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

M E M O R A N D U M

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

FROM: SFWMD Staff Environmental Advisory Team

DATE: December 20, 2016

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

Some showers again today, then mainly dry tomorrow through Friday. A slow moving cold front over south central Florida will continue into south Florida this evening before stalling. Some showers will develop mainly near and along the frontal boundary. Little or no rain is expected the latter half of the week as the front washes out and mid to upper level high pressure dominates. Longer term, no appreciable rainfall is expected over the next 7-10 days. Next sign of significant rains is advertised by the models in early January.

Kissimmee

On Sunday, stage in East Lake Toho, Lake Toho and Kissimmee-Cypress-Hatchineha was 0.2, 0.2, and 1.5 feet below schedule, respectively. Over the past week, discharge at S65, S65A, and S65E averaged 809, 700, and 779 cfs, respectively. Tuesday morning discharges were ~820 cfs, ~688 cfs, ~900 cfs, and ~770 cfs, respectively at S65, S65A, S65C, and S65E. Dissolved oxygen in the Kissimmee River averaged 7.17 mg/L over the past week. Kissimmee River mean floodplain depth on Sunday was 0.13 feet. No new recommendations this week.

Lake Okeechobee

Lake stage fell an additional 0.07 feet over the past week equating to a monthly recession rate of 0.28 feet, which is lower than the preferred monthly rate of 0.50 feet per month but still within the range conducive to good wading bird conditions. Algal bloom potential is low. Any activities which contribute to maintaining the current recession rate and preventing reversals would be ecologically beneficial.

Estuaries

Total discharge to the St. Lucie estuary averages 184 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 in the North Fork and at the US1 Bridge. The seven-day average salinity at the US1 Bridge is in the good range for adult oysters. Total inflow to the Caloosahatchee estuary averaged 798 cfs over the past week with 515 cfs (65%) 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 and Shellpoint, while in the fair range at the Sanibel Causeway. The 30-day moving average salinity at the I-75 Bridge is forecast to reach 4.8 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 9,600 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 131,800 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 very low and stage changes declined throughout the region. The recession rates ranged from -0.02 feet to -0.08 feet last week, which is generally close to the overall ranges preferred for wading bird foraging during their breeding season (-0.05 feet to -0.09 feet per week). The wading bird breeding season will begin soon in the WCAs and Everglades National Park. The 30-day moving average salinity at the Florida Bay Minimum Flows and Levels (MFL) site has declined to 0.4 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 0.12 inches of rainfall in the past week and the Lower Basin received 0.12 inches (SFWMD Daily Rainfall Report 12/19/2016).

Upper Kissimmee Basin

Stages and departures in the Kissimmee Chain of Lakes (KCOL) are shown in Table1.

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: **12/20/2016**

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)						
							12/18/16	12/11/16	12/4/16	11/27/16	11/20/16	11/13/16	11/6/16
Lakes Hart and Mary Jane	S62	7	LKMJ	61.0	R	61.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lakes Myrtle, Preston, and Joel	S57	11	S57	61.8	R	61.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alligator Chain	S60	0	ALLI	63.4	R	64.0	-0.6	-0.6	-0.6	-0.6	-0.5	-0.5	-0.5
Lake Gentry	S63	0	LKGT	61.5	R	61.5	0.0	-0.1	-0.1	-0.1	-0.1	0.0	0.0
East Lake Toho	S59	0	TOHOE	57.8	R	58.0	-0.2	-0.2	-0.2	-0.2	-0.1	-0.1	-0.1
Lake Toho	S61	0	TOHOW, S61	54.8	R	55.0	-0.2	-0.2	-0.3	-0.2	-0.2	-0.2	-0.1
Lakes Kissimmee, Cypress, and Hatchineha	S65	809	LKISSP, KUB011, LKIS5B	51.0	R	52.5	-1.5	-1.3	-1.1	-0.7	-0.6	-0.4	-0.2

* 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: **12/20/2016**

Metric	Location	Sunday's 1-day average	Weekly Average**									
			12/18/16	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
Discharge (cfs)	S-65	808	**809**	821	822	789	777	766	750	706	1019	1131
Discharge (cfs)	S-65A	700	**700**	699	698	693	691	695	697	708	1147	1570
Discharge (cfs)	S-65C	868	**887**	909	895	880	898	924	982	1298	2164	3124
Headwater stage (feet NGVD)		32.8	**32.7**	32.8	32.7	32.7	32.7	32.7	32.8	33.1	33.5	33.7
Discharge (cfs)	S-65D****	1583	**1638**	1700	1610	1631	1700	1752	1833	2155	2922	3859
Discharge (cfs)	S-65E	731	**779**	773	781	800	811	849	914	1269	2230	3553
DO concentration (mg/L)***	Phase I river channel	7.31	**7.17**	7.06	7.46	7.28	6.65	6.78	6.63	6.15	4.84	3.38
Mean depth (feet)*	Phase I floodplain	0.13	**0.13**	0.14	0.15	0.16	0.19	0.22	0.27	0.39	0.79	1.25

* 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
12/20/2016	No new recommendations.			
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	• Begin reducing discharge when Ops and management feel the time is right (could be now) • 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 • If KCH stage reaches ~50.5 ft, hold ~1400 cfs while KCH stage is at or above ~50.5 ft, then: • 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 • 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	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.			

KCOL Hydrographs (through Sunday midnight)

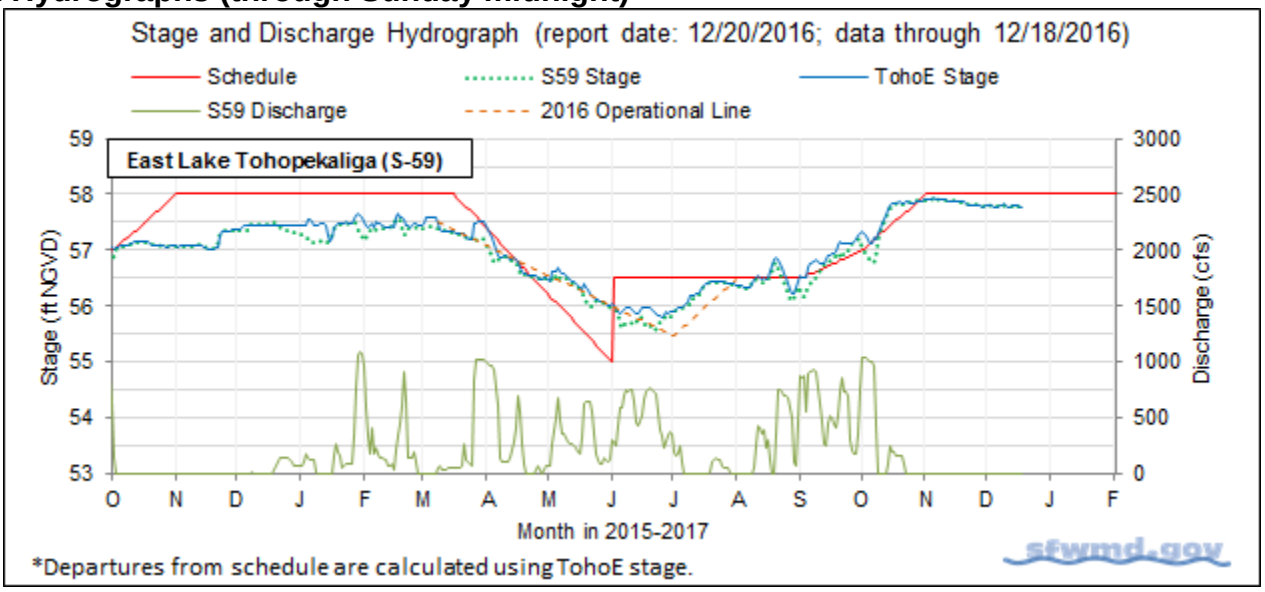


Figure 1.

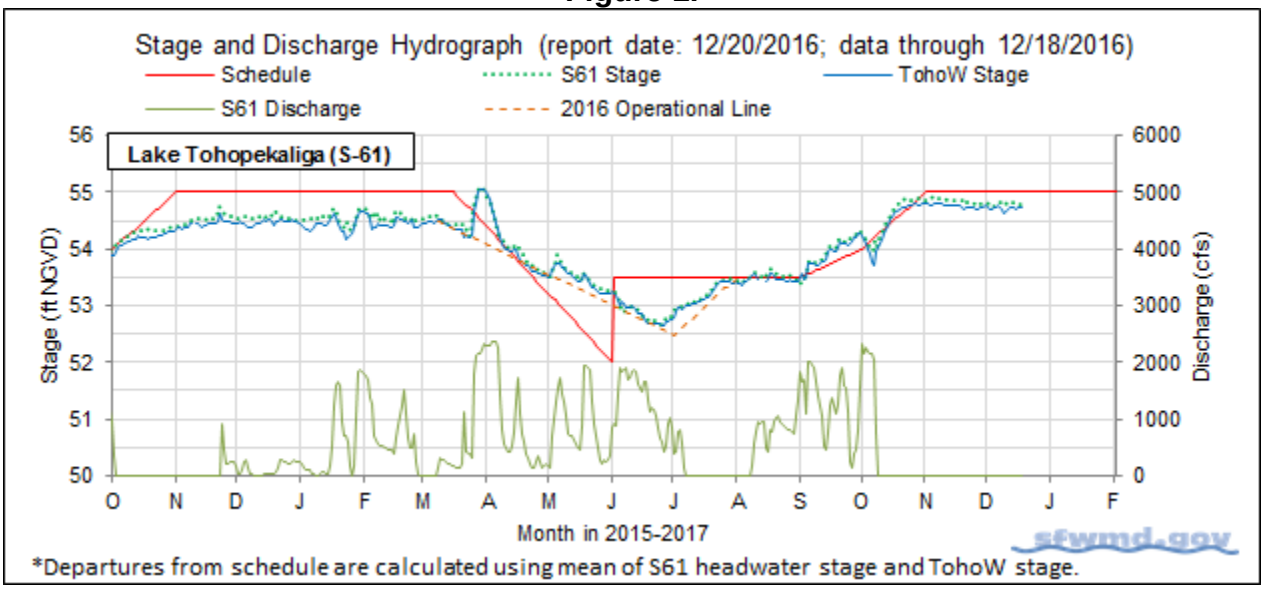


Figure 2.

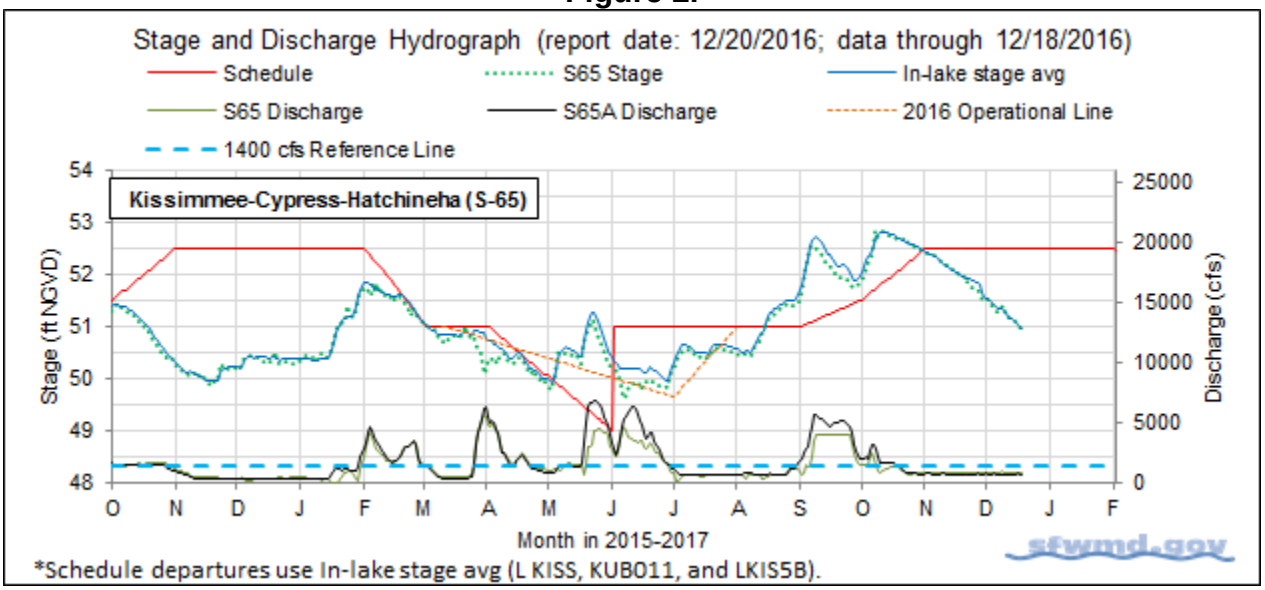


Figure 3.

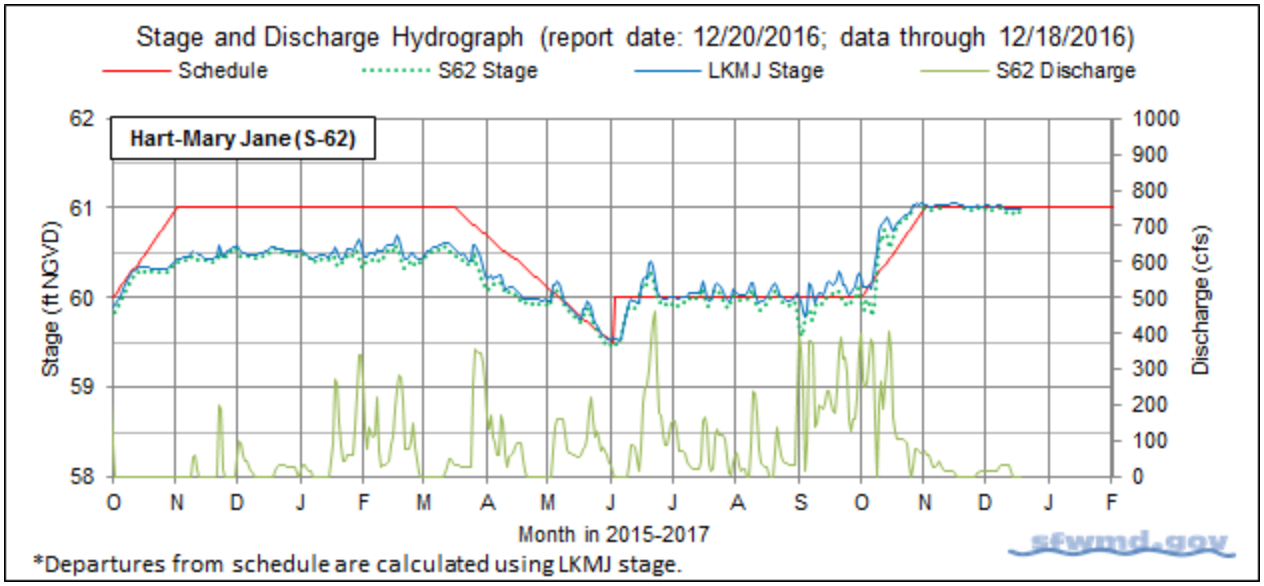


Figure 4.

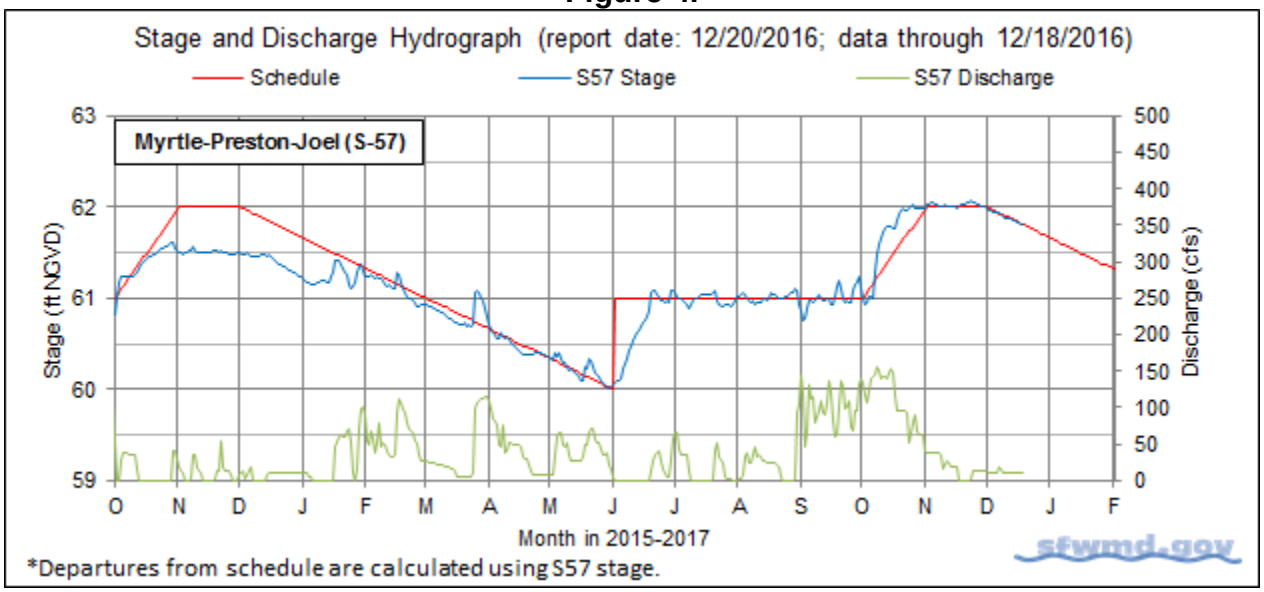


Figure 5.

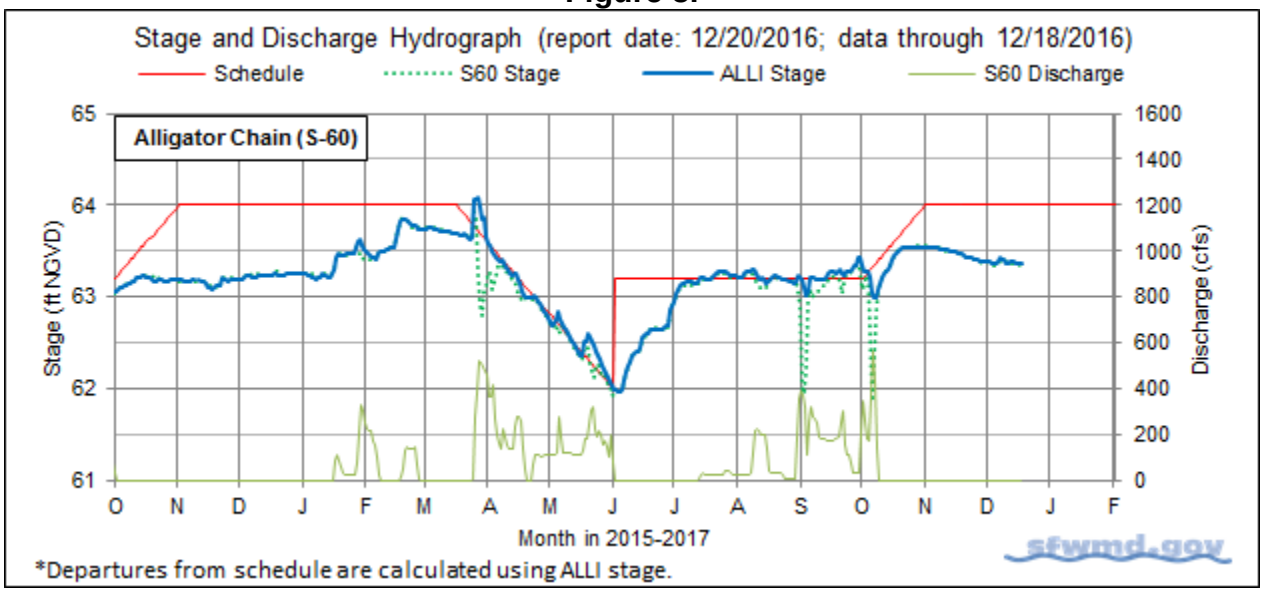


Figure 6.

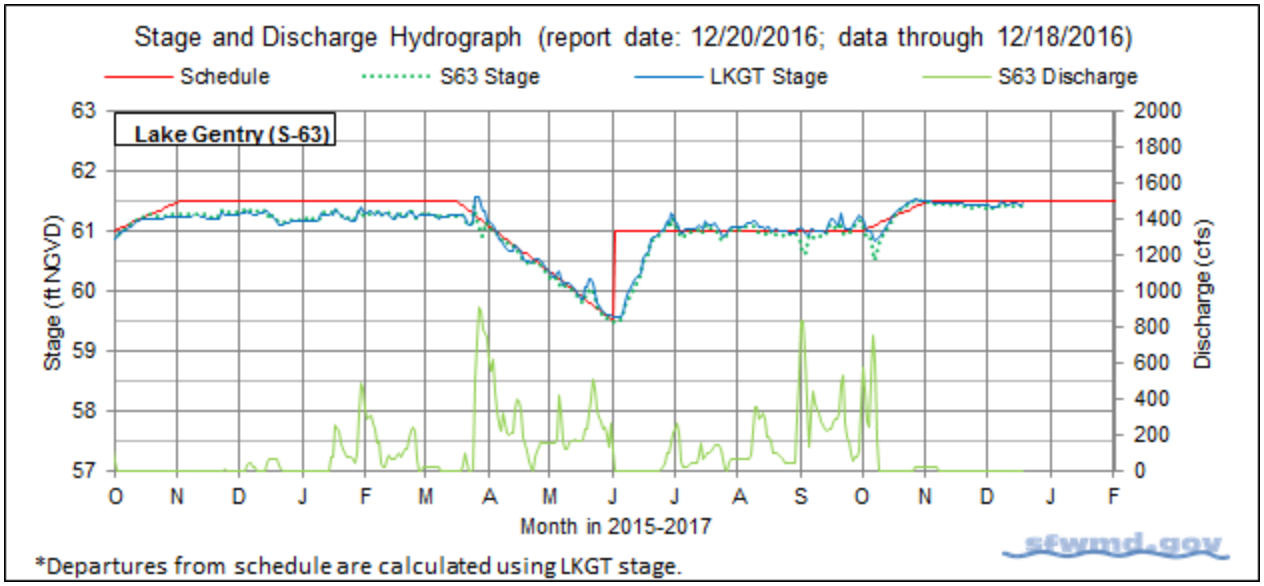


Figure 7.

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

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

Discharge Rate of Change Limits for S65/S65A (revised 11/16/16).	
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.

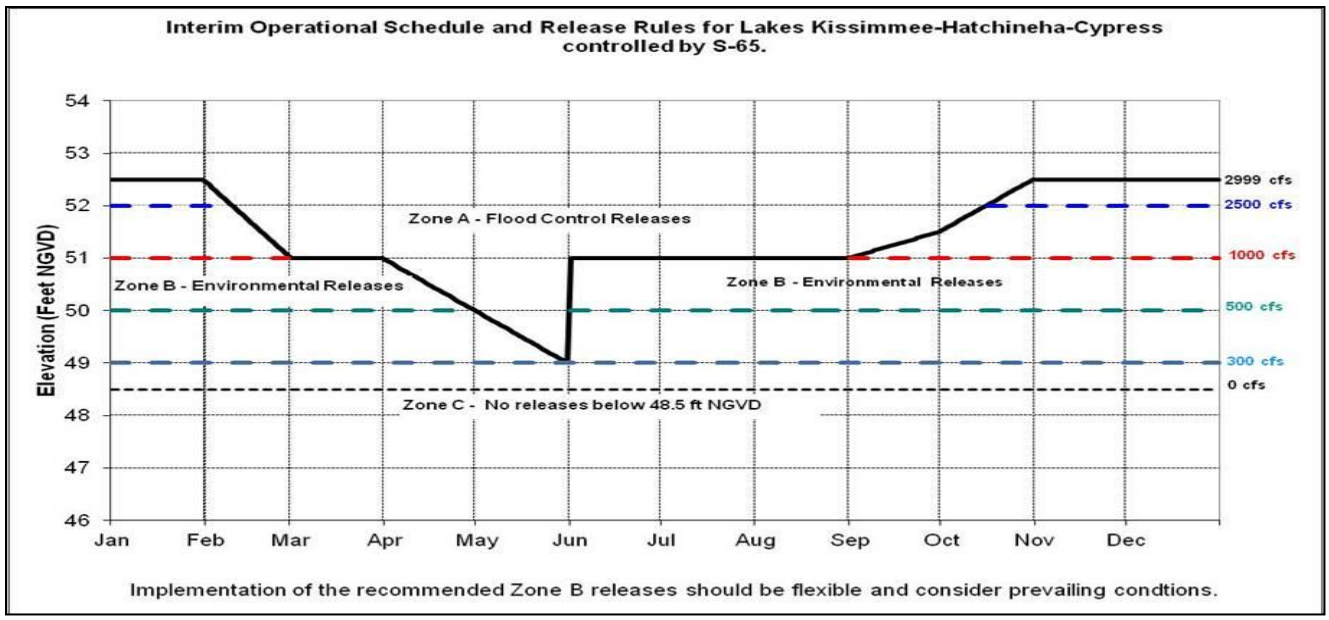


Figure 8b. Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years or in Wet Season 2015.

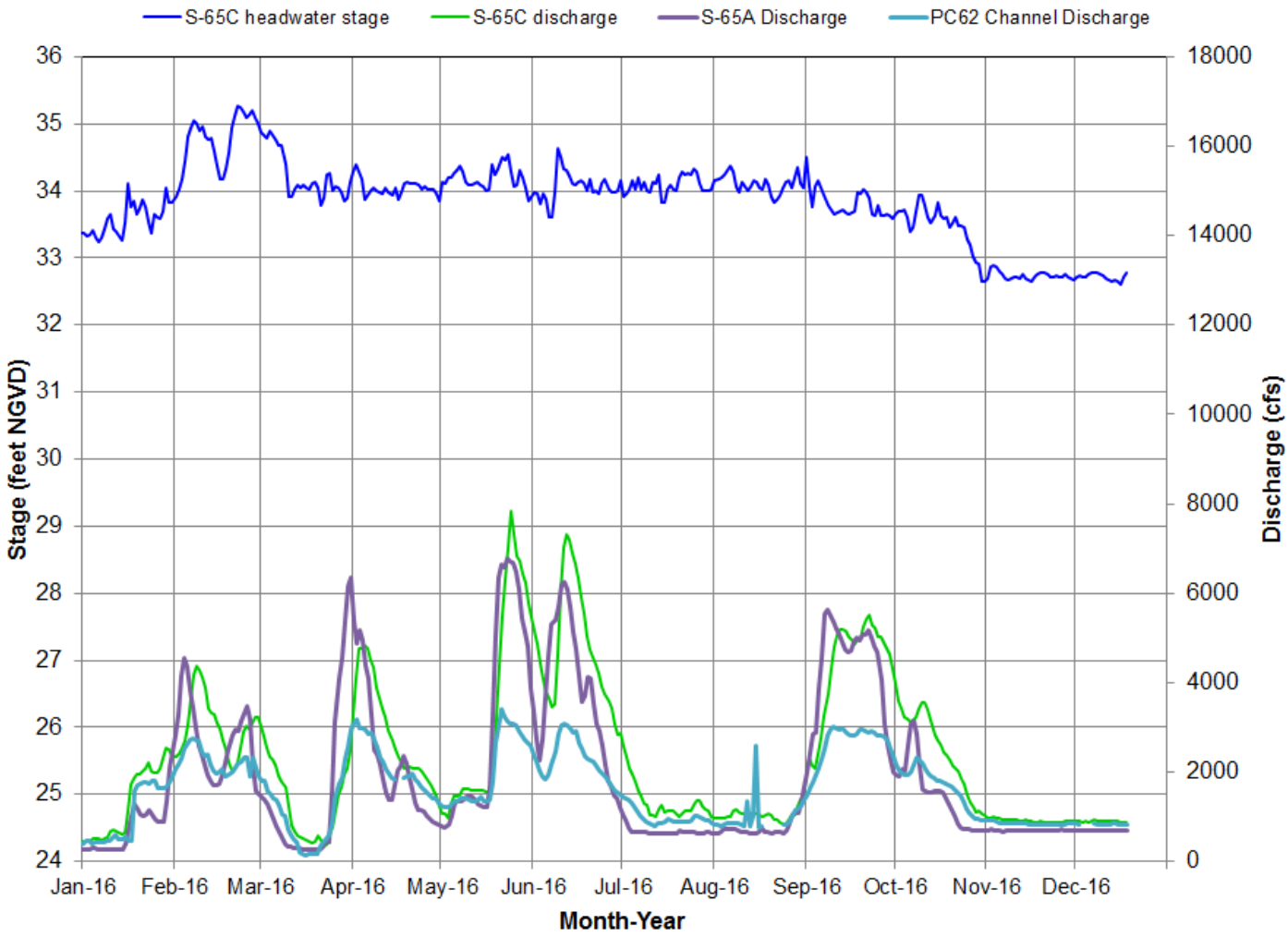


Figure 9. S-65C headwater stage in relation to discharge at S-65C, S-65A, and PC62.

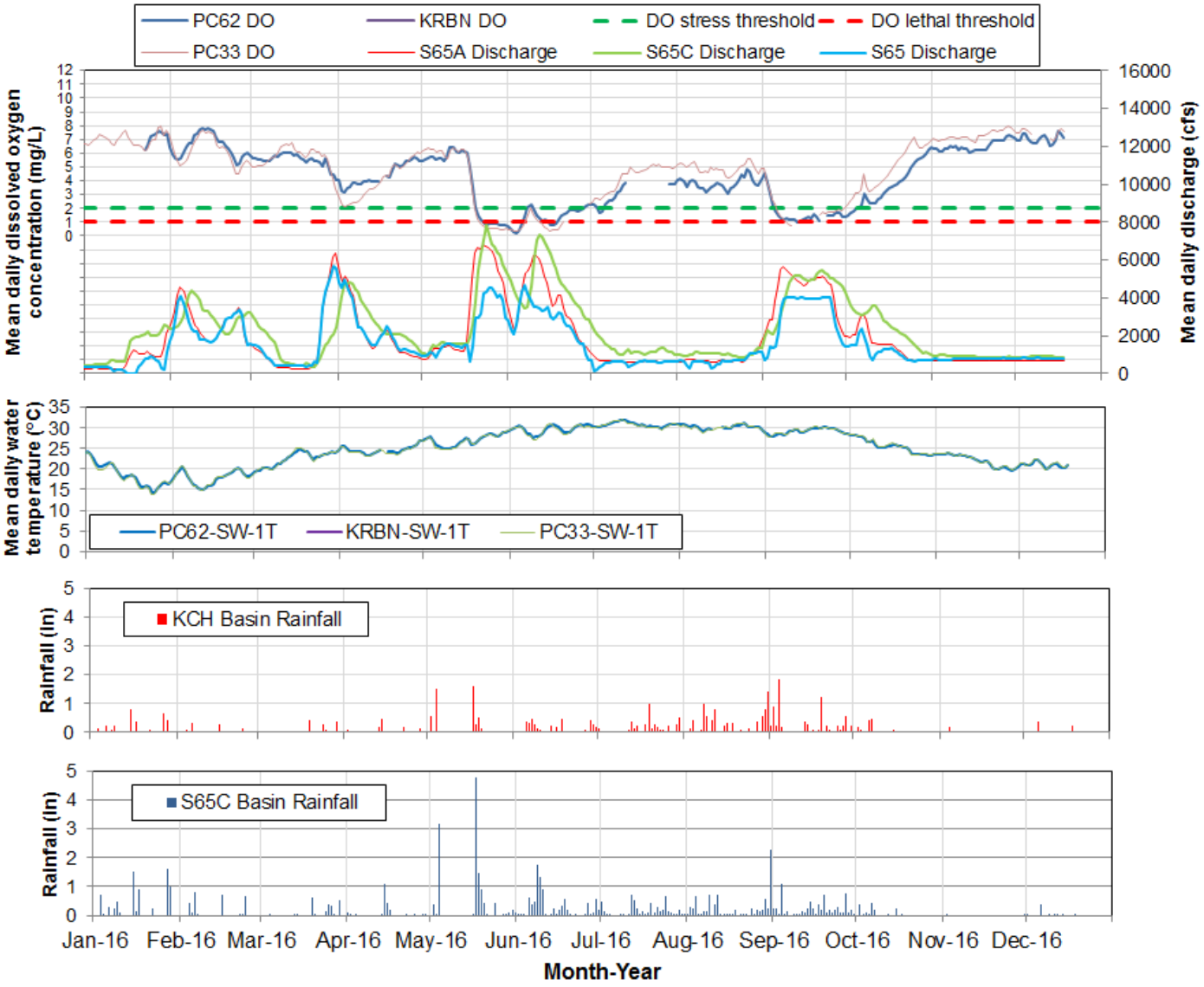


Figure 10. Mean daily Dissolved Oxygen, discharge, temperature and rainfall in the Phase I river channel.

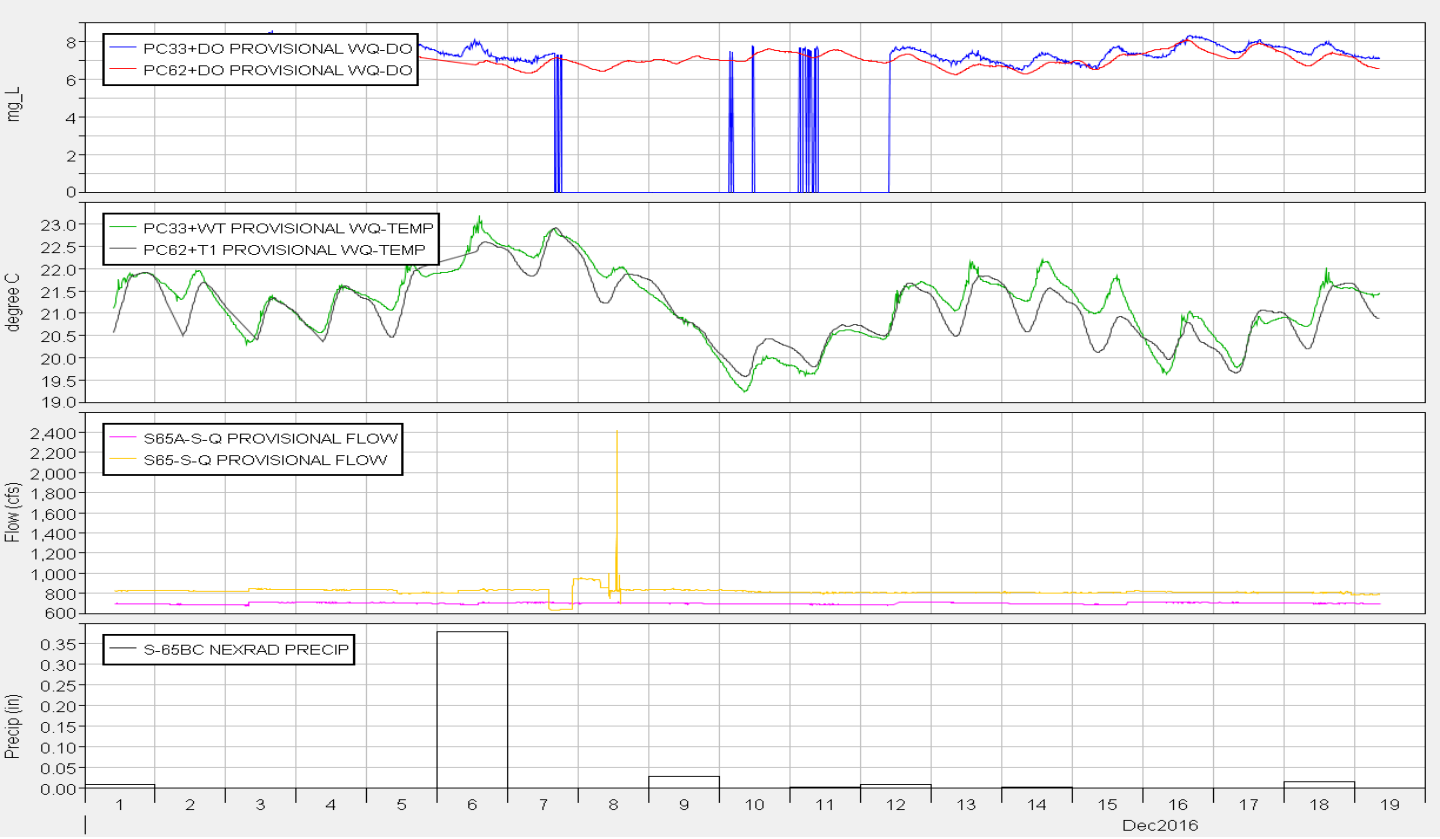


Figure 11. Phase I river channel dissolved oxygen and water temperature (measured at 15 minute intervals) and Pool BC daily rainfall.

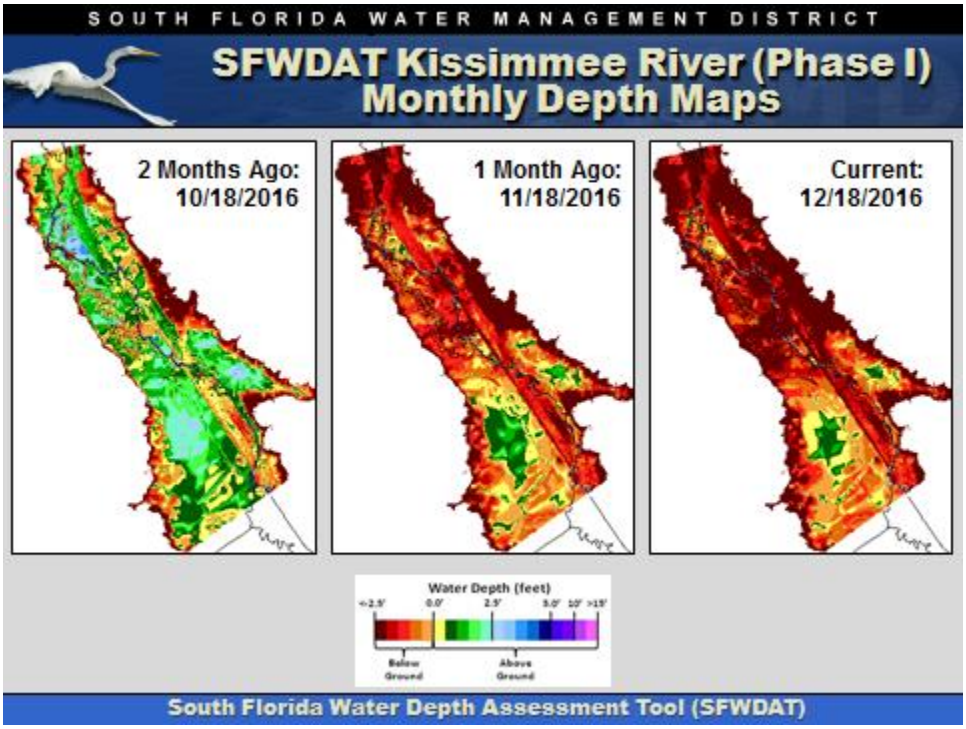
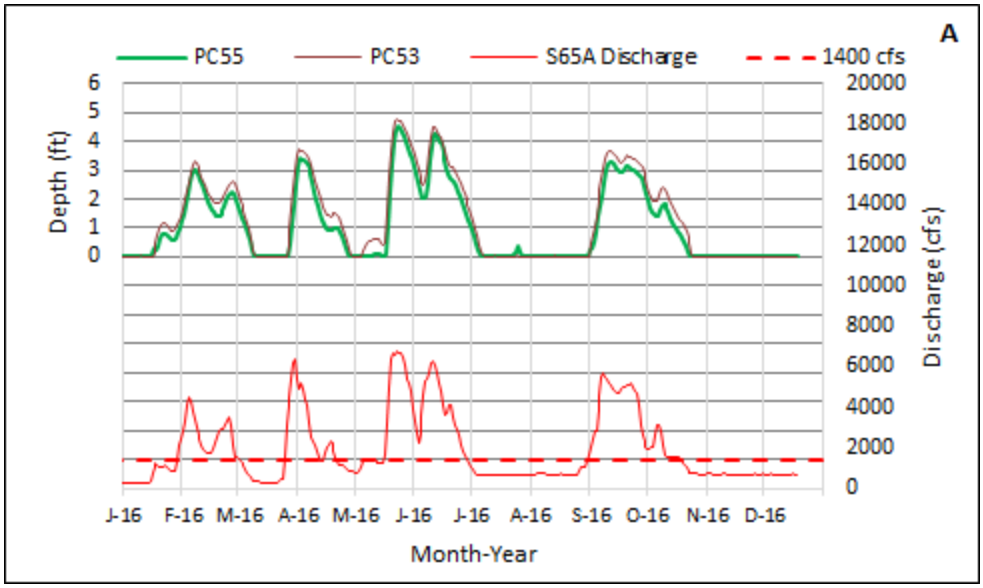
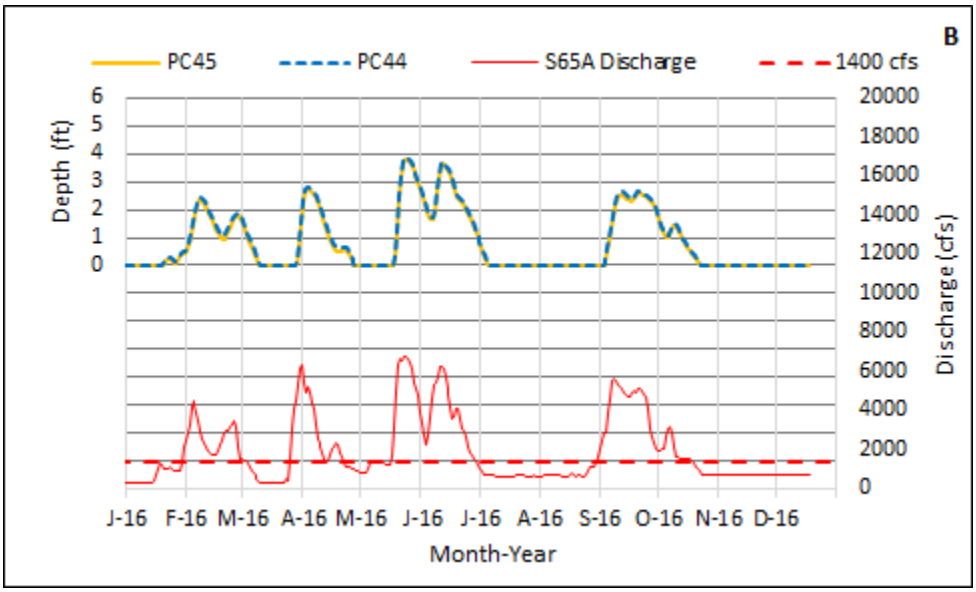


Figure 12. Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to Jan. 16, 2012.





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

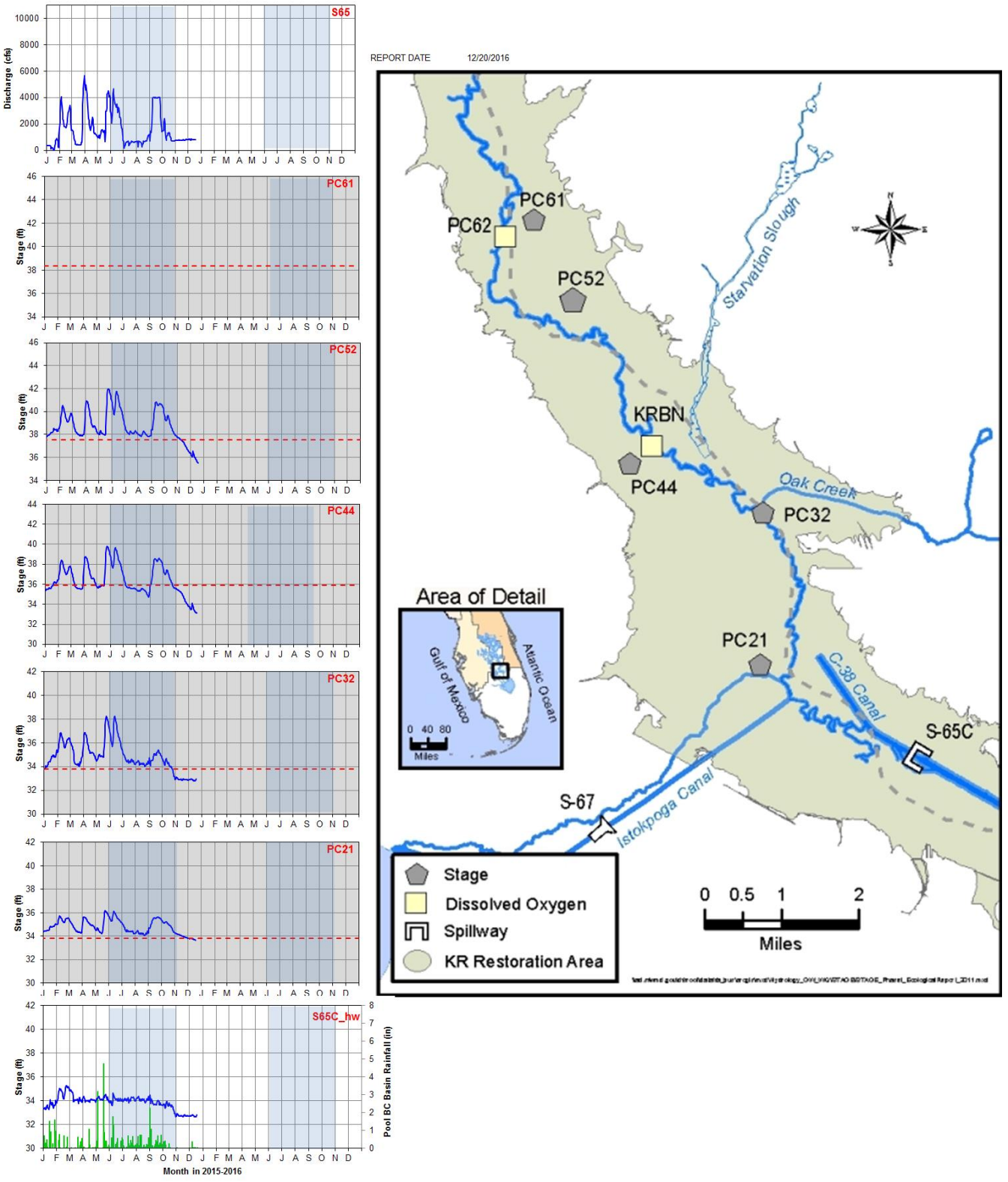


Figure 13. Discharge at S65, stages at five monitoring stations in the Phase I area of the Kissimmee River floodplain, and headwater stage at S65-C since January 1, 2015. The most recent data (~2 weeks) are provisional real-time data from SFWMD DualTrend; previous data are from SFWMD DB-HYDRO (validated).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

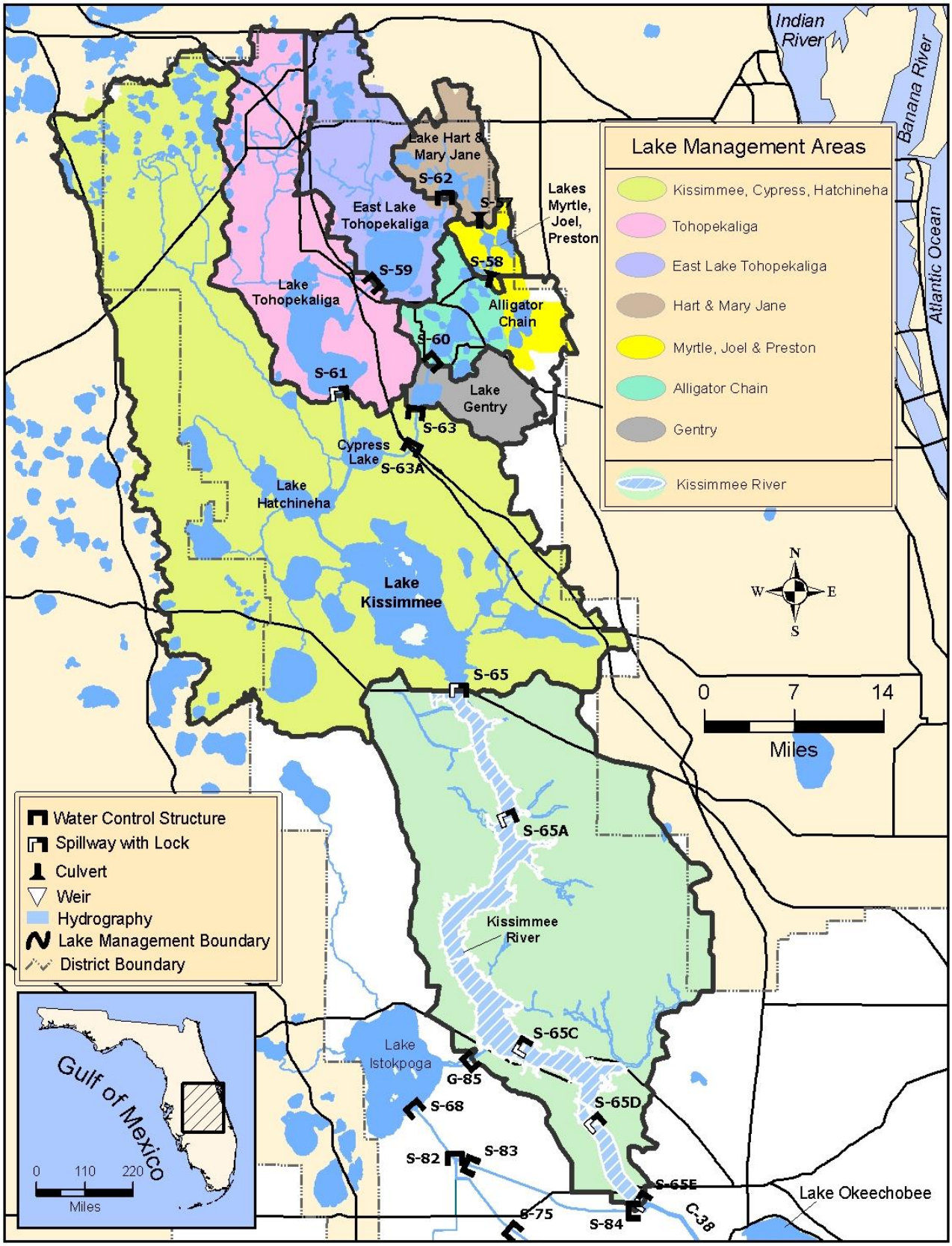


Figure 14. The Kissimmee Basin

LAKE OKEECHOBEE

The USACE web site was unavailable so the information presented here are provisional data from the South Florida Water Management District's (SFWMD) OASyS DualTrend database. Lake Okeechobee stage is at 14.54 feet NGVD for the period ending at midnight on December 18, 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 0.07 feet over the past week and is 0.49 feet lower than it was a month ago and 0.26 feet lower than it was a year ago (Figure 1). The Lake is currently in the Low sub-band (Figure 2). According to RAINDAR, 0.056 inches of rain fell directly over the Lake during the past seven days (Figure 3). Similar to slightly greater amounts of rain fell in the surrounding watershed.

Based on SFWMD reported values, current Lake inflow is approximately 747 cfs as detailed below. No data are available for C5.

Structure	Flow cfs
S65E	732
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	0
Fisheating Creek	15
S2 Pumps	0
S3 Pumps	0
S4 Pumps	0

Current Lake outflow is approximately 2,748 cfs with 1,370 cfs exiting at S77, 8 cfs exiting at S308 and 365 cfs exiting the L8 canal through Culvert 10A. Approximately 1,005 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 855 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 54,815 acres of suitable foraging habitat for long-legged birds and 23,766 acres for long and short-legged birds on the Lake (Figure 5).

November chlorophyll data indicate the presence of bloom level concentrations (40 ppb or greater) at one nearshore station along the western shoreline (Figure 6). One of the six stations at which microcystin-LR are collected and measured by ELISA (as opposed to microcystin samples as

measured by summing all microcystin cogeners as done by Department of Environmental Protection) had values exceeding the limit of detection of 0.2 ppb.

The MODIS satellite image from November 10 confirms the presence of bloom activity along the western shoreline (Figure 7). The most recent image (December 14) indicates low bloom conditions; however, interpretation in the southwestern region is confounded by cloud cover.

Total phosphorus (TP) values in November decreased in both the nearshore zone and overall compared to October while total suspended solid (TSS) values were similar (Figure 8).

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 0.07 feet equates to a monthly recession rate of 0.28 feet, which is 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, reaching 12.50 feet NGVD by the end of the dry season, and avoiding any reversals. Any activities which contribute to maintaining the current recession rate would be ecologically beneficial.

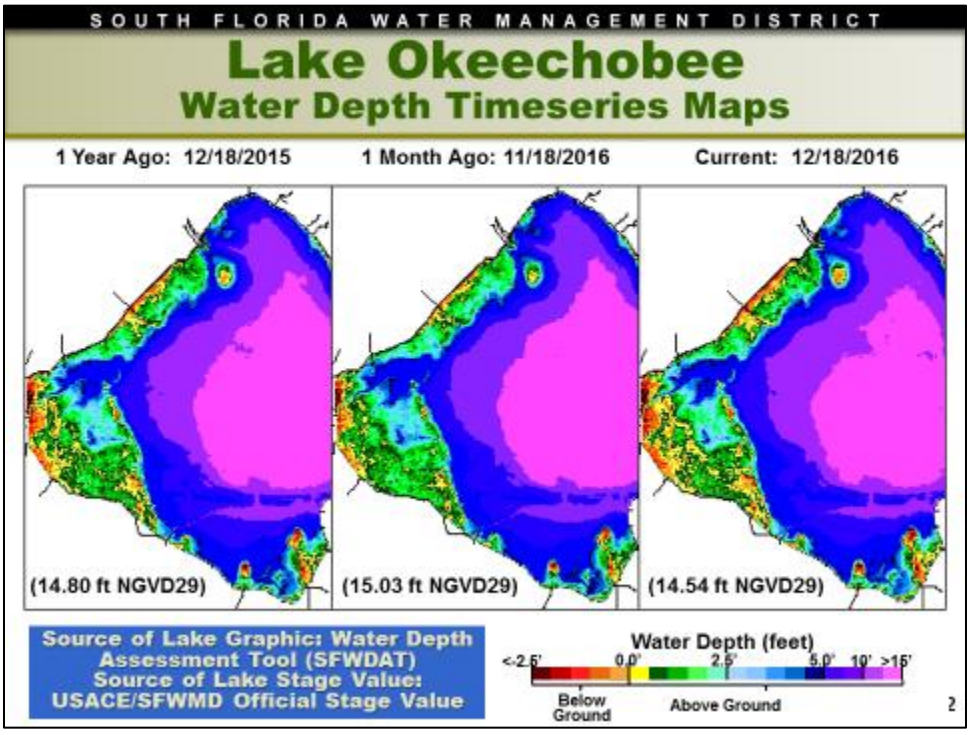


Figure 1

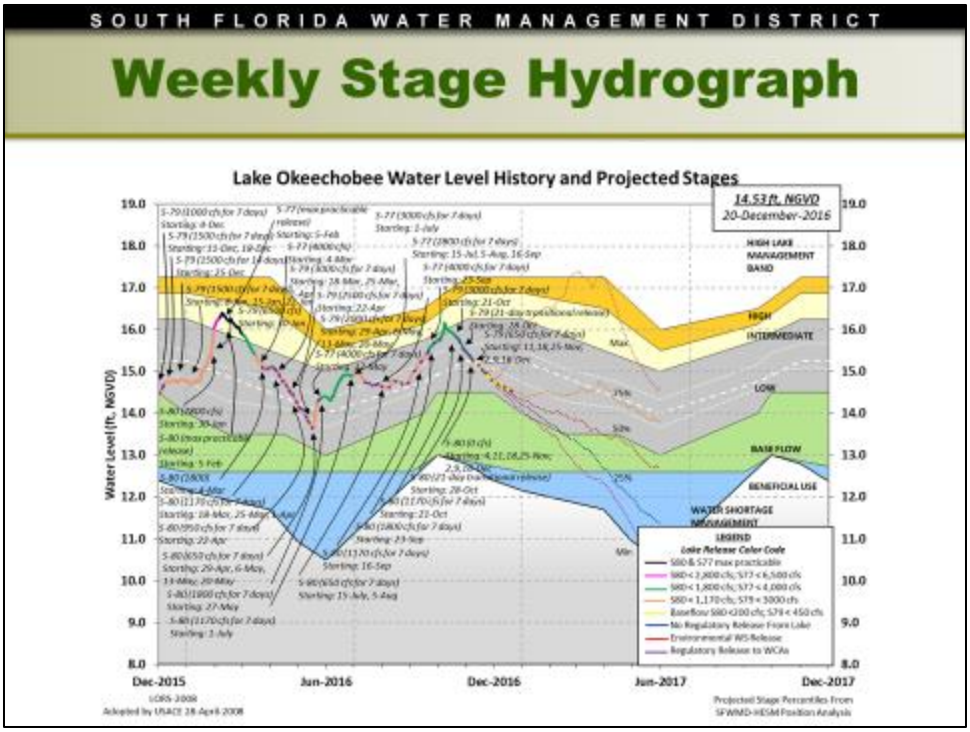

SOUTH FLORIDA WATER MANAGEMENT DISTRICT
Weekly Stage Hydrograph
Lake Okeechobee Water Level History and Projected Stages
14.53 ft. NGVD
20-December-2016
HIGH LAKE MANAGEMENT BAND
HIGH
INTERMEDIATE
LOW
BASE FLOW
BENEFICIAL USE
WATER SHORTAGE MANAGEMENT
LEGEND
Lake Release Color Code
Water Level (ft. NGVD)
Dec-2015
Jun-2016
Dec-2016
Jun-2017
Dec-2017
LORS 2008
Adopted by USACE 28 April 2008
Projected Stage Percentiles From
SFWMD-HESM Position Analysis

Figure 2

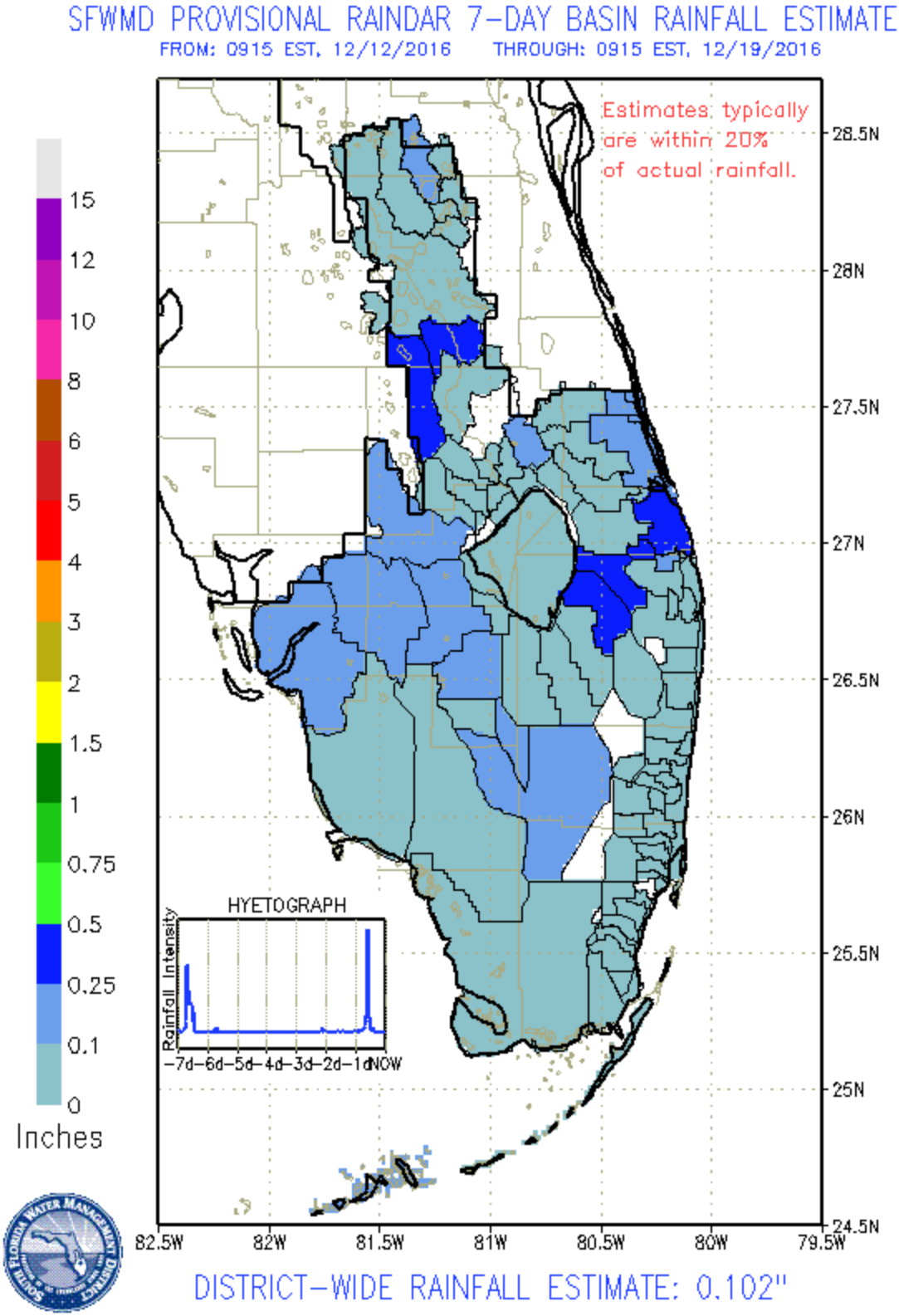

SFWMD PROVISIONAL RAINDAR 7-DAY BASIN RAINFALL ESTIMATES
FROM: 0915 EST, 12/12/2016 THROUGH: 0915 EST, 12/19/2016
Estimates typically are within 20% of actual rainfall.
15
12
10
8
6
5
4
3
2
1.5
1
0.75
0.5
0.25
0.1
0
Inches
HYETOGRAPH
Rainfall Intensity
-7d-6d-5d-4d-3d-2d-1d NOW
28.5N
28N
27.5N
27N
26.5N
26N
25.5N
25N
24.5N
82.5W
82W
81.5W
81W
80.5W
80W
79.5W
DISTRICT-WIDE RAINFALL ESTIMATE: 0.102"

Figure 3

INFLOWS	Average Daily Flow Past Week cfs	Feet of Change Past Week
S65E	782	0.026
S71 & 72	0	0.000
S84 & 84X	3	0.000
Fisheating Creek	24	0.001
Rainfall	N.A.	0.005
OUTFLOWS	**Average Daily Flow Past Week cfs**	**Feet of Change Past Week**
S77	770	0.026
S308	-8	0.000
S351	543	0.018
S352	206	0.007
S354	571	0.019
L8	357	0.012
ET	855	0.029

Figure 4

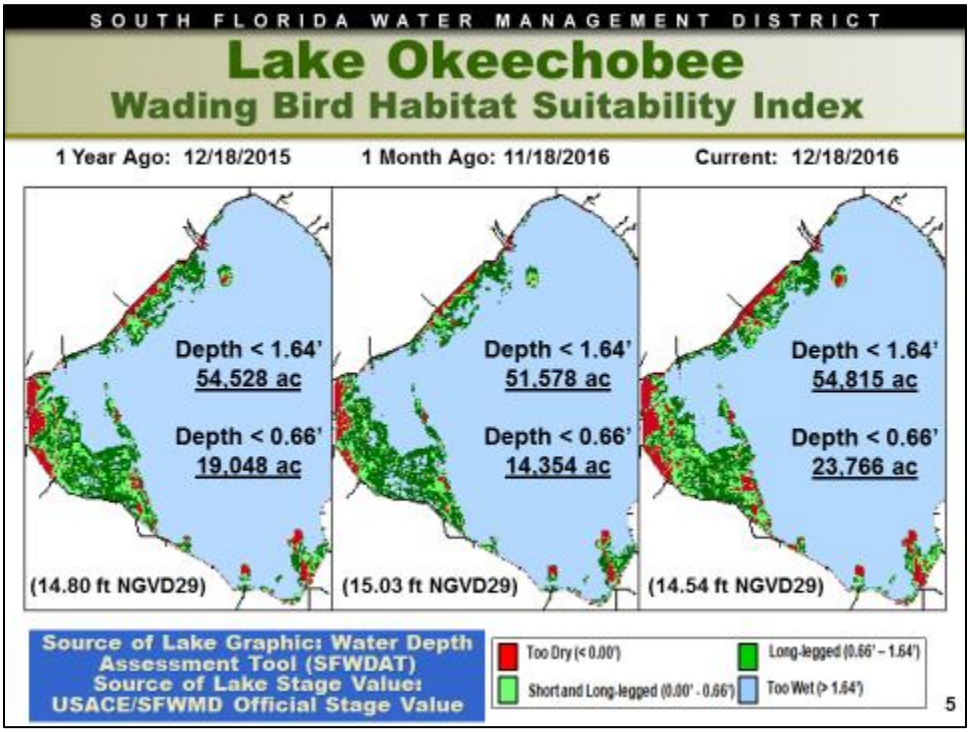


Figure 5

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Lake Okeechobee
Water Quality

Nov. 1-2 and Nov. 21, 2016		
Site	Chlorophyll *a* (ug/L)	Microcystin (ug/L)
Nearshore Stations		
FEBIN	9.1	
FEBOUT	10.2	
KISSR0.0	10.3	0.20
LZ2	20.3	0.20
LZ25A	18.8	
PALMOUT	53.6	
PELBAY3	12.1	
POLE3S	24.5	
POLESOUT	23.7	0.20
RITTAE2	26.6	
Pelagic Stations		
L001	10.4	
L004	4.7	
L005	29.5	0.20
L006	10.7	
L007	14.6	
L008	22.8	
LZ30	13.1	0.32
LZ40	9.3	
CLV10A	5.4	0.20

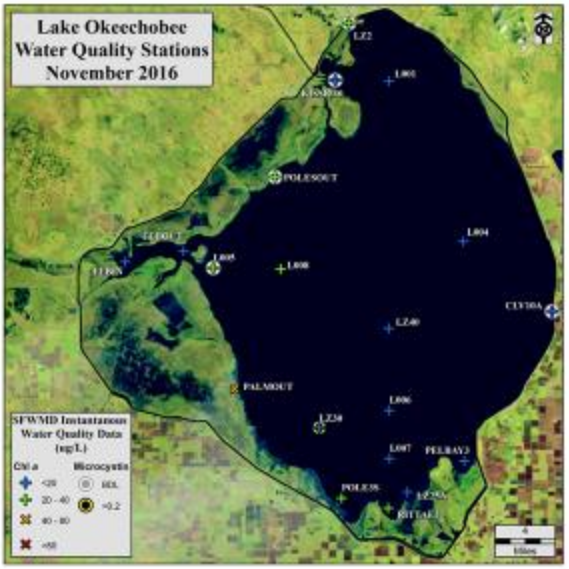


Figure 6

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Lake Okeechobee
Algal Blooms

Unvalidated and Experimental Data

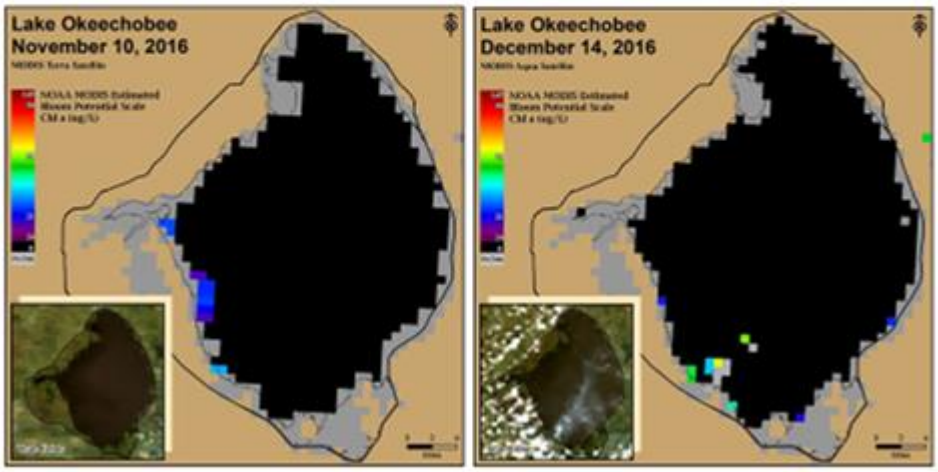
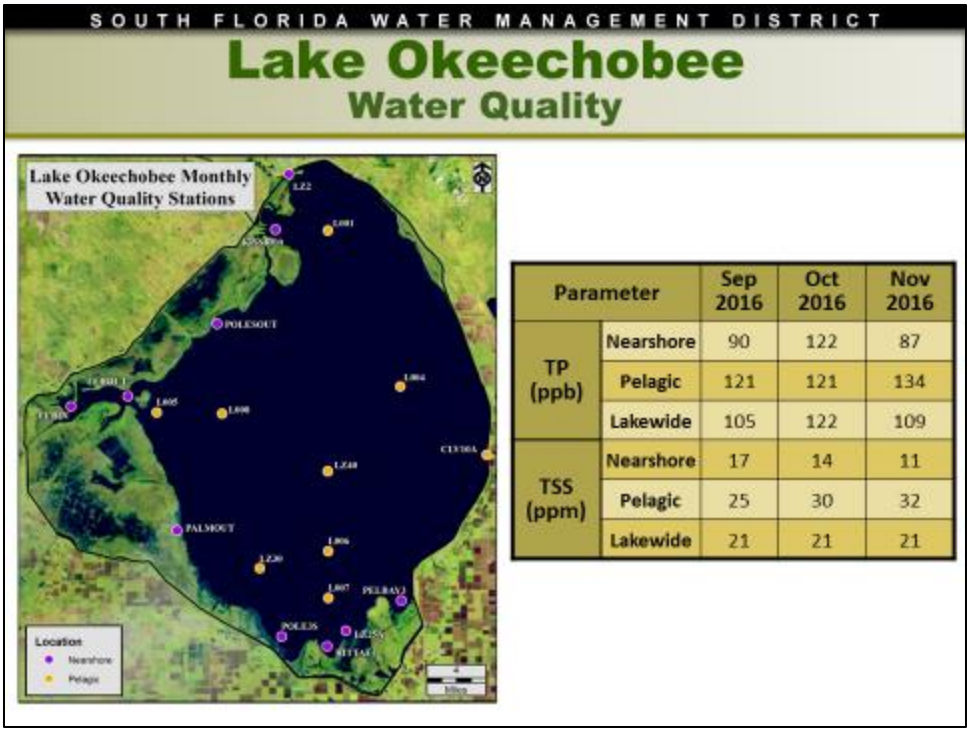


Figure 7



Parameter		Sep 2016	Oct 2016	Nov 2016
TP (ppb)	Nearshore	90	122	87
	Pelagic	121	121	134
	Lakewide	105	122	109
TSS (ppm)	Nearshore	17	14	11
	Pelagic	25	30	32
	Lakewide	21	21	21

Figure 8

Lake Istokpoga

The Lake Istokpoga regulation schedule is at winter pool stage of 39.50 feet NGVD. Lake stage is 39.43 feet NGVD and is currently 0.07 feet below regulation stage (Figure 9). Average flows into the Lake from Arbuckle and Josephine creeks were 166 cfs and 25 cfs, respectively, a slight decrease in total flows from the previous week. Average discharge from S68 and S68X this past week was 85 cfs, an increase from the previous week. According to RAINDAR, 0.292 inches of rain fell in the Lake Istokpoga watershed during the past seven days.

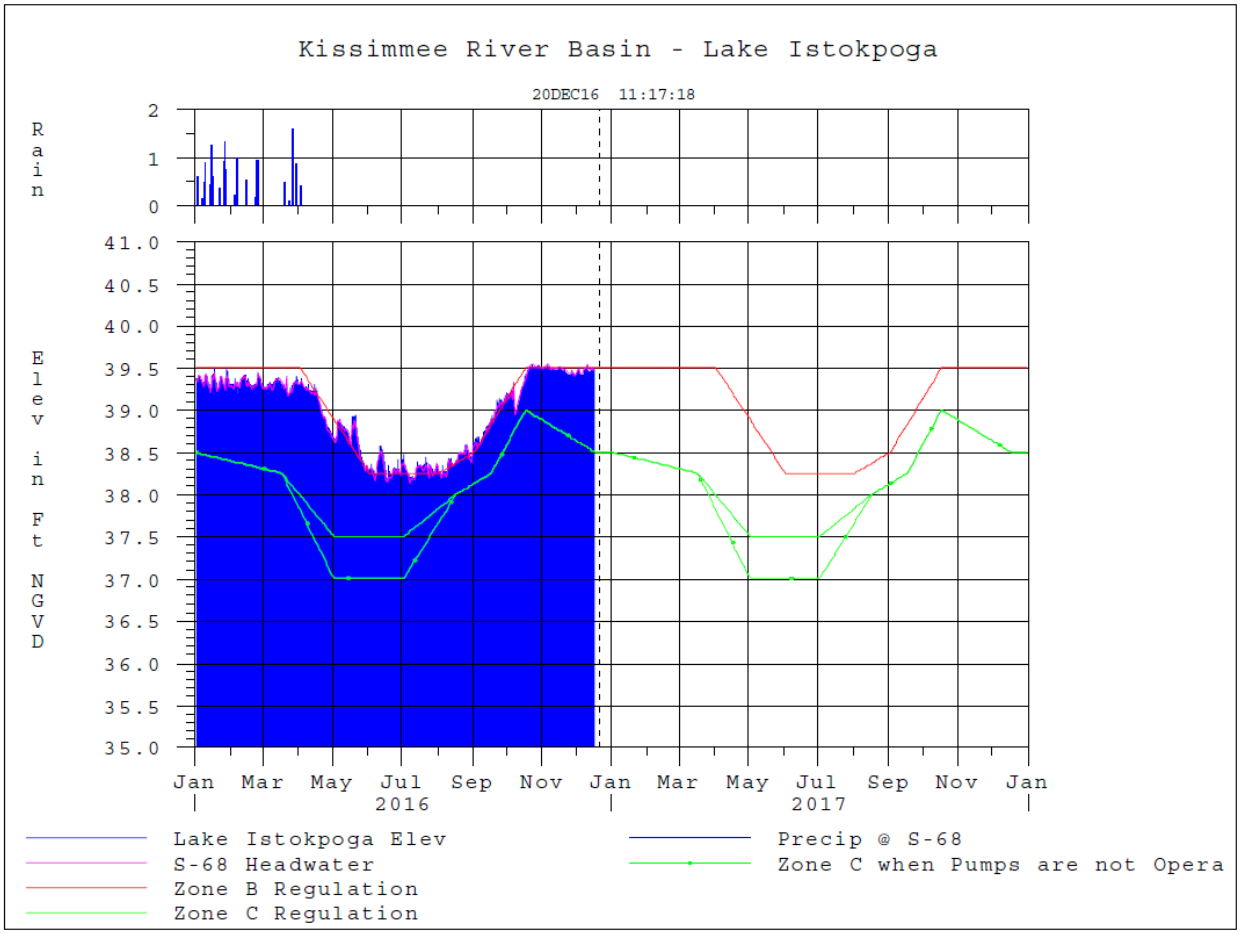


Figure 9

ESTUARIES

St. Lucie Estuary

Over the past week, provisional flows averaged about 0 cfs at S-80, 10 cfs downstream of S-308 is flowing into Lake Okeechobee, 0 cfs at S-49 on C-24, 0 cfs at S-97 on C-23, and 72 cfs from Ten Mile Creek at the Gordy Road Structure. Average inflow from tidal basin tributaries is estimated to be 112 cfs (Figures 1 and 2). Total inflow averaged about 184 cfs last week and 202 cfs over last month.

Over the past week in the estuary, salinity increased to A1A Bridge where salinity remained the same as last week (Table 1, Figures 3 and 4). The seven-day moving average salinity of the water column at the US1 Bridge is about 23.4. 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)	**19.8** (18.4)	**21.8** (20.6)	NA[1]
US1 Bridge	**23.1** (22.0)	**23.7** (23.0)	10.0-26.0
A1A Bridge	**29.5** (29.5)	**30.8** (30.9)	NA

[1]Envelope not applicable

Caloosahatchee Estuary

During the past week, provisional flows averaged approximately 712 cfs at S-77, 515 cfs at S-78, and 683 cfs at S-79. Average inflow from tidal basin tributaries is estimated to be 115 cfs (Figures 5 and 6). Total inflow averaged 798 cfs last week and 817 cfs over last month.

Over the past week, salinity increased downstream 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 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)	**2.8** (2.5)	**2.7** (2.5)	NA[1]
*Val I75	**3.6** (3.3)	**5.9** (5.0)	0.0-5.0[2]
Ft. Myers Yacht Basin	**10.3** (8.6)	**12.2** (11.0)	NA
Cape Coral	**17.3** (16.1)	**19.4** (17.9)	10.0-30.0
Shell Point	**EM**[3] (EM)	**28.4** (EM)	10.0-30.0
Sanibel	**31.2** (30.3)	**31.3** (30.5)	10.0-30.0

[1]Envelope not applicable, [2]Envelope is based on a 30-day average, [3]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. Live data will be unavailable until website upgrades are complete.

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 *a* (µg/l)	Unavailable	Unavailable	Unavailable
Dissolved Oxygen (mg/l)	Unavailable	Unavailable	Unavailable

The Florida Fish and Wildlife Research Institute reported on December 16, 2016, that *Karenia brevis*, the Florida red tide organism, was observed in background to medium concentrations in 17 samples collected from Lee County. The only medium concentration was located at Cork Island (West of Pine Island Sound) on December 13. All other samples in Lee County were background to low concentrations.

Water Management Recommendations

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

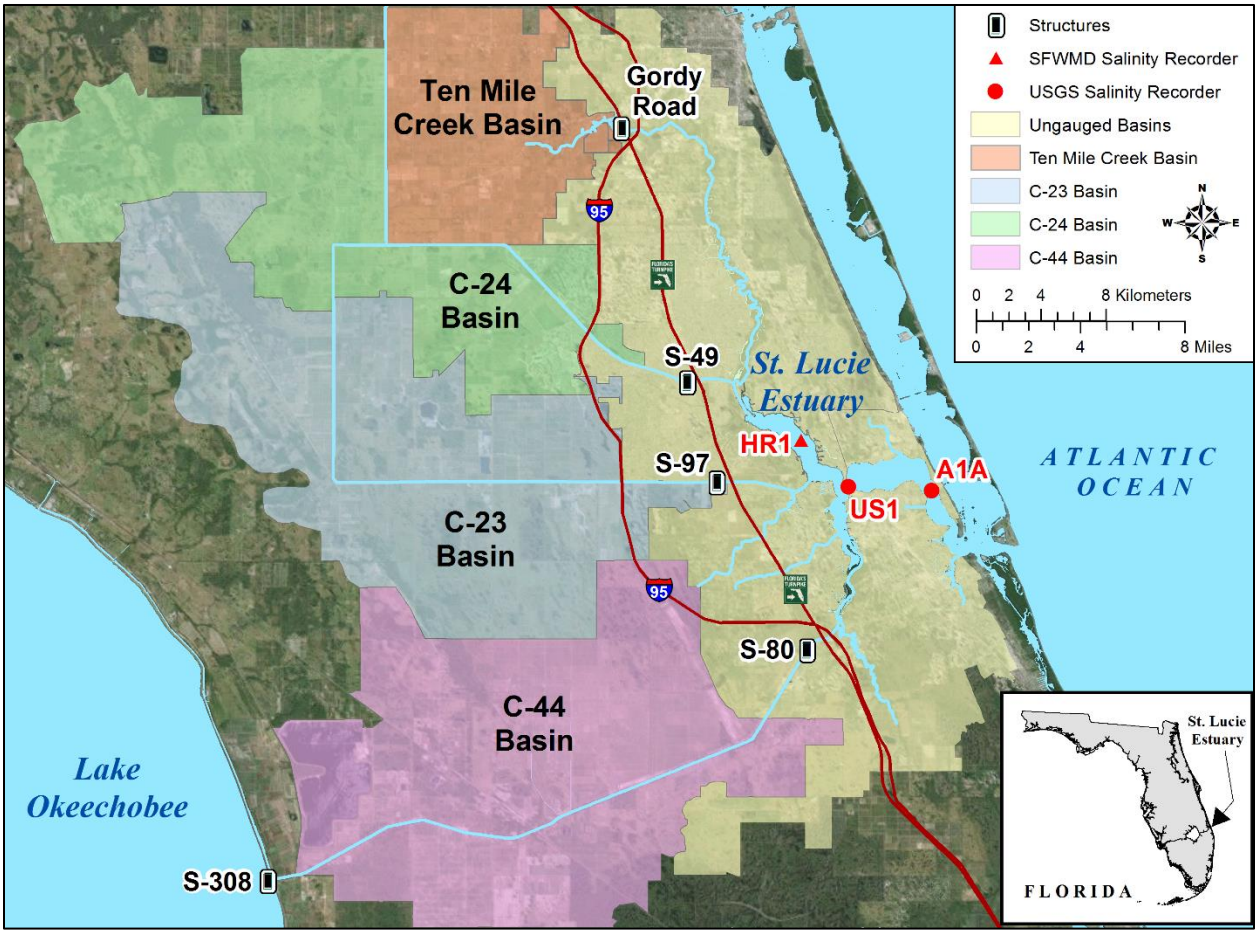


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

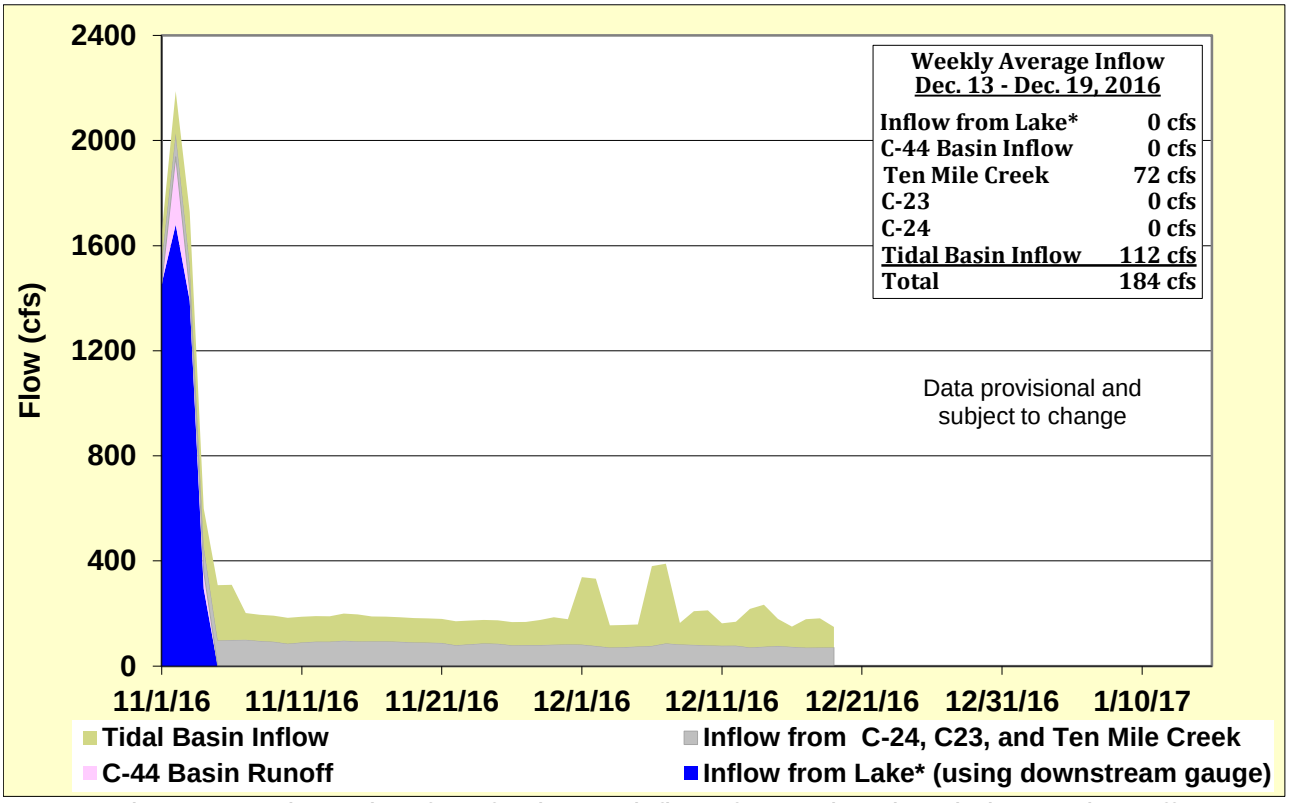


Figure 2. Estimated surface freshwater inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basins into the St. Lucie Estuary.

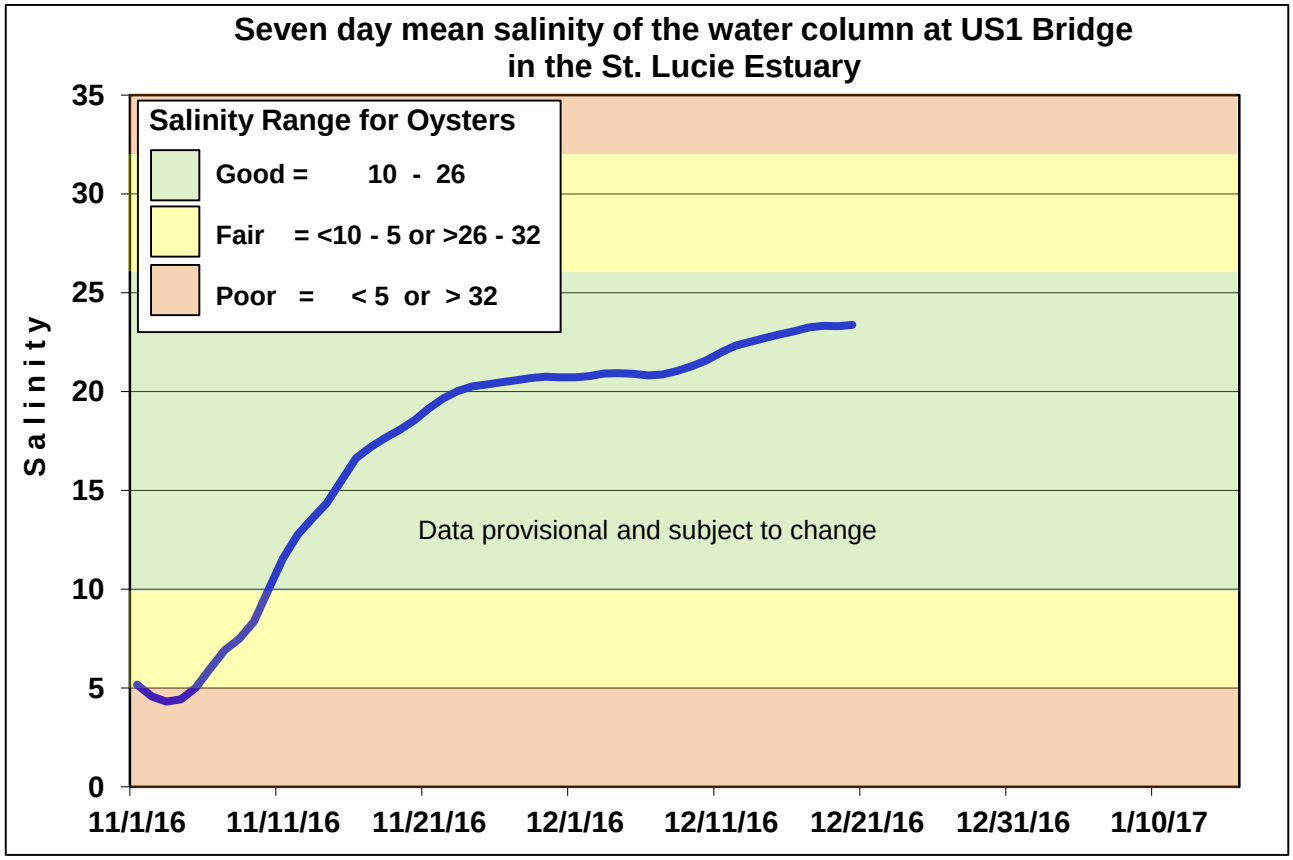


Figure 3. Seven-day mean salinity of the water column at the U.S. Highway 1 Bridge.

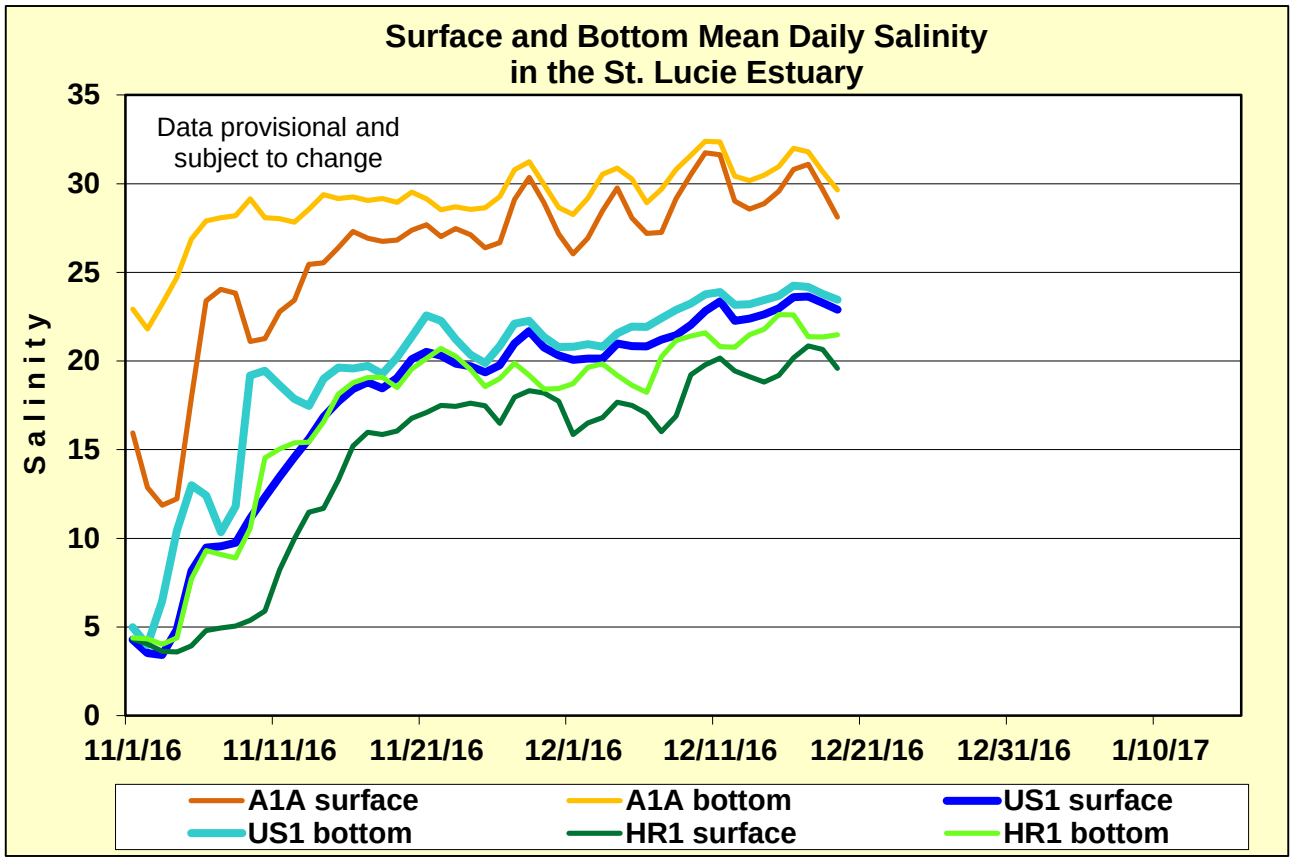


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

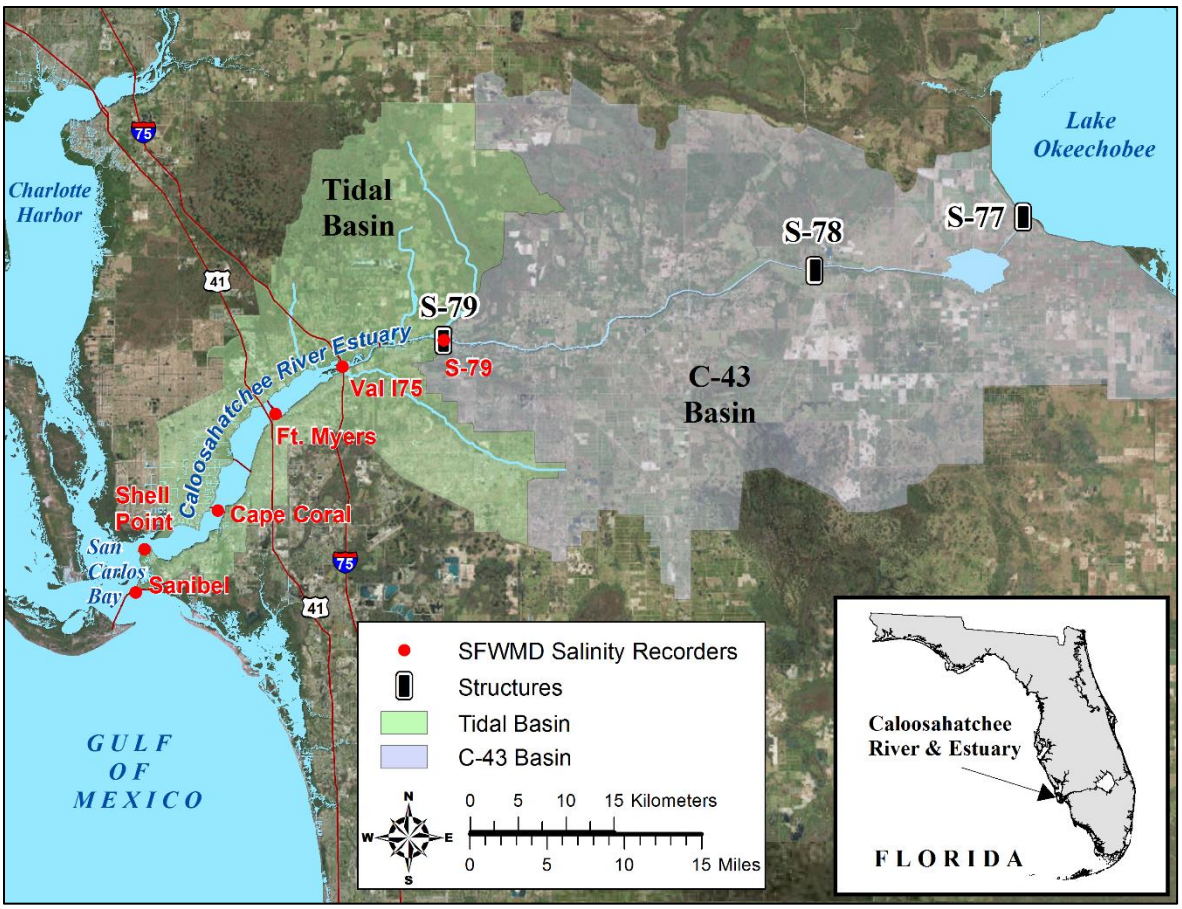


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

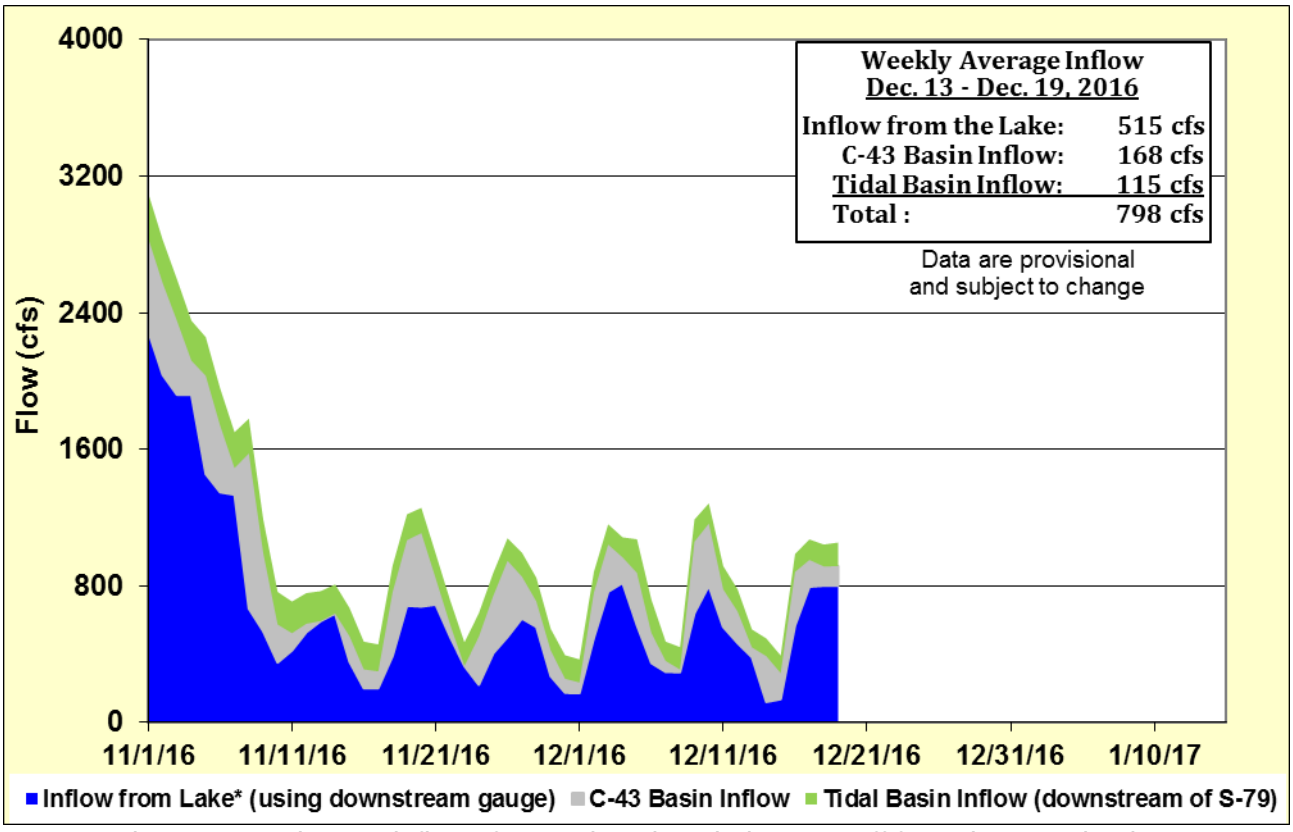
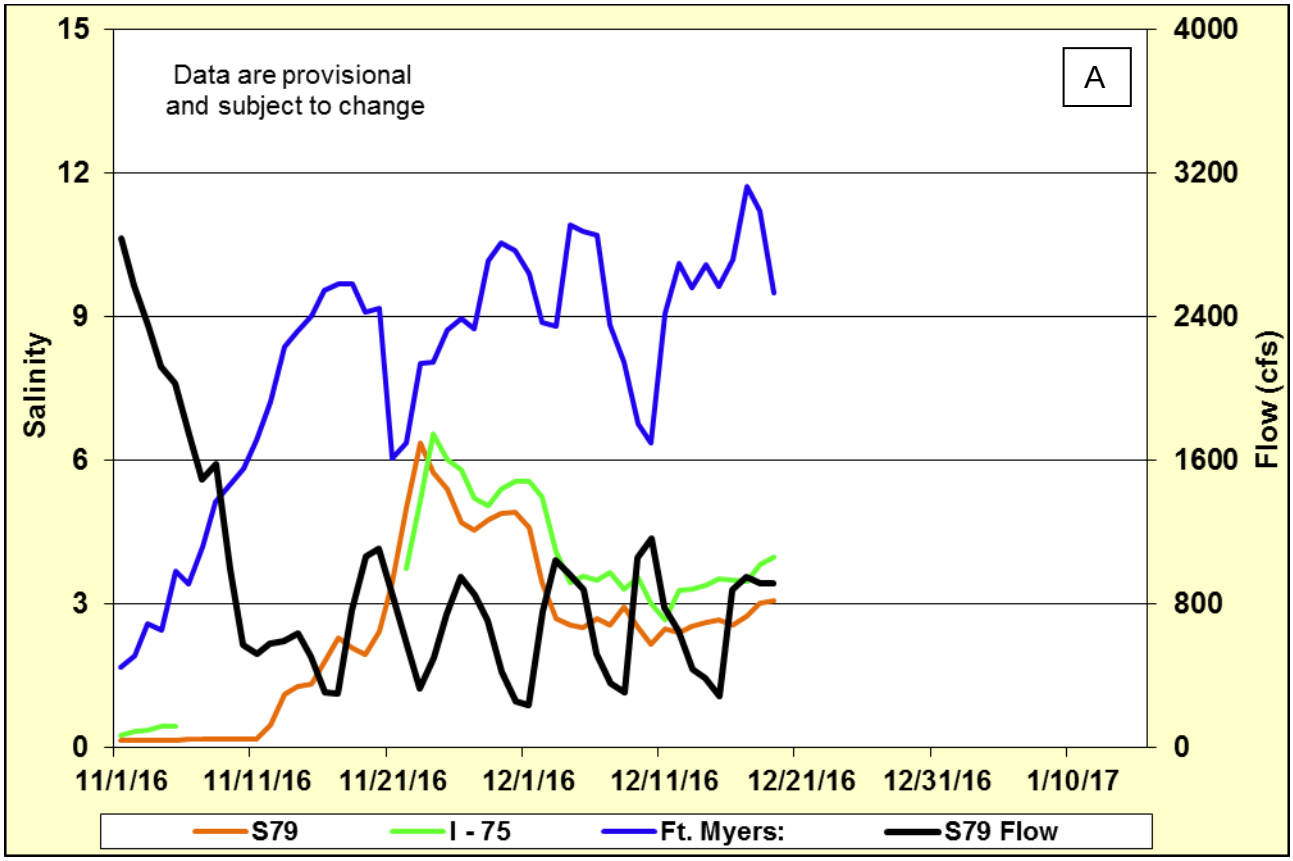


Figure 6. Freshwater inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.



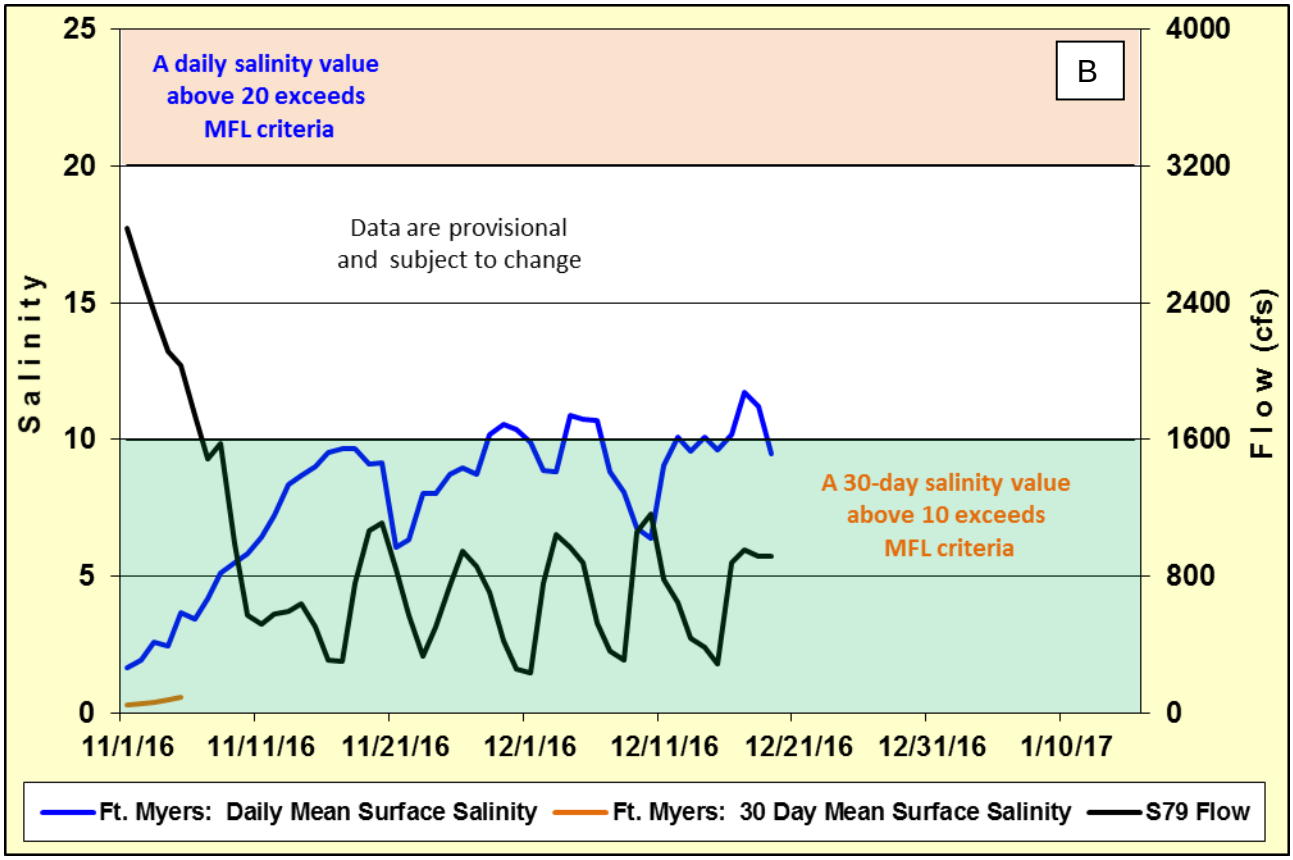


Figure 7. Daily mean flows at S-79 and salinity at upper estuary monitoring stations (A) and 30-day moving average salinity at Ft. Myers (B).

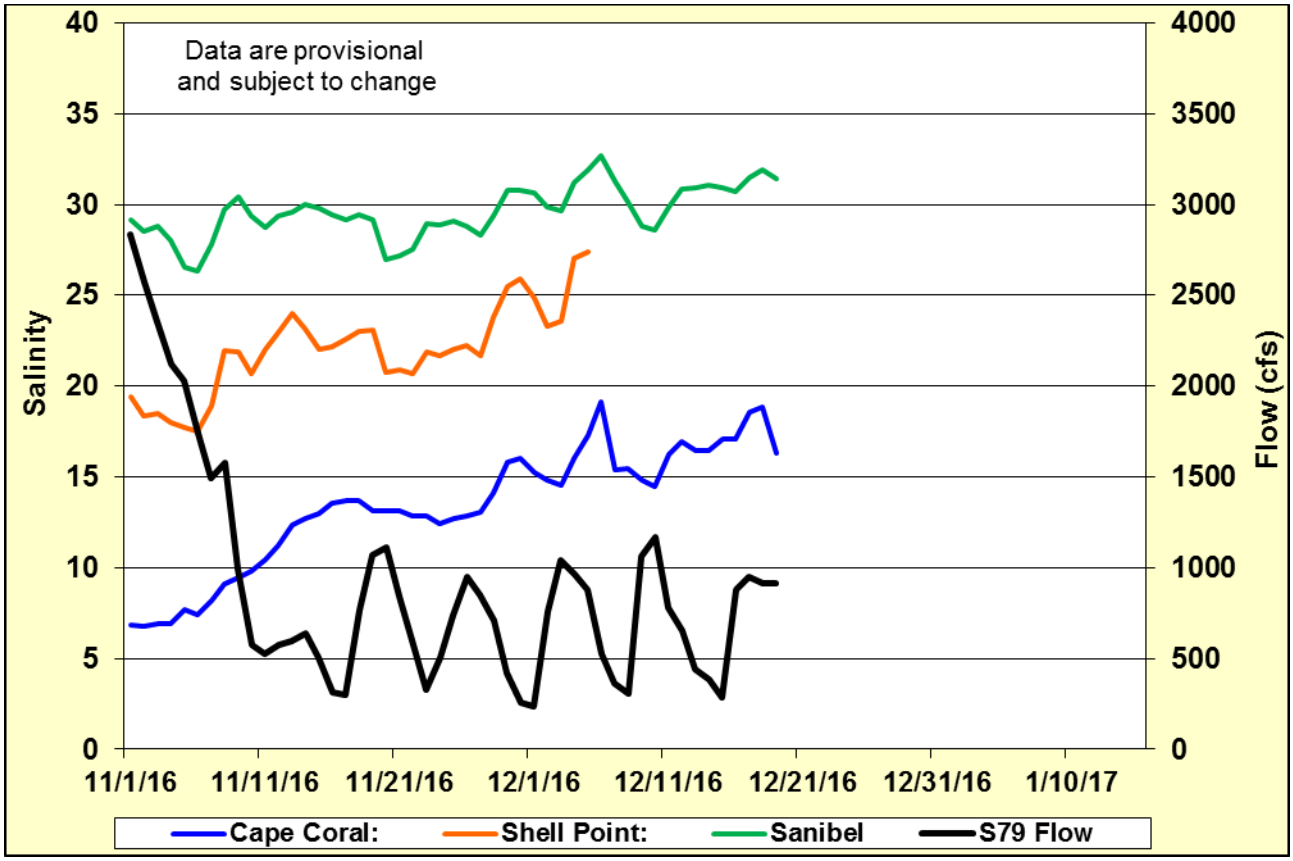


Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.

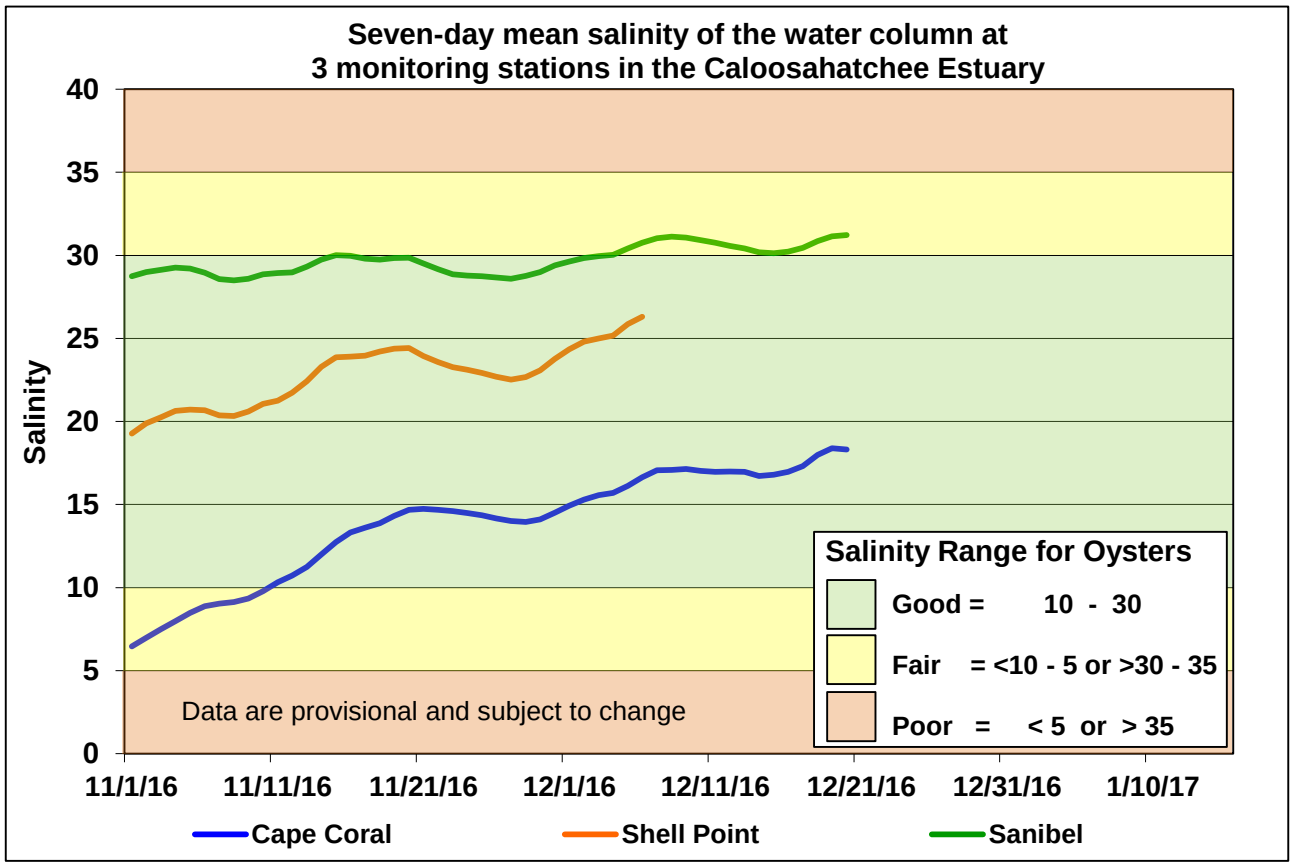


Figure 9. Seven-day mean salinity at Cape Coral Bridge, Shell Point and Sanibel Bridge monitoring stations.

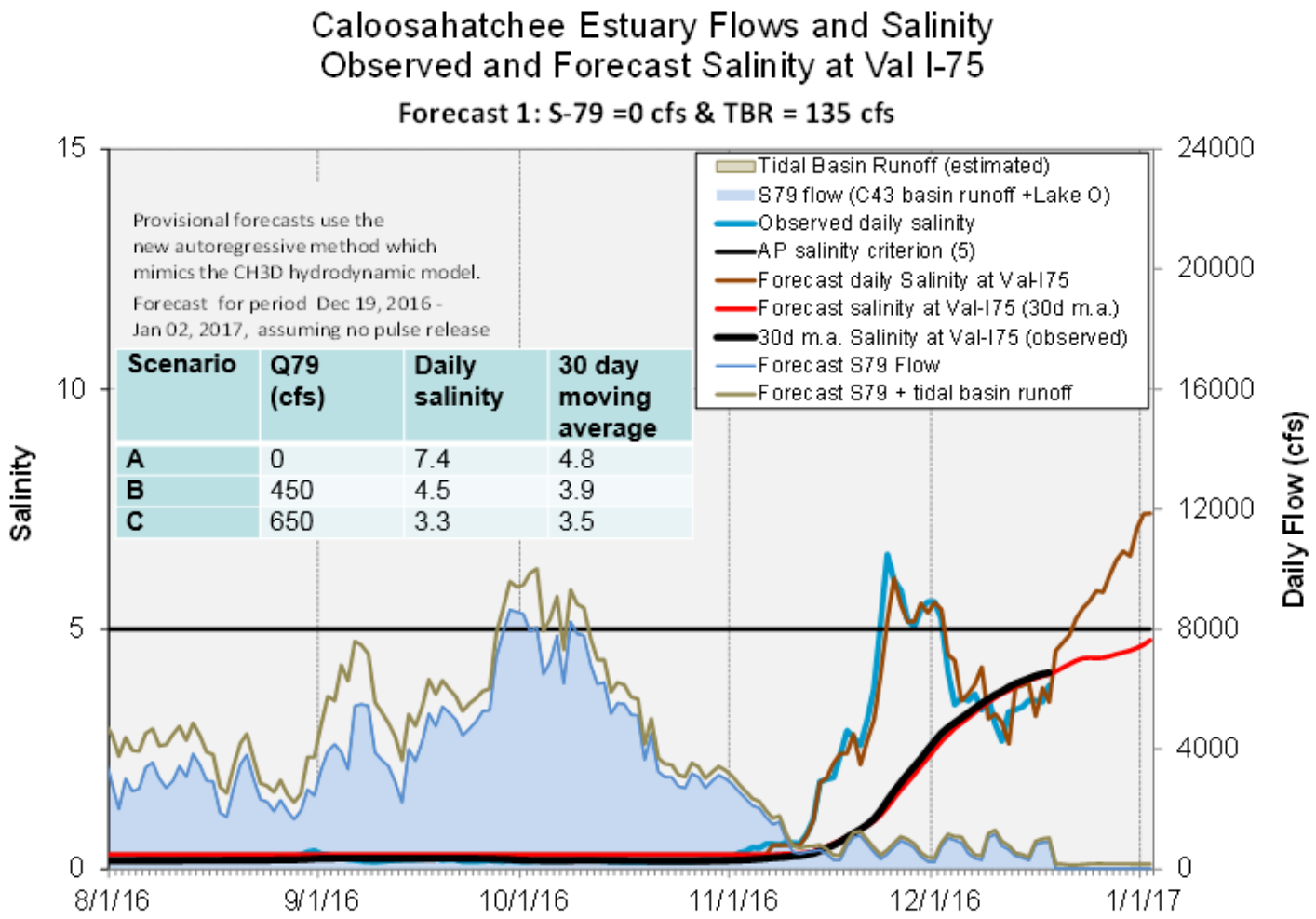
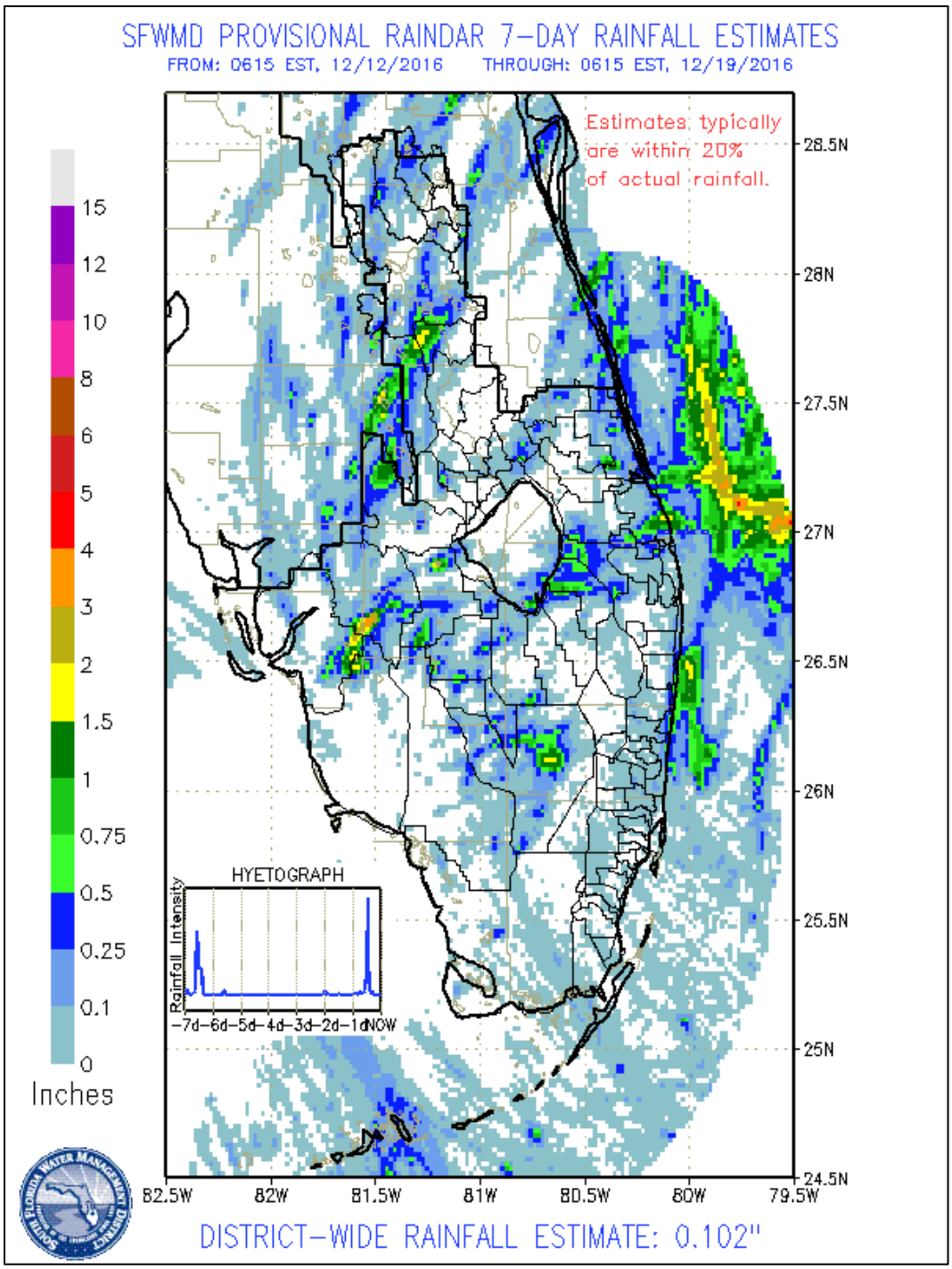


Figure 10. 14-day salinity forecast at Val I-75 assuming no releases at S-79.

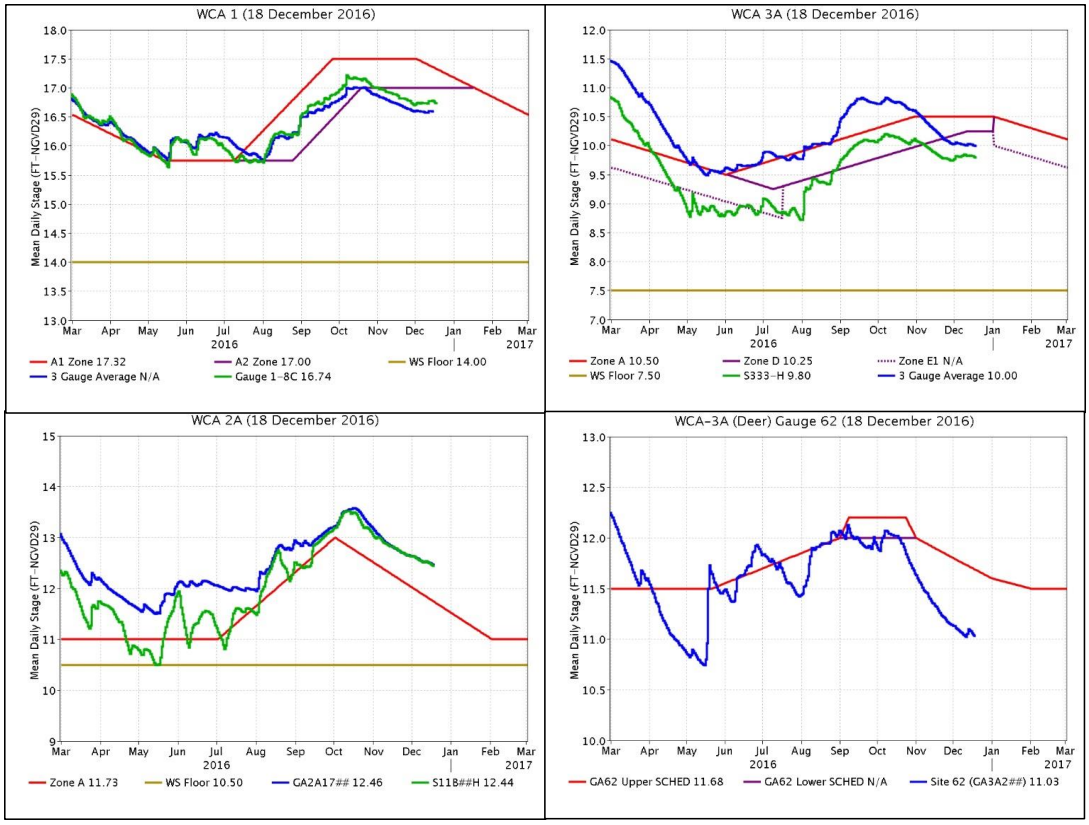
GREATER EVERGLADES

Rainfall was very low again last week in the WCAs and Everglades National Park (ENP), ranging from a trace to 0.17 inches. Stages decreased from -0.02 feet to -0.08 feet throughout the region. The local maximum rainfall was 1.63 inches in WCA-3A. Pan evaporation was 0.73 inches, slightly below the pre-project average of 0.76 inches.

Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	0.01	-0.02
WCA-2A	<0.01	-0.08
WCA-2B	0.01	-0.07
WCA-3A	0.17	-0.04
WCA-3B	<0.01	-0.06
ENP	0.01	-0.07

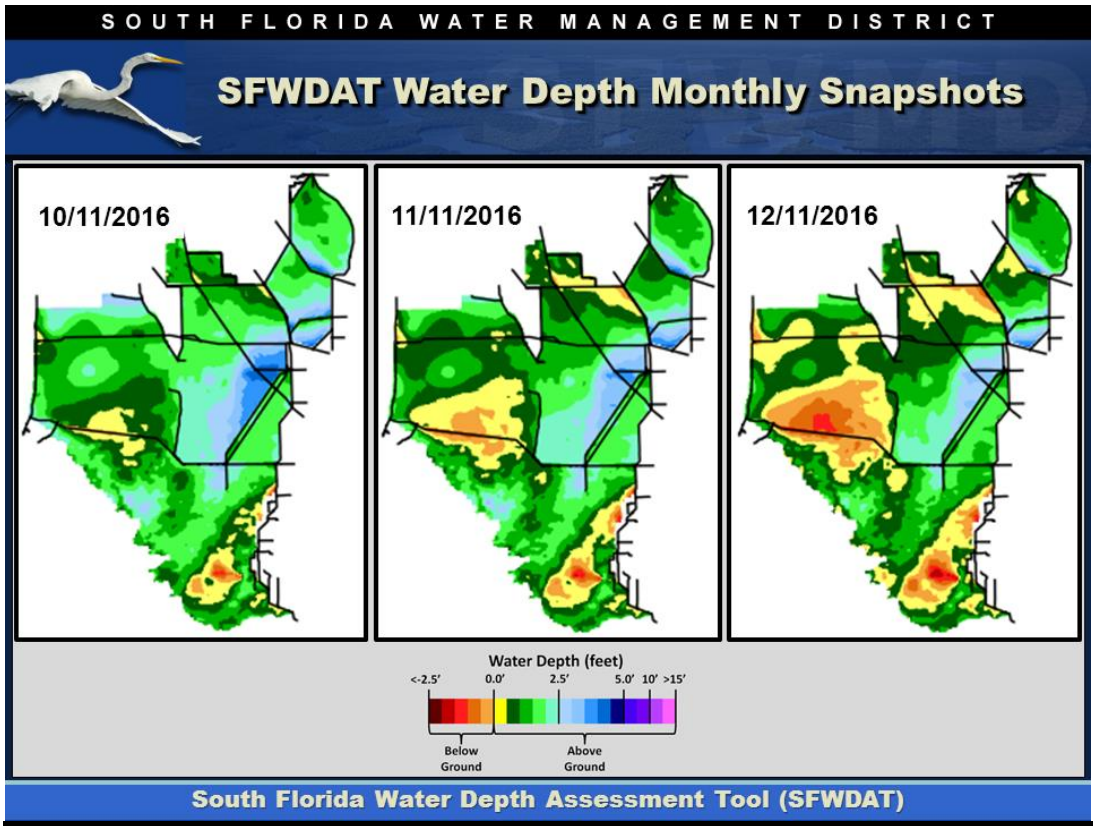


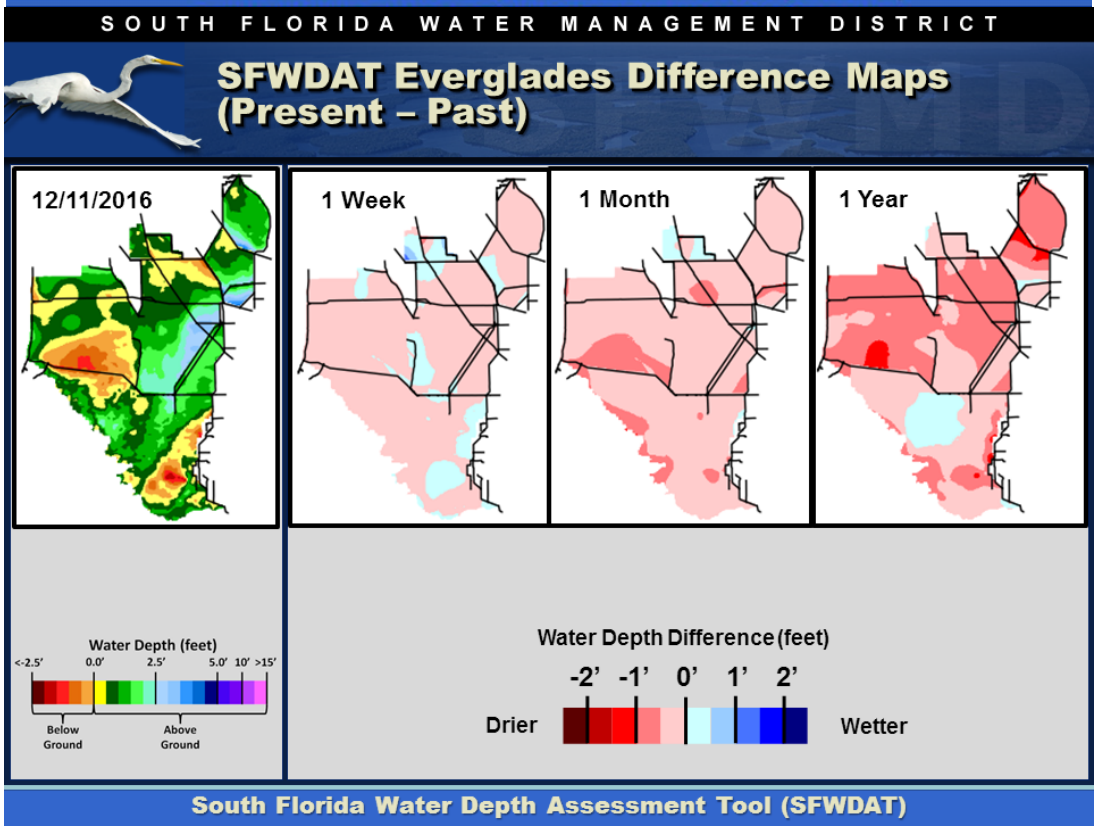
Regulation Schedules: Stages are below regulation for three of the four areas. The WCA-1 three-gauge average is −0.75 feet below regulation, the northwestern WCA-3A gauge stage (gauge 62) is −0.65 feet below the upper schedule, and the WCA-3A three-gauge average stage is -0.50 feet below regulation. The WCA-2A stage remains above regulation by 0.73 feet.



Water Depths and Changes: Data issues prevented this week's water depths and depth difference maps from running. Water levels remain lower than they were one and two months ago. This week's water depths at monitored gauges other than in WCA-2B range from 0.92 feet to 2.47 feet.

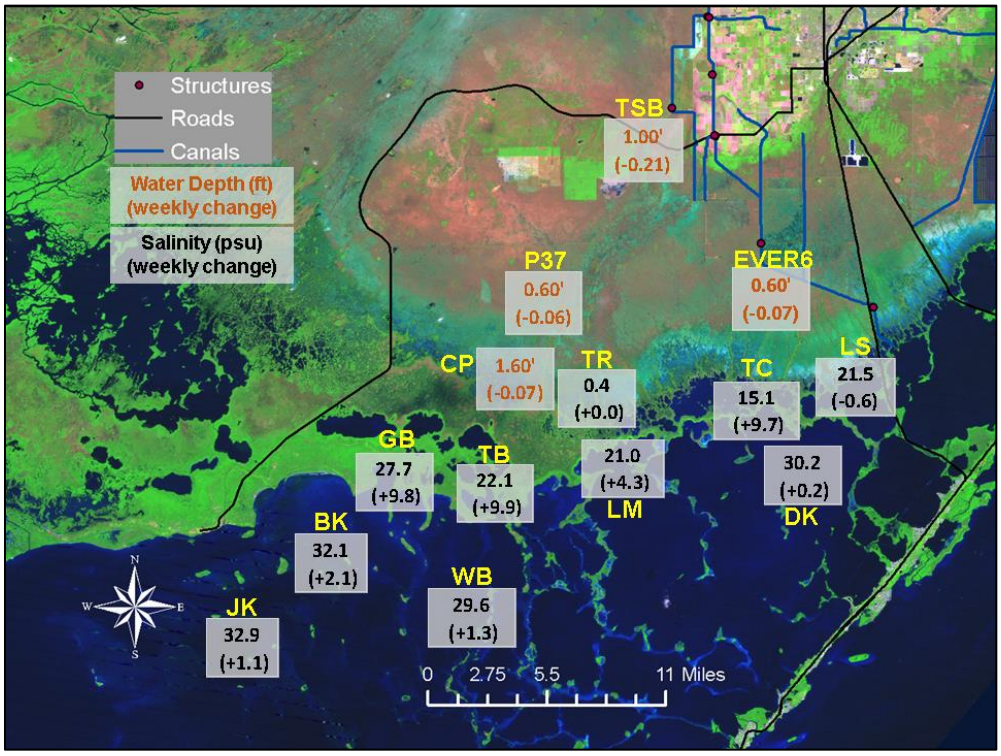
Stages were lower across the region this week. Individual gauge changes ranged from −0.01 feet to -0.10 feet. Stages are lower than a month ago, and much lower than a year ago.

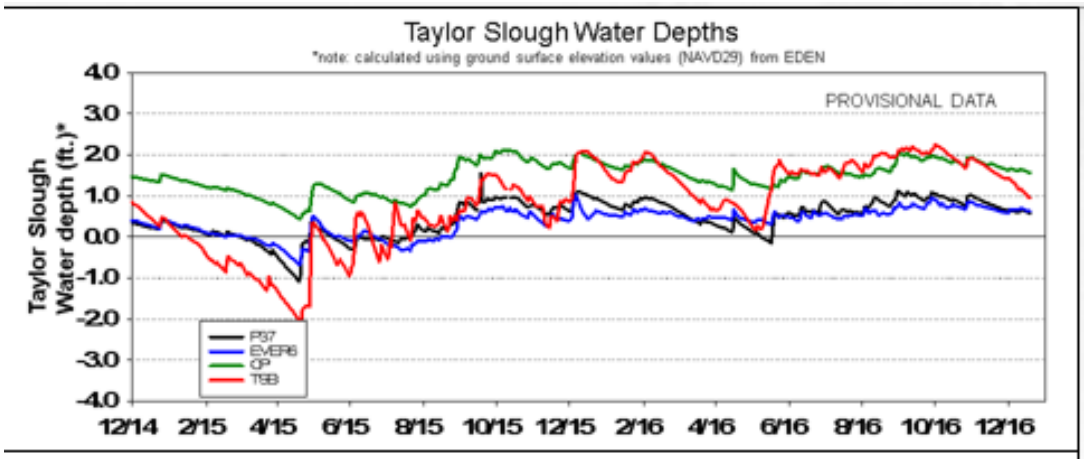




Taylor Slough and Florida Bay: Water levels are decreasing, and the weekly changes ranged from −0.21 to −0.03 feet. As is typical for this time of year, northern Taylor Slough is changing most rapidly. All areas are still one to four inches above average with the panhandle area being the furthest from average.

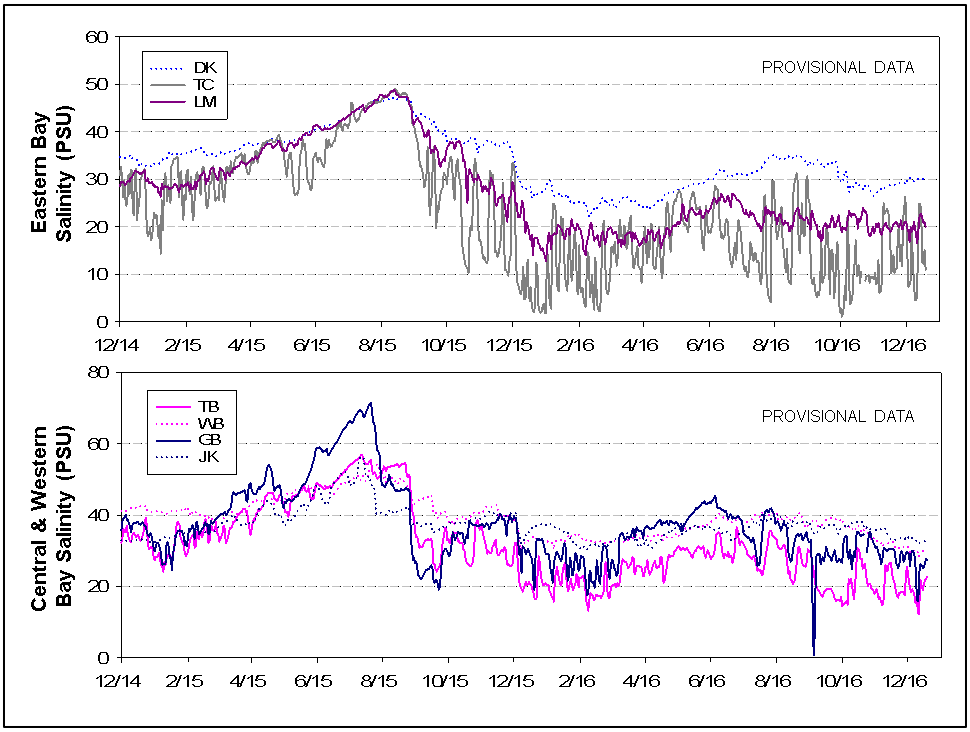
Salinity changes ranged from −0.6 psu to +9.9 psu over the last week. The rapid increases along the shoreline are actually a return to salinities from two weeks ago after rapid freshening last week. Salinities currently range from 15 psu to 33 psu and are −2 psu below average in the central bay to 4 psu above average in the eastern bay.

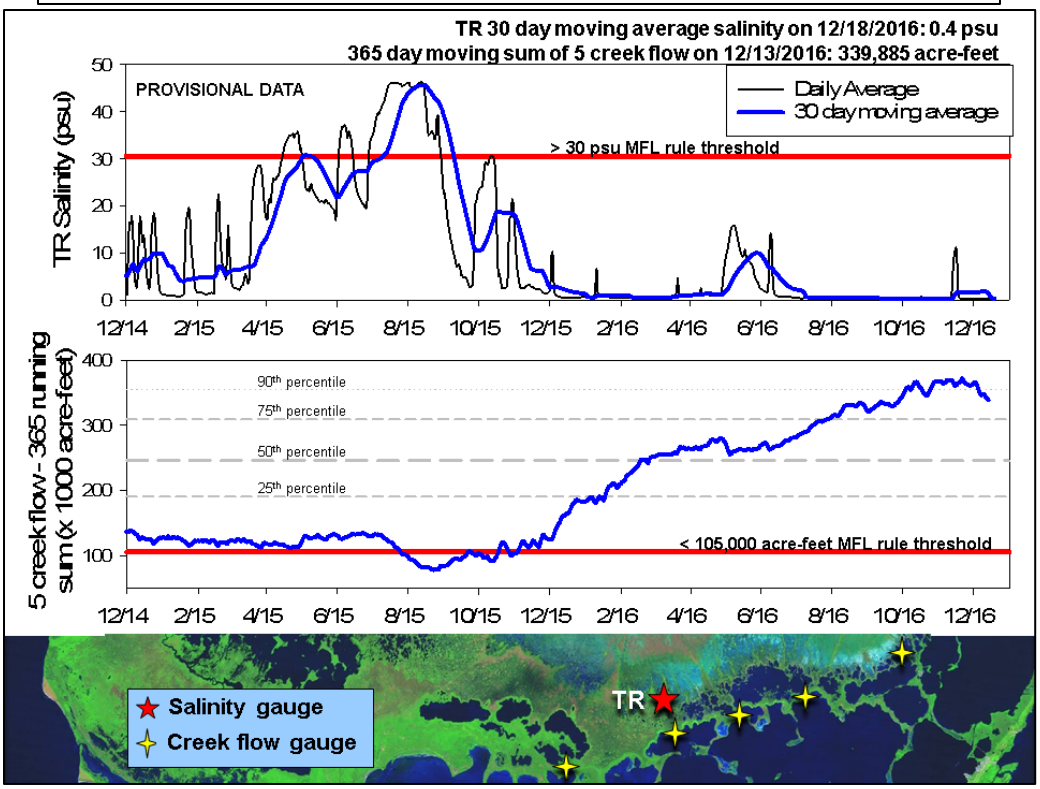




Florida Bay MFL: The salinity at the Minimum Flows and Levels sentinel site TR in the mangrove zone remained at its seasonal low of 0.4 psu, and the 30-day moving average has now fallen to 0.4 psu as well.

The 365-day moving sum of flow from the five creeks identified by stars on the map was 339,885 acre-feet on December 13 using interpolated data to fill the missing month at Mud Creek (the center star on the map). The U.S. Geological Survey is still working on correcting the missing Mud Creek data. Another gauge has failed now, however. McCormick Creek (the westernmost star on the map), which had been experiencing occasional issues through the month of December, stopped reporting as of December 14.





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. It is unclear what the effects are on the tree islands.

- The seasonal Multispecies Management Team (interagency group related to the Everglades Restoration Transition Plan regulation 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 future rainfall should be retained 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. 20, 2016 (red is new)				
Area	**Current Condition**	**Cause(s)**	**Recommendation**	**Reasons**
WCA-1	Stages changed -0.01' to -0.04'	Rainfall, ET, management	Operate 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 -0.08'	Rainfall, ET, management	Maintain slower recession rates. 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 -0.07' to -0.08'	Rainfall, ET, management	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 fell -0.10'	Rainfall, ET, management	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 −0.01'	Rainfall, ET, management		
Central WCA-3A S	Stage fell −0.03'	Rainfall, ET, management	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 fell -0.02'	Rainfall, ET, management		
WCA-3B	Stages decreased -0.04' to -0.08'	Rainfall, ET, management	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 decreased -0.07'	ET, rainfall, topography, management	Make discharges to the Park according to the ERTP 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	-2 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.