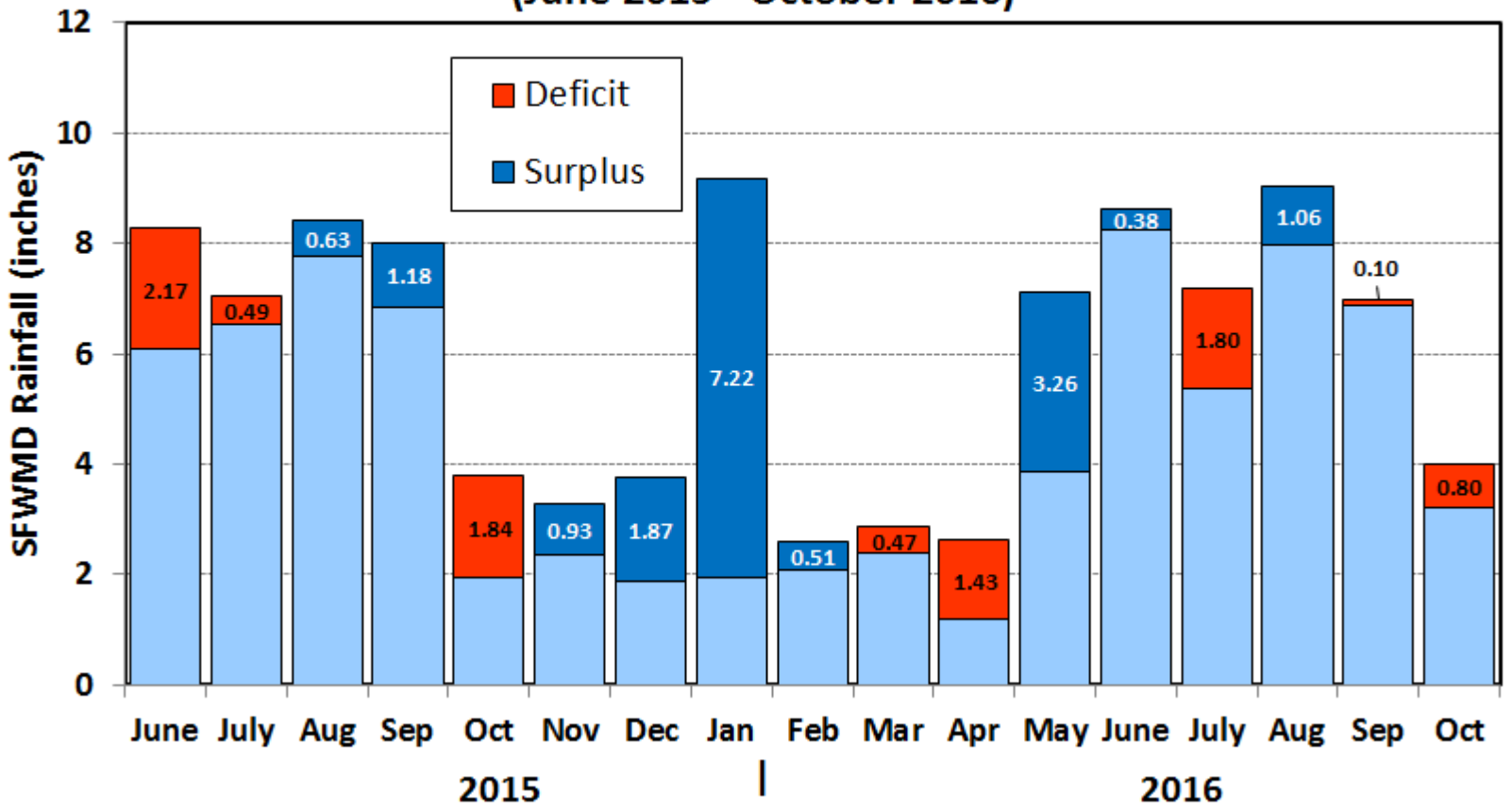
Water Conditions Summary

South Florida Water Management District
WRAC Meeting
November 3, 2016

Akintunde O. Owosina, P.E.
Chief, Hydrology and Hydraulics Bureau

SFWMD Rainfall Distribution Comparison

(June 2015 - October 2016)

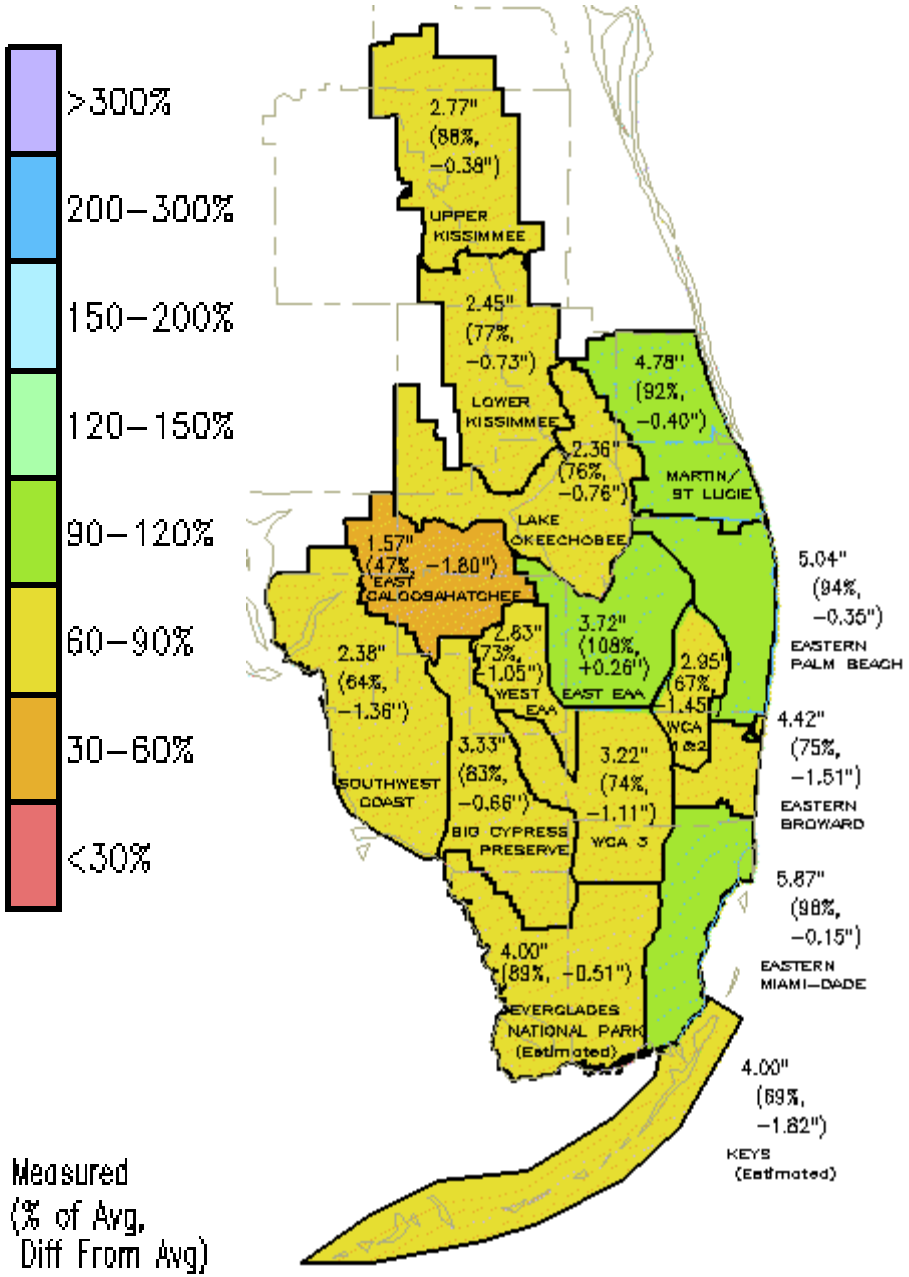


2015 WET SEASON:

- Driest May-July since 2004
- Ended below average

2015-16 DRY AND 2016 WET SEASON:

- Nov 2015-Jan 2016 wettest since 1932
- Jan 2016 wettest since 1932
- Second wettest May since 1976
- Dry season 2015-16 168% above average
- 2016 Wet season is below average



SFWMD

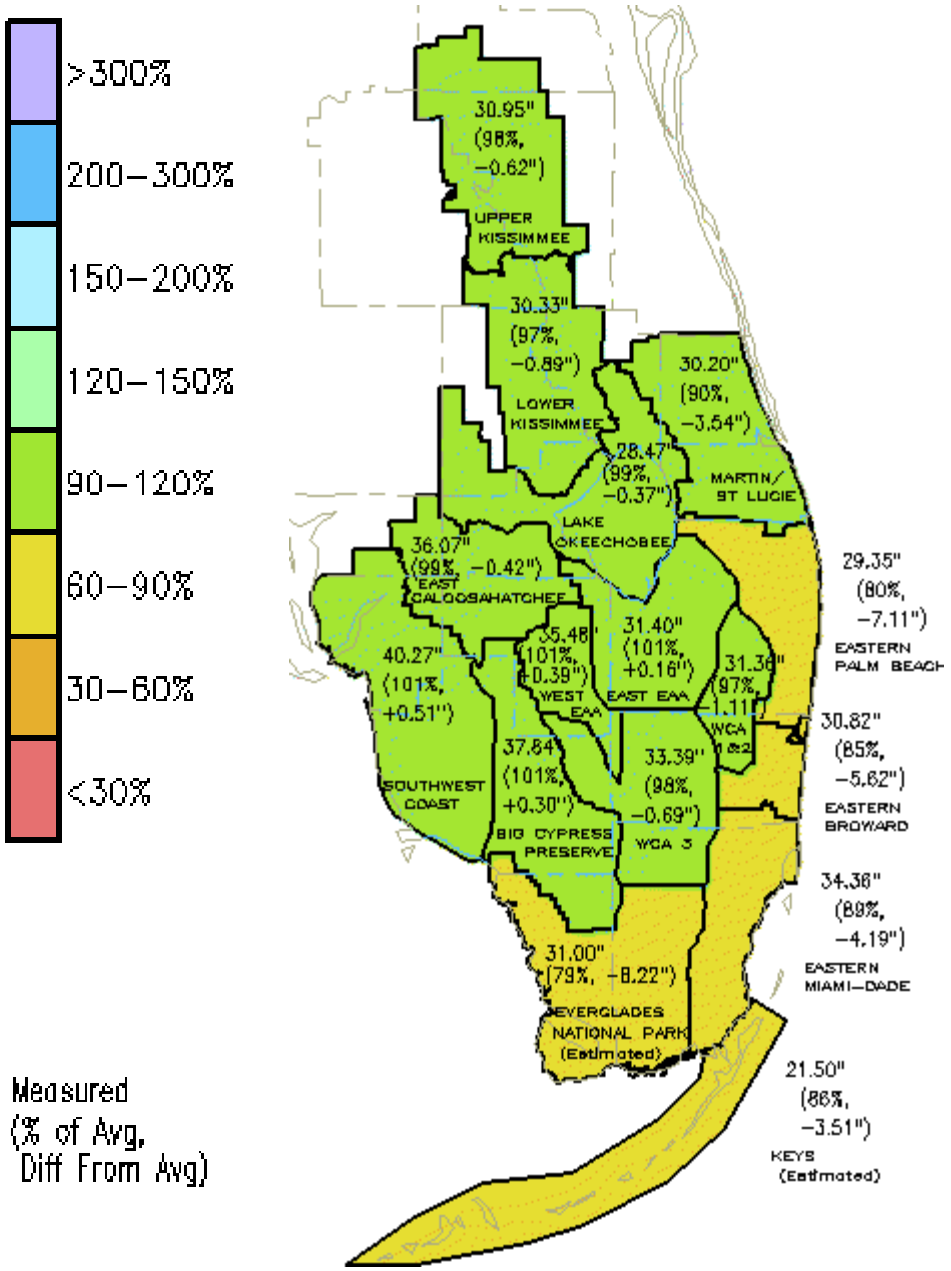
October 2016 Rainfall

(02-Oct to 01-Nov-2016)

DISTRICT-WIDE: 3.21” 80% of Avg, or -0.80”)

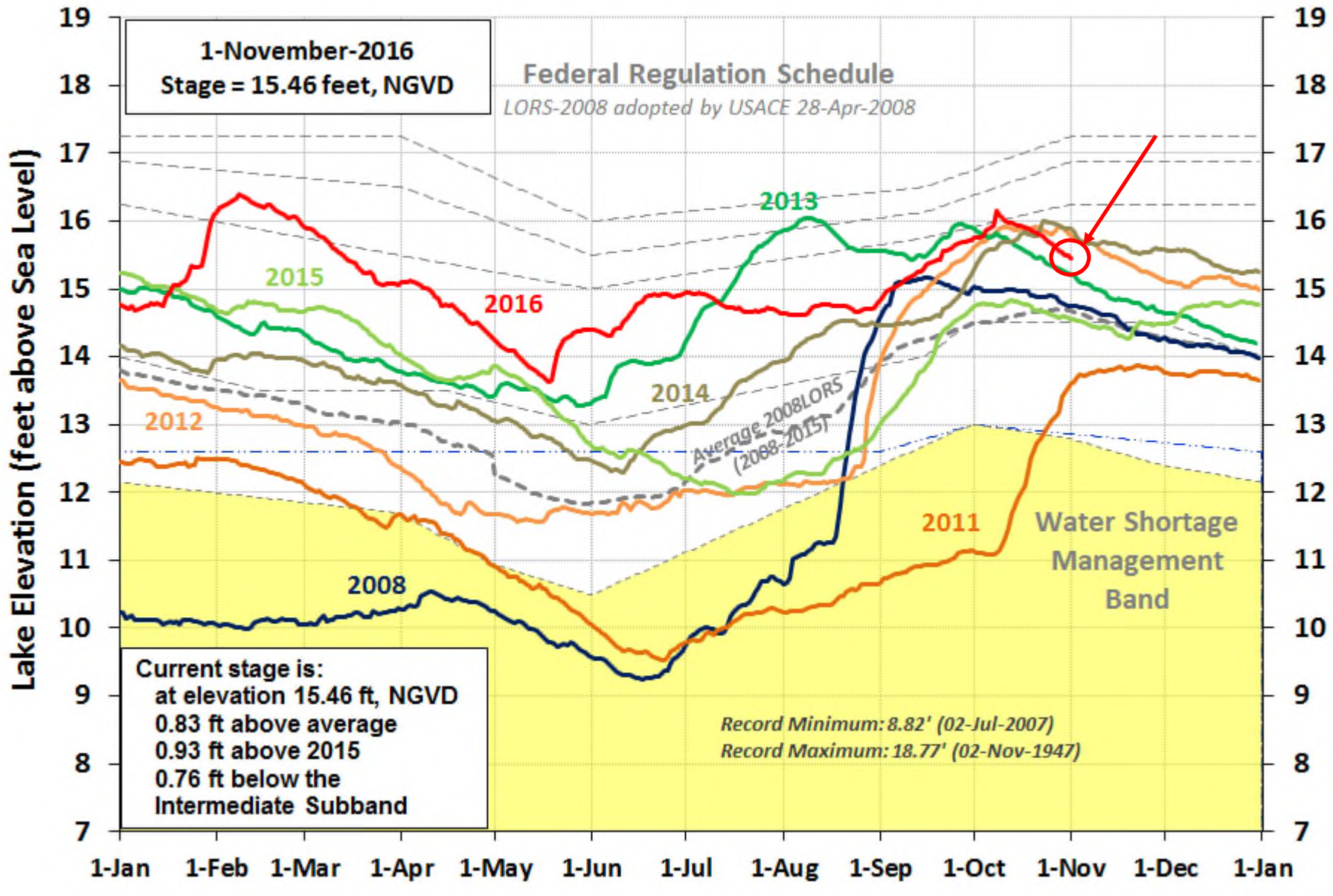
- **October rainfall is below normal**
- **Only East EAA rainfall area shows a surplus of 0.28.**
- **East Caloosahatchee rainfall deficit is 1.80”**
- **Most of the rain took place up to October 7, when Hurricane Matthew passed to the east of the District**

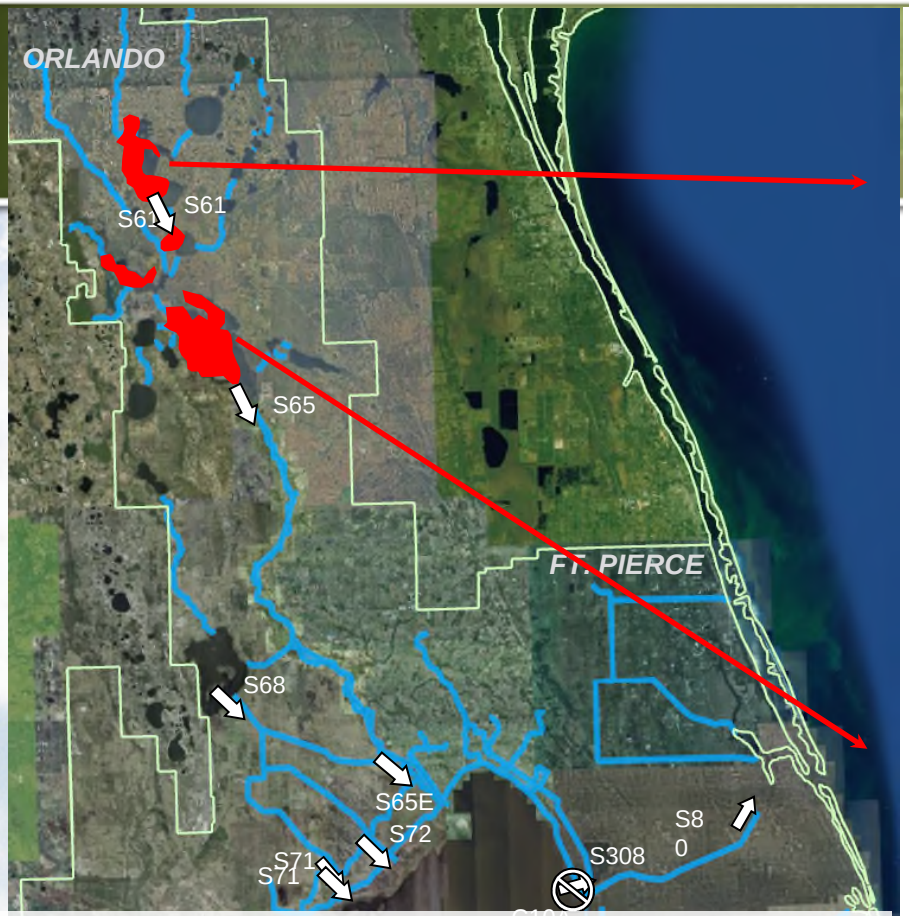
SFWMD
2016 Wet Season Rainfall
(02-Jun-2016 to 01-Nov-2016
DISTRICT-WIDE: 33.13” 96% of Avg, or -1.26”)



- 2016 wet season District rainfall is slightly below average
- Areas in the LEC, ENP and the Florida Keys are noticeably below normal
- All other rainfall areas are close to average.

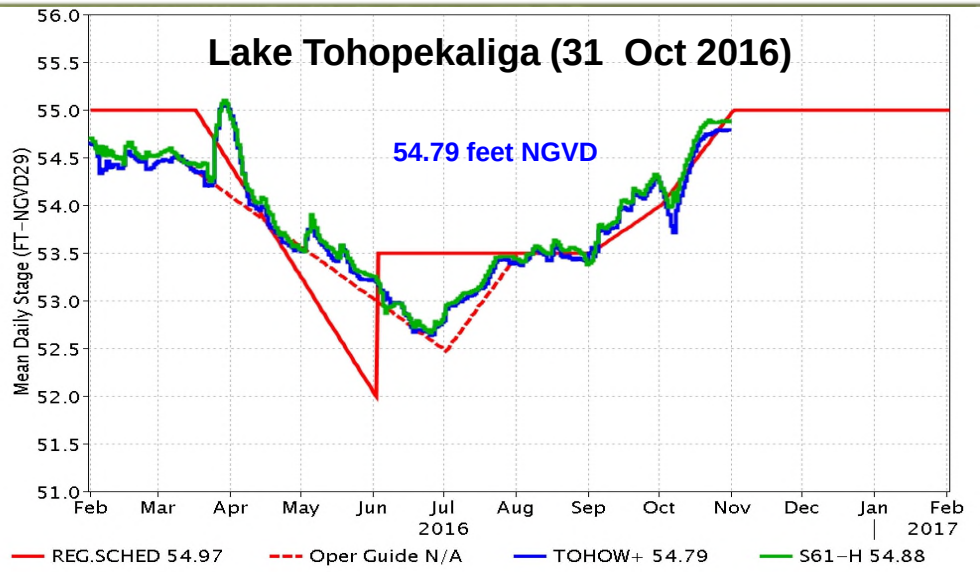
Lake Okeechobee Water Level Comparison

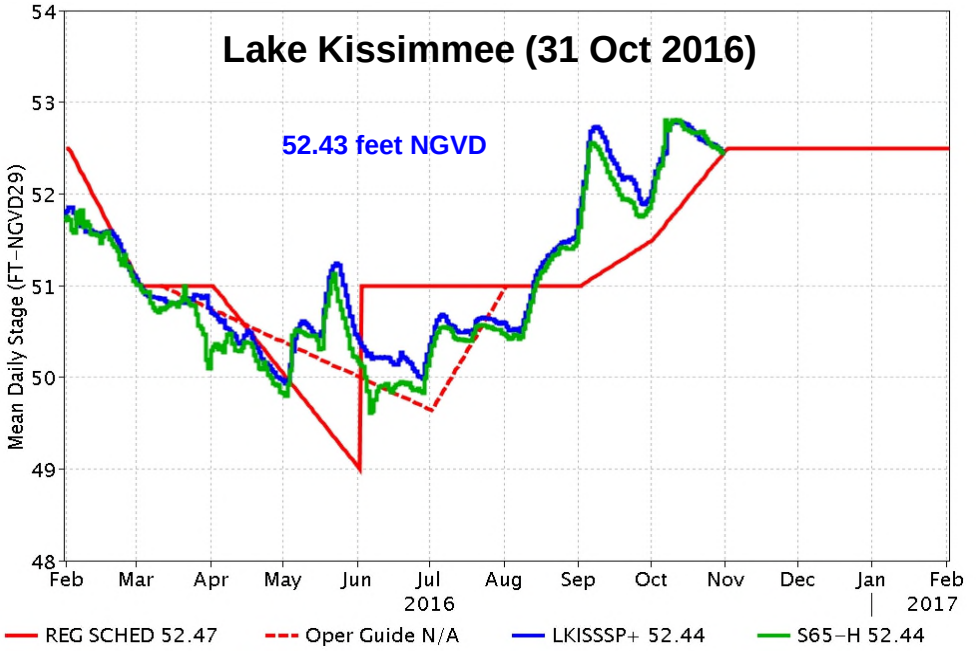


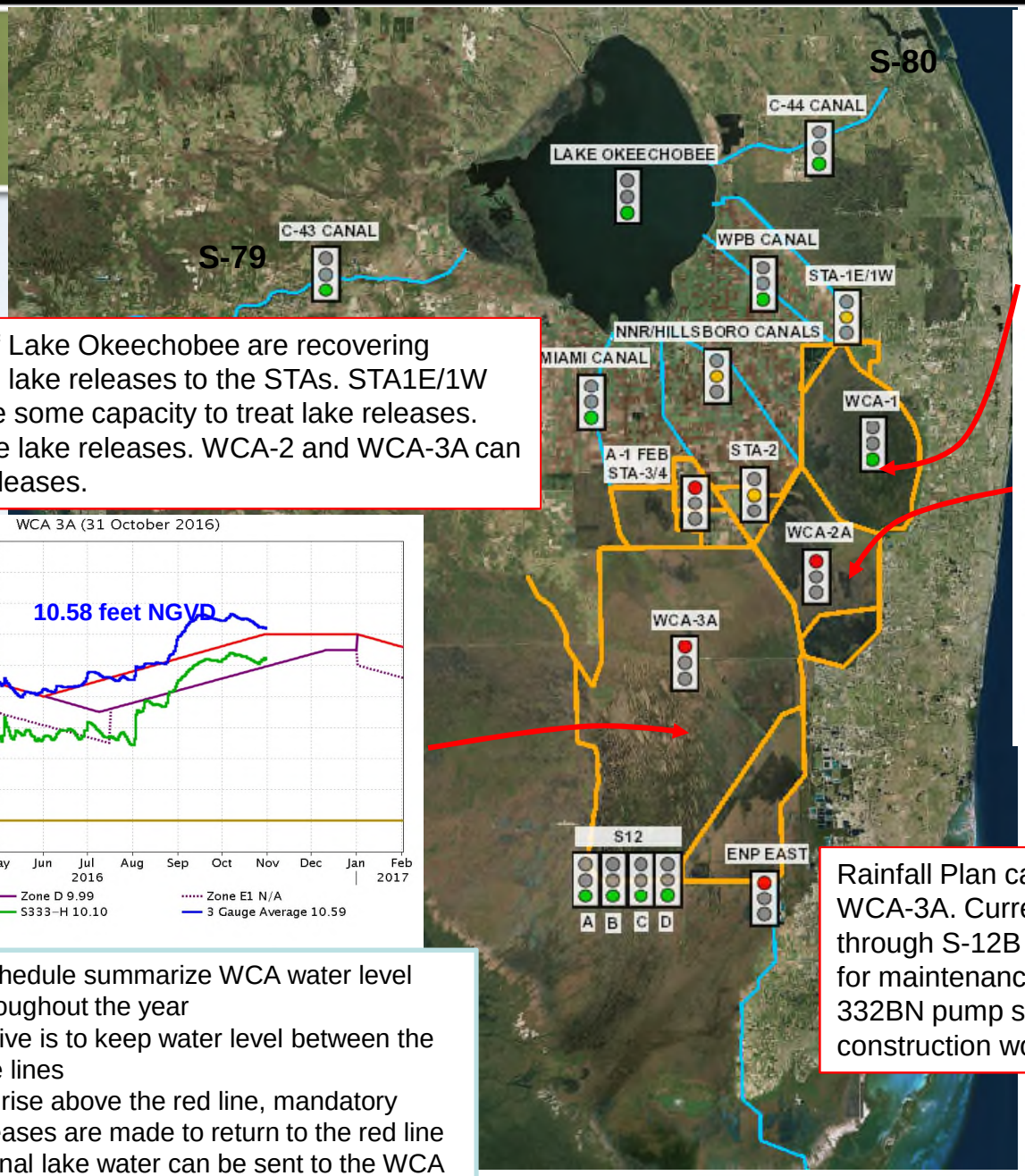


Kissimmee Basin

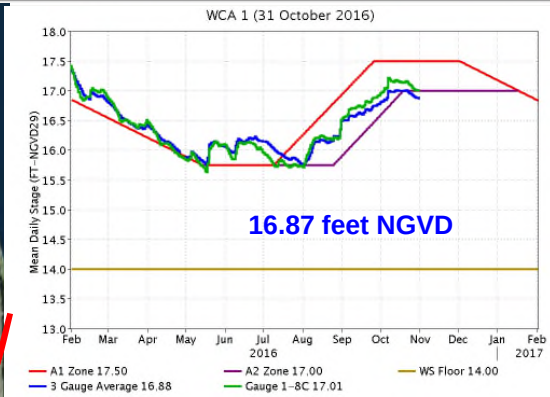
- Stages at Kissimmee-Cypress-Hatchineha are at winter pool elevation
- Stages at East Toho and Toho are ~ 0.2 ft within and below winter pool regulation
- With the exception of Lake Alligator, stages for all other lakes are close to winter pool regulation
- Discharge at S65 is about 700 cfs

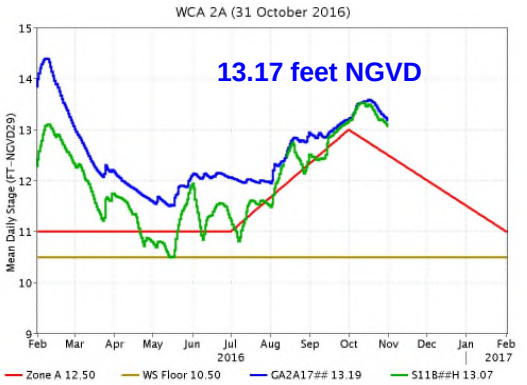






Canals south of Lake Okeechobee are recovering capacity to take lake releases to the STAs. STA1E/1W and STA-2 have some capacity to treat lake releases. WCA-1 can take lake releases. WCA-2 and WCA-3A can not take lake releases.

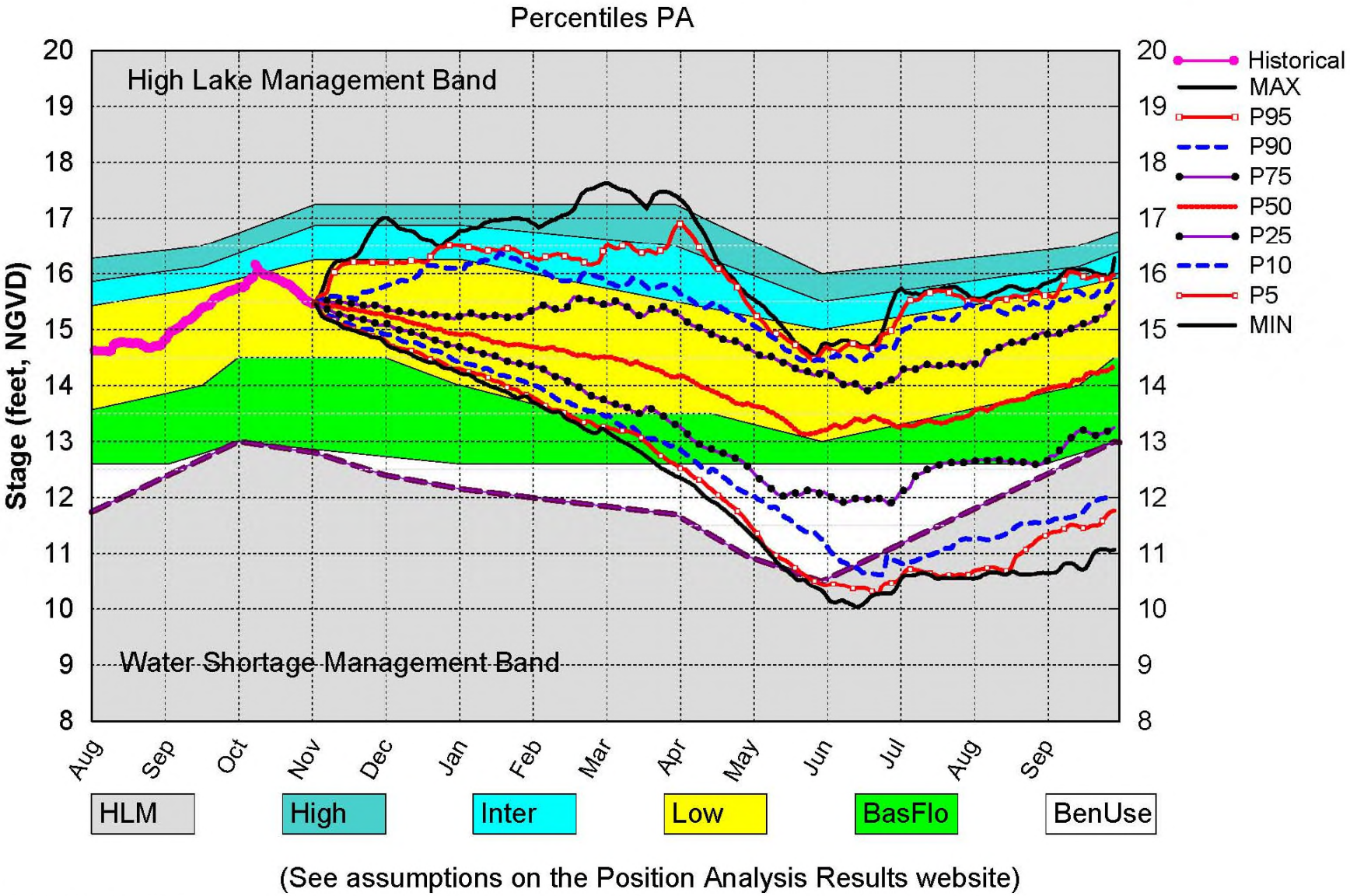




- Regulation Schedule summarize WCA water level thresholds throughout the year
- Current objective is to keep water level between the red and purple lines
- If water levels rise above the red line, mandatory regulatory releases are made to return to the red line and no additional lake water can be sent to the WCA

Rainfall Plan calls for maximum releases from WCA-3A. Currently discharging ~ 1,900 cfs through S-12B to D. S-333 and S-334 are closed for maintenance and due to stages in ENP. S-332BN pump station remains secured due to construction work. S-197 is closed.

Lake Okeechobee SFWMM November 2016 Dynamic Position Analysis

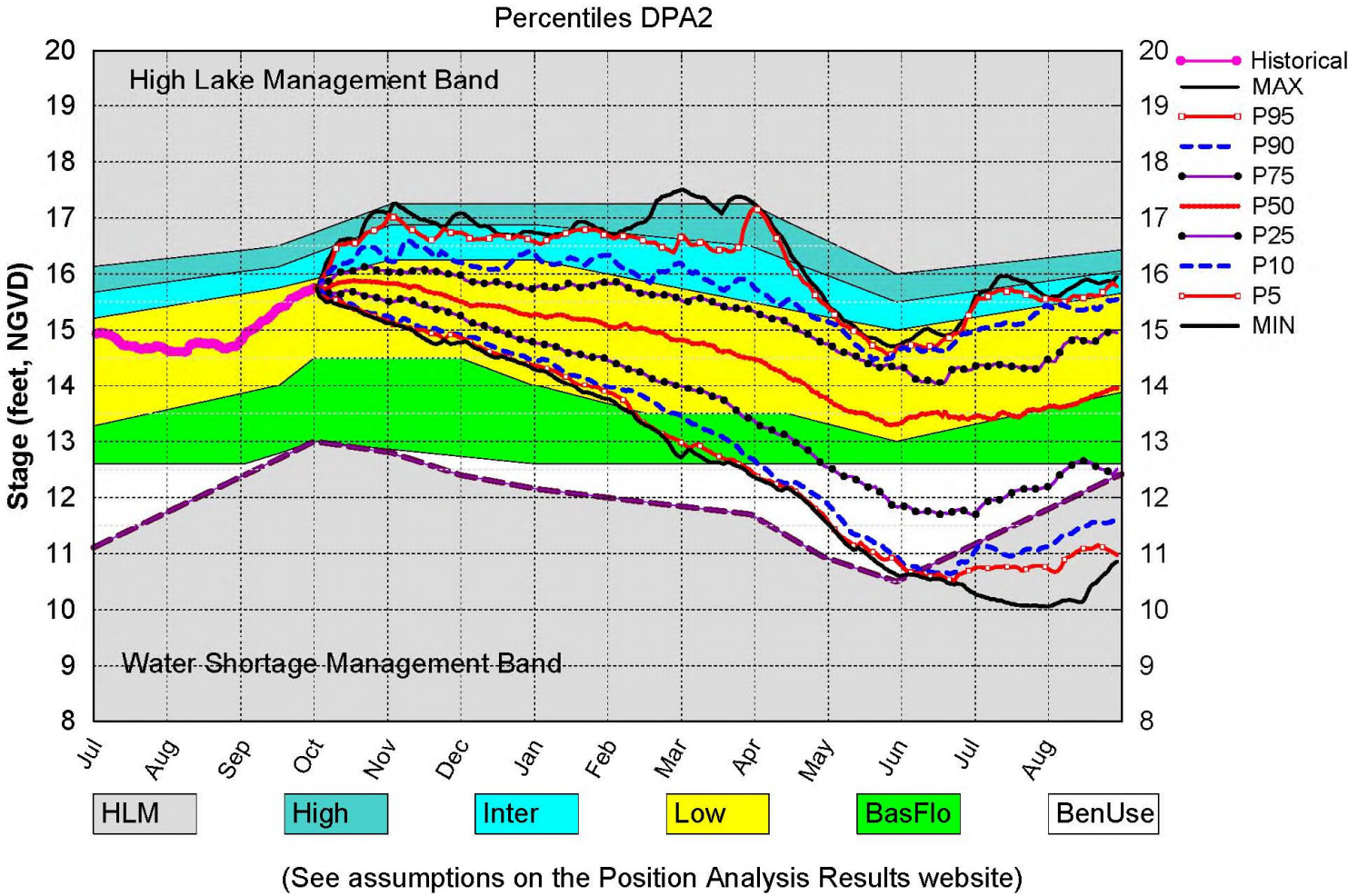


(See assumptions on the Position Analysis Results website)

Wed Nov 2 20:25:44 2016

Questions?

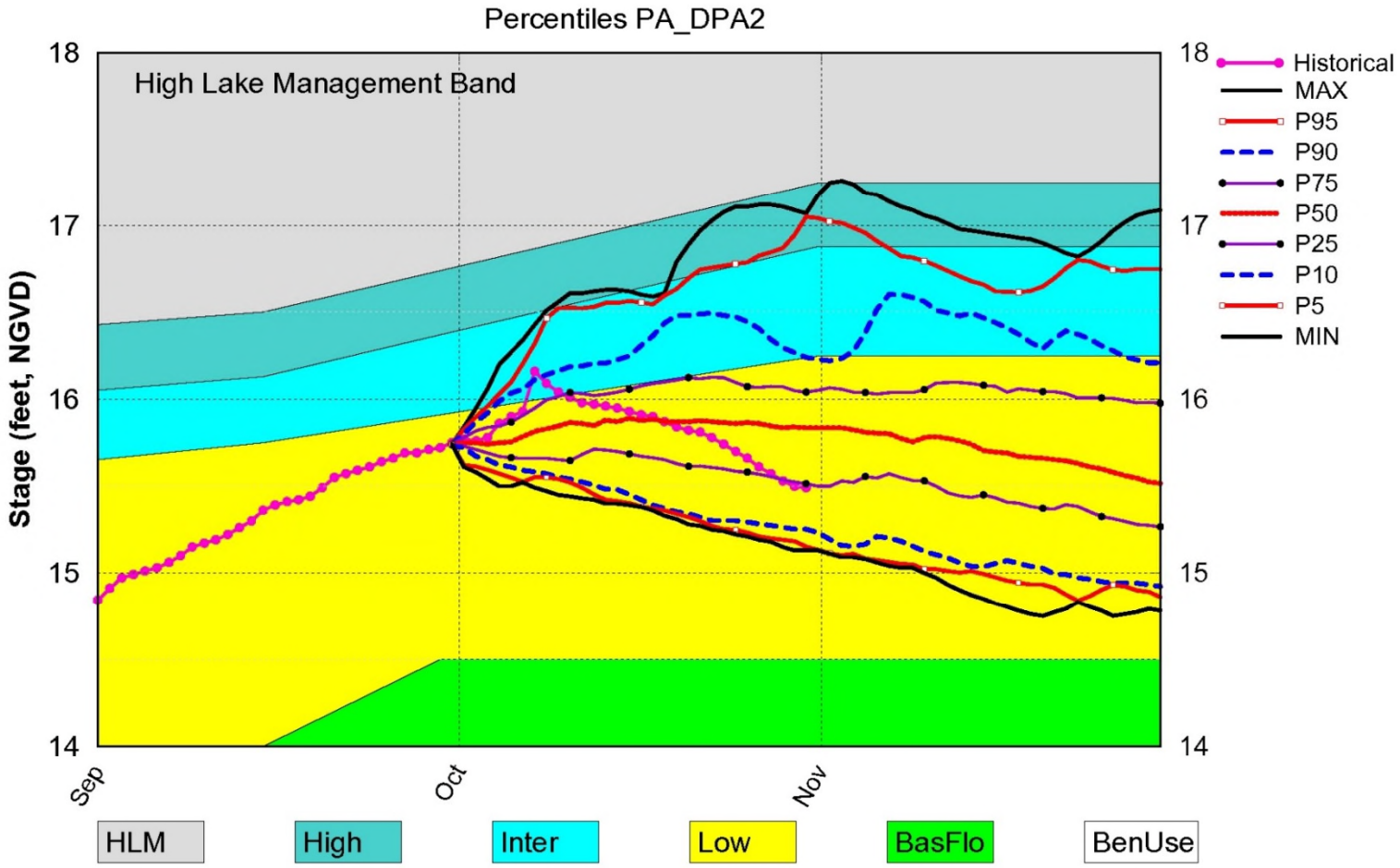
Lake Okeechobee SFWMM October 2016 Dynamic Position Analysis



(See assumptions on the Position Analysis Results website)

Mon Oct 10 14:35:45 2016

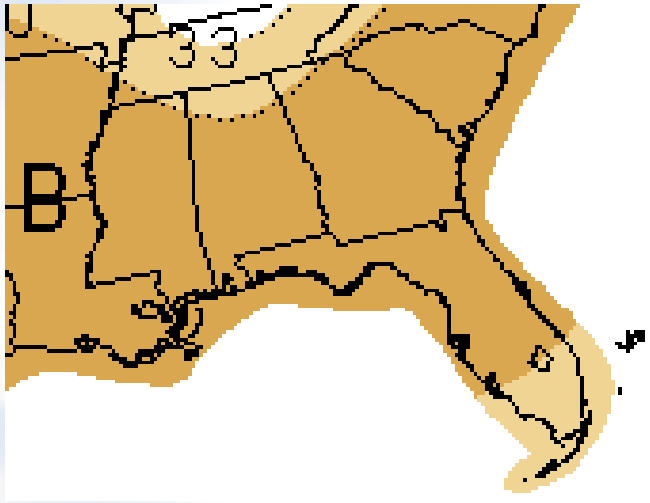
Lake Okeechobee SFWMM October 2016 Position Analysis



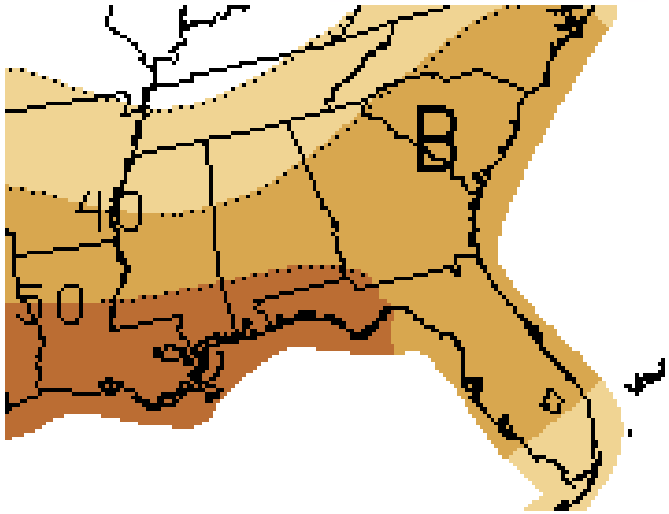
(See assumptions on the Position Analysis Results website)

Mon Oct 31 12:05:37 2016

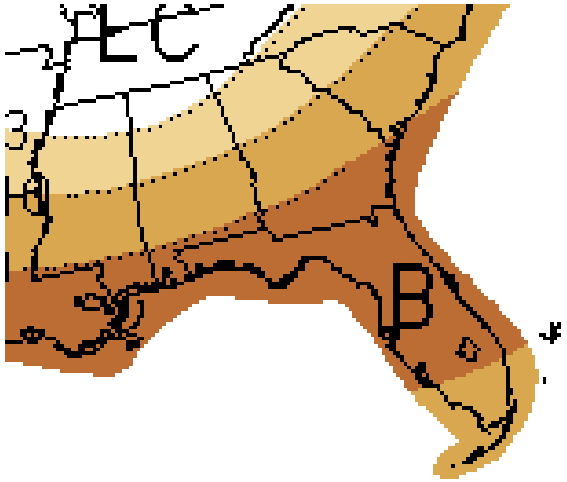
CPC Precipitation Outlook



November 2016

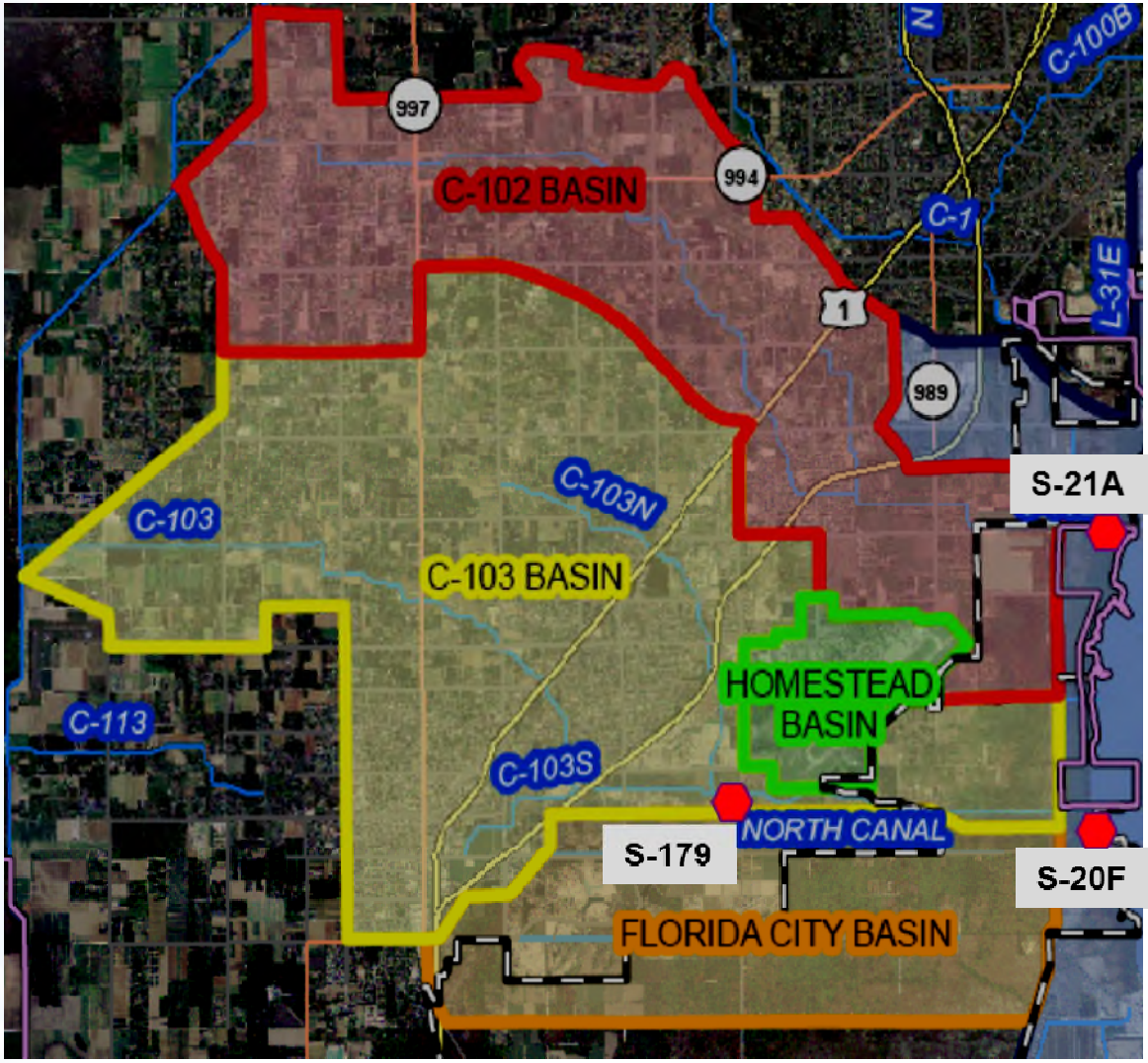


November-January 2016



December 2016 – February 2017

2016-2017 South Miami-Dade Seasonal Agricultural Operations

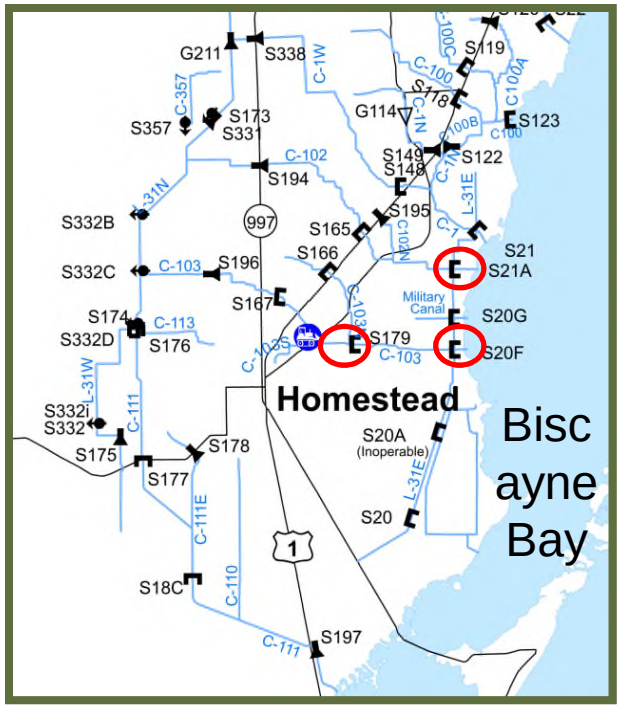


What are Seasonal Operations?

- **C-102 and C-103 basins specific operational actions implemented to provide flood protection and access to fields for row crop planting and harvesting**
- **History**
  - Climate creates market niche for winter vegetables
  - However, fall and spring rains can make fields unworkable
  - Early 1900's farmers created and maintained local drainage networks of ditches, canals, pumps and structures to control water levels
  - USACE Design Memorandums describe use of pumps by farmers to drain fields but did not specify that the coastal structures would have a drawdown
  - Operations shifted to South Florida Flood Control District in 1960's
  - USACE C&SF Project Master Control Manual, East Coast Canals, Optimum Water Control and Design Elevations (Table 7-1 and Note 18 in the table)

What are Seasonal Operations?

- **As local sponsor, SFWMD has used the Ag drawdown at coastal structures, in place of local farm pumps used in the past**
- **Direct reference to Ag drawdown is in District structure descriptions, not in USACE Water Control Manual**
- **Gravity structures involved**
  - S21A, S20F and S179 (No pumps)
- **Implementation period**
  - October 15th through April 30th
- **What is done**
  - Structure gates operations are set at lower settings to facilitate drainage consistent with the USACE's Master Water Control Manual
  - Selection of operating ranges depends on field conditions and agricultural needs



USACE Water Control Manual

Table 7-1

Optimum Water Control and Design Elevations (1)

Structure	Canal	Range	Headwater Elevation Auto Gate Operation Open	Optimum	Close	Design HW ft.	Design TW ft.	Design Disch cfs	Notes
S-5AE	C-51	---	---	---	---	---	---	---	(2)
S-9	C-11	---	---	---	---	---	---	---	(2)
S-9NX	L-37	---	---	---	---	---	---	---	(2)
S-9SX	L-33	---	---	---	---	---	---	---	(2)
S-13	C-11	All	---	2.5	---	2.2to2.5	6.2to6.5	540	(3,21)
S-13S	C-11	All	1.8	1.6	1.4	1.2	1.0	540	(4,21)
S-13A	C-11	Low		4.0		3.5	2.4	---	(5,16)
S-18	C-109	---	---	---	---	---	---	---	(6)
S-20	L-31	High	2.4	2.1	1.8	1.5	1.0	450	(8,18)
		Low	1.4	1.2	1.0				
S-20A	L-31	High	---	---	---	1.7	1.2	575	(9,18)
		Low	---	---	---				
S-20F	C-103	High	2.2	2.0	1.8	1.9	1.4	2900	(7,18)
		Low	1.4	1.2	1.0				
S-20G	L-31	High	2.2	2.0	1.8	2.0	1.5	900	(7,18)
		Low	1.4	1.2	1.0				
S-21	C-1	High	2.4	1.9	1.5	1.9	1.4	2560	(7,18)
		Low	2.0	1.5	1.0				
S-21A	C-102	High	2.2	2.0	1.8	2.1	1.6	1330	(7,18)
		Low	1.4	1.2	1.0				
S-22	C-2	All	3.5	2.9	2.5	3.2	2.7	1905	(7)
S-25	C-5	All	2.2	2.0	1.8	1.8	1.7	320	(7)
S-25A	C-5	All	---	2.5	---	NA	NA	NA	(16)
S-25B	C-4	All	3.0	2.8	2.0	4.4	4.1	2000	(7)
S-26	C-6	All	2.8	2.5	2.3	4.4	3.9	3470	(7)
S-27	C-7	All	1.9	1.7	1.6	3.0	2.5	2800	

(18) Selection of an operating range depends on field conditions and agricultural needs.

Constraints on Seasonal Operations

- **Low lying land elevations**
  - Three to eight foot land surface elevations
  - Thin unsaturated zone
- **Gravity based drainage system (no pumps)**
  - Low gradients mean slow drainage
- **Coastal gravity structures must drain local runoff plus upstream runoff and base flow**
- **Water levels in Bay (tailwater) exceed canal operational target levels at high tide. Gates are closed to prevent salt water intrusion in the canal**
- **Area vulnerable to saltwater intrusion**

Issues Associated with Seasonal Operations

- **Agriculture/flood control**
  - Area prone to standing water during moderately heavy rainfall events
  - Lowering of area water table takes weeks without rainfall but increases rapidly
  - High probability of ground water penetrating crop root zone resulting in root damage/crop loss
  - Ability for grower to qualify for crop insurance is questionable
  - Delays in growing season can impact market windows and financial returns on investment

Issues Associated with Seasonal Operations (cont.)

- **Ecological**
  - Timing, volume and distribution of near-shore flows to Biscayne Bay
    - Rapid fluctuations in salinity due to localized peak discharges stress animal and plant species in the Bay
    - Lowered coastal groundwater table reduces fresh groundwater seepage into the near-shore area of the Bay
    - Lack of surface water discharges into the Bay during late dry season contributes to hypersaline conditions
- **Lack of dedicated stormwater storage**
  - No water storage projects planned for the area
  - Groundwater storage infeasible

How Operations are Implemented

- Homestead Field Station conducts regular site visits and field condition assessments
- Identifies hydrologic conditions, cultivation and planting activities
- Analyzes forecast weather conditions and water elevations
- Recommends appropriate actions
- Water Managers direct operational changes as necessary
- District staff holds periodic conferences with Field Station, Ag Industry, BNP and ENP staff, Tropical Audubon, and other stake holders to evaluate conditions

C-103 Basin
Pre and Post Drawdown

Field conditions before drawdown

Field conditions after drawdown