Draft Lake Okeechobee Protection Plan Update

Governing Board Workshop
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Legislative Requirements

SFWMD

- In 2000, the legislature passed the Lake Okeechobee Protection Act (LOPA) to reduce phosphorus inflows into the lake through a comprehensive, phased program linked to meeting the total maximum daily load (TMDL) target by 2015
- The coordinating agencies submitted the initial Lake Okeechobee Protection Plan (LOPP) to the legislature in 2004. LOPA requires the plan to be updated every three years
- In 2007, the legislature expanded LOPA to also include protection of the Caloosahatchee and St. Lucie watersheds and estuaries (Northern Everglades and Estuaries Protection Program)
- This update covers the three-year period since submission of the Lake Okeechobee Watershed Construction Project Phase II Technical Plan to the Legislature in 2008. The LOPP update will be submitted to the legislature in early 2011

Action Plan Summary

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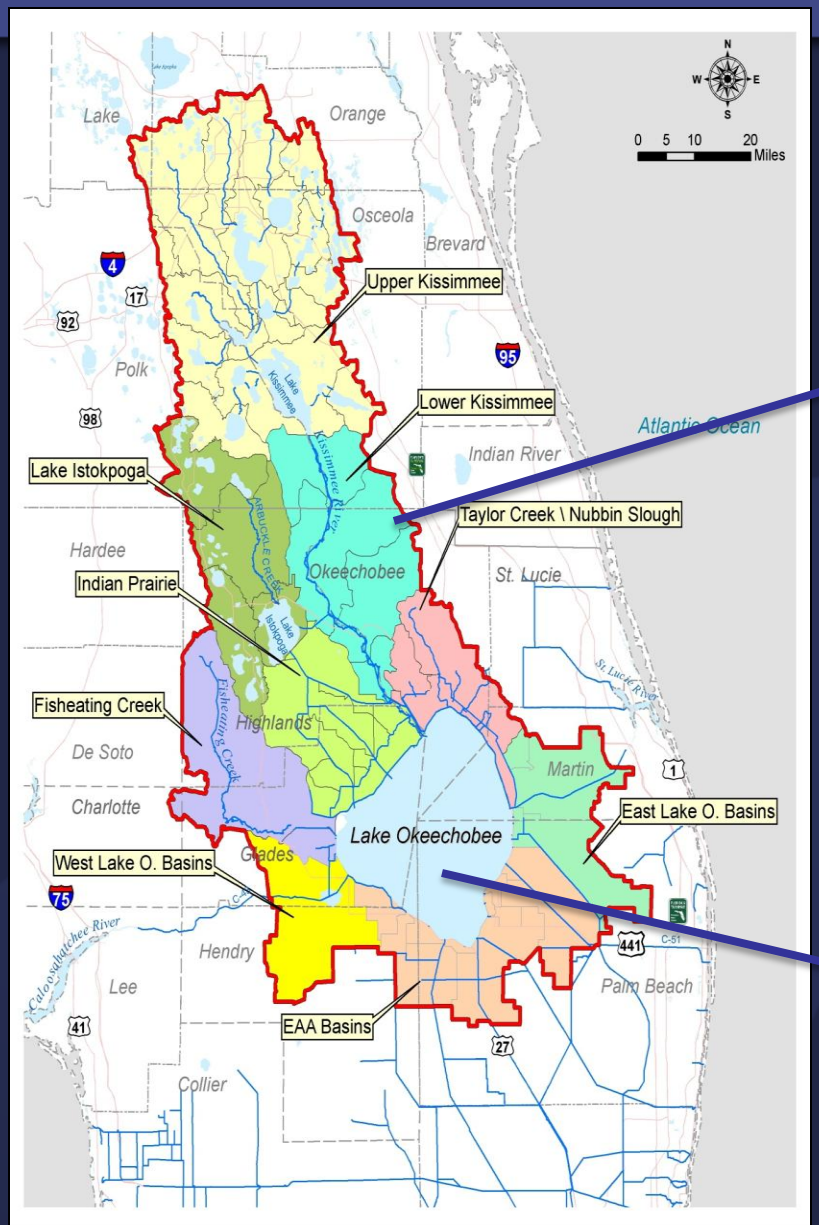

WATERSHED ISSUES

WATER QUALITY

- **Excessive Phosphorus Loads** (Nutrient Import/Export Balance)
- **Legacy Phosphorus** (Soil Saturation, Mobility)

STORAGE

- **Lack of Stormwater Storage**

STRATEGIC SOLUTIONS

- **Source Control**
  - FDACS Agricultural BMP Program
  - FDEP Agricultural and Non-Agricultural Programs
  - SFWMD Source Control Program
- **Sub-regional and Regional Projects**
  - Hybrid Wetland Treatment Technology
  - Northern Everglades Chemical Treatment
  - Permeable Reactive Barrier Technology
  - Stormwater Treatment Areas
- **Research Projects**
  - New Alternative Technology Assessment
  - Legacy Phosphorus Studies
  - BMP Research and Extension Coordinating Council Proposals
- **Shallow Storage**
  Dispersed Water Management (Easements, Cost Share, Payment for Services)
- **Regional Storage**
  (Reservoirs, Aquifer Storage Recovery, Deep Injection Wells)

IN-LAKE ISSUES

WATER QUALITY

- **Sediments** (Turbidity, Internal Loading)

EXOTIC SPECIES MANAGEMENT

- **Exotic Vegetation**
- **Exotic Snail Population Increase**

STRATEGIC SOLUTIONS

- **Dredging**
- **Dry Condition Muck Removal, Scraping and Tilling**
- **In-Lake Islands or Littoral Zone Habitat Creation**
- **Chemical Treatment**
- **Treatment/Management of Exotic Vegetation**
- **Restocking Native Apple Snail**

Current Ecological Conditions

SFWMD

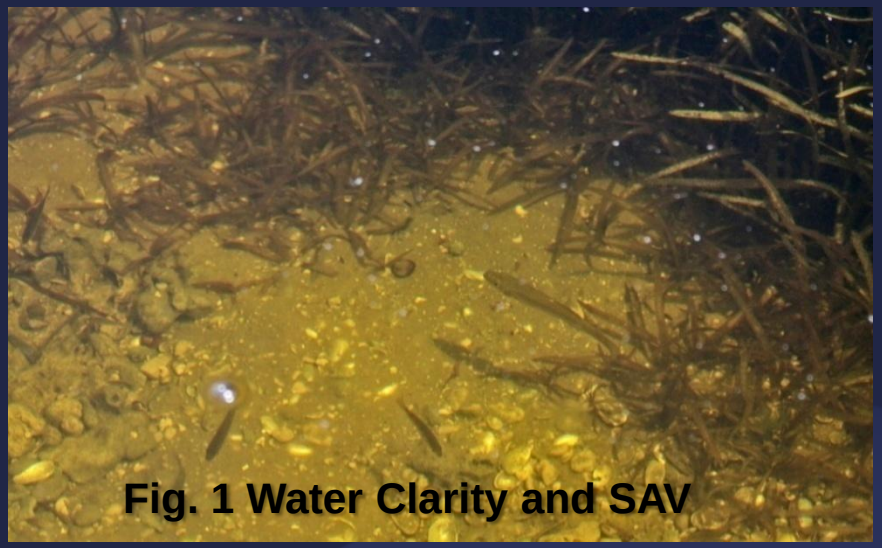

Fig. 1 Water Clarity and SAV

Fig. 2 Emergent Vegetation (Bulrush)

Fig. 3 Apple Snail Recovery

Fig. 4 Wading Bird Foraging and Nesting

Watershed Water Quality
Defining the Magnitude of Problem

SFWMD

- Phosphorus TMDL for Lake Okeechobee
  - 140 metric tons is five-year rolling average
  - 35 metric tons attributed to atmospheric deposition
  - 105 metric tons allowable from all surface water inflows
- Phosphorus Load (annual average)
  - Current analyses 2001-2009 = 539 metric tons
  - 2008 Lake Okeechobee Phase 2 Technical Plan (1991-2005) = 514 metric tons
  - 2007 Lake Okeechobee Protection Plan update based on 1991-2000 = 433 metric tons
  - Annual average phosphorus loading will vary as period of record is updated

Watershed Water Quality
Strategies and Promising Technologies

SFWMD

- Source Control
  - FDACS/FDEP and SFWMD Source Control Programs
- Regional and Sub-Regional Projects
  - Hybrid Wetland Treatment Technology
  - Chemical Treatment
  - Permeable Reactive Barrier Technology
  - Stormwater Treatment Areas/Reservoir-Assisted STAs
- Research Projects
  - New Alternative Technology Assessment
  - Legacy Phosphorus Studies
  - Best Management Practice (BMP) Research and Extension Coordinating Council Proposals

Watershed Water Storage
Defining the Magnitude of Problem

SFWMD

Lake Okeechobee Phase II Technical Plan

- Analyses performed to determine amount of water needed to be stored in watershed to:
  - Improve lake stage management
  - Reduce excess damaging freshwater releases to estuaries
  - Meet other water-related needs
- Analyses indicate a breakpoint between 900,000 and 1.3 million acre-ft
- Storage need for north of the lake is further evaluated and refined through River of Grass planning process

Watershed Water Storage
Strategies and Promising Technologies

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- Mixture of regional and dispersed water management projects
- Dispersed Water Management
  - Most promising near-term option
  - Goal for dispersed water management is to provide 450,000 ac-ft of storage throughout the Northern Everglades watersheds
  - Northern Everglades dispersed water management payment for environmental services solicitation

Watershed Water Storage
Strategies and Promising Technologies (Cont.)

- Dispersed Water Management (Cont.)
  - Proposal for pilot projects for intensive agricultural operations
  - Evaluation of publicly owned lands usage for water management projects
  - Other large-scale efforts
    - Fisheating Creek Wetland Reserve Special Project
    - Istokpoga Marsh-Dispersed Water Management and Stormwater Recycling Project

Watershed Water Storage
Strategies and Promising Technologies (Cont.)

- Regional Storage
  - Reservoirs
  - Aquifer Storage and Recovery
  - Deep well injection
- CERP Lake Okeechobee Watershed Project
- River of Grass Land Acquisition

In-Lake Strategies

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- Sediment Management Options
  - Muck removal, scraping and tilling
  - Sediment dredging
  - Creation of in-lake islands or littoral zones near outlets
  - Chemical treatment
- Exotic Species Management
  - Most of SFWMD's efforts focused on exotic vegetation in collaboration with the FFWCC

Muck Scraping in Fisheating Bay (2007)

Luziola Treatment in Fisheating Bay (2008)

Sub-Watershed Conceptual Plans and Modeling

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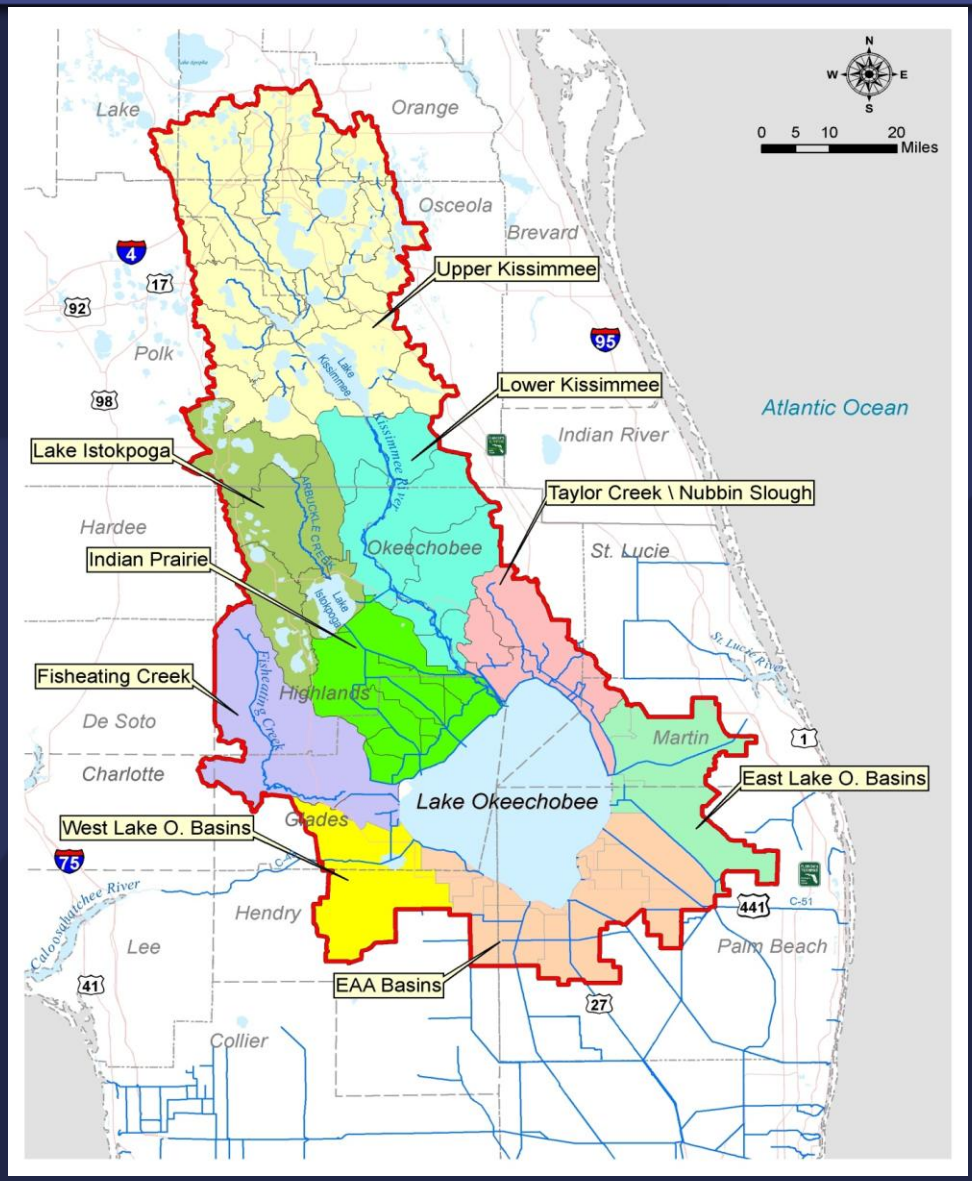
- Indian Prairie Sub-Watershed Phase I Assessment
- Pre-Drainage Characterization Modeling



Phosphorus Load Reductions

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- Baseline period from 2001 to 2009
- Used a combination of the Watershed Assessment Model (WAM) and an Excel spreadsheet tool
  - WAM has been applied to evaluate the effectiveness of BMPs
  - Load reductions from other projects were estimated based on best available data and P2TP evaluations
- Water quality evaluations conducted for three phases:
  - Current
  - Near-term (2011-2013)
  - Long-term (2014 and beyond)

Phosphorus Load Reductions
Current Activities

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Activities	Estimated TP Load Reduction (mt)	Lead Agency
Baseline Phosphorus Load (2001–2009)	539	
Current Activities		
Owner Implemented and Cost-share Agricultural BMPs	30.9	FDACS
Watershed Phosphorus Control Projects	26.4	SFWMD
Regional Public Works Projects	35.0	SFWMD
Florida Ranchlands Environmental Services Project (FRESP)	6.0	SFWMD
Dispersed Water Management Projects	7.9	SFWMD
Hybrid Wetland Treatment Technology (HWTT)	1.1	FDACS and SFWMD
Total under Current Activities	**107.3**	

Phosphorus Load Reduction
Near-term Activities (2011-2013)

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Activities	Estimated TP Load Reduction (mt)	Lead Agency
Remaining Load	**326.7**	
Near-Term Activities		
Owner implemented and Cost-share Agricultural BMPs	29.9	FDACS
Dispersed Water Management Projects – Planned	17.2	SFWMD
Northern Everglades Payment for Environmental Service Program Solicitation	TBD	SFWMD
Fisheating Creek Wetland Reserve Special Project	3.6	USDA
Hybrid Wetland Treatment Technology (Grassy site)	2.9	SFWMD
Aquifer Storage Recovery (Kissimmee Pilot ASR and Taylor Creek ASR Reactivation)	1.3	SFWMD and USACE
C-44 Project	6.7	SFWMD and USACE
Lakeside Ranch STA Phase I and Phase II	19.0	SFWMD
Subtotal	**80.6**	
Remaining Load	**246.1**	

Phosphorus Load Reduction
Long-term Activities (Beyond 2014)

SFWMD

	Activities	Adjusted TP Load Reduction* (mt)	Lead Agency
Remaining Load		**246.1**	
Future Activities	Owner implemented and Cost-share Agricultural BMPs*	25.9	FDACS
	Dispersed Water Management Project – Potential Sites	5.9	SFWMD
	Chemical Treatment at the Parcel Level	44.9	FDEP and SFWMD
	Chemical Treatment within Reservoirs	14.7	FDEP and SFWMD
	CERP Lake Okeechobee Watershed Project**	54	USACE and SFWMD
	Clewiston STA	2.5	SFWMD
	Brady Ranch STA*	2.0	SFWMD
	S-68 STA	8.0	SFWMD
	Istokpoga/Kissimmee RASTA	8.9	SFWMD
	Kissimmee Reservoir East	6.5	SFWMD
	Aquifer Storage and Recovery (ASR)	11.2	SFWMD
	Subtotal	184.5	
Remaining Load		**61.7**	

*** To be conservative, where reductions were projected to result in concentrations less than 30 ppb, the remaining loads were calculated by multiplying the basin flow by 30 ppb instead of a lower projected concentration.**

*** * CERP Lake Okeechobee Watershed Project load estimates do not include estimated load reductions from the Lakeside Ranch STA.**

Summary

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- The total P load reduction needed to meet TMDL of 105 mt: 434 mt
- Remaining load above the target: 62 mt
- Additional strategies may include:
  - Additional dispersed and sub-regional/regional storage/treatment
  - Soil amendments/stabilization
  - Linkages with other programs

Implementation
Near-term Phase

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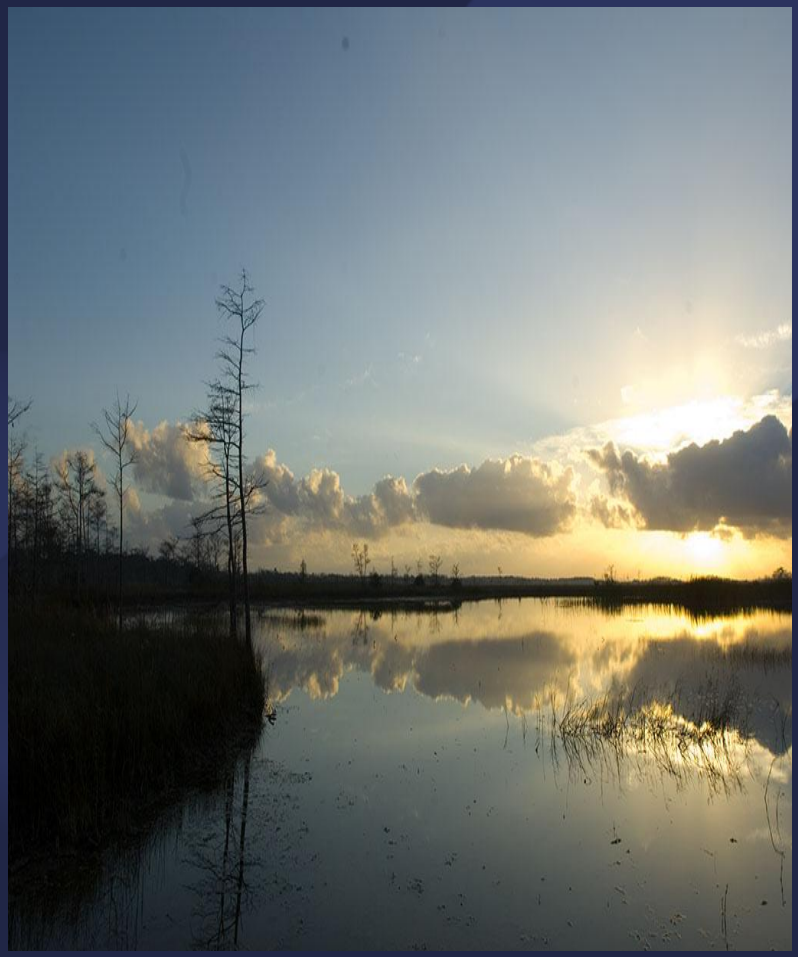
- Includes projects that are most imminent and have the highest potential to be completed by 2013
- Plan will be revisited and necessary adjustments will be made in the next LOPP update in 2014
- List takes into account the current economic realities and likelihood of recovery in the near-term



Cost Estimates
Near-Term Phase (2011-2013)

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Category of Cost	Cost Estimate
Watershed Source Control	$17.5 M
O&M of Completed Projects	$10.3 M
Near-term Construction Project (included the PES program funding for Northern Everglades)	$88.6 M
Research and Water Quality Monitoring	$3.2 M
Exotic Species Control	$0.8 M
Internal Phosphorus Management	TBD
Total Cost	**$120.4 M**

Note: Cost estimates are adjusted for an inflation rate of 3.5%

Next Steps

- End Public Comment Review Period 12/9/10
- NE Interagency Team Meeting/LO WRAC 1/11
- WRAC/GB Meetings - Final LOPP 2/11
- Final LOPP to the Legislature 3/11


Questions?
https://my.sfwmd.gov/northerneverglades