



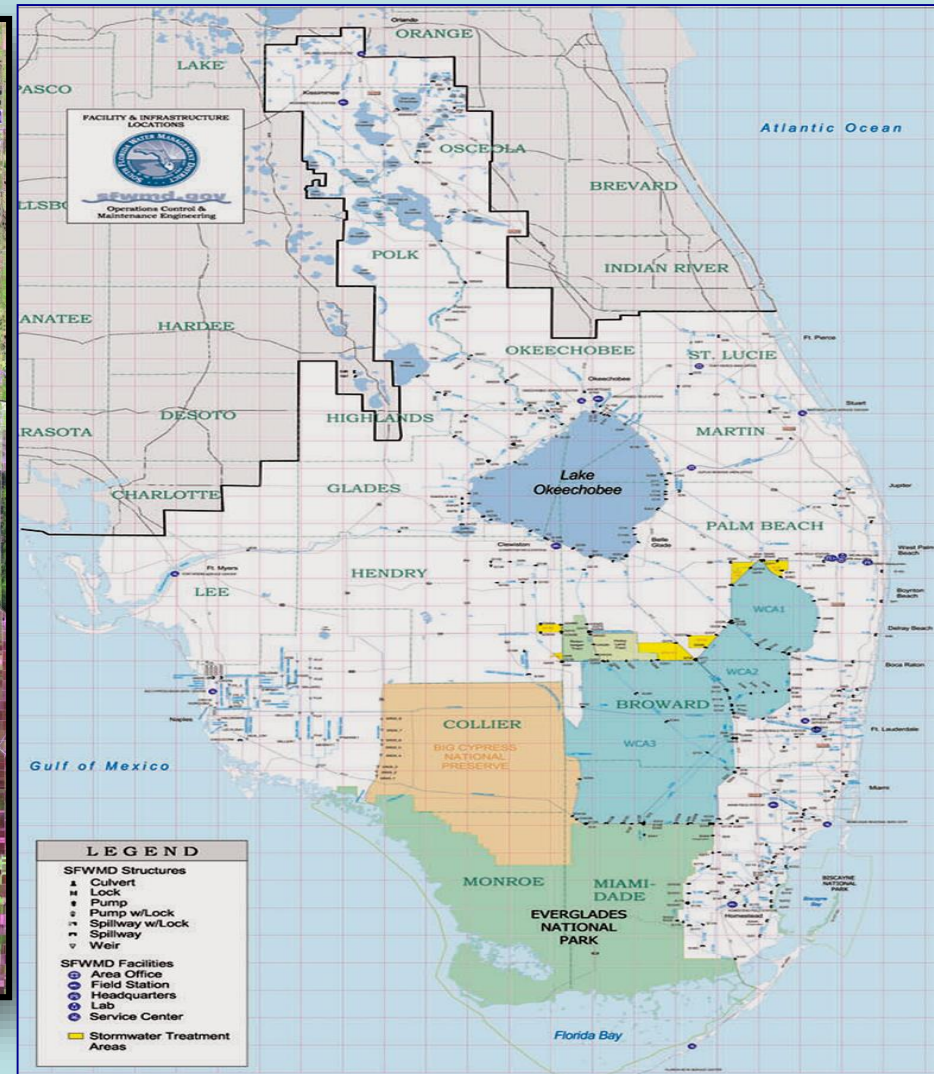
Restoring Lake Okeechobee and other Regional Resources

The Northern Everglades Initiative

Garth Redfield, Chief Scientist, SFWMD

Lake Okeechobee

The Heart of the Region

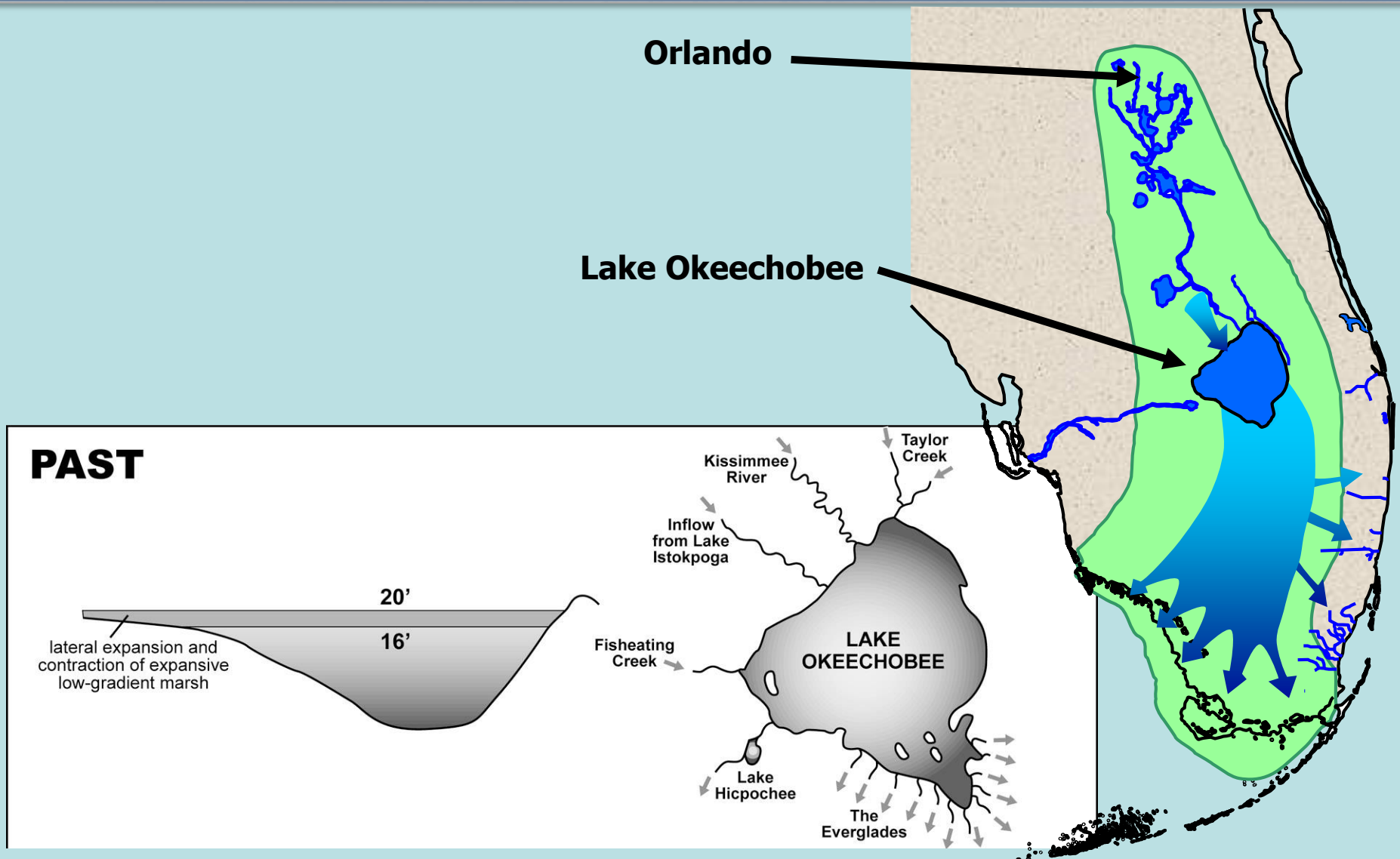


Lake Okeechobee

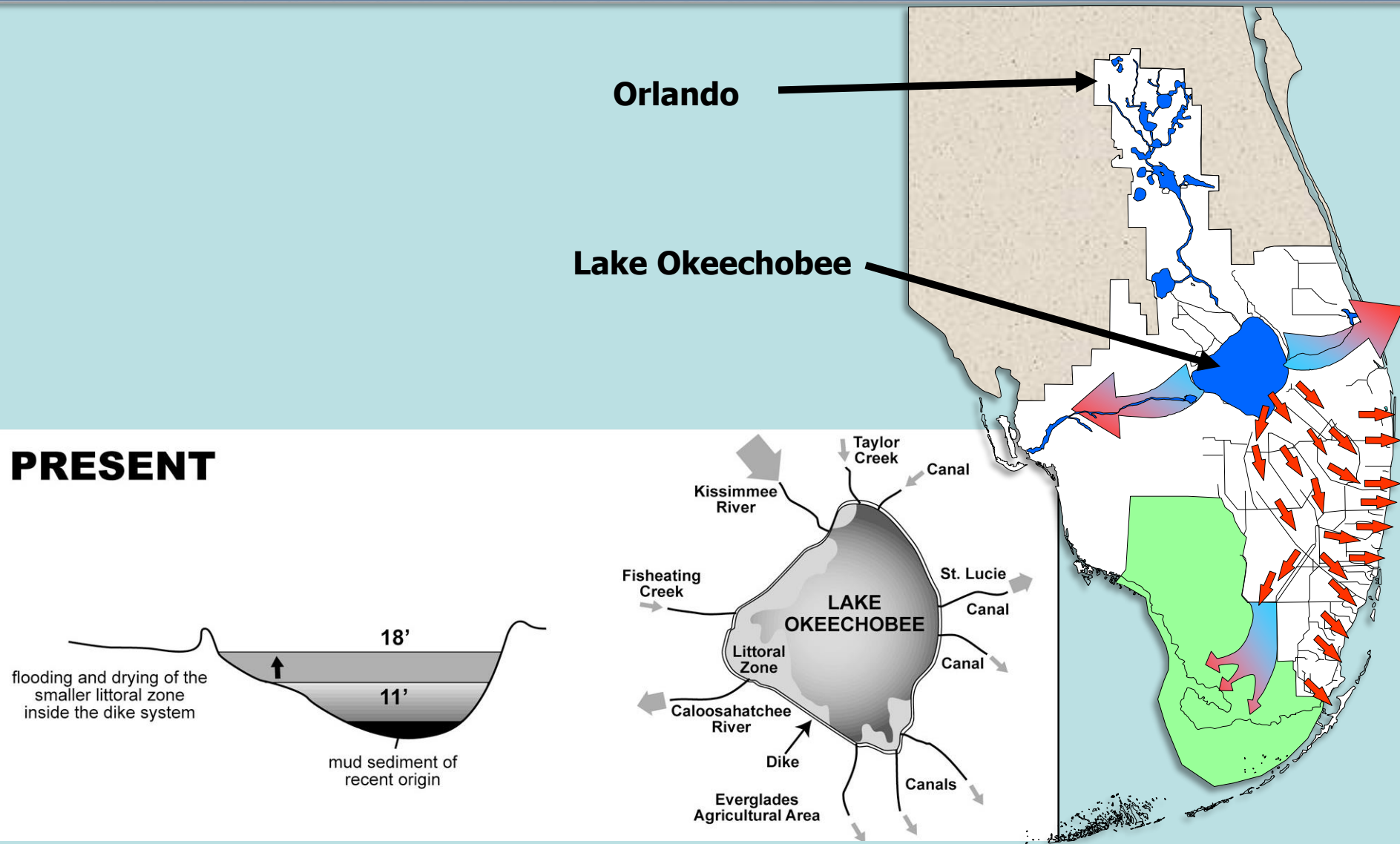


- Largest lake in southeastern US
- Area: 1800 km²
- Average depth: 2.7 m
- Length: 64 km
- Width: 48 km
- Surrounded by levee
- Turbid, wind driven
- Eutrophic
- Sub-tropical

Predrainage Conditions



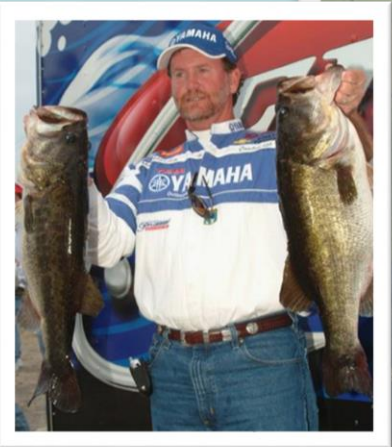
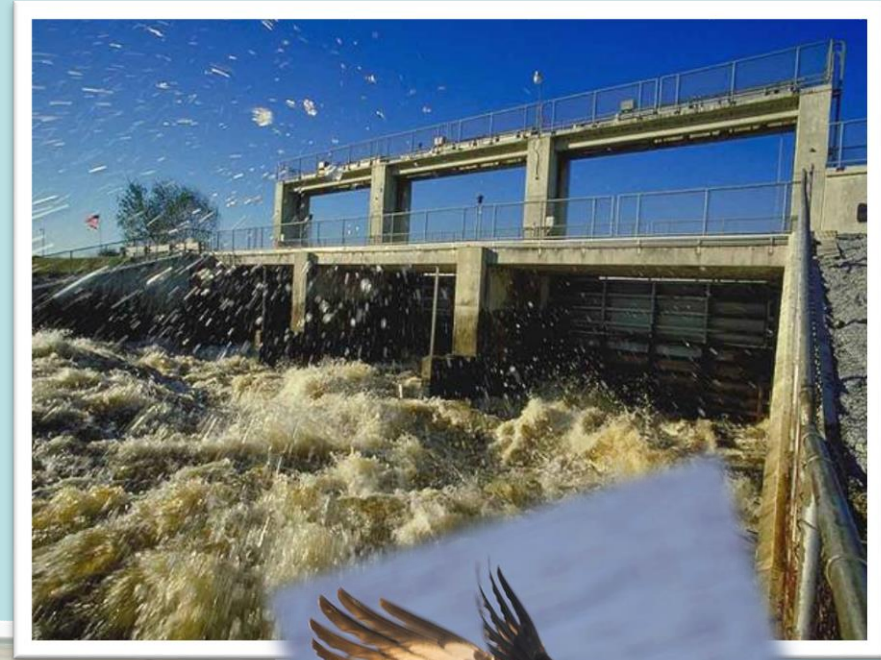
Present-Day Conditions



Lake Okeechobee

A Multi-purpose Resource

- Flood Protection
- Water Supply
- Navigation
- Fishing
- Recreation
- Wildlife



Lake Okeechobee: The Heart of the Matter

- **The Lake is the liquid heart of the KOE ecosystem**
 - ▶ *Restoration, like treating heart disease, requires an integrated series of steps*
- **Capital projects combined with numerous interagency initiatives**
- **Focused on meaningful improvements to water quality and water quantity in Lake Okeechobee and the St. Lucie and Caloosahatchee Estuaries**
- **Regional problems require a regional approaches**

Major Environmental Challenges



Excess P Loads



Exotic Species



Sediment Buildup



Lake
Okeechobee



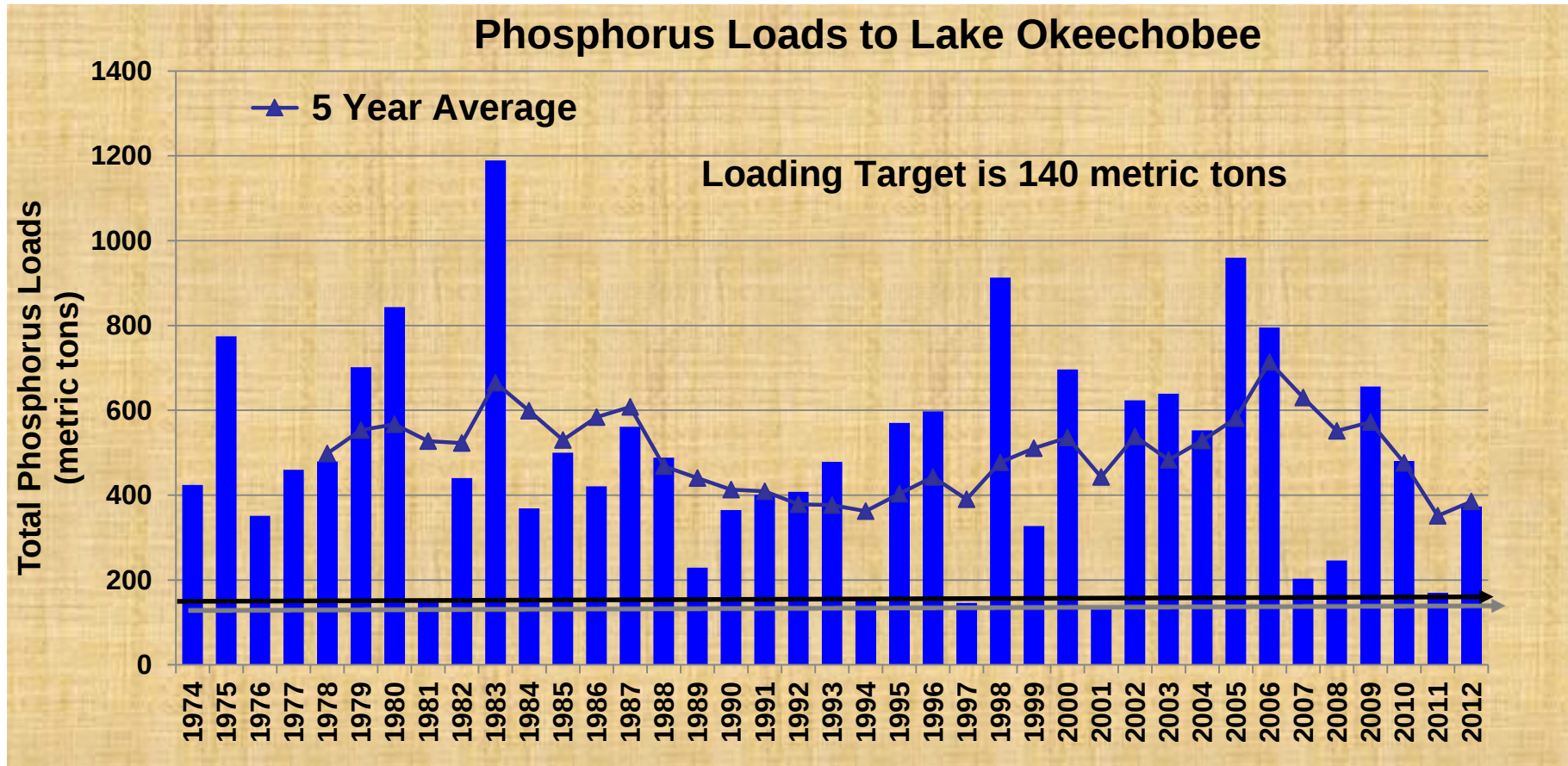
Dynamic Hydrology

Lake Okeechobee: Management Challenge

- **Managing the Lake and its large watershed is a huge challenge, but not uncommon worldwide**
 - **Multiple stressors – P loads, exotic species, sediment and fluctuating water levels**
 - **Very large watershed in agriculture**
 - **Nutrient rich soils with legacy phosphorus**
 - **Limited ability of best management practices to control P at the watershed source**

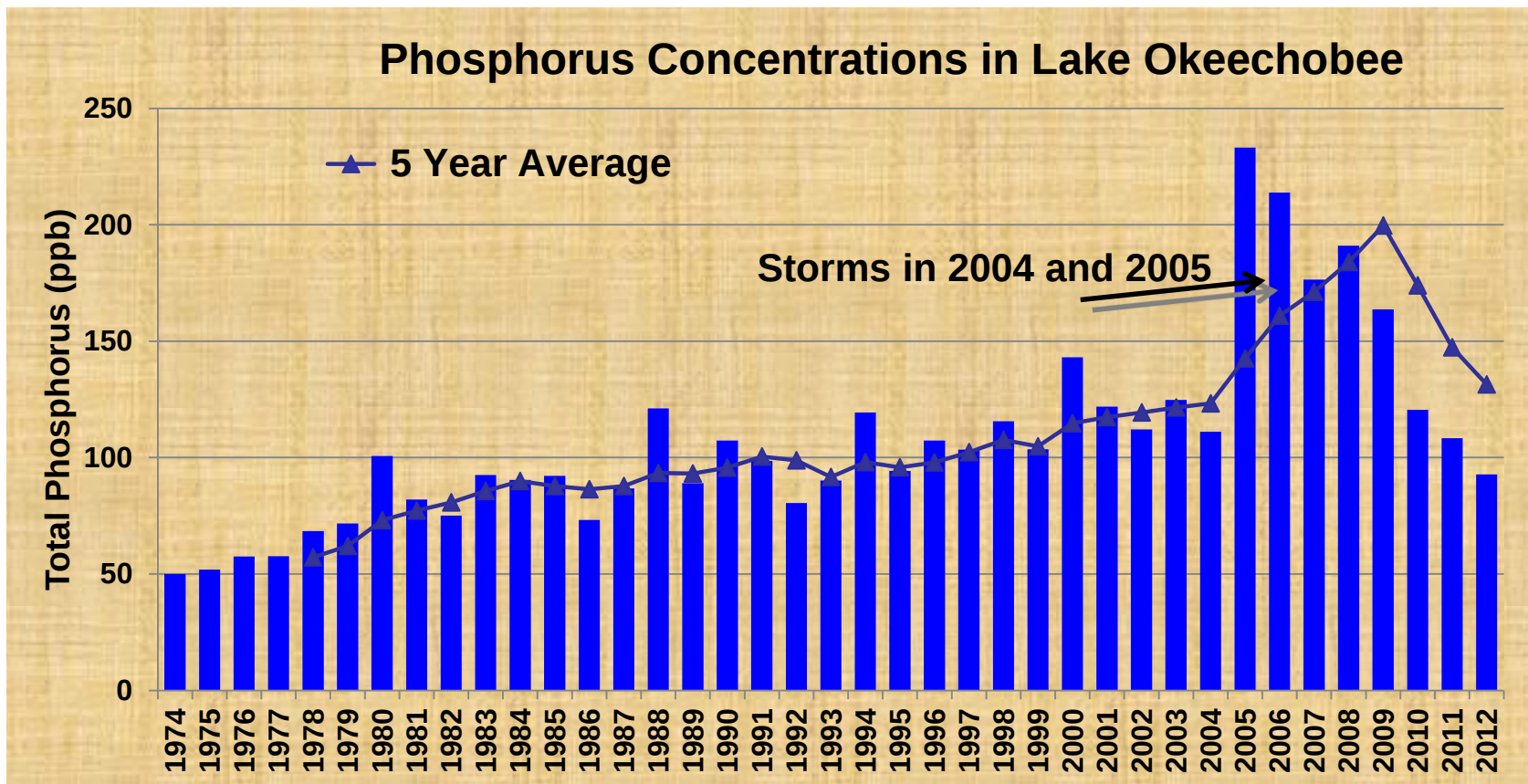
The Nutrient Problem is Phosphorus

A regional water quality problem and P loading is about three times the target



The Phosphorus Problem is Long-Term

Lake TP concentrations have increased in response to loads



Lake Okeechobee Management

Attempts at P control have not been able to improve conditions

A multi-agency, regional program is needed to address:

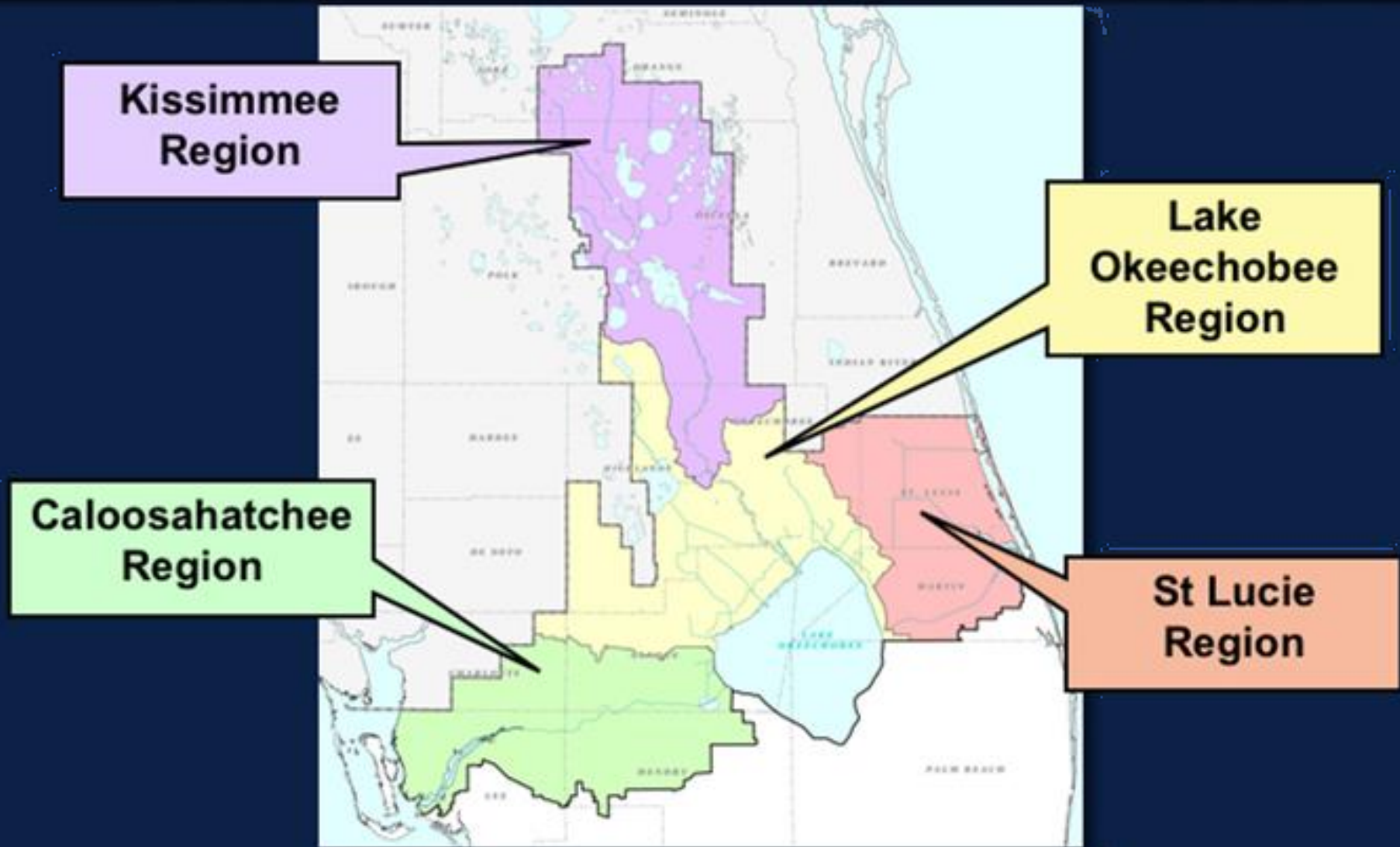
- **Excessive phosphorus loading**
- **Unnatural fluctuations in water levels**
- **Spread of exotic species**
- **Downstream impacts on marine systems**

*** Chapter 8 of the 2012 SFER provides highlights of this integrated and large scale restoration effort**

Northern Everglades Program

**Integrative Initiative by the
Florida Legislature titled -
Northern Everglades and
Estuaries Protection Program**

Northern Everglades Initiative



Lake Okeechobee



St. Lucie Estuary



Caloosahatchee Estuary



Northern Everglades Legislation

- **Creates the Northern Everglades and Estuaries Protection Program**
- **Provides a dedicated state funding source for the Northern Everglades Restoration**
- **Requires development of a technical plan to identify storage and water quality requirements for the Lake**
 - ▶ *New water quality treatment technologies*
 - ▶ *Designed to achieve all applicable TMDLs in the Lake Okeechobee watershed*

Northern Everglades Legislation

- **Requires development of the Caloosahatchee and St. Lucie Estuaries Watershed Plans**
 - ▶ *Identify watershed storage projects and water quality targets*
 - ▶ *Establish salinity goals and targets*
 - ▶ *Plan Watershed Construction Projects & Pollutant Control Programs*
 - ▶ *Plan Watershed Research and Water Quality Monitoring Program*
- **The Bill extends the state's commitment to provide funding for the Northern Everglades through 2020**

Key Restoration Components

Lake Okeechobee

Watershed Protection Program

- **Lake Okeechobee fast track projects**
 - ▶ *Revise Lake Okeechobee Operating Schedule*
 - ▶ *Set Total Maximum Daily Loads, TP loading targets for tributaries*
 - ▶ *Mandatory fertilizer Best Management Practices*
- **Permitting revisions for urban development**
- **Alternative storage of excess surface water**

Progress on the Lake

- **Between 1998 and 2005, more than 35 projects have been completed in the watershed.**
- **Approximately 20 additional projects are underway for completion in the next one to five years.**
 - ▶ *Will prevent an estimated 150 metric tons of phosphorus from entering the Lake each year.*
 - ▶ *Will add approximately 345 million cubic meters of additional water storage to reduce impacts from flood-control releases to the estuaries*
 - ▶ *A good start; a great challenge*

Progress - Watershed Protection Program

- **Multiple STAs being built and dispersed storage projects are underway**
- **Working on new treatment technologies for chemical treatment, permeable reactive barriers and hybrid wetland stormwater treatment**
- **Sub-watershed feasibility studies conducted with model development and application**
- **Multiple studies completed on best management practices and soils P assimilation**
- **Many projects are multi-agency and collaborative**

Restoring Lake Okeechobee

Lessons Learned

- **Cumulative impacts are very difficult to overcome due to internal recycling and TP storage**
- **Massive spatial scale of the watershed and lake present major challenge to management**
- **Sources and sinks of P must be understood at the watershed level**
- **Water quality impacts cascade to downstream areas – truly a regional problem**





Restoring Lake Okeechobee and other Regional Resources

