



Water Quality into Shark River Slough during High Water Emergency Operations

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Presentation Outline

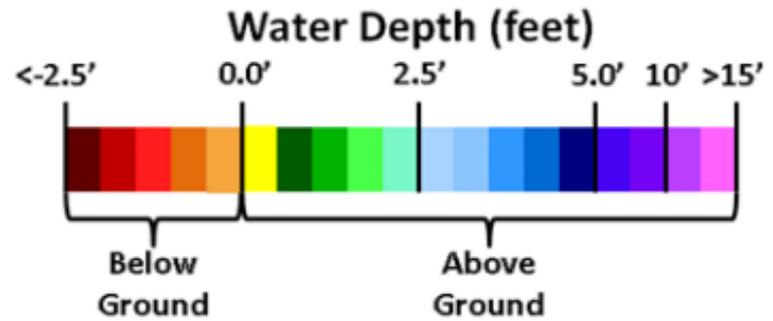
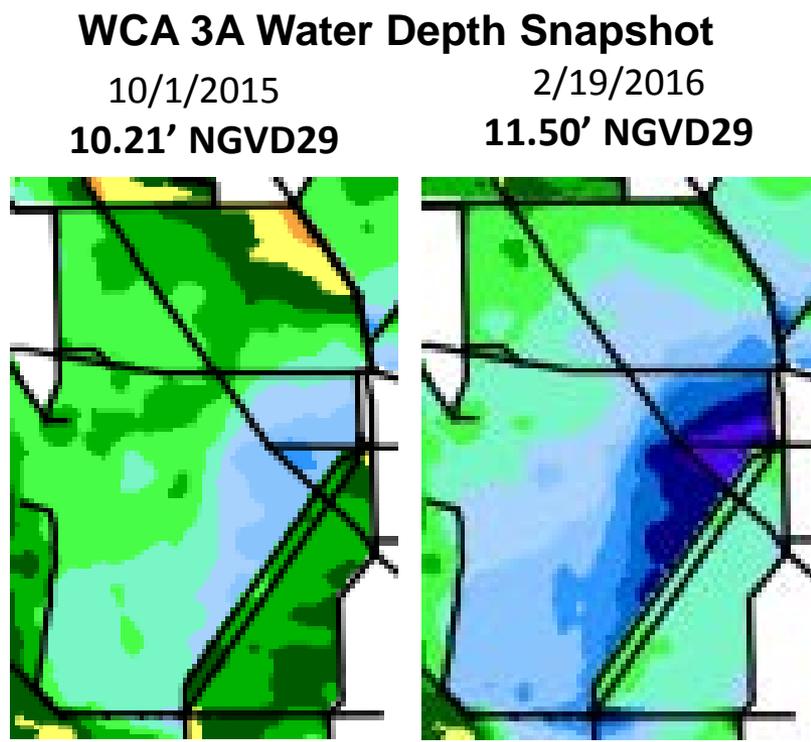
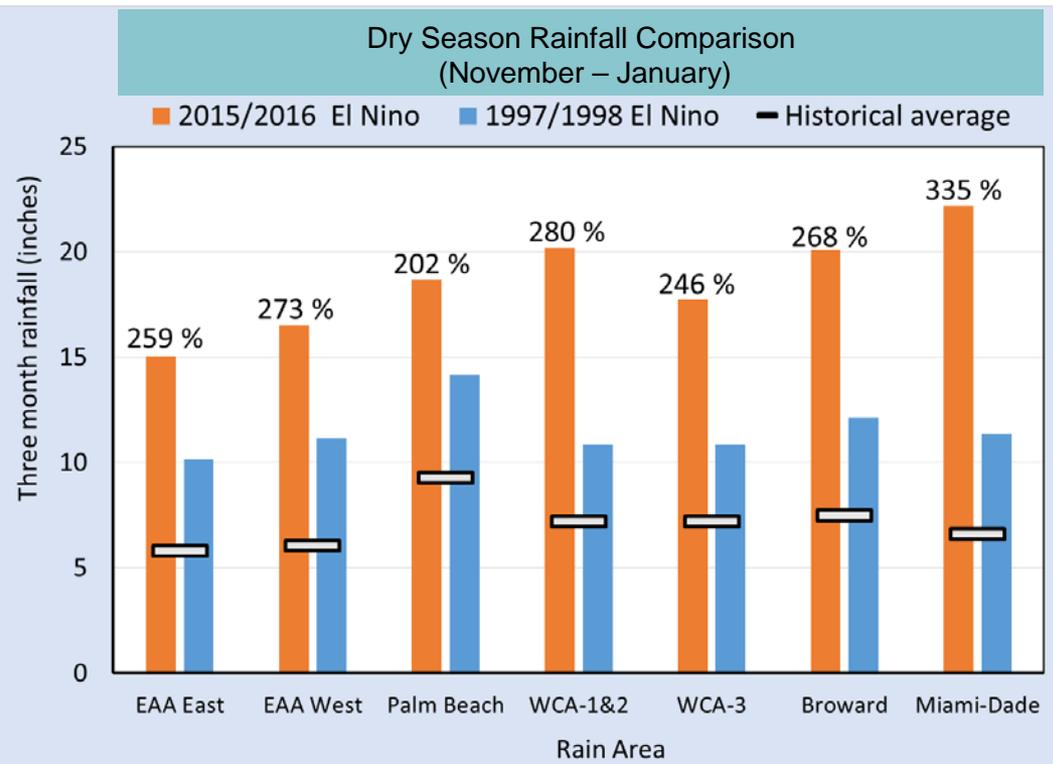
- **El Niño Conditions - “Extraordinary”**
 - Dry season rainfall
 - Unseasonably high water levels WCA-3A
- **High Water Emergency Authorization**
 - Alleviate high water levels in WCA-3A
 - Modifications to structures / operations
 - Temporary emergency deviations to Water Control Plan
 - Continue 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 (November – January)



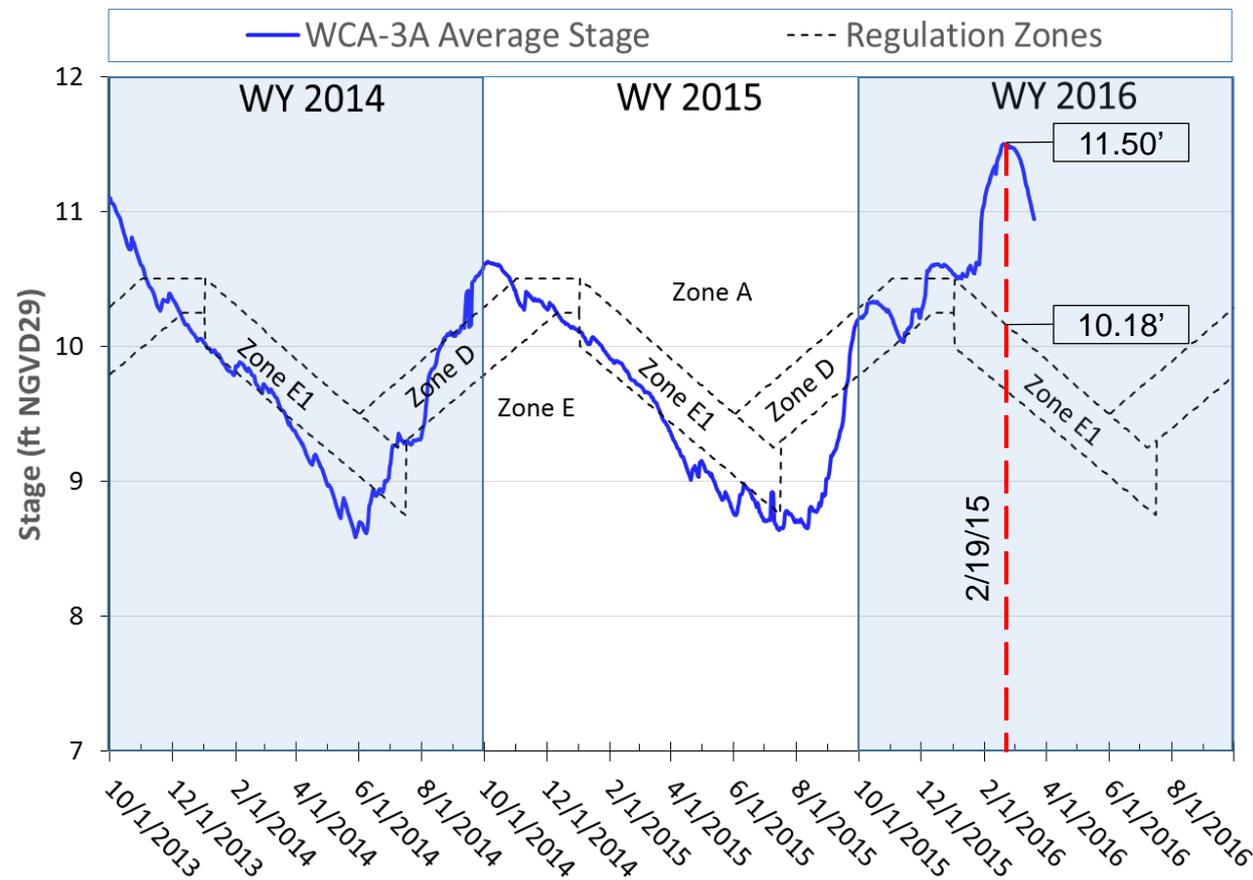
- Very strong El Niño resulted in up to 3 times historical average rainfall on areas that drain to the WCAs
- Water levels in the WCAs rose as a result of inflows and direct rainfall

Provisional data included – Subject to change

FDEP Emergency Order (EO)

*Alleviate High Water levels

WCA-3A Average Stage and Regulation Schedule



- 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

Operational Modifications / Temporary Deviations

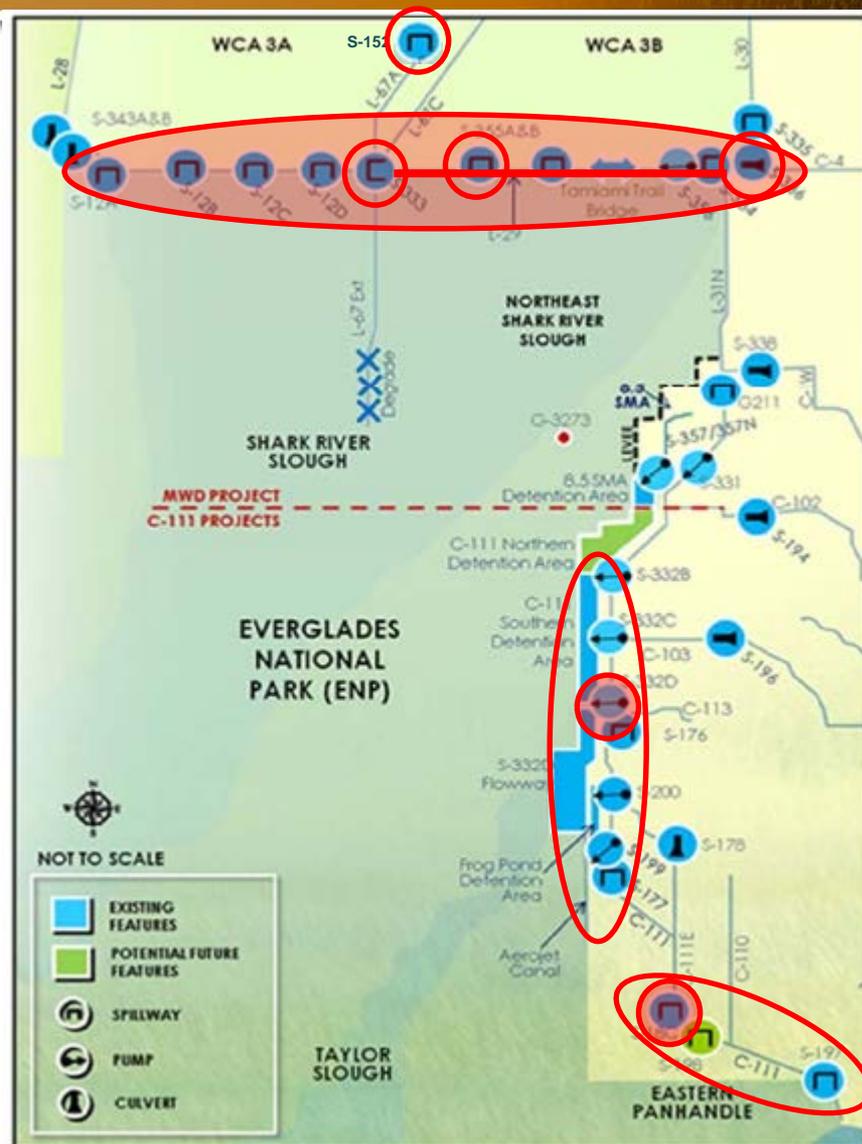
*SFWM and USACE Actions

Shark River Slough

- Increase S-333 discharges from WCA-3A to L-29 Canal and Shark River Slough
- Increase L-29 Canal stage from 7.5' up to 8.5' NGVD29
- S-356 pump operation test (Increment 1) ceased
- Operate S-152 to move water from WCA-3A to WCA-3B
- Temporary pumps at S-355B from WCA-3B to L-29 Canal

Taylor Slough & Coastal Basins

- Utilize the C-111 south detention basins to route water to Taylor Slough & Coastal Basin (Eastern Panhandle)

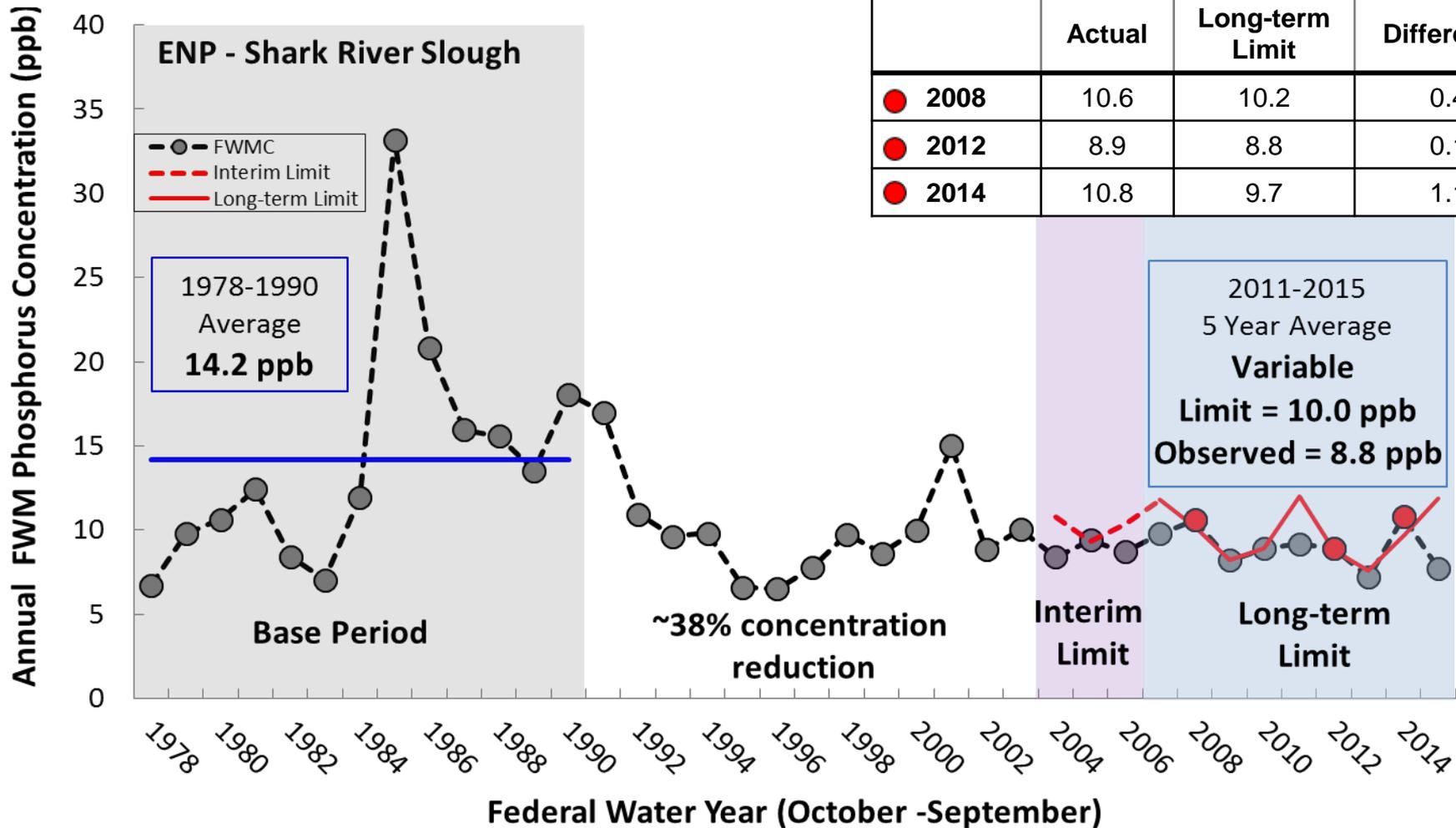




Shark River Slough Compliance History

*Total Phosphorus (TP) Trends

Federal Consent Decree (Appendix A)

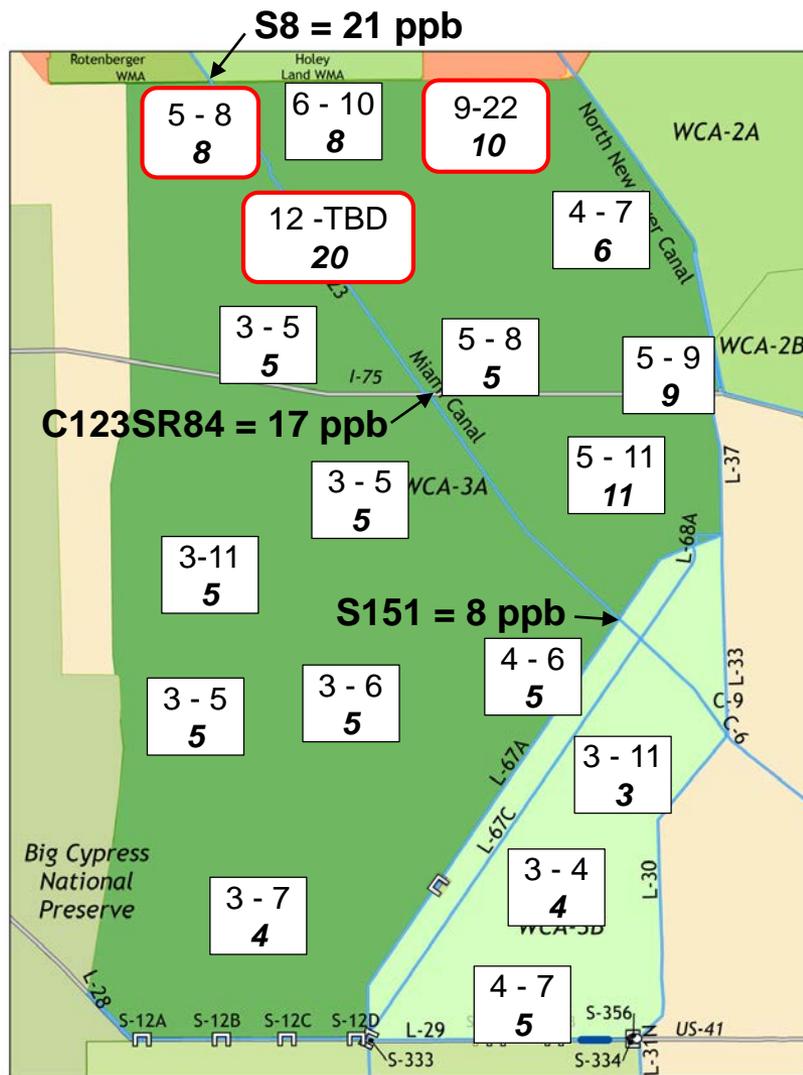


Notes: The laboratory margin of error is +/- 2 ppb; FWM – flow weighted mean concentration; Water Year 2015 results are provisional.



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:

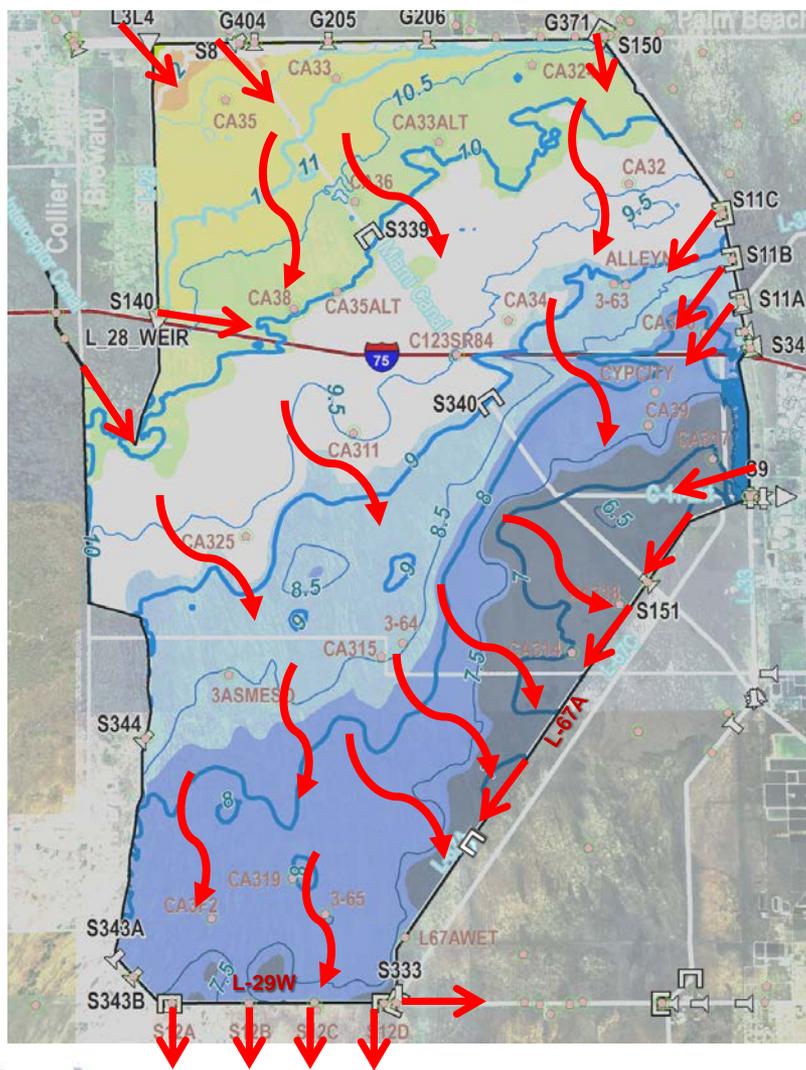
Min-Max	Oct-Mar TP range (ppb)
X	Most recent TP (March)

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

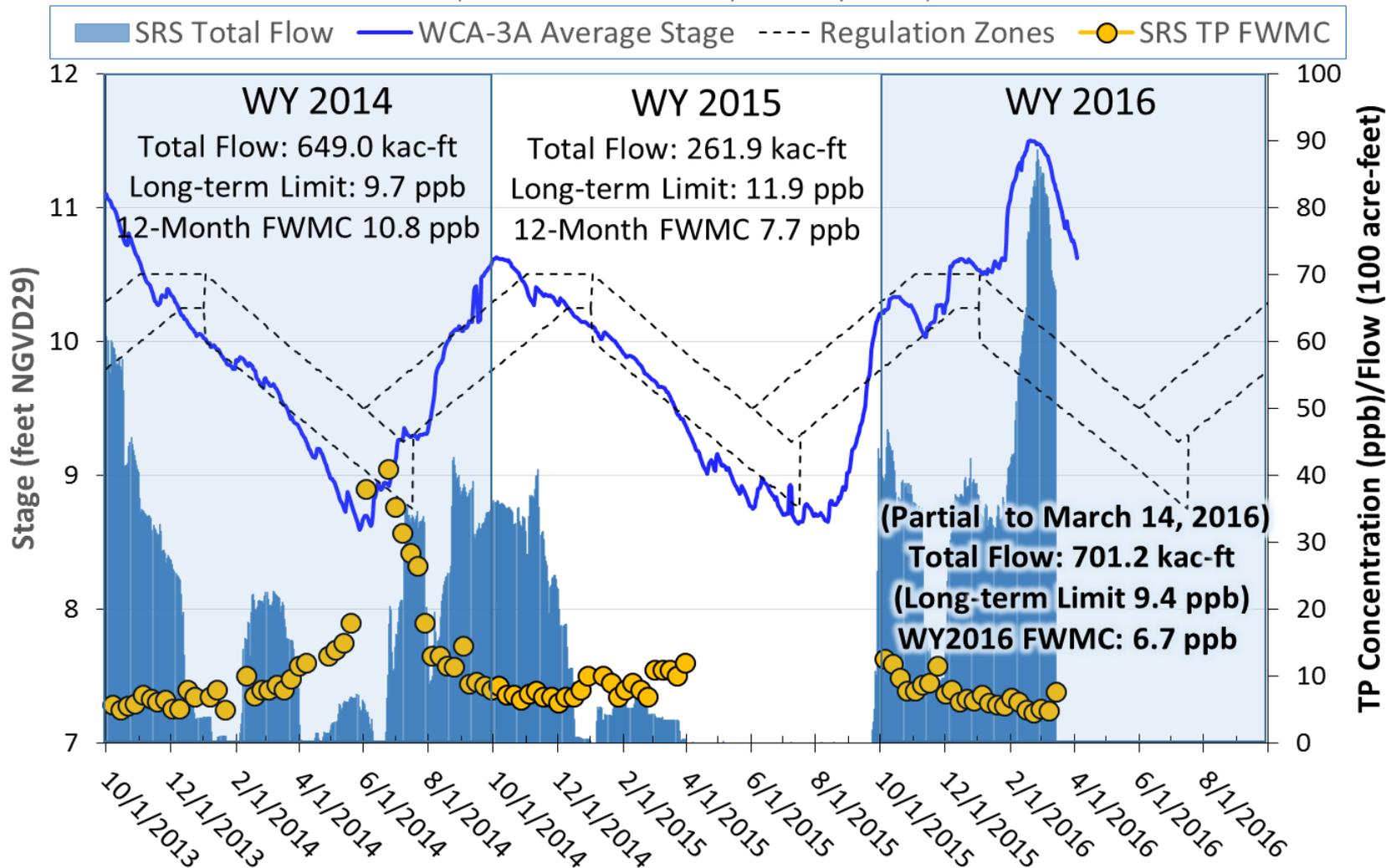
- Greater portion of marsh dry
- Gradient between lower canal and higher marsh water surface levels
- More potential disturbance of flocculent / sediment layer under low water depth



Water Level, Flow and TP Trends

*Shark River Slough WY2014 – WY2016

(WY2015 and WY2016 are preliminary values.)



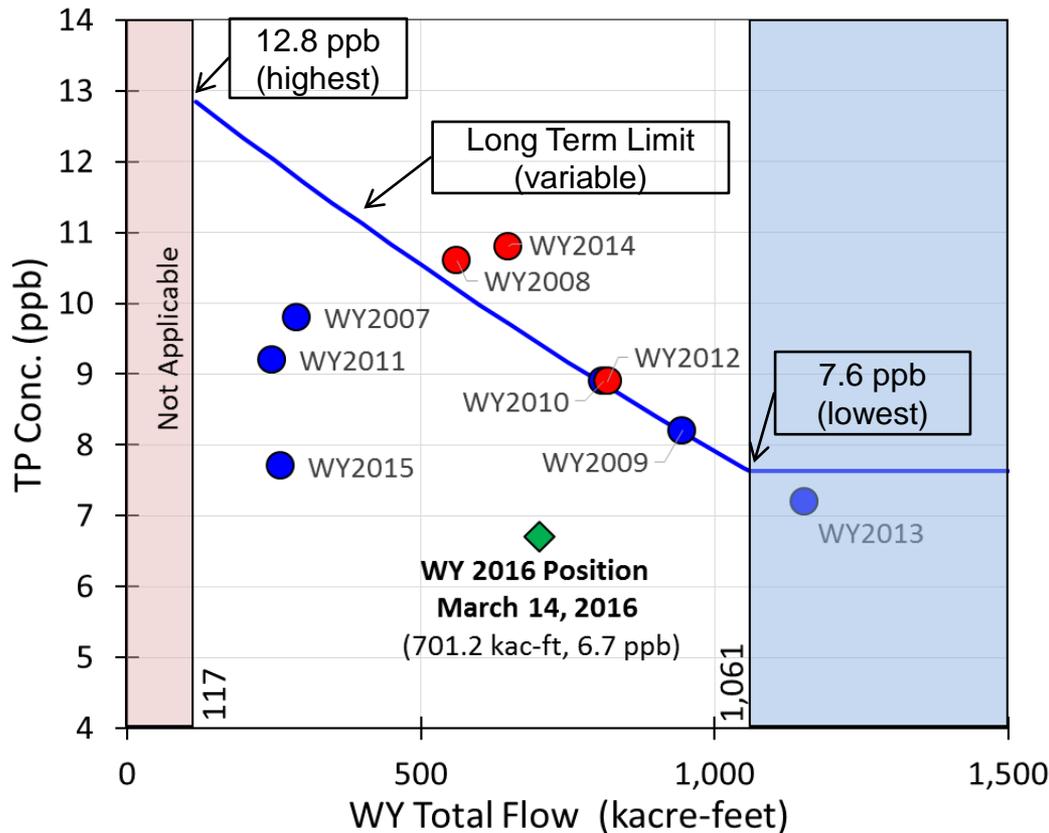
WY2016 Provisional data included – Subject to change



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)



- 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)

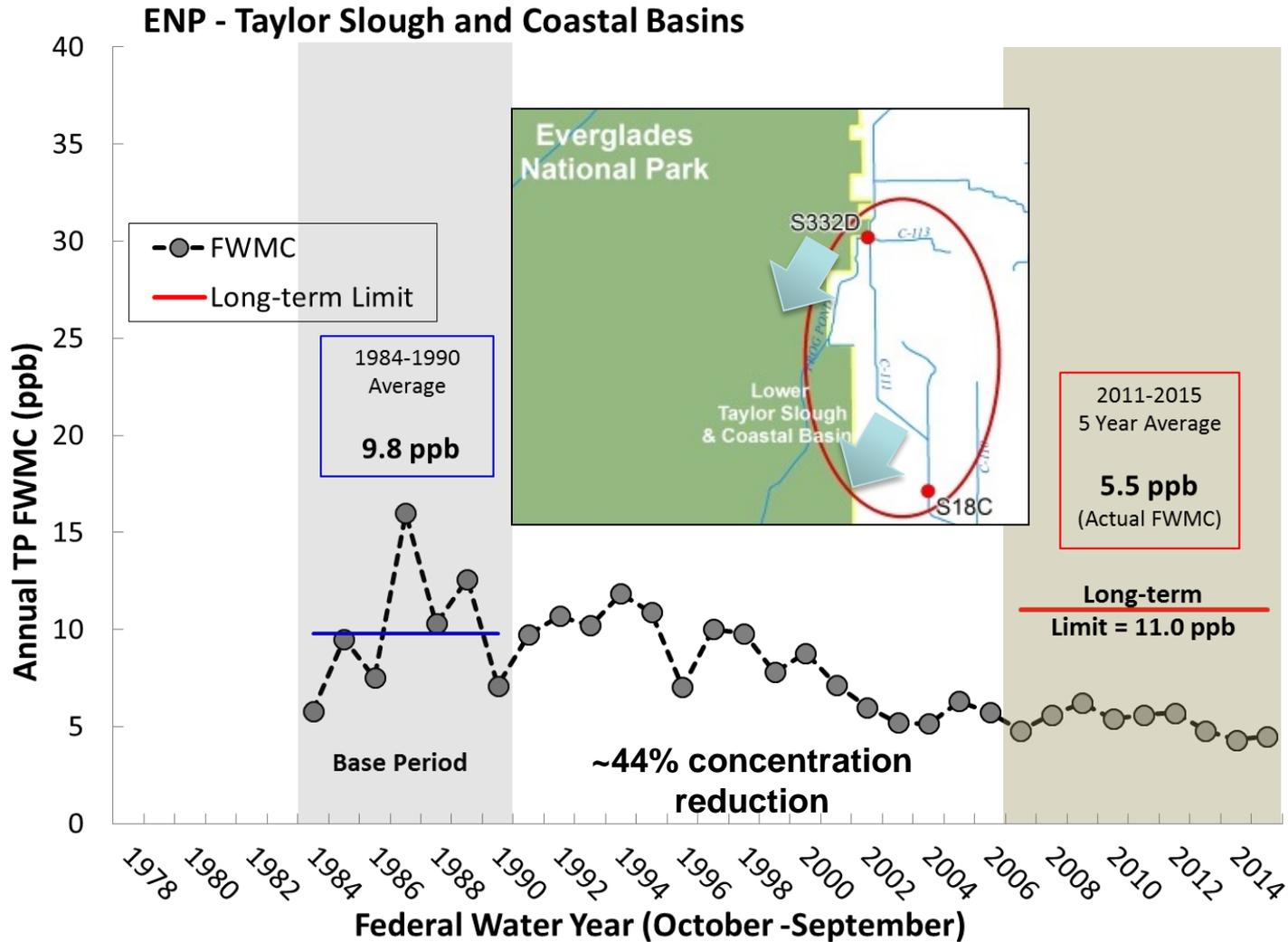
Provisional data included – Subject to change
 1 ppb = 1 µg/L = 0.001 mg/L
 kac-ft = thousand acre-feet

WY2015 and Partial WY2016 results preliminary



Taylor Slough/Coastal Basins Compliance History

*Total Phosphorus (TP) Trends



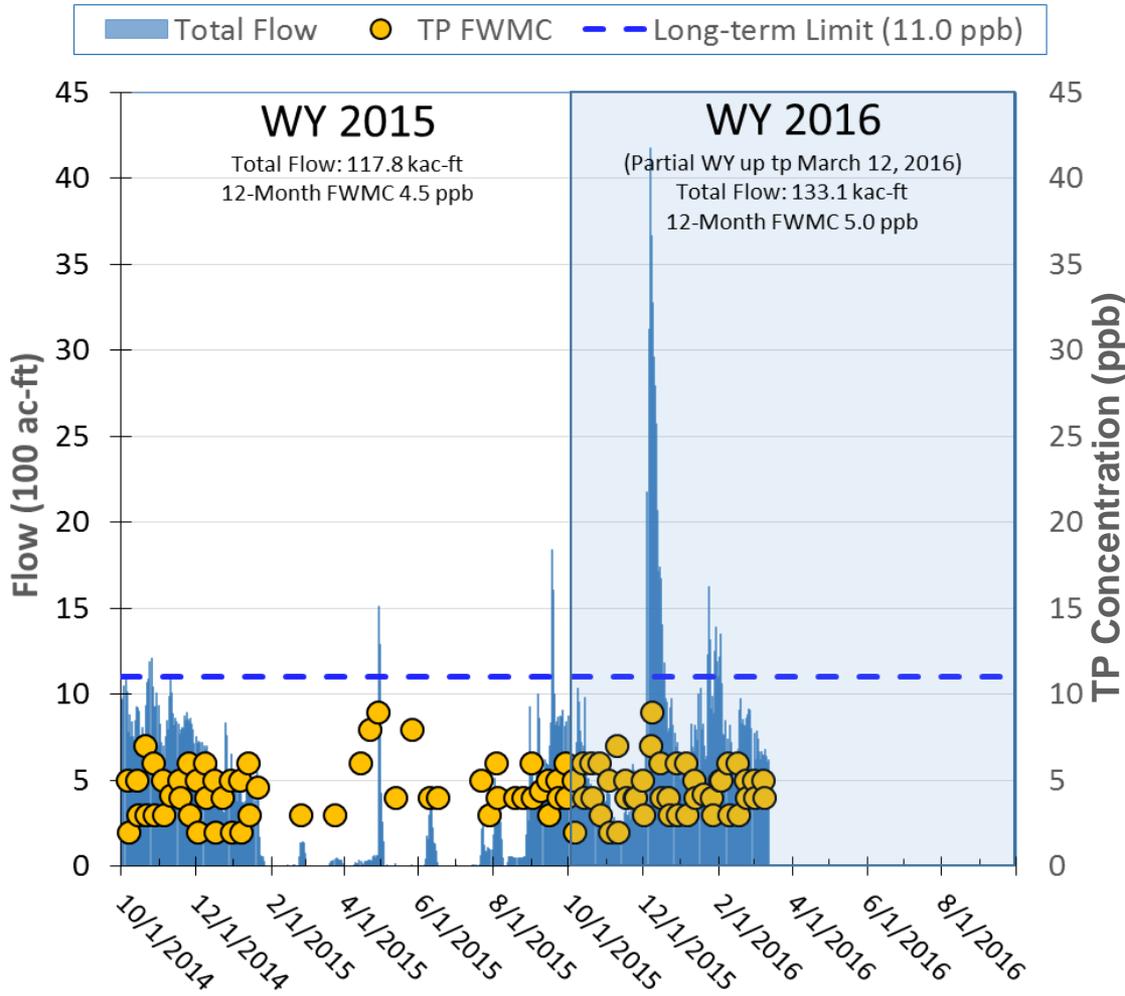
FWMC – flow weighted mean concentration



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 ~700,000 acre-feet) and result in low TP limit (1 million acre-feet = 7.6 ppb) for WY2016 (ends 9/30/2016)



Discussion