



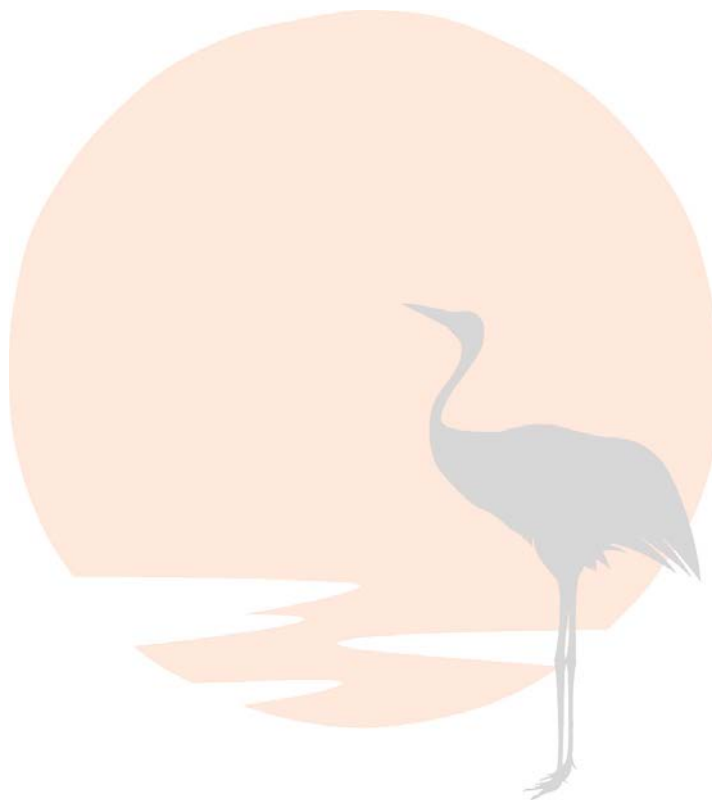
# Lemon Bay

## WATERSHED MANAGEMENT PLAN



# ***Chapter 2***

## ***Goals and Objectives***



*August 2010*



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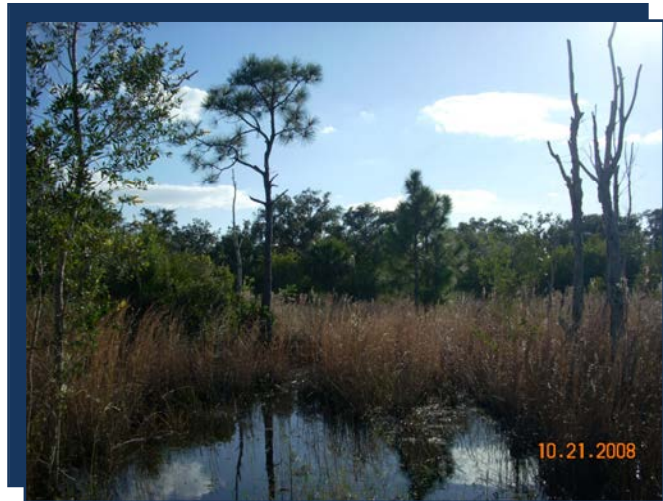
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## 2.0 GOALS AND OBJECTIVES

Each of the objectives established in Chapter 1 is designed to preserve, protect, and/or enhance natural systems and water quality in Lemon Bay ecosystems; support a sustainable water supply; and provide flood protection for the citizens of Sarasota County in conjunction with maintaining aquatic recreational uses and offering public education opportunities in a comprehensive Watershed Management Plan. In summary, these goals and objectives include:

- 1 Improving and protecting water quality.
- 2 Providing information to help the Florida Department of Environmental Protection (FDEP) develop Basin Management Action Plans to address adopted Total Maximum Daily Load issues within the Lemon Bay watershed.
- 3 Providing a more natural hydrologic regime for Lemon Bay and the watershed.
- 4 Protecting existing and future property owners from flood damage.
- 5 Developing ecosystem goals and targets based on the needs of environmental and biological indicators.
- 6 Investigating potential sustainable surface water supply options that are consistent with and support the Sarasota County Comprehensive Plan, the Southwest Florida Water Management District's Regional Water Supply Plan, and the Southern Water Use Caution Area Regional Strategy.



Sarasota County, the Southwest Florida Water Management District, the Charlotte Harbor National Estuary Program, Mote Marine Laboratory, and the Lemon Bay League have developed management plans and technical reports through studies, workshops, and other efforts. For planning purposes, Lemon Bay is considered part of the Charlotte Harbor Estuary in many of these plans and studies. The previous plans are summarized in this section based on the four watershed areas of responsibility.

*Four watershed areas of responsibility: natural systems, water quality, water supply, and flood protection.*

A summary spreadsheet of previous goals, objectives/strategies, and recommendations is provided in Appendix A.





Previous plans and studies were reviewed within the Lemon Bay WMP framework. The project team, consisting of Jones Edmunds, Janicki Environmental, and County and District staff, evaluated goals, objectives, and recommendations for each area of responsibility. Using previous recommendations, current ecological conditions, and future planning information, the project team developed goals, objectives, and approaches to implement a work flow for Lemon Bay early in the WMP process. The resulting work flow provides a scientific and engineering basis for the final recommendations. The proposed approaches to gather and evaluate data for each area of responsibility are summarized in the following sections. The data evaluation is presented in subsequent chapters and is the basis for proposed conceptual projects and program recommendations provided in Chapter 8.

## 2.1 NATURAL SYSTEMS

### 2.1.1 Proposed Goals, Objectives, and Approaches

The primary natural systems goal is to protect, enhance, and restore natural communities and habitats. The proposed objective is to establish critical natural habitat criteria that will be used to determine the overall ecological health of Lemon Bay. Five habitat types have been defined for this purpose and the evaluation approach is summarized in Table 2-1. More detail is presented in the Natural Systems section of Chapter 3.

*Shorelines, seagrasses, benthos, oysters, and wetlands represent critical natural habitats in Lemon Bay.*

### 2.1.2 Previous Goals, Objectives, and Recommendations

Documents listing natural systems goals and objectives were produced by Sarasota County, Southwest Florida Water Management District, the Charlotte Harbor National Estuary Program, and the Lemon Bay League. A summary of pertinent information is provided.

#### 2.1.2.1 Sarasota County Planning Department

The Environmental Plan (Chapter 2) of the Sarasota County Comprehensive Plan focuses on conserving, maintaining, and restoring natural systems and on the need to coordinate between the Environmental Plan and the other chapters (i.e., roads, sewers, housing). Four primary goals of the Environmental Plan are:

1. Protect, maintain, and, where deemed necessary in the public interest, restore or enhance the natural resources of Sarasota County (including the barrier island, beach, and estuarine system) to ensure their continued high quality and their critical value to the quality of life in the County.



**Table 2-1 Lemon Bay Watershed Habitat Summary**

Habitat	Description	Anthropogenic Impacts	Approach
Shorelines	Shorelines provide critical transition zones between terrestrial and marine habitats.	Alterations have resulted in a degraded littoral zone and 'hardening' of the shoreline from structures such as concrete seawalls or riprap bulkheads.	Estimate the extent of hardened and of natural shorelines and identify potential shoreline restoration areas.
Seagrass	Seagrasses provide critical habitat for juvenile fishes and invertebrates, stabilize sediments, and are a food source for manatees and sea turtles.	Changes in light penetration, salinity, and nutrients can potentially have a detrimental impact on seagrasses.	Evaluate seagrasses by comparing current and historic aerial surveys for extent of coverage and persistence and establish restoration and protection targets.
Benthos	Benthos support bottom-dwelling organisms such as worms, snails, clams, small crustaceans, and other invertebrates. They are an essential component of the diet of many fishes and wading birds.	Changes in salinity and DO can potentially have a detrimental impact on the benthos.	Examine salinity and DO distributions in Lemon Bay using existing information and relate distribution to areas of concern. Any data gaps should be identified. <sup>1</sup>
Oysters	Oyster reefs serve a number of valuable ecological functions and are an important indicator of estuarine health.	Changes in salinity, nitrogen nutrients (over-nitrification depletes DO), toxic chemicals and metal contaminants, and siltation can potentially have a detrimental impact on the oysters.	Examine historic oyster distribution and establish target restoration sites.
Wetlands	Wetlands are a vital component of any watershed with significant ecological and hydrological benefits.	There has been a significant decline in wetlands from activities such as drainage and clearing for agriculture and urbanization, channeling of streams, and water obstruction and impoundment.	Estimate current and historic extents of freshwater and estuarine wetlands for the watershed and then develop wetland protection and balanced restoration targets.

1) The approach to address DO and salinity is provided in the related Water Quality section (Table 2-2)



2. Support the implementation of the regional Comprehensive Conservation and Management Plans (CCMP) to restore and improve the natural estuarine systems and related coastal components as a member of the Sarasota Bay and Charlotte Harbor National Estuary Programs.
3. Lessen the impact of a destructive storm on human life, public facilities, private structures, infrastructure, and coastal natural resources in Sarasota County.
4. Preserve, protect, and restore the integrity of the natural environment, historic and archeological resources, and neighborhoods and preserve agricultural uses consistent with resource protection.

Specific policies are found in the Comprehensive Plan.

### 2.1.2.2 Sarasota County Natural Resources

The Natural Resources Department produced the *Land Management Plan for the Alligator Creek Conservation Area (2005)*. The goal is to manage the Conservation area's upland communities to improve habitat value for wildlife and habitat function by controlling nuisance and exotic species, reducing understory vegetation, and developing community coordination.

### 2.1.2.3 Southwest Florida Water Management District (SWFWMD)

Three documents from SWFWMD are important to natural systems strategies in Lemon Bay: *Charlotte Harbor Surface Water Improvement Plan (SWIM)*, *Southern Coastal Comprehensive Watershed Management Plan (SCC-WMP)*, and *Nonpoint Source Model Development and Basin Management Strategies for Lemon Bay*.

The SWIM plan outlined two goals: improving the environmental integrity of the Charlotte Harbor study area and preserving, restoring, and enhancing seagrass beds, coastal wetlands, barrier beaches, and functionally related uplands. The plan's objectives are:

- Identify and remove areas of heavy invasive exotic vegetation from the Charlotte Harbor NEP study area.
- Enhance fish and wildlife habitat along shorelines, including canals, lakes, riverine systems, and artificial water bodies.
- Restore freshwater and estuarine wetland areas, especially those adversely impacted by ditching.
- Bring environmentally sensitive land under protection through ownership and/or management, and expand conservation areas, reserves, and preserves.
- Acquire lands to increase wildlife habitat currently privately held within large, undeveloped, platted areas.



Recommended projects to support achieving the SWIM plan goals include implementing the restoration master plan for Alligator Creek; restoring Lemon Bay Park; and continuing other restoration projects.

The primary natural system goal for the SCC-WMP is to protect, preserve, and restore important upland and wetland systems and to establish minimum water levels and flows necessary to maintain these natural systems. Specific objectives/strategies for the SCC-WMP are to continue ongoing efforts focused on protecting and restoring wetlands and to protect natural systems through land-acquisition and land-conservation methods.

The primary goal of *Nonpoint-Source Model Development and Basin Management Strategies for Lemon Bay* in 2004 is to reduce non-point-source loadings into Lemon Bay. Objectives include developing hydrologic restoration programs for the tidal creeks and other entities in areas where manmade alterations have taken place, enhancing floodplain storage, and improving surface water quality. Proposed restoration sites include Alligator Creek, Forked Creek Western Branch, Forked Creek Eastern branch, Manasota Key, Gottfried Creek, River Road Wetlands, and Ainger Creek.

#### 2.1.2.4 Charlotte Harbor National Estuary Program (CHNEP)

The CHNEP developed a CCMP for the estuary (2008). The natural systems focus of the plan is to improve the environmental integrity of the Charlotte Harbor study area. The report contains a number of goals to support the focus statement:

1. Preserve, restore, and enhance seagrass beds, coastal wetlands, barrier beaches, and functionally related uplands.
2. Reduce the severity, extent, duration, and frequency of harmful algal blooms, including red tide.
3. Conserve and preserve sensitive lands to protect habitat.
4. Stop new infestations of exotic pest plants and exotic nuisance animals and bring current infestations to manageable levels.
5. Address fish and wildlife habitat loss, such as degradation and elimination of headwater streams and other habitats caused by development, conversion of natural shorelines, cumulative impacts of docks and boats, invasion of exotic species, and cumulative and future impacts.
6. Address hydrologic alterations, which cause adverse changes to amounts, locations, and timing of freshwater flows; the hydrologic function of floodplain systems; and natural river flows.

Some of the CCMP recommendations that impact natural systems are listed here:

- Re-establish hydrologic watersheds to contribute flows to their historic receiving water bodies.





- Build and restore water conveyances to have shallow, broad, vegetated, and serpentine components that also restore floodplains.
- Implement watershed initiative projects to address hydrologic alterations, loss of water storage, and changed hydroperiod and to improve water quality.
- Develop methods to enhance seagrass recovery from prop scarring.
- Ensure that navigation programs protect the CHNEP study area habitat resources.
- Restore freshwater and estuarine wetland areas, especially those adversely affected by ditching, using the following methods: backfilling ditches, removing spoil piles, eliminating exotic vegetation, and other techniques.
- Enhance fish and wildlife habitat along shorelines, including canals, lakes, riverine systems, and artificial waterways.
- Assess the impacts of canal/lake management activities on fish and wildlife.
- Restore and protect a balance of native plant and animal communities.
- Provide multifaceted environmentally responsible boater education programs.
- Support public involvement programs in habitat and wildlife issues.
- Bring environmentally sensitive land under protection through ownership and/or management and expand conservation areas, reserves, and preserves, including undeveloped platted lots.
- Advocate land acquisition and conservation easement programs.
- Where practical, identify and remove areas of heavy invasive exotic vegetation and exotic nuisance animals.
- Develop a historic and current estuarine mixing model, focusing on salinity and indicator species that are sensitive to salinity changes, and better evaluate proposed capital and operations projects.
- Protect headwater tributaries from elimination and restore these tributary courses and their floodplains where opportunities exist.
- Establish minimum flows and levels (MFLs).
- Participate in Everglades restoration and the Southwest Florida Feasibility Study.
- Re-establish hydrologic watersheds to contribute flows to their historic receiving water bodies.
- Evaluate the impacts of man-made barriers to historic flows.
- Identify the hydrologic and environmental impacts of surface water reservoirs on estuaries within the watershed.

### 2.1.2.5 Lemon Bay League

The Lemon Bay League is a community-based, non-profit (501.C.3) organization consisting of a diverse group of stakeholders in Sarasota and Charlotte Counties designed to increase civic engagement on planning efforts relating to watershed goals for the Lemon Bay Watershed. The League's broad goal is to develop continuity in planning among multiple agencies and jurisdictions to provide a stewardship plan and a common community vision for the health and sustainability of the watershed.



The Lemon Bay League produced the *Lemon Bay Interagency Comprehensive Watershed Management Plan* (2004). The plan’s primary natural systems goal is to enhance, protect, and conserve the hydrologic and ecologic functions of natural systems, including estuaries, freshwater, and groundwater systems. Determining and restoring natural hydrologic regimes and protecting and restoring ecological habitats are the objectives outlined in the plan. Recommendations to achieve the goal include developing watershed budgets, supporting an aquifer storage and recovery feasibility study, implementing a hydrologic restoration program, and implementing stormwater conservation and reuse programs.

## 2.2 WATER QUALITY

### 2.2.1 Proposed Goals, Objectives, and Approaches

The primary water quality goal is to protect, maintain, and improve water quality conditions in estuarine and freshwater environments. To evaluate the current health of the bay and estuaries and provide a framework for future evaluation, four primary parameters serve as water quality indicators: chlorophyll *a*, water clarity, dissolved oxygen, and salinity. A detailed discussion of each indicator as well as the interaction and relationships among the indicators is provided in Chapter 4 Water Quality. Identifying critical water quality indicators and establishing living-resource-based targets for each indicator as it relates to the health and vitality of the Lemon Bay system is a primary objective of the plan.

*Primary water quality parameters are: Chlorophyll a, Water clarity, Dissolved oxygen, Salinity.*

Following is a brief discussion of each indicator and Table 2-2 lists the approaches to develop scientifically sound resource protection targets for each indicator.

Table 2-2 Lemon Bay Critical Water Quality Indicators	
Indicator	Approach
Chlorophyll <i>a</i>	• Examine relationship between nutrient loads and chlorophyll <i>a</i> levels, taking into account circulation and residence time.
	• Examine the relationship between current and historic conditions and Impaired Waters Rule thresholds.
	• Estimate critical nutrient loads to meet living-resource-based target levels for chlorophyll.
Water Clarity	• Use existing information on water clarity requirements for seagrasses to set targets for water clarity.
	• Examine relationship between nutrient loads, color, turbidity, and chlorophyll.
	• Estimate current nutrient load to meet living-resource-based water clarity targets.
Dissolved Oxygen	• Examine relationships between freshwater input, nutrient load, and biochemical oxygen demand load on bottom dissolved oxygen.
	• Estimate critical freshwater inputs and nutrient loads to meet bottom dissolved oxygen targets.



**Table 2-2 Lemon Bay Critical Water Quality Indicators**

Indicator	Approach
Salinity	• Examine relationship between freshwater inflows and salinity regimes.
	• Identify appropriate salinity regimes for key/priority natural resources.
	• Maintain critical freshwater inflows to support successful recruitment and growth of oysters and other shellfish and for fishes that utilize the water body as an estuarine- dependent resource.

2.2.1.1 Chlorophyll *a*

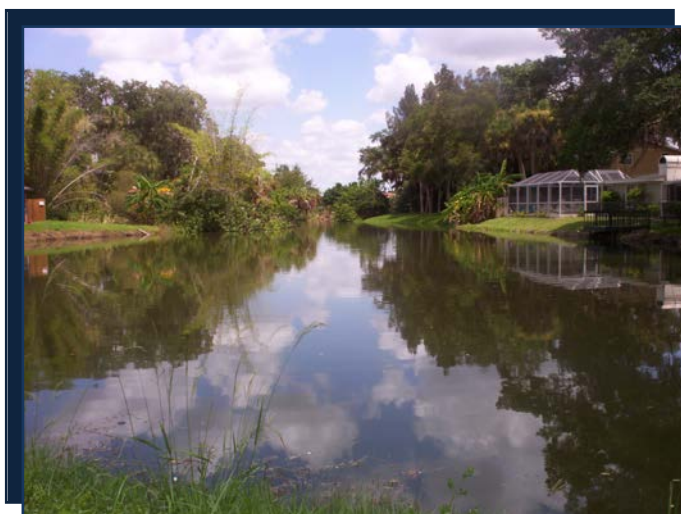
Algae levels are commonly quantified by measuring the chlorophyll *a* (the predominant chlorophyll type found in algae) concentrations in water samples. Excess algae can deplete oxygen levels in the bay waters, cause large-scale algae blooms, and reduce sunlight necessary to maintain seagrasses and other bottom habitat. Higher nutrient loads (nitrogen and phosphorus) from anthropogenic sources affect aquatic and marine systems and can often lead to higher algae levels, which may have undesirable effects on the ecology of the system.

2.2.1.2 Water Clarity

Water clarity is related to turbidity and color. Turbidity is affected by suspended sediments, algae cells, and other minute particles. Color is generally affected by dissolved constituents in the water column (e.g., dissolved tannins lead to ‘tea-colored’ water). Water clarity affects light penetration. Seagrasses depend on sunlight and are traditionally used as a measure of the overall condition and health of the bay. Reduced light penetration can reduce the quantity and weaken the health of seagrasses and diminish the benthic habitat the vegetation provides for marine life.

2.2.1.3 Dissolved Oxygen

Appropriate dissolved oxygen (DO) concentrations are critical to animals in marine and aquatic systems. Levels of DO are affected by temperature, nutrient load, freshwater inflows, and circulation. Any alterations to these conditions can reduce the amount of oxygen available for aquatic animals; a population may be easily eradicated if oxygen deficit is prolonged. Maintaining minimum levels of DO is important for bay health.



The State of Florida has established the same minimum DO requirement for Marine Class II (Shellfish Propagation or Harvesting) and Class III (Recreation, Propagation and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife) Waters. The east side of Lemon Bay



from Forked Creek south is a Class II waterbody; the remaining portion of the Bay is a Class III waterbody.

FAC 62-302.530 (30) states that DO: “Shall not average **less than** 5.0 (*mg/L*) in a 24-hour period and shall never be less than 4.0 (*mg/L*). Normal daily and seasonal fluctuations **above** these levels shall be maintained.”

A large number of DO impairments (levels less than this standard) have been identified and concerns have been raised as to the appropriateness of the existing DO standards in fresh and marine waters. Ongoing research to address these concerns will hopefully result in a more meaningful suite of DO criteria for Florida waters.

### 2.2.1.4 Salinity

Salinity is a measure of the dissolved salt concentration in a marine system and is a balance of freshwater inflows from streams and groundwater seepage and the oceanic saltwater. Freshwater inflow may be affected by hydrologic alterations of flow patterns or by natural causes such as large storms (decreasing salinity) and drought (increasing salinity) or by anthropogenic activities such as surface or groundwater withdrawals (increasing salinity) or freshwater discharges (decreasing salinity—usually in the vicinity of the discharge).

Salinity levels outside the normal regime for the system, whether high or low, may have a detrimental effect on the marine plants and animals.

Table 2-2 summarizes the water quality indicators and approaches developed to define the current health of Lemon Bay and its estuaries and provide a framework for future evaluation of the watershed.

### 2.2.2 Previous Goals, Objectives, and Recommendations

Documents containing existing water quality goals and objectives were produced by Sarasota County, the Southwest Florida Water Management District, the Charlotte Harbor National Estuary Program, Mote Marine Laboratory, and the Lemon Bay League. A summary of pertinent information is provided.

#### 2.2.2.1 Sarasota County Planning Department

The Environmental Plan (Chapter 2) of the Comprehensive Plan provides the basis for maintaining and improving environmental quality, including water quality in Sarasota County, as the County seeks a sustainable balance between manmade and natural systems. The plan notes that designation of Lemon Bay as an Aquatic Preserve by FDEP provides additional water-quality protection. Water quality within Lemon Bay varies through the waterways. The northern portion of Lemon Bay and Alligator Creek Drainage Basin are listed as impaired waterways by



FDEP for chlorophyll a concentrations, nitrogen loadings, and bacteria. The following water quality goals and objectives are outlined in the Environmental Plan:

1. Goal: Protect and enhance wherever possible the quality of the estuarine environment throughout Sarasota County.
  - a. Objective: Improve surface water quality, including estuarine, freshwater, coastal streams, rivers, and bays.
2. Goal: Support the implementation of the FDEP Lemon Bay Aquatic Preserve Management Plan.
3. Goal: Protect, maintain, and, where necessary, restore the natural resources of Sarasota County to ensure their high quality and critical value to the quality of life in the County.
  - a. Objective: Protect the quality and quantity of all jurisdictional waters, recognize the ongoing study efforts, and ensure that the current water quality in the County will be improved through 2010.

The Watershed Management Plan (Chapter 4) of the Sarasota County Comprehensive Plan focuses on land use and management and the management of water resources. Two primary goals of the Watershed Management Plan are:

1. Continue to improve and centralize regional wastewater collection and treatment in a safe, clean, efficient, economical, and environmentally sound manner concurrent with urban development.
2. Provide programs that enhance water quality.

The following requirements are specified to meet a water-quality-level-of-service (LOS) criterion in the Plan:

1. The County shall implement a stormwater quality management plan consistent with the National Pollutant Discharge Elimination System requirements.
2. New and existing industrial activities require the development and implementation of a Stormwater Pollution Prevention Plan.
3. No discharge from any stormwater facility should cause or contribute to a violation of water quality standards in Waters of the State.
4. Best management practices should be encouraged for intensive agricultural practices that negatively impact water quality.
5. The County's Basin Master Plans should include evaluation of pollutant loading.

### 2.2.2.2 Sarasota County Stormwater Environmental Utility

Basin Master Plans were completed in the late 1990s for the Ainger Creek, Forked Creek, Gottfried Creek, and Woodmere Creek subbasins to address water quality LOS. These plans were flood protection driven but did contain water quality components. The goal of the Basin





Master Plan was to identify existing and future LOS deficiencies. The objective was to develop and evaluate stormwater best management practices to address current and predicted LOS deficiencies. Table 2-3 lists the specific project recommendations to address water quality concerns in three of the Lemon Bay subbasins.

<b>Table 2-3 Recommended Water Quality Projects by Subbasin</b>	
Subbasin	Project Recommendation
Forked Creek Basin Master Plan	Construct an approximately 400-foot channel, 12 feet wide with 3:1 side slopes, along 5th Street to connect the existing wetland systems.
	Improve channel and clear and snag 1,200-foot-long creek segment from Manasota Beach Road to existing driveway. Design improvements as a longitudinal wetland/slough with 3:1 side slopes to obtain water quality benefits.
	Acquire and improve existing 3-acre wetland.
	Reconstruct about 300 feet of creek channel upstream from a private driveway located approximately 500 feet upstream from SR 776 crossing. Design the system as a longitudinal wetland/slough with 3:1 side slopes to obtain water quality benefits. Provide for erosion control at selected locations along the creek. Sides with slopes steeper than 3:1 should be protected with erosion-control materials.
	Improve about 1,500 feet of creek channel in the Whispering Pines area by reshaping the creek banks to a 3:1 slope or a 2:1 slope with protected side slopes. Stabilize creek banks in areas where structures are located. Design project as a longitudinal wetland/slough to obtain water quality benefits.
	Implement a Regional Stormwater Management Facility in the Forked Creek basin with its outfall approximately 1,300 feet north of Keyway Road crossing on the creek's eastern branch.
Ainger Creek Comprehensive Basin Master Plan	Coordinate with landowner and Sarasota County's Environmentally Sensitive Lands Program to protect the Ainger Creek floodplain.
	Restore water level control structure located just within North Port city limits on SWFWMD property.
	Construct a minimum 50-acre regional stormwater facility.
	Maintain existing systems.
Gottfried Creek Basin Master Plan	Regional water quality facility. Clear, snag, and remove existing spoil berms along the creek banks between the confluence of the main branch with the Englewood lateral and the Park Forest bridge. Place diversion structures to route flows through adjacent wetlands for water quality treatment. (Englewood Lateral Improvement)
	Proposed future regional detention facility: It will cover about 60 acres of currently undeveloped land north of an existing Englewood lateral weir structure. (Englewood Lateral Improvement)
	Construct stormwater detention facility approximately 1,300 feet downstream of the WENG Radio culvert in the Ainger Creek basin. (South River Road Improvement)



### 2.2.2.3 Southwest Florida Water Management District

Three documents from SWFWMD are important to water quality strategies in Lemon Bay: *Charlotte Harbor Surface Water Improvement Plan (SWIM)*, *Southern Coastal Comprehensive Watershed Management Plan*, and *Nonpoint Source Model Development and Basin Management Strategies for Lemon Bay*.

- Identify gaps in water quality data needed to calibrate the appropriate models used to determine Total Maximum Daily Load (TMDL) limits; coordinate monitoring programs; and implement programs to fill data gaps for TMDLs.
- Install or retrofit best management practices to maintain or improve water quality.
- Establish and implement minimum flows for tributaries as detailed within the draft CCMP. Determine maximum cumulative withdrawals.
- Reestablish, where practical, surface flows from sub-basins that do not currently contribute to their historic hydrologic connections.
- Where possible and practical restore groundwater levels to historic seasonal mean levels.

The water quality goals for *Charlotte Harbor SWIM Plan (2000)* are reducing point and non-point sources of pollution to attain the desired use of the estuary and providing the proper fresh water inflow to the estuary to ensure a balanced and productive ecosystem. Objectives include:

Recommendations to implement the plan are develop a linked nutrient budget and water quality model for Lemon Bay, develop a resource-based pollutant-load-reduction goal for Charlotte Harbor, continue the existing short-term water quality monitoring program, continue seagrass mapping efforts, and implement the long-term water quality monitoring program.

The primary water quality goal of the *Southern Coastal Comprehensive Watershed Management Plan (2000)* was to protect water quality by preventing further degradation of the water resource and enhancing water quality where appropriate. Recommended strategies include:

1. Continue and expand ongoing water quality monitoring and data management.
2. Determine the County-wide potential for using high flows as a supplemental potable or non-potable water source through understanding the ecological impacts of flood-control practices elsewhere in the County.
3. Reduce point-source and non-point-source pollutant loads to fresh and estuarine waters, including stormwater and wastewater.

The primary water quality goal of the *Nonpoint Source Model Development and Basin Management Strategies for Lemon Bay (2004)* was to reduce non-point-source loadings into Lemon Bay. Objectives included implementing hydrologic restoration programs for the tidal creeks and other entities in areas where manmade alterations have taken place and converting



effluent ponds previously used for wastewater to stormwater treatment ponds in specific mobile home parks and other communities.

### 2.2.2.4 Charlotte Harbor National Estuary Program (CHNEP)

The CCMP produced in 2008 has multiple water quality goals:

- Reducing point and non-point source pollution.
- Addressing water quality degradation from numerous sources.
- Addressing hydrologic alterations that may cause adverse changes to the amounts, locations, and timing of freshwater flows, the hydrologic function of floodplain systems, and natural river flow.

The recommendations in the CCMP to achieve these goals are:

- Participate in 303(d) TMDL, Reasonable Assurance, and BMAP development and implementation.
- Identify gaps in water quality data needed to calibrate the appropriate models used to assess impairments, determine TMDL limits, and develop BMAPs. Coordinate monitoring programs and implement programs to fill data gaps for impairment assessments, TMDLs, and BMAPs.
- Develop integrated ground and surface water quality and pollutant loading models.
- Reduce nonpoint-source pollutants associated with stormwater runoff. Install or retrofit BMPs to maintain or improve water quality and flows.
- Implement projects to restore or protect water quality to offset anthropogenic impacts.
- Promote conservation and stormwater and intergovernmental coordination within local comprehensive plans to prevent the impacts of increasing levels of impervious surface and fill to achieve either a neutral impact on water quality and loss of groundwater and surface water storage or to achieve restoration based on the condition of the receiving waters.
- Implement the Florida Yards and Neighborhoods program and similar Florida-friendly plant programs throughout the CHNEP study area.
- Increase the use of personal and home BMPs by consumers throughout the watershed to reduce nonpoint-source pollution.
- Develop site-specific criteria for dissolved oxygen, chlorophyll a, turbidity/total suspended solids, salinity and pesticides as applicable.
- Determine the relationship between macro and micronutrients and phytoplankton/algal blooms.
- Provide central sanitary sewers to developed areas within 900 feet of waters such as estuarine shorelines, rivers, creeks, canals, and lakes.



- Assess the bacteria, nutrient load, and base flow impacts of septic tank systems, wastewater treatment plants, and reuse water. Recommend effective corrective action.
- Develop a historic and current estuarine mixing model, focusing on salinity and indicator species that are sensitive to salinity changes, and better evaluate proposed capital and operations projects.

### 2.2.2.5 Mote Marine Laboratory

Mote Marine Laboratory produced *Tidal Creek Condition Index for Coastal Streams in Sarasota County, Florida* (2006). This plan recommends developing a Tidal Creek Condition Index for tracking the biological health of the County's tidal creeks. Through the joint cooperation of Sarasota County, SWFWMD, FDEP, CHNEP, and Mote Marine Laboratory, metrics were developed, baseline data collection efforts initiated, and preliminary data assessment begun in a parallel timeline with this watershed management plan.

### 2.2.2.6 Lemon Bay League

The primary water quality goal of the *Lemon Bay Interagency Comprehensive Watershed Management Plan* (2004) is to prevent further degradation of the water resource and enhance water quality where appropriate. Recommendations to achieve the goal include:

- Establishing benchmark water quality data in creek systems.
- Implementing biological characterization in creek systems.
- Implementing hydrologic restoration and sediment management programs.
- Converting decommissioned wastewater treatment plants to stormwater treatment plants.
- Initiating a biosolids handling program.

## 2.3 WATER SUPPLY

### 2.3.1 Proposed Goals, Objectives, and Approaches

The primary water supply goal is to support the previous plans strategies to provide reliable and safe water to meet existing and future demands. The proposed objective is to identify water that may be available for beneficial uses while maintaining appropriate water budgets to avoid causing quantity or quality changes that harm the water resources, including surface and ground waters, for Lemon Bay and its watershed. Five approaches to meet the primary goal are:

*The primary water supply goal is to provide reliable and safe water to meet existing and future demands.*



1. Develop historical, existing, and target water budgets.
2. Identify future demands for potable and non-potable public supply.
3. Determine potential availability of water from alternative sources.
4. Identify potential users, delivery systems, and schedules for water from alternative sources.
5. Identify the lowest water quality suitable for specific uses, provided that its use does not interfere with recovery of a waterbody to its established minimum flow or level and it is not a source that is either currently or projected to be adversely affected.

### 2.3.2 Previous Goals, Objectives, and Recommendations

Sarasota County, Southwest Florida Water Management District, Charlotte Harbor National Estuary Program, and the Lemon Bay League produced documents containing existing water supply goals and objectives. A summary of pertinent information is provided.

#### 2.3.2.1 Sarasota County Planning Department

The Watershed Management Plan (Chapter 4) of the Sarasota County Comprehensive Plan focuses on land use and management with the management of water resources. Two primary water supply goals of the Watershed Management Plan are:

1. Provide potable water service to Sarasota County residents through the continual evolution of a centralized regional supply, treatment, and distribution system in a safe, efficient, economical, sustainable, and environmentally sound manner concurrent with urban development.
2. Provide programs to ensure safe, efficient, economical, and sustainable water supplies that provide customers with the appropriate water quality for the intended use.



The Plan outlines non-potable water strategies, irrigation strategies, reclaimed water use, and demand management as recommendations to ensure the adequacy of potable water supplies to serve existing and future development.





### 2.3.2.2 Southwest Florida Water Management District

SWFWMD developed the *Southern Water Use Caution Area (SWUCA) Recovery Strategy* in 2006 in response to growing demands for groundwater withdrawals. Depressed aquifer levels cause saltwater intrusion leading to the potential degradation of a potable water source. Two primary goals of the Recovery Strategy are:

1. Reduce the rate of saltwater intrusion in Hillsborough, Manatee, and Sarasota Counties by achieving minimum aquifer levels for saltwater intrusion by 2025; future efforts should seek further reductions to achieve the ultimate stabilization of the saltwater-freshwater interface.
2. Ensure that there are sufficient water supplies for all existing and projected reasonable beneficial uses.

The six objectives of the Recovery Strategy are:

1. Develop a regional water supply plan to achieve effective water management.
2. Use existing rules to effectively contribute to the Recovery Strategy.
3. Enhance existing rules.
4. Provide financial incentives to encourage conservation and development of alternative supplies to ensure consistency with the Recovery Strategy.
5. Develop and implement water resource development projects that will restore historically lost lake and floodplain storage.
6. Monitor, report on, and analyze cumulative impacts on resources.

Conservation efforts include plugging wells, artificially recharging the aquifer, and retiring water use permits associated with acquired preservation lands. Water reuse initiatives include expanding the use of reclaimed water to reduce the use of groundwater and surface water for non-potable purposes such as irrigation and industrial cooling.

The SWFWMD *Southern Coastal Comprehensive Watershed Management Plan* (2000) has the broad goal of ensuring an adequate supply of the water resource for all reasonable and beneficial uses now and in the future while protecting and maintaining the water and related resources of the District. It includes a number of strategies:

- Requiring consistent water resource/land use planning by local governments.
- Improving coordination between planners.
- Promoting conservation and reuse.
- Improving compliance with water-use restrictions.
- Developing alternative water sources.
- Adopting intermediate aquifer-level protection.

These are accompanied by numerous recommendations.



### 2.3.2.3 Charlotte Harbor National Estuary

The CCMP produced in 2008 has a primary water supply goal of addressing hydrologic alterations, which cause adverse changes to amounts, locations, and timing of freshwater flows and to the hydrologic function of floodplain systems and natural river flows. The recommendations to support water supply are:

1. Identify gaps in flow data based on ecosystem needs and projected need for water withdrawal.
2. Support public involvement programs addressing watershed management issues.
3. Encourage, expand, and develop incentives for the reuse of water that protect water quality and water use.

*The goal of flood protection is to minimize the risk to human safety and property while protecting the natural floodplain.*

### 2.3.2.4 Lemon Bay League

The primary water supply goal of the *Lemon Bay Interagency Comprehensive Watershed Management Plan* (2004) is to ensure safe, efficient, economical, and sustainable water supplies that provide customers with the appropriate water quality for the intended use. The plan presents several strategies, including identifying and evaluating future water supply options, evaluating future water needs and the capacity of existing supplies, and optimizing water use efficiency and supply sustainability. One strategy distinct from other plans is to establish sound business practices to optimize the financial sustainability of water. The following recommendations are found in the plan:

1. Initiate an aquifer storage and recovery feasibility study.
2. Initiate stormwater conservation and reuse program.
3. Convert wastewater treatment plants to stormwater treatment plants.
4. Initiate biosolids handling program.

## 2.4 FLOOD PROTECTION

### 2.4.1 Proposed Goals, Objectives, and Approaches

The primary flood protection goal is to minimize flood risk to human safety and property in developed areas while protecting natural and beneficial functions of the remaining floodplain. Meeting the County flooding LOS criteria and revising land development regulations are two proposed objectives of the WMP. Six approaches to meet the flood protection goal are:



1. Document and update the status of stormwater management and conveyance facilities with respect to their permitted or design criteria.
2. Document and update the status of implementation of Capital Improvement Plan projects intended to alleviate existing flooding problems.
3. Refine existing maintenance practices as appropriate to ensure that floodwater conveyance is adequate while minimizing ecological impacts, in a cost-effective manner.
4. Identify implications of new statewide stormwater rules with regard to protection of natural water storage and conveyance areas that currently provide flood protection.
5. Identify and engage major stakeholders (Department of Transportation, U.S. Army Corps of Engineers, other jurisdictions, etc.) with respect to operation and maintenance of surface water drainage systems.
6. Identify and protect natural surface water storage areas that currently provide flood protection, or may provide flood protection to future development.

### 2.4.2 Previous Goals, Objectives, and Recommendations

Sarasota County, the Southwest Florida Water Management District, and the Lemon Bay League produced documents containing existing flood protection goals and objectives. A summary of pertinent information is provided.

#### 2.4.2.1 Sarasota County Planning Department

The Watershed Management Plan (Chapter 4) of the Sarasota County Comprehensive Plan focuses on land use and management, including the management of water resources. Its primary flood-control goal is that the County shall provide programs that prevent and mitigate the losses, cost, and human suffering caused by flooding and protect the natural and beneficial functions of the floodplain.

Specific objectives outlined in the Plan are:

1. Address the maintenance of existing facility capacity and ensure the adequacy of facilities to meet future needs.
2. Ensure that land development and redevelopment provides for adequate stormwater management.
3. Protect environmentally sensitive lands, conserve natural resources, protect floodplains, maintain or improve water quality, and open spaces, and conserve and protect historic and archeological resources.



2.4.2.2 Sarasota County Stormwater Environmental Utility

Basin Master Plans were completed in the late 1990s for the Ainger Creek, Forked Creek, Gottfried Creek, and Woodmere Creek subbasins to address flood protection LOS. The Basin Master Plan goal was to identify existing and future LOS deficiencies. The objective was to develop and evaluate stormwater best-management practices to address current and predicted LOS deficiencies. Table 2-4 lists the specific project recommendations to address flooding concerns in three of the Lemon Bay subbasins.

**Table 2-4 Recommended Flood Protection Projects by Subbasin**

Subbasin	Recommendation
Ainger Creek BMP	Acquire additional drainage easement and replace culverts to reduce flood depths associated with Medical Center Blvd and provide additional conveyance capacity.
	Acquire a 60-foot-wide drainage easement, replace culverts, and improve maintenance in Wellington Acres. Construct an overflow swale along the east side of Englewood Hospital to tie into the FP1.
	Acquire public easements in the Englewood Farm Acres lateral catchment to improve maintenance and replace a restrictive culvert.
	Manage floodplain functions adjacent to Ainger Creek Main by setting aside a preservation or conservation area.
	Construct a swale along the north side of Lots 1 through 5 and along the east side of Lots 5 through 7 in Englewood Farm Acres to connect to the existing ditch network to the south.
	Re-establish the north-south drainage ditch along the North Port City Limits to Ainger Creek Main.
	Construct a 50-acre regional stormwater facility to mitigate the impacts of Interstate Industrial Park, Morris Industrial Park, and the commercial and high-density residential area along the south side of River Road.
Gottfried Creek BMP	Remove culvert and improve approximately 300 feet of ditch upstream of Viridian Street. (Englewood Lateral Improvement)
	Replace culvert across Elm Street with double 54-inch culverts. Eliminate culvert located about 50 ft east of Elm Street crossing. Restore about 250 feet of ditch cross section. (Englewood Lateral Improvement)
	Coordinate with FDOT to replace culverts on the north SR 776 crossing downstream from the Viridian Street pond with triple 60-inch RCPs. Replace culverts across the Florida Power easement with double 54-inch pipes. (Englewood Lateral Improvement)
	Clear and snag approximately 250 feet of ditch in the Artist Avenue area. Maintain existing culvert. (Englewood Lateral Improvement)
	Remove erosion deposits and provide erosion protection in about 700 feet of creek channel. Regrade banks to a 3:1 slope. (Englewood Lateral Improvement)
	Replace culverts across Florida Power easement with double 72-inch pipes. (Englewood Lateral Improvement)
	Maintain culvert across River Road. (South River Road Improvement)
Replace about 300 feet of 29-inch-x-45-inch culvert. (South River Road Improvement)	



**Table 2-4 Recommended Flood Protection Projects by Subbasin**

Subbasin	Recommendation
Forked Creek BMP	Improve facilities to prevent localized flooding in the area around Franklin Street (various localized projects).
	Acquire easements and clear and snag 2,400 feet of channels from Manasota Beach Road to Overbrook Road.
	Install double 30-inch culverts at the inflow of the Overbrook Road pond. Add an additional 30-inch culvert at the outflow.
	Construct a 1,500-foot drainage ditch along Manasota Beach Road and improve existing culverts to double 24-foot RCP.
	Clear and snag approximately 800 feet of creek channel downstream from wetland area.
	Clear and snag approximately 500 feet of creek channel immediately upstream from Dale Lake (SR 776 crossing).
	Clear and snag about 1,000 feet of channel downstream from the Keyway Road culvert. Remove spoil berms where feasible.
	Clear and snag about 300 feet of channel. Provide erosion protection on the creek banks.
	Provide erosion protection on the 800-foot segment of the creek channel along the Brook to Bay Trailer Ranch.
	Provide bank erosion control in secondary channel that runs along the south side of Almeda Isles subdivision.
Provide bank erosion control in main channel downstream from the Dale Lake outfall.	

The goal of the Alligator Creek Flood Protection Improvement Plan (2002) was to create a tool to help determine and prioritize flood protection capital improvement projects within the subbasin. Several priority areas were evaluated and the following locations recommended for stormwater improvements:

1. Scenic Drive outfall to the Intracoastal Waterway
2. Banyan Drive culverts and right-of-way storage facility
3. Briarwood Area conveyance improvements
4. Bal Harbour-Shamrock Blvd drainage improvements
5. Quail Lake-Venice East Blvd interconnecting culverts
6. Venice East Blvd box culvert

#### 2.4.2.3 Southwest Florida Water Management District

The SWFWMD plan *Nonpoint Source Model Development and Basin Management Strategies for Lemon Bay* (2004) mentioned previously has the primary goal of reducing nonpoint source loadings into Lemon Bay. Objectives included hydrologic restoration programs for Alligator Creek, Forked Creek, Manasota Key, Gottfried Creek, River Road, and Ainger Creek.

The SWFWMD *Southern Coastal Comprehensive Watershed Management Plan* (2000) is regional in scale, encompassing portions of Sarasota, Manatee, and Charlotte Counties, and





details the four primary areas of responsibility for the District: water supply, flood protection, water quality, and natural systems. The flood protection chapter details a number of strategies and actions to address flooding issues:

1. Enhancing data and information collection.
2. Linking water resource and land use planning.
3. Effectively managing floodplain functions.
4. Establishing ownership, operation, and maintenance responsibilities for flood management systems.
5. Facilitating public education and understanding of flood protection.

The plan's primary goal is to minimize potential for damage from floods by protecting and restoring the natural water storage and conveyance functions of flood-prone areas and states that SWFWMD shall give preference wherever possible to nonstructural surface water management methods. The plan includes numerous recommendations.

#### 2.4.2.4 Lemon Bay League

The primary flood protection goal of the *Lemon Bay Interagency Comprehensive Watershed Management Plan (2004)* is identical to that of the Sarasota County Planning Department: to prevent and mitigate the losses, cost, and human suffering caused by flooding and to protect the natural and beneficial functions of the floodplain. The objectives outlined in the plan are:

1. Determine the depth and extent of areas susceptible to riverine flooding.
2. Protect existing and future residents from flood damage.
3. Develop and implement cost-effective management strategies to protect the natural functions of the floodplain.

Strategies to achieve these objectives include:

- Developing a watershed budget.
- Completing and updating flood studies.
- Mapping the drainage system and implementing a long-term stormwater maintenance plan.
- Developing local flood mitigation and flood reporting programs.
- Implementing a stormwater improvement program.

The Lemon Bay watershed has many stakeholders vested in the conservation, protection, and restoration of its many natural resources. Previous plans included a multitude of recommendations. To bring into focus current conditions, Chapter 8 of the plan provides revised, updated, and new recommendations to preserve, protect, and/or enhance natural systems and water quality in Lemon Bay ecosystems; support a sustainable water supply; and provide flood protection for the citizens of Sarasota County.