CONSERVATION ELEMENT

Data, Inventory & Analysis

2030 Planning Horizon

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

The purpose of the conservation element is to provide a guide for the conservation, use, and protection of the natural resources located within the County. The element provides a means to protect the beneficial qualities of the natural environment and thereby enhance the public health, safety, welfare and quality of life of its citizens.

The element includes inventories of the quality and quantity of Lake County's natural resource base, and will provide a basis for decision making by County officials as an integral part of the Comprehensive Plan. The element has been developed within the context of the legislative mandate provided by the State.

Lake County has experienced population growth through in-migration caused by the expansion of the Orlando Metropolitan Area. The purpose of the Conservation Element is to seek a balance between accommodating the growth of man-made urban systems and maintaining and improving the rural and natural systems that have traditionally characterized Lake County.

GENERAL LOCATION AND PHYSIOGRAPHY

Lake County lies within the St Johns River Basin region of Central Florida. A portion of the southern and western parts of the County contain the headwaters of the Withlacoochee River, while the extreme southeastern portion of the County contains the headwaters of the Kissimmee River. The Ocklawaha and Palatlakaha Rivers drain the majority of the County. The middle of the County is precisely half way between the cities of Ocala and Orlando to the north and south, and Daytona Beach and Tampa to the east and west.

Lake County is comprised of 1,156 square mile areas which consist of ridges, uplands, and valleys. The County is divided into eight major geohydrologic provinces: St. Johns River Valley, Marion Upland, Mount Dora Ridge, Ocklawaha Chain of Lakes, Sumter Upland, Lake Wales Ridge, Palatlakaha Upland, and Green Swamp. Land surface altitudes range from near sea level in the St. Johns River Valley to 312 feet above sea level in the Lake Wales Ridge.

There are four river chains of large lakes in Lake County. The County also possesses a tremendous number of small solitary lakes, significant wetlands acreage in the Blackwater Creek and Green Swamp, and substantial sandhill and scrub natural communities located within the Ocala National Forest.

AIR INVENTORY AND ANALYSIS

INTRODUCTION

The Florida Department of Environmental Protection (FDEP) and the United States Environmental Protection Agency (USEPA) monitor air quality data in Lake County. Lake County does not have an established program dedicated to monitoring air quality. The data contained in this report is limited to the sampling events, parameters, and reporting limitations associated with those respective agencies.

The air quality monitoring program of the State of Florida provides measures of pollutant concentration levels in ambient air, the portion of the atmosphere near ground level. The Environmental Protection Agency and the State of Florida establish primary standards and legal

limitations of pollution concentration levels for ambient air. Amendments to the Clean Air Act have changed the measurement criteria since the 1991 Comprehensive Plan; historic data is no longer comparable and has not been included. Chapter 62-204 of the Florida Administrative Code outlines rules and regulations concerning air pollution.

A geographic area that meets or exceeds the primary standard is called an attainment area. Lake County has attainment status for clean air. This is documented in a letter dated July 15, 2003 from Secretary David B. Struhs of the Florida Department of Environmental Protection. The following information describes the fundamental information for understanding air quality and Lake County's current air quality status.

NON POINT SOURCE AIR POLLUTANT

Attributes and Sources

There are six major air pollutants that can cause health problems if they are at high concentrations in the ambient air. The pollutants are Carbon Monoxide(CO), Nitrogen Oxides (NOx), Ozone (O3), Lead (Pb), Sulfur Dioxide (SO2) and Particulate Matter (PM-2.5 and PM-10). These pollutants are referred to as "criteria pollutants" and a National Ambient Air Quality Standard (NAAQS) has been established for each based on health related criteria and data.

- **Carbon monoxide, or CO**, is a colorless, odorless gas that is formed when carbon in fuel is not burned completely. Higher levels of CO generally occur in areas with heavy traffic congestion. In cities, 85 to 95 percent of all CO emissions may come from motor vehicle exhaust. High levels of CO in the air are poisonous to healthy people. The level of CO can be of major concern to people with heart disease and affects the central nervous system. (USEPA)
- **Nitrogen oxides, or NOx**, are the generic term for a group of highly reactive gases, which contain nitrogen and oxygen in varying amounts. Many nitrogen oxides are colorless and odorless. Nitrogen oxides form when fuel is burned at high temperatures, as in a combustion process. The primary sources of NOx are motor vehicles, electric utilities, and other industrial, commercial, and residential sources that burn fuels. Nitrogen oxides contribute to the formation of acid rain and contribute to nutrient overload that deteriorates water quality. (USEPA)
- **Ozone (O_3)** is a gas composed of three oxygen atoms. This compound is formed by the combination of nitrogen oxides, volatile organic compounds, heat, and sunlight. As a result, it is known as a summertime air pollutant. Ozone has the same chemical structure whether it occurs miles above the earth or at ground level and can be "good" or "bad," depending on its location in the atmosphere. "Good" ozone occurs naturally in the stratosphere approximately 10 to 30 miles above the earth's surface and forms a layer that protects life on earth from the sun's harmful rays. In the earth's lower atmosphere, ground-level ozone is considered "bad." The primary cause of concern is that it can trigger a variety of health problems at low levels and may cause permanent lung damage after long-term exposure. Elevated ozone levels are detrimental to plants and the ecosystem. (USEPA) Many urban areas tend to have high levels of "bad" ozone, but even rural areas are also subject to increased ozone levels because the wind can carry ozone and pollutants that form it hundreds of miles away from their original sources. Elevated ozone levels are detrimental to plants and the ecosystem. (USEPA)

- **Lead (Pb),** a metal which is found naturally in the environment as well as in manufactured products. The major sources of lead emissions have been historically from motor vehicles (such as cars and trucks) and industrial sources. Due to the phase out of leaded gasoline, metals processing is the major source of lead emissions to the air today. The highest levels of lead in air are generally found near lead smelters. Other stationary sources are waste incinerators, utilities, and lead-acid battery manufacturers. Since the 1980's, USEPA and it's federal partners have phased out lead in gasoline, reduced lead in drinking water and industrial air pollution, and banned or limited lead used in consumer products, including residential paint.
- **Particulate matter, or PM-2.5 and PM -10,** the term for particles found in the air, including dust, dirt, soot, smoke, and liquid droplets. Particles can be suspended in the air for long periods of time. Some particles are large or dark enough to be seen as soot or smoke. Others are so small that individually they can only be detected with an electron microscope. The particles come from a variety of sources such as cars, trucks, buses, factories, construction sites, tilled fields, unpaved roads, stone crushing, and burning of wood. Particulate matter is associated with serious health effects and is a major source of haze that reduces visibility. (USEPA) Particulate matter is categorized by the following sizes:
  - *Particulate matter 2.5, or PM 2.5,* is the measurement of particulate matter smaller than 2.5 micrometers in size. By comparison, the thickness of a human hair is approximately 90 micrometers.
  - *Particulate matter 10, or PM 10,* is the measurement of particulate matter smaller than 10 micrometers in size.

Total Suspended Particulate (TSP) was broken into two classifications PM 10 and PM 2.5. The air quality of Lake County will be analyzed based on national ambient air quality standards. Those standards and Lake County's measurable standards are listed in the table below.

Only two criteria pollutants are actively monitored in Lake County, Ozone and PM10. According to the USEPA Air Data, there were 282 "good" days, 21 "moderate" days, and 1 "unhealthy for sensitive groups" day in 2003. The "unhealthy for sensitive groups" day was attributed to Ozone. The year-to-date three-year running average of Ozone is .077.

Table 1 - US EPA 2004 National Ambient Air Quality Standards

POLLUTANT	PRIMARY STDS.	AVERAGING TIMES	SECONDARY STDS.	LAKE COUNTY
Carbon Monoxide	9 ppm (10 mg/m^3)	8-hour[1]	None	NA
	35 ppm (40 mg/m^3)	1-hour[1]	None	NA
Lead	1.5 µg/m^3	Quarterly Average	Same as Primary	NA
Nitrogen Dioxide	0.053 ppm (100 µg/m^3)	Annual (Arithmetic Mean)	Same as Primary	NA
Particulate Matter (PM_{10})	50 µg/m^3	Annual[2] (Arith. Mean)	Same as Primary	18µg/m^3
	150 ug/m^3	24-hour[1]		38 ug/m^3
Particulate Matter ($PM_{2.5}$)	15 µg/m^3	Annual[3] (Arith. Mean)	Same as Primary	NA

	65 ug/m3	24-hour[4]		NA
Ozone	0.08 ppm	8-hour[5]	Same as Primary	0.079 ppm
	0.12 ppm	1-hour[6]	Same as Primary	0.090 ppm
Sulfur Oxides	0.03 ppm	Annual (Arith. Mean)	-------	NA
	0.14 ppm	24-hour[1]	-------	NA
	-------	3-hour[1]	0.5 ppm (1300 ug/m3)	NA

1 Not to be exceeded more than once per year.
2 To attain this standard, the expected annual arithmetic mean PM_{10} concentration at each monitor within an area must not exceed 50 ug/m3.
3 To attain this standard, the 3-year average of the annual arithmetic mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15 ug/m3.
4 To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 65 ug/m3.
5 To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.
6 (a) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is <= 1, as determined by appendix H. (b) The 1-hour standard is applicable to all areas notwithstanding the promulgation of 8-hour ozone standards under Sec. 50.10. On June 2, 2003, (68 FR 32802) EPA proposed several options for when the 1-hour standard would no longer apply to an area.

POINT SOURCE AIR POLLUTION

The map below shows the permitted point source air polluters (2003) and the locations of the PM10 and Ozone monitors. The number of point source air polluters that report to the USEPA declined from 38 to 17 facilities since the 1991 Comprehensive Plan. Listed below, in the table, are the 17 facilities arranged by industry. These facilities are monitored by the FDEP.

Figure 1 – Facility/Monitor Locator Map

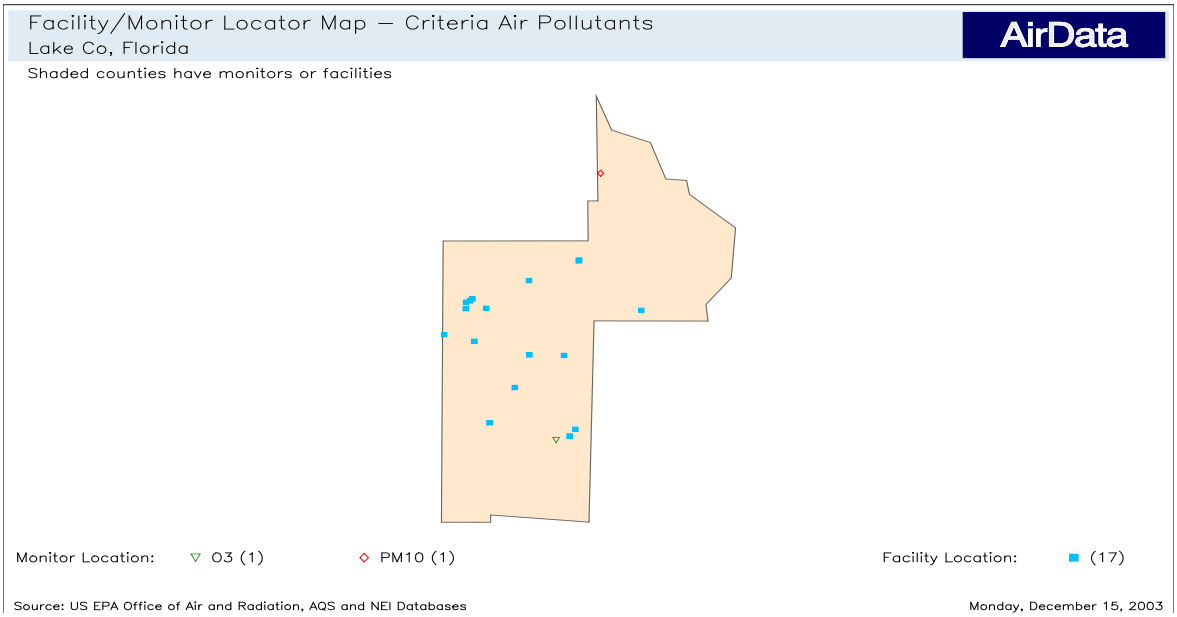


Table 2 - Summary of Permitted Point Source Air Polluters 2004

FACILITY TYPE	NUMBER	PERCENT
Citrus Processing	2	13.3%
Concrete Plants	1	6.6%
Soil Cement Plants	0	0%
Asphalt Plants	4	26.6%
Pathological Incinerators	1	6.6%
Other industries	7	46.6%
Total	15	100%

Emissions data are available for each permitted facility in the Air Quality Index Summary (AQI) Report from the USEPA. The AQI report identifies each facility's owner, location, types of emissions, and their estimated and allowable amounts. The report also identifies any emissions tests that have been performed at these facilities.

WATER INVENTORY AND ANALYSIS

GROUNDWATER AND WELLHEAD PROTECTION

The federal Safe Drinking Water Act (SDWA), as amended in 1986, established a new program for the States to delineate and manage Wellhead Protection Areas (WHPAs) for the protection of public ground water supplies. The Wellhead Protection (WHP) Program is the first resource based approach at the federal level for ensuring that ground water supplies are protected from a wide range of potential contaminating sources. The U.S. Environmental Protection Agency is the principal federal agency for implementing the Wellhead Protection Program with the states.

Wellhead protection areas are the surface and subsurface area surrounding a water well or well field supplying a public water system, through which contaminants are reasonably likely to move toward and reach the water well or well field. Factors to consider in developing wellhead protection include: delineating protection areas around well fields, assessing the locations and threats to the well(s), developing management approaches and educational outreach programs, and regulatory or non-regulatory tools to reduce contamination threats.

Wellhead Protection in Florida

Over 90% of Florida's population depends on ground water as the source of drinking water for public and private wells. Much of this resource is especially vulnerable to contamination because of the karst (an irregular limestone region with sinks, underground streams, and caverns.) geology in many parts of the state, a high water table, rapid land use changes, and a growing population. The Florida Department of Environmental Protection has several ground water protection programs which bolster a separate wellhead protection rule. The collective implementation of these programs, with the addition of technical assistance to the local governments, frames the statewide Wellhead Protection Program. This approach to managing public ground water supplies focuses on preventing contamination from entering the water source of supply wells.

The Department of Environmental Protection implements the wellhead rule to provide the most stringent protection to the ground water in close proximity to potable water wells. To heighten attention to the significance of human health issues and threats adjacent to wellhead areas, the Florida Wellhead Protection Program recommends local governments identify potential sources of contamination outside a 500 foot setback from the well. To assist the local governments in this endeavor, the Department provides technical assistance in identifying the five or ten year ground water hydraulic time of travel around the wells. The dimension of the outer zone will be subject to local hydrogeologic conditions and local policies.

GROUNDWATER RESOURCE CONSUMPTION

Meeting long term water supply needs, while protecting water resources, is an important issue for local governments and water supply utilities in the St. Johns River Water Management District. Defining the roles of the various entities involved in the process requires careful consideration.

The District Governing Board is in the process of defining its role in water resource and water supply development, and particularly its role in funding water resource development and water supply development projects.

In order to evaluate the projected impact of the cost of alternative water upon the cost of delivered potable water, the District contracted with Burton & Associates to conduct an analysis of cost impacts for a typical, moderately sized water supply utility. The results of the analysis should be representative of the impact of the cost of alternative water facilities upon the cost of delivered water.

Ground water from the Floridan aquifer is the primary source of water for potable, agricultural and industrial use in Lake County. In 2000, the top five municipalities with the highest rate of water consumption were, in descending order, Leesburg, Mount Dora, Eustis, Tavares, and Clermont. According to 2025 projections, water consumption for Clermont, Eustis, Fruitland Park, Groveland, Mascotte, Minneola, Montverde, and Tavares will more than double. County wide, projected total potable water consumption will increase from 29.53 MGD to 77.68 MGD, an increase of about 163 percent. Lake County and St. Johns River Water Management District 2025 population projections vary.

Lake County Division of Water -Quality Services samples approximately 45 sites primarily along the Palatlakaha and Ocklawaha chains. A report was issued in 1995 on the results of this sampling and an update is in progress. Lake County also works with the St. Johns River Water Management District, the Florida Department of Environmental Protection, Lake Watch and other concerned groups in monitoring and sampling various sites within Lake County.

The mission of the Lake County Division of Water -Quality Services is to manage, protect, conserve, and restore water resources of Lake County. Water –Quality Services monitors all ground and surface water within Lake County. The Division works closely with the St. Johns River Water Management District for surface and ground water monitoring, and with the Florida Department of Environmental Protection.

The Division also provides hydrological and geological support to the various divisions within Growth Management. Water –Quality Services checks all permitted discharges to surface waters. In addition, the Storage Tank program seeks to protect the waters and soils through appropriate inspections and compliance actions.

Water –Quality Services Division Programs:

- Underground and Storage Tanks
- Surface Water Monitoring Program
- Water Quality Laboratory
- Mining Program
- Industrial Waste Program
- Ground Water Monitoring Program
- Golf Course Management Program

Lake County partnered with the Lake County Water Authority and The St. Johns River Water Management District to develop a Water Resource Atlas, a "One-Stop" site for all of Lake County's water resource related data. With the aid of a grant from the (former) Department of Commerce, Lake County contracted with the University of South Florida's Center for Design and Research (CDR) to develop the site, which provides citizens and environmental professionals with current and historical water data and information. The Atlas is a dynamic resource with constant updates to water quality information and is available to and used by the general public and other interested parties.

Atlas Details:

- The atlas is a web-based application allowing for the browsing of spatial data such as aerial photographs, location of water resources, watershed or basin boundaries, recreation sites, boat ramps and other important GIS datasets and local water resource information.
- Provides a mapping interface allowing users to view multiple themes such as hydrography, ecology, wetlands, political boundaries, watershed boundaries and aerial photography.
- Water resource data pages are summarized by topic and displays key indices and parameters to determine the current conditions of a watershed, lake or river.
- Built-in computing tools allow users to determine current water quality of any given water body in the database.
- Built-in graphing tools provide graphs of all data in the database.
- Numerous query components allow users to discern meaning from the data presentations.
- Advanced data access tools allow users to query, graph, and download sampling location specific data.
- A document catalog system displays web links and Adobe Acrobat documents related to water resource issues.
- Information and functionality related to Total Maximum Daily Loads program, National Pollutant Discharge Elimination System, stormwater management, and other regulatory programs are integrated into the atlas.

Table 3 - Lake County Municipal Potable Water Use Projections

Utility Provider	1995 Average Daily Usage (MGD)	2000 Average Daily Usage (MGD)	2025 Projection (MGD)	Percent Change 1995 - 2025
Astor - Astor Park Water Association	0.27	0.31	0.44	63
Clermont, City of	1.63	2.00	9.62	490
Eustis, City of	2.33	2.95	5.01	115
Fruitland Park, City of	0.59	0.77	2.15	497
Groveland, City of	0.44	0.80	2.95	570
Howey In The Hills, Town of	0.21	0.33	0.35	67
Lady Lake Central	0.26	0.38	0.49	88
Leesburg, City of	4.87	6.82	7.74	59
Mascotte, Town of	0.25	0.32	1.32	428
Minneola, City of	0.39	0.60	3.63	831
Montverde, Town of	0.15	0.26	0.33	120
Mount Dora, City of	2.72	3.94	5.05	86
Tavares, City of	1.49	2.74	5.21	250
Umatilla, City of	0.44	0.47	0.59	34
Municipality Subtotal	16.04	22.69	44.88	169
Total County*	29.53	44.82	77.68	163

Source: Technical Publication SJ2006-1, Water Supply Assessment 2003, St. Johns River Water Management District, Palatka, Florida, 2006

* Total County includes domestic self-supply and other small public supply uses.

Potable Water Demand

Table 3 shows the demand for potable water for the years 1995, 2000, and 2025. The 2025 projection is based on an average rainfall year. Drought years will use rates about five to ten percent higher. Potable water use was estimated as the product of the projected County population plus seasonal demand and average per capita daily demand coefficients. Based on the estimates of the consulting firm Post, Buckley, Shuh and Jernigan, per capita consumption was expected to decline through the year 2005. The 1986 SJRWMD per capita value of 189 gallons per day was proportionately reduced over 5 year increments to 150 gallons per day by 2005 as the County changes from an agricultural setting to an urban/suburban setting. Total average annual potable water demand is projected to reach 28.4 billion gallons by the year 2025 reflecting a consumption rate of nearly 78 million gallons per day.

Agricultural Water Demand

According to the St. Johns River Water Management District, irrigation accounts for 98.8% of water withdrawn for agricultural purposes. Total daily agricultural water use estimates for 2025 in an average rainfall year anticipate 21.05 MGD from ground water and 3.04 MGD from surface water for a total of 24.09 MGD for agriculture use.

Improved pasture accounts for 91.5% of all non-irrigated farmlands. Citrus grove irrigation, on a 2025 estimate of 10,000 acres, accounts for 8.10 MGD, reflecting an expected 41% decrease in grove acreage from 1995.

Table 4 - Estimated 2025 Agricultural Water Use

CROP	1995 WATER USE(MGD)			2025 WATER USE(MGD) AVERAGE RAINFALL YEAR				2025 WATER USE(MGD) 1-IN-10 RAINFALL YEAR			ACRES		
	GROUND	SURFACE	TOTAL	GROUND	SURFACE	TOTAL	PERCENT CHANGE	GROUND	SURFACE	TOTAL	1995	2025	PERCENT CHANGE
Citrus	33.91	5.07	38.98	6.89	1.21	8.10	-79%	8.61	1.51	10.12	16,842	10,000	-41%
Fern	1.31	0.15	1.46	1.67	0.19	1.86	27%	2.15	0.24	2.39	550	700	27%
Field Crops	0.25	0.25	.50	0.23	0.23	0.46	-8%	0.28	0.28	0.56	650	585	-10%
Other Fruits and Nuts	0.33	0.01	0.34	0.69	0.02	0.71	109%	0.81	0.02	0.83	552	1,156	109%
Pasture	2.06	0.10	2.16	1.68	0.08	1.76	-19%	1.78	0.08	1.86	1,886	1,535	-19%
Greenhouse/ Nursery	4.85	0.23	5.08	9.23	0.44	9.67	90%	9.94	0.47	10.41	1,050	2,000	90%
Sod	0.08	0.49	0.57	0.09	0.55	0.64	12%	0.09	0.56	0.65	250	279	12%
Turf grass	0.11	0.02	0.13	0.19	0.04	0.23	77%	0.20	0.04	0.24	120	202	68%
Vegetables, Melons, Berries	1.01	0.74	1.75	0.38	0.28	0.66	-62%	0.47	0.34	0.81	2,670	995	-63%
Total	43.91	7.06	50.97	21.05	3.04	24.09	-53%	24.33	3.54	27.87	24,570	17,452	-29%

Source: Technical Publication SJ2006-1, Water Supply Assessment 2003, St. Johns River Water Management District, Palatka, Florida, 2006

Disclaimer: Please note that the decision to use 1995 as the base year by SJRWMD was based on the availability of suitable regional groundwater flow models calibrated to 1995 conditions.

Industrial Water Demand

Water use for the County's four major food processors has held fairly constant. Water use for mining operations is projected to increase in the short term (7% rate) given the proposed local highway projects expected to be built over the next ten years. As manufacturing employment projections for Lake County are unavailable, projections will be based upon a ratio of 38 industrial employees per 1,000 persons. Total average daily industrial and commercial demand is projected to reach 17.06 MGD by the year 2025.

There are ten large industrial users located within Lake County as well as several campgrounds and commercial/industrial small users. Food processing accounted for about 30 percent of industrial water use in 2000 and it is expected to remain about the same. The largest industrial user is a mine, Tarmac America, at 5.39 MGD in 2000. This is expected to increase to around 8.28 MGD in 2025. The food processors use 29% of the groundwater while the mines use about 56%, with the remaining 15% used by the smaller users. Most of this is ground water. Industrial surface water use is projected to be less than one million gallons per day by 2025.

Summary of Projected Groundwater Demand

The County will probably continue to rely almost exclusively on the Floridian aquifer for future water needs. If not used wisely, the projected demand may exceed the Aquifer's capacity. The potential for drawdown of the Floridian aquifer will increase in the next fifteen years.

Table 5 - Estimated 2025 Total Water Use from All Sources

Use Category	1995			2000			2025			Percent Change 2000-2025
	Ground	Surface	Total	Ground	Surface	Total	Ground	Surface	Total	
Public Supply	23.51	0	23.51	37.76	0	37.76	63.18	0	63.18	168.7%
Domestic Self Supply	6.02	0	6.02	7.06	0	7.06	14.5	0	14.5	140.9%
Agriculture	43.91	7.06	50.97	28.85	5.16	34.01	21.05	3.04	24.09	-52.1%
Recreation	9.27	7.59	16.86	5.36	3.87	9.23	15.58	12.74	28.32	68.1%
Com/Ind/Inst	10.23	1.14	11.37	10.44	0.6	11.04	16.14	0.92	17.06	57.8%
TOTAL	92.94	15.79	108.73	89.47	9.63	99.1	130.45	16.7	147.15	40.4%

Source: Technical Publication SJ2006-1, Water Supply Assessment 2003, St. Johns River Water Management District, Palatka, Florida, 2006.
NOTE: All quantities in million gallons per day (MGD).

SURFACE WATER

Point Source Discharges

Point sources generally have a human-made discharge point such as a pipe or channel. These are discharged into water bodies at discrete points. A point source permitting program has been implemented for domestic and industrial wastewater facilities that discharge either to surface or ground water. The Department of Environmental Protection maintains a listing of these permitted point source pollution discharges to surface waters located within Lake County. This list, when combined with the inventory of marinas, use of chemical sprays, traffic activity, acid rain, and other storm water runoff issues, gives a fairly complete inventory of all surface water pollution sources in the County.

Nonpoint Source Discharges

Land use coverage is a significant indicator of nonpoint source pollution. Nonpoint source pollution is difficult to monitor because of the diffuse and intermittent nature of discharges. The fact that most nonpoint source pollution occurs during the "first flush" of rainfall following a storm event adds to the difficulty of nonpoint source monitoring.

Though an exact definition of nonpoint source pollution is difficult, it is generally associated with runoff water from the surface which carries with it sediment, organic material, nutrients, and toxins into receiving waters. Under some circumstances ground water can become contaminated by water percolating down through the soil or through karst formations. The nonpoint source discharges in Lake County are from agricultural and urban land uses.

The Department of Environmental Protection, Florida's water management districts, Department of Agriculture and Consumer Services, Department of Health, local governments, and the public implement the State of Florida's Nonpoint Source Management Program. Their goal is to mitigate nonpoint source pollution from new land use activities and to reduce pollution from existing activities. The Nonpoint Source Management Section administers the following programs:

- State Stormwater Management Program Coordination

- State Nonpoint Source Management Program
- Clean Lakes Program

The conversion of many of Lake County's muck farms into restoration areas has helped to lower phosphorous levels, but nutrient-heavy farmland still contributes to the degradation of lakes. Systematic gizzard shad removal also has increased the reduction of algae (see Fisheries section for further data). The restoration process will continue to make progress and continue to decrease phosphorous run off.

Total Maximum Daily Loads (TMDLs)

A Total Maximum Daily Load (TMDL) is the maximum amount of a given pollutant that a water body can absorb and still maintain its designated uses (e.g., drinking, fishing, swimming, shellfish harvesting). Under Section 303(d) of the federal Clean Water Act and the Florida Watershed Restoration Act, TMDLs must be developed for all waters that are not meeting their designated uses and, consequently, are defined as "impaired waters."

Through the TMDL program, the following goals are expected to be accomplished: (1) Cleaner water through more collaborative restoration efforts with increased public involvement; (2) Better use of Science to understand the human activities affecting water resources in specific locations and cumulatively throughout our watersheds; (3) Better Protection for water bodies, as people give more attention to preventing and reducing human impacts on water resources; and (4) TMDLs will be developed, allocated, and implemented through a watershed-based management approach (managing water resources within their natural hydrological boundaries) that addresses the state's 52 major hydrologic basins which are organized into five groups.

Lake County currently does not use TMDL's in the regulatory or land use process. The County is using TMDL's to justify the priority of our basin studies for stormwater management. Regulatory changes are being looked at for the future.

Basin Management Action Plan (BMAP)

The Basin Management Action Plan (BMAP) serves as the total maximum daily loads implementation plan. The sole purpose of this plan is for equitable reduction of pollutant loadings to meet the TMDLs established for an impaired water body. The minimum elements of a BMAP, one of which is established for the Upper Ocklawaha River Basin, are as follows: (1) Description of the impaired water/identification of pollutants of concern; (2) Identification of stakeholders; (3) listing of applicable TMDL and allocations for each pollutant of concern; (4) Description of loading sources and estimate of loading contributions; (5) Listing of structural and nonstructural management actions and where applicable; (6) Their estimated load reductions; (7) Implementation roles and responsibilities; (8) Timetables and funding for implementation of management actions, monitoring, evaluation, and reporting strategy; and (9) Adaptive management measures.

As for the BMAP process, Lake County is the first BMAP to be developed in the state. The BMAP has not been adopted by the BCC yet. The anticipated benefit is improved water quality in the Upper Ocklawaha Basin through retrofit projects, improved regulations, and public education by the County, the Water Authority, and surrounding municipalities.

LAKES

The origin of most lakes in the County is sinkhole related subsidence in the covered karst terrain. The number and type of lakes vary with the geohydrologic area. In the Green Swamp and St.

Johns River Valley, depressions are shallow, leading to the creation of swamps rather than lakes. The Palatlakaha Upland contains small shallow lakes that are landlocked at medium and low water stages, and they have good hydraulic connection with the Floridian aquifer. The Lake Wales Ridge has deep sink-lakes that are, for the most part, entirely landlocked and have good hydraulic connection with the Floridian aquifer. Landlocked lakes also predominate in the Sumter Upland and Mt. Dora Ridge, but they are generally deeper due to greater relief. The Marion Upland area has a variety of small, shallow lake types.

Lake levels fluctuate naturally in response to variations in rainfall, evaporation, and surface and ground water inflow and outflow. Differences in the magnitude of lake level fluctuations relate primarily to variability in the subsurface thickness and permeability of the watershed. This determines the extent to which rainfall runs off the land surface or percolates down to the water table. It also determines the extent to which water from the surficial aquifer moves down to the Floridan aquifer. Lakes in recharge areas generally fluctuate more widely than lakes in discharge areas. Lake County has 46 lakes whose surface areas are over 200 acres.

Lake County has fifteen lakes over a thousand acres in size located entirely within the County's boundaries. In addition, the County shares Lake Apopka with Orange County and Lakes Dexter and George with Volusia County. The County contains an estimated 129,900 acres of open water lakes, some of which are quite shallow such as Emeralda Marsh and Mill Stream Swamp. Many of the shallower and smaller lakes will dry or nearly up during the dry season which typically begins in October and lasts through the middle or end of May. Conversely, the wet season usually begins late in May and runs through the end of September, although late season hurricanes in October and even November can bring in large amounts of rainfall.

Table 6 – Lake County Lakes 1,000 Acres and Greater

NAME OF LAKE	SIZE	NAME OF LAKE	SIZE
Mill Stream Swamp	1,100	Little Lake Harris	3,359
Lake Norris	1,104	Lake Yale	4,013
Lake Beauclair	1,140	Lake Dora	4,382
Lake Dorr	1,705	Lake Eustis	7,802
Lake Minneola	1,883	Lake Griffin	9,327
John's Lake	2,183	Lake Harris	15,087
Lake Minnehaha	2,298	Lake Dexter	16,511
Lake Louisa	3,161	Lake Apopka	30,173
Emeralda Marsh	3,322	Lake George	43,761

SOURCE: Lake County GIS, File: WA_LAKES_05

All lakes naturally age in a process known as eutrophication. The timeframe for this process may be hundreds or thousands of years. However, increasing the rate at which nutrients and organic

matter enter aquatic ecosystems typically accelerates this process. The citrus industry has lead to the acceleration of eutrophication.

Surface Water Quality

Lake County maintains the Lake County Water Resources Atlas, available on the Internet at http://wateratlas.co.lake.fl.us/, in which water quality data is given for the county's watersheds, lakes, and rivers. Water quality is measured by the Trophic State Index (TSI). The Florida Trophic State Index (TSI) is a measure of water quality that uses algae and nutrient content to categorize lakes into four categories (see table listed below).

Table 7 - Trophic State Index

Oligotrophic	**0 - 49**	Clear waters with little organic matter or sediment and minimum biological activity
Mesotrophic	**50 - 60**	Waters with more nutrients, and therefore, more biological activity
Eutrophic	**61 - 69**	Waters extremely rich in nutrients, with high biological productivity. Some species may be choked out.
Hypereutrophic	**70 - 100**	Murky, highly productive waters, closest to the wetland status. Many clear water species cannot survive.

Source: EPA Lake County Water Resource Management Division ranked lakes in the county using the TSI in 2002 and 2003.

Table 8 - Trophic State Indices 2002/03 – 2008 for Lake County Lakes.

RANK	LAKE	2003 TSI	2004 TSI	2005 TSI	2006 TSI	2007 TSI	2008 TSI	Avg. TSI	TSI Description
1	Clear Lake (Eustis)					17		17	Oligotrophic
1	North Twin Lake					18	16	17	Oligotrophic
2	Lake Melton	23						23	Oligotrophic
2	Lake Sellers	15	33		26		19	23	Oligotrophic
3	Lake Cooley	28		21		27		25	Oligotrophic
4	Lake Dalhousie	35	27	24		36	16	28	Oligotrophic
4	South Boat Lake					28		28	Oligotrophic
5	Lake Owen					29		29	Oligotrophic
6	Lake Junietta					28	**31**	30	Oligotrophic
6	Lake Gibson	28		21		41	29	30	Oligotrophic
7	South Twin Lake	34		24			34	31	Oligotrophic
7	Lake Blanchester	31				42	19	31	Oligotrophic
7	Lake Idamere	38		37	**23**	**33**	**25**	31	Oligotrophic
8	Lake Pearl	32		27		44	25	32	Oligotrophic
8	Palatlakaha River @ Haw.						**32**	32	Oligotrophic
8	Lake Schimmerhorn	28	32		27		42	32	Oligotrophic
8	Lake Dorr	40	39	35			15	32	Oligotrophic
9	Island Lake	33		24	38	38		33	Oligotrophic

RANK	LAKE	2003 TSI	2004 TSI	2005 TSI	2006 TSI	2007 TSI	2008 TSI	Avg. TSI	TSI Description
9	Lake Swatara	47		31	23	32		33	Oligotrophic
9	Lake Joanna	36	**39**	**31**	**29**	**32**	**33**	33	Oligotrophic
9	Lake Woodward	46	34	40	**24**	30	26	33	Oligotrophic
10	Lake Moon	30				37		34	Oligotrophic
10	Lake Grasshopper South	42	37				22	34	Oligotrophic
10	Lake Lucy	43	**24**	36	32			34	Oligotrophic
10	Sawgrass Lake	40	34	24	38			34	Oligotrophic
11	Trout Lake (Clermont)	41	43		42	14		35	Oligotrophic
12	Lake Myrtle					37	34	36	Oligotrophic
12	Lake Gertrude	40		40	**32**	**32**	**34**	36	Oligotrophic
12	Plum Lake	32		32	43			36	Oligotrophic
12	Lake Nellie	43			37		27	36	Oligotrophic
13	Jacks Lake			34	39			37	Oligotrophic
13	Lake Holly	44		31		**37**		37	Oligotrophic
13	Lake Wilson	46	**34**	**17**	37	53		37	Oligotrophic
14	Big Creek	43	**40**	**32**	**39**	**40**	**31**	38	Oligotrophic
15	Wildcat Lake	36	49		28			38	Oligotrophic
15	Lake Hammond	66	62		12	31	18	38	Oligotrophic
15	Bear Lake (Paisley)	38						38	Oligotrophic
16	East Crooked Lake	31	**48**	34	**66**	**20**	**32**	39	Oligotrophic
16	Lake Eldorado	34	31	57		49	24	39	Oligotrophic
17	Church Lake				39	40		40	Oligotrophic
17	East Lake (Umatilla)	48				31		40	Oligotrophic
17	Lake Saunders	43		**39**	**34**	**47**	**35**	40	Oligotrophic
17	Pine Island Lake	44	51		17	47		40	Oligotrophic
17	Lake Etowah				40			40	Oligotrophic
17	Lake Nettie				40			40	Oligotrophic
17	Loch Leven	43		40	**39**	39		40	Oligotrophic
18	West Crooked Lake	28			53			41	Oligotrophic
18	Lady Lake	45	48		30		39	41	Oligotrophic
18	Lake Gary	50			31			41	Oligotrophic
18	Cresent Lake	53	35		39	35		41	Oligotrophic
18	Lake Beakman	36	50				36	41	Oligotrophic
19	Blue Lake					42		42	Oligotrophic
19	Lake Dixie	36	58		46	37	33	42	Oligotrophic
19	Lake Emma	44	**48**	**50**	**39**	**30**		42	Oligotrophic

RANK	LAKE	2003 TSI	2004 TSI	2005 TSI	2006 TSI	2007 TSI	2008 TSI	Avg. TSI	TSI Description
20	Fish Lake				25	60		43	Oligotrophic
20	Grassy Lake			44	41			43	Oligotrophic
20	Lake Minnehaha	44	**43**	**37**	**48**	**44**	**40**	43	Oligotrophic
20	Lake Umatilla	49	39	34		45	47	43	Oligotrophic
20	Lake Akron	43		43				43	Oligotrophic
20	Palatlakaha River @ SR50	45	**51**	**42**	**39**	**47**	**35**	43	Oligotrophic
21	Lake Bracy	53		39		42		45	Oligotrophic
21	Lake Hancock	53	53		32	46	40	45	Oligotrophic
21	Turkey Lake					45		45	Oligotrophic
21	Lake Ella	45		45				45	Oligotrophic
21	North Grasshopper Lake						45	45	Oligotrophic
21	Erie Lake			41	47	48		45	Oligotrophic
22	Cherry Lake	44	**50**	**52**	**43**	**40**		46	Oligotrophic
22	Lake Irma (Eustis)	46						46	Oligotrophic
22	Lake Minneola	51	**50**	**50**	**46**	**42**	**37**	46	Oligotrophic
23	Lake Seneca	56		57	31	42		47	Oligotrophic
23	Sawmill Lake	52				41		47	Oligotrophic
23	Lake Sumner	47						47	Oligotrophic
23	Palatlakaha River @ CR48	45	**50**	**46**	**47**		**47**	47	Oligotrophic
23	Lake Kirkland	48	53	53	47	35		47	Oligotrophic
23	Lake Arthur	38			72	32		47	Oligotrophic
23	Johns Lake	53		**45**	**33**	**53**	**53**	47	Oligotrophic
24	Lake Dexter	39	56					48	Oligotrophic
24	Lake Norris	47			48			48	Oligotrophic
24	Lake Louisa	48	**58**	**55**	**39**	**43**	**42**	48	Oligotrophic
24	Lake Hiawatha	43	**54**	**51**	**46**	**48**	**44**	48	Oligotrophic
24	Silver Lake	50	**54**	**46**	**44**	**45**		48	Oligotrophic
24	Lake St. Clair					48		48	Oligotrophic
24	Lake Mack	47	49					48	Oligotrophic
25	Lake Florence	58	65		28			50	Mesotrophic
26	Little Creek	48	**43**	**40**	**61**	**59**	**53**	51	Mesotrophic
26	Lake of the Woods					51	51	51	Mesotrophic
27	Stagger Mud Lake	43	61					52	Mesotrophic
27	Indianhouse Lake	54			59	44		52	Mesotrophic
28	Lake Lulu (Paisley)	53						53	Mesotrophic

RANK	LAKE	2003 TSI	2004 TSI	2005 TSI	2006 TSI	2007 TSI	2008 TSI	Avg. TSI	TSI Description
28	Flat Lake				53			53	Mesotrophic
29	Lake Felter				54			54	Mesotrophic
29	Lake Francis	54						54	Mesotrophic
30	Lake Catherine (Groveland)	46	50		51	64	62	55	Mesotrophic
31	Sunset Pond	56						56	Mesotrophic
31	Lake Unity	60	59		49			56	Mesotrophic
32	Lake Hermosa					57		57	Mesotrophic
32	Lake Palatlakaha						**57**	57	Mesotrophic
33	Lake Glona	59	54	80	50	49		58	Mesotrophic
34	Lake Yale	64	**56**	**57**	**54**	**57**	**69**	60	Mesotrophic
35	Schoolhouse Lake					61		61	Eutrophic
36	Lake Harris	60	**63**	**57**	**63**	**67**	**67**	63	Eutrophic
37	Little Lake Harris		**60**	**53**	**68**	**65**	**72**	64	Eutrophic
37	Green Lake						64	64	Eutrophic
38	Lake Victoria						65	65	Eutrophic
38	Trout Lake (Eustis)	64		56	**74**	**73**	60	65	Eutrophic
39	Lake Carlton					71	62	67	Eutrophic
39	Haynes Creek		**68**	**65**	**66**	**65**	**71**	67	Eutrophic
39	Lake Eustis	67	**72**	**69**	**58**	**68**	**68**	67	Eutrophic
40	Dora Canal						**68**	68	Eutrophic
41	Lake Griffin	73	**70**	**65**	**61**	**75**	76	70	Hypereutrophic
42	Lake Enola					73		73	Hypereutrophic
43	Lake Dora	79	**74**	**73**	**70**	**75**	**80**	75	Hypereutrophic
44	Lake Beauclaire	75	**83**	**79**	**78**	**77**	**75**	78	Hypereutrophic
45	Lake Denham		79					79	Hypereutrophic

Numbers in bold lettering indicate that calculation was performed on multiple samples and/or sampling events. All other results were calculated on one sample/event.

High phosphorous levels, which make a water body conducive to algae growth, have been of primary concern. The Ocklawaha Basin, according to recent data, has seen remarkable improvement in many of its lakes, with phosphorous levels close to those established by the Department of Environmental Protection.

Lake Griffin has made the biggest improvement and may soon reach target levels (see Fisheries section for further data). The phosphorous concentration for Lake Apopka is 80 parts per billion, which is less than half of the 175 parts per billion averages from 1991 to 2000. Lake Beauclaire has also achieved a significant decrease, reporting less than half its 1991-2000 phosphorous levels. Still, at more than 75 parts per billion, there is still work to do to reach the target 32 parts per billion.

Lake Yale and several other lakes are still posting phosphorous levels higher than from 1991-2000. Lake Harris has also had increased phosphorous levels, but has seen a decrease in chlorophyll levels. A spike in phosphorous levels due to the deluge of storm water following hurricanes Charley, Francis, and Jeanne, is expected to show up in the monitoring results.

The Clermont Chain of Lakes

The Clermont Chain of Lakes - consisting of Lakes Louisa, Susan, Crescent, Minnehaha, Winona, Palatlakaha, Hiawatha, Minneola, Wilson, Cook, Cherry, Stewart, Lucy, and Emma, and the waterways that connect these lakes - were designated as Outstanding Florida Waters (OFW). The state of Florida defines an OFW as water designated worthy of special protection because of its natural attributes. The chain is connected by the Palatlakaha River and is a Zone of High Recharge for the Floridian Aquifer.

The designation as an OFW prohibits the issuing of permits which would allow the degradation of the water's quality. Any new pollutant discharge would be subject to requirements that must be met for direct and indirect discharges. New direct pollutant discharges must not lower existing ambient water quality. New indirect pollutant discharges (discharges to waters which influence OFW's but not placed directly into an OFW) must not significantly degrade nearby Outstanding Florida Waters.

Aquatic Plant Management

Lake County Mosquito and Aquatic Plant Management (LCMAPM) assume the responsibility of managing invasive aquatic plants within Lake County. Aquatic plant management activities are performed on approximately 78,700 acres of public waters. The St. John's River, including Lake George, is under the jurisdiction of the U.S. Army Corps of Engineers. However, management activities for minor invasive aquatic plants on the residential canals off the St. John's River located within Lake County, as well as Alexander Springs Run, are the responsibility of LCMAPM. Aquatic plant management on Lake Apopka and the Apopka-Beauclair Canal up to the water control structure are the responsibility of the St. John's River Water Management District.

Aquatic plant management activities performed by LCMAPM are separated into three programs. The Florida Fish and Wildlife Conservation commission' Cooperative Aquatic Plant Control Program (Chapter 68F-54, F.A.C.) provides state funding for the management of major exotic and invasive aquatic plants on water bodies that meet strict eligibility requirements. The Major Exotic and Invasive Aquatic Plant Management Program (Chapter 68F-20, F.A.C.) is funded at the County level for the management of major exotic and invasive aquatic plants on public water bodies that do not meet the requirements for inclusion in the Cooperative Program. The County also funds the Minor Exotic and Invasive Aquatic Plant Management Program and management activities are performed primarily on residential canals.

Cooperative Aquatic Plant Control Program

Water Hyacinth, Water Lettuce, Hydrilla, and other exotic and invasive aquatic plants that interfere with navigation or adversely impact the ecological diversity of natural aquatic flora are considered for management activities under the Cooperative Program. Only those water bodies that meet the eligibility requirements as defined in Chapter 68F-54, F.A.C. are included in this program. The cost of management activities performed on inter-county water bodies are reimbursed at 100% from the State while those on intra-county water bodies are reimbursed at 50%.

A severe drought during FY1999-2000 and FY2000-2001 significantly lowered water levels. Aquatic plant growth declined and the total treated acres were less than previous years. Increasing water levels during FY2001-2002, FY2002-2003, and FY2003-2004 stimulated aquatic plant growth and management activities intensified.

Table 9 - Cooperative Aquatic Plant Control Program: Total Acres Treated Costs for Inter-County Water Bodies

	FY2003-2004		FY2004-2005		FY2005-2006		FY2006-2007		FY2007-2008	
Water Body	Acres Treated	Cost	Acres Treated	Cost	Acres Treated	Cost	Acres Treated	Cost	Acres Treated	Cost
Alexander Spring Run	-	-	-	-	-	-	-	-	125	19338.42
Apopka-Beauclair Canal	32.00	3894.58	44.77	6278.21	58.32	13088.61	40.90	15422.34	42.26	7926.04
Bugg Springs Run	10.00	580.73	20.68	6771.59	23.25	4045.31	18.06	1811.41	12.19	1565.41
Cherry Lake	15.50	1807.07	0.50	207.61	2.00	358.39	0.50	780.50	0.00	316.82
Cook Lake	3.13	357.27	0.50	50.11	1.00	171.65	0.75	302.66	0.00	129.42
Crescent Lake	0.00	24.86	2.75	429.58	0.50	176.37	0.60	588.15	0.45	746.93
Dead River	9.52	3024.92	23.21	9077.53	21.79	10781.66	1.20	3187.41	1.26	1257.01
Dora Canal	4.43	1342.98	5.50	2386.23	26.52	11593.06	3.31	3283.84	1.18	1439.00
Haines Creek	32.41	23367.97	4.26	2123.65	12.93	9172.14	4.80	2226.77	8.99	3601.53
Helena Run	18.66	4427.60	26.41	13776.40	49.34	21674.75	12.50	2691.25	22.53	6556.35
Johns Lake	302.37	35108.83	108.01	15604.26	375.45	211775.44	357.96	144170.23	238.87	71722.55
Lake Beauclair	9.59	1330.41	17.75	7664.79	11.91	5974.17	2.54	1257.10	5.40	2768.28
Lake Carlton	0.00	144.13	1.00	346.95	0.00	56.04	0.00	305.12	0.06	127.46
Lake Denham	0.25	185.13	0.00	182.41	1.00	248.58	0.00	150.51	1.25	512.26
Lake Dora	0.14	453.52	2.85	1351.84	0.85	838.60	0.00	1087.24	0.75	1470.93
Lake Ella	3.90	3727.33	3.59	2905.86	7.10	7149.89	6.71	1671.69	11.77	1905.71
Lake Emma	0.00	0.00	0.00	210.36	0.25	73.23	0.00	526.19	0.01	429.48
Lake Eustis	542.08	270190.12	124.75	60831.64	465.80	263890.88	627.28	344223.14	20.45	8188.69
Lake Griffin	519.48	173113.28	306.39	138901.51	261.62	129293.23	280.65	129718.15	52.79	24094.75
Lake Harris	301.67	262698.35	917.01	694460.06	1161.58	705412.73	53.60	30620.19	55.68	26692.49
Lake Hiawatha	1.25	281.58	1.00	257.75	4.13	736.65	6.00	1831.24	5.69	1755.29
Lake Holly	0.00	0.00	0.00	267.01	0.00	315.65	2.81	1702.04	2.47	966.03
Lake Louisa	158.33	10441.78	5.00	1063.50	3.25	832.21	1.13	1870.98	0.03	1304.15
Lake Lucy	0.00	0.00	0.00	286.63	0.25	92.58	0.00	457.68	0.25	568.22
Lake Minnehaha	12.00	1245.05	2.56	663.44	5.59	1526.76	6.36	1928.96	1.32	1287.64
Lake Minneola	20.50	1873.70	2.50	1528.30	0.13	152.08	0.01	656.30	0.32	838.18
Lake Norris	0.00	93.08	2.50	1336.52	1.50	321.78	0.00	341.19	6.25	1278.14
Lake Palatlakaha	12.13	535.76	1.50	260.21	3.31	573.87	6.12	2050.74	1.10	1119.97
Lake Susan	1.50	232.54	2.19	391.10	2.50	669.58	8.54	2347.58	1.13	559.74

	FY2003-2004		FY2004-2005		FY2005-2006		FY2006-2007		FY2007-2008	
Water Body	Acres Treated	Cost	Acres Treated	Cost	Acres Treated	Cost	Acres Treated	Cost	Acres Treated	Cost
Lake Wilson	0.88	328.72	0.00	0..00	0.00	77.81	0.38	223.33	0.00	170.09
Lake Winona	9.50	859.62	2.78	780.20	0.81	1034.93	0.79	901.65	1.84	1229.96
Lake Yale	7.14	1921.32	17.83	5321.69	8.55	2533.35	9.22	5384.69	9.21	2851.04
Palatlakaha River	29.58	3896.96	9.67	3321.56	49.28	11671.65	63.00	22409.89	38.91	12800.86
Sellers Lake	0.00	0.00	0.00	448.14	0.00	56.19	0.25	358.36	0.00	576.99
St Johns River	-	-	-	-	-	-	-	-	16.75	5159.59
Trout Lake	7.72	1592.34	12.76	2405.06	14.95	1966.44	9.55	3708.38	20.27	3754.75
Totals	2065.66	565910.53	1668.22	981891.07	2575.46	140049.93	1525.38	730196.70	564.68	208110.17

SOURCE: Lake County Aquatic Plant Management, 2008

NOTE: All costs are 100% reimbursed from the State.

Note: Cost is in US dollars

Table 10 - Cooperative Aquatic Plant Control Program: Total Acres Treated and Costs for Intra-County Water Bodies

	FY2003-2004		FY2004-2005		FY2005-2006		FY2006-2007		FY2007-2008	
Water Body	Acres Treated	Cost	Acres Treated	Cost	Acres Treated	Cost	Acres Treated	Cost	Acres Treated	Cost
Grasshopper Lake	0.00	62.05	0.00	80.92	0.00	146.35	0.00	485.56	0.00	444.28
Lake Dalhousie	0.00	46.54	0.00	161.06	0.00	64.67	0.00	185.82	1.21	2123.87
Lake David	0.00	85.50	0.00	36.27	0.00	0.00	0.00	359.63	0.00	369.60
Lake Dorr	0.05	228.77	2.13	864.61	0.00	113.13	10.12	2302.32	4.31	1565.74
Lake Umatilla	0.00	76.28	0.13	219.57	0.00	136.98	0.00	352.73	0.00	381.66
Wildcat Lake	0.00	62.05	0.00	105.71	0.00	201.25	0.12	612.13	0.00	489.77
Totals	0.05	561.19	2.26	1226.16	0.00	662.38	10.24	4298.16	5.52	5374.92

SOURCE: Lake County Aquatic Plant Management, 2008

NOTE: All activities are funded at a 50/50 cost share between the State and Lake County

* No treatment acres reported. Cost is for survey activities only.

Note: Cost is in US Dollars

Major Exotic Invasive Aquatic Plant Management Program

Public water bodies that do not meet the eligibility requirements for inclusion in the Cooperative Program are considered for the Major Exotic Invasive Aquatic Plant Management Program. Only Water Hyacinth and Water Lettuce are managed to prevent possible infestation to other water bodies and to promote the growth of desirable native aquatic vegetation. Hydrilla management is excluded due to the costs associated with these activities. Lake County assumes all expenses. Table 10 summarizes the acres treated and associated costs for this program.

Table 11 - Major Exotic Invasive Aquatic Plant Management Program: Total acres treated and associated costs for public water bodies located in Lake County, Florida.

	FY2003-2004		FY2004-2005		FY2005-2006		FY2006-2007		FY2007-2008	
Water Body	Acres Treated	Cost	Acres Treated	Cost	Acres Treated	Cost	Acres Treated	Cost	Acres Treated	Cost
Big Bear Lake	34.66	2694.34	0.00	74.87	0.00	0.00	0.00	0.00	0.00	0.00
Dukes Lake	0.00	33.00	0.00	73.44	0.00	0.00	0.00	71.66	0.00	0.00
Lake Catherine	0.00	13.73	0.00	0.00	0.00	0.00	0.00	249.89	0.00	0.00
Lake Erie	4.75	724.81	3.50	260.93	4.50	556.49	5.50	1395.12	0.00	440.51
Lake Junietta	1.50	363.46	0.00	0.00	0.06	92.07	0.00	31.19	2.00	233.47
Lake Lulu	0.00	0.00	1.75	499.24	4.00	569.96	1.00	381.42	3.25	1072.04
Pretty Lake	5.16	685.75	46.00	2966.68	23.00	2964.89	21.00	3323.10	.01	409.04
Lake Saunders			0.00	69.36	0.00	0.00	0.00	139.50	0.00	265.03
Sawgrass Lake	0.00	0.00	0.00	0.00	0.00	0.00	0.00	228.47	0.00	0.00
Lake Unity			0.00	18.15	0.00	0.00	0.00	0.00	0.00	81.96
Totals	46.07	4515.09	51.25	3962.67	31.56	4183.41	27.50	5820.35	5.26	2502.05

SOURCE: Lake County Aquatic Plant Management, 2008

Lake County encumbers all costs for management activities under this program.

Note: Cost is in US Dollars

Minor Exotic Invasive Aquatic Plant Management Program

Duckweed, Salvinia, Pennywort, and other minor exotic invasive aquatic plants that interfere with navigation or potentially create flooding situations are considered for management activities under the Minor Exotic Invasive Aquatic Plant Management Program. These activities are conducted on residential canals connected to public water bodies and on navigational channels. In FY1992-93, state funding for this program was discontinued. Lake County continues to fund this program to maintain lake access and reduce potential flooding. Table 11 summarizes the acres treated and associated costs for this program.

Table 12 - Minor Exotic Invasive Aquatic Plant Management Program: Total acres treated and associated costs for public water bodies located in Lake County, Florida. Lake County encumbers all costs for management activities under this program

	FY2003-2004		FY2004-2005		FY2005-2006		FY2006-2007		FY2007-2008	
Water Body	Acres Treated	Cost	Acres Treated	Cost	Acres Treated	Cost	Acres Treated	Cost	Acres Treated	Cost
Apopka-Beauclair Canal	10.09	649.53	1.50	174.10	8.31	2492.56	12.58	1817.38	16.00	1458.58
Crescent Lake	0.00	46.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dead River	10.82	2607.35	16.75	2865.61	9.12	1724.02	6.00	1273.97	15.25	2532.78
Dora Canal	0.89	209.28	0.00	19.17	2.00	162.42	5.50	757.23	3.56	504.45
Haines Creek	0.00	47.32	3.25	434.99	4.50	611.92	0.50	106.08	14.25	1653.86

	FY2003-2004		FY2004-2005		FY2005-2006		FY2006-2007		FY2007-2008	
Water Body	Acres Treated	Cost	Acres Treated	Cost	Acres Treated	Cost	Acres Treated	Cost	Acres Treated	Cost
Helena Run	0.50	77.64	4.00	313.60	6.00	429.94	2.00	201.40	6.00	695.81
Lake Beauclair	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	101.62
Lake Denham	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.50	167.14
Lake Dora	0.50	89.41	2.00	227.86	0.00	28.09	0.00	30.08	0.00	18.76
Lake Ella	0.00	0.00	0.00	0.00	0.00	46.82	0.00	0.00	0.00	0.00
Lake Emma	0.00	27.44	2.00	343.47	2.00	364.33	0.00	0.00	0.00	0.00
Lake Eustis	52.58	7271.07	71.44	12295.23	36.51	5953.07	41.58	7117.16	54.84	5980.98
Lake Griffin	12.83	1817.99	22.67	2255.73	29.95	3618.29	11.03	1693.55	18.78	3525.22
Lake Harris	7.74	1308.53	25.24	2628.43	27.38	5987.05	15.21	2172.10	14.43	2797.88
Lake Hiawatha	1.00	103.00	3.50	367.72	4.75	488.69	0.00	0.00	2.00	78.73
Lake Holly	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lake Idamere	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lake Louisa	5.75	585.04	1.00	122.36	2.00	115.15	0.00	0.00	0.12	38.66
Lake Minnehaha	0.00	0.00	0.00	0.00	1.25	120.65	0.00	0.00	0.00	0.00
Lake Minneola	2.25	302.30	4.00	536.57	3.25	427.87	0.00	0.00	0.50	159.65
Lake Susan	0.16	20.11	0.50	66.59	0.00	0.00	0.00	0.00	1.00	122.08
Lake Willson	0.00	46.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lake Winona	1.00	208.09	1.00	286.49	3.25	317.34	0.00	0.00	0.00	65.65
Lake Yale	4.50	734.18	10.33	1142.23	5.66	590.04	7.00	1049.99	6.00	492.16
Palatlakaha River	2.25	461.20	0.50	41.61	0.00	11.69	0.12	60.56	0.50	77.57
St Johns River	23.17	4848.19	51.07	7515.35	38.10	5675.98	84.48	17465.46	132.00	28084.44
Trout Lake	7.25	501.80	4.00	419.99	7.83	629.23	2.67	277.80	7.25	478.65
Totals	143.28	21962.55	224.75	32057.10	191.86	29795.15	188.67	34022.76	294.98	49034.67

Projected Trends for Aquatic Plant Management in Lake County

Growth of Water Hyacinth, particularly on Lake Louisa and John's Lake, significantly increased during FY2002-2003 as compared to the three previous fiscal years. Management activities were targeted for those water bodies with the greatest potential for infestation and Water Hyacinth populations started declining toward the end of FY2003-2004. Survey results for Hydrilla indicate expanding populations in Lakes Harris, Griffin, and Eustis. Management activities were scheduled for these three lakes in FY2003-2004 and FY2004-2005. Such activities are expected to continue as needed.

Minor exotic invasive aquatic plant management will continue in residential canals. Salvinia has shown some resistance to previously used herbicides in certain locations. However, this problem has been resolved by using different herbicide formulations, but the cost has increased accordingly. A less dominant species of Duckweed (*Landoltia* spp.) has emerged in certain residential canals due to a lack of competition from previously managed more dominant species. *Landoltia* spp. is not affected by currently available herbicide formulations. Consultation with

research institution staff and technical representatives on appropriate management strategies will continue.

SPRINGS INVENTORY AND ANALYSIS

Spring flow occurs at points where the potentiometric surface of the Floridian aquifer is above the land surface and where the confining bed overlying the aquifer has been breached. According to the FDEP, the major issues impacting the health of the springs include population growth, urban sprawl, growing demand for groundwater, and introduction of fertilizers, pesticides, and other pollutants into the spring sheds. Lake County has a total of thirty-three springs. The table below shows the historic and 2004 mean spring flows for Lake County's nine largest springs.

Table 13 - Historic Spring Flows

NAME	USGS ID NUMBER	MEAN SPRING FLOW FOR PERIOD OF RECORD (FT3/S)	MEAN SPRING FLOW FOR MOST RECENT YEAR (FT3/S)
Alexander Springs	02236095	104.0 1970-2008	93.6 for 2008
Apopka Springs	283400081405100	30.6 1971-2005	33.0 for 2005
Seminole Springs	02235250	35.2 1931-1995	40.0 for 1995
Messant Springs	02235255	14.7 1946-1995	18.0 for 1995
Bugg Springs	02237322	11.5 1943-2005	12.0 for 2005
Holiday Springs	02237400	3.4 1946-2005	4.5 for 2005
Blue Springs	284455081494100	2.7 1991-2005	2.8 for 2005
Helene Springs	28585027	1.1 2008 only	1.1 for 2008
Camp-La-No-Che Springs	285702081322400	0.7 1954-2001	1.1 for 2001

Source: Summary Statistics of Spring flows, USGS, 2004
St. John's River Water Management District on-line Data, 2008.

FLORIDA AQUIFER VULNERABILITY ASSESSMENT (FAVA)

An analytical method adapted for GIS-based mineral-potential mapping has been applied to assess contamination potential of Florida's aquifer systems. The method, known as Weights of Evidence (WofE), combines evidence from known occurrences of a phenomenon with spatial data to calculate a predictive response based on Bayesian theory with an assumption of conditional independence. Prior probabilities are calculated by dividing the number of known occurrences (training points) by the study area producing a probability of occurrence without the benefit of relevant data. Weights are calculated for independent different GIS data coverages (evidential themes) based on the spatial relation between each evidential theme and training points. Results are reflected as posterior probabilities on an output map known as the response theme.

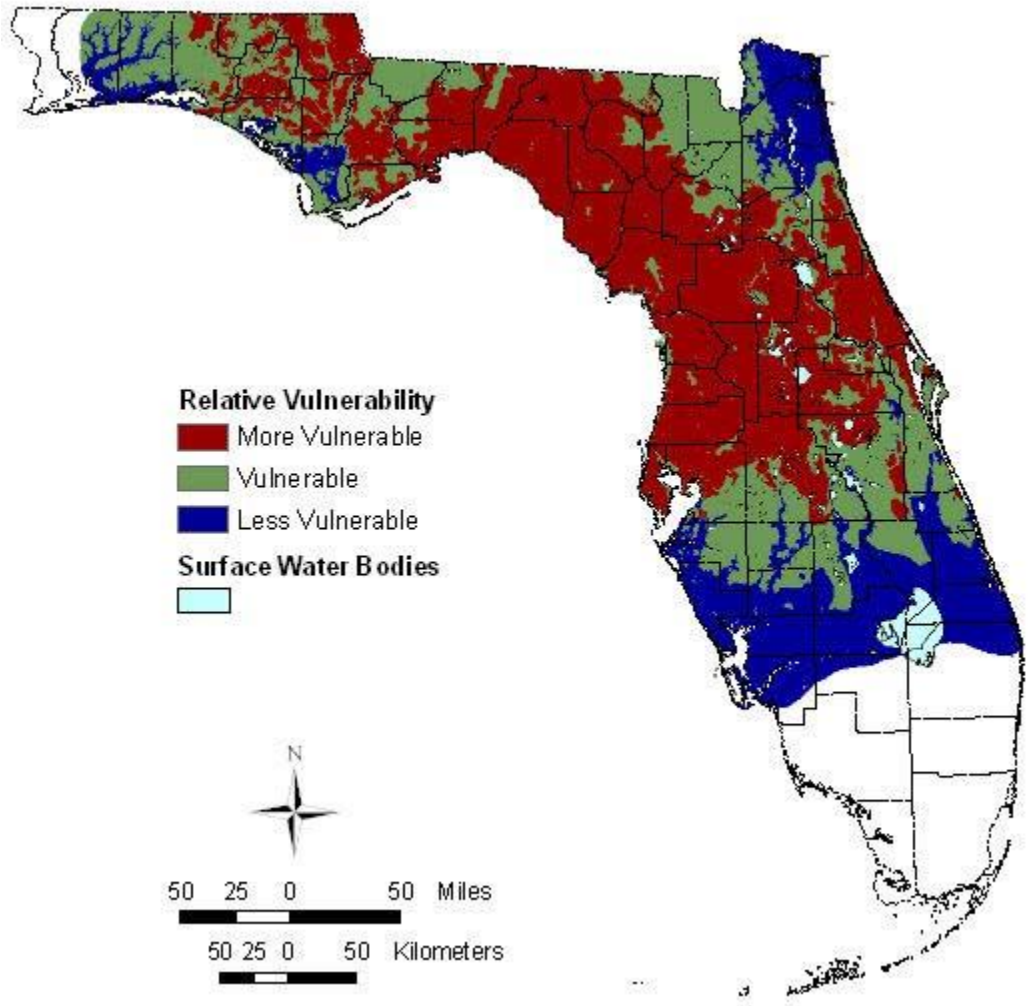
The Florida Aquifer Vulnerability Assessment (FAVA) applies the WofE method to the three principal aquifer systems in Florida through the use of the Arc Spatial Data Modeler within the ArcView 3.x platform. This extension facilitates assessment of spatial datasets, conditional independence, response theme uncertainty and validation, and provides other modeling techniques and statistical tools.

In FAVA models, training points consist of data from wells reflecting background water quality. Parameters used in the models to reflect known occurrences of aquifer vulnerability in the natural

hydrogeologic system include dissolved oxygen and total dissolved nitrogen. Evidential themes include combinations of several improved or newly created statewide coverages: depth to water table, hydraulic head difference, thickness of confinement, distance to karst features, soil permeability, and aquifer system overburden. To maximize scientific defensibility of the response themes (relative vulnerability maps), models were validated using independent training data sets, training-point subsets, and by demonstrating lack of correlation between land use and posterior probability.

Aquifer vulnerability maps are an important resource for planners, developers, resource-management professionals and policy makers to facilitate protection of Florida's ground-water resources.

Figure 2



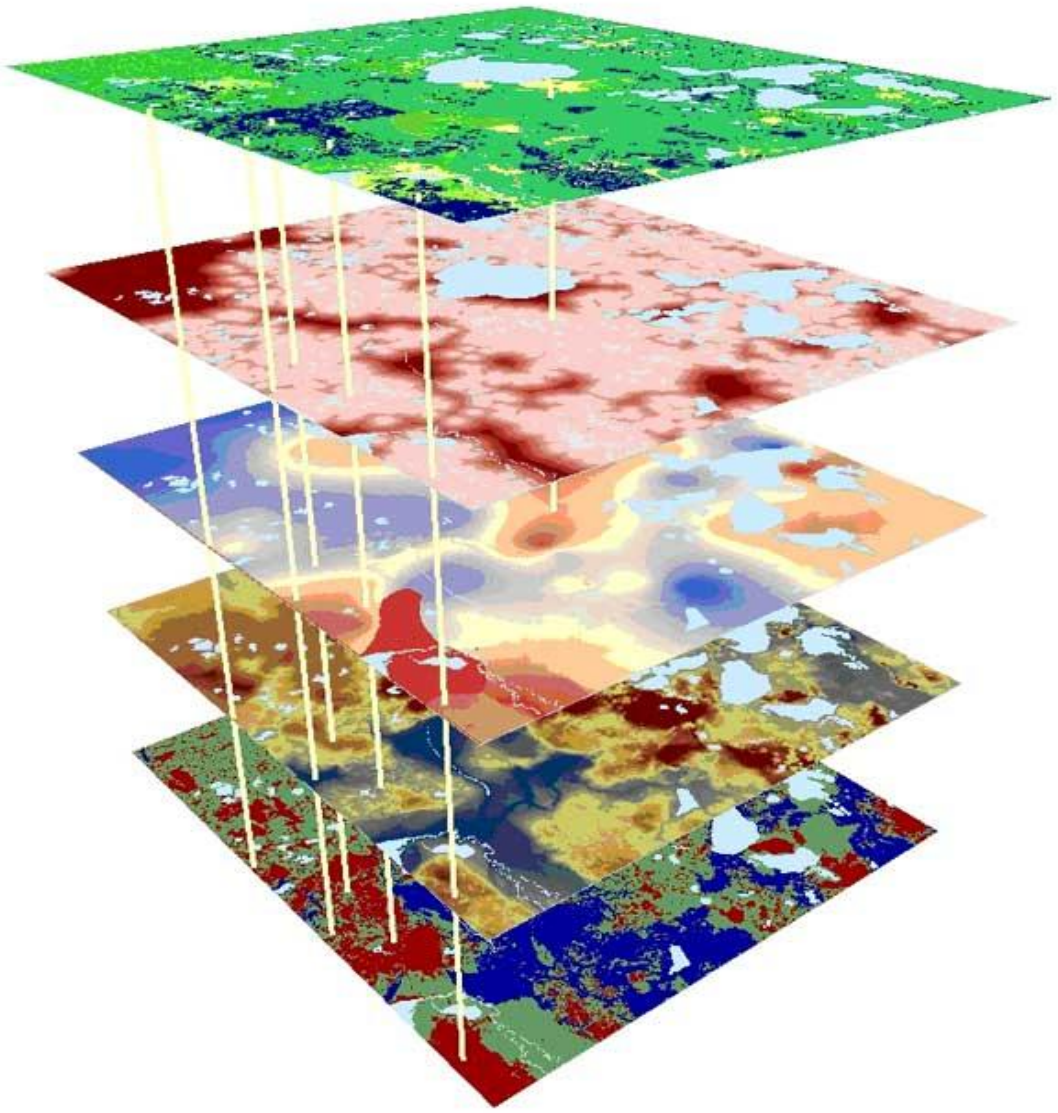
WEKIVA AQUIFER VULNERABILITY ASSESSMENT (WAVA)

The hydrogeology of the Wekiva River study area is characterized by moderate to no confinement and a multitude of karst features. Groundwater recharges the Floridan Aquifer System (FAS) by infiltration through these sediments or directly through sinkholes. The Wekiva River Coordinating Committee Final Report identifies numerous studies by Florida's water management districts and the United States Geological Survey (USGS) that clearly demonstrate contamination attributable to changes in land use. Therefore, the FGS was authorized under the Springs Initiative and the Wekiva River Coordinating Committee to identify zones of aquifer vulnerability, for the Floridan Aquifer System, within the Wekiva River study area.

The Wekiva Aquifer Vulnerability Assessment (WAVA) is a model that uses existing geographic information system data for the prediction of vulnerability zones and is based on the weights of evidence (WofE) modeling technique used in the statewide Florida Aquifer Vulnerability Assessment (FAVA). Use of WofE requires the combination of diverse spatial data which are used to describe and analyze interactions and generate predictive models. Additional information about the WofE technique can be found in FGS Bulletin 67, Florida Aquifer Vulnerability Assessment: Contamination potential of Florida's principal aquifer systems (in preparation).

In WAVA the spatial data is composed of a training point theme and evidential themes. The training point theme consists of locations of known occurrences. In WAVA these are wells that exceed a certain concentration of dissolved oxygen. Wells with high dissolved oxygen concentrations are indicative of areas where a good connection exists between the top of the aquifer and land surface. The evidential themes include soil permeability, buffered effective karst features, Intermediate Aquifer System (IAS) thickness, and head difference between the Surficial Aquifer System and the Floridan Aquifer System. These themes act as evidence in the model by either protecting the aquifer from contamination or allowing contamination to move quickly from land surface to the top of the aquifer system (i.e., areas of thick IAS sediments versus areas of thin IAS sediments). The WofE technique quantifies relationships between these evidential themes and the training point theme in order the predict zones of vulnerability. These zones are classified into a primary protection zone, a secondary protection zone, and a tertiary protection zone. These protection zones will be used in decision making and development of rules or policies regarding environmental conservation, protection, growth management and planning.

Figure 3 – Wekiva Conceptual Model



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.

RIVERS AND STREAMS

Lake County contains three river basins: the St. Johns, the Kissimmee, and the Withlacoochee. The St. Johns River basin contains both the Ocklawaha and Palatlakaha river basins. Almost one-half of the County is drained by the Ocklawaha River basin which extends across the center of the County. The northeast portion of the County drains into the St Johns River basin either directly or by way of Blackwater Creek and the Wekiva River. The remaining one-sixth of the County is drained by the headwaters of the Withlacoochee and Kissimmee Rivers.

There are a total of six rivers within or along the boundaries of Lake County. Listed below are the rivers:

- St. Johns River is the largest river in the County and is located along the northeastern boundary. The river flows north from St. Lucie County to the Atlantic Ocean near Jacksonville.
- The Ocklawaha River originates from Lake Apopka and the Lake Harris Chain of Lakes. It is the principal tributary of the St Johns River and drains the Florida central valley. It has been designated an Outstanding Florida Water.
- The Palatlakaha River is a water course connecting a series of lakes rather than a true river. It originates in Lake Lowery in Polk County and flows north through the Clermont Chain of Lakes before entering Lake Harris near Okahumpka.
- The Wekiva River begins at the confluence of Wekiva Springs Run and Rock Springs Run and flows into the St. Johns River. The river constitutes about eight miles of Lake County's eastern border. Much of the river has been protected as a state aquatic preserve and is designated an Outstanding Florida Water and a Wild and Scenic River.
- The Withlacoochee River's headwaters are located in the Green Swamp in the southwest corner of Lake County. The Withlacoochee has been designated an Outstanding Florida Water west of State Road 33.
- The Kissimmee River's headwaters are located in the southeastern portion of Lake County, in the Sawgrass Marsh area.

FLOODPLAINS

Floodplains are areas inundated during a 100-year flood event, as determined by the Federal Emergency Management Agency's (FEMA) flood insurance rate maps. The 100-year flood has been adopted by the Federal Insurance Administration (FIA) as the base flood for purposes of floodplain management. Floodplains slow the velocity of storm water run-off and are valuable as wildlife habitats and groundwater recharge zones.

Flooding may occur throughout the year but it is most common during the rainy season, from June to October. The potential for the most severe flooding is from rainfall associated with hurricanes and tropical storms or when the ground has been saturated from previous rainfall. The worst flooding in Lake County occurs within closed lake basins that depend on subsurface drainage.

Statistical analyses are used when estimating the rainfall associated with 100-year floods. Within the duration of 1 day, approximately 12 inches of rain falls, 3 days has approximately 13.6 inches, and 31 days has 21 inches.

Most floodplains occur within wetlands and around surface waters. Therefore, they are substantially protected from development. Lake County also has a floodplain ordinance that

requires development in the 100-year flood plain to use strict construction standards and site plan guidelines.

Control structures are in place to regulate stream flows and are monitored by comparing the monthly mean discharges on Haines Creek and the Palatlakaha River. The pattern of daily discharges indicates that the base flow of the regulated streams is reduced.

COMPREHENSIVE PROTECTION OF WETLANDS

Estimates of wetland areas may vary greatly depending upon the methodologies used. The 1990 existing land use analysis performed by the Water Management Districts estimated the County's total wetland acreage to be around 181, 224 acres with forested and mixed forested wetlands comprising some 111,607 acres, about 62 percent of the wetland areas, and non-forested wetlands comprising about 69,613 acres, or about 38 percent of the wetland areas. The County's 2002 existing land use analysis estimated wetland acreage to be about 129,039 acres with only about 26 percent identified as non-forested wetlands. The difference probably is due to a different evaluation of open water lakes by the County which apparently did not include emergent wetlands which typically fringe lakeshores, as well as wet prairies which probably were defined as other types of open areas. During this period, Florida was undergoing a serious drought which severely impacted shallow lakes and herbaceous wetlands. This could account for a lower estimate of wetland areas, as well.

The proposed Future Land Use Map's wetland layer shows the County's total wetland acreage as 166,144 acres or 22.3% of the total land area. The areas of the County with the greatest extent of wetlands include: the Green Swamp, the lower Palatlakaha River Basin, the Blackwater Creek Basin, the Okahumpka Swamp, the St Johns River valley, Emeralda Marsh, and Double Run Swamp.

Wetlands are defined as transitional land between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. They provide habitat for many species of birds, fish, and animals, and contain Aquifer Recharge Zones that allow the groundwater to be replenished. Wetlands are protected by local, regional, state, and federal regulations because of the numerous benefits they provide.

Water Quality Enhancement is provided through a natural filtration process where sediments, nutrients, agricultural and stormwater runoff and other pollutants are assimilated by the wetland vegetation, resulting in an improved water quality and shoreline protection.

Water Quantity Management is accomplished through absorption and storage of water during wet seasons and during flood conditions. Wetlands reduce flooding by providing for the slow release of stored waters into natural surface water bodies and maintaining the hydrologic balance between aquatic and terrestrial ecosystems.

WETLAND CLASSIFICATION SYSTEMS

Florida uses the Florida Land Use and Forms Classification System (FLUCCS) for classifying wetland types. FLUCCS is written for all land uses. All wetlands as described in the FLUCCS can be further described using the U.S. Fish and Wildlife Service Wetland Classification System once detailed field visits are made.

WETLAND DEVELOPMENT

Changes in wetland quality may be brought about from natural succession, enhancement through conservation and restoration programs, or degradation through development activities such as excavating (dredging), filling, ditching/draining, clearing or edge encroachment, and peat mining. Off-site activities that cause indirect effects upon wetlands include the discharging of wastewaters and the artificial alteration of runoff flow in areas near wetlands. Edge Effects result from the lack of protective buffer areas between developing uplands and adjoining wetlands.

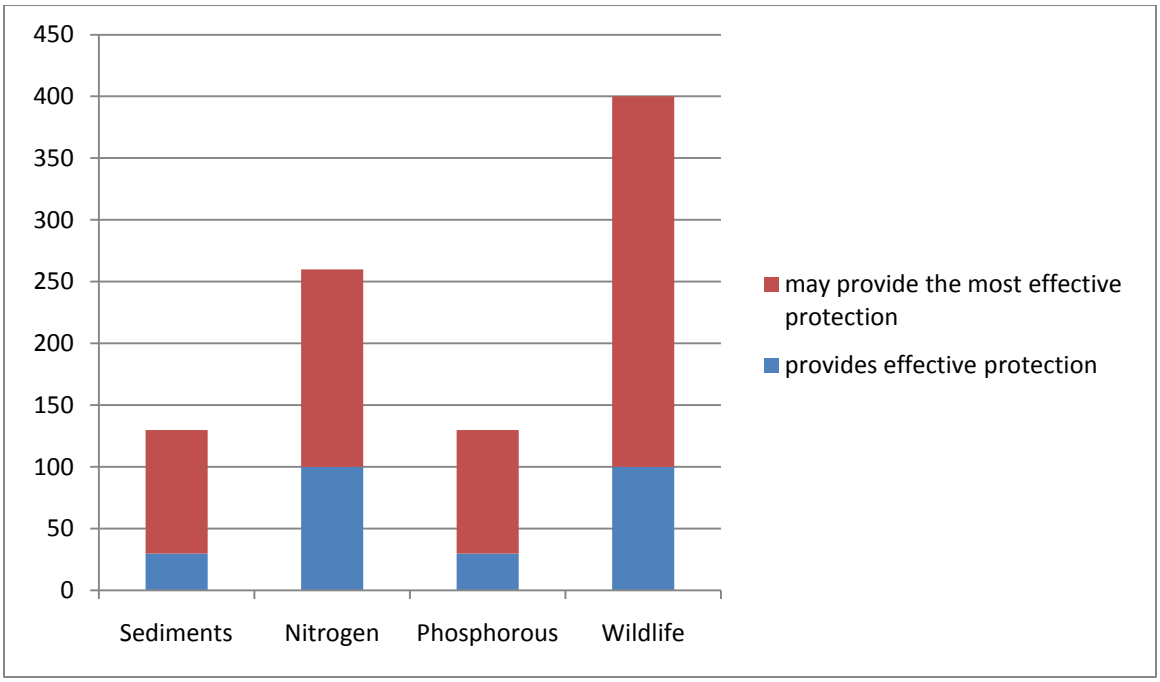
Wetland buffers provide a natural filter to wetlands and surface waters by absorbing pollutants and capturing debris before they are able to contaminate the wetland system. In addition, the root systems of vegetation located in the buffer provides protection from the erosion of sediments from being deposited into the wetland

Wetland buffers provide habitat for many species that rely on both upland and wetland systems for nesting, feeding, and protection from predators. Wetland buffers provide creatures with critical habitat corridors allowing them to move safely between vital habitats for their survival.

Wetland buffers also serve as an added protection to storm water management by protecting property from flooding in cases of severe storms.

Figure 4

Buffer Distance by Function



Source: Environmental Law Institute "Planner's Guide to Wetland Buffers for Local Governments" March 2008

Wetland types vary in their ability to accept development activities without diminishing wetland functions. For this reason the compatibility of development impacts must be defined in terms of wetland type, function and significance. The compatibility of each development impact is determined by comparing the effects of the activity on each wetland function and type.

Channelization, or ditching of wetlands for the purpose of surface drainage improvements, can dewater the wetland. Another form of physical alteration of wetlands is mining or excavation. This process alters wetland biological functional values by replacing vegetative communities with open water. This can lead to degradation of water quality as the filtration processes of the wetland are removed. There has been significant excavation activity throughout the County in the form of peat mining and the creation of man-made lakes.

HABITAT AND DESIGNATED SPECIES PRESERVATION

Natural communities provide a variety of important ecological functions and provide many benefits to human society. They are a distinct population of plants, animals, fungi, and microorganisms that are naturally associated with their environment and each other, serve as noise barriers, reduce pollutants, provide habitat, and provide resources for recreation and scientific research. They are named for their most characteristic biological or physical feature.

The forms of development on Lake County's natural areas include the construction of residential and commercial structures, roads and bridges, agricultural production, mining, and timber harvesting.

In 1990, the Florida Fish and Wildlife Conservation Commission (FWC) completed a project to map Florida vegetation and land cover using 1985-89 Landsat Thematic Mapper satellite imagery. The resulting digital database contained 17 natural and semi-natural land cover types, 4 land cover types indicative of human disturbance, and 1 water class. Over the last decade, this digital database has been put to many uses. For example, staff of many state and local programs who make decisions concerning the Florida environment often have used the FWC vegetation and land cover data as indicative of current conditions on the ground. In addition, FWC staff used the vegetation data to create potential habitat models for over 130 rare and imperiled species of wildlife. In turn, the potential habitat models of rare and imperiled wildlife formed the basic information set used to identify strategic habitats for biodiversity conservation in Florida (Cox et al. 1994, Kautz and Cox 2001).

The results of the FWC strategic habitat modeling project have been widely used in Florida to help guide land acquisition, land use planning, development regulation, and land management programs. However, over time, the 1985-89 vegetation and land cover data set became increasingly out of date. Since completion of the earlier data set, Florida's resident and tourist populations have continued to grow, converting both natural and disturbed areas of the Florida landscape to human uses. By 2003 (the year of the imagery used in this project), the earlier data set (comprised mostly of 1986-87 imagery) was about 16-17 years old, and could no longer be considered current. Not only was the earlier vegetation and land cover data set becoming out of date, but so were the wildlife and strategic habitat models that were based on that data. In order to keep our vegetation, land cover, and wildlife habitat models current, FWC staff realized the need to develop a new, updated vegetation and land cover map for Florida.

Table 14 - Land Cover Acreage, Lake County

LAND COVER	ACREAGE	PERCENT OF TOTAL COUNTY ACREAGE
Xeric Oak Scrub	8,653.6	1.17%
Sand Pine Scrub	18,432.0	2.49%
Sandhill	17,123.1	2.31%

LAND COVER	ACREAGE	PERCENT OF TOTAL COUNTY ACREAGE
Dry Prairies	16,832.3	2.27%
Mixed Hardwood-Pine Forests	21,980.2	2.97%
Hardwood Hammocks and Forests	8,755.7	1.18%
Pinelands	55,690.2	7.52%
Freshwater Marsh and Wet Prairie	53,043.8	7.17%
Shrub Swamp	18,298.9	2.47%
Bay Swamp	3,949.7	0.53%
Cypress Swamp	27,120.8	3.66%
Mixed Wetland Forest	32,422.6	4.38%
Hardwood Swamp	62,607.6	8.46%
Open Water	103,673.8	14.01%
Shrub and Brush land	33,408.4	4.51%
Grassland	141.4	0.02%
Bare soil/ Clear-cut	9,173.4	1.24%
Improved Pasture	90,393.5	12.21%
Unimproved/Woodland Pasture	4,491.2	0.61%
Citrus	32,567.7	4.40%
Row/Field Crops	31,657.1	4.28%
High Impact Urban	19,317.4	2.61%
Low Impact Urban	63,056.7	8.52%
TOTAL	**740,109.0**	**100.00%**

SOURCE: Florida Fish and Wildlife Conservation Commission, March 2004

In addition to the data and mapping conducted by FFWCC, the Florida Natural Areas Inventory (FNAI) provides vital information used by the county to identify and protect essential habitat and species. The Florida Natural Areas Inventory begun in 1981 and runs as a non-profit organization funded by grants and contracts by various state and federal agencies. In June of 2009, FNAI updated their website to include a list that includes all the species and natural communities that occur within Lake County.

Table 15- Natural Species found in Lake County, FL and Designation Status

Common Name	Federal Listing	State Listing
Plants & Lichens		
Florida Bonamia	Threatened	Endangered

Chapmans Sedge	Not Listed	Endangered
Sand Butterfly	Not Listed	Endangered
Pygmy Fringe Tree	Endangered	Endangered
Scrub Pigeon-wing	Threatened	Endangered
Piedmont Jointgrass	Not Listed	Threatened
Okeechobee Gourd	Endangered	Endangered
Spoon-leaved Sundew	Not Listed	Threatened
Scrub Buckwheat	Threatened	Endangered
Hartwrightia	Not Listed	Threatened
Florida Hasteola	Not Listed	Endangered
Star Anise	Not Listed	Endangered
Pinesap	Not Listed	Endangered
Narrowleaf Naiad	Not Listed	Threatened
Celetial Lily	Not Listed	Endangered
Britton's Beargrass	Endangered	Endangered
Cutthroat Grass	Not Listed	Endangered
Paper-like Nailwort	Threatened	Endangered
Lewton's Polygala	Endangered	Endangered
Small's Jointweed	Endangered	Endangered
Scrub Plum	Endangered	Endangered
Giant Orchid	Not Listed	Threatened
Florida Willow	Not Listed	Endangered
Silver Buckthorn	Not Listed	Endangered
Scrub Stylisma	Not Listed	Endangered
Ocala Vetch	Not Listed	Endangered
Clasping Warea	Endangered	Endangered
Carter's Warea	Endangered	Endangered
Gastropods		
Dense Hydrobe Snail	Not Listed	Not Listed

Alexander Siltsnail	Not Listed	Not Listed
Flatwood Siltsnail	Not Listed	Not Listed
Seminole Spring Siltsnail	Not Listed	Not Listed
Spiders		
McCrone's Burrowing Wolf Spider	Not Listed	Not Listed
Red Widow Spider	Not Listed	Not Listed
Workman's Jumping Spider	Not Listed	Not Listed
Blue Purse-web Spider	Not Listed	Not Listed
Decapods		
Big-cheeked Cave Crayfish	Not Listed	Not Listed
Grasshoppers & Allies		
Ocala Claw-Cercus	Not Listed	Not Listed
Rosemary Grasshopper	Not Listed	Not Listed
Beetles		
Pygmy Anomala Scarab Beetle	Not Listed	Not Listed
Small Pocket Gopher Aphodius Beetle	Not Listed	Not Listed
Large Pocket Gopher Aphodius Beetle	Not Listed	Not Listed
Sand Pine Scrub Ataenius Beetle	Not Listed	Not Listed
Gopher Tortiose Copris Beetle	Not Listed	Not Listed
Scaly Anteater Scarab Beetle	Not Listed	Not Listed
Red Diplotaxis Beetle	Not Listed	Not Listed
Relictual Tiny Sand-loving Scarab	Not Listed	Not Listed
Florida Hypotrichia Scarab Beetle	Not Listed	Not Listed
Three Spotted Pleasing Fungus Beetle	Not Listed	Not Listed
Punctate Gopher Tortiose Onthophagus Beetle	Not Listed	Not Listed

Florida Deepdigger Scarab Beetle	Not Listed	Not Listed
Elongate June Beetle	Not Listed	Not Listed
Diurnal Scrub June Beetle	Not Listed	Not Listed
Skelley's June Beetle	Not Listed	Not Listed
Round-Necked Romulus Long-Horned Beetle	Not Listed	Not Listed
Florida Cebrionid Beetle	Not Listed	Not Listed
Large-Jawed Cebrionid Beetle	Not Listed	Not Listed
Pygmy Silky June Beele	Not Listed	Not Listed
Scrub Palmetto Flower Scarab Beetle	Not Listed	Not Listed
Yellow-banded Typocerus Long-horned Beetle	Not Listed	Not Listed
Caddisflies		
Florida Cernotinan Caddisfly	Not Listed	Not Listed
Floridian Finger-net Caddisfly	Not Listed	Not listed
Berner's Microcaddisfly	Not listed	Not listed
Wakulla Springs Vari-colored Microcaddisfly	Not listed	Not listed
Tavares White Miller Caddisfly	Not listed	Not listed
Rasmussen's neotrichia Caddisfly	Not listed	Not listed
Little Oecetis Longhorned Caddisfly	Not listed	Not listed
Little-entrance Oxyethiran Microcaddisfly	Not listed	Not listed
Pescador's Bottle-Cased Caddisfly	Not listed	Not listed
Floridian Triaenode	Not listed	Not listed
Little-fork Triaenode	Not listed	Not listed
Butterflies & Moths		
Lace-winged Roadside Skipper	Not listed	Not listed
Eastern Pine Elfin	Not listed	Not listed

Berry's Skipper	Not listed	Not listed
Zabulon Skipper	Not listed	Not listed
Fish		
Snail Bullhead	Not listed	Not listed
Lake Eustis Pupfish	Not listed	Species of Special Concern
Blackbanded Sunfish	Not listed	Not listed
Sea Lamprey	Not listed	Not listed
Bluenose Shiner	Not listed	Species of Special Concern
Amphibians		
Striped Newt	Not listed	Not listed
Gopher Frog	Not listed	Species of Special Concern
Reptiles		
American Alligator	Threatened	Species of Special Concern
Spotted Turtle	Not listed	Not listed
Eastern Diamondback Rattlesnake	Not listed	Not listed
Eastern Indigo Snake	Threatened	Threatened
Gopher Tortoise	Not listed	Threatened
Southern Hognose Snake	Not listed	Not listed
Mole Snake	Not listed	Not listed
Common Kingsnake	Not listed	Not listed
Sand Skink	Threatened	Threatened
Florida Pine Snake	Not listed	Species of Special Concern
Suwannee Cooter	Not listed	Species of Special Concern
Florida Scrub Lizard	Not listed	Not listed
Short-tailed Snake	Not listed	Threatened
Birds		
Cooper's Hawk	Not listed	Not listed
Bachman's Sparrow	Not listed	Not listed
Florida Scrub-jay	Threatened	Threatened

Limpkin	Not listed	Species of special concern
Great Egret	Not listed	Not listed
Florida Burrowing Owl	Not listed	Species of Special Concern
Short-tailed Hawk	Not listed	Not listed
Little Blue Heron	Not listed	Species of Special Concern
Snowy Egret	Not listed	Species of Special Concern
Tricolored Heron	Not listed	Species of Special Concern
Swallow-tailed Kite	Not listed	Not listed
White Ibis	Not listed	Species of Special Concern
Merlin	Not listed	Not listed
Peregrine Falcon	Not listed	Endangered
Southeastern American Kestrel	Not listed	Threatened
Florida Sandhill Crane	Not listed	Threatened
Bald Eagle	Not listed	Not listed
Least Bittern	Not listed	Not listed
Black Rail	Not listed	Not listed
Wood Stork	Endangered	Endangered
Yellow-crowned Night-heron	Not listed	Not listed
Black-crowned Night-heron	Not listed	Not listed
Osprey	Not listed	Species of Special Concern
Red-cockaded Woodpecker	Endangered	Species of Special Concern
Hairy Woodpecker	Not listed	Not listed
Glossy Ibis	Not listed	Not listed
Least Tern	Not listed	Threatened
Mammals		
Rafinesque's Big-eared Bat	Not listed	Not listed
Southeastern Weasel	Not listed	Not listed

Florida Long-tailed Weasel	Not listed	Not listed
Round-tailed Muskrat	Not listed	Not listed
Florida Mouse	Not listed	Species of Special Concern
Sherman's Fox Squirrel	Not listed	Species of Special Concern
Manatee	Endangered	Endangered
Florida Black Bear	Not listed	Threatened

FISHERIES

Lake County contains two fish management areas, one located at Lake Griffin and one for the Clermont Chain of Lakes. The Florida Fish and Wildlife Conservation Commission annually samples fisheries within Lake County to evaluate water quality and trends.

Clermont Chain of Lakes

The fifteen lakes within the Clermont Chain of Lakes range in size from 20 to 3,634 acres. In 1991, there was a large fish kill and the Clermont Chain of Lakes fishery collapsed. It has taken over a decade for the chain to recover, but tests have shown encouraging signs of improvement and evidence that reducing phosphorous levels and other pollutants within Lake County's numerous lakes and streams enables the fish population to increase.

Bass, bluegill, shellcracker, an abundant supply of channel catfish, and various other fish can be found within the chain. Many of the lakes have fish attractors attached to buoys to facilitate fishing.

Ocklawaha Chain of Lakes

The Ocklawaha Chain of Lakes includes lakes Apopka (the headwater lake), Beauclair, Carlton, Dora, Eustis, Griffin (headwater for the Ocklawaha River), Harris, Little Lake Harris, and Yale.

Lakes Apopka and Griffin were two of Central Florida's main fisheries through the early 1940s. The effects of nonpoint source pollution (agricultural stormwater runoff), with high levels of plant nutrients, became evident in the late 1940s. Shoreline marshes were diked and drained for vegetable farms on the rich muck soils. Excess stormwater with high levels of phosphorous was pumped into the lakes causing algal blooms. The dying algal blooms reduced the water's oxygen and destroyed the fish population which affected all of the lakes within the chain. These conditions favored increases in rough fish and a decrease in game fish.

The St. Johns River Water Management District, following the enactment of the 1985 Lake Apopka Restoration Act and the 1987 Surface Water Improvement and Management (SWIM) Act, was directed to find "environmentally sound and economically feasible" means to restore the water quality of the Ocklawaha Chain of Lakes in cooperation with other state and local governments and resource management agencies. Improvements include:

- Removing phosphorous runoff from farms and decreasing algal blooms which will allow more light to reach the lake bottom
- Planting beneficial vegetation in appropriate areas

- Fluctuating lake levels to encourage natural establishment of desirable vegetation which helps to stabilize sediments and improve water clarity
- Constructing marsh flow-ways to filter suspended sediment and phosphorous from circulated lake water
- Harvesting rough fish thereby reducing phosphorous recycling and re-suspension in the water from their feeding activities.

Since 2002, the St. Johns River Water Management District has harvested more than 1.25 million pounds of gizzard shad from Lake Griffin, reducing the cycling and re-suspension of phosphorous-laden sediments associated with the feeding behavior of these fish. Furthermore, there is now a fourteen-inch minimum when catching game fish. This new law has helped increase the number of large fish in the chain.

Lake Apopka began showing signs of improvement in 1995 and by 2003, there was a 30% reduction in phosphorous levels. Beginning in 2000, Lake Griffin began showing signs of improvement in water quality and a decrease in phosphorous and aquatic vegetation, with significant and sustained improvements in 2002. Lakes Beauclair, Dora, and Eustis have also shown signs of improvement. Lakes Eustis, Yale, and Harris have the highest percentage of shoreline in good shape, and had the largest fish yields during the 2004 electro-fishing tests.

Table 16 - LMB results (CPUE in fish per minute) 2004 electro-fishing samples.

LAKE	MEAN TOTAL CPUE (S.E.)	MEAN CPUE > 20CM (S.E.)	MEAN HARVESTABLE CPUE (S.E.)
Apopka	0.34 (0.06)	0.33 (0.06)	0.14 (0.03)
Beauclair	0.44 (0.07)	0.32 (0.07)	0.16 (0.04)
Carlton	0.94 (0.11)	0.71 (0.12)	0.38 (0.08)
Dora	0.89 (0.08)	0.69 (0.07)	0.31 (0.04)
Eustis*	2.77 (0.22)	1.50 (0.09)	0.50 (0.04)
Griffin	0.96 (0.10)	0.59 (0.06)	0.23 (0.04)
Harris*	1.62 (0.14)	1.28 (0.11)	0.67 (0.07)
Yale*	2.69 (0.30)	1.13 (0.12)	0.17 (0.03)

NOTE: Indicates high fish yield in Lakes Eustis, Harris, and Yale

Note: LMB- Large Mouth Bass

CPUE: Catch Per Unit Effort

S.E: Standard Error

MANAGED AREAS

Managed Areas are managed and/or regulated by various local, state, and federal agencies for recreation and conservation purposes. The Lake County Recreation and Open Space Element provides a detailed inventory of the recreational aspects of these facilities. This section will discuss the conservational aspects of the major areas.

Ocala National Forest

The 383,573 acres Ocala National Forest is located in Lake, Marion, and Putnam Counties. Approximately one-fourth of the forest is situated north of SR 42 in northern Lake County. Lakes found in the Lake County portion include: Dorr, Sellers, Schimmerhorn, Wildcat, North and South Grasshopper, Beakman, Stagger Mud, Dexter, and George. A wide variety of vegetation thrives in the Forest, as well as the vast majority of the Sand Pine Scrub, Sandhill, and Pine Flatwoods natural communities occurring in the County.

The U.S. Government has banned phosphate mining in the National Forest. Most of the forest is designated as a Wildlife Management Area. A large area surrounding Alexander Springs and parts of Silver Glen Springs is closed to hunting. A designated species management plan has been established for the red-cockaded woodpecker in upland yellow pine vegetative communities.

Table -17 - Other Designated Species in Ocala National Forest

FLORA	FLORA ACREAGE	FAUNA	HABITAT ACREAGE
Harper's Beauty	Not Available	Florida Black Bear	17,731
Ocala Vetch	Not Available	Florida Manatee	Not Available
Curtis Milkweed	Not Available	Grey Bat	Not Available
Flora	Flora Acreage	Fauna	Habitat Acreage
Florida Bonamia	Not Available	Florida Mouse	3,281
Ashe's Savory	Not Available	Florida Burrowing Owl	7,700
Star-Anis	Not Available	Sherman's Fox Squirrel	4,816
Small Lewton's Milkwort	Not Available	Wood Stork	6,042
		Bald Eagle	3,721
		Florida Sandhill Crane	1,755
		Scrub Jay	172
		Southeastern Kestrel	686
		American Alligator	18,039
		Eastern Indigo Snake	25,746
		Short-tailed Snake	1,382
		Sand Skink	Not Available
		Bluestripe Shiner	Not Available
		Shortnose Sturgeon	Not Available

Wekiva

Lower Wekiva River State Preserve

Lower Wekiva River State Preserve is located in Lake and Seminole counties and contains almost 18,000 acres of environmentally significant land bordering six miles of the St. Johns River, the lower four and one-half miles of the Wekiva River, and four miles of Blackwater Creek. The

Preserve has a variety of plant and animal communities that provide great species diversity and biological richness.

The Florida Department of Environmental Protection, Division of Recreation and Parks, manages the Preserve. Management programs involve ecological burning, removal of exotic species of plants and animals, reforestation of pine and cypress, and elimination of man-caused disturbances to the greatest extent possible.

Wekiva River Aquatic Preserve

The Office of Coastal and Aquatic Managed Areas manages the Wekiva River Aquatic Preserve (WRAP). The WRAP totals 19,000 acres and includes one mile of Rock Springs Run, three miles of the Little Wekiva River, the Wekiva River, the lower portion of Blackwater Creek, and 20 miles of the St. Johns River. The aquatic preserve supports a productive and diverse array of aquatic and upland natural systems and is a refuge for many endangered, threatened and rare species.

AREAS OF ECOLOGICAL SIGNIFICANCE

LAKE WALES RIDGE

Over a million years ago, most of Florida was underwater and the high, sandy land that remained is what we now refer to Ridges. The ancient Lake Wales ridge was a chain of islands, detached from the mainland, comprised of over 80,000 acres. Today approximately 85% of the land has been disturbed, mostly by citrus, pasture, and houses. The Lake Wales Ridge follows the east side of Highway 27 south from Lake Apopka through Polk County and ending in Highlands County. The ridge consists of an ecosystem known as scrub and is currently home to 53 rare, indigenous and endangered plant and animal species including the Florida scrub jay, sand skink, and scrub mint.

THE WEKIVA RIVER PROTECTION AREA

The Wekiva Basin is an area of biological transition between the northern limits of numerous tropical plants and the southern limits of temperate zone plants. The extensive wetlands in the basin provide habitat for many designated species. The Wekiva River is designated as an Aquatic Preserve and the lower three miles have been designated a Wild and Scenic River.

In 1988, the legislature enacted the Wekiva River Protection Act providing for review of local comprehensive plans, land development regulations, and certain development. The Act declared the Wekiva River Protection Area a natural resource of state and regional importance. The following flora is considered rare and endangered: Butterfly Orchid, Cardinal Flower, Cinnamon Fern, Royal Fern, Hand Fern, and Needle Palm. The listed fauna is considered rare and endangered: Bluenose Shiner Fish, American Alligator, Limpkin, Little Blue Heron, Snowy Egret, Tricolored Heron, White Ibis, Southeastern American Kestrel, Florida Sandhill Crane, Bald Eagle, Wood Stork, Least Tern, West Indian Manatee, and the Florida Black Bear.

WEKIVA PARKWAY

In 2002, Governor Bush created the Wekiva River Basin Coordinating Committee to find an expressway route that connects SR 429 to I-4 with the least disruption to the Wekiva Basin. In August, 2003, the committee established the Wekiva Study Area that includes land areas that contribute surface and ground water. The committee eliminated the NW Extension of SR 429, which would have extended 429 through the Wekiva Basin and into northeast Lake County, and replaced it with the Apopka Bypass—which extends Maitland Boulevard west to link SR 429 and

US 441—and the SR 46 Bypass—which brings SR 46 around the communities of Mt. Plymouth and Sorrento.

Governor Jeb Bush signed the Wekiva Parkway and Protection Act in June of 2004. The Act approved a plan to complete the Orlando Beltway, connecting State Road 429 in Apopka with Interstate 4 in Sanford. The legislation requires the State to preserve thousands of acres of wildlife habitat in Lake, Orange, and Seminole Counties and protect regional waterways.

Each local government within the Wekiva Study Area will be required to develop a master storm water management plan, an up-to-date 10-year water supply facility work plan to serve new and existing developments, and, where central wastewater facilities are not available, a wastewater facility plan, an infrastructure work plan, and a financially feasible schedule of improvements.

Local governments also will be required to establish a water reuse and irrigation program to minimize groundwater pumping. It is recommended that this program include improved conservation efforts and better utilization of resources.

Local governments will help reduce nitrogen in the Wekiva Basin to levels required by the Florida Department of Environmental Protection (FDEP) by phasing out existing on-site septic tank systems where central facilities are available and up-grading facilities elsewhere. The communities of Sorrento and Mt. Plymouth are of concern due to the large number of pre-1982 septic tanks in use which are more prone to polluting; however, moving to central sewer and water may be difficult as the area is already developed. The potential for getting grants to enable residents to up-grade their systems will be included in the initial assessment the Lake County Department of Health will send to the state office in Tallahassee. Lake County Environmental -Utilities is - pursuing federal assistance to replace older septic systems currently along the river.

Local governments will establish strategies that optimize open space and protect recharge areas, karst features, and sensitive natural habitats, and they should require the use of best management practices for landscaping, construction, and golf course siting, design, and management. A model landscape code is currently being developed in Lake County, in conjunction with - St. Johns River Water Management District.

Comprehensive Plan amendments required by the Wekiva legislation will be exempt from the two amendments per year rule and funding will be limited to $125,000. Comprehensive Plan amendments recommended by the Committee had to be adopted by January 1, 2006, and land development regulations had to be adopted by January 1, 2007.

THE GREEN SWAMP AREA OF CRITICAL STATE CONCERN

The Green Swamp is a 560,000-acre region that lies in portions of Lake, Polk, Sumter, Pasco, and Hernando counties. It is the headwater for the Hillsborough, Withlacoochee, Ocklawaha, and Peace rivers, and recharges the Floridan Aquifer which provides most of the area's water supply. It is a diverse ecological environment containing numerous plant species and 330 animal species, of which 30 are either threatened or endangered. In 1974, the Florida Legislature designated 189,000 acres of Polk County and 106,000 acres of Lake County as the Green Swamp Area of Critical State Concern. There are about 172,988 acres of the Green Swamp in public ownership with an additional 27,300 acres of private land protected through the purchase of conservation easements. The 4,000-plus acre Lake Louisa State Park is one of the protected areas within the Green Swamp Area of Critical State Concern located in Lake County.

The Floridian Aquifer is close to the surface in the Green Swamp allowing water to easily percolate through the sand and porous rock. Pressure caused by the high groundwater elevation

(Florida's highest) forces water throughout the aquifer, dispersing it underground for hundreds of miles, preventing saltwater intrusion, and sustaining the four major rivers in the region, and numerous streams, springs, ponds, and lakes. Because of the Green Swamp's elevation, the water table remains higher than the Floridian Aquifer's potentiometric surface (the altitude at which water in the aquifer stands) throughout the year, supplying recharge to the area.

EMERALDA MARSH

There are 6,779 protected acres in the Emeralda Marsh Conservation Area. The area provides habitat for rare and endangered species such as the bald eagle, limpkin, and snowy egret, and many other species of plants and animals. Emeralda Marsh also has one of the highest alligator populations in Central Florida. Emeralda Marsh was purchased and is managed by the St. Johns River Water Management District, which plans to restore and protect floodplain and upland ecosystems.

ROCK SPRINGS RUN STATE RESERVE

Rock Springs Run State Reserve borders more than 12 miles of the Wekiva River and Rock Springs Run. The Reserve is comprised of nearly 14,000 acres of a variety of plant communities representative of central Florida's original domain. These communities include sand pine scrub, pine flatwoods, bayheads, hammocks, and swamps. The river system is formed from the discharge of several artesian springs together with tannic runoff from the surrounding watershed. The wetlands and uplands provide habitat for a variety of rare and endangered species native to Florida. The Florida black bear, Florida scrub jay, wood stork, Florida sandhill crane, indigo snake, and a variety of more common species are often seen throughout the Reserve. Rock Springs Run State Reserve is located within parts of Lake and Orange Counties.

The Reserve is managed under a cooperative agreement between the Florida Department of Environmental Protection (FDEP), the Florida Fish and Wildlife Conservation Commission, the Department of Agriculture's Division of Forestry, and the St. Johns River Water Management District. The FDEP Division of Recreation and Parks is the agency providing on-site resource management and protection.

LAKE GRIFFIN STATE PARK

Lake Griffin State Recreation Area (SRA) is over 460 acres located approximately 3.5 miles north of Leesburg. It offers a picnicking and interpretive program area situated in a mature live oak hammock. The park has 40 campsites and a public boat ramp providing access to Lake Griffin via a canal and the Dead River.

Lake Griffin SRA contains elements of sandhill, upland hardwood forest, and bayhead swamp plant communities. Floating islands of peat sometimes form in the lake, often acquiring a carpet of rooted plants. The park has a 50 acre tract of sandhill habitat in its northern section.

Wildlife species which have been noted at the park include the white-tailed deer, gray fox, fox squirrel, raccoon, glossy ibis, anhinga, common moorhen, least bittern, black-crowned night heron, belted kingfisher, boat-tailed grackle, gopher tortoise, coral snake, and American alligator. The park contains no known archaeological or historical sites.

MINING AND BORROW PITS

As of 2009, Lake County has approximately 32 active mining operations, including one peat mine, fourteen hydraulic sand mines, and seventeen clay pits.

Mining operations must follow certain procedures in order to obtain approval from the County before beginning operations. During the permitting process, Lake County staff reviews the proposed mining operation and its feasibility is projected. As part of this procedure, the following items must be submitted: mining site plan and reclamation plan for approval by the BCC. Following BCC approval, the Operating Permit is reviewed and approved by the Development Review Staff before mining activity begins. The hydraulic sand mines and the peat mines leave a man-made lake to reclaim the mine area. The applicants for mining operations must address many factors, including the following:

- Ground and surface water level
- Slopes and runoff
- Maintenance of natural drainage patterns after reclamation
- Reclamation of vegetation
- Waste contamination
- Ground water quality and recharge capability

A bond valued at 100 percent of the cost of the proposed reclamation plan must be posted for small operations. This bond is forfeited in case of non-compliance, allowing the County to undertake the reclamation of the site.

Requirements in the Lake County Zoning Ordinance define and limit mining operations. The County mining ordinance was adopted on May 8, 1990. This revised ordinance instituted more stringent standards regarding the operations and reclamation requirements of a given mine.

The life expectancy of a mine operation is dependent upon both the size of the property and the viability of the market for the product. Slow production would extend the life of the mine. In an extreme instance of low demand, the life of the mine could last indefinitely.

MINERALS

There are three commercially valuable minerals utilized in Lake County: sand, clay, and peat. A large amount of fill dirt is also removed.

Lake County has extensive deposits of clay and sand that cover the majority of Lake County and major deposits of peat located near lakes Apopka, Griffin, and Minnehaha and the Okahumpka Marsh. These deposits were utilized as muck farms but they have since been purchased for conservation or urban development. The County possesses two limestone deposits along its western border at Okahumpka and the Green Swamp Area of Critical State Concern. Mining within the Green Swamp Area of Critical State Concern is prohibited with the exception of sand mining. There are also substantial phosphate deposits in the far northern portion of Lake County along Lake George. However, the Ocala National Forest has land use policies that strictly forbid the mining of phosphates in the Forest.

SOILS

There are 41 soil types in Lake County, twenty-five of which are hydric soils and are not ideal for development. There are six soils that are floodable and another thirteen that tend to pond. It is possible to build on these soils; however, it is more expensive to do so and it often requires the developer to de-muck to create a stable ground for construction.

Other soils in the county tend to be droughty and are sometimes unstable when weight is added to their surface. Droughty soils or soils with steep slopes allow water to pass through or over them rapidly and thus, they do not function well with septic tanks or de-nitrification fields due to the possibility of contamination to groundwater or nearby lakes and streams.

The Natural Resources Conservation Service (NRCS, formerly the Soil Conservation Service-SCS) has developed a hydrological classification system for soils that can be used to estimate runoff and soil erosion potential. The classification system is as follows:

Table -18 - NRCS Soil Classification System

Hydrologic Group	Description
Group A	Low runoff potential: Soils that have high infiltration rates even when thoroughly wetted and a high rate of water transmission
Group B	Moderately low runoff potential: Soils that have moderate infiltration rates when thoroughly wetted and a moderate rate of water transmission
Group C	Moderately high runoff potential: Soils that have slow infiltration rates when thoroughly wetted and a slow rate of water transmission
Group D	High runoff potential: Soils having very slow infiltration rates when thoroughly wetted and a very slow rate of water transmission

The majority of soil types in Lake County are group D soils and account for 237,151 acres, or 43 percent of lands outside the Ocala National Forest. These soils are either hydric or are associated with flood plains.

Soil Erosion

Development in Lake County has significantly grown in the past two decades. The recent down turn in the economy has left countless lots disturbed, but not constructed. This break in development has increased the potential of soil erosion within the county. Many of the disturbed areas are the high, dry regions of the county such as Clermont, Howey-in-the-Hills, and Montverde. The soils in these regions are loose sands that easily erode once vegetation and root systems are removed from the ground.

Land areas that have slopes of more than 10 percent are considered unsuitable for septic tank drain fields. These slopes generally correspond with the ridge and upland regions of the County, where the soils have some potential for erosion when denuded of vegetation and are usually classified in Group A.

The 1991 Lake County Comprehensive Plan identified the loss of organic soils in muck farms as the most significant soil conservation issue. Muck farm acreage has since declined from 11,360 acres in 1988 to the current 1,515 acres.