Osceola County Comprehensive Plan

Conservation Element
Data & Analysis

CONSERVATION ELEMENT

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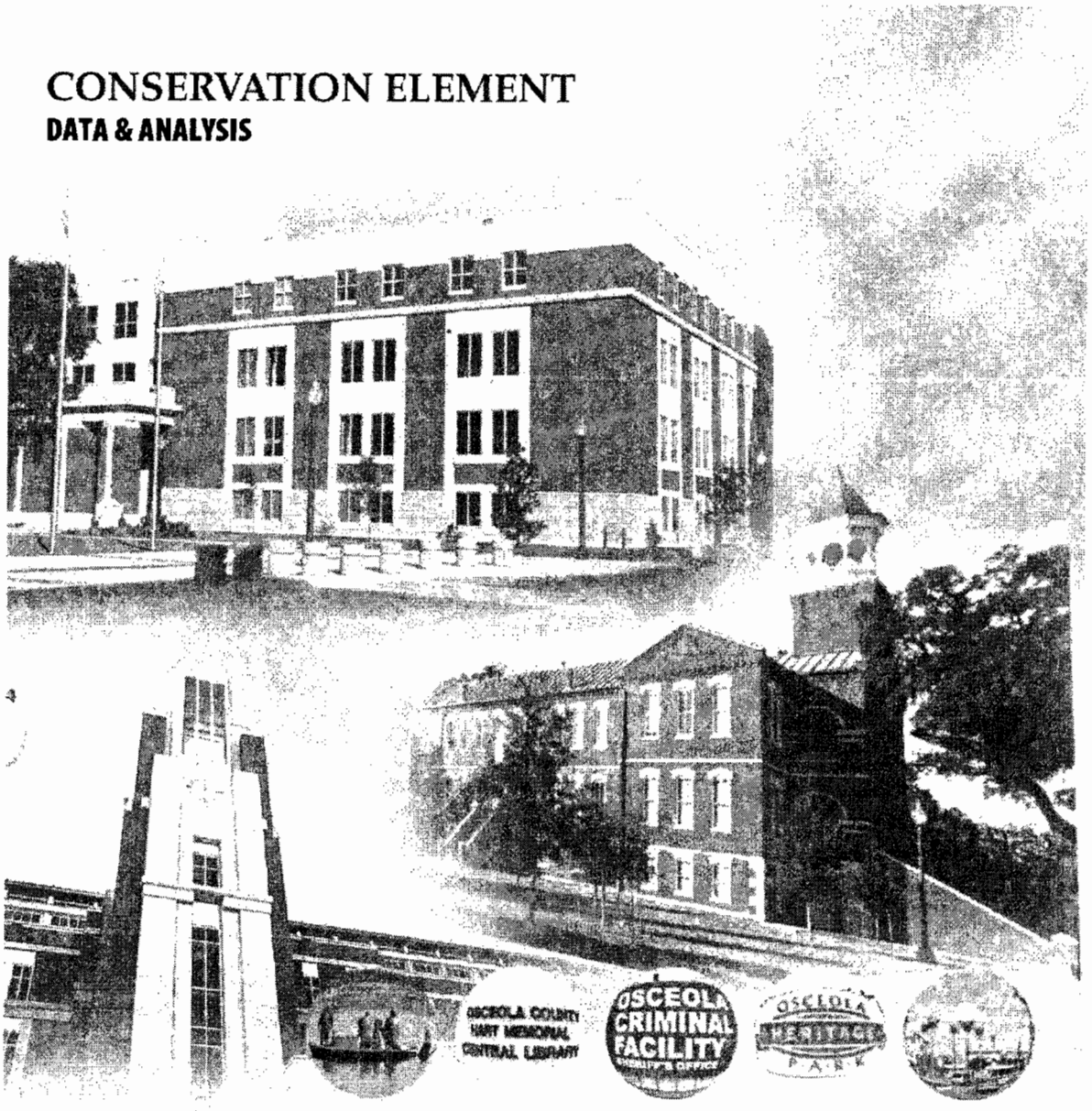

OSCEOLA COUNTY COMPREHENSIVE PLAN 2025

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CHAPTER NINE

CONSERVATION ELEMENT
(Section 163.3177(6)(d), F.S. & Rule 9J-5.013)

"We do not inherit the Earth from our fathers. We borrow it from our children."
-David Brower-

A. INTRODUCTION

1. Purpose

As stated in Rule 9J-5.013, Florida Administrative Code (F.A.C.), the purpose of the Conservation Element is to promote the conservation, use, and protection of natural resources. This element of the Osceola County Comprehensive Plan identifies and analyzes sources of surface and groundwater, wetlands, floodplains, air quality, valuable minerals, soil erosion, dominant vegetative and wildlife communities, and vegetative and wildlife species listed as threatened or endangered. Exhibits depicting each of these characteristics are found throughout the Data and Analysis sections of the various Elements. In addition, this element will provide potential methods for the conservation, use, and protection of these vital resources. All policies in the Goals, Objectives, and Policies portion of the Conservation Element, developed from the data herein, shall be based on accepted scientific methods and evidence as they may apply.

2. Environmental Setting

Covering 1506 square miles (1480.1 sq. miles in unincorporated areas, 9.2 sq. miles for St. Cloud and 16.7 sq. miles for Kissimmee), Osceola County occupies the Osceola Plain, a broad, flat area of land lying immediately adjacent to the Lake Wales and Mount Dora Ridges on the northwest and west. Elevations range from a minimum of about 15 feet above the National Geodetic Vertical Datum (NGVD) in the northeast part of the County to a maximum of over 100 feet NGVD in the northwest part of the County near the top of the Lake Wales Ridge.

Osceola County is one of Florida's most loved tourist destinations that beckoned the nation's earliest explorers. In 1884, steamboat captains navigated the chain of lakes leading from Kissimmee City to the Gulf of Mexico. During the same time period, as much as one million pounds of sugar were produced annually in the County until freezes and other devastating events ended the sugar industry. However, these events helped turn the rugged swampland into one of the world's leading tourist destinations.

Today the County's bountiful natural resources attract enthusiasts of boating, fishing, hiking, and observers of exotic wildlife.

The climate of Osceola County is subtropical with a mean annual temperature of approximately 72 degrees Fahrenheit. The County's numerous lakes provide for high relative humidity throughout the year. In addition to its abundant lakes, Osceola County is endowed with an abundance of natural resources, which include wetlands, floodplains, minerals, and fertile soils. These resources, as well as many others, will be inventoried and analyzed in the following sections.

B. INVENTORY OF NATURAL FEATURES AND RESOURCES

Although each and every natural resource existing in Osceola County is a valuable component of the ecosystem, worthy of being protected and conserved, the following sections identify and describe the more significant resources of the County.

1. Surface Waters

Osceola County has an abundance of natural surface water features (Map 9-5). This section will identify major surface water basins and watersheds within the County.

a. Major Surface Waters

The surface drainage of Osceola County is dominated by the Kissimmee River and the St. Johns River. The Kissimmee River drains the western two-thirds of the County and flows south to Lake Okeechobee. The eastern part of the County drains to the St. Johns River or its tributaries, which flow northward to empty into the Atlantic Ocean. The hydrologic divide separating the Kissimmee River and St. Johns Basins in the County is located along a north-south treading line running from the Osceola-Orange County line east of Lake Preston, crossing U.S. Highway 192 one mile east of U.S. Highway 441 intersection near Holopaw, then intercepting the Osceola-Okeechobee county line at a point about 4 miles west of U.S. Highway 441 (Exhibit 6-2).

The Kissimmee River Basin, which includes most of the Upper Kissimmee River Chain of Lakes (KCOL), provides a variety of economic, recreational, and aesthetic benefits, including world-class bass fishing and wildlife viewing. These lakes are part of the Central and Southern Florida Project that was authorized by Congress in the 1950s to provide flood protection for the region. In addition, these lakes and associated wetlands provide a variety of

environmental benefits including habitat for fish and wildlife and nutrient removal.

In April 2003, South Florida Water Management District (SFWMD) initiated an interagency project to develop a Kissimmee Chain of Lakes Long Term Management Plan. The partnering agencies include SFWMD, FWC, FDEP, FDACS, USACOE, USFWS, USEPA, Osceola County, other local governments, and other stakeholders. The goal of this plan is to improve, enhance, and sustain the KCOL ecosystem health while also considering and balancing downstream effects of the management practices ecosystems, including the Kissimmee River, Lake Okeechobee, and the St. Lucie and Caloosahatchee estuaries.

After identifying existing water resource issues and conflicts within the KCOL, it was decided that the plan should focus on:

- Hydrologic management
- Habitat preservation and enhancement
- Aquatic plant management
- Water quality, and
- Public use and recreation.

The plan is intended to complement existing local government and watershed projects. This plan can be adopted in whole or in part into Osceola County's Comprehensive Plan and regulations set forth in the Land Development Code. The plan will assist in Total Maximum Daily Load (TMDL) developments, which will be addressed once the FDEP Impaired Water Bodies List is complete.

The St. Johns River Basin in Osceola County is characterized by numerous streams, small creeks, and sloughs which flow over flat terrain to the St. Johns River itself, the St. Johns Marsh, or Blue Cypress Lake. Streams included here as tributaries to the St. Johns River are as follows:

- Taylor Creek, which enters the St. Johns downstream of Lake Poinsett;
- Wolf Creek, flowing to the St. Johns upstream of Lake Winder;
- Crabgrass and Bull Creeks, which coalesce into Jane Green Creek and flow into the St. Johns Marsh; and

- Blue Cypress Creek, which enters Blue Cypress Lake in Indian River County.

Reaches of some of these streams, including Taylor Creek, Wolf Creek, and their tributaries have been channelized for agricultural purposes. Other streams, notably Bull Creek, Crabgrass Creek, and Blue Cypress Creek have not been subject to extensive modifications.

b. Inventory of Watersheds

The County is composed of five watersheds and the Alligator Chain of Lakes. These watersheds include the following:

Reedy Creek Watershed	Shingle Creek Watershed
Lake Tohopekaliga Watershed	East Lake Tohopekaliga Watershed
Kissimmee River Watershed	Alligator Chain of Lakes

An inventory of these watersheds is included in this section.

1) Reedy Creek Watershed

The Reedy Creek watershed covers approximately 150 square miles of land in northwest Osceola County and neighboring Polk, Orange, and Lake Counties. The major stream in the watershed is Reedy Creek, which is a tributary to the Kissimmee River drainage, entering the system at Lake Cypress after passing through Lake Russell. Several streams contribute flow to Reedy Creek, including Bonnet Creek and Davenport Creek. Cypress Creek, draining the northeast sector of the watershed, is a tributary to Bonnet Creek.

2) Shingle Creek Watershed

The Shingle Creek watershed drains an area of about 89.2 square miles. Its surface waters flow south from Orange County and enter the northern part of Lake Tohopekaliga. Shingle Creek runs parallel to the Kissimmee Airport on the west.

3) Lake Tohopekaliga Watershed

The Lake Tohopekaliga watershed is a sub-basin of the Kissimmee River Basin, entering at the northwestern portion of Lake Kissimmee.

This watershed receives inflow from other major surface water systems, including Shingle Creek, Mill Slough, Canoe Creek, Reedy Creek, and the East Lake Tohopekaliga Watershed. Lake Tohopekaliga is one of many lakes (mostly within the KCOL) in Osceola County that is infested with hydrilla (*Hydrilla verticillata*). The County has received more than two million dollars ($2M) in grants to assist in the battle against this exotic submerged aquatic plant, and recognizes the importance to all aspects of the lake to control it to the greatest extent possible and feasible.

4) East Lake Tohopekaliga Watershed

East Lake Tohopekaliga is the major surface water feature of the watershed. It receives inflow from Boggy Creek and Jim Branch.

Three other sources of inflow are Dakota Ditch, Lake Runnymede, and discharge from S-62, which conveys drainage from Lake Hart in Orange County. East Lake Tohopekaliga discharges southwest to Lake Tohopekaliga via the St. Cloud Canal. The lake has not experienced the water quality deterioration evident in the Lake Tohopekaliga watershed.

According to the Florida Department of Environmental Protection (FDEP), the general water quality of the East Lake Tohopekaliga Watershed is considered to be good, although the lake itself is considered to be threatened by pollution. Construction, urban, and agricultural runoff are considered to be the sources of pollution, which have led to sedimentation, elevated nutrient, chemical, and bacterial levels, excessive aquatic plant growth, algal blooms, and odor. However, trends show water quality stability, while analysis indicates lowering of chlorophyll levels.

5) Kissimmee River Watershed

In Osceola County, this watershed consists of Lake Kissimmee and the Kissimmee River Basin. Lake Kissimmee receives inflow from Lake Hatchineha as well as from the Lake Tohopekaliga, East Lake Tohopekaliga, Boggy Creek, Shingle Creek, and Reedy Creek Watersheds. Additional inflow comes from Tiger Creek in Polk County and from Lake Jackson and Lake Marian east of Lake Kissimmee. The lake discharges through control structure S-65,

forming the Kissimmee River, which has been channelized along much of its length as it flows to Lake Okeechobee.

Upstream of Lake Kissimmee, the Kissimmee River Basin in Osceola County includes many streams and chains of lakes. Nearly all of the County's 878 lakes having a surface area greater than 10 acres are located in the Kissimmee River Basin. Combined, these lakes cover about 15 percent of the County. Osceola County's lake-dominated terrain ends south of Lake Kissimmee at S-65, a water control structure maintained and operated since 1964 by the South Florida Water Management District (SFWMD).

The streams included in the Kissimmee Basin include the following: Reedy Creek, Davenport Creek, Bonnet Creek, Canoe Creek, Gator Bay Slough, Mill Slough, Bass Slough, Dead River, Jim Branch, Fennel Slough, Peg Horn Slough, Boggy Creek, and Shingle Creek.

6) Alligator Chain of Lakes

This watershed encompasses a very large area in the western part of the County that is composed of lakes and wetlands, agricultural lands, and scattered clumps of residential development. Major lakes in the watershed include Lake Gentry, Brick Lake, Alligator Lake, Pearl Lake, Sardine Lake, Live Oak Lake, Bay Lake, Lake Lizzie, Trout Lake, Coon Lake, Lake Center, Lake Joel, Bullock Lake, Lake Myrtle, and Lake Preston.

2. Groundwater

Groundwater consists of rainfall and surface water that filters into the underlying aquifer system. It is the principal source of water for all municipal water distribution systems as well as for most private industrial, agricultural, and domestic water users within the County. Groundwater levels vary in response to five general factors. The first is infiltration from rainfall, lakes, and streams. The second is evapotranspiration, which is a joint term for evaporation and transpiration. Evapotranspiration from the water table occurs where water is within approximately five feet of land surface. The third factor is lateral discharge of water to lakes, springs, and streams, while the fourth is vertical discharge of water from the Surficial Aquifer to the underlying Floridan Aquifer. The final factor is lateral submarine discharge from the Floridan Aquifer directly into the Gulf of Mexico or the Atlantic Ocean. Groundwater levels

also vary seasonably; they are generally higher in Osceola County through the rainy season and into October and November, and are lowest in May and June.

a. Water Supply Sources

The Floridan Aquifer, underlying most of the state of Florida and all of Osceola County, is the primary source of water supply in the County. Water supplies have been developed from production zones at depths ranging from 500 feet to 1200 feet for agricultural, industrial, and domestic purposes. Water quality in the production zones is generally satisfactory for the desired uses. However, the chemical makeup of water varies somewhat with location and depth. For example, in the eastern part of the County, chloride and dissolved solids concentrations are higher than in the central and western parts of the County. Higher concentrations of chloride are also found in deeper production zones.

The Surficial Aquifer in Osceola County is also an important source of supply, yielding about 10 percent of water used in the County. Again, water quality in this aquifer is generally suitable for desired uses, although iron concentrations are substantial in water from the Surficial Aquifer in the north-central part of the County.

The Floridan Aquifer System provides a supply of freshwater, amounting to approximately 90 percent of all groundwater used in the County, including the public water sources of the Cities of Kissimmee and St. Cloud, as well as large citrus, ranching, and industrial users. For smaller-scale consumers, low to moderate yields are provided by wells tapping the Surficial Aquifer System. These aquifer systems are discussed in detail in the Natural Groundwater Aquifer Recharge Element of this Comprehensive Plan.

b. Water Demand

To determine future water supply needs, the St. Johns River Water Management District (SJRWMD) developed *Water 2020: Water for the Future*. This report, which is a conceptual water supply plan, details the planning process and recommendations for implementing the plan in Work Group Area I, which encompasses all of Orange and Seminole Counties, the majority of Lake County, and portions of Marion, Osceola, Polk, and Sumter Counties. The purpose of *Water 2020: Water for the Future* was to establish future water supply demand projections for a variety of use categories in consultation with major water suppliers. According to this report, the

northwest portion of the County, around Walt Disney World and the theme park area, is experiencing lowering of the water table due to the large water demand in the area.

The SFWMD, in conjunction with the SJRWMD, developed future water supply demand scenarios in the Kissimmee Basin Water Supply Plan (April 2000). This water supply plan is currently being updated and is planned for completion in 2006 (http://www.sfwmd.gov/org/wsd/wsp/kiss/kiss_update.html). The updated Water Supply Plan projects demand to 2025, based on future population growth in Osceola County. According to the SFWMD, public water suppliers would use approximately 94,970,000 GPD in 2025, based on a future service area population of 501,652. Although the projected service area population in 2025 is less than the locally-defined County population projection of 525,000, the SFWMD demand projections reflect a future increase in the demand for public water supplies.

c. Recharge Areas

A recharge area is the land surface in which water infiltrates and flows into the underlying groundwater aquifer. Due to geologic processes that have caused changes to the rock layers comprising the land, a recharge area is not always directly above the aquifer it is recharging. The main area of aquifer recharge to the Florida Aquifer system is located in the Lake Wales Ridge area and adjacent areas of northwest Osceola and eastern Polk County (Exhibit 8-1) from which water moves eastward via subsurface flow. The Surficial Aquifer System yields adequate amounts of water for small demand residential ranching and irrigation use. The Reedy Creek Swamp floodplain provides recharge to the Surficial Aquifer, which in turn recharges the Intermediate and Floridan Aquifers. The recharge rate from the swamps is relatively low, compared with the relic dunes of north central Polk County. However, the long period of inundation in the swamp provides ample opportunities for recharge to the Surficial Aquifer.

d. Hazardous Waste Problems Affecting Groundwater

Currently, the County is aware of two hazardous waste sites that may be potentially harmful to groundwater supplies. Both sites are in or near Kissimmee, and located within the Shingle Creek watershed. These sites include the Animal Diagnostic Lab located at 2700 N. John Young Parkway,

Kissimmee, and the Bass Road Landfill, located near the Kissimmee Municipal Airport (Exhibit 4-1).

The Animal Diagnostic Lab disposed of certain solid wastes to a septic tank/drainfield system, resulting in localized contamination of the Surficial Aquifer. Forty percent of the municipal supply wells for the City of Kissimmee are located within one block of the site. These wells produce water from the Florida aquifer. Although the area is not considered a likely recharge area for the Floridan aquifer, the potential does exist for migration of contaminated shallow groundwater into the Floridan Aquifer and subsequent contamination of Kissimmee's drinking-water supply. Surface water in the drainage ditches adjacent to the site may be contaminated by shallow groundwater discharge.

The Bass Road Landfill (Exhibit 4-1) historically operated as Class I, open trench landfill, which received residential, commercial, industrial and agricultural wastes, and dead animals. Currently, it accepts only inert solid waste, such as construction and building materials, and yard waste. Two shallow and 43 deep drinking-water wells are located within one mile of the site. A new groundwater monitoring system has recently been installed on site and no contamination problems have been encountered as of yet.

A third site, that is no longer considered an uncontrolled hazardous waste site, was American Decalomania located on east U.S. 192, east of St. Cloud. The site was closed in the late 1980s and was subject to FDEP investigations.

3. Wetlands

Florida wetlands are defined by Section 62-340, F.A.C., as those areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soils. Exhibit 9-7 maps the location of major wetland systems found in Osceola County. These resources have been included in the Natural Resource Inventory (NRI) per the DCA's comments. Soils present in wetlands generally are classified as hydric or alluvial soils (Exhibit 9-4). The prevalent vegetation in wetlands generally consists of facultative or obligate hydrophytic macrophytes that are typically adapted to areas having soil conditions described above. These species, due to morphological, physiological, or reproductive adaptations, have the ability to grow, reproduce or persist in aquatic environments or anaerobic soil conditions. Florida wetlands generally include swamps, marshes, bayheads, bogs, cypress domes and strands, sloughs, wet prairies, riverine swamps

and marshes, hydric seepage slopes, tidal marshes, mangrove swamps, and other similar areas. Florida wetlands generally do not include longleaf or slash pine flatwoods with an understory dominated by saw palmetto. The FDEP classifies both slash pine and saw palmetto as facultative wetland species.

Wetlands provide many important functions such as providing vital fish and wildlife habitats, and acting as storage areas for excess surface water. They also improve water quality as impurities enter the wetland and are filtered through the vegetation. As the water travels through the wetland, toxins and nutrients are removed, allowing the filtered clean water to exit the wetland. This protects the rivers from overloading with nutrients, which would have a negative effect on fisheries throughout Florida. In addition, the soil is stabilized which, in turn, prevents erosion.

The wetlands of Osceola County may be divided into two categories: wetlands in urban areas and wetlands in rural areas. Wetlands in urban areas are those wetlands located in the developed portion of the County, and have generally suffered degradation from developmental impacts. Wetlands in rural areas, on the other hand, are located in undeveloped areas. Although these wetlands have not suffered the same developmental impacts, some have become degraded through the impacts of agriculture. The following section will provide descriptions and inventories of the wetlands in Osceola County (Exhibit 9-7).

a. Wetlands in Urban Areas

Over the past two decades, the northwestern portion of Osceola County, referred to as the Urban Expansion Area, has experienced tremendous growth. This growth was initially generated by the opening of Disney World in the early 1970s and followed by explosive resort-commercial, tourist, and residential development.

In 1988, an intensive wetland assessment was conducted in the Urban Expansion Area for the County's planning purposes. Since financial resources would not permit a detailed wetlands assessment to be conducted for the entire County, the Urban Expansion Area, where 98.5 percent of the County's population was concentrated in 1988, was selected for wetland assessment. Information compiled for the wetlands, during this assessment, is the focus of the wetland discussions in the following section.

Wetlands of considerable variety occupy the Urban Expansion Area. Reedy Creek Swamp and Davenport Creek Swamp contribute the majority of wetland acreage, but numerous wetlands associated with Lake Tohopekaliga,

East Lake Tohopekaliga, Cypress Lake, and the Alligator Chain of Lakes are scattered throughout the Urban Expansion Area as well. Descriptions of these principal wetlands follow:

1) Reedy Creek Swamp

Reedy Creek is a seasonally fluctuating black water stream that connects Lake Russell to Cypress Lake and Lake Hatchineha. With headwaters in Lake County, it runs south through Orange, Osceola, and Polk counties for approximately 25 miles. Reedy Creek remains un-channelized and meanders through a floodplain swamp forest dominated by bald cypress, red maple, and strangler fig. The Reedy Creek watershed provides a range of habitat types that support a diversity of species. While floodplain swamp is the dominant community, 13 additional communities are also present, including dry prairie, mesic flatwoods, and scrub that form a valuable biological resource.

The use of Reedy Creek by wildlife fluctuates with the seasons and changing water levels. During the winter and spring, water flow in Reedy Creek slows due to low amounts of rainfall, and may dry up in certain areas, as it did in 1999. When summer rains begin, the creek swells, rising to depths greater than four feet. Water control structures placed at the headwaters of the creek (by the Reedy Creek Improvement District) may manipulate downstream hydroperiods, altering water levels and natural flow (Richardson et al., 1996). The south end of Reedy Creek diverges into two channels; Reedy Creek flows into Cypress Lakes and the Dead River flows into Lake Hatchineha.

Uplands to the east of the creek support nesting and breeding sites for numerous bird species, and provide habitat for wild game such as turkeys, feral pigs, and white-tailed deer. Wood storks, a federally endangered species, return annually to the creek for breeding and nesting. Buffer zones are used by the District to protect wood storks from human activity.

Similarly, bald eagles, a threatened species, are protected by regulations that create buffers between eagle nests and human activities. Regulations restricting nighttime activities were also established to protect southeastern big-eared bats that inhabit the area.

2) Davenport Creek Swamp

Davenport Creek Swamp is composed primarily of high-quality wetlands for both the hydroperiod/flow regime and vegetational attributes. The swamp's wetlands are surrounded by uplands, which were at one time covered by citrus groves. However, the citrus trees underwent a fatal freeze in 1989. Currently, there is relatively little urbanization along the swamp where it flows from Orange County across Osceola County and on south into Polk County.

3) Shingle Creek Watershed.

Shingle Creek enters Osceola County in the north, from Orange County. It follows a southerly path then bends to the east and eventually enters Lake Tohopekaliga. Wetlands associated with the north end of the creek, near the Orange County line, are of high quality for both hydroperiod/flow regime and vegetational attributes. Other than edge effects associated with the adjacent upland pasture uses, which include cattle grazing, these wetlands have suffered minimal impacts.

b. Wetlands in Rural Areas

In general, most wetlands outside of the Urban Expansion Area have not suffered the severe impacts of land development activities. However, they have experienced some degradation associated with agricultural practices. The following section will provide a brief characterization of the wetlands occurring in rural Osceola County.

1) Big Bend Swamp

The Big Bend Swamp is a large wetland located in the rural northeast area of the County. Big Bend Swamp is primarily a cypress swamp intermixed with wetland hardwood hammocks and swamp hardwoods. Major Slough and Jug Creek Swamp, which are secondary systems, are cypress swamps. Freshwater marshes occur intermittently throughout the entire swamp. The water regime for this system is seasonally to permanently flooded.

The wetlands associated with the Big Bend Swamp generally are of moderate quality. However, disturbances have occurred from excavation activities to drain adjacent, isolated wetlands and from the removal of uplands to convert the land to agricultural uses. This system exhibits high to moderate values for hydroperiod/flow regime and vegetation species.

2) Bull Creek Swamp

Bull Creek Swamp is situated in the northeast portion of the County. The Bull Creek Swamp system is characterized primarily by a swamp hardwood community intermixed with cypress swamps and wetland hardwood hammocks. The system's water regimes vary from seasonally to permanently flooded.

3) Blue Cypress Creek Wetlands

The Blue Cypress Creek Wetland System is situated in southeast Osceola County. This system is featured as a mixture of swamp hardwood and cypress swamp with scattered wetland hardwood hammocks. The Blue Cypress Creek Wetland System's water regime is classified as seasonally to permanently flooded. The wetlands associated with this System are of moderate to high quality for hydroperiod/flow regime and vegetation species. The wetlands associated with the Blue Cypress System exhibit conditions similar to Bull Creek's wetlands, with most of the uplands converted to agricultural lands and agricultural ditching to drain adjacent isolated depressional areas.

4) Econlockhatchee River Swamp

The Econlockhatchee River Swamp is connected to Grape Hammock Slough and Cat Island Swamp and is characterized by the cypress swamp intermixed with freshwater marshes and open-surface waters. The water regimes for the Swamp range from seasonally flooded to semi-permanently flooded.

The Econlockhatchee River Swamp exhibits good quality wetlands, as the upland vegetation surrounding the swamp is relatively undisturbed. However, there is evidence of silviculture in the swamp. Silviculture activities allow for sun-sensitive wetlands species to be temporarily

replaced with sun-tolerant wetland species. In addition, in the southeast portion of the swamp, there is evidence of agricultural ditching and dredging to provide drainage for surrounding wetlands areas. Many of the wetlands associated with this system are moderate to very high quality for both hydroperiod/flow regime and vegetational attributes.

5) Kissimmee River Wetland System

The Kissimmee River wetland system is found in the southwest portion of the County. The Kissimmee River wetland system is comprised of the Reedy Creek Swamp and wetlands of Lake Kissimmee, Lake Hatchineha, Dead River, Kissimmee River, and Lake Russell. The Kissimmee River Wetland System is characterized by the swamp hardwood community and the freshwater marsh and wet prairie community. The water regime for the Kissimmee River Wetland System is seasonally to permanently flooded.

6) St. John's River Wetland System

The St. John's River Wetland System (SJRWS) is found in the eastern portion of the County. The SJRWS is composed of the Bull Creek, Taylor Creek, Jane Green Creek, Blue Cypress Creek, and Crabgrass Creek and associated wetlands. The SJRWS is characterized by the swamp hardwood community and the freshwater marsh and wet prairie community. The water regime for the SJRWS is seasonally to permanently flooded.

4. Floodplains and Floodways

Floodplains serve a natural and beneficial service. Floodplains store flood waters in areas that are generally low lying, and either allow the water to percolate into the soil or allow it to slowly run off into our lakes, streams, and wetlands. Floodplains are described as areas that may be inundated by a 100-year storm event. A 100-year storm event has a one percent chance of occurring annually. The amount of rain that is generated by a 100-year storm event is approximately 12.9 inches and occurs over a 96-hour period. Areas that are located within the 100-year floodplain are located near tributaries, lakes, and canals, and are naturally low-lying. Flooding may occur at any time, but generally occurs most frequently between June and October. Flooding may result from prolonged heavy rainfall due to hurricanes, tropical storms, or when heavy rainfall has resulted in saturated ground conditions. A floodway is the channel

or stream where water travels at a higher velocity. Any encroachment into the floodway, such as fill or structures, reduces the flood-carrying capacity of the floodway, thus increasing flood heights and velocities and increasing flood hazards beyond the encroachment.

According to the National Flood Insurance Program (NFIP), administered through the Federal Emergency Management Agency (FEMA), floodplains are delineated in the County by the NFIP flood maps (Exhibit 9-2). These maps indicate the Special Flood Hazard Areas (SFHA) by using different delineations on the flood maps. There are a total of 10 different SFHA categories: Zone A areas located in the 100-year floodplain with no Base Flood Elevation; Zone AE areas located in the 100-year floodplain with an established BFE; Zone AO areas located in the 100-year floodplain with flood depths of one to three feet; Zone A99 areas protected by the federal government; Zone V areas located on the coast that have velocity hazard (wave action); Zone VE areas with coastal flooding that have velocity hazard (wave action) with known Base Flood Elevations; floodway areas located in Zone AE; Zone X (shaded) areas located in the 500-year floodplain; and Zone X areas located outside the 500-year floodplain; and floodways. Only Zones A, AE, X (shaded), X, and floodways are located in Osceola County. Floodways located in Zone AE within Osceola County represent important areas for protection and may be the cause of flooding severity. The NFIP flood maps for Osceola County were updated on June 6, 2001. Updates allow Osceola County to use the most recent floodplain data to assist development occurring in the County

Prior to development within floodplains, measures are taken to assure that the natural storage areas are preserved or that compensating storage is provided in a development. The Osceola County Engineering Department oversees all development in the floodplains and ensures that County and federal regulations are met. By taking measures to protect our floodplains, the NFIP rewards communities that follow a more stringent set of regulations. The Community Rating System (CRS), administered through the Insurance Service Office (ISO), rates communities by assessing their floodplain management activities and rewarding those communities by ranking the community on a scale of one to 10, with lower numbers indicating a better rating for insurance purposes. Osceola County is rated as a 7 on the CRS scale. These classifications translate into savings for residents toward the purchase of flood insurance. When a community improves its ISO rating, this improved classification constitutes a savings of five percent toward the purchase of flood insurance. As any individual living in a 100-year floodplain with a federally-backed mortgage must carry flood insurance, a community's ISO ranking may result in significant savings for homeowners countywide.

5. Air Quality

Osceola County has a very limited amount of air pollution for a County of its size, which may be attributed to the agricultural nature of the County. As of September 2005, Osceola County has 30 active and 16 inactive air pollution sites that are permitted by the FDEP, and include, but are not limited to, an animal crematory, a human crematory, an animal feed manufacturer, a citrus processor, a soil remediation plant, and several dry cleaning operations. In addition, the County has 16 inactive sites, as well as two un-permitted sites, both of which are located in Kissimmee. These un-permitted sources are Continental Pet Technologies and Florida Hospital. An inventory of active and inactive air pollution sources, including their locations, may be found in Table 9-1.

The quality of ambient air, which is the outside air we breathe, is monitored by the FDEP. The Florida air-quality monitoring network consists of approximately 300 monitors located in 35 counties throughout the state. The monitors are placed in areas where the ambient air-quality standards are being violated or in areas where the standards are being met but plans are needed to ensure maintenance of acceptable levels in the face of anticipated population or industrial growth. The population and industrial growth rate of Osceola County have not been sufficient to warrant the placement of a monitoring station in the past, but the growth experienced by the County and surrounding areas may require placement in the near future.

There is one ozone monitoring station, located at 8706 West State Road 192, at the Kissimmee Fire Station. At present, stations in Osceola County do not measure Carbon Monoxide, Lead, Nitrogen Dioxide, or Sulfur. However, these pollutants are more than likely present in the County, according to the FDEP. An assessment of these pollutants is provided below.

a. Carbon Monoxide

Carbon Monoxide (CO) occurs in both natural and synthetic forms. Natural emissions of CO take place from the oxidation of naturally occurring methane, plant synthesis and decomposition, and forest fires. Synthetic emissions, on the other hand, tend to be concentrated in urban areas and are responsible for the high CO concentrations associated with adverse health effects. The primary synthetic source of CO is motor vehicles with gasoline-burning, internal-combustion engines. However, existing traffic patterns within the County are such that large concentrations of traffic seldom accumulate for long periods of time. This helps to negate the possibility of large concentrations of carbon monoxide from forming. Other synthetic sources of

CO include industrial process losses, open burning, and fuel combustion in industrial, utility, and other boilers, such as concrete plants.

b. Lead

While lead is an abundant element of the earth's crust and is found readily in most aspects of human life, it is the lead from synthetic sources, which is most prevalent. Legislation from the EPA has reduced the amount of lead allowed in gasoline to the point that the maximum allowable level of lead in gasoline stands at 0.1 grams per gallon. According to the FDEP, lead as an air pollutant is practically non-existent in the state of Florida except in areas that have lead smelters or process batteries. Therefore, Osceola County faces no substantial problems with lead.

c. Nitrogen Oxides

The threat of nitrogen dioxide forming in heavy concentrations in Osceola County is relatively low due to the traffic patterns of the County, and also to environmental legislation. The prime contributor of nitrogen dioxide to the atmosphere is the high temperature fuel combustion engine. Under legislation from the Federal Clean Air Act, new model cars are required to be equipped with catalytic converters. These converters act as a filter of car exhaust, thereby helping to prevent the further proliferation of nitrogen dioxide.

d. Ozone

Ozone is not emitted directly into the atmosphere but results from a series of reactions between nitrogen oxides and volatile organic compounds (VOCs) in the presence of sunlight. The nitrogen oxides, important in triggering the sequence of ozone-producing reactions, are emitted primarily from high-temperature combustion sources. The VOCs, important in sustaining the reactions, are emitted primarily from motor vehicles but may also arise from the evaporation of gasoline and solvents, from surface coating operations, and from open burning and other combustion sources.

The worst ozone conditions occur on hot, calm days. During this type of weather, the atmosphere becomes extremely heated causing increased reactions and, as a result, increased levels of ozone. Without wind the ozone remains in a concentrated area causing further pollution problems. Since ozone is a problem associated primarily with heavily urbanized areas, Osceola County is not currently in danger of exceeding or approaching the ambient

ozone air-quality standards. State and federal control programs are expected to be important in reducing the future impacts of ozone.

e. Sulfur Dioxide

Human-made sources of sulfur dioxide (SO_2) account for approximately one-third of all measurable amounts in the atmosphere. The majority of this amount is emitted through coal-fired or oil-fired electric generation plants. Osceola County's power generating plants are primarily fueled with natural gas, which, at this time, is considered a relatively clean fuel source in terms of emissions. However, some of the plants have back up systems, which operate on diesel fuel and coal. Other sources of SO_2 emissions include fuel combustion in mobile sources, the production of sulfuric acid, and the production of natural gas. However, since these sources are not significant contributors in Osceola County, ambient SO_2 air quality is not likely to be degraded by any considerable amount in future years.

f. Total Suspended Particulates

Particulate matter is emitted from both natural and human made sources with natural sources accounting for the greatest portion of the mass of total suspended particulate (TSP) in the atmosphere. The human-made contribution to the natural background may be divided into two categories, traditional and nontraditional. Traditional sources include combustible engines and sources produced from some industrial activities. Non-traditional sources include dirt from unpaved streets, dry topsoil from agricultural fields, and dust from construction or mining.

Traditional sources of TSP may be controlled with currently available air-pollution control equipment or through the choice of fuels, process techniques, and operating practices. Common particulate-matter control devices currently in use in Florida are inertial separators, wet-collection devices, bag-houses, and electrostatic precipitators. Emissions of particulate matter from non-traditional sources may be controlled through measures such as paving or wetting unpaved roads, cleaning streets, constructing windbreaks in agricultural areas, restricting open burning, and treating aggregate storage piles with chemical stabilizers.

6. Hazardous and Household Chemical Waste

The U.S. Environmental Protection Agency (EPA) considers a substance hazardous if it is ignitable; if it is reactive to other substances when mixed; if it is corrosive; or if it is toxic. Many products containing hazardous components are found around the home. These household substances, which are unregulated by the EPA, include, paints, stains, varnishes, cleaners, solvents, batteries, motor oil, and pesticides. These products contain chemicals that are poisonous, corrosive, or flammable and may have an adverse effect on the environment if not properly disposed. The Resource Conservation and Recovery Act (RCRA) as outlined in Chapter 40, (CFR), is the federal act identifying certain wastes that the EPA has specifically listed as hazardous. The act also governs generators of hazardous substances, excluding private households. In the state of Florida, the FDEP is the agency responsible for the implementation of the federal mandate.

Within Osceola County, the Household Chemical Collection Division (HCCD) of the Solid Waste Department assists the FDEP with inspections of businesses producing hazardous waste. However, the primary mission of the HCCD is to help community businesses handle their hazardous waste according to federal, state, and local regulations. The HCCD does not function as a first responder for accidents involving hazardous wastes and does not collect chemical wastes from businesses. Currently, the Osceola County Fire Department functions as the first responder for the County.

In Osceola County there are approximately 60,139 households utilizing hazardous materials for daily private uses. In 2001, 148,800 pounds of household chemical waste were disposed of properly, according to the HCCD. This chemical waste consisted of 112,000 pounds of paints, both oil and water-based; 25,000 batteries, the majority being wet cell auto batteries; 8,000 pounds of motor oil; 3,500 pounds of flammable liquids; and 300 pounds of pesticides. In order to encourage proper disposal of these substances, the HCCD, sponsors and funds Mobile Collection Amnesty Days approximately six to eight times per year at various locations in the County. These days are well advertised, and in 2001, the collection of household chemical wastes increased by 50 percent. In addition, the County operates a facility at the Bass Road Landfill (Exhibit 4-1) for the collection and storage of household chemical waste.

a. Large-Quantity Generators

Large-quantity generators are defined as entities producing more than 1,000 kilograms (2,200 pounds) of hazardous waste per month. Examples of large-quantity generators include power plants and chemical manufacturers. Large quantity generators in the County are further addressed in the Solid Waste Element of this Comprehensive Plan.

b. Small-Quantity Generators

Small-quantity generators are defined as entities producing between 100 and 1,000 kilograms of hazardous waste per month, with the exclusion of private households. The Household Waste Collection Division inspects 20 percent of the County's small quantity generators annually. Common examples of small-quantity generators include print shops, funeral homes, auto-mechanic shops, and photography studios. As of October 2001, there were 49 Conditionally Exempt Small Quantity Generators (CESQG) and 302 registered Small Quantity Generators in Osceola County. The Resource Conservation and Recovery Act (RCRA) status of 301 of these registered sites, as listed by the FDEP in their 2004 *Hazardous Waste Management Needs Assessment Report* (http://www.dep.state.fl.us/waste/quick_topics/publications/shw/hazardous/2004HazardousWasteManagementNeedsAssessment.pdf) are shown as Non Generator with only one shown to be generating hazardous waste requiring RCRA compliance.

c. Abandoned Sites and Known Hazardous Sites

The FDEP Sites List is a compilation and revision of various EPA and FDEP lists summarizing obsolete and uncontrolled sites causing environmental contamination. The Bass Road landfill and the Animal Diagnostic Lab are the sites listed for Osceola County. At this point, both sites have been cooperating with FDEP in the site cleanup.

The FDEP Bureau of Petroleum Storage Systems maintains a facility contamination cleanup status list. According to this list, petroleum contamination has been identified at 295 sites. However, the sites are in different phases of cleanup (e.g. recently reported, ongoing cleanup, completed cleanup, etc.). A current list of facilities and their associated cleanup status can be obtained at (ftp://ftp.dep.state.fl.us/pub/reports/pc/cleanup.xls).

Underground fuel tanks, residential fuel oil tanks, and cattle dipping vats are also sources of hazardous waste, which may pose a threat to Osceola County. Currently, the County has a contract with the FDEP, in which an underground storage tank inspector provided by the Osceola County EMS (Emergency Medical Services) periodically inspects regulated underground storage tanks and reports the results to the FDEP.

7. Commercially Valuable Minerals

Several mineral deposits, including clay, sand, peat, coquina, and phosphate have been identified in Osceola County (Map 9-1). These resources have been included in the Natural Resource Inventory (NRI) per the DCA's comments. Sand and clay deposits are known to occur throughout the County, while coquina and phosphate are found in the eastern portion of the County near the Brevard County line. Peat deposits may be found in the northern portion of the County. However, excavation activities in the County have historically been confined to the mineral deposits economical to excavate for local consumption. For example, sand, shell, and clay have been the extracted and used locally for road construction and fill materials. Various local constraints have made Osceola County an unproductive area for excavating for large-scale commercial purposes.

Osceola County has adopted an excavation ordinance for all excavation activities with the exception of those associated with the installation of utilities, minor landscaping, swimming pool construction, and agricultural use ponds. Mine operators regulated by the ordinance are required to obtain permits from the County Engineer. Before the permits are issued, the operator must comply with certain requirements. The ordinance also stipulates that nonconforming pits in operation at the date of its adoption must comply. Site reclamation is not a requirement under the ordinance, and due to this, past excavation endeavors have been largely unregulated. Unsightly, non-vegetated pits left after excavation may be found scattered throughout the County. These sites may be unsafe and may lead to water quality degradation.

The following is a brief description of the mineral deposits mined within Osceola County:

a. Clay

Clay is a general term for common materials composed of hydrous aluminum or magnesium silicates, which have a very fine particle size and exhibit the property of plasticity when wet. Clay is commonly used for manufacturing whitewares, cement, fillers, brick, Portland cement and other products. In Osceola County, clay deposits have been identified throughout the County and have historically been extracted locally by draglines and heavy equipment for use in local road construction. Clay deposits found in the County are not extracted on a large-scale because deposits usually do not meet the purity, mineralogy, and volume requirements that are necessary for commercial exploitation.

b. Sand

Sand is loose, granular particles of worn or disintegrated rock that is used commercially for road base material, construction fill, asphalt mixtures, and glass making. Locally, sand deposits are found throughout the County in variable volumes, qualities, and grain sizes. Historically, the County's sand deposits have only been economically important on a local scale because of the quality and volume of the deposits. Sand is mined by the County and local contractors, using draglines and heavy equipment, primarily for use as road base and fill materials.

c. Peat

Peat is a deposit of partially decayed plant remains, which accumulate in a waterlogged environment. It is often used for horticultural and agricultural purposes. Peat deposits have been identified at different locations throughout the northern portion of the County at depths between 15 to 20 feet. Peat has historically been produced by local nurserymen and farmers on a small scale for use as a soil conditioner. The large-scale excavation of peat in Osceola County would be extremely costly due to the thick overburdens, which hinder accessibility. Depending on the environmental characteristics of the site to be excavated, equipment utilized, in the peat removal process includes shovels, bulldozers, front-end loaders, draglines, clamshells, and dredges.

d. Coquina

Coquina is an organic material composed of whole or broken shells that are firmly cemented into a rock. Coquina is commonly found in young marine terraces, such as the Pamlico Terrace in eastern Osceola County. The coquina deposits found in eastern Osceola County are only of local importance and are extracted by the County for road construction material. Low deposit volumes in the County, as opposed to the large deposit volumes found in coastal counties are factors that impede large-scale excavation in Osceola County. Coquina is usually mined in the County using draglines and heavy equipment.

e. Phosphate

Phosphate is a mineral derived from decaying organic matter and chemical precipitation and is frequently used for agricultural fertilizers and in numerous industrial applications. In Osceola County, phosphate is found throughout the

eastern portion of the County, lying at depths between 50 and 150 feet with an average ore zone thickness of 20 feet. However, constraints such as an abundance of impurities, thickness of overlying sediments, low ore zone thickness and the lowest level of bone phosphate of lime in the state of Florida have been significant in making the phosphate reserves found in Osceola County uneconomical to excavate. Due to the constraints that exist for phosphate production in the County, the production of phosphate, thus far, has been non-existent.

8. Soil Erosion

Water and wind are the major causes of soil erosion, transport, and deposition. Water is by far the most important because amounts of soil locally removed by wind usually are small compared with those eroded and transported by water. Wind erosion is often related to drought, whereas water erosion is generally related to flooding and stormwater runoff. Although soil erosion has generally not been a major problem for the County, some soil erosion problems have been identified. For the majority of the County, topographic features such as relatively level land and large amounts of vegetation have been significant in reducing the threat of soil erosion. However, in the northwestern portion of the County, known as the Lake Wales Ridge area, soil erosion is a significant and continuous threat. Water and wind are the major causes of soil erosion in this area. Hilly terrain, small amounts of vegetative cover, and dry, sandy soils are the factors facilitating erosion. Soil erosion also occurs in the County where fields are plowed for replanting and in areas experiencing, or having recently experienced, new construction activity. In this case, soil erosion is usually short-term and may be resolved through the planting of vegetation. Specific areas in Osceola County that are experiencing measurable soil erosion are the Lake Wales Ridge area, Boggy Creek area, Shingle Creek area, and the sandhill and scrub areas in the northwest corner of the County.

9. Vegetative Communities

According to the Florida Natural Areas Inventory (FNAI), the vegetative communities identified in Osceola County include the following:

Basin Marsh	Floodplain Swamp	Seepage Slope
Baygall	Hydric Hammock	Slough
Bottomland Forest	Mesic Flatwoods	Strand Swamp
Depression Marsh	Prairie Hammock	Wet Flatwoods
Dome Swamp	Sandhill	Wet Prairie
Dry Prairie	Sandhill Upland Lake	Xeric Hammock

Flatwoods/Prairie Lake

10. Threatened and Endangered Species

Before a plant or animal receives protection from the state or federal government under an Endangered Species Act, it must first be placed on the state or federal list of endangered and threatened wildlife and plants. The listing program follows a strict legal process to determine whether to list a species, depending on the degree of threat it faces. The terms used in this section: Endangered species, threatened species, and species of special concern are defined in the glossary. The County utilizes both the state and federal government's Protected Species lists for identifying threatened, endangered, or species of special concern.

11. Protected Plant and Animal Species in Osceola County

The environmental conditions that exist in the County and surrounding area provide the habitat for a multitude of threatened species, endangered species, and species of special concern. Included in this inventory of state and federally listed species is the Southern bald eagle, which is present in Osceola County.

This threatened species (*Haliaeetus leucocephalus*) is present throughout Osceola County. However, nesting in the County is limited principally to the areas near lakes and rivers. The bald eagle population in Osceola County is estimated to be in excess of 175 breeding pairs, with the densest breeding concentrations found on islands in Lake Kissimmee and along the shores of Lake Cypress, Lake Kissimmee, and Lake Marian. In addition, bald eagles are found along the extreme southern portion of Lake Tohopekaliga, where they feed along the shores or over the shallow waters. Nests are also frequently found far from expanses of open water on isolated hammocks in large marshes or in mainly dry prairies with small marshes and ponds.

In addition to the plentiful Bald Eagle population, Osceola County is home to many other state and federally Protected plant and animal species, as listed in Table 9-2.

12. Commercial, Recreational, and Conservation Use of Natural Resources

The following section provides an inventory of the commercial, recreational, and conservation uses of natural resources in Osceola County:

a. Commercial

Commercial uses of natural resources include activities such as forestry, agriculture, ecotourism, and mining. An inventory of these practices follows:

1) Forestry

Forestry is the art, science, and practice of creating, managing, using, and conserving forests and associated resources for human benefit in a sustainable manner. Silviculture, a basic tool of forestry, is defined as the art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis. In simple terms, silviculture is the art and science of cultivating forest crops.

The most recent data on the forest industry for Osceola County is derived from a 1995 United States Department of Agriculture report. According to this report, the County has 181,500 acres of timberland of which 82 percent is privately owned. The balance of this forestland is publicly-owned. Bottomland hardwoods comprise 62 percent and natural pine and oak-pine account for 25 percent of the timberland. The County's forest industry employs approximately 200 people with an annual payroll of $4.2 million. The industry's contribution to the overall economy when considering values added from raw material to retail sale of finished product is $123.5 million annually. It is noted that maintenance of adequate water resources and traditional water levels is of critical importance to the forestry resources of Osceola County.

2) Agriculture

Osceola County has 67% percent of its total land in some form of agricultural use, according to the 2002 USDA Census of Agriculture. The main agricultural industries of the County are citrus production, cattle grazing, nursery and greenhouse production, and sod farming. The economic impacts generated by these activities are considered substantial in the community. The income earned in these agricultural sectors of Osceola County supports a range of jobs elsewhere in the County's economy. Many secondary jobs are concentrated in the business and professional services sectors of agriculture.

Based on the 2002 USDA Census of Agriculture, Osceola County had 11,051 commercial acres of citrus trees. These trees produced approximately 5,628,000 boxes of citrus fruit. According to an economic impact study performed by the University of Florida, Osceola County gained approximately $182.6 million from the citrus industry in 2000. This figure takes into account both direct and indirect aspects of the County's citrus industry.

Cattle grazing, fishing and hunting are other important commercial uses of the natural resources of Osceola County that are dependent upon the recognition that water resources must be treated as a potentially non-renewable resource. The economic impacts generated by these activities are considered substantial in the community and shall be recognized to be inextricably linked to the careful husbandry of water resources.

In 2002, Osceola County had 99,890 head of cattle, as estimated by the USDA. In the same year, the County gained approximately 19.8 million dollars from beef cattle and calf sales. The economic value of the nursery and greenhouse industries continues to rise as available space decreases and the demand for products increase with development.

3) Ecotourism

Ecotourism refers to environmentally responsible tourism that is based on the natural ecological features of the area as opposed to manufactured attractions or features. Known for its ecotourism, natural attractions within Osceola County include guided tours through nature parks and preserves, waterways, and citrus groves. These environmentally based forms of tourism serve the following purposes:

- Provides money and other tangible support for developing parks and recreation services, and managing natural resources.
- Links commercial tourism to local conservation programs.
- Develops sustainable tourist facilities that minimize environmental damage.
- Helps repair the damage done by previous generations.
- Promotes ecological research and rescue programs.

- Arranges and promotes meaningful contact between tourists and local people.
- Supports local businesses by purchasing local goods and services.

4) Mining

Soil excavation mines are considered "borrow pits" in Osceola County. Borrow pits are classified by three sizes: small, medium and large. Small borrow pits are less than one acre in size, medium pits are between one and five acres, and large pits are greater than five acres in size. There are currently thirteen (13) active borrow pits in the County. Between January 2000 and May 2005, fifty-six (56) borrow pits have been permitted in Osceola County.

b. Recreational

Osceola County's abundant natural resources provide for numerous recreational opportunities, which may be classified as either consumptive or non-consumptive use activities. Recreational activities in Osceola County are the following:

1) Consumptive Use Activities

Consumptive use recreational activities usually involve the disruption or consumption of wildlife resources, such as hunting or fishing. The Florida Fish and Wildlife Conservation Commission (FFWCC) regulates hunting and freshwater fishing in the state of Florida. This agency establishes and enforces policies and initiates environmental conservation programs to protect Florida wildlife. In addition, this state office determines license fees, which are established by the Florida Legislature. Hunting and Fishing licenses may be obtained at the Osceola County Tax Collectors' Office or at various sport stores, bait and tackle shops, and retail stores, as designated by the Tax Collector. All citizens who intend to hunt or fish in Florida require a valid license. However, there are exemptions available to individuals that qualify.

a) Hunting

Hunting is a consumptive use activity in which enthusiasts have plenty of opportunities to experience within Osceola

County's natural lands. Wild game, which are frequently hunted within the County, include wild turkey, wild boar, alligator, and whitetail deer.

Hunting licenses are permits valid for 12 months from the date of issuance. A five-day hunting and fishing license, and a lifetime hunting license, are also available to Florida residents. Non-residents may apply for a 10-day hunting permit.

b) Fishing

An abundance of fishing opportunities are provided by Osceola County's two major waterways, the Kissimmee Chain of Lakes and the Alligator Chain of Lakes. In fact, the Kissimmee Chain of Lakes is world renowned for record-breaking largemouth bass. Other fish common to the Kissimmee Chain of Lakes include Black Crappie, Blue Gill, Redear Sunfish, and Channel Catfish.

Although a valid fishing license is necessary to fish in the state of Florida, the "Cane Pole Law" allows residents to fish in the county of his or her residency without a license and no fishing license is required to fish in a private fishing pond. Freshwater fishing licenses are valid 12 months from the date of issuance. A five-year freshwater fishing license and a lifetime freshwater fishing license are also available to Florida residents. Non-residents may apply for a seven-day permit.

2) Non-Consumptive Use Activities

Non-consumptive use activities involve the enjoyment of nature without the removal or consumption of resources. Such activities include utilization of parks and trail systems.

a) Parks

Parks may be classified as being either activity-based or resource-based. Activity-based recreation is defined by sites and facilities developed for the enjoyment of particular user-oriented, activities such as tennis, basketball, shuffleboard, soccer, or recreational programs, such as aerobics or painting. Resource-based recreation, on the other hand, utilizes the natural environment to provide more passive activities such as picnicking, hiking, fishing, swimming, or boating. Osceola County provides a wide range of recreation opportunities to its residents. The County's inventory of passive and active recreational parkland is greater than 3,000 acres, of which 1,431 acres are classified as active parks. A complete inventory and analysis of the parks in the County may be found in the Parks and Recreational Facilities Element of the Comprehensive Plan.

b) Trails System

A trail is a linear corridor, or path, that provides public access for walking, bicycling, horseback riding, or other forms of recreation and transportation. A "Recreational Trail System" means a linear corridor and any adjacent support parcels connecting parks, schools, residential, commercial, or retail areas on land providing public access for recreation and authorized alternative modes of transportation, such as bicycling, walking, hiking, skating, and horseback riding. A complete list of park facilities containing trails is provided in the Parks and Recreational Facilities Element of the Comprehensive Plan.

c. Conservation

Conservation uses of natural resources are an important means by which to protect and sustain the County's natural resources. Conservation uses include greenways and wildlife and nature preserves (Map 9-6). These resources have been included in the Natural Resource Inventory (NRI) per the DCA's comments.

1) Greenways

Greenways are corridors of protected open space managed for conservation and recreation purposes. Greenways often follow natural land or water features and serve to link nature reserves, parks, cultural features, and historic sites with each other and with populated areas. A "Greenway" means a linear open space protected and managed as part of linked conservation lands or recreation opportunities. Greenways typically follow natural landscape features such as rivers, streams, shorelines, man-made corridors such as utility and abandoned railroad right-of-ways, scenic roadways, or any area defined in Section 260.13, F.S. Greenways may protect the habitat of native plants and wildlife, maintain wildlife movement routes and natural connections, or provide opportunities for outdoor recreation.

Osceola County contains several natural greenways, which contribute to the statewide system. These greenways include shorelines in addition to the following:

Shingle Creek	Blue Cypress Creek
Reedy Creek	Econolockahatchee Watershed
Davenport Creek	SJRWMD Watershed
Bull Creek	Kissimmee River
Crabgrass Creek	Big Bend Swamp

For additional information on Greenways, refer to the Parks and Recreational Facilities Element of the Comprehensive Plan.

2) Wildlife and Nature Preserves

Osceola County possesses a wide variety of ecosystems, many of which are environmentally sensitive. In an attempt to preserve and protect such delicate ecosystems, six sites within the County have been set aside as nature preserves and managed wildlife areas (Map 9-6). These managed natural areas include Bull Creek Wildlife Management Area, Three Lakes Wildlife Management Area, Prairie Lakes State Preserve, Lake Lizzie Nature Preserve, Shingle Creek Recreational Preserve, and Split Oak Forest Mitigation Park.

These and other managed natural areas provide more than 90,500 acres for recreational and environmental activities, and are dependent upon

the long-term preservation of the County's water resources. A discussion of the recreation and environmental aspects of each area follows:

a) Bull Creek Wildlife Management Area

The Bull Creek Wildlife Management is a 22,206-acre natural area situated within the Osceola plain in eastern Osceola County. Topographically, Bull Creek is the dominant feature in the area. The creek is located in the eastern one-third of the area, and runs from south to north. Approximately 75 percent of the land area is drained through Bull Creek and its tributaries.

Environmental values are abundant in the Bull Creek Wildlife Management Area. The pine flatwoods, sand-pine scrub, oak hammock, wetland-hardwood hammock, freshwater marsh, wet prairie, cypress swamp, and swamp hardwood are not only found in the natural area, but are evenly dispersed throughout the area and provide a diversity of wildlife habitats. Native endangered and threatened species that may reside in the area include the woodstork, red-cockaded woodpecker, bald eagle, American alligator, eastern indigo snake, Florida sandhill crane, limpkin, snowy egret and tricolored heron. Hunting, fishing, camping and hiking are the recreational opportunities available to the public.

b) Three Lakes Wildlife Management Area

The Three Lakes Wildlife Management Area is a managed wildlife community containing 45,303 acres, situated in south central Osceola County, approximately 28 miles southeast of the City of Kissimmee. A unique topographic feature of the area is the watershed divide, which occurs along the 80-foot contour line in the northeastern portion of the area. Approximately 12,500 acres of the area drain into the tributaries of the St. Johns River and 32,803 acres drain into the tributaries of the Kissimmee River.

Wildlife values are high, and numerous endangered and threatened species, and species of special concern, such as the

osprey, sandhill crane, bald eagle, woodstork, Florida panther, crested caracara, Florida grasshopper sparrow, and red-cockaded woodpecker are known to inhabit the area. Marshes and wet prairies in the area absorb nutrients and filter out pollutants, thereby improving the water quality of nearby surface waters, and providing a natural flood storage area.

Additionally, the marshes and wet prairies and other vegetative communities such as the dry prairie, cypress swamp, wetland-hardwood hammock, sand-pine scrub, and pine flatwood provide a diversity of wildlife habitats. Recreational opportunities provided by the area include hunting, fishing, camping, and hiking.

According to the DEP, Bureau of Surface Water Management, all waters within the jurisdictional boundaries of the Three Lakes/Prairie Lakes EEL Project have been designated as Outstanding Florida Waters. The importance of this designation is that the area receives special protection from the state to prevent the degradation of water quality.

c) Prairie Lakes State Preserve

Prairie Lakes State Preserve is an 8,000-acre wildlife sanctuary located in southwest Osceola County. Lakes Marian, Jackson, and Kissimmee border the preserve on the south, north, and west, respectively. The preserve is open to public use for hiking, nature study, picnicking, and fishing. The surface water in Prairie Lake State Preserve has been designated as an OFW.

A variety of wildlife is harbored in the preserve. Vegetative communities characterizing the area include the oak hammock, pine flatwood, marsh, wet prairie, and the dry prairie. The Florida sandhill crane, barred owl, crested caracara, and burrowing owl are animal species typically found in the preserve's habitat.

d) Lake Lizzie Nature Preserve

This 986-acre area known as the Lake Lizzie Nature Preserve was acquired by Osceola County in July 1998 and opened July 2000 as a passive recreational park and which will provide the County with off-site wetland and wildlife mitigation. The preserve has extensive shorelines along Trout Lake, Lake Lizzie, and Bay Lake. Two of these three lakes are part of the Alligator Chain of Lakes, which is part of the Upper Kissimmee Chain of Lakes. SFWMD has reported that the Alligator Chain of Lakes is of high water quality. Through this acquisition, not only is the quality of these three lakes protected, but also the quality of the entire Upper Kissimmee Chain of Lakes is enhanced and improved due to this area being designated as a public resource.

e) Shingle Creek Recreational Preserve

The Shingle Creek Recreational Preserve is jointly owned by the City of Kissimmee and Osceola County and managed by the County Parks and Recreation Department and the City of Kissimmee. The preserve is approximately 182 acres and provides SFWMD offsite wetland mitigation as well as a home for the Kissimmee Valley Audubon Society and the Osceola County School Board's Environmental Education Center. Eventually, the park will offer an internal trail system, which will connect, to the Osceola County Historical Society's Pioneer Center. A long-term proposed use of this property is to include a recreational trail along Shingle Creek.

f) Shingle Creek Preserve North

Shingle Creek Recreational Preserve North is located north of U.S. 192, west of Babb Road, and adjacent to both sides of Shingle Creek. It is approximately 160 acres in size. Osceola County acquired the property in December 2002 with funding from Florida Communities Trust. The property is co-managed with SFWMD, Osceola County, and the City of Kissimmee. There are some potential upland and wetland enhancement mitigation opportunities for Osceola County and the City of Kissimmee. Some of the proposed uses include nature hiking, wildlife observation, canoeing, airboat rides, fishing, boating, and camping.

g) Split Oak Forest Mitigation Park

Split Oak Forest Mitigation Park was acquired in March 1994 and is managed in conjunction with Orange County and the FFWCC through an inter-local agreement. The total acreage of the park is 1,689 acres, with approximately 640 acres existing within Osceola County. This park is located adjacent to Orange County's Moss Park, which will allow for expansion of resource-based recreation, such as hiking and wildlife observation, as well as horseback riding by special permit. The park is an environmentally significant property with a wide variety of vegetative communities and wildlife species. Communities found on the site include dry prairie, pine flatwoods, xeric oak scrub, hardwood hammock, freshwater marsh, shrub swamp, pasture, and lakes. Endangered and threatened species, and species of special concern, have also been documented on site. These include: woodstork, sandhill crane, gopher tortoise, alligator, white ibis, Sherman's fox squirrel, gopher frog, scrub jay, and indigo snake.

h) Open Space

Open space is defined as any land or water surface that affords unobstructed physical movement, and is relatively free of human-made structural mass. Open space may be classified in two ways, as either green open space or as urban open space. Open space is undeveloped land suitable for passive recreation or conservation (9J5.003 (84) F.A.C.). Open space does not include golf courses. Urban open space, on the other hand, exists principally to intersperse congested urban environments with aesthetically pleasing buffer areas, to protect natural resources, and to provide passive recreation opportunities. Either type of open space may be publicly or privately owned. Since open space is a fundamental element in planning, resource management, and the protection of groundwater supplies and aquifer recharge areas, open space is important to maintain and protect throughout the County.

i) Disney Wilderness Preserve

The Disney Wilderness Preserve was part of a mitigation plan that was established in 1992, through the cooperative actions of The Walt Disney Company, Greater Orlando Aviation Authority, The Nature Conservancy, and several public agencies. The initial size of the preserve was 8,500 acres (previously known as the Walker Ranch) and has since expanded to 12,000 acres through additional mitigation programs. The preserve is at the headwaters of the Kissimmee Chain of Lakes and is bordered by Reedy Creek to the east and Lake Hatchineha to the south. The preserve includes a diversity of habitats including pine flatwoods, oak scrub, and approximately 2,550 acres of wetlands. Over fourteen documented protected species of birds and other animals are listed as living on the property, including wood storks, Florida scrub jays, gopher tortoises, and one of the largest concentrations of nesting bald eagles in the Southeast.

3) Mitigation Lands

Osceola County owns and manages several mitigation lands, including Poinciana Scrub Island Preserve, Shingle Creek East and West Mitigation Sites, Oak Island Road Mitigation Site, Overstreet Park Mitigation Sites, three Reedy Creek Mitigation Sites, and the Carroll Street Mitigation Site.

C. ANALYSIS OF NATURAL FEATURES

The following section provides an analysis of existing and potential problems and opportunities associated with the conservation of the natural features identified in the inventory.

1. Surface Waters

A federal permitting program jointly administered by the EPA and the FDEP, the National Pollution Discharge Elimination System (NPDES), regulates the discharge of pollutants into surface waters of the United States from one or more point sources.

Recommendations for the acquisition, improvement, restoration and protection of wetlands, floodplains and surface waters are considered together, primarily because the remedial and protective actions each requires will benefit each resource type. Although considerable efforts are underway by SFWMD, SJRWMD, FFWCC,

FDEP, and U.S. Army Core of Engineers (USACOE), To add more effective local mechanisms for the reversal of resource quality degradation, the County shall develop the Natural Resource Utilization land use type and language that adds preventive mechanisms to protect its good-quality wetlands, floodplains, and surface waters and their associated wildlife habitats.

The County must continue to pursue the development and adoption of standards and rules for wetland and surface water acquisition, protection, and restoration. As part of the protection standards, a County-ordained buffer zone must be developed to allow for intelligent upland development while protecting the valuable natural resource of the wetlands and surface waters. Such standards are necessary for preventing edge effects. Currently, the County defers to SFWMD's suggested setback of a minimum width of 15 feet; average of 25 feet.

Regional cooperation and planning will be vital to the future protection of wetlands and surface waters in the County. Development in Orange County may potentially have significant deleterious effects on Davenport Creek (and swamp), Reedy Creek (and swamp), Shingle Creek, Boggy Creek, and East Lake Tohopekaliga. Conversely, over-development of the Reedy Creek swamp system in Osceola County may adversely affect the swamp system in Polk County. FFWCC has worked closely with Osceola County, USACOE and SFWMD in order to coordinate the lake drawdowns of the Upper Kissimmee Chain of Lakes. These drawdowns are for the expressed purpose of enhancing and restoring the lake's surface waters and fisheries habitats.

a. Surface Water Quality of Watersheds

The surface water quality status of principal watersheds of Osceola County is examined in this section. These watersheds include the following:

Reedy Creek Watershed	Lake Tohopekaliga Watershed
Shingle Creek Watershed	East Lake Tohopekaliga Watershed
Kissimmee River Watershed	Alligator Chain of Lakes

The discussion is based upon a review of available data on the chemical and physical quality of surface water in the County, examination of reports dealing with trends and use patterns.

The quality of Osceola County's surface water resources is influenced by a number of factors, some of which are interrelated. Many of these factors have been identified by previous investigators and have been discussed in past

reports by SFWMD, FDEP, the FFWCC, and the U.S. Geological Survey (USGS). Although the FDEP discontinued monitoring water quality 10 years ago, this report has considered the data and interpretations of these agencies in describing the quality status of surface water in the County and in developing recommendations for pollution abatement and conservation measures.

1) Reedy Creek Watershed

Diking, channelization, dredging, and the operation of water-control structures throughout the system have directly altered the drainage in the watershed. According to studies performed at the time of the County's Stormwater Master Plan, in 1992, the general water quality of the Reedy Creek Watershed was judged fair to poor. Pollution problems within the watershed include excessive nutrients, turbidity, aquatic plant growth, elevated chemical levels, declining fisheries, and oxygen depletion. Agricultural and urban runoff are the sources of these pollutants. However, a water quality trend analysis indicates improving water quality and lower turbidity levels.

2) Shingle Creek Watershed

The general water quality of the Shingle Creek Watershed is considered to be poor. The watershed has experienced problems with high nutrient loads believed to be due to increased impervious surface in its drainage-way in Southern Orange County. Additional pollution problems include excessive sedimentation, aquatic plant growth, algal blooms, chemical pollution, oxygen depletion, and declining fisheries. Urban runoff, solid waste disposal, and construction are other major sources of pollution in the watershed. However, water quality protection is provided in the area by the airport through filtration of stormwater pollutants in on-site retention ponds. Water quality in the Shingle Creek Watershed has shown improvement.

3) Lake Tohopekaliga Watershed

The major lakes in the immediate Lake Tohopekaliga watershed are Tohopekaliga, Cypress, and Hatchineha. These three lakes, as well as many other area lakes, are important recreational resources in Osceola County and have been the subject of several studies by the FFWCC, SFWMD, and FDEP.

Lake Tohopekaliga was altered in the 1880s when the canal to Lake Cypress was completed and the St. Cloud Canal was built between Lake Tohopekaliga and East Lake Tohopekaliga. Other inflows to the lake have been channelized, and the lake now receives about one-third of its total flow through channelized streams and ditches. Inflow to the lake is mainly from Shingle Creek, St. Cloud Canal, and rainfall. The remainder is contributed from Bass Slough; Mill Slough; Johnson, Partin, and Kissimmee Ditches; Partin Canal; a sod farm (formerly known as Judges Dairy); and from seepage.

Water quality in the Lake Tohopekaliga Watershed has been judged by the FDEP to be Class IIIF. Class III waters, as specified by the FDEP, are suitable for recreation, propagation, and maintenance of a healthy, well balanced population of fish and wildlife.

Lake Tohopekaliga is currently experiencing problems with hydrilla a submersed freshwater herb which, as an invasive non-native weed, often forms dense stands from the bottom to the top of the water or sprawling across the surface as detached drifting mats. Hydrilla once was cultured and sold as an aquarium plant.

Hydrilla greatly slows water flow and clogs irrigation and flood-control canals. Hydrilla seriously interferes with boating, both recreational and commercial, and prevents swimming and fishing as major infestations limit sportfish weight and size. In addition, dense hydrilla infestations may alter water chemistry and oxygen levels, as is the case in Lake Tohopekaliga.

4) Kissimmee River Watershed

The Kissimmee River Basin in Osceola County typically has undergone significant alteration as a result of efforts begun on a large scale in the early 1880s to drain central and south Florida initially for agriculture and silviculture. Drainage practices since then have resulted in more than 50 miles of major canals together with approximately 15 major water-control structures in Osceola County built by USACOE and the South Florida Flood Control District.

Lake Kissimmee discharges through control structure S-65, forming the Kissimmee River, which has been channelized along much of its length as it flows to Lake Okeechobee. This channelization, in

conjunction with the drainage of the historical floodplain, was implemented between 1962 and 1971 to prevent catastrophic flooding. Unfortunately, there were considerable unintended impacts, which included drastic declines in wintering waterfowl, wading bird, and game fish populations, as well as the demise of ecosystem functions.

The Kissimmee Restoration Act of 1992 was authorized by the U.S. Congress in the Water Resources Development Act of 1992 in an effort to restore an estimated 40 square miles of meandering river channel and 27,000 acres of wetlands. Another unintended consequence of the Kissimmee River Restoration is hydrilla accumulation in the Upper Kissimmee Chain of Lakes. The lake's water height regulation has been severely reduced in that the high pool stage duration has been increased and the low pool stage has been reduced to accommodate restoration. The consequence is that the lake's nutrient levels have increased and resulted in a proliferation of algae blooms and various exotic and invasive aquatic vegetative growth. The net result is a decreased fish and wildlife productivity in the lakes, exacerbating the need for lake drawdowns to cleanse the lake's out-of-control aquatic plant growth.

The Lake Kissimmee area is the site of three publicly-owned tracts of land whose waters are designated as Outstanding Florida Waters (OFW): Lake Kissimmee State Park on the lake's western shore; Prairie-Lakes State Preserve; and the Three Lakes Ranch, both in the vicinity of Lakes Marian and Jackson on the eastern shore of Lake Kissimmee all have OFWs. The Upper Kissimmee River is also designated as an Outstanding Florida Water. Otherwise, Lake Kissimmee is designated Class III, and FDEP has judged the lake as having water quality sufficient for Class III uses. Water quality in Lake Kissimmee is considered better than that of Lake Tohopekaliga. However, hydrilla and other exotic aquatic plant species have become a problem in this lake as well.

5) Alligator Chain of Lakes

The general water quality of this watershed is good. However, it is threatened by pollution due to increased urbanization and continued agricultural and urban runoff. Excessive aquatic plant growth has also been a problem. The implementation of stormwater treatment practices and the protection of wetlands in this area will be

instrumental in preserving and improving water quality as this area develops.

b. Restoration Programs

During the 1999 Legislative session in Tallahassee, lawmakers passed the Florida Forever Bill that includes a visionary fisheries restoration program targeting 31 Florida lakes deemed to be in dire need of attention. Beginning in 2001, approximately $5.5-million per year for nine years was made available to the FFWCC to perform lake drawdowns, muck (sediment) removal, reestablishment of native submersed vegetation, purging of willows and semi-aquatic littoral zone vegetation, as well as other fishery habitat enhancements through the year 2010. The FFWCC will use its current $1.5-million per year funding authorization to maintain lakes that have already been rehabilitated. This will include Lake Kissimmee, Lake Tohopekaliga, and East Lake Tohopekaliga.

Studies have determined that long-term stabilized water levels in many of Florida's lakes, although necessary for flood control, have resulted in negative impacts on fish and wildlife habitat. In early 1971, Lake Tohopekaliga experienced its first drawdown to improve aquatic habitat that had been negatively impacted by flood control practices and nutrient enrichment. Following the drawdown, fish food organisms rapidly increased and within two years the largemouth bass populations in the lake's vegetated areas increased significantly. Consequently, the economic value from sport fishing increased by an estimated $6-million.

Additional drawdowns of Lake Tohopekaliga were conducted in 1979 and again in 1987, both resulting in recovered fish populations. However, neither the 1971 nor the 1979 Lake Tohopekaliga drawdowns included muck removal. Biologists later concluded that such measures are often vital in overall lake restoration processes.

During drawdowns, organic material is dried, consolidated, and transported to upland areas or, occasionally, to in-lake disposal sites to form wildlife islands. The later practice is a relatively recent FFWCC initiative, which has proven to be successful by reducing hauling costs while simultaneously creating added habitat for fish, birds, and mammals.

c. Stormwater Management Programs

Stormwater runoff is a major contributor of surface water pollution in the County. This includes runoff from urban areas and agricultural lands. As evident in the data inventory, stormwater runoff is a problem experienced by all the major watersheds in the County. For further information regarding the various stormwater management programs the County is implementing, please refer to the Stormwater Management Element of the Comprehensive Plan.

The County adopted its current County-wide Stormwater Management Plan in September 1992. The plan emphasizes non-structural approaches to surface water management, which include long-range land use planning that recognizes and protects wetlands as natural stormwater management areas. In addition, the plan directs the location and design of development of the natural drainage rather than destroying it and promotes innovative techniques and strategies for the treatment of stormwater and for water quality protection. The County plans to update the existing master plan to reflect current conditions.

d. Sediment in Agricultural Runoff

To mitigate the potential impact of sediment in agricultural runoff, the County will work cooperatively with the Osceola County Soil and Water Conservation District (OCSWCD) for the development of management plans to assist the landowner in stabilizing areas for water quality protection. Any strategy for mitigation offered by the OCSWCD will also be transmitted to the appropriate water management district to ensure that the management plan is consistent with district permitting requirements.

e. Best Management Practices

Industry-specific Best Management Practices (BMPs) have been defined as practices or combinations of practices, industrial techniques, and good housekeeping principles determined to be the most effective and practical known means of preventing or reducing the amount of non-point source pollution. A list of many industry-standard and specific BMPs is maintained by the FDEP at http://www.dep.state.fl.us/water/nonpoint/pubs.htm. The overall philosophy is to conduct everyday activities in an ecologically sound manner in order to keep pollutants out of the water. BMPs are meant to

protect and maintain the soil, air, and water resources and their associated dependent organisms.

In order to be effective, BMPs must be feasible, economically competitive practices, and must be tested under real conditions. They are subject to change as new and better practices are discovered and evaluated. Small and subtle changes in local conditions may result in quite different BMPs in order to achieve the same degree of protection. Local temperatures and rainfall must be considered to determine which BMPs are needed and appropriate.

In regards to private and public golf courses, the County is requiring the implementation of the University of Florida's Golf Course Best Management Plan program.

f. Monitoring

Past water quality monitoring in Osceola County detected pollution from agricultural or urban runoff in all watersheds excluding the Kissimmee River watershed. Problems associated with these types of pollution include high nutrient and bacterial levels, turbidity, aquatic plant growth, chemical pollution, and algal booms.

g. Safe Development Line

The safe development line is a mechanism for providing the long-term management of surface waters, wetlands, wildlife, and flood protection associated with the following lakes in Osceola County. In Osceola County, a safe development line is an elevation of one foot above the highest elevation of the regulated high pool stage, the mean high water level or the ordinary high water level (Lake Tohopekaliga's line is 1 ½ feet above due to its unique characteristics). The safe development line establishes where certain development activities may begin in relationship to lakes. The ordinary high water line and mean high water line shall be determined by the Florida Department of Environmental Protection. The regulation schedule high shall be determined by South Florida Water Management District. Non-water dependent Construction is prohibited from the safe development line to the water's edge and water-dependent construction, excavating, and clearing may be allowed with State and County approval and permits. The safe development line does not represent an ownership line.

The original safe development lines were established when the County's Comprehensive Plan was updated in the early 1990s and are based on levels designated by the County in cooperation with the Florida Fish and Wildlife Conservation Commission (FFWCC). The County, FFWCC, SFWMD, and FDEP determined, when the safe development lines were established, that these safe development lines, at the established levels, would protect the water quality, wildlife, and wildlife habitat associated with Osceola County lakes.

2. Groundwater

At the present, it is recognized that the County is expected to continue to experience rapid population growth in its urbanizing area, which coincidentally includes all of the County's high potential groundwater recharge area. Protection of the quality, quantity, and availability of the County's water resources is recognized as one of the highest priorities for the County's ongoing efforts. There are numerous threats to the County's water resources including contamination, increased demand from residential and agricultural users, and the potential of declining recharge rates that must continue to be part of the land use decision-making process undertaken by Osceola County. As increasing urbanization may lead to impacts on the water supply, the County will need to establish land use decision mechanisms to prevent adverse impacts to the water supply. It is the County's intention to investigate and implement mechanisms to protect its groundwater resources in the most effective and sensitive fashion possible, consistent with the procedures and authority established in the Florida Statutes. It is recognized that water is a public resource, and is hereby declared to be essential to the long-term health, safety, and welfare of the public. Further, the maintenance and viability of wetlands, lakes, streams, recharge areas, and agricultural activities are deemed to be of critical importance to the environment and the public health, safety, and welfare.

Federal, state, and local regulations have been enacted to protect existing groundwater resources and to prevent the negative impacts associated with excessive groundwater consumption. Extreme lowering of aquifer levels and surface water flows may adversely impact ecosystems by lowering lake levels and degrading wetlands and other natural systems and habitats. Other related negative impacts may include sinkhole frequency. The FDEP is involved in protecting, conserving, and restoring water supplies. Water management districts, which work in conjunction with the FDEP, are the agencies responsible for regulating and managing water use. The SJRWMD and the SFWMD have jurisdiction of Osceola County.

a. Protection of Recharge Areas

Local governments have some control of water supplies, as well as the state agencies mentioned above. A process known as recharge, which is the percolation of rainwater in the soil, maintains groundwater reserves. Significant amounts of recharge may only occur in areas possessing the special geological characteristics needed for recharge (Map 8-1). However, these well-drained areas are often subject to alteration since these areas are typically prime land for development. The development of impervious surfaces such as roads, buildings, and parking areas reduces the quantity of natural recharge to the aquifer. The quality of the water that is recharged into the aquifer is also a critical factor since impacts of development may compromise the quality of water. More information is provided and protection measures are addressed in the Natural Groundwater and Aquifer Recharge Element of this Comprehensive Plan.

b. Water Demand

The Kissimmee Basin Water Supply Plan, prepared by the SFWMD, is intended to provide a framework to address future water use decisions regarding current and future water supply for urban areas, agriculture, and the environment through the year 2020. Analysis contained in the *Kissimmee Basin Water Supply Plan* identified that Osceola and Orange Counties may be at a higher risk than other Counties within the District for harm to wetlands, significant saline water movement, and sinkhole formation, as a result of increased groundwater withdrawals.

However, the analysis completed under this planning effort is limited to identifying areas of risk associated with future withdrawals contributing to harm to groundwater resources. Identification of these areas does not imply harm will or will not occur, but instead provides guidance on the level of possible risk that may result from future groundwater withdrawals and identifies where additional research efforts may be focused. Three strategies were developed under the *Kissimmee Basin Water Supply Plan* to address the future water supply issues in the Orange-Osceola County Area. These include the following:

- Recharge to the Floridan Aquifer (through application of reclaimed water and stormwater)
- Demand reduction (through water conservation)
- Optimized use of the Floridan Aquifer and development of alternative sources (through continued testing and modeling of the Floridan Aquifer and development of surface water sources)

More information on the current status of the Plan can be found on SFWMD's web site: http://www.sfwmd.gov/org/wsd/wsp/kisswsp.htm. Further information on future water demands are addressed in the Potable Water Element of the Comprehensive Plan.

3. Wetlands

Many wetlands in Osceola County have suffered degradation due to human impacts. The federal government has a no net loss of wetlands policy. The County shall comply with and enforce the federal and state regulations regarding these impacts to support this policy. In addition, the County must mitigate past wetland damage by restoring and creating wetlands to the greatest extent possible.

a. Wetland Acquisition, Expansion, and Creation Programs

The County has acquired and expanded existing wetlands in order to mitigate public road projects. The County may in the future undertake additional measures to create new wetlands should the opportunity arise. Creation begins with upland, or non-wetland, ecosystems and attempts to modify the hydrology and topography in order to create saturated or inundated conditions. Modification of the soils and vegetation may be included in a creation design in order to facilitate the transition to a wetland system. It is typically the goal of creation projects to produce a self-sustaining wetland. Currently, the County has no plans to create wetlands from uplands. The County's current policy is to restore existing wetlands and uplands to increase wildlife functions and values.

1) Reedy Creek Swamp

Any future channelization may be carefully considered since further alterations to hydroperiod and flow regime may affect a significant loss of cover by preferable vegetation species and the encroachment of undesirable species such as blackberry, cat briar, grape and willow.

2) Davenport Creek Swamp

The grove/wetland combination of Davenport Creek Swamp generally does not have harmful effects on the wetlands, except for the lack of buffer or transition zones. This absence allows clearing and grove maintenance practices to occur adjacent to, and sometimes within, the

wetlands. These activities usually cause marked edge effects and heighten the probability of non-point source loading of nutrients, herbicides and pesticides because of reduced capability for natural assimilation of these materials before they enter the watershed's drainage system. To date, there has been a limited degree of urbanization of the watershed. Although mitigation practices have been common, it is anticipated that with future urban development of the area's uplands, some wetland degradation is still likely to occur.

3) Shingle Creek Swamp

As the creek approaches U.S. Highway 192, development of virtually all of the wetlands adjacent to the creek has dramatically altered the vegetative composition along the creek bank, and the flow regime has been altered to the extent that it is restricted to culvert flow beneath U.S. Highway 192. The impacts associated with this commercial development are such that the wetlands along this reach of Shingle Creek exhibit only moderate quality for hydroperiod and flow regime and low quality for vegetational attributes. However, in order to mitigate the significant loss of wetlands along U.S. Highway 192, many wetlands in urbanized areas have been restored as a result of the water management district's permitting process.

From just below U.S. Highway 192 downstream to approximately CR 531, Shingle Creek's wetlands are of moderate to high quality for both attributes. There has been little development to date along this reach; quality impacts are primarily restricted to edge effects associated with the conversion of adjacent uplands to pasture land.

Shingle Creek has been channelized south of CR 531 downstream to its egress to Lake Tohopekaliga. Channelization alone has not been a major form of degradation. However, these wetlands have been degraded to a low to very low level for both of the quality attributes due to the combination of channelization, wetland encroachment, conversion of adjacent uplands to residential and past agricultural land uses. This degradation is also evident in Shingle Creek's poor water quality where it discharges to Lake Tohopekaliga.

4) Kissimmee River Wetland System

The Kissimmee River System has undergone extensive channelization, resulting in considerable displacement of the system's wetlands. Several wetlands associated with this system have long since disappeared as a result of the Kissimmee River's channelization. However, the SFWMD has plans to restore the river's wetlands, which will include the backfilling of manmade canals and rerouting of the river to meander through its oxbows. In general, this system supports moderate quality wetlands in terms of hydroperiod/flow regime and vegetational species.

5) Boggy Creek

Boggy Creek enters Osceola County from Orange County, just south of Orlando International Airport. Boggy Creek's final discharge is into East Lake Tohopekaliga. Boggy Creek's water quality is considered poor to moderate according to records reviewed from the SFWMD and FDEP.

6) Bull Creek/Crabgrass Creek

The wetlands associated with Bull Creek are generally of moderate quality. The impacts that have been experienced are disturbances from agricultural activities, which include silvicultural activities, agricultural ditching, and clearing of native upland vegetation. Generally, elimination of groundcover adjacent to wetlands reduces the surface water filtering capacity necessary for water quality protection. Ditching may result in the lowering of the water table. This wetland system exhibits high to moderate quality values for hydroperiod and flow regime and vegetation species.

7) Three Lakes

The wetlands associated with Three Lakes Wildlife Management Area are generally of moderate to high quality. The impacts that have been experienced are disturbances from past agricultural activities which include silvicultural activities, agricultural ditching, and clearing of native upland vegetation. This wetland system exhibits high to moderate quality values for hydroperiod, wildlife, surface water flow regime, and native vegetation species.

8) Blue Cypress Creek

The wetlands associated with Blue Cypress Creek are generally of moderate to high quality. The impacts that have been experienced are disturbances from past agricultural activities which include silvicultural activities, agricultural ditching, and clearing of native upland vegetation. As with Three Lakes and Bull Creek, this wetland system also exhibits high to moderate quality values for hydroperiod, wildlife, surface water flow regimes, and native vegetation.

b. Protection and Conservation of Wetlands

In order to preserve wetlands, the most appropriate non-destructive use is passive recreation (such as nature walks), nature photography, wildlife observation, agriculture, and environmental education. Another possible use of poor-quality wetlands is for stormwater treatment, although due to their disrupted hydroperiod and flow regime, these wetlands may not be suitable for such use. The moderate-to-good quality wetlands in the County have a greater potential for protection and conservation and appropriate use. Portions of these wetlands may be preserved or conserved from development by public or private acquisition programs, encouragement of greenbelt designations, planned-unit development zoning, conservation easements and voluntary landowner cooperative management agreements.

Wetland systems to be considered for these programs include large riverine systems which possess the following qualities: perform important ecological functions; contain unique features, such as wildlife and plant communities; and include sizeable portions which remain relatively undeveloped. In light of the fact that these wetland communities have viable economic agricultural uses in the County, whenever possible, conservation must be given serious consideration rather than protection in all situations.

The County, in cooperation with the City of Kissimmee and SFWMD, is acquiring many of the moderate to good quality wetlands, such as with the acquisitions that are occurring along Shingle Creek and Reedy Creek. Additionally, in the County's current land development regulations, as well as with SFWMD permitting criteria, as development occurs in the County, the remaining wetlands left on the land being developed are typically placed into conservation by plat or by a conservation easement.

The basic framework for the acquisition, conservation, restoration, and protection of wetlands throughout all of Osceola County is provided through multiple regulatory permitting programs administered by regional, state, and federal agencies, as described below.

1) U.S. Army Corps of Engineers (USACOE)

The Corps works cooperatively with the County, SFWMD, FDEP, and FFWCC in the coordination of the Upper Kissimmee River Chain of Lakes drawdowns and high and low pool regulation of the lakes in the chain.

2) Florida Department of Environmental Protection (FDEP)

The FDEP works cooperatively with the County, SFWMD, USACOE and FFWCC in the coordination of the Upper Kissimmee River Chain of Lakes drawdowns, high/low pool regulation of the lakes in the chain, and Upland Invasive Species grant applications.

3) Water Management Districts

SFWMD and SJRWMD, in addition to their regulatory functions, provide wetlands conservation and protection through the Save Our Rivers (SOR) program. Through this programs, monies from the Water Management Lands Trust Funds are used to acquire the fee simple or other interest in lands the Districts deem necessary for water management, water supply, and the conservation, protection, and appropriate use of water (including wetlands) resources.

4) The Reedy Creek Improvement District (RCID)

The Reedy Creek Improvement District also exercises water-quality-related authority over the discharge of waters into its jurisdiction on a contractual agreement basis. RCID has also prepared a draft surface-water quality ordinance which includes provisions for wildlife, fish, other aquatic life, and recreational uses.

These programs are implemented by regulations designed to preserve the types and functional values of wetlands within the state. However, not all wetlands are afforded equal protection. To some extent the

degree of protection is influenced by agency staffing limitations and the size and quality of a wetland.

c. Wetland Mitigation Banks

Mitigation banking is defined as wetland restoration, creation, enhancement, and preservation undertaken expressly for the purpose of compensating for unavoidable wetland losses associated with development activities, when such compensation cannot be achieved at the development site or would not be as environmentally beneficial. Mitigation involves the consolidation of small, fragmented wetland mitigation projects into one large contiguous site. Units of restored, created, enhanced or preserved wetlands are expressed as "credits" for a developer, which may subsequently be withdrawn to offset "debits" incurred at a project development site.

By consolidating compensation requirements, banks may more effectively replace lost wetland functions within a watershed, as well as provide economies of scale relating to the planning, implementation, monitoring and management of mitigation projects. The USACOE, Jacksonville District, in conjunction with state, federal, and local agencies have completed the Joint state/federal Mitigation Bank Review Team Process for Florida.

There are currently thousands of acres of mitigation lands or dedicated conservation lands existing in Osceola County. These are sites that are in conservation easements for wetland impacts associated with construction that has occurred in the County.

4. Air Quality

Currently, air quality in Osceola County is good. However, with the County's projected population and increased tourist and commercial activity and urbanization in surrounding areas, there is the concern that the potential for air quality degradation is increasing. However, good air quality may be maintained in the County by monitoring current air quality and initiating actions to prevent air quality degradation.

a. Monitoring

The County may consider the establishment of an air quality monitoring station as a priority. The establishment of an air quality monitoring station would be significant in detecting air quality problems in sufficient time to address problems before they become insurmountable. Rises in carbon

monoxide, lead, nitrogen and ozone, which result from the increase in motor vehicles due to urbanization are the pollutants that must be monitored.

b. Management

In order to appropriately manage the factors that lead to poor air quality, they must first be recognized. This may be accomplished using the following methodologies.

1) Evaluation

Future developments may be evaluated for their cumulative effects on air quality during the development review process. Air quality impact analyses may be prepared for those development and transportation projects suspected of causing violations of state air quality standards.

2) Consistency with Land Use

Land uses must be compatible with the maintenance of good air quality. Urban land uses may be buffered from stationary and linear pollution sources (roadways). Vegetation may be utilized, when possible to buffer air pollution sources. Facilities for housing the elderly, very young and sick must be located away from emission sources and encourage development designs that reduce automobile trips. The inclusion of design features such as bicycle facilities and sidewalks in transportation projects, office parks, multifamily residential projects and commercial areas will encourage other forms of travel. Constructing multi-use developments, such as multi-use centers and planned developments, will also promote other modes of travel.

3) Relationship to Transportation Element

The primary efforts to control Carbon Monoxide (CO) emissions from motor vehicles are centered on the emission limitations mandated through the Federal Motor Vehicle Control Program (FMVCP) under the Clean Air Act. The FMVCP sets forth a schedule of continued reduction of CO from new motor vehicles. Despite increases in vehicle-miles traveled in the urban areas of Osceola County associated with population growth, the area wide emissions of CO will decrease as a result of FMVCP. Emissions of CO may increase, however, in a local area of increased traffic congestion.

As determined in the Transportation Element, existing traffic patterns within the City are such that large concentrations of traffic seldom accumulate for long periods of time. This helps to negate the possibility of large concentrations of carbon monoxide from forming. Therefore, the consideration of air quality in transportation planning is necessary to prevent potentially harmful concentrations of CO from occurring in traffic-congested areas.

5. Hazardous and Household Chemical Waste

Improper handling, storage, disposal, and use of household chemical waste are major considerations in hazardous waste management. The improper management of these substances poses threats to the environment, particularly water quality, and to the general public. While the entire County is dependent on the use of hazardous materials in some fashion or form, it is essential that hazardous wastes, including household chemical wastes, be managed to provide the maximum protection to the environment and general public.

a. Adequate Facilities

Adequate facilities for collection, storage, and disposal are necessary in protecting the County's population and environment from the negative effects of hazardous waste. Public education on proper disposal methods is critical in achieving this.

1) Collection and Storage

The Household Chemical Collection Center, which was removed from the Southport Road Landfill, located at the Bass Road Landfill and offers the community a facility for the collection and storage of waste oils and used batteries (Exhibit 4-1). A new collection center is also located at the St. Cloud Transfer Station on Pug Mill Road.

2) Disposal

The establishment of a chemical waste disposal facility for households and Mobile Collection Amnesty Days are long-term management tools for the control of hazardous waste. These facilities provide households and low-volume generators with the opportunity to regularly dispose of hazardous waste.

3) Public Education

Educating private households about the hazardous waste situation is another approach to the management of household waste. In the past, most hazardous-waste education efforts have only focused on education of small-quantity generators. The objective of a program for private households is to change buying and usage habits of hazardous materials and in turn decrease the amount of improperly disposed household waste.

6. Commercially Valuable Mineral Resources

Excavation activities in Osceola County have historically been confined to the mineral resources which are economical to excavate for local consumption.

a. Future Mineral Supply and Demand

The primary mineral resource that is actively mined in the County is sand. At this time, there is no anticipation of any reduction in the future demand for sand.

b. Effects of Mining

Since the very nature of mining usually involves major alterations to the configuration of the landscape, environmental impacts associated with mining

are inevitable. The elimination or displacement of native wildlife resulting from use of heavy equipment, land clearing or changes in the drainage patterns or water levels is one of the most visible impacts of mining. Water quality impacts associated with mining are caused by sediment runoff, discharges into water resources, and removal of vegetative buffers. Other impacts are air and noise pollution. The County has an ongoing program to restore commercial sand mines that are proposed for closing as defined in the Land Development Code.

c. Protective Regulations

Osceola County sets forth reasonable standards for soil excavation to protect the health, safety, and welfare of the County's population. Soil excavation is only allowed within rural and agricultural areas and conservation zoning districts, which are located outside of the urban service area. The LDC details review, setback, and inspection criteria, as well as standards for ground and surface water, and reclamation of the mined areas.

d. Restoration

Restoration of borrow pits may be accomplished by refilling the mine with muck soils to create wetlands or shaping them to mimic natural lakes. On one occasion, the County restored, to natural habitat, a mine in the western part of the County. The restored mine is referred to as Oak Island Mitigation Site. No other mines have been restored, other than what is required in the Land Development Code. Approximately 23 borrow pits have been recontoured to encourage littoral zone vegetation and replanted with trees on banks and adjacent uplands.

7. Soil Erosion

The major problem that erosion causes is the loss of topsoil. Loss of topsoil is damaging for essentially two reasons. First, productivity is reduced as topsoil is lost. The loss of topsoil is especially damaging for soils that have a spodic layer in or below the subsoil limiting the depth of the root zone. Secondly, soil erosion results in sedimentation that may suffocate benthic organisms and disrupt food chains. In addition, sedimentation may promote or accelerate lake eutrophication by increasing phosphorus loadings. The County and state (SFWMD or FDEP) require all developments that interface with wetlands to install silt barriers, and when activity occurs in surface waters, turbidity barriers are required.

Generally, soil erosion is not a major problem in Osceola County. However, practices are frequently necessary for certain known soil erosion problems. The County cooperates with the Osceola Soil and Water Conservation District in the development of management plans to assist in mitigating the problem of soil erosion on a case-by-case basis. To afford protection from erosion, siltation and fugitive dust typically caused by development, land clearing, and building operations, the County shall implement BMPs for exposed, destabilized, or otherwise altered soil. These include, but are not limited to NPDES BMPs or those listed on FDEP's web site for erosion control (http://www.dep.state.fl.us/water/nonpoint/pubs.htm).

8. Vegetative Communities

Vegetative communities are unique groupings of plants, and a wide variety of vegetative communities exist in Osceola County. Several of these vegetative communities are sensitive and significant areas which must be given special recognition. Map 9-8 contains plant community and landcover data for Osceola County. This map was compiled by the FWC as a State-wide landcover project using 2003 imagery.

a. Sensitive and Significant Areas

Since upland communities are usually less costly to develop than wetland plant communities and since they do not enjoy the amount of legal protection that wetlands enjoy, they are extremely vulnerable to human encroachment. However, upland plant communities warrant protection and conservation because the unique conditions found in them are home to several sensitive plants and animals. Two upland communities, the sand-pine scrub and dry prairie, are the home of plant communities imperiled in the state because of rarity or vulnerability to extinction due to biological or human factors.

Uses in these areas must incorporate conservation techniques to assure the co-existence of the flora and fauna with these uses. The longleaf pine/ turkey oak hills and sand-pine scrub communities occurring on the Lake Wales Ridge in northwest Osceola County have also been given special recognition. These communities are considered unique and rare by state and federal agencies because they represent the oldest habitats in Florida. Approximately 37 rare species of plants and animals that do not typically occur anywhere else in the world dwell in this area.

b. Exotic/Nuisance Species

Several exotic plant species are known to exist in Osceola County. These species are considered undesirable due to growth characteristics, which may result in human health problems and the elimination of habitat for more desirable native vegetative species. The County's Land Development Code establishes regulations for clearing development sites of these trees. However, clearing must first be approved by the County's Planning Department. All Category I and II exotic and invasive plant species, as defined by Florida Exotic Pest Plant Council, are approved for eradication. One option for Osceola County is to pursue state and federal grant money to help fund the eradication program.

c. Upland Buffers

Upland communities may be protected through mechanisms such as Planned Development zoning. This zoning may be used to negotiate higher development densities on part of a site in exchange for lower densities elsewhere. Other mechanisms available for the protection of significant ecosystems include voluntary landowner participation in fee simple purchases, open-space designations, conservation easements, voluntary landowner cooperative management agreements, rules and standards for land clearing and landscaping, which provide for the management and protection of wildlife through criteria and regulations for alteration activities and other land clearing activities and greenbelt status.

9. Threatened and Endangered Species

Habitat degradation and destruction have been cited by biologists and environmentalists as primary causes for reduction and loss of species in Osceola County. According to the Florida Natural Areas Inventory, as of October, 2005, the County provides habitat for 53 plant and animal species under special protection laws. Unfortunately, special protection laws, in the past, have been species-oriented, with little or no concern for habitats. Regulating and monitoring species cannot guarantee preservation without protection and conservation for a diversity of native habitats.

Map 9-9 shows the FFWCC's Intergrated Wildlife Habitat Ranking System. It is a process for identification and ranking of landscape level habitat areas that are important to a broad array of wildlife and plant species. The ranking system provides a scored map depicting habitat values ranging from 1 to 10 based on a composite score of many important variables that collectively represent quality habitat. The higher the habitat scores, the higher the quality. This model can also be used as a

decision making tool to map wilderness resource areas and as a compliment to make many other natural resource decisions. As part of the ranking matrix, it considers Landsat thematic imagery, the location of all public land as defined by the FNAI, the FFWCC Strategic Habitat and Wildlife Potential models, the location of all Greenway, CARL and SOR lands, and the location of all known Protected Species.

10. Commercial, Recreational, and Conservational Uses of Natural Resources

Commercial, recreational, and conservation uses of natural resources may be economically beneficial to the County when properly managed. Smart growth also utilizes these resources in a sustainable manner. This sustainability allows for the best use of conservation areas. The following aspects may be considered when using Smart Growth planning practices:

a. Commercial

As discussed in the inventory, the commercial forestry industry is a viable economic industry in Osceola County. Without proper management (BMPs), these operations can have a significant effect on the surrounding environment. Degradation of water quality is a potential problem. Sediment due to erosion from logging roads, paths made from dragging logs on the ground, harvest areas, and scouring of watercourse banks due to rapid runoff from harvested land surfaces, organic matter from logging residues, and the exposure of streams to the sun caused by tree removal along watercourse banks are potential sources of water pollution generated by the forestry industry.

The use of acceptable forestry practices is extremely important to minimize the potentially adverse effects of forestry operations on the environment. The Florida Division of Forestry has developed Best Management Practices, which illustrate practices that may be used to alleviate environmental impacts associated with the forestry industry. The Division's forester for Osceola County is available to assist landowners in developing sound forest management plans. In addition, BMPs prepared by FDACS, specific to silviculture, are shown on the FDEP's online list of BMPs http://www.dep.state.fl.us/water/nonpoint/pubs.htm.

b. Recreational

The managed public conservation areas within the County must be protected in order to provide recreational opportunities, enhance the resource base, and

retain the economic opportunities and benefits associated with the areas. These conservation areas must be seen not just as space remaining after development, but as an essential element determining the character and quality of the County. As mentioned previously, one method of preserving wetland areas is to use them as passive recreation opportunities. The managed wildlife and nature preserves discussed in the inventory section are used to preserve sensitive areas, while functioning as passive recreational opportunities.

c. Conservation

The development review process is one mechanism that must be used by the County to provide protection for the conservation areas. The County may alleviate the environmental problems caused by development adjacent to public conservation areas through the review of proposed developments in adjacent areas for potential impacts on the hydrology, water quality, air quality, ambient noise level; wildlife populations, natural ecosystems, and aesthetics of the public conservation areas during the development approval process. The state agency responsible for maintaining the affected area and the East Central Florida Regional Planning Council are agencies that must be included in the review.

1) Greenway Programs

The County is currently working on a master greenway plan for the County and is working cooperatively with FDEP on the development of a regional master greenway plan, into which the County's plan is integrated.

2) Restoration Programs

The County is currently working with SFWMD, FDEP and USACOE on the drawdowns that occur in the Upper Kissimmee Chain of Lakes. The drawdowns and subsequent de-mucking that occurs provides five to seven years of restoration to the fisheries and wildlife values associated with the lakes.

Maintaining Florida's natural fire regime is also an important strategy for preserving the health and species diversity of ecosystems that are dependent on periodic fire events. Map 9-10 shows the areas prone to burn as part of Florida's fire ecology. Areas shown as moderate to

high potential for burning are: oak and pine scrub, pinelands, dry prairies, shrub and brushlands and grasslands. These fire-dependent ecosystems were identified and described from *Ecosystems of Florida* (Myers, R. and Ewel, J., 1990).

3) Land Acquisition Programs

Osceola County will continue to use Ordinance 04-28 to identify and protect, through an acquisition program, environmentally significant lands and green spaces that contain natural upland or wetland communities, native plant communities, rare and endangered flora and fauna, endemic species, endangered species habitat, a diversity of species, significant water resources, or outstanding aesthetic, recreational, or other natural features; maximizing protection of the County's habitats.

Osceola County, through the Land Conservation Advisory Board (LCAB), shall coordinate with the State of Florida Conservation and Recreation Lands (CARL), Florida Communities Trust (FCT), and Save Our Rivers (SOR) programs to complement the lands acquired through local sources and to facilitate management plans designed to preserve or enhance onsite/adjacent listed species and their habitats. One option is for Osceola County to coordinate with private land trusts, such as The Nature Conservancy and the Trust for Public Land, to acquire and manage environmentally sensitive lands.

4) Education

The Osceola County Cooperative Extension Office offers educational programs to help businesses, residents, and visitors become aware of the many issues that impact the natural world as well as the quality of life. The office coordinates the following activities to educate the public about the conservation of natural resources:

- Teaching the public how the community may continue to grow with less impact on the environment.
- Assisting businesses and organizations involved in eco and heritage tourism in protecting the natural, cultural, and historic resources through education of their customers and patrons.
- Developing a countywide plan for a network of greenways and trails.

In addition, the Osceola County Extension Office is currently building a Construction Education Center. The Osceola Construction Education Center is being planned as a joint project funded by the University of Florida, the Osceola County School District, Osceola County, and local businesses. The center will provide opportunities for a variety of classes and demonstrations relating to environmentally friendly construction, energy conservation, water conservation, materials selection, wind storm damage reduction, and universal design for life-long living.

5) Surface Water Conservation

To offer protection of specific surface waters, Osceola County has developed conceptual management plans for two properties which are both owned by the state of Florida and the FFWCC. Makinson Island and Paradise Island are located in the northern portion of Lake Tohopekaliga.

Makinson Island, which is an approximately 131.59-acre island, was purchased by the state of Florida in 1999. Paradise Island, an approximately 88.26-acre island, was purchased in 2000. The FFWCC acquired both properties with Preservation 2000 monies utilizing the Trust for Public Land as an intermediary. Both islands are primarily managed by FFWCC with Osceola County, the Osceola County School Board, and the City of Kissimmee as cooperating agencies. In addition, Valencia Community College is a cooperating agency in the management of Paradise Island.

The primary reason for the recent acquisition of Makinson and Paradise Islands by the state was to prevent development of facilities which would have functions and clientele that would stand in opposition to lake management techniques, such as extreme drawdowns, necessary for maintaining healthy fish and wildlife habitat in Lake Tohopekaliga. The acquisition of the islands will allow low-impact public usage, such as resource-based education and recreation, consistent with acquisition objectives.

6) Groundwater Conservation

Over the life of this Plan, raw water is seen as one of the most critically valuable commercial resources for the future of both the residents of Osceola County and the citizens of Florida at large. Both the Floridan and Surficial Aquifers are utilized in Osceola County and the continuing economic viability of the County will be dependent upon the raw water deposits in these aquifers. Further, the maintenance of traditional water levels in wetlands, lakes, streams, and farm areas is of critical importance to the environment as well as the economy of the County. Protection of the quality, quantity, and availability of the County's water resources is recognized as one of the highest priorities for the County's ongoing efforts. Recognizing that the regulation of the consumptive use of water is within the exclusive authority of the FDEP and the water management districts, it is the County's intention to coordinate and communicate with the respective Water Management Districts and the Florida Department of Environmental Protection regarding the investigation and implementation of mechanisms to manage the utilization of its groundwater resources in the most effective and sensitive fashion possible.

Though the County is not currently a public-water supplier, the County should, at a minimum, require large-scale utilities to practice water conservation through the reuse of non-potable water. Osceola County shall implement the use of BMPs specific to groundwater conservation and/or quality shown on the FDEP's list of BMPs: (http://www.dep.state.fl.us/water/nonpoint/pubs.htm). It is the County's expressed intent that additional control be exercised over the water resources found in Osceola County, consistent with the procedures and authority established in the Florida Statutes, and to that end the County will explore all avenues pertaining to the management of vital water resources.

D. CONCLUSION

Osceola County includes over 100,300 acres of major water bodies, 221,034 acres of wetlands, and is home to 53 Federally or State-listed plant and animal species, and includes many non-renewable natural resources. Boating, fishing, hiking, and wildlife watching continue to become an increasing part of the popular eco-tourism industry. Therefore, it is vital for Osceola County to promote the conservation, use, and protection of its natural resources. As the growing population and associated developments continue to place increasing pressures and demands on the County's natural resources, it becomes more important for the County to review and amend its regulations and policies in order to sustain these resources for future generations.

Groundwater is the principal source of freshwater in Osceola County. Approximately 90% of the water used in the County is supplied by the Floridan Aquifer, while 10% comes from the surficial aquifer. According to the *Water 2020: Water for the Future* report, the northwest portion of the County is experiencing lowering of the water table due to the large water demand in that area. The main recharge areas for the Floridan Aquifer are found along and adjacent to the Lake Wales Ridge, parts of which are also located in the northwest portion of the County.

Currently, air quality in Osceola County is good and the population and industrial growth have not been sufficient to warrant a monitoring station. However, the projected growth in the County and surrounding areas may soon require the County to consider the establishment of an air quality monitoring station. The establishment of a monitoring station would be significant in detecting air quality problems in sufficient time to address problems before they become insurmountable.

Many wetlands in Osceola County have suffered degradation due to human impacts. Wetlands provide many important functions such as providing vital fish and wildlife habitats, acting as storage areas for excess surface water, and improving water quality as impurities enter the wetland and are filtered through the vegetation.
Therefore, it is pertinent that measures be taken, such as land acquisitions, increased buffers, and stricter development standards, to curb any future degradation. In addition, the County must mitigate past wetland damage by restoring and creating wetlands to the greatest extent possible.

The County must continue to evaluate the overall environment, perform detailed studies as needed, search for outside funding sources to acquire environmentally significant lands, modify regulations as necessary to reduce or eliminate adverse environmental loss and pollution, and remain compliant with other regulatory agencies. The County's current land development regulations are in their infancy, but will likely require significant changes in

scope and effect in the near future. The County must develop a better understanding of its existing natural resources, so future development may be designed and developed appropriately. Lack of significant environmental planning in the near future, may require substantially more costly development later. Frequent updates and revisions to the County's Land Development Code, specifically the land management and wetlands chapters will help to provide the detailed analysis of all land development and land management issues, and recommend how expenditures and efforts may be most effectively utilized in the foreseeable future.

Table 9-1: Osceola County FDEP Permitted Air Pollution Sites

#	OWNER	SITE	ADDRESS	CITY	AIRS ID.	DESCRIPTION
1	Kissimmee Utility Authority	Roy B. Hansel Power	102 Lake Shore Blvd	Kissimmee	097001	Power Plant
2	St Cloud City Power Plant	Same as Owner	1718 Tenth St.	St. Cloud	097002	Power Plant
3	Hanson Pipe and Products	Same as Owner	1150 Joelson Road	Kissimmee	097004	2 Silos (Concrete Batch
4	Fl Dept. Of Agriculture	Same as Owner	2700 N.Bermuda Ave.	Kissimmee	097005	Animal Cremator
5	Quaker Oats Company	Kissimmee Plant	1650 S. Poinciana	Kissimmee	097007	Citrus Processor
6	Rinker Materials	Kissimmee Plant	732 N. Central Ave.	Kissimmee	097009	Concrete Plant
7	Comptech Antenna Systems	Same as Owner	3100 Communications Road	St Cloud	0970010	Fiberglass Antenna Reflectors
8	Rmc Ewell Inc	St Cloud Plant	4820 E. Irlo Bronson Memorial Highway.	St Cloud	0970013	Concrete Batch Plant
9	Florida Power Corporation	Intercession City Plant	6525 Osceola Polk County Line Road	Inter. City	0970014	Power Plant
10	Sci Funeral Services of Fl	Grissom Funeral Home	803 Emmett St	Kissimmee	0970017	Human Crematory
11	Ewell Industries	Same as Owner	3501 Pugmill Road	Kissimmee	0970018	Concrete Batch Plant
12	Florida Rock Industries	Same as Owner	49 Neptune Road	Kissimmee	0970024	Concrete Batch Plant/Block Plant
13	Florida Rock Industries	Same as Owner	170 Delores Drive	Kissimmee	0970028	Unknown
14	Apac-Florida, Inc.	Kissimmee Asphalt Plant	733 E. Duncan St	Kissimmee	0970030	Asphalt Plant
15	Soil Treatment Services, Inc.	Same as Owner	3505 Pugmill Road	Kissimmee	0970032	Soil Remediation Plant
16	Cargill, Inc.	Cargill Animal Nutrition	1845 Avenue A	Kissimmee	0970034	Animal Feed
17	Cellofoam North America	Same as Owner	325 W Magnolia St	Kissimmee	0970036	Rigid Board Insulation
18	Buns Unlimited	East Balt Bakery	1108 Collins Dr.	Kissimmee	0970037	Food and Kindred Products
19	Windsor Metal Specialties	Same as Owner	1820 Avenue A	Kissimmee	0970037	Electrostatic Coating System
20	Kissimmee Utility	KUA Cane	KUA Cane Island	Inter. City	0970043	Power Plant

	Authority	Island Power Park Cogeneration Plant	Power Park			
#	OWNER	SITE	ADDRESS	CITY	AIRS ID.	DESCRIPTION
21	Walt Disney World Company	Same as Owner	3499 West Buena Vista Drive	Kissimmee	0970044	Surface Coating Operation
22	Young's Drycleaners	Diamond Cleaners	1312 E. Vine St.	Kissimmee	0970048	Personal Services-Dry Cleaners
23	Town N' Country Cleaners	Same as Owner	3147 West Vine St.	Kissimmee	0970049	Personal Services-Dry Cleaners
24	Frontier of Central Florida Inc.	Frontier Cleaners	1310 John Young Parkway	Kissimmee	0970053	Personal Services-Dry Cleaners
25	Phoenix Marble Inc.	Southeast Marble	500 N. Hoagland Blvd.	Kissimmee	0970054	Personal Services-Dry Cleaners
26	Dixie Cleaners	Same as Owner	4038 13th St	St. Cloud	0970058	Personal Services-Dry Cleaners
27	Jeld-wen Inc.	Doorcraft of Florida	1700 Avenue A	Kissimmee	0970059	Apparel & Other Finished Products
28	Cemex, Inc. (was Southdown)	Kissimmee Plant	2441 Smith Street	Kissimmee	0970060	Concrete Plant
29	Phu Lock of Kissimmee	Formosa Garden	7854 Irlo Bronson Memorial Highway	Kissimmee	0970062	Personal Services-Dry Cleaners
30	J. Herbert Corp.	Same as Owner	1751 S. Bermuda Ave.	Kissimmee	0970062	Nonclassifiable Establishment
31	Debeers Cleaners	Same as Owner	1901 W. Vine Street	Kissimmee	0970064	Personal Services-Dry Cleaners
32	Kuber Inc.	Metro Cleaners	1220 E. Vine St.	Kissimmee	0970065	Personal Services-Dry Cleaners
33	Ldc of Kissimmee Inc.	Love Dry Clean	1125 Vine St.	Kissimmee	0970066	Personal Services-Dry Cleaners

Table 9-2: Listed Plant and Animal Species in Osceola County

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Occurrence Status
Amphibians						
Rana capito	Gopher frog	G4	S3	N	LS	P
Reptiles						
Alligator Mississippiensis	American alligator	G5	S4	T(S/A)	LS	C
Drymarchon corais couperi	Eastern indigo snake	G4T3	S3	LT	LT	C
Eumeces egregious lividus	Blue-tailed mole skink	G4T2	S2	LT	LT	C
Gopherus polyphemus	Gopher tortoise	G3	S3	N	LS	C
Neoseps reynoldsi	Sank Skink	G2	S2	LT	LT	C
Pituophis melanoleucus mugitus	Florida pine snake	G4T3?	S3	N	LS	-
Birds						
Ammodramus savannarum floridanus	Florida grasshopper sparrow	G5T1	S1	LE	LE	C
Aphelocoma coerulescens	Florida scrub-jay	G3	S3	LT	LT	C
Aramus guarauna	Limpkin	G5	S3	N	LS	C
Caracara plancus	Crested caracara	G5	S2	LT	LT	C
Egretta caerulea	Little blue heron	G5	S4	N	LS	C
Egretta thula	Snowy egret	G5	S4	N	LS	C
Egretta tricolor	Tricolored heron	G5	S4	N	LS	C
Eudocimus albus	White ibis	G5	S4	N	LS	C
Falco peregrinus	Peregrine falcon	G4	S2	LE	LE	P
Falco Sparverius paulus	Southeastern American kestrel	G5T3T4	S3?	N	LT	C
Grus Americana	Whooping Crane	G1	SXC	XN	LS	C
Grus Canadensis pratensis	Florida sandhill crane	G5T2T3	S2S3	N	LT	C

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Occurrence Status
Haliaeetus leucocephalus	Bald eagle	G4	S3	LT	LT	C

Mycteria americana	Wood stork	G4	S2	LE	LE	C
Pandion haliaetus	Osprey	G5	S3S4	N	LS**	C
Picoides borealis	Red-cockaded woodpecker	G3	S2	LE	LT	C
Rostrhamus sociabilis plumbeus	Snail kite	G4G5T1	S1	LE	LE	C
Speotyto cunicularia floridana	Florida burrowing owl	G4T3	S3	N	LS	C
Mammals						
Felis concolor coryi	Florida panther	G5T1	S1	LE	LE	P
Podomys floridanus	Florida Mouse	G3	S3	N	LS	C
Sciurus niger shermani	Sherman's fox squirrel	G5T2	S2	N	LS	C
Ursus americanus floridanus	Florida black bear	G5T2	S2	C	LT**	C
Vascular Plants						
Andropogon arctatus	Pine-woods bluestem	G3	S3	N	LT	C
Asclepias curtissii	Curtiss' milkweed	G3	S3	N	LE	C
Bonamia grandiflora	Florida Bonamia	G3	S3	LT	LE	C
Calopogon multiflorus	Many-flowered Grass-pink	G2G3	S2S3	N	LE	-
Carex chapmanii	Chapman's sedge	G3	S3	N	LE	-
Chionanthus pygmaeus	Pygmy fringe tree	G3	S3	LE	LE	C
Conradina brevifolia	Short-leaved rosemary	G2Q	S2	LE	LE	C

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Status	Occurrence Status
Conradina grandiflora	Large-flowered rosemary	G3	S3	N	LE	C
Erigonum longifolium var gnaphalifolium	Scrub buckwheat	G4T3	S3	LT	LE	C
Lechea cernua	Nodding pinweed	G3	S3	N	LT	C
Lupinus westianus var aridorum	Scrub lupine	G2T1	S1	LE	LE	C
Nemastylis floridana	Fall-flowering ixia	G2	S2	N	LE	C
Nolina atopocarpa	Florida beargrass	G3	S3	N	LT	C
Nolina brittoniana	Britton's beargrass	G2	S2	LE	LE	C
Ophioglossum palmatum	Hand Fern	G4	S2	N	LE	
Panicium abscissum	Cutthroat grass	G2	S2	N	LE	C
Paronychia chartacea ssp chartacea	Paper-like nailwort	G3T3	S3	LT	LE	C
Platanthera integra	Yellow fringeless orchid	G4	S3S4	N	LE	C
Polygala lewtonii	Lewton's polygala	G2	S2	LE	LE	C
Polygonella myriophylla	Small's jointweed	G3	S3	LE	LE	C
Prunus geniculata	Scrub plum	G2G3	S2S3	LE	LE	C
Pteroglossaspis ecristata	Giant orchid	G2G3	S2	N	LT	C
Warea amplexifolia	Clasping warea	G1	S1	LE	LE	C
Zephyranthes simpsonii	Rain lily	G2G3	S2S3	N	LT	C

Source: Florida Natural Areas Inventory and Land Design Innovations, 2001
A legend may be found on the following pages.

FNAI GLOBAL RANK DEFINITIONS

G1 = Critically imperiled globally because of extreme rarity (5 or fewer occurrences or less than 1000 individuals) or because of extreme vulnerability to extinction due to some natural or man-made factor.
G2 = Imperiled globally because of rarity (6 to 20 occurrences or less than 3000 individuals) or because of vulnerability to extinction due to some natural or man-made factor.
G3 = Either very rare and local throughout its range (21-100 occurrences or less than 10,000 individuals) or found locally in a restricted range or vulnerable to extinction from other factors.
G4 = Apparently secure globally (may be rare in parts of range)
G5 = Demonstrably secure globally
GH = Of historical occurrence throughout its range, may be rediscovered (e.g., ivory-billed woodpecker)
GX = Believed to be extinct throughout range
GXC = Extirpated from the wild but still known from captivity or cultivation
G#? = Tentative rank (e.g., G2?)
G#G# = Range of rank; insufficient data to assign specific global rank (e.g., G2G3)
G#T# = Rank of a taxonomic subgroup such as a subspecies or variety; the G portion of the rank refers to the entire species and the T portion refers to the specific subgroup; numbers have same definition as above (e.g., G3T1)
G#Q = Rank of questionable species - ranked as species but questionable whether it is species or subspecies; numbers have same definition as above (e.g., G2Q)
G#T#Q = Same as above, but validity as subspecies or variety is questioned.
GU = Due to lack of information, no rank or range may be assigned (e.g., GUT2).
G? = Not yet ranked (temporary)

FNAI STATE RANK DEFINITIONS

S1 = Critically imperiled in Florida because of extreme rarity (5 or fewer occurrences or less than 1000 individuals) or because of extreme vulnerability to extinction due to some natural or man-made factor.
S2 = Imperiled in Florida because of rarity (6 to 20 occurrences or less than 3000 individuals) or because of vulnerability to extinction due to some natural or man-made factor.
S3 = Either very rare and local throughout its range (21-100 occurrences or less than 10,000 individuals) or found locally in a restricted range or vulnerable to extinction from other factors.
S4 = Apparently secure in Florida (may be rare in parts of range)
S5 = Demonstrably secure in Florida
SH = Of historical occurrence throughout its range, may be rediscovered (e.g., ivory-billed woodpecker)
SX = Believed to be extinct throughout range
SA = Accidental in Florida, i.e., not part of the established biota
SE = An exotic species established in Florida may be native elsewhere in North America
SN = Regularly occurring, but widely and unreliably distributed; sites for conservation hard to determine

FEDERAL LEGAL STATUS

Provided by FNAI for information only. For official definitions and lists of protected species, consult the relevant federal agency.
LE = Endangered: species in danger of extinction throughout all or a significant portion of its range.
LT = Threatened: species likely to become Endangered within the foreseeable future throughout all or a significant portion of its range.
E(S/A) = Endangered due to similarity of appearance to a species which is federally listed such that enforcement personnel have difficulty in attempting to differentiate between the listed and unlisted species.
T(S/A) = Threatened due to similarity of appearance (see above).
PE = Proposed for listing as Endangered species.
PT = Proposed for listing as Threatened species.
C = Candidate species for which federal listing agencies have sufficient information on biological vulnerability and threats to support proposing to list the species as Endangered or Threatened.
XN = Non-essential experimental population.
MC = Not currently listed, but of management concern to USFWS.
N = Not currently listed, nor currently being considered for listing as Endangered or Threatened.

STATE LEGAL STATUS

Provided by FNAI for information only. For official definitions and lists of protected species, consult the relevant federal agency.
LE = Endangered: species, subspecies, or isolated population so few or depleted in number or so restricted in range that it is in imminent danger of extinction.
LT = Threatened: species, subspecies, or isolated population facing a very high risk of extinction in the future.
LS = Species of Special Concern is a species, subspecies, or isolated population which is facing a moderate risk of extinction in the future.
PE = Proposed for listing as Endangered.
PT = Proposed for listing as Threatened.
PS = Proposed for listing as Species of Special Concern.
N = Not currently listed, nor currently being considered for listing.
LE = Endangered: species of plants native to Florida that are in imminent danger of extinction within the state, the survival of which is unlikely if the causes of a decline in the number of plants continue; includes all species determined to be endangered or threatened pursuant to the U.S Endangered Species Act.
LT = Threatened: species native to the state that are in rapid decline in the number of plants within the state, but which have not so decreased in number as to cause them to be Endangered.
PE = Proposed for listing as Endangered.
PT = Proposed for listing as Threatened.
N = Not currently listed, nor currently being considered for listing.

SPECIAL ANIMAL LISTINGS - STATE AND FEDERAL STATUS

Grus americana (whooping crane) - Federally listed as XN (nonessential experimental population) which refers to the Florida experimental population only; Federal listing elsewhere is LE.
Pandion haliaetus (osprey) - State listed as LS (Species of Special Concern) in Monroe county only; not listed in rest of state.
***Mustela vison mink* pop1** (southern mink, S. Florida population) - State listed as LT (Threatened) which refers to the Everglades population only; species formerly listed as *Mustela vison evergladensis*.
Ursus americanus floridanus (Florida black bear) - State listed as LT but not applicable in Baker and Columbia counties or the Apalachicola National Forest.

COUNTY STATUS

Vertebrates and Invertebrates:
C = (Confirmed) Occurrence status derived from a documented record in the FNAI database.
P = (Potential) Occurrence status derived from a reported occurrence for the county or the occurrence lies within the published range of the taxon.
N = (Nesting) For sea turtles only; occurrence status derived from documented nesting occurrences

Plants, Natural Communities, and Other:
C = (Confirmed) Occurrence status derived from a documented record in the FNAI database or from a herbarium specimen.
R = (Reported) Occurrence status derived from published reports.

Table 9-3: Osceola County Trails

Nature Trails	Paved Trails
Bull Creek Wildlife Management Area	Archie Gordon Memorial Park Path
Triple N Ranch Wildlife Management Area	Kissimmee Lake Front Park
Lake Lizzie Nature Preserve	St. Cloud Lake Front Park
Peghorn Nature Park	Pleasant Hill Road Recreational Pathway
The Nature Conservancy's Disney Wilderness Preserve	Shingle Creek Trail
Forever Florida	
Osceola County Schools Environmental Center	
Prairie Lakes Wildlife Management Area	
Split Forest Mitigation Park	
Ralph Chisholm Park	
Three Lakes Wildlife Management Area	

Source: Kissimmee-St. Cloud Convention and Visitors Bureau, 2001

Table 9-4: Osceola County Mitigation Lands

Mitigation Land	Easement to	For Construction of
Poinciana Scrub Island Preserve	SFWMD	Doral Woods
Shingle Creek East and West Mitigation Sites	FDEP/SFWMD	Osceola Parkway extension
Oak Island Road Mitigation Site	SFWMD	Osceola Parkway
Overstreet Park Mitigation Site	SFWMD	Pleasant Hill Road four lane expansion
John Young Parkway/Bermuda Extension Mitigation Site	SFWMD	John Young Parkway/Bermuda Avenue extension
Reedy Creek Mitigation Site #1	SFWMD/FDEP	Pleasant Hill Road 1990 two-lane bridge replacement
Reedy Creek Mitigation Site #2	FDEP	John Young Parkway/Bermuda Avenue extension
Reedy Creek Mitigation Site #3	FDEP	Carroll Street extension
Carroll Street Mitigation Site	SFWMD	Pleasant Hill Road 1990 two-lane bridge replacement

Source: Osceola County Planning and Environmental Services Department.

DEFINITIONS:

Areas, Conservation	Lands, waters, or interests therein, wholly or partially contained within the county boundaries, dedicated in fee simple or by easement to a governmental or not-for-profit agency, for the purpose of managing and maintaining natural resources. [See also Uses, Conservation.]	MSCW language revised by staff
Buffer	An undisturbed or appropriately managed area that surrounds, or is adjacent to, a particular natural, archaeological, or historical resource that is utilized to minimize human-induced disturbances from interfering with the continued preservation and protection of the particular natural, archaeological or historical site or property. The use of any human-made or natural materials or open space in any fashion designed to limit the effects of one land use upon adjoining land uses.	MSCW language revised by staff
Burning, Prescribed and Controlled	Techniques used by foresters and forest managers to simulate natural fire ecology and stimulate the germination of desirable botanical species.	MSCW language revised by staff
Ecological Evaluation	See Evaluation, Ecological	
Ecology, Fire	A branch of science that concentrates on the origins, cycles, and future stages of wildland fire.	MSCW language revised by staff
Ecosystems, Fire-Dependent	An environmental community or complex, the long-term viability of which is dependent on natural or controlled burning to maintain the normal fire regime.	MSCW language revised by staff
Environmentally Sensitive Lands	Areas of land or water which conserve or protect natural habitats and ecological systems. Nothing in this definition shall be construed to prohibit silvicultural operations which employ the Florida Department of Agriculture and Consumer Affairs Best Management Practices as revised in 1993.	Rule 9J-5
Environmentally Significant Area	Surface waters and floodways adjacent to surface waters, wetlands, potentially high recharge areas, threatened or endangered ecosystems, lands which contain threatened	Language grafted by staff from

	or endangered species, and unique or rare wildlife habitats.	1995 Conser-vation Element GOPs
Evaluation, Ecological	The study of a defined area performed by an environmental consultant which includes, defines, or discusses the following features: general site description, description of habitat on-site and adjacent to the site (using the Florida Land Use, Forms and Classification System), on-site soil types, a listing of protected species observed and potentially found on-site, a detailed description of any onsite wetlands, analysis of environmental regulatory conditions, analysis, and other narrative, graphics, maps, or exhibits.	MSCW language revised by staff
Feral	A species that has returned to an untamed state from domestication.	MSCW language revised by staff
Fill	The deposition, by any means, of materials in surface waters or wetlands, as delineated in subsection 373.421(1), F.S. (subsection 373.403(14), F.S.).	MSCW language
Groundwater	Water found below the earth's surface, including aquifers.	Staff language
Material, Hazardous	Any substance which is defined as a hazardous substance in 42 USC § 9601(14) and which is designated as a hazardous substance in 40 CFR § 302.4 (1987).	MSCW language
Historic Tree	See Tree, Historic	
Mitigation	An action or series of actions to offset the adverse impacts that would otherwise cause a regulated activity to fail to meet the criteria set forth in sections 12.2 - 12.2.8.2. Actions typically consist of restoration, enhancement, creation, preservation, or a combination thereof.	MSCW language revised by staff
Natural Resources	Aquifer recharge areas, wellhead protection areas, wetlands, mineral resource areas, raw water extraction and production resource areas, wilderness resource areas, rare and endangered animal species, areas deemed suitable for waste disposal, re-use or recycling, or land filling, areas characterized by a "fire ecology", and rare	Adapted from Compliance Agreement with DCA, May 17,

	and endangered plant species.	2004
Open Space	Land that is either undeveloped or is relatively free of buildings and other structures	MSCW language
Plat	A map or delineated representation of the subdivision of lands, being a complete, exact representation of the subdivision and other information in compliance with the requirement of all applicable sections of Chapter 65. This term includes Replats, Amended Plats and Revised Plats.	MSCW language revised by staff
Recharge Zones, High	Areas which contribute 4 –8 inches of water annually to the storage and flow of an aquifer through vertical movement from the land surface. [See also Recharge Zones, Prime].	Staff language
Recharge Zones, Prime	Areas contributing 8 –12 inches of water annually, which add to the storage and flow of an aquifer through vertical movement from the land surface.	MSCW language revised by staff
Resources, Natural	See Natural Resources.	
Sensitive Lands, Environmentally	See Environmentally Sensitive Lands	
Significant Areas, Environmentally	See Environmentally Significant Areas	
Soils, Hydric	Soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part of the soil (Federal Register, July 13, 1994)	MSCW language
Species, Exotic/Nuisance	A plant or animal species which is not indigenous to the geographic area under consideration. Whether or not a plant species is indigenous to the area may be determined from floristic information available about the natural range of the plant species.	MSCW language revised by staff
Species, Protected	A species listed by the Federal government as endangered or threatened, or by the State of Florida as a species of special concern.	MSCW language revised by staff
Tree, Historic	A tree designated on the Florida Division of Forestry's list of historic trees.	Staff language
Uses, Conservation	Activities or conditions within land areas designated for the purpose of conserving or protecting natural resources or environmental quality, including areas designated for such purposes as flood control, protection of quality or	Rule 9J-5, FAC

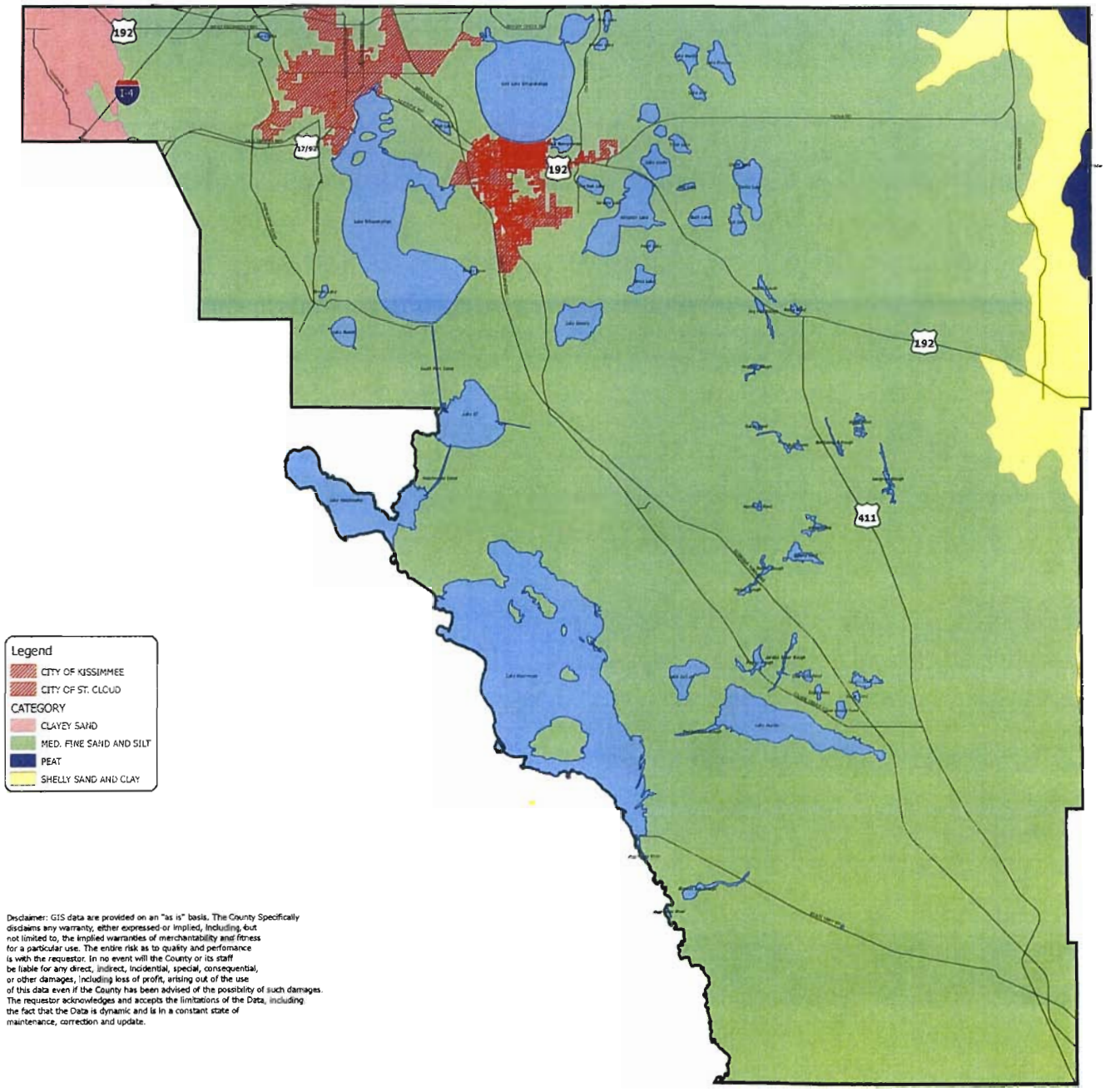
	quantity of groundwater or surface water, floodplain management, commercially or recreationally viable fish and shellfish, or protection of vegetative communities or wildlife habitats. [See also Areas, Conservation.]	
Vegetative Community, Native	A natural community that is dominated by indigenous plant species and as a natural community type described in the Florida Natural Areas Inventory publication, "Guide to the Natural Communities of Florida."	MSCW language revised by staff
Water System, Community	A public water provider that serves at least 15 year-round residential service connections or 25 year-round residents; under control of an operator and used primarily in connection with such system; or 2) any collection or pretreatment storage facilities not under such control that are used primarily in connection with such system. A public water system is a "Community Water System," a "non-community water system," or a "non-transient non-community water system	MSCW language revised by staff
Waters, Surface	Waters which lie upon the exterior of the earth, whether contained in bounds created naturally or artificially or diffused. Waters from natural springs shall be so classified when they exit from the spring onto the earth's surface (subsection 373.019(10), F.S.). (See also Groundwater).	MSCW language revised by staff
Wellhead Protection Area	An area designated by local government to provide land use protection for the groundwater source for a potable water wellfield, as defined in this rule chapter, including the surface and subsurface area surrounding the wellfield. Differing levels of protection may be established within the wellhead protection area commensurate with the capacity of the well and an evaluation of the risk to human health and the environment. Wellhead protection areas shall be delineated using professionally accepted methodologies based on the best available data and taking into account any zone of contribution described in existing data.	MSCW language
Wetland Functions	The role wetlands play within the ecosystem including: providing vital fish and wildlife habitats, acting as storage areas for excess surface water, and improving water quality as impurities enter the wetland and are filtered through the vegetation.	MSCW language

Wetland Impact	Any permanent or temporary dredge, fill or construction activity that takes place within a wetland.	MSCW language
Wildlife Corridor	An area of land, water, or both, used by wildlife to travel or migrate from one habitat area to another.	MSCW language
Xeric	Characterized by, or adapted to, an extremely dry habitat.	MSCW language

CONSERVATION ELEMENT MAPS

The maps which appear in this element depict environmental conditions of Osceola County, and are intended to provide guidance to local government decision makers and to private citizens. Although they are based upon best available data, they have not been ground-truthed and should not be used as a substitute for rigorous on-site surveys and reconnaissance to determine the exact nature of resources present.

Environmental Geology



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Osceola County Planning Department
GIS Section

Geology Data Provided by the Florida Department of Environmental Protection

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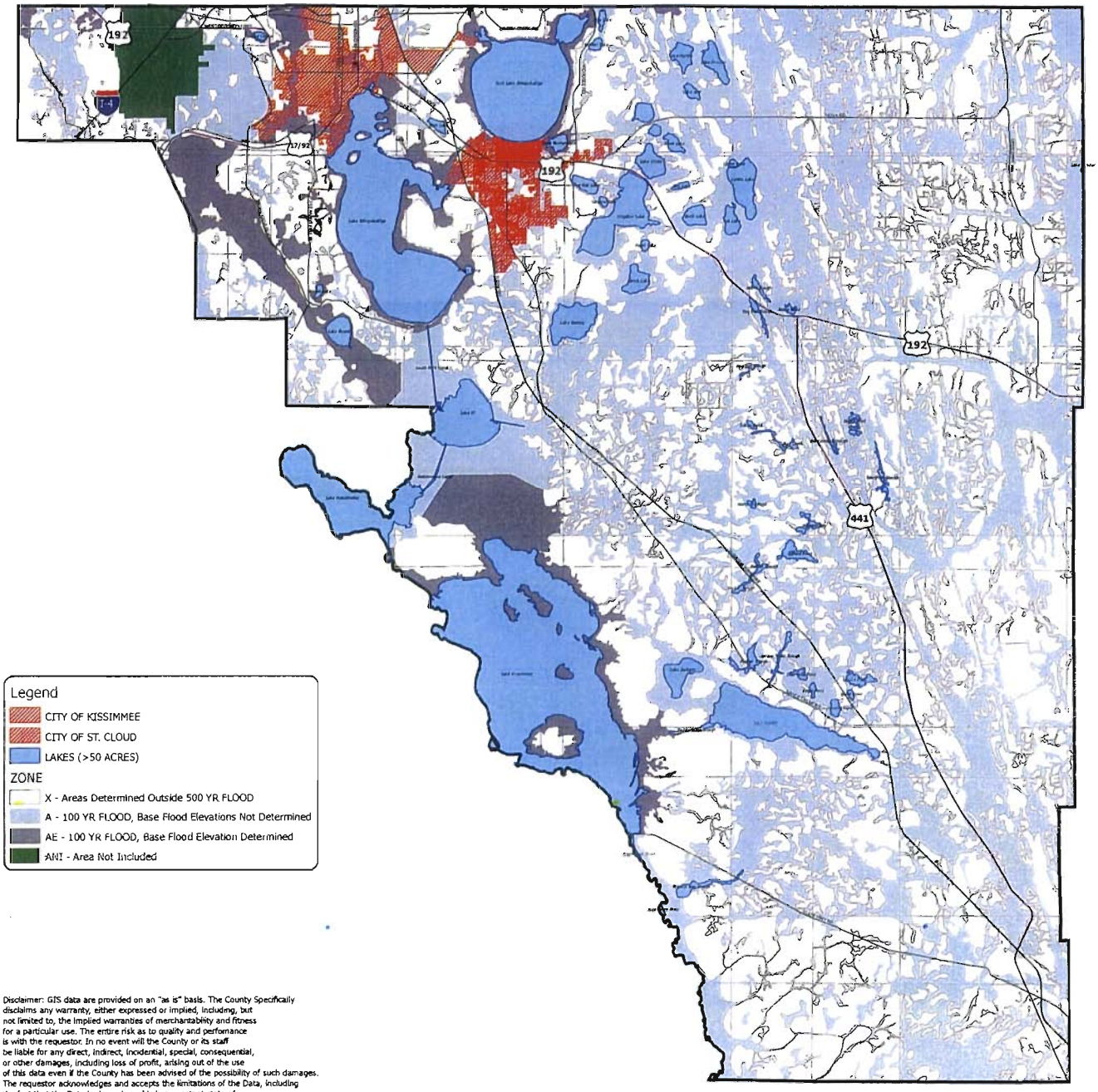
FEMA Floodzones



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Flood Zone Data Provided by FEMA

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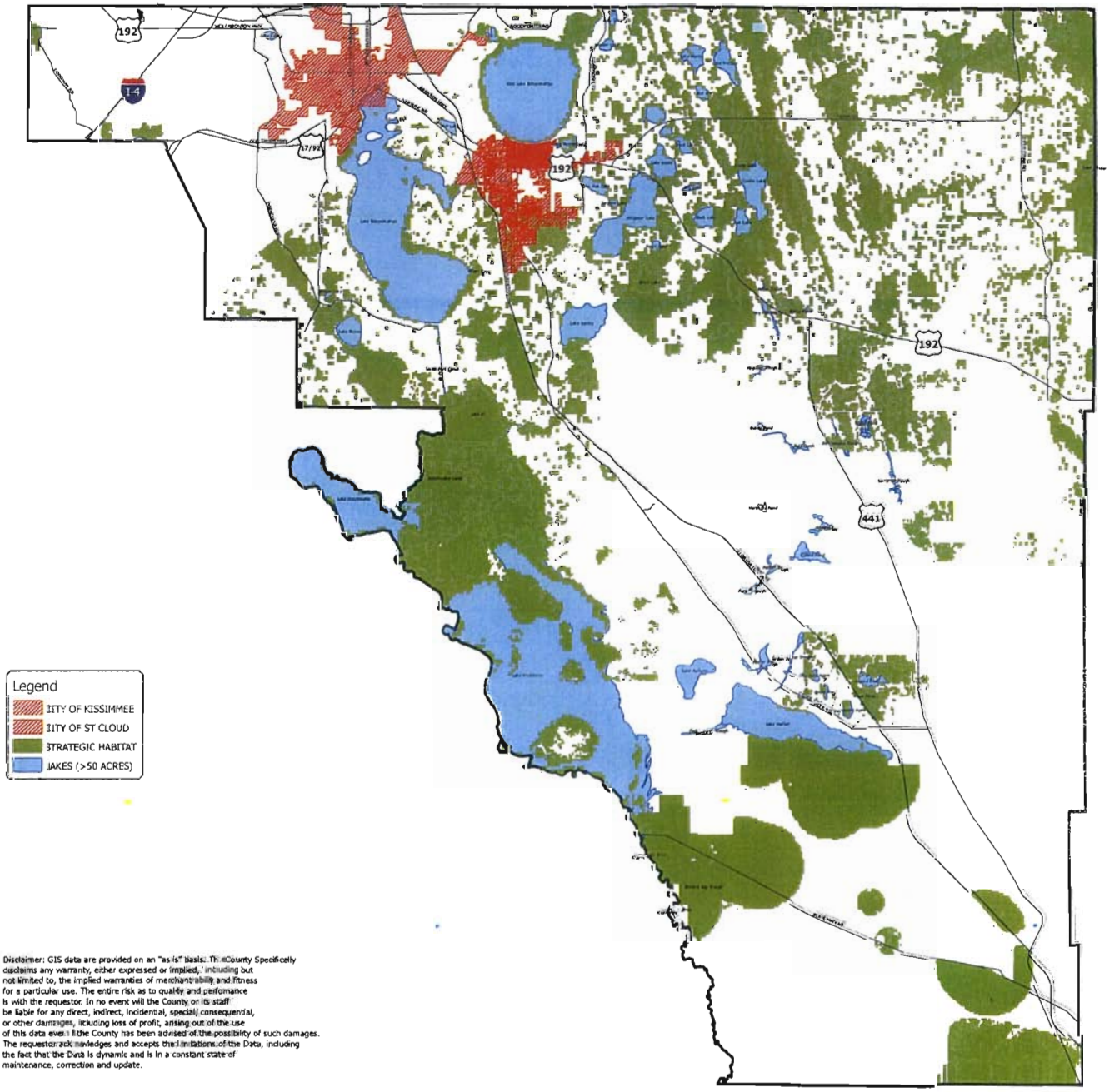
Strategic Habitat Conservation Areas



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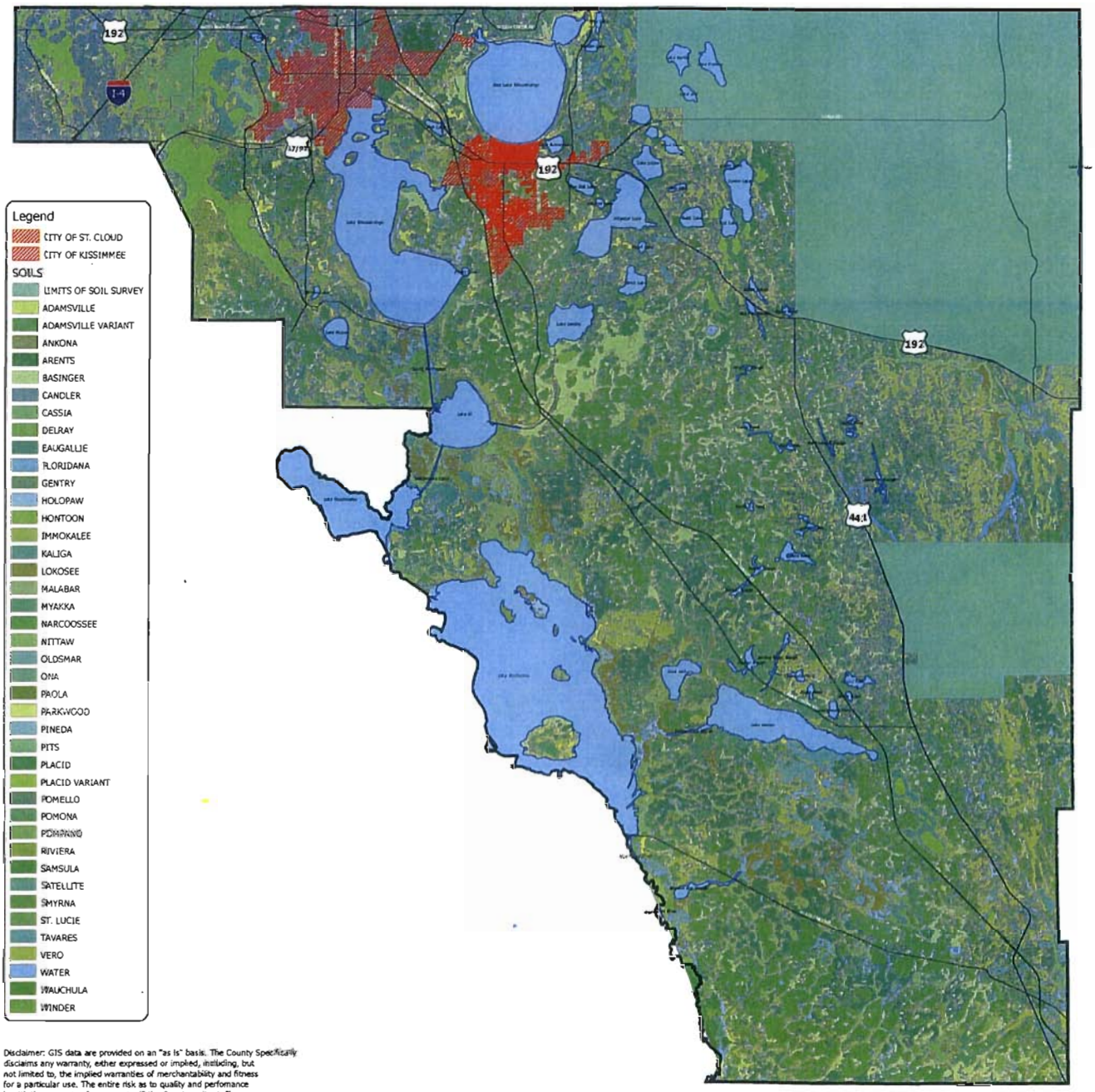
Habitat Data Provided by Florida Fish and Wildlife Conservation Commission

Soils



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Soils data provided by St. Johns River Water Management District and National Resource Conservation Service

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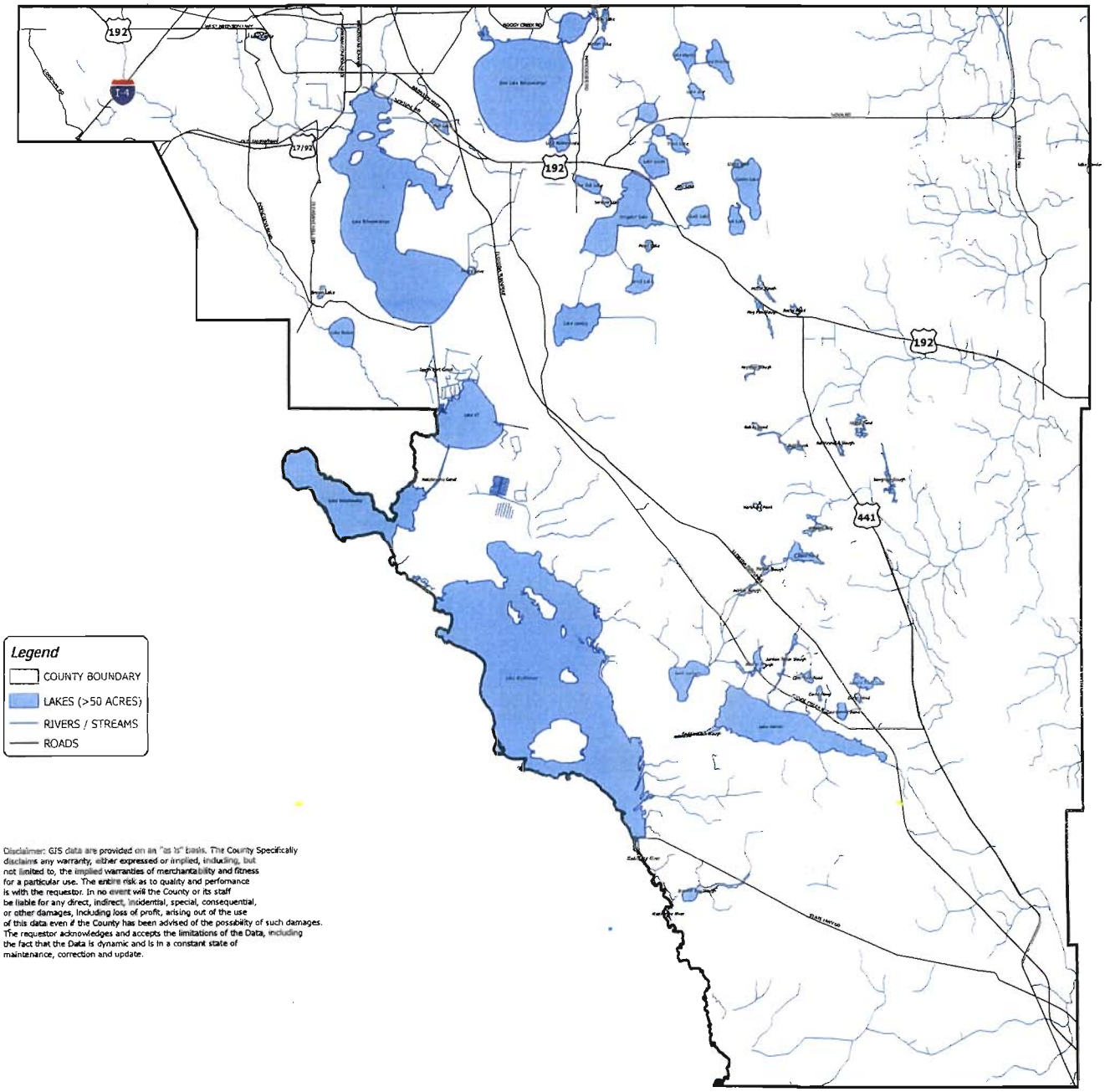
Major Water Bodies



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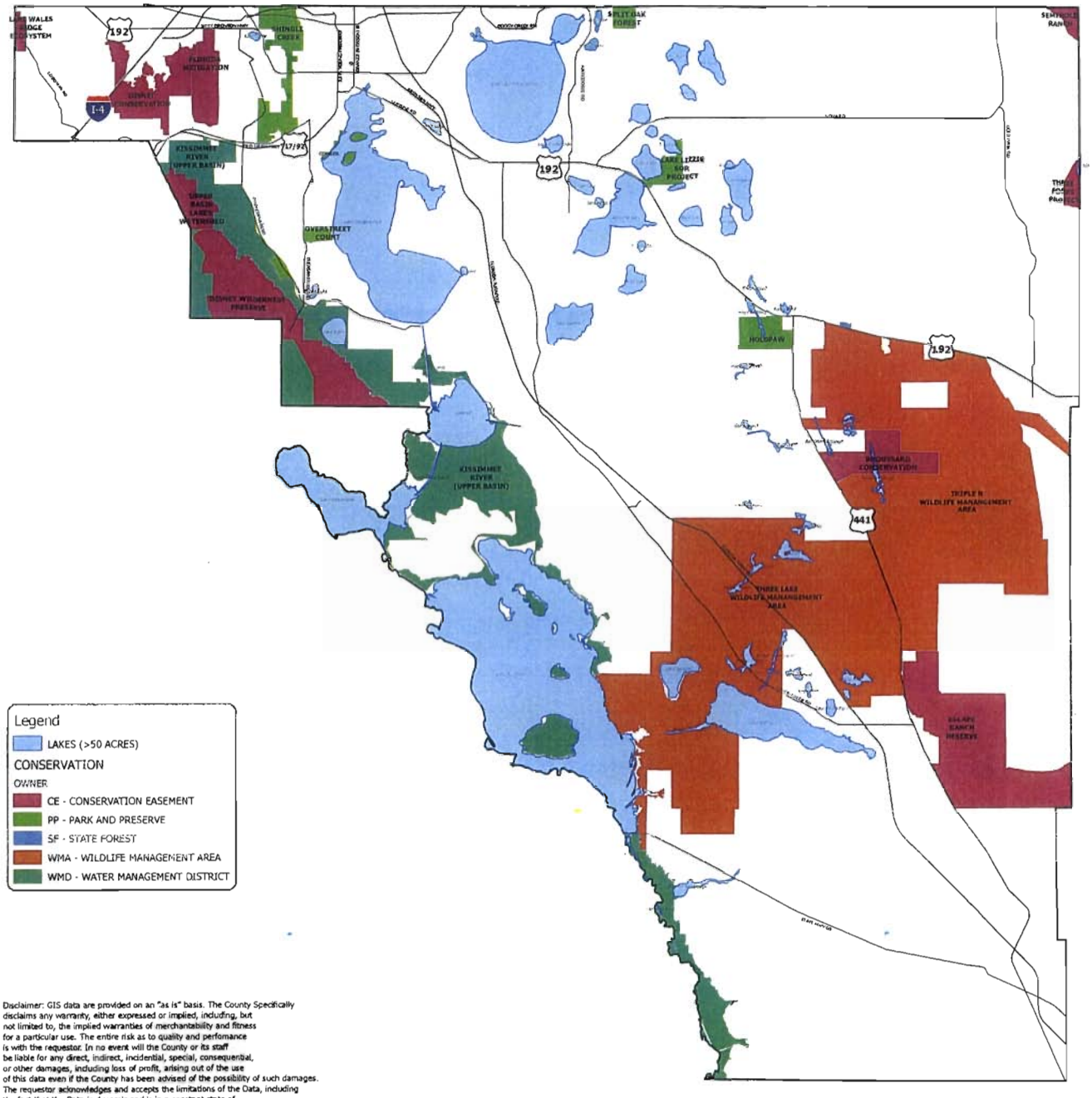
Conservation Lands



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Conservation Data Provided by Floods Natural Areas Inventory

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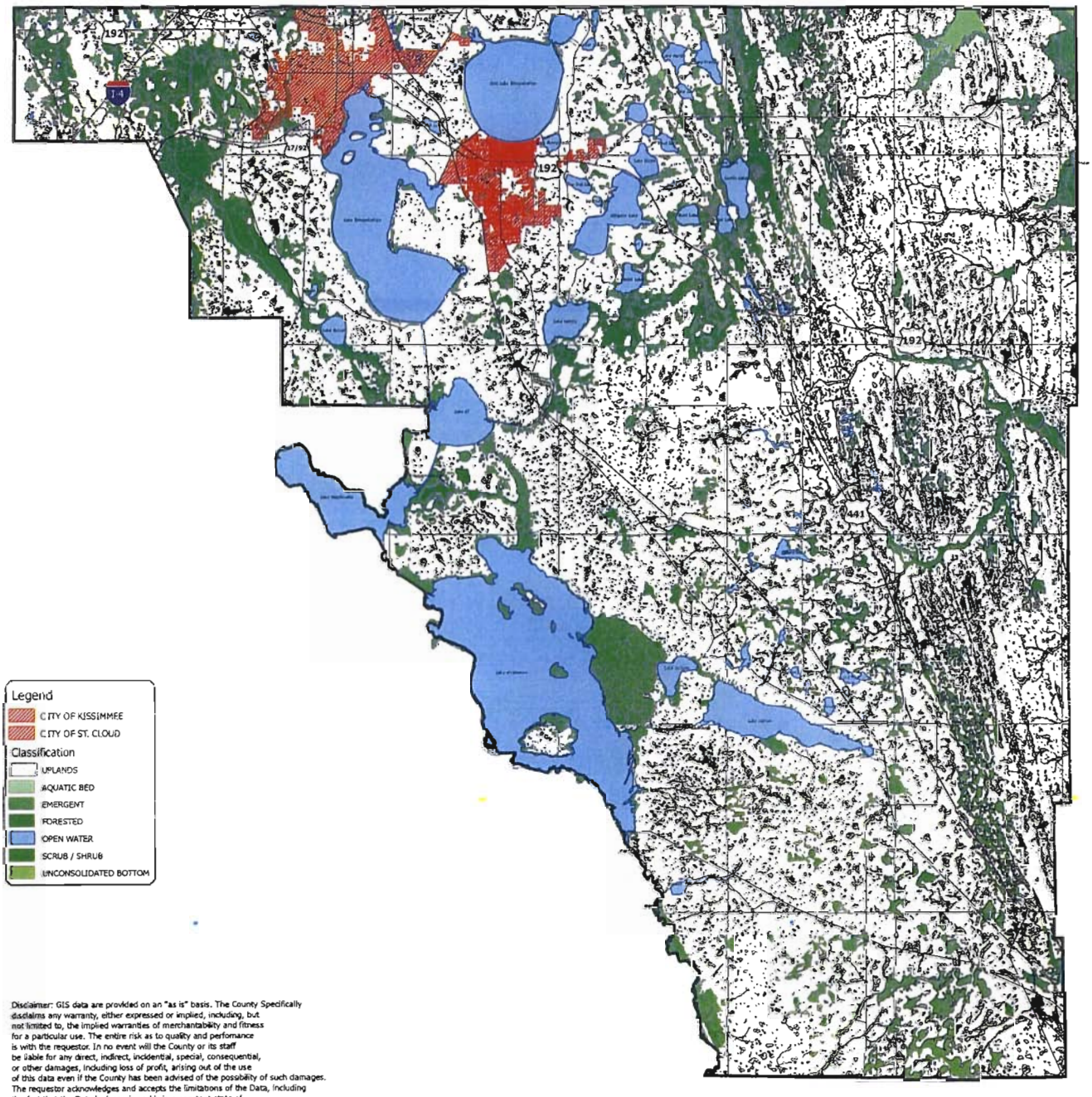
Wetlands



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GIS Section

Wetlands Data Provided by St Johns River Water Management District and South Floods Water Management District

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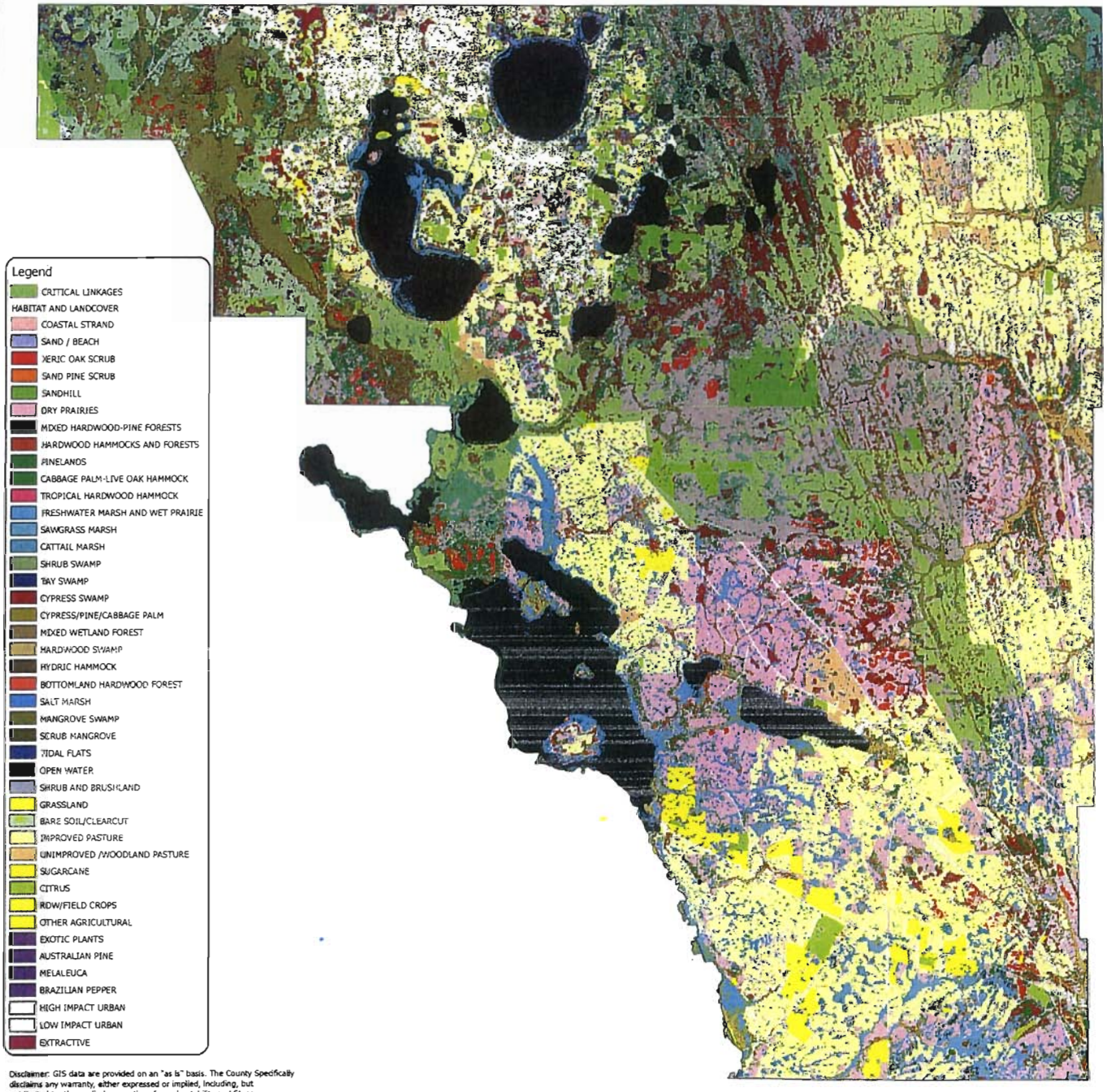
Strategic Habitat Linkages



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Strategic Habitat Linkages Data Provided by Florida Fish and Wildlife Conservation Commission

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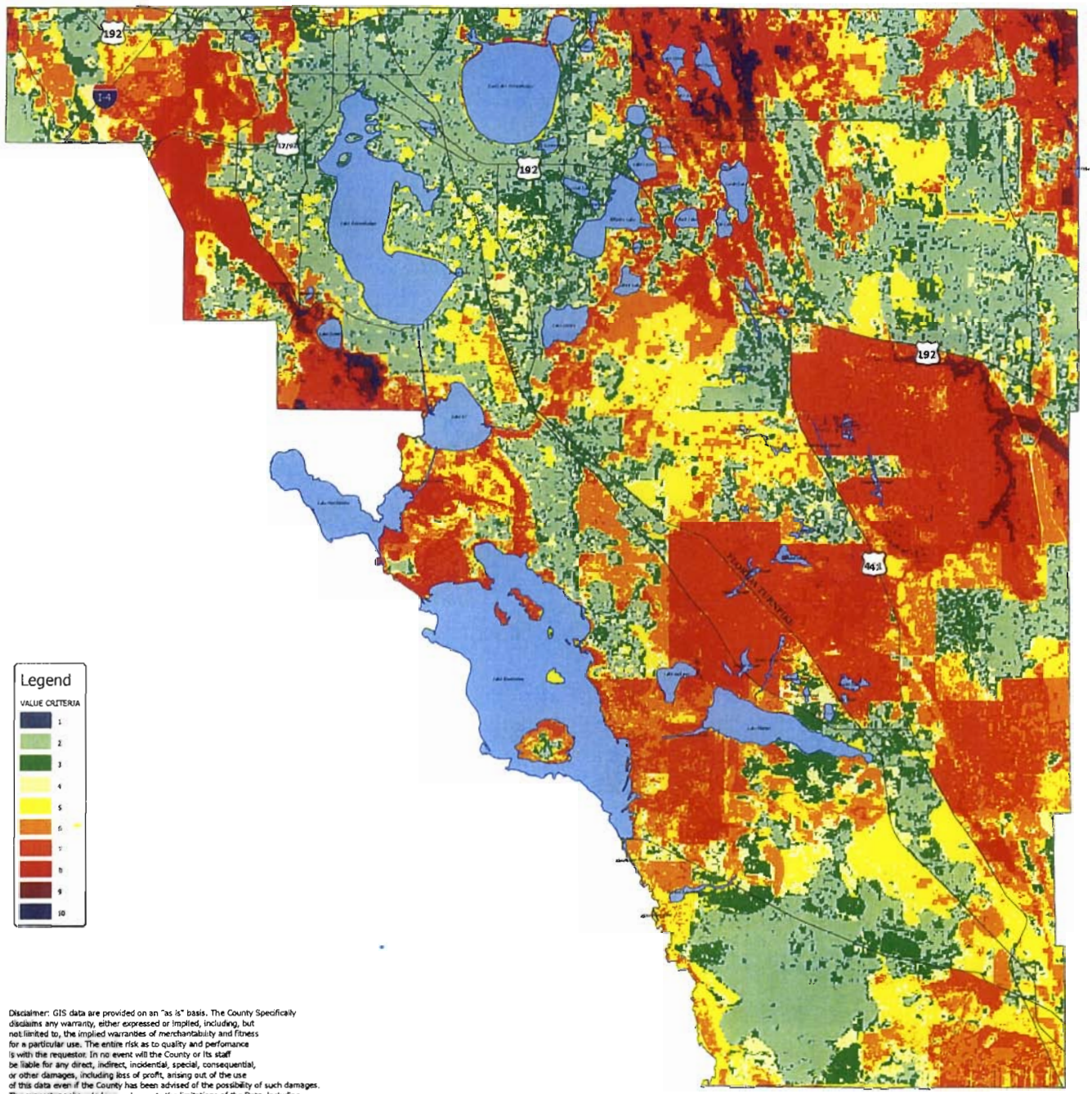
Integrated Wildlife Habitat Ranking System



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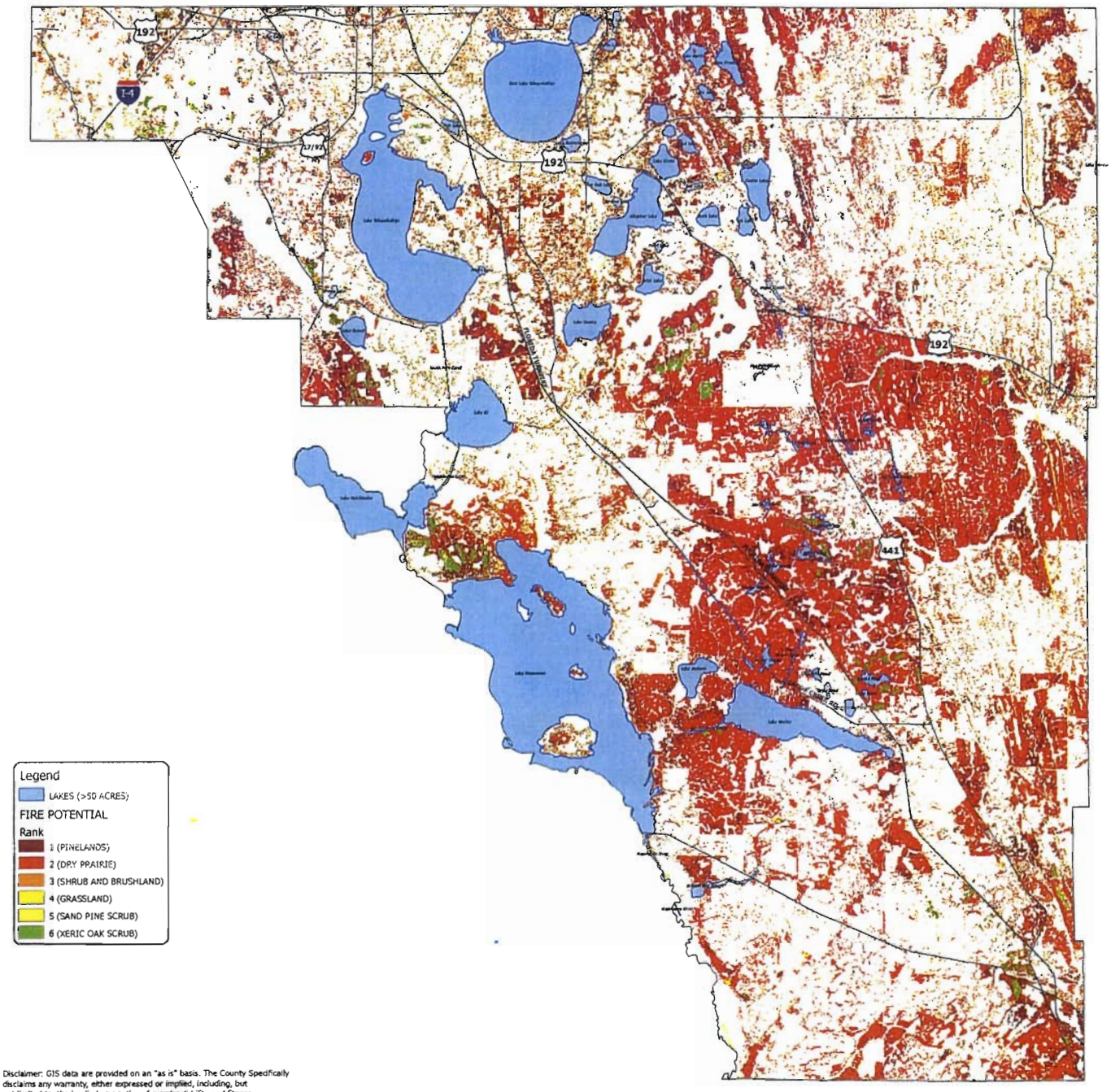
Osceola County Planning Department
GIS Section

Integrated Wildlife Habitat Ranking System Data Provided by Florida Fish and Wildlife Conservation Commission

Fire Ecology



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Fire Ecology Data Provided by Florida Fish and Wildlife Conservation Commission