

**AGENDA**  
**Caloosahatchee River Watershed Protection Plan**

**Thursday, December 20, 2007**  
**9:00 – 1:00**

**SFWMD Lower West Coast Service Center**  
2301 McGregor Boulevard  
Fort Myers, FL  
First Floor Conference Room

9:00	Introduction and Opening Remarks	<b>Janet Starnes</b>
9:15	Management Measures	<b>Janet Starnes</b>
10:15	Public Comment Period*	<b>All</b>
10:30	Lake Okeechobee Phase II Technical Plan - Water Quality Spreadsheet Modeling	<b>Joyce Zhang</b>
11:15	Public Comment Period	<b>All</b>
11:30	Continue Management Measures	<b>Janet Starnes</b>
12:30	Public Comment Period*	<b>All</b>
12:45	Closing Remarks/Next Meeting	<b>Janet Starnes</b>

\* As time permits, a Public Comment Period will be held at this point in the agenda

**DRAFT Meeting Summary**  
**Caloosahatchee River Watershed Protection Program**  
**Northern Everglades and Estuaries Protection Program**  
**December 20, 2007**

The Monthly Meeting for development of the Caloosahatchee River Watershed Protection Plan was held on Thursday, December 20, 2007, from 9:00 to 1:00 p.m. at the South Florida Water Management District's Lower West Coast Service Center. Following is a list of attendees.

<b>Attendee</b>	<b>Organization</b>	<b>Attendee</b>	<b>Organization</b>
Janet Starnes	SFWMD	Tim Liebermann	SFWMD
Pinar Balci	SFWMD	Kim Love	Tetra Tech
Jim Beever	SWFRPC	Sally McPherson	SFWMD
Terry Bengtsson	SFWMD	Temperince Morgan	SFWMD
Karen Bickford	Lee County	Frank Nearhoof	FDEP
Fred Calder	FDEP	Jennifer Nelson	FDEP
John Cassani	Lee Co. Hyacinth CD	Roland Ottolini	Lee County
Miao-Li Chang	SFWMD	Tony Pellicer	Lee County
Clyde Dabbs	SFWMD	Peter Quasius	Audubon
Marti Daltry	Sierra Club & Riverwatch	Darren Rumbold	FGCU
Wayne Daltry	Lee County	Steve Sentes	SFWMD
Mick Denham	SWFRPC	Noel Marton	FDACS
James Evans	City of Sanibel	Geordie Smith	Lee Co. Health Dept.
Pat Fricano	FDEP	Mike Voich	SFWMD
Kurt Harclerode	Lee County	Joyce Zhang	SFWMD
Joy Hazell	Lee County	Michael Boyle	City of LaBelle
Katie Higgs	FDEP	Kevin O'Donnell	FDEP
Bob Howard	Agnoli, Barber & Brundage, Inc.	Kristina Lakes	FDEP
Scott Legg	SFWMD	Tim Denger	AIM/ECWCD

Following is a summary of the discussions at this meeting.

**1. Introduction and Opening Remarks**

Janet Starnes welcomed agency representatives and the public to the Caloosahatchee River Watershed Protection Plan Working Team Meeting. There will opportunity for public comment at appropriate points on the agenda.

Anyone who would like to be added to the e-mail list for meeting announcements was asked to provide their contact information to Janet Starnes [jstarne@sfwmd.gov] and all meeting summaries and final documents will be posted on my.sfwmd.gov/northerneverglades.

**2. Management Measures**

The Working Team reviewed each of the over 100 management measure sheets that have been submitted for consideration. Some were combined and some need additional information. The

management measure sheets are posted under the Meetings Tab on [my.sfwmd.gov/northerneverglades/Calooshatchee](http://my.sfwmd.gov/northerneverglades/Calooshatchee).

### **3. Lake Okeechobee Phase II Technical Plan – Water Quality Spreadsheet Modeling**

Joyce Zhang presented the methodology that was used for the water quality assessment in the Lake Okeechobee Phase II Technical Plan. A rather simplistic approach was used. A water quality spreadsheet was developed which kept track of the phosphorous reductions across alternatives. The presentation is posted under the Meetings Tab on [my.sfwmd.gov/northerneverglades/Calooshatchee](http://my.sfwmd.gov/northerneverglades/Calooshatchee).

### **4. Closing Remarks / Review Action Items and Next Steps**

Janet thanked the individuals and agencies for their participation in the Working Team meeting and the input on the management measures. At the next meeting the first draft of Alternative 1 should be provided as well as performance measures.

The Working Group's next meeting is scheduled for Thursday, January 17, 2008 at the Lower West Coast Service Center in Fort Myers.

# **Caloosahatchee River Watershed Protection Plan (CRWPP)**

## **Draft Management Measures**

**December 5, 2007**

**Northern Everglades- Potential Management Measure****Project Feature/Activity:** Agricultural BMPs**Level:** 1

**General Description/Background:** Since 2002, considerable effort has been expended on the implementation of agricultural BMPs and water-quality improvement projects to immediately reduce the discharge of P from the watershed to the lake. Agricultural Nutrient Management Plans (AgNMPs) for the 22 active dairies in the watershed were completed in 2002, covering more than 31,000 acres (12,545 ha). Detailed planning, engineering, and design for implementing the stormwater component of the AgNMPs, at four of the dairies, will be completed by June 2007. Implementation of all of the dairy AgNMPs is expected to be completed by FY 2015.

Completed conservation plans now cover approximately 474,200 acres (191,902 ha) in the watershed, and BMPs are in various stages of implementation. The majority of this acreage lies within the four priority basins. Plans are being developed for an additional approximately 600,000 acres (242,811 ha) of agricultural operations. These figures reveal that more than half of the agricultural acreage in the entire watershed is currently under voluntary FDACS programs to plan and implement practices to control offsite movement of P. At the current rate of participation, FDACS is on schedule to complete BMP-based plans for the remainder of the agricultural acreage in the watershed by July 2010, and fully implement BMPs by 2015, as required by the Lake Okeechobee Protection Plan.

**Purpose:** Improve water quality by reducing transport of nutrients (primarily phosphorus) via runoff and leaching into regional system from agricultural and non-agricultural land uses

**Location/Size/Capacity:** Primarily within Lake Okeechobee watershed; expanding into estuary watersheds

**Initiative Status:**

Agricultural- underway; need update from FDACS

Urban- underway; need update from FDEP

**Estimate of Water Quality Benefits**

- Minimum: 72 mt/yr
- Maximum: 72 mt/yr
- Most Likely: 72 mt/yr
- Level of Certainty: Conceptual
- Assumptions: Water quality benefits will be rolled up into a single “urban” category

**Estimate of Water Quantity Benefits**

- Minimum: Unknown
- Maximum: Unknown
- Most Likely: Unknown
- Level of Certainty: Unknown
- Assumptions: NA

## **Screening Criteria**

- Proof of Concept: 1
- Other Impacts: 0

**Contact:** Rich Budell; FDACS; 850-488-6249.

**Northern Everglades- Potential Management Measure**

**Project Feature/Activity:** Urban Turf Fertilizer Rule (LOER)

**Level:** 1

**General Description/Background:** FDACS has prepared draft rule language regulating the content of phosphorus and nitrogen in urban turf fertilizers. The rule will apply statewide and uses FDACS fertilizer labeling authority to regulate the distribution and sale of fertilizer products for urban turf. Rule requires fertilizer bags to have clearer labeling and warning statement regarding overuse/transport into waterways. Most, if not all, fertilizers will have to be rebagged with larger application area, otherwise they will have to reformulate. Use directions on label must be consistent with the application rates identified below.

- Total Phosphorus
  - No more than 0.25 lb total phosphorus per application
  - No more than 0.5 lb total phosphorus per year
  - **Note:** I have requested and FDACS is working on providing an estimate of percent phosphorus reduction which would result from these app rates (similar to that provided for nitrogen below).
  
- Nitrogen
  - No more than 0.7 lbs soluble nitrogen per application
  - 2-6 lbs nitrogen applied per year (depending on turf type and location)
  - **Note:** There has been much debate about the nitrogen application rate. Some research supports levels as low as 0.5 lbs per application. FDACS noticed a draft rule with 0.5 lbs per application; however their ability to defend that position is questionable. FDEP is funding ongoing IFAS research which should provide definitive answers to this question. In the meantime, FDACS is considering moving forward with the rule with 0.7 lbs per application limit. This would result in approximately a 25% reduction of nitrogen throughout the State. FDACS proposes revisiting this limit and potentially revising the rule once the FDEP-funded IFAS research has concluded.

**Purpose:** Improve water quality by reducing phosphorus and nitrogen runoff and leaching resulting from application of fertilizers to urban turf.

**Location/Size/Capacity:** Statewide within urban settings.

**Initiative Status:** Several rule workshops have already been conducted. Will be noticing revised rule language and proceeding with rulemaking. Anticipate rule adoption in summer/fall 2007.

**Cost:** Not applicable

**Documentation:** For more information, please see draft Rule Language, PowerPoint presentations, and meeting summaries

**Estimate of Water Quality Benefits**

- Minimum: Urban Rollup

- Maximum: Urban Rollup
- Most Likely: Urban Rollup
- Level of Certainty: Conceptual
- Assumptions: Water quality benefits will be rolled up into a single “urban” category

### **Estimate of Water Quantity Benefits**

- Minimum: NA
- Maximum: NA
- Most Likely: NA
- Level of Certainty: Final
- Assumptions: NA

### **Screening Criteria**

- Proof of Concept: NA
- Other Impacts: NA

**Contact:** Rich Budell; FDACS; 850-488-6249

**Northern Everglades Potential Management Measures**

**Project Feature/Activity:** Land Application of Residuals

**Level:** 1

**General Description/Background:** Subsection 373.4595(3)(c)6. of the LOPA a. requires an affirmative demonstration that domestic wastewater residuals will not add to phosphorus loadings in Lake Okeechobee or its tributaries prior to authorization of disposal. LOPA further specifies that the demonstration will be based on achieving a net balance between phosphorus imports & exports on the permitted application site.

**Purpose:** Quantify TP reduction benefits resulting from implementation of LOPA requirement for residual applications.

**Location/Size/Capacity:** Basin wide

**Initiative Status:** Not initiated

**Cost:** To be determined

**Estimate of Water Quality Benefits**

- Minimum: Urban Rollup
- Maximum: Urban Rollup
- Most Likely: Urban Rollup
- Level of Certainty: Conceptual
- Assumptions: NA

**Estimate of Water Quantity Benefits**

- Minimum: NA
- Maximum: NA
- Most Likely: NA
- Level of Certainty: Final
- Assumptions: NA

**Screening Criteria**

- Proof of Concept: NA
- Other Impacts: NA

**Contact:** Maurice Barker; FEDP; 850-245-8614

**Northern Everglades Potential Management Measures**

**Project Feature/Activity:** Florida Yards & Neighborhoods

**Level:** 1

**General Description/Background:** The Florida Yards & Neighborhoods program is an excellent example of a nonstructural program that is helping to minimize the use of pesticides, fertilizers, and irrigation water by educating citizens and builders about proper landscape design. This promotes “right plant-right place” and minimizes the amount of fertilizer, pesticide, and irrigation needed for a successful landscape. DEP has an ongoing monitoring program to determine the effectiveness of this program in reducing nutrient loads.

**Purpose:** Reduce the use of nutrients and pesticides, and irrigation, thereby reducing nutrient loading and reducing water use.

**Location/Size/Capacity:** Statewide

**Initiative Status:** On-going

**Cost:** To be determined

**Documentation:** For more information, please see

**Estimate of Water Quality Benefits**

- Minimum: Urban Rollup
- Maximum: Urban Rollup
- Most Likely: Urban Rollup
- Level of Certainty: Conceptual
- Assumptions: Projected benefits will roll up under urban category

**Estimate of Water Quantity Benefits**

- Minimum: Unknown
- Maximum: Unknown
- Most Likely: Unknown
- Level of Certainty: Unknown
- Assumptions: NA

**Screening Criteria**

- Proof of Concept: NA
- Other Impacts: NA

**Contact:** Michael Scheinkman, FDEP Environmental Specialist - Clean Lakes program, lake management. Florida Yards and Neighborhoods. Phone 850-267-2075  
Eric Livingston, FDEP, on monitoring project for FYN

**Northern Everglades – Potential Management Measure**

**Project Feature/Activity:** ERP Regulatory Program

**Level:** 1

**General Description/Background:** The Environmental Resource Permit (ERP) program regulates activities involving the alteration of surface water flows. This includes activities in uplands that alter stormwater runoff, as well as dredging and filling in wetlands and other surface waters. ERP applications are processed by either the Department or the water management districts, in accordance with the division of responsibilities specified in operation agreements between the Department and the water management districts.

**Purpose:** The purpose of this measure is to ensure that activities do not degrade water quality, impact flood protection or adversely impact the function of wetland systems.

**Location/Size/Capacity:** SFWMD jurisdiction

**Initiative Status:** Existing Program Activity

**Cost:** N/A

#### **Estimate of Water Quality Benefits**

- Minimum: Urban Rollup
- Maximum: Urban Rollup
- Most Likely: Urban Rollup
- Level of Certainty: Conceptual
- Assumptions: No increase in phosphorus loads resulting from new development; Applies to new development only; Conversion of intense agricultural uses (dairies, row crops, improved pasture, sod, citrus) with little or no water quality treatment to urban uses with modern surface water management systems with treatment; Projected benefits will roll up under the urban category

#### **Estimate of Water Quantity Benefits**

- Minimum: Unknown
- Maximum: Unknown
- Most Likely: Unknown
- Level of Certainty: Conceptual
- Assumptions: Applies to new development only; Conversion of intense agricultural uses (dairies, row crops, improved pasture, sod, citrus) with little or no stormwater storage to urban uses with modern surface water management systems with storage; Projected benefits will roll up under urban category

#### **Screening Criteria**

- Proof of Concept: NA
- Other Impacts: NA

**Contact:** Damon Meiers; SFWMD; 561-682-6876

## Northern Everglades Potential Management Measures

**Project Feature/Activity:** NPDES Stormwater Program

**Level:** 1

**General Description/Background:** In 1987, the Federal Clean Water Act was amended requiring the U.S. Environmental Protection Agency (EPA) to develop rules to implement the federal National Pollutant Discharge Elimination System (NPDES) stormwater permitting program. Phase I, promulgated in 1990, addresses the following sources:

"Large" and "medium" **municipal separate storm sewer** systems (MS4s) located in incorporated places and counties with populations of 100,000 or more, and eleven categories of **industrial activity**, one of which is large **construction activity** that disturbs 5 or more acres of land.

Phase II, promulgated in 1999, addresses additional sources, including MS4s not regulated under Phase I, and small construction activity disturbing between 1 and 5 acres.

In October 2000, EPA authorized the Florida Department of Environmental Protection (DEP) to implement the NPDES stormwater permitting program in the State of Florida (in all areas except Indian Country lands). DEP's authority to administer the NPDES program is set forth in [Section 403.0885, Florida Statutes \(F.S.\)](#).

Important note: The NPDES stormwater permitting program is separate from the State's stormwater/environmental resource permitting programs (found under [Part IV, Chapter 373, F.S.](#) (593KB) and [Chapter 62-25, F.A.C.](#) and local stormwater/water quality programs, which have their own regulations and permitting requirements.

**Purpose:** To reduce stormwater pollutant loads discharged to surface waters, especially from existing land uses and drainage systems. This is especially true for the master drainage systems owned and operated by cities, counties, FDOT, and Chapter 298 water control districts. Also can help to reduce stormwater pollutant loads from existing industrial sites and from new construction sites.

**Location/Size/Capacity:** Basin wide

**Initiative Status:** Being implemented by FDEP

**Cost:** To be determined

**Documentation:** For more information, please see:  
<http://www.dep.state.fl.us/water/stormwater/npdes/index.htm>

### **Estimate of Water Quality Benefits**

- Minimum: Urban Rollup
- Maximum: Urban Rollup
- Most Likely: Urban Rollup
- Level of Certainty: Conceptual
- Assumptions: Projected benefits will roll up under urban category

### **Estimate of Water Quantity Benefits**

- Minimum: Unknown
- Maximum: Unknown
- Most Likely: Unknown
- Level of Certainty: Conceptual
- Assumptions: Depends if infiltration BMPs or stormwater reuse is done; Projected benefits will roll up under urban category

### **Screening Criteria**

- Proof of Concept: NA
- Other Impacts: NA

**Contact:** Steven Kelly, Program Administration, NPDES Stormwater Section, Tallahassee, 850-245-7518

## Northern Everglades – Potential Management Measure

**Project Feature/Activity:** Coastal and Estuarine Land Conservation Program

**Level:** 1

**General Description/Background:** The Coastal and Estuarine Land Conservation Program (CELCP) was established in 2002. The Federal Office of Ocean and Coastal Resource Management (OCRM) will administer the program which provides up to \$3 million dollars for each eligible project. CELCP federal funds will be provided for eligible activities related to state planning, program administration and project acquisition. Any project approved through the program must provide non-federal matching dollars.

**Purpose:** Protecting important coastal and estuarine areas that have significant conservation, recreation, ecological, historical, or aesthetic values, or that are threatened by conversion from their natural or recreational state to other uses” (CELCP Final Guidelines, 2003).

**Location/size/capacity:** Statewide

**Initiative Status:** On-going

**Cost:** \$3 million dollars for each eligible project.

**Documentation:** For more information, please see:  
<http://coastalmanagement.noaa.gov/land/welcome.html>

### **Estimate of Water Quality Benefits**

- Minimum: Unknown
- Maximum: Unknown
- Most Likely: Unknown
- Level of Certainty: Unknown
- Assumptions: NA

### **Estimate of Water Quantity Benefits**

- Minimum: Incidental
- Maximum: Incidental
- Most Likely: Incidental
- Level of Certainty: Unknown
- Assumptions: NA

### **Screening Criteria**

- Proof of Concept: NA
- Other Impacts: NA

**Contact:** W. Kennedy; FDEP; 561-681-6706

**Northern Everglades – Potential Management Measure**

**Project Feature/Activity:** Lake Okeechobee Works of the District Regulatory Phosphorus Source Control Program

**Level:** 2

**General Description/Background:** Chapter 40E-61, F.A.C., the Lake Okeechobee Works of the District rule, which was adopted in 1989 as a result of the Lake Okeechobee Surface Water Improvement and Management plan, limits the amount of phosphorus that can be discharged from lands within the regulatory boundary defined by the rule regardless of whether the land use is agricultural or nonagricultural. This is accomplished by issuing permits that approve a phosphorus control plan. The rule criteria are based on initiatives in place at the time the rule was adopted. These criteria need updating.

**Purpose:** The original purpose of the current rule was to establish criteria to ensure that discharges to Lake Okeechobee Works of the District are compatible with the District's ability to carry out the objectives of the legislative declarations of policy in 373 FS. The current rule is no longer compatible with current initiatives and amendments to the statute. The District is in the rule development process to update the criteria of the rule. More specifically, the goal is to amend the rule to:

- implement a phosphorus source control program utilizing best management practices for all lands within the Lake Okeechobee Watershed;
- allow agricultural land uses, greater than 100 acres, the option of participating in the FDACS Notice of Intent Program to meet the intent of the rule;
- establish expected percent load reductions from BMPs per individual basin based on data presented in LOPP and use those to develop BMP compliance methodologies and as the basis for inflow loads to downstream WQ projects;
- define the monitoring network necessary to monitor the rule's effectiveness and to make compliance determinations;
- establish a plan for optimizing the BMP program should the expected percent load reductions not be met.

**Location/Size/Capacity:** The location is the Lake Okeechobee Watershed as defined by the Lake Okeechobee Protection Act.

**Initiative Status:** The Governing Board authorized staff, November 2006, to initiate rule amendments. Four rule development workshops were conducted in early 2007 with limited public input. The original timeline for rule development proposed an optimistic completion date of September 2007; however, with the latest legislative changes, the District rulemaking team is re-evaluating the effort and the timeline to ensure that the latest authorizations are considered in proposed amendments. Staff are also conducting internal technical working group meetings to optimize the phosphorus monitoring network, to review permit criteria, and to consider compliance strategies.

**Cost:** FY08 \$891,986 ad valorem

**Estimate of Water Quality Benefits**

- Minimum: Unknown

- Maximum: Unknown
- Most Likely: Unknown
- Level of Certainty: Unknown
- Assumptions: Projected benefits will roll up under urban category; n/a (Based on LOPP, we might expect to accomplish a 20-25% load reduction when comparing pre and post BMP periods for individual basin that are primarily agricultural. Less reduction would be anticipated for areas with a higher proportional area that is urban.) Because basins are typically made up of agricultural *and* nonagricultural land uses and because of the disparate expected load reductions for each category (2-2.5% for Non-Ag and 20-25% for Ag), we will need to look at the proportion of Ag to Non-Ag in each basin to determine what % reduction can be expected based on current conditions.

Keep in mind that these predicted percentages are what can be expected from *each* property implementing BMPs within an individual basin, which is impossible, from a resource perspective, to track at that level thus the reason for looking at land use area proportions. These estimates could be considered as the planning basis for quantifying the input load for other downstream WQ projects in the treatment train. New development will have to be looked at separately as added future benefit that is unpredictable assuming the ERP rule is adopted. These benefits will roll up under the urban category.

### **Estimate of Water Quantity Benefits**

- Minimum: Unknown
- Maximum: Unknown
- Most Likely: Unknown
- Level of Certainty: Final
- Assumptions: NA

### **Screening Criteria**

- Proof of Concept: 0
- Other Impacts: 0

**Contact:** Steffany Gornak; SFWMD; Phone Number

## Northern Everglades – Potential Management Measure

**Project Feature/Activity:** Lake Okeechobee and Estuary Watershed Basin Rule (LOER)

**Level:** 3

**General Description/Background:** This management measure originated as a component of the Lake Okeechobee and Estuary Recovery (LOER) plan. The component was titled Environmental Resource Permit (ERP) Revisions. The intent is to develop specific supplemental permit criteria for new permitted projects to demonstrate that they will not cause or contribute to the impairment of the targeted water bodies by discharging lower phosphorus loads and runoff volume on an average annual basis.

**Purpose:** The purpose of this measure is to reduce phosphorus loads and total runoff volume from new development that discharge ultimately to Lake Okeechobee or the Caloosahatchee or St. Lucie estuaries.

**Location/size/capacity:** The basin rule would cover the Lake Okeechobee Watershed and the Caloosahatchee and St. Lucie Estuary Watersheds

**Initiative Status:** The District initiated the rule development process on February 8, 2006. Several workshops have been conducted to solicit input from stakeholders in the subject basins. The District is in the process of developing technical criteria and draft rule language necessary to conduct additional workshops. The original goal for requesting rule adoption from the Governing Board is December 2007.

**Cost:** To be determined

**Documentation:** For more information, follow: <https://my.sfwmd.gov/portal/page> and choose the Lake Okeechobee and Estuary Watersheds Basin Rule PowerPoint.

### **Estimate of Water Quality Benefits**

- Minimum: Unknown
- Maximum: Unknown
- Most Likely: Unknown
- Level of Certainty: Unknown
- Assumptions: Projected benefits will roll up under urban category

### **Estimate of Water Quantity Benefits**

- Minimum: Unknown
- Maximum: Unknown
- Most Likely: Unknown
- Level of Certainty: Unknown
- Assumptions: NA

### **Screening Criteria**

- Proof of Concept: 0
- Other Impacts: 0

**Contact:** Damon Meiers; SFWMD; 561-682-6876

**Northern Everglades – Potential Management Measure**

**Project Feature/Activity:** Agricultural BMPs - Additional Agricultural BMPs (Urban Rollup)

**Level:** 1

**General Description/Background:** This is an advanced level of BMPs with chemical treatment, plus retention/detention pond to treat discharge from higher P loading land uses.

**Purpose:** To treat water and reduce phosphorus loads at source

**Location/Size/Capacity:** All basins north of Lake Okeechobee

**Initiative Status:** Starting implementation in 2010

**Cost:** 143.6 million capital and 86.1 O&M cost from 2010 to 2015

**Documentation:** For more information, please see Table 6 from 2007 LOPP Update.

**Estimate of Water Quality Benefits**

- Minimum: 36 mt/yr
- Maximum: 36 mt/yr
- Most Likely: 36 mt/yr
- Level of Certainty: Conceptual
- Assumptions: It was calculated based on phosphorus concentrations after implementing typical cost-share BMPs. It was applied to citrus, dairy, row crop, ornamentals, and sod

**Estimate of Water Quantity Benefits**

- Minimum: Unknown
- Maximum: Unknown
- Most Likely: Unknown
- Level of Certainty: Unknown
- Assumptions: NA

**Screening Criteria**

- Proof of Concept: 1
- Other Impacts: 0

**Contact:** Joyce Zhang; SFWMD; 561- 682-6341

**Northern Everglades – Potential Management Measure**

**Project Feature/Activity:** Watershed Phosphorus Source Control Projects

**Level:** 1

**General Description/Background:** It includes about 30 ongoing multi-year projects under phosphorus source control grant, dairy best available technology, former dairy remediation, and alternative water storage programs.

**Purpose:** To treat water and reduce phosphorus loads at source

**Location/Size/Capacity:** Mainly in the four priority basins (lower Kissimmee, TCNS, and IP)

**Initiative Status:** Completed and operational

**Cost:** 1.3 million for O&M cost per year

**Documentation:** For more information, please see Table 6 from 2007 LOPP Update

**Estimate of Water Quality Benefits**

- Minimum: 31 mt/yr
- Maximum: 31 mt/yr
- Most Likely: 31 mt/yr
- Level of Certainty: Conceptual
- Assumptions: Calculated based on the existing (current) phosphorus concentrations

**Estimate of Water Quantity Benefits:**

- Minimum: Incidental
- Maximum: Incidental
- Most Likely: Incidental
- Level of Certainty: Conceptual
- Assumptions: NA

**Screening Criteria**

- Proof of Concept: 1
- Other Impacts: 0

**Contact:** Joyce Zhang, SFWMD, 561- 682-6341

**Northern Everglades- Potential Management Measure**

**Project Feature/Activity:** Wastewater & Stormwater Master Plans

**Level:** 4

**General Description/Background:** Initiative to work with entities (e.g. Cities and Counties) in the Lake Okeechobee basin responsible for wastewater & stormwater programs. Work with those entities to review existing wastewater & stormwater Master Plans to identify planned or possible projects that will provide additional phosphorus reductions that could be implemented in the service area.

**Purpose:** Implement urban stormwater retrofitting projects or wastewater projects to achieve additional phosphorus reductions and water storage.

**Location:** Basinwide

**Initiative Status:** Not initiated

**Cost:** To be determined

**Estimate of Water Quality Benefits**

- Minimum: Urban Rollup
- Maximum: Urban Rollup
- Most Likely: Urban Rollup
- Level of Certainty: Unknown
- Assumptions: Projected benefits will roll up under urban category

**Estimate of Water Quantity Benefits**

- Minimum: Unknown
- Maximum: Unknown
- Most Likely: Unknown
- Level of Certainty: Unknown
- Assumptions: Projected benefits will roll up under urban category

**Screening Criteria**

- Proof of Concept:
- Other Impacts:

**Contact:** Frank Nearhoof; FDEP, xxx

**Northern Everglades- Potential Management Measure**

**Project Feature/Activity:** Unified Statewide Stormwater Rule

**Level:** 4

**General Description/Background:** Florida’s stormwater treatment rules are technology-based and rely upon BMP design criteria that are presumed to achieve a specified level of stormwater treatment. The rule’s original performance standard was “secondary treatment”, or 80% average annual load reduction of Total Suspended Solids (TSS). However, the minimum level of treatment in Chapter 62-40, F.A.C., is “80% average annual load reduction of pollutants that cause or contribute to violations of water quality standards”. Nutrients are the biggest source of water body impairment throughout the state and the Governor has directed DEP to increase the level of stormwater nutrient treatment. Accordingly, DEP and WMD staff are working on a statewide stormwater treatment rule that will be based on a performance standard of post-development nutrient loading does not exceed pre-development nutrient loading.

**Purpose:** To increase the level of nutrient treatment of stormwater from new development and thereby reduce the discharge of nutrients and excess stormwater volume.

**Location:** Basinwide

**Initiative Status:** Beginning July 07, Rule in effect January 09

**Cost:** To be determined

#### **Estimate of Water Quality Benefits**

- Minimum: Unknown
- Maximum: Unknown
- Most Likely: Unknown
- Level of Certainty: Conceptual
- Assumptions: Rule will be adopted

#### **Estimate of Water Quantity Benefits**

- Minimum: Unknown
- Maximum: Unknown
- Most Likely: Unknown
- Level of Certainty: Conceptual
- Assumptions: Depends on how much infiltration and reuse is done

#### **Screening Criteria**

- Proof of Concept:
- Other Impacts:

**Contact:** Eric Livingston, FDEP, Tallahassee, 850/245-8430

**Northern Everglades- Potential Management Measure**

**Project Feature/Activity:** Comprehensive Planning – Land Development Regulations

**Level:** 3

**Description:** Initiative to work with entities (e.g. Cities and Counties) in the Lake Okeechobee basin responsible for comprehensive planning and land development approvals. Work with those entities to review current comprehensive plans and associated land development regulations to assure that they promote low impact design and proper stormwater treatment.

**Purpose:** Implement low impact design measures in Okeechobee basin to achieve addition phosphorus reductions and water storage.

**Location:** Basin wide

**Initiative Status:** Not initiated

**Cost:** To be determined

**Estimate of Water Quality Benefits**

- Minimum: Unknown
- Maximum: Unknown
- Most Likely: Unknown
- Level of Certainty: Unknown
- Assumptions: Assume LDRs are changed to promote LID

**Estimate of Water Quantity Benefits**

- Minimum: Unknown
- Maximum: Unknown
- Most Likely: Unknown
- Level of Certainty: Unknown
- Assumptions: Assume LDRs are changed to promote LID

**Screening Criteria**

- Proof of Concept:
- Other Impacts:

**Contact:** Eric Livingston; FDEP; 850/245-8430

**Northern Everglades – Potential Management Measure**

**Project Feature/Activity:** Florida Ranchlands Environmental Services Project (FRESP) – 4 Existing Pilots

**Level:** 1

**General Description/Background:** Launched in October 2005, the Florida Ranchlands Environmental Services Project (FRESP) will design a program in which ranchers in the Northern Everglades' sell environmental services of water retention, phosphorus load reduction and wetland habitat expansion to agencies of the state and other willing buyers.

These ranches can bring services on line quickly as compared to other options and will complement public investment in regional water storage and water treatment facilities. The sale of the services will be additional income for ranchers who face low profit margins and will provide an incentive against selling land for more intensive agriculture and urban development—land uses that will further aggravate water flow, pollution, and habitat problems.

FRESP is being implemented through a collaboration between World Wildlife Fund (WWF), 8 participating ranchers, USDA's Natural Resources Conservation Service and state agencies – the Florida Department of Agriculture and Consumer Services, the South Florida Water Management District, and the Florida Department of Environmental Protection. Technical support is being provided by scientists from the MacArthur Agro-Ecology Research Center and the University of Florida. Funding from Federal, state and private sources exceeds \$5 mil for Phase One – pilot project implementation and program design.

**Key Accomplishments**

Developed procedures to compare different protocols for documenting environmental services from ranchlands. FRESP will field test different methods of using monitoring and modeling of hydrology, water and soil chemistry, and vegetation change to document the level of environmental services provided by ranch water management projects.

Completed the design, permitting and construction of water management projects on 4 ranches; additional water management projects will be implemented by four additional ranchers. Projects include rehydrating drained wetlands, water table management, and pumping water from a nearby canal through existing ranch wetlands and flowing back into the canal. Based on available information the 8 water management projects occupy some 8,500 acres not including drainage acres. A planning level estimate of the static water retention capacity of the eight projects is 8,260 acre-feet of water for a single storm event with the average acre-feet of storage per acre being 0.98 ft.

**LEVEL 1 (Implemented or to be Implemented)**

Four Ranchlands Environmental Services Pilot Projects (FRESPP) have been constructed with Alderman-Deloney Ranch (43 acre-feet of on-site water storage and treatment, 0.078 mton/yr, C-25), Williamson Cattle Company (150 acre-feet of on-site water storage, 0.09 mton/yr, S-191), Buck Island Ranch (967 acre-feet of on-site water storage and treatment, 0.37 mton/yr, C-41), and Lykes Bros., Inc. (5,000 acre-feet of regional water storage and treatment, 0.2 mton/yr, C-40). Total \$1,000,000 (District contributed \$500,000 through Highlands Soil & Water Conservation District, FDACS \$500,000 through Okeechobee Soil & Water Conservation District). \$1,000,000 Conservation Innovation Grant is funding the monitoring and pay-for-performance program development.

Four additional Rancher Agreements for implementation of FRESPP have been developed with C. M. Payne & Son, Inc. (932 acre-feet of on-site water storage, Fisheating Creek) - total of \$298,489; Lightsey Cattle Company (135 acre-feet of on-site water storage, Fisheating Creek) - total of \$137,280; Syfrett Ranch West (140 ac-ft of regional water storage, C-41A) - total of \$183,500; and Rafter T Ranch (1,145 acre-feet of on-site water storage, Arbuckle Creek) - total of \$609,151. The District provided State Community Budget Issue Request (CBIR) funding which was specifically appropriated by the State through the CBIR process for additional pilot projects implementing water management alternatives to store and treat runoff on private lands.

Developing the design of a pay for services program. Essential program design questions—such as how to assure a dedicated, multiyear funding source to meet contract payment obligations; how to establish what prices that will be paid for services and how to integrate a new pay-for-services program with other state and federal programs,— will be addressed and answered through the deliberations of the collaboration team, in cooperation with multiple stakeholders and with state agency officials.

**Watershed Static Water Retention Potential**

Planning level estimates generated by the existing pilot projects were used to derive conservative estimates of potential static storage – maximum capacity to hold water from a single storm event. If FRESPP contracts covered only 15% of improved pasture acreage in the Northern Everglades, using the average acre ft/acre estimate of the 8 existing FRESPP sites of 0.98, the potential storage estimate is 118,000 ac ft of water (800,500 X 15% = 120,000 acres X 0.98 ac ft / ac). If 15% of the unimproved pasture acreage is included the potential storage is 151,800 ac ft (1,029,500 X 15% = 154,400 acres X 0.98 ac ft / ac). Because these estimates are for a single storm event, they are conservative estimates of annual on-ranch water retention.

**Location/Size/Capacity:**

	<b>Improved Pasture in LOPP Watershed</b>	<b>Acre-Ft Static Storage on Improved Pasture (0.98 acre ft/ac)</b>	<b>Improved and Unimproved Pasture</b>	<b>Acre Ft Static Storage on Improved &amp; Unimproved Pasture (0.98 acre-ft/ac)</b>
<b>Total Acres</b>	800,464		1,029,509	
<b>Assumptions re % Acres in FRESPP for Different Land Use Combinations</b>				
<b>10%</b>	80,046	78,706	102,951	101,226
<b>15%</b>	120,070	118,058	154,426	151,840
<b>20%</b>	160,093	157,411	205,902	202,453

**Initiative Status:** Developed procedures to compare different protocols for documenting environmental services from ranchlands. FRESPP will field test different methods of using monitoring and modeling of hydrology, water and soil chemistry, and vegetation change to document the level of environmental services provided by ranch water management projects.

Completed the design, permitting and construction of water management projects on 4 ranches; additional water management projects will be implemented by four additional ranchers. Projects

include rehydrating drained wetlands, water table management, and pumping water from a nearby canal through existing ranch wetlands and flowing back into the canal. Based on available information the 8 water management projects occupy some 8,500 acres not including drainage acres. A planning level estimate of the static water retention capacity of the eight projects is 8,260 acre feet of water for a single storm event with the average acre feet of storage per acre being 0.98 ft.

Developing the design of a pay for services program. Essential program design questions—such as how to assure a dedicated, multiyear funding source to meet contract payment obligations; how to establish what prices that will be paid for services and how to integrate a new pay-for-services program with other state and federal programs,— will be addressed and answered through the deliberations of the collaboration team, in cooperation with multiple stakeholders and with state agency officials.

### **Estimate of Water Quality Benefits**

- Minimum :
- Maximum:
- Most Likely:
- Level of Certainty:
- Assumptions:

### **Estimate of Water Quantity Benefits**

- Minimum:
- Maximum:
- Most Likely:
- Level of Certainty: conceptual/final/unknown
- Assumptions: Planning level estimates generated by the existing pilot projects were used to derive conservative estimates of potential static storage – maximum capacity to hold water from a single storm event. If FRESP contracts covered only 15% of improved pasture acreage in the Northern Everglades, using the average acre ft/acre estimate of the 8 existing FRESP sites of 0.98, the potential storage estimate is 118,000 ac ft of water ( $800,500 \times 15\% = 120,000$  acres  $\times 0.98$  ac ft / ac). If 15% of the unimproved pasture acreage is included the potential storage is 151,800 ac ft ( $1,029,500 \times 15\% = 154,400$  acres  $\times 0.98$  ac ft / ac). Because these estimates are for a single storm event, they are conservative estimates of annual on-ranch water retention.

**Contact:** Benita Whalen; SFWMD; 863-462-5260

## Northern Everglades – Potential Management Measure

**Project Feature/Activity:** Farm and Ranchland Protection Program Partnership

**Level:** 4

**General Description/Background:** The Farm and Ranchland Protection Program (FRPP) is a voluntary USDA Natural Resources Conservation Service (NRCS) program that helps farmers and ranchers keep their land in agriculture. The program provides matching funds to State, Tribal or local governments and non-governmental organizations to purchase conservation easements. The proposal is that the NRCS, The Nature Conservancy (TNC), local agricultural landowners, and the District enter into an agreement to each contribute \$5 million dollars toward a long-term partnership.

**Purpose:** The partnership would acquire easements on private lands to remain in agriculture and provide water quality and storage benefits in support of the Northern Everglades initiative.

**Location/Size/Capacity:** Northern Everglades watershed; Over fifteen large landowners are interested in participating in this partnership. Over 3000 acres of property in 42 states are currently under the FRPP.

**Initiative Status:** FRPP is an established program and landowners are waiting to participate.

**Cost:** The proposal is that the NRCS, The Nature Conservancy (TNC), local agricultural landowners, and the District enter into an agreement to each contribute \$5 million dollars toward a long-term partnership. The partnership would bring federal, state, not-for-profit, and private funding together.

### **Estimate of Water Quality Benefits**

- Minimum: Unknown
- Maximum: Unknown
- Most Likely: Unknown
- Level of Certainty: Unknown
- Assumptions: NA

### **Estimate of Water Quantity Benefits**

- Minimum: Unknown
- Maximum: Unknown
- Most Likely: Unknown
- Level of Certainty: Unknown
- Assumptions:

### **Screening Criteria**

- Proof of Concept: NA
- Other Impacts: NA

**Contact:** Benita Whalen; SFWMD; 863-462-5260

## Northern Everglades – Potential Management Measure

**Project:** Recyclable Water Containment Areas (RWCA) in the Freshwater Caloosahatchee SouthEast sub-basin

**Description:** A distributed reservoir system within agricultural lands. Constructed with earthen berms from on-site material with ~2' water depth. RWCA's will remain in operation for approximately 5 years, at which time the area will come back into production of traditional ag products utilizing the nutrients that have built up in the soil through settling when water was present in the RWCA.

*Note: This project is one of many developed by the SWFFS WQ sub-team to address the nutrient enrichment issues of the Caloosahatchee Basin. The strategy of this effort was to formulate both structural and non-structural features that, once implemented, will collectively lead to restoration through pollutant load reductions (primarily nutrients). The cumulative effect of these pollutant reductions are to achieve water quality targets set forth by the SWFFS WQ sub-team (based either on an ecological resource, historical conditions, or reference conditions).*

**Purpose:** The purpose of this feature is reduction of nutrient loads into the Caloosahatchee River.

**Location/Size/Capacity:**

- Sub-basin: Freshwater Caloosahatchee SouthEast
- Location: Agricultural properties within the sub-basin
- Size and Capacity: RWCA's will be implemented on a percentage of ag properties an any given time, and the capacity will be dependent upon that percentage and the acreage of ag land in the sub-basin.

**Initiative Status:** Conceptual

**Cost:** TBD

**Documentation:** Southwest Florida Feasibility Study (SWFFS) Water Quality Sub-team: Water Quality Plan Formulation Document (work in progress)

**Also see documents produced by IFAS (Sanjay Shukla and Ed Hanlon)**

**Estimate of Water Quality Benefits:**

- Nutrient load reduction to Caloosahatchee River and Estuary. The specific water quality benefits will be dependent upon the total area of ag lands operating RWCA's
- Level of Certainty- Conceptual
- Assumptions leading to benefit estimate- Work by UF and IFAS has shown this system to have potential water quality benefits as well as benefits to agricultural operations.

**Estimate of Water Quantity Benefits:**

- Water quantity benefits include the storage of water during peak flows on land that would otherwise continue down the River to the Estuary. This system has the potential for very large quantities of water to be stored.
- Level of Certainty- Conceptual
- Assumptions leading to benefit estimate- Work by UF and IFAS has shown this system to have potential water quantity benefits as well as benefits to agricultural operations.

**Level of Certainty: (select one)**

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Northern Everglades – Potential Management Measure****Project:** Centralized Recycled Water Containment Area in the S-4 Basin

**Description:** The Recycled Water Containment Area (RWCA) concept utilizes agricultural or other lands for temporary water storage for water quality and storage benefits. The land is later returned to other uses after a period of time. This concept could be rotated through lands within the S-4 basin so that one land is not taken out of production for an extended period of time. RWCA's have numerous benefits including recycling nutrients, water storage, aquifer recharge, and decreasing excessive flows to the estuaries. In addition, this concept could be used as backup water supply for agriculture and eliminate the need for back pumping into Lake Okeechobee. Currently the S-4 basin, depending on hydrologic conditions, drains into or uses irrigation water from the Caloosahatchee River.

**Purpose:** Remove nutrients and treat agricultural stormwater runoff from the S-4 basin to help reduce nutrient loading to the Caloosahatchee, aquifer recharge, and add a temporary back-up water supply for irrigation.

**Location/Size/Capacity:** Located in S-4 Basin. Size and capacity to be determined by discharge volume during peak rain events.

**Initiative Status:** Conceptual Phase

**Cost:** N/A

**Documentation:**

**Estimate of Water Quality Benefits:**

- **Minimum** – Remove agricultural runoff from the S-4 basin and reduce nutrient loading to the eastern Caloosahatchee. Reduce high flows during rain events and when the S-4 basin is pumping water off agricultural lands into adjacent canals that empty into the Caloosahatchee.
- **Maximum-** N/A
- **Most Likely-** N/A
- **Level of Certainty-** conceptual/final/unknown
- **Assumptions leading to benefit estimate-** (e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities- location/sub-watershed where activity will apply; what does % reduction apply to-which land uses, only new development, etc.)

**Estimate of Water Quantity Benefits:**

- **Minimum** – May add additional storage for irrigation by adjacent land owners.
- **Maximum-** N/A
- **Most Likely-** N/A
- **Level of Certainty-** conceptual/final/unknown
- **Assumptions leading to benefit estimate-** (e.g., sub-watershed; period of record; flow/volume; operational assumptions)

**Level of Certainty: (select one)**

**Level 5-** implementation certainty unknown; conceptual idea with limited information

**Northern Everglades – Potential Management Measure**

**Project:** Lake Hicpochee

**Description:** The Lake Hicpochee Project is located on approximately 9,660 acre feet of storage on land which is currently in private ownership. This project comprises a reservoir and stormwater treatment area along the C-19 and C-43 Canals, degradation of berms, and exotic removal and control.

**Purpose:** The project objectives are to restore the ecological functioning of Lake Hicpochee. Some of the benefits that would be achieved are use of less water during the dry season due to altered operation of water levels which might involve higher water levels during the wet season and lower wet season and lower water levels during the dry season that currently occurs. Slowly drawing down the pool during the dry season would provide more water for the estuary during that time of year. Additional benefits include improved areas for potential recreation and public use, improvement of an already diverse area of wildlife, and improvement of lake fisheries.

**Location/Size/Capacity:**

The project is located in Glades County, directly west of Lake Hicpochee on the west side of C-19 north of the Lake and along the Caloosahatchee River on the south side, west of the Lake.

The project components include a reservoir and STA, degradation of berms, exotic plant removal, stormwater treatment areas, canals, embankments, structures, roads, and the temporary reconfiguration of TIWCD canals:

**Initiative Status:**

- Advance planning phase and associated field work TBD
- PIR/BODR TBD
- Preliminary Plans and specifications TBD
- Intermediate Design for the PS and Reservoir TBD
- Intermediate Design for the STA TBD
- Pre-final Design TBD

**Cost:** Costs are based on the per acre foot of storage costs established in the C43 west reservoir project of \$2,982 per acre foot of storage. 9,660 acre feet X \$2,982 per acre foot = \$28,809,529.

**Northern Everglades – Potential Management Measure**

**Project:** Lake Hicpochee Restoration -STAs and Filter Marsh  
Concept

**Description:** Create STAs on private lands adjacent to Lake Hicpochee to treat runoff from the agricultural canals that currently flow into the eastern Caloosahatchee. Additional restoration would include removing nutrient-rich organic sediments in portions of the lake and diverting some of the flow of the Caloosahatchee into the northern and southern portions of the historic lake bed to create open water habitat and a flowing marsh with filtering capability. Deeper areas could be used to attenuate high flows and the littoral zones created would provide wading bird habitat during the dry season.

**Purpose:** The primary purpose of this project is to reduce nutrient loading to the Caloosahatchee River from the eastern portion of the basin and to add habitat diversity in the historic lake bed.

**Location/Size/Capacity:** Lake Hicpochee historically was 7,776 acres.

**Initiative Status:** Conceptual Phase

**Cost:** N/A

**Documentation:** SWFFS Water Quality Subteam WQ Plan Formulation- Draft- 10/24/07 (STA concept)

**Estimate of Water Quality Benefits:**

- **Minimum** – The project would remove significant nutrient inputs from the agricultural canals surrounding Lake Hicpochee that empty into the east Caloosahatchee. It would also add additional nutrient removal within the river by adding a flow through marsh system that would flow by gravity back to the Caloosahatchee from the north and south sides of the lake. Water control structures could be used to force water to sheet flow across the marsh and back into the mainstem of the river to filter additional nutrients. Water depths could be minimized in sensitive areas to reduce impacts to existing wildlife habitat.
- **Maximum-** N/A
- **Most Likely-** N/A
- **Level of Certainty-** conceptual/final/unknown
- **Assumptions leading to benefit estimate-** (e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities- location/sub-watershed where activity will apply; what does % reduction apply to-which land uses, only new development, etc.)

**Estimate of Water Quantity Benefits:**

- **Minimum** – This project would add water storage on agricultural lands surrounding Lake Hicpochee giving farmers an alternative water supply during droughts. Capacity would be based on the size of STA/reservoir constructed for water retention at each canal discharge point. This project would also add additional storage in the deeper portions of the flowing marsh along the outside perimeter of the historic lake bed.
- **Maximum-** N/A

- **Most Likely- N/A**
- **Level of Certainty- conceptual/final/unknown**
- **Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)**

**Level of Certainty: (select one)**

**Level 5- implementation certainty unknown; conceptual idea with limited information**

## Northern Everglades – Potential Management Measure

**Project:** Water Quality Treatment Area - Constructed Wetland/STA – Lake Hicpochee vicinity (C-19 canal) @ Duda property Northwest of L. Hicpochee - SWFFS WQ – W47

**Description:** This project consists of a constructed wetland designed for optimal nitrogen removal from water diverted to the facility from the C-19 canal that currently flows into Lake Hicpochee. The water will be diverted to the treatment facility and then back to the Caloosahatchee River, bypassing Lake Hicpochee. The downstream estuary is generally limited by nitrogen, and therefore the treatment feature will be designed for optimal nitrogen removal. The assumption has been made that a feature targeting nitrogen removal will also successfully reduce concentrations of both phosphorus and suspended solids.

**Purpose:** The purpose of this project is to reduce nutrient concentrations within Lake Hicpochee, the Caloosahatchee River, and nutrient pollutant loading to the downstream estuary. This feature, in conjunction with others within the basin, are designed to have the cumulative effect of reducing nutrient concentrations and loads significantly enough to meet water quality targets within the Caloosahatchee Estuary.

*Note: This project is one of many developed by the SWFFS WQ sub-team to address the nutrient enrichment issues of the Caloosahatchee Basin. The strategy of this effort was to formulate both structural and non-structural features that, once implemented, will collectively lead to restoration through pollutant load reductions (primarily nutrients). The cumulative effect of these pollutant reductions are to achieve water quality targets set forth by the SWFFS WQ sub-team (based either on an ecological resource, historical conditions, or reference conditions).*

**Location/Size/Capacity:**

- Sub-basin: Freshwater Caloosahatchee NorthEast
- Location: Duda property northwest of Lake Hicpochee
- Size and Capacity: The facility will be sized in order to achieve maximum concentration and load reductions of nitrogen, under the constraints of property size, and other applicable constraints.

**Initiative Status:** Conceptual

**Cost:** TBD

**Documentation:** Southwest Florida Feasibility Study (SWFFS) Water Quality Sub-team: Water Quality Plan Formulation Document (work in progress)

**Estimate of Water Quality Benefits:**

- Nutrient load reduction to Caloosahatchee River and Estuary, as well as Lake Hicpochee itself which contains a range of valuable habitats that have been degraded by nutrient pollution. The specific water quality benefits will be dependent upon the size of the feature, the effectiveness of the design and operation for removal of nitrogen (as well as other constituents), and on the concentration of pollutants in the inflow water to the feature (Caloosahatchee River and/or sub-basin runoff)
- Level of Certainty- Conceptual
- Assumptions leading to benefit estimate- Constructed wetlands have been shown to be effective phosphorus removal features. Applying methods/technologies to target nitrogen is assumed to be able to increase N removal efficiencies. This sub-basin has been determined to be an appropriate place for a water quality treatment feature due to its location within the basin.

**Estimate of Water Quantity Benefits:**

- Water quantity benefits may be achieved through the water storage capabilities of the feature (reducing peak flows or providing flows to downstream estuary depending upon season/conditions). Any potential water quantity benefits should be considered incidental because the feature’s main purpose is water quality treatment and should be operated as such.
- Level of Certainty- Conceptual
- Assumptions leading to benefit estimate- It is assumed that the Caloosahatchee River and/or sub-basin sources will be able to adequately supply this feature with the water necessary for effective operation. It should be noted that during times of drought, competing water uses may have an impact on the operation of this feature and/or the water use of this feature may impact other water uses (e.g. MFL at S-79)

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Level 5-** implementation certainty unknown; conceptual idea with limited information

## Northern Everglades – Potential Management Measure

**Project:** Lake Hicpochee restoration - SWFFS WQ – W50-52

**Description:** This project consists of the re-route of canals flowing into Lake Hicpochee (aside from C-19 which is captured in SWFFS WQ – W47), the dredging of organic sediments on the lake bottom, and removal of floating vegetative mats on the lake. (See BAT ID F46). The re-routed canals (e.g. Flaghole canal) can then flow into treatment features similar to the C-19 treatment facility, before the water is released back into the Caloosahatchee. This project is NOT proposing the storage of more water within Lake Hicpochee, where valuable and unique habitats exist.

**Purpose:** The purpose of this project is to return Lake Hicpochee to a rain-driven system by reducing unnatural inflows to the lake, and removing organic sediments and vegetative mats that are a product of nutrient enrichment. The project will restore a range of valuable and unique habitats found within the historical lake boundaries.

*Note: This project is one of many developed by the SWFFS WQ sub-team to address the nutrient enrichment issues of the Caloosahatchee Basin. The strategy of this effort was to formulate both structural and non-structural features that, once implemented, will collectively lead to restoration through pollutant load reductions (primarily nutrients). The cumulative effect of these pollutant reductions are to achieve water quality targets set forth by the SWFFS WQ sub-team (based either on an ecological resource, historical conditions, or reference conditions).*

**Location/Size/Capacity:**

- Sub-basin: Freshwater Caloosahatchee NorthEast
- Location: Lake Hicpochee and potential adjacent properties for WQ treatment facilities
- Size and Capacity: See BAT ID F46 for dredging and vegetative mat removal acreages. The water quality treatment facility/s will be sized in order to achieve maximum concentration and load reductions of nitrogen, under the constraints of property size, and other applicable constraints.

**Initiative Status:** Conceptual

**Cost:** TBD

**Documentation:** Southwest Florida Feasibility Study (SWFFS) Water Quality Sub-team: Water Quality Plan Formulation Document (work in progress)

**Estimate of Water Quality Benefits:**

- An improvement in water quality within Lake Hicpochee due to removal of organic sediments and vegetative mats which may be a source of nutrients (organic nitrogen) to the Lake and the Caloosahatchee River; Increase in dissolved oxygen concentrations within L. Hicpochee; Nutrient load reduction to Caloosahatchee River and Estuary by treating water from incoming canals prior to discharge to the River. The specific water quality benefits will be dependent upon the size of WQ treatment feature, the effectiveness of the design and operation for removal of nitrogen (as well as other constituents), and on the concentration of pollutants in the inflow water to the feature (Caloosahatchee River and/or sub-basin runoff)
- Level of Certainty- Conceptual
- Assumptions leading to benefit estimate- Constructed wetlands have been shown to be effective phosphorus removal features. Applying methods/technologies to target nitrogen is assumed to be able to increase N removal efficiencies. The canals flowing into L. Hicpochee are from ag areas and can have high nutrient concentrations.

**Estimate of Water Quantity Benefits:**

- Water quantity benefits may be achieved through the water storage capabilities of a WQ treatment feature (reducing peak flows or providing flows to downstream estuary depending upon season/conditions). Any potential water quantity benefits should be considered incidental because the feature’s main purpose is water quality treatment and should be operated as such.
- Level of Certainty- Conceptual
- Assumptions leading to benefit estimate- It is assumed that the canals being re-routed will be able to adequately supply this feature with the water necessary for effective operation. It should be noted that during times of drought, competing water uses may have an impact on the operation of this feature and/or the water use of this feature may impact other water uses (e.g. MFL at S-79)

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Level 5-** implementation certainty unknown; conceptual idea with limited information

Northern Everglades – Potential Management Measure

## Southwest Regional Planning Council – Supported Recommendation

**Project: Lake Hicpochee Restoration -STAs and Filter Marsh****Description:**

Create STAs on private lands adjacent to Lake Hicpochee to treat runoff from the agricultural canals that currently flow into the eastern Caloosahatchee. Additional restoration would include removing nutrient-rich organic sediments in portions of the lake and diverting some of the flow of the Caloosahatchee into the northern and southern portions of the historic lake bed to create open water habitat and a flowing marsh with filtering capability. Deeper areas could be used to attenuate high flows and the littoral zones created would provide wading bird habitat during the dry season.

**Purpose:** The primary purpose of this project is to reduce nutrient loading to the Caloosahatchee River from the eastern portion of the basin and to add habitat diversity in the historic lake bed.

**Location/Size/Capacity:** Lake Hicpochee historically was 7,776 acres.

**Initiative Status:** Conceptual Phase

**Cost:** N/A

**Documentation:** SWFFS Water Quality Subteam WQ Plan Formulation- Draft- 10/24/07 (STA concept)

**Estimate of Water Quality Benefits:**

- **Minimum** – The project would remove significant nutrient inputs from the agricultural canals surrounding Lake Hicpochee that empty into the east Caloosahatchee. It would also add additional nutrient removal within the river by adding a flow through marsh system that would flow by gravity back to the Caloosahatchee from the north and south sides of the lake. Water control structures could be used to force water to sheet flow across the marsh and back into the mainstem of the river to filter additional nutrients. Water depths could be minimized in sensitive areas to reduce impacts to existing wildlife habitat.
- **Maximum-** N/A
- **Most Likely-** N/A
- **Level of Certainty-** conceptual/final/unknown
- **Assumptions leading to benefit estimate-** (e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities- location/sub-watershed where activity will apply; what does % reduction apply to-which land uses, only new development, etc.)

**Estimate of Water Quantity Benefits:**

- **Minimum** – This project would add water storage on agricultural lands surrounding Lake Hicpochee giving farmers an alternative water supply during droughts. Capacity would be based on the size of STA/reservoir constructed for water retention at each canal discharge point. This

project would also add additional storage in the deeper portions of the flowing marsh along the outside perimeter of the historic lake bed.

- **Maximum-** N/A
- **Most Likely-** N/A
- **Level of Certainty-** conceptual/final/unknown
- **Assumptions leading to benefit estimate-** (e.g., sub-watershed; period of record; flow/volume; operational assumptions)

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Level 5-** implementation certainty unknown; conceptual idea with limited information

**Contact:**

Mick Denham, Mayor of City of Sanibel – Chairman of Lower West Coast Watersheds – Member of Southwest Florida Regional Planning Council

mickdenham@aol.com

**Northern Everglades – Potential Management Measure**

**Project Feature:** Lake Hicpochee storage/floway/ treatment feature

**Level:** Level 3

**General Description/Background:** Lake Hicpochee is an historic lake of approximately 7,776 acres that lies immediately south west of Lake Okeechobee along the Caloosahatchee. Prior to the excavation of the channel that connected the Caloosahatchee and Lake Okeechobee in the 1880's this basin collected water that sheet flowed overland from Lk Okeechobee and from the marsh lands that surrounded Lake Hicpochee. Preconstruction, the water elevation in Lake O averaged 20 -21 ft while Lk Hicpochee averaged 18 ft , thus the flow was gravity fed allowing for a gentle distribution of water from east to west but only when Lake O expanded beyond its basin.

Today all that remains of Lk Hicpochee is a pair of shallow mud holes along the excavated channel with a significant accumulation of highly flocculent organic matter. The water quality in this feature is extremely deteriorated with untreated agricultural drainage discharging directly into and around the boundaries of the lake via canals from all sides. Attached are current aerial images that depict the approximate 1887 survey boundary in red, remnant open water areas (black) and agricultural drainage canals.

We propose that this public owned lake bottom be restored to provide primarily water quality treatment and some storage for water being discharged out of Okeechobee into the Caloosahatchee.

**Purpose:** The major purpose of this restoration project will be multifold:

- To address sources of nutrient loading into the Caloosahatchee from agricultural drainage ditches
- To provide water quality treatment of surface water discharges from Lake Okeechobee
- Regain historic storage in the Caloosahatchee watershed
- Restore the largest natural aquatic feature in the Caloosahatchee channel & reclaim the wetland habitat

The main watershed affected is the Caloosahatchee and the subwatershed would be the eastern Caloosahatchee basin.

**Location/Size/Capacity:** Southwest of Lake Okeechobee bordering the Caloosahatchee channel on the north and south, in Glades County. The historic lake was 7,776 acres, based on the 1887 Capt Black survey, post Disston dredging.

**Initiative Status:** Conceptual with some evaluation completed

**Cost:** Undetermined, however it would predictably compare very favorably with land purchase and construction of an STA since it would use state-owned land, would be built on natural soils to restore an historic aquatic habitat & function.

**Documentation:** Around 1996-7 I provided an analysis and historical documentation of Dick Dawdy proposing the historic basins (Hicpochee and Flirt/Bonnett) of the Caloosahatchee be considered for restoration and reservoir storage.

**Estimate of Water Quality Benefit:**

Minimum:

Maximum:

Most Likely: This project would address water quality sources both in the landscape and surface water flows. Rehydrating and restoring this historic lake would provide an opportunity to eliminate untreated discharges into public waters by requiring upland landowners create treatment areas for their runoff as required by urban and suburban uses. Surface waters from Lake O can be treated immediately downstream of Lake O by directing water through both lobes -north and south- of the lake to filter water in a flowthrough marsh to provide treatment and resident time for uptake of nutrients, deposition of suspended solids and precipitation/absorbption of organic material.

Level of Certainty: Conceptual, and well documented.

Assumptions: That realistic, economically and ecologically sound solutions are sought for water quality and habitat restoration .

**Estimate of Water Quantity Benefit:**

Minimum:

Maximum:

Most Likely: Lake Hicpochee was the largest of four natural lakes that provided storage, retention, treatment and aquatic habitat prior to the dredging of the Caloosahatchee channel from Lake Flirt to Lake Okeechobee in the 1880's. This project could restore  $\pm 7,776$  acres of surface storage on soils that were historically lake bottom. The development of this project will also precipitate the overdue requirement of adjacent land owners to provide storage and treatment of water on their own lands, thus further increasing basin storage.

Level of Certainty: Conceptual, and well documented.

Assumptions: That realistic, economically and ecologically sound solutions are sought for estuary and river, water quality and habitat restoration .

**Screening Criteria:**

Proof of Concept:

Other Impacts:

**Contact:** Rae Ann Wessel, Natural Resource Policy Director,  
SCCF – Sanibel Captiva Conservation Foundation  
PO Box 713, Ft Myers, FL 33902  
239.731.7559  
Rawessel@sccf.org

**Northern Everglades – Potential Management Measure**

**Project:** Recyclable Water Containment Areas (RWCA) in the Freshwater Caloosahatchee SouthEast sub-basin

**Description:** A distributed reservoir system within agricultural lands. Constructed with earthen berms from on-site material with ~2' water depth. RWCA's will remain in operation for approximately 5 years, at which time the area will come back into production of traditional ag products utilizing the nutrients that have built up in the soil through settling when water was present in the RWCA.

*Note: This project is one of many developed by the SWFFS WQ sub-team to address the nutrient enrichment issues of the Caloosahatchee Basin. The strategy of this effort was to formulate both structural and non-structural features that, once implemented, will collectively lead to restoration through pollutant load reductions (primarily nutrients). The cumulative effect of these pollutant reductions are to achieve water quality targets set forth by the SWFFS WQ sub-team (based either on an ecological resource, historical conditions, or reference conditions).*

**Purpose:** The purpose of this feature is reduction of nutrient loads into the Caloosahatchee River.

**Location/Size/Capacity:**

- Sub-basin: Freshwater Caloosahatchee SouthEast
- Location: Agricultural properties within the sub-basin
- Size and Capacity: RWCA's will be implemented on a percentage of ag properties an any given time, and the capacity will be dependent upon that percentage and the acreage of ag land in the sub-basin.

**Initiative Status:** Conceptual

**Cost:** TBD

**Documentation:** Southwest Florida Feasibility Study (SWFFS) Water Quality Sub-team: Water Quality Plan Formulation Document (work in progress)

**Also see documents produced by IFAS (Sanjay Shukla and Ed Hanlon)**

**Estimate of Water Quality Benefits:**

- Nutrient load reduction to Caloosahatchee River and Estuary. The specific water quality benefits will be dependent upon the total area of ag lands operating RWCA's
- Level of Certainty- Conceptual
- Assumptions leading to benefit estimate- Work by UF and IFAS has shown this system to have potential water quality benefits as well as benefits to agricultural operations.

**Estimate of Water Quantity Benefits:**

- Water quantity benefits include the storage of water during peak flows on land that would otherwise continue down the River to the Estuary. This system has the potential for very large quantities of water to be stored.
- Level of Certainty- Conceptual
- Assumptions leading to benefit estimate- Work by UF and IFAS has shown this system to have potential water quantity benefits as well as benefits to agricultural operations.

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Level 5-** implementation certainty unknown; conceptual idea with limited information

## Northern Everglades – Potential Management Measure

**Project:** Water Quality Treatment Area - Constructed Wetland/STA (@Boma property) - SWFFS WQ – W28

**Description:** This project consists of a constructed wetland designed for optimal nitrogen removal from water diverted to the facility from the Caloosahatchee River and/or the Freshwater Caloosahatchee SouthEast sub-basin. The downstream estuary is generally limited by nitrogen, and therefore the treatment feature will be designed for optimal nitrogen removal. The assumption has been made that a feature targeting nitrogen removal will also successfully reduce concentrations of both phosphorus and suspended solids.

**Purpose:** The purpose of this project is to reduce nutrient concentrations within the Caloosahatchee River and nutrient pollutant loading to the downstream estuary. This feature, in conjunction with others within the basin, are designed to have the cumulative effect of reducing nutrient concentrations and loads significantly enough to meet water quality targets within the Caloosahatchee Estuary.

*Note: This project is one of many developed by the SWFFS WQ sub-team to address the nutrient enrichment issues of the Caloosahatchee Basin. The strategy of this effort was to formulate both structural and non-structural features that, once implemented, will collectively lead to restoration through pollutant load reductions (primarily nutrients). The cumulative effect of these pollutant reductions are to achieve water quality targets set forth by the SWFFS WQ sub-team (based either on an ecological resource, historical conditions, or reference conditions).*

**Location/Size/Capacity:**

- Sub-basin: Freshwater Caloosahatchee SouthEast
- Location: Boma Property (see BAT ID SLG04 – Long Hammock Slough)
- Size and Capacity: The facility will be sized in order to achieve maximum concentration and load reductions of nitrogen, under the constraints of property size, and other applicable constraints.

**Initiative Status:** Conceptual

**Cost:** TBD

**Documentation:** Southwest Florida Feasibility Study (SWFFS) Water Quality Sub-team: Water Quality Plan Formulation Document (work in progress)

**Estimate of Water Quality Benefits:**

- Nutrient load reduction to Caloosahatchee River and Estuary. The specific water quality benefits will be dependent upon the size of the feature, the effectiveness of the design and operation for removal of nitrogen (as well as other constituents), and on the concentration of pollutants in the inflow water to the feature (Caloosahatchee River and/or sub-basin runoff)
- Level of Certainty- Conceptual
- Assumptions leading to benefit estimate- Constructed wetlands have been shown to be effective phosphorus removal features. Applying methods/technologies to target nitrogen is assumed to be able to increase N removal efficiencies. This sub-basin has been determined to be an appropriate place for a water quality treatment feature due to its location within the basin.

**Estimate of Water Quantity Benefits:**

- Water quantity benefits may be achieved through the water storage capabilities of the feature (reducing peak flows or providing flows to downstream estuary depending upon

season/conditions). Any potential water quantity benefits should be considered incidental because the feature's main purpose is water quality treatment and should be operated as such.

- Level of Certainty- Conceptual
- Assumptions leading to benefit estimate- It is assumed that the Caloosahatchee River and/or sub-basin sources will be able to adequately supply this feature with the water necessary for effective operation. It should be noted that during times of drought, competing water uses may have an impact on the operation of this feature and/or the water use of this feature may impact other water uses (e.g. MFL at S-79)

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Level 5-** implementation certainty unknown; conceptual idea with limited information

**See SFWMD plans for parcel specifics**

## Northern Everglades – Potential Management Measure

**Project:** Water Quality Treatment Area - Constructed Wetland/STA - Caloosahatchee Ecoscape - SWFFS WQ – W38(1)

**Description:** This project consists of a constructed wetland designed for optimal nitrogen removal from water diverted to the facility from the Caloosahatchee River and/or water from the Freshwater Caloosahatchee SouthWest sub-basin. The downstream estuary is generally limited by nitrogen, and therefore the treatment feature will be designed for optimal nitrogen removal. The assumption has been made that a feature targeting nitrogen removal will also successfully reduce concentrations of both phosphorus and suspended solids.

**Purpose:** The purpose of this project is to reduce nutrient concentrations within the Caloosahatchee River and nutrient pollutant loading to the downstream estuary. This feature, in conjunction with others within the basin, are designed to have the cumulative effect of reducing nutrient concentrations and loads significantly enough to meet water quality targets within the Caloosahatchee Estuary.

*Note: This project is one of many developed by the SWFFS WQ sub-team to address the nutrient enrichment issues of the Caloosahatchee Basin. The strategy of this effort was to formulate both structural and non-structural features that, once implemented, will collectively lead to restoration through pollutant load reductions (primarily nutrients). The cumulative effect of these pollutant reductions are to achieve water quality targets set forth by the SWFFS WQ sub-team (based either on an ecological resource, historical conditions, or reference conditions).*

**Location/Size/Capacity:**

- Sub-basin: Freshwater Caloosahatchee SouthWest
- Location: Caloosahatchee Ecoscape (see BAT ID BC84)
- Size and Capacity: The facility will be sized in order to achieve maximum concentration and load reductions of nitrogen, under the constraints of property size, and other applicable constraints.

**Initiative Status:** Conceptual

**Cost:** TBD

**Documentation:** Southwest Florida Feasibility Study (SWFFS) Water Quality Sub-team: Water Quality Plan Formulation Document (work in progress)

**Estimate of Water Quality Benefits:**

- Nutrient load reduction to Caloosahatchee River and Estuary. The specific water quality benefits will be dependent upon the size of the feature, the effectiveness of the design and operation for removal of nitrogen (as well as other constituents), and on the concentration of pollutants in the inflow water to the feature (Caloosahatchee River and/or sub-basin runoff)
- Level of Certainty- Conceptual
- Assumptions leading to benefit estimate- Constructed wetlands have been shown to be effective phosphorus removal features. Applying methods/technologies to target nitrogen is assumed to be able to increase N removal efficiencies. This sub-basin has been determined to be an appropriate place for a water quality treatment feature due to its location within the basin.

**Estimate of Water Quantity Benefits:**

- Water quantity benefits may be achieved through the water storage capabilities of the feature (reducing peak flows or providing flows to downstream estuary depending upon

season/conditions). Any potential water quantity benefits should be considered incidental because the feature's main purpose is water quality treatment and should be operated as such.

- Level of Certainty- Conceptual
- Assumptions leading to benefit estimate- It is assumed that the Caloosahatchee River and/or sub-basin sources will be able to adequately supply this feature with the water necessary for effective operation. It should be noted that during times of drought, competing water uses may have an impact on the operation of this feature and/or the water use of this feature may impact other water uses (e.g. MFL at S-79)

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Level 5-** implementation certainty unknown; conceptual idea with limited information

**Northern Everglades – Potential Management Measure**

**Project:** Christmas Canal Stormwater Treatment Area

**Description:** The SFWMD partnered with Hendry County to develop and implement a surface water master plan. The Christmas Canal basin, an area south of the LaBelle airport, east of SR 29, west of Canal 1 and north of Sears Road has experienced periodic flooding. The Airport Sears MSBU master plan identified the C43 west reservoir as a potential solution to the Christmas Canal basin flooding problem. Various alternatives were investigated and recently the District determined that it would not be possible for the reservoir to accept runoff from the Christmas Canal area at this time. This SOW modifies the existing agreement to authorize the evaluation of alternative solutions.

**Purpose:** The primary objective of this study is to identify a conveyance route to convey the runoff from the Christmas Canal basin of Hendry County and treatment site that could be utilized for the runoff.

**Location/Size/Capacity:** The consultant will coordinate design criteria (flow volumes for 5 year, 25 year, and 100 year storm events, and load reduction or treatment volume) with SFWMD and Hendry County Staff to meet all permit requirements. The Consultant will utilize the design criteria to first determine the volume of type of treatment Best Management Practice (BMP) that will be utilized, and second determine the proper size required to meet the criteria.

**Initiative Status:** *Preliminary Design*

**Cost:** \$10,000,000 - \$100,000,000

**Estimate of Water Quality Benefits: --**

- **Minimum –**
- **Maximum-**
- **Most Likely-**
- **Level of Certainty-** *conceptual*
- **Assumptions leading to benefit estimate-** Modeled values for flow and assume 20% reduction due to settling in the basin

**Estimate of Water Quantity Benefits:**

- **Minimum –** *15,000 ac/ft*
- **Maximum-** *37,000 ac/ft*
- **Most Likely-** *20,000 ac/ft*
- **Level of Certainty-** *conceptual*
- **Assumptions leading to benefit estimate-** *(Calculated using modeled flow rates and assumed BMP efficiency)*

## Northern Everglades – Potential Management Measure

**Project:** Water Quality Treatment Area - Constructed Wetland/STA @ C-43 West Basin Storage Reservoir - SWFFS WQ – W38(2)

**Description:** This project consists of a constructed wetland in association with the C-43 West Basin Storage Reservoir (formerly Berry Groves property) in Hendry County. The feature will be designed to treat water from the reservoir for nutrient removal (focused on nitrogen). The downstream estuary is generally limited by nitrogen, and therefore the treatment feature will be designed for optimal nitrogen removal. The assumption has been made that a feature targeting nitrogen removal will also successfully reduce concentrations of both phosphorus and suspended solids.

**Purpose:** The general purpose of this project is to reduce nutrient concentrations within the Caloosahatchee River and nutrient pollutant loading to the downstream estuary. The reservoir is an opportunity to utilize its infrastructure to collect water from the River, store it, and provide water to the constructed wetland for treatment. This feature, in conjunction with others within the basin, are designed to have the cumulative effect of reducing nutrient concentrations and loads significantly enough to meet water quality targets within the Caloosahatchee Estuary.

*Note: This project is one of many developed by the SWFFS WQ sub-team to address the nutrient enrichment issues of the Caloosahatchee Basin. The strategy of this effort was to formulate both structural and non-structural features that, once implemented, will collectively lead to restoration through pollutant load reductions (primarily nutrients). The cumulative effect of these pollutant reductions are to achieve water quality targets set forth by the SWFFS WQ sub-team (based either on an ecological resource, historical conditions, or reference conditions).*

**Location/Size/Capacity:**

- Sub-basin: Freshwater Caloosahatchee SouthWest
- Location: Associated with C-43 West Storage Basin Reservoir
- Size and Capacity: The facility will be sized in order to achieve maximum concentration and load reductions of nitrogen, under the constraints of property size, and other applicable constraints.

**Initiative Status:** Conceptual

**Cost:** TBD

**Documentation:** Southwest Florida Feasibility Study (SWFFS) Water Quality Sub-team: Water Quality Plan Formulation Document (work in progress)

**Estimate of Water Quality Benefits:**

- Nutrient load reduction to Caloosahatchee River and Estuary. The specific water quality benefits will be dependent upon the size of the feature, the effectiveness of the design and operation for removal of nitrogen (as well as other constituents), and on the concentration of pollutants in the inflow water to the feature (Reservoir water)
- Level of Certainty- Conceptual
- Assumptions leading to benefit estimate- Constructed wetlands have been shown to be effective phosphorus removal features. Applying methods/technologies to target nitrogen is assumed to be able to increase N removal efficiencies. This sub-basin has been determined to be an appropriate place for a water quality treatment feature due to its location within the basin.

**Estimate of Water Quantity Benefits:**

- Water quantity benefits may be achieved through the water storage capabilities of the feature (reducing peak flows or providing flows to downstream estuary depending upon season/conditions). Any potential water quantity benefits should be considered incidental because the feature's main purpose is water quality treatment and should be operated as such.
- Level of Certainty- Conceptual
- Assumptions leading to benefit estimate- It is assumed that the Caloosahatchee River and/or sub-basin sources will be able to adequately supply this feature with the water necessary for effective operation. It should be noted that during times of drought, competing water uses may have an impact on the operation of this feature and/or the water use of this feature may impact other water uses (e.g. MFL at S-79)

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Level 5-** implementation certainty unknown; conceptual idea with limited information

Northern Everglades – Potential Management Measure

## Southwest Regional Planning Council – Supported Recommendation

**Project:** Filter Marsh (STA) for C-43 Reservoir

**Description:**

Acquire lands and create a filter marsh or similar Stormwater Treatment Area (STA) to remove nitrogen, phosphorus, and suspended solids in water released from the C-43 reservoir into the Caloosahatchee River.

**Purpose:**

The purpose of this project is to provide a water quality component to the C-43 reservoir. The primary goal is to remove nutrients such as nitrogen and phosphorus that contribute to eutrophic conditions downstream in the estuary and fuel algal blooms. In addition, removal of suspended solids will also increase water transparency improving conditions for seagrasses and essential fish habitat.

**Location/Size/Capacity:**

The STA should be located somewhere in close proximity to the C-43 reservoir and the Caloosahatchee River. The size / capacity should be adequate to treat the maximum volume of water that will be released from the reservoir so as to not add additional nutrients or suspended solids to the already enriched basin runoff. The goal should be to reduce nutrient loads to ensure that the C-43 reservoir acts as a sink and not a source of nutrients to the river. Nutrient targets should not exceed those recommended by the SWFFS Water Quality Subteam in their WQ Plan Formulation for the Caloosahatchee River, i.e. TN=0.66 mg/l (Dry) & 0.89 mg/l (Wet); TP=0.04 mg/l (Dry) & 0.07 mg/l (Wet); and TSS=3.60 mg/l (Dry) & 3.00 mg/l (wet) at a salinity of 0-5 ppt (Janicki Environmental Inc. 2006).

**Initiative Status:** Conceptual Phase

**Cost:**

Cost will be dependent on the maximum volume of water to be treated and the average nutrient load.

**Documentation:**

SWFFS Water Quality Subteam WQ Plan Formulation- Draft- 10/24/07

Janicki Environmental Inc. 2006. Developing Water Quality Targets for Water Bodies Associated with the Southwest Florida Feasibility Study. Technical Memorandum. Prepared for the Everglades Partners Joint Venture

**Estimate of Water Quality Benefits:**

- **Minimum** – At a minimum, an STA would ensure that the C-43 reservoir will not act as a source of nutrients to the river.
- **Maximum**- Benefits dependent on the volume of water treated
- **Most Likely**- Reduction of nutrients below levels that will trigger imbalances in the phytoplankton and macroalgal communities in the lower estuary as a result of water released from the reservoir.
- **Level of Certainty**- conceptual/final/unknown
- **Assumptions leading to benefit estimate**- (e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for

**activities- location/sub-watershed where activity will apply; what does % reduction apply to-which land uses, only new development, etc.)**

**Estimate of Water Quantity Benefits:**

Water quantity benefits will be achieved through the C-43 reservoir. This project will primarily benefit water quality in the Caloosahatchee.

- **Minimum** – N/A
- **Maximum**- N/A
- **Most Likely**- N/A
- **Level of Certainty- conceptual/final/unknown**
- **Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)**

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Level 5-** implementation certainty unknown; conceptual idea with limited information

**Contact:** Mick Denham, Mayor of City of Sanibel – Chairman of Lower West Coast Watersheds – Member of Southwest Florida Regional Planning Council  
mickdenham@aol.com

**Northern Everglades – Potential Management Measure***duplicate of 14*

- Project:** Filter Marsh (STA) for C-43 Reservoir
- Description:** Acquire lands and create a filter marsh or similar Stormwater Treatment Area (STA) to remove nitrogen, phosphorus, and suspended solids in water released from the C-43 reservoir into the Caloosahatchee River.
- Purpose:** The purpose of this project is to provide a water quality component to the C-43 reservoir. The primary goal is to remove nutrients such as nitrogen and phosphorus that contribute to eutrophic conditions downstream in the estuary and fuel algal blooms. In addition, removal of suspended solids will also increase water transparency improving conditions for seagrasses and essential fish habitat.

**Location/Size/Capacity:** The STA should be located somewhere in close proximity to the C-43 reservoir and the Caloosahatchee River. The size / capacity should be adequate to treat the maximum volume of water that will be released from the reservoir so as to not add additional nutrients or suspended solids to the already enriched basin runoff. The goal should be to reduce nutrient loads to ensure that the C-43 reservoir acts as a sink and not a source of nutrients to the river. Nutrient targets should not exceed those recommended by the SWFFS Water Quality Subteam in their WQ Plan Formulation for the Caloosahatchee River, i.e. TN=0.66 mg/l (Dry) & 0.89 mg/l (Wet); TP=0.04 mg/l (Dry) & 0.07 mg/l (Wet); and TSS=3.60 mg/l (Dry) & 3.00 mg/l (wet) at a salinity of 0-5 ppt (Janicki Environmental Inc. 2006).

**Initiative Status:** Conceptual Phase

**Cost:** Cost will be dependent on the maximum volume of water to be treated and the average nutrient load.

**Documentation:** SWFFS Water Quality Subteam WQ Plan Formulation- Draft- 10/24/07

Janicki Environmental Inc. 2006. Developing Water Quality Targets for Water Bodies Associated with the Southwest Florida Feasibility Study. Technical Memorandum. Prepared for the Everglades Partners Joint Venture.

**Estimate of Water Quality Benefits:**

- **Minimum** – At a minimum, an STA would ensure that the C-43 reservoir will not act as a source of nutrients to the river.
- **Maximum**- Benefits dependent on the volume of water treated
- **Most Likely**- Reduction of nutrients below levels that will trigger imbalances in the phytoplankton and macroalgal communities in the lower estuary as a result of water released from the reservoir.
- **Level of Certainty**- conceptual/final/unknown
- **Assumptions leading to benefit estimate**- (e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for

**activities- location/sub-watershed where activity will apply; what does % reduction apply to-which land uses, only new development, etc.)**

**Estimate of Water Quantity Benefits:** Water quantity benefits will be achieved through the C-43 reservoir. This project will primarily benefit water quality in the Caloosahatchee.

- **Minimum** – N/A
- **Maximum**- N/A
- **Most Likely**- N/A
- **Level of Certainty**- **conceptual/final/unknown**
- **Assumptions leading to benefit estimate**- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)

**Level of Certainty: (select one)**

**Level 1**- already constructed/implemented or construction/implementation imminent

**Level 2**- construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3**- implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4**- implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Level 5**- implementation certainty unknown; conceptual idea with limited information

**Northern Everglades – Potential Management Measure**

**Project:** Water Quality Treatment Area - Constructed Wetland/STA @ Hunt Club - *SWFFS WQ*  
– W38(3)

**Description:** This project consists of a constructed wetland designed for optimal nitrogen removal from water diverted to the facility from the Caloosahatchee River and/or water from the Freshwater Caloosahatchee SouthWest sub-basin. The downstream estuary is generally limited by nitrogen, and therefore the treatment feature will be designed for optimal nitrogen removal. The assumption has been made that a feature targeting nitrogen removal will also successfully reduce concentrations of both phosphorus and suspended solids.

**Purpose:** The purpose of this project is to reduce nutrient concentrations within the Caloosahatchee River and nutrient pollutant loading to the downstream estuary. This feature, in conjunction with others within the basin, are designed to have the cumulative effect of reducing nutrient concentrations and loads significantly enough to meet water quality targets within the Caloosahatchee Estuary.

*Note: This project is one of many developed by the SWFFS WQ sub-team to address the nutrient enrichment issues of the Caloosahatchee Basin. The strategy of this effort was to formulate both structural and non-structural features that, once implemented, will collectively lead to restoration through pollutant load reductions (primarily nutrients). The cumulative effect of these pollutant reductions are to achieve water quality targets set forth by the SWFFS WQ sub-team (based either on an ecological resource, historical conditions, or reference conditions).*

**Location/Size/Capacity:**

- Sub-basin: Freshwater Caloosahatchee SouthWest
- Location: Hunt Club property (see BAT ID SLH01)
- Size and Capacity: The facility will be sized in order to achieve maximum concentration and load reductions of nitrogen, under the constraints of property size, and other applicable constraints.

**Initiative Status:** Conceptual

**Cost:** TBD

**Documentation:** Southwest Florida Feasibility Study (SWFFS) Water Quality Sub-team: Water Quality Plan Formulation Document (work in progress)

**Estimate of Water Quality Benefits:**

- Nutrient load reduction to Caloosahatchee River and Estuary. The specific water quality benefits will be dependent upon the size of the feature, the effectiveness of the design and operation for removal of nitrogen (as well as other constituents), and on the concentration of pollutants in the inflow water to the feature (Caloosahatchee River and/or sub-basin runoff)
- Level of Certainty- Conceptual
- Assumptions leading to benefit estimate- Constructed wetlands have been shown to be effective phosphorus removal features. Applying methods/technologies to target nitrogen is assumed to be able to increase N removal efficiencies. This sub-basin has been determined to be an appropriate place for a water quality treatment feature due to its location within the basin.

**Estimate of Water Quantity Benefits:**

- Water quantity benefits may be achieved through the water storage capabilities of the feature (reducing peak flows or providing flows to downstream estuary depending upon

season/conditions). Any potential water quantity benefits should be considered incidental because the feature's main purpose is water quality treatment and should be operated as such.

- Level of Certainty- Conceptual
- Assumptions leading to benefit estimate- It is assumed that the Caloosahatchee River and/or sub-basin sources will be able to adequately supply this feature with the water necessary for effective operation. It should be noted that during times of drought, competing water uses may have an impact on the operation of this feature and/or the water use of this feature may impact other water uses (e.g. MFL at S-79)

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Level 5-** implementation certainty unknown; conceptual idea with limited information

**Northern Everglades – Potential Management Measure****Project Feature: East Lee County Aquifer Recharge Program (Project #8515 – FY 1995-1996)****Level: 1****General Description/Background:** Run models in optimum recharge area to assess potential recharge between Water-table and Sandstone aquifers by increasing water levels in existing surface water bodies.**Purpose: Assessment of aquifer recharge potential in East Lee County.****Location/Size/Capacity: Southeast Lehigh Acres.****Initiative Status: Complete****Cost: \$150,000****Documentation:** Natural Resources CIP Budget Guide**Estimate of Water Quality Benefit: NA**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions:

**Estimate of Water Quantity Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: Improved capacity should help with adjacent flooding.

**Screening Criteria:**

Proof of Concept:

Other Impacts:

**Contact:** Roland Ottolini – 239-533-8127

## Northern Everglades – Potential Management Measure

**Project:** *Harns Marsh Improvements, Phase I Construction - East County Water Control District*

**Description:** *Lehigh Acres is located within the service area of the East County Water Control District. East County Water Control District (ECWCD) was created on May 5, 1958. It encompasses over 63,000 acres of land and approximately 311 miles of canals. ECWCD is a political sub-division of the State of Florida and is funded through the collection of an acreage tax. ECWCD is requesting a state appropriation in the form of a member project. The Harns Marsh Restoration project is a result of a comprehensive hydrologic study of the area to identify problems and solutions. Harns Marsh is a 578-acre-flood detention facility within ECWCD boundaries.*

*An analysis of the hydrology and hydraulics for the entire District was conducted to provide both the policy and decision makers with the necessary information to properly dedicate resources toward those critical water management facilities that have the greatest impact for the least cost.*

*The following problems and solutions were identified:*

- The control weir at the South Marsh will be rebuilt to accept flows at a lower elevation.*
- The existing marsh inlet structures will be equipped with automated staff and rainfall gauges and drawdown gates.*
- The drawdown gates will only be opened when large storms such as hurricanes are expected and will release water to provide additional flood protection. Normally, these gates will be closed to provide maximum dry season storage.*

**Purpose:** *Lowering the intake point for the South Marsh will expand the storage by 230 acres. This will provide a potential to store 1,450 acre-feet of water. Construction of a control weir at the outlet of Harns Marsh into the Orange River which will raise water levels in Harns Marsh; restrict flows from Harns Marsh; and lower peak flow discharge into the Orange River at least 20 percent for the 25-year-design storm.*

*The control weirs in Able Canal which discharge into Harns Marsh will be repaired, modified, or replaced to allow flexible operation to provide maximum flood storage in the marsh. Separate wet and dry season control elevations will be maintained by ECWCD. A pump may also be added to lift water to the cypress head during dry periods. Higher water levels year round, due to these improvements, will provide the best management practices for the Marsh. Design and permitting is well under way for the first phase, which will include the replacement of the outlet structures (S-HM-2) and (S-HM-3) along with the addition of a controllable gate structure next to the existing inlet to the South Marsh structure (S-HM-1).The ECWCD is also working with the Lee County Parks and Recreation Department to allow limited, responsible civic groups access to enjoy the Marsh for recreational purposes.*

**Location/Size/Capacity:** *Harns Marsh is located in Sections 10, 14, & 15, within Township 44S, Range 26E, Lee County, Florida. It is entirely within the boundaries of East County Water Control District located south of State Route 80 and east of Buckingham Road.*

*Harns Marsh is a 578 acre flood detention facility. Lowering the intake point for the South Marsh will expand the storage by 230 acres. This will provide a potential to store 1,450 acre feet of water.*

**Initiative Status:** *Modeling has been completed, preliminary design and planning has been completed and final design / permitting for phase 1 has been started and should be completed in early 2008. Final design / permitting for Phase 2 should be started in early 2008. Construction will follow*

*contingent on availability of state legislative funding to match East County Water Control District funds.*

**Cost:** *Total Estimated Project Cost for Phase I Construction: \$1,750,000.00*  
*Requested Funding: \$875,000.00*

**Documentation:**

**Estimate of Water Quality Benefits:**

- Minimum
- Maximum
- Most Likely
- Level of Certainty – conceptual/final/unknown
- Assumptions leading to benefit estimate-(e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities – location/sub-watershed where activity will apply; what does % reduction apply to which land uses, only new development, etc.)

*The anticipated benefits to the Caloosahatchee River include:*

- *Flood attenuation*
- *Water quality improvements*
- *Enhancement of existing wetlands*
- *Reduction of sediment and nutrient loading to the estuary*
- *Provide aquifer recharge*
- *Protect public health and safety*
- *Provide recreational opportunities*
- *Provide native wildlife habitat*
- *Provide native plant habitat free of exotic and invasive plants*

**Estimate of Water Quantity Benefits:**

- Minimum
- Maximum
- Most Likely
- Level of Certainty – conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)

**Level of Certainty: (select one)**

- **Level 1-** already constructed/implemented or construction/implementation imminent
- **Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined
- **Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined
- **Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location
- **Level 5-** implementation certainty unknown; conceptual idea with limited information

*This project is certainly at Level 2 and approaching Level 1.*

**Northern Everglades – Potential Management Measure**

**Project:** *Yellowtail Structure Construction - East County Water Control District*

**Description:** *Lehigh Acres is located within the service area of the East County Water Control District. East County Water Control District (ECWCD) was created on May 5, 1958. It encompasses over 63,000 acres of land and approximately 311 miles of canals. ECWCD is a political sub-division of the State of Florida and is funded through the collection of an acreage tax.*

*The Yellowtail Structure will replace an old, failing broad- crest weir with a new sheet- pile weir with operable gates that will allow for better control of canal water, for water quality, and water recharge purposes. The proposed structure will have top-down gates that will enable the District to have more control (within the established permit levels) of releasing or containing water as needed.*

**Purpose:** *The existing 30-year-old structure leaks which allows the entire basin to drain during extended dry periods. This leaking structure also does not allow for adequate removal of sediment/nutrients from storm water runoff and it does not allow for groundwater recharge—which is becoming a serious problem within the District.*

**Location/Size/Capacity:** *The Yellowtail Structure is located in Section 31, within Township 44S, Range 27E, Lee County, Florida. It is within the boundaries of ECWCD and it is located south of Lee Boulevard, west of Homestead Road and just east of Anita Ave.*

**Initiative Status:** *Modeling has been completed, preliminary design and planning has been completed and final design / permitting should be completed in early 2008. Construction will follow contingent on availability of funding to match East County Water Control District funds.*

**Cost:** *Total Estimated Construction Cost: \$500,000.00*

*Requested Funding: \$250,000.00*

**Documentation:****Estimate of Water Quality Benefits:**

- Minimum
- Maximum
- Most Likely
- Level of Certainty – conceptual/final/unknown
- Assumptions leading to benefit estimate-(e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities – location/sub-watershed where activity will apply; what does % reduction apply to which land uses, only new development, etc.)

*The anticipated benefits to the Caloosahatchee River include:*

- *Flood attenuation*
- *Water quality improvements*
- *Enhancement of existing wetlands*
- *Reduction of sediment and nutrient loading to the estuary*
- *Provide aquifer recharge*
- *Protect public health and safety*

**Estimate of Water Quantity Benefits:**

- Minimum
- Maximum
- Most Likely
- Level of Certainty – conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)

**Level of Certainty: (select one)**

- **Level 1-** already constructed/implemented or construction/implementation imminent
- **Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined
- **Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined
- **Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location
- **Level 5-** implementation certainty unknown; conceptual idea with limited information

*This project is certainly at Level 3 and approaching Level 2.*

## **Northern Everglades – Potential Management Measure**

**Project:** *Harns Marsh Improvements, Phase II, Final Design - East County Water Control District*

**Description:** *Lehigh Acres is located within the service area of the East County Water Control District. East County Water Control District (ECWCD) was created on May 5, 1958. It encompasses over 63,000 acres of land and approximately 311 miles of canals. ECWCD is a political sub-division of the State of Florida and is funded through the collection of an acreage tax.*

*ECWCD is requesting a state appropriation in the form of a member project. The Harns Marsh Restoration project is a result of a comprehensive hydrologic study of the area to identify problems and solutions. Harns Marsh is a 578- acre flood detention facility within ECWCD boundaries.*

*An analysis of the hydrology and hydraulics for the entire District was conducted to provide both the policy and decision makers with the necessary information to properly dedicate resources toward those critical water management facilities that have the greatest impact for the least cost.*

*The following problems and solutions were identified:*

- *The control weir at the South Marsh will be rebuilt to accept flows at a lower elevation.*
- *The existing marsh inlet structures will be equipped with automated staff and rainfall gauges and drawdown gates.*
- *The drawdown gates will only be opened when large storms such as hurricanes are expected and will release water to provide additional flood protection. Normally, these gates will be closed to provide maximum dry season storage.*

**Purpose:** *Lowering the intake point for the South Marsh will expand the storage by 230 acres. This will provide a potential to store 1,450 acre- feet of water. Construction of a control weir at the outlet of Harns Marsh into the Orange River which will raise water levels in Harns Marsh; restrict flows from Harns Marsh; and lower peak flow discharge into the Orange River at least 20 percent for the 25-year-design storm.*

*The control weirs in Able Canal which discharge into Harns Marsh will be repaired, modified, or replaced to allow flexible operation to provide maximum flood storage in the Marsh. Separate wet and dry season control elevations will be maintained by ECWCD. A pump may also be added to lift water to the cypress head during dry periods. Higher water levels year round due to these improvements will provide the best management practices for the Marsh. Design and permitting is well under way for the first phase construction which will include the replacement of the outlet structures (S-HM-2) and (S-HM-3) along with the addition of a controllable gate structure next to the existing inlet to the south marsh structure (S-HM-1).*

*The second phase planning and preliminary design has been completed with the final design and permitting (this project) will follow in early 2008. The second phase will include the replacement of structure (S-OR-1) and (S-OR-ISE). The ECWCD is also working with the Lee County Parks and Recreation Department to allow limited, responsible civic groups access to enjoy the Marsh for recreational purposes.*

**Location/Size/Capacity:** *Harns Marsh is located in Sections 10, 14, & 15, within Township 44S, Range 26E, Lee County, Florida. It is entirely within the boundaries of ECWCD located south of State Route 80 and east of Buckingham Road.*

*Harns Marsh is a 578-acre-flood detention facility. Lowering the intake point for the south Marsh will expand the storage by 230 acres. This will provide a potential to store 1,450 acre feet of water.*

**Initiative Status:** *Modeling has been completed, preliminary design and planning has been completed and final design / permitting for Phase 1 has been started and should be completed in early 2008. Final design / permitting for Phase 2 should be started in early 2008. Construction will follow contingent on availability of funding to match ECWCD funds.*

**Cost:** *Total Estimated Project Cost for Phase II, Final Design: \$227,820.00  
Requested Funding: \$113,910.00*

**Documentation:** *See attached copy of design contract and scope of engineering services.*

**Estimate of Water Quality Benefits:**

- Minimum
- Maximum
- Most Likely
- Level of Certainty – conceptual/final/unknown
- Assumptions leading to benefit estimate-(e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities – location/sub-watershed where activity will apply; what does percent reduction apply to which land uses, only new development, etc.)

*The anticipated benefits to the Caloosahatchee River include:*

- *Flood attenuation*
- *Water quality improvements*
- *Enhancement of existing wetlands*
- *Reduction of sediment and nutrient loading to the estuary*
- *Provide aquifer recharge*
- *Protect public health and safety*
- *Provide recreational opportunities*
- *Provide native wildlife habitat*
- *Provide native plant habitat free of exotic and invasive plants*

**Estimate of Water Quantity Benefits:**

- Minimum
- Maximum
- Most Likely
- Level of Certainty – conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)

**Level of Certainty: (select one)**

- **Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined
- **Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

*This project is certainly at Level 3 and approaching Level 2.*

**Northern Everglades – Potential Management Measure**

**Project:** *Hendry County Storage - East County Water Control District*

**Description:** *East County Water Control District (ECWCD) is a Florida Statutes 298 Special District created in 1958 to build, operate, and maintain drainage facilities in eastern Lee County and western Hendry County. The boundaries of the ECWCD are essentially the same as that of unincorporated Lehigh Acres with the addition of three square miles of adjacent land in Hendry County. The District encompasses over 63,000 acres of land and approximately 311 miles of primary and secondary freshwater canals with numerous culverts, water control structures and bridges.*

*The ECWCD has three natural and one man-made outfall(s) that convey stormwater runoff to the C-43 Canal (Caloosahatchee River). The three natural outfalls, the Orange River, Hickeys Creek, and Bedman Creek are meandering water bodies that begin at various locations along the ECWCD boundary and flow into the C-43 Canal. The development of the ECWCD canal system modified the historic flow patterns of surface water that feed these natural outfalls. Prior to the establishment of the ECWCD, surface water entered the natural outfalls via overland sheet flow and natural tributaries. The construction of the ECWCD canal network reduced the storage capacity of the ECWCD headwaters area and changed the volume and intensity of storm water entering the Orange River, Hickeys Creek, and Bedman Creek.*

*The ECWCD system was designed when excess surface water was considered the “common enemy”, and the intent was to significantly reduce water table levels so Lehigh Acres could be developed. No significant sized parcels of land were set aside for water detention or impoundment to reduce the surface water flow impacts on the three natural outfalls from the ECWCD. Given the current deficiency of available surface water storage areas within the ECWCD system, additional route(s) of stormwater discharge from the ECWCD along with basin interconnections and additional storage within the system are needed to reduce the impacts to the three natural outfalls.*

*The recently completed work under the ongoing Lehigh Headwaters Initiative Study is recommending that ECWCD proceed with increasing the amount of storage volume available for storm events, provide for additional water quality treatment in the canals and increase groundwater recharge. This proposed Hendry County Storage land purchase project will help to address all three of these needs in the Lehigh Acres area.*

**Purpose:** *To purchase land for additional storm water storage capacity and treatment during the rainy season and to provide base flows for the ECWCD’s outfalls along with additional groundwater recharge in the dry season.*

**Location/Size/Capacity:** *The location is not finalized but negotiations have started with the owner of an entire section of land in western Hendry County on the ECWCD eastern border. Preliminary efforts have focused on the western portions of Hendry County because of cheaper land prices and the availability of large tracts of property under single ownership. The proposed size is roughly one section of land or 640 +/- acres.*

**Initiative Status:** *Preliminary discussions with the property owners of some potential sites have taken place and some preliminary modeling and planning has been completed.*

**Cost:** *Estimated Project Cost: \$10,000,000.00*

*Requested Funding: \$5,000,000.00*

## Documentation:

### Estimate of Water Quality Benefits:

- Minimum
- Maximum
- Most Likely
- Level of Certainty – conceptual/final/unknown
- Assumptions leading to benefit estimate-(e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities – location/sub-watershed where activity will apply; what does % reduction apply to which land uses, only new development, etc.)

*The anticipated benefits to the Caloosahatchee River include:*

- *Flood attenuation*
- *Water quality improvements*
- *Enhancement of existing wetlands*
- *Reduction of sediment and nutrient loading to the estuary*
- *Provide aquifer recharge*
- *Protect public health and safety*

### Estimate of Water Quantity Benefits:

- Minimum
- Maximum
- Most Likely
- Level of Certainty – conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)

### Level of Certainty: (select one)

- **Level 1-** already constructed/implemented or construction/implementation imminent
- **Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined
- **Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined
- **Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location
- **Level 5-** implementation certainty unknown; conceptual idea with limited information

*This project is certainly at Level 4.*

**Northern Everglades – Potential Management Measure**

**Project:** *Hendry Extension Canal Widening (Construction) - East County Water Control District*

**Description:** *East County Water Control District (ECWCD) is a Florida Statutes 298 Special District created in 1958 to build, operate, and maintain drainage facilities in eastern Lee County and western Hendry County. The boundaries of the ECWCD are essentially the same as that of unincorporated Lehigh Acres with the addition of three square miles of adjacent land in Hendry County. The District encompasses over 63,000 acres of land and approximately 311 miles of primary and secondary freshwater canals with numerous culverts, water control structures and bridges.*

*The ECWCD has three natural and one man-made outfall(s) that convey stormwater runoff to the C-43 Canal (Caloosahatchee River). The three natural outfalls, the Orange River, Hickeys Creek, and Bedman Creek are meandering water bodies that begin at various locations along the ECWCD boundary and flow into the C-43 Canal. The development of the ECWCD canal system modified the historic flow patterns of surface water that feed these natural outfalls. Prior to the establishment of the ECWCD, surface water entered the natural outfalls via overland sheet flow and natural tributaries. The construction of the ECWCD canal network reduced the storage capacity of the ECWCD headwaters area and changed the volume and intensity of storm water entering the Orange River, Hickeys Creek, and Bedman Creek.*

*The ECWCD system was designed when excess surface water was considered the “common enemy”, and the intent was to significantly reduce water table levels so Lehigh Acres could be developed. No significant sized parcels of land were set aside for water detention or impoundment to reduce the surface water flow impacts on the three natural outfalls from the ECWCD. Given the current deficiency of available surface water storage areas within the ECWCD system, additional route(s) of stormwater discharge from the ECWCD along with basin interconnections and additional storage within the system are needed to reduce the impacts to the three natural outfalls.*

*The recently completed work under the ongoing Lehigh Headwaters Initiative Study is recommending that ECWCD proceed with increasing the amount of storage volume available for storm events, provide for additional water quality treatment in the canals and increase groundwater recharge. This proposed canal widening project will help to address all three of these needs in the Lehigh Acres area.*

**Purpose:** *To provide additional storm water storage capacity and water treatment in a 5.5 mile section of Hendry Extension Canal.*

**Location/Size/Capacity:** *The canal widening project starts at SR 82 along the Lee County/Hendry County Line and extends north approximately 5.5 miles to the northeast corner of Section 1, Township 45 S, Range 27 E (near structure S-H-3).*

**Initiative Status:** *Phase I (the southern 2 miles) is designed and just received SFWMD permit approval. Phase II (the northern 3.5 miles) is designed and SFWMD permit approval is expected anytime.*

**Cost:** *Estimated Construction Cost: \$500,000.00*

**Documentation:**

**Estimate of Water Quality Benefits:**

- Minimum

- Maximum
- Most Likely
- Level of Certainty – conceptual/final/unknown
- Assumptions leading to benefit estimate-(e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities – location/sub-watershed where activity will apply; what does % reduction apply to which land uses, only new development, etc.)

*The anticipated benefits to the Caloosahatchee River include:*

- *Flood attenuation*
- *Water quality improvements*
- *Enhancement of existing wetlands*
- *Reduction of sediment and nutrient loading to the estuary*
- *Provide aquifer recharge*
- *Provide public recreational opportunities with linear parks along the canal*
- *Protect public health and safety*

#### **Estimate of Water Quantity Benefits:**

- Minimum
- Maximum
- Most Likely
- Level of Certainty – conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)

#### **Level of Certainty: (select one)**

- **Level 1-** already constructed/implemented or construction/implementation imminent
- **Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined
- **Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined
- **Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location
- **Level 5-** implementation certainty unknown; conceptual idea with limited information

*This project is at Level 2.*

**Northern Everglades – Potential Management Measure**

**Project:** Carlos Waterway Conveyance for water quality in C-43

**Description:** SFWMD to use our Carlos Waterway (wide grass covered channel) as an outfall in order to provide some water quality benefits to the new C-43 reservoir.

**Purpose:**

**Location/Size/Capacity:** located just east of the Lee/Hendry County Line and crosses under SR 80 and outlets directly into the River.

**Initiative Status:**

- Advance planning phase and associated field work
- Preliminary Plans and Specification (30% complete)
- Intermediate Design (60% complete)
- Pre-final Design (90% complete)
- Final Design
- Permit submittals

**Cost:**

**Documentation:**

**Estimate of Water Quality Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities- location/sub-watershed where activity will apply; what does % reduction apply to-which land uses, only new development, etc.)

**Estimate of Water Quantity Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)

**Level of Certainty: (select one)**

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Northern Everglades – Potential Management Measure**

**Project:** Bedman Creek Corridor Restoration

**Description:**

**Purpose:** Remove impediment to flows and restore historic flows through the use of proper culverting and control structures as needed. An added benefit will be the removal of exotic plants in the project area.

**Location/Size/Capacity:** Bedman Creek Corridor, Tidal Caloosahatchee Southern, East County Water Control District, Lee County

**Initiative Status:**

- |  |     |
|--|-----|
| • Advance planning phase and associated field work   | TBD |
| • Preliminary Plans and Specification (30% complete) | TBD |
| • Intermediate Design (60% complete)                 | TBD |
| • Pre-final Design (90% complete)                    | TBD |
| • Final Design                                       | TBD |
| • Permit submittals                                  | TBD |

**Cost:**

**Documentation:** SWFFS Proposed Management Measure 104

**Estimate of Water Quality Benefits:**

- **Minimum –**
- **Maximum-**
- **Most Likely-**
- **Level of Certainty- conceptual/final/unknown**
- **Assumptions leading to benefit estimate- (e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities- location/sub-watershed where activity will apply; what does % reduction apply to-which land uses, only new development, etc.)**

**Estimate of Water Quantity Benefits:**

- **Minimum –**
- **Maximum-**
- **Most Likely- Would improve flow by 60%**
- **Level of Certainty- conceptual/final/unknown**
- **Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)**

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Northern Everglades – Potential Management Measure**

**Project:** Hickey Creek Cypress Swamps

**Description:** Disperse channelized drainage and remove and control exotics by installing stepped weirs every 0.5’ to 1.0’ in elevation increase.

**Purpose:** Disperse 65% of channelized flow.

**Location/Size/Capacity:** Hickey Creek Swamp – East County Water Control District – Lee County – Freshwater Caloosahatchee

**Initiative Status:**

- |  |     |
|--|-----|
| • Advance planning phase and associated field work   | TBD |
| • Preliminary Plans and Specification (30% complete) | TBD |
| • Intermediate Design (60% complete)                 | TBD |
| • Pre-final Design (90% complete)                    | TBD |
| • Final Design                                       | TBD |
| • Permit submittals                                  | TBD |

**Cost:**

**Documentation:** SWFFS #109

**Estimate of Water Quality Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities- location/sub-watershed where activity will apply; what does % reduction apply to-which land uses, only new development, etc.)

**Estimate of Water Quantity Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Level 5-** implementation certainty unknown; conceptual idea with limited information

**Northern Everglades – Potential Management Measure**

**Project:** Hickey Creek Cypress Swamps

**Description:** Disperse channelized drainage and remove and control exotics by installing stepped weirs every 0.5’ to 1.0’ in elevation increase.

**Purpose:** Disperse 65% of channelized flow.

**Location/Size/Capacity:** Hickey Creek Swamp – East County Water Control District – Lee County – Freshwater Caloosahatchee

**Initiative Status:**

- |  |     |
|--|-----|
| • Advance planning phase and associated field work   | TBD |
| • Preliminary Plans and Specification (30% complete) | TBD |
| • Intermediate Design (60% complete)                 | TBD |
| • Pre-final Design (90% complete)                    | TBD |
| • Final Design                                       | TBD |
| • Permit submittals                                  | TBD |

**Cost:**

**Documentation:** SWFFS #109

**Estimate of Water Quality Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities- location/sub-watershed where activity will apply; what does % reduction apply to-which land uses, only new development, etc.)

**Estimate of Water Quantity Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Level 5-** implementation certainty unknown; conceptual idea with limited information

**Northern Everglades – Potential Management Measure**

**Project:** Hickey Creek Headwater Restoration

**Description:** SWFFS 105

**Purpose:** Create filter marsh and lakes for stormwater quality  
 Remove impediment to flows and restore historic flows through the use of proper culverting and control structures as needed.

**Location/Size/Capacity:** Hickey Creek Headwaters, Tidal Caloosahatchee Southern, East County Water Control District, Lee County

**Initiative Status:**

- Advance planning phase and associated field work TBD
- Preliminary Plans and Specification (30% complete) TBD
- Intermediate Design (60% complete) TBD
- Pre-final Design (90% complete) TBD
- Final Design TBD
- Permit submittals TBD

**Cost:**

**Documentation:** SWFFS Management Measure 105

**Estimate of Water Quality Benefits:**

- **Minimum –**
- **Maximum-**
- **Most Likely-**
- **Level of Certainty- conceptual/final/unknown**
- **Assumptions leading to benefit estimate- (e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities- location/sub-watershed where activity will apply; what does % reduction apply to-which land uses, only new development, etc.)**

**Estimate of Water Quantity Benefits:**

- **Minimum –**
- **Maximum-**
- **Most Likely-**
- **Level of Certainty- conceptual/final/unknown**
- **Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)**

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Level 5-** implementation certainty unknown; conceptual idea with limited information

## Northern Everglades – Potential Management Measure

**Project:** Lehigh Acres Centralized Wastewater Treatment and Re-use (Hickey Creek sub-basin ~ Freshwater Caloosahatchee Basin) - SWFFS WQ – W44

**Description:** This project consists of the conversion of high-density septic tanks to centralized wastewater treatment in Lehigh Acres, including the installation of the infrastructure for a treated wastewater re-use system.

**Purpose:** The purpose of this project is to eliminate high-density septic systems as well as the use of private wells for irrigation. The replacement of septic systems increases the level of wastewater treatment significantly and eliminates the pollutant loading potential of high-density septic systems in an area with high water tables and sandy soils.

*Note: This project is one of many developed by the SWFFS WQ sub-team to address the nutrient enrichment issues of the Caloosahatchee Basin. The strategy of this effort was to formulate both structural and non-structural features that, once implemented, will collectively lead to restoration through pollutant load reductions (primarily nutrients). The cumulative effect of these pollutant reductions are to achieve water quality targets set forth by the SWFFS WQ sub-team (based either on an ecological resource, historical conditions, or reference conditions).*

**Location/Size/Capacity:**

- Sub-basin: Hickey Creek
- Location: Lehigh Acres

**Initiative Status:** Conceptual

**Cost:** TBD

**Documentation:** Southwest Florida Feasibility Study (SWFFS) Water Quality Sub-team: Water Quality Plan Formulation Document (work in progress)

**Estimate of Water Quality Benefits:**

- Nutrient loading reduction to surface waters and shallow groundwater
- Level of Certainty- Conceptual
- Assumptions leading to benefit estimate- Septic systems have been shown to contribute nutrients as well as other pollutants to nearby surface waters and shallow groundwater.

**Estimate of Water Quantity Benefits:**

- Water quantity benefits include the reduction of demand on the surficial aquifer from individual wells for irrigation due to the availability of re-use water
- Level of Certainty- Conceptual
- Assumptions leading to benefit estimate- Centralized wastewater treatment provides a higher level of treatment than septic systems. High-density septic systems can contribute nutrients and other pollutants to surface waters and shallow groundwater

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Level 5-** implementation certainty unknown; conceptual idea with limited information

## Northern Everglades – Potential Management Measure

**Project:** Lehigh Acres Stormwater Retrofits - SWFFS WQ – ‘NEW’ Hickey Creek

**Description:** This project consists of the installation of stormwater treatment features in Lehigh Acres (e.g. wet detention ponds, bioretention areas, vegetated swales, riparian buffers, etc.). The project will update the current stormwater management system (which is minimal or non-existent) within the existing urban area of Lehigh Acres prior to build-out of the platted area.

**Purpose:** The purpose of this project is to install structural components to slow and hold stormwater on the land to facilitate settling and nutrient uptake prior to discharge into canals and ditches that discharge to the Caloosahatchee River.

*Note: This project is one of many developed by the SWFFS WQ sub-team to address the nutrient enrichment issues of the Caloosahatchee Basin. The strategy of this effort was to formulate both structural and non-structural features that, once implemented, will collectively lead to restoration through pollutant load reductions (primarily nutrients). The cumulative effect of these pollutant reductions are to achieve water quality targets set forth by the SWFFS WQ sub-team (based either on an ecological resource, historical conditions, or reference conditions).*

**Location/Size/Capacity:**

- Sub-basin: Hickey Creek
- Location: Lehigh Acres – particularly in the area between Greenbriar and Hickey Creek natural area.
- Size and Capacity: The size, capacity, and specific type of the stormwater features will be dependent upon the land availability within the area.

**Initiative Status:** Conceptual

**Cost:** TBD

**Documentation:** Southwest Florida Feasibility Study (SWFFS) Water Quality Sub-team: Water Quality Plan Formulation Document (work in progress)

**Estimate of Water Quality Benefits:**

- Nutrient and TSS load reduction to Caloosahatchee River and Estuary. The specific water quality benefits will be dependent upon the size of the area within Lehigh Acres that can be retrofitted with stormwater features, and the amount of stormwater that can be held by the cumulative system.
- Level of Certainty- Conceptual
- Assumptions leading to benefit estimate- Constructed wetlands have been shown to be effective phosphorus removal features. Applying methods/technologies to target nitrogen is assumed to be able to increase N removal efficiencies. This sub-basin has been determined to be an appropriate place for a water quality treatment feature due to its location within the basin.

**Estimate of Water Quantity Benefits:**

- Water quantity potential benefits include the reduction or dampening of “flashy” discharges to canals and the Caloosahatchee River by holding stormwater on the land for a longer period of time, and allowing some percolation into the surficial aquifer.
- Level of Certainty- Conceptual

- Assumptions leading to benefit estimate- Stormwater BMPs have been proven to be effective at removal of certain water quality constituents.

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Level 5-** implementation certainty unknown; conceptual idea with limited information

## **Northern Everglades – Potential Management Measure**

**Project:** *Aquifer Benefit and Storage for Orange River Basin (A.B.S.O.R.B.)  
- East County Water Control District*

**Description:** *The East County Water Control District. East County Water Control District (ECWCD) is a Florida Statutes 298 Special District created in 1958 to build, operate, and maintain drainage facilities in eastern Lee County and western Hendry County. The boundaries of the ECWCD are essentially the same as that of unincorporated Lehigh Acres with the addition of three square miles of adjacent land in Hendry County. The District encompasses over 63,000 acres of land and approximately 311 miles of primary and secondary freshwater canals with numerous culverts, water control structures and bridges.*

*The ECWCD has three natural and one man-made outfall(s) that convey storm water runoff to the C-43 Canal (Caloosahatchee River). The three natural outfalls, the Orange River, Hickeys Creek, and Bedman Creek are meandering water bodies that begin at various locations along East County Water Control District's boundaries and flow into the C-43 Canal. The development of the ECWCD canal system modified the historic flow patterns of surface water that feed these natural outfalls. Prior to the ECWCD, surface water entered the natural outfalls via overland sheet flow and natural tributaries. The construction of the ECWCD canal network reduced the storage capacity of the ECWCD headwaters area and changed the volume and intensity of storm water entering the Orange River, Hickeys Creek, and Bedman Creek.*

*The ECWCD system was designed when excess surface water was considered the “common enemy”, and the intent was to significantly reduce water table levels so Lehigh Acres could be developed. No significant sized parcels of land were set aside for water detention or impoundment to reduce the surface water flow impacts on the three natural outfalls from the ECWCD. Given the current deficiency of available surface water storage areas within the ECWCD system, additional route(s) of storm water discharge from the ECWCD along with basin interconnections and additional storage within the system are needed to reduce the impacts to the three natural outfalls. In addition to these objectives, it will also be beneficial to restore the historic headwaters area and re-establish historical flow patterns where possible.*

*The recently completed work under the ongoing Lehigh Headwaters Initiative Study is recommending that ECWCD proceed with increasing the amount of storage volume available for storm events, provide for additional water quality treatment in the canals and increase groundwater recharge in the SW Lehigh Acres area. The proposed A.B.S.O.R.B. project will help to address all three of these needs in the southwest Lehigh Acres area as well as to lessen the impact on the environment and the surrounding communities affected by the Caloosahatchee Watershed.*

**Purpose:** *The purpose of this project is to continue the restoration goals and watershed improvement projects that were started under the Caloosahatchee Watershed Initiative during the last few years. This project will be the final design phase for Alternative #3 that was recommended in the preliminary design report.*

**Location/Size/Capacity:** *The A.B.S.O.R.B. project is located in the southwest portion of Lehigh Acres, Lee County, Florida. It is referred to as drainage basin #7 and #10 located within Township(s) 44S and 45S and Range(s) 25E and 26E of the East County Water Control District. Both basins combined include approximately 18.6 square miles and are generally located south of Buckingham Road, and east of State Route 82 and west of Yellowtail Canal.*

**Initiative Status:** *Modeling has been completed, preliminary design and planning has been completed and final design / permitting could start in early 2008 contingent on availability of funding to match East County Water Control District funds.*

**Cost:** *Total Estimated Final Design Cost: \$150,000.00*

*Requested Funding: \$75,000.00*

**Documentation:** *See attached copy of the preliminary Design Report.*

**Estimate of Water Quality Benefits:**

- Minimum
- Maximum
- Most Likely
- Level of Certainty – conceptual/final/unknown
- Assumptions leading to benefit estimate-(e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities – location/sub-watershed where activity will apply; what does % reduction apply to which land uses, only new development, etc.)

*The anticipated benefits to the Caloosahatchee River include:*

- *Flood attenuation*
- *Water quality improvements*
- *Enhancement of existing wetlands*
- *Reduction of sediment and nutrient loading to the estuary*
- *Provide aquifer recharge*
- *Protect public health and safety*

**Estimate of Water Quantity Benefits:**

- Minimum
- Maximum
- Most Likely
- Level of Certainty – conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)

**Level of Certainty: (select one)**

- **Level 1-** already constructed/implemented or construction/implementation imminent
- **Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined
- **Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined
- **Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location
- **Level 5-** implementation certainty unknown; conceptual idea with limited information

*This project is at Level 3 and ready to proceed to Level 2 with the necessary funding in place.*

**Northern Everglades – Potential Management Measure**

**Project:** Expansion of Harnes Marsh – Orange River sub-basin - *SWFFS WQ – W65*

**Description:** This project consists of the expansion of Harnes Marsh in the Lehigh Acres area (Orange River sub-basin).

**Purpose:** The purpose of this project is to reduce nutrient loading to the Caloosahatchee River and Estuary from the Orange River sub-basin. This feature, in conjunction with others within the basin, are designed to have the cumulative effect of reducing nutrient concentrations and loads significantly enough to meet water quality targets within the Caloosahatchee Estuary.

*Note: This project is one of many developed by the SWFFS WQ sub-team to address the nutrient enrichment issues of the Caloosahatchee Basin. The strategy of this effort was to formulate both structural and non-structural features that, once implemented, will collectively lead to restoration through pollutant load reductions (primarily nutrients). The cumulative effect of these pollutant reductions are to achieve water quality targets set forth by the SWFFS WQ sub-team (based either on an ecological resource, historical conditions, or reference conditions).*

**Location/Size/Capacity:**

- Sub-basin: Orange River
- Location: Harnes Marsh
- Size and Capacity: ?

**Initiative Status:** Conceptual

**Cost:** TBD

**Documentation:** Southwest Florida Feasibility Study (SWFFS) Water Quality Sub-team: Water Quality Plan Formulation Document (work in progress)

**Estimate of Water Quality Benefits:**

- Nutrient load reduction to Caloosahatchee River and Estuary. The specific water quality benefits will be dependent upon how large the expansion is, and the effectiveness of the design.
- Level of Certainty- Conceptual

**Estimate of Water Quantity Benefits:**

- Water quantity benefits may be achieved through the water storage capabilities of the marsh expansion and its ability to capture stormwater during high rainfall/runoff events
- Level of Certainty- Conceptual

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Level 5-** implementation certainty unknown; conceptual idea with limited information

**Northern Everglades – Potential Management Measure****Project:** Orange River Algal Turf Scrubber**Description:** Acquire lands to create an Algal Turf Scrubber near the Orange River to treat urban stormwater runoff from East Fort Myers.**Purpose:** Remove nutrients and treat urban stormwater runoff from east Fort Myers using an Algal Turf Scrubber, STA, or similar technology to help reduce nutrient loading to the Caloosahatchee.**Location/Size/Capacity:** There is a 70.2 acre parcel that is owned by Lee County located between SR-80 and the Orange River that is near the mouth of the river where it empties into the Caloosahatchee. Further investigation would be needed to determine if this land could be used for water treatment.

Since there is limited land available in this area, the Algal Turf Scrubber (ATS) concept appears to be the most efficient for the size of the footprint. Efficiencies for the ATS system are typically 10-40 times higher per acre than wetland treatment systems and may be the best choice for that location.

**Initiative Status:** Conceptual Phase**Cost:** N/A**Documentation:**

<http://www.hydromentia.com/Products-Services/Algal-Turf-Scrubber/Product-Documentation/ATS-FAQ.html>

[http://www.hydromentia.com/Products-Services/Algal-Turf-Scrubber/Product-Documentation/Assets/2005\\_Sano-et-al-Economic-Analysis-of-Water-Treatment.pdf](http://www.hydromentia.com/Products-Services/Algal-Turf-Scrubber/Product-Documentation/Assets/2005_Sano-et-al-Economic-Analysis-of-Water-Treatment.pdf)

**Estimate of Water Quality Benefits:**

- **Minimum** – Phosphorus removal rates typically range from 200 to 1000 lbs/ac/yr for ATS systems and from 5 to 30 lbs/ac/yr for treatment wetlands. Nitrogen removal rates for the ATS range from 500 to 8,000 lbs/ac/yr and for treatment wetlands from about 30 to 300 lbs/ac/yr. Source: Hydromentia website 2007
- **Maximum-** N/A
- **Most Likely-** N/A
- **Level of Certainty-** conceptual/final/unknown
- **Assumptions leading to benefit estimate-** (e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities- location/sub-watershed where activity will apply; what does % reduction apply to-which land uses, only new development, etc.)

**Estimate of Water Quantity Benefits:**

- **Minimum** – N/A
- **Maximum-** N/A
- **Most Likely-** N/A
- **Level of Certainty-** conceptual/final/unknown

- **Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)**

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Level 5-** implementation certainty unknown; conceptual idea with limited information

**Northern Everglades – Potential Management Measure**

**Project Feature: Orange River Outfall (403134)**

**Level: 1**

**General Description/Background: Permit design and construct a flood bypass outfall to the Caloosahatchee River for the Orange River watershed. This will be an East County Water Control District, SFWMD and Lee County joint project.**

**Purpose: Provide storm protection benefits in an area of frequent flooding.**

**Location/Size/Capacity: Lehigh Acres and Buckingham.**

**Initiative Status: Ongoing**

**Cost: \$2,800,000 total; Lee Co contribution \$500,000.**

**Documentation: Natural Resources CIP Budget Guide**

**Estimate of Water Quality Benefit: NA**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions:

**Estimate of Water Quantity Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: The bypass should relieve flooding in the Orange River Basin.

**Screening Criteria:**

Proof of Concept: FDEP Permit for project.

Other Impacts:

**Contact: Roland Ottolini – 239-533-8127**

Northern Everglades – Potential Management Measure

## Southwest Regional Planning Council – Recommendation

**Project: Caloosahatchee Tidal Creeks – Mouth of Orange River; problem, habitat loss**

There are number of critical tributaries and creeks that lead into the river, the Orange River tributary might be a good first project.

**Description:**

Protect and restore cells to pre-development levels. Remove raised berm which is impeding tidal exchange. Remove exotic vegetation. Add marsh with filtering capability

**Level:****General Description/Background:****Purpose:****Location/Size/Capacity:****Initiative Status:****Cost:****Documentation:****Estimate of Water Quality Benefit:**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions:

**Estimate of Water Quantity Benefit:**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions:

**Screening Criteria:**

Proof of Concept:

Other Impacts:

**Contact:**

**Northern Everglades – Potential Management Measure**

**Project:** Lehigh Acres Centralized Wastewater Treatment and Re-use (Orange River Sub-basin ~ Tidal Caloosahatchee Basin) - SWFFS WQ – W69

**Description:** This project consists of the conversion of high-density septic tanks to centralized wastewater treatment in Lehigh Acres, including the installation of the infrastructure for a treated wastewater re-use system.

**Purpose:** The purpose of this project is to eliminate high-density septic systems as well as the use of private wells for irrigation. The replacement of septic systems increases the level of wastewater treatment significantly and eliminates the pollutant loading potential of high-density septic systems in an area with high water tables and sandy soils.

*Note: This project is one of many developed by the SWFFS WQ sub-team to address the nutrient enrichment issues of the Caloosahatchee Basin. The strategy of this effort was to formulate both structural and non-structural features that, once implemented, will collectively lead to restoration through pollutant load reductions (primarily nutrients). The cumulative effect of these pollutant reductions are to achieve water quality targets set forth by the SWFFS WQ sub-team (based either on an ecological resource, historical conditions, or reference conditions).*

**Location/Size/Capacity:**

- Sub-basin: Orange River
- Location: Lehigh Acres

**Initiative Status:** Conceptual

**Cost:** TBD

**Documentation:** Southwest Florida Feasibility Study (SWFFS) Water Quality Sub-team: Water Quality Plan Formulation Document (work in progress)

**Estimate of Water Quality Benefits:**

- Nutrient loading reduction to surface waters and shallow groundwater
- Level of Certainty- Conceptual
- Assumptions leading to benefit estimate- Septic systems have been shown to contribute nutrients as well as other pollutants to nearby surface waters and shallow groundwater.

**Estimate of Water Quantity Benefits:**

- Water quantity benefits include the reduction of demand on the surficial aquifer from individual wells for irrigation due to the availability of re-use water
- Level of Certainty- Conceptual
- Assumptions leading to benefit estimate- Centralized wastewater treatment provides a higher level of treatment than septic systems. High-density septic systems can contribute nutrients and other pollutants to surface waters and shallow groundwater

**Level of Certainty: (select one)**

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Northern Everglades – Potential Management Measure**

**Project:** *Dog Canal – Hendry Canal Connection (Final Design & Construction) - East County Water Control District*

**Description:** *East County Water Control District (ECWCD) is a Florida Statutes 298 Special District created in 1958 to build, operate, and maintain drainage facilities in eastern Lee County and western Hendry County. The boundaries of the ECWCD are essentially the same as that of unincorporated Lehigh Acres with the addition of three square miles of adjacent land in Hendry County. The District encompasses over 63,000 acres of land and approximately 311 miles of primary and secondary freshwater canals with numerous culverts, water control structures and bridges.*

*The ECWCD has three natural and one man-made outfall(s) that convey stormwater runoff to the C-43 Canal (Caloosahatchee River). The three natural outfalls, the Orange River, Hickeys Creek, and Bedman Creek are meandering water bodies that begin at various locations along the ECWCD boundary and flow into the C-43 Canal. The development of the ECWCD canal system modified the historic flow patterns of surface water that feed these natural outfalls. Prior to the establishment of the ECWCD, surface water entered the natural outfalls via overland sheet flow and natural tributaries. The construction of the ECWCD canal network reduced the storage capacity of the ECWCD headwaters area and changed the volume and intensity of storm water entering the Orange River, Hickeys Creek, and Bedman Creek.*

*The ECWCD system was designed when excess surface water was considered the “common enemy”, and the intent was to significantly reduce water table levels so Lehigh Acres could be developed. No significant sized parcels of land were set aside for water detention or impoundment to reduce the surface water flow impacts on the three natural outfalls from the ECWCD. Given the current deficiency of available surface water storage areas within the ECWCD system, additional route(s) of stormwater discharge from the ECWCD along with basin interconnections and additional storage within the system are needed to reduce the impacts to the three natural outfalls.*

*The recently completed work under the ongoing Lehigh Headwaters Initiative Study is recommending that ECWCD proceed with increasing the amount of storage volume available for storm events, provide for additional water quality treatment in the canals and increase groundwater recharge. This proposed will help to address all three of these needs in the Lehigh Acres area.*

**Purpose:** *To provide flooding relief and more consistent base flows for Bedman Creek. By designing and constructing a connection between Dog Canal and Hendry Canal flows can be diverted back and forth as needed to improve conditions in Bedman Creek and Carlos Waterway.*

**Location/Size/Capacity:** *The exact location for the proposed connection has not been determined but a general location (between E. 12<sup>th</sup> Street and the northeast corner of the District) has been studied and modeled.*

**Initiative Status:** *ECWCD is currently discussing options with property owners in the desired connection areas.*

**Cost:** *Estimated Final Design Cost: \$40,000.00*

*Estimated Construction Cost: \$300,000.00*

**Documentation:**

**Estimate of Water Quality Benefits:**

- Minimum
- Maximum
- Most Likely
- Level of Certainty – conceptual/final/unknown
- Assumptions leading to benefit estimate-(e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities – location/sub-watershed where activity will apply; what does % reduction apply to which land uses, only new development, etc.)

*The anticipated benefits to the Caloosahatchee River include:*

- *Flood attenuation*
- *Water quality improvements*
- *Enhancement of existing wetlands*
- *Reduction of sediment and nutrient loading to the estuary*
- *Provide aquifer recharge*
- *Provide more consistent base flows to Bedman Creek*
- *Protect public health and safety*

**Estimate of Water Quantity Benefits:**

- Minimum
- Maximum
- Most Likely
- Level of Certainty – conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)

**Level of Certainty: (select one)**

- **Level 1-** already constructed/implemented or construction/implementation imminent
- **Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined
- **Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined
- **Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location
- **Level 5-** implementation certainty unknown; conceptual idea with limited information

*This project is between Level 4 and Level 3.*

**Northern Everglades – Potential Management Measure**

**Project:** *West Marsh Property (Final Design & Construction) - East County Water Control District*

**Description:** *East County Water Control District (ECWCD) is a Florida Statutes 298 Special District created in 1958 to build, operate, and maintain drainage facilities in eastern Lee County and western Hendry County. The boundaries of the ECWCD are essentially the same as that of unincorporated Lehigh Acres with the addition of three square miles of adjacent land in Hendry County. The District encompasses over 63,000 acres of land and approximately 311 miles of primary and secondary freshwater canals with numerous culverts, water control structures and bridges.*

*The ECWCD has three natural and one man-made outfall(s) that convey stormwater runoff to the C-43 Canal (Caloosahatchee River). The three natural outfalls, the Orange River, Hickeys Creek, and Bedman Creek are meandering water bodies that begin at various locations along the ECWCD boundary and flow into the C-43 Canal. The development of the ECWCD canal system modified the historic flow patterns of surface water that feed these natural outfalls. Prior to the establishment of the ECWCD, surface water entered the natural outfalls via overland sheet flow and natural tributaries. The construction of the ECWCD canal network reduced the storage capacity of the ECWCD headwaters area and changed the volume and intensity of storm water entering the Orange River, Hickeys Creek, and Bedman Creek.*

*The ECWCD system was designed when excess surface water was considered the “common enemy”, and the intent was to significantly reduce water table levels so Lehigh Acres could be developed. No significant sized parcels of land were set aside for water detention or impoundment to reduce the surface water flow impacts on the three natural outfalls from the ECWCD. Given the current deficiency of available surface water storage areas within the ECWCD system, additional route(s) of stormwater discharge from the ECWCD along with basin interconnections and additional storage within the system are needed to reduce the impacts to the three natural outfalls.*

*The recently completed work under the ongoing Lehigh Headwaters Initiative Study is recommending that ECWCD proceed with increasing the amount of storage volume available for storm events, provide for additional water quality treatment in the canals and increase groundwater recharge. This proposed project will help to address all three of these needs in the Lehigh Acres area.*

**Purpose:** *To construct improvements on the 200 acres being purchased through the Lee County 20/20 program. The improvements would restore wetlands and excavate filled areas to provide additional storm water storage and treatment for the Orange River.*

**Location/Size/Capacity:** *The property is located adjacent (west) of the existing Harns Marsh and (southeast) of Buckingham Airpark. The property is 202 +/- acres. The strap number is 15-44-26-00-00003.0000 and the property is accessible from Industry Ave. on the east side of the runway for Lee County Mosquito Control.*

**Initiative Status:** *Appraisals are being prepared for the purchase of the land and then Lee County will negotiate with the property owner.*

**Cost:** *Estimated Final Design Cost: \$125,000.00  
Estimated Construction Cost: \$1,000,000.00*

**Documentation:**

**Estimate of Water Quality Benefits:**

- Minimum
- Maximum
- Most Likely
- Level of Certainty – conceptual/final/unknown
- Assumptions leading to benefit estimate-(e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities – location/sub-watershed where activity will apply; what does % reduction apply to which land uses, only new development, etc.)

*The anticipated benefits to the Caloosahatchee River include:*

- *Flood attenuation*
- *Water quality improvements*
- *Enhancement of existing wetlands*
- *Reduction of sediment and nutrient loading to the estuary*
- *Provide aquifer recharge*
- *Protect public health and safety*

#### **Estimate of Water Quantity Benefits:**

- Minimum
- Maximum
- Most Likely
- Level of Certainty – conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)

#### **Level of Certainty: (select one)**

- **Level 1-** already constructed/implemented or construction/implementation imminent
- **Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined
- **Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined
- **Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location
- **Level 5-** implementation certainty unknown; conceptual idea with limited information

*This project is between Level 4 and Level 3.*

**Caloosahatchee River – Potential Management Measure**

**Project:** Jacks Branch Stream Restoration

**Description:** Project will remove impediments to flow by improving adequate Culverting with control structures as needed. Project will also help to stabilize banks with native vegetation and install weirs every 0.5’ to 1.0’ elevation drop. Project will also remove exotic plants from site.

**Purpose:** Create littoral zone along approximately 3500 ft of channel.

**Location/Size/Capacity:** 1,724 acres in Hendry and Glades County -

**Initiative Status:**

- |  |     |
|--|-----|
| • Advance planning phase and associated field work   | TBD |
| • Preliminary Plans and Specification (30% complete) | TBD |
| • Intermediate Design (60% complete)                 | TBD |
| • Pre-final Design (90% complete)                    | TBD |
| • Final Design                                       | TBD |
| • Permit submittals                                  | TBD |

**Cost:**

**Documentation:** SWFFS F41 and listed as top ten project by Glades and Hendry County in meetings with SFWMD Stormwater project identification meetings.

**Estimate of Water Quality Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities- location/sub-watershed where activity will apply; what does % reduction apply to-which land uses, only new development, etc.)

**Estimate of Water Quantity Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Level 5-** implementation certainty unknown; conceptual idea with limited information

**Northern Everglades – Potential Management Measure**

**Project:** Yellowtail Structure Retrofit Construction

**Partner:** East County Water Control District

**Description:** Lehigh Acres is located within the service area of the East County Water Control District. East County Water Control District (ECWCD) was created on May 5, 1958. It encompasses over 63,000 acres of land and approximately 311 miles of canals. ECWCD is a political sub-division of the State of Florida and is funded through the collection of an acreage tax. East County Water Control District is requesting a state appropriation in the form of a member project. The Yellowtail Structure Retrofit project is a construction project that will replace an old failing broad crest weir with a new sheet pile weir with operable gates that will allow for better control of canal water for water quality and water recharge purposes. The proposed structure will have top down gates that will allow the District to have more control of releasing water or containing it as needed. The existing structure leaks and allows the entire basin to drain during extended dry periods. This leaking structure does not allow for adequate removal of sediment from storm water runoff and it does not allow groundwater recharge.

**Purpose:**

**Location/Size/Capacity:**

**Initiative Status (scheduling):**

- |  |     |
|--|-----|
| • Advance planning phase and associated field work   | TBD |
| • Preliminary Plans and Specification (30% complete) | TBD |
| • Intermediate Design (60% complete)                 | TBD |
| • Pre-final Design (90% complete)                    | TBD |
| • Final Design                                       | TBD |
| • Permit submittals                                  | TBD |

**Cost:** Total Construction Costs: \$500,000.00  
 Requested Funding: \$250,000.00

**Documentation:**

**Estimate of Water Quality Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities- location/sub-watershed where activity will apply; what does % reduction apply to-which land uses, only new development, etc.)

**Estimate of Water Quantity Benefits:**

- Minimum –

- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)
- *Flood attenuation*
- *Water quality improvements to an impaired waterbody*
- *Enhancement of existing wetlands*
- *Reduction of sediment and nutrient loading to the estuary*
- *Provide aquifer recharge*
- *Protect public health and safety*

**Level of Certainty: (select one)**

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

Construction will follow contingent on availability of state legislative funding to match East County Water Control District funds.

Preliminary design and planning has been completed. Final design / permitting is almost completed and should be finished in early 2008.

**Northern Everglades – Potential Management Measure****Project Feature: Stroud Creek Improvements (Project #8530 – FY 1997-1998)****Level: 1****General Description/Background: Install larger culverts at minor access locations and provide limited clearing and snagging in accordance with the Surface Water Master Plan.****Purpose: Improve storm system to alleviate flooding areas along Stroud Creek.****Location/Size/Capacity: North Fort Myers.****Initiative Status: Completed.****Cost: \$480,000****Documentation: Natural Resources CIP Budget Guide, Lee County Surface Water Master Plan.****Estimate of Water Quality Benefit: NA**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions:

**Estimate of Water Quantity Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: Improved capacity should help with adjacent flooding.

**Screening Criteria:**

Proof of Concept:

Other Impacts:

**Contact: Roland Ottolini – 239-533-8127**

**Northern Everglades – Potential Management Measure****Project Feature: Stroud Creek Restoration (Project #8585 – FY 2003)****Level: 1****General Description/Background: Identify adverse impacts to Stroud Creek’s historic flow way caused by human intervention; reduce the severity of those impacts by providing mechanisms (i.e. culverts, re-established conveyances, etc) to restore and/or increase hydraulic capacity efficiency through the area; reduce potential for additional impacts by acquiring easements and/or properties within the flow way.****Purpose: Improve conveyance and alleviate flooding areas along Stroud Creek.****Location/Size/Capacity: North Fort Myers.****Initiative Status: Completed.****Cost: \$300,000****Documentation: Natural Resources CIP Budget Guide, Lee County Surface Water Master Plan.****Estimate of Water Quality Benefit: NA**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions:

**Estimate of Water Quantity Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: Improved hydraulic capacity should help with chronic flooding.

**Screening Criteria:**

Proof of Concept:

Other Impacts:

**Contact: Roland Ottolini – 239-533-8127**

## Northern Everglades – Potential Management Measure

**Project:** Water Quality Treatment Area - Constructed Wetland/STA – “Four Corners” area - SWFFS WQ – W62

**Description:** This project consists of a constructed wetland designed for optimal nitrogen removal from water diverted to the facility from the Caloosahatchee River and/or water from the Otter Creek sub-basins and surrounding areas. The discharge water may be re-routed to Spanish Creek for hydrologic restoration. The downstream estuary is generally limited by nitrogen, and therefore the treatment feature will be designed for optimal nitrogen removal. The assumption has been made that a feature targeting nitrogen removal will also successfully reduce concentrations of both phosphorus and suspended solids.

**Purpose:** The purpose of this project is to reduce nutrient concentrations within the Caloosahatchee River and nutrient pollutant loading to the downstream estuary. This feature, in conjunction with others within the basin, are designed to have the cumulative effect of reducing nutrient concentrations and loads significantly enough to meet water quality targets within the Caloosahatchee Estuary.

*Note: This project is one of many developed by the SWFFS WQ sub-team to address the nutrient enrichment issues of the Caloosahatchee Basin. The strategy of this effort was to formulate both structural and non-structural features that, once implemented, will collectively lead to restoration through pollutant load reductions (primarily nutrients). The cumulative effect of these pollutant reductions are to achieve water quality targets set forth by the SWFFS WQ sub-team (based either on an ecological resource, historical conditions, or reference conditions).*

**Location/Size/Capacity:**

- Sub-basin: Otter Creek
- Location: Four Corners Area
- Size and Capacity: The facility will be sized in order to achieve maximum concentration and load reductions of nitrogen, under the constraints of property size, and other applicable constraints.

**Initiative Status:** Conceptual

**Cost:** TBD

**Documentation:** Southwest Florida Feasibility Study (SWFFS) Water Quality Sub-team: Water Quality Plan Formulation Document (work in progress)

**Estimate of Water Quality Benefits:**

- Nutrient load reduction to Caloosahatchee River and Estuary. The specific water quality benefits will be dependent upon the size of the feature, the effectiveness of the design and operation for removal of nitrogen (as well as other constituents), and on the concentration of pollutants in the inflow water to the feature (Caloosahatchee River and/or sub-basin runoff)
- Level of Certainty- Conceptual
- Assumptions leading to benefit estimate- Constructed wetlands have been shown to be effective phosphorus removal features. Applying methods/technologies to target nitrogen is assumed to be able to increase N removal efficiencies. This sub-basin has been determined to be an appropriate place for a water quality treatment feature due to its location within the basin.

**Estimate of Water Quantity Benefits:**

- Water quantity benefits will be achieved in Spanish Creek through the re-route of discharge water; Water quantity benefits may also be achieved through the water storage capabilities of the feature (reducing peak flows or providing flows to downstream estuary depending upon season/conditions). Any potential water quantity benefits to the Caloosahatchee should be considered incidental because the feature's main purpose is water quality treatment and should be operated as such.
- Level of Certainty- Conceptual
- Assumptions leading to benefit estimate- It is assumed that the Caloosahatchee River and/or sub-basin sources will be able to adequately supply this feature with the water necessary for effective operation. It should be noted that during times of drought, competing water uses may have an impact on the operation of this feature and/or the water use of this feature may impact other water uses (e.g. MFL at S-79)

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Level 5-** implementation certainty unknown; conceptual idea with limited information

**Northern Everglades – Potential Management Measure****Project Feature: Spanish Creek Restoration (Project #8538 – FY 2001-2002)****Level: 1****General Description/Background: Provide interconnect between County Line Drainage and Spanish Creek to restore historic flow pattern and wetland rehydration.****Purpose: Improve drainage and overland flow in Spanish Creek basin.****Location/Size/Capacity: North Fort Myers.****Initiative Status: Completed.****Cost: \$250,000****Documentation: Natural Resources CIP Budget Guide, Lee County Surface Water Management Plan.****Estimate of Water Quality Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: Wetland hydration project should improve downstream water quality by increasing filtration and residence time.

**Estimate of Water Quantity Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: Improved capacity should help with adjacent flooding.

**Screening Criteria:**

Proof of Concept:

Other Impacts:

**Contact: Roland Ottolini – 239-533-8127**

**Northern Everglades – Potential Management Measure**

Project: Spanish Creek Four Corners Environmental Restoration

**Description:** Flowway Restoration Water Quality Improvement Attenuation

**Purpose:** Improve water quality. Restore flow ways, aquifer recharge

**Location/Size/Capacity:** 400 – 4,000 acres in Lee County near the intersection of Hendry, Glades, Charlotte and Lee Counties

**Initiative Status:** *Preliminary Design*

Cost: \$10,000,000 - \$100,000,000

**Estimate of Water Quality Benefits: --**

- **Minimum –**
- **Maximum-**
- **Most Likely-**
- **Level of Certainty-** *conceptual*
- **Assumptions leading to benefit estimate-** Modeled values for flow and assume 20% reduction due to settling in the basin

**Estimate of Water Quantity Benefits:**

- **Minimum –** *15,000 ac/ft*
- **Maximum-** *37,000 ac/ft*
- **Most Likely-** *20,000 ac/ft*
- **Level of Certainty-** *conceptual*
- **Assumptions leading to benefit estimate-** *(Calculated using modeled flow rates and assumed BMP efficiency)*

**Northern Everglades – Potential Management Measure**

**Project:** Billy Creek Filter Marsh Phase I

**Description:** The completed project Phase I & II will include the construction of a 56-acre filter marsh facility on an undeveloped parcel adjacent to Billy Creek. The project will install a water control structure within Billy Creek to divert flows into the filter marsh facility providing additional attenuation of stormwater flows within the channel itself. The filter marsh facility itself will consist of an 8 acre open water lake, 13 acre wetland marsh, and incorporate/restore an existing 12 acre cypress hammock.

**Purpose:** The lake will provide for removal of the suspended solids and sediments. The wetland marshes and cypress hammock will provide for the removal of nutrients such as nitrogen, phosphorus, and heavy metals.

**Location/Size/Capacity:** Billy Creek/ City of Fort Myers/Tidal Caloosahatchee

**Initiative Status:** Listed in FY 09 Caloosahatchee Partners for Restoration (CPR) project is ready to begin

- Advance planning phase and associated field work TBD
- Preliminary Plans and Specification (30% complete) TBD
- Intermediate Design (60% complete) TBD
- Pre-final Design (90% complete) TBD
- Final Design TBD
- Permit submittals TBD

**Cost:** Total Cost\$5 million – City of Fort Myers request SFWMD contribute \$1 million

**Documentation:** see CPR FY09 report

**Estimate of Water Quality Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate-

**Estimate of Water Quantity Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)

**Level of Certainty: (select one)**

Level 2- construction/implementation likely; detailed design/activity development ongoing; location well defined

**Contact:** Steve Sentes – SFWMD Stormwater Division 239-338-2929 x7754

**Northern Everglades – Potential Management Measure**

**Project:** Billy Creek Filter Marsh, Phase 1

**Description:**

The project consists of the creation of a filter marsh system to remove nutrients from Billy Creek. The District has provided funding towards the design and permitting of the project, as well as construction funds for the creation of the filter marsh system, preservation of jurisdictional wetlands, and creation of a lake.

**Purpose:**Phase 1 of the project involves the removal of exotics prior to construction of the water quality components.

**Location/Size/Capacity:** Billy Creek – City of Fort Myers

**Initiative Status:**

- Advance planning phase and associated field work
- Preliminary Plans and Specification (30% complete)
- Intermediate Design (60% complete)
- Pre-final Design (90% complete)
- Final Design
- Permit submittals

**Cost:** \$308,000

**Documentation:****Estimate of Water Quality Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities- location/sub-watershed where activity will apply; what does % reduction apply to-which land uses, only new development, etc.)

**Estimate of Water Quantity Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)

**Level of Certainty: (select one)**

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Northern Everglades – Potential Management Measure**

**Project:** Ford Filter Canal

**Description:** The project proposes to create a water quality filter marsh to improve the overall quality of stormwater discharging into Billy Creek.

**Purpose:** The filter marsh will work collectively with a number of other individual treatment areas along Billy Creek and its tributaries. Funds will be used for the design and permitting of the facility.

**Location/Size/Capacity:** Billy Creek – City of Fort Myers

**Initiative Status:**

- Advance planning phase and associated field work
- Preliminary Plans and Specification (30% complete)
- Intermediate Design (60% complete)
- Pre-final Design (90% complete)
- Final Design
- Permit submittals

**Cost:** \$30,000 for design and permitting

**Documentation:**

**Estimate of Water Quality Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities- location/sub-watershed where activity will apply; what does % reduction apply to-which land uses, only new development, etc.)

**Estimate of Water Quantity Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)

**Level of Certainty: (select one)**

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Northern Everglades – Potential Management Measure**

**Project:** Manuel’s Branch Silt Reduction Structure

**Description:** The project proposes to install siltation structures within the existing walled outfall section located immediately upstream of the Caloosahatchee river.

**Purpose:** The facility will reduce siltation associated with stream bank scour, erosion, and degradation via reduced stream/outfall velocities within the immediate upstream reach of the waterway. Funds will be used for the design and permitting of the structures.

**Location/Size/Capacity:** City of Fort Myers

**Initiative Status:**

- Advance planning phase and associated field work
- Preliminary Plans and Specification (30% complete)
- Intermediate Design (60% complete)
- Pre-final Design (90% complete)
- Final Design
- Permit submittals

**Cost:** \$15,000.00 for design and permitting

**Documentation:**

**Estimate of Water Quality Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities- location/sub-watershed where activity will apply; what does % reduction apply to-which land uses, only new development, etc.)

**Estimate of Water Quantity Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)

**Level of Certainty: (select one)**

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Northern Everglades – Potential Management Measure**

**Project:** Manuel’s Branch East and West Weirs

**Description:** The project involves the installation of two weir/water control structures within existing canal sections.

**Purpose:** The purpose of the weir structures is to create a linear storage feature within the upstream reach of the existing canal to attenuate flows downstream and reduce peaking effects of past urbanization and storm sewerage practices.

**Location/Size/Capacity:**

**Initiative Status:**

- Advance planning phase and associated field work
- Preliminary Plans and Specification (30% complete)
- Intermediate Design (60% complete)
- Pre-final Design (90% complete)
- Final Design
- Permit submittals

**Cost:** \$240,000 - Funds will be used for the design, permitting and construction of the structures.

**Documentation:**

**Estimate of Water Quality Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities- location/sub-watershed where activity will apply; what does % reduction apply to-which land uses, only new development, etc.)

**Estimate of Water Quantity Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Northern Everglades – Potential Management Measure****Project Feature: Alameda Canal (Project #0761 – FY 1990-1991)****Level: 1****General Description/Background: Replace eroded ditch with 2-72” diameter culverts, install water control weirs and wetland plants and dredge canal.****Purpose: To correct flooding and erosion problems in the Alta Vista Ditch/Alameda Canal.****Location/Size/Capacity: Alameda Street in East Fort Myers.****Initiative Status: Complete****Cost: \$415,000****Documentation: Natural Resources CIP Budget Guide****Estimate of Water Quality Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: Vegetation should support improved water quality by minimizing erosion in the canal system.

**Estimate of Water Quantity Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: Culverting should prevent bank degradation and prevent flooding.

**Screening Criteria:**

Proof of Concept:

Other Impacts:

**Contact: Roland Ottolini – 239-533-8127**

**Northern Everglades – Potential Management Measure****Project Feature: Poling Lane Drainage (Project #8556 – FY 2006-2008)****Level: 1****General Description/Background: Acquisition of existing conveyance from Mello/DelPrado to Slater Rd (a tributary to Daughtrey's Creek) for preservation and restoration to include bank stabilization and upgrades to culvert crossings.****Purpose: Enhanced flood protection and water quality in Daughtrey's Creek.****Location/Size/Capacity: North Fort Myers, Daughtrey's Creek.****Initiative Status: Ongoing.****Cost: \$1,200,000****Documentation: Natural Resources CIP Budget Guide, Lee County Surface Water Management Plan.****Estimate of Water Quality Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: Should improve downstream water quality by increasing filtration and residence time.

**Estimate of Water Quantity Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: Improved capacity should help with adjacent flooding.

**Screening Criteria:**

Proof of Concept:

Other Impacts:

**Contact: Roland Ottolini – 239-533-8127**

**Northern Everglades – Potential Management Measure****Project Feature: Daughtrey's Creek Improvements (Project #8524 – FY 1997-1998)****Level: 1****General Description/Background: Provide limited clearing and snagging from SR78 to Rich Rd in accordance with the Surface Water Management Plan.****Purpose: This project will improve drainage characteristics by reducing the magnitude, frequency, and duration of overland flooding.****Location/Size/Capacity: North Fort Myers, Daughtrey's Creek.****Initiative Status: Completed****Cost: \$540,000****Documentation: Natural Resources CIP Budget Guide, Surface Water Management Plan****Estimate of Water Quality Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions:

**Estimate of Water Quantity Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: Improved capacity should help with adjacent flooding.

**Screening Criteria:**

Proof of Concept:

Other Impacts:

**Contact: Wanda Wooten – 239-533-8138**

Northern Everglades – Potential Management Measure**Project: Caloosahatchee Creeks Preserve Hydrological Restoration**

**Description:** Lee County has hired a biologist/engineer to design and permit a hydrological restoration project on Caloosahatchee Creeks Preserve, a Conservation 20/20 preserve in Lee County. Planned hydrological restoration projects include plugging the ditches that currently occur on the property and providing culverts to flow under existing berms. One large ditch channels water north-south directly into the Caloosahatchee River and one east-west ditch channels water into a canal (Stroud Creek) and then into the Caloosahatchee River. The ditch plugs will slow the water and allow onsite wetlands to be rehydrated and filter the water before it enters the Caloosahatchee River.

**Purpose:** The purpose of the project is to reduce the amount of channelized water that enters the Caloosahatchee River and to rehydrate the wetlands on Caloosahatchee Creeks Preserve..

**Location/Size/Capacity:** The project will take place in management units 108-1 and 108-2 (211.2 acres) of a 1,325 acre Caloosahatchee Creeks Preserve on the northern shore of the Caloosahatchee River. The capacity has not yet been determined. Tom Odum, the consultant, expects to submit a permit application to the South Florida Water Management District in December 2007.

**Initiative Status:**

- Advance planning phase and associated field work
- Preliminary Plans and Specification (30% complete)
- Intermediate Design (60% complete) : Plans are underway and should be submitted to the South Florida Water Management District in December 2007.
- Pre-final Design (90% complete)
- Final Design
- Permit submittals

**Cost:** The construction cost is estimated to be \$500,000. At this point, Lee County has secured \$350,000 from the Florida Department of Environmental Protection for the construction of the project. We are requesting the balance of the project (\$150,000) to be funded by the South Florida Water Management District.

**Documentation:** Please see the attached documentation from the Florida Department of Environmental Protection.

**Estimate of Water Quality Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities- location/sub-watershed where activity will apply; what does % reduction apply to-which land uses, only new development, etc.)

- Quantitative water quality benefits are not available at this time, but will be available in December once the engineering design has been completed.

**Estimate of Water Quantity Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)
- Quantitative water quantity benefits are not available at this time, but will be available in December once the engineering design has been completed.

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Level 5-** implementation certainty unknown; conceptual idea with limited information

**Northern Everglades – Potential Management Measure****Project Feature: Bayshore Creek Improvements (Project #8520 – FY 1997-1998)****Level: 1****General Description/Background: Install larger culverts and provide limited clearing and snagging in accordance with the surface water management plan. Such locations include Leetana Rd, Henderson Grade, and Dosonte Rd.****Purpose: Improved capacity should help with adjacent flooding.****Location/Size/Capacity: North Fort Myers. Such locations include Leetana Rd, Henderson Grade, and Dosonte Rd.****Initiative Status: Complete****Cost: \$150,000****Documentation: Natural Resources CIP Budget Guide****Estimate of Water Quality Benefit: NA**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions:

**Estimate of Water Quantity Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: Improved capacity should help with adjacent flooding.

**Screening Criteria:**

Proof of Concept:

Other Impacts:

**Contact: Roland Ottolini – 239-533-8127**

**Northern Everglades – Potential Management Measure****Project Feature: Powell Creek Filter Marsh (Project #8584 – FY 2006-2007)****Level: 1****General Description/Background: Construct channel improvements and water control structures to reconnect historic flow paths along Powell Creek.****Purpose: Improve flood control and water quality in Powell Creek.****Location/Size/Capacity: North Fort Myers, Powell Creek.****Initiative Status: Ongoing****Cost: \$1,100,000****Documentation: Natural Resources CIP Budget Guide, Powell Creek Surface Water Management Master Plan.****Estimate of Water Quality Benefit: NA**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: Should improve downstream water quality by increasing filtration and residence time.

**Estimate of Water Quantity Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: Should improve hydraulic capacity in the creek during storm events.

**Screening Criteria:**

Proof of Concept:

Other Impacts:

**Contact: Roland Ottolini – 239-533-8127**

**Northern Everglades – Potential Management Measure**

**Project Feature: Powell Creek Clean & Snag Program (Project #3042 – FY 1994-1995)**

**Level: 1**

**General Description/Background: Clean and snag Powell Creek from Marianna to Valencia Weir in order to adequately convey the 25 year – 3 day storm event per the Powell Creek Surface Water Management Master Plan.**

**Purpose: Clean & snag natural creek and bypass as needed to restore flood protection for 25 year-3 day storm events.**

**Location/Size/Capacity: North Fort Myers, Powell Creek.**

**Initiative Status: Complete**

**Cost: \$525,000**

**Documentation: Natural Resources CIP Budget Guide, Powell Creek Surface Water Management Master Plan.**

**Estimate of Water Quality Benefit: NA**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions:

**Estimate of Water Quantity Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: Cleaning and snagging old debris from the natural creek bed should improve hydraulic capacity in the creek during storm events.

**Screening Criteria:**

Proof of Concept:

Other Impacts:

**Contact: Roland Ottolini – 239-533-8127**

Northern Everglades – Potential Management Measure**Project: Powell Creek Algal Turf Scrubber**

**Description:** The project proposes to install and operate for one year a mobile unit of the Algal Turf Scrubber system.

**Purpose:** The Algal Turf Scrubber is an alternative technology designed to optimize and create flow conditions that maximize the nutrient uptake at rates higher than constructed wetland systems. Installation of the product is estimated to remove of 200 - 1000 pounds of phosphorous and 500 - 8000 pounds of nitrogen for every acre of process area. Based upon the results of this pilot project, a large scale installation of the Algal Turf Scrubber system might be pursued.

**Location/Size/Capacity:****Initiative Status:**

- Advance planning phase and associated field work
- Preliminary Plans and Specification (30% complete)
- Intermediate Design (60% complete)
- Pre-final Design (90% complete)
- Final Design
- Permit submittals

**Cost: \$427,000**

**Documentation:****Estimate of Water Quality Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities- location/sub-watershed where activity will apply; what does % reduction apply to-which land uses, only new development, etc.)

**Estimate of Water Quantity Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)

**Level of Certainty: (select one)**

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Northern Everglades – Potential Management Measure****Project: Kickapoo Creek Stormwater System Analysis**

**Description:** The study will evaluate improvements to the existing stormwater ponds to increase filtration and detention time of stormwater.

**Purpose:** The project proposes to conduct a study to determine the feasibility of enhancing the existing stormwater system at the Lee County Civic Center.

**Location/Size/Capacity:****Initiative Status:**

- Advance planning phase and associated field work
- Preliminary Plans and Specification (30% complete)
- Intermediate Design (60% complete)
- Pre-final Design (90% complete)
- Final Design
- Permit submittals

**Cost: \$135,000**

**Documentation:****Estimate of Water Quality Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities- location/sub-watershed where activity will apply; what does % reduction apply to-which land uses, only new development, etc.)

**Estimate of Water Quantity Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)

**Level of Certainty: (select one)**

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

Northern Everglades – Potential Management Measure**Project: North Ft. Myers Surface Water Restoration Project**

**Description:** This project proposes to construct and operate a surface water management system to serve a 2,400 acre project area. The project involves channel improvements, construction of diversion weirs and the planting of shallow water emergent aquatic plants to facilitate longer time for nutrient uptake.

**Purpose:** Construction of the weirs will capture sediment and slow velocities. This project was previously funded by the District.

**Location/Size/Capacity:****Initiative Status:**

- Advance planning phase and associated field work
- Preliminary Plans and Specification (30% complete)
- Intermediate Design (60% complete)
- Pre-final Design (90% complete)
- Final Design
- Permit submittals

**Cost: \$300,000**

**Documentation:****Estimate of Water Quality Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities- location/sub-watershed where activity will apply; what does % reduction apply to-which land uses, only new development, etc.)

**Estimate of Water Quantity Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Northern Everglades – Potential Management Measure****Project Feature: Popash Creek Culvert Replacement (Project #8508 – FY 1992-1993)****Level: 1****General Description/Background: Replace culverts approximately 4000' upstream of SR78.****Purpose: Repair of storm system to alleviate flooding areas along SR78 and Popash Creek.****Location/Size/Capacity: North Fort Myers, SR78.****Initiative Status: Complete****Cost: \$180,000****Documentation: Natural Resources CIP Budget Guide****Estimate of Water Quality Benefit: NA**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions:

**Estimate of Water Quantity Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: Improved capacity should help with adjacent flooding.

**Screening Criteria:**

Proof of Concept:

Other Impacts:

**Contact: Roland Ottolini – 239-533-8127**

**Northern Everglades – Potential Management Measure***duplicate of 60***Project Feature: Popash Creek Culvert Replacement (Project #8508 – FY 1992-1993)****Level: 1****General Description/Background: Replace culverts approximately 4000' upstream of SR78.****Purpose: Repair of storm system to alleviate flooding areas along SR78 and Popash Creek.****Location/Size/Capacity: North Fort Myers, SR78.****Initiative Status: Complete****Cost: \$180,000****Documentation: Natural Resources CIP Budget Guide****Estimate of Water Quality Benefit: NA**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions:

**Estimate of Water Quantity Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: Improved capacity should help with adjacent flooding.

**Screening Criteria:**

Proof of Concept:

Other Impacts:

**Contact: Roland Ottolini – 239-533-8127**

**Northern Everglades – Potential Management Measure**

**Project Feature: Popash Creek Preserve (Project #8593 – FY 2005-2006)**

**Level: 1**

**General Description/Background: Hydrologic restoration and enhancement for Conservation 2020 parcel located at the headwaters of Popash Creek to provide water quality and flood protection benefits for basin.**

**Purpose: Provide water quality and flood protection benefits in a basin where anthropogenic activities have caused alterations in historic flow patterns.**

**Location/Size/Capacity: North Fort Myers, Popash Creek north of Nalle Grade Road.**

**Initiative Status: Complete**

**Cost: \$2,400,000**

**Documentation: Natural Resources CIP Budget Guide, Conservation 2020**

**Estimate of Water Quality Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: Improved hydrology should increase residence time and filtration to improve water quality in basin.

**Estimate of Water Quantity Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: Improved capacity should help with adjacent flooding.

**Screening Criteria:**

Proof of Concept:

Other Impacts:

**Contact: Roland Ottolini – 239-533-8127**

**Northern Everglades – Potential Management Measure***duplicate of 62***Project Feature: Popash Creek Preserve (Project #8593 – FY 2005-2006)****Level: 1****General Description/Background: Hydrologic restoration and enhancement for Conservation 2020 parcel located at the headwaters of Popash Creek to provide water quality and flood protection benefits for basin.****Purpose: Provide water quality and flood protection benefits in a basin where anthropogenic activities have caused alterations in historic flow patterns.****Location/Size/Capacity: North Fort Myers, Popash Creek north of Nalle Grade Road.****Initiative Status: Complete****Cost: \$2,400,000****Documentation: Natural Resources CIP Budget Guide, Conservation 2020****Estimate of Water Quality Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: Improved hydrology should increase residence time and filtration to improve water quality in basin.

**Estimate of Water Quantity Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: Improved capacity should help with adjacent flooding.

**Screening Criteria:**

Proof of Concept:

Other Impacts:

**Contact: Roland Ottolini – 239-533-8127**

Northern Everglades – Potential Management Measure

**Project Feature:** Yellow Fever Crk/Gator Slough Transfer Facility (#208509, FY 2005-2007)

**Level:** 1

**General Description/Background:** Construct an operable interconnect facility between the Gator Slough Canal and Yellow Fever Creek in North Fort Myers/Northeast Cape Coral. The project would transfer surface waters during periods of high flows from Gator Slough canal system located just north of Del Prado Blvd (S22-T43-R24) to the Yellow Fever Creek near Littleton Rd through a control facility. The project will utilize existing rights of way.

**Purpose:** This project will improve the area's overall water quality by reducing and balancing the fresh water peak inflows to Matlacha Pass and Charlotte Harbor. By transferring these excess surface water flows to the Caloosahatchee, the overall system will mimic the historical flow patterns and hydrologic distribution.

**Location/Size/Capacity:** Yellow Fever Creek (S22-T43-R24)

**Initiative Status:** Ongoing

**Cost:** \$600,000.

**Documentation:** Natural Resources CIP Budget Guide

**Estimate of Water Quality Benefit:** unknown

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions:

**Estimate of Water Quantity Benefit:** NA

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: This project will improve the area's overall water quality by reducing and balancing the fresh water peak inflows to Matlacha Pass and Charlotte Harbor.

**Screening Criteria:**

Proof of Concept: FDEP Permit for project.

Other Impacts:

**Contact:** Roland Ottolini – 239-533-8127

**Northern Everglades – Potential Management Measure**

**Project Feature: Yellow Fever Creek (E. Branch) Structure Replacements (Project #8510 – FY 1993-1994)**

**Level: 1**

**General Description/Background: Replace Culverts under Littleton Rd and Neatherlands Ave.**

**Purpose: Improve flood protection along Yellow Fever Creek.**

**Location/Size/Capacity: North Fort Myers, Yellow Fever Creek, east branch.**

**Initiative Status: Complete**

**Cost: \$640,000**

**Documentation: Natural Resources CIP Budget Guide**

**Estimate of Water Quality Benefit: NA**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions:

**Estimate of Water Quantity Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: Improved capacity should help with adjacent flooding.

**Screening Criteria:**

Proof of Concept:

Other Impacts:

**Contact: Roland Ottolini – 239-533-8127**

**Northern Everglades – Potential Management Measure**

**Project Feature: Gator Slough Phase 1 (Project #3060 – FY 1994-1996)**

**Level: 1**

**General Description/Background: Improve channel from station 490+00 to US41 and beyond by 1410', a total distance of 4410', and install a weir 1410' upstream of US41.**

**Purpose: Improvements per the Gator Slough Surface Water Management Master Plan to adequately convey the 25 year storm event, enhance aquifer recharge and water quality.**

**Location/Size/Capacity: West of US41 and North of Pine Island Road.**

**Initiative Status: Complete**

**Cost: \$1,208,000**

**Documentation: Natural Resources CIP Budget Guide, Gator Slough Surface Water Management Master Plan**

**Estimate of Water Quality Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: Channel improvements and the addition of a weir are expected to improve water flow off of adjacent properties, while increasing capacity and residency which should improve water quality.

**Estimate of Water Quantity Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: Improved capacity should help with adjacent flooding and increased residency will help with groundwater recharge.

**Screening Criteria:**

Proof of Concept:

Other Impacts:

**Contact: Roland Ottolini – 239-533-8127**

**Northern Everglades – Potential Management Measure**

**Project:** Yellow Fever Creek & Gator Slough Interconnect - Lee County

**Description:** Gator Slough Canal has cut off the historic headwaters of Yellow Fever Creek, discharging freshwater into Matlacha Pass that should be going into Yellow Fever Creek and out falling into the Caloosahatchee River. This project proposes a facility to restore historic flows to Yellow Fever Creek. The project would restore base flows to Yellow Fever Creek ecosystem, re-hydrating wetlands, and enhancing flows to the Caloosahatchee River. Diverting the fresh water inflows away from Charlotte Harbor will allow for the return of normal salinity value to the estuary and aid in the restoration of thriving oyster beds.

**Purpose:**

- Surface water storage and slowing of surface water discharge velocities to the river
- Water quality improvement to an impaired waterbody
- Restore historic wetlands
- Restoration of habitat

**Location/Size/Capacity:**

**Initiative Status:**

- |  |     |
|--|-----|
| • Advance planning phase and associated field work   | TBD |
| • Preliminary Plans and Specification (30% complete) | TBD |
| • Intermediate Design (60% complete)                 | TBD |
| • Pre-final Design (90% complete)                    | TBD |
| • Final Design                                       | TBD |
| • Permit submittals                                  | TBD |

**Cost:** Total Construction Costs: \$600,000 Requested Funding: \$300,000

**Documentation:**

**Estimate of Water Quality Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities- location/sub-watershed where activity will apply; what does % reduction apply to-which land uses, only new development, etc.)

**Estimate of Water Quantity Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown

- Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent  
Project is ready to begin construction.

**Northern Everglades – Potential Management Measure**

**Project Feature:** Spreader Canal Restoration – Cape Coral

**Level:** 3

**General Description/Background:** The spreader system on the western side of Cape Coral was put in place to avoid point source discharges to Matlacha Pass Aquatic Preserve. Through the years breaks have occurred in the banks of the spreader. Restoration of the spreader has been discussed by DEP and the City of Cape Coral.

**Purpose:** To make the spreader function as intended and remove the point source discharges.

**Location/Size/Capacity:** The western boundary of Cape Coral/eastern boundary of the Aquatic Preserve. Approximately 14 miles of shoreline.

**Initiative Status:** Conceptual only. One break was improved by the DEP in the south spreader, but no more work has been done since then.

**Cost:** ?

**Documentation:** DEP / City of Cape Coral

**Estimate of Water Quality Benefit:**

Minimum: Unknown

Maximum: Unknown

Most Likely: Unknown

Level of Certainty: Conceptual

Assumptions: Reduction in nutrients to specific locations in downstream waters

**Estimate of Water Quantity Benefit:**

Minimum: NA

Maximum:

Most Likely:

Level of Certainty:

Assumptions:

**Screening Criteria:**

Proof of Concept: -1

Other Impacts: 0

**Contact:** Connie Jarvis, City of Cape Coral, 239.574.0745

**Northern Everglades – Potential Management Measure**

**Project: Cape Coral Stormwater Improvements**

**Description:** The project involves the replacement of older stormwater inlets with newer inlets designed to assist with stormwater management.

**Purpose:** The new inlets facilitate the filtration of nutrients and pollutants and reduce the effects of "first flush" by retaining this water within the City's swale system. As such, the new inlet structures will reduce residential pollutant loads including fertilizers and pesticides and road run off containing oils and heavy metals. Funds will be used for the purchase and installation of the inlets.

**Location/Size/Capacity:**

**Initiative Status:**

- Advance planning phase and associated field work
- Preliminary Plans and Specification (30% complete)
- Intermediate Design (60% complete)
- Pre-final Design (90% complete)
- Final Design
- Permit submittals

**Cost:** \$893,500

**Documentation:**

**Estimate of Water Quality Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities- location/sub-watershed where activity will apply; what does % reduction apply to-which land uses, only new development, etc.)

**Estimate of Water Quantity Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Level 5-** implementation certainty unknown; conceptual idea with limited information

**Northern Everglades – Potential Management Measure**

**Project:** Cape Coral Spreader Canal Restoration - *SWFFS WQ – W100*

**Description:** This project consists of the restoration of the spreader canal system that runs along the western edge of Cape Coral, separating the development from mangrove wetlands held by the State of Florida. The project will engineer a fix to the breeches in the system that allow Cape Coral stormwater to flow directly into the adjacent Matlacha Pass Aquatic Preserve.

**Purpose:** The purpose of this project is to effectively isolate the stormwater from Cape Coral within the canal system and not allow it to flow directly into the Caloosahatchee Estuary or Matlacha Pass.

*Note: This project is one of many developed by the SWFFS WQ sub-team to address the nutrient enrichment issues of the Caloosahatchee Basin. The strategy of this effort was to formulate both structural and non-structural features that, once implemented, will collectively lead to restoration through pollutant load reductions (primarily nutrients). The cumulative effect of these pollutant reductions are to achieve water quality targets set forth by the SWFFS WQ sub-team (based either on an ecological resource, historical conditions, or reference conditions).*

**Location/Size/Capacity:**

- Sub-basin: Cape Coral
- Location: western edge of the Cape Coral development
- Size and Capacity: Length of the Spreader canal

**Initiative Status:** Conceptual

**Cost:** TBD

**Documentation:** Southwest Florida Feasibility Study (SWFFS) Water Quality Sub-team: Water Quality Plan Formulation Document (work in progress)

**Estimate of Water Quality Benefits:**

- Reduction of pollutant loading to Estuary and Matlacha Pass
- Level of Certainty- Conceptual
- Assumptions leading to benefit estimate-

**Estimate of Water Quantity Benefits:**

- Reduction of large and flashy flows through the mangrove buffer system to Matlacha Pass.
- Level of Certainty- Conceptual
- Assumptions leading to benefit estimate-

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Level 5-** implementation certainty unknown; conceptual idea with limited information

**Northern Everglades – Potential Management Measure****Project Feature: Cohn Branch Channel Improvements (Project #8522 – FY 2006-2008)****Level: 1****General Description/Background: Channel silt removal and replanting with wetland and native vegetation.****Purpose: This project will improve drainage characteristics by reducing the magnitude, frequency, and duration of overland flooding.****Location/Size/Capacity: North Fort Myers, Cohn Branch.****Initiative Status: Completed****Cost: \$268,000****Documentation: Natural Resources CIP Budget Guide****Estimate of Water Quality Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions:

**Estimate of Water Quantity Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: Improved capacity should help with adjacent flooding.

**Screening Criteria:**

Proof of Concept:

Other Impacts:

**Contact: Wanda Wooten – 239-533-8138**

**Northern Everglades – Potential Management Measure****Project Feature: Chapel Branch Improvements (Project #8521 – FY 2005-2006)****Level: 1****General Description/Background: Replace damaged culverts at powerline easement south of Samville Rd.****Purpose: Help relieve area of chronic flooding.****Location/Size/Capacity: North Fort Myers.****Initiative Status: Complete****Cost: \$150,000****Documentation: Natural Resources CIP Budget Guide****Estimate of Water Quality Benefit: NA**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions:

**Estimate of Water Quantity Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: Improved capacity should help with adjacent flooding.

**Screening Criteria:**

Proof of Concept:

Other Impacts:

**Contact: Roland Wanda Wooten – 239-533-8138**

**Northern Everglades – Potential Management Measure****Project Feature: March Point Improvements (Project #8526 – FY 1997-1998)****Level: 1****General Description/Background: Provide limited clearing and snagging from about ½ mile south of SR78 to about ½ mile north of SR78.****Purpose: This project will improve drainage characteristics by reducing the magnitude, frequency, and duration of overland flooding.****Location/Size/Capacity: North Fort Myers, March Point.****Initiative Status: Completed****Cost: \$240,000****Documentation: Natural Resources CIP Budget Guide, Surface Water Management Plan****Estimate of Water Quality Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions:

**Estimate of Water Quantity Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: Improved capacity should help with adjacent flooding.

**Screening Criteria:**

Proof of Concept:

Other Impacts:

**Contact: Wanda Wooten – 239-533-8138**

**Northern Everglades – Potential Management Measure****Project Feature: Hancock Bridge Pkwy Flood Control (Project #8504 – FY 1990-1991)****Level: 1****General Description/Background: Install culverts in flood prone areas (Beau Dr, Palm Ave, Moody Rd and 1700' west of Moody Rd.).****Purpose: Construction of a storm system to alleviate flooding areas of a designated evacuation route.****Location/Size/Capacity: North Fort Myers, west of US41 on Hancock Bridge Parkway.****Initiative Status: Complete****Cost: \$240,000****Documentation: Natural Resources CIP Budget Guide****Estimate of Water Quality Benefit: NA**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions:

**Estimate of Water Quantity Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: Improved capacity should help with adjacent flooding.

**Screening Criteria:**

Proof of Concept:

Other Impacts:

**Contact: Roland Ottolini – 239-533-8127**

## Northern Everglades – Potential Management Measure

**Project:** Water Quality Treatment Area - Constructed Wetlands/STAs – North Cape Coral - SWFFS WQ – W97

**Description:** This project consists of a constructed wetland or series of constructed wetlands designed for optimal nitrogen removal from water diverted (and/or backpumped) from Cape Coral stormwater as well as Gator Slough. After treatment, the water will then be diverted to North Fort Myers Creeks to restore more natural hydrologic regimes within the creeks (See BAT ID 52 – Hancock Creek). The downstream estuary is generally limited by nitrogen, and therefore the treatment features will be designed for optimal nitrogen removal. The assumption has been made that a feature targeting nitrogen removal will also successfully reduce concentrations of both phosphorus and suspended solids.

**Purpose:** The purpose of this project is to reduce nutrient loading to the Caloosahatchee Estuary, and provide some hydrologic restoration to North Fort Myers Creeks that flow into the Caloosahatchee. This feature, in conjunction with others within the basin, are designed to have the cumulative effect of reducing nutrient concentrations and loads significantly enough to meet water quality targets within the Caloosahatchee Estuary.

*Note: This project is one of many developed by the SWFFS WQ sub-team to address the nutrient enrichment issues of the Caloosahatchee Basin. The strategy of this effort was to formulate both structural and non-structural features that, once implemented, will collectively lead to restoration through pollutant load reductions (primarily nutrients). The cumulative effect of these pollutant reductions are to achieve water quality targets set forth by the SWFFS WQ sub-team (based either on an ecological resource, historical conditions, or reference conditions).*

**Location/Size/Capacity:**

- Sub-basin: Cape Coral
- Location: North Cape Coral – (north of 78); Creek flows to North Fort Myers (see BAT ID BC52)
- Size and Capacity: The facility will be sized in order to achieve maximum concentration and load reductions of nitrogen, under the constraints of property size, and other applicable constraints.

**Initiative Status:** Conceptual

**Cost:** TBD

**Documentation:** Southwest Florida Feasibility Study (SWFFS) Water Quality Sub-team: Water Quality Plan Formulation Document (work in progress)

**Estimate of Water Quality Benefits:**

- Nutrient load reduction to Caloosahatchee Estuary. The specific water quality benefits will be dependent upon the size of the feature, the effectiveness of the design and operation for removal of nitrogen (as well as other constituents), and on the concentration of pollutants in the inflow water to the feature (Cape Coral stormwater and Gator Slough water)
- Level of Certainty- Conceptual
- Assumptions leading to benefit estimate- Constructed wetlands have been shown to be effective phosphorus removal features. Applying methods/technologies to target nitrogen is assumed to be able to increase N removal efficiencies. This sub-basin has been determined to be an appropriate place for a water quality treatment feature due to its location within the basin.

**Estimate of Water Quantity Benefits:**

- Water quantity benefits may be achieved through the restoration of more natural hydrologic flows in the North Fort Myers Creeks and the Caloosahatchee estuary.
- Level of Certainty- Conceptual
- Assumptions leading to benefit estimate- It is assumed that Cape Coral stormwater and Gator Slough flows will be able to adequately supply this feature with the water necessary for effective operation.

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Level 5-** implementation certainty unknown; conceptual idea with limited information

**Northern Everglades – Potential Management Measure**

**Project Feature:** Spreader Canal Restoration – Cape Coral

**Level:** 3

**General Description/Background:** The spreader system on the western side of Cape Coral was put in place to avoid point source discharges to Matlacha Pass Aquatic Preserve. Through the years breaks have occurred in the banks of the spreader. Restoration of the spreader has been discussed by DEP and the City of Cape Coral.

**Purpose:** To make the spreader function as intended and remove the point source discharges.

**Location/Size/Capacity:** The western boundary of Cape Coral/eastern boundary of the Aquatic Preserve. Approximately 14 miles of shoreline.

**Initiative Status:** Conceptual only. One break was improved by the DEP in the south spreader, but no more work has been done since then.

**Cost:** ?

**Documentation:** DEP / City of Cape Coral

**Estimate of Water Quality Benefit:**

Minimum: Unknown

Maximum: Unknown

Most Likely: Unknown

Level of Certainty: Conceptual

Assumptions: Reduction in nutrients to specific locations in downstream waters

**Estimate of Water Quantity Benefit:**

Minimum: NA

Maximum:

Most Likely:

Level of Certainty:

Assumptions:

**Screening Criteria:**

Proof of Concept: -1

Other Impacts: 0

**Contact:** Connie Jarvis, City of Cape Coral, 239.574.0745

**Northern Everglades – Potential Management Measure**

**Project:** Canal Stormwater Recovery And Treatment by ASR – Cape Coral

**Description:** At present the City of Cape Coral experiences a shortfall of water during the dry season and freshwater resources are lost to tidally influence estuaries and waterways during the rainy season. During this rainy season approximately 200 Million gallons per day of freshwater is lost impacting these areas.

By capturing and storing surface flows using planned ASR wells, the volume of fresh water escaping the canals at weirs and locks is reduced. This reduces, and in some cases may eliminate, point source discharge to riparian areas and estuaries in the watershed. ASR will also reduce the potential threat of saltwater intrusion by eliminating over-pumping of irrigation water from the Mid Hawthorne Aquifer.

Development of ASR wells provides a feasible solution to reduce or eliminate point source discharge and the growing water storage concern. This project is being implemented as a phased project, which has funding identified in the City’s Capital Improvement Plan for the next eight years.

Funding requested will be used for construction of conveyance and/or surface water treatment necessary under Florida Statue for ASR.

**Purpose:** In addition to prevention of saltwater intrusion and creation of more reliable water resource availability, anticipated benefits to the Caloosahatchee River watershed include:

- Flood attenuation
- Water quality improvements to an impaired waterbody
- Protection of existing wetlands
- Reduction of sediment and nutrient loading

**Location/Size/Capacity:**

**Initiative Status:**

- |  |     |
|--|-----|
| • Advance planning phase and associated field work   | TBD |
| • Preliminary Plans and Specification (30% complete) | TBD |
| • Intermediate Design (60% complete)                 | TBD |
| • Pre-final Design (90% complete)                    | TBD |
| • Final Design                                       | TBD |
| • Permit submittals                                  | TBD |

**Cost:** Total Construction Costs: \$15 million - Requested Funding: \$500,000

**Documentation:**

**Estimate of Water Quality Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown

- Assumptions leading to benefit estimate- (e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities- location/sub-watershed where activity will apply; what does % reduction apply to-which land uses, only new development, etc.)

**Estimate of Water Quantity Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent.

Planning, system modeling and preliminary design have been completed. Engineering and construction is currently on-going with three ASR wells being drilled during 2007-2008 and three wells being permitted for construction during 2008-2009. Conveyance and water quality treatment systems will be constructed during the same timeframes in a phased manner.

Northern Everglades – Potential Management Measure

**Project:** Cape Coral canal weir system - SWFFS WQ – W101

**Description:** This project consists of a system of weirs in the Cape Coral canal system that will hold stormwater within for longer periods of time and at higher levels.

**Purpose:** The purpose of this project is to reduce discharges of stormwater to the Caloosahatchee Estuary.

*Note: This project is one of many developed by the SWFFS WQ sub-team to address the nutrient enrichment issues of the Caloosahatchee Basin. The strategy of this effort was to formulate both structural and non-structural features that, once implemented, will collectively lead to restoration through pollutant load reductions (primarily nutrients). The cumulative effect of these pollutant reductions are to achieve water quality targets set forth by the SWFFS WQ sub-team (based either on an ecological resource, historical conditions, or reference conditions).*

**Location/Size/Capacity:**

- Sub-basin: Cape Coral
- Location: Cape Coral canals
- Size and Capacity:
- 

**Initiative Status:** Conceptual

**Cost:** TBD

**Documentation:** Southwest Florida Feasibility Study (SWFFS) Water Quality Sub-team: Water Quality Plan Formulation Document (work in progress)

**Estimate of Water Quality Benefits:**

- Nutrient load reduction to Caloosahatchee River and Estuary.
- Level of Certainty- Conceptual
- Assumptions leading to benefit estimate- Holding water for longer periods of time within the canals and limiting exchange with estuarine waters will allow some pollutant settling/uptake and reduce loads of certain pollutants to the estuary from the canals.

**Estimate of Water Quantity Benefits:**

- Reduce unnatural flows of stormwater to the Caloosahatchee Estuary
- Level of Certainty- Conceptual
- Assumptions leading to benefit estimate- Holding water within the canal system will reduce unnatural discharges to the Estuary

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Level 5-** implementation certainty unknown; conceptual idea with limited information

**Northern Everglades – Potential Management Measure**

**Project Feature:** Weir System in Canals in Cape Coral

**Level:** 1

**General Description/Background:** The City of Cape Coral has put in concrete weirs at the freshwater/saltwater interface, and at several locations in Gator Slough. A number of these weirs also have adjustable risers, in order for the city to keep back water for the irrigation system. These weirs also cause the canals to function as retention systems which can improve the water quality downstream.

**Purpose:** To retain water for the City's use, and to improve downstream water quality.

**Location/Size/Capacity:** The weirs are sited at a number of locations within the City of Cape Coral. The city has approximately 300 miles of freshwater canals that are retained through weirs.

**Initiative Status:** Installation complete and weirs are in use.

**Cost:** Paid in full

**Documentation:** City of Cape Coral Weir Maps

**Estimate of Water Quality Benefit:**

Minimum: Unknown

Maximum: Unknown

Most Likely: Unknown

Level of Certainty: Conceptual

Assumptions: Overall reduction in nutrients to downstream waters

**Estimate of Water Quantity Benefit:**

Minimum: Unknown

Maximum: Unknown

Most Likely: Unknown

Level of Certainty: Conceptual

Assumptions: Weirs will retain more water and provide greater retention time for nutrient fall out prior to going to downstream waters.

**Screening Criteria:**

Proof of Concept: 1

Other Impacts: 0

**Contact:** Connie Jarvis, City of Cape Coral, 239.574.0745

**Northern Everglades – Potential Management Measure**

**Project Feature:** Utility Expansion Program

**Level:** 1 and 2 depending on geographic area within Cape Coral

**General Description/Background:** The City of Cape Coral is implementing the utility expansion program to changeover from septic systems to gravity sewers. About ¼ of the city already has sewer systems, and this project is being done in phases, currently in the southwestern portion of the city.

**Purpose:** To reduce the nutrient load to the city's canal system and ultimately the Caloosahatchee River, Matlacha Pass and surrounding waters.

**Location/Size/Capacity:** The project is being done in phases, Southwest 5, 6 and 7 are currently being started. They encompass about 1/8 of the city.

**Initiative Status:** Southwest 5 is scheduled for completion in 2009, Southwest 6 and 7 in 2010.

**Cost:**

**Documentation:** City of Cape Coral's Utility Expansion Plan

**Estimate of Water Quality Benefit:**

Minimum: Unknown

Maximum: Unknown

Most Likely: Unknown

Level of Certainty: Unknown

Assumptions: Overall reduction in nutrients and coliform bacteria

**Estimate of Water Quantity Benefit:**

Minimum: NA

Maximum:

Most Likely:

Level of Certainty:

Assumptions:

**Screening Criteria:**

Proof of Concept: 1

Other Impacts: 1

**Contact:** Connie Jarvis, City of Cape Coral, 239.574.0745

**Northern Everglades – Potential Management Measure**

**Project Feature:** Florida Yards and Neighborhoods – Cape Coral

**Level:** 1

**General Description/Background:** The City of Cape Coral has had the Florida Yards and Neighborhoods program implemented since 1998. This program teaches residents how to be more environmentally friendly in their own yards through the use of native plants, fewer fertilizers and pesticides and other practices. By educating the residents, the City hopes to reduce water, pesticide and fertilizer uses that impact our canal system.

**Purpose:** To decrease the use of irrigation water, pesticides and fertilizers.

**Location/Size/Capacity:** The City of Cape Coral / 110 square miles

**Initiative Status:** Program has been implemented, xxx number of residents have taken initial class.

**Cost:** Done through minimal grants and staff time.

**Documentation:** City of Cape Coral FYN logs

**Estimate of Water Quality Benefit:**

Minimum: Unknown

Maximum: Unknown

Most Likely: Unknown

Level of Certainty: Conceptual

Assumptions: Reduction in nutrients and pesticides to surrounding waters

**Estimate of Water Quantity Benefit:**

Minimum: Unknown

Maximum: Unknown

Most Likely: Unknown

Level of Certainty: Unknown

Assumptions: Planting the right plants will lead to less water usage by residents

**Screening Criteria:**

Proof of Concept: 1

Other Impacts: 1

**Contact:** Connie Jarvis, City of Cape Coral, 239.574.0745

## Northern Everglades – Potential Management Measure

### Southwest Regional Planning Council – Recommendation

**Project:** Provide financial Incentives to Local Government to Eliminate Small Waste Treatment Package Plants

Elimination of surface water discharges from small wastewater treatment facilities, by providing financial incentives to eliminate package plants that are situated on Barrier Islands, Bay Islands, Sound Islands, Pass Islands, or any other plants situated close to a sensitive water bodies

#### General Description/Background:

The South West Florida Regional Planning Council, which represents the six counties of South West

Florida, gave a mandate to a sub-committee, “Lower West Coast Watersheds” to focus a multi-pronged

effort to reduce nutrient runoff to the region’s waterways other than releases from Lake Okeechobee. The

major topics to be addressed, all threats to our waterways are:

1. Fertilizer Application
2. Waste Water Discharges
3. Privately Owned Package Treatment Facility Discharges
4. On-Site Wastewater Treatment Systems, Septic Systems
5. Storm Water Runoff

The Regional Planning Council has made good progress in approving three resolutions that address current control standards and criteria, assessing regional impact and recommending new standards for control that will ultimately improve water quality throughout the region. The resolutions approved to this point are

1. Fertilizer Application containing Nitrogen and Phosphorous
2. Treated Wastewater Discharges of Nitrogen and Phosphorous
3. Privately owned Package Wastewater Treatment Facility Discharges

All of these resolutions are directly aligned with the stated Problems – Excess Nutrient Loads to our Estuary and the Objectives – Meeting Total Daily Load, manage watershed discharges and reducing pollutant loads by improving management of pollutant sources. This project recommendations focus is on Package treatment facilities.

The next step that the Regional Planning Council is attempting to resolve is how resolutions can become implementable actions

#### Purpose:

Meet TMDL in the Watershed, manage watershed discharges, and reduce pollutant loads

#### Location/Size/Capacity:

Initiative Status:

Cost:

Documentation:

Resolution approved by the SWFRPC:

- Wastewater Package Plant Resolution, approved October 18, 2007

Estimate of Water Quality Benefit: Purpose:

The primary purpose of this project is to reduce nutrient loading to the Caloosahatchee River

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions:

Estimate of Water Quantity Benefit:

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions:

Screening Criteria:

Proof of Concept:

Other Impacts:

Contact:

Mick Denham, Mayor of City of Sanibel – Chairman of Lower West Coast Watersheds – Member of Southwest Florida Regional Planning Council

mickdenham@aol.com

**Northern Everglades – Potential Management Measure**

Project Feature: Caloosahatchee Tributaries Maintenance (Project #8581 – FY 2003-2007)

Level: 1

General Description/Background: Cleaning and snagging of various tributaries of the Caloosahatchee River to allow optimum performance of outfalls and avoid flooding.

Purpose: Enhanced flood protection and water quality in the Caloosahatchee River.

Location/Size/Capacity: Caloosahatchee River, Lee County.

Initiative Status: Ongoing.

Cost: \$935,000

Documentation: Natural Resources CIP Budget Guide, Lee County Surface Water Management Plan.

Estimate of Water Quality Benefit: unknown

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: Should improve downstream water quality by increasing filtration and residence time.

Estimate of Water Quantity Benefit: unknown

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: Improved capacity should help with adjacent flooding.

Screening Criteria:

Proof of Concept:

Other Impacts:

Contact: Roland Ottolini – 239-533-8127

**Northern Everglades – Potential Management Measure**

**Project Feature:** Caloosahatchee SII for TMDL compliance (Project #8588 – FY 2006-2012)

**Level:** 1

**General Description/Background:** Source Identification and Improvements. Verify impaired water body status, identify sources of impairment, prepare a basin management action plan (BMAP) in coordination with other agencies for TMDL compliance, and begin remedial activities, projects, etc. This project reflects the Lee County element of a multi-agency coordinated effort.

**Purpose:** Improve water quality in the Caloosahatchee watershed.

**Location/Size/Capacity:** Caloosahatchee River, Lee County.

**Initiative Status:** Ongoing

**Cost:** \$8,500,000

**Documentation:** Natural Resources CIP Budget Guide, Lee County Surface Water Master Plan.

**Estimate of Water Quality Benefit:** unknown

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: Improve downstream water quality through implementation of various water quality improvements in keeping with FDEP TMDL requirements.

**Estimate of Water Quantity Benefit:** unknown

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions:

**Screening Criteria:**

Proof of Concept:

Other Impacts:

**Contact:** Roland Ottolini – 239-533-8127

**Northern Everglades – Potential Management Measure**

**Project Feature: Surface Water Management Plan (Project #200983 – FY 2004-2010)**

**Level: 1**

**General Description/Background: Surface water management analysis on a basin by basin approach. Plan includes existing and proposed improvements for flood protection, water quality, and water conservation.**

**Purpose: Provides for watershed studies, updates and implementation of recommended elements. Studies are used for FEMA mapping updates, provides NPDES permitting, continuous monitoring, and annual reporting.**

**Location/Size/Capacity: Lee County, county wide.**

**Initiative Status: Ongoing**

**Cost: \$10,675,357.**

**Documentation: Natural Resources CIP Budget Guide**

**Estimate of Water Quality Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: Projects that are implemented over time will provide a measurable water quality improvement. TMDLs will drive water quality goals and will be considered during the planning and construction of future projects.

**Estimate of Water Quantity Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: Projects that are implemented will improve flooding conditions as Lee County will seek to improve storage capacity.

**Screening Criteria:**

Proof of Concept: Permits for various projects to be implemented under this plan including current NPDES permits.

Other Impacts:

**Contact: Roland Ottolini – 239-533-8127**

**Northern Everglades – Potential Management Measure****Project Feature: Neighborhood Improvement Program (Project #8514 – FY 2005-2011)****Level: 1****General Description/Background: Miscellaneous small drainage improvement projects that result from citizen complaints or other departments.****Purpose: Reduce chronic flooding in local areas.****Location/Size/Capacity: County wide.****Initiative Status: Ongoing****Cost: \$6,195,905****Documentation: Natural Resources CIP Budget Guide****Estimate of Water Quality Benefit: NA**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions:

**Estimate of Water Quantity Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: Improved capacity should help with adjacent flooding.

**Screening Criteria:**

Proof of Concept:

Other Impacts:

**Contact: Wanda Wooten – 239-533-8138**

**Northern Everglades – Potential Management Measure****Project Feature: Marine Sanitation Initiative (2904)****Level: 1****General Description/Background: Comprehensive marine sanitation plan, including pump out vessel and strategic land based facilities.****Purpose: Provides facilities to pump out sewage on vessels.****Location/Size/Capacity: Lee County, county wide.****Initiative Status: Ongoing****Cost: \$6,300,000 for FY 2006-2020.****Documentation: Natural Resources CIP Budget Guide****Estimate of Water Quality Benefit: unknown**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: The positive net effect of keeping raw sewage out of Lee County's waterbodies includes protection of public health from bacterial and viral infection and eliminating a point source discharge of nutrients.

**Estimate of Water Quantity Benefit: None**

Minimum:

Maximum:

Most Likely:

Level of Certainty:

Assumptions: None

**Screening Criteria:**

Proof of Concept: Lee County Ordinance 92-30.

Other Impacts:

**Contact: Steve Boutelle – 239-533-8128**

Northern Everglades – Potential Management Measure**Project: Sewer System Infiltration/Inflow Improvements**

**Description:** The project entails planned improvements to the City of Sanibel sewer system to correct infiltration and inflow problems to reduce leakage of nutrients and harmful bacteria into surrounding waters.

**Purpose:** The problems involve the occurrence of groundwater or stormwater entering municipal wastewater systems through cracked or leaking lines. This additional volume of water increases the volume of water that must be collected and treated by municipal wastewater facilities.

**Location/Size/Capacity: Sanibel Island****Initiative Status:**

- Advance planning phase and associated field work
- Preliminary Plans and Specification (30% complete)
- Intermediate Design (60% complete)
- Pre-final Design (90% complete)
- Final Design
- Permit submittals

**Cost: \$40,000**

**Documentation:****Estimate of Water Quality Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities- location/sub-watershed where activity will apply; what does % reduction apply to-which land uses, only new development, etc.)

**Estimate of Water Quantity Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Northern Everglades – Potential Management Measure**

**Project: Bayous Collection System Evaluation**

The project involves conducting an evaluation of an existing failing wastewater treatment facility prior to the City of Sanibel's acceptance of the system.

**Description:** Sanibel Bayous Utilities currently operates the system which is in need of repair and suspected of polluting Clam Bayou. The evaluation will serve to determine if the system needs to be retrofitted or connected to the regional wastewater collection/transmission system.

**Purpose:**

**Location/Size/Capacity:**

**Initiative Status:**

- Advance planning phase and associated field work
- Preliminary Plans and Specification (30% complete)
- Intermediate Design (60% complete)
- Pre-final Design (90% complete)
- Final Design
- Permit submittals

**Cost: \$35,000**

**Documentation:**

**Estimate of Water Quality Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities- location/sub-watershed where activity will apply; what does % reduction apply to-which land uses, only new development, etc.)

**Estimate of Water Quantity Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)

**Level of Certainty: (select one)**

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Northern Everglades – Potential Management Measure**

**Project:** Sanibel Centralized Sanitary Sewer Expansion

**Description:** This project involves the expansion of the City's sanitary sewer system to alleviate pollution to Clam Bayou.

**Purpose:** This portion of the project involves the construction of a low pressure sewer system to facilitate removal of residential septic tanks located on Clam Bayou. The project has recently been completed and the requested funds are for reimbursement.

**Location/Size/Capacity:** Sanibel Island

**Initiative Status:**

- Advance planning phase and associated field work
- Preliminary Plans and Specification (30% complete)
- Intermediate Design (60% complete)
- Pre-final Design (90% complete)
- Final Design
- Permit submittals

**Cost:** \$500,000

**Documentation:**

**Estimate of Water Quality Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities- location/sub-watershed where activity will apply; what does % reduction apply to-which land uses, only new development, etc.)

**Estimate of Water Quantity Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Northern Everglades – Potential Management Measure**

**Project:** Sewer System Expansion, Phase IV

**Description:** This project involves the design of the sanitary sewer system expansion covering six areas of the island located on San Carlos Bay, the Gulf of Mexico and the Sanibel River.

**Purpose:** The project will complete an important intermediate phase required in order to eliminate sewage from septic systems as a source of nutrients and harmful bacteria from surrounding waters.

**Location/Size/Capacity:**

**Initiative Status:**

- Advance planning phase and associated field work
- Preliminary Plans and Specification (30% complete)
- Intermediate Design (60% complete)
- Pre-final Design (90% complete)
- Final Design
- Permit submittals

**Cost:** \$120,000 Funds will be used to initiate the design work necessary to implement the project.

**Documentation:**

**Estimate of Water Quality Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities- location/sub-watershed where activity will apply; what does % reduction apply to-which land uses, only new development, etc.)

**Estimate of Water Quantity Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Northern Everglades – Potential Management Measure****Project: Ft. Myers Beach Stormwater Management Study**

**Description:** The project proposes to implement Phase 1A of a two phase comprehensive stormwater management plan for Estero Island.

**Purpose:** The initial phase will identify and map existing infrastructure, assess water storage and treatment alternatives, and develop an island-wide stormwater management strategy.

**Location/Size/Capacity:****Initiative Status:**

- Advance planning phase and associated field work
- Preliminary Plans and Specification (30% complete)
- Intermediate Design (60% complete)
- Pre-final Design (90% complete)
- Final Design
- Permit submittals

**Cost: \$60,000**

**Documentation:****Estimate of Water Quality Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g. for features- sub-watershed; period of record; inflow concentration/load; did you assume bmps were implemented or not) (e.g. for activities- location/sub-watershed where activity will apply; what does % reduction apply to-which land uses, only new development, etc.)

**Estimate of Water Quantity Benefits:**

- Minimum –
- Maximum-
- Most Likely-
- Level of Certainty- conceptual/final/unknown
- Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

## Northern Everglades – Potential Management Measure

**Project:** RWCA (Recyclable Water Containment Areas)

Agricultural Suite (SWFFS WQ - W30, W33, W36, W39, W42, W48, W54, W57, W60, W63, NEW Freshwater Okeechobee, W82, W86, W91, W108)

**Description:** This project consists of several specific management measures/features that can be applied to agricultural areas for reduction of nutrients to receiving waters. These features can be applied in sub-basins (list below) with significant agricultural land use. Which feature is applied will be dependent upon the suitability of the features for the specific area/grower. The following are management measures that may be included within the agricultural suite:

- RWCA (Recyclable Water Containment Areas) - A distributed reservoir system within agricultural lands. Constructed with earthen berms from on-site material with ~2' water depth. RWCA will remain in operation for approximately 5 years, at which time the area will come back into production of traditional ag products utilizing the nutrients that have built up in the soil through settling when water was present in the RWCA.

*Note: This project is one of many developed by the SWFFS WQ sub-team to address the nutrient enrichment issues of the Caloosahatchee Basin. The strategy of this effort was to formulate both structural and non-structural features that, once implemented, will collectively lead to restoration through pollutant load reductions (primarily nutrients). The cumulative effect of these pollutant reductions are to achieve water quality targets set forth by the SWFFS WQ sub-team (based either on an ecological resource, historical conditions, or reference conditions).*

**Purpose:** The purpose of this feature is reduction of nutrient loads into the Caloosahatchee River.

**Location/Size/Capacity:**

- Sub-basin:
  - Freshwater Caloosahatchee SouthEast
  - Okaloacoochee Slough North
  - Gum Slough
  - Freshwater Caloosahatchee SouthWest
  - Hickey Creek
  - Freshwater Caloosahatchee NorthEast
  - Freshwater Caloosahatchee Tributaries
  - Bee Branch
  - Jacks Branch
  - Otter Creek
  - Freshwater Caloosahatchee Okeechobee
  - Telegraph Swamp
  - Tidal Caloosahatchee Tributaries
- Location: Agricultural properties within each of these sub-basins
- Size and Capacity: Specific management measures from the ag suite will be implemented on a percentage of ag properties at any given time, and the capacity will be dependent upon that percentage, the measure implemented, and the acreage of ag land in the sub-basin.

**Initiative Status:** Conceptual

**Cost:** TBD

**Documentation:** Southwest Florida Feasibility Study (SWFFS) Water Quality Sub-team: Water Quality Plan Formulation Document (work in progress)

**Also see documents produced by IFAS (Sanjay Shukla and Ed Hanlon)**

**Estimate of Water Quality Benefits:**

- Nutrient load reduction to Caloosahatchee River and Estuary. The specific water quality benefits will be dependent upon the total area of ag lands implementing this, and the specific measure used
- Level of Certainty- Conceptual

**Estimate of Water Quantity Benefits:**

- Water quantity benefits include the storage of water during peak flows on land that would otherwise continue down the River to the Estuary. This system has the potential for very large quantities of water to be stored.
- Level of Certainty- Conceptual

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Level 5-** implementation certainty unknown; conceptual idea with limited information

## Northern Everglades – Potential Management Measure

**Project:** HWCAs (Harvestable Water Containment Areas)

Agricultural Suite (SWFFS WQ - W30, W33, W36, W39, W42, W48, W54, W57, W60, W63, NEW Freshwater Okeechobee, W82, W86, W91, W108)

**Description:** This project consists of several specific management measures/features that can be applied to agricultural areas for reduction of nutrients to receiving waters. These features can be applied in sub-basins (list below) with significant agricultural land use. Which feature is applied will be dependent upon the suitability of the features for the specific area/grower. The following are management measures that may be included within the agricultural suite:

HWCAs (Harvestable Water Containment Areas) - Essentially the same structural framework as the RWCAs, but with different management. The HWCAs will be managed to sell water on demand and may be more permanent features than RWCAs.

*Note: This project is one of many developed by the SWFFS WQ sub-team to address the nutrient enrichment issues of the Caloosahatchee Basin. The strategy of this effort was to formulate both structural and non-structural features that, once implemented, will collectively lead to restoration through pollutant load reductions (primarily nutrients). The cumulative effect of these pollutant reductions are to achieve water quality targets set forth by the SWFFS WQ sub-team (based either on an ecological resource, historical conditions, or reference conditions).*

**Purpose:** The purpose of this feature is reduction of nutrient loads into the Caloosahatchee River.

**Location/Size/Capacity:**

- Sub-basin:
  - Freshwater Caloosahatchee SouthEast
  - Okaloacoochee Slough North
  - Gum Slough
  - Freshwater Caloosahatchee SouthWest
  - Hickey Creek
  - Freshwater Caloosahatchee NorthEast
  - Freshwater Caloosahatchee Tributaries
  - Bee Branch
  - Jacks Branch
  - Otter Creek
  - Freshwater Caloosahatchee Okeechobee
  - Telegraph Swamp
  - Tidal Caloosahatchee Tributaries
- Location: Agricultural properties within each of these sub-basins
- Size and Capacity: Specific management measures from the ag suite will be implemented on a percentage of ag properties an any given time, and the capacity will be dependent upon that percentage, the measure implemented, and the acreage of ag land in the sub-basin.

**Initiative Status:** Conceptual

**Cost:** TBD

**Documentation:** Southwest Florida Feasibility Study (SWFFS) Water Quality Sub-team: Water Quality Plan Formulation Document (work in progress)

**Also see documents produced by IFAS (Sanjay Shukla and Ed Hanlon)**

**Estimate of Water Quality Benefits:**

- Nutrient load reduction to Caloosahatchee River and Estuary. The specific water quality benefits will be dependent upon the total area of ag lands implementing this, and the specific measure used
- Level of Certainty- Conceptual

**Estimate of Water Quantity Benefits:**

- Water quantity benefits include the storage of water during peak flows on land that would otherwise continue down the River to the Estuary. This system has the potential for very large quantities of water to be stored.
- Level of Certainty- Conceptual

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Level 5-** implementation certainty unknown; conceptual idea with limited information

**Northern Everglades – Potential Management Measure**

**Project:** Modified Water Retention

Agricultural Suite (SWFFS WQ - W30, W33, W36, W39, W42, W48, W54, W57, W60, W63, NEW Freshwater Okeechobee, W82, W86, W91, W108)

**Description:** This project consists of several specific management measures/features that can be applied to agricultural areas for reduction of nutrients to receiving waters. These features can be applied in sub-basins (list below) with significant agricultural land use. Which feature is applied will be dependent upon the suitability of the features for the specific area/grower. The following are management measures that may be included within the agricultural suite:

- Modified Water Retention - Utilization of existing agricultural stormwater r/detention areas (many are former wetland areas). The management of the existing r/detention areas will be modified to increase water storage. This will likely require an agreement/regulatory authorization from the SFWMD and any other agency that approved the r/detention areas as mitigation for wetlands.

*Note: This project is one of many developed by the SWFFS WQ sub-team to address the nutrient enrichment issues of the Caloosahatchee Basin. The strategy of this effort was to formulate both structural and non-structural features that, once implemented, will collectively lead to restoration through pollutant load reductions (primarily nutrients). The cumulative effect of these pollutant reductions are to achieve water quality targets set forth by the SWFFS WQ sub-team (based either on an ecological resource, historical conditions, or reference conditions).*

**Purpose:** The purpose of this feature is reduction of nutrient loads into the Caloosahatchee River.

**Location/Size/Capacity:**

- Sub-basin:
  - Freshwater Caloosahatchee SouthEast
  - Okaloacoochee Slough North
  - Gum Slough
  - Freshwater Caloosahatchee SouthWest
  - Hickey Creek
  - Freshwater Caloosahatchee NorthEast
  - Freshwater Caloosahatchee Tributaries
  - Bee Branch
  - Jacks Branch
  - Otter Creek
  - Freshwater Caloosahatchee Okeechobee
  - Telegraph Swamp
  - Tidal Caloosahatchee Tributaries
- Location: Agricultural properties within each of these sub-basins
- Size and Capacity: Specific management measures from the ag suite will be implemented on a percentage of ag properties an any given time, and the capacity will be dependent upon that percentage, the measure implemented, and the acreage of ag land in the sub-basin.

**Initiative Status:** Conceptual

**Cost:** TBD

**Documentation:** Southwest Florida Feasibility Study (SWFFS) Water Quality Sub-team: Water Quality Plan Formulation Document (work in progress)

**Also see documents produced by IFAS (Sanjay Shukla and Ed Hanlon)**

**Estimate of Water Quality Benefits:**

- Nutrient load reduction to Caloosahatchee River and Estuary. The specific water quality benefits will be dependent upon the total area of ag lands implementing this, and the specific measure used
- Level of Certainty- Conceptual

**Estimate of Water Quantity Benefits:**

- Water quantity benefits include the storage of water during peak flows on land that would otherwise continue down the River to the Estuary. This system has the potential for very large quantities of water to be stored.
- Level of Certainty- Conceptual

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Level 5-** implementation certainty unknown; conceptual idea with limited information

**Project:** Tailwater Recovery

Agricultural Suite (SWFFS WQ - W30, W33, W36, W39, W42, W48, W54, W57, W60, W63, NEW Freshwater Okeechobee, W82, W86, W91, W108)

**Description:** This project consists of several specific management measures/features that can be applied to agricultural areas for reduction of nutrients to receiving waters. These features can be applied in sub-basins (list below) with significant agricultural land use. Which feature is applied will be dependent upon the suitability of the features for the specific area/grower. The following are management measures that may be included within the agricultural suite:

- Tailwater Recovery - Agricultural stormwater runoff is routed to a catchment basin (new structure), that acts as an infiltration basin with a shallow well downstream. The water will be recovered through the well, which creates a negative pressure and pulls the water in the catchment basin through the soil. Particulate pollutants (including common water molds that would endanger the receiving crops) will be removed via soil infiltration process.

*Note: This project is one of many developed by the SWFFS WQ sub-team to address the nutrient enrichment issues of the Caloosahatchee Basin. The strategy of this effort was to formulate both structural and non-structural features that, once implemented, will collectively lead to restoration through pollutant load reductions (primarily nutrients). The cumulative effect of these pollutant reductions are to achieve water quality targets set forth by the SWFFS WQ sub-team (based either on an ecological resource, historical conditions, or reference conditions).*

**Purpose:** The purpose of this feature is reduction of nutrient loads into the Caloosahatchee River.

**Location/Size/Capacity:**

- Sub-basin:
  - Freshwater Caloosahatchee SouthEast
  - Okaloacoochee Slough North
  - Gum Slough
  - Freshwater Caloosahatchee SouthWest
  - Hickey Creek
  - Freshwater Caloosahatchee NorthEast
  - Freshwater Caloosahatchee Tributaries
  - Bee Branch
  - Jacks Branch
  - Otter Creek
  - Freshwater Caloosahatchee Okeechobee
  - Telegraph Swamp
  - Tidal Caloosahatchee Tributaries
- Location: Agricultural properties within each of these sub-basins
- Size and Capacity: Specific management measures from the ag suite will be implemented on a percentage of ag properties at any given time, and the capacity will be dependent upon that percentage, the measure implemented, and the acreage of ag land in the sub-basin.

**Initiative Status:** Conceptual

**Cost:** TBD

**Documentation:** Southwest Florida Feasibility Study (SWFFS) Water Quality Sub-team: Water Quality Plan Formulation Document (work in progress)

**Also see documents produced by IFAS (Sanjay Shukla and Ed Hanlon)**

**Estimate of Water Quality Benefits:**

- Nutrient load reduction to Caloosahatchee River and Estuary. The specific water quality benefits will be dependent upon the total area of ag lands implementing this, and the specific measure used
- Level of Certainty- Conceptual

**Estimate of Water Quantity Benefits:**

- Water quantity benefits include the storage of water during peak flows on land that would otherwise continue down the River to the Estuary. This system has the potential for very large quantities of water to be stored.
- Level of Certainty- Conceptual

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Level 5-** implementation certainty unknown; conceptual idea with limited information.

SWFFWS Preliminary Alternative 26: Billy's Creek Restoration

Significance:

Addresses Objectives 1, 3, 4, 5, 6, 7

- Remove spoil berms
- Modify topography
- Remove invasive exotic vegetation
- Plant native vegetation
- Construct filter marsh

**SWFFWS**

**Preliminary Alternative 29: Caloosahatchee Creeks**

Significance: Some unique habitats

Addresses Objectives 1, 2, 3, 4, 5, 6, 7

- Remove invasive exotic vegetation
- Plant native vegetation
- Modify topography
- Remove spoil berms
- Remove fill material
- Backfill ditches
- Remove solid waste debris
- Remove agricultural weir
- Replace culverts
- Construct filter marsh
- ("Reconnect creek profile at road blockages")
- ("Reduce encroachment")
- ("Improve water quality around SR 78")
- ("Water quality improvement features")

**SWFFWS**

**Preliminary Alternative 30: Caloosahatchee Oxbows**

Significance: Riparian backwater habitat for fish spawning, turtle activity

Addresses Objectives 1, 2

- Dredge sediments
- Remove fill material
- Modify topography
- Remove invasive exotic vegetation
- Plant native vegetation

**SWFFWS**

**Preliminary Alternative 31: City Golf Course Filter Marsh**

Significance:

Addresses Objectives 1, 7

- Construct filter marsh
- Modify topography

**SWFFWS**

**Preliminary Alternative 33: Ding Darling Impoundments**

Significance: Critical for migratory bird habitat

Addresses Objectives 1, 2

- Construct water control structures
- Install culverts under roads
- Remove spoil berms
- Construct bridge with sill
- ("Rehabilitate Wildlife Drive")
- ("Reconnect freshwater flows that backup behind Indigo Trail")

**SWFFWS**

**Preliminary Alternative 36: Hancock Creek Riverine Corridor**

Significance: Includes very rare leather fern habitat. Half of this area is under high development pressure.

Addresses Objectives 1, 2, 3, 4, 5, 6

- Construct water control structures
- Remove invasive exotic vegetation
- Plant native vegetation

**SWFFWS**

**Preliminary Alternative 43: Manatee Island Complex**

Significance:

Addresses Objectives 1, 2

- Remove spoil berms
- Modify topography
- Remove invasive exotic vegetation
- Plant native vegetation

**SWFFWS**

**Preliminary Alternative 44: Manual's Branch**

Significance:

Addresses Objective 7

- Construct filter marsh
- Plant native vegetation

**SWFFWS**

**Preliminary Alternative 45: Matlacha Buffer**

Significance: Important crocodile corridor. High marsh habitat is rare in SW Florida.

Addresses Objectives 1, 2, 3, 4, 5, 6

- Remove spoil berms
- Install culverts under roads
- Remove fill roads
- Backfill ditches
- Modify topography
- Remove invasive exotic vegetation
- Plant native vegetation

**SWFFWS**

**Preliminary Alternative 47: Orange River**

Significance: Some recent development pressure in this area.

Addresses Objectives 1, 2, 3, 4, 5, 6, 7

- Remove spoil berms
- Modify topography
- Remove invasive exotic vegetation
- Plant native vegetation
- Construct water detention area
- Install culverts under roads
- Remove fill roads
- Backfill ditches
- Construct filter marsh

**SWFFWS****Preliminary Alternative 48: Pine Island Buffer**

Significance: Pineland habitat on coastal barrier islands is rare in SW Florida.

Addresses Objectives 1, 2

- Remove spoil berms
- Install culverts under roads
- Remove fill roads
- Backfill ditches
- Modify topography
- Construct filter marsh
- Backfill borrow pits
- Create littoral zones in borrow pits
- Fire Management - controlled burns
- Remove invasive exotic vegetation
- Plant native vegetation

**SWFFWS****Preliminary Alternative 49: Prairie Pine Preserves / Caloosahatchee Headwaters**

Significance: This hydric slash pine flatwoods area is under high development pressure. Contains habitat for red-cockaded woodpeckers and black bears.

Addresses Objectives 1, 2, 3, 4, 5, 6, 7

- Backfill borrow pits
- Create littoral zones in borrow pits
- Replace or install culverts
- Modify topography
- Remove invasive exotic vegetation
- Plant native vegetation
- Construct wildlife crossing underpasses
- Construct filter marsh

**SWFFWS**

**Preliminary Alternative 50: Punta Rassa**

Significance: High marsh and tropical hardwood hammock habitats are rare in SW Florida.

Addresses Objectives 1, 2, 3, 4, 5, 6, 7

- Modify topography
- Backfill ditches
- Remove spoil berms
- Remove fill material
- Remove invasive exotic vegetation
- Plant native vegetation

**SWFFWS**

**Preliminary Alternative 51: Sanibel Wetland Complex**

Significance: Leather fern marsh habitat is rare in SW Florida.

Addresses Objectives 1, 2, 7

- Modify topography
- Construct water control structures
- Backfill ditches
- Remove spoil berms
- Remove fill material
- Remove invasive exotic vegetation
- Plant native vegetation

**SWFFWS**

**Preliminary Alternative 53: Sound Island Network**

Significance:

Addresses Objectives 1, 2

- Modify topography
- Backfill ditches
- Remove spoil berms
- Remove fill material
- Remove invasive exotic vegetation
- Plant native vegetation

**SWFFWS**

**Preliminary Alternative 54: Tidal Caloosahatchee Buffer**

Significance:

Addresses Objectives 1, 2, 3, 4, 5, 6

- Modify topography
- Backfill ditches
- Remove spoil berms
- Remove fill roads
- Remove fill material
- Remove invasive exotic vegetation
- Plant native vegetation

**SWFFWS**

**Preliminary Alternative 55: Yellow Fever Creek Headwaters**

Significance: This area is under heavy development pressure.

Addresses Objectives 1, 3, 4, 5, 6

- Construct water control structures

**SWFFWS****Preliminary Alternative 56: Yucca Pens**

Significance: Very significant area for ecological connectivity. Contains the endangered beautiful pawpaw.

Addresses Objectives 1, 2, 3, 4, 5, 6

- Modify topography
- Backfill ditches
- Create littoral zones in borrow pits
- Remove spoil berms
- Remove fill roads
- Remove fill material
- Remove invasive exotic vegetation
- Plant native vegetation

## Northern Everglades – Potential Management Measure

**Project:** Urban Suite (SWFFS WQ – W66, W71, W77, W85, W90, W98,)

**Description:** This project consists of many specific management measures/features that can be applied within urban areas for reduction of nutrients and other pollutants to receiving waters. These features can be applied in sub-basins (list below) with significant urban land use. Both structural and non-structural measures can be implemented, and which feature is applied will be dependent upon the suitability of the features for the specific urban land use. The following are management measures that may be included within the urban suite:

### 7.1 Urban Suite

- Urban stormwater components
    - Vegetated Swales
    - Bioretention Areas
    - Modular Treatment Systems
    - Sand Filters
    - Wet Detention Ponds
    - Pervious pavement
  - Stormwater infrastructure retrofits
  - Modified Water Retention
  - Filter Marshes
  - Urban non-structural
  - Golf course components & tailwater recovery
  - Low impact development
- 
- Urban stormwater components – These are small-scale components that can be incorporated into an urban setting for a cumulative pollutant reductions impact.
    - Vegetated Swales - A broad, shallow channel with a dense stand of vegetation covering the side slopes and bottom. Designed to trap particulate pollutants (suspended solids and trace metals), promote infiltration, and reduce the flow velocity of stormwater runoff to receiving waterbodies. (Weirs/check dams and floating debris removal components can be added to enhance swales)
    - Wet Detention Ponds – Stormwater control structures providing both retention and treatment of contaminated storm water runoff. Sedimentation processes remove particulates, organic matter, and metals, while dissolved metals and nutrients are removed through biological uptake.
    - Bioretention Areas – Vegetated depression areas used to retain stormwater and provide some level of treatment using soil, plants and microbes before the water is infiltrated or discharged. This component is traditionally used in areas where the water table is below 6 feet from surface, to allow for infiltration as the primary pollutant removal element. In South Florida, this component will be similar to a wet detention pond or vegetated swale that will retain stormwater for settling of pollutants and include vegetation for some nutrient removal.
    - Modular Treatment Systems – Storm water treatment technology consisting of a series of sedimentation chambers and constructed wetlands. The wetlands are contained within a modular, 2.9- meter (9.5 feet) diameter recycled-polyethylene tank. The modular system can be applied in many different scenarios, ranging from residential areas to most industrial parks. This may be useful at stormwater outfalls into canals that are adjacent to other surface waters.

- Sand Filters - A typical sand filter system consists of two or three chambers or basins. The first is the sedimentation chamber, which removes floatables and heavy sediments. The second is the filtration chamber, which removes additional pollutants by filtering the runoff through a sand bed. The third is the discharge chamber. Sand filters are able to achieve high removal efficiencies for sediment, biochemical oxygen demand (BOD), and fecal coliform bacteria. Total metal removal, however, is moderate, and nutrient removal is often low.
  - Pervious Pavement – Porous asphalt or pervious cement – allows water to percolate through it. Reduces runoff and filters some pollutants.
- Stormwater infrastructure retrofits – Updating of current stormwater management systems within older urban areas. This includes many structural components (including some of the urban stormwater components), but is applied to an entire urban area with the intent of slowing and holding stormwater on the land to facilitate settling and nutrient uptake prior to discharge into surface waters.
- Modified Water Retention - Utilization of existing agricultural stormwater r/detention areas (many are former wetland areas). The management of the existing r/detention areas will be modified to increase water storage. This will likely require an agreement/regulatory authorization from the SFWMD and any other agency that approved the r/detention areas as mitigation for wetlands.
- Filter Marshes - Constructed treatment wetlands that are much smaller in scale than STAs and often located in urban settings where space is limited. Intent is to slow down flow of water and reduce suspended solids and metals, as well as provide some nutrient uptake.
- Urban Non-structural components:
  - Urban non-structural components – Includes educational components to increase awareness (general public and lawn care workers) on detrimental effects of over-fertilization and the promotion of native plants. Intent is to curb fertilizer, pesticide, and irrigation usage in the urban setting
    - Homeowner BMPs
      - Florida Yards & Neighborhoods
      - On-site summer water storage for winter watering
    - BMP Training for contractors
    - Community/Resident Education
      - Golf course non-structural components and tailwater recovery– Fertilizer, pesticide, stormwater, and stormwater pond BMPs to reduce nutrients, chemicals, and stormwater leaving the golf course.
      - Clean Marina – DEP program. It involves many BMPs that the marina operators can choose from to reduce pollution and increase efficiency. It may provide WQ benefits in the areas of stormwater retention and metal contamination reduction to surface waters.
      - **Conversion of WWTP point sources to reuse**
- Tailwater Recovery\* - Agricultural (or golf course) stormwater runoff is routed to a catchment basin (new structure), that acts as an infiltration basin with a shallow well downstream. The water will be recovered through the well, which creates a negative pressure and pulls the water in the catchment basin through the soil. Particulate pollutants (including common water molds that would endanger the receiving crops) will be removed via soil infiltration process.
- Low impact development – Technologies applied to developed landscapes to reduce stormwater runoff and pollutant loading to receiving waters. Some of the elements include:

bioretention, grass swales, vegetated roof covers, permeable pavements, and other strategies to reduce the amount of impervious surface in developed areas.

---

*Note: This project is one of many developed by the SWFFS WQ sub-team to address the nutrient enrichment issues of the Caloosahatchee Basin. The strategy of this effort was to formulate both structural and non-structural features that, once implemented, will collectively lead to restoration through pollutant load reductions (primarily nutrients). The cumulative effect of these pollutant reductions are to achieve water quality targets set forth by the SWFFS WQ sub-team (based either on an ecological resource, historical conditions, or reference conditions).*

**Purpose:** The purpose of this feature is reduction of nutrients and other pollutants into the Caloosahatchee River.

**Location/Size/Capacity:**

- Sub-basin:
  - Orange River
  - Six Mile Cypress
  - Fort Myers
  - Tidal Caloosahatchee Tributaries
  - North Fort Myers
  - Cape Coral
- Location: Urban areas within each of these sub-basins
- Size and Capacity: Specific to area/neighborhood/land use.

**Initiative Status:** Conceptual

**Cost:** TBD

**Documentation:** Southwest Florida Feasibility Study (SWFFS) Water Quality Sub-team: Water Quality Plan Formulation Document (work in progress)

**Estimate of Water Quality Benefits:**

- Pollutant load reduction to Caloosahatchee River and Estuary. The specific water quality benefits will be dependent upon the total area and type of measures being implemented.
- Level of Certainty- Conceptual

**Estimate of Water Quantity Benefits:**

- Some of the measures contain a water storage feature that may have water quantity benefits
- Level of Certainty- Conceptual

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Level 5-** implementation certainty unknown; conceptual idea with limited information

## Northern Everglades – Potential Management Measure

**Project:** Recyclable Water Containment Areas (RWCA) in the S-4 sub-basin (Freshwater Caloosahatchee Okeechobee)

**Description:** A distributed reservoir system within agricultural lands. Constructed with earthen berms from on-site material with ~2' water depth. RWCAs will remain in operation for approximately 5 years, at which time the area will come back into production of traditional ag products utilizing the nutrients that have built up in the soil through settling when water was present in the RWCA.

*Note: This project is one of many developed by the SWFFS WQ sub-team to address the nutrient enrichment issues of the Caloosahatchee Basin. The strategy of this effort was to formulate both structural and non-structural features that, once implemented, will collectively lead to restoration through pollutant load reductions (primarily nutrients). The cumulative effect of these pollutant reductions are to achieve water quality targets set forth by the SWFFS WQ sub-team (based either on an ecological resource, historical conditions, or reference conditions).*

**Purpose:** The purpose of this feature is reduction of nutrient loads into the Caloosahatchee River.

**Location/Size/Capacity:**

- Sub-basin: S-4 basin (Freshwater Caloosahatchee Okeechobee)
- Location: Agricultural properties within the sub-basin
- Size and Capacity: RWCAs will be implemented on a percentage of ag properties at any given time, and the capacity will be dependent upon that percentage and the acreage of ag land in the sub-basin.

**Initiative Status:** Conceptual

**Cost:** TBD

**Documentation:** Southwest Florida Feasibility Study (SWFFS) Water Quality Sub-team: Water Quality Plan Formulation Document (work in progress)

**Also see documents produced by IFAS (Sanjay Shukla and Ed Hanlon)**

**Estimate of Water Quality Benefits:**

- Nutrient load reduction to Caloosahatchee River and Estuary. The specific water quality benefits will be dependent upon the total area of ag lands operating RWCAs
- Level of Certainty- Conceptual
- Assumptions leading to benefit estimate- Work by UF and IFAS has shown this system to have potential water quality benefits as well as benefits to agricultural operations.

**Estimate of Water Quantity Benefits:**

- Water quantity benefits include the storage of water during peak flows on land that would otherwise continue down the River to the Estuary. This system has the potential for very large quantities of water to be stored.
- Level of Certainty- Conceptual
- Assumptions leading to benefit estimate- Work by UF and IFAS has shown this system to have potential water quantity benefits as well as benefits to agricultural operations.

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Level 5-** implementation certainty unknown; conceptual idea with limited information

**Northern Everglades – Potential Management Measure**

**Project:** Riparian Buffers (SWFFS WQ – W31, W34, W37, W40, W45, W49, W55, W58, W61, W64, W67, W75, W78, W83, W88, W93, W96, W99)

**Description:** This project consists of the installation of riparian buffers, which are vegetated areas adjacent to a body of water that can be a complete ecosystem or function as an ecotone between aquatic and terrestrial ecosystems. Depending upon the slope, density of vegetation, soils, width of buffer, water flow direction and speed, etc. riparian buffers can be very effective for nutrient removal. In order for nutrient removal to occur, the water must flow directly through the riparian buffer into the surface water.

In areas where canals are the main waterbodies, a technique called “canal softening” is included under the heading of riparian buffers. This may include re-working the canals to have: shallower side slopes, shallower depths, littoral zones, meanders, etc. This component is designed to eliminate the water quality problems associated with deep, box-cut canal systems (DO, stratification, etc.) and to add natural treatment features such as littoral zones as well as a benthic biological component. A riparian buffer will be installed along the edge of the re-worked (softened) canals.

This specifically includes “canal softening” along the C-43 canal (Caloosahatchee River)

*Note: This project is one of many developed by the SWFFS WQ sub-team to address the nutrient enrichment issues of the Caloosahatchee Basin. The strategy of this effort was to formulate both structural and non-structural features that, once implemented, will collectively lead to restoration through pollutant load reductions (primarily nutrients). The cumulative effect of these pollutant reductions are to achieve water quality targets set forth by the SWFFS WQ sub-team (based either on an ecological resource, historical conditions, or reference conditions).*

**Purpose:** The purpose of this feature is reduction of nutrient loads into the Caloosahatchee River and improvement of other water quality parameters.

**Location/Size/Capacity:**

- Sub-basin:
  - Freshwater Caloosahatchee SouthEast
  - Okaloacootchee Slough North
  - Gum Slough
  - Freshwater Caloosahatchee SouthWest
  - Hickey Creek
  - Freshwater Caloosahatchee NorthEast
  - Freshwater Caloosahatchee Tributaries
  - Bee Branch
  - Jacks Branch
  - Otter Creek
  - Orange River
  - Six Mile Cypress
  - Fort Myers
  - Telegraph Swamp
  - Tidal Caloosahatchee Tributaries
  - North Fort Myers
  - Cecil Webb/Yucca Pens
  - Cape Coral
- Location: Agricultural properties within each of these sub-basins

- **Size and Capacity:** Specific management measures from the ag suite will be implemented on a percentage of ag properties at any given time, and the capacity will be dependent upon that percentage, the measure implemented, and the acreage of ag land in the sub-basin.

**Initiative Status:** Conceptual

**Cost:** TBD

**Documentation:** Southwest Florida Feasibility Study (SWFFS) Water Quality Sub-team: Water Quality Plan Formulation Document (work in progress)

**Also see documents produced by IFAS (Sanjay Shukla and Ed Hanlon)**

**Estimate of Water Quality Benefits:**

- Nutrient and other pollutant load reduction to Caloosahatchee River and Estuary.
- Level of Certainty- Conceptual

**Estimate of Water Quantity Benefits:**

- Potential for slowing down flows
- Level of Certainty- Conceptual

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Level 5-** implementation certainty unknown; conceptual idea with limited information

**Northern Everglades – Potential Management Measure**

**Project:** Water Quality Treatment Area – Algal Turf Scrubber facility – Orange River sub-basin (Bob’s Triangle Marsh) - SWFFS WQ – NEW Orange River

**Description:** This project consists of an Algal Turf Scrubber facility (or multiple facilities) within the Orange River sub-basin to treat water from this sub-basin for nutrient removal.

**Purpose:** The purpose of this project is to reduce nutrient concentrations within the Caloosahatchee River and nutrient pollutant loading to the downstream estuary. This feature, in conjunction with others within the basin, are designed to have the cumulative effect of reducing nutrient concentrations and loads significantly enough to meet water quality targets within the Caloosahatchee Estuary.

*Note: This project is one of many developed by the SWFFS WQ sub-team to address the nutrient enrichment issues of the Caloosahatchee Basin. The strategy of this effort was to formulate both structural and non-structural features that, once implemented, will collectively lead to restoration through pollutant load reductions (primarily nutrients). The cumulative effect of these pollutant reductions are to achieve water quality targets set forth by the SWFFS WQ sub-team (based either on an ecological resource, historical conditions, or reference conditions).*

**Location/Size/Capacity:**

- Sub-basin: Orange River
- Location: Bob’s Triangle Marsh?
- Size and Capacity: One or more ATS facilities to attain the maximum nutrient removal possible

**Initiative Status:** Conceptual

**Cost:** TBD

**Documentation:** Southwest Florida Feasibility Study (SWFFS) Water Quality Sub-team: Water Quality Plan Formulation Document (work in progress)

**Estimate of Water Quality Benefits:**

- Nutrient load reduction to Caloosahatchee River and Estuary. The specific water quality benefits will be dependent upon the amount of water the facility can treat, and the efficiency of treatment it is capable of.
- Level of Certainty- Conceptual
- Assumptions leading to benefit estimate- ATS technology is relatively new, but has been shown to be efficient at nutrient removal. The assumption is made that a series of these facilities will be able to treat enough water to have an impact on nutrient loading to the River and Estuary

**Estimate of Water Quantity Benefits:**

- None
- Level of Certainty- Conceptual

**Level of Certainty: (select one)**

**Level 1-** already constructed/implemented or construction/implementation imminent

**Level 2-** construction/implementation likely; detailed design/activity development ongoing; location well defined

**Level 3-** implementation certainty unknown; conceptual level of design/activity development complete; location defined

**Level 4-** implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

**Level 5-** implementation certainty unknown; conceptual idea with limited information

SOUTH FLORIDA WATER MANAGEMENT DISTRICT



## Water Quality Analyses

### Phase II Technical Plan for Lake Okeechobee Watershed Construction Project

CRWPP Working Team Meeting  
December 20, 2007

Joyce Zhang, Principal Engineer  
Lake Okeechobee Division  
South Florida Water Management District

sfwmd.gov

---

---

---

---

---

---

---

---

SOUTH FLORIDA WATER MANAGEMENT DISTRICT



## Water Quality Analyses

- Spreadsheet approach to evaluate phosphorus reductions at different spatial scales
- Built upon the 2007 Lake Okeechobee Protection Plan update

sfwmd.gov

---

---

---

---

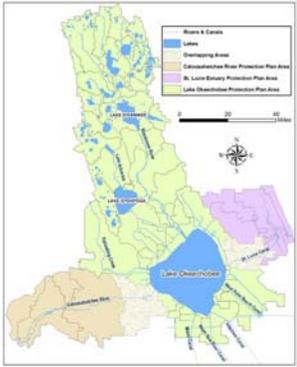
---

---

---

---

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Northern  
Everglades  
Protection Plan  
Areas

sfwmd.gov

---

---

---

---

---

---

---

---









SOUTH FLORIDA WATER MANAGEMENT DISTRICT

## Water Quality Analyses

- **Baseline Data**
- **Current Activities (Levels 1 and 2)**
- **Alternatives – Combinations of Load Reduction Management Measures (Levels 3 through 5)**

sfwmd.gov

---

---

---

---

---

---

---

---

---

---

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

## Water Quality Analyses

- **Alternative 1 – Common Element**  
Contains Levels 1 and 2 MMs, plus certain Levels 3 and 4 MMs
- **Alternatives 2 through 4 are independent, but they are additive to Alternative 1**

sfwmd.gov

---

---

---

---

---

---

---

---

---

---

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Subwatershed	Average Annual # Load		Other Regional Projects (7)		Alternative #1 Load Reduction Management Measures (8)		
	Measured (1991-2005) (Mtons)	Adjusted Remain. Load* (Mtons)	Load Red. (Mtons)	Remain. Conc. (ppb)	Adjusted Remain. Load* (Mtons)	Adjusted Remain. Load* (Mtons)	Adjusted Remain. Load* (Mtons)
Upper Kissimmee (S-65)**	91	78	4	63	74		
Lower Kissimmee (S-65A,B,C,D,E)	77	21	8	29	14		
Taylor Creek/Nubbin Slough (S-191,154,133,135)	124	42	15	113	26		
Lake Istokpoga (S-68)**	23	23	0	63	23		
Indian Prairie Basins (12 basins)	89	51	36	50	15		
Fisheating Creek & Nicodemus Slough (Culv 5)	55	39	0	143	39		
West Lake Okeechobee Basin (S-77)***	1	1	0	139	1		
EAA Basins	33	12	0	66	12		
East Lake Okeechobee Basins (C-44, L-8)	20	8	0	57	8		
<b>Total Reductions to the Lake</b>	<b>514</b>	<b>275</b>	<b>62</b>	<b>67</b>	<b>213</b>		
TMDL (not including 35 t of atmospheric deposition)			105		105		
Remaining Load			170		108		

sfwmd.gov

---

---

---

---

---

---

---

---

---

---

