SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Can One Lake Be Everything to Everyone? The Challenge of Managing Lake Okeechobee for Multiple Users

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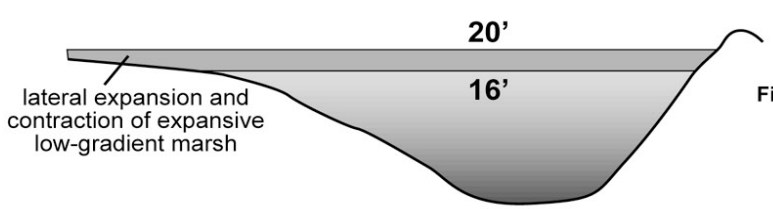
South Florida Water Management District

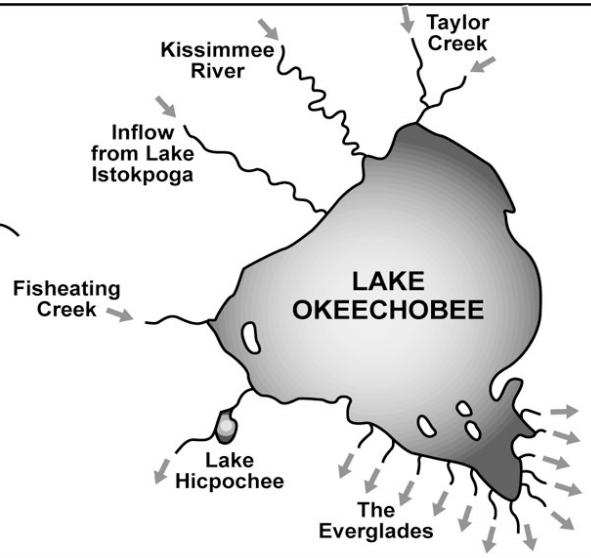
sfwmd.gov

Lake Okeechobee Characteristics

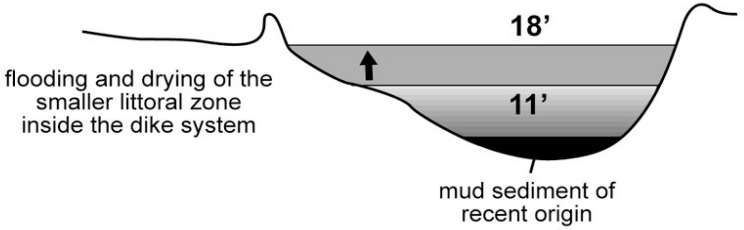
- Surface Area ~730 square miles
- Mean depth ~8 ft, Maximum depth ~18 ft
- Natural lake, but now impounded
- Regulated Stage
- Phosphorus enriched open water zone
- High turbidity due to sediment re-suspension
- Many ecological and societal values

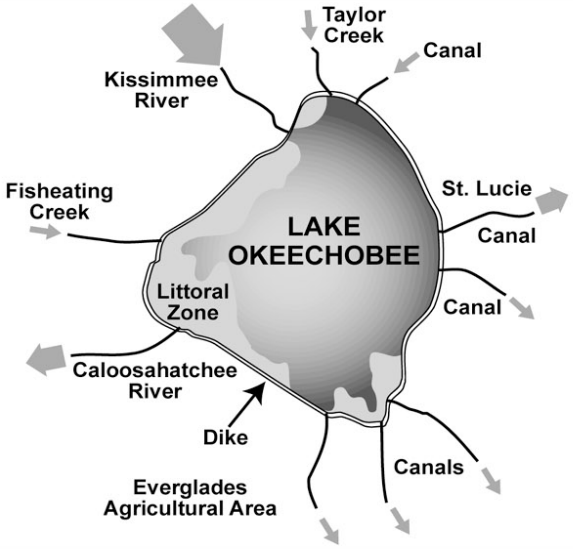
PAST

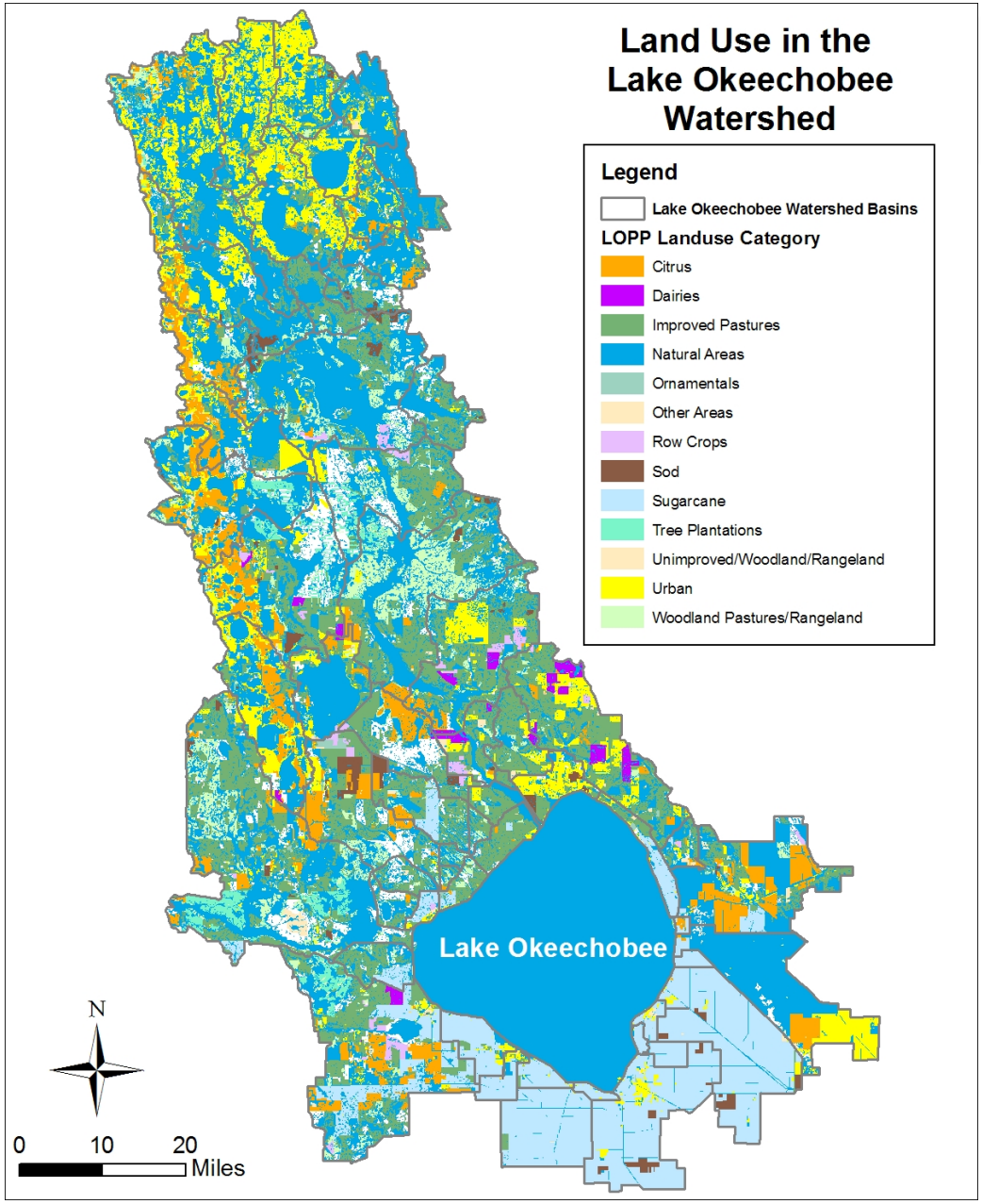


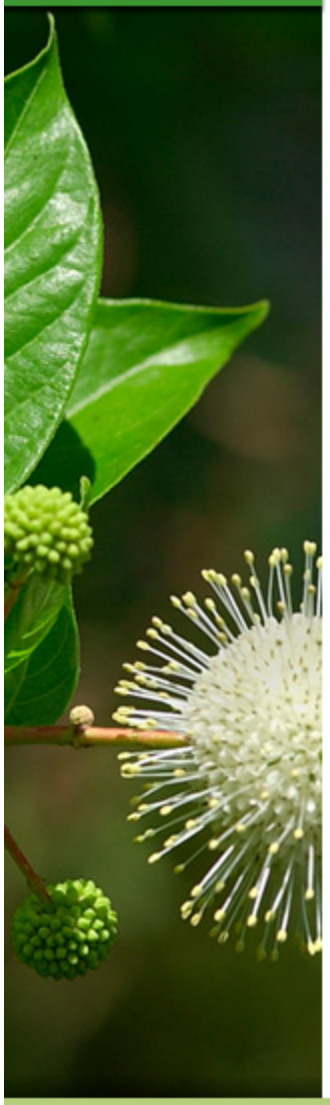


PRESENT

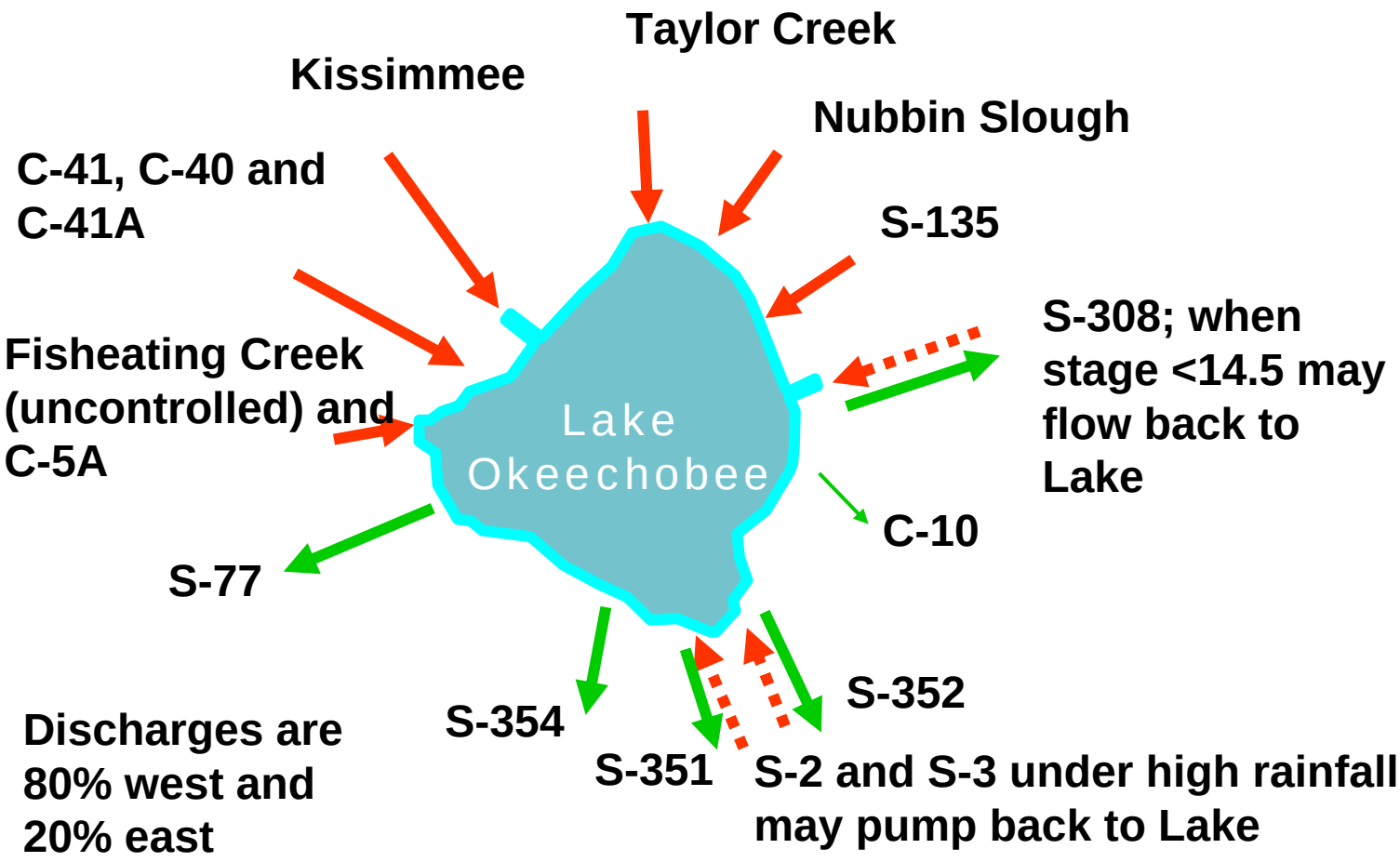




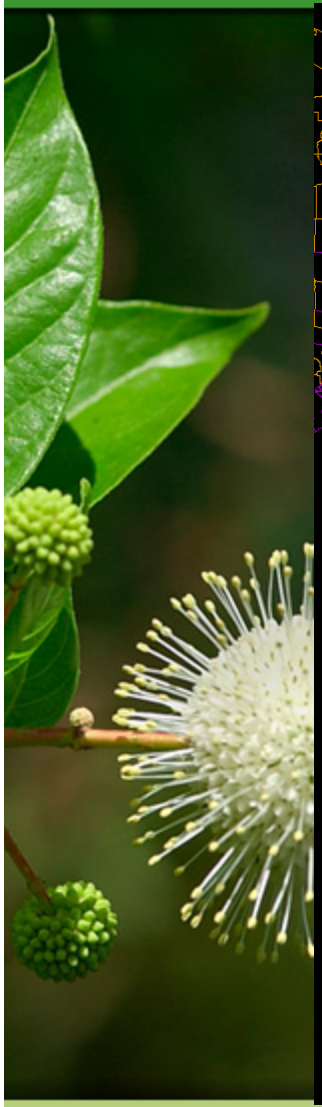

Land Use in the Lake Okeechobee Watershed
Legend
Lake Okeechobee Watershed Basins
LOPP Landuse Category
Citrus
Dairies
Improved Pastures
Natural Areas
Ornamentals
Other Areas
Row Crops
Sod
Sugarcane
Tree Plantations
Unimproved/Woodland/Rangeland
Urban
Woodland Pastures/Rangeland
Lake Okeechobee
N
0
10
20
Miles

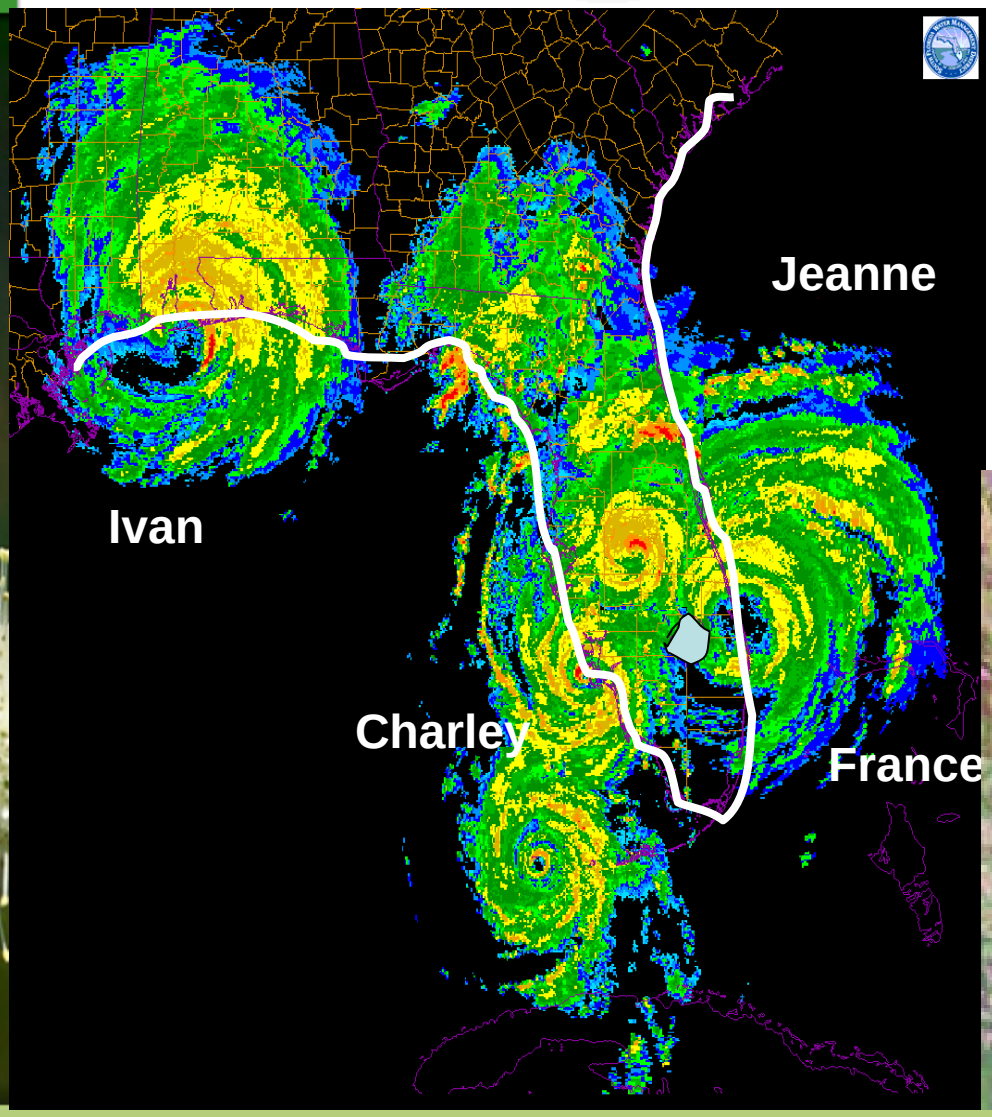


Inflows & Outflows – Inflow capacity exceeds outflow capacity

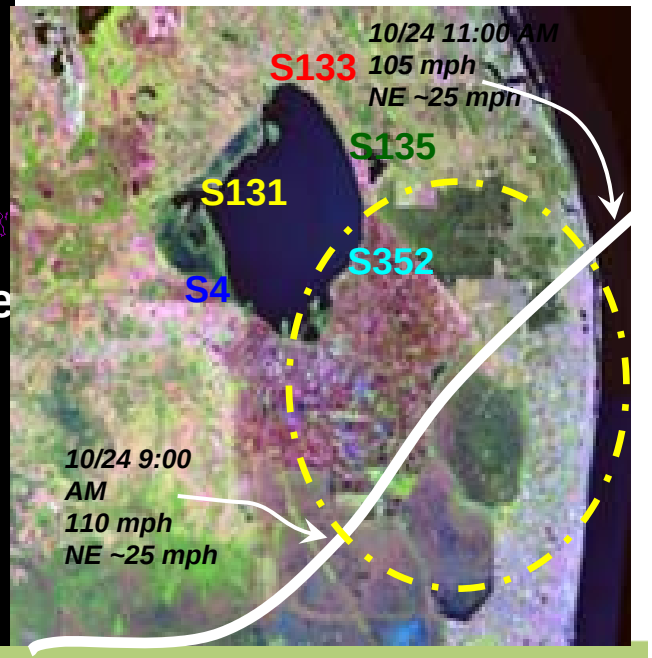


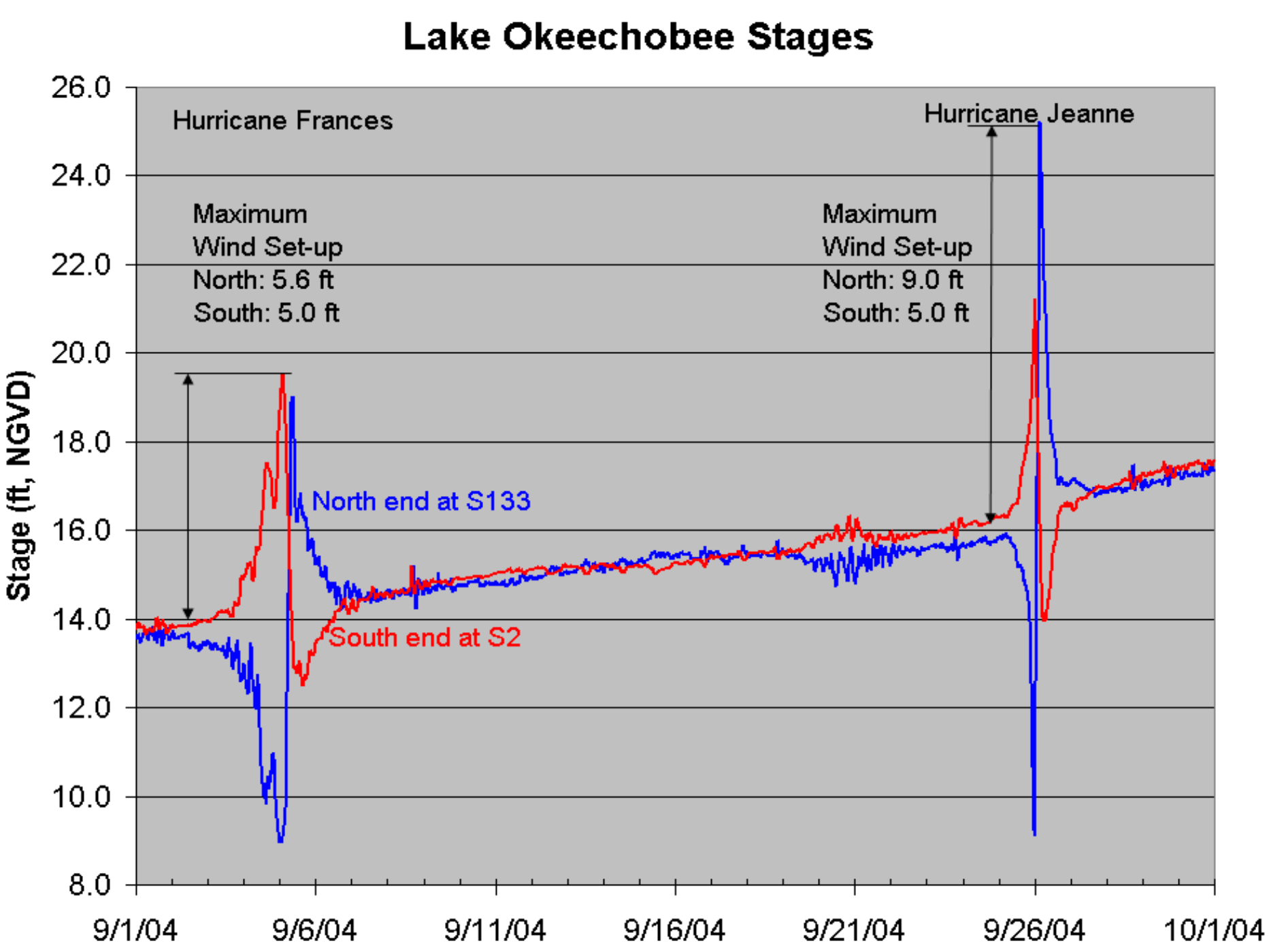
2004 and 2005 Hurricane Tracks

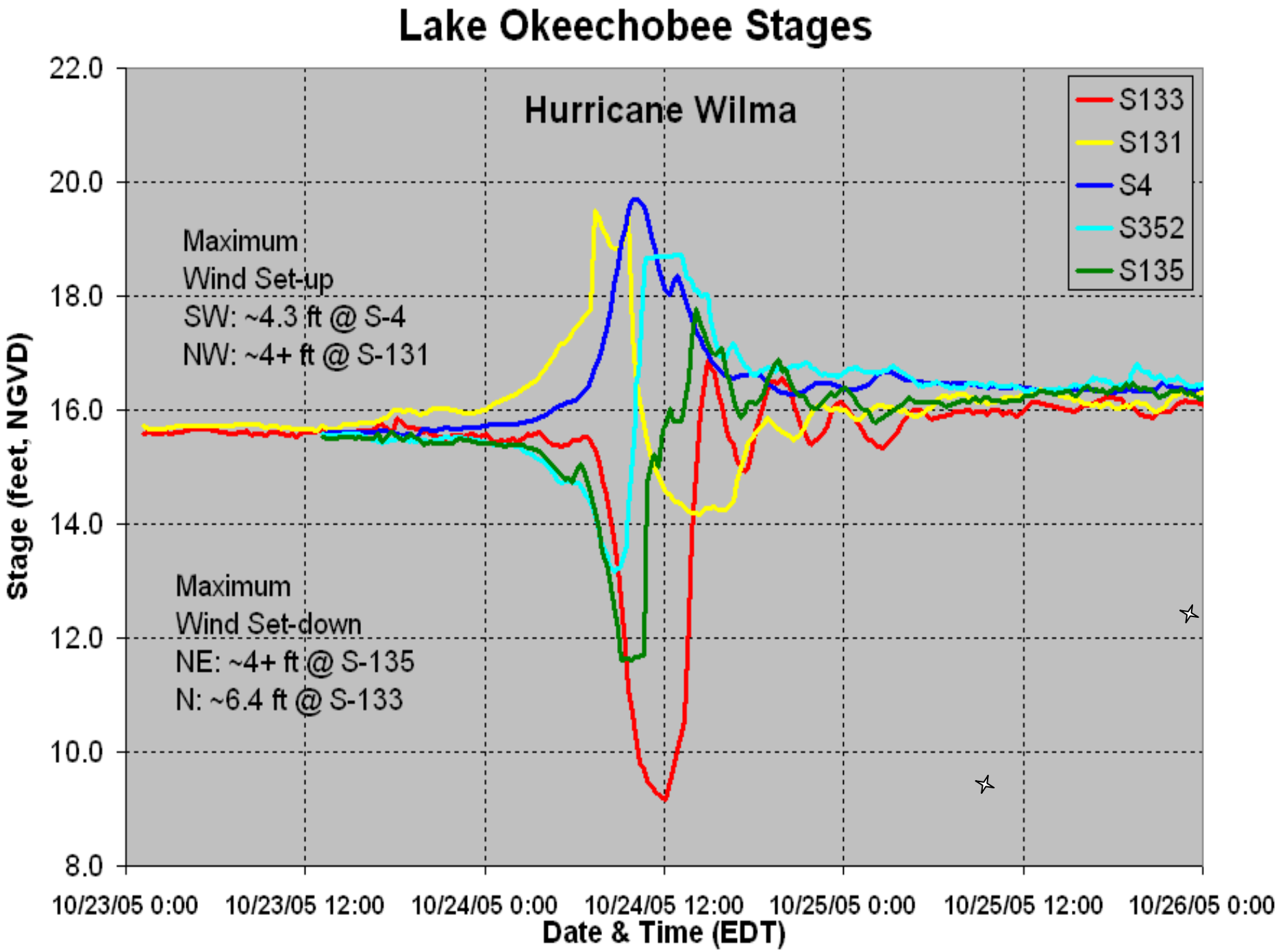




Wilma




Lake Okeechobee Stages
Hurricane Frances
Hurricane Jeanne
Maximum
Wind Set-up
North: 5.6 ft
South: 5.0 ft
Maximum
Wind Set-up
North: 9.0 ft
South: 5.0 ft
North end at S133
South end at S2
Stage (ft, NGVD)
26.0
24.0
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
9/1/04
9/6/04
9/11/04
9/16/04
9/21/04
9/26/04
10/1/04

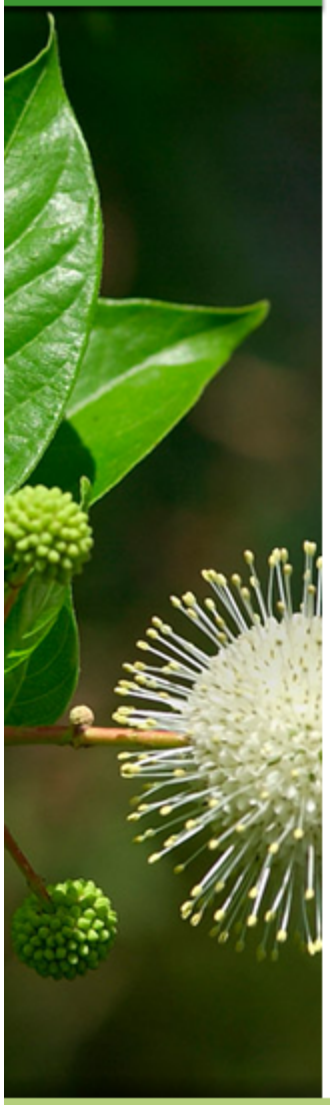

Lake Okeechobee Stages
Hurricane Wilma
S133
S131
S4
S352
S135
Maximum
Wind Set-up
SW: ~4.3 ft @ S-4
NW: ~4+ ft @ S-131
Maximum
Wind Set-down
NE: ~4+ ft @ S-135
N: ~6.4 ft @ S-133
Stage (feet, NGVD)
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
10/23/05 0:00
10/23/05 12:00
10/24/05 0:00
10/24/05 12:00
10/25/05 0:00
10/25/05 12:00
10/26/05 0:00
Date & Time (EDT)

SEICHE AND LAKE LEVELS

- Near-term hurricane impacts were primarily due to wind/wave interactions
- Long-term hurricane impacts due to re-suspension of lake sediments and nutrient loads from high rainfall events
- Lake levels increased by approximately 6 feet due to the 2004 hurricanes and approximately 1.5 feet from Hurricane Wilma
- High lake levels, coupled by storm surge and dry season frontal systems continued to keep sediments in suspension for many months

Wave Erosion From Hurricane Wilma

Other in-Lake impacts



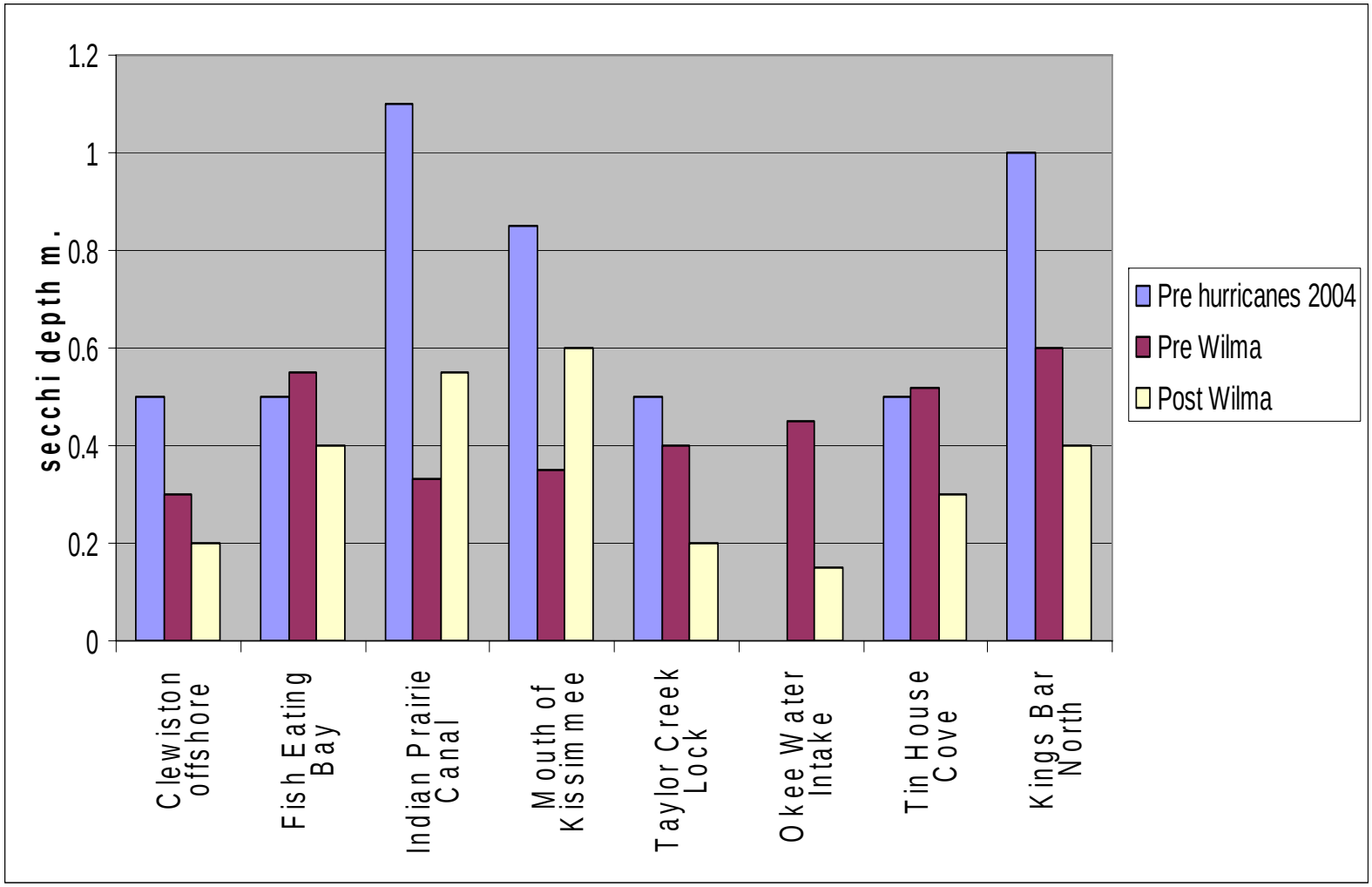
Missing bulrush near Observation Shoal

Uprooted vegetation near Belle Glade

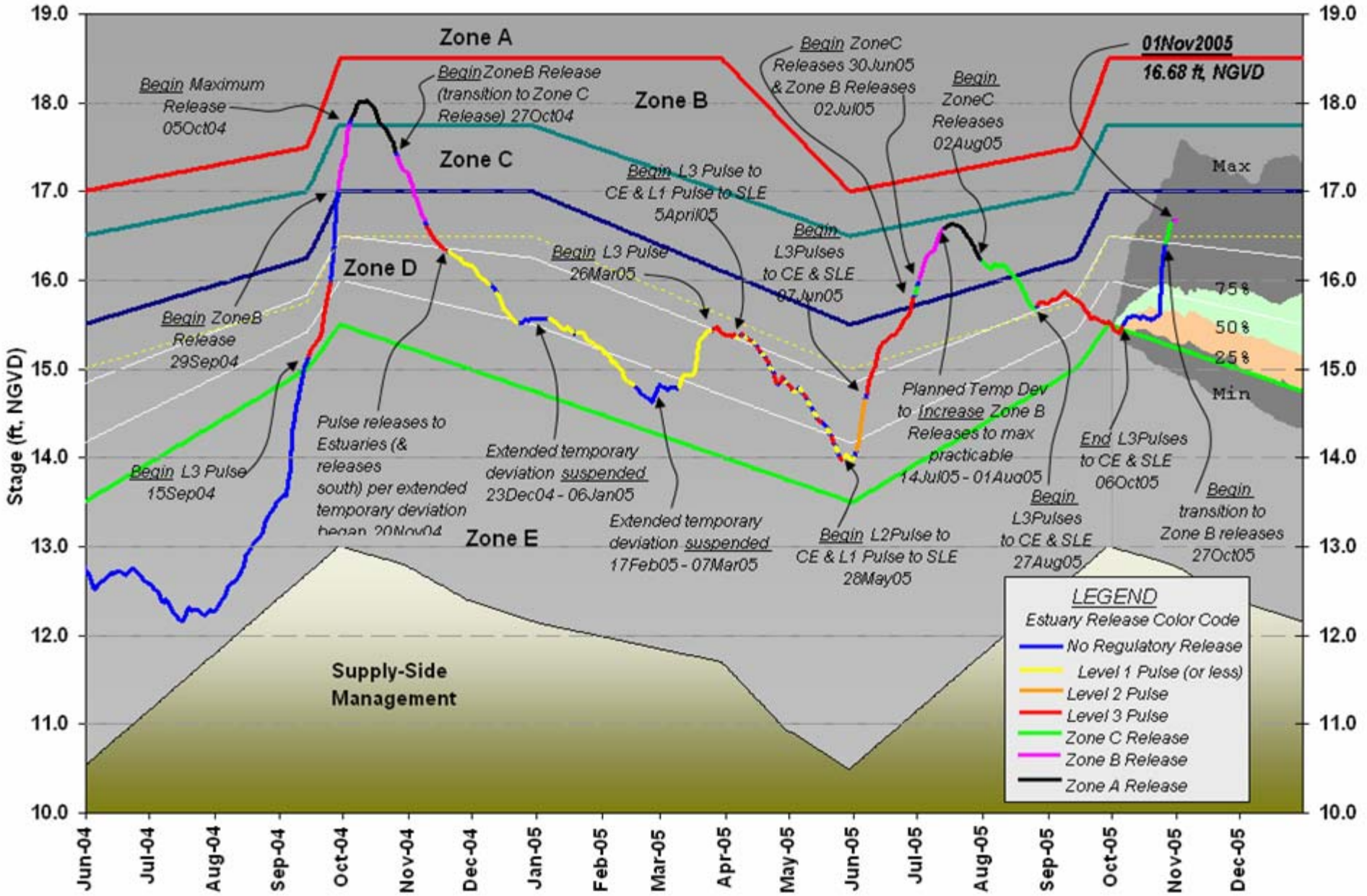
New cut north of Cochran's Pass

Bloom near Clewiston

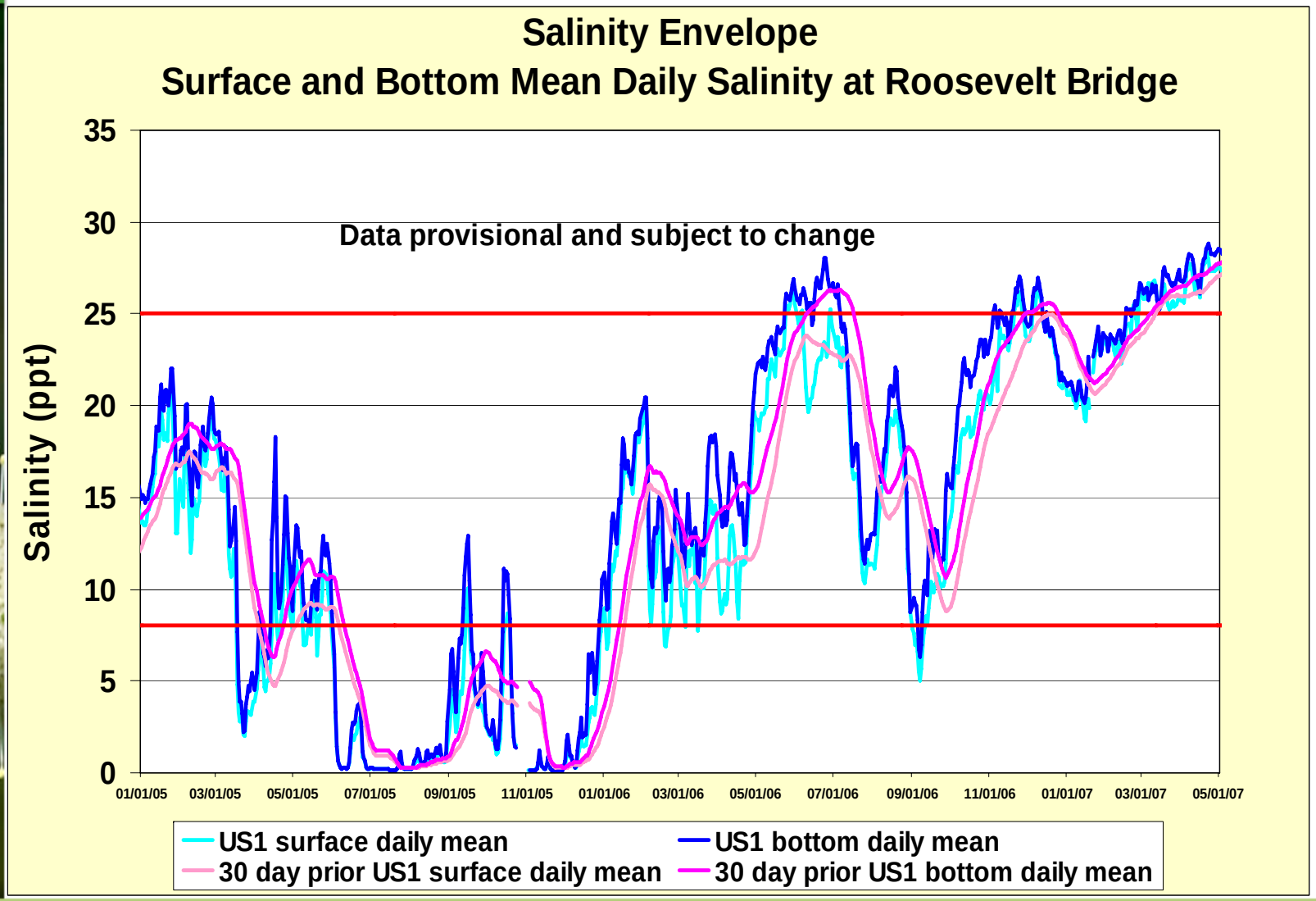
TRANSPARENCY



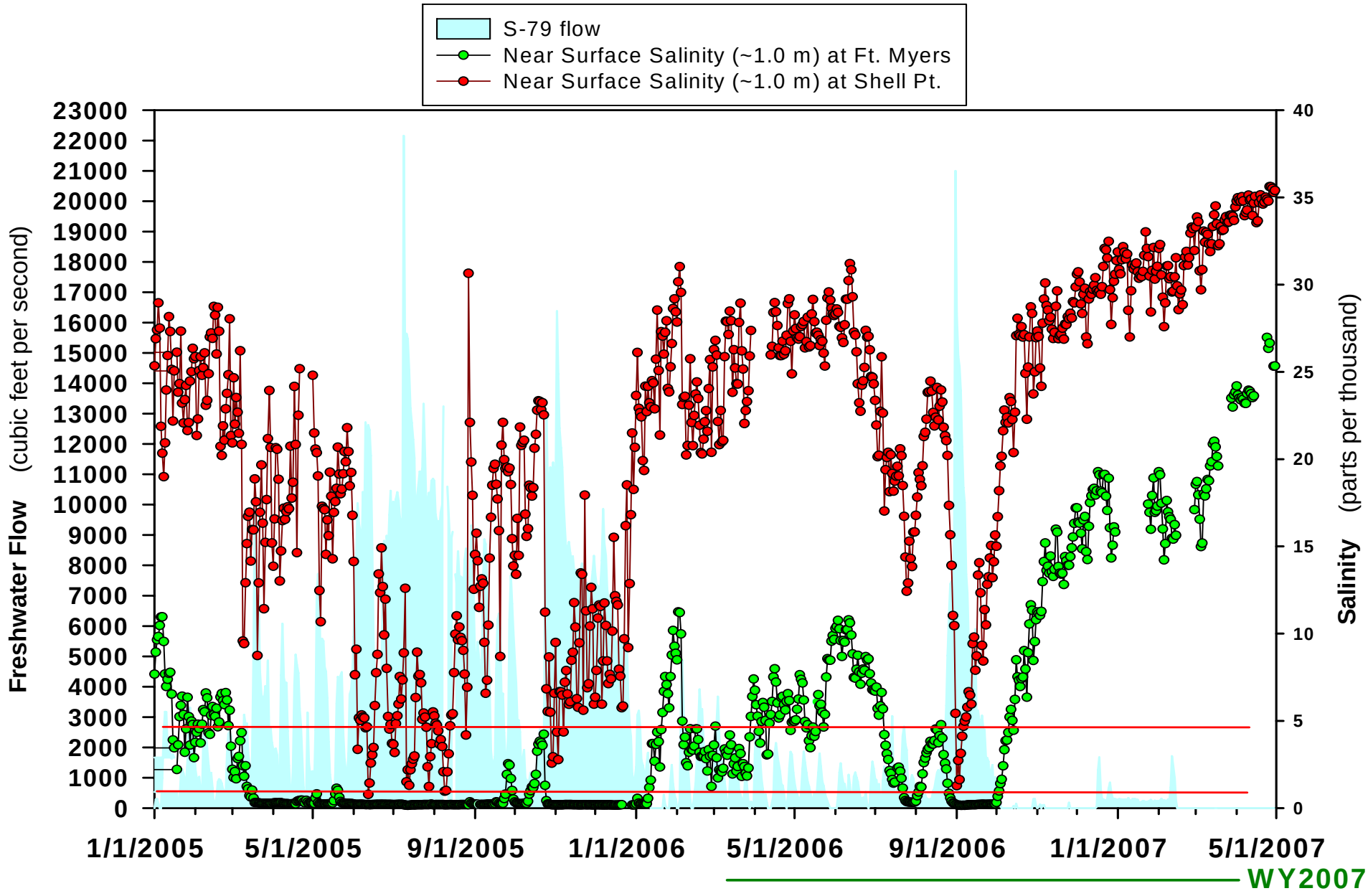
Lake Okeechobee Stage & Regulatory Discharge History & Projection



St. Lucie Estuary Salinity Envelope



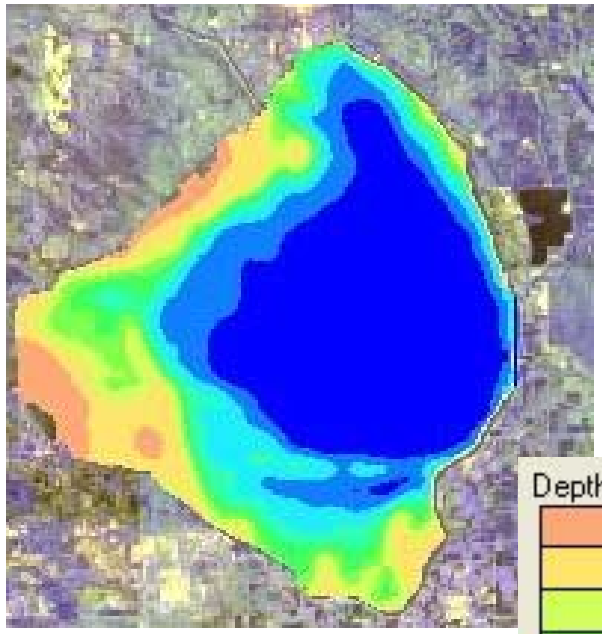
Daily Salinity in the Caloosahatchee Estuary and S-79 Discharge



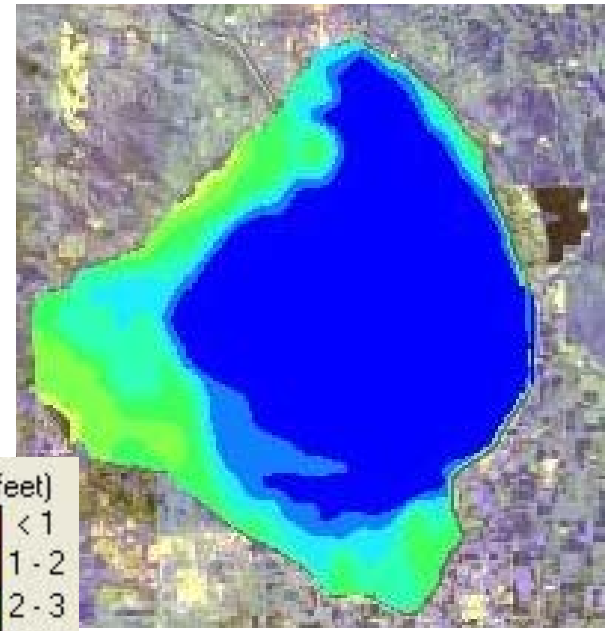
Lake Okeechobee Water Depth Comparison

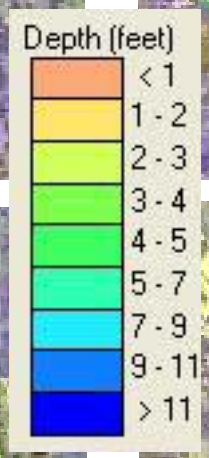
http://spatial1.sfwmd.gov/losac/sfwmd.asp

Elevation 14.3 ft, NGVD Long-term Average (1965-2005)

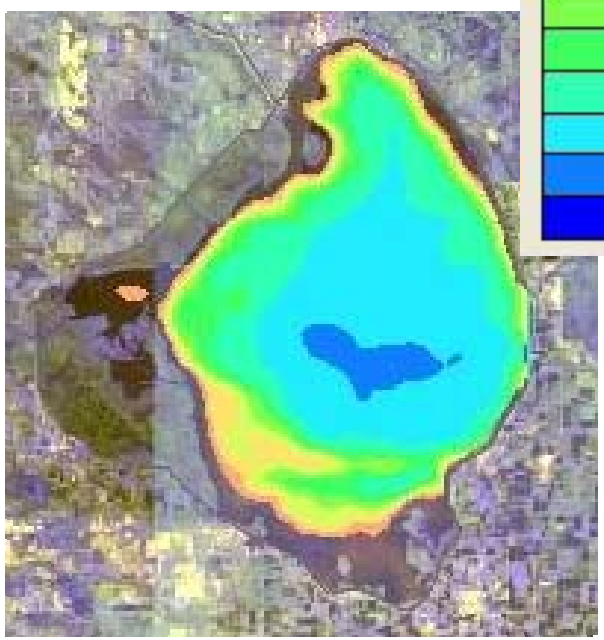


Elevation 17.0 ft, NGVD H. Wilma Nov-2005

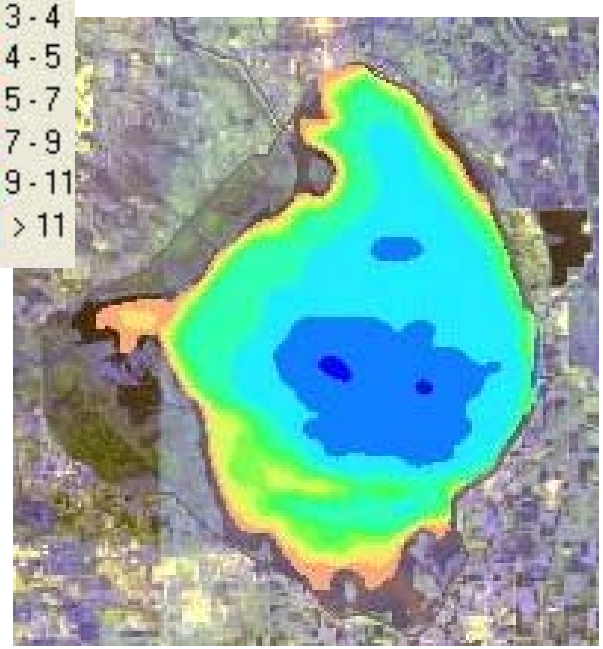


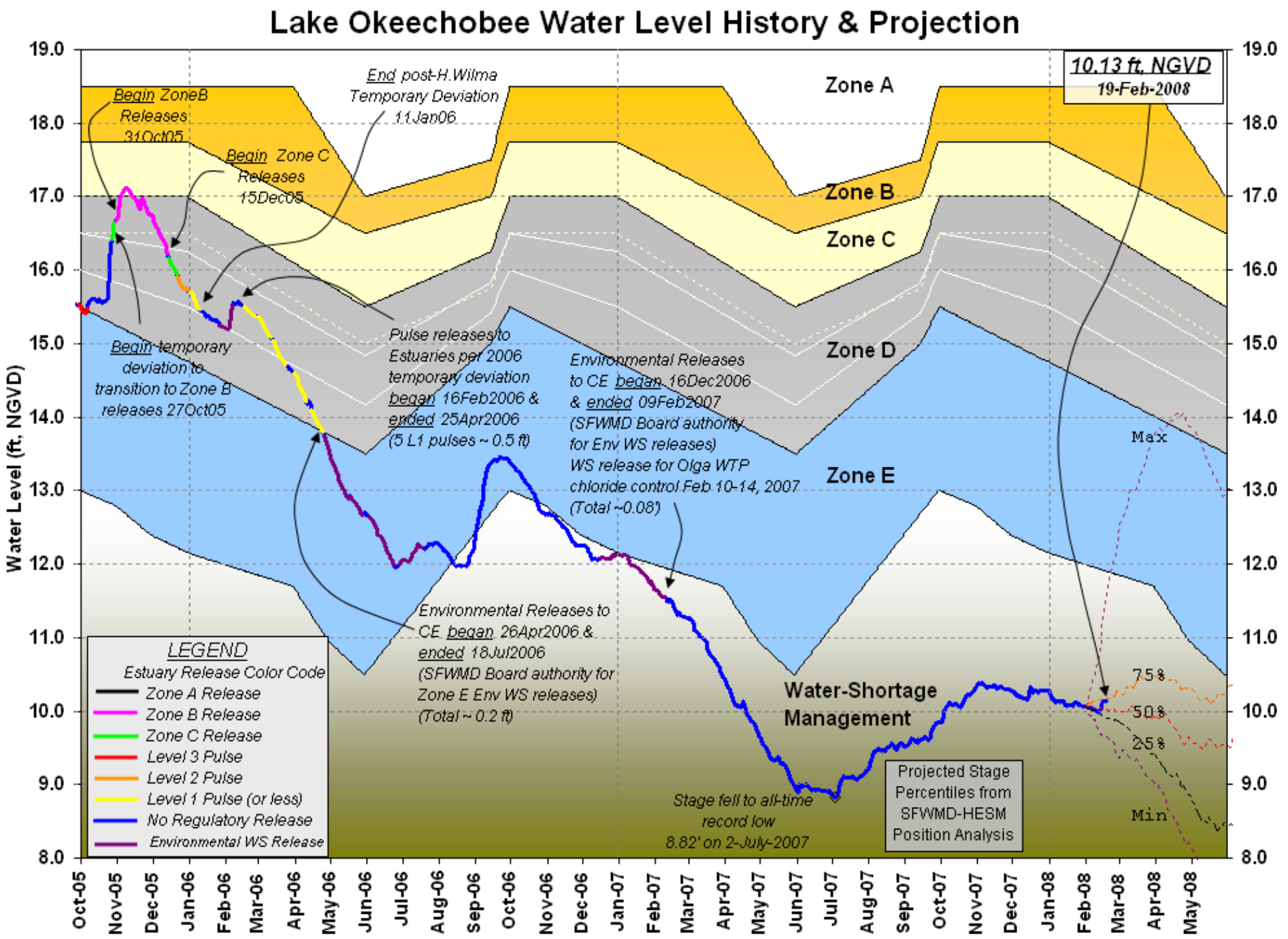


Elevation 8.82 ft, NGVD Record Low 02-July-2007

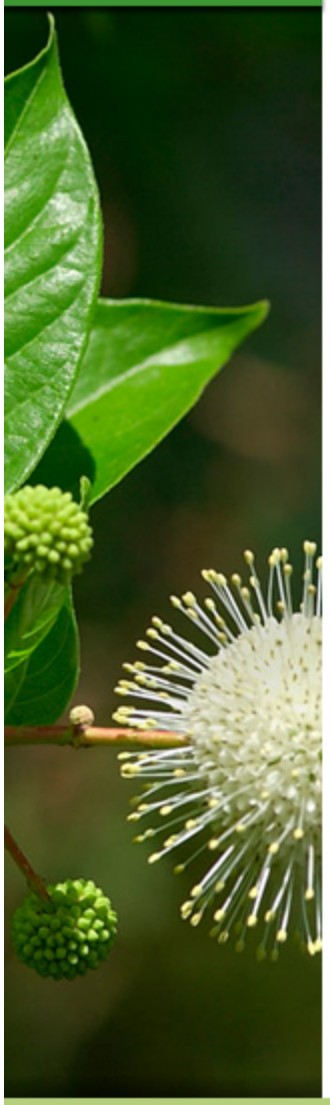


Elevation 10.1 ft, NGVD 20-Feb-2008

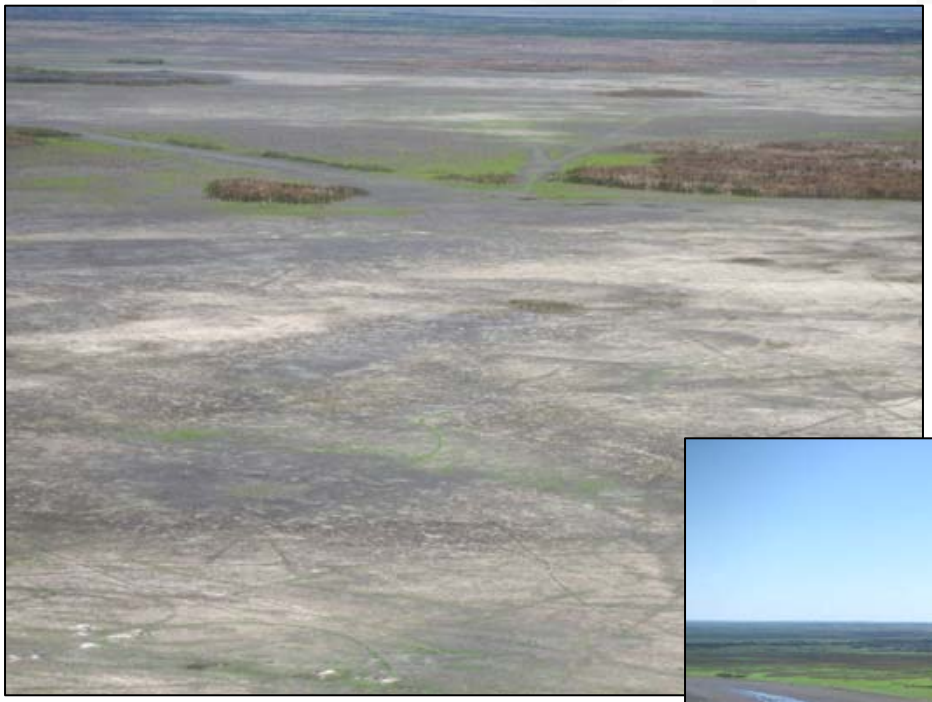



Lake Okeechobee Water Level History & Projection
Water Level (ft, NGVD)
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
11.0
10.0
9.0
8.0
Oct-05
Nov-05
Dec-05
Jan-06
Feb-06
Mar-06
Apr-06
May-06
Jun-06
Jul-06
Aug-06
Sep-06
Oct-06
Nov-06
Dec-06
Jan-07
Feb-07
Mar-07
Apr-07
May-07
Jun-07
Jul-07
Aug-07
Sep-07
Oct-07
Nov-07
Dec-07
Jan-08
Feb-08
Mar-08
Apr-08
May-08
Zone A
Zone B
Zone C
Zone D
Zone E
10.13 ft. NGVD
19-Feb-2008
Begin ZoneB Releases 31Oct05
Begin Zone C Releases 15Dec05
End post-H.Wilma Temporary Deviation 11Jan06
Begin temporary deviation to transition to Zone B releases 27Oct05
Pulse releases to Estuaries per 2006 temporary deviation began 16Feb2006 & ended 25Apr2006 (5 L1 pulses ~ 0.5 ft)
Environmental Releases to CE began 16Dec2006 & ended 09Feb2007 (SFWMD Board authority for Env WS releases) WS release for Olga WTP chloride control Feb 10-14, 2007 (Total ~0.08)
Environmental Releases to CE began 26Apr2006 & ended 18Jul2006 (SFWMD Board authority for Zone E Env WS releases) (Total ~ 0.2 ft)
Water-Shortage Management
Stage fell to all-time record low 8.82' on 2-July-2007
Max
75%
50%
25%
Min
Projected Stage Percentiles from SFWMD-HESM Position Analysis
LEGEND
Estuary Release Color Code
Zone A Release
Zone B Release
Zone C Release
Level 3 Pulse
Level 2 Pulse
Level 1 Pulse (or less)
No Regulatory Release
Environmental WS Release

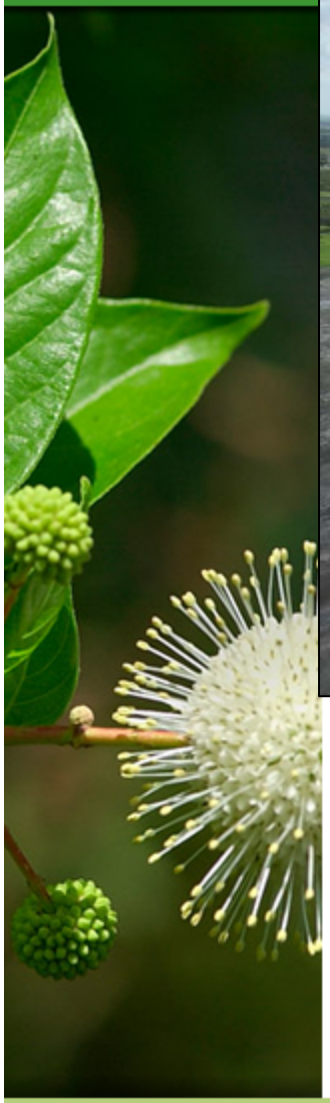
Dry Conditions - North

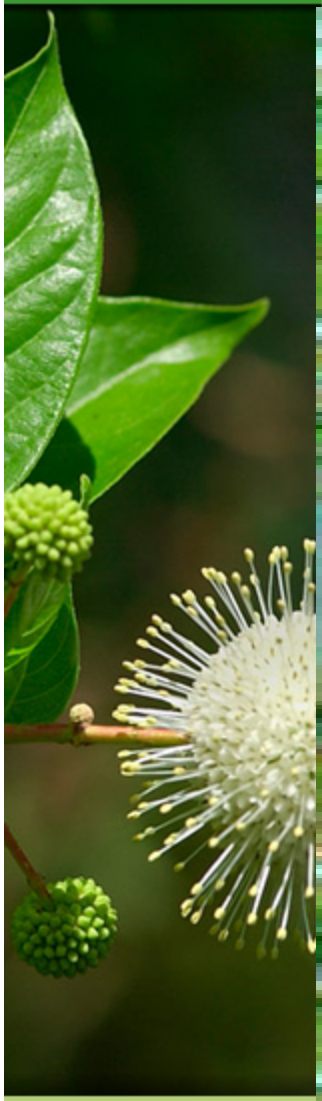


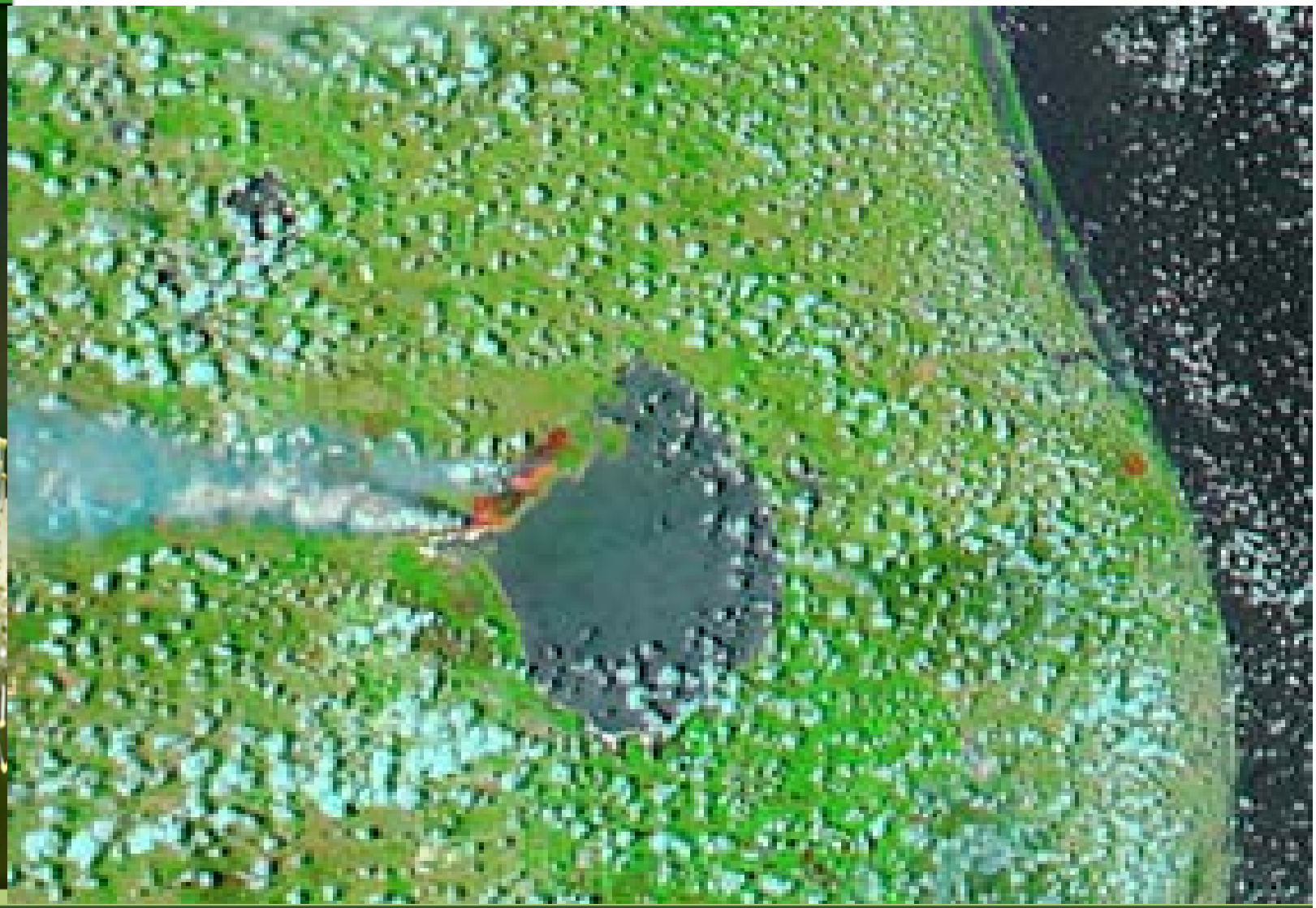
Dry Conditions - West

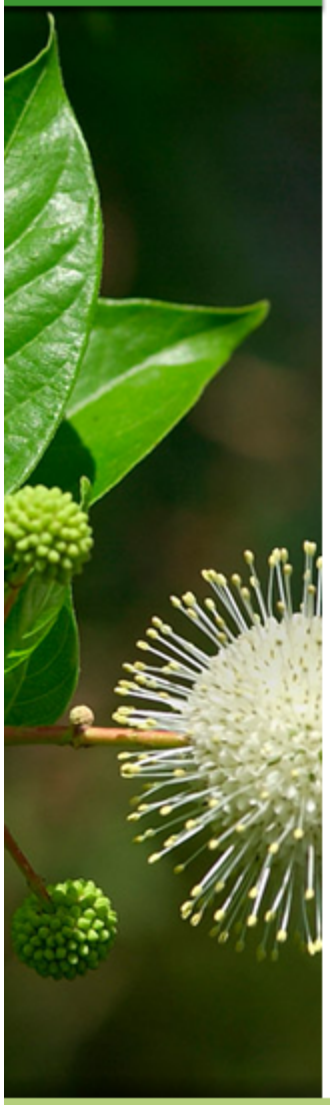


Dry Conditions - South

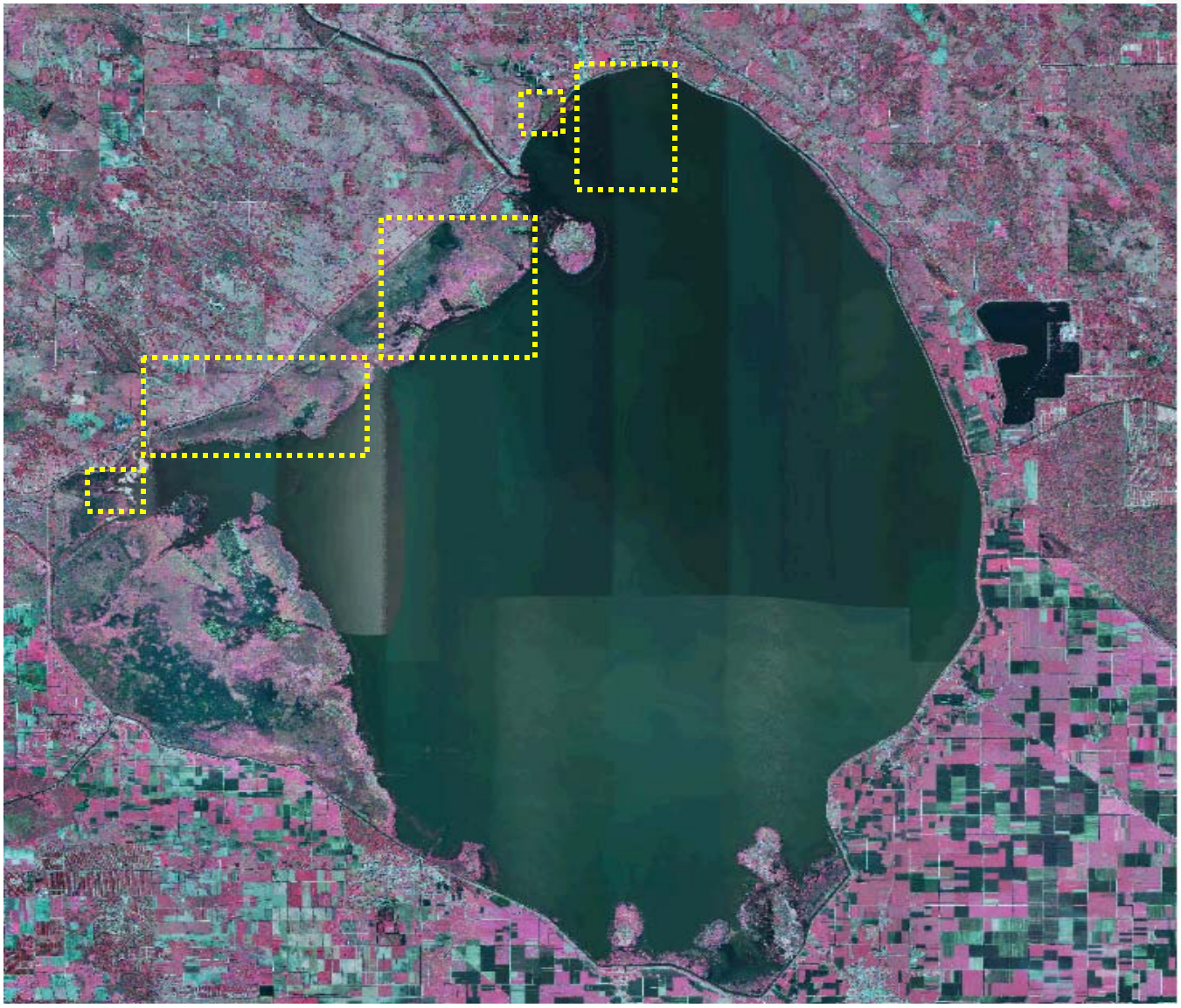




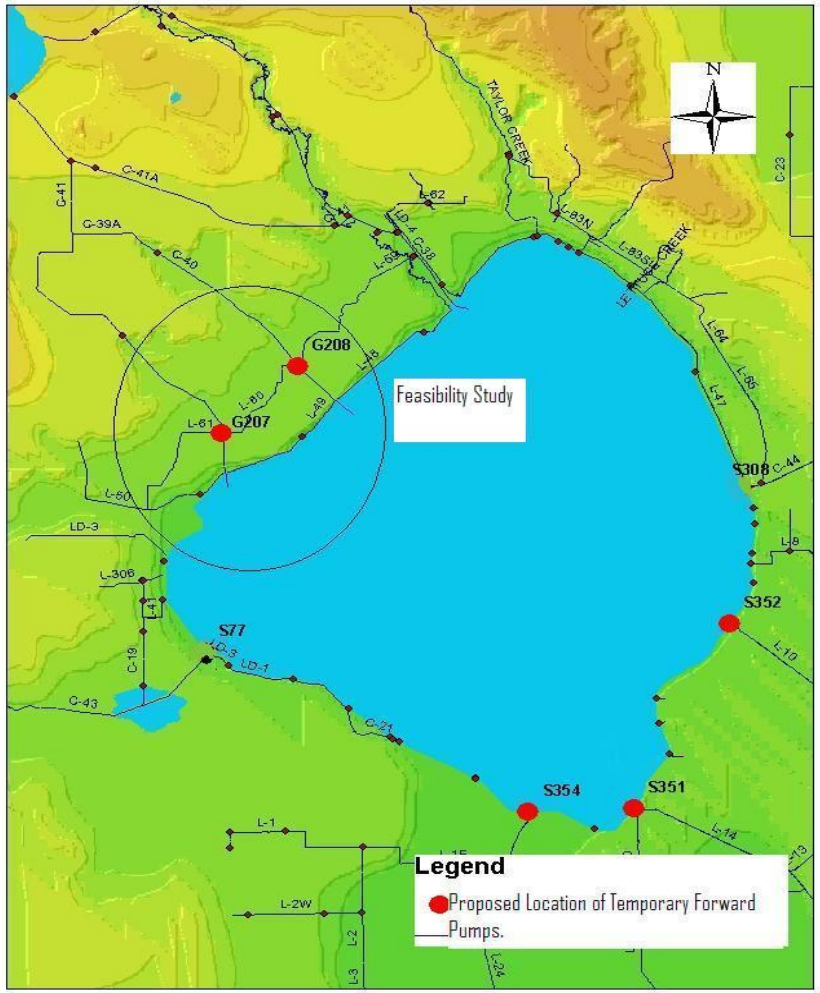




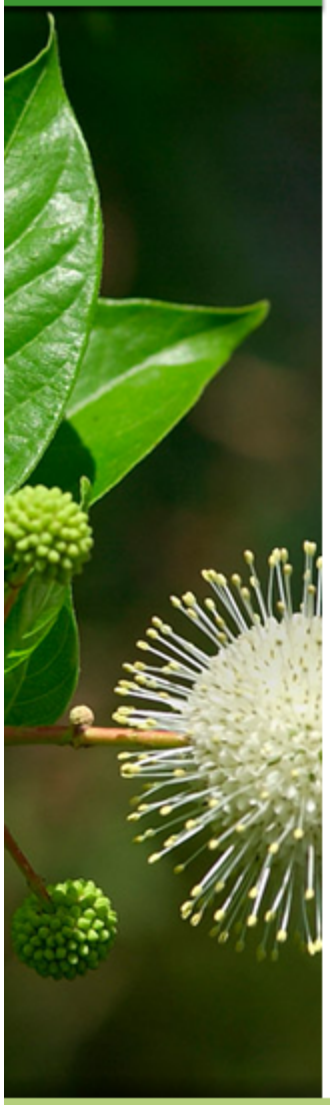
Low Lake Stage Project Locations



Temporary Forward Pumps for Water Supply



Temporary Forward Pumps



- Cost $1.5 million (already purchased)
- 1400 cfs capacity
- Deliveries to the south only
- Meets 45 % cutback in agricultural users to a Lake elevation of 7 ft.
- This demand met for all but 4 weeks under extreme drought
- Investigating upgrade potential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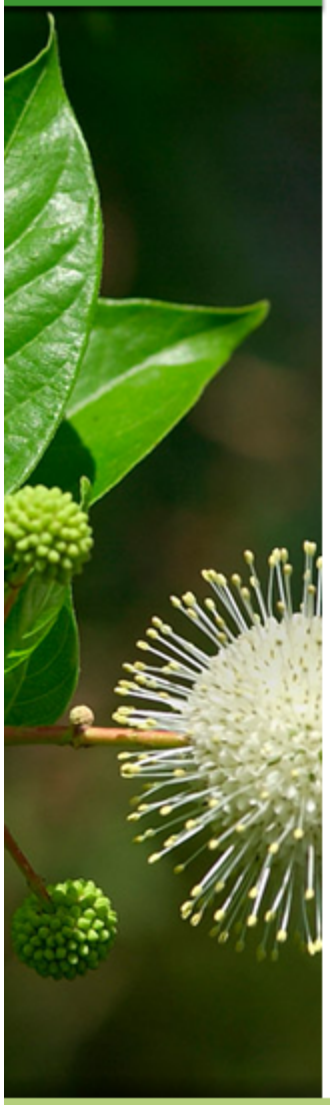
26 2:07 PM

Challenges re. Lake Stage

- Efforts to manage stage to benefit of lake health must take into consideration other uses of the resource (e.g., water supply for human and environmental needs)
- Present lack of alternative regional storage locations
- Impacts of lake regulatory discharges on downstream ecosystems (St. Lucie Estuary, Caloosahatchee Estuary, Everglades Protection Area)
- Extreme highs and lows an ecological concern

The Solution



- Northern Everglades Program
- Phase II of the Lake Okeechobee Construction Project Technical Plan submitted to the Legislature February 2008
- Outlines a phased approach to water quality and water quantity improvements, using a combination of source and regional projects, including public/private partnerships.
- Defines storage needs as a range from 900,000 to 1.3 million ac. ft.