

East Central Florida Transient Model Update

Central Florida Coordination Area
Tools Development Team Workshop
July 29, 2010

*Presented by Jefferson B. Giddings
South Florida Water Management District*

Central Florida Coordination Area Model Naming Convention

- **DWRM** – South West Florida Water Management District's District Wide Regulation Model
- **ECFT** – South Florida Water Management District's East Central Florida Transient Model
- **CFCA** – Central Florida Coordination Area

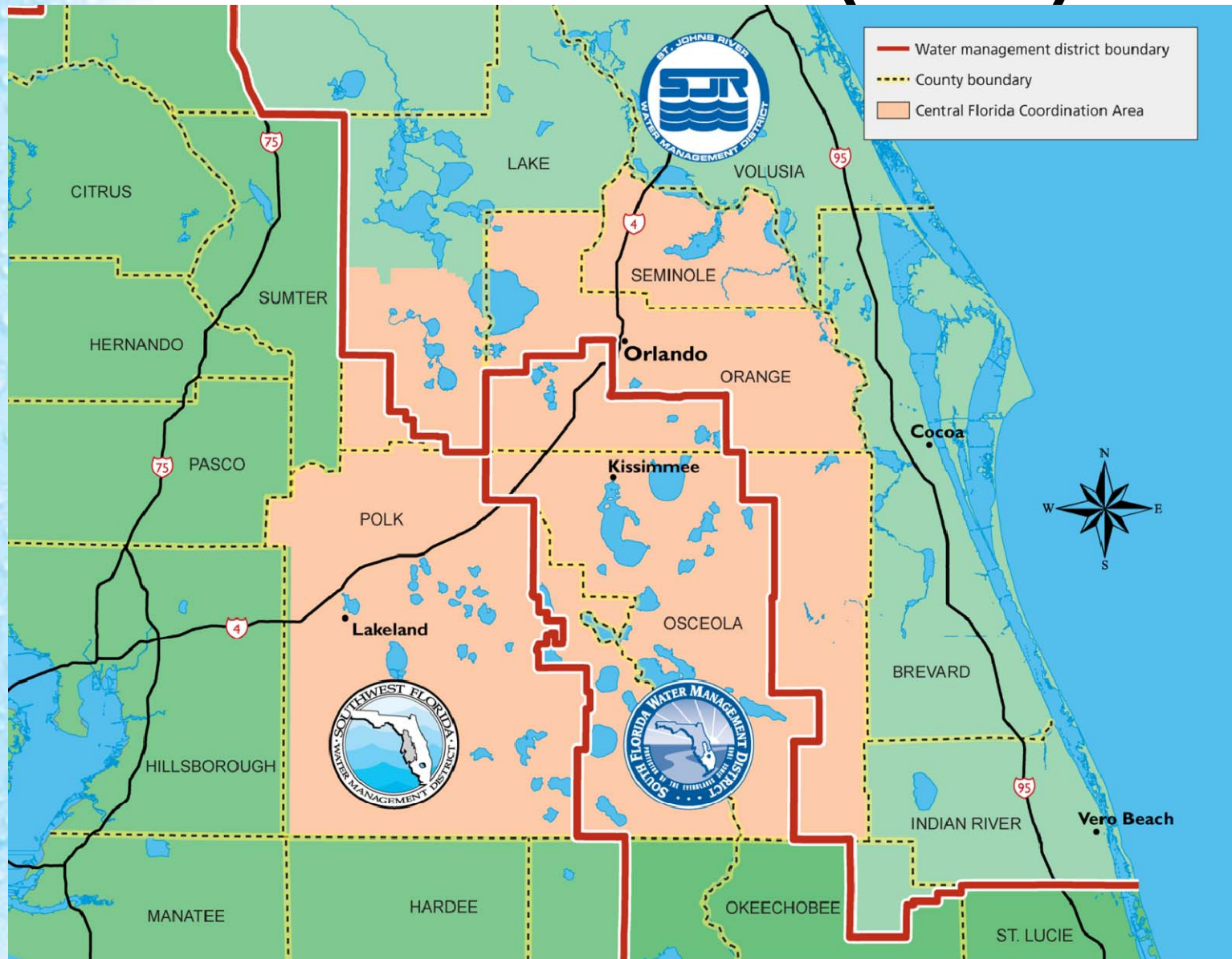
Central Florida Coordination Area – Presentation Overview

- Key Features of Central Florida
- Hydrogeology
- ECFT Model Development and Calibration Statistics

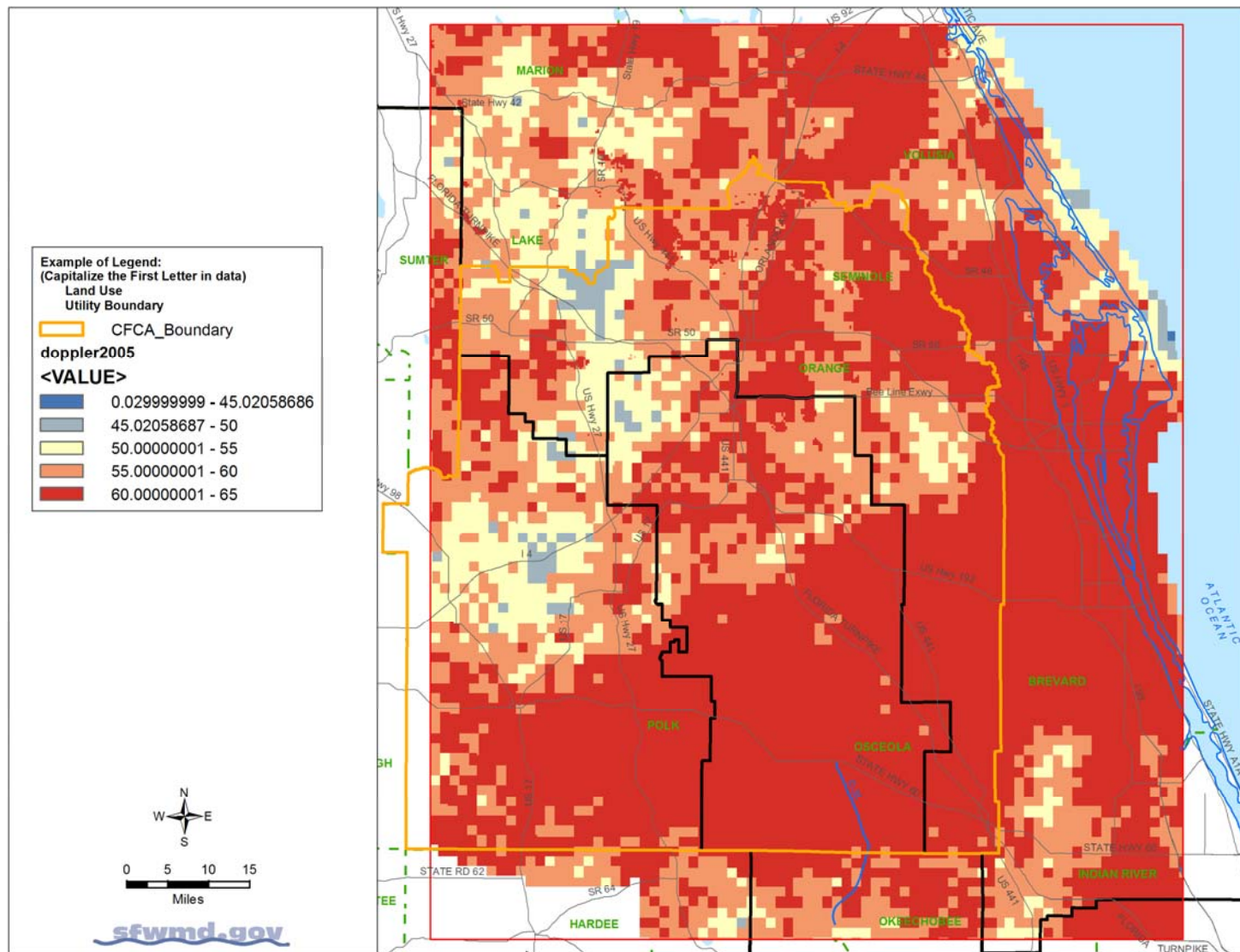
Generalized Features of the CFCA

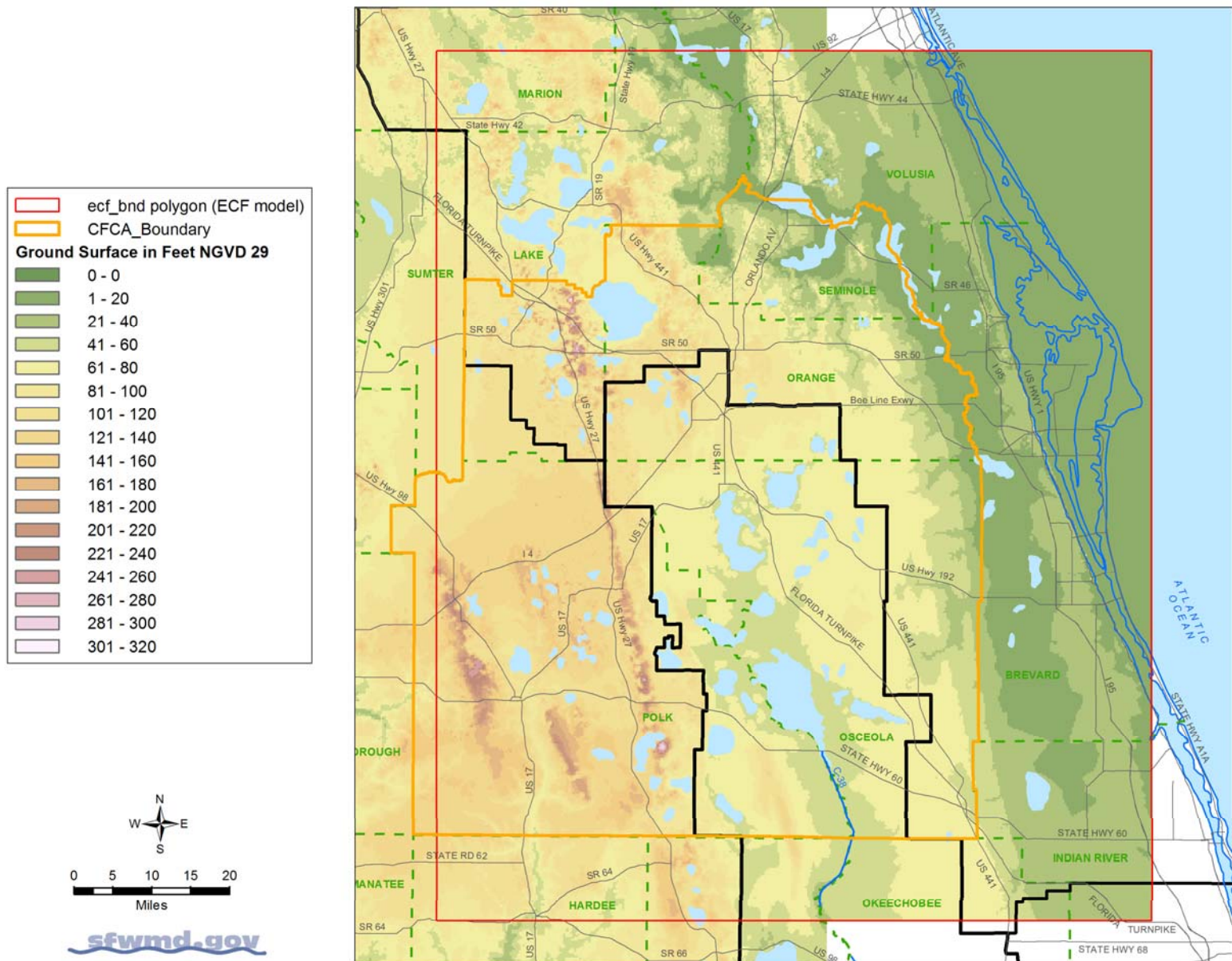


Location of the Central Florida Coordination Area (CFCA)

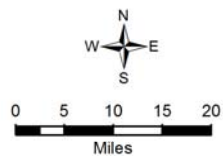


2005 Cumulative Doppler Rainfall Distribution

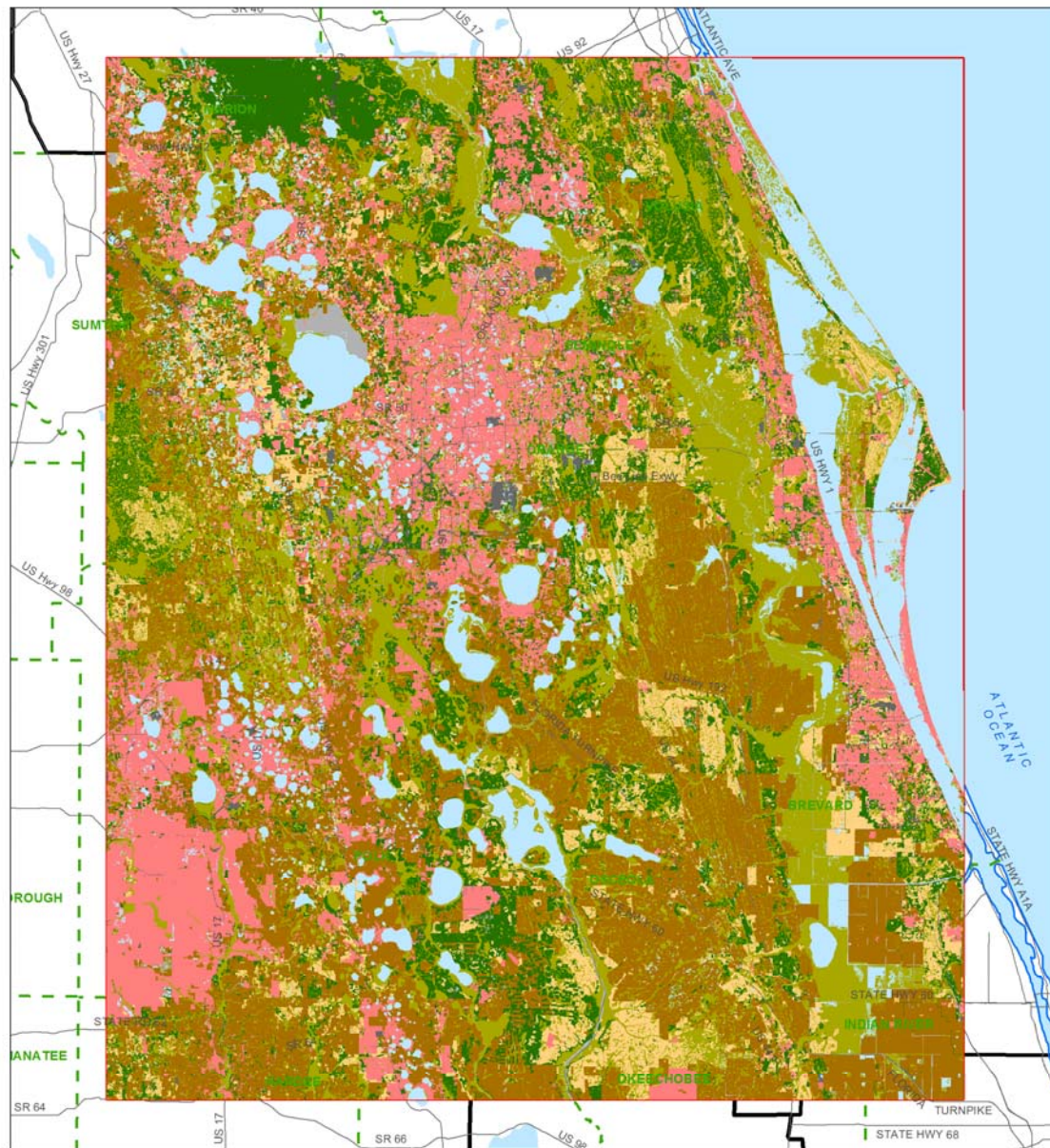




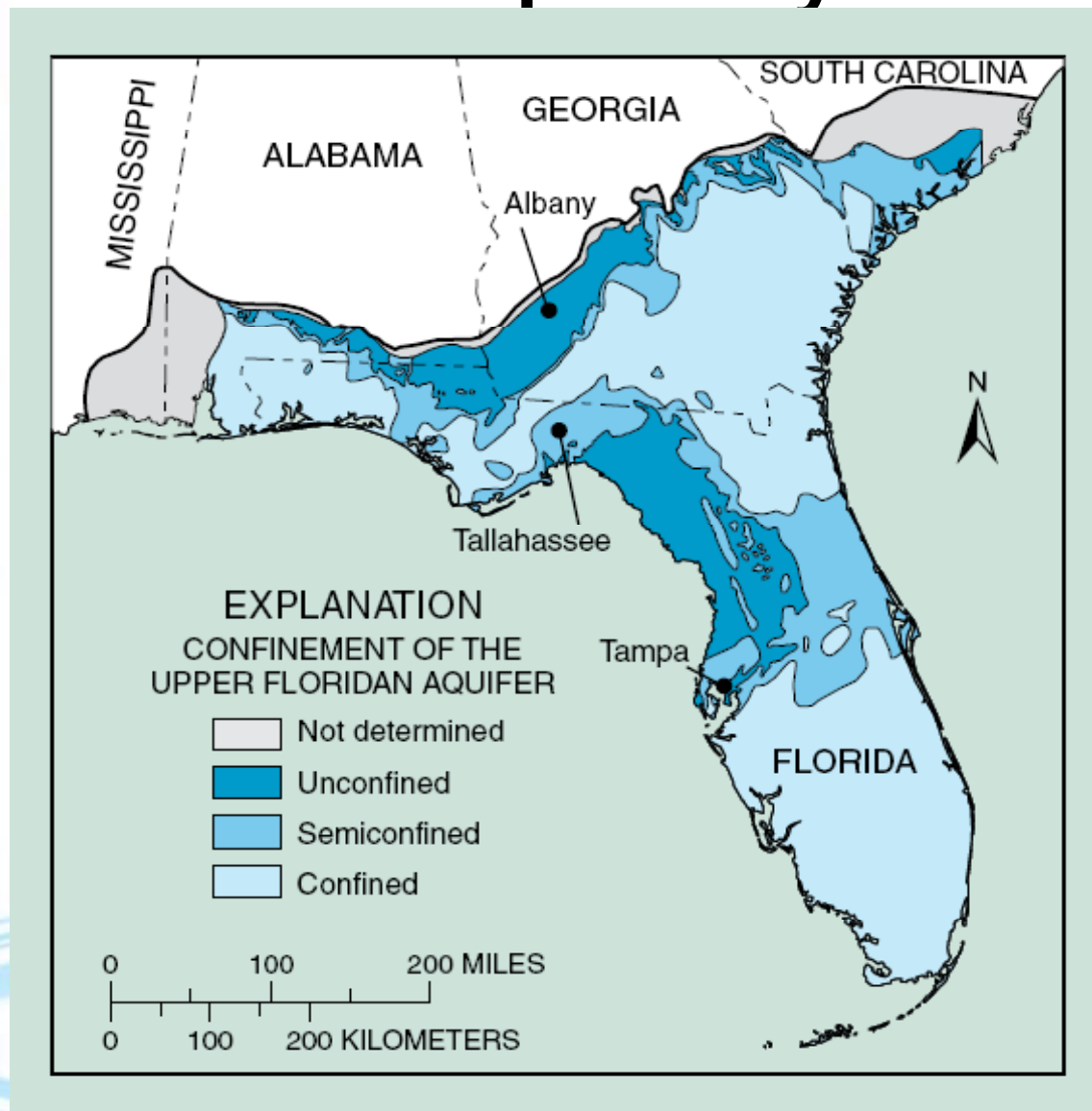
CFCA Landuse Map



sfwmd.gov

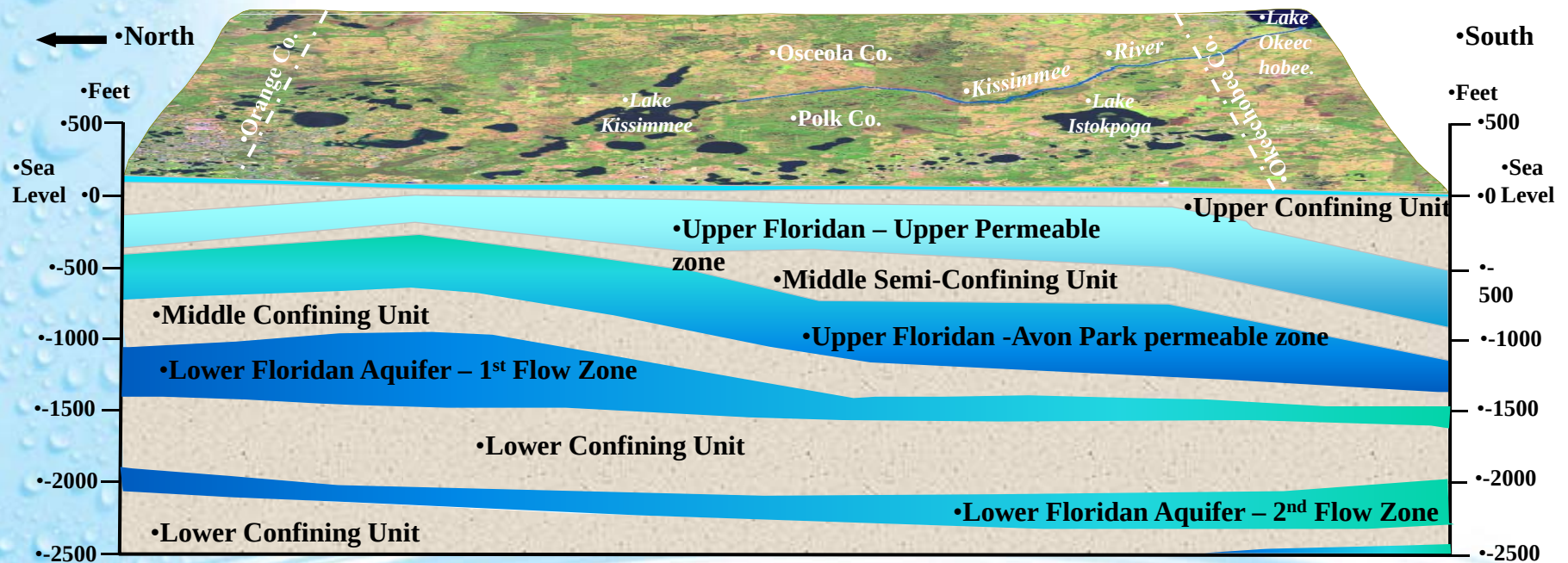


Geographic Differences in the Floridan Aquifer System

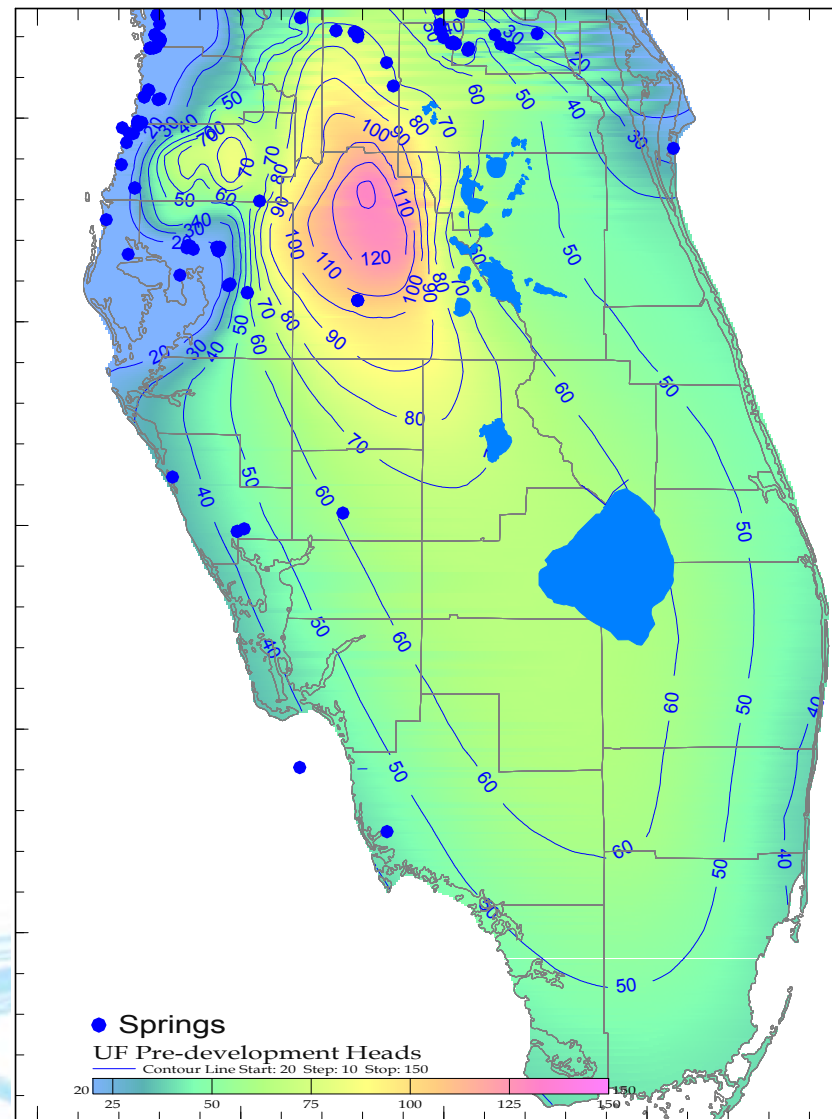


Generalized Cross-section down the Kissimmee Valley

Reese and Richardson (2007)



Estimated Predevelopment Upper Floridan Water Levels



ECFT Model Development and Calibration



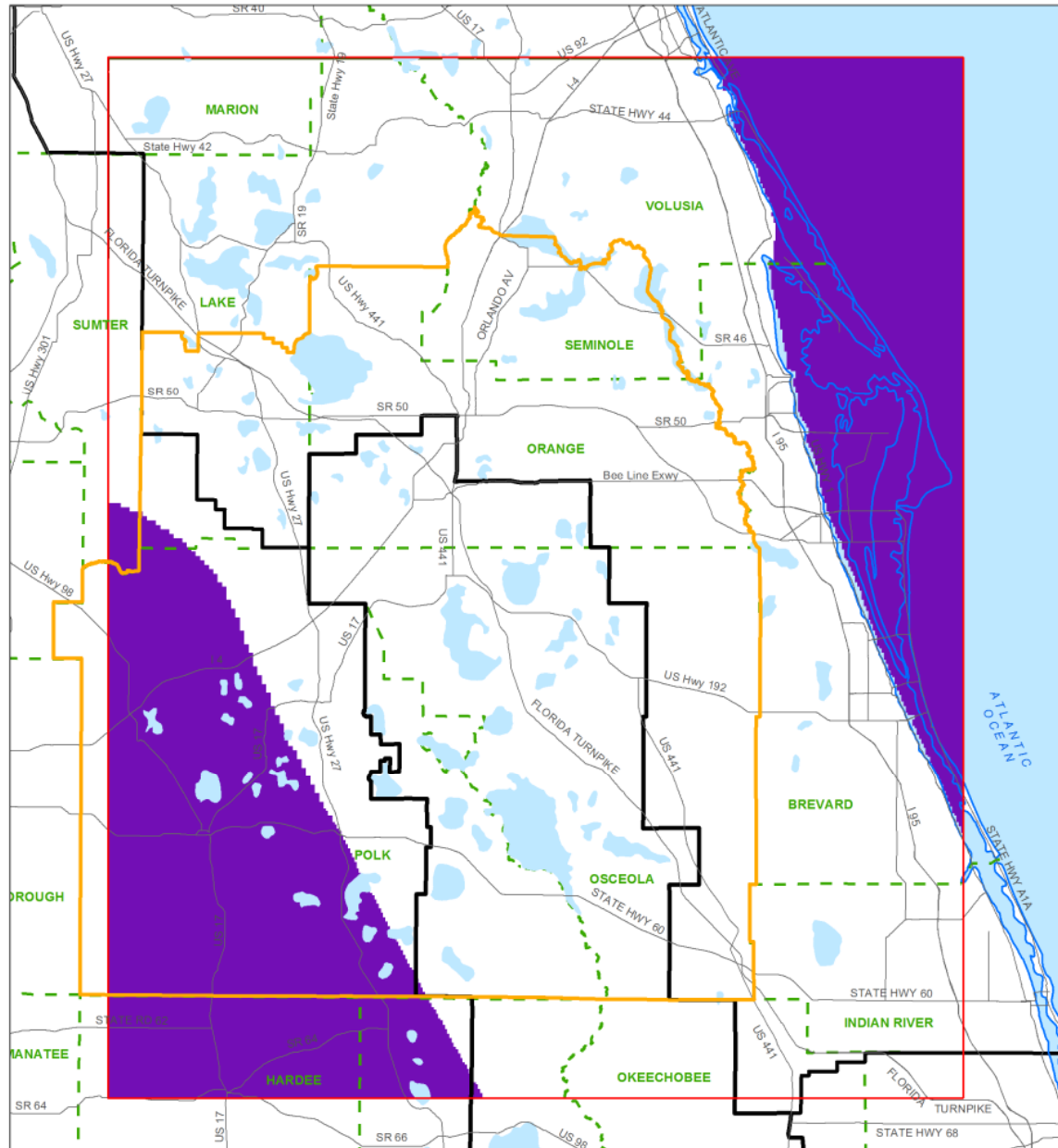
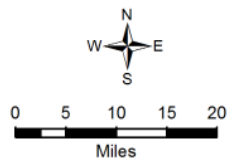
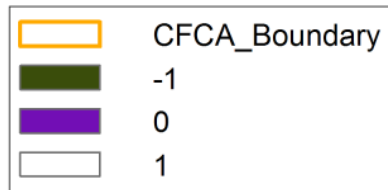
East Central Florida Transient Model

- Model Extent
- Pumpage Distribution
- Overlap with SWFWMD's DWRM Model
- Calibration Results
- Sensitivity Analysis

History of ECFT Peer Review

- Preliminary Calibration & Documentation – October 2006
- Peer Review Completed in 2007
 - Incorporated Majority of Short Term Peer Review Comments
 - Extend Calibration Period to 1995 through 2006
 - Add newly acquired aquifer test data
 - Refined other data sets

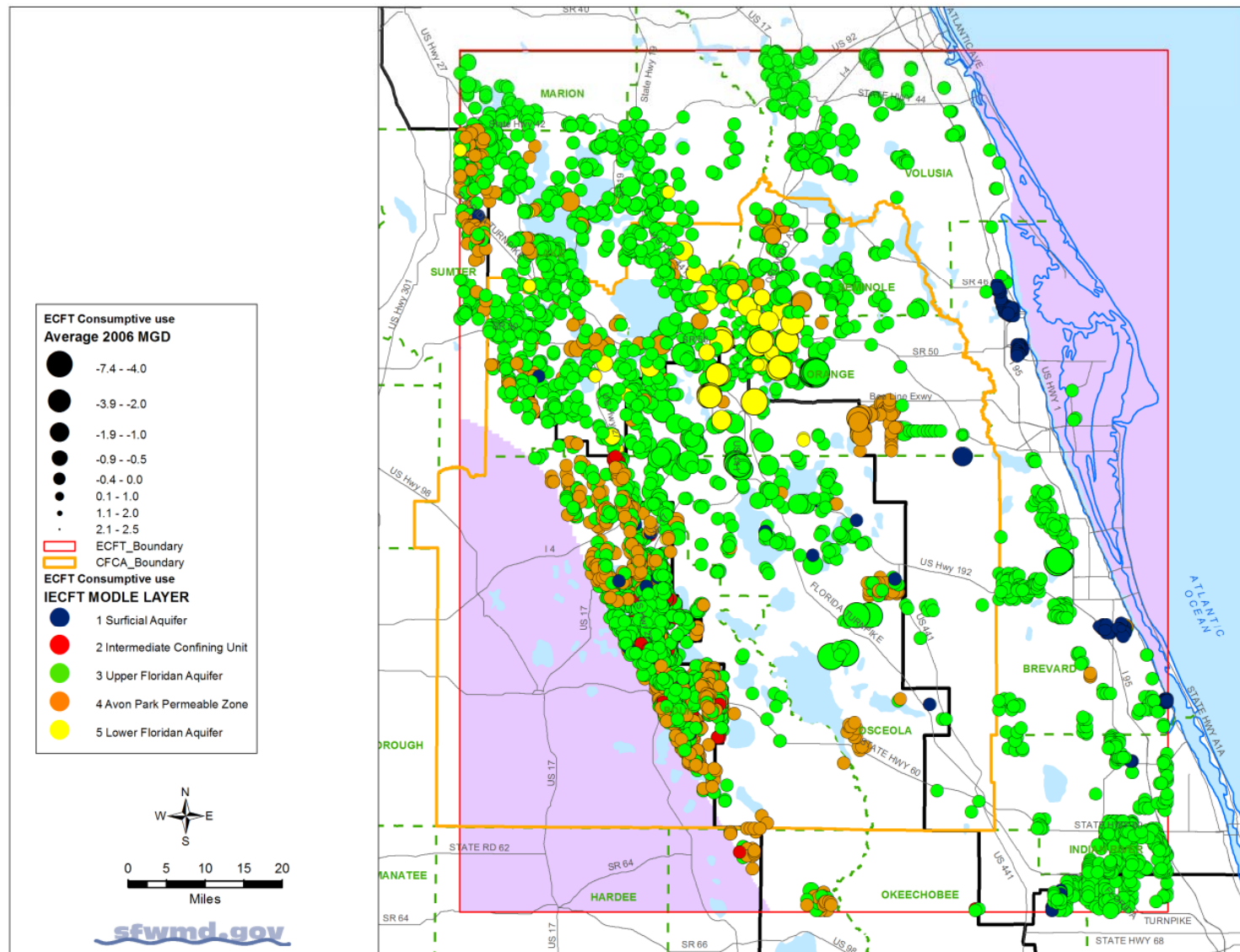
Model Extent of ECFT



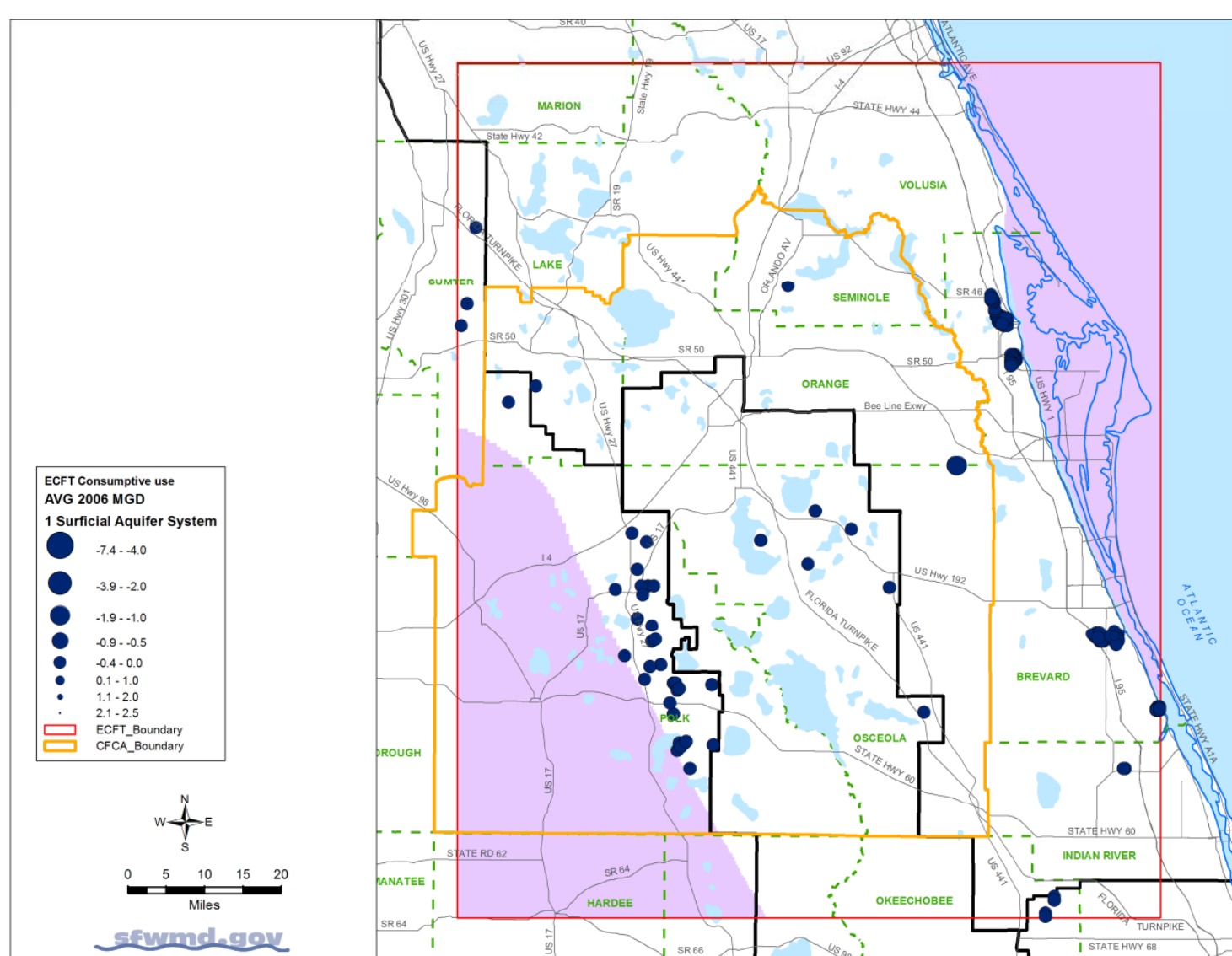
Model Develop

- Grid Spacing is 1250 Feet by 1250 feet
- Simulation Period Jan – 1995 through December 2006
- Daily Stress Period
- 5 Layers
- Trail and error calibration approach due to the size of the model

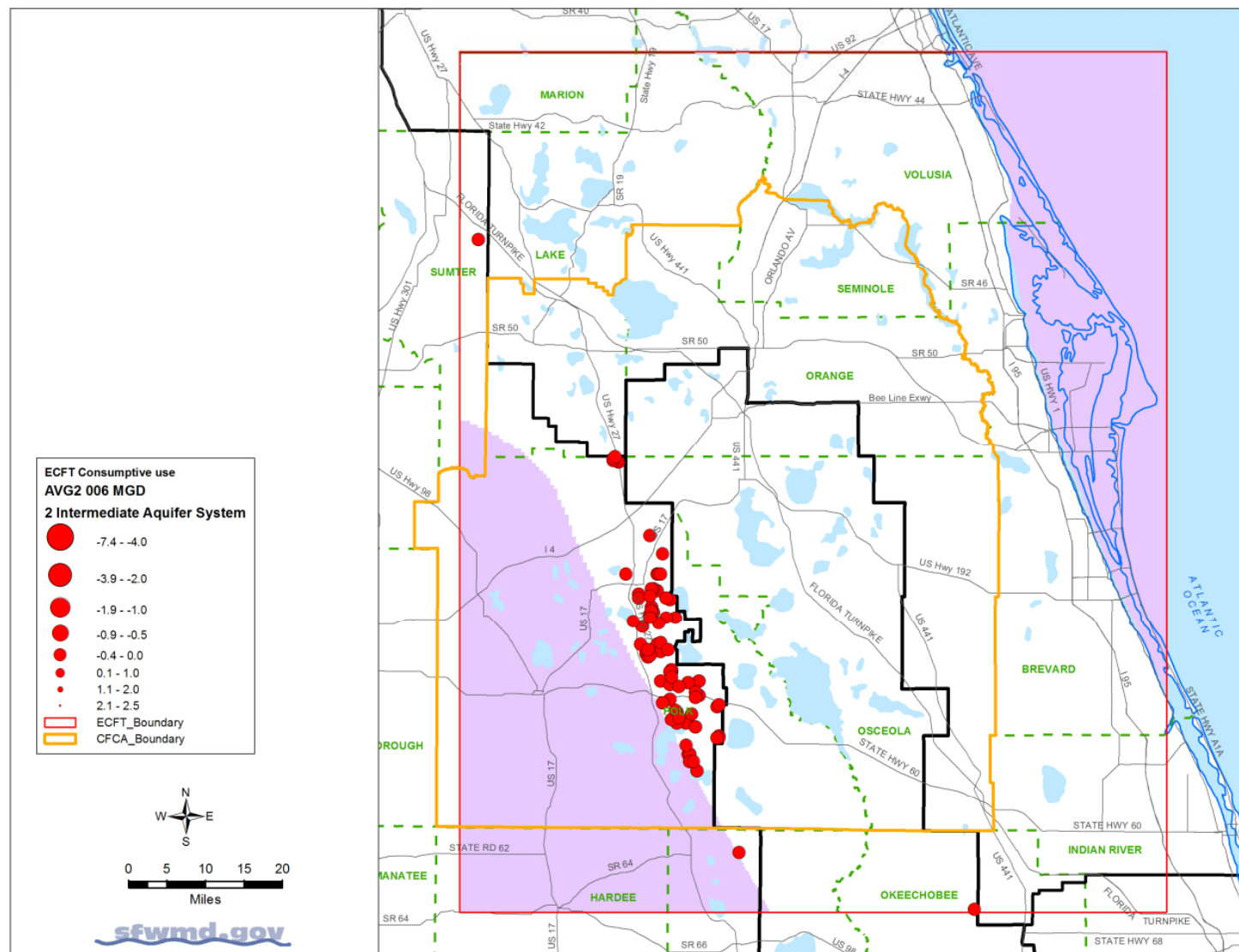
East Central Florida Transient Pumpage Distribution – All Aquifers



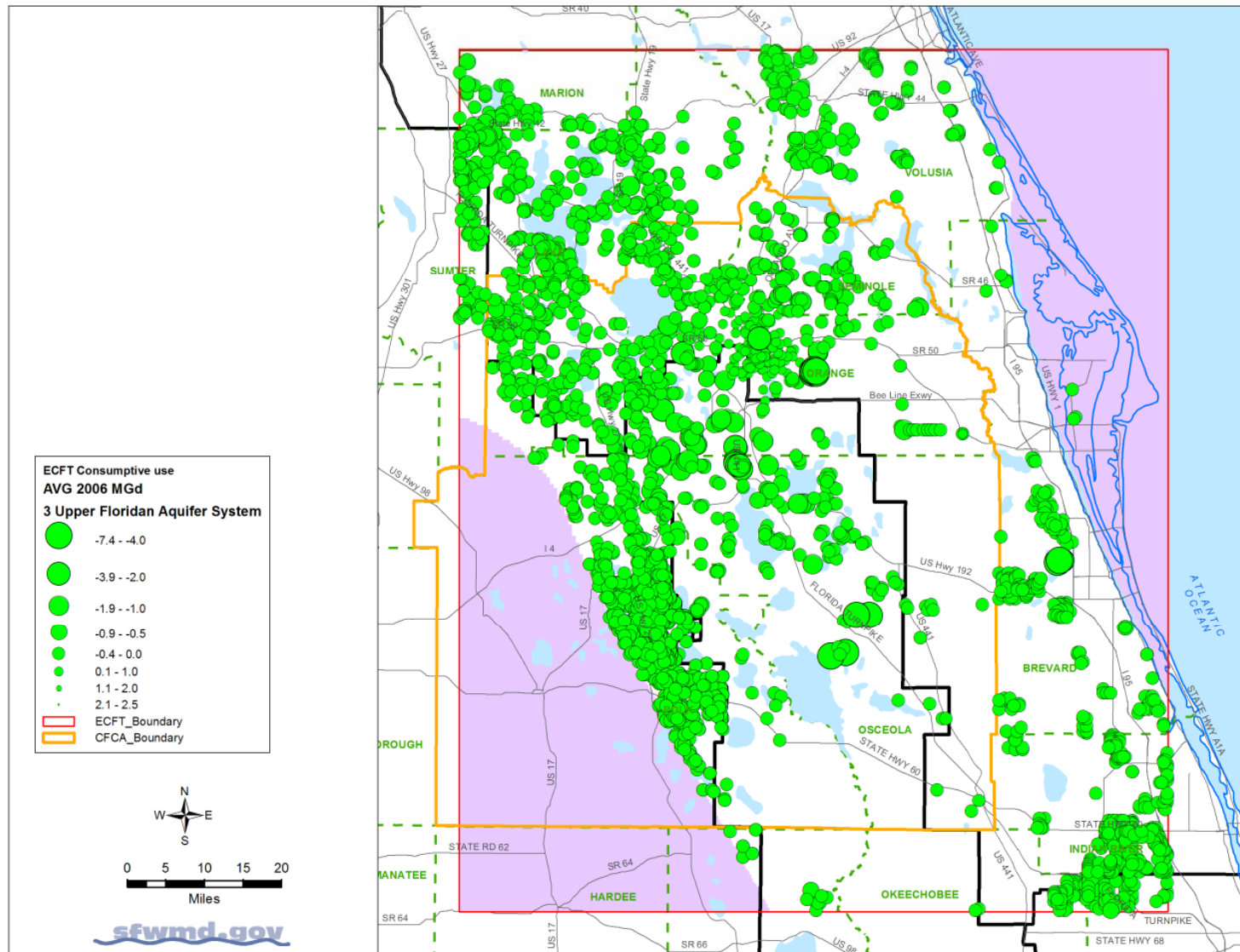
East Central Transient Model Pumpage Distribution – Surficial Aquifer



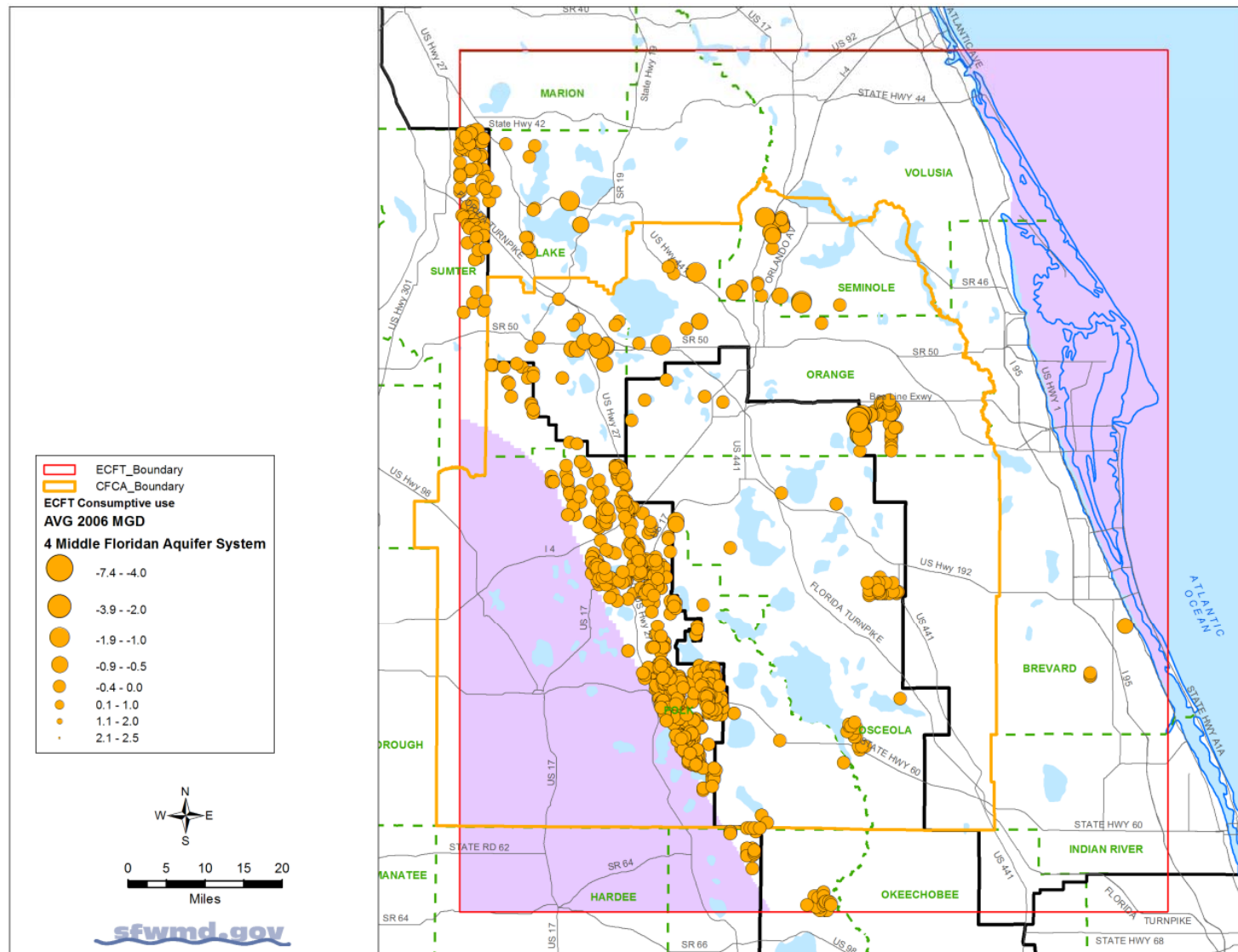
East Central Transient Model Pumpage Distribution – Intermediate Confining Unit



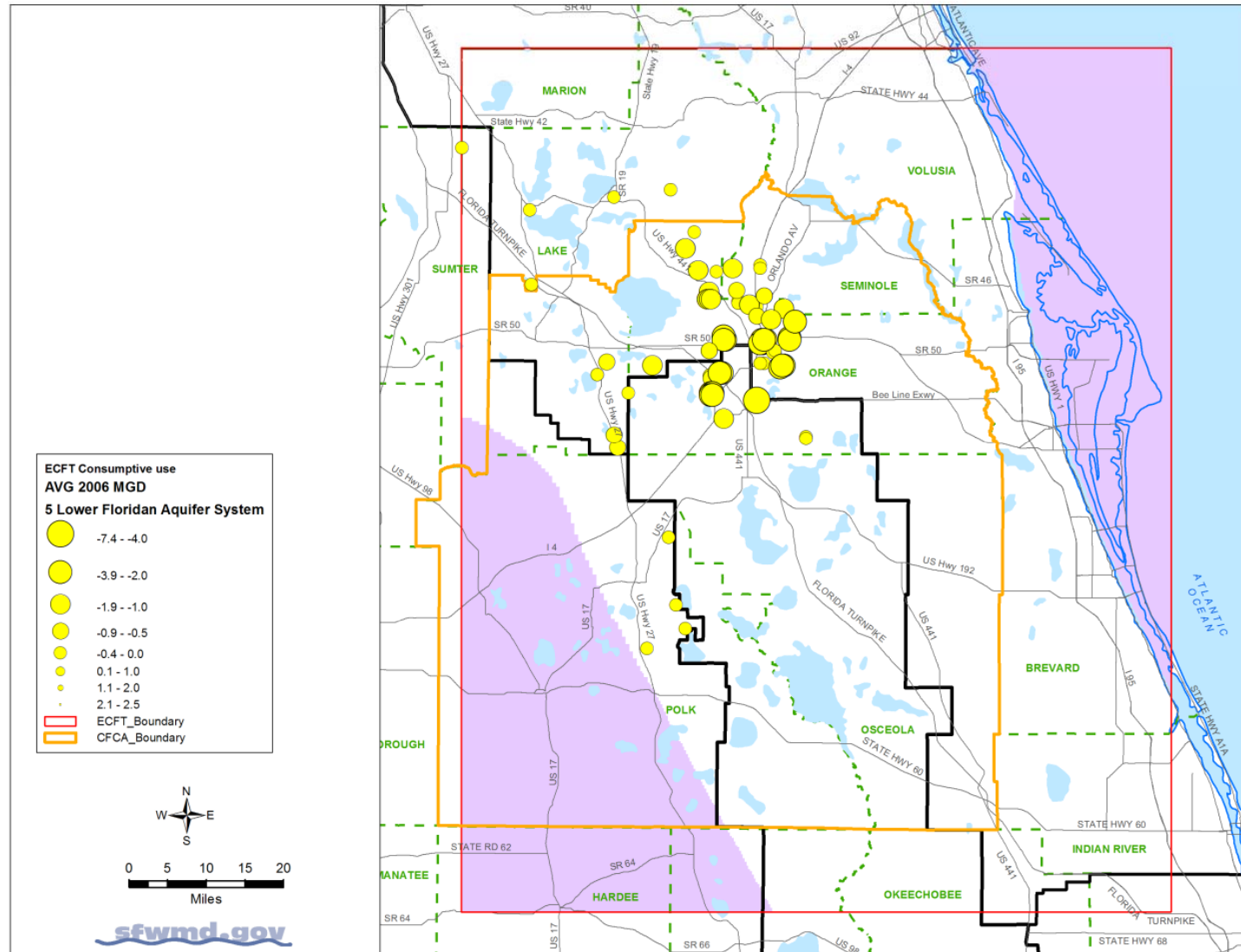
East Central Transient Model Pumpage Distribution – Upper Floridan Aquifer



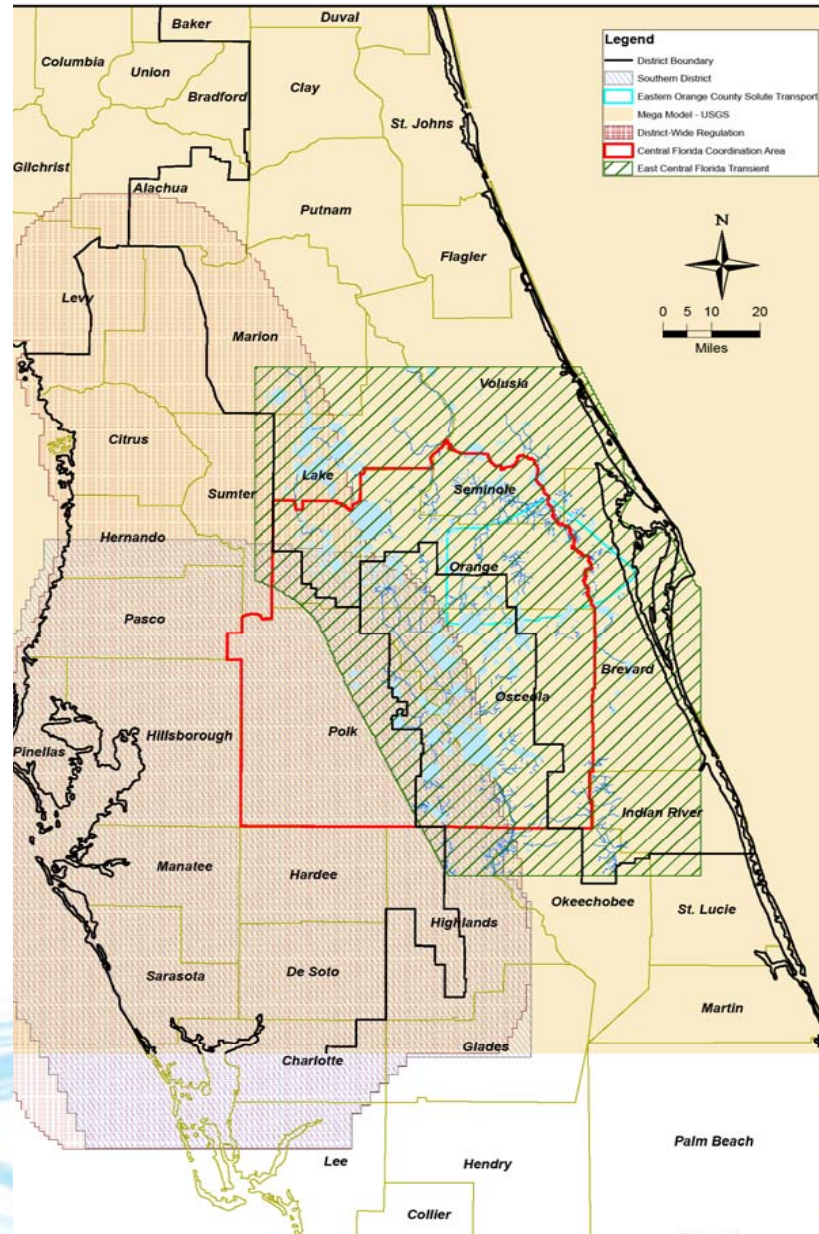
East Central Transient Model Pumpage Distribution – Avon Park Producing Zone



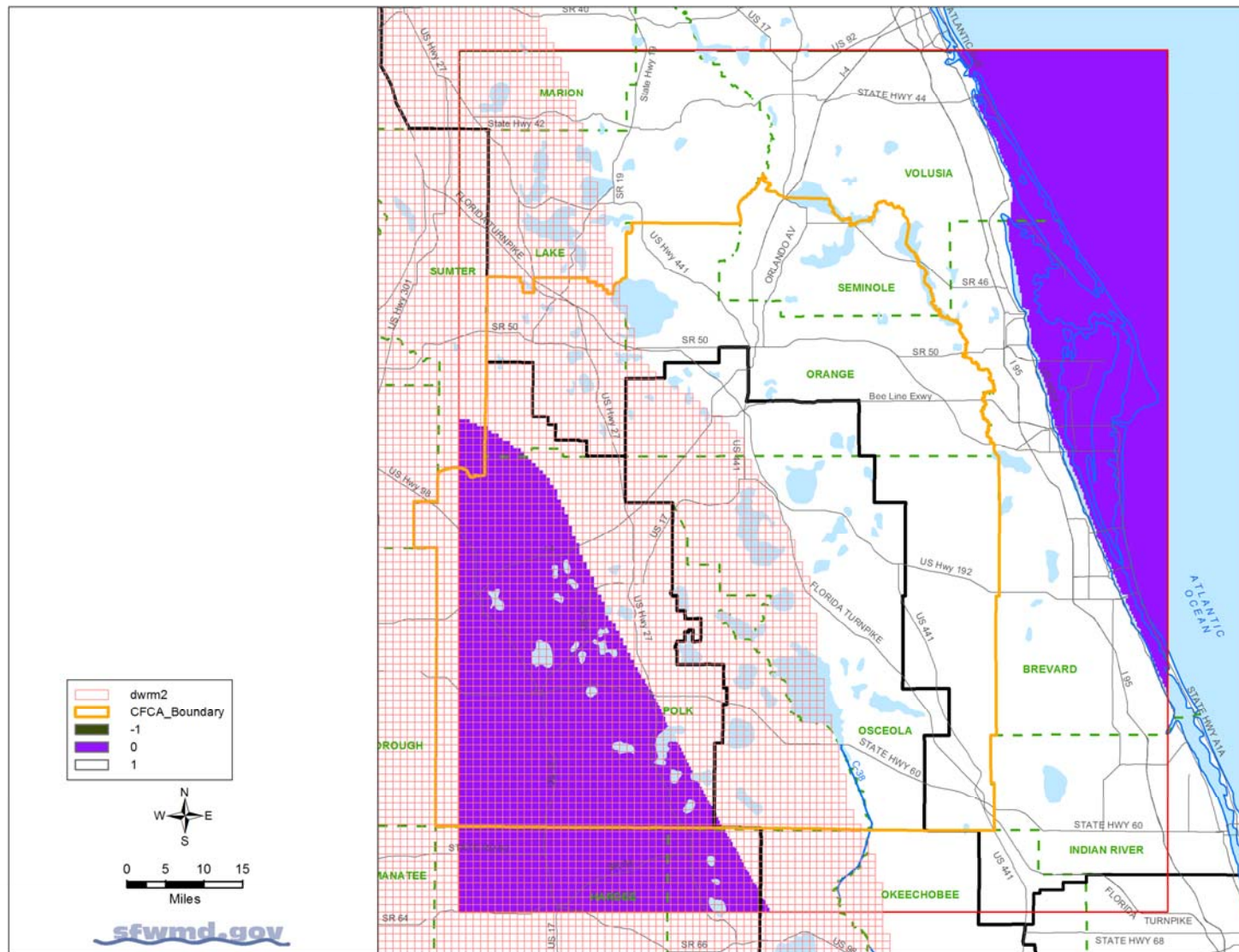
East Central Transient Model Pumpage Distribution – Lower Floridan Aquifer



Geographical Extent of DWRM and ECFT



Overlap of DWRM and ECFT in the Central Florida Coordination Area

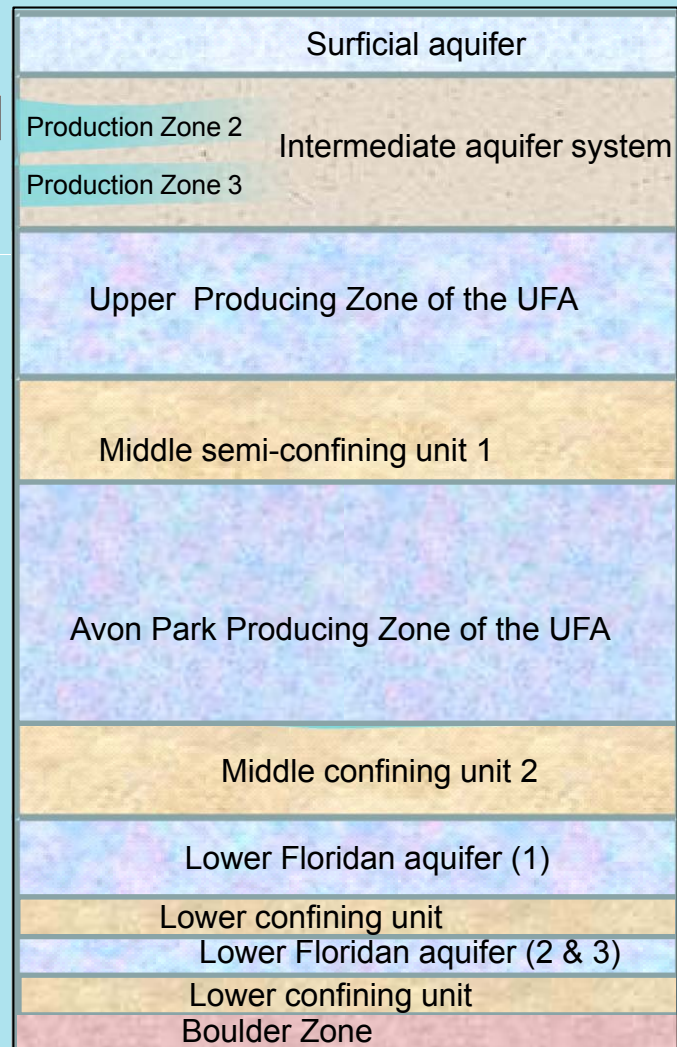


Hydrogeology and Conceptualization

DWRM2 – CFCA and ECFT

DWRM2 - CFCA

L 1
L 2
L 3
L 4
L 5



ECFT

L 1
L 2
L 3
L 4
L 5

CENTRAL FLORIDA COORDINATION AREA

ECFT Calibration Results



ECFT Calibration Results Overview

- Global Calibration Statistics
- Well Hydrographs
- Wetland Hydrographs
- Spring Flows
- Lake Stages

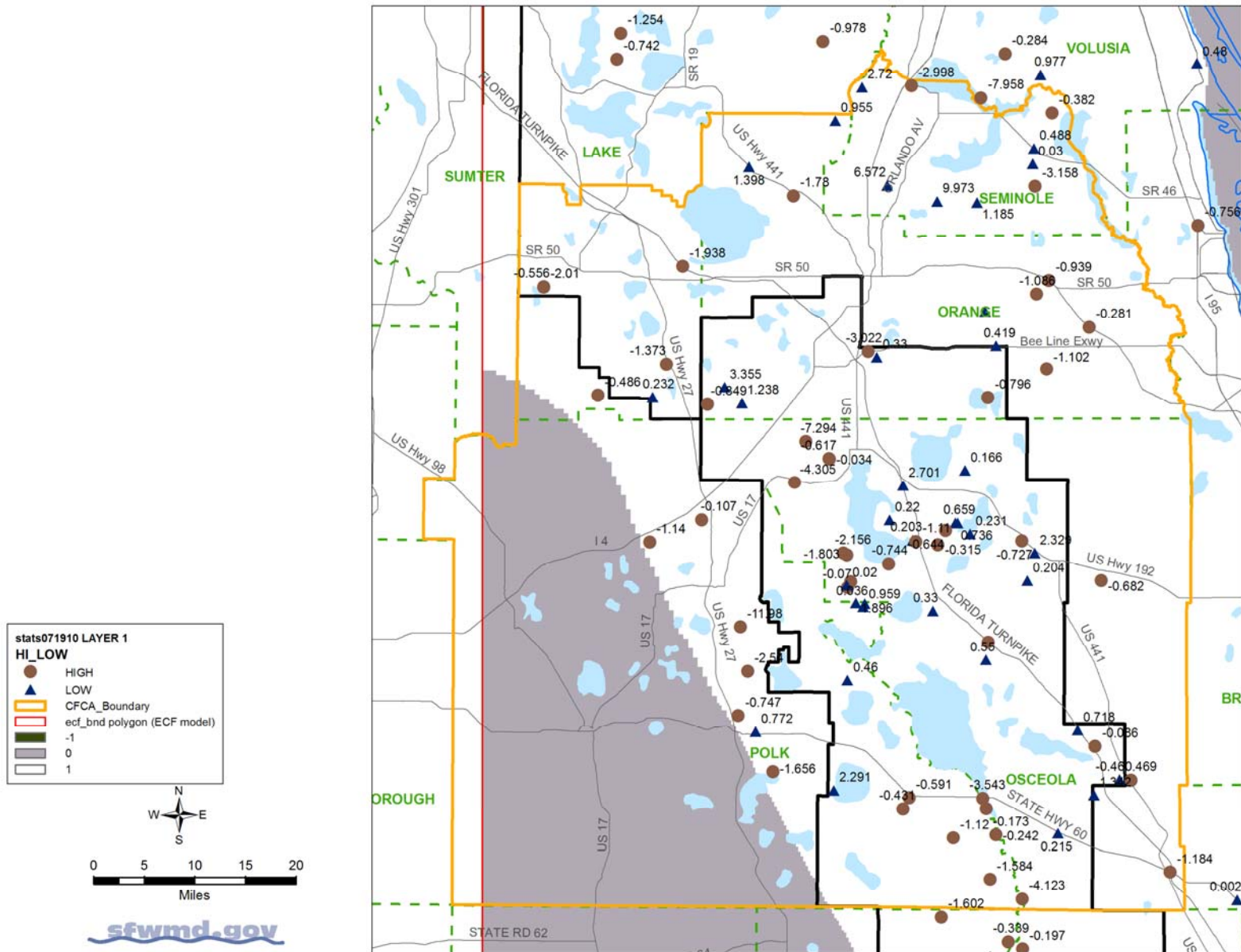
CENTRAL FLORIDA COORDINATION AREA

Layer	Count of Well ID	Count of CALIB 5FT	% Calib 5FT	Count of CALIB 2.5 FT	% Calib 2.5FT	Sum of Abs. Ave. (ft)	Average (Ft).
1	117	114	97.44%	88	75.21%	230.11	1.97
3	130	117	90.00%	80	61.54%	350.18	2.69
4	41	33	80.49%	19	46.34%	136.04	3.32
5	17	15	88.24%	9	52.94%	68.61	4.04
Grand Total	305	279	91.48%	196	64.26%	784.93	2.57

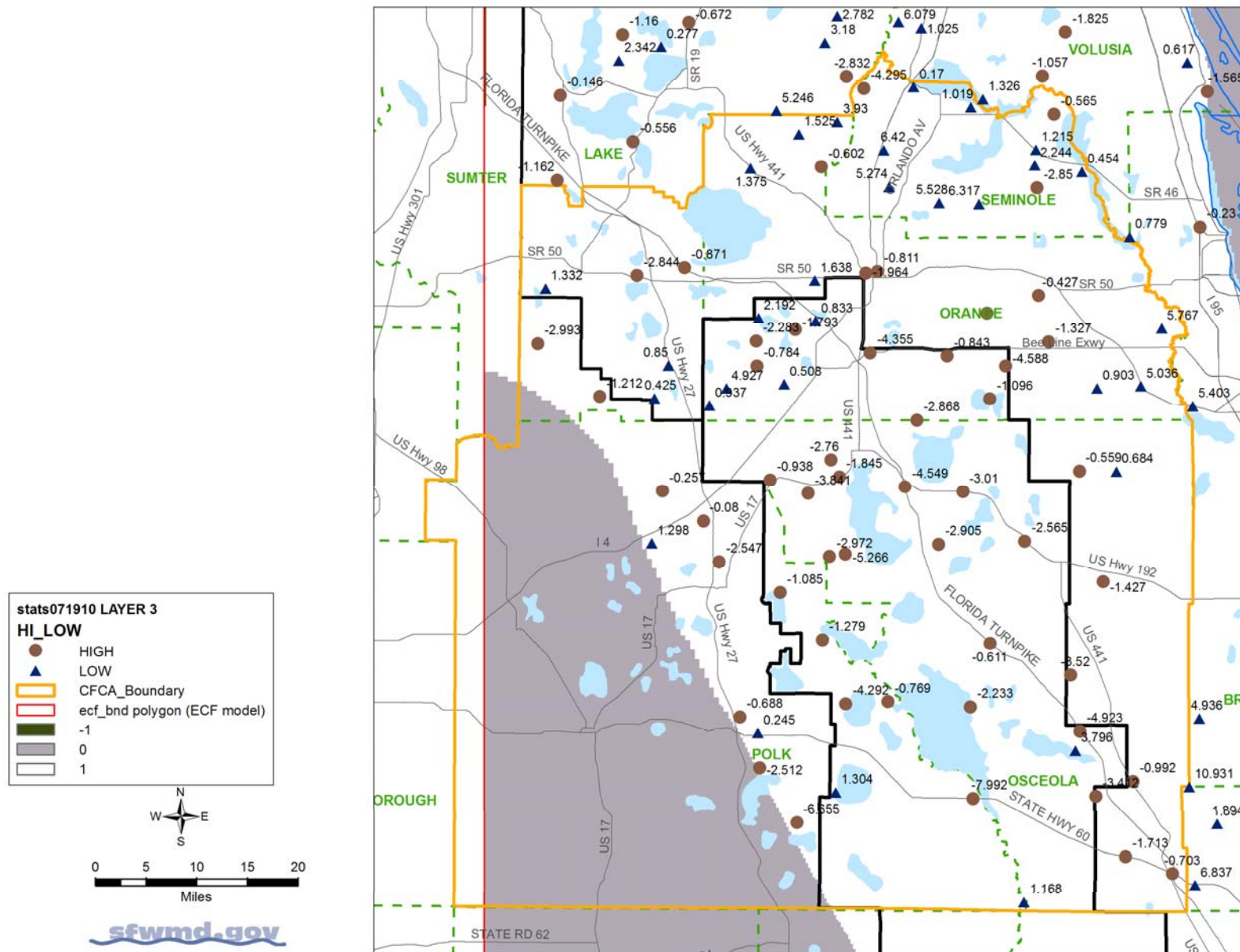
Calibration Statistics for ECFT – Criteria Accepted by Peer Review Panel

Note: Calibration statistics subject to revision as a result of incorporation of additional information.

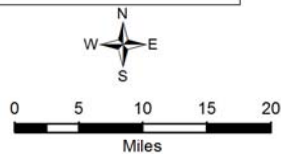
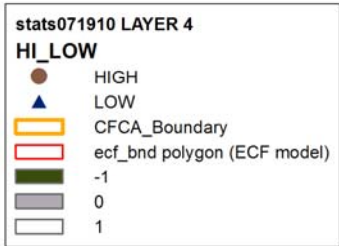
Surficial Aquifer Residual Map



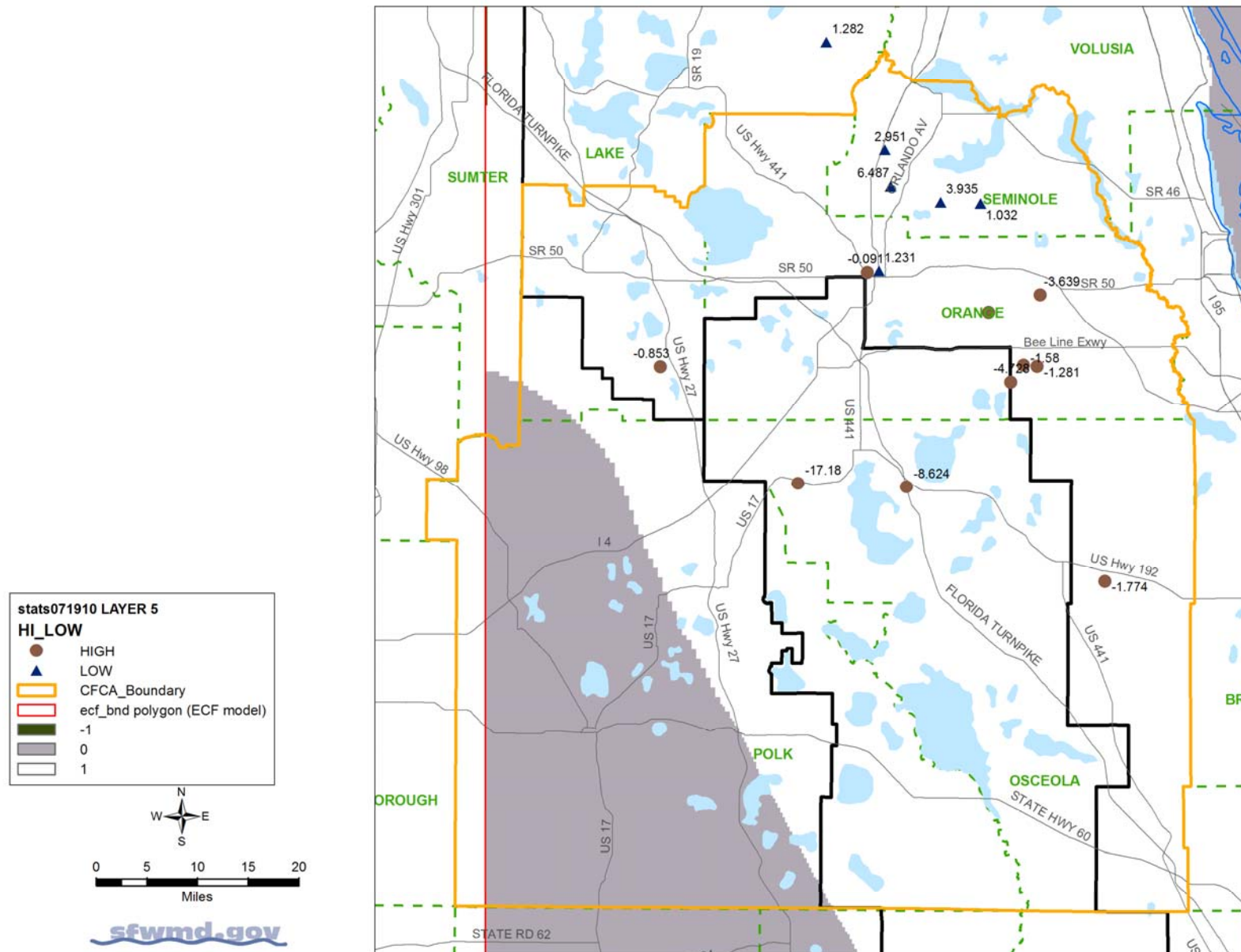
Upper Floridan Aquifer Residual Map



Avon Park Residual Map



Lower Floridan Zone 1 Aquifer Residual Map



CENTRAL FLORIDA COORDINATION AREA

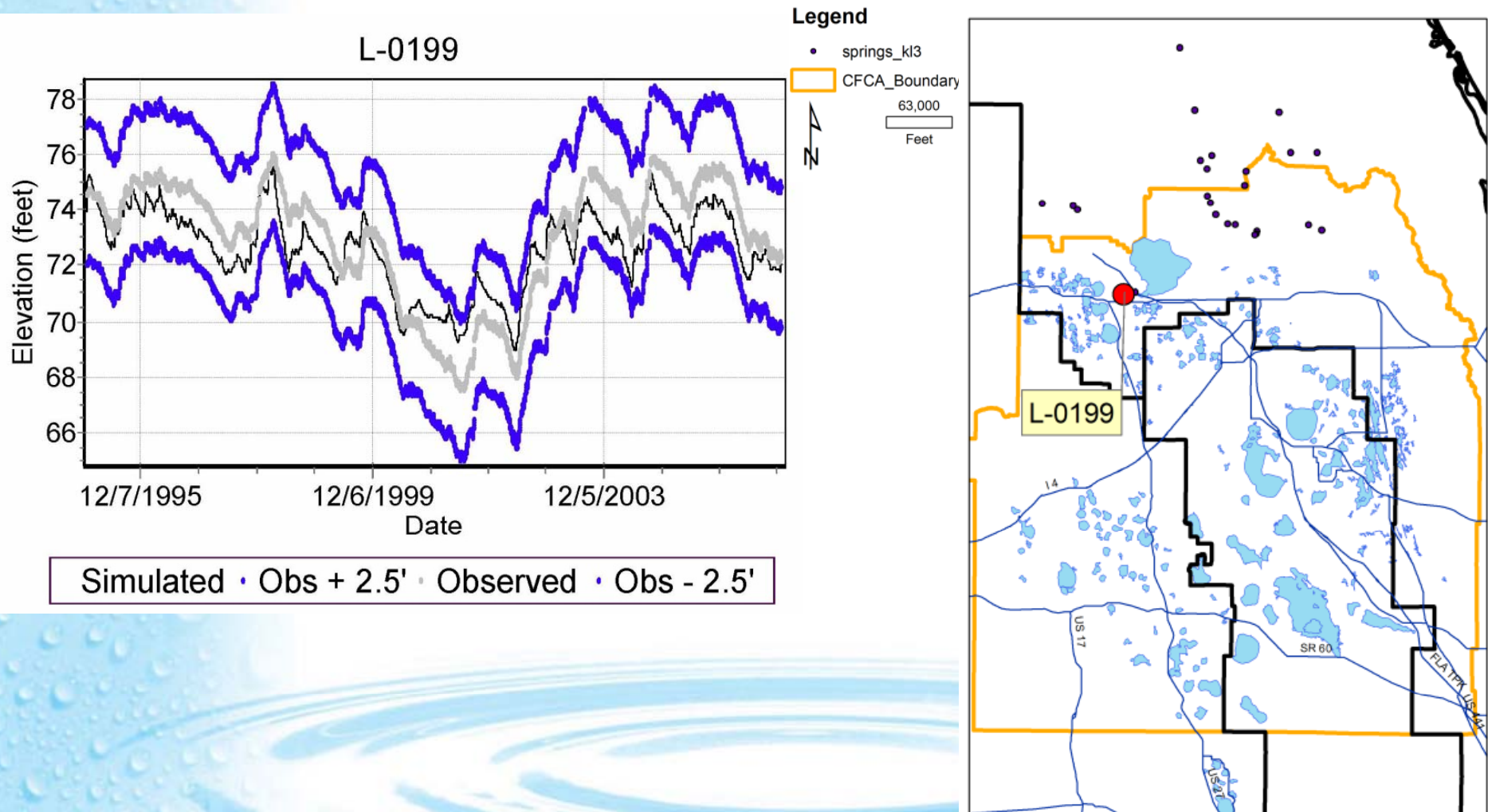
ECFT Calibration Results Monitoring Wells



ECFT Calibration Results Well Hydrographs

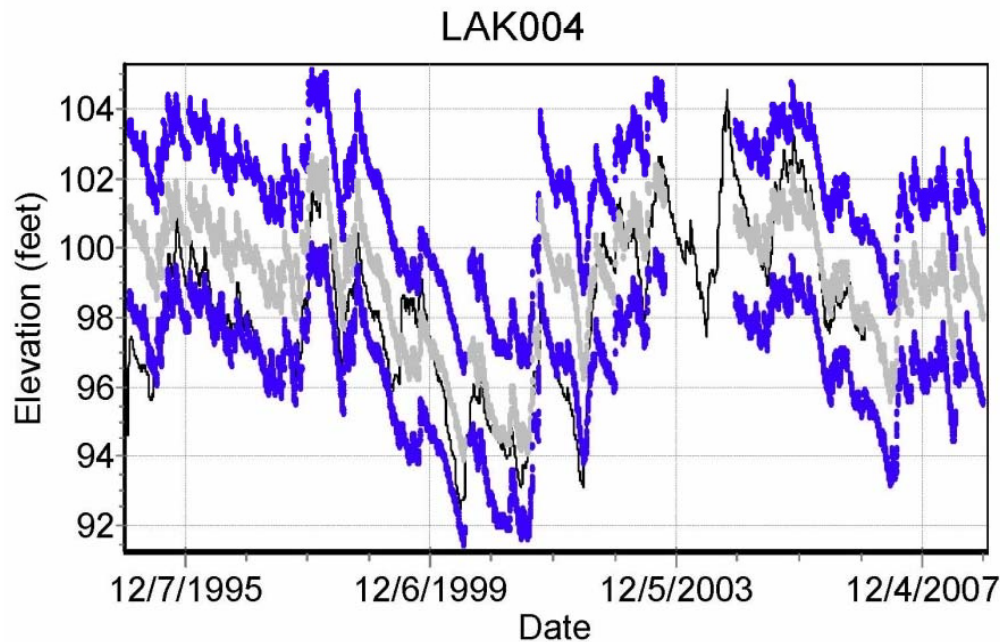
- 307 Total Observation Wells Used for Calibration
- 117 in the Surficial Aquifer
- 130 in the Upper Floridan Aquifer
- 41 in the Avon Park Producing Zone
- 17 in the Lower Floridan Aquifer

Upper Floridan Calibration Plot Lake County (Well L-0199)



Upper Floridan Calibration Plot

Lake County (Well Lake-4)



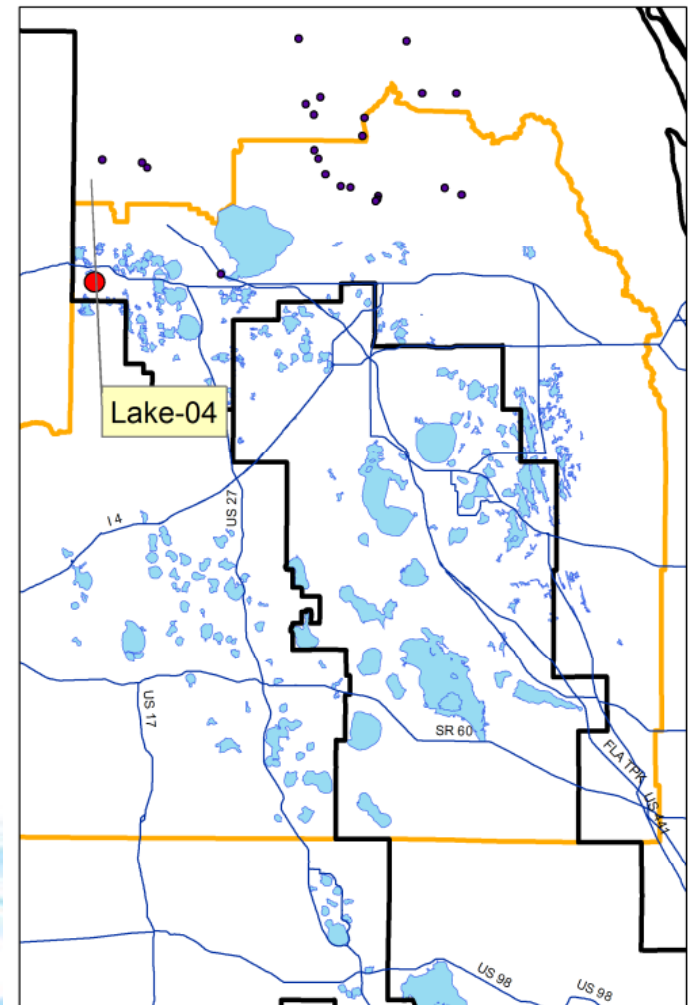
Simulated · Obs + 2.5' · Observed · Obs - 2.5'

Legend

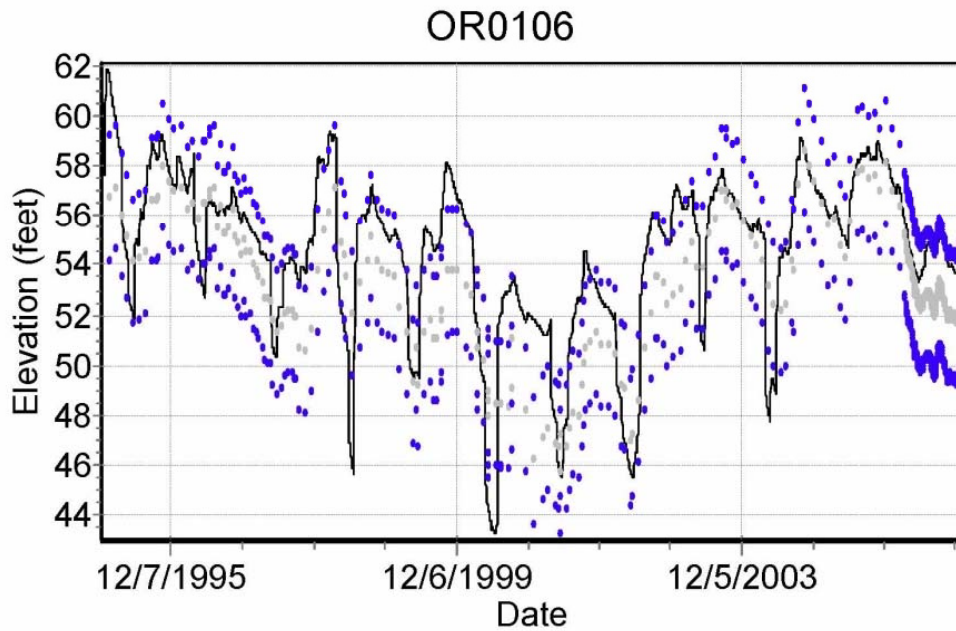
- springs_kl3
- trvehmj1 arc
- bdwmdwmb
- pshysurlak polygon
- CFCa_Boundary



37,500
Feet



Avon Park Calibration Plot Orange County (Well OR-0106)

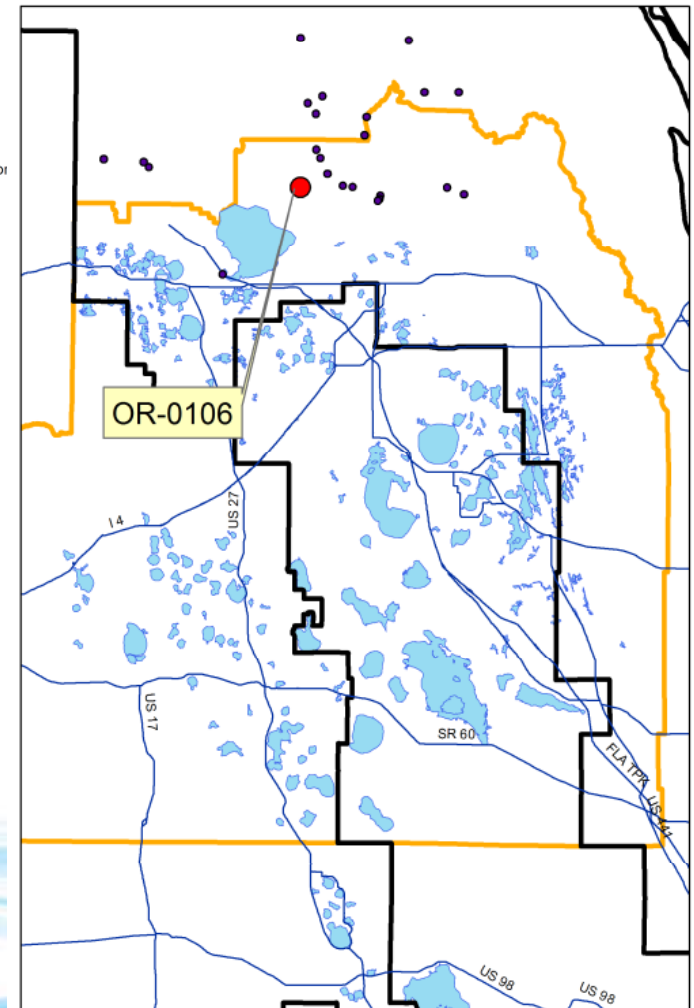


Simulated · Obs + 2.5' · Observed · Obs - 2.5'

Legend

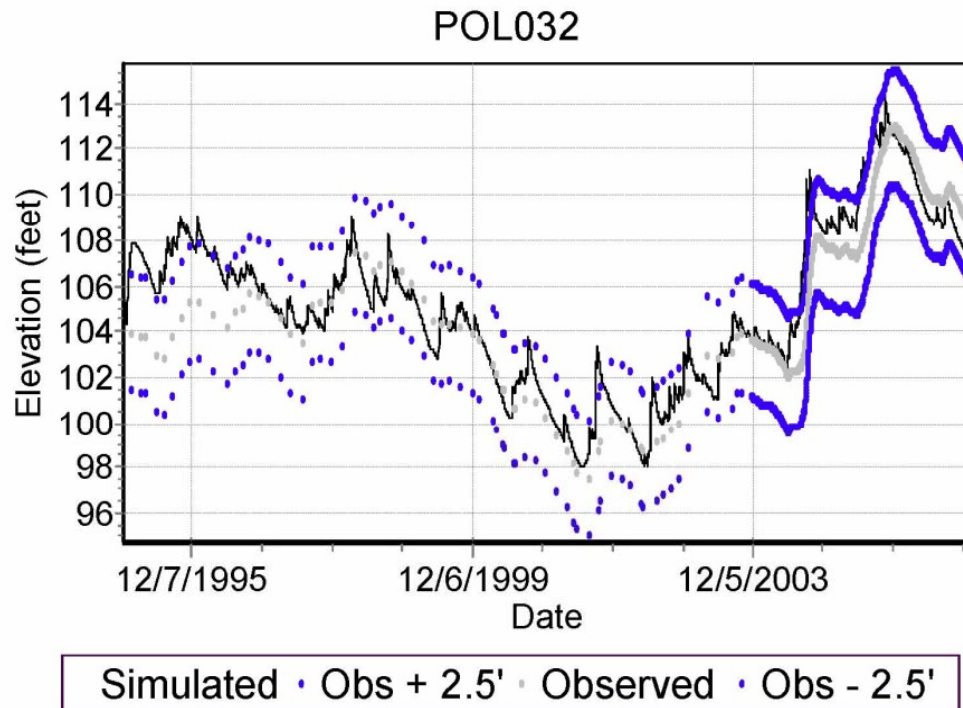
- springs_kl3
- trvehmj1 arc
- bdwmdwmb
- pshysurlak polygon
- CFWA_Boundary

37,500
Feet



Surficial Aquifer Calibration Plot

Polk County (Well Polk-32)

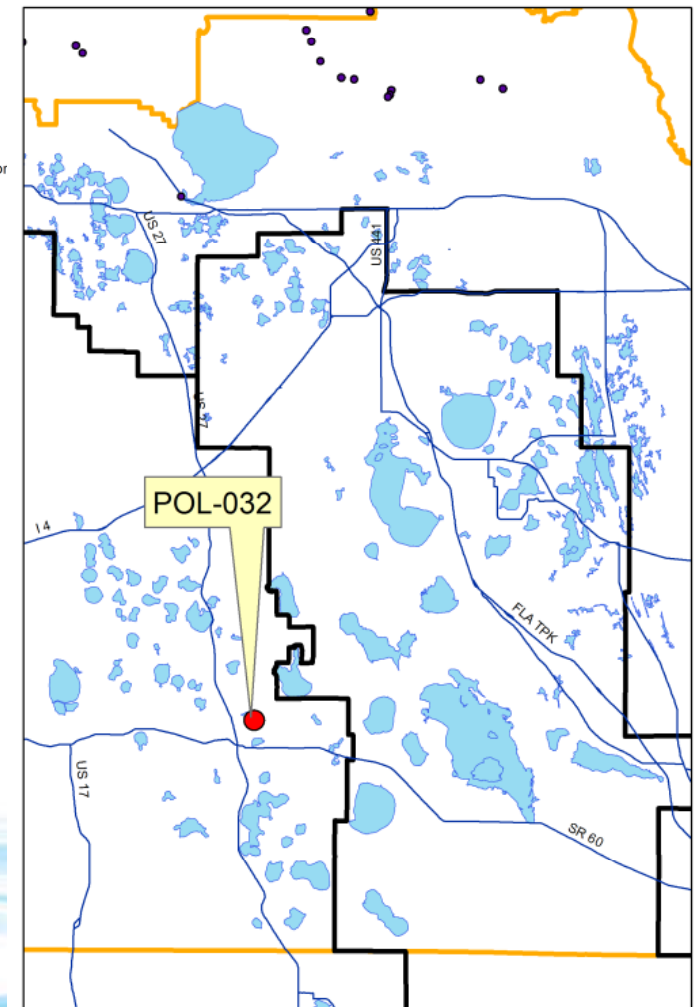


Legend

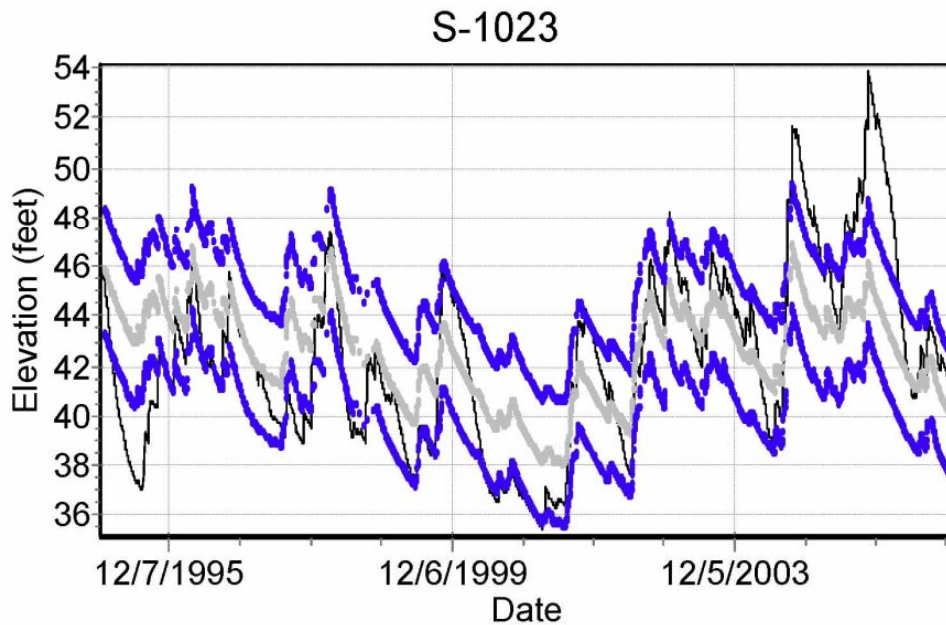
- springs_kl3
- trvehmj1 arc
- bdwmdwmb
- shaded blue area pshysurlak polygor
- orange outline CFWA_Boundary



28,000
Feet



Surficial Aquifer Calibration Plot Seminole County (Well S-1023)

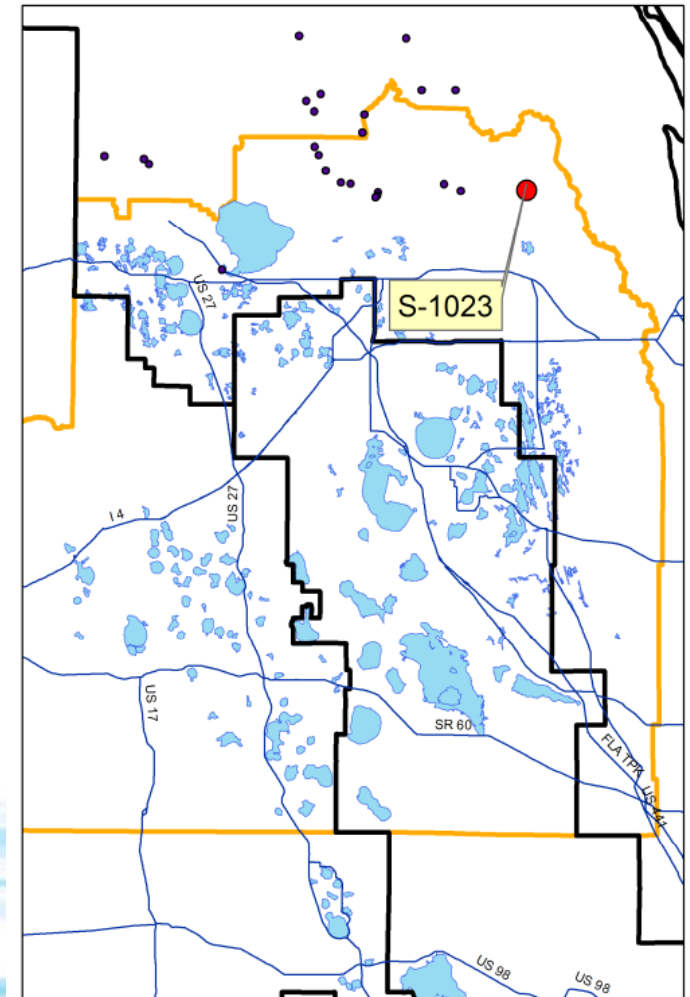


Simulated · Obs + 2.5' · Observed · Obs - 2.5'

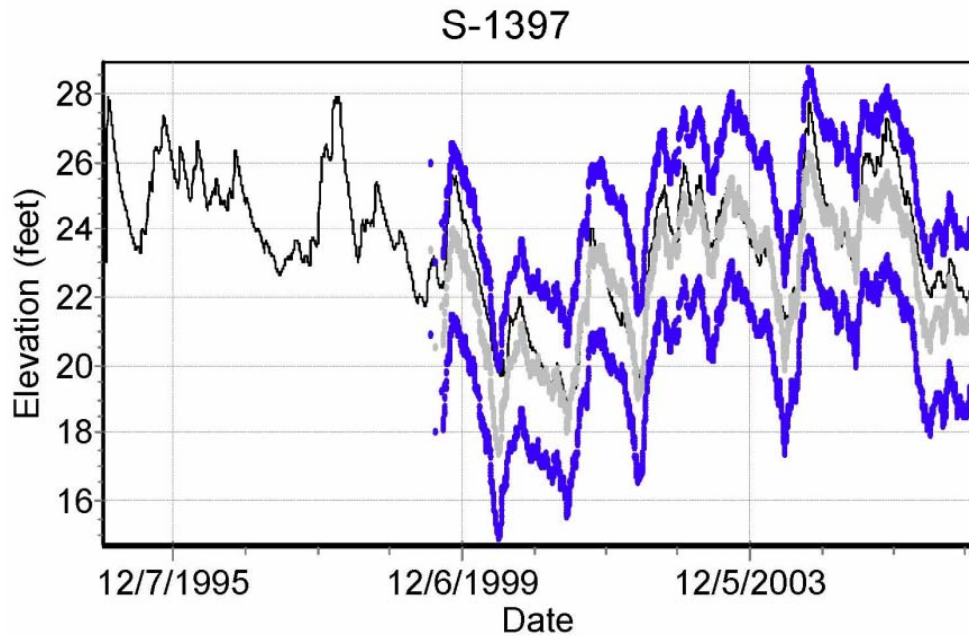
Legend

- springs_ki3
- trvehmj1 arc
- bdwmdwmb
- pshysurlak polygon
- CFCa_Boundary

37,500
Feet



Upper Floridan Calibration Plot Seminole County (Well S-1397)

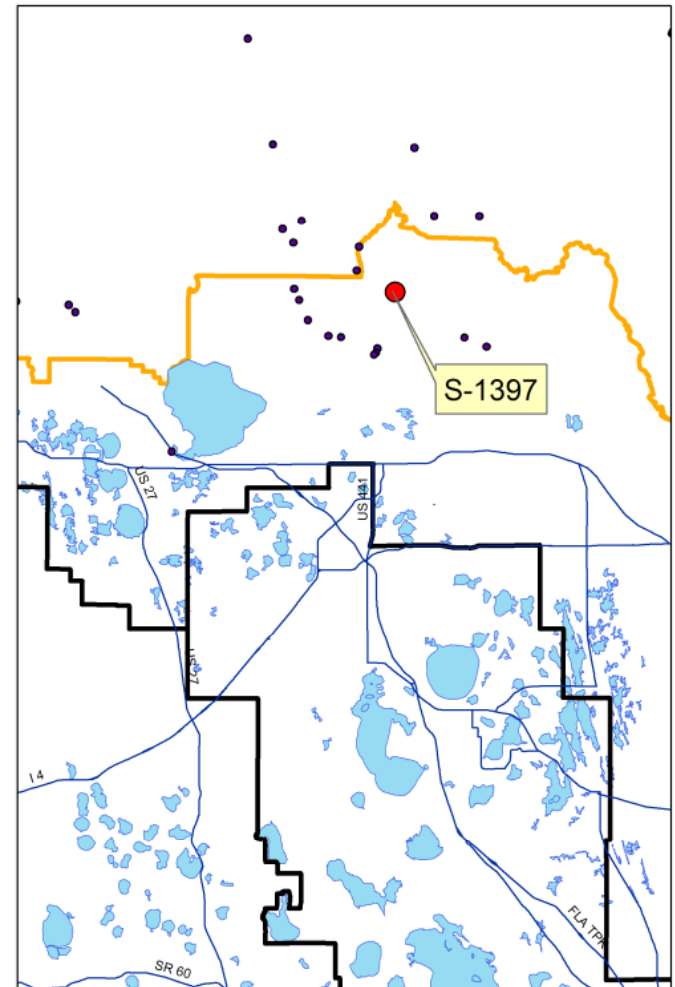


Simulated · Obs + 2.5' · Observed · Obs - 2.5'

Legend

- springs_kl3
- trvehmj1 arc
- bdwmdwmb
- pshysurlak polygon
- CFCA_Boundary

28,000
Feet



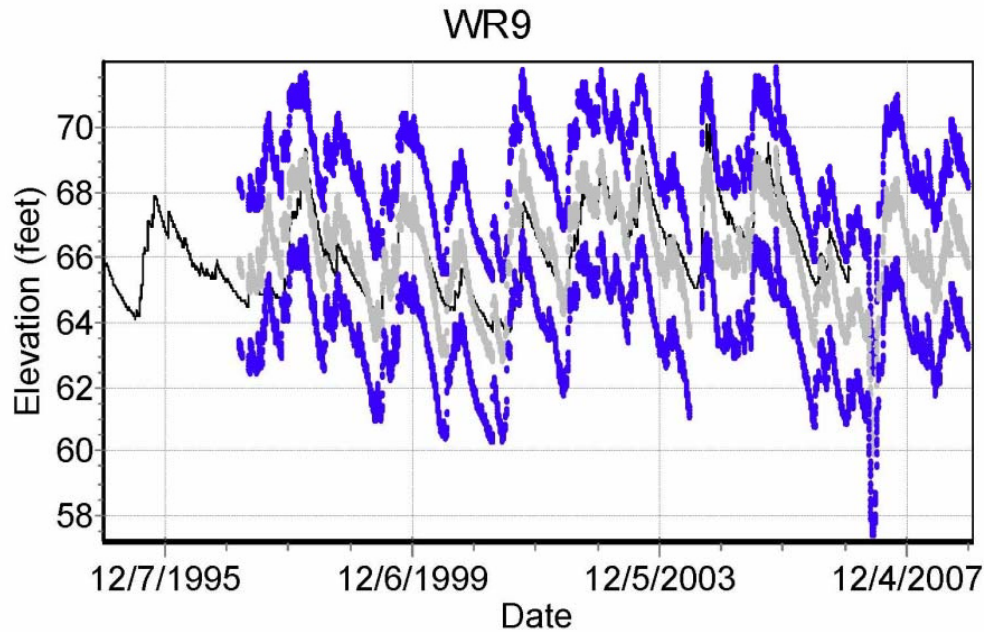
ECFT Calibration Results Wetland Areas



ECFT Calibration Results Wetland Gage Subset

- Approximately 15 Staff Gages with Data Available in or Adjacent to Wetland Areas
- Environment Scientist Conducting Research on approximately 400 Additional Wetland Sites
- Results of this Additional Research will be incorporated into the model where Applicable

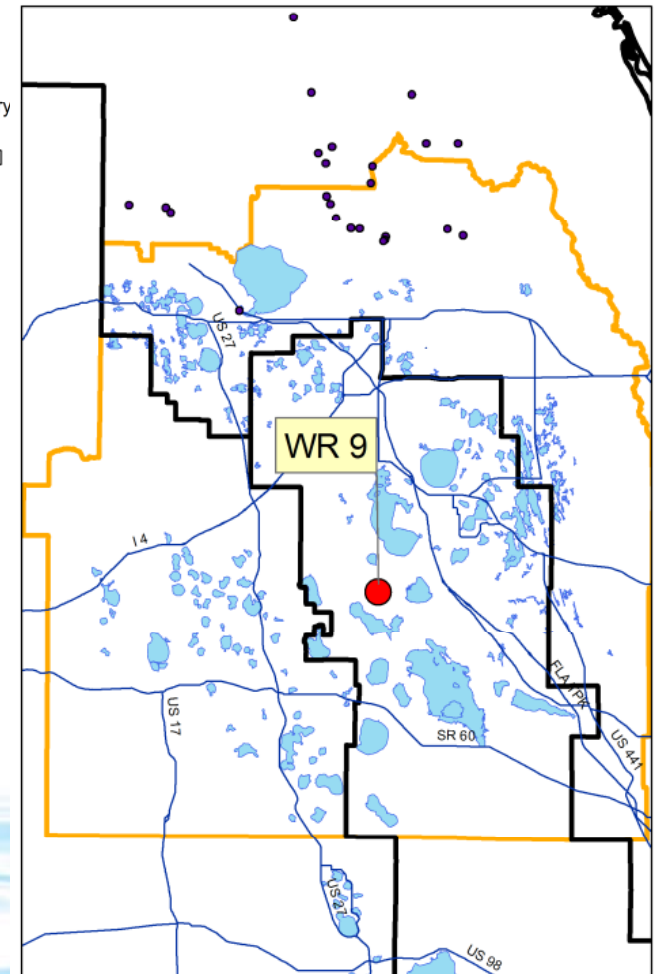
Walker Ranch Wetland Gage Number 9 Calibration Plot



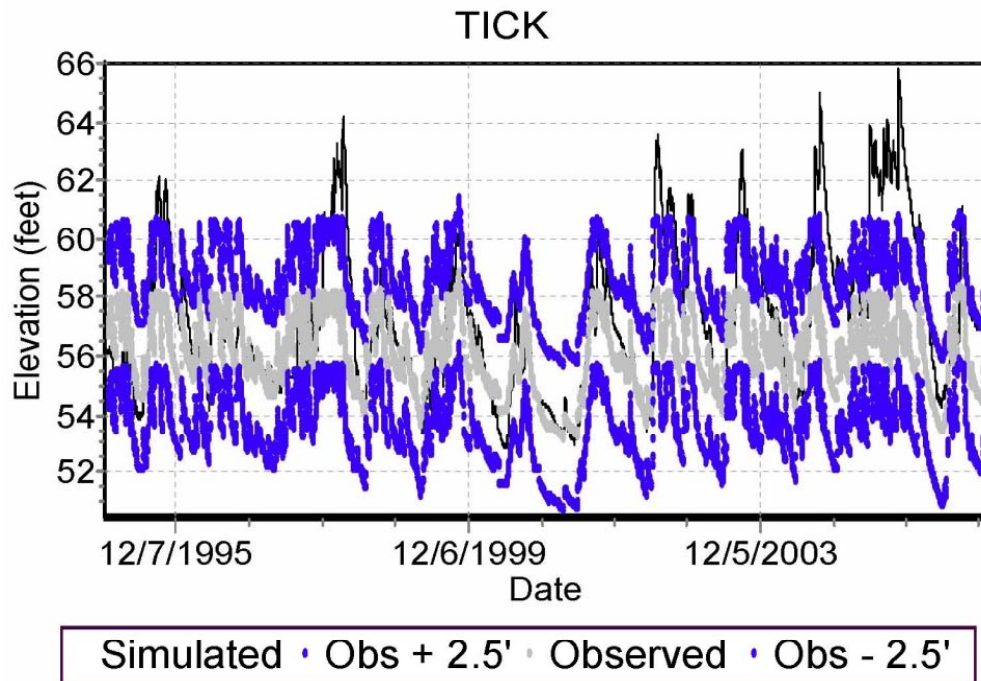
Simulated • Obs + 2.5' • Observed • Obs - 2.5'

Legend

- springs_kl3
- CFCA_Boundary
- 64,000
Feet

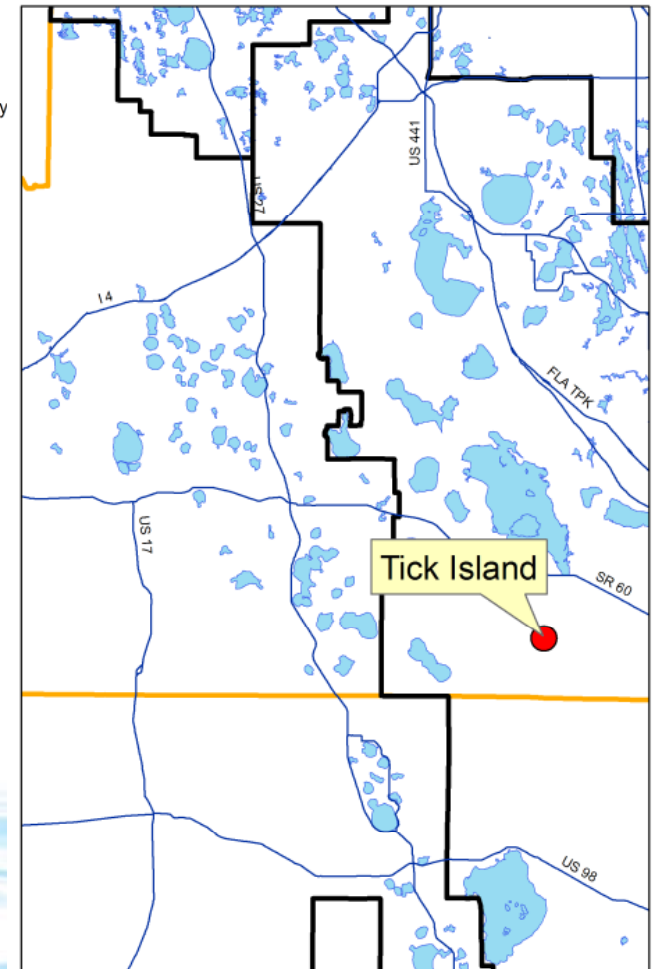


Tick Island Wetland Gage Calibration Plot



Legend

- springs_kl3
- CFCA_Boundary
- 47,500
- Feet



ECFT Calibration Results Springs



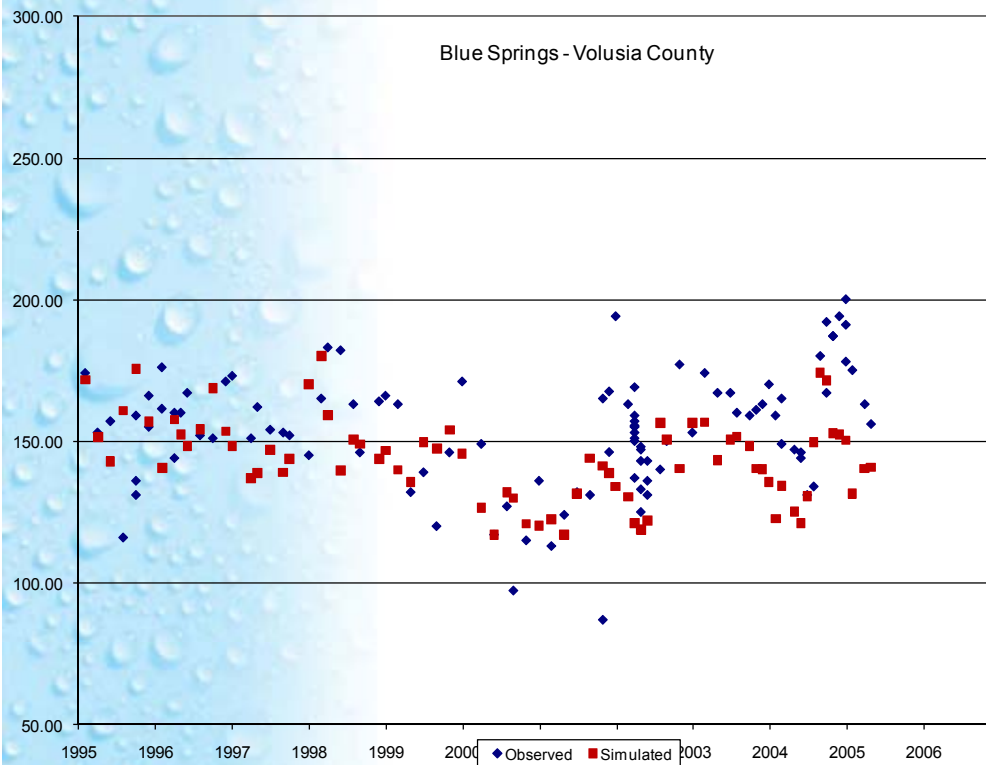
ECFT Calibration Results

Spring Flow Subset

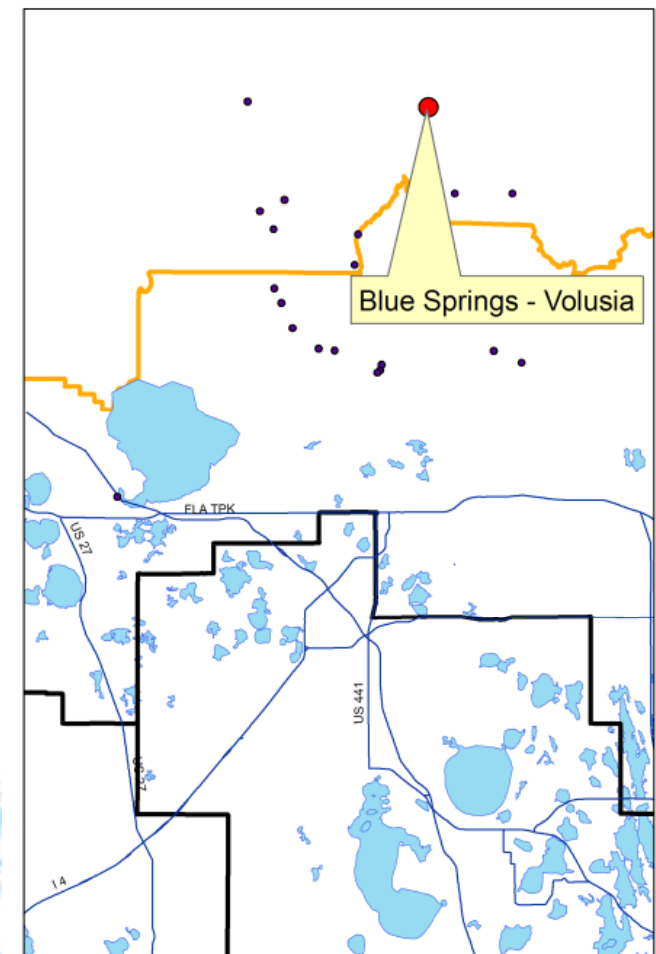
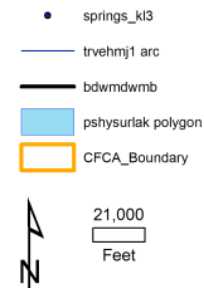
- 24 Springs in Active Model Area
- Calibration Criteria is +/- 10 percent of the Observed Spring Flow
- Two Submerged Springs Calibration Criteria is +/- 25 Percent of Flow

Blue Springs Calibration Plot

Volusia County

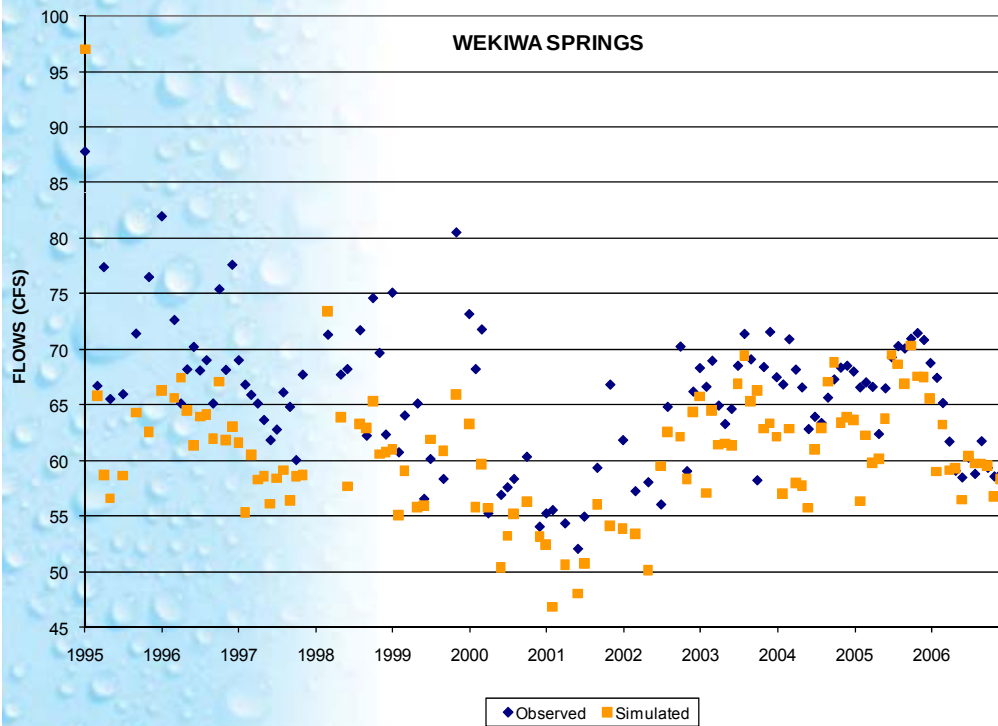


Legend



Wekiwa Springs Calibration Plot

Orange County

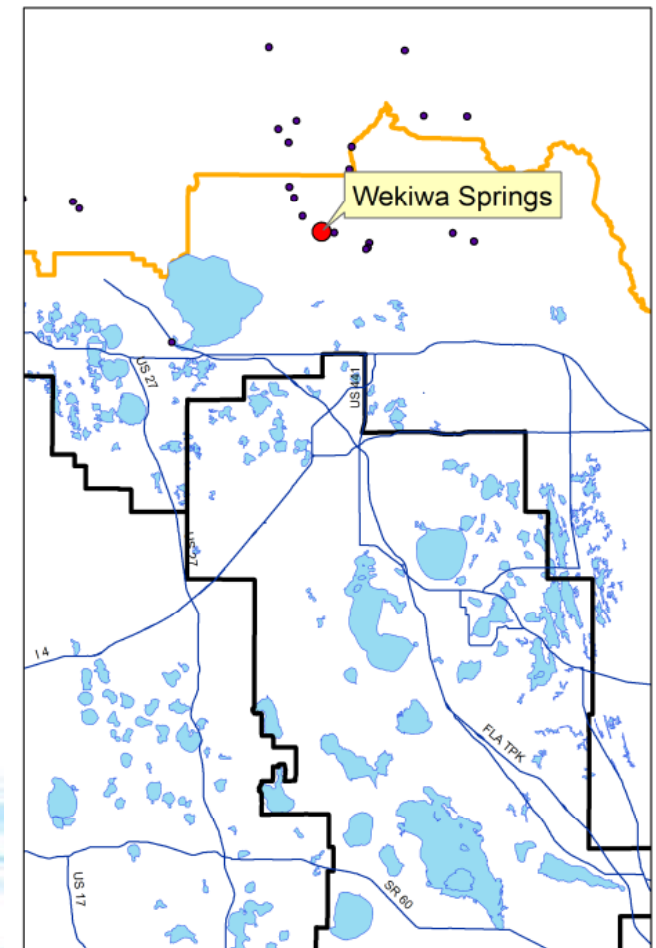


Legend

- springs_kl3
- trvehmj1 arc
- bdwmdwmb
- pshysurlak polygon
- CFC_A_Boundary



28,000
Feet



CENTRAL FLORIDA COORDINATION AREA

ECFT Calibration Results

Lake Stage Subset

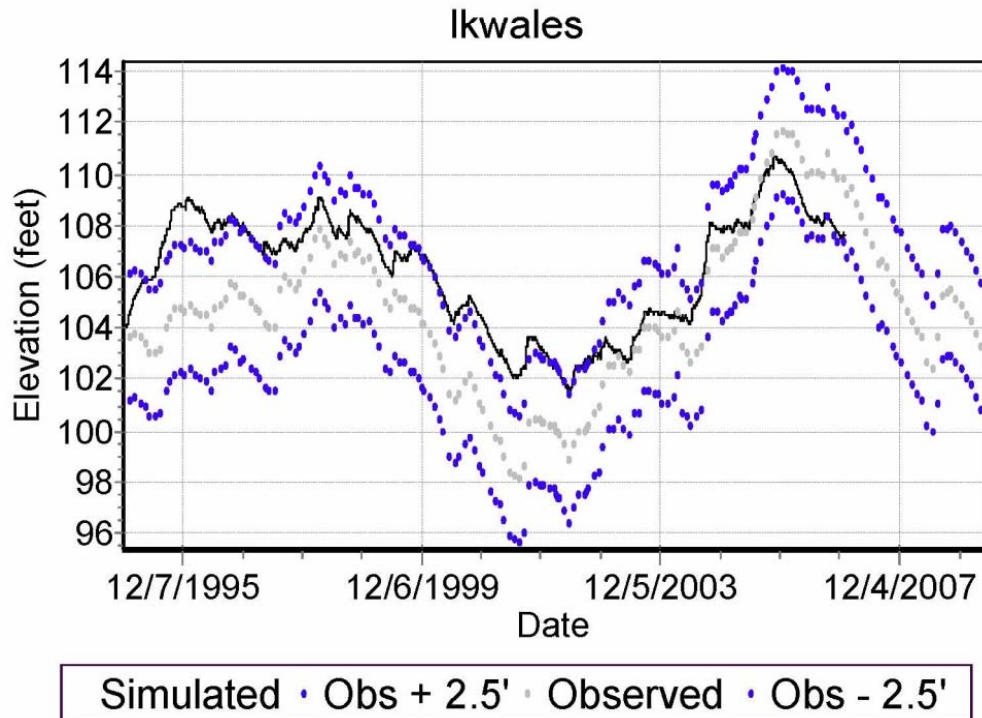


ECFT Calibration Results Lake Stage Subset

- 17 Lakes Used for Calibration
- Calibration Criteria +/- 2.5 Feet
- All Lakes Meet Calibration Criteria

Lake Wales Calibration Plot

Polk County

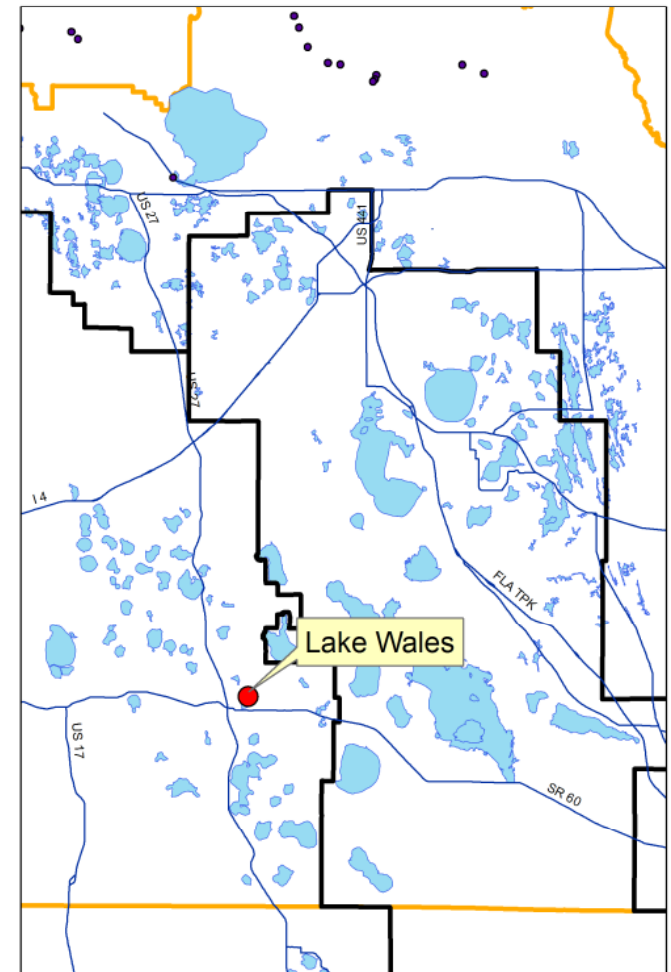


Legend

- springs_kl3
- trvehmj1 arc
- bdwmdwmb
- pshysuriak polyg
- CFLCA_Boundary

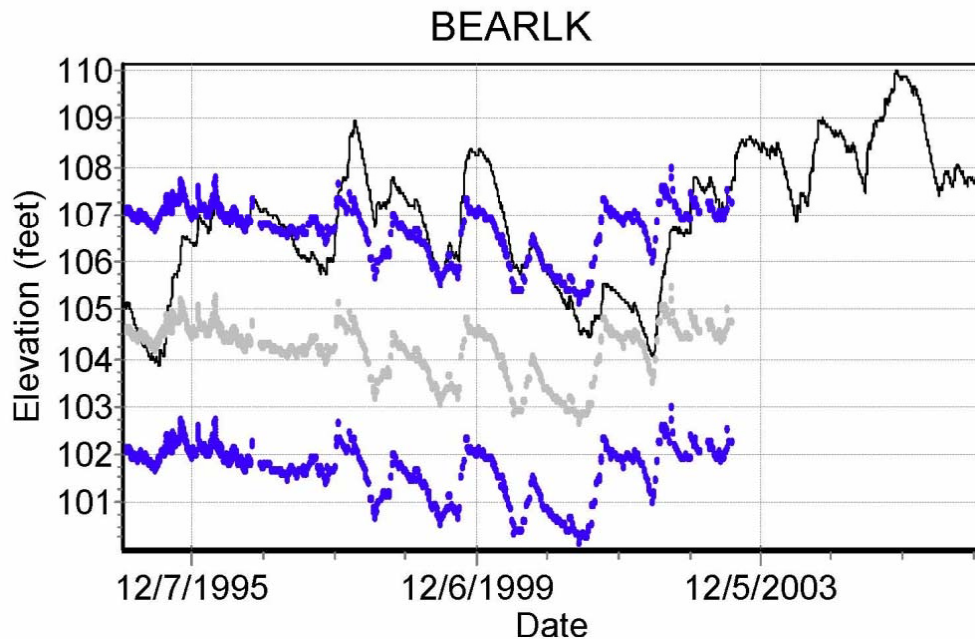


28,000
Feet



Bear Lake Calibration Plot

Orange County



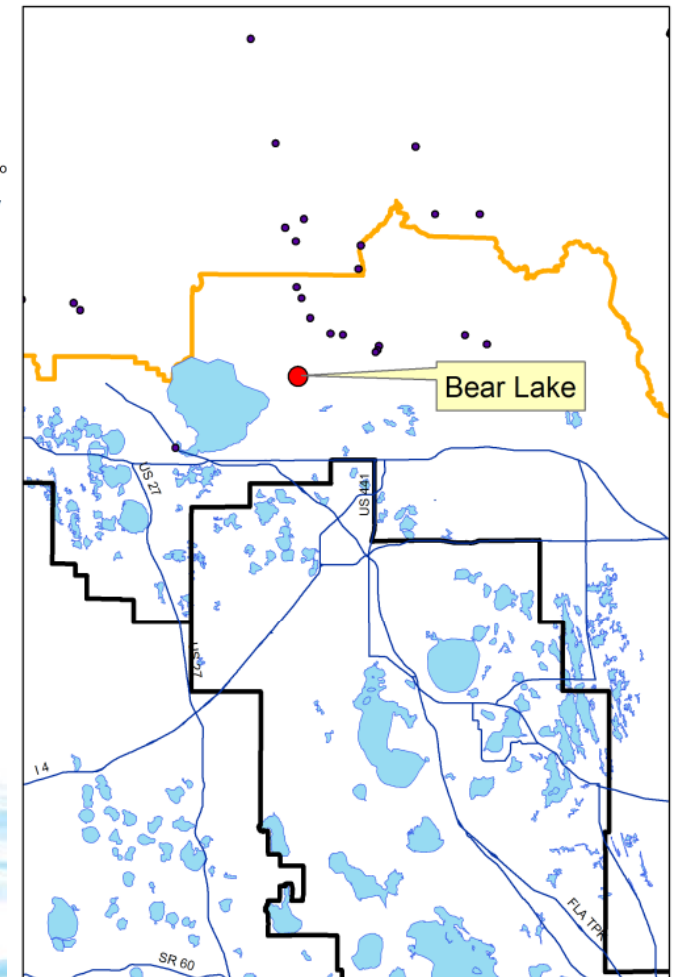
Simulated · Obs + 2.5' · Observed · Obs - 2.5'

Legend

- springs_ki3
- trvehmj1 arc
- bdwmdwmb
- pshysurlak polygo
- CFCA_Boundary



28,000
Feet



CENTRAL FLORIDA COORDINATION AREA

East Central Florida Transient Model Sensitivity Analysis

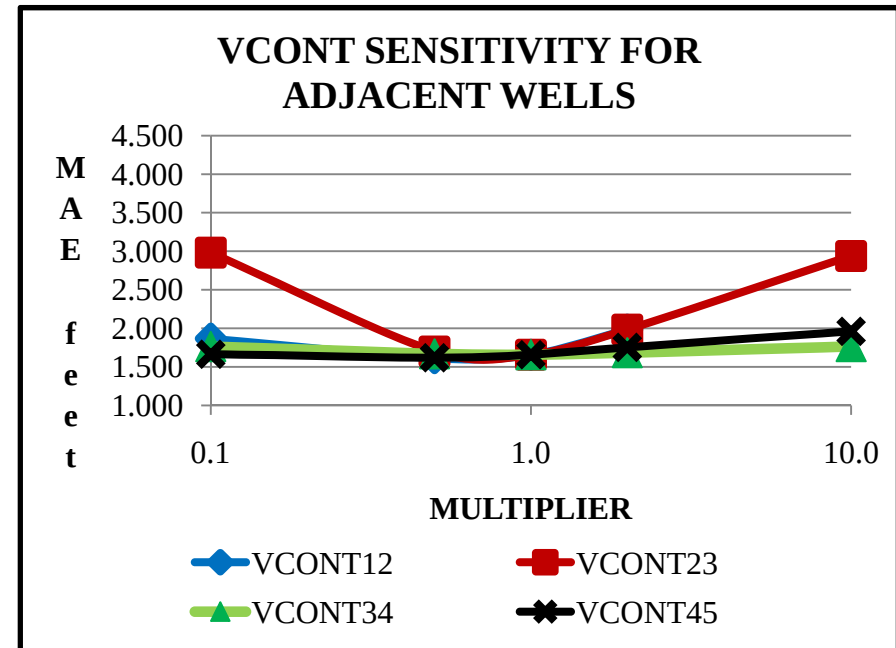
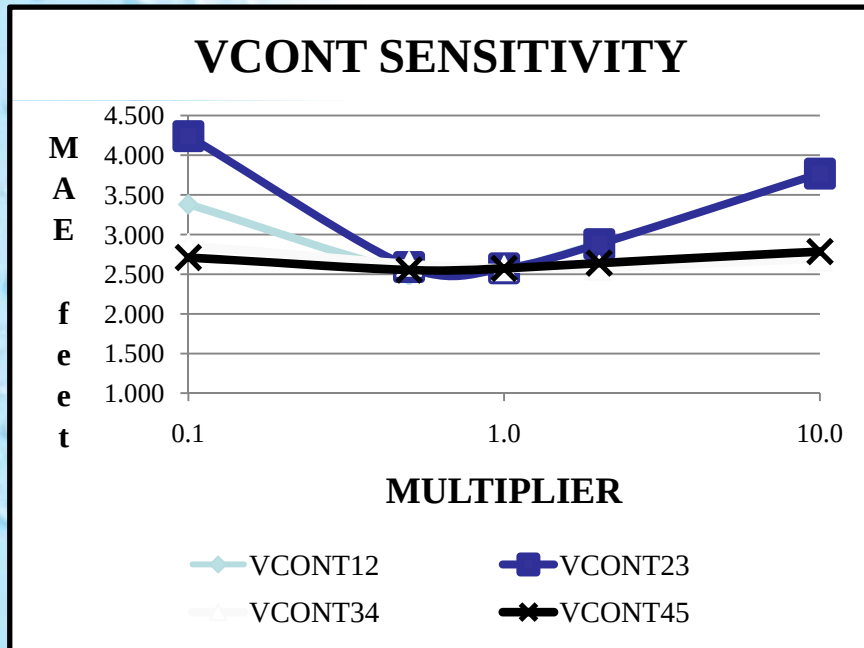


ECFT Sensitivity Analysis

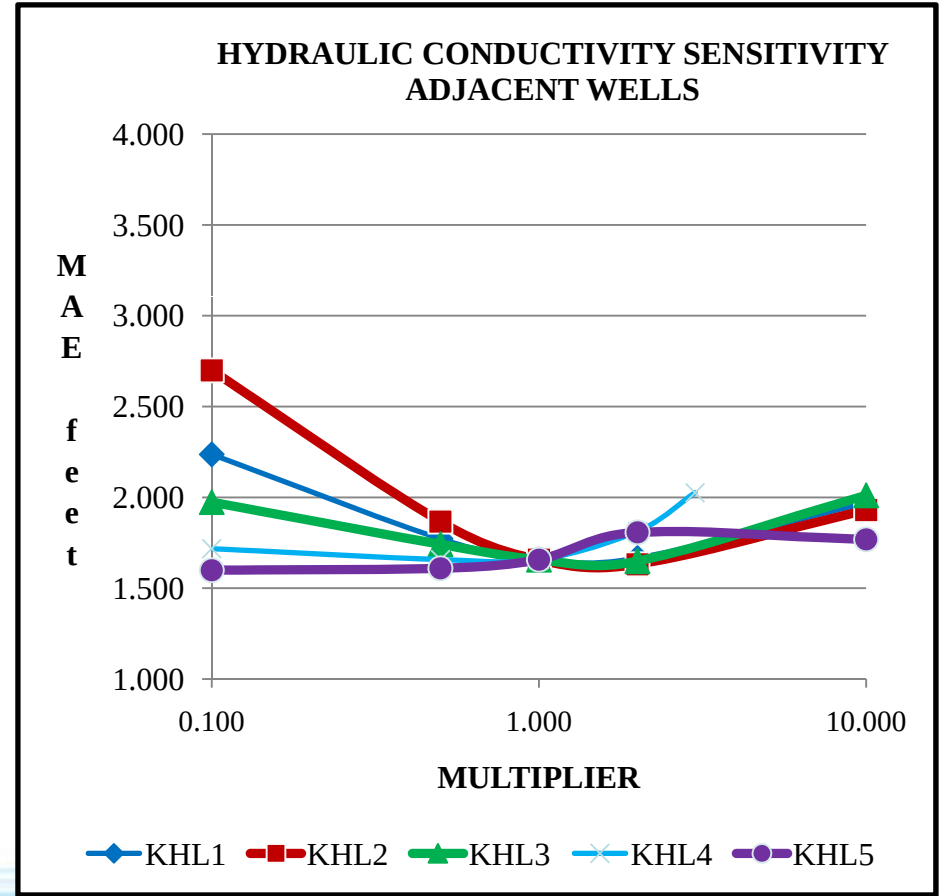
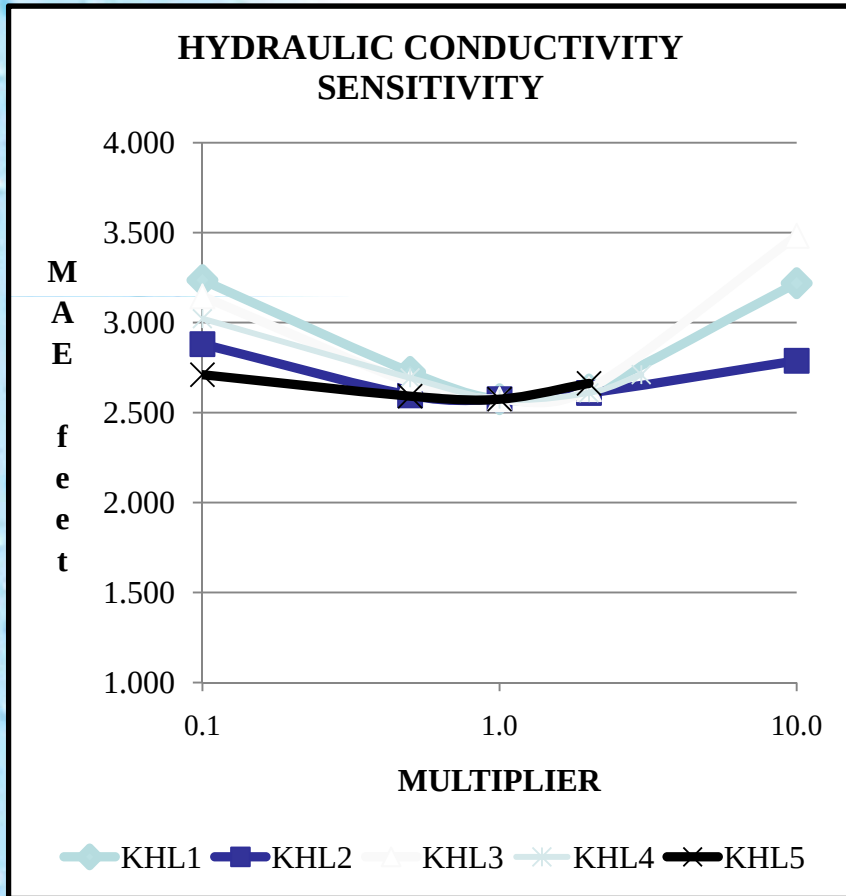
Subsection of Results

Parameter (K)	Parameter (Sy)	Parameter (Vcont)
KH1 * 0.1	SY1X01	VCONT12*01
KH1 * 0.5	SY1X05	VCONT12*05
KH1 * 2	SY1X2	VCONT12*2
KH1 * 10	SY1X3	VCONT12*10
KH3 * 0.1		VCONT23 * 10
KH3 * 0.5		VCONT23 * 2
KH3 * 2		VCONT23 *0.1
KH3 * 10		VCONT23 *0.5
KH4 * 0.1		VCONT34 * 10
KH4 * 0.5		VCONT34 * 2
KH4 * 2		VCONT34 *0.1
KH4 * 3		VCONT34 *0.5
KH5 * 0.1		VCONT45 * 10
KH5 * 0.5		VCONT45 * 2
KH5 * 2		VCONT45 *0.1
KH5 * 10		VCONT45 *0.5

Sensitivity of ECFT to Vertical Conductance

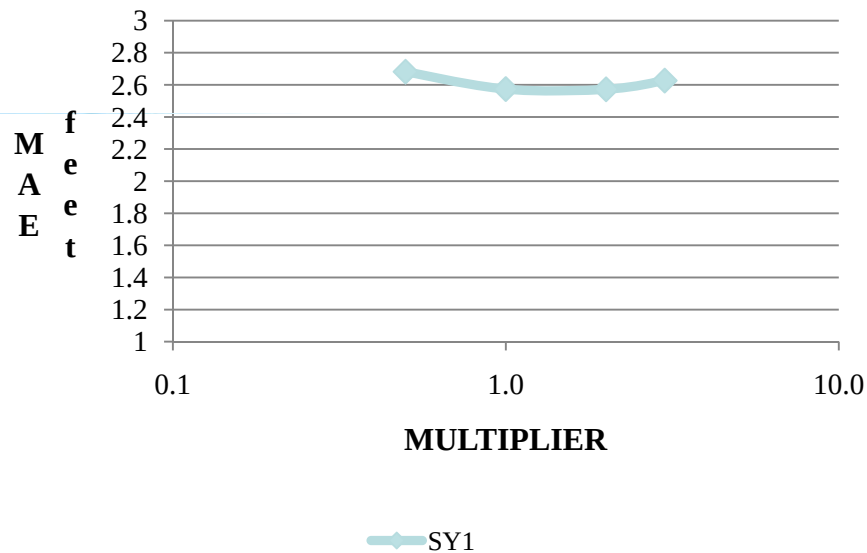


Sensitivity of ECFT to Hydraulic Conductivity

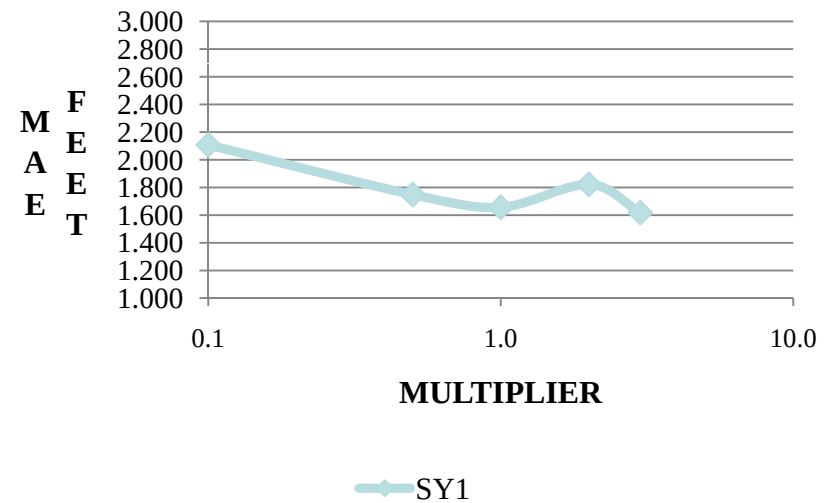


Sensitivity of ECFT to Specific Yield in the Surficial Aquifer

SY1 SENSITIVITY



SENSITIVITY FOR SY1 - ADJACENT WELLS



Remaining Work To Be Done

- Finish incorporating additional aquifer test data into the model (Cypress Lake, South East Polk, Yeehaw Junction area)
- Refinement of Pumpage Data
- General fine-tuning of Calibration

CENTRAL FLORIDA COORDINATION AREA

Questions?

