

Disclaimer: Information contained in the report addresses environmental conditions only and is not the official South Florida Water Management District operations recommendation or decision.

## MEMORANDUM

**TO:** John Mitnik, Chief, Engineering and Construction Bureau  
Paul Linton, Administrator, Water Control Operations Section

**FROM:** SFWMD Staff Environmental Advisory Team

**DATE:** November 22, 2016

**SUBJECT:** Weekly Environmental Conditions for Systems Operations

### Summary

#### **Weather Conditions and Forecast**

Minor rains over the holiday weekend; otherwise, dry through the end of the month. Deep-layered high pressure over the Gulf of Mexico will dominate our skies as it moves slowly eastward ahead of our next dry cold front Friday night/Saturday morning. High pressure will dominate again after the frontal passage through early next week. Next chance for significant rain arrives the end of next week.

#### **Kissimmee**

On Sunday, stage in East Lake Toho, Lake Toho and Kissimmee-Cypress-Hatchineha was 0.1, 0.2, 0.6 feet below schedule, respectively. Over the past week, discharge at S65, S65A, and S65E averaged 777, 695, and 898 cfs, respectively. Tuesday morning discharges were ~772 cfs, ~695 cfs, ~874 cfs, and ~813 cfs, respectively at S65, S65A, S65C, and S65E. Dissolved oxygen in the Kissimmee River averaged 6.65 mg/L over the past week. Kissimmee River mean floodplain depth on Sunday was 0.18 feet. There are no new recommendations this week.

#### **Lake Okeechobee**

Lake stage has fallen by an additional 0.18 feet over the past week and is currently in the Low sub-band. The current recession rate is in line with the preferred monthly rate of 0.5 feet per month. Recent satellite imagery indicates the absence of any potential bloom activity.

#### **Estuaries**

Total discharge to the St. Lucie estuary average 186 cfs over the past week with 0 cfs (0%) coming from Lake Okeechobee as the USACE has stopped flow through the S-80 structure for the foreseeable future. Salinities increased throughout the estuary, and the seven-day average salinity at the US1 Bridge is in the good range for adult oysters. Total inflow to the Caloosahatchee estuary averaged 853 cfs over the past week with 456 cfs (53%) coming from the Lake. Salinity conditions are estimated to be in the good range for tape grass in the upper estuary. Salinity conditions are good for adult oysters at the Cape Coral Bridge, Sanibel Causeway, and Shellpoint. The 30-day moving average salinity at the I-75 Bridge is not forecast to exceed 5 psu in the next two weeks, even with no flow through the S-79 structure.

#### **Stormwater Treatment Areas**

Over the past week, the STAs/FEBs received approximately 4,300 acre-feet of Lake regulatory releases. The total amount of Lake regulatory releases sent to the STAs/FEBs in WY2017 (since May 1, 2016) is approximately 98,400 acre-feet. All STA cells are at target depths. Operational restrictions are in place for structure repairs and vegetation rehabilitation in STA-1E. This week, if 2008 LORS

recommends Lake releases to the WCAs and the conditions allow, releases will be sent to STA-1E, STA-1W, STA-2 and STA-3/4.

## Everglades

Almost no rain fell last week again throughout the Everglades and stages have continued their one-month decline in all basins. Over the last five weeks, stages in WCA-3A have declined by -0.65 feet and WCA-2A has declined by -0.85 feet. Because of flow reversals, the 30-day moving average salinity at the Florida Bay Minimum Flows and Levels (MFL) site rose to 1.8 psu last week. Technical difficulties with one creek flow gauge has prevented recalculating the cumulative five-creek inflow into Florida Bay since November 8, when it was 370,591 acre-feet.

## Supporting Information

### KISSIMMEE BASIN

#### **Kissimmee Basin Rainfall**

The Upper Kissimmee Basin and the Lower Basin received 0.01 inches of rainfall in the past week (SFWMD Daily Rainfall Report 11/21/2016).

#### **Upper Kissimmee Basin**

Stages and departures in the Kissimmee Chain of Lakes (KCOL) are shown in Table 1.

**Table 1.** Departures from KCOL flood regulation (F) or temporary schedules (T, A, or S) (feet NGVD). Discharge and stage data are provisional real-time data from SFWMD OASyS DualTrend; reported values are averages through midnight of the Sunday prior to the report date unless otherwise specified.

Report Date: 11/22/2016							Sunday Departure (feet)						
Water Body	Structure/Site	Discharge (cfs), week's average**	Stage Monitoring Site***	Lake Stage (feet)	Schedule*	Regulation (R) or Target (S or T) Stage (feet)	11/20/16	11/13/16	11/6/16	10/30/16	10/23/16	10/16/16	10/9/16
Lakes Hart and Mary Jane	S62	7	LKMJ	61.0	R	61.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2
Lakes Myrtle, Preston, and Joel	S57	8	S57	62.0	R	62.0	0.0	0.0	0.0	0.1	0.3	0.3	0.3
Alligator Chain	S60	0	ALLI	63.5	R	64.0	-0.5	-0.5	-0.5	-0.4	-0.3	-0.1	-0.3
Lake Gentry	S63	0	LKGT	61.4	R	61.5	-0.1	0.0	0.0	0.0	0.1	0.1	-0.2
East Lake Toho	S59	0	TOHOE	57.9	R	58.0	-0.1	-0.1	-0.1	0.0	0.2	0.3	0.0
Lake Toho	S61	0	TOHOW, S61	54.8	R	55.0	-0.2	-0.2	-0.1	-0.1	0.1	0.1	-0.2
Lakes Kissimmee, Cypress, and Hatchineha	S65	777	LKISSP, KUB011, LKISSB	51.9	R	52.5	-0.6	-0.4	-0.2	0.1	0.4	0.7	1.0

\* T = temporary schedule, R = USACE flood control schedule, S = temporary snail kite schedule, A = projected ascension line, N/A = not applicable or data not available.

\*\* Seven-day average of weighted daily means through Sunday midnight.

\*\*\* Names of in-lake monitoring sites and structures used to determine lake stage; if more than one site is listed, an average is reported.

DATA ARE PROVISIONAL

#### **Lower Kissimmee Basin**

Discharges and stages at Lower Basin structures are shown in Table 2. SFWDAT depth maps for the Phase I restoration area are shown in Figure 12. Kissimmee River floodplain stages at selected stations are shown in Figure 13.

**Table 2.** Mean weekly discharge at S-65x structures, and mean weekly Phase I area river channel dissolved oxygen and floodplain mean water depth. Discharge and stage data are provisional real-time data from SFWMD OASyS DualTrend; reported values are averages through midnight of the Sunday prior to the report date unless otherwise specified.

Report Date: 11/22/2016

Metric	Location	Sunday's 1-day average	Weekly Average**									
			11/20/16	11/13/16	11/6/16	10/30/16	10/23/16	10/16/16	10/9/16	10/2/16	9/25/16	9/18/16
Discharge (cfs)	S-65	784	777	766	750	706	1019	1131	1718	1968	4001	3991
Discharge (cfs)	S-65A	680	691	695	697	708	1147	1570	2557	2557	4966	4861
Discharge (cfs)	S-65C	886	898	924	982	1298	2164	3124	3250	4459	5247	5054
Headwater stage (feet NGVD)		32.8	32.7	32.7	32.8	33.1	33.5	33.7	33.6	33.6	33.8	33.7
Discharge (cfs)	S-65D****	1668	1700	1752	1833	2155	2922	3859	4185	5532	6302	5224
Discharge (cfs)	S-65E	812	811	849	914	1269	2230	3553	3841	4960	5802	5246
DO concentration (mg/L)***	Phase I river channel	6.79	6.65	6.78	6.63	6.15	4.84	3.38	2.83	1.78	1.55	1.20
Mean depth (feet)*	Phase I floodplain	0.18	0.19	0.22	0.27	0.39	0.79	1.25	1.55	2.11	2.49	2.28

\* 1-day spatial average from South Florida Water Depth Assessment Tool (SFWDAT).

\*\* Seven-day average of weighted daily means through Sunday midnight.

\*\*\* DO is the average for PC62 and PC33 starting June 2. PC33 omitted for week of Aug16. DO for week of Sept 15-22 is for PC33 only.

\*\*\*\* S-65D discharge combines discharge at S-65D, S-65DX1, and S-65DX2.

DATA ARE PROVISIONAL

## Water Management Recommendations

### Kissimmee Basin Adaptive Recommendations and Operational Actions

Date	Recommendation	Purpose	Outcome	Source
11/22/2016	No new recommendations.			
11/15/2016	No new recommendations.			
11/8/2016	No new recommendations.			
10/25/2016	Allow S65C headwater stage to decline to approximately 33 feet NGVD over the next few days.	To help reduce stage in Pool C to facilitate MacArthur Ditch backfilling	Implemented	USACE/ KB Ops
10/24/2016	No new recommendations.			
10/17/2016	Temporarily reduce discharge at S65A to 700 cfs following the discharge rampdown schedule in Figure 8a.	To facilitate MacArthur Ditch backfilling over the next 2-3 weeks.	Implemented	KB Operations
10/10/2016	No new recommendations.			
10/3/2016	No new recommendations.			
9/27/2016	<ul style="list-style-type: none"> <li>• Begin reducing discharge when Ops and management feel the time is right (could be now)</li> <li>• Use the discharge table below to ramp down to 1400 cfs; however, if stage should stop declining or start to rise during the rampdown, hold the current discharge unless stage begins to decline again</li> <li>• If KCH stage reaches ~50.5 ft, hold ~1400 cfs while KCH stage is at or above ~50.5 ft, then: <ul style="list-style-type: none"> <li>• If KCH stage declines below ~50.5 ft, continue reducing discharge, potentially to minimum discharge. However, if stage stops declining or starts to rise during the rampdown, hold or increase current discharge until stage begins to decline again or until it rises to ~50.5 ft</li> <li>• If KCH stage rises or stays above ~50.5 ft, hold ~1400 cfs unless stage approaches ~0.25 ft below the regulation line. If stage continues to rise into this buffer zone, use the discharge table to ramp up in anticipation of flood control releases</li> </ul> </li> </ul>	To the extent possible, avoid repeated wet/dry cycles in the Kissimmee River floodplain and extend the period of continuous floodplain inundation without decreasing lake stage too much. The recommendation is similar to the discharge plan used last wet season that balanced the river, the KCOL, and downstream waterbodies.	TBD	KB Operations
9/20/2016	No new recommendations.			
9/13/2016	No new recommendations.			
9/6/2016	No new recommendations.			
8/30/2016	Use figure 8a as possible for discharge rampup/rampdown at S65/S65A.			
8/23/2016	No new recommendations.			
8/16/2016	No new recommendations.			
8/9/2016	No new recommendations.			
8/2/2016	No new recommendations.			
7/26/2016	No new recommendations.			
7/19/2016	No new recommendations.			
7/12/2016	No new recommendations.			
6/30/2016	Ramp down S65/S65A discharge by 150 cfs per day to 650 cfs and hold at 650 cfs until lake stage rises to Zone A of the schedule. When stage enters Zone A, ramp up S65 discharge to 1,400 cfs as stage rises from 0.0 to 0.6 feet above the regulation line unless there is a large rainfall event. This ramp up schedule will be reevaluated when the regulation schedule reaches 52.0 feet NGVD.	The ramp down in S65/S65A discharge is intended to lessen the impact of Lake Okeechobee releases on naturally occurring algal blooms. Holding discharge at 650 cfs reflects consideration for the Snail Kites nesting in the Kissimmee River floodplain.	Implemented	SFWMD Operations Control
6/28/2016	No new recommendations.			
6/21/2016	No new recommendations.			
6/14/2016	No new recommendations.			
6/7/2016	No new recommendations.			

# KCOL Hydrographs (through Sunday midnight)

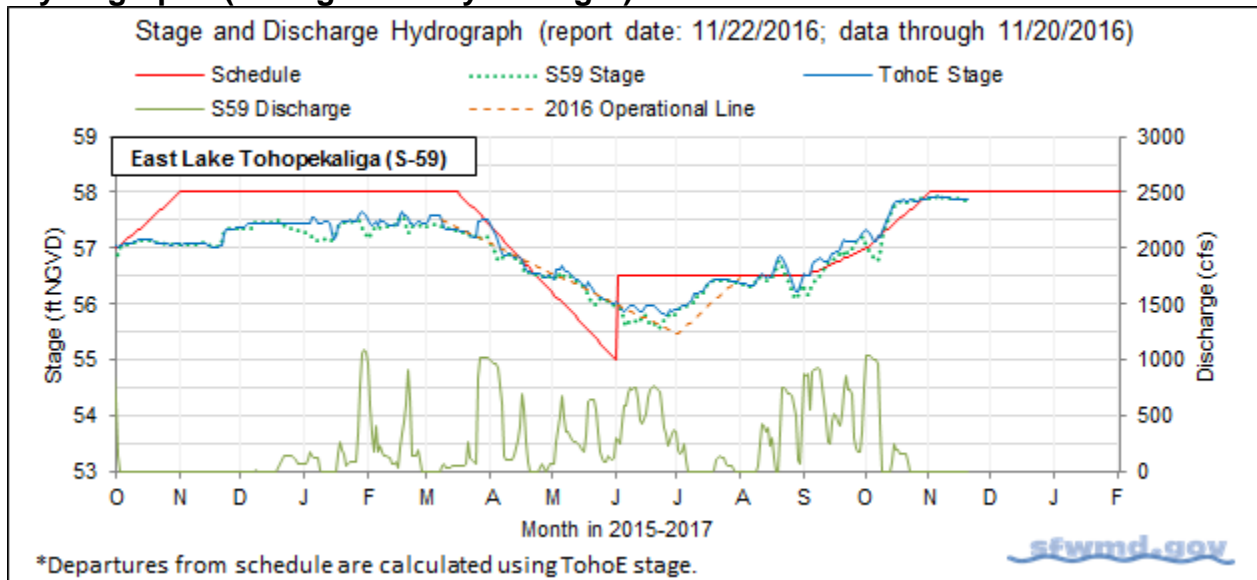


Figure 1.

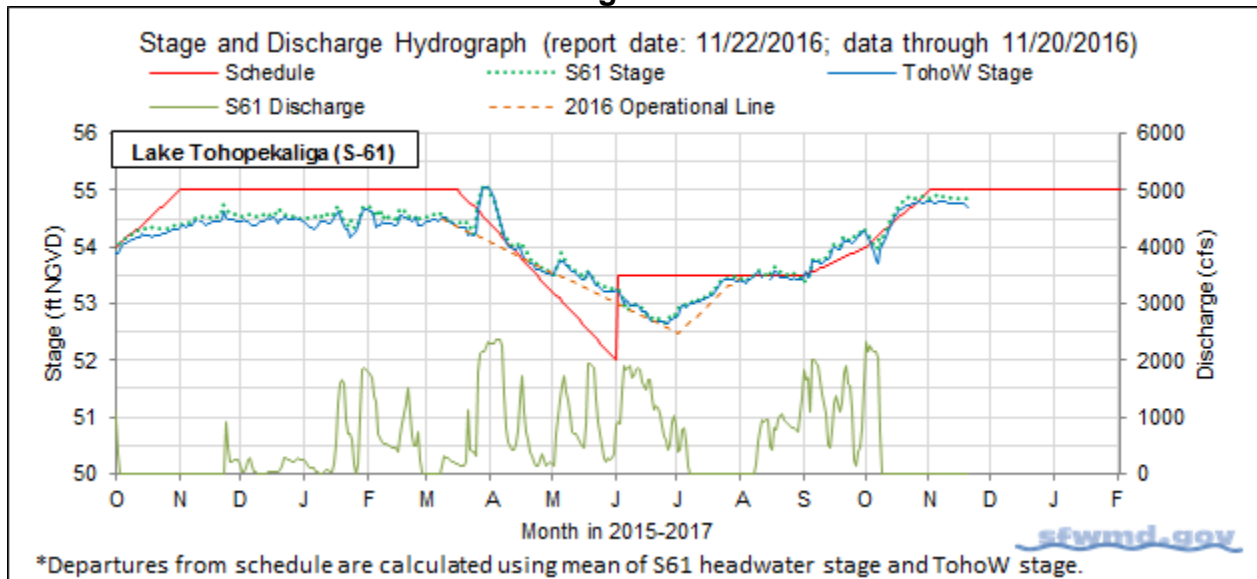


Figure 2.

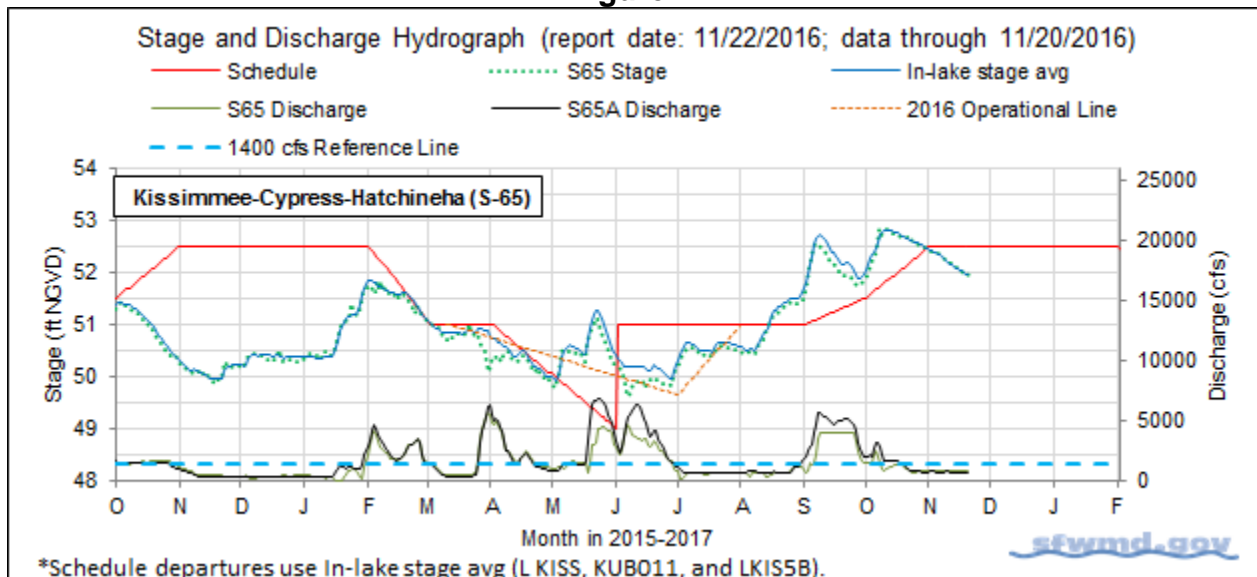


Figure 3.

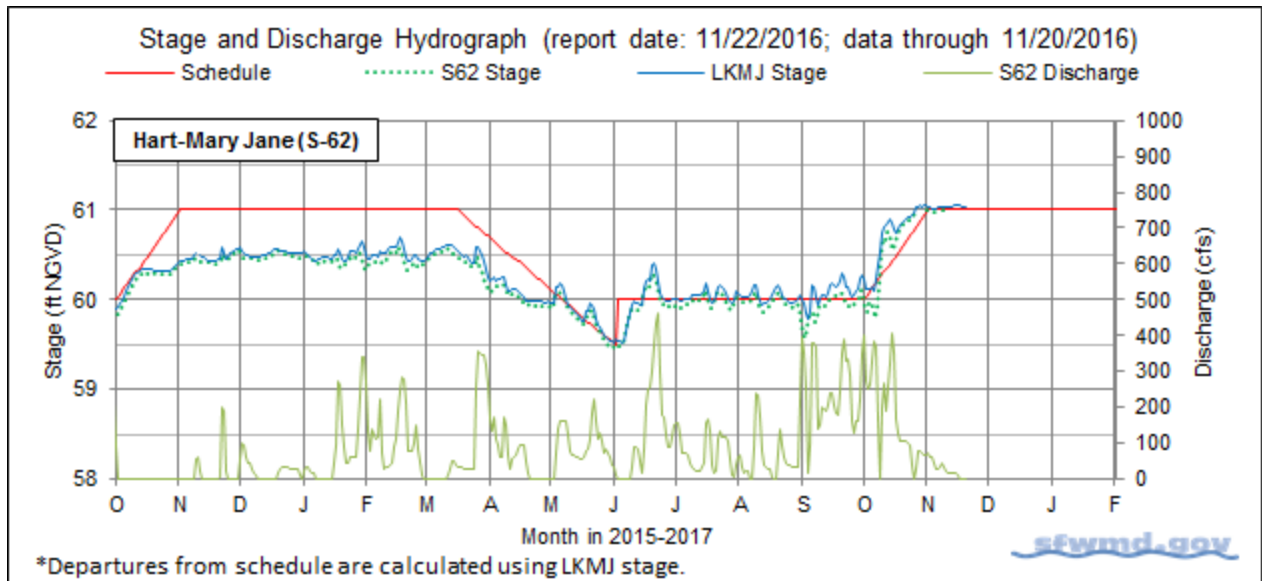


Figure 4.

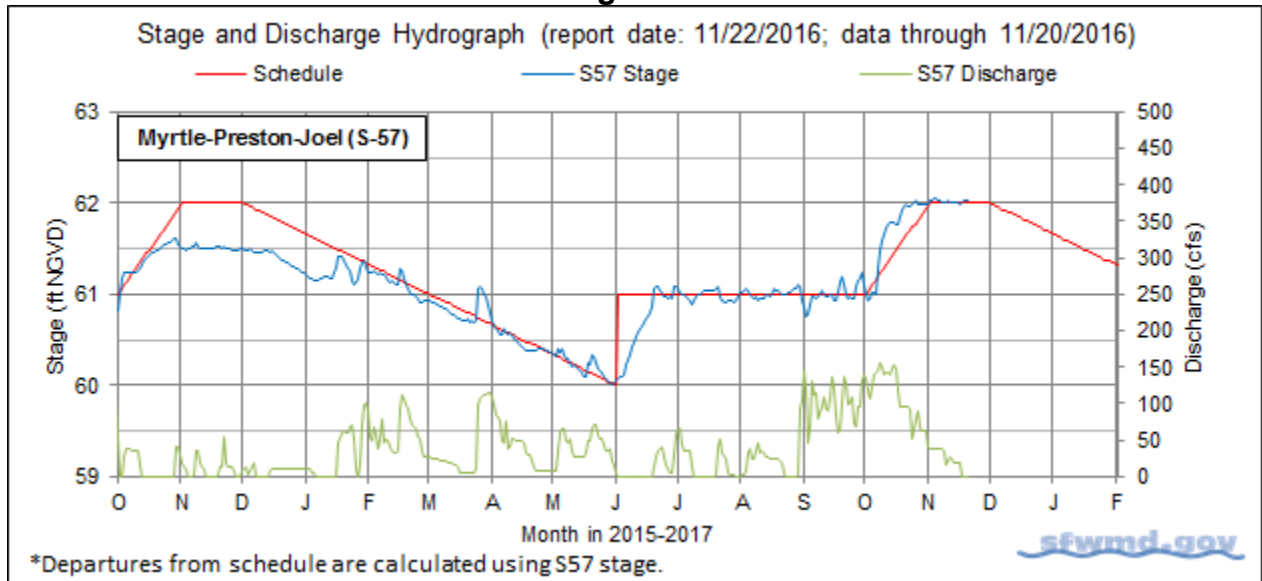


Figure 5.

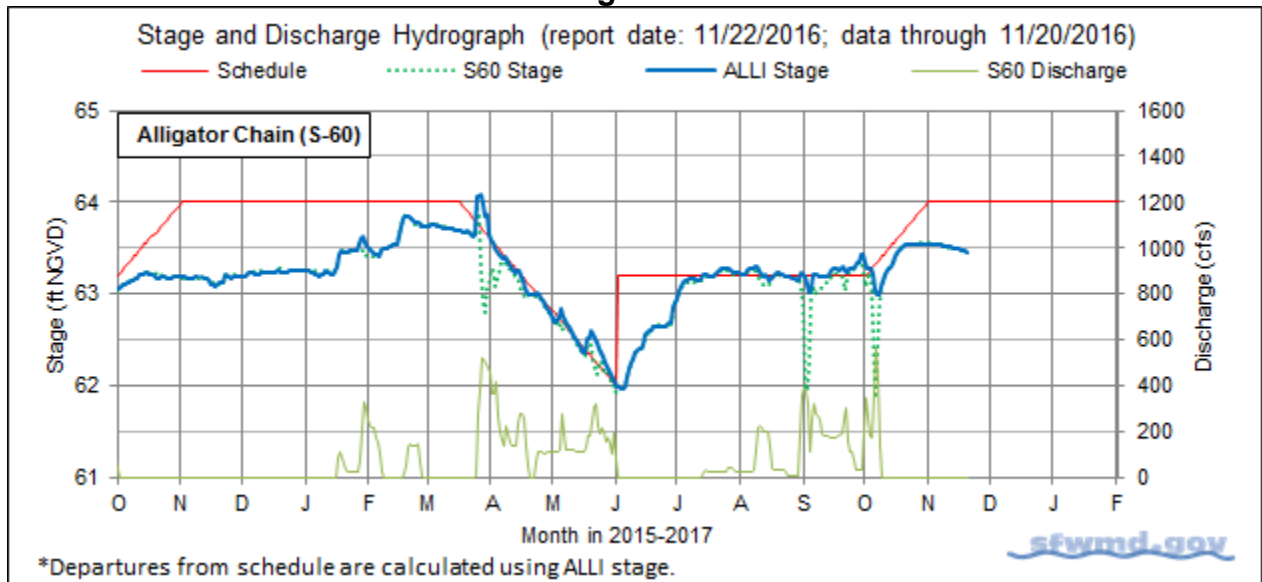


Figure 6.

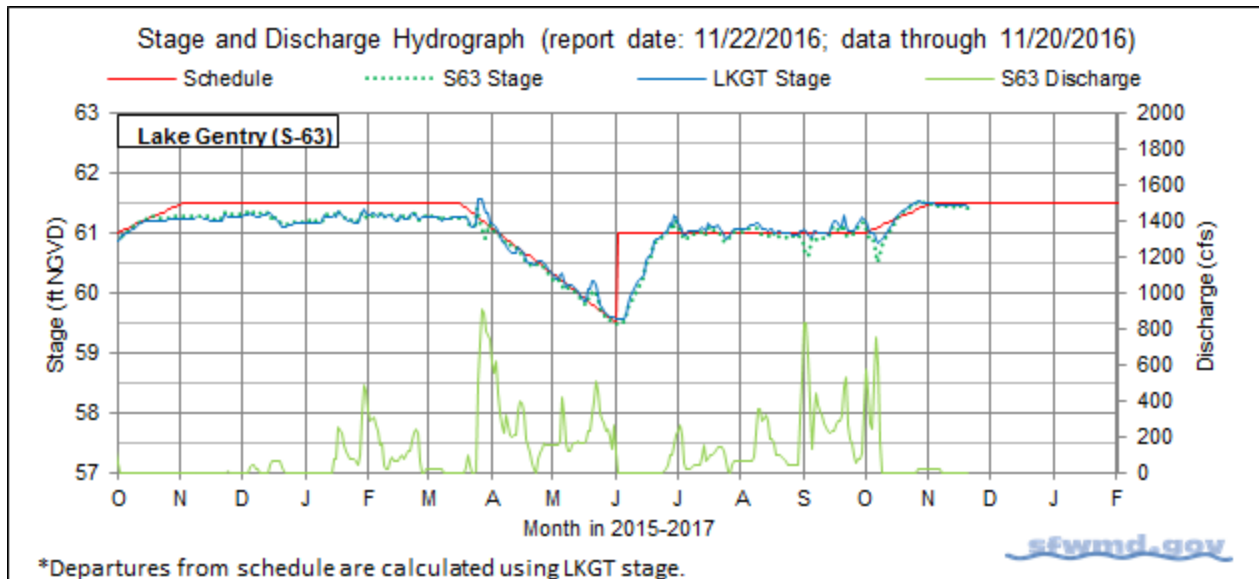


Figure 7.

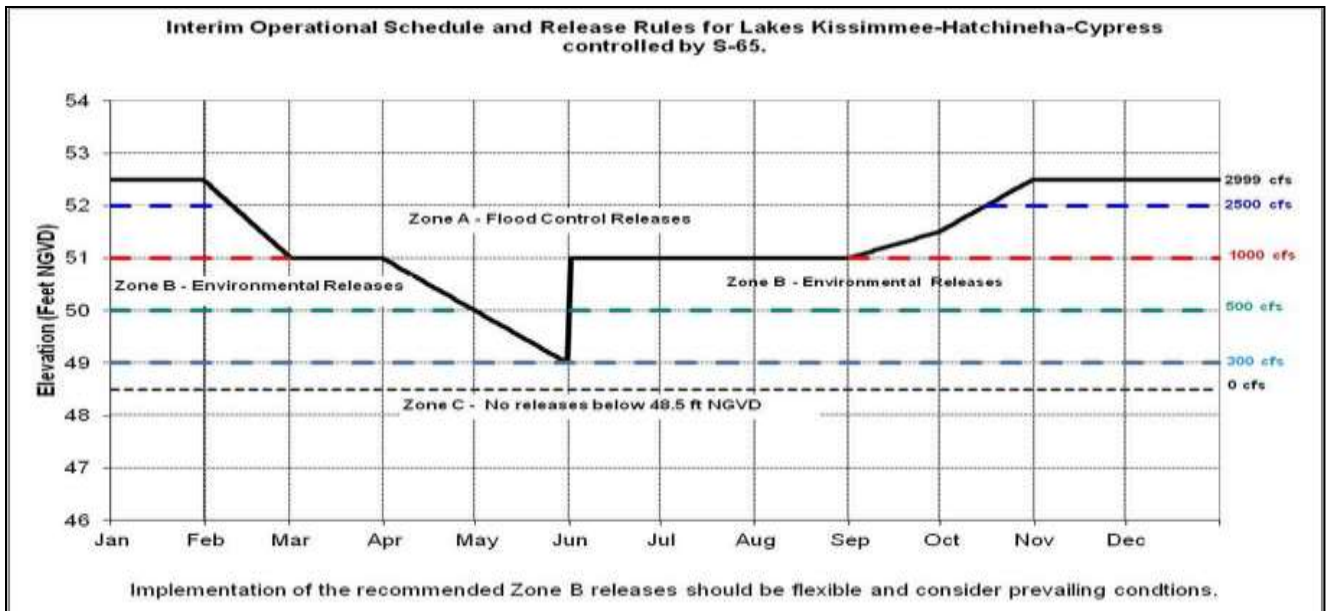
**SOUTH FLORIDA WATER MANAGEMENT DISTRICT**

**Limits on Rate of Discharge Change at S65/S65A During Dry Season 2016-2017**

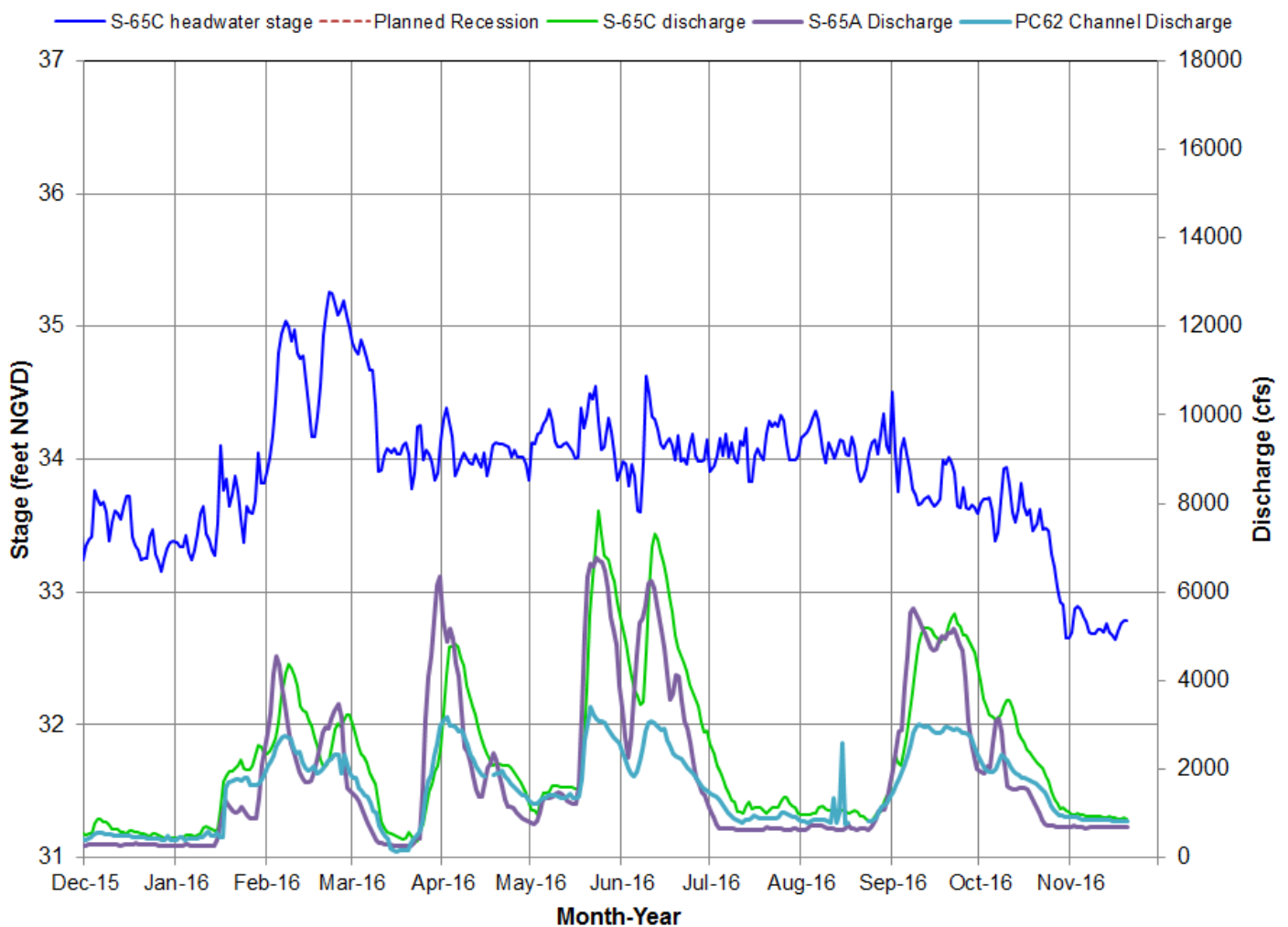
<b>Discharge Rate of Change Limits for S65/S65A (revised 11/16/16).</b>	
Q (cfs)	Maximum rate of increase or decrease (cfs/day)
300-650	75
650-1700	150
1700-3000	300
>3000	1000

15

Figure 8a. Limits on rate of discharge change at S65/S65A for the 2016-2017 Dry Season.

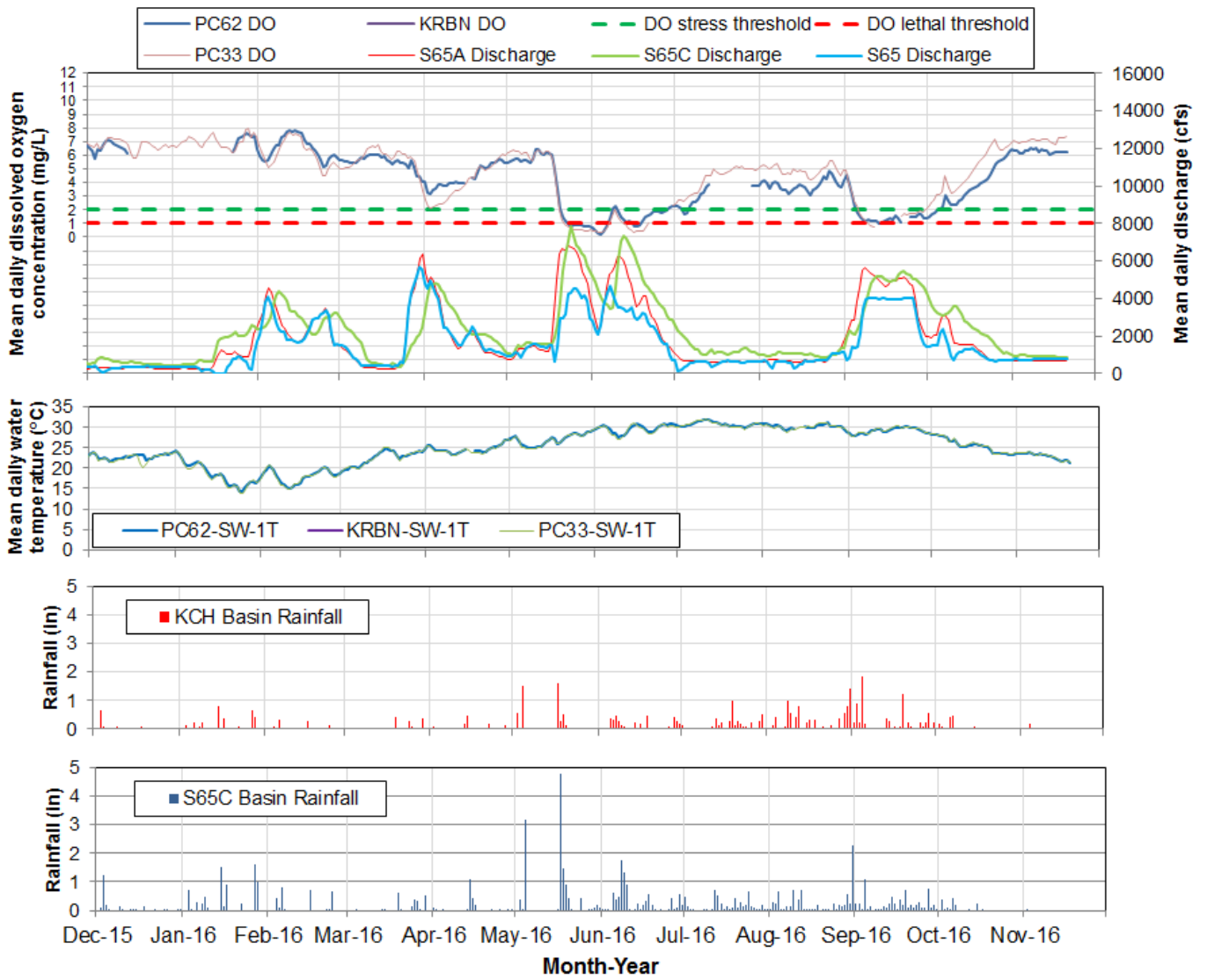


**Figure 8b.** Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years or in Wet Season 2015.

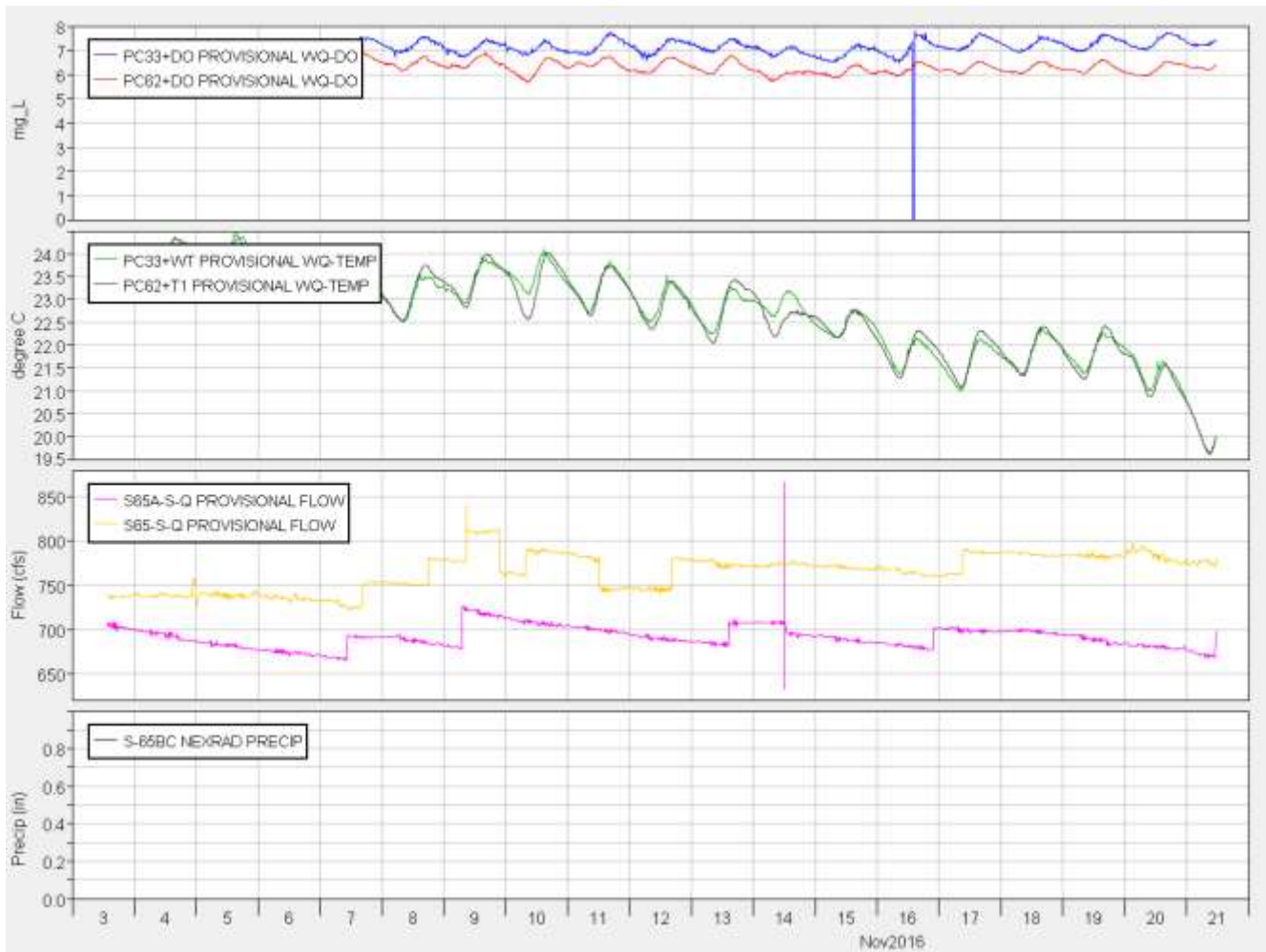


**Figure 9.** S-65C headwater stage in relation to discharge at S-65C, S-65A, and PC62.

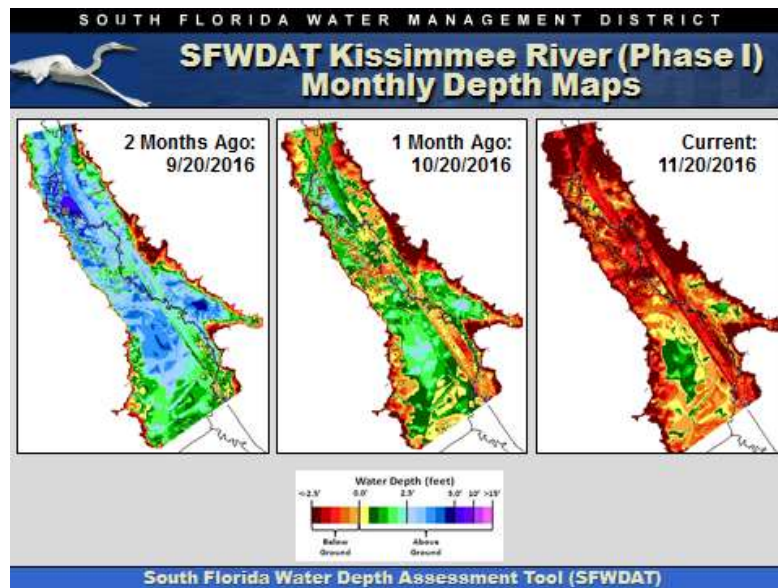




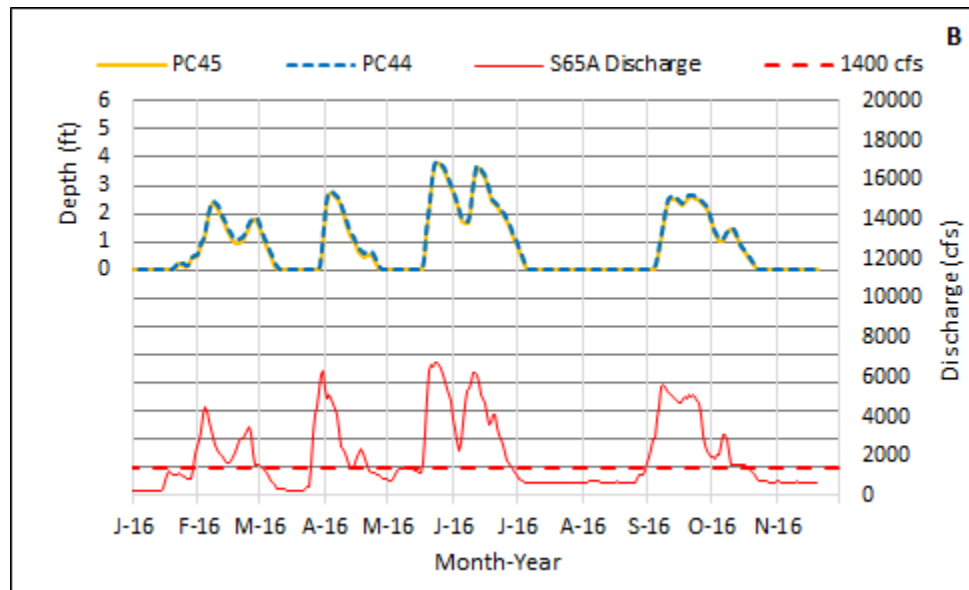
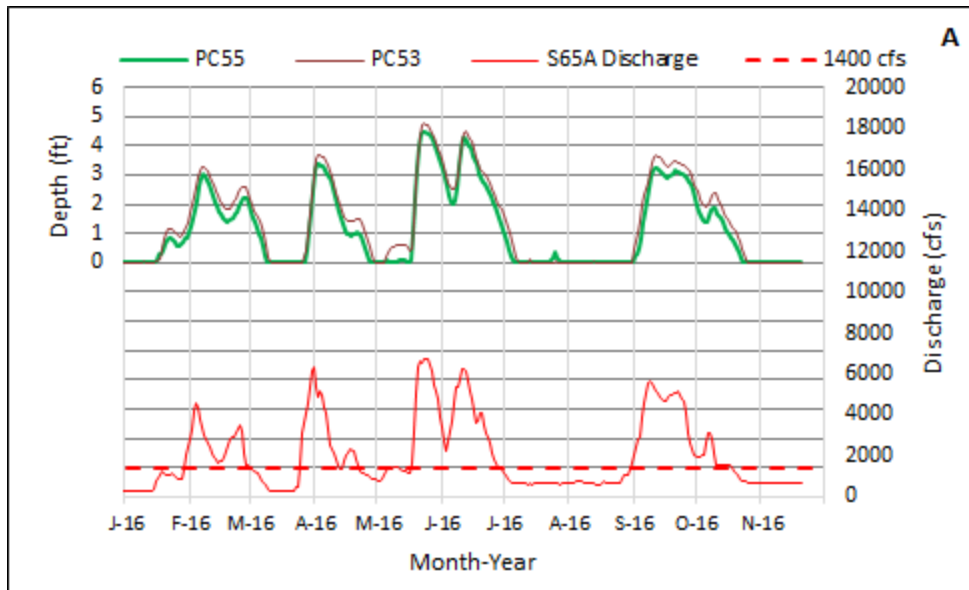
**Figure 10.** Mean daily Dissolved Oxygen, discharge, temperature and rainfall in the Phase I river channel.



**Figure 11.** Phase I river channel dissolved oxygen and water temperature (measured at 15 minute intervals) and Pool BC daily rainfall.

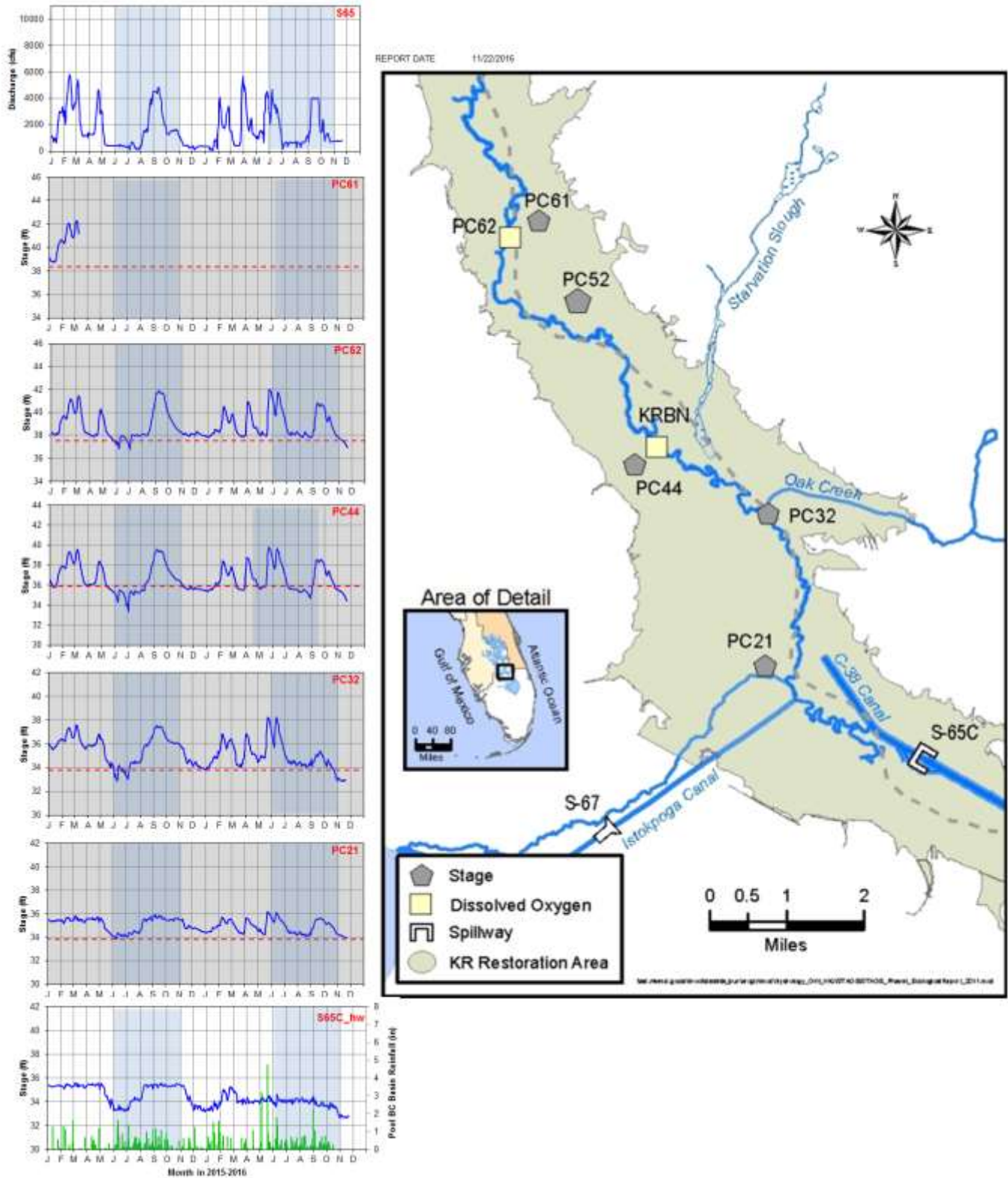


**Figure 12.** Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to Jan. 16, 2012.



**Insert.** Water depth at selected northern Kissimmee River floodplain sites on (A) the PC5's transect and (B) the PC4's transect, with S65A discharge.

# Kissimmee River Hydrographs



**Figure 13.** Discharge at S65, stages at five monitoring stations in the Phase I area of the Kissimmee River floodplain, and headwater stage at S65-C since January 1, 2015. The most recent data (~2 weeks) are provisional real-time data from SFWMD DualTrend; previous data are from SFWMD DB-HYDRO (validated). Dashed lines are ground elevations.

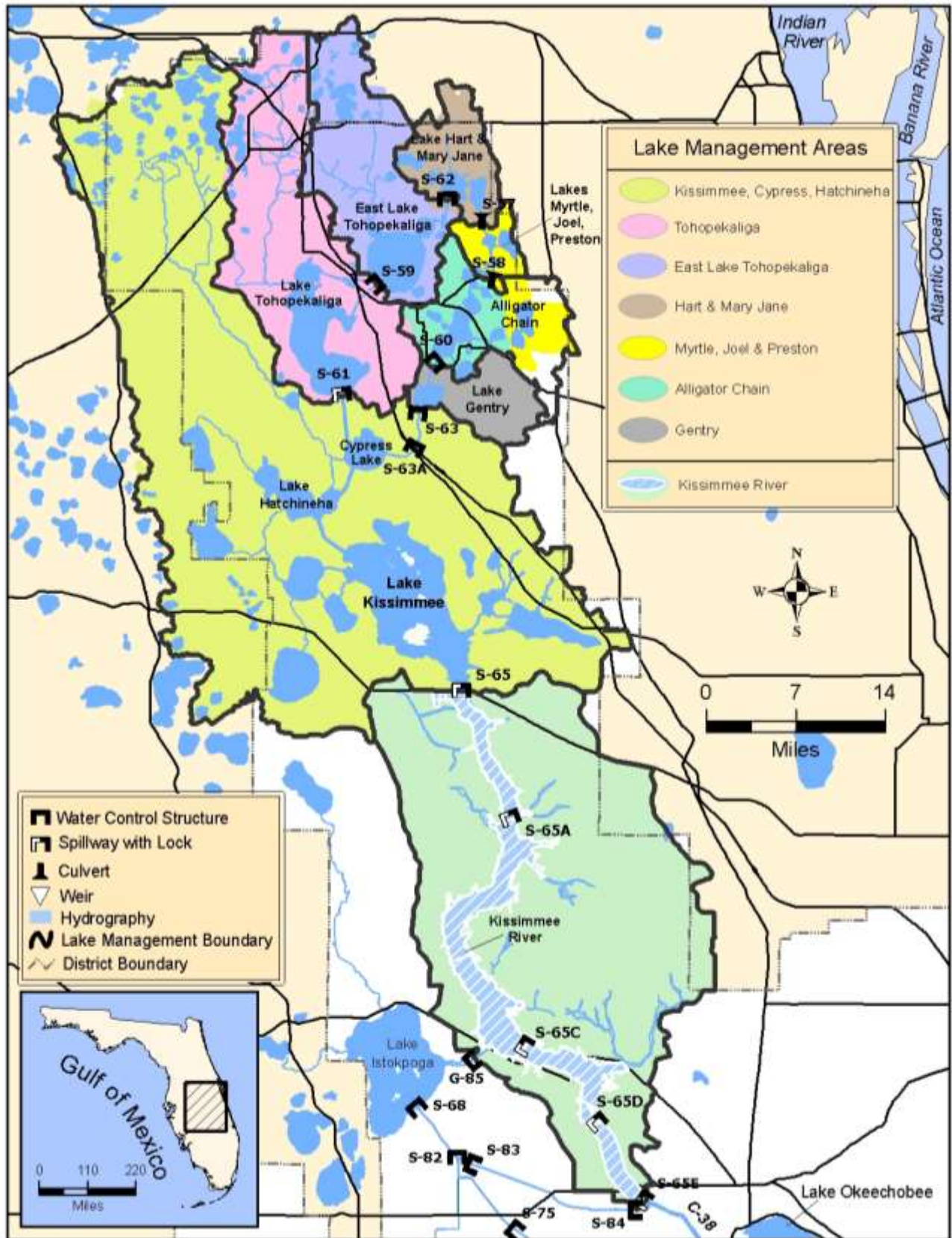


Figure 14. The Kissimmee Basin

## **LAKE OKEECHOBEE**

According to the USACE web site, Lake Okeechobee stage is at 14.95 feet NGVD for the period ending at midnight on November 21, 2016. This value is based on the use of four interior Lake stations (L001, L005, L006, and LZ40) and four perimeter stations (S352, S4, S308 and S133). Lake stage decreased by 0.18 feet over the past week and is 0.83 feet lower than it was a month ago and 0.51 feet higher than it was a year ago (Figure 1). The Lake is currently in the Low sub-band (Figure 2). According to RAINDAR, no rain fell directly over the Lake during the past seven days (Figure 3). Similar amounts fell throughout most of the surrounding watershed with the exception of the lower east coast which received slightly higher rainfall amounts.

Based on USACE reported values, current Lake inflow is approximately 680 cfs as detailed below.

<b>Structure</b>	<b>Flow cfs</b>
S65E	810
S154	0
S84 & 84X	0
S71	0
S72	0
C5 (Nicodemus slough dispersed storage)	-138
S191	0
S133 PUMPS	0
S127 PUMPS	0
S129 PUMPS	0
S131 PUMPS	0
S135 PUMPS	0
Fisheating Creek	8
S2 Pumps	0
S3 Pumps	0
S4 Pumps	0

Current Lake outflow is approximately 3,781 cfs with 1,498 cfs exiting at S77, 4 cfs exiting at S308 and 208 cfs exiting the L8 canal through Culvert 10A. Approximately 2,071 cfs is being directed south through S351, S352 and S354. Corrected evapotranspiration value based on the L006 weather platform solar radiation data for this past week was 965 cfs.

Change in elevation equivalents and average weekly flows for major structures are presented in Figure 4. Weekly average values for S77 and S308 are based on USGS data for the below structure gauges.

As the wading bird season gets underway, we begin to track potential foraging habitat (Figure 5). Current foraging potential is good for most species.

Recent MODIS satellite imagery (Figure 6) shows no evidence of potential blooms on the Lake.

### **Water Management Recommendations**

Lake stage is continuing to fall and is below the top of the preferred stage envelope (14.95 feet NGVD). Future short-term recommendations are to continue lowering Lake levels at a rate not to exceed 0.5 feet per month. From an ecological perspective, the Lake has been too high since the February rain

event resulting in a loss of submerged aquatic vegetation (SAV) and increased cyanobacterial blooms and associated toxins. If elevated Lake stages persist into the next growing season we expect additional damage to SAV and a resurgence of the bloom conditions that have characterized this past wet season. However, a too rapid decrease in Lake levels may jeopardize the upcoming wading bird season by drying out foraging locations too early in the winter.

The goal should be to lower Lake levels at a rate of no more than 0.5 feet per month keeping levels within the preferred stage envelope and reaching a Lake stage of approximately 12.5 feet NGVD by the end of the dry season. Near optimal Lake stages will be necessary this coming spring and summer to provide conditions conducive to the reestablishment of the submerged aquatic vegetation acreage lost this year due to high Lake stages.

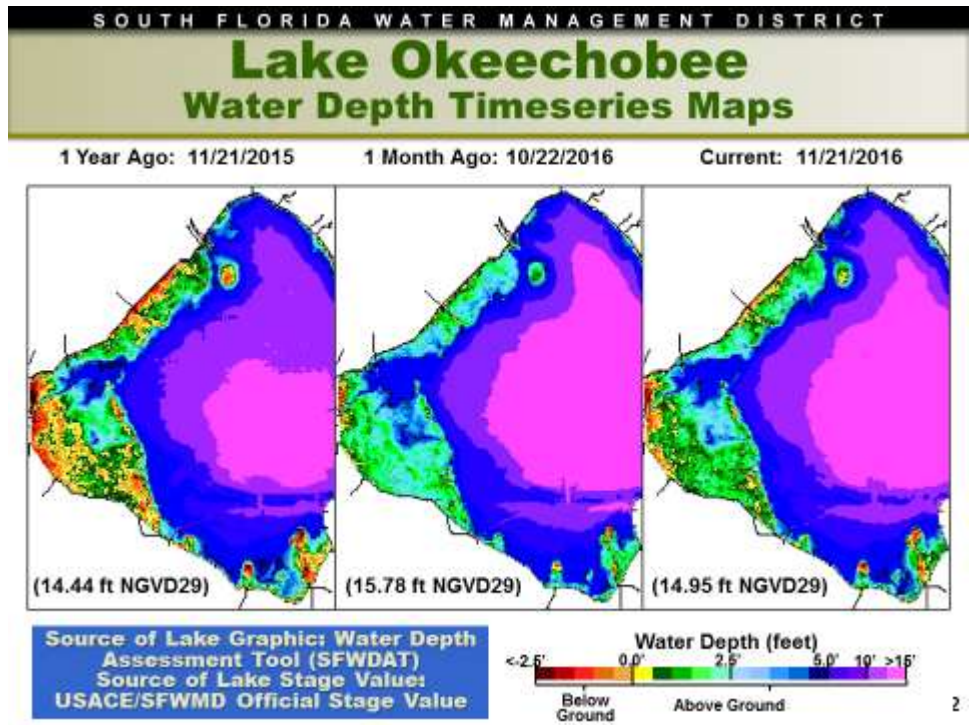


Figure 1

# Lake Okeechobee Water Level History and Projected Stages

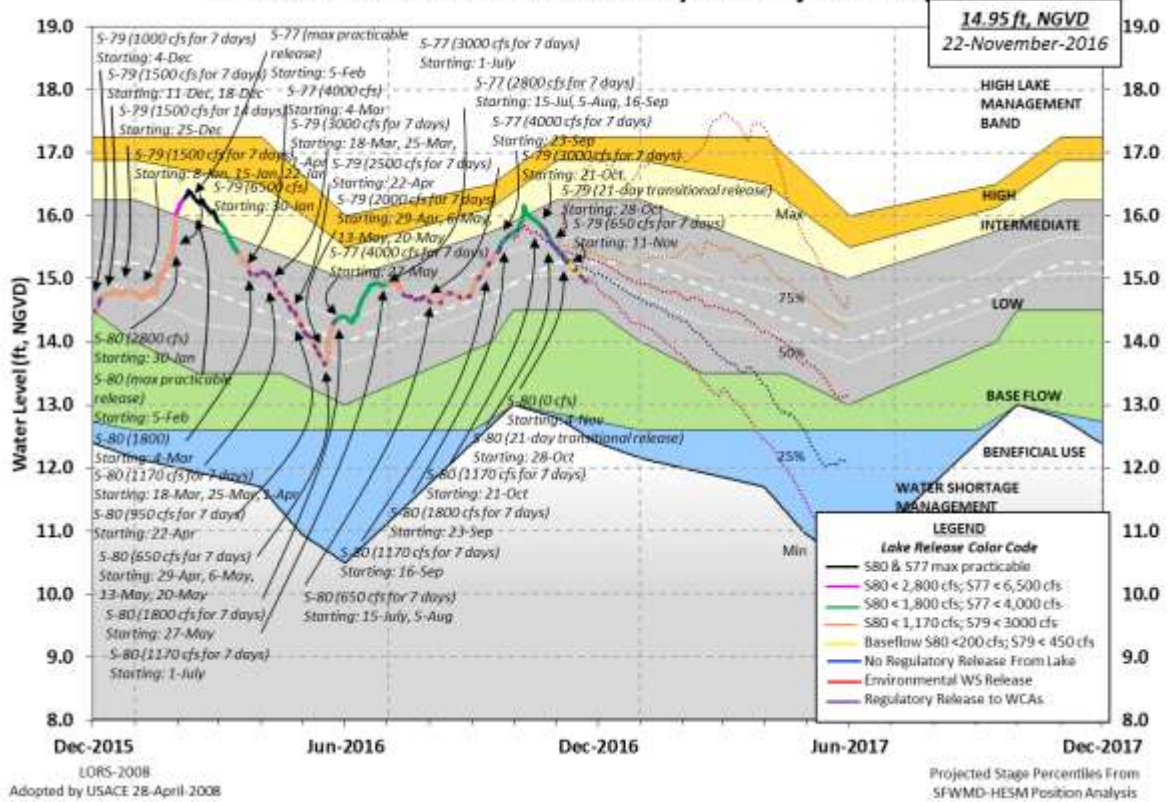
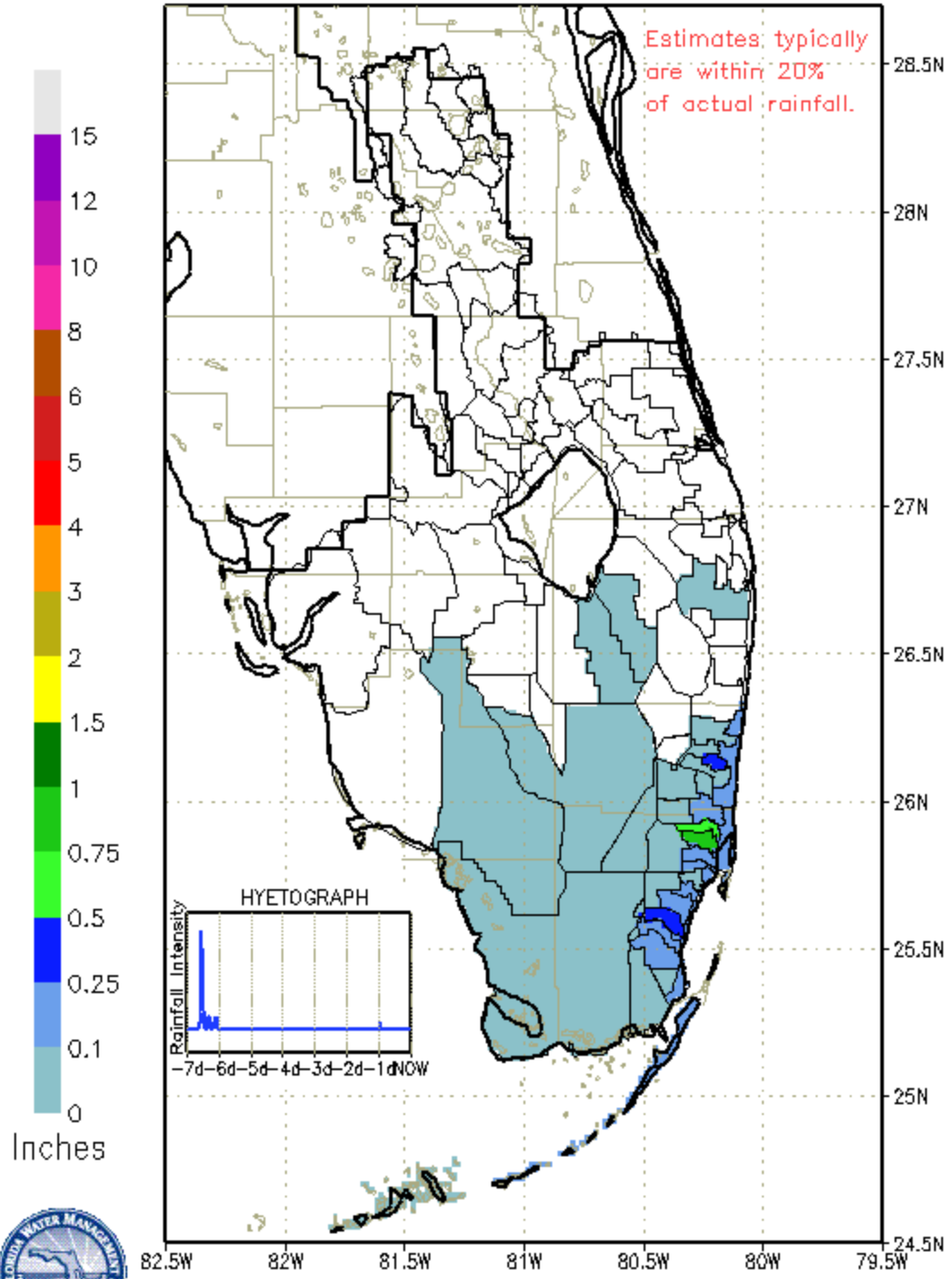


Figure 2



# SFWMD PROVISIONAL RAINFAR 7-DAY BASIN RAINFALL ESTIMATES

FROM: 0615 EST, 11/15/2016 THROUGH: 0615 EST, 11/22/2016



DISTRICT-WIDE RAINFALL ESTIMATE: 0.014"



Figure 3

INFLOWS	Average Daily Flow Past Week cfs	Feet of Change Past Week
S65E	813	0.027
S71 & 72	0	0.000
S84 & 84X	0	0.000
Fisheating Creek	65	0.002
Rainfall	N.A.	0.000
OUTFLOWS	Average Daily Flow Past Week cfs	Feet of Change Past Week
S77	1086	0.036
S308	37	0.001
S351	1046	0.034
S352	468	0.015
S354	550	0.018
L8	265	0.009
ET	965	0.032

Figure 4

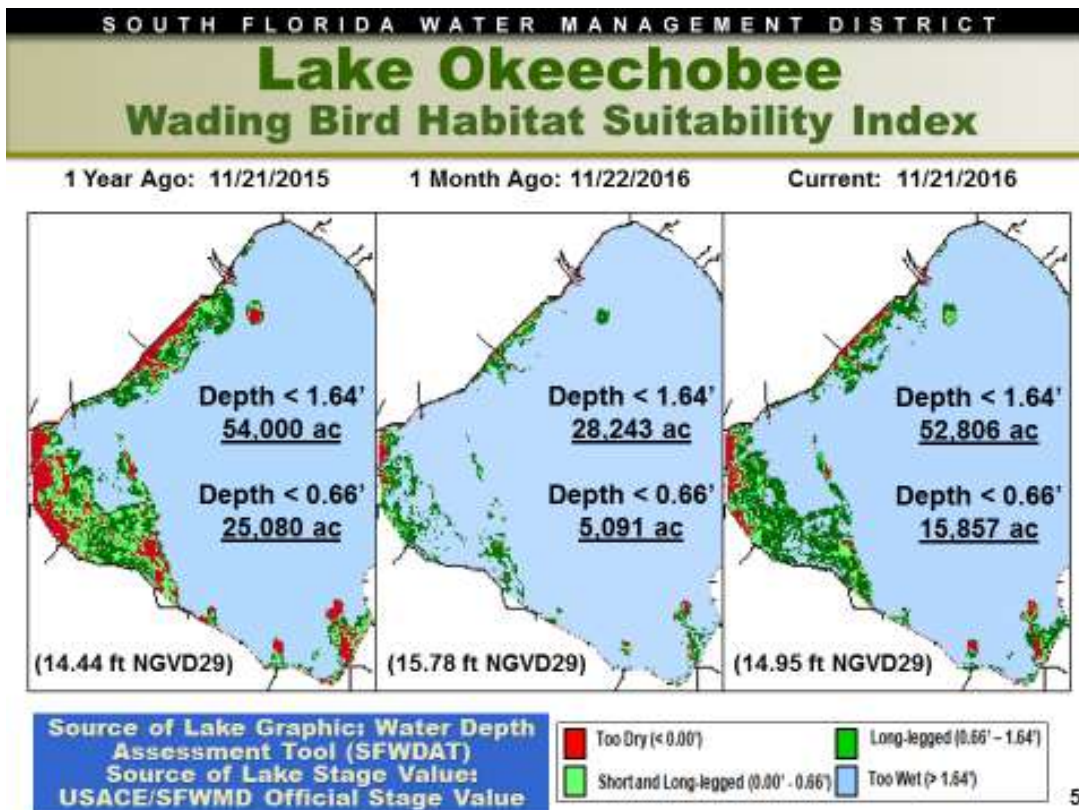


Figure 5

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

# Lake Okeechobee

## Algal Blooms

### Unvalidated and Experimental Data

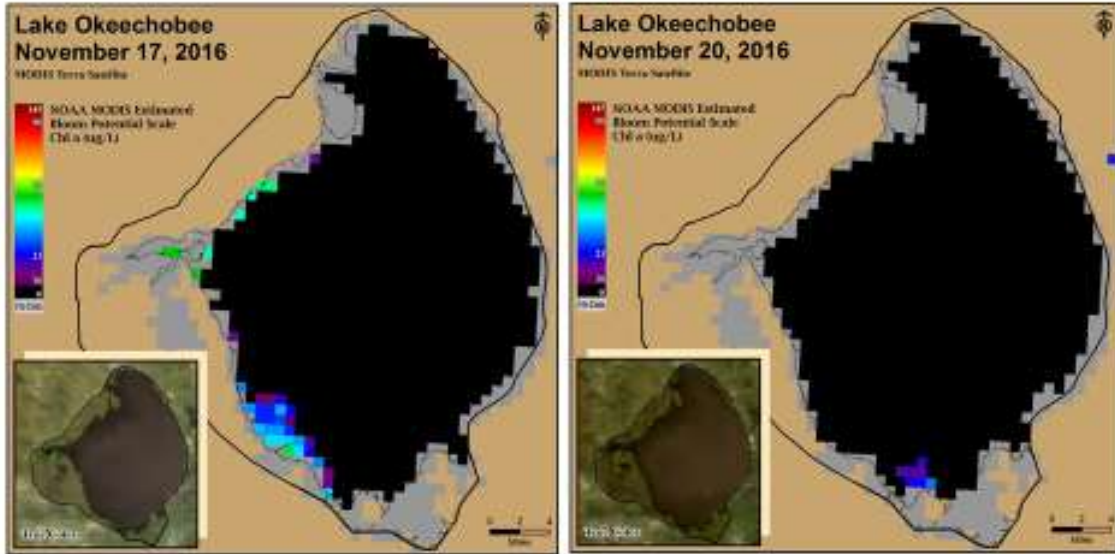


Figure 6

### Lake Istokpoga

The Lake Istokpoga regulation schedule has reached winter pool stage of 39.50 feet NGVD. Lake stage is 39.41 feet NGVD and is currently 0.09 feet below regulation stage (Figure 7). Average flows into the Lake from Arbuckle and Josephine creeks were 99 cfs and 42 cfs respectively, a continuing decrease in total flows from the previous three weeks. Average discharge from S68 and S68X this past week was 117 cfs, a decrease from the previous two weeks. According to RAINDAR, no rain fell in the Lake Istokpoga watershed during the past seven days.

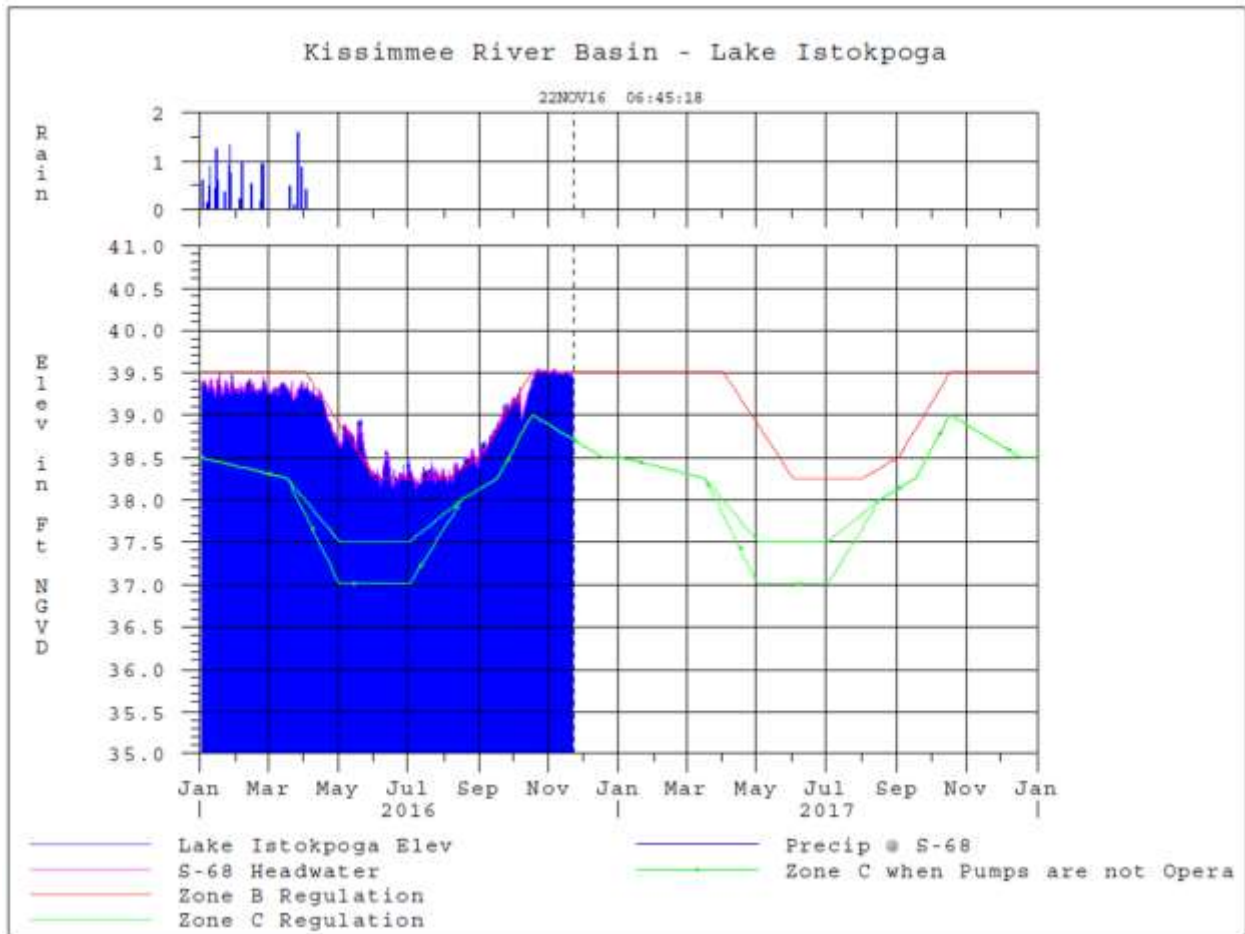


Figure 7

## ESTUARIES

### St. Lucie Estuary

Over the past week, provisional flows averaged about 0 cfs at S-80, 37 cfs downstream of S-308, 0 cfs at S-49 on C-24, 0 cfs at S-97 on C-23, and 92 cfs from Ten Mile Creek at the Gordy Road Structure. Average inflow from tidal basin tributaries is estimated to be 94 cfs (Figures 1 and 2). Total inflow averaged about 186 cfs last week and 709 cfs over last month.

Over the past week, salinity increased throughout the estuary (Table 1, Figures 3 and 4). The seven-day moving average salinity of the water column at the US1 Bridge is about 19.7. Salinity conditions in the middle estuary are in the good range for the adult eastern oyster.

Table 1. Seven-day average salinity at three monitoring stations in the St. Lucie Estuary. Current average is in bold face type, previous average in parentheses. The envelope reflects the preferred salinity range for adult eastern oysters (*Crassostrea virginica*) in the middle estuary.

Sampling Site	Surface	Bottom	Envelope
HR1 (N. Fork)	<b>15.8</b> (8.2)	<b>19.0</b> (13.8)	NA <sup>1</sup>
US1 Bridge	<b>19.0</b> (13.4)	<b>20.3</b> (17.6)	10.0-26.0
A1A Bridge	<b>27.0</b> (23.3)	<b>29.2</b> (28.5)	NA

<sup>1</sup>Envelope not applicable

## Caloosahatchee Estuary

During the past week, provisional flows averaged approximately 1,086 cfs downstream of S-77, 456 cfs at S-78, and 694 cfs at S-79. Average inflow from tidal basin tributaries is estimated to be 159 cfs (Figures 5 and 6). Total inflow averaged 853 cfs last week and 1,972 cfs over last month.

Over the past week, salinity increased throughout the estuary (Table 2, Figures 7 and 8). The seven-day average salinity values are within the good range for adult oysters at Cape Coral, Shell Point and at Sanibel (Figure 9). The 30-day moving average surface salinity is unavailable at Val I-75 and at Ft. Myers. Salinity conditions at Val I-75 are estimated to be in the good range for tape grass, and are forecasted to remain so in following two weeks even without discharges at S-79 (Figure 10).

Table 2. Seven-day average salinity at six monitoring stations in the Caloosahatchee Estuary. Current average is in bold face type, previous average in parentheses. The envelope reflects the preferred salinity range for tape grass (*Vallisneria americana*) at Val I-75 and for adult eastern oysters (*Crassostrea virginica*) elsewhere.

Sampling Site	Surface	Bottom	Envelope
S-79 (Franklin Lock)	<b>2.2</b> (0.2)	<b>2.1</b> (0.2)	NA <sup>1</sup>
*Val I75	<b>NE</b> <sup>4</sup> (0.4*)	<b>NE</b> (1.0*)	0.0-5.0 <sup>2</sup>
Ft. Myers Yacht Basin	<b>EM</b> <sup>3</sup> (2.6)	<b>EM</b> (4.4)	NA
Cape Coral	<b>13.3</b> (7.3)	<b>16.0</b> (11.0)	10.0-30.0
Shell Point	<b>22.1</b> (18.3)	<b>25.1</b> (22.3)	10.0-30.0
Sanibel	<b>28.7</b> (27.9)	<b>29.6</b> (29.1)	10.0-30.0

<sup>1</sup>Envelope not applicable, <sup>2</sup>Envelope is based on a 30-day average, <sup>3</sup>Equipment Malfunction, <sup>4</sup>No Estimate.

\*Val I75 is temporarily offline due to site construction,

Salinity values are estimated using models developed for this site.

Monitoring data collected by the River, Estuary and Coastal Observing Network of Sanibel-Captiva Conservation Foundation using continuous sensors are summarized in Table 3 as concentration ranges of Chlorophyll *a* and dissolved oxygen at Beautiful Island, Ft. Myers, and Shell Point in the Caloosahatchee Estuary.

Table 3. Weekly ranges of Chlorophyll *a* (a measure of algal biomass) and dissolved oxygen concentrations at three monitoring stations maintained by the Sanibel-Captiva Conservation Foundation.

	RECON Monitoring Stations		
	Beautiful Island	Ft. Myers	Shell Point
Chlorophyll <i>a</i> (µg/l)	NA <sup>1</sup>	NA	NA
Dissolved Oxygen (mg/l)	NA	NA	NA
<sup>1</sup> Not Available			

The Florida Fish and Wildlife Research Institute reported on November 18, 2016, that *Karenia brevis*, the Florida red tide organism, was observed in background to high concentrations in sixteen samples collected from Lee County.

Fish kills affecting multiple species have been reported along Charlotte, Lee, Collier, and northern Monroe counties over the past week. Slight respiratory irritation has also been reported in some areas of Sarasota and Lee counties.

## Water Management Recommendations

Given the current estuarine conditions, there are no ecological benefits associated with additional releases from Lake Okeechobee.

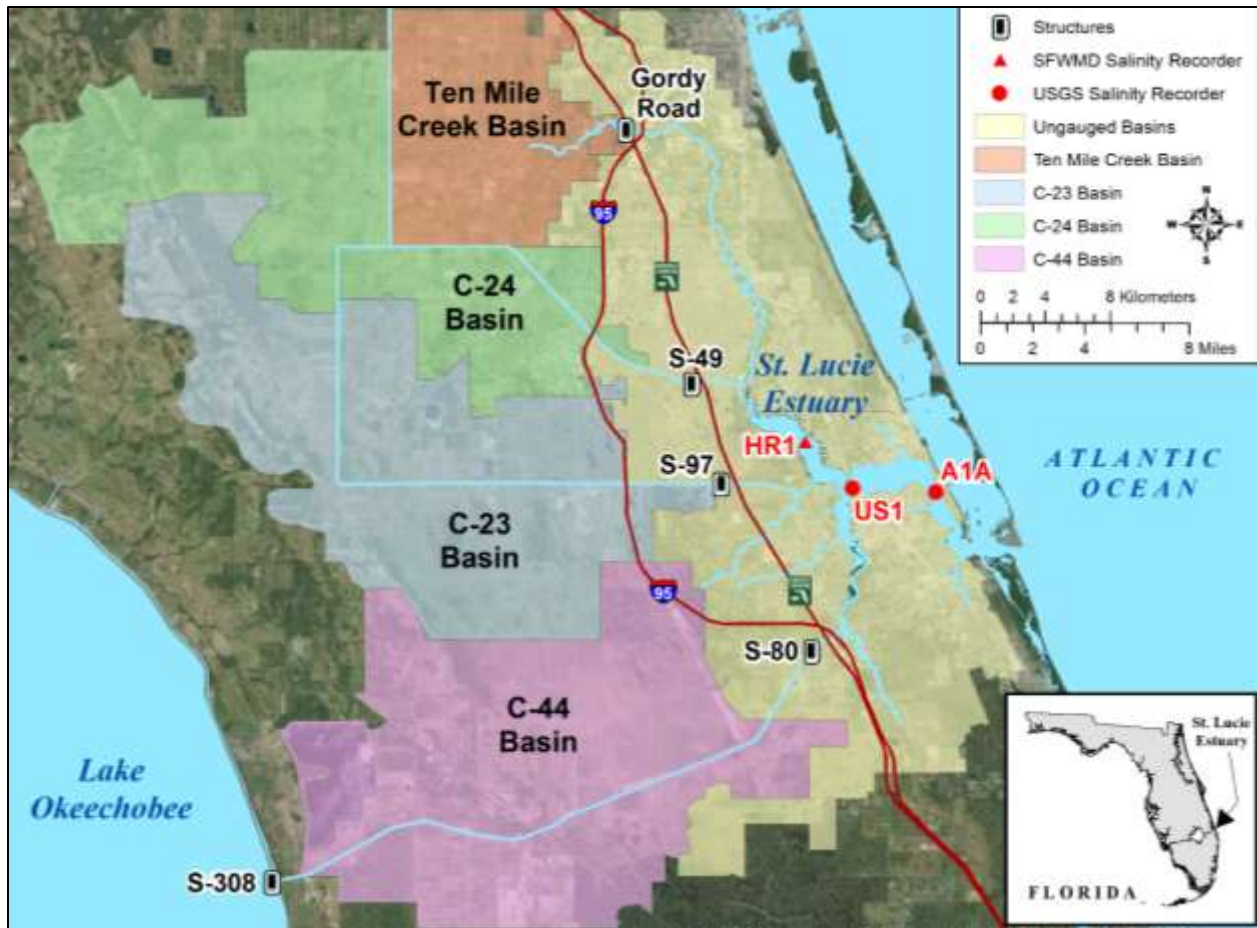


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

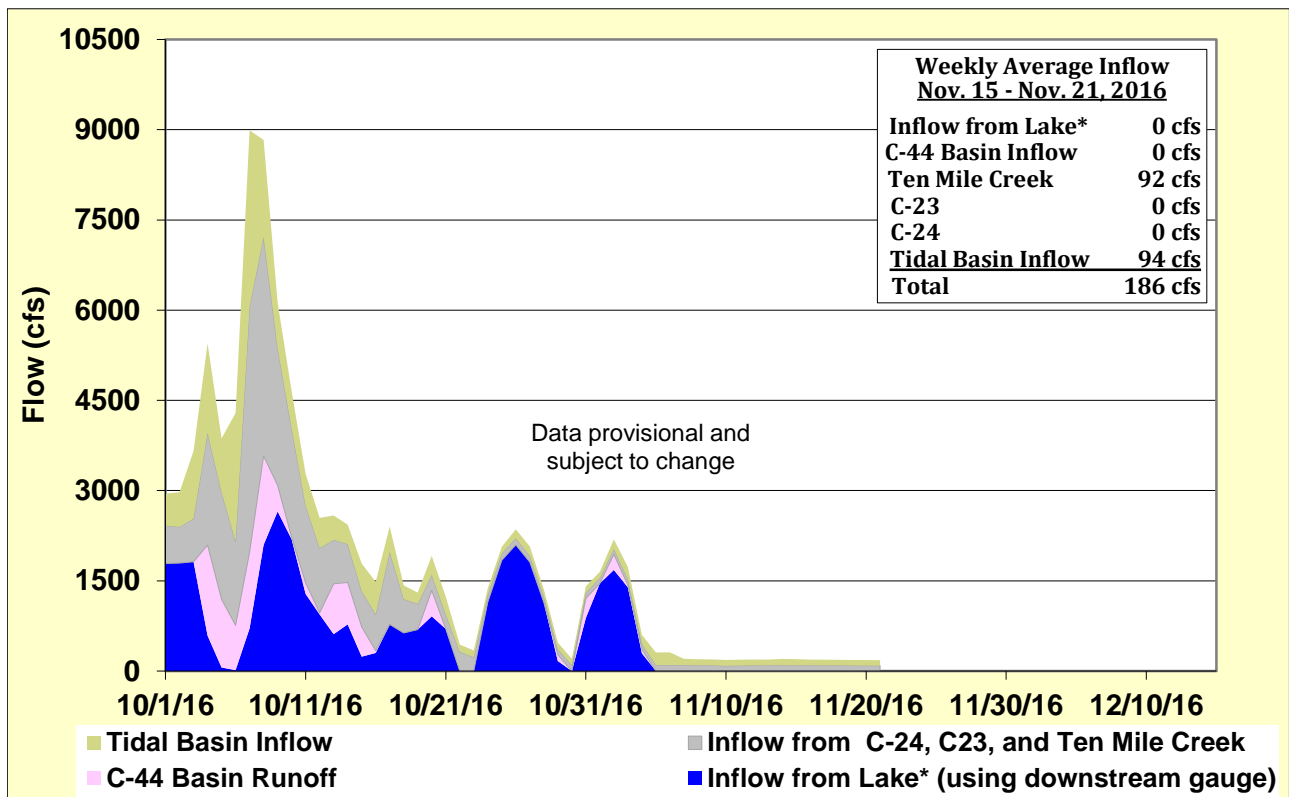


Figure 2. Estimated surface freshwater inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basins into the St. Lucie Estuary.

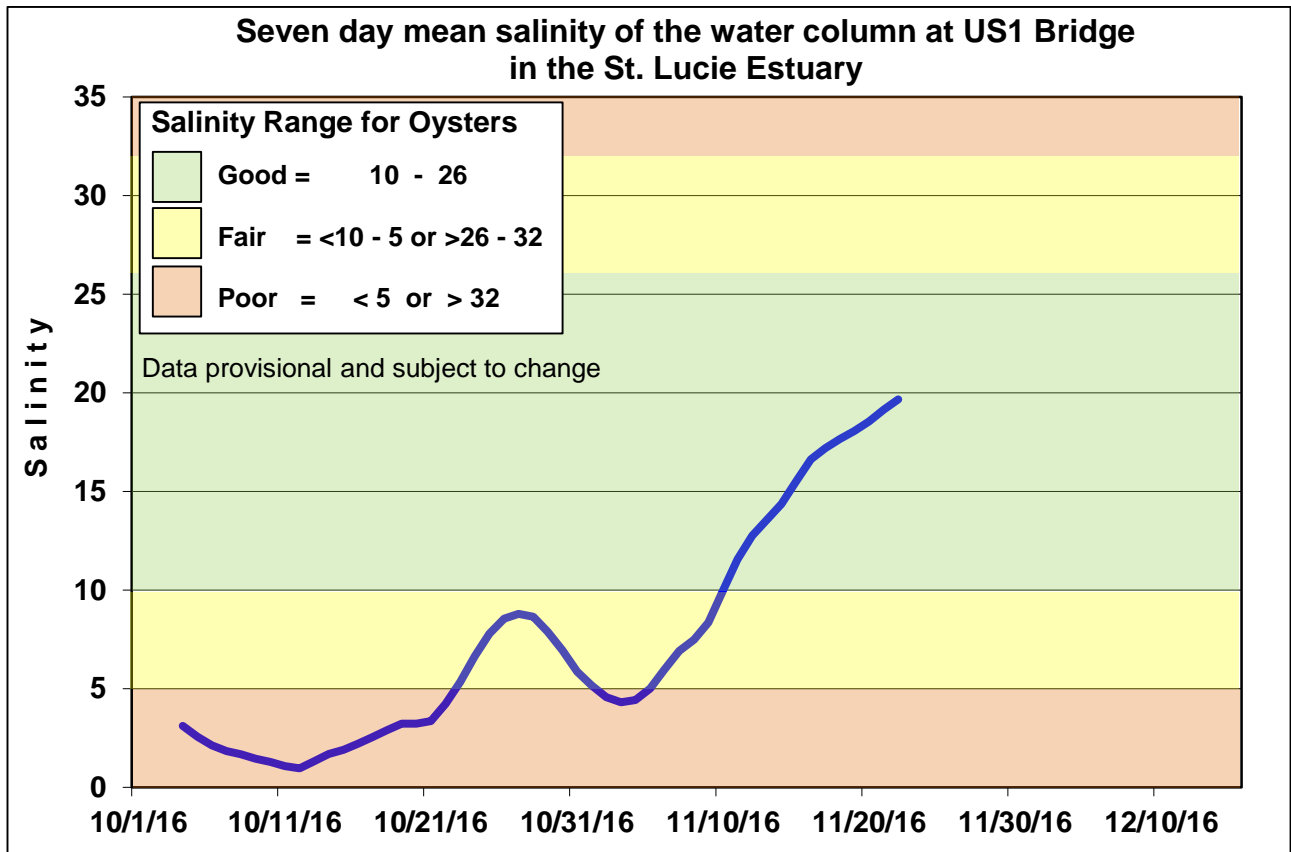


Figure 3. Seven-day mean salinity of the water column at the U.S. Highway 1 Bridge.

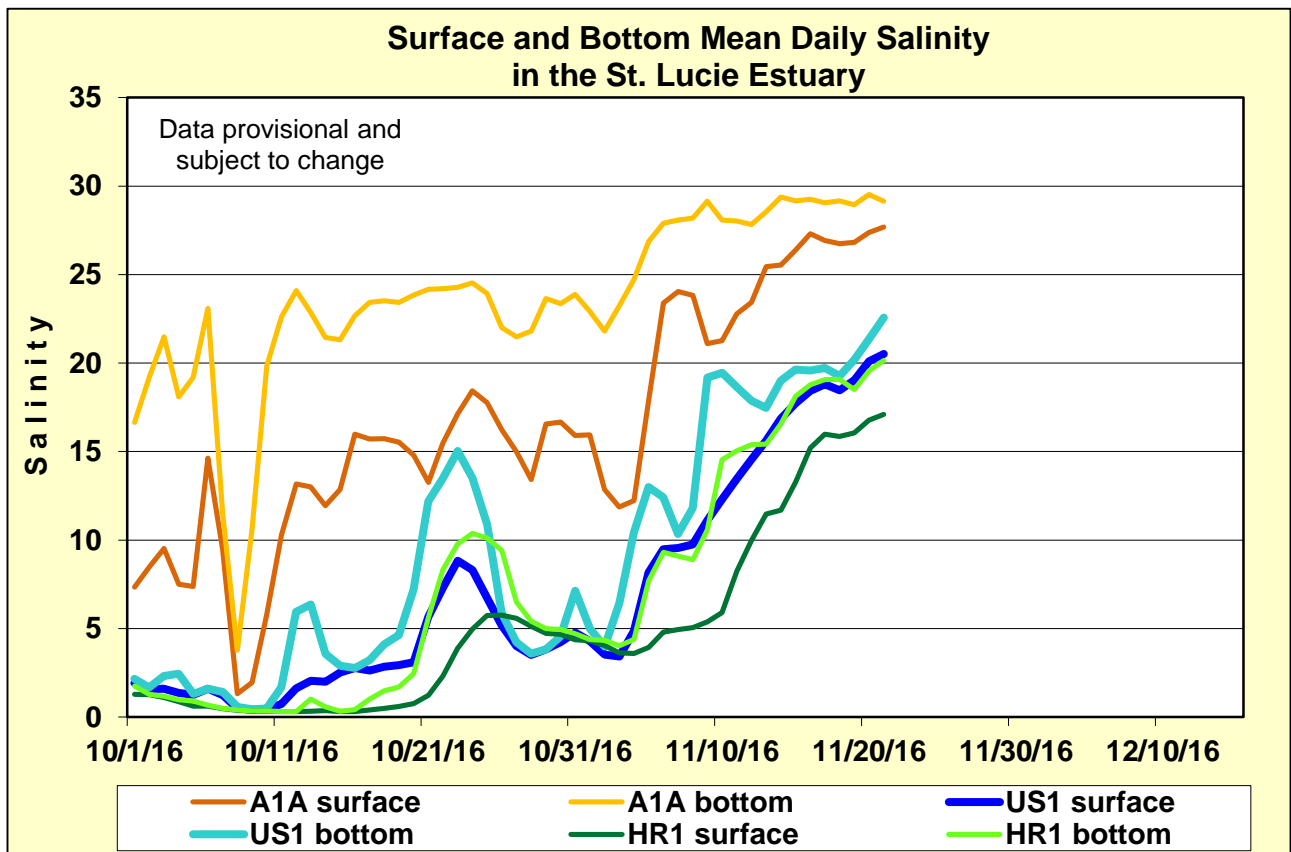


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

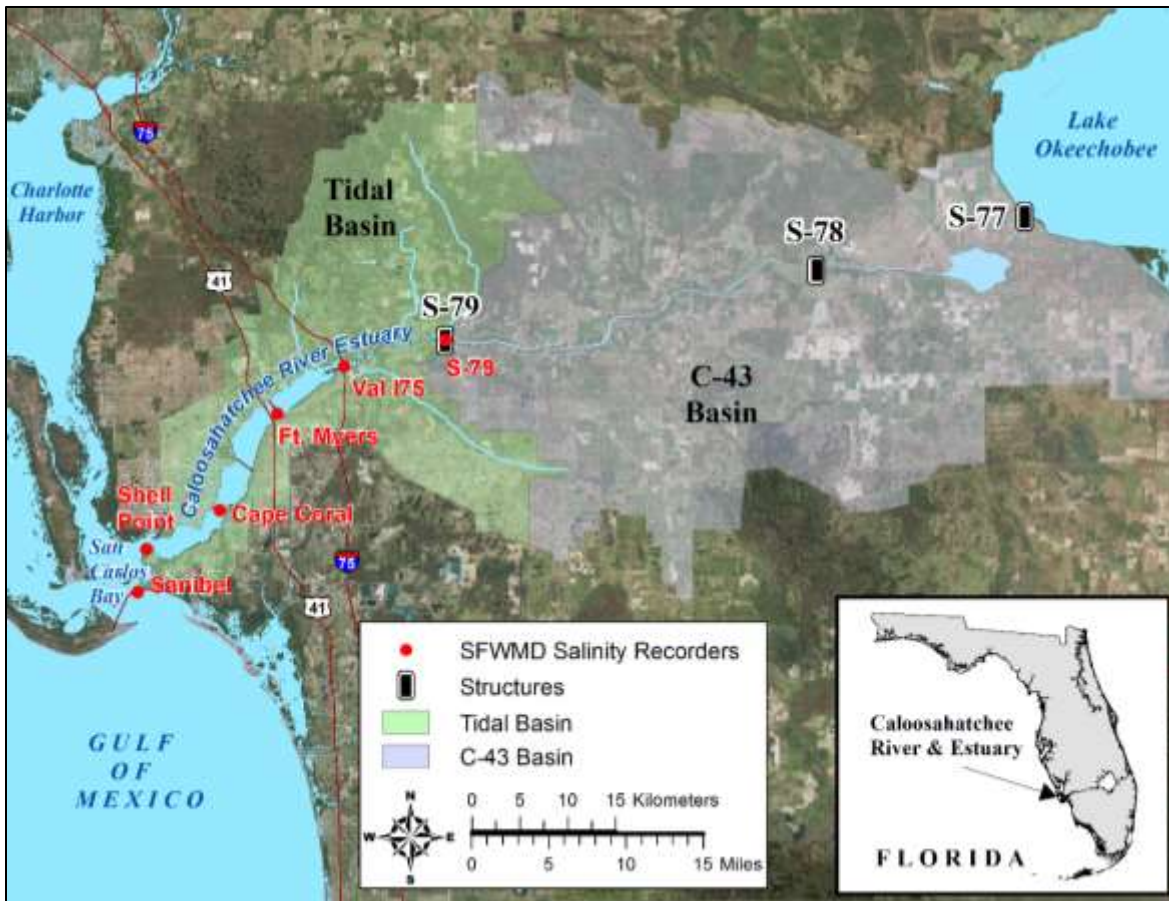


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

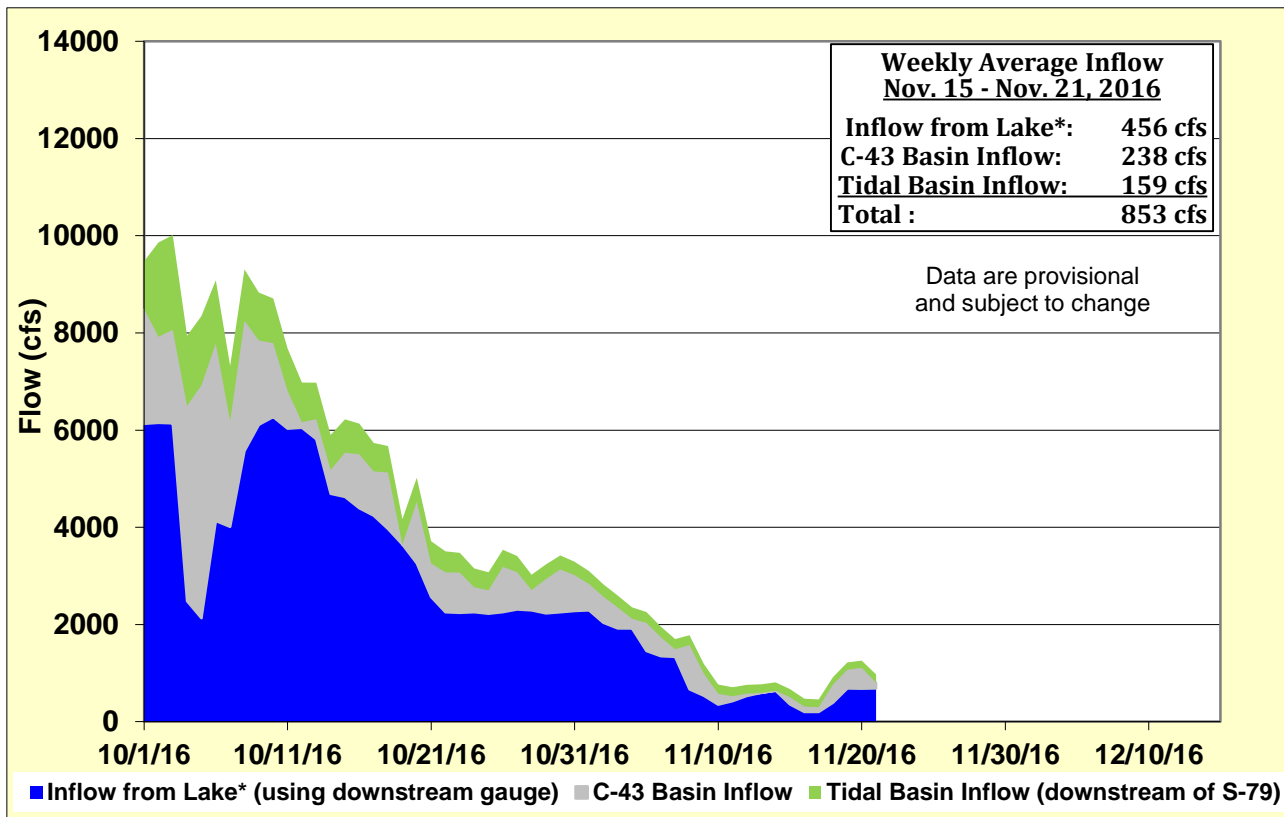


Figure 6. Freshwater inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.



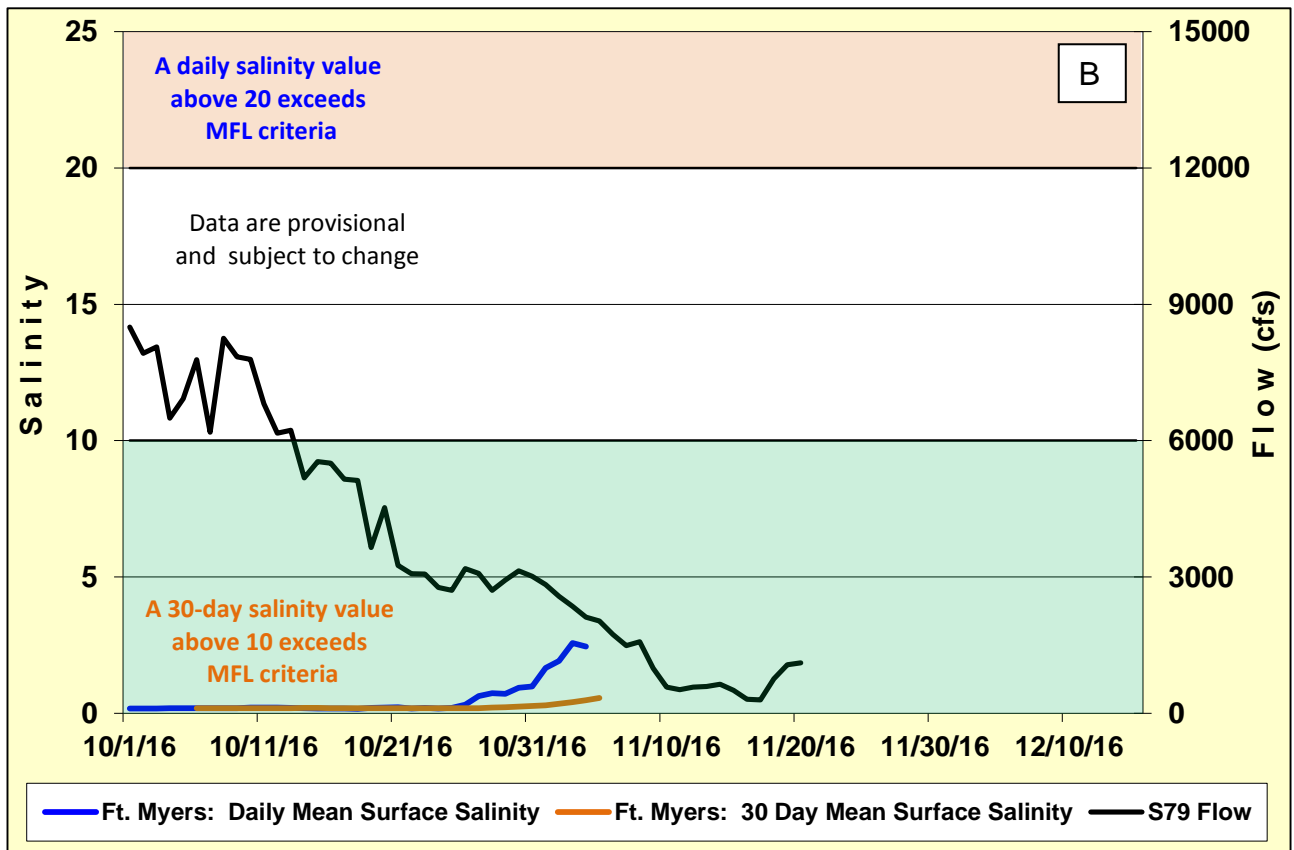
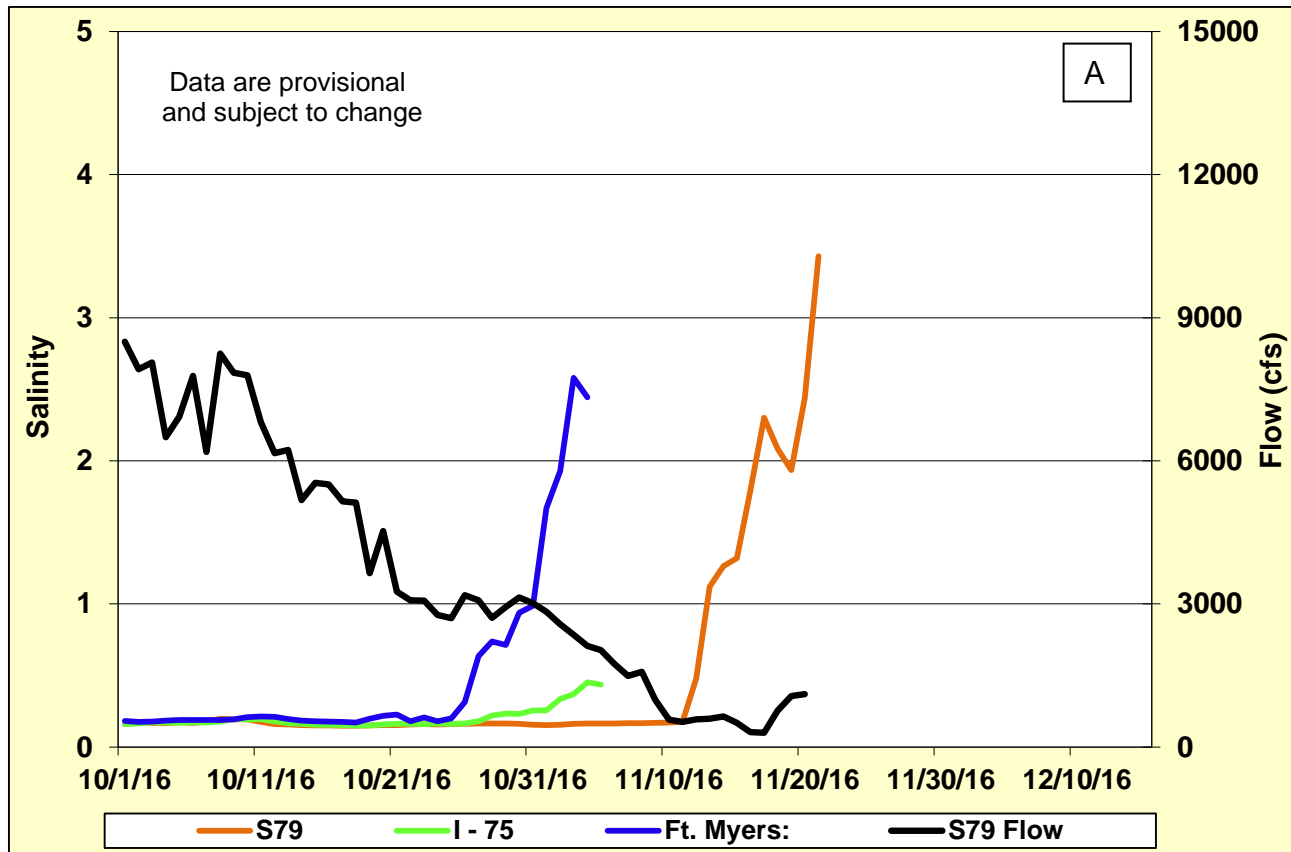


Figure 7. Daily mean flows at S-79 and salinity at upper estuary monitoring stations (A) and 30-day moving average salinity at Ft. Myers (B).

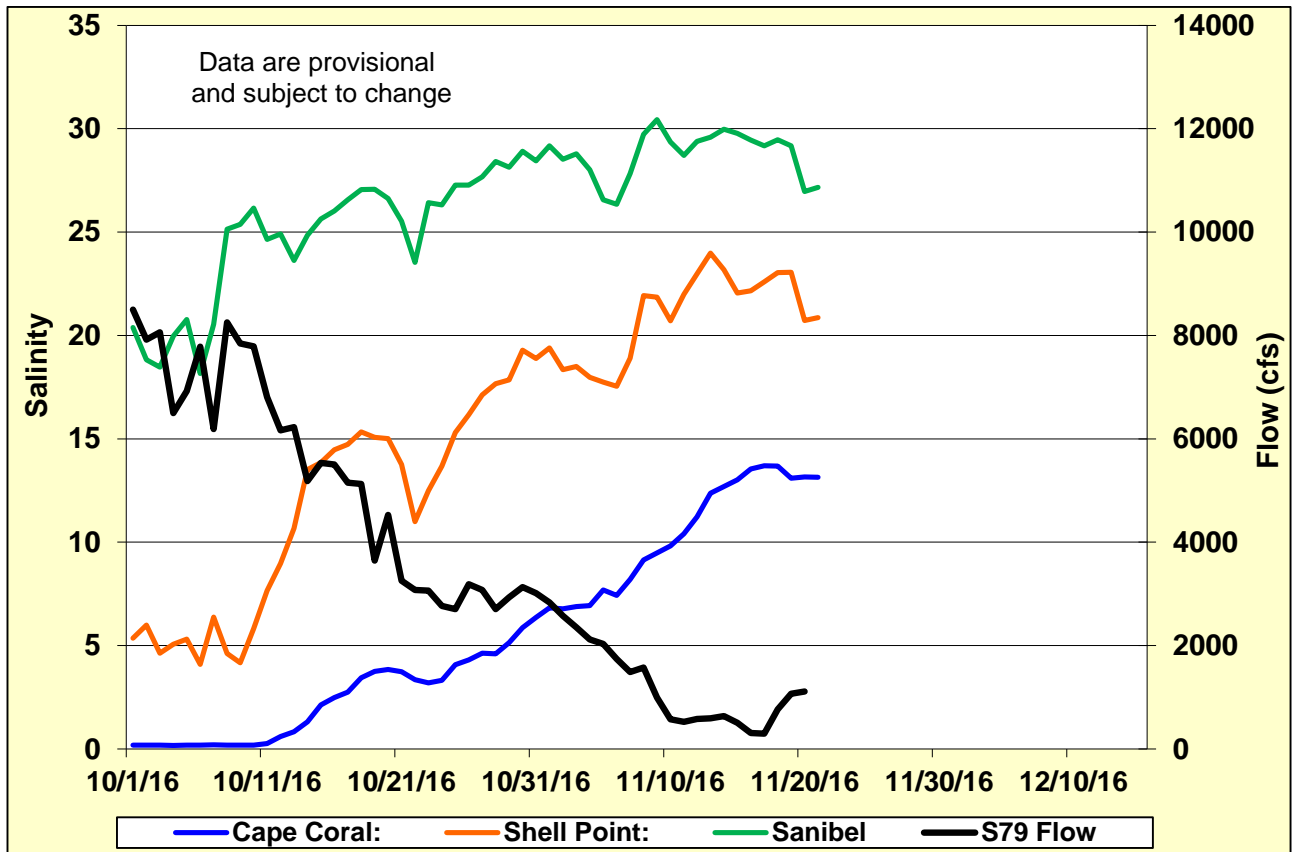


Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.

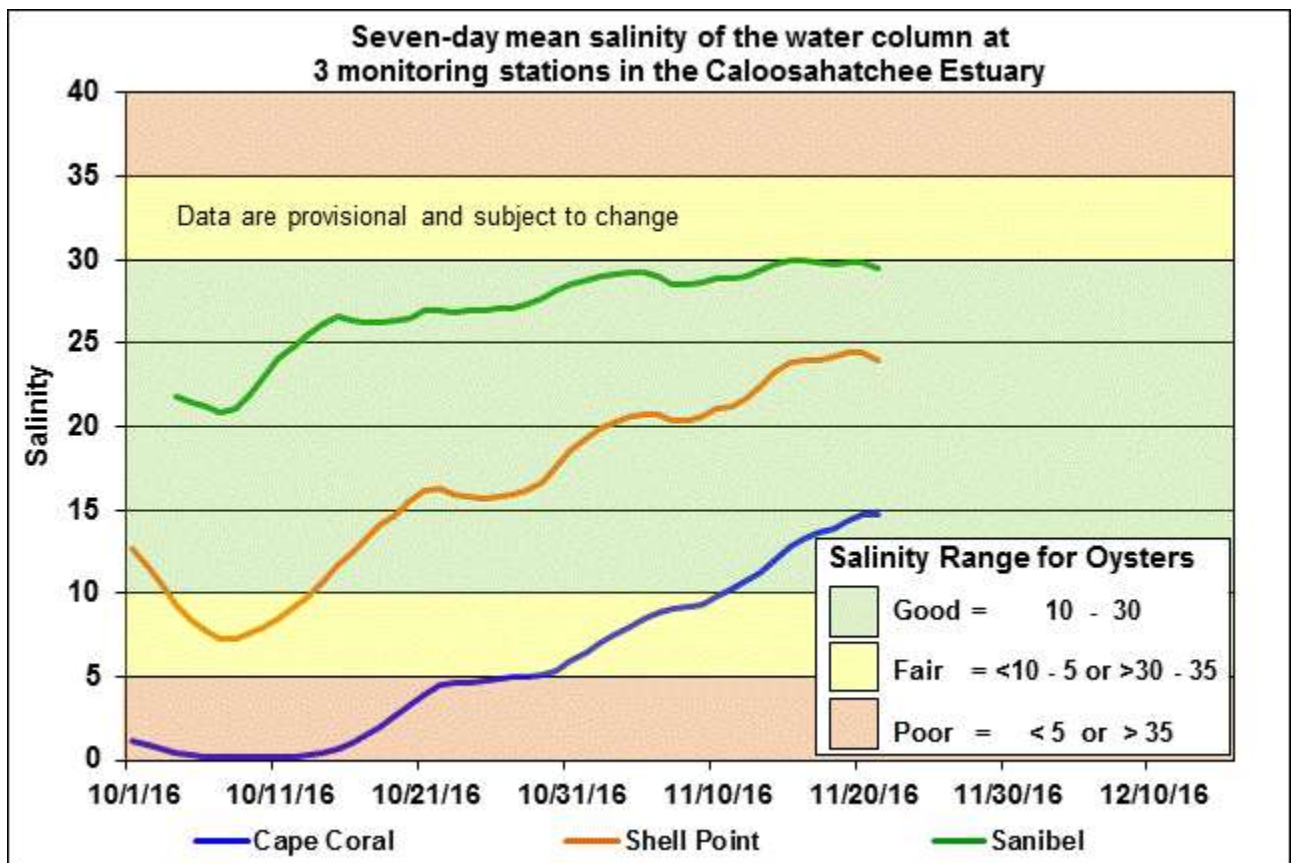


Figure 9. Seven-day mean salinity at Cape Coral Bridge, Shell Point and Sanibel Bridge monitoring stations.

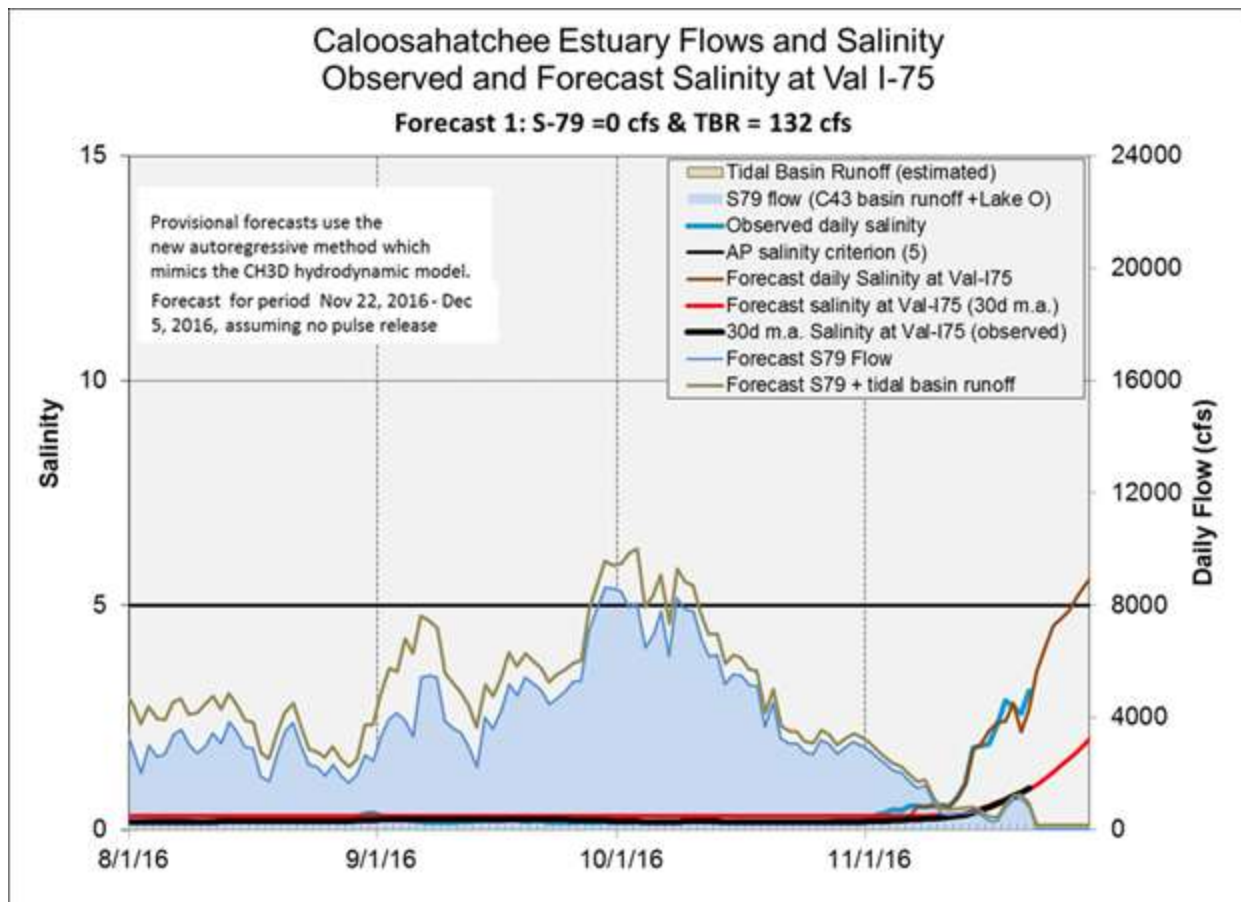


Figure 10. 14-day salinity forecast at Val I-75 assuming no releases at S-79.

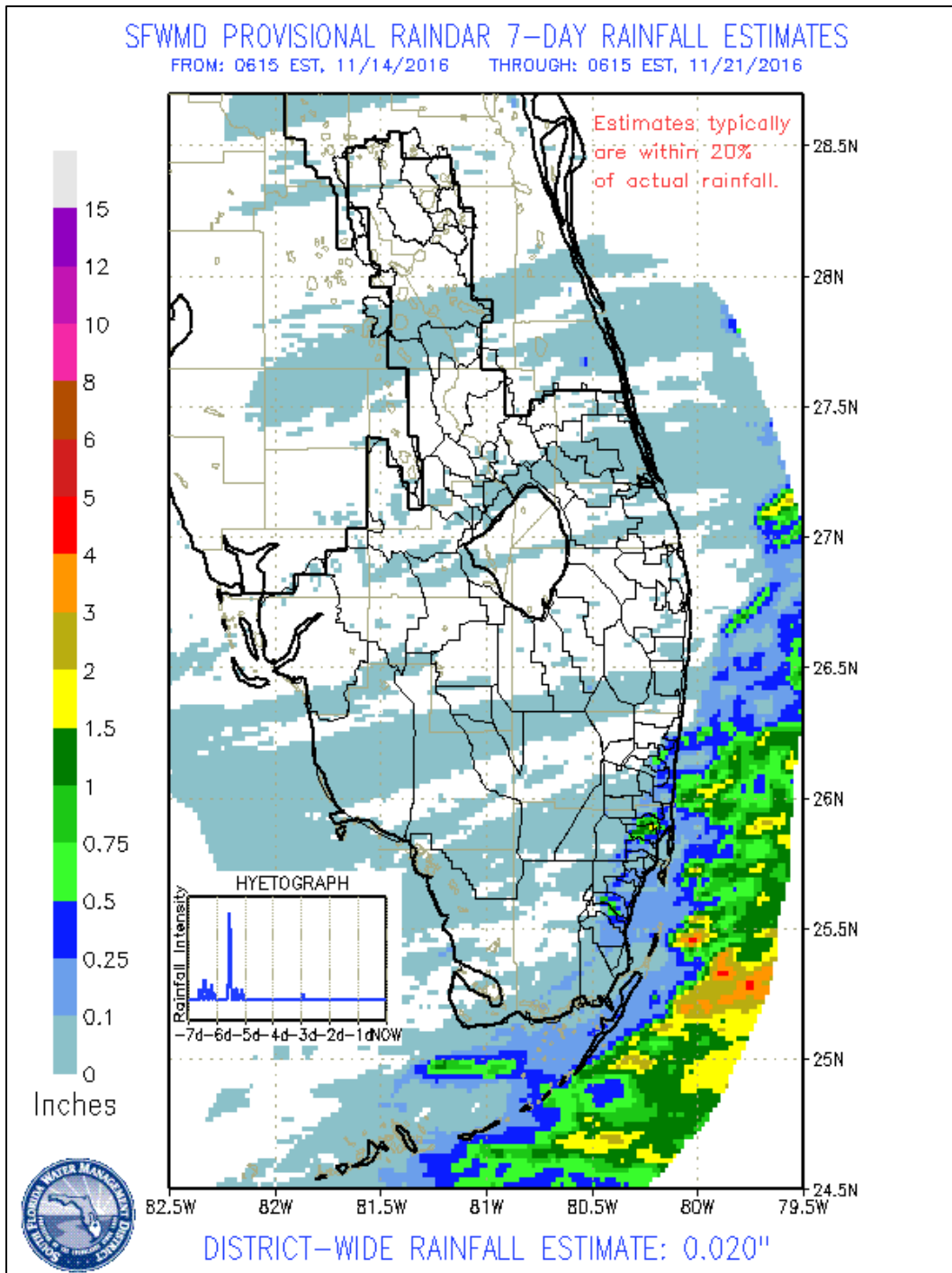
## **GREATER EVERGLADES**

Almost no rain fell last week again in the WCAs and Everglades National Park (ENP), and the highest local maximum rainfall was only 0.13 inches in ENP. Stages decreased by -0.06 feet to -0.14 feet in all basins. Pan evaporation was 0.82 inches, slightly below the pre-project average of 0.87 inches.

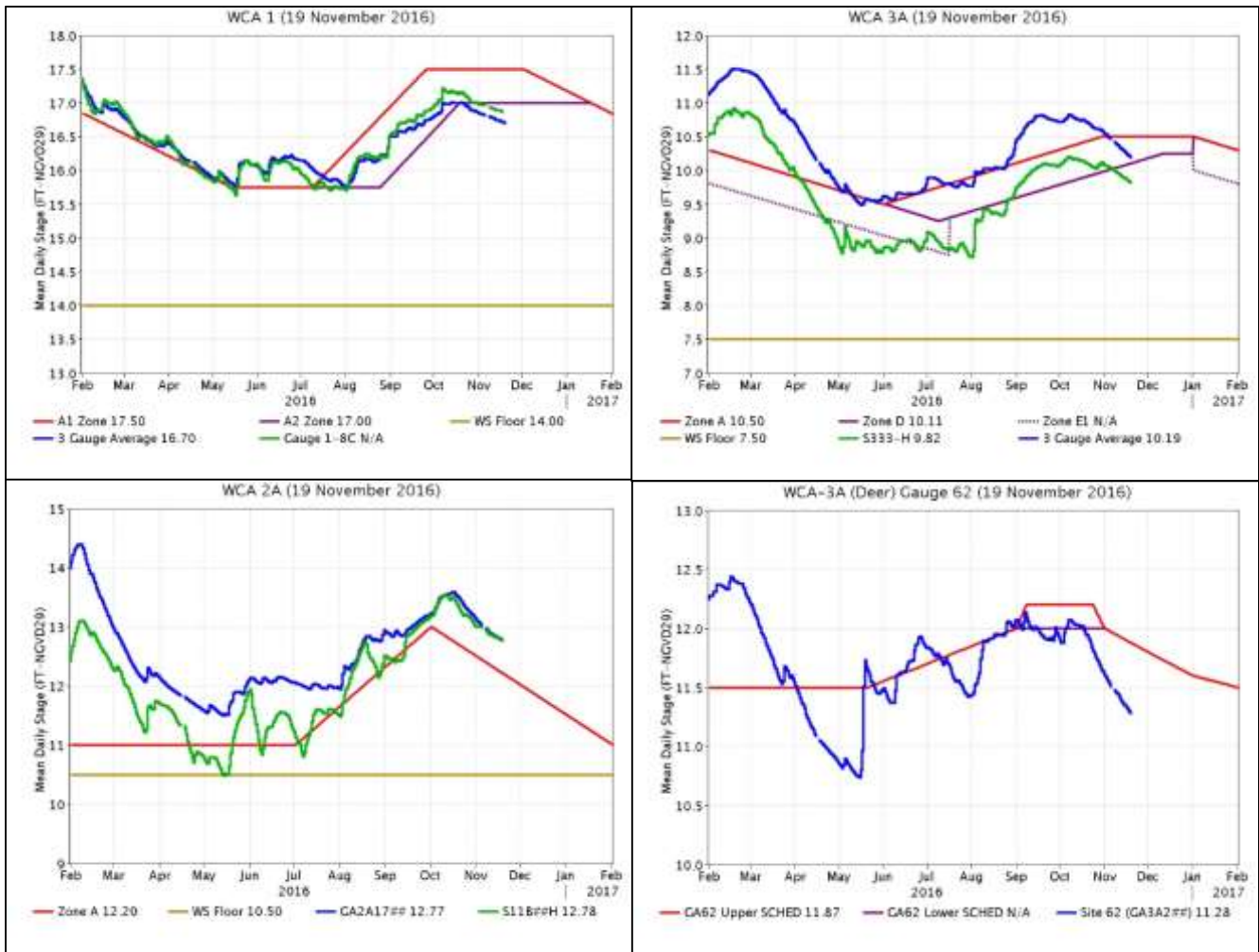
<b>Everglades Region</b>	<b>Rainfall (Inches)</b>	<b>Stage Change (feet)</b>
WCA-1	<0.01	-0.06
WCA-2A	0.01	-0.10
WCA-2B	0.00	-0.07
WCA-3A	0.01	-0.14
WCA-3B	0.04	-0.08
ENP	0.02	-0.07

# SFWM District Provisional Raindar 7-Day Rainfall Estimates

FROM: 0615 EST, 11/14/2016 THROUGH: 0615 EST, 11/21/2016

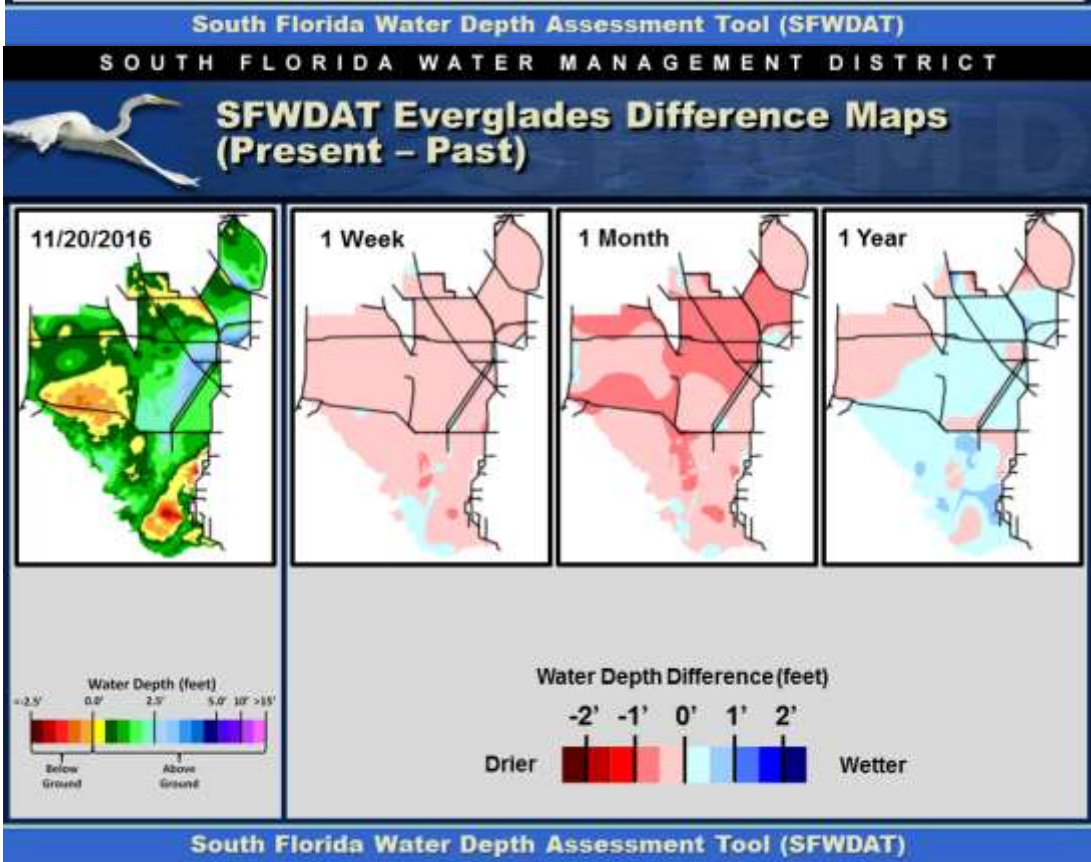
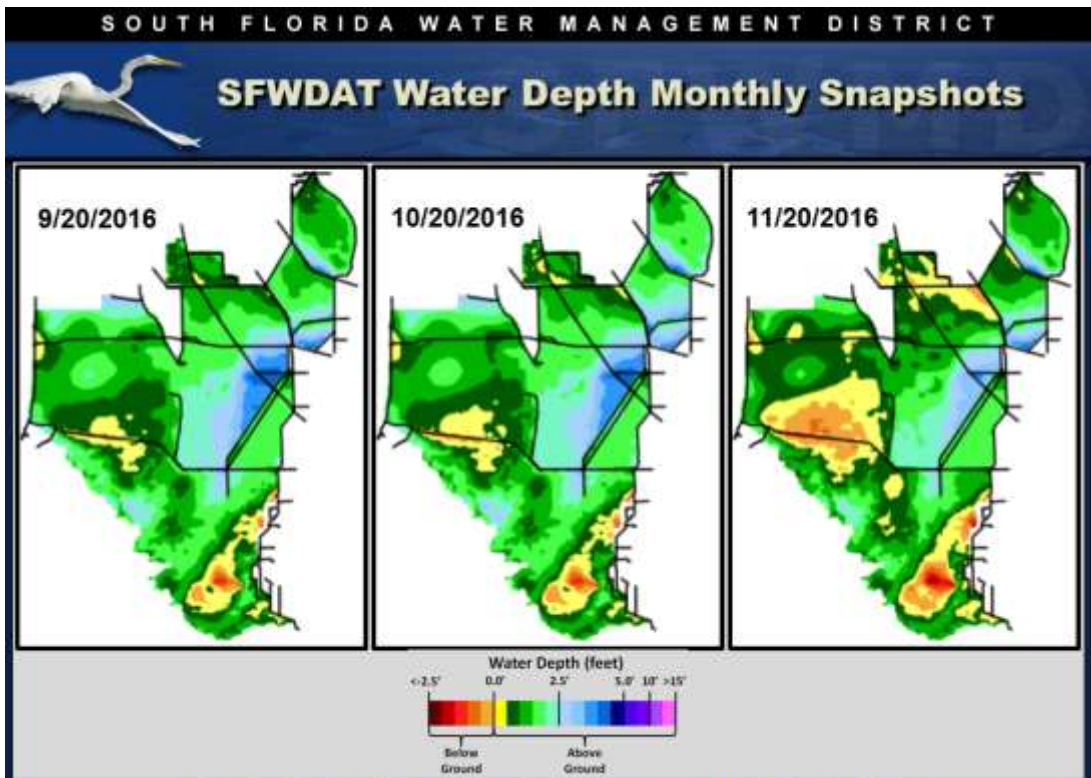


Regulation Schedules: Stages continued to decline and are below regulation for three of the four areas. The WCA-1 three-gauge average is -0.80 feet below zone A1, the northwestern WCA-3A gauge stage (gauge 62) is -0.59 feet below the upper schedule, and the WCA-3A three-gauge average stage has dropped to -0.31 feet below regulation. The WCA-2A stage remains above regulation by 0.57 feet.



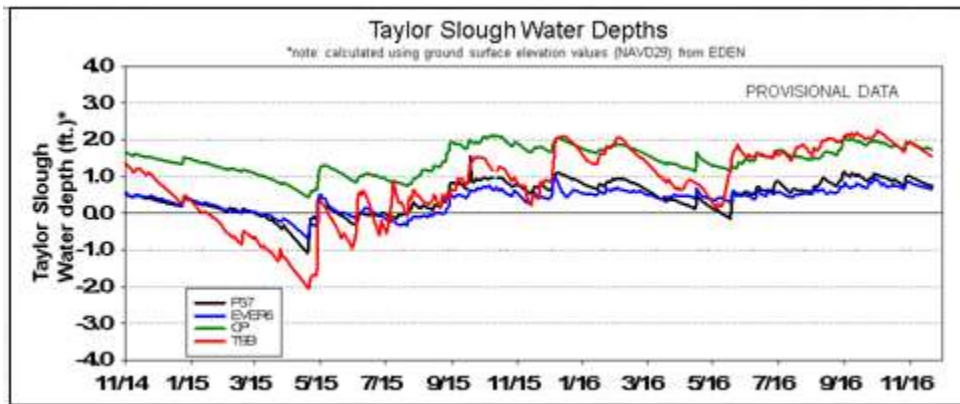
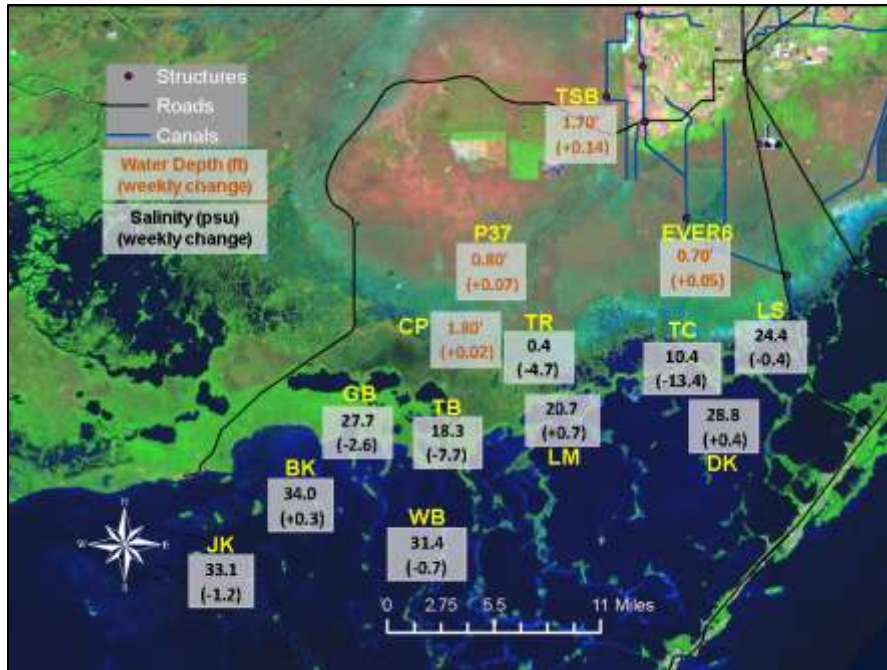
Water Depths and Changes: With recent continuing stage declines, water levels are below stages occurring one and two months ago. Water depths at monitored gauges other than in WCA-2B range from 1.14 feet to 2.51 feet.

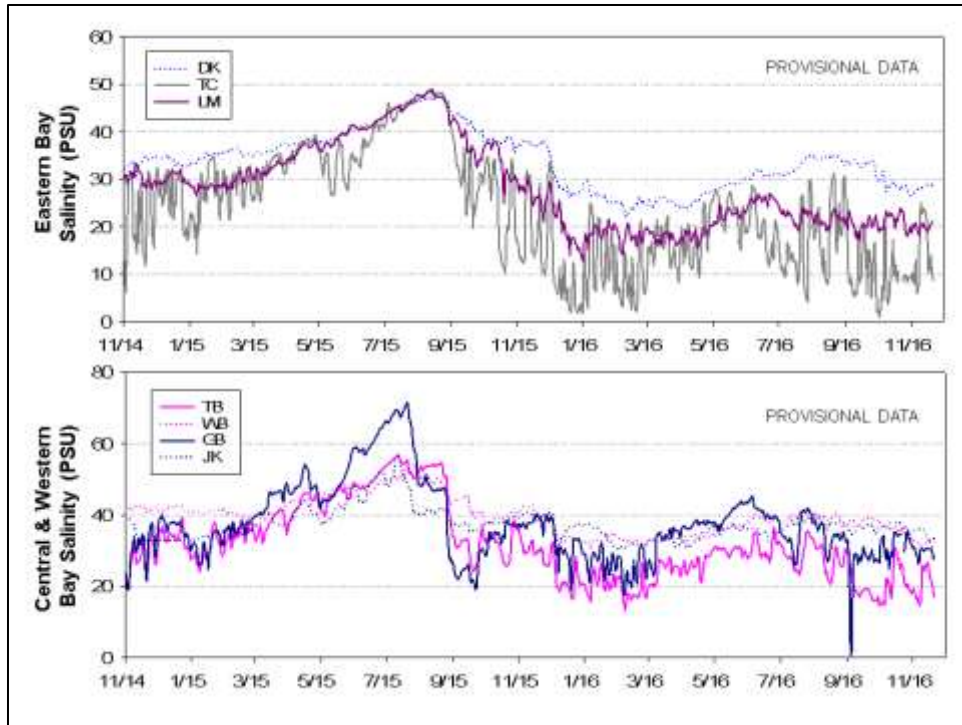
Stages decreased last week throughout the Everglades with individual gauge changes ranging from -0.06 feet to -0.18 feet. Stages are lower than a month ago, but still higher than a year ago except in WCA-1 and scattered areas elsewhere.



Taylor Slough and Florida Bay: Water levels in Taylor Slough decreased 0.01 to 0.14 feet last week with Northern Taylor Slough showing the largest change. All areas are two to eight inches above average with northern Taylor Slough remaining the furthest from average.

Weekly salinity changes in Florida Bay ranged from -13.4 psu to +0.7 psu. The negative flows of last week have ended, allowing salinities in the creeks to return to their seasonal low values. Salinities currently range from 10 psu to 34 psu and are -5 psu below average in the eastern nearshore area to 3 psu above average in the western nearshore area.

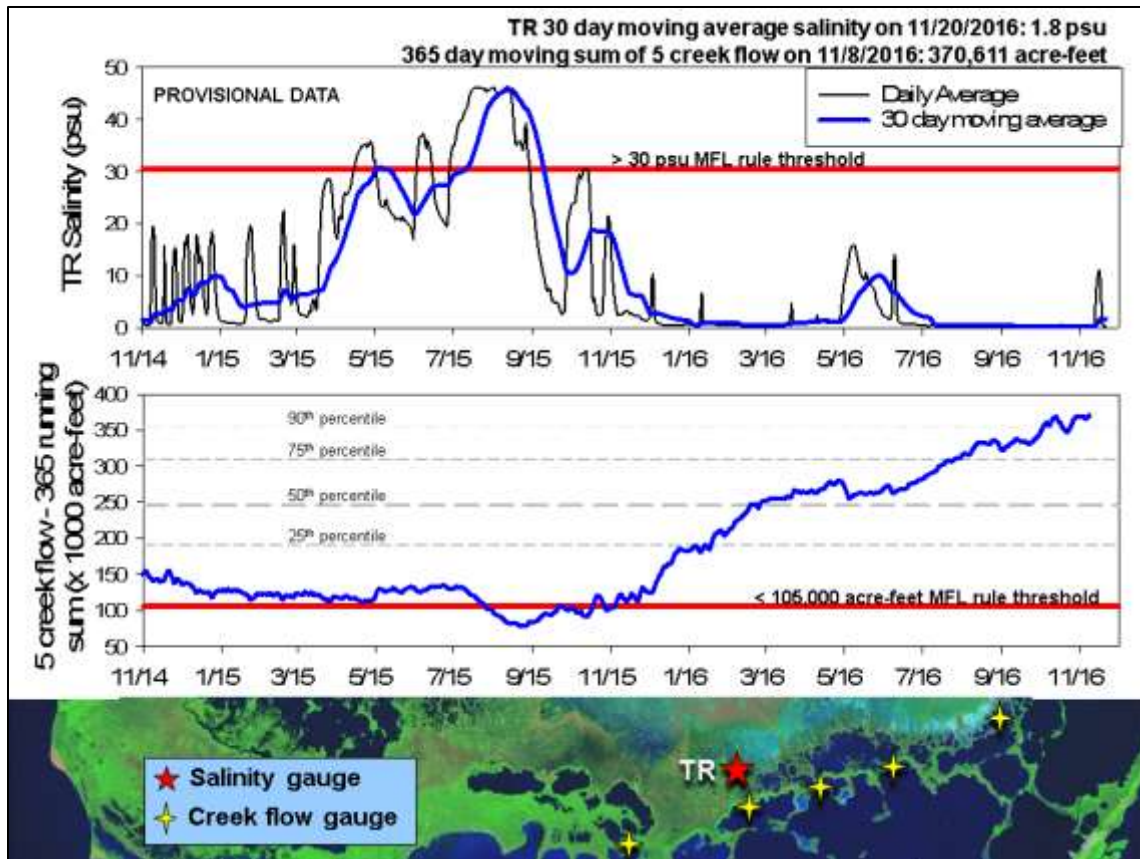




Florida Bay MFL: The salinity at MFL sentinel site TR in the mangrove zone increased to 11 psu because of negative flows (saltwater moving upstream) last week before returning to its seasonal low of 0.4; the 30-day moving average salinity increased to 1.8 psu.

One of the five creeks reported in the cumulative flow has continued to have data difficulties, so the five creek cumulative flow has not been recalculated since November 8. The 365-day running sum of the cumulative flow from the five creeks feeding Florida Bay was 370,611 acre-feet on November 8 (still above the average of 257,628 acre-feet). Creek flow is provisional data from the USGS and is highly variable.





## Water Management Recommendations

- Water levels in southern WCA-3A remain high but the depth at gauge 65 is about 2.50 feet and declining. Water depths in southern WCA-3A should stay below 2.5 feet throughout the dry season to protect tree island forests that were inundated for over 20 weeks in last year's dry season and an additional 11 weeks this summer. Over the last year, water levels have exceeded 2.5 feet for 31 weeks.
- With the beginning of the dry season, recession rates should be between -0.05 feet and -0.09 feet per week to provide good foraging for wading birds.

More specific recommendations appear in the summary table below. The red text represents new or modified information or recommendations.

**Everglades Ecological Recommendations, Nov. 22, 2016 (red is new)**

Area	Current Condition	Cause(s)	Recommendation	Reasons
<b>WCA-1</b>	Stages changed - 0.05' to -0.07'	Rainfall, ET, management	Prepare for dry season conditions and, when possible, restrict recession rates to -0.05' to 0.09' per week.	Protect habitat and wildlife and prepare for wading bird breeding season.
<b>WCA-2A</b>	Stages fell -0.10'	Rainfall, ET, management	Slow the recession rates; stages have declined by 0.85' in the last 5 weeks. Prepare for dry season conditions and, when possible, restrict recession rates to -0.05' to 0.09' per week.	Protect habitat and wildlife and prepare for wading bird breeding season.
<b>WCA-2B</b>	Stages fell -0.06' to -0.07'	Rainfall, ET, management	Prepare for dry season conditions and, when possible, restrict recession rates to -0.05' to 0.09' per week.	Protect habitat and wildlife and prepare for wading bird breeding season.
<b>WCA-3A NE</b>	Stage fell -0.18'	Rainfall, ET, management	Slow the recession rates; the average WCA-3A stages have declined by 0.65' in the last 5 weeks. Prepare for dry season conditions and, when possible, restrict recession rates to -0.05' to 0.09' per week.	Protect habitat and wildlife and prepare for wading bird breeding season.
<b>WCA-3A NW</b>	Stage fell -0.12'	Rainfall, ET, management		
<b>Central WCA-3A S</b>	Stage fell -0.14'	Rainfall, ET, management	Slow the recession rates; the average WCA-3A stages have declined by 0.65' in the last 5 weeks. Water depth at gauge 65 has fallen to 2.51'. Prepare for dry season conditions and, when possible, restrict recession rates to -0.05' to 0.09' per week. When flows are changed a gradual reduction is recommended (stepping down over several days).	Water depths at gauge 65 should remain below 2.5 feet over this upcoming wet season. Keeping depths below 2.5' at gauge 65 is important to allow tree island vegetation to recover from stress of the recent extended inundation duration. Protect habitat and wildlife and prepare for wading bird breeding season.
<b>Southern WCA-3A S</b>	Stage fell -0.12'	Rainfall, ET, management		
<b>WCA-3B</b>	Stages fell -0.06' to -0.10'	Rainfall, ET, management	Prepare for dry season conditions and, when possible, restrict recession rates to -0.05' to 0.09' per week.	Protect habitat and wildlife and prepare for wading bird breeding season.
<b>ENP-SRS</b>	Stage fell -0.07'	ET, rainfall, topography, management	Make discharges to the Park according to the ERTTP rainfall plan.	Keep peat wet to promote native habitat and maintain wetland plant and animal communities. Protect habitat and wildlife and prepare for wading bird breeding season.
<b>ENP-CSSS habitats</b>	S-12A is closed.	Rainfall, ET, management	Follow rainfall plan for releases. Decreases in flow should be gradual through S333 and the S-12 structures when they occur (stepping down over several days). Follow guidance in C-111 Western Spreader Canal Project operations manual.	Future operations need to continue to provide appropriate hydrological and habitat conditions for breeding in subpopulation A.
<b>Taylor Slough</b>	2 to 8 inches above average	Rain, ET, inflows	Move water southward as possible	Provide freshwater buffer for ecosystems and maintain low salinity conditions downstream
<b>FB- Salinity</b>	-5 psu below to 3 psu above average	Rain, ET, inflows, wind	Move water southward as possible	Maintain low salinity conditions and prevent early salinity increases.