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: September 26, 2017

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast
Below average rains expected through Thursday evening, then widespread moderate to heavy rains likely beginning Friday morning. Drier air on the southwestern periphery of Hurricane Maria will help limit our seabreeze activity through Thursday. Beyond then, deep moisture and energy will move back northward over the District and be met by a frontal boundary that should stall around Lake Okeechobee over the weekend. These are classic parameters for heavy rain potential beginning Friday through the weekend.

Kissimmee
Tuesday morning stages and departures from schedule were 59.2 feet (2.3 feet above schedule) in East Lake Toho, 55.6 feet (1.7 feet above schedule) in Lake Toho, and 52.9 feet (1.5 feet above schedule) in Kissimmee Cypress Hatchineha; S65A headwater stage was 50.6 feet. Tuesday morning discharges were 1,3001 cfs at S65, 8,281 cfs at S65A, and 1,3707 cfs at S65E. Dissolved oxygen concentration in the Kissimmee River averaged 0.8 milligrams per liter (mg/L) for the week. Kissimmee River mean floodplain depth on Sunday was 5.06 feet.

Lake Okeechobee
Lake stage is 16.21 feet NGVD having increased by 0.55 feet over the past week and 2.72 feet over the past month, due to Hurricane Irma's extensive rainfall. Lake stages are expected to continue to rise as the watershed drains, and combined with the turbidity from resuspended Lake sediment, 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. The high inflows and resuspended Lake sediment are also expected to significantly increase water column total phosphorus, which could lead to algal blooms as turbidity begins to decline.

Estuaries
Total discharge to the St. Lucie estuary averaged 5,158 cfs over the past week with 2,470 cfs (48%) coming from Lake Okeechobee. Salinities increased slightly at HR1 and US1 Bridge and substantially at the A1A Bridge. 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 Lake releases. Low oxygen levels (<3 mg/L) were recorded in the North Fork.

Total inflow to Caloosahatchee estuary averaged 11,474 cfs over the past week with 4,703 cfs (41%) 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 at Val I-75 is forecast to be 0.2 in two weeks with no flow through S-79. 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, and are in the fair range at Shell Point and in the poor range at Cape Coral

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 21,500 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. Due to recent basin runoff, it is recommended that no Lake releases be sent to the STAs/FEBs this week.

Everglades

Below average rainfall and fairly stable conditions bring about relief from high water conditions in WCA-2A with a 0.26-foot drop in stage. However deep-water conditions persist in WCA-3A. WCA-1 is below regulation schedule while WCA-2A and WCA-3A are above regulation schedule. 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 4.15 feet, and has exceeded 2.5 feet for 99 days.

Supporting Information

KISSIMMEE BASIN

Kissimmee Basin Rainfall

The Upper Kissimmee Basin received 0.44 inches of rainfall in the past week and the Lower Basin received 0.56 inches (SFWMD Daily Rainfall Report 9/25/2017).

Upper Kissimmee Basin

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

Table 1. Departures from KCOL flood regulation (F) or temporary schedules (T, A, or S) (feet NGVD). Discharge and stage data are provisional real-time data from SFWMD OASyS DualTrend; reported values are averages through midnight of the Sunday prior to the report date unless otherwise specified.

Report Date: 9/26/2017

Water Body	Structure/Site	Discharge (cfs), week's average**	Stage Monitoring Site***	Lake Stage (feet)	Schedule*	Regulation (R) or Target (S or T) Stage (feet)	Daily Departure (feet)						
							9/24/17	9/17/17	9/10/17	9/3/17	8/27/17	8/20/17	8/13/17
Lakes Hart and Mary Jane	S62	473	LKMJ	62.1	R	60.0	**2.1**	2.3	0.1	0.0	0.1	0.1	0.0
Lakes Myrtle, Preston, and Joel	S57	214	S57	64.1	R	61.0	**3.1**	3.2	0.1	-0.1	0.1	0.0	0.0
Alligator Chain	S60	554	ALLI	63.9	R	63.2	**0.7**	1.3	0.0	0.0	0.0	0.0	0.0
Lake Gentry	S63	815	LKGT	61.4	R	61.0	**0.4**	0.9	0.0	0.0	-0.1	0.0	0.0
East Lake Toho	S59	1448	TOHOE	59.3	R	56.9	**2.4**	2.6	0.0	0.0	0.1	0.0	0.0
Lake Toho	S61	2776	TOHOW, S61	55.7	R	53.9	**1.8**	2.1	0.0	0.0	0.0	0.0	0.0
Lakes Kissimmee, Cypress, and Hatchineha	S65	12054	KUB011, LKIS5B	53.2	R	51.4	**1.8**	2.7	1.3	1.2	1.0	0.9	0.8

* T = temporary schedule, R = USACE flood control schedule, S = temporary snail kite schedule, A = projected ascension line, N/A= not applicable or data not available.

** Seven-day average of weighted daily means through Sunday midnight.

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

DATA ARE PROVISIONAL

Lower Kissimmee Basin

Discharges and stages at Lower Basin structures are shown in Table 2. SFWDAT depth maps for the Phase I restoration area are shown in Figure 12. Kissimmee River floodplain stages at selected stations are shown in Figure 13.

Table 2. Mean weekly discharge at S-65x structures, and mean weekly Phase I area river channel dissolved oxygen and floodplain mean water depth. Discharge and stage data are provisional real-time data from SFWMD OASyS DualTrend; reported values are averages through midnight of the Sunday prior to the report date unless otherwise specified.

Report Date: **9/26/2017**

Metric	Location	Sunday's 1-day average	Weekly Average**									
			9/24/17	9/17/17	9/10/17	9/3/17	8/27/17	8/20/17	8/13/17	8/6/17	7/30/17	7/23/17
Discharge (cfs)	S-65	13096	**12054**	5535	1809	1209	1152	958	1181	665	616	342
Discharge (cfs)	S-65A	8377	**8455**	7539	2375	1465	1448	1213	1298	1274	927	638
Discharge (cfs)	S-65D****	13517	**13276**	11906	2442	2262	2032	2255	2154	2234	1180	1236
Discharge (cfs)	S-65E****	13895	**13748**	13216	2584	2279	2085	2276	2195	2319	1293	1321
DO concentration (mg/L)***	Phase I river channel	1.2	**0.8**	1.3	2.3	2.3	2.0	2.8	2.0	2.2	2.3	1.8
Mean depth (feet)*	Phase I floodplain	5.06	**5.07**	4.69	1.36	1.31	1.18	1.08	1.10	1.00	0.63	0.68

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

** Seven-day average of weighted daily means through Sunday midnight.

*** DO is the average for manual sondes at PC62 and PC33; telemetry sondes have been taken offline.

**** S-65D discharge combines discharge at S-65D, S-65DX1, and S-65DX2; S65E discharge combines S65E and S65EX1.

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

Water Management Recommendations

Date	Recommendation	Purpose	Outcome	Source
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

KCOL Hydrographs (through Sunday midnight)

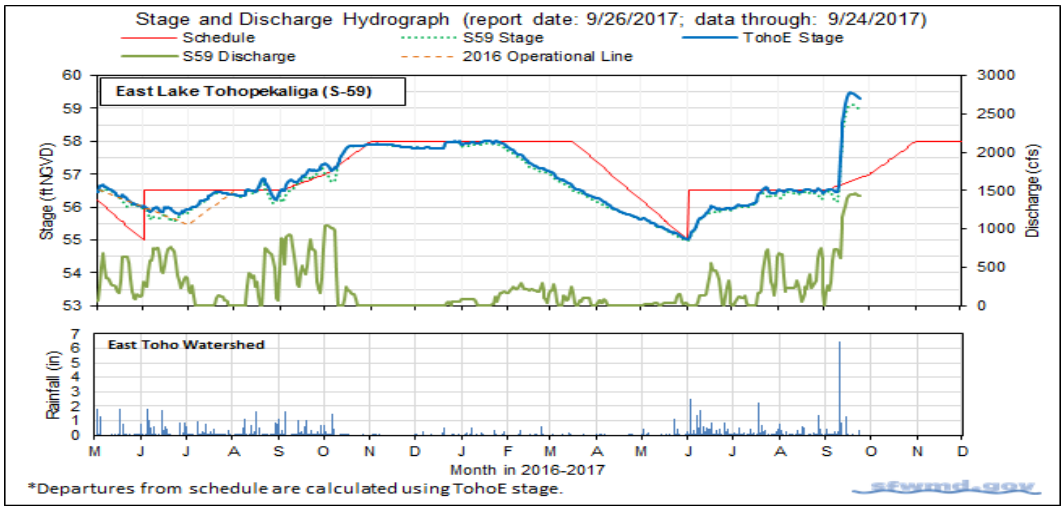


Figure 1.

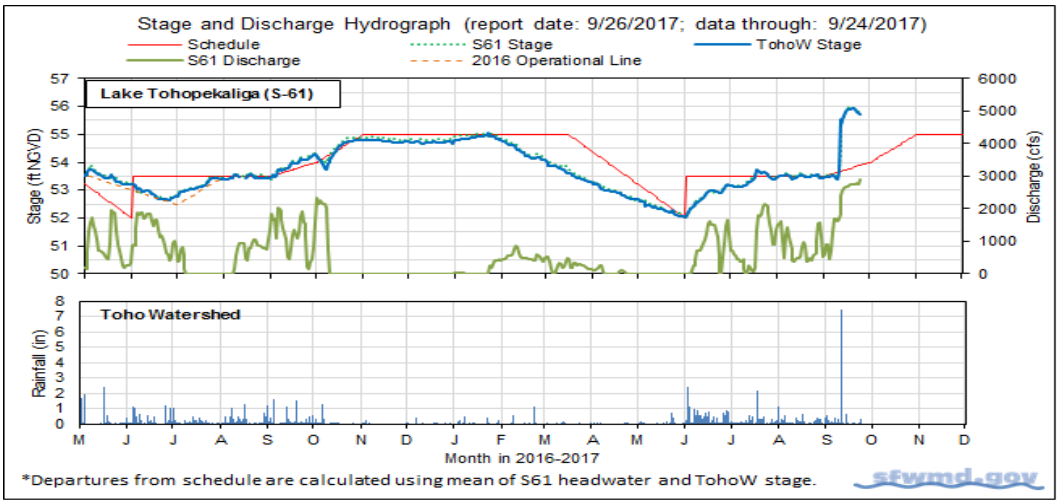


Figure 2.

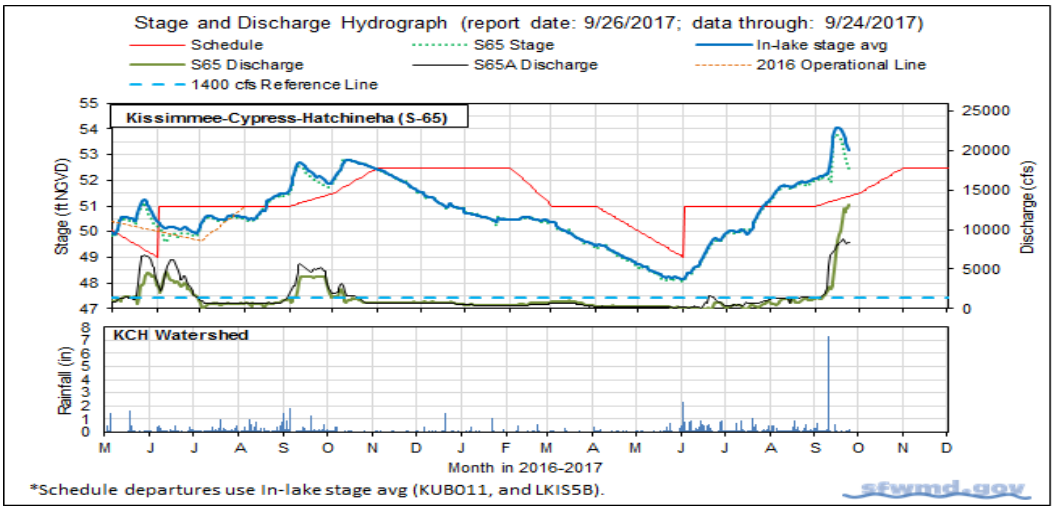


Figure 3.

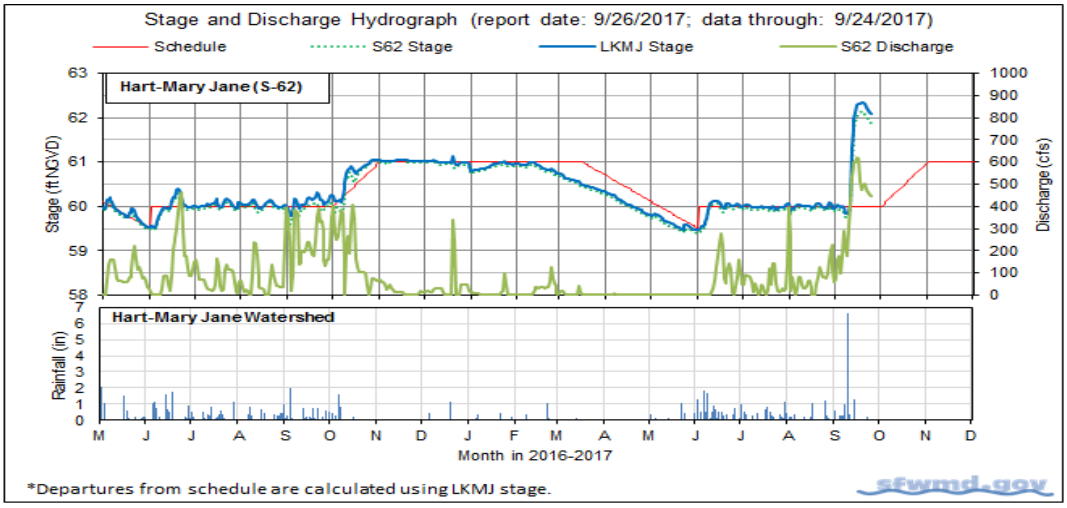


Figure 4.

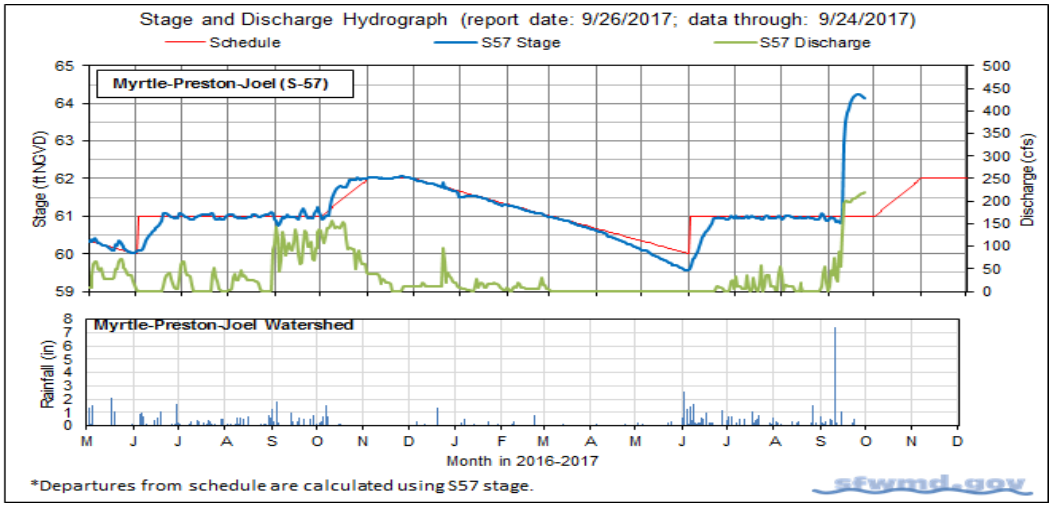


Figure 5.

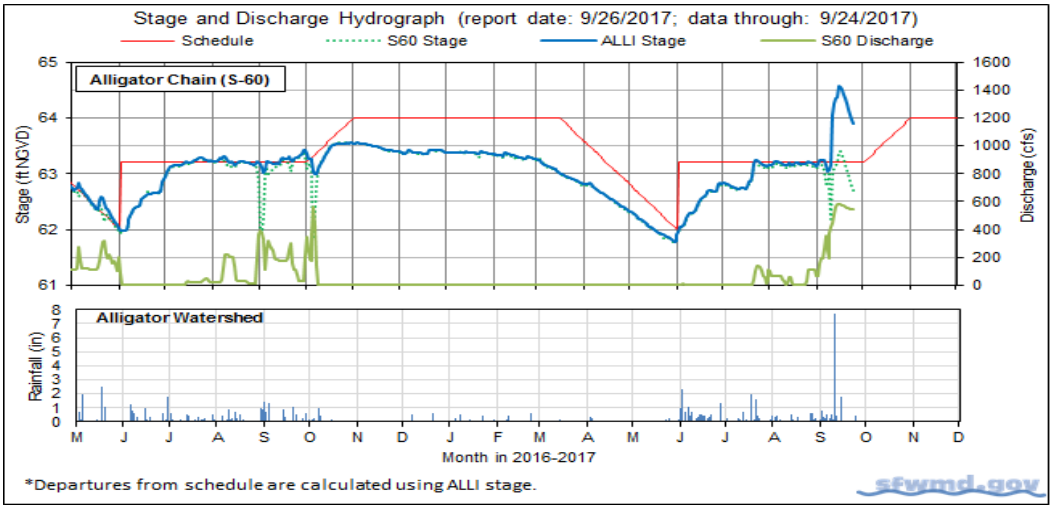


Figure 6.

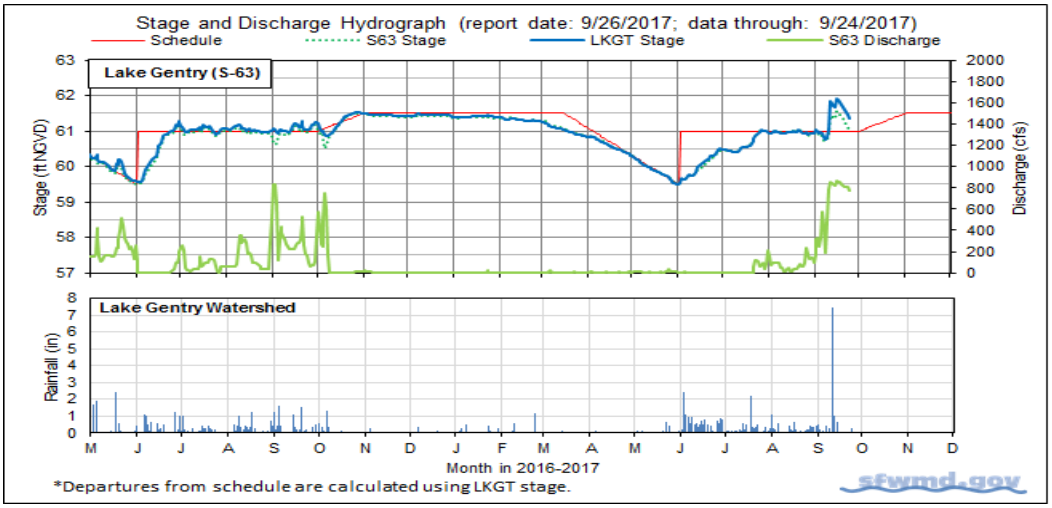


Figure 7.

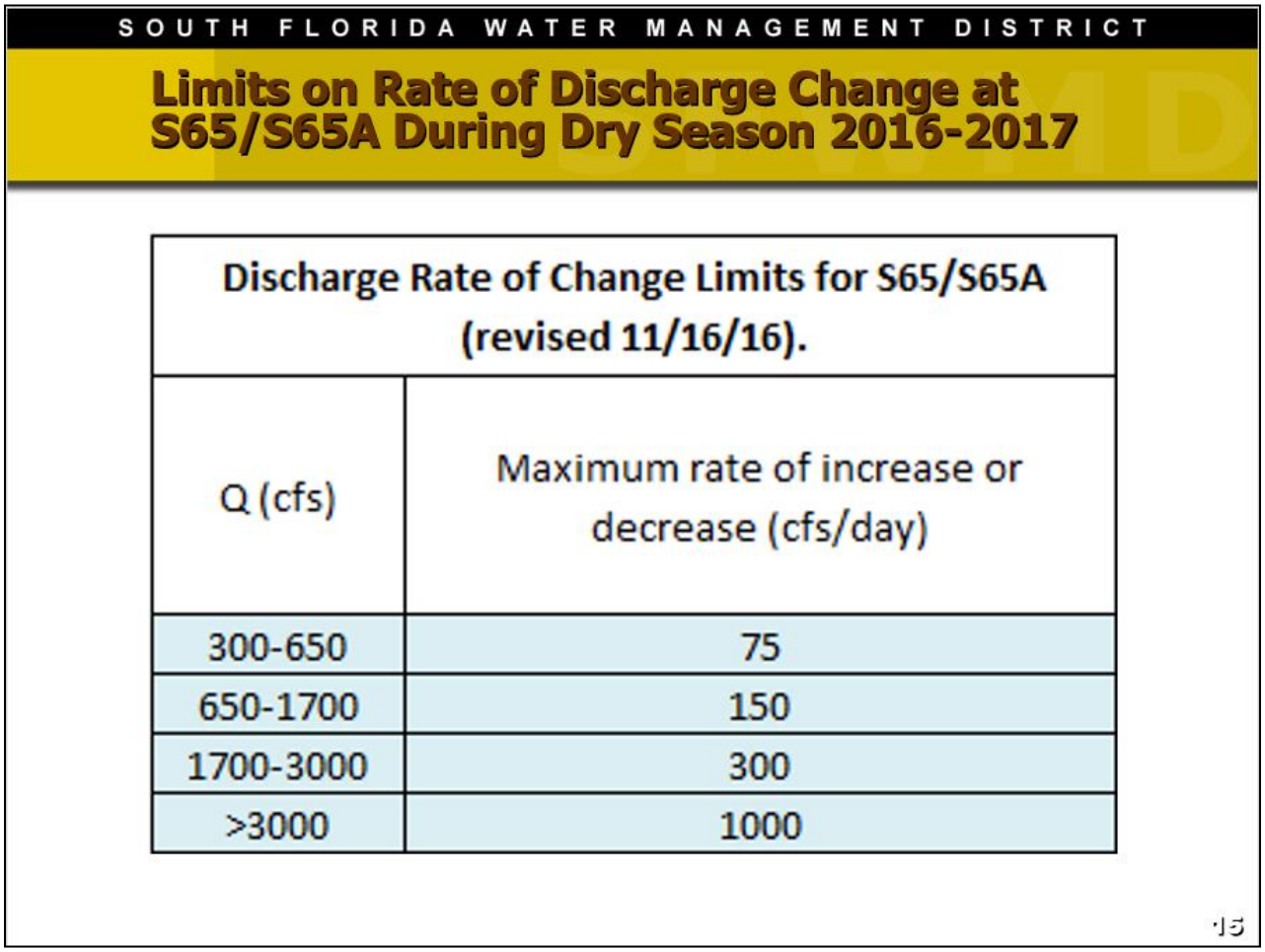


Figure 8. Limits on rate of discharge change at S65/S65A for the 2016-2017 Dry Season.

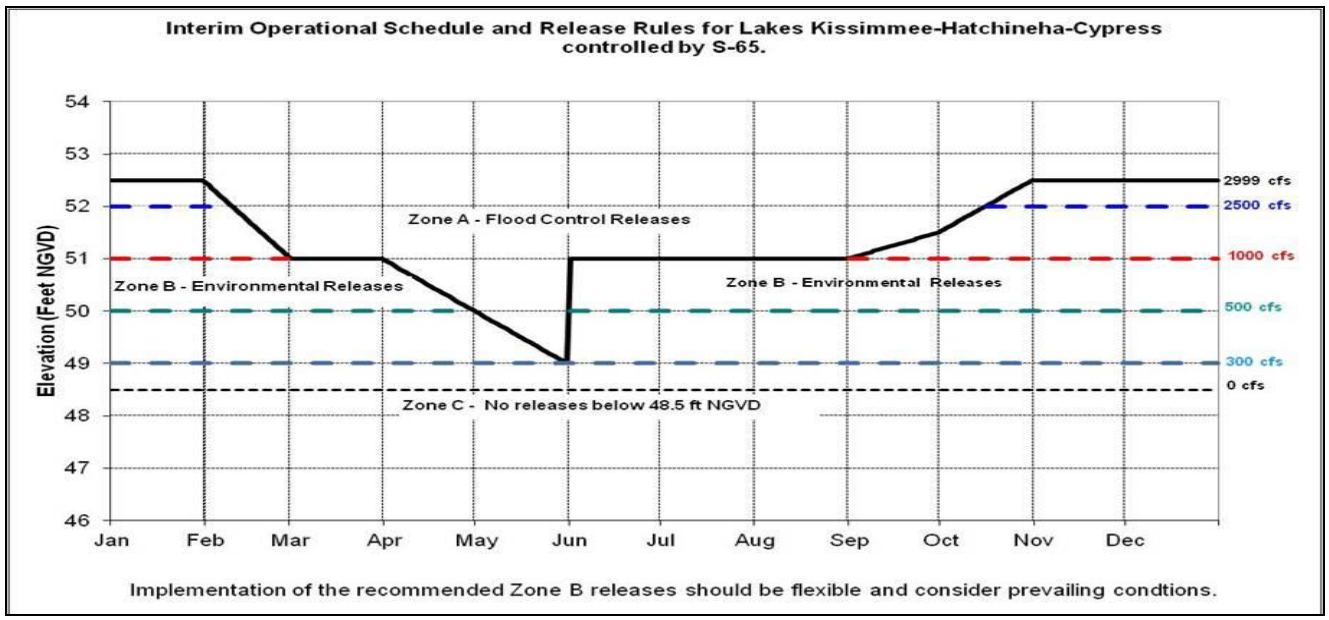


Figure 9. Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years or in Wet Season 2015.

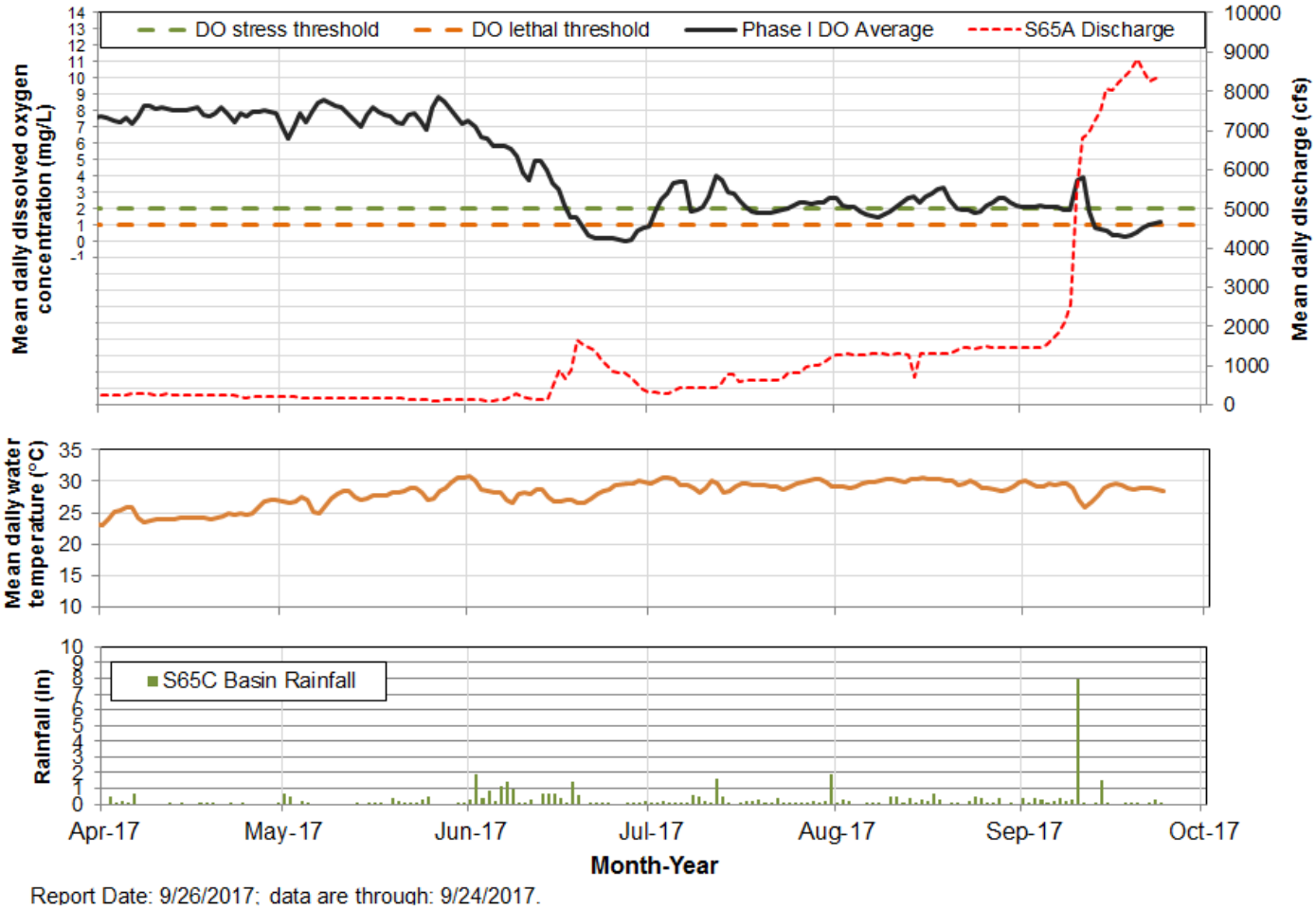


Figure 10. Mean daily Dissolved Oxygen, discharge, temperature and rainfall in the Phase I river channel.

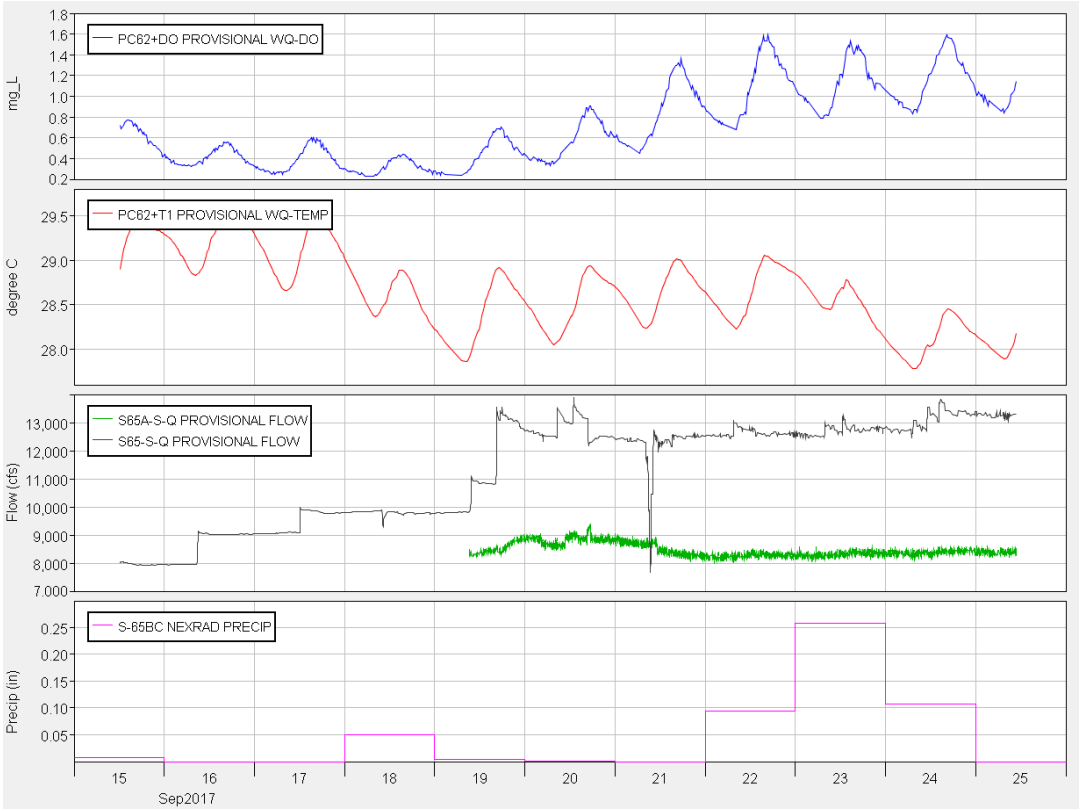


Figure 11. Phase I river channel dissolved oxygen and water temperature (measured at 15 minute intervals) and Pool BC daily rainfall.

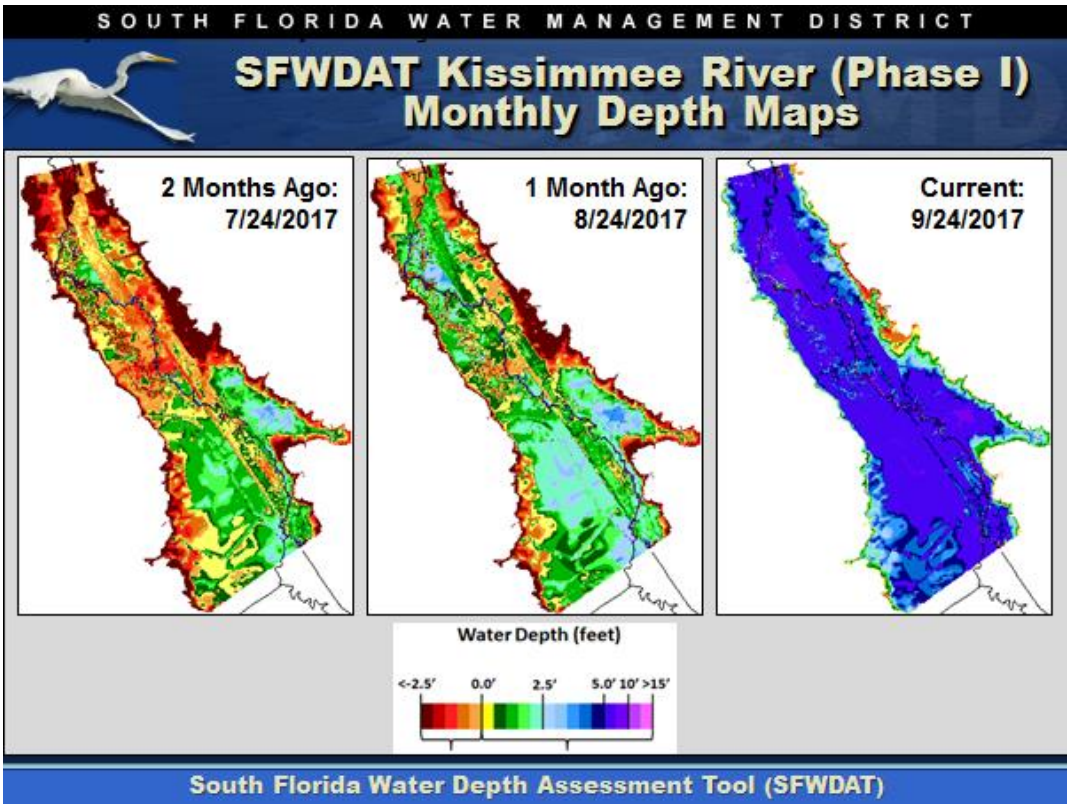
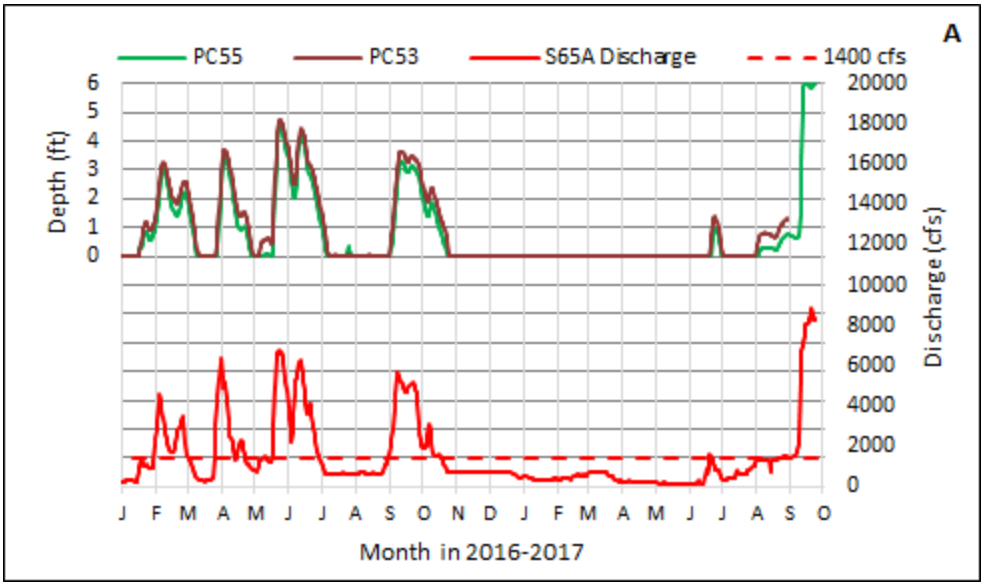
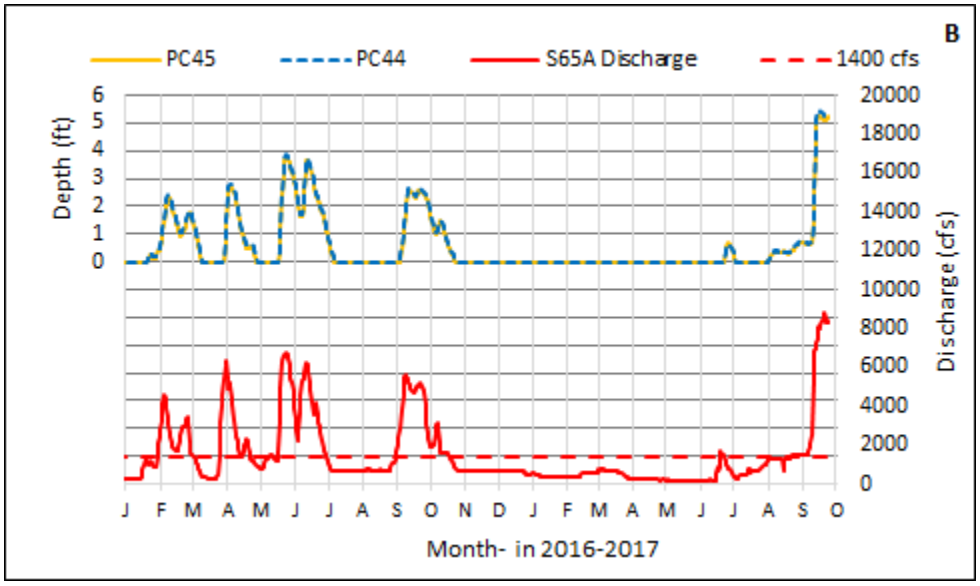


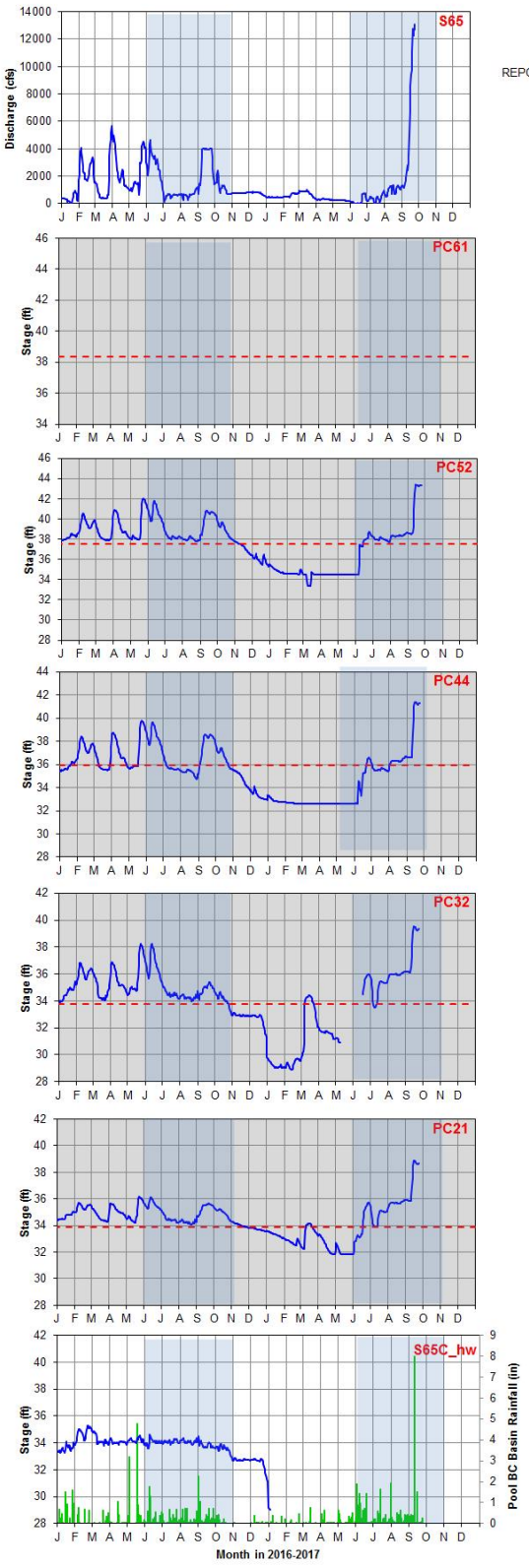
Figure 12. Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to Jan. 16, 2012.





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



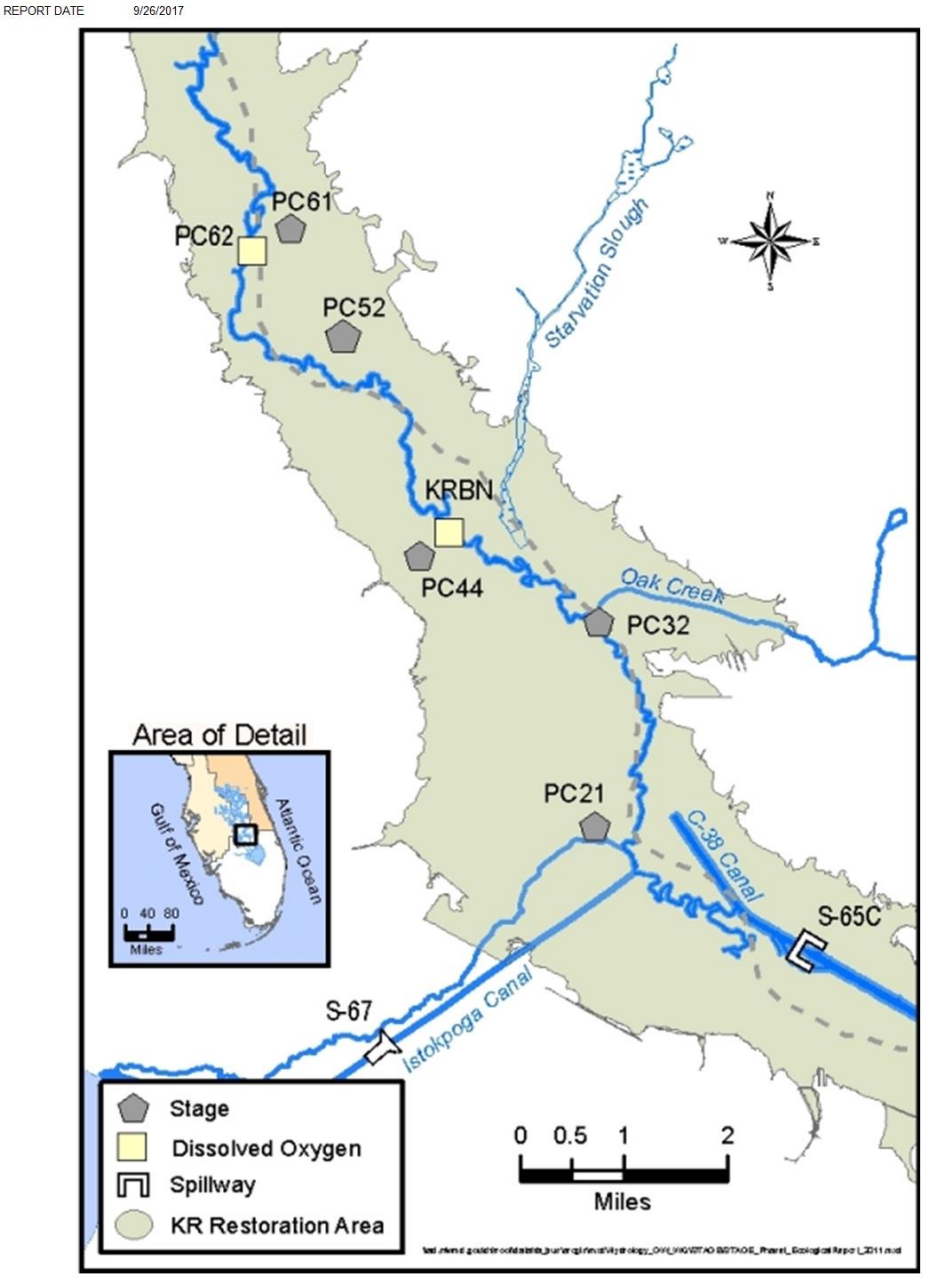


Figure 13. Discharge at S65, stages at five monitoring stations in the Phase I area of the Kissimmee River floodplain, and headwater stage at S65-C since January 1, 2015. The most recent data (~2 weeks) are provisional real-time data from SFWMD DualTrend; previous data are from SFWMD DB-HYDRO (validated).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

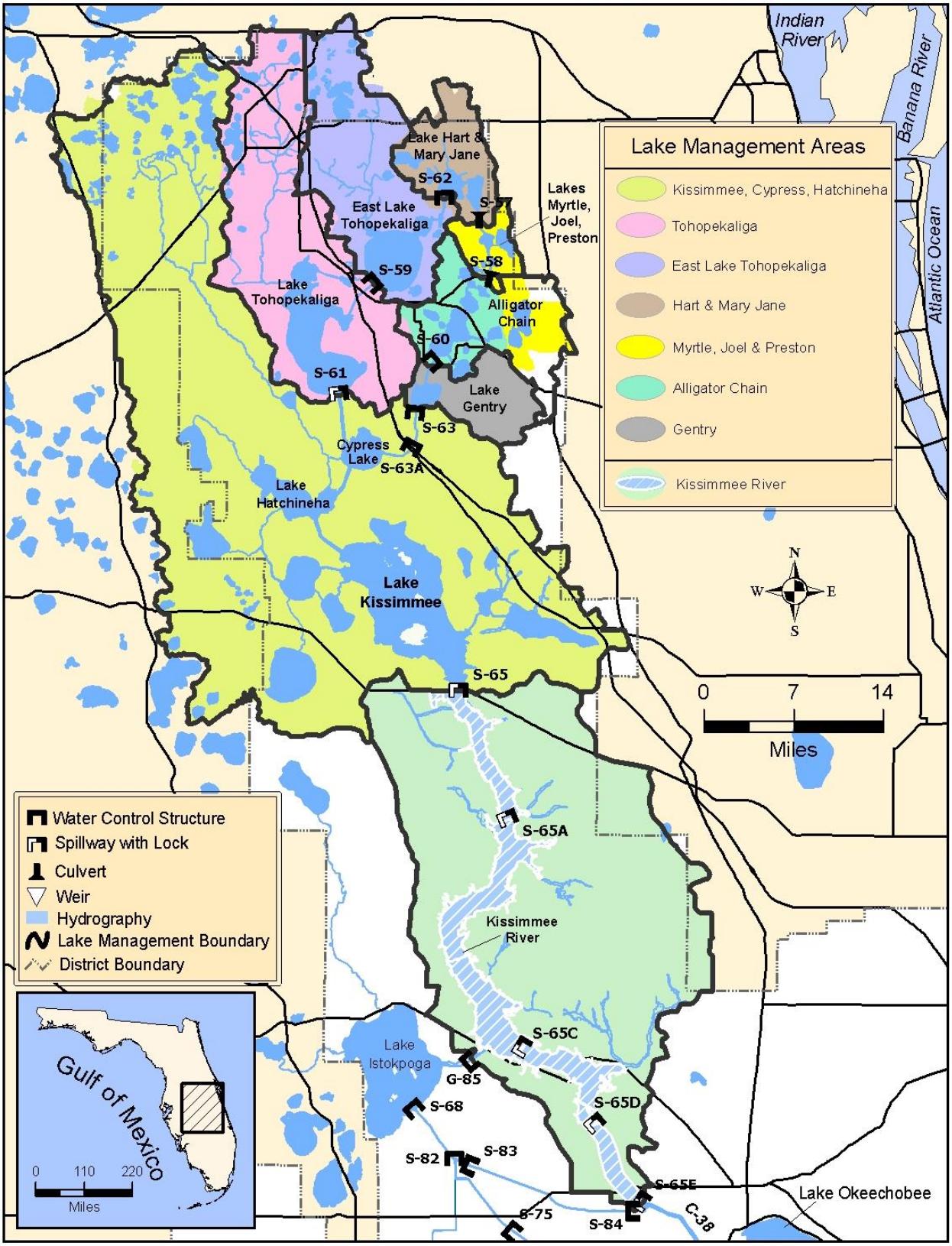


Figure 14. The Kissimmee Basin

LAKE OKEECHOBEE

According to the USACE web site, Lake Okeechobee stage is at 16.21 feet NGVD for the period ending at midnight on September 25, 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 0.55 feet over the past week and is 2.72 feet higher than it was a month ago and 0.55 feet higher than it was a year ago (Figure 1). The Lake is currently in the Intermediate sub-band (Figure 2). According to RAINDAR, 0.21 inches of rain fell directly over the Lake during the week September 19 – September 25 (Figure 3). Most of the surrounding watershed had more rainfall, averaging between 0.25-1.0 inches.

Average daily inflows to the Lake over the past two weeks were 21,484 cfs, primarily from the Kissimmee River via the S65 and S84 structures, which averaged 13,654 and 3,809 cfs daily, respectively. Back-pumping into the Lake from the south through the S2 and S3 pumps ceased around September 19, and averaged 82 and 120 cfs daily, respectively, from September 19 – September 25.

Average daily outflows for the Lake have been increasing since Hurricane Irma, but were essentially zero or even negative since the beginning of June, as water flowed back into the Lake through the S308 and Culvert 10A when stages were lower. Post-storm releases have increased average daily outflows to 6,993 cfs over the past week. These were primarily through the S77 structure, which averaged 4,614 cfs daily, followed by S308 at 2,631 cfs. Backflows from the L8 canal through Culvert 10A averaged -252 cfs due primarily to inflows prior to releases. There were no discharges south through the S350 structures. The corrected evapotranspiration value based on the L006 weather platform solar radiation data was 1.25 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 September 19, 2017 to midnight September 25, 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 from S2 and S3. These data are provisional, and are subject to change.

In addition to substantial rainfall in and around the Lake, Hurricane Irma produced strong winds that resulted in significant seiche, pushing Lake stages to roughly 20 feet NGVD in the north (S133) and west (S131), and dropping stages to roughly 10 feet NGVD in the east (S352) and south (S2). This resulted in very turbid conditions in the Lake, primarily in the center and southern areas, while nearshore locations remained somewhat clearer near inflows from the north and west. Turbidity values ranged from 2 - 25 NTU in these clearer areas, between 50 and 115 NTU in the central portion, and between 115-170 NTU in the south and eastern portions (Figure 5).

Satellite imagery indicates that the bloom potential declined over the past month, based on NOAA's cyanobacteria monitoring product derived from the OLCI satellite sensor. High winds from Hurricane Irma have further reduced current bloom potential on the Lake, but elevated total phosphorus 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	13654	5.2
S71 & 72	1623	0.6
S84 & 84X	3809	1.4
Fisheating Creek	1202	0.5
S154	267	0.1
S191	302	0.1
S133 P	67	0.0
S127 P	42	0.0
S129 P	46	0.0
S131 P	24	0.0
S135 P	101	0.0
S2 P	82	0.0
S3 P	120	0.0
S4 P	146	0.1
C5	0	0.0
Rainfall	568	0.2
Total	**22051**	**8.3**

OUTFLOWS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)
S77	4614	1.7
S308	2631	1.0
S351	0	0.0
S352	0	0.0
S354	0	0.0
L8	-252	-0.1
ET	3445	1.3
Total	**10438**	**3.9**

Water Management Recommendations

The Lake is 16.21 feet NGVD having increased 2.72 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. These high-water levels, 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.

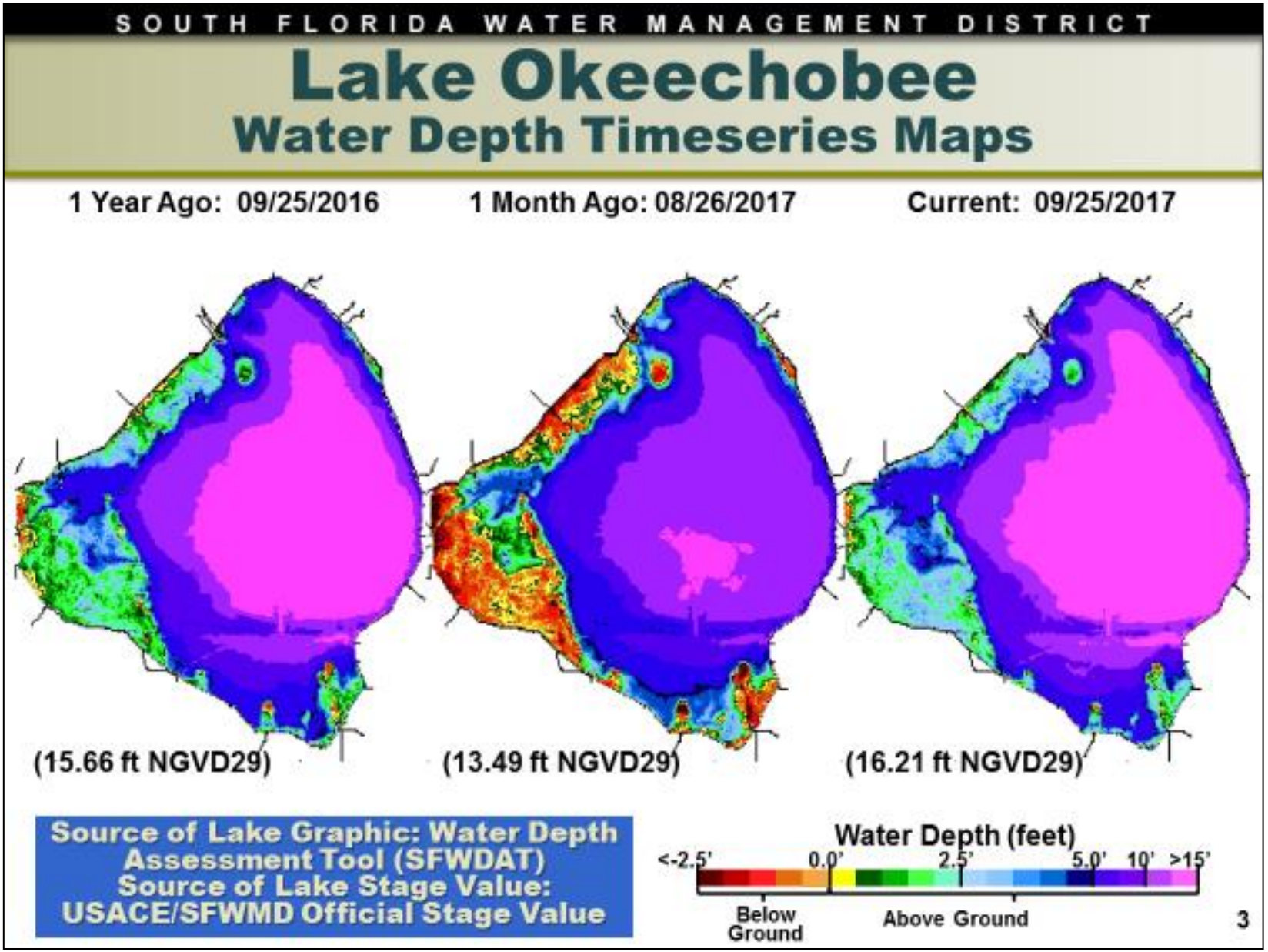

SOUTH FLORIDA WATER MANAGEMENT DISTRICT
Lake Okeechobee
Water Depth Timeseries Maps
1 Year Ago: 09/25/2016
1 Month Ago: 08/26/2017
Current: 09/25/2017
(15.66 ft NGVD29)
(13.49 ft NGVD29)
(16.21 ft NGVD29)
Source of Lake Graphic: Water Depth Assessment Tool (SFWDAT)
Source of Lake Stage Value: USACE/SFWMD Official Stage Value
Water Depth (feet)
<-2.5'
0.0'
2.5'
5.0'
10'
>15'
Below Ground
Above Ground
3

Figure 1

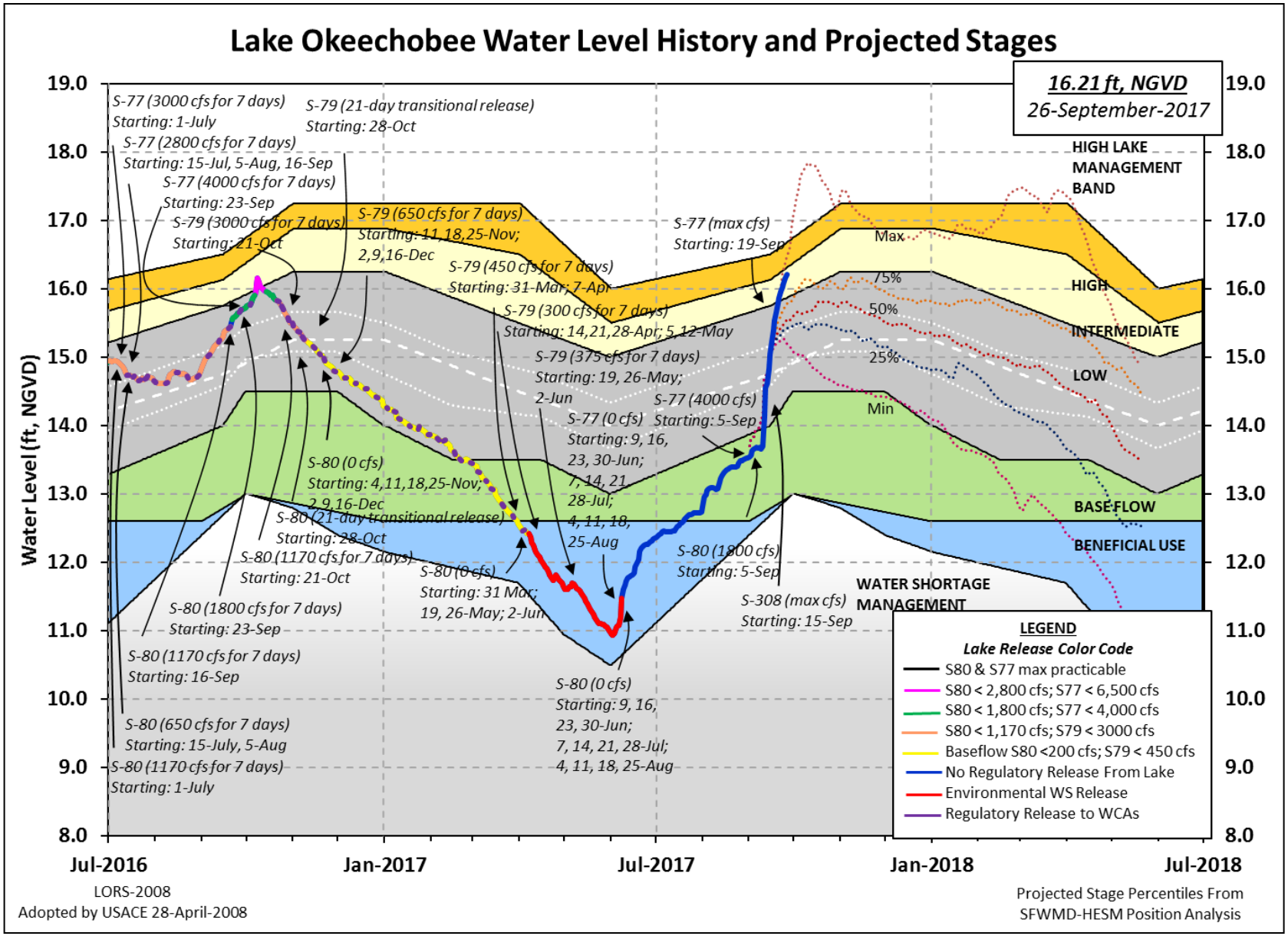

Lake Okeechobee Water Level History and Projected Stages
16.21 ft, NGVD
26-September-2017
Water Level (ft, NGVD)
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
11.0
10.0
9.0
8.0
Jul-2016
Jan-2017
Jul-2017
Jan-2018
Jul-2018
HIGH LAKE MANAGEMENT BAND
HIGH
INTERMEDIATE
LOW
BASE FLOW
BENEFICIAL USE
WATER SHORTAGE 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

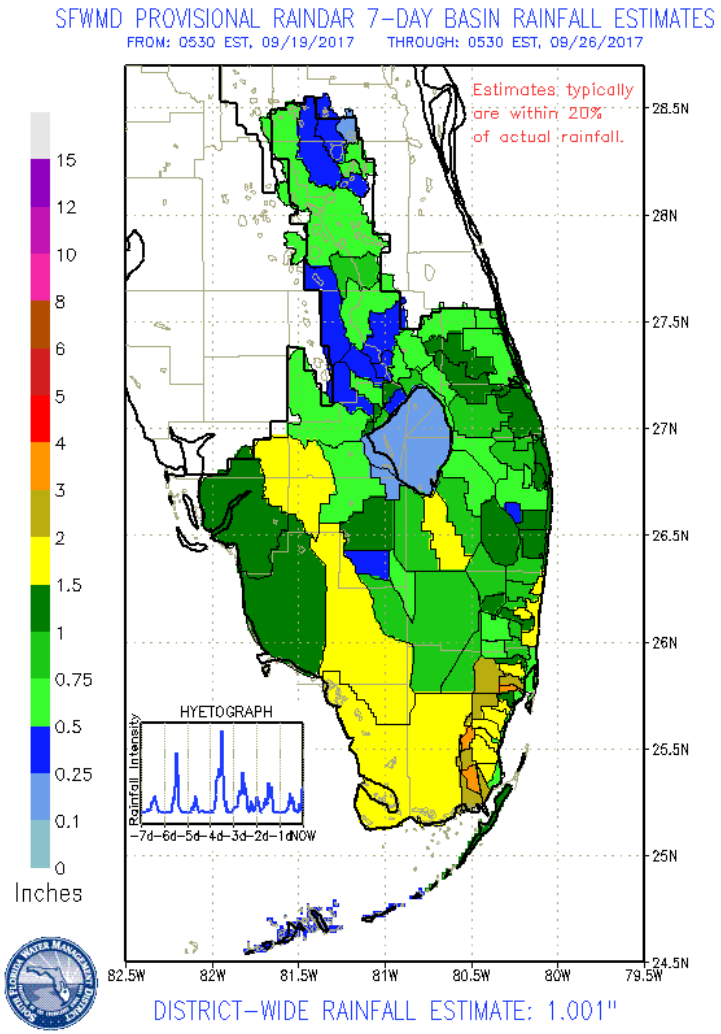


Figure 3

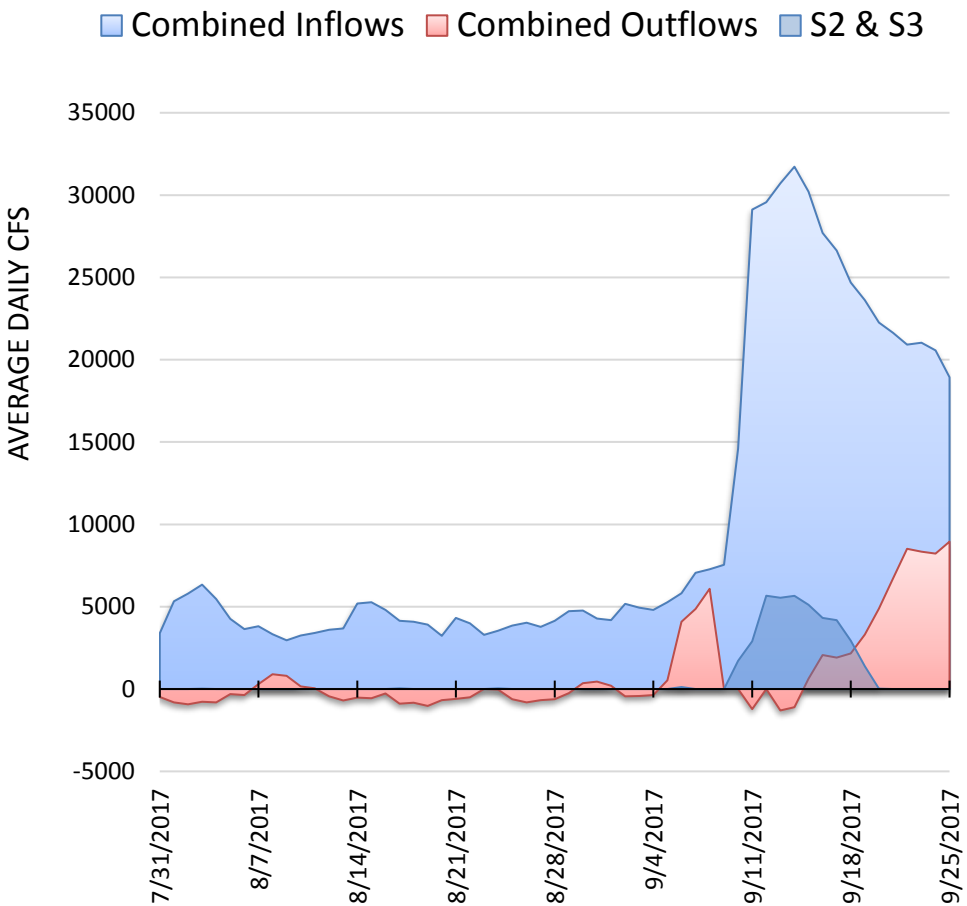


Figure 4

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Lake Okeechobee
Water Quality

September 18-19, 2017	
Site	**Turbidity (NTU)**
Nearshore Stations	
FEBIN	4.5
FEBOUT	2.6
KISSR0.0	17.9
LZ2	10.2
LZ25A	136
PALMOUT	25.4
PELBAY3	169
POLE3S	93.3
POLESOUT	6.9
RITTAE2	131
Pelagic Stations	
L001	8.5
L004	114
L005	6
L006	91.9
L007	142
L008	50.2
LZ30	116
LZ40	82
CLV10A	165

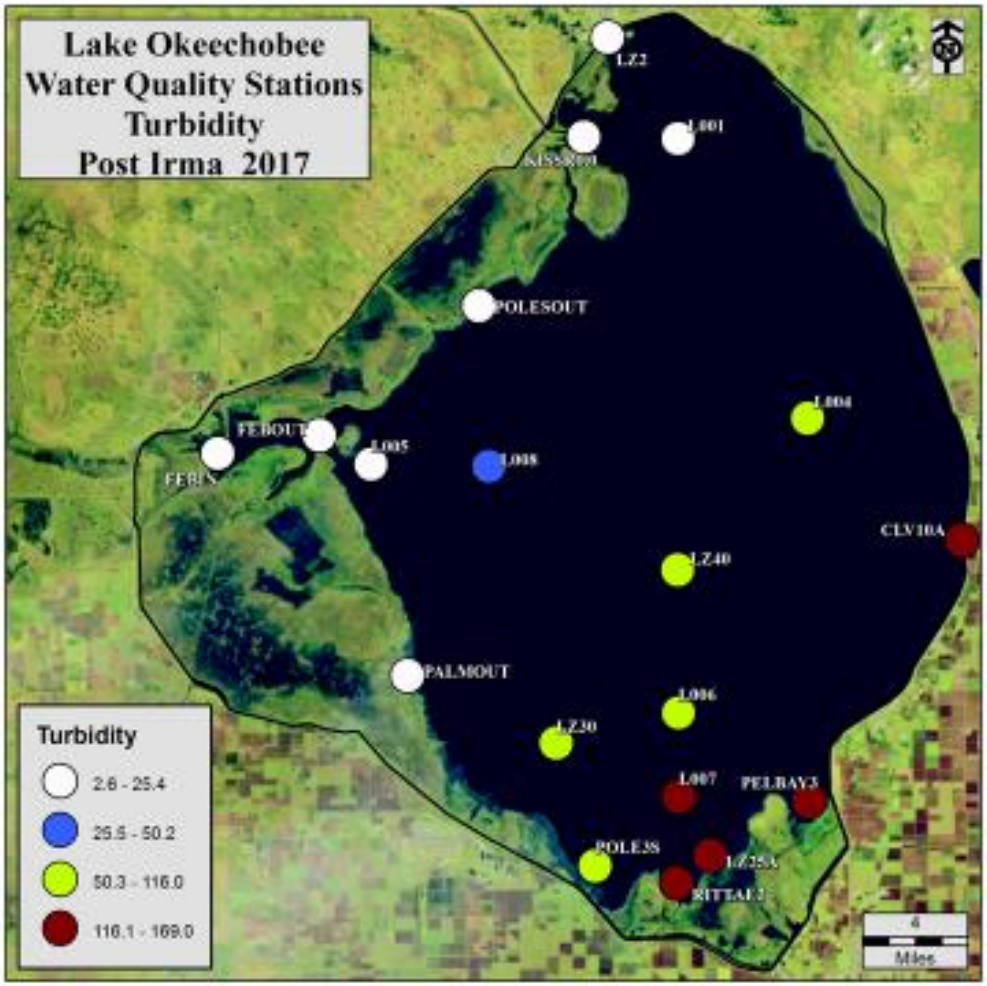


Figure 5

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Lake Okeechobee
Algal Bloom Potential

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

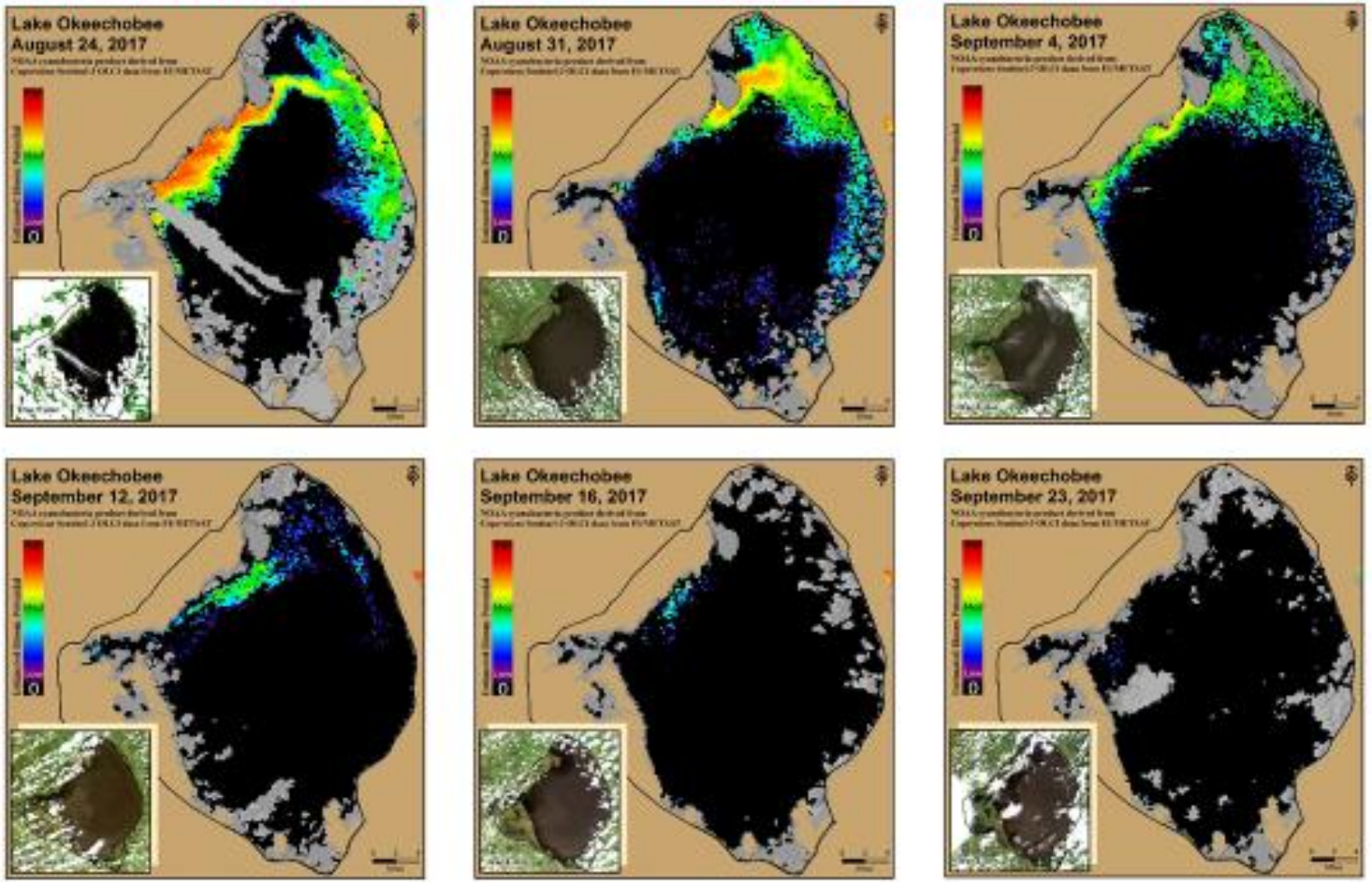


Figure 6

LAKE ISTOKPOGA

Lake Istokpoga stage is 39.01 feet NGVD as of midnight September 25, 2017 and is currently 0.02 feet below its regulation schedule of 39.03 feet NGVD (Figure 7). Average daily flows into the Lake from Josephine Creek for the week September 19 – September 25 were roughly half that of the previous two weeks average, dropping from 741 cfs to 368 cfs. No data have been reported for Arbuckle Creek since July 4. Average daily discharge from S68 and S68X over the past week increased from the previous two-week average, from 3,541 cfs to 4,816 cfs. According to RAINDAR, 0.411 inches of rain fell in the Lake Istokpoga basin from September 19 - September 25.

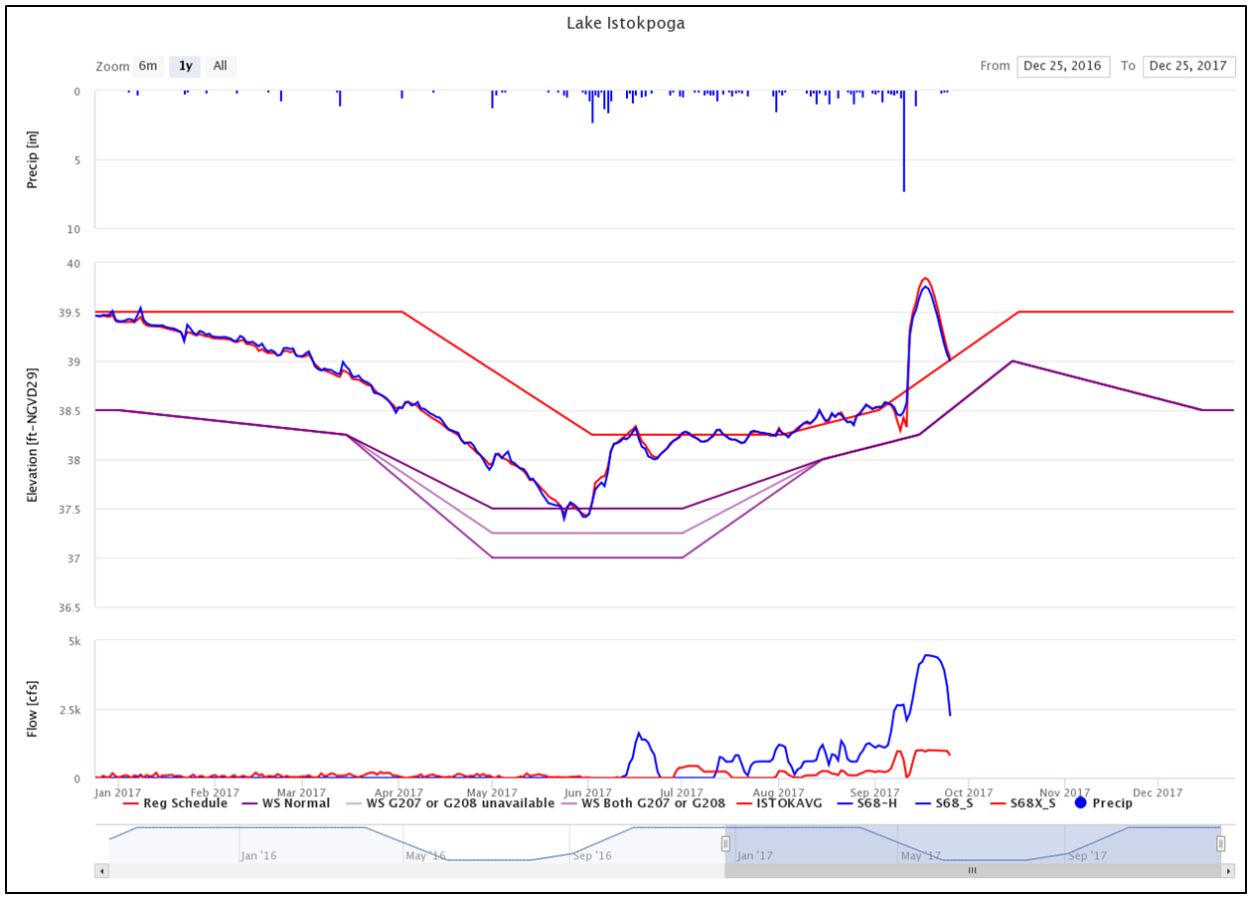


Figure 7

ESTUARIES

St. Lucie Estuary

Over the past week, provisional flows averaged about 2,848 cfs at S-80, 2,470 cfs at S-308, 768 cfs at S-49 on C-24, 740 cfs at S-97 on C-23, and 477 cfs from Ten Mile Creek at the Gordy Road Structure. Average inflow from tidal basin tributaries is estimated to be 325 cfs (Figures 1 and 2). Total inflow averaged about 5,158 cfs last week and 5,045 cfs over last month.

Over the past week, salinity increased throughout the estuary (Table 1, Figures 3 and 4). The seven-day moving average salinity of the water column (an average of the surface and bottom salinity) at the US1 Bridge is 0.6. 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)	**0.2** (0.1)	**0.2** (0.1)	NA[1]
US1 Bridge	**0.4** (0.2)	**0.7** (0.3)	10.0-26.0
A1A Bridge	**4.8** (1.5)	**15.4** (6.4)	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	Questionable	Questionable	Questionable
HR1	bottom	Questionable	Questionable	Questionable

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	3.12	4.59 - 5.74	5.38	3.79	10.61
SF	1.91	5.23 - 6.36	5.49	3.78	6.40
NF	2.37	5.47 - 9.68	1.26	0.03	4.74
ME	2.12	5.04 - 7.49	4.25	1.71	6.08
IRL-SLE					

Caloosahatchee Estuary

During the past week, provisional flows averaged approximately 4,703 cfs at S-77, 5,806 cfs at S-78, and 10,377 cfs at S-79. Average inflow from tidal basin tributaries is estimated to be 1,097 cfs (Figures 6 & 7). Total inflow averaged 11,474 cfs last week and 10,978 cfs over last month.

Over the past week in the estuary, salinity remained the same to Cape Coral Bridge and increased downstream (Table 4, Figures 8 and 9). 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 10). The 30-day moving average surface salinity is 0.2 at Val I-75 and Ft. Myers. Salinity at Val I-75 is forecast to be 0.2 in two weeks with no flow through S-79 (Figure 11). 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** (0.1)	**0.2** (0.1)	NA[1]
*Val I75	**0.2** (0.1)	**0.2** (0.1)	0.0-5.0[2]
Ft. Myers Yacht Basin	**0.2** (0.2)	**0.2** (0.2)	NA
Cape Coral	**0.2** (0.1)	**0.2** (0.1)	10.0-30.0
Shell Point	**4.7** (1.5)	**5.9** (2.4)	10.0-30.0
Sanibel	**NR**[3](NR)	**NR** (NR)	10.0-30.0

[1]Envelope not applicable and [2]Envelope is based on a 30-day average,
[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	5.79 - 8.30	4.09 - 7.82
Dissolved Oxygen (mg/l)	Down for maintenance	Questionable data	No Data

The Florida Fish and Wildlife Research Institute reported on September 22, 2017, that *Karenia brevis*, the Florida red tide dinoflagellate, was not observed in samples collected from Lee County.

Water Management Recommendations

Lake stage is in the Intermediate flow sub-band of 2008 LORS. The 2008 LORS recommends up to 6,500 cfs at S-77 and 2,800 cfs at S-80. Given the current estuarine conditions, there are no ecological benefits associated with freshwater releases from Lake Okeechobee.

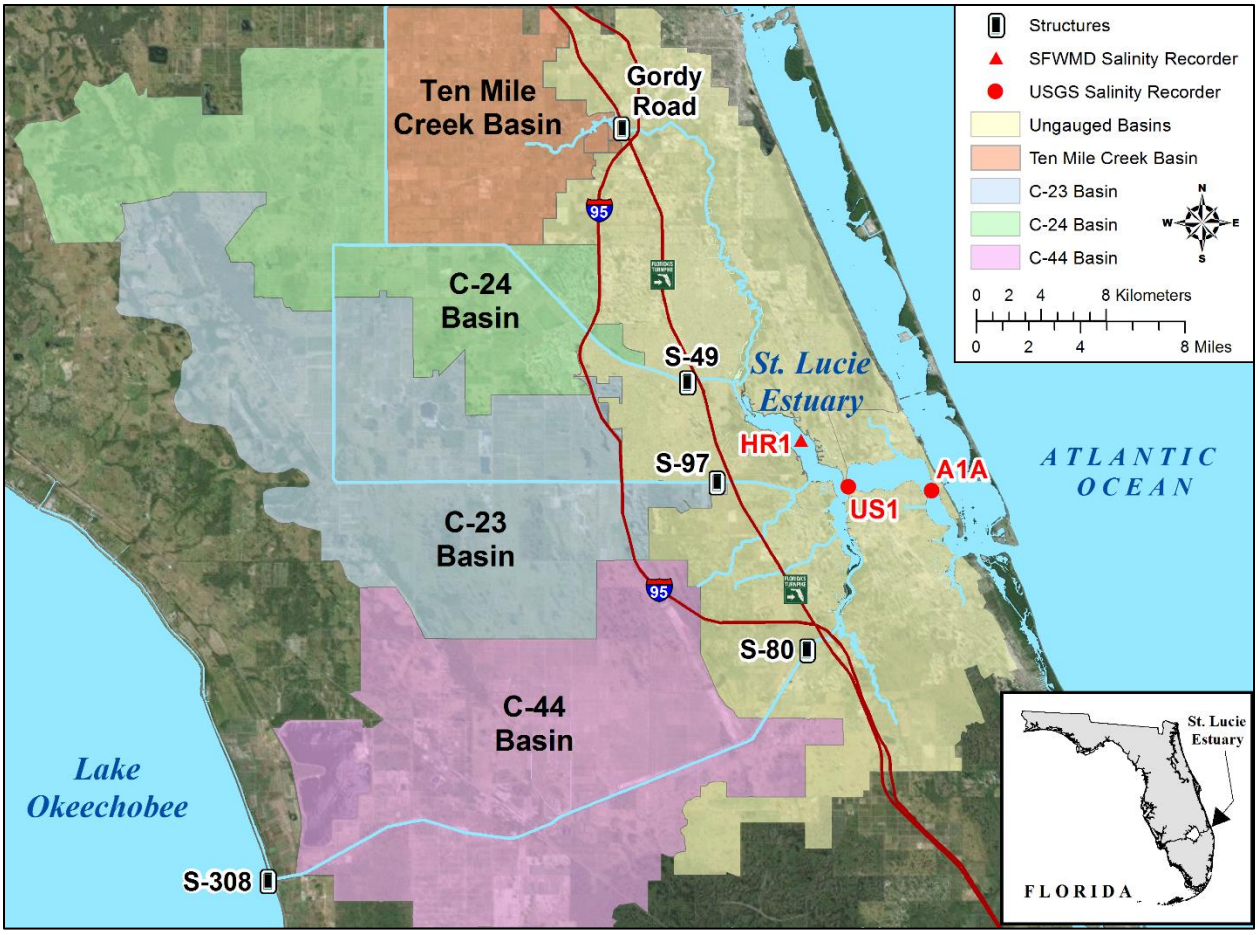


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

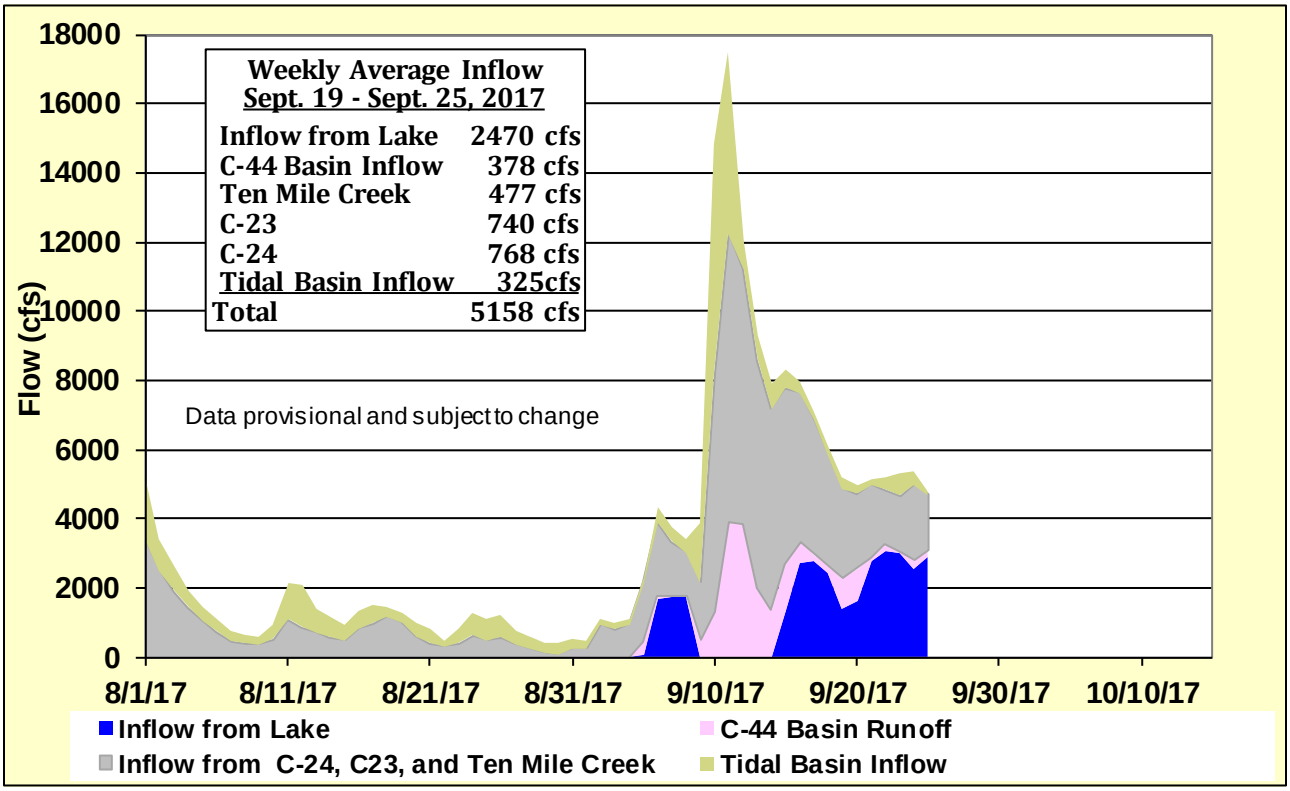


Figure 2. Estimated surface freshwater inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basins into the St. Lucie Estuary.

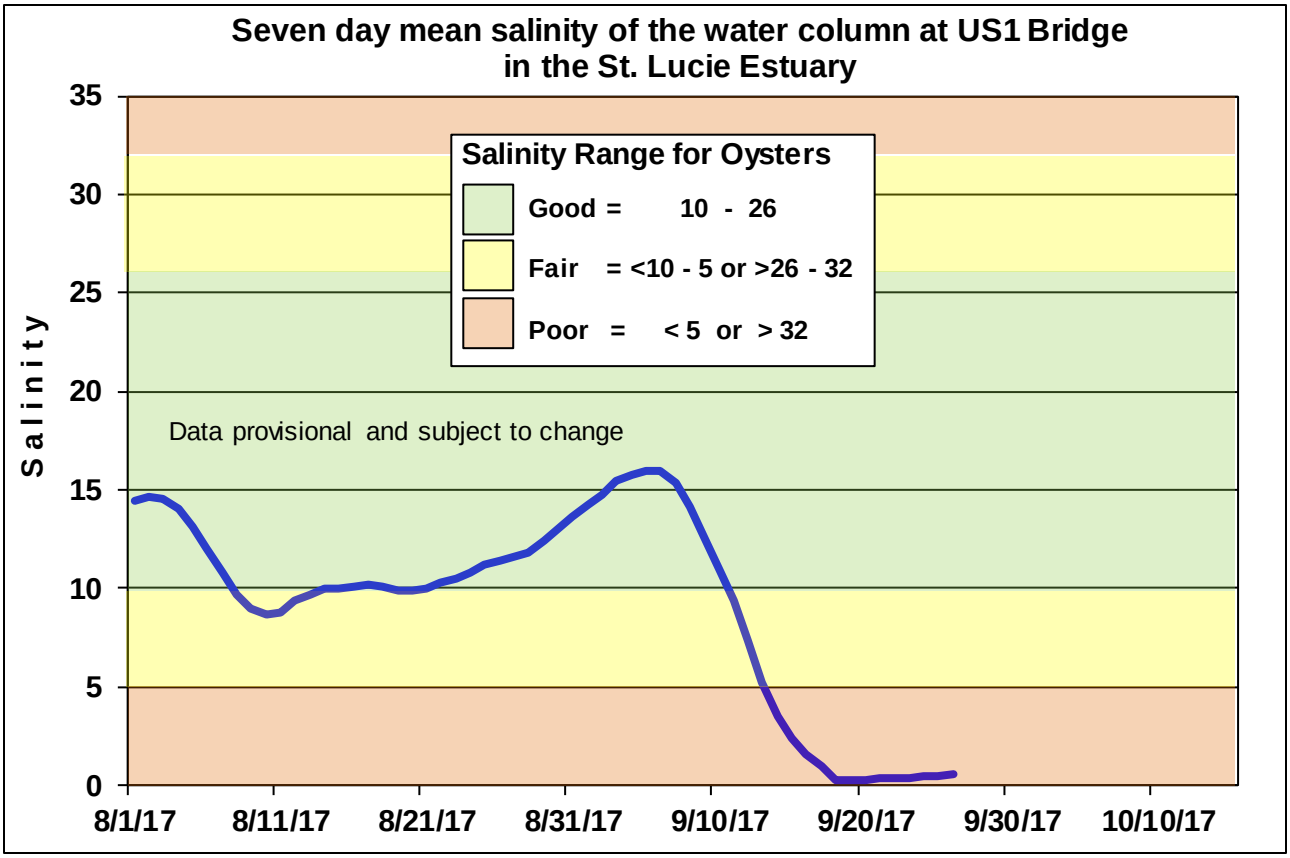


Figure 3. Seven-day mean salinity of the water column at the U.S. Highway 1 Bridge.

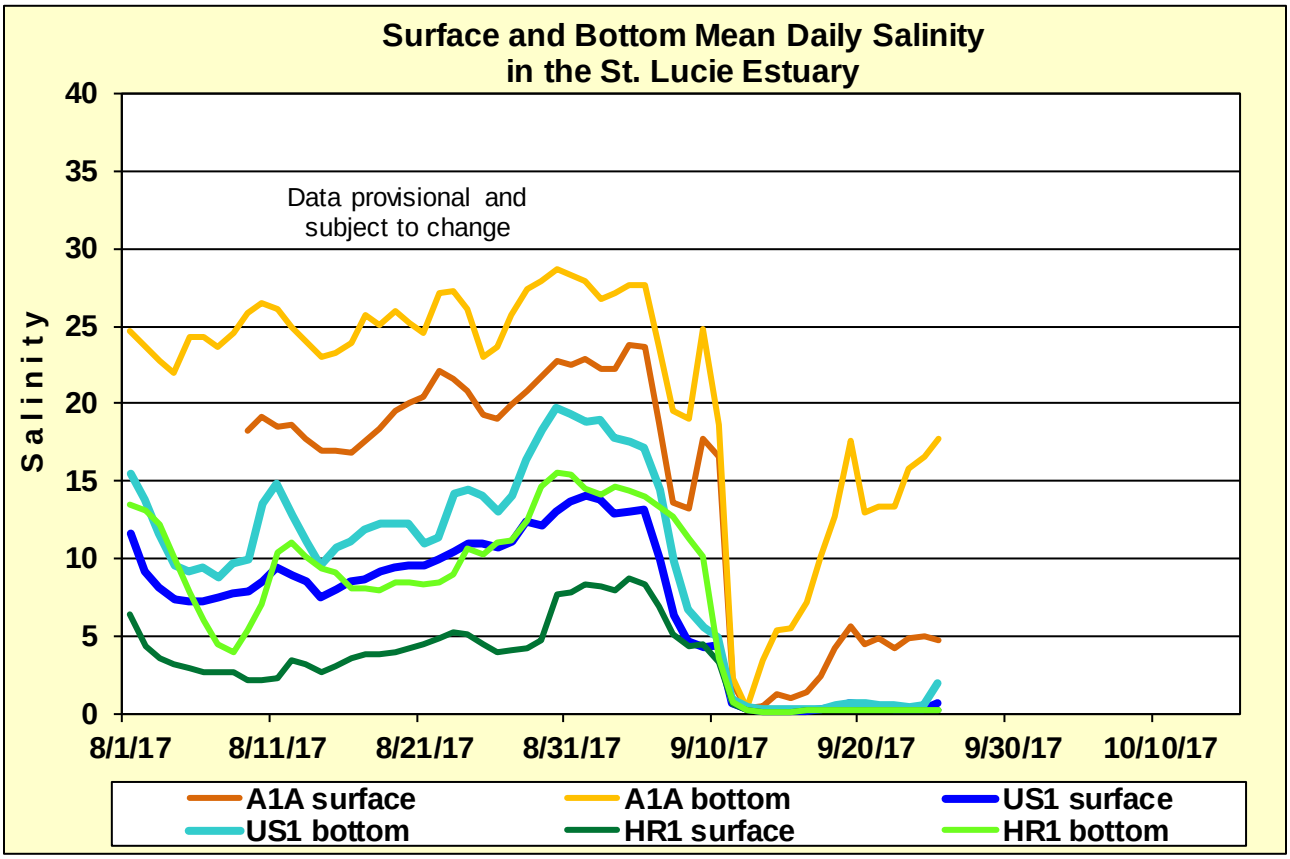


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

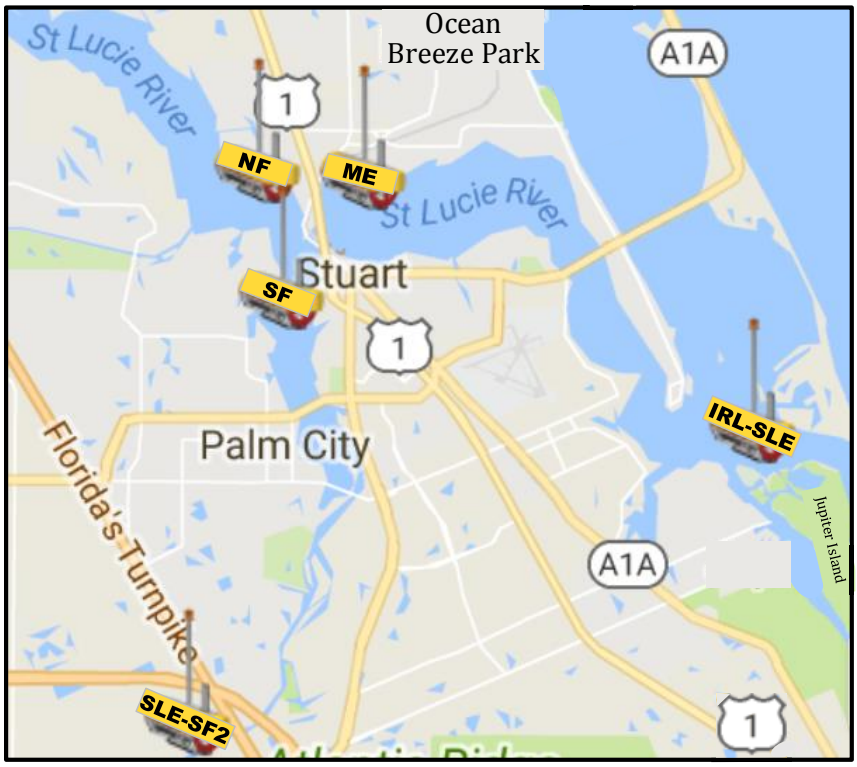


Figure 5. Location of FAU-HBOI LOBO water quality stations in the St. Lucie Estuary.

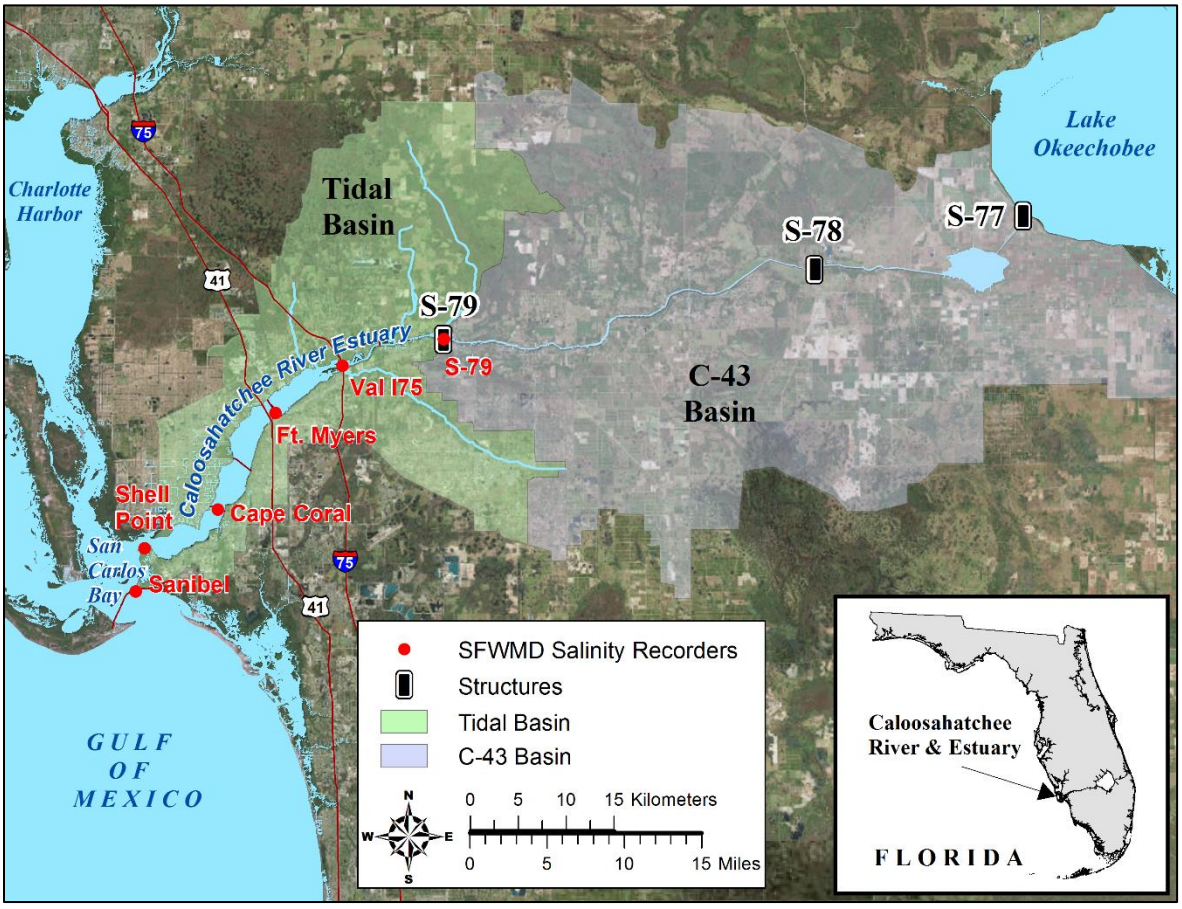


Figure 6. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

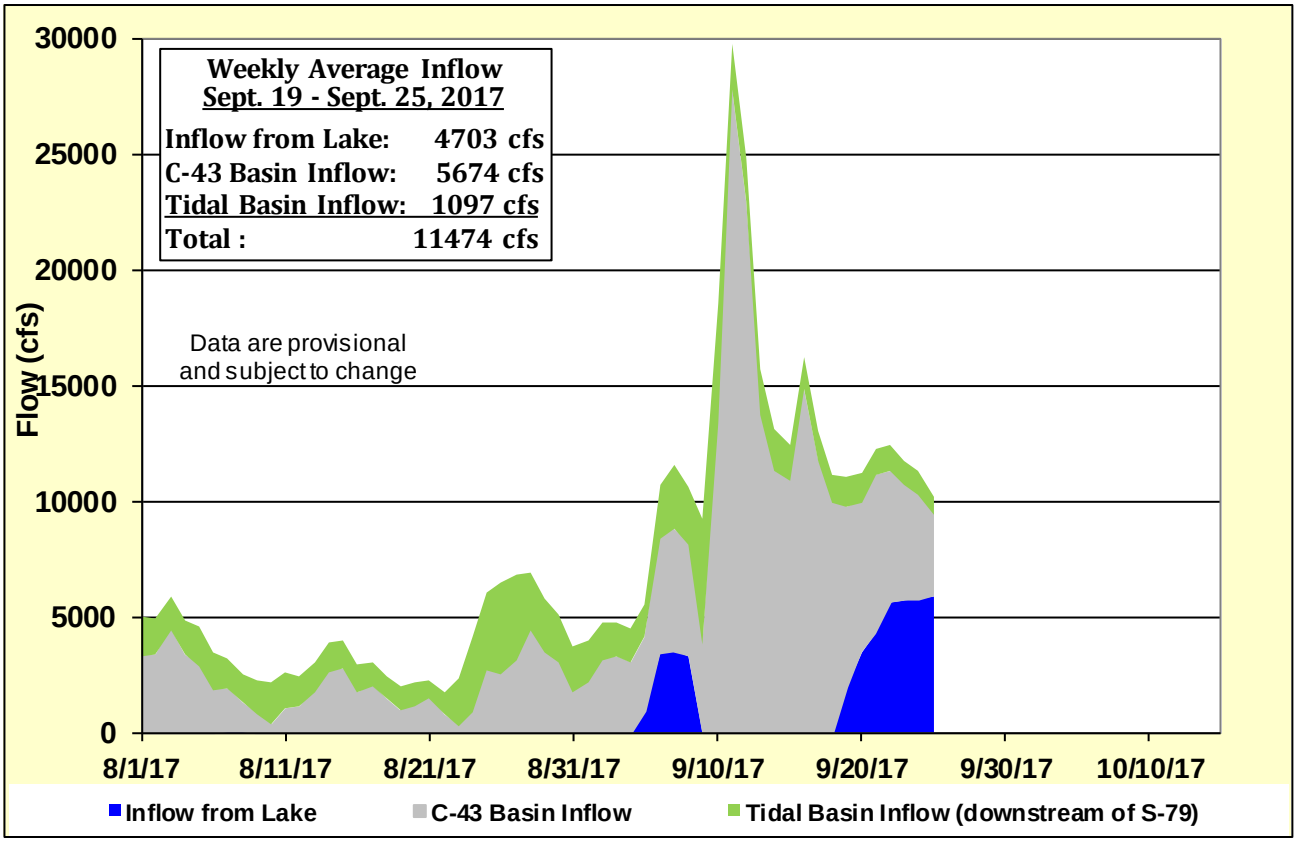
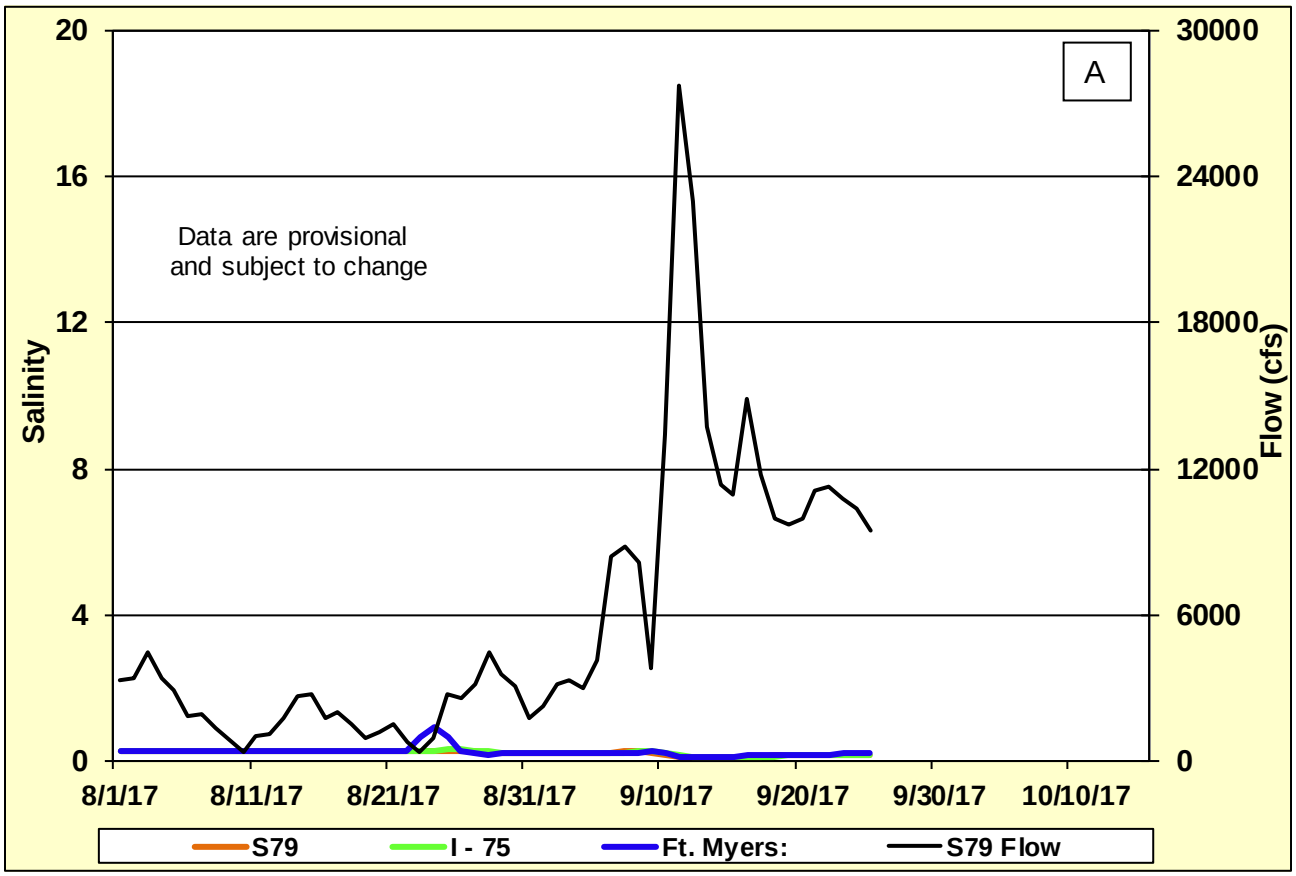


Figure 7. Freshwater inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.



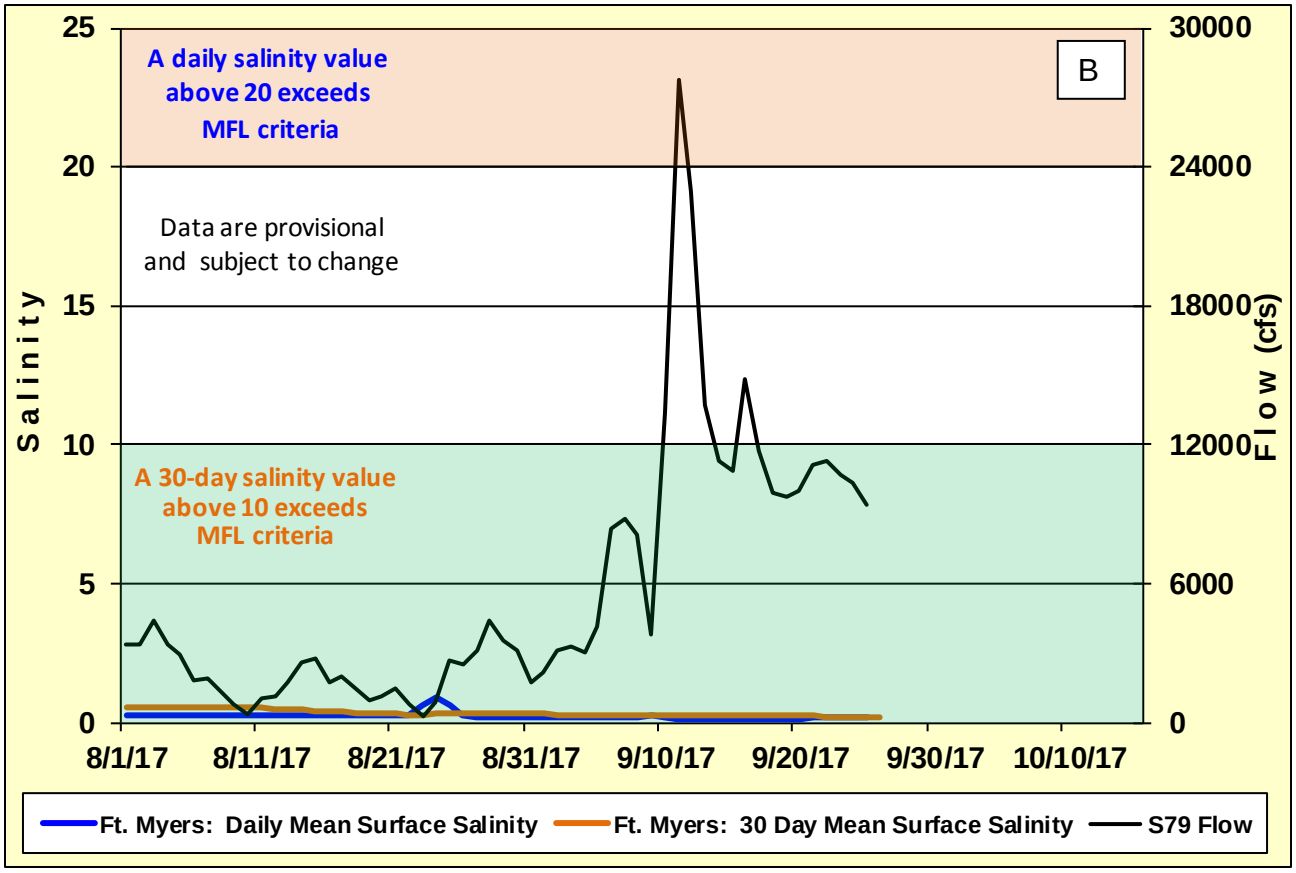


Figure 8. Daily mean flows at S-79 and salinity at upper estuary monitoring stations (A) and 30-day moving average salinity at Ft. Myers (B).

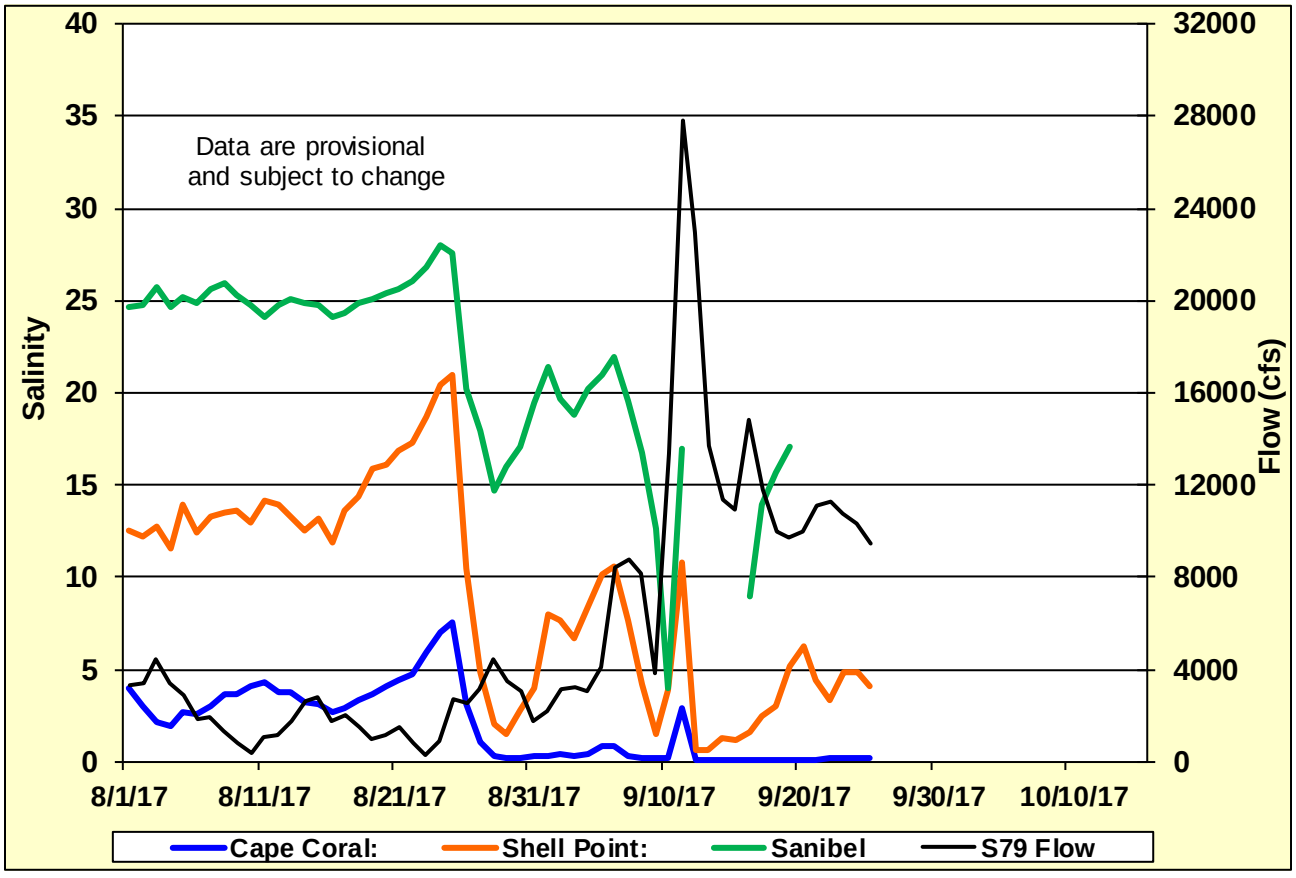


Figure 9. Daily mean flows at S-79 and salinity at lower estuary stations.

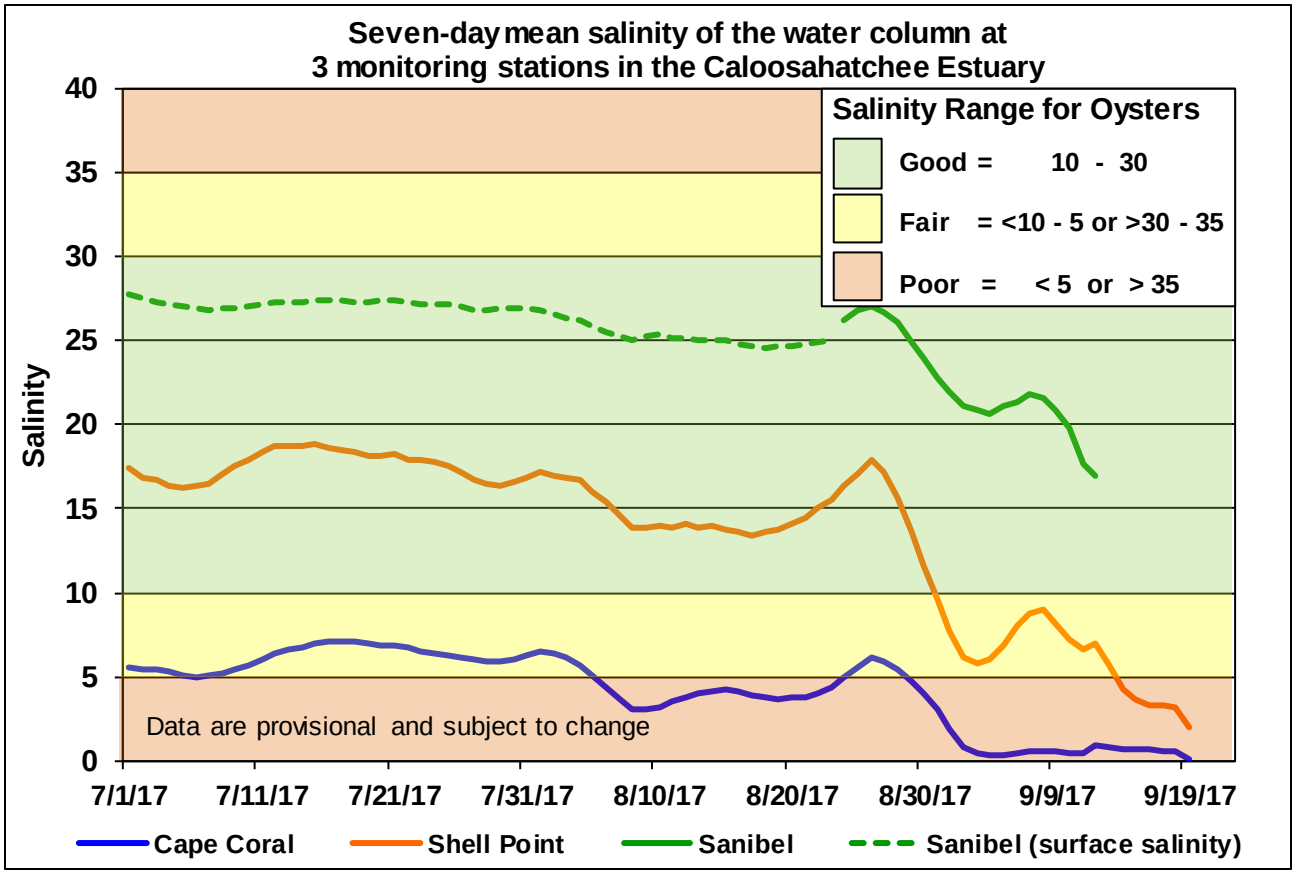


Figure 10. Seven-day mean salinity at Cape Coral Bridge, Shell Point and Sanibel Bridge monitoring stations.

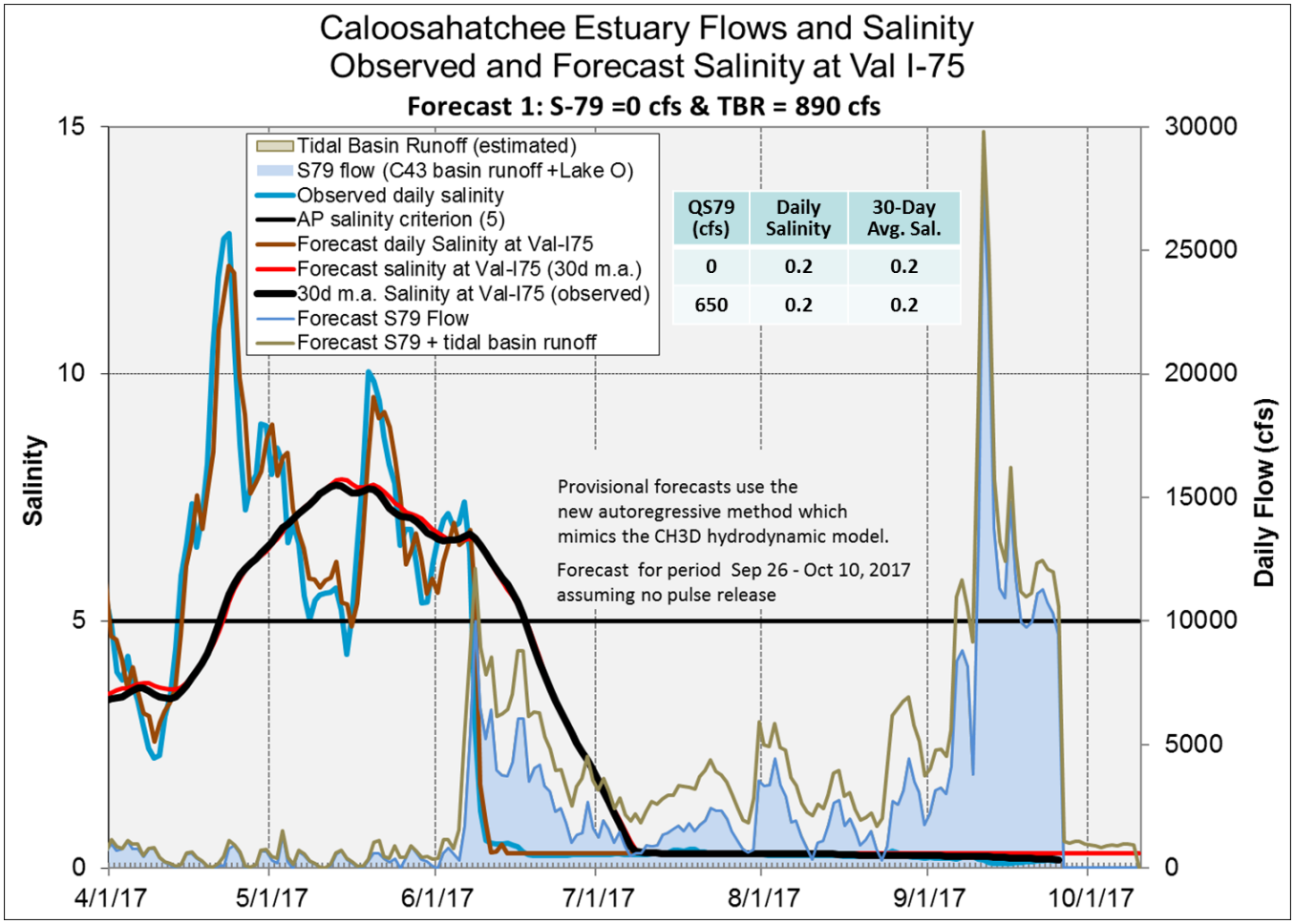
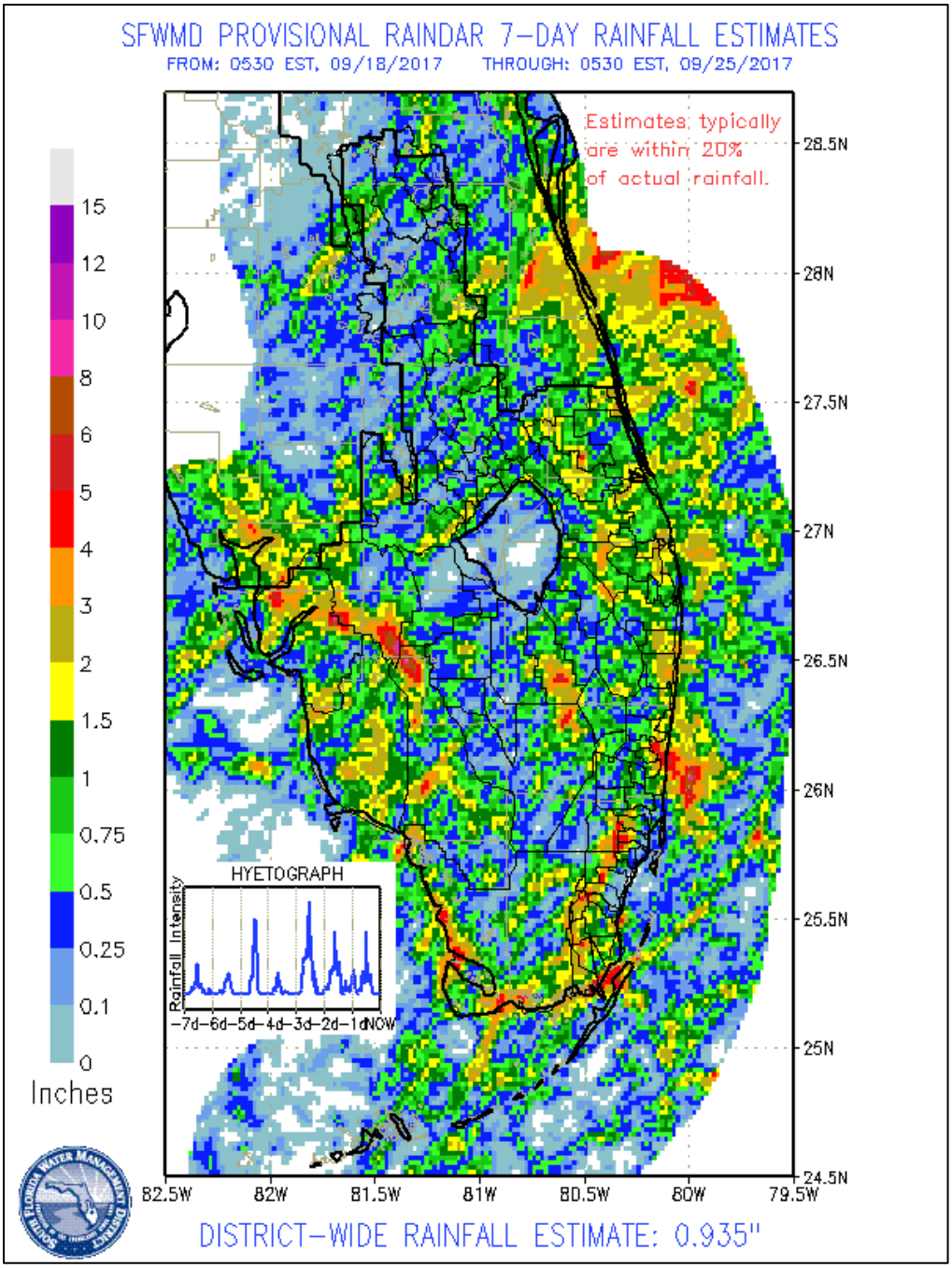


Figure 11. 14-day salinity forecast at Val I-75 assuming no releases at S-79.

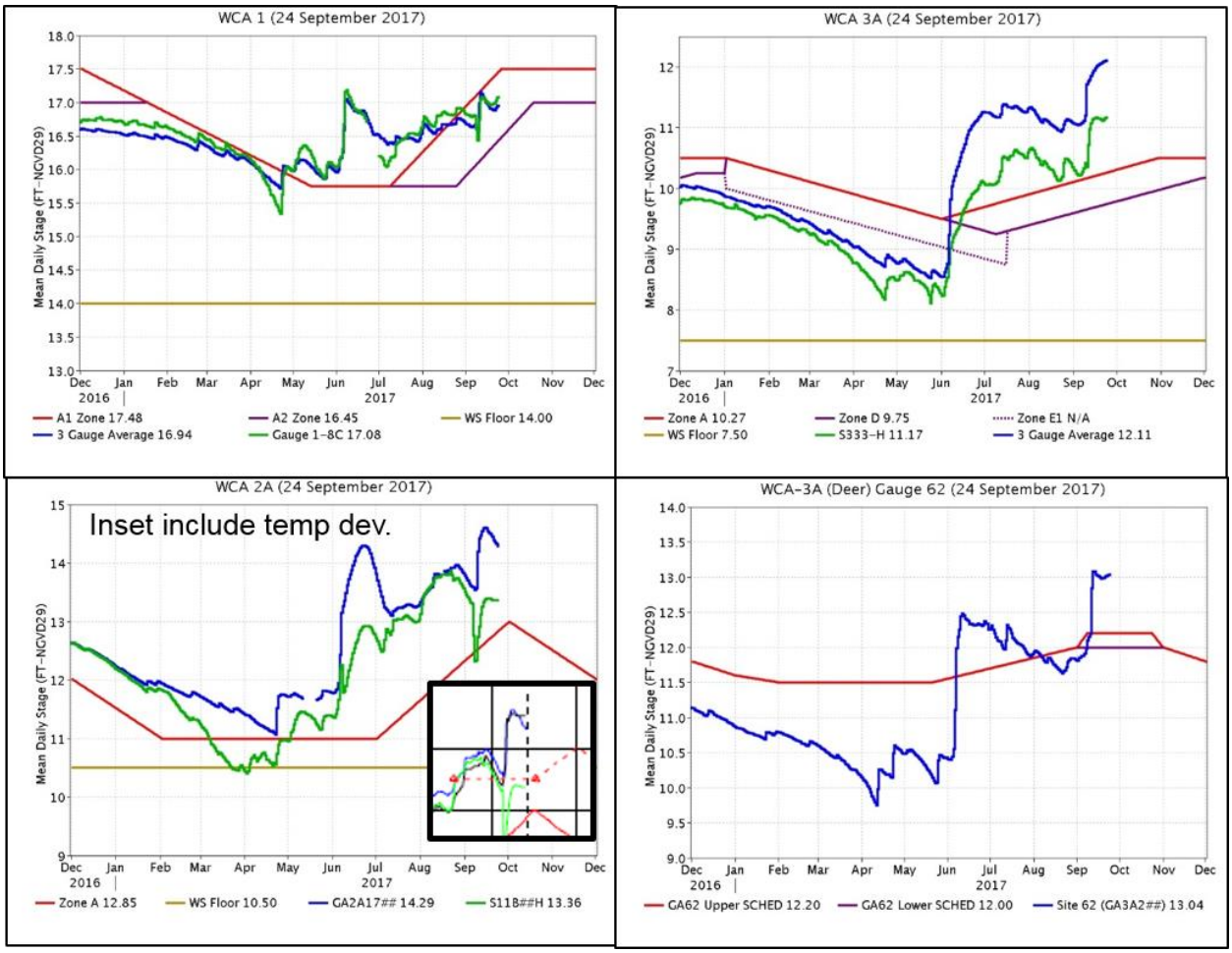
EVERGLADES

Below average rainfall fell across the Everglades last week. WCA-1 is below and WCA-2A and 3A are above regulation. In WCA-3A the stage at gauges 62 - 65 rose evenly, deep water conditions pervade there.

Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	0.83	+0.01
WCA-2A	0.71	−0.26
WCA-2B	0.89	−0.06
WCA-3A	0.68	+0.09
WCA-3B	0.43	−0.06
ENP	1.16	−0.03

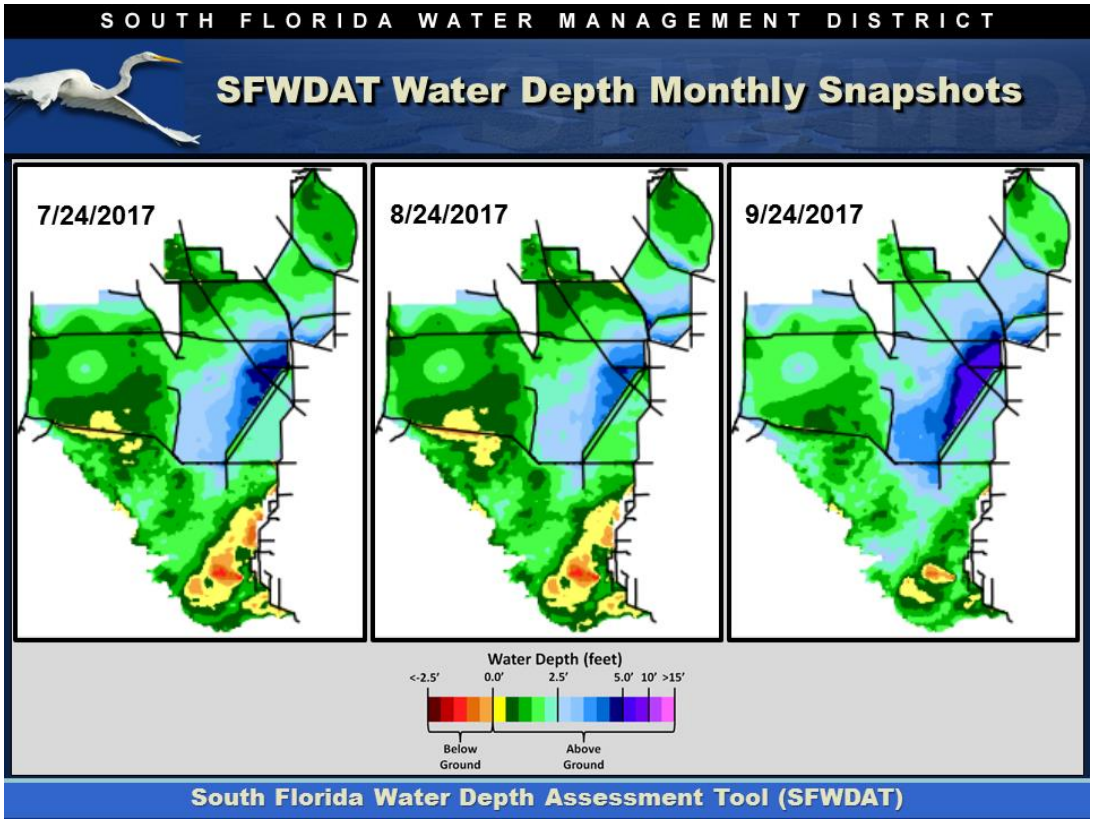


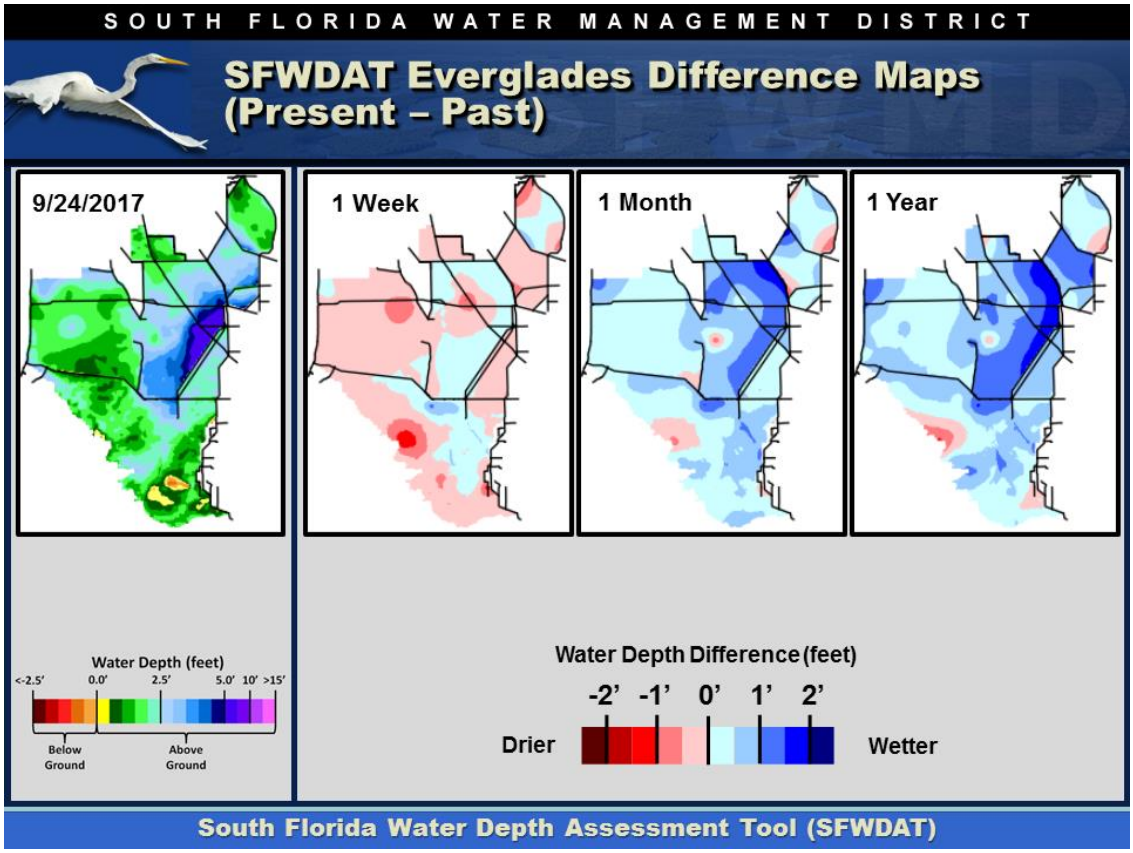
Regulation Schedules: WCA-1 three-gauge average is 0.54 feet below Zone A1, and stage difference between the marsh and the canal is minimal. WCA-2A marsh stage at gauge GA2A17 is currently 1.44 feet above zone A and around 0.80 feet higher than temporary deviation. Marsh stage is 0.93 feet above canal stage at S11B. WCA-3A three-gauge average stage is 1.84 feet above zone A, 2.36 feet higher than zone D and 0.94 higher than canal stage. WCA-3A at gauge 62 (Northwest corner) is 0.84 feet above the upper schedule.



Water Depths and Changes: The WDAT tool for spatial interpolation of depth indicates a wide range in depths from a low of 0.5 to 1.0 feet in Northern WCA-1 to a high of 5.0 to 7.5 feet along the L-67A canal and a significant portion of Eastern WCA-3A.

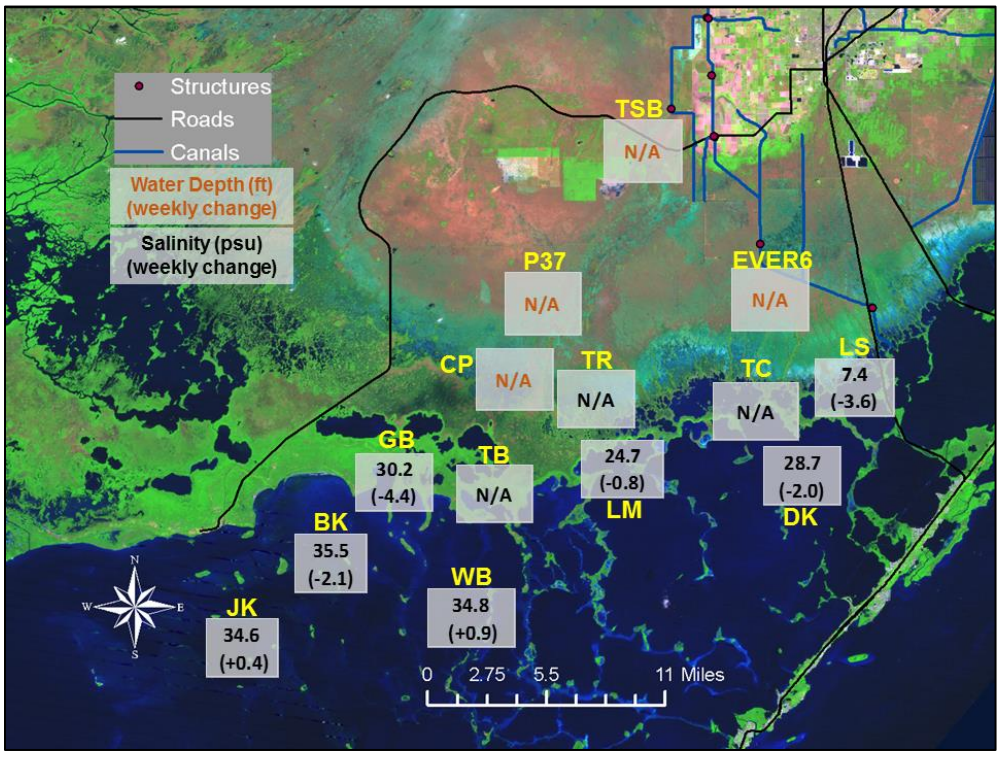
Pan evaporation was estimated at 1.64 inches above the pre-project estimate of 1.27 inches.

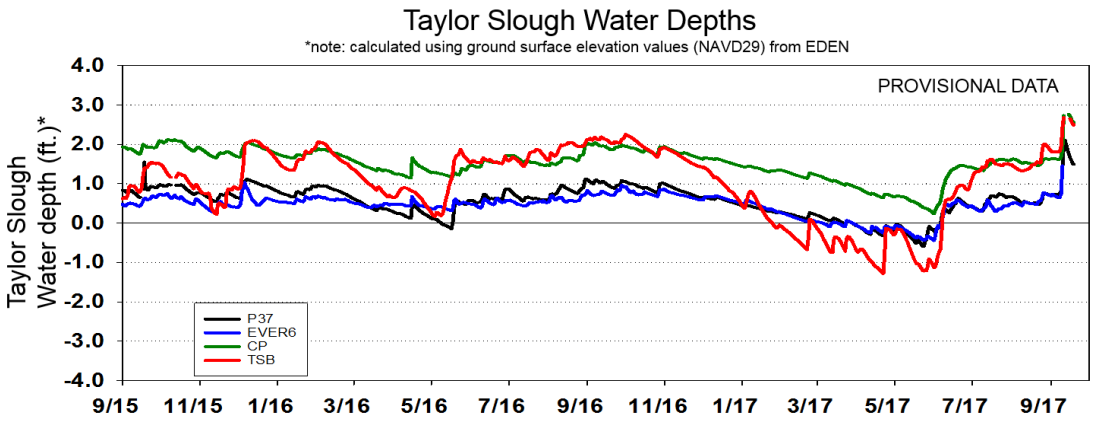


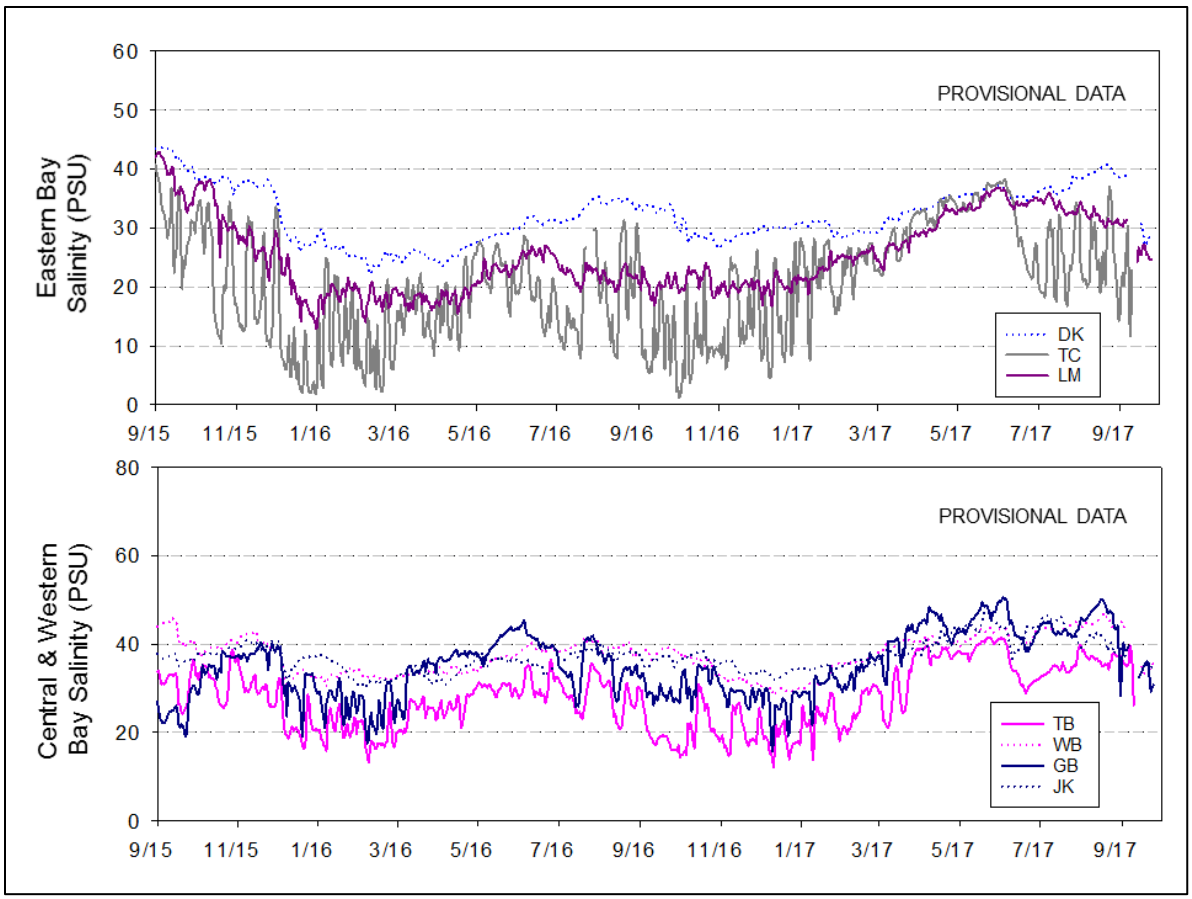


Taylor Slough stages: Water level data was not available this week as data transmission difficulties continue with Everglades National Park. Most recent data available is from September 19. Rainfall associated with Hurricane Irma caused water levels to rise 6 to 14 inches within Taylor Slough.

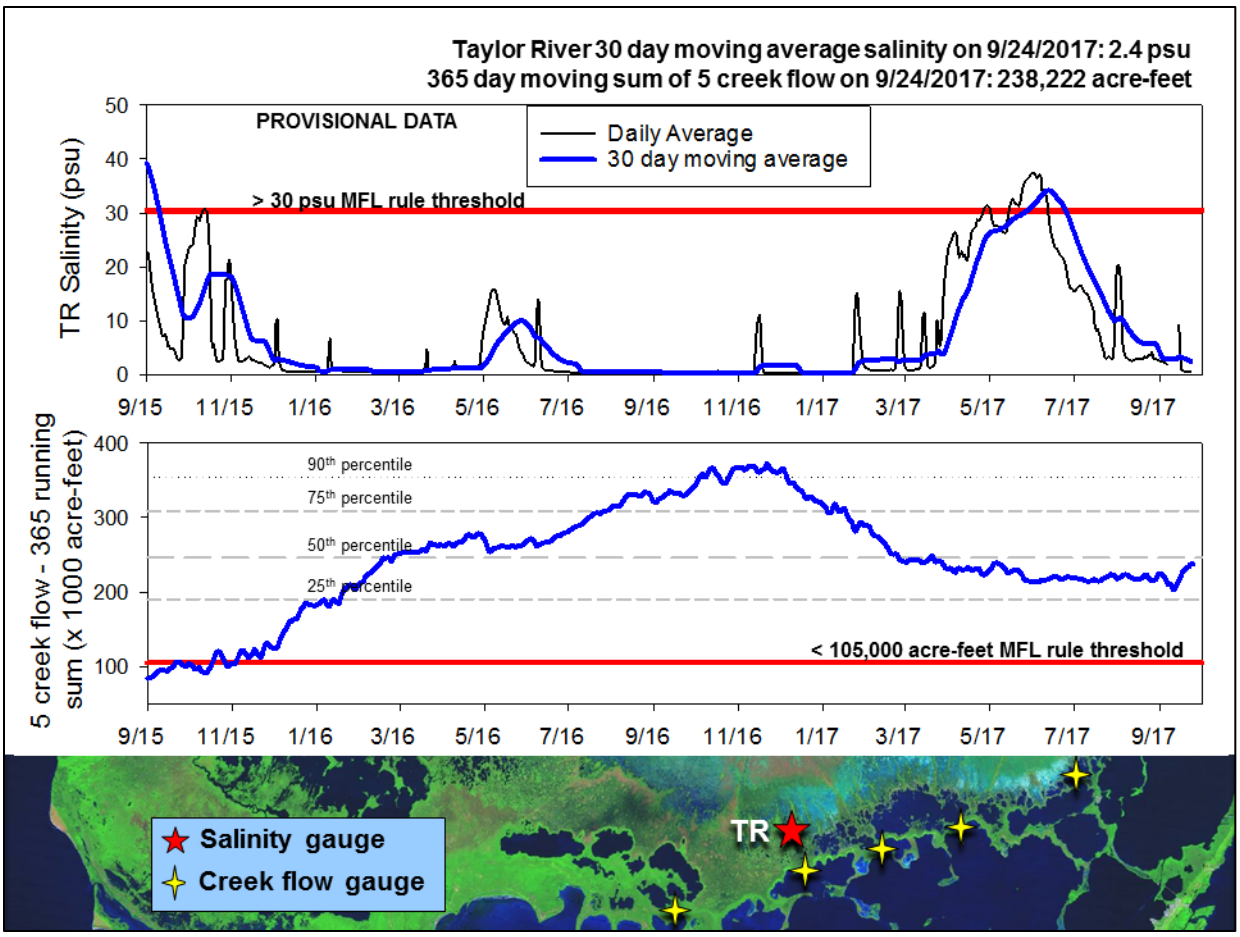
Florida Bay salinity: Salinities decreased as a result of the rain and flow associated with Hurricane Irma. Prior to the hurricane, salinities ranged from 22 psu to 44 psu with the highest values in the central Bay region. Currently, salinities range from 7 in the US Highway 1 corridor to 36 in the western Bay. The western nearshore area is still 4 psu above average for this time of year while other regions are within 1 psu of average.







Florida Bay MFL: Mangrove zone daily average salinity decreased to 0.5 psu as of September 23. The calculated 30-day moving average decreased to 2.4 psu by September 23 but this does not include increased salinity from storm surge since data for that period was lost. The 365-day moving sum of flow from the five creeks identified by stars on the map increased about 16,000 acre-feet since prior to the hurricane to end at 238,222 acre-feet (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

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 4.15 feet, and has exceeded 2.5 feet for 99 days.

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

Everglades Ecological Recommendations, September 26th, 2017 (red is new)

Area	Current Condition	Cause(s)	Recommendation	Reasons
WCA-1	Stage changes ranged from -0.06 to +0.07'	Rainfall, ET, management	Where/when possible achieve high water targets (17.5 ft).	Protect habitat and facilitate invasive plant treatments.
WCA-2A	Stages decreased -0.26'	Rainfall, ET, management	Moderate ascension rates as possible. Manage for relief of high water conditions.	Protect habitat, wildlife and support apple snail reproduction.
WCA-2B	Stages decreased -0.06'	Rainfall, ET, management	Moderate ascension rates as possible.	Protect habitat, wildlife and support apple snail reproduction.
WCA-3A NE	Stages increased +0.10'	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 +0.10'	Rainfall, ET, management		
Central WCA-3A S	Stages increased +0.10'	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 99 days.
Southern WCA-3A S	Stages increased +0.08'	Rainfall, ET, management		
WCA-3B	Stages decreased -0.06'	Rainfall, ET, management	Moderate ascension rates as possible..	Protect habitat, wildlife and support apple snail reproduction.
ENP-SRS	Stages decreased -0.03'	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	N/A	Rain, ET, inflows	Move water southward as possible	When available provide freshwater buffer for ecosystems and slow recession rates.
FB- Salinity	Salinity changes ranged −4.4 to +0.9 psu.	Rain, ET, inflows, wind	Move water southward as possible	When available, provide freshwater to produce low salinity wet season conditions.