



# **LOSOM Issues in S.E. Palm Beach County**

*Palm Beach County  
Water Resources Task Force*

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Executive Director  
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# Management of Lake Okeechobee

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- Enormously Complex
- Numerous competing objectives
  - Flood Control – Herbert Hoover Dike
  - Ecology
    - Lake Okeechobee
    - Coastal Estuaries
      - St. Lucie, Caloosahatchee, Loxahatchee River, Lake Worth Lagoon
    - Water Conservation Areas
    - Everglades National Park
  - Water Supply
    - Lake Okeechobee Service Area
    - Lower East Coast Service Areas
    - ...and; navigation, tribal interests, water quality, etc.

# Management of Lake Okeechobee

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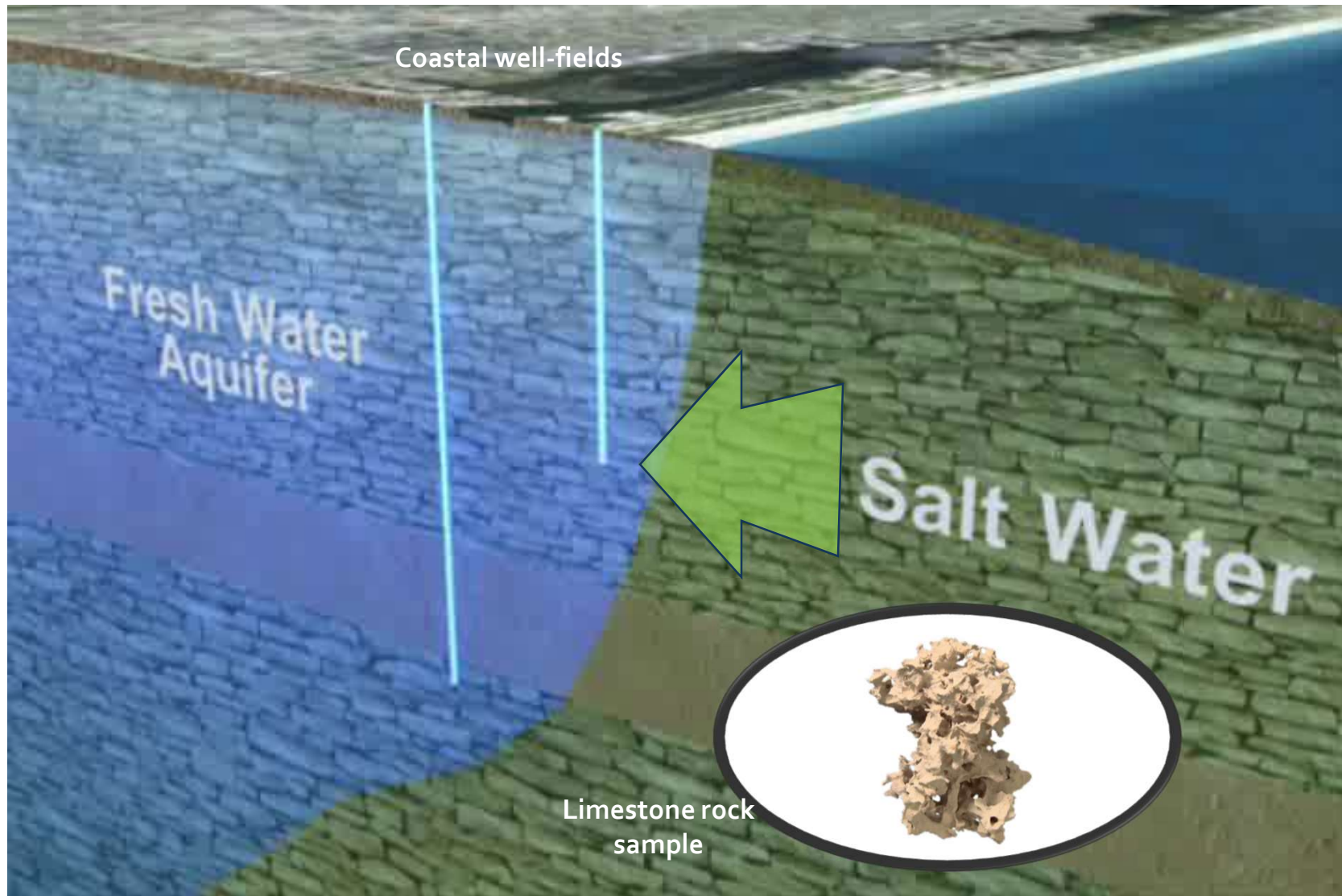
- With current infrastructure, it is impossible to satisfy all competing needs
  - *CERP is ultimately the best solution*
- USACE should be commended for their efforts to develop a new comprehensive regulation schedule for the Lake upon completion of the Herbert Hoover Dike refurbishment
- However, there are some water supply concerns specific to southeastern Palm Beach County associated with drought conditions

# LWDD's Water Supply Role

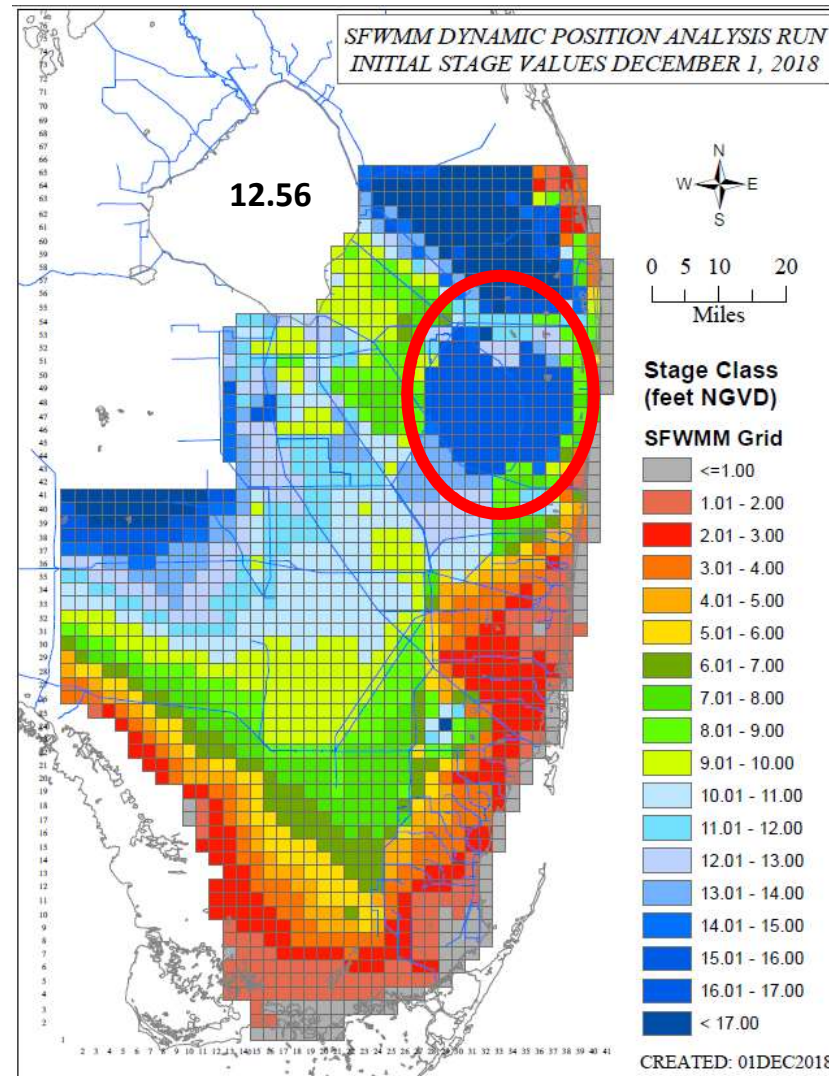
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- LWDD plays key role in balancing water supply needs in southeastern Palm Beach County
- LWDD not a water consumer
  - “Diversion & Impoundment” ...
- LWDD manages water levels to make it available for urban and agricultural needs
- Sources of water supply...
  - Rainfall
  - Water Conservation Area 1 (Primary)
  - Lake Okeechobee (Secondary)

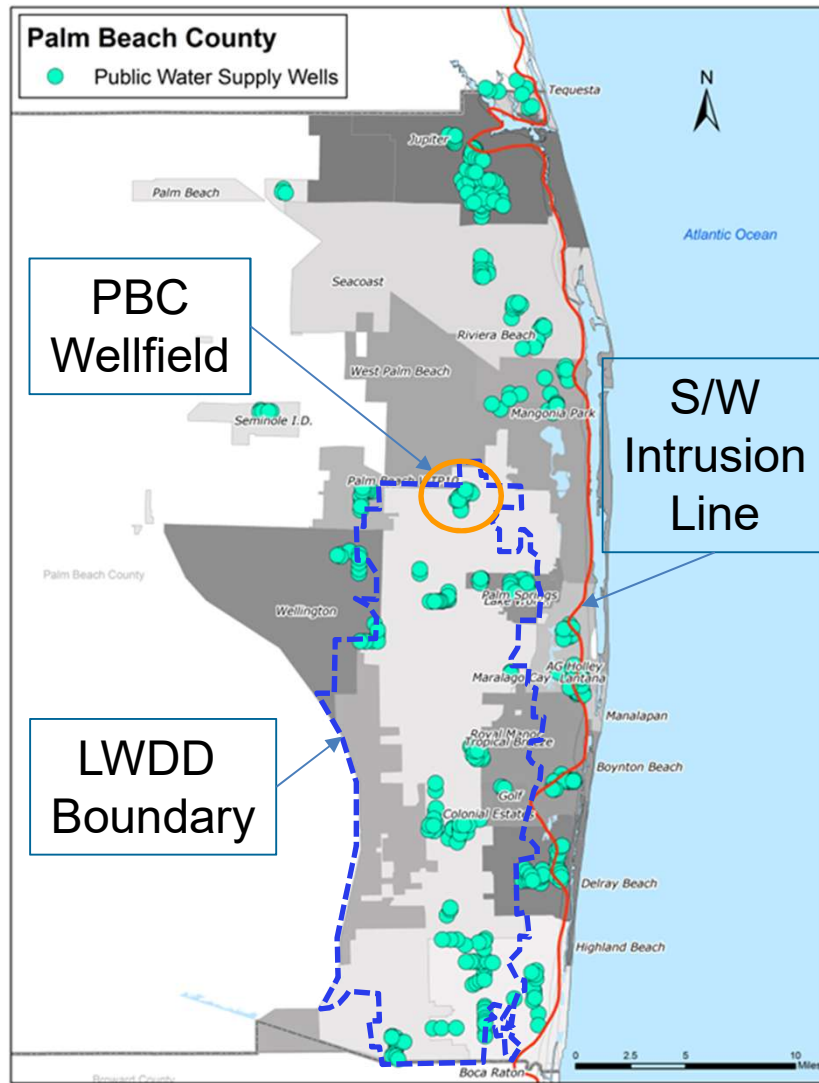
# Water Supply: Saltwater Intrusion



# Groundwater Levels



# Palm Beach County Wellfields



# LECSA-1

- LECSA-1 is located in SE PBC and is comprised of...
  - LWDD
  - Wellington
  - Portions of ITID
  - Portions of WPB
  - Portions of N. Broward County in Hillsboro Basin
- LOSOM performance metrics generally focus of the LECSAs as a unit

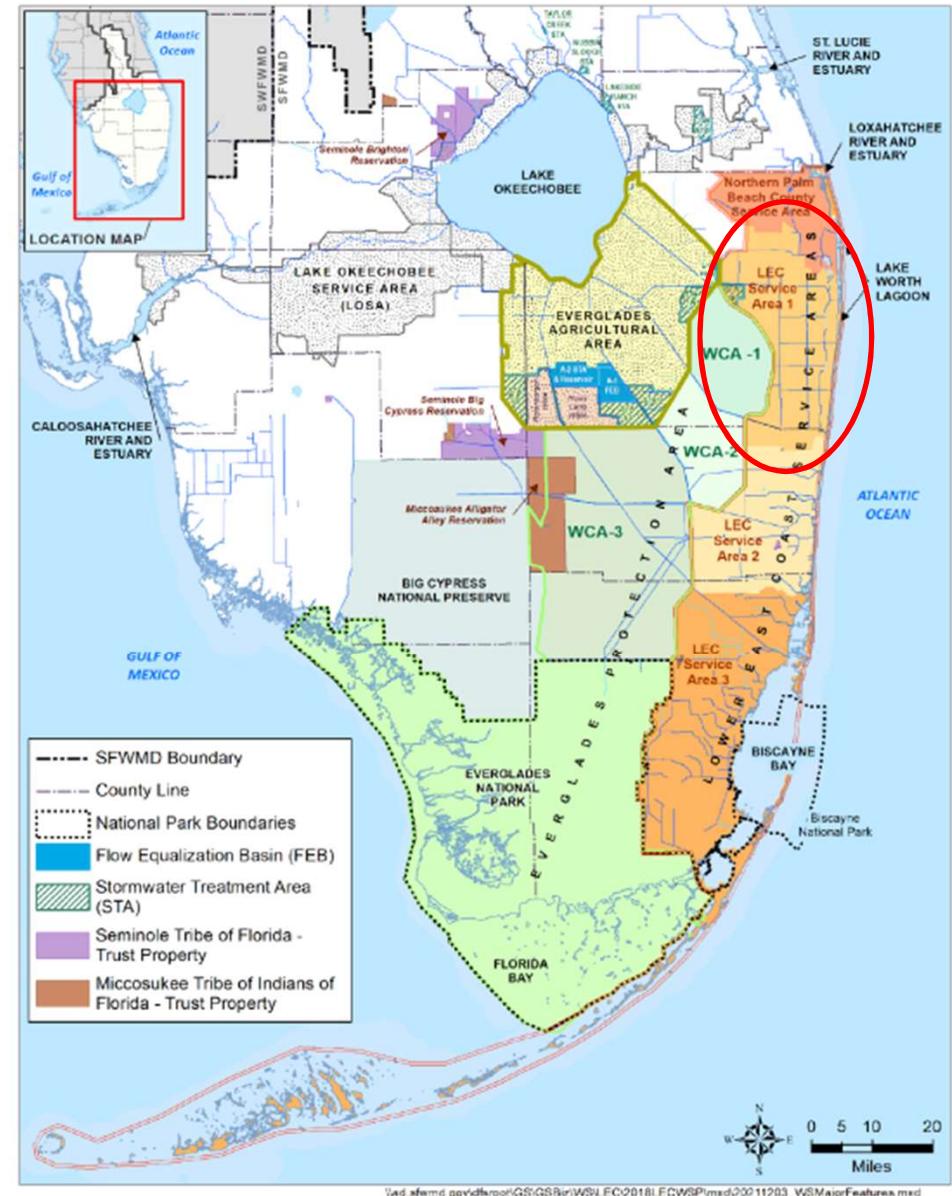
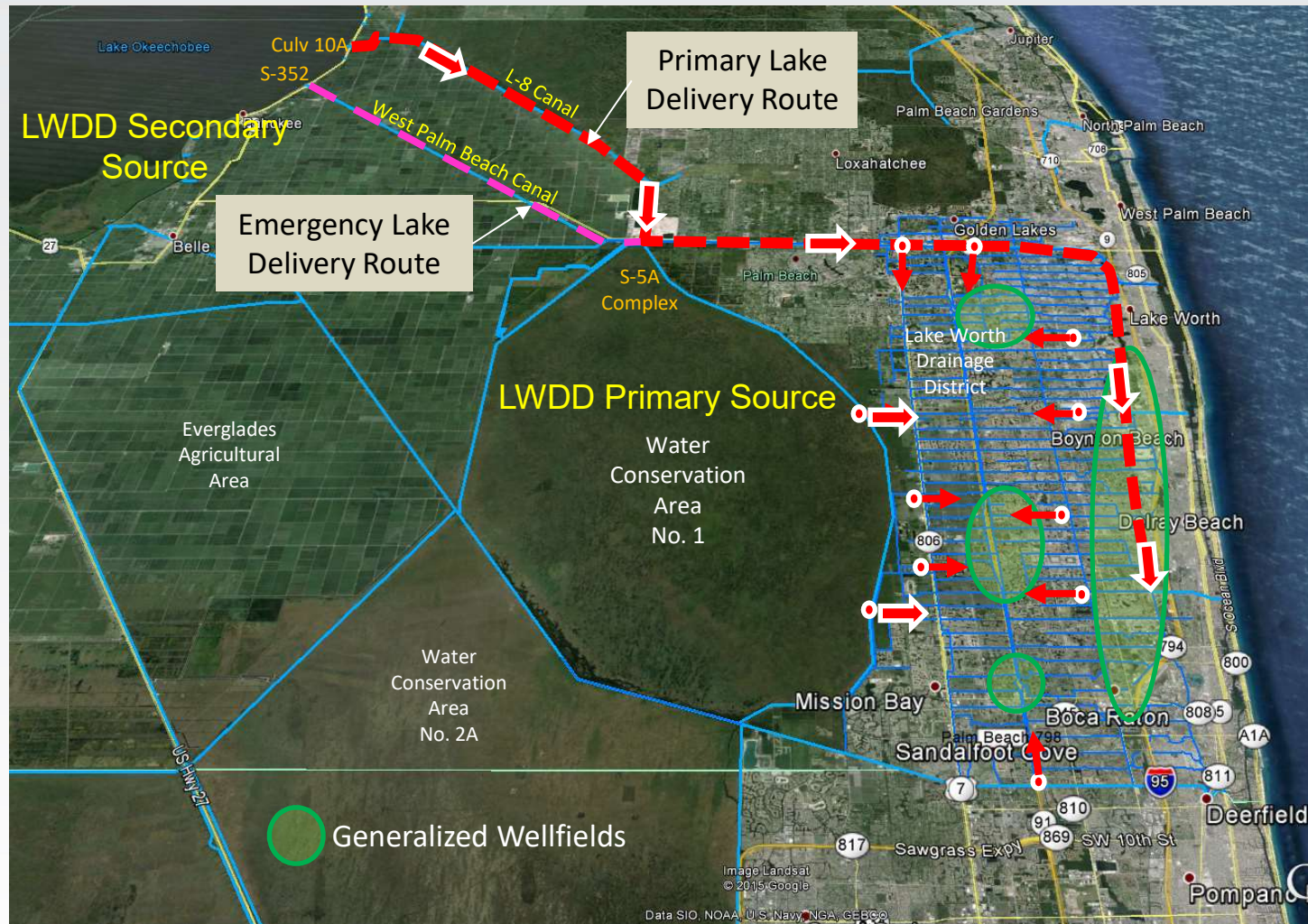


Figure C.1-17. Map of south Florida including Lake Okeechobee Service Area, Everglades Agricultural Area, and Lower East Coast Service Area.

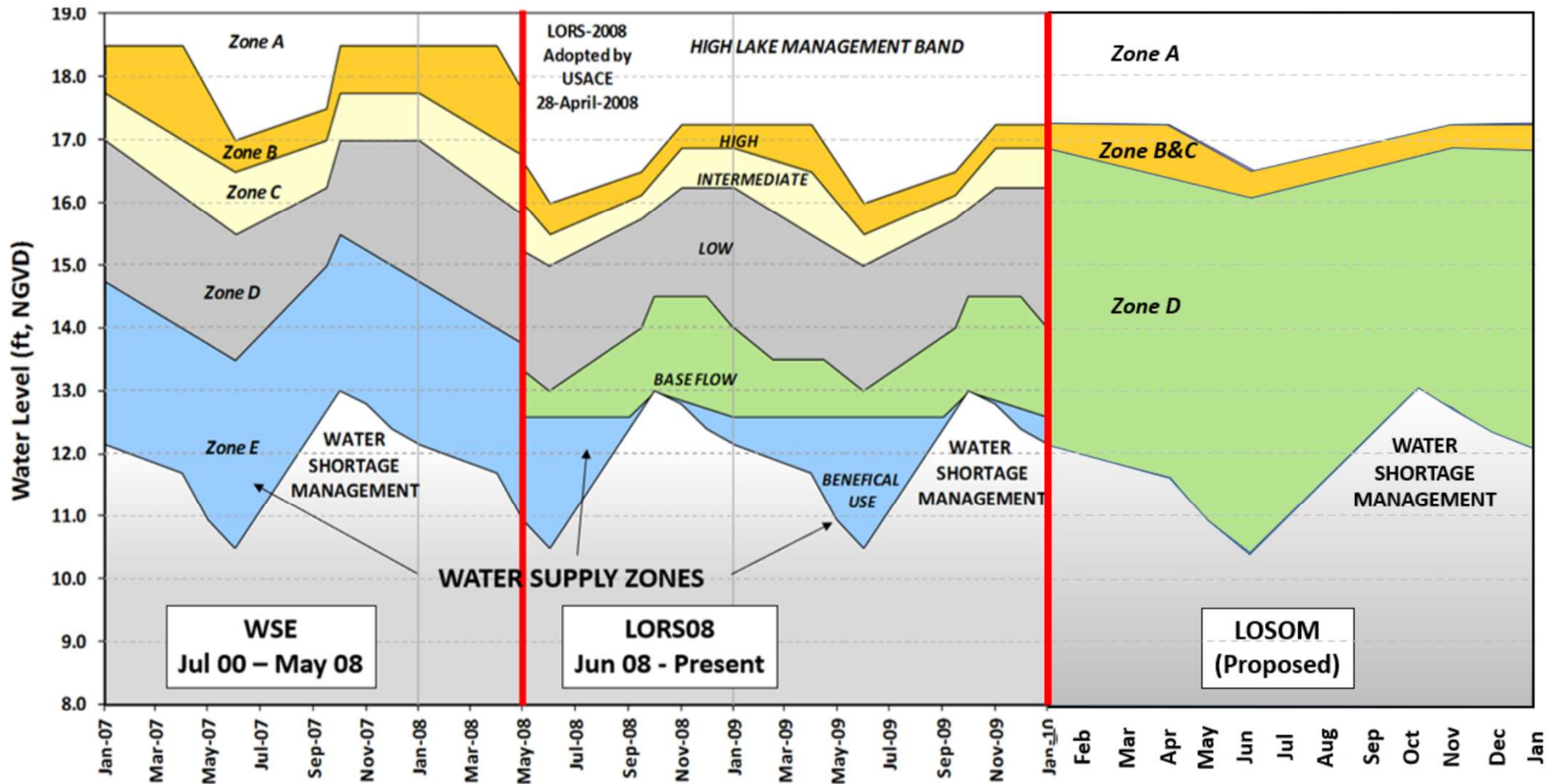


# LWDD Water Supply



# Recent Lake Schedules Compared to LOSOM

## Lake Okeechobee Regulation Schedule Comparison (WSE-LORS08-LOSOM)



LOSOM Issues - PBCWRTF

# LOSOM MODELING RESULTS

# LOSOM General Water Supply Performance

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- Lake Triggered Water Shortages (40 yr POS)
  - Number of years in water shortage reduced from 18 drought years (LORS08) down to 13 years (LOSOM)
  - Duration of water shortages improved (shortened)
- Locally Triggered Water Shortages (LECSA-1)
  - Number of months of locally triggered water shortages increased by one
  - The severity of locally triggered water shortages increased by one
- Regional Water Supply Deliveries (LECSA-1)
  - Increase in average annual deliveries
  - Decrease in deliveries during drought years
- Regional Water Deliveries (WCA-1)
  - 12% decrease in water supply deliveries from the Lake
  - 16% increase in water deliveries to LECSA-1

**Generally resulting in Less water in WCA-1 over time...**

# Iteration 2 Alternatives – Dry Event Severity

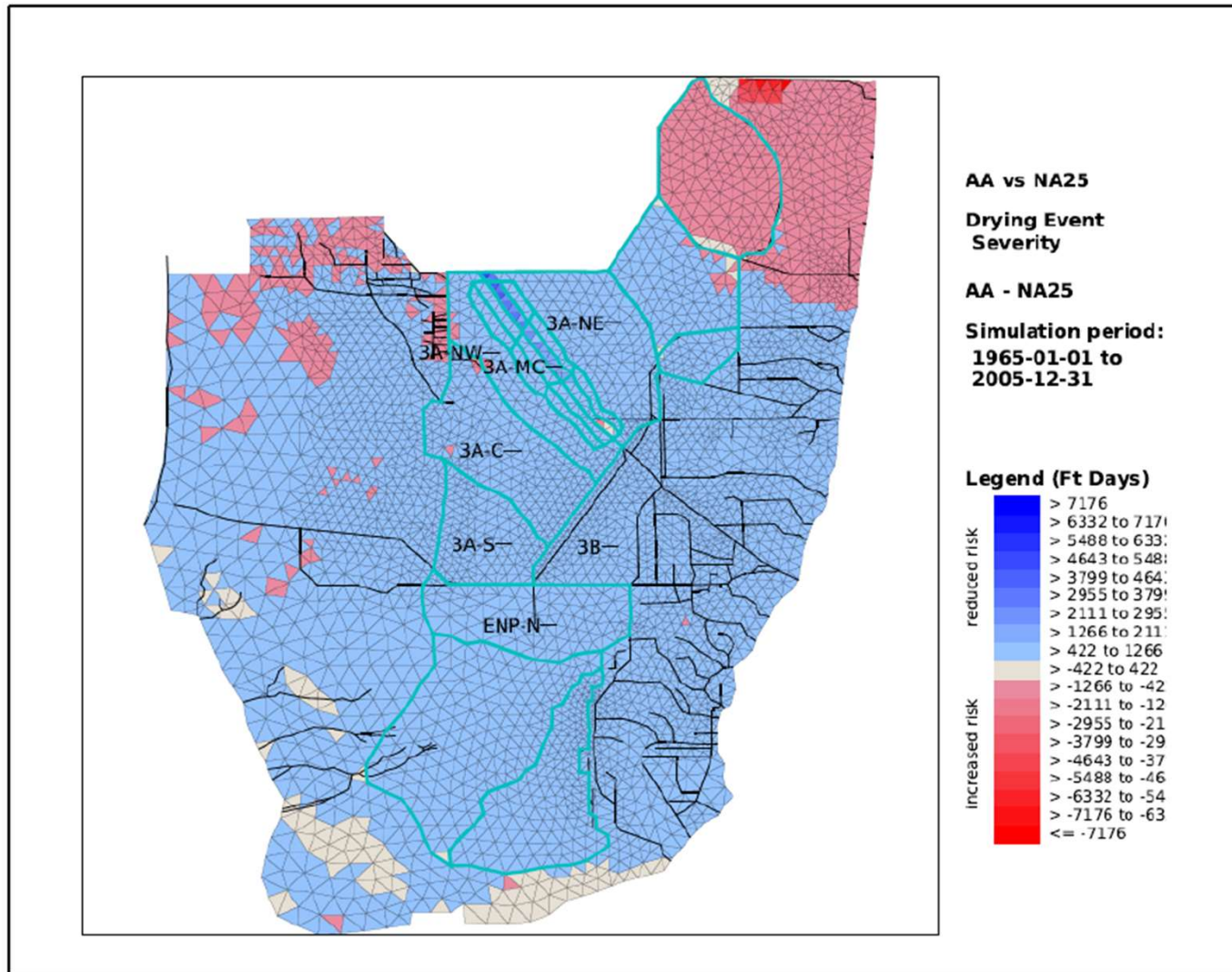


Figure C.2-25. Difference in dry event severity (Ft-Days) between NA25 for Alternative AA relative to NA25 across the RSM-GL model mesh.

# Iteration 2 Alternatives – Dry Event Severity

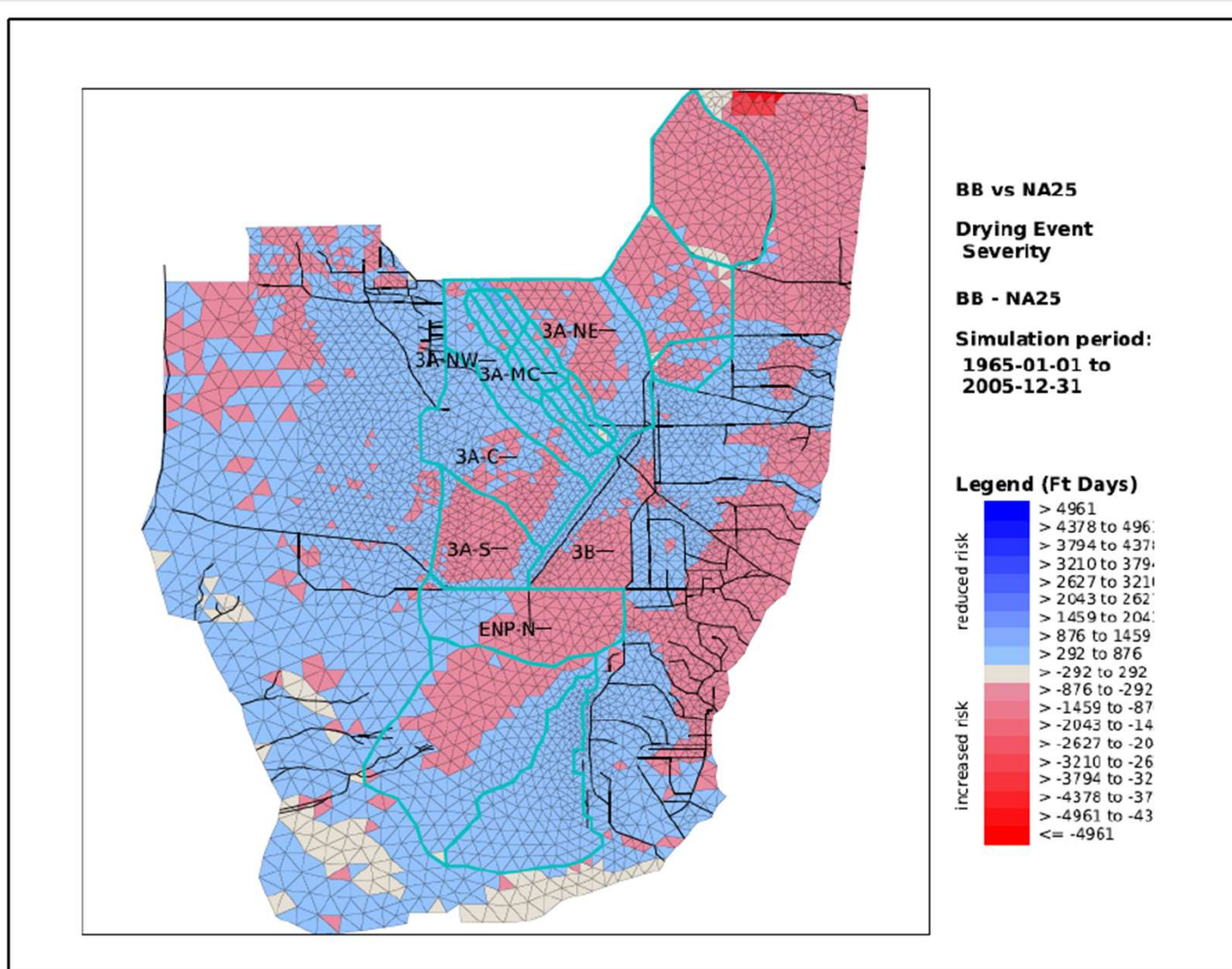


Figure C.2-26. Difference in dry event severity (Ft-Days) between NA25 for Alternative BB relative to NA25 across the RSM-GL model mesh.

# Iteration 2 Alternatives – Dry Event Severity

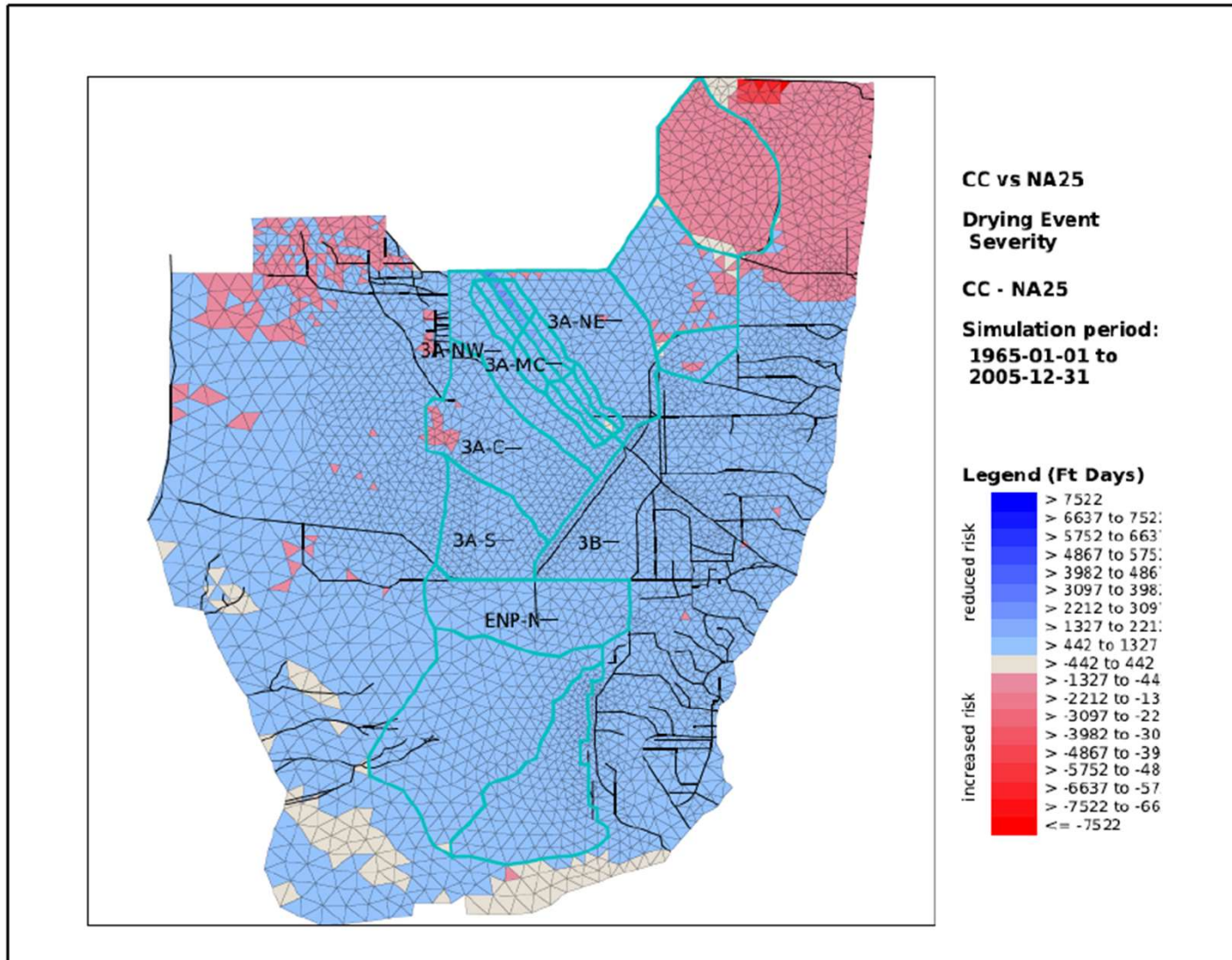


Figure C.2-27. Difference in dry event severity (Ft-Days) between NA25 for Alternative CC relative to NA 25 across the RSM-GL model mesh.

# Iteration 2 Alternatives – Dry Event Severity

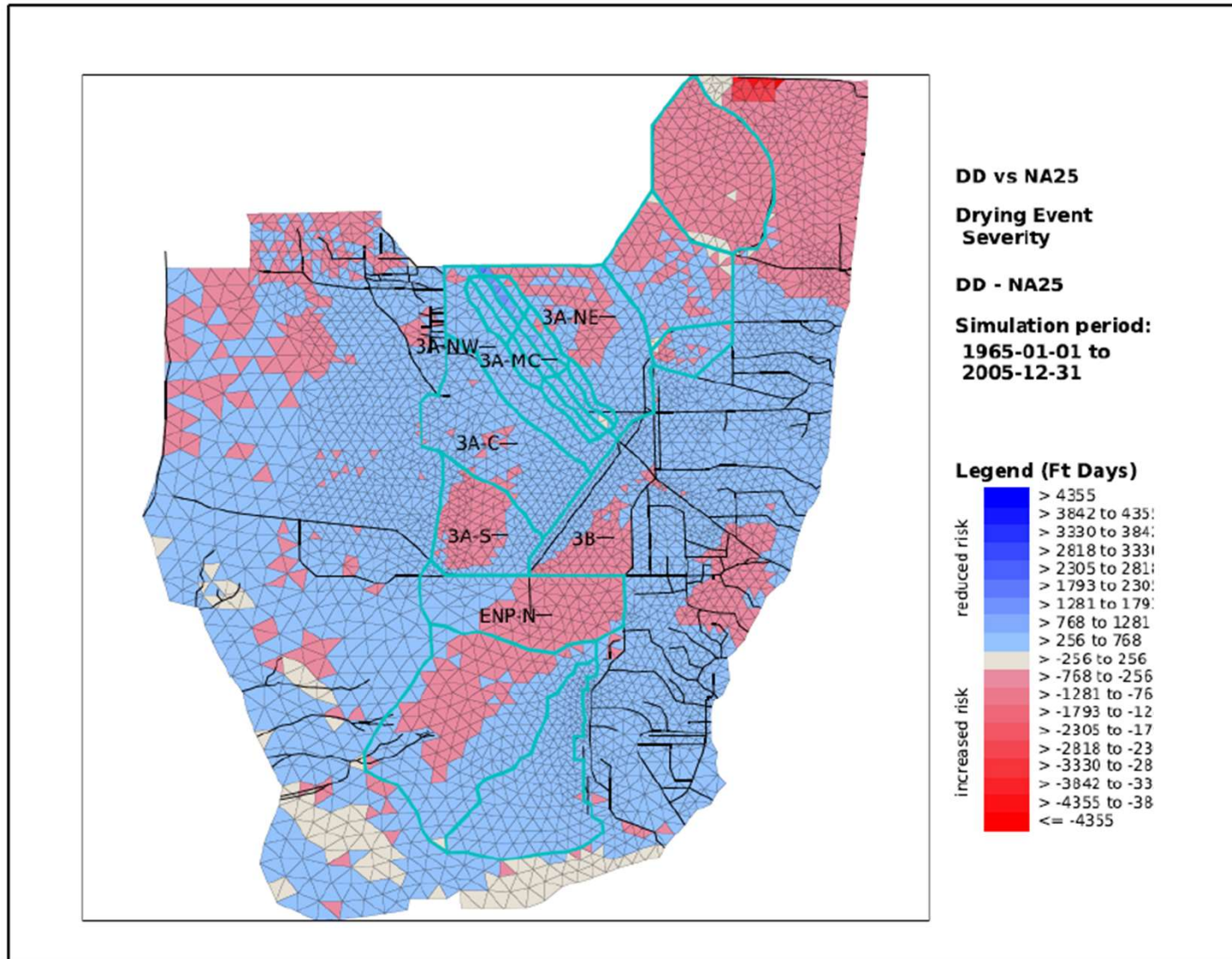


Figure C.2-28. Difference in dry event severity (Ft-Days) between NA25 for Alternative DD relative to NA 25 across the RSM-GL model mesh.



# Iteration 2 Alternatives – Dry Event Severity

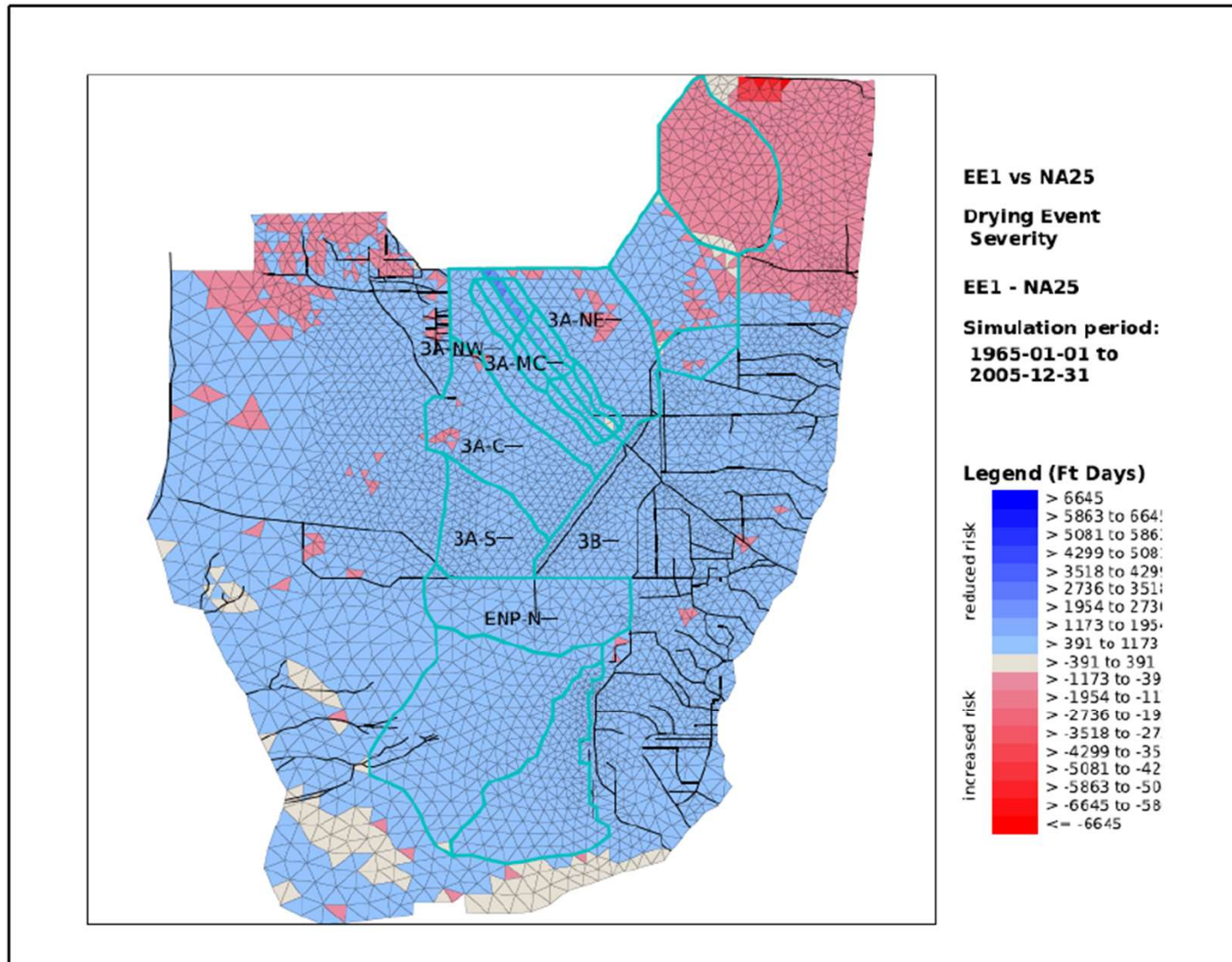


Figure C.2-29. Difference in dry event severity (Ft-Days) between NA25 for Alternative EE1 relative to NA 25 across the RSM-GL model mesh.

# Iteration 2 Alternatives – Dry Event Severity

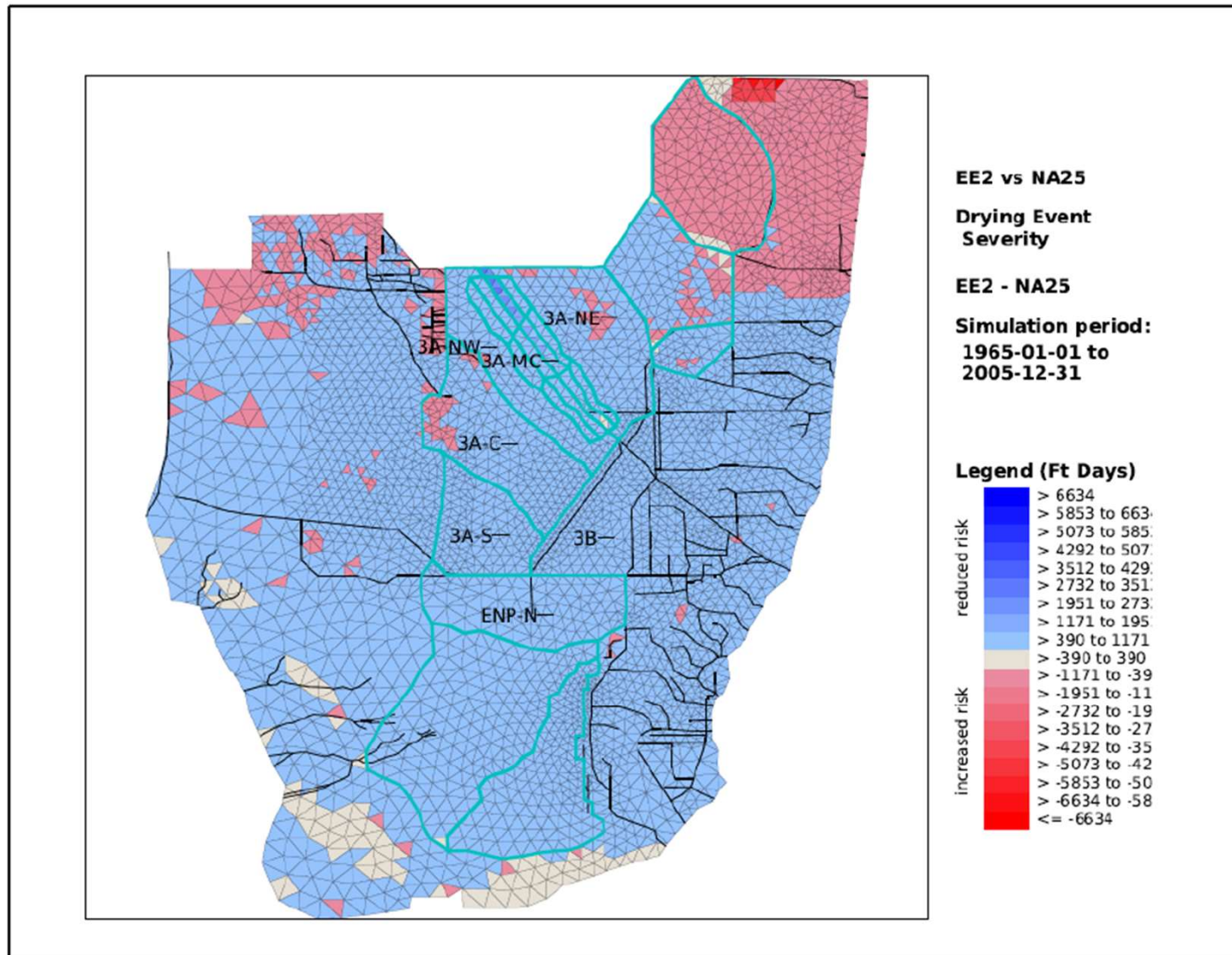


Figure C.2-30. Difference in dry event severity (Ft-Days) between NA25 for Alternative EE2 relative to NA 25 across the RSM-GL model mesh.

# Iteration 3 – Dry Event Severity

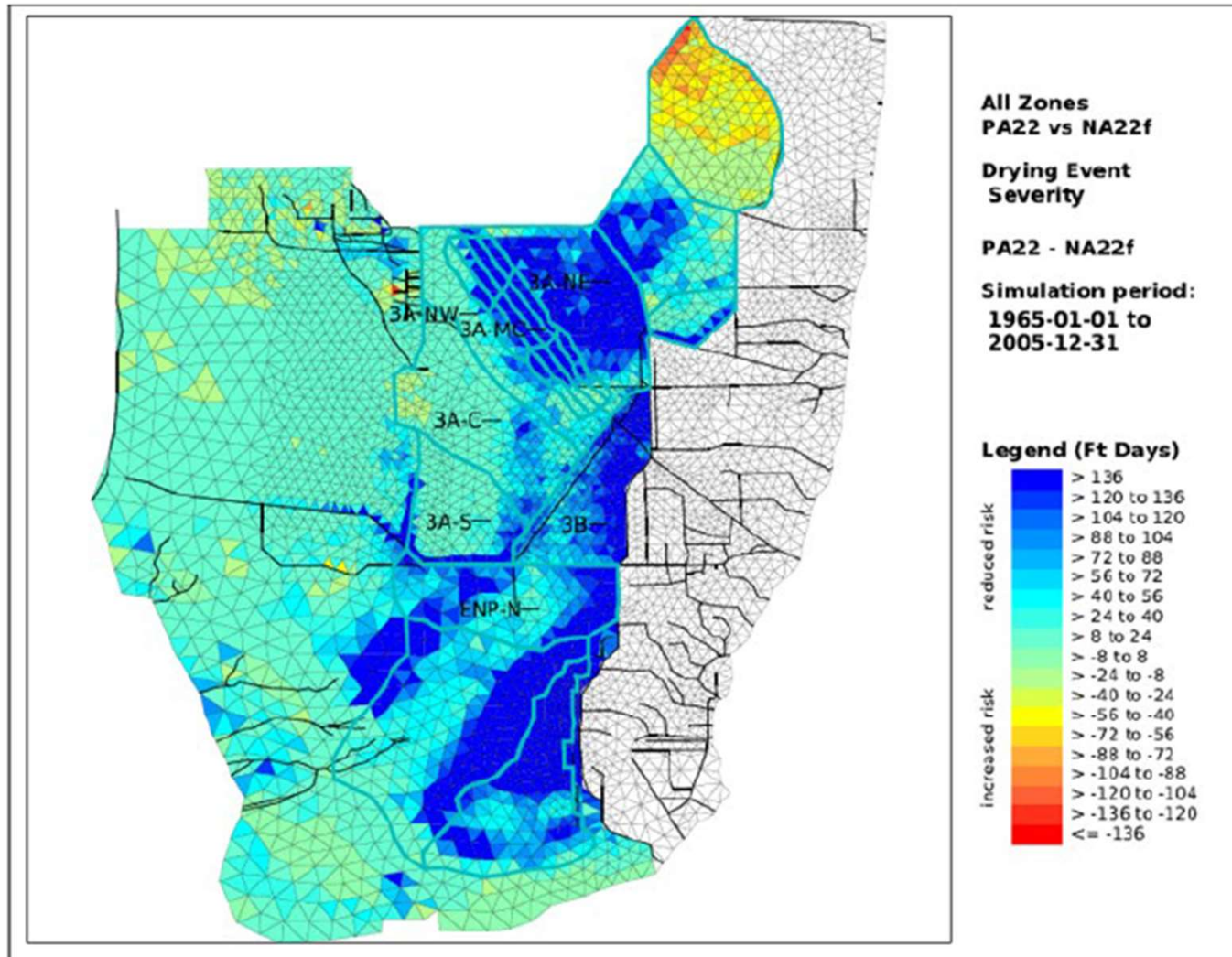


Figure C.3-37. Difference in dry event severity (Ft-Days) between NA22f and PA22 across the RSMGL model mesh.

# Average Stage Difference – Wet Month / Wet Year

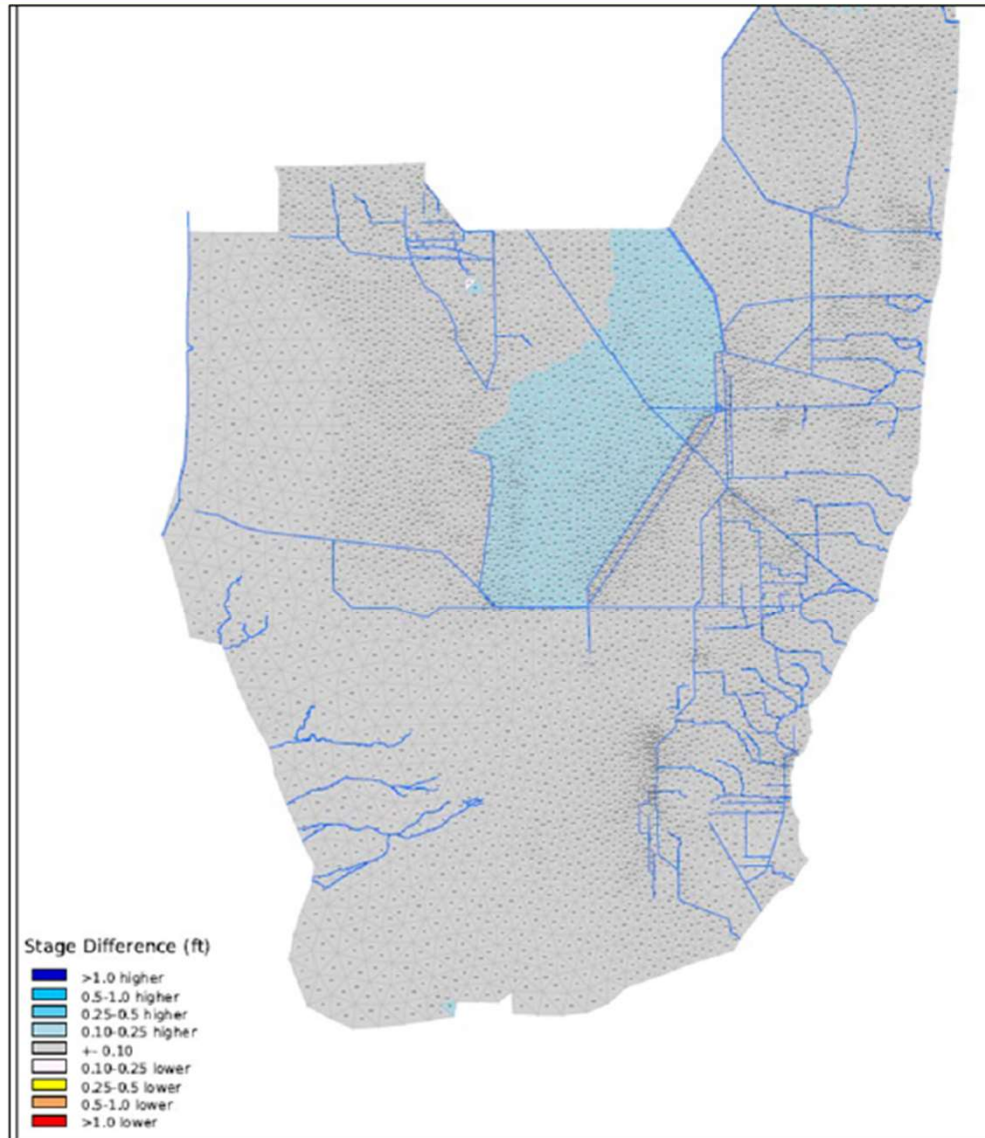


Figure C.3-63. Average stage differences (Preferred Alternative-No Action Alternative) during October 1995 (wet year)

# Average Stage Difference – Dry Month / Wet Year

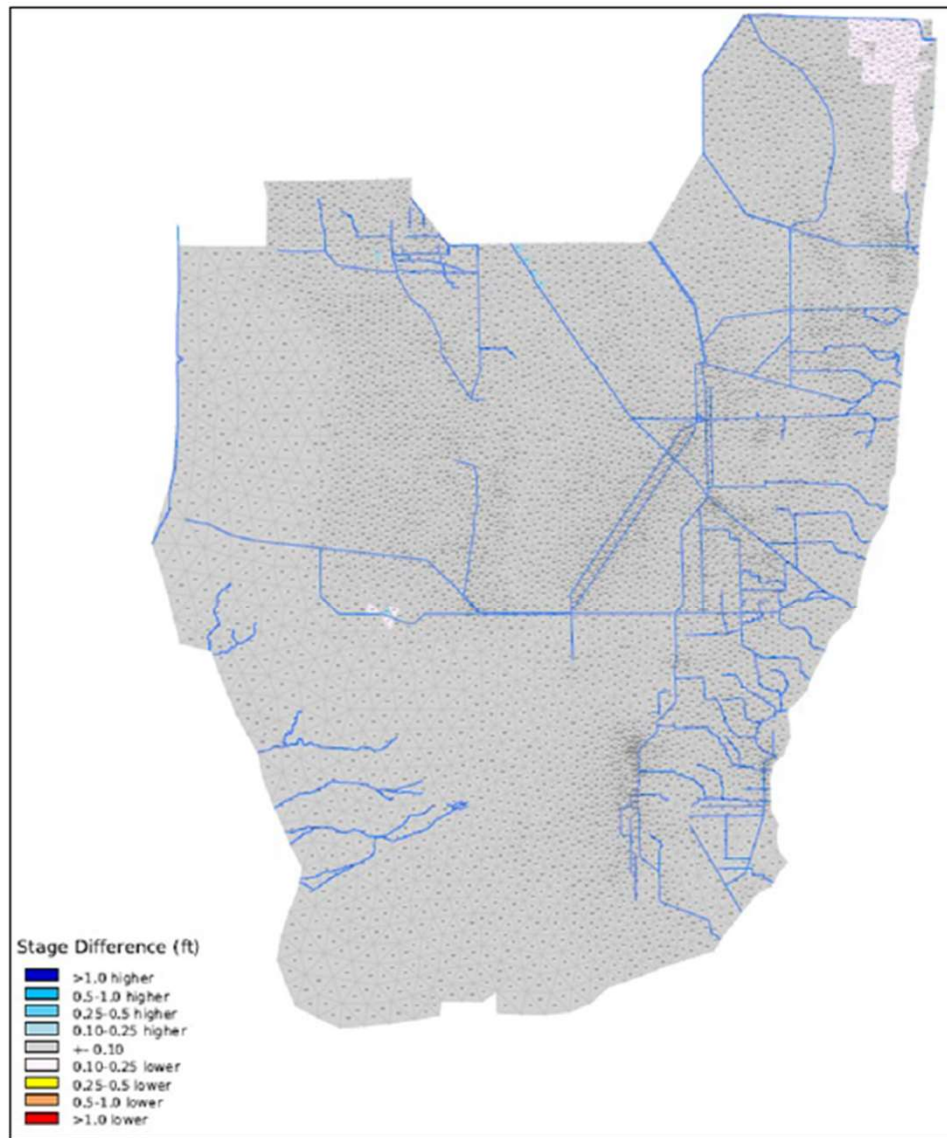


Figure C.3-64. Average stage differences (Preferred Alternative-No Action Alternative) during April 1995 (wet year).

# Average Stage Difference – Wet Month / Avg Year

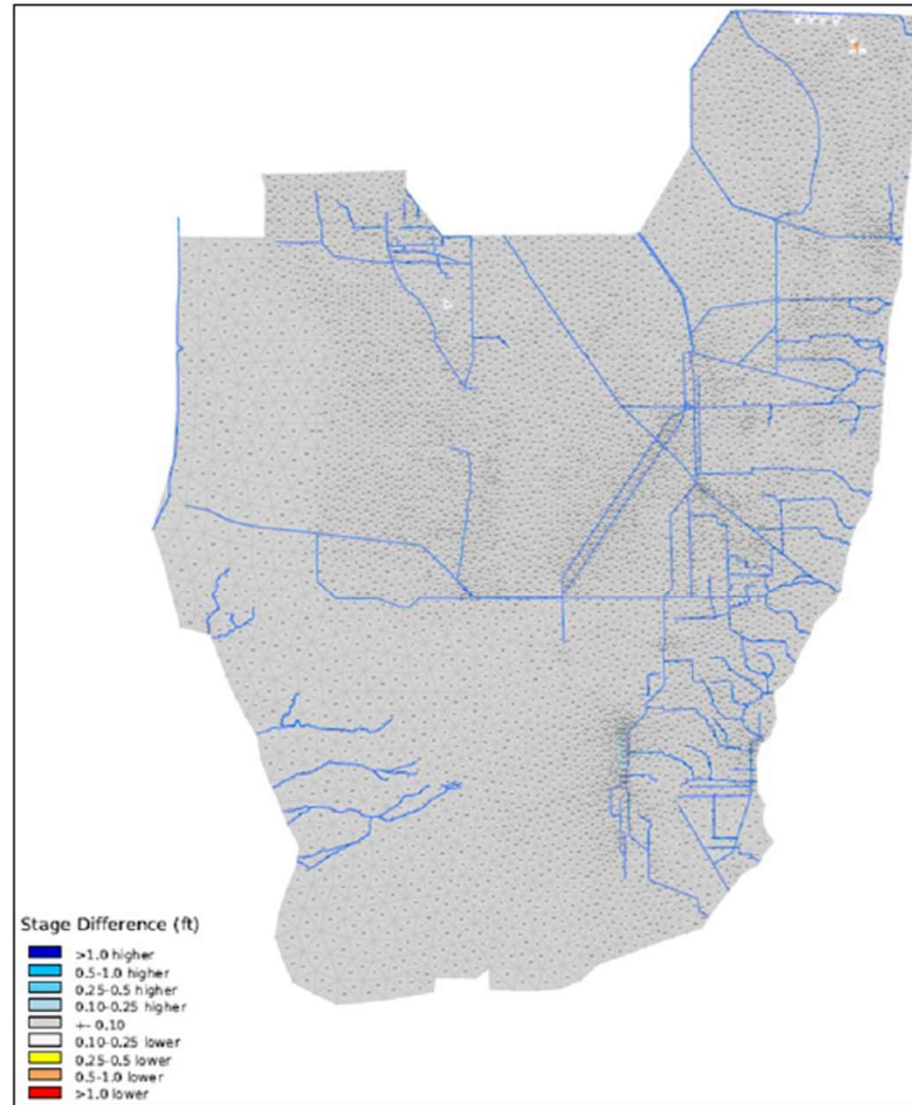


Figure C.3-65. Average stage differences (Preferred Alternative-No Action Alternative) during October 1978 (average year).

# Average Stage Difference – Dry Month / Avg Year

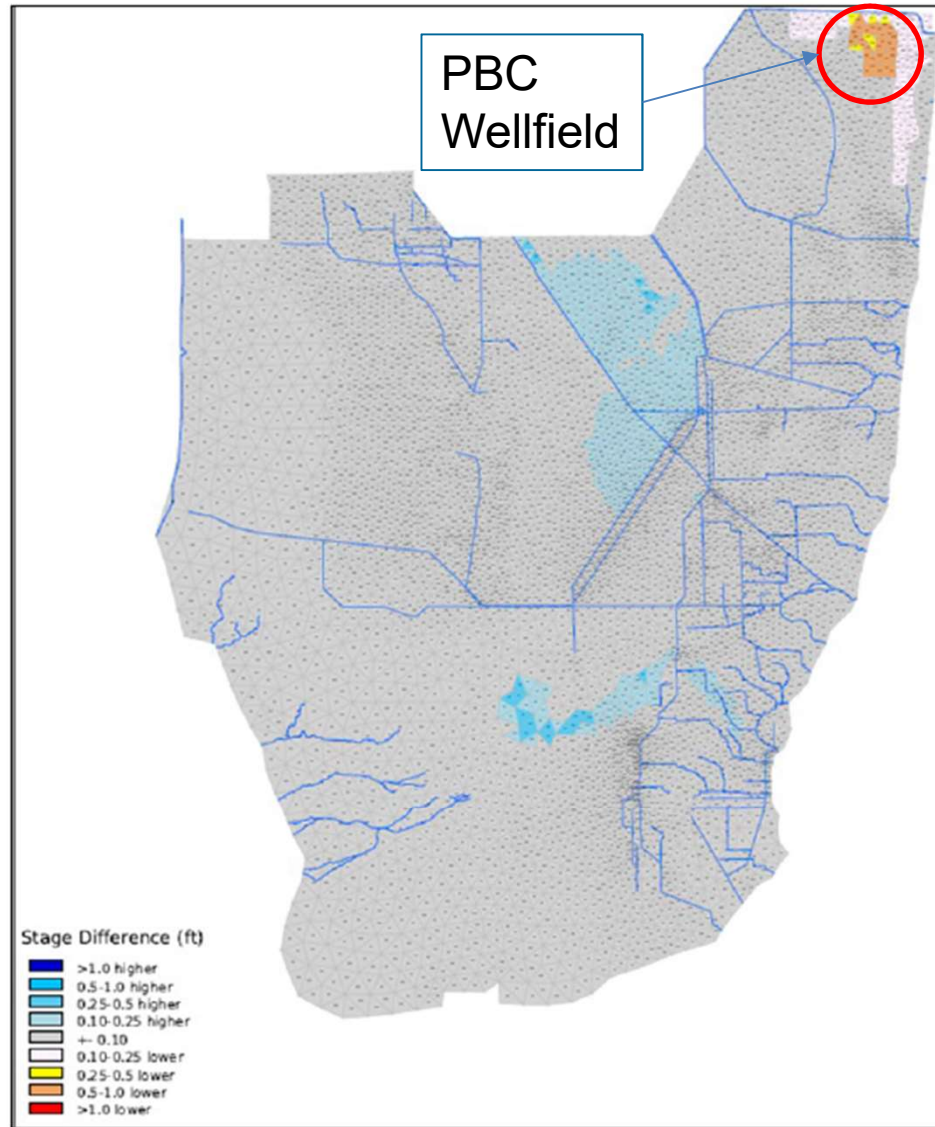


Figure C.3-66. Average stage differences (Preferred Alternative-No Action Alternative) during April 1978 (average year).

# Average Stage Difference – Wet Month / Dry Year

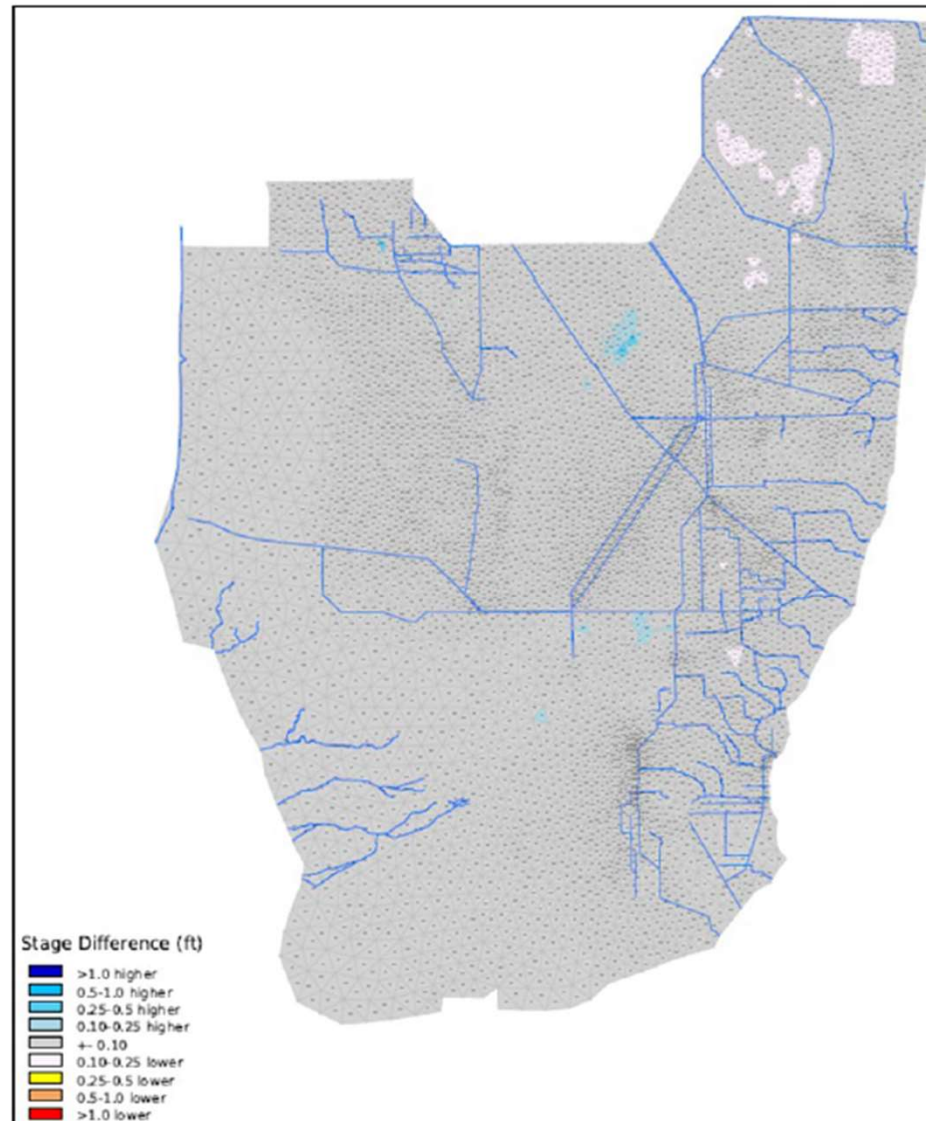


Figure C.3-67. Average stage differences (Preferred Alternative-No Action Alternative) during October 1989 (dry year).



# Average Stage Difference – Dry Month / Dry Year

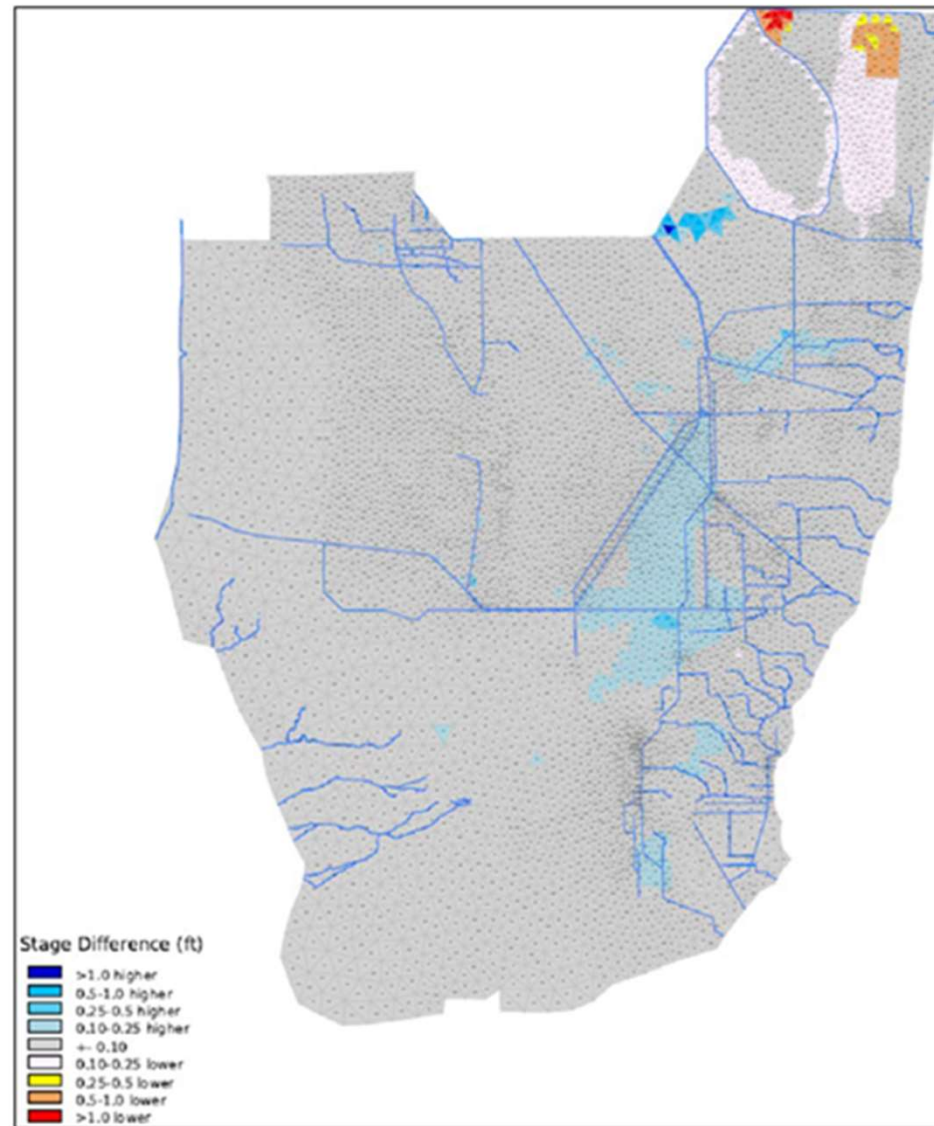
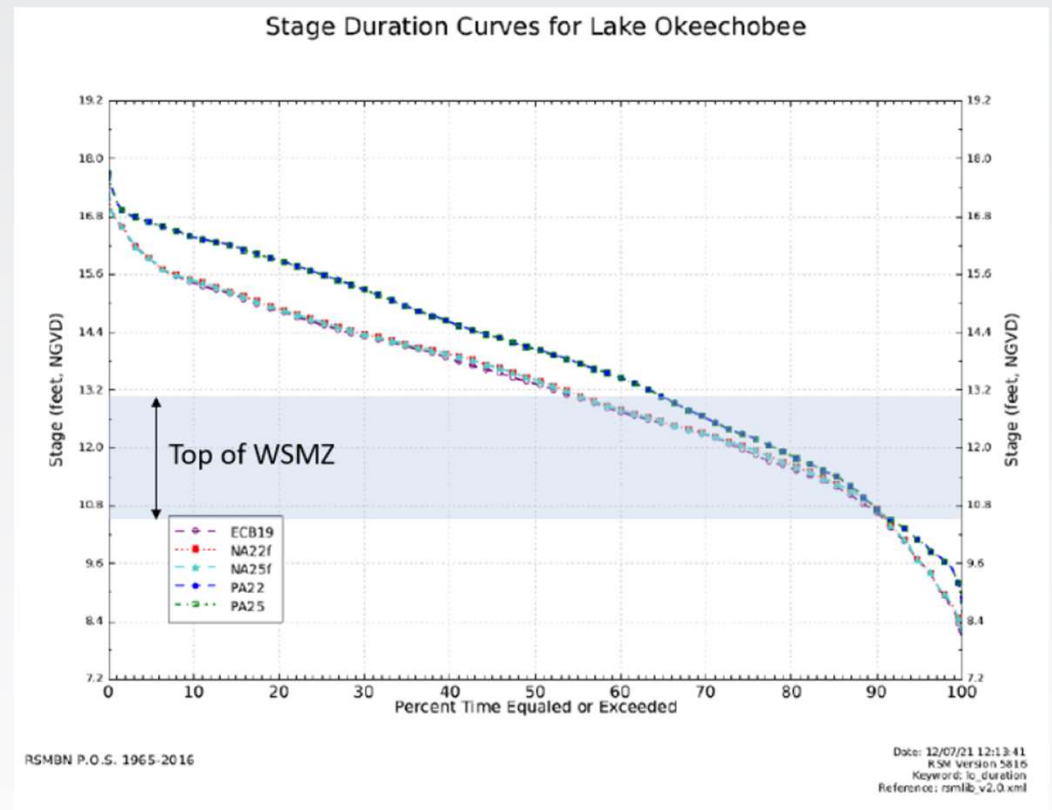


Figure C.3-68. Average stage differences (Preferred Alternative-No Action Alternative) during April 1989 (dry year).

# Lake Okeechobee Water Supply Availability

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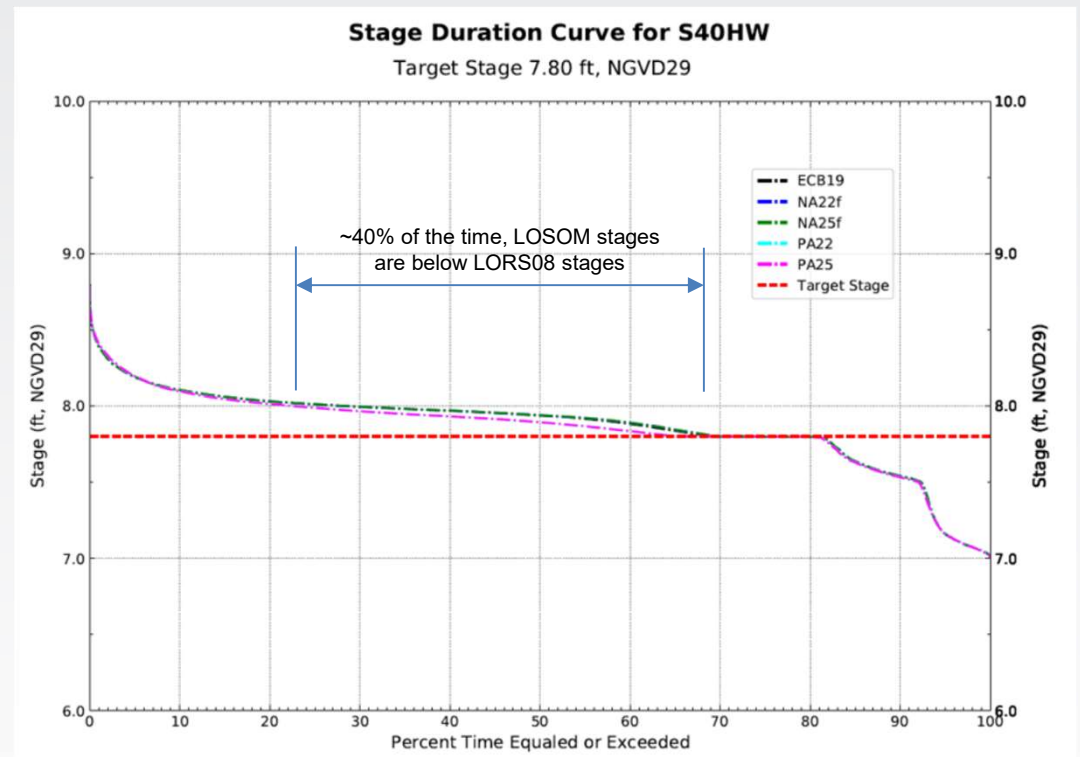
- More water is available for WS in the Lake above, and just below the top of the WSMZ under LOSOM
- Near the top of the WSMZ, stages are nearly the same under LOSOM
- Under severe droughts, stages are slightly higher under LOSOM
  - But its very difficult to get water from the Lake at those levels
  - Requires temporary pump facilities



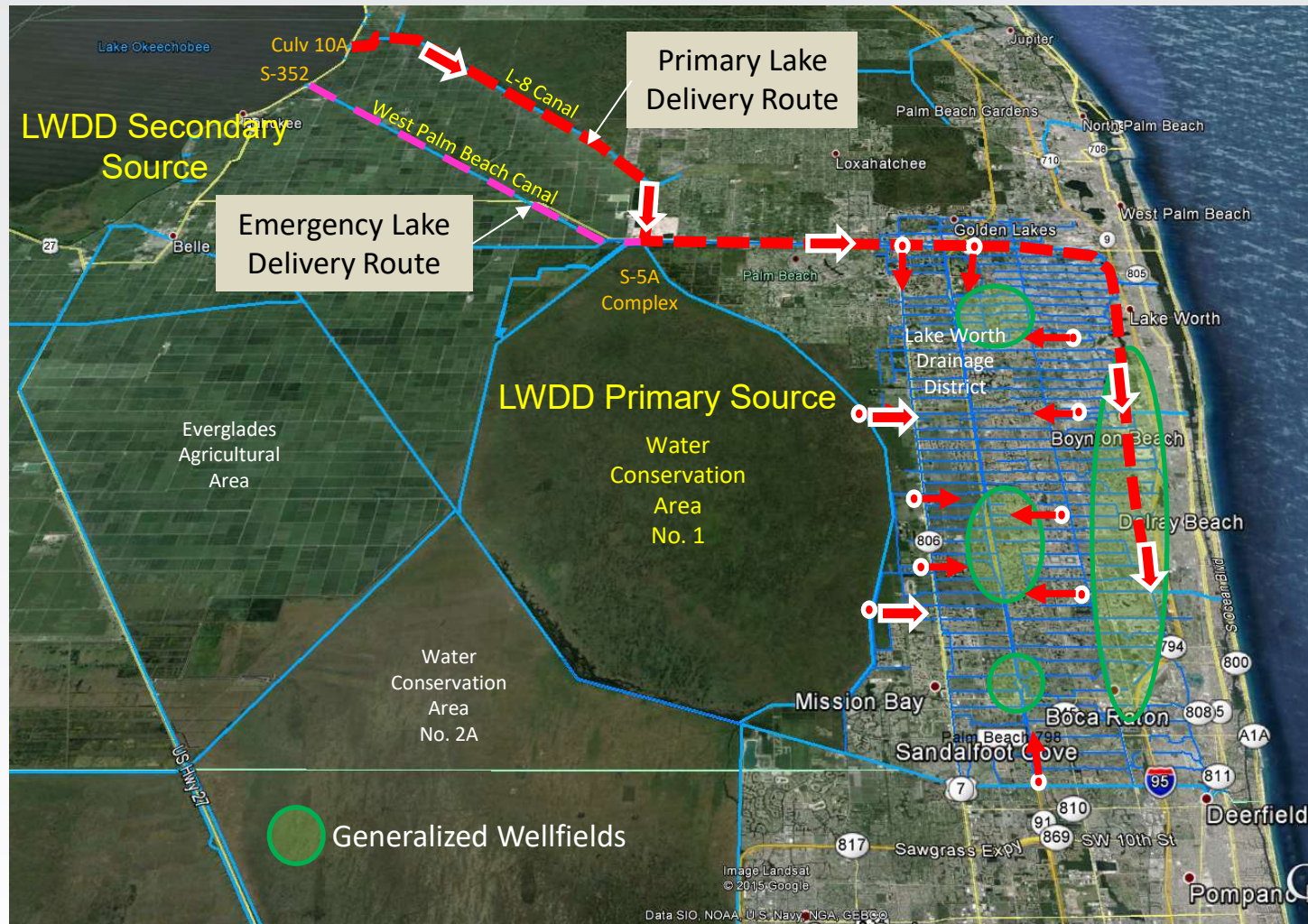
# Diversions to Canals Reduced Under LOSOM

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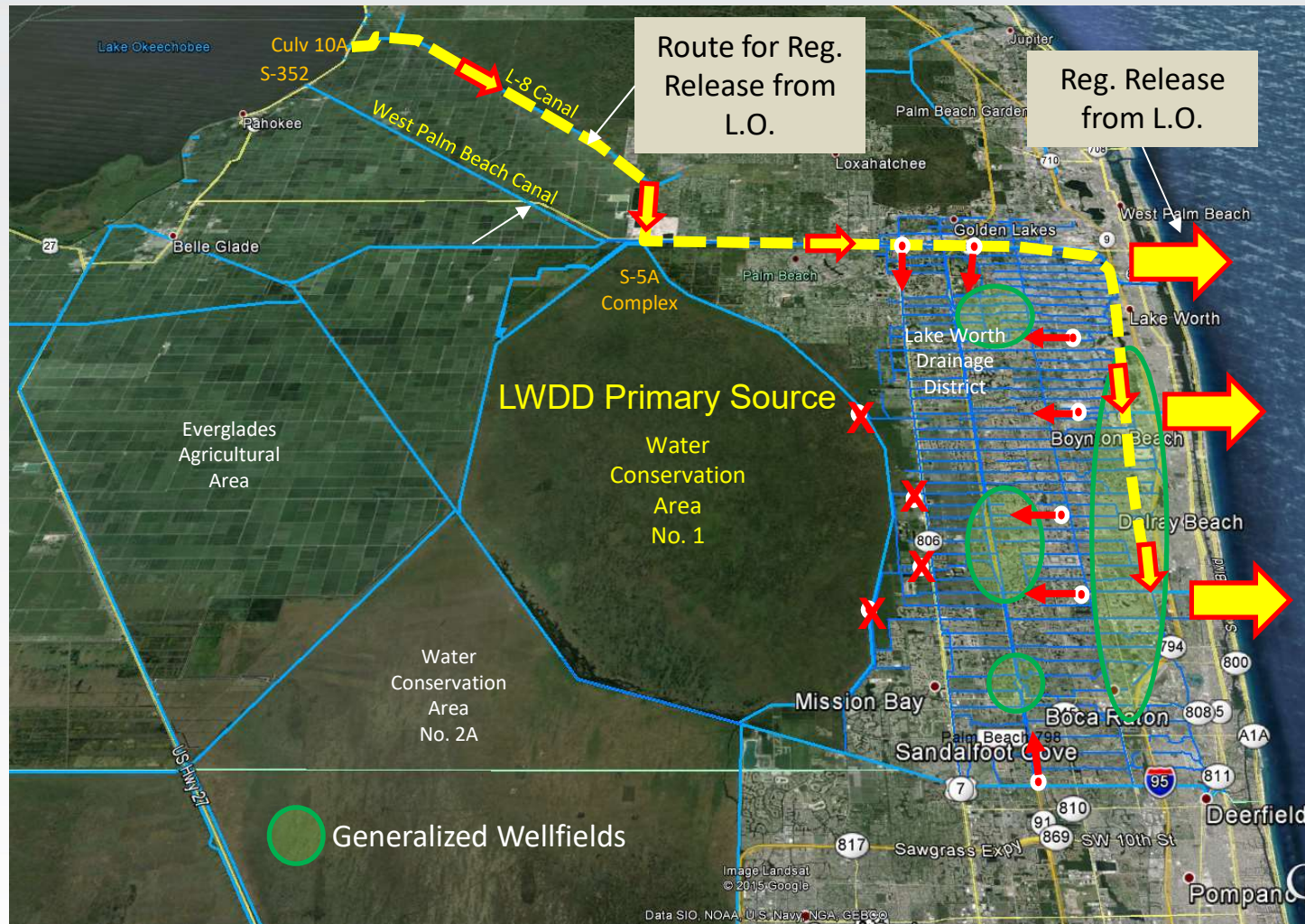
- As canal levels near LWDD approach the target level (low water cond.), It becomes increasing difficult to pump water into LWDD
- Stages are slightly lower under LOSOM than under LORS08
- This indicates that less excess water is available from Lake Okeechobee under LOSOM
- This reduction in the availability of regional water from the Lake would require LWDD to pull supplemental water from WCA-1
  - Increasing demand on WCA-1
  - Lowering stages in WCA-1



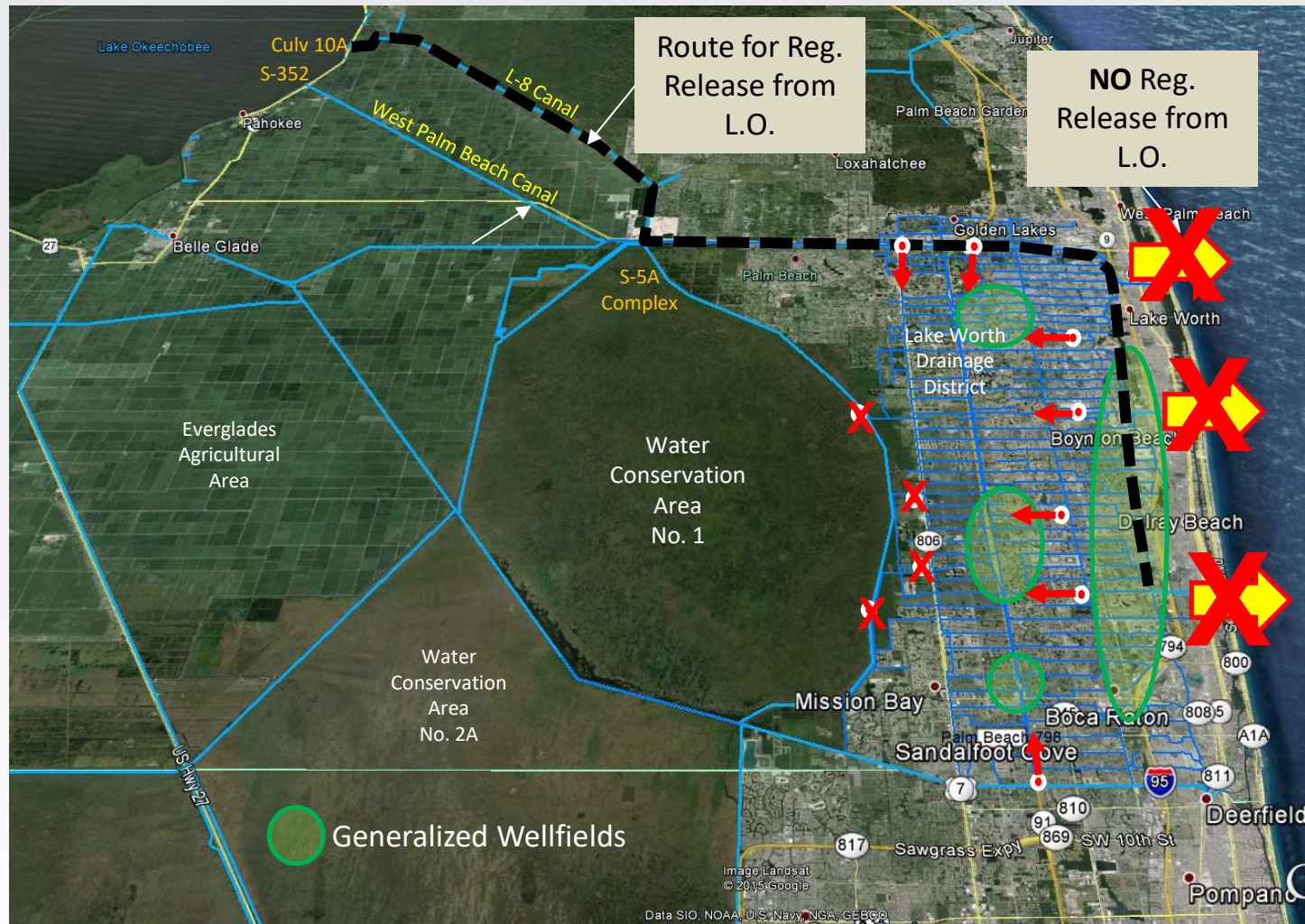
# LWDD Water Supply



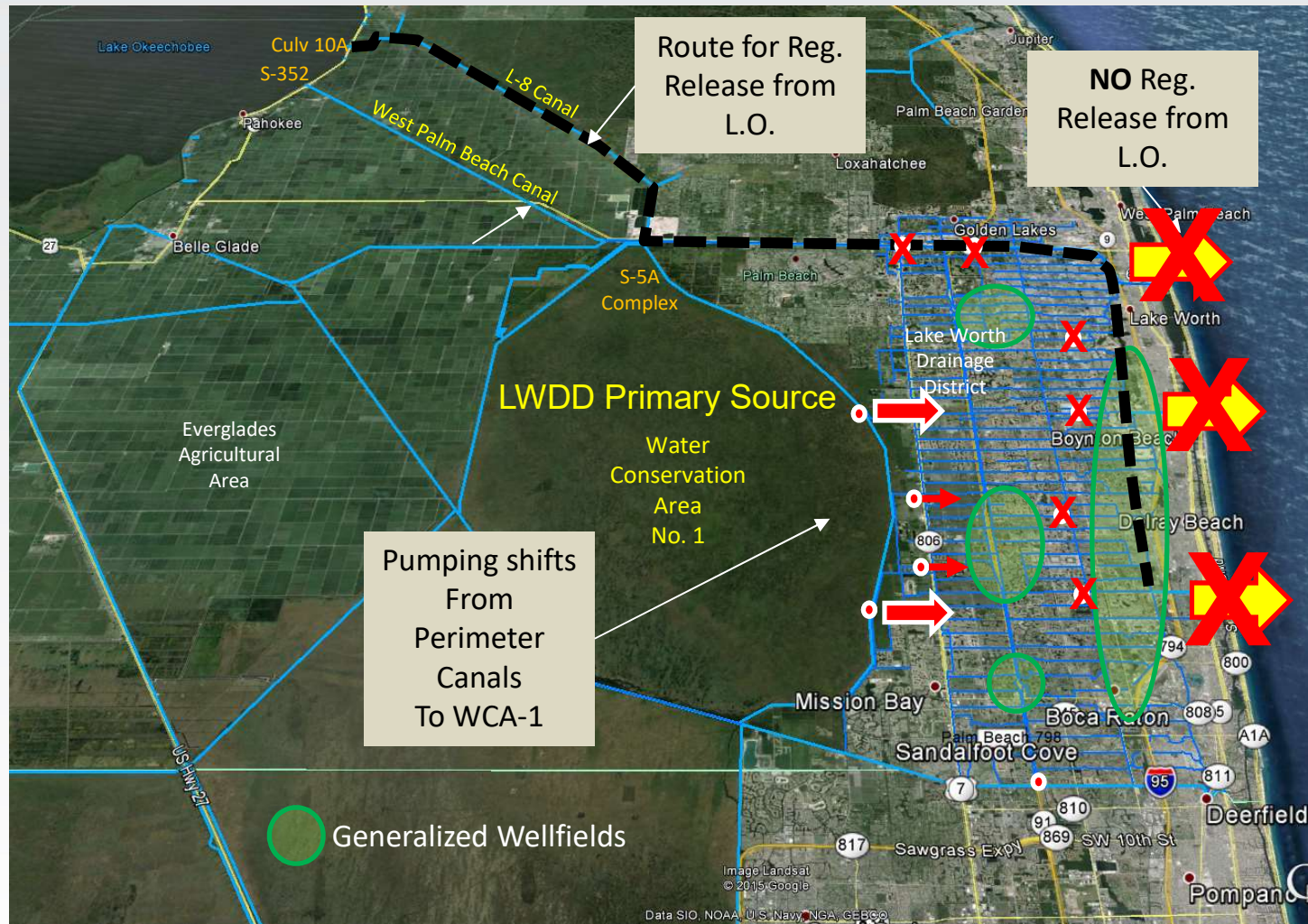
# LWDD Water Supply / Regulatory Releases From Lake Okeechobee – LORS08



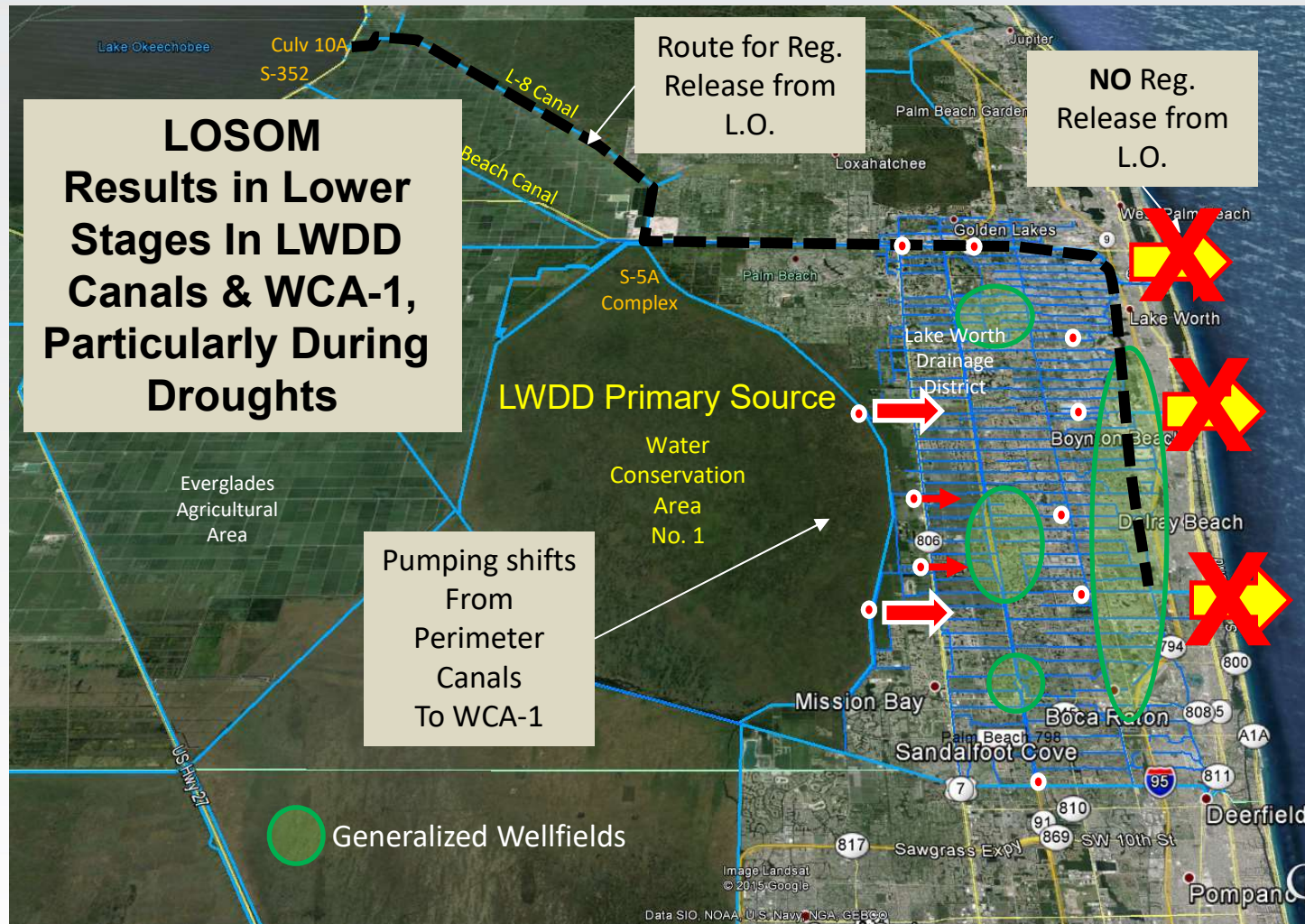
# LWDD Water Supply / Regulatory Releases From Lake Okeechobee – LOSOM



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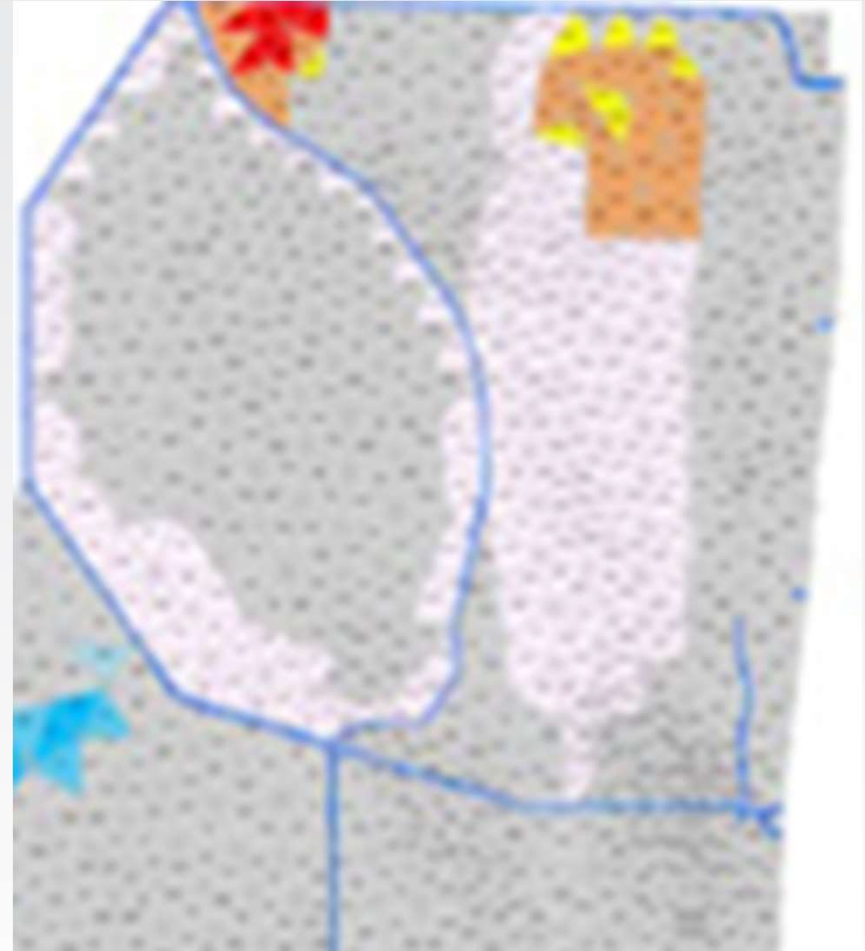




# LOSOM Effects on LECSA-1

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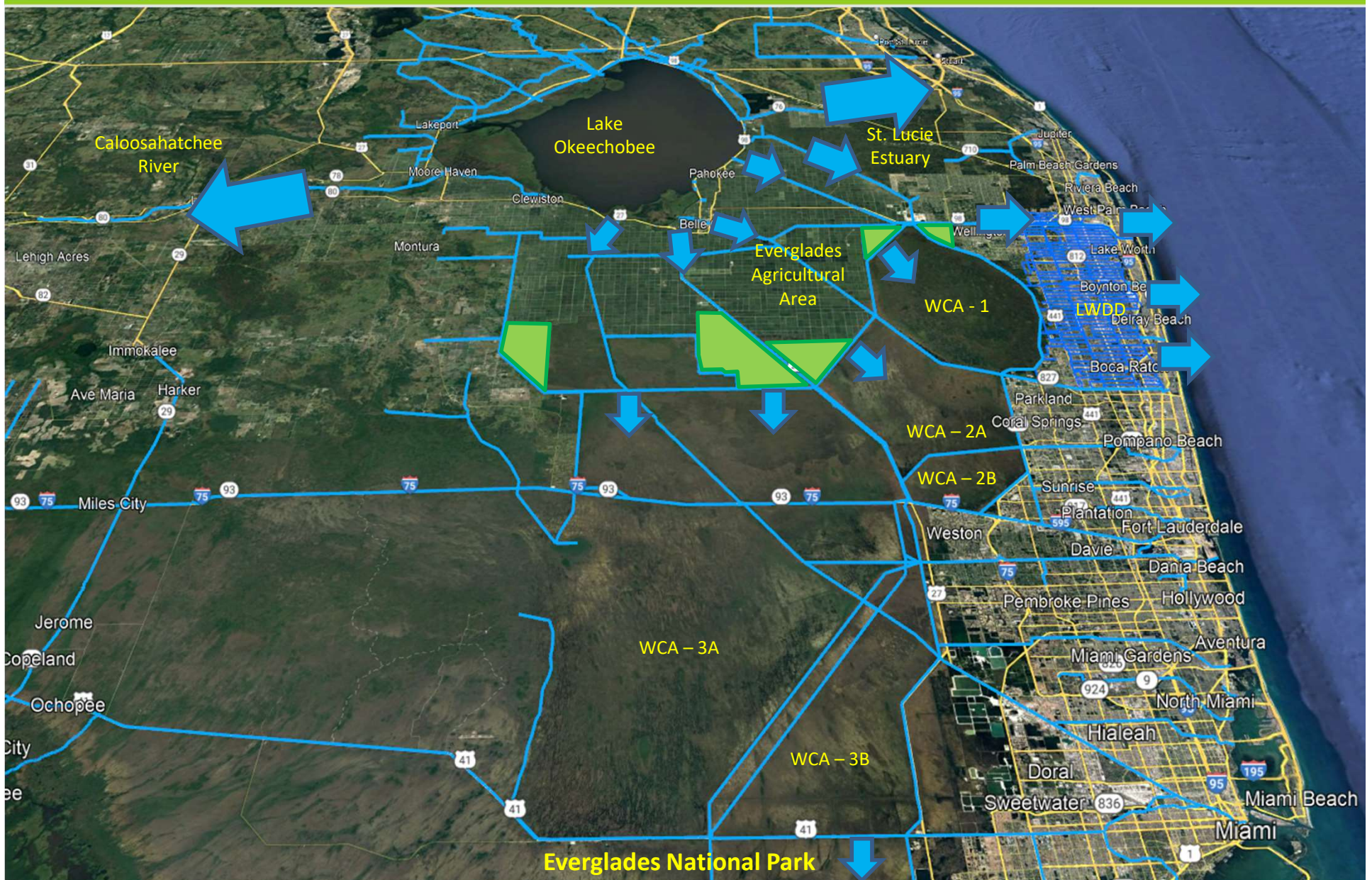
- No regulatory releases to Lake Worth Lagoon
- Lower canal stages during dry periods
- Reduced pumping from East into LWDD
- Shifts reliance to WCA-1 for water supply
- Increased withdrawal from WCA-1 lowers perimeter stages and impacts hydroperiods
- Less water in WCA-1 coupled with drier antecedent conditions results in lower levels in LWDD, with increased risk for saltwater intrusion



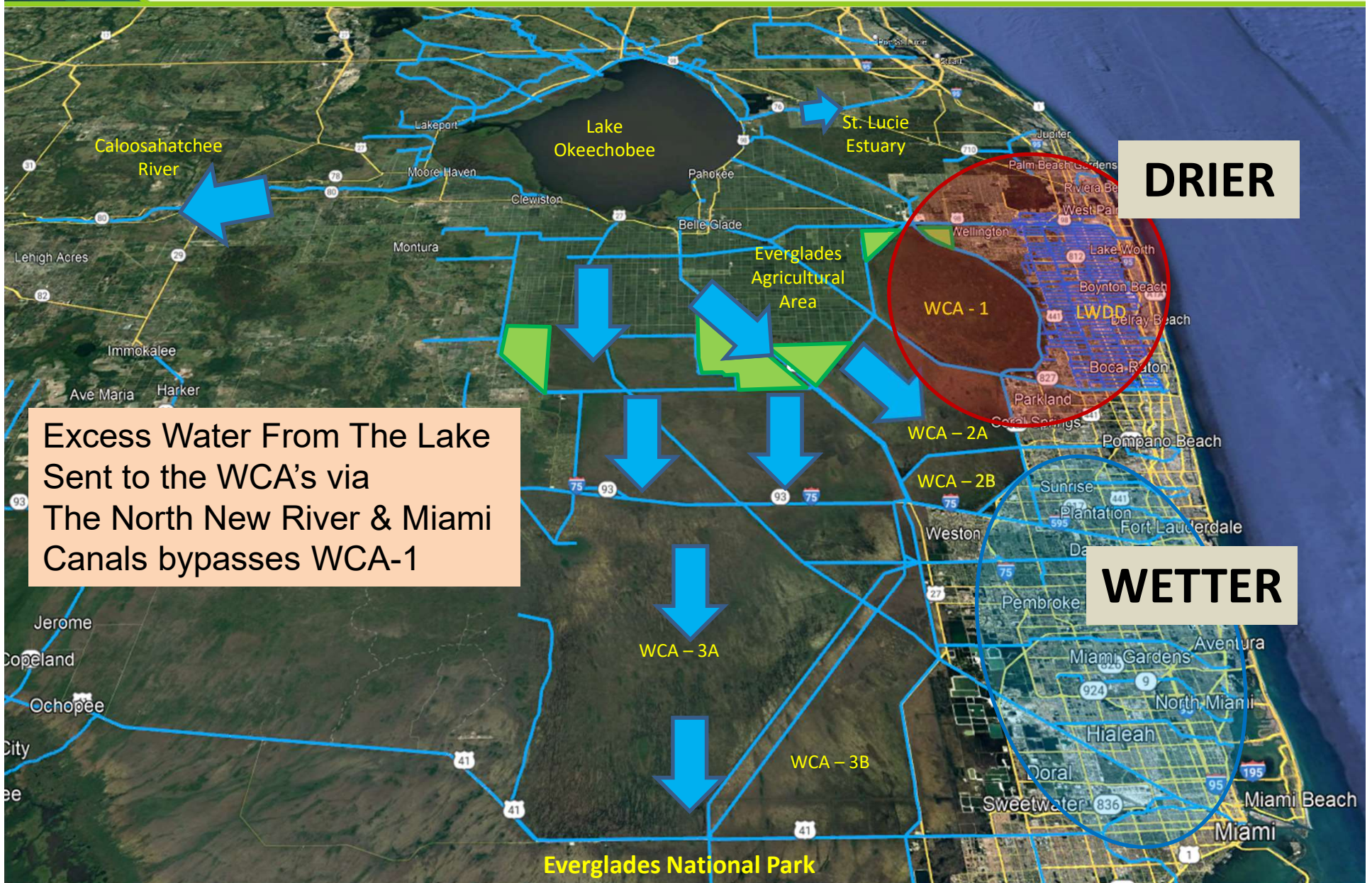
LOSOM Issues - PBCWRTF

# **SENDING WATER SOUTH**

# LORS08 Operations – ‘Regulatory Releases to the Estuaries’



# LOSOM Operations – ‘Sending Water South’



LOSOM Issues - PBCWRTF

# **WATER CONTROL PLAN**

# LOSOM Operations in the Model

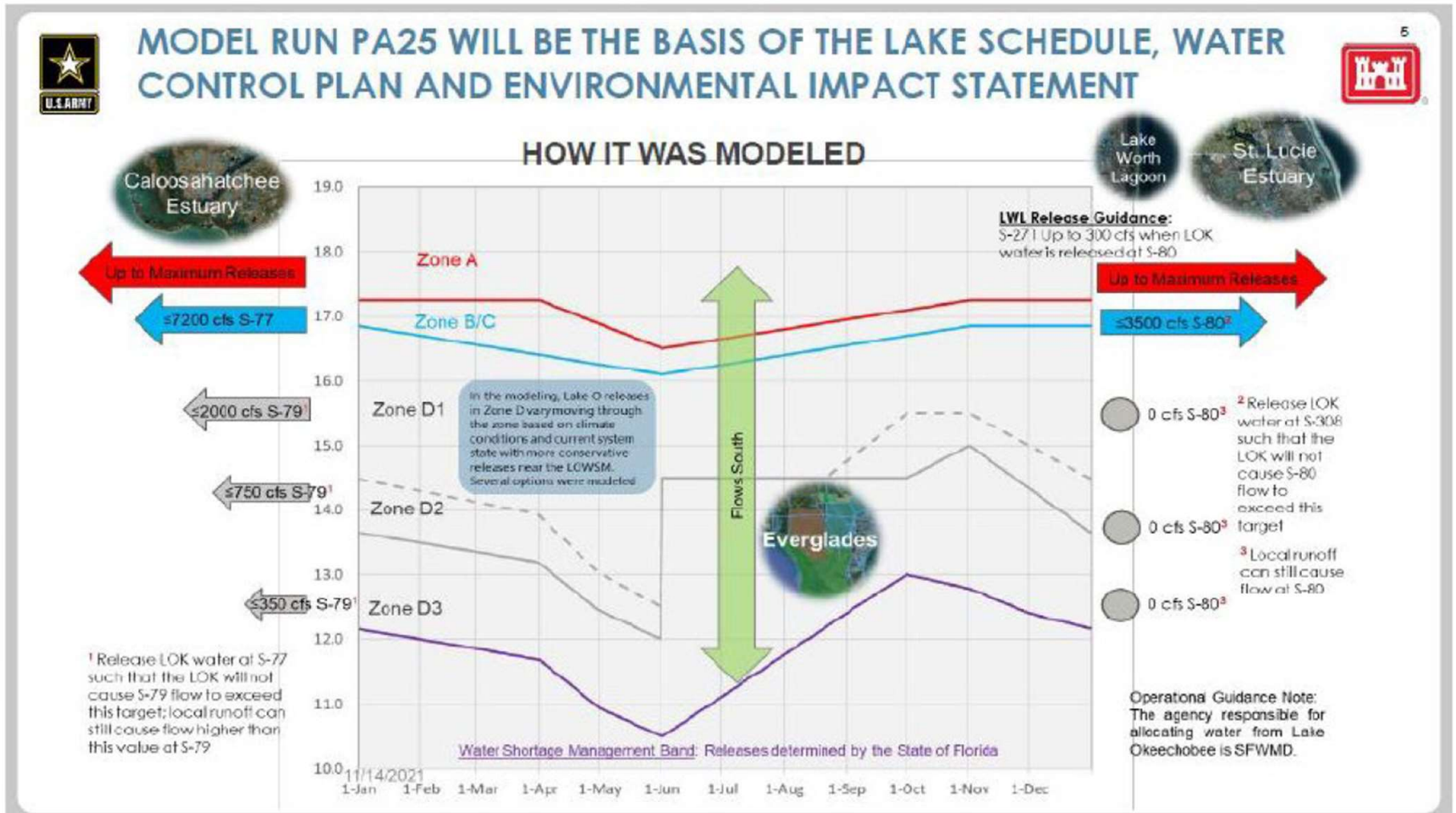


Figure 4-4. LOSOM Preferred Alternative

# LOSOM Operations in the Draft Water Control Manual

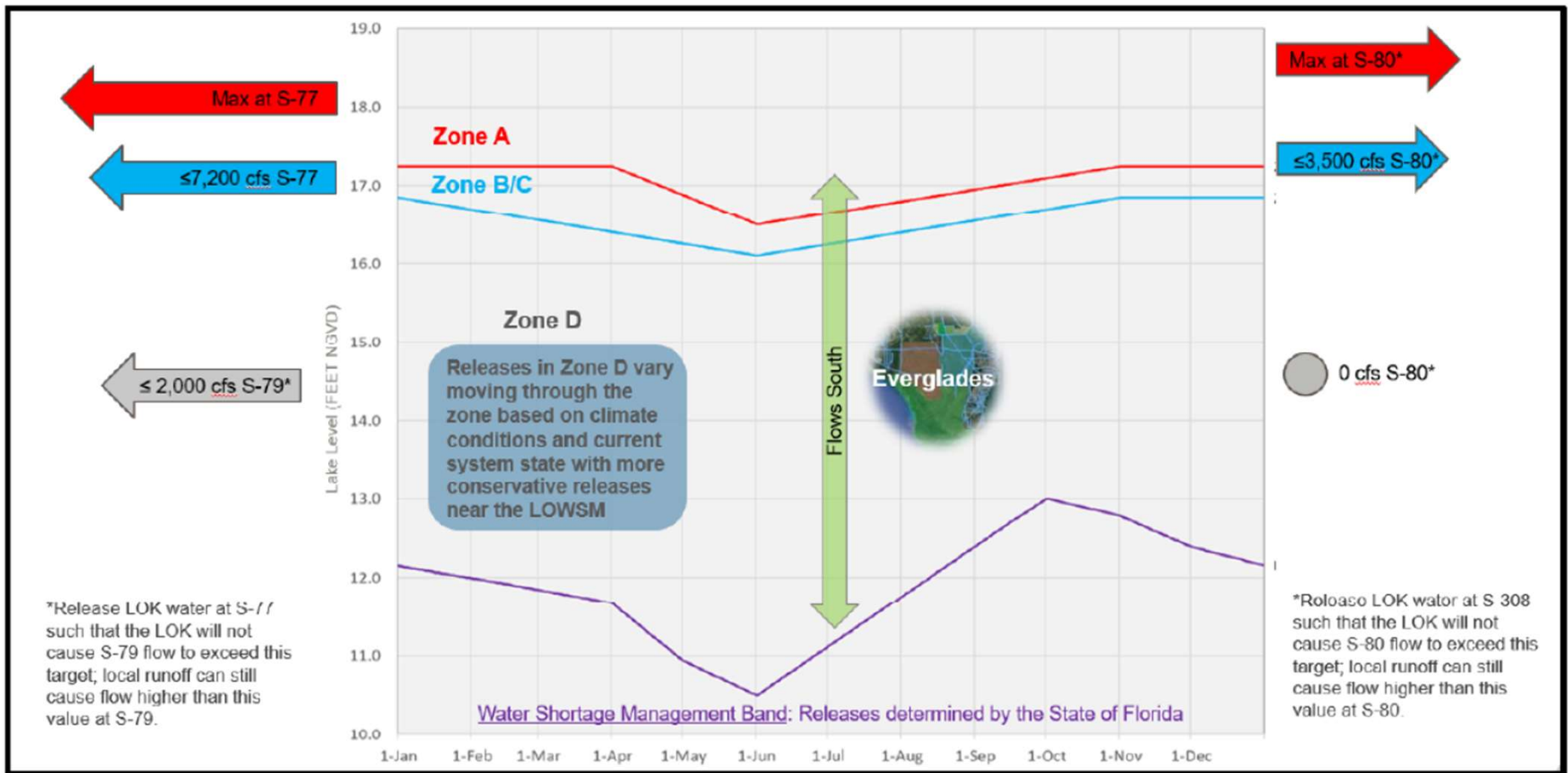


Figure ES-5. LOSOM Preferred Alternative in Water Control Plan.

## Water Control Plan – Simplification of Zone D

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- The Preferred Alternative was modeled assuming a detailed set of Sub-Zones within Zone D, with more precisely defined operational parameters for the model (i.e., discharge rates, seasonal stage adjustments, etc.)
  - Sub-Zone D3 included criteria presumed to conserve quantities for water supply
- All Zones above the WSMZ considered releases south to the WCAs and Everglades National Park
- However, this more detailed criteria was omitted in WCP and a narrative description of operational flexibility was described across Zone D



# Water Control Plan Uncertainty

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- The WCP contains a general narrative in lieu of a specific, detailed operational decision matrix to guide real-time decisions
- While this approach provides the USACE with a broad range of operational flexibility, it introduces a significant measure of uncertainty as to what specific operations will occur under varying conditions

LOSOM Issues - PBCWRTF

# **CERP SAVINGS CLAUSE**

# CERP Savings Clause

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- The USACE determined that LOSOM would not include CERP considerations based on the original Herbert Hoover Dike authorizations
  - Therefore, consideration of CERP constraints would be un-necessary
    - Water Reservations – Protection of ‘new’ water developed by CERP projects for Everglades Restoration
    - Savings Clause - Protection of ‘existing’ water users from the elimination or transfer of water sources associated with Everglades Restoration, “implementation of the Plan”

# CERP Savings Clause

- Recently Judge Middlebrook ruled on the applicability of the Savings Clause associated with the CERP A-2 Reservoir & STA. While he agreed that the Savings Clause was applicable to this CERP project, he held that the LORS08 baseline was appropriate to use in the analysis. The Holding is narrow and applies only to LORS08.
- He agreed with the USACE that the Savings Clause “replacement water” did not apply to LORS08 because the draw down of the lake for dike repairs was considered an ‘intervening non-CERP activity’.
- He further stated that this intervening condition did not require CERP projects to make-up for this loss
  - While CERP cannot make conditions worse, a new ‘intervening non-CERP-activity could. The Savings Clause analysis is done on a case by case basis until the Guidance Memorandum is finalized or issued.
  - **So what we may be left with is the ‘New Normal’**

LOSOM Issues - PBCWRTF

# **IS THERE A SOLUTION?...**

# Solutions?...

- **Redistribution of water ‘Sent South’...**
- In the detailed discussion of this issue in the DEIS (Appendix C, Part 2.) it was stated;
  - “...there is more availability of “excess” water in LORS08 simulation compared to LOSOM. This reduction in C51 “excess” results in increased use of G94 as described above. **The magnitude of the relative differences observed at different points in the LOSOM process varies depending on the evolving definition of “excess”** as well as refinements over time to the LOSOM schedule discharges via the “L8 to tide” route.”
- Therefore, a better definition of the ‘excess’ water released from the Lake may be a mechanism to move water to the LECSA-1 canals, minimize water supply impacts to WCA-1 & LWDD, and still avoid discharge to the Lake Worth Lagoon

# Solutions?...

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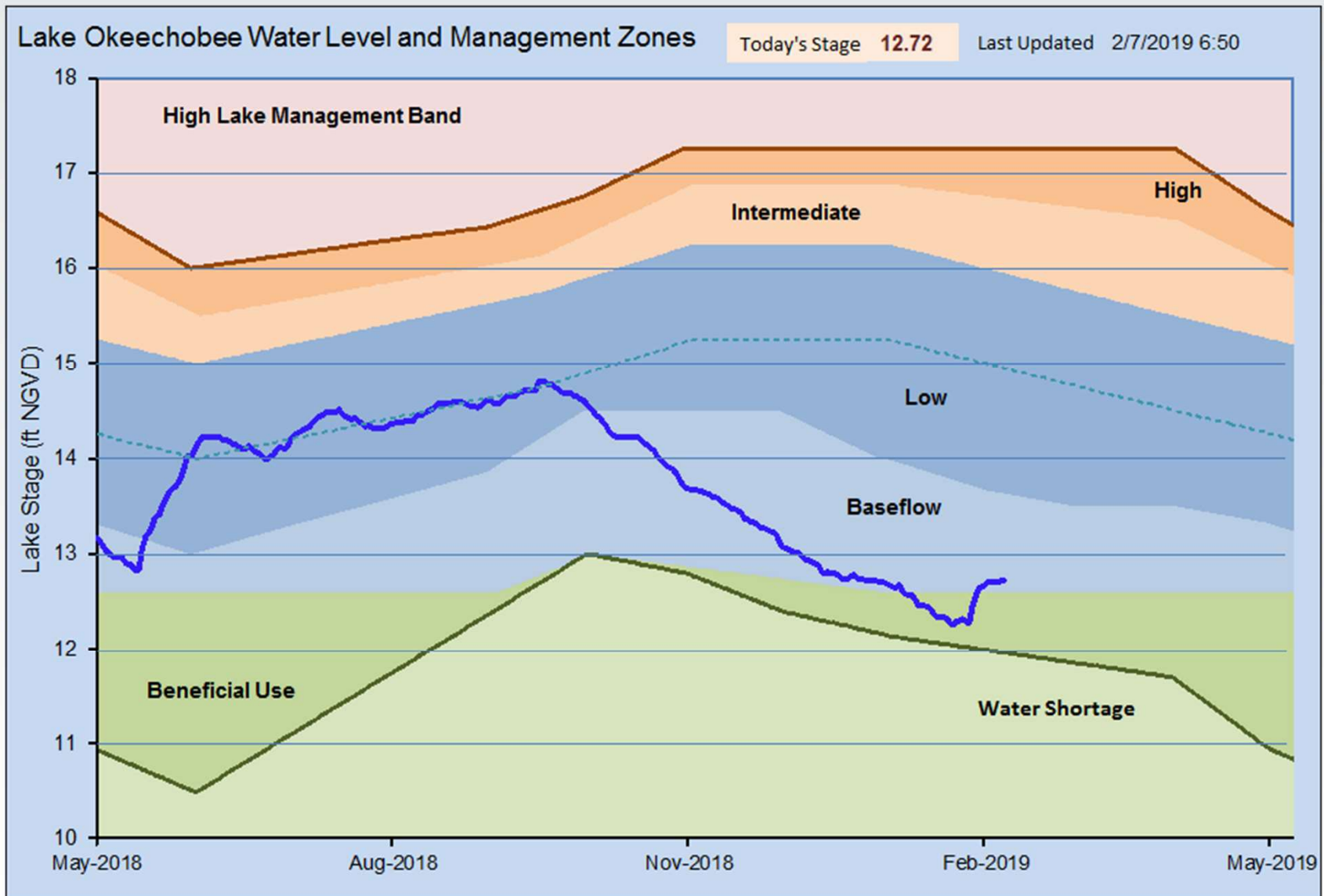
- **Storage, Storage, Storage...**
- A number of storage projects were identified in CERP which could play a significant role in resolving these issues in PBC
  - Site I Reservoir
    - 1,600 acres – 4 ft. deep
    - ASR Wells
  - C-51 ASR
  - Others?...



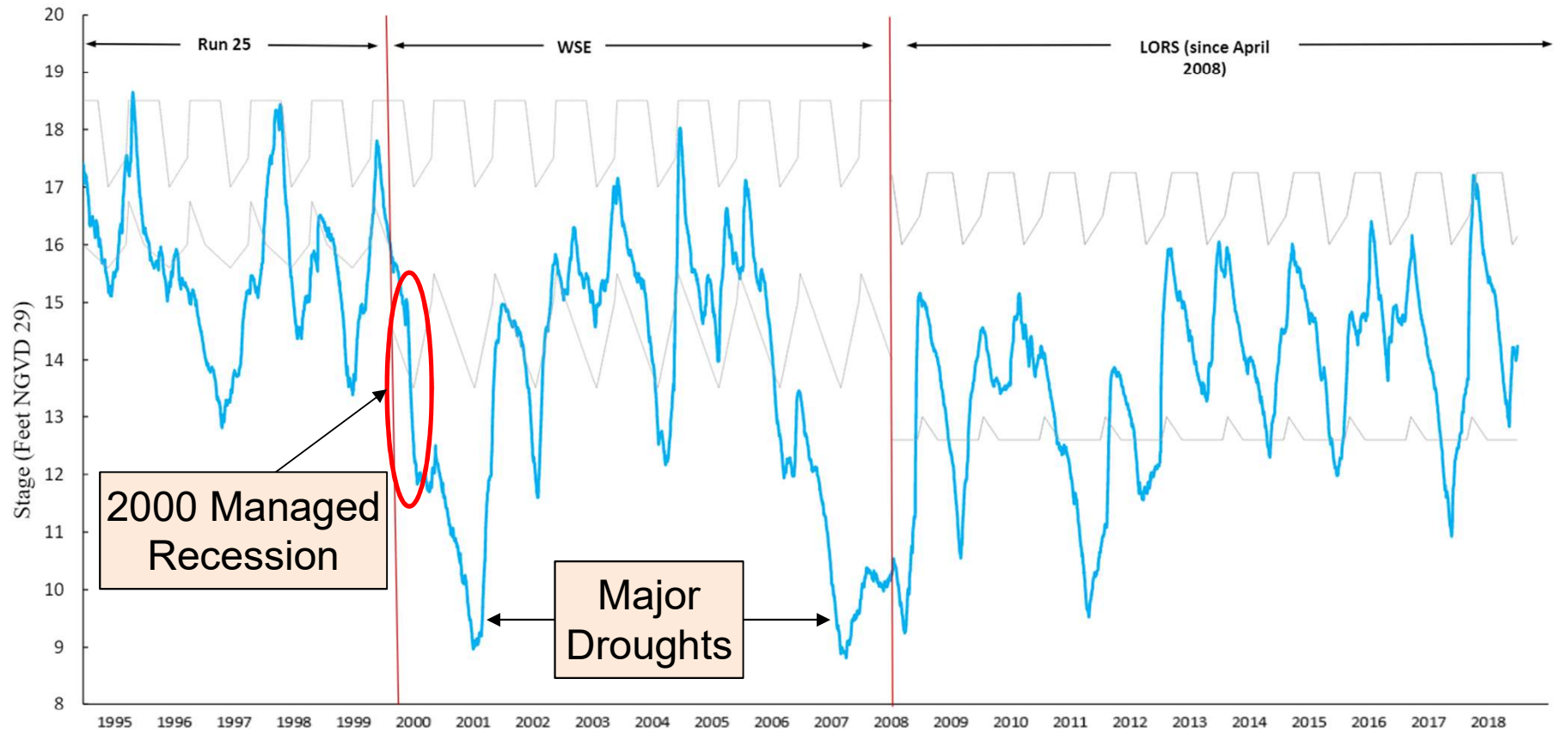
# Question



# Lake Okeechobee Operations (LORS08)



# Recent Lake Okeechobee Regulation Schedules – Stage Hydrograph



# USACE Decoupled Modeling Approach

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## Regional Simulation Model

- NE & Central PBC
  - Node - Link Model
    - (RSMBN) – ‘Basins’
      - West Palm Beach
      - ITID
      - EAA
- SE PBC
  - Spatial Landscape Model
    - (RSMGL) – Glades/LECSA
      - LWDD
      - Wellington
      - WCA-1
- Interface – ‘Boundary Condition’

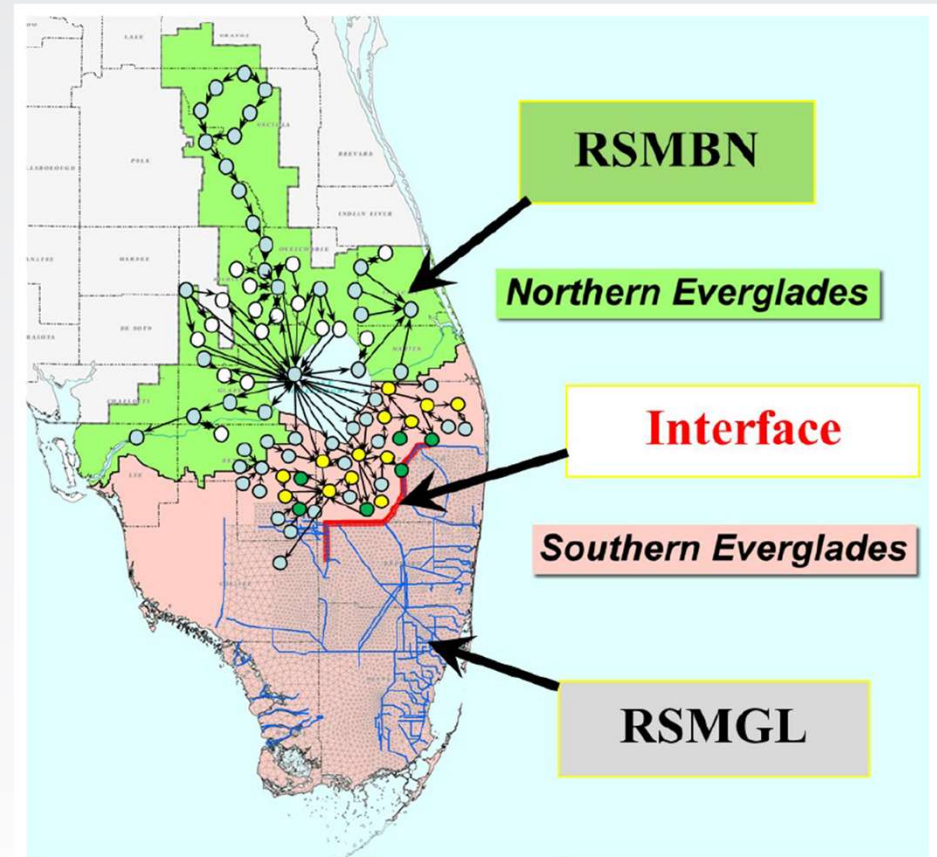
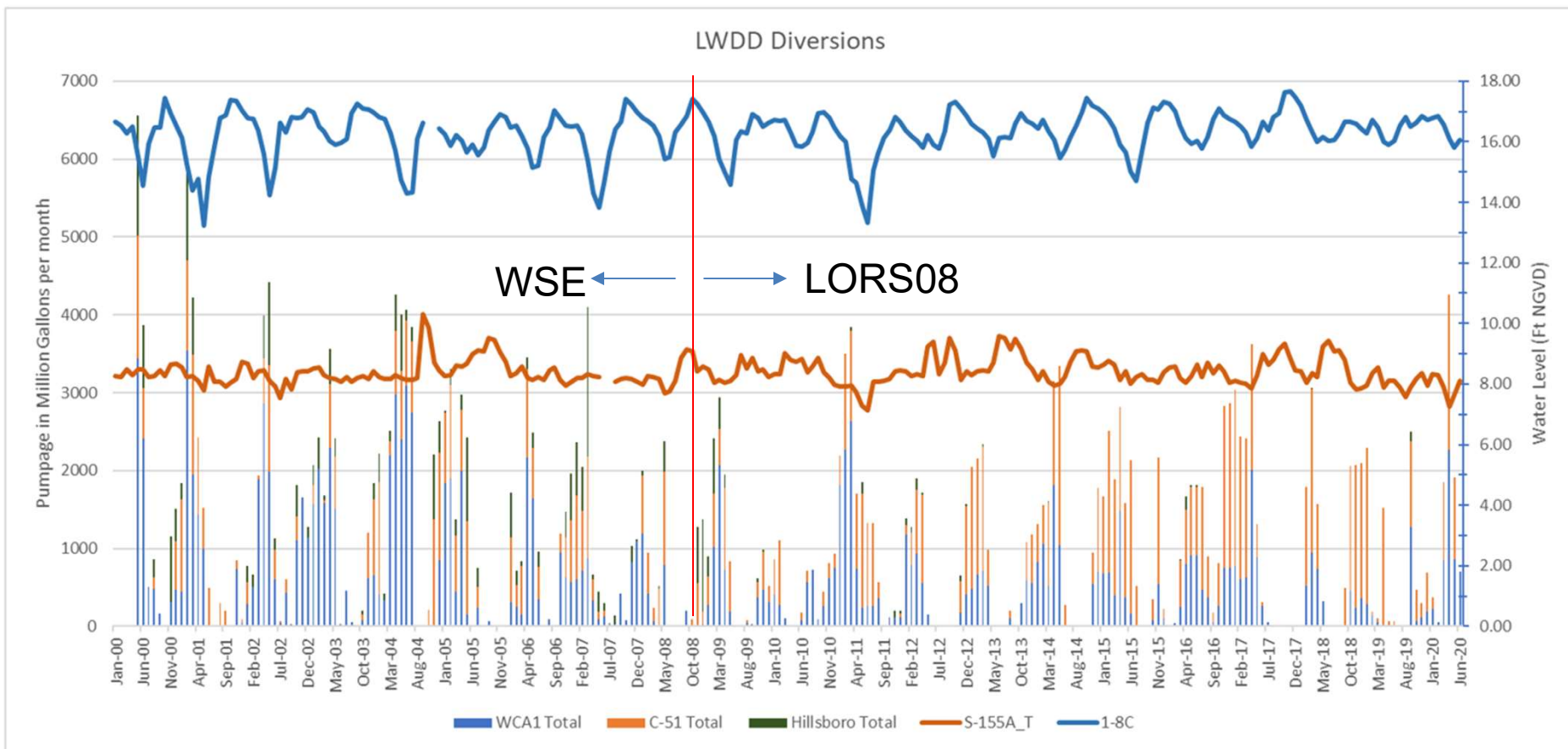


Figure 1-4. Decoupled LOSOM Modeling Approach.

# LWDD Water Supply Diversions



2000-2020	Sum Monthly (MG)	Avg Monthly (MGM)
WCA 1	135,958	553
C-51	122,848	499
Hillsboro	11,292	110

2000-2020	Avg Daily (Ft NGVD)	Min Daily (Ft NGVD)
1-8C (WCA 1)	16.27	12.06
S-155A_T (C-51)	8.39	6.83