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: November 14, 2017

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

A cold front is stalling across central Florida and upper level energy streaming across the area will generate moderate to heavy shower activity along the boundary. Heaviest rains should occur this evening, focused near the east coast between St Lucie County and Cape Canaveral (north of the District coastline). Expect areas of moderate to heavy rain to regenerate Wednesday and Thursday, with the focus shifting southward each day ahead of a second front, which is expected to push into the District Thursday night. Drier conditions will spread over the District Friday and Saturday. A stronger front will then push through the District Sunday with light showers.

Kissimmee

Tuesday morning stages were 58.0 feet (at schedule) in East Lake Toho, 55.0 feet (at schedule) in Toho, and 51.8 feet (0.7 feet below schedule) in KCH; S65A headwater stage was 46.4 feet. Tuesday morning discharges were: 1153 cfs at S65, 1121 cfs at S65A, and 2312 cfs at S65E. Dissolved oxygen concentration in the Kissimmee River averaged 4.1 milligrams per liter (mg/L) for the week. Kissimmee River mean floodplain depth on Sunday was 0.98 feet. There are no new recommendations.

Lake Okeechobee.

Current Lake stage is 16.67 feet NGVD having decreased by 0.25 feet over the past week and by 0.53 feet from its peak of 17.20 feet on October 13. Stages have exceeded 16 feet for 53 days, the longest period since the end of 2005. 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 conditions and turbidity from resuspended lake sediment associated with Hurricane Irma. The high inflows and resuspended lake sediment 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.

Estuaries

Total inflow to St. Lucie estuary averaged 5,497 cfs over the past week with 2,373 cfs coming from Lake Okeechobee. Salinity remain close to 0 in the North Fork (HR1), and increased at and downstream of US1 Bridge. The 7-day average salinity at the US1 Bridge is in the poor range for adult oysters. Average chlorophyll *a* concentration levels at the LOBO stations (maintained by FAU) remain low (between 4.0-7.0 µg/L). Average oxygen levels near the surface and the bottom were between 6.0-8.5 mg/L.

Total inflow to Caloosahatchee estuary averaged 8,680 cfs over the past week with 6,313 cfs coming from the Lake. The 30-day moving average surface salinity is 0.2 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 good range for adult oysters at Shell Point. Salinity data was not available for Cape Coral or Sanibel. Chlorophyll *a* measurements by the Sanibel-Captiva Conservation Foundation show low chl *a* concentration levels near Ft. Myers and Shell Point (between 2.0-5.2 µg/L) over the last week. Red tide dinoflagellate was not present in samples collected along the Lee County coast. 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 above 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 Flowway.

Everglades

Water depths dropped across the Everglades but most notably in WCA-3A over the last week. At the gauges monitored for this report stages dropped in that area by an average of 0.24 feet, with WDAT model in agreement.

Keeping depths below 2.5' 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 4.18 feet, and has exceeded 2.5’ for 150 days.

Conditions in Florida Bay warrant some concern. There is an active bloom along with low dissolved oxygen values in the nearshore areas and creeks. Salinities there for the most part are 3 to 7 psu below average, however steadily increasing in some nearshore locations.

Recommendations for each area in the Everglades are outlined in the table at the end of this report.

Supporting Information

KISSIMMEE BASIN

Kissimmee Basin Rainfall

The Upper Kissimmee Basin received 0.26 inch of rainfall in the past week and the Lower Basin received 0.41 inch (SFWMD Daily Rainfall Report 11/13/2017).

Upper Kissimmee Basin

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

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: 11/14/2017

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)						
							11/12/17	11/5/17	10/29/17	10/22/17	10/15/17	10/8/17	10/1/17
Lakes Hart and Mary Jane	S62	116	LKMJ	61.1	R	61.0	**0.1**	0.1	0.0	0.3	1.0	1.4	1.7
Lakes Myrtle, Preston, and Joel	S57	70	S57	62.0	R	62.0	**0.0**	0.2	0.3	1.3	2.2	2.4	2.5
Alligator Chain	S60	20	ALLI	64.0	R	64.0	**0.0**	0.0	0.1	0.3	0.4	0.2	0.1
Lake Gentry	S63	43	LKGT	61.5	R	61.5	**0.0**	0.0	0.0	0.2	0.3	0.3	0.0
East Lake Toho	S59	109	TOHOE	58.0	R	58.0	**0.0**	0.0	0.1	0.3	0.7	1.4	2.0
Lake Toho	S61	222	TOHOW, S61	55.0	R	55.0	**0.0**	0.0	0.1	0.3	0.5	0.3	1.0
Lakes Kissimmee, Cypress, and Hatchineha	S65	1,349	KUB011, LKIS5B	51.8	R	52.5	**-0.7**	-0.5	-0.2	0.1	0.5	0.5	0.9

[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: **11/14/2017**

Metric	Location	1-Day Average	Average for the Preceeding 7-Days[1]									
		11/12/2017	11/12/17	11/5/17	10/29/17	10/22/17	10/15/17	10/8/17	10/1/17	9/24/17	9/17/17	9/10/17
Discharge (cfs)	S-65	1,299	**1,349**	1,439	1,564	2,319	3,200	6,671	11,491	12,054	5,535	1,809
Discharge (cfs)	S-65A	1,271	**1,346**	1,638	1,703	2,265	3,723	7,028	7,972	8,336	6,779	2,375
Discharge (cfs)	S-65D[2]	2,199	**2,467**	3,714	3,240	4,298	7,381	12,111	12,914	13,332	11,906	2,442
Discharge (cfs)	S-65E[2]	2,236	**2,519**	3,938	3,453	4,551	7,568	12,702	13,341	13,748	13,216	2,584
DO (mg/L)[3]	Phase I river channel	4.4	**4.1**	4.2	3.4	2.0	1.1	1.4	1.0	0.8	1.3	2.3
Mean depth (feet)[4]	Phase I floodplain	0.98	**1.09**	1.47	1.43	1.93	2.77	4.18	4.85	5.17	4.86	1.58

[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
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

KCOL Hydrographs (through Sunday midnight)

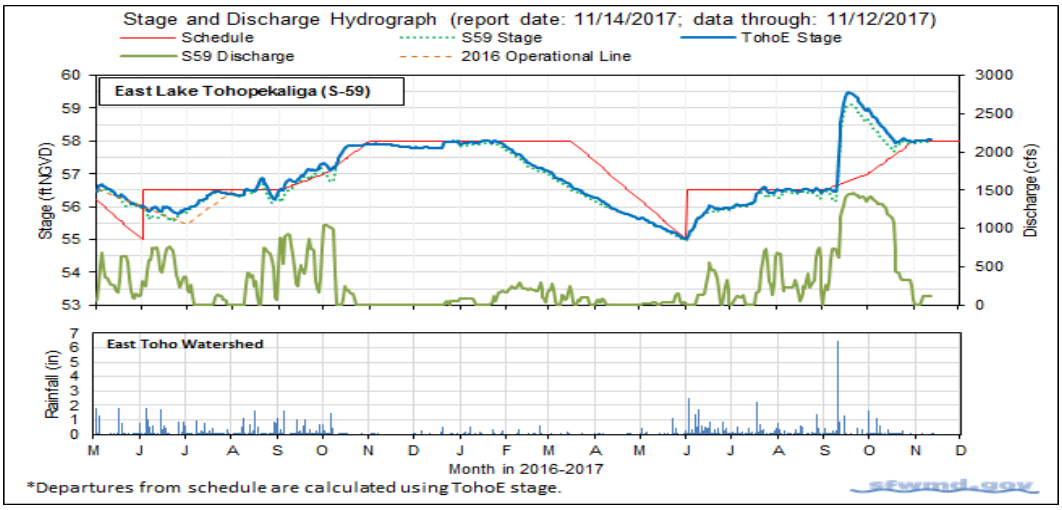


Figure 1.

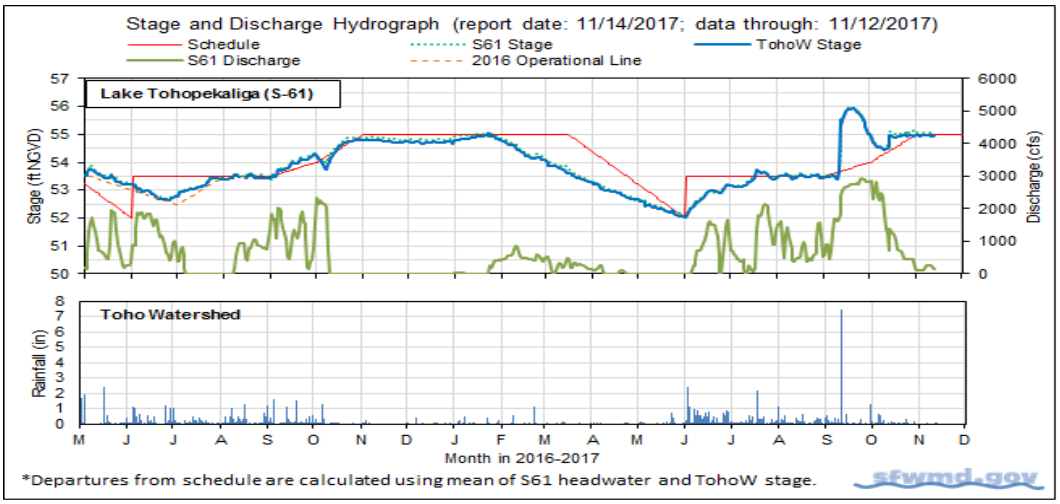
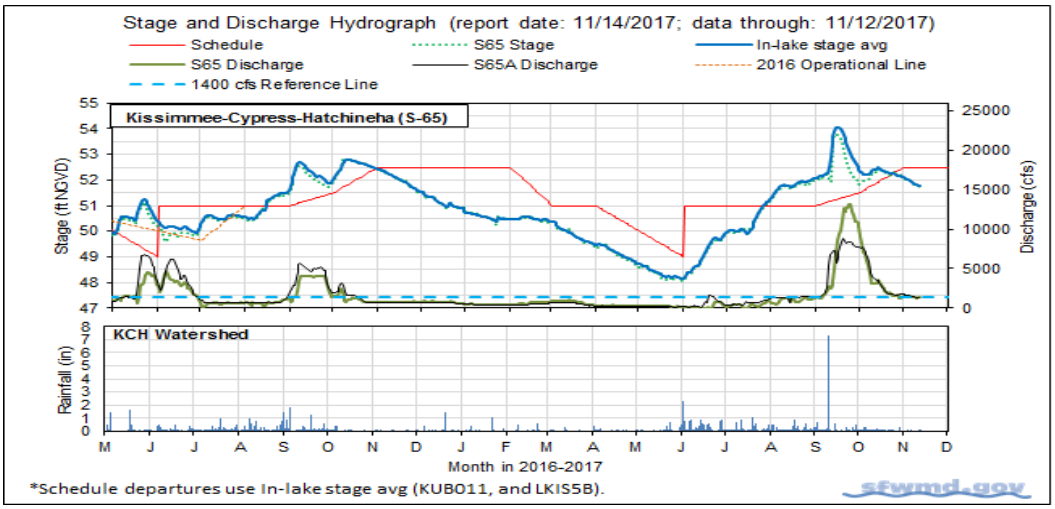


Figure 2.



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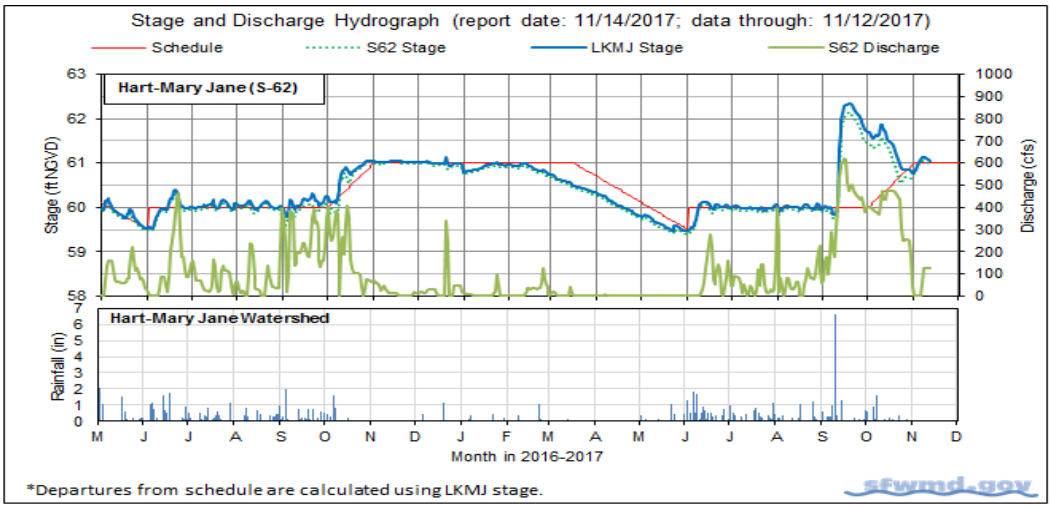

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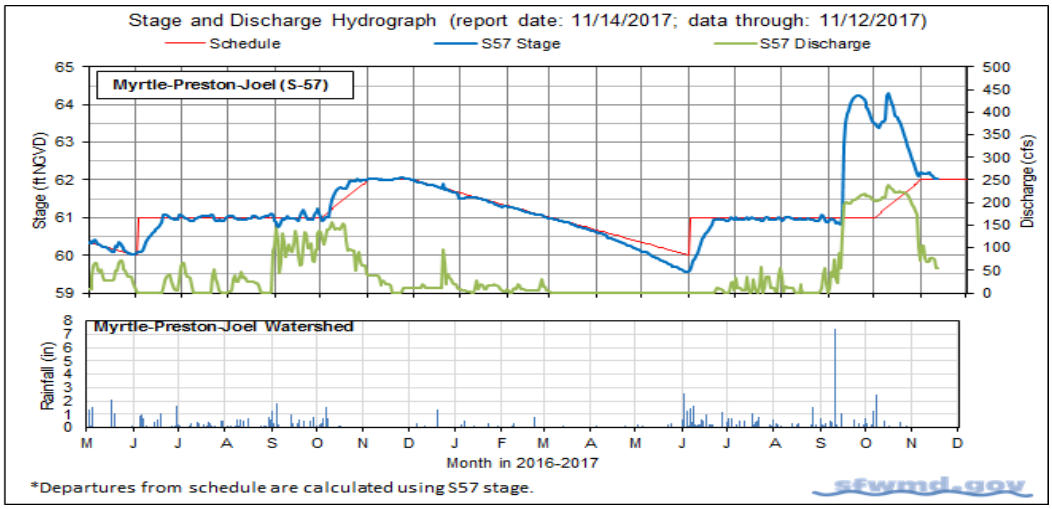

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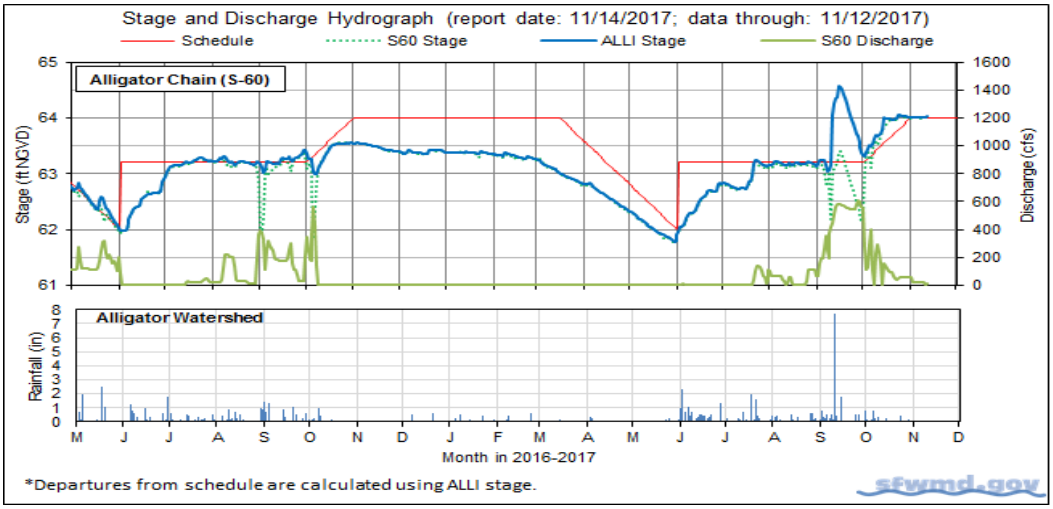


Figure 6.

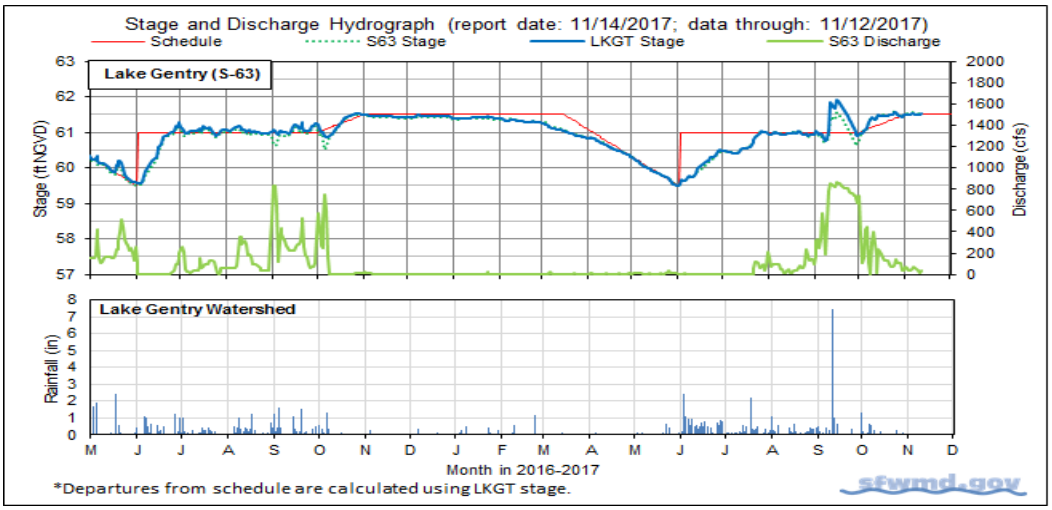


Figure 7.

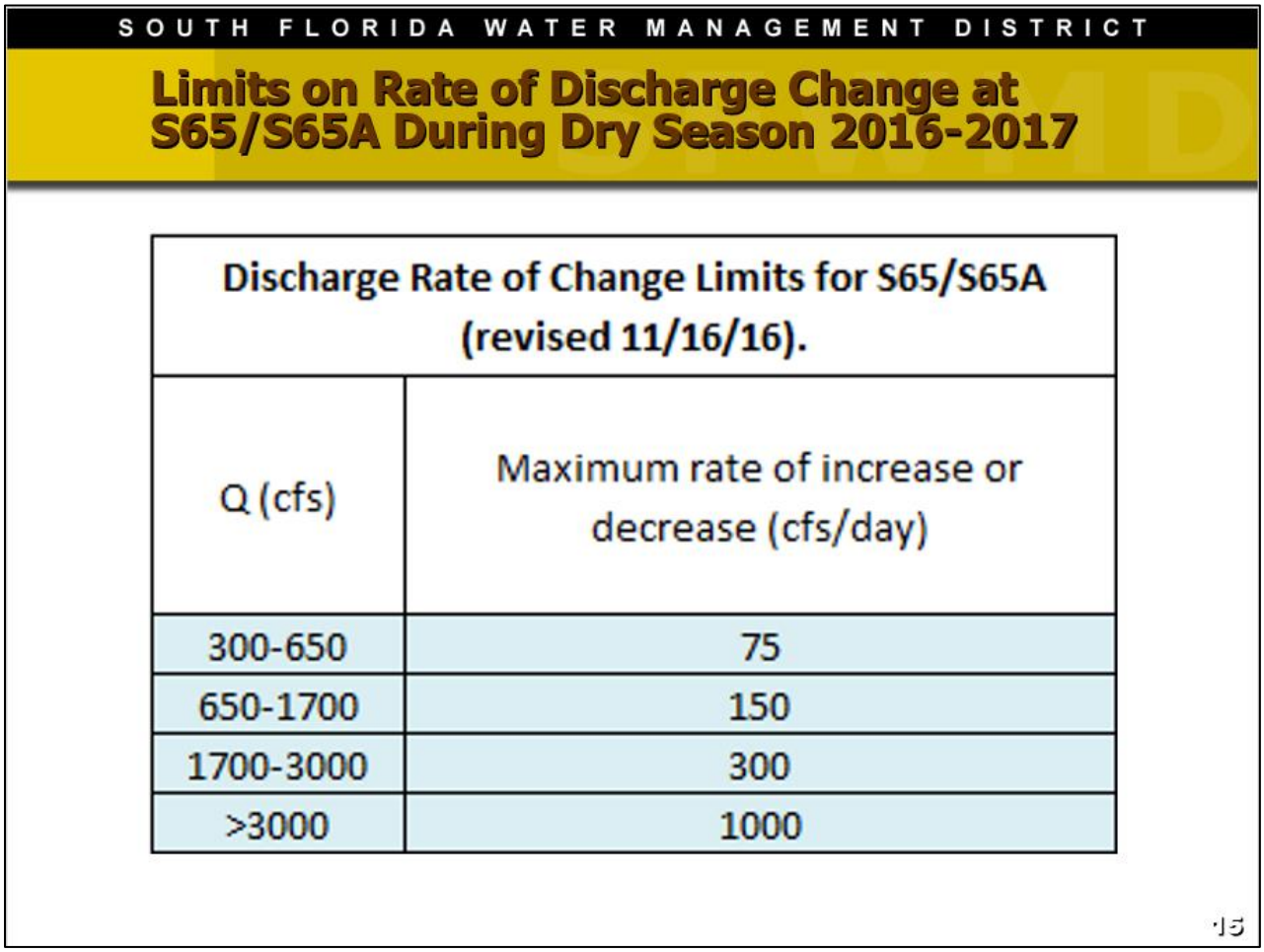


Figure 8. Limits on rate of discharge change at S65/S65A as of the 2016-2017 Dry Season.

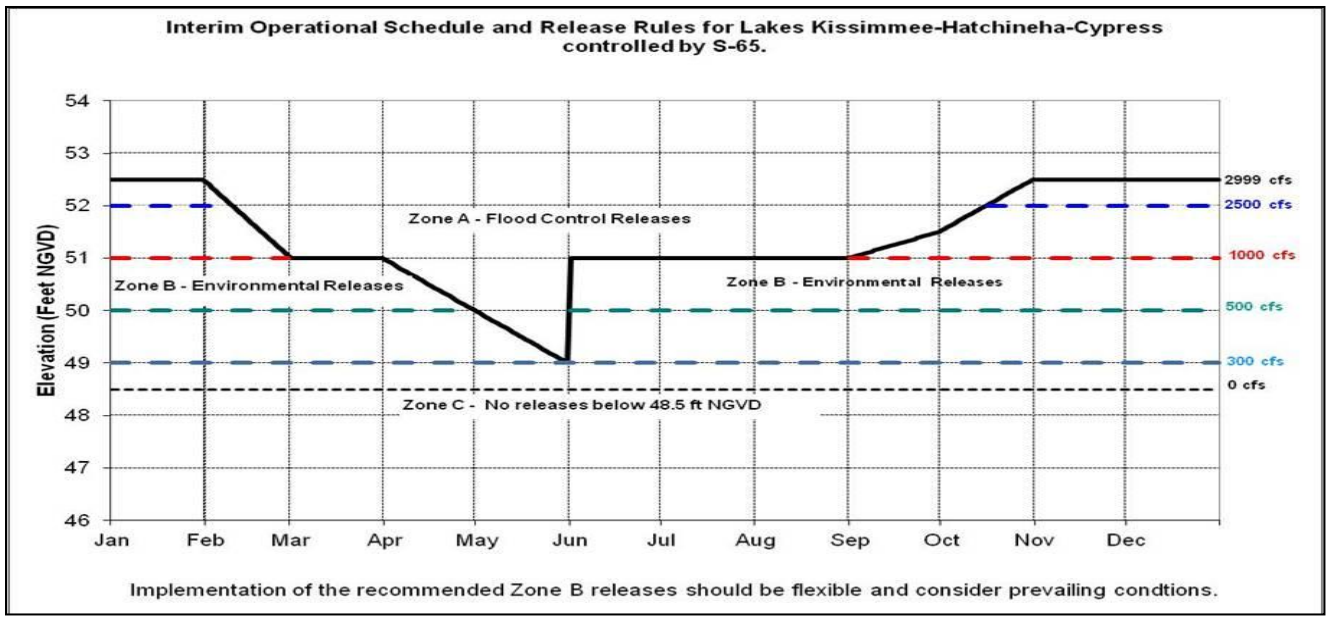


Figure 9. Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years.

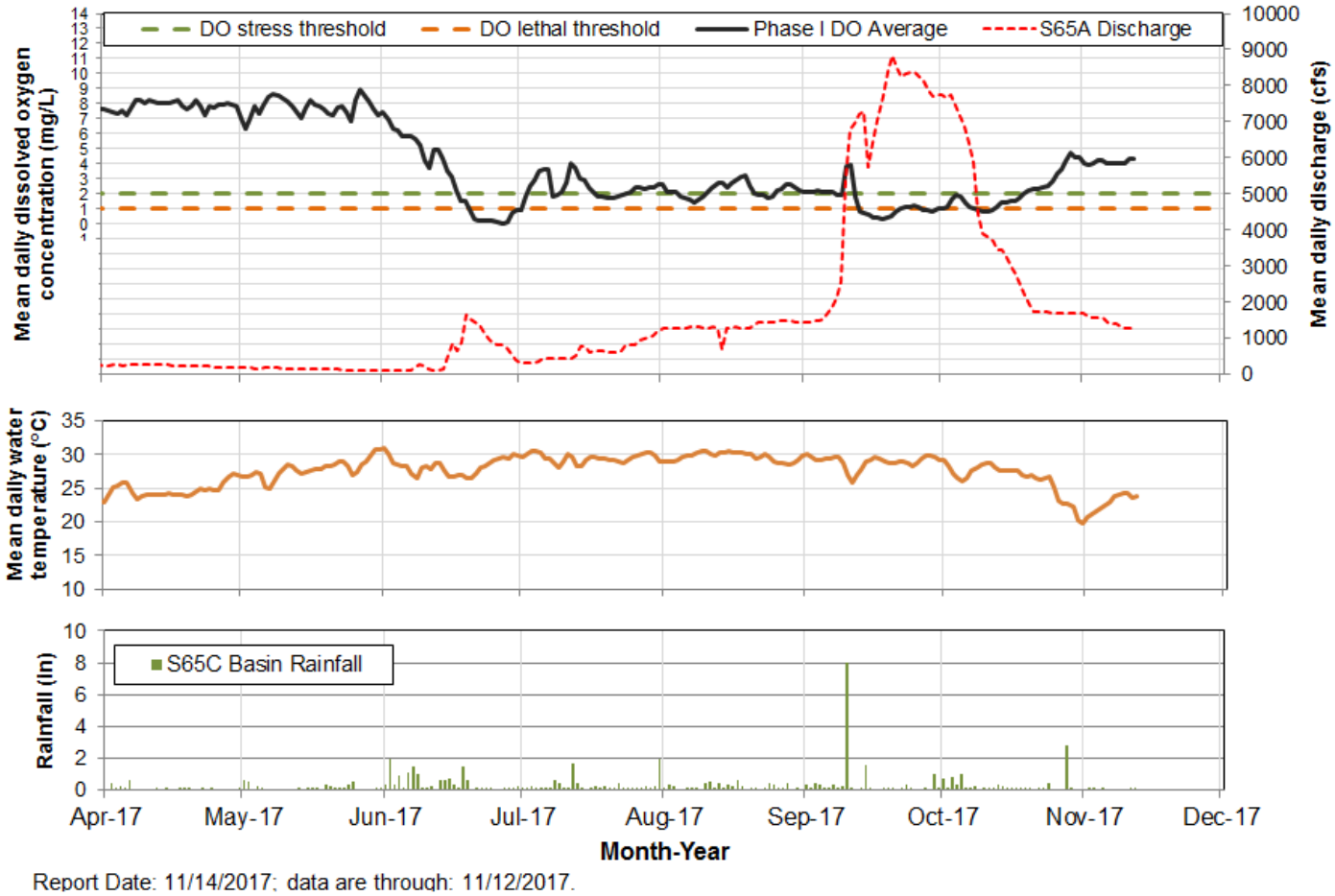


Figure 10. Mean daily Dissolved Oxygen, discharge, temperature and rainfall in the Phase I river channel.

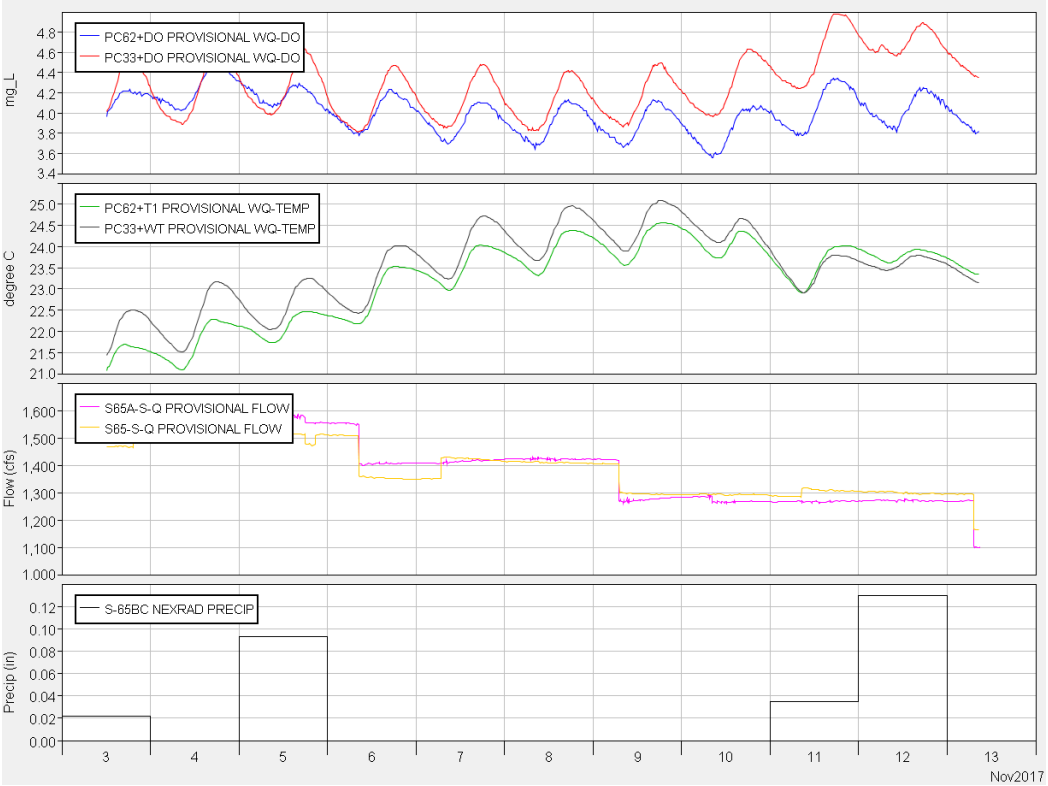


Figure 11. Phase I river channel dissolved oxygen and water temperature (measured at 15 minute intervals) and Pool BC daily rainfall.

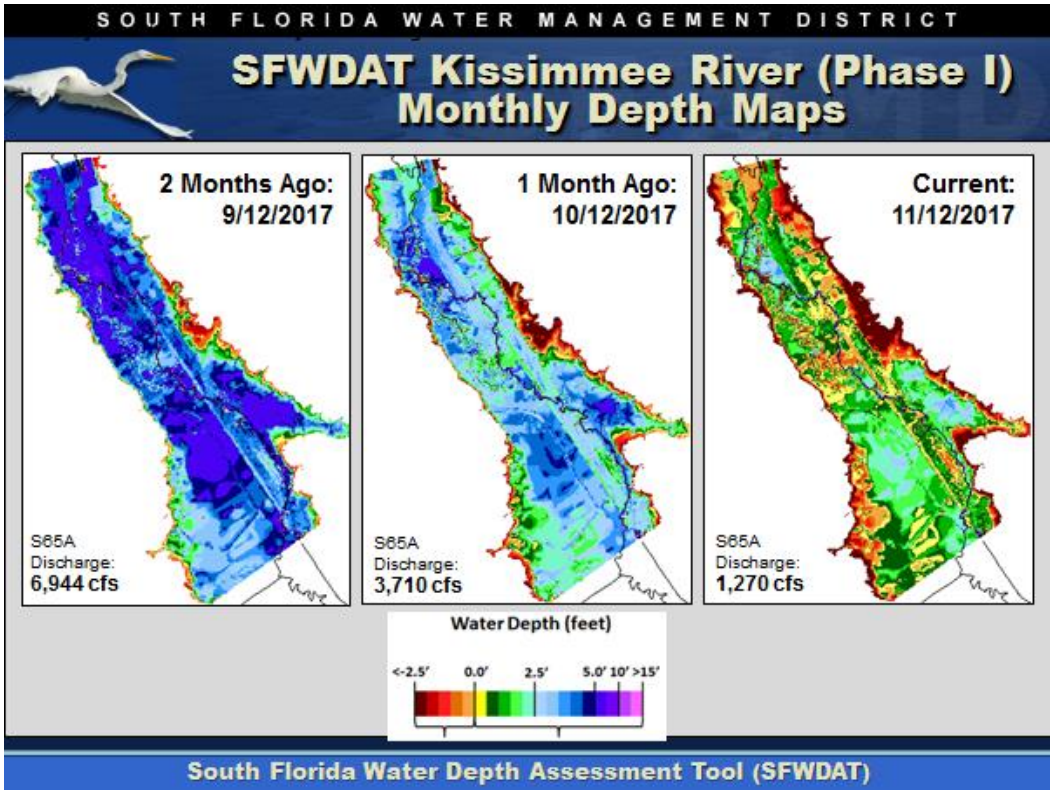
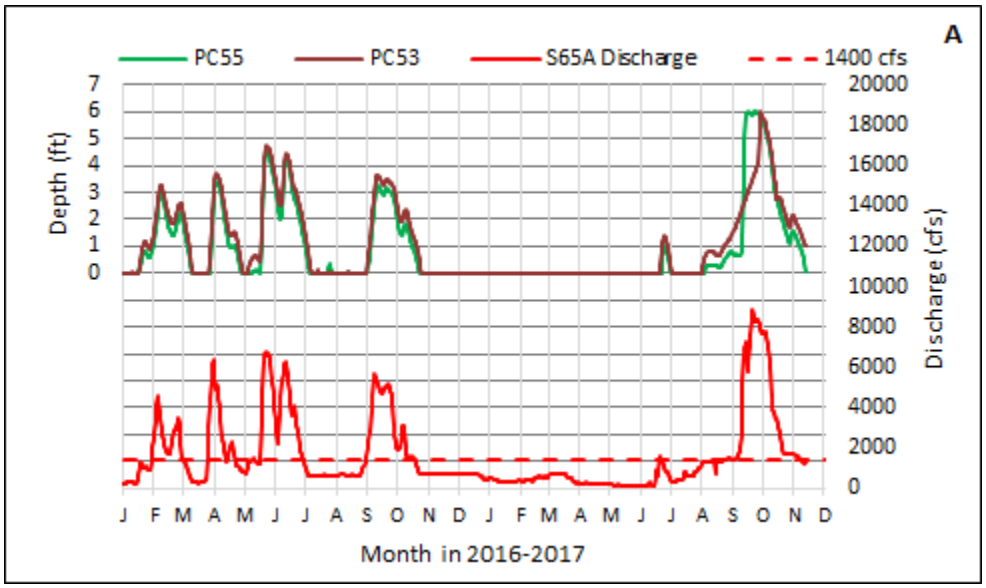
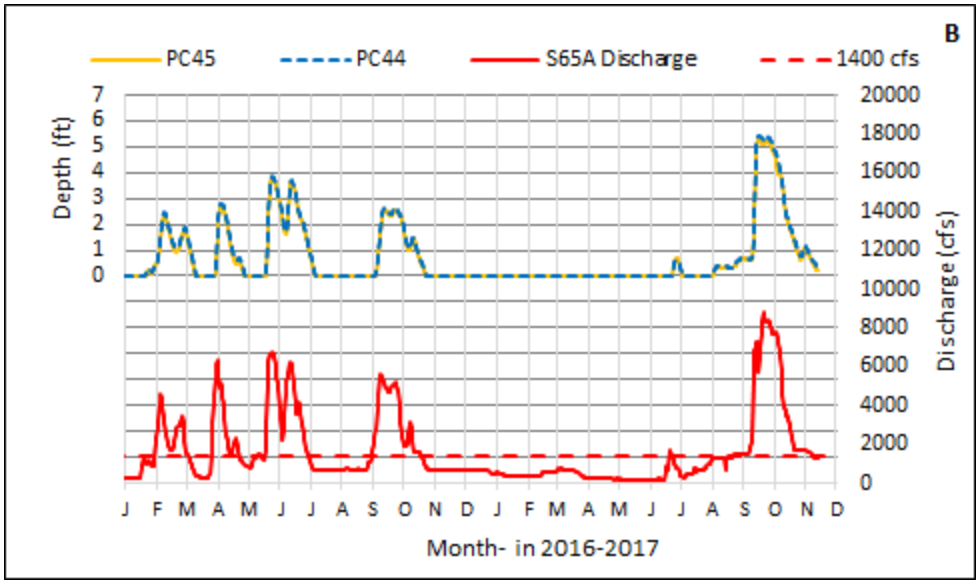


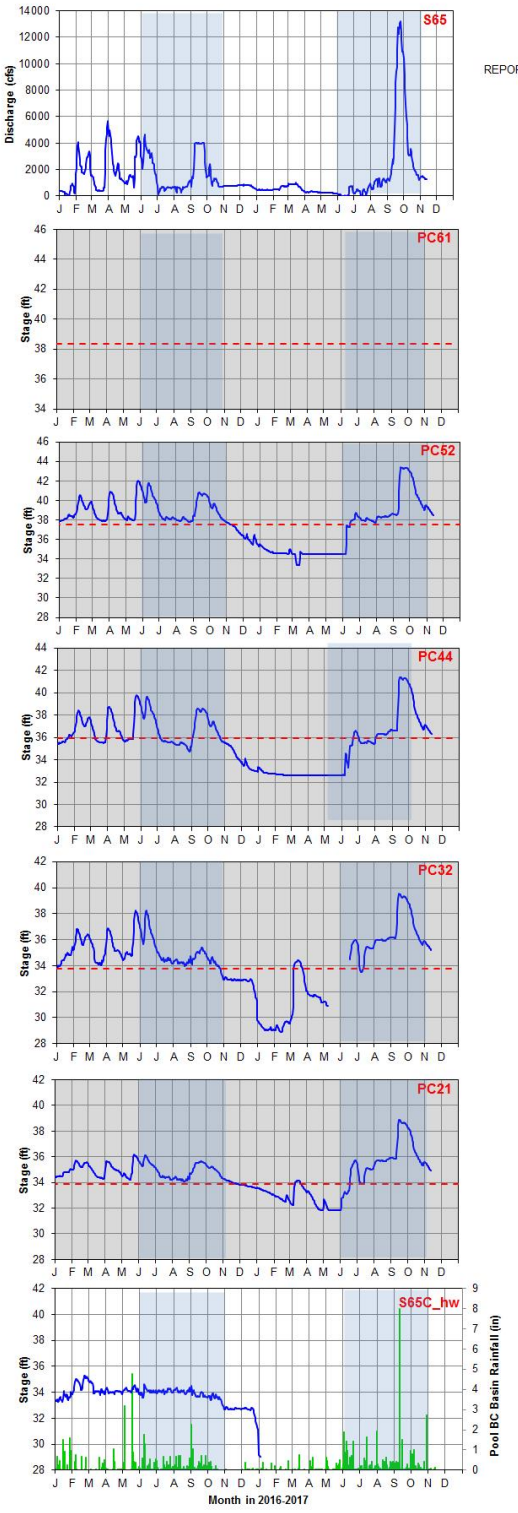
Figure 12. Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to Jan. 16, 2012.





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



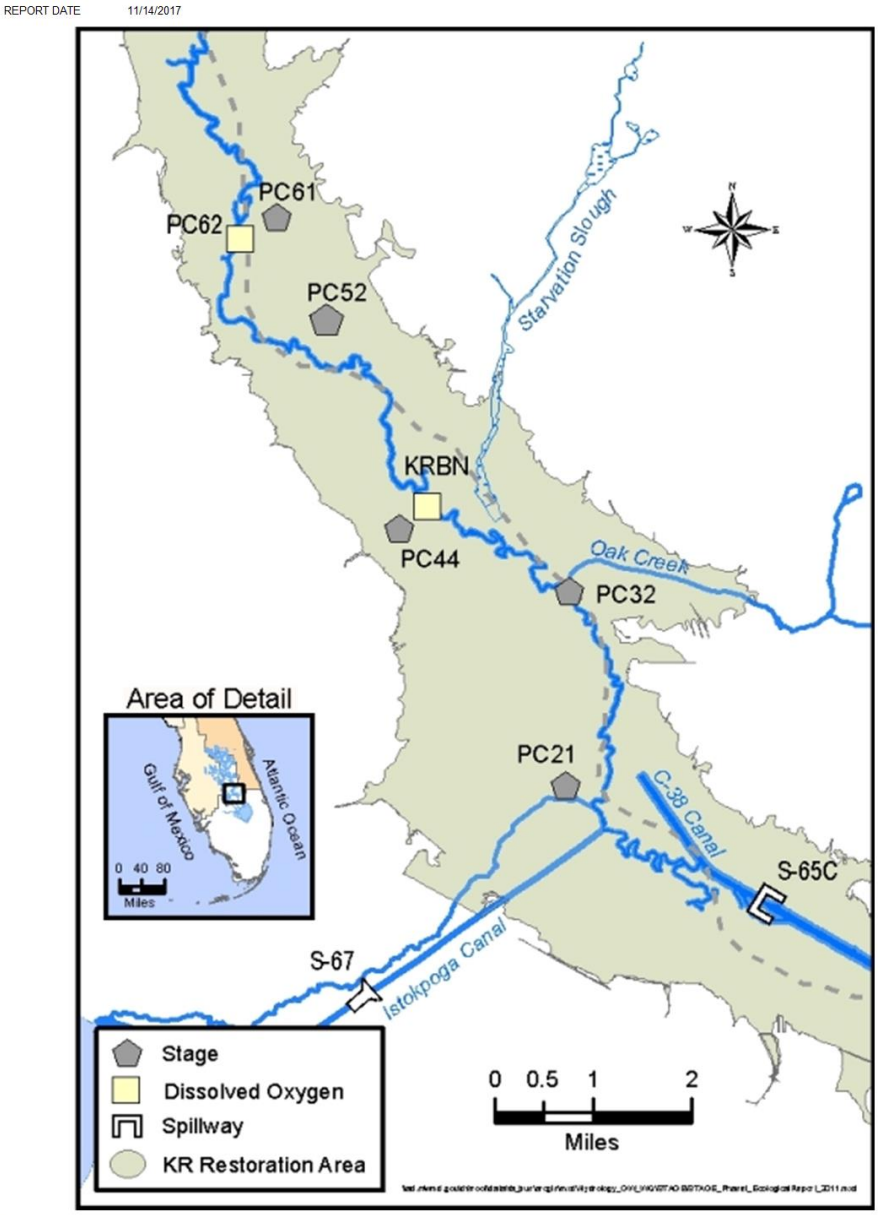


Figure 13. Discharge at S65, stages at five monitoring stations in the Phase I area of the Kissimmee River floodplain, and headwater stage at S65-C since January 1, 2016. The most recent data (~2 weeks) are provisional real-time data from SFWMD DualTrend; previous data are from SFWMD DB-HYDRO (validated).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

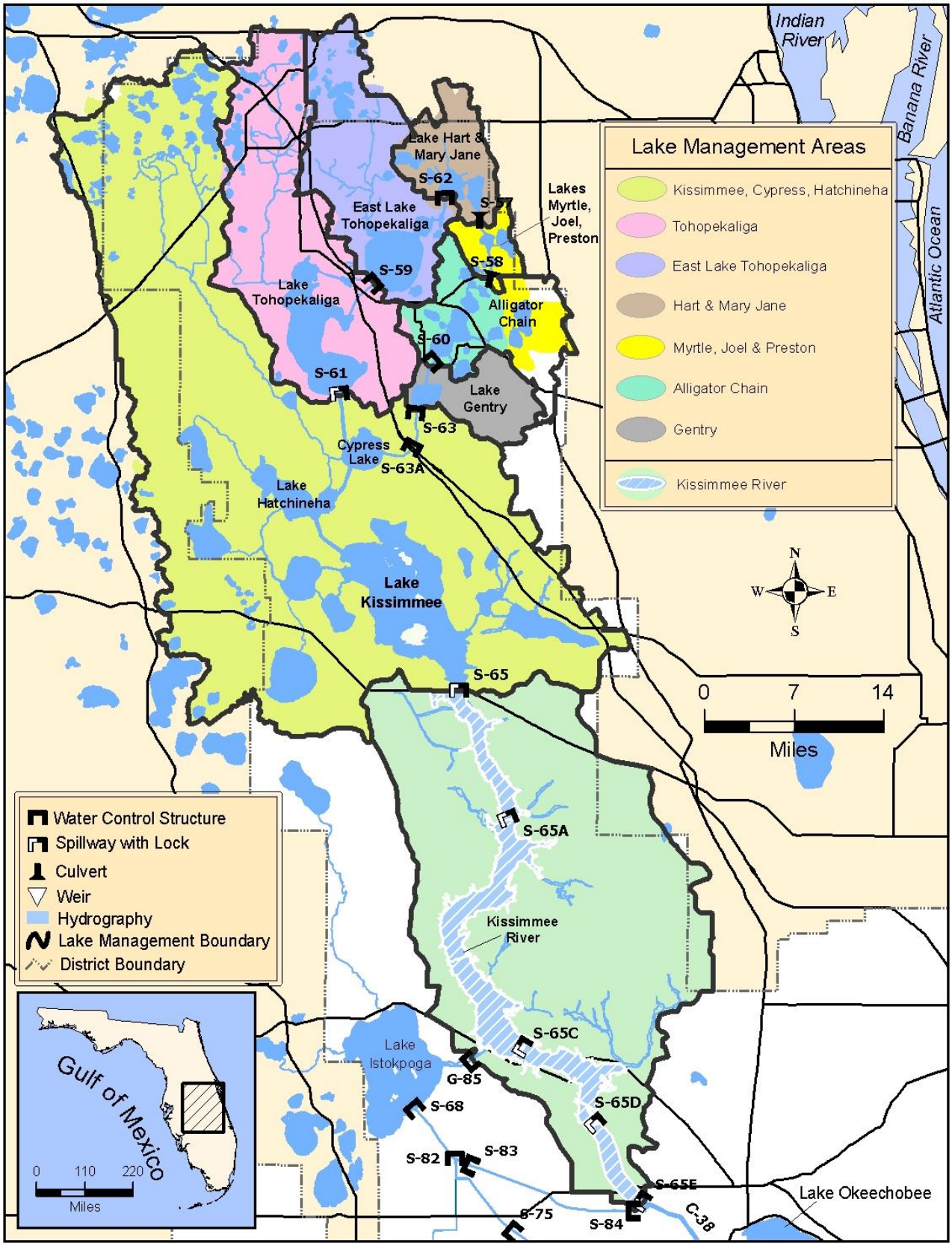


Figure 14. The Kissimmee Basin.

LAKE OKEECHOBEE

According to the USACOE web site, Lake Okeechobee stage is at 16.67 feet NGVD for the period ending at midnight on November 13, 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 on October 13, before declining to 16.8 feet on October 28 and then back up to 17.02 feet. The lake is now -0.51 feet lower than it was a month ago but 1.52 feet higher than it was a year ago (Figure 1). The Lake is currently in the High sub-band (Figure 2). According to RAINDAR, 0.43 inches of rain directly over the lake during the week Nov 7 - Nov 13 (Figure 3), with the northern watersheds receiving between 0.5 – 1.5 inches and from 1.5 – 3.5 inches falling to the east.

Average daily inflows to the lake decreased again over the past week, from 8,413 cfs to 5,704 cfs. Most of the inflows were from the Kissimmee River via the S65E and S84 structures, which averaged 2,427 cfs and 869 cfs daily, respectively. S71 and S72 structures, along with Fisheating Creek, contributed a combined 1,331 average daily cfs as well.

Average daily outflows for the Lake were similar to the previous two weeks, with S77 discharges increasing slightly from 6,125 cfs to 6,368 cfs, while discharges through S308 decreased slightly from 2,666 cfs to 2,384 cfs this past week. There were no discharges south through the S350 structures or to the L8 canal via Culvert 10A (average of only 11 cfs). The corrected evapotranspiration value based on the L006 weather platform solar radiation data decreased slightly to 0.14 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 Nov 07 to midnight Nov 13). Figure 4 shows the combined average daily cfs for inflows and outflows for the Lake over the past eight weeks, as well as backpumping that occurred immediately following Irma from S2 and S3. These data are provisional, and are subject to change.

Table 1

INFLOWS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)
S65E & S65EX1	2427	0.9
S71 & 72	303	0.1
S84 & 84X	869	0.3
Fisheating Creek	1028	0.4
S154	98	0.0
S191	168	0.1
S133 P	59	0.0
S127 P	42	0.0
S129 P	22	0.0
S131 P	3	0.0
S135 P	52	0.0
S2 P	0	0.0
S3 P	0	0.0
S4 P	3	0.0
C5	0	0.0
Rainfall	1185	0.4
Total	**6259**	**2.3**

OUTFLOWS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)
S77	6368	2.4
S308	2384	0.9
S351	0	0.0
S352	0	0.0
S354	0	0.0
L8	11	0.0
ET	2701	1.0
Total	**11463**	**4.3**

PROVISIONAL DATA

Satellite imagery indicates that algal bloom potential has remained very low over the past two months, based on NOAA's cyanobacteria monitoring product derived from the OLCI satellite sensor. Potential for elevated cyanobacterial levels were last observed in the northern portion of the lake in early September (Figure 5). Chlorophyll *a* samples collected October 9-10 from 17 locations in the nearshore and pelagic zones of the lake were all below 40 µg/L, the above which the District considers an algal bloom (Figure 6). The highest value was collected at L005 near the mouth of Fisheating Bay, at 20.3 µg/L.

Along with decreasing temperatures, high winds from Irma may have further reduced bloom potential on the lake by increasing turbidity, but elevated TP levels from high inflows and resuspended lake sediment are expected to produce high bloom potentials next year as turbidity declines and temperatures increase.

Water Management Recommendations

The Lake is 16.67 feet NGVD having decreased by0.25 feet from the week prior, primarily from below average rainfall. Submerged and emergent vegetation communities in the nearshore region have experienced stages >16 feet three times in less than two years, and for 53 consecutive days and counting; the longest since 2005. These stages, combined with turbid conditions from 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

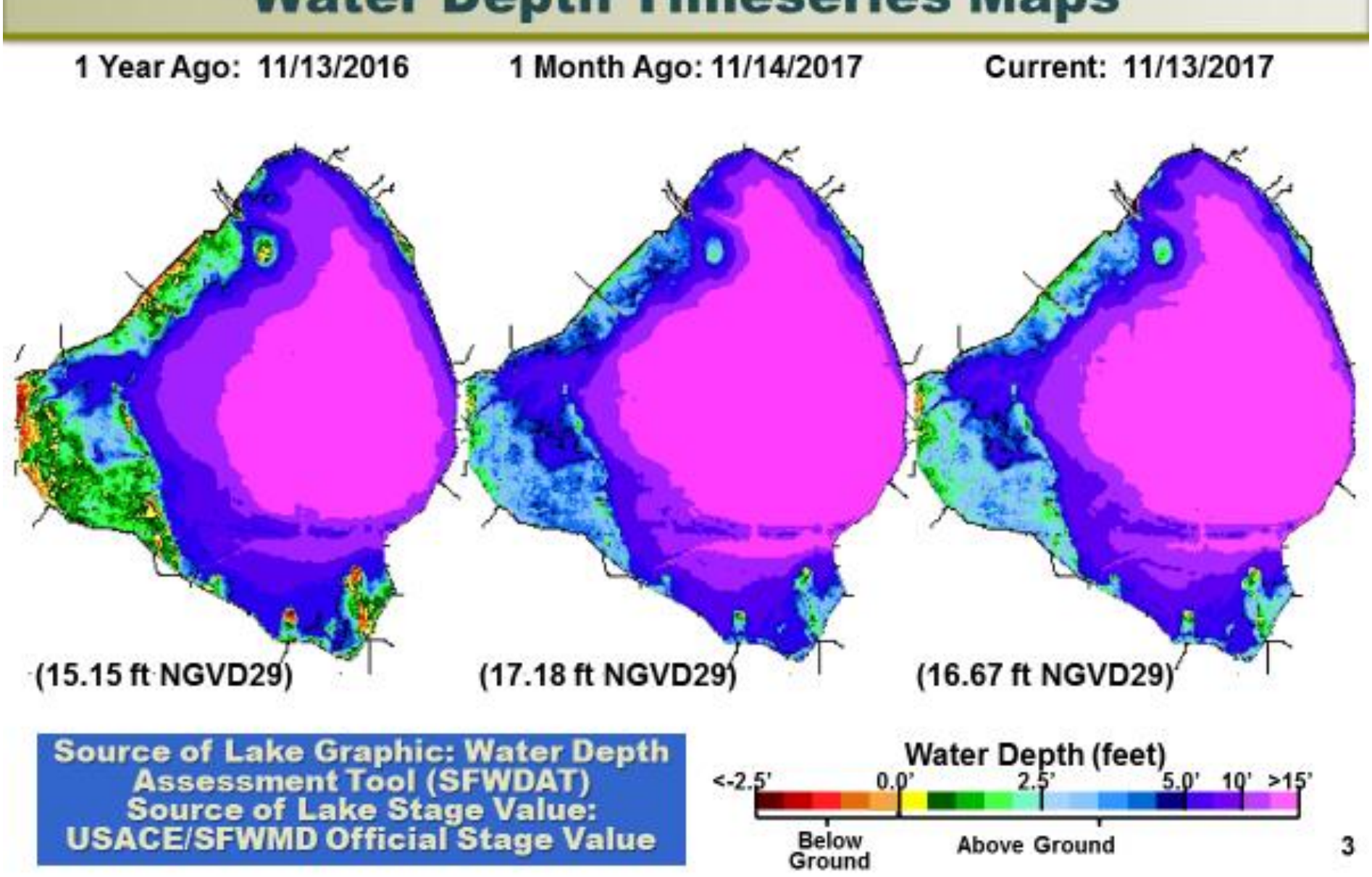


Figure 1

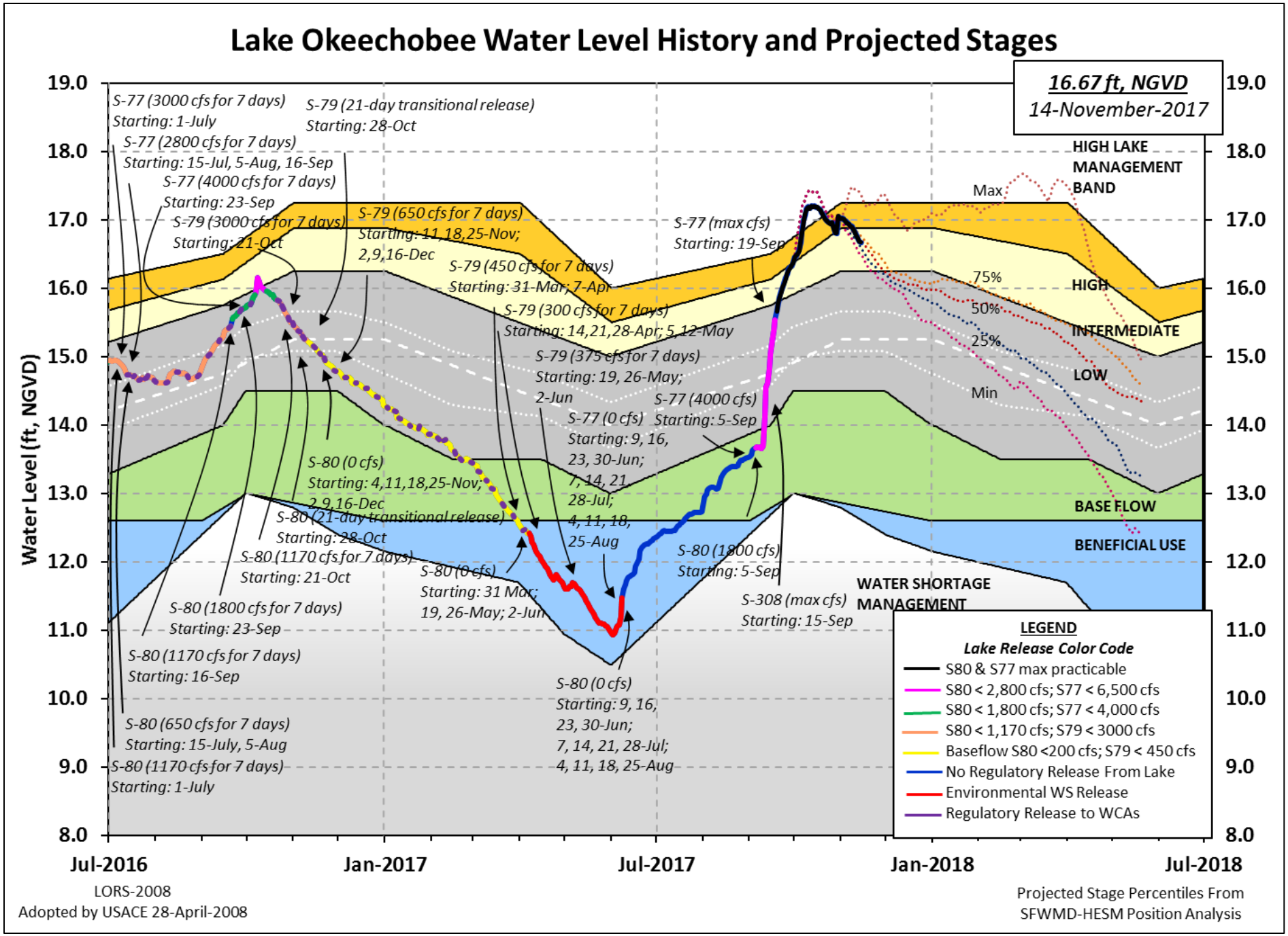

Lake Okeechobee Water Level History and Projected Stages
16.67 ft, NGVD
14-November-2017
Water Level (ft, NGVD)
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
11.0
10.0
9.0
8.0
Jul-2016
Jan-2017
Jul-2017
Jan-2018
Jul-2018
HIGH LAKE MANAGEMENT BAND
HIGH
INTERMEDIATE
LOW
BASE FLOW
BENEFICIAL USE
WATER SHORTAGE MANAGEMENT
Max
75%
50%
25%
Min
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 (max cfs) Starting: 19-Sep
S-77 (4000 cfs) Starting: 5-Sep
S-77 (0 cfs) Starting: 9, 16, 23, 30-Jun; 7, 14, 21, 28-Jul; 4, 11, 18, 25-Aug
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 (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: 31 Mar; 19, 26-May; 2-Jun
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-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

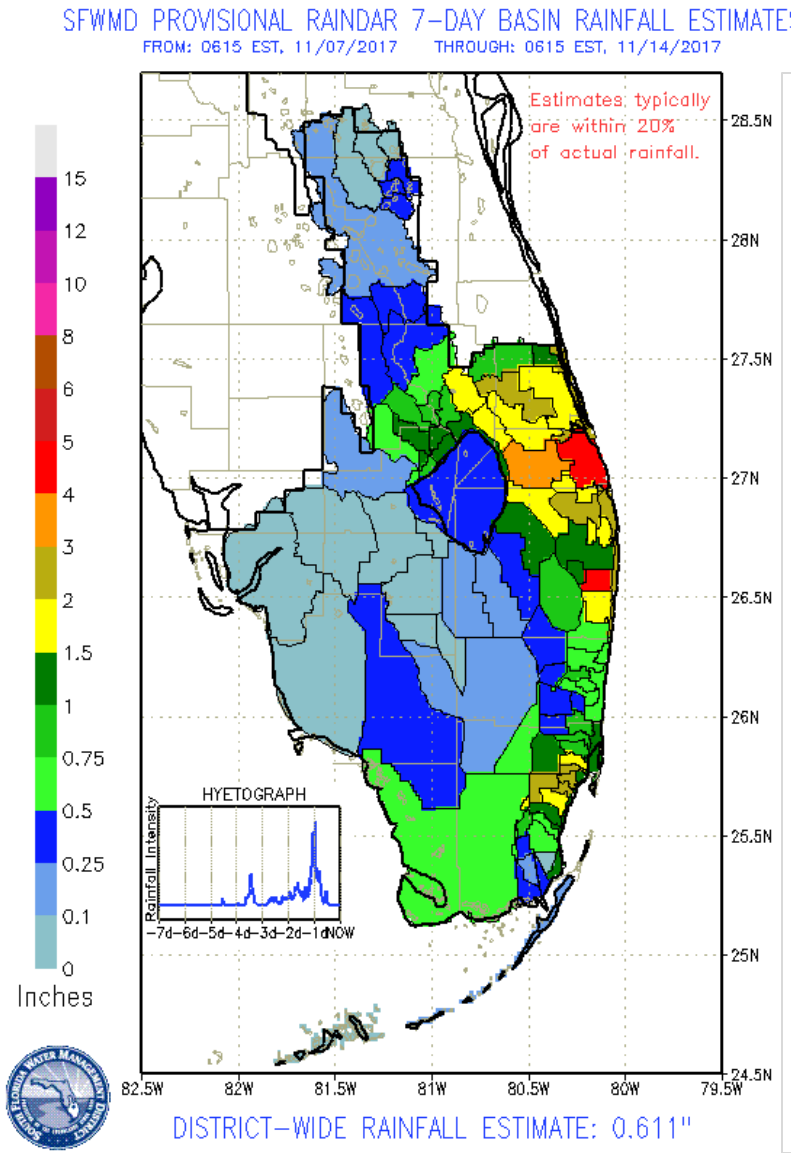


Figure 3

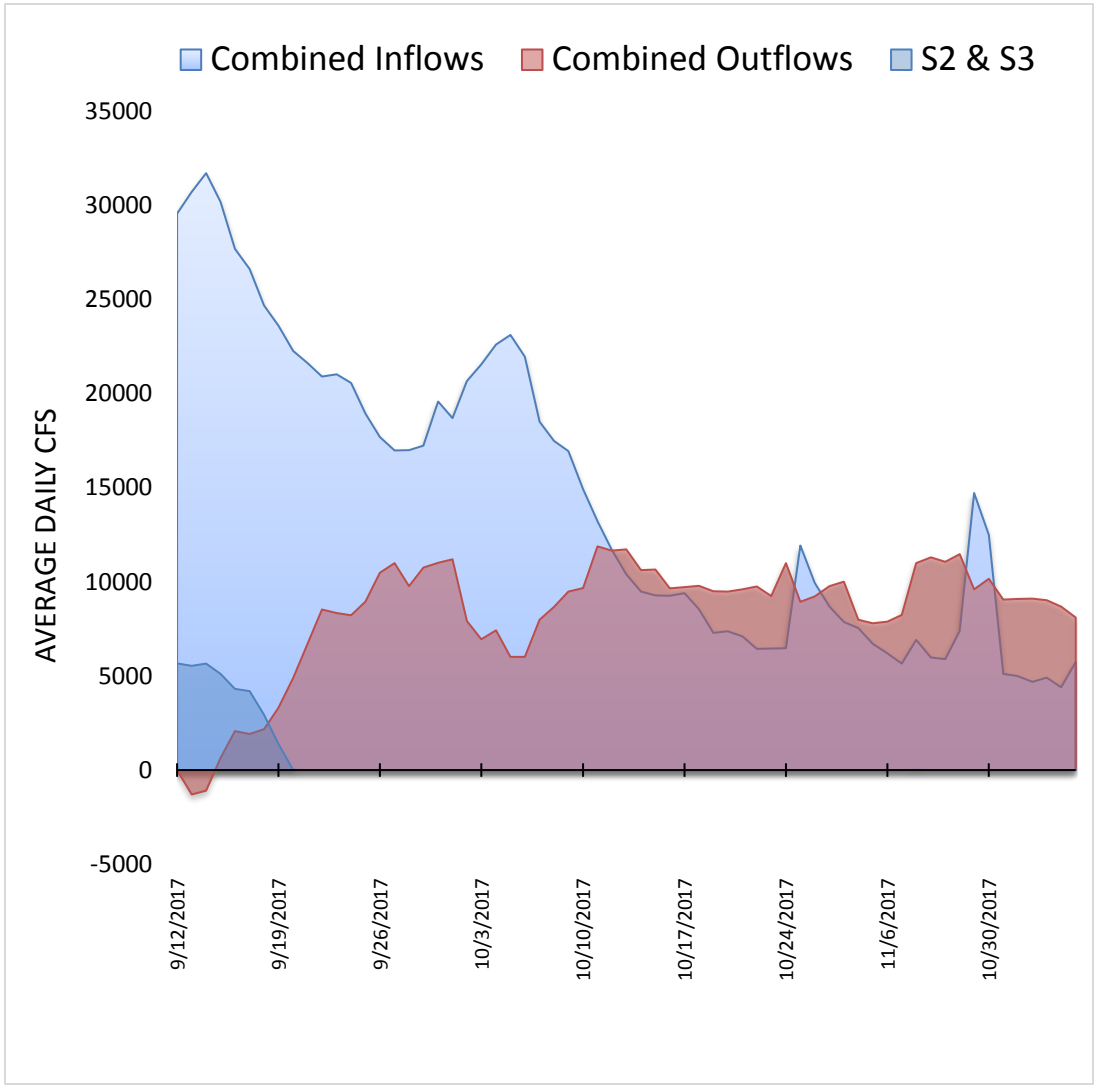


Figure 4

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Lake Okeechobee
Experimental Algal Bloom Potential

NOAA cyanobacteria product derived from Copernicus Sentinel-3 OLCI data from EUMETSAT

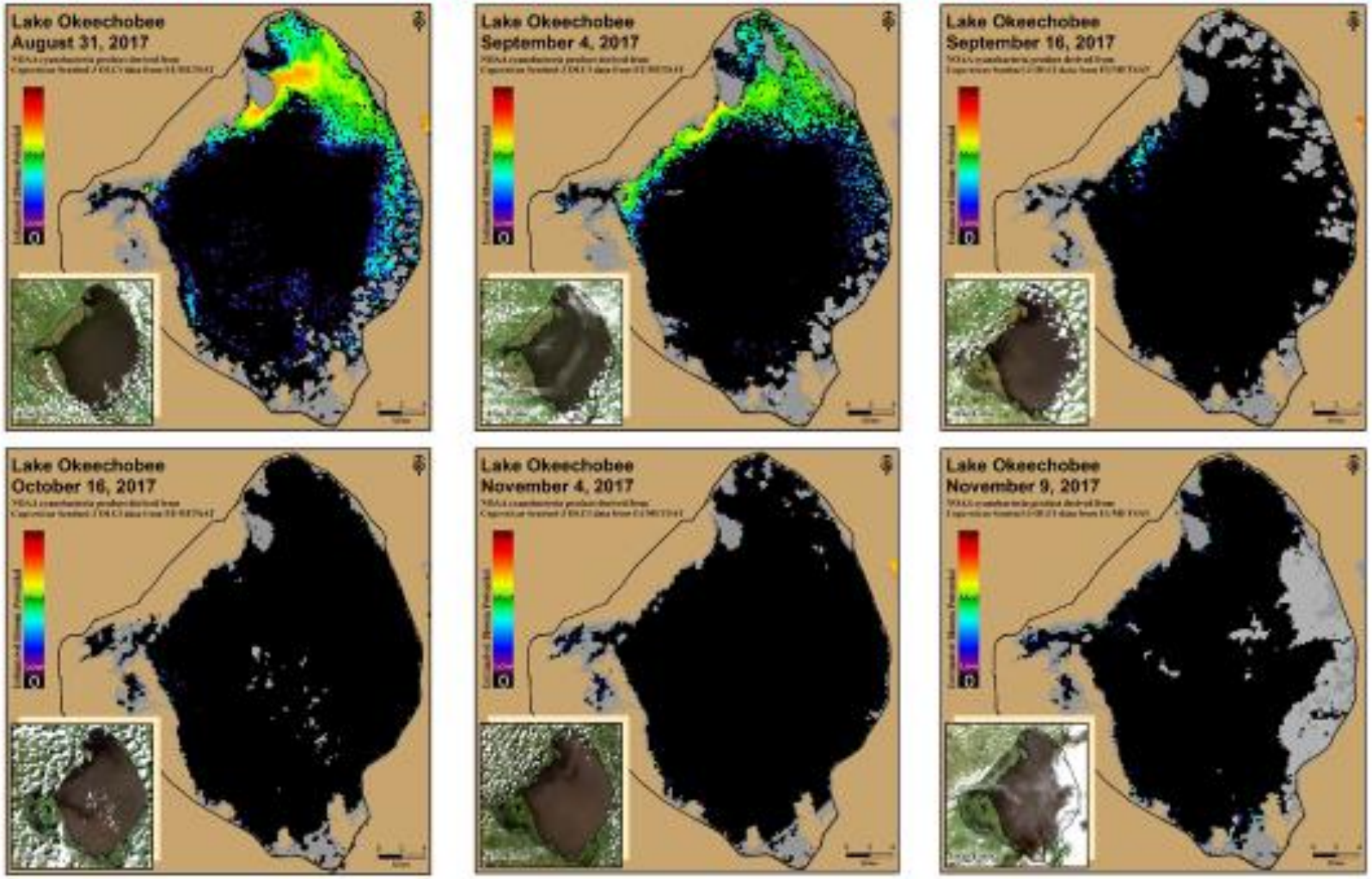


Figure 5

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Lake Okeechobee
Water Quality

October 9-10, 2017		
Site	Chlorophyll *a* (ug/L)	Microcystin (ug/L)
Nearshore Stations		
FEBIN	Not Sampled	
FEBOUT	Not Sampled	
KISSR0.0	6.4	BDL
LZ2	15.9	BDL
LZ25A	5.9	
PALMOUT	4.5	
PELBAY3	3.7	
POLE3S	6.3	
POLESOUT	12.1	BDL
RITTAE2	13.2	
Pelagic Stations		
L001	10.0	
L004	3.8	
L005	20.3	BDL
L006	4.7	
L007	5.7	
L008	10.2	
LZ30	4.6	BDL
LZ40	4.1	
CLV10A	4.4	BDL

BDL=Below Detectable Limit

Figure 6

LAKE ISTOKPOGA

Lake Istokpoga stage is 39.30 feet NGVD as of midnight November 13, 2017 and is currently -0.20 feet below its regulation schedule to accommodate construction on downstream structures (Figure 7). Average daily flows into the lake from Josephine Creek for the week Nov 7 – Nov 13 were the same as the previous week, at 172 cfs. No data have been reported for Arbuckle Creek since July 4th as the gauge is being recalibrated after construction in the area. Average daily discharge from S68 and S68X over the past week decreased from the previous week, from 1,352 cfs to 893 cfs. According to RAINDAR, 0.38 inches of rain fell in the Lake Istokpoga basin in the past week.

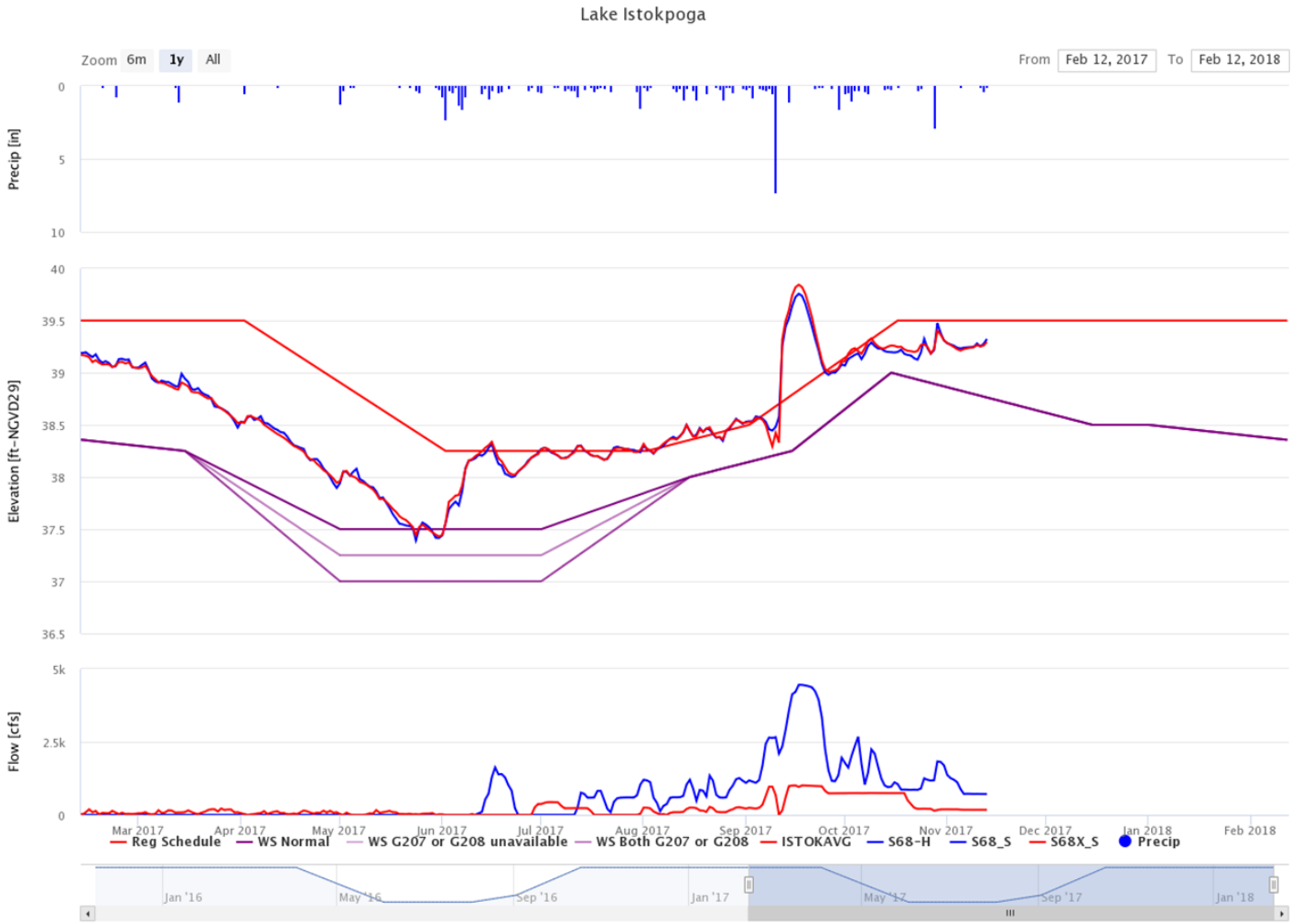


Figure 7

ESTUARIES

St. Lucie Estuary:
Over the past week, provisional flows averaged about 4,141 cfs at S-80, 2,373 cfs at S-308, 326 cfs at S-49 on C-24, 317 cfs at S-97 on C-23, and 198 cfs from Ten Mile Creek at the Gordy Road Structure. Average inflow from tidal basin tributaries is estimated to be 515 cfs (Figures 1 and 2). Total inflow averaged about 5,497 cfs last week and 6,585 cfs over last month.

Over the past week, salinity remained about the same in North Fork (HR1) and increased slightly in the middle (US1 Bridge) and lower parts of the estuary (Table 1, 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 0.8. Salinity conditions in the middle estuary are in the poor range for the adult eastern oysters (Figure 3).

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)	**0.4** (0.3)	**0.4** (0.3)	NA[1]
US1 Bridge	**0.6** (0.3)	**1.1** (0.5)	10.0-26.0
A1A Bridge	**5.6** (3.2)	**15.6** (10.1)	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 2.

Table 2. 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	7.26	5.76	7.95
HR1	bottom	6.73	4.37	7.86

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 3 and station location map is shown in Figure 5.

Table 3. 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	3.24	4.06 - 5.22	6.36	6.04	6.46
SF	1.93	4.46 - 5.34	8.20	7.62	8.53
NF	2.37	4.41 - 6.95	6.98	6.01	7.62
ME	2.13	4.01 - 5.99	7.55	6.71	8.10
IRL-SLE	3.83	1.82 - 4.64	5.87	5.20	6.37

NOAA satellite imagery was unavailable due to cloud coverage in the St. Lucie Estuary last week.

Caloosahatchee Estuary:
During the past week, provisional flows averaged approximately 6,368 cfs at S-77, 6441 cfs at S-78, and 8,336 cfs at S-79. Average inflow from tidal basin tributaries is estimated to be 344 cfs (Figures 6 & 7). Total inflow averaged 8,680 cfs last week and 10,103 cfs over last month.

Over the past week, salinity remained about the same to Ft. Myers Yacht Basin and increased downstream (Table 4, Figures 8 A & B and 9). The seven-day average salinity values are within the good range for the adult eastern oysters at Shell Point (Figure 10). Salinity data was not available for Cape Coral or Sanibel. The 30-day moving average surface salinity is 0.2 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 4. 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)	**0.1** (0.2)	**0.1** (0.2)	NA[1]
*Val I75	**0.2** (0.2)	**0.2** (0.2)	0.0-5.0[2]
Ft. Myers Yacht Basin	**0.2** (0.2)	**0.2** (0.2)	NA
Cape Coral	**NR**[3](0.2)	**NR** (0.3)	10.0-30.0
Shell Point	**8.6** (6.3)	**12.0** (7.4)	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 5 as concentration ranges of chlorophyll *a* and dissolved oxygen at Beautiful Island, Ft. Myers, and Shell Point in the Caloosahatchee Estuary.

Table 5. 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)	Down for maintenance	1.96 - 2.93	2.30 - 5.20
Dissolved Oxygen (mg/l)	Down for maintenance	No Data	5.25 - 8.29

The Florida Fish and Wildlife Research Institute reported on November 9, 2017, that *Karenia brevis, the Florida red tide dinoflagellate,* was not present in samples collected from Lee County.

NOAA satellite imagery indicates low to medium potential for cyanobacteria blooms at just few nearshore locations in the Caloosahatchee Estuary (Figure 11).

Water Management Recommendations

Lake stage is in the Intermediate sub band of 2008 LORS. Tributary hydrological conditions are very wet. The 2008 LORS recommends up to 4,000 cfs at S-77 and up to 1,800 cfs at S-80. Given the current estuarine conditions, there are no ecological benefits associated with freshwater releases from Lake Okeechobee.

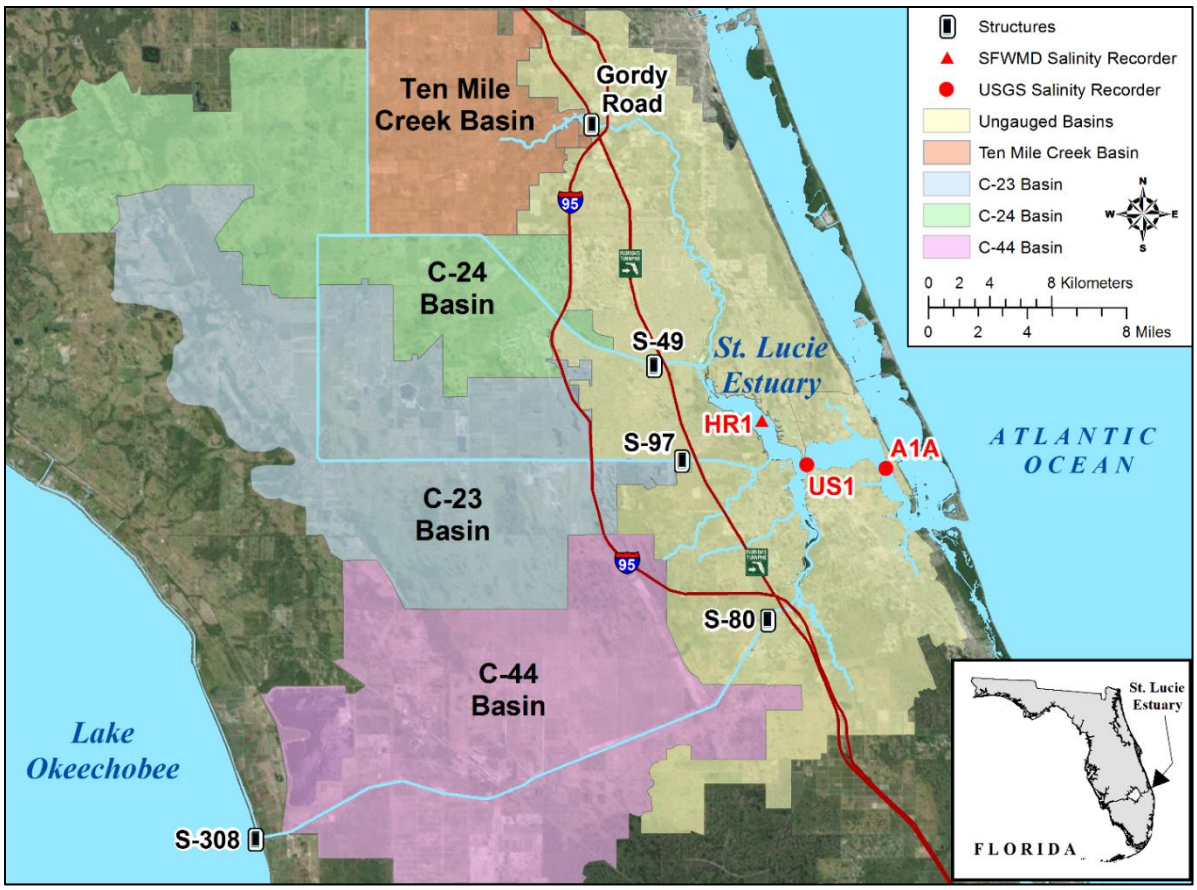


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

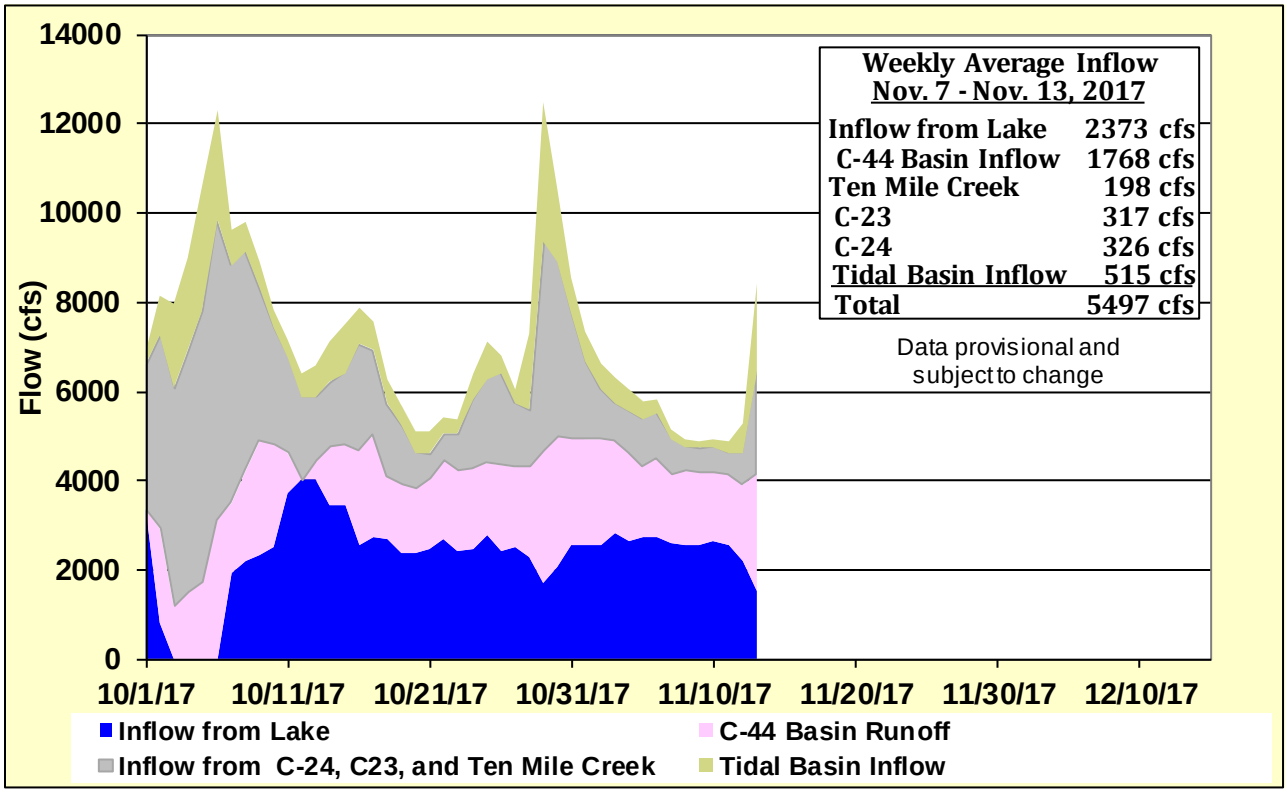


Figure 2. Estimated surface freshwater inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basins into the St. Lucie Estuary.

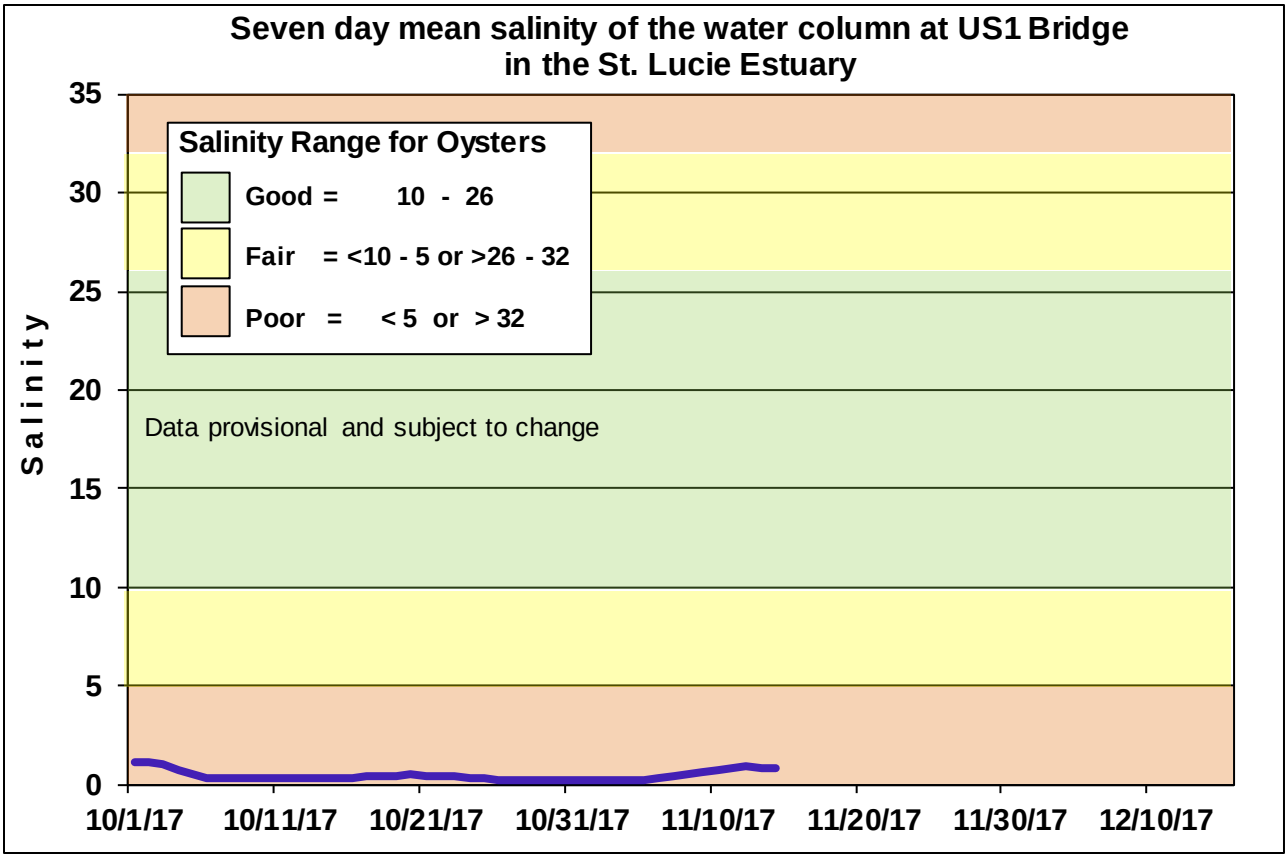


Figure 3. Seven-day mean salinity of the water column at the U.S. Highway 1 Bridge.

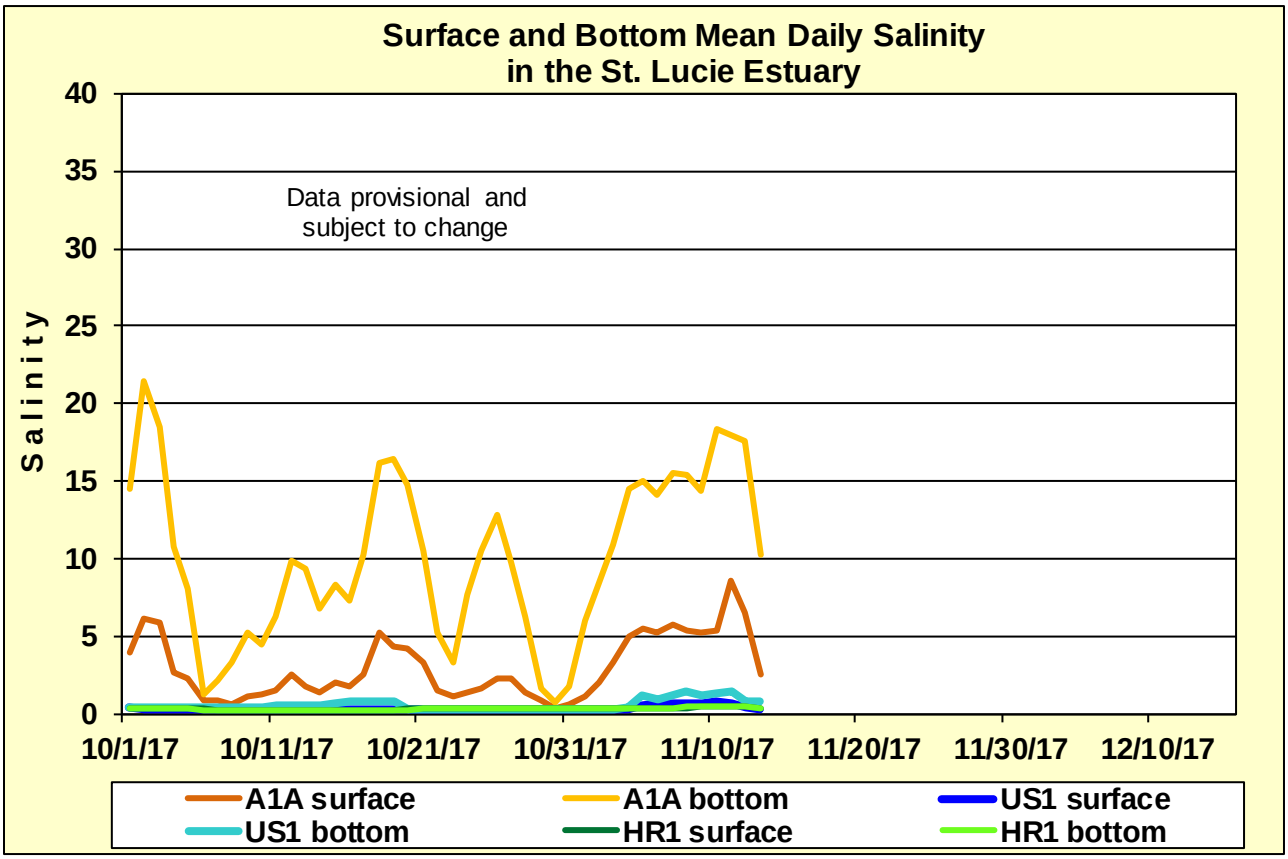


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

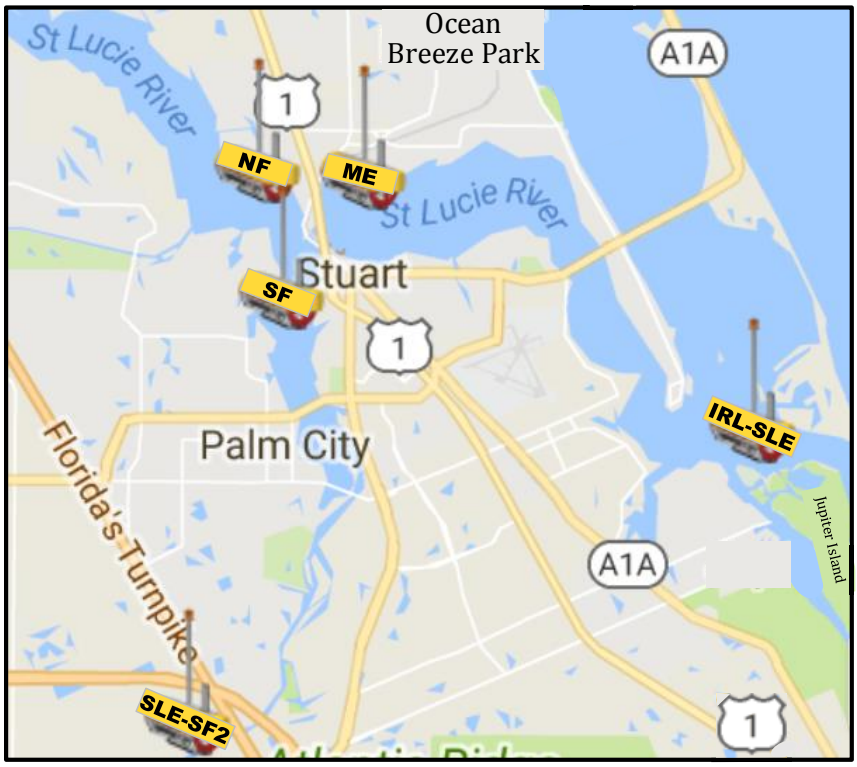


Figure 5. Location of FAU-HBOI LOBO water quality stations in the St. Lucie Estuary.

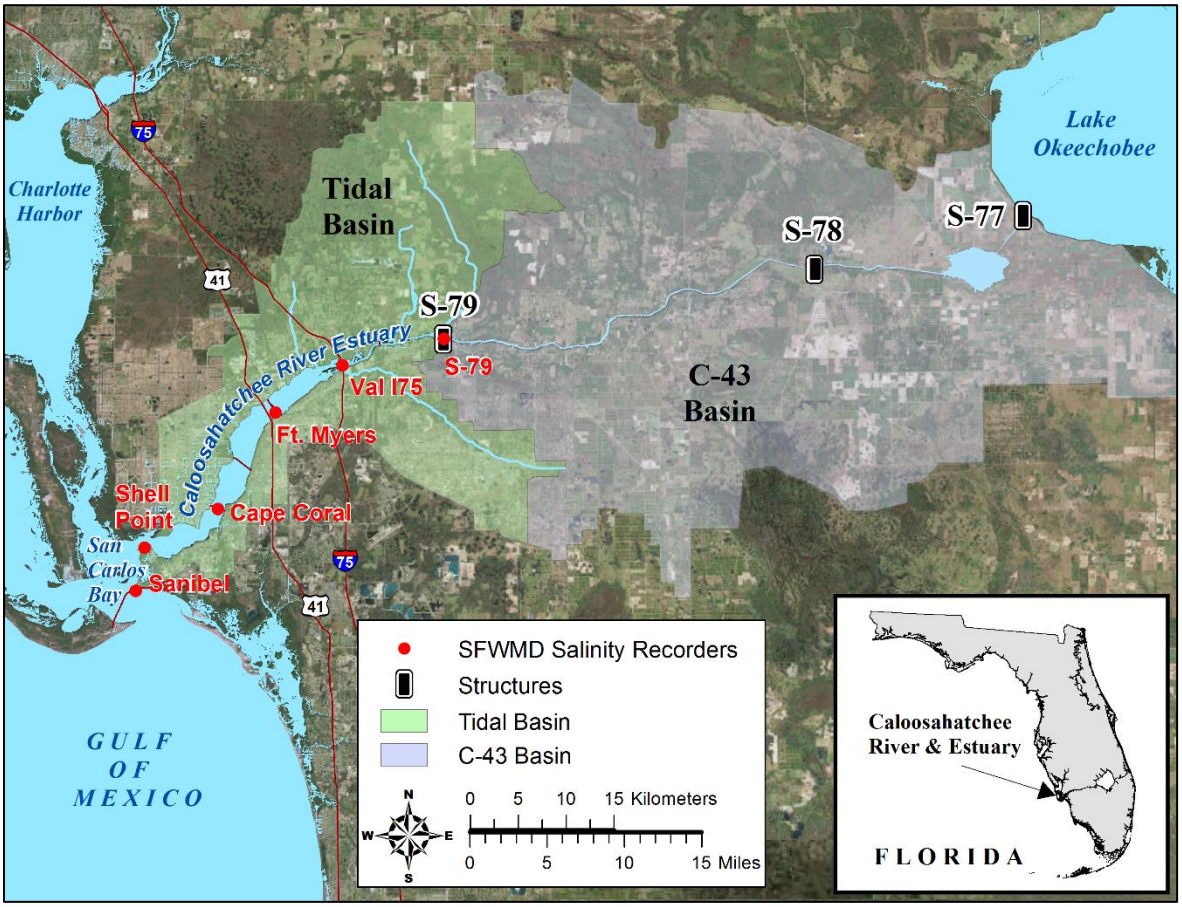


Figure 6. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

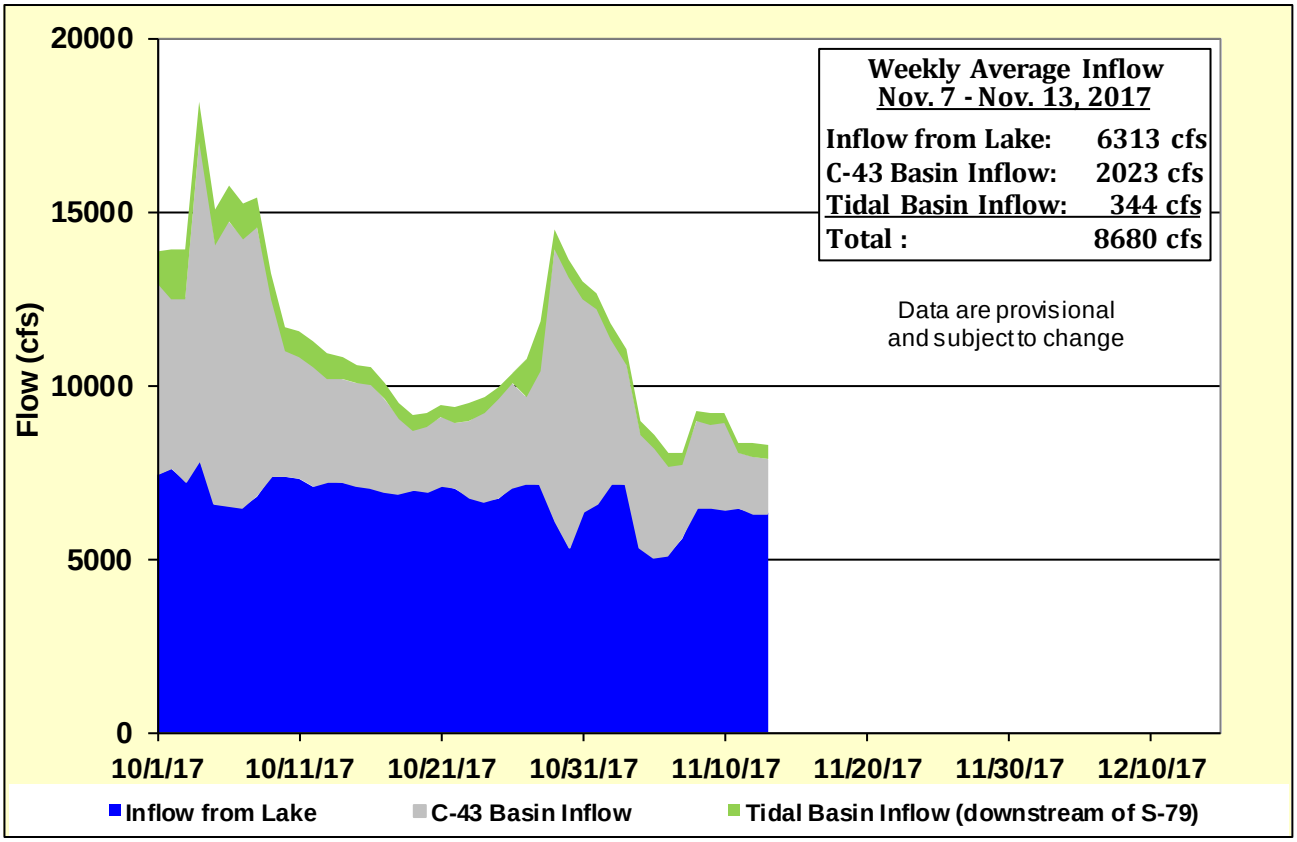
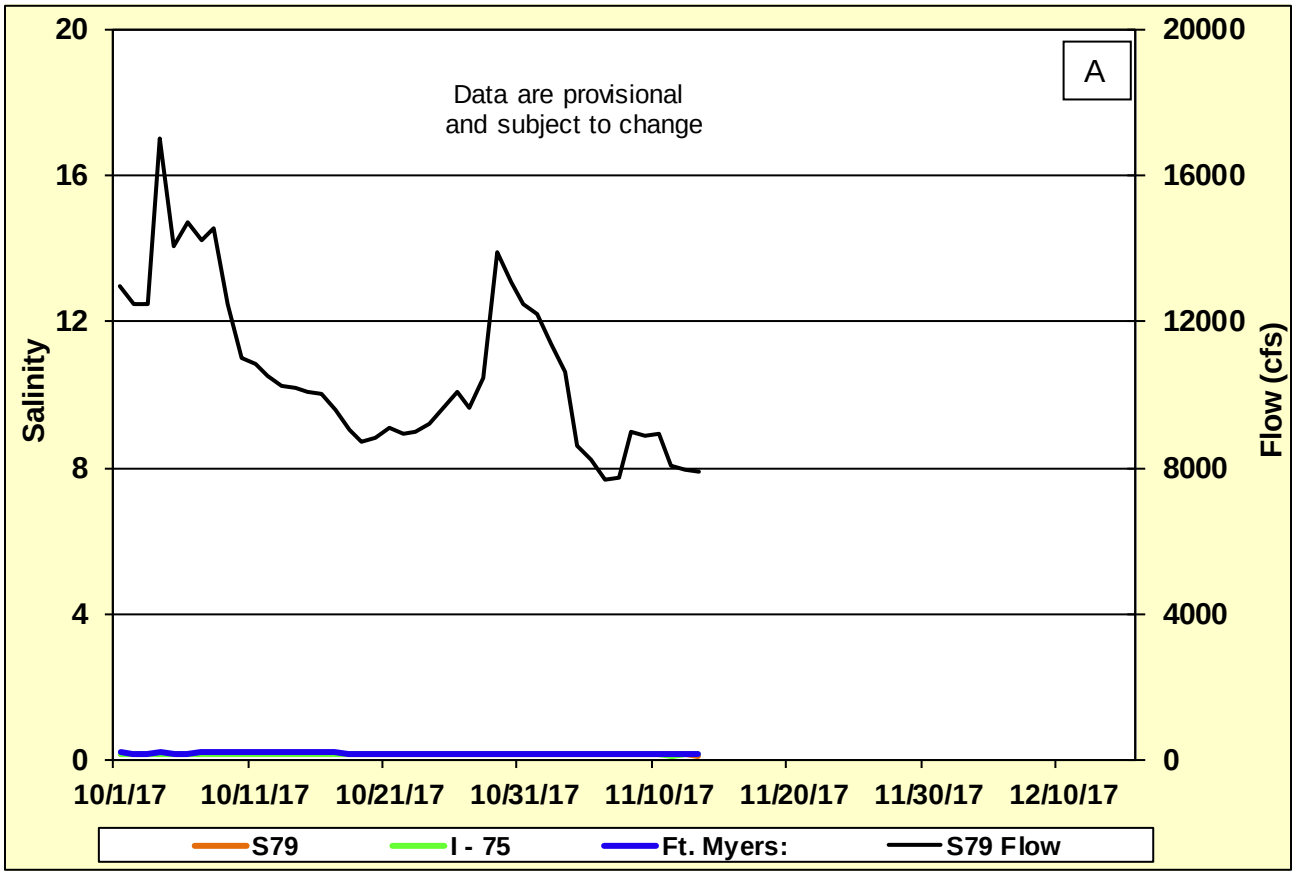


Figure 7. Freshwater inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.



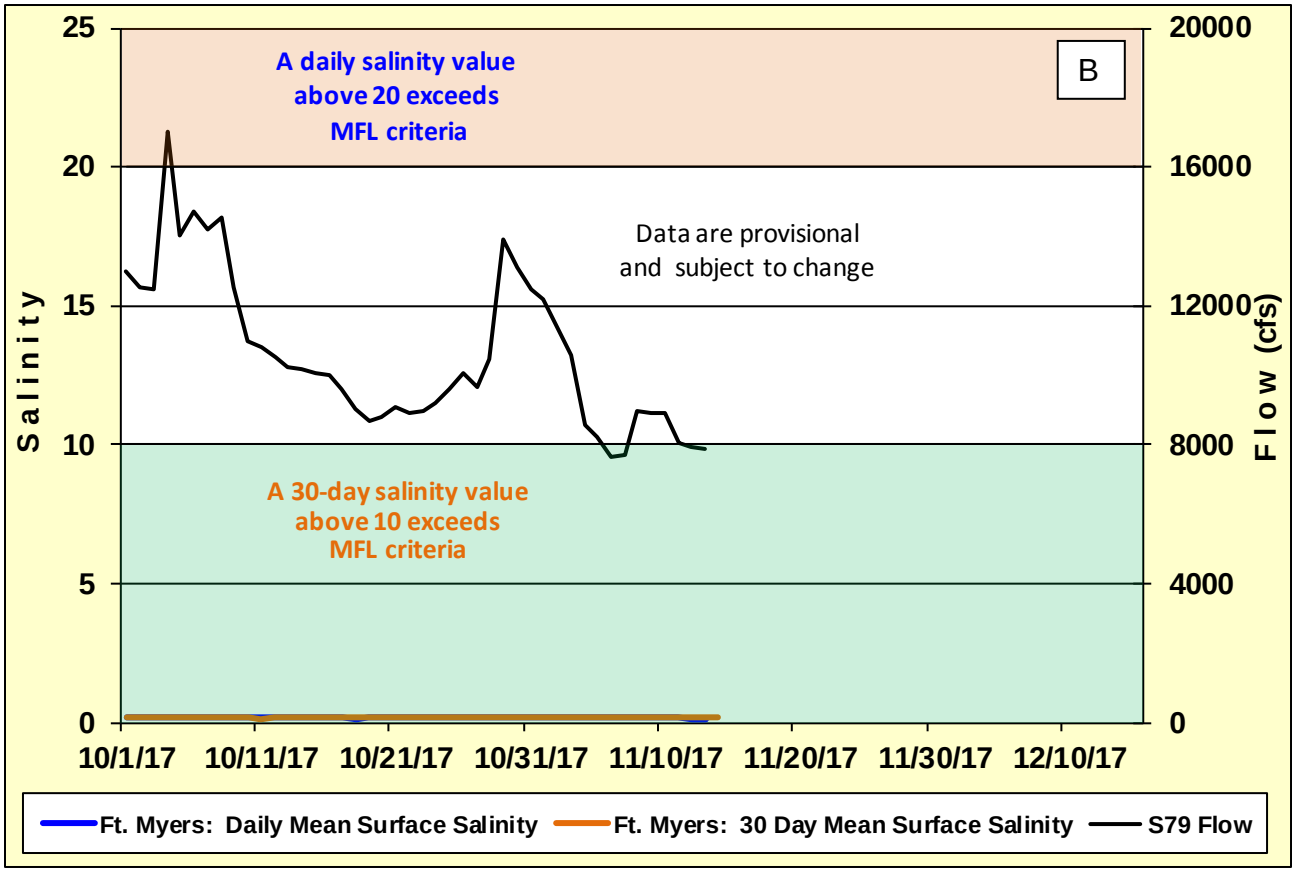


Figure 8. Daily mean flows at S-79 and salinity at upper estuary monitoring stations (A) and 30-day moving average salinity at Ft. Myers (B).

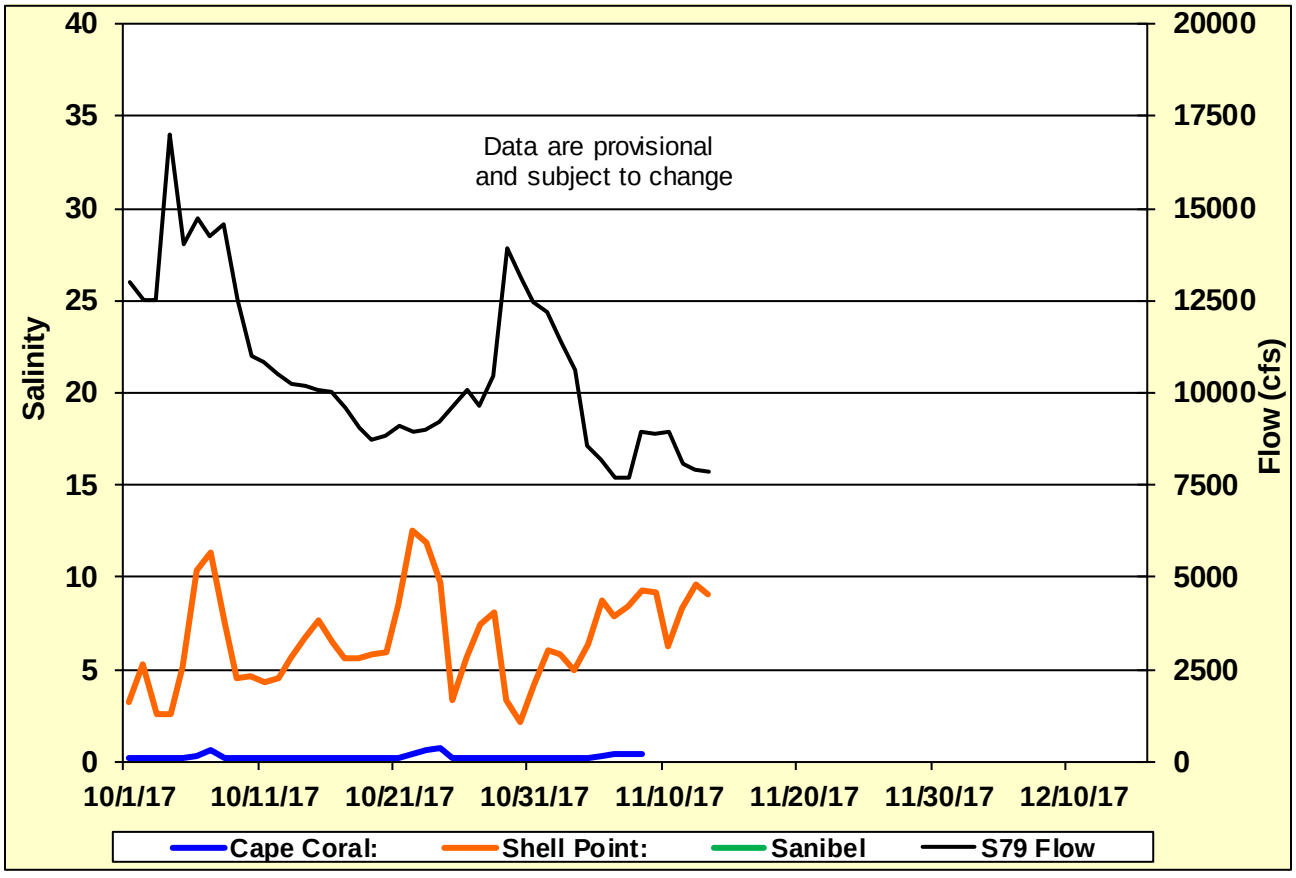


Figure 9. Daily mean flows at S-79 and salinity at lower estuary stations.

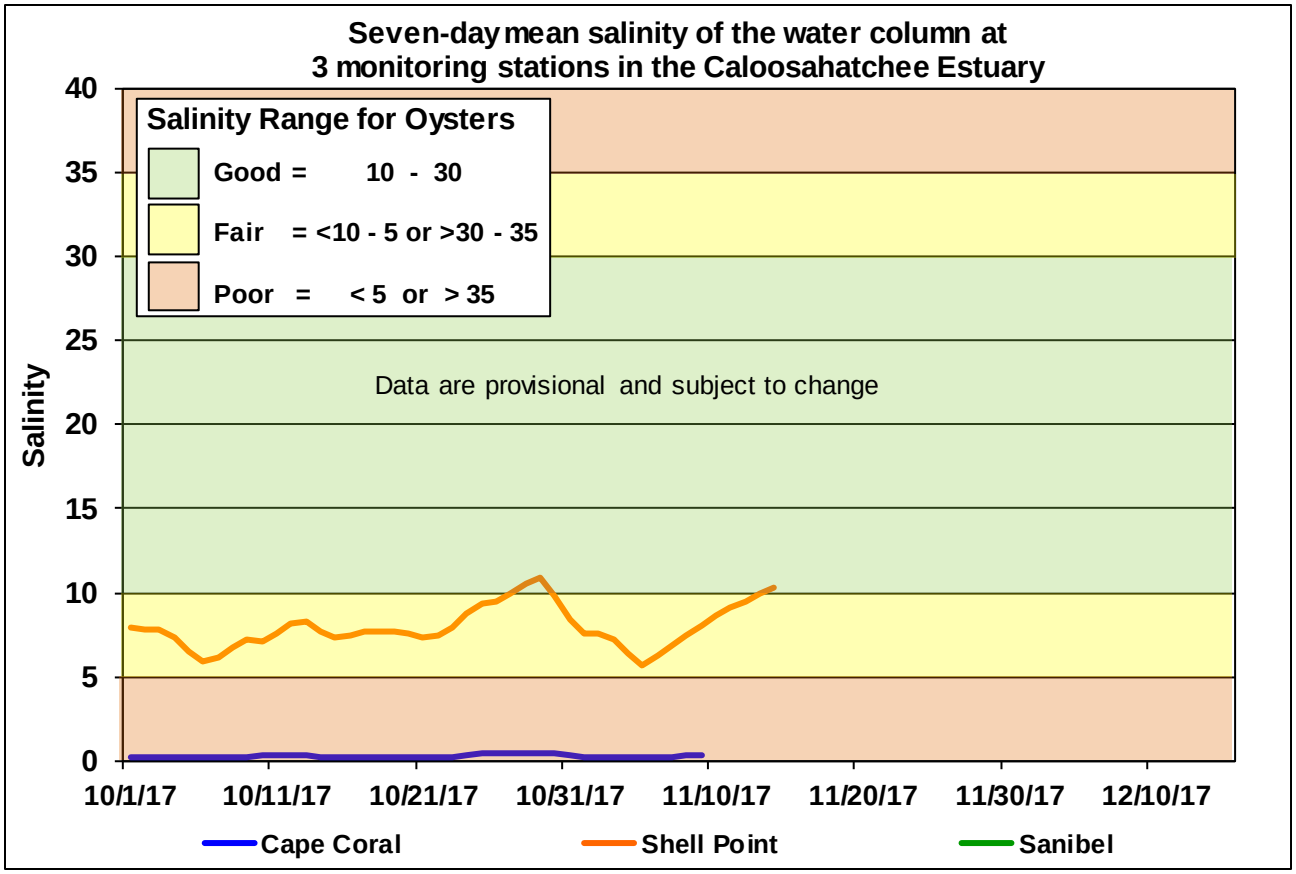


Figure 10. Seven-day mean salinity at Cape Coral Bridge, Shell Point and Sanibel Bridge monitoring stations.

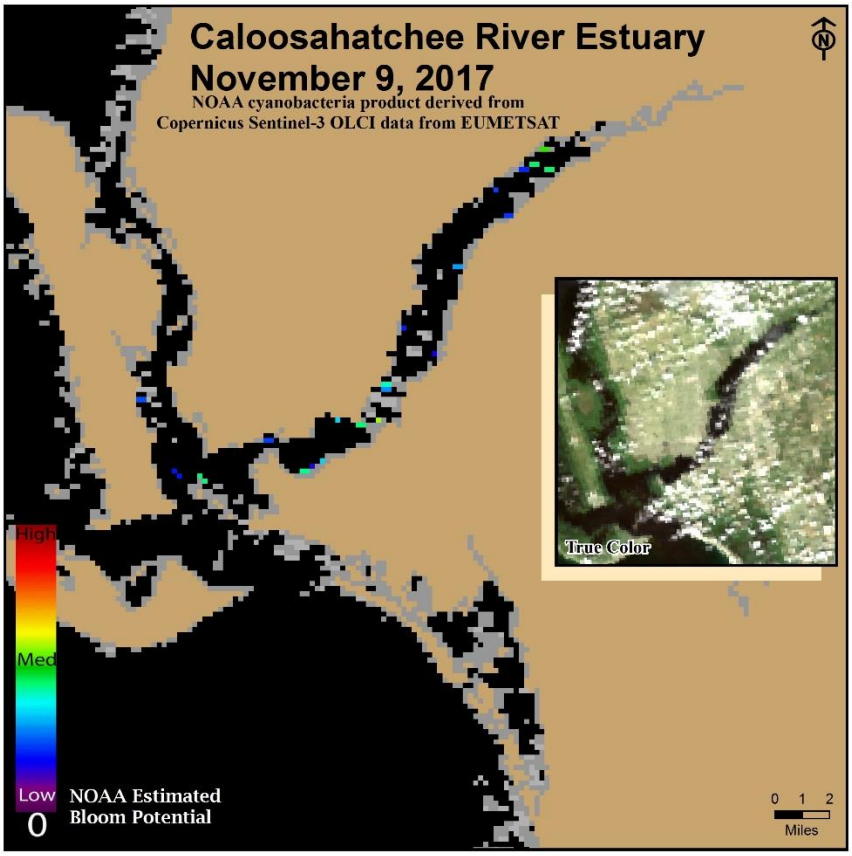
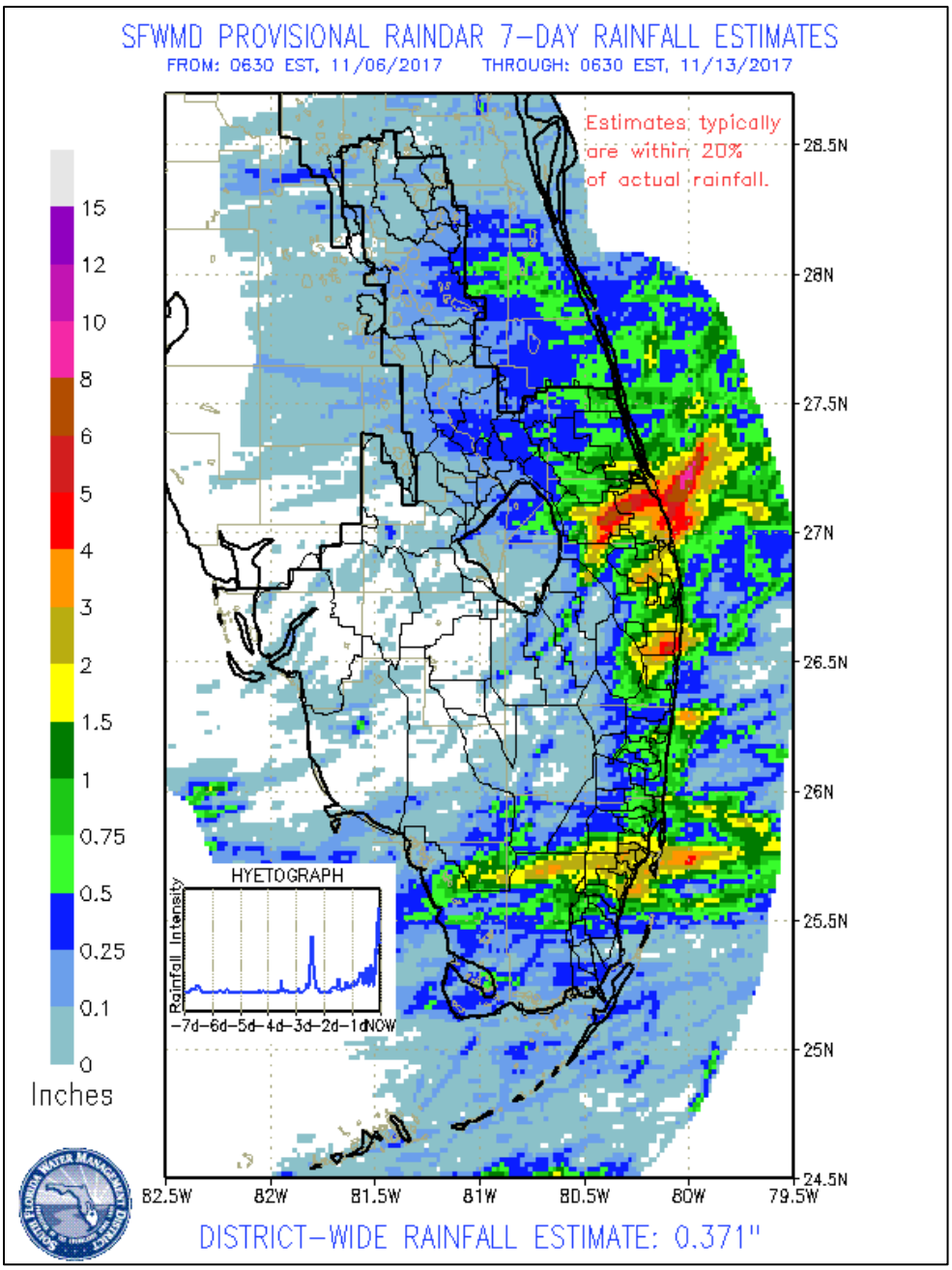


Figure 11. Sentinel 3a Satellite imagery provided by NOAA uses Ocean and Land Color Instrument (OLCI) to estimate cyanobacteria bloom potential in Caloosahatchee Estuary.

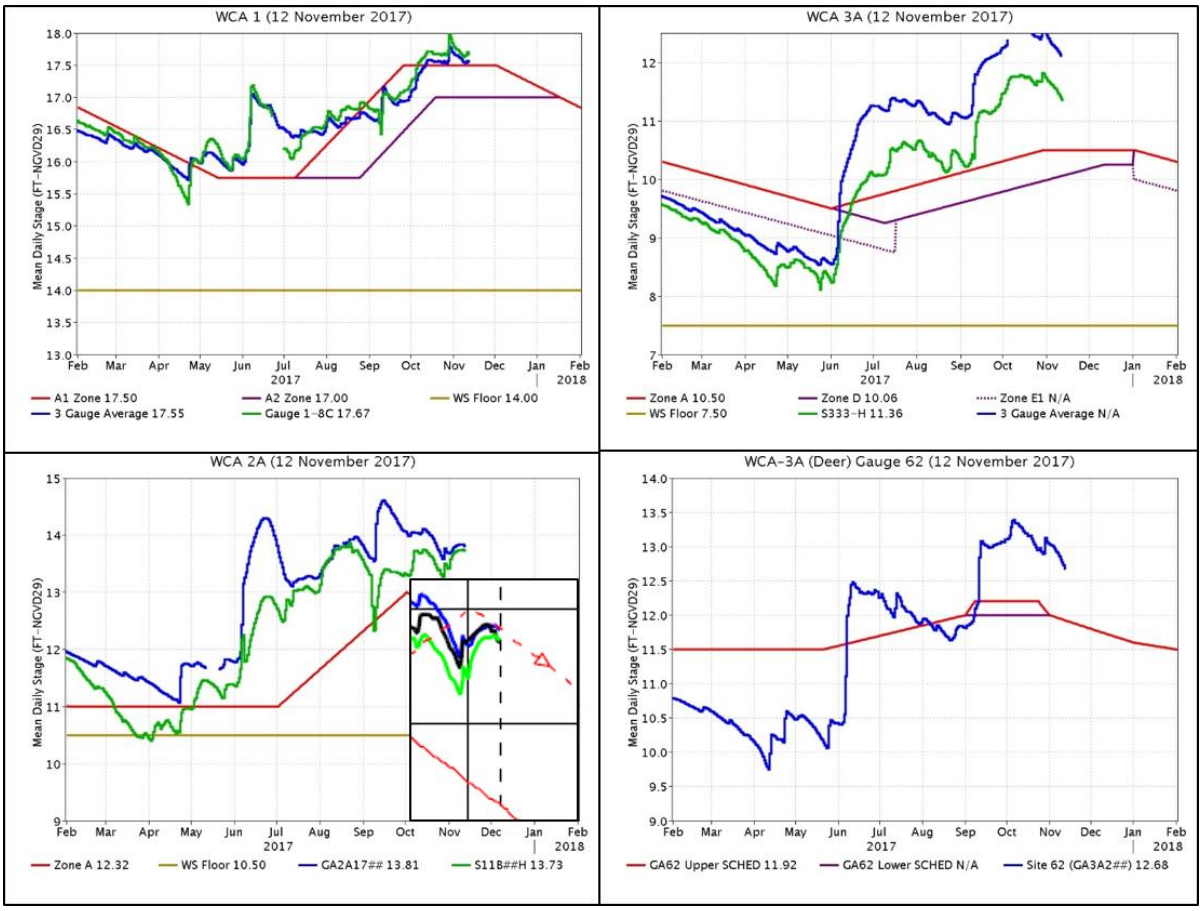
EVERGLADES

Rainfall was focused along the coast last week meaning sparse rain fell across the interior Everglades late. All of the WCAs trended towards their regulation schedule with the most significant change coming in WCA-3A.

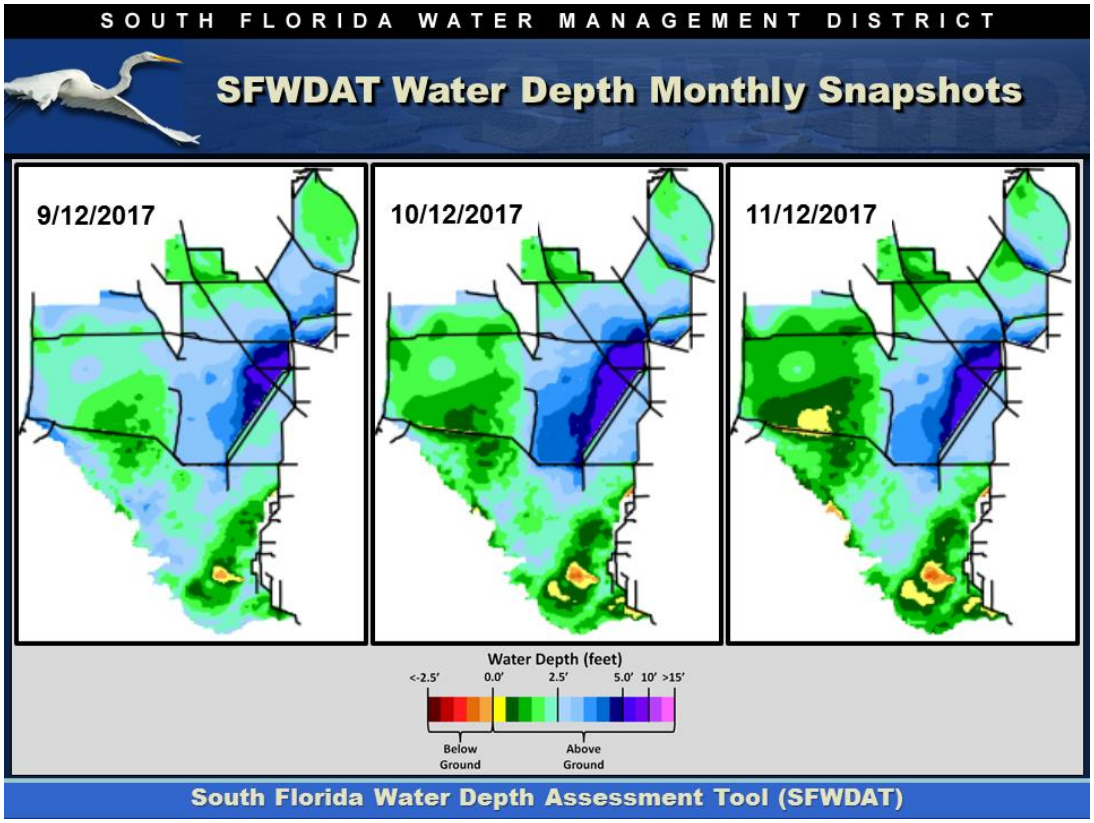
Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	0.63	−0.06
WCA-2A	0.18	−0.01
WCA-2B	0.22	−0.09
WCA-3A	0.11	−0.24
WCA-3B	0.27	−0.11
ENP	0.37	−0.09

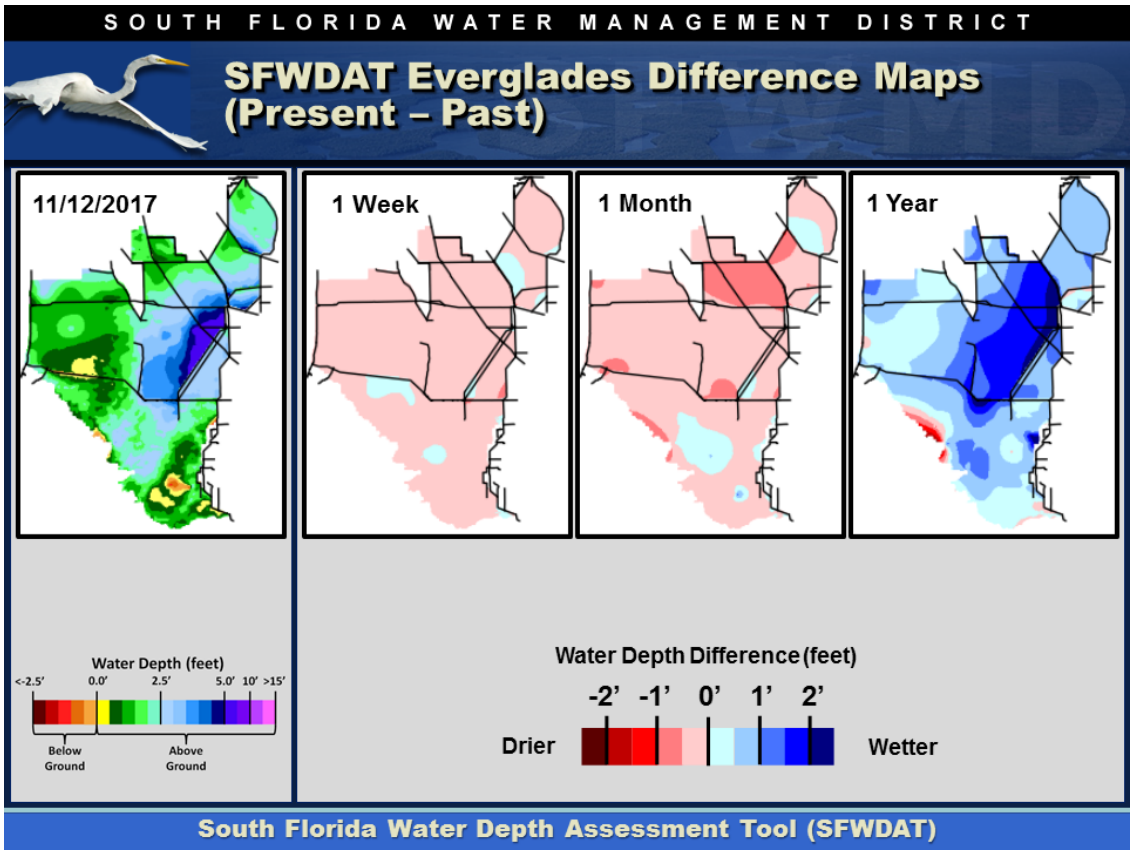


Regulation Schedules: WCA-1 three-gauge average is 0.05 feet above Zone A1, and stage difference between the marsh and the canal is 0.12 feet. WCA-2A the marsh stage at gauge GA2A17 is currently 0.02 feet below the current temporary deviation. Marsh stage is 0.08 feet above canal stage at S11B. WCA-3A three-gauge average stage is 1.56 feet above zone A (closer to target by 0.23 feet this week). 0.70 feet is the difference between marsh and canal. WCA-3A at gauge 62 (Northwest corner) is 0.76 feet above the upper schedule.



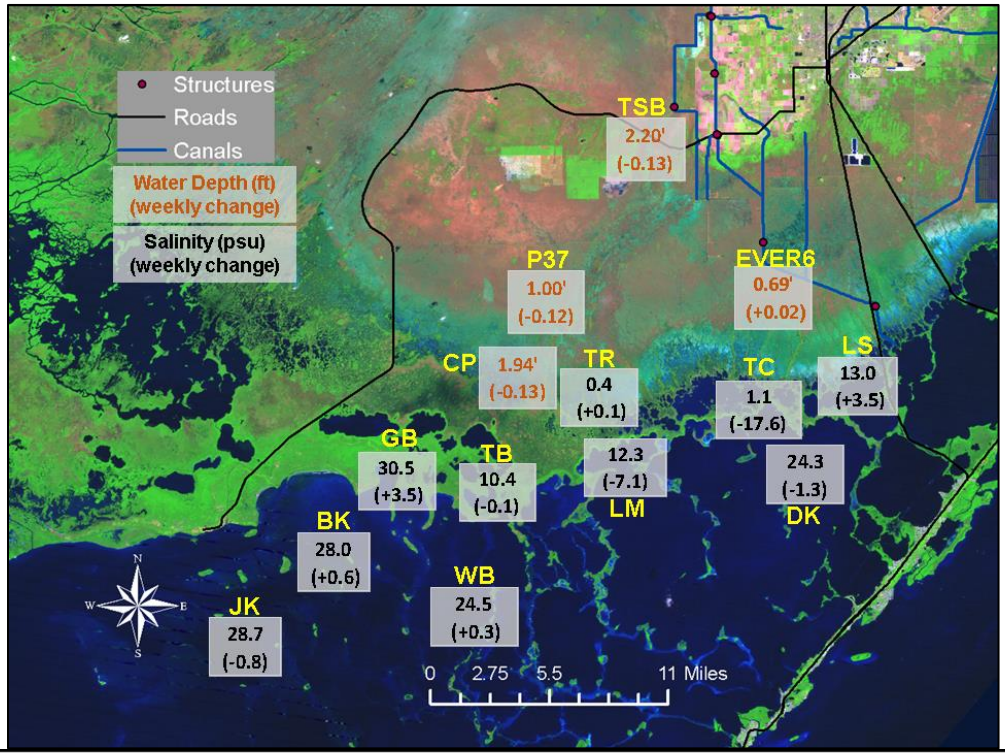
Water Depths and Changes: The WDAT tool for spatial interpolation of depth indicates a range from a low of 1.0 feet to 1.5 feet in Northern portions of all the WCA-1, 2A and 3A to a high of 5.0+ feet along the L-67A canal in WCA-3A South. Over the last week individual gauge changes ranged from −0.01 feet (WCA-2A) to −0.27 feet (Northwestern WCA-3A). Pan evaporation fell this week, estimated at 1.13 inches, above the pre-project 0.97 inches. Comparing WDAT water levels from present, water depths fell across WCA-3A and WCA-1, only rising in the southwestern section of WCA-2A.

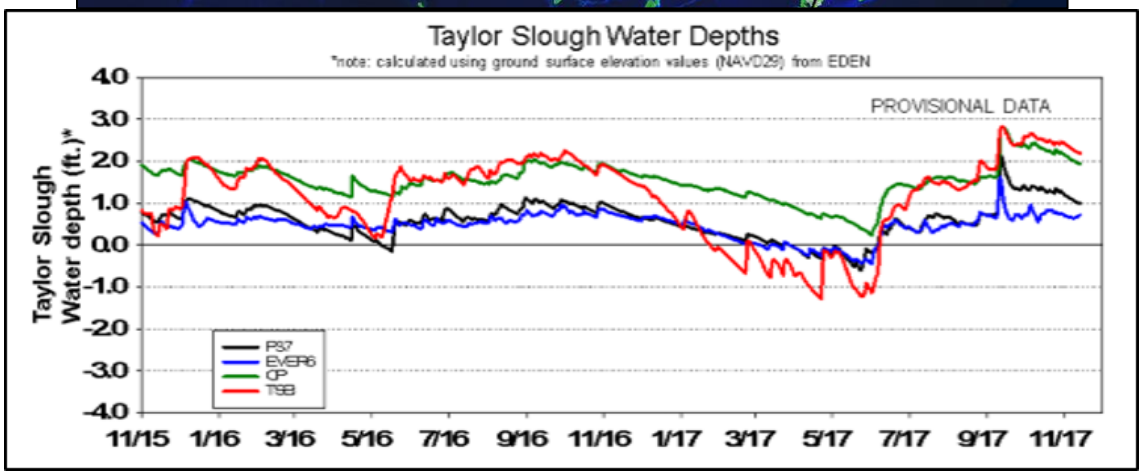


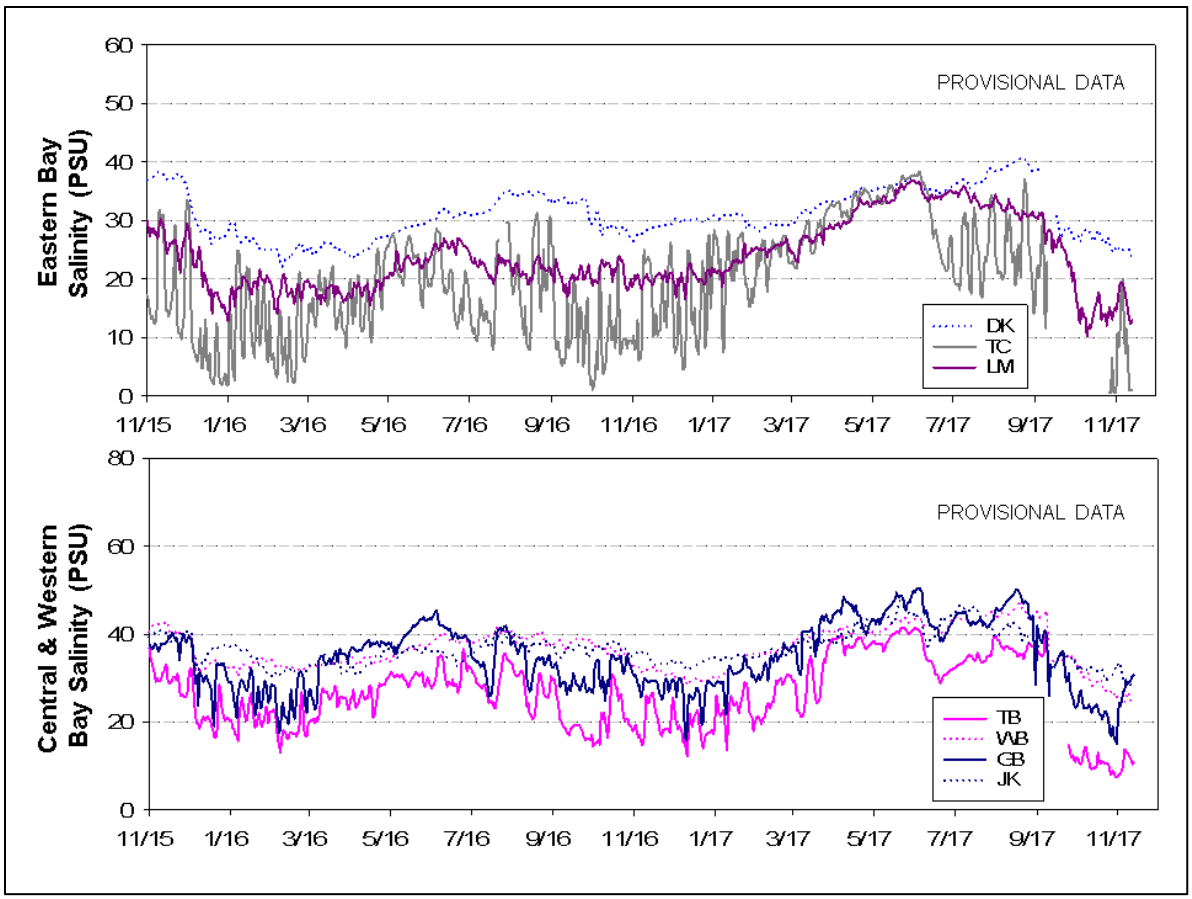


Taylor Slough stages: Water levels changed −0.13 feet in Taylor Slough and +0.02 feet in the ENP panhandle. Rainfall in the area was less than 0.38 inches for the week. Water levels are 3 to 13 inches above the historic average for this time of year with the highest divergence occurring in northern Taylor Slough (similar to last week).

In Florida Bay salinity changes for the last week ranged from −18 to +4 psu and current salinities range from 1 psu in the eastern nearshore to 31 in the western nearshore. Most areas are in the range of 3 to 7 psu below the historic averages, but Garfield Bight (GB), in the western nearshore, has been increasing day after day for the last 2 weeks and is currently 7 psu above average for this time of year.

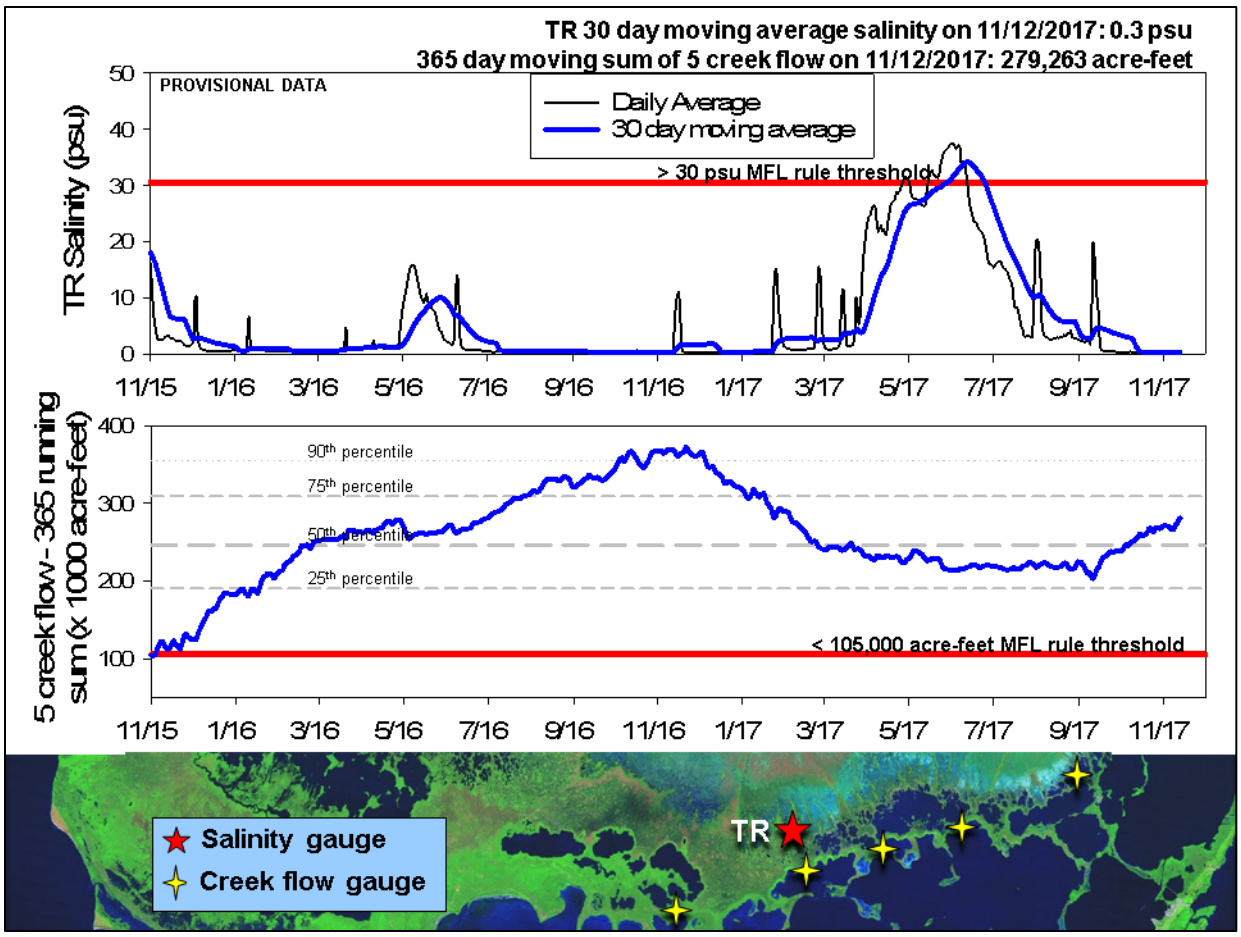






Florida Bay MFL: Mangrove zone daily average salinity remains near fresh at 0.4 psu. The 30-day moving average remains at 0.3 psu.

The weekly cumulative flow from the five creeks denoted by yellow stars on the map was 14,600 acre-feet last week which is 50% greater than the historic average for this time of year. Daily flows increased over the past week. The 365-day moving sum of flow from the five creeks identified by yellow stars on the map increased about 12,000 acre-feet this past week to end at 279,263 acre-feet (still greater than the long-term average of 257,628 acre feet). Creek flow is provisional data from the USGS and is highly variable.



Water Management Recommendations

Deep water conditions persist in WCA-3A and across most the Everglades. All practicable and novel management options should be explored in order to relieve high water conditions particularly in WCA-3A South. Florida Bay conditions continue to reflect the stress caused by the extraordinary climatic conditions this wet season, including active algal blooms and low dissolved oxygen in the creeks. Freshwater discharges into Florida Bay could break up and flush out problem areas.

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

Everglades Ecological Recommendations, November 14th, 2017 (red is new)

Area	Current Condition	Cause(s)	Recommendation	Reasons
WCA-1	Stages decreased from −0.04' to −0.09'	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 −0.01'	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 −0.25'	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 −0.27'	Rainfall, ET, management		
Central WCA-3A S	Stages decreased −0.22'	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 150 days.
Southern WCA-3A S	Stages decreased −0.22'	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	Stages decreased −0.09'	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 -0.13' to +0.02'	Rain, ET, inflows	Move water southward as possible	When available provide freshwater buffer for ecosystems.
FB- Salinity	Salinity changes ranged -17.6 to +3.5 psu.	Rain, ET, inflows, wind	Move water southward as possible	When available, provide freshwater to main low salinity buffer and promote water movement.