Water Quality into Shark River Slough during High Water Emergency Operations
Quarterly Technical Oversight Committee Meeting
April 26, 2016
Stuart Van Horn, P.E. – Chief, Water Quality Bureau
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

*Hydrology Conditions

- 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

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
Operational Modifications / Temporary Deviations
*SFWMD 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)

Exceedance Event TP Differences in ppb

<table>
<thead>
<tr>
<th>Year</th>
<th>Actual</th>
<th>Long-term Limit</th>
<th>Difference</th>
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<tr>
<td>2008</td>
<td>10.6</td>
<td>10.2</td>
<td>0.4</td>
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<tr>
<td>2012</td>
<td>8.9</td>
<td>8.8</td>
<td>0.1</td>
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<tr>
<td>2014</td>
<td>10.8</td>
<td>9.7</td>
<td>1.1</td>
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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:
- Oct-Mar TP range (ppb)
- 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.)

- **WY 2014**
  - Total Flow: 649.0 kac-ft
  - Long-term Limit: 9.7 ppb
  - 12-Month FWMC: 10.8 ppb

- **WY 2015**
  - Total Flow: 261.9 kac-ft
  - Long-term Limit: 11.9 ppb
  - 12-Month FWMC: 7.7 ppb

- **WY 2016**
  - (Partial to April 17, 2016)
  - Total Flow: 889.2 kac-ft
  - (Long-term Limit: 8.5 ppb)
  - WY2016 FWMC: 6.8 ppb

*WY2016 Provisional data included – Subject to change*
Shark River Slough
*Appendix A TP Limit Equation (Variable)

- 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

~44% concentration reduction

FWMC – flow weighted mean concentration
Taylor Slough/Coastal Basins
*Flow and TP Trends WY2015 – WY2016*

- 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)

\[ 1 \text{ ppb} = 1 \mu\text{g/L} = 0.001 \text{ mg/L} \]
\[ \text{ac-ft} = \text{acre-feet} \]
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