Development of an improved model watershed-scale master wetland mitigation strategy for restoration, protection and public projects for local governments.

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Executive Summary

This project demonstrates the effectiveness of local government scale mitigation planning coordinated with future public works projects in achieving the goals of wetland and water quality protection, watershed hydrologic restoration, and completion of necessary public infrastructure projects. We will develop an improved model local government watershed scale wetland mitigation strategy for wetland restoration, wetland protection, and water quality improvement and public project mitigation at the local government scale that is transferable to other Florida counties. Depending upon the parameters in other States this will likely be transferrable to other local governments in other States that have a governance system similar to the Florida's.

A generic How-To document included with in this report and a PowerPoint presentation was also developed for available use in implementing similar programs in other jurisdictions.

Introduction

County-wide wetland mitigation planning can be a successful tool to identify, organize, and implement wetland protection, wetland restoration, and achieve water quality improvement and public project mitigation of unavoidable wetland impacts. In southwest Florida the Estero Bay Agency on Bay Management in coordination with the Lee County Public Works Department pioneered a landscape scale watershed management-oriented plan for coherent wetland protection and restoration that was an inclusive multi-entity public planning process. The resultant document has functioned well for the past nine years in improving water quality, protecting and restoring wetland habitats, creating habitat linkages in a regional wildlife habitat system, and successfully offsetting unavoidable wetland impacts of public road and utility projects and reducing permitting time for the county and the wetland regulatory agencies.

The Southwest Florida Regional Planning Council (SWFRPC) assisted Lee County, Florida in developing the initial Lee County Mitigation Plan (LCMP) in 2005 and in subsequent updating of the LCMP for the unincorporated areas of Lee County and incorporated areas. This process of updating the LCMP can serve as a model for other local governments to develop their own Master Mitigation Plans (MMP) that will link up regionally with adjacent Master Mitigation Plans. The update of the Lee County Mitigation Plan is designed to provide guidance for locations of land acquisitions and restorations to achieve goals in hydrologic restoration, water quality improvement and habitat protection are proposed to include a text document, GIS maps, and a spreadsheet database.

Using accumulated data and studies from regional capacity-building projects, including the Southwest Florida Watershed Study (SWFWS) framework for Lee County, the Coastal Conservation Corridor Plan (CCCP), Southwest Florida Regional Restoration Coordination Team Plan (SWFRRCTP), and restoration goals of the Charlotte Harbor National Estuary Program (CHNEP), the SWFRPC worked with Lee County Public Works and Department of Transportation Staff to produce a strategy for wetland acquisition, protection, and restoration that will also provide mitigation opportunities for Lee County.

The Master Mitigation Plan has three main purposes:

1. to provide a master strategy by which critical wetland environmental features continue to be preserved,

2. to provide "safe harbor" approaches for wetland mitigation projects that are required for the infrastructure needed to accommodate growth, which in turn will enable the local government budgeting process to be reliable, and

3. to restore degraded wetland resources that are important for the health, safety, and welfare of the public.

The Master Mitigation Plan is an outgrowth of the problems the county has had in the past satisfying, in a meaningful way, mitigation requirements for road projects, particularly the widening of Alico Road, which took three years to get permits.

Lee County began developing its first Master Natural Resources Preservation/Mitigation Plan in coordination with a multiagency team in early 2002 to proactively address potential cumulative impacts to the county's natural resources such as water supply, water quality and wildlife habitat due to existing and future development including both private and public works projects. A proactive and comprehensive approach addresses environmental concerns through implementation of retrofit and restoration-type projects instead of engaging in the continual technical debates and legal challenges, on a case-by-case basis, that had characterized the process. Additionally, many of the mitigation efforts were not coordinated in a comprehensive way, so there were isolated and scattered mitigation projects that weren't as meaningful individually because they did not connect to anything as those that have been identified on a countywide basis as having a countywide impact.

The first mitigation plan was completed and approved on February 2, 2006 utilizing the mapping and planning efforts of the SWFRPC, led by the Principle Investigator, David Burr, in coordination with the Estero Bay Agency on Bay Management and the Charlotte Harbor National Estuary Program. It was current though the year 2012.

On July 10, 2012 the Lee County Commission adopted an ordinance to incorporate the LCMMP into the site selection process for the Conservation 2020 local government land acquisition program. The MMP identifies private and publicly owned parcels that could be candidate projects for preservation, restoration, or mitigation activities. The MMP implements Lee Plan Policy 2.1 1.4, which calls for the County to "Identify and map and update, through a science-based process, those lands with the environmental science-based opportunities for mitigation, remediation, or preservation. Promote such areas for such uses through County programs." The map is administratively updated to remove tracts that are developed and to add appropriate tracts that are acquired for conservation purposes.

The mapping has been maintained and modified as projects are completed or opportunities are lost to other land use decisions with an update in the form of part of the Southwest Florida Watershed Study in 2011. These modifications and new candidate parcels have not been project linked to the current Lee County CIP. The MMPs are an investment strategy for economic stability. With tourism, agriculture, and fisheries and retirement related businesses as the major components of the southwest Florida counties economic base, ensuring that there is a diversity of open space features, quality outdoor experiences, and healthy air and water quality supports the economic services that provide one of the highest qualities of life standards in the United

States.

Lee County needs an updated master Mitigation Plan and has previously contacted the SWFRPC to assists in the process of performing an update. It is also valuable to other local governments to have a model developed for their implementation of similar mitigation plans to assist in achieving needed water quality improvements for identified impaired water segments, to restore impacted wetlands in public ownership, create and protect riverine riparian corridors in a connected wetland landscapes, restore hydrology to improve surficial and other aquifers, and have a dependable cost effective means to provide wetland restoration and improvement as an off-set to wetland impacts incurred by public infrastructure projects including roads, stormwater utilities, other utilities, and public safety buildings. Estuarine and freshwater wetland environments require careful management. In southwest Florida they exist in a reticulate patchwork of cores, strands, and ecotones drawn together by the threads of hydrology. The estuaries in the southwest Florida are heavily influenced by human water management and intense human use. The regional impacts on coastal and interior wetlands are well documented and reflect a wide variety of water diversions, impoundments, impediments drainage, and man caused flooding; a wide diversity of exotic plant and animal invasions, direct removal through filling and excavation into mines, water management structures, linearized waterways and flow ways, and terra-forming with full in attempts to create drier ground. Wetland restoration projects have a long history in south west Florida beginning in the 1970s with the recognition for the values of and functions of wetlands that were being lost in the conversion and degradation processes to that date. These restorations include a full range of hydrologic, water quality, fisheries habitat, wildlife habitat, and public use improvements designed to return wetland areas and function to an improved condition relative to the degraded pre-restoration conditions. The decision to undertake a wetland restoration is predicated on several factors including the mission of the restorer, the availability of suitable sites, the availability of funding for a restoration method that is achievable with known methods and technologies, and the perceived value of the outcome of the restoration to decisions-makers, the implementer and the public. In Florida as elsewhere, decisions-makers, the managers of the restoration, and the general public want to know if the restorations are successful, what benefits are accrued from the restoration and particularly, do the benefits out-weight the costs of the restoration process.

The three ecosystem services studies (Beever and Walker 2013, Beever 2013 a, b) completed in the region have been well received by the agencies, restoration community, general public and local governments of southwest Florida. There has been a strong interest in local government staff and private conservation organization in learning how to do ecosystem services estimates for their projects. By qualifying the values and functions of restoration, and in particular, by documenting the increase in services, known in the practice as "lift" of the restoration ecosystem services, calculation measures can provide a means to evaluate restoration outcomes in a measurable and for many functions monetized way. Training staff of the government agencies and conservation-oriented NGOs that are performing restoration in southwest Florida in a regionally calibrated ecosystem services assessment method using real life examples will give them a planning and project assessment tool that is easily communicated to financially oriented decision-makers who typically lack a scientific or wetland science background.

3. Projects Task:

A multi-agency task team will be convened at the Southwest Florida Regional Planning Council. Members will identify private and publicly owned parcels that could be candidate projects for preservation, restoration, or mitigation programs. The aggregate of these parcels will be mapped in GIS. A description of each parcels' suitability for public preservation, restoration, or

mitigation efforts, along with a coarse estimate of the costs for the described efforts will be provided as a one-time estimate. The listing will include existing private and public mitigation, restoration, and some preservation projects. Use of existing lands and programs may meet short term permitting needs. The continued use of private and public partnerships for adding lands to meet mitigation and restoration needs is expected to be a major component of the implementation of the Master Mitigation Plan.

This baseline map and series of descriptions will be presented for agency review as the vehicle for the physical expression of the Master Mitigation Plan's implementation. Public parcels depicted on the map will be those with deficiencies that need remediation. Private parcels depicted on the map are not required by the mitigation planning process to be mitigation sites. Appearance on the map does, however, reflect current environmental conditions of the land that are notable at the mapping scale. Their inclusion for mapping purposes demonstrates the systematic review of Lee County restoration needs and mitigation and preservation opportunities.

The projects identified as candidates for preservation, restoration or mitigation through the Mitigation Plan will be summarized. Most projects will address more than one issue and may include some acreage that does not have to be acquired or restored.

An update of the LCMP would involve the following deliverables: three multiagency meetings; a review draft of the report, map, and database; and a final product including the report, database and map

The ECOSERVE ecosystem services method, developed by the principle investigator and calibrated to Florida, will be applied to evaluate the benefits of the existing wetland habitat restoration projects completed in the mitigation. Training in how to use the method will be provided to wetland land managers, regulatory scientists, and the interested public decision-makers. This will allow wetland decision-makers to evaluate the benefits provided by wetland restoration and to predict the range of ecosystem services that can be expected from different restoration proposals under differing future conditions.

Based upon the experience gained in the Master Mitigation Planning for Lee County we will document, develop and write the generic methodology of the MMP process into a How-to Manual for use by other local governments. This will become a review draft of the final How to Manual Final Report of the How to do a Master Mitigation Plan for Local Governments. We will then take the How-to Manual to meetings with adjacent and watershed connected local governments in Charlotte, Collier, Glade, Hendry and Sarasota Counties.

Review of the existing Lee County Mitigation Plan including identifying completed and ongoing projects implemented and projects yet to be done.

Calculation of the ecosystem services values for the collected mitigation projects using the ECOSERVE total ecosystem services method,

The major mitigation projects that were created as part of the Lee County Master Mitigation Plan are the Ten-Mile Canal Filter Marsh and its expansion, the Island Park Mitigation Area in the Hendry Creek watershed, the Briarcliff Canal Filter Marsh. For each of these the total ecosystem services values was calculated using the ECOSERVE total ecosystem services method described in (Beever and Walker 2016) that includes Use Values (Direct and Indirect) from market-based and non-market-based sources; Market Price Methods, Travel Costing, Damage Cost Avoidance Method, Replacement and Substitute Cost Methods, Benefit Transfer Measures, Net Present Values, and Natural Capital Approaches.

Ten-Mile Canal Filter Marsh

The Ten Mile Canal was constructed in the 1920's to drain agricultural lands in South Fort Myers. It cut through the Six-Mule Cypress Strand disconnecting it form the headwaters of Hendry Creek. In the 1970's the Canal was deepened and widened, and control structures were installed to maintain the water table and to protect saltwater intrusion. The Ten Mile canal watershed covers an area of 13 square miles and flows into Mullock Creek, an outstanding Florida Water which is designated as impaired, and subsequently into Estero Bay, Florida's first aquatic preserve. The existing predominant land use includes commercial and industrial. The watershed is affected by heavy urban development, cropland, and some pastureland along the banks.

Construction of an approximately 6,000-foot long filter marsh was completed in December 2005. The filter marsh is located approximately at the half-way point along the canal length between Daniels Boulevard and Six-Mile Cypress Parkway. The construction involved excavating approximately 400,000 cubic yards of material from a 6,000-foot by 100-foot area adjacent to the canal and routing the canal water into the filter marsh through two (2) 30-inch diameter pipes. A maintenance road and a recreation bike path have been constructed to separate the canal from the filter marsh. The inlet with a controllable screw type sluice gate system is installed upstream of a weir. Water flow into the filter marsh system is regulated through the gate system. The filter marsh system is divided into four (4) different cells connected through three (3) 30-inch diameter pipes. Water depths in cells vary from 18 inches to 5 feet. The first cell acts as a settling basin with limited wetland vegetation. The second cell is shallow and planted with wetland vegetation. The third cell is deeper than any other cell and has wetland vegetation suitable for deeper water. The last cell is shallow and has a lot of shallow water wetland vegetation. Each cell is outfitted with an outflow riser regulated by flash boards. This structure allows excess water flow back into the canal. Further, this structure is being used to lower the water level in the cells during maintenance events.

The long-term goal is to implement dynamic, effective water quality enhancement for Lee County's designated impaired water bodies. Nutrient reduction is the primary focus of this project. In order to monitor the effectiveness of the system, Lee County Environmental Lab is collecting water quality samples on a monthly basis at stations established within the filter marsh in addition to established sampling stations in the canal proper. Flow and stage data within the marsh is collected to coincide with the water quality sample collection. Water quality data collected show some improvements from inflow to outflow conditions. The maintenance of the filter marsh includes harvesting wetland vegetation on a regular basis. The construction cost of the filter marsh was approximately 1.6 million dollars. Florida Department of Environmental Protection provided $507,000 in grant funding. The filter marsh was constructed along with a contiguous linear park to the east of the filter marsh. Both the filter marsh and the linear park were included in a single construction project.

Figure 1: Ten-Mile Canal Filter Marsh, Aerial View

Figure 2: Ten-Mile Canal Filter Marsh, looking north.

The Total Ecosystem Services Value of the Ten-Mile Canal Filter Marsh Project is calculated by the ECOSERVE method described in (Beever and Walker 2016). Completing the calculation, the Total Pre- construction Total Ecosystem Services Value (TEV) of the basic Ten-Mile Canal was $111,674.38 per year. After the construction of the filter marsh the Total Post-construction TEV is $467,647.38. This is a Net TEV gain of $355,973.00 or a NET TEV gain/acre of $12,921.82.

Estero Marsh Preserve

Located near Estero Bay, this preserve is 243.97 acres and was acquired as three parcels between 1999 and 2014. Portions of the preserve are also adjacent to Estero Bay Preserve State
Total Cost is $3,822,970.00. The first parcel was acquired Wednesday, December 15, 1999. Estero Marsh Preserve consists of several native plant communities, including estuarine tidal swamp and marshes, mesic and wet flatwoods, and tidal swamp lake. There is an ongoing mitigation project onsite by the Lee County Department of Transportation to remove invasive exotic plants, plant native vegetation, and perform hydrological restoration. The preserve has limited public access and there are no marked hiking trails. Please contact staff to visit. Recreation Opportunities include: Bird Watching, Hiking (Unmarked or Fire Lines), Nature Study/Photography. Although there are no planned facilities for this site, a pedestrian gate has been installed at the corner of Island Park & Park Roads for primitive hiking. The Total Ecosystem Services Value of the Estero Marsh Preserve Project is calculated by the ECOSERVE

method described in (Beever and Walker 2016). Completing the calculation, the Total Pre-construction Total Ecosystem Services Value (TEV) of the Estero Marsh Preserve was $141,653.86 per year. After the construction of the restoration the Total Post-construction TEV is $23,405,013.17. This is a Net TEV gain of $23,263,359.30 or a NET TEV gain/acre of $95,353.36.

Figure 3: Ribbon cutting at the Estero Marsh Preserve

Figure 4: Interpretive sign at the Estero Marsh Preserve

Figure 5: Mitigation Area at the Estero Marsh Preserve

Figure 6: Roseate Spoonbills and Little Blue Heron at the Estero Marsh Preserve

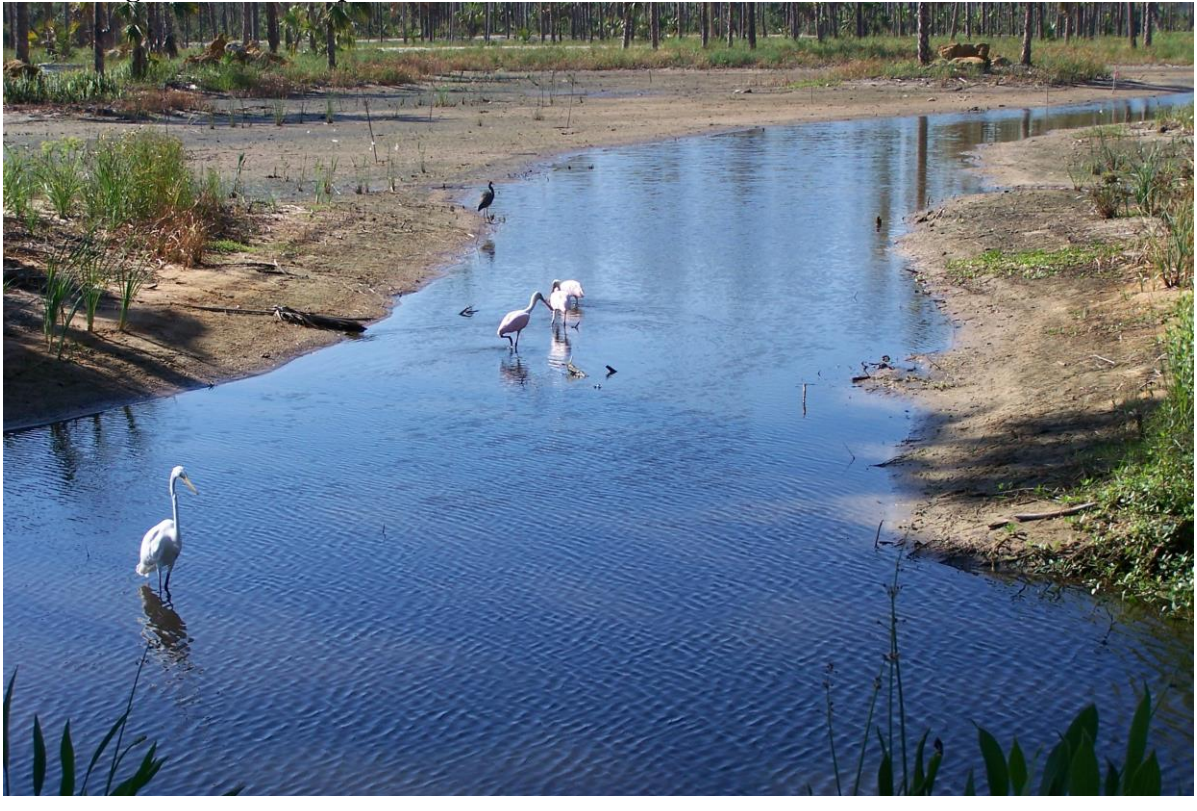


Figure 7: Roseate Spoonbills, Common Egret and Little Blue Heron at the Estero Marsh Preserve

Figure 8: Game trail path in marsh leading to mangroves at the Estero Marsh Preserve

Figure 9: Ocean blue morning-glory at the Estero Marsh Preserve. This is a natural recruit.

Briarcliff Canal Filter Marsh

The Briarcliff Canal Filter Marsh Project is a 15-acre filter marsh designed to provide wetlands that will filter water from the Briarcliff Canal, thereby improving the water quality. Water will enter the filter marsh by two control structures. A steel sheet-pile weir was installed to aid in the dry season water conservation. There will be no public access to date.

Figure 10: Briarcliff Canal Filter Marsh

The Total Ecosystem Services Value of the Briarcliff Canal Filter Marsh Project is calculated by the ECOSERVE method described in (Beever and Walker 2016). Completing the calculation, the Total Pre- construction Total Ecosystem Services Value (TEV) of the basic Ten-Mile Canal was $60,806.70 per year. After the construction of the filter marsh the Total Post-construction TEV is $254,634.00. This is a Net TEV gain of $193,827.30 or a NET TEV gain/acre of $12,921.82.

The Lee County Master Mitigation Plan Update

The Lee County Master Mitigation Plan (Mitigation Plan) is an investment strategy for economic stability and infrastructure enhancement. With tourism, health care, and retirement as the major components of the County's economic base, ensuring that there is a diversity of open space features, quality outdoor experiences, and healthy air and water quality makes tremendous economic sense. The Mitigation Plan has three main purposes:

1 to provide a master strategy by which critical environmental features continue to be

preserved,

2 to provide “safe harbor” approaches for mitigation projects that are required for the infrastructure needed to accommodate growth, which in turn will enable the budgeting process to be reliable, and

3 to restore degraded resources that are important for the health, safety, and welfare of the public.

The Mitigation Plan is a component of the implementation of the Lee County Comprehensive Plan. Implementation includes incorporation into the Administrative Code, capital budget direction, and land development code reform.

Background

Lee County consists of 804 square miles of land and 408 square miles of coastal and inland waters. In 1950, the population of the County was 23,401 and by 1970 it had grown to 105,216. By 1980, the population had reached 205,266 and in the year 2000, there were 440,888 residents of Lee County. In 2010 Lee County had a population of 618,754, exceeding predictions for the future population in 2020. This population growth will not stop. The Lee County population in 2018 is estimated at 739,224 with a growth rate of 2.31% in the past year according to the most recent United States census data. Lee County is the 8th largest county in population in Florida. Lee County is projected to have a population ranging from 1,106,300 to 1,336,800 permanent (BEBR 2017) and 764,171 seasonal residents by the year 2045.

The population growth and development in Lee County has, in many cases, caused fragmentation of important aquatic systems, destruction of upland areas and filling or draining of freshwater, saltwater and tidal wetlands, created impervious surfaces in excess of watershed capacities, altered and shifted hydrology within and among basins. These activities have led to the loss of important ecological values including water retention functions, drought-buffering capacity, and wildlife habitat. Freshwater and estuarine systems alike within Lee County have been listed as impaired by the Florida Department of Environmental Protection in recent years, and concern is mounting about the effects of human activities on the Gulf of Mexico, including algae blooms.

While it is impossible to describe the future face of the County with any degree of certainty or precision, the Lee County Comprehensive Plan has identified themes that will be of great importance as Lee County approaches the planning horizon.

The growth patterns of the County will continue to be dictated by a Future Land Use map that will not change dramatically during the time frame of the Comprehensive Plan. Except for Cape Coral and Lehigh Acres, the County's urban areas will essentially be built out by 2020 (pending, in some cases, redevelopment). The County will attempt to maintain the clear distinction between urban and rural areas that characterizes this plan. Its success will depend on two things: the continuing viability of agricultural uses and the amount of publicly owned land in outlying areas.

The County will protect its natural resource base to maintain a high quality of life for its residents and visitors. This will be accomplished through an aggressive public land acquisition

program and by maintaining and enforcing cost-effective land use and environmental regulations that supplement, where necessary, Federal, State, and regional regulatory programs.

Offsetting the impacts of infrastructure projects that are necessary to accommodate the ongoing growth of the County is of paramount importance. To be successful in preserving the natural resources of Lee County, we must devise a better way of projecting the impacts of growth and utilize a decision-making process that effectively allows growth to occur without sacrificing the natural systems upon which our economy and quality of life depend. The Mitigation Plan is being developed to facilitate planning and budgeting for projects that will restore and protect natural resources of significant importance and foster the continued growth that has been forecast in the County.

Summary of the Initial Lee County Master Mitigation Plan

The Mitigation Plan is designed to compensate for the environmental impacts of infrastructure projects in an environmentally and economically sound manner. Between the years 2000 and 2020, the growth rate of Lee County is projected to be more than 35%. The addition of over 200,000 permanent residents to the community will necessitate the construction of new and expanded roadways, utilities, storm water management facilities and other public works projects.

While all public works projects should be designed to avoid negative impacts to natural resources, there are times when impacts cannot be avoided. Such impacts, even when minimized, must be mitigated for, and such mitigation cannot always effectively occur on the site of the project. Lee County is proposing the Mitigation Plan to provide consistency and a cumulative accountability for the primary and secondary impacts of its public works program. In addition, the County proposes to pursue restoration and preservation opportunities for hydrology, water pollution, fire hazards, wildlife and natural habitats as mitigation requirements are addressed through synergistic planning, budgeting and operational efforts.

A team of representatives of public and private entities developed the Mitigation Plan in 2003-2004. Members of the team identified private and publicly owned parcels that could be candidate projects for preservation, restoration, or mitigation activities. These parcels were assessed in a preliminary manner and deemed potentially suitable for such activities. A map series has been created to facilitate the initiation of more detailed analysis. The Mitigation Plan is not intended to provide an in-depth analysis of potential projects. The maps will serve as a starting point for efforts to select appropriate preservation, restoration, or mitigation sites.

The Mitigation Plan envisions modest modifications to Lee County's Capital Improvements Program (CIP). While capital projects are now identified in the five-year CIP, the Mitigation Plan calls for including a quantification of impacts that will result from each capital project, a listing of mitigation projects that provide the remedy for these impacts, and funding estimates and identification of sources for mitigation. A Capital Improvement Mitigation Plan would capture this information and serve as an addendum to the overall CIP.

Implementation of the Mitigation Plan will be facilitated through the County's Annual Work Plan. It will draw from the CIP the forthcoming year's capital needs and identify and fund the parallel mitigation. It will also include the County's restoration and mitigation targets so that opportunities for synergistic efforts can be identified and included. Successful implementation of the Mitigation Plan will depend on several key elements:

- its adoption as a supporting document to the Lee County Comprehensive Plan,
- the partnership of regulatory agencies, and
- a process that ensures ongoing review and updating so that it reflects changes that occur in the restoration and protection priorities of the County, as well as changes to the land and water resources within Lee County.

Once in place, the Mitigation Plan allows Lee County to more effectively accommodate the growth that is occurring and ensure the restoration and protection of the important natural resources that provide the framework for our economy and quality of life.

Collection of information of the pre-mitigation and post-mitigation habitat change acreages, and available Geographic Information Systems Shapefiles or geodatabases of pre-mitigation and post-mitigation conditions.

Part I: The Natural Resources of Lee County

Those natural resources that can be depicted through mapping are provided in the map figures 11 through 17 in this report. These resources are the ones commonly identified as materially contributing to the County's economy and sense of being. These are also the resources subject to State or Federal oversight through various permitting processes.

Map figures depict critical environmental resources that are the current "base condition" by which some tabular assessment can be made for assessing progress. These maps, for such things as wetlands, critical habitat and water tables, provide geographic applicability for the preservation, restoration, and mitigation efforts discussed in following sections.

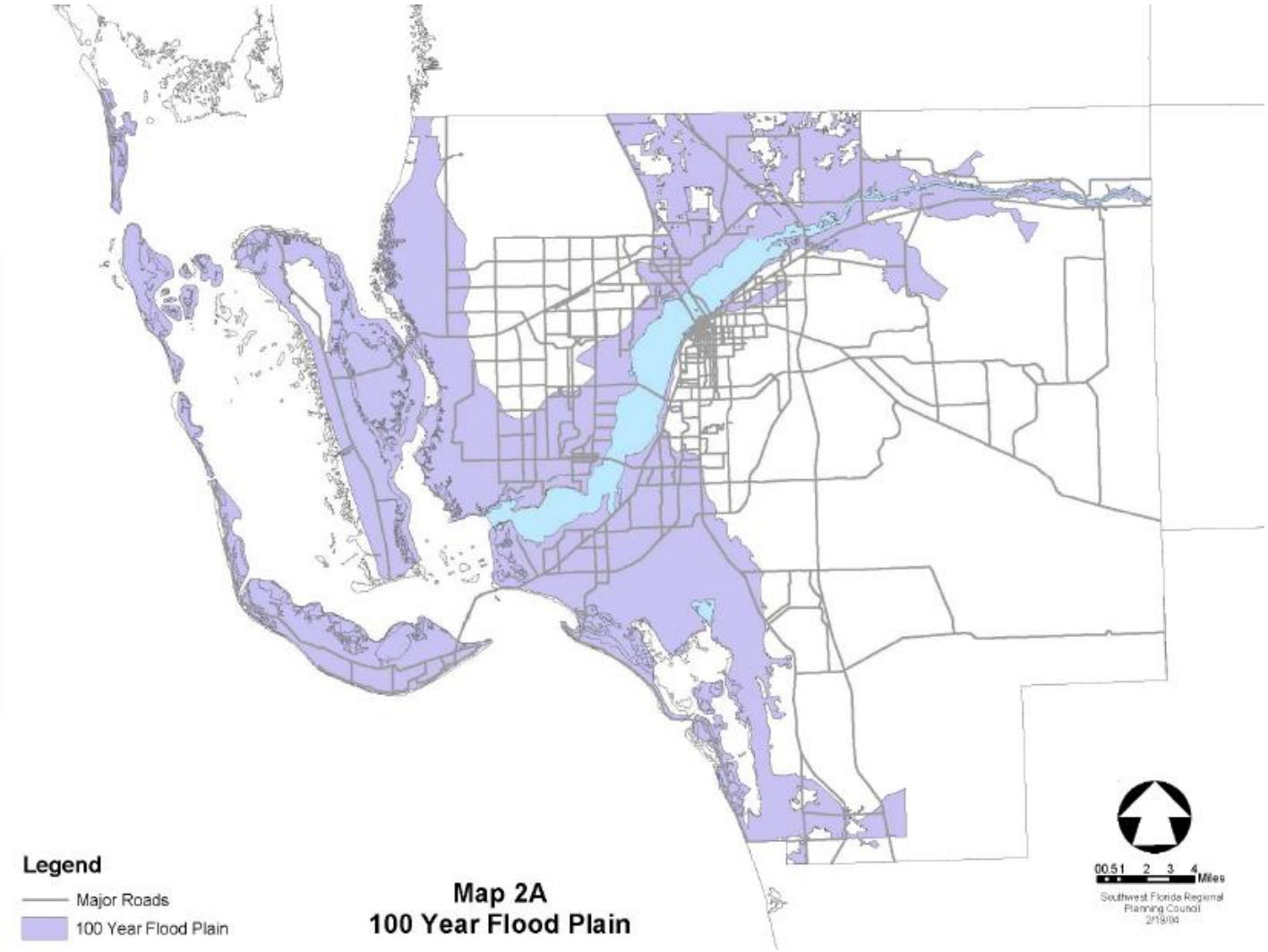


Figure 11: Map 2A -Lee County, Florida 100 Year Flood Plain

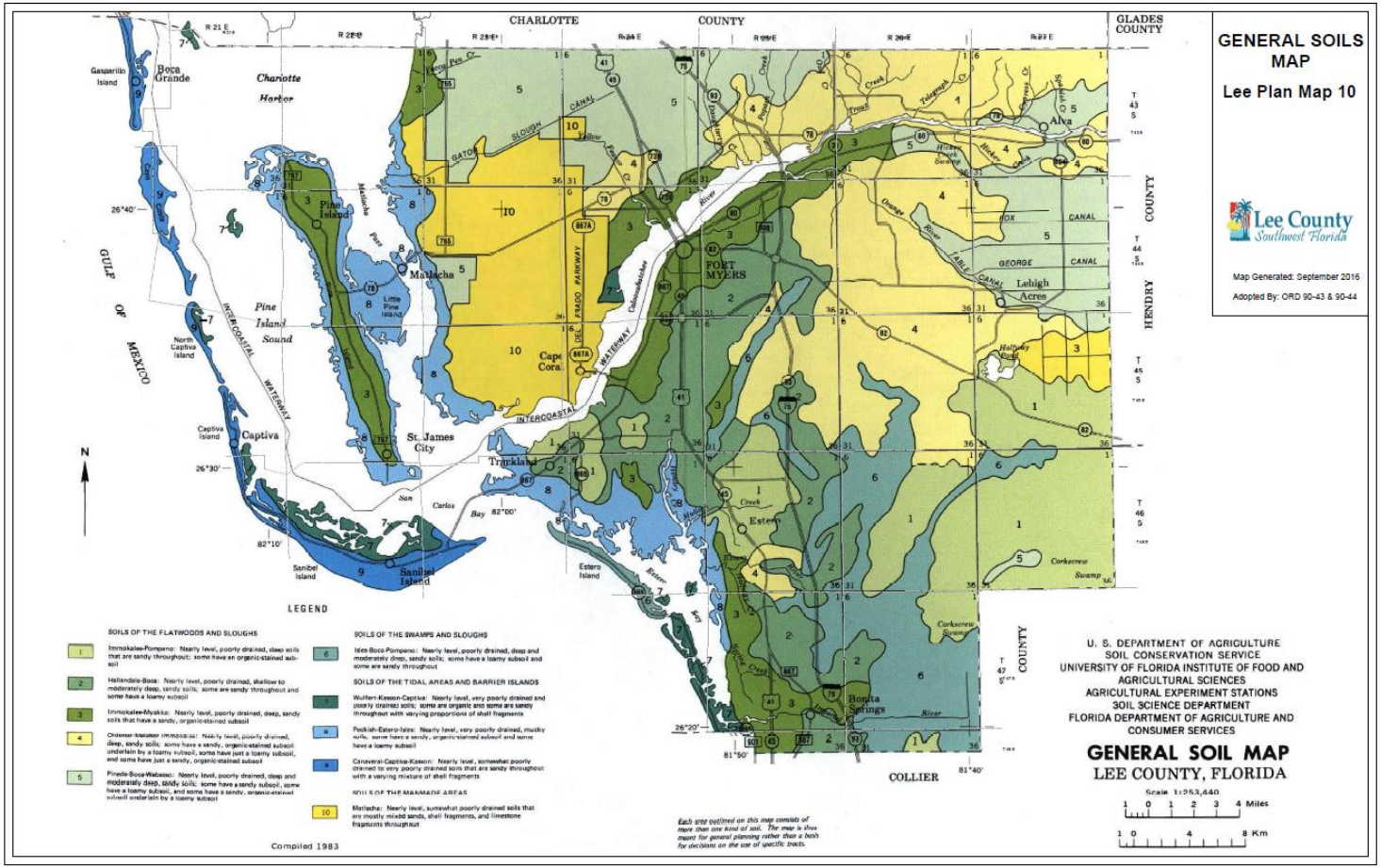
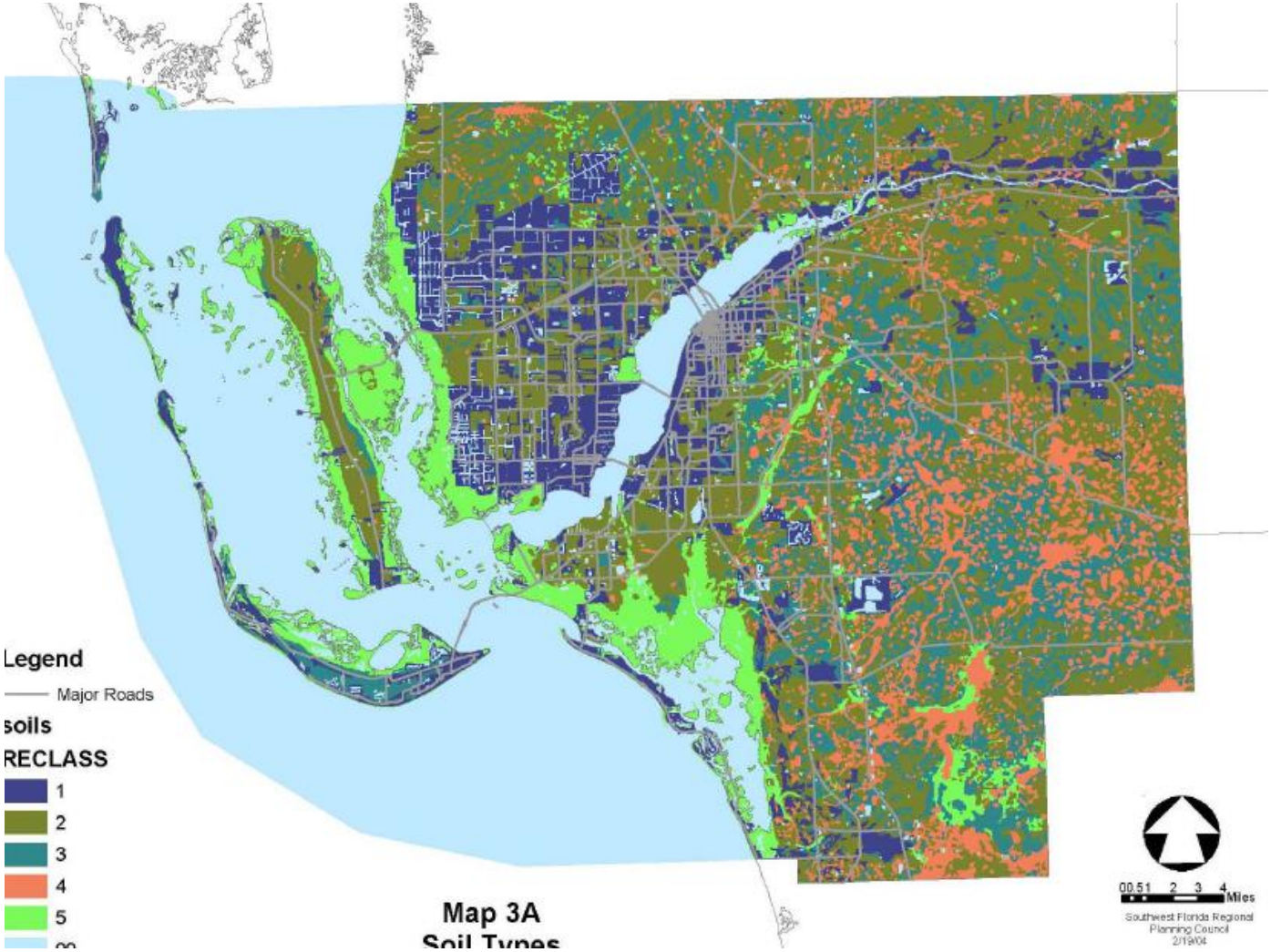


Figure 12: General Soil Map of Lee County. Florida



Soils Key

Dark Blue- Man Altered Disturbed Urban Soils

Light Green- Deeply Hydric Wetland Soils (wetlands)

Pink- Shallow Hydric Soils (wetlands)

Aquamarine – Seasonally wet soils

Olive Green – Mesic upland soils

Light blue – Open water

Figure 13: A detailed Soil Map of Lee County. Florida

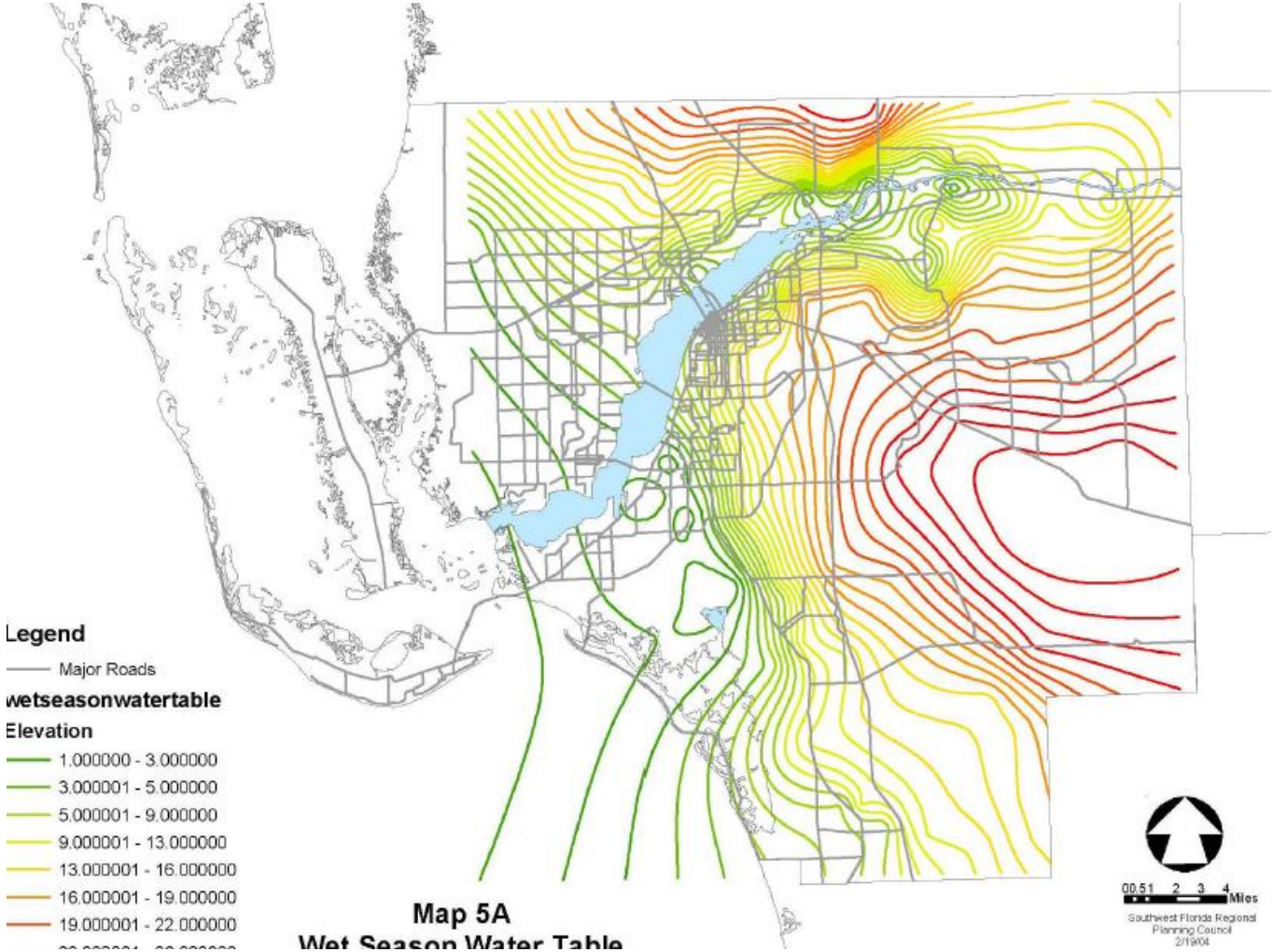


Figure 14: Map 5A: West Season Water Table of Lee County. Florida

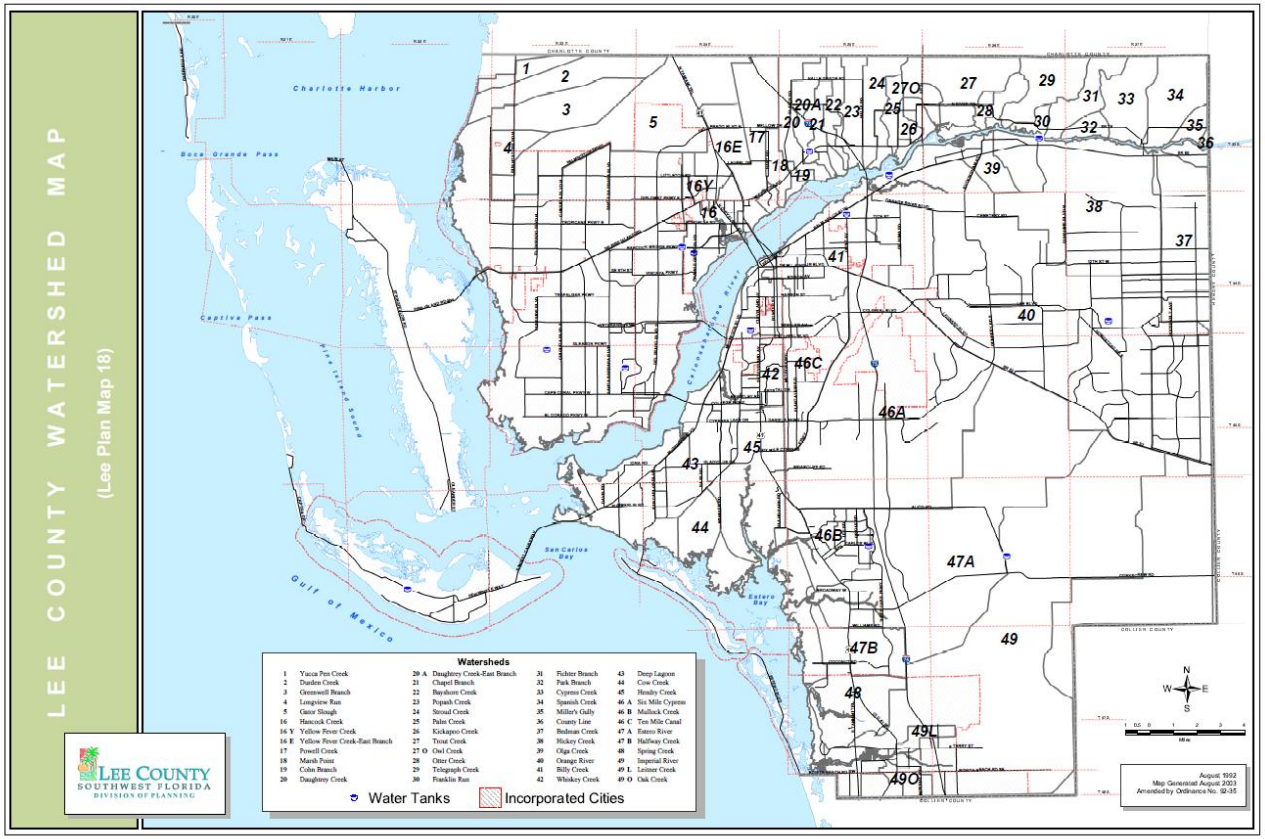


Figure 15: Detailed Watersheds Map of Lee County Florida

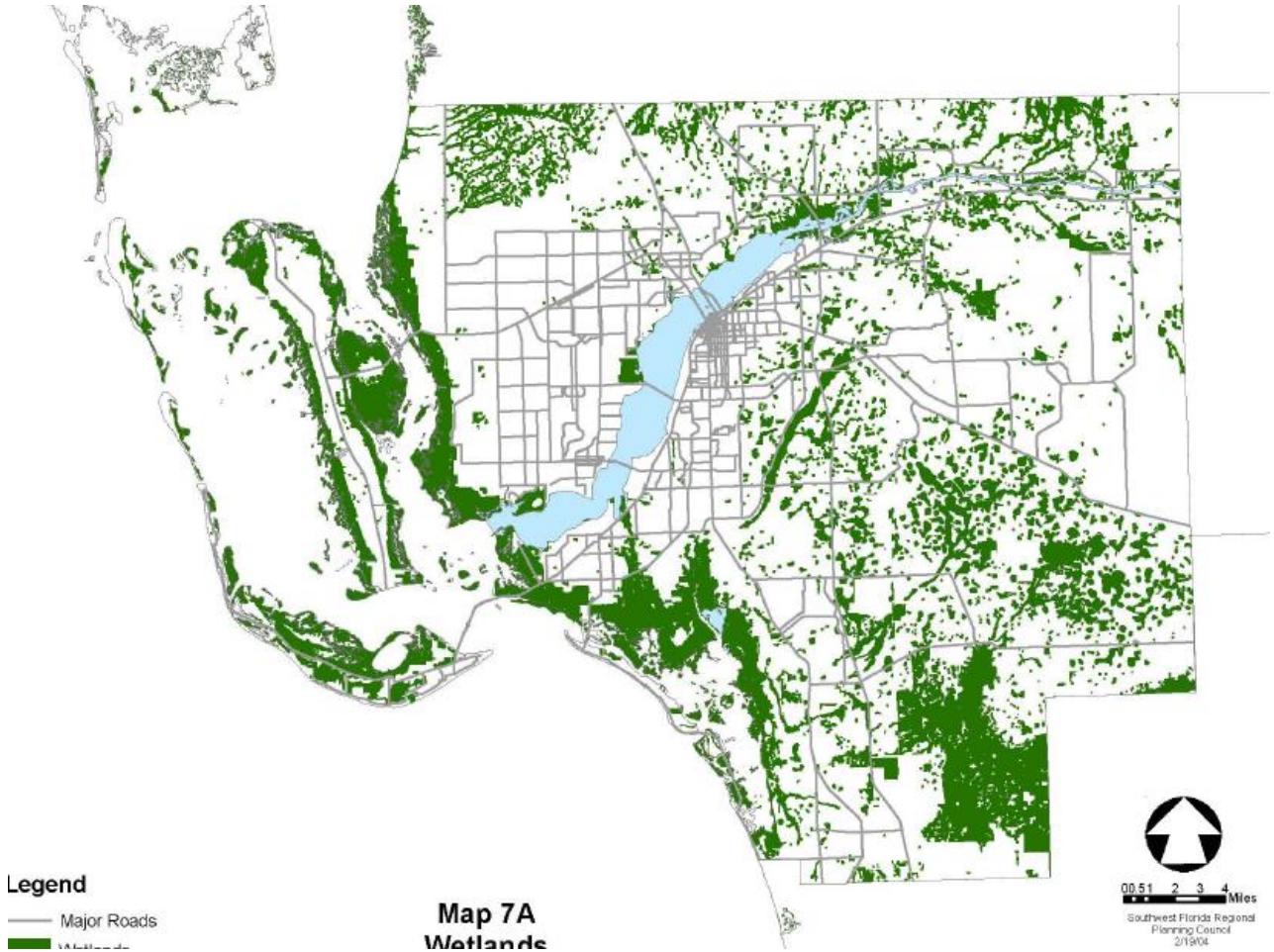


Figure 16: Wetlands Map of Lee County, Florida

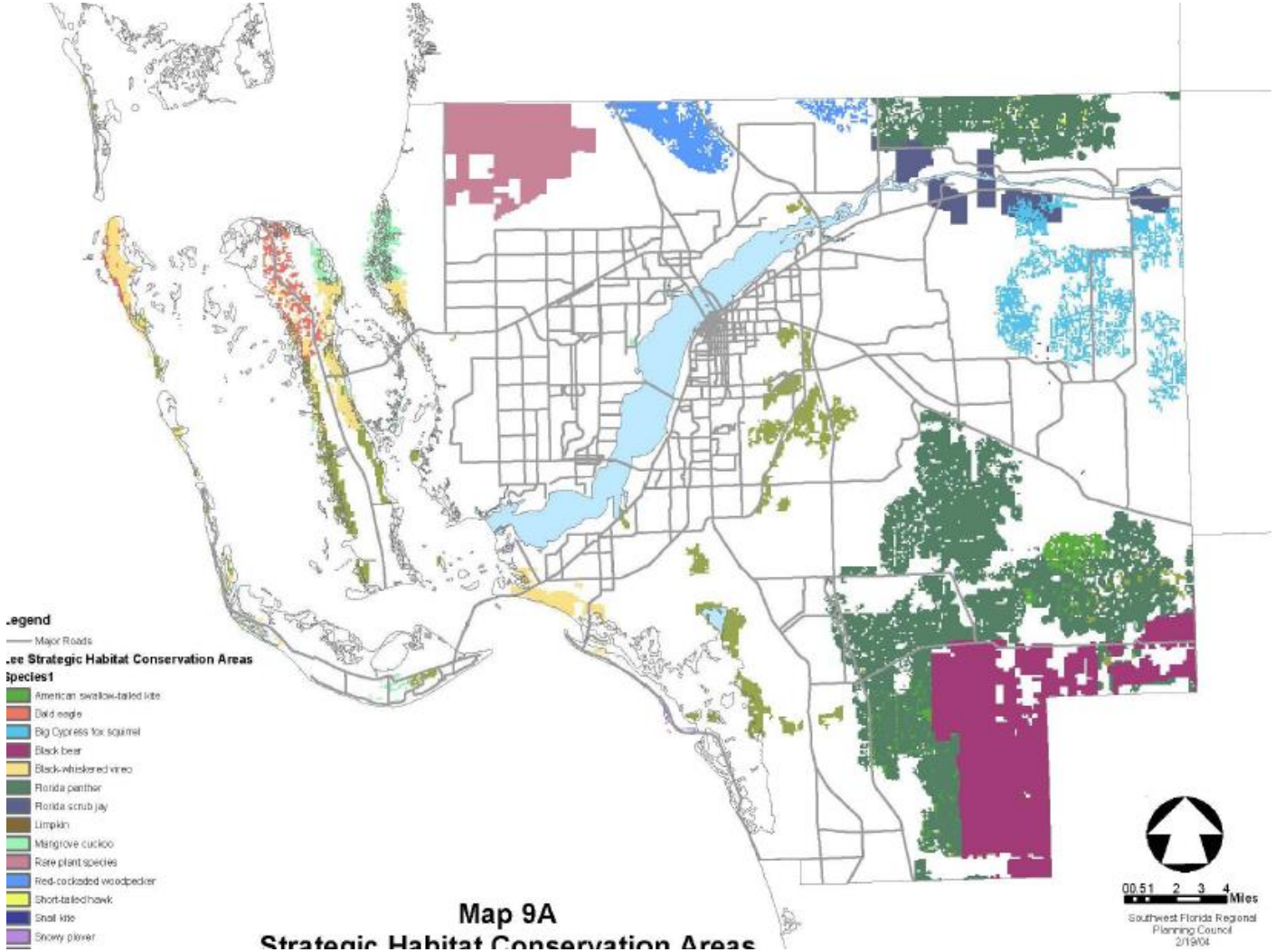


Figure 17: Map 9A - FWC Strategic Habitat Conservation Areas for Wildlife in Lee County Florida.

Part II. Lee County Growth

A. Growth Numbers: Lee County became a metropolitan area in 1970. This was the year the population exceeded 100,000 persons. Many people consider that the time at which Lee County's economic development strategy succeeded. The County had converted from a low-income, rural community with limited economic opportunities for improvement to an urban community with expanding opportunities for individual advancement. It can also be considered the time the County began to wrestle with the question of what additional sacrifices were necessary to achieve this economic success. That discussion continues to this date.

The Mitigation Plan recognizes that discussion and proposes a "win-win" approach for current management efforts. Two Tables illustrate why this discussion is important. Table 1 represents the censused Lee County population.

Year	1950	1960	1970	1980	1990	2000	2010	2018
Population	23,401	54,539	105,216	205,266	335,113	440,888	618,754	739,224

Table 1: Lee County, Florida Population Growth 1950-2018

Figure 18 depicts a 20-fold increase in population. This is not a natural increase -- it is from in-migration. In-migrants basically have little to no historical identity with the community -- their index of the "way it used to be" is the day they first moved to Lee County.

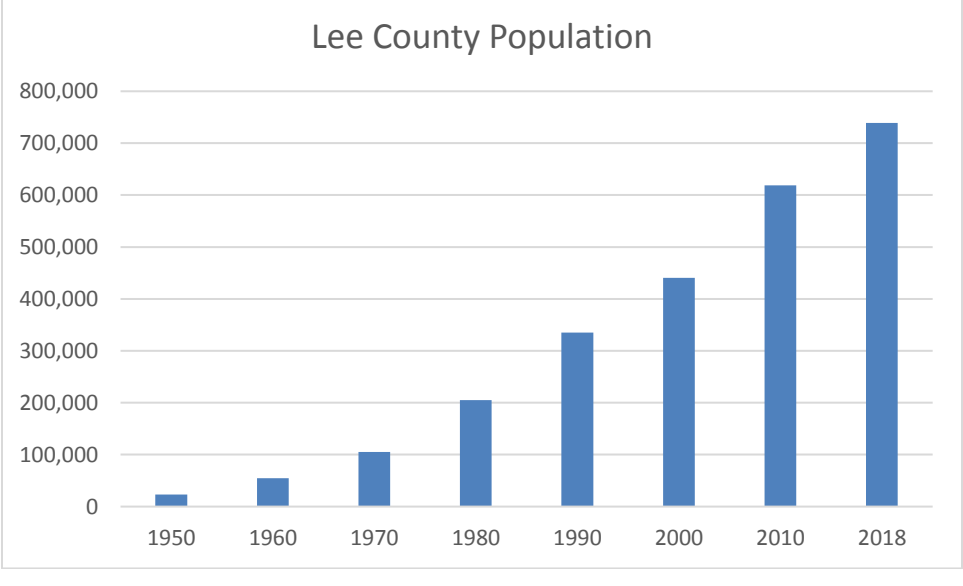


Figure 18: Lee County Population Growth

Figure 19 represents the forecasted population growth to the year 2045. For these newcomers, the story will be the same. Their baseline for Lee County will be established when they move here. However, unless we act to ensure that the County's resources maintain a level of quality,

future residents will not have the same quality community as the current residents enjoy and the current residents also expect to be future residents.

Lee County	Estimated	Projections by Year					
	April 1, 2017	2020	2025	2030	2035	2040	2045
Low	698,468	705,900	746,200	778,400	805,600	827,100	843,400
Medium 698,468		749,600	826,900	891,200	951,500	1,007,100	1,059,900
High	698,468	791,800	897,700	999,800	1,100,700	1,198,500	1,298,000

Table 2: Projected Lee County, Florida Population

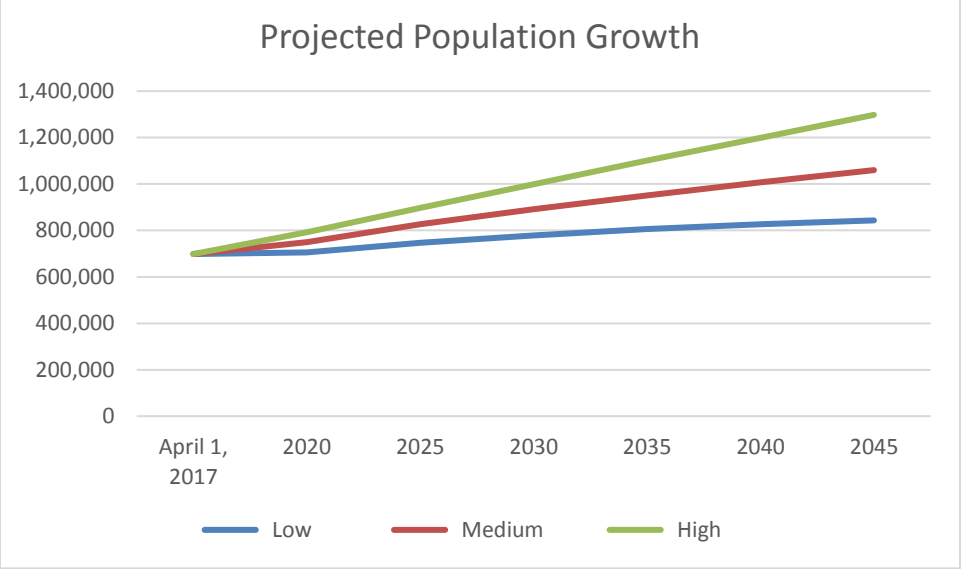


Figure 19: Projected Lee County Population Growth

B. Growth Location

The challenge is just not in the numbers of people but in where they locate. The population growth in the past has determined the County's current land use distribution and urban and suburban boundaries. These current land uses are depicted in Figure 20.

The Lee County Comprehensive Plan (Lee Plan) sets forth the policies by which future residents will locate in the unincorporated areas of Lee County. Each municipality in Lee County has a similar plan. The Lee Plan though, also sets forth a map that depicts the dominance of the accumulated public policy for any geographic spot in the County. The County is the supreme land use authority for the areas under its jurisdiction, as is each City. The County's authority

lies in the balance of interests and policies that comprise the governance needed for the public health, safety, and welfare. However, there are overriding Federal and State laws guiding how lands may be developed, or further developed, also based upon public health, safety and welfare. These laws typically involve issuance of one or more permits.

Lee County generally requires private development to go through the entire permitting process on its own, as a component of the "risk" of real estate investment. However, once permits have been issued, the County government is required, by its own responsibility in protecting the public welfare, to also ensure that needed infrastructure is available for the new residents, and for the cumulative needs of all residents. This infrastructure also requires permits.

Permits notwithstanding, the Future Land Use Map also effectively depicts where significant wetlands will be at "buildout," what the County's water storage capability will be at "buildout" and the likelihood of habitat surviving within the County at "buildout." These are shown in Figure 20.

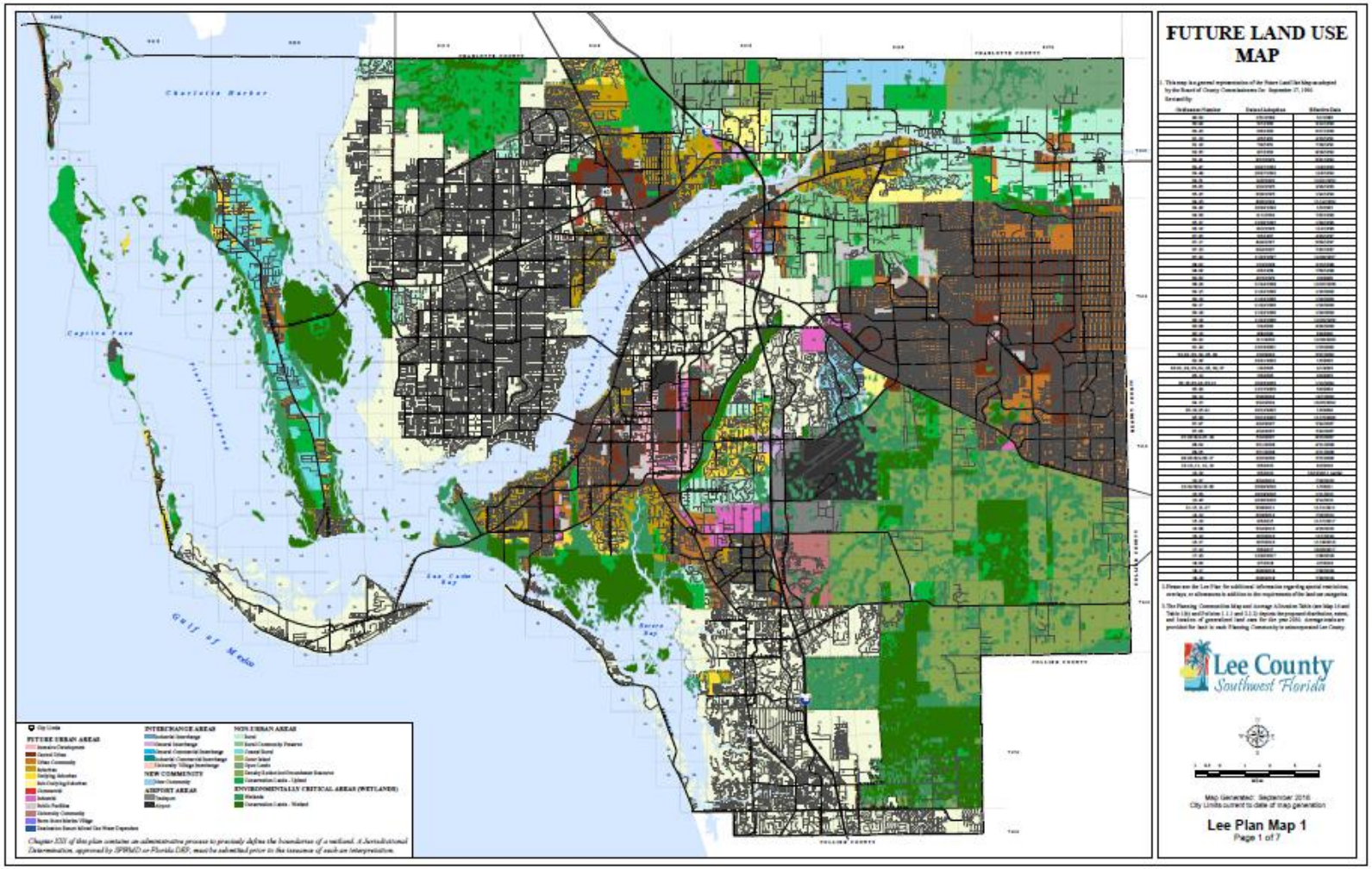


Figure 20: Lee County Land Use Map

Part III: Governance Structure of Lee County

The citizens of Lee County have a broad band of governance to meet the public health, safety and welfare. This governance has Federal, State, Regional and Local components. Each component has a funding/budgetary (tax and spend) component and a regulatory (enforcement) component. The essence of the Mitigation Plan is to align its budgetary components with its regulatory component. This section summarizes the primary public entities that are involved with the Mitigation Plan.

A. Federal: There are three primary Federal agencies involved with permitting the County's developments. These are the U.S. Army Corps of Engineers, Environmental Protection Agency, and Department of Interior, Fish and Wildlife Service. Each has a regulatory component, and each has a funding component, with either research, land acquisition, or capital construction included.

B. State: There are four primary State agencies involved with the County's development. These are the Department of Economic Opportunity (DEO), Department of Environmental Protection (DEP), Fish and Wildlife Conservation Commission (FWC), and Department of Transportation (DOT). DEO has some regulatory and funding components; DEP has regulatory and land and water management components; FWC has regulatory, advisory and land and water management components; and, DOT has significant land and storm water management components.

C. Region: There is one primary agency involved with permitting wetland impacts associated with County road, utility and public infrastructure projects. That is the South Florida Water Management District (SFWMD), which has regulatory and water resource management components, the latter involving significant capital expenditures.

D. Local: There are three types of entities involved with County development. They are the Board of County Commissioners, in its general and enterprise capacities; the six cities of Bonita Springs, Cape Coral, Fort Myers, Fort Myers Beach, Estero, and Sanibel; and independent special districts, with the School Board being the most far reaching. All have capital capacities, and the County and cities have regulatory components.

Lee County Board of County Commissioners (BoCC): The BoCC, the sponsor of the mitigation plan, has the most diverse set of responsibilities and authorities. The BoCC has certain Countywide duties, certain municipal scale duties for the unincorporated area, and certain enterprise duties; all three types of duties involve capital expenditures for infrastructure and the need to obtain permits. Two major departments implement these efforts.

Public Works: The Public Works Department is the lead County agency for virtually all levels of capital efforts. All County building construction is overseen by this Department. This Department also includes the following:

a. County Transportation Department: This Department builds and maintains County roads, takes maintenance responsibility for unincorporated local streets given to the County, and maintains the drainage works associated with these roads. These efforts involve environmental impacts and permits. An ongoing issue remains the timing of removal of vegetation from drainage works.

b. Utility Department: This department maintains and expands water and utility services for parts of the unincorporated County. This department has been acquiring and assembling various private utilities into a regional system of water supply development and waste disposal. Both efforts involve environmental impacts and permits. The Utility Department also oversees the hauling of the varieties of sludge. Ordinance 89-20, amended by 90-32, provides for the County regulation of these matters. It sets forth a process for designating treatment plants that haulers must use. It provides for required certificates for haulers. It exempts hauling from approved plants.

c. Solid Waste Department: Solid waste disposal is an activity required by County ordinance but funded as an enterprise.

d. Division of Natural Resources (DNR): This division maintains and constructs those county storm water works not maintained by other public agencies. It also is charged with meeting water quality issues County-wide, brownfield remediation on County sites, and it oversees County wetlands and water resources, including coastal and riverine waters, and beach resources. The Division also oversees natural resource construction issues and engages in environmental education programs

e, Parks and Recreation: The Department of Parks and Recreation maintains the County's open space lands. It has a capital component through the planning and construction of recreational facilities on County park lands (in conjunction with public works). The County parklands include open space preserves that are managed for wildlife and habitat values. This Department receives the lands acquired through the County's conservation lands acquisition program (Conservation 20/20). The Department is also responsible for the County's public beaches and boat ramps. The County's agricultural extension services and rural resource services are overseen by the Department of Parks and Recreation. The agricultural extension services are provided in partnership with the University of Florida and its Institute for Food and Agricultural Services (IFAS). The Extension Service provides information and training on exotic plants and their removal, as well as the "Florida Yards and Neighborhoods" program which teaches home and business owners to wisely apply fertilizers, pesticides and fungicides. Rural resource services (Natural Resources Conservation Service, or NRCS) are provided in partnership with the U.S. Department of Agriculture. The NRCS provides information and assistance to land owners for wise use of soil and water resources.

f. Animal Services: The Division of Animal Services oversees the collection and disposal of feral domestic animals, as well as the humane treatment of domestic animals under a complaint-driven system. It also serves as an information and referral service for nuisance animals. Discussions are underway for it to play an expanded role in the management of exotic animals with rapid population increases that are by their magnitude becoming an issue.

Part IV: Infrastructure Needed for Growth

The tone of the Mitigation Plan is set by infrastructure and public works needs including transportation, utilities, flood control and storm water management. To a lesser degree they also involve parks, recreational facilities and other public buildings.

The keynotes of infrastructure planning are: 1) need, which is evident through population growth; 2) location; and 3) timing. These keynotes are commonly provided in planning through

an annual work program, a five-year capital budget plan, and a 10-20-year long range plan. The annual work program is where the plans meet budget reality, and if land use and permitting issues have not yet been resolved for the project under the annual work program, delays will occur, and the public welfare may be injured.

The primary participant in the Mitigation Plan is the BoCC. Besides having the greatest transportation and storm water management systems within Lee County, the BoCC holds the National Pollution Discharge Elimination System permits for all the County's cities, the Florida Department of Transportation, and the East Lee County Water Control District, for a total of 13 Co-permittees, with four more due soon. To the extent that the Mitigation Plan becomes successful, the BoCC invites the participation of the Florida Department of Transportation (FDOT), the Cities/Town (in order of incorporation) of Fort Myers, Cape Coral, Sanibel, Fort Myers Beach, Bonita Springs, and Estero, the East Lee County Water Control District, and any other public agency within the borders of the County that can subscribe to the commitments of the Mitigation Plan. The FDOT's Five Year Work Program, a sample of which is shown in Table 3, provides an example of the participation of another public agency.

The immediate need for capital planning is the five-year planning horizon. The Lee County Five Year Capital Improvements Program (CIP) for infrastructure. These projects are summarized in Table 3: The CIP Table which follows.

Proposed Lee County Capital Improvement Program Future Road Projects

Project ID Number	Project Name	Number of Lanes	Length in Miles	Length in feet	Road width in feet	Area in Square Feet	Area in Acres
1	3 Oaks Pkwy Ext	4	2.66	14069.72	68	956741	21.96
2	40th St	2	0.23	1218.91	44	53632	1.23
3	Alico Green Meadows	4	8.40	44362.63	68	3016659	69.25
4	Ben Hill to Alico	2	2.56	13514.13	44	594622	13.65
5	Bonita Beach Rd	6	0.72	3821.16	92	351546	8.07
6	Burnt Store Rd	4	6.06	32014.78	68	2177005	49.98
7	Chiquita Blvd	6	5.21	27525.81	92	2532375	58.14
8	Corkscrew Rd	4	3.96	20909.47	68	1421844	32.64
9	Crystal Dr	2 Divided	1.17	6193.35	44	272508	6.26
10	Daniels Pkwy	6	2.94	15504.13	92	1426380	32.75
11	Diplomat Pkwy	4	8.80	46446.35	68	3158352	72.51
12	E Terry St/Bonita Grande	4	2.49	13157.08	68	894682	20.54
13	Edison Ave	4	0.64	3362.00	68	228616	5.25
14	Estero Blvd	2 Divided	0.18	960.29	44	42253	0.97

15	Estero Blvd	2 Divided	1.15	6090.68	44	267990	6.15
16	Hanson Ext	4	1.79	9469.82	68	643948	14.78
17	Hanson St	4	2.15	11353.18	68	772017	17.72
18	Homestead Rd	4	2.20	11641.68	68	791634	18.17
19	Homestead Rd	4	1.69	8935.41	68	607608	13.95
20	Littleton Rd	4	2.17	11436.90	68	777709	17.85
21	Logan Ext	2	1.00	5299.89	44	233195	5.35
22	Luckett Ext	4	7.60	40145.24	68	2729876	62.67
23	Luckett Rd	4	0.79	4184.23	68	284527	6.53
24	Metro Pkwy	6	4.05	21375.36	92	1966533	45.15
25	NE 24th Ave	4	2.53	13347.53	68	907632	20.84
26	NE 24th Ave Ext	2	0.79	4149.63	44	182584	4.19
27	Old 41	4	1.17	6190.68	68	420966	9.66
28	Ortiz Ave	4	2.98	15746.68	68	1070774	24.58
29	Sandy Ln Ext	2	0.89	4706.22	44	207074	4.75
30	Seaboard St	2	1.15	6063.38	44	266789	6.12
31	SR 78	6	3.32	17518.36	92	1611689	37.00
32	SR 80	2	1.01	5317.94	44	233989	5.37
33	SR 82	6	5.37	28352.27	92	2608409	59.88
34	State Road 31	4	3.25	17184.62	68	1168554	26.83
35	State Road 82	6	5.09	26878.98	92	2472867	56.77
							857.52

Table 3: Proposed Lee County Capital Improvement Program Future Road Projects

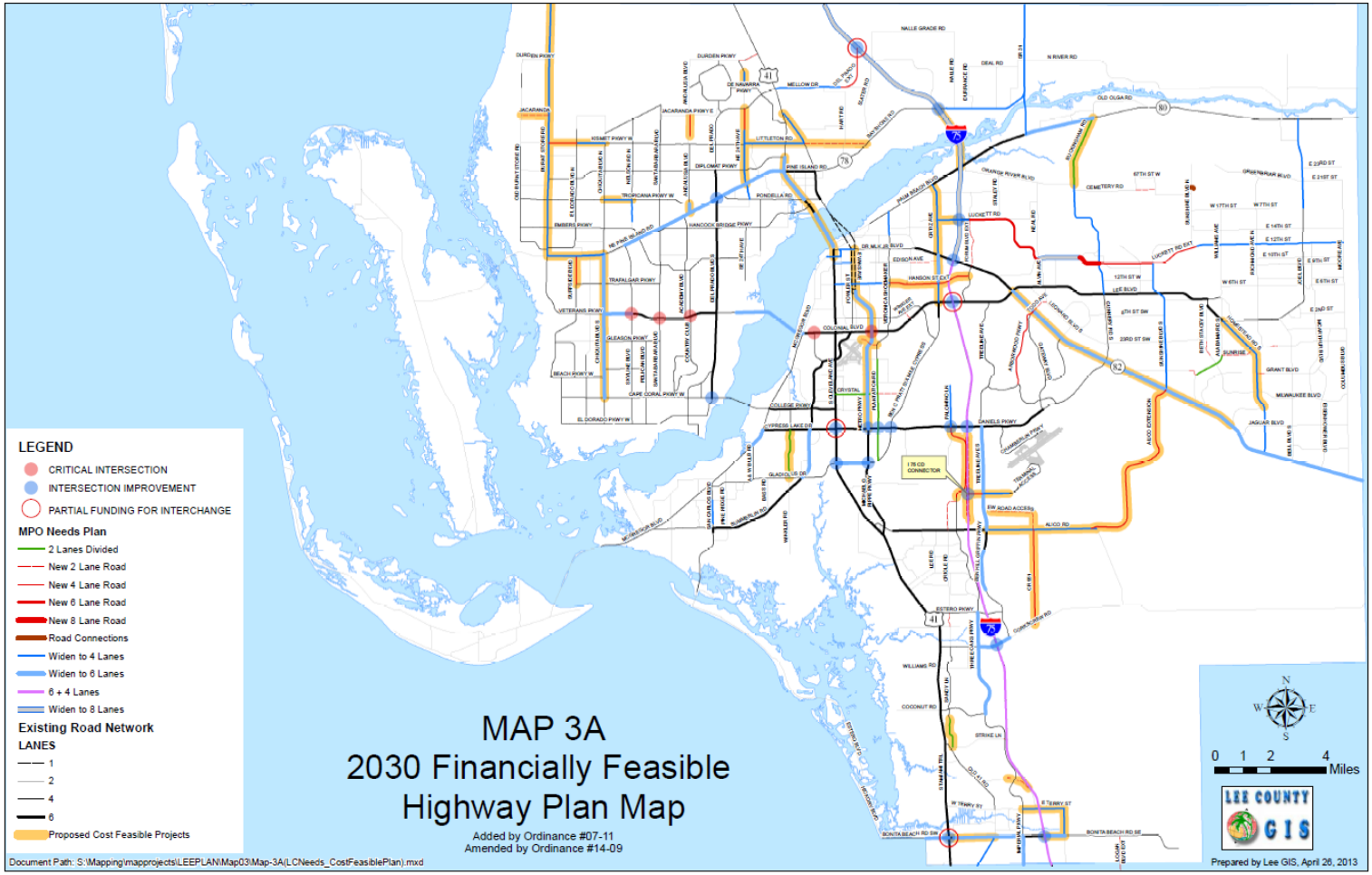


Figure 21: Lee County, Florida 2030 Financially Feasible Highway Plan Map

Figure 22: Lee County, Florida 2040 Cost Feasible Highway Plan Map

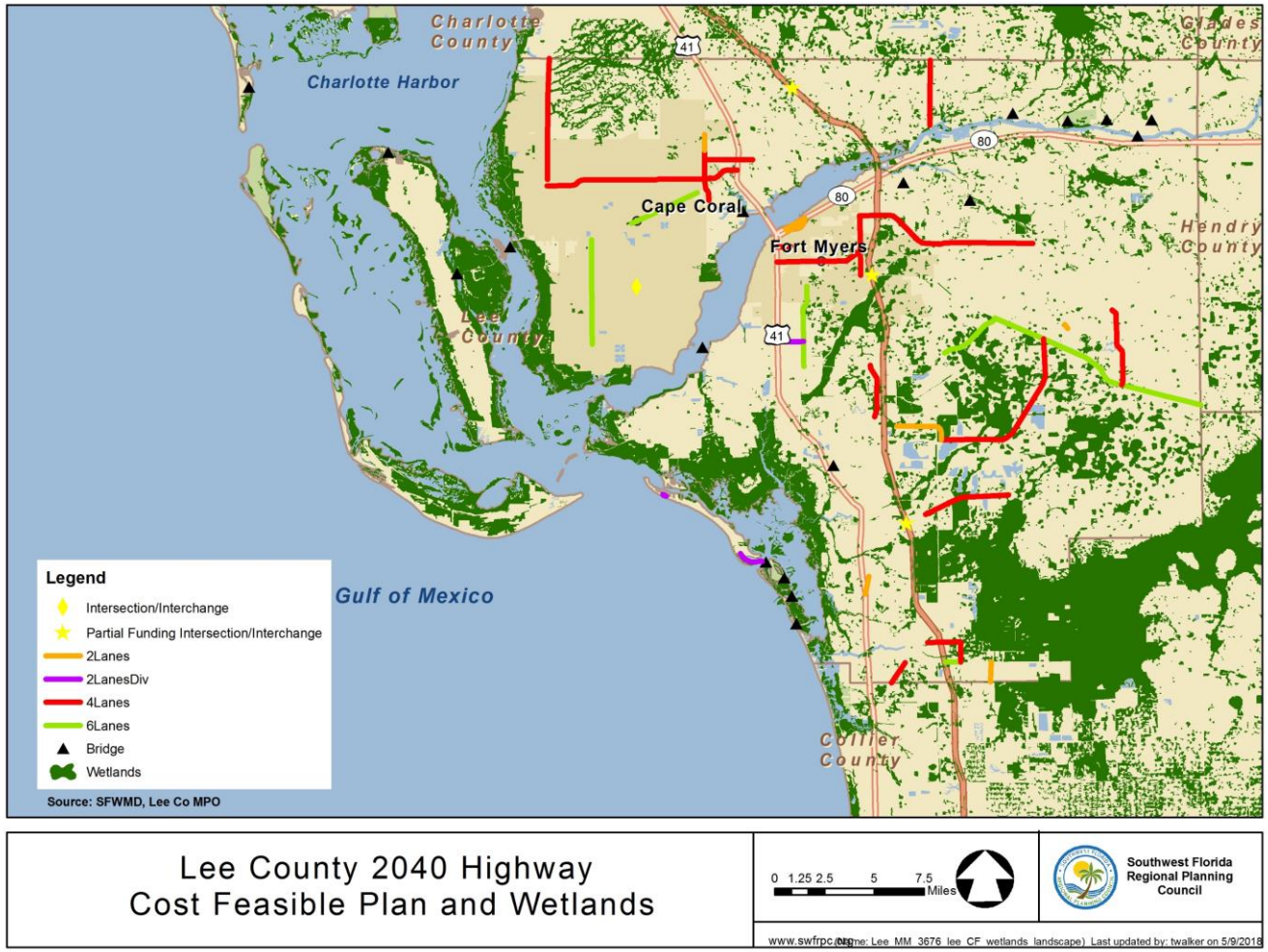


Figure 23: Intersection of the Lee County, Florida 2040 Cost Feasible Highway Plan Map with the Existing Wetlands of Lee County

All public works projects are designed to avoid negative impacts to natural resources to the greatest degree possible. When impacts cannot be avoided, they are expected to be minimized. Even minimal impacts must be mitigated for, and such mitigation cannot always effectively occur on the site of the project. Lee County is proposing this overall mitigation approach to provide consistency and a cumulative accountability for the primary and secondary impacts of its public works program. Lee County, however, proposes to go beyond mitigation. Under various initiatives, the County has restoration requirements and concerns for water pollution, fire hazards, and wildlife and its habitats -- aquatic, estuarine, and terrestrial. It is possible to have synergistic efforts if restoration and preservation opportunities are pursued at the same time mitigation requirements are addressed. This synergistic effort is proposed in the next section. It should be noted that the Five-Year CIP is just a component of longer-range capital planning. Recognizing that transportation is the primary infrastructure that requires longer range (up to 25 years) planning, the Metropolitan Planning Organization (MPO) process develops maps and project lists for such a period. In that planning process, the MPO distinguishes between those projects that are needed to meet a level of service (Needs Plan) and those that can only be afforded under today's budgeting and taxation structure (Financially Feasible). Figure 21 contains the forecasted 2030 Needs Map and Figure 22 contains the 2040 Financially Feasible Map. Of the 35 proposed Lee County projects 18 (40 %) will have wetland impacts. Table 23 shows which projects will impact wetlands and to what extent those wetlands will be impacted.

ID	Location	Lanes	Length in wetlands_(ft)	Size of Lane (ft)	Area (square feet)	Acres of Impact
1	3 Oaks Pkwy Ext	4	2,650.29	68	180,219.84	4.14
2	Alico Green Meadows	4	14,280.90	68	971,101.42	22.29
3	Ben Hill to Alico	2	5,565.65	44	244,888.44	5.62
4	Burnt Store Rd	4	1,078.83	68	73,360.19	1.68
5	Corkscrew Rd	4	5,520.14	68	375,369.28	8.62
6	Diplomat Pkwy	4	54.53	68	3,707.89	0.09
7	E Terry St/Bonita Grande	4	5,246.39	68	356,754.52	8.19
8	Hanson Ext	4	83.52	68	5,679.62	0.13
9	Logan Ext	2	8.13	44	357.73	0.01
10	Luckett Ext	4	3,189.72	68	216,901.04	4.98
11	NE 24th Ave Ext	2	1,124.64	44	49,484.28	1.14
12	Seaboard St	2	540.01	44	23,760.46	0.55
13	SR 82	6	561.49	92	51,656.90	1.19
14	State Road 82	6	2,999.76	92	275,977.85	6.34
	Total					64.95

Table 4: Wetland Impacts of the 14 Proposed Lee County Road Projects.

For each of the projects where wetland impacts will occur the watersheds where the impacts were occurring are identified (see Figure 23)., Table 4 lists the projects by the watersheds.

ID	Location	Acres of Impact	Watershed (s)	Watershed Names
1	3 Oaks Pkwy Ext	4.14	46A	Six-Mile Cypress
2	Alico Green Meadows	22.29	46A	Six-Mile Cypress
3	Ben Hill to Alico	5.62	46A	Six-Mile Cypress
4	Burnt Store Rd	1.68	1,2,3,4	Yucca Pen Creek, Durden Creek, Greenwell Branch, and Longview Run
5	Corkscrew Rd	8.62	47A	Estero River
6	Diplomat Pkwy	0.09	16E	Yellow Fever Creek
7	E Terry St/Bonita Grande	8.19	49	Imperial River
8	Hanson Ext	0.13	46C	Ten-Mile Canal
9	Logan Ext	0.01	49	Imperial River
10	Luckett Ext	4.98	41	Billy's Creek
11	NE 24th Ave Ext	1.14	16E	Yellow Fever Creek
12	Seaboard St	0.55	41	Billy's Creek
13	SR 82	1.19	38	Hickey Creek
14	State Road 82	6.34	38	Hickey Creek, Bedman Creek

Table 5: Wetland Impacts of the 14 Proposed Lee County Road Projects by the Watersheds.

For each of the watersheds that will have impacted wetlands potential mitigation projects were identified that could utilized C2020 nominated properties or existing owned properties. Additionally, mitigation opportunities on other conservation lads were identified.

Watershed Names	Potential C2020 Projects	Other Mitigation Options
Bedman Creek	Acquisition and restoration of hydrology and removal of exotics on nominated parcels 109, 169, 255, 381,382, and 549.	Installation of wildlife undercrossing at Bedman Creek at SR 82.
Billy's Creek	Acquisition and restoration of hydrology and removal of exotics on nominated parcels 341-2, 351, 353, 443, 538. Restoration work on existing owned parcel 388.	Increased filter marsh locations on Billy's Creek. Source removal of the causes of bacteriological contamination.

Estero River	Acquisition and restoration of hydrology and removal of exotics on nominated parcels 100, 112, 114, 135, 221, 242, 246, and 496. Restoration work on existing owned parcels 62, 90, 74, 200, 249 and 474-2.	Restoration and acquisition projects in the northern CREW
Hickey Creek	Acquisition and restoration of hydrology and removal of exotics on nominated parcels 23, 80, 130, 150, 177, 266,408, 273, 418, 484, 490, 518. Restoration work on existing owned parcel 57, 101, 127, 163-3, 195, 325, and 357.	Installation of wildlife undercrossing at Hickey's Creek and SR82. Expansion of the FWC Hickey's Creek Mitigation Park
Imperial River	Acquisition and restoration of hydrology and removal of exotics on nominated parcels 15, 179, 232, 296, 327, 427, 433, 436, 437, 446, 467, 482, 492, 502, 513, 215-2, 524, 541, and 542. Restoration work on existing owned parcels 119, 249, 419, 428, and 465.	Implementation of parts of the City of Bonita Springs Flood Reduction and Watershed Restoration Plan. Restoration and acquisition projects in the southern CREW
Six-Mile Cypress	Acquisition and restoration of hydrology and removal of exotics on nominated parcels 237, 244-2, 254-3, 267, 396, 432, 485, and 501. Restoration work on existing owned parcels 69, 216, 239, 298, 348, 352, 360, 390. 410, 422, and 439.	Restoration projects in Filter marches in major drainage ways.
Ten-Mile Canal	Acquisition and restoration of hydrology and removal of exotics on nominated parcels 364-2. 395, 398, and 505.	Restoration and acquisition projects in the Estero Bay State Park.
Yellow Fever Creek	Acquisition and restoration of hydrology and removal of exotics on nominated parcels 138, 180 and 198. Restoration work on existing owned parcels 134, 156, and 194.	Restoration work in the Charlotte Harbor Flatwoods- Yucca-Panes, Babcock - Webb WMA hydrologic Restoration.
Yucca Pen Creek, Durden Creek, Greenwell Branch, and Longview Run	Acquisition and restoration of hydrology and removal of exotics on nominated parcels 87, 86, 94, 91, 97, 98, 405, and 539. Restoration work on existing owned parcels 58, 75,95, 102, 107 and 281	Restoration projects in the FWC Yucca Pens Project; restoration work and exotic removal on the Charlotte Harbor State Park.

Table 6: Mitigation Opportunities within the Watersheds Where Wetlands Would Be Impacted by Proposed Lee County Road Projects.

Part V: Mitigation, Restoration and Preservation Opportunities

Lee County's baseline for preservation and existing mitigation and restoration efforts consists largely of public lands that have tripled in acreage in the last 20 years. This baseline involves a large percentage of its coastal and bay shorelines and related wetlands; the Six Mile Cypress Slough Preserve; the Corkscrew Regional Ecosystem Trust lands; and a host of public and private protection and mitigation lands. A baseline map is shown as Figure 24.

To address past problems and future needs, as well as continuing to pursue preservation goals, there are multiple efforts underway in Lee County and all Southwest Florida. These have contributed greatly to the development of the Mitigation Plan. While each major study and management program has its own goals and methodologies, for the purposes of this effort, key issues identified in Lee County by these efforts, general Federal and State environmental permitting laws, and the County's own Comprehensive Plan can be organized into three major categories: hydrology, water quality, and habitat/wildlife.

Hydrology: Wetlands and Freshwater Bodies

Wetlands cover approximately 22% of Lee County's land surface. They provide essential ecological functions including filtration and assimilation of runoff, groundwater recharge, sediment stabilization, the tempering of flood peak discharges to rivers and lakes, the subsequent slow release of these stored floodwaters during the dry season, and habitat for wildlife. Destruction of wetlands in the County is recognized as a contributing factor in declining environmental water quality. Wetlands in Lee County are depicted in Figure 16**.**

The freshwater resources of Lee County are subjected to intense management, primarily for flood control purposes. A system of weirs, levees and canals dots the landscape and moves water quickly from land surfaces and the groundwater table into ponds, lakes, streams, rivers and bays. This rapid conveyance of water has proved to be a double-edged sword in Lee County – while it helps to protect the population from flooding (usually), it does not allow for adequate filtering of pollutants through natural processes, nor does it promote storage of water for utilization in the dry months of the year. In addition, in some parts of the County, the manipulation of flows has led to lower levels of aquifer recharge, harmful discharges of fresh water into our coastal waters, and, when flows are withheld, harmful salinity levels in estuarine systems.

Water Quality and Non-Point Source Pollution

While there are areas in Lee County where waters are not impaired, non-point source pollution, primarily storm water runoff, has contributed significantly to the impairment of many surface waters in Lee County. Segments of all the major tributaries to Estero Bay are listed as "impaired" by the DEP, meaning that they do not meet their designated beneficial uses. Water body segments in the Caloosahatchee Basin are also designated as "impaired" when the DEP. Nutrients, fecal coliform, mercury and copper are the most common pollutants in the Lee County water bodies. Impaired and potentially impaired waters are depicted in Figure 24**.**

Only the Surficial and Intermediate Aquifer Systems are used for domestic groundwater supply in Lee County. The Surficial Aquifer System is susceptible to anthropogenic contamination

because of its proximity to the land surface. Lack of confinement, high recharge, and relatively high permeability and a high-water table all increase the potential for contamination. Concerns exist about yield and recharge of the Intermediate Aquifer since it recharges from above and below, and the conditions of both recharge areas have been changing due to demand impacts upon them. The lower aquifer (various components of the Floridan Aquifer) his mineralized. It is a source of raw water for the desalination systems of Cape Coral and Sanibel, and the Lee County Utility Department also has wells within the lower aquifer.

Habitat/Wildlife: First timbering, then land clearing agriculture, and then urbanization, displaced native species as a normal component of settlement. With the change in the County's economic base and the implementation by Federal, State, County and city government of laws to protect species from becoming extinct, earlier views of land and resource management have changed. Lee County is doing its part to protect natural resources and proposes to do more. Initial efforts include the Southern Bald Eagle Management Plan, the Sea Turtle Protection Ordinance, and various habitat protection and restoration efforts including species survey requirements that go beyond State requirements, species management plan requirements, native indigenous preservation requirements, the Conservation 20/20 program and incorporation of green infrastructure into the surface water management system. However, habitat and listed species management goes beyond any local effort.

While the U.S. Fish and Wildlife Service has identified fifteen species of plants and animals in Lee County that are Federally listed as endangered, there are many more species whose populations are being monitored through Federal, State, regional and local efforts due to concerns that they may be in decline.

Habitat destruction and fragmentation have contributed to the loss of diversity and the decline in population of many native species in Lee County in both upland and wetland areas. The introduction of invasive non-native species has also contributed to the decline in native species as the exotics compete for available resources.

The report, *Closing the Gaps in Florida's Wildlife Habitat Conservation System*, published in 1994 by the Florida Game and Fresh Water Fish Commission, identifies Strategic Habitat Conservation Areas that should be conserved to maintain components of the State's biological diversity. By means of a computerized Geographic Information System, distribution maps depicting selected species of wildlife, threatened species of plants, and rare plant communities have been created. The maps in *Closing the Gaps*, when used in conjunction with maps in the Environmental Impact Statement on Southwest Florida growth, and others provided by State and Federal agencies, provide valuable information that can be used to identify and prioritize habitat needs in Lee County. This map is included in Figure 17.

In response to a call for a systematic approach to manage resources for protection and restoration, and to capitalize upon mitigation efforts associated with the permitting needs of public infrastructure, a multi-agency task team convened in December of 2003 at the Southwest Florida Regional Planning Council at the request of the BoCC. Members of the task team identified private and publicly owned parcels that could be candidate projects for preservation, restoration, or mitigation programs. The aggregate of these parcels is depicted in Figure 26. The list also includes existing private and public mitigation, restoration, and some preservation

projects. Use of existing lands and programs may meet short term permitting needs. The continued use of private and public partnerships for adding lands to meet mitigation and restoration needs is expected to be a major component of the implementation of the Mitigation Plan.

These baseline maps (Figures 26,27, 287) and series of descriptions are presented for agency review as the vehicle for the physical expression of the Mitigation Plan's implementation. Public parcels depicted on the map commonly have deficiencies that need remediation. Private parcels depicted on the map are not required by the mitigation planning process to be mitigation sites. Appearance on the map does, however, reflect current environmental conditions of the land that are notable at the mapping scale. Their inclusion for mapping purposes demonstrates the systematic review of Lee County restoration needs and mitigation and preservation opportunities.

The projects identified as candidates for preservation, restoration or mitigation through the Mitigation Plan are summarized in Table 7. Most projects address more than one issue, and many include some acreage that does not have to be acquired or restored, thus the numbers in the table do not add up across rows or down columns.

Table 7 Preservation, Restoration or Mitigation Project Summary

Issue to be Addressed	Estimated Cost	Total Acreage	Restoration Acreage	Acquisition Acreage
Water Quality	$221,120,000	32,395	26,355	7,241
Hydrogeology	$361,555,348	76,762	67,722	37,221
Biodiversity	$606,255,268	104,449	93,101	47,652
All	$652,733,268	110,096	98,748	51,534

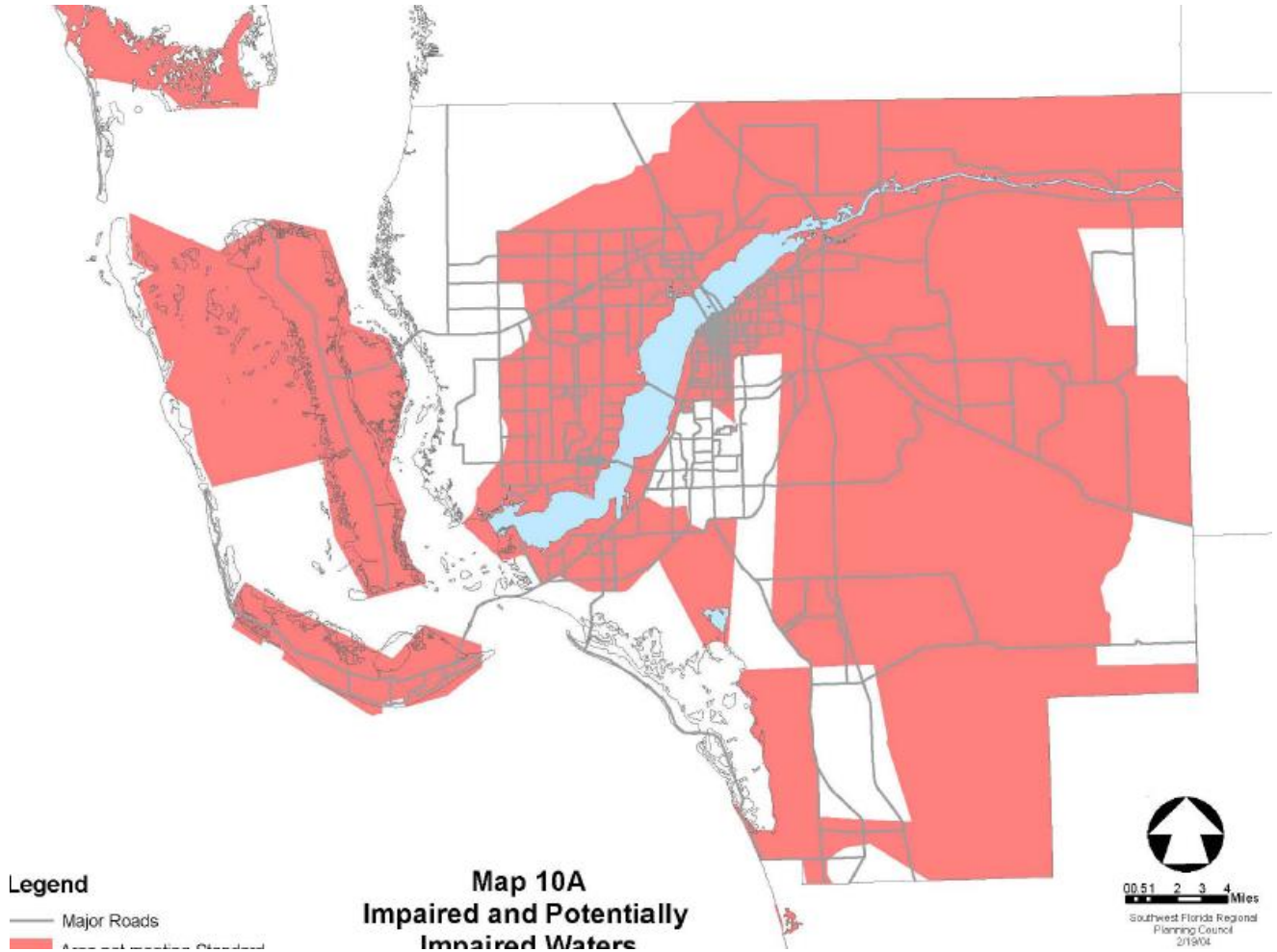


Figure 24: Map 10A- Impaired and Potentially Impaired Waters of Lee County, Florida

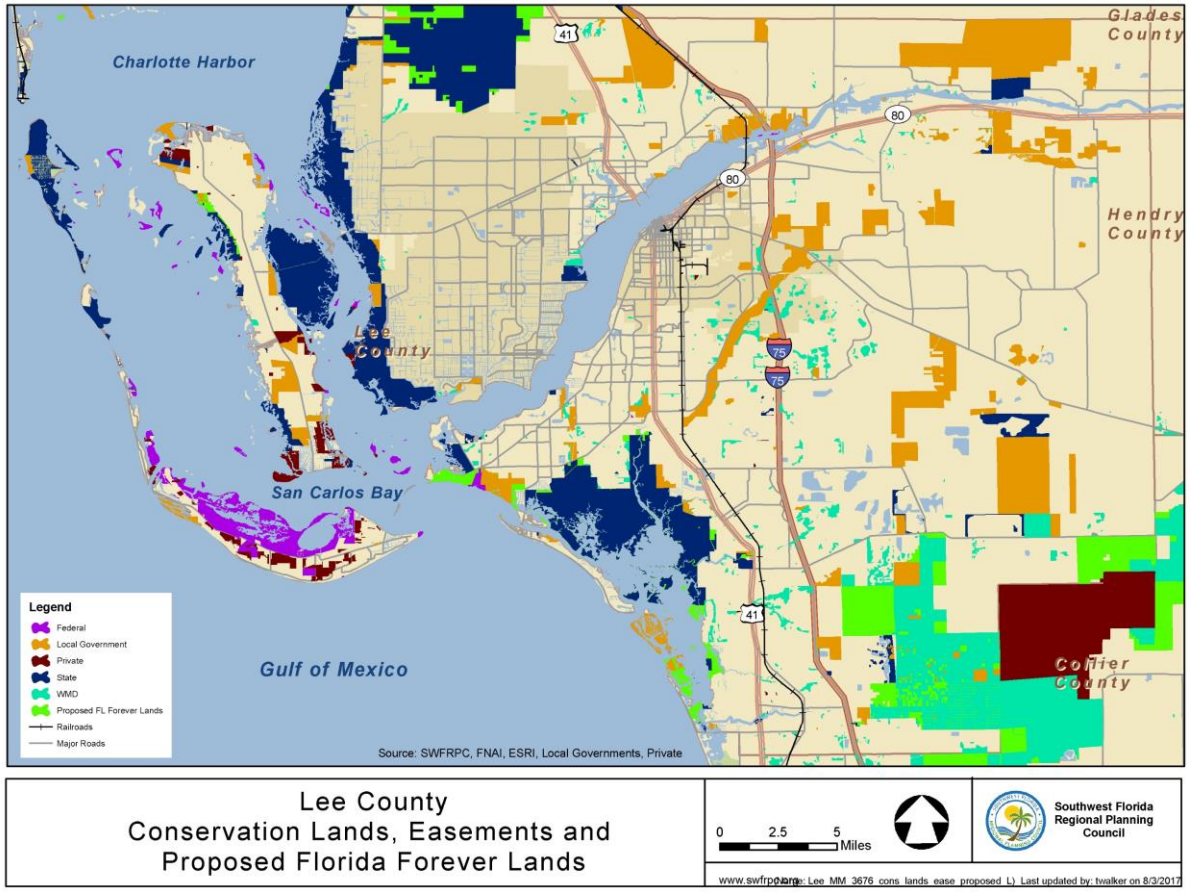


Figure 25: Lee County Florida Conservation Lands, Conservation Easements, and Proposed Conservation Land Acquisitions

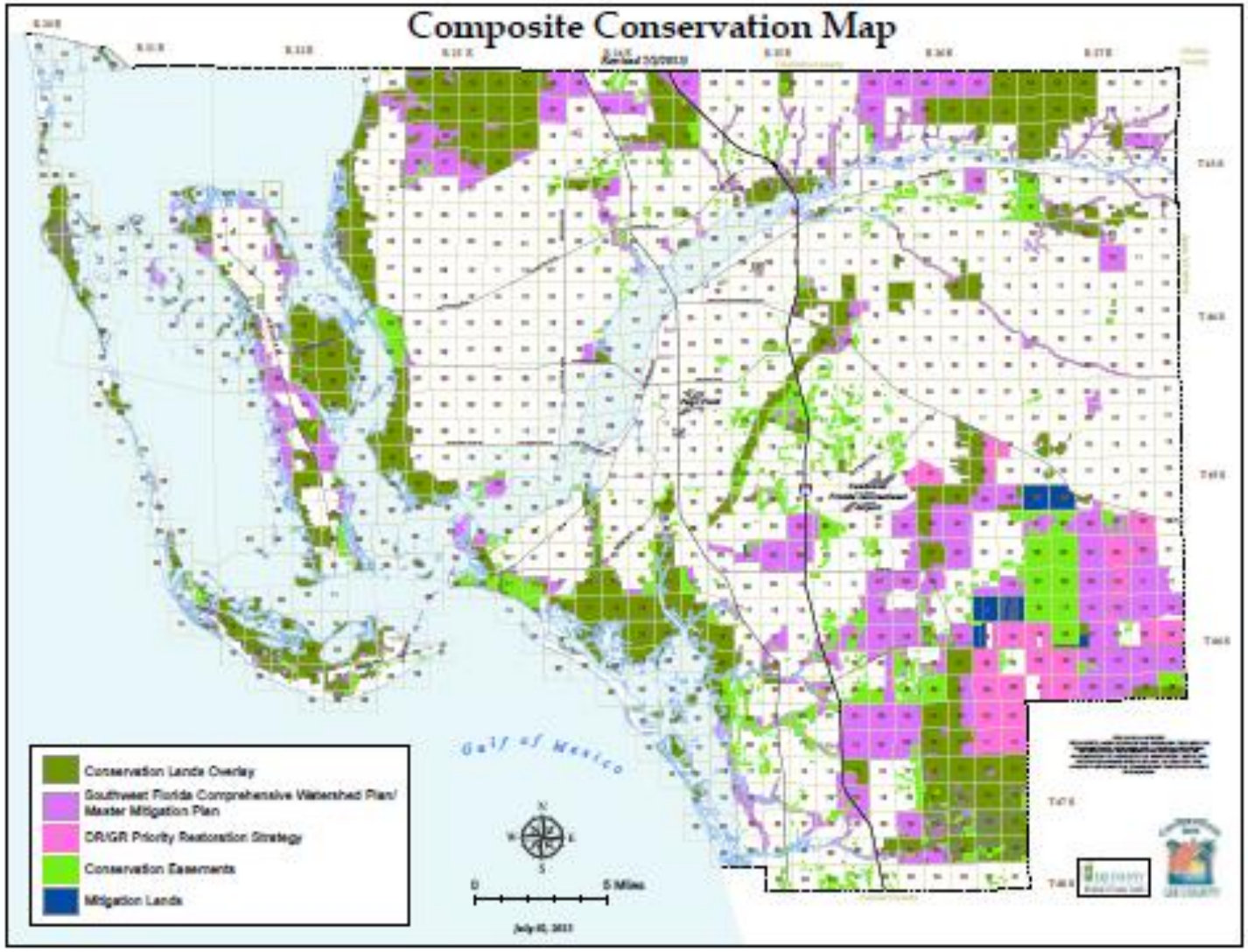


Figure 26: Lee County Florida Composite Conservation Map

Figure 27: Lee County Updated Master Mitigation Plan Map as of 2017

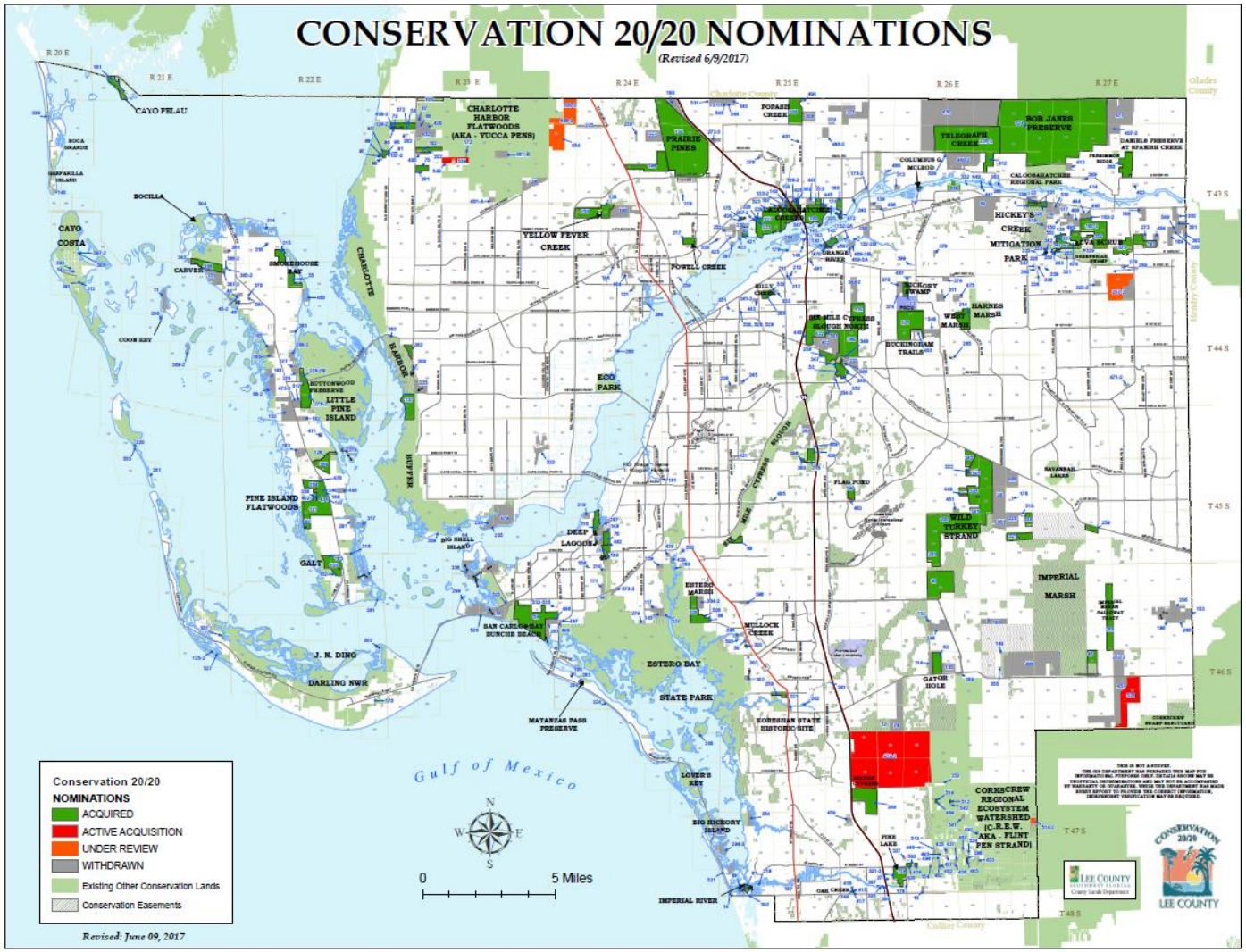


Figure 28: Lee County Conservation 2020 Existing and Nominations including 2018 Acquisitions

Part VI. Implementation of the Lee County Master Mitigation Plan

A. The Five-Year Plan. Lee County's CIP is a planning, budgetary, and prioritizing tool which reflects the County's infrastructure needs (via a list of capital projects) for a five-year time frame. The five years are balanced; i.e., revenues are identified to offset expenditures in accordance with State requirements.

The *current* CIP process begins each February with interaction between the coordinating departments -- Budget Services and the Division of Planning -- and other Lee County departments which maintain direct management responsibility for capital projects. Preliminary instructions for required data and proposed schedules are discussed and revised. Preliminary revenue estimates are disseminated to County staff. In April of each year, department managers, constitutional officers, and Lee County citizens identify initial proposed revisions to the CIP. These preliminary lists are then reviewed by the Division of Planning to determine if the projects meet the requirements of the Comprehensive Plan. (This Plan was prepared in response to the 1985 Florida Growth Management Act, which provides the basis for County planning and infrastructure requirements of the future.) Once this review is completed, the revised project lists are reviewed by the County Manager and then presented to the BoCC in an advertised workshop. After receiving direction from the BoCC, departments review and prioritize projects and prepare a "balanced" CIP. The proposed CIP is reviewed by the Local Planning Agency, an advisory committee to the BoCC, before final approval by the BoCC in September each year.

The Mitigation Plan proposes only modest modifications to the process. These modifications involve (1) an actual quantification of impacts resulting from capital projects; (2) a separate listing of mitigation projects that provide the remedy for impacts; and, (3) funding estimates and sources for mitigation. These mitigation projects may stand alone, or be part of larger restoration, remediation, or preservation efforts that are also underway.

Here is an example. Roadway X is in the Five-Year CIP. The roadway is initially assessed through a preliminary planning phase to have impacts on specific resources -- wetlands, water storage, listed species, and associated water quality. Through overall plan review with the appropriate regulatory agencies, the degree to which impacts can be satisfied “off-site” is ascertained. Then, using the sample calculations for mitigation developed in the original Master Mitigation Plan Appendix F, the Five-Year CIP can include an estimate of some permitting costs affiliated with each capital project. These costs can then be aggregated and compared to projects (or a series of projects) on a Master Mitigation List that are deemed suitable. That project is then added to the CIP as the Capital Improvement Mitigation Plan (CIMP) addendum.

The CIMP will have several components. In addition to straight-up mitigation, there is a section on land acquisition under Conservation 20/20 (for preservation, which is an existing expense), a section under water quality/remediation (which may already be an existing expense), and some corollary expenditures by the Department of Parks and Recreation.

Expenditures in the past have been significant and can be expected to be significant in the future. Using as one example wetland impacts, over the past five years and forecasted for this year and the next two (1999-2006), Lee County alone has spent approximately $1.9 million for mitigation bank credits for about 74 acres, or $238,000 for 9 acres per year. Using as another example, nitrogen/water quality, a standard estimate of 11.25 kg nitrogen per new lane mile of roadway,

three lane miles of roadway require approximately an acre of filter marsh. (Lee County DNR estimates). The Conservation 20/20 program, one Lee County preservation program, has approximately $12 million to spend on preservation purchases and restoration each year. (Approximately 10% of funds annually are to be expended for restoration, or $1.2 million). Moving from the theoretical to the practical, Table 8 constitutes the current Lee County CIP projects that contain mitigation needs. Also included in Table 9 are the hypothetical Conservation 20/20 conservation land restoration/acquisition projects and other conservation land restoration/acquisition projects forecasted (for water storage, water quality and habitat restoration. Table 10 puts tables 8 and 9 together for the proposed revised Mitigation Plan.

ID	Location	Acres of Impact	Watershed (s)	Watershed Names
1	3 Oaks Pkwy Ext	4.14	46A	Six-Mile Cypress
2	Alico Green Meadows	22.29	46A	Six-Mile Cypress
3	Ben Hill to Alico	5.62	46A	Six-Mile Cypress
4	Burnt Store Rd	1.68	1,2,3,4	Yucca Pen Creek, Durden Creek, Greenwell Branch, and Longview Run
5	Corkscrew Rd	8.62	47A	Estero Road
6	Diplomat Pkwy	0.09	16E	Yellow Fever Creek
7	E Terry St/Bonita Grande	8.19	49	Imperial River
8	Hanson Ext	0.13	46C	Ten-Mile Canal
9	Logan Ext	0.01	49	Imperial River
10	Luckett Ext	4.98	41	Billy's Creek
11	NE 24th Ave Ext	1.14	16E	Yellow Fever Creek
12	Seaboard St	0.55	41	Billy's Creek
13	SR 82 West	1.19	38	Hickey Creek
14	State Road 82 East	6.34	38	Hickey Creek, Bedman Creek

Table 8: Location of the proposed wetlands impacts by watershed.

Watershed Names	Potential C2020 Projects	Other Mitigation Options
Bedman Creek	Acquisition and restoration of hydrology and removal of exotics on nominated parcels 109, 169, 255, 381,382, and 549.	Installation of wildlife undercrossing at Bedman Creek at SR 82.
Billy's Creek	Acquisition and restoration of hydrology and removal of exotics on nominated parcels 341-2, 351, 353, 443, 538. Restoration work on existing owned parcel 388.	Increased filter marsh locations on Billy's Creek. Source removal of the causes of bacteriological contamination.
Estero River	Acquisition and restoration of hydrology and removal of exotics on nominated parcels 100, 112, 114, 135, 221, 242, 246, and 496. Restoration work on existing owned parcels 62, 90, 74, 200, 249, 474-2 and the recently acquired Edison Farms property.	Restoration and acquisition projects in the northern CREW
Hickey Creek	Acquisition and restoration of hydrology and removal of exotics on nominated parcels 23, 80, 130, 150, 177, 266,408, 273, 418, 484, 490, 518. Restoration work on existing owned parcel 57, 101, 127, 163-3, 195, 325, and 357.	Installation of wildlife undercrossing at Hickey's Creek and SR82. Expansion of the FWC Hickey's Creek Mitigation Park
Imperial River	Acquisition and restoration of hydrology and removal of exotics on nominated parcels 15, 179, 232, 296, 327, 427, 433, 436, 437, 446, 467, 482, 492, 502, 513, 215-2, 524, 541, and 542. Restoration work on existing owned parcels 119, 249, 419, 428, and 465.	Implementation of parts of the City of Bonita Springs Flood Reduction and Watershed Restoration Plan. Restoration and acquisition projects in the southern CREW
Six-Mile Cypress	Acquisition and restoration of hydrology and removal of exotics on nominated parcels 237, 244-2, 254-3, 267, 396, 432, 485, and 501. Restoration work on existing owned parcels 69, 216, 239, 298, 348, 352, 360, 390. 410, 422, and 439.	Restoration projects in Filter marches in major drainage ways.
Ten-Mile Canal	Acquisition and restoration of hydrology and removal of exotics on nominated parcels 364-2. 395, 398, and 505.	Restoration and acquisition projects in the Estero Bay State Park.

Yellow Fever Creek	Acquisition and restoration of hydrology and removal of exotics on nominated parcels 138, 180 and 198. Restoration work on existing owned parcels 134, 156, and 194.	Restoration work in the Charlotte Harbor Flatwoods-Yucca-Panes, Babcock - Webb WMA hydrologic Restoration.
Yucca Pen Creek, Durden Creek, Greenwell Branch, and Longview Run	Acquisition and restoration of hydrology and removal of exotics on nominated parcels 87, 86, 94, 91, 97, 98, 405, and 539. Restoration work on existing owned parcels 58, 75,95, 102, 107 and 281	Restoration projects in the FWC Yucca Pens Project; restoration work and exotic removal on the Charlotte Harbor State Park.

Table 9: Potential options on Lee County 2020 lands, shown in Figure 28, and on other conservation lands to offset the proposed wetlands impacts by watershed.

ID	Location	Acres of Impact	Watershed (s)	Watershed Names	Potential C2020 Projects	Other Mitigation Options
1	3 Oaks Pkwy Ext	4.14	46A	Six-Mile Cypress	Acquisition and restoration of hydrology and removal of exotics on nominated parcels 237, 244-2, 254-3, 267, 396, 432, 485, and 501. Restoration work on existing owned parcels 69, 216, 239, 298, 348, 352, 360, 390. 410, 422, and 439.	Restoration projects in Filter marches in major drainage ways.
2	Alico Green Meadows	22.29	46A	Six-Mile Cypress	Acquisition and restoration of hydrology and removal of exotics on nominated parcels 237, 244-2, 254-3, 267, 396, 432, 485, and 501. Restoration work on existing owned parcels 69, 216, 239, 298, 348, 352, 360, 390. 410, 422, and 439.	Restoration projects in Filter marches in major drainage ways.
3	Ben Hill to Alico	5.62	46A	Six-Mile Cypress	Acquisition and restoration of hydrology and removal of exotics on nominated parcels 237, 244-2, 254-3, 267, 396, 432, 485, and 501. Restoration work on existing owned parcels 69, 216, 239, 298, 348, 352, 360, 390. 410, 422, and 439.	Restoration projects in Filter marches in major drainage ways.

4	Burnt Store Rd	1.68	1,2,3,4	Yucca Pen Creek, Durden Creek, Greenwell Branch, and Longview Run	Acquisition and restoration of hydrology and removal of exotics on nominated parcels 87, 86, 94, 91, 97, 98, 405, and 539. Restoration work on existing owned parcels 58, 75,95, 102, 107 and 281	Restoration projects in the FWC Yucca Pens Project; restoration work and exotic removal on the Charlotte Harbor State Park.
5	Corkscrew Rd	8.62	47A	Estero River	Acquisition and restoration of hydrology and removal of exotics on nominated parcels 100, 112, 114, 135, 221, 242, 246, and 496. Restoration work on existing owned parcels 62, 90, 74, 200, 249, 474-2 and the recently acquired Edison Farms property.	Restoration and acquisition projects in the northern CREW
6	Diplomat Pkwy	0.09	16E	Yellow Fever Creek	Acquisition and restoration of hydrology and removal of exotics on nominated parcels 138, 180 and 198. Restoration work on existing owned parcels 134, 156, and 194.	Restoration work in the Charlotte Harbor Flatwoods- Yucca-Panes, Babcock - Webb WMA hydrologic Restoration.
7	E Terry St/Bonita Grande	8.19	49	Imperial River	Acquisition and restoration of hydrology and removal of exotics on nominated parcels 15, 179, 232, 296, 327, 427, 433, 436, 437, 446, 467, 482, 492, 502, 513, 215-2, 524, 541, and 542. Restoration work on existing owned parcels 119, 249, 419, 428, and 465.	Implementation of parts of the City of Bonita Springs Flood Reduction and Watershed Restoration Plan. Restoration and acquisition projects in the southern CREW

8	Hanson Ext	0.13	46C	Ten-Mile Canal	Acquisition and restoration of hydrology and removal of exotics on nominated parcels 364-2. 395, 398, and 505.	Restoration and acquisition projects in the Estero Bay State Park.
9	Logan Ext	0.01	49	Imperial River	Acquisition and restoration of hydrology and removal of exotics on nominated parcels 15, 179, 232, 296, 327, 427, 433, 436, 437, 446, 467, 482, 492, 502, 513, 215-2, 524, 541, and 542. Restoration work on existing owned parcels 119, 249, 419, 428, and 465.	Implementation of parts of the City of Bonita Springs Flood Reduction and Watershed Restoration Plan. Restoration and acquisition projects in the southern CREW
10	Luckett Ext	4.98	41	Billy's Creek	Acquisition and restoration of hydrology and removal of exotics on nominated parcels 341-2, 351, 353, 443, 538. Restoration work on existing owned parcel 388.	Increased filter marsh locations on Billy's Creek. Source removal of the causes of bacteriological contamination.
11	NE 24th Ave Ext	1.14	16E	Yellow Fever Creek	Acquisition and restoration of hydrology and removal of exotics on nominated parcels 138, 180 and 198. Restoration work on existing owned parcels 134, 156, and 194.	Restoration work in the Charlotte Harbor Flatwoods- Yucca-Panes, Babcock - Webb WMA hydrologic Restoration.
12	Seaboard St	0.55	41	Billy's Creek	Acquisition and restoration of hydrology and removal of exotics on nominated parcels 341-2, 351, 353, 443, 538. Restoration work on existing owned parcel 388.	Increased filter marsh locations on Billy's Creek. Source removal of the causes of bacteriological contamination.

13	SR 82 West	1.19	38	Hickey Creek	Acquisition and restoration of hydrology and removal of exotics on nominated parcels 23, 80, 130, 150, 177, 266,408, 273, 418, 484, 490, 518. Restoration work on existing owned parcel 57, 101, 127, 163-3, 195, 325, and 357.	Installation of wildlife undercrossing at Hickey's Creek and SR82. Expansion of the FWC Hickey's Creek Mitigation Park
14	State Road 82 East	6.34	38	Hickey Creek, Bedman Creek	Acquisition and restoration of hydrology and removal of exotics on nominated parcels 23, 80, 130, 150, 177, 266,408, 273, 418, 484, 490, 518. Restoration work on existing owned parcel 57, 101, 127, 163-3, 195, 325, and 357. Acquisition and restoration of hydrology and removal of exotics on nominated parcels 109, 169, 255, 381,382, and 549.	Installation of wildlife undercrossing at Hickey's Creek and SR82. Expansion of the FWC Hickey's Creek Mitigation Park. Installation of wildlife undercrossing at Bedman Creek at SR 82.

Table 10: Potential options on Lee County 2020 lands and on other conservation lands to offset the proposed wetlands impacts by project.

The general need to bring impact mitigation to fruition involves several policy steps, review forums, and an update program.

B. Annual Work Plan The annual work plan cycle will draw from the Five-Year CIP the forthcoming year's capital needs and will identify and fund the paralleling mitigation. Additionally, the County's restoration and preservation targets will be assessed and included. These targets will look towards the mitigation efforts for any synergy. (For example, a preservation site may be suitable for water quality restoration projects, rehydration, and habitat/biological uplift. Further, some greenways/trails activities may be appropriate.) In such cases, additional fiscal resources may be employed, providing savings opportunities that would not be achieved through projects located in disparate areas. Finally, the paralleling effort will identify expenditures the County will make by satisfying certain impacts through purchase of credits from mitigation banks.

Part VII: Review and Updating of the Mitigation Plan

Annual Update

The Mitigation Plan has been designed to be reviewed and updated on an annual basis. It will continually evolve and be influenced by the development of new or improved management techniques; increased coordination with other regional programs and conservation organizations; and changes in Federal, State and local regulations.

As preparations for the new CIP begin each year, Lee County and its partners in both the public and private sectors should gather to assess the accomplishments that have resulted from implementation of the Mitigation Plan. The basis for this discussion will be a report that tracks the cumulative progress of acquisition and restoration activities undertaken to offset for the impacts of growth each year. Lee County and its partners will also assess the status of other efforts aimed at the restoration and protection of natural resources in the region (the Comprehensive Everglades Restoration Plan, Total Maximum Daily Loads Program, etc.) to determine how they affect and can be incorporated into the Mitigation Plan. Finally, the County will use existing monitoring programs, along with any necessary amendments, to establish progress in achieving overall restoration goals.

Monitoring for Water Quality and Hydrology

County Monitoring programs currently encompass water quality and hydrology. The lead County agency for monitoring is the Division of Natural Resources.

Priority Review

Restoration and protection priorities should be evaluated and affirmed or revised. Each map that is a part of the Mitigation Plan should be updated to reflect changes that occur over time in Lee County, and the map series should be expanded to include pertinent data from all permitting agencies and be placed in an accessible location on-line to maximize its usefulness to scientists, planners, reviewers and resource managers.

From the review process, the Mitigation Plan databases can be updated, cooperative agreements can be affirmed and/or renegotiated, and the planning and implementation processes can continue to advance. Lee County may either facilitate the annual review and update of the Mitigation Plan or contract with a consulting firm or agency such as the Southwest Florida

Regional Planning Council for this work. Updates to maps may be performed in a similar manner.

Part VIII: Structure for Implementing the Plan

Implementation of the Plan requires several steps which are proposed herein:

A. Lee Plan Implementation Amend the Lee Plan, with *Lee County Department of Community Development* as the Lead Agency. (2005) The Lee Plan is Lee County's policy blue print for guiding development and redevelopment. Various elements of the Lee Plan will need to be amended to state that the Mitigation Plan is the County's environmental quality investment plan that will guild its expenditures for hydrology, water quality, and habitat. The Mitigation Plan itself will then become a supporting document to the Lee Plan. This approach follows the MPO model. The Lee Plan should explicitly identify in the Intergovernmental Coordination Element the other public agencies discussed below as partners.

The Mitigation Plan should be stated in the Lee Plan to be a guide for the following County agencies and programs:

Department of Transportation. Pre-identify suitable sites for offsite mitigation.

Division of Natural Resources: Pre-identify suitable sites to initiate water quality and hydrology remediation, and mitigation for storm water, navigation, and beach projects.

Department of Utilities: In conjunction with the Groundwater Resources assessment to be completed late 2004, (which will subsequently be used to update the Mitigation Plan), sites will be identified for hydrology mitigation for any projects with groundwater impacts.

Department of Parks and Recreation: Preliminary identification of candidate sites to link with the open space trails, greenways, and blue ways master strategy being developed (and subsequently amended into the Lee Plan.) Identification of sites suitable for exotics removal, wherein it is a permit concern. Identification of watersheds for soils management evaluation priority.

Division of County Lands: Preliminary identification of candidate sites for preservation under Conservation 20/20, which would only be furthered if owners are willing sellers. Preliminary identification of candidate sites for the other County agencies' mitigation and remediation needs.

Division of Animal Services: Should a County role be required, identification of sites for exotic animal control.

Airport Authority: Preliminary identification of candidate sites for offsite remediation or mitigation.

B. Mitigation Banks and Bank Designation Agencies in their permit programs have accepted mitigation banks. These are locations that have been assessed to achieve a certain "volume" of incremental benefit if restored. There is no requirement that properties be restored to natural conditions under existing uses (nor should there be, barring a public health, safety or welfare finding). Consequently, mitigated "banks" have been established to meet a market demand for

lands that want to change uses and lose "grandfather" protection since the public health, safety and welfare declaration has been made for air, land and water resources for new uses. Many of these banks are privately owned and operated. Others are publicly owned, established in part for a bank purpose. The Lee County BoCC will identify and annually update those public and private "banks" in Lee County. The "banks" identified are those considered qualified to meet some part of Lee County's mitigation credit needs.

C. Agreements Pursue agreements with other agencies to accept the use of the Mitigation Plan as the guidebook for the cumulative and secondary impact remediation and mitigation.

South Florida Water Management District: Achieve an agreement for partnering in storm water management and hydrology mitigation and remediation impacts, land acquisition, drawdown management, and permitting responses.

Florida Department of Environmental Protection: Achieve an agreement for partnering in land and estuarine management activities, impaired waters response, and permitting responses.
Florida Fish and Wildlife Conservation Commission: Achieve an agreement for partnering in managing the cumulative and secondary impacts on habitat of listed species. Recognize the role the FFWCC has in providing advice in habitat and species issues.

United States Fish and Wildlife Service: Achieve an agreement for partnering in managing the cumulative and secondary impacts on habitat of listed species. Recognize the role the USFWS has in providing advice in habitat and species issues.

United States Army Corps of Engineers: Achieve an agreement that implementing the Mitigation Plan is the tool to remedy the secondary and cumulative impact issues of the Corps Environmental Impact Statement (EIS) on Southwest Florida for Lee County public works permitting.

United States Environmental Protection Agency: Achieve an agreement that implementing the Mitigation Plan is the tool to remedy the secondary and cumulative impact issues of the Corps EIS on Southwest Florida for Lee County public works permitting.

Department of Agriculture/Natural Resources Conservation Service (DoA/NRCS): Achieve an agreement with NRCS that the Mitigation Plan identifies areas that would meet the public benefit test in addressing wetland and hydrology remediation proposals by landowners and other proponents of programs of DoA farmland, wetland and water resource issues.

Coordinating Joint Planning Agreement: Create an overall Joint Planning Agreement (JPA) specifying the needed components of the Mitigation Plan, its implementation, and its review and update process. The agreement will be between the County and each review agency. It will specify the responsibilities of each party to participate in the joint planning process and provide appropriate resources for implementation. It will establish a baseline plan. (This plan will have projects date-certain, mitigation/restoration/ preservation content-specific, and dollar value reasonably committed.) A sample JPA is provided in *Appendix D,* as is the draft JPA for the Island Park Filter Marsh Project currently underway.

E. Update Process: Maintain and update the list of Candidate Projects, and the Capital

Improvement Mitigation Plan subset of candidate projects that will be acted upon in the five-year period. The Candidate Projects and CIMP will then be presented to the BoCC for adoption as part of the CIP and Concurrency update program.

Establish a cyclical meeting schedule and work plan for the signatories of the JPA by which progress will be ascertained and updates developed. This involves update reports on mitigation site progress, and the designation of additional banks and the acknowledged transition of a completed bank to a management entity.

How to Do a Master Mitigation Plan

Development of the new list of upcoming public infrastructure projects for the projected planning future with the compatible in-watershed mitigation project.

Step 1: Collect all the available data on the proposed road, rail, port, airport, public transit, and utilities projects proposed within the plan timeframe.

The listings of the proposed public works projects for a particular jurisdiction can be found in the Capital Improvement Program (CIP) in local government and Metropolitan Planning Organization (MPO) short- and long-range planning. In current plans the projects are available in Geographic Information System (GIS) files that allow specific placement relative resources they have the potential to impact. Create an inventory/timeline of county public projects needed to implement the County's Comprehensive Plan.

Step 2: Overlay projects with maps of wetlands, listed species, conservation lands, and conservation easements. (This could also include archeological and cultural features).

Existing GIS resources regrading wetlands, listed species, conservation lands, and conservation easements and available from Federal, State local government and non-governmental sources. The State resource maps are collected by the University of Florida at the FGDL Metadata Explorer. https://www.fgdl.org/metadataexplorer/explorer.jsp

Step 3: Quantify the intersection of the projects with the wetland (listed species, conservation lands, conservation easements, archeological and cultural features) resources.

By overlaying the different data layers the intersection of the proposed public construction project impacts with the sensitive resources including wetlands can be defined and calculated. The derived results can be identified to extent, in area, type, and watershed.

Step 4: Gather information of the conservation needs of local government, state government, federal government and non-governmental conservation lands along with available mitigation banks.

Maps of existing Federal, State, local government, and non-governmental conservation lands are available from the source entities and the Florida Natural Resource Inventory. Conservation easement mapping has been completed by the FNAI and the SWFRPC (Beever and Walker 2015). If the regional has an active Regional Planning Council program or a National Estuary Program. compiled lists and mapping of cumulative conservations lands for their regions are available. Established conservation land's will generally have or will be developing management plans that identify the restoration needs for their specific properties. Often these plans will have a corresponding restoration need for impacts that will be accrued by proposed public construction projects. Inventory the restoration efforts affecting the County that are required by various public programs.

Step 5: Link proposed construction projects to conservation restoration and acquisition needs within the watersheds that the wetland impacts are occurring.

Assess the mitigation requirements of the proposed construction projects that will have an impact. The direct linkage of specific construction projects to specific restoration and or acquisition projects provides that the mitigation for a wetland impact can offset not just the wetland functional assessment, acreage and type, but also the hydrologic and water quality impacts within the same watersheds. Most commercial mitigation banks are not in the same watershed as the impacts they are purported to offset. Generally due to the functional assessment methods used in the state of Florida the mitigation provided at off-site locations is a fraction of the area that is actually impacted (Beever et al. 2011). Functionally where this planning method has been implemented the mitigation projects are completed before the construction impacts occur. This provides a surety that mitigation has been achieved.

Step 6: Add the Master Mitigation Plan to the Annual Work Plan of County.

The annual work plan cycle can draw from the Five-Year CIP forthcoming year's capital needs plan and identify and fund the paralleling mitigation. Additionally, the County's restoration and preservation targets can be assessed and included. These targets will then look towards the mitigation efforts for any synergy. (For example, a preservation site may be suitable for water quality restoration projects, rehydration, and habitat/biological uplift. Further, some greenways/trails activities may be appropriate.) In such cases, additional fiscal resources can be employed, providing savings opportunities that would not be achieved through projects located

in disparate areas. Finally, the paralleling effort identifies expenditures the County will make by satisfying certain impacts through purchase of credits from mitigation banks.

Step 7: Establish a Standing Coordination Team for the Mitigation Plan Implementation and Updating

Establish a Standing Coordination Team for the Mitigation Plan Implementation and Updating composed of the agencies engaged in permitting and the CIP for monitoring of progress and for updating the Master Mitigation Plan. This team would include the active County departments, Federal, State, Regional and in some cases non-governmental land conservation entities.

Step 8: Review and Updating of the Mitigation Plan Annually

The Mitigation Plan can be designed to be reviewed and updated on an annual basis. It can then continually evolve and be influenced by the development of new or improved management techniques; increased coordination with other regional programs and conservation organizations; and changes in Federal, State and local regulations.

As preparations for the new CIP begin each year, the County and its partners in both the public and private sectors should gather to assess the accomplishments that have resulted from implementation of the Mitigation Plan. The basis for this discussion will be a report that tracks the cumulative progress of acquisition and restoration activities undertaken to offset for the impacts of growth each year. The County and its partners will also assess the status of other efforts aimed at the restoration and protection of natural resources in the region (the Comprehensive Everglades Restoration Plan, Total Maximum Daily Loads Program, etc.) to determine how they affect and can be incorporated into the Mitigation Plan. Finally, the County can use existing monitoring programs, along with any necessary amendments, to establish progress in achieving overall restoration goals.

Restoration and protection priorities can be evaluated and affirmed or revised. Each map that is a part of the Mitigation Plan should then be updated to reflect changes that occur over time, and the map series should be expanded to include pertinent data from all agencies and be placed in an accessible location on-line to maximize its usefulness to scientists, planners, reviewers and resource managers.

From the review process, the Mitigation Plan databases can be updated, cooperative agreements can be affirmed and/or renegotiated, and the planning and implementation processes can continue to advance. The County may either facilitate the annual review and update of the Mitigation Plan or contract with a consulting firm or agency such as the Regional Planning Council for this work. Updates to maps may be performed in a similar manner.

Citations

Beever III, J.W., W. Gray, L. Beever, and D. Cobb 2011. A Watershed Analysis of Permitted Coastal Wetland Impacts and Mitigation Methods within the Charlotte Harbor National Estuary Program Study Area. Southwest Florida Regional Planning Council and Charlotte Harbor National Estuary Program. USEPA CE- 96484907-0. 391 pp.

Beever III, J.W., and T. Walker 2013. Estimating and Forecasting Ecosystem Services within Pine Island Sound, Sanibel Island, Captiva Island, North Captiva Island, Cayo Costa Island, Useppa Island, Other Islands of the Sound, and the Nearshore Gulf of Mexico. 46 pp.

Beever III, J.W., W. Gray, D. Cobb, and T. Walker 2013. A Watershed Analysis of Permitted Coastal Wetland Impacts and Mitigation Assessment Methods within the Charlotte Harbor National Estuary Program. Florida Scientist 76(2): 311- 328.

Beever III, J.W. 2013. Estimate of the Ecosystem Services of Existing Conservation 2020 Lands in Lee County Florida. Report to the Southwest Florida Audubon Society 18 pp.

Beever III, J. W. D. Cobb, W. Gray, L. Van Houdt and T. Walker 2015. A rapid functional assessment method for designed freshwater and brackish water filter marsh ecosystems used for water quality treatment (FMFAM). 151 pp

Beever III, J.W., and T. Walker 2015. A Unified Conservation Easement Mapping and Database for the State of Florida, 70 pp and GIS Mapping Files

Beever III, J.W., and T. Walker 2016. Total Ecosystem Services Values (TEV) in Southwest Florida: The ECOSERVE Method. Florida Scientist 79 (2-3) (2016):178-193.

Beever III, J.W., T. Walker, and A. Bandy, 2018. City of Bonita Springs Flood Reduction and Watershed Restoration Plan, January 26, 2018.

Cox, J., Kautz, R., MacLaughlin M., and Gilbert, T. 1994. Closing the Gaps in Florida's Wildlife Habitat Conservation System. Office of Environmental Services, Florida Game and Fresh Water Fish Commission, 620 South Meridian Street, Tallahassee, Florida 32399-1600.

Lee County, 2005. Lee County Master Mitigation Plan. 30 pp.

Lee County, 2007. Lee County Master Mitigation Plan. 29 pp.

Lee County, 2019. The Lee Plan,

Lee County Metropolitan Planning Organization (MPO), 2017. Unified Work Program for Fiscal Years 2016/2017-2017/2018. 159 pp.

South Florida Water M\management District, 2011. Southwest Florida Comprehensive Watershed Plan, 180 pp.

Southwest Florida Regional Planning Council (SWFRPC). 2002. Strategic Regional Policy Plan. 97 pp.