

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:** December 13, 2016

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

### Summary

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

Some spotty showers east today. Drier air is moving over the area so just some spotty light showers are expected to pop up east this afternoon and then no shower activity is expected Wednesday afternoon. The next cold front is forecast to move through the District Thursday with limited shower activity associated with it. Widely scattered light showers will move into northern areas predawn Thursday and remain light as they shift southward through the District during the day. Northeast to southeast winds will bring some spotty showers east on Friday and Saturday.

#### **Kissimmee**

On Sunday, stage in East Lake Toho, Lake Toho and Kissimmee-Cypress-Hatchineha was 0.2, 0.2, and 1.3 feet below schedule, respectively. Over the past week, discharge at S65, S65A, and S65E averaged 821, 699, and 773 cfs, respectively. Tuesday morning discharges were ~808 cfs, ~707 cfs, ~901 cfs, and ~847 cfs, respectively at S65, S65A, S65C, and S65E. Dissolved oxygen in the Kissimmee River averaged 7.06 mg/L over the past week. Kissimmee River mean floodplain depth on Sunday was 0.14 feet. No new recommendations this week.

#### **Lake Okeechobee**

Lake stage fell an additional 0.08 feet over the past week equating to a monthly recession rate of 0.32 feet, which is slightly lower than the preferred monthly rate of 0.50 feet per month but still within the range conducive to good wading bird conditions. The first survey of the 2017 wading bird season, conducted on December 7, located 2,439 birds in 13 flocks.

#### **Estuaries**

Total discharge to the St. Lucie estuary average 239 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 slightly 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 832 cfs over the past week with 486 cfs (58%) coming from the Lake. Salinity conditions are estimated to be in the good range for tape grass in the upper estuary. Salinity conditions are fair for adult oysters at the Cape Coral Bridge, Sanibel Causeway, and in the good range at Shellpoint. The 30-day moving average salinity at the I-75 Bridge is forecast to reach 4.9 in the next two weeks if no flow comes through the S-79 structure.

#### **Stormwater Treatment Areas**

Over the past week, the STAs/FEBs received approximately 11,700 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 122,200 acre-feet. Most STA cells are at or near 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

Rainfall was low, so stage changes were mixed. Recession rates ranged from -0.06 feet to 0.01 feet last week. These rates are much lower than they were up until several weeks ago when they were too rapid. Water levels in southern WCA-3A are still high and need to be reduced to prevent further inundation of tree islands. The 30-day moving average salinity at the Florida Bay Minimum Flows and Levels (MFL) site remains at 1.8 psu. The creek flow gauge has been repaired and the USGS is recalculating the cumulative five-creek inflow into Florida Bay since November 8, when it was 368,727 acre-feet.

## Supporting Information

### KISSIMMEE BASIN

#### **Kissimmee Basin Rainfall**

The Upper Kissimmee Basin received 0.51 inches of rainfall in the past week and the Lower Basin received 0.37 inches (SFWMD Daily Rainfall Report 12/12/2016).

#### **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: 12/13/2016**

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)	Sunday Departure (feet)						
							12/11/16	12/4/16	11/27/16	11/20/16	11/13/16	11/6/16	10/30/16
Lakes Hart and Mary Jane	S62	26	LKMJ	61.0	R	61.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Lakes Myrtle, Preston, and Joel	S57	13	S57	61.9	R	61.9	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Alligator Chain	S60	0	ALLI	63.4	R	64.0	-0.6	-0.6	-0.6	-0.5	-0.5	-0.5	-0.4
Lake Gentry	S63	0	LKGT	61.4	R	61.5	-0.1	-0.1	-0.1	-0.1	0.0	0.0	0.0
East Lake Toho	S59	0	TOHOE	57.8	R	58.0	-0.2	-0.2	-0.2	-0.1	-0.1	-0.1	0.0
Lake Toho	S61	0	TOHOW, S61	54.8	R	55.0	-0.2	-0.3	-0.2	-0.2	-0.2	-0.1	-0.1
Lakes Kissimmee, Cypress, and Hatchineha	S65	821	LKISSP, KUB011, LKISSB	51.2	R	52.5	-1.3	-1.1	-0.7	-0.6	-0.4	-0.2	0.1

\* 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: 12/13/2016

Metric	Location	Sunday's 1-day average	Weekly Average**									
			12/11/16	12/4/16	11/27/16	11/20/16	11/13/16	11/6/16	10/30/16	10/23/16	10/16/16	10/9/16
Discharge (cfs)	S-65	807	821	822	789	777	766	750	706	1019	1131	1718
Discharge (cfs)	S-65A	689	699	698	693	691	695	697	708	1147	1570	2557
Discharge (cfs)	S-65C	902	909	895	880	898	924	982	1298	2164	3124	3250
Headwater stage (feet NGVD)		32.7	32.8	32.7	32.7	32.7	32.7	32.7	32.8	33.1	33.5	33.7
Discharge (cfs)	S-65D****	1732	1700	1610	1631	1700	1752	1833	2155	2922	3859	4185
Discharge (cfs)	S-65E	795	773	781	800	811	849	914	1269	2230	3553	3841
DO concentration (mg/L)***	Phase I river channel	7.31	7.06	7.46	7.28	6.65	6.78	6.63	6.15	4.84	3.38	2.83
Mean depth (feet)*	Phase I floodplain	0.14	0.15	0.15	0.16	0.19	0.22	0.27	0.39	0.79	1.25	1.55

\* 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

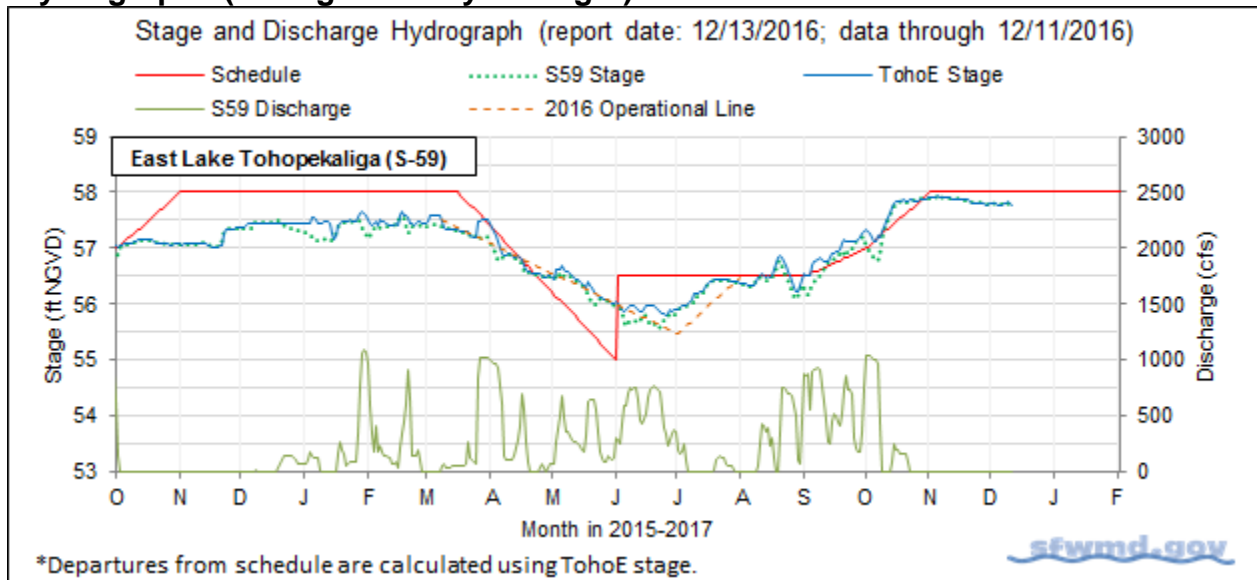
DATA ARE PROVISIONAL

## Water Management Recommendations

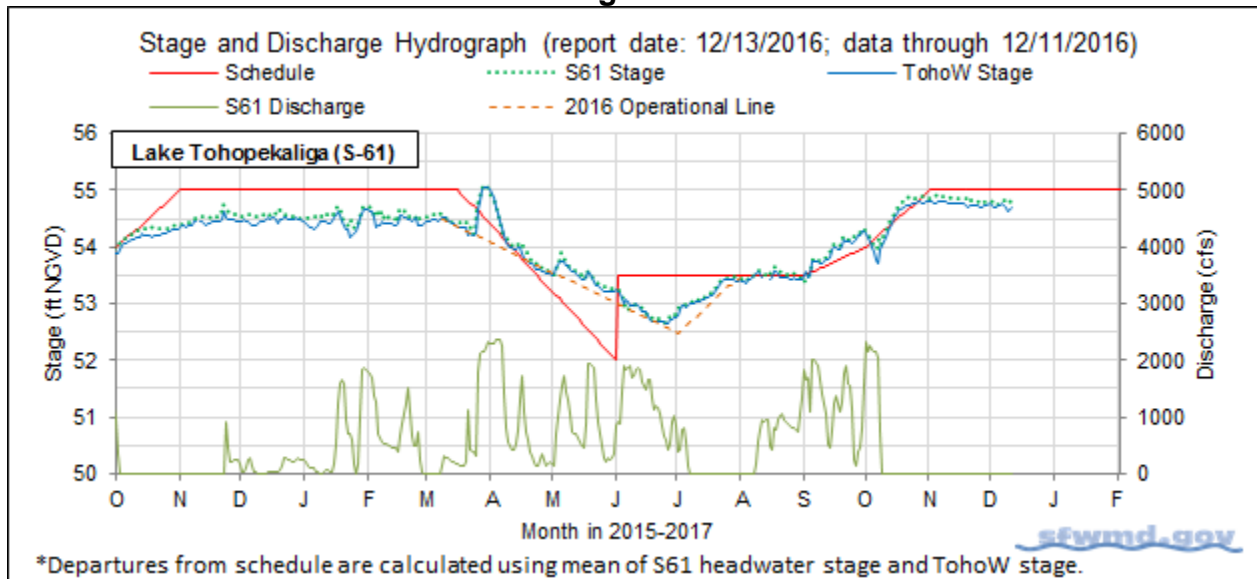
### Kissimmee Basin Adaptive Recommendations and Operational Actions

Date	Recommendation	Purpose	Outcome	Source
12/13/2016	No new recommendations.			
12/6/2016	No new recommendations.			
11/29/2016	No new recommendations.			
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	SFWMDC 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.			

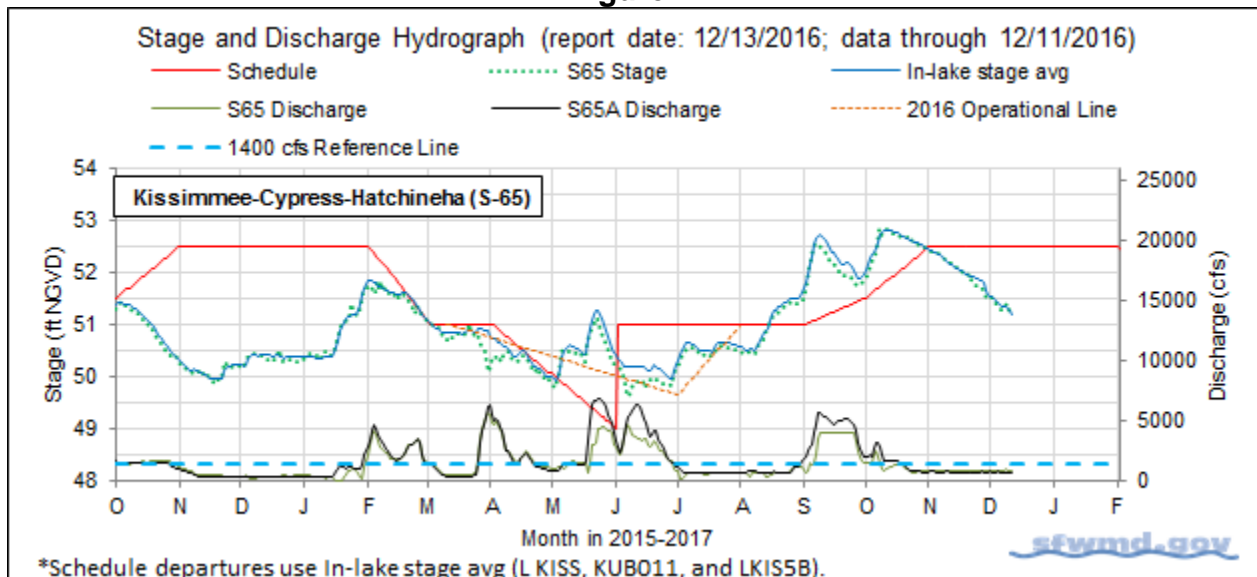
# KCOL Hydrographs (through Sunday midnight)



**Figure 1.**



**Figure 2.**



**Figure 3.**

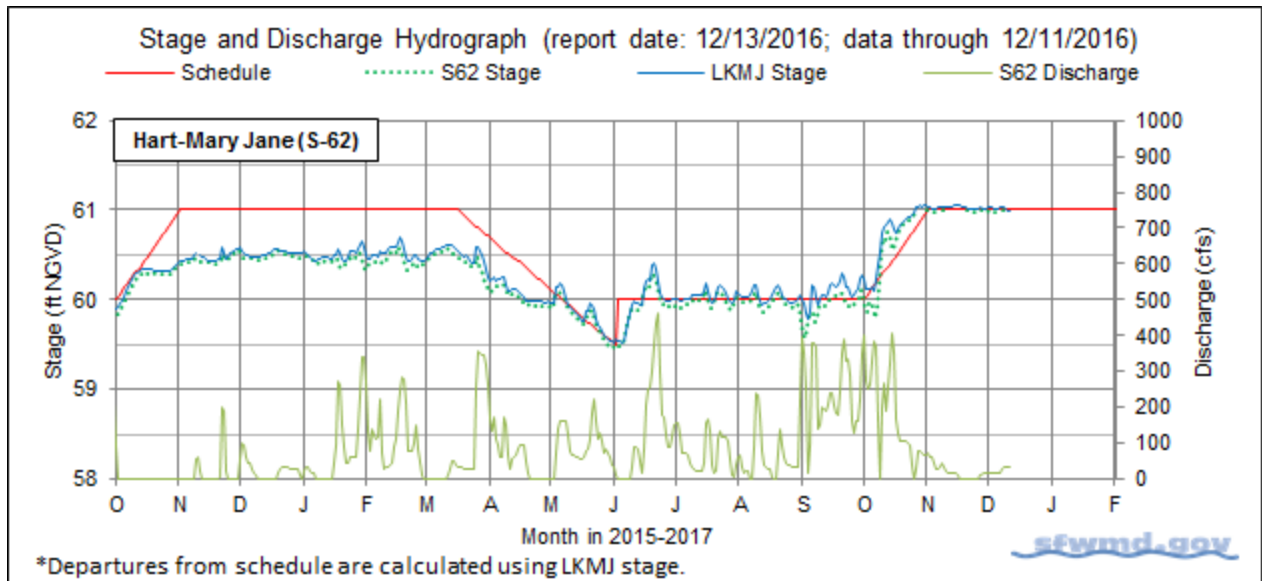


Figure 4.

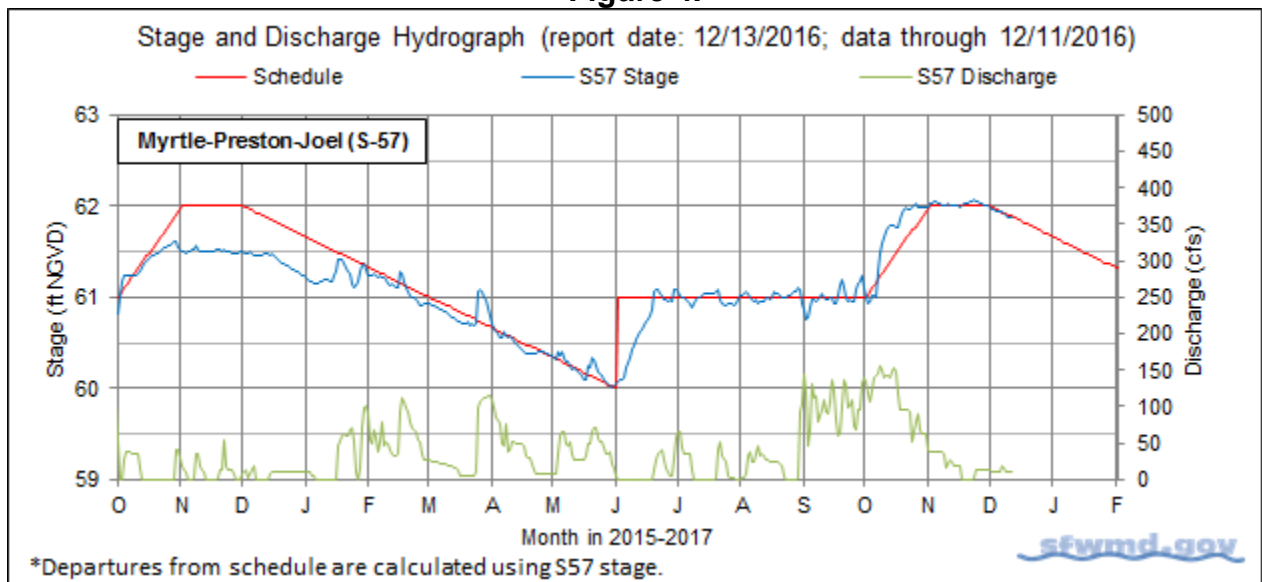


Figure 5.

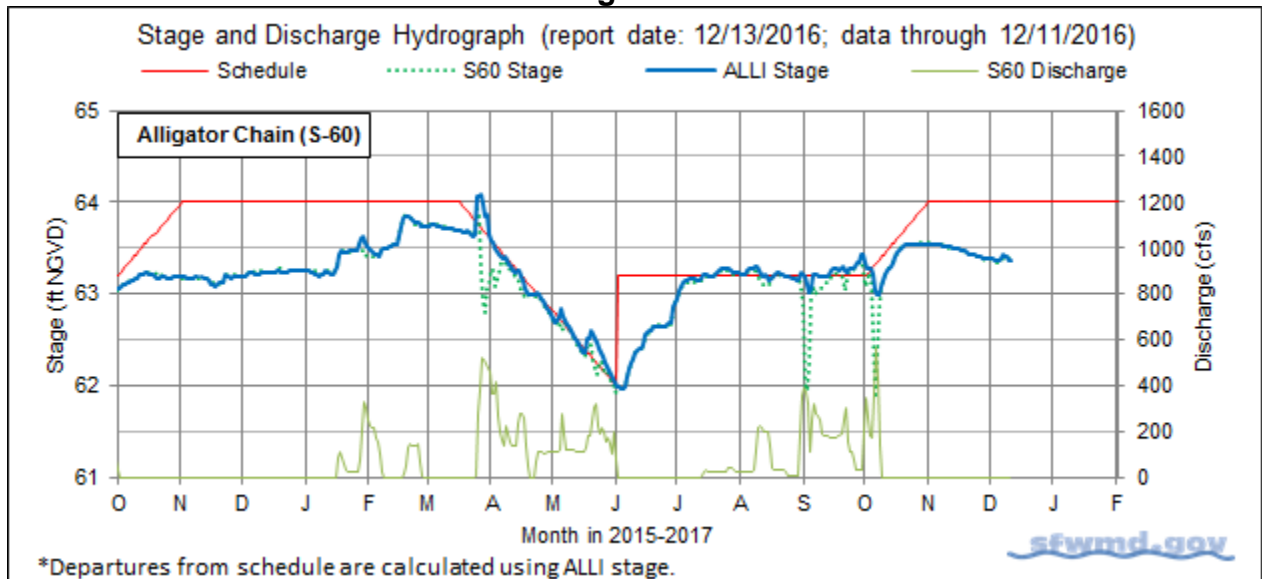


Figure 6.

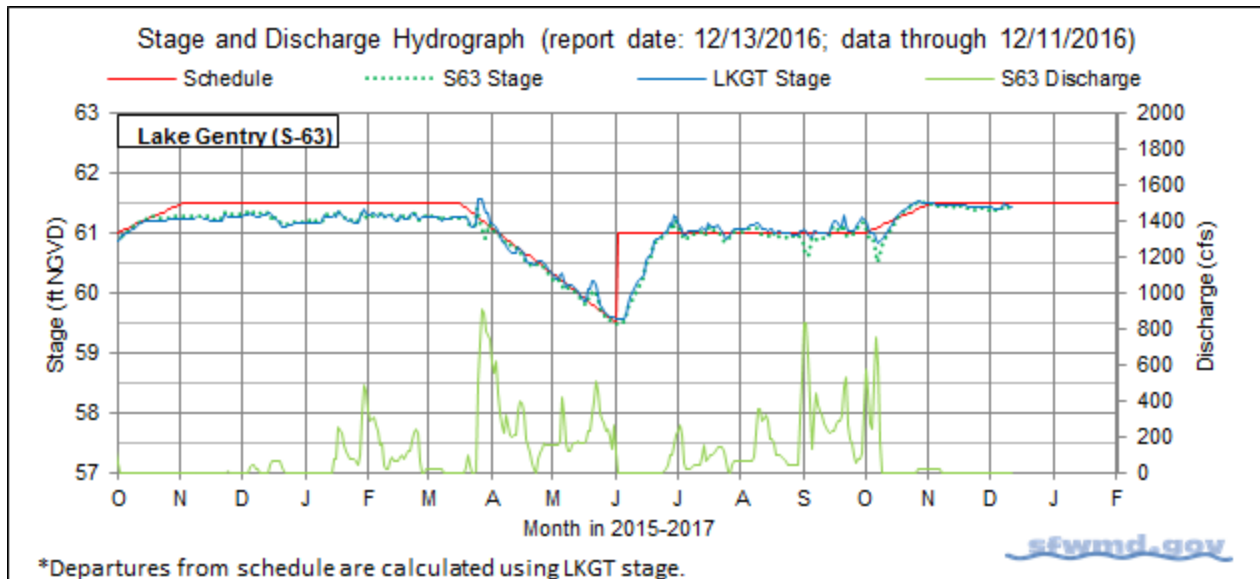


Figure 7.

**SOUTH FLORIDA WATER MANAGEMENT DISTRICT**

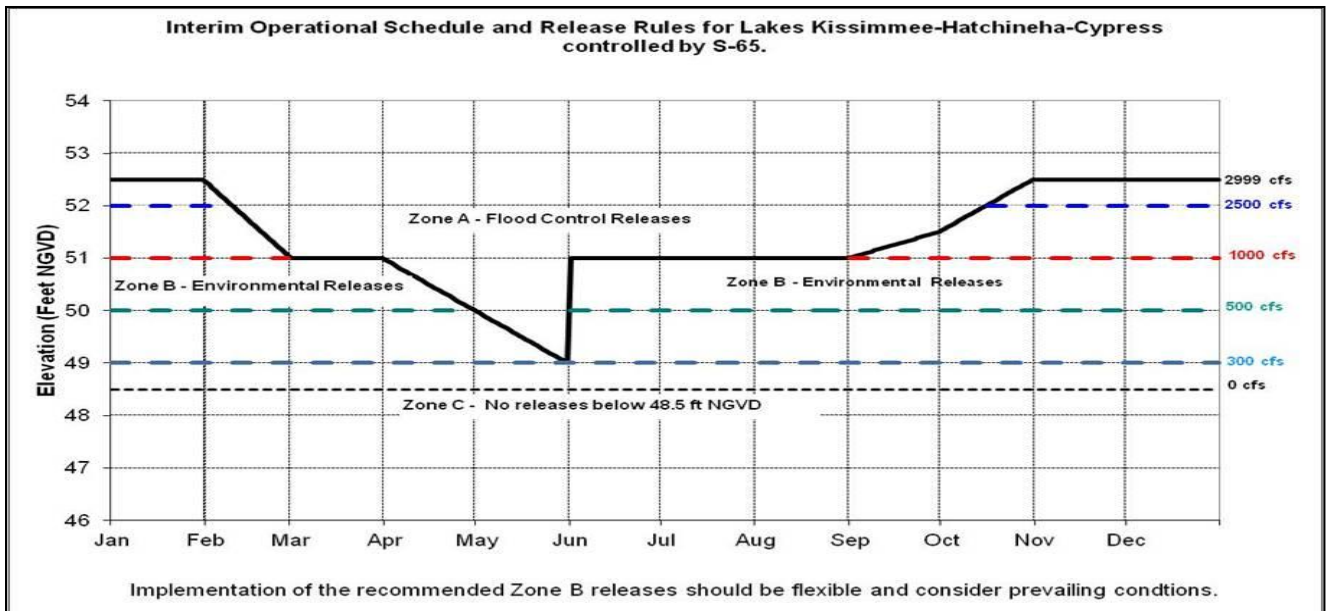
**Limits on Rate of Discharge Change at S65/S65A During Dry Season 2016-2017**

<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

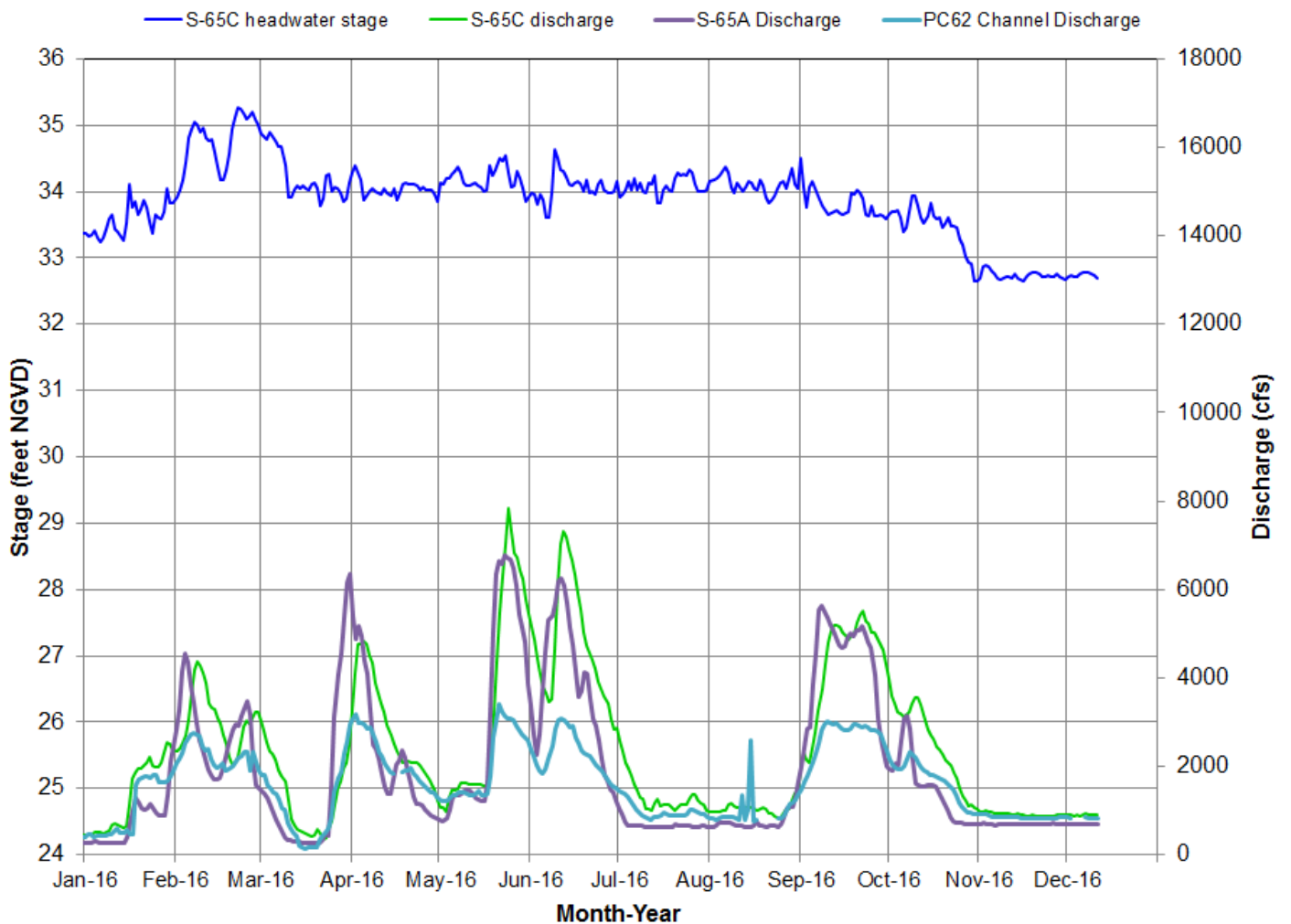
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Figure 8a. Limits on rate of discharge change at S65/S65A for the 2016-2017 Dry Season.



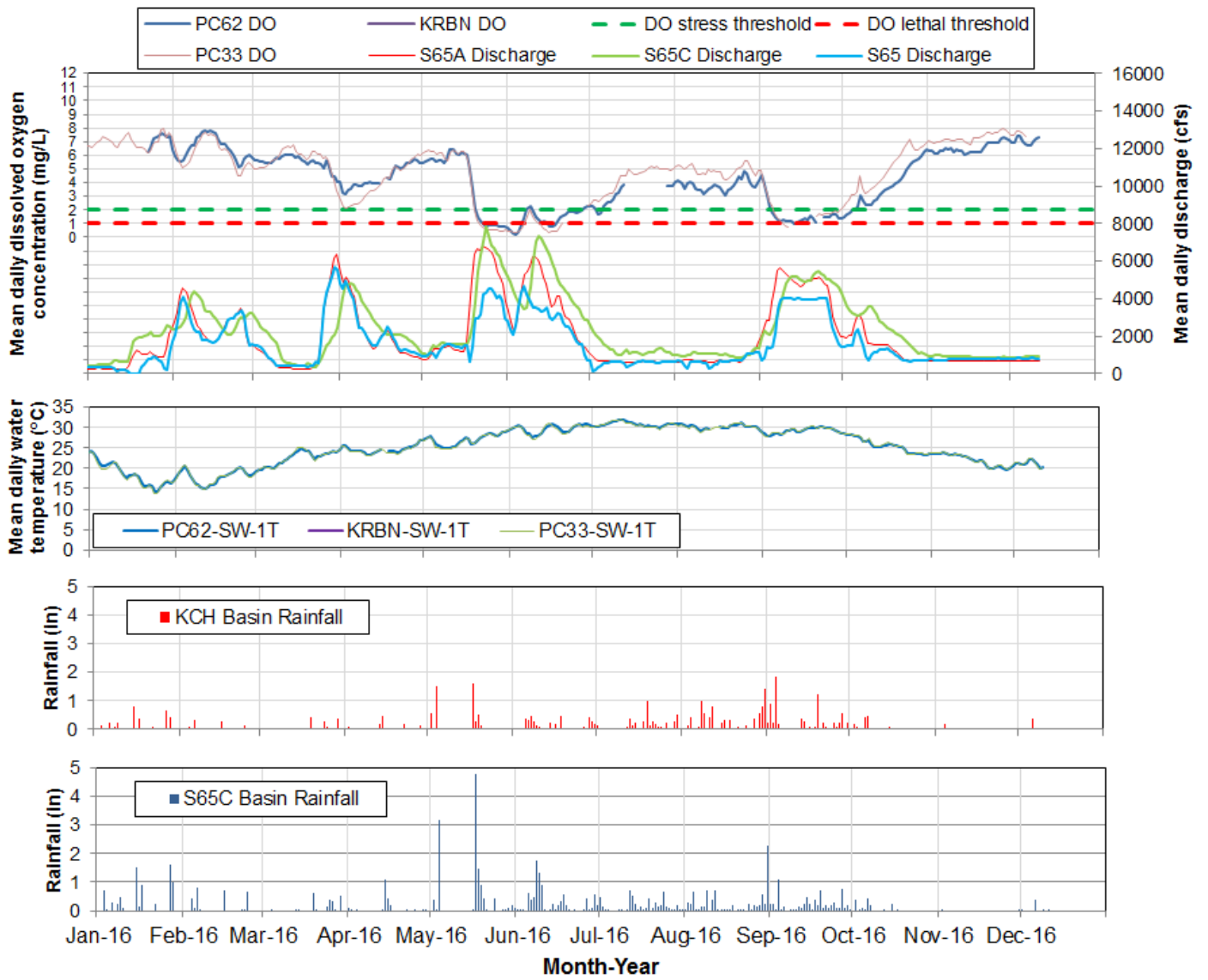


**Figure 8b.** Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years or in Wet Season 2015.

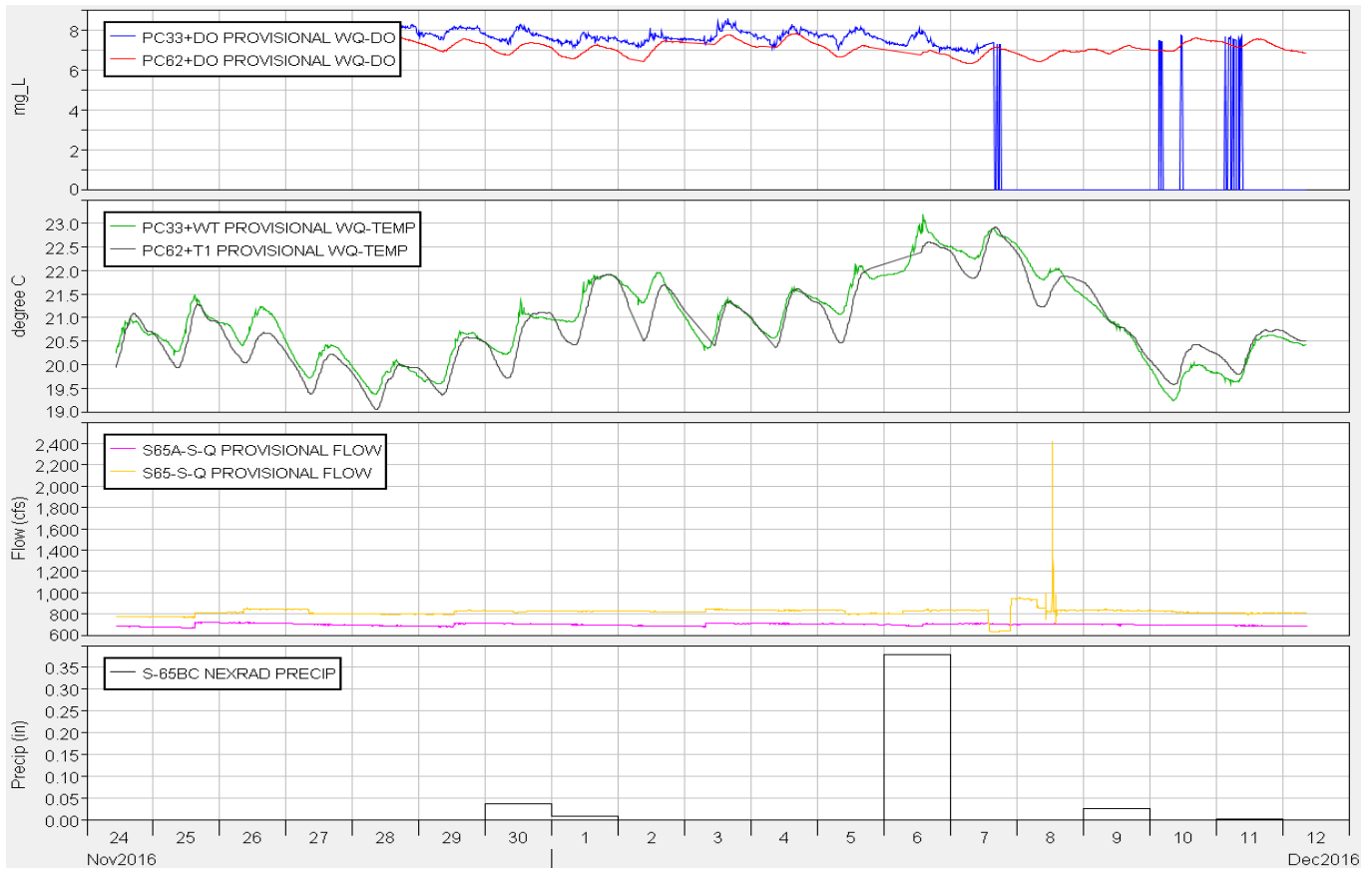


**Figure 9.** S-65C headwater stage in relation to discharge at S-65C, S-65A, and PC62.

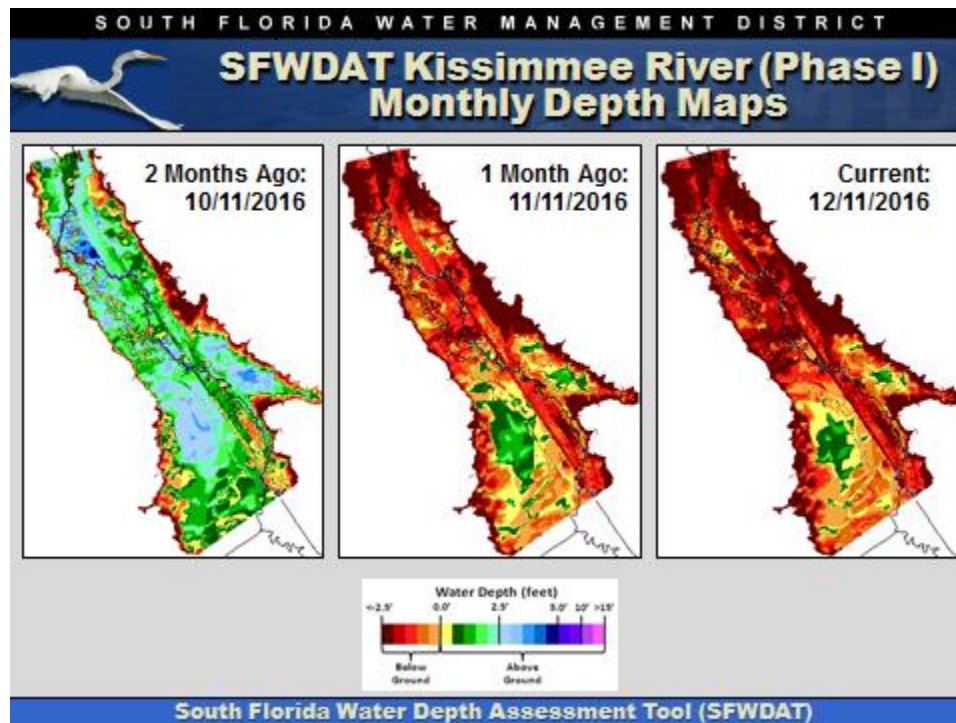




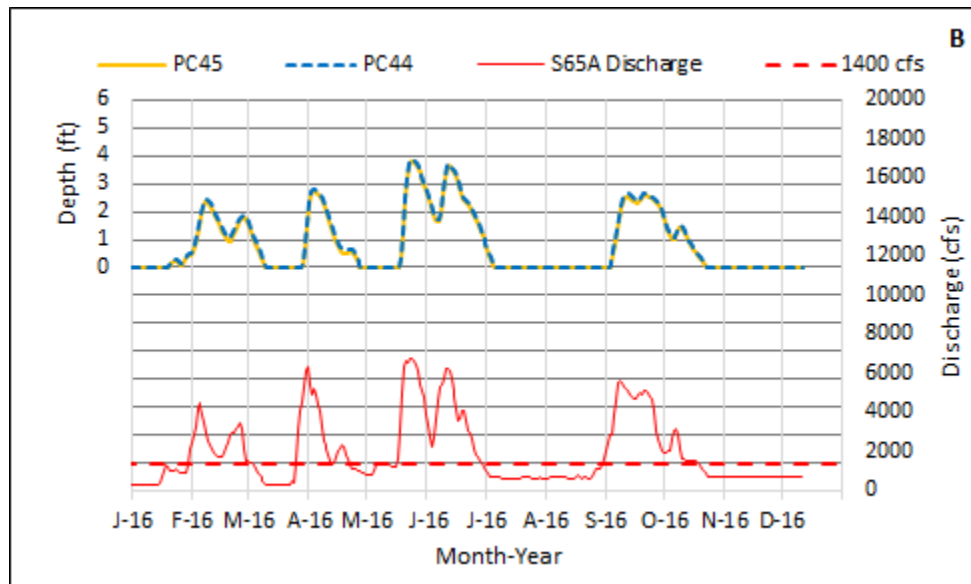
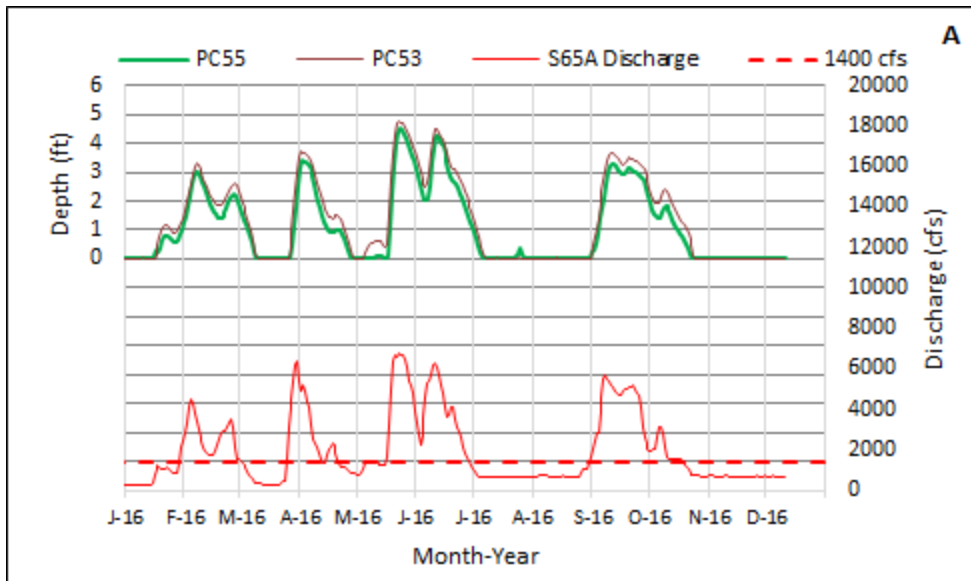
**Figure 10.** Mean daily Dissolved Oxygen, discharge, temperature and rainfall in the Phase I river channel.



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

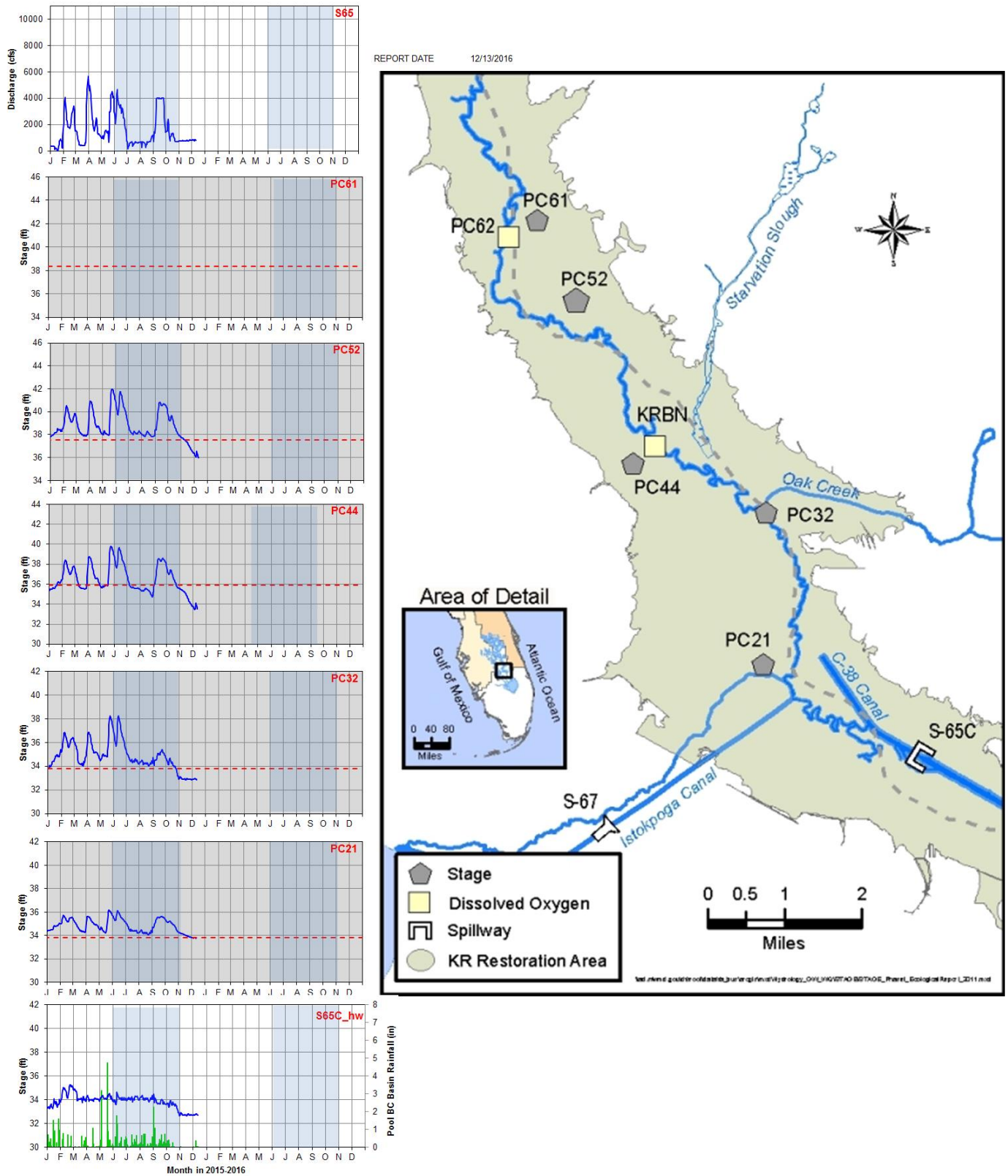


**Figure 12.** Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to Jan. 16, 2012.



**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.



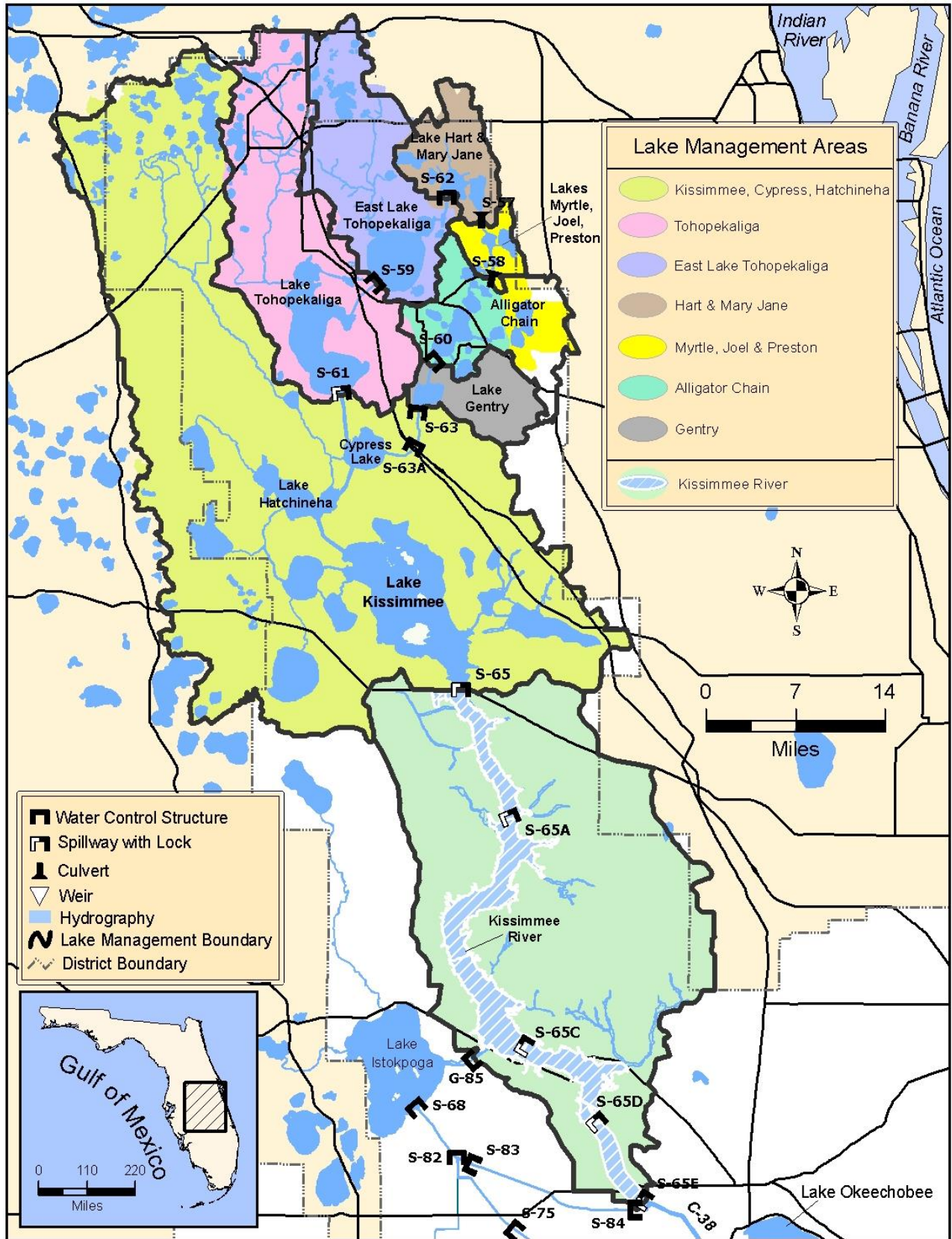


Figure 14. The Kissimmee Basin

## LAKE OKEECHOBEE

According to the USACE web site, Lake Okeechobee stage is at 14.61 feet NGVD for the period ending at midnight on December 11, 2016. This value is based on the use of three interior Lake stations (L005, L006, and LZ40) and four perimeter stations (S352, S4, S308 and S133). No data are available for the interior station L001. Lake stage decreased by 0.08 feet over the past week and is 0.58 feet lower than it was a month ago and 0.15 feet lower than it was a year ago (Figure 1). The Lake is currently in the Low sub-band (Figure 2). According to RAINDAR, 0.533 inches of rain fell directly over the Lake during the past seven days (Figure 3). Similar or greater amounts of rain fell along the lower east coast while lesser amounts fell in the remainder of the watershed.

Based on USACE reported values, current Lake inflow is approximately 799 cfs as detailed below. No data are available for C5 or S135 PUMPS.

<b>Structure</b>	<b>Flow cfs</b>
S65E	795
S154	0
S84 & 84X	0
S71	0
S72	0
C5 (Nicodemus slough dispersed storage)	NA
S191	0
S133 PUMPS	0
S127 PUMPS	0
S129 PUMPS	0
S131 PUMPS	0
S135 PUMPS	NA
Fisheating Creek	4
S2 Pumps	0
S3 Pumps	0
S4 Pumps	0

Current Lake outflow is approximately 2,640 cfs with 1,063 cfs exiting at S77, 145 cfs exiting at S308 and 300 cfs exiting the L8 canal through Culvert 10A. Approximately 1,132 cfs is being directed south through S351, S352 and S354 mostly for water supply to the EAA. Corrected evapotranspiration value based on the L006 weather platform solar radiation data for this past week was 523 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.

Based on the Lake Okeechobee wading bird habitat suitability index, there are currently approximately 55,177 acres of suitable foraging habitat for long-legged birds and 22,423 acres for long and short legged birds on the Lake (Figure 5). A wading bird foraging survey conducted on December 7 located 2,439 birds in 13 flocks in the northwestern, western and southern littoral marsh (Figure 6). These numbers are similar to the December 2014 and 2015 numbers.

No new MODIS imagery is available due to extensive cloud cover.



## Water Management Recommendations

Lake stage continues to fall and is within the preferred stage envelope (12.50 to 15.50 feet NGVD). The current weekly recession rate of 0.08 feet equates to a monthly recession rate of 0.32 feet, which is slightly lower than the recommended 0.50 feet per month but still within the acceptable range. A too rapid decrease in Lake levels may jeopardize the upcoming wading bird season by drying out foraging locations too early in the winter.

From an ecological perspective, high Lake levels over the past spring and summer resulted in a loss of submerged aquatic vegetation (SAV) and increased cyanobacterial blooms and associated toxins. Near optimal Lake stages will be necessary this coming spring and summer to provide conditions conducive to the reestablishment of the SAV acreage lost this year due to high Lake stages.

The goal should be to lower Lake levels at a rate of no more than 0.50 feet per month keeping levels within the preferred stage envelope and reaching a Lake stage of approximately 12.50 feet NGVD by the end of the dry season.

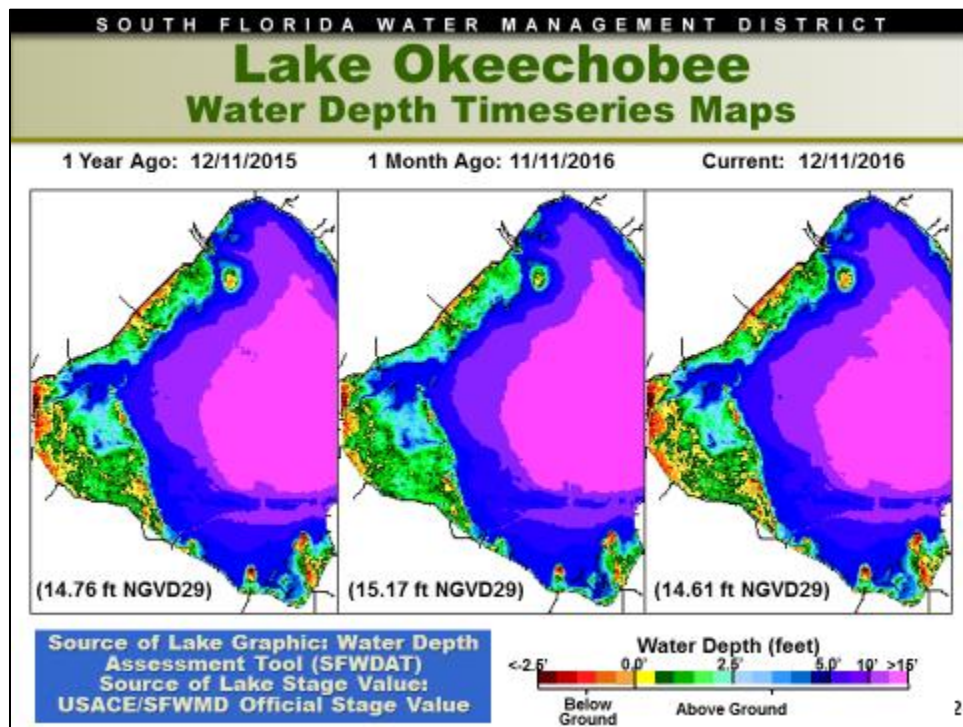


Figure 1

# Weekly Stage Hydrograph

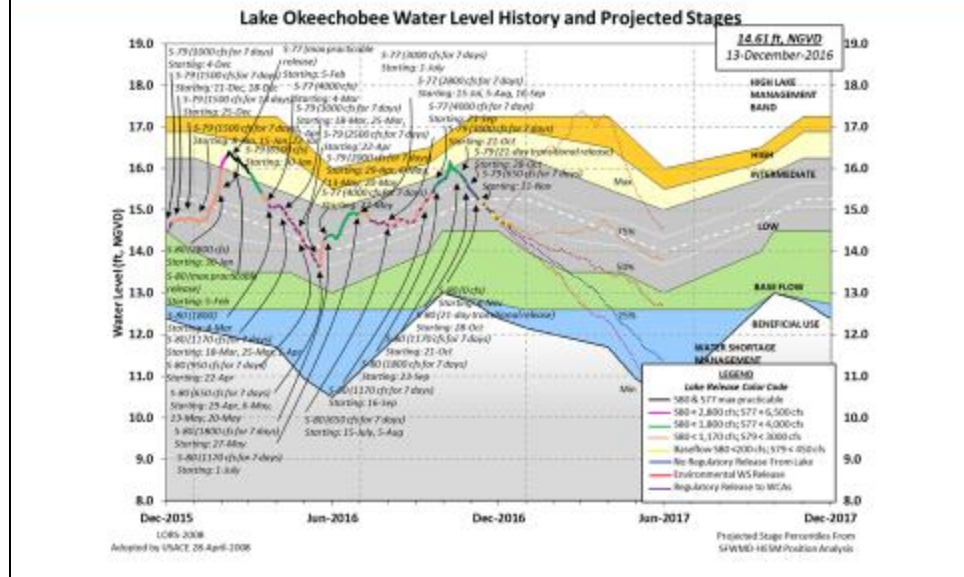
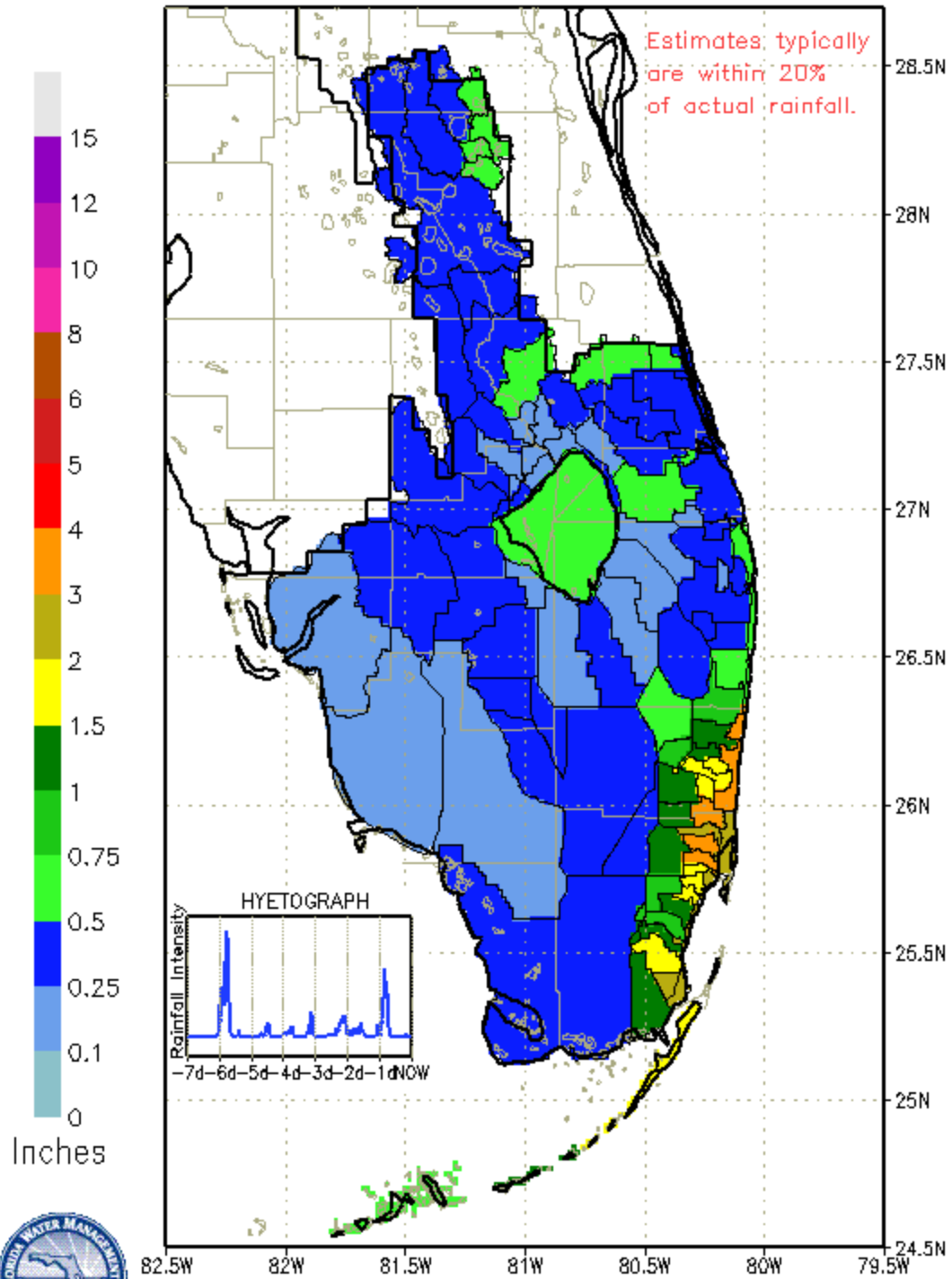


Figure 2

# SFWMD PROVISIONAL RAINDAR 7-DAY BASIN RAINFALL ESTIMATES

FROM: 1215 EST, 12/05/2016 THROUGH: 1215 EST, 12/12/2016



DISTRICT-WIDE RAINFALL ESTIMATE: 0.476"



Figure 3

INFLOWS	Average Daily Flow Past Week cfs	Feet of Change Past Week
S65E	770	0.026
S71 & 72	10	0.000
S84 & 84X	24	0.001
Fisheating Creek	42	0.001
Rainfall	N.A.	0.044
OUTFLOWS	Average Daily Flow Past Week cfs	Feet of Change Past Week
S77	899	0.030
S308	21	0.001
S351	760	0.025
S352	383	0.013
S354	611	0.020
L8	273	0.009
ET	523	0.018

Figure 4

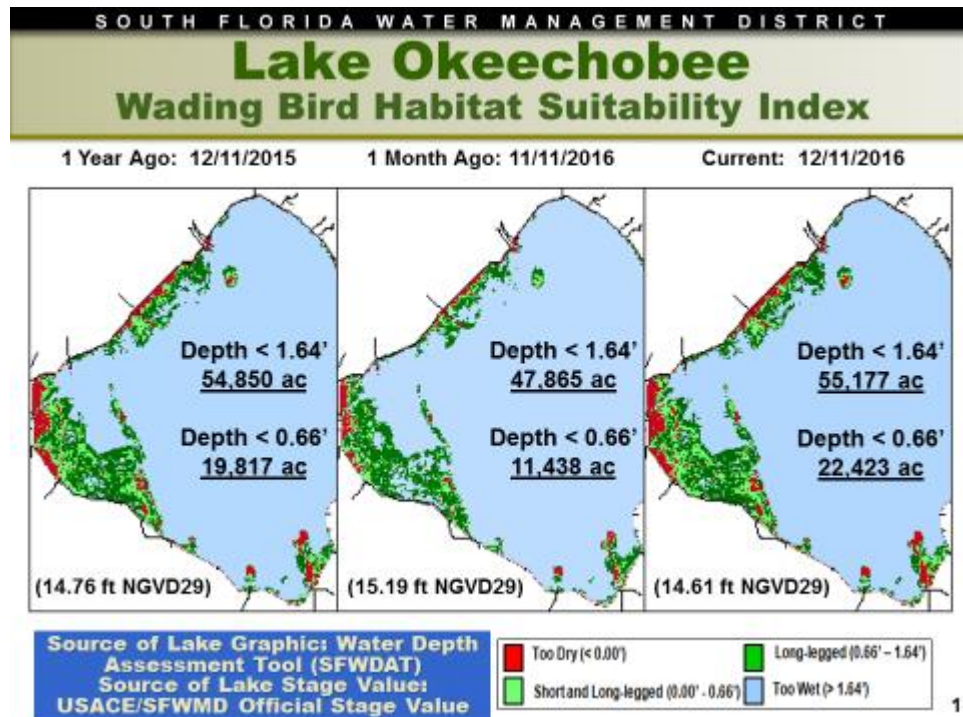


Figure 5

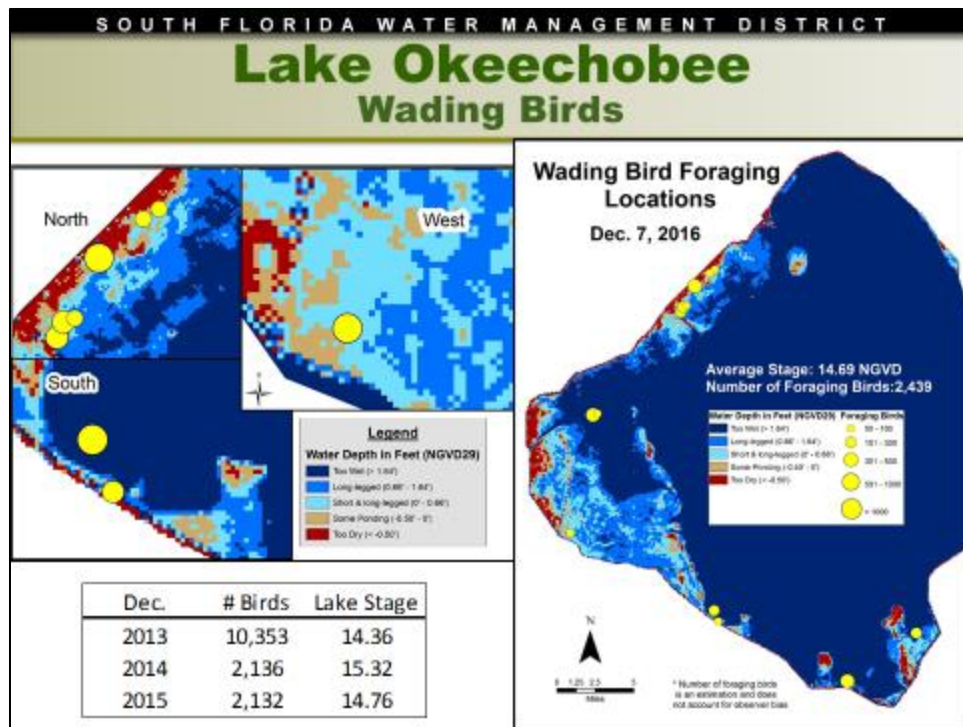


Figure 6

### Lake Istokpoga

The Lake Istokpoga regulation schedule is at winter pool stage of 39.50 feet NGVD. Lake stage is 39.45 feet NGVD and is currently 0.05 feet below regulation stage (Figure 7). Average flows into the Lake from Arbuckle and Josephine creeks were 141 cfs and 28 cfs respectively, an increase in total flows from the previous week. Average discharge from S68 and S68X this past week was 58 cfs, a decrease from the previous four weeks. According to RAINДАР, 0.358 inches of rain fell in the Lake Istokpoga watershed during the past seven days.

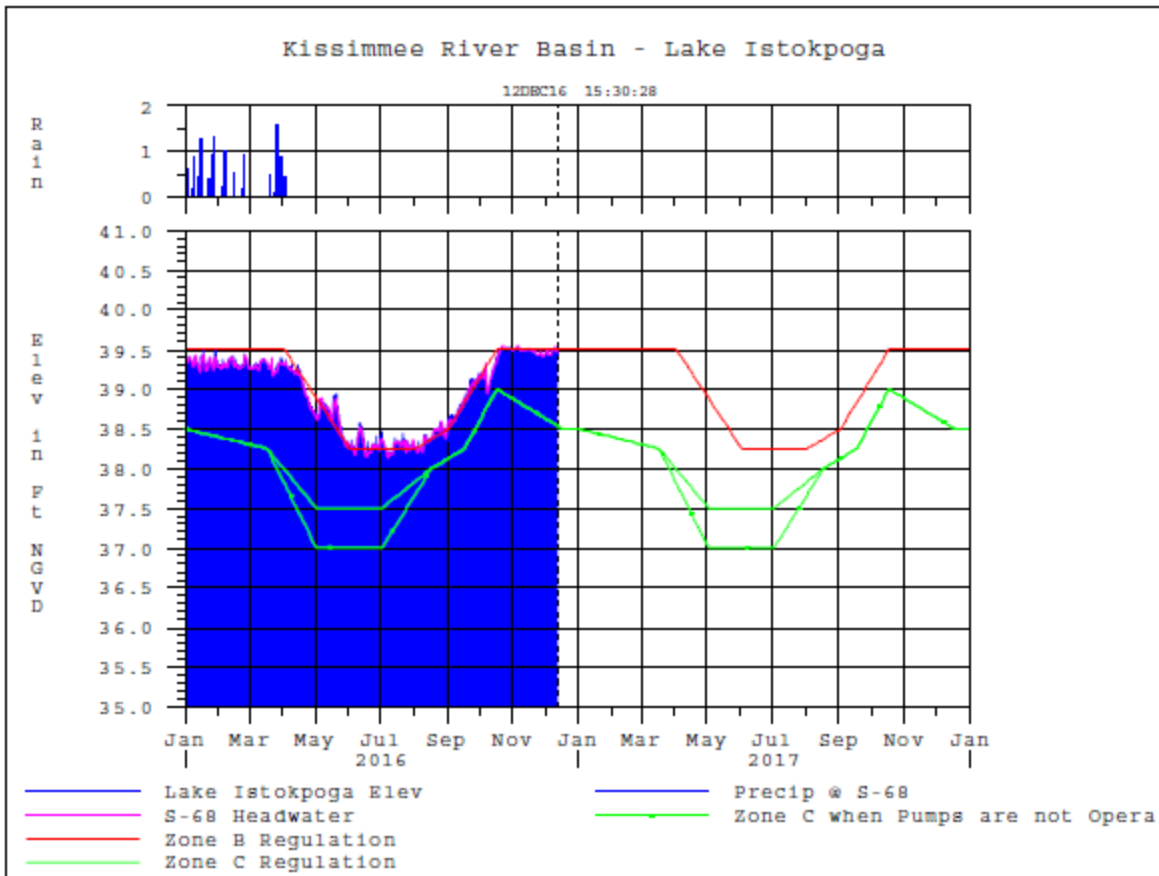


Figure 7

## ESTUARIES

### **St. Lucie Estuary**

Over the past week, provisional flows averaged about 0 cfs at S-80, 31 cfs downstream of S-308, 0 cfs at S-49 on C-24, 0 cfs at S-97 on C-23, and 80 cfs from Ten Mile Creek at the Gordy Road Structure. Average inflow from tidal basin tributaries is estimated to be 159 cfs (Figures 1 and 2). Total inflow averaged about 239 cfs last week and 203 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 22.5. 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>18.4</b> (17.2)	<b>20.6</b> (19.0)	NA <sup>1</sup>
US1 Bridge	<b>22.0</b> (20.5)	<b>23.0</b> (21.2)	10.0-26.0
A1A Bridge	<b>29.5</b> (27.9)	<b>30.9</b> (29.7)	NA

<sup>1</sup>Envelope not applicable

### **Caloosahatchee Estuary**

During the past week, provisional flows averaged approximately 892 cfs downstream of S-77, 486 cfs at S-78, and 693 cfs at S-79. Average inflow from tidal basin tributaries is estimated to be 139 cfs (Figures 5 and 6). Total inflow averaged 832 cfs last week and 817 cfs over last month.



Over the past week in the estuary, salinity decreased to Ft. Myers and remained about the same downstream (Table 2, Figures 7 and 8). The seven-day average salinity values are within the good range for adult oysters at Cape Coral and at Shell Point and in the fair range 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 at current flow conditions. However, without discharges at S-79, salinity is forecast to be just below 5 psu in two weeks (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>2.5</b> (3.7)	<b>2.5</b> (3.6)	NA <sup>1</sup>
*Val I75	<b>3.3</b> (4.7)	<b>5.0</b> (5.5)	0.0-5.0 <sup>2</sup>
Ft. Myers Yacht Basin	<b>8.6</b> (10.0)	<b>11.0</b> (11.0)	NA
Cape Coral	<b>16.1</b> (15.7)	<b>17.9</b> (17.6)	10.0-30.0
Shell Point	<b>EM</b> <sup>3</sup> (25.4)	<b>EM</b> (27.3)	10.0-30.0
Sanibel	<b>30.3</b> (30.7)	<b>30.5</b> (30.9)	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.

\*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)	4.0 – 37.0	Not Reporting	1.8 – 3.9
Dissolved Oxygen (mg/l)	5.0 – 11.5	Not Reporting	EM <sup>1</sup>
<sup>1</sup> Equipment Malfunction			

The Florida Fish and Wildlife Research Institute reported on December 9, 2016, that *Karenia brevis*, the Florida red tide organism, was observed in background to medium concentrations in 19 samples collected from Lee County.

Fish kills affecting multiple species have been reported along Manatee, Sarasota, Charlotte, and Lee counties over the past week.

### Water Management Recommendations

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

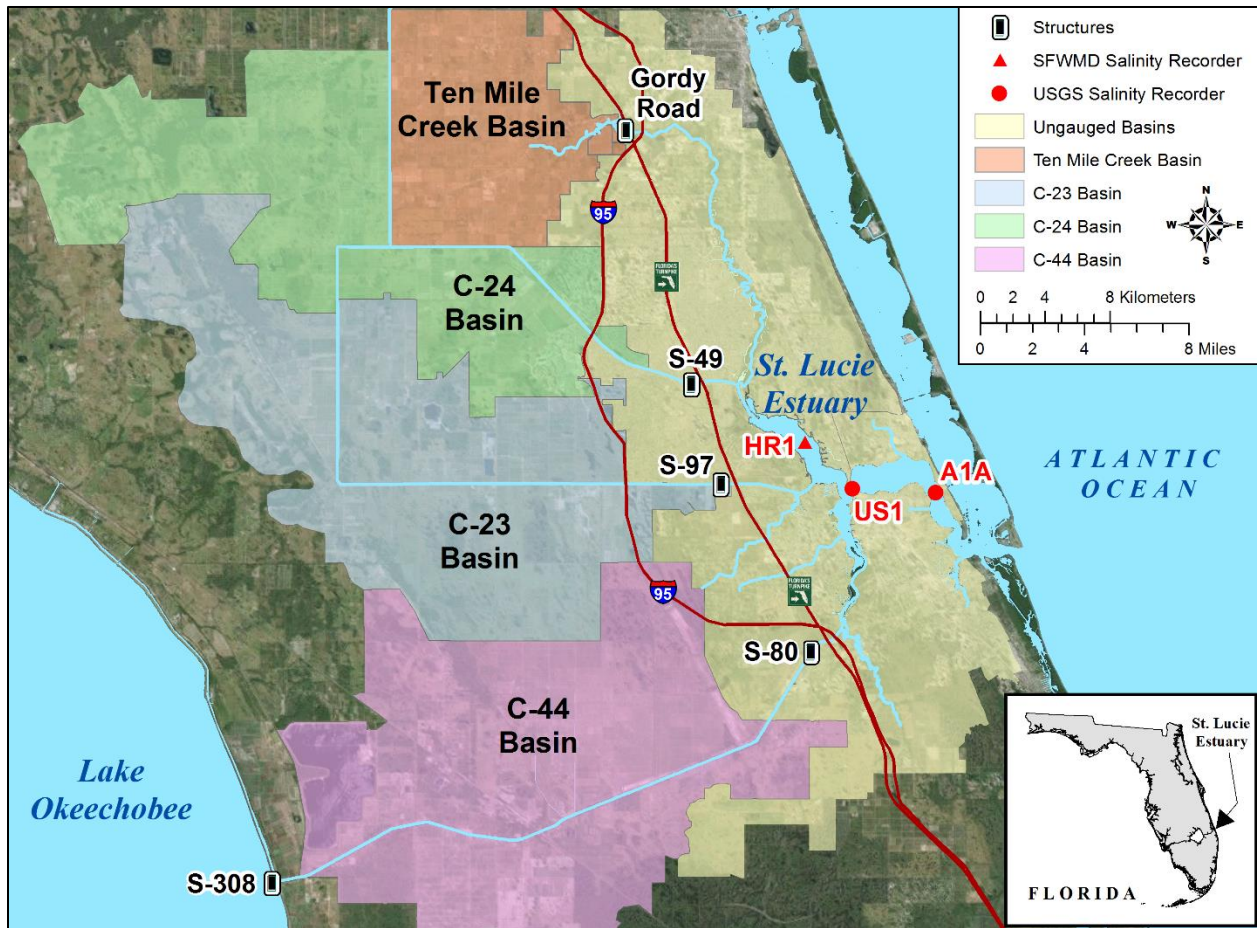


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

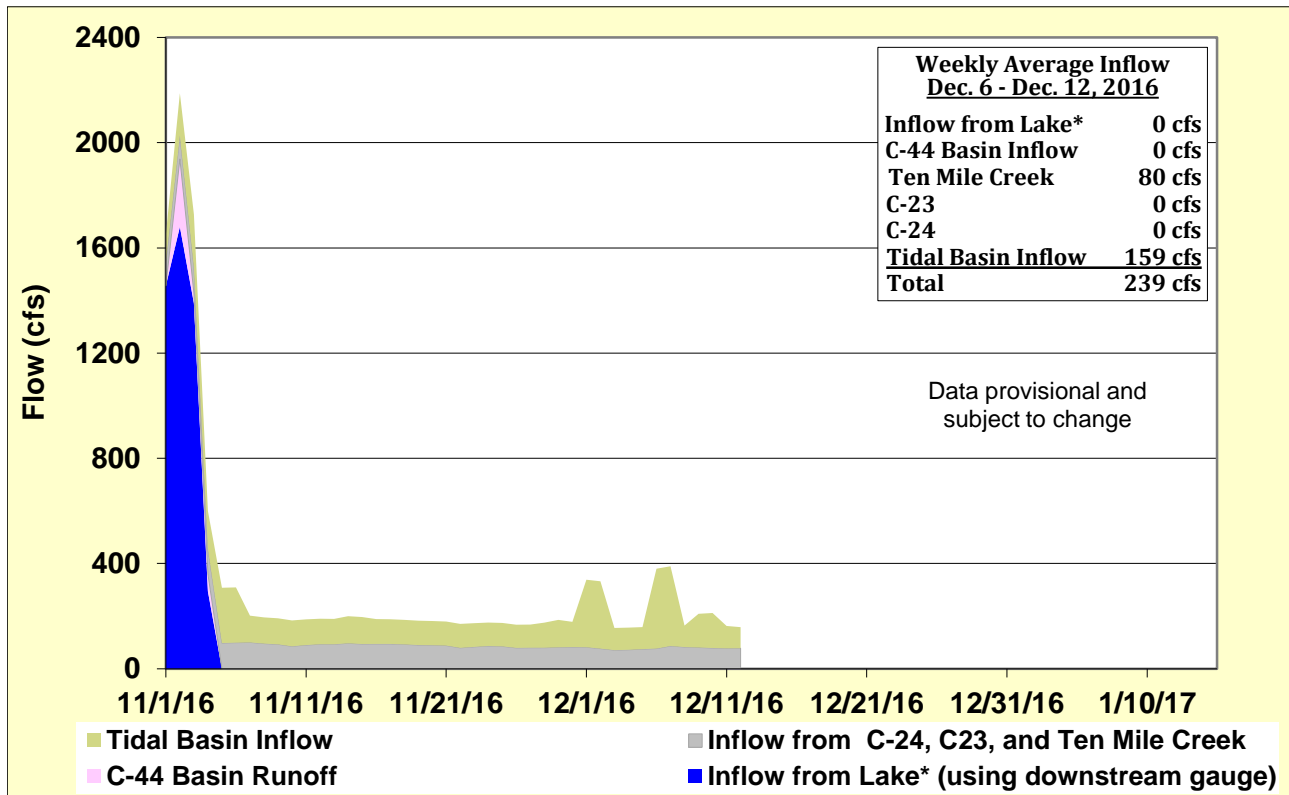


Figure 2. Estimated surface freshwater inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basins into the St. Lucie Estuary.

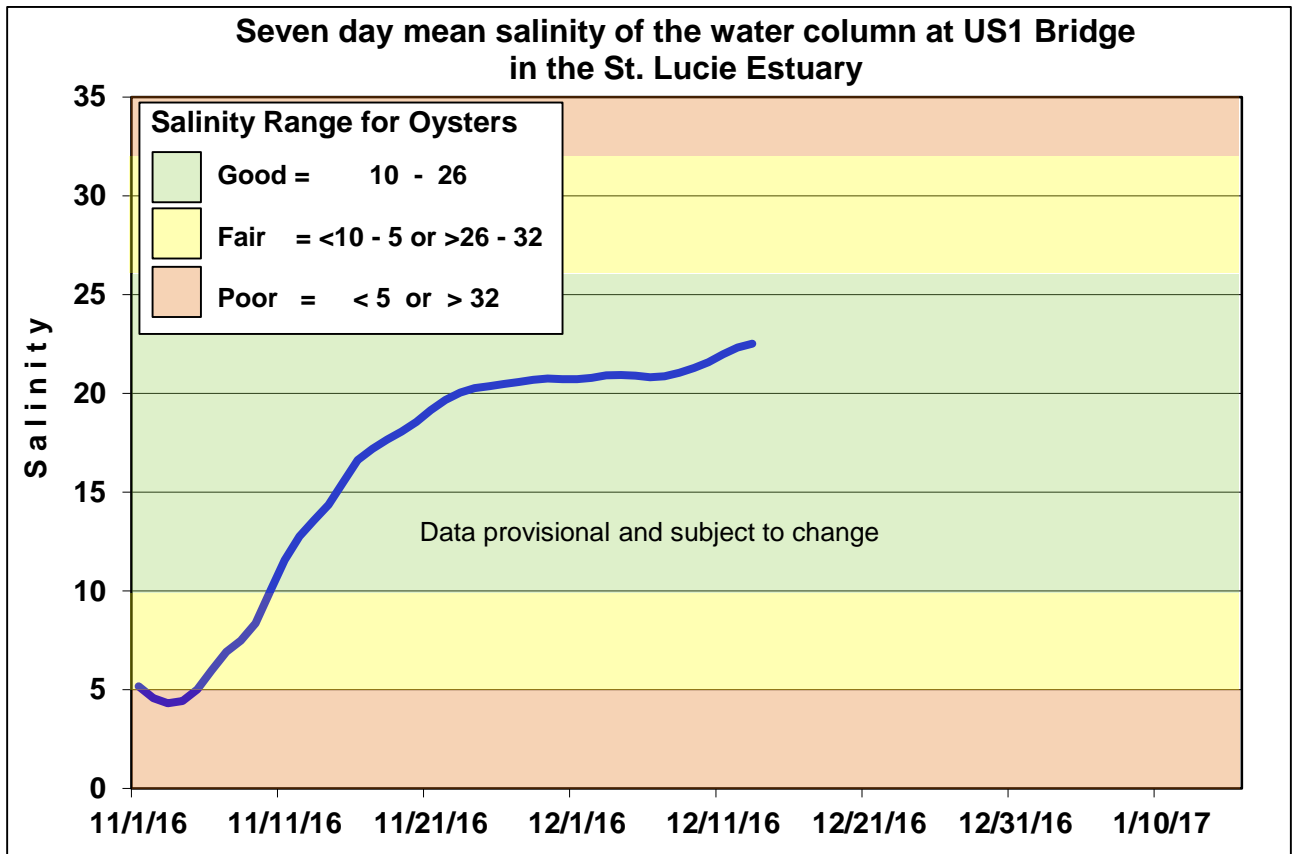


Figure 3. Seven-day mean salinity of the water column at the U.S. Highway 1 Bridge.

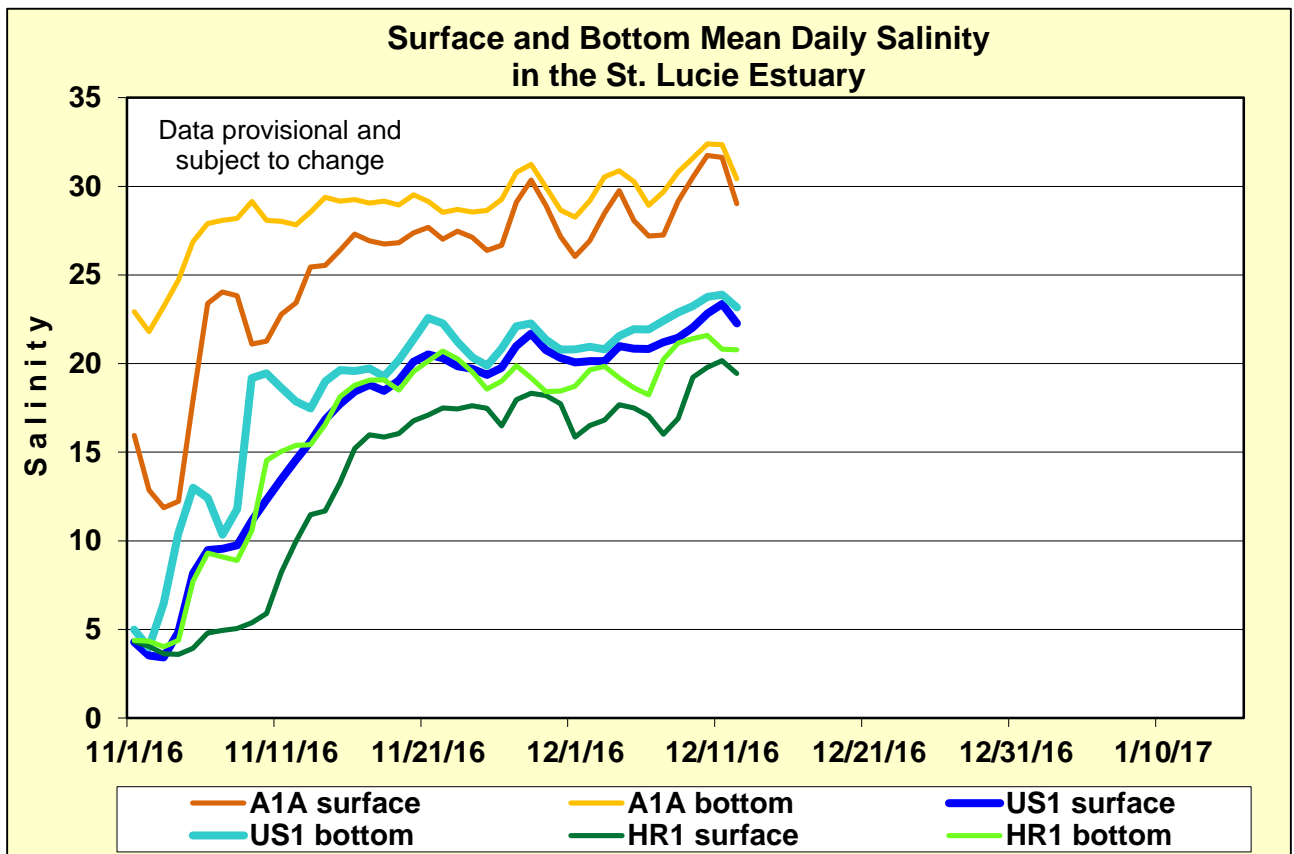


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

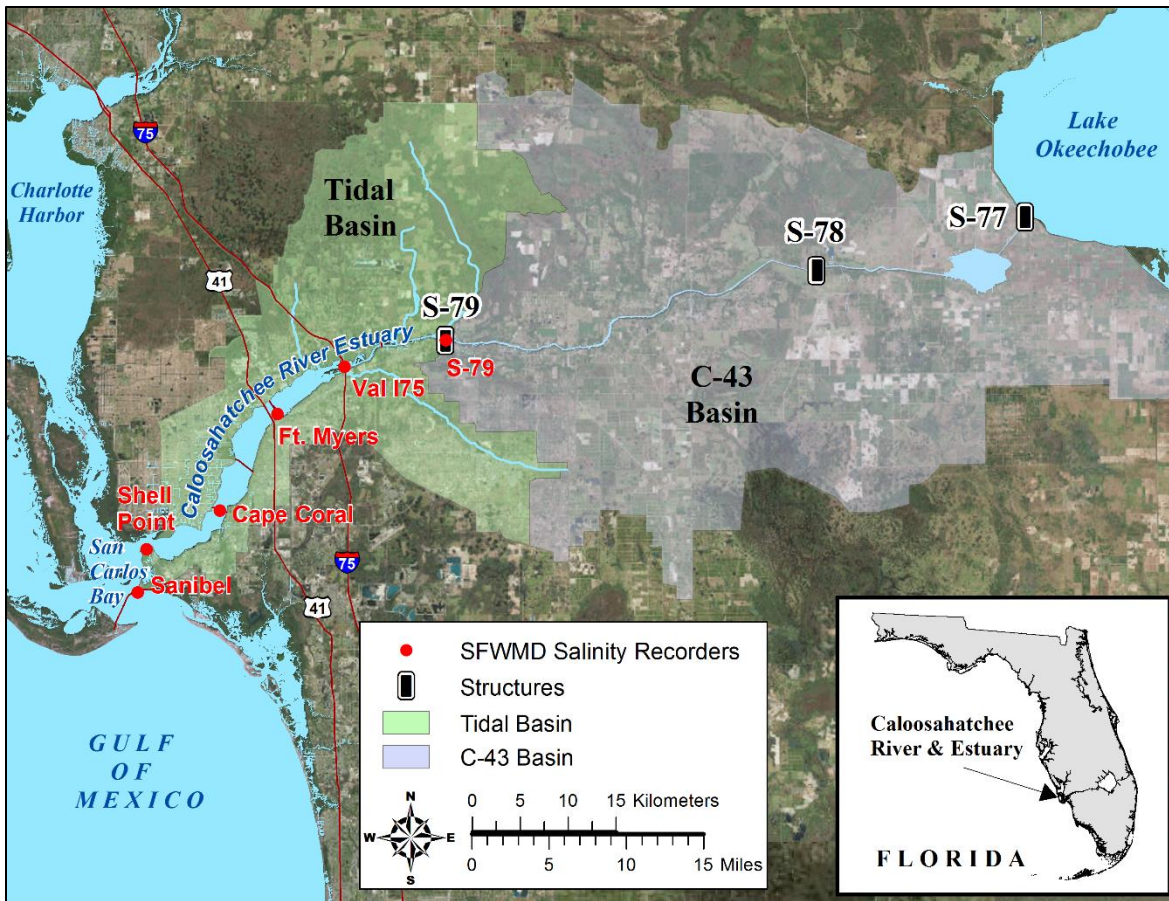


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

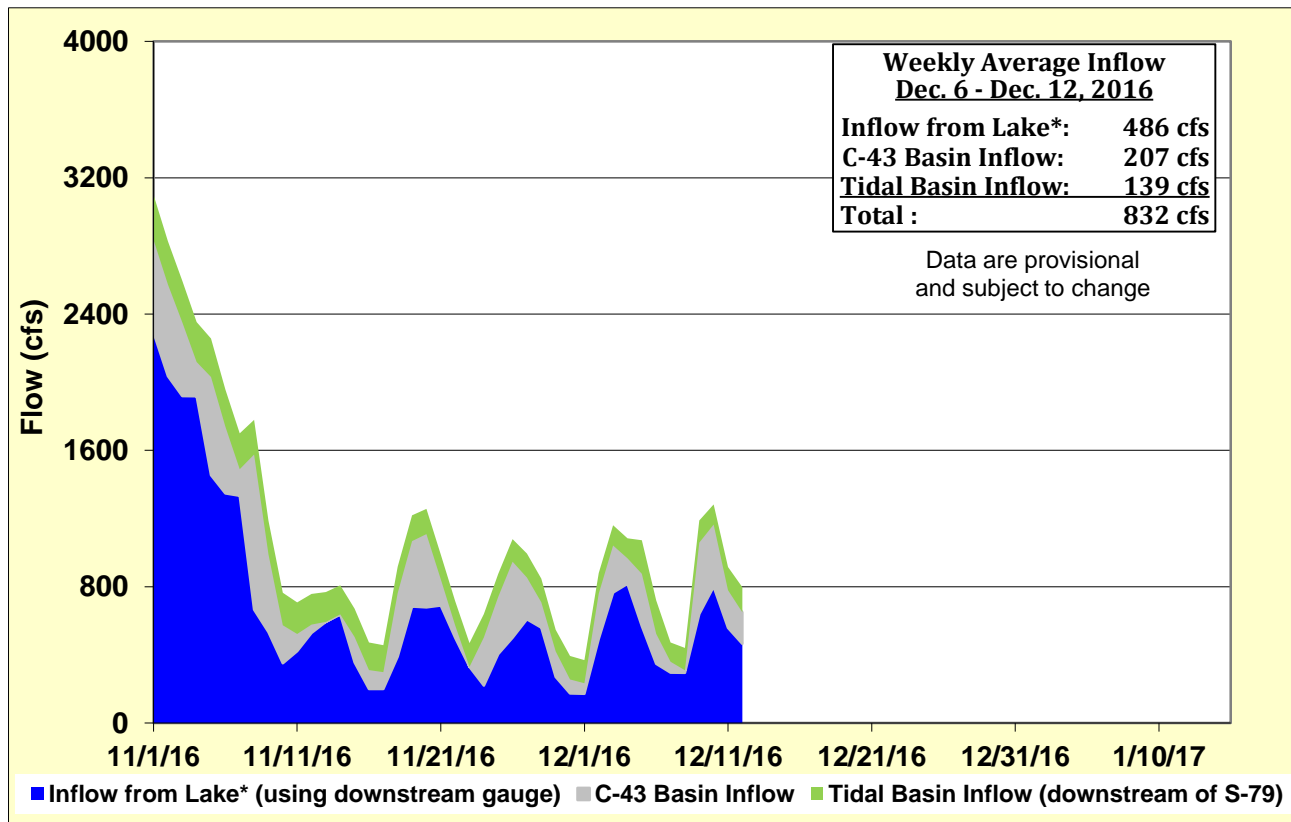


Figure 6. Freshwater inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.

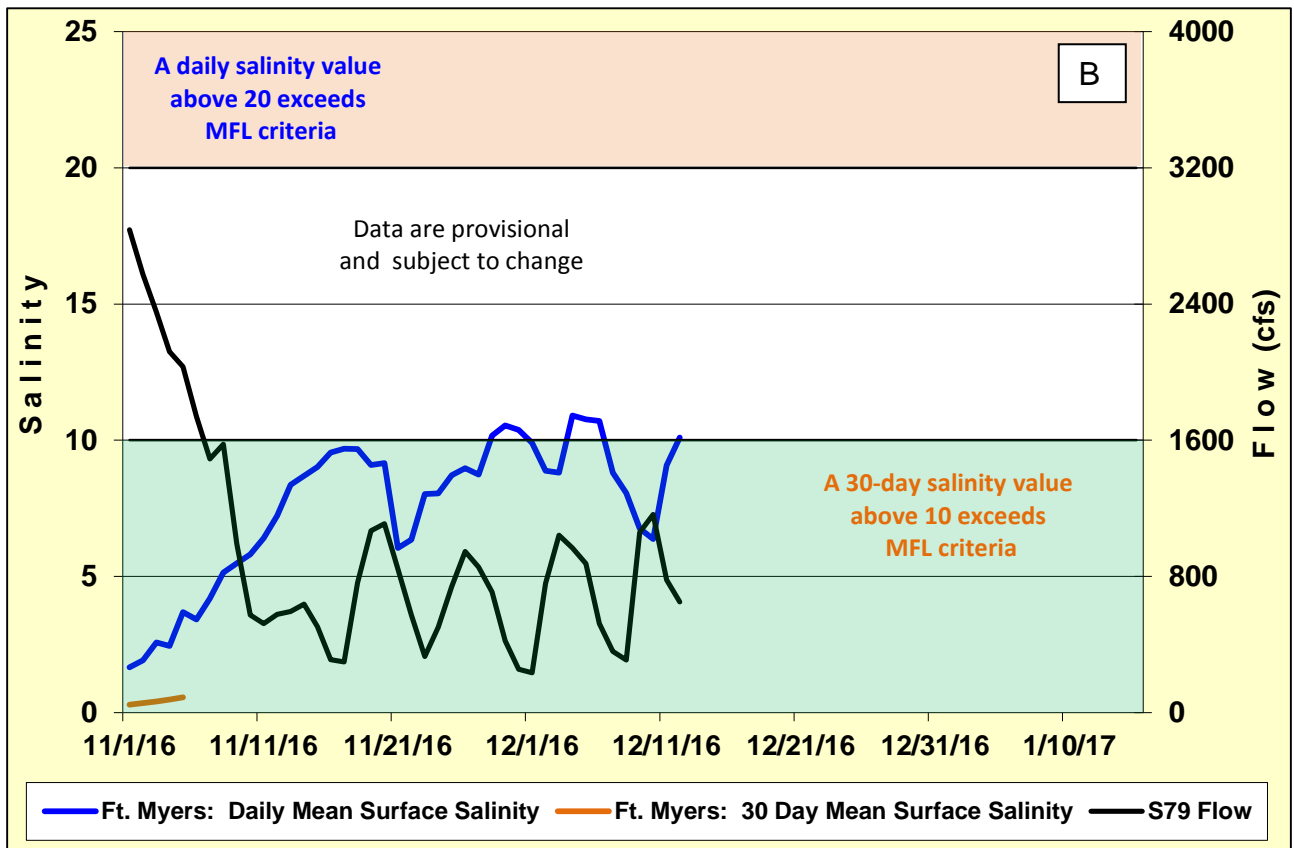
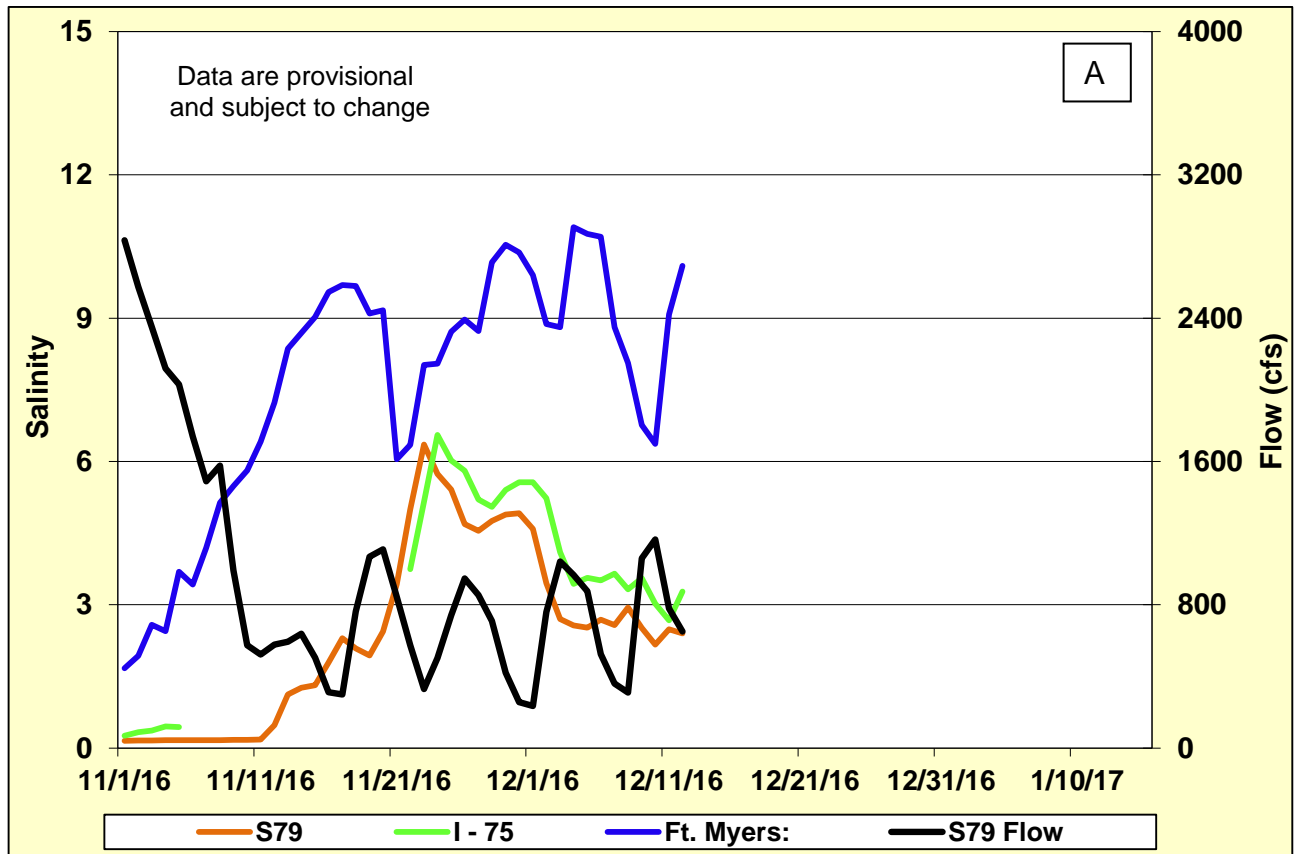


Figure 7. Daily mean flows at S-79 and salinity at upper estuary monitoring stations (A) and 30-day moving average salinity at Ft. Myers (B).



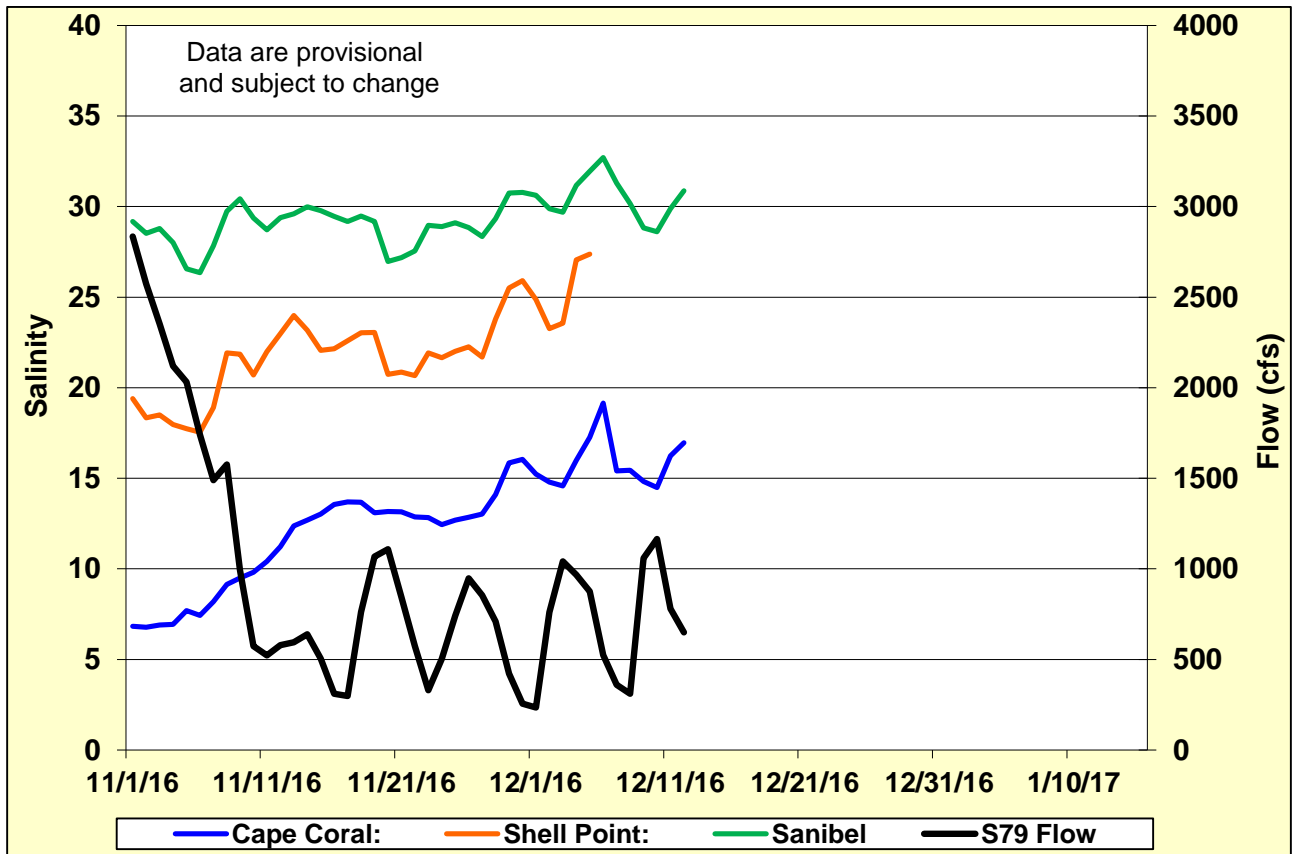


Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.

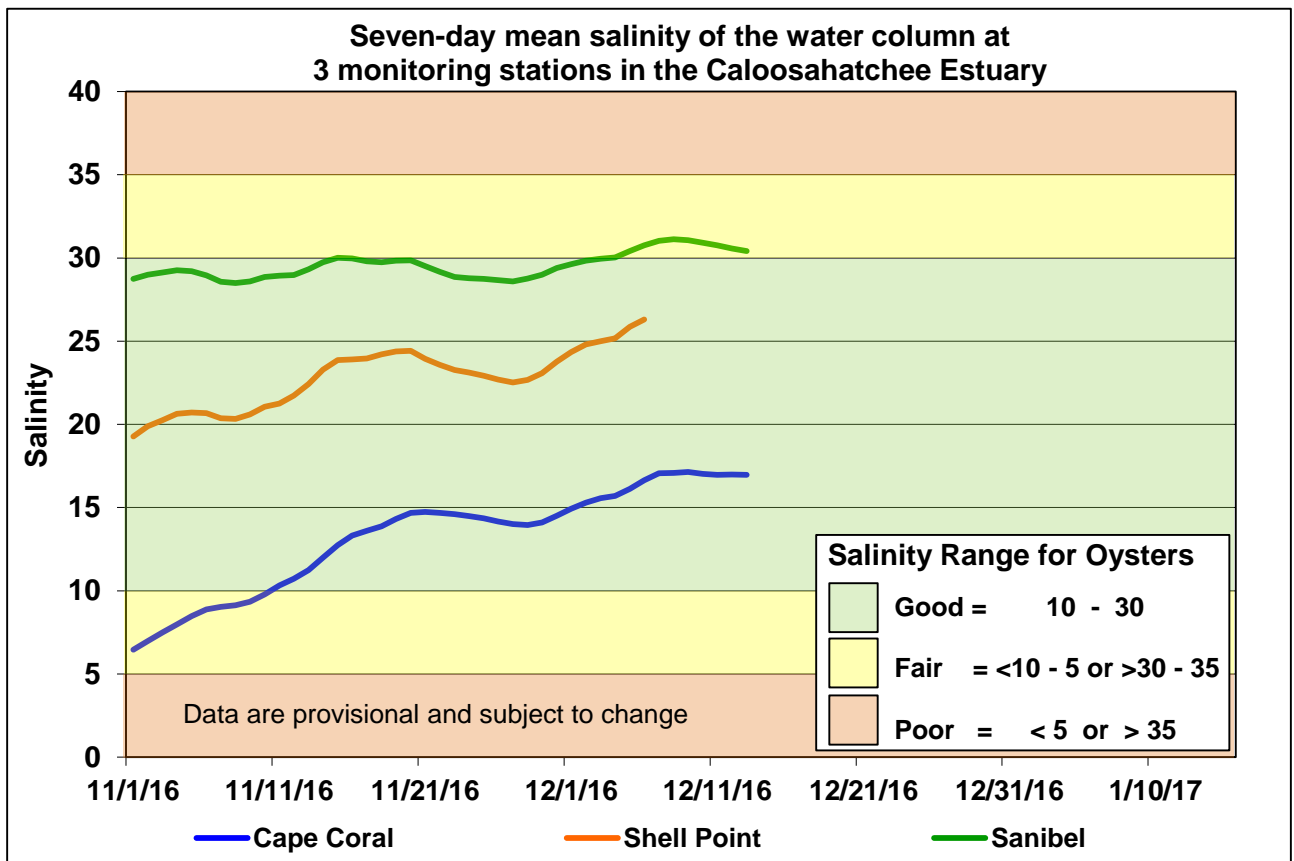


Figure 9. Seven-day mean salinity at Cape Coral Bridge, Shell Point and Sanibel Bridge monitoring stations.



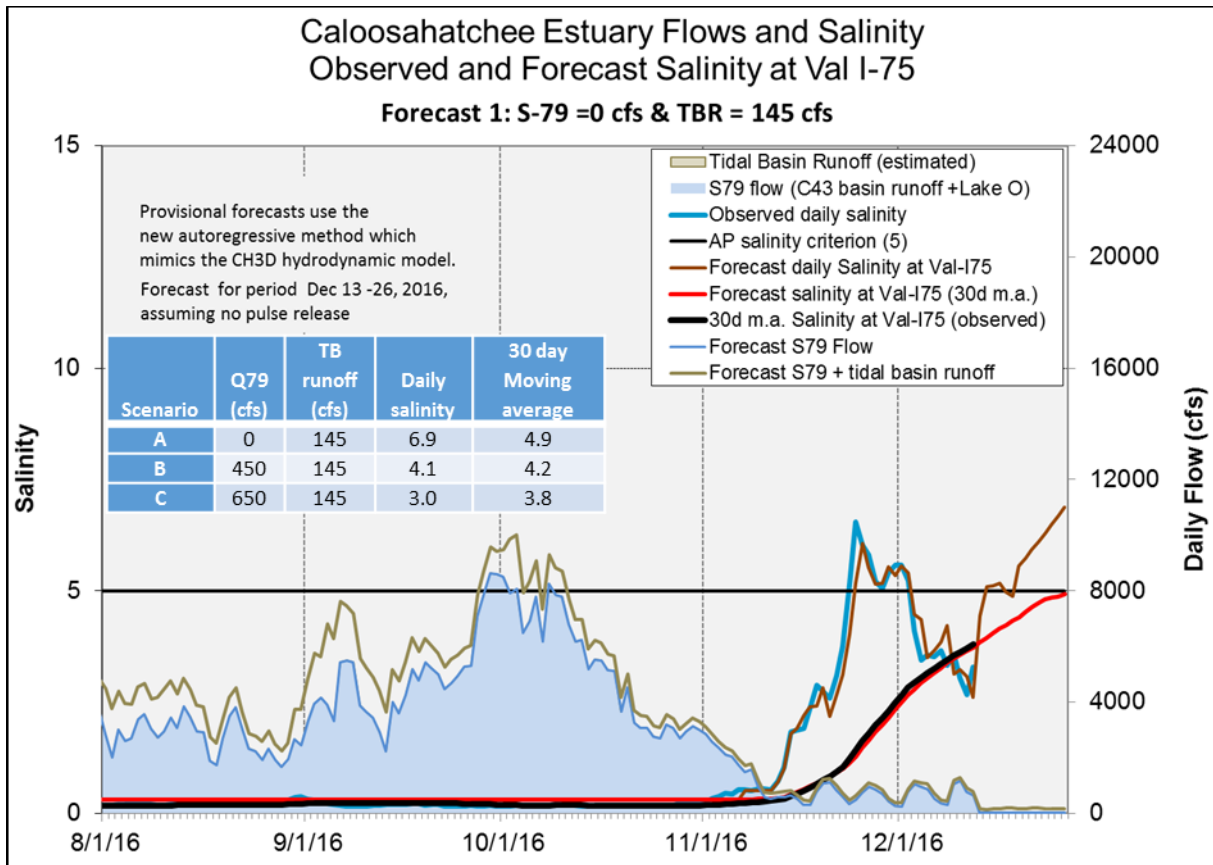


Figure 10. 14-day salinity forecast at Val I-75 assuming no releases at S-79.

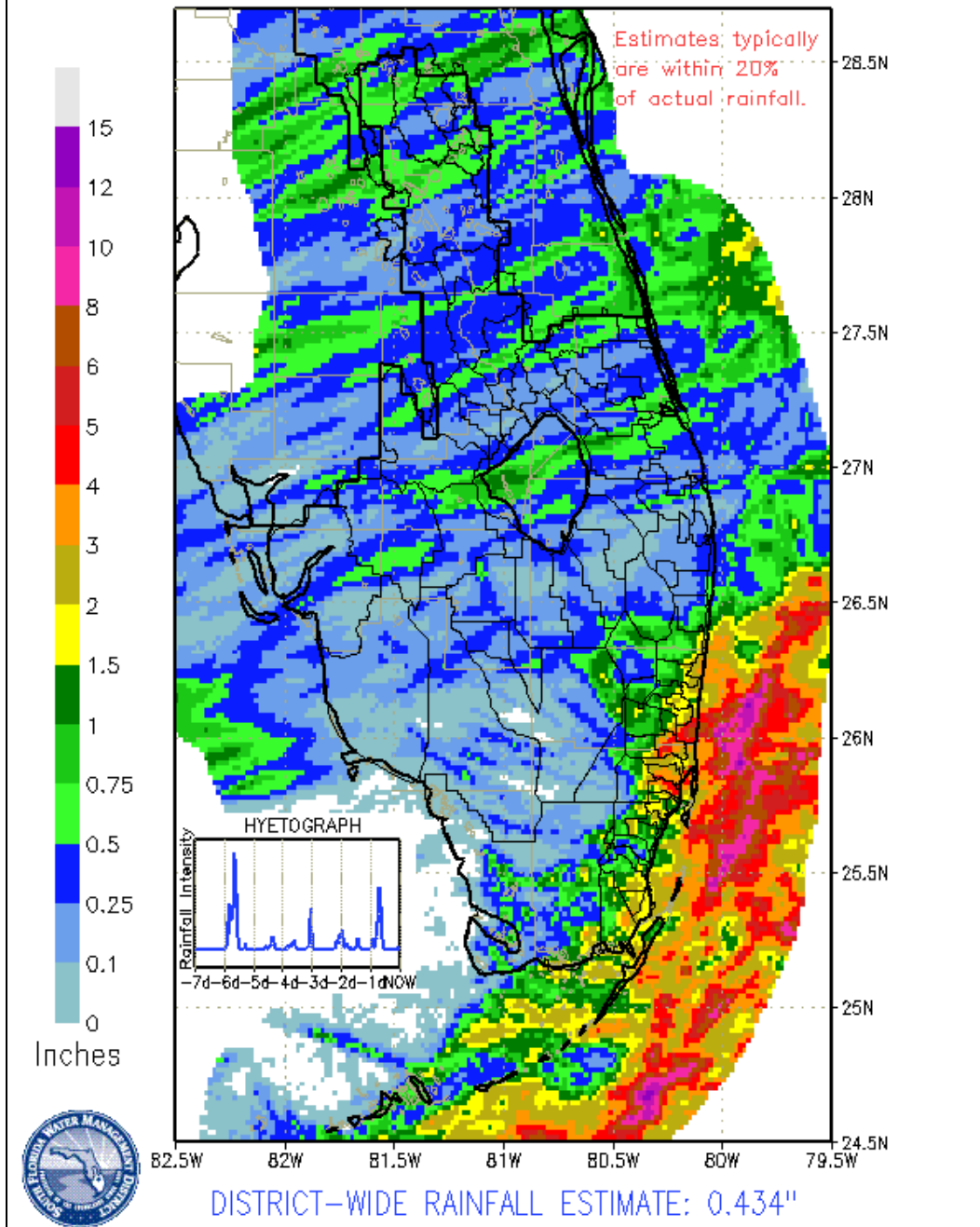
## GREATER EVERGLADES

Rainfall was low again last week in the WCAs and (Everglades National Park (ENP)), ranging from 0.26 inches to 0.78 inches. Stages decreased slightly in WCAs 2A, 3A, and 3B but remained about the same elsewhere. The local maximum rainfall was 3.1 inches in ENP. Pan evaporation was 0.87 inches, slightly above the pre-project average of 0.78 inches.

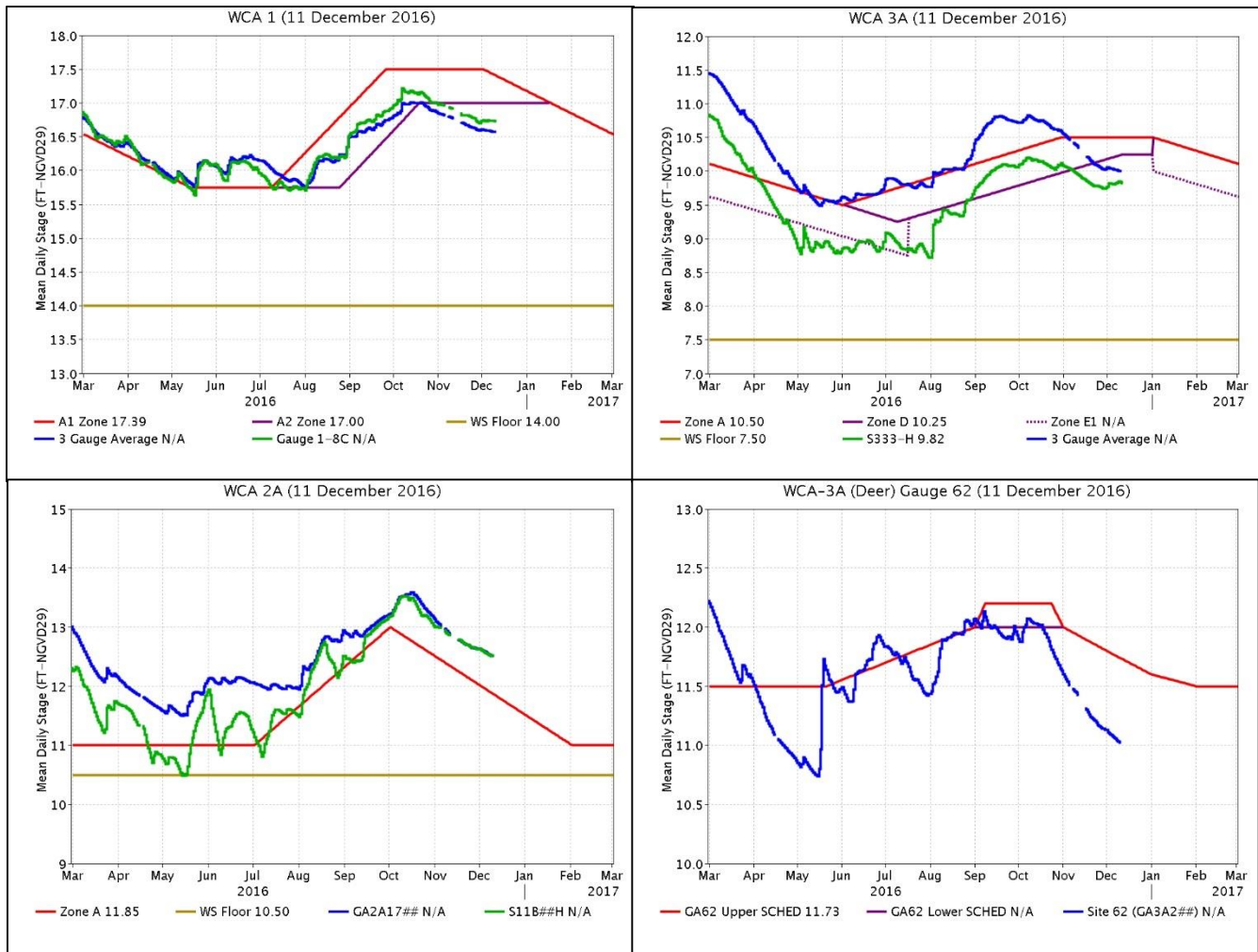
Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	0.38	0.00
WCA-2A	0.58	-0.06
WCA-2B	0.78	0.00
WCA-3A	0.26	-0.02
WCA-3B	0.29	-0.05
ENP	0.40	0.01

# SFWM District-wide Rainfall 7-Day Rainfall Estimates

FROM: 0915 EST, 12/05/2016 THROUGH: 0915 EST, 12/12/2016



Regulation Schedules: Stages are below regulation for three of the four areas. The WCA-1 three-gauge average is -0.79 feet below regulation, the northwestern WCA-3A gauge stage (gauge 62) is -0.70 feet below the upper schedule, and the WCA-3A three-gauge average stage is -0.46 feet below regulation. The WCA-2A stage remains above regulation by 0.68 feet.

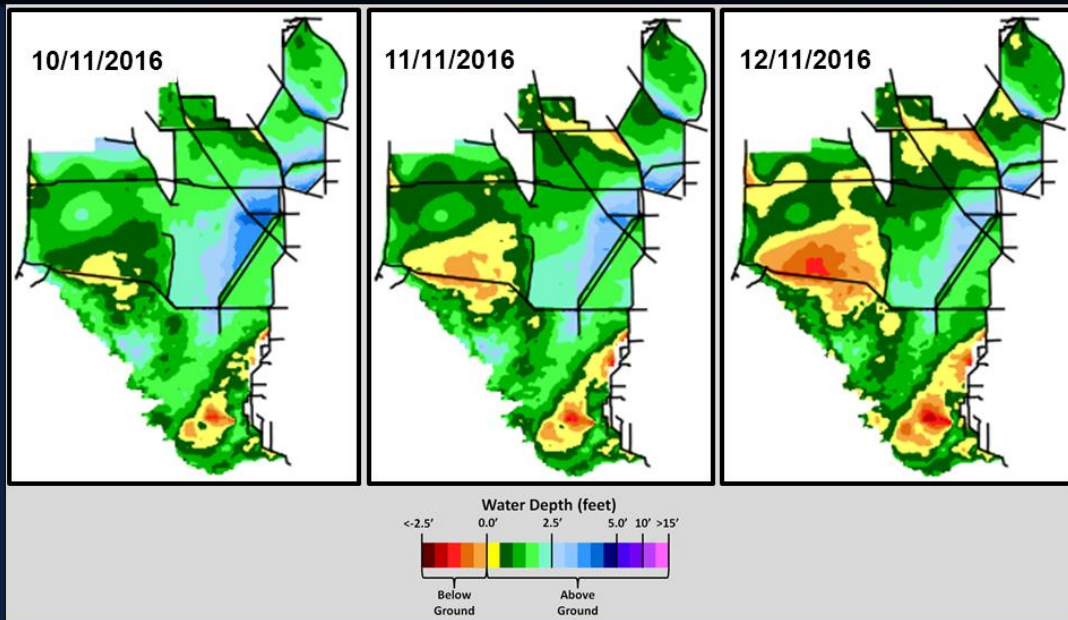


Water Depths and Changes: Water levels are lower than they were one and two months ago. Water depths at monitored gauges other than in WCA-2B range from 0.93 feet to 2.49 feet.

Stage changes were mixed last week. Individual gauge changes ranged from -0.07 feet to 0.02 feet. Stages are lower than a month ago, and much lower than a year ago except for parts of central ENP.



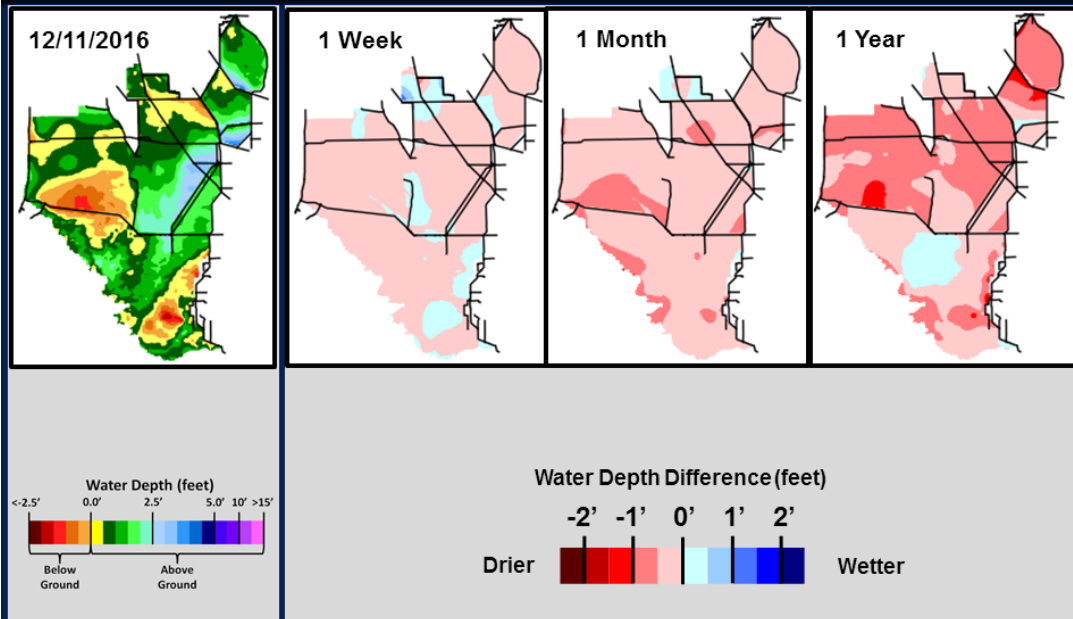
### SFWDAT Water Depth Monthly Snapshots



South Florida Water Depth Assessment Tool (SFWDAT)



### SFWDAT Everglades Difference Maps (Present - Past)

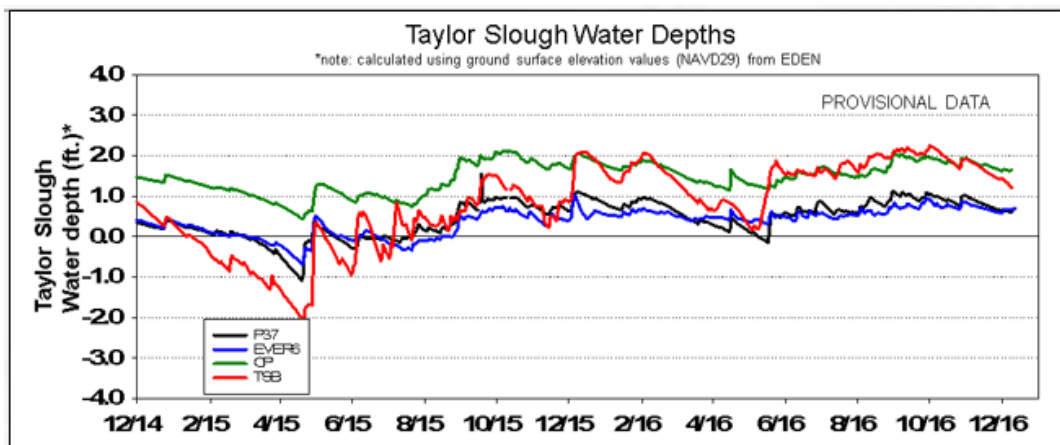
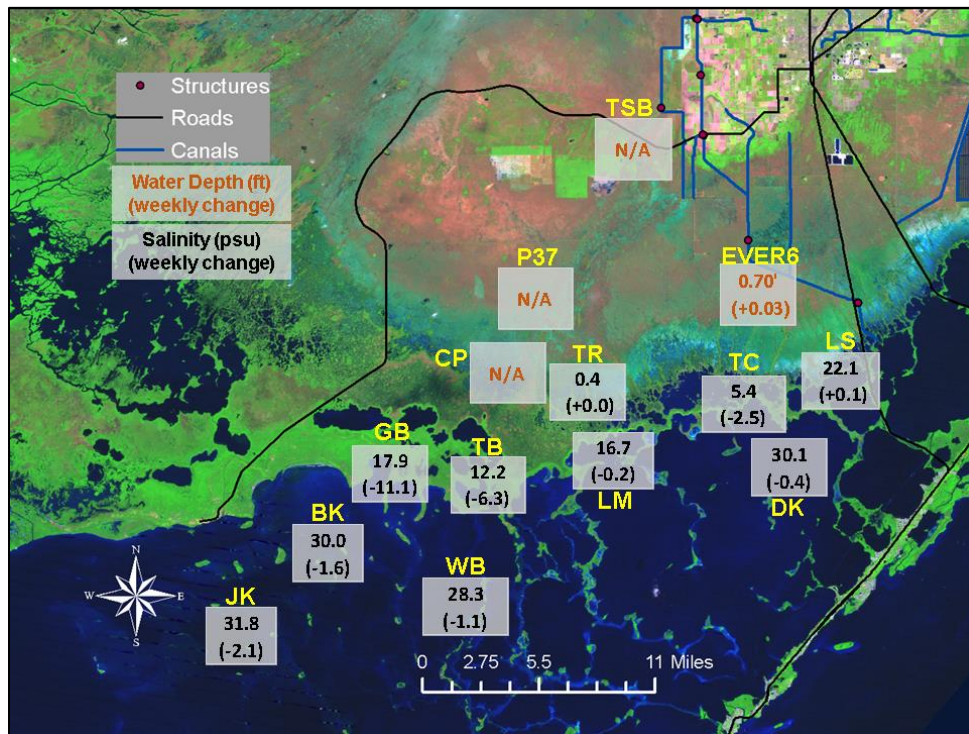


South Florida Water Depth Assessment Tool (SFWDAT)

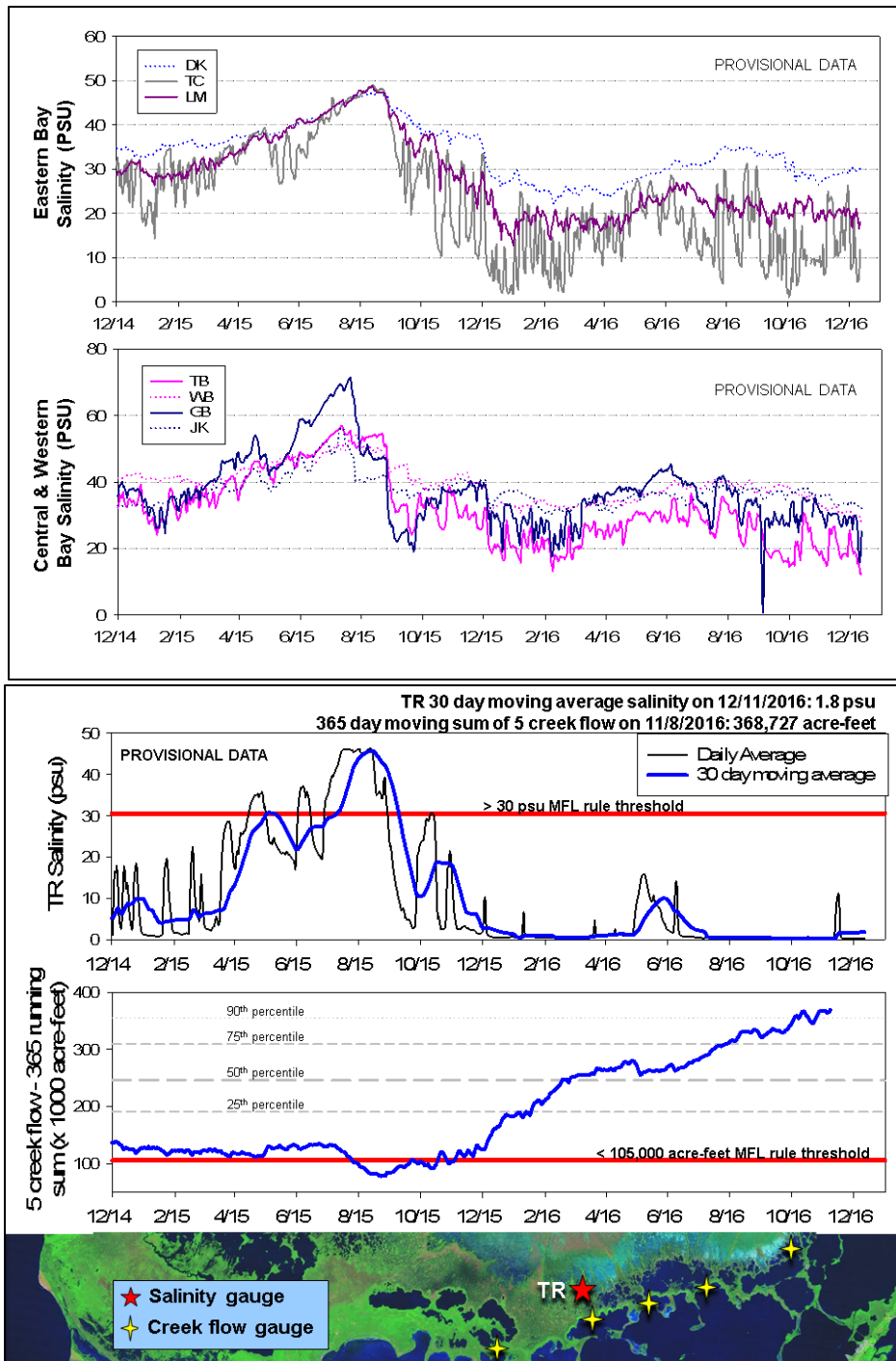
Taylor Slough and Florida Bay: Several of the stage gauges were not reporting over the weekend, but all stations were decreasing except in the ENP panhandle region. The ENP panhandle area showed a very slight increase of 0.3 to 0.5 inches over the last week, and all areas were still one to four inches above average with the panhandle area being the furthest from average.



Salinity changes ranged from  $-11.1$  to  $+0.1$  psu over the last week. Salinities currently range from 5 psu to 32 psu and are  $-9$  psu below average in the eastern nearshore area and 4 psu above average in the eastern bay.



Florida Bay MFL: The salinity at MFL sentinel site TR in the mangrove zone remained at its seasonal low of 0.4 psu, and the 30-day moving average salinity also was unchanged at 1.8 psu. USGS made repairs to the Mud Creek gauge last week and is now correcting last month's data. The five-creek cumulative flow has not been calculated since November 8 as a result of data difficulties. All creeks have continued positive flows this past week.



## Water Management Recommendations

- Recession rates throughout the regions should be between -0.05 and -0.09 feet per week to provide good foraging for wading birds during their breeding season.
- Water depths in southern WCA-3A should stay below 2.5 feet throughout the dry season to protect tree island forests from further high water conditions (experienced in 31 out of the last 52 weeks). Tree islands south of gauge 65 in southern WCA-3A are likely to still be in high water conditions.



- The seasonal Multispecies Management Team (interagency group related to ERTTP schedule) is concerned that water levels in the WCAs are too low going into the breeding season. Water should continue to move into the WCAs and ENP, and upcoming rainfall should be held to improve hydrologic conditions.

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

Everglades Ecological Recommendations, Dec. 13, 2016 (red is new)				
Area	Current Condition	Cause(s)	Recommendation	Reasons
WCA-1	Stages changed - 0.02' to 0.02'	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.
WCA-2A	Stages fell -0.06'	Rainfall, ET, management	Maintain slower recession rates. 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.
WCA-2B	Stages changed 0.00' to 0.01'	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.
WCA-3A NE	Stage rose 0.02'	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.
WCA-3A NW	Stage fell -0.06'	Rainfall, ET, management		
Central WCA-3A S	Stage fell -0.04'	Rainfall, ET, management	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).	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.
Southern WCA-3A S	Stage rose 0.01'	Rainfall, ET, management		
WCA-3B	Stages decreased - 0.03' 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.
ENP-SRS	Stage rose 0.01'	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.
ENP-CSSS habitats	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.
Taylor Slough	1 to 4 inches above average	Rain, ET, inflows	Move water southward as possible	Provide freshwater buffer for ecosystems, maintain low salinity conditions downstream, and maintain slow recession rates.
FB- Salinity	-9 psu below to 4 psu above average	Rain, ET, inflows, wind	Move water southward as possible	Maintain low salinity conditions and prevent early salinity increases.