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: October 10, 2017

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

Below average rains are expected through Thursday before we likely transition back into a wet weekend. Deep easterly flow, which is rather unusual for the second week of October, will dominate this week. Generally, deep easterlies yield below average rainfall during our wet season; and, that seems likely for most of this week. By the end of the week, computer models show an inverted trough from near the Dominican Republic across the District Friday night and Saturday. This trough would bring heavier rains south and east of the Lake on Friday night. Longer term forecast indicates that the daily rains could end in about ten days.

Kissimmee

Tuesday morning stages and departures from schedule were 58.5 feet (1.2 feet above schedule) in East Lake Toho, 54.5 feet (0.2 feet above schedule) in Lake Toho, and 52.3 feet (0.5 feet above schedule) in Kissimmee Cypress Hatchineha; S65A headwater stage was 46.6 feet. Tuesday morning discharges were 3,019 cfs at S65, 4,105 cfs at S65A, and 9,155 cfs at S65E. Dissolved oxygen concentration in the Kissimmee River averaged 1.4 milligrams per liter (mg/L) for the week. Kissimmee River mean floodplain depth on Sunday was 3.73 feet. There are no new recommendations for this week.

Lake Okeechobee

Lake stage is 17.19 feet NGVD having increased by 0.69 feet over the past week and 3.52 feet over the past month, due primarily to Hurricane Irma's extensive rainfall. Lake stages may be stabilizing as inflows from the Kissimmee basin are slowing while discharges to the east and west estuaries are increasing to manage high Lake stages. The submerged aquatic and emergent vegetation coverage in the nearshore areas of the Lake are expected to decline due to the high water conditions and turbidity from resuspended sediment. The high inflows and resuspended sediment have also significantly increased water column total phosphorus, which could lead to algal blooms as turbidity begins to decline. Lower Lake stages near the end of WY2018 would help to recover vegetation communities, and long, steady recessions of water levels throughout the dry season may help promote another productive year for wading birds on the Lake.

Estuaries

Total discharge to the St. Lucie estuary averaged 9,762 cfs over the past week with 983 cfs (10%) coming from Lake Okeechobee. Salinities decreased throughout the estuary. The seven-day average salinity at the US1 Bridge is in the poor range for adult oysters and is likely to remain low due to continued freshwater inflow. Low oxygen levels (<3 mg/L) were recorded in the North Fork.

Total inflow to the Caloosahatchee estuary averaged 15,277 cfs over the past week with 6,995 cfs (46%) coming from the Lake. The 30-day moving average surface salinity is 0.2 at Val I-75 and Ft. Myers. Salinity conditions between Val I-75 and Ft. Myers are good for tape grass. Salinity conditions are estimated to be in the good range for adult oysters at Sanibel, in the fair range at Shell Point, and in the poor range at Cape Coral. 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 21,600 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

Above average rainfall across the Everglades led to an increase in stage throughout the system, except in WCA-2A, where stage remained stable. Deep water conditions persist in WCA-3A with an almost 1/3 of a foot rise over the past week at all stations monitored for this report. Keeping depths below 2.5 feet at gauge 65 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 4.71 feet (+0.33 feet last week), and has exceeded 2.5 feet for 115 days. In Florida Bay, salinities are staying fairly stable with most weekly changes at less than 2 psu.

Supporting Information

KISSIMMEE BASIN

Kissimmee Basin Rainfall

The Upper Kissimmee Basin received 1.80 inches of rainfall in the past week and the Lower Basin received 1.92 inches (SFWMD Daily Rainfall Report 10/09/2017).

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: 10/10/2017

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)						
							10/8/17	10/1/17	9/24/17	9/17/17	9/10/17	9/3/17	8/27/17
Lakes Hart and Mary Jane	S62	385	LKMJ	61.6	R	60.2	**1.4**	1.7	2.1	2.3	0.1	0.0	0.1
Lakes Myrtle, Preston, and Joel	S57	208	S57	63.6	R	61.2	**2.4**	2.5	3.1	3.2	0.1	-0.1	0.1
Alligator Chain	S60	187	ALLI	63.6	R	63.4	**0.2**	0.1	0.7	1.3	0.0	0.0	0.0
Lake Gentry	S63	230	LKGT	61.4	R	61.1	**0.3**	0.0	0.4	0.9	0.0	0.0	-0.1
East Lake Toho	S59	1,371	TOHOE	58.6	R	57.2	**1.4**	2.0	2.4	2.6	0.0	0.0	0.1
Lake Toho	S61	2,524	TOHOW, S61	54.5	R	54.2	**0.3**	1.0	1.8	2.1	0.0	0.0	0.0
Lakes Kissimmee, Cypress, and Hatchineha	S65	6,671	KUB011, LKIS5B	52.2	R	51.7	**0.5**	0.9	1.8	2.7	1.3	1.2	1.0

[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: 10/10/2017

Metric	Location	1-Day Average	Average for the Preceeding 7-Days[1]									
		10/8/2017	10/8/17	10/1/17	9/24/17	9/17/17	9/10/17	9/3/17	8/27/17	8/20/17	8/13/17	8/6/17
Discharge (cfs)	S-65	4,409	**6,671**	11,491	12,054	5,535	1,809	1,209	1,152	958	1,181	665
Discharge (cfs)	S-65A	5,852	**7,028**	7,972	8,336	6,779	2,375	1,465	1,448	1,213	1,298	1,274
Discharge (cfs)	S-65D[2]	10,672	**12,111**	12,823	13,270	11,906	2,442	2,262	2,032	2,255	2,154	2,234
Discharge (cfs)	S-65E[2]	11,039	**12,702**	13,342	13,748	13,216	2,584	2,279	2,085	2,276	2,195	2,319
DO (mg/L)[3]	Phase I river channel	1.0	**1.4**	1.0	0.8	1.3	2.3	2.3	2.0	2.8	2.0	2.2
Mean depth (feet)[4]	Phase I floodplain	3.73	**4.16**	4.60	4.73	4.42	1.35	1.30	1.18	1.08	1.10	1.00

[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
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)

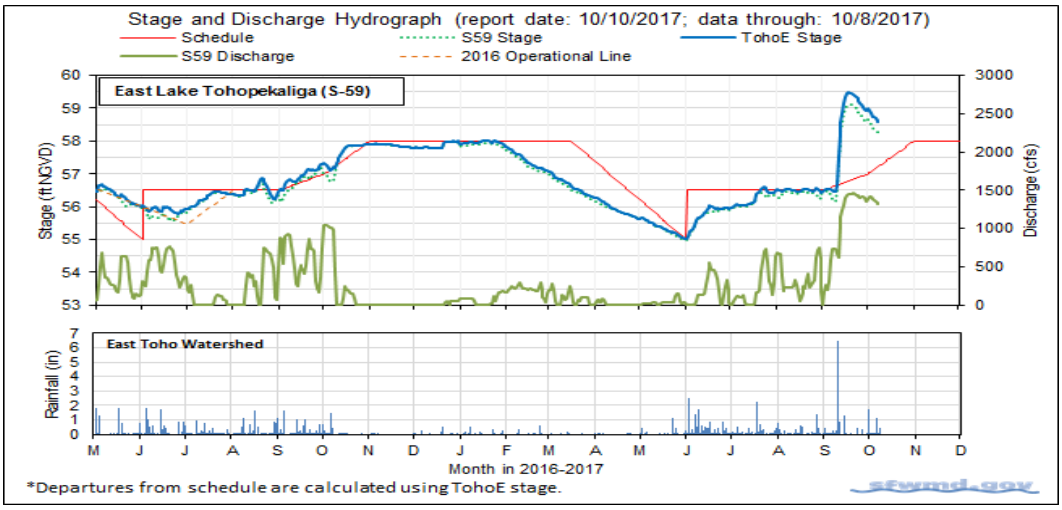


Figure 1.

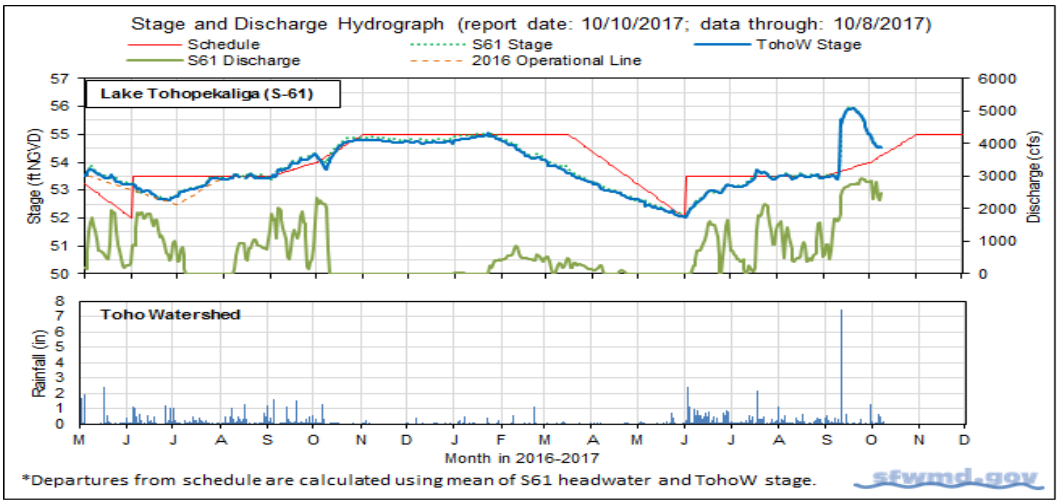


Figure 2.

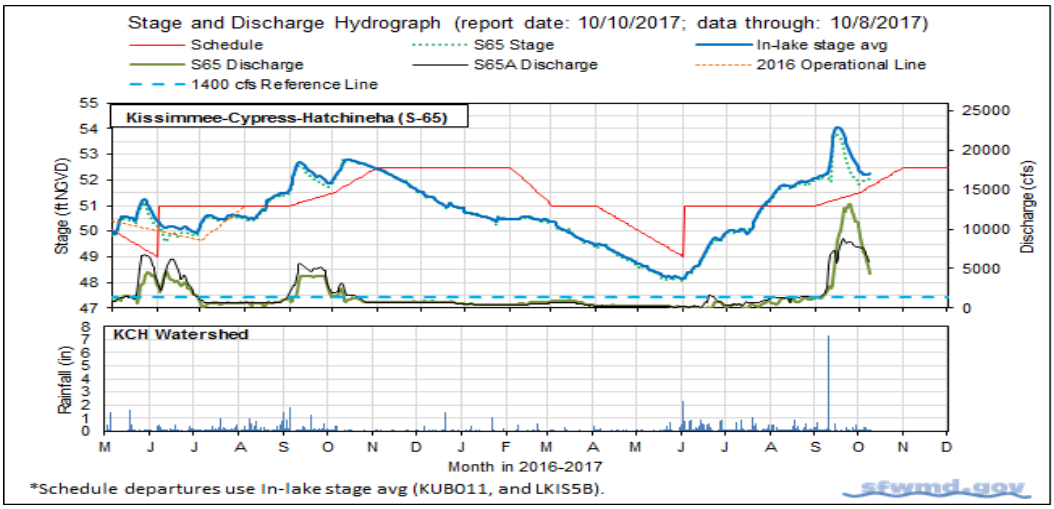


Figure 3.

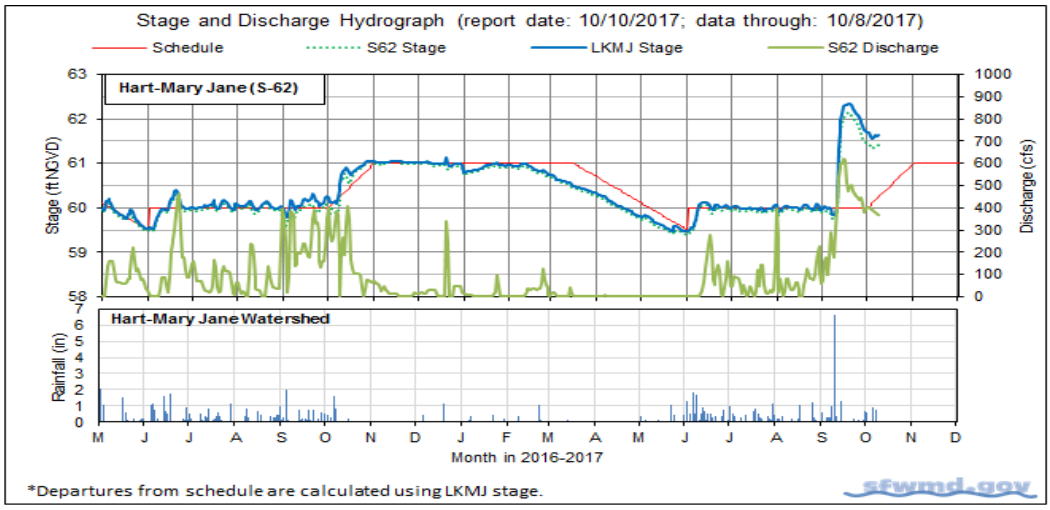


Figure 4.

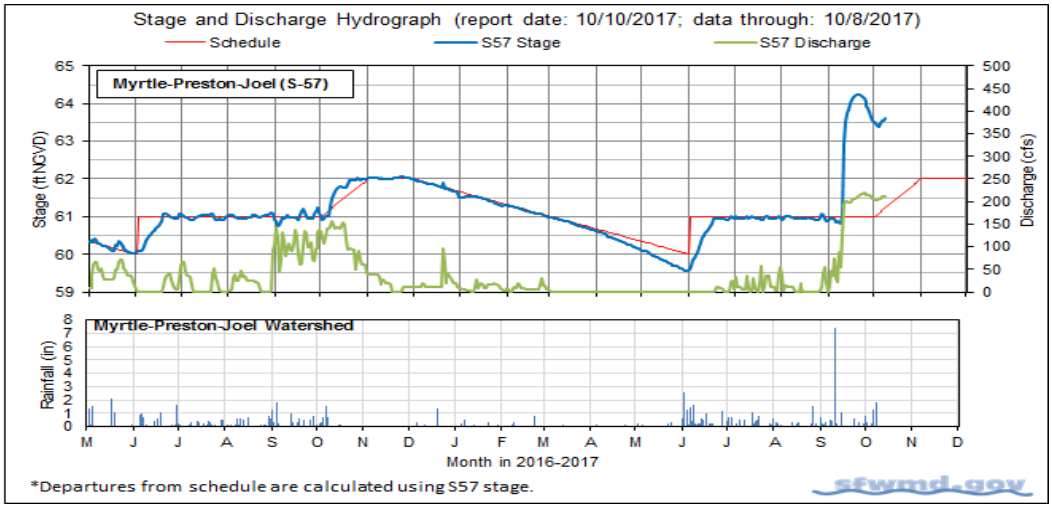


Figure 5.

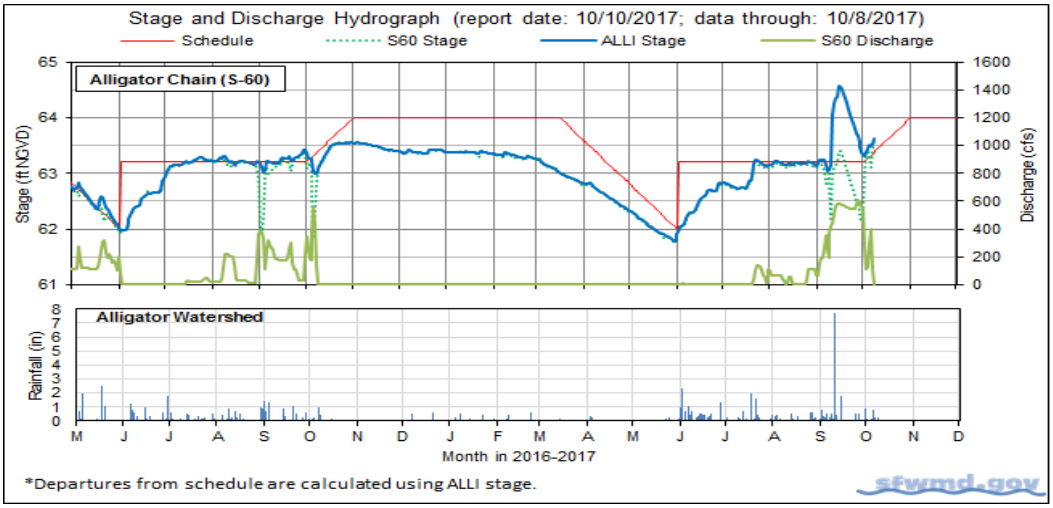


Figure 6.

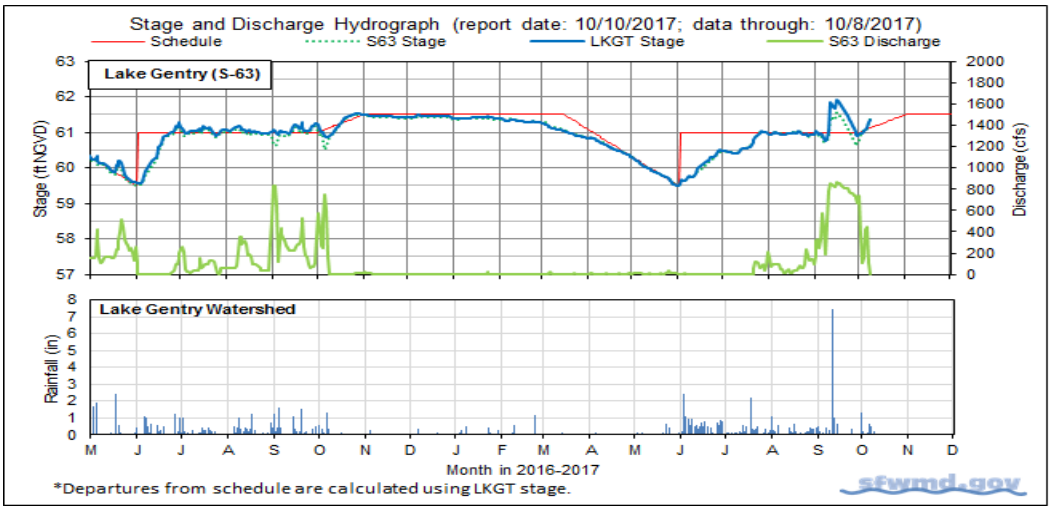


Figure 7.

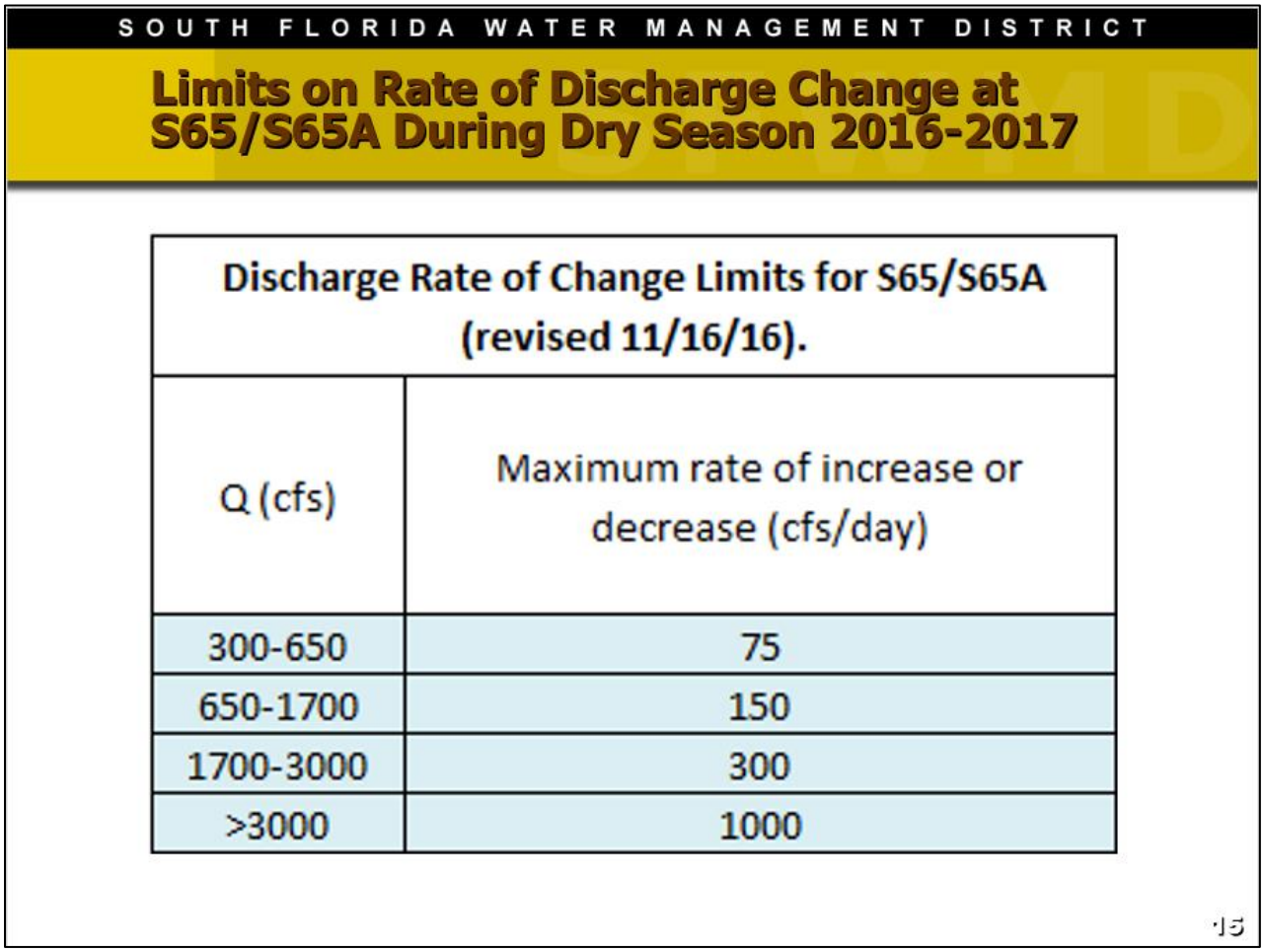


Figure 8. Limits on rate of discharge change at S65/S65A as of the 2016-2017 Dry Season.

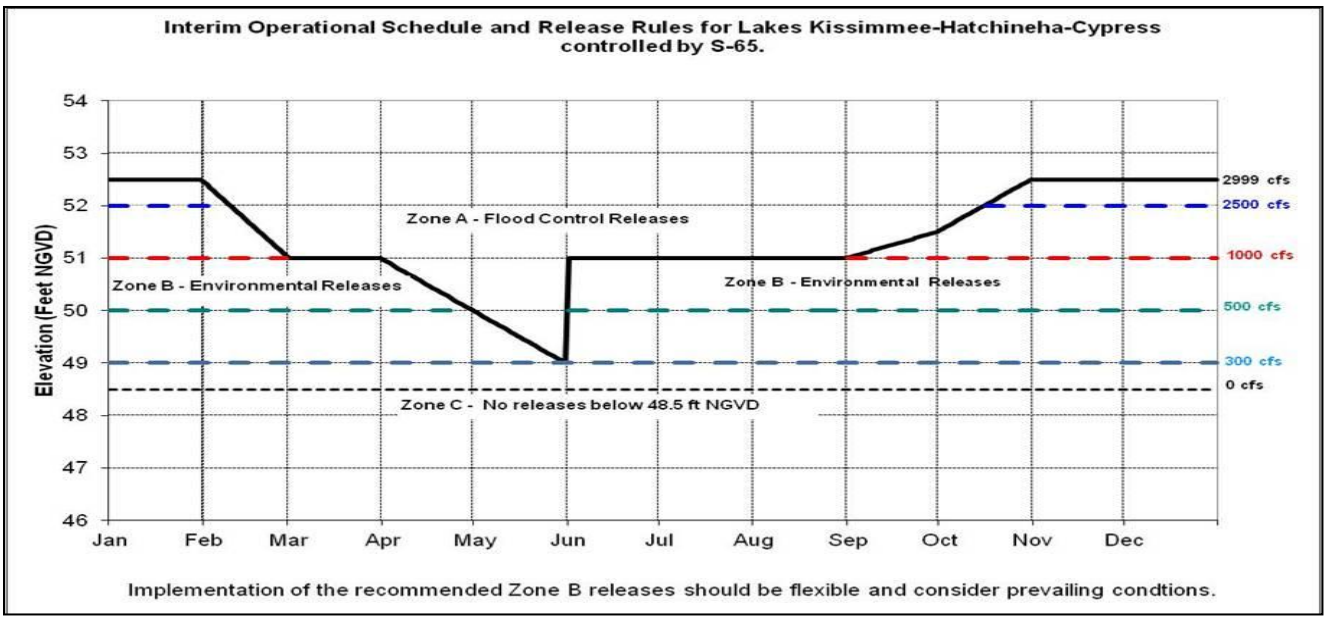


Figure 9. Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years.

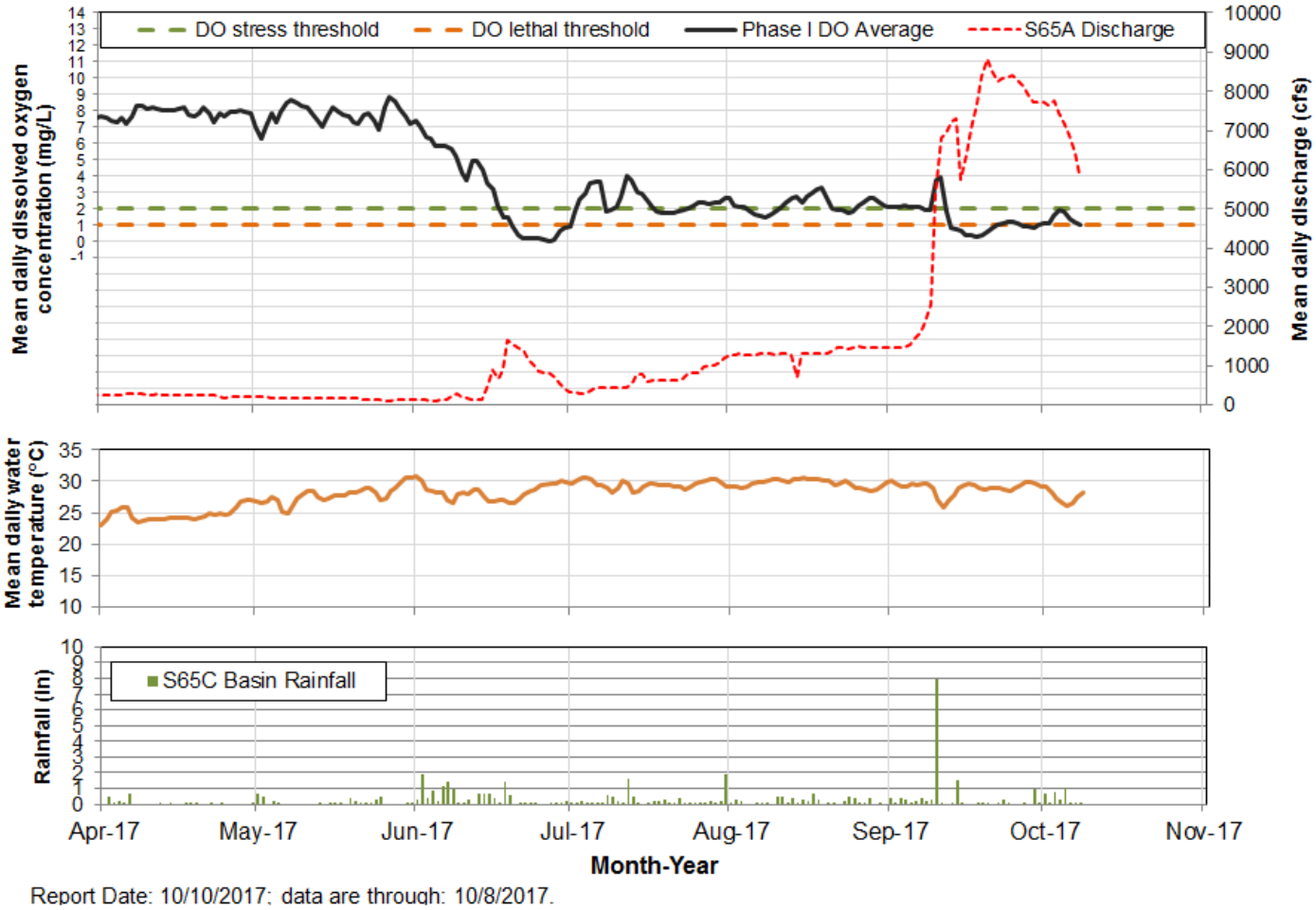


Figure 10. Mean daily Dissolved Oxygen, discharge, temperature and rainfall in the Phase I river channel.

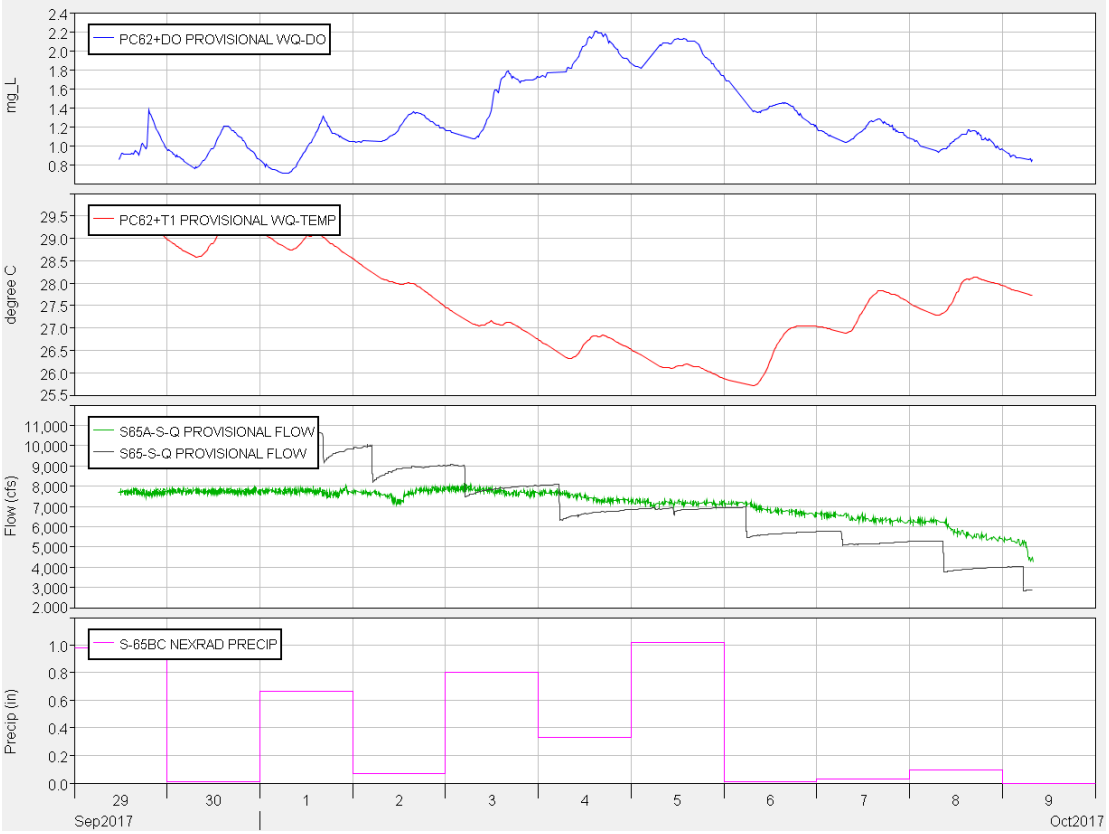


Figure 11. Phase I river channel dissolved oxygen and water temperature (measured at 15 minute intervals) and Pool BC daily rainfall.

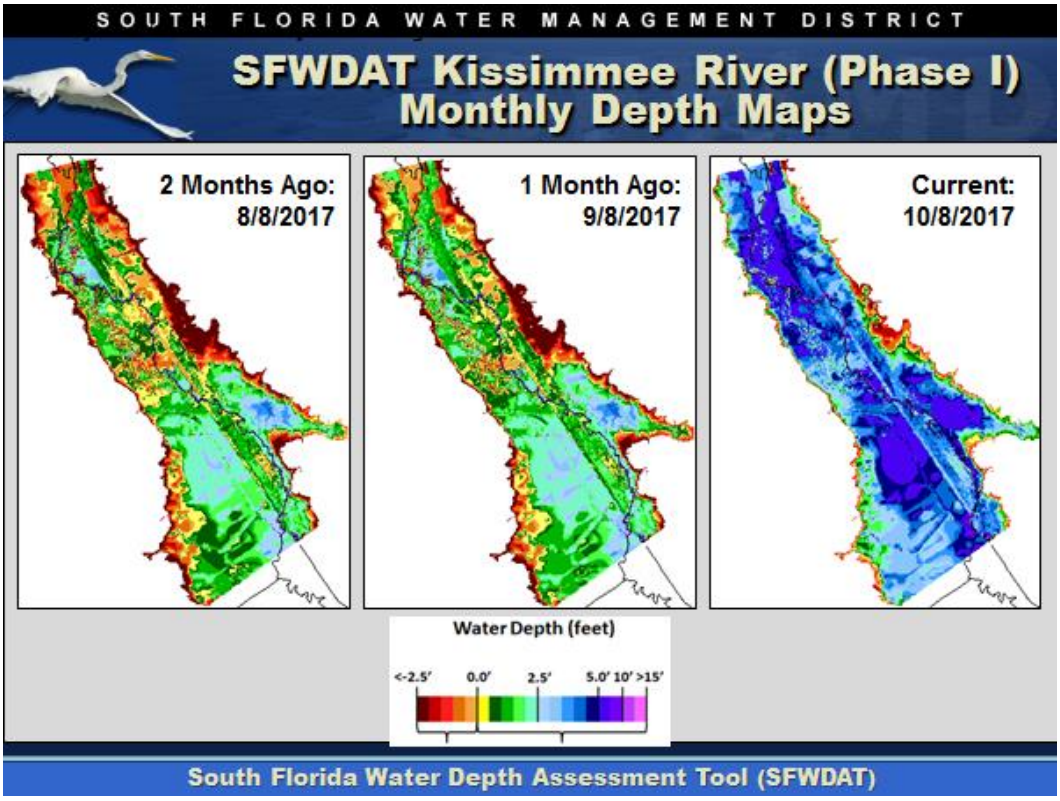
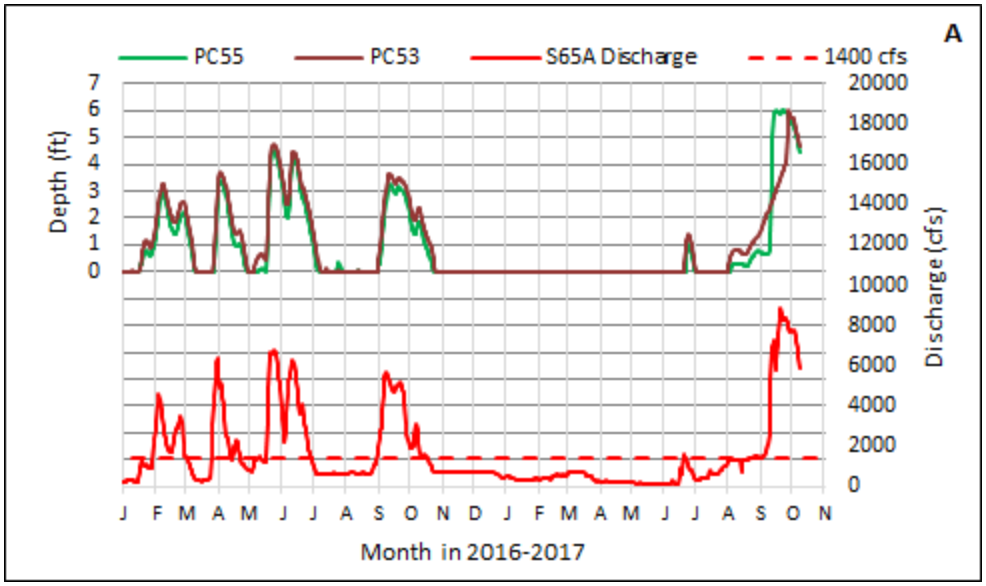
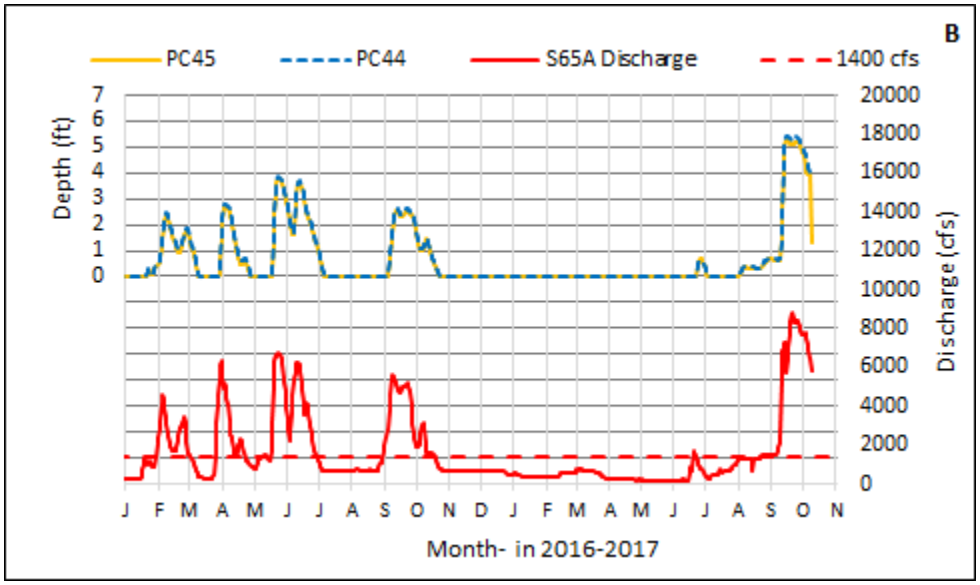


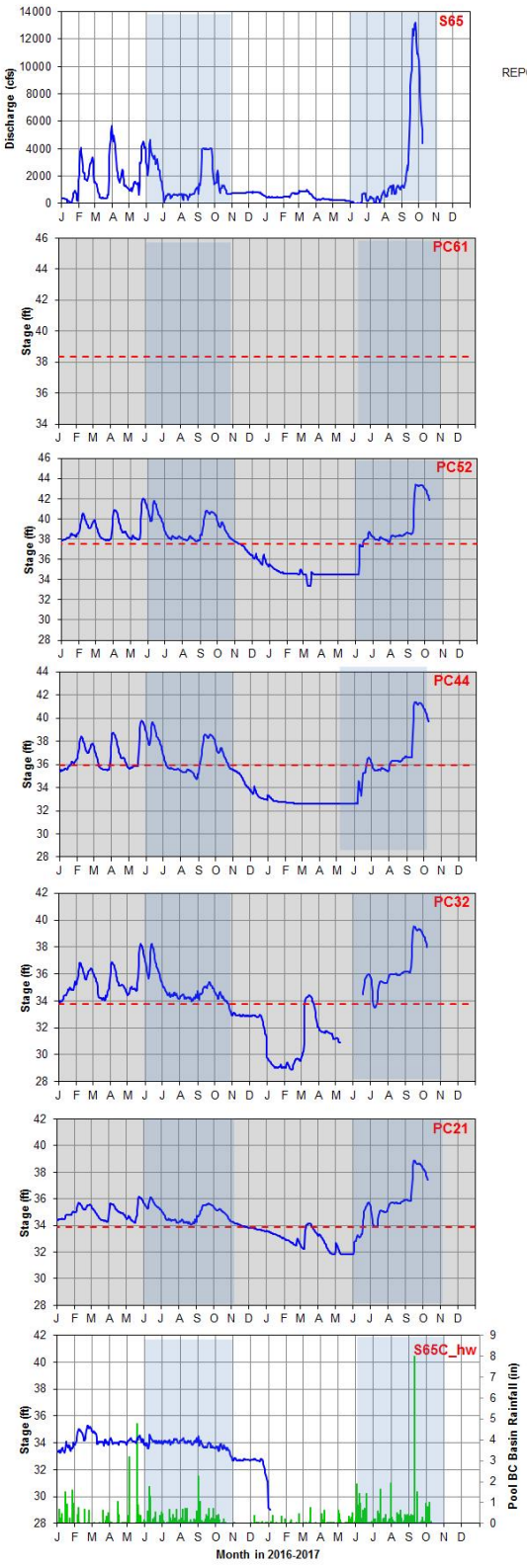
Figure 12. Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to Jan. 16, 2012.





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



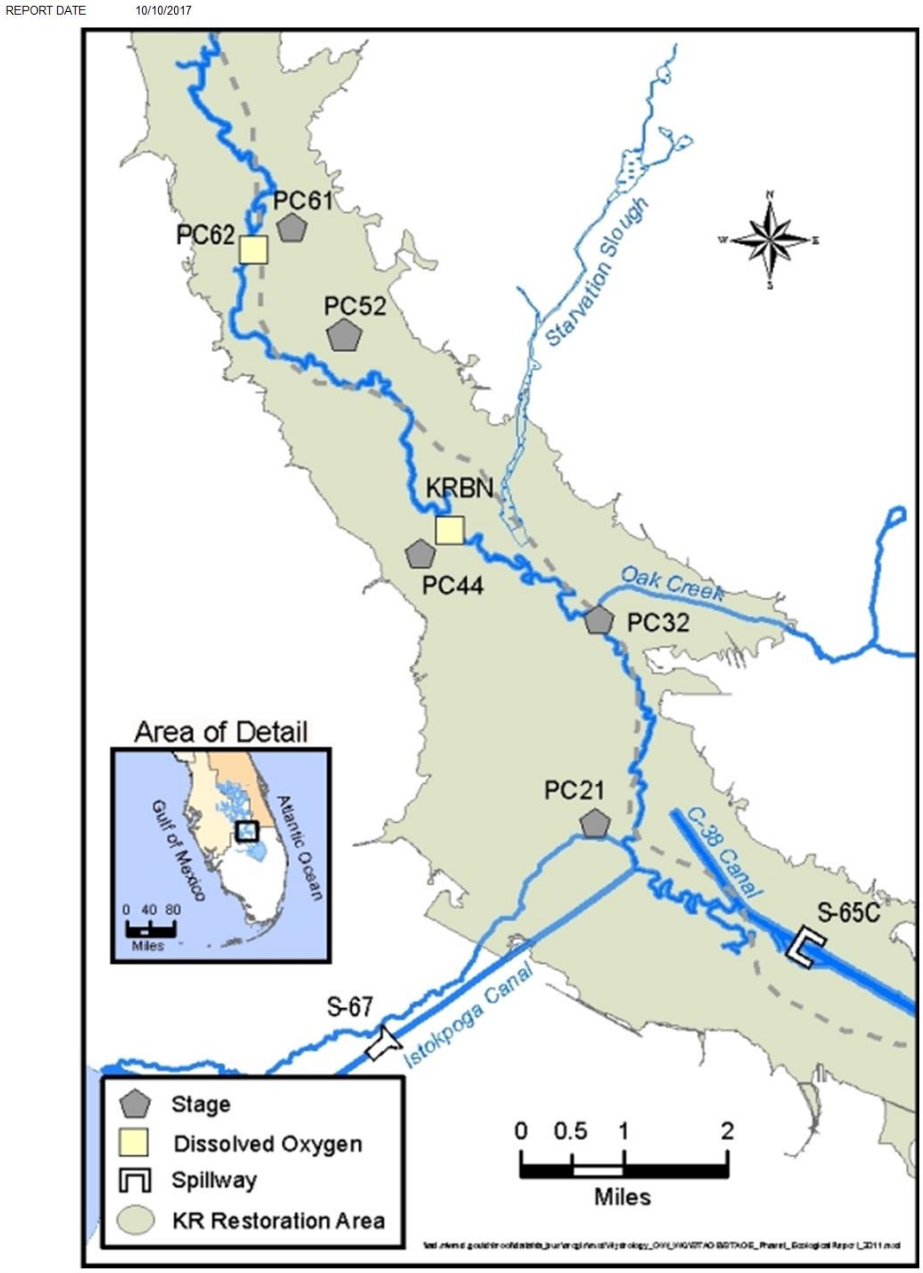


Figure 13. Discharge at S65, stages at five monitoring stations in the Phase I area of the Kissimmee River floodplain, and headwater stage at S65-C since January 1, 2015. The most recent data (~2 weeks) are provisional real-time data from SFWMD DualTrend; previous data are from SFWMD DB-HYDRO (validated).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

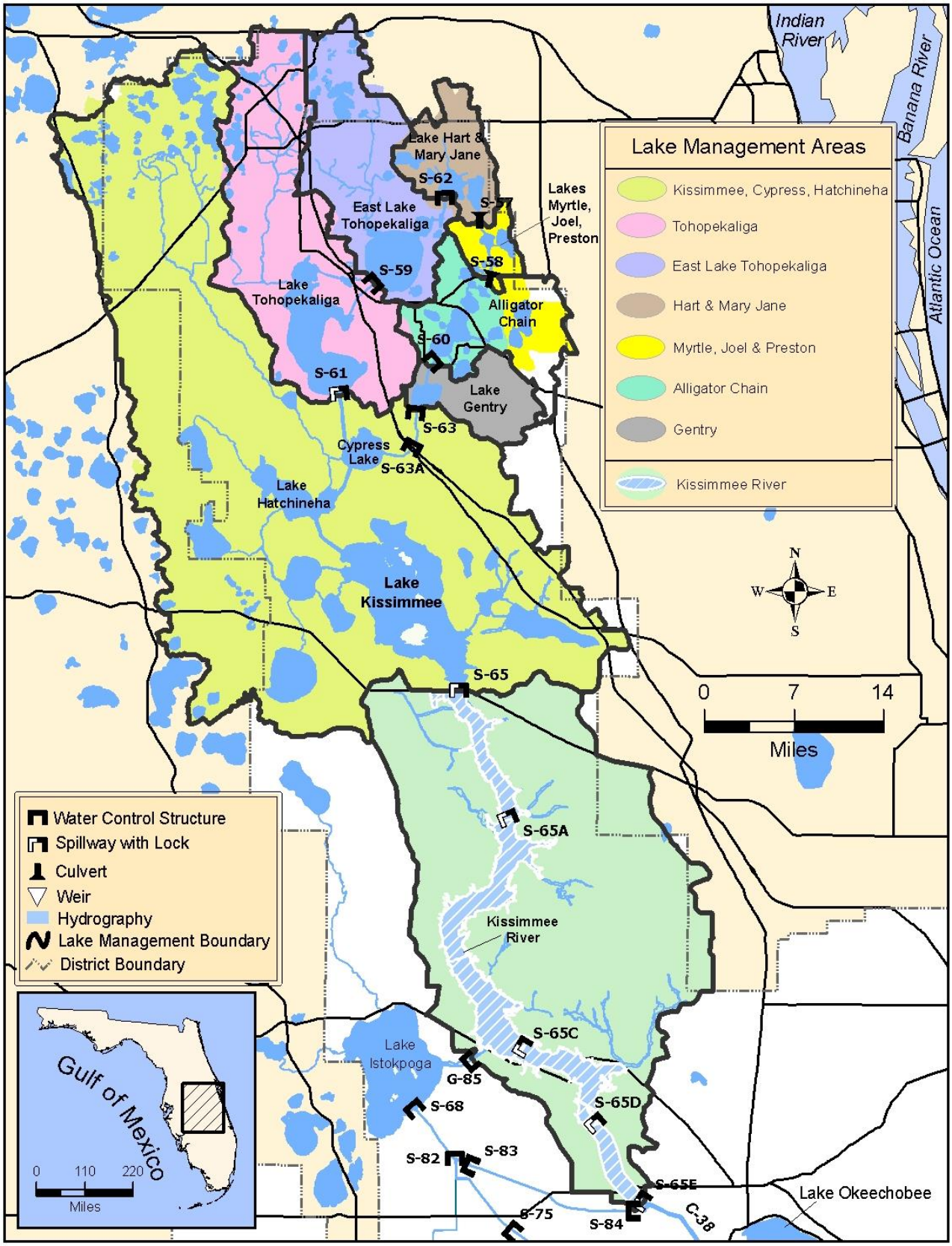


Figure 14. The Kissimmee Basin

LAKE OKEECHOBEE

According to the USACE web site, Lake Okeechobee stage is at 17.19 feet NGVD for the period ending at midnight on October 9, 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 increased by 0.69 feet over the past week and is 3.52 feet higher than it was a month ago and 1.15 feet higher than it was a year ago (Figure 1). The Lake is currently in the High Lake Management sub-band (Figure 2). According to RAINDAR, 2.50 inches of rain fell directly over the Lake during the week October 3 - October 9 (Figure 3). The majority of the surrounding watershed had similar amounts of rainfall, between 1.0 – 3.0 inches.

Average daily inflows to the Lake increased over the past week, from 18,272 cfs to 20,113 cfs. Most of the inflows were from the Kissimmee River via the S65E and S84 structures, which averaged 12,158 cfs and 2,929 cfs daily, respectively. This was the fourth straight week that inflows exceeded 12,000 cfs from the S65E structures.

Average daily outflows for the Lake decreased over the past week, primarily due to reductions in discharges to the St. Lucie estuary (via the S308) because of high basin runoff and king tides. Outflows declined from 10,308 cfs to 7,601 cfs, with S308 discharges going from 3,183 average daily cfs the previous week to 1,139 cfs this past week. Most of the Lake discharges were through S77, which increased from 6,340 cfs daily to 6,951 cfs. Backflows from the L8 canal through Culvert 10A increased substantially due to basin rainfall, from -45 cfs the previous week to -489 average daily cfs over the past week. There were no discharges south through the S350 structures. The corrected evapotranspiration value based on the L006 weather platform solar radiation data was down again to 0.88 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 October 3, 2017 to midnight October 9, 2017). 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 Hurricane Irma from S2 and S3. These data are provisional, and are subject to change.

Hurricane Irma increased total phosphorous (TP) concentrations by resuspending phosphorous-laden sediments from the muddy, pelagic zone of the Lake, and bringing in phosphorous-laden inflows from flooded watersheds. The nearshore areas tend to have lower TP levels when Lake stages are lower as they become more isolated from the pelagic zone, while areas in the deeper portions of the Lake tend to remain higher in TP. Following Hurricane Irma, TP increased in the nearshore areas by 100-200+ ppb, while increases in the deeper portions were generally <100 ppb. Combined with high loads from the inflows, the highest Lake TP concentrations were in the nearshore areas in mid-September, and ranged from 165 ppb – 388 ppb (Figure 5).

Satellite imagery indicates that the bloom potential for the Lake remains low since Hurricane Irma, based on NOAA's cyanobacteria monitoring product derived from the OLCI satellite sensor. High winds from the hurricane 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 in the coming months as the turbidity declines in the water column (Figure 6).

Table 1

INFLOWS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)
S65E & S65EX1	12158	4.5
S71 & 72	841	0.3
S84 & 84X	2929	1.1
Fisheating Creek	704	0.3
S154	311	0.1
S191	2091	0.8
S133 P	283	0.1
S127 P	194	0.1
S129 P	89	0.0
S131 P	31	0.0
S135 P	279	0.1
S2 P	0	0.0
S3 P	0	0.0
S4 P	202	0.1
C5	0	0.0
Rainfall	6889	2.5
Total	**27002**	**9.9**

OUTFLOWS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)
S77	6951	2.6
S308	1139	0.4
S351	0	0.0
S352	0	0.0
S354	0	0.0
L8	-489	-0.2
ET	2425	0.9
Total	**10026**	**3.7**

PROVISIONAL DATA

Water Management Recommendations

The Lake is 17.19 feet NGVD having increased 3.52 feet over the past month. Submerged and emergent vegetation communities in the nearshore region have experienced stages >16 feet three times in less than two years, and are now experiencing a 13 year high in water levels. 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.

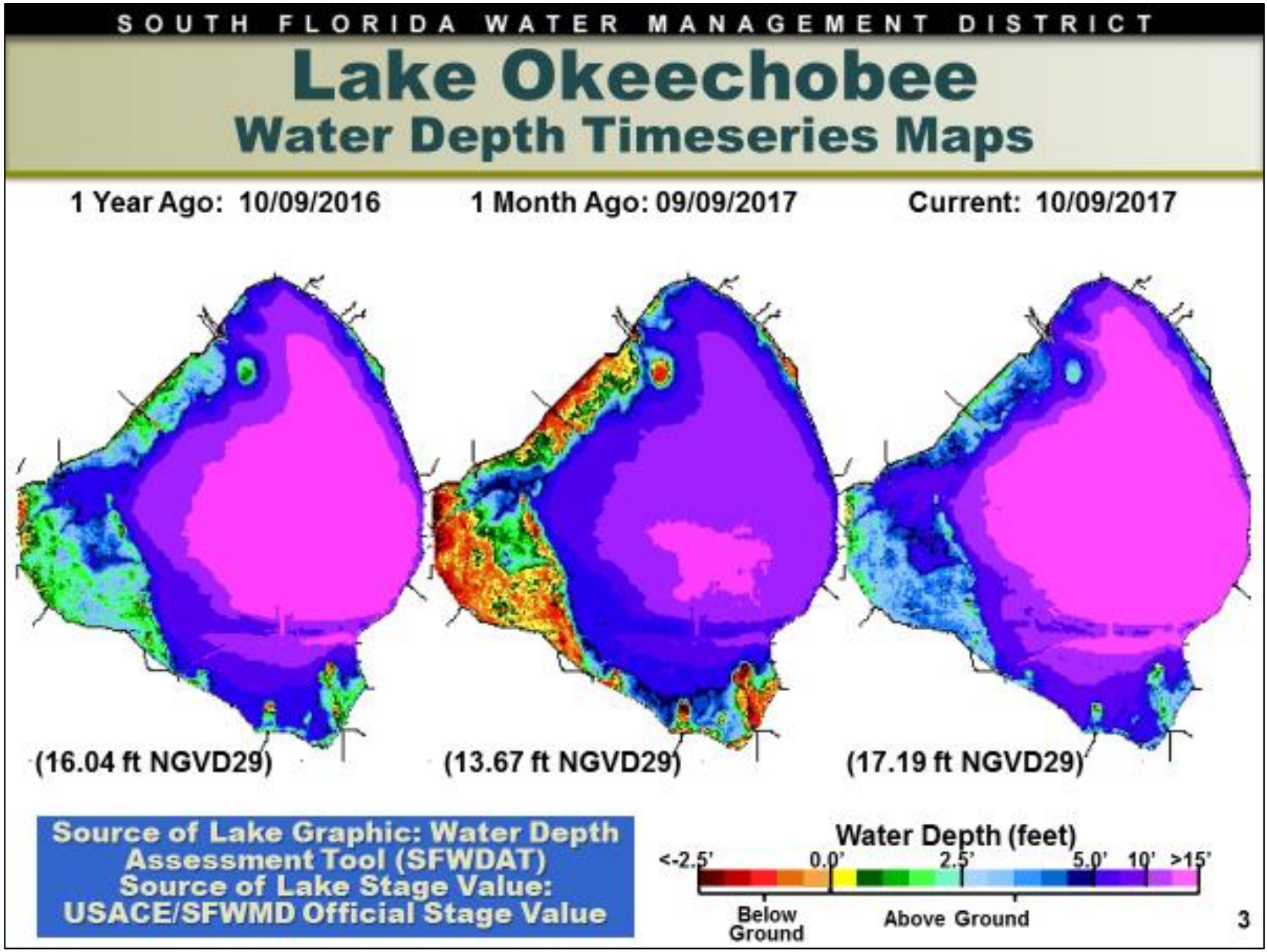

SOUTH FLORIDA WATER MANAGEMENT DISTRICT
Lake Okeechobee
Water Depth Timeseries Maps
1 Year Ago: 10/09/2016
1 Month Ago: 09/09/2017
Current: 10/09/2017
(16.04 ft NGVD29)
(13.67 ft NGVD29)
(17.19 ft NGVD29)
Source of Lake Graphic: Water Depth Assessment Tool (SFWDAT)
Source of Lake Stage Value: USACE/SFWMD Official Stage Value
Water Depth (feet)
<-2.5'
0.0'
2.5'
5.0'
10'
>15'
Below Ground
Above Ground
3

Figure 1

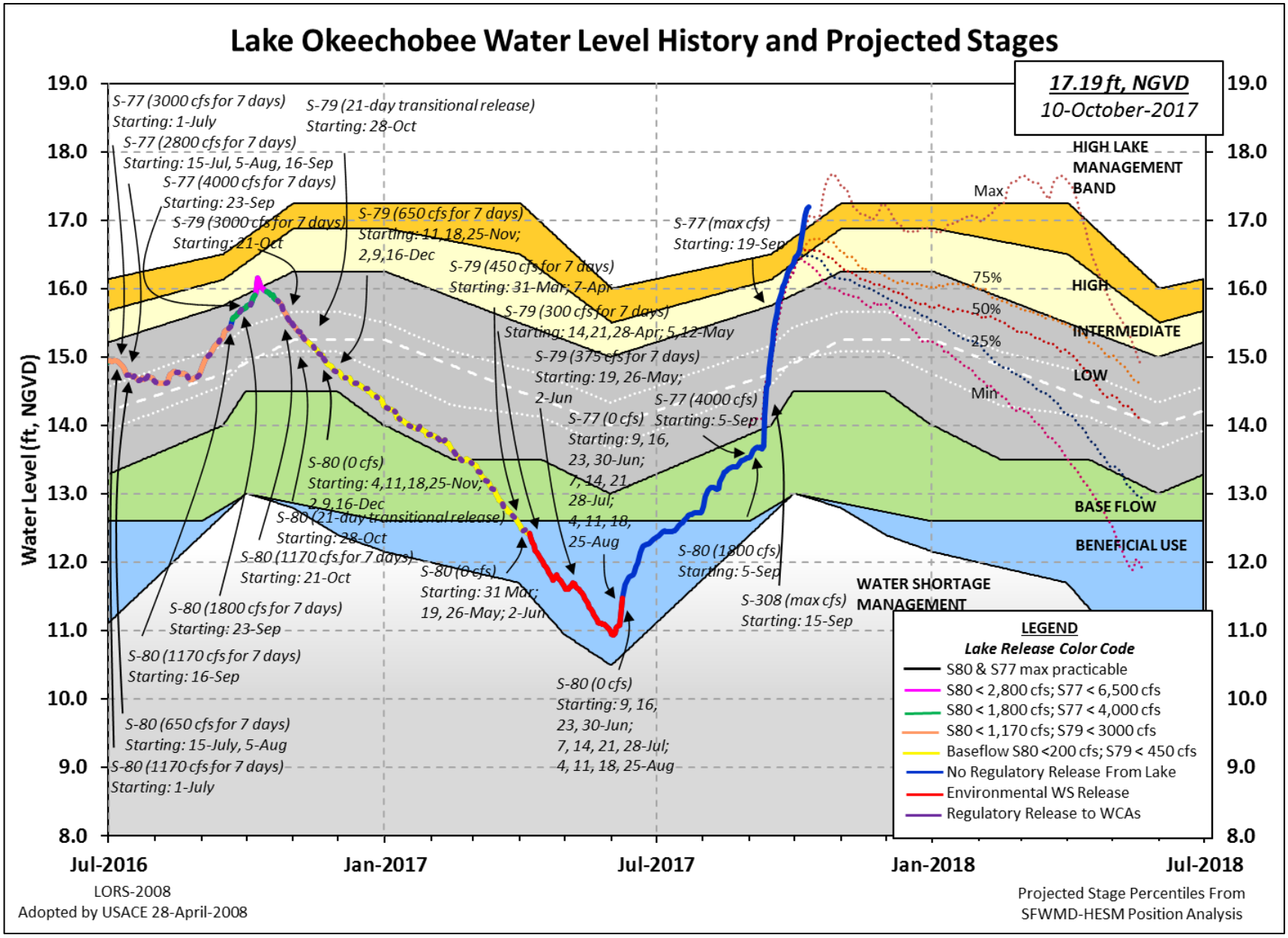

Lake Okeechobee Water Level History and Projected Stages
17.19 ft, NGVD
10-October-2017
Water Level (ft, NGVD)
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
11.0
10.0
9.0
8.0
Jul-2016
Jan-2017
Jul-2017
Jan-2018
Jul-2018
HIGH LAKE MANAGEMENT BAND
Max
75%
50%
25%
Min
HIGH
INTERMEDIATE
LOW
BASE FLOW
BENEFICIAL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

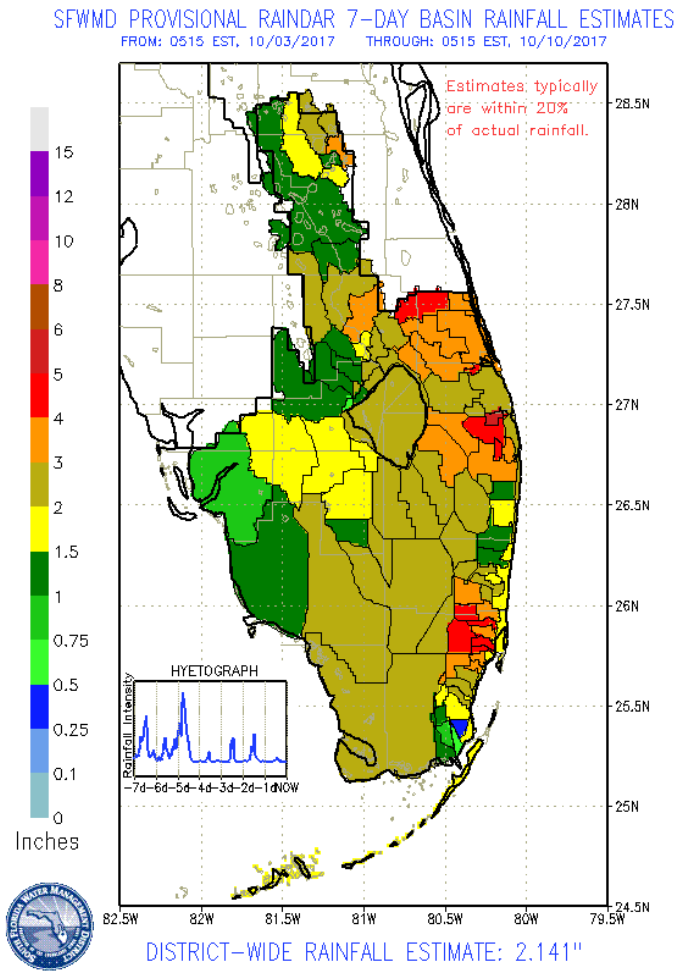


Figure 3

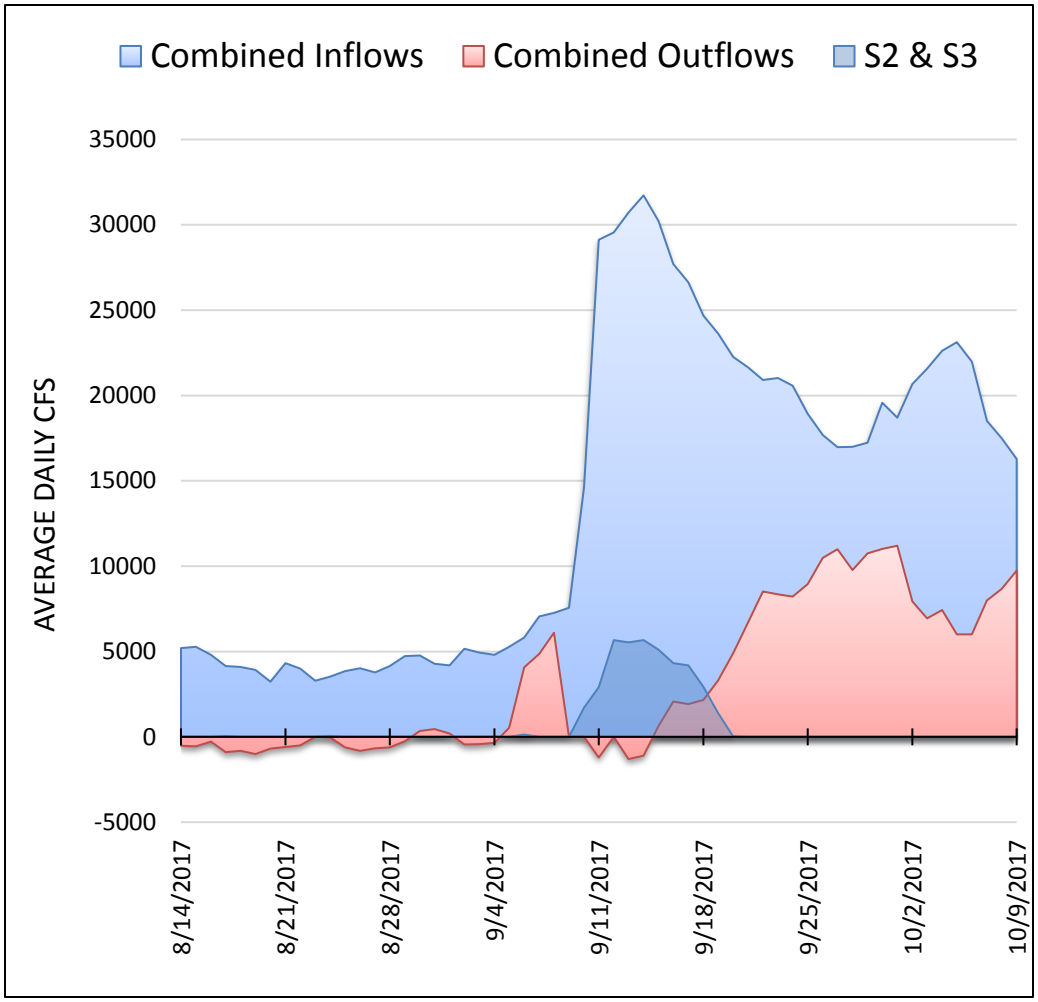


Figure 4

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Lake Okeechobee
Water Quality

September 18-19, 2017	
Site	**TP (ppb)**
Nearshore Stations	
FEBIN	373
FEBOUT	352
KISSR0.0	243
LZ2	388
LZ25A	248
PALMOUT	319
PELBAY3	279
POLE3S	286
POLESOUT	213
RITTAE2	245
Pelagic Stations	
L001	197
L004	230
L005	214
L006	164
L007	245
L008	112
LZ30	196
LZ40	161
CLV10A	313

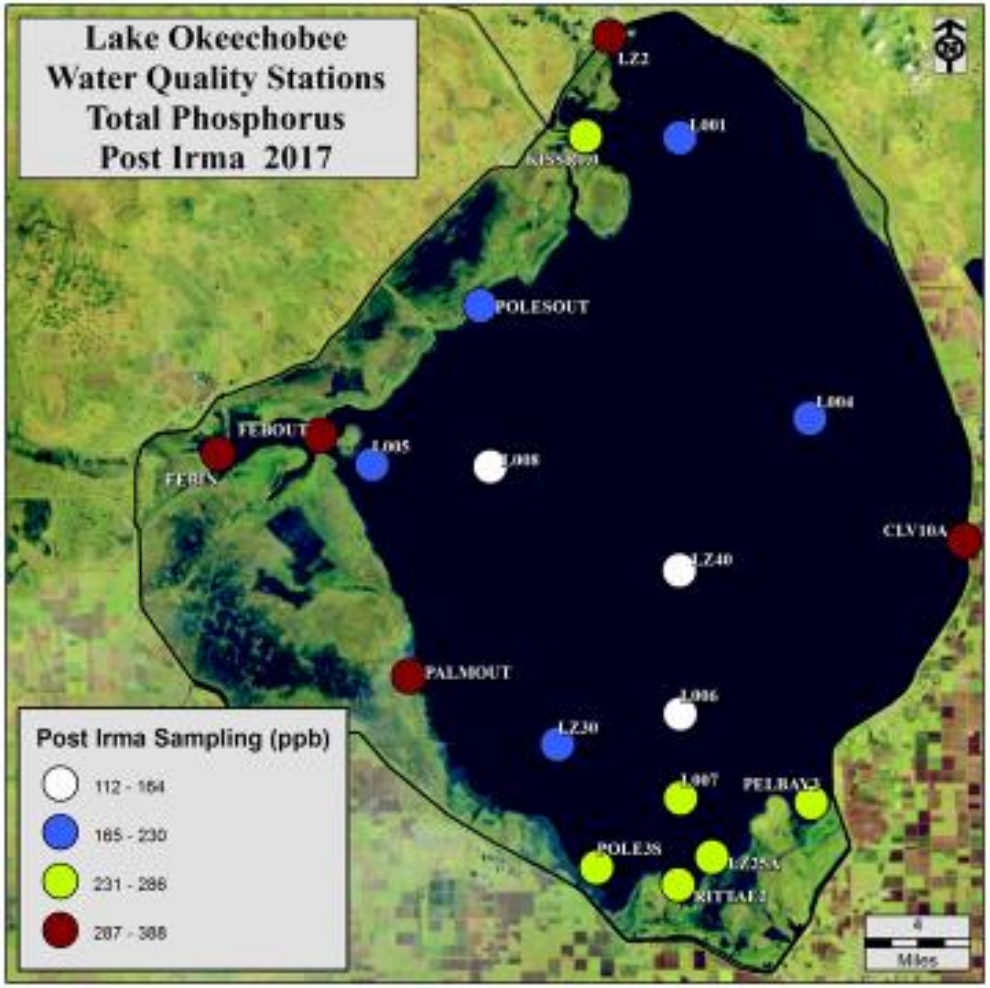


Figure 5

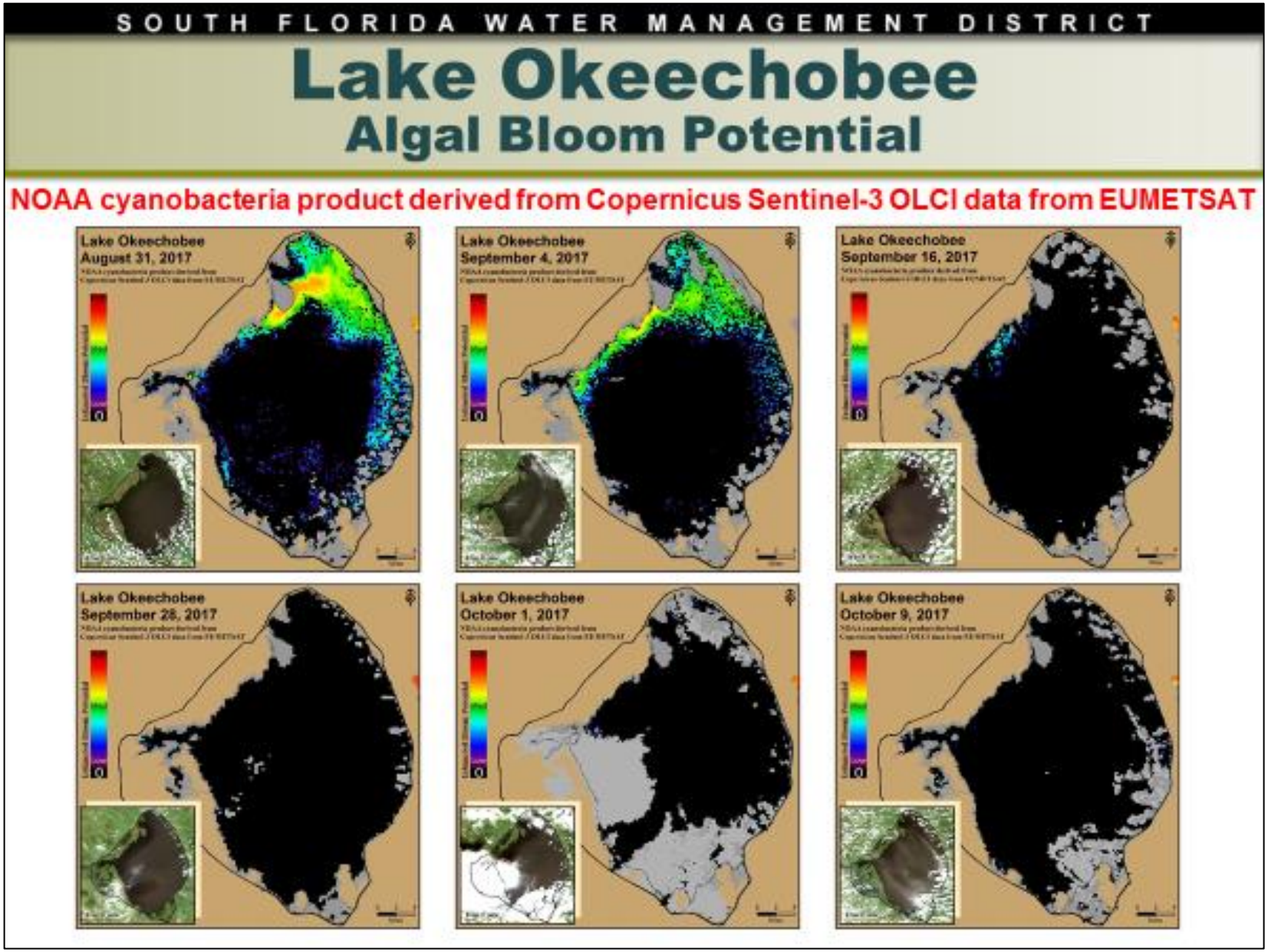

SOUTH FLORIDA WATER MANAGEMENT DISTRICT
Lake Okeechobee
Algal Bloom Potential
NOAA cyanobacteria product derived from Copernicus Sentinel-3 OLCI data from EUMETSAT
Lake Okeechobee
August 31, 2017
Lake Okeechobee
September 4, 2017
Lake Okeechobee
September 16, 2017
Lake Okeechobee
September 28, 2017
Lake Okeechobee
October 1, 2017
Lake Okeechobee
October 9, 2017

Figure 6

LAKE ISTOKPOGA

Lake Istokpoga stage is 39.31 feet NGVD as of midnight October 9, 2017 and is currently -0.03 feet below its regulation schedule of 39.34 feet NGVD (Figure 7). Average daily flows into the Lake from Josephine Creek for the week October 3 – October 9 increased from the previous week, from 286 cfs to 423 cfs. No data have been reported for Arbuckle Creek since July 4 as the gauge is being recalibrated after construction in the area. Average daily discharge from S68 and S68X over the past week increased slightly from the previous week, from 2,248 cfs to 2,663 cfs. According to RAINDAR, 2.27 inches of rain fell in the Lake Istokpoga basin from October 3 - October 9.

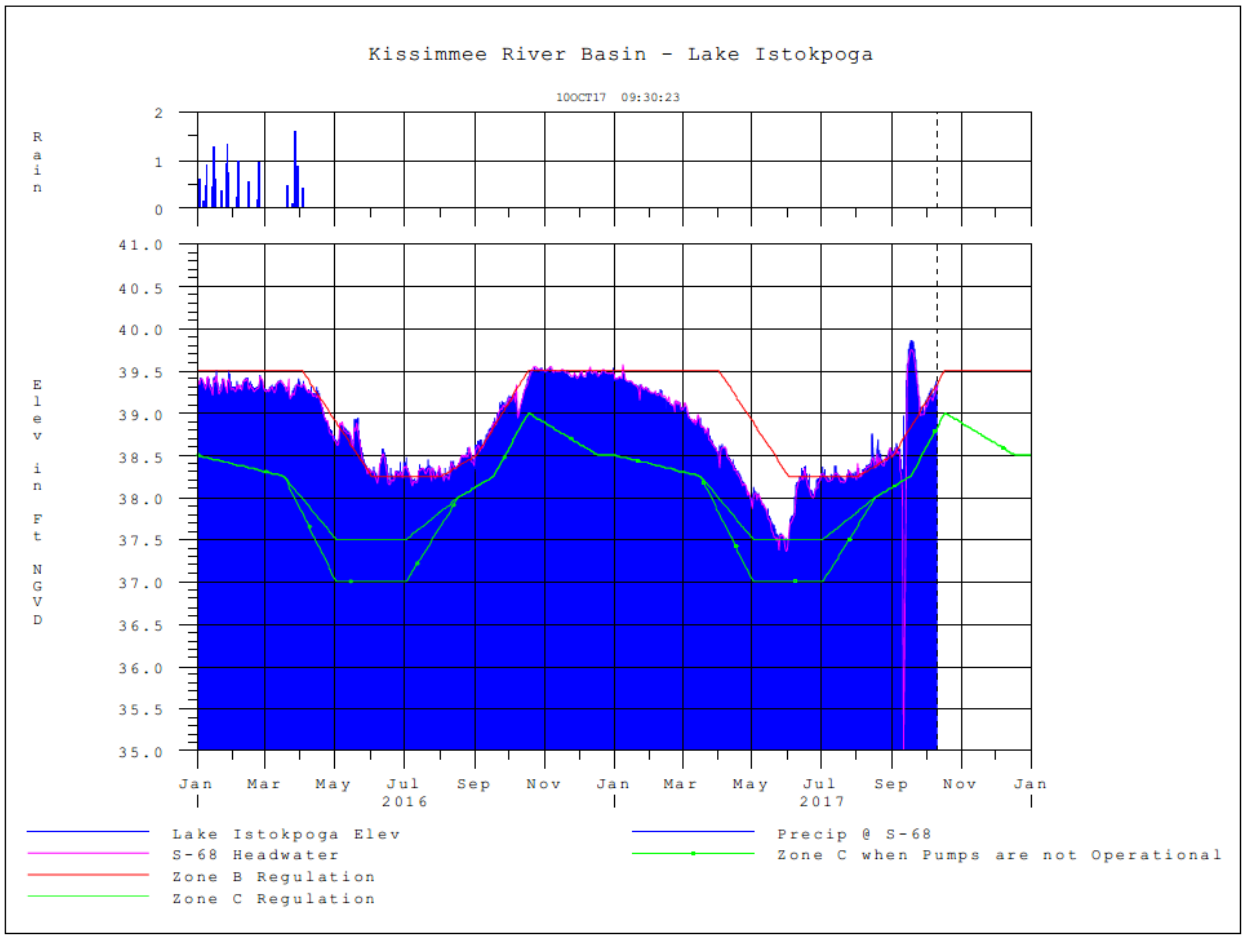


Figure 7

ESTUARIES

St. Lucie Estuary

Over the past week, provisional flows averaged about 2,879 cfs at S-80, 976 cfs at S-308, 1,744 cfs at S-49 on C-24, 2471 cfs at S-97 on C-23, and 1,109 cfs from Ten Mile Creek at the Gordy Road Structure. Average inflow from tidal basin tributaries is estimated to be 1,559 cfs (Figures 1 and 2). Total inflow averaged about 9,762 cfs last week and 7,988 cfs over last month.

Over the past week, salinity decreased throughout 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 0.3. Salinity conditions in the middle estuary are in the poor range for the adult eastern oysters.

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)	**0.3** (0.3)	**0.3** (0.3)	NA[1]
US1 Bridge	**0.3** (0.6)	**0.4** (1.4)	10.0-26.0
A1A Bridge	**2.0** (4.1)	**7.0** (17.8)	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	4.81	1.67	6.72
HR1	bottom	2.12	0.66	5.65

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	3.29	4.73 - 7.12	4.90	3.75	5.52
SF	2.02	5.02 - 7.64	6.11	4.36	7.40
NF	2.53	6.01 - 8.23	5.06	3.76	6.61
ME[1]	N/A	N/A	N/A	N/A	N/A
IRL-SLE[2]	N/A	N/A	N/A	N/A	N/A

[1]Recorder stopped working on 9/28/17 at 2 pm and [2]Recorder stopped on 9/14/17 at 9 am.

NOAA satellite imagery indicates low potential cyanobacterial presence at some nearshore locations in the St. Lucie estuary (Figure 6).

Caloosahatchee Estuary

During the past week, provisional flows averaged approximately 6,995 cfs at S-77, 8,242 cfs at S-78, and 14,228 cfs at S-79. Average inflow from tidal basin tributaries is estimated to be 1,049 cfs (Figures 7 & 8). Total inflow averaged 15,277 cfs last week and 14,916 cfs over last month.

Over the past week in the estuary, salinity remained about the same (Table 4, Figures 9 and 10). The seven-day average salinity values are within the poor range for adult oysters at Cape Coral, within the fair range at Shell Point, and within the good range at Sanibel (Figure 11). The 30-day moving average surface salinity is 0.2 at Val I-75 and 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)	**0.2** (0.2)	**0.2** (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	**0.3** (0.2)	**0.3** (0.2)	10.0-30.0
Shell Point	**6.3** (4.6)	**7.9** (11.0)	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	4.35 - 5.48	3.50 - 8.13
Dissolved Oxygen (mg/l)	Down for maintenance	No Data	No Data

The Florida Fish and Wildlife Research Institute reported on October 6, 2017, that *Karenia brevis*, the Florida red tide dinoflagellate, was observed at background concentrations in two samples collected from Lee County.

NOAA satellite imagery indicates low to medium potential cyanobacterial presence in the Caloosahatchee estuary, mostly in nearshore areas (Figure 12).

Water Management Recommendations

Lake stage is in the High Lake Management band of 2008 LORS. Tributary hydrological conditions are very wet. The 2008 LORS recommends up to maximum discharge capacity to tidewater. Given the current estuarine conditions, there are no ecological benefits associated with freshwater releases from Lake Okeechobee.

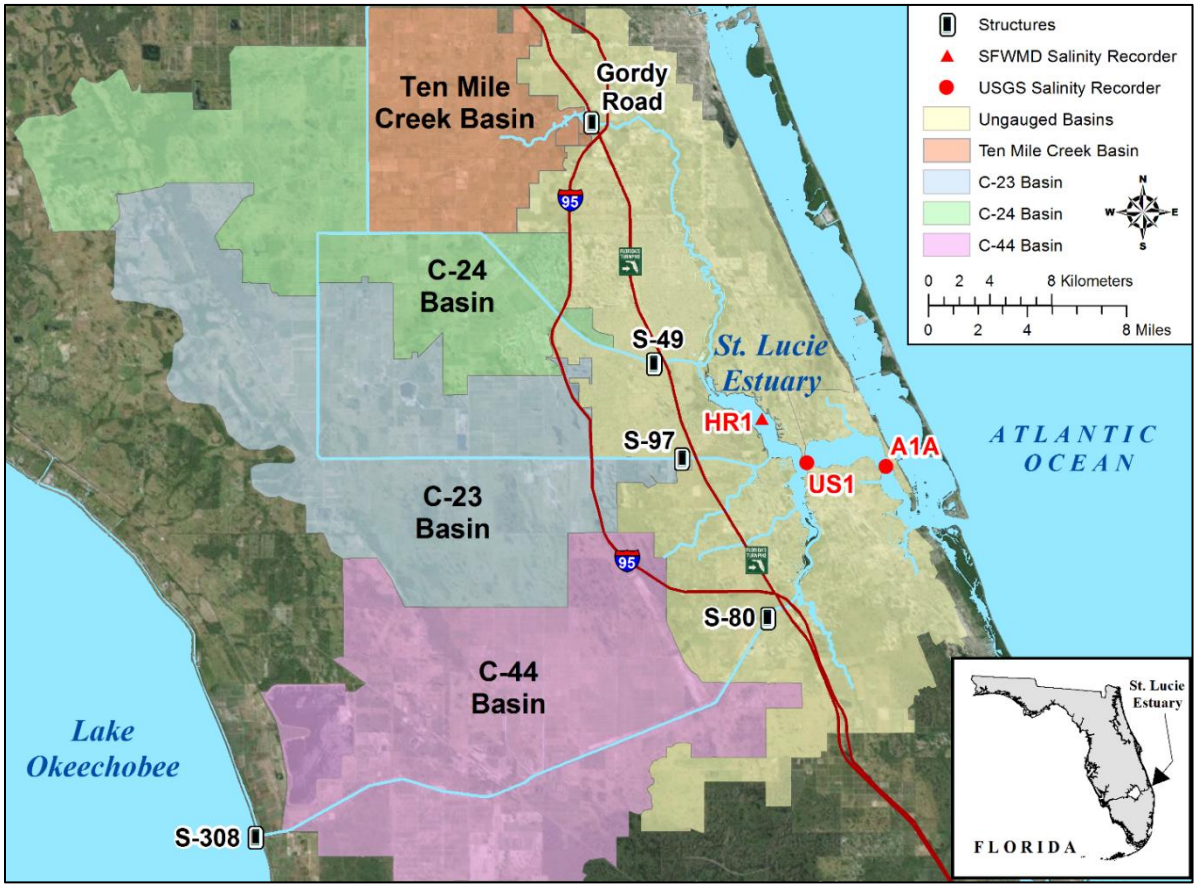


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

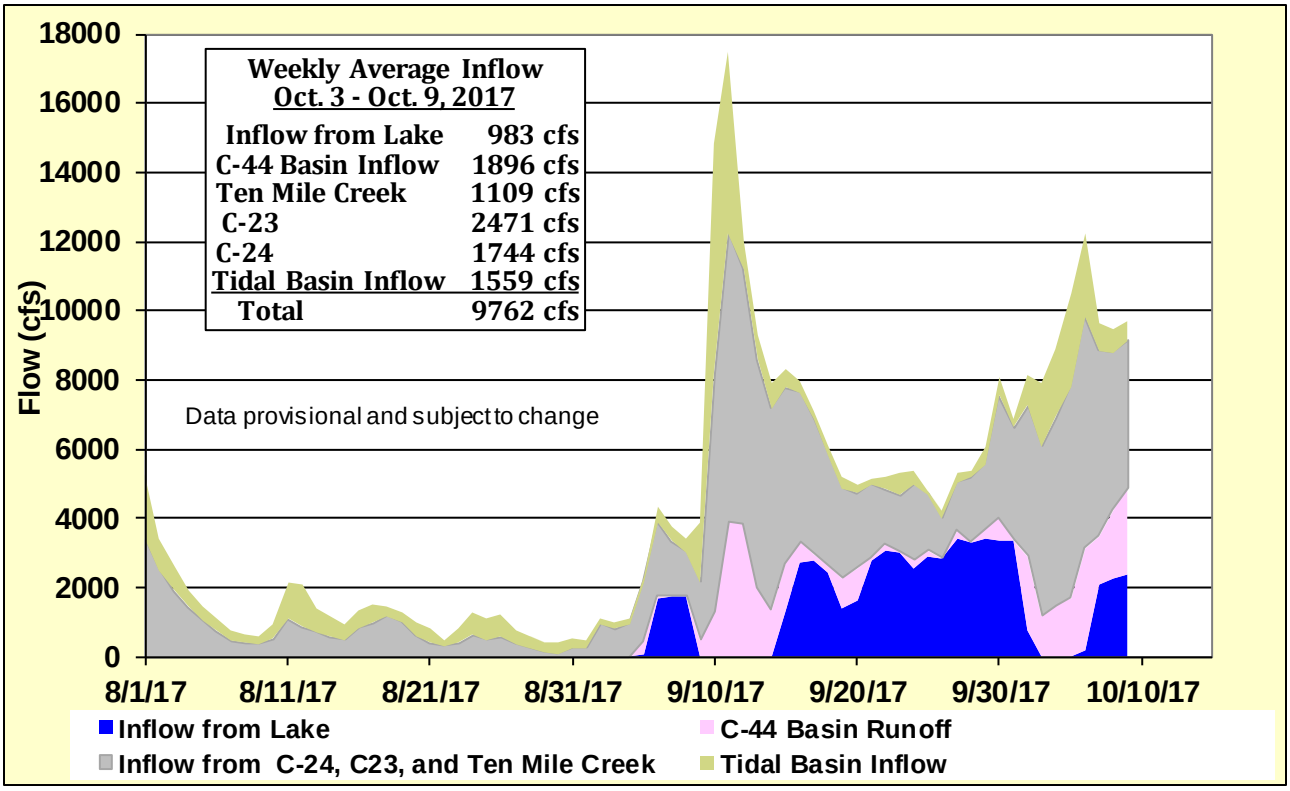


Figure 2. Estimated surface freshwater inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basins into the St. Lucie Estuary.

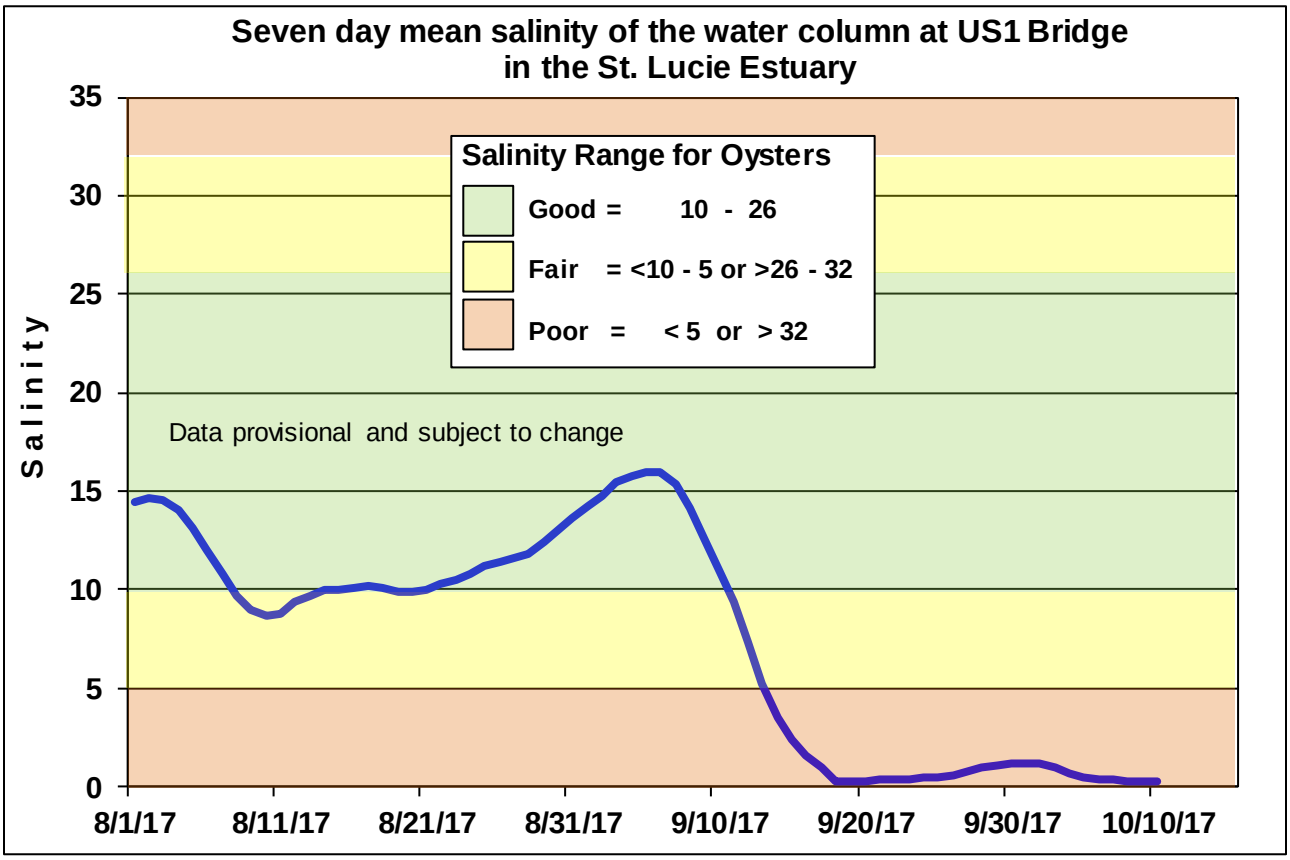


Figure 3. Seven-day mean salinity of the water column at the U.S. Highway 1 Bridge.

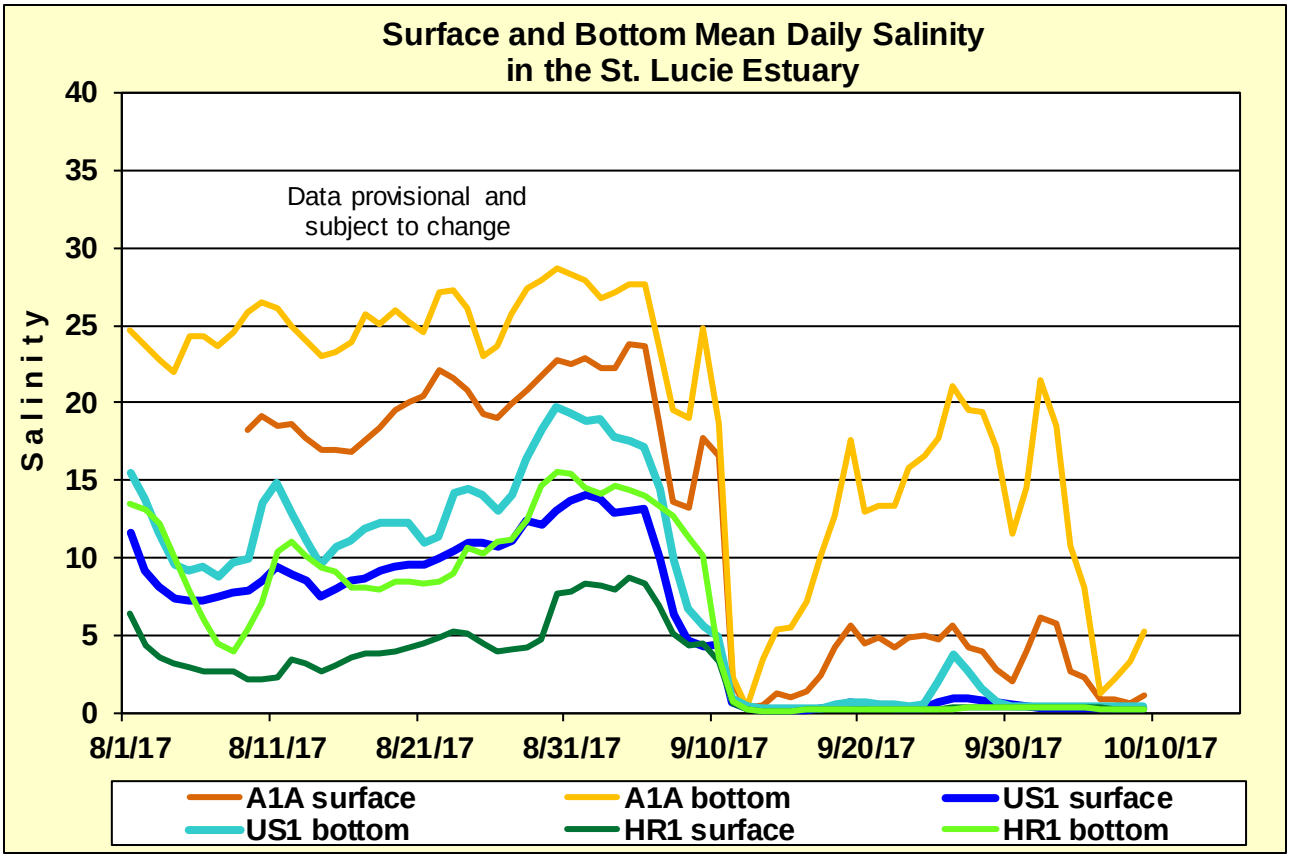


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

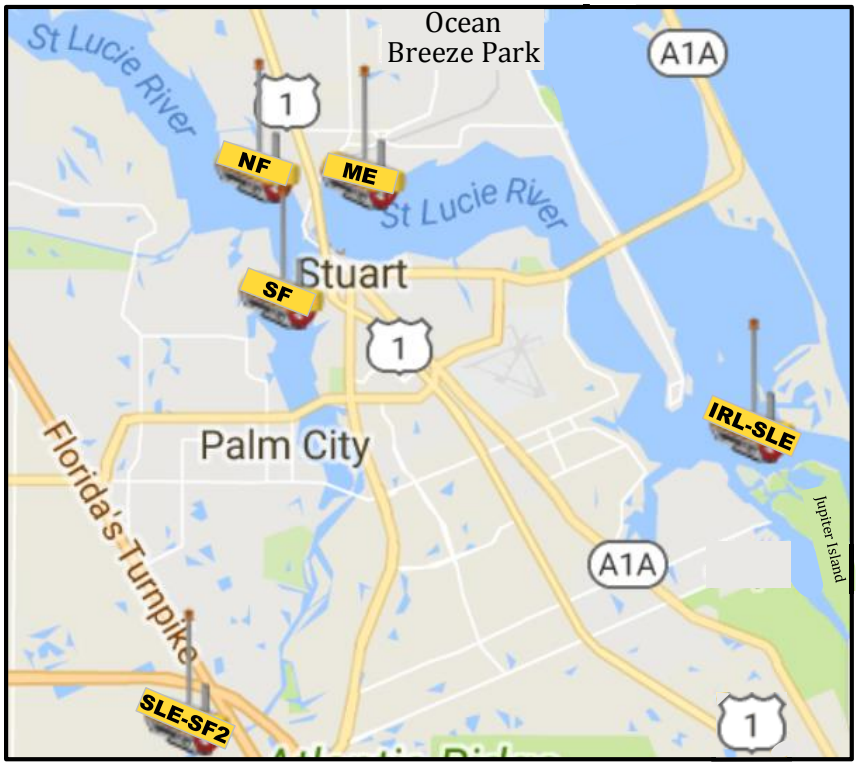


Figure 5. Location of FAU-HBOI LOBO water quality stations in the St. Lucie Estuary.

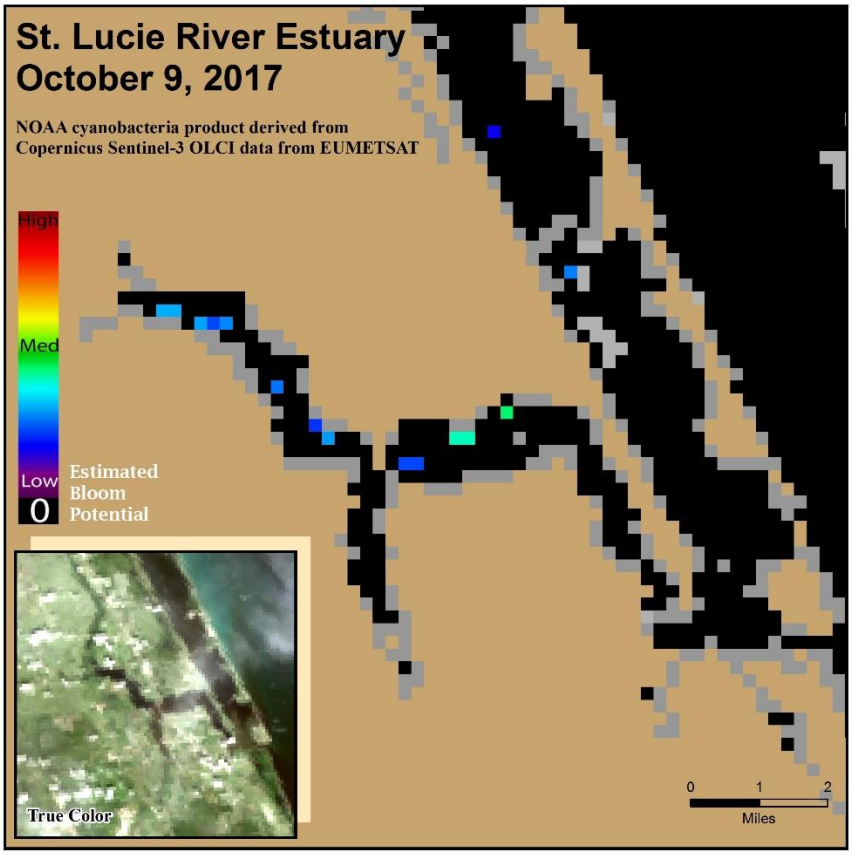


Figure 6. Sentinel 3a Satellite imagery provided by NOAA uses Ocean and Land Color Instrument (OLCI) to estimate cyanobacteria bloom potential in St. Lucie Estuary.

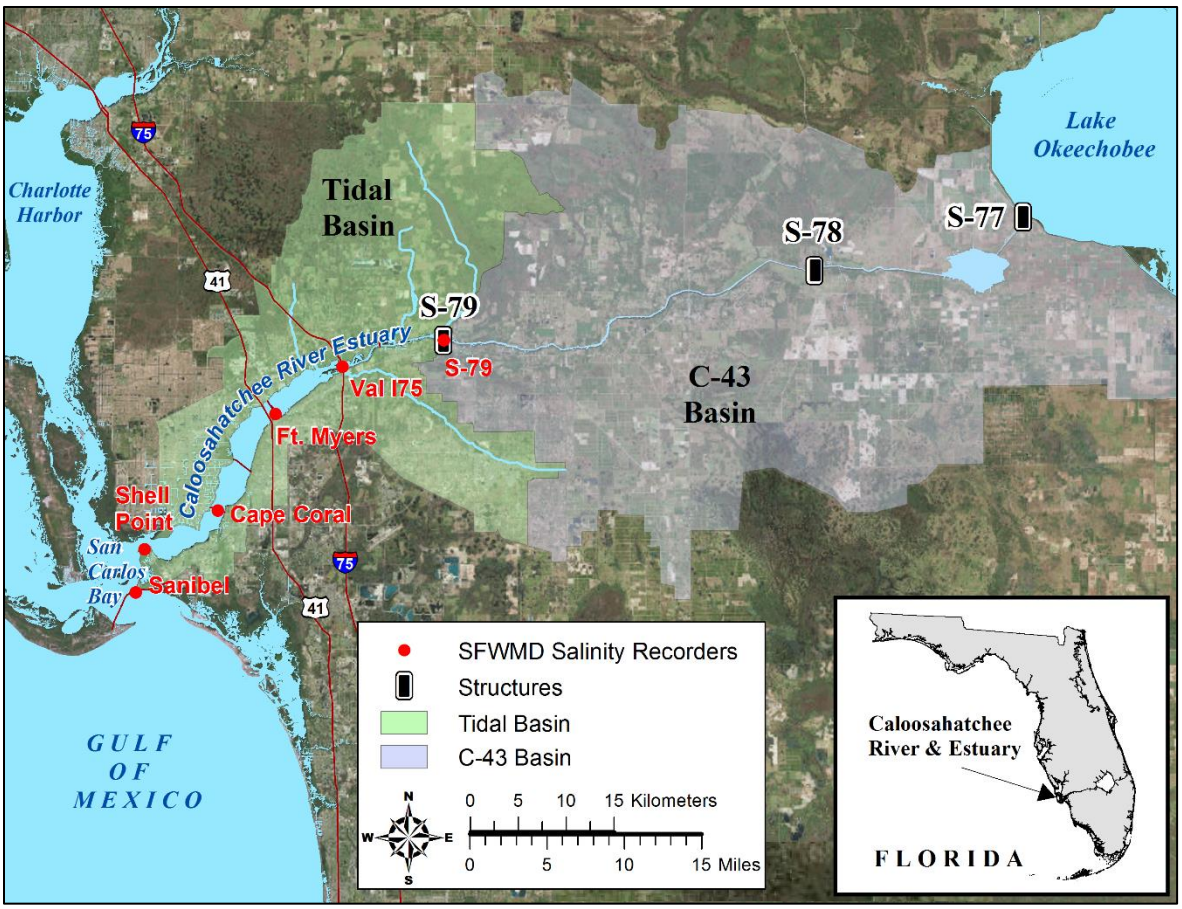


Figure 7. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

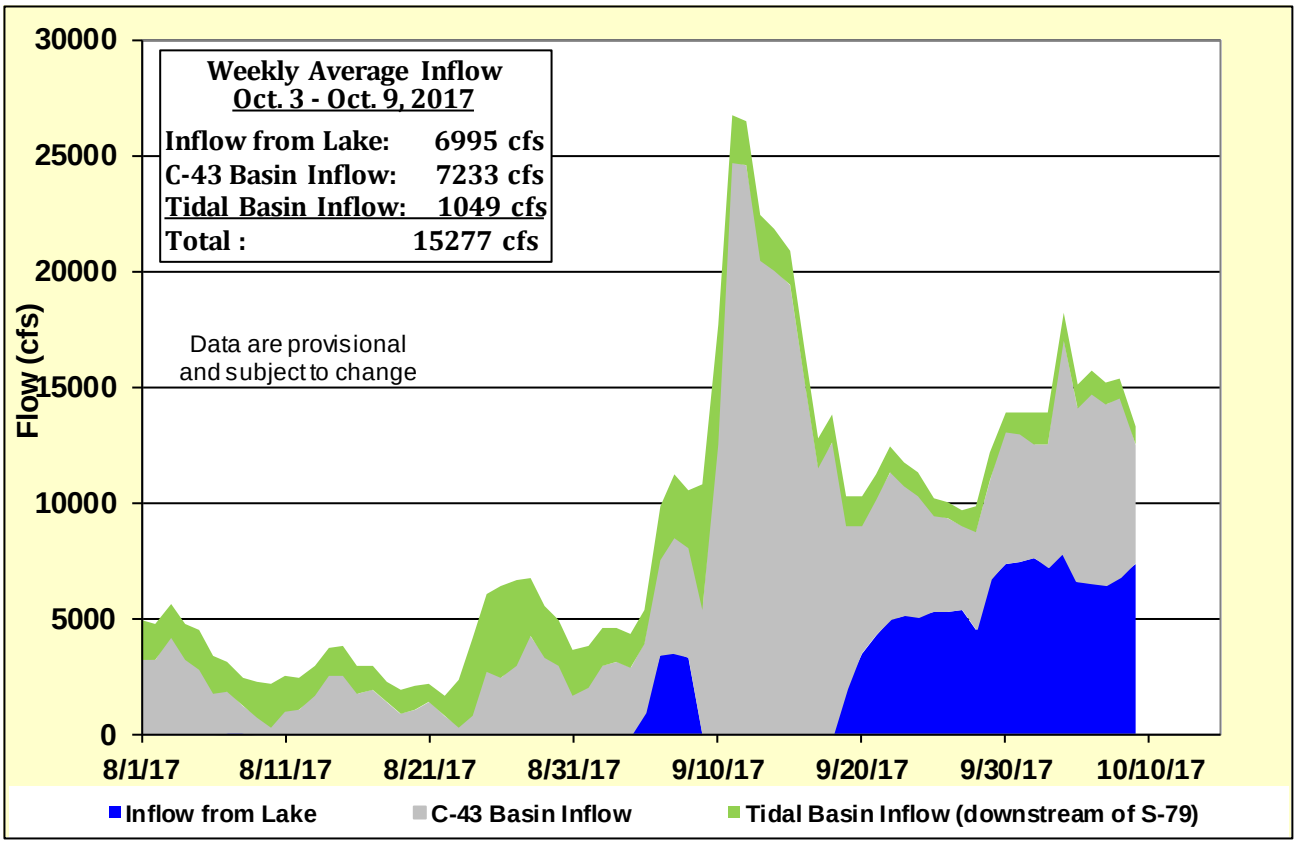
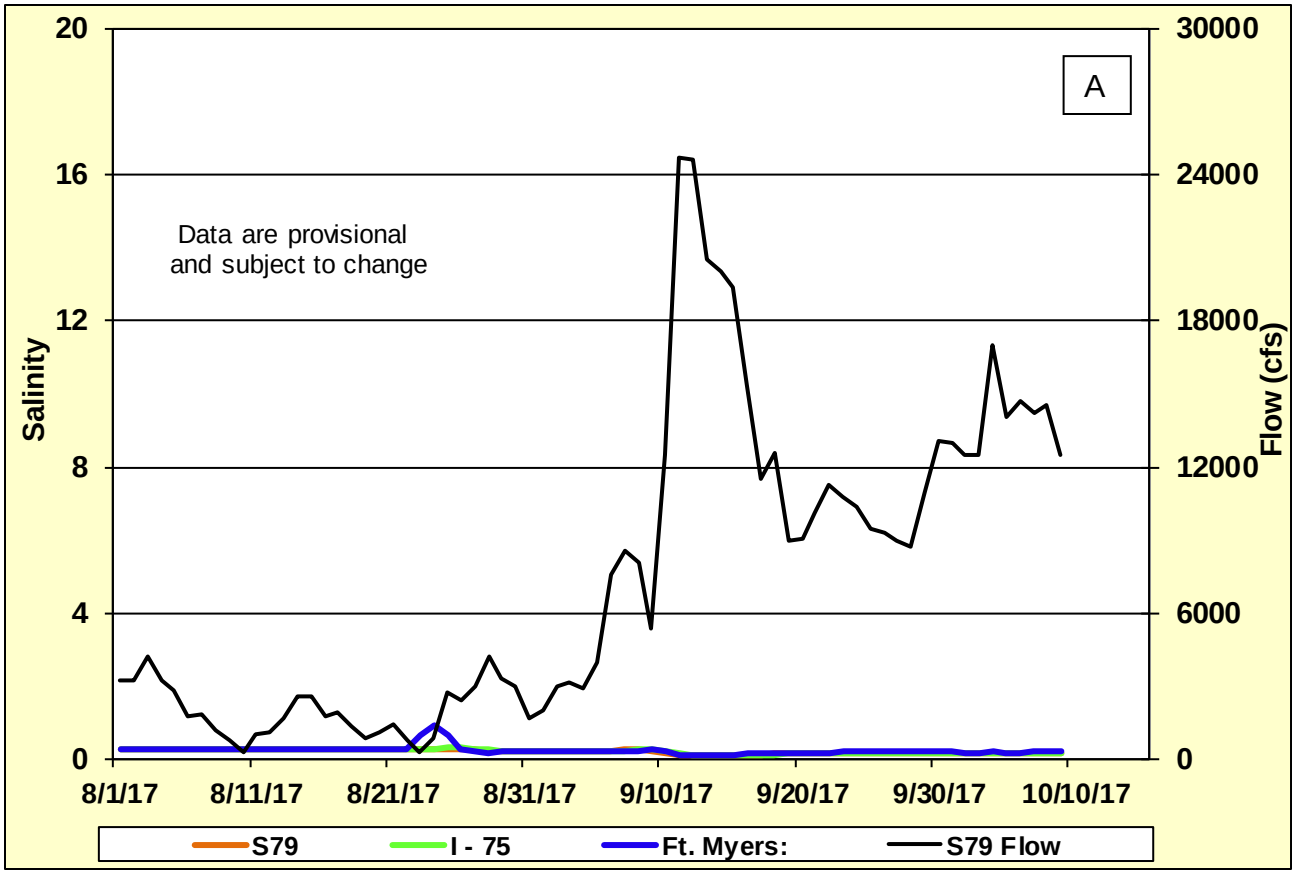


Figure 8. Freshwater inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.



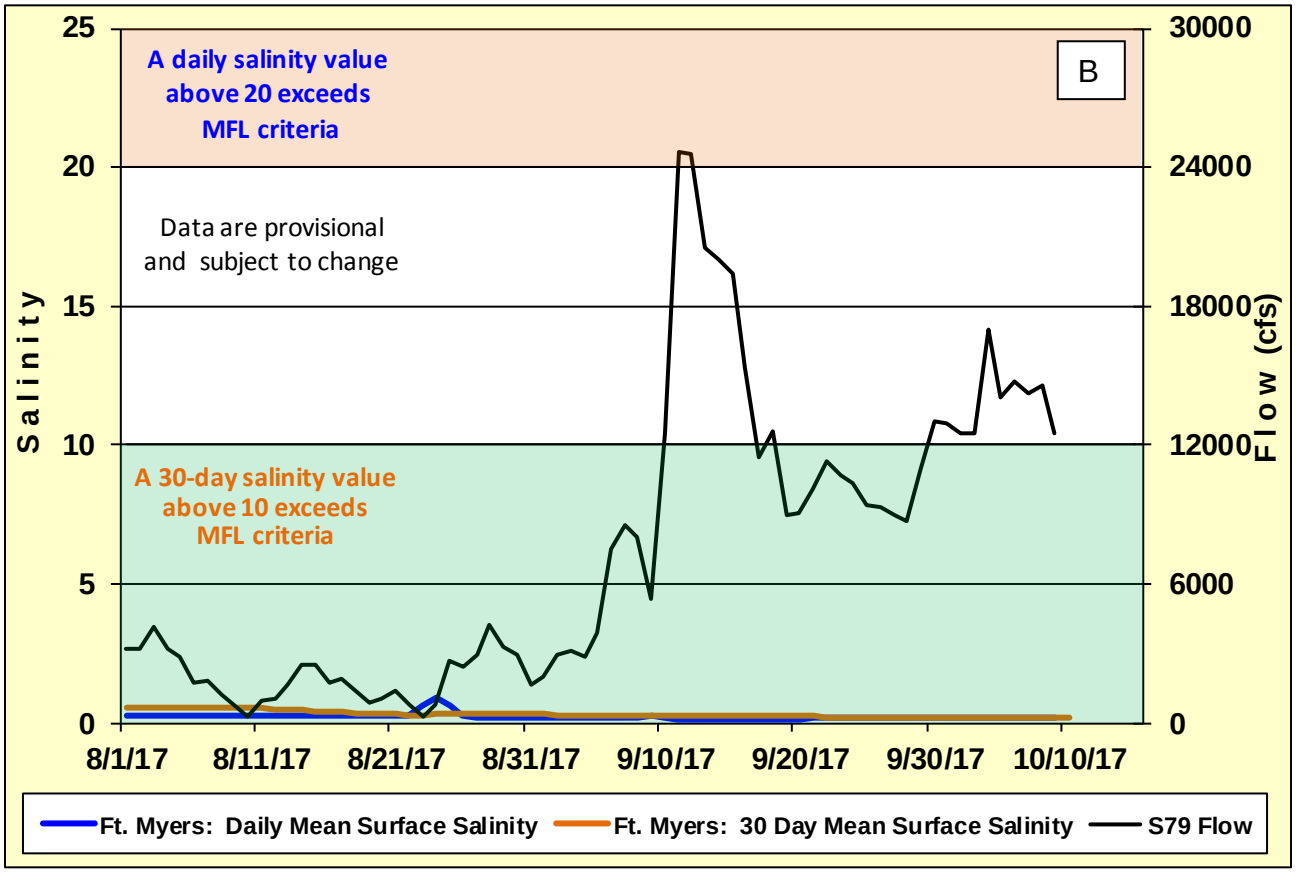


Figure 9. Daily mean flows at S-79 and salinity at upper estuary monitoring stations (A) and 30-day moving average salinity at Ft. Myers (B).

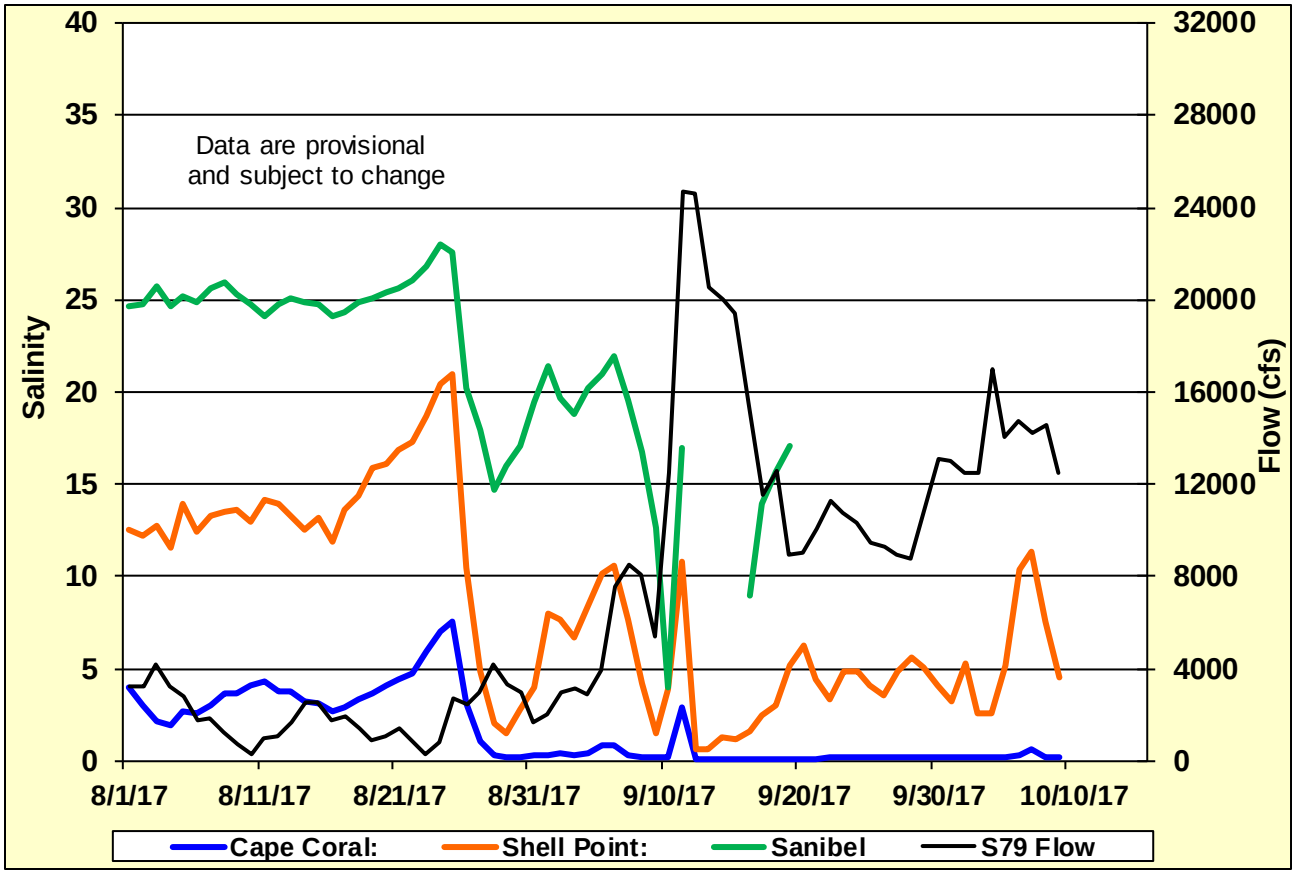


Figure 10. Daily mean flows at S-79 and salinity at lower estuary stations.

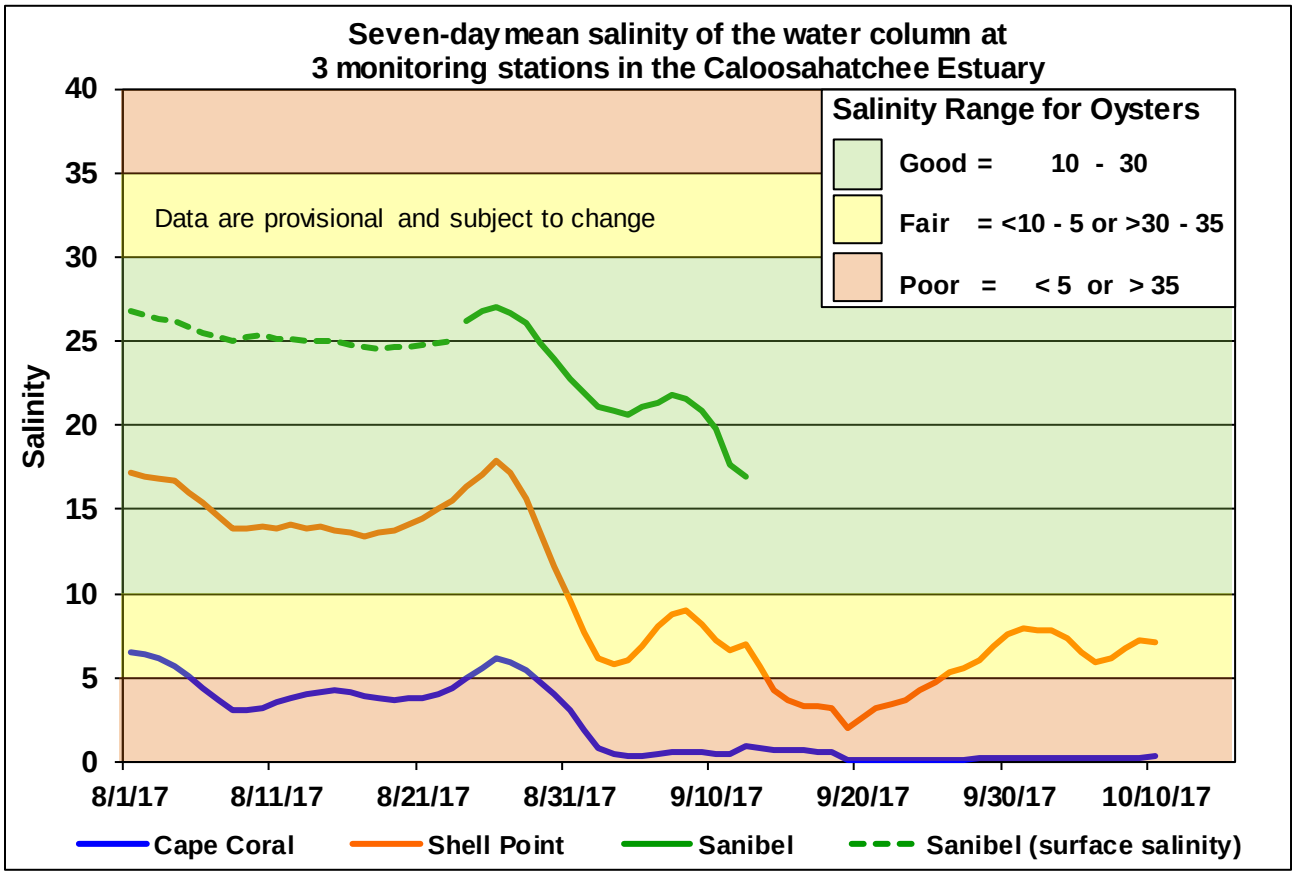


Figure 11. Seven-day mean salinity at Cape Coral Bridge, Shell Point and Sanibel Bridge monitoring stations.

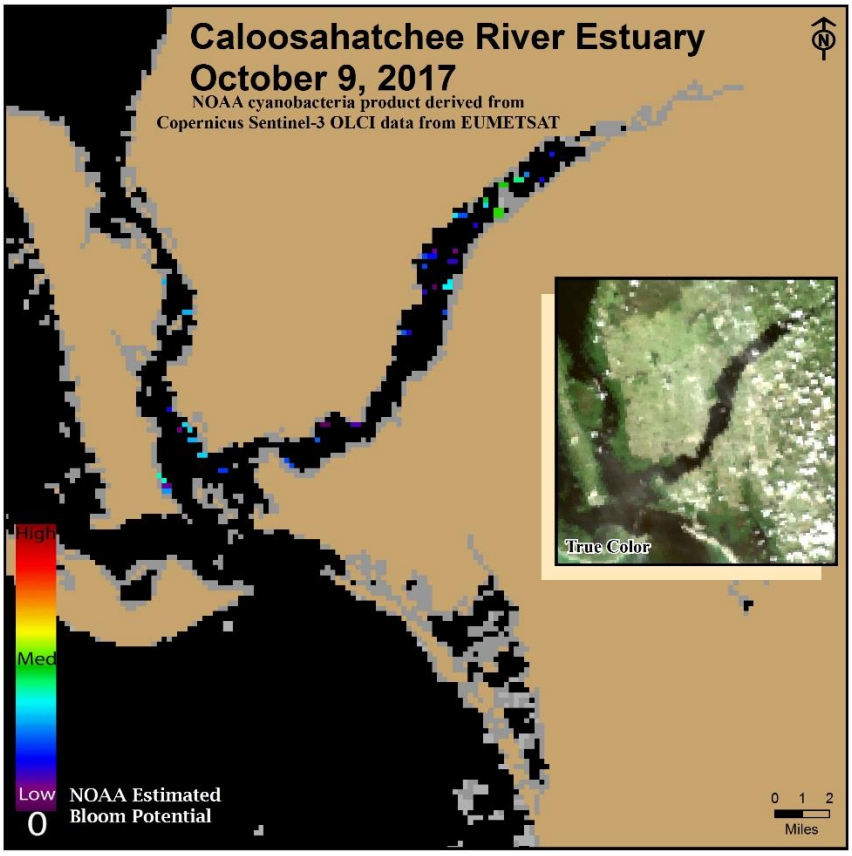
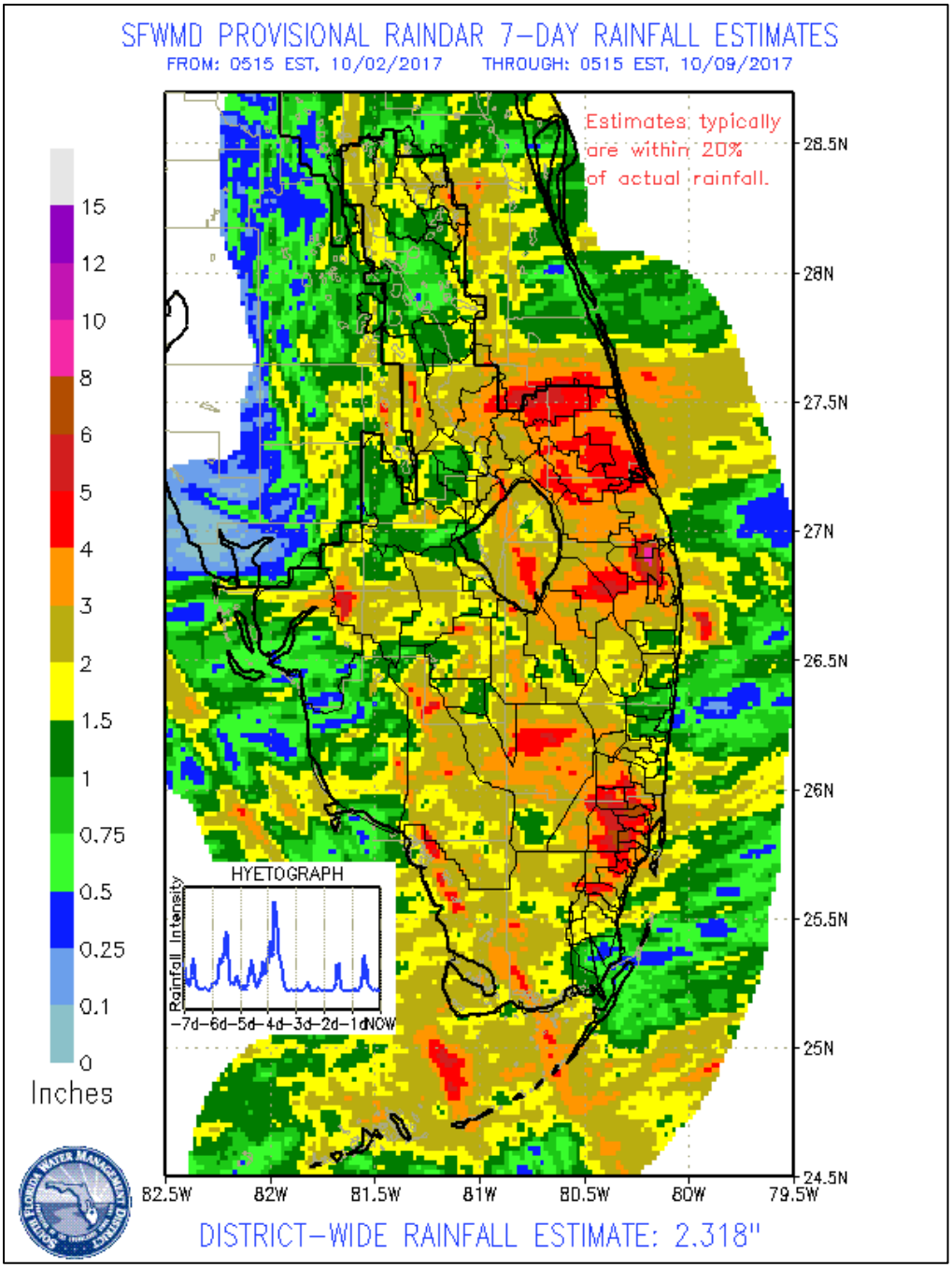


Figure 12. Sentinel 3a Satellite imagery provided by NOAA uses Ocean and Land Color Instrument (OLCI) to estimate cyanobacteria bloom potential in Caloosahatchee Estuary.

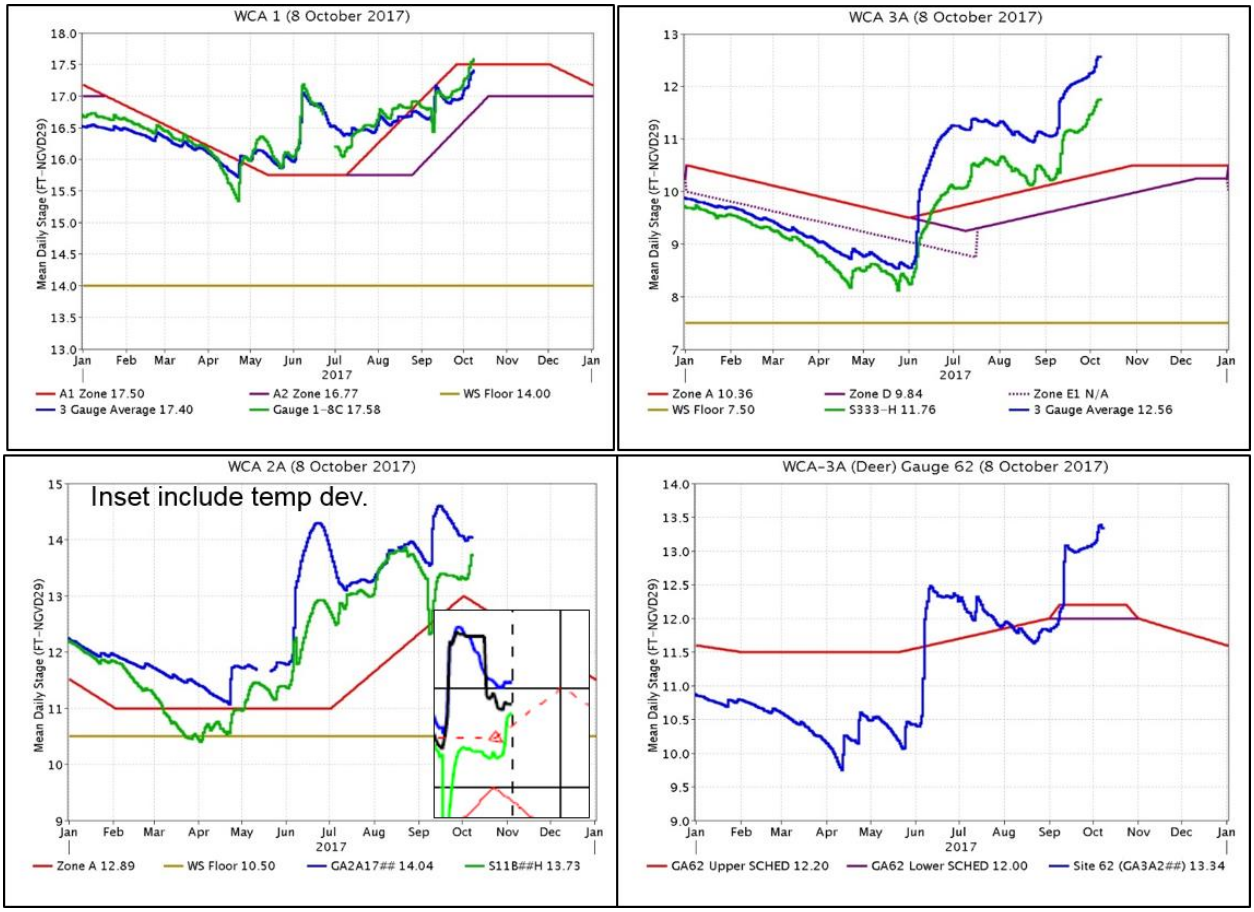
EVERGLADES

The Everglades received above average rainfall last week. WCA-1 is just below regulation schedule and is following the schedule. WCA-2A is just above the temporary schedule. WCA-3A is significantly above schedule and continues to trend deeper.

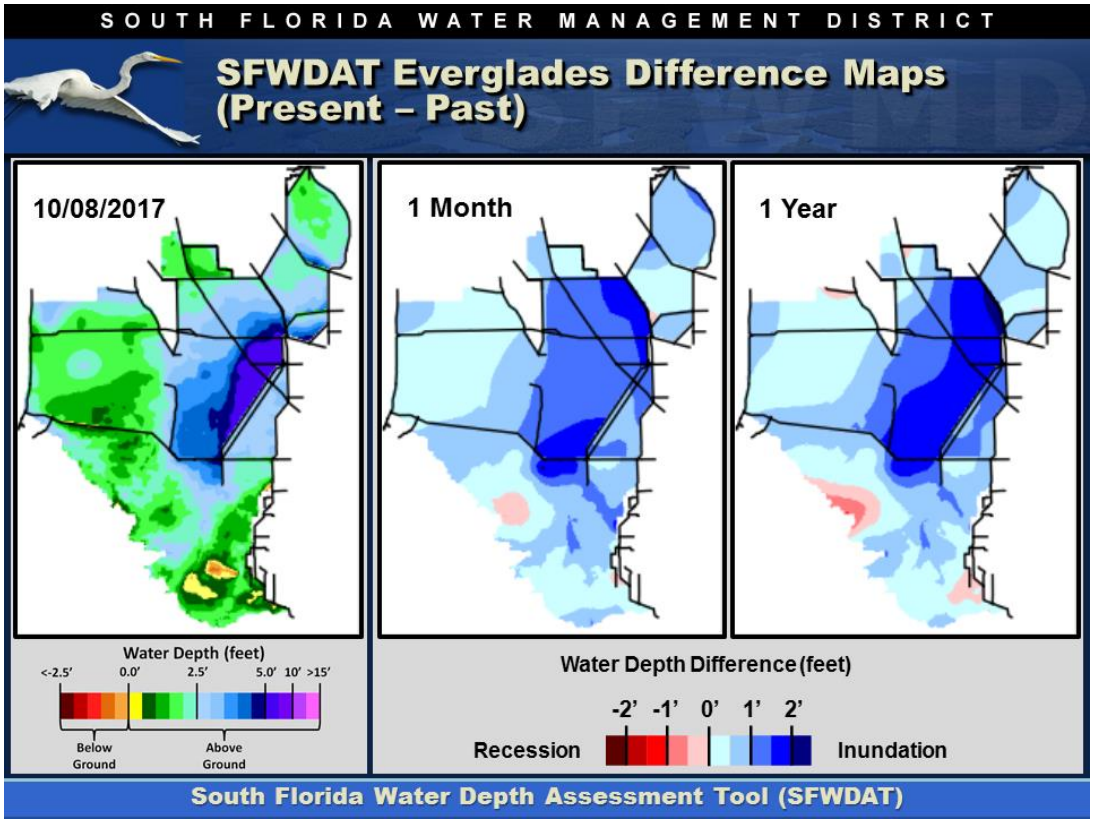
Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	2.14	+0.31
WCA-2A	2.26	+0.01
WCA-2B	2.86	+0.16
WCA-3A	2.86	+0.28
WCA-3B	3.06	+0.26
ENP	2.42	NA

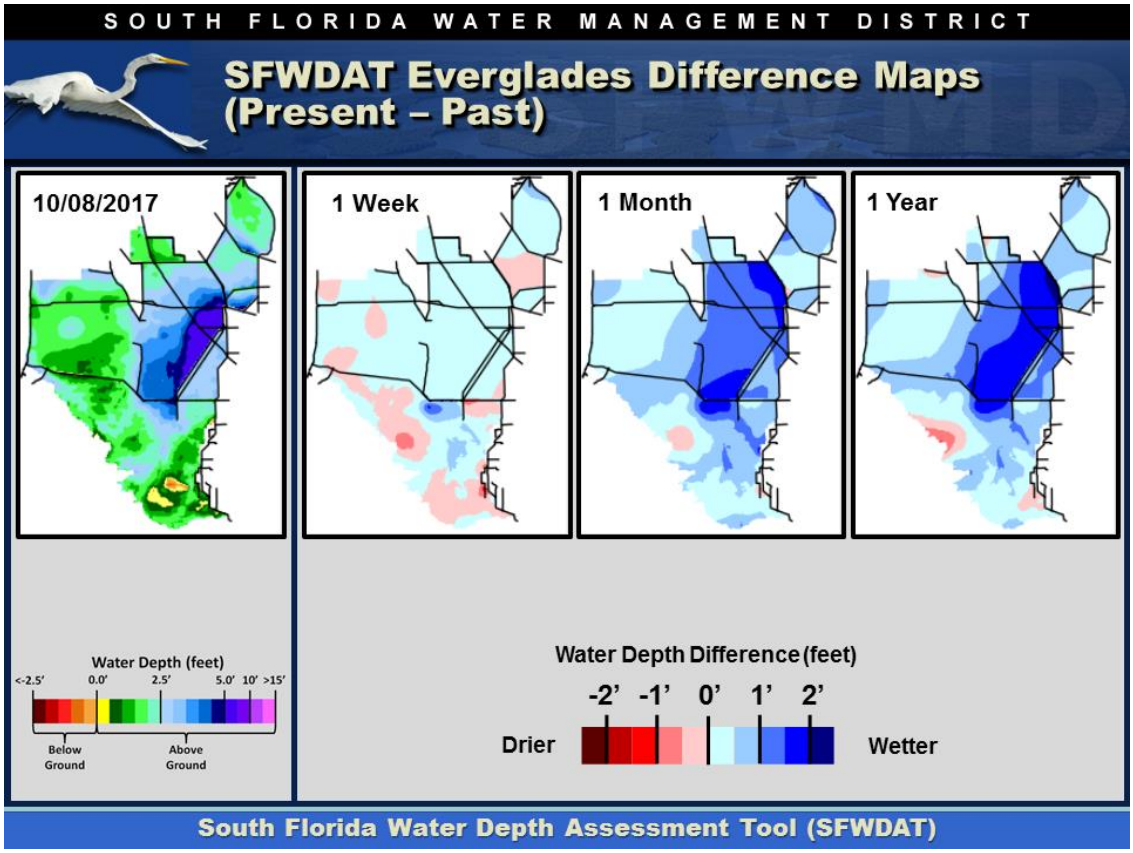


Regulation Schedules: WCA-1 three-gauge average is 0.10 feet below Zone A1, and stage difference between the marsh and the canal is 0.18 feet. WCA-2A marsh stage at gauge GA2A17 is currently 1.15 feet above zone A and less than 0.5 feet higher than temporary deviation. Marsh stage is 0.31 feet above canal stage at S11B. WCA-3A three-gauge average stage is 2.20 feet above zone A, and 0.80 higher than canal stage. WCA-3A at gauge 62 (Northwest corner) is 0.90 feet above the upper schedule.



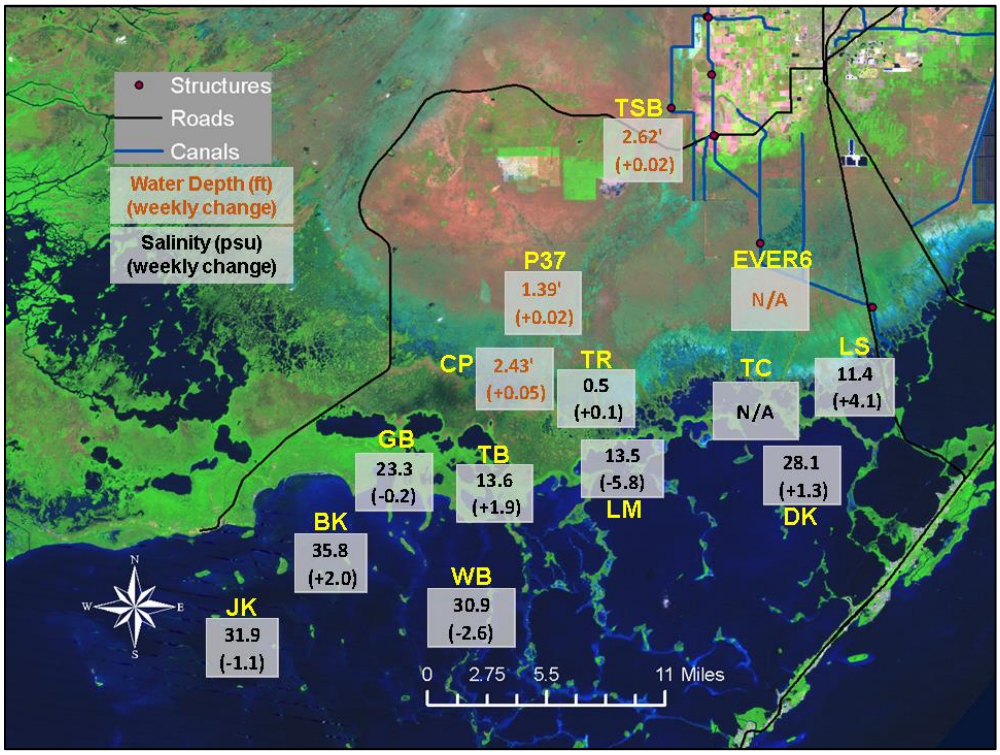
Water Depths and Changes: Over the last week individual gauge changes ranged from +0.01 feet (WCA-2A) to +0.37 feet (WCA-2A). The WDAT tool for spatial interpolation of depth indicates a range from a low of 1.0 feet to 1.5 feet in Northern WCA-1 to a high of 5.0+ along the L-67A canal. A majority of WCA-3A South contains water depths that exceed 3.0 feet. Pan evaporation was lower this week, estimated at 1.38 inches, above the pre-project 1.21 inches. Comparing WDAT water levels from present, water depths were deeper a week ago across WCA-1, 2B, 3A and 3B. Only central and southern WCA-2A is drier.

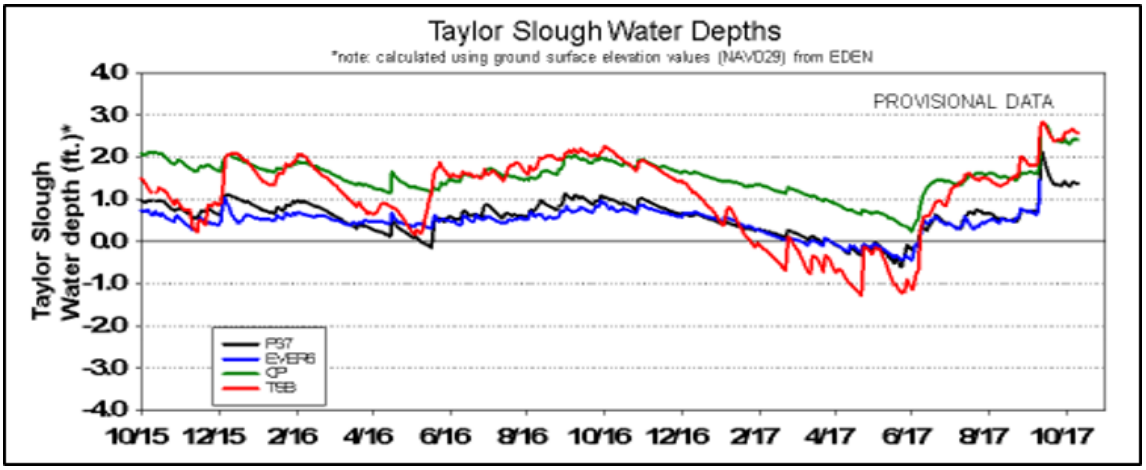


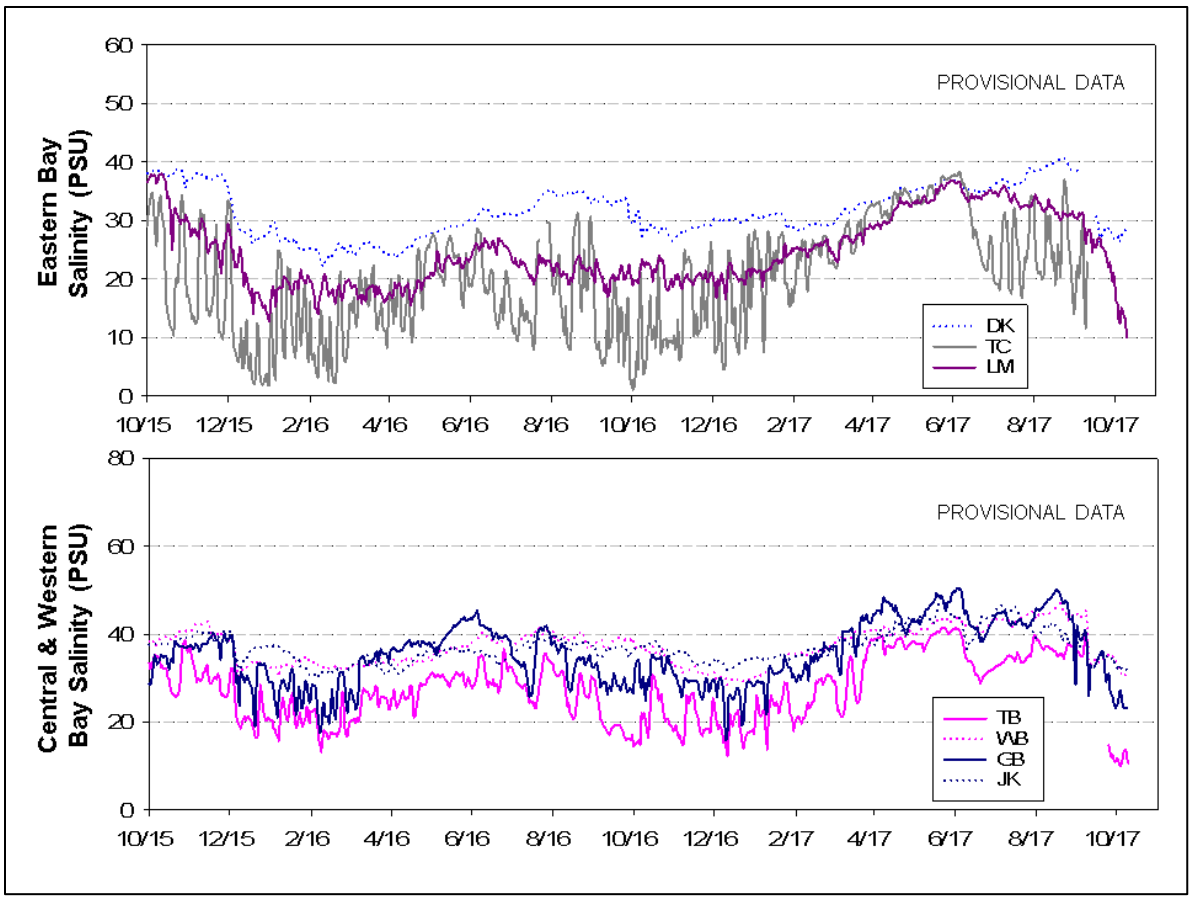


Taylor Slough stages: Water levels in Taylor Slough continued to increase this past week with the largest change of 0.05 feet in southwest Taylor Slough. Water levels are now 6 to 12 inches above the historic average for this time of year with the highest divergence occurring in northern Taylor Slough.

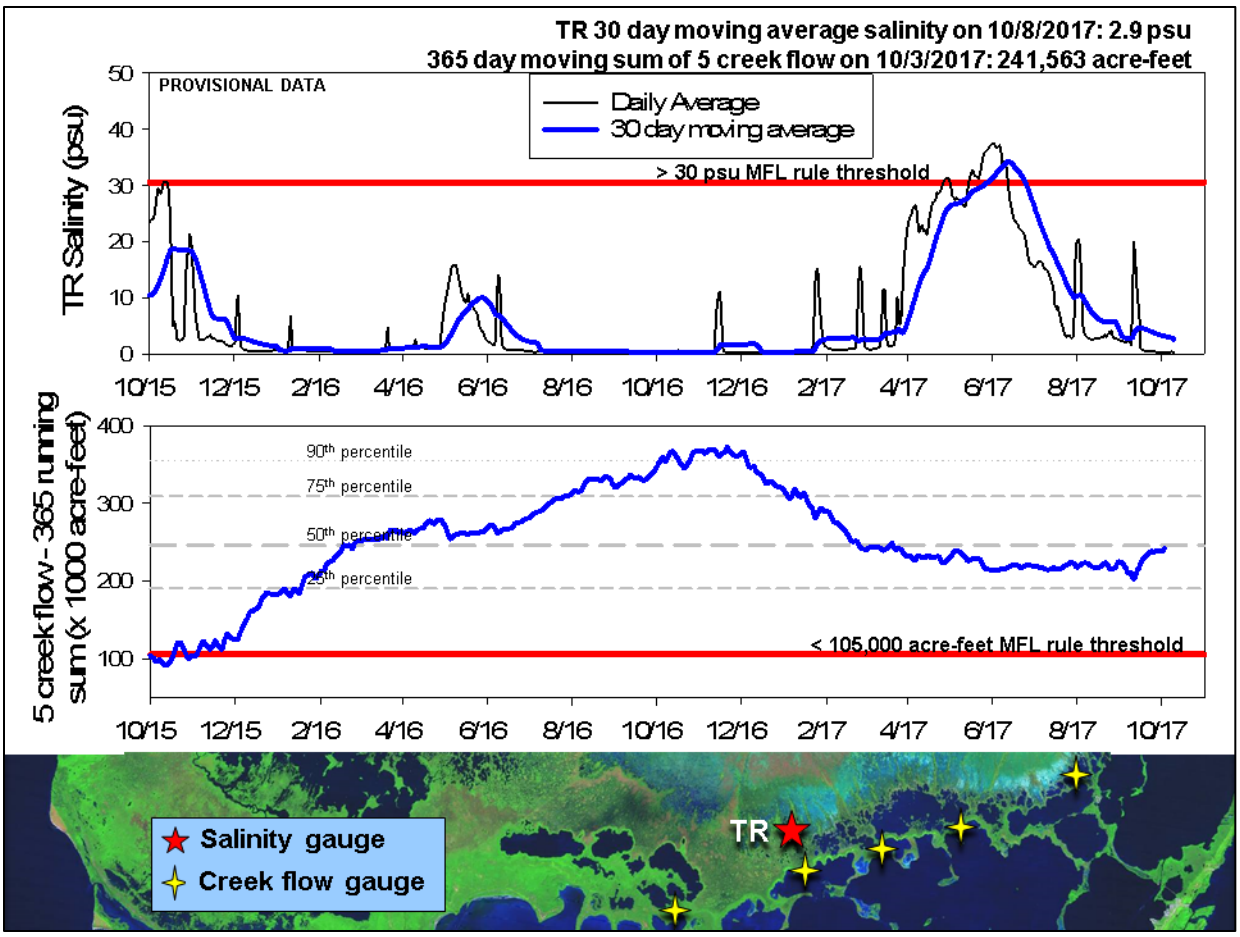
Florida Bay salinity: Salinities are staying fairly stable with most weekly changes at less than 2 psu. Currently, salinities range from 11 in the US Highway 1 corridor to 36 in the western Bay. Areas are 6 psu below (eastern nearshore region) to 3 psu above average (western central area) compared to the historic averages for this time of year.







Florida Bay MFL: Mangrove zone daily average salinity remains near fresh at 0.4 psu. The calculated 30-day moving average decreased 0.4 psu to reach 2.9 psu. One of the five creek stations used for the MFL (Taylor River Mouth) stopped reporting on October 3 so the 365-day moving sum of flow could not be calculated at this time. The 365-day moving sum of flow from the five creeks identified by stars on the map was 241,563 acre-feet on October 3 (still below 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. One measure of stress to the ecology of the Everglades is continuous water depths above 2.5 feet at gauge 65 in Southern WCA-3A beyond 90 days. The water depth at that location on Sunday was 4.71 feet and as of today had exceeded that mark for 115 days.

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

Everglades Ecological Recommendations, October 10th, 2017 (red is new)				
Area	**Current Condition**	**Cause(s)**	**Recommendation**	**Reasons**
WCA-1	Stages increase from +0.26 to +0.35'	Rainfall, ET, management	Where/when possible achieve high water targets (17.5 ft).	Protect habitat and facilitate invasive plant treatments.
WCA-2A	Stages increased +0.01'	Rainfall, ET, management	Moderate ascension rates as possible.	Protect habitat, wildlife and support apple snail reproduction.
WCA-2B	Stages increased +0.15'	Rainfall, ET, management	Moderate ascension rates as possible.	Protect habitat, wildlife and support apple snail reproduction.
WCA-3A NE	Stages increased +0.37'	Rainfall, ET, management	Moderate ascension rates as possible. Manage for relief of high water conditions.	Protect habitat, wildlife and support apple snail reproduction.
WCA-3A NW	Stages increased +0.21'	Rainfall, ET, management		
Central WCA-3A S	Stages increased +0.21'	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 115 days.
Southern WCA-3A S	Stages increased +0.33'	Rainfall, ET, management		
WCA-3B	Stages increased +0.26'	Rainfall, ET, management	Moderate ascension rates as possible..	Protect habitat, wildlife and support apple snail reproduction.
ENP-SRS	N/A	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 +0.02 to +0.05'	Rain, ET, inflows	Move water southward as possible	When available provide freshwater buffer for ecosystems and slow recession rates.
FB- Salinity	Salinity changes ranged -5.8 to +4.1 psu.	Rain, ET, inflows, wind	Move water southward as possible	When available, provide freshwater to produce low salinity wet season conditions.