Central Florida Water Initiative

Water for Tomorrow

Technical Methods Workshop

April 25, 2024

www.cfwiwater.com

Agenda

- **Objective**
  - Present the technical methods and modeling tools used in support of the 2025 CFWI Regional Water Supply Plan
- **Regional Water Supply Plan –** Callie Register, SJRWMD
- **Technical Methods**
  - Hydrologic Analysis – Peter Kwiatkowski, SFWMD
  - Minimum Flows and Minimum Water Levels – Doug Leeper, SWFWMD
  - Environmental Measures – Kym Holzwart, SWFWMD

Regional Water Supply Plan

Callie Register, P.E.
St. Johns River Water Management District
Regional Water Supply Planning Coordinator

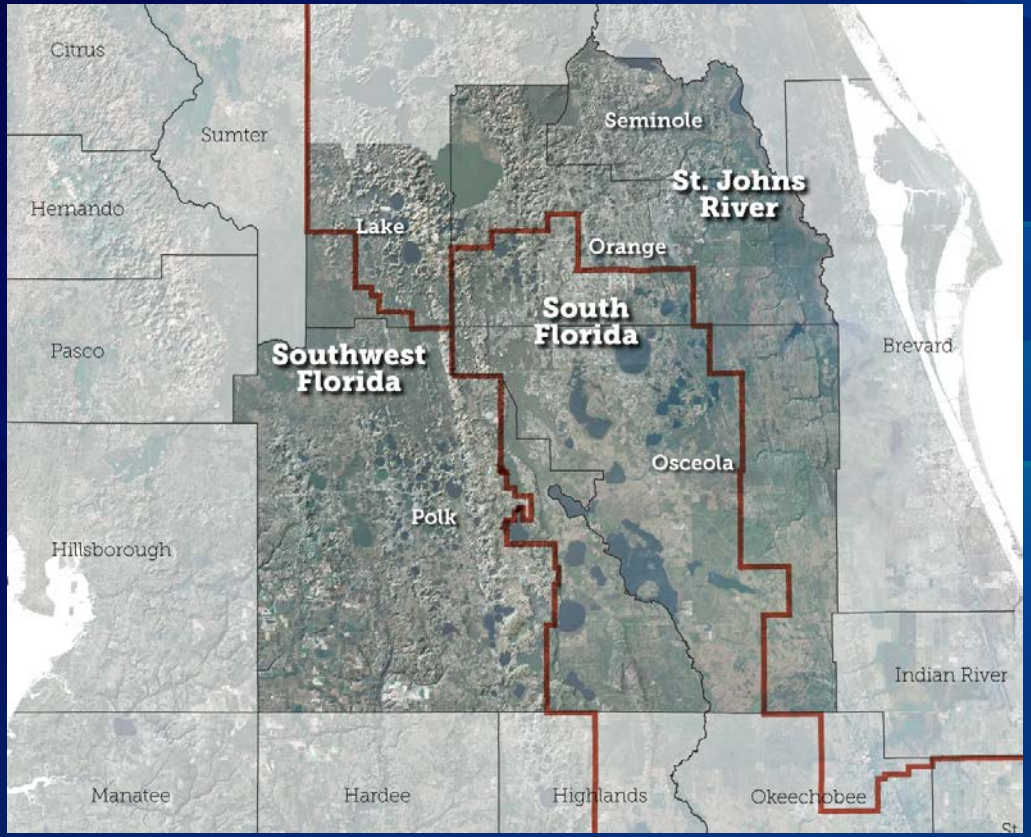
Regional Water Supply Plan Requirements

- 20-year planning period
- Demand estimates and projections
- Resource analyses
- Issue identification
- Evaluation of water source options
- Water Resource Development
  - Responsibility of water management districts
- Water Supply Development
  - Responsibility of water utilities/users
- Funding options
- Update every 5 years

2025 Process and Objectives

- Update the population and water demand projections
- Update the groundwater modeling with the most recent water demand projections
- Update the strategies to meet water demands
- 2025 CFWI RWSP

Central Florida Water Initiative Planning Area



- A collaborative water supply planning effort to protect, manage, conserve, and restore Central Florida's water resources
- A comprehensive plan for Orange, Osceola, Polk, Seminole, and southern Lake counties

CFWI Planning Area Projections

Planning Horizon 2020 – 2045

- Population:
  - 2020 3,383,425
  - 2045 4,741,314

  40% increase

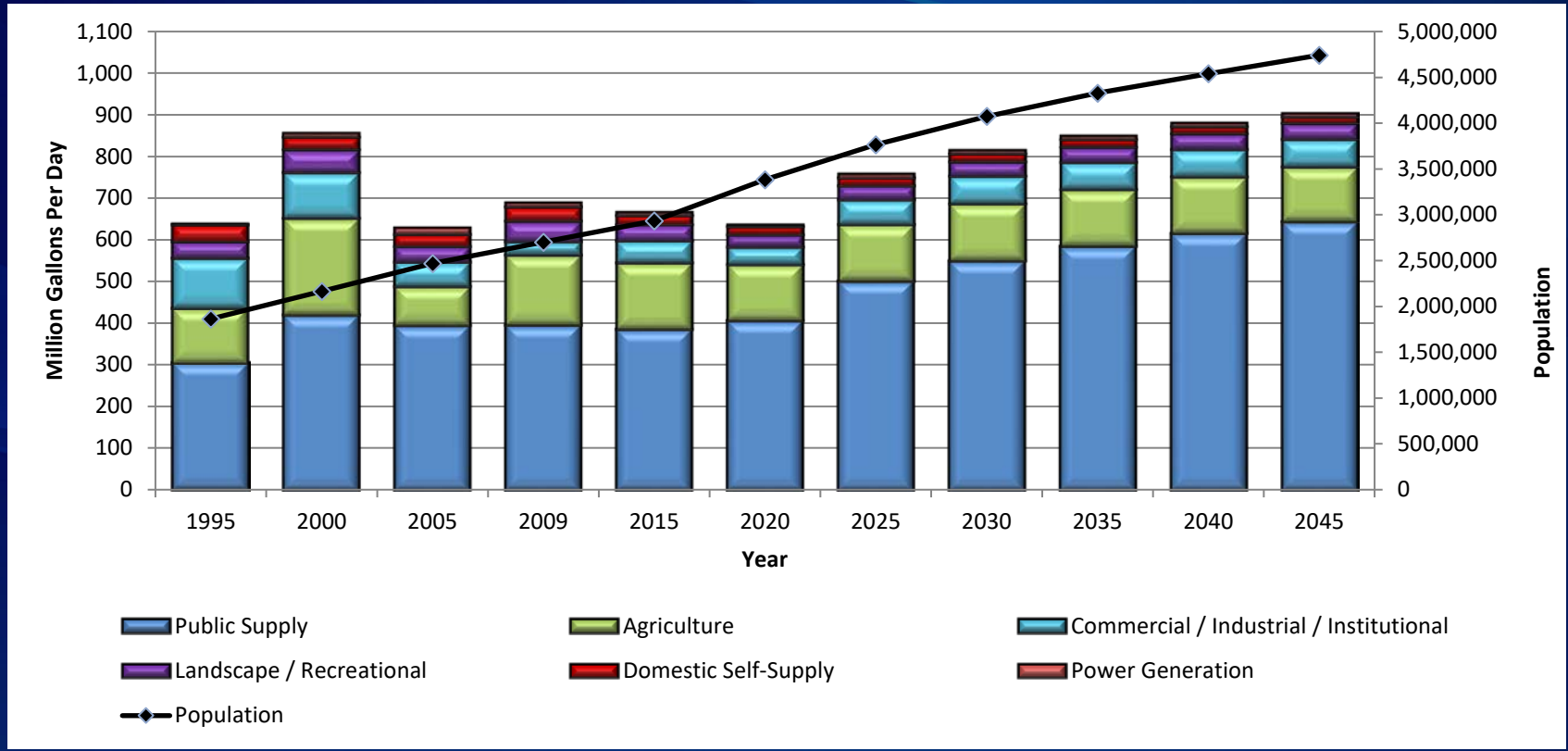
- Irrigated agricultural acreage:
  - 2020 121,686 acres
  - 2045 115,183 acres

  5% decrease

- Total water demands:
  - 2020 639 mgd
  - 2045 903 mgd

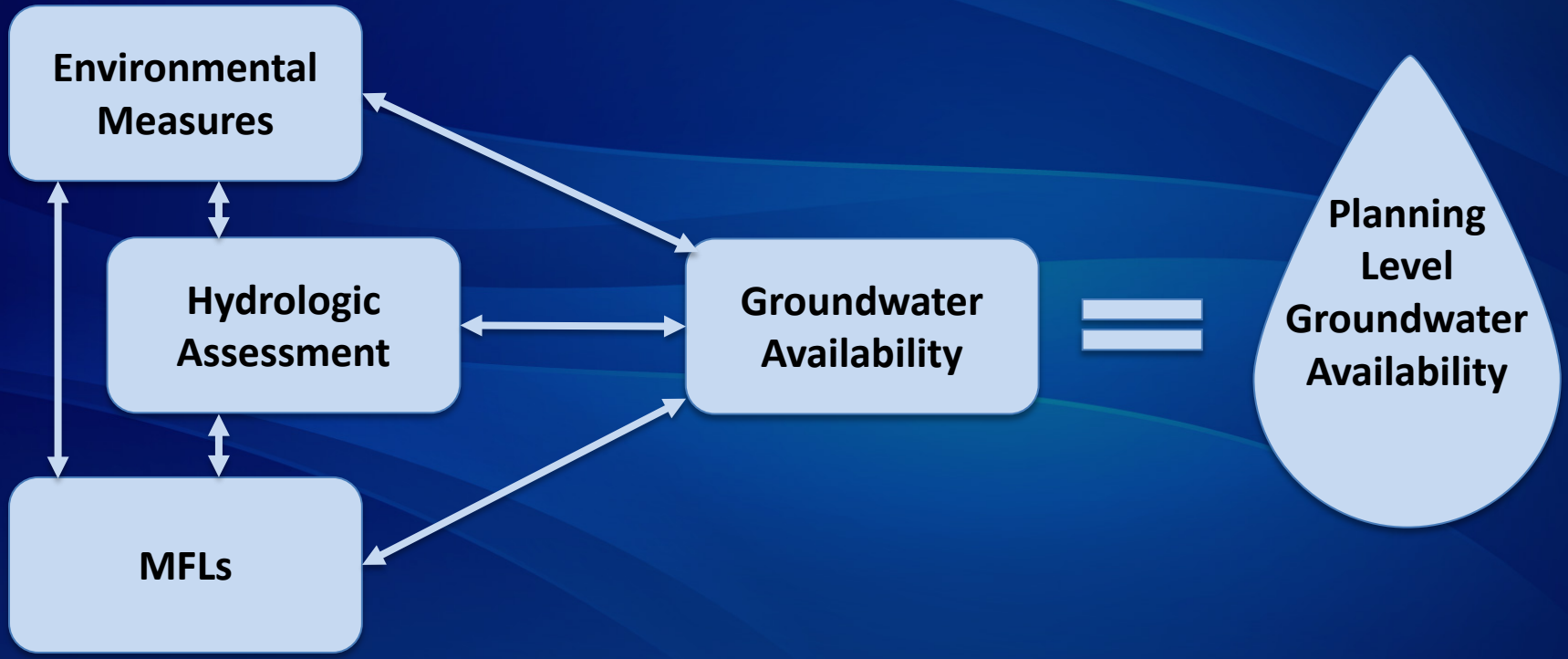
  41% increase

Historic Water Use and Projected Water Demand versus Historic Population and Projected Population



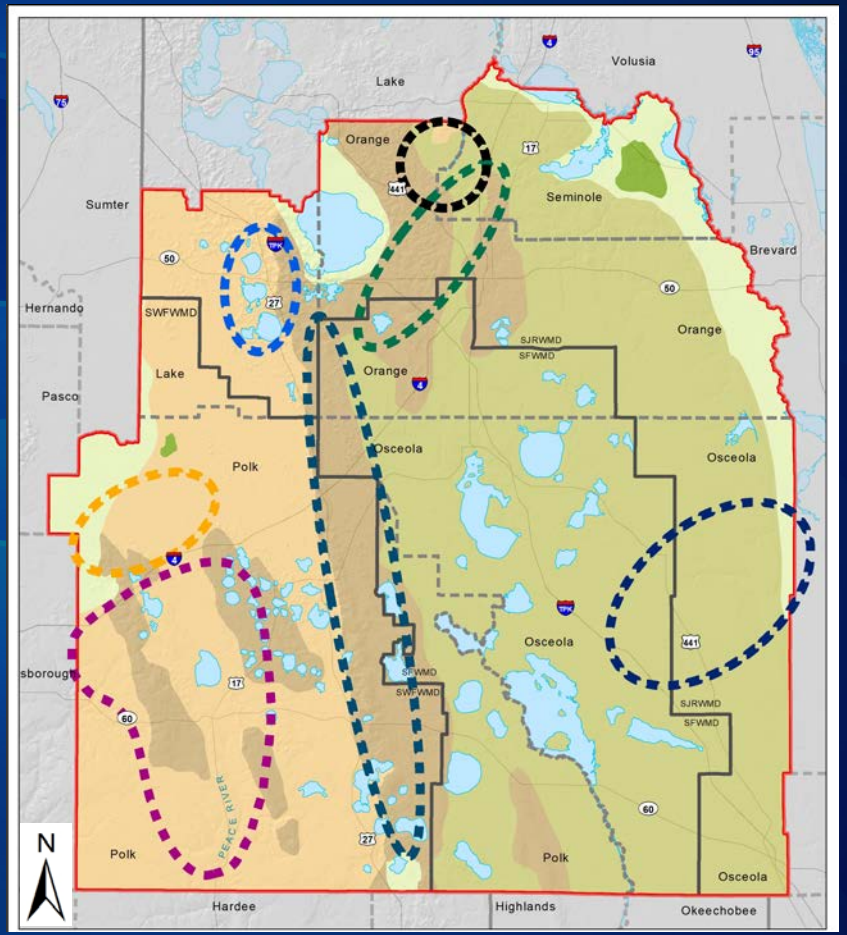
1995-2020 is historic data / 2025-2045 is projected data.

Groundwater Availability

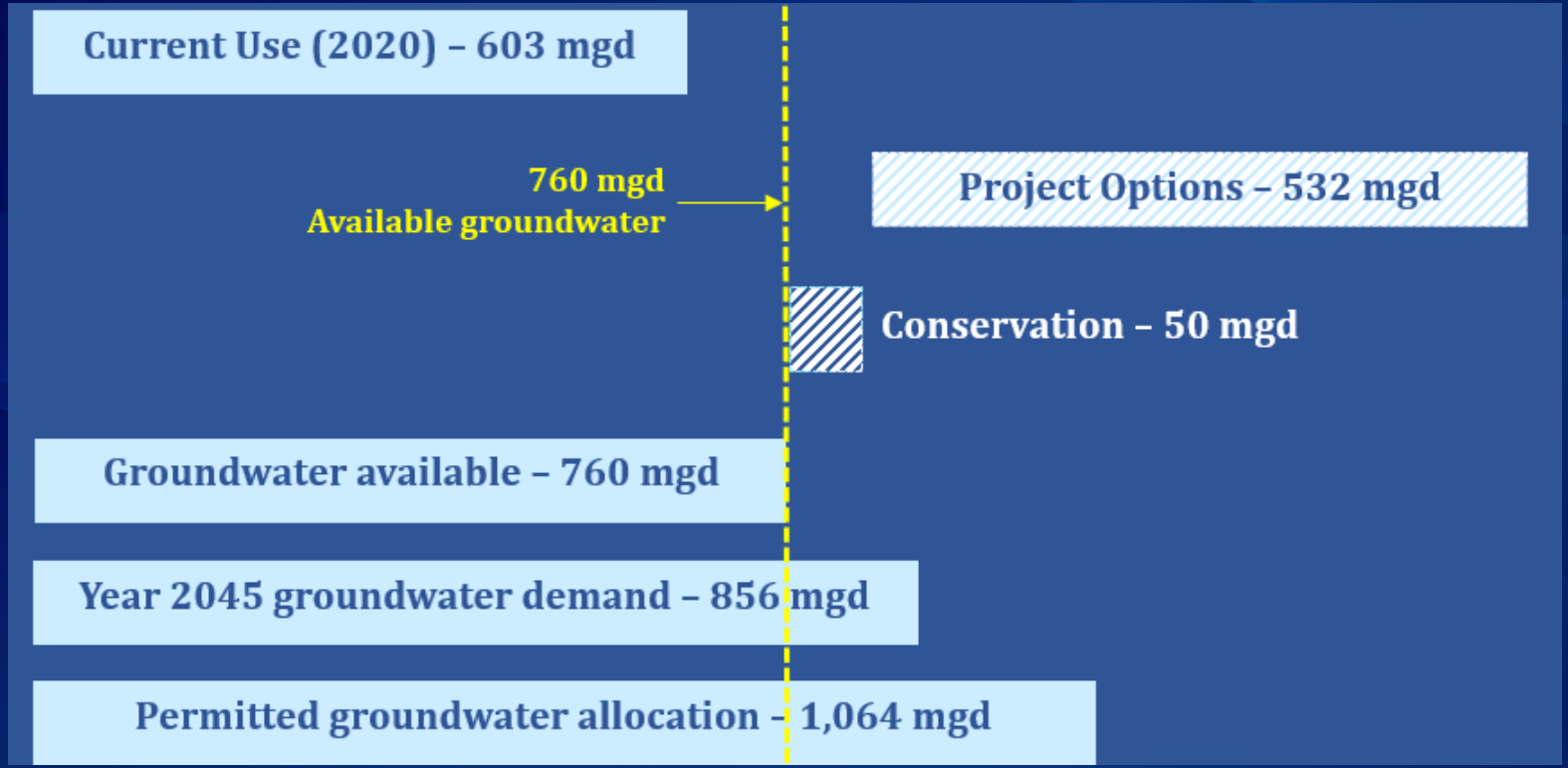


Primary Areas Susceptible to Groundwater Withdrawals (2020 RWSP)

- Wekiva Springs/River System
- West Seminole County/West Orange County
- South Lake County
- East Osceola County
- Lake Wales Ridge
- Upper Peace River Basin
- Central Polk County (north of I-4)



Planning-Level Groundwater Availability



Schedule

Public Outreach Meeting	*October 2023*
Technical Methods Public Workshop	*April 2024*
Steering Committee/Public Workshop (with results)	October 2024
Governing Board overview of Draft 2025 CFWI RWSP	February/March 2025
Draft 2025 CFWI RWSP for public comment	March 2025
Steering Committee/Public Workshop	April 2025
Public Comment Ends	May 2025
Steering Committee/Public Workshop on Draft Final RWSP	October 2025
Governing Board Approval of the 2025 CFWI RWSP	November 2025
Final 2025 CFWI RWSP posted to cfwiwater.com	December 2025

Questions

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  - *6 Mutes/Unmutes

Hydrologic Assessment

Peter J. Kwiatkowski, P.G.
South Florida Water Management District
CFWI Hydrologic Assessment Lead

Topics

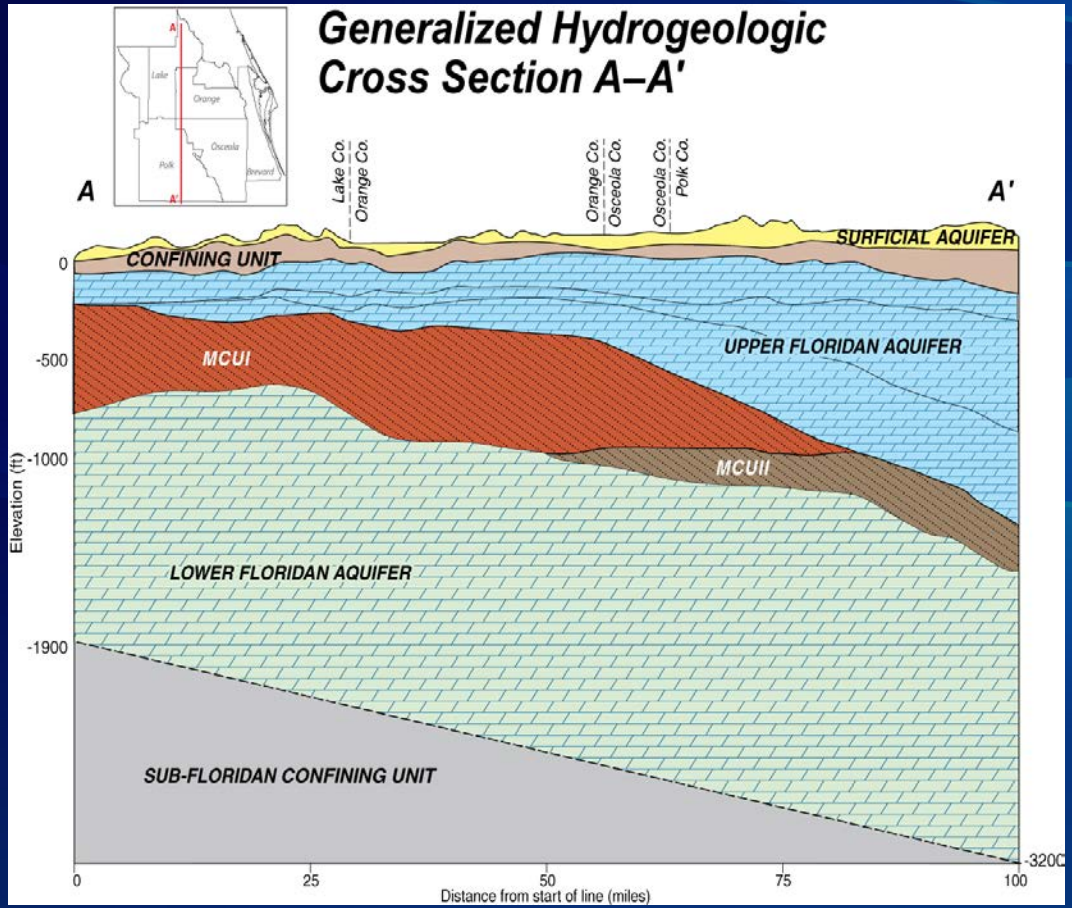
- Purpose of Modeling
- Central Florida Hydrogeology and Hydrology
- East Central Florida Transient Expanded (ECFTX v2.0) Groundwater Flow Model
- Modeling Scenarios
- Example Model Output

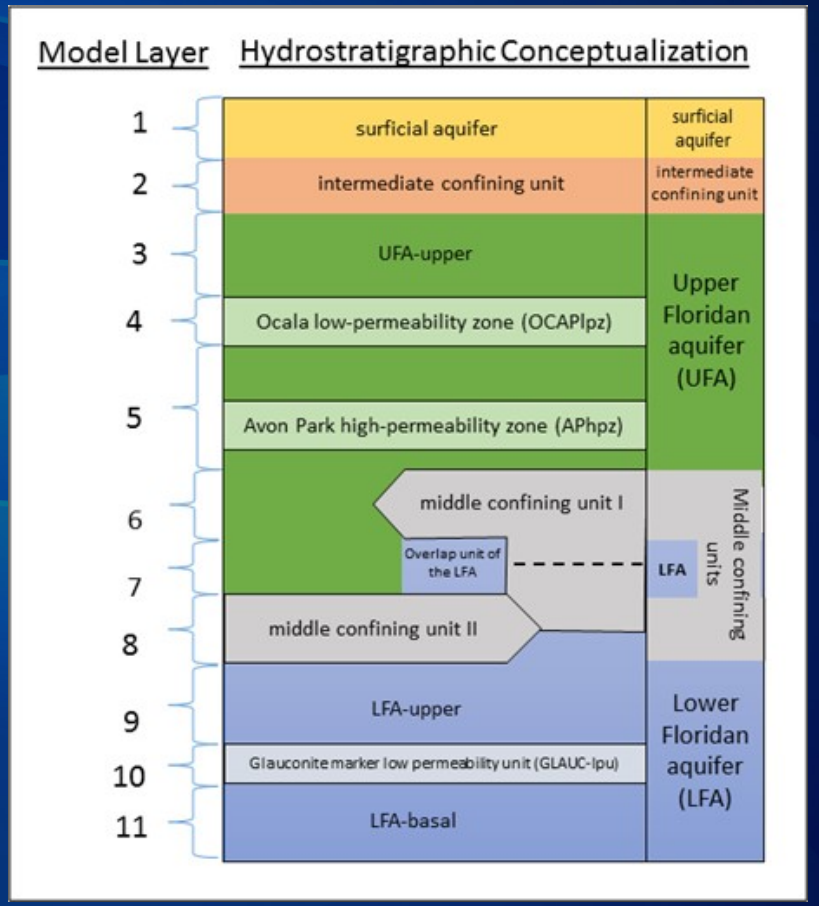
Purpose of Modeling

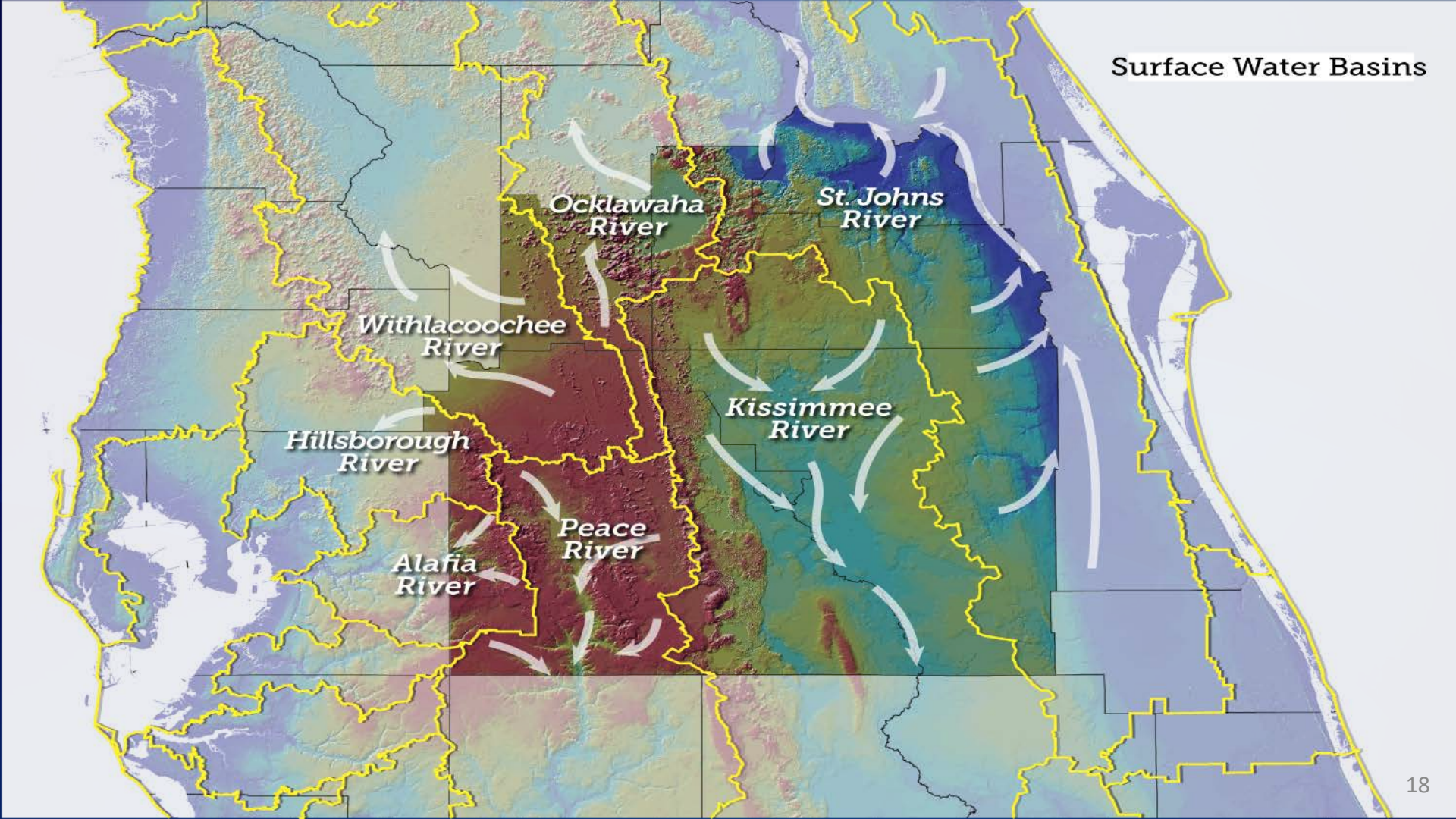
Use a calibrated, peer-reviewed groundwater flow model to:

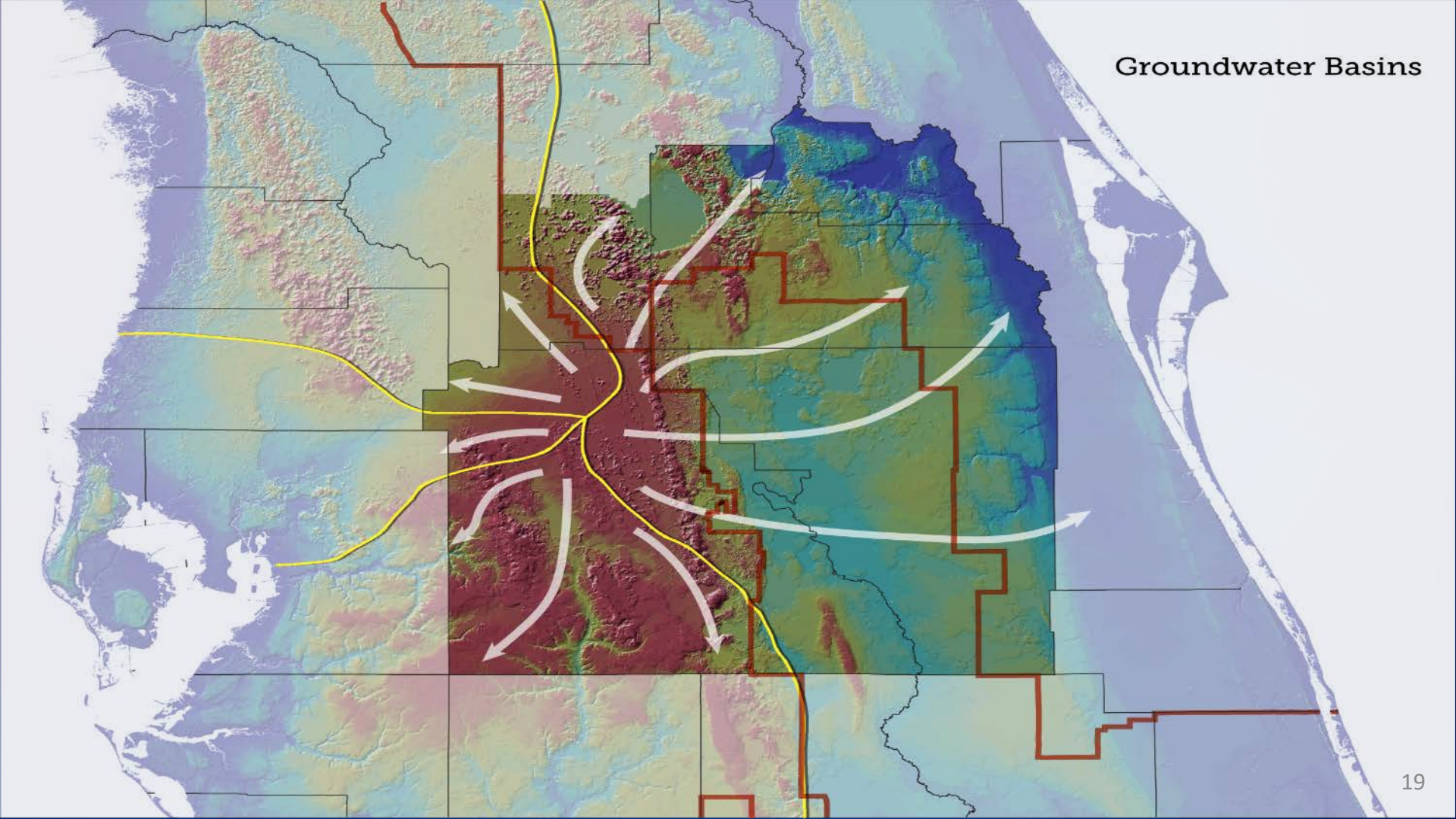
- Simulate effects of groundwater withdrawals on natural systems, including springs, lakes, wetlands, and aquifers
- Assist in evaluating whether projected water supply demands can be met over the 20-year planning horizon while meeting resource protection criteria

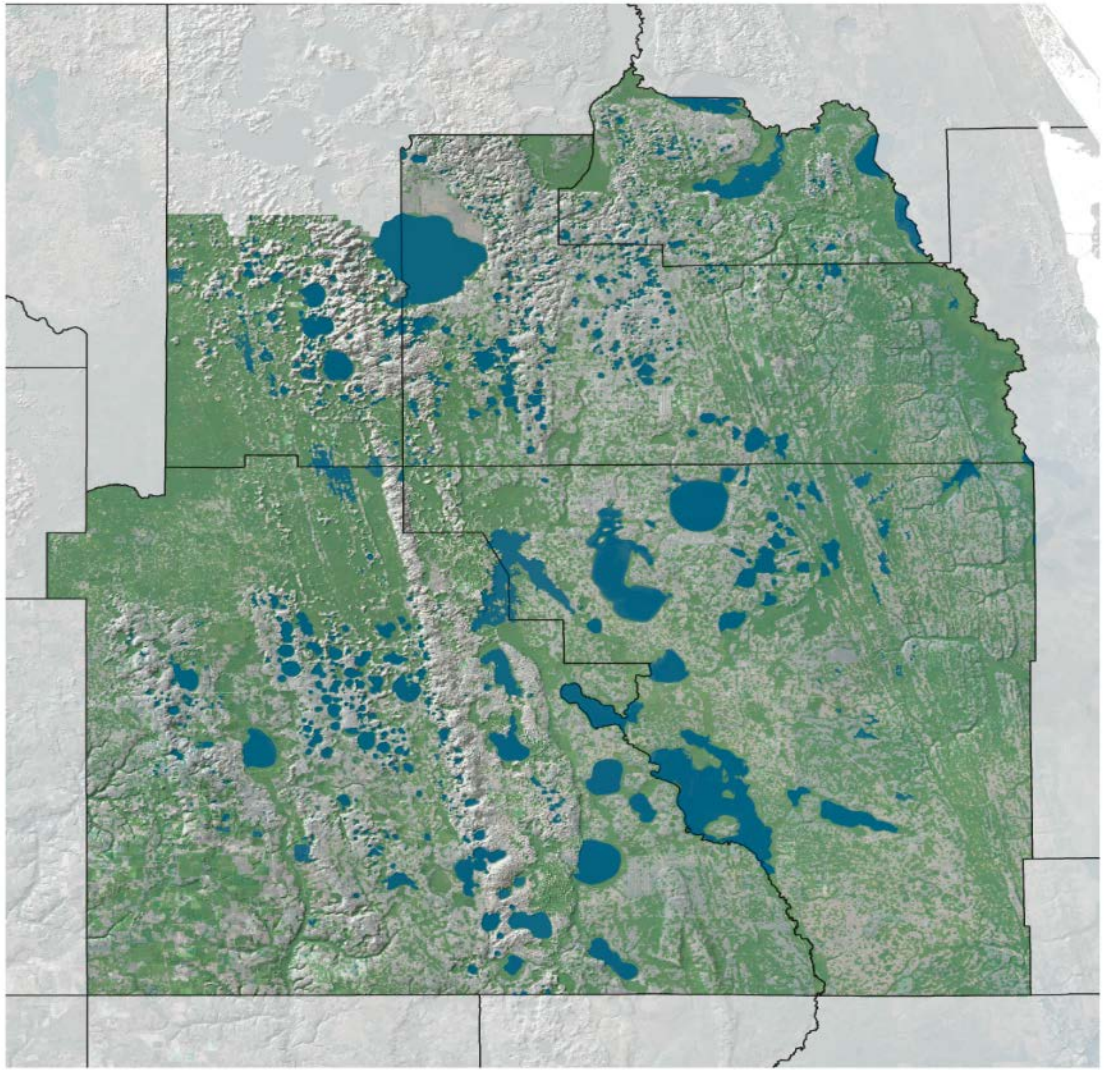
Central Florida Hydrogeology






Surface Water Basins
Ocklawaha River
St. Johns River
Withlacoochee River
Kissimmee River
Hillsborough River
Peace River
Alafia River


Groundwater Basins

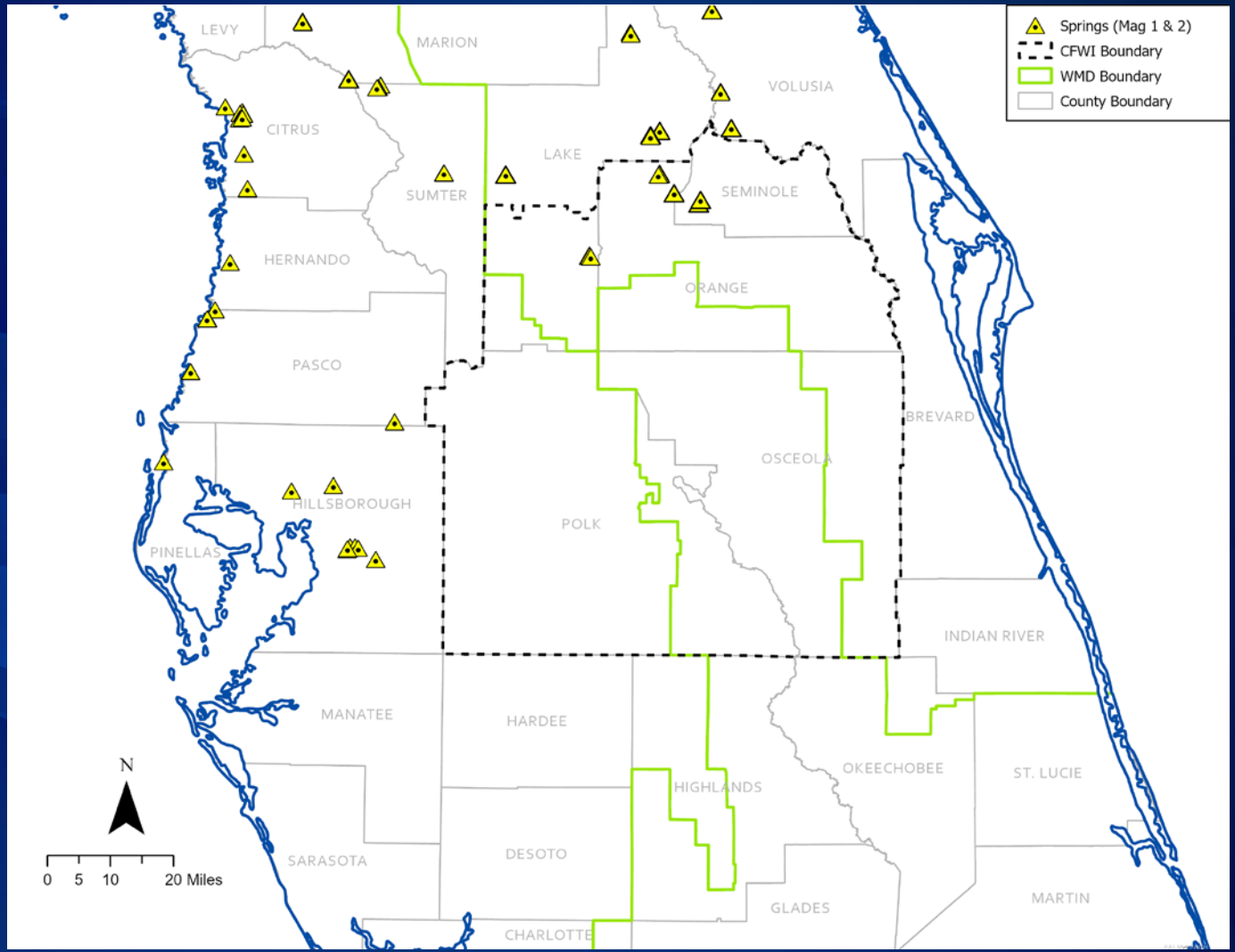


Lakes and Wetlands

lakes

wetlands

Springs

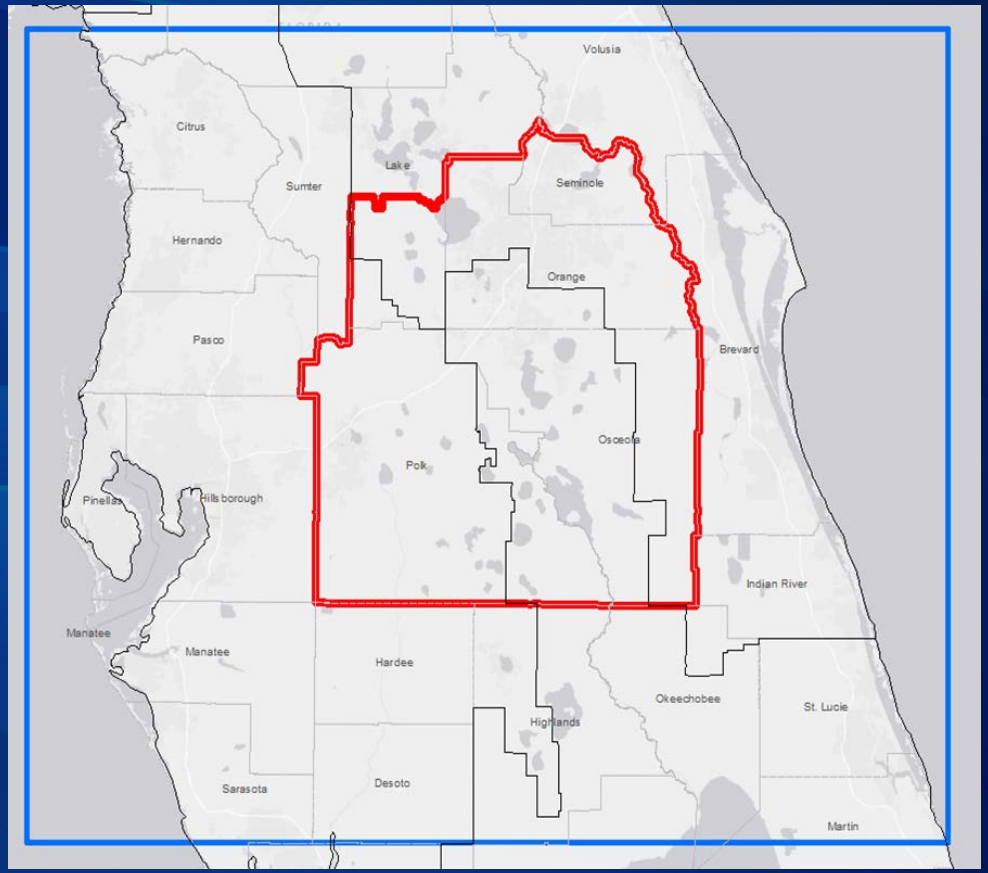

Springs (Mag 1 & 2)
CFWI Boundary
WMD Boundary
County Boundary
LEVY
MARION
VOLUSIA
CITRUS
LAKE
SUMTER
SEMINOLE
HERNANDO
ORANGE
PASCO
BREVARD
OSCEOLA
HILLSBOROUGH
POLK
PINELLAS
INDIAN RIVER
MANATEE
HARDEE
OKEECHOBEE
ST. LUCIE
HIGHLANDS
SARASOTA
DESOTO
GLADES
MARTIN
CHARLOTTE
N
0 5 10 20 Miles

Model History

- ECFT Model (2014) – original transient model
- ECFTX Model (2019) – updated model with expanded boundaries, improved calibration performance, peer reviewed by independent modeling experts
- ECFTX v2.0 Model (2021) – updated model with improved calibration statistics, especially in SJRWMD portion of model domain
  - Provides greater confidence in model results in area with several, sensitive natural system water bodies (e.g., lakes and springs)

East Central Florida Transient Model Expanded

- Planning Level Tool
- 2020 RWSP and 2025 RWSP
  - ECFTX
    - 25,000 sq. mi

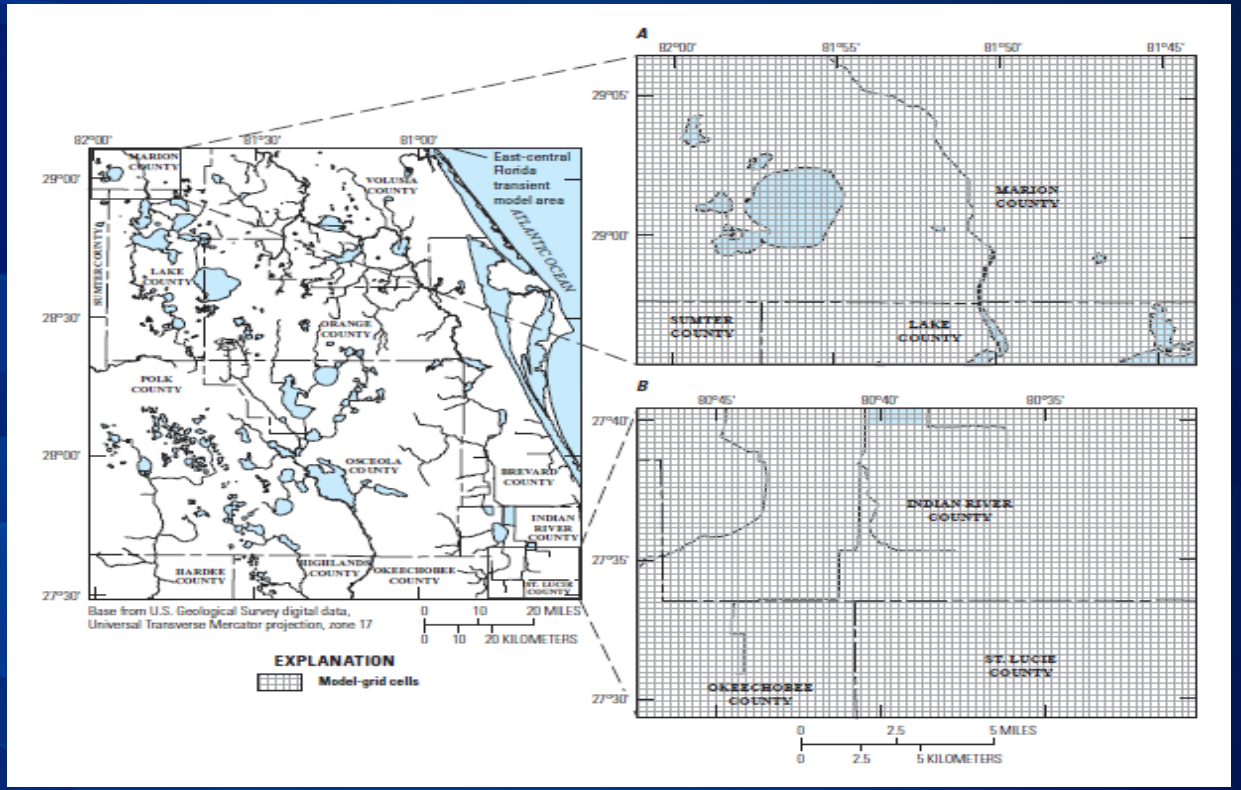


Red line = CFWI Planning Area boundary

Blue line = ECFTX model boundary

ECFTX v2.0 Groundwater Flow Model

- Use USGS' MODFLOW computer code
- Overlay uniform grid over area to be simulated
- Grid spacing: 1,250 ft by 1,250 ft
- 603 rows and 740 columns

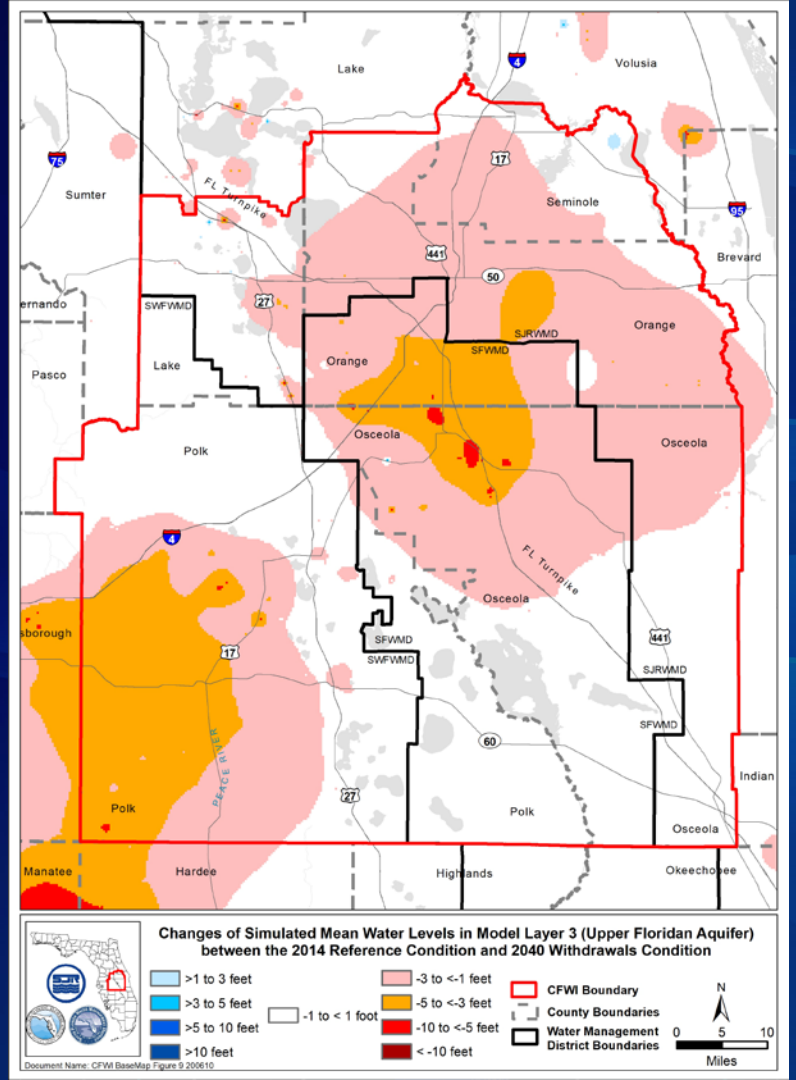


- Simulate groundwater flow incorporating rainfall, runoff, wetlands, evapotranspiration, lakes, rivers, springs, wells, RIBs, drains, etc.

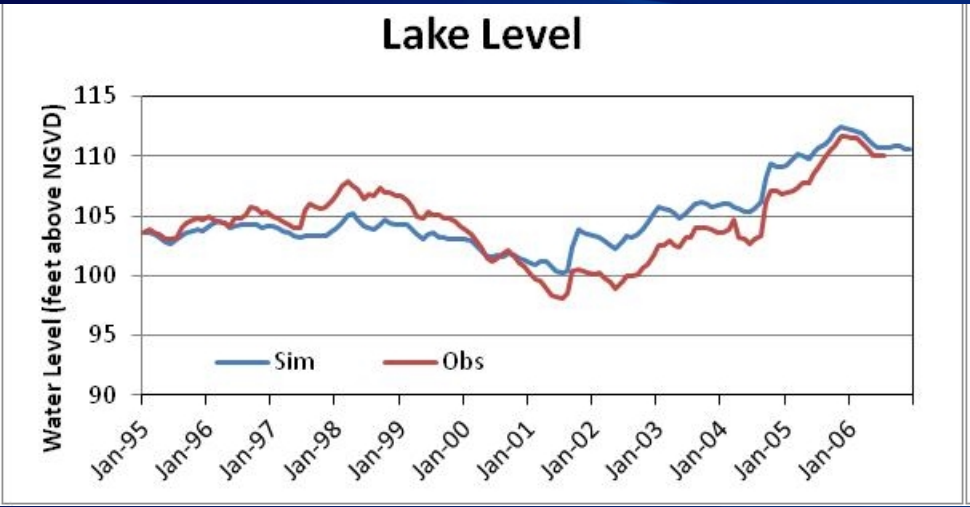
Modeling Scenarios

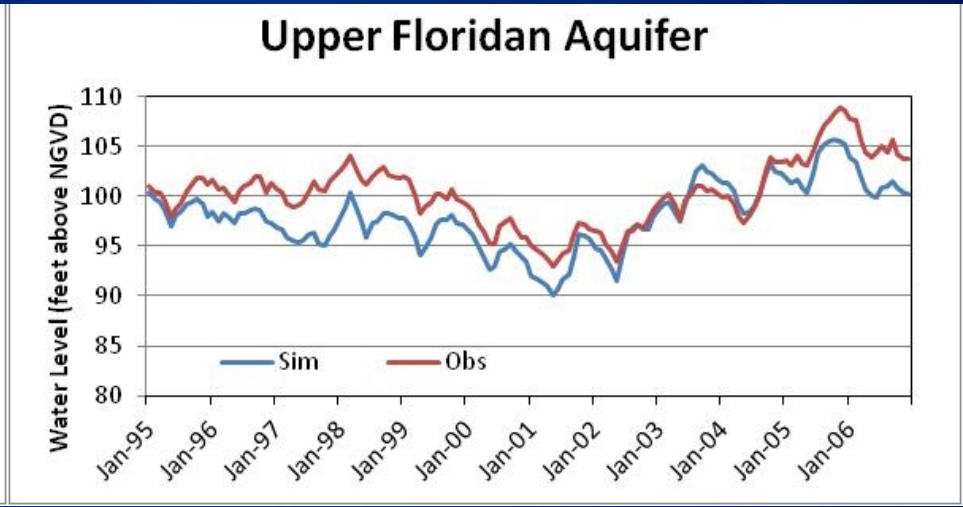
- Calibration and verification from 2003 to 2014
- Scenarios include rainfall from 2003 to 2014 (wet and dry years)
  - Reference Condition
    - 2016 -2020 average withdrawal condition
  - Future Conditions
    - 2025 withdrawal condition
    - 2030 withdrawal condition
    - 2035 withdrawal condition
    - 2040 withdrawal condition
    - 2045 withdrawal condition
- Compare simulated water levels and flows between reference condition and future condition
- Evaluate effects of groundwater withdrawals on aquifers and natural systems

Example Model Output:
Change in Water Levels in Upper Floridan Aquifer (UFA)



Example Model Output: Change in Water Levels





Questions

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Minimum Flows and Minimum Water Levels

Doug Leeper
Southwest Florida Water Management District
Minimum Flows and Levels and Reservations Lead

Minimum Flows and Minimum Water Levels (MFLs)

Water management districts or the Florida Department of Environmental Protection must establish minimum flows and levels (MFLs) that set the limit or level…

"…at which further withdrawals would be significantly harmful to the water resources or ecology of the area."

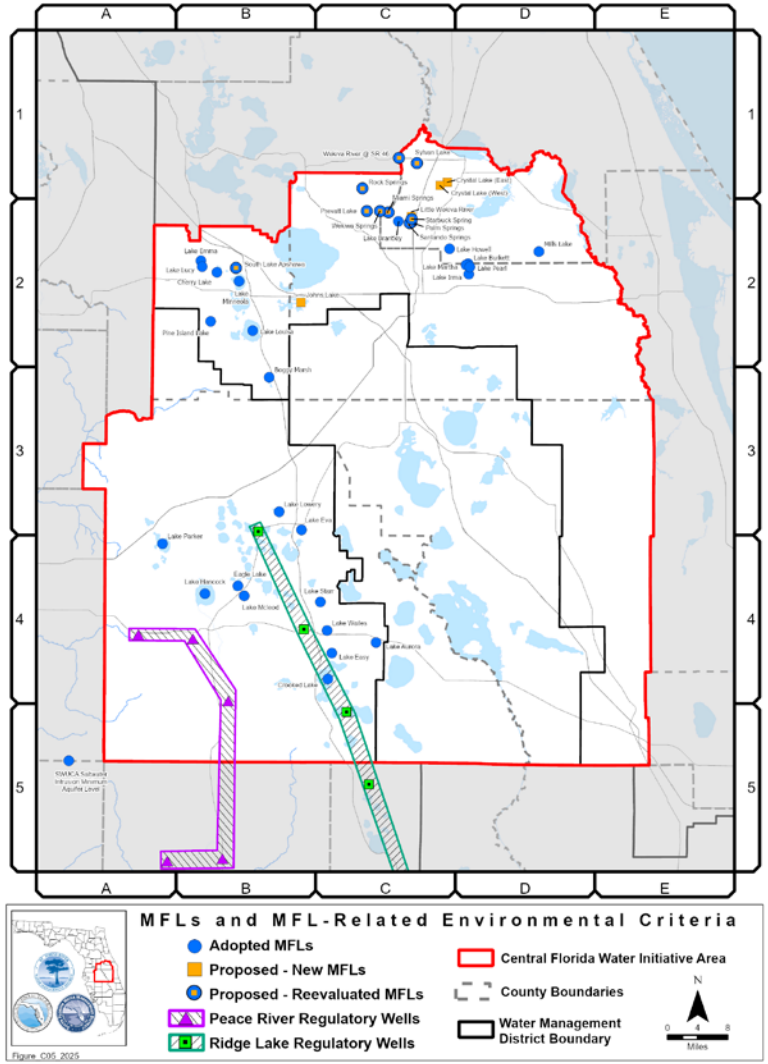
from Subsection 373.042(1), Florida Statutes

Use of MFLs

- Water use permitting
- Water supply planning

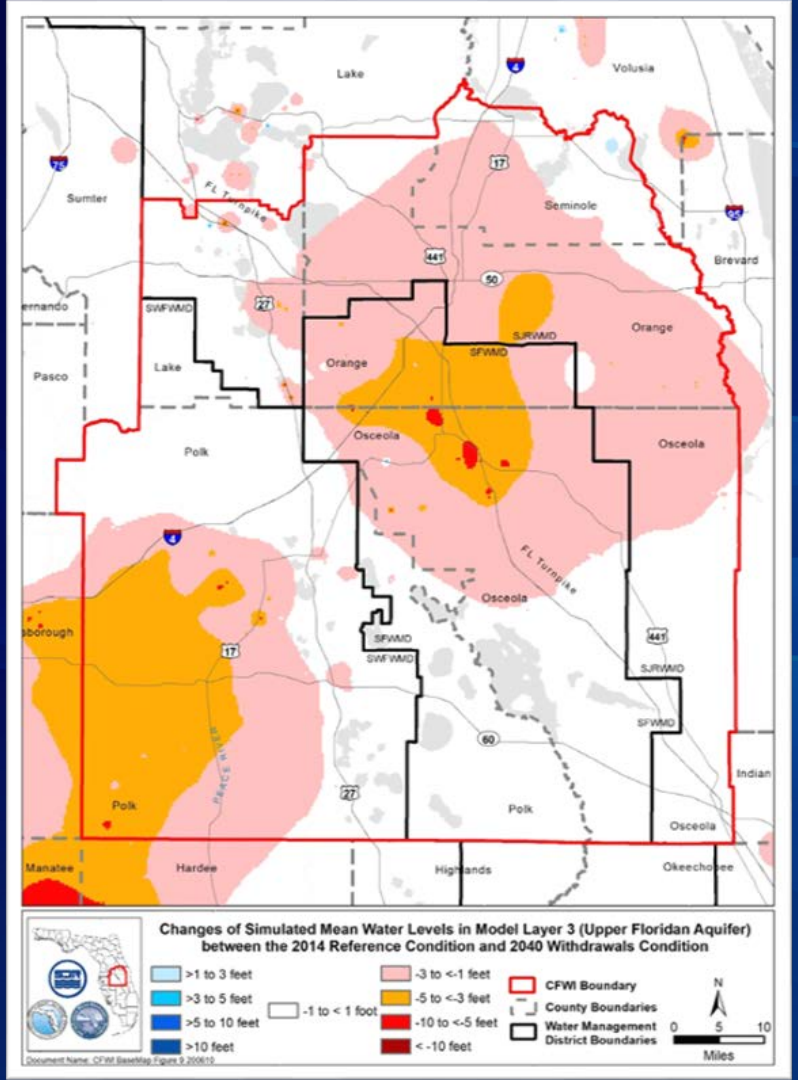
MFLs Environmental Criteria Data/Tools/Methods

- Data
  - MFLs environmental criteria
    - Adopted MFLs for lakes, springs, and rivers
    - As available, additional new or revised MFLs
    - Regulatory well target water levels for lake and river MFLs
  - Surface water levels/flows, well water levels, rainfall, evapotranspiration, and other hydrologic data
  - ECFTX model output (UFA levels and flows)
- Tools/Methods
  - ECFTX model output and water budget models used to determine effects of groundwater level changes on MFLs environmental criteria



MFLs and MFL-Related Environmental Criteria

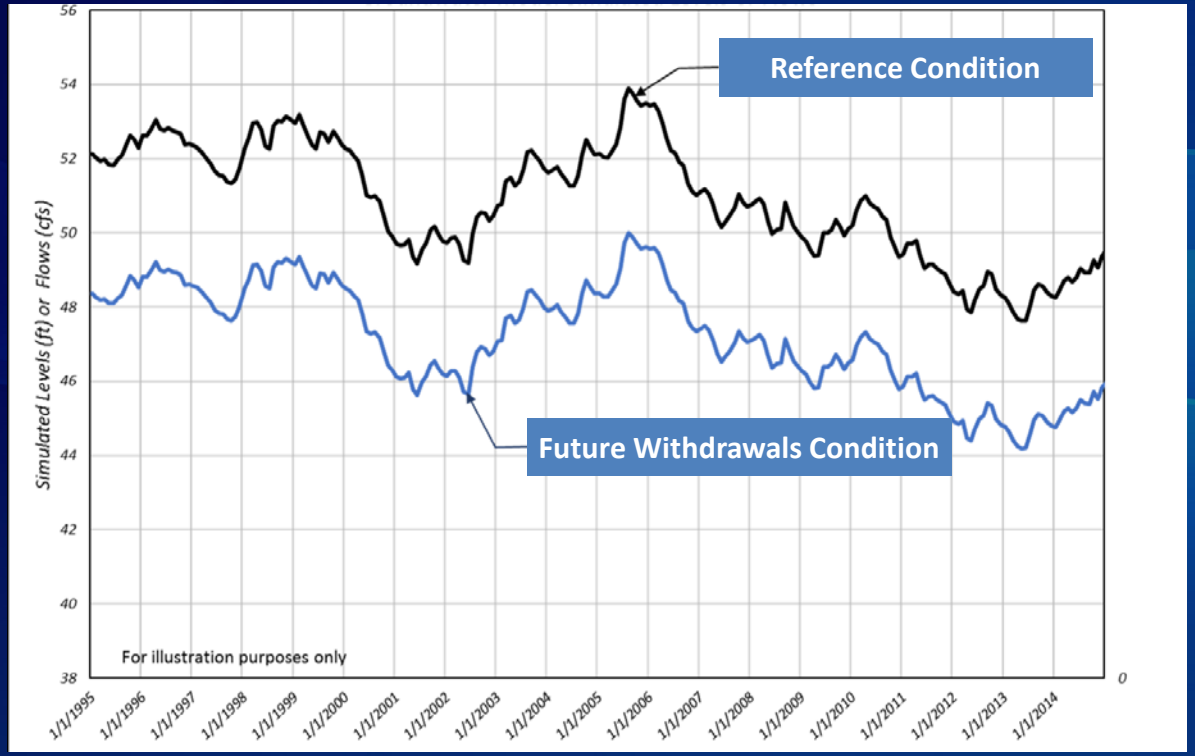
- Adopted MFLs in the CFWI Planning Area: 28 lakes/ wetlands, 6 springs, and 1 river segment
- Adopted Southern Water Use Caution Area (SWUCA) Saltwater Intrusion Minimum Aquifer Level
- Upper Peace River Regulatory Wells for SWUCA recovery
- Ridge Lakes Regulatory Wells for SWUCA recovery
- As available, proposed MFLs in the CFWI Planning Area: 6 lakes, 6 springs, and 2 river segments



Example Model Output: Change in Water Levels in UFA

Predicted change from the Reference Condition to 2040 Withdrawals Condition from the previous CFWI planning effort

Site-specific Predicted Changes in Upper Floridan Aquifer Water Levels



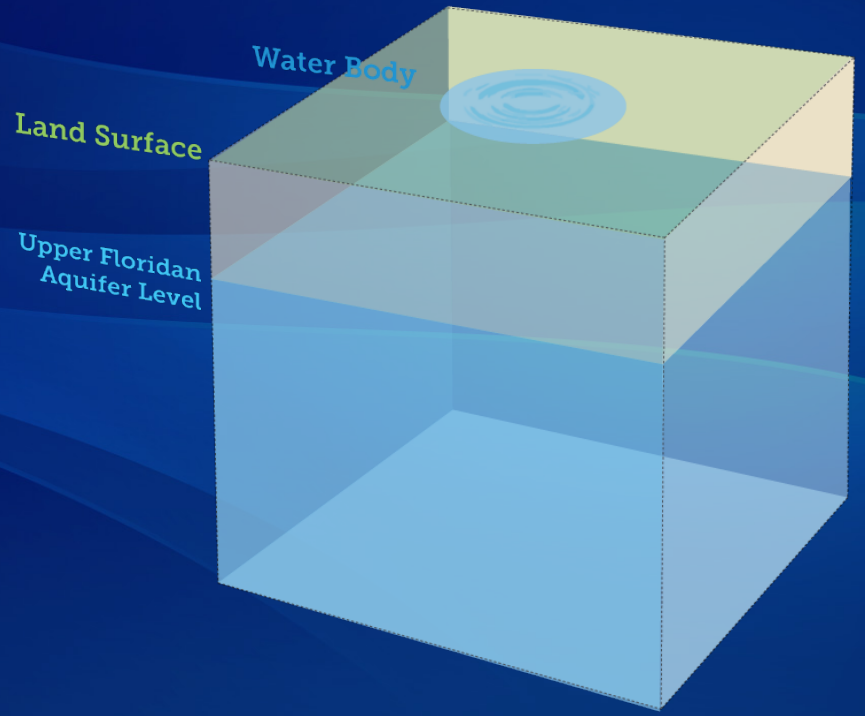
Hypothetical example: Predicted UFA water levels in a well near a lake

- *Water level differences represent UFA change*
- *UFA change linked to surface water change with water budget models*

MFLs Environmental Criteria

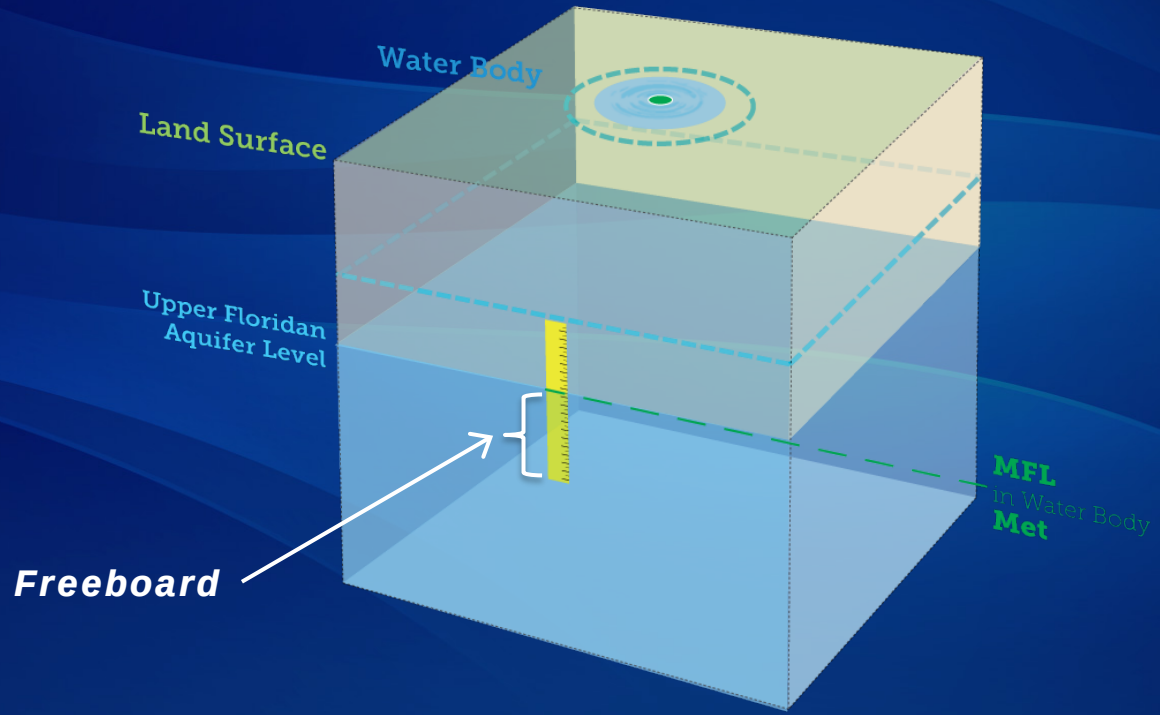
Linking Upper Floridan Aquifer Levels to Surface Water Levels

Water budget models link predicted Upper Floridan aquifer levels with surface water body levels



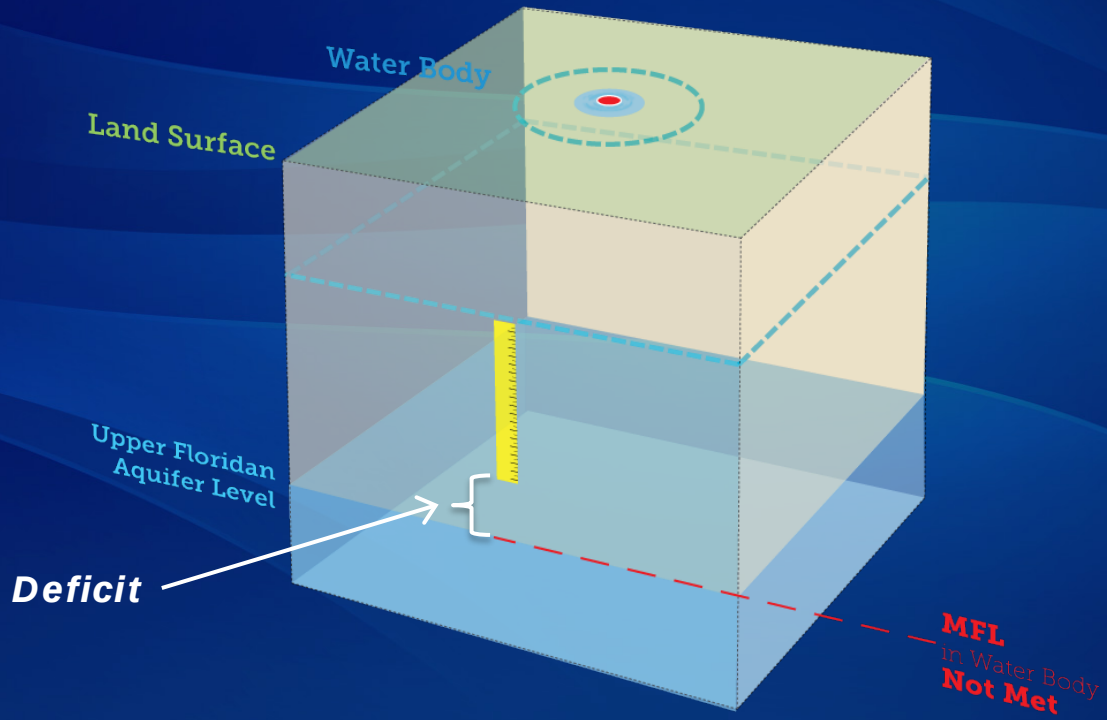
MFLs Environmental Criteria

Upper Floridan Aquifer Drawdown and Freeboard Concept



MFLs Environmental Criteria

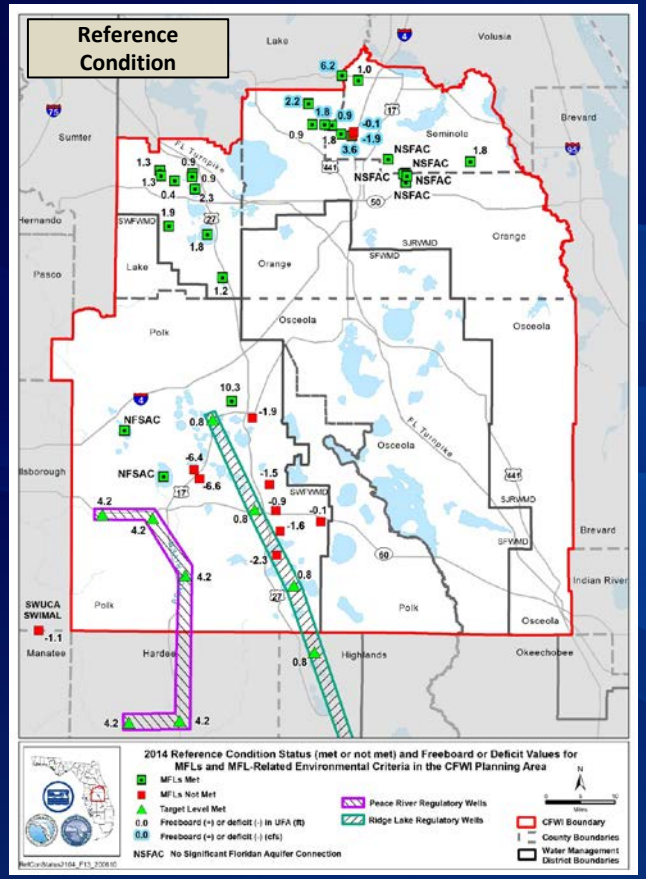
Upper Floridan Aquifer Drawdown and Freeboard/Deficit Concept

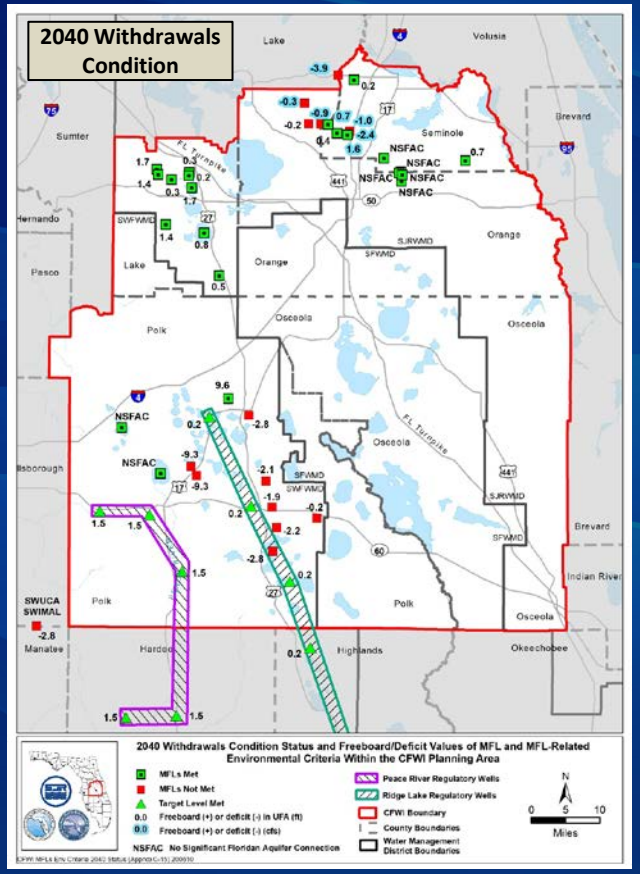


Freeboard/Deficit Expression for MFLs Environmental Criteria

- Freeboard/deficit in feet for lakes with MFLs and a groundwater MFL
- Freeboard/deficits in cubic feet per second for rivers and springs with MFLs
- Freeboard/deficits in feet for regulatory wells associated with an MFLs recovery strategy

MFL Environmental Criteria Mapping





Example: Modeled status of MFL-related criteria from the 2020 CFWI planning effort

- *Green symbols indicate criteria "met"*
- *Red symbols indicate criteria "not met"*

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Environmental Measures

Kym Rouse Holzwart
Southwest Florida Water Management District
Environmental Measures Lead

Introduction and Background

- Water management district representatives
- Wetlands, hydrology, statistical analysis expertise
- Determines current status of wetlands
- Develops tools to analyze future groundwater withdrawals on wetlands

Wetlands Assessments

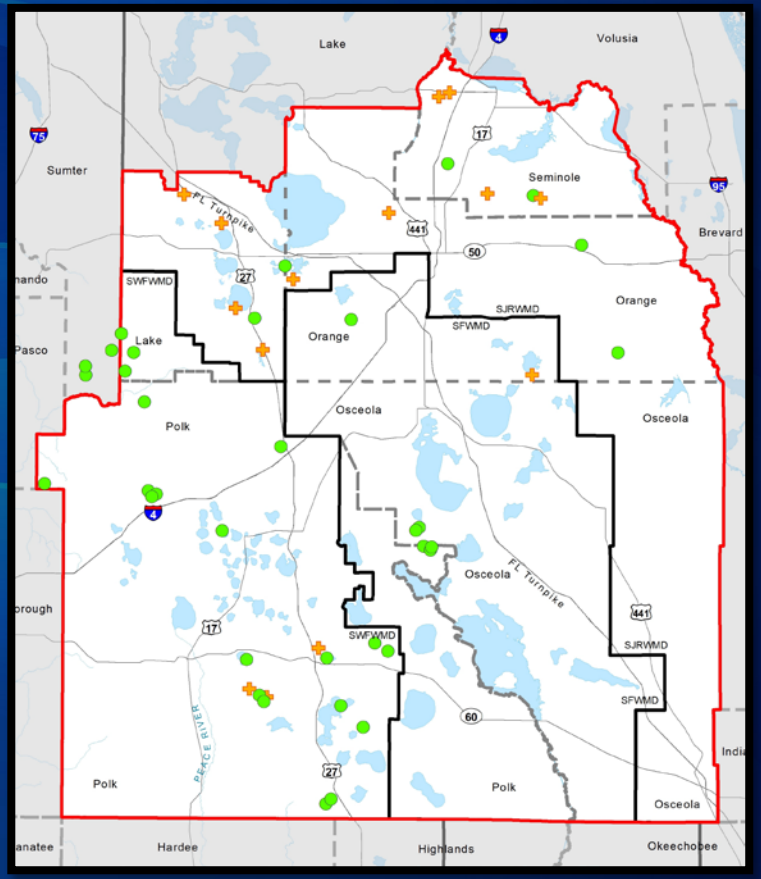
- Assessed ~400 wetlands and lakes
- Using EM-specific method, two types assessed:
  - Class 1: Condition and wetland edge known, long-term water level data
  - Class 2: Condition known
- Third type:
  - Class 3: Location known

Analysis Methodology

- Approved methodology:
  - Re-assessed original Class 1 and Class 2 wetlands
  - Added new wetlands
  - Original methodology with expanded wetlands dataset and updated model runs

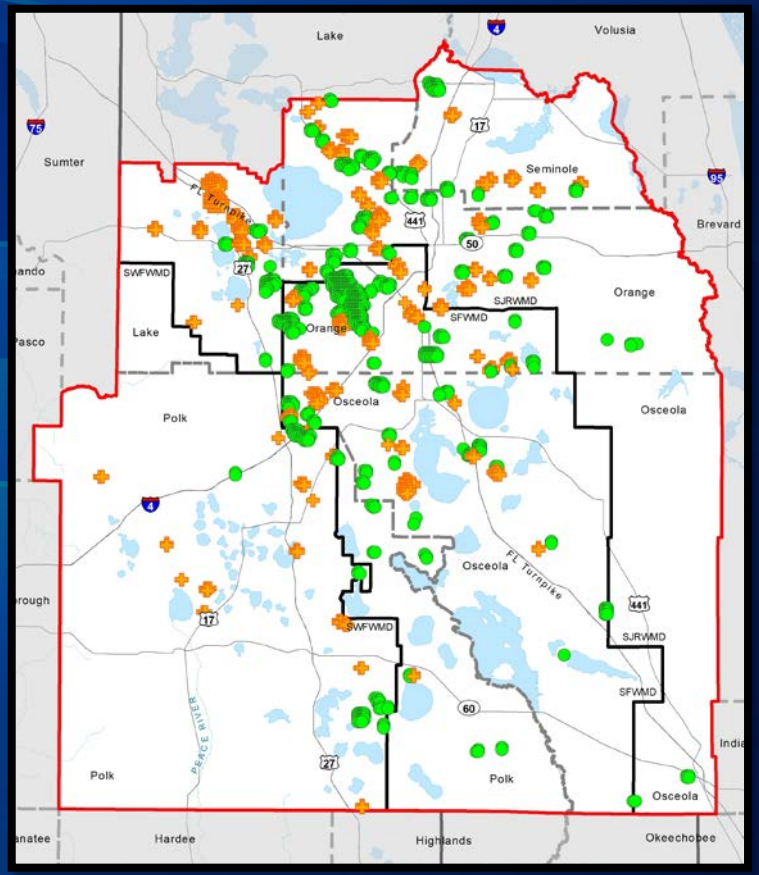
Class 1 Wetlands Dataset

- 51 wetlands
  - Most included in previous analyses
- 27 Plains wetlands (21 not stressed, 6 stressed)
- 24 Ridge wetlands (19 not stressed, 5 stressed)



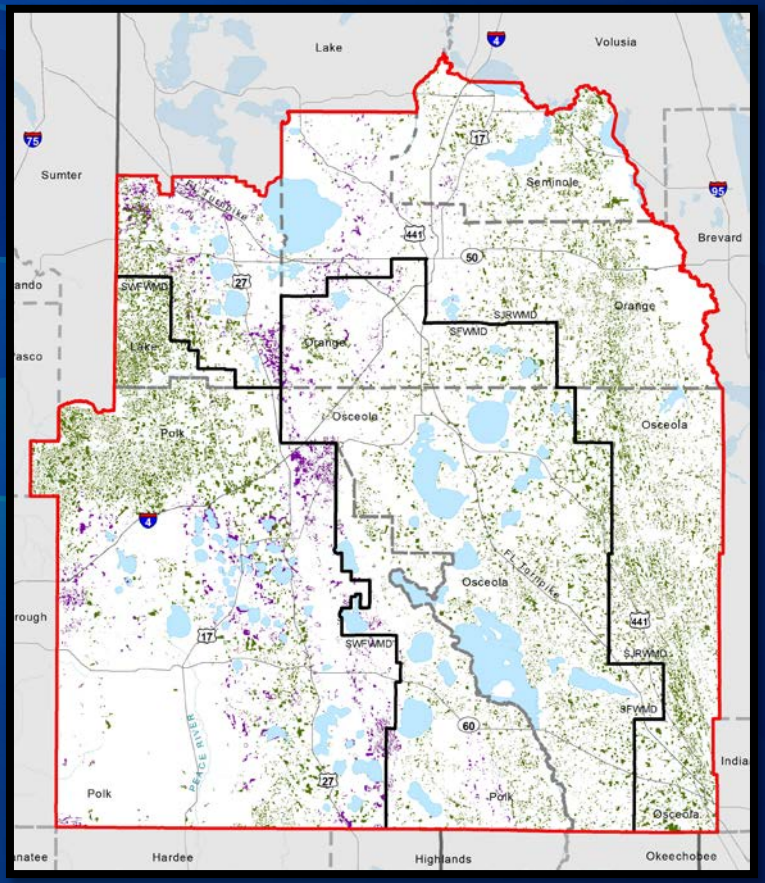
Class 2 Wetlands Dataset

- 342 wetlands
- 208 Plains wetlands (167 not stressed, 41 stressed)
- 134 Ridge wetlands (99 not stressed, 35 stressed)



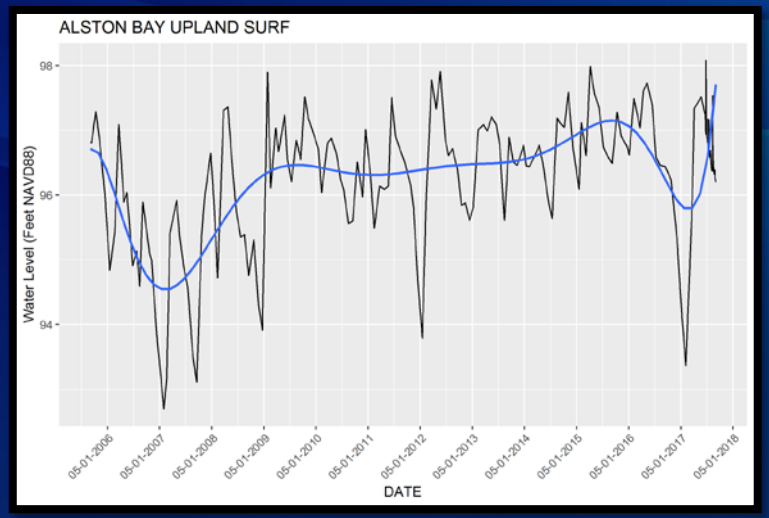
Class 3 Wetlands Dataset

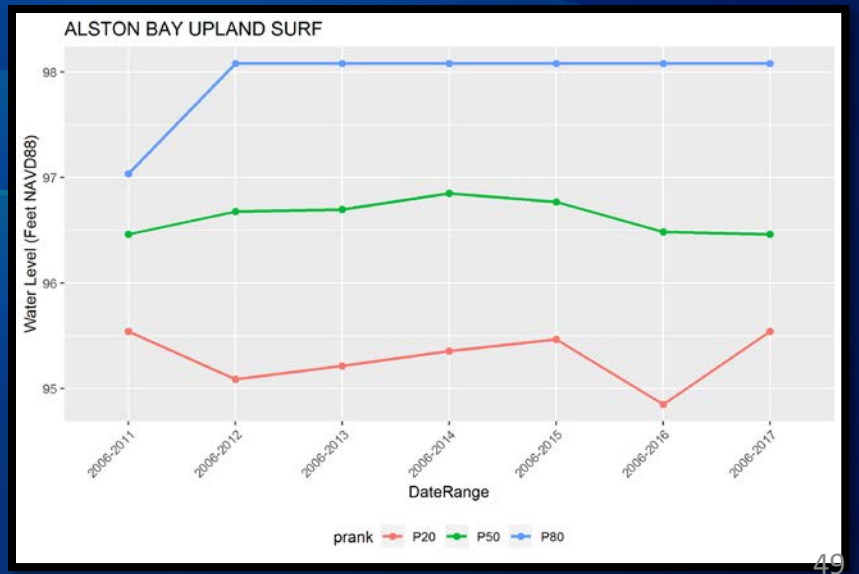
- Thousands
- Location known
- Stress status unknown



Wetlands Analysis Methodology Details

- Selected 8-year period of record (2015-2022) of Class 1 wetlands water level data to use for analysis
- Hydrologic index calculated by comparing P80 water level data to wetland edge elevation



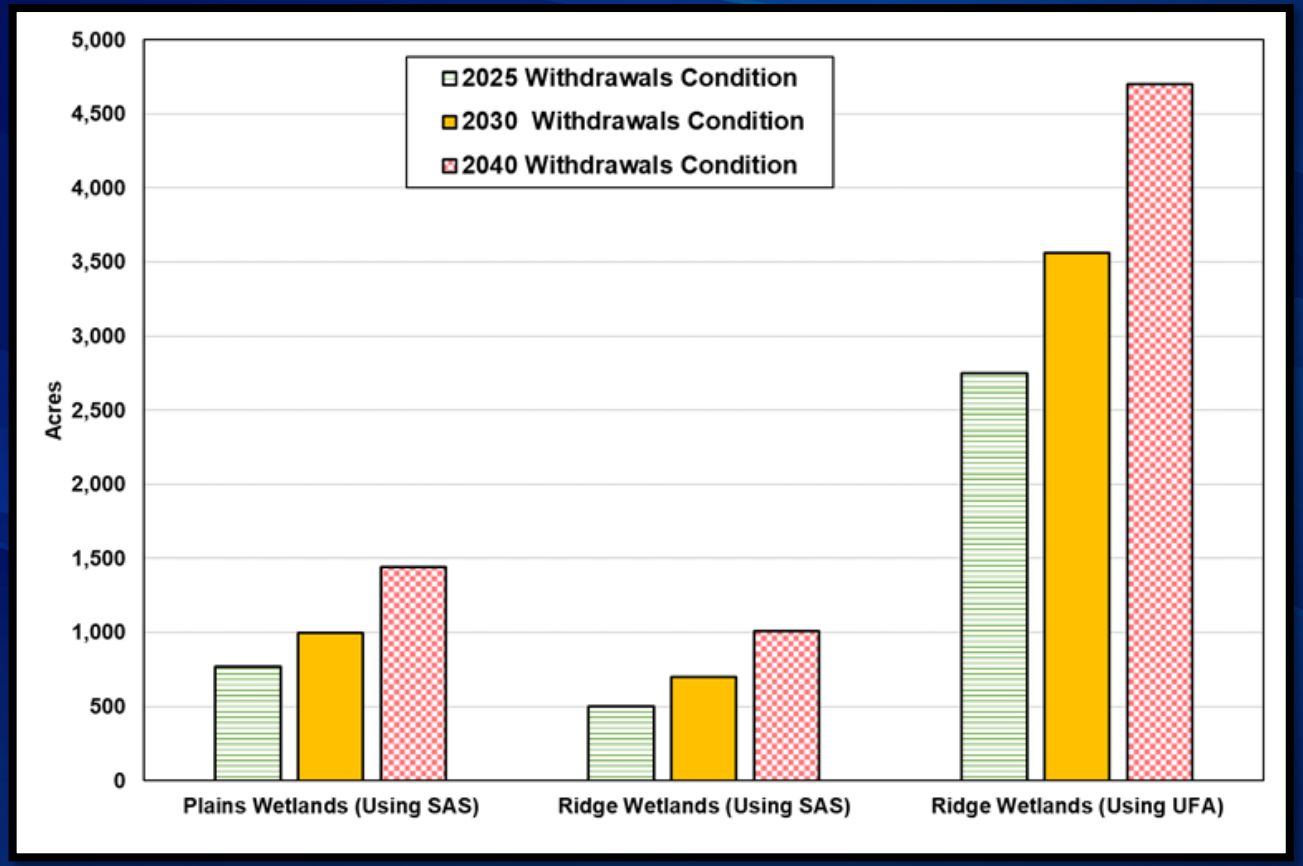


Wetlands Analysis Methodology Details

- Class 1 wetland hydrologic index and stress status used to develop statistical relationship
- Relationship used to develop equations to estimate probability of future change in wetland stress status
- Predict probable future change in stressed and unstressed wetland acreage on a regional scale

50

Wetlands Analysis Example Results



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