Response to the WCA-3A High Water Emergency February – May 2016

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South Florida Water Management District

Deployment of temporary pumps next to S-355B on L-29 Canal

Greater Everglades Ecosystem Restoration Conference April 19, 2017
January 2016 WCA-3A rainfall (9.5 inches, 300% of average) was the highest January rainfall since recordkeeping began in 1957.

The 4.8-inch three-day WCA-3A rainfall January 27-29, 2016 was more than twice the average amount for January.

January 2016 SFWMD rainfall (9.2 inches, 476% of average) was also a record amount.
Water Conservation Area 3

- Largest of the three WCAs; 915 square miles
- Divided into WCA-3A and WCA-3B in 1962 to reduce seepage losses

- Major outflow structures:
  - S-12A, S-12B
  - S-12C, S-12D
  - S-333
  - S-151, S-152
WCA-3A WY 2016 Dry Season, Historical Average and Regulation Stages

Record high stages set for 30 consecutive days

Inset: WCA-3A interim regulation schedule (USACE 2012).
4.8 inches of rainfall over WCA-3A Jan 27-29

L-29 stage above 7.5 ft
S-333 closed

L-29 Canal Stage
S-333 Discharge

WCA-3A Stage

Bottom of Regulation Schedule Zone A

Effect of Emergency Operations...Conditions leading up to Emergency Order

Regulation Schedule

Zone A
Emergency Operations Field Work

Deployment of Temporary Pumps on the L-29 Levee
Emergency Operations Field Work

Protecting Businesses Along Tamiami Trail from Higher L-29 Canal Stages

Placement of culvert covers at Gator Park

Before and after placement of sand to provide dry refugia for crocodiles at Everglades Safari Park

Installation of elevated walkway with handrails at Everglades Safari Park
Emergency Operations Field Work

Mitigation for Higher Water Levels in the Las Palmas Community

C-358 to C357 temporary pump installation

C-358 seepage collection canal
west end berm erosion and repair
WCA-3A/3B Discharge South
February 12 – May 11, 2016

Flows to Shark River Slough
Flow volumes in acre-feet x 1000

*S Temporary pump stations deployed next to S-355B
WCA-3A/3B Discharge Destinations
February 12 – May 11, 2016

- East Coast Basins: 143
- Everglades National Park:
  - Shark River Slough: 510
  - Detention Areas / Hydraulic Ridge and Taylor Slough: 214
- S-18C (toward Eastern Panhandle and Barnes Sound): 63
- S-197: 9

Flow volumes are in acre-feet x 1000
Water Level Response in Northeast Shark River Slough

Northeast Shark River Slough next to L-31 Canal, January 2016 (looking south)
Water Level Response in Northeast Shark River Slough

Angel's well WY2016 stage hydrograph with historical data

WY2016 stage

Median daily stage (2002-2015)

50% band

95% band

Hydrograph courtesy USACE
Total Phosphorus Concentration Comparison
February – May Periods

*Concentrations are presented as flow-weighted means except for S-152 which is a geometric mean.*
### WCA-3A Stage and Flow with TP Flow-weighted Mean Concentrations to Shark River Slough

#### SRS Total Flow...

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<thead>
<tr>
<th></th>
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<th>WCA-3A Average Stage</th>
<th>Regulation Zones</th>
<th>SRS TP FWMC</th>
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<tr>
<td><strong>WY 2014</strong></td>
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<tr>
<td>Total Flow</td>
<td>649 kac-ft</td>
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<tr>
<td>Long-term Limit</td>
<td>9.7 ppb</td>
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<tr>
<td>12-Month FWMC</td>
<td>10.8 ppb</td>
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**Long-term Limit:** 9.7 ppb 12-Month FWMC 10.8 ppb

**WY 2015**

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<tr>
<td>Total Flow</td>
<td>267 kac-ft</td>
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<tr>
<td>Long-term Limit</td>
<td>11.9 ppb</td>
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<tr>
<td>12-Month FWMC</td>
<td>7.7 ppb</td>
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**Long-term Limit:** 11.9 ppb 12-Month FWMC 7.7 ppb

**WY 2016 (Provisional)**

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<tr>
<td>Total Flow</td>
<td>1422 kac-ft</td>
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<td>Long-term Limit</td>
<td>7.6 ppb</td>
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<tr>
<td>12-Month FWMC</td>
<td>7.5 ppb</td>
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**Long-term Limit:** 7.6 ppb 12-Month FWMC 7.5 ppb

**WY2016 Provisional data included and is subject to change; 1 ppb = 1 µg/L = 0.001 mg/L; ac-ft = acre-feet; 1 kac-ft = 1,000 ac-ft**
Relationship between the Shark River Slough Federal Water Year Total Flow and TP Flow-Weighted Mean Concentration

- Phosphorus 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 acre-feet x 1000
- Federal water year to-date TP FWM concentration decreased during emergency operations
Flow and TP Flow-Weighted Mean Concentration to Taylor Slough and Coastal Basins

- Consent Decree compliance for Taylor Slough and Coastal Basins is based on an annual flow-weighted mean TP concentration
- The TP limit is fixed at 11 ppb
- The provisional WY2016 FWM TP concentration is 5.3 ppb
Manatee Bay and Barnes Sound

Shaded regions indicate S-197 discharge during WCA-3A high water emergency operations.

Thalassia testudinum Manatee Bay May 23, 2016; photo courtesy Miami-Dade Department of Environmental Resources Management.
Summary

- WCA-3A stage was significantly lowered as a result of emergency operations.
- More than one half million acre-feet of water was delivered to Shark River Slough.
- Inflow TP concentrations to ENP were between 5 and 10 parts per billion and were below historical average concentrations for this time of year.
- Discharges through S-197 helped maintain desirable salinity in Manatee Bay and Barnes Sound; healthy bottom cover and clear water conditions were sustained.
For More Information

SFWMD publication

Emergency Operations After Action Report
High Water Conditions in the South Florida Region
February 12 – May 11, 2016

available online at http://www.sfwmd.gov