

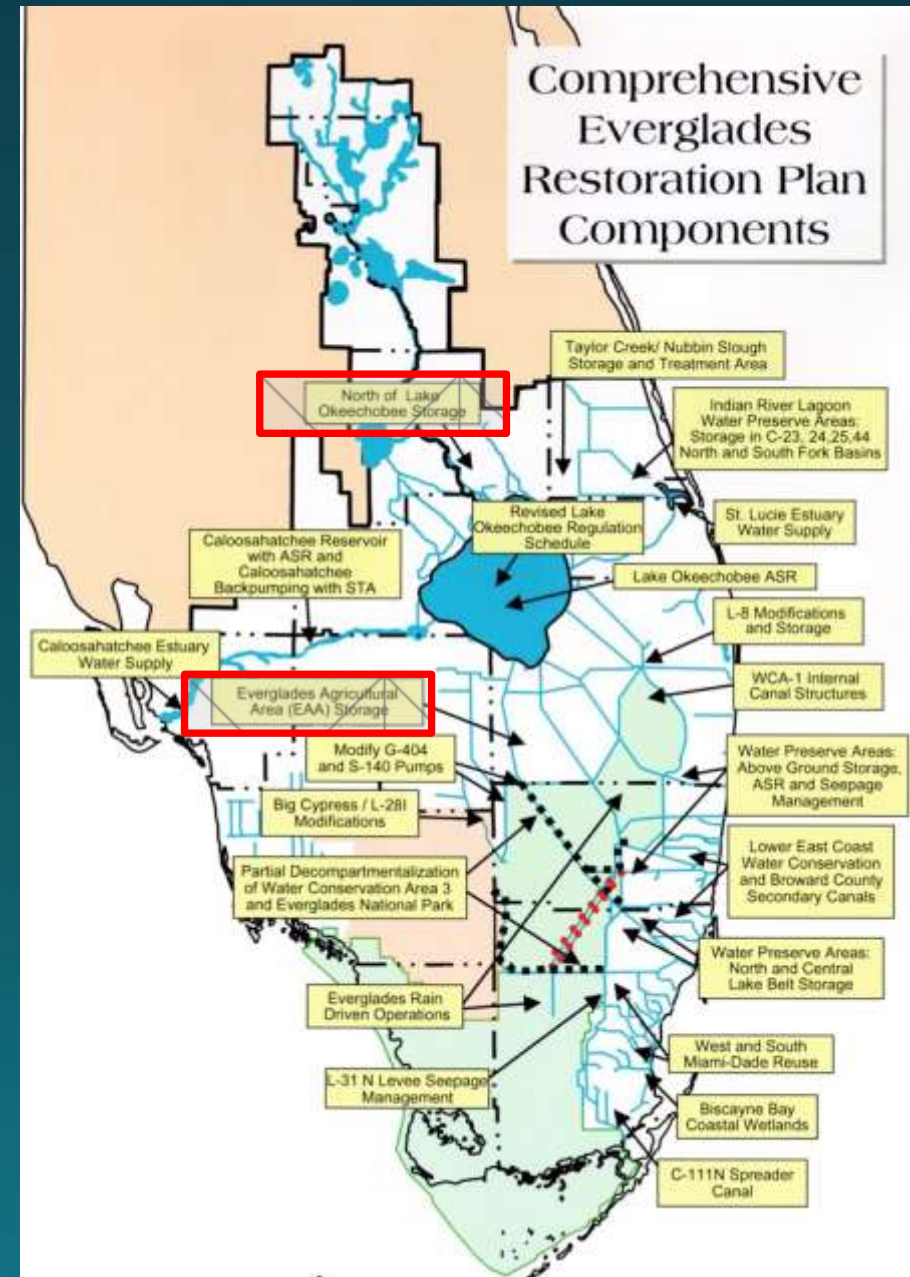
A Comparison of the Benefits of Northern and Southern Everglades Storage

Rajendra Paudel, Ph.D.
Thomas Van Lent, Ph.D.
The Everglades Foundation



The Comprehensive Everglades Restoration Plan (CERP)

- U.S. Army Corps and South Florida Water Management District developed CERP
- Authorized in 2000 by Florida Legislature and by Congress (WRDA 2000)
- 68 individual projects each requires authorization and appropriations
- Key components: water storage, remove barriers to flow, maintain flood protection and water supply, increase water delivery



Prioritization

The Legacy Florida Act States:

“The Department of Environmental Protection and the South Florida Water Management District shall give preference to those Everglades restoration projects that reduce harmful discharges of water from Lake Okeechobee to the St. Lucie or Caloosahatchee estuaries in a timely manner.”

Goal: to get some objective information that should help determine the proper prioritization of projects based on the new Legacy Florida mandate.



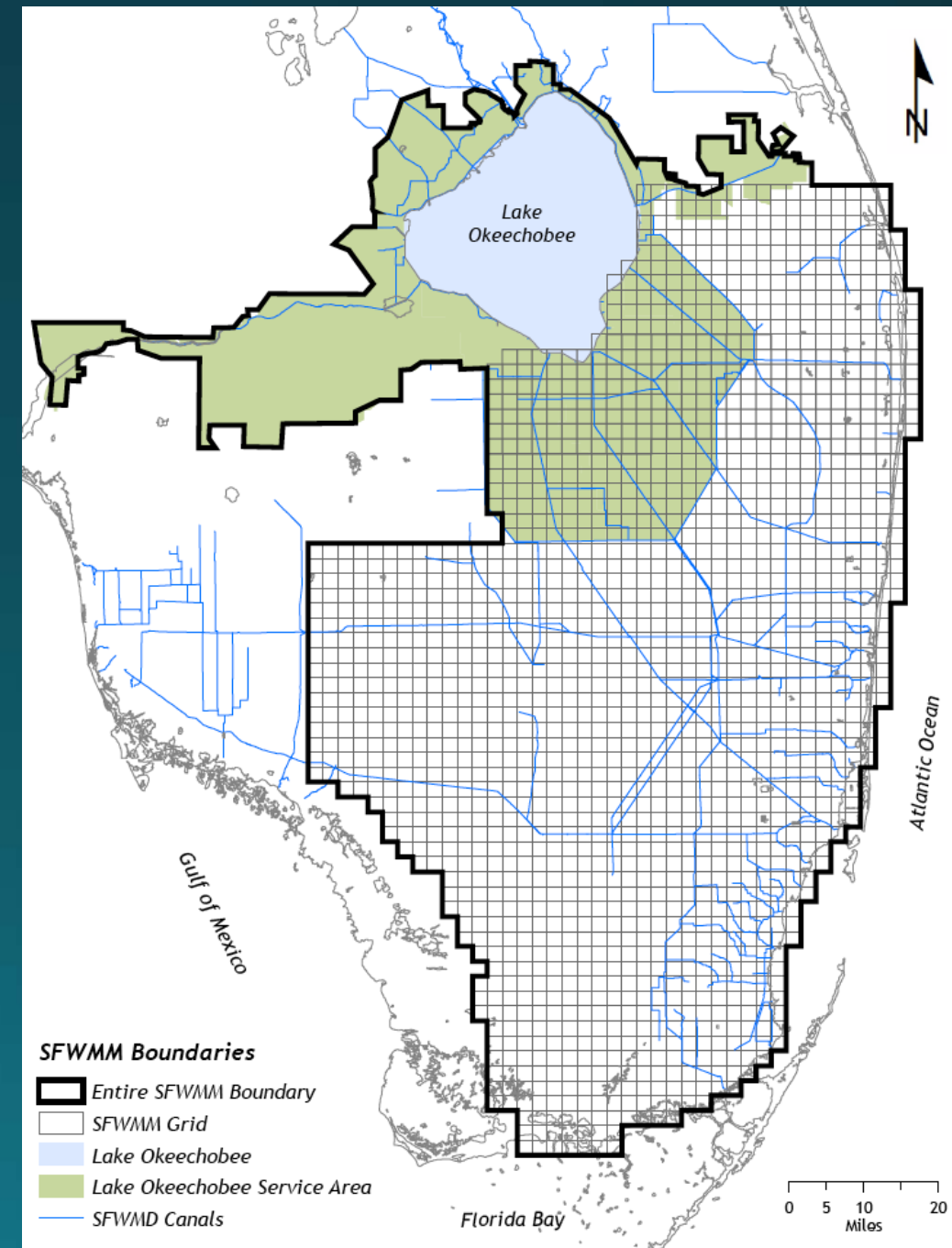
Northern Everglades and EAA Storage

- North Storage Reservoir
 - 200,000 acre-ft storage
 - CERP Component A
- Everglades Agricultural Area Storage Reservoir
 - 360,000 acre-ft
 - CERP Component G
- Storage capacity is based on the official CERP project description



Hydrologic Modeling

- The South Florida Water Management Model (SFWMM) is a physically-based, integrated surface water-groundwater model
- 2 mile x 2 mile grid size (known as “2x2 Model”)
- Climatic data from 1965 to 2000
- Simulates major components of hydrologic cycles in South Florida as well as operational criteria
- 2x2 Model was used to develop CERP

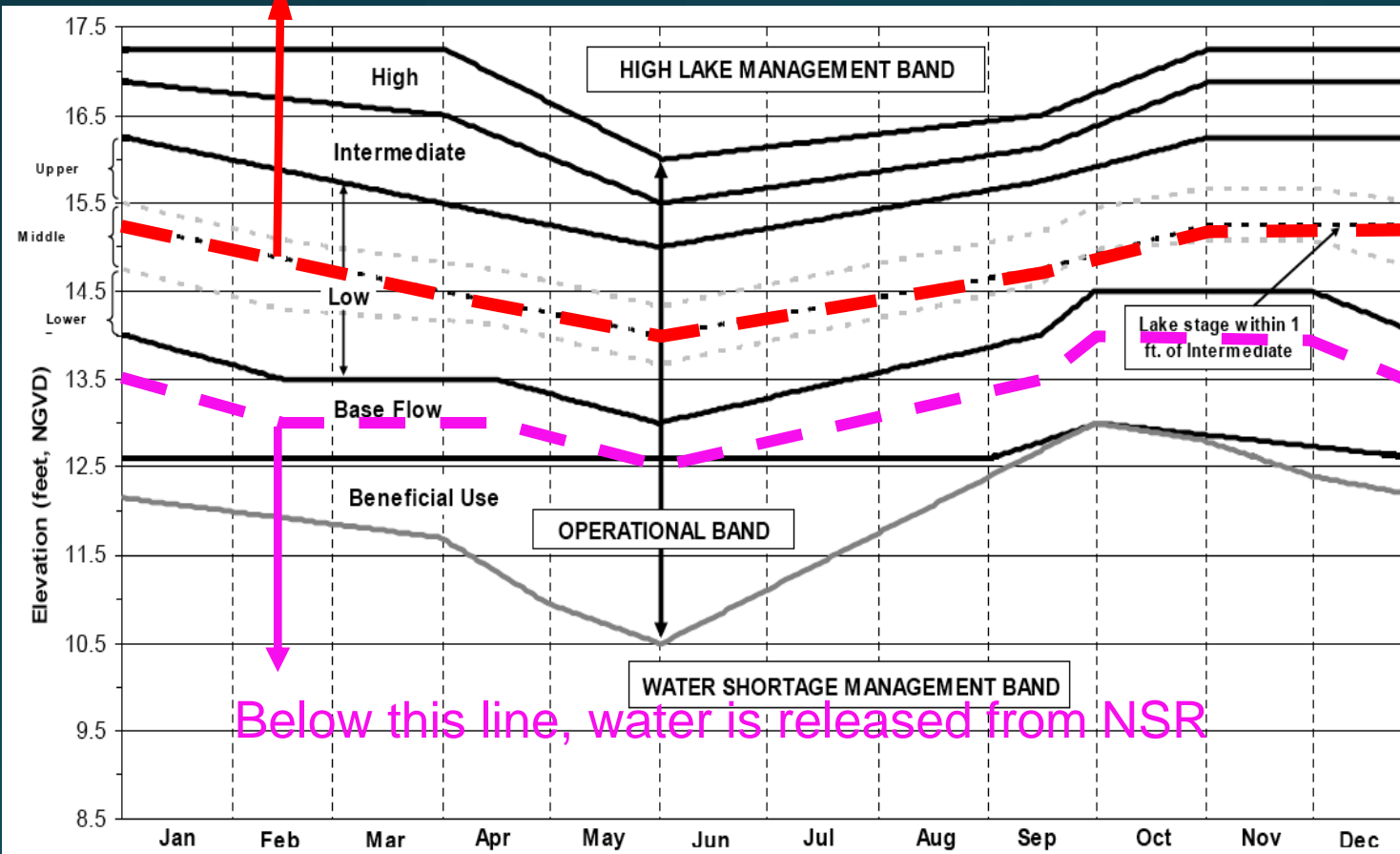


Scenarios Description

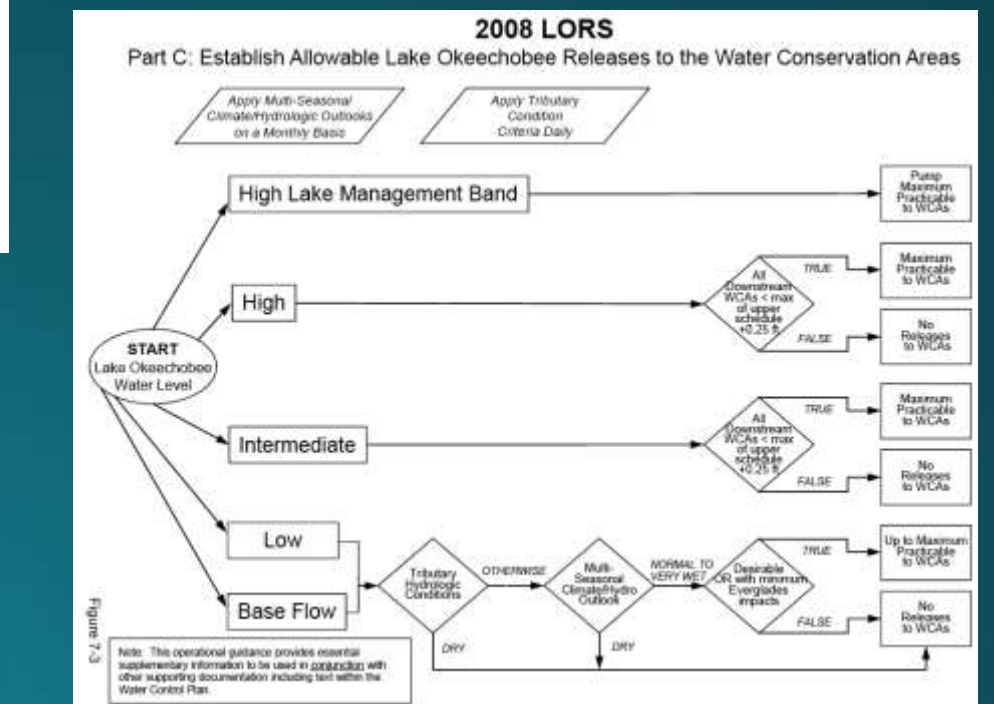
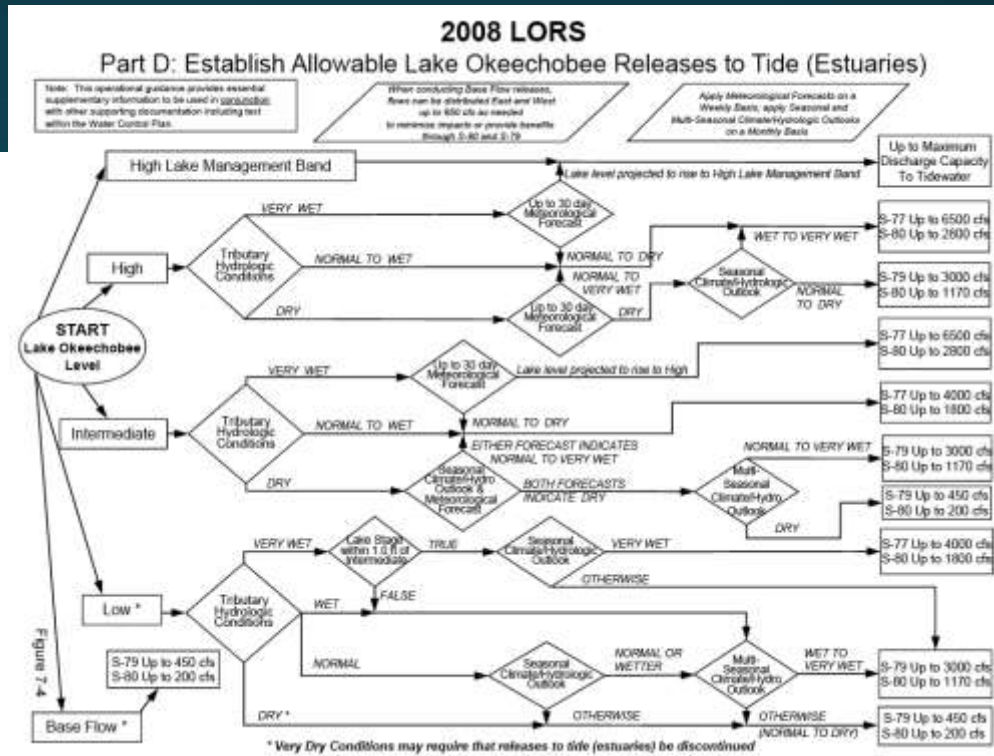
1. Existing Condition Base (ECB): current C&SF infrastructure and operating rules
2. Northern Reservoir (NSR): exactly the same as the Existing Condition Base, but with the addition of the North of Lake Okeechobee Storage Reservoir
3. EAA Reservoir Shallow (SSR_Shallow): exactly the same as the Existing Condition Base, but with the addition of the EAA Reservoir (CERP Component G)
4. EAA Reservoir Deep (SSR_Deep): same as the “SSR_Shallow” but with deep EAA Reservoir (30,000-acre footprint and 12 ft maximum depth)

Lake Okeechobee Operational Triggers

Above this line, water is diverted to NSR

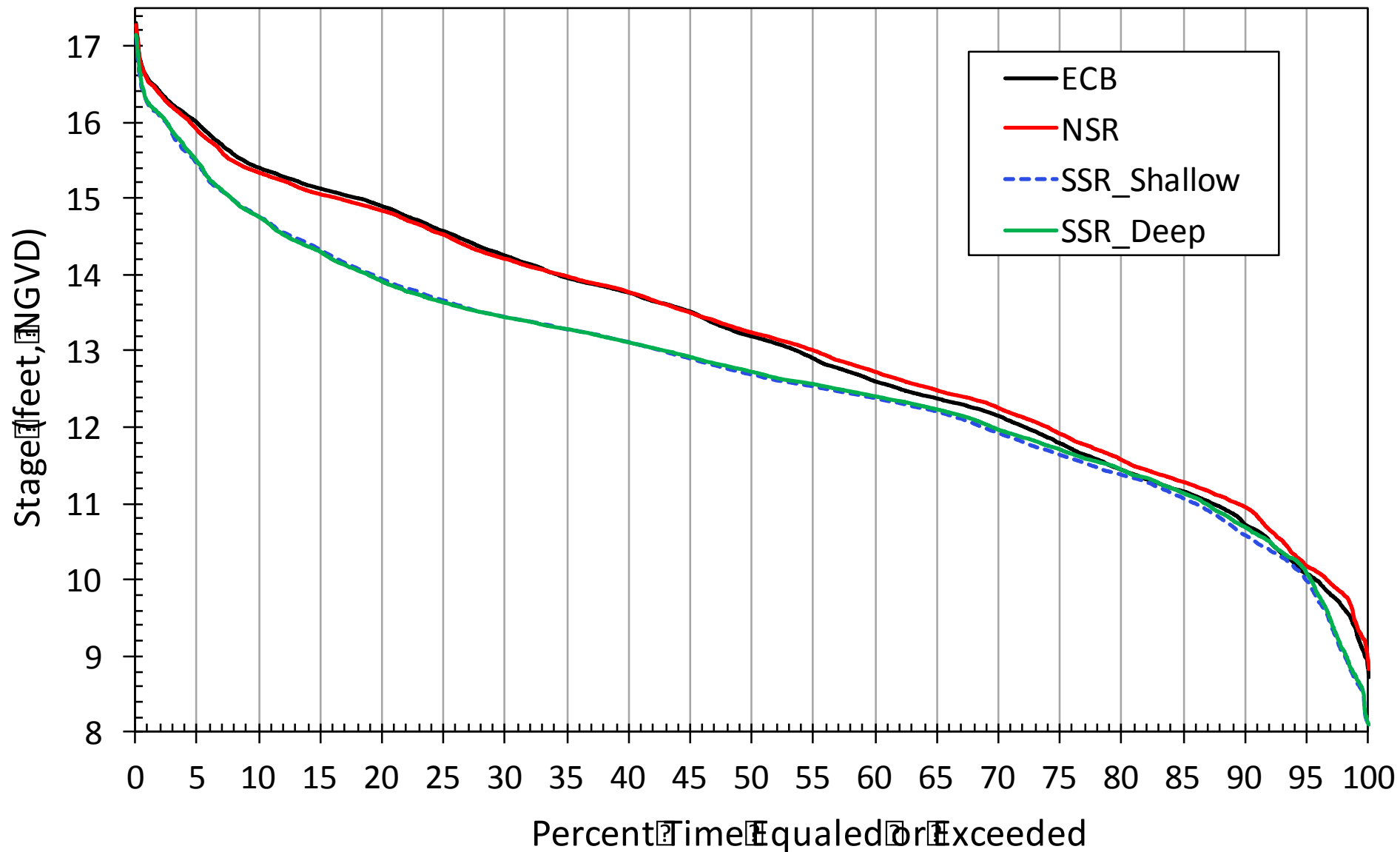


Below this line, water is released from NSR



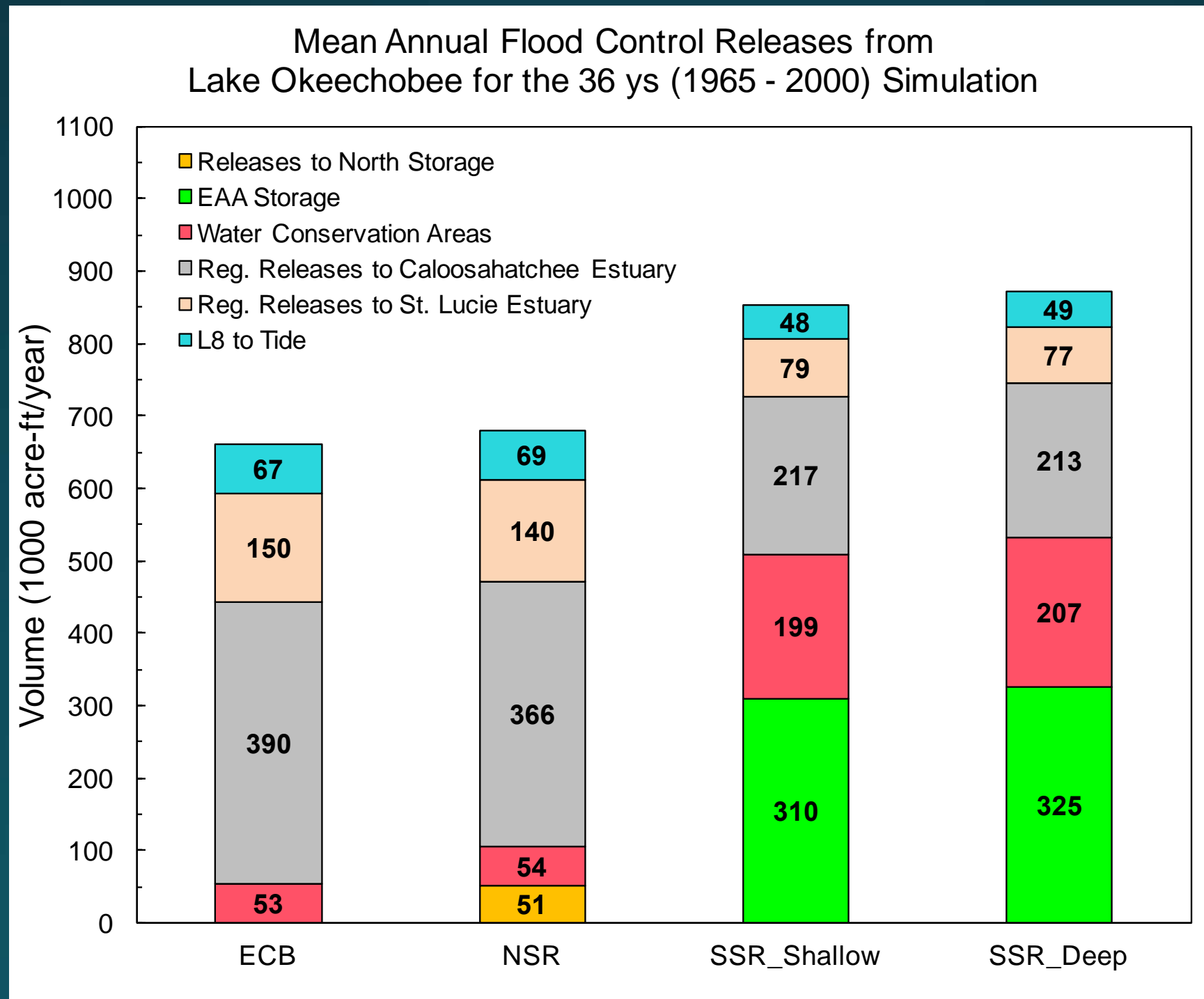
Results: Lake Okeechobee Performance

Stage Duration Curves for Lake Okeechobee



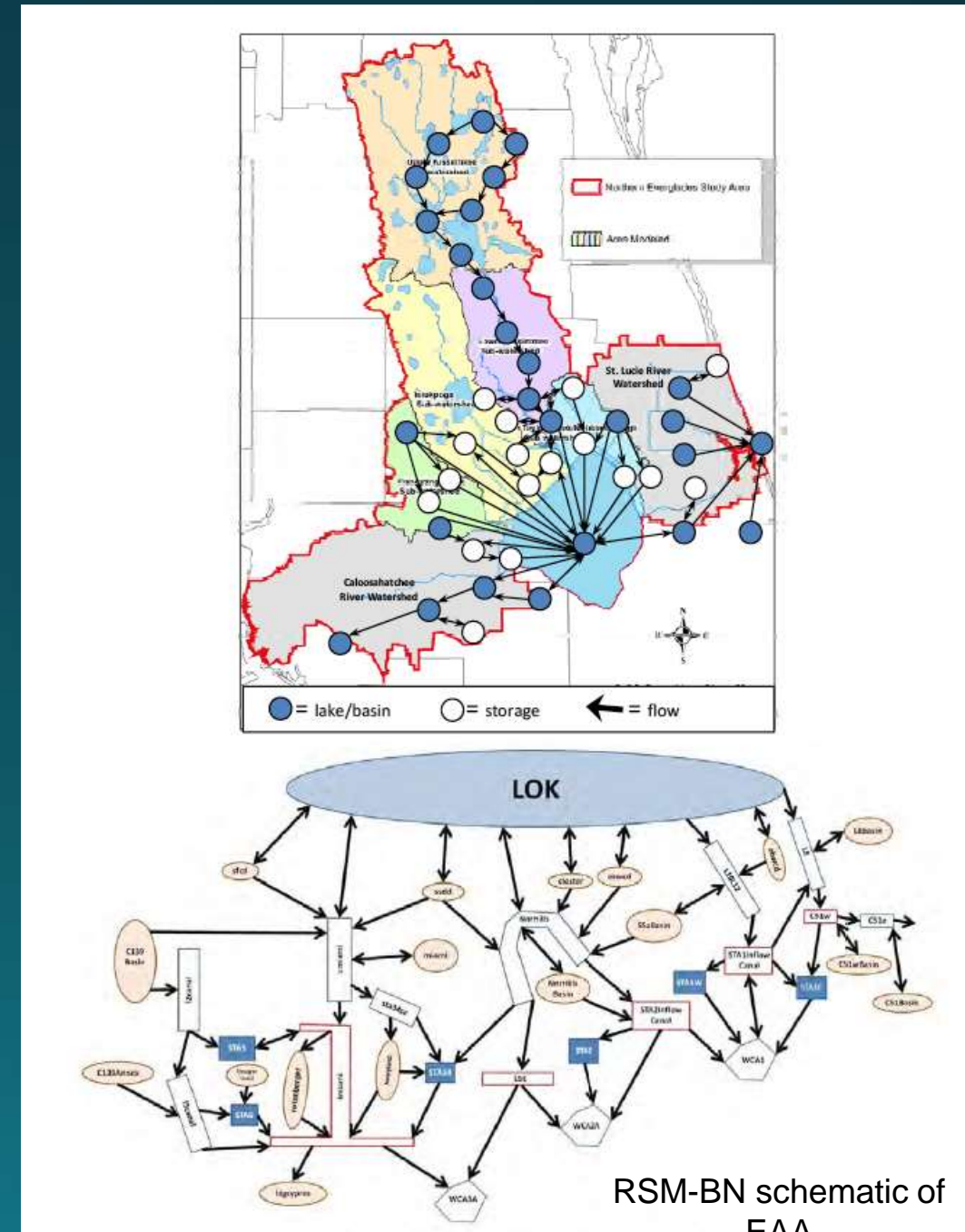
	ECB	NSR	SSR_Shallow	SSR_Deep
Number of days > 15.5 ft	1133	1023	626	634
% reduction	-	9.7%	44.7%	44.0%

Results: Lake Okeechobee Outflows



Regional Simulation Model for Basins (RSM-BN)

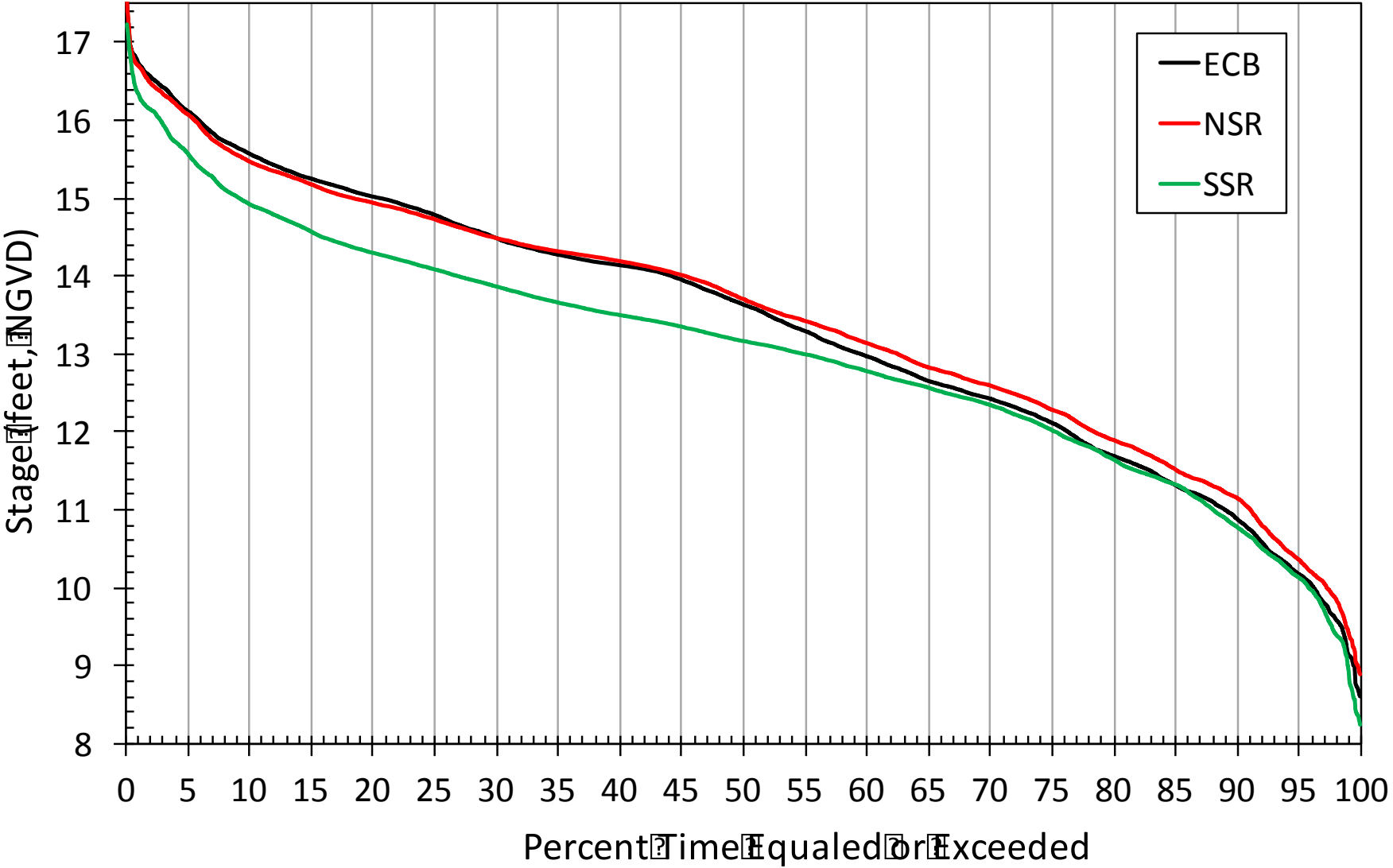
- Link-node application of Regional Simulation Model
- Model covers northern basins, Caloosahatchee and St. Lucie river watersheds, EAA and STAs
- Climatic data from 1965 - 2005
- Used in the Central Everglades Project



<http://www.saj.usace.army.mil/Missions/Environmental/Ecosystem-Restoration/Central-Everglades-Planning-Project/>

Comparisons with RSM-BN Simulations

Stage Duration Curves for Lake Okeechobee



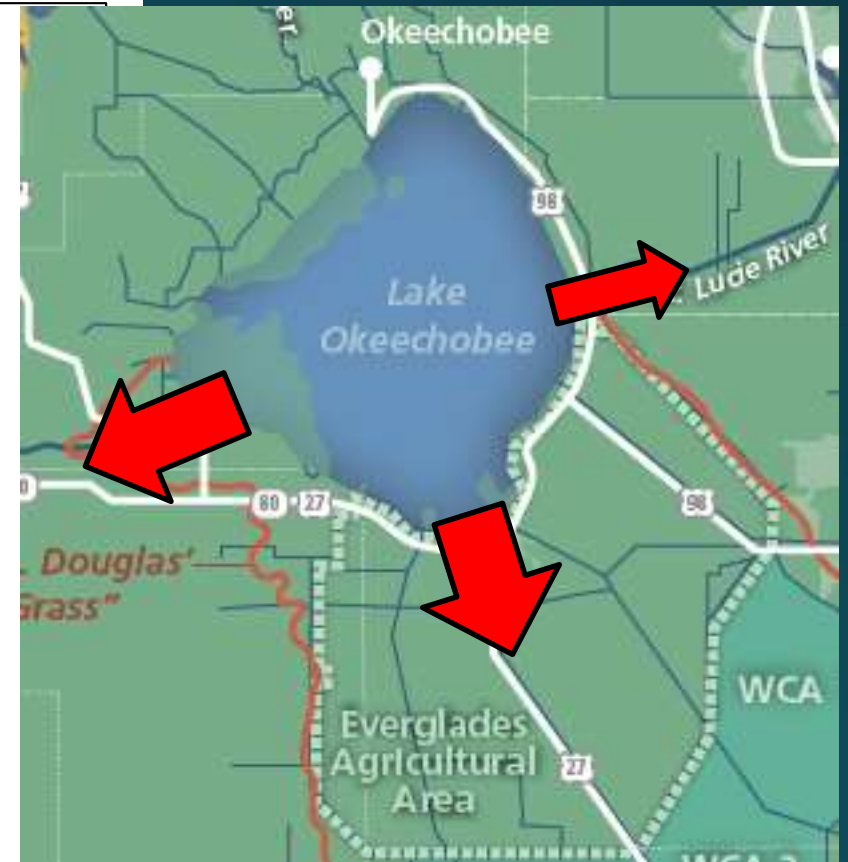
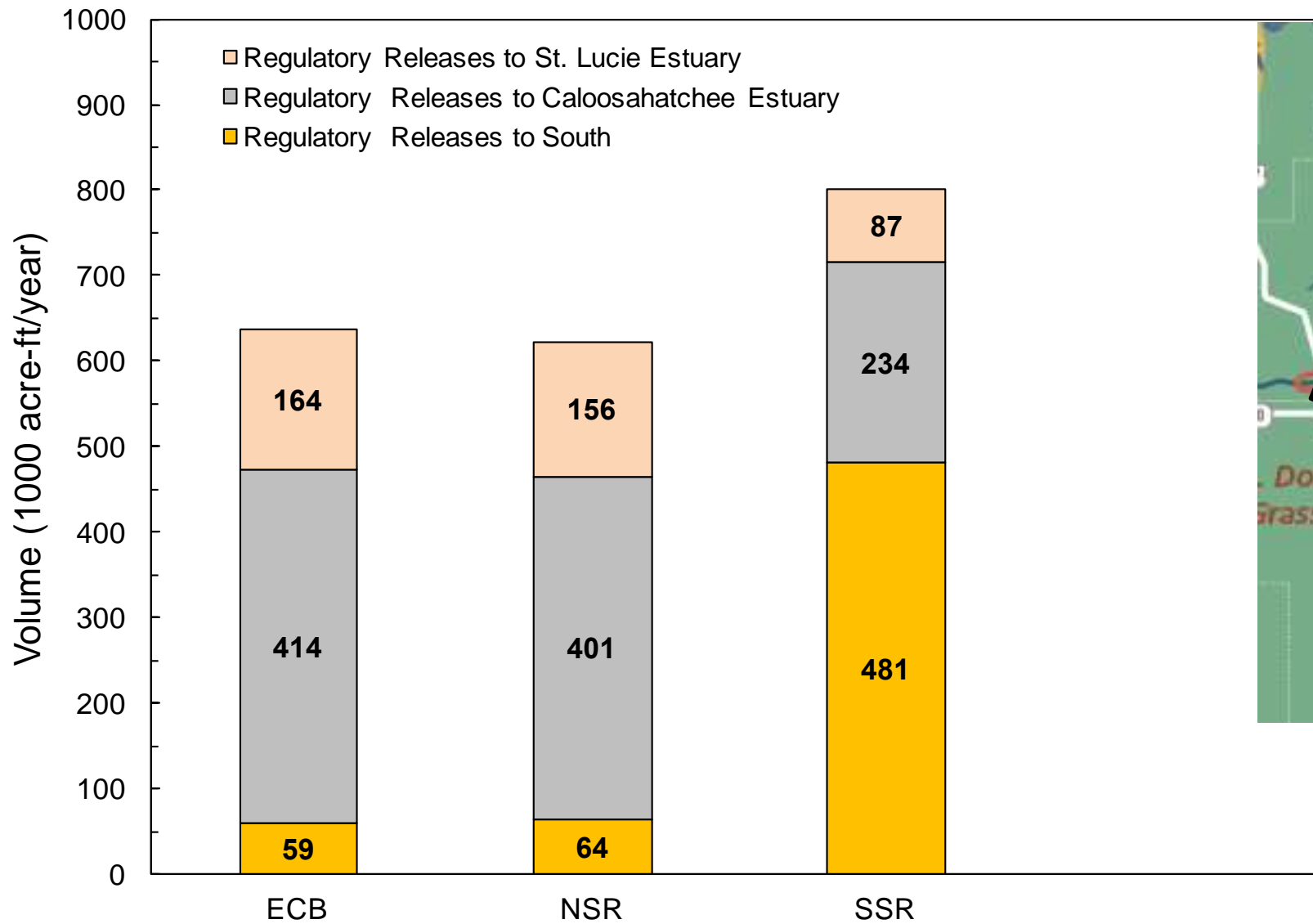
Model output
for RSM =
1965-2005

	ECB	NSR	SSR_Deep
Number of days > 15.5 ft	1628	1428	798
% reduction	-	12.3%	51.0%

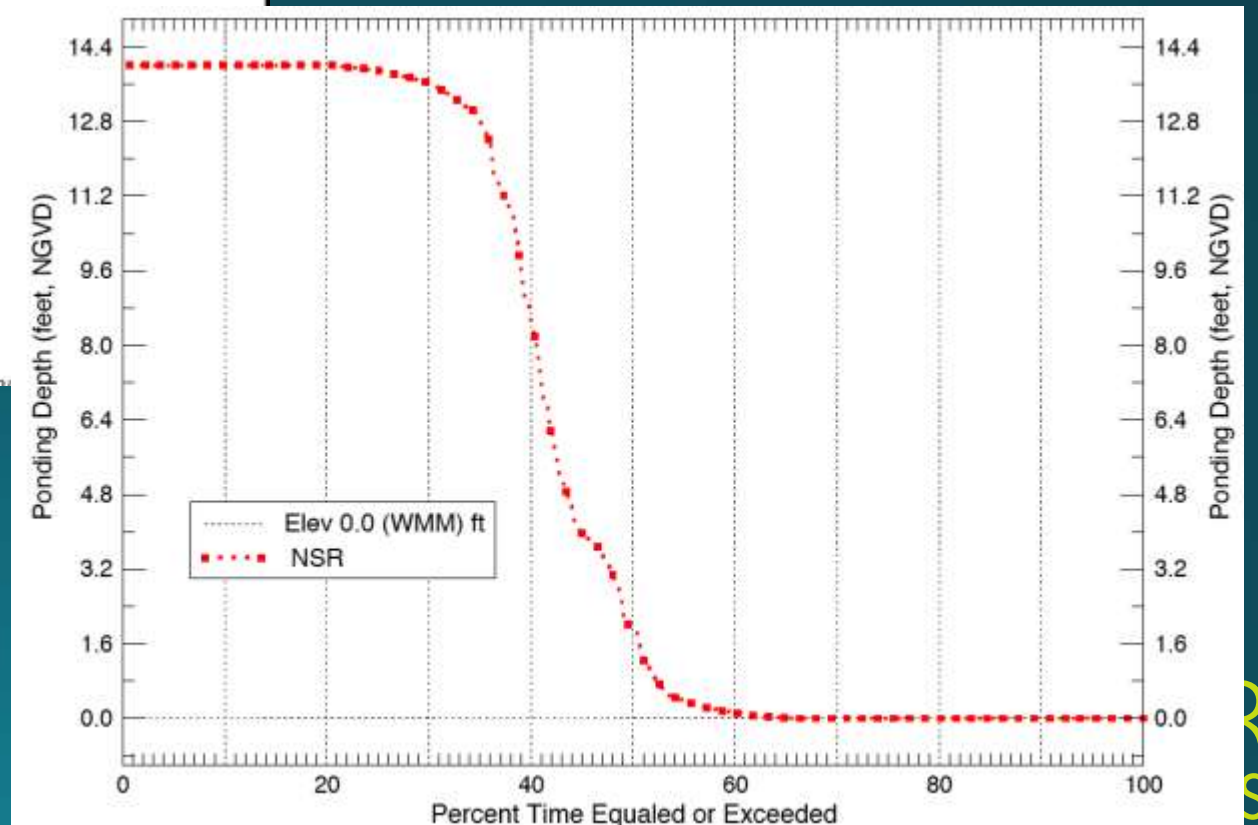
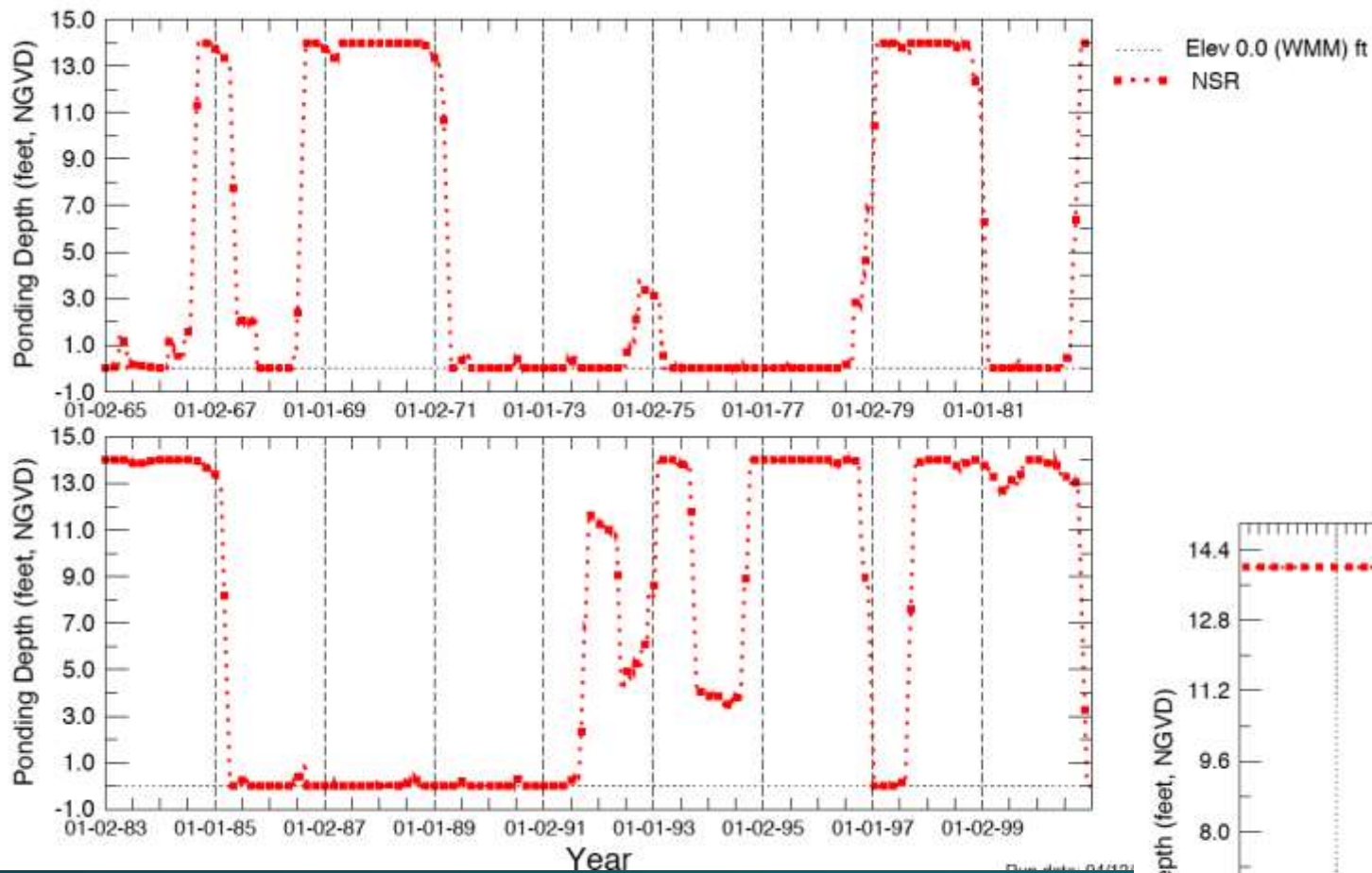


Comparisons with RSM-BN Simulations

Mean Annual Regulatory Releases from Lake Okeechobee for the 41 ys (1965 - 2005) Simulation

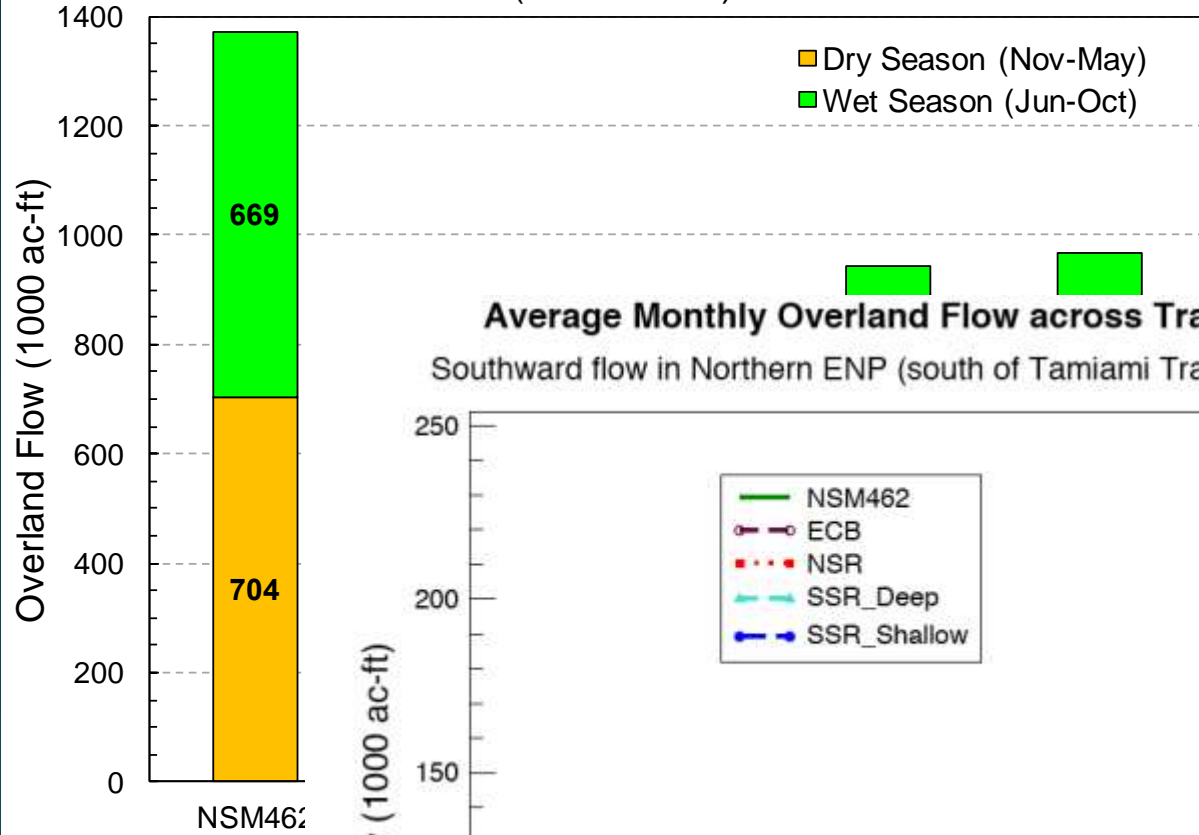


Why EAA Reservoir Outperforms Northern Reservoir?

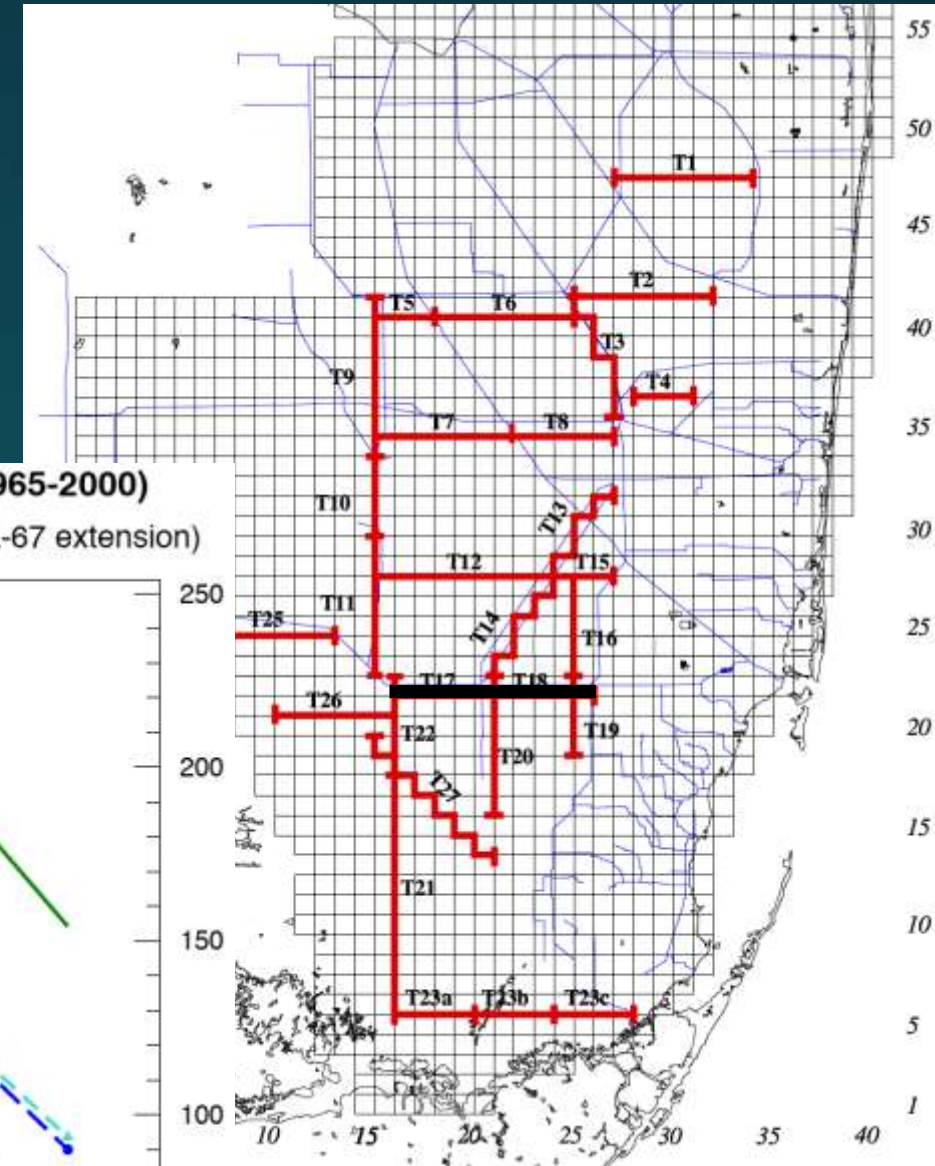
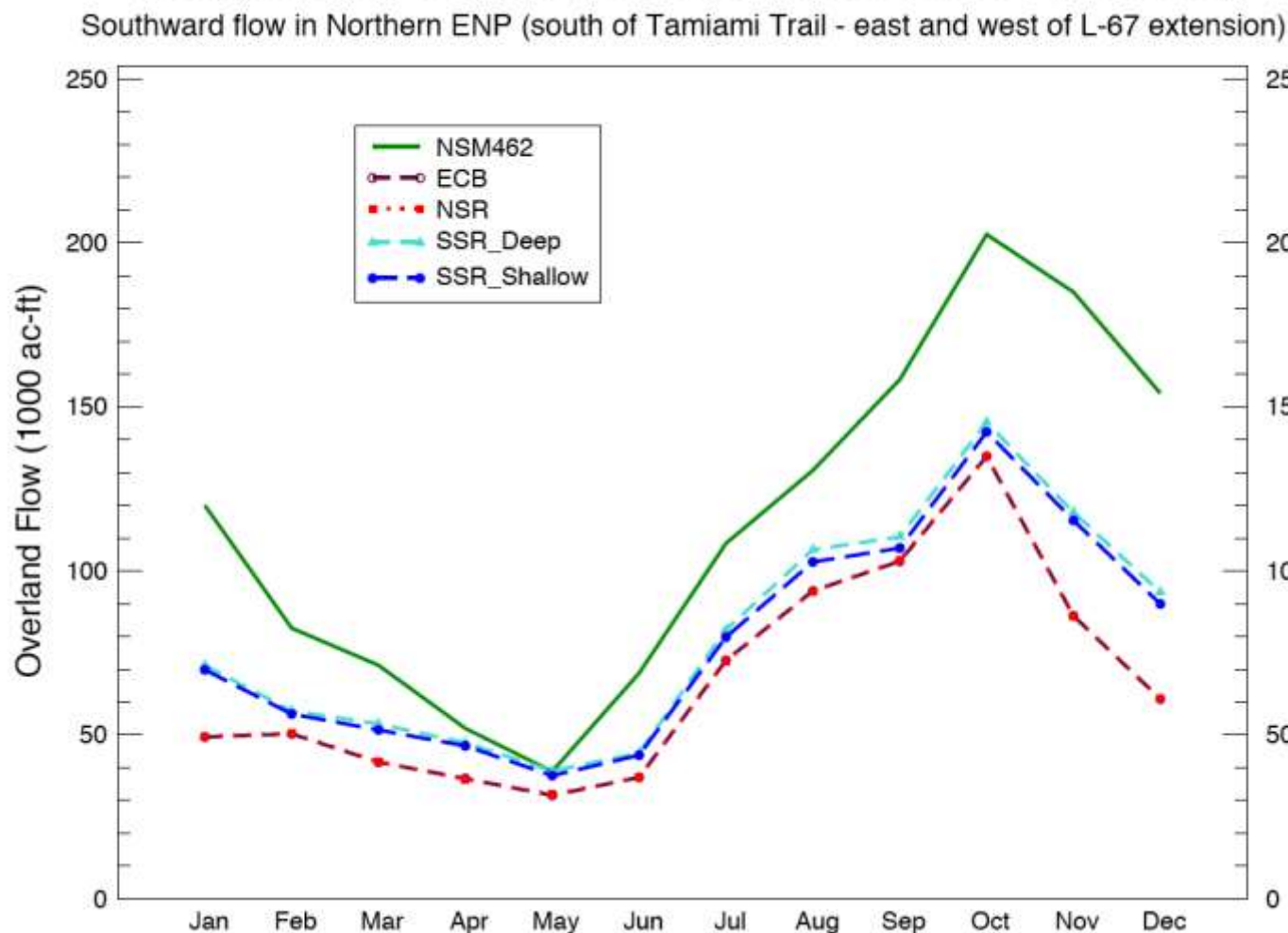


Southward Flow across Tamiami Trail

Average Annual Overland Flow across Transects 17 & 18 (1965 - 2000)

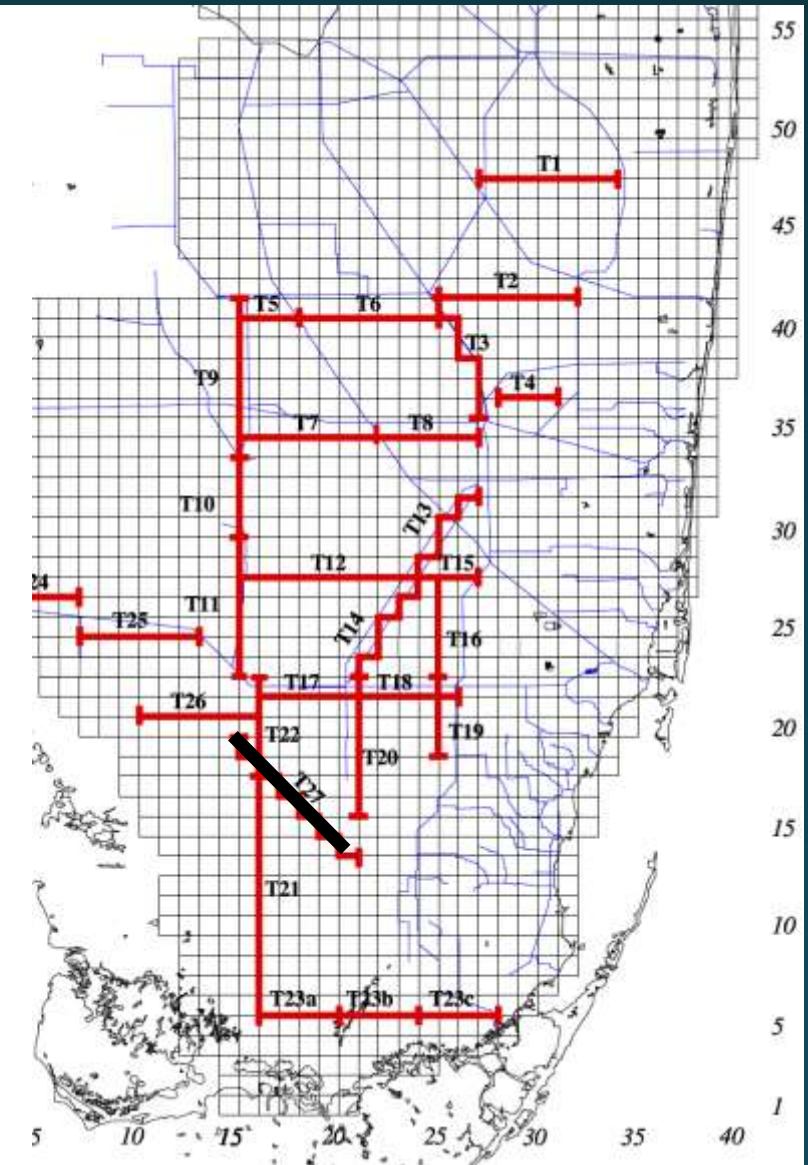
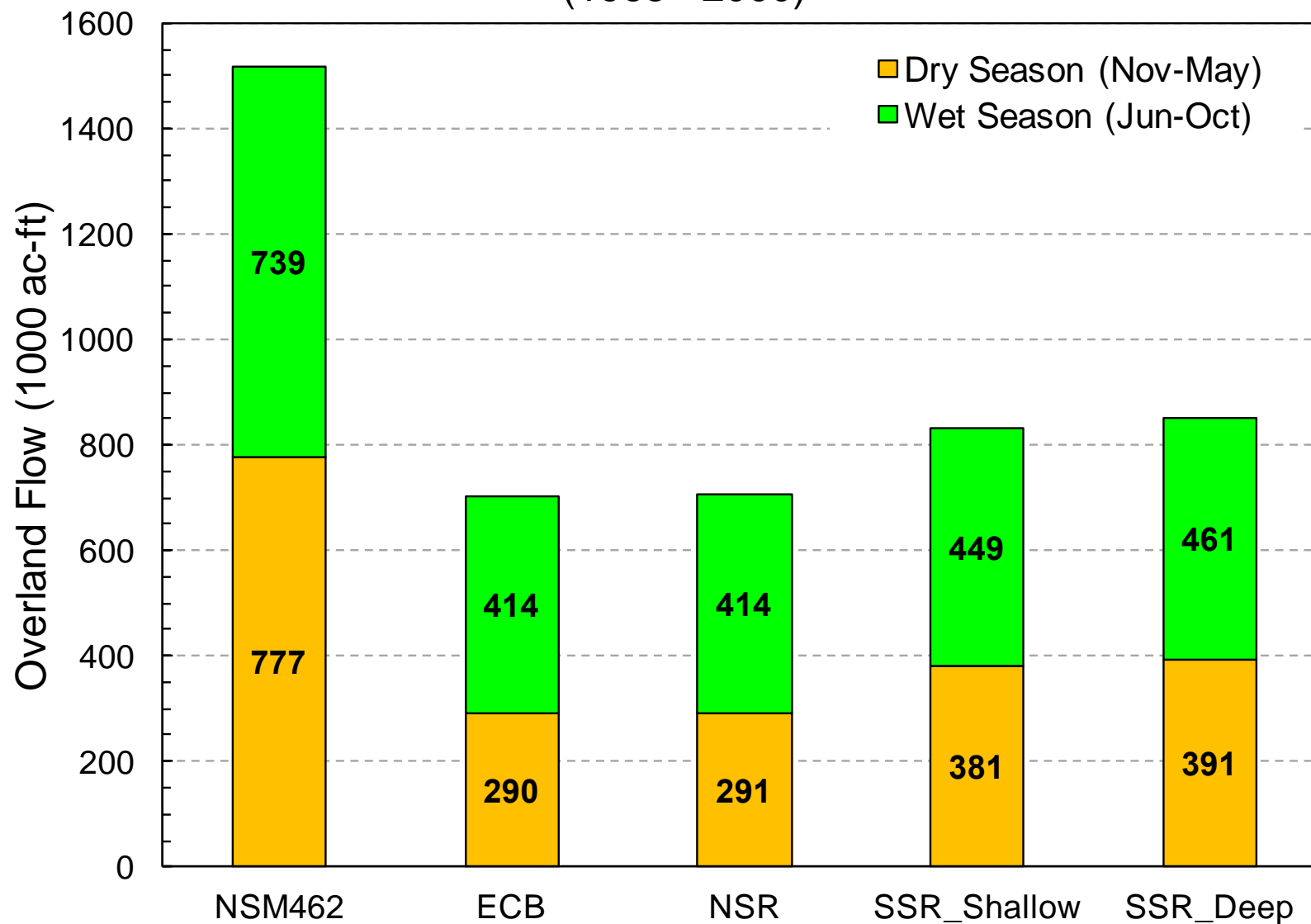


Average Monthly Overland Flow across Transects 17 & 18 (1965-2000)



Southwestward flow in Central Shark River Slough

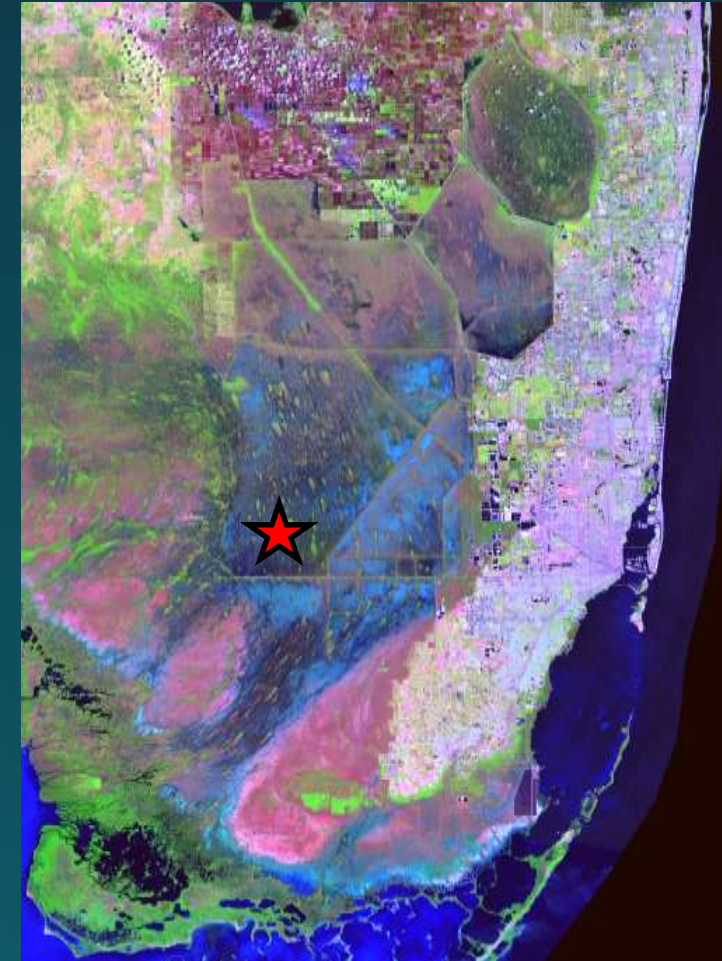
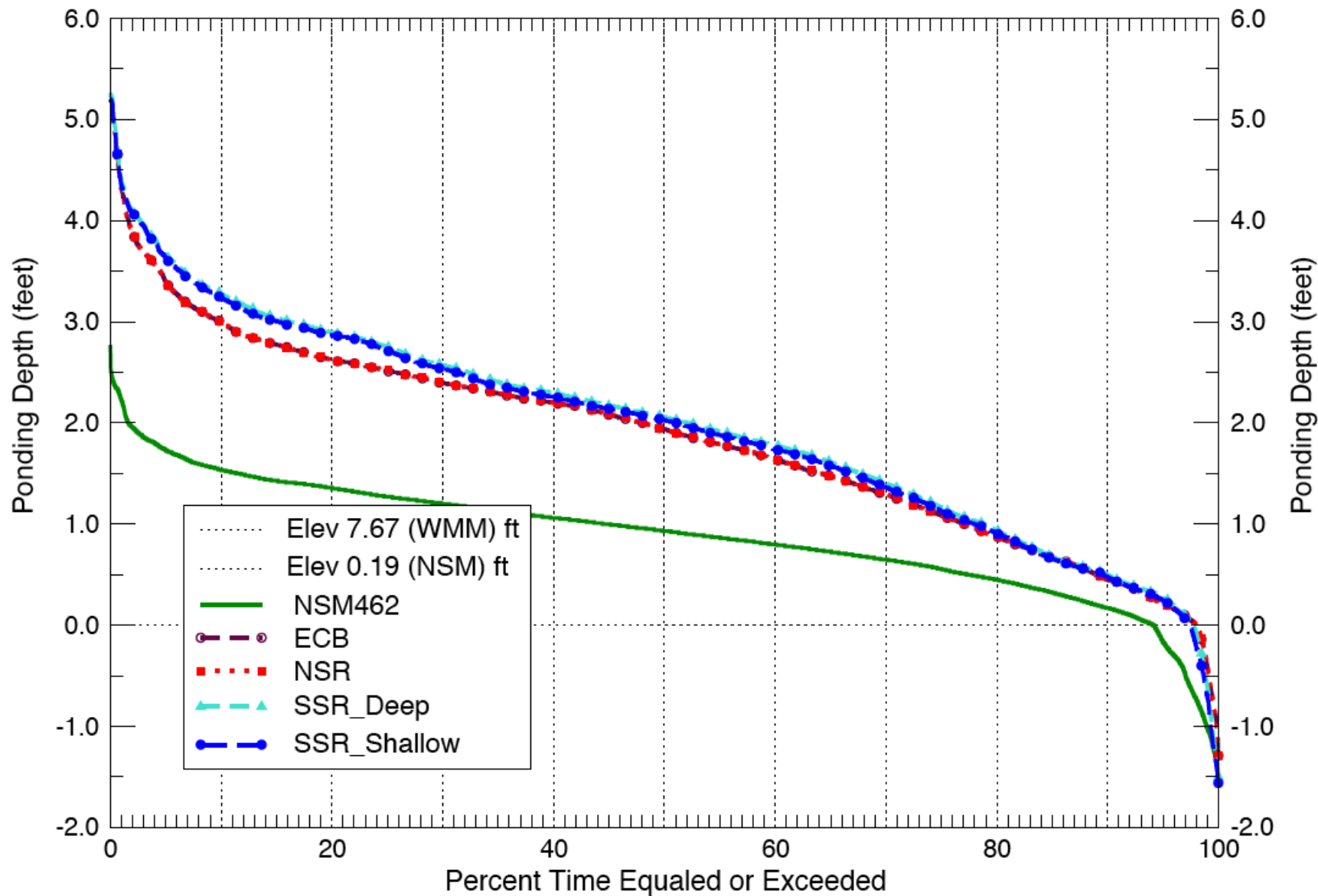
Average Annual Overland Flow across Transects 27
(1965 - 2000)



Depth Duration Curves

Normalized Duration Curves for South End of WCA-3A

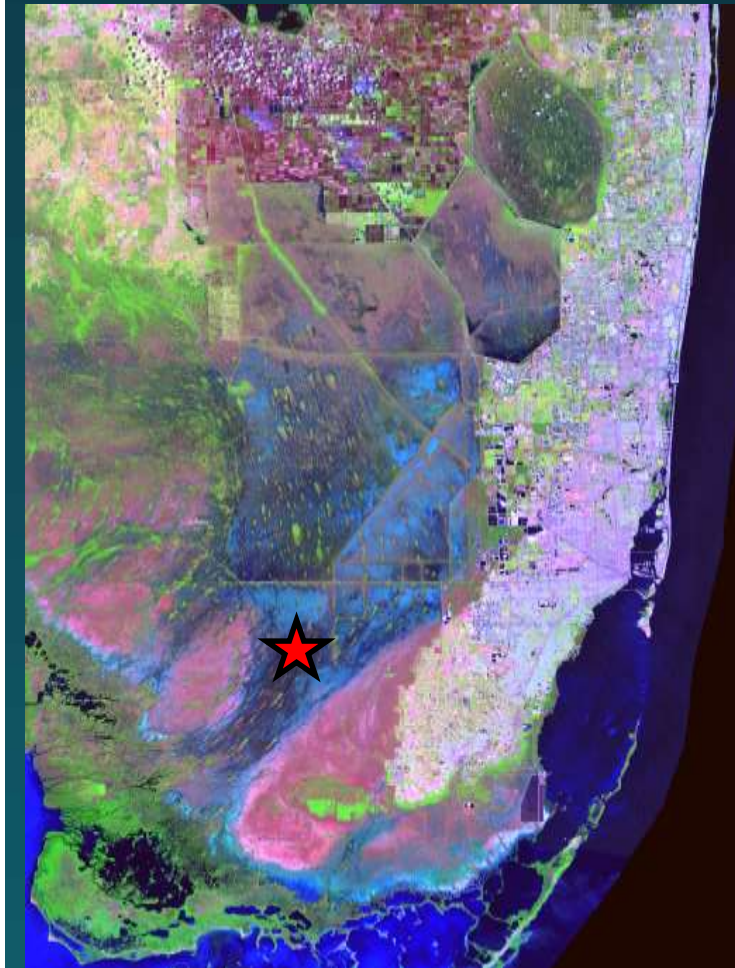
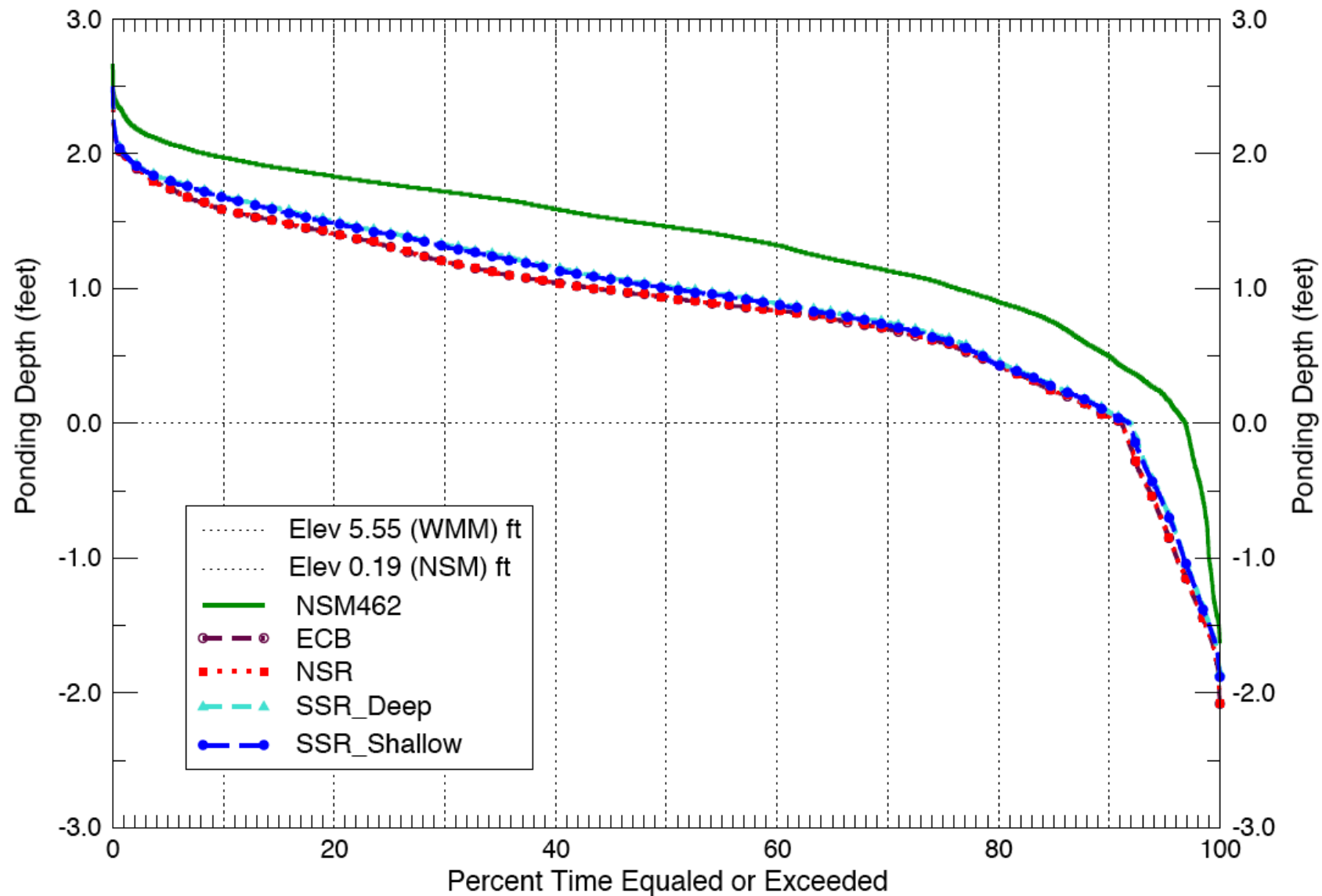
(Gage 3A-28, Cell Row 24 Col 19)



Depth Duration Curves (Contd ...)

Normalized Duration Curves for Everglades National Park

(Gage NP-33, Cell Row 17 Col 20)



Summary

- EAA reservoir reduced the harmful discharges from lake Okeechobee to the estuaries nearly by 50% while the Northern Reservoir reduced the volume of harmful discharges by 6%.
- Northern Reservoir provided more water supply benefits to the lake.
- EAA reservoir increased dry season flows in Central Shark River Slough by 35% compared to no changes in flows with Northern Reservoir.
- Deep reservoir in EAA provided additional dry season flows (13,000 ac-ft/year) across Tamiami Trail compared to the shallow reservoir with the same storage capacity.

Thank You!

Contact: Rajendra Paudel
Hydrologist, Everglades Foundation
Email:

rpaudel@evergladesfoundation.org

