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, Operations, Engineering and Construction Bureau
Paul Linton, Chief, Operations Section

FROM: SFWMD Staff Environmental Advisory Team

DATE: December 12, 2017

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

Forecast is for dry weather until some minor rains arrive on Friday. A large-scale trough over the eastern U.S. will dominate the mid to upper levels of the atmosphere this week. A couple of impulses will pinwheel through the base of this larger trough, manifested by separate cold fronts pushing down the peninsula late today and another on Friday. Tonight's front will be mainly dry, but reinforces the cooler air. The second front is expected to have more moisture and probably a few showers at the end of the week, but will not bring appreciable cooling. Dry and pleasant conditions are expected for the weekend. Longer term forecast is for below average rains, and warmer temperatures are expected next week.

Kissimmee

Tuesday morning stages were 58.0 feet NGVD (at schedule) in East Lake Toho, 55.0 feet NGVD (at schedule) in Toho, and 51.3 feet NGVD (1.2 feet below schedule) in Kissimmee-Cypress-Hatchineha; S65A headwater stage was 46.2 feet NGVD. Tuesday morning discharges were: 587 cfs at S65, 458 cfs at S65A, and 858 cfs at S65E. Dissolved oxygen concentration in the Kissimmee River averaged 5.2 milligrams per liter (mg/L) for the week. Kissimmee River mean floodplain depth on Sunday was 0.32 feet.

Lake Okeechobee

Lake Okeechobee stage is 15.85 feet NGVD having decreased 0.09 feet over the past week and 0.87 feet over the last month. Following Hurricane Irma, stages exceeded 16.0 feet NGVD for 72 days, the longest period since late 2004, which was 73 days. The submerged aquatic and emergent vegetation coverage in the nearshore areas of the Lake are expected to decline over the coming months and possibly years due to the high water and turbidity from resuspended lake sediment. The high inflows and resuspended lake sediment associated with Hurricane Irma also increased water column total phosphorus, which could lead to algal blooms as turbidity begins to decline and water temperatures rise. Lower Lake stages near the end of WY2018 would help to recover these important communities, and long, steady recessions of water levels throughout the dry season may help promote another productive year for wading birds on the Lake as well.

Estuaries

Total inflow to St. Lucie estuary averaged 2,698 cfs over the past week (3,063 cfs week before) with 1,307 cfs coming from Lake Okeechobee. Salinity increased throughout the estuary. The seven-day average salinity at the US1 Bridge is in the fair range for adult oysters. Average chlorophyll *a* concentration levels at the LOBO stations remain low (4.18 – 5.96 µg/L), with highest values reported in the South Fork (4.31 – 5.96 µg/L). Average dissolved oxygen levels were at 6.62 – 7.91 mg/L.

Total inflow to Caloosahatchee estuary averaged 4,701 cfs over the past week (6,164 cfs week before) with 3,231 cfs coming from the Lake. Salinity increased throughout the estuary, especially in the lower part of the estuary. The 30-day moving average surface salinity is 0.1 at Val I-75 and 0.2 at Ft. Myers. Salinity conditions between Val I-75 and Ft. Myers are good for tape grass. Salinity conditions are in the good range for adult oysters at Shell Point and in the poor range at Cape Coral. Chlorophyll *a* measurements show low chlorophyll *a* concentration levels near Ft. Myers and Shell Point (2.59 - 4.87 µg/L) over the last week. Average dissolved oxygen levels at Shell Point were between 6.30 – 11.27 mg/L. *Karenia brevis* (red tide dinoflagellate) was observed in background to medium concentrations in thirty samples collected from Lee County. Given the current estuarine conditions, there are no ecological benefits associated with freshwater releases from Lake Okeechobee.

Stormwater Treatment Areas

Over the past week, the STAs/FEBs did not receive Lake releases. The total amount of Lake releases sent to the STAs/FEBs in WY2018 (since May 1, 2017) is approximately 21,800 acre-feet. Most STA cells are at or near target depths. Operational restrictions are in place for vegetation rehabilitation in STA-1E and STA-2. This week, if 2008 LORS recommends Lake releases to the WCAs and the conditions allow, releases will be sent to STA-1E Eastern Flow-way and STA-2 Flow-way 1.

Everglades

Despite above average rainfall late last week (as of Sunday midnight) water depths continued to drop across the Everglades (except for Everglades National Park). The gauges monitored for this report dropped in stage an average of 0.10 feet last week. WCA-1, WCA-2A, and WCA-3A are all at or trending towards the regulation lines. Keeping depths below 2.5 feet at gauge 65 in WCA-3A is important to moderate the stress to tree islands caused by flooding when durations last longer than 60-90 days. The depth on Sunday at that location was 3.21 feet, and has exceeded 2.5 feet for 177 days.

Salinity changes in Florida Bay last week were minor. Current salinities range from 6 psu in the northeastern nearshore to 28 psu in the central bay. Western bay salinities continue to be less than the historic average, with a maximum difference of 6 psu.

Area-specific recommendations are summarized in the table at the end of this report.

Supporting Information

KISSIMMEE BASIN

Kissimmee Basin Rainfall

The Upper Kissimmee Basin received 0.49 inch of rainfall in the past week and the Lower Basin received 1.22 inch (SFWMD Daily Rainfall Report 12/12/2017).

Upper Kissimmee Basin

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

Table 1. Average discharge (cfs) for the preceding seven days, one-day stage (feet NGVD), and departures from KCOL flood regulation (R) or temporary schedules (T, A, or S). Provisional, real-time data are from SFWMD.

Report Date: 12/12/2017

Water Body	Structure	7-day Average Discharge (cfs)[1]	Stage Monitoring Site[2]	Lake Stage (feet)	Schedule Type[3]	Schedule Stage (feet)	Daily Departure (feet)						
							12/10/17	12/3/17	11/26/17	11/19/17	11/12/17	11/5/17	10/29/17
Lakes Hart and Mary Jane	S62	34	LKMJ	61.0	R	61.0	**0.0**	0.0	0.0	0.0	0.1	0.1	0.0
Lakes Myrtle, Preston, and Joel	S57	20	S57	61.9	R	61.9	**0.0**	0.0	0.0	0.0	0.0	0.2	0.3
Alligator Chain	S60	14	ALLI	64.0	R	64.0	**0.0**	0.0	0.0	0.0	0.0	0.0	0.1
Lake Gentry	S63	40	LKGT	61.5	R	61.5	**0.0**	0.1	0.0	0.0	0.0	0.0	0.0
East Lake Toho	S59	4	TOHOE	58.0	R	58.0	**0.0**	0.0	0.0	0.0	0.0	0.0	0.1
Lake Toho	S61	16	TOHOW, S61	55.0	R	55.0	**0.0**	0.0	0.0	0.0	0.0	0.0	0.1
Lakes Kissimmee, Cypress, and Hatchineha	S65	368	KUB011, LKIS5B	51.4	R	52.5	**-1.1**	-1.1	-1.0	-0.9	-0.7	-0.5	-0.2

[1] Seven-day average of weighted daily means through midnight.

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

[3] 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.

DATA ARE PROVISIONAL

Lower Kissimmee Basin

Discharges 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. One-day and seven-day averages of discharge at S-65x structures, of dissolved oxygen concentration in the Phase I area river channel, and water depth in the Phase I area floodplain. Data are provisional real-time data from SFWMD.

Report Date: 12/12/2017

Metric	Location	1-Day Average	Average for the Preceeding 7-Days[1]									
		12/10/2017	12/10/17	12/3/17	11/26/17	11/19/17	11/12/17	11/5/17	10/29/17	10/22/17	10/15/17	10/8/17
Discharge (cfs)	S-65	341	**368**	586	925	1,097	1,349	1,439	1,564	2,319	3,200	6,671
Discharge (cfs)	S-65A	292	**306**	486	817	1,038	1,346	1,638	1,703	2,265	3,723	7,028
Discharge (cfs)	S-65D[2]	749	**595**	989	1,425	1,925	2,467	3,714	3,240	4,298	7,381	12,111
Discharge (cfs)	S-65E[2]	780	**658**	980	1,436	1,988	2,519	3,938	3,453	4,551	7,568	12,702
DO (mg/L)[3]	Phase I river channel	5.8	**5.2**	5.7	5.8	5.0	4.1	4.2	3.4	2.0	1.1	1.4
Mean depth (feet)[4]	Phase I floodplain	0.32	**0.25**	0.34	0.53	0.81	1.09	1.48	1.43	1.94	2.77	4.18

[1] Seven-day average of weighted daily means through Sunday midnight.

[2] S-65D discharge combines discharge at S-65D, S-65DX1, and S-65DX2; S65E discharge combines S65E and S65EX1.

[3] DO is the average for sondes at PC62 and PC33.

[4] 1-day spatial average from South Florida Water Depth Assessment Tool (SFWDAT).

DATA ARE PROVISIONAL; N/A indicates that data were not available.

Water Management Recommendations

Kissimmee Basin Adaptive Recommendations and Operational Actions

Date	Recommendation	Purpose	Outcome	Source
12/12/2017	No new recommendations.		N/A	
12/5/2017	No new recommendations.		N/A	
11/28/2017	No new recommendations.		N/A	
11/21/2017	No new recommendations.		N/A	
11/13/2017	No new recommendations.		N/A	
11/1/2017	No new recommendations.		N/A	
10/24/2017	No new recommendations.		N/A	
10/17/2017	No new recommendations.		N/A	
10/10/2017	No new recommendations.		N/A	
10/3/2017	No new recommendations.		N/A	
9/25/2017	No new recommendations.		N/A	
9/19/2017	No new recommendations.		N/A	
9/5/2017	No new recommendations.		N/A	
8/29/2017	No new recommendations.		N/A	
8/22/2017	No new recommendations.		N/A	
8/15/2017	No new recommendations.		N/A	
8/4/2017	Increase S65A discharge by 150 cfs to about 1400 cfs.	Reduce rate of stage rise in KCH.		SFWMD Water Mgt, KB Ops
8/1/2017	No new recommendations.		N/A	
7/25/2017	Hold current discharge at S65A, adjusting S65 discharge to maintain current flow to the Kissimmee River.	Maintain current S65A discharge.		SFWMD Water Mgt, KB Ops
7/23/2017	Increase S65A discharge slowly using Figure 8a toward the seasonal target of 1400 cfs. Hold at 1400 cfs while stage in KCH remains above 50 feet (+/- 0.2 foot).	Reduce current rapid rate of stage rise in KCH; provide Kissimmee River floodplain inundation if conditions stay wet.	Implemented	KB Ops
7/16/2017	Reduce S65A flow to ~600-650 cfs. As Pool A runoff diminishes keep S65A around 650 +/- 50 cfs by increasing flow from S65.	Maintain moderate discharge to the Kissimmee River from S65A while maintaining S65A headwater within its operating range using flow from S65.	Implemented	SFWMD Water Mgt, KB Ops
7/6/2017	Hold 450 cfs at S65A due to reduced forecast.	Reduced-rainfall forecast led to decision to hold 450 cfs at S65A rather than continuing to ramp up.	Implemented	KB Ops
7/5/2017	Increase S65A flow by 150 cfs today to 450 cfs and by another 150 cfs tomorrow.	Control stage in KCH and Pool A in anticipation of forecast significant rainfall; begin discharge rampup in anticipation of forecast rainfall.	Implemented	KB Ops
6/28/2017	Reduce S65A discharge by a maximum of 150 cfs per day until 300 cfs is reached.	Allow KCH stage to rise before transitioning to 2017 Wet Season discharge plan; facilitate DO recovery in the Kissimmee River by reducing depth in the river channel.	Implemented	KB Ops
6/26/2017	Hold 800 cfs at S65A until further notice.	Maintain reduced discharge to allow stages in KRR project area to decline to facilitate DO recovery.	Implemented	KB Ops
6/22/2017	Reduce discharge by 150 cfs each day on Thursday 6/22, Friday 6/23, Saturday 6/24, and Sunday 6/25. After the Sunday reduction hold at approximately 800 cfs through Monday when new DO data should be available to help guide next steps.	Attempt to allow Kissimmee River dissolved oxygen concentration to rise.	Implemented	KB Ops
6/20/2017	Maintain 1400 cfs at S65A as KCH stage continues to rise. Supplement declining S65A basin runoff by increasing discharge at S65 as needed.	Transition from current operations to 2017 Wet Season discharge plan.	Implemented	KB Ops, SFWMD Water Management
6/15/2017	Attempt to slow the rates of stage rise in Lakes Toho and East Toho by increasing discharge from S59 into Toho and S61 into KCH.	Slow rates of rise in Lakes Toho and East Toho.	Implemented	KB Ops, SFWMD Water Management
6/15/2017	Increase discharge from S65A as necessary using the discharge rates of change table in Figure 8a.	Lower stage in Pool A following rainfall directly over the S65A Basin.	Implemented	SFWMD Water Management, KB Ops
6/13/2017	No new recommendations.			

KCOL Hydrographs (through Sunday midnight)

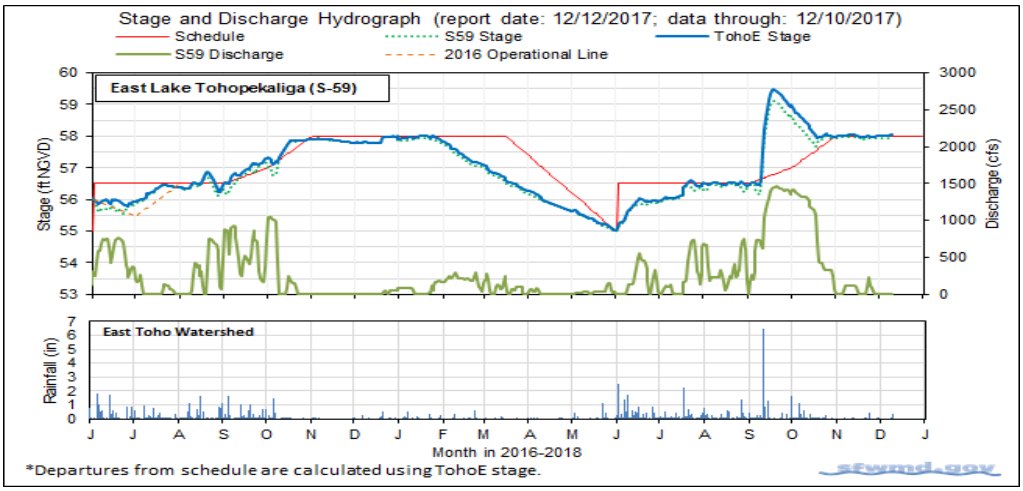


Figure 1.

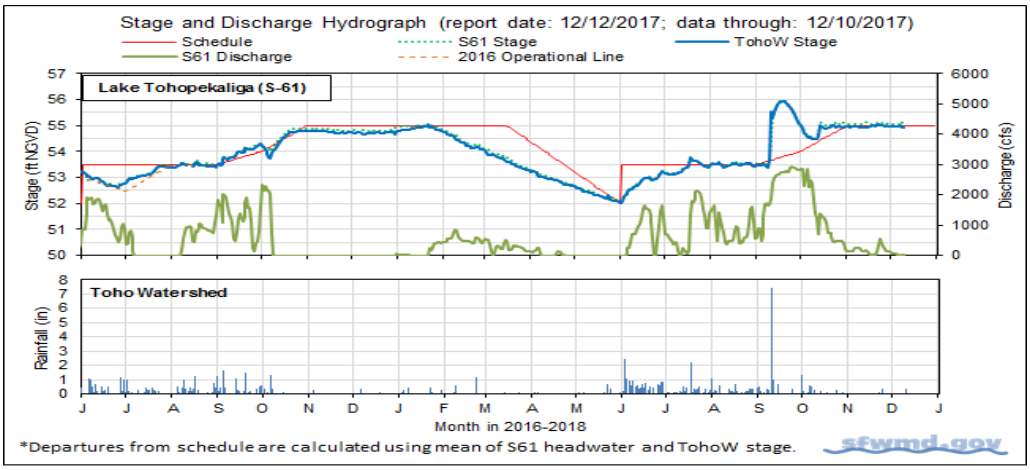


Figure 2.

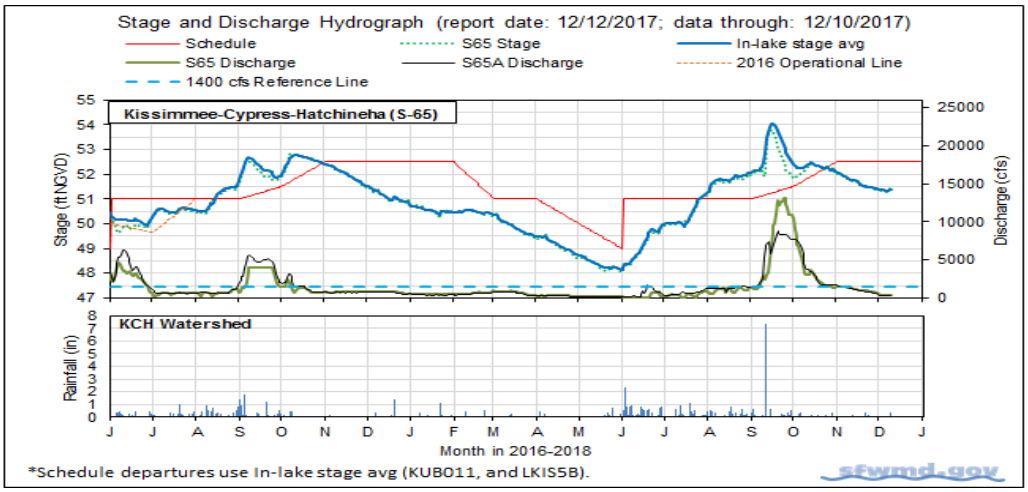


Figure 3.

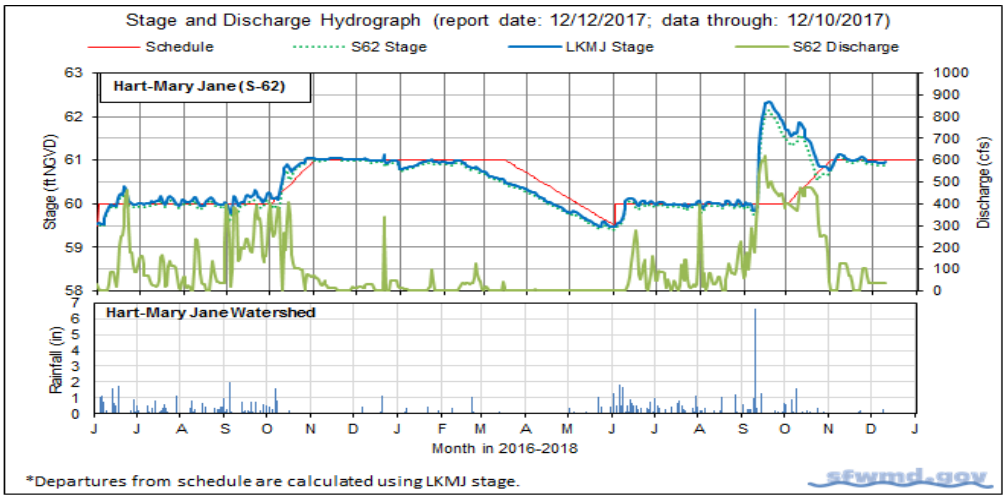


Figure 4.

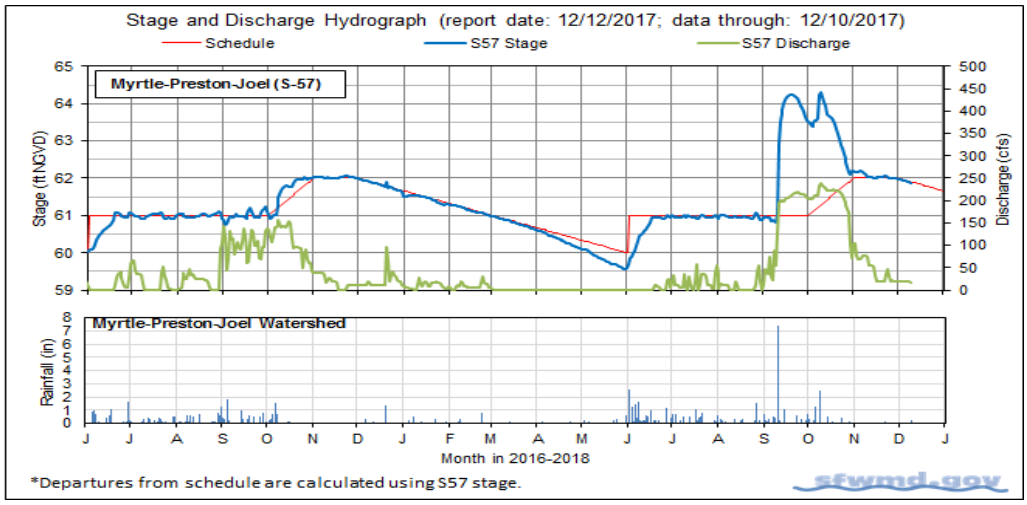


Figure 5.

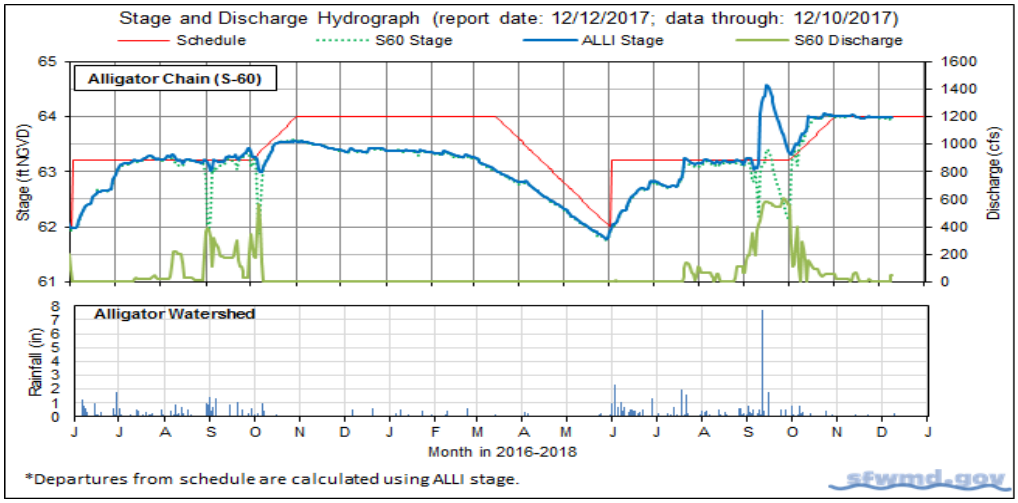


Figure 6.

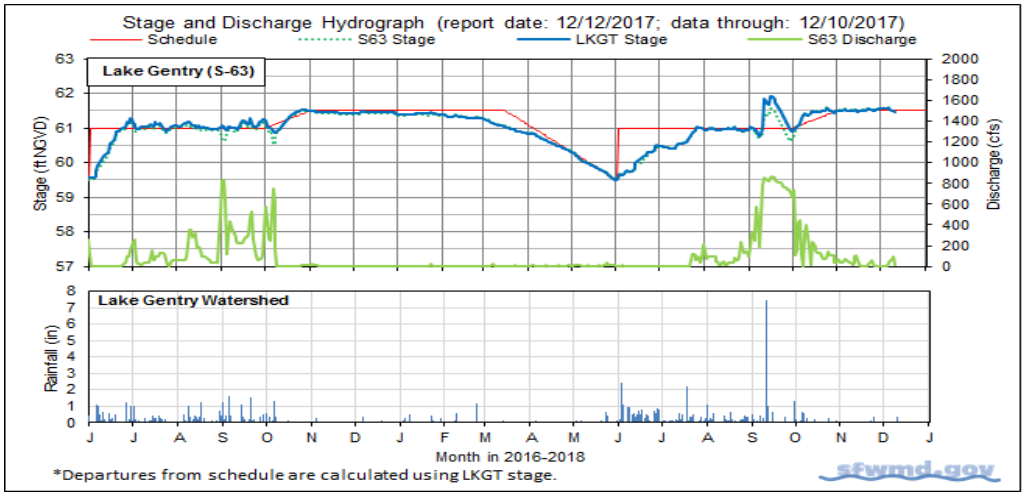


Figure 7.

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

S65/S65A Limits on Rate of Change in Discharge

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

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

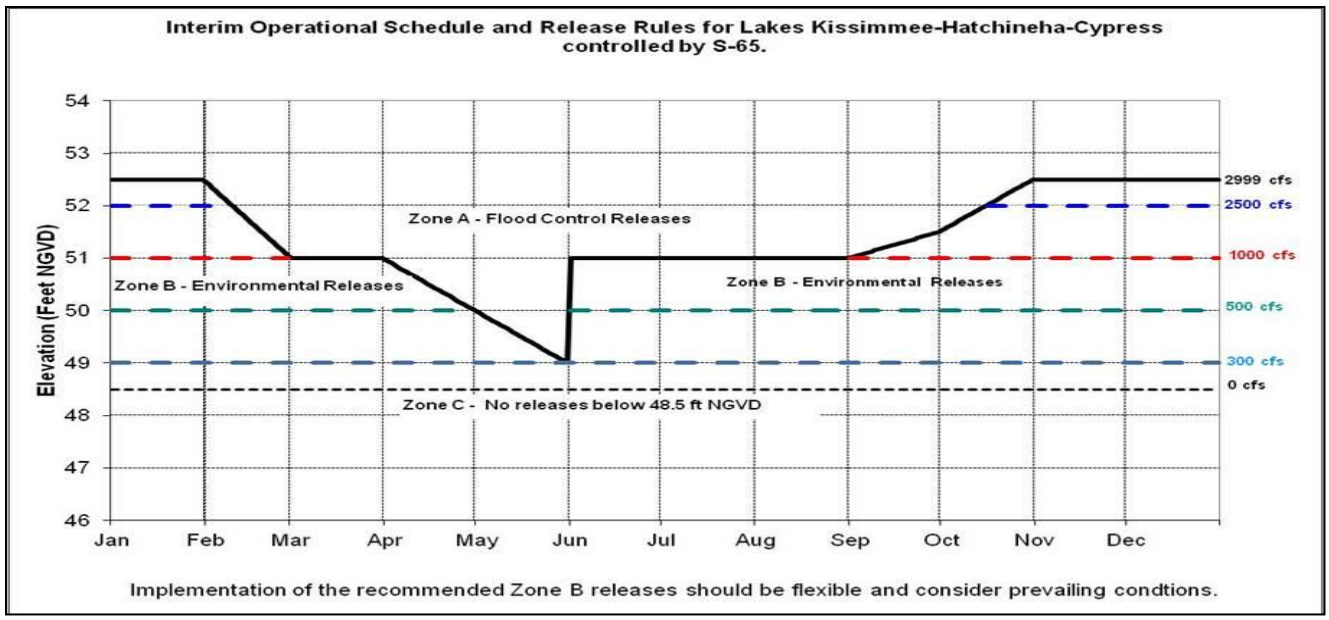


Figure 9. Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years.

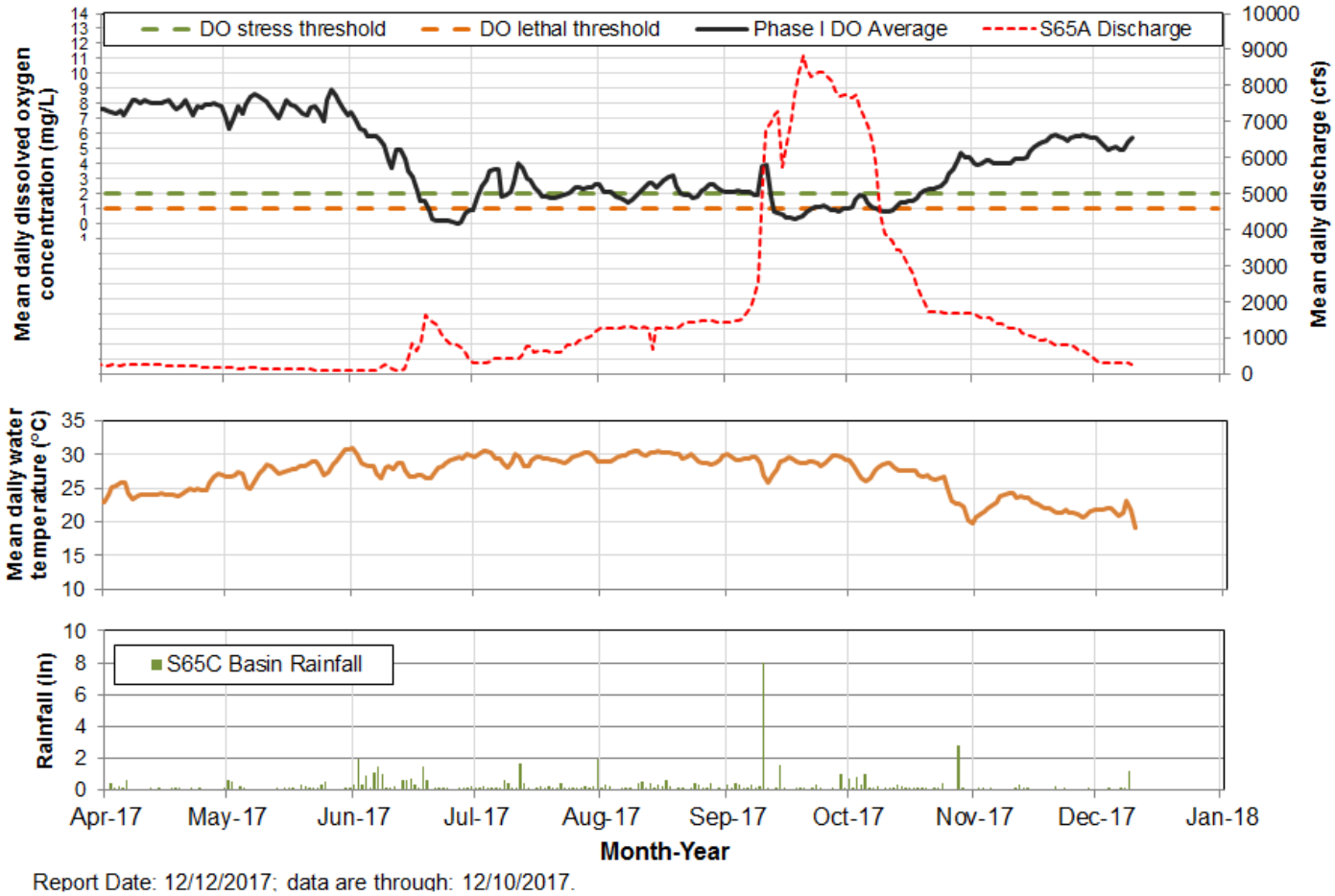


Figure 10. Mean daily dissolved oxygen, discharge, temperature and rainfall in the Phase I river channel.

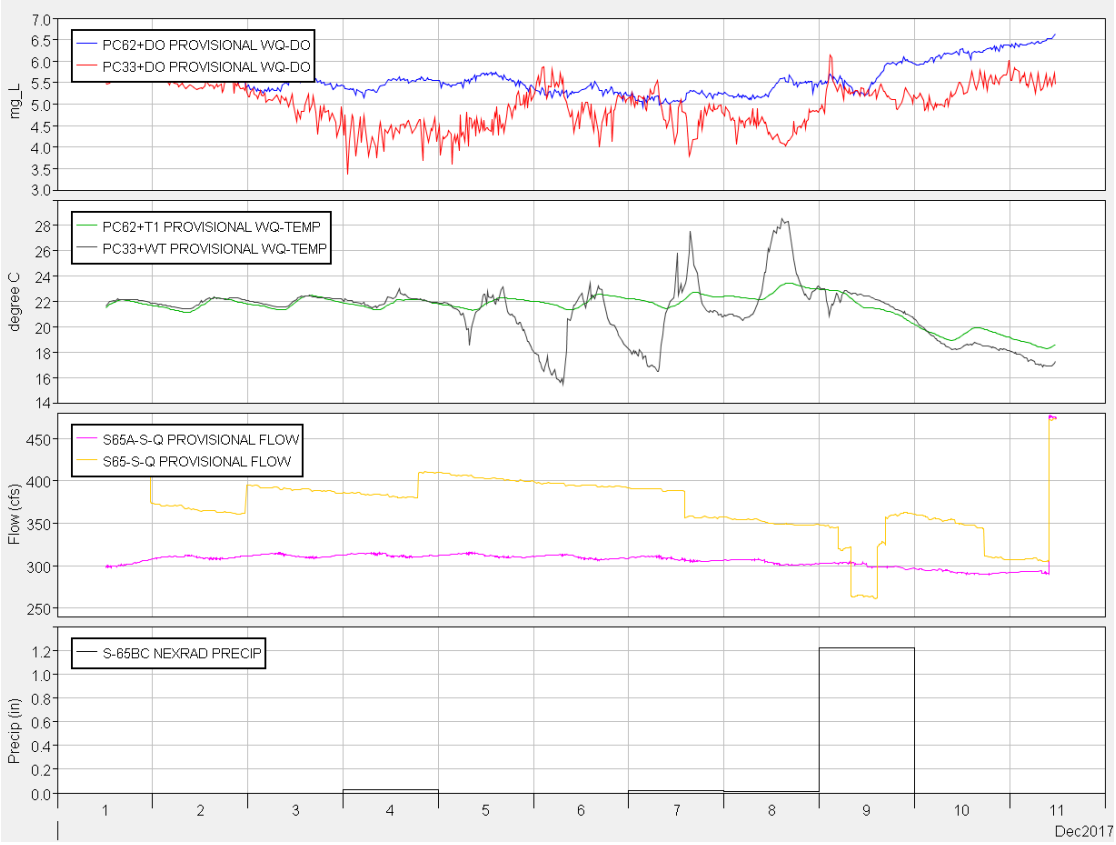


Figure 11. Phase I river channel dissolved oxygen and water temperature (measured at 15 minute intervals) and Pool BC daily rainfall.

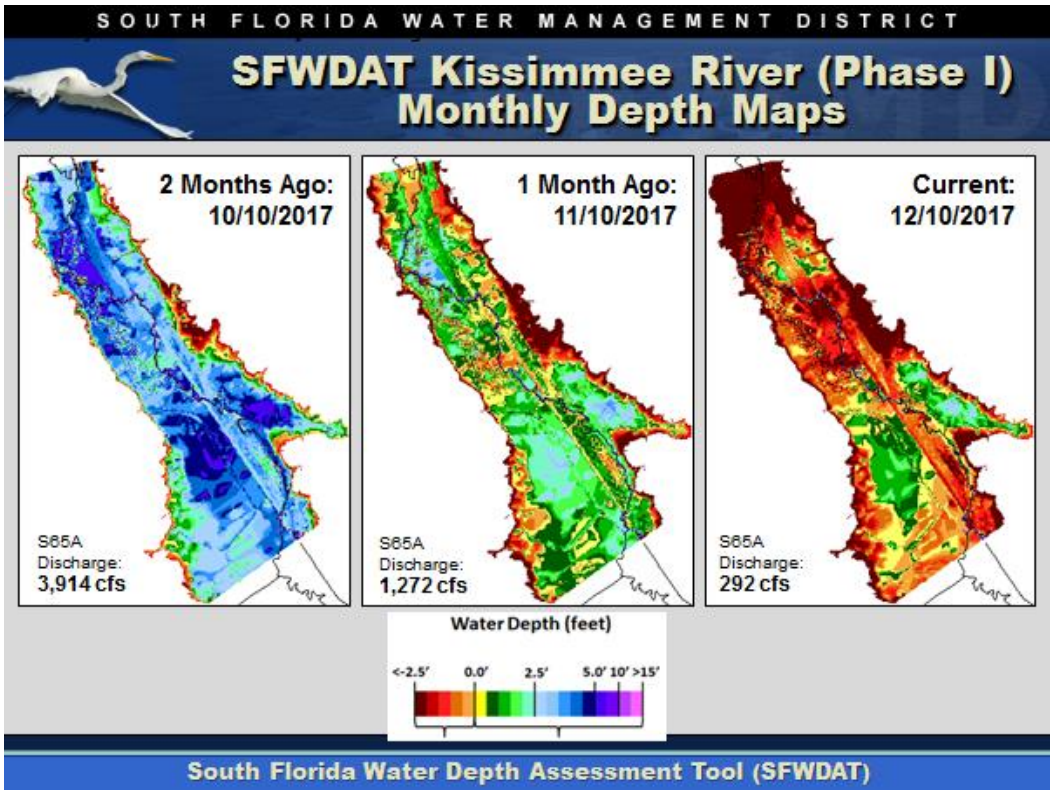
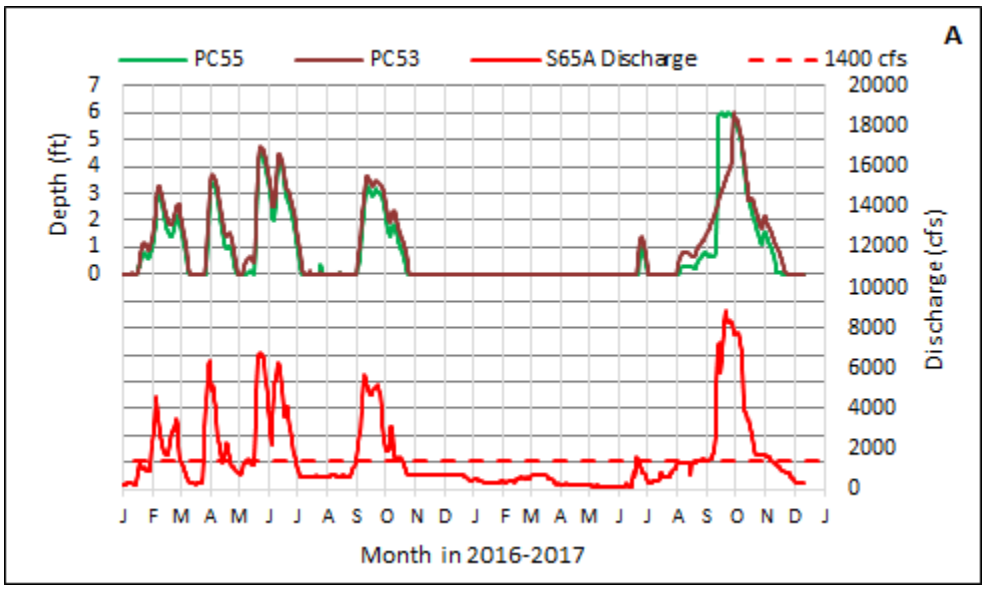
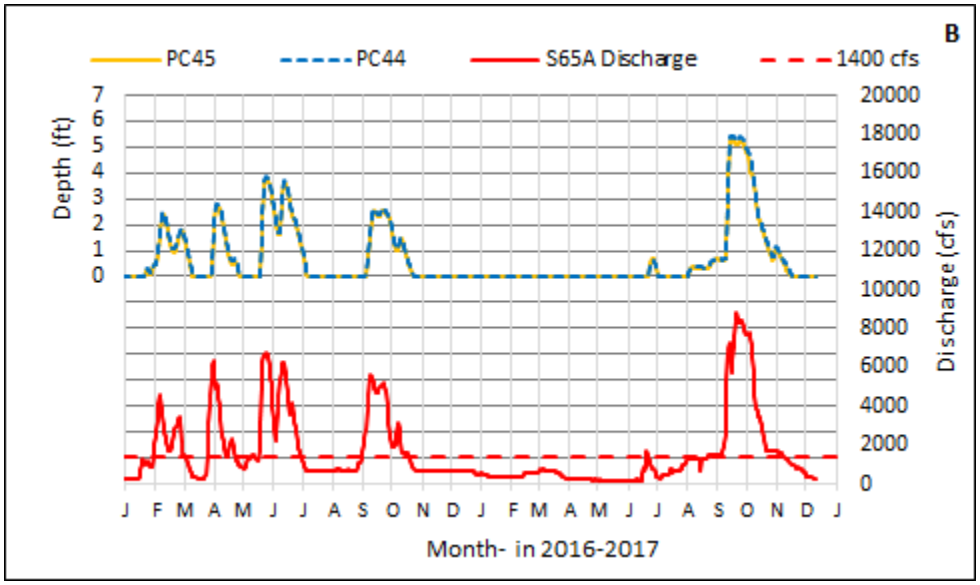


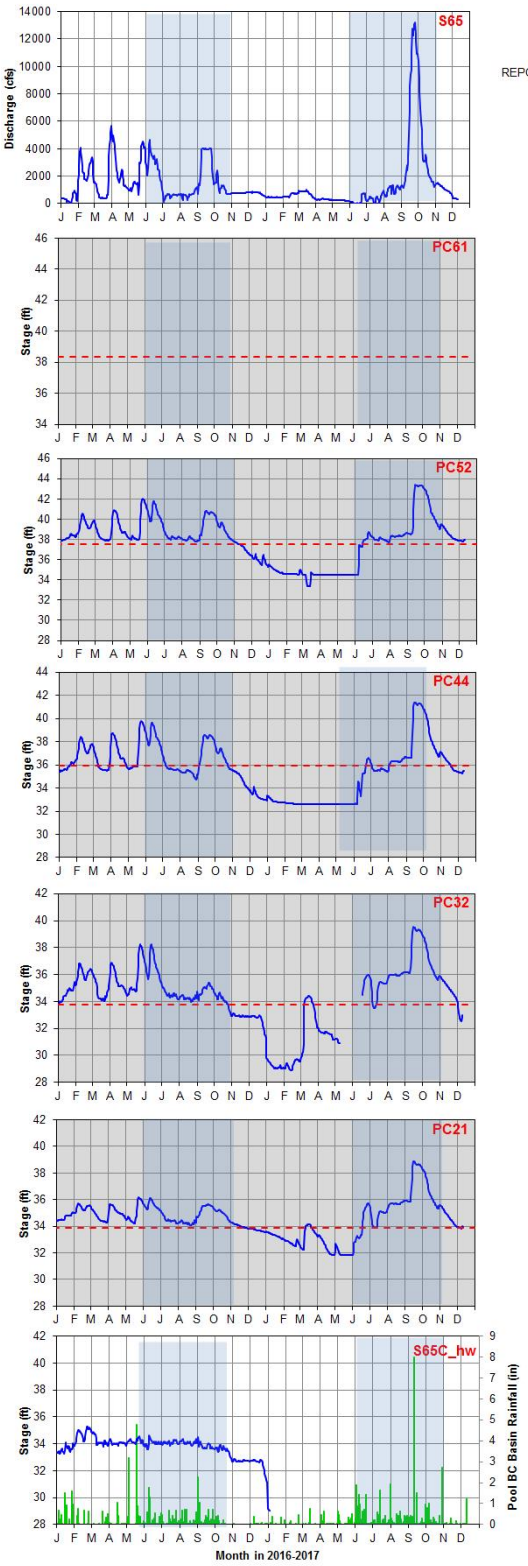
Figure 12. Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to Jan. 16, 2012.





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



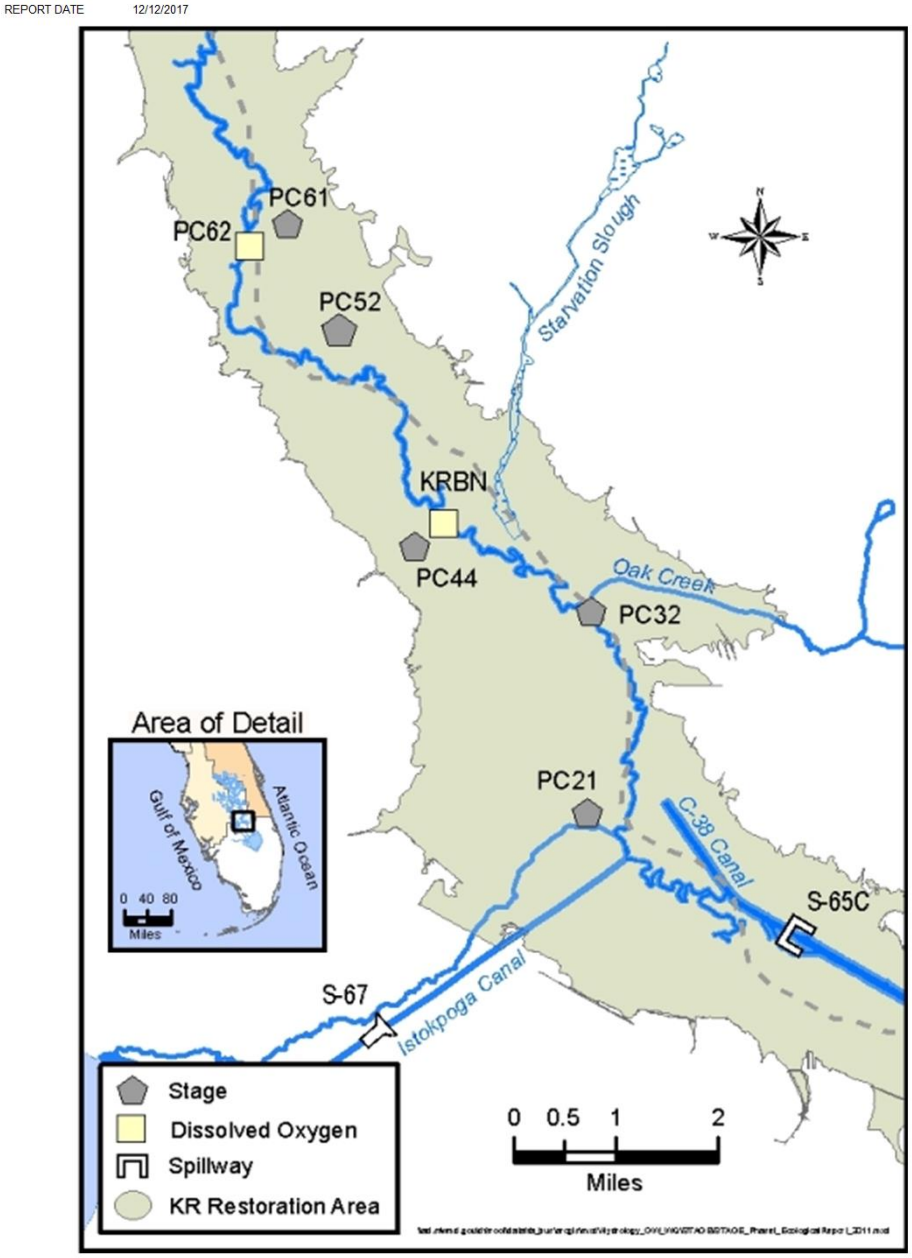


Figure 13. Discharge at S65, stages at five monitoring stations in the Phase I area of the Kissimmee River floodplain, and headwater stage at S65-C since January 1, 2016. The most recent data (~2 weeks) are provisional real-time data from SFWMD DualTrend; previous data are from SFWMD DB-HYDRO (validated). Dashed lines are ground elevations.

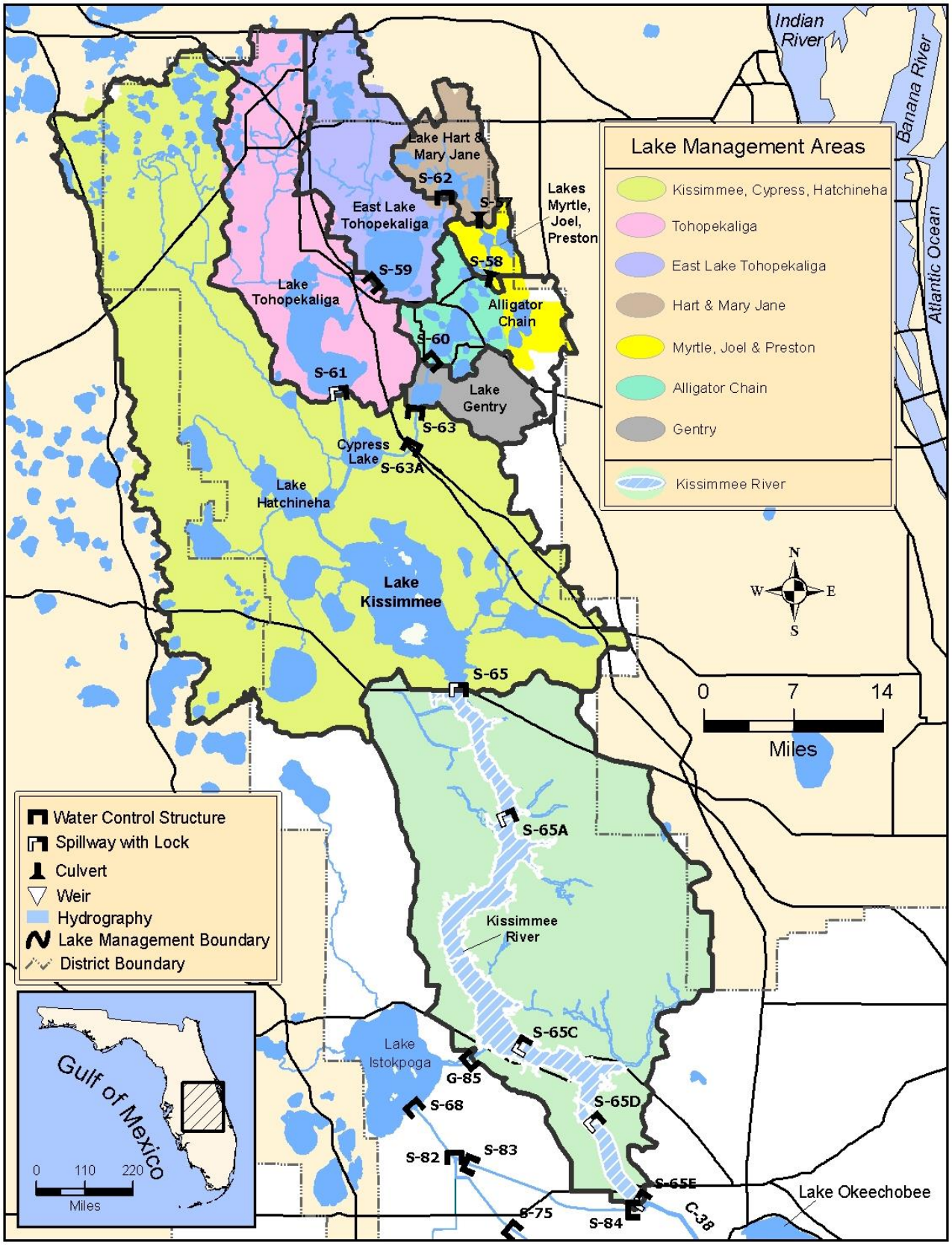


Figure 14. The Kissimmee Basin.

LAKE OKEECHOBEE

According to the USACE web site, Lake Okeechobee stage is at 15.85 feet NGVD for the period ending at midnight on December 11, 2017. This value is based on the use of four interior lake stations (L001, L005, L006 and LZ40) and four perimeter stations (S308, S352, S4 and S133). Lake stage last peaked at 17.20 feet NGVD on October 13, 2017 before declining to 16.8 feet NGVD on October 28, 2017 and then back up to 17.02 feet NGVD. The Lake is now 0.87 feet lower than it was a month ago, but 1.23 feet higher than a year ago (Figure 1). The Lake is now in the Low sub-band (Figure 2). According to RAINDAR, 1.41 inches of rain fell directly over the Lake during the week December 5 - December 11, 2017 (Figure 3). Similar amounts fell throughout much of its watershed (1.2 – 1.9 inches) except for the Upper Kissimmee Basin, which only had 0.4 – 0.6 inches.

Average daily inflows to the Lake increased over the past week, from 2,443 cfs to 2,751 cfs. Most of the inflows were from the Kissimmee River via the S65E and S84 structures, which averaged 680 cfs and 839 cfs daily, respectively. S71 and S72 structures, along with Fisheating Creek, contributed a combined 872 average daily cfs as well.

Average daily outflows for the Lake decreased substantially from the previous week, going from 7,285 cfs to 5,144 cfs, primarily from reductions in S77 discharges. S77 discharges decreased from 5,393 cfs the previous week to 3,322 cfs this past week, while S308 discharges went from 1,309 cfs to 1,624 cfs. The S350 structures were shut early in the week, so discharges went from a combined total of 581 average daily cfs that previous week to 189 cfs this past week. There were no discharges to the L8 canal via Culvert 10A (average daily 9 cfs). The corrected evapotranspiration value based on the L006 weather platform solar radiation data fell to 0.09 inches for the past week.

Total inflows and outflows for the last two weeks are detailed in Table 1, as well as the approximate change in Lake stage from each major structure's total flows over the period (midnight December 5, 2017 to midnight December 11, 2017). Figure 4 shows the combined average daily cfs for inflows and outflows for the Lake over the past eight weeks. These data are provisional, and are subject to change.

Table 1

INFLOWS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)
S65E & S65EX1	680	0.3
S71 & 72	208	0.1
S84 & 84X	839	0.3
Fisheating Creek	664	0.3
S154	22	0.0
S191	111	0.0
S133 P	102	0.0
S127 P	47	0.0
S129 P	23	0.0
S131 P	5	0.0
S135 P	48	0.0
S2 P	0	0.0
S3 P	2	0.0
S4 P	0	0.0
C5	0	0.0
Rainfall	3886	1.4
Total	**6636**	**2.5**

OUTFLOWS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)
S77	3322	1.3
S308	1624	0.6
S351	41	0.0
S352	63	0.0
S354	85	0.0
L8	9	0.0
ET	1709	0.7
Total	**6853**	**2.6**

PROVISIONAL DATA

Water Management Recommendations

The Lake stage is 15.85 feet NGVD having decreased 0.09 feet from the week prior, and 0.87 feet over the past month. Submerged and emergent vegetation communities in the nearshore region have experienced stages >16.0 feet NGVD three times in less than two years, and for 72 consecutive days this past wet season, the longest period since late 2004 which was 73 consecutive days. These stages, combined with turbid conditions from Hurricane Irma's winds, will likely cause substantial declines in these communities over the coming months and/or years. Lower Lake stages near the end of WY2018 would help to recover these important communities, and long, steady recessions of water levels throughout the dry season may help promote another productive year for wading birds on the Lake as well.

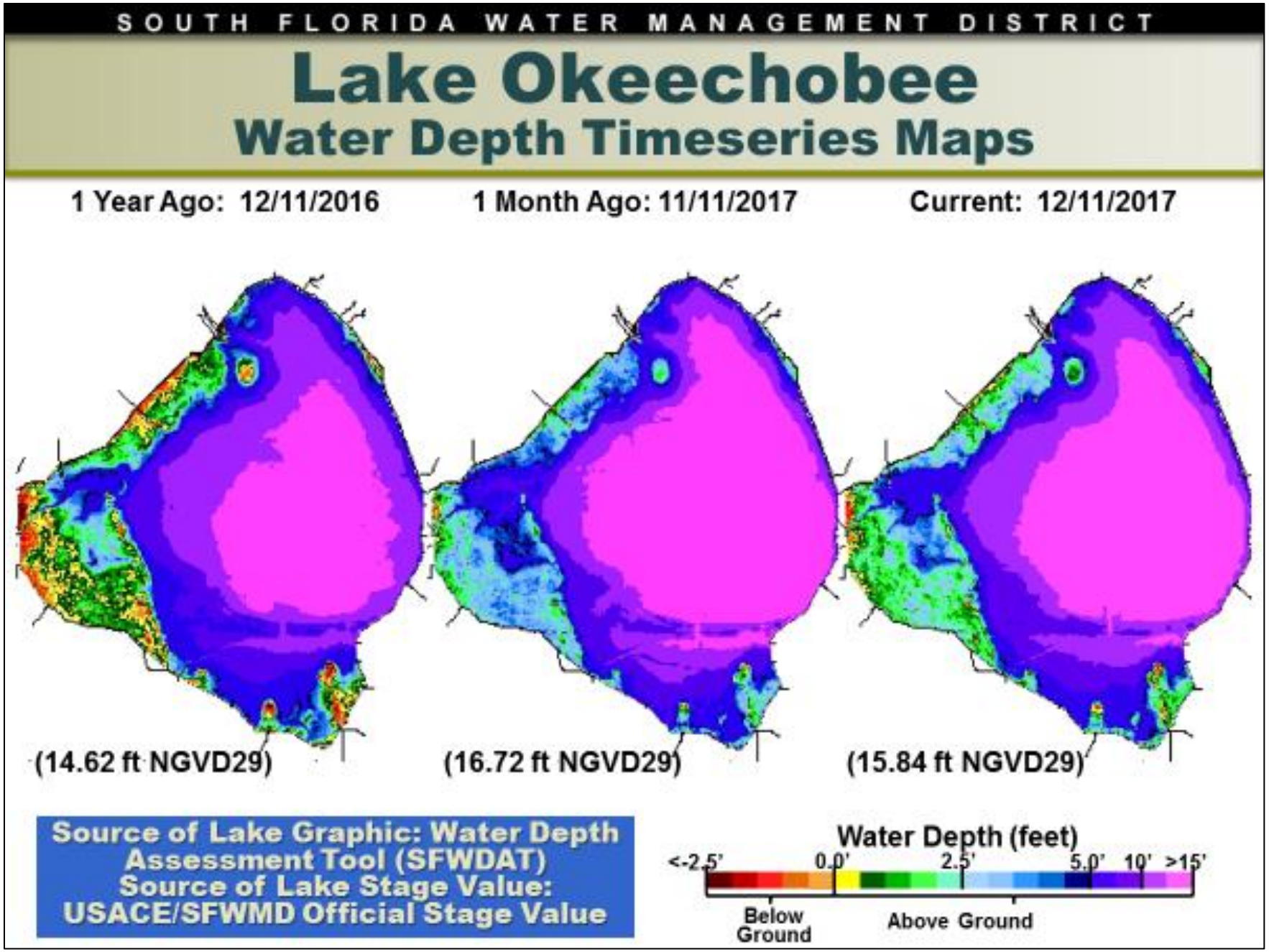

SOUTH FLORIDA WATER MANAGEMENT DISTRICT
Lake Okeechobee
Water Depth Timeseries Maps
1 Year Ago: 12/11/2016
1 Month Ago: 11/11/2017
Current: 12/11/2017
(14.62 ft NGVD29)
(16.72 ft NGVD29)
(15.84 ft NGVD29)
Source of Lake Graphic: Water Depth Assessment Tool (SFWDAT)
Source of Lake Stage Value: USACE/SFWMD Official Stage Value
Water Depth (feet)
<-2.5'
0.0'
2.5'
5.0'
10'
>15'
Below Ground
Above Ground

Figure 1

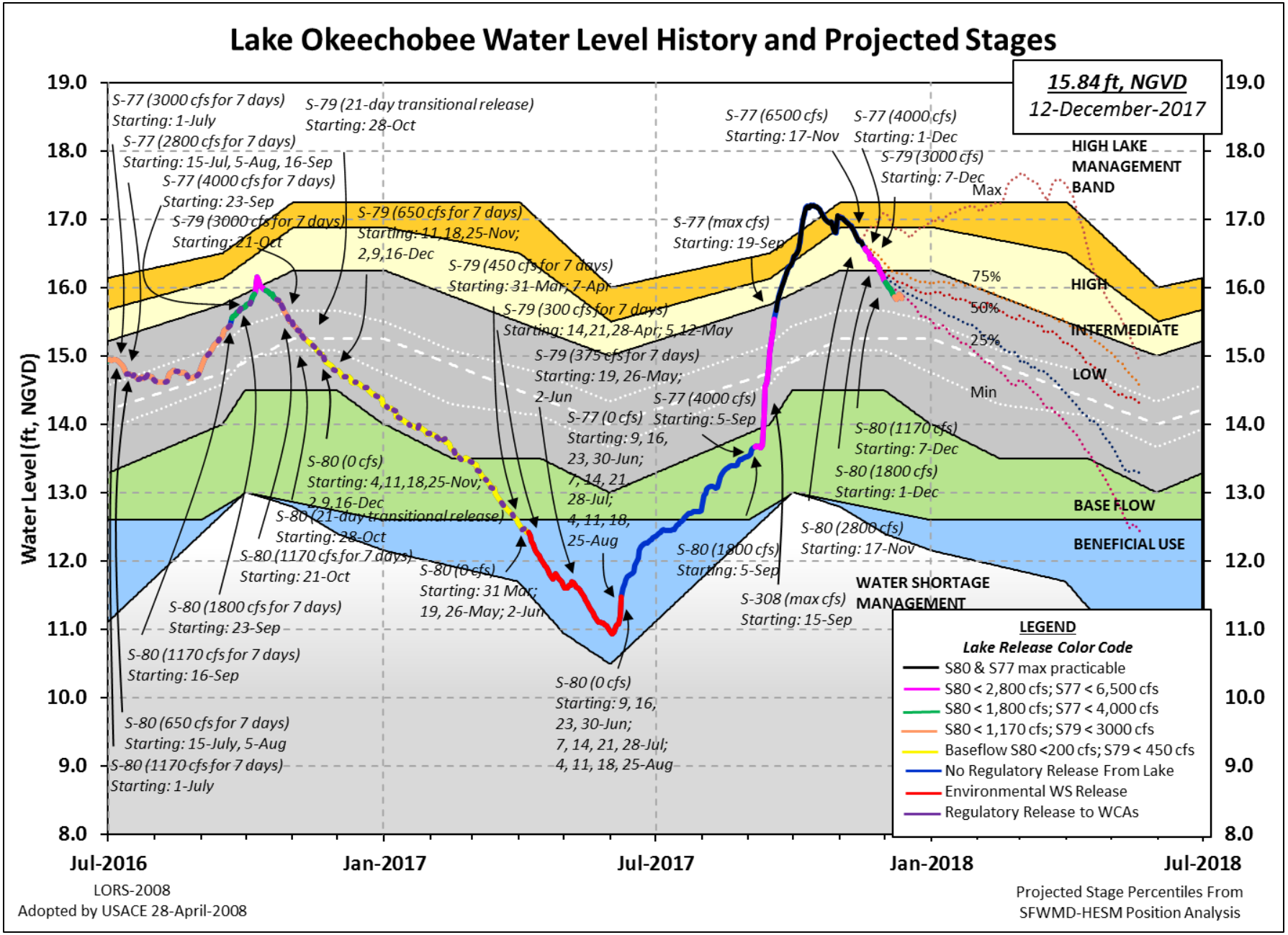

Lake Okeechobee Water Level History and Projected Stages
15.84 ft, NGVD
12-December-2017
Water Level (ft, NGVD)
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
11.0
10.0
9.0
8.0
Jul-2016
Jan-2017
Jul-2017
Jan-2018
Jul-2018
HIGH LAKE MANAGEMENT BAND
Max
75%
50%
25%
Min
HIGH
INTERMEDIATE
LOW
BASE FLOW
BENEFICIAL USE
WATER SHORTAGE MANAGEMENT
S-77 (3000 cfs for 7 days) Starting: 1-July
S-77 (2800 cfs for 7 days) Starting: 15-Jul, 5-Aug, 16-Sep
S-77 (4000 cfs for 7 days) Starting: 23-Sep
S-79 (3000 cfs for 7 days) Starting: 21-Oct
S-79 (21-day transitional release) Starting: 28-Oct
S-79 (650 cfs for 7 days) Starting: 11,18,25-Nov; 2,9,16-Dec
S-79 (450 cfs for 7 days) Starting: 31-Mar; 7-Apr
S-79 (300 cfs for 7 days) Starting: 14,21,28-Apr; 5,12-May
S-79 (375 cfs for 7 days) Starting: 19, 26-May; 2-Jun
S-77 (0 cfs) Starting: 9, 16, 23, 30-Jun; 7, 14, 21 28-Jul; 4, 11, 18, 25-Aug
S-77 (max cfs) Starting: 19-Sep
S-77 (6500 cfs) Starting: 17-Nov
S-77 (4000 cfs) Starting: 1-Dec
S-79 (3000 cfs) Starting: 7-Dec
S-77 (4000 cfs) Starting: 5-Sep
S-80 (0 cfs) Starting: 4,11,18,25-Nov; 2,9,16-Dec
S-80 (21-day transitional release) Starting: 28-Oct
S-80 (1170 cfs for 7 days) Starting: 21-Oct
S-80 (0 cfs) Starting: 31 Mar; 19, 26-May; 2-Jun
S-80 (1800 cfs for 7 days) Starting: 23-Sep
S-80 (1170 cfs for 7 days) Starting: 16-Sep
S-80 (650 cfs for 7 days) Starting: 15-July, 5-Aug
S-80 (1170 cfs for 7 days) Starting: 1-July
S-80 (0 cfs) Starting: 9, 16, 23, 30-Jun; 7, 14, 21, 28-Jul; 4, 11, 18, 25-Aug
S-80 (1800 cfs) Starting: 5-Sep
S-80 (1170 cfs) Starting: 7-Dec
S-80 (1800 cfs) Starting: 1-Dec
S-80 (2800 cfs) Starting: 17-Nov
S-308 (max cfs) Starting: 15-Sep
LEGEND
Lake Release Color Code
S80 & S77 max practicable
S80 < 2,800 cfs; S77 < 6,500 cfs
S80 < 1,800 cfs; S77 < 4,000 cfs
S80 < 1,170 cfs; S79 < 3000 cfs
Baseflow S80 <200 cfs; S79 < 450 cfs
No Regulatory Release From Lake
Environmental WS Release
Regulatory Release to WCAs
LORS-2008
Adopted by USACE 28-April-2008
Projected Stage Percentiles From SFWMD-HESM Position Analysis

Figure 2

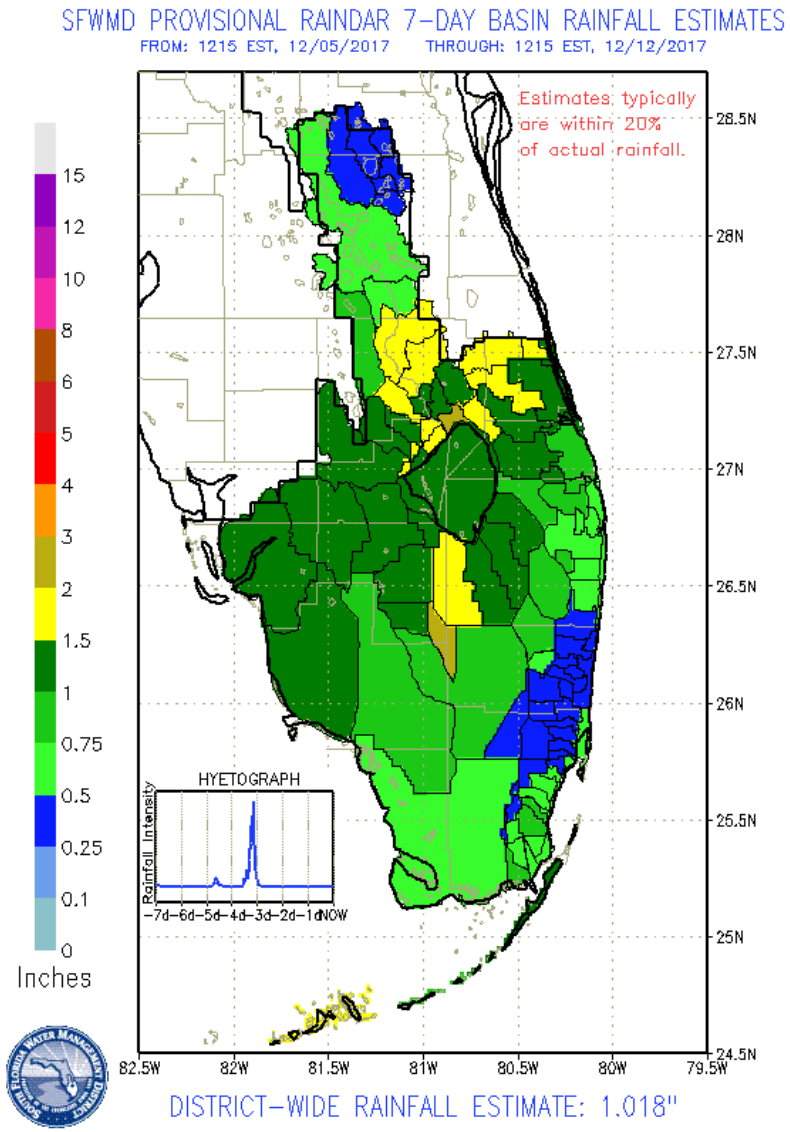


Figure 3

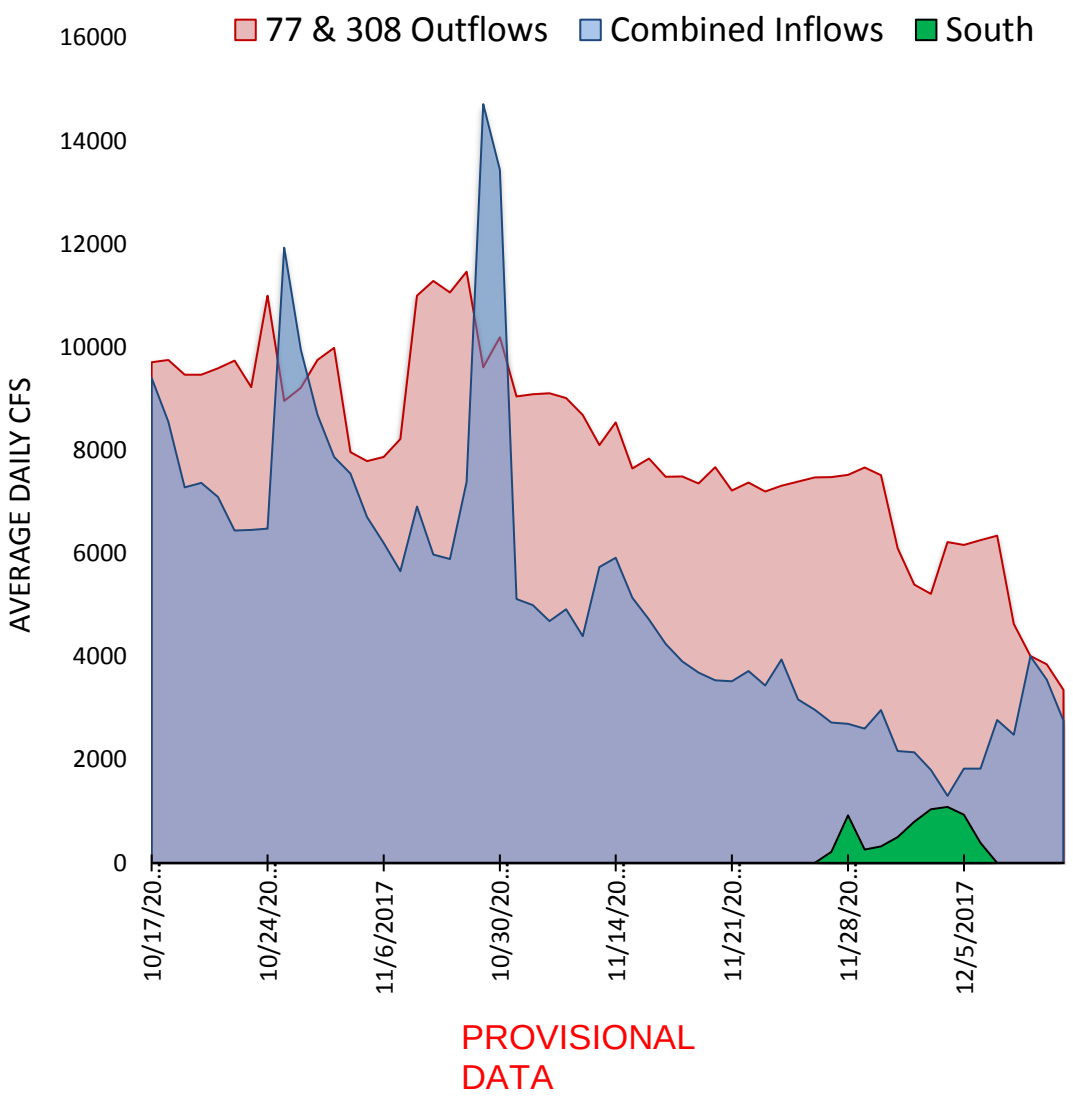


Figure 4

LAKE ISTOKPOGA

Lake Istokpoga stage is 39.21 feet NGVD as of midnight December 11, 2017 and is currently 0.29 feet below its regulation schedule to accommodate construction on downstream structures (Figure 5). Average daily flows into the lake from Josephine Creek for the week December 5 – December 11, 2017 were similar to the previous week, at 101 cfs. No data have been reported for Arbuckle Creek since July 4, 2017 as the gauge is being recalibrated after construction in the area. Average daily discharge from S68 and S68X over the past week increased, going from 566 cfs to 888 cfs. According to RAINDAR, 0.87 inches of rain fell in the Lake Istokpoga basin over the past week.

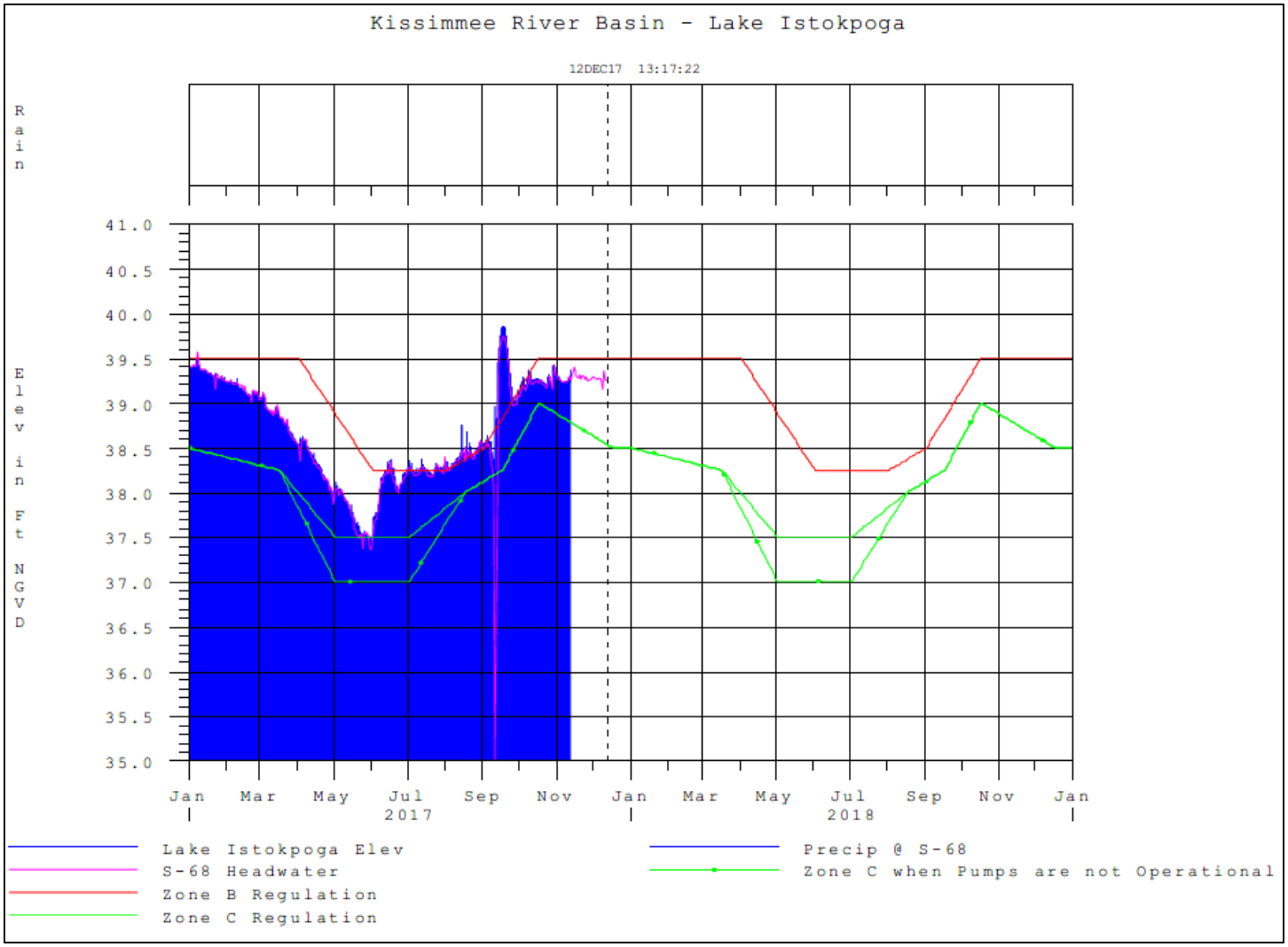


Figure 5

ESTUARIES

St. Lucie Estuary:

Last week total inflow into the St. Lucie Estuary averaged about 2,698 cfs (Figures 1 and 2) and last month inflow averaged about 4,122 cfs. Last week provisional averaged inflows from the tidal basin and the structures are shown in Table 1.

Table 1. Weekly average inflows (data is provisional).

Location	Flow (cfs)
Tidal Basin Inflow	390
S-80	1,611
S-308	1,307
S-49 on C-24	304
S-97 on C-23	222
Gordy Rd. structure on Ten Mile Creek	171

Over the past week, salinity increased throughout the estuary (Table 2, Figures 3 and 4). The seven-day moving average salinity of the water column (an average of the surface and bottom salinity) at the US1 Bridge is 7.0. Salinity conditions in the middle estuary are in the fair range for the adult eastern oysters (Figure 3).

Table 2. Seven-day average salinity at three monitoring sites 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 (North Fork)	**2.0** (0.8)	**4.3** (1.2)	NA[1]
US1 Bridge	**4.3** (1.5)	**9.7** (4.3)	10.0-26.0
A1A Bridge	**11.6** (8.6)	**19.0** (18.2)	NA[1]

[1]Envelope not applicable.

Continuous monitoring of water quality is conducted at HR1 in the North Fork. Weekly dissolved oxygen data are summarized in Table 3.

Table 3. Weekly dissolved oxygen conditions at HR1 in the North Fork of the St. Lucie Estuary.

Location	Depth	Average DO (mg/l)	Minimum DO (mg/l)	Maximum DO (mg/l)
HR1	surface	7.41	4.28	8.30
HR1	bottom	6.71	3.28	8.17

Continuous monitoring of water quality is conducted at five Land/Ocean Biogeochemical Observatory (LOBO) stations located in the St. Lucie Estuary and maintained by Florida Atlantic University/Harbor Branch Oceanographic Institute (FAU-HBOI). Data are summarized in Table 4 and station location map is shown in Figure 5.

Table 4. Weekly ranges of instrument depth, chlorophyll *a* (a measure of algal biomass) and dissolved oxygen concentrations at five FAU-HBOI LOBO stations located in the St. Lucie Estuary.

Location	Depth (m)	Chlorophyll *a* (µg/l)	Average DO (mg/l)	Minimum DO (mg/l)	Maximum DO (mg/l)
SF2	2.95	4.18 - 5.05	6.62	6.01	7.45
SF	1.83	4.31 - 5.96	7.91	6.90	8.91
NF	2.26	3.71 - 5.79	7.14	6.07	8.18
ME	2.04	3.17 - 5.35	7.11	6.19	7.98
IRL-SLE	NA[1]	NA	NA	NA	NA

[1]Not available.

NOAA satellite imagery in the St. Lucie Estuary was unavailable this week.

Caloosahatchee Estuary:
Last week total inflow into the Caloosahatchee Estuary averaged about 4,701 cfs (Figures 6 and 7) and last month inflow averaged about 6,704 cfs. Last week provisional averaged inflows from the structures are shown in Table 5.

Table 5. Weekly average inflows (data is provisional)

Location	Flow (cfs)
S-77	3,353
S-78	3,419
S-79	4,434

Over the past week, salinity increased throughout the estuary (Table 6, Figures 8 & 9). The seven-day average salinity values are within the poor range for the adult eastern oysters at Cape Coral and in the good range at Shell Point (Figure 10). Salinity data was not available at Sanibel. The 30-day moving average surface salinity is 0.1 at Val I-75 and 0.2 at Ft. Myers. Salinity conditions between Val I-75 and Ft. Myers are good for tape grass.

Table 6. 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)	**0.2** (0.1)	**0.2** (0.1)	NA[1]
*Val I75	**0.2** (0.1)	**0.2** (0.2)	0.0-5.0[2]
Ft. Myers Yacht Basin	**0.2** (0.2)	**0.2** (0.2)	NA
Cape Coral	**2.7** (1.4)	**4.0** (2.2)	10.0-30.0
Shell Point	**14.1** (11.9)	**15.5** (13.2)	10.0-30.0
Sanibel	**NR**[3](NR)	**NR** (NR)	10.0-30.0

[1]Envelope not applicable, [2]Envelope is based on a 30-day average, and [3]Not Reporting.
*Val I75 is temporarily unavailable (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 7 as concentration ranges of chlorophyll *a* and dissolved oxygen at Beautiful Island, Ft. Myers, and Shell Point in the Caloosahatchee Estuary.

Table 7. 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.

Parameter Name	RECON Monitoring Stations		
	Beautiful Island	**Ft. Myers**	**Shell Point**
Chlorophyll *a* (µg/l)	Down for maintenance	3.49 - 4.34	2.59 - 4.87
Dissolved Oxygen (mg/l)	Down for maintenance	No Data	6.30 - 11.27

The Florida Fish and Wildlife Research Institute reported on December 8, 2017, that *Karenia brevis, the Florida red tide dinoflagellate,* was observed in background to high concentrations in thirty samples collected from Lee County.

NOAA satellite imagery in the Caloosahatchee River Estuary was unavailable this week.

Water Management Recommendations

Lake stage is in the Low Sub-Band of 2008 LORS. Tributary hydrological conditions are wet. The 2008 LORS recommends up to 3,000 cfs at S-79 and up to 1,170 cfs at S-80. Given the current estuarine conditions, there are no ecological benefits associated with freshwater releases from Lake Okeechobee.

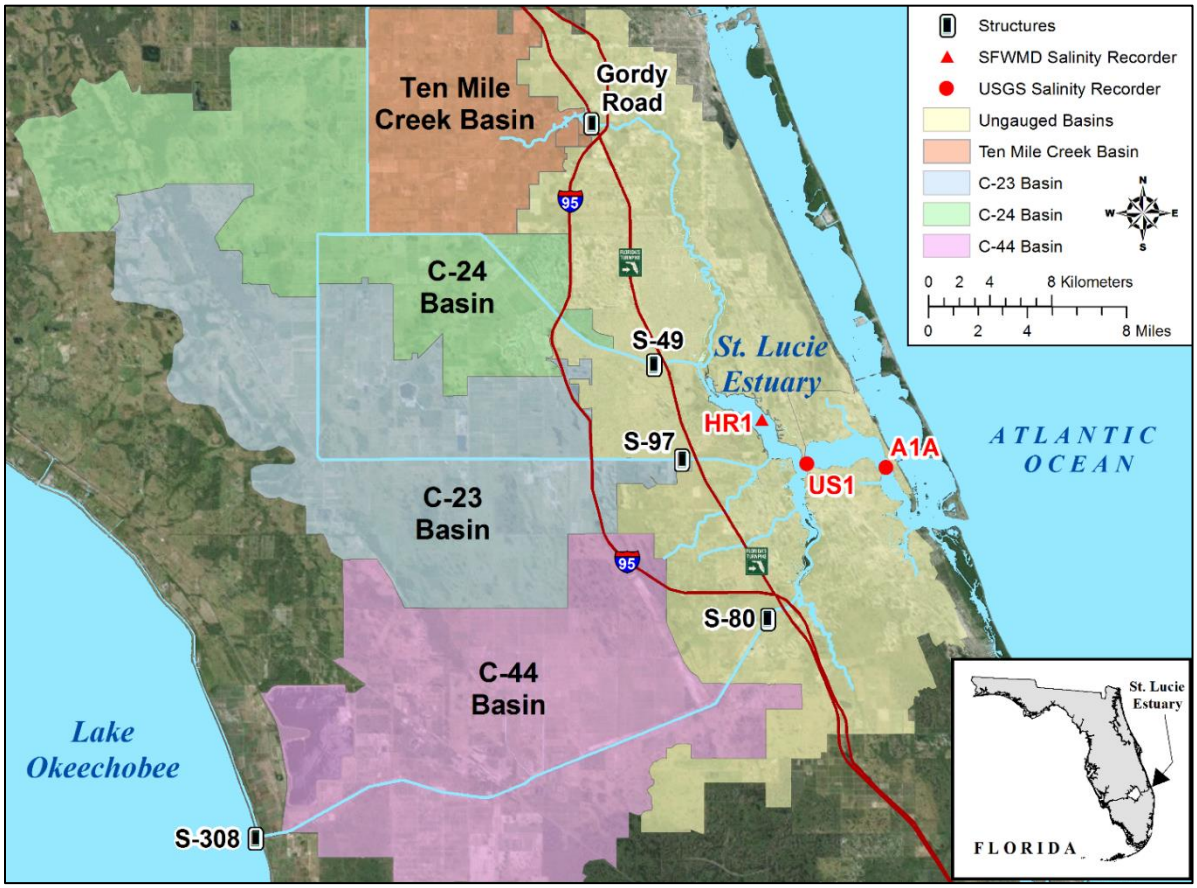


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

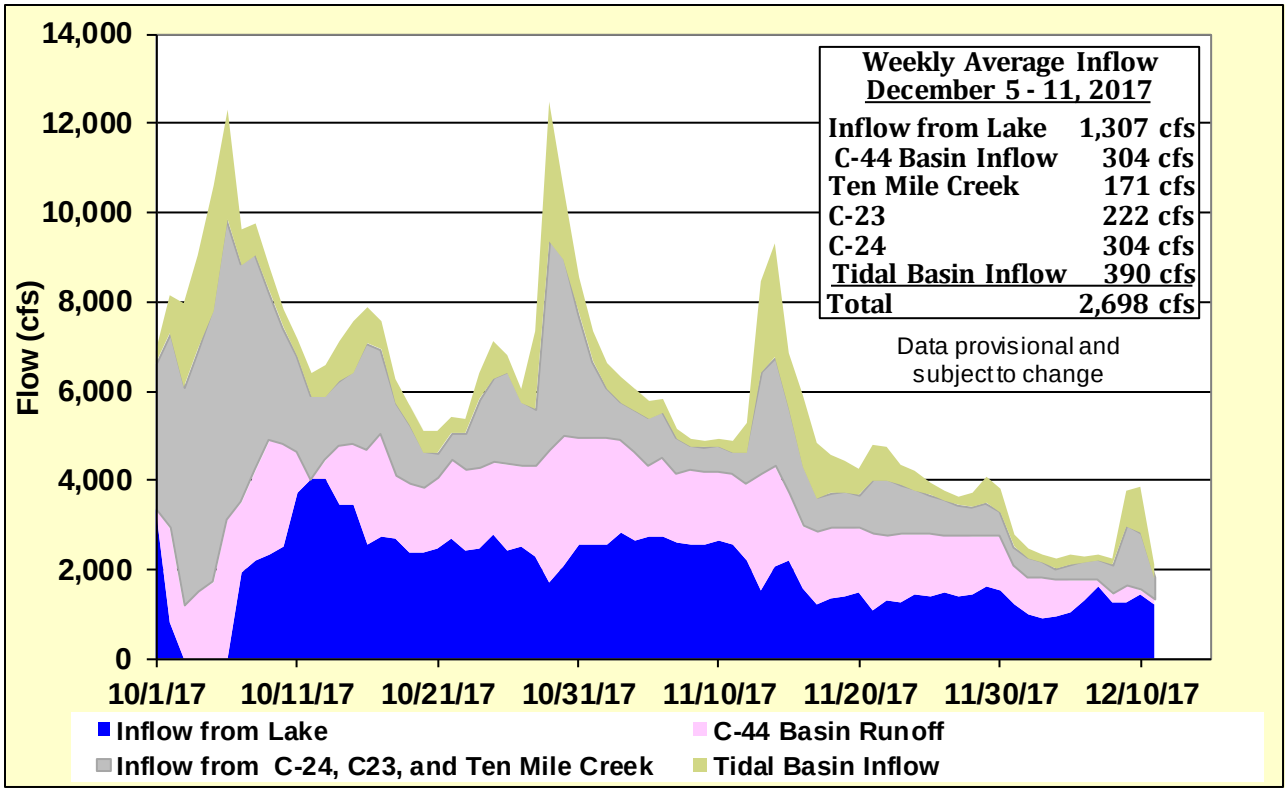


Figure 2. Estimated surface freshwater inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basins into the St. Lucie Estuary.

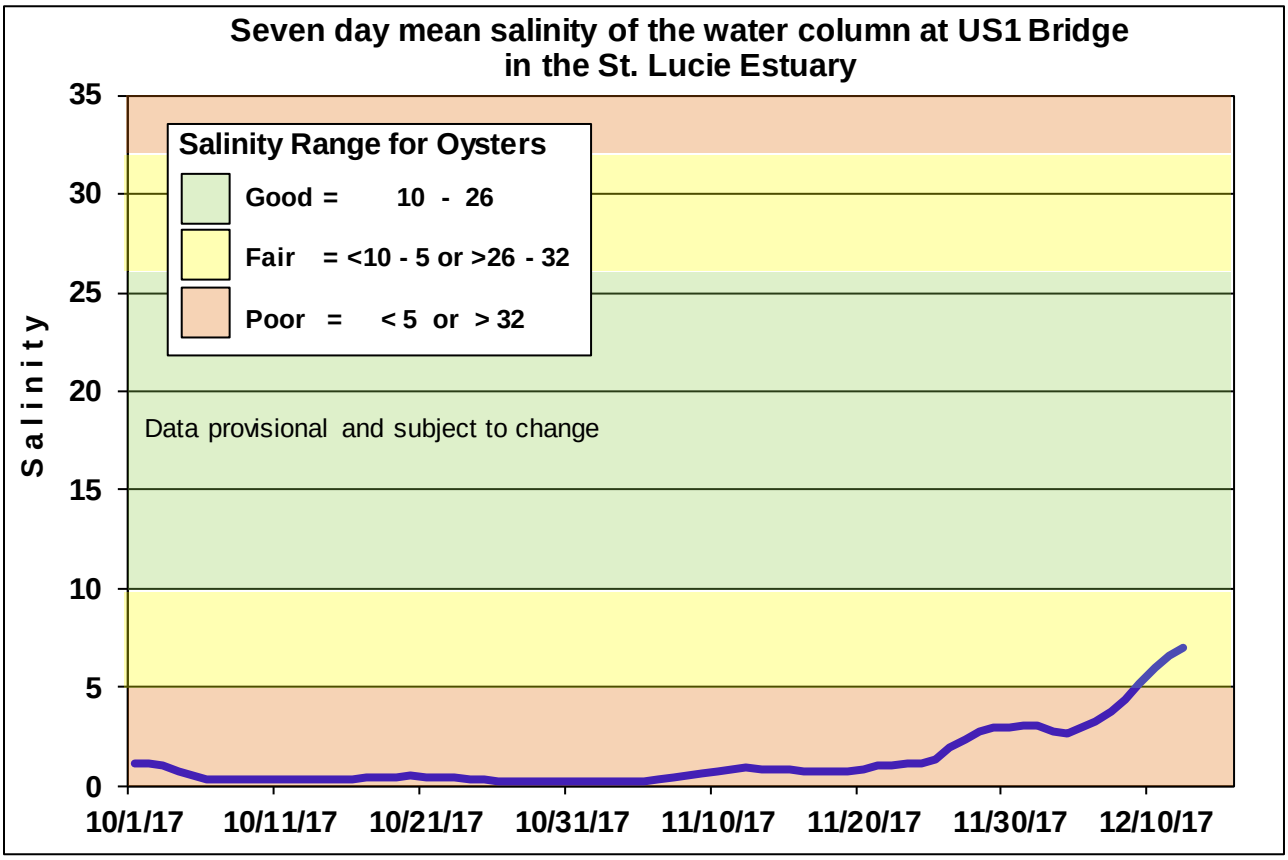


Figure 3. Seven-day mean salinity of the water column at the U.S. Highway 1 Bridge.

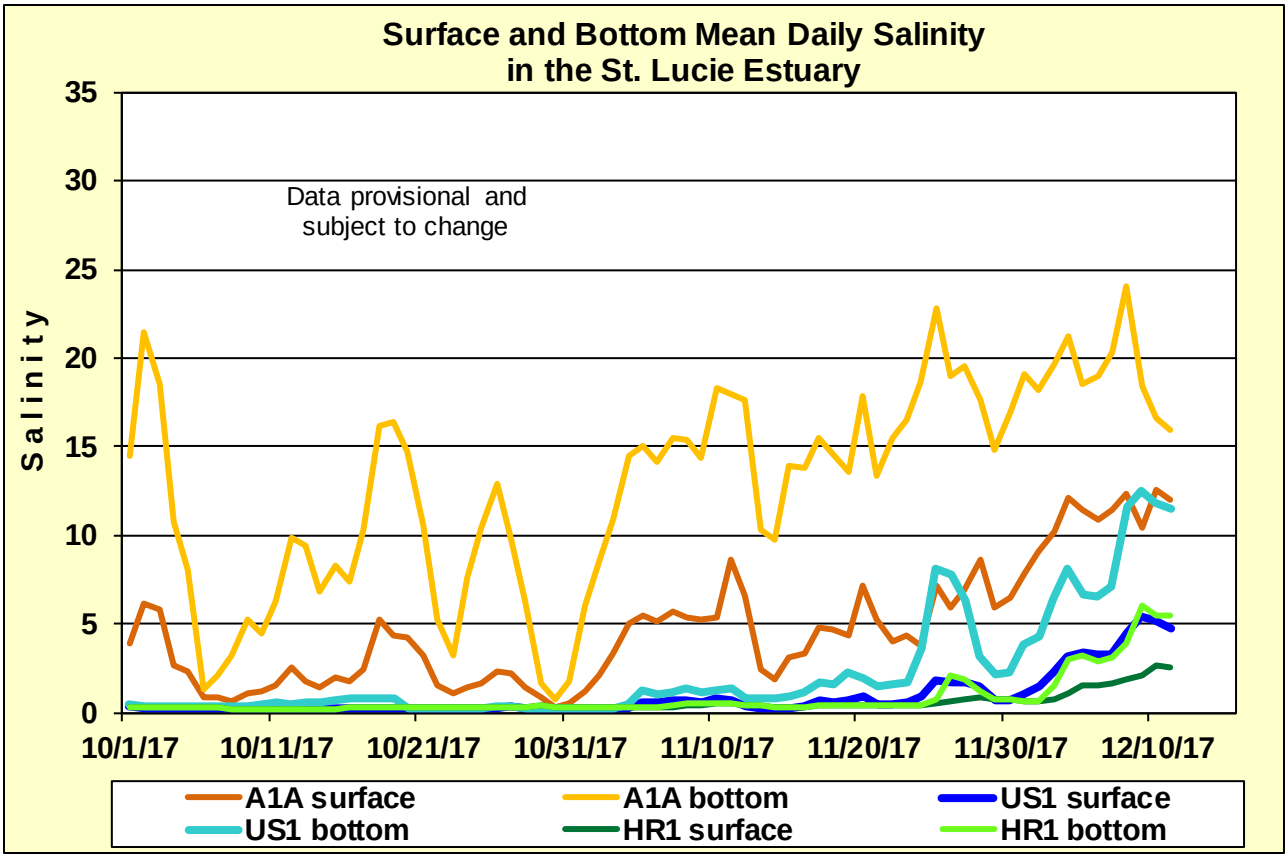


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

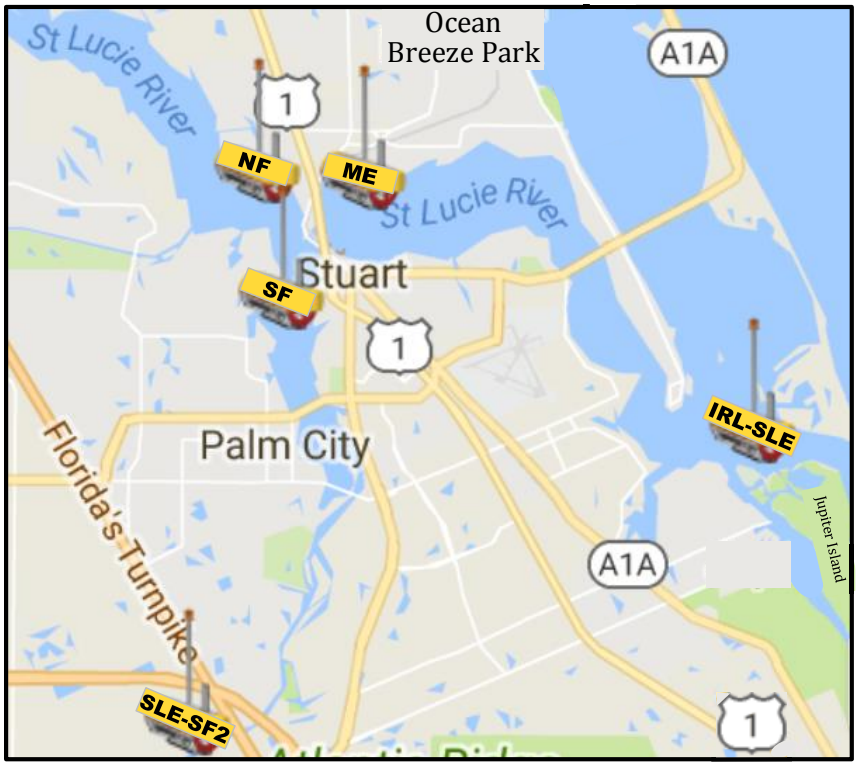


Figure 5. Location of FAU-HBOI LOBO water quality stations in the St. Lucie Estuary.

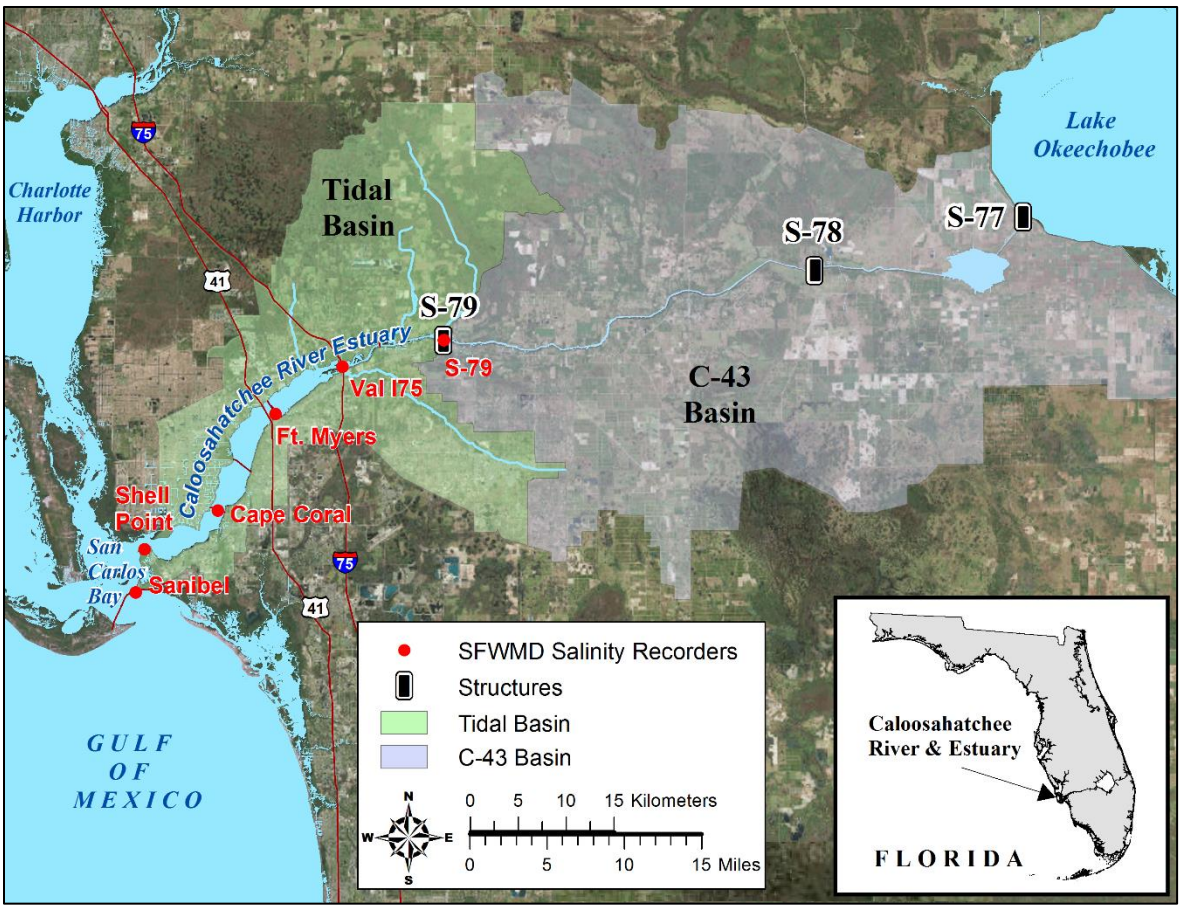


Figure 6. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

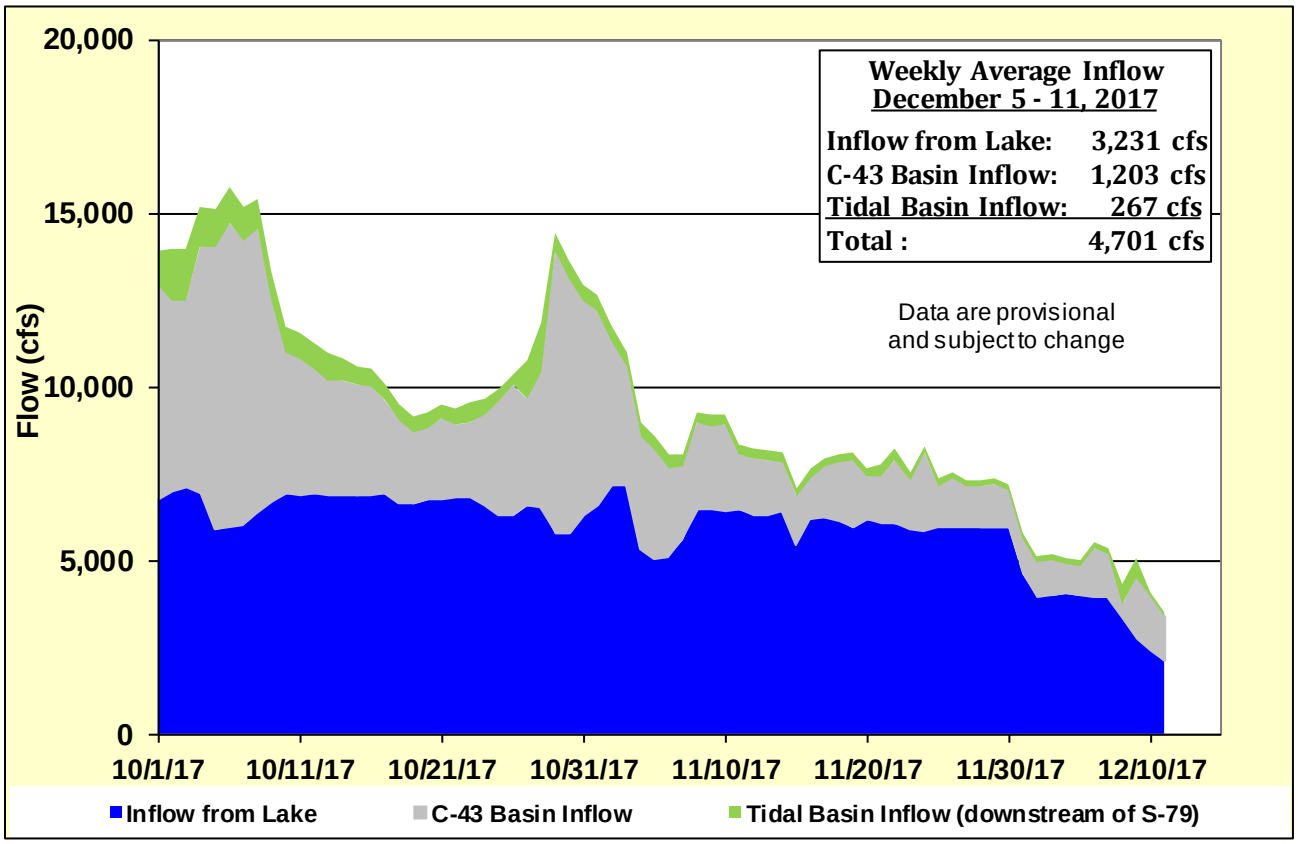


Figure 7. Freshwater inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.

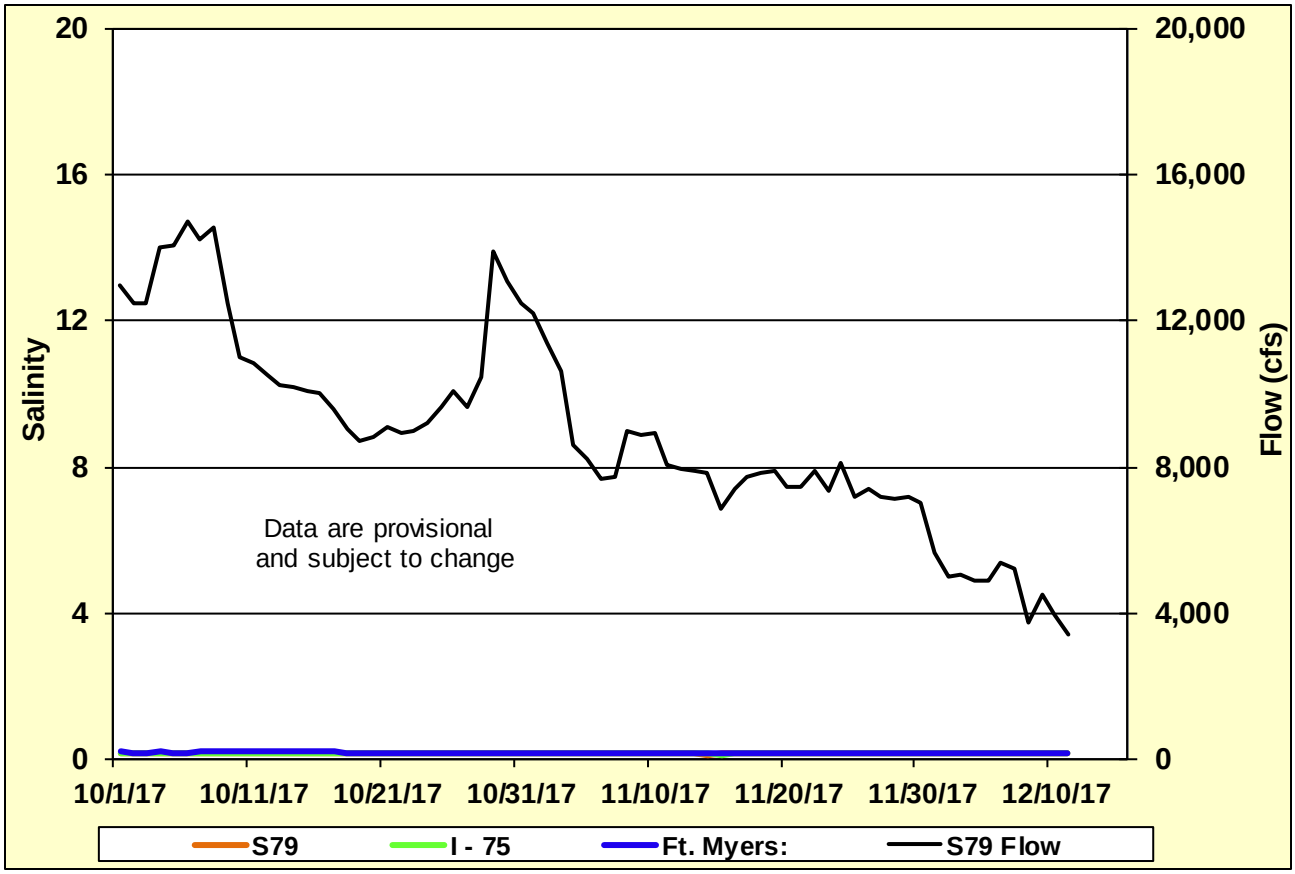


Figure 8. Daily mean flows at S-79 and salinity at upper estuary monitoring stations.

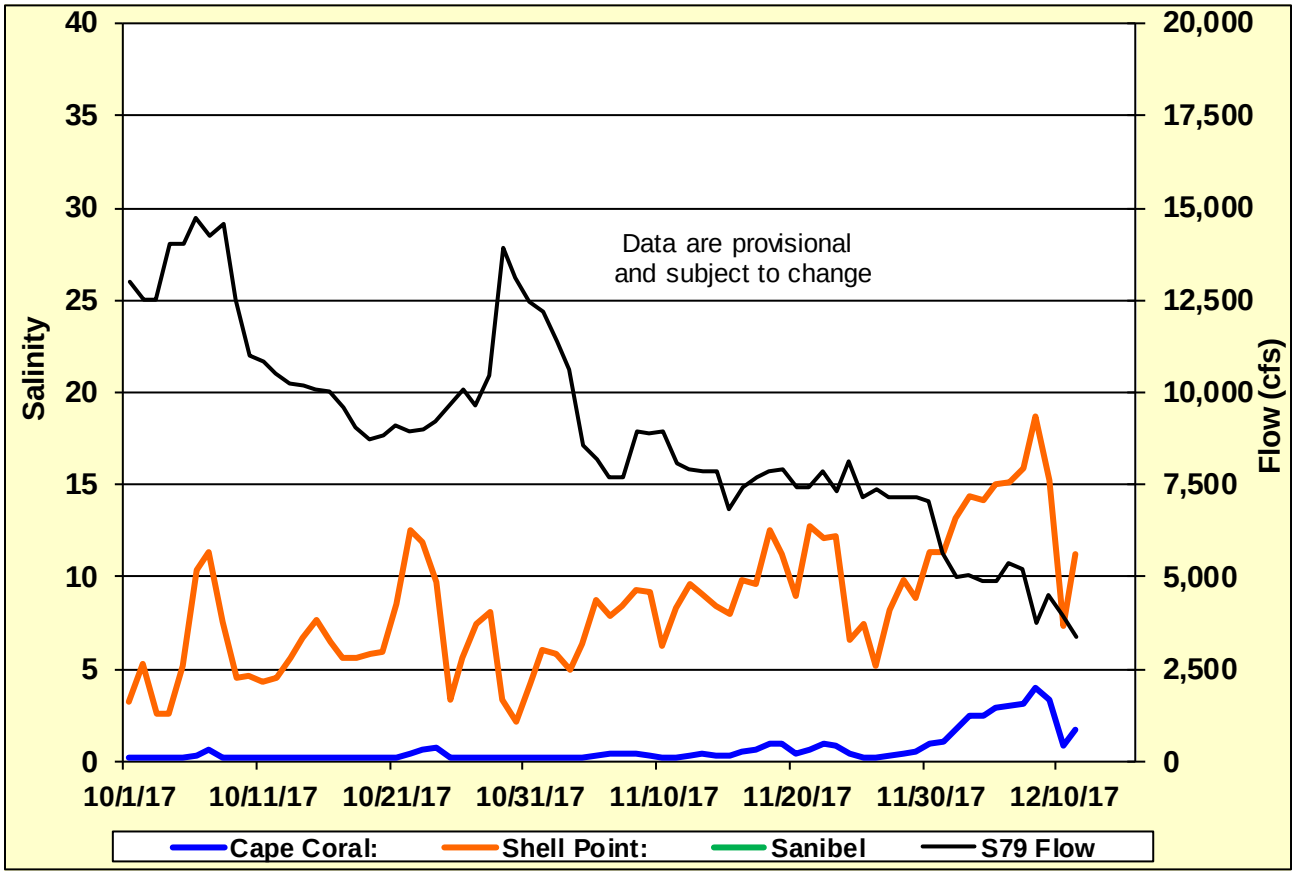


Figure 9. Daily mean flows at S-79 and salinity at lower estuary stations.

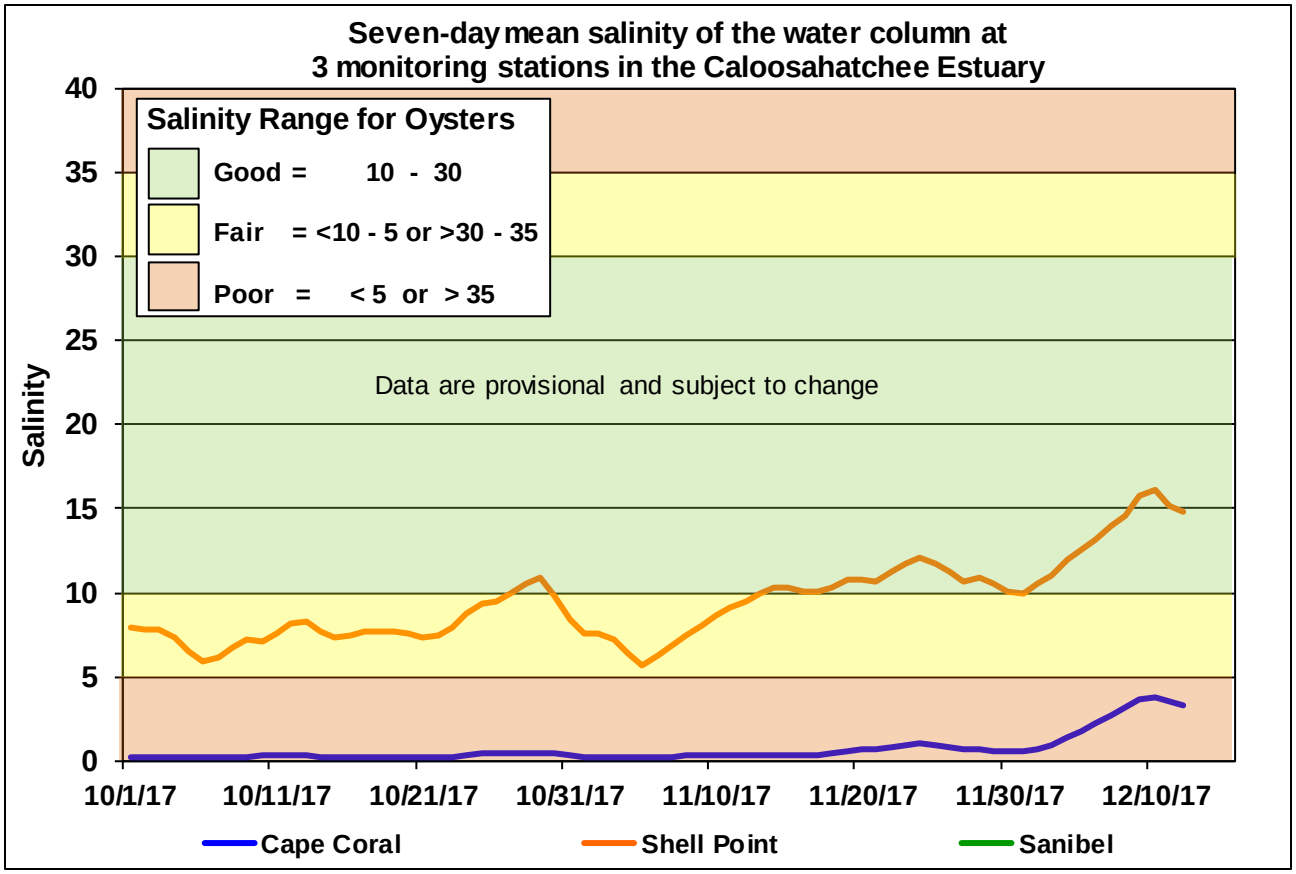


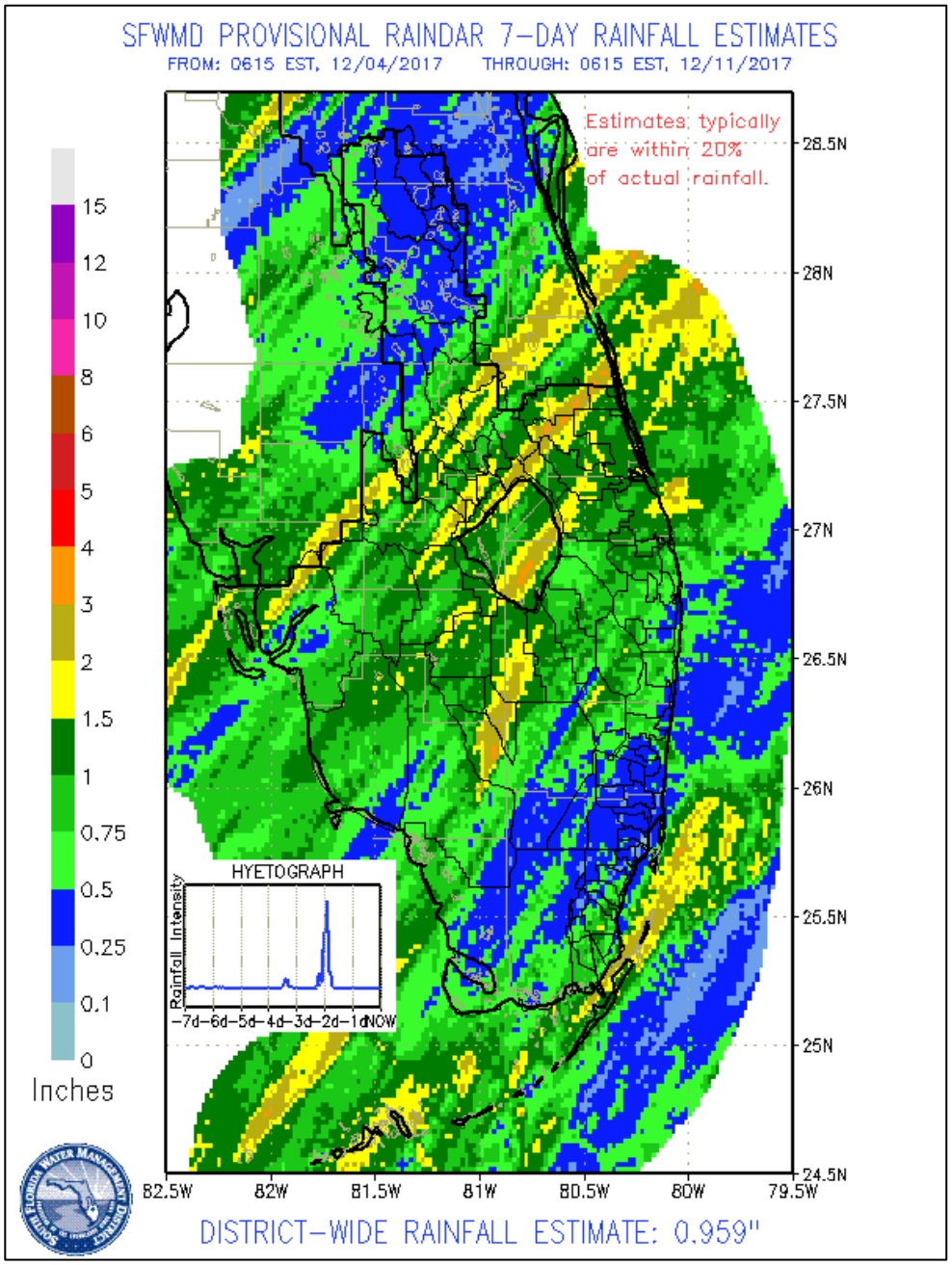
Figure 10. Seven-day mean salinity at Cape Coral Bridge, Shell Point and Sanibel Bridge monitoring stations.

EVERGLADES

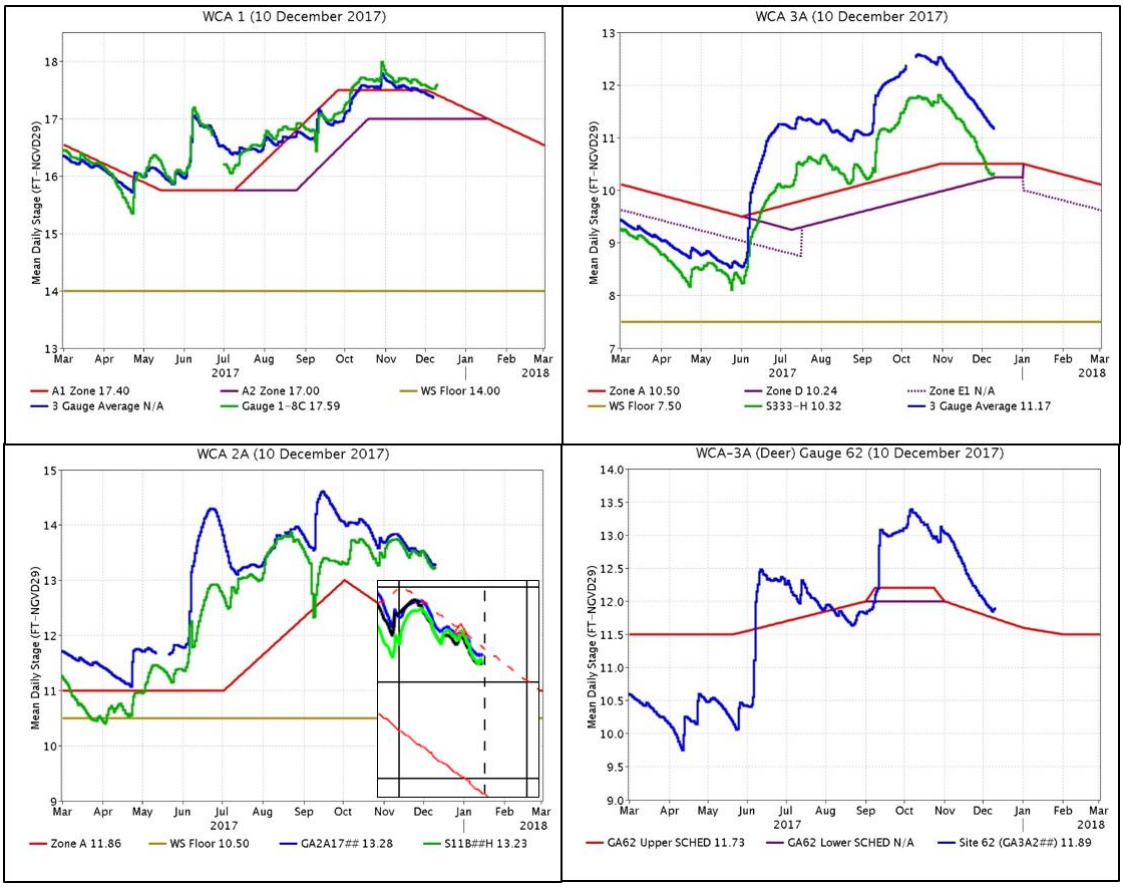
Rainfall was widespread and fairly consistent across the Everglades last week. However, the WCA basins dropped an average of 0.12 feet in stage, with WCA-3A gauges reporting changes from −0.08 feet to −0.25 feet.

Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	0.91	ERROR★
WCA-2A	0.92	−0.17
WCA-2B	0.58	−0.09
WCA-3A	0.79	−0.19
WCA-3B	0.49	−0.11
ENP	0.59	+0.16

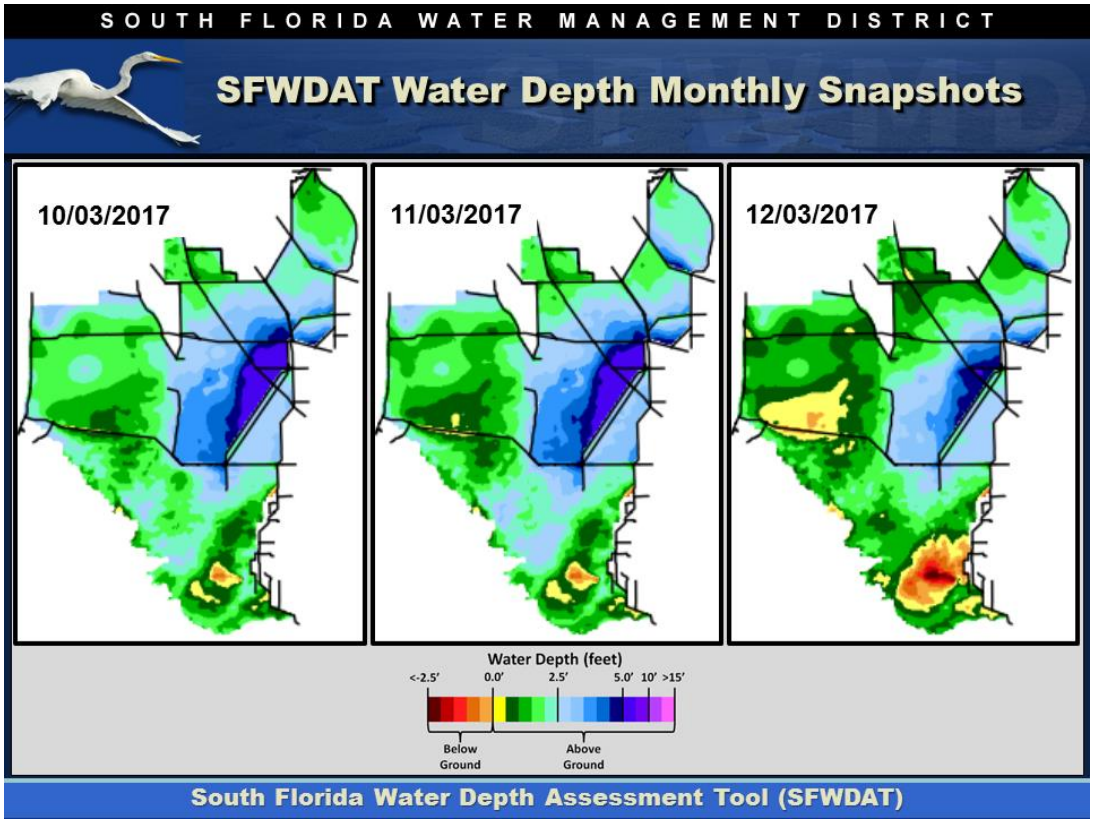
*** a malfunctioning gauge (1-8T) within WCA-1**

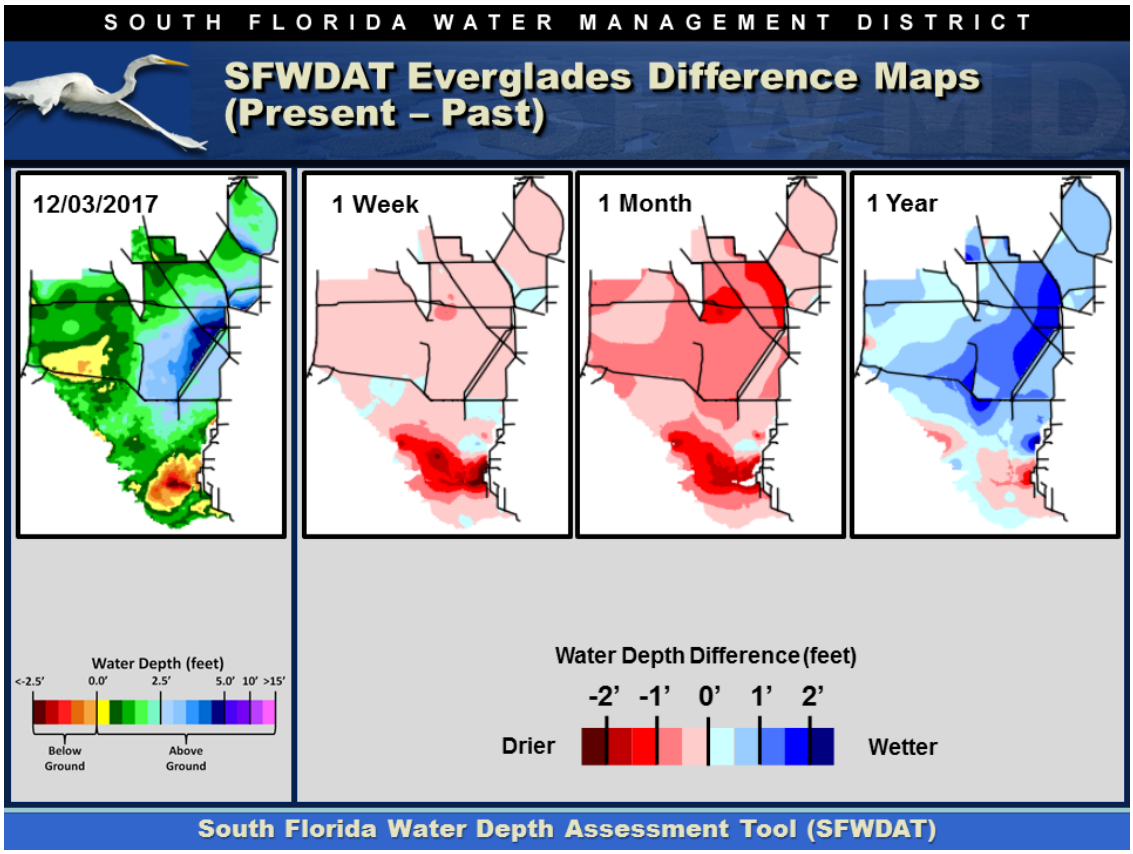


Regulation Schedules: WCA-1 three-gauge average was not available for December 10, 2017 but continues trending along the top of the Zone A1 schedule. WCA-2A is still subject to the temporary deviation with marsh stage at gauge GA2A17 holding 1.42 feet above Zone A1 and just below the temporary schedule. WCA-3A three-gauge average stage is 0.67 feet above Zone A and continues to rapidly decrease. Stage difference between marsh and canal is 0.85 feet. WCA-3A at gauge 62 (northwest corner) is 0.16 feet above the upper schedule.



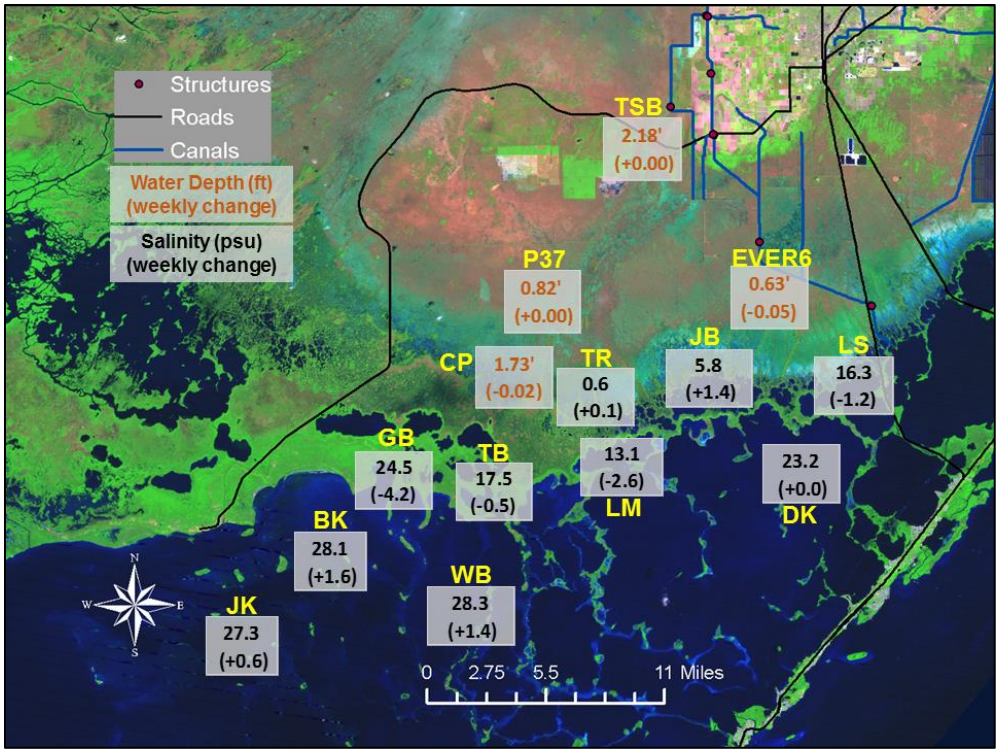
Water Depths and Changes: The WDAT tool for spatial interpolation of depth indicates a range from a low of 0.5 feet to 1.0 feet in Northwest WCA-3A to a high of 4.5 to 5.0 feet in small pockets along the northern L-67A canal in southern WCA-3A. WDAT modelers report an anomaly in Everglades National Park data. Comparing WDAT water levels from present, water depths over the last week fell across most of the Everglades, only rising in northwest WCA-3A and the eastern perimeter of WCA-1. WCA-3A is again lower than it was a month ago. Over the last week individual gauge changes in the WCAs ranged from 0.0 feet (WCA-1) to −0.25 feet (southern WCA-3A).

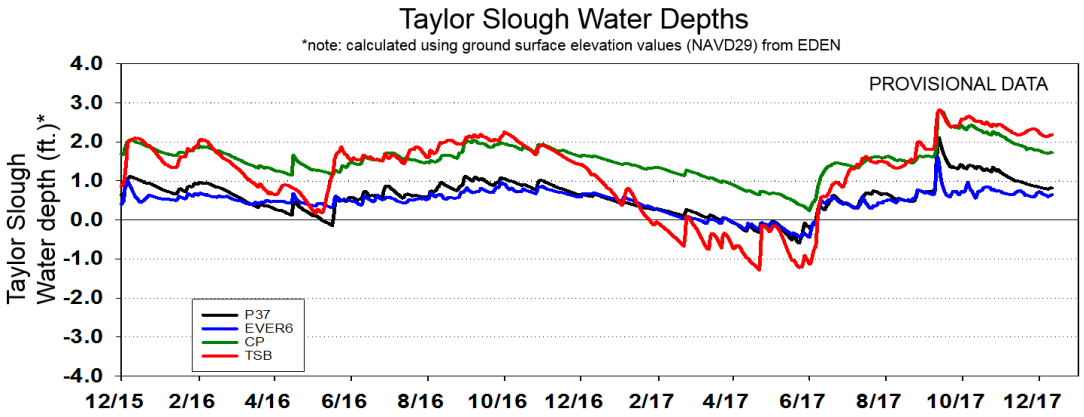


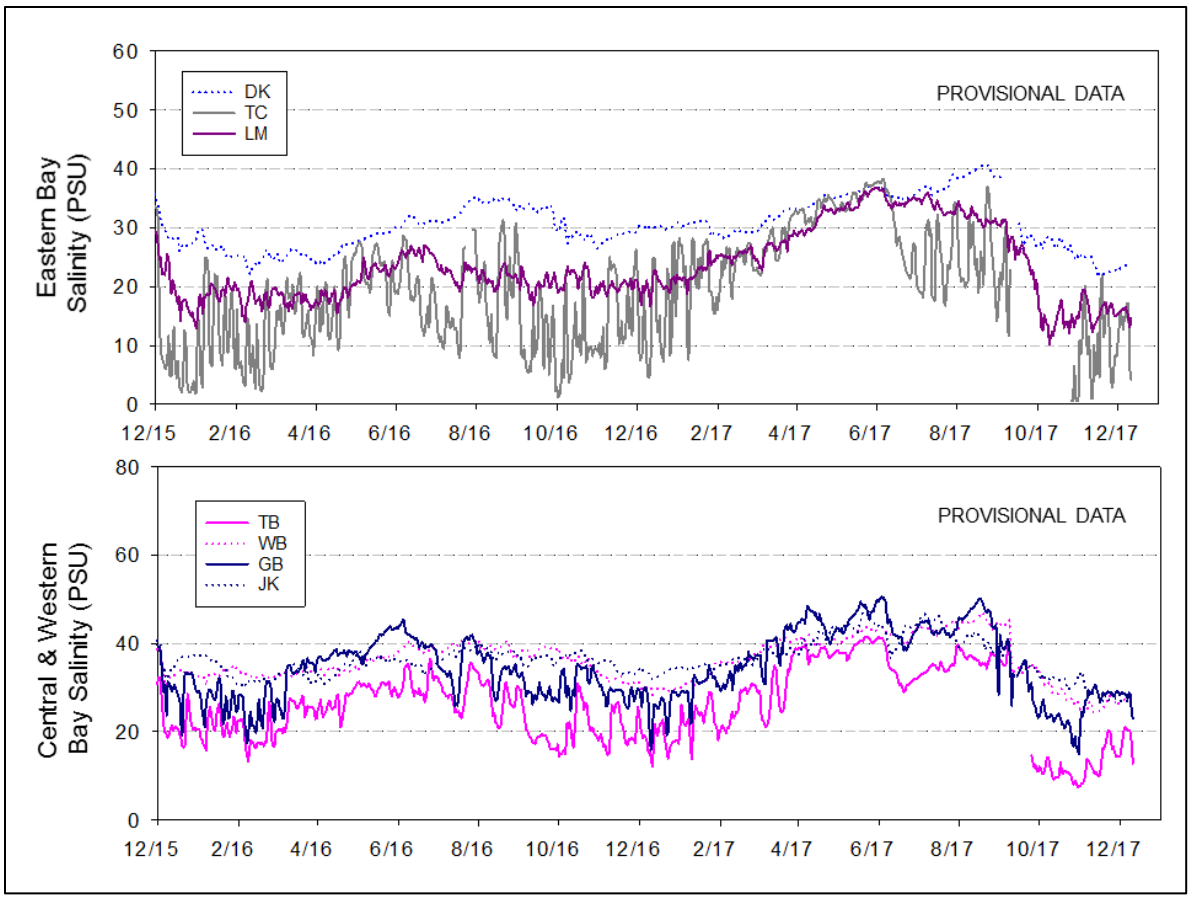


Taylor Slough stages: Water level changes ranged from 0.0 feet in central and northern Taylor Slough to −0.05 feet in the ENP panhandle. Weekly rainfall in the area averaged 0.57 inches with all of it falling over the weekend. Water levels are still three to 15 inches above the historic average for this time of year with the highest divergence occurring in northern Taylor Slough.

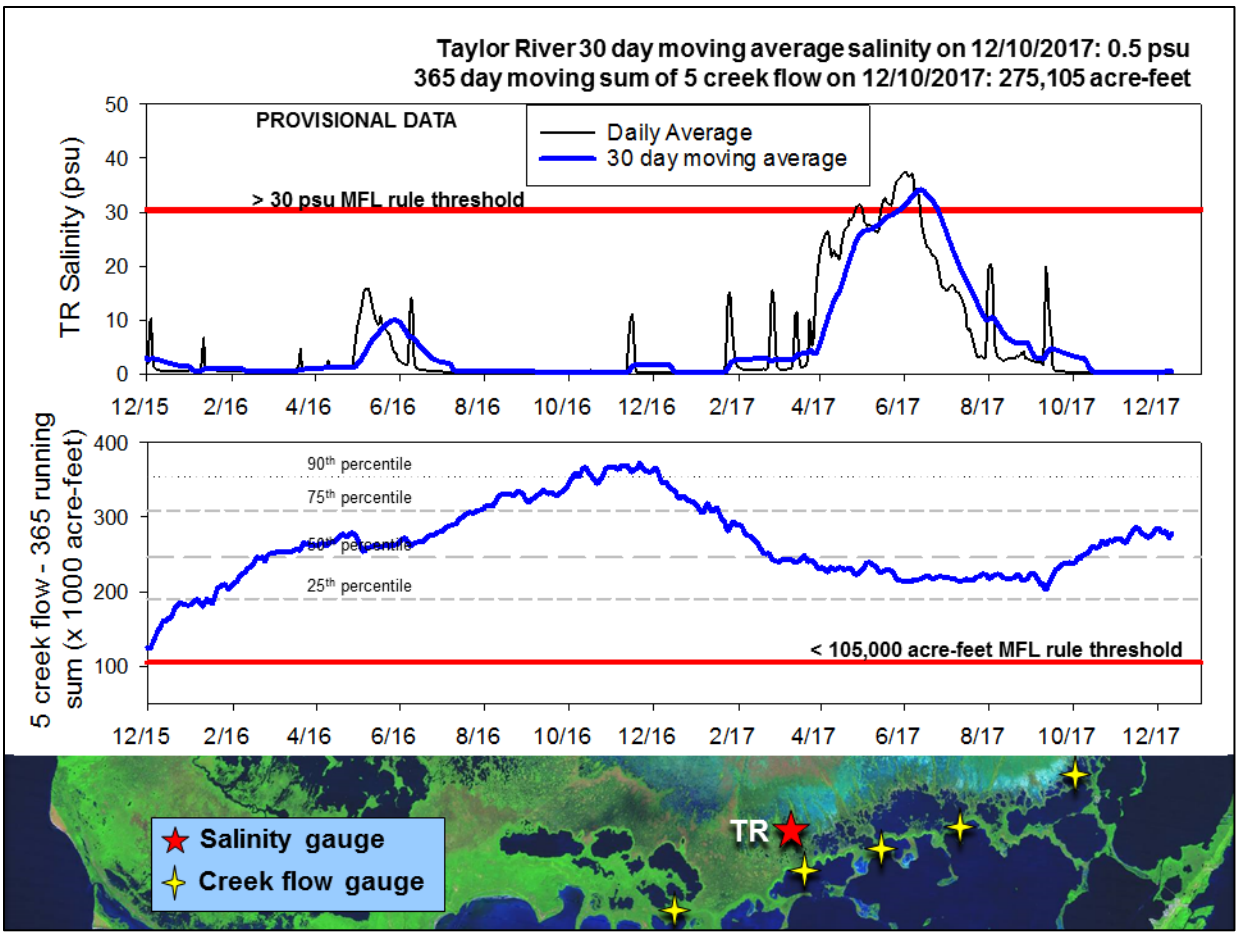
Florida Bay Salinities: Salinity changes for the last week were mostly less than 1.6 psu with only two nearshore stations experiencing decreases greater than 2 psu. Current salinities range from 6 psu in the northeastern nearshore to 28 psu in the central bay. Western bay salinities continue to be less than the historic average for this area, with a maximum difference of 6 psu.







Florida Bay MFL: Mangrove zone daily average salinity remains near fresh at 0.5 psu, but is very slowly increasing. The 30-day moving average is 0.5 psu. The weekly cumulative flow from the five creeks denoted by yellow stars on the map decreased to 5,560 acre-feet (only half of the previous week's total) but this is still 700 acre-feet higher than the average for this time of year. Flows are expected to decrease as the dry season progresses. The 365-day moving sum of flow from the five creeks identified by yellow stars on the map increased about 5,600 acre-feet this past week to end at 275,105 acre-feet (still greater than the long-term average of 257,628 acre-feet). Creek flow is provisional data from the U.S. Geological Survey and is highly variable.



Water Management Recommendations

Deep water conditions persist in WCA-3A. All practicable and novel management options should be explored in order to relieve high water conditions particularly in southern WCA-3A. Florida Bay salinities are stable, and bloom conditions continue to be helped by freshwater flushing and cooler temperatures.

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

Everglades Ecological Recommendations, December 12th, 2017 (red is new)

Area	Current Condition	Cause(s)	Recommendation	Reasons
WCA-1	Stage changed from 0.0 to −0.04'	Rainfall, ET, management	Maintain depths at high water targets (17.5 ft) at regulation schedule or slightly above.	Protect habitat and facilitate invasive plant treatments.
WCA-2A	Stages decreased −0.17'	Rainfall, ET, management	Maintain depths at temporary regulation schedule or slightly above.	Protect habitat and wildlife from high water stress.
WCA-2B	Stages decreased −0.09'	Rainfall, ET, management	Maintain depths at regulation schedule or slightly above.	Protect habitat and wildlife from high water stress.
WCA-3A NE	Stages decreased −0.18'	Rainfall, ET, management	Moderate ascension rates as possible. Manage for relief of high water conditions.	Protect habitat and wildlife from high water stress.
WCA-3A NW	Stages decreased −0.08'	Rainfall, ET, management		
Central WCA-3A S	Stages decreased −0.23'	Rainfall, ET, management	Moderate ascension rates as possible. Manage for relief of high water conditions.	Water depths above 2.5 feet at gauge 65 are indicative that tree islands are flooded and under stress. Depths exceeded that mark on 18 June, meaning the tree islands have been flooded for 177 days.
Southern WCA-3A S	Stages decreased −0.25'	Rainfall, ET, management		
WCA-3B	Stages decreased −0.11'	Rainfall, ET, management	Maintain depths at regulation schedule.	Protect habitat and wildlife from high water stress.
ENP-SRS	Stage increased +0.16'	ET, rainfall, topography, management	Make discharges to the Park according to the 2012 WCP rainfall plan.	Keep peat wet to promote native habitat and maintain wetland plant and animal communities. Protect habitat and wildlife, including apple snail reproduction.
Taylor Slough	Stage changes ranged from −0.07' to +0.0'	Rain, ET, inflows	Move water southward as possible	When available provide freshwater buffer for ecosystems.
FB- Salinity	Salinity changes ranged −4.2 to +1.6 psu	Rain, ET, inflows, wind	Move water southward as possible	When available, provide freshwater to main low salinity buffer and promote water movement.