Johns Lake

Draft Minimum Levels

Peer Review Kickoff

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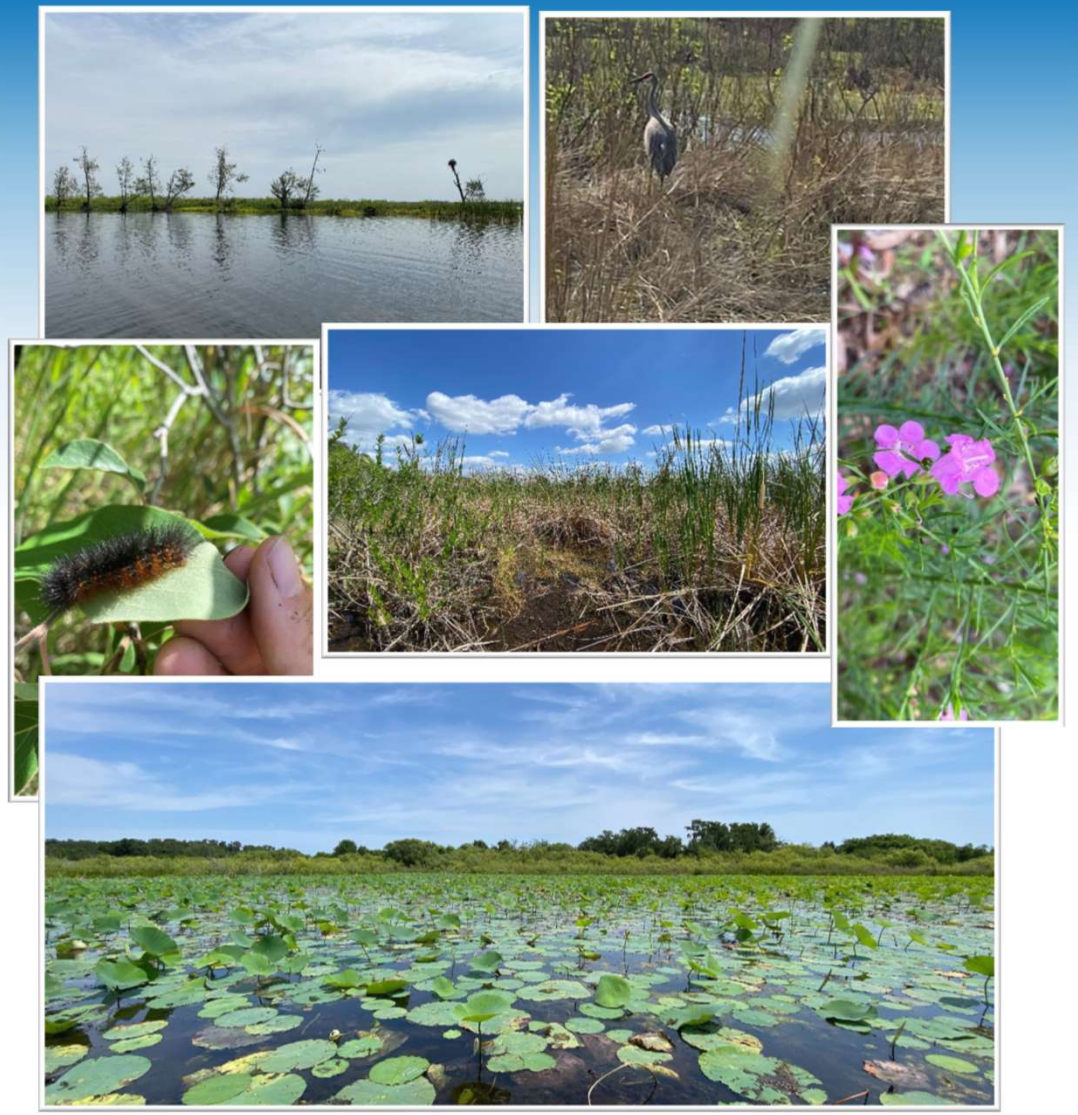
4/24/2025

St. Johns River
Water Management District

Agenda

- Overview of Peer Review, Johns Lake Basin, and MFLs Process
- Hydrological Analyses
- MFLs Determination and Assessment
- WRVs Assessment
- Recommended Minimum Levels
- Stakeholder questions
- Next Steps – Tentative Schedule
- Site Tour



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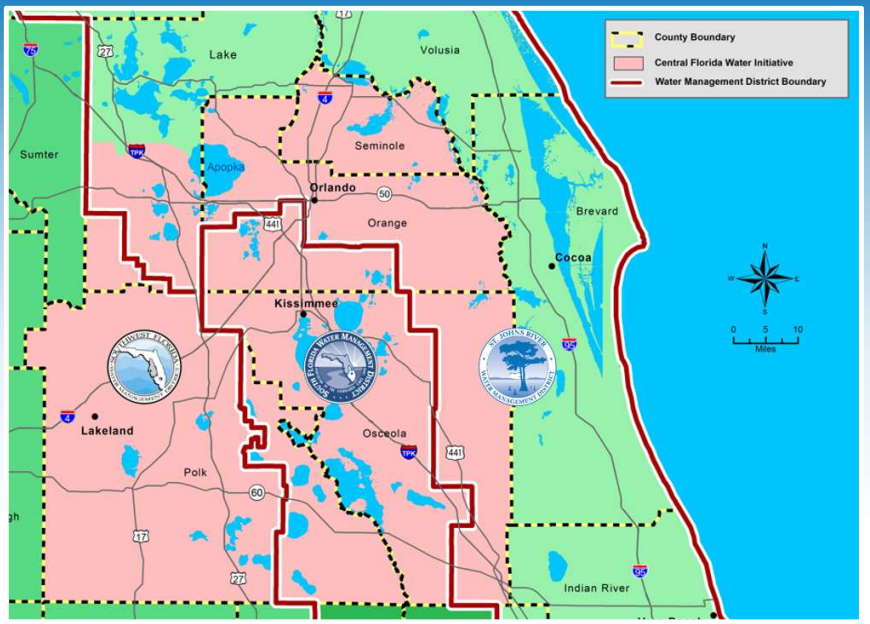
Peer Review Process

- Kick-off meeting – introduce MFLs and clarify scope
- Collaborative Central Florida Water Initiative (CFWI) process that involves all interested stakeholders
- Peer reviewers can consider stakeholder input as part of their final comments / recommendations
- ICPR4 model peer reviewed by ATM (Geosyntec Consultants, Inc.)
- MFL Peer Review by Geosyntec Consultants, Inc. and ESA



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ATM
A Geosyntec Company

Geosyntec consultants

ESA

Peer Review Process

Scope of Work

- Determine appropriateness of environmental criteria, hydrological analyses, and recommended minimum levels;
- Determine validity and appropriateness of methods and procedures used for data analyses, assumptions used and conclusions drawn regarding the recommended minimum levels;
- Determine adequacy of data used to support conclusions; and
- Identify and make recommendations regarding any deficiencies in development of the draft recommended minimum levels for Johns Lake.

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Johns Lake

- MFL Adoption for 2025:
  - Original MFL
- 1 mile south of Lake Apopka
- Orange County
- Lake County

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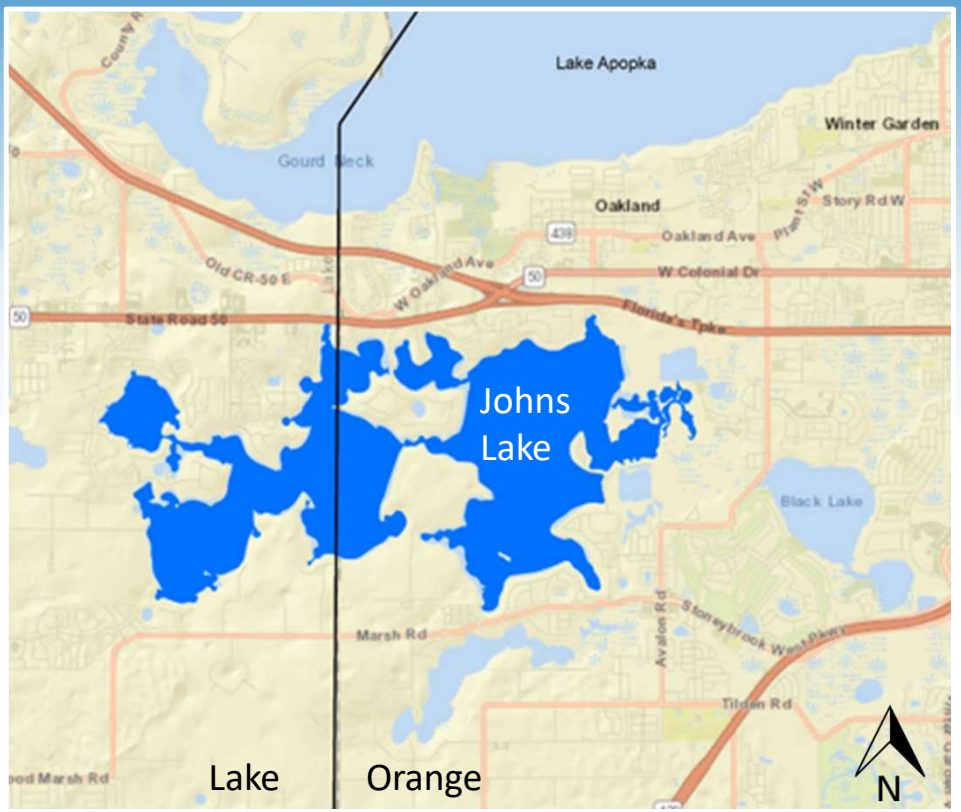
Johns Lake

- **MFL Adoption for 2025:**
  - Original MFL
- **1 mile south of Lake Apopka**
- **Orange County**
- **Lake County**



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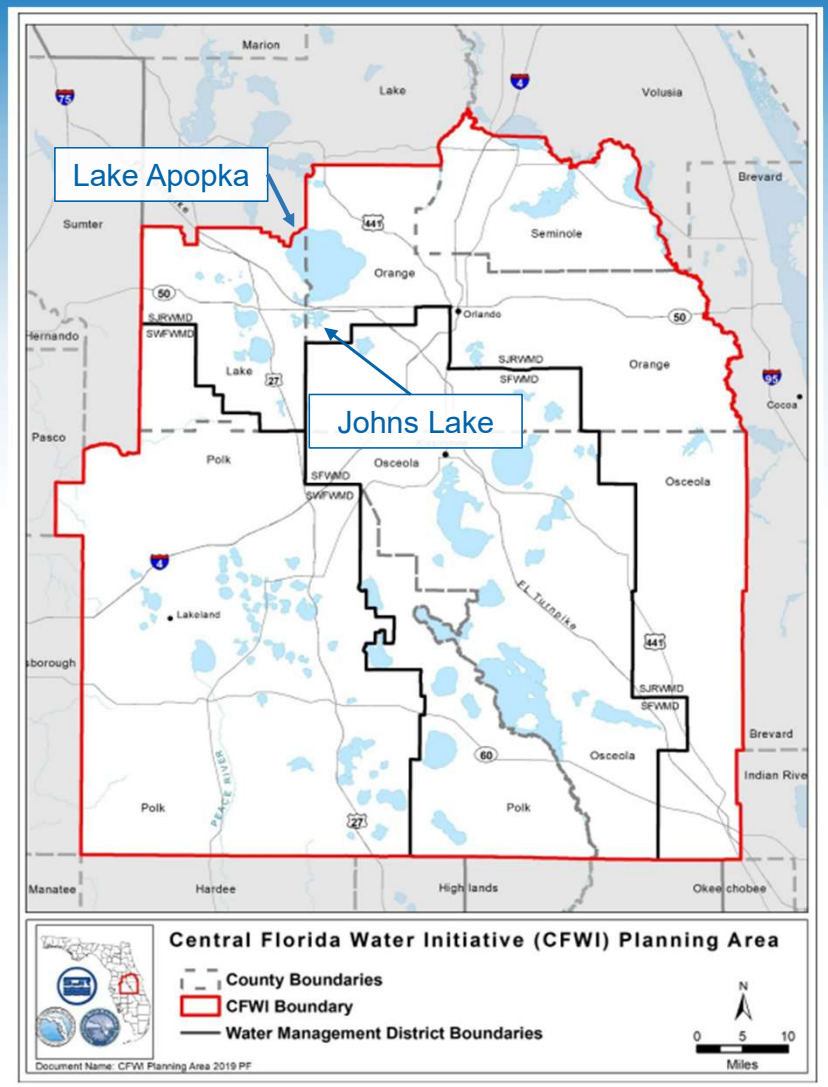
Johns Lake

- **Central Florida Water Initiative – CFWI**
  - Collaborative water supply planning effort among three water management districts, state agencies, utilities, environmental groups, and other stakeholders.



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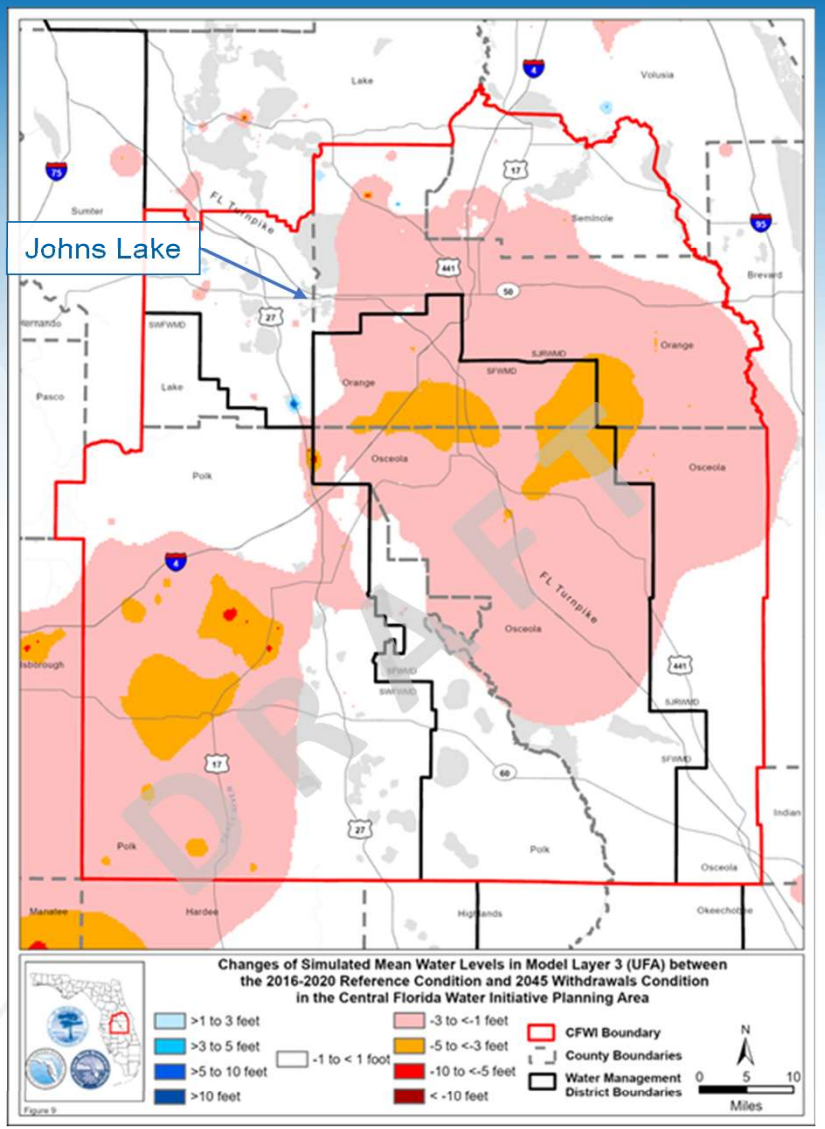
Johns Lake

- **CFWI**
  - **Projected UFA drawdown of 0.8 feet by 2045**



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Why do we set MFLs?

Statutory Directive

Water management districts must establish MFLs that set…

"…the <u>limit</u> at which further withdrawals would be significantly harmful to the water resources or the ecology of the area."

Section 373.042(1), Florida Statutes (F.S.)

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MFLs Process – Overview

MFLs Determination:

- Determine the most critical environmental features to protect and the minimum hydrologic regime required for their protection (MFLs condition)

MFLs Assessment:

- Determine the current impacted hydrologic regime (current-pumping condition)
- Compare the MFLs condition and current-pumping condition to assess if water is available (freeboard)

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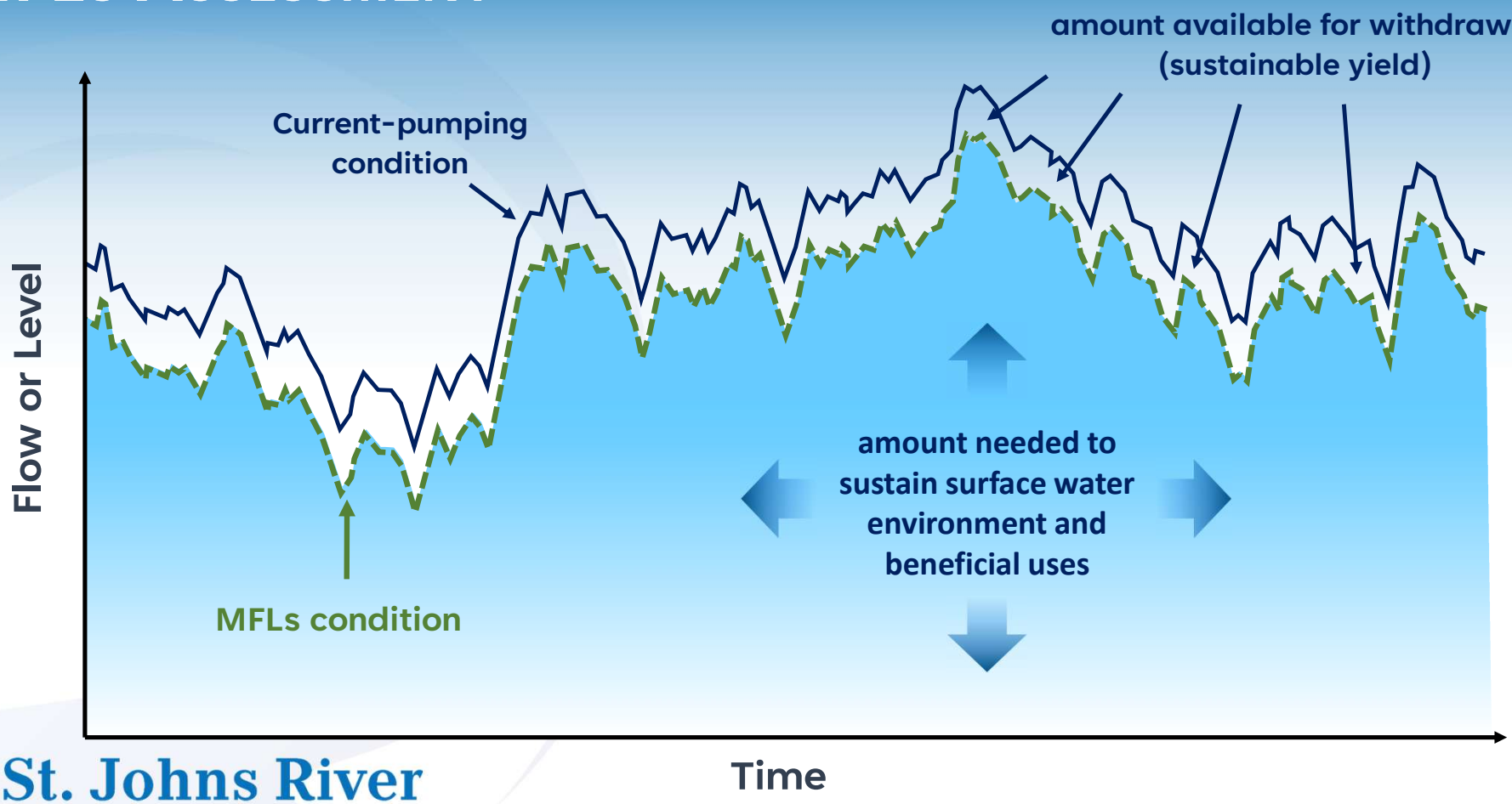
MFLs Assessment



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Johns Lake

Hydrological Analysis

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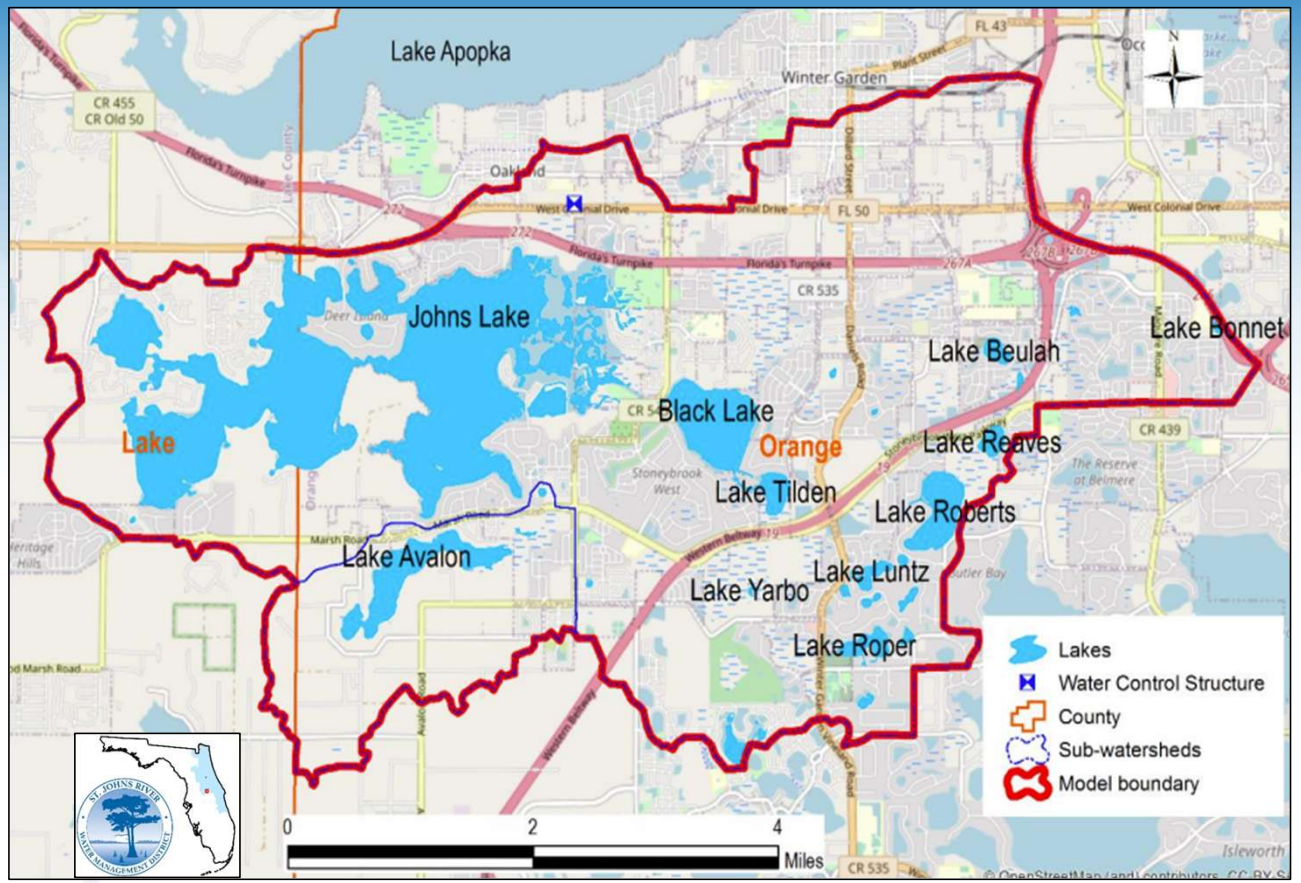
Johns Lake

- ICPR Version 4 (ICPR4) model (Interconnected Channel and Pond Routing)
  - Model Peer Review – Completed May 2022
  - Basin: 26.9 mi²



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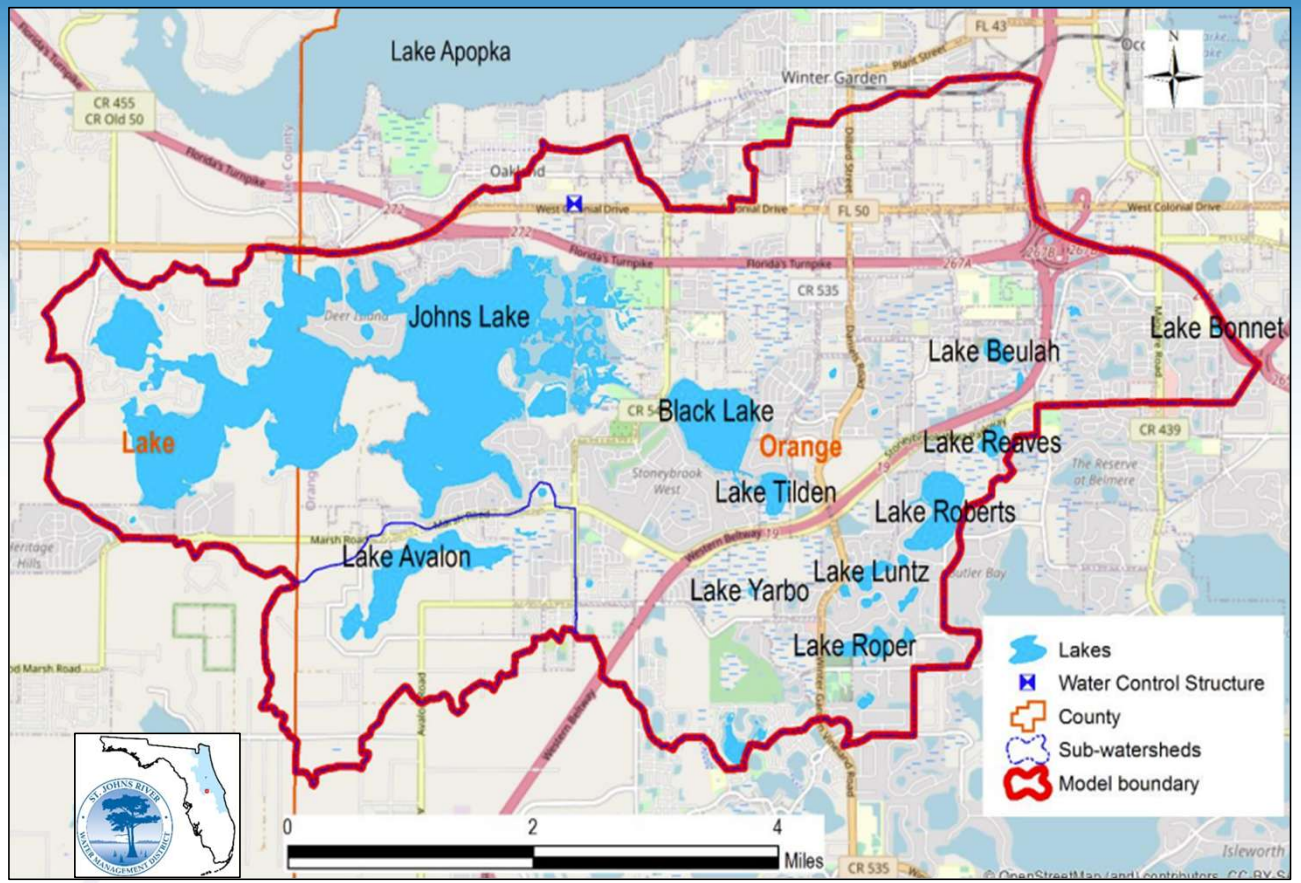
Johns Lake

- ICPR4 model
  - Model Peer Review – Completed May 2022
  - Basin: 26.9 mi^2
- Simulated long-term lake level dataset conditions (1948-2020):
  - Historical reconstruction
  - No-pumping condition
  - Current-pumping condition
    - 2016-2020 Impacts
  - Use these conditions to assess the MFLs developed from ecological data



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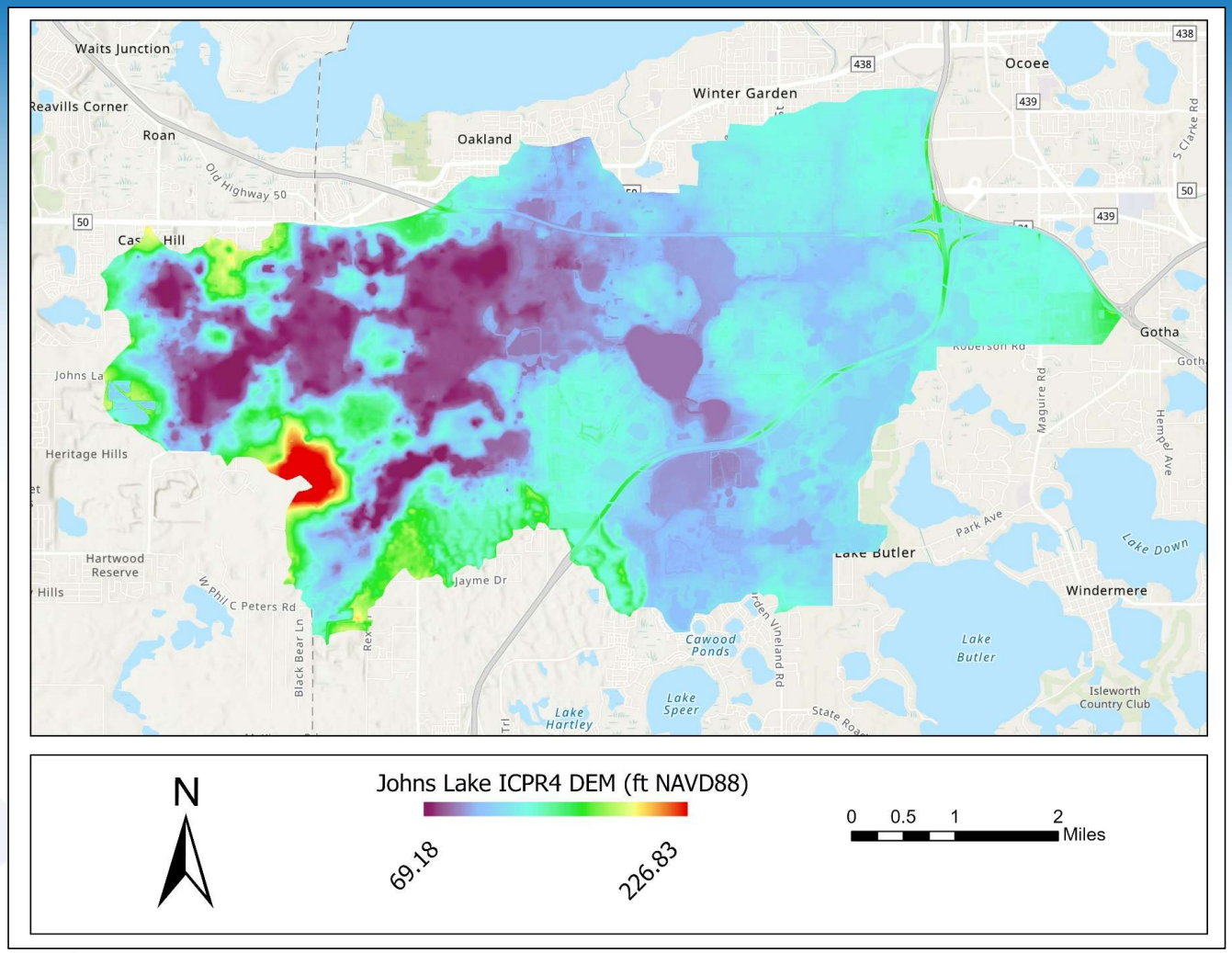
TOPOBATHYMETRIC DEM

- DEM constructed from survey data, depth soundings, and LiDAR data



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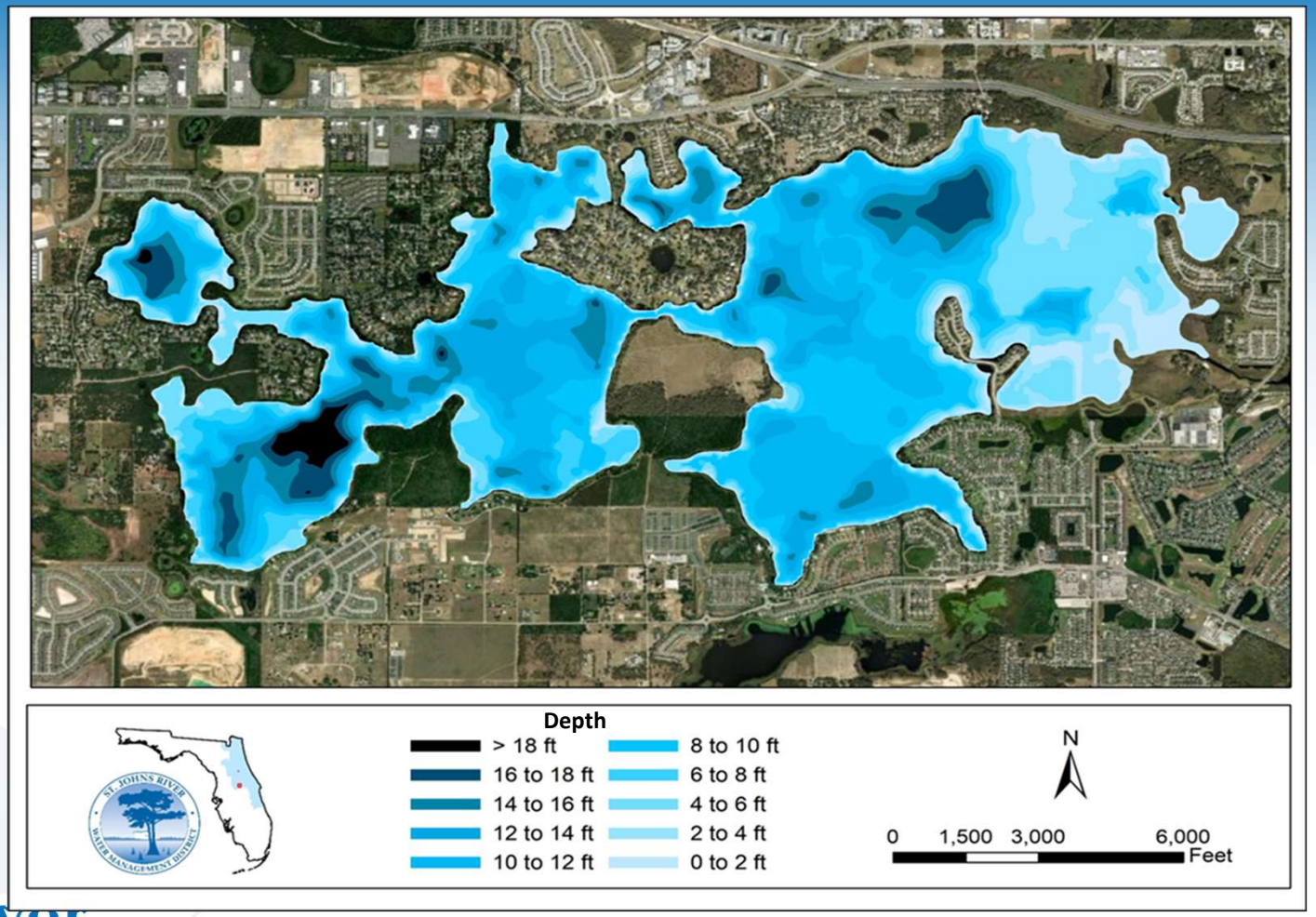
Topobathymetric DEM

- Water depths when the stage is 96.0 feet NAVD88 (90th percentile)



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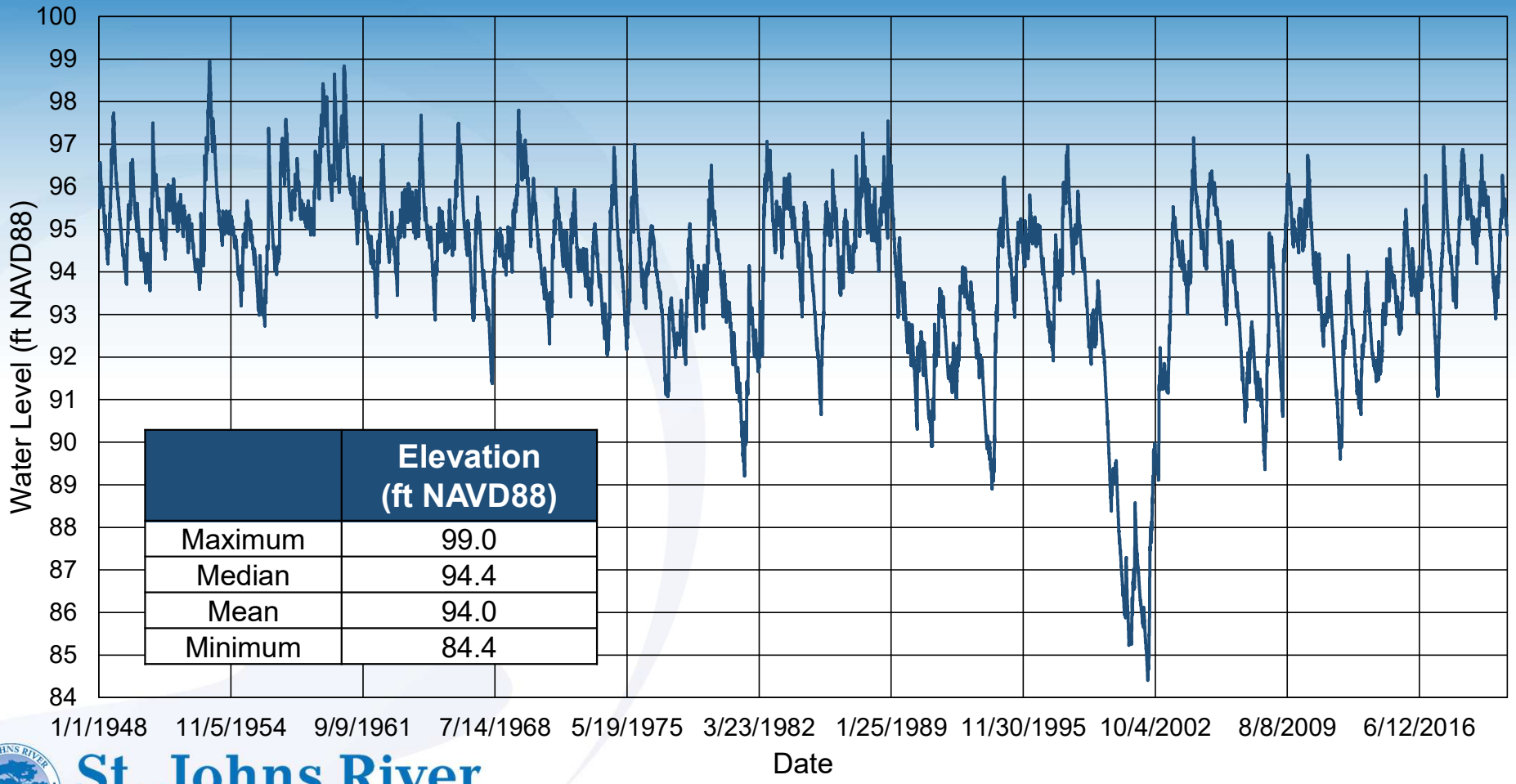
Johns Lake Simulated Historical Stage Record 1948-2020



	Elevation (ft NAVD88)
Maximum	99.0
Median	94.4
Mean	94.0
Minimum	84.4

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Johns Lake

MFLs Determination

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Field Data Collection

Transects

- 5 ecological transects

Vegetation and Soils

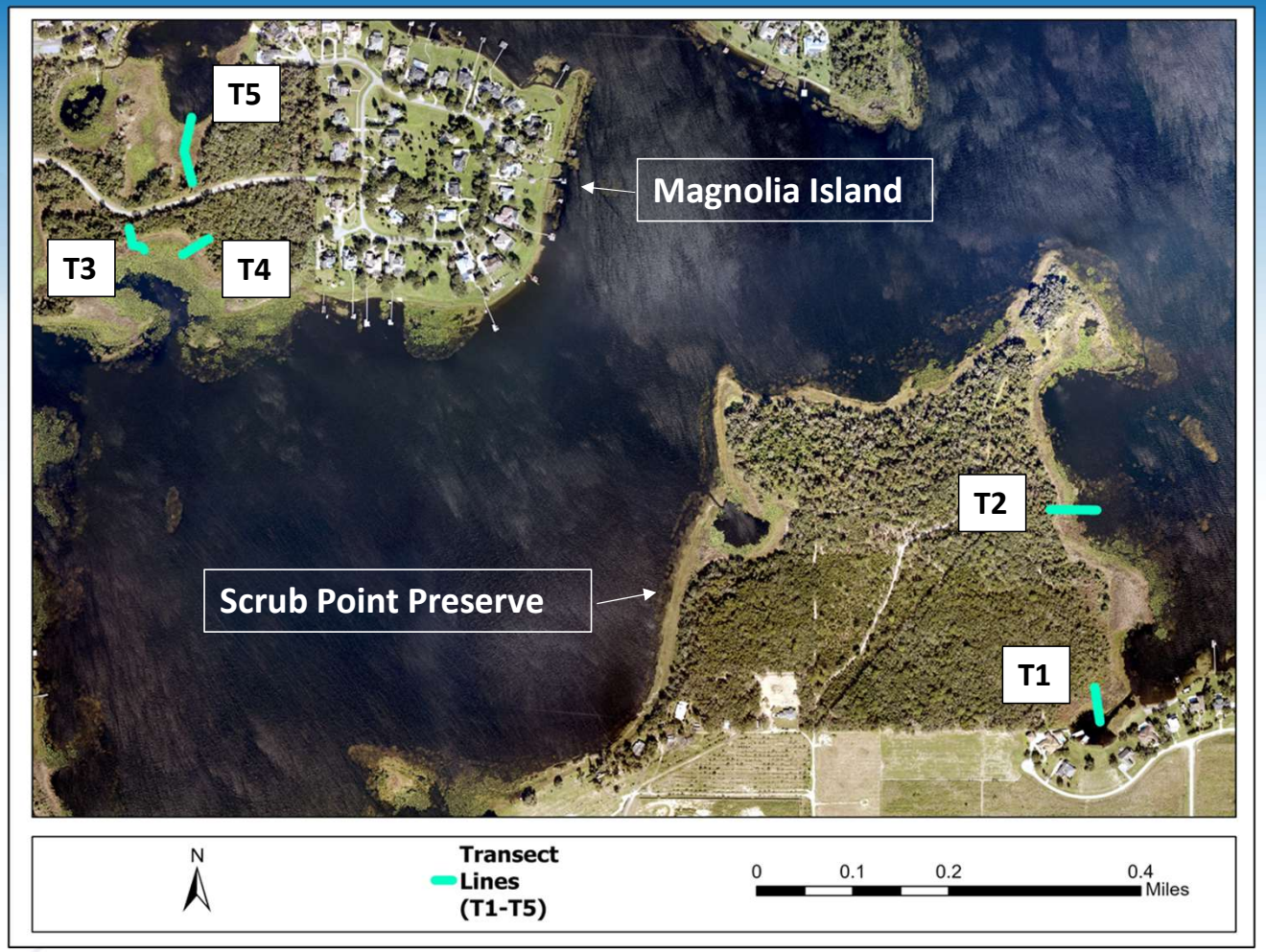
- Location and composition of wetland communities and soils

Elevation / Depths

- Elevations along transects
- Bathymetry

Metrics

- Event-based
- Hydroperiod Tool



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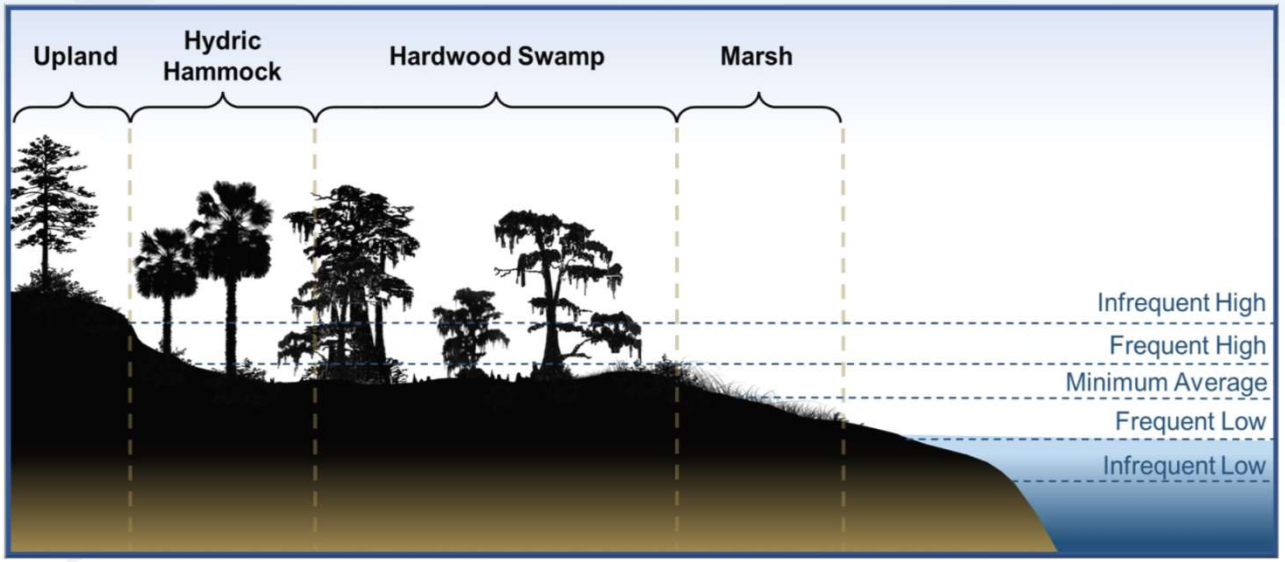
Event-based Metrics

- Protect a minimum hydroperiod necessary for maintenance of specific environmental values
  - Magnitude (elevation, ft NAVD88)
  - Duration (# of days)
  - Return Interval
- Event-Based Metrics assessed at Johns Lake
  - Frequent High #1 (FH#1)
  - Frequent High #2 (FH#2)
- Frequency Analysis of these events with the long-term lake level conditions



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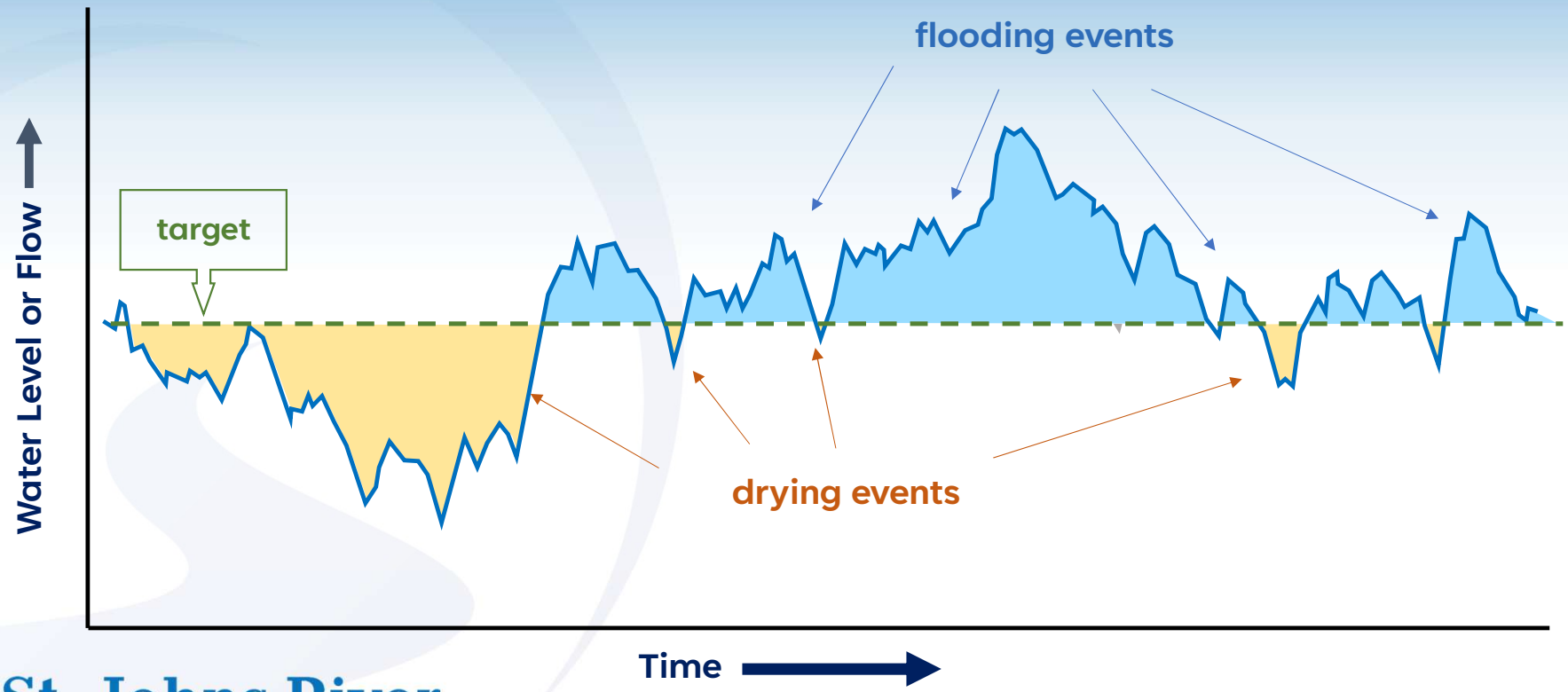
Hydrographs: *series of events of varying duration and frequency*



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Minimum Frequent High #1

- **Magnitude:**
  - Mean elevation of all communities where *Cephalanthus occidentalis* (buttonbush) was a cover class 3 or above (25%+)
  - 94.1 ft NAVD88
- **Duration:** 30-day exceedance
- **Return Interval:** SWIDS Process

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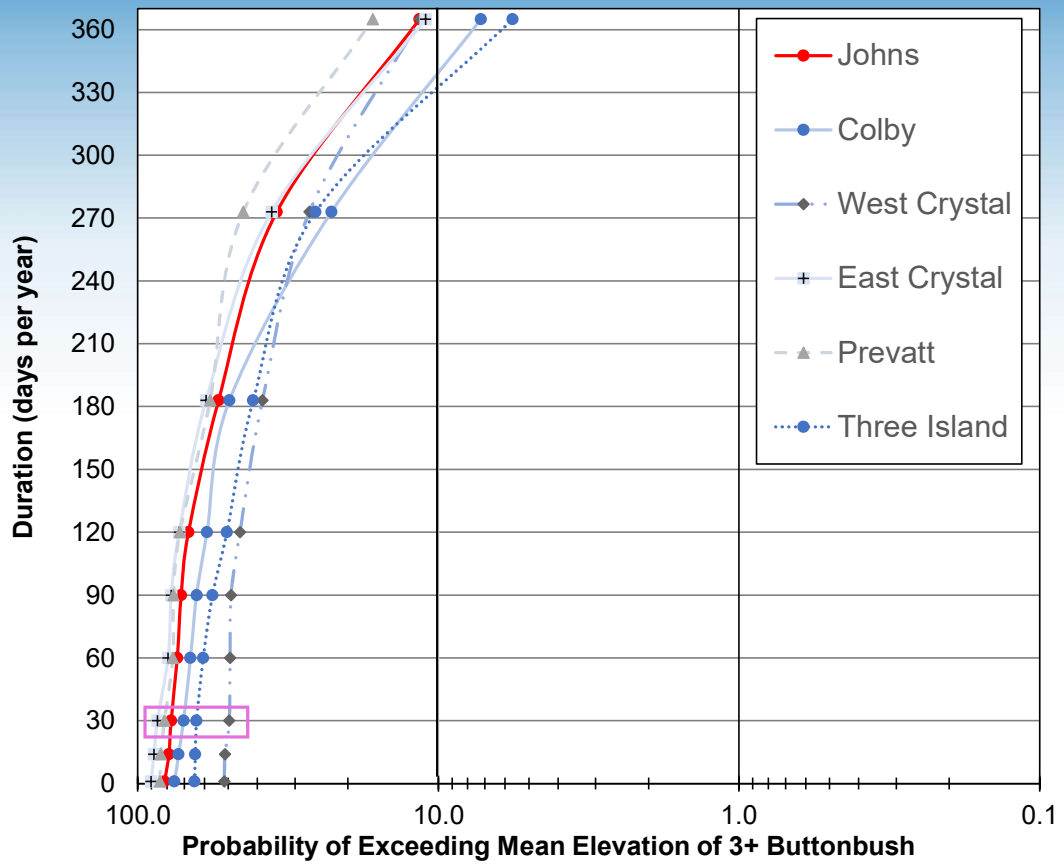
Minimum Frequent High: Return Interval (RI) Calculation

Cluster Sites	% Exceedance	Return Interval (yr)
Johns	77.5	1.29
Colby	70.4	1.42
Prevatt	81.5	1.23
Three Island	63.7	1.57
East Crystal	86.1	1.16
West Crystal	49.6	2.02
Range	36.5	0.86
Mean		1.45
SE		0.12
Mean + SE		1.6



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Minimum Frequent High #1

- **Magnitude:**
  - Mean elevation of all communities where *Cephalanthus occidentalis* (buttonbush) was a cover class 3 or above (25%+)
  - 94.1 ft NAVD88
- **Duration:** 30-day exceedance
- **Return Interval:** 1.6 years

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Minimum Frequent High #2

- Protects minimum spawning frequency that maintains largemouth bass population
- Regionally important bass fishery
- Magnitude:
  - Average elevation of floating deep marsh communities plus 1 foot
  - 90.4 ft NAVD88
- Duration:
  - 60-day continuous exceedance between January 1st and May 31st
- Return Interval:
  - 3 years
- Metric developed with guidance and support from FWC

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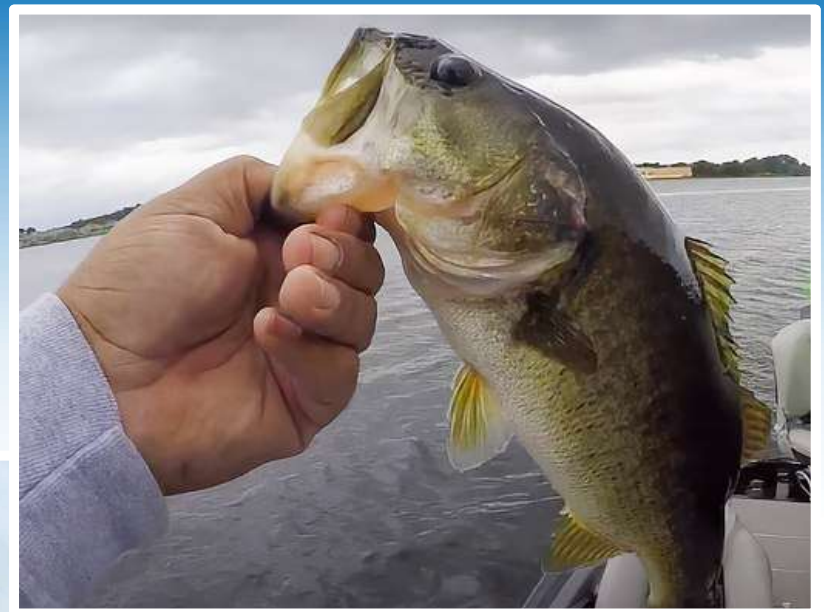
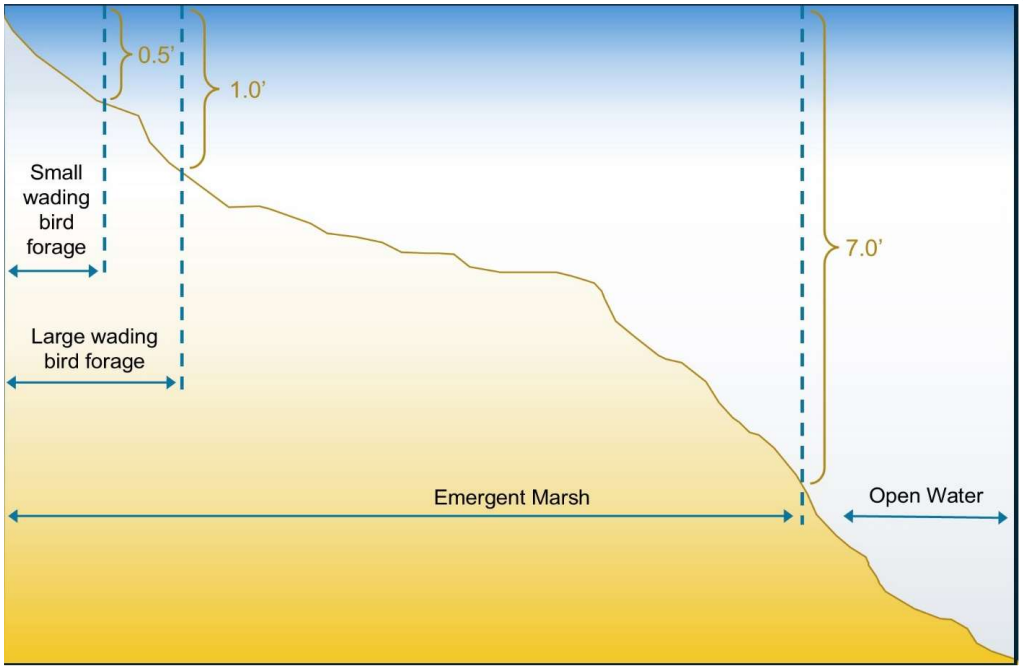


Hydroperiod Tool Metrics

- Stage-Habitat Area Relationship
  - Utilizes a detailed DEM with raster representations of the environment
  - Compare the no-pumping and current-pumping conditions
    - Average Habitat Area for each day in the POR
- > 15% Change from no-pumping condition

Habitat and Lake Characteristics	Minimum depth (ft)	Maximum depth (ft)
Open Water	7	NA
Canoe	1.67	NA
Emergent Marsh	0.1	7
Large Waders	0.1	1
Small Waders	0.1	0.5



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Johns Lake

MFLs Assessment

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MFLs Assessment

Dataset

Long-term water levels or flows

Pumping Impact Assessment

Determine the impact from pumping on levels and/or flows

Current-Pumping Condition Levels

Develop no-pumping and current-pumping condition levels/flows

Current Status of MFLs

Estimate freeboard or deficit in the levels/flows under current pumping condition to assess current status of MFLs

Future Status of MFLs

Estimate freeboard or deficit in the levels/flows under future pumping condition

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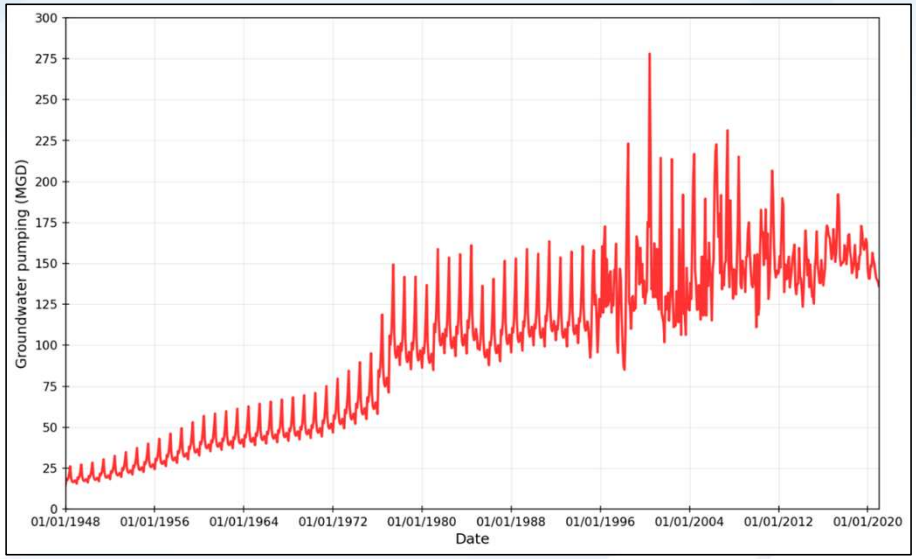
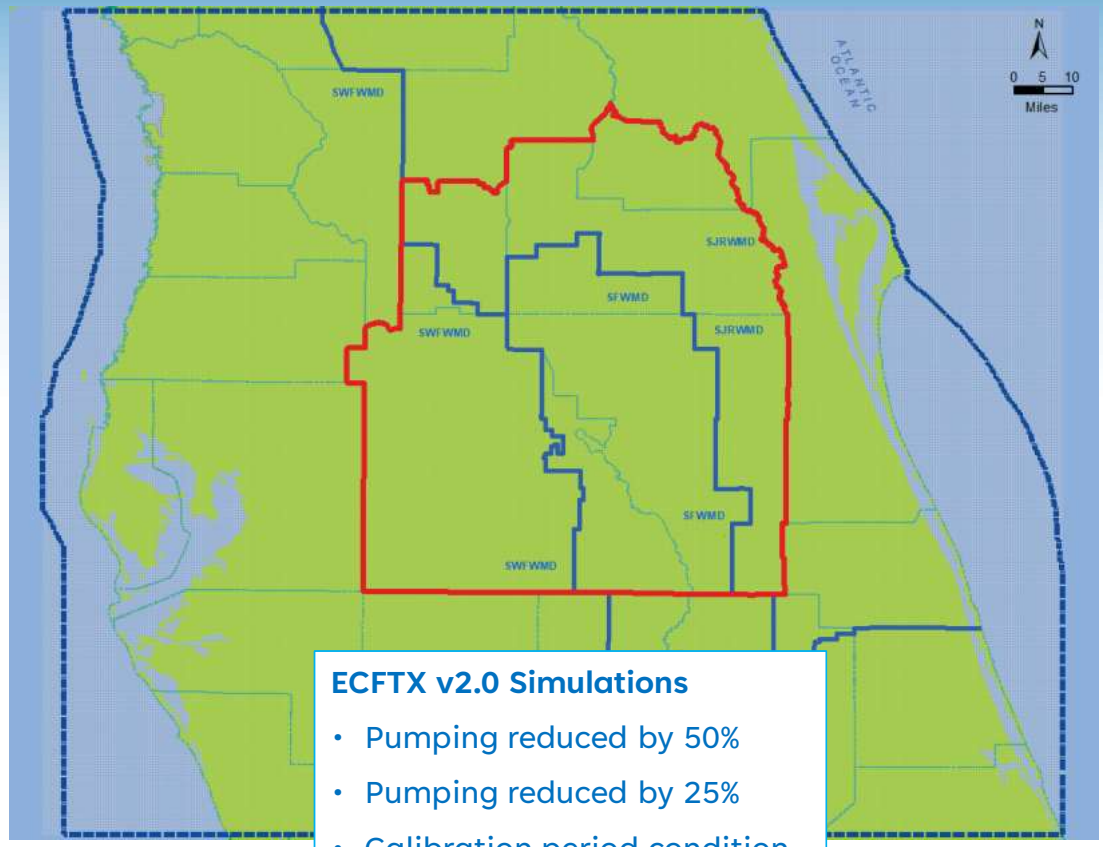
MFLs Assessment: Pumping Impact Assessment

- ECFTX v2.0
- Historical pumping

Estimated Historical Pumping in 15-mile radius around Johns Lake





ECFTX v2.0 Simulations

- Pumping reduced by 50%
- Pumping reduced by 25%
- Calibration period condition
- Pumps off

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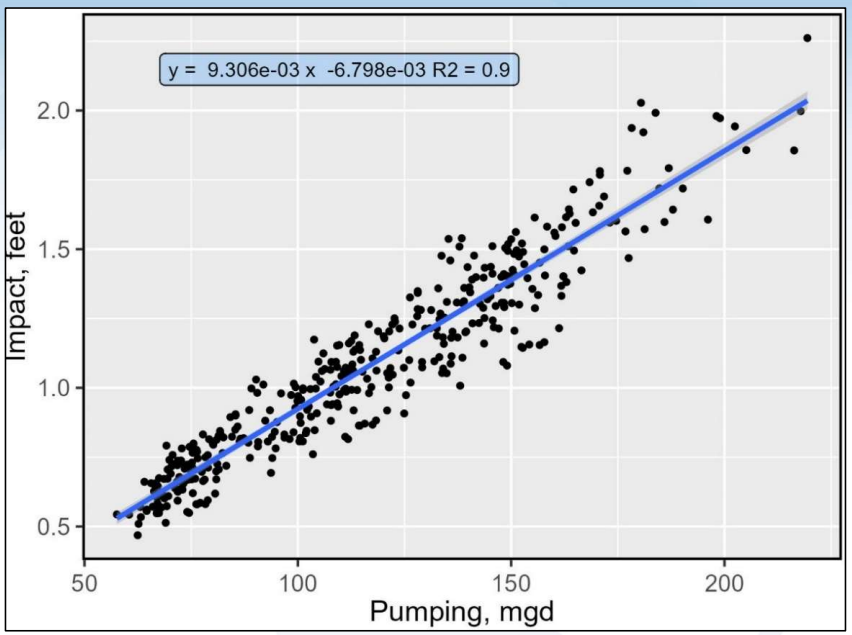
Groundwater Pumping Impact

Pumping Impact (ft) in the UFA near Johns Lake vs Pumping (mgd)



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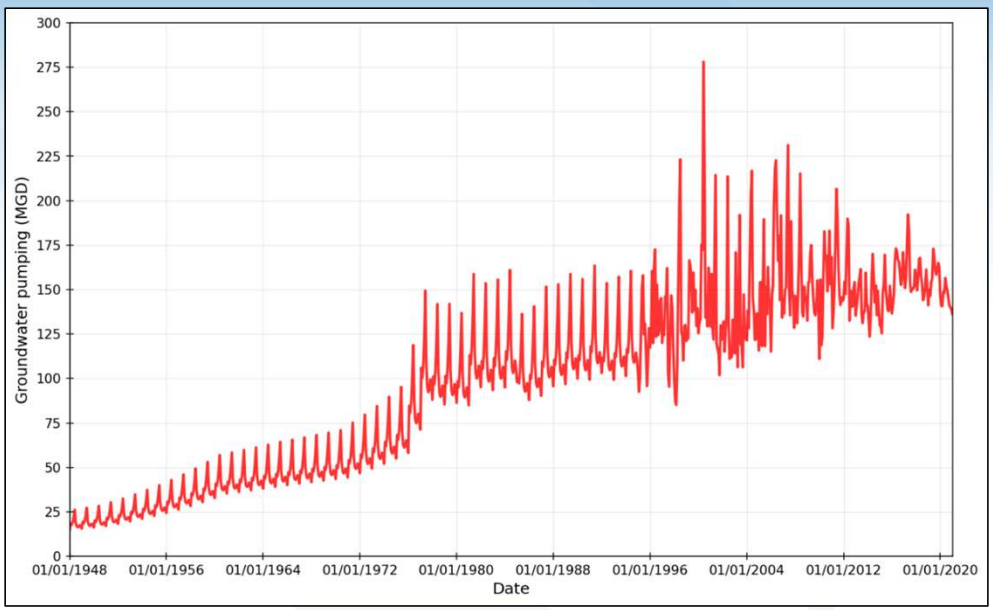
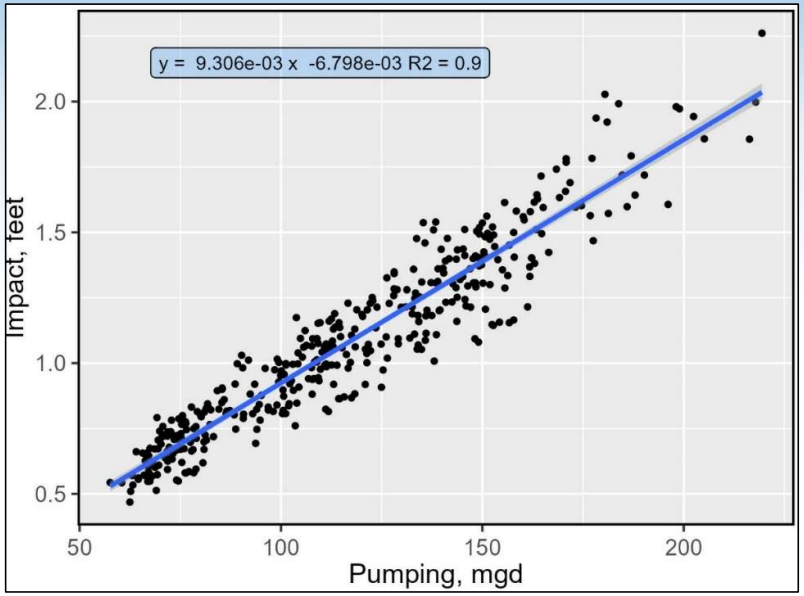
Groundwater Pumping Impact

Estimated Historical Pumping in 15-mile radius around Johns Lake



Pumping Impact (ft) in the UFA near Johns Lake vs Pumping (mgd)



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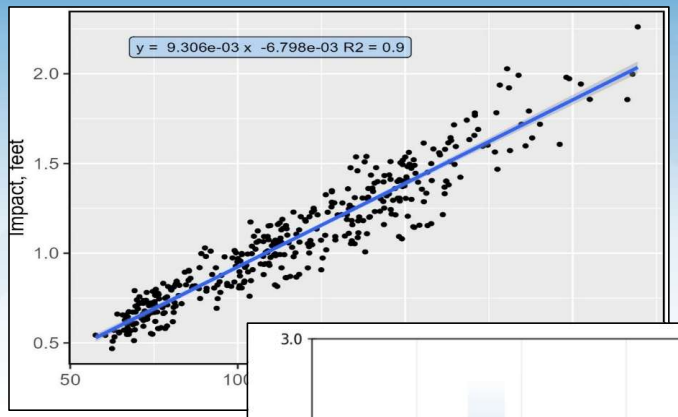
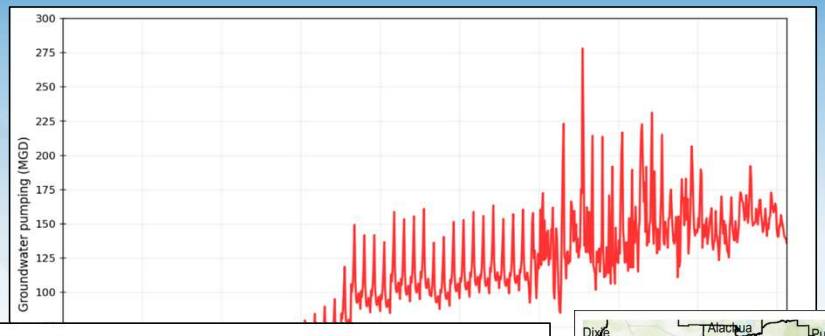
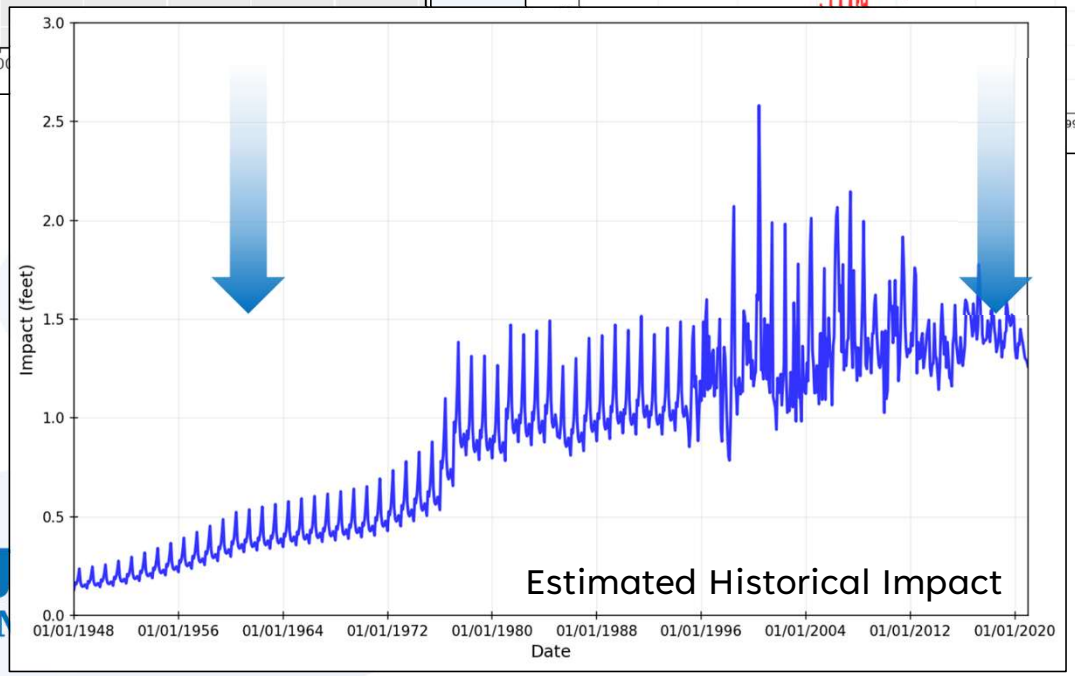
Groundwater Pumping Impact

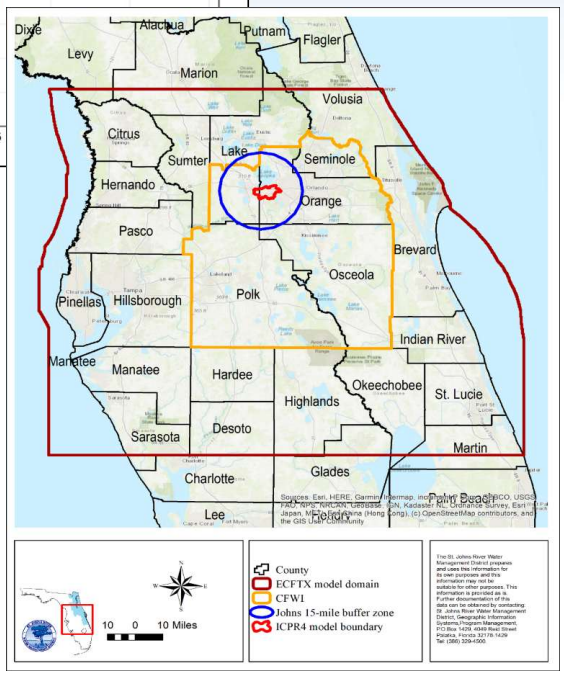
Pumping Impact (ft) at Johns Lake vs Pumping (mgd)



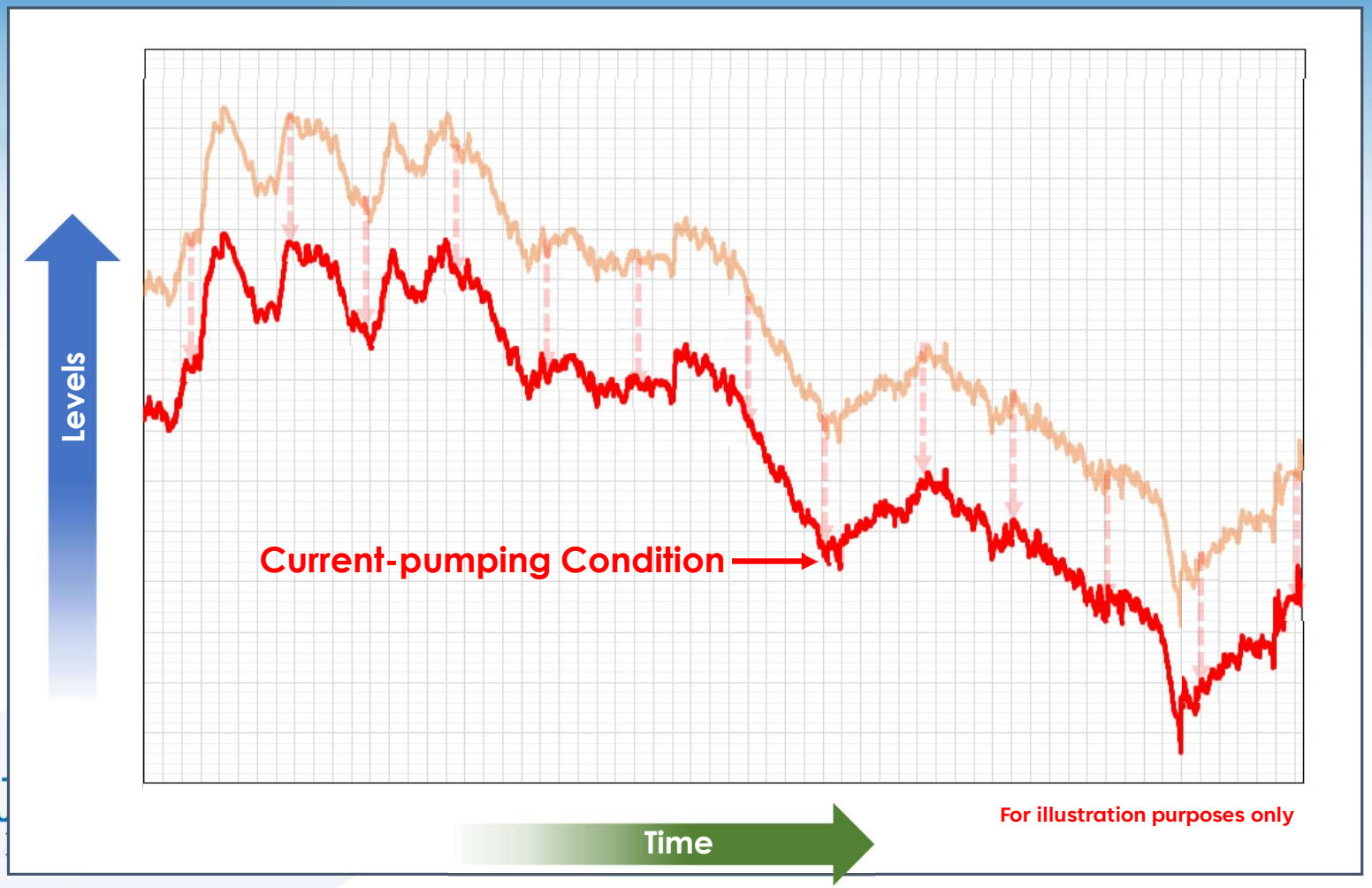
Estimated Historical Pumping in 15-mile radius around Johns Lake



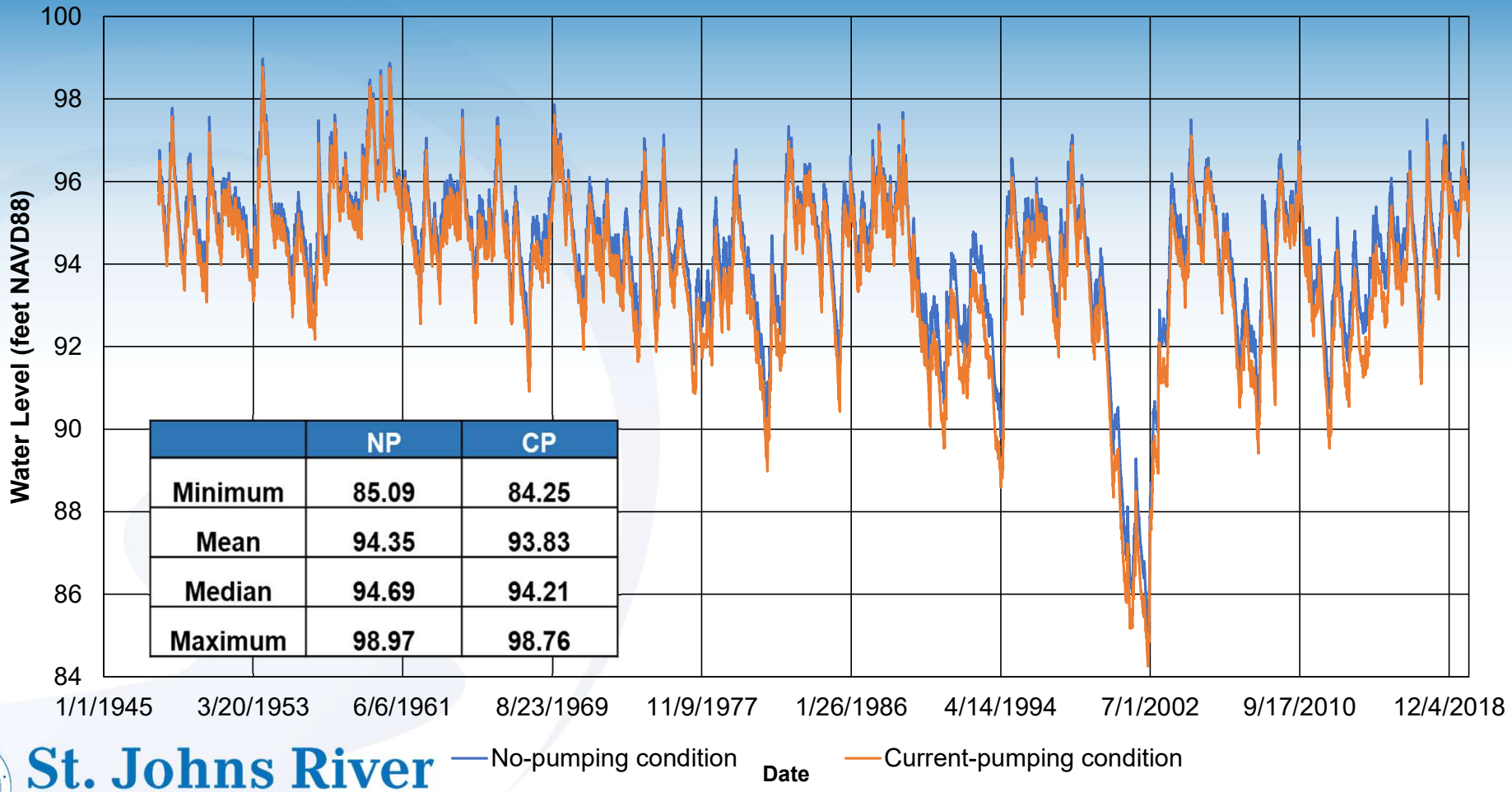




No-pumping and Current-pumping UFA Levels



Johns Lake No-pumping and Current-pumping



	NP	CP
Minimum	85.09	84.25
Mean	94.35	93.83
Median	94.69	94.21
Maximum	98.97	98.76

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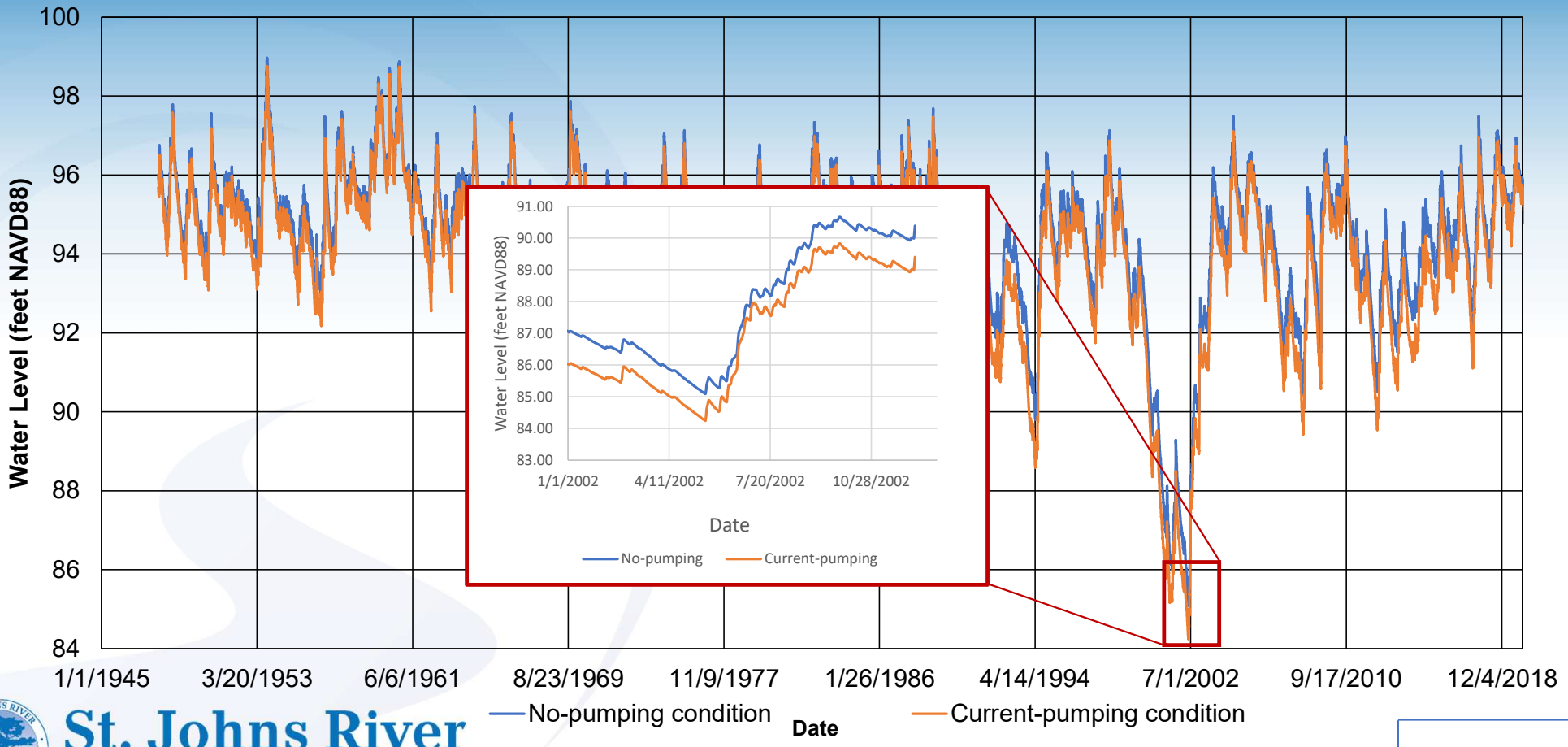
Johns Lake No-pumping and Current-pumping



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DRAFT Frequent High #1 and #2 - Assessment

Frequency Analysis - Weibull Plot

- Determine level event probabilities;
- Rank annual probability (current-pumping) data;
- Compare MFL frequency (RI) to current frequency;
- Iteratively reduce (if there is freeboard) or increase (if there is deficit) the boundary condition (**water levels**) in ICPR4 model until MFL is just met;
- Most constraining event-based metric could determine the freeboard/deficit = **MFLs Condition**

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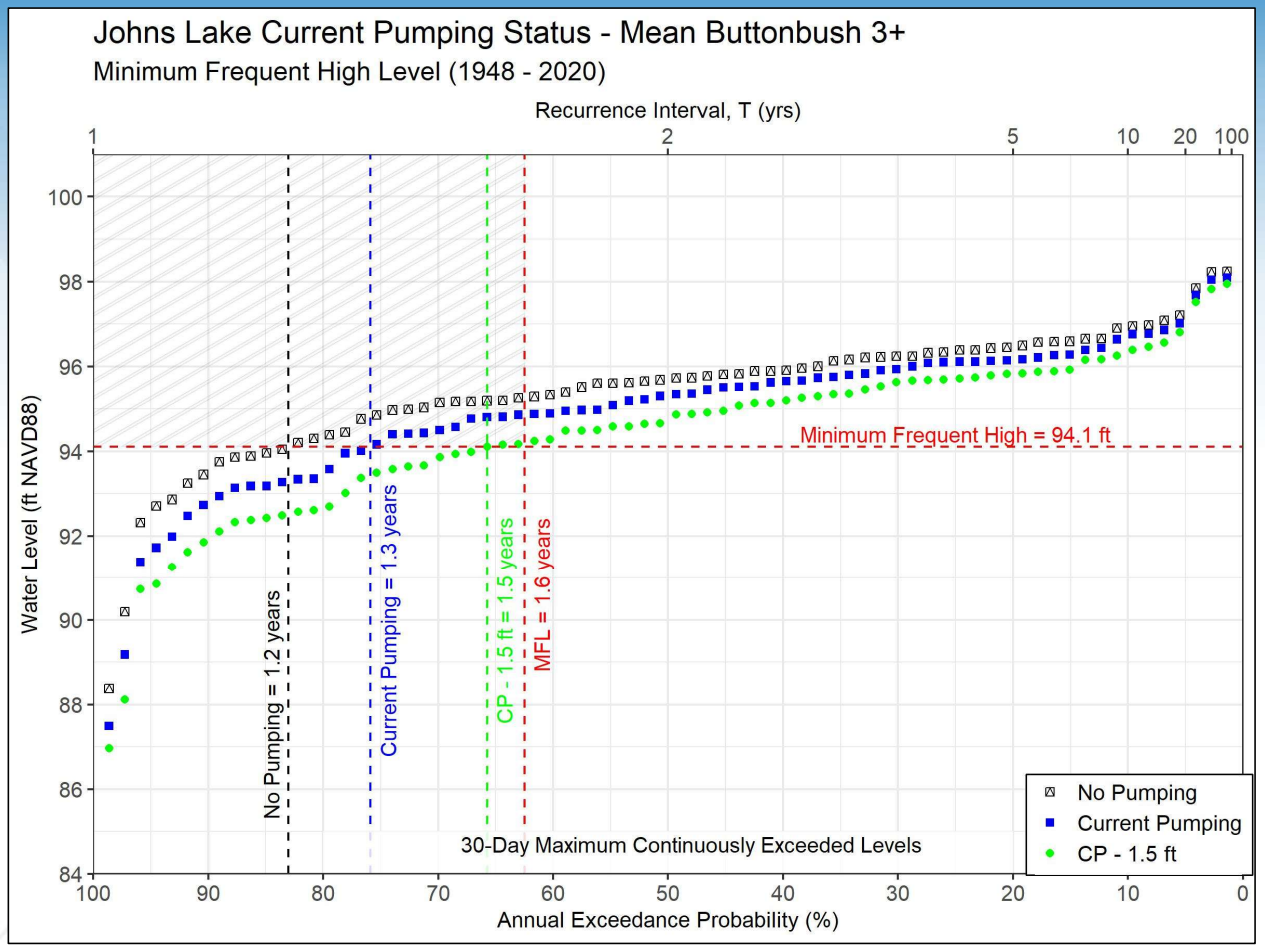
Draft Minimum Frequent High #1 – Assessment

FH#1	
Scenario	Lake Freeboard
No-pumping	1.2
Current-pumping	0.8
CP - 1.5 ft in UFA	~0.0 (<0.1)

UFA Freeboard: 1.5 ft



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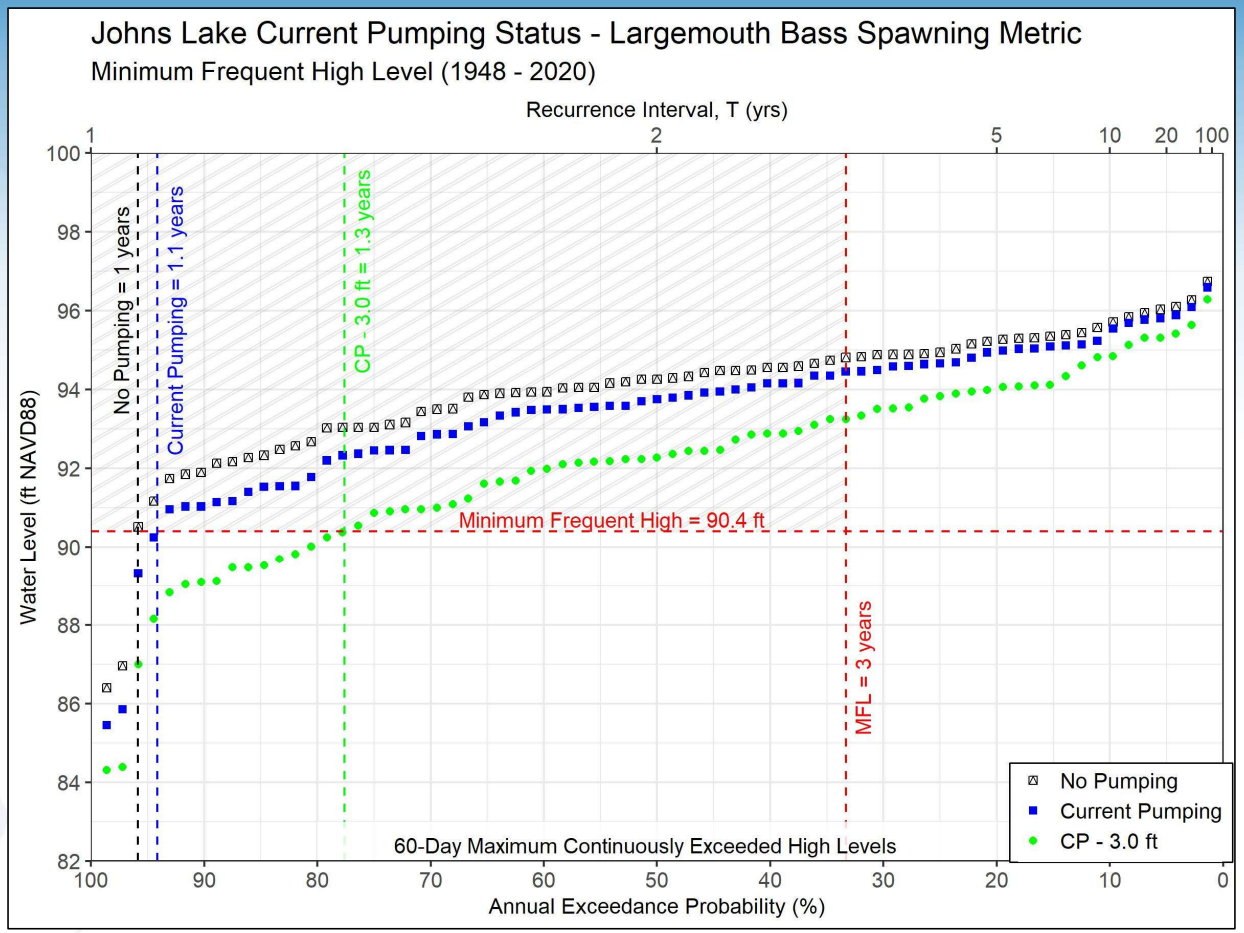
Draft Minimum Frequent High #2 – Assessment

FH#2	
Scenario	Lake Freeboard
No-pumping	4.4
Current-pumping	4.1
CP – 3.0 ft	2.9

UFA Freeboard: >3.0 ft



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Draft Hydroperiod Tool Metrics – Assessment

Hydroperiod Tool Habitat and Lake Characteristics	Percent Area Reduction from No-pumping condition to MFL condition	UFA Freeboard (ft)
Small Waders	NA*	>3.0
Large Waders	NA*	>3.0
Emergent Marsh (< 7 ft)	NA*	>3.0
Lake Area	9.6	>3.0
Canoe Area	11.9	>3.0
Open Water (≥ 7 ft)	14.7†	1.3

*NA indicates there was no area reduction from simulated drawdowns

†1.4 feet of drawdown produced > 15% reduction in Open Water habitat

> 15% reduction from no-pumping condition = metric not met

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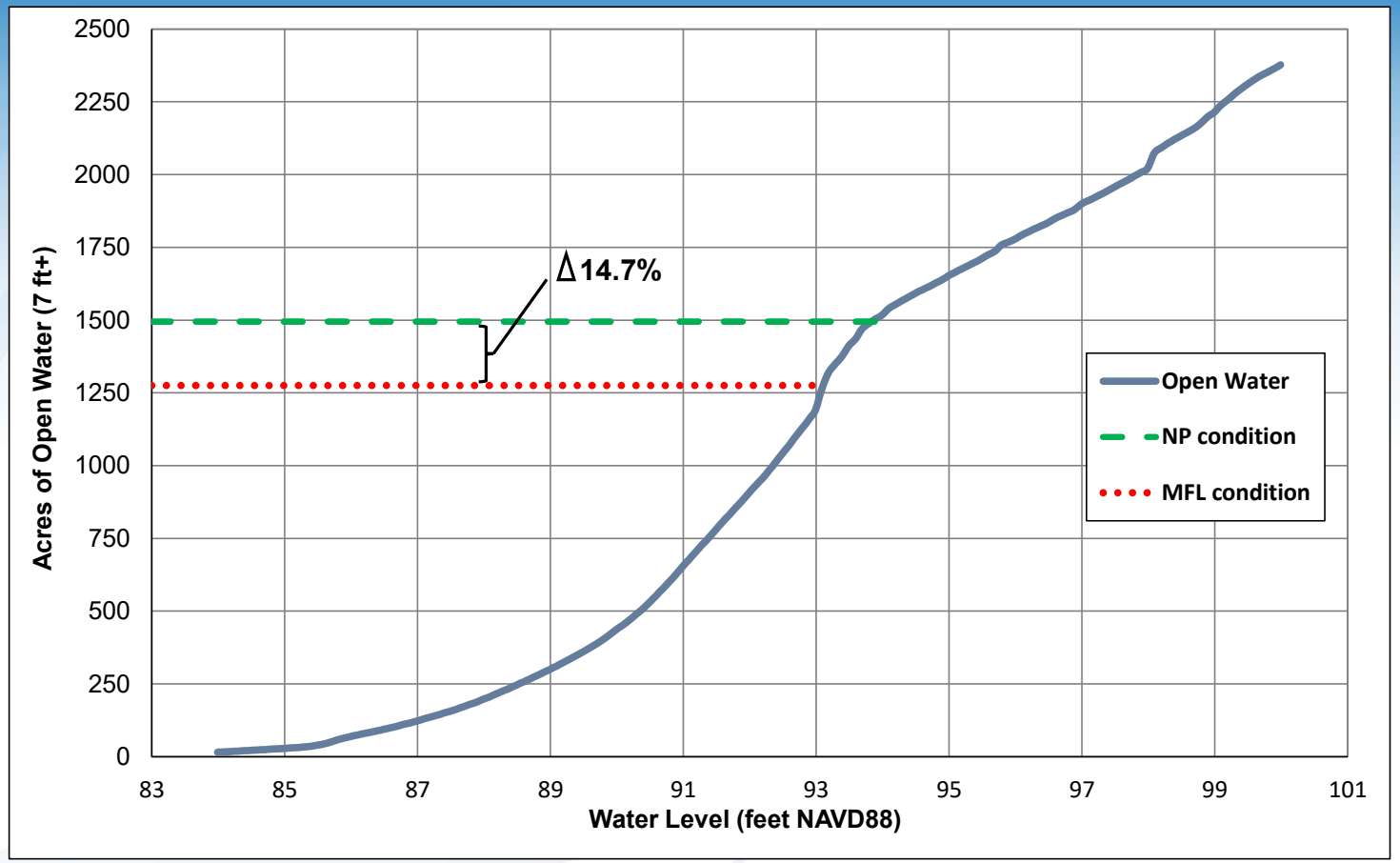
Hydroperiod Tool Metrics – Assessment



Average Open Water Extent	
Scenario	Acres
No-pumping Condition	1495.2
CP - 1.3ft (MFL Condition)	1275.5

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Johns Lake Metric Summary

Environmental Criterion	Environmental Value(s) Protected	UFA Freeboard (ft)
Event - Based Metrics		
FH#1 – Average elevation cover class 3+ of buttonbush	Highest elevated seasonally-flooded community and associated wildlife values (buttonbush 3+)	**1.5**
FH#2 – Largemouth Bass Spawning Habitat (average elevation of floating deep marsh communities)	Bass population and associated values	**> 3.0**
Hydroperiod Tool Metrics		
Small Wading bird forage habitat	Fish and wildlife habitat	**> 3.0**
Large Wading bird forage habitat	Fish and wildlife habitat	**> 3.0**
Emergent Marsh < 7ft	Fish and wildlife habitat	**> 3.0**
Lake Area	Recreation/Aesthetics/Water Quality/Fish Habitat	**> 3.0**
Canoe Area	Recreation	**> 3.0**
Open Water ≥ 7ft	Recreation/Aesthetics/Water Quality/Fish Habitat	**1.3**

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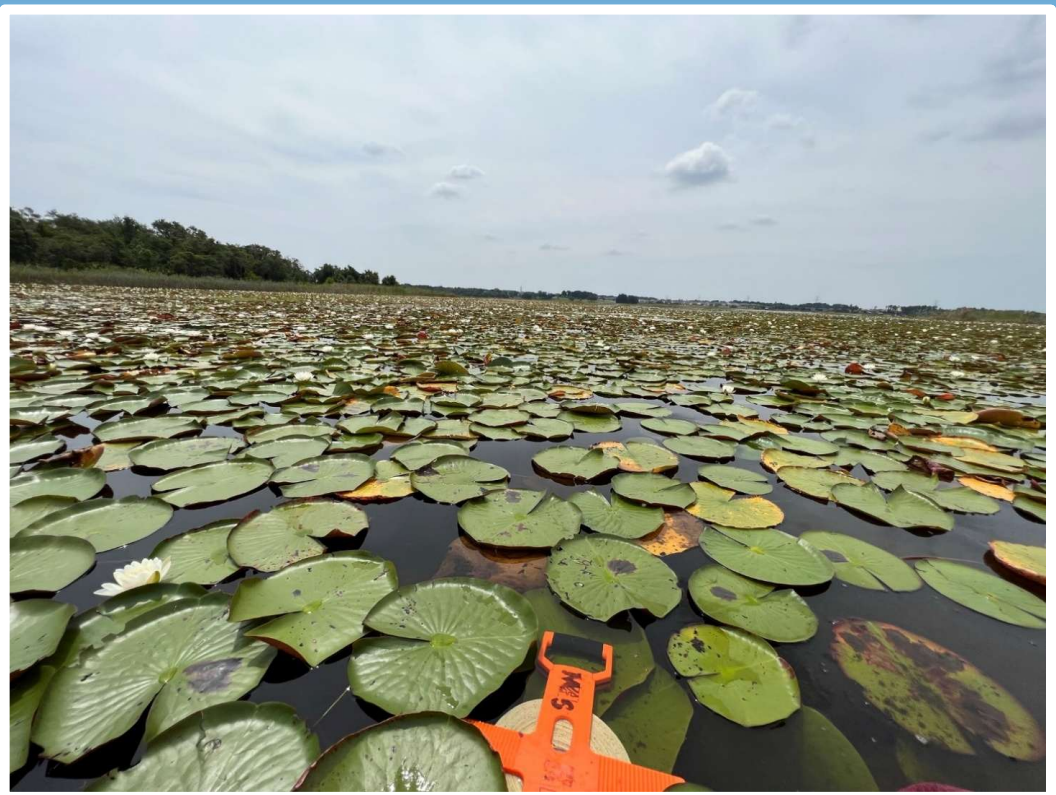
Johns Lake

Water Resource Values (WRVs) Assessment



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Water Resource values (WRVs) Assessment

"...consideration shall be given to... non-consumptive uses, and environmental values..."

62-40.473, F.A.C.

- Recreation in and on the water
- Fish & wildlife habitats and the passage of fish
- Estuarine resources
- Transfer of detrital material
- Maintenance of freshwater storage & supply
- Aesthetic and scenic attributes
- Filtration / absorption of nutrients & pollutants
- Sediment loads
- Water quality
- Navigation

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Water Resource Values (WRVs) Assessment

"...consideration shall be given to... non-consumptive uses, and environmental values..."

62-40.473, F.A.C.

- Recreation in and on the water
- Fish & wildlife habitats and the passage of fish
- ~~Estuarine resources~~ Lake is land-locked
- Transfer of detrital material
- Maintenance of freshwater storage & supply
- Aesthetic and scenic attributes
- Filtration / absorption of nutrients & pollutants
- ~~Sediment loads~~ Relevant only in flowing systems
- Water quality
- ~~Navigation~~ Not accessible to commercial watercraft

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Water Resource Values (WRVs) Assessment

WRVs associated with ecological functions of wetland communities:

- **Fish & wildlife habitats and the passage of fish:** Hydroperiod Tool (HT) habitat metrics, FH#1, FH#2
- **Transfer of detrital material:** Flooding events from FH#1
- **Maintenance of freshwater storage & supply:** MFL condition protects all other environmental values
- **Filtration / absorption of nutrients & pollutants:** MFL condition protects flooding events necessary for maintenance of wetland communities

Environmental Criterion	NP Condition area (acres)	Percent reduction in NP condition area based on most constraining metric
Small wading bird forage habitat	46	+
Large wading bird forage habitat	105.5	+
Emergent marsh vegetation (< 7 ft)	993.3	+
Open water (≥ 7 ft)	1495.2	14.7

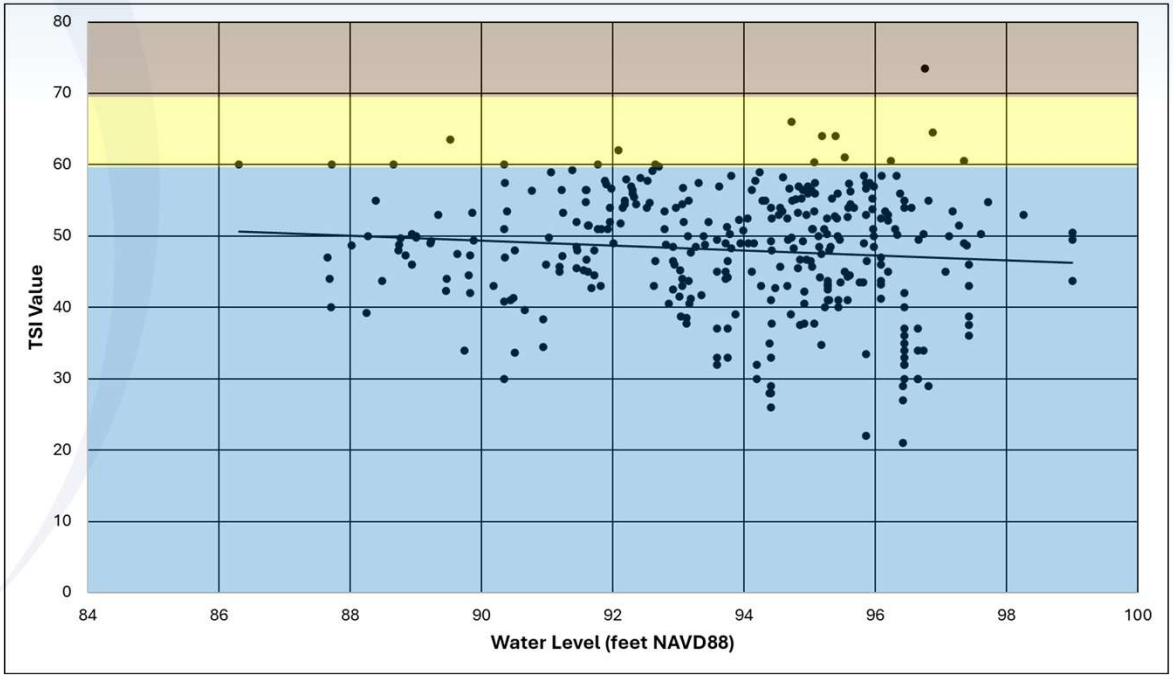
St. Johns River Water Management District

Water Resource Values (WRVs) Assessment

WRVs associated with recreation, lake area, and depth:

- **Recreation in and on the water:** Canoe paddling depth and open water extent protected by MFLs condition
- **Aesthetic and scenic attributes:** Total lake area reduction supported by open water metric
- **Water quality:** No significant trends in water quality with water levels

Trophic State Index Value	Trophic State Classification	Water Quality
70-100	Hypereutrophic	Poor
60-69	Mid-Eutrophic through Eutrophic	Fair
0-59	Oligotrophic through Mid-Eutrophic	Good



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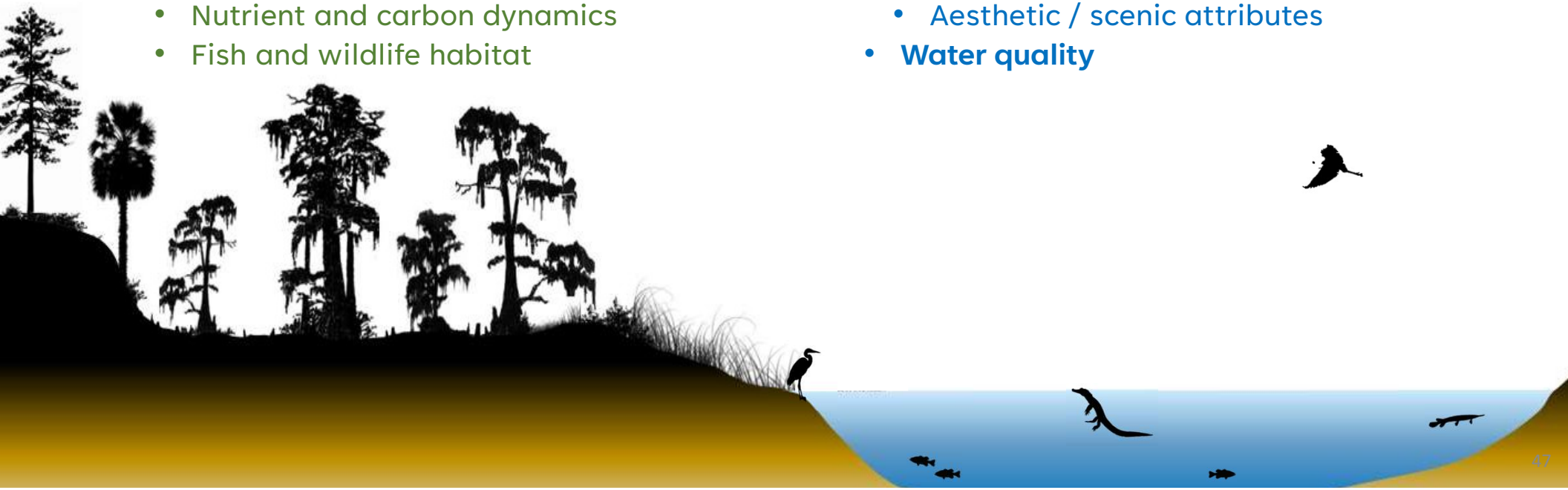
Ecological Functions of Wetland Communities

Floodplain / basin

- **Vegetation community composition / location**
- **Deep organic soils maintenance**
- **Wetland inundation**
- **Flooding functions / values:**
  - Nutrient and carbon dynamics
  - Fish and wildlife habitat

In-lake

- **Wildlife habitat**
  - Wading bird forage
  - Fish spawning
- **Human uses**
  - Canoe paddling depth
  - Aesthetic / scenic attributes
- **Water quality**



WRVs Assessment: Summary

WRV	Environmental Criteria Evaluated	Protected by the MFLs Condition?
Recreation in and on the water	Canoe Paddling depth, Open water	Yes
Fish and wildlife habitats and the passage of fish	FH#1, FH#2, small wader habitat, large wader habitat, game fish spawning habitat, emergent marsh vegetation, and open water	Yes
Transfer of detrital material	FH#1 provides flooding events necessary for transfer of detrital material	Yes
Maintenance of freshwater storage and supply	Other WRVs protected by the MFLs condition, provide balance between consumptive and non-consumptive uses.	Yes
Aesthetic and scenic attributes	Lake area and Open water metrics	Yes
Filtration, absorption of nutrients and pollutants	FH#1	Yes
Water quality	Open water metric	Yes

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MFLs Status

- UFA Freeboard = 1.3 ft
- Projected drawdown to 2045 = 0.8 ft
- Therefore, Johns Lake is NOT in Prevention or Recovery at the 20-year planning horizon

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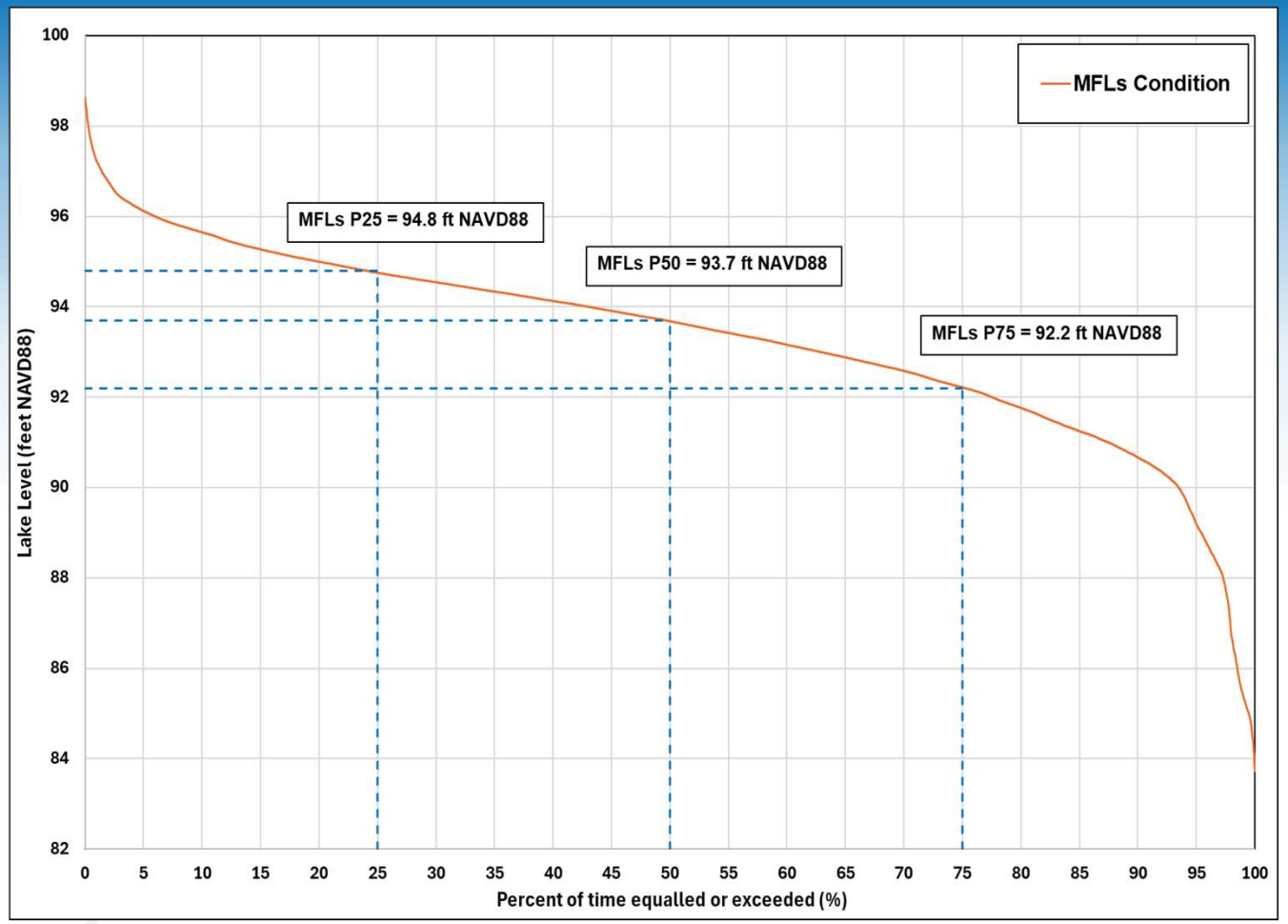
DRAFT MFL Status

Current Status:

- Johns Lake has freeboard
- MFL is meeting at 2045 planning horizon

MFLs Condition: Lake level timeseries resulting from 1.3 ft of UFA drawdown

Exceedance Percentile (P)	Recommended Minimum Lake Level (ft NAVD88)
25	94.8
50	93.7
75	92.2



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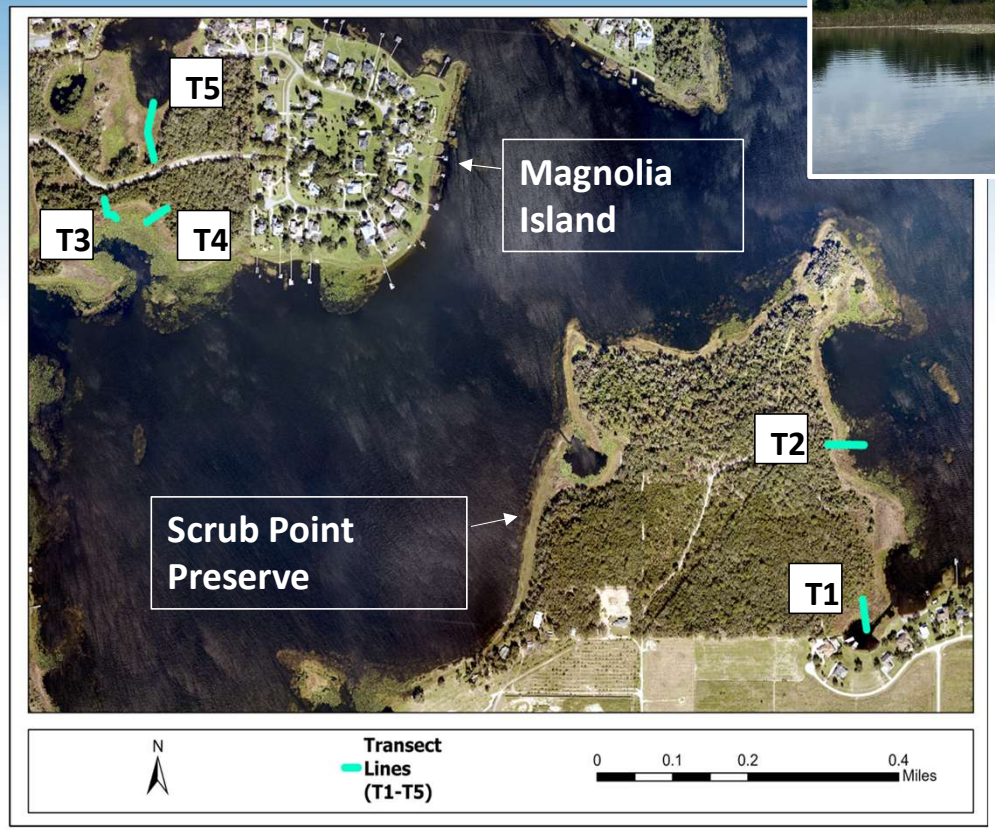
Ongoing Status / Adaptive Management

Periodic Assessment

- Status of adopted P25, P50, and P75
- MFLs determination metrics and locations
- Groundwater level trends
- Regional water supply planning efforts



Adaptive Management

- If the MFLs are not meeting, a more detailed analysis will be triggered
- Rainfall and uncertainty analyses
- Determine if min levels not meeting is due to pumping

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Please submit all questions and comments in writing to Connor Blais at:

cblais@sjrwmd.com

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Peer Review Schedule and Next Steps

Task	Date
Project Kick-off Meeting and Site Visit	April 24, 2025
Presentation of Initial Findings at Public Teleconference	May 26, 2025
Draft Technical Memorandum Presentation – Public Teleconference	June 9, 2025
Final Technical Memorandum	June 16, 2025
Notice of Rule Development	Mid to Late 2025

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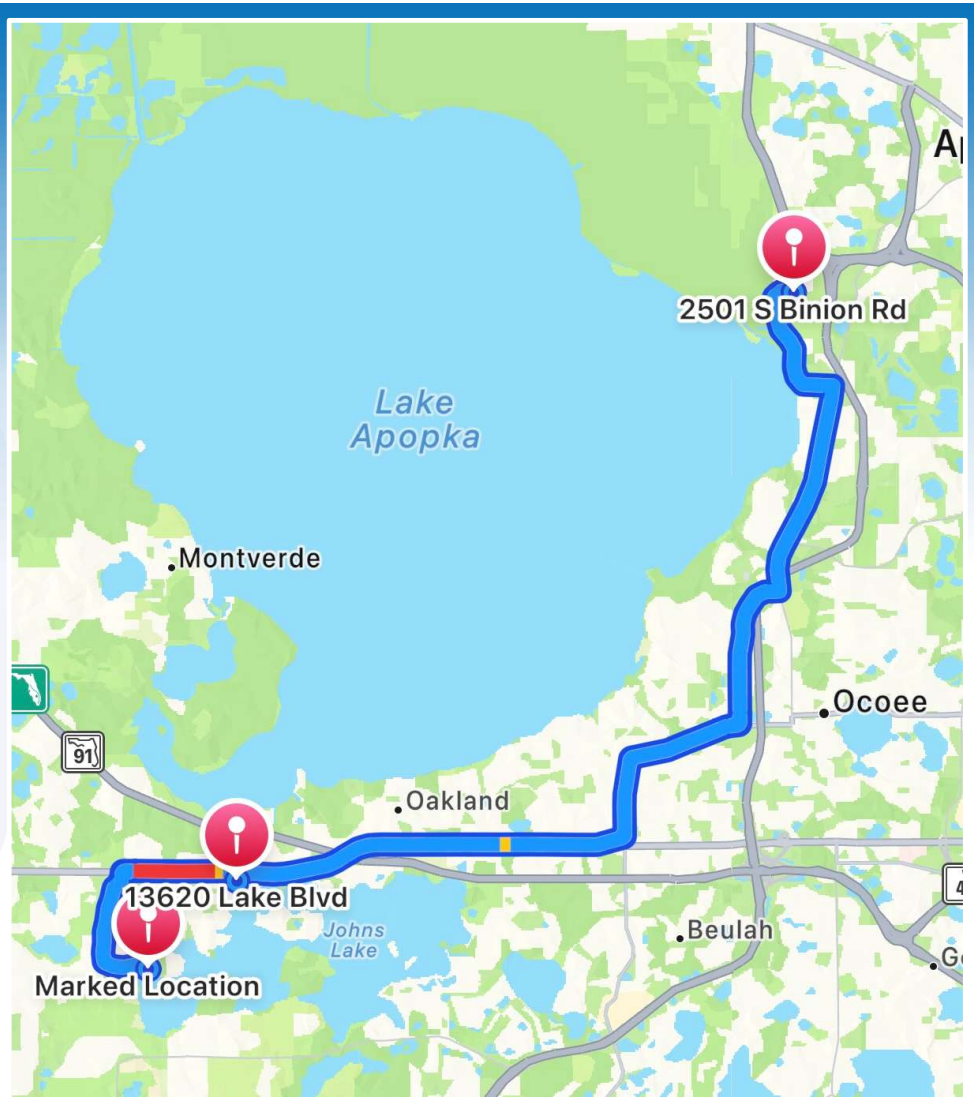
Johns Lake Site Tour

- 30 minutes for lunch (optional)
- Stop 1: Drive to Johns Lake Public Boat Ramp
  - 13620 Lake Boulevard, Winter Garden Florida 34711
- Stop 2: Drive to Transect 3
  - Magnolia Island Blvd



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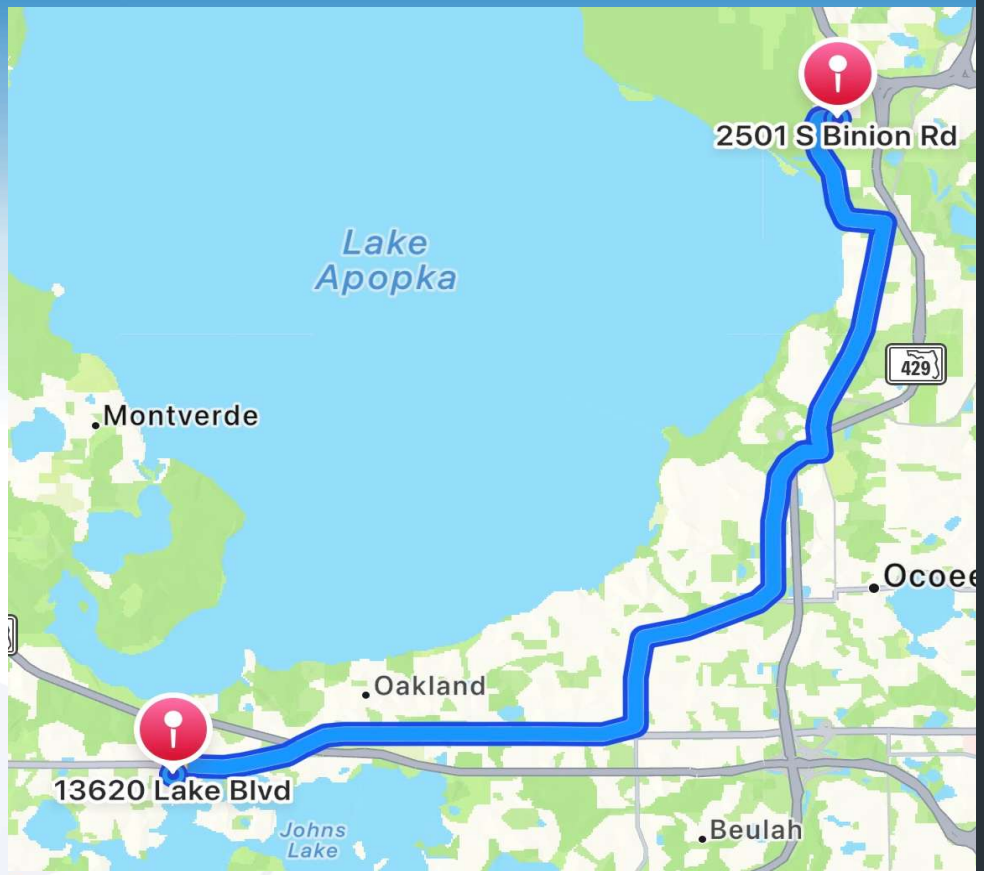
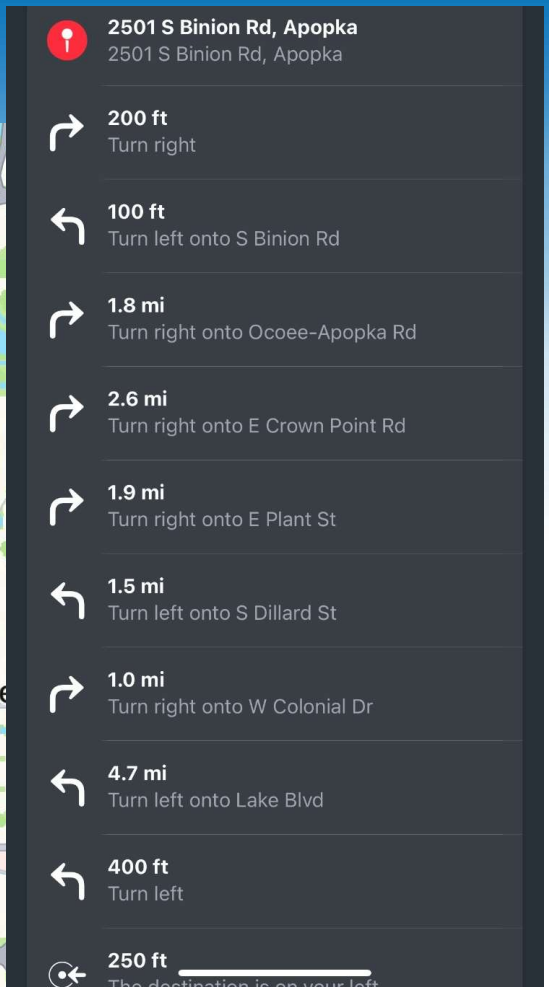
Johns Lake Site Tour – Stop 1

- Johns Lake Public Boat Ramp
  - 13620 Lake Boulevard, Winter Garden Florida 34711





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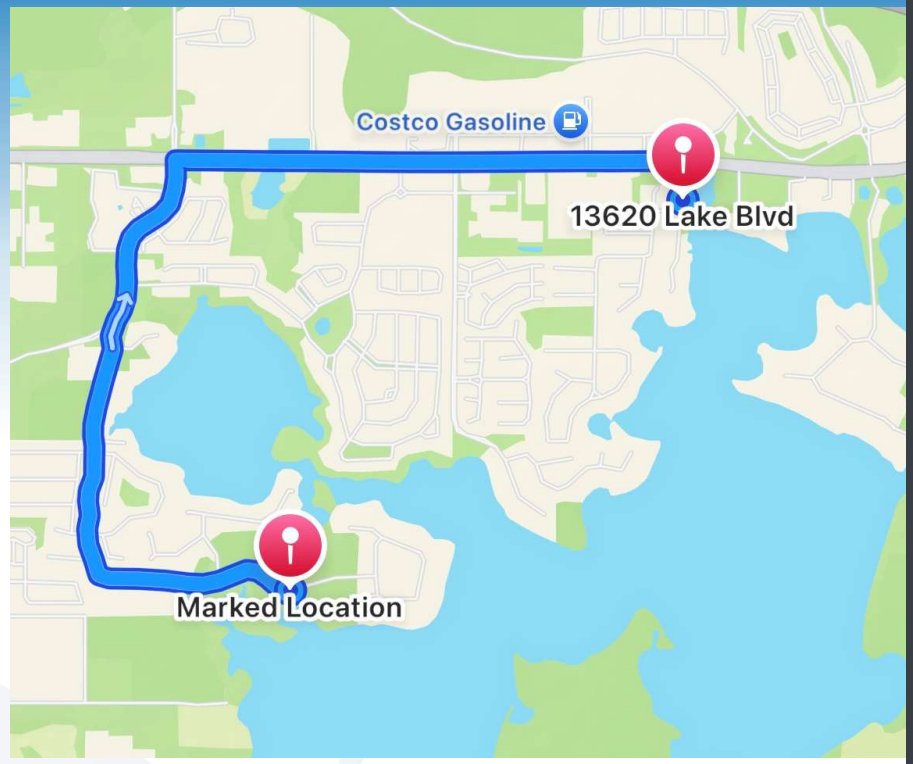
Johns Lake Site Tour – Stop 2

- Johns Lake Transect 3
  - Magnolia Island Blvd



13620 Lake Blvd, Winter Garden
13620 Lake Blvd, Winter Garden

20 ft
Turn right onto Lake Blvd

600 ft
Turn left onto SR-50 W

1.4 mi
Turn left onto Ray Goodgame Pkwy

0.5 mi
Turn left onto Hartle Rd

0.7 mi
Take a slight right turn onto Magnolia Island Blvd

0.5 mi
Arrive at the destination

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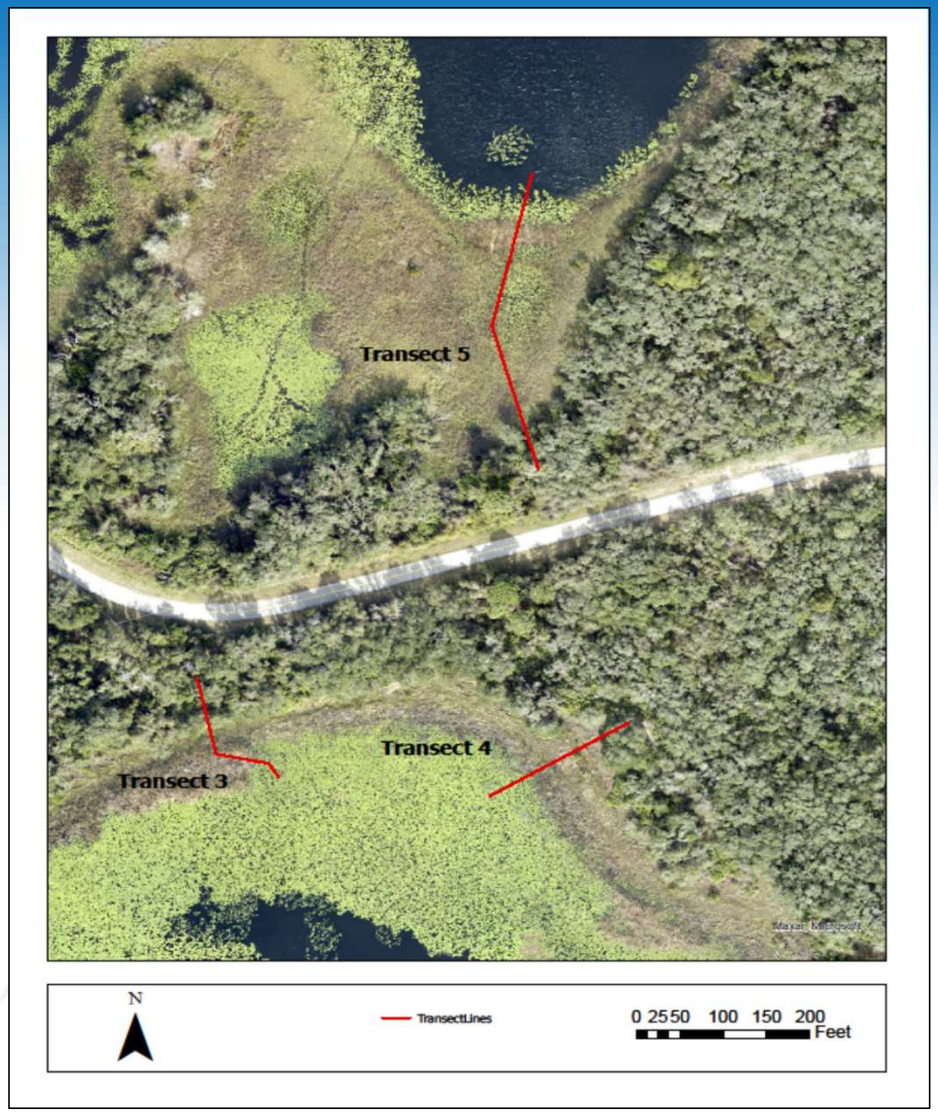
Johns Lake Site Tour – Transect 3 Avenza Map

- Johns Lake Transect 3
  - Magnolia Island Blvd



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For more information on the Johns Lake MFL go to:

https://www.sjrwmd.com/minimumflowsandlevels/johns-lake/

...or email Connor Blais at:

cblais@sjrwmd.com

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