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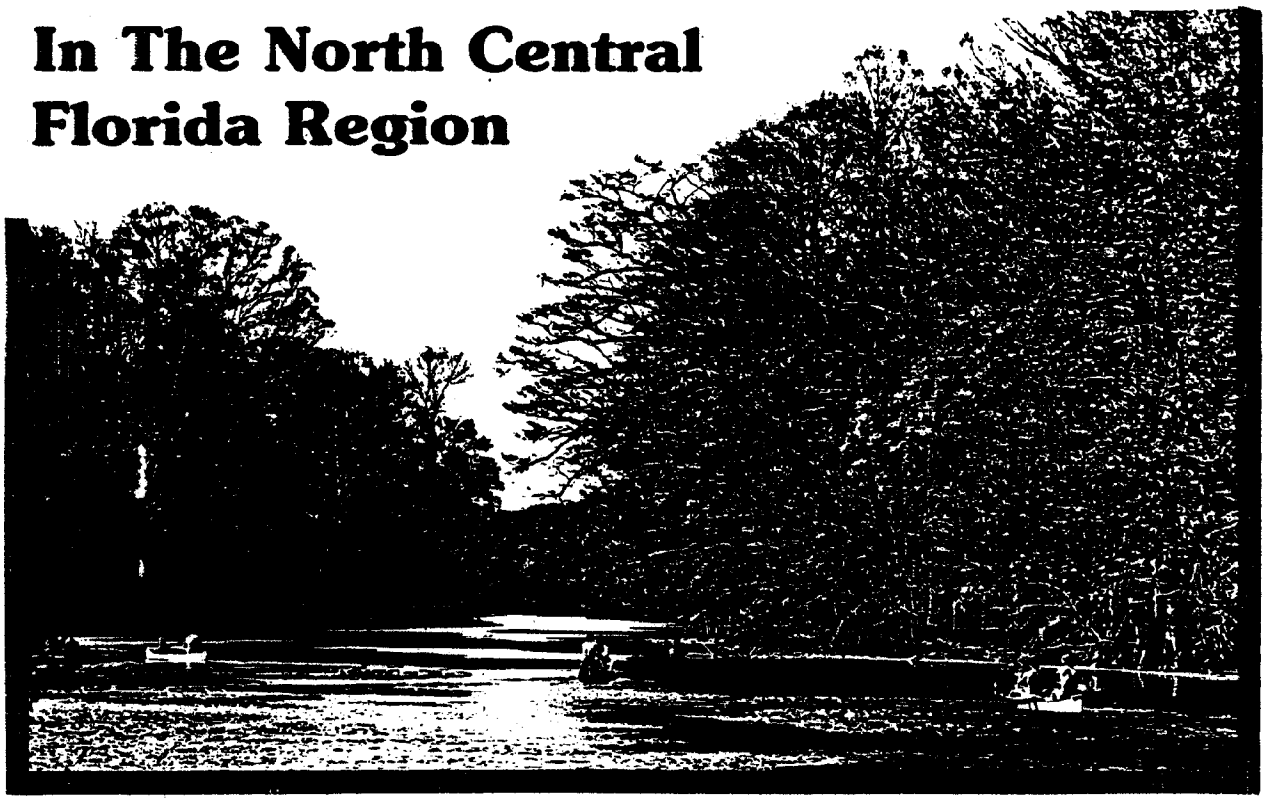
Coastal Hazard Mitigation And Resource Protection

In The North Central Florida Region



NORTH CENTRAL FLORIDA
REGIONAL PLANNING COUNCIL

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COASTAL HAZARD MITIGATION AND RESOURCE PROTECTION IN THE NORTH CENTRAL FLORIDA REGION

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Prepared for:

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EXECUTIVE SUMMARY

This study identifies and delineates hurricane hazard and regionally-significant natural areas within the North Central Florida Region. Based in part on the amount of development pressure occurring within or adjacent to these areas and their intrinsic natural values, management programs are recommended for application to the various areas for the purpose of mitigating or eliminating potential adverse impacts which could be created by present or future development activities.

To assist in accomplishing this purpose, the Region is divided into five major ecological zones: (1) coastal areas subject to the hurricane surge which include off-shore islands and seagrass beds, coastal marshlands including salt, estuarine, and freshwater marshes, estuaries, and the upland swamps and associated streams which supply fresh water to the coastal marshes and estuaries; (2) rivers and riverine systems subject to flooding and other hurricane-induced hazards; (3) upland areas directly adjacent to the river system such as upland swamps and forests; (4) upland areas not directly linked to a river system including upland forests and prairies along with scattered remnants of Florida ecology prior to its conversion to agricultural and urban uses; and (5) the Floridan Aquifer and associated sinkholes, springs, and stream-to-sink discharge areas.

Within these zones, over 50 areas are identified as being regionally significant. These areas range in size from relatively small areas such as Brook Sink located in Bradford County, to areas covering vast stretches of land such as the coastal marsh and associated freshwater wetlands which occupy significant portions of Dixie and Taylor Counties. The areas serve a wide variety of functions such as groundwater recharge, recreation, habitat for flora and fauna, flood control and hurricane surge protection. These areas are listed on Table 27.

The study ascertains the degree of development pressure that is occurring within or adjacent to these identified regionally significant areas. It is first noted that the Region, like the State, will nearly double its population by the Year 2020 with some regionally significant areas, such as the Suwannee River floodplain, developing faster than the Region as a whole. This section of the study concludes that regionally significant areas in the Region are threatened by three predominant activities: (1) the subdivision and development of land for residential uses; (2) the clear-cutting of hardwood forests and hammocks; and (3) the filling and draining of wetlands. To assist in determining the type of management program needed to successfully mitigate or eliminate adverse impacts created by development or economic activities, the areas are divided into four groups: natural areas facing imminent danger; natural areas facing significant pressure; natural areas facing average pressure; and natural areas facing little or no pressure.

Three general methods are available to the public sector to ensure the proper use and management of areas vulnerable to natural disasters and areas of high natural significance. They are public acquisition, public regulation of the use of privately owned land, and public regulation of individual actions. All three are not particularly popular nor necessarily effective. In examining State and local laws and programs that could be applied for use in either acquiring the area or in regulating activities and development that may occur within or adjacent to these areas, the study finds that a vast array of laws/programs exist. However, these laws and programs were established over a period of many years, usually to address a specific purpose and, therefore, are generally not applied to a specific area in a coordinated manner by the various responsible agencies following a single plan.

Utilizing existing laws and programs available to State, regional and local agencies, this study attempts to address this deficiency by developing a management plan which includes four different program thrusts for application to the regionally significant areas. These program thrusts include the following: (1) preservation-conservation; (2) preservation-recreation; (3) economic-production rural; and (4) urban.

These generalized program thrusts are assigned to the various areas in combination with overlay zones that indicate special programs which should apply to all or a portion of the special area. The overlay zones range in purpose from a wildlife corridor along the Suwannee River to the hurricane surge zone along the coasts of Dixie and Taylor Counties. When combined, the resulting programs often include recommendations for public purchase and the strict management of certain areas and strict regulation of other areas within the program thrust. In other cases, the program thrust places few restrictions on economic or development activities and only applies a few overlay zones to ensure the protection of a specific resource. Illustration 1 shows the application of the generalized program thrusts to the various regionally significant areas, while Table 27 provides more detail in terms of recommended overlay zones.

The study concludes with an evaluation of the fiscal impacts that could be anticipated if all of the areas recommended for public purchase would be taken off county tax roles.

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I

INTRODUCTION

The population of the State of Florida is projected to reach 16.6 million by the year 2010, a sixty percent increase in population over the 1980 population of 9.7 million.[1] This represents an enormous increase in population over a relatively short period of time and could place Florida as the fourth-largest state in the nation. All areas of Florida will share in this population explosion including the north central Florida region -- an 11-county area which, thus far, has been relatively untouched by the growth that has been and is continuing to effect all other parts of the state.

Today, the region is largely undeveloped and is rich in natural areas. The region's unique environment is characterized by extensive coastal marshes adjacent to freshwater swamps extending great distances inland, undisturbed estuaries, meandering rivers which have been mostly maintained in a natural state, and large expanses of forests managed by several large paper companies. The current population of the 11-county region is 327,836, an average of only 48.1 persons per square mile which can be compared to a State of Florida average of 202 persons per square mile.

According to the projections, the region's estimated share of this doubling in population is 557,500, representing a 70 percent increase. What changes in development patterns within the region can be expected to occur as a result of this increase? Will migration tend toward coastal areas as it has for the rest of Florida? Will people prefer rural homesites within or adjacent to the many beautiful natural areas contained within the region over urban environments? Hoc can the State of Florida and local governments within the region effectively manage this growth?

As one effort to address these questions, this study identifies and delineates hurricane hazard and regionally-significant natural areas, determines the current level of development pressure within or adjacent to these areas, and recommends a management plan to mitigate or eliminate adverse impacts upon these areas (and the people who may choose to locate within such areas) which could be created by future development activities.

METHODOLOGY

The first task in completing this study is to develop criteria for the identification of regionally significant natural areas. This study focuses on natural areas which are significant due to their intrinsic values. The values are generally defined in terms of a function these areas provide the region, such as water recharge to the Floridan Aquifer or the recreational values provided by a state park. However, to be designated as "regionally significant" requires their having an actual or potential substantial impact on the citizens of more than one local government.

The second task is to develop a management plan which can be used to direct growth in and around these areas or, in some cases where the values of the resource can only be adequately preserved by public purchase, identify those existing programs, state or local, that can be utilized for that purpose.

The third and fourth tasks are to apply the appropriate management programs to the identified regionally significant natural areas and, where public purchase is recommended, estimate the potential fiscal impact on local government finances when such areas are taken off the tax roles.

II

AREA IDENTIFICATION

INTRODUCTION

For purposes of this study, the region is divided into five major ecological zones. These zones are as follows: 1) coastal areas subject to hurricane surge, consisting of off-shore islands and grass beds, coastal marshlands consisting of salt marsh, estuarine marsh, and freshwater marsh, estuaries, as well as upland swamps and associated tributaries which supply fresh water for estuarine areas; 2) rivers and riverine systems subject to flooding and other hurricane-induced hazards; 3) Upland areas directly adjacent to the river system including upland swamps and forests; 4) Upland areas not directly linked to a river system, including upland forests and prairies, remnants of Florida ecology before extensive logging operations, draining, filling, and conversion of lands to agricultural and urban uses; and 5) The Floridan Aquifer and associated sinkholes, springs, and groundwater recharge areas.

COASTAL DRAINAGE BASIN

The Gulf coast and its drainage basin represent the region's focal point where the Floridan Aquifer, the Suwannee River system, and upland marsh converge and interact with one another. The viability of any productive coastal wetlands system depends upon the ecological integrity of its surrounding estuarine and wetlands system. Therefore, the coastal marsh as well as its drainage basin is grouped together and treated as one discrete system.

COASTAL DRAINAGE BASIN

The Gulf Coastal drainage basin, which provides water to many smaller streams with access to the coast, consists of an area of approximately 1700 square miles. It is characterized by sinks, lakes, swamps, springs, streams and underground limestone solution channels that store and regulate much of the runoff before it collects in surface channels. Permeable soils which are underlain by clays and/or limestone also affect the amount of runoff which reaches the rivers and streams of the basin.

There are approximately 80 linear miles of coastline bordering the Gulf of Mexico within the coastal drainage basin. A considerably greater distance could be measured if all irregularities of the coast are considered. This coastline is characterized by rock outcroppings, oyster reefs, island clusters, as well as saltwater and freshwater marsh. Beaches and partially enclosed bays are rare, while salt marshes line virtually the entire length of the Dixie and Taylor county coastline, broken only by streams and very few areas of beach.

The basin is important to the estuarine and freshwater components of the coastal marsh as a principal source of freshwater. This water is provided by the Steinhatchee, Econfina and, to a lesser extent, by the Fenholloway River and Spring Warrior Creek. In addition, significant areas of the coastal basin drain by direct sheet flow to the Gulf. The basin is composed of many wetland areas and numerous smaller rivers and creeks. Further inland are managed pine forest wetlands. Although these areas no longer support native hardwoods, they still moderate the flow of surfacewater runoff to the Gulf, releasing water during dry periods and storing water during wet periods. In addition, the managed pine forests help buffer and reduce the impact of hurricanes. At the inland periphery of the basin are two large titi-based swamps, San Pedro Bay and Mallory Swamp, located in Taylor, Lafayette, and Hamilton counties.

Not all of the coastal drainage area impacts upon the coastal marsh. The best available evidence indicates it is mostly the area west of U.S. Highway 19 that continues to play an important role in providing surfacewater runoff to the Gulf. The highway has significantly altered the course of surfacewater runoff by forcing flows through specific culverts and drainage channels. Furthermore, although the headwaters of the Steinhatchee River are in San Pedro Bay, the river's principal water source appears to be Steinhatchee Springs, located approximately 4 miles north of Highway 19. The Fenholloway would be an intermittent stream were it not for waste water pumped into the river by a wood pulp processing plant and a wastewater treatment plant in Cross City.[2] Both the Econfina and Fenholloway are similar in that flows become significantly larger west of Highway 19. Although the entire coastal drainage basin west of highway 19 is considered a regionally significant natural area, a discussion of significant features within the basin follows.

SALT MARSH

The salt marsh appears to average between 1/2 and 1 mile in width but penetrates several miles inland in some places, most notably at Shired Island and Horseshoe Cove where Suwannee River and California Swamp waters enter the Gulf. Submarine meadows form an extensive offshore community extending out from the salt marsh along the coast two to six nautical miles offshore (about the 6 foot contour).

Nutrients from the land and sea combine in the salt marsh to produce more protein than some of the most intensively managed farms in the nation. The coastal wetland is a rich breeding ground for plant and animal life and is a primary nursery that supplies commercial fish to the Gulf. Spotted sea trout, mullet, redfish and others spend much of their lives in the productive wetland areas afforded by marshes. In addition, crabs, oysters, some species of clams, several species of shrimp and other Gulf marine life depend on the salt marsh for food, protection, and breeding.

Animal species which abound in the salt marsh ecosystem include birds such as rails, egrets, gulls, terns, and seaside sparrows, all of which are relatively common to coastal marshes and depend upon that system for food. The bald eagle breeds in several areas of salt marsh habitat. In addition to the bald eagle other rare, endangered, or threatened species found within the coastal marsh include the diamond-back terrapin, salt marsh snake, mink, and otter.

Seaward of the salt marsh are submerged lands and their biological communities. These generally lie below mean sea level and merge with the salt marsh landward. Submerged seagrass beds constitute the primary biologic community of the submerged lands. The seagrass beds throughout the coastal zone are reported to be the most important community of the inner continental shelf in terms of basic productivity. They also provide an essential environment for many species of invertebrate and fishes including those of economic value such as the spotted sea trout, mullet, redfish, crabs, oysters, and several species of shrimp. In additions, submerged grass beds supply food to grazing animals, provide nutrients to the water, add oxygen (during daylight hours) and stabilize bottom sediments. They are nursery areas for young fish and crustaceans and are often the source for a substantial amount of the primary productivity of estuaries.

Plant species in the saltwater marshes are limited to a few species which occur in large numbers. Very few plants have physical and physiological adaptations to grow and reproduce in the conditions of salinity and flooding found in the salt marsh. The Dixie and Taylor county coastlines are dominated by two plant species, Spartina alterniflora (salt marsh grass) which forms an almost pure stand in an outer band of the salt march where is exposed to the deepest an longest inundation by salt water during high tide. Juncus roemerianus (black rush) is commonly found on slightly higher ground and covers the greatest area of any salt marsh plant. With a height of up to six or seven feet, its density slows the penetration of tidal water into the marsh. The height of Juncus drops inland as the salt marsh with the salt flats. Only lower plants, such as blue-green algae, are abundant in the salt flats.

Estuarine marshes can be found to a greater or lesser extent all along the region's coastline where rivers and creeks empty their fresh waters into the Gulf. Estuarine marshes are distinguished from salt marsh by brackish water and lower salinity levels. Estuarine marsh forms a buffer

area between saltwater and freshwater marshlands. Many commercial fish such as the spotted sea trout, mullet, redfish, and others spend much of their lives in the productive wetlands afforded by such marshes. In addition, crabs, oysters, some species of clams, several species of shrimp, and other Gulf marine life depend on the estuarine marsh for food, protection, and breeding. Particularly notable estuarine marsh areas occur at the mouths of the Aucilla, Econfina, Fenholloway, and Steinhatchee rivers as well as Spring Warrior Creek. The most extensive estuarine marsh occurs between California Swamp and the Suwannee River.

Fortunately, the environmental quality of the Gulf Coast of Dixie and Taylor Counties is generally excellent with few major problems. Land in the coastal region is owned largely by the timber and pulp industry which, in general, recognizes the natural attributes of coastal marshes and forests, as well as the ramifications for forest management.

LOWER SUWANNEE NATIONAL WILDLIFE REFUGE

The Lower Suwannee National Wildlife Refuge comprises approximately 22,821 acres of coastal marsh. The refuge starts at the unincorporated town of Suwannee and extends eight miles northward. The coastal marsh here is at its widest in the region and penetrates several miles inland at Shired Island.

National wildlife refuges were created by Congress for the protection of migratory waterfowl and endangered species. They are owned or leased by the federal government and managed by the U.S. Fish and Wildlife Service. While economic use may be made of a national wildlife refuge, the economic activity must not threaten the habitats of endangered species or migratory birds. It is not uncommon for selected timber harvesting or limited agricultural activities to occur in a wildlife refuge.

CALIFORNIA SWAMP

California Swamp is located in the southwest corner of Dixie County between Cross City and the Gulf of Mexico. Its major feature is an extensive cypress-hardwood swamp. However, a wide variety of habitat types ranging from tidal marsh near the coast to upland hammocks and pine forest further inland are found within California Swamp.

The swamp occupies a approximately 63,360 acres. However, the core swamp and hardwood forest area are considerably smaller at approximately 17,280 acres. There is an abrupt change between the core and the periphery of California Swamp. The core is bounded by logging roads, forming a very distinct break with the planted pine forest. The core swamp extends from Station Lake to the Gulf coastal marsh along Sanders Creek. Its width varies from five miles near California Lake to two miles further south along Sanders Creek where the forest grades into coastal marsh.

California Swamp is generally flat, having a relief of approximately two to five feet and a gentle slope to the south. Drainage is poorly developed. In the area from Station Lake southward some flow is channelized through Fishbone and California Creeks into California Lake. From there, water moves through Sanders Creek for the remaining five miles to the Gulf.

Although numerous logging roads have been established for the purpose of harvesting within the swamp, portions of the lower regions of core of California Swamp are still inaccessible. Dirt roads are passable to California Lake and to the few private hunting camps located in the vicinity of the swamp.

Approximately 94 percent of the entire watershed is forested land. The principal tree species include slash and loblolly pines, black gum, ash, oak, red maple, and cypress. Excluding the core swamp, the remainder of the California watershed is extensively harvested. Most of the land is in planted pine forests. In 1973, the California Swamp area was added to the Steinhatchee Wildlife Management Area. The swamp has a good population of deer, turkey, and squirrel. Other wildlife species include the alligator, black bear, raccoon, opossum, mink, and otter. The salt marsh near the coast is reported to have many varieties of shore birds such as terns, plovers, and sandpipers. Wading birds living within the swamp include large populations of common and cattle egret, white ibis, limpkin, and many others.

The now defunct Florida Bureau of Coastal Zone Planning generally outlined the entire coastal marsh at the mouth of Sanders Creek and the hardwood swamp inland along that Creek as an area deserving preservation status. The remaining areas of the California Lake watershed were also designated as deserving of conservation status in management and development plans.

SPRING WARRIOR SWAMP

Spring Warrior Swamp is located in Taylor County approximately five miles south of the City of Perry, west of U.S. Highway 99. The drainage basin comprises approximately 51,500 acres. The swamp itself comprises approximately 19,840 acres and includes floodplain forests with good stands of cypress and diverse hardwoods. The swamp is an important source of freshwater to the coastal marsh. Drainage is provided from the swamp to the marsh via Spring Warrior Creek. The upland areas of the coastal hydric hammock vegetation include live oak, magnolia, cabbage palm, elm, maple, hickory, sweet gum, and others. This habitat is heavily used by spring and fall migratory birds. Both upland and floodplain hardwoods in this area constitute a prime wildlife habitat.

TIDE SWAMP

Tide Swamp is located on Florida's Gulf Coast in southwest Taylor County. It is roughly confined to the Gulf side of State Road 361 just north of the Steinhatchee River which forms a border with Dixie County.

The coastal marsh here is heavily vegetated with a variety of mixed grasses and reeds. The marsh serves a dual purpose as a valuable waterfowl refuge and a protective barrier from storm winds for an inland hardwood forest which extends seaward almost to the coast.

Tide Swamp stands as an example of what the future may hold for some of the region's as yet undisturbed natural areas. Until the early 1980's, Tide Swamp was noted for containing approximately 10,000 acres of hardwood swamp and nearly 20 miles of coastal marsh in an undisturbed condition. Portions of the swamp were cut over for forestry products in the 1930's. However, a significant portion of the hardwoods in the swamp have been harvested since 1980.

Tide Swamp has declined as a habitat for wildlife and waterfowl. This is apparently due to extensive timber harvesting. Before recent harvesting activities began, the swamp contained a relatively small deer population. Before 1980, approximately 5,000 to 6,000 squirrels were harvested every year.[3] The number of squirrels currently harvested is between 1,000 to 2,000. Pre-1980 population estimates of wild hog and turkey were described as "abundant". Residential and transient duck populations were described as "large". The turkey population is now described as "low" and duck populations as "moderate"[4].

STEINHATCHEE RIVER

The Steinhatchee River which flows from Cooks Hammock in southwestern Lafayette County to the Gulf of Mexico, forms the border between Dixie and Taylor Counties. The Steinhatchee is approximately 30 miles in length and has an average flow of 325 cubic feet per second (CFS).[5] The river is generally considered to begin approximately six miles north of U.S. Highway 19 at Steinhatchee Springs, a principal source of water for the Steinhatchee River. However, numerous small tributaries whose headwaters are located in Mallory Swamp in the southwestern corner of Lafayette County also contribute to the river. Approximately four miles downstream of the springs, the river disappears underground for a distance of approximately one-half mile. From the point of its resurgence, it is possible to canoe the entire distance to the Gulf without portage. The river forms an important estuary at the Gulf Coast.

The town of Steinhatchee, a small fishing village, is located at the mouth. The outstanding feature of the Steinhatchee River is its undeveloped nature. Virtually the entire length of the river from Steinhatchee Springs to the town of Steinhatchee is under one ownership

and remains in a relatively natural state. Many untouched hardwood trees line the banks. Another distinctive feature of the river is the extensive tidal flats which front the marsh around the river's mouth. The Steinhatchee River has a relatively large coastal drainage basin of approximately 375,000 acres. Most of this is wet forests and titi-based swamps. The western half of Mallory swamp is located within the Steinhatchee drainage basin. Excess waters drain from Mallory Swamp to the Steinhatchee River during rainy periods.

ECONFINA RIVER

Located approximately midway between the Aucilla River and the City of Perry, the Econfina River has a length of approximately 32 miles with a drainage area of 198 square miles. The river has an average discharge of 138 CFS.[6] Its principal attractions are its relatively natural state along its banks and its estuary at the Gulf. Virtually no residential development has taken place along its entire length. Hardwood forest lines the banks of the river while numerous adjacent lands contain managed pine forest. The river becomes significantly wider at the Gulf and forms an important estuarine marsh.

Water quality of the river and the adjoining marsh is reported to be very good. The adjoining forests contribute to the quality of the marsh by filtering the water before it reaches the coast and by acting as a buffer between the marsh and the forest industry land to the north.
The river corridor is primarily a mixture of hydric and messic communities. The major ecosystems found on the river include salt marsh, mixed-pine-hardwood community, pine-oak-palm community, and river swamp.

AUCILLA RIVER

The Aucilla River begins near the Georgia community of Boston, and meanders 48 miles through Florida terminating at the Gulf of Mexico. The river drains approximately 805 square miles and has an average discharge of 436 CFS.[7]

Forming the boundary between Taylor, Madison, and Jefferson Counties, the Aucilla River flows through the Aucilla Wildlife Management Area in upper Taylor County and St. Marks Wildlife Management Area in the coastal marsh area. The river has been designated as an Outstanding Florida Water. It provides some of Florida's most unspoiled river vistas available to canoeists and hikers. The Aucilla River traverses upland forests of longleaf pine and turkey oak, as well as old growth messic and hydric hardwood forests, cypress and gum swamps, beech-magnolia groves, cabbage palm-live oak hammocks, and finally salt marshes of the St. Marks Wildlife Management Area on the coastal fringe.

Southern bald eagles, osprey, otters, and turkeys can be seen, as well as smaller animals such as fox squirrels and raccoons. Numerous species of birds nest or migrate throughout the coastal marsh segment of the river. Indian mounds, dating back more than 2000, years are said to be scattered along the banks of the river. Much of the river floodplain is owned and managed by timber companies, effectively restricting residential intrusion, and two Wildlife Management Areas provide habitat for numerous plant and wildlife species.

A four mile section of the river, known as the natural bridge or sink area, is described in another section of this document. This unique geological feature, combined with a wide variety of wildlife in diverse and varied forest settings along the river, qualify the Aucilla River as one of the most unique areas of regional significance in north central Florida.

SUWANNEE RIVER SYSTEM

INTRODUCTION

The Suwannee River System Corridor is defined by the 100 year floodplains of the Suwannee River and its major tributaries, the Santa Fe, Withlacoochee, Ichetucknee, and Alapaha rivers. The Suwannee River system serves an important role in the region by the linking of inland wetlands to the Gulf coastal marshes. The rivers also play an important role in the control of freshwater flooding. In addition, they are the setting of many natural features unique to the southeastern United States, including an abundance of freshwater springs, sinks, and underwater caves. The rivers are also widely used as a recreational resource for camping, boating, canoeing, skindiving, and fishing.

This report divides the Suwannee into five sections: the upper Suwannee, or Segment I which runs from the Georgia-Florida border to White Springs; Segment II which flows from White Springs to the confluence of the Withlacoochee River; Segment III which traverses between the confluences of the Withlacoochee River and the Santa Fe River; Segment IV, which extends from the Santa Fe River to Manatee Springs; and Segment V which extends from Manatee Springs to the Gulf of Mexico. In addition, the major tributaries of the Suwannee are each discussed separately.

SUWANNEE RIVER

The Suwannee River flows some 288 miles in a southwesterly direction from the Okefenokee Swamp in Georgia to the Gulf of Mexico. It is the largest water course in north central Florida and dominates the entire planning region. The Suwannee forms the borders of seven counties and drains all, or portions of, every county within north central Florida. The actual drainage basin extends into Georgia and Alabama. In fact,

4,127 square miles of Florida are located within the Suwannee River drainage basin. The Suwannee River owes its popularity to its outstanding scenic beauty and undeveloped, unspoiled nature. The combination of abundant natural vegetation, the Floridan Aquifer, and numerous springs and sinkholes along the river make it special.

Unlike many rivers, the Suwannee's water quality is generally better downstream than upstream. The headwaters of the Suwannee, the Okefenokee Swamp in Georgia, produces a dark and muddy water flow that is high in tannic and humic acids from the decay of lush swamp vegetation. Its major tributaries provide the Suwannee with cleaner water. Downstream springs also provide the Suwannee with a high quality water source. The Suwannee is fed by over 50 springs. Nine of these are among the nation's 75 first magnitude springs.[8] During periods of drought the springs are a major source of the Suwannee's water.[9] The Suwannee has a flow of approximately one billion gallons per day at its entrance into the State of Florida but empties eleven billion gallons per day into the Gulf of Mexico.[10]

The Suwannee has relatively few tributaries compared to most rivers due to the basin's fast draining sands and underlying limestone channels. Instead of having many tributaries as sources of water, the great number of sinks and lakes in the region collect rain and local runoff before well-defined channels are formed. The Suwannee River flows across sediments formed over a time span of 40 million years. Many of these sediments, deposited in large deltas, estuaries, and shallow ocean environments are composed of limestone, dolostone, and other sandy materials. Geological attributes principally center around the karst features of the river. The dissolution of underlying limestone produces scenic rock outcroppings, sinkholes, and the many springs along the river. This diversification of geologic features greatly contributes to its scenic and recreational value.

The vegetation along the river is one of the major features of the Suwannee River's scenic beauty. Its almost unbroken forested banks are unique in that they contain every principal terrestrial habitat in Florida. Fresh water marsh and swamp forests occur at its headwaters while salt marsh can be found river's mouth. Although there apparently is no plant species unique to the river area aside from ogeechee tupelo, the variety, size, and geographic location of the several plant communities are noteworthy.

The river and its heavily forested floodplains provide excellent habitat for many fish and animal species. Fifty-four species, most notably the Suwannee black bass and the Okefenokee pigmy sunfish, are found only in the Suwannee River drainage basin.

The Suwannee is also home to the endangered West Indian Manatee and Atlantic Sturgeon. The sturgeon have historically been a mainstay of fishermen all along the Gulf coast. However, due to over fishing, dam construction, and river pollution their numbers have declined to the

point where it is considered an endangered specie on the Mississippi River. The Florida Game and Freshwater Fish Commission imposed a suspension on the fishing of the Atlantic Sturgeon in 1984. The Suwannee may well represent one of the last spawning grounds for the Atlantic Sturgeon. In the spring, adult sturgeon migrate upstream from their wintering grounds over the continental shelf to spawning areas in shallow portions of the Suwannee. Adults return to the Gulf of Mexico in the fall. Juveniles may remain in fresh or brackish water for 3 to 5 years although they may participate in prespawning runs as early as age one.[11] West Indian manatees can be found in the lower Suwannee River during the warmer months of the year. During the winter months, they concentrate at Manatee Springs, one of six natural, warm water refuges for this endangered specie within the state.[12]

Thirty-nine species of amphibians, 73 species and subspecies of reptiles, 232 species and subspecies of birds, and 42 species and subspecies of mammals are known to be present within the Suwannee River floodplain.[13] This large number of species may be accounted for in part by the diverse and undeveloped habitat that is present. The river also forms an important dividing line which abruptly terminates the range of a number of species. Some life forms such as the alligator snapping turtle, wood thrush and marsh hawk reach their southern and eastern limits on the northeast bank of the Suwannee. Other species reach their westerly and northerly limits at the river including the Florida crow and the Florida black bass.[14] Forested areas along the river support, as the principal large upland species, white-tailed deer and wild turkey. In addition, black bear can be found in small numbers. Small game species that can be found in the watershed include bobwhite quail, mourning dove, grey squirrel, woodcock and common snipe. The delta region at the mouth of the Suwannee has an abundant habitat for waterfowl. Numerous duck species utilize north central Florida. These include mallard, pintail, red-breasted merganser, black duck, gadwall, and others.

The value of the Suwannee's archeological attributes cannot be underestimated. A number of historical and archeological sites lie along the river, including an Indian flint mine as well as evidences of Spanish influence and activities that occurred during the Seminole and Civil Wars. Many valuable paleontological finds have been discovered both on the river bottom as well as on the surrounding lands, most notably near Bell in Gilchrist County.

SUWANNEE RIVER, SEGMENT I

The upper Suwannee flows some forty miles from the Georgia-Florida border (river mile 210) to the Stephen Foster State Cultural Center at White Springs. This river segment is characterized by its numerous shoals and swift currents. It is used for recreational purposes mostly by canoers, campers, and fishermen. The Big Shoals and Little Shoals areas are reported to have the best whitewater in the state. The upper Suwannee is generally a very scenic and unspoiled segment. The riverbanks are all

privately owned. Public ownership is confined to the Suwannee River State Park and the Stephen Foster State Cultural Center. The segment receives discharges from phosphate mine slime pits but the large water volume of the river appears to preclude significant pollution with limited development. Surrounding land uses are typically farmland, forest, and low density residential.

Significant points of interest along Segment I include Algal Beach, Big Shoal, Agatized Coral, and the Brown Tract-Little Shoals area.

SUWANNEE RIVER, SEGMENT II

Segment II covers the area from White Springs to the confluence of the Withlacoochee River. The segment is 53 miles in length and is noted for its many freshwater springs. The spawning grounds of the Atlantic Sturgeon probably occur in this segment of the Suwannee between Ellaville and White Springs. A section of the Florida Trail parallels the course of the Suwannee for the entire length of segment II. The Florida Trail Guide states about this section of the Suwannee,

> Near creek and spring junctions people have found fossils, Indian articles, and Florida's unique agatized coral. Striking white sand beaches occur frequently... White lilies, azalea, sparkle berries, dogwood, and redbud trees grow along the path, and at the western end there is an abundance of spruce pine. Many types of animals are found, including the beaver which leave abundant handiwork in evidence... The Suwannee section also has a picturesque bluff over 130 feet above the water called Devil's Mountain, named after a peculiar barbstick which grows there.[15]

Significant points of interest include Bell Spring, White Spring, Louisa Sink, Indian Flint Quarry, Suwannee Springs, Guinea Creek, Alapaha River confluence, Holton Creek natural area, a hardwood preserve, Ellaville Springs, Morgan Spring, Adam's Spring, Wesson's Iron Spring, Florida Sheriff's Boys Ranch, and Suwannee Spring.

SUWANNEE RIVER SEGMENT III

This river segment is 62 miles in length and includes the area from the Withlacoochee River confluence to the Santa Fe River confluence. Segment III is also noted for its many springs. The following significant natural features are located within Segment III: Withlacoochee River confluence, Anderson Spring, Greenspan, Charles Spring, two historic spanish trails, Allen's Mill Pond Spring, the North Florida Methodist Camp, a pine preserve, Running Springs, Bonnet Springs, Peacock Springs, Owen's Island, Troy Spring, Little River Springs, and the Santa Fe River confluence.

SUWANNEE RIVER SEGMENT IV

Segment IV covers 42 miles from the confluence of the Santa Fe River to Manatee Springs State Park. Segment IV is noted for its many freshwater springs and has a considerably larger water flow as it has already received most of its additional waters by the time it passes Santa Fe River confluence. This segment also has many public boat ramps and is heavily used by boaters. Significant natural features along Segment IV include: Fletcher Spring, Branford Spring, Mearson Spring, Ruth Spring, Owen's Spring, Royal Spring, Convict Spring, Telford Spring, Perry Spring, Falmouth Spring, Morrison Spring, Turtle Spring, Rock Bluff Spring, Little Copper Spring, Hart Springs, Otter Springs, Lumbercamp Spring, Townsend Spring, Fanning Spring, Bell Springs, McCrabb Spring, Copper Spring, Big Cypress Spring, the Guaranto property, and the Kalogridis property.

SUWANNEE RIVER SEGMENT V

The lower Suwannee segment is 25 miles in length and ranges from Manatee Springs State Park to the Gulf of Mexico. The lower Suwannee serves as a travel corridor for the western manatee during its annual migration to its wintering habitat at Manatee Springs. The segment is relatively free of springs and becomes increasingly wider as it approaches the mouth. The river eventually breaks up into numerous smaller streams and deposits its sediments in the Gulf of Mexico. The Suwannee forms a large estuary at its mouth. This estuary is a prime habitat area for many different species of birds, fish, mollusks, and crustaceans, as well as many different plant species.

SANTA FE RIVER

The Santa Fe River is the largest tributary of the Suwannee, covering 75 miles from its headwaters at the Santa Fe Swamp - Upper Santa Fe Lake and Santa Fe Lake complex in northeast Alachua County to its confluence with the Suwannee River in northwestern Gilchrist County. The river has a watershed of 1,440 square miles. This major tributary of the Suwannee River, the Santa Fe, has three major tributaries of its own: the Sampson River, New River, and Olustee Creek. With average recorded flows of over 1,500 feet per second, the large volume of surface waters flowing through the river make the Santa Fe a regionally significant natural area independent of the Suwannee.[16]

The forest areas which surround the river can be divided into swamp forest and hammock forest. The swamp forest has an abundant diversity of tree species including sweet gum, tupelo gum, pumpkin ash, carolina ash, laurel oak, Florida elm, red maple, bald cypress, water hickory and water locust. The intermittently flooded areas of the river swamp show a preponderance for live oak trees. Of special note, the overcup oak and river birch species that are found in the area reach their southern-most limit of growth along the Suwannee and Santa Fe Rivers.

A diverse group of vegetative and tree species still exist along the Santa Fe floodway. The hammock forest normally exists in the higher elevations outside the floodplain. Typical trees include maple, live oak, laurel oak, swamp chestnut, sweet gum, red bay, magnolia, spruce pine, sugarberry, blue beach, and pignut hickory.

Examples of virtually all wildlife species that still exist in north central Florida can be found along the Santa Fe River. Bobcats and an occasional black bear may still be found along the river. An abundant wildlife population including such wide-ranging species as deer, grey squirrel, turkey, and otter can be also found. Alligators are abound, particularly in the northern portion. The bird population is fairly extensive and includes the common egret and heron, the pileated woodpecker and the limpkin, kingfisher, red shouldered hawk, barn owl, many species of warbler, and reportedly the rare Mississippi kite. Aquatic species in the Santa Fe River system consist of a small but apparently stable species population. This includes more than 40 fish species and approximately 50 invertebrate species.[17]

The Santa Fe is in a nearly natural state and receives almost no domestic or industrial pollution. The most notable attribute of the upper Santa Fe River is the Santa Fe Swamp. The lower Santa Fe is noted for its many springs. The area between O'leno State Park and the Suwannee River confluence is the center of the range of the Suwannee Bass, a species of very restricted distribution and an excellent game fish. In fact, the lower Santa Fe harbors an estimated eighty to ninety percent of the total population of this unique species. The area between the Ichetucknee River and Poe Springs is an important fossil site.

Important natural features along the Santa Fe include Poe Spring, Lily Spring, Ginnie Springs, Devil' Eye Spring, Dogwood Spring, July Spring, Blue Spring, Naked Spring, and Rum Island Spring.

WITHLACOOCHEE RIVER

The Withlacoochee River begins its 108 mile route to the Suwannee near Tifton, Georgia. Flowing southeasterly, it joins the Suwannee near Ellaville at Suwannee River State Park. Some 24 miles of the river lie within Florida forming the border between Madison and Hamilton counties. The river flows through some of the state's most picturesque swamp lands. Its varying river channel exhibits such features as sandy beaches and impressive limestone outcroppings. Several springs feed the Withlacoochee and add to its scenic qualities. These include Blue Spring, Suwannacoochee Spring, and Morgan Springs.

The Withlacoochee River Canoe Trail was the first river canoe trail established in Florida. The trail is maintained by the Florida Department of Natural Resources in cooperation with the Coastal Plain Area Tourism Council of Valdosta, Georgia. The trail begins north of Valdosta and terminates some 56 miles downstream at the confluence with

the Suwannee River.

The river is only accessible by small boats and canoes. Many shoals and shallow areas severely limit powerboat access. Only one public boat launch is known. Canoes and other small boats primarily launch at river crossings.

Approximately 2,120 square miles are contained within the Withlacoochee drainage basin in Georgia and Florida. The river itself has a recorded discharge at the Suwannee ranging from 93 to 2,060 cubic feet per second with an average flow of approximately 1,000 CFS.[18]

The Withlacoochee averages 150 feet in width and the water is apparently clean although it has a dark tannic-acid stain. The river has relatively high, steep banks. Owing to the fairly resistant nature of the limestone throughout the area, these banks are often sheer, thereby severely limiting boat access and serving, in effect, as a means of natural protection for the river.

The ecology of the Withlacoochee River is much the same as that which occurs along the Suwannee. Forest types vary considerably along the river depending upon variations of land character around the river. Oak and pine are the predominant tree types. The forests along the river's bank are harvested primarily for pulpwood. Less than two percent of the stream margins appear to be actively used by the property owners, with the rest lying in a relatively natural condition. There are very few areas with residential housing along the river. These are located near river's mouth at its junction with the Suwannee.

Wildlife species found in and around the river's relatively narrow floodplain include a year round population of wood duck. Beaver, once trapped out of the region, have been reintroduced and are active in contributing to tree damage. In addition, deer, gray and red fox, and a variety of bird species including the kingfisher, and numerous species of swallow are abundant. The rare and endangered striped turtle and alligator are only two of the numerous aquatic species that live in the river. A fish survey by the Florida Game and Freshwater Fish Commission identified 31 species including Suwannee bass, warmouth, blue gill, shellcracker, red breast sunfish, spotted sucker, several species of shiner, and shad.

Both agricultural runoff and industrial pollution degrade the water quality and compromise the environmental integrity of the river. The industrial pollution results from the discharge of approximately 11.7 million gallons per day of paperboard mill wastewater into the Withlacoochee River near Clyattville, Georgia. Nutrient and dissolved oxygen problems in the river are caused, at least in part, by these effluents. Runoff from agricultural lands bordering the river is likely to be the source of high levels of coliform bacteria and phosphate.

Despite the pollution problems occurring in small segments of the river, the Withlacoochee remains essentially a unique undeveloped natural river affording excellent recreational potential. The varied character of the river itself, in addition to the profuse natural vegetation and absence of development, create a very impressive aesthetic appearance which offers a pleasing, and perhaps primitive, river experience.

ICHETUCKNEE RIVER

Located in southern Columbia County, Ichetucknee Springs forms the headwaters of this five mile long river. This clearwater river is a very popular location for canoeing, rafting, and tubing.

The river runs past high limestone banks, river swamp, and marsh shoreline where dominant plant types are ribbon grass, spatter-dock, coastal willow, and buttonbush. The swamp area originally had several beaver ponds. However, beavers are no longer present. Animals common to the park include turkey, limpkin, apple snail, suwannee bass, gulf pipe fish, and river otter.

The floodplain is primarily composed of sandhills and messic hammock vegetation. The sandhill community is located in the highest elevations. Common plants include turkey oaks, sand post oak, longleaf pine, bracken fern, and wiregrass. Messic Hammock is moderately drained and has a closed canopy consisting of mixed hardwoods such as southern red oak, laurel oak, sweetgum, flowering dogwood, and sparkleberry. There is a small area of river swamp which is poorly drained, frequently flooded, and has a dense canopy. Dominant trees in this swamp area include red maple, sweetgum, american elm, Florida ash, and bald cypress.

ALAPAHA RIVER

The Alapaha River travels 125 miles from its headwaters in southwestern Georgia to the Suwannee River in Hamilton County. The Alapaha drainage basin contains 1,840 square miles. Only a relatively small portion of the river, approximately 40 miles, flows through the region. Similarly, only 140 square miles of its drainage basin is located in the region. The river flow averages 1,346 CFS.[19]

The Alapaha is similar to the Upper Suwannee in that it has fairly high and steep banks and winds through undeveloped forest lands. However, the Alapaha is unique as it is divided into two distinct parts by a group of sinks. The river flows continuously in the northern segment year round. The northern segment flows into the sinks channeling a significant portion of the river flow underground. The southern segment is considered to be an intermittent stream. During periods of low flow, the sinks absorb all of the northern segment's waters. However, water flows the entire length of the Alapaha about sixty percent of the time. It is thought that the river waters travel through underground limestone

channels for 19 miles and re-emerge at Holton Creek.

UPLANDS WITH DIRECT IMPACT ON RIVER SYSTEM

INTRODUCTION

Regionally significant upland areas with direct impact upon the Aucilla River and Suwannee River system include areas which have regional significance beyond their association with the rivers. Typically, these areas include major springs, sinks, swamps, and hardwood hammocks adjacent to either the Suwannee or one of its major tributaries but exclude areas located within the Gulf coastal drainage basin. These areas typically have high recreational value or play an important role in the Suwannee River ecosystem. In the case of springs and sinks, they represent the best examples of their type in the region. The wooded areas of the Suwannee represent the last vestiges of a once extensive native wood forest population.

Upland wetlands are important to the region for natural flood control. Wetlands also filter and purify water as well as provide a rich habitat and travel lane for varied wildlife. They also serve as important natural fire breaks to limit forest fire damage. Wetlands throughout the southeast have been vastly reduced by logging, drainage, and channelization projects. River swamp is an important and endangered original Florida forest type.[20] Three upland swamps impacting the Suwannee River system, Pinhook Swamp, Santa Fe River Headwaters Swamp, and Bee Haven Bay have been identified as regionally significant natural areas.

Upland wetlands occupy a large portion of north central Florida. Their dense vegetation causes wetlands to act as a reservoir. During the rainy season, wetland vegetation absorbs surfacewaters, helping to reduce flooding along the Suwannee River system. During dry periods, wetland vegetation slowly releases water, helping to maintain stream flows. This vegetative growth, enhanced by a ready supply of water, provides abundant resources both for wildlife and for the forestry industry. It also provides a constant supply of nutrients which are essential to the wetlands ecosystem.

AUCILLA RIVER SINKS

Marking the boundary between Taylor and Jefferson Counties, the Aucilla River remains one of the few unspoiled and natural rivers in north central Florida. A four-mile section of the river is known as the "natural bridge" or "sink area". This is where the river disappears and rises in numerous sinkholes. This unique geological feature, combined with a wide variety of wildlife in a diverse and varied forest setting makes the sinks area of the Aucilla River one of the most unique geologic

settings in Florida.

The entire sink area encompasses some 2,000 acres lying along four miles of the river's trace in both Taylor and Jefferson Counties. In the four mile stretch below the river's disappearance there are at least 50 to 60 known sinkholes and quite possibly hundreds more.[21] Some are simply limestone chimneys only a few feet in diameter; many are several hundred feet across and seem to favor an elongated shape. Areas of both upwelling and downwelling of waters can be seen in the larger sinks. Many have a distinct, flowing current.

The origin of these sinkholes may most likely be attributed to ceiling collapse of an underground limestone river channel. Throughout the entire area, limestone banks are evident along the borders of all the sinks, usually forming banks from three to approximately ten feet above the water's surface. It is reported that during periods of high rainfall the entire area may flood with river water as well as water from overflowing sinkholes.

The area along the trace of the river is predominantly a hardwood or upland hammock. Although there are some pine plantings throughout the area, the limestone formation very near the surface effectively prohibits successful beddings and subsequent pine growth along the immediate river trace area. Much of the surrounding forest is overgrown with a dense understory, but paths and trails are frequent providing a network of access roads between the sinks. The area is not well used primarily because so few people know of its existence. Through the courtesy of Buckeye Cellulose, it is open to the public for fishing, hunting, camping, and other recreational pursuits. Numerous woods roads remain as evidence of past logging efforts. Cattle range over much of the area. However, the lack of general information about this area coupled with difficult access to many of its more remote spots has left much of the area free from serious human abuse.

No information is available on the precise numbers or diversity of wildlife species. The area is recognized for its hunting potential and has excellent populations of raccoon, deer, and squirrel. Many types of birds are apparent, and reportedly, a large number of turkey inhabit the forest area. The entire region in Taylor and Jefferson Counties surrounding the sinks trace is either within the Aucilla Wildlife Management Area or within the Buckeye Cellulose hunting area in Taylor County.

HOLTON CREEK

The Holton Creek area has been designated as a potential preserve site by the Nature Conservancy. The area is located on the north side of the Suwannee River between Holton and Mitchell Creeks, approximately one mile east of the Alapaha River in Hamilton County. J. Merrill Lynch, author of the Suwannee River Preserve Design Project, notes that the area

includes Holton Spring and its run to the Suwannee, one of the nine first magnitude springs on the Suwannee and one of 27 such springs in the state.[22] More importantly, it is one of the few first magnitude springs that remains in a relatively undisturbed, natural state. The area includes one of the largest concentration of sinkholes and depressions in the floodplain.

Perhaps most importantly, it contains the largest and highest quality of old-growth, bottomland forest remnant in the upper Suwannee River floodplain. The area also contains five and one-half miles of undeveloped river frontage.

Endangered species found in the area include the gopher tortoise and Suwannee cooter and also contains the cedar elm, an endangered plant. According to Lynch, the tract contains the largest known population of cedar elm in Florida with an estimated 100 to 1,000 individual trees.

BROWN TRACT

The Brown Tract is located on the north bank of the Suwannee River approximately three miles east of the town of White Springs in Hamilton County. Mr. Lynch notes that the Brown Tract is the largest block of natural vegetation that remains on the upper Suwannee River. The tract contains over five miles of river frontage and includes both Big and Little Shoals, the largest and most extensive white water rapids in Florida. In addition to the rapids, the tract is significant because it contains at least ten natural community types, representing almost all community types within one segment of the river basin. Also of note, the tract contains a sizable population of American beech, one of the southernmost populations of this tree specie.

Threatened or endangered species found in the tract include a sizable population of gopher tortoise. An active rookery, one of only seven in the Suwannee River basin, is also located on the property. In addition, the tract contains a number of non-threatened wildlife species, including wild turkey, beaver, bobcat, river otter, and white-tailed deer.

SUWANNEE RIVER STATE PARK

Located 14 miles west of Live Oak and 15 miles east of Madison on the north side of U.S. 90 in Madison and Hamilton counties, the Suwannee River State Park features the confluence of the Suwannee and Withlacoochee Rivers.

The park comprises 1831 acres of open pine sandhills, rich hardwood hammocks, and dense river swamps. The banks of the Suwannee in the park have striking exposed walls of limestone outcroppings, where the river has cut down the underlying rock over long periods of time.

Typical plants found in the sandhill community include longleaf pine, turkey oak, blue jack oak, and wiregrass. Typical wildlife found in the park includes fox squirrel, gopher tortoise, red-tail hawk, indigo snake, pine snake, fence lizard, quail, rufous-sided towhee, and red cockaded woodpecker. The sandhills are relatively high rolling prairies with pines growing on them. They are places of expansive openness, with wide spacing between the trees and a grassy cover. Original explorers found miles upon miles of open sandhills with virgin longleaf pines towering above them. Most of these have now been logged and cleared for development or agriculture. Some, however, were left to succeed into hardwoods through the exclusion of natural fire. Sandhills are fire dependent, and constitute a fire-climax community wherever they appear.

Hardwood hammocks are a very important Florida forest type and are considered the climax forest of the southeastern coastal plain. Due to heavy logging and development and clearing for agriculture, there are very few sizeable areas of hardwood hammock left in Florida. The wildlife species that depend on it are, therefore, diminishing.

Typical plants of the xeric hammock include live oak, scrub holly, sparkleberry, turkey oak, palmetto, myrtle oak, wild cherry, and rusty lyonia. Plant species typical to the Messic hammock include pignut hickory, mockernut hickory, palmetto, laurel oak, American beautyberry, Carolina jasmine, dogwood, and muscadine grape. Hydric hammock plant species include swamp sweetbells, loblolly bay, red bay, sweetgum, needle palm, buttonbush, as well as many ferns and epiphytes. Typical river swamp plants include pond cypress, bald cypress, blackgum, sweetgum, sweetbay, southern magnolia, water hickory, pop ash, and buttonbush.

The Suwannee River State park provides a rich habitat for a wide variety of wildlife including bobcat, deer, turkey, gray squirrel, river otter, pileated woodpecker, wood duck, alligator, white ibis, cottonmouth moccasin, as well as numerous songbirds, turtles, and snakes.

PEACOCK SLOUGH

Located in Suwannee County six miles north of the Town of Mayo lays Peacock Slough. The Slough has been declared an Environmentally Endangered Land (EEL) Project and has been recently purchased by the Nature Conservancy. The area is a truly exemplary natural ecosystem containing elements of regional and statewide significance. The natural area encompasses excellent examples of surface and subsurface karst limestone features, including sizeable sinks, numerous smaller sinks, and depressions. It has one of the most extensive underwater cave systems in the continental United States and contains a total of 28,000 feet of underwater passage which have been explored and surveyed.[23] The underwater cave system is widely regarded as one of the best underwater cave diving areas in the United States. In addition, the property has important archeological value as an early Spanish mission site.

The sinks and associated aquatic cave system provide critical habitat for at least three endangered or threatened species of cave crustaceans endemic to the limestone regions of Florida. The area also contains mature, second-growth and old-growth forest stands. These represent four major natural community types.

SUWANNEE - SANTA FE RIVERS CONFLUENCE

Located at the confluence of the Suwannee and Santa Fe Rivers, this area extends about 4.3 miles both upstream and downstream from the Santa Fe River. It also extends as far as the lower two miles of the Santa Fe. The area overlaps portions of Gilchrist, Lafayette, and Suwannee counties. It contains excellent examples of various wetland and terrestrial natural communities associated with the river floodplains. Four natural community systems are represented by mature second-growth or old growth forest stands. These include the threatened cedar elm.

The confluence contains the largest active heronry in north central Florida.[24] Nesting species include the great blue heron, little blue heron, white ibis, cattle egret, and American anhinga. The confluence is the largest remaining undeveloped floodplain area between Branford and Fanning Springs.

WANNEE NATURAL AREA

Located 8 miles north of Fanning Springs, the Wannee Natural Area straddles both sides of the Suwannee River for approximately 5 miles of its length in Dixie and Gilchrist Counties. J. Merrill Lynch notes that the Wannee natural area contains the most extensive remnant of mature, second-growth and old-growth bottomland forest and floodplain swamp on the Suwannee River.[25] The site is known to contain excellent examples of at least ten different floodplain-wetland plant communities. It is by far the largest block of undeveloped bottomland forest that remains in the river floodplain corridor upstream from Fanning Springs.

The site is particularly noted for its high diversity of alluvial landforms in the Suwannee River floodplain. Examples include natural levees, sloughs, backswamps, and ridge and swale topography.

SANTA FE HEADWATERS SWAMP

Santa Fe Headwaters Swamp is located north of Little Santa Fe Lake in northeastern Alachua County and southeastern Bradford County. The swamp in its natural capacity performs valuable services to the region by being part of the headwaters of Santa Fe River, by contributing to aquifer recharge, and by serving as an excellent and remote wildlife habitat. The swamp encompasses some 5,500 acres. The major feature of this area is an extensive hardwood swamp. Approximately 300 acres along the

eastern side of the swamp may be described as a sandhill community dominated by longleaf pine, turkey oak, and wire grass. The remainder of the property consists primarily of inaccessible wetlands. The swamp community is consists of a mosaic of vegetation types including pine flatwoods, cypress swamps, bayheads, wet prairies, and marshes, portions of which reportedly resemble Okefenokee Swamp.

The dominant swamp vegetation includes cypress, gum, and bay trees. Several small pine plantations occur in the upland portions near the eastern boundary of the property. Reportedly, there is some logging in the perimeter. Large amounts of hardwood are available in the swamp. Although the wetness of the area provides obstacles, it does not preclude the harvesting of these trees.

Water quality is largely unknown but is probably good. This information is based upon limited available records and visual inspection of the Santa Fe River near the swamp. A considerable number of wading birds have been observed in the feeding ponds and prairies, and reportedly, the area would be a potentially good habitat for waterfowl and game species. In addition, three nesting pairs of bald eagles as well as black bear and wood stork have been observed.

It is expected that those species inhabiting the area around the Santa Fe River would likewise reside in the swamp. There are no roads or access of any kind into the swamp. The area is expected to be the habitat of a diverse and abundant wildlife population due to its undisturbed nature.

O'LENO STATE PARK AND RIVER RISE STATE PRESERVE

O'leno State Park and River Rise State Preserve encompass 10,120 acres along the Santa Fe River corridor. The property is located within Alachua and Columbia Counties between High Springs and Interstate 75. The Santa Fe River enters the park at its northeast corner and proceeds in a southwesterly direction through the property. The river disappears within in the area known as the "river sink". The Santa Fe River travels approximately three miles underground before reappearing in the highly scenic area known as "river rise". This unique geological formation is referred to as the "natural bridge".

The "natural bridge" is due to the underlying geology of the park, which is characterized by a thin layer of quartz sand on top of the Ocala Limestone Formation. Sinkholes are scattered throughout the property. Also interspersed throughout the park are areas of common clay which can be found just under the surface. Lime rock surfaces along the river and chert, also known as flint or flintrock, is present. Chert was utilized by Florida's Indians in the manufacture of axe heads, spear heads, and arrow points.

The area has significant historical interest to the state. The northern portion of the property is traversed by the Old Bellamy Road. This road was authorized by Congress and begun in 1824 for the purpose of linking the east and west coasts of Florida. The abundance of chert artifacts also adds to the archeological value of the area.

Major plant communities are sandhill, messic hammock, swamp, and sandy scrub. Dominant species of the sandhill community include longleaf pine and loblolly pine. The loblolly pine has been able to establish itself because of the lack of fire within the community. Other species found here are the turkey oak, and wiregrass. Dominant plant species in the messic hammock community include the live oak, laurel oak, pignut hickory, and swamp chestnut oak. The sub-canopy consists of hollies, numerous shrubs, and wildflowers.

Areas of sandy scrub are found on the natural levees and the former floodplain along the course of the river. Due to a lack of nutrients and dry soil conditions the trees that grow here very seldom attain great height. Some of the species found here include the sand live oak, chapman oak, and extensive areas of saw palmetto.

Much of the river is bordered by woody swamp which is inundated at least part of the year. Some of the plant species in the swamp area include the bald cypress, river birch, red maple, american hornbeam, and black gum. Common animals found in the park include the fox squirrel, gopher tortoise, red tail hawk, indigo snake, pine snake, rufus-sided towhee, alligator, river otter, wood duck, and white ibis, whitetail deer, opossum, raccoon, wild turkey, and pileated woodpecker.

ICHETUCKNEE SPRINGS STATE PARK

Ichetucknee Springs State Park consists of 2,250 acres and has a shoreline of 37,400 feet along the Ichetucknee River (both banks). The park was purchased by the state in 1970 and listed on the National Registry of Natural Landmarks in 1972. It is known for its numerous freshwater springs and is a very popular location for canoeing, rafting, and tubing.

The river bank ranges from high limestone outcrops to river swamp/marsh shoreline where dominant plant types are ribbon grass, spatter-dock, coastal willow, and buttonbush.

The swamp area originally had several beaver ponds. However, beavers are no longer present in the park. Animals common to the park include turkey, limpkin, apple snail, Suwannee bass, gulf pipe fish, and river otter.

The highest elevations in the park are dominated by sandhills. The sandhill community comprises 30 percent of the park and has well drained soil with an open canopy. Common plants include turkey oaks, sand post

oak, longleaf pine, bracken fern, and wiregrass. The next line of succession is messic hammock which constitutes 65 percent of the park area. It is moderately drained and has a closed canopy consisting of mixed hardwoods such as southern red oak, laurel oak, sweetgum, flowering dogwood, and sparkleberry. There is a small area of river swamp, which is poorly drained and frequently flooded. It also has a dense canopy which is comprised of red maple, sweetgum, American elm, Florida ash, and bald cypress.

GINNIE SPRINGS

Located on the Santa Fe River in northwestern Gilchrist County, Ginnie Springs is actually composed of nine separate springs; Ginnie, Poe, Lily, Devil's Pond, Dogwood, July, Blue, Rum Island, and Naked. They are located in an aesthetically appealing woodland setting and are easily accessible from each other. Much of the plant life here is in an almost natural state. Large species of cypress, oak, and maple trees surrounded by a dense undergrowth of natural vegetation occur along both the adjacent Santa Fe River and the spring group.

Ginnie Spring is a large clear-water spring with depths to 40 feet and is one of the most popular scuba diving springs in the region. The underwater view is notable. Devil's Eye Spring is in the middle of three boils in one of the loveliest combinations of springs in the state. The spring contains a multi-caved tunnel leading to the Santa Fe River.

BLUE SPRING

Blue Spring is located approximately five miles east of the City of Madison on the west bank of the Withlacoochee River in Hamilton County. Although located on private property. The site is widely used by Madison and Hamilton County residents for recreational activities. The spring has gained a national reputation for skindiving and draws visitors from a very large area of Florida and Georgia.

Blue Spring is one of the 27 first magnitude springs and spring groups in the State of Florida. It has an average flow of about 78 million gallons per day. The spring pool is normally about thrity yards wide and some thirty feet deep. The river that borders the tract is about 50 yards wide. A clear run travels approximately fifty yards from the spring to the Withlacoochee River. Vegetation on the property can be characterized by high pine lands and sand hills on the west giving way to a dense hardwood forest toward the east and along the river. Approximately 170 acres north of State Road 6 is cleared and in agricultural use. Of the forested area, approximately fifty percent pine-turkey forest, forty percent is hardwood hammock, and a small portion is swamp bottomland forest. The vegetation is generally diverse with many large trees that contribute to the aesthetic appearance of the site[26].

UPLANDS WITH INDIRECT OR NO IMPACT UPON RIVER SYSTEM

PINHOOK SWAMP - SANDLIN BAY - IMPASSABLE BAY

Lying 15 miles northeast of Lake City, extending through much of Columbia and Baker Counties, and ranging up to the Georgia - Florida border, Pinhook Swamp is essentially one continuous swamp system It extends from the Okefenokee Swamp southward to the Osceola National Forest and westward to the Suwannee River. Covering approximately 70,000 acres within north central Florida, Pinhook Swamp is probably the largest continuous wilderness area in northern Florida.

The swamp includes the area known as Sandlin Bay and those portions of the Osceola National Forest known as Impassable Bay. It is predominantly a cypress, gum, and loblolly bay swamp and may be characterized as a vast, open area that is almost continually flooded. It is interspersed with dotted pine, cypress, and lesser shrubs in open areas. The swamp is not as aesthetically pleasing as other natural areas within the region but has a unique character due to the bleak wilderness quality of the expansive tree dotted prairie and thick fetter bush and titi-based vegetation around its fringe.

This predominantly fetter bush swamp is very wet with many peat bogs and generally has a very rich humus soil. In slightly higher areas around the swamp, wide belts of pine forests are quite evident. Slash pines have been, in many cases, planted in fringe areas, but harvesting has apparently not been on a large scale due to the wetness of the ground. These fringe areas are typical pine flatwoods which, near the swamp give way to cypress, slash and long-leaf pine, magnolia, and sweet bay.

The interior of the swamp is inaccessible except by aircraft or perhaps by airboat. Only those few elevated, unimproved dirt roads that extend a short way into the swamp for timber harvesting allow even partial access to its interior.

Pinhook Swamp is a valuable wildlife habitat. Rare, endangered, or protected species included in this habitat are the black bear, the Florida sandhill crane, and the bald eagle. It is reported to contain one-third of Florida's entire bear population. The swamp has a good population of deer and turkey, as well as squirrel, rabbit, otter, beaver, and many varieties of snakes, alligators, and other reptiles. Common birds reported in this area include the anhinga, many species of egrets, heron, and ibis, as well as many duck species, including wood duck. Canadian geese now frequent the area as winter residents. Drainage of the swamp is very poor. Timber companies have dug a few canals to drain portions of the swamp. They have done this by channeling runoff water into fringe areas and off of access roads. However, no large scale drainage works have been undertaken. Surface runoff generally flows westerly to the Suwannee River, principally through

Little Creek, with some runoff flowing easterly to St. Mary's River in Baker County.

The swamp itself is unquestionably of regional significance not only for the ecological values it represents as a wetland system but because of its immense size. Its size and flat terrain offer a natural degree of protection that will not be readily overcome by developers and land speculators.

OSCEOLA NATIONAL FOREST

Approximately one-half (80,000 acres) of Osceola National Forest is located in northern Columbia County immediately south of Pinhook Swamp. The other half is located in Baker County. In total, this forest consists of 157,218 acres and represents the largest federal government land holding within the region. The higher, better drained areas are covered by pine flatwoods with longleaf pine predominating in western one-third and slash pine predominating in the eastern two-thirds of the forest. The most common understory includes saw palmetto and gallberry. Runner oak and wiregrass comprise the most common ground cover. Cypress is the second largest tree type in the Forest. Blackgums, red bay, red maple, and holly accompany the bald cypress and pond cypress. Creek swamp type which features sweetbay, blackgum, and red maple occupies about 12 percent of the Forest. A variety of wildflowers can be found throughout the forest.

Osceola National Forest hosts a wide variety of wildlife and fish. Game animals include white-tailed deer, black bear, wild turkey, quail, rabbit, squirrel, and dove. Non-game species include over 50 species of fish, 40 species of amphibians, 60 species of reptiles, 180 species of birds, and 48 species of mammals. The red-cockaded woodpecker, Florida sandhill crane, American alligator, indigo snake, and Suwannee bass are among the rare, threatened, or endangered species found within the forest.

National Forest land is owned by the federal government. The National Forest Management Act of 1976 authorizes the U.S. National Forest Service as the management agency for national forest lands. Under the act, the Forest Service is mandated to produce a continuous supply of goods and services from national forest lands. Goods and services are limited to timber, wildlife, water, forage, minerals, outdoor recreation, and soil conservation. Essentially, any activity which is detrimental to these items is prohibited in National Forest lands. The National Environmental Policy Act of 1976 requires the preparation of an Environmental Impact Statement for major projects proposed on national forest lands.

The forest is extensively used for timber production and also contains economically valuable phosphate deposits. Exploratory drilling during the late 1960's indicated a high quality phosphate reserve in excess of

100 million tons. There may also be some potential for oil and gas reserves, but limited exploration to date has shown no deposits.

BIG GUM SWAMP NATIONAL WILDERNESS AREA

Within Osceola National Forest is the newly-created Big Gum Swamp National Wilderness Area which comprises approximately 13,640 acres. Big Gum Swamp is administered by the National Forest Service. Wilderness areas differ from national forest lands in that no economic activity may take place in wilderness areas. The land and wildlife must be left in its natural state.

BEE HAVEN BAY

Located approximately four miles east of the City of Jasper, Bee Haven Bay is found immediately north of Occidental Chemical's phosphate mining area in Hamilton County. As the name implies, Bee Haven Bay is a bayhead swamp consisting of bays, dahoon holly, cypress, red maple, and other mixed woods. The bay is a prime habitat for the threatened black bear and other mammals. Drainage of the bay is by Rock Creek into the Suwannee River. The bay contains several species of bay pitcher plants which is considered by the state to be a critical specie.

HIXTOWN SWAMP

Hixtown Swamp is located between the cities of Madison and Greenville in central Madison County. It is roughly confined on the north by U. S. Highway 90 and on the south by Interstate 10. Hixtown Swamp comprises approximately 15,000 acres. It is listed by the National Park Service as a potential addition to the National Register of Natural Landmarks.

The swamp is a wide expanse of wetlands broken up by peninsulas, islands, and cypress stands. It is surrounded by considerably higher rolling country. The highlands surrounding the swamp often reach elevations that are approximately 50 feet higher than the swamp. It is considered to be the most extensive, undisturbed cypress swamp still found in northern Florida. Many of the islands of pond and bald cypress cut around 1900 have now returned to sizeable trees of 12 to 18 inches in diameter. The luxuriant undergrowth includes many species commonly found in more northern areas. Therefore, the swamp is totally different from the semi-tropical aspects of cypress swamps found in south Florida.

Despite the construction of Interstate 10, Hixtown Swamp has retained most of this rare primitive character. This is due, in part, to conservative construction practices. A provision was made for the flow of water underneath the highway through a series of culverts. However, no similar provision was made for the safe movement of wildlife.

Nevertheless, a rich diversity of wildlife occurs within the swamp. The area is considered to represent one of north Florida's heaviest concentrations of wildlife. In addition to the alligator, other large species include otter, raccoon, wildcat, deer, fox, and possibly even black bear.

Wading birds are abundant, including several rare and endangered species. These are the white ibis, American egret, sandhill crane, great blue heron, Louisiana heron, little green heron, little blue heron, the least bittern, the common bittern, the limpkin, a great number of other duck species, black and turkey vulture, osprey, bald eagle and the endangered wood stork.[27]

The highlands surrounding the swamp are largely devoted to farming and cattle grazing. A small amount of pulp cutting and some cypress timbering occurs in the fringe areas. However, there appears to be no large-scale tree harvesting at the present time. Pastures abutting the swamp, when dry, are utilized by domestic cattle. The adjacent waters of the swamp often provide a source of drinking water to such animals.

Cypress and bottomland hardwoods predominate the isolated hammock islands. They are also found in low areas bordering the swamp. Many of the plant species that occur in the fringe area include spruce, slash, loblolly and longleaf pines, bottomland gums, as well as many varieties of oak, magnolia, and willow. The dense understory consists of way myrtle, sea myrtle, elderberry, green briar, sumac, and wild plum.

In terms of aquatic vegetation, the swamp has been reported to be one of the most productive wetlands in all of north Florida. The dominant aquatic vegetation in the swamp is maidencane. However, associated species are abundant and consist of frogbit, floating hear, wampee, pickerel weed, cow tongue, golden club, dotted smartweed, watershield, water lily, and a variety of aquatic grasses.

Drainage in the marsh is generally in a southeasterly direction with one small stream, Sundown Creek, carrying a majority of the outflow for the area. Several other culverts running beneath I-10 transmit water to southern portions of the swamp.

WACASSASSA FLATS

Occupying 61,440 acres, Wacassassa Flats forms the spine of Gilchrist county. The Flats are an intermittent wetland which begins about one and one-half miles south of the Suwannee River in the center of the county and continues to the Levy County border. The principal feature of Wacassassa Flats is Wacassassa Creek, whose headwaters are found in southern Gilchrist County. The Flats are part of a larger wetlands system which traverses Levy County and empties to the Gulf of Mexico at Wacassassa Bay.

The Floridan Aquifer comes very close to the surface in the flats. During the rainy season, waters in the aquifer build up sufficient pressure to spill out of the many sinkholes and ponds scattered throughout the Flats to inundate the area. Because the aquifer is so close to the surface and because of many small sinkholes in the area, it is very easy to contaminate the Floridan Aquifer in Wacassassa Flats.

BROOKS SINK

Brooks sink is located within a privately owned and managed pine forest approximately four miles east of the Town of Brooker in Bradford County. The natural character of the sink is said to rival that of Devil's Millhopper. It is located in a small, well-maintained area of natural vegetation within an eight square mile area of planted pine forest It is closed to the public. Although in the midst of an intensively managed pine forest, the immediate surroundings of the sink, approximately ten acres, have not been harvested.

The value of Brooks Sink lies primarily in its significance as a site for geologic study. The area is known for its excellent exposures of soil and rock strata, particularly of the phosphatic Hawthorne formation. The relatively small, natural forest surrounding the sink contributes to the aesthetic appeal of the site.

The sink itself has almost sheer limestone banks lined with large oak and elm trees which occasionally fall into the sink. The walls are covered with a variety of moss and ferns. Only on its south side do the banks have sufficient slope for trees and shrubs to grow partially into the basin. The sink is approximately 85 feet deep and greater than 400 feet in diameter. A deep gully has been eroded into the southeast side of the sink draining some 600 acres of planted pines northeast of the sink. This channel has eroded deeply into the sides of the cavern.

Almost every common pine species occurs here including slash, longleaf, and loblolly pine, as well as large oak, elm, and gum trees. The planted pine forest surrounding the sink area consists primarily of loblolly pines in various stages of maturity. The retention of natural vegetation around the sink itself greatly minimizes erosion in the sink and generally precludes its removal.

Common wildlife in the area include wild pig, deer, and rabbit. A variety of panfish have been caught in the sink but no other aquatic specie has yet been identified.

SAN FELASCO HAMMOCK STATE PRESERVE

San Felasco Hammock is located in the center of Alachua County, between the cities of Gainesville and Alachua. The hammock is renowned for having the most fertile soil on the Florida peninsula. It is the last large remaining example of hardwood hammock in north central Florida.

San Felasco Hammock has many steep slopes, ravines, sinkholes, ponds, scattered swamps, and sand ridges. It contains virtually every species of plant and animal native to Alachua County. In addition, the hammock recharges the Floridan Aquifer. Surfacewater runoff is transported into the hammock via Turkey Creek and Blue's Creek.

The hammock comprises approximately 10,240 acres of wild forest land with some pasture land on its northern edge. Most of the forest has been selectively logged at one time or another during the 20 years previous to its purchase by the state. However, the selective cutting does not appear to have caused any permanent damage.

San Felasco Hammock has direct recharge to underground aquifers. The water quality of Blues Creek is especially important to the health of the hammock and the water quality of underground aquifers.

San Felasco Hammock was the first property purchased under the State Environmentally Endangered Lands program in August of 1974 and was placed on the National Registry of Natural Landmarks in 1975.

DEVIL'S MILLHOPPER STATE GEOLOGIC SITE

The Devil's Millhopper is a large sinkhole located north of Gainesville in Alachua County. The bowl shaped sink, one of the largest in the state, measures 500 feet across and approximately 120 in depth. Currently owned and managed by the Florida Department of Natural Resources, Division of Recreation and Parks, the Devil's Millhopper was registered as a National Landmark by the National Park Service in 1976.

Because of its depth, the sinkhole creates a gradation of micro-ecosystems, each with its own biotic community. In addition to its unique ecological features, the exposed slopes of the sinkhole reveal a slice of Florida's fossil and geologic record.

LOCHLOOSA WILDLIFE MANAGEMENT AREA

The Lochloosa Wildlife Management Area is located in southeastern Alachua County and comprises approximately 31,000 acres. It includes Lake Lochloosa, a small portion of Orange Lake, and the River Styx Rookery. It is on the state's Environmentally Endangered Lands list and has been proposed for purchase as a state forest.

Lochloosa Forest forms the habitat for several endangered species. Approximately 16 active bald eagle nests can be found in the area.[28] The River Styx Rookery, located within the wildlife management area, contains one of the two most important wood stork colonies in northern Florida. Between 100 and 125 nesting pairs of wood stork, recognized as an endangered specie, nest in the large cypress trees of the Rookery.[29] Since the 1930's it has been one of the few stable and constantly productive rookeries in the state. The few colonies of wood storks in Florida and one colony in Georgia, are all that remain in North America. In addition, the rookery is known to be used as a nesting site by significant numbers of ospreys and herons. In 1978, approximately 50 active osprey nests and 12 to 15 breeding pairs of great blue heron used the area.[30]

The River Styx flows into the northern tip of Orange Lake in southeastern Alachua County. The river environment is defined by a broad expanse of swamp forest and hammock for a two and one-half mile distance from Camps Canal on the north to Orange Lake on the south. The river's sluggish trace southward is obscured within a 3,500 acre area of swamp, forest, and hardwood hammock. The dense, relatively undisturbed vegetation system gives way to a shallow marsh area at its junction with Orange Lake. The inaccessibility of the area has afforded a secure breeding haven for colonies of wading birds which are otherwise sensitive to human encroachment.

PAYNE'S PRAIRIE STATE PRESERVE

Encompassing 18,000 acres in southeastern Alachua County, Payne's Prairie was acquired by the state as part of its State Parks and Preserves system in 1973. The prairie is intermittently flooded and serves as a drainage recipient for groundwater runoff from metropolitan Gainesville. The quality of surfacewater runoff to the prairie is of particular concern as the prairie has direct access to the Floridan Aquifer through Alachua Sink. Payne's Prairie is famous as a wildlife and waterfowl habitat. State preserves differ from state parks as they are established primarily to protect natural wildlife and habitat. Access is limited, when necessary, to prevent adverse environmental damage. State parks are generally more accessible and emphasize outdoor recreation and camping activities.

The major plant community of the prairie is marsh composed of herbaceous plants. The depth of water governs plant species and several vegetative zones can be found as one moves from the dry prairie edge to the deeper water in the center. Dog fennels occupy the dry zone as well as maiden cane, pickerel weed, cattails, and spatterdock. Woody plants such as the coastal plain willow, wax myrtle, elderberry, and persimmon have invaded the prairie along the artificial dikes.

The abundance and diversity of animal life in the prairie has been well known since it was first described by Bartrum. Deer, otter, muskrat, and raccoon exist in the prairie along with numerous birds, including herons, egrets, ibises, ducks, and bobwhites. Among threatened species inhabiting the prairie are the wood stork, Florida sandhill crane, and American kestrel.

Payne's Prairie State Preserve, despite its size, does not include the prairie's entire ecosystem. The state Department of Natural Resources is concerned about development on the fringe of the prairie and would like to expand its boundaries. An area of land on the southeast side of the preserve has been proposed for purchase under the Conservation and Recreation Lands (CARL) program.

GUM ROOT SWAMP

Gum Root Swamp is a natural hardwood swamp covering about 2,800 acres on the north side of Newnan's Lake in eastern Alachua County. The swamp owes its environmental value to its large area of relatively natural swamp which serves as a biologic filter and purifier for runoff waters for a very large watershed.

All the waters from Hatchett Creek as well as overland flow from a wide area pass through Gum Root Swamp before entering Newnan's Lake. These waters are very high in nutrients due to the large amount of surrounding agricultural land and homes in the vicinity. The swamp serves as a large filter system by which biological processes which occur in the

swamp convert nutrients in the water to cellulose and plant life, thus leaving the water in a more purified form as it flows into Newnan's Lake. The capacity of Gum Root Swamp to assimilate these nutrients has been exceeded by the large nutrient production in the watershed and has contributed to the eutrophication of the lake.

A wide, often wet, heavily vegetated fringe area has helped restrict access and development over the years. The dominant forest vegetation in this fringe area includes live oak, laurel oak, and red maple. The predominant understory species include gallberry, palmetto, wax myrtle, red bay, blackberry, and American holly.

Cypress and gum trees predominate the swamp while red maple and bay trees are also abundant. The numbers of sweet gum, wax myrtle and gallberry increase in density toward the edge of the swamp. Many ferns, mosses, and lichen are evident as undergrowth vegetation. There is evidence that some selective cutting of hardwood occurred approximately 40 years ago. Abandoned, overgrown tramways as well as debris left over from earlier cuttings have been found among the thick vegetation. The swamp appears to have nearly regained its natural state and no evidence of recent harvesting is apparent. Mixed hardwoods of commercial value exist in the swamp at the present time. However, the inaccessibility of the area due

to its very wet nature appears to be an obstruction to harvesting.

Gum Root Swamp is considered to have one of the largest varieties of wildlife species of any area in Alachua County. There are at least two rare or endangered species living in this swamp. These are a small colony of wood stork or iron stork and a small number of southern bald eagle. Other birds which frequent the area include egrets, herons, bitterns, and white ibis. Also identified in the area are the anhinga, the osprey, loon, cormorant, black and turkey vulture, and the turkey. Of the larger animals, deer and otter also inhabit the swamp and its marginal areas.

NEWNAN'S LAKE - PRAIRIE CREEK

Located just east of the City of Gainesville in Alachua County, Newnan's Lake - Prairie Creek area occupies approximately 15 square miles. The lake itself can be described a perched surface water body with an area of 6,007 acres and a mean depth of 1.5 meters.[31] The lake obtains regional significance for several reasons. The northern lake shorelines is the boundary of Gum Root Swamp. Prairie Creek, located at the south end of the lake is Newnan's Lake has only one surface outflow. Prairie Creek drains directly into Alachua Sink and Payne's Prairie State Preserve.

A natural edge of cypress and gum trees in a relatively undisturbed state surrounds the entire lake. The lake shoreline is The border's of the lake is a hardwood swamp. Due to its wet shoreline, very little residential development has occurred next to the lake.

GROUNDWATER RECHARGE AREAS

North central Florida is underlain by the Floridan Aquifer, one of the largest underground repositories of high quality freshwater in United States. The aquifer is the single most important natural resource of north central Florida. It is vital to man as a source of drinking water. The success of agriculture, phosphate mining, and the forest industry is dependent upon adequate groundwater supplies.

Generally, groundwater recharge occurs to intervening water table and artesian aquifers, thus preventing direct surfacewater penetration to the Floridan Aquifer. Sands and soils filter and purify this water before it reaches the aquifer. Concerns regarding water recharge revolve around potential pollution of the Floridan Aquifer. Two methods of recharge are considered in this report: direct recharge to the aquifer via sinkholes (stream to sink recharge areas) and through downward percolation from surficial soils where Floridan Aquifer is near the surface.

STREAM TO SINK RECHARGE AREAS

Waters entering the aquifer via sinkholes and sinkhole lakes do not receive any filtering or cleansing. In the natural environment, direct aquifer recharge does not constitute a threat to groundwater quality due to the high quality of groundwater runoff. However, the introduction of manmade chemicals, pollutants, and fertilizers to the Floridan Aquifer could have disastrous consequences and has made the identification and management of sinkholes and their drainage basins especially critical.

A listing of major sinkholes and stream-to-sink recharge areas with section-township-range coordinates is included an appendix. However, this listing is not complete. Additional research should be undertaken to identify known sinkholes.

PERCOLATION RECHARGE AREAS

Percolation recharge areas are defined as land areas where, large amounts of surfacewater penetrate surface and subsurface soils to enter the Floridan Aquifer. Percolating waters are subject to a natural purification process performed through leeching.

Aquifer depth to surface and cover soils type are related to the amount of natural filtering percolating surfacewater receives before entering underground aquifers.

Percolation recharge areas have as yet not been well defined in north central Florida and no percolation recharge areas have been identified in this study. Additional work needs to be performed to identify areas within the region where the soil type and depth to limestone require special handling of groundwater runoff in order to avoid groundwater pollution.

SUMMARY

Regionally significant natural areas are categorized into at least one of five major groups. These are: (1) coastal areas, consisting of off-shore islands and grass beds, coastal marshlands including salt marsh, freshwater wetlands with direct sheet flow connection to salt marsh, freshwater wetlands without direct sheet flow connection to salt marsh, and streams and rivers which empty into the Gulf of Mexico; (2) The Aucilla River, the Suwannee River, and the major tributaries of the Suwannee which constitute a regionally significant natural area independent of the Suwannee's role in providing estuarine waters and as the major source of freshwater flooding; (3) Upland areas with direct impact upon the river system; (4) upland areas with indirect or no impact upon the river system; and 5) the Floridan Aquifer and associated stream-to-sink recharge and percolation recharge areas.

Several identified natural areas are located either adjacent to or in close proximity with one another, thus creating a regionally significant natural area of greater importance than indicated through presentation of isolated segments. These include the Gum Root Swamp - Newnan's Lake - Payne's Prairie - Lochloosa Forest area; the Okefenokee Swamp (located outside the region) - Pinhook Swamp - Osceola National Forest area; the California Swamp - Lower Suwannee National Wildlife Refuge area; and the O'leno State Park - River Rise State Preserve - Ginnie Springs area.

In total, 49 regionally significant areas were identified, comprising approximately 37 percent of the entire area of the region. In many cases, additional research is needed to define more precise boundaries of significant natural areas based on ecosystems. This is particularly true of state parks and preserves, whose boundaries are based typically upon land ownership patterns and thus do not include entire ecosystems.

Although the list of natural areas is considerable, additional candidates for regionally significant natural area designation may exist. San Pedro Bay, Mallory Swamp, the Fenholloway River, Olustee Creek, stream-to-sink recharge areas, and percolation recharge areas need further study. Further work is also needed on identification of habitats of rare, endangered, or threatened species of plants and animals.

III

DEVELOPMENT PRESSURE

INTRODUCTION

Chapter II identifies and describes natural areas located within the eleven-county area which have intrinsic values considered to be of regional or greater significance to mankind. The purpose of this chapter is to ascertain the degree of development pressure each of these areas is facing in order to design a management program which will ensure that the natural values of these areas can be preserved for the benefit of both present and future generations.

Development pressure on natural systems can take many forms but in Florida, it historically has included the subdivision and development of land for residential and other urban uses, the filling and draining of wetlands for agricultural production, and specific to northern Florida, timber harvesting. Thus, the following sections examine the types of activity that are occurring within and around the identified regionally significant areas and then, based on this evaluation, projects future conditions and groups the areas based on the degree of development pressure each is facing.

EVALUATION OF DEVELOPMENT PRESSURE

As noted above, the subdivision and development of land for residential or second home purposes is one of the major threats to the continued viability of natural systems. In Florida, it is undoubtedly the greatest single threat given the stat's extremely high population growth rate --a rate that is expected to continue well into the twenty-first century.

Until fairly recently, the northern parts of Florida have been relatively unaffected by this population influx. However, as the southern parts of the state are becoming overcrowded, many of these residents are beginning to move to the less-crowded counties to the north. Although a portion of this movement is generated by the University of Florida and the state prison facilities located in the region, this relocation of people within the state accounted for over twenty percent of the net migration increase of population in region during the 1970's.

Table 1 presents both historical and projected population for each of the counties located within the region. As can be seen in the table, the region's population is projected to increase to nearly one-half million people by the year 2010, more than doubling its 1970 population of 107,764.

TABLE 1

POPULATION BY COUNTY

COUNTY	1970[1]	1980[1]	1990[2]	2000[2]	2010[3]	PERCENT INCREASE 1970-2010
Alachua	107,764	151,348	194,765	229,134	260,600	141.82
Bradford	14,625	20,023	25,407	28,104	31,000	119.97
Columbia	25,250	35,399	43,832	50,203	56,100	122.18
Dixie	5,480	7,751	11,086	13,890	16,100	193.80
Gilchrist	3,551	5,767	8,890	11,601	13,700	285.81
Hamilton	7,787	8,761	9,332	9,469	10,000	28.42
Lafayette	2,892	4,035	5,336	6,061	6,700	236.17
Madison	13,481	14,894	15,919	16,363	17,400	29.07
Suwannee	15,559	22,287	28,479	32,940	37,000	137.80
Taylor	13,541	16,532	19,461	21,738	24,100	78.00
Union	8,112	10,166	11,304	12,172	13,300	63.95
Region	218,042	296,963	373,811	431,675	486,000	122.89
State (x1,000)	6,791	9,746	12,528	14,671	16,579	144.13

Source: [1]Bureau of the Census, U.S. Dep't. of Commerce, 1980 Census of Population.

[2]Division of Economic and Demographic Research, Joint Legislative Management Committee, State of FLorida, "Florida Population by County April 1st Estimates and Projections", Official January 1, 1986.

[3]Bureau of Economic and Business Administration, University of Florida, 1985 Florida Statistical Abstract, Table 1.84, "Population Projections: Estimates April 1, 1984 and Projections April 1, 1987, 1990, 1995, 2000, 2010, and 2020, in the State and Counties of Florida",(medium projection) pg. 37.

Table 1 suggests that natural areas within Alachua County should experience, by far, the greatest development pressure. Other counties receiving significant development pressure as a result of population growth are Columbia, Bradford, Suwannee, and Taylor. The population projections suggest a middle range, or average development pressure, group of counties. These are Madison, Dixie, and Union counties. A fourth group can be classified as facing little or no development pressure. These are Hamilton and Lafayette counties.

Although development pressure at first blush may seem lower in counties projected to experience lower population increase, development pressure can still be significant when measured in relative terms.

Gilchrist, Lafayette, and Dixie counties are projected to incur the largest percentage increases over their 1970 population. These counties are projected to triple in population by 2010. A second tier includes Alachua, Suwannee, columbia, and Bradford counties where population is projected to increase at rates ranging between 119 to 141 percent. A third group of counties are expected to receive considerably below average development pressure due to low rates of population growth. These are Taylor, Union, Madison, and Hamilton counties. However, population growth will still be experienced within these counties. Projected percentage population increases within this group range between 78 to 24 percent.

Perhaps a more meaningful measure of development pressure upon regionally significant natural areas may be found in county population density projections when regionally significant lands are excluded. This method assumes that the higher the population density the greater the pressure on regionally significant areas. The examination of county population densities exclusive of regionally significant natural areas has value as it indicates that development pressure may be different than expected when looking solely at county population counts or growth rates. Table 2 portrays county population densities over time when regionally significant natural areas are removed from county land area totals.

TABLE 2

POPULATION DENSITY
WHEN NATURAL AREAS ARE EXCLUDED
(PERSONS PER SQUARE MILE)

	1970	1980	1990	2000	2010	PERCENT INCREASE 1970-2010
Alachua	164.8	231.4	297.8	350.4	398.5	141.8
Bradford	57.4	78.5	99.6	110.2	121.6	112.0
Columbia	58.9	82.6	102.3	117.2	130.9	122.2
Dixie	32.8	46.4	66.4	83.2	96.4	193.8
Gilchrist	20.2	32.8	50.6	66.1	78.0	285.8
Hamilton	28.8	32.4	34.5	35.0	37.0	28.4
Lafayette	6.2	8.6	11.4	12.9	14.3	131.7
Madison	21.5	23.8	25.4	26.1	27.8	29.1
Suwannee	29.3	41.9	53.5	61.9	69.6	137.8
Taylor	43.3	52.8	62.2	69.5	77.0	78.0
Union	33.9	42.5	47.3	50.9	55.7	64.0
Region	52.8	71.9	90.5	104.5	117.6	123.9

Using this method, Alachua county still stands clearly above the others sa the most threatened in terms of the largest number of persons per square mile. A second tier of counties which can be considered to be receiving significant development pressure includes Bradford, Columbia, and Dixie County. Taylor and Suwannee counties, due to their large size, drop to the average development pressure category. In addition to Taylor Suwannee counties, this class includes Gilchrist and Union counties. Hamilton and Madison counties are still below average in terms of development pressure.

This method produces no change in classification when measuring relative increase in population densities. Gilchrist and Dixie Counties again stand out as experiencing the greatest relative change. A second tier of counties again includes Alachua, Bradford, Lafayette, Columbia, and Suwannee Counties. The below average development pressure group again includes Taylor, Union, Madison, and Hamilton counties.

This county level analysis has tried to present an overview of comparative development pressure within the region at the county level. However, the analysis does not, and cannot, evaluate development pressure on individual natural areas as county-wide growth trends are not uniform. The remainder of this section examines the degree of development pressure on the identified regionally significant areas posed by population growth and other activities on a county-by-county basis.

ALACHUA COUNTY

Alachua County is by far the most populous county in the region. Estimates for 1985 indicate a population of 172,900, comprising approximately 52 percent of the region's population. Alachua County is the only county within the region which has experienced a continuous population expansion with growth rates comparable to the state as a whole. Since its 1930 population of 30,365, Alachua County has grown by 340 percent to a 1980 population of 151,348. Projected population to the year 2010 is 260,600.[32]

Census data indicates that between 1970 and 1980, 51 percent of the county's population growth was due to net in-migration from other states. Roughly 24 percent of the county's growth was attributable to in-migration from other Florida counties. Local officials indicate an increase in the proportion of new residents from other parts of Florida, particularly south Florida. The county has been issuing an average of 2,446 residential dwelling unit permits per year, roughly 10 times as many as any other county in the region.

The focal area for Alachua County growth is the City of Gainesville. Located between San Felasco Hammock and Payne's Prairie, the city is ranked as the twelfth most populous city in the state.[33] However, approximately 70 percent of new residential development during the 1980's has occurred in the unincorporated areas, principally in the fringe areas of the cities of Gainesville and Alachua.

As can be seen in the Table 3, privately-held lands in and round Devil's Millhopper, Payne's Prairie, and San Felasco Hammock have experienced the greatest amount of subdivision activity.

TABLE 3

ALACHUA COUNTY DEVELOPMENT BY REGIONALLY SIGNIFICANT NATURAL AREA

NATURAL AREA	ACREAGE	SUBDIVIDED ACREAGE	PERCENT SUBDIVIDED	AVERAGE LOT SIZE
Cary Forest	3,008	51	1.7	1.42
O'leno State Park	2,560	0	0.0	0.0
Payne's Prairie	36,480	2,354	6.5	2.84
San Felasco Hammock	10,240	1,090	10.6	1.03
Santa Fe River	41,600	403	1.0	0.60
Santa Fe Swamp	12,160	12	0.1	0.33
Alachua Co. Recharge	51,840	3,738	7.2	1.51
Gum Root Swamp	2,816	0	0.0	0.00
Lochloosa Forest	36,922	378	1.0	0.40
Devil's Millhopper	640	266	41.6	0.79

Much of the new residential development in Alachua County is concentrated between the cities of Gainesville and Alachua along U.S. Highway 441. San Felasco Hammock, Devil's Millhopper, and Payne's Prairie are all located in this linear corridor. The hammock and Devil's Millhopper are located between Gainesville and Alachua while Payne's Prairie is southeast of Gainesville.

As Gainesville and Alachua have grown, residential development has increasingly crept in on the fringes of these natural areas. Although all three natural areas are state-owned, development pressure upon their fringe is a serious concern, particularly for San Felasco Hammock and Payne's Prairie, as the limits of their ecosystems extend beyond the boundaries of the preserves. Thirty-six different subdivisions have occurred in areas adjacent to Payne's Prairie since 1959 consisting of 1,103 lots on 3,135 acres of land. The average lot size for these subdivisions is 1.61 acres.

Similarly, San Felasco Hammock is also experiencing significant development pressure. Nineteen separate subdivisions have occurred on the fringes of the hammock since 1970. These subdivisions have created 1,056 lots occupying 1,190 acres of land. The average lot size appears to be smaller than in Payne's Prairie, averaging 1.04 acres. The greatest outside influence on the hammock is an 840 acre tract of private land on its southern edge. This area borders some fragile areas of the preserve. Development here could play havoc on the natural systems of the hammock. Residential developments draining into Turkey and Blue's Creek could also have an adverse impact on the water quality of the aquifer. [34]

Three subdivisions consisting of 338 lots on 266.58 acres with an average lot size of .49 acres have been developed adjacent to the Devil's Millhopper State Geologic Site. Although the total acreage appears

relatively small, it in fact, represents 42 percent of the section which includes Devil's Millhopper.

The physical beauty of the hammock and the prairie are likely to continue to attract development activity. The rate of subdivision activity is so great that both areas are in jeopardy of irrevocable losses within the immediate future of the privately-owned lands which comprise the remainders of their respective ecosystems.

To a lesser extent, the proposed Lochloosa State Forest area is also experiencing development pressure. A total of 14 subdivisions have been recorded in this area. These subdivisions have accounted for 950 lots on 378 acres of land. Lot sizes average .40 acres. Only five subdivisions have been recorded in this area since 1970, possibly owing to its greater distance from Gainesville and that Payne's Prairie acts as a natural boundary to the southern expansion of the City of Gainesville. If development is not contained at the prairies the Lochloosa Forest area is likely to receive a larger percentage of future county growth.

Another area receiving a significant amount of growth is the Alachua County Recharge Area. This area encompasses the San Felasco Hammock, Devil's Millhopper, and the City of Alachua. In total, there are 74 recorded subdivisions within this area comprising 9,367 lots on 3,685.3 acres. Development in this area has largely occurred since 1970, as 55 subdivisions have been recorded during the past 15 years.

The Santa Fe River floodplain is relatively undeveloped. Only four subdivisions have been recorded in the Santa Fe River floodplain. These subdivisions account for 668 lots on 403 acres of land. The acreage lot size is .6 acres. Subdivision data indicates little or no development activity around Austin Cary Memorial Forest, O'Leno State Park, or Gum Root Swamp.

BRADFORD COUNTY

Bradford County is located adjacent to and northeast of Alachua county. In 1982, Bradford County was added to the Gainesville Metropolitan Statistical Area (MSA). Bradford County ranks as the fourth most populous county in the region with a 1980 population of 20,023. The county has the third highest population density in the region after natural areas exclusion at 78.5 persons per square mile. Between 1980 and 1985, Bradford County population has risen to an estimated 23,400. Population is projected to increase by 112 percent between 1970 and 2010.[35]

Three sites in Bradford County have been identified as natural areas of regional significance: the Santa Fe River corridor, Santa Fe Swamp, and Brooks Sink. At the present time there is little development pressure on either area.

Brooks Sink, said to rival Devil's Millhopper in size and natural character, is located on land owned and managed by Container Corporation. Statements by Container Corporation representatives indicate that residential development in the area is not likely in the near future.

Much of the recent residential development in the county has been on lake frontage. Residential growth is primarily occurring in the southern half of the county, most recently in the southeast quarter. However, little of the Santa Fe River Corridor has been subdivided or developed. Only one 60-acre subdivision, Santa Fe Acres, has been platted on the Bradford County side of the river. Only four houses within this eleven-lot subdivision have been constructed. Furthermore, Georgia Pacific donated Santa Fe Swamp to the Suwannee River Water Management District in 1985.

Future county growth is expected to continue to occur in unincorporated areas and generally concentrate around the many small lakes located in the southern half of the county.

TABLE 4

BRADFORD COUNTY DEVELOPMENT BY NATURAL AREA

NATURAL AREA	ACREAGE	SUBDIVIDED ACREAGE	PERCENT SUBDIVIDED	AVERAGE LOT SIZE
Santa Fe River	16,000	60	0.3	5.5
Santa Fe Swamp	7,680	0	0.0	0.0
Brooks Sink	640	0	0.0	0.0

COLUMBIA COUNTY

With a 1980 population of 35,399, Columbia County is the second most populous county in the region.[36] County population is projected to reach 57,100 by 2010.[37] Census data reveals that 57 percent of the county's population growth between 1970 and 1980 was attributable to in-migration from other states. Seventeen percent of the county's growth was a result of in-migration from other Florida counties. Local officials suggest that there has been a recent increase in the number of new residents moving to Columbia County from southern Florida.[38]

New residential construction building permits between 1980 and 1983 have averaged 277 units per year. Local officials indicate a sharp increase in development activity during the first half of 1985. The perceptions of local officials are born out by the recent influx of subdivision requests.

The county can be viewed as consisting of two sections: lands north and south of Lake City. The northern part of the county is generally very wet. Land use is generally limited to forestry operations. Land south of Lake City is a dry, gently rolling terrain used for agriculture. Growth is generally occurring to the south and west of Lake City with residential subdivisions appearing in a checkerboard pattern from Lake City to the Santa Fe River. Eighty-one percent of all new residential construction permits for the years between 1980 and 1983 inclusive were issued in unincorporated areas. Ninety-two percent of all single family residential dwelling unit starts were located in unincorporated areas.

Columbia County contains a large percentage of regionally significant natural areas. Fifty-four percent of Columbia County has been identified as regionally significant natural area. These areas include portions of the Santa Fe and Suwannee River floodplain corridors as well as Osceola National Forest, Pinhook Swamp, and two large stream to sink recharge areas.

TABLE 5

COLUMBIA COUNTY DEVELOPMENT BY NATURAL AREA

NATURAL AREA	ACREAGE	SUBDIVIDED ACREAGE	PERCENT SUBDIVIDED	AVERAGE LOT SIZE
Osceola N Forest	80,000	0	0	0.0
Pinhook Swamp	89,600	0	0	0.0
Santa Fe River F P	48,320	4,622	9.57	1.28
Ichetucknee River F P	2,880	1,500	52.8	1.0
Ichetucknee St Park	3,520	810	23.01	1.49
Western Recharge	13,440	316	2.35	1.43
Southern Recharge	47,360	5,419	11.44	0.90
O'leno & River Rise	6,400	453	7.08	0.0

There are numerous subdivisions within the Suwannee and Santa Fe river corridors located in Columbia County. Most of the subdivided river corridor development is intended for single family homes. Local officials indicate these lots area principally used as places of primary residence.

The Santa Fe River Corridor comprises approximately 28 square miles of Columbia County. Subdivision information indicates that approximately 50 percent of the corridor has been subdivided and that residences have been constructed on approximately 50 percent of these parcels. Lots are typically one acre or less in size. Property at the confluence of the Santa Fe, Ichetucknee, and Suwannee rivers is particularly developed. The entire east bank of the Ichetucknee River from Ichetucknee State Park

to the Santa Fe has been subdivided into one acre lots. Furthermore, a growing area for residential development along the Santa Fe is occurring near O'leno State Park. Not only has a larger percentage of the Santa Fe floodplain corridor been developed compared to the Suwannee, but development activity has been greater on the Santa Fe when measured in absolute terms. Santa Fe River corridor subdivisions include 3,582 lots on approximately 5,380 acres of land, roughly three times the land area and six times as many lots as on the Suwannee.

Development within the Suwannee River Corridor began much later than on the Santa Fe. The first recorded subdivision in Columbia County within the Suwannee River Corridor occurred in 1968. Since then, 17 subdivisions totaling 503 lots on approximately 1,080 acres have been recorded along the Suwannee. Development is concentrated in the southwestern segment. Approximately 20 percent of the Suwannee River Corridor has been subdivided within a ten square mile area in the western segment.

That portion of the Suwannee north of Lake City is practically untouched by subdivision activity. There have been no recorded subdivisions on the Suwannee north of the Big Shoals area. Development has apparently been prevented by wet soil conditions. However, development activity has gradually been moving northerly along the Suwannee and subdivisions now extend virtually entire length of the Suwannee from the Hamilton County line east to within two miles of Big Shoals.

Columbia County river corridor subdivision activity has been increasing at a rapid rate. Only three subdivisions were platted in the floodplain prior to 1957. Four subdivisions, comprising 3,100 acres, were platted between 1957 and 1969. Between 1970 and 1979, twelve subdivisions were recorded totalling 591 lots on 1,640 acres. Average lot size in these subdivision was two acres. Since 1980, there have been seven subdivisions totalling 175 lots on 241 acres. Five of these subdivisions have occurred since adoption of the county floodplain ordinance.

Lots adjacent to Columbia County rivers tend to be long and narrow to maximize the number of lots with riverbank access. Lots along the Santa Fe have an average width of 71 feet. Lots adjoining the Suwannee tend to be wider, with an average width of 103 feet.

The quality of development within the river corridors is questionable, particularly along the Santa Fe and Ichetucknee rivers. Residences bordering the riverbanks tend to have little natural vegetative screening. The lack of screening may, at least in part, be due to homeowner's attempts to enhance their view of the river. In addition, structures built since the adoption of the floodplain ordinance have been placed on unsightly stilts to prop the unit above the regulatory flood profile. The combination of cleared vegetation, increased building height, and one acre density levels has significantly detracted from the appearance of the Santa Fe and Ichetucknee rivers.

In spite of river corridor subdivision activity, the greatest growth is occurring to the south of Lake City in the South Recharge Area. This stream-to-sink recharge area encompasses approximately 74 square miles. Approximately 8.6 square miles (11.7 percent) of the recharge area has been subdivided. During the past 10 years, approximately 50 percent of all county subdivision activity has occurred here. While the recharge area may be well-suited to low density residential development, concern exists over the quality of groundwater runoff penetrating the Floridan Aquifer.

The Western Recharge Area, a 21 square mile stream-to-sink recharge area west of Lake City, has received only a small amount of development. Approximately one-half of one square mile (2.4 percent) of this area has been developed. The remaining land is still, primarily, in agricultural use.

The county floodplain ordinance appears to have reduced development activity within the floodplains as only four floodplain subdivisions have been platted since its adoption. The floodplain ordinance requires a 75 foot buffer of natural vegetation along the riverbanks. All new construction must be 75 feet back from the riverbanks. In addition, the ordinance requires new construction to be placed one foot above the regulatory flood profile. State standards on septic tank construction also impact upon floodplain development, prohibiting the construction of septic tanks within the 10 year floodplain and requiring 1/2 acre minimum lot sizes for homes which rely upon well water.

Building permit data reveals that 53 new residential dwelling units have been constructed within the floodplains for the years between 1982 and 1984, with most of the activity occurring in 1984 for mobile home placement.

It is expected that a most of the development activity anticipated by the year 2000 will occur n the South Recharge Area and, to a lesser extent, in the Western Recharge Area. The Osceola National Forest to the east and generally wet soil conditions to the north appear to preclude extensive residential development in these areas. Given the difficult economy faced by many farmers, the increased numbers of persons migrating to northern Florida from southern Florida, and a general increased demand for recreational development within the state, it is likely that pressure to subdivide agricultural land in the river corridors, particularly land with direct access to the river will increase. It is anticipated that the riverbanks along the entire length of the Santa Fe will be subdivided and developed into one-half acre residential lots with an average width of 100 feet at the river's edge. Furthermore, the Suwannee River corridor is anticipated to be subdivided from the Hamilton County border to Big Shoals.

DIXIE COUNTY

With a 1980 population of 7,751, Dixie County has the second smallest county population within the region and has one of the lowest population densities of any county in the State. Growth rates since 1930 have lagged behind state and regional averages, increasing by a relatively small 20.75 percent between 1930 and 1980. Most of this population increase occurred during the 1970's. Census data reveals that between 1970 and 1980, Dixie County grew from 5,840 to 7,751, an increase of 41.4 percent. Eighty percent of the increase in population was attributable to net in-migration. Sixty-four percent of the population increase was attributable to out-of-state migration while 16 percent was attributable to other Florida counties. Local officials indicate that a growing proportion of new residents appear to be relocating from southern Florida.

Dixie County, perhaps more than any other county in the region, is at a cross-roads. While historical growth trends and population densities have remained low, county population and subsequent development pressure is rapidly increasing. Dixie County's population is projected to experience a very fast rate of growth. Dixie County's year 2010 population is projected at 16,100, a 193 percent increase over the county's 1980 population. Dixie County ranks as the second fastest growing county in the region in terms of growth rate.

Approximately 76 percent of Dixie County has been designated as regionally significant natural area. Dixie County has the second-largest share of regionally significant areas. 19.4 percent of the region's significant natural area is located in Dixie County. The county's projected 2010 population density is a low 22.97 persons per square mile. However, population density dramatically rises to 96.41 persons per square mile when regionally significant natural areas are removed.

Dixie County currently has 39 subdivisions consisting of 3,163 lots on 2,129 acres within regionally significant natural areas. Current development activity is concentrated around Cross City, Old Town, and, to a lesser extent, the Town of Steinhatchee. Local officials indicate that development activity is increasing. Most of the new construction consists of mobile homes placed on single family lots. Local officials indicate that approximately 67 percent of all new residential construction consists of mobile home siting.

TABLE 6

DIXIE COUNTY DEVELOPMENT BY NATURAL AREA

NATURAL AREA	ACREAGE	ACREAGE SUBDIVIDED	PERCENT SUBDIVIDED	AVERAGE LOT SIZE
Hurricane Surge Area	152,320	616	0.4	0.33
Suwannee Floodplain	42,240	2,129	5.0	0.67
Salt Marsh	42,240	178	0.4	0.23
California Swamp	63,360	11	0.02	0.93
L Suw N Wildlife Refuge	16,000	0	0.0	0.0
Steinhatchee Corridor	5,120	183	3.6	0.84
Lime Sink	640	0	0.0	0.0
Drainage Basin	248,800	2,537	0.9	0.63
Freshwater Wetlands with sheet flow to salt marsh	87,040	0	0.0	0.0

A large number of subdivisions exist along the Suwannee River, occupying approximately 23,400 linear feet of riverbank from Guaranto Springs in northern Dixie County south to Yellow Jacket, where subdivision activity adjacent to the Suwannee appears to halt. Yellow Jacket is also the upper limit of the hurricane surge line. Approximately 17.7 percent of the 25 miles of Suwannee riverbank in Dixie County has been subdivided. However, a rather low percentage of this land has actually been built upon. Approximately 30 percent of the lots adjacent to the river have been built upon. Less than 10 percent of the lots located within the floodplain but lacking riverfront access have been built upon. Developed lots typically feature mobile homes and dirt access roads. The average lot adjacent to the Suwannee River is one acre in size and 130 feet in width.

Floodplain subdivision activity on the lower Suwannee is a relatively new phenomenon. Most floodplain subdivision activity has occurred since 1960 in and around the town of Suwannee. Floodplain subdivision activity in the 1980's has generally concentrated in the area between U.S. Highway 19 and Hatchbend. The county floodplain ordinance appears to have had some success in deterring floodplain subdivision activity. Many of the new subdivisions are occurring just outside and immediately adjacent to floodplain designated areas.

TABLE 7

DIXIE COUNTY DEVELOPMENT: SUWANNEE RIVER CORRIDOR BY DECADE

TIME PERIOD	LOTS	PERCENT OF TOTAL	ACRES	PERCENT OF TOTAL	AVERAGE LOT SIZE
pre 1950	183	5.79	34.31	1.61	.19
1950-1959	272	8.60	77.20	3.63	.28
1960-1969	1,517	47.96	269.68	12.63	.18
1970-1979	942	29.78	858.90	40.34	.91
1980-1985	249	7.87	889.09	41.76	3.57
TOTAL	3,163	100.00	2,129.18	99.97	.67

Development on the Steinhatchee and Econfina rivers is very limited. There are two eighty-acre tracts on both rivers which have experienced a relatively small amount of development activity. Both rivers are virtually free of development except for the town of Steinhatchee at the mouth of the Steinhatchee River.

Excluding the area around the Town of Steinhatchee, coastal development is generally restricted by physical constraints imposed by the coastal marsh. Development activity at the towns of Suwannee and Horseshoe Beach appear to be limited by the availability of land suitable for buildings. Further development in these areas will require increased intensity of lands already developed.

Property development pressure in California Swamp is virtually non-existent. Land use is limited to forestry activities and is expected to remain in forest use in the future. The major pressure in the swamp revolves around harvesting the swamp core. Currently, the core swamp has not been harvested for many years and contains a large number of hardwood trees.

GILCHRIST COUNTY

With a 1980 population of 5,767 and a population density of 16.3 persons per square mile, Gilchrist County is one of the least populated counties in the state.[39] County population growth rates have lagged behind the rest of the state. Dixie County population grew by 39.4 percent between 1930 and 1980. The population growth represents only an additional 1,630 persons. The greatest period of population growth was between 1970 and 1979 when county population increased by 63 percent.

Census data indicates that 80 percent of the population increase experienced between 1970 and 1980 was attributable to net in-migration. Relocation from other Florida counties accounted for 27 percent of the net in-migration while 64 percent was attributable to out of state

populations.[40] Gilchrist County is projected to have a year 2010 population of 13,700. This represents a 285.8 percent increase and is the highest rate of growth for any county in the region.[41]

The county has an agricultural and forestry based economy. Development activity throughout the county is relatively low. Between 1980 and 1983, only 267 single family units and 37 multiple family dwelling units were authorized for construction in all of Gilchrist County.[42] No city within the county has a population greater than 2000. Most development activity appears to be taking place at the Alachua-Gilchrist County line. A large proportion of future population growth is likely to be spillover growth in the form of Alachua County commuters.

Gilchrist County also contains a large amount of regionally significant natural areas. Fifty percent of the county has received such designation. The year 2010 population density with the exclusion of natural areas is 78.02 persons per square mile.

The majority of Gilchrist County regionally significant natural area is located within Wacassassa Flats. As indicated in Table 8, the flats comprises 61 percent of the counties identified regionally significant natural areas. However, as mentioned previously, most of the future development pressure within Gilchrist County is expected to occur within the river corridors.

TABLE 8

GILCHRIST COUNTY DEVELOPMENT BY NATURAL AREA

NATURAL AREA	ACREAGE	ACREAGE SUBDIVIDED	PERCENT SUBDIVIDED	AVERAGE LOT SIZE
Suwannee River	20,480	2,384	11.6	2.0
Santa Fe River	14,976	169	1.1	2.2
Wacassassa Flats	62,720	0	0	0

Approximately 32 square miles of land is located within the Suwannee River Corridor. 3.75 square miles, or 11.7 percent, of the corridor has been subdivided. The vast majority of river corridor subdivision activity has been adjacent to the river. Of the approximately 32 miles of Suwannee River frontage bordering the county, approximately 42.6 percent has been subdivided. There appears to be little subdivision activity near the confluence of the Suwannee and Santa Fe rivers, possibly owing to the regular flooding of this area.

The Santa Fe River Corridor is relatively undeveloped. Approximately 22.7 percent of the 23.4 miles of Santa Fe River frontage within the county has been subdivided. There are approximately 22 square miles of county land within the Santa Fe River floodplain corridor. Only 55 acres of the corridor have been subdivided. Homes have been constructed on approximately 70 percent of the subdivided land.

Earlier subdivisions were platted on the higher river corridor elevations and in generally more desireable locations. Later subdivisions have occurred on land less well suited to residential construction. Generally, the later subdivisions have not sold well. Only a handful of lots from subdivisions recorded in the 1980's have been built upon. Older river corridor subdivisions, dating from the 1950's through the mid 1960's, are almost completely developed and now serve as places of primary residence. Local officials estimate that 90 to 95 percent of the lots in the older subdivisions have been developed and of these, 90 to 95 percent are used as places of primary residence. The newer subdivisions appear to be primarily used as campsites.

Subdivision activity has been particularly concentrated around major springs. Land adjacent to Hart, Sun, and Otter Springs are extensively subdivided. However, development activity has been fairly unsuccessful.

Lots within the Otter Springs Estates subdivision were never sold and is today a privately-owned campground. A few lots have been sold in Sun Springs Estates but none have been built upon and is primarily used for camping and as a summer vacation retreat. Hart Springs is a county park. Ginnie Springs and its associated smaller springs is a privately-run camping, cave-diving, and outdoor recreation center.

Lot sizes within river corridor subdivisions varies from one-fourth acre to ten acres. However, virtually all riverfront lots are long and narrow to maximize the number of lots with riverbank access. The average width for lots fronting the Suwannee is 152 feet. Lots greater than seven acres in size appear to have a significantly wider width (300 feet).

There are 38 recorded subdivisions with a total of 1552 lots within the Suwannee and Santa Fe river corridors. The average subdivision consists of 43 lots on 68 acres of land. Subdivision activity occurred at a relatively constant rate in the decades between 1950 and 1980, typically averaging 10 platted subdivisions per year. Lot size remained relatively constant at one acre through 1970. Although riverfront lot width has not significantly changed over time, lot sizes have increased since 1970. Between 1970 and 1979 the average lot size was 2.5 acres. The average lot size between 1980 and 1985 was 4 acres.

Six river corridor subdivisions were approved during the 1950's. These subdivisions consisted of 190 lots on 206 acres. The typical 1950's subdivision consisted of 32 one-acre lots within a 34 acre tract. There were 10 subdivisions in the 1960's including the two subdivisions on the Santa Fe River. These subdivisions provided a total of 698 lots on 744

acres. The typical 1960's subdivision consisted of 70 one-acre lots on 74 acres. In the 1970's, there were 10 subdivisions. These subdivisions included a total of 213 lots on 539 acres. The typical subdivision consisted of 21 2.5-acre lots on a 50 acre tract of land. During the 1980's thus far, there have been 12 subdivisions consisting of a total of 313 lots on 1243 acres. The typical 1980's subdivision consists of 26 four-acre lots on a 103 acre tract.

The period of greatest river corridor subdivision activity occurred in the years between 1979 and 1982 when sixteen subdivisions were recorded. Only four subdivisions have been platted in the river corridors since adoption of a county floodplain ordinance in the fall of 1982. Only one subdivision has been platted in the river corridors since January 1984.

HAMILTON COUNTY

Hamilton County, located in the north central section of the region, is bounded on the north by the Georgia state line, on the east and south by the Suwannee River, and on the west by the Withlacoochee River. Hamilton County has experienced no net population growth since 1930. In fact, the county's 1980 population of 8,761 was 7.48 percent lower than its 1930 population of 9,454. Population projections estimate a 28.4 percent increase in population to 10,000 by the year 2010.[43] This represents the smallest projected county growth rate for the region. The 1980 population density exclusive of identified natural areas was 32.4 persons per square mile.

Land use in Hamilton County is similar to that of the surrounding counties. The western half of the county is principally used for agricultural activities. Mining in the southeast, however, sets the county apart from the rest of the region.

Almost the entire eastern half of the county consists of swamps and associated wetlands. Most of the timber in this part of the county has been or is currently being harvested and, with the exception of mining areas, is used by the timber industry as managed pine forest.

Settlement patterns in the county are typical of other rural counties in the Region. Individual residences are scattered throughout the county, while residential concentrations exist in and around the communities of Jasper, Jennings and White Springs. No specific areas have been identified by county personnel as experiencing development pressure and, in their opinion, future development will likely continue to be in and around existing communities.

A significant portion of the Suwannee River borders Hamilton County. The county has control of 82 miles of the Suwannee River, which represents approximately 21 percent of the total river frontage found within the region. There are nineteen subdivisions within the Suwannee and Withlacoochee river corridors and two subdivisions in the Alapaha

River Corridor. According to the County Building Inspector, no more than five percent of the lots in these 21 subdivisions have been built upon.

As can be seen in the Table 9, privately-held lands near the Stephen Foster State Cultural Center, have experienced significant development activity and is likely to continue to experience development pressure since the Center is located adjacent to the town of White Springs and the Suwannee River. However, Bee Haven Bay is experiencing the greatest development threat in Hamilton County due to phosphate mining which is expected to unearth the entire bay area.

TABLE 9

HAMILTON COUNTY DEVELOPMENT BY NATURAL AREA

NATURAL AREA	ACREAGE	SUBDIVIDED ACREAGE	PERCENT SUBDIVIDED	AVERAGE LOT SIZE
Withlacoochee River	16,000	649	4.06	1.0
Alapaha River	17,920	125	0.07	1.4
Suwannee River	38,080	781	2.60	1.5
S. Foster Center	640	167	26.09	0.3
Suwannee State Park	1,830	200	10.93	1.0
Recharge Area	61,440	964	1.57	0.75
Bee Haven Bay	29,760	0	0.0	n/a
Brown Tract	5,760	0	0.0	n/a

LAFAYETTE COUNTY

By every available measure, Lafayette County ranks as one of the counties least likely to experience significant population growth. Despite healthy regional growth rates, the 1980 Lafayette County population of 4,035 is 7.5 percent lower than its 1930 population of 4,361. The county is projected to grow by 131.7 percent between 1970 and 2010 population of 6,700. However, this population growth is roughly equivalent to what Alachua County is expected to experience in nine months.[44] Similarly, the 1980 county population density exclusive of regionally significant areas is very low ranks as the lowest in the region at 8.6 persons per square mile.

Agriculture and silviculture are the principal land uses in the county. Agricultural activities are concentrated along a north-south five mile strip of land west of the Suwannee River. To the west of the agricultural area, the land is swampy and intermittently wet. The principal land use in this area is managed pine forest, along with some agriculture at higher elevations.

TABLE 10

LAFAYETTE COUNTY DEVELOPMENT BY NATURAL AREA

NATURAL AREA	ACREAGE	SUBDIVIDED ACREAGE	PERCENT SUBDIVIDED	AVERAGE LOT SIZE
Suwannee River	48,000	2,303	4.8	.8

Only thirty-one building permits for new residential dwelling units were issued in the county between 1980 and 1983. The permits were generally scattered throughout the county, with no discernable development pressure in any particular area. Between 1975 and 1985, twenty-seven subdivisions were recorded. Of these, fifteen are within the Suwannee River floodplain.

Lafayette County has 53 miles, roughly 13.67 percent of the region's Suwannee River frontage. There are 29 subdivisions within the Suwannee River Corridor. A total of 14.84 miles of Suwannee River frontage, 28 percent, has been subdivided. Only a small percentage of river frontage has been built upon. Local officials indicate that floods in 1984 convinced many of these residents to vacate the floodplain and/or sell their property. An inspection of several floodplain subdivisions by reveals numerous "for sale" signs by individual owners. Generally, river corridor construction has been in the northern portion of the floodplain.

MADISON COUNTY

Madison County, lying in the northwest corner of the region, is bounded on the west by the Aucilla River and on the east by the Withlacoochee and Suwannee Rivers. Madison county reflects the typical distribution of population common to the rural counties of the region. Most of the county's population is concentrated in and around the communities of Cherry Lake, Greenville, Lee, and the City of Madison.

Madison County, like Hamilton and Lafayette counties, actually lost population between 1930 and 1980. The county's 1980 population of 14,894 is 4.6 percent less than its 1930 population of 15,614. Madison County growth rates also lag behind region and state averages. Madison County's population is projected to reach 17,400 by 2010. This represents an increase of 29.1 percent over the county's 1970 population. Population densities with the exclusion of regionally significant natural areas is also low. The 1980 population density was 23.8 persons per square mile. This it projected to increase to 27.8 by 2010.

Land use in Madison County is predominately agriculture and silviculture. Forestry activity generally occurs south of Interstate 10, especially in the San Pedro Bay area. Land use in the northern half of the county is principally agriculture, with some agricultural activity also in the southeast quarter of the county.

Residential development is widely dispersed throughout the county with slightly more activity in the existing urban areas. One hundred eighty-five building permits were issued for new residential dwelling unit construction between 1980 and 1983. Almost all issued permits have been for year-round residences. County officials anticipate that future residential development will locate near the City of Madison, along State Road 90, and, to a lesser extent, at Cherry Lake and the Town of Lee.

Land subdivision since 1980 has been concentrated along the Withlacoochee and Suwannee river corridors, with 16 plats recorded between 1980 and 1981. A subdivision ordinance was passed by the Madison County Commission in August of 1982. No subdivision plat has been approved since.

TABLE 11

MADISON COUNTY DEVELOPMENT BY NATURAL AREA

NATURAL AREA	ACREAGE	SUBDIVIDED ACREAGE	PERCENT SUBDIVIDED	AVERAGE LOT SIZE
Hixtown Swamp	29,440	0	0	n/a
Suwannee River	10,688	40	0.07	0.6
Withlacoochee River	13,120	1,051	1.9	1.4
Blue Springs	640	52	0.1	0.6
Campbell Springs	640	0	0	n/a
Rogers Sink	640	0	0	n/a
Johnson Sink	1,280	0	0	n/a
County Recharge	11,200	0	0	n/a
Western Recharge	1,280	0	0	n/a

Development along the Withlacoochee and Suwannee river corridors has been limited. Construction has occurred on no more than ten percent of the river corridor lots. According to the Building Inspector, sale of river property has been almost exclusively to out-of-state or out-of-county residents. Mobile homes have been the dominant housing type where construction has occurred.

No regionally significant natural area within Madison County is experiencing noticeable development pressure. Hixtown Swamp is generally unsuited to residential development due to wet conditions and periodic flooding. However, any drainage activity by agricultural interests

should be closely monitored since this could create an opportunity for residential development in the more scenic areas of the swamp. In general, the vulnerability of the swamp to man's encroachment may be high. The potential for degradation due to drainage for crop or pasture land conversion or for irrigation waters is a distinct possibility. In addition, extensive harvesting of hardwoods could have a detrimental effect on the ecology of the swamp.

Development within the Madison County Stream-to-Sink Recharge Area is generally restricted by county subdivision and sanitary sewer regulations. The several sinkholes in this area should, however, be closely monitored for encroaching development. County regulations and floodplain ordinances likewise restrict development within the flood-prone areas of the Withlacoochee and Suwannee Rivers.

SUWANNEE COUNTY

Suwannee County is bounded by the Suwannee River, the Santa Fe River, and the Ichetucknee River. The county is sparsely populated. The 1980 county population was 22,287. The 1980 county population density minus regionally significant natural areas was 41.9 persons per square mile. Suwannee County's population growth rate between 1930 and 1980 lagged considerably behind the state and regional averages. However, county population growth is projected to more than double by the year 2010, reaching 37,000.[45]

Census data also that 83 percent of the population increase between 1970 and 1980 was attributable to net in-migration. Eighteen percent of the population increase attributable to in-migration originated from other Florida counties. Local officials here, as in almost all counties within the region, feel there has been an increase in the number of residents relocating from southern Florida.

Between 1980 and 1983 inclusive, the county authorized the construction of 780 residential dwelling units. Local officials indicate that the majority of residential construction consists of the siting of mobile homes. According to the Building Inspector and personnel in the Property Appraiser's office, much of the current sale of platted land, particularly river property, is to out-of-state or out-of-county residents.

The predominant county land uses are managed pine forests and irrigation-based agriculture. The northeast portion of the county, an area of approximately 165 square miles, has numerous lakes, creek, surficial depressions, and scattered cypress heads and domes interspersed with cleared agricultural land. While not specifically delineated as a recharge area, soils and topography suggest a close relationship between the quality of groundwater runoff and water quality in upper aquifers.

As can be seen in Table 12, both the Suwannee and Santa Fe River corridors have experienced considerable subdivision activity.

TABLE 12

SUWANNEE COUNTY DEVELOPMENT BY NATURAL AREA

NATURAL AREA	ACREAGE	SUBDIVIDED ACREAGE	PERCENT SUBDIVIDED	AVERAGE LOT SIZE
Suwannee River	69,440	7,027	10.10	1.3
Low. Little R. Rechg.	16,000	597	0.57	4.3
Up. Little R. Rechg.	8,960	60	0.06	3.0
Telford Springs	640	0	0.0	n/a
Peacock Slough	1,280	0	0.0	n/a
Ichetucknee St. Park	2,240	80	3.6	2.1
Ichetucknee River	3,200	324	10.13	2.0
Santa Fe River	2,240	820	36.60	4.3

Suwannee County has an important role in the management of the Suwannee River. Approximately 27 percent of the region's Suwannee River frontage is under the jurisdiction of Suwannee County. Areas of most intense land subdivision within the Suwannee River Corridor include nine miles of frontage immediately south of Peacock Slough, 15 miles of frontage south of Dowling Park, and 4 miles of frontage at the State Road 249 bridge. Notable Santa Fe River Corridor development includes 5 miles of frontage below Ichetucknee Springs State Park. Construction activity has occurred on only ten to fifteen percent of subdivided lots in the river corridors. Suwannee County appears to have the highest incidence of recreational use of the river. Local officials indicate that only 15 percent of established river corridor dwelling units are used as places of primary residence.

TAYLOR COUNTY

Taylor County is one of two coastal counties found within the region. Population growth has historically lagged behind regional and state averages. Taylor County's 1980 population of 16,532 represents only a 24.2 percent increase over its 1930 population of 13,316. The population is projected to increase by 78 percent for the years between 1970 and 2010 to 24,100.

Census data indicates that, of the net increase in population between 1970 and 1980, 64 percent was the result of net in-migration. Thirty-six percent of the population increase was caused by net in-migration from out-of-state while only 6 percent was attributable to in-migration from other Florida counties. Local officials indicate that the number of new residents from southern Florida is increasing.

The number of authorized new residential dwelling units for the years between 1980 and 1983 inclusive averaged 110 units per year. Approximately 60 percent of these permits were issued for unincorporated

areas. During this period, all residential construction in unincorporated parts of the county has been for single family residences. Local officials indicate that most of the building activity in Taylor county is located in and around the City of Perry and the town of Steinhatchee. This is evidenced by the fact that only 13 building permits for new residential units were issued in 1984 for the coastal areas (excluding the Town of Steinhatchee).

Taylor County ranks as sixth-lowest in population density county in the state. The 1980 Population density was only 15.6 persons per square mile. However, the county contains 745 square miles of regionally significant natural areas. This is the largest amount of natural area located within any county and constitutes twenty-seven percent of all regionally significant natural areas. Excluding these areas from population density considerations, the 1980 population density was much higher, at 52.8 persons per square mile.

All of Taylor County's regionally significant natural area within the coastal drainage basin. It includes all areas subject to either hurricane surge or freshwater flooding. In addition, the off-shore seagrass beds, salt marsh, freshwater wetlands with sheet flow connection to the salt marsh, the Tide Swamp Wildlife Management Area, the Steinhatchee River, the Aucilla River, and the Aucilla River Sinks have been identified as regionally significant natural areas.

The greatest growth pressure within the identified regionally significant areas appears to be along the Steinhatchee River around the town of Steinhatchee. Some development pressure exists within the Aucilla River floodplain as well. Along the coast, lands between Spring Warrior Creek and Cedar Island, a distance of approximately 4 miles (7 percent of the Taylor County coastline) is experiencing the greatest level of development pressure. The remainder of coastal lands are owned by large timber companies.

The unincorporated town of Steinhatchee has a 1984 estimated population of 1624. Steinhatchee contains approximately 570 residential units and approximately 2000 residential lots. Homes have been constructed on an estimated forty percent of all available lots in Steinhatchee. Of particular note is the subdivision activity occurring along the Steinhatchee River immediately to the east of the town of Steinhatchee. Here, three residential subdivisions have been platted since 1981 totalling 119 lots on 120 acres of land. Virtually no development has occurred on these lots as of this time. The entire north bank of the Steinhatchee River has been subdivided from the town of Steinhatchee to Boggy Creek, a distance of approximately 3.5 miles. The town of Steinhatchee has the potential to double in population within ten years. Subdivision activity is likely to continue along the Steinhatchee River from the town of Steinhatchee all the way to U.S Highway 27-A.

TABLE 13

TAYLOR COUNTY DEVELOPMENT BY NATURAL AREA

NATURAL AREA	ACREAGE	ACREAGE SUBDIVIDED	PERCENT SUBDIVIDED	AVERAGE LOT SIZE
Aucilla River Sinks	2,560	148	5.8	1.84
Aucilla River F P	6,400	324	5.1	0.83
Hurricane Surge Area	125,440	1,554	1.2	0.67
Coastal Drainage	390,400	2,357	0.6	0.59
Salt Marsh	71,040	1,036	1.5	0.63
Econfina F P	18,240	0	0 .0	0.0
Freshwater Wetlands with Direct Sheet Flow to Salt Marsh	139,520	0	0.0	0.0
Steinhatchee F P	7,360	405	5.5	0.75
Spring Warrior Creek F P	14,720	0	0.0	0.0
Tide Swamp	9,984	0	0.0	0.0

Development between Cedar Island and Dekle Beach is occurring as unrecorded subdivisions and as lot splits for individual housing units. The areas has a development pattern whereby streets are platted but the resulting blocks are not subdivided. Typically, one or two homes have been constructed per block. The remainder of the block is retained as one parcel to be split at a later date for an additional one or two homes. It is estimated that construction has occurred on approximately 50 percent of the available land intended for development in this manner. Of the 29 identified residential development areas, only 8 were recorded subdivisions.

There are approximately 1700 residential lots on 1313 acres located within the gulf coastal marsh and hurricane surge area between Spring Warrior Creek and Cedar Island, residential units have been constructed on approximately 25 percent of these lots. Assuming existing densities continue an additional 1700 residential lots are anticipated as infill development, for a total of approximately 3400 residential lots by the year 2010.

The Aucilla River is also experiencing development pressure. There are currently 381 residential lots within the corridor, 111 of which have direct access to the river. Lots with riverfront access average two acres in size and 167 feet in width. Approximately 19,000 feet of the Aucilla riverbank has been subdivided. There have been four unrecorded and one recorded subdivision in this area.

While the growth projections may appear to lag behind state and regional averages, it must be pointed out that regionally significant natural

areas within Taylor County, as in Dixie County, are extremely sensitive, especially the Gulf coastal marsh. Finally, the impact which an improved and soon to be completed State Highway 51 will have on the county is unknown. One can only estimate that the current population projections may need to be revised substantially upward for Taylor County upon the completion of this road.

UNION COUNTY

Union County, with a 1980 population of 10,166, is one of the lesser populated counties in the region. The 1980 population density exclusive of regionally significant natural areas was 42.5 persons per square mile. Most of Union County's population is concentrated in the southern half of the county. Northern Union County is, for the most part, either used for timber harvesting or for the Florida state prison system. Population projections suggest a below-average growth rate. Union County is projected to experience a 64 percent increase in population between the years 1970 and 2010. The 2010 county population is projected to reach 13,300.

County subdivision activity is relatively slow. Only 13 subdivisions were filed with the Clerk's office for the years between 1956 and 1964. Two subdivisions were filed in 1981 and 1982 respectively. No subdivisions were filed in 1983. Only one was filed in 1984. Local officials note that a large percentage of new construction activity within recent years has used metes and bounds lot splits. This technique has apparently been employed to avoid the county subdivision process and the re-classification of land use from agricultural to residential for property tax purposes.

Future development will most likely continue to concentrate in the Olustee Creek area and south of County Road 238. There is currently some individual siting of homes along the Santa Fe and New Rivers but these are scattered, individual lots and are not related to any subdivision development efforts. As can be seen in Table 14, there has been relatively little subdivision activity within the Santa Fe River Corridor.

TABLE 14

UNION COUNTY DEVELOPMENT BY NATURAL AREA

NATURAL AREA	ACREAGE	SUBDIVIDED ACREAGE	PERCENT SUBDIVIDED	AVERAGE LOT SIZE
Santa Fe River	4,480	120	2.7	1.9
Total	4,480	120	2.7	1.9

SUWANNEE RIVER SYSTEM

This section examines development pressure along the Suwannee River System, focusing principally upon the Suwannee and its major tributary, the Santa Fe. These two river corridors are treated separately as development activity within the two corridors does not generally follow county growth trends. Furthermore, the rate of development activity appears to be occurring in a more or less uniform manner along the entire length of the Suwannee.

The evaluation of development pressure examines historical trends in subdivision activity. Furthermore, the analysis distinguishes between corridor-wide development and development activity directly adjacent to the rivers. Projections are then made based upon historical trends for the Santa Fe as well as each segment of the Suwannee River.

The following evaluation is an important indicator of development trends. However, it is less than a complete accounting of all river corridor development activity. The unit of aggregation is the section which constitutes one square mile. Section-level data does not precisely correspond to actual 100 year floodplain boundaries. Furthermore, development dates were not available for unrecorded subdivisions which excluded their use in time series analyses. The quality of land development information varies widely from county to county. Where available, lot counts were made from aerial photographs. However, not every county within the region has up-to-date aerial photographs. In counties where aerial photographs were unavailable, development data was limited to information gleaned from subdivision plats. In such cases, unrecorded subdivisions and residences created through the use of lot splits went uncounted.

HISTORICAL TRENDS

In general, development pressure appears to have started sooner on the Santa Fe than on the Suwannee. Although portions of the Suwannee developed in the 1920's, these areas were limited to areas near the coast within Segment V as well as major upland springs. Development activity on the Santa Fe was much more extensive during the 1920's.

There does not appear to be any reduction in development pressure along either river. Table 15 reveals that development along the Santa Fe corridor has been proceeding at a fairly constant rate since 1950. As indicated in Table 16, development activity along the Suwannee has doubled every ten years between 1950 and 1985.

Historical trends for the Suwannee suggest a general increase in average lot size over time. However, no such trend is readily discernible within the Santa Fe River Corridor. Despite the large number of recorded subdivisions, only 11.2 percent of the land adjacent to the riverbanks of the Santa Fe has been subdivided. A significantly larger proportion,

17.2 percent, of the lands directly adjacent to the Suwannee River have been subdivided.

TABLE 15

SANTA FE RIVER CORRIDOR DEVELOPMENT BY DECADE

DECADE	ACRES SUBDIVIDED	NO. OF LOTS	AVERAGE LOT SIZE
pre 1950	227.7	952	.24
1950 - 1959	1,849.0	2,020	.92
1960 - 1969	1,034.0	955	1.08
1970 - 1979	1,724.0	678	2.54
1980 - 1985	971.0	664	1.46

TABLE 16

SUWANNEE RIVER CORRIDOR DEVELOPMENT BY DECADE

DECADE	ACRES SUBDIVIDED	NO. OF LOTS	AVERAGE LOT SIZE
Pre 1950	215.8	1,639	0.13
1950 - 1959	1,028.2	916	1.12
1960 - 1969	1,782.9	4,276	0.42
1970 - 1979	6,169.4	4,514	1.37
1980 - 1985	6,061.1	2,529	2.40

USAGE CHARACTERISTICS

Approximately 80 percent of existing residential dwelling units within the floodplain corridor are estimated by local officials to be used as places of primary residence. However, despite the flurry of subdivision activity in recent years, local officials indicate that approximately 80 percent of all river corridor subdivisions recorded since 1980 remain undeveloped. Several local officials indicate a relatively high rate of quick-claim deeds where the purchaser of newly subdivided land relinquishes ownership to the original landowner upon discovering that building upon the property is either impractical or too costly. This suggests a speculative nature to the subdivision activity. This sort of speculative subdivision activity is especially harmful to government attempts to purchase large portions of the river corridor.

PARCEL AND STRUCTURAL CHARACTERISTICS

Lot width is similar along both rivers, averaging 122 feet on the Santa Fe and 126 feet on the Suwannee for lots with river frontage. rIver frontage lot width does not appreciably change with increased lot size until a lot size of 3 acres or larger is reached. The purpose appears to be to provide as many lots as possible with direct access to the rivers. It is not uncommon to find lots 90 feet wide and 500 feet in length. The long length is important for the placement of septic tanks beyond the 10-year floodplain. Lot size appears to vary widely from county to county with no readily apparent explanation.

A large number of mobile homes are located within the river corridors. In some counties, mobile homes appear to constitute as much as 75 percent of all river corridor residential construction. However, on the average, mobile homes appear to constitute 50 percent of all river corridor construction. Very few residences have landscaped Developed property is generally left in its natural state. This is particularly true for properties with river frontage. River corridor subdivisions generally lack paved roads, public sewerage systems, or public water supply.

TABLE 17

SANTA FE RIVER CORRIDOR IDENTIFIED LOTS ADJACENT TO RIVER

COUNTY	TOTAL RIVER FRONTAGE	SUBDIVIDED FRONTAGE	AVERAGE LOT WIDTH	AVERAGE LOT SIZE	PERCENT OF FRONTAGE SUBDIVIDED
Alachua	221,760	8,333	163.4	3.85	3.8
Bradford	81,460	1,750	250.0	6.00	2.2
Columbia	178,840	32,720	89.2	1.00	18.3
Gilchrist	123,552	27,974	149.6	2.69	22.6
Suwannee	37,488	4,725	175.0	2.35	12.6
Union	47,520	1,700	100.0	1.00	3.6
Region III	690,620	77,202	122.8	1.89	11.2

TABLE 18

SANTA FE RIVER CORRIDOR DEVELOPMENT

COUNTY	CORRIDOR ACREAGE	ACRES SUBDIVIDED	NO. OF LOTS	AVERAGE LOT SIZE	PERCENT OF CORRIDOR SUBDIVIDED
Alachua	41,600	403	668	.60	0.9
Bradford	16,000	60	10	6.00	0.4
Columbia	17,920	4,622	3,598	1.28	25.8
Gilchrist	14,976	169	77	2.20	1.1
Suwannee	2 240	820	189	4.34	36.6
Union	4,480	120	63	1.90	2.7
Region III	97,216	6,194	4,965	1.25	6.4

TABLE 19

SUWANNEE RIVER CORRIDOR IDENTIFIED LOTS ADJACENT TO RIVER

COUNTY	TOTAL RIVER FRONTAGE	SUBDIVIDED FRONTAGE	AVERAGE LOT WIDTH	AVERAGE LOT SIZE	PERCENT OF FRONTAGE SUBDIVIDED
Columbia	211,200	19,300	107	.74	9.1
Dixie	322,080	23,400	130	1.74	7.3
Gilchrist	181,104	83,307	152	2.20	46.0
Hamilton	432,960	47,610	114	1.37	11.0
Lafayette	279,840	78,369	124	1.23	28.0
Madison	73,920	5,310	104	.50	7.2
Suwannee	547,536	95,857	121	1.49	17.5
Region III	2,048,640	353,153	126	1.50	17.2

TABLE 20

SUWANNEE RIVER CORRIDOR DEVELOPMENT BY COUNTY

COUNTY	CORRIDOR ACREAGE	ACRES SUBDIVIDED	NO. OF LOTS	AVERAGE LOT SIZE	PERCENT OF CORRIDOR SUBDIVIDED
Columbia	30,400	843	487	1.73	2.7
Dixie	42,240	2,129	3,613	0.67	5.0
Gilchrist	20,480	2,384	1,194	2.00	11.6
Hamilton	38,080	781	489	1.60	2.1
Lafayette	48,000	2,303	2,755	0.84	4.8
Madison	10,688	40	68	0.59	0.4
Suwannee	69,440	7,026	5,324	1.32	10.1
Region III	259,328	15,506	13,930	1.11	6.0

PROJECTIONS AND RANKINGS

This study has tried to ascertain the current level of development pressure upon regionally significant natural areas using subdivision information, on-site visitation, and discussions with local officials. Existing evidence suggests that regionally significant natural areas are threatened by three predominant activities: The subdivision and development of land, the clear cutting of hardwood forests and hammocks, and the filling or draining of wetlands. Development pressure and rankings of individual areas presented in this section are based upon the estimated amount of time remaining before the natural area is irrevocably lost through one of these three activities.

An attempt was made to base projections on the average annual acreage subdivided since 1970. This average was projected to the year 2010 or until all available lands have been utilized. Unfortunately, significant amounts of subdivision data is unavailable for all natural areas. County-wide averages are substituted in cases where the number of subdivisions was too small for reliable projections. Appendix G contains more detailed projections and underlying assumptions for selected natural areas.

The projections are conservative. They do not take into account metes and bounds lot splits, which could account for 25 percent of all development activity. Projected average yearly development activity is based upon mean acreage and lot figures between 1970 and May 1, 1985. In fact, subdivision activity within most natural areas has been occurring at a greater rate during the 1980's than during the 1970's.

Four categories of development pressure are used. These are natural areas facing imminent danger, natural areas facing significant development pressure, natural areas facing average development pressure, and natural areas facing little or no development pressure.

NATURAL AREAS FACING IMMINENT DANGER

Areas facing imminent danger can be described as those areas which, due to one of the identified major types of development pressure, are anticipated to lose their natural character by the year 2010. As Table 21 indicates, not all areas classified as facing imminent development pressure are threatened by subdivision activity. Certain areas, such as the Econfina River, the Steinhatchee River, and California Swamp are threatened by clear-cut timber practices. As the recent experience of Tide Swamp demonstrates, these areas could, in less than 12 months, lose all of their remaining hardwoods. The hardwoods contained within these areas currently receive no government protection from clear cutting.

Although the Florida State Best Management Practices Manual recommends a streamside buffer zone in which there should be no harvesting of trees, the best management practices are purely advisory in nature.[46] Furthermore, while the Works of the District rules recently adopted by the Suwannee River Water Management District prohibit the removal of vegetation within 75 feet of the riverbank, neither the Econfina or Steinhatchee River has been designated as a Work of the District.

TABLE 21

NATURAL AREAS FACING IMMINENT DANGER

NATURAL AREA	ACREAGE	PERCENT OF AREA SUBDIVIDED BY 1985	2010
Devil's Mhopper	640	41.6	100.0
S Felasco Hammock	10,240	10.6	100.0
Suwannee R Frontage [a]	2,048,640	17.2	75.8
Payne's Prairie	36,480	14.8	30.2
Suwannee River St Park	4,380	76.5	100.0
Cal Swamp	63,360	0.0	0.0
Bee Haven Bay	29,760	0.0	0.0
Steinhatchee R	7,360	8.0	15.4
Aucilla R	6,400	5.1	8.7
Econfina R	18,240	0.0	0.0

If current trends continue, the region faces the very real possibility of having all of the lands adjacent to the Suwannee River subdivided by the year 2034. This could result in the irrevocable loss of the river

as a natural environment and habitat for native species. The river could become a linear city with lots averaging 125 feet in width, a width which is not uncommon for typical large-lot urban subdivisions. Of particular concern within the river corridors are local subdivision regulations and zoning ordinances. Although the counties have adopted ordinances requiring new construction to be 75 feet back from the river banks and to prohibit the removal of natural vegetation, almost all counties permit small and narrow lots adjacent to the river.

Privately-held lands which comprise the remaining portion of the ecosystems of Payne's Prairie and San Felasco Hammock state preserves, Devil's Millhopper State Geologic Site, and Suwannee River State Park also face imminent danger. These lands are popular residential development locations precisely because of their attractive environmental setting and proximity to state-owned lands.

Development pressure is so great on Devil's Millhopper that all remaining undeveloped land on its fringe could be subdivided within the next 12 months. The San Felasco Hammock is experiencing similar development pressure. If current trends continue, the remaining privately held lands whIch constitute the reset of the San Felasco Hammock Ecosystem will be completely developed by the year 2005. Payne's Prairie State Preserve, despite its size, does not include the prairie's entire ecosystem. The state Department of Natural Resources is concerned about development on the fringe of the prairie and would like to expand its boundaries. An area of land on the southeast side of the preserve has been proposed for purchase under the Conservation and Recreation Lands (CARL) program.

If additional lands are scheduled for purchase by the state for these state preserves, consideration should be given to accelerating the acquisition date. This is particularly important in the case of San Felasco Hammock and Payne's Prairie where significant portions of their ecosystem are privately owned.

NATURAL AREAS FACING SIGNIFICANT DEVELOPMENT PRESSURE

The following areas are currently experiencing significant development pressure. However, projected trends do not indicate that these areas are in imminent danger of losing their natural character, despite the fact that many of these areas are projected to experience a greater percentage of their area subdivided than for the other category. This is in a large part due to the fact that many of these areas, such as stream-to-sink recharge areas, are less sensitive to development. In addition, some of these areas, such as the Ichetucknee River, have already been significantly altered.

Area facing significant development pressure include the western and southern stream-to-sink recharge areas of Columbia County, the Alachua County Stream-To-Sink Recharge Area, and the Lower Santa Fe and

Ichetucknee River corridors. The lower Santa Fe River floodplain corridor should be carefully monitored for development trends. In particular, the O'leno Park - River Rise area, Ginnie Springs natural area, and the Suwannee-Santa Fe River confluence should be closely monitored for development activity for potential changes in development pressure.

As indicated earlier, all of the subdivision activity along the Santa Fe River Corridor is located downstream of O'leno State Park. The following projections are limited to the lower portion of the Santa Fe.

TABLE 22

NATURAL AREAS FACING SIGNIFICANT PRESSURE

NATURAL AREA	ACRES	1985 SUBDIVIDED ACRES	1985 SUBDIVIDED PERCENT	2010 SUBDIVIDED ACRES	2010 SUBDIVIDED PERCENT
Col Co S Recharge	47,360	5,419	11.4	9,093	19.2
Col Co W Recharge	13,440	316	2.4	3,961	29.5
Al Co Recharge	51,840	3,738	7.2	11,049	21.3
Lwr S F R Frontage	512,516	77,202	15.1	201,295	39.3
Ichetucknee R	6,080	1,824	30.0	2,528	41.5
Ichetucknee St Park	5,760	890	15.5	1,713	29.8
S Foster Center	640	167	26.1	219	34.3
Suwannee River St Pk	1,830	200	10.9	250	13.7
Dixie Co Salt Marsh	42,240	178	0.4	523	1.2
Taylor Co Salt Marsh	71,040	1,036	1.5	1,844	2.6

As can be seen in the preceding table, the Dixie and Taylor County salt marshes are projected to receive very small amounts of additional development. As discussed previously, most of this development is anticipated to occur around existing coastal communities. Little development will occur within the salt marsh itself. Instead, upland areas immediately adjacent to the salt marsh have been, and are likely to continue to receive, most of the future coastal development. The sensitivity of the salt marsh is so great, however, that a significant rating was attached to it. Existing studies indicate that eighty percent of the nutrients found within the region's salt marsh originates from upland sources.[47] Therefore, even small amounts of development in or near the salt marsh have the potential for significant impact.

NATURAL AREAS FACING AVERAGE DEVELOPMENT PRESSURE

Areas experiencing average development pressure are regarded as areas which will receive some development activity within the projected time period but appear to be able to handle the projected growth without undue adverse environmental impacts. Regionally significant natural areas in this category are listed in table 23.

TABLE 23

NATURAL AREAS FACING AVERAGE PRESSURE

NATURAL AREA	ACRES	1985 SUBDIVIDED ACRES	1985 SUBDIVIDED PERCENT	2010 SUBDIVIDED ACRES	2010 SUBDIVIDED PERCENT
Dixie Co H S	152,320	616	0.4	1,121	0.7
Taylor Co H S	125,440	1,554	1.2	3,460	2.8
Cary Forest	3,008	51	1.7	98	3.3
O'leno-River Rise	12,000	0	0.0	0	0.0
Lochloosa Forest	36,922	378	1.0	750	2.0
Wacassassa Flats	62,720	0	0.0	0	0.0
Alapaha River	17,920	125	0.7	164	0.9
Withlacoochee River	16,000	649	4.1	852	5.3
Hamilton Co Recharge	61,400	964	1.6	1,265	2.1
Madison Co Recharge	11,200	0	0.0	0	0.0
Taylor Co Freshwater Wetlands w Sheet Flow to Salt Marsh	139,520	0	0.0	0	0.0
Dixie Co Freshwater Wetlands w Sheet Flow to Salt Marsh	87,040	0	0.0	0	0.0

NATURAL AREAS FACING LITTLE OR NO PRESSURE

Areas with below average or little development pressure have not experienced any or, at most, very little development activity due to natural conditions or government ownership of land. These areas include wetlands and swamps as well as large tracts of government-owned land. Of particular note is Tide Swamp, which, since its recent clear-cutting, has little to offer for timber harvesting or aesthetics for residential development.

TABLE 24

NATURAL AREAS FACING LITTLE OR NO PRESSURE

NATURAL AREA	ACRES	1985 SUBDIVIDED ACRES	1985 SUBDIVIDED PERCENT	2010 SUBDIVIDED ACRES	2010 SUBDIVIDED PERCENT
Gum Root Swamp	2,816	0	0	0	0
U Santa Fe R Corridor	39,680	11	0	22	0
Santa Fe Swamp	7,680	0	0	0	0
Brooks Sink	640	0	0	0	0
Osceola Forest	80,000	0	0	0	0
Pinhook Swamp	89,600	0	0	0	0
Lwr Suw Nat Wld Rfg	16,000	0	0	0	0
Lime Sink	640	0	0	0	0
Hixtown Swamp	29,440	0	0	0	0
Tide Swamp	9,984	0	0	0	0

SUMMARY

North central Florida is in the middle of a major growth period. Population growth and urban development common to southern Florida since 1960 is now beginning to occur in north central Florida. However, the growth is occurring in uneven increments throughout the region. Certain counties are receiving and are projected to continue to experience greater growth increments than other counties. Most notably, Alachua and Columbia counties are expected to receive the largest increases in absolute numbers. Although their increase in absolute numbers is less, Dixie, Gilchrist, Bradford, and Suwannee counties are projected to experience the greatest rates of population growth. By far, Alachua County will experience the greatest increase in population density (when regionally significant areas are subtracted from total county acreage values), followed by Bradford and Columbia counties. Conversely, Hamilton, Madison, and Lafayette counties are expected to experience the smallest increases in population density.

Development of the Suwannee River Corridor is of particular concern. Given the history of subdivision platting on the Suwannee, it is entirely possible for one subdivision to wipe out an entire regionally significant contained within this natural area. Similarly, Devil's Millhopper could also be completely surrounded by residential subdivisions at any time. Timber harvesting concerns aside, it is not surprising that the majority of development pressure is occurring in Alachua County, the region's most populous county.

The major threats to regionally significant natural areas appear to be 1) new construction and development activity at an intensity level similar to large lot development found in most cities; 2) clear cutting of

remaining hardwood forest stands; 3) dredging and filling of wetlands; and 4)phosphate mining within wetlands areas. Timber harvesting appears to represent the most immediate threat. Residential development occurs over a sustained period of time which usually allows government time to develop and respond with appropriate policies. However, timber cutting of large land areas can occur virtually overnight, without allowing adequate lead time for government action. Florida state law provides provisions for reclamation of lands used for phosphate mining. Despite legal requirements for wetlands reclamation, areas subject to phosphate mining activity cannot be restored to their original appearance due to the large quantities of fill material removed.

Difficulty is encountered with the definition of development pressure. While the current approach may be adequate for comparative purposes, it may not be adequate for recognizing the real problems associated with individual natural areas. What types of activity or how much development pressure is too much for a natural area to sustain and still perform its original functions? It is entirely possible that a relatively small scale development or activity could have disastrous consequences for Payne's Prairie yet be entirely appropriate in another regionally significant natural area. More information is required about the ecological processes of these natural areas.

A cause-effect relationship exists between the degradation and elimination of natural systems and man's actions. Perhaps the best measures are indicators of the health of the natural systems and functions. Wildlife counts, water quality and flow analyses, water table levels, vegetation counts and the like perhaps represent the best measures of the effects of man's activities. Unfortunately, such information is not readily available. Available information is particularly incomplete for areas of high indirect recharge to the Floridan Aquifer. A more detailed understanding of the vegetative cover, food-chain, and hydrologic cycles is needed.

A set of key indicators of development pressure specific to each natural area is beginning to emerge. Examples of key indicators deal with whether the coastal marsh is receding or expanding, the quality of groundwater runoff entering the Floridan Aquifer through sinks and major stream to sink recharge areas, and the impact of fertilizers and herbicides used by the forestry industry on the coastal marsh. Such a set of key indices could serve as part of a system for monitoring the health of natural areas. However, while data is being gathered and studied, development pressure and subsequent irretrievable loss of significant natural areas continues. Public funds are limited. It may be necessary to weigh expenditures of public funds between data collection, land acquisition, and regulation development.

IV

DISCUSSION OF MANAGEMENT PROGRAMS

INTRODUCTION

Chapter II of this study identifies areas subject to hurricane-induced hazards as well as natural areas considered to be regionally significant, while Chapter III evaluates development trends within and around these areas. This chapter addresses methods of land acquisition and regulation--programs that may be utilized to: (1) reduce/prevent damage to property as well as loss of life resulting from hurricanes and flooding; and (2) preserve representative samples of original Florida habitat, flora, and fauna within the Region for the benefit of both present and future generations.

There are three general methods available to accomplish this purpose: (1) public land acquisition; (2) public regulation of privately-owned land; and (3) public regulation of individual actions. These methods and their variants have advantages and disadvantages.

Aside from limited acquisition funds, government acquisition of land reduces the total assessed valuation of land available to state and local governments for property tax revenues. In addition, public acquisition does not always assure proper land management. Government expenditures must increase to provide minimum levels of maintenance and security for government-held lands. It is difficult for government officials to decide which lands should be purchased now and which should be left vulnerable to development for acquisition at a later date. Land costs are high and land which is most vulnerable to development is usually the most costly to purchase. Given limited acquisition funds, lands deserving of purchase must compete with one another for acquisition funding.

Regulation of land is difficult. It is generally unpopular. Land regulation must fall within parameters established by state enabling legislation and constitutional guarantees for private property rights which may or may not allow an adequate level of protection. Furthermore, enforcement of government regulations is often times inadequate. Property owners can cause irreparable environmental damage which cannot be rectified through fines or restoration requirements.

Regulation of individual actions such as banning the collection of endangered plants is probably the least effective implementation mechanism. Not only are these laws difficult to enforce, once the violation of the regulation has been committed, such as the killing of a bald eagle, it may be too late for government sanctions to restore the original species.

GOVERNMENT PROGRAMS

Government programs applicable to hazard mitigation and natural resource protection are comprised of three different types: (1) acquisition programs; (2) regulatory programs; and (3) planning programs. There are currently three major State programs for acquisition of regionally significant natural areas. These are Save Our Rivers (water management district funds), Land Acquisition Trust Fund (LATF), and Conservation and Recreation Lands Trust (CARL) Fund.

The regulatory programs strive to protect Florida's natural resources and native species by establishing minimum standards which must be met by a proposed development. These include such programs as the Coastal Zone Protection Act, the Aquatic Preserves Act, Outstanding Florida Waters program (Water Resources and Protection Act), the Wetlands Protection Act, and the Developments of Regional Impact review process which is considered as both a planning and a regulatory program. However, these programs are uncoordinated, single-purpose programs typically designed for the protection of a specific resource.

Planning programs can be differentiated from regulatory programs by their broader perspective. It is through the planning programs that goals and policies for protection of hazard and natural resource areas can be devised and appropriate regulatory programs be selected. Where existing programs are inadequate, new regulatory programs can be proposed. Planning programs include Areas of Critical State Concern, the Local Government Comprehensive Planning Act, and the State Comprehensive Planning Act. A brief overview of these acts and programs, focussing primarily on those sections that are pertinent to this study, completes this chapter.

ACQUISITION PROGRAMS

CARL FUNDS

The 1979 Legislature created the Conservation and Recreation Lands Program and Trust Fund for the selection and acquisition of lands for use and protection as natural floodplain, marsh, or estuary, if the protection and conservation of such lands is necessary to enhance or protect water quality or quantity or to protect fish and wildlife habitat which cannot otherwise be accomplished through local and state regulatory

programs. CARL funds can also be used for acquisition of state parks, recreation areas, public beaches, wilderness areas, or wildlife management areas, the restoration of altered ecosystems to correct environmental damage that has already occurred, and the preservation of significant archaeological or historical sites.

The selection of lands for acquisition is made by the Conservation and Recreation Lands Selection Committee. The Selection Committee has established a priority list of potential land acquisitions. As of July 3, 1984, the list consisted of 45 separate areas with an estimated market value of $217,421,000. The legislature has allocated a significant level of funds to the CARL program, $35 million dollars during the current fiscal year and $40 million dollars during the next fiscal year.

The 1984 CARL list consisted of approximately 173,410 acres, of which 32,494 acres are located in the region. This represents an estimated average cost of $1,254 per acre. However, it should be noted that all but 350 acres of this land is located within Alachua County (Lochloosa Forest and Payne's Prairie) and that the remaining 350 acres (Peacock Slough) has been purchased by the Suwannee River Water Management District. The two Alachua County projects are ranked 24th and 30th on the current CARL program funding priority list.

The CARL program has been extensively used in the region to acquire state lands, most notably Payne's Prairie, River Rise, and San Felasco Hammock State Preserves.

SAVE OUR RIVERS PROGRAM

The Save Our Rivers program is funded by the documentary stamp tax, which allows Florida's water management districts to acquire environmentally sensitive areas. North central Florida is under the jurisdiction of two water management districts, the Suwannee River Water Management District and the St. Johns River Water Management District. The Suwannee River Water Management District is expected to receive approximately $80 million over the next 20 sheet flow connection to salt marsh, freshwater wetlands without direct sheet flow connection to salt marsh, and streams and rivers which empty into the Gulf of Mexico; (2) The Aucilla River, the Suwannee River, and the major tributaries of the Suwannee which constitute a regionally significant natural area independent of the Suwannee's role in providing estuarine waters and as the major source of freshwater flooding; (3) Upland areas with direct impact upon the river system; (4) upland areas with indirect or no impact upon the river system; and 5) the Floridan Aquifer and associated stream-to-sink recharge and percolation recharge areas.

Several identified natural areas are located either adjacent to or in close proximity with one another, thus creating a regionally significant natural area of greater importance than indicated through presentation of

isolated segments. These include the Gum Root Swamp - Newnan's Lake - Payne's Prairie - Lochloosa Forest area; the Okefenokee Swamp (located outside the region) - Pinhook Swamp - Osceola National Forest area; the California Swamp - Lower Suwannee National Wildlife Refuge area; and the O'leno State Park - River Rise State Preserve - Ginnie Springs area.

In total, 49 regionally significant areas were identified, comprising approximately 37 percent of the entire area of the region. In many cases, additional research is needed to define more precise boundaries of significant natural areas based on ecosystems. This is particularly true of state parks and preserves, whose boundaries are based typically upon land ownership patterns and thus do not include entire ecosystems.

Although the list of natural areas is considerable, additional candidates for regionally significant natural area designation may exist. San Pedro Bay, Mallory Swamp, the Fenholloway River, Olustee Creek, stream-to-sink recharge areas, and percolation recharge areas need further study. Further work is also needed on identification of habitats of rare, endangered, or threatened specience that water quality standards will not be violated and that the project is not contrary to the public interest. The Department must consider and balance certain criteria relating to public safety, impacts upon fish and wildlife, water navigation and water flows when determining whether to grant a permit.

The Department is authorized to develop appropriate regulatory provisions governing activities in waters. Such rules may include stricter permitting and enforcement provisions within areas designated Outstanding Florida Waters, aquatic preserves, areas of critical state concern, and areas subject to resource management plans, when plans for an area include waters that are particularly identified as needing additional protection.

The Act does not apply to subdivisions in which 30 percent or more of the lots approved for sale as home sites subsequent to January 1, 1970, have been sold, to any residential development for which a development order pursuant to Section 380.06 F.S. (DRI) has been issued or which is exempt pursuant to Section 498.025(2)(a) and (4)(a), F.S. or to any activity to which a dredge and fill permit has been issued by the Department prior to October 1, 1984. The Act also took permitting authority for dredge and fill and surfacewater management activities pertaining to agriculture and forestry away from the Department and placed it with the five water management districts.

FLORIDA AQUATIC PRESERVES

The Aquatic Preserves Act allows the State of Florida to recognize and set aside for future generations State-owned submerged lands in areas which have exceptional biological, aesthetic, and scenic attributes. The establishment of an aquatic preserve limits the construction of bulkheads, places severe restrictions on dredging, restricts the dredging

of minerals, and limits the erection of structures within the preserve to docks for reasonable ingress and egress, commercial docking facilities, and shore protection structures. In addition, no water or effluents can be discharged into an aquatic preserve which substantially harms the preserve. There are currently 30 aquatic preserves in the State, consisting of inland and coastal waters. None of these are located within the region.

OUTSTANDING FLORIDA WATERS

The Florida Air and Water Pollution Control Act (Section 403.061(10), (25),(28) F.S.) allows the Department of Environmental Regulation to establish rules which provide for a special category of water within the State known as "Outstanding Florida Waters" (OFW). In general, the Department cannot issue permits for direct pollution discharges to OFW's which would lower existing ambient water quality or for indirect discharges which would significantly degrade an Outstanding Florida Water. In addition, permits for new dredging and filling within an OFW must clearly be in the public interest.

Waters under OFW designation include all waters in National Parks, National Wildlife Refuges, State Parks and Preserves, Scenic and Wild Rivers, State Aquatic Preserves, and certain waters within National Forests. Currently, 17 of Florida's 1,700 rivers, one chain of lakes, and waters off the Florida Keys are designated OFW's. Waters within the region designated Outstanding Florida Waters include the Suwannee River, and the Santa Fe River system (Santa Fe River, Lake Santa Fe, Little Lake Santa Fe, Santa Fe Swamp, Olustee Creek and the Ichetucknee River below State Road 27).

DEVELOPMENTS OF REGIONAL IMPACT

The Florida Environmental Land and Water Management Act of 1972 declares the intent of the legislature to protect the natural resources and environment of the State and establishes land and water management policies to guide and coordinate local decisions relating to growth and development.

The Act provides for the Administration Commission to adopt guidelines and standards to determine whether a particular development is presumed to be of regional impact. For development proposals deemed to be of regional impact, a complicated process allows for the identification and resolution of development related issues, including potentially adverse impacts upon regionally significant natural areas and endangered or threatened plant and animal species. Regional planning councils prepare a report and make recommendations on the regional impact of the proposed development. Local governments have the discretionary authority to approve the development as submitted, deny the development, or approve the development subject to conditions designed to mitigate or eliminate adverse impacts.

ENDANGERED AND THREATENED SPECIES

Florida has enacted numerous laws for the protection and preservation of native Florida species and endangered or threatened plant and animal species. Among the more significant acts are the following.

The Endangered and Threatened Species Act of 1977 declares the intent of the State to provide for research and management and to conserve and protect native animal and plant species defined by the Game and Freshwater Fish Commission, the Department of Natural Resources, or the U.S. Department of the Interior as endangered or threatened. The Act provides for public education and the preparation and update of a plan for the management and conservation of said species.

Section 372.26, F.S. requires permits from the Department of Environmental for placing imported fish in any fresh waters of the State, while Section 372.265 F.S. makes it unlawful to release any animal species not indigenous to Florida without a permit from the Game and Freshwater Fish Commission. Permit decisions are based upon any foreseen detrimental impacts that may be caused to the ecology of the State by the release of non-indigenous species.

Current State statutes make it unlawful to kill alligators (Section 372.663, F.S.), the Florida panther (Section 372.671, F.S.), to contaminate waters of the State to the degree to cause fish kills (Section 372.85, F.S.), the personal possession of certain classes of wildlife without a permit (Section 372.922, F.S.), engage in organized poisonous reptile hunts without a permit (Section 379.912, F.S.), or harm or disturb a manatee (Section 370.12(c),(d), F.S.).

Endangered plants are protected by Section 581.185, F.S. makes it a Class I misdemeanor to willfully destroy or collect endangered or threatened plants on public land without first obtaining a State permit, or on private land without permission of the property owner. A State permit is also required when taking three or more endangered plants from private lands.

DEPARTMENT OF HEALTH AND REHABILITATIVE SERVICES STANDARDS FOR ON-SITE SEWAGE DISPOSAL SYSTEMS

Section 10D-6, Florida Administrative Code sets minimum statewide standards for the construction and location of septic tanks. The regulations include minimum allowable lot sizes for use with septic systems. Under these rules, "Sewage waste and effluent from individual on-site sewage disposal systems shall not be discharged into the ground surface or into ditches, drainage systems, surfacewaters, or aquifers."

In conjunction with the construction standards, these regulations require minimum lot widths of 100 ft. and, where community water systems are not available, lot sizes of at least one-half acre. Lots utilizing a community water system may develop at a density of four lots per acre. In addition, no system can be placed laterally within 75 feet of the mean high water line of tidal water bodies or within 75 feet of the ordinary high water line of lakes, streams, canals or other non-tidal surfacewaters. Nor can a septic system be placed within the 10-year flood elevation. The regulations further require that the water table elevation at the wettest season of the year is at least 24 inches below the bottom surface of the drainfield trench or absorption bed.

SURFACEWATER MANAGEMENT RULES AND WORKS OF THE DISTRICT

The Suwannee River Water Management District has recently adopted surfacewater management rules which include special standards for those areas declared "Works of the District". Designated areas essentially include the floodways of the Suwannee, Santa Fe, Alapaha, Withlacoochee, and Aucilla Rivers. In addition, the surfacewater management rules provide special standards for surfacewater runoff in stream-to-sink recharge areas as well as areas having direct sheet flow connection to the Gulf coastal marsh. While these rules do not dictate land use or land use intensities, they do provide for a 75 foot streamside setback from the water's edge of all streams and rivers located within Works of the District. The rules prevent construction and vegetation clearance within the streamside setback area, including mounded septic tanks.

For areas located outside of Works of the District, the rules essentially require all structures except a single-family residence of less than 10,000 square feet to obtain a surfacewater management permit.

THE COASTAL ZONE ACT OF 1985

The State of Florida has had some measure of control of coastal development for the past twenty years provided by the Beach and Shore Preservation Act of 1965. Since then, the State has become more restrictive with each new law affecting the coastal area. The growth management legislation passed during the 1985 Legislative session continues this trend by significantly increasing the requirements for development in the coastal area.

In amending Section 161.53, F.S., the Act essentially provides strong recognition of the importance of coastal areas as "...the first line of defense against both winter storms and hurricanes..." and that "...these coastal areas...should be preserved and enhanced." The legislation states that the most sensitive portion of the coastal area "shall be managed through the imposition of strict construction standards in order to minimize damage to the natural environment, private property, and life...".

The coastal building zone along Dixie and Taylor county coastline is an area from mean high-water to a line 3,000 feet inland. Major structures within this area, except mobile homes, must be designed and constructed to withstand a wind velocity of no less than 140 miles per hour. All major structures, including mobile homes, are required to be elevated above the design breaking wave crests or wave uprush as superimposed on the storm surge of a 100-year storm.

The legislation does not set additional minimum wind load standards for minor structures, such as signs, however. Instead, such structures will continue to comply with Southern Standard Building Code minimum wind load requirements. Along the coast of Dixie and Taylor Counties, the minimum wind load is 110 miles per hour. Inadequate funding levels prevent the surveying of the mean high water line by the Department of Natural Resources. Therefore, the Department will use the velocity zone established by the Federal Emergency Management Administration (FEMA) for the flood insurance program on an interim basis as the coastal building zone until proper funding is provided.

PLANNING PROGRAMS

AREAS OF CRITICAL STATE CONCERN

Areas eligible for designation as an Area of Critical State Concern include lands or waters having significant impact on environmental or natural resources of regional or statewide importance, including state/federal parks forests, wildlife preserves, wildlife refuges, major rivers and estuaries, Outstanding Florida Waters, and aquifer recharge areas for which the development thereof would cause substantial deterioration of such resources.

Designated areas are subject to locally developed regulations which comply with state-developed standards. Such state-developed standards are developed specific for each designated area and are based upon a careful study of the characteristics, problems, and needs of the area.

The State Legislature can designate specific geographic areas of state concern and establish the principles for guiding the development of the area. State and regional agencies are required to coordinate their plans and to conduct their programs and regulatory activities consistent with the state-adopted principles for guiding development.

Designation is limited to no more than five percent of the area of the State. Current "Areas of Critical of State Concern" include the Everglades, the Florida Keys, and the Green Swamp. The 100-year floodplain of the Suwannee River was recently considered but not recommended for designation by a resource management committee appointed by the Governor. However, this effort resulted in a management plan which is presently being implemented by State regulatory agencies and by units of local government abutting the river.

LOCAL GOVERNMENT COMPREHENSIVE PLANNING

The Local Government Comprehensive Planning Act requires all units of general purpose local government to prepare a comprehensive plan for their jurisdiction which must include a future land use map that designates areas for future residential, commercial, industry, agriculture, recreation, conservation, education, public buildings and grounds, and other categories of land use.

A conservation element is also required which provides for the conservation, use, and protection of natural resources in the area, including air, water, water recharge areas, wetlands, water wells, estuarine marshes, soils, beaches, shores, floodplains, rivers, bays, lakes, harbors, forests, fisheries and wildlife, marine habitat, minerals, and other natural and environmental resources.

In addition, coastal cities and counties are required to develop a coastal zone protection element which includes policies to guide a local government's decisions and program implementation with respect to the maintenance, restoration, and enhancement of the overall quality of the coastal zone environment. The element must address a number of subject areas including the protection of coastal resources, the orderly development and use of ports and the issue of public expenditures which may have the effect of subsidizing development in high-hazard areas.

Amended in 1985, this Act now requires the development and adoption of land development regulations such as zoning ordinances and subdivision regulations which are designed to implement the adopted comprehensive plan.

THE STATE COMPREHENSIVE PLANNING ACT OF 1972

This Act, as amended by the 1984 Legislature, requires the preparation of a state comprehensive plan for the "...long range policy guidance for the orderly social, economic, and physical growth of the state. " (Section 187.01 (1), F.S.). The plan, which was subsequently adopted by the 1985 Legislature, contains goals which, along with many other topics, deal with the protection of the State's water resources, natural systems, coastal resources, land development and use, and property rights. Each State agency must prepare a state agency functional plan which will guide its programs and functions consistent with the State Comprehensive Plan. These plans must be completed by May, 1986.

The Act also calls for the development of "Comprehensive Regional Policy Plans" (CRPP) consistent with the adopted State Comprehensive Plan. The regional plans are to contain goals, policies, and standards which accurately reflect and implement the goals and policies of the State plan. On adoption, the comprehensive regional policy plans will

provide the basis for regional review of developments of regional impact, local government comprehensive plans, federally-assisted projects, and other regional overview and comment functions. Comprehensive regional policy plans for the eleven planning councils must be completed by December, 1986.

V

RECOMMENDED MANAGEMENT PROGRAM

INTRODUCTION

As can be seen from the programs described in Chapter IV, much legislation has been enacted by the State to provide for legislation has been enacted by the State to provide for the protection of hurricane surge areas, floodprone areas, water quality, and significant natural areas. However, these programs have been created over a number of years, usually to address a specific issue. Thus, these programs are often isolated from one another in their application to a specific area. The purpose of this chapter is to describe a coordinated hazard mitigation and natural area protection management program.

The recommended program establishes a desired outcome for each of the previously identified regionally significant areas and suggests a number of independent programs which, when taken together, should be successful in resource protection and hazard mitigation. These programs include public acquisition, the imposition of optional State regulatory programs, and the use of local regulatory powers. It is the intent of the recommended management program to provide guidance to the proper management and use of these areas for inclusion in State, regional and local plans and programs. The management program consists of two major parts: (1) overall program thrusts; and (2) overlay designations.

PROGRAM THRUSTS

Four broad classifications, or program thrusts, are developed for application to the previously identified regionally significant natural areas. These are Preservation-Conservation, Preservation-Recreation, Economic Production-Rural, and Urban.

PRESERVATION-CONSERVATION

The preservation-conservation program thrust has as its objective the maintenance of designated natural areas in a relatively undisturbed state. Thus, this program thrust places emphasis on the public acquisition of especially critical natural areas, along with the strict regulation of privately-held lands.

For example, public acquisition programs such as the Save Our Rivers program would be widely used to purchase certain critical areas which would then be managed to ensure their preservation while a combination of State, regional and local regulatory programs would be used to ensure the protection of the remaining area under this designation. Appropriate State and regional programs would be the Outstanding Florida Waters program administered by the Department of Environmental Regulation, the Works of the District program administered by the Suwannee River Water Management District and/or the Developments of Regional Impact program administered by the Council which could establish lower "thresholds" for areas so designated. Local governments could address issues regarding the use and management of these areas through their comprehensive plans and regulations.

PRESERVATION-RECREATION

The preservation-recreation program thrust has as its objective the provision and maintenance of resource-based recreation values. Similar to the preservation-conservation program, this program thrust would utilize public acquisition programs such as the Land Acquisition Trust Fund or the Save Our Rivers program to purchase regionally-significant natural areas for recreational use--open to the general public. In addition, State, regional and local regulatory programs such as the ones discussed above would be used to protect the natural recreational and aesthetic values of privately-held areas adjacent to lakes and river corridors and to designate the types of recreational uses that may be most appropriate for the adjoining water bodies.

An example of the application of the Preservation-Recreation Program Thrust would be along Segment III of the Suwannee River. Here, residential development would be permitted but lot sizes would be large enough and riverfront setbacks of sufficient depth to maintain undeveloped character of the river. The wildlife corridor overlay would be extensively used by the public as a hiking and horseback riding trail. Motorboats would be permitted extensive use of the river corridor in conjunction with canoes and speed limits sufficient to prevent riverbank erosion.

ECONOMIC DEVELOPMENT-RURAL

The economic production-rural program thrust has as its objective the retention of regionally significant areas in rural uses such as agriculture and forestry operations. For areas designated economic production-rural, rural production values would take precedence over residential and urban land uses. Several of the State, regional and local regulatory programs such as the ones described above would be appropriate for application to these areas.

Public acquisition is limited to specific springs or other small-scale, unique features. Wildlife corridor overlays are possible within this program thrust but are subordinate to economic production values. For example, within an agricultural area, the wildlife corridor may also be used by grazing cattle or may be altered from its actual course to reflect crop plantings and property lines.

An example of an Economic Production-Rural Program Thrust is the secondary wetlands of California Swamp. This area is under extensive timber harvesting and has been for many years. Most of the timber is on a 20-year rotation cycle employing clear-cut harvesting techniques.

Silviculture Best Management Practices are employed. The land is regularly burned and fertilized using aerial application techniques to promote tree growth. Such applications could cause problems adjacent to residential subdivisions. In order to promote economical timber harvesting and management, aerial application techniques would be allowed to continue and residential development would be prohibited within such areas. A buffer area of adequate depth may be appropriate around the designated area in order to insure the continued use of appropriate economic production techniques.

URBAN

The urban designation is applied to existing and proposed urban areas located within or adjacent to regionally significant natural areas. Once identified, the objective is to determine which areas can receive further growth without causing significant adverse impacts to the resource and what special precautions should be taken to ensure its protection as development occurs. Table 25 presents existing urban areas classified by size and function located within or immediately adjacent to regionally significant areas. Urban places within the region range from settlements (Class 1) with populations of less than 100 persons, e.g., town of Suwannee, to a regional metropolis (Class 6) with a population exceeding 60,000 persons, e.g., Gainesville.

TABLE 25

URBAN AREAS LOCATED WITHIN OR ADJACENT TO
REGIONALLY SIGNIFICANT NATURAL AREAS BY
ECOLOGICAL ZONE, INCLUDING URBAN AREA CLASSIFICATION

URBAN AREAS BY ECOLOGICAL ZONE	URBAN AREA CLASS
Coastal Drainage Basin	
Athens	1
Cedar Island	1
Cross City	4
Dekle Beach	1
Hampton Springs	1
Horseshoe Beach	2
Jena	1
Jonesboro	1
Keaton Beach	1
Old Town	1
Perry	5
Salem	1
Spring Warrior Camp	1
Steinhatchee	1
Steward City	1
Tennille	1
Town of Suwannee	1
Suwannee River System	
Branford	3
Dowling Park	1
Ellaville	1
Fanning Springs	2
Grady	1
Luraville	1
Rock Bluff Ferry	1
Wannee	1
White Springs	3
Uplands with Direct Impact on River System	
Brooker	2
Chancey	1
Dixie Town	1
Fletcher	1
Graham	1
Hampton	2
Hatchbend	1

TABLE 25, CONTINUED

URBAN AREAS BY ECOLOGICAL ZONE	URBAN AREA CLASS
Jennings	3
Louise	1
Mayo Junction	1
Old Town	1
Santa Fe	1
Wilcox Junction	1
Uplands with Indirect/No Impact on River System	
Cross Creek	1
Earleton	1
Gainesville	6
Greenville	3
Hawthorne	3
Island Grove	1
Lake City	5
Lochloosa	1
Melrose	1
Micanopy	3
Rochelle	1
Waldo	3
Groundwater Recharge Areas	
Alachua	4
Baker's Mill	1
Columbia City	1
Hillcoat	1
Jasper	4
Lee	2
Myrtis	1
Northwood	1
Wellborn	1
Williford	1

OVERLAY DESIGNATIONS

In addition to program thrusts, the recommended management program uses a number of programs independent of program thrust designation, referred to hereafter as overlay designations. Overlay designations are designed for an underlying resource which is so special that regardless of the program thrust designation, special consideration must be given to the protection of the affected resource.

Overlay designations are divided into four types: (1) Flora and Fauna Protection; (2) Resource-based Recreation; (3) Hazard Protection; and (4) Water Quality Protection. Flora and fauna overlays include wildlife islands, wildlife breeding areas, wildlife nesting sites, aquatic preserves, unique habitats, manatee preserves, and wildlife corridors. Resource-based recreation overlays include hiking/horseback riding trails, canoe trails, and motorboat corridors. Hazard protection overlays include the hurricane surge area, floodplain corridors and floodprone areas. Water quality protection overlays include stream-to-sink recharge areas, high indirect recharge areas, Works of the District, and Outstanding Florida Waters.

As noted in Table 26, overlay designations can overlap each other and cross areas with differing program thrust designations. However, standards and implementation methods may vary by program thrust designation. There are a few overlay programs which are applicable only to specific program thrust designations. The majority of overlays are applicable to all program thrusts.

TABLE 26

OVERLAY ELEMENTS BY PROGRAM THRUST

CORRIDOR OVERLAY	PROGRAM THRUSTa C	R	E	U
Flora and Fauna Overlays				
1. Wildlife Island, including	X			
Wildlife Breeding Areas and	X	X	X	
Wildlife Nesting Sites	X	X	X	X
2. Wildlife Corridor	X	X	X	X
3. Aquatic Preserve Designation	X	X	X	X
4. Manatee Preserve Designation	X			
5. Unique Habitat Overlay	X	X	X	X
Resource-based Recreation				
1. Hiking/Horseback Riding Trail	X	X	X	X
2. Canoe Trail	X			
3. Motorboat Corridor		X	X	X

TABLE 26, CONTINUED

CORRIDOR OVERLAY	PROGRAM THRUSTa C	R	E	U
Hazard Protection Overlays				
1. Hurricane Surge Area	X	X	X	X
2. Floodplain Corridors and Floodprone areas	X	X	X	X
Water Quality Protection Overlays				
1. Stream-to-sink Recharge Areas	X	X	X	X
2. High Indirect Recharge Areas	X	X	X	X
3. OFW Designation	X	X	X	X
4. Sink/Spring Overlay	X	X	X	X
5. Works of the District	X	X	X	X

aWhere C represents Conservation; R - Recreation; E - Economic Production-Rural; and U - Urban.

OVERLAY ELEMENT DESCRIPTIONS

FLORA AND FAUNA OVERLAYS

WILDLIFE ISLAND, BREADING AND NESTING SITES OVERLAY

Flora and fauna overlays consist of wildlife islands, wildlife corridors, aquatic preserves, manatee sanctuaries, and unique habitats. Furthermore, wildlife island designations consist of three different scales: (1) wildlife islands; (2) wildlife breeding areas; and (4) wildlife nesting sites. A wildlife island should be large enough to support a threshold level population of a particular species. Therefore, wildlife islands tend to be quite large, involving several thousand acres of land. Wildlife breeding areas tend to be much smaller ranging between 50 and 200 acres in size and are typically used by migratory and resident bird populations. Nesting sites represent individual nests of birds, reptiles, or other animals. Such areas generally represent only one or two nesting pairs and may be found within any program thrust.

WILDLIFE CORRIDOR OVERLAY

Wildlife corridors connect wildlife islands together. They allow animals to migrate from one wildlife island to another to reduce in-breeding and provide evacuation routes during stressful environmental events such as fires and hurricanes. Most wildlife corridors follow

One proposal currently under review is the establishment of a statewide corridor system for movement of Florida panthers from north to south Florida. This proposal also calls for linking the Gulf coastal marsh with the Osceola National Forest-Pinhook Swamp area using wildlife corridors.

AQUATIC PRESERVE OVERLAY

The Aquatic Preserve Overlay sets aside for future generations state-owned submerged lands in areas which have exceptional biological, aesthetic, and scenic attributes. The establishment of a State aquatic preserve limits the construction of bulkheads, places severe restrictions on dredging, restricts the dredging of minerals, limits the erection of structures within the preserve to docks for reasonable ingress and egress, commercial docking facilities, and shore protection structures. In addition, no water or effluents can be discharged into an aquatic preserve which substantially harms the preserve. Currently, the Dixie and Taylor county coastal marsh are the only aquatic preserves in the region.

MANATEE PRESERVE OVERLAY

The Manatee Preserve Overlay is intended to preserve Florida's "outstanding marine mammal". The Overlay Designation essentially calls for the enactment of a state manatee preserve under the State's Manatee Preserve Act. Designation may impose limits on dredging activities, motorboat speed limits, and general river use, particularly during the spring Manatee migration.

UNIQUE HABITAT OVERLAY

Unique habitat designation is meant to apply primarily to areas containing endangered, threatened or rare plant species. Once identified, special care should be given to these areas to prevent the loss of the habitat. In urban areas, a specialist should be brought in to design development proposals compatible with such plant species.

RESOURCE-BASED RECREATION OVERLAYS

HIKING/HORSEBACK RIDING OVERLAY

This corridor is very similar to a wildlife corridor and in some instances the two may be coterminous. When overlapping, hiking trails should be kept as distant as possible from the center of the wildlife corridor to reduce disturbance and human intrusion. For example, in the case of the Suwannee River, the trail should only approach the river's

edge at areas offering interesting views or containing unique river features. Buffer areas should be established in conservation and recreation areas to minimize the negative impacts of residential land use and other activities upon hikers. When overlapping wildlife corridors, usage of the trail should be kept down to levels which will not substantially disrupt the wildlife corridor function.

Camping areas should be kept small in size. In preservation-conservation areas, camping areas should be limited to off-road access while in preservation-recreation areas, car campers should be permitted along the trail and bicyclists should be allowed to use the trail. Camping areas should be prohibited in urban areas. In economic production-rural areas, hiking trail campgrounds should generally be limited to hikers and horseback campers. In urban areas, the trail system might be incorporated into urban parks and along scenic highways.

CANOE TRAIL OVERLAY

Canoe trails are meant to provide a quality wilderness experience similar to a hiking/horseback riding trail and could correlate well with wilderness corridors, hiking trails, and floodprone areas. For example, canoe trails could share campgrounds with the hiking trails. In order to provide a quality outdoor experience for canoe trails, it is important that special regulations be adopted along the stream banks of canoe trails for minimum setbacks and special design review of development proposals to insure all proposed development is harmonious with the wilderness quality of the canoe trail.

MOTORBOAT OVERLAY

Motorboat corridors should allow for mixed use of motorboats, canoes, and other watercraft. Speed limits and special regulations may be necessary in order to minimize shoreline erosion. A certain amount of limited boat dock access should be available to allow river access to State parks, urban areas, and other selected features. In addition, during certain times of the year it may be necessary to limit motorboat activity, such as during manatee migration periods and sturgeon spawning runs.

HAZARD PROTECTION OVERLAYS

HURRICANE SURGE AREA OVERLAY

This overlay zone applies only to the coastal areas of Dixie and Taylor Counties. The primary thrust of this overlay designation is to minimize damage to human life and property caused by hurricanes. As noted in Chapter IV, coastal jurisdictions must address this problem in their comprehensive plans including the issue of public infrastructure

investments which may have effect of subsidizing development in hazardous areas.

FLOODPLAIN CORRIDOR AND FLOODPRONE AREA OVERLAY

This overlay designation applies only to the regional river systems and is limited to the 100-year floodplain. The primary intent of the overlay designation is to minimize damage to human life and property caused by river flooding. Continued application of the local government floodplain ordinances and Works of the District setback requirements are appropriate to this designation.

WATER QUALITY PROTECTION OVERLAYS

STREAM-TO-SINK RECHARGE AREA OVERLAY

This overlay is intended to provide adequate treatment of groundwater runoff reaching sinks with direct recharge to the Floridan Aquifer. Currently, the surfacewater management rules of the Suwannee River Water Management District have identified such recharge areas and produced surfacewater runoff regulations for development within such areas. These regulations minimize surfacewater discharge to sinks. Additional regulations could include a development setback of sufficient distance from the sink to allow proper treatment of surfacewater runoff.

HIGH INDIRECT RECHARGE AREA OVERLAY

The protection of the Floridan Aquifer as the primary source of potable water for the urban areas of the region is anticipated to require special land management techniques within areas subject to large volumes of indirect (percolation) groundwater recharge. Such regulations may limit the use of certain pesticides, herbicides, and fertilizers. Additionally, such areas are likely to require special consideration for hazardous waste and toxic chemical contamination considerations.

OFW DESIGNATION OVERLAY

The OFW Overlay designation is an extension of the Florida Air and Water Pollution Control Act (section 403.061 (10), (25),(28) F.S.) which allows the Department of Environmental Regulation to establish rules which provide for a special category of water within the state known as "Outstanding Florida Waters."

Waters under the State Outstanding Florida Waters Act include all waters in National Parks, National Wildlife Refuges, State Parks and Preserves, Scenic and Wild Rivers, State Aquatic Preserves, and certain waters

within National Forests. Special Water OFW's within the region include the Suwannee River, and the Santa Fe River system (Santa Fe River, Lake Santa Fe, Little Lake Santa Fe, Santa Fe Swamp, Olustee Creek and the Ichetucknee River below State Road 27).

OFW designation freezes current water quality levels and prevent further water quality degradation regardless of DER Water Quality Classification. Designation does not include incorporated or unincorporated municipalities or the area 500 ft. off-shore of any incorporated or unincorporated municipality. When an individual submits a DER application, it is reviewed under a tougher standard than would otherwise apply. OFW designation only has an impact if a proposed project is in the DER permitting system. Septic tanks and building permits are not included. Silvicultural activities are also exempted. In practice, OFW status affects dredge & fill activities, sewage disposal plants, and industrial waste disposal. In addition, residential developments of 40 acres or more must meet certain water detention and retention requirements. Under OFW designation, a residential development must meet existing surfacewater management requirements plus 50 percent more. For example, if a development project is required by surfacewater management rules to retain the first 1/2 inch of stormwater, the same development would have to retain the first 3/4 inch of stormwater under an OFW classification.

SINK/SPRING OVERLAY

The Sink/spring overlay is similar to the spring to sink recharge overlay with additional provisions for the protection spring sloughs. The Overlay is more localized and applies only to areas within close proximity to major sinks and first, second, and third magnitude springs.

WORKS OF THE DISTRICT OVERLAY

The Works of the District Overlay is an extension of surfacewater management rules developed by the water management districts. The SRWMD and SJRWMD have rules for surfacewater management within the water management district as well as works of the district rules for those areas declared works of the district by the respective water management districts. Works of the District currently include the floodways of the Suwannee, Santa Fe, Alapaha, Withlacoochee, and Aucilla rivers. While these rules do not dictate land use or land use intensities, they do provide for a 75 foot streamside setback from the river's edge of all streams and rivers located within works of the district. The rules prevent construction and vegetation clearance within the streamside setback area, including mounded septic tanks.

PROGRAM THRUST DESIGNATION BY ECOLOGICAL ZONE

This section applies the management program developed in this chapter to the previously identified regional significant areas. Table 27 presents a summary of the recommended management program for all of the areas grouped by ecological zone. The recommendations consist of program thrust designation, public acquisition policy, and applicable overlay zones. It is important to note that the wildlife island overlays (islands, breeding areas, and nesting sites) are hierarchical. The actual designation presented in the table represents the highest level of wildlife island recommended for each regionally significant area. Thus, an area designated as a wildlife island will also include both breeding area and nesting site overlays.

COASTAL DRAINAGE BASIN

The primary program thrust recommended for the coastal drainage basin is preservation-conservation due in part to the sensitivity of the coastal ecology (which is critical to the health of the Gulf fishing industry) and in part to hurricane hazards. Virtually the entire coastline, except for a few scattered areas designated for urban development, is included in the recommended designation. The second-largest areal designation within the coastal drainage basin is economic production-rural. This designation acknowledges the vast acreage of existing commercial forestry and agricultural operations occurring within the coastal drainage basin.

In addition to the primary program thrusts, the hurricane surge overlay designation is recommended for the entire coastline of Dixie and Taylor counties, while the unique habitat overlay is recommended for the coastal marsh and estuaries. The Outstanding Florida Waters designation is recommended for the Gulf coastal waters, the coastal marsh, the Econfina, Steinhatchee and Aucilla Rivers, and regionally significant freshwater wetlands located westward of U.S. Highway 19. Finally, public acquisition is recommended for the core of California Swamp as well as the Aucilla, Econfina, and Steinhatchee River corridors.

SUWANNEE RIVER SYSTEM

The following program thrusts are recommended for the five segments of the Suwannee River and its major tributaries; the Alapaha, Ichetucknee, Santa Fe, and Withlacoochee rivers. Segment I of the Suwannee is recommended for preservation-conservation; Segment II is designated for preservation-conservation; Segment III, preservation-recreation; Segment IV, preservation-recreation; and Segment V, preservation-conservation. Only Segment V of The Suwannee is recommended for acquisition. However, within each segment of the Suwannee as well as its tributaries are several features which require special consideration in their treatment.

These smaller areas consist of significant natural areas, urban areas, sinks and springs. Regardless of program thrust, two overlay designations are applied along the entire Suwannee River system. These are the floodplain and wildlife corridor overlays.

The intent of the recommended program thrusts for the Suwannee River system is to limit land uses primarily to recreational, agricultural, and silvicultural along the length of river system and to cluster urban development within designated points along the rivers. Urban clusters would support a greater intensity of development, allowing smaller lot sizes than permitted elsewhere along the rivers.

As shown on Table 27,a number of different overlays are recommended for various segments of the river system, for example, hiking/horseback and canoe trails are recommended for Segments I and II, while the manatee preserve overlay is recommended for Segment V which includes the mouth of the Suwannee River.

UPLANDS WITH DIRECT IMPACTS ON RIVER SYSTEM

The primary program thrusts recommended for these regionally significant areas are preservation-conservation and preservation-recreation. Generally, areas which are currently used for recreational purposes are classified for future use as recreational while undeveloped areas are classified as conservation. This ecological zone includes some of the most extensive proposed land acquisitions. Only Ginnie Spring and Blue Spring are recommended to remain in private ownership.

Regionally significant natural areas within this ecological zone are almost inseparable from the rivers themselves. Most of these areas are located within the 100-year floodplain. Identified areas include many floodprone lands directly adjacent to the river system. These natural areas are generally smaller than other identified regionally significant areas; however, they represent the best remaining natural areas on or adjacent to the river system. Many of these areas are presently experiencing significant development pressure.

UPLANDS WITH INDIRECT OR NO IMPACT ON RIVER SYSTEM

The primary recommended program thrust is preservation-conservation, with the exceptions of the proposed Lochloosa Forest and Osceola National Forest which are designated as preservation-recreational, and Wacassassa Flats which is designated economic production-rural.

These lands are primarily large areas of upland wetlands and forests, much of which is already in public ownership. Some of the land, particularly in Alachua County, is experiencing significant development pressure while other areas, due to wetness, are experiencing virtually no development pressure and are not anticipated to experience significant pressure through the year 2010.

One of the primary goals for upland areas, particularly Pinhook Swamp and the Osceola National Forest, is preservation of existing natural systems due in part to the possibility that an experimental panther preserve may be established linking the Okefenokee National Wildlife Refuge in southern Georgia to the Osceola National Forest.

GROUNDWATER RECHARGE AREAS

Less is known about groundwater recharge areas in the Region than any other natural resource. The Suwannee River Water Management District has identified stream-to-sink recharge areas but has yet to accurately identify areas of high indirect recharge. Nevertheless, the identified stream-to-sink recharge areas represent a significant land area which require special care due to their direct hydrologic connection to the Floridan Aquifer. Generally, the land use and intensity of use is not so much a concern as is the method of surfacewater management. Recently enacted surfacewater management rules are expected to provide an adequate level of protection to protect the underground aquifers within identified recharge areas.

Areas with high indirect recharge rates may require different forms of land management. In such areas, the use of certain pesticides, herbicides, and fertilizers may need to be restricted in order to protect the drinking water supply from contamination. Due to the many contaminants created by an urban environment, intensive development should be directed away from these areas. The Suwannee River Water Management District is attempting to identify such areas and their associated rates of recharge. Once the areas have been identified and recharge rates established, local governments as well as the District should be prepared to develop and implement appropriate regulations for groundwater protection.

Currently, all but the Alachua County Recharge Area is recommended for the economic production-rural classification. Classification of these areas is especially difficult, since with proper surfacewater management, a wide variety of land uses could be supported within the stream-to-sink recharge areas. The current program thrust designation is a reflection of both current and projected land use and economic activities within these areas.

TABLE 27 RECOMMENDED MANAGEMENT PROGRAM FOR AREAS BY ECOLOGICAL ZONE

	Program	Acquis	Flora & Fauna Protection							Recreation			Hazard		Water Quality			
	Thrust	Policy	W Isl	W Breed	W Nest	W Corr	Habitat	H2O	Manatee	Trail	Canoe	Boat	H S Area	F P	S-Sink	Ground	OFW	W of D
Coastal Drainage Basin																		
1. Aucilla River Corridor	C	A				X					X			X			X	X
2. Aucilla River Estuary	C	R					X	X					X				X	X
3. California Swamp, Core	C	A	X				X						X				X	
4. California Swamp, Remainder	E	R											X					
5. Econfina River Corridor	C	A				X					X			X			X	
6. Econfina River Estuary	C	R	X				X	X					X				X	
7. Freshwater Wetlands	E																	
west of U.S. 19																		
a. Direct Sheet Flow to Gulf	C	R											X				X	
b. Indirect Sheet Flow to Gulf	E	R															X	
8. Gulf Coastal Marsh	E	R	X				X	X					X				X	
9. Gulf Coastal Waters							X	X									X	
10. Lwr Suwannee Nat Wildlife Ref	C	P	X				X	X					X				X	
11. St Marks Nat W Refuge	C	A					X	X					X				X	
12. Spring Warrior Creek Corridor	C	R				X								X			X	
13. Spring Warrior Creek Estuary	C	R	X				X	X					X				X	
14. Spring Warrior Swamp	C	R	X														X	
15. Steinhatchee River Corridor	C	A				X					X			X			X	
16. Steinhatchee River Estuary	C	R	X				X	X					X				X	
17. Suwannee River, Segment V																		
(see Suwannee River System)																		
18. Tide Swamp	E	R	X										X				X	
Suwannee River System																		
19. Alapaha River	C	R				X					X			X				X
20. Ichetucknee River	R	R				X					X			X				
21. Santa Fe River	R	R				X						X		X			X	X
22. Suwannee River, Segment I	C	R				X					X			X			X	X
23. Suwannee River, Segment II	C	R				X				X	X			X			X	X
24. Suwannee River, Segment III	R	R				X				X		X		X			X	X
25. Suwannee River, Segment IV	R	R				X						X		X			X	X
26. Suwannee River, Segment V	C	A				X		X	X			X		X			X	X
27. Withlacoochee River	C	R				X					X			X				X

TABLE 27, CONTINUED

	Program Thrust	Acquis Policy	Flora & Fauna Protection: W Isl	W Breed	W Nest	W Corr	Habitat	H2O	Manatee	Trail	Canoe	Canoe	Boat	Hazard: H S Area	F P	Water Quality: S-Sink	Ground	OFW	W of
Uplands With Direct Impact on River System																			
28. Aucilla River Sinks	C	A			X		X			X					X	X			X
29. Blue Spring	R	R			X										X	X			X
30. Brown Tract	C	P		X			X			X					X				X
31. Carey Forest	C	R		X															
32. Ginnie Springs	R	R			X										X	X			X
33. Holton Creek	C	A		X			X			X					X				X
34. Ichetucknee Springs State Park	R	P			X										X				
35. O'leno State Park & River Rise State Preserve	C	P		X											X				X
36. Peacock Slough	R	A			X		X								X	X			
37. Remaining Lands Comprising Ecosystem of:																			
a. Ichetucknee St. Park	R	A			X										X				
b. Suwannee River State Park	R	A			X										X				X
c. O'lenor-River Rise St Pre	C	A		X											X				X
38. Santa Fe Headwaters Swamp	C	P	X				X								X				X
39. Suwannee River State Park	R	P		X						X					X				X
40. Suwannee-Santa Fe Confluence	C	A		X			X								X				X
41. Wannee Natural Area	C	A		X			X								X				X
Uplands with Indirect/No Impact on River System																			
42. Bee Haven Bay	C	R	X																
43. Big Gum Swamp Nat Wilderness	C	P	X				X												
44. Brooks Sink	C	A			X		X									X			
45. Devil's H'hopper St Geo Site	C	P			X											X			
46. Gum Root Swamp	C	R		X			X												
47. Hixtown Swamp	X	R	X							X									
48. Lochloosa Wildlife Mgmt Area	C	A	X																
49. Osceola Nat Forest	R	P	X							X									
50. Payne's Prairie State Preserve	C	P	X				X									X			
51. Pinhook Swamp-Sandlin Bay-Impassable Bay	X	R	X																
52. Remaining Lands Comprising Ecosystem of:																			
a. S Felasco Hammock St Preserve	C	A	X																
b. Payne's Prairie St Preserve	C	A	X																
53. S Felasco Hammock St Preserve	C	P	X																
54. Wacassassa Flats	X	R		X												X			
Groundwater Recharge Areas																			
55. Alachua Co Recharge	U	R			X											X			
56. Columbia Co Southern Recharge	X	R			X											X			
57. Columbia Co Western Recharge	X	R			X											X			
58. Hamilton Co Recharge	X	R			X											X			
59. Madison Co Recharge	X	R			X											X			
60. Suwannee Co Recharge	X	R			X											X			

VI

ECONOMIC IMPACT OF THE PROPOSED ACQUISITION POLICY

All or portions of 23 regionally significant natural areas are recommended for purchase. Areas recommended for public acquisition are located in 9 of the 11 north central Florida counties. It is the intent of this section to determine fiscal impacts upon county governments and school districts from the withdrawal of these lands from the local tax base. No proposed acquisition is located within city limits or metropolitan service taxing units. All other local taxing jurisdictions, except for the Suwannee River Water Management District, are unaffected. It should be noted that the following analysis is only an indicator of the relative impacts the management plan's proposed acquisition policy upon county government and school district revenues.

The fiscal impact analysis presented in this report is a worst case scenario. The worst case is considered to be the acquisition policy which would produce the most severe financial burden possible on local governments by removing all recommended lands from the tax roles in one year (1986).

METHODOLOGY

Taxable value figures are gathered from the 1985 and, to a limited extent, 1984 tax roles for sections recommended for public acquisition. These figures were then compared to county total taxable values. Total taxable value figures presented for each natural area reflect real property values only. They do not include personal property or centrally assessed property as it is assumed that these taxable values would be unaffected by the acquisition program. An analysis of property tax records for areas proposed for purchase did not reveal significant amounts of taxable personal property and their omission should not substantially affect estimates of loss.

The fiscal impact analysis is limited to operating revenues. However, it should be noted that Alachua and Bradford county governments have separate county tax assessments for bonded indebtedness. In addition, Alachua, Bradford, and Suwannee counties have separate tax assessments for school district bonded indebtedness. Required funds for meeting bond obligations represents a fixed amount of money every year. Therefore, the actual rate charged for these funds may vary from year to year depending upon countywide taxable values. It is anticipated that the fiscal impacts on these funds would be very slight and is not considered in the following analysis.

As noted above, the values are obtained for sections which include the areas proposed for acquisition. Actual acquisitions, particularly along river corridors, are unlikely to conform to section line boundaries. It is therefore estimated that the lost tax base presented in this report may be overstated by as much as 20 percent. Furthermore, significant tax breaks for green belt and homestead exemptions exist which are not reflected in taxable value figures.

EVALUATION RESULTS

Table 28 depicts the impact of lost tax revenues upon affected county governments and school districts. The lost tax base as a percentage of total county taxable value ranges from a high of 3.71 percent in Dixie County to a low of 0.11 percent in Bradford County. Using 1985 tax rates, actual dollar amounts are also provided, with an estimated loss of 1986 county government tax revenues ranging from a high of $44,088 in Dixie to a low of $801 annually for Lafayette. Similarly, lost 1986 school district revenue ranges from a high of $31,530 in Dixie County to a low of $586 in Lafayette County.

TABLE 28

1985 MILLAGE RATES AND ESTIMATED FIRST YEAR LOST OPERATING REVENUES FOR AFFECTED COUNTY GOVERNMENTS AND SCHOOL DISTRICTS IN DOLLAR AMOUNTS AND PERCENTAGE OF COUNTYWIDE TAXABLE VALUE

	LOST ANNUAL OPERATING REVENUE ($)		LOST TAX VALUE AS PERCENT OF	OPERATING REVENUE MILLAGE RATES	
COUNTY	COUNTY	SCHOOL	OF TAX BASE	COUNTY	SCHOOL
Alachua	34,430	27,317	0.2	8.5	6.744
Bradford	1,599	1,174	0.1	8.25	6.017
Columbia	3,571	3,127	0.1	6.466	5.662
Dixie	44,088	31,532	3.7	10.0	7.152
Gilchrist	12,421	7,130	1.3	10.0	5.74
Hamilton	13,831	15,284	1.0	5.35	5.95
Lafayette	801	586	1.3	10.0	7.309
Suwannee	5,208	3,232	0.2	9.136	5.669
Taylor	26,094	35,378	1.3	4.587	6.219

Alachua, Bradford, Columbia, Hamilton, Suwannee, and Taylor county governments as well as all school districts could recover all lost revenues through slight increases in millage rates. However, the maximum allowable millage rate under state law for both county government

and school district operating revenues is 10 ($10.00 of tax per $1,000 of assessed valuation). Dixie, Gilchrist, and Lafayette county governments are currently at the 10 mill operating revenue cap. These three counties must rely upon increases in the total taxable value to recover any lost revenue.

As can be seen in Table 29, all nine counties have experienced significant increases in countywide total taxable value for the years between 1980 and 1985 inclusive. Assuming that these average annual rates of increase in county taxable value continue into the immediate future, all counties are anticipated to recoup lost operating revenues within one year after removal of all selected areas from the tax roles. Thus, no county or school district is anticipated to experience a reduction in operating revenues from current levels.

TABLE 29

CHANGES IN TAXABLE VALUE AND RESULTING TAX REVENUES AS A RESULT OF INCREASED TAXABLE VALUE FOR COUNTY GOVERNMENTS AND SCHOOL DISTRICTS, 1980-1985

COUNTY	AVERAGE ANNUAL PERCENTAGE CHANGE TAXABLE VALUE 1980 -1985	AVERAGE ANNUAL INCREASE IN 1980-1985 TAX REVENUES ($) COUNTY	SCHOOL
Alachua	10.4	2,085,740	1,654,850
Bradford	2.8	39,777	29,010
Columbia	4.5	118,523	103,882
Dixie	6.8	80,176	57,342
Gilchrist	3.8	36,291	20,831
Hamilton	3.2	43,944	48,872
Lafayette	2.2	13,871	10,139
Suwannee	4.9	121,926	75,657
Taylor	8.6	148,627	201,507

As can be seen in tables 30 and 31, under the worst case scenario no county or school district is anticipated to experience a reduction in operating revenues from current levels. However, reductions the amount of increased operating revenues attributable to increased taxable value would occur.

Under this worst case scenario, several counties are anticipated to experience, in the short term, significant adverse impacts on future revenue increases. Although the lost taxable value in all cases represents a very small percentage of the countywide total taxable value, the resultant loss would have a significant impact on increases in short-term future revenues. For example, Dixie County's first-year

lost taxable revenue base represents 3.5 percent of the county's tax base. However, this 3.5 percent loss translates into a first-year reduction of 55 percent in anticipated revenue increases attributable to increased countywide taxable value for the county government and a

39 percent reduction for the school district. Similarly, the first-year revenue loss for Gilchrist County amounts to 34 percent for county government and 19 percent for the school district. Other significantly impacted counties are Hamilton with first-year

county government losses of 31 percent and 35 percent for the county school district. Taylor County also would experience a notable fist-year revenue loss of 18 and 24 percent, respectively, for the county government and county school district.

TABLE 30

FIRST YEAR PROJECTED INCREASE IN COUNTY GOVERNMENT OPERATING REVENUES DUE TO INCREASES IN TAXABLE VALUE MINUS REVENUES GENERATED BY LANDS PROPOSED FOR ACQUISITION

COUNTY	PROJECTED INCREASE (IN $)	LOST REVENUE (IN $)	PERCENTAGE LOSS OF INCREASED REVENUE	PROJECTED NET INCREASE (IN $)
Alachua	2,085,740	34,430	1.7	2,051,310
Bradford	39,777	1,599	4.0	38,178
Columbia	118,523	3,571	3.0	114,952
Dixie	80,176	44,088	55.0	36,088
Gilchrist	36,291	12,421	34.2	23,870
Hamilton	43,944	13,831	31.5	30,113
Lafayette	13,871	801	5.8	13,070
Suwannee	121,926	5,209	4.3	116,717
Taylor	148,627	26,094	17.6	122,533

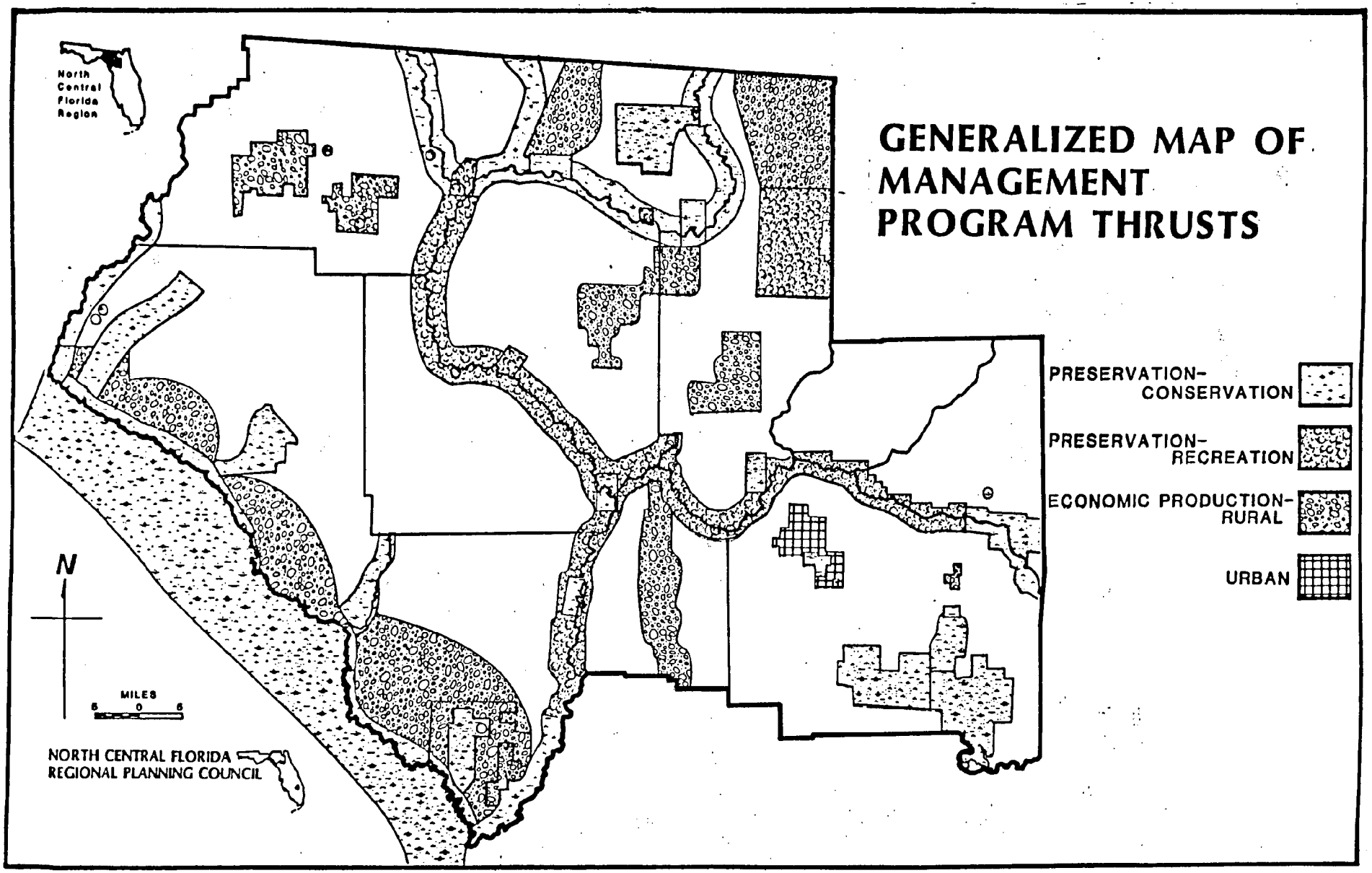
TABLE 31

FIRST YEAR PROJECTED INCREASE IN SCHOOL DISTRICT OPERATING REVENUES DUE TO INCREASES IN TAXABLE VALUE MINUS REVENUES GENERATED BY LANDS PROPOSED FOR ACQUISITION

COUNTY	PROJECTED INCREASE (IN $)	LOST REVENUE (IN $)	PERCENTAGE LOSS OF INCREASED REVENUE	PROJECTED NET INCREASE (IN $)
Alachua	2,085,740	27,317	1.3	2,058,423
Bradford	39,777	1,174	3.0	38,603
Columbia	118,523	3,127	2.6	115,396
Dixie	80,176	31,532	39.3	48,644
Gilchrist	36,291	7,130	19.7	29,161
Hamilton	43,944	15,284	34.8	28,660
Lafayette	13,871	586	4.2	13,284
Suwannee	121,926	3,232	2.7	118,694
Taylor	148,627	35,378	23.8	113,249

In conclusion, lost revenues are anticipated to represent an ever-decreasing proportion of actual annual operating revenues over time. Over the long term, increases in taxable value are anticipated to reflect increases in county-wide population growth. Furthermore, public acquisition of lands in Dixie, Taylor, Hamilton, and Gilchrist counties should occur over a period of several years in order to reduce adverse short-term fiscal impacts. Specifically, an acquisition policy could be established to limit the annual impact upon lost revenues to a fixed dollar amount or percent of total increased taxable value.

ILLUSTRATION 1



APPENDIX A: STORM HAZARDS

Major hurricanes and floods have occurred in north central Florida. It is entirely possible that the storms of record will be exceeded in the future. Development now exists in coastal and riverine floodplain and damages have occurred as a result of past storms. As in the case of riverine flooding, topographic features can be identified which reveal the landward limits of typical coastal floods. In the case of Dixie and Taylor counties, a natural "seawall" exists several miles inland. This natural seawall is not really a wall at all. Rather it is an area where there is a notable rise in land elevation to 20 - 30 feet above mean sea level (MSL). In the case of the region, this rise in elevation is located several miles inland.

In order to plan for activities within the hurricane zone, we need to understand what are the forces involved, how the elements of a hurricane affect the land and how the land and biologic communities have adjusted over time to coastal storms and hurricanes. While most studies consider hurricanes instead of smaller coastal storms, due consideration should be given to the impact of smaller storms as well. Natural functions which appear insignificant in the face of hurricanes can play an important role in absorbing the impacts of lesser magnitude coastal storms.

Coastal flooding is distinctly different from riverine flooding. When a river floods, the runoff and subsequent damage generally follow the river's course. Coastal flooding occurs over broad areas that alternately flood and drain during hurricanes and intense winter sea storms. To fully understand the danger requires a detailed review of the physical hazards associated with these storms and the full range of impacts such forces could have on the coastal area. The characteristic components of a hurricane which cause physical damage are storm surge, waves, winds, debris battering, and coastal erosion.

HURRICANE STORM FORCES

Waves, wind, storm surge, and coastal erosion constitute the main hurricane forces that must be considered when evaluating impact forces on structures within the coastal zone. These force categories cause the most property damage and loss of life during a storm.

HURRICANE SURGE

One of the most devastating elements of the hurricane is the high tide which floods the coastal area. A rise in the ocean water level is generally caused by a storm approaching the shoreline. The height of the surge during a hurricane is dependent on a number of factors, which include offshore water depth, wind speed, and storm speed.

The onset of the storm surge is usually characterized by a gradual rise in the sea level at the shoreline. This gradual rise may begin when the hurricane is as much as 500 miles offshore. As the storm moves toward the land, the level of the water continues to rise, reaching its maximum height when the eye of the hurricane makes its landfall. However, dangerously high tides can occur all along the coastline during a severe hurricane and are not confined to the immediate vicinity of the storm center.

The increased water level is a function of two major factors: barometric pressure and high wind velocity. The low barometric pressure found at the center of the hurricane may raise the water level one foot for each inch of pressure reduction. The high winds associated with hurricanes cause the water to shoal or pile up as the storm moves toward the coast, which increases surge height. Furthermore, the storm surge is heightened by a shallow coastal bottom, as is the case in the Gulf waters adjacent to Dixie and Taylor Counties.

The maximum storm surge may be expected 10 to 50 miles to the right of the storm track or in the direction of the on-shore hurricane winds. Thus for Gulf storms, the greatest surge levels are usually to the right of the center of the storm as it makes a landfall, and to the left of the center as it moves from land to sea and for hurricanes travelling overland from the Atlantic.

Hurricane high-water surges often last three to five hours, during which seawater flows into bays with such intensity that it may stop or reverse the direction of flow down tidal rivers and through estuaries to the sea. Furthermore, hurricanes are usually preceded by many hours of heavy rains, which saturate the soil, cause advance runoff, and raise the water level in rivers and bays before the surge hits. Pre-hurricane rainfalls of five inches or more are common.

It is important to note that the direct effect of waves, including the wave is not included with the height of the storm surge. Along the Dixie and Taylor county coasts, the wave crest can be expected to add an additional eight feet in height to the storm surge at the coastline and decrease as the surge moves inland. The wave is expected to drop to less than 3 feet in height after travelling 200 yards inland.

WAVES

There are many factors which influence the height of the storm waves. These include the wave period, wave length, barometric pressure, and wind speed. They also have a significant affect on the two major components of the wave force: vertical and horizontal wave pressures. The horizontal impact pressure of a hurricane storm wave has tremendous destructive potential when breaking directly on coastal structures. The vertical force component has the effect of producing uplift pressures on the structure as the wave peaks.

WINDS

The shore and nearshore regions are often characterized as windy areas, having little topographical relief to slow down wind gusts. Hurricanes can gust up to 200 miles per hour with sustained winds of 140 miles per hour. Wind forces exerted on structures during a hurricane can have devastating effects particularly in conjunction with wave forces. Wind increases with height above ground, so a tall structure is subject to greater wind pressure than a low structure.[48] It is important to note that hurricane force winds can occur anywhere within the region.[49] Generally, wave and wind forces on structures during a hurricane will have similar impacting consequences, unless structural design techniques are implemented to mitigate these forces. For example, direct horizontal wave and wind forces will cause inadequately designed structures to laterally move off their foundations, laterally collapse from racking, or lose parts of the structure by material failure or connection separation, all of which can cause structural collapse.

COASTAL EROSION

When a hurricane moves onshore, its high-velocity winds, waves, and currents scour and transport large quantities of coastline sands and soil. The amount of damage suffered by the coastline and adjoining areas depends on a number of factors including angle of storm approach, configuration of the shoreline, shape and slope of the ocean bottom, wind velocity, astronomical tide, decrease in atmospheric pressure, and longevity of the storm.[50]

Storm surge and wave action tend to plane off pre-existing topographic features and produce a featureless, uniformly seaward-sloping beach. Eroded dunes, wave-cut steps, and overwash fans are common results of storm surge and wave activity. Sand removed by erosion may be (1) transported and stored temporarily in an offshore bar, (2) transported along the shore, and/or (3) transported onto or across barrier islands through overwash channels. Trees along the coastline may be uprooted and projected inland, like hurtling missiles, damaging structures and other trees in their path.

The extent of shore erosion is especially critical on shorelines with residential structures. The overall storm action will loosen and scour out the sand or dirt underneath slab-on-grade foundations. This action has the effect of causing the structure to become unstable and thus subject to failure and collapse.

Although beach area within the region is limited, these concerns do apply for the coastal area around Horseshoe Beach in Dixie County and the area between Keaton Beach and Adam's Beach in Taylor County.

HAZARDS FROM UPLANDS

Storm-water runoff from uplands in the coastal drainage basin may discharge so rapidly that it adds to the water level already forced up by a sea storm or hurricane. Uplands runoff can thereby cause increased flooding along the shores of a confined coastal embayment. In the case of region III, this is especially important for coastal communities located at the mouths of rivers, i.e., the towns of Suwannee and Steinhatchee. The magnitude of storm necessary to cause inundation of these areas is to some extent dependent upon water management practices of in the upland areas of the coastal drainage basin.

Furthermore, hurricanes are often preceded by many hours of heavy rains which saturate the soil, cause advance runoff, and raise the water level in rivers and bays before the surge hits. Pre-hurricane rainfalls of five inches or more are common, and far greater rainfalls have been recorded. Both upland and costal wetlands help to reduce the impact of this water through their normal function of retaining and gradually releasing stormwater runoff. When wetlands areas within the coastal drainage basin filled and drained, a significant increase may occur in the impact of surfacewater runoff within the coastal basin upon coastal flooding.

HAZARDS TO STRUCTURES WITHIN HURRICANE SURGE ZONE

Waves and wind can cause severe battering damage not only in forcing water onshore to flood buildings, but also in throwing boats, barges, piers, and other floating and wind blown debris inland against standing structures. Few, if any, residential structures could be expected to survive the impact of a one-ton object moving at even a slow velocity of seven miles per hour.[51]

At the shoreline proper, inundation by the storm surge and accompanying storm waves can be one to the most destructive elements of a hurricane. The tremendous force of a wave can be realized when considering that a cubic yard of water weighs over three-fourths of a ton. A breaking wave moving shoreward at 60 miles per hour will have devastating effects on structures subject to storm surge inundation.[52]

Direct vertical wave forces from peaking waves will cause structures not securely anchored to overturn or be laterally moved off their foundation. Structures that are anchored securely but are not elevated high enough above the peaking wave level may experience floor cracking leading to flooding and possible floor collapse.

Other direct forces to be reckoned with are those associated with the effects of rising water. Often the pressure of the wind backs water into streams or estuaries already swollen from the additional rainfall brought by the storm. The town of Suwannee may be particularly susceptible to flooding due to its low elevation and proximity to the mouth of the Suwannee River.

An unanchored house located in high water may become buoyant and float off its foundation possibly colliding against another house, severely damaging both. Even if a house itself is left structurally intact, flooding may destroy its contents. The buoyancy phenomenon is caused by the difference between outside pressure and inside pressure of the structure. An object becomes buoyed by an upward force equal to the weight of the water displaced. Each cubic foot of water displaced by the structure exerts enough buoyant force to float about 62 pounds.[53] As a rule of thumb, the average one-story air-tight house will float when water reaches to the structure's eaves.

Rising water accompanying the storm surge will also create a pulsating water action which is most pronounced inside the house once a wall has given way. Water rushing in is halted by an opposite wall and is then forced back toward its place of entry. This pulsating water will cause floating contents and debris inside the house to batter against furnishings and structural elements.

Many of the indirect forces of coastal flooding, such as scouring and horizontal recession can destroy coastal structures by undermining the soil that underlie foundations, thereby causing the structures to collapse.

In sum, the battering process of onrushing water, waves, and objects floating in the water, in conjunction with high velocity winds can create extensive damage to structures within the hurricane surge zone.

HAZARDS FROM SALTWATER INTRUSION

One of the major concerns with coastal flooding is saltwater intrusion. Saltwater associated with storm surge rushes inward to the hurricane surge line. The normally dry depressions of lands within the surge zone can temporarily retain considerable amounts of surge generated saltwater. If saltwater is held long enough, it can damage soil fertility (by penetration into the earth) or groundwater quality (by penetration into subsurface aquifers). It is important that saltwater does not remain for very long due to the danger of saltwater

intrusion to underground aquifers. This is especially important for Dixie and Taylor counties as the Floridan Aquifer comes very near the surface at the coastline. Therefore, construction of seawalls or alterations in landscape or topography should not impede the outflow of seawater back to the Gulf.

HAZARDS IN ESTUARIES

The danger to life and property from estuarine flooding is exacerbated by the intensity of development in the coastal zone. Mounting losses due to floods can be expected when new residential, commercial, and industrial construction is located in the floodplains of bays and other estuaries. Not only are more people and property exposed, but there is a reduction of the coastal environment's natural resistance to floods. Eliminating wetlands and stripping watersheds accelerates runoff to the coastal basins.

In estuaries, inundation from a rising water level, rather than direct wave action, is the principal threat. The flood waters come principally from seawater driven through the estuarine mouth, or inlet, by the force of the hurricane. The form of an inlet is a key factor in protection against hazards. Inlet channels, if they are narrow, slow the surging water entering estuarine basins but also hold back the outward flow of rainwater and storm runoff that fill the basins.

The normally heavy rains that accompany hurricanes and sea storms not only fall into the estuary itself but also often produce heavy storm-water runoff that flow into the estuary from adjacent uplands. Rain and runoff-added to the ocean surge level may, during the course of a storm, elevate bay waters higher than the ocean waters outside. The result can be extreme flooding of shore communities as well as possible breaks through barrier islands from bay water rushing seaward after the hurricane passes.

The flooding of estuarine shores diminishes according to the basin's capacity to receive and store both storm-water discharge from the shorelands and storm surges from the ocean. This capacity is related to the depth, width, and shape of the basin.

Saltwater wetlands can help protect communities from sea storms. Wetland vegetation stabilizes estuarine shorelines and prevents erosion. Salt marshes may also provide some frictional dissipation of flooding, particularly in the broad stretches of vigorous cordgrass and spike-grass marshes, especially for lesser magnitude storms.

HAZARDS UPON THE SUWANNEE RIVER SYSTEM

Flooding upon the Suwannee River System can be categorized into two types of storm events, those induced by hurricanes and those induced by frontal-type storms.

Major differences between the effects of hurricane storms on the coastal and upland riverine system have to do with intensity of wind and water action. Except for that part of the region's rivers located within the hurricane surge zone, rivers are not subject to hurricane surge or wave action. In addition, flooding of riverine systems occur within a defined floodway. The concern with riverine flooding is not so much the damage which hurricanes can inflict but rather keeping the floodway clear of obstacles which may block the water's flow. However, it should be pointed out that hurricanes are capable of extensive damage anywhere within the region. Inland winds generated by hurricanes reach speeds of 70 to 90 miles per hour.

It is possible for a combination of strong winds and rapidly moving water to dislodge roofs and poorly fastened structural members and send them hurtling through the air like missiles or floating downstream. It is entirely possible for unsecured air-tight structures, such as mobile homes, to be washed off their foundation and swept downstream, breaking up and littering the streambanks or crashing into nearby buildings. Other concerns include the pollution of riverine floodwaters and underground aquifers from stores of hazardous chemicals, pesticides, fertilizers, and petroleum products washed away by floodwaters.

Most of the region has permeable soil and subsurface structures and sparse distribution of tributary streams. Normal runoff to the primary watercourse is accomplished largely by way of sinks, seepage, and underground channels. During periods of sustained rainfall, groundwater levels are high, sinks and depressions overflow, and flood runoff reaches the main river system mostly by sheet flow over the saturated soils. There are no large reservoirs, diversions, or stream regulating structures in the basin. Limited storage provided by numerous small lakes and ponds has little effect on flood stages.

The average bottom slope of the Suwannee River is less than those of the tributaries. Flooding in the lower reaches of the tributaries to the Suwannee River is accentuated by channel control and backwater effect from the main river. Also, several highway and railroad bridge structures intrude into the flood plain and aggravate flood conditions. Combinations of the above factors cause frequent and prolonged flooding in the basin after severe storms and extended rainfall periods. For storms causing major flooding, it is not uncommon for floodwaters to remain for 30 days over the lowlands and for longer periods in depressions that drain by percolation and seepage.

APPENDIX B: BIOLOGIC COMMUNITIES

INTRODUCTION

Plant communities and wildlife are closely linked components of the total natural resources of the region. Each plant community has an associated animal community, the combination of which is considered a biological community. Each regionally significant area is described in terms of the biologic community found within it. Therefore, a brief description of each biological community is provided. In general, plant communities may be subdivided into two very broad categories, upland communities and lowland or wetland communities. Upland communities of north-central Florida include sandhills, mixed hardwoods and pine, hammocks, and pine flatwoods. Lowland communities include swamp forests, wet prairies, salt marshes and submerged lands.

UPLAND COMMUNITIES

SANDHILL COMMUNITIES

Sandhill communities typically occur on well-drained sandy soils and may usually be identified by the typical longleaf pine-turkey oak vegetative association. In general, due to the harsh conditions imposed by poor soil quality, low moisture and high fire potential, the community has a low tree diversity. It possesses a low understory composed of herbaceous plants such as wiregrass and yellow foxglove.

Many of the animals found in sandhill communities are burrowers due to the often high temperatures and absence of water. Species such as indigo snakes, gopher tortoises, desert lizards, ground doves, quail, fox squirrels and pocket gophers are cited as typical vertebrae associated with this community. The rare red-cockaded woodpecker, listed as an endangered specie by the U. S. Fish and Wildlife Service, inhabits old and diseased trees in mature sandhill communities.

MIXED HARDWOOD AND PINE COMMUNITIES

Mixed hardwood and pine communities are typically found on the clayey soils of Madison and Taylor counties. They represent the southernmost extension of the southern piedmont mixed hardwood forest. The natural climax vegetation of the community is characterized by an American beech- southern magnolia-Florida maple association along with numerous other hardwoods.

Animal species vary with the successional stage of the forest community. Typical in early successional stages are cottontails and bobwhites, while woodpeckers, moles, and woodcock are found in more mature communities. Other characteristic animals include gray fox, white-tailed deer, barred owl, pileated woodpecker, and red-bellied woodpecker.

HAMMOCKS

Hammocks are a cluster of broad-leaved trees, often evergreens, usually growing on relatively rich soil. They are noted as the climax vegetation of most areas of central and peninsular Florida. Characteristic trees in the north central region include live oak, cabbage palm, magnolia, laurel oak and American holly. San Felasco Hammock in Alachua County is a good example of this type of community. Typical animals in the hammock community include the spadefoot toad, tufted-tit mouse, great-crested flycatcher, golden mouse, wood rat and flying squirrel.

Based upon a survey assessing wildlife values of Florida's plant communities, the Florida Game and Fresh Water Fish Commission has recognized hardwood hammocks as first priority communities. Such a designation indicates those communities most deserving of protection based upon estimated wildlife values, scarcity within the watershed and endangerment of the plant community.

PINE FLATWOODS

Pine flatwoods are the dominant plant community in the gulf coastal zones and are widespread throughout the region. The great majority of upland areas of Dixie and Taylor counties are covered with pine flatwoods forests. Most of these are managed by the large lumbering and pulp industry which owns vast tracts within this area.

Generally, flatwoods have a low diversity of tree species. Many understory plants common to flatwoods are wire grass, saw palmetto, wax myrtle, mulberry, and fetterbush. Often found within large pine flatwoods forests are small cypress pond, bayheads, and other forest types typical of wetter environments, emphasizing the rather poorly developed drainage.

Pine flatwoods are noted as having fairly numerous and diverse animal populations. Larger animals such as deer, bear, bobcat, racoon, and gray fox are commonly found near boundaries between flatwoods and associated forest communities. Other typical animals common to flatwoods include the black racer, brown-headed nuthatch, fox squirrel, cotton rat and cottontail rabbit. Wildlife values can vary considerably depending upon the degree and type of forest management applied.

LOWLAND COMMUNITIES

SWAMP FORESTS

Swamp forests, or deciduous hardwood swamps, are found bordering rivers and basins where the forest floor is saturated or submerged during a portion of each year. Other terms for this community are floodplain forest, hydric hammock and river swamp. Such communities are characterized by hardwoods such as black gum, water rupulo, red maple, sweetgum, water oak, and water hickory. Other typical trees include the bald cypress and cabbage palm. Within the north central region, swamp forests are typically encountered along the floodplains of the Suwannee, Steinhatchee, Santa Fe and Econfina Rivers.

Animals inhabiting these areas include species such as the bobcat, deer, turkey, grey squirrel, otter, pileated woodpecker, wood duck, as well as numerous other birds, turtles, and snakes. In general, the productivity of both plant and animal systems in swamp forests is very high because of the diverse habitat, the availability of nutrients, and the periodic flooding and drying essential to the maintenance of this system.

WET PRAIRIE

Wet prairies and freshwater marshes cover a very limited area in north central Florida. They are defined by any grass-sedge-rush community occurring in an area where the soil is saturated or covered with water two or more months of the year. Payne's Prairie in Alachua County is the most notable example of this type of community in the region, but occurrences are also noted in western Madison County and northern Columbia County.

Prairie communities are very productive in wildlife. Numerous wading birds, water fowl, frogs and other amphibians inhabit such areas. Many rare and/or endangered species rely upon this habitat, including the wood stork, sandhill crane, and Florida round-tailed muskrat.

SALT MARSH

Salt marshes are plant communities that have developed in inter-tidal zones along low energy coasts. Tidal marshes extend along the full length of the coasts of Dixie and Taylor counties, and extend up into tidal rivers. In the salt marsh zone only a few inches of vertical elevation may determine a suitable habitat for a given species or community. Salt marsh grass often forms an almost pure stand as an outer band of the salt marsh where it is exposed to the deepest and longest inundation by salt water during high tide. The black rush is commonly found on slightly higher ground in the coastal marshes of Dixie and Taylor Counties. The species existing in any one area are usually dependent upon the degree of inundation by tides as well as the salinity of the water.

Salt marshes harbor large numbers of invertebrates which are fed upon by many of the higher animals of the marsh and estuary, and consequently are of particular importance to Florida. Nutrients from the land and sea combine to produce more protein than some of the most intensively managed farms. Many commercial fish such as the spotted sea trout, mullet, redfish, and others spend much of their lives in the protective estuaries afforded by salt marshes. In addition, crabs, oysters, some species of clams, several species of shrimp and other Gulf marine life depend on the salt marsh for food, protection and breeding.

Other animal species which abound in the salt marsh ecosystem include numerous species of birds, such as rails, egrets, gulls, turns, and seaside sparrows. In addition, the endangered bald eagle breeds in several areas of salt marsh habitat in Taylor County. Characteristic animals also include diamond-back terrapin, salt marsh snake, mink otter and raccoon.

SUBMERGED LANDS

Submerged lands and their communities are those salt water ecosystems which merge with the coastal marshes at their landward limits and extend westward into the Gulf of Mexico. Submerged lands are those generally lying below sea level.

Generally, the salt water systems along the northwestern gulf coast consist of numerous flowering plants that grow completely submerged in undiluted sea water. Although there are about 35 species of seagrasses in the worlds's oceans, only five have been recognized on the continental shelf of the eastern Gulf of Mexico.

Thalassia testudinum or turtlegrass is the most abundant species in this portion of the gulf. Three other species, including manatee grass and shoal grass, make up about 90 percent of the total seagrass biomass.

Seagrass beds form an important habitat for many small crustacean, shellfish and other invertebrates as well as fish. Most of the important species in Florida's commercial and sport fishery spend a portion of their lives in shallow inland and coastal waters. Many species, including oysters, crab, sea trout, and pompano spend much of their lives in such areas. In addition, a variety of reptiles, water fowl, wading birds and aquatic mammals such as the otter and manatee utilize this habitat. Sea turtles and manatees feed on seagrasses as well as do some sea urchins, conch, parrot fishes, sturgeon, trigger fish and many others.

Many commercial fish such as the spotted sea trout, mullet, redfish and others spend much of their lives in the productive wetland areas afforded by marshes. In addition, crabs, oysters, some species of clams, several species of shrimp and other gulf marine life depend on the salt marsh for food, protection, and breeding. The destruction of salt marshes could therefore have significant economic consequences which demand their preservation. In addition, the coastal marshes provide a measure of storm surge protection for inland areas and serve as a natural tertiary waste treatment facility because of the nutrient intake afforded by the abundant vegetative growth.

Animal species which abound in the salt marsh ecosystem include birds such as rails, egrets, gulls, terns, and seaside sparrows all of which and mare are relatively common to coastal marshes and depend upon that system for food. The bald eagle breeds in several areas of salt marsh habitat. In addition, the diamond-back terrapin, salt marsh snake, mink, otter, and raccoon are also found in the marsh areas.

For a given plant species or community to survive in the region's coastal environment, only a few inches of vertical elevation may determine suitability for growth. Vegetation in marsh areas include salt marsh grass, which forms an almost pure stand in an outer band of the salt marsh where it is exposed to the deepest and longest inundation by salt water during high tide. The black rush is commonly found on slightly higher ground. Black rush generally covers the greatest area of any salt marsh. With a height up to six or seven feet, its density slows the penetration of tidal water into the marsh. The height of the Black Rush drops inland as that system merges with a third ecological zone. The salt flats and the subsequent barrens area consisting of bare ground is flooded only by exceptionally high storm tides for brief periods of time. In such areas only lower plants, such as blue-green algae, are abundant.

Seaward of the coastal marshes are submerged lands and their communities. These generally lie below mean sea level and merge with the salt marsh landward. Submerged seagrass beds constitute the primary biologic community of the submerged lands. Turtlegrass is the most abundant seagrass species in this portion of the Gulf of Mexico. Other species of seagrass beds include Manatee grass and shoalgrass. The seagrass beds throughout the coastal zone are reported to be the most

important community of the inner shelf in terms of basic productivity. They also provide an essential environment for many species of invertebrate and fishes including those of economic value.

Submerged grass beds supply food to grazing animals, provide nutrients to the water, add oxygen (during daylight hours) and stabilize bottom sediments. They are nursery areas for young fishes and crustaceans and are often the source for a substantial amount of the primary productivity of estuaries.

APPENDIX C:

NORTH CENTRAL FLORIDA HABITATS AND CRITICAL SPECIES

INTRODUCTION

No states other than California, Hawaii, and Texas have larger numbers of native plant and animal species than Florida. Along with water, native plants and animals constitute important parts of Florida's heritage and contribute to Florida's uniqueness.

Some native species are very common. They may be found throughout the state, or they may occur abundantly in particular habitats. Many are as common today as they ever were. These Florida natives have characteristics that enable them to withstand the impact of modern man and to resist the competition of the foreign plant and animal species now invading the state. But a greater number, perhaps a majority, of native species are not so capable and are declining in numbers of individuals and in numbers of populations. In time, if this trend is not stopped or reversed, the native species of Florida will in large part be eliminated from their natural setting and be confined to zoos and horticultural houses. The loss of sufficient numbers and diversity of native plant species may bring about the destruction of habitats necessary to support Florida's native animal species.

Of the many species declining in number, a relative few may be singled out for concern because of their beauty, historical interest, biological importance, economic value, or perceived threat to man. These species are largely those that are now approaching the point where their remaining populations are in danger and only prompt action can avert their disappearance. As can be seen in the following table, a significant proportion of plant and animal species are already on the critical list. A significant number of these species can be found within THE region (See Appendix D).

CRITICAL SPECIES

The Florida Committee on Rare and Endangered Plants and Animals (FCREPA) study of 1978 identified 153 species of reptiles and amphibians, approximately 3,500 species of plants and 76 species of land animals presently existing in Florida. The study identified 210 critical species, of which 82 can be found within the region.[54]

Nearly one-fifth (10 of 54 species) of the amphibians and more than one-third (35 of 99 species) of reptiles in the state are considered to fall into one of five status categories of concern. Nearly two-thirds of Florida's land mammal species are on the critical list along with 72 species of birds and 101 plant species.

TABLE C-1

CRITICAL SPECIES FOUND IN NORTH CENTRAL FLORIDA

CLASS	NO. OF SPECIES	NO. OF ENDANGERED SPECIES STATE	REGION
Birds		72	29
Fish		43	6
Mammals, land	76	49	12
Plants	3,500	101	20
Reptiles & Amphibians	153	45	15

Certain variables emerge which must be measured in order to develop management techniques to properly protect critical species. These include habitat type and diversity of different habitat types which sustain the species, primary threats, degree of habitat degradation and modification, territory size and range, nesting and breeding sites, travel corridors, edge or interior species status, principal food source, degree of specialization, and key species designation, minimum sustainable threshold population, and degree of sensitivity to man. While additional study is needed, steps must now be taken based upon the available information as the explosive state population growth may otherwise eliminate these species.

THE IMPORTANCE OF HABITAT

Habitat, the place where an organism lives, is the single most important determinant of species health and diversity. Habitats are typically described in terms of vegetative cover, water functions, soil types, and land elevation. The correlation between habitat type and species expected to occupy a particular habitat type is high. The very limited expanse of certain Florida habitats means that often only a minute portion of the mapped range is home for these special species.

Unfortunately, no map exists which identifies habitat areas at a scale adequate for regional planning. The best available information is based upon Landsat imagery which classifies land use by vegetative cover types, a more general classification system.[55]

Florida habitats are most complex and do not easily lend themselves to mapping. For example, certain species require intermittently flooded wetlands while others require permanently flooded wetlands. Certain species found in river beds require a sandy bottom and moving waters while others require standing water. Therefore, a river may support several different habitat types.

TABLE C-2

NORTH FLORIDA HABITAT TYPES

Coastal Strand	Dry Prairies
Pine Flatwoods	Sand Pine Scrub
Longleaf Pine-Oak	Mixed Hardwood-Pine
Hardwood Hammocks	Tropical Hammocks
Coastal Marshes	Freshwater Marinas &
Scrub Cypress	Wet Prairies
Hardwooe Swamps	Cypress Swamps
Open Water	Mangrove Swamps
Old Fields	Sand, Mud Flats
Caves	Grassy Ditches
Marine-Freshwater	Buildings
Ponds & Lakes	Sphagnum Bogs
Subterranean Wateres	Streams & Rivers
Marshes	Marine Environments
	Springs

Kautz's study of number of animal species by north Florida habitat type suggests that natural pine flatwoods support the largest total number of species of Florida wildlife and intensively managed pine plantations support the least numbers.[56] Other communities which support large numbers of animal species include sandhills, mixed swamp, and xeric hammock. In addition, wetlands ares appear to support the largest number of species specifically dependent upon habitat type. That is to say, without the wetness the specie would be unable to survive. Amphibian species are most abundant in cypress-tupelo swamps and least abundant in xeric and altered habitats such as improved pasture and managed pine plantations.

TABLE C-3

NUMBER OF VERTEBRATE SPECIES USING 14 N FLORIDA HABITAT TYPES

HABITAT TYPE	AMPHIBIANS	REPTILES	BIRDS	MAMMALS	TOTAL
Pine Flatwoods	19	26	81	23	149
Sandhills	10	33	76	25	144
Mixed Swamp	10	14	98	18	140
Xeric Hammock	11	31	78	19	139
Cypress-tupelo Swamp	27	27	73	5	132
Sand Pine Scrub	9	25	67	28	129
Marsh and Prairie	15	24	72	14	125
Messic Hammock	12	19	59	21	125
Pine-Hardwood Forest	14	21	62	14	111
Hydric Hammock	15	21	54	16	106
Improved Pasture	8	14	68	14	104
Bayhead	20	27	43	10	100
Coastal Hammock	6	26	49	10	91
Pine Plantation	4	18	52	12	86
Mean	13	23	67	16	119

Source: Randy S. Kautz, "Criteria for Evaluating Impacts of Development on Wildlife Habitats."

TABLE C-4

NUMBER OF SPECIES USING NO MORE THAN 3 HABITAT TYPES

HABITAT TYPES	AMPHIBIAN	REPTILES	BIRDS	MAMMALS	TOTAL
Pine Flatwoods	2	2	7	1	12
Sandhills	0	6	8	3	17
Mixed Swamp	3	2	24	6	35
Xeric Hammock	0	3	8	0	11
Cypress-tupelo Swamp	7	5	9	0	21
Sand Pine Scrub	0	2	5	4	11
Marsh and Prairie	3	8	20	2	33
Messic Hammock	0	1	2	2	5
Pine-Hardwood Forest	0	1	3	1	5
Hydric Hammock	2	2	2	2	8
Improved Pasture	0	0	15	2	17
Bayhead	3	3	0	0	6
Coastal Hammock	0	4	4	1	9
Mean	1	3	8	2	14

Source: Kautz.

An examination of critical animal species within the region tends to support Kautz's findings. Pine flatwoods and coastal marshes provide habitat for the largest number of critical species within the region.

Sand pine scrub, longleaf pine, and hardwood swamp also provide habitat for significant numbers of critical species. Dry prairie provides for the least number of species, but even this appears to represent a significant number of animals.

TABLE C-5

NUMBER OF CRITICAL NORTH CENTRAL FLORIDA SPECIES BY HABITAT TYPE

HABITAT	NUMBER OF CRITICAL SPECIES
Coastal Strand	12
Dry Prairies	7
Pine Flatwoods	15
Sand Pine Scrub	13
Longleaf Pine Xerophytic Oaks	13
Mixed Hardwood Pine	10
Hardwood Hammocks	11
Coastal Marshes	15
Freshwater Marshes	10
Wet Prairies	
Hardwood Swamp	13

Source: FCREPA, 1978

FCREPA points out that sandhill, sand pine scrub, and xeric habitats are important because they are limited in areal extent, and they are home to a large number of endemic reptiles and amphibians. In addition, wet habitats, in general, are important travel corridors and are utilized by a large number of bird species, particularly in winter.

Certain animals, such as the Florida black bear, require a territory consisting of a wide variety of habitats while other species can adapt to virtually any habitat. Kautz suggests that fragmented forests, early successional stage habitats, and edge habitats are in abundance and that large blocks of undisturbed forest are at a premium.[57] Several species of amphibians and reptiles are associated primarily with vegetation types that occur on the well drained soils characteristic of the Central Florida Ridge and certain coastal areas. Habitats referred to as sand pine scrub, and sandhill or longleaf pine-turkey oak are typical of these xeric areas. This kind of habitat has a high degree of endemism and is one that is rapidly giving way to agricultural, urban, and residential development. Seven species, including one found within the region, the Florida gopher frog, are essentially restricted to these habitats.[58]
The coastal brackish water and marine habitats provide suitable area for several endemic Florida plants and animals. Several species of

Florida amphibians are found only in specific kinds of aquatic sites. Noteworthy among these in the region are the Florida gopher frog which is found in upland and flatwood ponds and the Carpenter Frog which is found in sphagnaceous ponds in bay head or cypress stands in Baker County and possibly eastern Columbia County.[59]

HABITAT ISLANDS, CORRIDORS, AND EDGES

A habitat island is an area of adequate size and habitat type(s) to support a specified number of a particular animal species. Islands are connected by corridors which serve as travel lanes for wildlife between habitat islands. Edges or ecotones refers to the border between habitat types. It has been noted that edges or ecotones support a larger number of animals and species type as well as different species type than found in adjacent habitat interiors. Similarly, certain animal species are found exclusively in habitat interiors. Patch sizes vary with minimum territory sizes necessary to support desired animal species. However, Kautz suggests that the larger the patch size, the greater the diversity of species the patch will support. Kautz does not suggest a minimum corridor width but does indicate that width must exceed 40 meters to support forest-interior species.

MINIMUM POPULATION THRESHOLDS

Minimum Population thresholds necessary to sustain a species is unclear. Geneticists speak of minimum population size necessary to sustain a gene pool without in-breeding. Others suggest a minimum population size necessary for the species to sustain its role in the food chain without upsetting the balance of the ecosystem. However, there are other considerations which may warrant a larger minimum population threshold, such as the minimum population necessary for a species to recover from climatic disasters such as drought, hurricane, or other short-term impact. For some species minimum population size is apparently attached to behavioral patterns. For example, it has been suggested that the minimum population threshold necessary to sustain the now extinct Passenger Pigeon was very high, possibly numbering in the millions.

TERRITORY SIZE

It seems apparent that minimum habitat size is related to minimum territory size. Differing animal species require differing territory sizes. Some species, such as the Florida Panther require a very large territory comprising between 70 and 150 square miles per individual. Black bears require similarly large territories. However, in the case of black bears, territories of individual animals can overlap. The eastern indigo snake, which requires one of the largest territories for a reptile, requires 90 to 175 acres. Since most species require

territories smaller than this, designated habitat areas should be based upon the largest territory size needed for such animals multiplied by the minimum number of animals needed to sustain the population at or above minimum population threshold limits.

DEGREE OF SPECIALIZATION

Plant and animal species have evolved to fill many niches in nature. Some have become highly specialized in one or more ways. Highly specialized species require special consideration as events or changes in the environment that adversely affect these specializations may cause the population to disappear. The Everglades kite, for example, is a highly specialized species. Its sole food item is the Apple Snail. In areas where this kite is found, the snail is abundant. When the snail disappears, so does the kite. Both the snail and the kite were plentiful and widespread in south and central Florida before massive drainage projects changed the hydrologic cycles and features of the land. As of 1978, no more than 150 kites remained, and the population is in imminent danger of extinction.[60]

HOST SPECIES

Host species are those which play an important role in providing habitat for other plant and animal species. Without the presence of host species, the other life forms dependent upon host species for survival would not exist. A relatively few plant species are of greater importance because they create a habitat required by other plants and animals. Host species should be given special consideration as when their numbers decline, the impact is far greater than with a proportionate decrease in other species. An example of a host animal species is the gopher tortoise. The gopher tortoise likes to burrow and can create burrows as long as 30 feet and as deep as 12 feet. These burrows also provide habitat for the indigo snake, Florida mouse, gopher frog, and big pine snake.[61]

ENDEMIC SPECIES

One of the most distinctive features of Florida species are the number of endemic species. The FCREPA study on Florida mammals indicated that of the 43 identified mammals, 25 were considered endemic to Florida. Although not specifically addressed, the FCREPA study indicated that a significant percentage of identified amphibians and reptiles were also endemic to the state. Endemic species also deserve special consideration as a loss of their population could mean extinction of the species.

EXTIRPATED AND EXTINCT SPECIES

Extirpated or extinct species formerly located within north central Florida are important to note as they may provide insight into what can happen to other species in the future. Extirpated and extinct plants from the region include ginseng, which was apparently collected out of existence by people seeking its medicinal root. The San Felasco spleenwort, found in a rocky ravine in San Felasco Hammock, has not seen since 1969, and is assumed to be extinct.[62]

It is worthwhile to note the fate of species in other locales in the state which have experienced significant development pressure as similar fates could befall those of the region without proper management. The mistletoe cactus, found on the upper branches of live oak trees in Monroe and Dade County, was entirely destroyed by Hurricane Donna in the fall of 1960.[63] A fern, Thelypteris macilenta, disappeared in 1937 following drought and disturbance by livestock.[64] Scentless vanilla, was destroyed by collectors.[65] Turk's-cap Lily was lost with the conversion of its habitat to permanent pasture.[66]

Several field sightings were made of large numbers of plains bison between the Suwannee and Aucilla rivers, around Newnan's Lake in Alachua County, and near Ichetucknee Springs in Columbia County. Bison were apparently extirpated in Florida by the late 18th or early 19th centuries as a result of killing of large numbers by early settlers. The Florida red wolf which used to be found in Payne's Prairie, was apparently extirpated in the early 1900's. The wolf apparently was found at Payne's Prairie. The species has been exterminated over much of its original range and in much of the remaining areas has hybridized with the coyote. The west indian monk seal was lost by the early 20th century. The animal was hunted out of existence for its oil.

The Carolina parakeet was once abundant throughout the eastern half of the United States and was common throughout Florida (except in the Keys). The bird was virtually extinct by the end of the 19th century. The bird was unusually susceptible to systematic killing. When a flock member was shot, its fellows would return again and again, so that a single hunter could take all the birds.

The passenger pigeon is an striking example of uncertainties regarding minimum threshold populations. FCREPA suggests that their minimum threshold population numbered in the millions.[67] The bird was one of the most gregarious birds ever known, travelling and nesting in flocks of millions. The low-flying flocks and large nesting grounds encouraged mass-slaughter for food and sport. In Florida, the bird was only known as a winter visitor. Their decline was rapid after the 19th century, probably because of reduction below a very high critical minimum threshold necessary to sustain the population.[68]

THREATS

One first thinks of habitat destruction as the primary cause of population declines, and indeed with many Endangered and Threatened species this is the case. Plants such as the four-petal pawpaw, the Spiny Hackberry, the Florida Golden aster, the wiregrass gentian, and the highlands scrub hypercium would presumably continue to thrive if their special habitats were not under pressure from agricultural and/or commercial development. A surprisingly large number of endangered and threatened plants, particularly those of south Florida, are being destroyed by selective removal from the undisturbed habitat. The hand fern, the bird's-nest spleenwort, nodding catopsis, and fuzzy-wuzzy airplant, and nearly all of the native orchids continue to decline in numbers even though their habitats remain undisturbed.[69] Within north central Florida, Bartram's Ixia has rapidly diminished in numbers. FCREPA notes this flowing herb as "Florida's premier endemic". It was spotted flowering in pine flatwoods north of Starke in Bradford County in 1931. However, this location has been converted to a junkyard and apparently can no longer be found at this site.[70]

One general characteristic of the region's threatened mammals is the tendency for individual species or subspecies to be relatively narrowly restricted to certain habitat types. Twenty-four of the 35 designated land mammals are limited to only one or two major habitat types.[71] One-third of these are wetland inhabitants. Required habitats for the remainder include beaches and dunes (coastal strand), tropical hammocks, longleaf pine-turkey oak woodlands, sand pine scrub, mixed pine and hardwoods, pine flatwoods, and caves. Most of these habitat types are being destroyed or modified by man throughout the state in ways unsuitable for the affected species. Some of the land mammals which are not narrowly restricted to specific habitat types, such as the Florida black bear and Florida panther, are dependent upon large, relatively undisturbed areas of mixed vegetation types.[72] Such large, undisturbed areas are rapidly giving way to urban development in many parts of the state.

The major factors responsible for the critical status of animals presently listed as endangered or threatened are habitat loss and various kinds of direct human impact. Natural factors, such as hurricanes or long-term climatic trends, may also be involved. Habitat loss alone appears to be the primary cause for the critical status of eight (62 percent) of the endangered and threatened mammals, including the Florida mouse in sand pine scrub and sandhill habitats. Habitat loss has resulted from development, overprotection from natural fires, and agricultural or forestry practices.

Habitat loss coupled with some direct detrimental human influences is apparently responsible for the critical status of the Sherman's fox squirrel. The squirrel is a legal game species and has been hunted. Habitat destruction in the form of development, logging, drainage, and burning has undoubtedly been by far the predominant cause of the decline of the species.

The critical status of the Florida panther, Florida black bear, and west indian manatee appear to be due more to human exploitation than loss of habitat. Although the carrying capacity of the habitats of these species today is less than under primitive conditions, evidence indicates that these mammals were drastically reduced by hunting or trapping much before there was significant habitat reduction. Populations are probably presently being suppressed at a level below the carrying capacity of remaining habitats by continued accidental or deliberate killing. The bear may still be legally hunted in parts of the state. It is possible that the Florida Mink is now scarcer in coastal areas because of destruction or degradation of salt marsh habitats. The only species of special concern among Florida mammals, the round-tailed muskrat, is so listed because of continuing reduction of wetland habitats.

The continued existence and size of populations of Florida panther and Florida black bear are ultimately dependent upon the availability and quality of their habitats. Therefore, for the most part, the problem of rare and endangered Florida animals boils down to the problem of rare and endangered Florida habitats. The survival of these species is synonymous with protection and proper management of their habitats.

Hunters and fishermen are seldom mentioned as a source of concern to species preservation. According to the laws of population dynamics, a particular species will maintain a specific biomass under a specific set of ecological conditions. Those individuals of a species that are eliminated from a population will in turn be replaced by others of the same species that would not otherwise have been able to survive. Fish, as a rule, have a higher reproductive potential than other vertebrate animals, and thus are quickly able to "bounce back" from temporary population losses. However, if their numbers increase in direct proportion to the expected population increases of north Florida, the additional pressure might place even more species on the critical list.

Certain species such as the Atlantic sturgeon, mature very slowly (possibly as long as 10 years or 15 years, depending upon the species). Expansion of the commercial fishery for sturgeon in Florida may substantially adversely affect this species.

Critical fish are vulnerable to a greater or lesser degree because of their limited ranges. As a general rule, the degree of vulnerability of fish is related to the size of the body of water in which they occur. Those species found in large rivers and closely adjacent areas are most subject to the adverse effects of pollution, dredging, or dam construction. The smaller the body of water, the less likely the water body will be subject to ecological disturbances.

APPENDIX D:

CRITICAL SPECIES OF NORTH CENTRAL FLORIDA

LEGEND

E = Endangered
T = Threatened
R = Rare
S = Special Concern
U = Unknown Status
X = Extirpated or Extinct

MAMMALS	STATUS
Florida Panther	E
Sherman's Fox Squirrel	T
Florida Mouse	T
Florida Black Bear	T
Round-Tailed Muskrat	S
West Indian Manatee	T
Southeastern Shrew	R
Southeastern Big-Eared Bat	R
Southeastern Weasel	R
Florida Mink	R
Southern Mink	R
Sherman's Short-Tailed Shrew	U
Plains Bison	X
Florida Red Wolf	X

PLANTS

Poppy Mallow	T
Needle Palm	T
Jackson-Vine	T
Bartram's Ixia	T
Florida Coontie	T
Baneberry	R
Texas Anemone	R
Flyr's Nemesis	R
Southern Lip Fern	R
Water Sundew	R
Hartwrightia	R
Mountain Laurel	R
West's Flax	R
Pond Spice	R
Green Adder's-Mouth	R
Spoon-Flower	R
Pine-Wood Dainties	R
Mexican Tear-Thumb	R
Florida Willow	R
Cedar Elm	R

BIRDS

Wood Stork	E
Ivory-Billed Woodpecker	E
Red-Cockaded Woodpecker	E
Bachman's Warbler	E
Kirtland's Warbler	E
Southern Bald Eagle	T
Southeastern American Kestrel	T
Florida Sandhill Crane	T
Louisiana Seaside Sparrow	T
White-Tailed Kite	R
Short-Tailed Hawk	R
Florida Great White Heron	S
Little Blue Herron	S
Great Egret	S
Snowy Egret	S
Louisiana Heron	S
Eastern Least Bittern	S
White Ibis	S
Cooper's Hawk	S
Limpkin	S
Royal Tern	S
Black Skimmer	S
Florida Burrowing Owl	S
Marian's Marsh Wren	S

BIRDS (Continued)

Florida Prairie Warbler	S
Scott's Seaside Sparrow	S
Wakulla Seaside Sparrow	S
Florida Clapper Rail	U
Black Rail	U
Carolina Parakeet	X
Passenger Pigeon	X

AMPHIBIANS

Florida Gopher Frog	T
One-Toed Amphiuma	R
Striped Newt	R
Carpenter Frog	R

REPTILES

Atlantic Ridley	E
Short-Tailed Snake	E
Suwannee Cooter	T
Gopher Tortoise	T
Spotted Turtle	T
Atlantic Leatherback	R
Mole Snake	R
Gulf Salt Marsh Snake	R
American Alligator	S
Eastern Indigo Snake	S
Alligator Snapping Turtle	U
Atlantic Sturgeon	E
Ohoopee Shiner	R
Spotted Bullhead	R
Mud Sunfish	R
Suwannee Bass	R
Dusky Shiner	S

Source: FCREPA, Rare and Endangered Biota of Florida Volumes I-V, Gainesville, University of Florida Press, 1978.

APPENDIX E:

SIGNIFICANT FEATURES OF THE SUWANNEE RIVER SYSTEM

SEGMENT I

Algal Beach	Example of ancient seashore phenomenon
Big Shoals	Example of limestone erosion and shoals phenomenon-Only freshwater shoals in the state of Florida.
Agatized Coral	Placer deposit agatized coral cobbles
Brown Tract Little Shoals	Example of cypress knees and limestone ledge features.

SEGMENT II

Bell Spring	S. bank of Suwannee River. Present use: Swim ming .6 mile from Suwannee River. 3 dams make a large body of water for swimming. Is used as private, residential, swimming hole.
White Springs	SW corner of the City of White Springs. Acreage 200-300. (Stephen Foster Memorial) Land Use: Residential, urban. One of first tourist centers in Florida. Spring is enclosed in 90' x 50' concrete foundation of former spring/bath house. Scenic spring and historic memorial. 2nd magnitude spring. Also known as White Sulphur Springs.
Blue Sink	See text
Louisa Spring	
Indian Flint quarry	Example of unique outcrop flintrock
Suwannee Springs Spa	Example of early conduit between Pond and Suwannee Springs Spa
Boat Ramp	Suwannee County Development Authority. 734 acres owned by county. Boat ramp facilities

Guinea Creek Florida Sheriff's Ranch	Example of karst features, limestone sinks privately owned. Boat rental, picnicking, Boy's & swimming.
Alapaha River Confluence	Example of underground river surface return
Hardwood Preserve	Example of mature hardwood timber
Adams Spring	Large spring syphon 500-600 ft. long by 200-250' wide. Good sight-seeing for skin and scuba diving to depths of 37 feet in spring basin & 25 ft. in syphon. Surrounding area very scenic. Land Use: Undeveloped/woodland.
Suwannee Springs	Interesting rock formation in spring issuing 19 mgd of clear green sulfur water. Entire spring is surrounded by rock walls that resemble an old Spanish Fort. Land use: woodland?. At least 6 springs in this third magnitude spring group. All are at edge of Suwannee River. No facilities.
Suwannee River	Suwanneecoochie Spring. 19 mgd.
Ellaville Springs	Example of large grotto spring.

SEGMENT III

Withlacoochee River confluence	
Anderson Spring	
Greenspan	County owned boat ramp facilities.
Charles Spring	Example of Spanish Mission (ruins at Charles Spring) A second magnitude spring. Headpool 50' in diameter, 10' depth to cave entrance. Cave can be dangerous due to extreme silt and cave-ins. Flow is 14 mgd. 2nd magnitude. Land use: undeveloped/woodland. 100 ft. run to river. Is apparently used for picnicking.
Historic Trail	Example of Spanish travel route.
Historic Trail	Example of Spanish St. Augustine Trail.
Allen's Mill Pond	30 Acres historic mill. Is in a valley Spring surrounded by dense woodland. 50 x 150 ft. Flow runs .6 mile to Suwannee River. Flow

	widens from 20 ft. to 100 ft. at confluence with Suwannee. Private campgrounds.
N. Fla. Methodist Camp	Privately owned campground consisting of 530 acres.
Pine Preserve	Example of virgin pines stand.
Hardwood Preserve	Example of mature hardwood timber.
Springs on Suwannee	(Bonnett, Peacock, Running Cow Spring, & Olson Sink) (Suwannee). A group of springs and sinks that are located next to each other on Suwannee River. Land use: woodland.
Running Springs	Two beautiful springs located on banks of Suwannee River. The right spring is 10' deep with a short run that syphons under the river banks to Suwannee. The left spring has an underwater natural bridge with a 3' x 5' opening that can be easily free-dived. Land use: Woodland. Approximate acreage: 1 acre. 3rd magnitude 6.46 mgd.
Bonnet Spring	Small spring in beautiful natural setting. Good swimming and skin diving in large area of lily pads with many fish. 3rd magnitude spring flow less than 10 cu.ft. per sec. 6.46 mgd.
Cow Spring	A small spring-syphon filled with crystal clear water. Apparently too small for any large scale recreation. Approx. acreage: 1 acre. Land use: woodland.
Owens Island	Vestiges of Seminole War Island Fort.
Troy Spring	On Suwannee River. Clear spring flowing into Suwannee river approx. 400 ft. distant. Open to public for limited use. Vestiges of sunken vessel. A first magnitude spring. Avg. flow of 166 cu. ft./sec.
Little River Springs	Restricted to only certified cave divers. Is rated as one of finest cave dives in Florida. Spring basin is large with bare land sand bottom. There is an underground system of caves. Surrounding land use woodland/un developed. Example of deep spring with extensive cavern source. A 2nd magnitude spring.

Santa Fe River Confluence	Example of an area with a variety of values, including hardwoods.
Fletcher Spring	Fletcher Spring is in a heavily wooded area with many dry sinks. It has been used for years as a swimming hole. The area is easily flooded as is located in floodplain, and there is not good visibility in the spring or run. Depth 32' to a small cave. The run is 30 ft. wide and meanders 450 downstream and disappears into a sink. A 2nd magnitude spring.
Branford Spring	Approximate acreage: 5 acres. Is part of a recreation area adjacent to Suwannee River. Is used for swimming and has a diving board. Private canoe rentals, boat ramp, etc. adjacent to spring. Land use: River, woodland, some residential. 2nd magnitude spring.
Mearson Spring	2nd magnitude spring.
Ruth Spring	550 ft. from Suwannee. 3rd magnitude spring surrounded by woods.
Owens Spring	West of Mearson Spring. 2nd magnitude spring. Used for fishing, swimming, and scuba diving. - Flow is .2 mile to Suwannee.
Royal Spring	Spring is surrounded by steep banks. A concrete retaining wall is built on east side with steps to the water. The basin is about 40 yards in diameter with a shallow 60 yd. of water. Land use: undeveloped. A third magnitude spring. Has flow of less than 10 cu.ft. per second (6.46 mgd).
Convict Spring	Is in a clearing surrounded by dense woodlands. Spring is in a 20 x 50' teardrop shaped pool. Run flows about 50 ft. to Suwannee River. A third magnitude spring. Quite attractive.
Telford Spring	Bare dirt banks slope gently down to the spring which has a run about 40 yards long a small crevice ends in a small cave. Located adjacent to Telford Sink and Terrapin Sink. Flow is 24 mgd. Second magnitude Spring. Adjacent to Suwannee River.

Perry Spring	Spring with depth to 30 ft. Run to river connects 2 natural bridges. Land use: pasture. South bank of Suwannee River. Present use: swimming & scuba diving.
Falmouth Spring	A first magnitude spring. Avg. flow of 158 cu. ft./sec. A spring-sink combination 400 ft. run from spring to sink. Spring reportedly flows underground to Suwannee.
Morrison Spring	Flow of 33 mgd.

SEGMENT IV

Turtle Spring	(Resurgence of Fletcher) 2nd magnitude spring.
Rock Bluff Spring	2nd magnitude spring 700 ft. run to Suwannee. Privately owned.
Little Copper	flow: 1.6 mgd. 200 yard run to Suwannee. A third magnitude spring.
Hart Springs	Acreage 190. Designated County Park. Flow 39 mgd W. Gilchrist Co. on Suwannee River. Flows 500 ft. to Suwannee. 2nd magnitude spring.
Otter Springs	Campground 640 acres. Privately owned. Full facility campground. Forested lands around spring run on Suwannee River. 65 acres in sandhill vegetation, 110 acres of messic hammock. Many sinkholes on property. Much of area is swamp land. Very scenic area. Possible archeological site on property.
Georgia Pacific Wilderness Area	188 acres privately owned. Camping
Lumbercamp Spring	flow 1.9 mgd. Land Use: Woodland
Townsend Spring	3rd magnitude spring. flow <6.46 mgd.
Trail Spring	
Fanning Spring	A 1st magnitude spring.
Bell Springs	
McCrabb Spring	A 3rd magnitude Spring flow <6.46 mgd.

Sun Spring	Also known as Aiken Springs. West Bank of Suwannee River. Land use: woodland on west or outer edge and pasture on east side. A small spring that forms a narrow run leading to Suwannee river. A circular rock cliff 10' below the surface drops to 20' depth. Popular swimming site, no other spring in immediate vicinity.
Copper Spring	flow 12 mgd. 2nd magnitude spring also known as Oldtown Springs. is a group of 3 springs. 500 ft. run to Suwannee River. Derives name from yellowish-brown deposits coating ground around springs. high in iron content. Private property used for swimming and boating.
Big Cypress Spring	Two miles below Rock Bluff Ferry. flow 8 mgd. 3rd magnitude spring.
Guaranto	Land Use: Woodland. 2nd magnitude spring. Used locally for swimming. No facilities.
Kalogridis Property	Acreage: 256. 6,240 ft. of river frontage on Suwannee River.

SEGMENT V

Hog Island	Acreage: 2980. Example of salt marsh ecosystem.

SANTA FE RIVER

Poe Springs	Acreage: 10. Land use: Woodland, few private homes. One of several springs feeding into the Santa Fe River. High potential as Alachua County Recreation site. During the 1920's it was a popular facility with bath house, dance hall. Many trees, variety of vegetation. Circular pool 90 ft. in diameter. 175 ft. run to Santa Fe. Little evidence of former development remains. 2nd magnitude spring.
Devil's Eye Spring	Land Use: Undeveloped-woodland. Devil's Eye is the middle of 3 boils in one of the most beautiful combinations of Springs in the state. Multi-caved with tunnel leading to Santa Fe River. Very popular for swimming and scuba diving. Centrally located around Ginnie, Hull, and Blue Springs. 2nd magnitude spring.

Dogwood Springs	100 yards west of Ginnie Springs on Santa Fe River. Land Use: Woodland. A small spring with depths to 12 ft.
Ginnie Spring	Acreage: 5 acres. Land Use: Undeveloped/woodland. Large shallow swimming area around spring boil. Cave at 15 ft. in boil leads to cave with initial depths to 40 ft. Clear water with some eel grass and fish along with nice run to Santa Fe River makes scenic swimming and scuba diving area. Ginnie Spring is one of the most popular scuba diving springs in the state. A 2nd magnitude spring.
Lily Spring	Surrounding Land Use: Woodland. Small shallow spring boil about 150 yards from Santa Fe River. Has winding run through wooded area. Centrally located around Poe, Rum Island, Blue Springs, etc.
Columbia Springs	Spring containing indian artifacts. Woodland surroundings. A 2nd magnitude spring.
Naked Spring	Acreage: 1 acre. Land use: Woodland. Spring is small and therefore is only capable of limited recreational use. Since it is centrally located with other springs it should be considered with that group with regard to management plans. Is 25 yds. in diameter with 3 small crevices about 12' below the surface. Water flows through the thick woods and connects with Blue Spring's run before it reaches the Santa Fe. This spring is very small but is located with Blue, Rum Island, and Ginnie Spring.
Hornsby Spring	Land use: Woodland and Pasture. A first magnitude spring. Avg. discharge of 163 cu. ft./sec. Part of camp Kuluqua. Used as a swimming and recreation facility by Camp Kuluqua, privately owned and operated by a religious organization.
Blue Spring	Spring is 1000 ft. south of Santa Fe River. Land Use: Woodland-undeveloped. A large limestone cliff drops 25' to a small cave entrance 1500' boardwalk down run. Sand beach borders south bank. Tourist attraction. Commercially owned. A 2nd magnitude springs complex.
July Spring	Surrounding land use: woodland. Reportedly there are connective passages between rum spring and devil's eye spring.

Rum Island Spring	Small spring located on the north bank of the Santa Fe River. Extremely clear water fills a 40' diameter basin. Depths to 12 feet. The spring is filled with a beautiful variety of plant life. Land use: woodland. Worthington In town of Worthington Springs. North bank of Santa Spring Fe River. Has been cased in a square pool with concrete walls measuring 90' by 50'. Water flows into an adjoining swimming pool. Flow estimated at 1,000 gpm. Land use: Residential. 4th magnitude spring. Used to be a privately operated bath house. No buildings remain. Not utilized.
Wright Estate	Straddling both sides of Santa Fe River. River Swamp & Hammock area with some pasture and hardwood forest. Periodic flooding of area. Pine & Scrub Oak in uplands. Early development in area, some historic value. Blue & Ginnie Springs located on property. Present use: pasture land, floodplain.
DLC Tract	Acreage: 190. Lands bordering Santa Fe River, including one island.
Kittredge Property	NE Alachua County portion only. Natural, almost pristine area. Pine flatwoods surrounds natural cypress swamp with scattered hardwood hammocks. Present use: none. Surrounding land use: Forest, Agriculture, some residential.
O'leno Addition	Acreage: 4000. Present use: natural, some timbering. Purchased by state. Area where the Santa Fe River returns to the surface after a three mile underground route from a sink in the O'leno State Park. Area noted for wilderness qualities and natural beauty. Site of old Belamy Road Historic Trail.

WITHLACOOCHEE RIVER

Morgan's Spring	North bank of Suwannee River but discharges into Withlacoochee.
Blue Springs	

ICHETUCKNEE RIVER

Dickenson Tract	Present use: none. Land use: woodland. Natural scenic tract near state park. wooded. Is adjacent to Ichetucknee State Park.

Ichetucknee Springs	In Ichetucknee Springs State Park. A first magnitude spring with avg. flow of 361 cu. ft. /sec.

ALAPAHA RIVER

Alapaha Rise	A first magnitude spring on Alapaha River avg. flow 608 cu. ft./day.
Holton Spring	A first magnitude spring discharges into Alapaha. Avg. flow of 288 cu. ft./sec.

APPENDIX F:

MAJOR SINKS WITHIN NORTH CENTRAL FLORIDA

ALACHUA COUNTY
- Devil's Millhopper
- Haile Quarry Herricle Smith
- Sinkholes & quarries in Newberry Area
- Alachua Sink
- Kanapaha Sink
- Robinson Sink

BRADFORD COUNTY
- Brooks Sink

DIXIE COUNTY
- Lime Sink

GILCHRIST COUNTY
- Ginnie & Devil's Eye Sinks

HAMILTON COUNTY
- Alpha Sink

MADISON COUNTY
- Blue Sink
- Campbell Sink
- Johnson Sink
- Patterson Sink
- Rogers Sink

SUWANNEE COUNTY
- Sailor Hole (?)
- Challenge Sink
- Cisteen Sink
- Olson Sink
- Orange Grove Sink
- Telford Sink
- Terrapin Sink

TAYLOR COUNTY
- Adams Sink
- Aucilla River Sinks
- California Sink
- Page Sink

APPENDIX G:

PROJECTIONS FOR SELECTED NATURAL AREAS

TABLE G-1

CURRENT TRENDS: SUWANNEE RIVER CORRIDOR

CURRENT TRENDS			
Avg. lot width for riverfront property	=	126	ft.
Avg. acreage subdivided per year	=	797	acres
Avg. lot size	=	1.74	acres
Available river frontage as of 4-85	=	1,666,087	feet
Available F. P. corridor area as of 4-85	=	242,322	acres
Percent of subdivided property with river frontage	=	58.32	Percent

TABLE G-2

PROJECTED DEVELOPMENT: SUWANNEE RIVER CORRIDOR

	CORRIDOR DEVELOPMENT			RIVERBANK DEVELOPMENT		
	DEVELOPED		REMAINING	DEVELOPED		REMAINING
YEAR	ACRES	PERCENT	ACRES	FEET	PERCENT	FEET
1990	20,022	07.7	239,306	543,871	26.6	1,504,769
2000	27,992	10.8	231,336	880,458	43.0	1,168,182
2010	35,962	13.9	221,836	1,217,045	59.4	831,595
2020	43,932	16.9	215,396	1,553,632	75.8	495,008
2030	51,902	20.0	205,426	1,890,219	92.3	158,421
2034	59,872	23.1	199,456	2,013,940	98.3	34,700

TABLE G-3

CURRENT TRENDS: SAN FELASCO HAMMOCK

CURRENT TRENDS	
Corridor Acreage	= 10,240
San Felasco Hammock Acreage	= 6,487
Developable Acreage	= 3,753
Developed Acreage	= 1,090
Remaining Developable Acreage	= 2,663
Average acreage/yr developed since 1977	= 131

TABLE G-4

PROJECTED DEVELOPMENT: SAN FELASCO HAMMOCK

YEAR	DEVELOPED ACRES	DEVELOPED PERCENT	REMAINING ACRES
1990	1,832	48.8	1,921
2000	3,142	83.7	611
2005	3,753	100.0	0

TABLE G-5

PROJECTED DEVELOPMENT: DEVIL'S MILLHOPPER

YEAR	DEVELOPED ACRES	DEVELOPED PERCENT	REMAINING ACRES
1987	603	100	0

TABLE G-6

CURRENT TRENDS: PAYNE'S PRAIRIE

CURRENT TRENDS

Corridor acreage	=	36,480	acres
Payne's Prairie State Preserve acreage	=	17,775	acres
Roadway corridor acreage	=	451	acres
Developed Acreage	=	2,354	acres
Remaining developable acreage	=	15,900	acres
15 year annual average development	=	88	acres

TABLE G-7

PROJECTED DEVELOPMENT: PAYNE'S PRAIRIE

	DEVELOPED		REMAINING
YEAR	ACRES	PERCENT	ACRES
1990	2,870	15.7	15,345
2000	3,750	20.5	14,465
2010	4,630	25.4	13,585
2020	5,510	30.2	12,705

TABLE G-8

CURRENT TRENDS: SANTA FE RIVER CORRIDOR

CURRENT TRENDS

Avg. lot width for riverfront property	=	122.8	ft.
Avg. acreage subdivided per year	=	175.8	acres
Avg. lot size	=	1.25	acres
Available river frontage as of 4-85	=	690,620	feet
Available F. P. corridor area as of 4-85	=	97,216	acres
Percent of subdivided property with river frontage	=	21.07	Percent

TABLE G-9

PROJECTED DEVELOPMENT: SANTA FE RIVER CORRIDOR

	CORRIDOR DEVELOPMENT			RIVERBANK DEVELOPMENT		
	DEVELOPED		REMAINING	DEVELOPED		REMAINING
YEAR	ACRES	PERCENT	ACRES	FEET	PERCENT	FEET
1990	6,956	11.7	52,500	92,864	18.1	419,292
2000	8,713	14.7	50,743	129,007	26.2	383,149
2010	10,471	17.6	48,985	165,151	32.3	347,005
2020	12,229	20.6	47,227	201,295	39.3	310,861
2030	13,987	23.5	45,469	237,439	46.4	274,717
2040	15,744	26.5	43,712	273,583	53.4	238,573

TABLE G-10

CURRENT TRENDS: ALACHUA STREAM-SINK RECHARGE

CURRENT TRENDS		
15 year annual average acreage development	= 205	acres
Currently developed acreage	= 3,738	acres
Total Recharge Area acreage	= 51,840	acres

TABLE G-11

PROJECTED DEVELOPMENT: ALACHUA STREAM-SINK RECHARGE

	DEVELOPED		REMAINING
YEAR	ACRES	PERCENT	ACRES
1990	4,899	9.5	46,941
2000	6,949	13.4	44,891
2010	8,999	17.4	42,841
2020	11,049	21.3	40,791

TABLE G-12

CURRENT TRENDS: COLUMBIA RECHARGE AREAS

CURRENT TRENDS

15 year annual average acreage development	= 106	acres
Currently developed acreage, South Recharge	= 5,419	acres
Total South Recharge area acreage	= 47,360	acres
Currently developed acreage, Western Recharge	= 316	acres
Total Western Recharge area acreage	= 13,440	acres

TABLE G-13

PROJECTED DEVELOPMENT: COLUMBIA SOUTH RECHARGE

YEAR	DEVELOPED ACRES	DEVELOPED PERCENT	REMAINING ACRES
1990	5,913	12.5	41,446
2000	6,973	14.7	40,387
2010	8,033	17.0	39,327
2020	9,093	19.2	38,267

TABLE G-14

PROJECTED DEVELOPMENT: COLUMBIA WESTERN RECHARGE

YEAR	DEVELOPED ACRES	DEVELOPED PERCENT	REMAINING ACRES
1990	811	6.0	12,692
2000	1,841	13.7	11,608
2010	2,901	21.6	10,548
2020	3,961	29.5	9,488

TABLE G-15

CURRENT TRENDS: DIXIE COASTAL CORRIDOR

CURRENT TRENDS			
Corridor Acreage	=	152,320	acres
Developed Acreage	=	616	acres
15 year Avg Annual Developed Acreage	=	15	acres

TABLE G-16

PROJECTED DEVELOPMENT: DIXIE COASTAL AREA

YEAR	DEVELOPED ACRES	PERCENT	REMAINING ACRES
1990	671	0.4	151,649
2000	821	0.5	151,499
2010	971	0.6	151,349
2020	1,121	0.7	151,199

TABLE G-17

CURRENT TRENDS: TAYLOR COASTAL AREA

CURRENT TRENDS			
Corridor Acreage	=	124,440	acres
Developed Acreage	=	1,554	acres
Average Annual Acreage Subdivided:	=	55	acres

TABLE G-18

PROJECTED DEVELOPMENT: TAYLOR COASTAL AREA

YEAR	DEVELOPED ACRES	PERCENT	REMAINING ACRES
1990	1,810	1.5	122,630
2000	2,360	1.9	122,080
2010	2,910	2.3	121,530
2020	3,460	2.8	120,980

APPENDIX H:

SPECIAL TAXING DISTRICTS

ALACHUA COUNTY

MUNICIPALITIES

Alachua
Archer
Gainesville
High Springs
Lacrosse
Micanopy
Newberry
Waldo

SPECIAL DISTRICTS

Alachua County Health Facility Authority
Alachua County Soil and Water Conservation District
Gainesville Housing Authority

BRADFORD COUNTY

MUNICIPALITIES

Brooker
Hampton
Lawtey
Starke

SPECIAL DISTRICTS

-

COLUMBIA COUNTY

MUNICIPALITIES

Ft. White
Lake City

SPECIAL DISTRICTS

Columbia Housing Authority
Columbia Housing Finance Authority
Columbia Industrial Development Authority
Lake Shore Hospital Authority
Suwannee River Water Management District
School District?
Santa Fe Soil Conservation
Lake City Health Facility

DIXIE COUNTY

MUNICIPALITIES

Cross City
Horseshoe Beach

SPECIAL DISTRICTS

Dixie County Soil and Water Conservation District

GILCHRIST COUNTY

MUNICIPALITIES

Bell
Fanning Springs
Trenton

SPECIAL DISTRICTS

Gilchrist Housing Authority
Gilchrist Medical Board
Gilchrist County Park Board
Gilchrist County Soil and Water Conservation District

HAMILTON COUNTY

MUNICIPALITIES

Jasper
Jennings
White Springs

SPECIAL DISTRICTS

Hamilton Development Authority
Hamilton County Memorial Hospital

LAFAYETTE COUNTY

MUNICIPALITIES
Mayo

SPECIAL DISTRICTS

Lafayette County Development Authority

MADISON COUNTY

MUNICIPALITIES

Greenville
Lee
Madison

SPECIAL DISTRICTS

Madison County Soil and Water Conservation District

SUWANNEE COUNTY

MUNICIPALITIES

Branford

SPECIAL DISTRICTS

Live Oak Housing Authority
Suwannee Chamber of Commerce Development Authority
Suwannee Hospital
Suwannee County Soil and Water Conservation District

TAYLOR COUNTY

MUNICIPALITIES

Perry

SPECIAL DISTRICTS

Taylor County Development Authority
Taylor County Soil and Water Conservation District
Taylor County Recreation Board

UNION COUNTY

MUNICIPALITIES

Lake Butler
Worthington Springs

SPECIAL DISTRICTS

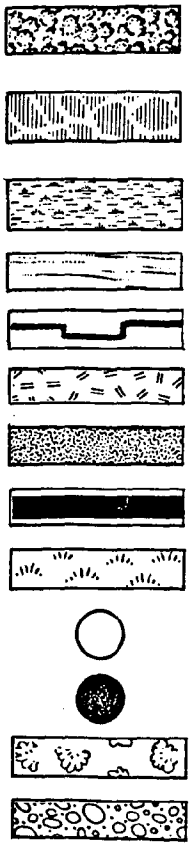
Union County Housing Authority

APPENDIX I

MAPS AND COORDINATES

LEGEND TO ILLUSTRATION I-1

1 ALACHUA COUNTY STREAM/SINK RECHARGE
2 DEVIL'S MILLHOPPER
3 GINNIE SPRINGS
4 GUM ROOT SWAMP
5 LOCHLOOSA FOREST
6 NEWNAN'S LAKE & PRAIRIE CREEK
7 O'LENO STATE PARK & RIVER RISE STATE PRESERVE
8 PAYNE'S PRAIRIE
9 SAN FELASCO HAMMOCK
10 SANTA FE RIVER CORRIDOR
11 SANTA FE SWAMP



FOREST

FRESHWATER WETLANDS WITH DIRECT CONNECTION TO SALT MARSH

FRESHWATER WETLANDS WITHOUT DIRECT CONNECTION TO SALT MARSH

FRESHWATER WETLAND, CORE WETLAND

HURRICANE SURGE

NATIONAL WILDLIFE REFUGE

RIVER

RIVER SEGMENT BOUNDARY

SALTWATER MARSH

SINK

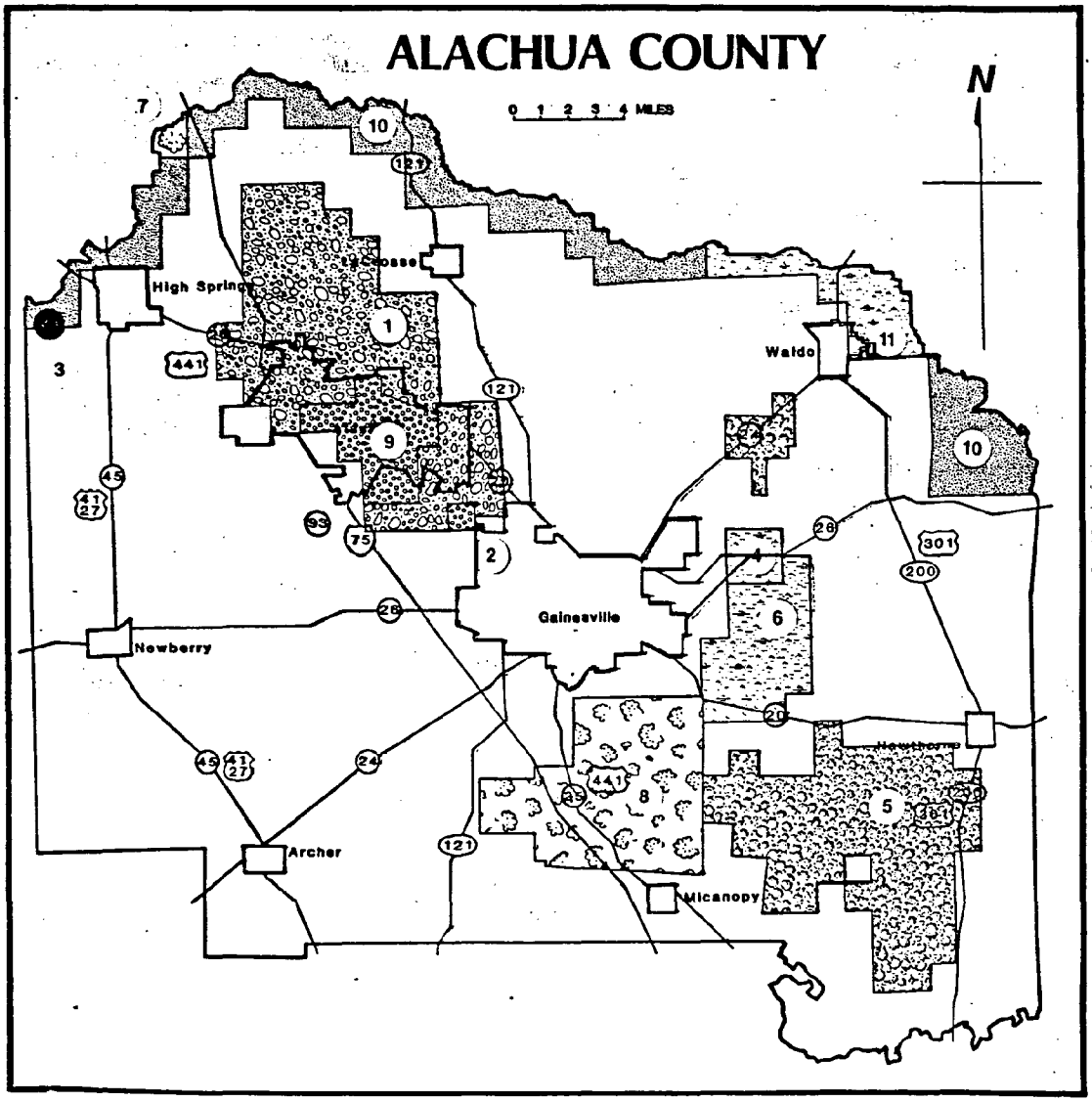
SPRING

STATE PARK/PRESERVE

STREAM/SINK RECHARGE

ILLUSTRATION I-1

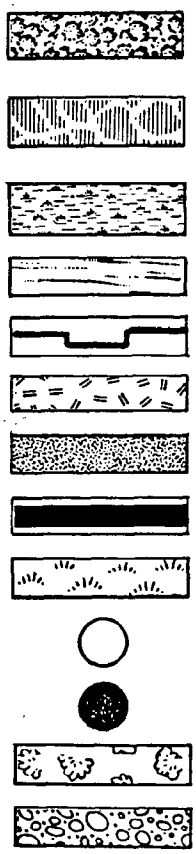
REGIONALLY SIGNIFICANT NATURAL AREAS IN ALACHUA COUNTY



NORTH CENTRAL FLORIDA
REGIONAL PLANNING COUNCIL

LEGEND TO ILLUSTRATION I-2

1 BROOKS SINK
2 SANTA FE RIVER CORRIDOR
3 SANTA FE SWAMP



FOREST

FRESHWATER WETLANDS WITH DIRECT CONNECTION TO SALT MARSH

FRESHWATER WETLANDS WITHOUT DIRECT CONNECTION TO SALT MARSH

FRESHWATER WETLAND, CORE WETLAND

HURRICANE SURGE

NATIONAL WILDLIFE REFUGE

RIVER

RIVER SEGMENT BOUNDARY

SALTWATER MARSH

SINK

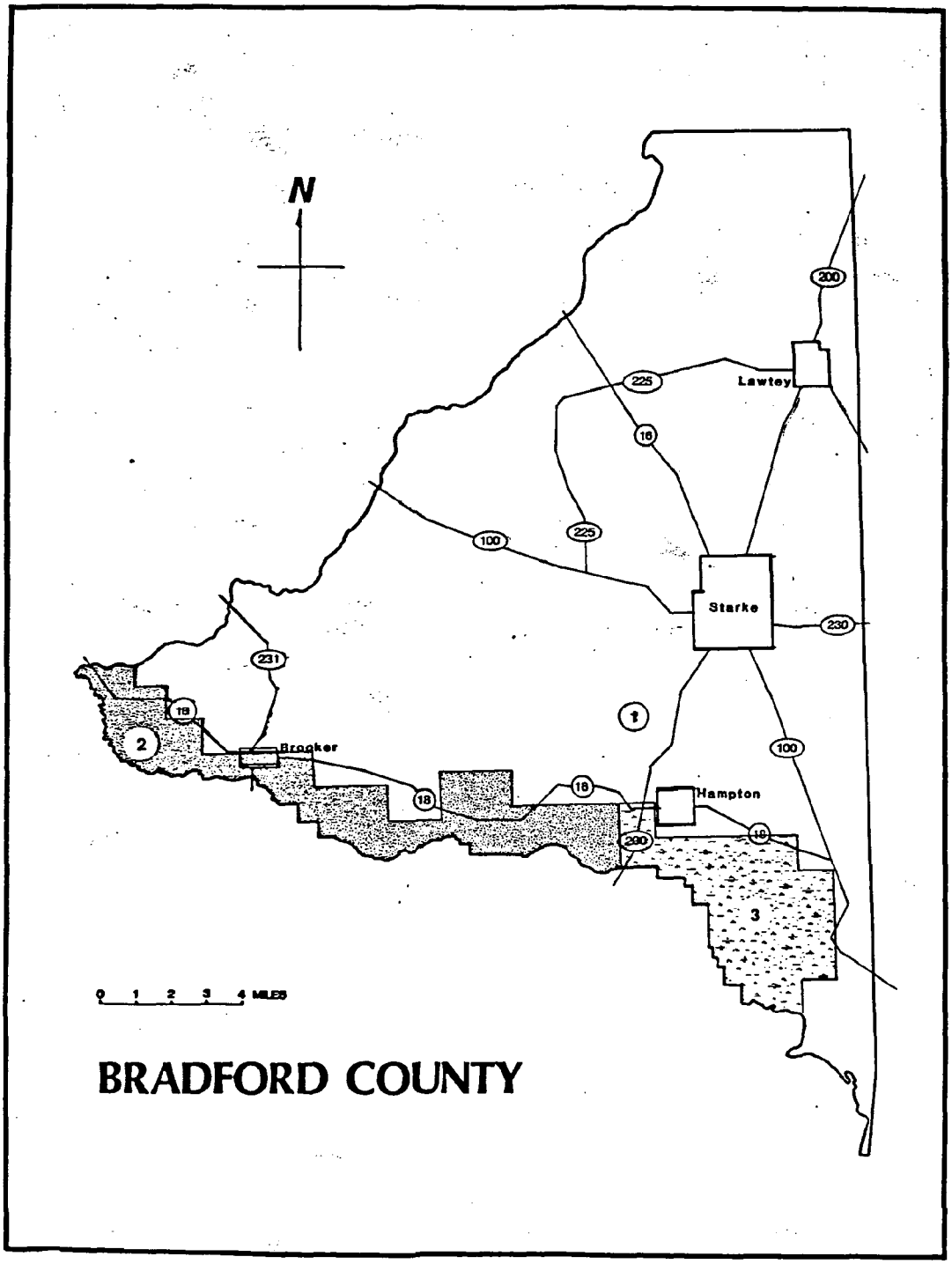
SPRING

STATE PARK/PRESERVE

STREAM/SINK RECHARGE

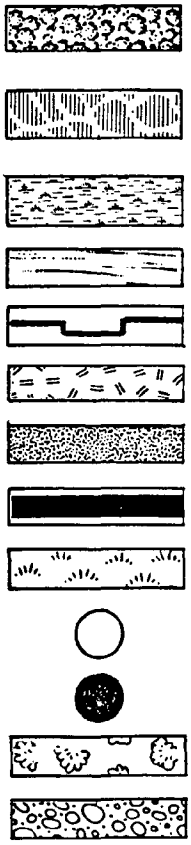
ILLUSTRATION I-2

REGIONALLY SIGNIFICANT NATURAL AREAS IN BRADFORD COUNTY



LEGEND TO ILLUSTRATION I-3

1 ICHETUCKNEE SPRINGS STATE PARK
2 O'LENO STATE PARK
3 OSCEOLA NATIONAL FOREST
4 PINHOOK SWAMP
5 SANTA FE RIVER CORRIDOR
6 SOUTHERN STREAM/SINK RECHARGE
7 SUWANNEE RIVER CORRIDOR SEGMENT I
8 SUWANNEE RIVER CORRIDOR SEGMENT II
9 WESTERN STREAM/SINK RECHARGE AREA



FOREST

FRESHWATER WETLANDS WITH DIRECT CONNECTION TO SALT MARSH

FRESHWATER WETLANDS WITHOUT DIRECT CONNECTION TO SALT MARSH

FRESHWATER WETLAND, CORE WETLAND

HURRICANE SURGE

NATIONAL WILDLIFE REFUGE

RIVER

RIVER SEGMENT BOUNDARY

SALTWATER MARSH

SINK

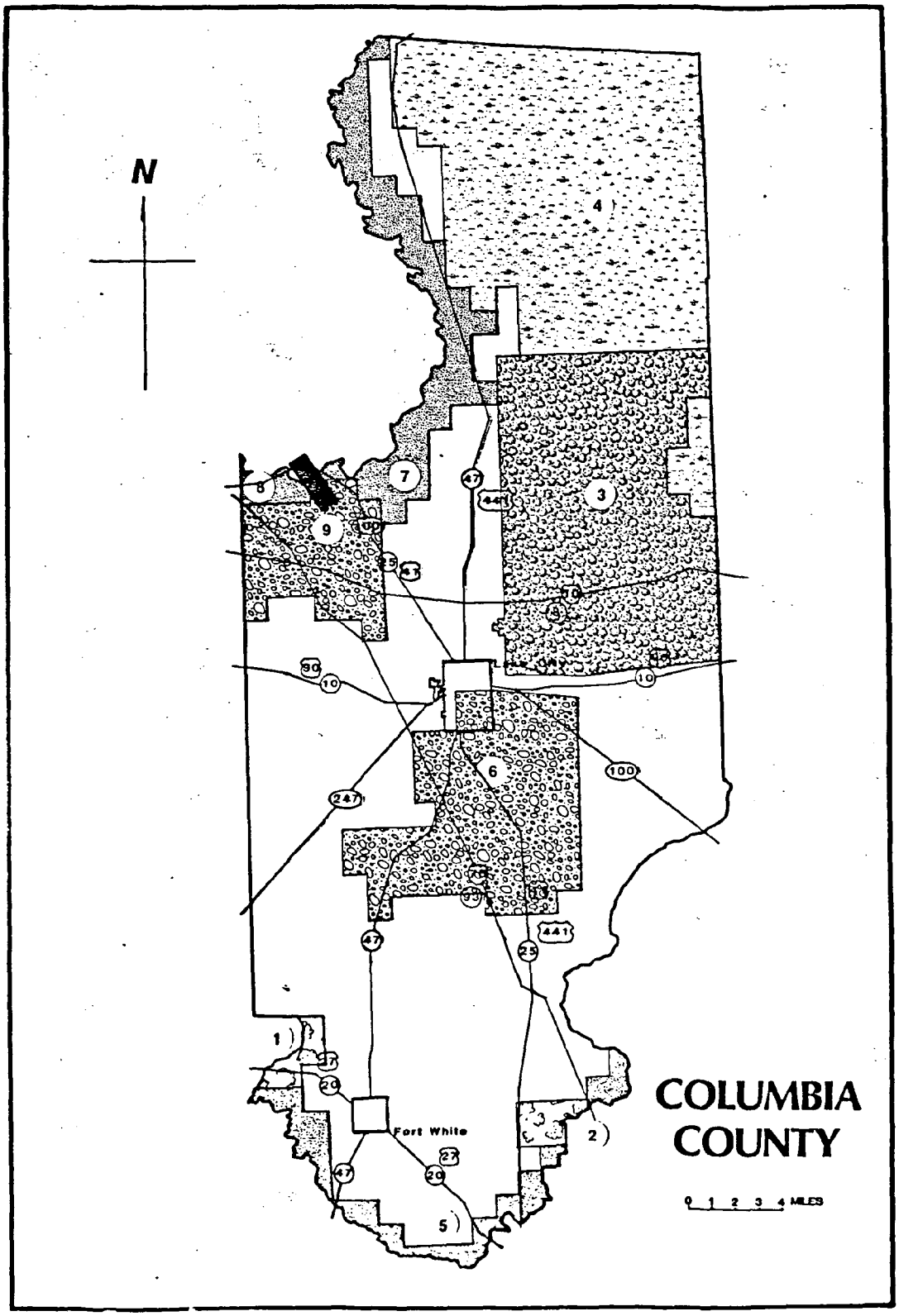
SPRING

STATE PARK/PRESERVE

STREAM/SINK RECHARGE

ILLUSTRATION I-3

REGIONALLY SIGNIFICANT NATURAL AREAS IN COLUMBIA COUNTY



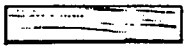
LEGEND TO ILLUSTRATION I-4

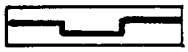
1 CALIFORNIA SWAMP
2 CORE OF CALIFORNIA SWAMP
3 FRESHWATER MARSH WITH DIRECT SHEET FLOW TO SALT MARSH
4 LIME SINK
5 LOWER SUWANNEE NATIONAL WILDLIFE REFUGE
6 SALT MARSH
7 STEINHATCHEE RIVER CORRIDOR
7 SUWANNEE RIVER CORRIDOR SEGMENT IV
8 SUWANNEE RIVER CORRIDOR SEGMENT V
10 WANNEE NATURAL AREA

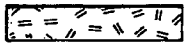
FOREST

FRESHWATER WETLANDS WITH DIRECT CONNECTION TO SALT MARSH

FRESHWATER WETLANDS WITHOUT DIRECT CONNECTION TO SALT MARSH

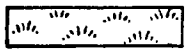

FRESHWATER WETLAND, CORE WETLAND


HURRICANE SURGE


NATIONAL WILDLIFE REFUGE

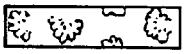
RIVER

RIVER SEGMENT BOUNDARY


SALTWATER MARSH

SINK

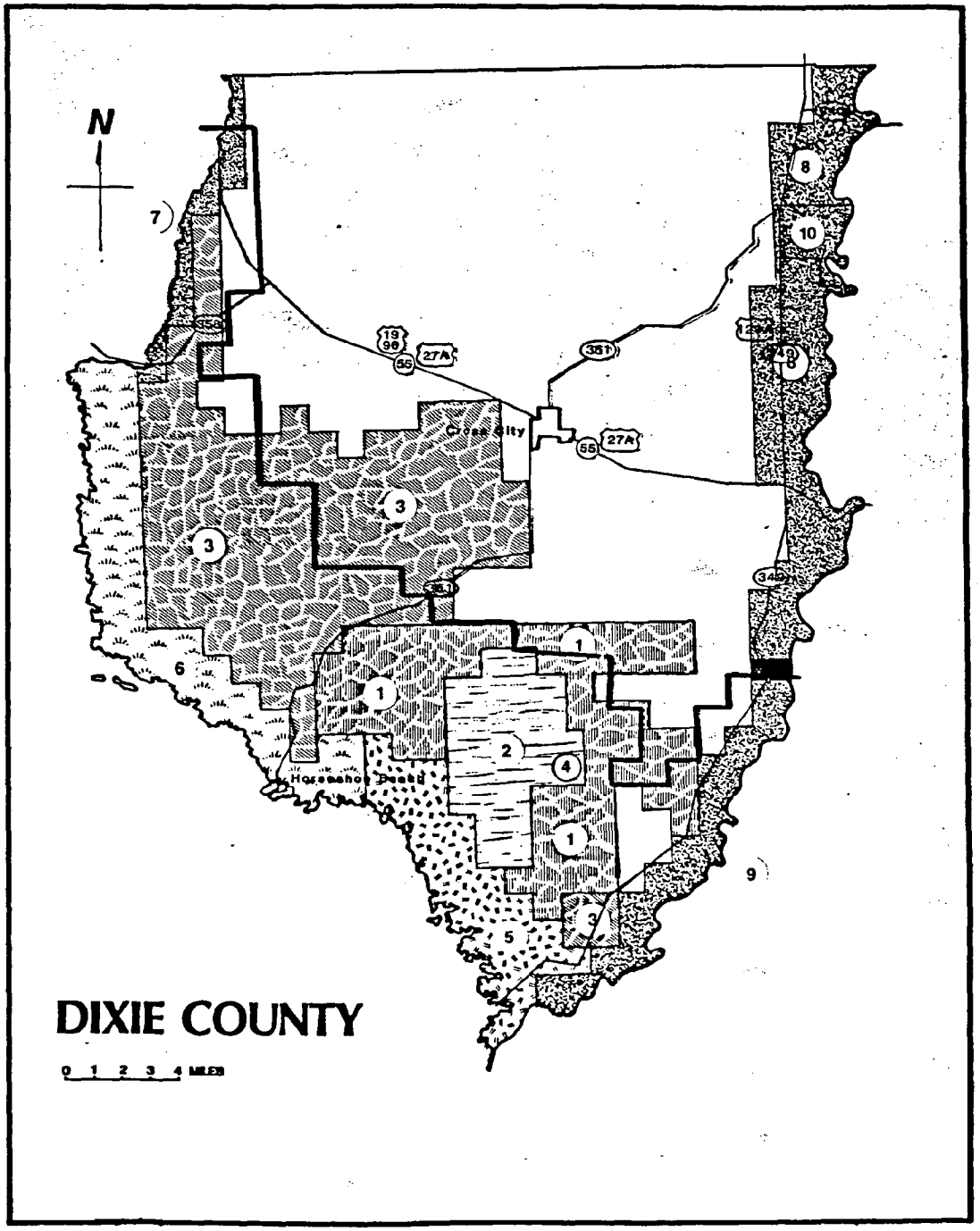
SPRING


STATE PARK/PRESERVE

STREAM/SINK RECHARGE

ILLUSTRATION I-4

REGIONALLY SIGNIFICANT NATURAL AREAS IN DIXIE COUNTY



NORTH CENTRAL FLORIDA
REGIONAL PLANNING COUNCIL

LEGEND TO ILLUSTRATION I-5

1 GINNIE SPRINGS
2 SANTA FE RIVER CORRIDOR
3 SUWANNEE/SANTA FE RIVERS CONFLUENCE
4 SUWANNEE RIVER SEGMENT IV
5 WACASSASSA FLATS
6 WANNEE NATURAL AREA

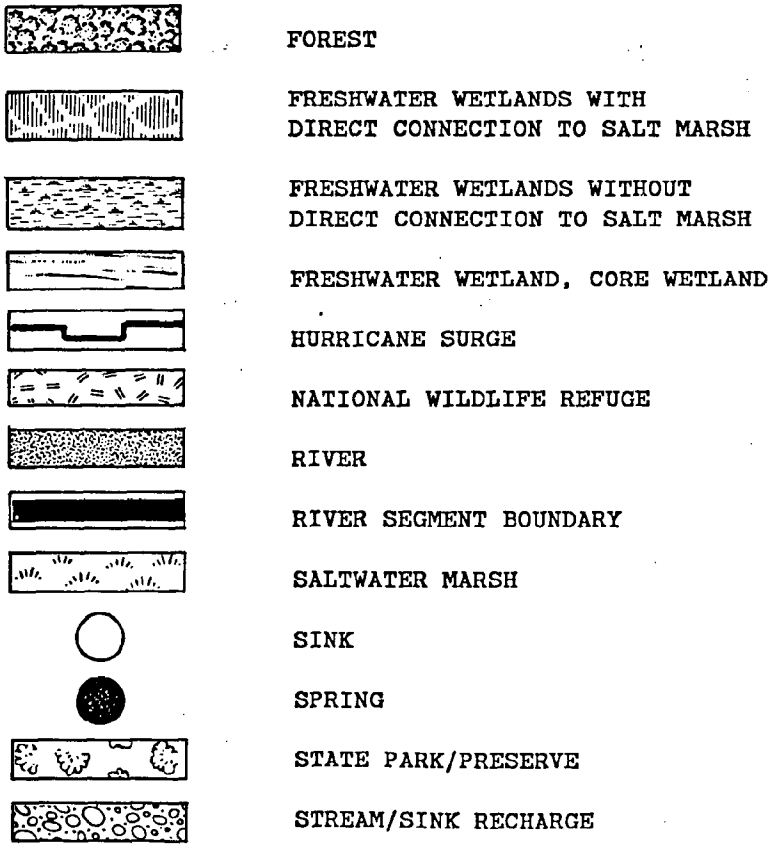
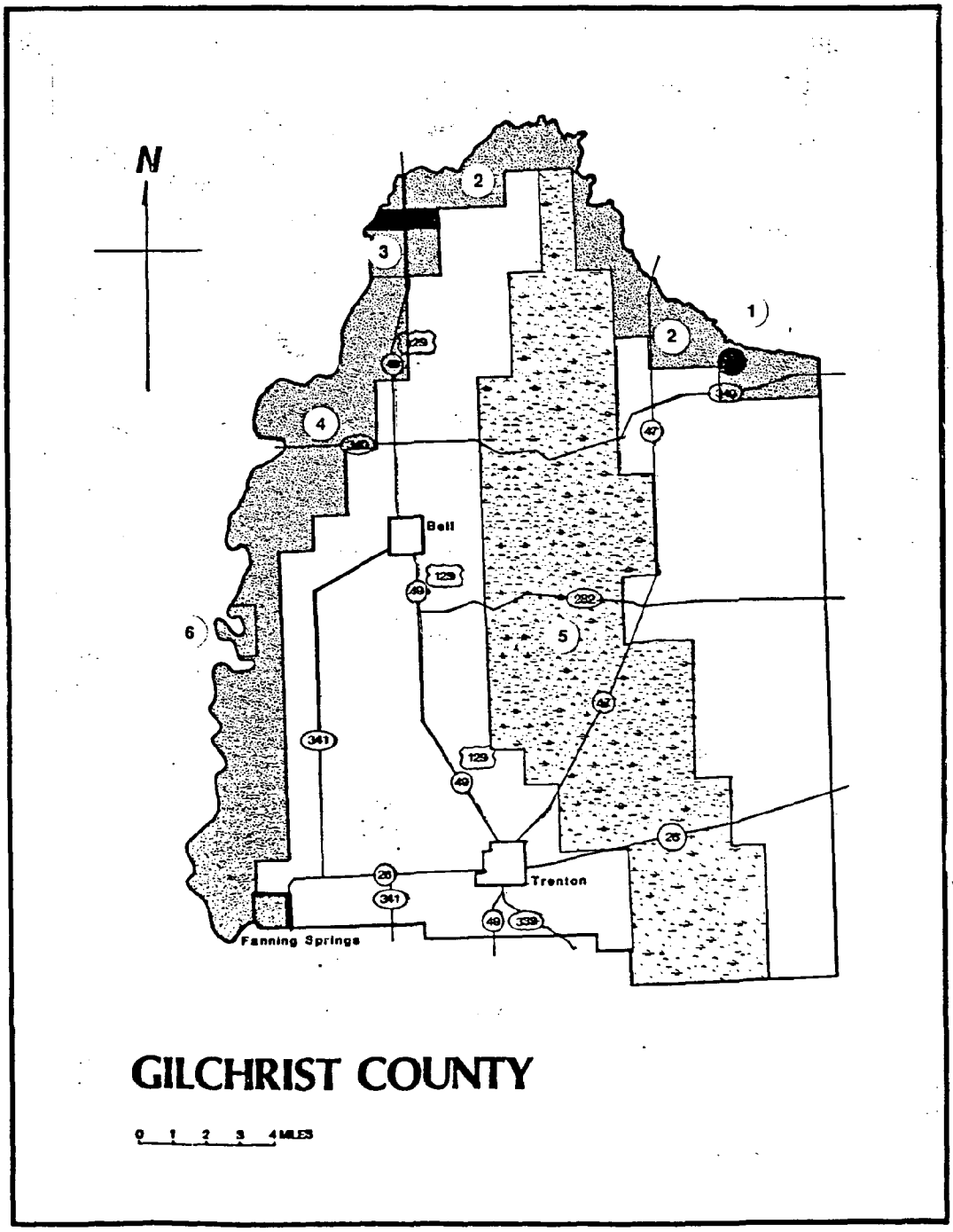


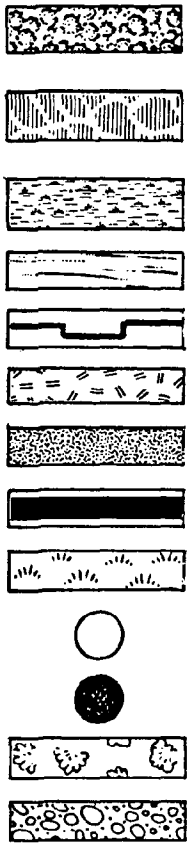
ILLUSTRATION I-5

REGIONALLY SIGNIFICANT NATURAL AREAS IN GILCHRIST COUNTY



LEGEND TO ILLUSTRATION I-6

1 ALAPAHA RIVER CORRIDOR
2 BEE HAVEN BAY
3 BROWN TRACT NATURAL AREA
4 HAMILTON STREAM/SINK RECHARGE
5 HOLTON CREEK NATURAL AREA
6 STEPHEN FOSTER CENTER
7 SUWANNEE RIVER CORRIDOR SEGMENT I
8 SUWANNEE RIVER CORRIDOR SEGMENT II
9 SUWANNEE RIVER STATE PARKS
10 WITHLACOOCHEE RIVER CORRIDOR



FOREST

FRESHWATER WETLANDS WITH DIRECT CONNECTION TO SALT MARSH

FRESHWATER WETLANDS WITHOUT DIRECT CONNECTION TO SALT MARSH

FRESHWATER WETLAND, CORE WETLAND

HURRICANE SURGE

NATIONAL WILDLIFE REFUGE

RIVER

RIVER SEGMENT BOUNDARY

SALTWATER MARSH

SINK

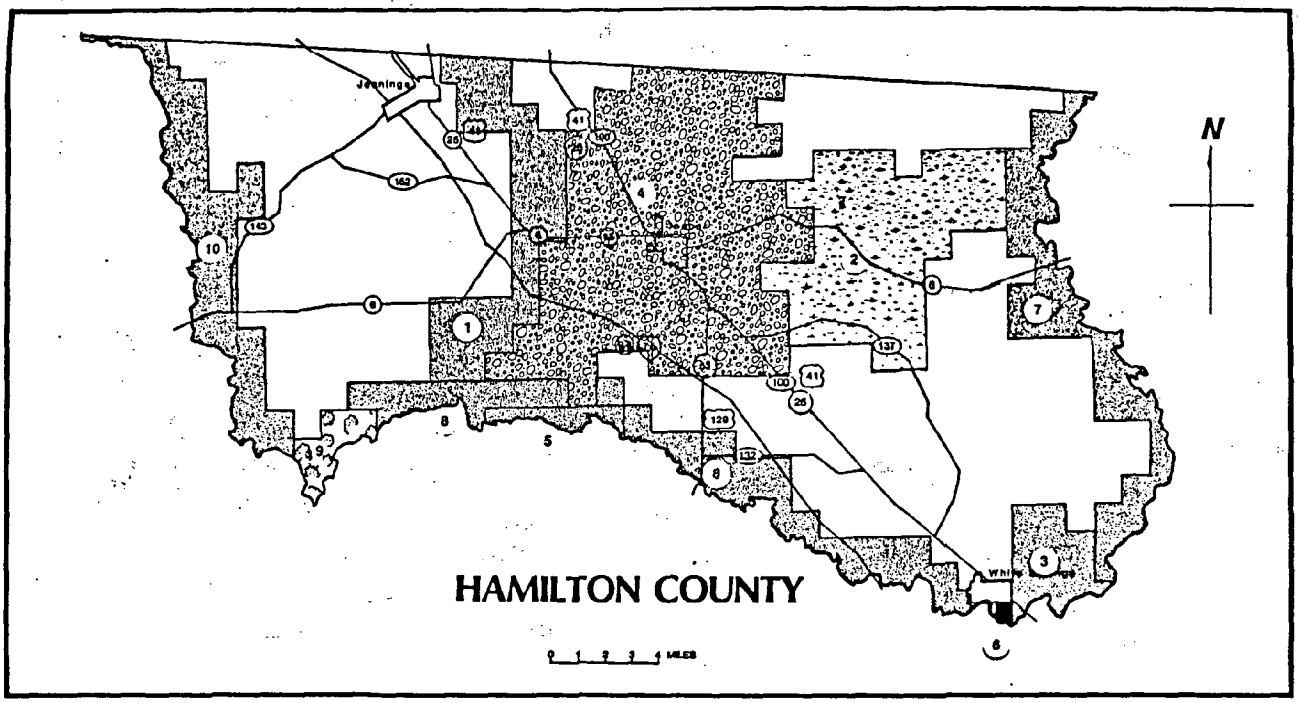
SPRING

STATE PARK/PRESERVE

STREAM/SINK RECHARGE

ILLUSTRATION I-6

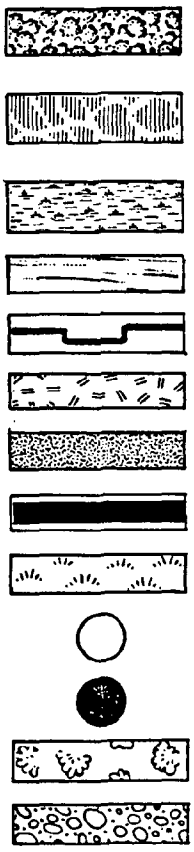
REGIONALLY SIGNIFICANT NATURAL AREAS IN HAMILTON COUNTY



NORTH CENTRAL FLORIDA
REGIONAL PLANNING COUNCIL

LEGEND TO ILLUSTRATION I-7

1 SUWANNEE RIVER CORRIDOR, SEGMENT III
2 SUWANNEE RIVER CORRIDOR, SEGMENT IV



FOREST

FRESHWATER WETLANDS WITH DIRECT CONNECTION TO SALT MARSH

FRESHWATER WETLANDS WITHOUT DIRECT CONNECTION TO SALT MARSH

FRESHWATER WETLAND, CORE WETLAND

HURRICANE SURGE

NATIONAL WILDLIFE REFUGE

RIVER

RIVER SEGMENT BOUNDARY

SALTWATER MARSH

SINK

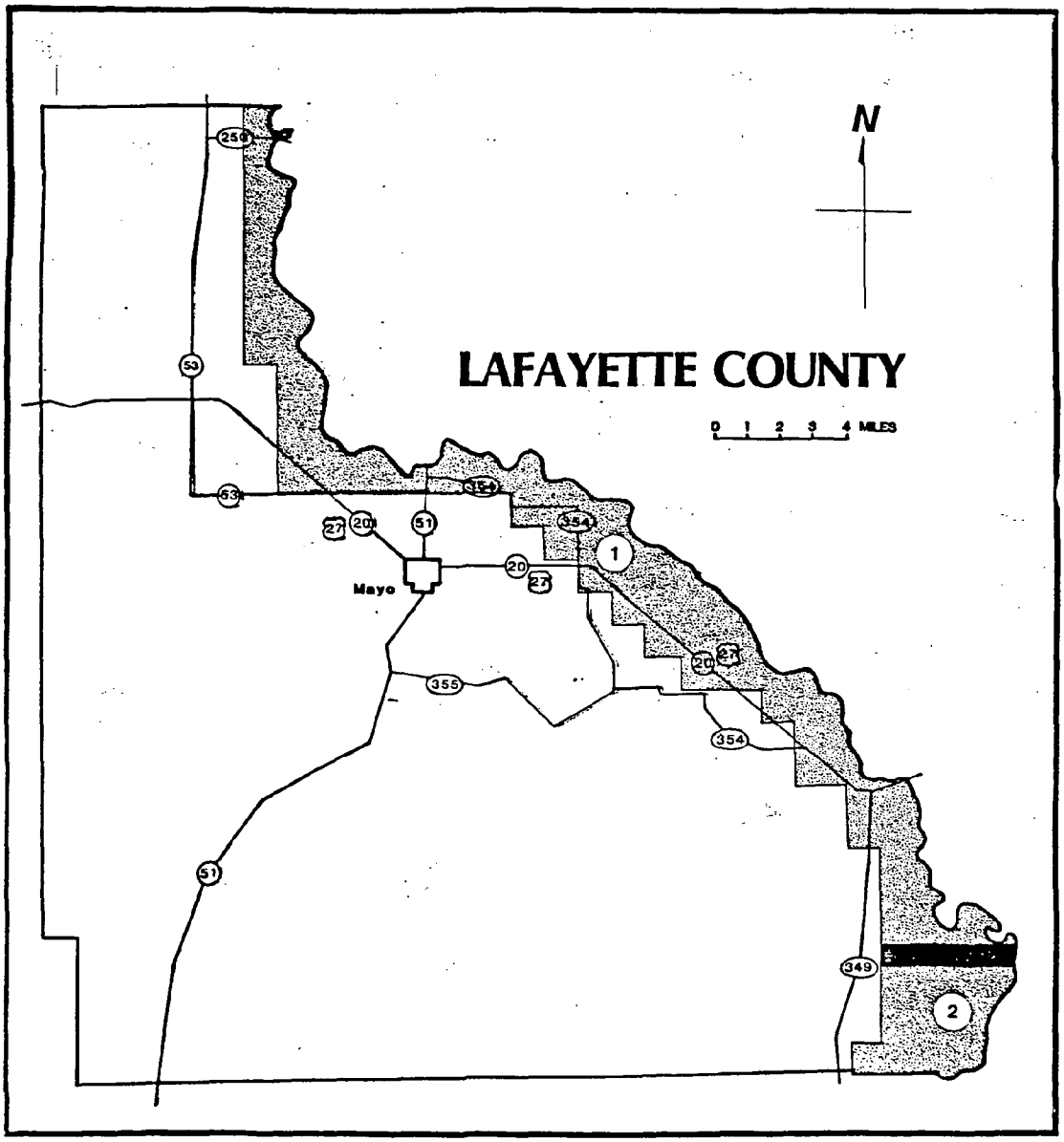
SPRING

STATE PARK/PRESERVE

STREAM/SINK RECHARGE

ILLUSTRATION I-7

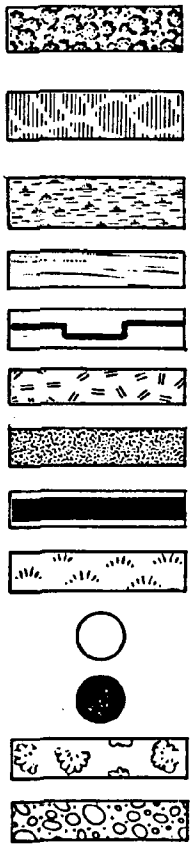
REGIONALLY SIGNIFICANT NATURAL AREAS IN LAFAYETTE COUNTY



NORTH CENTRAL FLORIDA
REGIONAL PLANNING COUNCIL

LEGEND TO ILLUSTRATION I-8

1 AUCILLA RIVER CORRIDOR
2 BLUE SPRING
3 CAMPBELL SINK
4 HIXTOWN SWAMP
5 JOHNSON SINK
6 MADISON STREAM/SINK RECHARGE
7 PATTERSON SINK
8 ROGERS SINK
9 SUWANNEE RIVER CORRIDOR SEGMENT III
10 SUWANNEE RIVER STATE PARK
11 WITHLACOOCHEE RIVER CORRIDOR



FOREST

FRESHWATER WETLANDS WITH DIRECT CONNECTION TO SALT MARSH

FRESHWATER WETLANDS WITHOUT DIRECT CONNECTION TO SALT MARSH

FRESHWATER WETLAND, CORE WETLAND

HURRICANE SURGE

NATIONAL WILDLIFE REFUGE

RIVER

RIVER SEGMENT BOUNDARY

SALTWATER MARSH

SINK

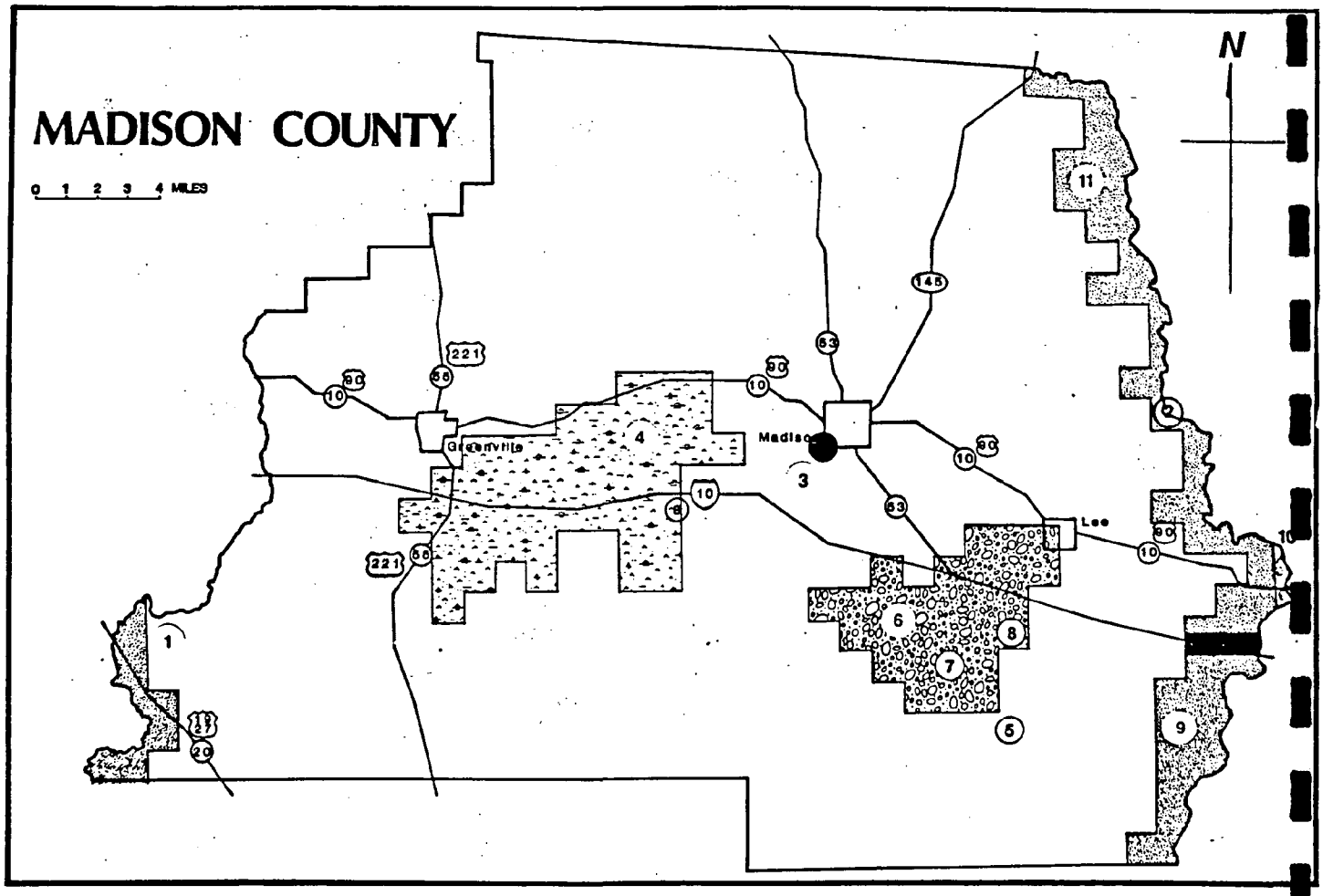
SPRING

STATE PARK/PRESERVE

STREAM/SINK RECHARGE

ILLUSTRATION I-8

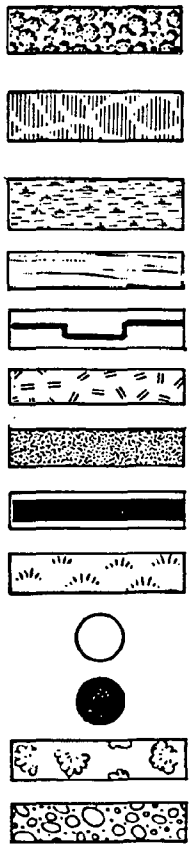
REGIONALLY SIGNIFICANT NATURAL AREAS IN MADISON COUNTY



NORTH CENTRAL FLORIDA REGIONAL PLANNING COUNCIL

LEGEND TO ILLUSTRATION I-9

1 COLUMBIA CO. WESTERN STREAM/SINK RECHARGE
2 ICHETUCKNEE SPRINGS STATE PARK
3 LOWER LITTLE RIVER STEAM/SINK RECHARGE
4 PEACOCK SLOUGH
5 SANTA FE RIVER CORRIDOR
6 SUWANNEE RIVER CORRIDOR SEGMENT II
7 SUWANNEE RIVER CORRIDOR SEGMENT III
8 SUWANNEE RIVER STATE PARK
9 TELFORD SPRINGS
10 UPPER LITTLE RIVER STREAM/SINK RECHARGE



FOREST

FRESHWATER WETLANDS WITH DIRECT CONNECTION TO SALT MARSH

FRESHWATER WETLANDS WITHOUT DIRECT CONNECTION TO SALT MARSH

FRESHWATER WETLAND, CORE WETLAND

HURRICANE SURGE

NATIONAL WILDLIFE REFUGE

RIVER

RIVER SEGMENT BOUNDARY

SALTWATER MARSH

SINK

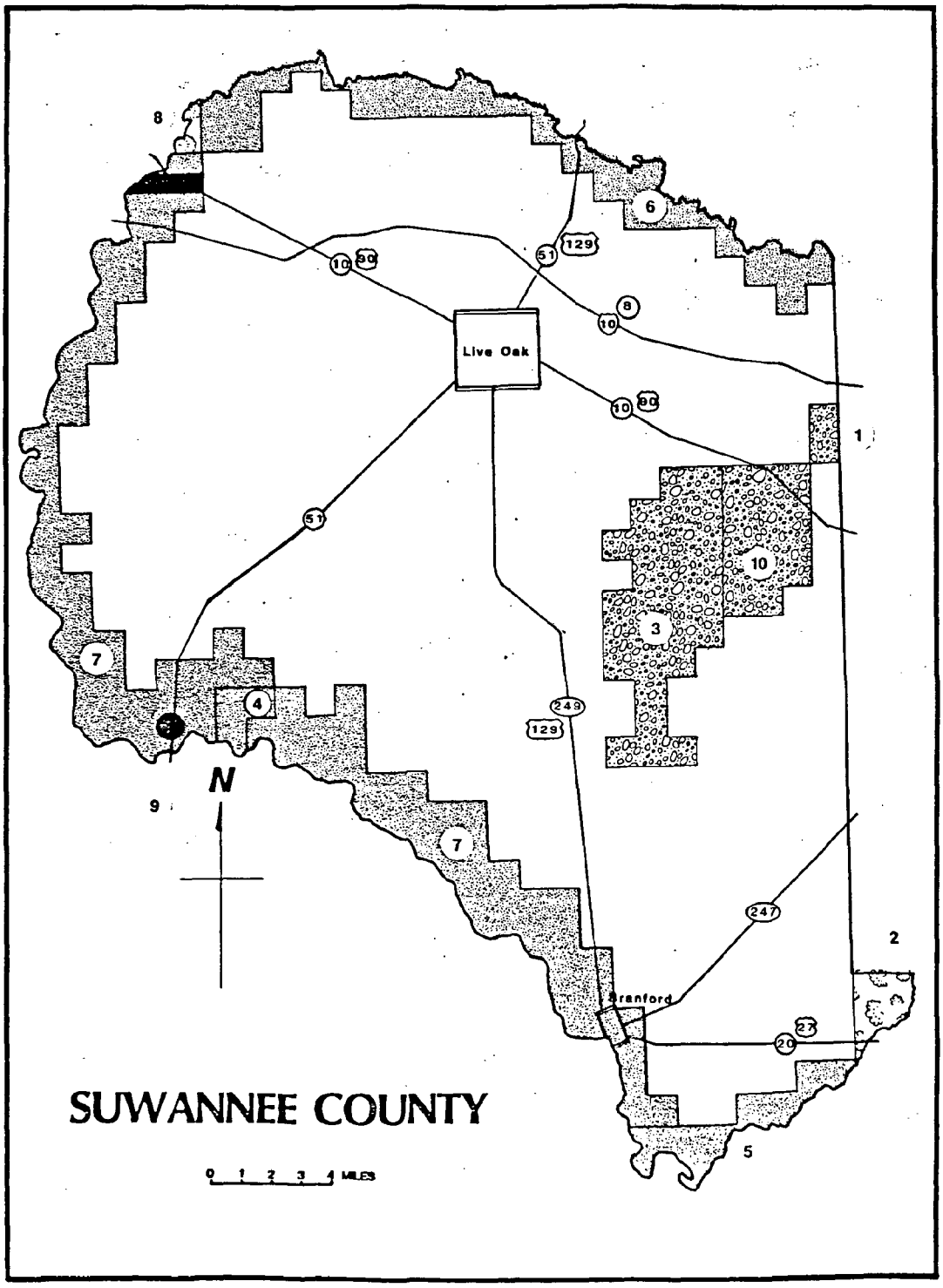
SPRING

STATE PARK/PRESERVE

STREAM/SINK RECHARGE

ILLUSTRATION I-9

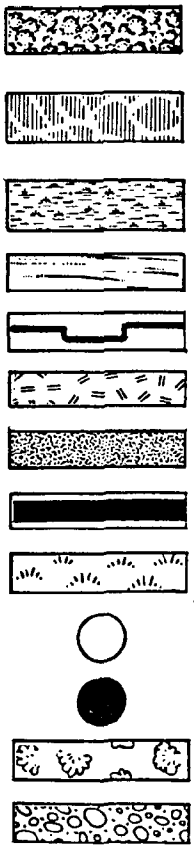
REGIONALLY SIGNIFICANT NATURAL AREAS IN SUWANNEE COUNTY



NORTH CENTRAL FLORIDA
REGIONAL PLANNING COUNCIL

LEGEND TO ILLUSTRATION I-10

1 AUCILLA RIVER CORRIDOR
2 AUCILLA RIVER SINKS
3 ECONFINA RIVER CORRIDOR
4 FRESHWATER MARSH WITH DIRECT SHEET FLOW CONNECTION TO SALT MARSH
5 ST. MARKS NATIONAL WILDLIFE REFUGE
6 SALT MARSH
7 SPRING WARRIOR SWAMP
8 STEINHATCHEE RIVER CORRIDOR
9 TIDE SWAMP



FOREST

FRESHWATER WETLANDS WITH DIRECT CONNECTION TO SALT MARSH

FRESHWATER WETLANDS WITHOUT DIRECT CONNECTION TO SALT MARSH

FRESHWATER WETLAND, CORE WETLAND

HURRICANE SURGE

NATIONAL WILDLIFE REFUGE

RIVER

RIVER SEGMENT BOUNDARY

SALTWATER MARSH

SINK

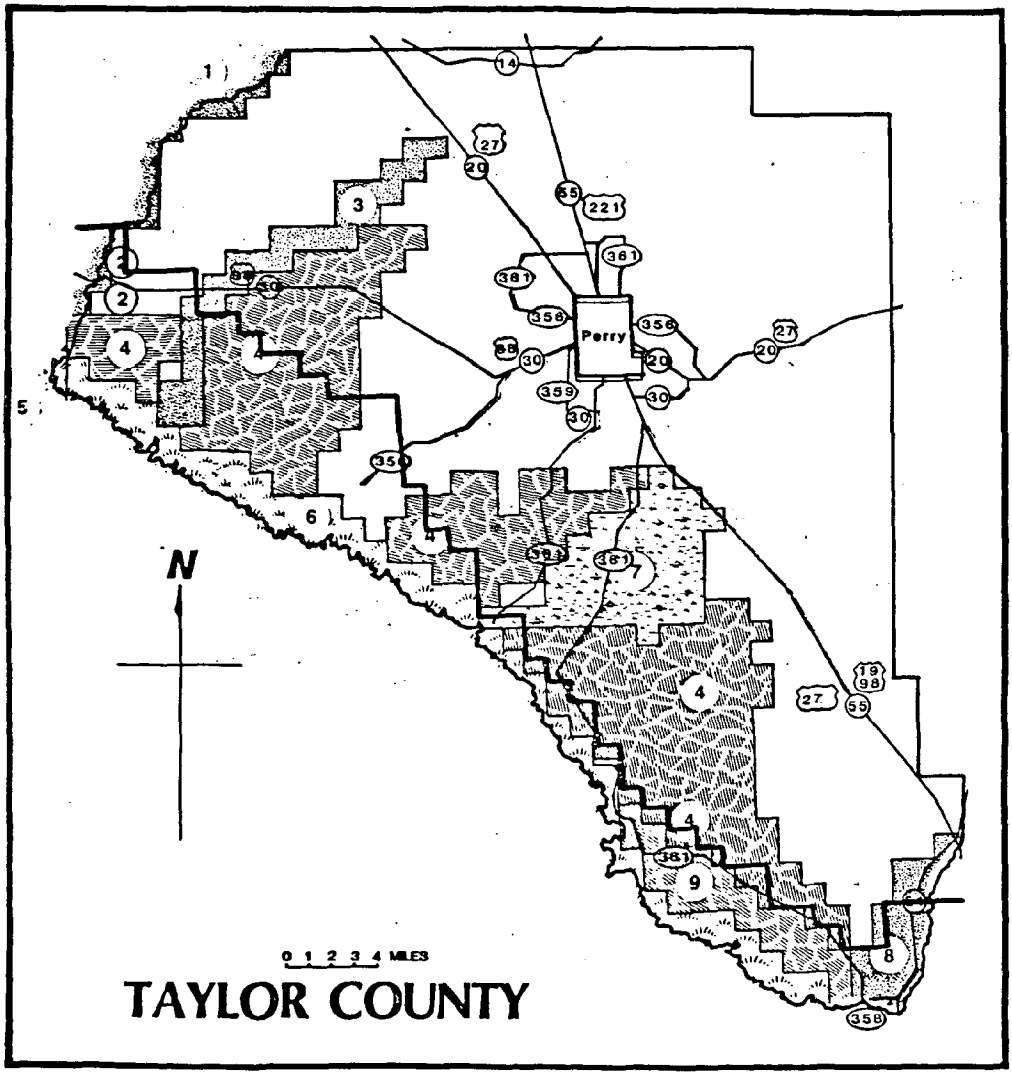
SPRING

STATE PARK/PRESERVE

STREAM/SINK RECHARGE

ILLUSTRATION I-10

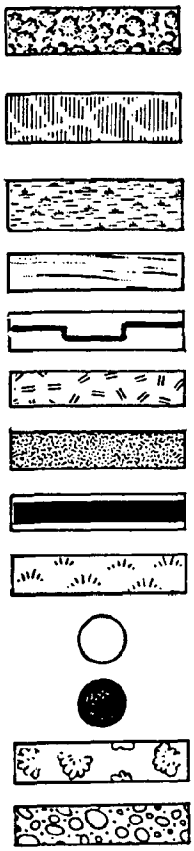
REGIONALLY SIGNIFICANT NATURAL AREAS IN TAYLOR COUNTY



NORTH CENTRAL FLORIDA
REGIONAL PLANNING COUNCIL

LEGEND TO ILLUSTRATION I-11

1 SANTA FE SWAMP



FOREST

FRESHWATER WETLANDS WITH DIRECT CONNECTION TO SALT MARSH

FRESHWATER WETLANDS WITHOUT DIRECT CONNECTION TO SALT MARSH

FRESHWATER WETLAND, CORE WETLAND

HURRICANE SURGE

NATIONAL WILDLIFE REFUGE

RIVER

RIVER SEGMENT BOUNDARY

SALTWATER MARSH

SINK

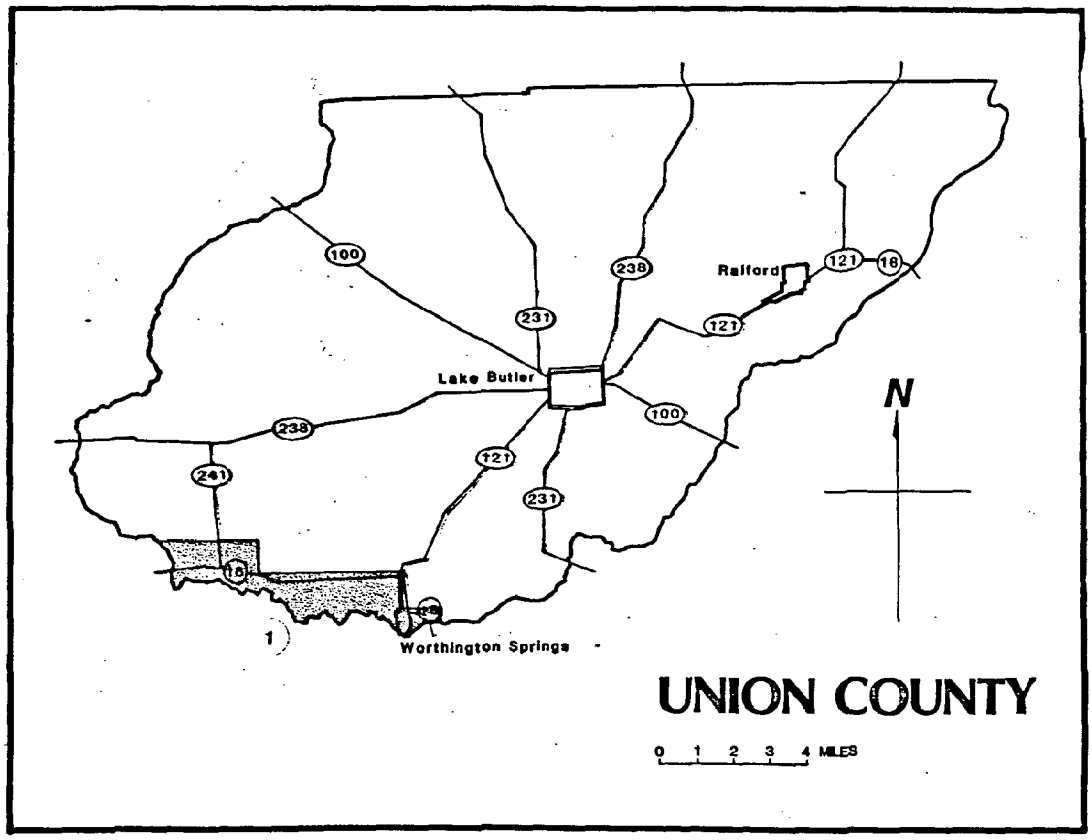
SPRING

STATE PARK/PRESERVE

STREAM/SINK RECHARGE

ILLUSTRATION I-11

REGIONALLY SIGNIFICANT NATURAL AREAS IN UNION COUNTY



NORTH CENTRAL FLORIDA
REGIONAL PLANNING COUNCIL

ALACHUA COUNTY REGIONALLY SIGNIFICANT NATURAL AREAS

Alachua County Stream to Sink Recharge Area
Austin Cary Mem. Forest
Gum Root Swamp
Lochloosa Forest
O'leno State Park
Newnan's Lake - Prairie Creek
Payne's Prairie
San Felasco Hammock
Santa Fe River floodplain Corridor
Santa Fe Swamp

SECTION - TOWNSHIP - RANGE COORDINATES

Alachua County Stream to Sink Recharge Area

Range 18E
Twn. 7S
Sec. 14-16, 21-28, 32-36

Range 18E
Twn. 8S
Sec. 1-4, 9-17, 22-27, 36

Range 18E
Twn. 9S
Sec. 37 (Sanchez Grant)

Range 19E
Twn. 7S
Sec. 30-31

Range 19E
Twn. 8S
Sec. 4-9, 16-22, 26-36

Range 19E
Twn. 9S
Sec. 1-18

remaining area undefined

Austin Cary Memorial Forest

Range 21E
Twn. 8S
Sec. 28, 32, 33

Range 21E
Twn. 9S
Sec. 4, 9
Arredondo Grant 4-6

Gum Root Swamp

Range 21E
Twn. 9S
Sec. 20, 28-29, 34

Lochloosa Forest

Range 21E
Twn. 10S
Sec. 26, 27, 32-36,

Range 21E
Twn. 11S
Sec. 1-4, 9-16, 21- 23, 25, 27, 28

Levy Grant 5-6, 11-12

Range 22E
Twn. 10S
Sec. 31 - 33

Range 22E
Twn. 11S
Sec. 3-10, 16-21, 28-33

Range 22E
Twn. 12S
Sec. 3-9

Newnan's Lake - Prairie Creek

Range 21E
Twn. 9S
Sec. 27, 31 - 34

Range 21E
Twn. 10S
Sec. 3 - 10, 16 - 20, 30

O'leno State Park

Range 17E
Twn. 6S
Sec. 36

Range 17E
Twn. 7S
Sec. 1

Payne's Prairie State Preserve

Range 19E
Twn. 11S
Sec. 1, 2, 11, 12

Range 20E
Twn. 10S
Sec. 20-29, land grant lots 1-4

Range 20E
Twn. 11S
Sec. 6, 7, 18, 24, land Grant Lots 1-5, land grant lots 7-10

San Felasco Hammock

Range 18E
Twn. 8S
Sec. 37, 38,39, 40
Special Grant No. 5

Range 18E
Twn. 9S
Sec. 12, 13, 38
Special Grant No. 5

Range 19E
Twn. 8S
Sec. 33, 37, 38, 49,
Special Grants. 4, 11, 12

Santa Fe River Floodplain Corridor
Range 22E
Twn 8S
Sec. 5, 6

Range 21E
Twn. 7S
Sec. 29-36

Range 21E
Twn. 8S
Sec. 1, 2

Range 20E
Twn. 7S
Sec. 17-21, 25, 27-29, 31-36

Range 19E
Twn. 7S
Sec. 3-6, 9, 10, 13-16, 24

Range 19E
Twn. 6S
Sec. 29-33

Range 18E
Twn. 6S
Sec. 31, 33-36

Range 18E
Twn. 7S
Sec. 6

Range 17E
Twn. 6S
Sec. 36

Range 17E
Twn. 7S
Sec. 1, 11, 12, 13, 14, 23-32, 37

Range 17E
Twn. 8S
Sec. 5, 6

Santa Fe Swamp

Range 22E
Twn. 8S
Sec. 5-8, 17, 18, 21

Range 21E
Twn. 8S
Sec. 1, 2, 12, 13

Range 21E
Twn. 7S
Sec. 29-36

BRADFORD COUNTY

BRADFORD COUNTY REGIONALLY SIGNIFICANT NATURAL AREAS

Brooks Sink
Santa Fe River Floodplain Corridor
Santa Fe Swamp

SECTION - TOWNSHIP - RANGE COORDINATES

Brooks Sink

Range 21E
Twn. 7S
Sec. 12

Santa Fe Swamp

Range 22E
Twn. 7S
Sec. 31-34

Range 22E
Twn. 8S
Sec. 2-11, 14-16, 18, 21, 22

Range 21E
Twn. 7S
Sec. 29-36

Santa Fe River Floodplain Corridor

Range 22E
Twn. 7S
Sec. 31, 32

Range 22E
Twn. 8S
Sec. 3-6, 8-17, 21, 22

Range 21E
Twn. 7S
Sec. 19, 20, 25-36

Range 20E
Twn. 7S
Sec. 16-18, 20-23, 25-27

Range 19E
Twn. 7S
Sec. 1, 2, 10-15,

Range 19E
Twn. 6S
Sec. 33, 34

COLUMBIA COUNTY

COLUMBIA COUNTY REGIONALLY SIGNIFICANT NATURAL AREAS

Big Gum Swamp National Wilderness Area
Columbia County Southern Recharge Area
Columbia County Western Recharge Area
Ichetucknee River Floodplain Corridor
Ichetucknee Springs State Park
O'leno State Park and River Rise State Preserve
Osceola National Forest
Pinhook Swamp
Santa Fe River Floodplain Corridor
Suwannee River Floodplain Corridor

SECTION - TOWNSHIP - RANGE COORDINATES

Big Gum Swamp National Wilderness Area

Range 18E
Twn. 1S
Sec. 36

Range 18E
Twn. 2S
Sec. 1, 11 - 14, 23, 24

Range 19E
Twn. 1S
Sec. 21, 22, 27 - 34

Range 19E
Twn. 2S
Sec. 3 - 10, 16 - 20

Columbia County South Recharge Area

Range 16E
Twn. 4S
Sec. 1-2, 11-13, 20-29, 33-36

Range 16E
Twn. 5S
Sec. 1-4, 10-12, 15

Range 17E
Twn. 3S
Sec. 31-36

Range 17E
Twn. 4S
Sec. 1-36

Range 17E
Twn. 5S
Sec. 1-12, 14-16

Range 18E
Twn. 4S
Sec. 7, 17-20, 29-31

Range 18E
Twn. 5S
Sec. 6

Columbia County Western Stream-to-Sink Recharge Area

Range 15E
Twn. 2S
Sec. 23-26, 35-36

Range 15E
Twn. 3S
Sec. 1-2, 11

Range 16E
Twn. 2S
Sec. 16-17, 19-22, 27-34

Range 16E
Twn. 3S
Sec. 3-6, 8-10, 15

Ichetucknee River Floodplain Corridor

Range 15E
Twn. 6S
Sec. 13, 14, 23, 24, 26, 27

Range 16E
Twn. 6S
Sec. 7, 18

Ichetucknee Springs State Park

Range 15E
Twn. 6S
Sec. 13, 14, 23, 24

Range 16E
Twn. 6S
Range 7, 18

O'leno State Park

Range 17E
Twn. 6S
Sec. 34-36

Range 17E
Twn. 7S
Sec. 1-3

Osceola National Forest

Range 17E
Twn. 1S
Sec. 22-27, 34-46

Range 17E
Twn. 2S
Sec. 1-3, 10-15, 22-27, 34-36

Range 17E
Twn. 3S
Sec. 1-3, 10-16, 22-27

Range 18E
Twn. 1S
Sec. 19-36

Range 18E
Twn. 2S
Sec. 1-36

Range 18E
Twn. 3S
Sec. 1-33

Pinhook Swamp

Government Lots 559-573, 594-607

Range 16E
Twn. 2N
Sec. 13-14, 23-26, 35

Range 17E
Twn. 1N
Sec. 1-5, 8-17, 20-30, 34-36

Range 17E
Twn. 2N
Sec. 13-18, 22-27, 34-36

Range 17E
Twn. 1S
Sec. 1-2, 4, 11-14

Range 18E
Twn. 1N
Sec. 1-36

Range 18E
Twn. 2N
Sec. 13-36

Range 18E
Twn. 1S
Sec. 1-18

Santa Fe River Floodplain Corridor

Range 15E
Twn. 6S
Sec. 25-27, 36

Range 15E
Twn. 7S
Sec. 1

Range 16E
Twn. 7S
Sec. 6, 7, 18, 19, 20, 21, 27, 28, 34-36

Range 17E
Twn. 6S
Sec. 35, 36

Range 17E
Twn. 7S
Sec. 1-3, 11, 15, 21-23, 27-29, 31, 32

Range 18E
Twn. 6S
Sec. 20, 29-32

Suwannee River Floodplain Corridor

Range 15E
Twn. 2S
Sec. 11-14, 23, 24

Range 16E
Twn. 2N
Sec. 10, 11, 15, 21, 22, 23, 27, 28, 33, 34, 574, 575

Range 16E
Twn. 1N
Sec. 3, 4, 9-11, 13-15, 22-26, 36

Range 16E
Twn. 1S
Sec. 25, 35, 36

Range 16E
Twn. 2S
Sec. 1, 2, 8-23

Range 17E
Twn. 1N
Sec. 30, 31

Range 17E
Twn. 1S
Sec. 5-9, 17-20, 28-31

DIXIE COUNTY

DIXIE COUNTY REGIONALLY SIGNIFICANT NATURAL AREAS

California Swamp
California Swamp Core
Coastal Drainage Basin
Hurricane Surge Zone
Freshwater Wetlands with Direct Sheet Flow to Coastal Marsh
Salt Marsh
Lime Sink
Lower Suwannee National Wildlife Refuge
Steinhatchee River Floodplain Corridor
Suwannee River Floodplain Corridor, Segment V
Wannee Natural Area

SECTION - TOWNSHIP - RANGE COORDINATES

California Swamp

Range 12E
Twn. 10S
Sec. 26-27, 34-35

Range 11E
Twn. 11S
Sec. 13-16, 19-36,

Range 12E
Twn. 11S
Sec. 1,2, 11-24, 27-36

Range 13E
Twn. 11S
Sec. 18, 19

Range 11E
Twn. 12S
Sec. 1-5, 10-14, 22-26, 35, 36

Range 12E
Twn. 12S
Sec. 1-13, 15-22, 27-29, 32-36

Range 13E
Twn. 12S
Sec. 5-7, 18, 19

Range 12E
Twn. 13S
Sec. 5, 6, 8,

Range 11E
Twn. 13S
Sec. 1

California Swamp, Core

Range 11E
Twn. 11S
Sec. 36

Range 11E
Twn. 12S
Sec. 1, 2, 11 - 13, 24, 25

Range 12E
Twn. 11S
Sec. 19, 20, 28 - 30, 33 - 36

Range 12E
Twn. 12S
Sec. 4 - 9, 18, 19, 30

Gulf Coastal Drainage Basin Freshwater Wetlands
with Direct Sheet Flow to Gulf

Wetland 1

Range 10E
Twn. 9S
Sec. 31, 32

Range 10E
Twn. 10S
Sec. 1, 4 - 36

Range 10E
Twn. 11S
Sec. 1 - 16, 22 - 26, 36

Range 10E
Twn. 12S
Sec. 1

Range 11E
Twn. 10S
Sec. 1, 2, 7, 9 - 36

Range 11E
Twn. 11S
Sec. 2 - 11, 14 - 23, 26 - 35

Range 11E
Twn. 12S
Sec. 3 - 5, 10

Range 12E
Twn. 10S
Sec. 6, 7, 18 - 20

Wetland 2

Range 12E
Twn. 12S
Sec. 31, 32

Range 12E
Twn. 13S
Sec. 4, 5, 8, 9

Salt Marsh

Range 9E
Twn. 9S
Sec. 26-28, 34-36

Range 9E
Twn. 10S
Sec. 1-3, 10-15, 22-27, 34-36

Range 9E
Twn. 11S
Sec. 1-3, 10-14, 23-24

Range 10E
Twn. 11S
Sec. 17-21, 27-30, 32-35

Range 10E
Twn. 12S
Sec. 2-3, 10-14, 24

Range 11E
Twn. 12S
Sec. 6-9, 15-18, 20-22, 26-28, 33-36

Range 11E
Twn. 13S
Sec. 1-3, 9-14

Range 12E
Twn. 13S
Sec. 7

Hurricane Surge Zone

Range 9E
Town. 9S
Sec. 25-27, 34-36

Range 9E
Town 10S
Sec. 1-3, 10-15, 22-27, 34-36

Range 9E
Twn. 11S
Sec. 1-3, 10-14, 23, 24

Range 10E
Twp. 8S
Sec 32, 33

Range 10E
Twp 9S
Sec. 4, 5, 8, 9, 16, 17, 19-21, 28-32

Range 10E
Town. 10S
Sec. 5-7, 16-21, 28-33

Range 10E
Twn. 11S
Sec. 2-11, 14-36

Range 10E
Twn. 12S
Sec. 1-3, 10-14

Range 11E
Twn. 11S
Sec. 19, 20, 28-36

Range 11E
Twn. 12S
Sec. All

Range 12E
Twn. 12S
Sec. 5-9, 15-22, 25, 28-36

Range 12E
Twn. 13S
Sec. all

Range 13E
Twn. 12S
Sec. 8, 9, 16-21, 25, 29-32

Range 13E
Twp. 13S
Sec 6

Lime Sink

Range 12E
Twn. 12S
Sec. 9

Lower Suwannee National Wildlife Refuge

Range 11E
Twn. 12S
Sec. 5, 8, 9, 15-17, 20-23, 26-28, 33-36

Range 11E
Twn. 13S
Sec. 1-3, 10-14, 23, 24

Range 12E
Twn. 13S
Sec. 6-8, 17-19

Steinhatchee River Floodplain Corridor

Rge-Twn-Sec

Range 10E
Twn. 8S
Sec. 21, 28, 29, 32

Range 10E
Twn. 9S
Sec. 5, 8, 17 - 19, 30

Suwannee River Floodplain Corridor, Segment V

Range 14E
Twn. 8S
Sec. 5-8, 16-19, 30-32

Range 13E
Twn. 8S
Sec. 13, 24, 25, 36

Range 14E
Twn. 9S
Sec. 6, 7, 17, 18, 30, 31

Range 13E
Twn. 9S
Sec. 1, 12-14, 23-26, 35, 36

Range 14E
Twn. 10S
Sec. 21, 29, 30, 31

Range 13E
Twn. 10S
Sec. 1, 2, 11-14, 24, 25, 36

Range 14E
Twn. 11S
Sec. 6

Range 13E
Twn. 11S
Sec. 1, 2, 10, 11, 13-15, 22, 23, 26, 27, 34, 35

Range 13E
Twn. 12S
Sec. 2-4, 8-10, 16, 17, 20, 21, 29-32

Range 12E
Twn. 12S
Sec. 36

Range 13E
Twn. 13S
Sec. 6

Range 12E
Twn. 13S
Sec. 1-5, 8-23, 28-36

Range 11E
Twn. 13S
Sec. 23, 24, 25, 36

Wannee Natural Area

Range 14E
Twn. 8S
Sec. 31

Range 14E
Twn. 9S
Sec. 6, 7

GILCHRIST COUNTY

GILCHRIST COUNTY REGIONALLY SIGNIFICANT NATURAL AREAS

Santa Fe River Flood Plain Corridor
Suwannee River Flood Plain Corridor
Suwannee - Santa Fe Rivers Confluence Natural Area
Wacassassa Flats
Wannee Natural Area

SECTION - TOWNSHIP - RANGE COORDINATES

Santa Fe River Floodplain Corridor

Range 16E
Twn. 7S
Sec. 7, 18-20, 28-30, 32-36

Range 16E
Twn. 8S
Sec. 1-3

Range 15E
Twn. 7S
Sec. 1, 4-7, 12, 13, 18

Range 15E
Twn. 6S
Sec. 26-28, 30-36

Suwannee River Floodplain Corridor

Range 14E
Twn. 7S
Sec. 1, 12, 13, 23-26, 35, 36

Range 14E
Twn. 8S
Sec. 2-5, 8-10, 15-17, 19-21, 28, 29, 30, 32

Range 14E
Twn. 9S
Sec. 5-8, 17-20, 29-32,

Range 14E
Twn. 10S
Sec. 5-7, 18-20

Range 13E
Twn. 10S
Sec. 12, 13, 24

Suwannee - Santa Fe Rivers Confluence Natural Area

Range 14E
Twn. 7S
Sec. 1, 12

Wacassassa Flats

Range 15E
Twn. 7S
Sec. 2, 11, 14,22 - 27, 34 - 36

Range 15E
Twn. 8S
Sec. 1-4, 9-16, 21-28, 33-36

Range 15E
Twn. 9S
Sec. 1-4, 9-16, 21-28, 34-36

Range 15E
Twn. 10S
Sec. 1, 2, 11, 12

Range 16E
Twn. 7S
Sec. 31

Range 16E
Twn. 8S
Sec. 19, 30, 31

Range 16E
Twn. 9S
Sec. 17-20, 29-32,

Range 16E
Twn. 10S
Sec. 4-9, 15-22, 27-34

Wannee Natural Area

Range 14E
Twn. 8S
Sec. 31

Range 14E
Twn. 9S
Sec. 6, 7

HAMILTON COUNTY

HAMILTON COUNTY REGIONALLY SIGNIFICANT NATURAL AREAS

Alapaha River Floodplain Corridor
Bee Haven Bay-Rocky Creek Swamp
Brown Tract Natural Area
Holton Creek Natural Area
Hamilton County Stream to Sink Recharge Area
Stephen Foster State Folk Culture Center
Suwannee River Floodplain Corridor, Segment I
Suwannee River Floodplain Corridor, Segment II
Suwannee River State Park
Withlacoochee River Floodplain Corridor

SECTION - TOWNSHIP - RANGE COORDINATES

Alapaha River Floodplain Corridor

Range 12E
Twn. 3N
Sec. 11, 12, 190, 191, 224, 225

Range 12E
Twn. 1N
Sec. 13, 14, 23-26, 34, 35

Range 13E
Twn. 3N
Sec. 6-8, 16, 17, 20, 21, 28, 29, 32, 33, W 1/2 of 226

Range 13E
Twn. 2N
Sec. 5, 8, 17-19

Bee Haven Bay-Rocky Creek Swamp

Range 14E
Twn. 2N
Sec. 25, 36

Range 14E
Twn. 1N
Sec. 1, 11-13, 24
Range 15E
Twn. 2N
Sec. 19-21, 23-36

Range 15E
Twn. 1N
Sec. 2-10, 15-22, 27, 28

Range 16E
Twn. 2N
Sec. 19-21, 28-33

Brown Tract Natural Area

Range 16E
Twn. 1S
Rec. 28, 29, 32-34

Range 16E
Twn. 2S
Sec. 2-5, 8-11

Holton Creek Natural Area

Range 13E
Twn. 1S
Sec. 2-6

Stephen Foster State Folk Culture Center

Range 15E
Twn. 2S
Sec. 12

Hamilton County Stream to Sink Recharge Area

Government Lots 231-232, 519-524, 589-592

Range 13E
Twn. 2N
Sec. 1-2, 11-15, 22-28, 33-36

Range 13E
Twn. 1N
Sec. 1-4, 9-17, 19-25, 27-35

Range 13E
Twn. 1S
Sec. 2-4

Range 14E
Twn. 2N
Sec. 4-10, 14-21, 26-36

Range 14E
Twn. 1N
Sec. 1-11, 14-23, 26-30

Suwannee River Floodplain Corridor, Section I

Range 16E
Twn. 2N
Sec. 15, 16, 20, 21, 28, 32, 33, 536, 537, 574, 575

Range 16E
Twn. 1N
Sec. 4, 5, 9, 10, 15-17, 20-23, 25, 26, 35, 36

Range 16E
Twn. 1S
Sec. 24-26, 35, 36

Range 16E
Twn. 2S
Sec. 2, 3, 8-11, 16, 17

Range 17E
Twn. 1S
Sec. 6, 7, 18, 19

Suwannee River Floodplain Corridor, Segment II

Range 11E
Twn. 1S
Sec. 13, 24

Range 12E
Twn. 1N
Sec. 32-36

Range 12E
Twn. 1S
Sec. 1, 3-8, 18

Range 13E
Twn. 1N
Sec. 31-33, 35

Range 13E
Twn. 1S
Sec. 1-6, 11, 12

Range 14E
Twn. 1S
Sec. 7-9, 14-17, 20-23, 25, 26, 36

Range 15E
Twn. 1S
Sec. 31-34

Range 15E
Twn. 2S
Sec. 2-6, 11, 12

Suwannee River State Park

Range 11E
Twn. 1S
Sec. 13, 24

Range 12E
Twn. 1S
Sec. 5-7, 18

Withlacoochee River Floodplain Corridor

Range 10E
Twn. 3N
Sec. 163-166, 204-206

Range 11E
Twn 3N
Sec. 201, 203, 212

Range 11E
Twn. 2N
Sec. 5-8, 17-20, 22, 27, 28, 33, 34

Range 11E
Twn. 1N
Sec. 4, 5, 8, 9, 16, 17, 20-22, 27, 28, 33, 34

Range 11E
Twn. 1S
Sec. 2-4, 9-13, 24

LAFAYETTE COUNTY

LAFAYETTE COUNTY REGIONALLY SIGNIFICANT NATURAL AREAS

Suwannee River Floodplain Corridor
Suwannee - Santa Fe Rivers Confluence Natural Area

SECTION - TOWNSHIP - RANGE COORDINATES

Suwannee River Floodplain Corridor

Range 11E
Twn. 3S
Sec. 5-7, 17-20, 30-32

Range 11E
Twn. 4S
Sec. 5-8, 16, 17, 20, 21, 25-29, 32-36

Range 12E
Twn. 4S
Sec. 28-34

Range 12E
Twn. 5S
Sec. 1-4, 10-14, 24

Range 13E
Twn. 5S
Sec. 7, 17-21, 27-30, 32-36

Range 13E
Twn. 6S
Sec. 1, 2, 12, 13

Range 14E
Twn. 6S
Sec. 17-21, 28-30, 32, 33

Range 14E
Twn. 7S
Sec. 4, 5, 8-11, 14-17, 20-23, 26-29, 31-34

Suwannee - Santa Fe Rivers Confluence Natural Area

Range 14E
Twn. 7S
Sec. 11, 14, 23, 26, 35

MADISON COUNTY

MADISON COUNTY REGIONALLY SIGNIFICANT NATURAL AREAS

Blue Spring
Campbell Spring
Hixtown Swamp
Johnson Sink
Madison County Stream to Sink Recharge Area
Patterson Sink
Rogers Sink
Suwannee River Floodplain Corridor, Segment III
Withlacoochee River Floodplain Corridor

SECTION - TOWNSHIP - RANGE COORDINATES

Blue Spring

Range 11E
Twn. 1N
Sec. 20

Campbell Spring

Range 10E
Twn. 1S
Sec. 10

Hixtown Swamp

Range 7E
Twn. 1N
Sec. 25-27, 33-36

Range 8E
Twn. 1N
Sec. 14-16, 19-23, 25-34

Range 7E
Twn. 1S
Sec. 1-5, 9-13, 15-16, 21

Range 8E
Twn. 1S
Sec. 3-6, 9-10, 15-16

Johnson Sink

Range 10E
Twn. 2S
Sec. 9, 10

Madison County Stream to Sink Recharge Area

Range 9E
Twn. 1S
Sec. 14, 21-27, 35-36

Range 9E
Twn. 2S
Sec. 1

Range 10E
Twn. 1S
Sec. 8-10, 15-21, 28-32

Range 10E
Twn. 2S
Sec. 5-6

Patterson Sink

Range 10E
Twn. 1S
Sec. 31

Rogers Sink

Range 10E
Twn. 1S
Sec. 28

Withlacoochee River Floodplain Corridor

Range 10E
Twn. 3N
Sec. 36, 160, 161, 203-206, 212

Range 11E
Twn. 2N
Sec. 6, 7, 18, 19, 30-33

Range 10E
Twn. 2N
Sec. 11-14, 24, 36

Range 11E
Twn. 1N
Sec. 5, 8, 17, 18, 20, 21, 28, 33

Suwannee River Floodplain Corridor, Segment III

Range 11E
Twn. 1S
Sec. 4, 5, 9-11, 13, 14, 22-24, 26, 28, 33-35

Range 11E
Twn. 2S
Sec. 3-5, 8-10, 15-17, 20, 21, 29, 31, 32

SUWANNEE COUNTY REGIONALLY SIGNIFICANT NATURAL AREAS

Columbia County Western Stream to Sink Recharge Area
Ichetucknee River Floodplain Corridor
Ichetucknee Springs State Park
Lower Little River Stream to Sink Recharge Area
Peacock Slough
Santa Fe River Floodplain Corridor
Suwannee River Floodplain Corridor
Suwannee - Santa Fe Rivers Confluence Natural Area
Telford Springs
Upper Little River STream to Sink Recharge Area

SECTION - TOWNSHIP - RANGE COORDINATES

Columbia County Western Stream to Sink Recharge Area

Range 15E
Twn. 3S
Sec. 3, 10

Ichetucknee River Floodplain Corridor

Range 15E
Twn. 6S
Sec. 12-14, 22, 23, 27

Ichetucknee Springs State Park

Range 15E
Twn. 6S
Sec. 11-14, 23

Lower Little River Stream to Sink Recharge Area

Range 14E
Twn. 3S
Sec. 13, 14, 22-27, 35, 36

Range 14E
Twn. 4S
Sec. 1-4, 9-15, 14, 15, 22, 27, 33-35

Peacock Slough

Range 21E
Twn. 4S
Sec. 20-21

Santa Fe River Floodplain Corridor

Range 14E
Twn. 7S
Sec. 1

Range 15E
Twn. 6S
Sec. 27, 28, 31, 32

Range 16E
Twn. 6S
Sec. 11-14, 23

Suwannee River Floodplain Corridor

Range 15E
Twn. 1S
Sec. 7, 17, 18, 20-23, 26-28, 24-36

Range 14E
Twn. 2S
Sec. 3-6, 8-10, 16

Range 15E
Twn. 1S
Sec. 31

Range 13E
Twn. 1S
Sec. 2-12

Range 12E
Twn. 1S
Sec. 1, 3, 4, 4-9, 16-18

Range 11E
Twn. 1S
Sec. 24-26, 34-36

Range 11E
Twn. 2S
Sec. 2, 3, 10, 14, 21, 22, 28, 32, 33

Range 11E
Twn. 3S
Sec. 5-8, 17, 20, 21, 29, 32, 33

Range 11E
Twn. 4S
Sec. 4, 5, 8-10, 13, 15, 16, 21-28, 35

Range 12E
Twn. 4S
Sec. 8, 16-22, 24-30, 32, 34-36

Range 12E
Twn. 5S
Sec. 1, 2, 12

Range 13E
Twn. 5S
Sec. 5-10, 15-17, 21-23, 25-27, 34-36

Range 14E
Twn. 5S
Sec. 5-8, 16-18, 21, 28, 33, 34

Range 14E
Twn. 7S
Sec. 2-4, 9-11

Suwannee - Santa Fe Rivers Confluence Natural Area

Range 14E
Twn. 7S
Sec. 1, 11

Telford Springs

Range 11E
Twn. 4S
Sec. 25

Upper Little River Stream to Sink Recharge Area

Range 15E
Twn. 3S
Sec. 16-21, 28-32

Range 15E
Twn. 4S
Sec. 5-6

TAYLOR COUNTY

TAYLOR COUNTY REGIONALLY SIGNIFICANT NATURAL AREAS

Aucilla River Floodplain Corridor
Aucilla River Sinks
California Sink
Gulf Coastal Drainage Basin Freshwater Wetlands with Direct Sheet Flow to Gulf
Gulf Coastal Marsh
Hurricane Surge Zone
Page Sink
Spring Warrior Swamp
Steinhatchee River Floodplain Corridor
Tide Swamp Wildlife Management Area

SECTION - TOWNSHIP - RANGE COORDINATES

Aucilla River Floodplain Corridor

Range 3E
Twn. 4S
Sec. 18, 19, 25, 36

Range 3E
Twn. 5S
Sec. 1

Range 4E
Twn. 3S
Sec. 2, 10, 15, 22, 27-29, 32

Range 4E
Twn. 4S
Sec. 5, 7, 8, 18
Range 5E
Twn. 2S
Sec. 21, 22, 27-29, 31, 32

Aucilla River Sinks

Range 4E
Twn. 3S
Sec. 22, 27-32

Range 4E
Twn. 4S
Sec. 5-6

Econfina River Floodplain Corridor

Range 5E
Twn. 3S
Sec. 33-36

Range 5E
Twn. 4S
Sec. 2-5, 7-10, 17-18

Range 6E
Twn. 3S
Sec. 19-21, 29-31

Gulf Coastal Drainage Basin Freshwater Wetlands
with Direct Sheet Flow to Gulf

Wetland 3

Range 4E
Twn. 4S
Sec. 21 - 29, 32 - 34

Range 4E
Twn. 5S
Sec. 3

Wetland 4

Range 4E
Twn. 5S
Sec. 13

Range 5E
Twn. 4S
Sec. 2, 10 - 15, 21 - 28, 32 - 36

Range 5E
Twn. 5S
Sec. 1 - 18, 21 - 23, 26, 27

Range 6E
Twn. 3S
Sec. 32 -34

Range 6E
Twn. 4S
Sec. 4, 5, 7, 8, 17 - 19, 30, 31

Range 6E
Twn. 5S
Sec. 6, 7

Wetland 5

Range 6E
Twn. 5S
Sec. 25, 34 - 36

Range 6E
Twn. 6S
Sec. 1 - 4, 9 - 14

Range 7E
Twn. 5S
Sec. 27, 28, 30, 31, 33 - 36

Range 7E
Twn. 6S
Sec. 1 - 11, 15 - 19

Range 8E
Twn. 5S
Sec. 29 - 31

Wetland 6

Range 7E
Twn. 6S
Sec. 32 - 36

Range 7E
Twn. 7S
Sec. 1 - 4, 10 - 15, 23 - 25

Range 8E
Twn. 6S
Sec. 25, 26, 31, 33 - 36

Range 8E
Twn. 7S
Sec. 1 - 36

Range 8E
Twn. 8S
Sec. 1 - 18, 20 - 29, 33 - 36

Range 8E
Twn. 9S
Sec. 1, 2, 12

Range 9E
Twn. 6S
Sec. 31

Range 9E
Twn. 7S
Sec. 7, 18

Range 9E
Twn. 8S
Sec. 18, 19, 29 - 33

Range 9E
Twn. 9S
Sec. 3 - 10, 15 - 18, 21, 22, 27, 28

Salt Marsh

Range 3E
Twn. 4S
Sec. 25, 36

Range 3E
Twn. 5S
Sec. 1

Range 4E
Twn. 4S
Sec. 19-36

Range 4E
Twn. 5S
Sec. 1-17, 22-25

Range 5E
Twn. 5S
Sec. 9-12, 14-36

Range 5E
Twn. 6S
Sec. Unnumbered sections

Range 6E
Twn. 5S
Sec. 19-20, 29-33

Range 6E
Twn. 6S
Sec. 6-8, 15-18, 21-23, 25-27, 36

Range 7E
Twn. 6S
Sec. 30-32

Range 7E
Twn. 7S
Sec. 5-6, 8-10, 15-16, 21-23, 25-27, 35-36

Range 7E
Twn. 8S
Sec. 1, 12-13, 24

Range 8E
Twn. 8S
Sec. 6-7, 17-22, 26-36

Range 8E
Twn. 9S
Sec. 1-24

Range 9E
Twn. 9S
Sec. 4-9, 15-23

Hurricane Surge Zone

Range 3E
Twn. 3S
Sec. 28-29, 32-33

Range 3E
Twn. 4S
Sec. 24-36 That portion in Taylor County

Range 3E
Twn. 5S
Sec. 1-? That portion in Taylor County

Range 4E
Twn. 4S
Sec. 1-36 That portion in Taylor County

Range 4E
Twn. 5S
Sec. 1-26 That portion in Taylor County

Range 5E
Twn. 4S
Sec. 17-21, 26-36

Range 5E
Twn. 5S
Sec. 1-36

Range 5E
Twn. 6S
Sec. 1-? That portion not in water

Range 6E
Twn. 5S
Sec. 4-9, 16-21, 27-34

Range 6E
Twn. 6S
Sec. 2-36 That portion not in water

Range 7E
Twn. 6S
Sec. 29-32

Range 7E
Twn. 7S
Sec. 4-10, 14-23, 25-36
Range 8E
Twn. 8S
Sec. 6-8, 16-22, 25-36

Range 8E
Twn. 9S
Sec. 1-24 That portion not in water

Range 9E
Twn. 9S
Sec. 1, 5-9, 12-36 That portion not in water

Range 10E
Twn. 8S
Sec. 31-32

Range 10E
Twn. 9S
Sec. 5-8, 17-19-36 That portion in Taylor County

Page Sink

Range 4E
Twn. 3S
Sec. 24

Spring Warrior Swamp

Range 7E
Twn. 6S
Sec. 12-14, 22-29

Range 8E
Twn. 5S
Sec. 33

Range 8E
Twn. 6S
Sec. 3-11, 15-22, 28-30

Steinhatchee River Floodplain Corridor

Range 9E
Twn. 9S
Sec. 23-26

Range 10E
Twn 8S
Sec. 21, 28, 29, 31, 32

Range 10E
Twn. 9S
Sec. 5-7, 17-19, 30

Tide Swamp (does not include Coastal Marsh sections)

Range 8E
Twn. 8S
Sec. 5-7, 17-18, 20-22, 26-29, 32-36

Range 8E
Twn. 9S
Sec. 1-2, 12

Range 9E
Twn. 9S
Sec. 4-9, 15-18, 21-22

Add following for Coastal Marsh

Range 7E
Twn. 8S
Sec. 13-24 not in water

UNION COUNTY

UNION COUNTY REGIONALLY SIGNIFICANT NATURAL AREAS

Santa Fe River Floodplain Corridor

SECTION - TOWNSHIP - RANGE COORDINATES

Santa Fe River Floodplain Corridor

Range 19E
Twn. 6S
Sec. 29-33

Range 18E
Twn. 6S
Sec. 20-22, 25-27

APPENDIX J

SECTION COORDINATES AND 1985 TAXABLE VALUE OF REAL PROPERTY FOR SECTIONS CONSIDERED FOR PUBLIC ACQUISITION

ALACHUA COUNTY

LOCHLOOSA FOREST

Rge-Twn-Sec	Taxable Value
21E-10S-32	$59,400.00
21E-10S-35	$84,300.00
21E-10S-36	$57,000.00
21E-11S-1	$68,600.00
21E-11S-2	$63,900.00
21E-11S-3	$58,600.00
21E-11S-4	$56,600.00
21E-11S-9	$34,900.00
21E-11S-10	$57,600.00
21E-11S-11	$51,200.00
21E-11S-12	$78,100.00
21E-11S-13	$51,500.00
21E-11S-14	$73,700.00
21E-11S-15	$156,900.00
21E-11S-16	$32,000.00
21e-11s-20	$26,300.00
21E-11S-21	$26,400.00
21E-11S-22	$49,400.00
21E-11S-23	$188,700.00
21E-11S-24	$55,700.00
21E-11S-25	$47,500.00
21E-11S-26	$562,400.00
21E-11S-27	$26,500.00
21E-11S-28	$0.00
21E-11S-33	$14,400.00
21E-11S-34	$8,200.00
22E-10S-31	$65,800.00
22E-10S-32	$120,390.00
22E-10S-33	$101,600.00
22E-10S-34	$90,600.00
22E-11S-4	$87,700.00
22E-11S-5	$73,400.00
22E-11S-6	$79,000.00
22E-11S-7	$68,900.00

22E-11S-8	$25,200.00
22E-11S-9	$57,200.00
22E-11S-16	$165,800.00
22E-11S-17	$0.00
22E-11S-18	$36,600.00
22E-11S-19	$6,000.00
22E-11S-20	$0.00
22E-11S-28	$0.00
22E-11S-29	$6,000.00
22E-11S-30	$10,600.00
22E-11S-31	$27,600.00
22E-11S-32	$21,200.00
22E-11S-33	$23,300.00
22E-12S-3	$83,200.00
22E-12S-4	$53,500.00
22E-12S-5	$23,400.00
22E-12S-6	$33,700.00
22E-12S-7	$85,200.00
22E-12S-8	$89,300.00
22E-12S-9	$109,800.00
TOTAL	$3,534,790.00

O'LENO - RIVER RISE

Rge-Twn-Sec	Taxable Value
17E-6S-36	0
17E-7S-1	0
TOTAL	0

PAYNE'S PRAIRIE

Rge-Twn-Sec	Taxable Value
19E-10S-24	$24,300.00
19E-10S-34	$0.00
19E-10S-35	$2,300.00
19E-10S-36	$0.00
19E-11S-1	$0.00
19E-11S-2	$0.00
19E-11S-3	$8,800.00
19E-11S-12	$105,300.00
20E-10S-00	$0.00
20E-10S-17	$0.00
20E-10S-20	$37,000.00

20E-10S-24	$0.00
20E-10S-26	$14,600.00
20E-10S-27	$0.00
20E-10S-28	$0.00
20E-10S-29	$0.00
20E-10S-30	$0.00
20E-10S-31	$0.00
20E-10S-32	$0.00
20E-10S-33	$0.00
20E-10S-34	$0.00
20E-10S-35	$0.00
20E-10S-36	$0.00
20E-11S-6	$0.00
20E-11S-7	$43,500.00
20E-11S-18	$11,800.00
20E-11S-24	$11,900.00
TOTAL	$259,500.00

SAN FELASCO HAMMOCK

Rge-Twn-Sec	Taxable Value
18E-8S-36	$7,300.00
18E-9S-1	$0.00
18E-9S-12	$0.00
19E-8S-29	$193,900.00
19E-8S-30	$0.00
19E-8S-31	$0.00
19E-8S-32	$5,500.00
19E-9S-5	$0.00
19E-9S-6	$0.00
19E-9S-7	$0.00
19E-9S-8	$49,600.00
TOTAL	$256,300.00

BRADFORD COUNTY

BROOKS SINK

Rge-Twn-Sec	Taxable Value
21E-7S-12	$195,040

COLUMBIA COUNTY

ICHETUCKNEE SPRINGS STATE PARK

Rge-Twn-Sec	Taxable Value
15E-6S-13	$0
15E-6S-14	$0
15E-6S-23	$58,510
15E-6S-24	$6,630
16E-6S-18	$300,960
TOTAL	$366,100

O'LENO STATE PARK

Rge-Twn-Sec	Taxable Value
17E-6S-34	$79,820
17E-6S-35	$44,140
17E-6S-36	$15,330
17E-7S-1	$0
17E-7S-2	$63,070
17E-7S-3	$123,080
TOTAL	$366,100

DIXIE COUNTY

CORE OF CALIFORNIA SWAMP

Rge-Twn-Sec	Taxable Value
11E-11S-36	$75,018
11E-12S-1	$34,030
11E-12S-2	$82,226
11E-12S-11	$54,506
11E-12S-12	$31,167
11E-12S-13	$32,134
11E-12S-24	$28,924
11E-12S-25	$31,264
12E-11S-19	$82,729
12E-11S-20	$78,197
12E-11S-28	$54,418
12E-11S-29	$83,900
12E-11S-30	$40,238
12E-11S-33	$54,269
12E-11S-34	$87,683

12E-11S-35	$84,583
12E-11S-36	$81,132
12E-12S-4	$84,455
12E-12S-5	$40,637
12E-12S-6	$33,170
12E-12S-7	$33,020
12E-12S-8	$43,780
12E-12S-9	$91,497
12E-12S-18	$33,373
12E-12S-19	$30,816
12E-12S-30	$36,476
TOTAL	$1,443,642

WANNEE NATURAL AREA

Rge-Twn-Sec	Taxable Value
14E-8S-31	$88,200
14E-9S-6	$95,400
14E-9S-7	$119,300
TOTAL	$302,900

STEINHATCHEE RIVER CORRIDOR

Rge-Twn-Sec	Taxable Value
10E-8S-21	$30,225
10E-8S-28	$82,990
10E-8S-29	$82,990
10E-8S-32	$82,990
10E-9S-5	$82,990
10E-9S-8	$82,990
10E-9S-17	$82,990
10E-9S-18	$82,990
10E-9S-19	$82,990
10E-9S-30	$82,990
TOTAL	$777,135

SUWANNEE RIVER, SEGMENT V

Rge-Twn-Sec	Taxable Value
11E-13S-23	$2,275
11E-13S-24	$3,425
11E-13S-25	$3,740
11E-13S-36	$8,090
12E-12S-36	$58,258

12E-13S-1	$23,744
12E-13S-2	$88,300
12E-13S-3	$75,935
12E-13S-4	$62,315
12E-13S-5	$87,290
12E-13S-8	$120,344
12E-13S-9	$61,215
12E-13S-10	$33,411
12E-13S-11	$40,270
12E-13S-12	$6,250
12E-13S-13	$7,620
12E-13S-14	$58,988
12E-13S-15	$77,151
12E-13S-16	$219,778
12E-13S-17	$35,196
12E-13S-20	$3,365
12E-13S-21	$314,993
12E-13S-22	$1,960
12E-13S-23	$475
12E-13S-28	$1,945
12E-13S-29	$2,010
12E-13S-31	$6,000
12E-13S-32	$0
12E-13S-33	$0
12E-13S-34	$0
12E-13S-35	$0
12E-13S-36	$0
13E-13S-6	$ 5,850
13E-12S-4	$61,190
13E-12S-8	$75,130
13E-12S-9	$46,860
13E-12S-10	$3,200
13E-12S-16	$10,572
13E-12S-17	$73,268
13E-12S-20	$41,834
12E-12S-21	$ 2,200
13E-12S-29	$44,654
13E-12S-30	$52,848
13E-12S-31	$47,439
13E-12S-32	$15,735
TOTAL	$1,885,123

GILCHRIST COUNTY

SUWANNEE - SANTA FE RIVERS CONFLUENCE

Rge-Twn-Sec	Taxable Value
14E-7S-1	$ 11,402
14E-7S-12	$ 779,343
TOTAL	$790,745

WANNEE NATURAL AREA

Rge-Twn-Sec	Taxable Value
14E-8S-31	$12,250
14E-9S-6	$28,795
14E-9S-7	$410,309
TOTAL	$451,354

HAMILTON COUNTY

BROWN TRACT

Rge-Twn-Sec	Taxable Value
16E-1S-28	$89,513
16E-1S-29	$88,459
16E-1S-32	$475,131
16E-1S-33	$102,796
16E-1S-34	$67,341
16E-2S-2	$11,932
16E-2S-3	$45,195
16E-2S-4	$69,214
16E-2S-5	$76,547
16E-2S-8	$74,953
16E-2S-9	$48,048
16E-2S-10	$8,480
16E-2S-11	$0
TOTAL	$757,609

HOLTON CREEK

Rge-Twn-Sec	Taxable Value
13E-1S-2	$154,466
13E-1S-3	$320,610
13E-1S-4	$441,770
13E-1S-5	$360,196
13E-1S-6	$531,072
TOTAL	$1,808,114

SUWANNEE RIVER STATE PARK

Rge-Twn-Sec	Taxable Value
11E-1S-13	$0
11E-1S-24	$0
TOTAL	$0

STEPHEN FOSTER STATE FOLK CULTURAL CENTER

Rge-Twn-Sec	Taxable Value
15E-2S-12	$19,810
TOTAL	$19,810

LAFAYETTE COUNTY

SUWANNEE - SANTA FE RIVERS CONFLUENCE

Rge-Twn-Sec	Taxable Value
14E-7S-11	$326,630
14E-7S-14	$252,470
14E-7S-23	$84,240
14E-7S-26	$137,960
14E-7S-35	$170
TOTAL	$801,470

SUWANNEE COUNTY

ICHETUCKNEE SPRINGS STATE PARK

Rge-Twn-Sec	Taxable Value
15E-6S-11	$54,324
15E-6S-12	$76,994
15E-6S-13	$0
15E-6S-14	$6,403
15E-6S-23	$0
TOTAL	$237,721

PEACOCK SLOUGH

Rge-Twn-Sec	Taxable Value
21E-4S-20	$218,993
21E-4S-21	$113,344
TOTAL	$332,337

SUWANNEE -SANTA FE RIVERS CONFLUENCE

Rge-Twn-Sec	Taxable Value
14E-7S-1	$280,988
14E-7S-11	$116,293
TOTAL	$397,281

TAYLOR COUNTY

STEINHATCHEE RIVER CORRIDOR

Rge-Twn-Sec	Taxable Value
9E-9S-23	$1,122,670
9E-9S-24	$268,784
9E-9S-25	$3,069,798
9E-9S-26	$1,588,792
10E-8S-21	$202,057
10E-8S-28	$3,530
10E-8S-29	$83,016
10E-8S-31	$71,760
10E-9S-5	$1,241,856

10E-9S-6	$60,834
10E-9S-7	$91,194
10E-9S-17	$467,133
10E-9S-18	$809,326
10E-9S-19	$1,961,344
10E-9S-30	$21,218,391
TOTAL	$32,260,485

ECONFINA RIVER CORRIDOR

Rge-Twn-Sec	Taxable Value
5E-3S-33	$118,849
5E-3S-34	$106,920
5E-3S-35	$10,7602
5E-3S-36	$97,251
5E-4S-2	$73,611
5E-4S-3	$119,493
5E-3S-4	$114,104
5E-4S-5	$109,260
5E-4S-7	$75,722
5E-4S-8	$109,840
5E-4S-9	$119,410
5E-4S-10	$98,372
5E-4S-17	$117,688
5E-4S-18	$108,838
6E-3S-19	$86,992
6E-3S-20	$80,192
6E-3S-21	$84,658
6E-3S-29	$92,820
6E-3S-30	$86,780
6E-3S-31	$61,428
TOTAL	$1,969,830

AUCILLA RIVER CORRIDOR

Rge-Twn-Sec	Taxable Value
3E-4S-18	$0
3E-4S-19	$0
3E-4S-25	$23,163
3E-4S-36	$0
3E-5S-1	$0
4E-3S-2	$59,870
4E-3S-10	$62,972
4E-3S-15	$74,116
4E-3S-22	$88,480
4E-3S-27	$88,470
4E-3S-28	$44,090

4E-3S-29	$0
4E-3S-30	$0
4E-3S-31	$0
4E-3S-32	$26,170
4E-4S-5	$63,314
4E-4S-6	$1,071
4E-4S-7	$912,260
4E-4S-8	$412,778
4E-4S-18	$182,220
5E-2S-21	$13,503
5E-2S-22	$67,756
5E-2S-27	$75,954
5E-2S-28	$71,692
5E-2S-29	$51,538
5E-2S-31	$319,734
5E-2S-32	$89,643
TOTAL	$2,728,794

FOOTNOTES

[1]Bureau of Economic and Business Research, University of Florida, 1985 Florida Statistical Abstract (Gainesville, Fl.: 1984), Table 1.84, Population Projections: Estimates April 1, 1985, 1990, 1995, 2010, and 2020, in the Stae and Counties of Florida", pg. 36.

[2]North Central Florida Regional Planning Council, Environmental Quality Assessment: Coastal Zone Planning for Dixie and Taylor Counties, Florida (Gainesville, Fl.: 1976), pg. 65.

[3]North Central Florida Regional Planning Council, Significant Natural Areas in Planning District Three (Gainesville, Fl.: 1977), pg. 46.

[4]A.T. Gailard, Florida Game and Freshwater Fish Commission (personal communication with author), April, 1985.

[5]Water Ressources Division, United States Geological Survey, Water Resource Data for Florida, Vol. 4, Northwest Florida (Tallahassee, Fl.: 1984).

[6]Water Resources Division.

[7]Water Resources Division.

[8]Ken Pelham, Suwannee River Visual Resource Assessment Study, University of Florida, Department of Landscape Architecture (Gainesville, Fl.: 1980).

[9]Pelham.

[10]Water Resources Division.

[11]Angelo D. Becasso, Nick Fotheringham, Alice E. Redfield, Ronald L. Frew, William M. Levitan, Joel E. Smith, and Jarrett O. Woodrow, Jr., Gulf Coast Ecological Inventory: User's Guide and Information Base, Dames and Moore (Bethesda, Md.: 1982), pg. 132.

[12]Beccasio, et. al., pg. 130.

[13]Beccasio, et. al., pg. 132.

[14]S. David Webb, "A Short Report on the Ecology of the Suwannee River Drainage", Florida State Museum (Gainesville, Fl.: 1970), Pg. 4-7.

[15]Walking the Florida Trail, John M. Keller, Ed., Florida Trail Association, Inc. (Gainesville, Fl.: 1983), pg. 114.

[16]Water Resources Division.

[17]North Central Florida Regional Planning Council, Significant Natural Areas (Gainesville, Fl.: 1977), pg. 60.

[18]Water Resources Division.

[19]Water Resources Division.

[20]Florida Department of Natural Resources, Division of Recreation and Parks, Management Criteria statement, Suwannee River State Park (Tallahassee, Fl.: 1985).

[21]Significant Natural Areas, pg. 41.

[22]J. Merrill Lynch, Suwannee River Preserve Design Project, The Nature Conservancy (Tallahassee, Fl.: 1984), pg. 55.

[23]J. Merrill Lynch, pg. 119.

[24]J. Merrill Lynch, pg. 150.

[25]J. Merrill Lynch, pg. 184.

[26]Significant Natural Areas, pg. 69.

[27]Significant Natural Areas, pg. 54.

[28]Annual Report of the Conservation and Recreation Lands Selection Committee, Division of State Lands (Tallahassee, Fl.: 1985), pg. 211.

[29]Robert M. Brantley, Executive Director of the Florida Game and Freshwater Fish Commission, correspondence of March 6, 1984 to Mr. John Bethea, Director, Division of Forestry, Department of Agriculture and Consumer Services, Tallahassee, Fl.

[30]Significant Natural Areas, pg. 82.

[31]Ad Hoc Committee for Newnans Lake Environmental Concerns, Report: 1983 Alachua County, Gaionesville, Fl.: pg. 13.

[32]Bureau of Economic and Business Research, Table 1.84.

[33]Bureau of Economic and Business Research, Table 1.69, "Population: Census Counts, April 1, 1970 and 1980, and Estimates April 1, 1984, of the 1984 Most Populous Cities in Florida", pg. 30.

[34]Management Criteria Statement, San Felasco Hammock State Preserve, Department of Natural Resources, Division of Recreation and Parks, 1977.

[35]Bureau of Economic and Business Research, Table 1.84.

[36]Bureau of Economic and Business Research, Estimates of Population by County and Municipality in Florida (Gainesville, Fl: April 1, 1984).

[37]Bureau of Economic and Business Research, Table 1.84.

[38]Bureau of Economic and Business Research, Economic Leaflets, Vol. 41, No. 12 (Gainesville, Fl.: 1982).

[39]Bureau of Economic and Business Research, Estimates of Population by County and Municipality in Florida (Gainesville, Fl.: April 1, 1984).

[40]Bureau of Economic and Business Research, Economic Leaflets, Vol. 41, No. 12, (Gainesville, Fl.: 1982).

[41]Bureau of Economic Research, 1984 Florida Statistical Abstract, Table 1.84.

[42]University of Florida, Bureau of Economic and Business Research, Florida Statisitcal Abstract, 1980-1984, Table 11.15, "Building Permit Activity: New Housing Units Authorized by Building Permits in the State, Counties, Municipalities, and Unincorporated Areas of Florida."

[43]Bureau of Economic and Business Research, 1984 Florida Statistical Abstract, Table 1.84.

[44]Bureau of Economnic and Business Research, Florida Statistical Abstract, Table 1.84.

[45]Bureau of Economic and Business Research, 1984 Florida Statistical Abstract, Table 1.84.

[46]Silviculture Best Practices Manual, State of Florida, Division of Forestry (Tallahassee, Fl.), ca. 1980.

[47]Judy P. Stout, The Ecology of Irregularly Flooded Salt Marshes of the Northeastern Gulf of Mexico: A Community Profile, Marine Environmental Sciences Consortium, Dauphin Island, Alabama (December, 1984), Pg. 6.

[48]Orrin H. Pilkey, et. al., From Curritack to Calabash: Living With North Carolina's Barrier Islands, North Carolina Science and Technology Research Center (Research Triangle Park, N. C.: 1978).

[49]John D. Wilson, et. al., Hurricane Hazard Mitigation at the Local Government Level: The Roles of the Building Code and Other Development Management Strategies, Department of Urban and Regional Planning, Florida State University (Tallahassee, Fl.: 1980), pg. 73.

[50] Texas Coastal and Marine Council, Model Minimum Hurricane Resistant Building Standards for the Texas Gulf Coast, Texas State Printing Office (Austin, Tx: 1978).

[51]Texas Coastal and Marine Council.

[52]Texas Coastal and Marine Council.

[53]Federal Emergency Management Agency, "Proposed Federal Emergency Management Agency Disaster Relief Policy for Barrier Islands, Beaches, and Spits," (Washington, D. C.: 1979).

[54]Florida Committee on Rare and Endangered Plants and Animals, Rare and Endangered Biota of Florida, Volumes I-V, Peter C.H. Pritchard, series ed. (Gainesville, Fl.: 1978).

[55]James R. Anderson, Ernest E. Hardy, John T. Roach, and Richard E. Witmer, A Land Use and Land Cover Classification System for Use with Remote Sensor Data, Dep't. of the Interior, U. S. Geological Survey Professional Paper 964 (Washington, D. C.: Government Printing Office, 1968).

[56]Randy S. Kautz, Criteria for Evaluating Impacts of Development on Wildlife Habitats, Office of Environmental Services, Florida Game and Freshwater Fish Commisison (Tallahassee, Fl., 1985).

[57]Kautz.

[58]Amphibians and Reptiles, Roy W. McDiarmid, ed. Vol. Three of Rare and Endangered Biota of Florida, Peter C. H. Pritchard, series ed., Florida Committee on Rare and Endangered Species, 5 vols. (Gainesville, Fl.: 1978), pg. x-xi.

[59]McDiarmid, pg. 15.

[60]Birds, Herbert W. Kale, ed., Vol. Two of Rare and Endangered Biota of Florida, pg. vii.

[61]McDiarmid, pg. 34.

[62]Plants, Daniel B. Ward, ed., Vol. Five of Rare and Endangered Biota of Florida, pg. xiii.

[63]Ward, ed., pg. xix.

[64]Ward, ed. pg. xix.

[65]C. A. Luer, The Native Orchids of Florida (New York: 1972), pg. 293.

[66]Luer.

[67]Kale II, ed., pg. 120.

[68]Pritchard, ed., pg. 120.

[69]Ward, ed., pg. xiii.

[70]Ward, ed., pg. 111.

[70]Mammals, James N. Layne, ed., Vol. One of Rare and Endangered Biota of Florida, pg. x.

[70]Layne.

BIBLIOGRAPHY

Anderson, James R., Hardy, Ernest T., Roach, John T., Witmer, Richard E. "A Land Use and Land Cover Classification System for Use with Remote Sensor Data". Geological Survey Professional Paper 964. Washington, D.C.: USGPO, 1976.

Bartholomew, J., Brown, M., Brown, S., Boyt, R., DeBellevue, E., Duever, L., Duever, M., Evel, K., Lugo, A., Odum, H. T., and Wharton, C. H. Forested Wetlands of Florida - Their Management and Use. Final Report to the Division of State Planning on a Contract for a Forested Wetlands Manual. Gainesville, Fl.: University of Florida, Center for Wetlands, 1977.

Balisllie, J. H. "Design Hurricane Generated Wind Loads". Florida Department of Natural Resources, Bureau of Beaches and Shores, unpublished report. Tallahassee, Fl.: 1978.

Beccasio, Angelo D., Fotheringham, Nick, Frew, Ronald L., Levitan, William M., Redfield, Alice E., Smith, Joel E., Woodrow, Jarrett O. Jr. Gulf Coast Ecological Inventory. User's Guide and Information Base. Dames and Moore, Bethesda, Md.: 1982.

Carter, Virginia, Cowardin, Lewis M., Golet, Francis C., and LaRoe, Edward T. Classification of Wetlands and Deepwater Habitats of the United States. Washington, D.C.: USGPO, 1979.

Clark, John. The Sanibel Report. Washington, D.C.: The Conservation Foundation, 1976.

Clark, John. Coastal Ecosystems. Ecological Considerations for Management of the Coastal Zone. Washington, D.C.: The Conservation Foundation, 1974.

Fernald, Edward A. and Patton, Donald J. Water Resources Atlas of Florida. Florida State University, Tallahassee, Fl: 1984.

Fifield, DeeEll, Hayes, Vera McIntyre, Trescott, Daniel L. and Wilson, John D. Hurricane Hazard Mitigation at the Local Government Level The Roles of the Building Code and Other Development Management Strategies. State of Florida, Department of Community Affairs, Division of Public Safety and Disaster Assistance, Bureau of Disaster Preparedness, Tallahassee, Fl.: 1980.

Gilbert, Carter R., ed. Fishes. Rare and Endangered Biota of Florida, Volume Four. Gainesville, Fl.: University of Florida Press, 1978.

Hunn, James D. and Slack, Larry J. Water Resources of the Santa Fe River. Tallahassee, Fl.: U.S. Department of the Interior, Geological Survey, 1983.

Kale II, Herbert W., ed. Birds. Rare and Endangered Biota of Florida, Volume Two. Gainesville, Fl.: University of Florida Press, 1978.

Kautz, Randy S. "Criteria for Evaluating Impacts of Development on Wildlife Habitats". Unpublished paper, State of Florida, Game and Freshwater Fish Commission, Office of Environmental Services, Tallahassee, Fl.: 1985.

Keller, John M., ed. Walking the Florida Trail. Gainesville, Fl.: Florida Trail Press, 1983.

Layne, James N., ed. Mammals. Rare and Endangered Biota of Florida, Volume One. Gainesville, Fl.: University of Florida Press, 1978.

Livingston, Robert J. "The Ecological Impact of Pulp Mill Efluents on Aquatic Flora and FAuna of North Florida: Comparison of a Polluted Drainage System (Fenholloway) with an Unpolluted One (Econfina)". Unpublished research paper, Florida State University, 1974.

Lynch, J. Merrill. Suwannee River Preserve Design Project. Enfield, N.C.: 1984.

McDiarmid, Roy W., ed. Amphibians and Reptiles. Rare and Endangered Biota of Florida, Volume Three. Gainesville, Fl.: University of Florida Press, 1978.

North Central Florida Regional Planning Council. Areas of Environmental Concern in Planning District Three. Gainesville, Fl.: 1974.

North Central Florida Regional Planning Council. Development Framework Element. Part 1, Regional Profiles. Gainesville, Fl.: 1982.

North Central Florida Regional Planning Council. Environmental Quality Assessment. coastal Zone Planning for Dixie and Taylor Counties, Florida. Gainesville, Fl.: 1976.

North Central Florida Regional Planning Council. Green Plan Inventory Sheets. Gainesville, Fl.: ca. 1978.

North Central Florida Regional Planning Council. Hurricane Evacuation Study. Gainesville, Fl.: 1985.

North Central Florida Regional Planning Council. Natural Resources. Gainesville, Fl.: 1978.

North Central Florida Regional Planning Council. Significant Natural Areas. Gainesville, Fl.: 1978.

Pelham, Ken. Suwannee River Visual Resources Management Study. Unpublished report, University of Florida, Department of Landscape Architecture, Gainesville, Fl.: ca. 1980.

Pilkey, Orrin H., et. al. From Currituck to Calabash: Living With North Carolina's Barrier Islands. North Carolina Science and Technology Research Center, Research Triangle Park, N.C.: 1978.

Research Planning Institute, Inc. Atlas: The Sensitivity of Coastal Environments and Wildlife to Spilled Oil in the North-Central Florida Region. Columbia, S.C.: 1984.

Rodriguez, Heber. Impact of Intensive Slash Pine Management on the Hydrology of a Coastal Savannah Watershed. Unpublished Masters thesis, University of Florida, Gainesville, Fl.: 1981.

Ryffel, Carleton J. Environmentally Sensitive Areas - 1975. State of Florida, Department of Community Affairs, Gainesville, Fl: 1975.

Sinclair, William C. and Stewart, L. "Sinkhole Type, Development, and Distribution in Florida". U.S. Geological, Survey, State of Florida, Department of Environmental Regulation, and State of Florida, Bureau of Geology, Tallahassee, Fl.: 1985.

State of Florida, Department of Community Affairs and the University of Florida, Holland Law Center, The Center for Governmental Responsibility. Local Options for Floodplain and Wetlands Management. Gainesville, Fl.: 1982.

State of Florida, Department of Community Affairs, Division of Resource Planning and Management, Bureau of State Land Planning. The Areas of Critical Concern Program. Tallahassee, Fl.: 1984.

State of Florida, Department of Environmental Regulation. Report to the Environmental Regulation Commission on the Proposed Designation of Portions of the Santa Fe River System as Outstanding Florida Waters. Tallahassee, Fl.: 1984.

State of Florida, Department of Environmental Regulation. Report to the Environmental Regulation Commission on the Proposed Redesignation of Portions of the Suwannee River System Between State Road 6 (Hamilton and Columbia Counties) and Suwannee Springs (Hamilton and Suwannee Counties) as an "Outstanding Florida Water. Tallahassee, Fl.: 1980.

State of Florida, Department of Natural Resources, Division of Recreation and Parks. Management Criteria Statement, Suwannee River State Park. Tallahassee, Fl.: 1985.

State of Florida, Division of Forestry. Silviculture Best Management Practices Manual. Tallahassee, Fl.: ca. 1985.

State of Florida, Division of State Lands. Annual Report of the Conservation and Recreation Lands Selection Committee. Tallahassee, Fl.: 1985.

State of Florida, Office of the Comptroller. State of Florida, Local Government Financial Report, Fiscal Year 1982-1983. Tallahassee, Fl.: 1984.

Stoudt, Judy P. The Ecology of Irregularly Flooded Salt Marshes of the Northeastern Gulf of Mexico: A Community Profile. U.S. Department of the Interior, Fish and Wildlife Service, Minerals Management Service, USGPO, Washington, D.C. 1984.

Suwannee River Coalition. Attachment to the Report to the Environmental Regulation Commission on the Proposed Designation of Portions of the Santa Fe River System as Outstanding Florida Waters. Gainesville, Fl.: 1983.

Texas Coastal and Marine Council. Model Minimum Hurricane Resistant Building Standards for the Texas Gulf Coast. Texas State Printing Office, Austin, Tx.: 1978.

U.S., Department of Agriculture, Soil Conservation Service. California Lake Watershed: Dixie County, Florida. Environmental Assessment. Gainesville, Fl.: 1975.

U.S., Department of Agriculture, Soil Conservation Service, Economic Research SErvice Forest Service. Interim Report. Northeastern Gulf River Basins Florida, Alabama, and Georgia. USGPO, Washington, D.C.: 1976.

U.S., Department of Defense, Army Corps of Engineers. Special Flood Hazard Information. Suwannee River Floods: Georgia and Florida.

U.S., Department of the Interior, Bureau of Outdoor Recreation. Suwannee River, Florida-Georgia. A National Wild and Scenic River Study. USGPO, Washington, D.C.: 1973.

U.S., Department of the Interior, National Park Service. National Scenic Trail Study Environmental Assessment: Florida Trail. USGPO, Washington, D.C.: 1982.

U.S., Federal Emergency Management Agency. "Proposed Federal Emergency Management Agency Disaster Relief Policy for Barrier Islands, Beaches, and Spits". USGPO, Washington, D.C.: 1979.

U.S., Geological Survey, Water Resources Division. Water Resources Data for Florida. Volume 4. Northwest Florida. Tallahassee, Fl.: 1982.

United States Water Resources Council. Regulation of Flood Hazard Areas. Volumes 1 & 2. USGPO, Washington, D.C.: 1971.

University of Florida, Bureau of Economic and Business Research. 1985 Florida Statistical Abstract. Gainesville, Fl.: 1984.

University of Florida, Bureau of Economic and Business Research. Economic Leaflets. Volume 41, No. 12. Gainesville, Fl.: 1982.

University of South Florida, Department of Marine Science. Proceedings of Marine Environmental Implications of Offshore Drilling in the Eastern Gulf of Mexico. Robert E. Smith, ed. St. Petersburg, Fl.: 1984.

Ward, Daniel B., ed. Plants. Rare and Endangered Biota of Florida, Volume Five. University of Florida Press, Gainesville, Fl.: 1978.

White, Larry. Ecosystems Analysis of Payne's Prairie for Discerning Optimum Resource Use. University of Florida, Institute of Food and Agricultural Sciences, School of Forest Resources and Conservation, Research Report No. 24, Gainesville, Fl.: 1978.

Wilson, John D. Hurricane Hazard Mitigation at the Local Government Level: The Roles of the Building Code and Other Development Management Strategies. Florida Sate University, Department of Urban and Regional Planning, Tallahassee, Fl.: 1980.

Wood, Don A. Official Lists of Endangered and Potentially Endangered Fauna and Flora in Florida. Florida Game and Freshwater Fish Commission, Tallahassee, Fl.: 1984.

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