



## **Water Quality into Shark River Slough during High Water Emergency Operations**

**Quarterly Technical Oversight Committee Meeting  
April 26, 2016**

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# Presentation Outline

- **El Niño Conditions - “Extraordinary”**
  - Dry season rainfall
  - Unseasonably high water levels WCA-3A
- **High Water Emergency Authorization**
  - Alleviate high water levels in WCA-3A
  - Modifications to structures / operations
  - Temporary emergency deviations to Water Control Plan
  - Continue existing monitoring
- **Water Quality - Everglades National Park (Federal Consent Decree - Appendix A)**
  - Shark River Slough
  - Taylor Slough & Coastal Basins

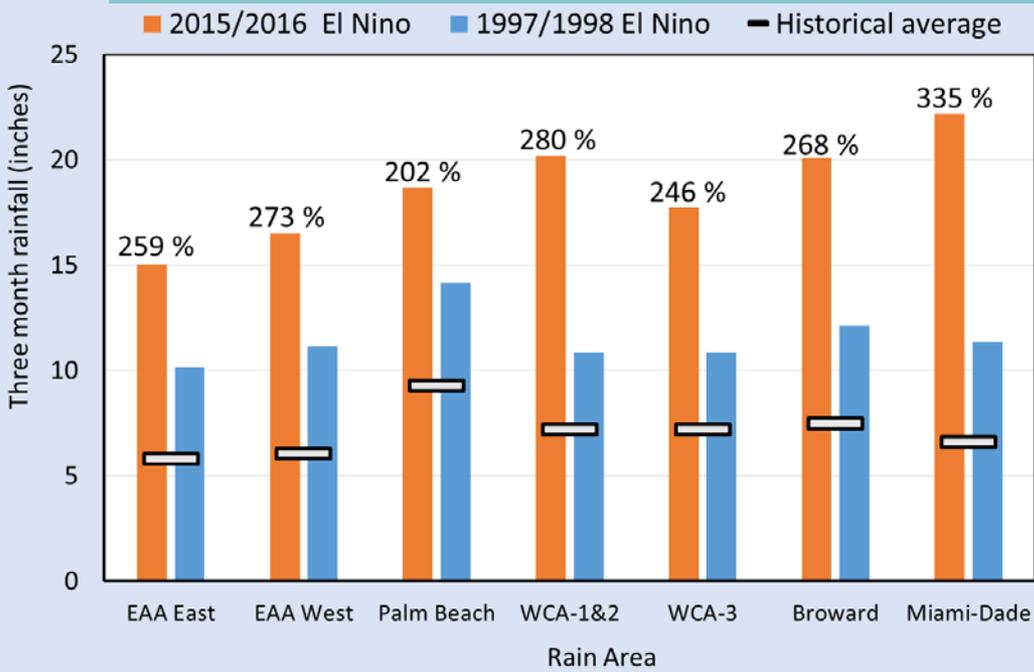




# Very Strong El Niño – 2015/2016

## \*Hydrology Conditions

Dry Season Rainfall Comparison  
(November – January)



- Very strong El Niño resulted in up to 3 times historical average rainfall on areas that drain to the WCAs
- Water levels in the WCAs rose as a result of inflows and direct rainfall

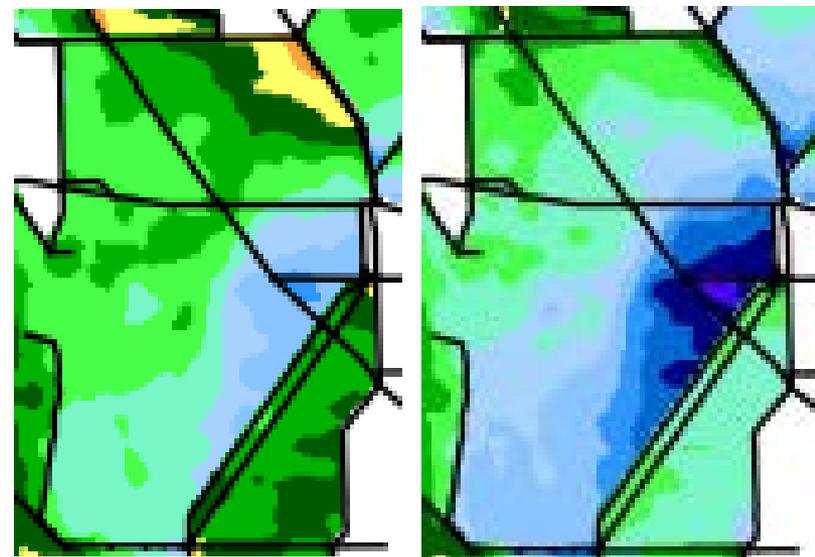
### WCA 3A Water Depth Snapshot

10/1/2015

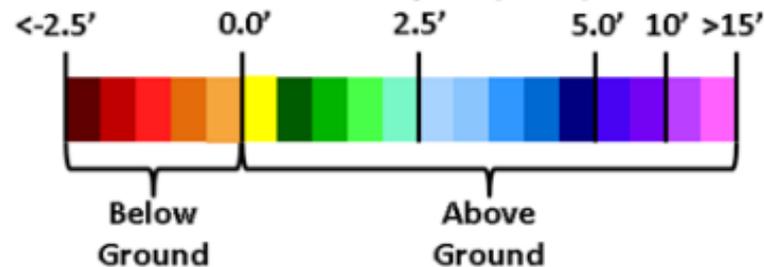
10.21' NGVD29

2/11/2016

11.28' NGVD29



Water Depth (feet)



Provisional data included – Subject to change

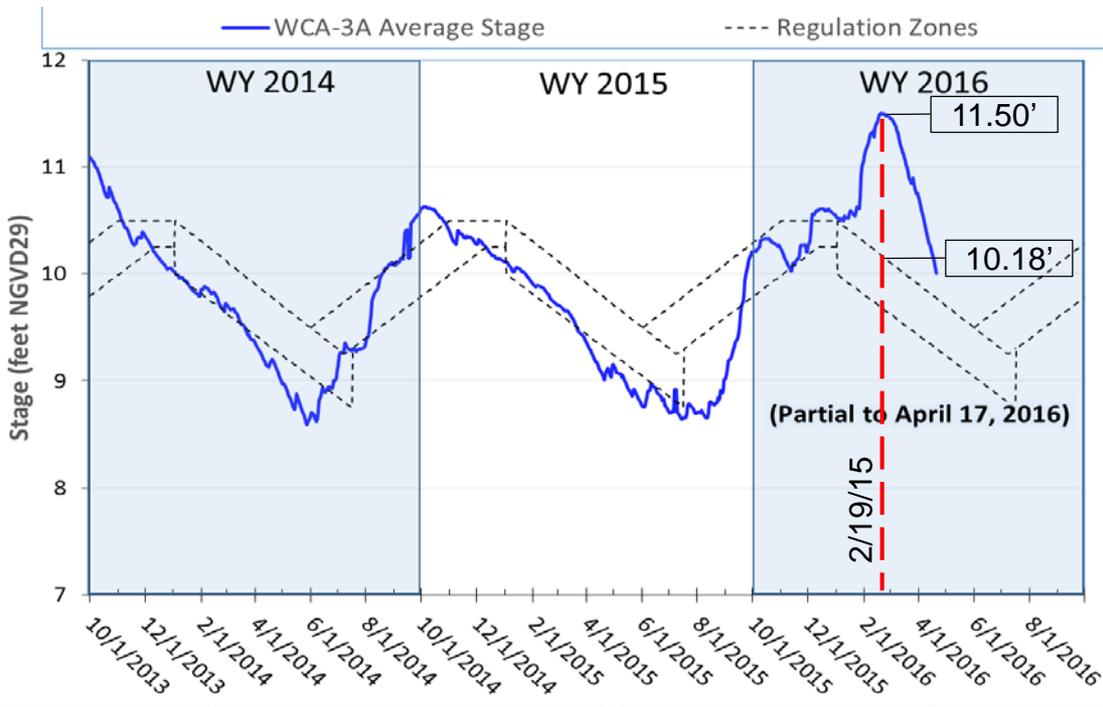


# FDEP Emergency Order (EO)

## \*Alleviate High Water Levels

### Hydrologic Conditions:

- All WCA stages above regulation schedules with no opportunity to take Lake water
- High conditions in WCA-3A detrimental to environment and wildlife



### High Water Emergency Order:

- FDEP issued EO to SFWMD and USACE 2/11/2016
- Primary goal to lower WCA-3A water level
- 90-day operation period
- Monitoring consistency:
  - Existing FDEP permits
  - Federal Consent Decree
- SFWMD and USACE collaboration on operations, monitoring and reporting

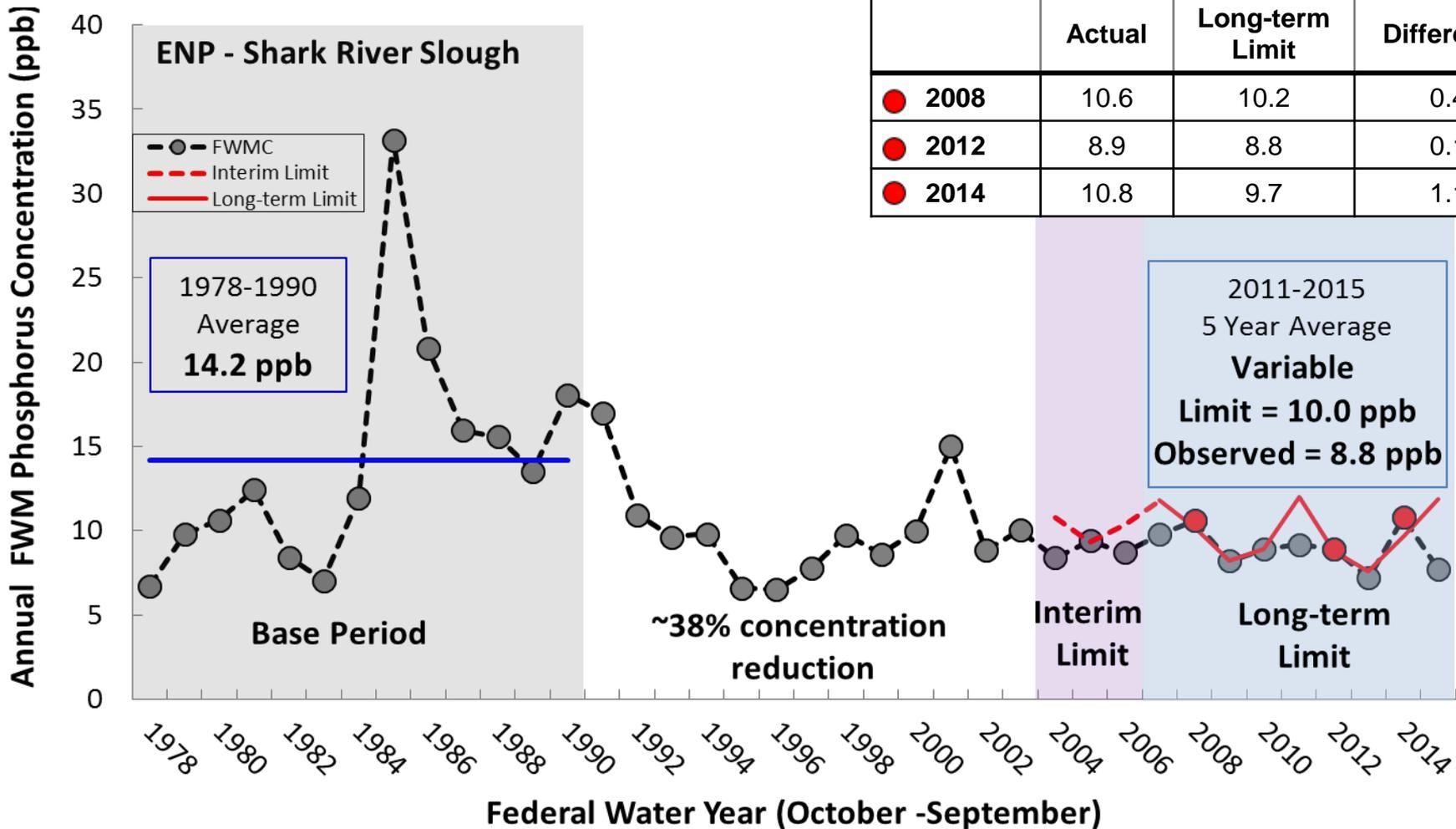




# Shark River Slough Compliance History

## \*Total Phosphorus (TP) Trends

### Federal Consent Decree (Appendix A)

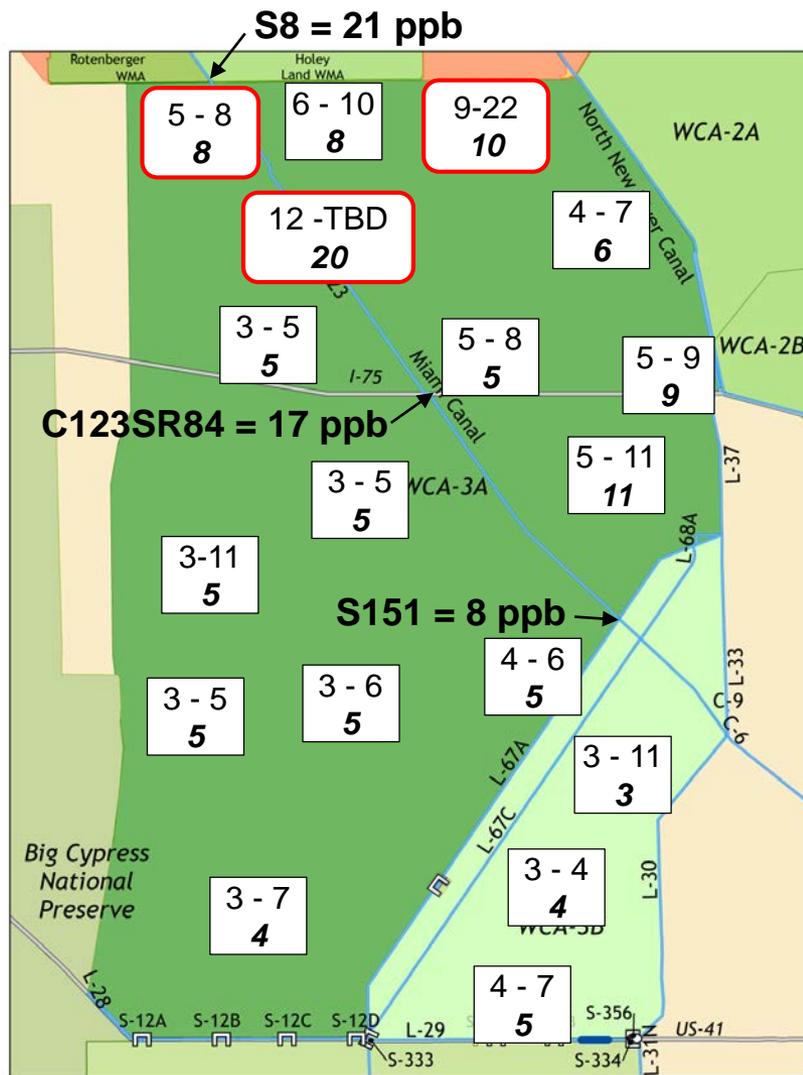


Notes: The laboratory margin of error is +/- 2 ppb; FWM – flow weighted mean concentration; Water Year 2015 results are provisional.



# Total Phosphorus Trends in WCA-3

## \*Indicator for Shark River Slough TP Levels



## October 2015 - March 2016 TP Concentrations in WCA-3

WCA-3 Network Average of Site Geometric Mean TP values

- Impacted 14.3 ppb
- Unimpacted 5.3 ppb

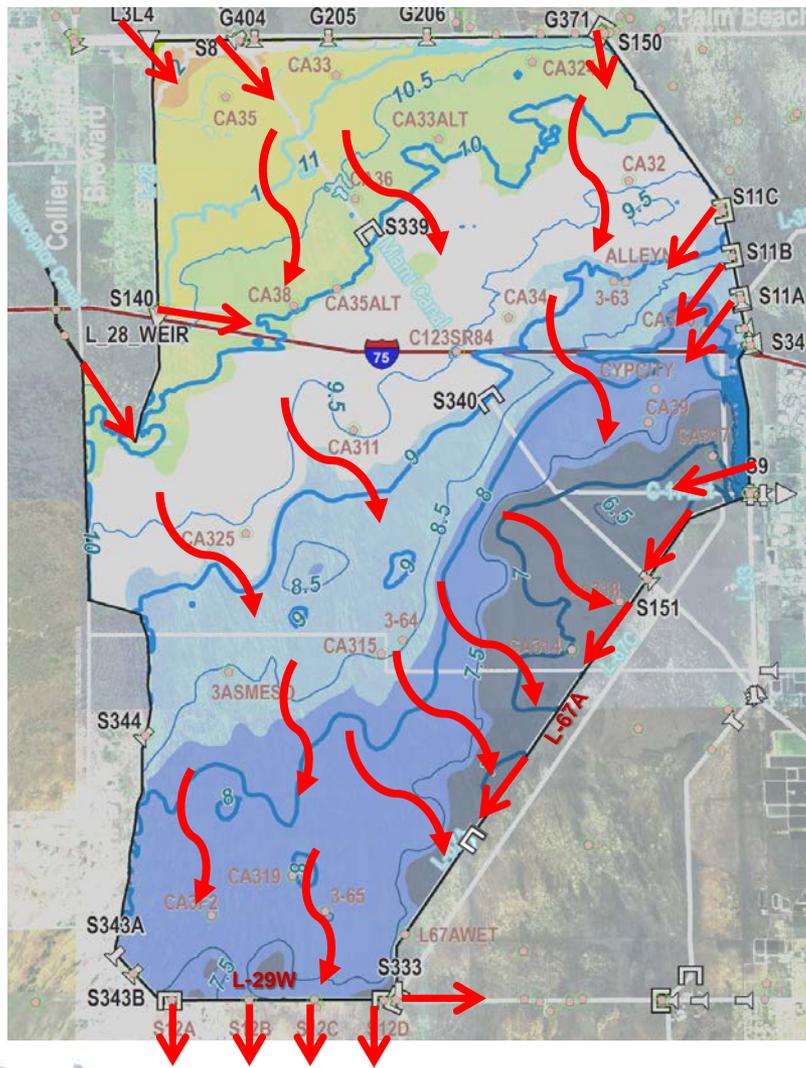
Legend:  
Min-Max Oct-Mar TP range (ppb)  
X Most recent TP (March)

Monitoring sites associated with State P-Rule Water Quality Compliance Network

*Provisional data included – Subject to change*

# Water Levels vs Total Phosphorus in WCA-3A

## \*Indicator for Shark River Slough TP Levels



### High Water Levels – Lower TP

- Greater portion of marsh wetted
- Canal and marsh water surface levels equal
- Less potential disturbance of flocculent / sediment layer under high water depth

### Low Water Levels – Higher TP

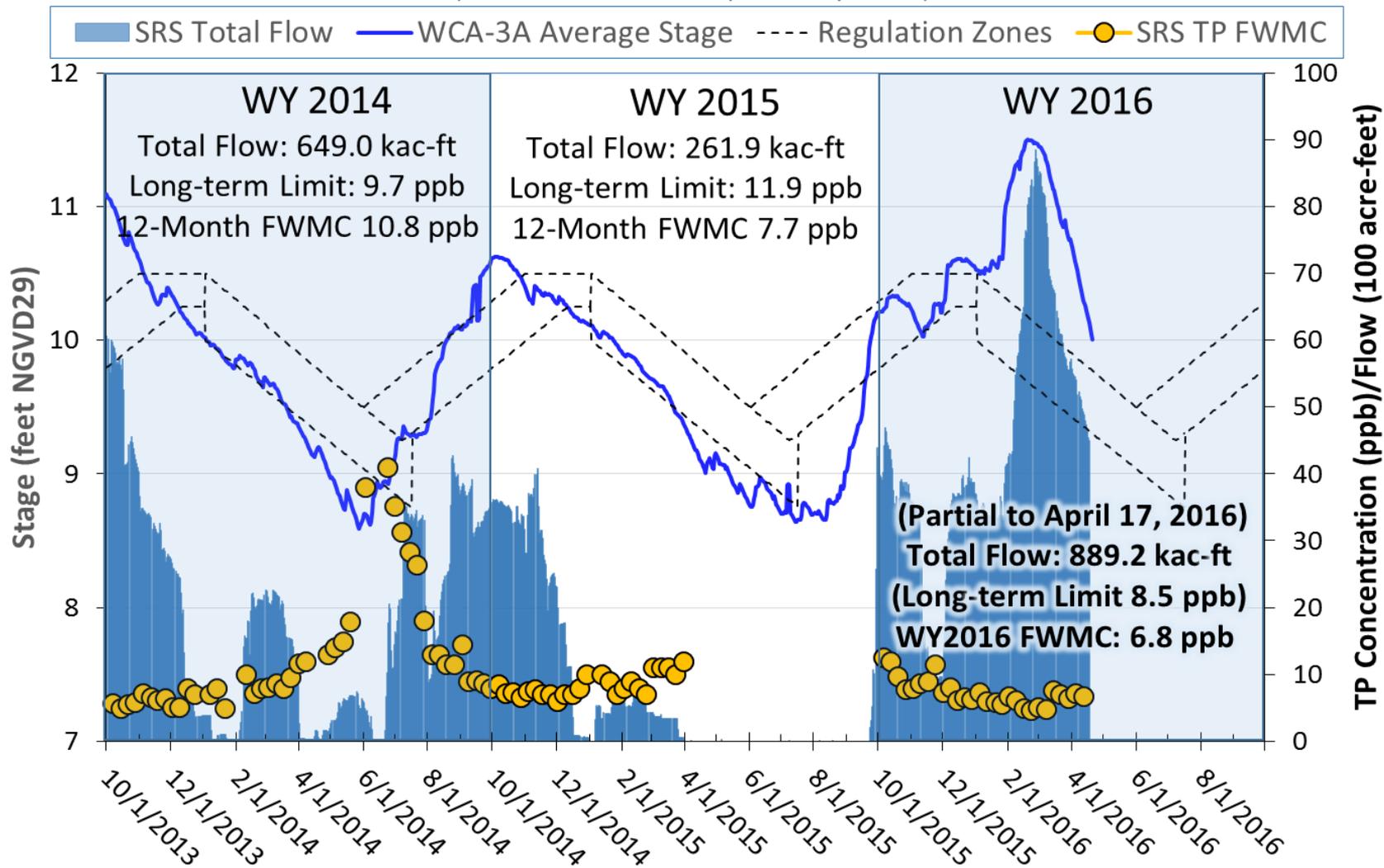
- Greater portion of marsh dry
- Gradient between lower canal and higher marsh water surface levels
- More potential disturbance of flocculent / sediment layer under low water depth



# Water Level, Flow and TP Trends

## \*Shark River Slough WY2014 – WY2016

(WY2015 and WY2016 are preliminary values.)



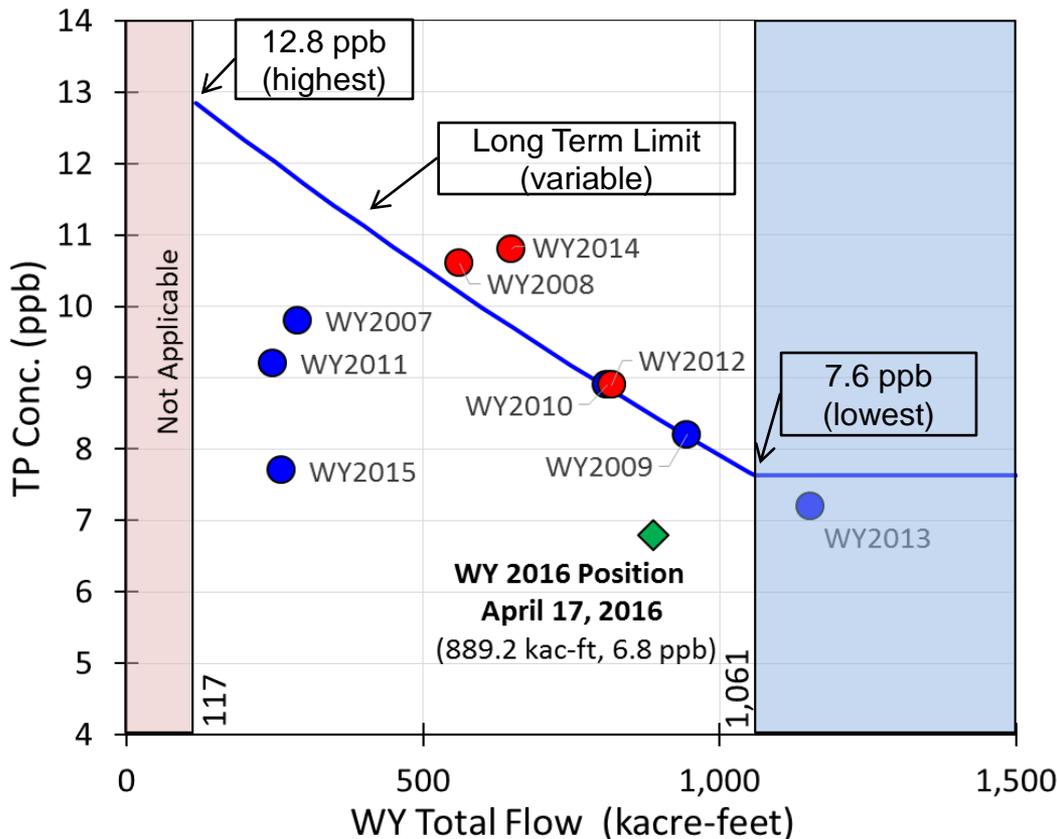
WY2016 Provisional data included – Subject to change



# Shark River Slough

## \*Appendix A TP Limit Equation (Variable)

Relationship between the Shark River Slough Water Year Total Flow and TP Flow-Weighted Mean Concentration (Long-term Limit Period : WY 2007 - Current)



WY2015 and Partial WY2016 results preliminary

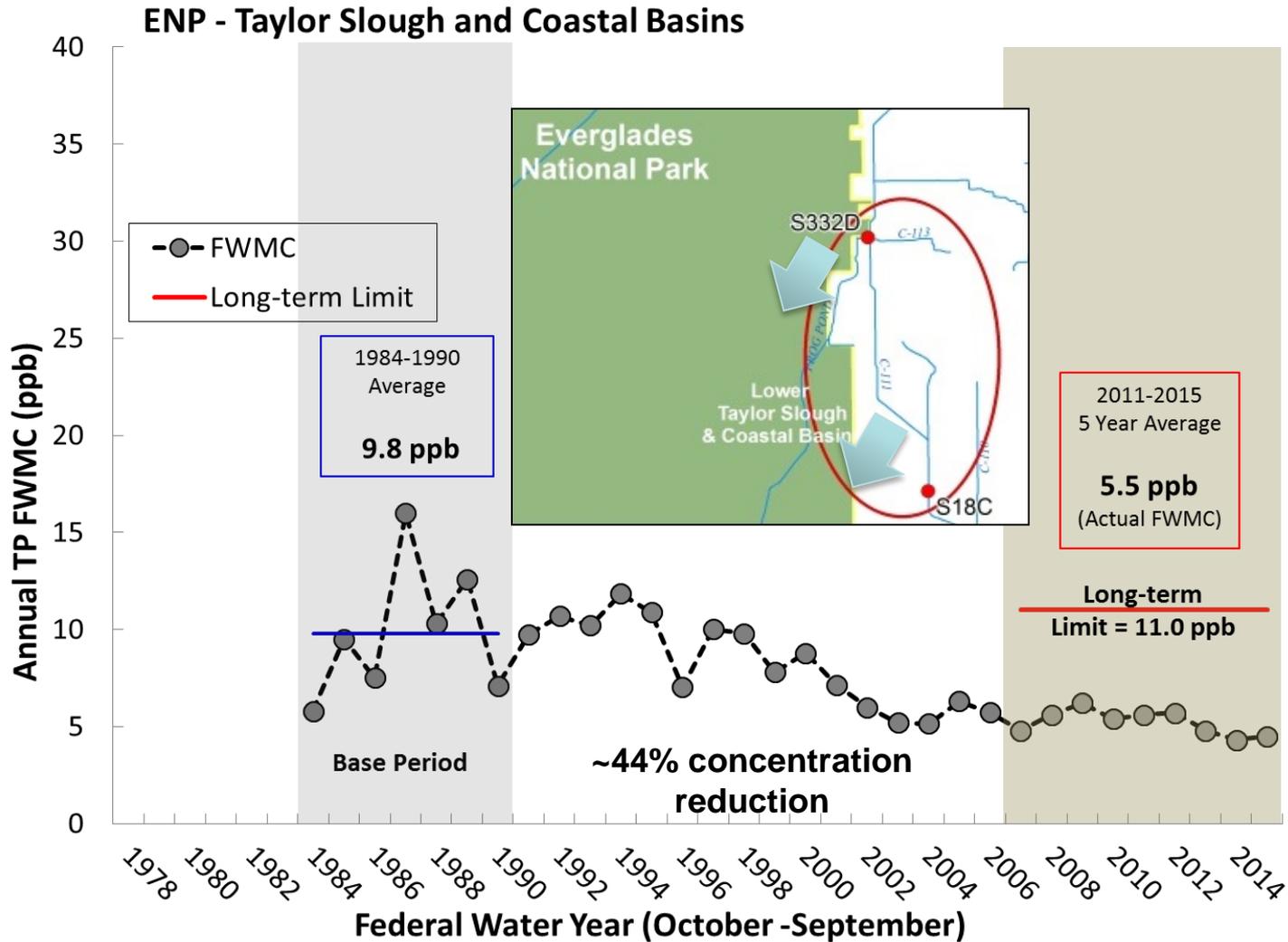
- Consent Decree compliance for Shark River Slough based on annual flow-weighted mean TP concentration
- Variable TP limit decreases as flow increases into SRS
- Lowest Limit is 7.6 ppb for total annual flows >1,061 kac-ft (likely for WY2016)
- Federal WY2016 ends September 30, 2016 (six months remain in compliance period)

Provisional data included – Subject to change  
 1 ppb = 1 µg/L = 0.001 mg/L  
 kac-ft = thousand acre-feet



# Taylor Slough/Coastal Basins Compliance History

## \*Total Phosphorus (TP) Trends



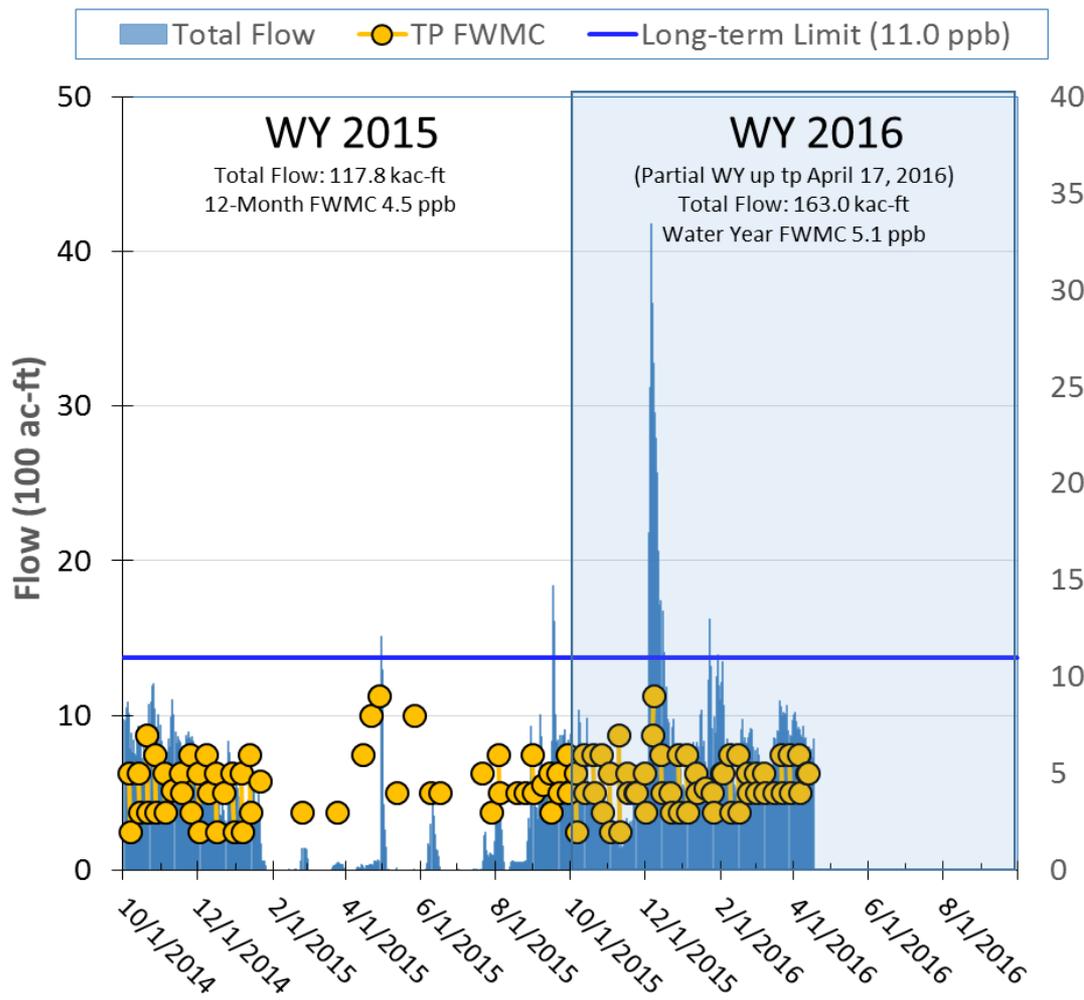
FWMC – flow weighted mean concentration



# Taylor Slough/Coastal Basins

## \*Flow and TP Trends WY2015 – WY2016

### Flow and TP Flow-weighted Mean Concentration to Taylor Slough and Coastal Basins



- Consent Decree compliance for Taylor Slough and Coastal Basins based on annual flow-weighted mean TP concentration
- The TP limit fixed at 11 ppb
- TP concentrations appear to be on trajectory for 5 - 6 ppb
- Federal WY2016 ends September 30, 2016 (six months remain in compliance period)

WY2016 Provisional data included – Subject to change  
 1 ppb = 1 µg/L = 0.001 mg/L  
 ac-ft = acre-feet



# Summary

- El Niño conditions resulted in record high rainfall in WCAs this dry season – **Extraordinary conditions**
- Emergency Authorization issued to lower water levels in WCA-3A to alleviate impacts to wildlife habitat, natural resources and ecology of the estuaries
- **Shark River Slough Results** (October 2015 - March 2016)
  - WCA-3A stage decreasing; still above regulation schedule
  - Observing low TP concentrations to Shark River Slough (~ 6-7 ppb) likely driven by high WCA-3A stage conditions and low upstream inflow TP concentrations
  - High flow volumes will likely continue (currently 900,000+ acre-feet) and result in low TP limit (~1 million acre-feet = 7.6 ppb) for WY2016 (ends 9/30/2016)



# Discussion