



# Lower East Coast Subregional (LECs<sub>R</sub>) North Palm Beach Groundwater Model Status Report

South Florida Water Management District  
December 14, 2016

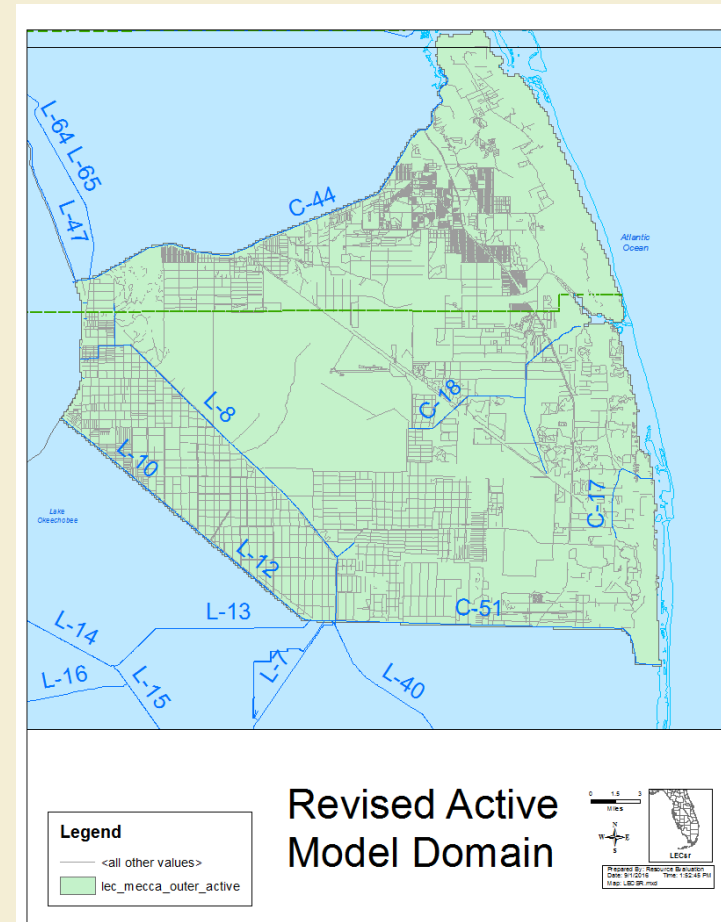
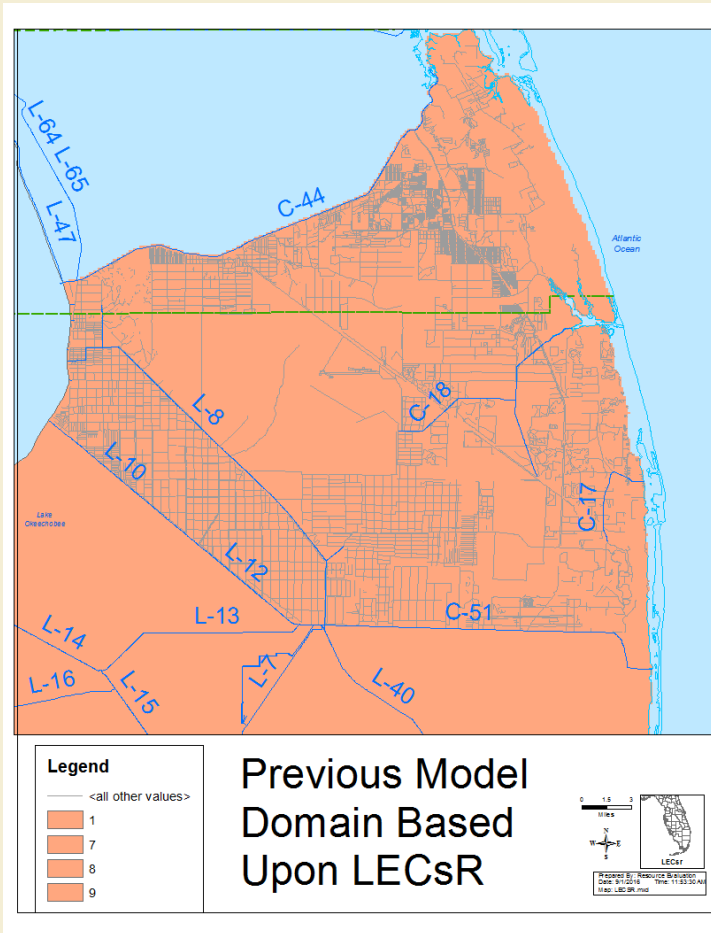
# Outline

- **Overview**
- **Model Updates**
- **Calibration**
- **Recent Activity**
- **What's Next**

# Significant Model Changes

- Incorporated additional hydrogeologic information obtained from the Mecca property and the L8-FEB/C-51 reservoir sites
- Updated control structure operations and weir elevations in Martin County and portions of Palm Beach County
- Improved simulation of coastal wellfields
- Revised active model domain and wetland assumptions
- Updated evapotranspiration, runoff and rainfall distribution

# Revised Active Model Domain



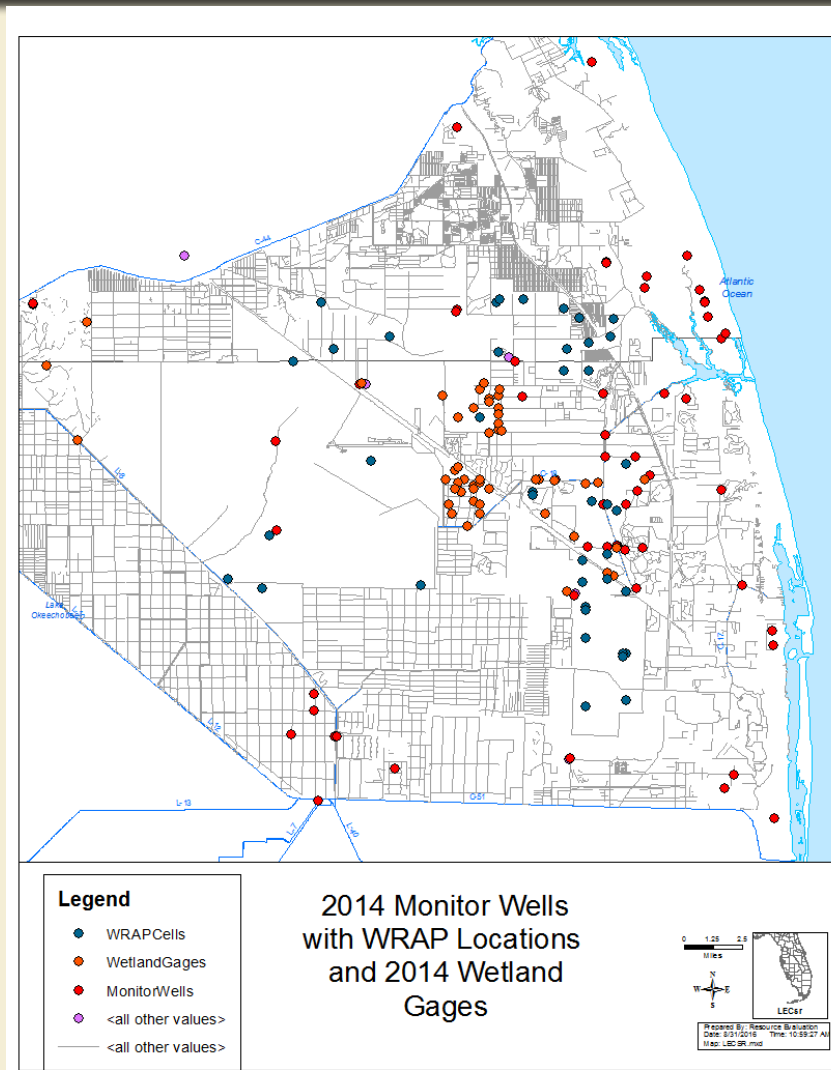
# Additional Model Updates

- **Updated calibration period**
  - Previous LECsR model calibrated from 1986-2005
  - Revised calibration is 2006-2014
  - Calibration period now includes the operations of SFWMD's G-160 and G-161 Structures
- **Calibration now incorporates a number of additional wetland, WRAP and groundwater monitoring sites**
  - Add data received for 10 additional wetland observation well sites in the Flowway 3
  - Included revisions suggested by the Review Team

# Additional Model Updates

- **Seepage losses from the M-Canal accounted for west of the WPB Water Catchment Area**
- **Converted irrigation demands from permitted to climatic driven as calculated from AFSIRS**

# Monitor Well and Wetland Sites





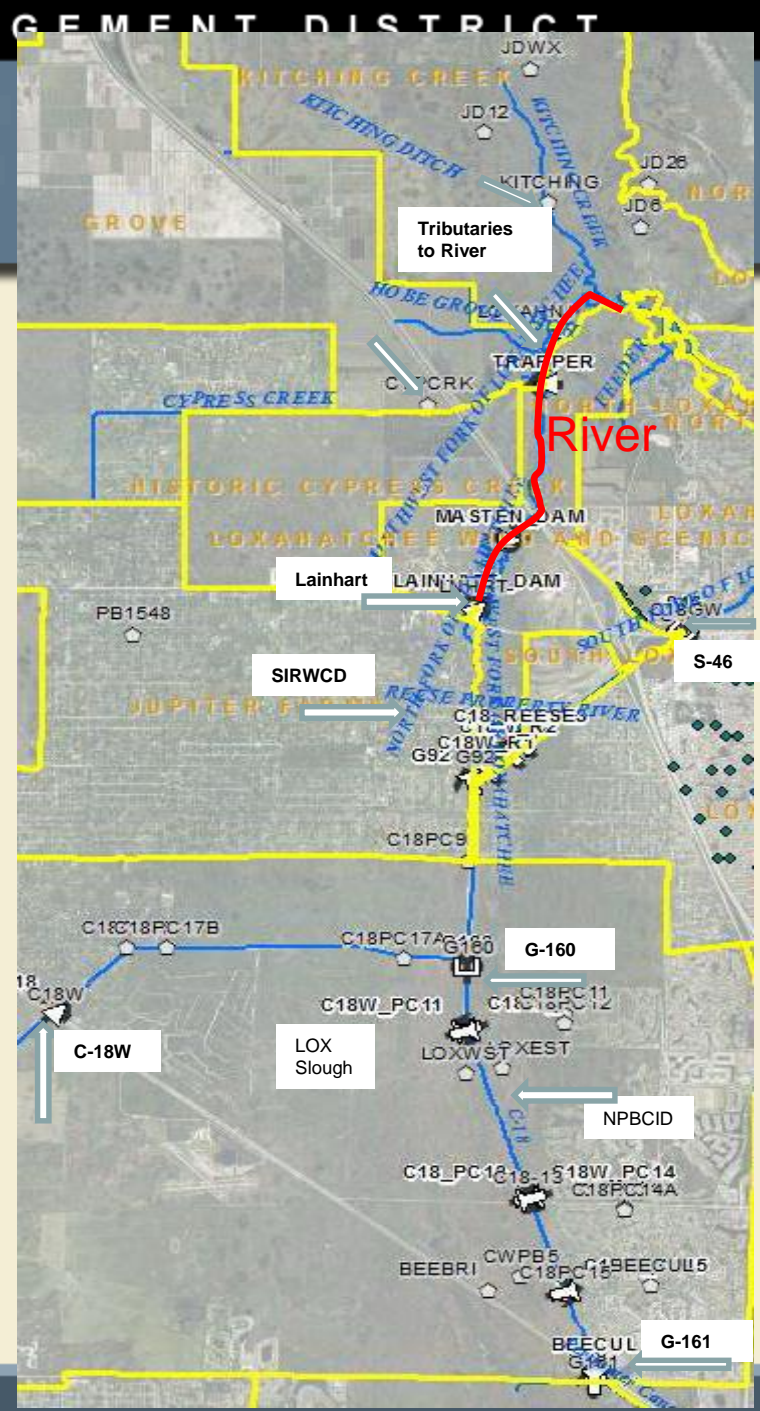
# Flow Calibration Statistics





# Flow Statistics

- Discharge locations:
  - 6 structures within C-18 Watershed
  - 3 structures within Tributary Watersheds
  - Flows out of L-8 (ITID) Watershed



# Flow Statistics

- **Calibration criteria:**
  - **Global statistics for each structure (SFWMD 2006; ASCE, 1993)**
    - **Nash-Sutcliffe (NS) > 0.4; indicates accuracy**
    - **$R^2 > 0.4$ ; explains variance**
    - **Deviation of volume (DV) < 15%; quantifies volume difference**
  - **Qualitative techniques**
    - **Daily flow hydrographs**
    - **Duration curves**
    - **Double mass curves**
    - **Water budgets**

# Global Statistics C-18/C-14 Watersheds

Calibration Criteria:  
NS & R<sup>2</sup> > 0.4  
DV < 15%

REVISED	C-18/C-14 Watersheds					
2006-2014	C-18W Weir	G-161	G-160	S-46	G-92	Lainhart
Number of days	3170	2621	3170	3170	3089	3170
R	0.79	0.80	0.67	0.86	0.68	0.84
R <sup>2</sup>	0.62	0.63	0.45	0.74	0.47	0.70
NS	0.62	0.63	0.43	0.70	0.42	0.69
DV (%)	6	-1	19	15	-15	-5
AverageQ(cfs)	37	3	45	33	75	105
2011-2014	C-18W Weir	G-161	G-160	S-46	G-92	Lainhart
Number of days	1461	1440	1461	1461	1461	1461
R	0.88	0.77	0.80	0.93	0.74	0.87
R <sup>2</sup>	0.77	0.59	0.65	0.86	0.55	0.77
NS	0.75	0.59	0.55	0.76	0.54	0.76
DV (%)	-21	-1	24	21	1	4
AverageQ(cfs)	32	4	47	37	73	110

- 2004: G-160 was built to control stages in LOX Slough and ability to send water to the River
- 2007: G-161 was built to allow improvements to hydrology in GWP, and passage flows to river
- 2009: Operations to raise G-160 structure and secondary canal culvert flashboard to maintain slough stage while maintain urban flood-control
- 2006-2014: G-160 and G-161 operations: nor formal agreements; following interim operational protocol guidelines
- Target values for G-161 during Tropical Storm Isaac were excluded for calibration statistics. Emergency operations during this extreme event are not simulated in the model.
- Parameters: recharge-runoff (C18W), canal-aquifer interaction (tributaries), wetlands properties (GWP), wetland cells representing canals, aquifer hydraulic conductivities

# Global statistics Tributaries to Loxahatchee River

Calibration Criteria:  
 NS & R<sup>2</sup> > 0.4  
 DV < 15%

REVISED	Tributaries to Lox River		
2006-2014	Cypress Creek	Hobe Grove Ditch	Kitching Creek
Number of days	1606	1597	1252
R	0.81	0.76	0.73
R <sup>2</sup>	0.65	0.57	0.53
NS	0.55	0.28	0.41
DV (%)	-17	23	-2
AverageQ(cfs)	91	14	15

# Groundwater and Wetland Calibration

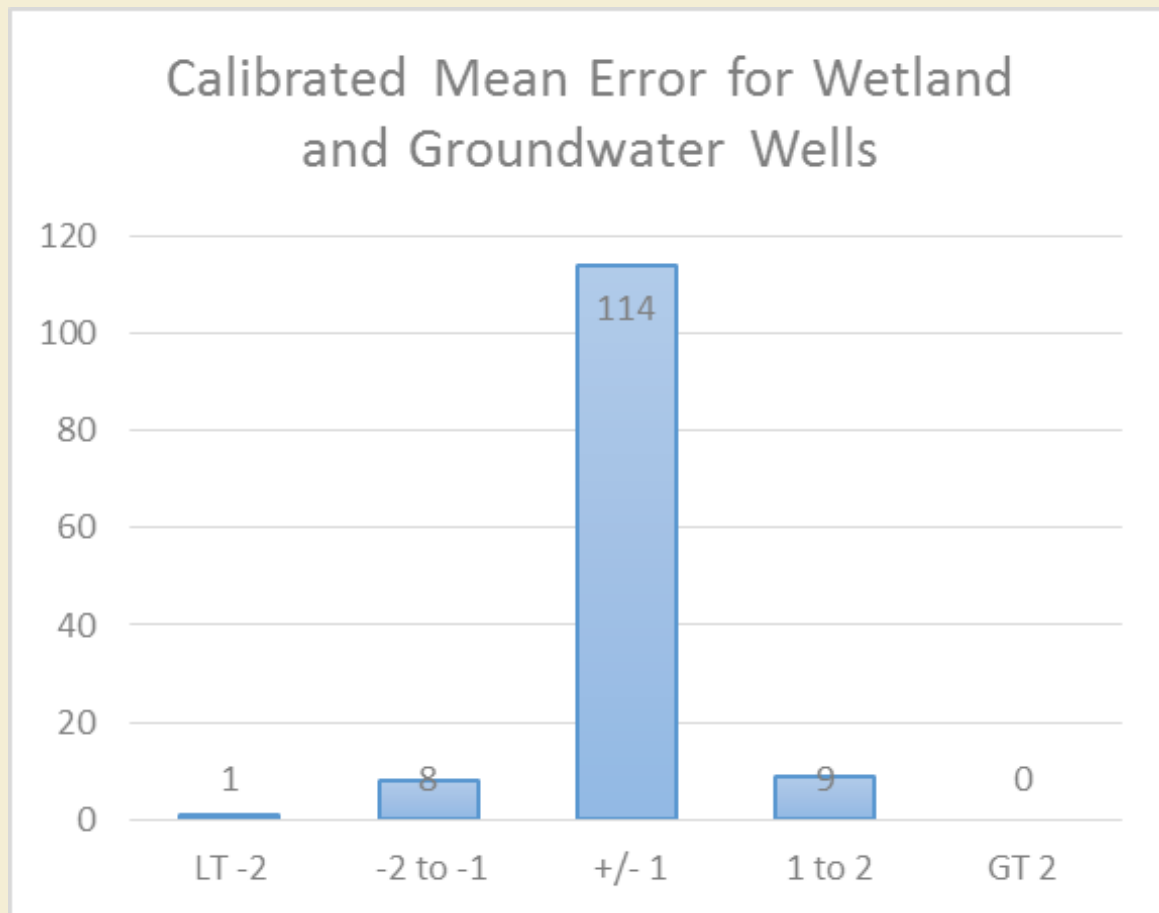


# Groundwater and Wetland Water Level Calibration

**Number of wells between plus/minus 1 foot increased from 92 in September to 114 presently**

**Number of wells greater than or less than 2 feet decreased from 5 to 1**

**Between plus or minus 1 - 2 feet dropped from 26 to 17**





# Overall Water Level Statistics

	Mean Absolute Error feet	Mean Absolute Error feet
	Monitor Wells	Wetland Gages
Jun-16	2.1	1.24
Sep-16	0.94	1.02
Oct-16	0.75	0.89

# Recent Activity

- **Assumptions complete**
- **Two 2070 Base Cases required**
  - **Separate Future Without Base run to support Alternative 10**
- **Continuing to refine Performance Measure Graphics to present results**

# Next Steps

- **Deliver calibration materials**
- **Re-run 2014 and 2070 Base Cases**
- **Incorporate features for each of the 5 alternatives into model**
- **Begin running alternatives in January**
- **Complete modeling in March**

# Questions?

