Lake Okeechobee

Climate Change Sensitivity Analysis

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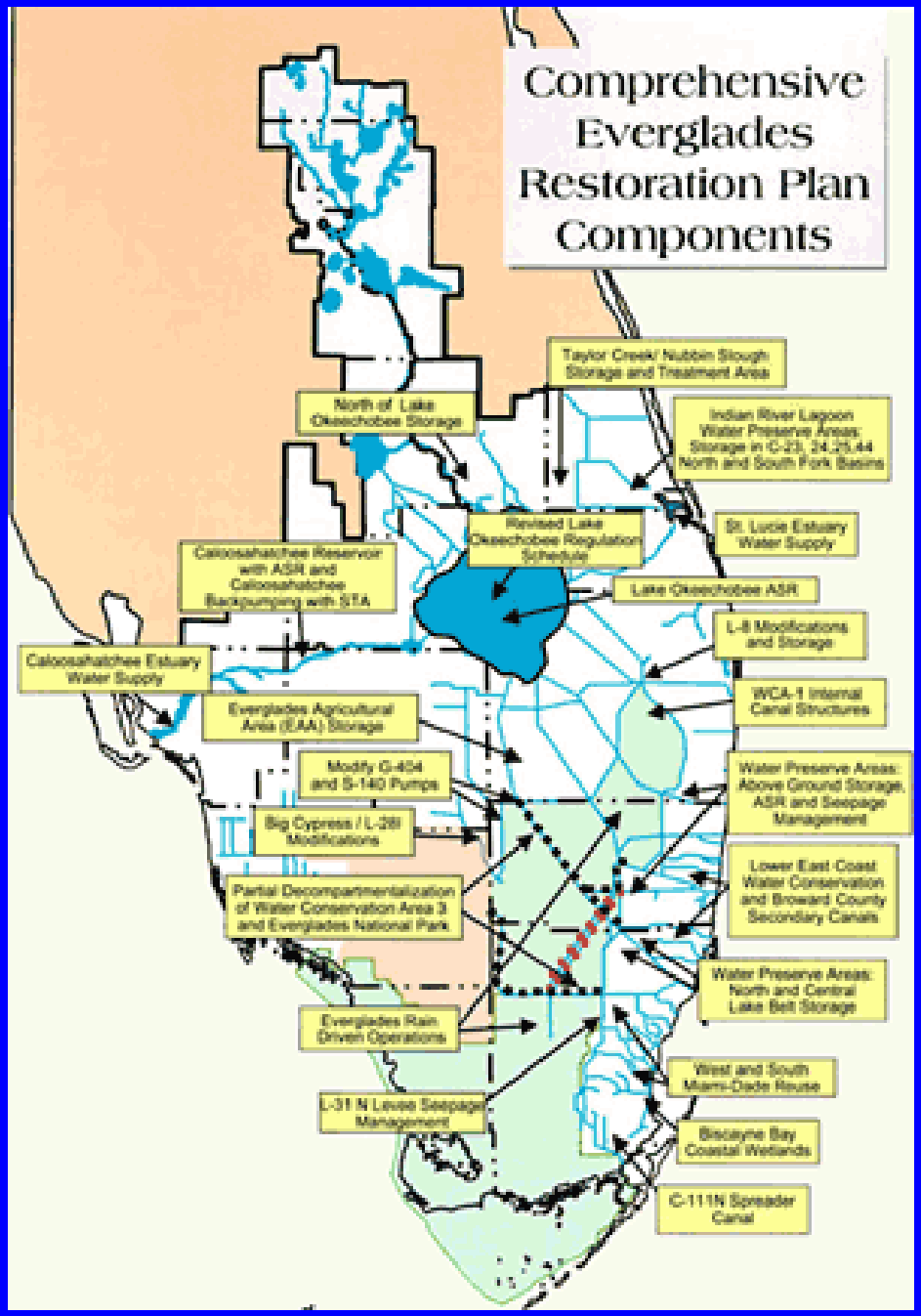
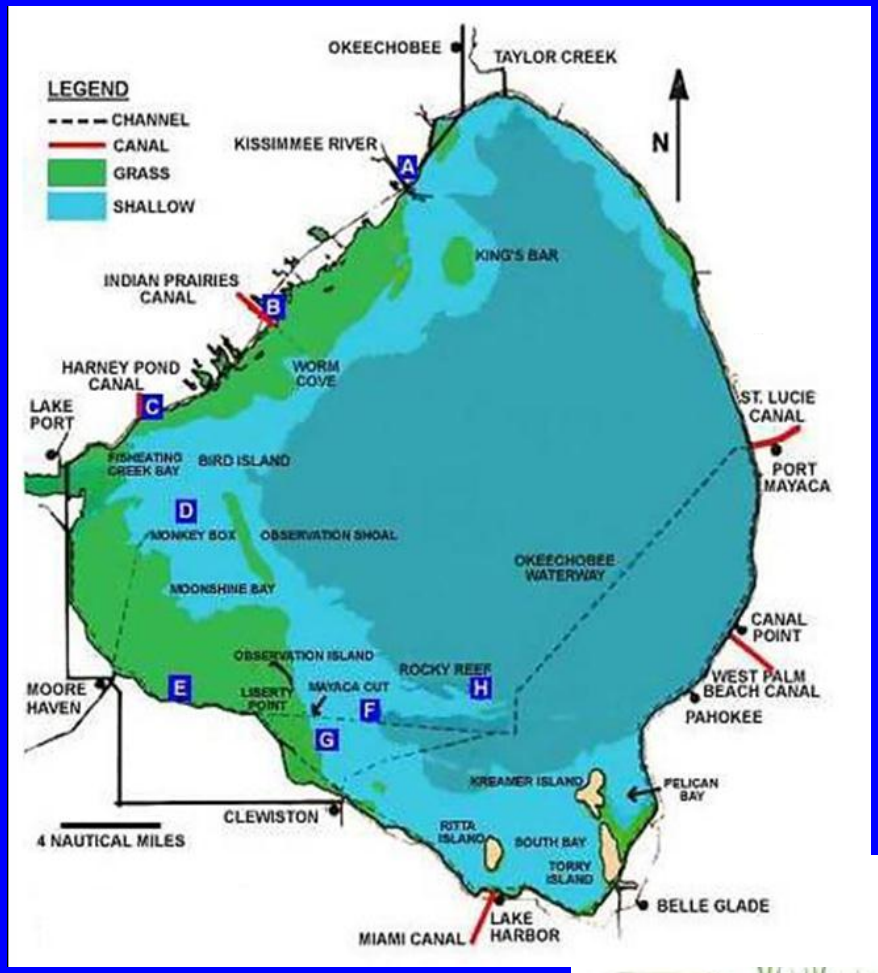
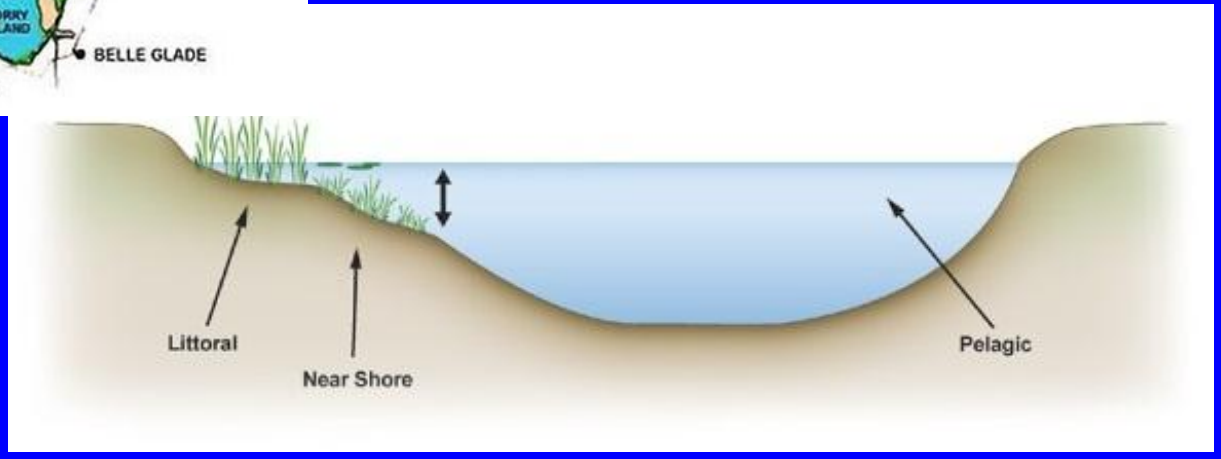
Objectives

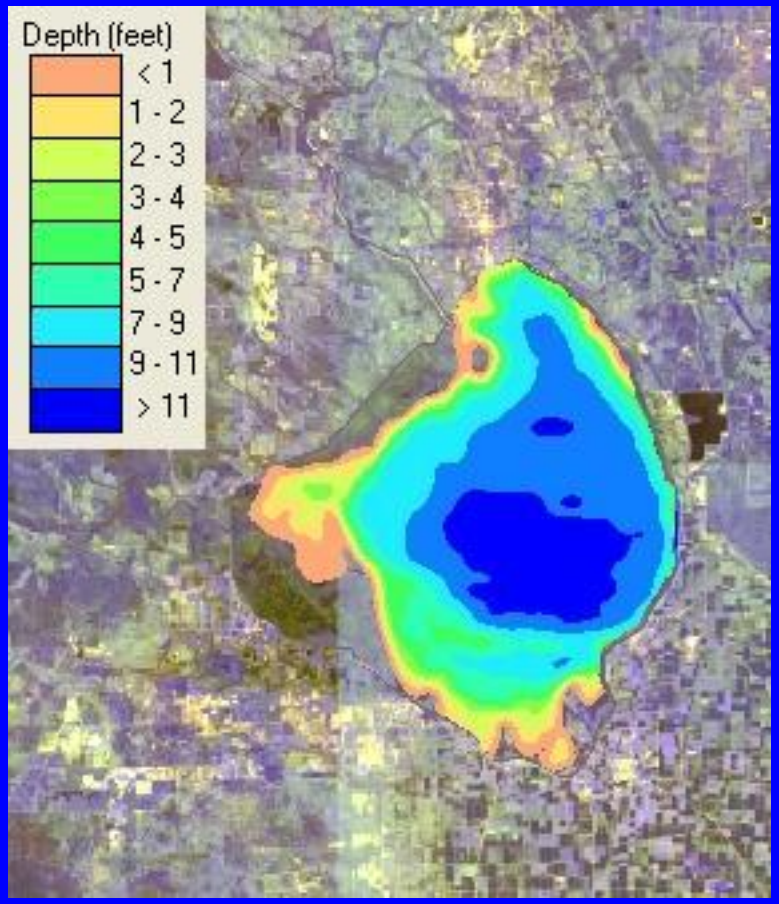
- Present output from the SFWMM regarding Lake Okeechobee hydrology under different future climate conditions
- Present hypotheses about ecological and water quality responses
- Identify unacceptable future conditions
- Discuss major reasons for uncertainty


Comprehensive Everglades Restoration Plan Components
Taylor Creek/ Nubbin Slough Storage and Treatment Area
North of Lake Okeechobee Storage
Indian River Lagoon Water Preserve Areas: Storage in C-23, 24,25,44 North and South Fork Basins
Revised Lake Okeechobee Regulation Schedule
St. Lucie Estuary Water Supply
Caloosahatchee Reservoir with ASR and Caloosahatchee Backpumping with STA
Lake Okeechobee ASR
L-8 Modifications and Storage
Caloosahatchee Estuary Water Supply
WCA-1 Internal Canal Structures
Everglades Agricultural Area (EAA) Storage
Water Preserve Areas: Above Ground Storage, ASR and Seepage Management
Modify G-404 and S-140 Pumps
Big Cypress / L-28I Modifications
Lower East Coast Water Conservation and Broward County Secondary Canals
Partial Decompartmentalization of Water Conservation Area 3 and Everglades National Park
Water Preserve Areas: North and Central Lake Belt Storage
Everglades Rain Driven Operations
West and South Miami-Dade Reuse
L-31 N Levee Seepage Management
Biscayne Bay Coastal Wetlands
C-111N Spreader Canal

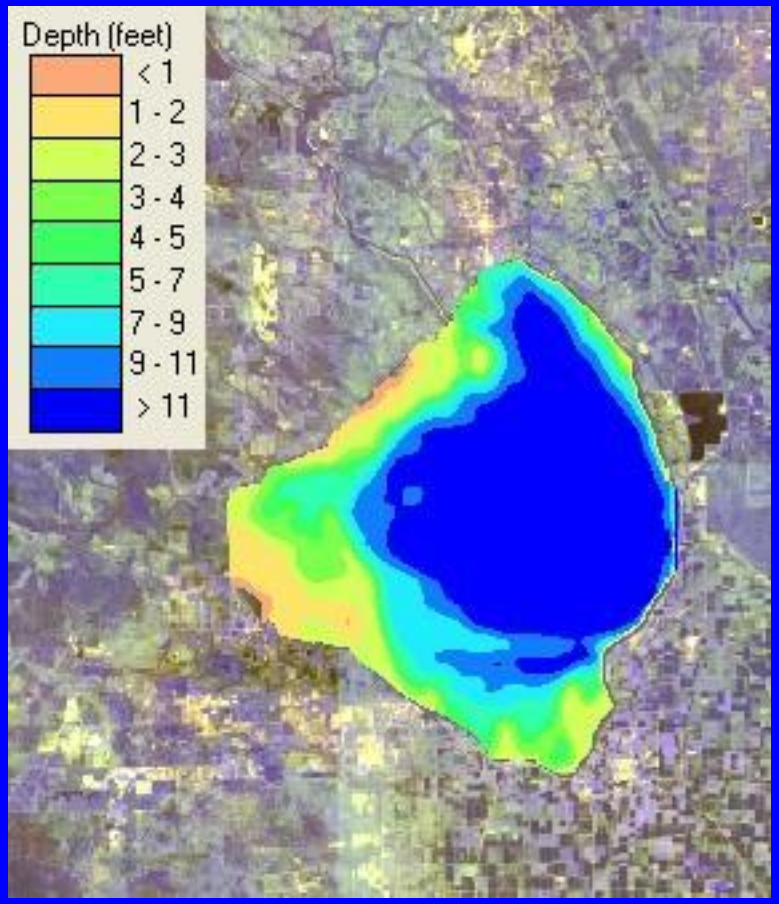

LEGEND
CHANNEL
CANAL
GRASS
SHALLOW
OKEECHOBEE
TAYLOR CREEK
KISSIMMEE RIVER
N
A
KING'S BAR
INDIAN PRAIRIES CANAL
B
HARNEY POND CANAL
C
WORM COVE
LAKE PORT
ST. LUCIE CANAL
PORT MAYACA
FISHEATING CREEK BAY
BIRD ISLAND
D
MONKEY BOX
OBSERVATION SHOAL
OKEECHOBEE WATERWAY
MOONSHINE BAY
CANAL POINT
OBSERVATION ISLAND
ROCKY REEF
H
WEST PALM BEACH CANAL
MOORE HAVEN
E
LIBERTY POINT
MAYACA CUT
F
PAHOKEE
G
KREAMER ISLAND
PELICAN BAY
CLEWISTON
4 NAUTICAL MILES
RITTA ISLAND
SOUTH BAY
TORRY ISLAND
BELLE GLADE
MIAMI CANAL
LAKE HARBOR


Littoral
Near Shore
Pelagic

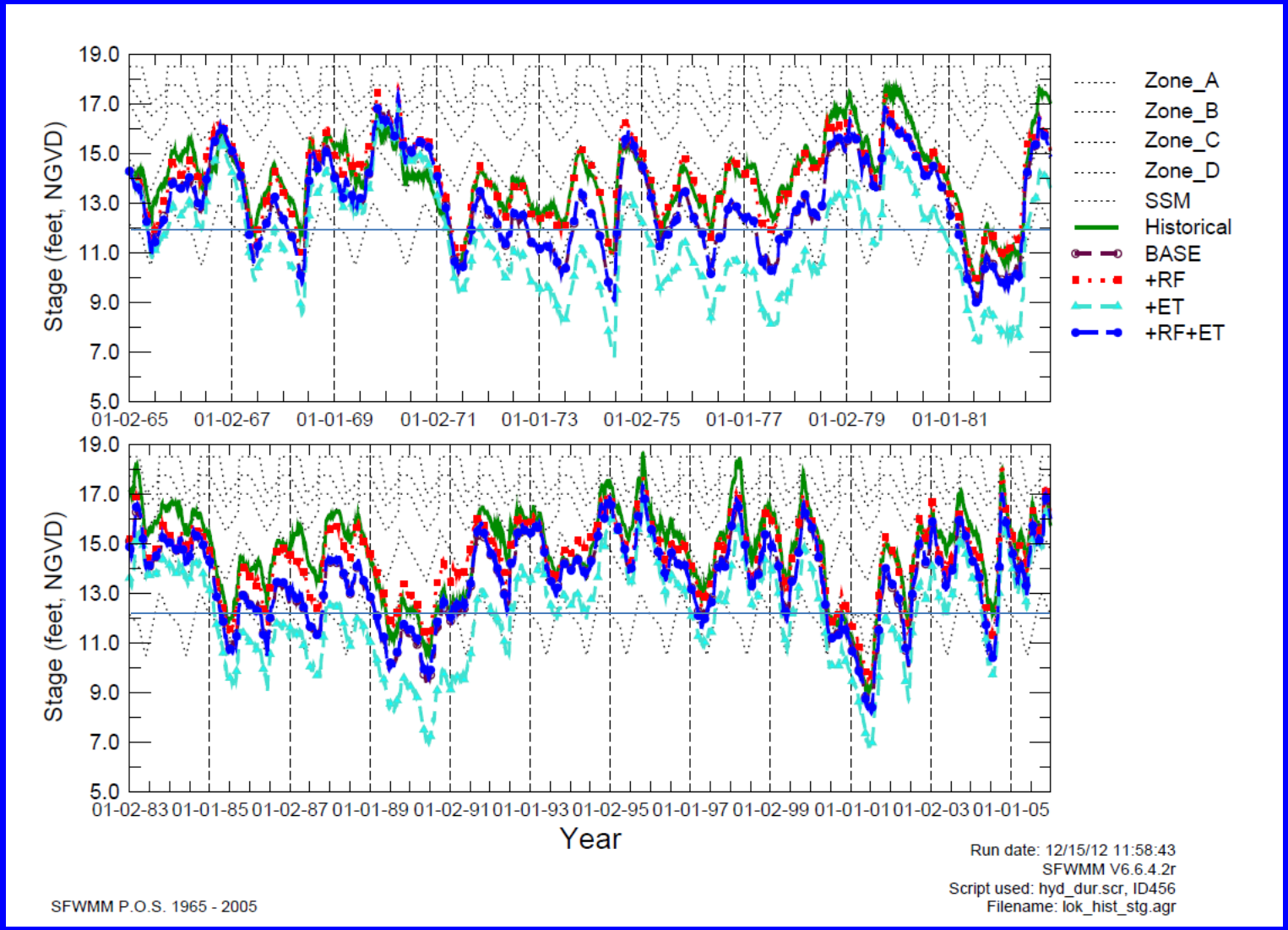
Stage 12 ft NGVD



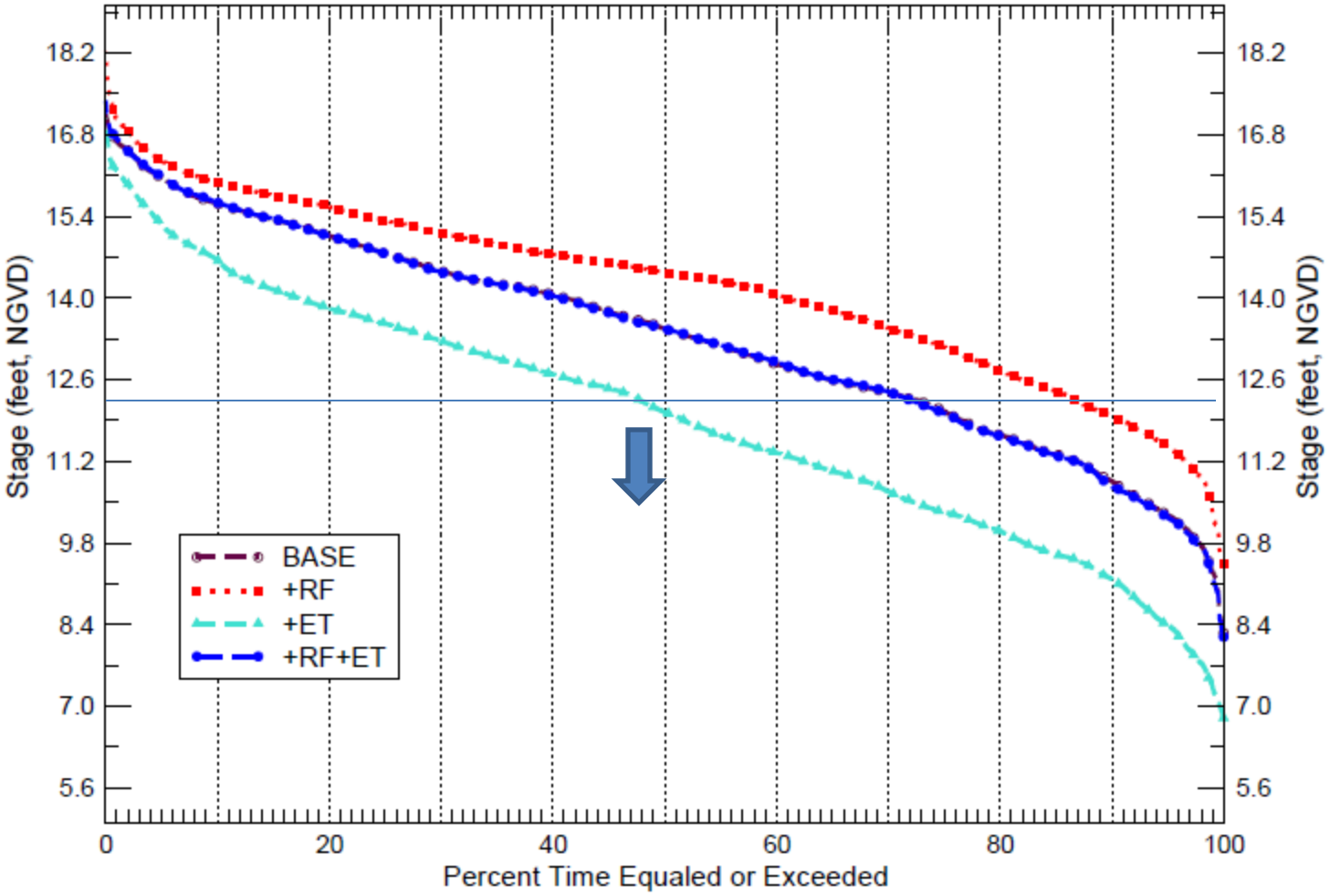
Stage 15 ft NGVD



Scenarios: increased RF, increased ET, increased RF and ET



Stage Duration Curves for Lake Okeechobee



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SFWMM P.O.S. 1965 - 2005

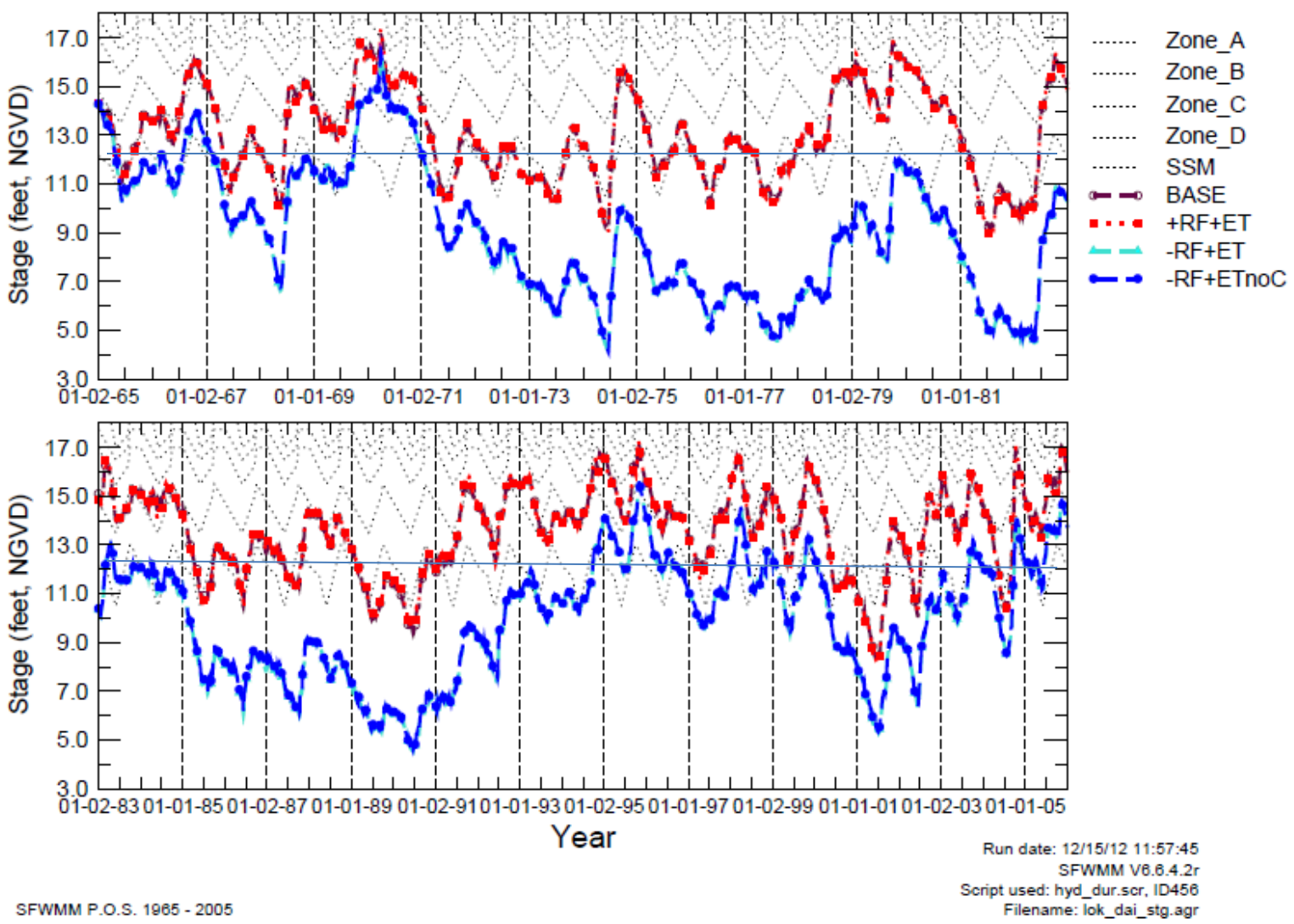
Anticipated Ecological Responses:

- +RF + ET scenario does not substantively affect the hydrograph compared to the CERP base condition

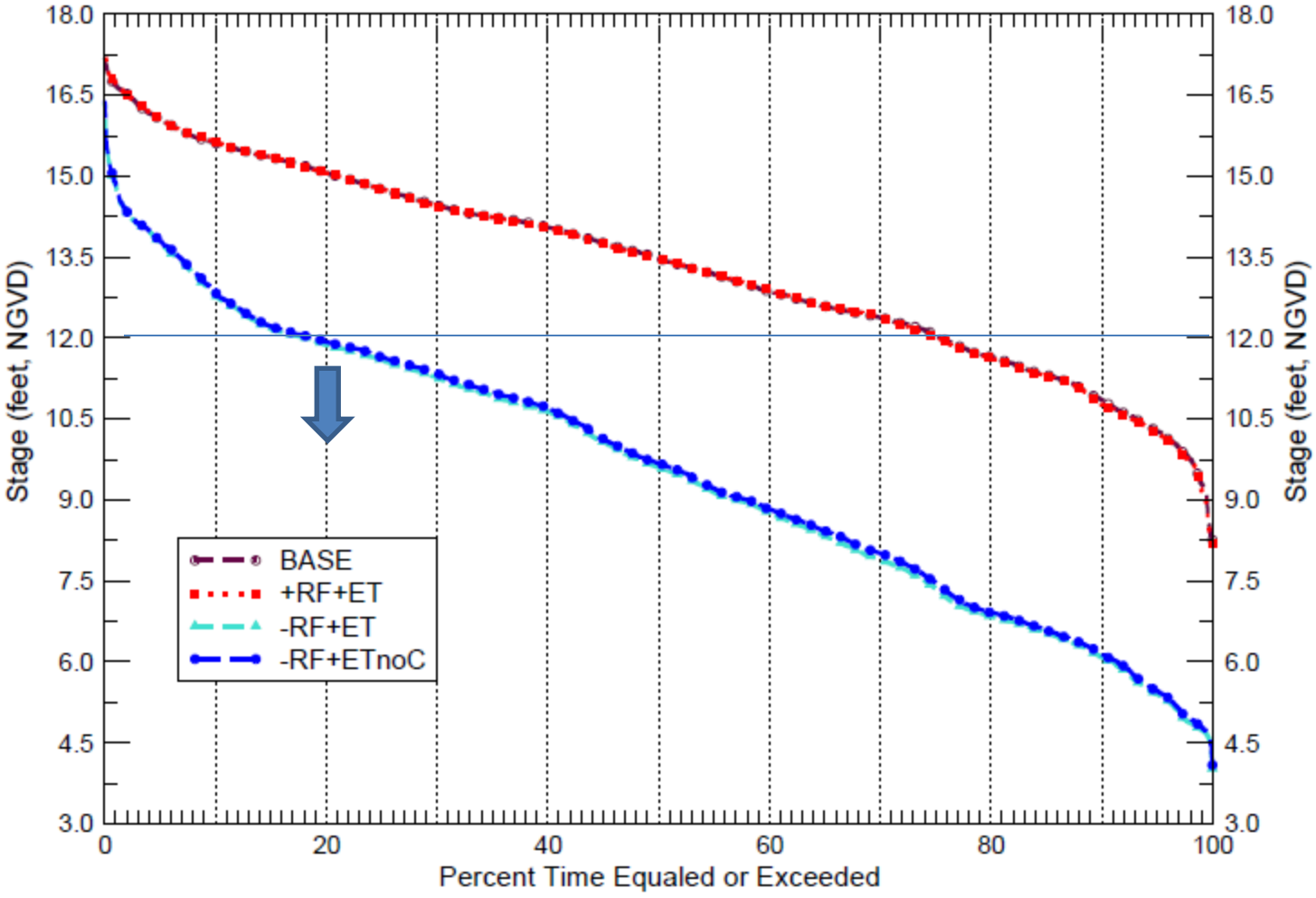
- +RF scenario: does not markedly affect occurrence of damaging high lake levels; reduces occurrence of low lake levels that are beneficial to periodically drying out near-shore areas for soil oxidation and maintaining submerged vegetation diversity

- +ET scenario: drastically lowers lake stage, with low water levels reaching 7 ft, and range as much as 9 ft between years. Marked changes in the ecosystem might occur, including potential cycling between woody vegetation in littoral zone and death of those plants on flooding; perhaps a lack of a substantive SAV community and associated impacts to fish; and increased pelagic TP and turbidity when water levels are low.

Scenarios: increased RF+ET, decreased RF+ET



Stage Duration Curves for Lake Okeechobee



SFWMM P.O.S. 1965 - 2005

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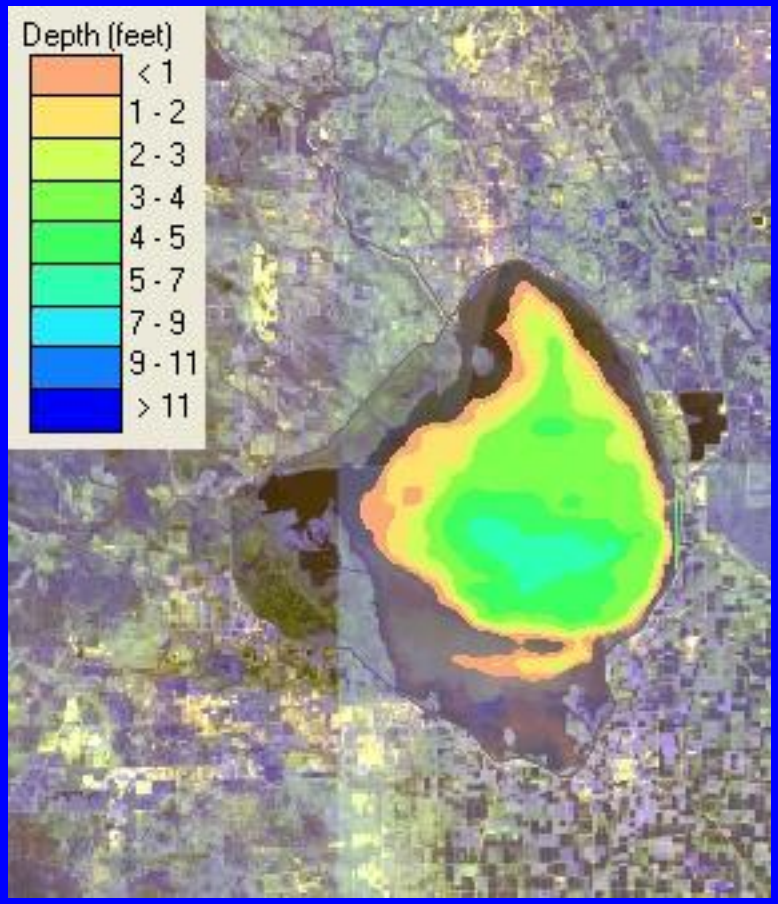
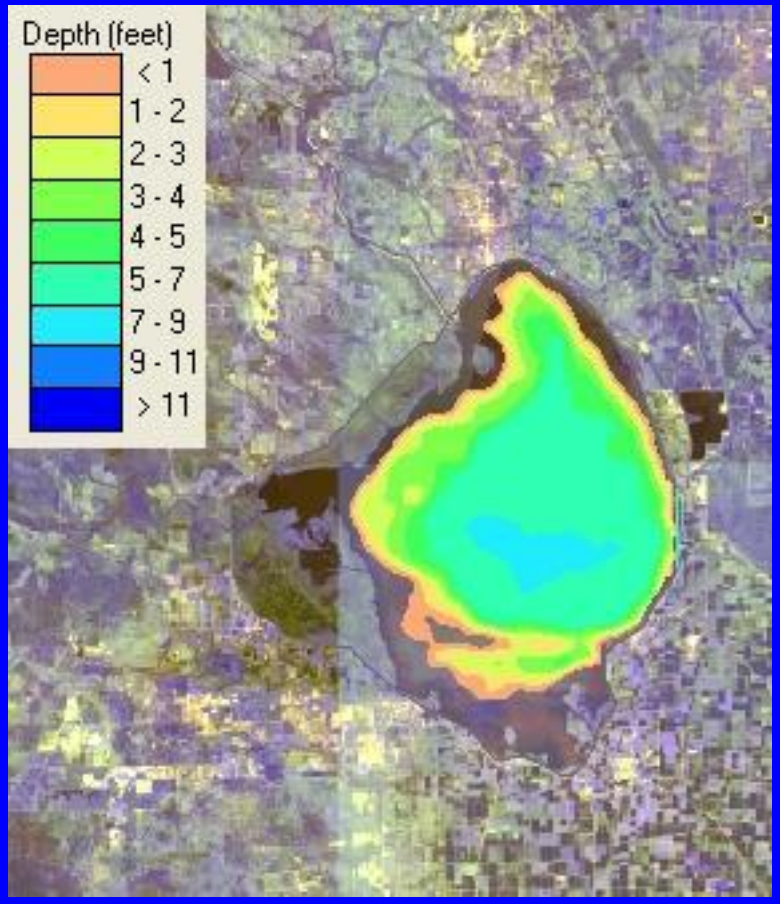
Stage 5 ft NGVD



Stage 7 ft NGVD



Anticipated Ecological Responses:

- +RF + ET scenario does not substantively affect the hydrograph compared to the CERP base condition

- -RT+ET scenario drastically lowers water level, to <5 ft and to near 7 ft for prolonged periods of time. Yet, there also are times when water level rises above 16 ft (an 11 ft range). Under these conditions the lake is expected to become very different. The littoral zone at low water level likely dominated by upland plants, which then will be killed during flooding. SAV community may not be viable under these conditions because the shallow water zone often will overly fluid mud. High TP and turbidity expected when stage is low, and perhaps intensive algal blooms around the pelagic fringe.

Reasons for Uncertainty:

- Scenarios of +ET and/or –RF: water levels become so low that they go outside the range of any prior observations – in regard to both their level and their duration of occurrence.

- It is possible to estimate what this will mean for the littoral zone and pelagic zone based on long period of drying in the upper littoral zone in some recent droughts and knowledge about wind effects on sediment re-suspension.

- However, it is most challenging to project what this wide range of fluctuation in water levels would do to the lake's SAV assemblage and the critical habitat it provides for fish.

- A 3D visualization of the lake with extent of mud sediments would help us to discern potential changes.

Thank you

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