

Caloosahatchee River Watershed Protection Plan Management Measures
aka "Where's My Management Measure"

Yellow = Alt 1 Common Elements

MM#	Project Feature/ Activity	Level	Notes
	Imported from LO Plan		
CRE-LO 01,02,49	Agricultural BMPs	1	
CRE-LO 03	Urban Turf Fertilizer Rule (LOER)	1	
CRE-LO 04	Land Application of Residuals	1	
CRE-LO 05	Florida Yards and Neighbors	1	
CRE-LO 08	NPDES Stormwater Program	1	
CRE-LO 09	Coastal & Estuarine Land Conservation Program	1	
CRE-LO 12g	Alternative Water Storage (LOER) - Barron Water Control District	1	
CRE-LO 15	Caloosahatchee River Watershed Works of the District Rule Regulatory Phosphorus Source Control Program	2	
CRE-LO 21	Lake Okeechobee and Estuary Watershed Basin Rule (LOER)	3	
CRE-LO 40	Lake Hicpochee	4	Combines CRE 03 & CRE 05
CRE-LO 41	C-43 Distributed Reservoirs	4	
CRE-LO 63	Wastewater & Stormwater Master Plans	4	
CRE-LO 64	Unified Statewide Stormwater Rule	4	
CRE-LO 68	Comprehensive Planning - Land Development Regulations (LDR)	3	
CRE-LO 87c	Florida Ranchlands Environmental Services Project (FRESP)	1	
CRE-LO 91	Farm and Ranchland Protection Program	4	
CRE-LO 92	Clewiston STA	4	
	CRE - MM		
CRE 01	Recyclable Water Containment Areas (RWCA) in the Freshwater Caloosahatchee Southeast sub-basin	4	Combine with CRE 93

CRE 02	Centralized Recycled Water Containment Area in the S-4 Basin	5	Include CRE 115
CRE 03	Lake Hicpochee	5	Combine with CRE-LO 40
CRE 04	Lake Hicpochee Restoration	5	Combine CRE 06, 07, 08
CRE 05	West Lake Hicpochee Water Quality Treatment Area (C-19 canal)	3	Combine with CRE-LO 40
CRE 06	Lake Hicpochee Restoration	4	Combine in CRE 04
CRE 07	Hicpochee Restoration -STAs and Filter Marsh	4	Combine in CRE 04
CRE 08	Lake Hicpochee storage/flowway/ treatment feature	3	Combine in CRE 04
CRE 09	Recyclable Water Containment Areas (RWCA) in the Freshwater Caloosahatchee Southeast sub-basin	4	
CRE10	C-43 Water Quality Treatment and Demonstration Project (BOMA property)	3	
CRE11	Water Quality Treatment Area - Constructed Wetland/STA - Caloosahatchee Ecoscape	4	
CRE 12	Christmas Canal Stormwater Treatment Area	3	
CRE 13	Water Quality Treatment Area - Constructed Wetland/STA @ C-43 West Basin Storage Reservoir	4	Combine with CRE 14
CRE 14	Filter Marsh (STA) for C-43 Reservoir	5	
CRE 15	Filter Marsh (STA) for C-43 Reservoir	Duplicate	
CRE 16	Water Quality Treatment Area - @ Hunt Club	4	
CRE 17	East Lee County Aquifer Recharge Program (Proj 8515 - FY 1995-1996)	1	does not meet objective
CRE 18	Harns Marsh Improvements, Phase I Construction - ECWCD	1	
CRE 19	Harns Marsh Improvements, Phase II Final Design - ECWCD	2	
CRE 20	Yellowtail Structure Construction - ECWCD	2	Combine with CRE 39
CRE 21	Hendry County Storage	4	
CRE 22	Hendry Extension Canal Widening (Construction) - ECWCD	2	
CRE 23	Carlos Waterway Conveyance for WQ in C-43	4	Potential combination with CRE 13
CRE 24	Bedman Creek Corridor Restoration	4	Combine as part of CRE 34 -Generic BMP for creeks/outfalls.
CRE 25	Hickey Creek Cypress Swamp	4	
CRE 26	Hickey Creek Cypress Swamp	Duplicate	

CRE 27	Hickey Creek Headwater Restoration	4	Combine as part of CRE 34 -Generic BMP for creeks/outfalls.
CRE 28	Lehigh Acres Centralized Wastewater Treatment and Re-use (Hickey Creek Sub-basin Freshwater Caloosahatchee) SWFFS WQ -w44	3	Combine with CRE 35
CRE 29	"New" Hickey Creek - Lehigh Acres Stormwater Retrofits - SWFFS WQ -	3	Combine with CRE 35
CRE 30	Aquifer Benefit and Storage for Orange River Basin (ABSORB) - ECWCD	2	
CRE 31	Expansion of Harnes March - Orange River sub-basin	4	Combine with CRE 37
CRE 32	Orange River Algal Turf Scrubber	5	WQ feature - include CRE 117
CRE 33	Orange River Outfall (403134)	1	
CRE 34	Caloosahatchee Tidal Creeks - Mouth of Orange River	4	Use as base for generic Creeks/Outfall MM
CRE 35	Lehigh Acres Centralized Wastewater Treatment and Re-use (Orange River sub-basin Tidal Caloosahatchee)	4	see Hickey Creek CRE 28
CRE 36	Dog Canal - Hendry Canal Connection (Final Design and Construction)	3	
CRE 37	West Marsh Property (Final Design and & Construction)	3	Combine with CRE 18
CRE 38	Jacks Branch Stream Restoration	4	Combine as part of CRE 34 -Generic BMP for creeks/outfalls. Tie into Bonita Bay project nearby.
CRE 39	Yellowtail Structure Retrofit Construction - ECWCD	2	Combine with CRE 20
CRE 40	Stroud Creek Improvements (Project #8530)	1	Combine as part of CRE 34 -Generic BMP for creeks/outfalls.
CRE 41	Stroud Creek Restoration (Project #8585)	1	Combine as part of CRE 34 -Generic BMP for creeks/outfalls.
CRE 42	Water Quality Treatment Are - Constructed Wetland/STA - "Four Corners" area SWFFS WQ - W62	4	Combine with CRE 44
CRE 43	Spanish Creek Restoration (Project #8538)	1	Combine with CRE 44
CRE 44	Spanish Creek Four Corners Environmental Restoration	3	Include CRE 42 & 43. Phase 1-3
CRE 45	Billy Creel Filter Marsh Phase I & II	2	Combine CRE 45, 46, 47
CRE 46	Billy Creek Filter Marsh, Phase 1	1	Combine with 45

CRE 47	Ford Filter Canal	2	Combine with 45
CRE 48	Manuel's Branch Silt Reduction Structure	2	
CRE 49	Manuel's Branch East and West Weirs	2	
CRE 50	Alameda Canal (Project #0761)	1	Combine as part of CRE 34 -Generic BMP for creeks/outfalls.
CRE 51	Poling Lane Drainage (Project #8556)	1	Combine as part of CRE 34 -Generic BMP for creeks/outfalls.
CRE 52	Daughtrey's Creek Improvements (Project # 8524)	1	Combine as part of CRE 34 -Generic BMP for creeks/outfalls.
CRE 53	Caloosahatchee Creeks Preserve Hydrological Restoration	2	
CRE 54	Bayshore Creek Improvements (Project #8520)	1	Combine as part of CRE 34 -Generic BMP for creeks/outfalls.
CRE 55	Powell Creek Filter Marsh (Project #8584)	1	
CRE 56	Powell Creek Clean & Snag Program (Project #3042)	1	LWCSC project need more details
CRE 57	Powell Creek Algal Turf Scrubber	3	
CRE 58	Kickapoo Creek Stormwater System Analysis	3	
CRE 59	N Ft Myers Surface Water Restoration Project	1	
CRE 60	Popash Creek Culvert Replacement (Project # 8508)	1	
CRE 61	Popash Creek Culvert Replacement (Project # 8508)	Duplicate	
CRE 62	Popash Creek Preserve (Project #8593)	1	Use as base for CRE 34 - Generic BMP for creeks/outfalls
CRE 63	Popash Creek Preserve (Project #8593)	Duplicate	
CRE 64	Yellow Fever Creek/Gator Slough Transfer Facility (#208509)	1	Combine with CRE 67
CRE 65	Yellow Fever Creek (E. Branch) Structure Replacements (Project #8510)	1	Combine as part of CRE 34 -Generic BMP for creeks/outfalls.
CRE 66	Gator Sough Phase 1 (Project #3060)	1	
CRE 67	Yellow Fever Creek and Gator Sough Interconnect - Lee County	1	Combined with CRE 64
CRE 68	Spreader Canal Restoration - Cape Coral	3	Combine with CRE 70
CRE 69	Cape Coral Stormwater Improvements	2	
CRE 70	Cape Coral Spreader Canals Restoration	3	include CRE 68 & CRE 76
CRE 71	Cohn Branch Channel Improvements (Project #8522)	1	combine as part of CRE 34 -Generic BMP for creeks/outfalls.

CRE 72	Chapel branch Improvements (Project #8521)	1	combine as part of CRE 34 -Generic BMP for creeks/outfalls.
CRE 73	March Point Improvements (Project #8526)	1	combine as part of CRE 34 -Generic BMP for creeks/outfalls.
CRE 74	Hancock Bridge parkway Flood Control (Project #8504)	1	combine as part of CRE 34 -Generic BMP for creeks/outfalls.
CRE 75	North Cape Coral - Water Control Treatment Area	4	get more info and combine with other MM
CRE 76	Spreader Canal Restoration - Cape Coral	1	combined into CRE 70
CRE 77	Cape Coral - Canal Stormwater Recovery and Treatment by ASR	1	
CRE 78	Cape Coral Canal Weir System SWFFS WQ - W101	4	include CRE 79
CRE 79	Weirs Systems in Canals in Cape Coral	1	Combined with CRE 78
CRE 80	Cape Coral Utility Expansion program	1	
CRE 81	Florida Yards and Neighbors - Cape Coral	1	Rolled into Urban Benefits MM
CRE 82	Financial incentives to small governments to eliminate small wastewater treatment plants	3	See CRE 82A
CRE 83	Caloosahatchee Tributary Maintenance (project # 8581)	1	Combine as part of CRE 34 -Generic BMP for creeks/outfalls.
CRE 84	Caloosahatchee SII for TMDL compliance (Project #8588)	1	planning project - does not meet objectives
CRE 85	Surface Water Management Plan (project #200983)	1	planning project - does not meet objectives
CRE 86	Neighborhood Improvement Program (project #8514)	1	Combine as part of CRE 34 -Generic BMP for creeks/outfalls.
CRE 87	Marine Sanitation Initiative (Project #2904)	1	work with DEP and extend to Hendry and Glades County - See CRE 87A
CRE 88	Sewer System Infiltration/Inflow Improvements	2	
CRE 89	Bayous Collection System Evaluation	3	
CRE 90	Sanibel Centralized Sanitary Sewer Expansion	1	
CRE 91	Sewer System Expansion, Phase IV	1	does not meet objective
CRE 92	Ft Myers Beach Stormwater Management Study	2	does not meet objectives

CRE 93	RWCA's Agricultural Suite	4	Fold into CRE 01 & CRE 02
CRE 94	HWCA's (Harvestable Water Containment area) Ag Suite	4	
CRE 95	Modified Water Retention Ag Suite	4	
CRE 95A	Tailwater Recovery	4	assign new number - CRE 127
CRE 96	Billy Creek Restoration	5	Combine with CRE 45
CRE 97	Caloosahatchee Creeks Preserve Hydrological Restoration	5	Combine with CRE 53
CRE 98	Caloosahatchee Oxbows	5	does not meet objectives
CRE 99	City Golf Course Filter Marsh	5	combine with CRE 48 & 49
CRE 100	Ding Darling Impoundments	5	does not meet objective
CRE 101	Hancock Creek Riverine Corridor	5	Combine as part of CRE 34 -Generic BMP for creeks/outfalls.
CRE 102	Manatee island Complex	5	does not meet objective
CRE 103	Manuel's Branch	5	Combine with CRE 48 & 49
CRE 104	Matlacha Buffer	5	Combine as part of CRE 34 -Generic BMP for creeks/outfalls.
CRE 105	Orange River	5	Combie with CRE 33
CRE 106	Pine Island Buffer	5	does not meet objective
CRE 107	Prairie Pine Preserves/ Caloosahatchee Headwaters	5	does not meet objective
CRE 108	Punta Russa	5	does not meet objective
CRE 109	Sanibel Wetland Complex	5	does not meet objective
CRE 110	Sound Island Network	5	does not meet objective
CRE 111	Tidal Caloosahatchee Buffer	5	Combine as part of CRE 34 -Generic BMP for creeks/outfalls.
CRE 112	Yellow Fever Creek Headwaters	5	Combine with CRE 67
CRE 113	Yucca Pens	5	Combine as part of CRE 34 -Generic BMP for creeks/outfalls.
CRE 114	Urban Suite	4	Same as CRE-LO 13
CRE 115	Recyclable Water Containment Areas (RWCA) in the S-4 subbasin (Freshwater Caloosahatchee Okeechobee)		Combine with CRE 02
CRE 116	Riparian Buffers	4	Combine as part of CRE 34 -Generic BMP for creeks/outfalls.
CRE 117	Water Quality Treatment Area - Algal Turf Scrubber Facility - Orange River sub-basin (Bob's Triangle Marsh)	4	Include in CRE 32

CRE 118	North Fort Myers Surface Water Restoration Powell Creek - #8533	2	see CRE 57
CRE 119	Kickapoo Creek Stormwater System Improvements	1	see CRE 58
CRE 120	Public Education Program for Fertilizer & Landscape BMP	3	Include in CRE-LO 02
CRE 121	City of LaBelle Stormwater Quality Improvements	3	
CRE 122	Rehydrate Lee County Well Fields	3	
CRE 123	North Ten Mile Canal Stormwater Treatment System	2	
CRE 124	Carrell Canal (FMCC) Water Quality Improvements	2	
CRE 125	Shoemaker-Zapato Canal Stormwater Treatment	2	
CRE 126	Fort Myers-Cape Coral Reclaimed Water Interconnect	5	
CRE 127	Tailwater Recovery	4	was numbered CRE 95A

CRWPP MANAGEMENT MEASURES

CURRENT

April 24, 2008

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.

DRAFT

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 percent 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

DRAFT

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 (TBD)

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; FDEP; 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. FDEP 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: TBD

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 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). FDEP'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: TBD

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: Alternative Water Storage (LOER) – Barron Water Control District (BWCD)

Level: 1

General Description/Background: The 2005 Lake Okeechobee Estuary and Recovery (LOER) action plan was developed to help restore the ecological health of Lake Okeechobee and adjoining estuaries, through a series of fast-track water quality improvement projects and several other far-reaching and innovative components. Among these additional components is an initiative to identify options for storage and/or disposal of excess surface water to aid in reducing lake levels and high discharge volumes to the estuaries. Assessments of available public and tribal lands for storage of excess surface water have been completed for the watershed, with assessments continuously ongoing for private lands. Eight water storage/disposal projects have been completed including Lykes Basinger Grove, Phase II Indiantown Citrus Growers Association. Additional water storage projects are under way (i.e. Avon Park Air Force Range, Kissimmee Prairie Preserve State Park, etc.), with investigations and designs continuing for additional water storage projects with a goal of 450,000 ac-ft.

Purpose: To assess, plan, design, and construct water storage/disposal projects on public, private, and tribal lands.

Location/Size/Capacity: BWCD is constructing a water storage project within its system which includes the construction of two weirs in an existing canal to retain more water within the BWCD canal system. Excess water in the Caloosahatchee River due to Lake Okeechobee regulatory regional releases will be pumped into BWCD for disposal when conditions support additional capacity. Retention within the existing ditch system and detention areas will result in water quality improvements and enable reuse by individual growers, thereby promoting water conservation and reducing the volume of discharge to the Caloosahatchee River.

Initiative Status: 5,000 ac-ft of water storage on 6,129 acres of project area

Cost: Total \$400,000 (District contributed \$200,000 and BWCD contributed \$200,000).

Estimate of Water Quality Benefits

- Minimum: Unknown
- Maximum: Unknown
- Most Likely: Unknown
- Level of Certainty: Unknown
- Assumptions: Not determined

Estimate of Water Quantity Benefits

- Minimum: 5,000 ac-ft
- Maximum: 5,000 ac-ft
- Most Likely: 5,000 ac-ft
- Level of Certainty: Final

- Assumptions: Not determined

Screening Criteria:

- Proof of Concept: 1
- Other Impacts: 1

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

DRAFT

Northern Everglades – Potential Management Measure

Project: Caloosahatchee River Watershed Works of the District Rule Regulatory Phosphorus Source Control Program

Description: To develop a phosphorus source control program for the Caloosahatchee River Watershed by amending Chapter 40E-61, F.A.C. Chapter 40E-61, F.A.C. the Lake Okeechobee Works of the District rule, which was developed 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 parcels. Ongoing activities include revising Chapter 40E-61 to reflect the requirements of the Northern Everglades Protection Act and to expand the rule boundary to include the Caloosahatchee River Watershed as defined by the Northern Everglades Protection Act. A program for verifying and optimizing permitted BMPs will also be developed.

Purpose: To implement a phosphorus source control program utilizing best management practices for the Caloosahatchee River Watershed complementary to the Coordinating Agencies collective efforts.

Location/Size/Capacity: The location is the Caloosahatchee River Watershed as defined by the Northern Everglades Protection Act.

Initiative Status: The Governing Board has authorized staff to initiate rule amendments to Chapter 40E-61 to reflect recent changes in the legislation. Staff will need to obtain authorization to expand the program to the Caloosahatchee River Watershed. Rule amendments will incorporate permitting, monitoring and BMP implementation verification program.

Cost: FY08 \$891,986 (LOK program) Ad Valorem

Please add your additional information below and return with the original document:

Estimate of Water Quality Benefits:

- Minimum – TBD
- Maximum- TBD
- Most Likely- TBD
- Level of Certainty- conceptual/final/unknown - unknown
- Assumptions leading to benefit estimate- n/a (Based on experience in other predominately agricultural areas with phosphorus limited BMP programs, we might expect to accomplish a 25% load reduction when comparing pre and post BMP periods. Less reduction would be anticipated for urban areas.)

Estimate of Water Quantity Benefits:

- Minimum – Unknown
- Maximum- Unknown
- Most Likely- Some changes may result from implementation of water management BMPs, but not quantifiable at this time.
- Level of Certainty- conceptual/final/unknown - unknown
- Assumptions leading to benefit estimate- n/a

Contact: Steffany Gornak; SFWMD; 561-682-6600

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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: TBD

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

DRAFT

Northern Everglades – Potential Management Measure

Project Feature/Activity: Lake Hicpochee

Level: 4

General Description/Background: The Lake Hicpochee Project is located on approximately 7500 acres 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. This project could potentially create 55,090 ac-ft of above ground storage.

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: Not yet determined

Documentation: For more information, please see Evergladesplan.org, C-43 Basin Storage Reservoir Project

Estimate of Water Quality Benefits

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

- Assumptions: It is assumed that there will be some level of water quality treatment by simply holding water for a period of time before releasing in to the river. Level of treatment is unknown at this time.

Estimate of Water Quantity Benefits

- Minimum: 21,490 ac-ft of above ground storage (2,880 acres)
- Maximum: 55,090 ac-ft of above ground storage (7,500 acres)
- Most Likely: 21,490 ac-ft
- Level of Certainty: Conceptual
- Assumptions: Acquisition of approximately 7500 acres immediately adjacent to Lake Hicpochee.

Screening Criteria

- Proof of Concept: 0
- Other Impacts: 1

Contact: Janet Starnes; SFWMD; 239-338-2929 *7735

Northern Everglades – Potential Management Measure

Project Feature/Activity: C-43 Distributed Reservoirs

Level: 4

General Description/Background: The Caloosahatchee Water Management Plan and preliminary work on the Caloosahatchee.

Purpose: The project objectives are to capture excess run-off within the West Lake Okeechobee Watershed which will then be operated to achieve both environmental flows to the Caloosahatchee Estuary and agricultural demands in the West Lake Okeechobee Watershed (Lake Okeechobee Service Area [LOSA]).

Location/Size/Capacity: The reservoirs are located in Hendry and Glades counties. Between Lake Okeechobee and S-78 (Ortona Lock and Dam). The project components include up to 4 reservoirs with a total storage capacity of 85,410 ac-ft.

- Reservoir (up to
 - Acreage
 - Water Depth
 - Storage volume 85,410 ac-ft (total all reservoirs)
 - Embankment length
 - Pump Station

Initiative Status:

- | | |
|----------------------------------------------------|-----|
| • Advance planning phase and associated field work | TBD |
| • 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: TBD

Estimate of Water Quality Benefits

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

Estimate of Water Quantity Benefits

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

Screening Criteria

- Proof of Concept: NA
- Other Impacts: NA

Contact: Janet Starnes; SFWMD; 239-338-2929 *7735

DRAFT

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: TBD

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

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 percent average annual load reduction of Total Suspended Solids (TSS). However, the minimum level of treatment in Chapter 62-40, F.A.C., is "80 percent 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 FDEP to increase the level of stormwater nutrient treatment. Accordingly, FDEP and SFWMD 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:** TBD**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 (LDR)

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 additional phosphorus reductions and water storage.

Location: Basin wide

Initiative Status: Not initiated

Cost: TBD

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)

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 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 ac-ft of water for a single storm event with the average ac-ft of storage per acre being 0.98 ft.

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 FRESP contracts covered only 15 percent of improved pasture acreage in the Northern Everglades, using the average ac-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 X 15 percent = 120,000 acres X 0.98 ac-ft / ac). If 15 percent of the unimproved pasture acreage is included the potential storage is 151,800 ac-ft (1,029,500 X 15 percent = 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:

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

Initiative Status: 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 ac-ft of water for a single storm event with the average ac-ft 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 Quantity Benefits

- Minimum: TBD
- Maximum: TBD
- Most Likely: TBD

- 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 percent of improved pasture acreage in the Northern Everglades, using the average ac-ft/acre estimate of the 8 existing FRESP sites of 0.98, the potential storage estimate is 118,000 ac-ft of water ($800,500 \times 15 \text{ percent} = 120,000 \text{ acres} \times 0.98 \text{ ac-ft / ac}$). If 15 percent of the unimproved pasture acreage is included the potential storage is 151,800 ac-ft ($1,029,500 \times 15 \text{ percent} = 154,400 \text{ acres} \times 0.98 \text{ ac-ft / ac}$). 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

DRAFT

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 Feature/Activity: Clewiston STA

Level: 4

General Description/Background: The State of Florida (TIITF) currently owns a parcel of land along the southwestern boundary of Lake Okeechobee in Clewiston (see attached site map Parcel HH200-004). This land in both Hendry and Glades Counties is approximately 766 acres in size and is bordered by Lake Okeechobee on the north side and Canals C-21 and C-20 on the south side. The land is currently in a natural state although it is reportedly impacted by invasive plant species. The potential exists for this land to be used as a natural treatment area for water that is currently discharged to Lake Okeechobee.

Purpose: The purpose of this potential Management Measure is to convert existing State owned land into a Stormwater Treatment Area to treat storm water from the S4 Basin and surrounding area that is currently sent to either Lake Okeechobee (via Culvert 2, S-310 lock Structure and/or S4 Pump Station) or the Caloosahatchee River (via S-235).

Location/Size/Capacity: The land area is approximately 766 acres of which approximately 700 – 750 acres could be used as “treatment area” with the remaining area used for levees and other infrastructure. The current estimated average load is 6.87 mt/yr from the S-4 Basin. It is assumed that a percentage of this water could be routed through the proposed STA.

Initiative Status: Conceptual

Cost: To Be Determined – Note: Other efforts (public and private) in the immediate area could potentially provide funding for all or portions of this proposal. The two main efforts include the S-169 Relocation Study – General Reevaluation Report by the U.S. Army Corps of Engineers and a development proposal by a private developer in Clewiston.

Documentation: Lake Okeechobee Protection Plan Evaluation Report – February 23, 2007

Estimate of Water Quality Benefits

- Minimum: 0 mt/yr
- Maximum: 6.87 mt/yr
- Most Likely: 2.5 mt/yr
- Level of Certainty: Conceptual
- Assumptions: Flow rate = 40 cfs; Inflow P Concentration = 200 ppb; STA size = 750 acres; Outflow P Concentration = 130 ppb

Estimate of Water Quantity Benefits

- Minimum: 1,013 ac-ft
- Maximum: 1,013 ac-ft
- Most Likely: 1,013 ac-ft
- Level of Certainty: Conceptual

- Assumptions: STA storage volume based on 90 percent of footprint acreage X 1.5 ft standard operating depth

Screening Criteria

- Proof of Concept: 1
- Other Impacts: 1

Contact: Mike Voich, SFWMD, 681-2563 *3720

DRAFT

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 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 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

Contact Person – Jennifer Nelson

DRAFT

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

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

DRAFT

Northern Everglades – Potential Management Measure

Project: West Lake Hicpochee Water Quality Treatment Area (C-19 Canal)

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

Contact: Jennifer Nelson/Janet Starnes/Clyde Dabbs

Northern Everglades – Potential Management Measure

Project: C-43 Water Quality Treatment and Demonstration Project (BOMA property)

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

Contact: Jennifer Nelson

Northern Everglades – Potential Management Measure

Project: Water Quality Treatment Area - Constructed Wetland/STA - Caloosahatchee Ecoscape -

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

Contact: Jennifer Nelson

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)*

Contact: Clyde Dabbs

Northern Everglades – Potential Management Measure

Project: Water Quality Treatment Area - Constructed Wetland/STA @ C-43 West Basin Storage Reservoir

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

Contact: Jennifer Nelson

Northern Everglades – Potential Management Measure

Project: Water Quality Treatment Area - Constructed Wetland/STA @ Hunt Club

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

Contact: Jennifer Nelson

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

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

DRAFT

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-1SE). 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

DRAFT

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

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

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

DRAFT

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 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: 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: 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

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 5- implementation certainty unknown; conceptual idea with limited information

DRAFT

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:

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: 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. 12th 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: This project is between Level 4 and Level 3.

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*)

Contact: Clyde Dabbs – SFWMD

Northern Everglades – Potential Management Measure

Project: Billy Creek Filter Marsh & Ford Canal Filter Marsh

Description: The completed project 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: City of Fort Myers (Billy Creek)

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

- Design Complete
- Permit issuance: March 2008
- Phase 1: March 2008; Phase 2: October 2008

Cost: \$2 million - City of Fort Myers request SFWMD contribute \$1 million

Documentation: see CPR FY09 report

Estimate of Water Quality Benefits (Tons/per 3-year Event):

- Minimum – 0.08 (N); 0.13 (P); 62 (TSS)
- Maximum – 0.16 (N); 0.45 (P); 74 (TSS)
- Most Likely – 0.20 (N); 0.29 (P); 86 (TSS)
- Level of Certainty- conceptual
- Assumptions leading to benefit estimate- BMP implementation
-

Estimate of Water Quantity Benefits (acre / acre-feet / cfs (inflow=outflow)):

- Minimum – 42 ac / 84 ac-ft / 4 cfs
- Maximum – 42 ac / 84 ac-ft / 12 cfs
- Most Likely – 42 ac / 84 ac-ft / 8 cfs
- Level of Certainty- conceptual
- Assumptions leading to benefit estimate- operational assumptions

Level of Certainty: (select one)

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

Ford Canal Filter Marsh Data

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: City of Fort Myers

Initiative Status:

- Intermediate Design (60% complete)
- Permit submittal May 2008

Cost: \$30,000 for design and permitting

Documentation:

Estimate of Water Quality Benefits (Tons/per 3-year Event):

- Minimum – 0.27 (N); 0.05 (P); 25 (TSS)
- Maximum – 0.54 (N); 0.17 (P); 31 (TSS)
- Most Likely – 0.40 (N); 0.11 (P); 28 (TSS)
- Level of Certainty- conceptual
- Assumptions leading to benefit estimate- BMP implementation

Estimate of Water Quantity Benefits (acre / acre-feet / cfs (inflow=outflow)):

- Minimum – 10 ac / 20 ac-ft / 3 cfs
- Maximum – 10 ac / 20 ac-ft / 7 cfs
- Most Likely – 10 ac / 20 ac-ft / 5 cfs
- Level of Certainty- conceptual
- Assumptions leading to benefit estimate- operational assumptions

Level of Certainty: (select one)

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

Contact: Judy Nothdurft - SFWMD

Northern Everglades – Potential Management Measure

Project: Manuel's Branch Silt Reduction Structure

Description: This project is located in the vicinity of McGregor Boulevard, Manuel's Drive, Cortez Boulevard, and Fort Myers High School.

Purpose: The project proposes to install siltation reduction measures within the existing channel section in the vicinity of the Cortez Boulevard crossing. The proposed project will reduce the siltation associated with the stream bank scour, erosion, and degradation. Funds will be used for the design and permitting of the structures.

Location/Size/Capacity: City of Fort Myers

Initiative Status:

- Final Design (90% complete)
- Permit submittal March 2008

Cost: \$15,000 for design and permitting

Documentation:

Estimate of Water Quality Benefits (Tons/per 3-year Event):

- Minimum – 0.05 (N); 0.06 (P); 32 (TSS)
- Maximum – 0.30 (N); 0.90 (P); 42 (TSS)
- Most Likely – 0.15 (N); 0.12 (P); 37 (TSS)
- Level of Certainty- conceptual
- Assumptions leading to benefit estimate- BMP implementation

Estimate of Water Quantity Benefits (acre / acre-feet / cfs (inflow=outflow)):

- Minimum – 2 ac / 1 ac-ft / 1 cfs
- Maximum – 2 ac / 1 ac-ft / 3 cfs
- Most Likely – 2 ac / 1 ac-ft / 2 cfs
- Level of Certainty- conceptual
- Assumptions leading to benefit estimate- operational assumptions

Level of Certainty: (select one)

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

Contact: Judy Nothdurft - SFWMD

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 sewer practices.

Location/Size/Capacity: City of Fort Myers

Initiative Status:

- Design and Permitting Complete
- Construction March 2008

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

Documentation:

Estimate of Water Quality Benefits (Tons/per 3-year Event):

- Minimum – 0.30 (N); 0.12 (P); 64 (TSS)
- Maximum – 0.60 (N); 0.24 (P); 84 (TSS)
- Most Likely – 0.45 (N); 0.12 (P); 74 (TSS)
- Level of Certainty- conceptual
- Assumptions leading to benefit estimate- BMP implementation

Estimate of Water Quantity Benefits (acre / acre-feet / cfs (inflow=outflow)):

- Minimum – 5 ac / 15 ac-ft / 3 cfs
- Maximum – 5 ac / 15 ac-ft / 7 cfs
- Most Likely – 5 ac / 15 ac-ft / 5 cfs
- Level of Certainty- conceptual
- Assumptions leading to benefit estimate- operational assumptions

Level of Certainty: (select one)

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

Contact: Judy Nothdurft - SFWMD

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

DRAFT

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: Caloosahatchee River Basin Algal Turf Scrubber (Formerly Powell Creek Algal Turf Scrubber, the project name was changed in Contract Amendment 4600000978-A1)

Description: The project proposes to install and operate for one year a mobile unit of the Algal Turf Scrubber system. This project also contains funding for a large scale permanent installation of an Algal Turf Scrubber based on the results of the pilot project.

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: Adjacent to Powell Creek bypass and approximately 1500 feet north of the Caloosahatchee river. Treatment area is about 10,000 square feet.

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 (Ad Valorem funding) The contract for this project (4600000978-A1) was amended to increase funding in the amount of \$1,205,000 (Ad Valorem) for the design and construction of the permanent Algal Turf Scrubber.

Documentation:

Estimate of Water Quality Benefits:

- Minimum – 20% less than most likely
- Maximum- 20% more than most likely
- Most Likely- 125 pounds of N, 50 pounds of P, and 5,000 pounds of TSS annually.
- 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 – 0
- Maximum- 20% more than most likely
- Most Likely- 2 cubic feet per second

- 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.

DRAFT

Northern Everglades – Potential Management Measure

Project Feature: Kickapoo Creek Surface Water System Improvements

Level: 1

General Description/Background: Kickapoo Creek has been designated as an impaired water body for dissolved oxygen, nutrients, and fecal coliform . The creek discharges to the Caloosahatchee River through a system of ponds and control structures located at the Lee County Civic Center. This obsolete surface water system appears to contribute to water quality impairment in the creek and drainage problems within the watershed basin. Lee County, with funding made available by the South Water Management District, conducted a feasibility study that identified water quality and conveyance issues within the Kickapoo Creek watershed and proposed improvement projects for the Lee County Civic Center property.

Purpose: To implement the water quality and conveyance improvement projects recommended as part of the Kickapoo Creek Stormwater System Analysis. The eight proposed improvements were analyzed using a scoring matrix consisting of five categories: water quality benefits, water quantity benefits, public safety benefits, permissibility and estimated cost. Each option was rated in each scoring category and a total score was determined. The prioritized projects are in shown in the following table from highest to lowest priority.

No.	Description	Water Quality Benefit	Water Quantity Benefit	Public Safety Benefit	Permittability	Estimated Costs	Score	Priority
1	Lake Interconnect Replacement	5	5	5	4	1	20	1
2	Replace/Add Control Structures	5	5	1	3	4	18	2
3	TV Inspect Gravity Service	0	0	5	5	5	15	3
4	Lake Littorals	5	0	0	4	5	14	4
5	Lake Aeration - Will need modified if constructed before lakes are excavated.	5	0	1	5	2	13	5
6	Redirect Stormwater Runoff to Lake 1	3	0	0	4	3	10	6
7	Lake Excavation	3	1	1	3	1	9	7
8	New Connection to Old Bayshore	1	1	1	1	3	7	8

Location/Size/Capacity: Kickapoo Creek watershed is located in northeast Lee County. The watershed extends over an area of approximately 665 acres. The improvements will take place on the 97 acre Lee County Civic Center site

Initiative Status: Feasibility study complete.

Cost:

No.	Description	Estimated Cost
1	Lake Interconnects Replacement (During Dry Season)	\$178,072.60
2	Replace/Add Control Structures	\$29,111.10
3	TV Inspect Gravity Sewer System	\$5,750.00
4	Lake Littorals	\$8,535.30
5	Lake Aeration - Will need modified if constructed before lakes are excavated.	\$74,175.00
6	Redirect Stormwater Runoff to Lake 1	\$46,722.20
7	Lake Excavation	\$144,440.00
8	New Connection to Old Bayshore	\$32,840.55
	Total Cost	\$519,646.75

Documentation: *Kickapoo Creek Stormwater System Analysis:*

1. Existing Conditions Report
2. Water Quality Improvement Project Report

Estimate of Water Quality Benefit:

Minimum:

Maximum: 81% to 91% for TN, TP, BOD, TSS

Most Likely:

Level of Certainty: 3

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

Estimate of Water Quantity Benefit:

Minimum:

Maximum:

Most Likely:

Level of Certainty: 3

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: North Fort Myers Surface Water Restoration Powell Creek Section
(Previous Lee Co Project #8533 – FY 2007-2008)

Level: 2

General Description/Background: Construction and Operation of a surface water management system to serve a 2400 acre Project know as North Fort Myers Surface Water Restoration Project to improve water discharge and water quality in North Fort Myers via the Gator Slough and Powell Creek systems.

Powell Creek (a channelized canal, overgrown with vegetation) begins at the south side of Del Prado, approx 3.2 miles east of the U.S. 41-Del Prado intersection and flows in a north south direction between Palermo development to the west and Sloanes Gate to the east, and eventually discharging into the Caloosahatchee River. The area is has been severely impacted by off road vehicles and erosion is common.

The historic flow in the area has been altered over time because of construction of roadways and residential development. As a result, the surface water is impounded north of Del Prado during intensive storms causing flooding impacts to the adjacent neighborhoods.

The proposed improvements include channel improvements, the construction of diversion weirs to accommodate offsite flows from Palermo (Golf and residential) as well as constructing an environmental weir at the location of the twin 60-inchRCPs,(to be removed) as well as an additional environmental weir upstream to provide for surface water storage and attenuation. The 125 foot wide conveyance is designed to meander about the centerline flanked by shallow littoral zones. These areas will be planted with shallow water emergent aquatic plants to facilitate longer contact time for nutrient uptake. The environmental weir will serve to capture sediment and to slow velocities.

The strategy for stormwater pollution reduction will focus on reduction of nutrients in the project watershed by increasing residence time of surface waters in areas of North Fort Myers to increase nutrient uptake by wetland plants and allow increased percolation for groundwater recharge by slowing the overland flow and increasing the system capacity.

In conclusion the project will incorporate filter marsh like plantings and to regulate storm events runoff to more mimic historical patterns.

Purpose: Flowway Restoration Water Quality Improvement Attenuation

Location/Size/Capacity: 20 acres in Lee County south of Del Prado Blvd. and north of the Alliance for the Arts school.

- Initiative Status:
- Construction Plans 95%
- Lee County Development Order DOS2007-00268 approved.
- South Florida Water Management District Permit 36-05574-P approved

- United States Army Corp of Engineers Permit SAJ-2001-6929- (IP-MJD) approved
- Construction Contract Documentation
- Prequalification of Contractors underway.

Cost: \$ 1,200,000

Documentation: Natural Resources CIP Budget Guide, Lee County Surface Water Management Plan.

Estimate of Water Quality Benefit:

ESTIMATED POLLUTANT LOAD REDUCTION:

BMPs Installed						Other kg/yr	Other kg/yr
Filter Marsh Treatment Train		TSS kg/yr	TP kg/yr	TN kg/yr	Sediment kg/yr	BOD kg/yr	
Pollutant Loads	Pre-Project	21,370	140	2,671		3,860	
	Post-Project	11,224	79	1,986		3,553	
	Load Reduction	10,146	61	685		307	
	% Reduction	47%	43	26		8	

Screening Criteria:

Proof of Concept:

Other Impacts:

Contact:

Anura Karuna-Muni
1500 Monroe St, 3rd Floor,

Fort Myers, FL 33901

Phone: 239-533-8131

Fax: 239-485-8408

Akaruna-muni@leegov.com

Northern Everglades – Potential Management Measure

Project: Tailwater Recovery

Project Feature: Pop Ash Creek Preserve (Project #8593 – FY 2005-2006)

General Description/Background: Pop Ash Creek Preserve (PACP) is a 307 acre parcel that was acquired in 2003 by Lee County. The site is bordered by Nalle Grade Road to the south, Nalle Road to the east, Lee-Charlotte County boundary line to the north, there is also Ag property to the northeast and a drainage canal adjacent to numerous five acre ranchettes to the west. The Preserve consists of both human-altered and natural plant communities that are mostly wet or mesic flat woods and a portion of a black water stream (Pop Ash Creek).

Purpose: Hydrologic restoration and enhancement for Conservation 2020 parcel located at the headwaters of Pop Ash Creek to provide conservation, water quality and flood protection benefits for basin where anthropogenic activities have caused alterations in historic flow patterns.

Location/Size/Capacity: The site location is 9451 Nalle Grade Rd North Fort Myers, Florida 33917-Sec 3, TWP 43 E., RNG 25 S. of Lee County, Florida. Parcel is a total 307.5 acres that consist of 17.5 acres of ponds and 3.1 acres of creek/ditches.

Initiative Status:

- Data Collection – stage recorder data, groundwater data, water quality data, and Sheet flow data.
- Survey – Field work to be completed by January/2008.
- Environmental Inventory – Wetland delineation completed.
- Geotechnical – soil samples
- Plans and Specification 30%, 60%, 90% and final design.
- Permit submittals @ design stage.

Cost: \$2,400,000

Documentation: Natural Resources CIP Budget Guide

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.

Level of Certainty: (select one) Level 2- construction/implementation likely; detailed design/activity development ongoing; location well defined

Screening Criteria:

Proof of Concept: Funds from Lee Co.

Other Impacts:

Contact: Tildon Copeland – 239-533-8139

DRAFT

Northern Everglades – Potential Management Measure

Project Feature: Yellow Fever Creek/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: Lee County 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: 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: 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) (none selected)

Northern Everglades – Potential Management Measure

Project: Cape Coral Spreader Canal Restoration

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

Northern Everglades – Potential Management Measure

Project: Water Quality Treatment Area - Constructed Wetlands/STAs – North Cape Coral

Description: This project consists of a constructed wetland or series of constructed wetlands designed for optimal nitrogen removal from water diverted (and/or back pumped) 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 4- implementation certainty unknown; conceptual idea; may have rough order of magnitude cost and/or general basin location

DRAFT

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

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

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

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

Feb 04, 2008 Addendum: *“SWFRPC Recommendation: Provide financial incentives to local government to eliminate small waste treatment package plants”*

I was asked to provide information on what sub-basins may have a higher concentration of these package plants or sub-basins that may have plants of concern.

I have been working with our domestic wastewater staff on this. We are in the process of producing some GIS layers with the package plants (Type III WWTP) overlaid with sub-basin boundaries from the SWFFS. So far, it looks like the main problem areas are the coastal islands (Sanibel/Captiva) and Pine Island. Other sub-basins have relatively low densities of these plants. Specific plants can be identified as a potential problem, but we so far have not found any sub-basin “hot spots” inclusive of several plants with the potential to affect the River or Estuary other than the barrier islands and Pine Island. We can provide some maps for the team when we are finished with the analysis if it would be useful.

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

Feb 04, 2008 Addendum: *“Marine Sanitation Initiative (2904): Provides facilities to pump out sewage on vessels”*

I was asked to investigate any DEP regulations that deal with this issue, and what the role of the Clean Marina Program is.

Vessel discharges of sewage has proven to be very difficult to regulate and enforce.

As I understand it, DEP regulates sewage discharges from land, and FWC (Florida Fish & Wildlife Conservation Commission) regulates sewage discharges in water from vessels. DEP obviously has regulatory authority over water quality standards in Florida, but we don't really have the ability (or resources) to enforce sewage discharges from vessels. We have no authority to board vessels. (FWC does, I believe).

DEP's role has thus been focused on encouraging marinas to provide pump-out facilities so vessels can properly dispose of their sewage. DEP has a program that administers Clean Vessel Act grants that provide \$ for pump out facilities. These grants are federal and provide 75% matching funds. The DEP Clean Marina program encourages marinas to apply for these grants and assists them with grant applications, but cannot require pump-out facilities to be installed.

In essence, enforcement of vessel discharges remains a big problem. Even with these programs, there are still areas of SW Florida that are not well-covered with available pump-out facilities. I do not believe that the overall impact of vessel sewage discharges on our waterbodies has been quantified, but with the number of vessels in our waters, any program that could provide the opportunity to make pump-out facilities more available in all areas, would undoubtedly provide the opportunity for water quality improvement.

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 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

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: RWCA (Recyclable Water Containment Areas) - Agricultural Suite

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

DRAFT

Northern Everglades – Potential Management Measure

Project: HWCAs (Harvestable Water Containment Areas) - Agricultural Suite

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

DRAFT

Northern Everglades – Potential Management Measure

Project: Modified Water Retention - Agricultural Suite

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

Northern Everglades – Potential Management Measure

Project Feature: North Fort Myers Surface Water Restoration Powell Creek Section
(Previous Lee Co Project #8533 – FY 2007-2008)

Level: 2

General Description/Background: Construction and Operation of a surface water management system to serve a 2400 acre Project know as North Fort Myers Surface Water Restoration Project to improve water discharge and water quality in North Fort Myers via the Gator Slough and Powell Creek systems.

Powell Creek (a channelized canal, overgrown with vegetation) begins at the south side of Del Prado, approx 3.2 miles east of the U.S. 41-Del Prado intersection and flows in a north south direction between Palermo development to the west and Sloanes Gate to the east, and eventually discharging into the Caloosahatchee River. The area is has been severely impacted by off road vehicles and erosion is common.

The historic flow in the area has been altered over time because of construction of roadways and residential development. As a result, the surface water is impounded north of Del Prado during intensive storms causing flooding impacts to the adjacent neighborhoods.

The proposed improvements include channel improvements, the construction of diversion weirs to accommodate offsite flows from Palermo (Golf and residential) as well as constructing an environmental weir at the location of the twin 60-inchRCPs,(to be removed) as well as an additional environmental weir upstream to provide for surface water storage and attenuation. The 125 foot wide conveyance is designed to meander about the centerline flanked by shallow littoral zones. These areas will be planted with shallow water emergent aquatic plants to facilitate longer contact time for nutrient uptake. The environmental weir will serve to capture sediment and to slow velocities.

The strategy for stormwater pollution reduction will focus on reduction of nutrients in the project watershed by increasing residence time of surface waters in areas of North Fort Myers to increase nutrient uptake by wetland plants and allow increased percolation for groundwater recharge by slowing the overland flow and increasing the system capacity.

In conclusion the project will incorporate filter marsh like plantings and to regulate storm events runoff to more mimic historical patterns.

Purpose: Flowway Restoration Water Quality Improvement Attenuation

Location/Size/Capacity: 20 acres in Lee County south of Del Prado Blvd. and north of the Alliance for the Arts school.

- Initiative Status:
- Construction Plans 95%
- Lee County Development Order DOS2007-00268 approved.

- South Florida Water Management District Permit 36-05574-P approved
- United States Army Corp of Engineers Permit SAJ-2001-6929- (IP-MJD) approved
- Construction Contract Documentation
- Prequalification of Contractors underway.

Cost: \$ 1,200,000

Documentation: Natural Resources CIP Budget Guide, Lee County Surface Water Management Plan.

Estimate of Water Quality Benefit:

ESTIMATED POLLUTANT LOAD REDUCTION:

BMP's Installed		TSS kg/yr	TP kg/yr	TN kg/yr	Sedimen t kg/yr	BOD kg/yr	Other kg/yr	Other kg/yr
Filter Marsh Treatment Train								
Pollutant Loads	Pre-Project	21,370	140	2,671		3,860		
	Post-Project	11,224	79	1,986		3,553		
	Load Reduction	10,146	61	685		307		
	% Reduction	47%	43	26		8		

Screening Criteria:

Proof of Concept: Other Impacts:

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Northern Everglades – Potential Management Measure

Project: City of Labelle Stormwater Quality Improvements

Description: The City of LaBelle is located in Hendry County, southwest of Lake Okeechobee in the SFWMD West Caloosahatchee Basin. Much of the LaBelle water management system was constructed many years ago without an overall plan, and years of non-coordinated modifications and lack of maintenance has resulted in periodic flooding problems within the city limits. Additionally, only minimal water quality storage is provided to the stormwater runoff before the ultimate discharge into the Caloosahatchee River.

The LaBelle Stormwater Quality Improvement Project is intended to implement stormwater conveyance and water quality storage improvements within the City of LaBelle. This Project will implement a portion of the previously performed “Identification of Storm Water Issues and Recommended Improvements Report” (Report) for the City of LaBelle, previously funded by the SFWMD in 2004. The goal of the improvements will be to provide increased water quality storage and reduce local road flooding within the LaBelle Drainage Basin previously identified as Basin C-5 in the Report. The proposed improvements will be designed to attenuate surface water runoff within Road Rights-of-Way and other City-owned lands, within Basin C-5, to improve water quality, and reduce peak flood stages. The Project will address both existing and projected storm water conditions and will improve the conveyance of storm water during storm events and reduce pollutant loadings discharging directly into the Caloosahatchee River.

Purpose: To implement (Design, Permit, and Construct) stormwater conveyance and water quality storage improvements within the City of Labelle. The project will provide increased water quality storage, reduced sediment and nutrient loadings, and reduce local road flooding within the LaBelle Drainage Basin previously identified as Basin C-5 in the previously performed “Identification of Storm Water Issues and Recommended Improvements Report”.

Location/Size/Capacity: This project will include stormwater conveyance and water quality storage improvements within Basin C-5, which consists of approximately 149 acres of urban/residential lands. Basin C-5 is generally described as State Road 80 South to Seminole Avenue, and Oak Street East to Grant Street, within the City Limits of LaBelle, Florida. The Project Design will recommend proposed swale grades and typical sections, new and replacement culvert locations, sizes, and inverts, and any proposed detention areas on City owned property.

Initiative Status: *Advance planning phase and associated field work*

In 2004, an “Identification of Storm Water Issues and Recommended Improvements Report” was initiated for the City of LaBelle. This report was funded and coordinated with the SFWMD Watershed Initiative Program. This report addressed several items including:

- Delineated drainage basins within the City of LaBelle;
- Identified general deficiencies (flooding) within the basins;
- Prioritized basins in need of improvements
- Performed preliminary hydraulic modeling of design storm events;
- General recommendations for stormwater quality, quantity, and conveyance improvements;

- Target land for acquisition for stormwater storage and treatment areas;
- Address permitting and public interest issues;
- Preliminary Construction Cost Estimates

This report identified Basin C-5 as the first priority in which to proceed with the Design and Permitting of the stormwater improvements. Topographic survey of the existing ditches, drainage ways, and stormwater conveyance system has already been collected as part of the previous work. Design, Permitting, and Construction of the improvements in Basin C-5 will be performed under this project.

Cost: Opinion of Probable Cost for the Design Permitting, and Construction of the stormwater improvements within Basin C-5 is \$350,000.

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.)

The anticipated water quality benefits to the Caloosahatchee River include:

- Increased volume for water quality storage in improved roadside swale system and new common detention areas;
- Increased volume for water quality storage with the installation of new control structures;
- Reduction of sediment and nutrient loadings to the estuary through increased water quality storage volume and time duration;
- Improved water quality through vegetated swales (grass) and the possible incorporation of littoral planting components in improved stormwater detention areas;

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)

The anticipated water quantity benefits to the Caloosahatchee River include:

- Reduction in peak discharge from Project Area from increase storage volume in system;
- Reduction in peak discharge from Project Area from installation of control structures;
- Help to protect public health and safety by reducing local flooding in Basin C-5 during various storm events;

- Improve conveyance and reduce local flooding in Basin C-5 through improved interconnectivity between drainage swales along local streets;

Level of Certainty: (select one) Level 3 considering the work previously performed.

DRAFT

Northern Everglades – Potential Management Measure

Project: Rehydrate Lee County Well Fields - “Move Water South” (Study and Preliminary Design)
- 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 could help ECWCD address all three of these needs in the Lehigh Acres area if it determined that the project is feasible.

Purpose: To reconnect and rehydrate the area south (well fields) of SR 82. Historically the southern portion of the District drained to the south of SR 82 but the existing canal system drains everything to the north. This project would try to restore the historic conditions and divert more water to the south which could help recharge groundwater in the Lee County “DR/GR” area. By sending stormwater to drained wetlands outside of the Caloosahatchee estuary watershed, this project will reduce nutrient loads to the estuary while providing appropriate treatment in drained wetlands of the Estero and Imperial River watersheds.

Location/Size/Capacity: This project would involve the area along the southern boundary of the District on both sides of SR 82 between the Hendry County Line and Gunnery Road. The current

request is for diversion of runoff from southern ECWCD lands (In the vicinity of Mirror Lakes) to Lee County Port Authority mitigation lands and ultimately to the Green Meadows well fields.

Initiative Status: This project has been preliminarily discussed in the Lehigh Headwaters Initiative Meetings and should be studied further to determine its feasibility. ECWCD has has positive discussions with Lee County Port Authority, Lee County Natural Resources, and Lee County Utilities.

Cost: Estimated Study and Preliminary Design Cost: \$100,000.00

Documentation:

Estimate of Water Quality Benefits:

- Minimum: 0 pounds TN/year
- Maximum: 5,600 pounds TN/yr (assumes 25% TN removal)
- Most Likely: 2,800 pounds TN/yr
- Level of Certainty – conceptual
- 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
- Rehydration of existing wetlands
- Rehydration of existing well fields
- Reduction of sediment and nutrient loading to the estuary
- Provide aquifer recharge
- Protect public health and safety

Estimate of Water Quantity Benefits:

- Minimum: 0 acre feet/yr, 0 cfs peak flow
- Maximum: 8,000 acre-feet/yr, 70 cfs peak flow
- Most Likely: 4,000 acre-feet/yr, 35 cfs peak flow
- Level of Certainty – conceptual
- Assumptions leading to benefit estimate- (e.g., sub-watershed; period of record; flow/volume; operational assumptions)

Level of Certainty: (select one) This project is at Level 3 to 4.

Northern Everglades – Potential Management Measure

Project: North Ten Mile Canal Stormwater Treatment System

Description: This project is located in the vicinity of Ten Mile Canal from Canal Street to Carrell Road and borders along the westerly boundary of the CSX/Seminole Gulf railroad and proposes to create a large scale detention storage/treatment area for those portions of the watersheds encompassing the Fowler commercial corridor and easterly industrial areas. This project will also work in conjunction with the proposed easterly weir/control structures for Manuel's Branch and Carrell Canal near Royal Palm Avenue.

Purpose: By constructing this project, the storm water runoff can better mimic a pre-developed hydrologic response condition(s). This, in turn, will attenuate peaking flows, decrease the degree of flooding in the downstream portions of the watershed, and decrease the pollutant constituency concentrations for enhanced water quality within the Manuel's Branch and Carrell Canal waterways and the outfalling stormwater flows to the Caloosahatchee.

Location/Size/Capacity: City of Fort Myers

Initiative Status:

- Design (60% complete)
- Permit submittal March 2008

Cost: \$600,000

Documentation:

Estimate of Water Quality Benefits (Tons/per 3-year Event):

- Minimum – 0.60 (N); 0.24 (P); 12 (TSS)
- Maximum – 1.20 (N); 0.48 (P); 168 (TSS)
- Most Likely – 0.90 (N); 0.36 (P); 148 (TSS)
- Level of Certainty- conceptual
- Assumptions leading to benefit estimate- BMP implementation

Estimate of Water Quantity Benefits (acre / acre-feet / cfs (inflow - outflow)):

- Minimum – 12 ac / 50 ac-ft / (24 - 6) cfs
- Maximum – 12 ac / 50 ac-ft / (72 - 18) cfs
- Most Likely – 12 ac / 50 ac-ft / (48 - 12) cfs
- Level of Certainty- conceptual
- Assumptions leading to benefit estimate- 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: Carrell Canal (FMCC) Water Quality Improvements

Description: This project is located between McGregor Boulevard and US 41 within that area known as the Fort Myers Country Club (FMCC) and proposes to create a Stormwater Treatment Area (STA) via diversion structures, quiescent settling ponds, and constructed marshes within the “non-play” areas (5.5 acres ±) of the existing golf course facility.

Purpose: The proposed project will reduce the characteristic pollutants of nutrients, suspended solids, and sediments associated with the contributory land uses. This facility will also work collectively with a number of other individual stormwater treatment projects currently being considered or implemented in order to improve the overall water quality of Carrell Canal and the stormwater discharges to the Caloosahatchee River.

Location/Size/Capacity: City of Fort Myers

Initiative Status:

- Design Complete
- Permit Complete (36-06607-P)

Cost: \$500,000

Documentation:

Estimate of Water Quality Benefits (Tons/per 3-year Event):

- Minimum – 0.30 (N); 0.12 (P); 64 (TSS)
- Maximum – 0.60 (N); 0.24 (P); 84 (TSS)
- Most Likely – 0.45 (N); 0.12 (P); 74 (TSS)
- Level of Certainty- conceptual
- Assumptions leading to benefit estimate- BMP implementation

Estimate of Water Quantity Benefits (acre / acre-feet / cfs (inflow=outflow)):

- Minimum – 5 ac / 10 ac-ft / 3 cfs
- Maximum – 5 ac / 10 ac-ft / 7 cfs
- Most Likely – 5 ac / 10 ac-ft / 5 cfs
- Level of Certainty- conceptual
- Assumptions leading to benefit estimate - 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: Shoemaker-Zapato Canal Stormwater Treatment

Description: The project proposes to install weir/control structures upstream of Michigan Avenue to improve the function and operations of the interconnection along the southerly boundary of the Vo-Tech facility between the Shoemaker and Zapato Canals. The project will provide for peak flow attenuation through increased channel storage and the “balancing” of outfalling stormwater volumes between the two canal systems so as to improve the water quality and reduce erosion and siltation into Billy Creek.

Purpose: This facility will also work collectively with a number of other individual stormwater treatment areas along Billy Creek and its tributaries currently being considered or implemented in order to improve the overall water quality of Billy Creek and the stormwater discharges to the Caloosahatchee River. The proposed project will reduce the characteristic pollutants of nutrients, suspended solids, and sediments associated with the contributory land uses.

Location/Size/Capacity: City of Fort Myers (Billy Creek)

Initiative Status:

- Planning Phase (Master Plan)

Cost: \$375,000

Documentation:

Estimate of Water Quality Benefits (Tons/per 3-year Event):

- Minimum – 0.30 (N); 0.13 (P); 31 (TSS)
- Maximum – 0.90 (N); 0.17 (P); 37 (TSS)
- Most Likely – 0.60 (N); 0.15 (P); 34 (TSS)
- Level of Certainty- conceptual
- Assumptions leading to benefit estimate- BMP implementation

Estimate of Water Quantity Benefits (acre / acre-feet / cfs (inflow=outflow)):

- Minimum – 6 ac / 9 ac-ft / 3 cfs
- Maximum – 6 ac / 9 ac-ft / 7 cfs
- Most Likely – 6 ac / 9 ac-ft / 5 cfs
- Level of Certainty- conceptual
- Assumptions leading to benefit estimate- 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: Fort Myers-Cape Coral Reclaimed Water Interconnect

Description: This proposed project plans a 20-inch diameter transmission line between the Fort Myers South Wastewater Treatment Plant and the Cape Coral Everest Reclamation Plant. The pipeline will be installed underneath the Caloosahatchee River using directional bore drilling techniques. The Everest plant has recently been upgraded to store more reclaimed water. Fort Myers is required by a FDEP permit condition to upgrade the South Plant to meet reclaimed water standards, and the design has been completed. However, the City has no reclaimed water customers in the South Plant service area, so is required by FDEP to construct an injection well for disposal rather than discharging to the Caloosahatchee River. An interconnect with Cape Coral and an agreement to take all the effluent from the South Plant will eliminate the need for an injection well. Cape Coral does need additional water and has an expanding distribution system of irrigation lines.

Purpose: The project will eliminate the City of Fort Myers' wastewater discharge from entering the Caloosahatchee Estuary, eliminate the need for the City to construct an injection well for dispose of high quality reclaimed water, and will provide reclaimed water to the City of Cape Coral which has infrastructure in place to distribute the water.

Location/Size/Capacity:

- Sub-basin: Cape Coral
- Location: near Mid-Point Bridge between Cape Coral and Fort Myers
- Size and Capacity: 20-inch diameter transmission line to pass 9 MGD of reclaimed water

Initiative Status: Conceptual

Cost: roughly \$12- 15 million

Documentation: Cape Coral public Works feasibility study in progress

Estimate of Water Quality Benefits:

- Nutrient load reduction to Caloosahatchee River and Estuary
- Level of Certainty- If cost effective, construction of pipeline will eliminate 6 to 11 MGD of wastewater discharge
- Assumptions of benefit estimate- none, project will eliminate nutrient loads

Estimate of Water Quantity Benefits:

- Route wastewater flow into the Cape Coral reclaimed water system
- Level of Certainty- will add 6 to 11 MGD of irrigation water
- Assumptions of benefit estimate- none

Level of Certainty: (select one)

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

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Northern Everglades – Potential Management Measure

Project: Tailwater Recovery - Agricultural Suite

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

Northern Everglades – Potential Management Measure**Project Feature/Activity:** East Caloosahatchee Storage**Level:** 4**General Description/Background:** The East Caloosahatchee Storage Project is located on approximately 7500 acres which is currently in private ownership. This project comprises a series of distributed reservoirs located in the East Caloosahatchee basin. This project could potentially create 100,000 ac-ft of above ground storage.**Purpose:** The project objectives are to provide additional storage in the East Caloosahatchee Basin to meet unmet demands. The distributed reservoirs would be smaller localized reservoirs to supply irrigation demands.**Location/Size/Capacity:** The project is located in the East Caloosahatchee Basin. A series of potential reservoir sites have been located with a total are of approximately 8,000 acres. The distributed reservoirs will provide above ground storage to meet unmet demand in the basin:**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
- Pre-final Design TBD

Cost: Not yet determined**Documentation:** For more information, please see CWMP Planning document.**Estimate of Water Quality Benefits**

- Minimum: Unknown
- Maximum: Unknown
- Most Likely: Unknown
- Level of Certainty: Unknown
- Assumptions: It is assumed that there will be some level of water quality treatment by simply holding water for a period of time before releasing in to the river. Level of treatment is unknown at this time.

Estimate of Water Quantity Benefits

- Minimum: 50,000 ac-ft of above ground storage
- Maximum: 100,000 ac-ft of above ground storage
- Most Likely: 70,000 ac-ft
- Level of Certainty: Conceptual
- Assumptions: Acquisition of approximately 8,000 acres in the East Caloosahatchee Basin

Screening Criteria

- Proof of Concept: 0
- Other Impacts: 1

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