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 19, 2017

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

Hurricane Jose is moving north off the coast of Virginia and a trough extends southwest across the Florida peninsula. Expect shower and thunderstorm activity to develop near the trough today and Wednesday with heaviest activity along the east coast where onshore winds will bring an inflow of moisture. The trough should begin lifting northward on Thursday and daytime heating should generate scattered afternoon showers and thunderstorms focused north and over the southern interior. Hurricane Maria is forecast to move more northward to the east of the Bahamas this weekend. Maria should start bringing northeast steering winds on Friday which should focus afternoon shower activity over the interior and southwest Friday and Saturday. Maria should then push some dry air southward over the District Sunday and the early part of next week.

Kissimmee

Tuesday morning stages and departures from schedule were 59.5 feet (2.7 feet above schedule) in East Lake Toho, 56.0 feet (2.2 feet above schedule) in Lake Toho, and 53.9 feet (2.6 feet above schedule) in Kissimmee Cypress Hatchineha (KCH); S65A headwater stage was 50.4 feet. Tuesday morning discharges were 9,797 cubic feet per second (cfs) at S65, 8,420 cfs at S65A, and 6,837 cfs at S65E. Dissolved oxygen concentration in the Kissimmee River averaged 1.1 milligrams per liter (mg/L) for the week. Kissimmee River mean floodplain depth on Sunday was 5.21 feet.

Lake Okeechobee

Lake stage is 15.66 feet NGVD having increased by 1.99 feet over the past two weeks and 2.27 feet over the past month, due almost exclusively to Hurricane Irma. 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. The high inflows and resuspended Lake sediment are also expected to significantly increase water column total phosphorus, which could lead to algal blooms in the coming months as turbidity begins to decline.

Estuaries

Total discharge to the St. Lucie estuary averaged 8,875 cfs over the past week with 1,324 cfs (15%) coming from Lake Okeechobee. Salinities at the three monitoring stations were fresh to oligohaline due to the high inflow conditions caused by Hurricane Irma. The seven-day average

salinity at the US1 Bridge is in the poor range for adult oysters. Low oxygen levels (<3 mg/L) were recorded in the North Fork.

Total inflow to the Caloosahatchee estuary averaged 15,222 cfs over the past week with 0 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 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 in the good range for adult oysters at Sanibel, and in the poor range at Shell Point and 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 above target depths. Operational restrictions are in place for vegetation rehabilitation in STA-1E and STA-2. Due to basin runoff, it is recommended that no Lake releases be sent to the STAs/FEBs this week.

Everglades

For the Hurricane Irma week, stage increases at the gauges monitored for this report averaged by basin: WCA-1 +0.53 feet, WCA-2A +0.76 feet, WCA-3A +0.72 feet. The NE Shark River Slough gauge stage increased +0.67 feet. WCA-1 is below regulation schedule while WCA-2A and WCA-3A are significantly 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 4.07 feet, and has exceeded 2.5 feet for 94 days. Data for Everglades National Park and Florida Bay was unavailable this week.

Supporting Information

KISSIMMEE BASIN

Kissimmee Basin Rainfall

The Upper Kissimmee Basin received 1.01 inches of rainfall in the past week and the Lower Basin received 1.38 inches (SFWMD Daily Rainfall Report 9/18/2017).

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: **9/19/2017**

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)						
							9/17/17	9/10/17	9/3/17	8/27/17	8/20/17	8/13/17	8/6/17
Lakes Hart and Mary Jane	S62	582	LKMJ	62.3	R	60.0	2.3	0.1	0.0	0.1	0.1	0.0	0.0
Lakes Myrtle, Preston, and Joel	S57	200	S57	64.2	R	61.0	3.2	0.1	-0.1	0.1	0.0	0.0	0.0
Alligator Chain	S60	548	ALLI	64.5	R	63.2	1.3	0.0	0.0	0.0	0.0	0.0	0.0
Lake Gentry	S63	850	LKGT	61.9	R	61.0	0.9	0.0	0.0	-0.1	0.0	0.0	0.0
East Lake Toho	S59	1171	TOHOE	59.4	R	56.8	2.6	0.0	0.0	0.1	0.0	0.0	0.0
Lake Toho	S61	2503	TOHOW, S61	55.9	R	53.8	2.1	0.0	0.0	0.0	0.0	0.0	0.1
Lakes Kissimmee, Cypress, and Hatchineha	S65	5535	KUB011, LKIS5B	54.0	R	51.3	2.7	1.3	1.2	1.0	0.9	0.8	0.7

* 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: **9/19/2017**

Metric	Location	Sunday's 1-day average	Weekly Average**									
			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	7/16/17
Discharge (cfs)	S-65	9441	**5535**	1809	1209	1152	958	1181	665	616	342	160
Discharge (cfs)	S-65A	8214	**7539**	2375	1465	1448	1213	1298	1274	927	638	575
Discharge (cfs)	S-65D****	14262	**11906**	2442	2262	2032	2255	2154	2234	1180	1236	838
Discharge (cfs)	S-65E****	15030	**13216**	2584	2279	2085	2276	2195	2319	1293	1321	886
DO concentration (mg/L)***	Phase I river channel	0.3	**1.1**	2.3	2.3	2.0	2.8	2.0	2.2	2.3	1.8	3.0
Mean depth (feet)*	Phase I floodplain	5.21	**4.69**	1.36	1.31	1.18	1.08	1.10	1.00	0.63	0.68	0.46

* 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

Kissimmee Basin Adaptive Recommendations and Operational Actions

Date	Recommendation	Purpose	Outcome	Source
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.			
6/6/2017	No new recommendations.			
5/30/2017	No new recommendations.			
5/22/2017	No new recommendations.			
5/15/2017	Reduce discharge at S65/S65A by 40-50 cfs	Reduce rate of stage decline in KCH while maintaining discharge to the Kissimmee River.	Implemented	KB Ops
5/9/2017	No new recommendations.			
5/3/2017	Reduce discharge at S65/S65A by 50 cfs	Reduce rate of stage decline in KCH		SFWMD Water Management/KB Ops

KCOL Hydrographs (through Sunday midnight)

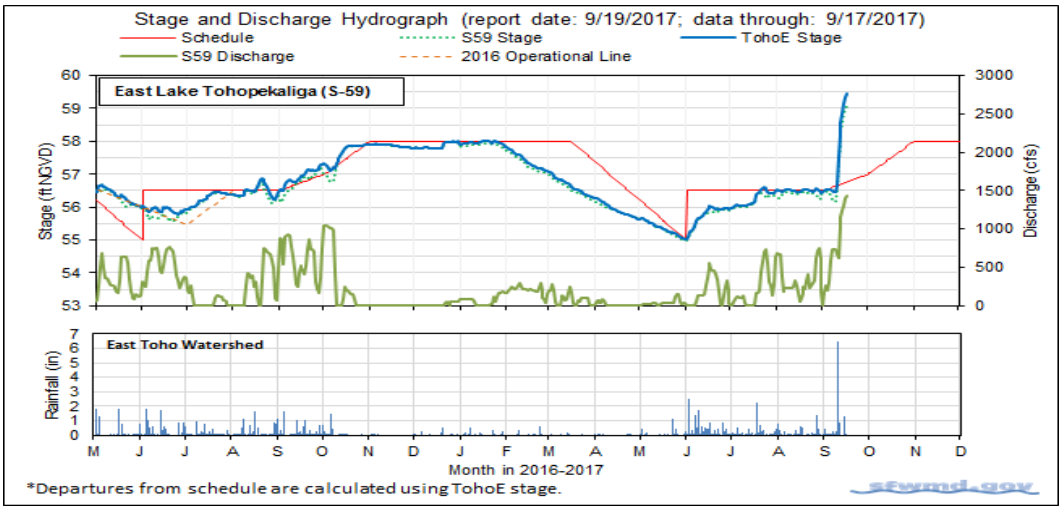


Figure 1.

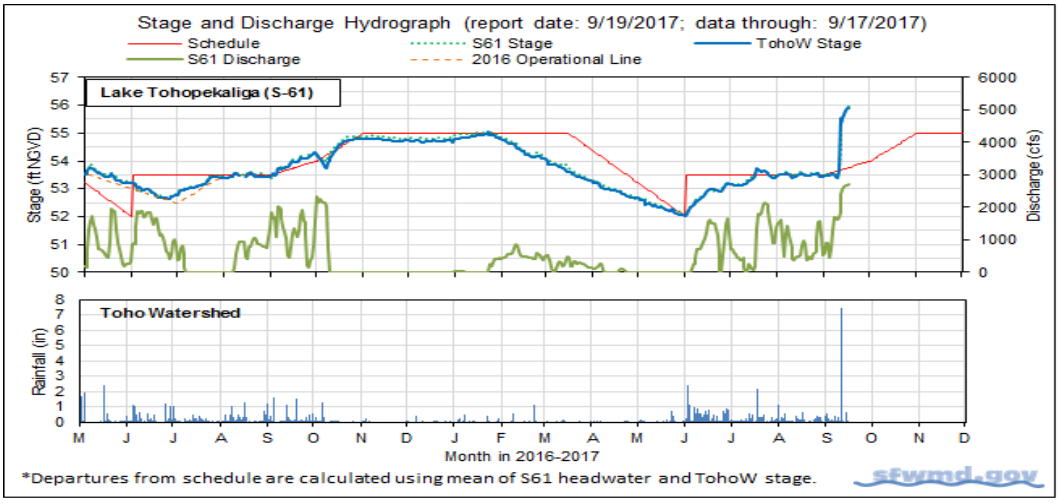
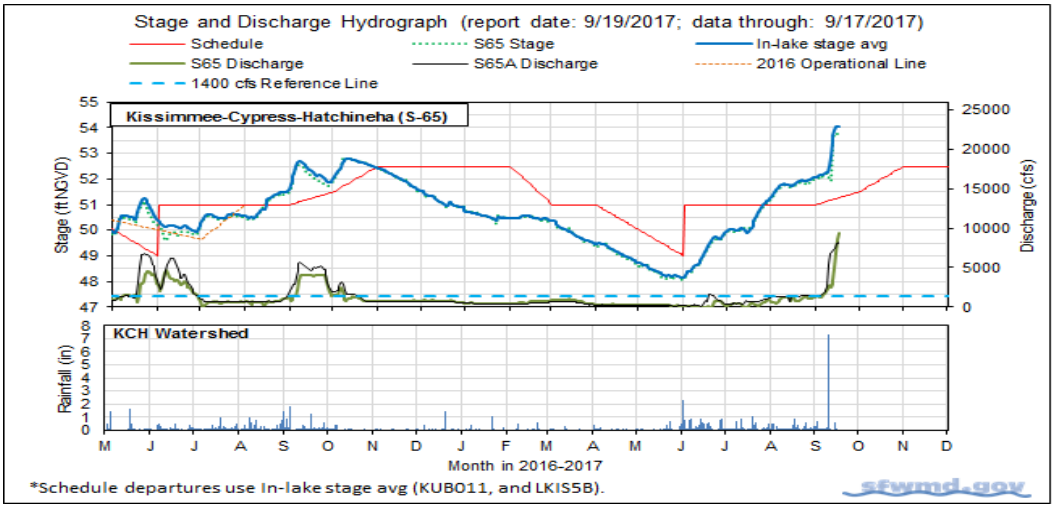


Figure 2.



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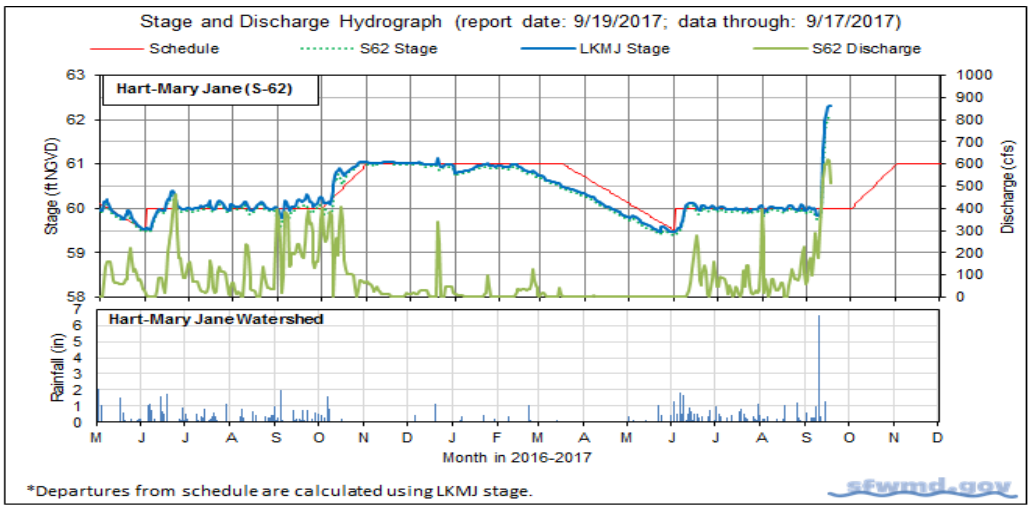


Figure 4.

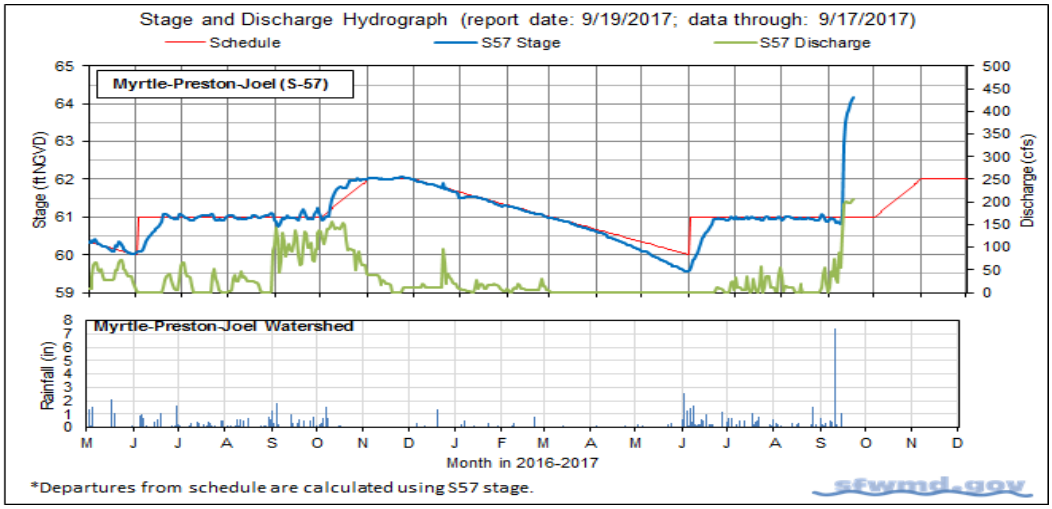


Figure 5.

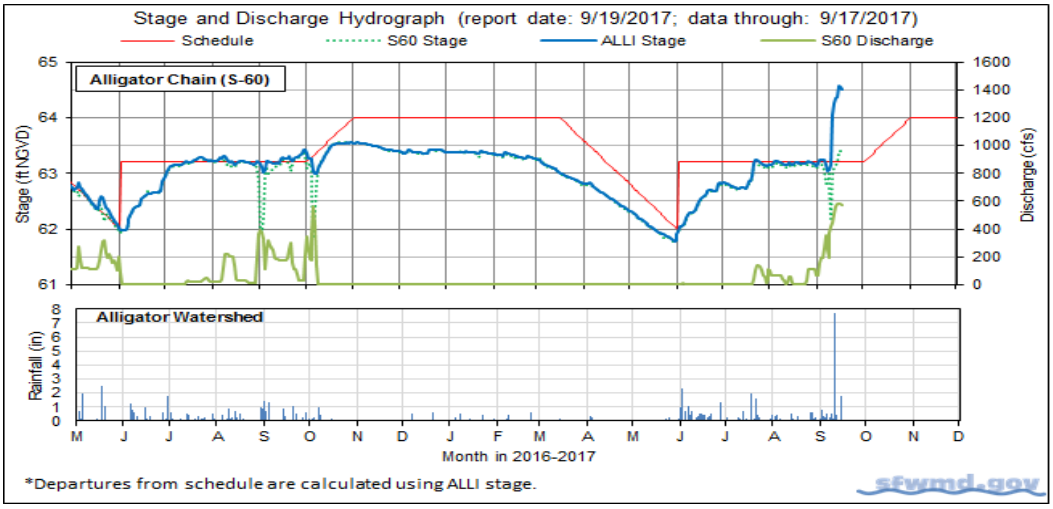


Figure 6.

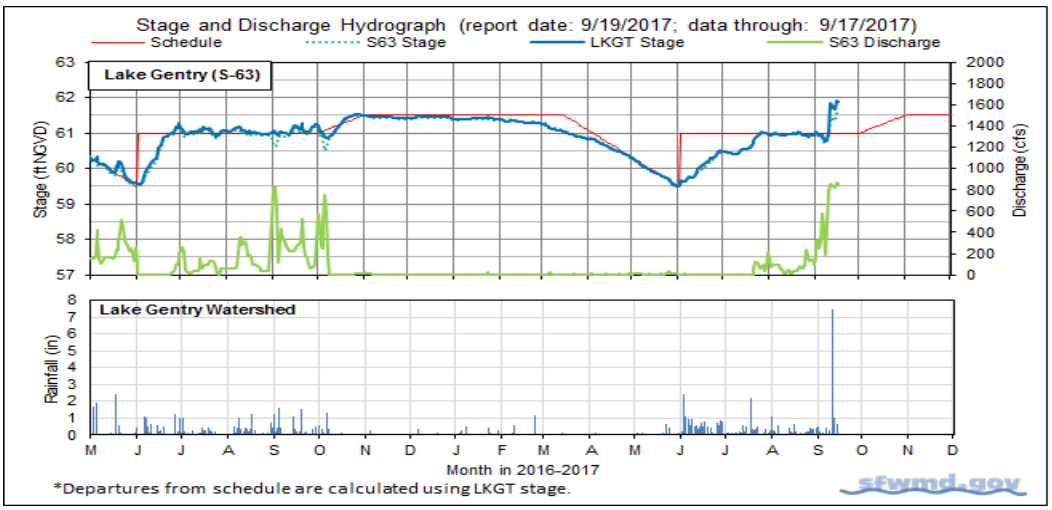


Figure 7.

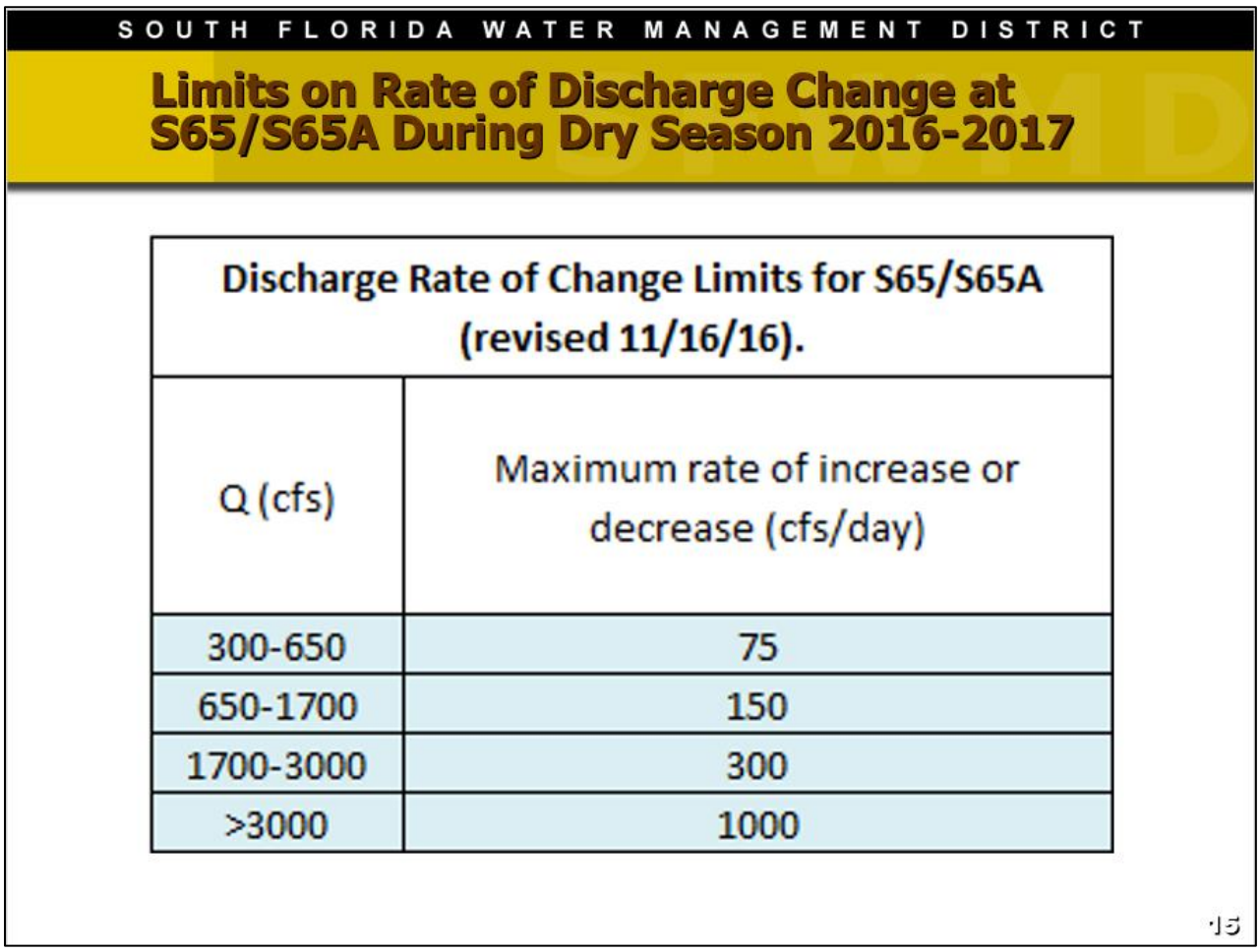


Figure 8. Limits on rate of discharge change at S65/S65A for the 2016-2017 Dry Season.

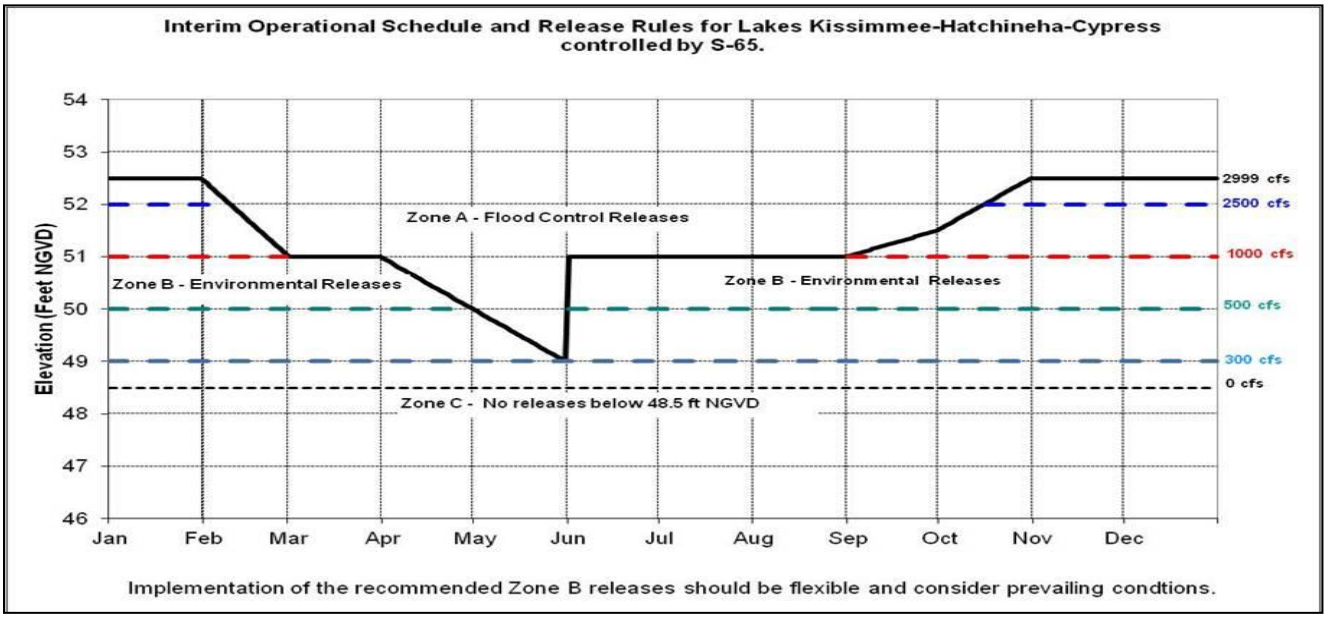


Figure 9. Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years or in Wet Season 2015.

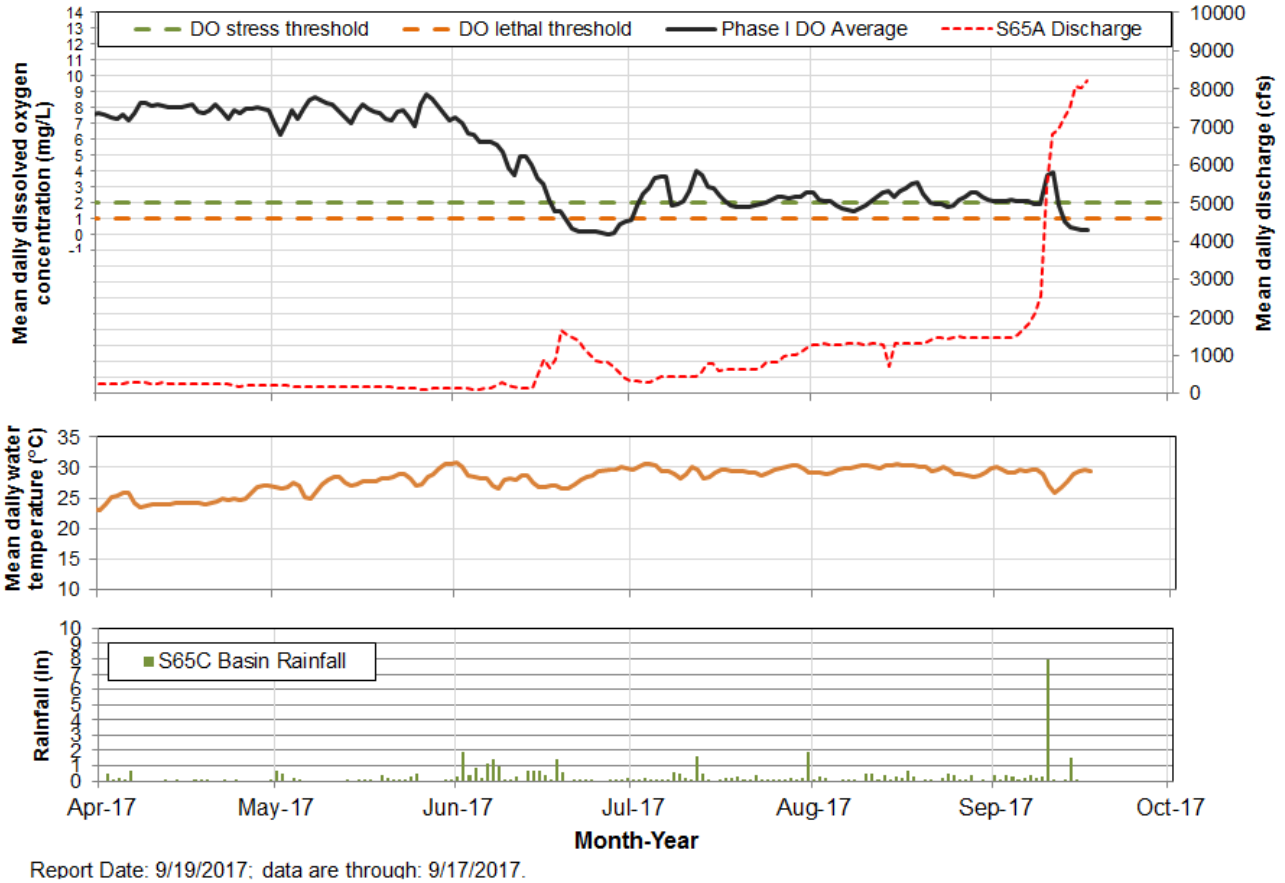


Figure 10. Mean daily Dissolved Oxygen, discharge, temperature and rainfall in the Phase I river channel.

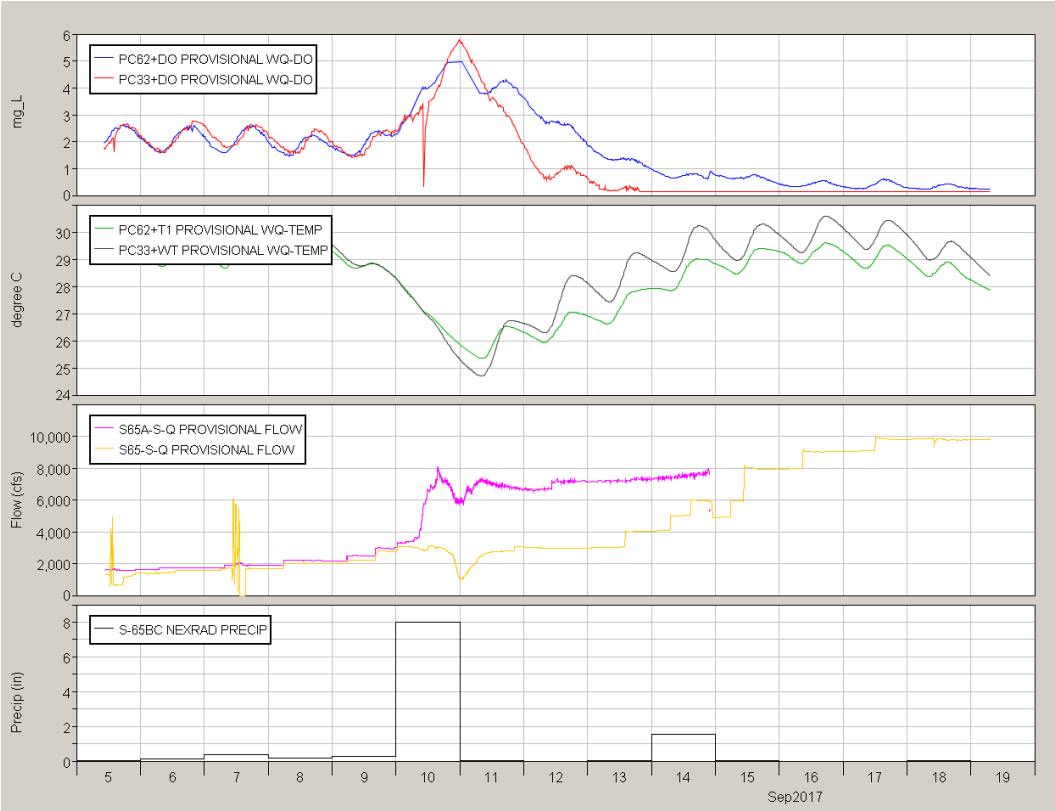


Figure 11. Phase I river channel dissolved oxygen and water temperature (measured at 15 minute intervals) and Pool BC daily rainfall.

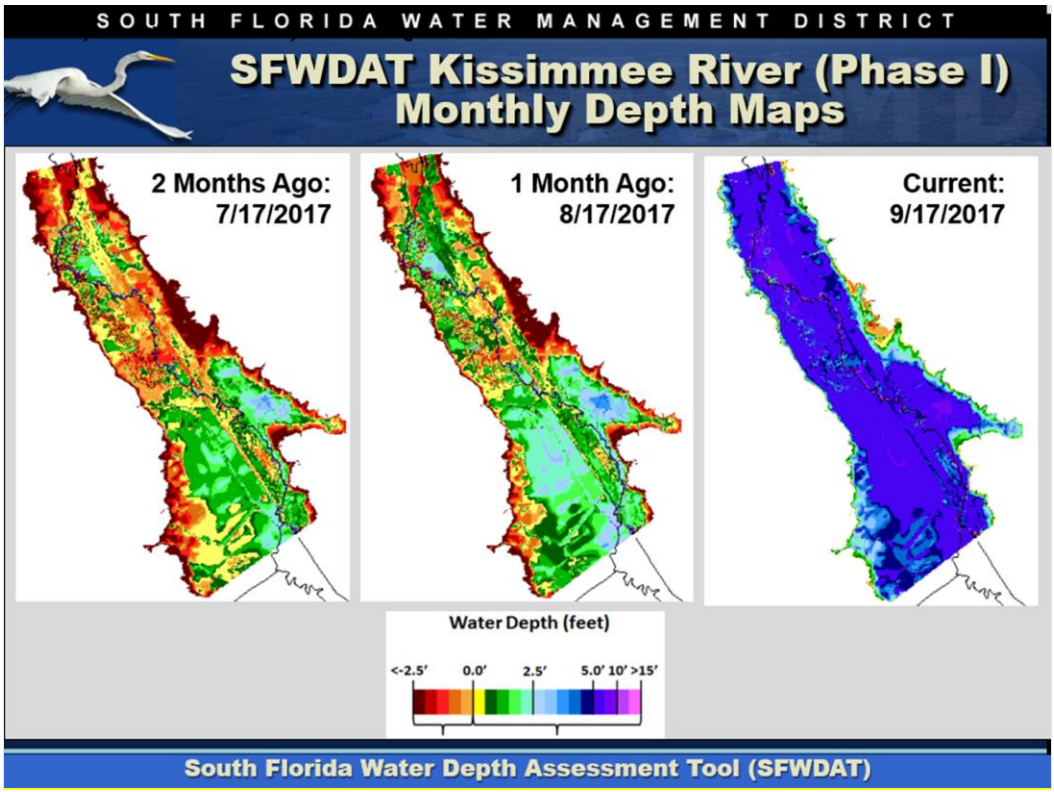
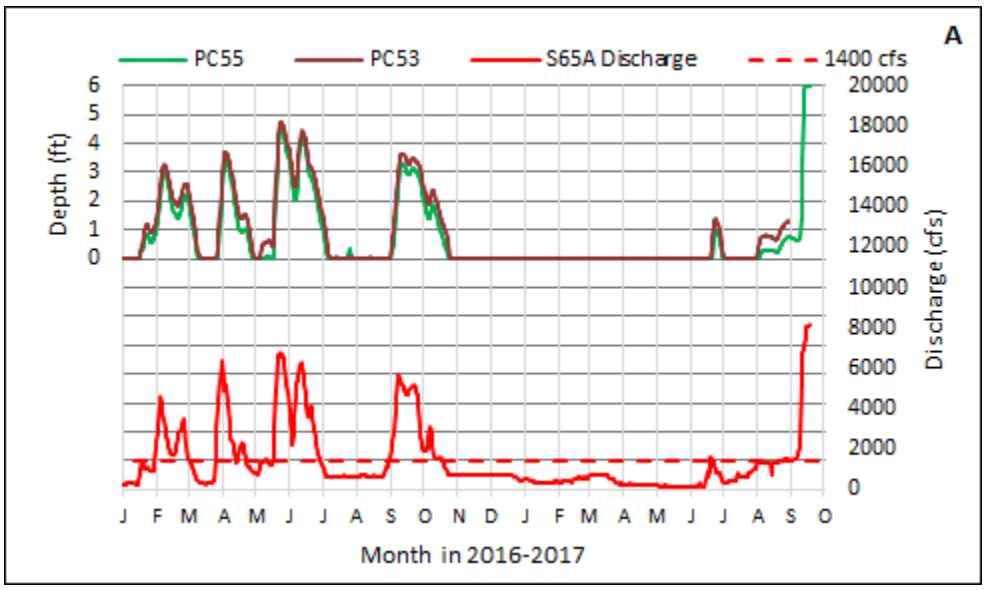
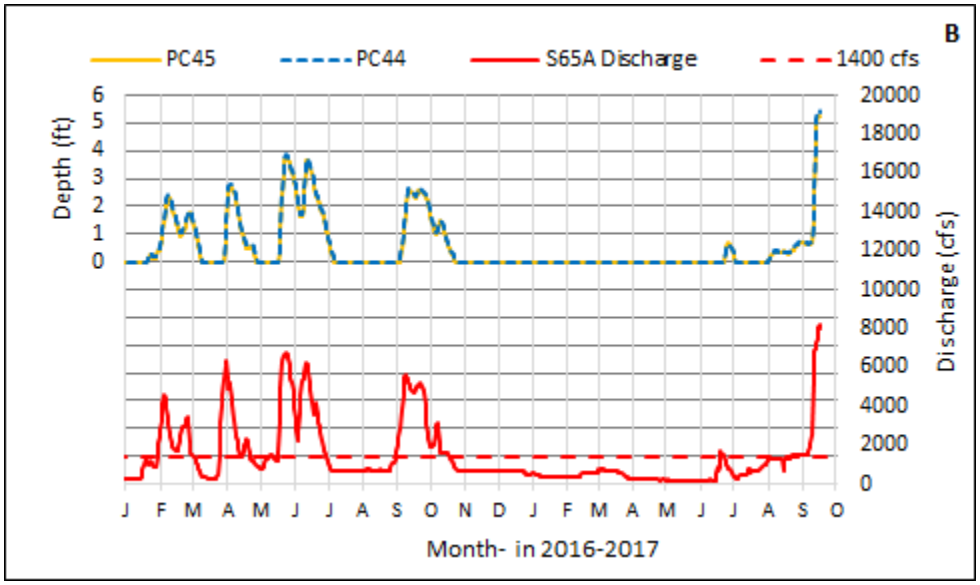


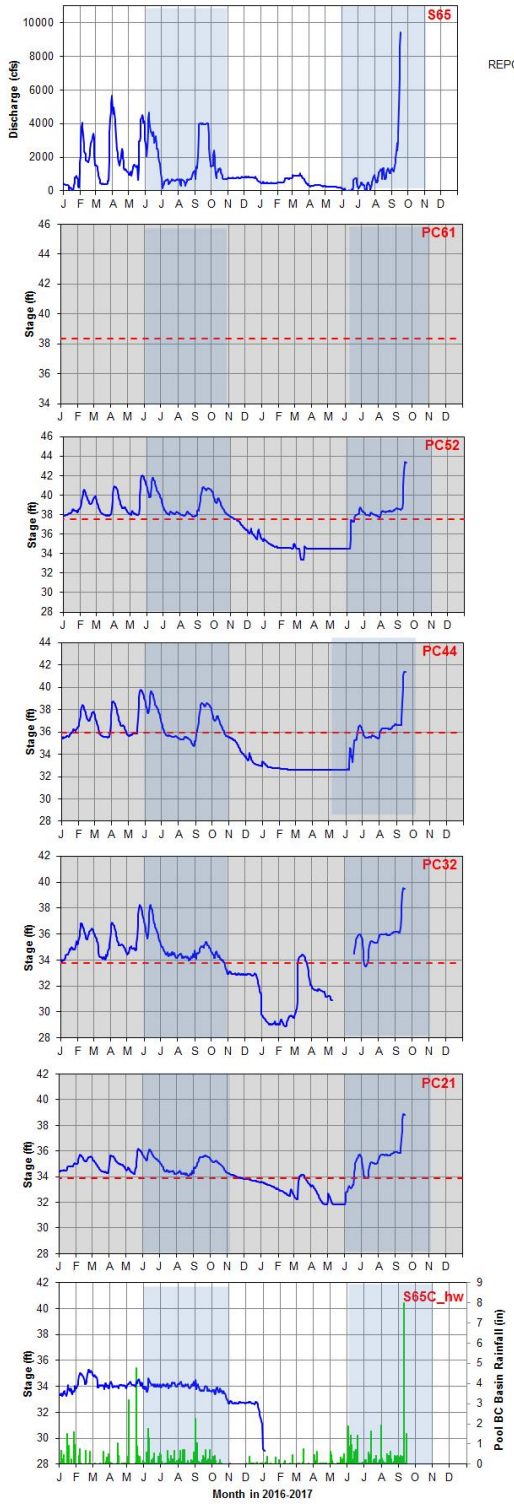
Figure 12. Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to Jan. 16, 2012.





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



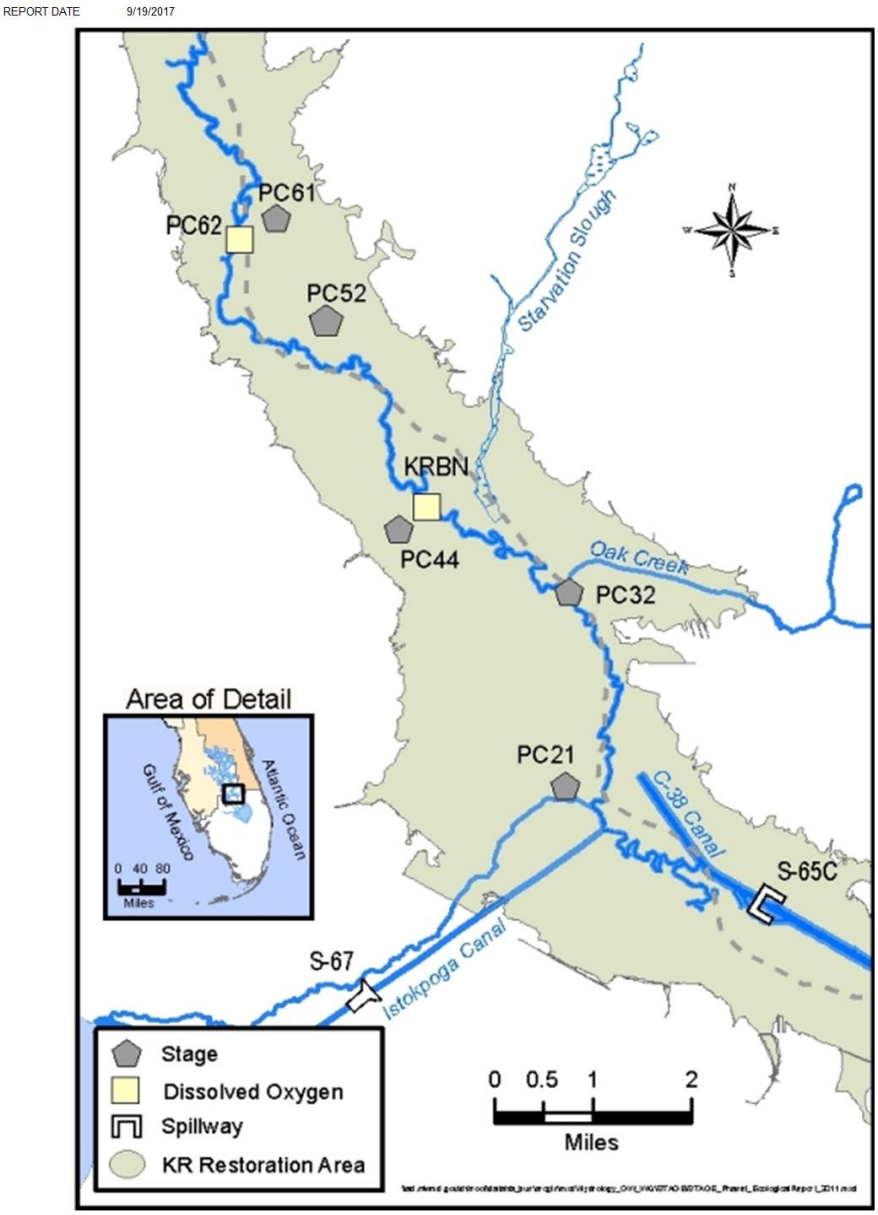


Figure 13. Discharge at S65, stages at five monitoring stations in the Phase I area of the Kissimmee River floodplain, and headwater stage at S65-C since January 1, 2015. The most recent data (~2 weeks) are provisional real-time data from SFWMD DualTrend; previous data are from SFWMD DB-HYDRO (validated).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

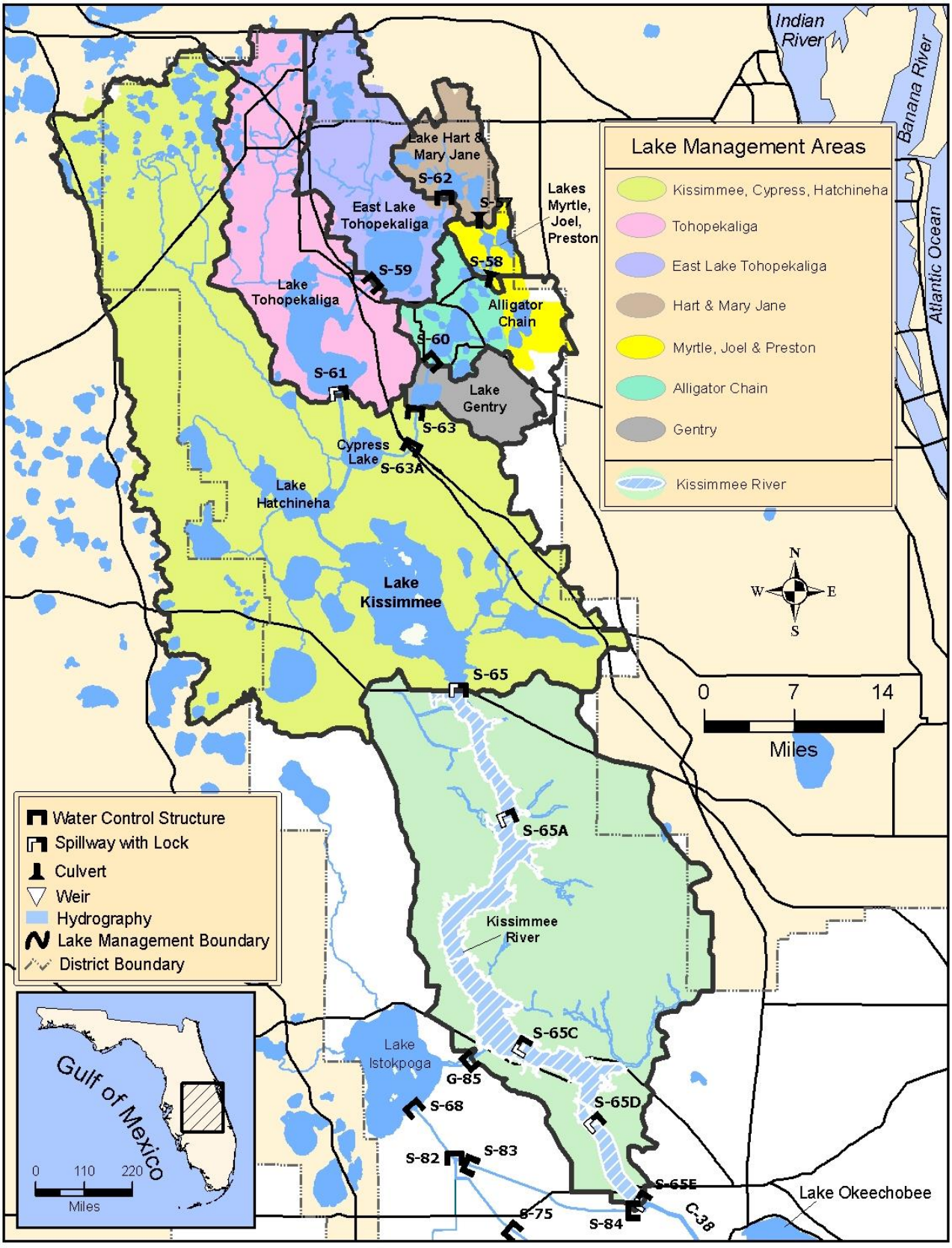


Figure 14. The Kissimmee Basin

LAKE OKEECHOBEE

According to the USACE web site, Lake Okeechobee stage is at 15.66 feet NGVD for the period ending at midnight on September 18, 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 1.99 feet over the past two weeks and is 2.27 feet higher than it was a month ago and 0.22 feet higher than it was a year ago (Figure 1). The Lake is currently in the Low sub-band (Figure 2). According to RAINDAR, 7.21 inches of rain fell directly over the Lake during the weeks Sep 05 - Sep 18 (Figure 3). Most of the surrounding watershed had even more rainfall, averaging between 8-12 inches.

Average daily inflows to the Lake over the past two weeks were 22,797 cfs, primarily from the Kissimmee River via the S65 and S84 structures, which averaged 8,813 and 3,543 cfs daily, respectively. Back-pumping into the Lake from the south through the S2 and S3 pumps also began around September 10, and averaged 2,255 and 1,970 cfs daily, respectively, through September 18.

Average daily outflows for the Lake have been minimal or negative since the beginning of June, which changed during preparations for Hurricane Irma. Pre- and post-storm releases resulted in average daily outflows of 1,475 cfs over the previous two weeks. These were primarily through the S308 structure, which averaged 1,330 cfs daily, followed by S77 at 865 cfs. Backflows from the L8 canal through Culvert 10A averaged -720 cfs. There were no discharges south through the S350 structures. The corrected evapotranspiration value based on the L006 weather platform solar radiation data was 1.86 inches for the two-week period.

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 05, 2017 to midnight September 18, 2017). Figure 4 shows the combined average daily cfs for inflows and outflows for the Lake over the past eight weeks. These data are provisional, and are subject to change.

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 a wind seiche, or difference in Lake stage of roughly 10 feet from one side of the Lake to the other (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).

Snail kite nesting activity ceased as a result of Hurricane Irma, with all 45 active nests failing due to high winds and significant increases in water level.

Table 1

INFLOWS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)
S65E & S65EX1	8813	6.8
S71 & 72	2356	1.8
S84 & 84X	3543	2.7
Fisheating Creek (LP)	2070	1.6
S154	323	0.2
S191	1453	1.1
S133 P	200	0.2
S127 P	151	0.1
S129 P	130	0.1
S131 P	79	0.1
S135 P	248	0.2
S2 P	1459	1.1
S3 P	1266	1.0
S4 P	705	0.5
C5	0	0.0
Rainfall	9934	7.2
Total	**32731**	**24.8**

OUTFLOWS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)
S77	865	0.7
S308	1330	1.0
S351	0	0.0
S352	0	0.0
S354	0	0.0
L8	-720	-0.6
ET	2566	2.0
Total	**4041**	**3.1**

Water Management Recommendations

The Lake is 15.66 feet NGVD having increased 1.99 feet over the past two weeks due to rainfall and inflows as a result of Hurricane Irma. The submerged and emergent vegetation communities that were recovering in the nearshore region after high water levels in February and October of 2016 are likely to decline in coverage from increased turbidity and high water levels from Irma. 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.

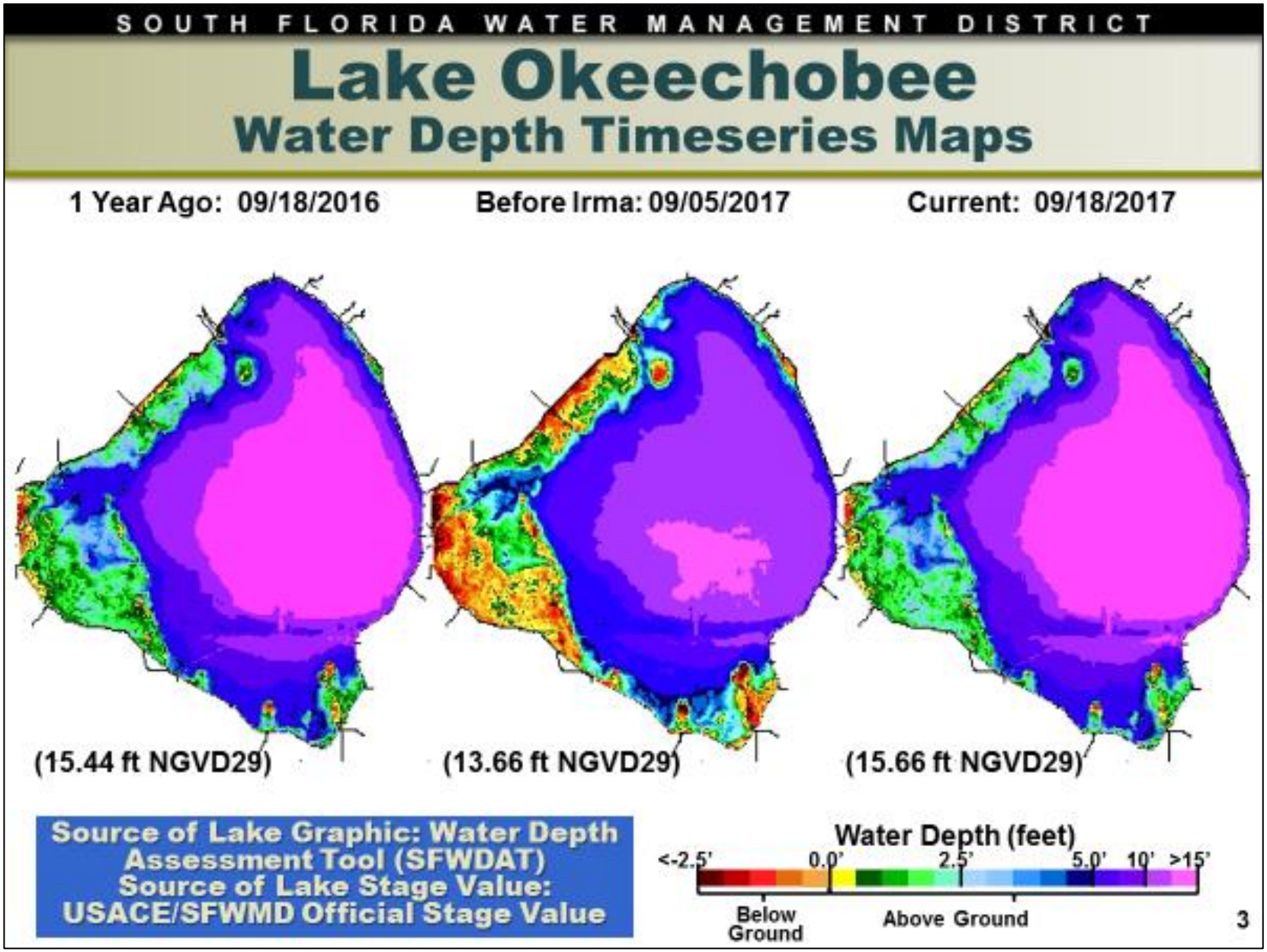

SOUTH FLORIDA WATER MANAGEMENT DISTRICT
Lake Okeechobee
Water Depth Timeseries Maps
1 Year Ago: 09/18/2016
Before Irma: 09/05/2017
Current: 09/18/2017
(15.44 ft NGVD29)
(13.66 ft NGVD29)
(15.66 ft NGVD29)
Source of Lake Graphic: Water Depth Assessment Tool (SFWDAT)
Source of Lake Stage Value: USACE/SFWMD Official Stage Value
Water Depth (feet)
<-2.5'
0.0'
2.5'
5.0'
10'
>15'
Below Ground
Above Ground
3

Figure 1

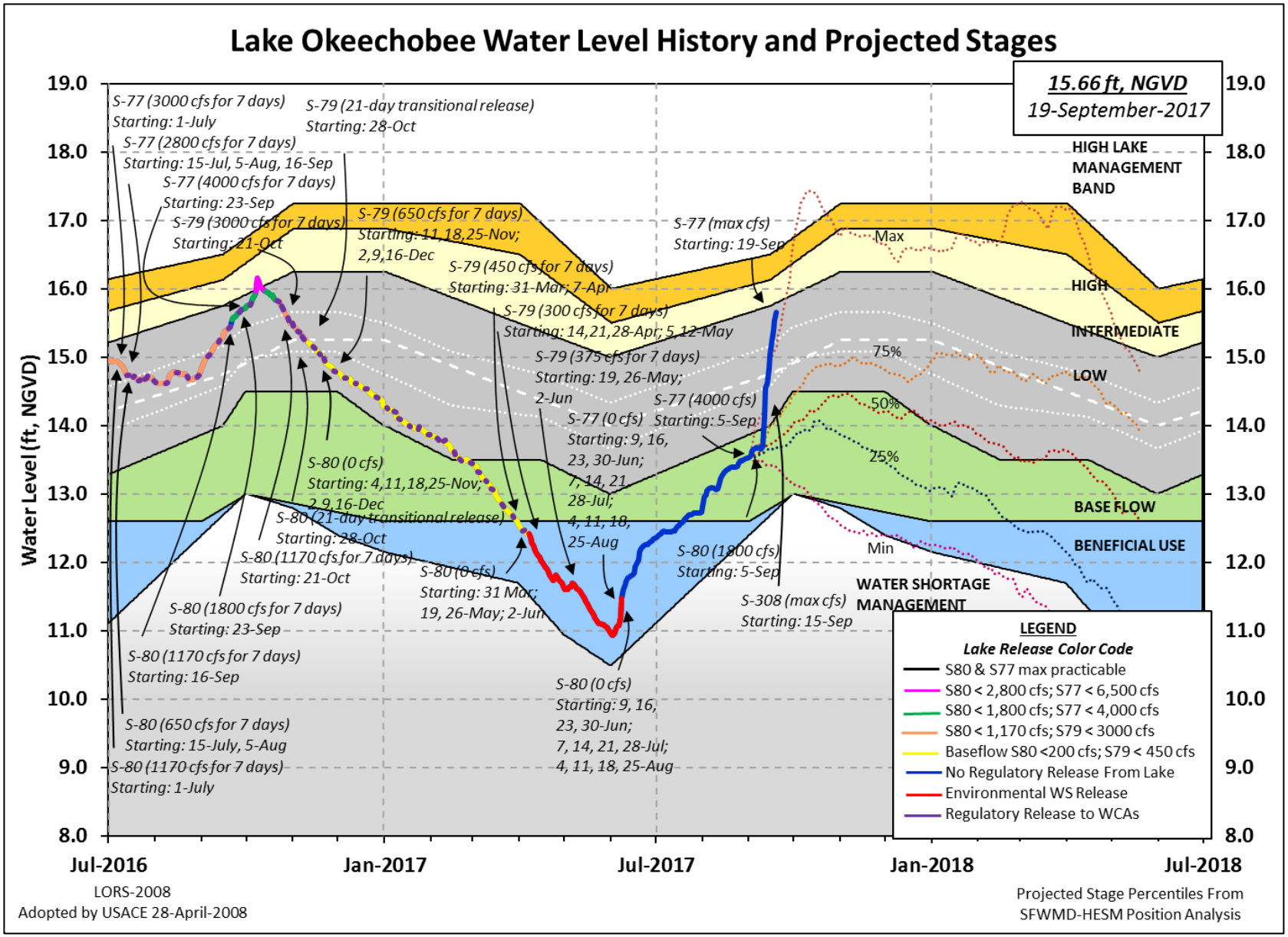

Lake Okeechobee Water Level History and Projected Stages
15.66 ft, NGVD
19-September-2017
Water Level (ft, NGVD)
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
11.0
10.0
9.0
8.0
Jul-2016
Jan-2017
Jul-2017
Jan-2018
Jul-2018
S-77 (3000 cfs for 7 days) Starting: 1-July
S-77 (2800 cfs for 7 days) Starting: 15-Jul, 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
HIGH LAKE MANAGEMENT BAND
Max
HIGH
INTERMEDIATE
75%
LOW
50%
25%
BASE FLOW
BENEFICIAL USE
Min
WATER SHORTAGE MANAGEMENT
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

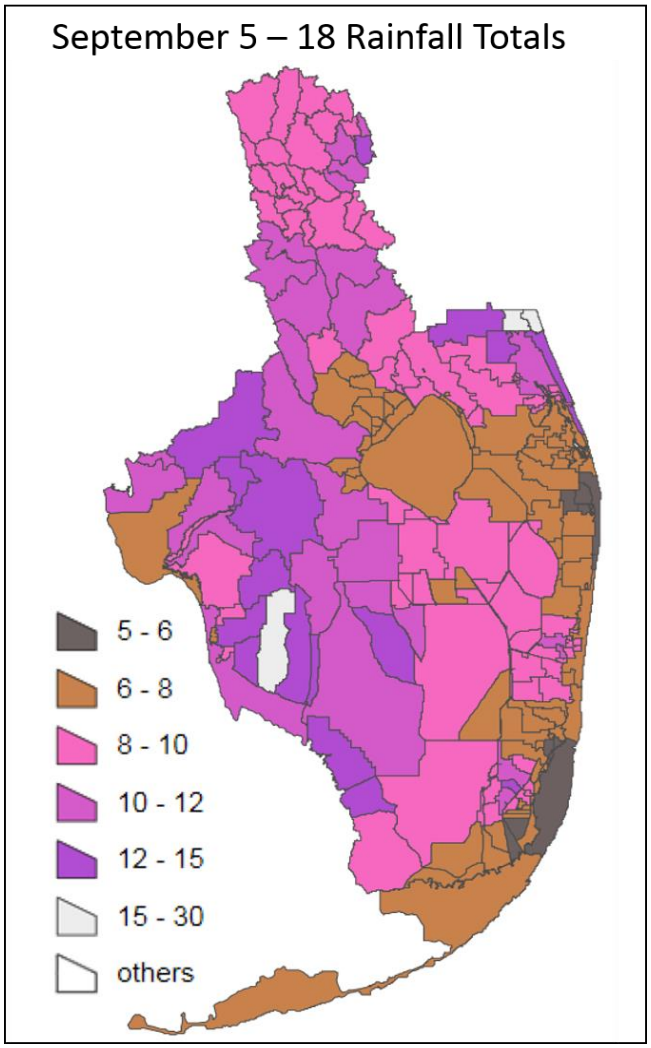


Figure 3

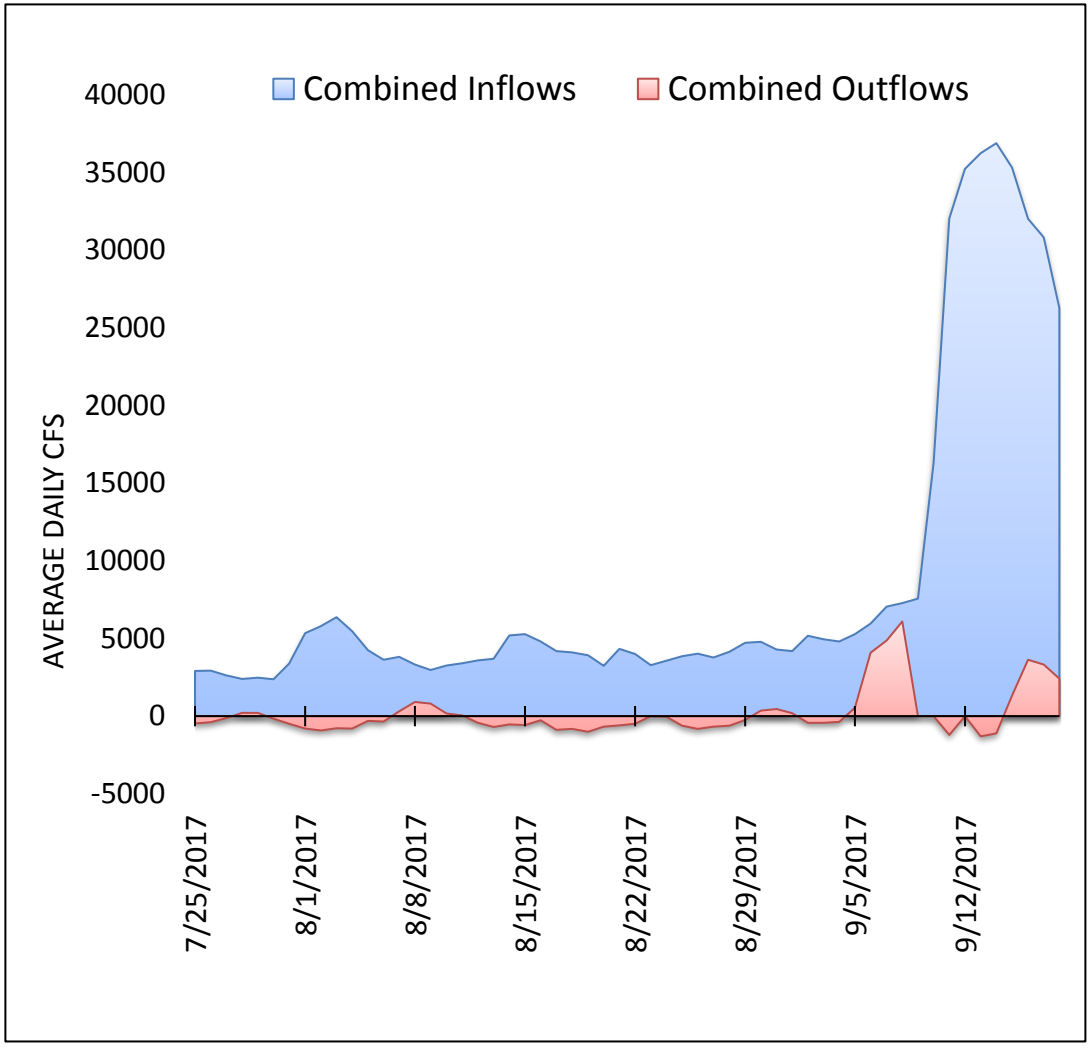


Figure 4

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Hurricane Irma Seiche

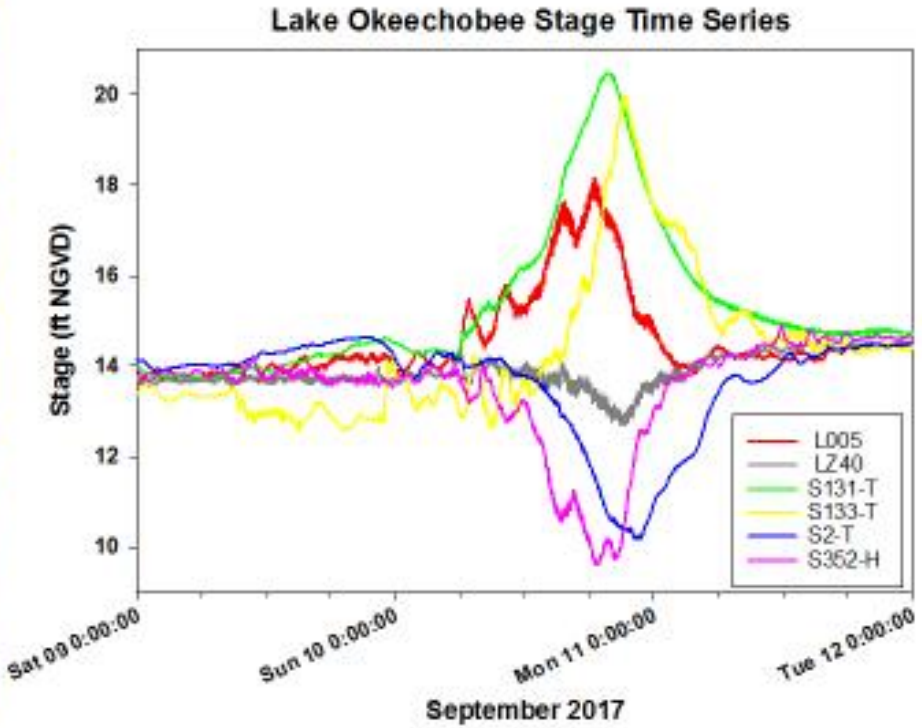


Figure 5

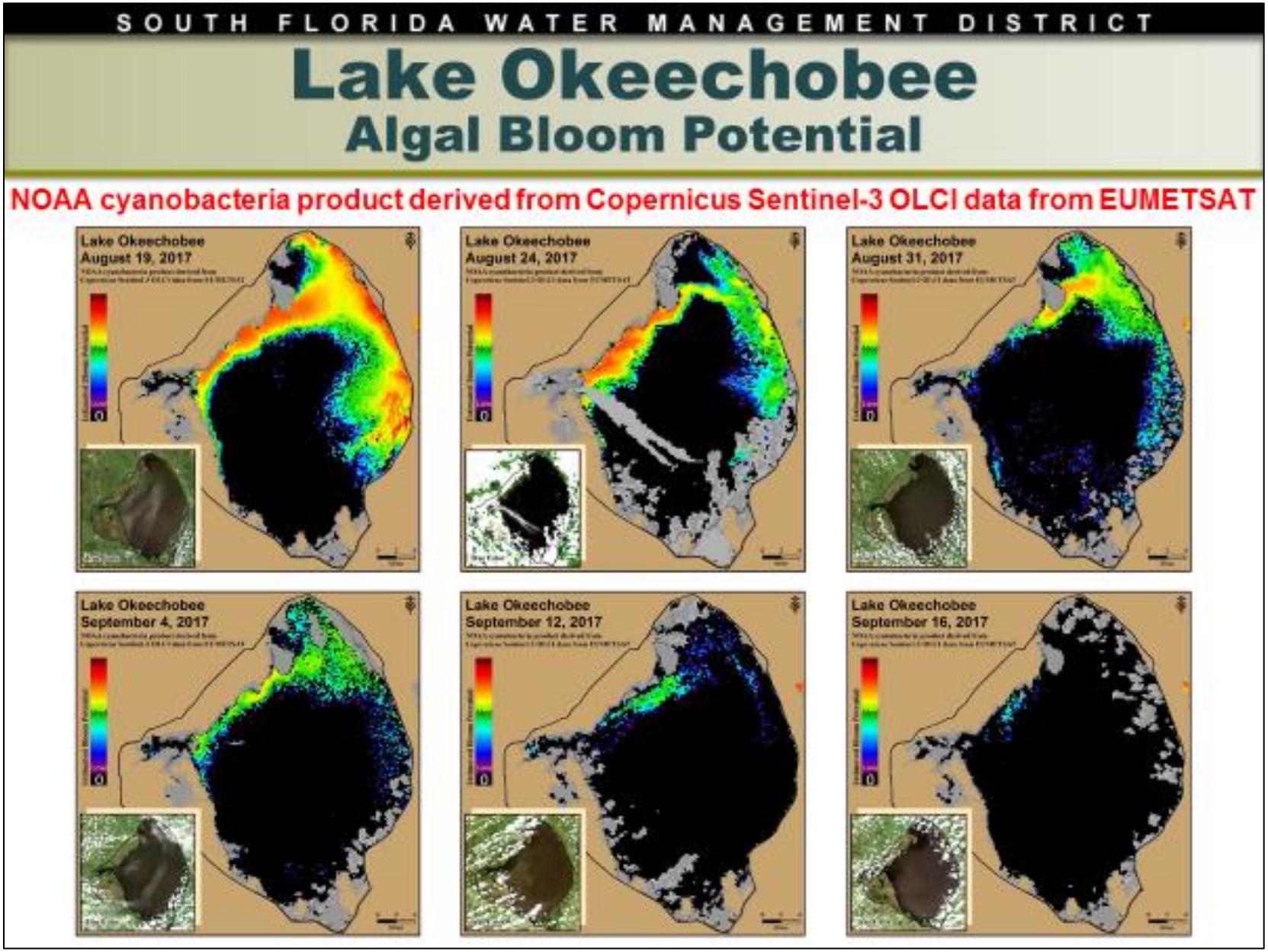

SOUTH FLORIDA WATER MANAGEMENT DISTRICT
Lake Okeechobee
Algal Bloom Potential
NOAA cyanobacteria product derived from Copernicus Sentinel-3 OLCI data from EUMETSAT
Lake Okeechobee
August 19, 2017
Lake Okeechobee
August 24, 2017
Lake Okeechobee
August 31, 2017
Lake Okeechobee
September 4, 2017
Lake Okeechobee
September 12, 2017
Lake Okeechobee
September 16, 2017

Figure 6

LAKE ISTOKPOGA

Lake Istokpoga stage is 39.8 feet NGVD as of midnight September 18, 2017 and is currently 0.92 feet above its regulation schedule of 38.88 feet NGVD (Figure 7). Average daily flows into the Lake from Josephine Creek over the past two weeks were nearly three times higher than for the week August 29 – September 4, from 192 cfs to 741 cfs. No data have been reported for Arbuckle Creek since July 4. Average daily discharge from S68 and S68X the past two weeks also increased dramatically to 3,541 cfs, from the previous week's flow of 1,406 cfs. According to RAINDAR, 9.67 inches of rain fell in the Lake Istokpoga basin from September 05 - September 18.

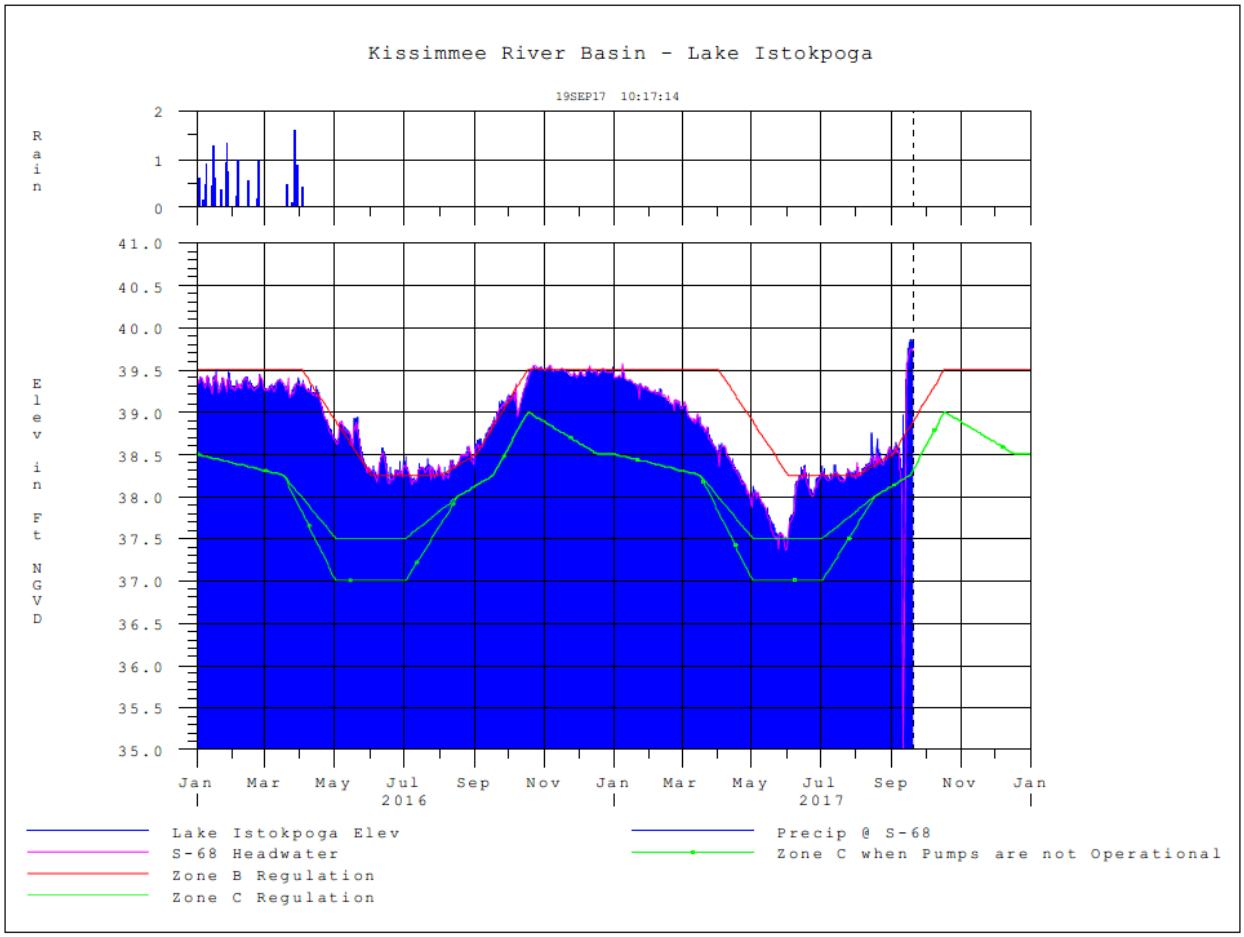


Figure 7

ESTUARIES

St. Lucie Estuary

Over the past week, provisional flows averaged about 2,702 cfs at S-80, 1,324 cfs at S-308, 2,461 cfs at S-49 on C-24, 2,073 cfs at S-97 on C-23, and 1,121 cfs from Ten Mile Creek at the Gordy Road Structure. Average inflow from tidal basin tributaries is estimated to be 518 cfs (Figures 1 and 2). Total inflow averaged about 8,875 cfs last week and 4,170 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)	**0.1** (4.7)	**0.1** (9.4)	NA[1]
US1 Bridge	**0.2** (6.2)	**0.3** (8.5)	10.0-26.0
A1A Bridge	**1.5** (15.1)	**6.4** (19.4)	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	1.41	0.99	3.53
HR1	bottom	1.63	1.00	4.71

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	3.01	4.55 - 13.59	4.82	3.33	5.98
SF	1.89	5.58 - 7.84	4.55	3.00	5.72
NF	2.35	4.41 - 7.65	2.11	0.07	4.75
ME	2.07	5.43 - 7.52	3.40	1.15	5.60
IRL-SLE					

NOAA satellite imagery indicates no potential cyanobacterial presence in the St. Lucie estuary (Figure 6).

Caloosahatchee Estuary:
During the past week, provisional flows averaged approximately 0 cfs at S-77, 3,944 cfs at S-78, and 13,643 cfs at S-79. Average inflow from tidal basin tributaries is estimated to be 1,579 cfs (Figures 7 & 8). Total inflow averaged 15,222 cfs last week and 9,143 cfs over last month.

Over the past week, salinity decreased throughout the estuary (Table 4, Figures 9 and 10). The seven-day average salinity values are within the poor range for adult oysters at Cape Coral and 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 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 (Figure 12). 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	**0.1** (0.2)	**0.1** (0.2)	0.0-5.0[2]
Ft. Myers Yacht Basin	**0.1** (0.2)	**0.2** (0.2)	NA
Cape Coral	**0.1** (0.8)	**0.1** (1.0)	10.0-30.0
Shell Point	**1.5** (7.0)	**2.4** (7.0)	10.0-30.0
Sanibel	**NR**[3](16.1)	**NR** (17.8)	10.0-30.0

[1]Envelope not applicable and [2]Envelope is based on a 30-day average, [3]Not Reporting values for 41/2 days over past week.
*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	Questionable data	Questionable data
Dissolved Oxygen (mg/l)	Down for maintenance	Questionable data	No Data

NOAA satellite imagery indicates minimal potential cyanobacterial presence in the Caloosahatchee estuary (Figure 13).

The Florida Fish and Wildlife Research Institute did not sample for *Karenia brevis,* the Florida red tide dinoflagellate, in Lee County last week due to Hurricane Irma.

Water Management Recommendations

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

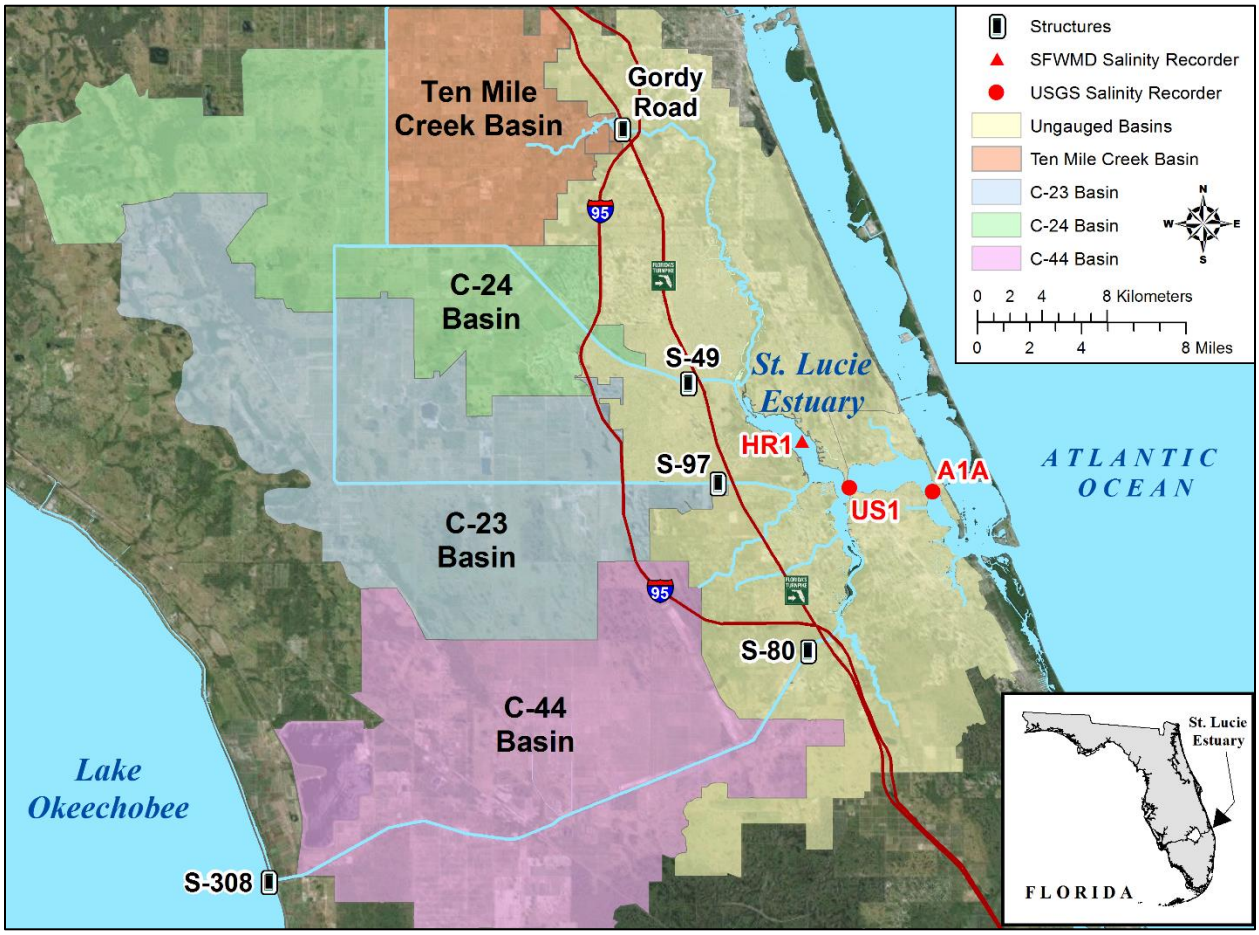


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

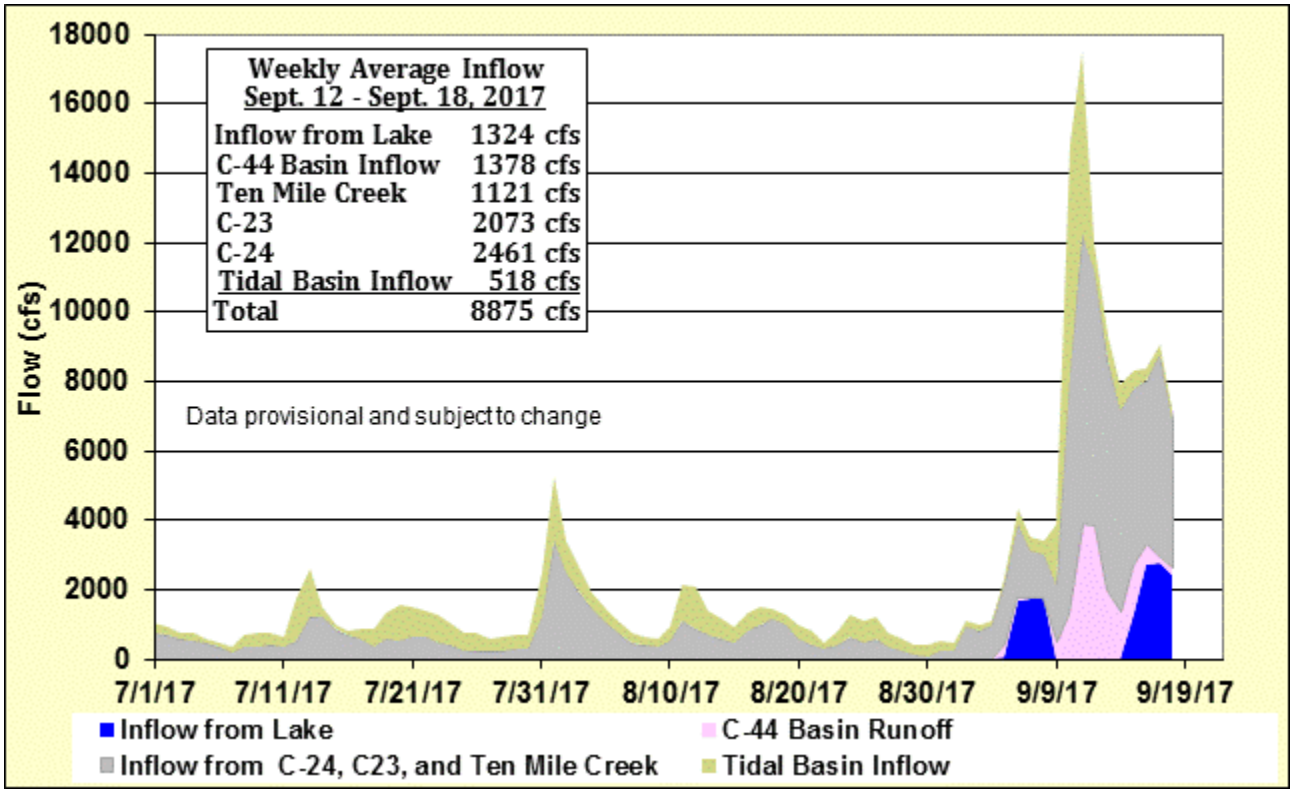


Figure 2. Estimated surface freshwater inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basins into the St. Lucie Estuary.

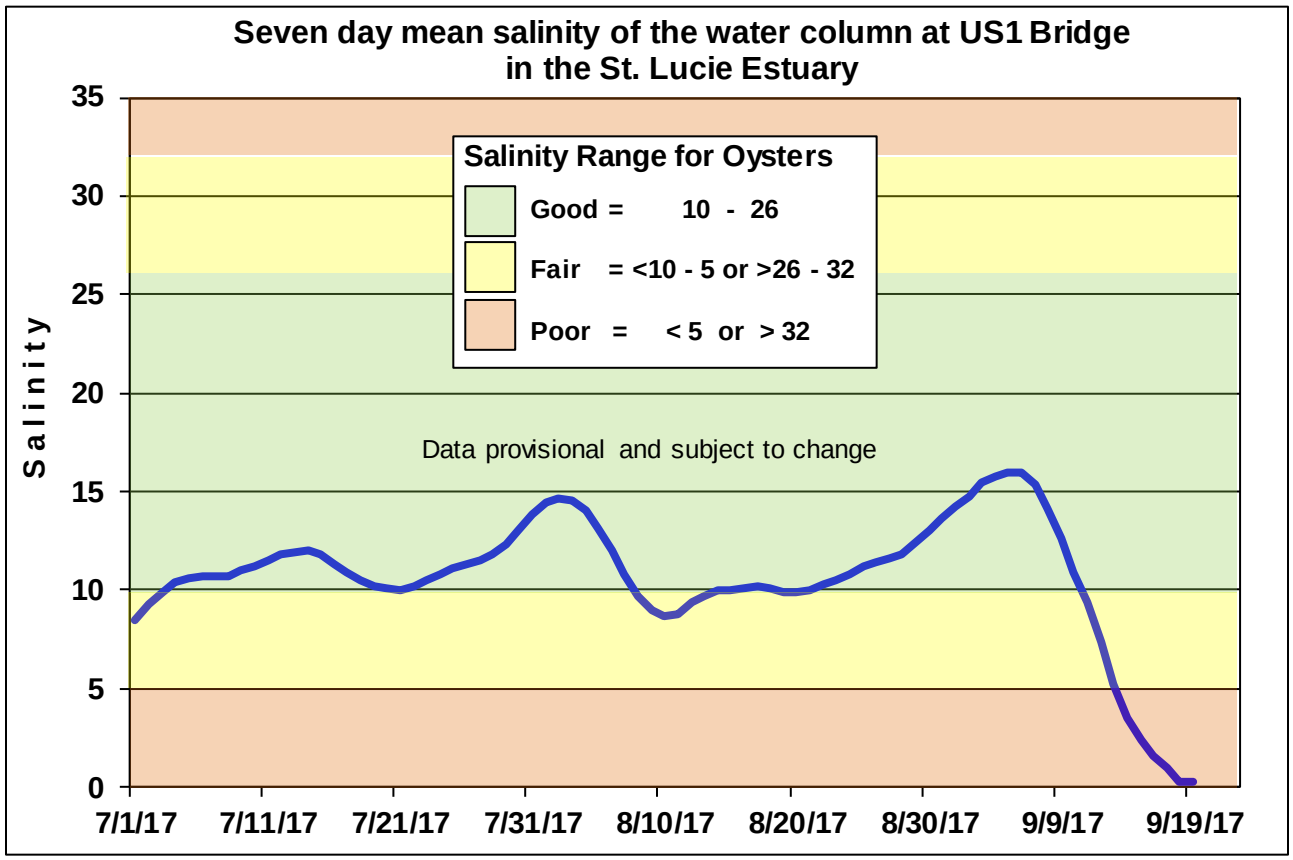


Figure 3. Seven-day mean salinity of the water column at the U.S. Highway 1 Bridge.

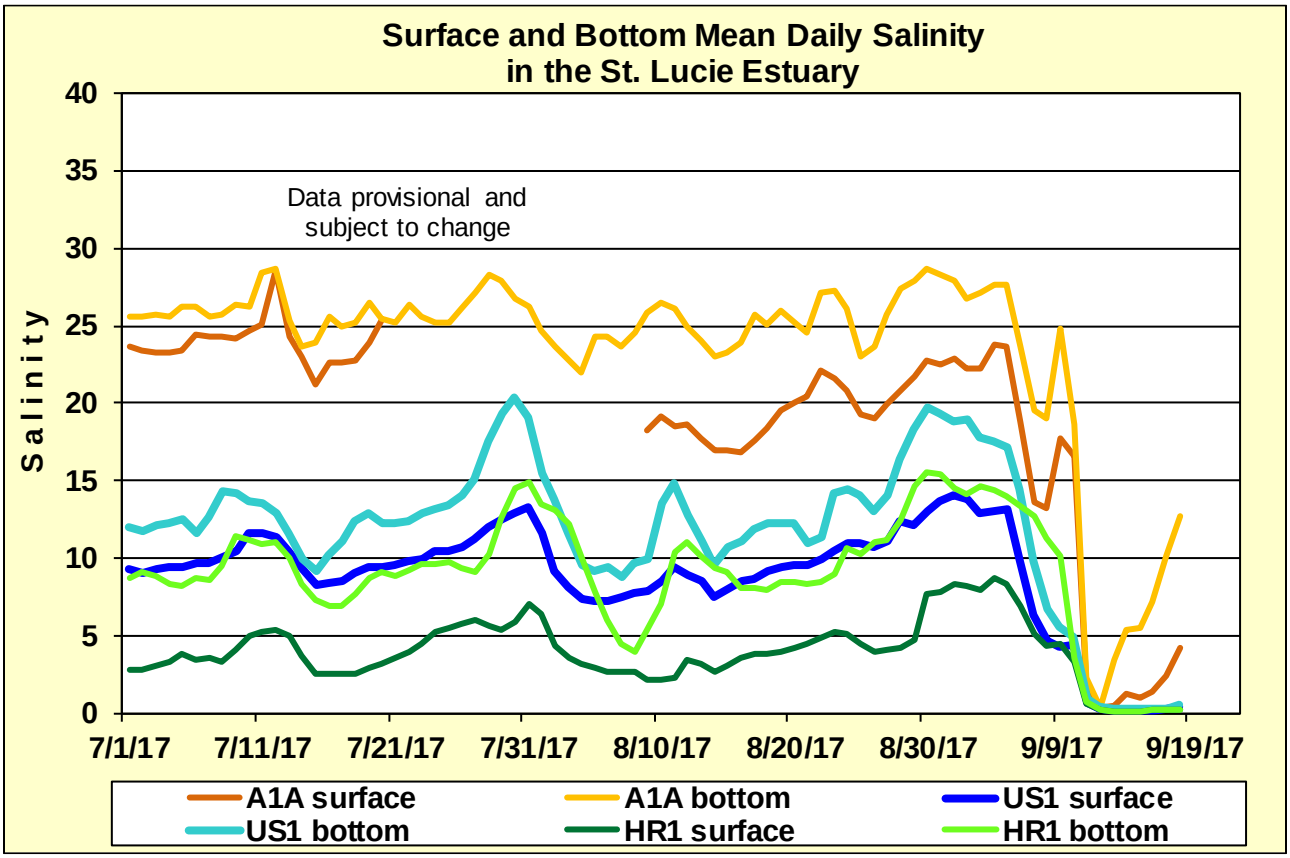


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

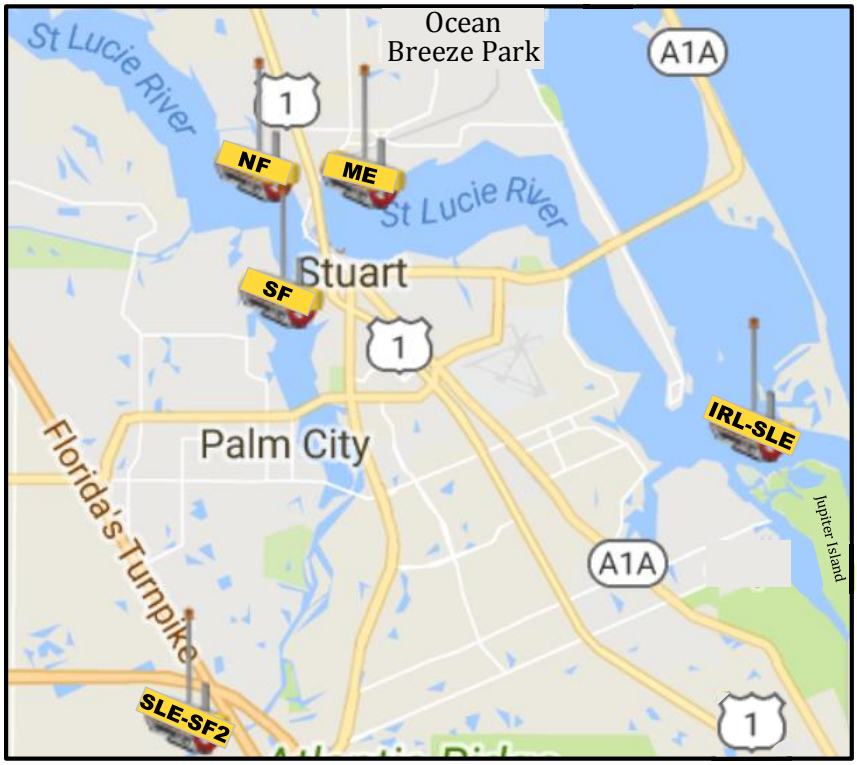


Figure 5. Location of FAU-HBOI LOBO water quality stations in the St. Lucie Estuary.

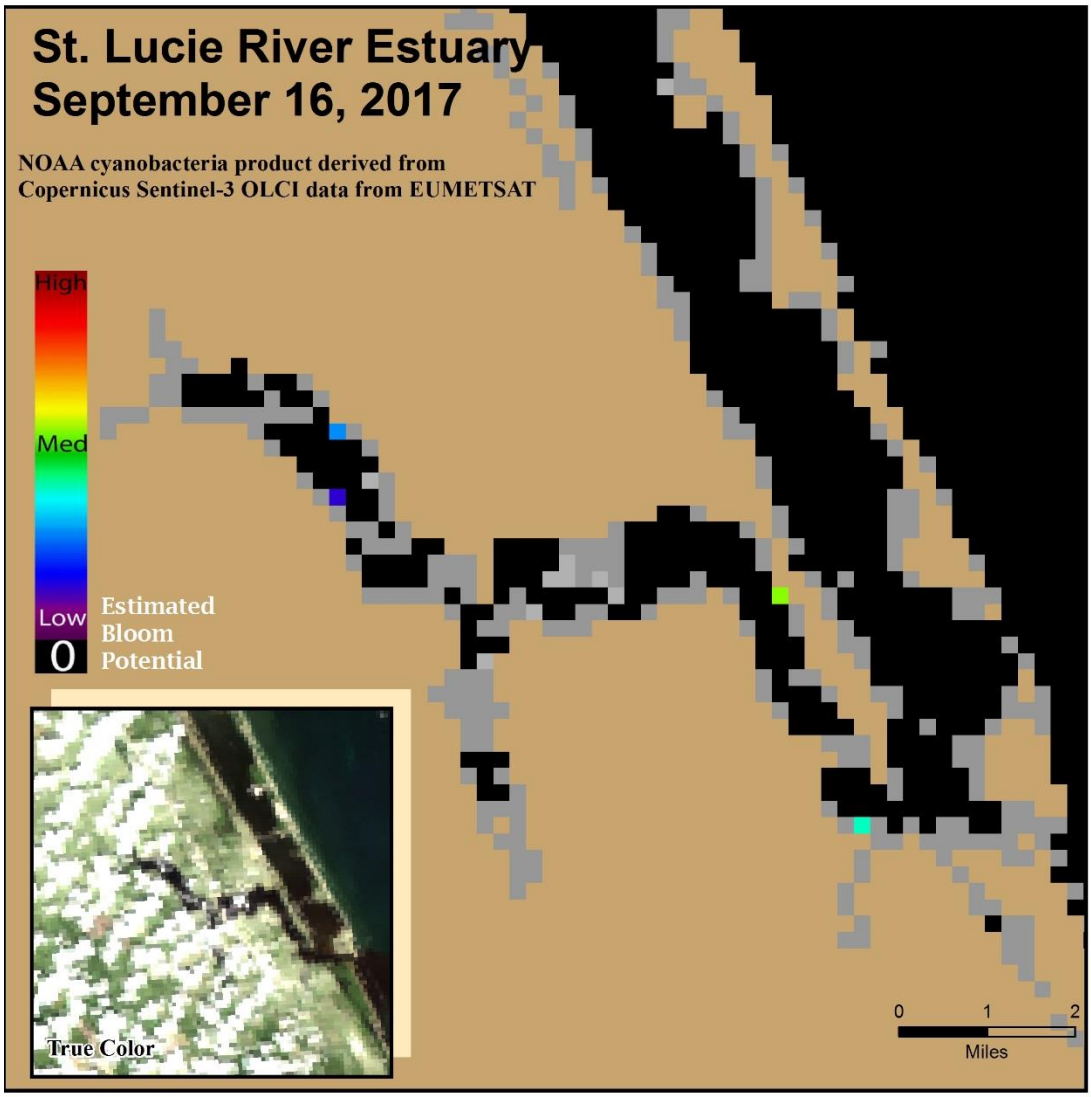


Figure 6. Sentinel 3a Satellite imagery provided by NOAA uses Ocean and Land Color Instrument (OLCI) to estimate cyanobacteria bloom potential in St. Lucie Estuary.

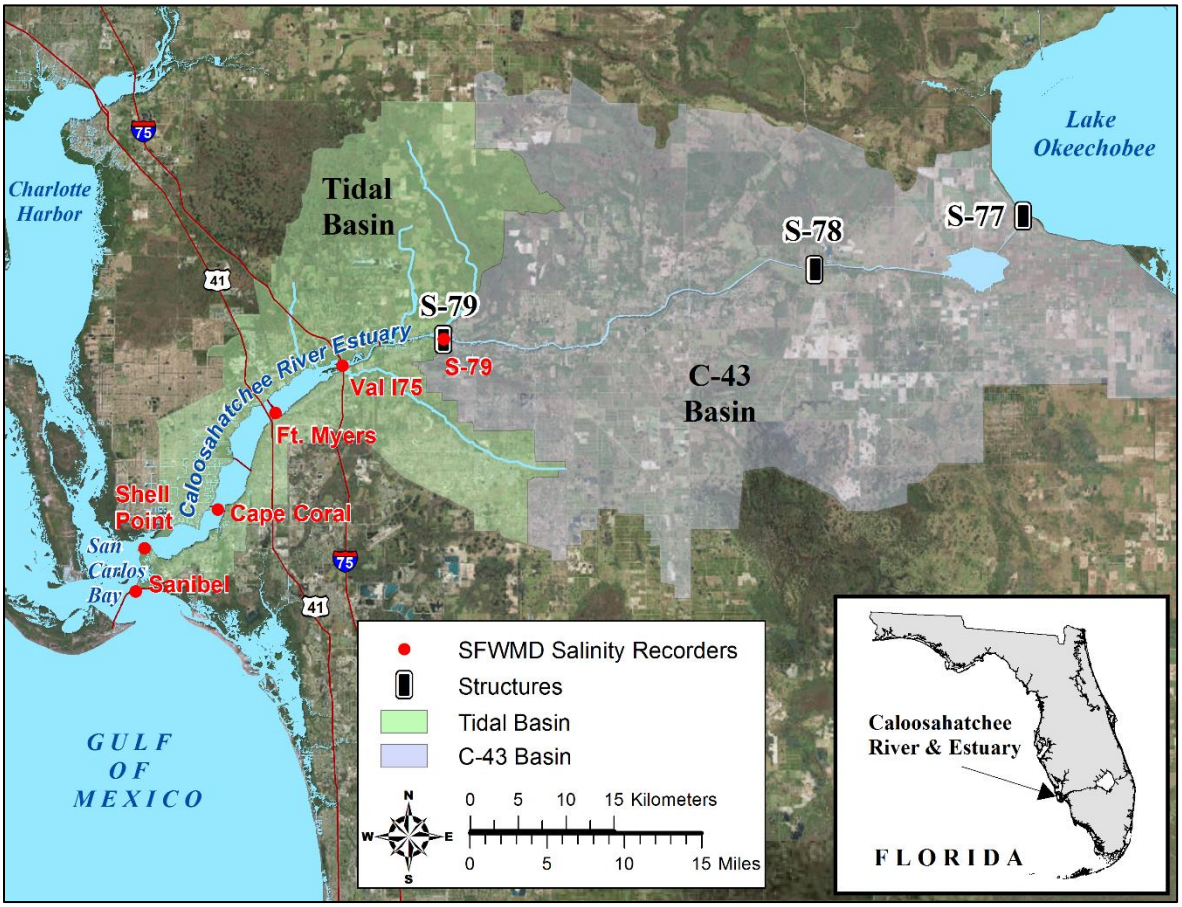


Figure 7. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

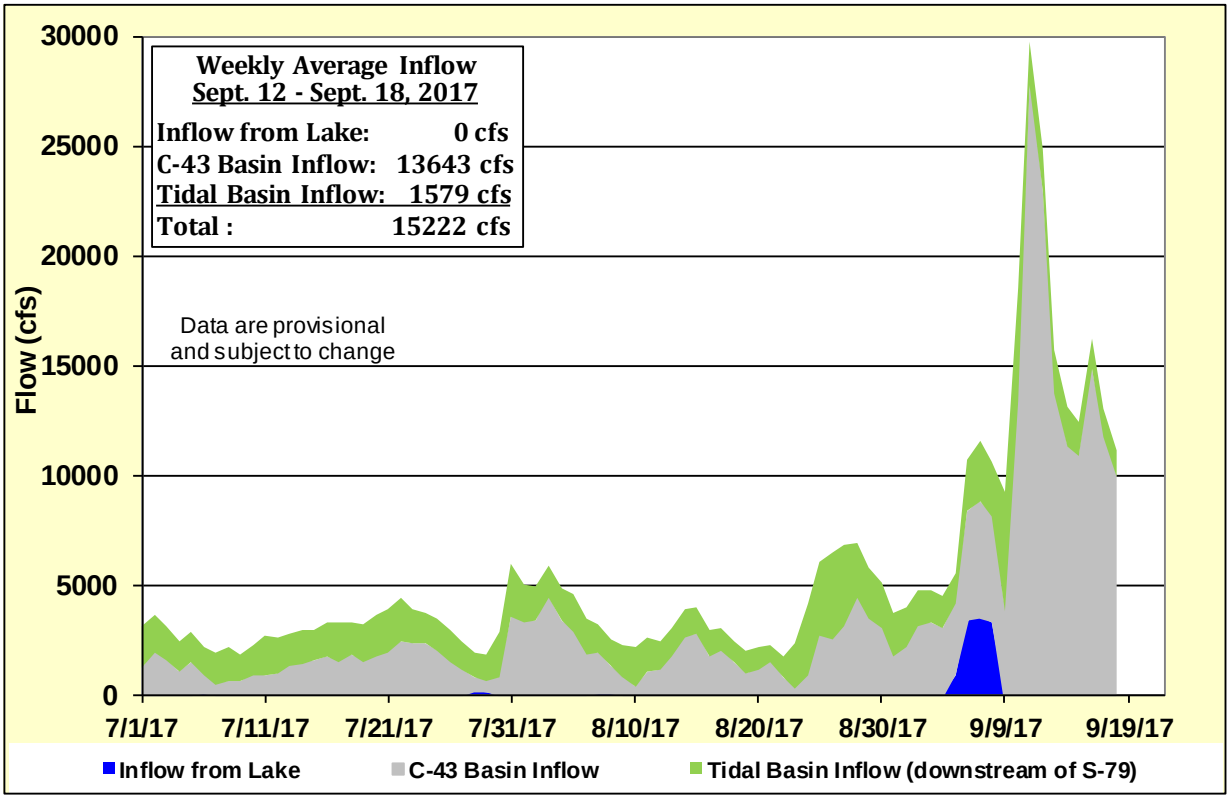
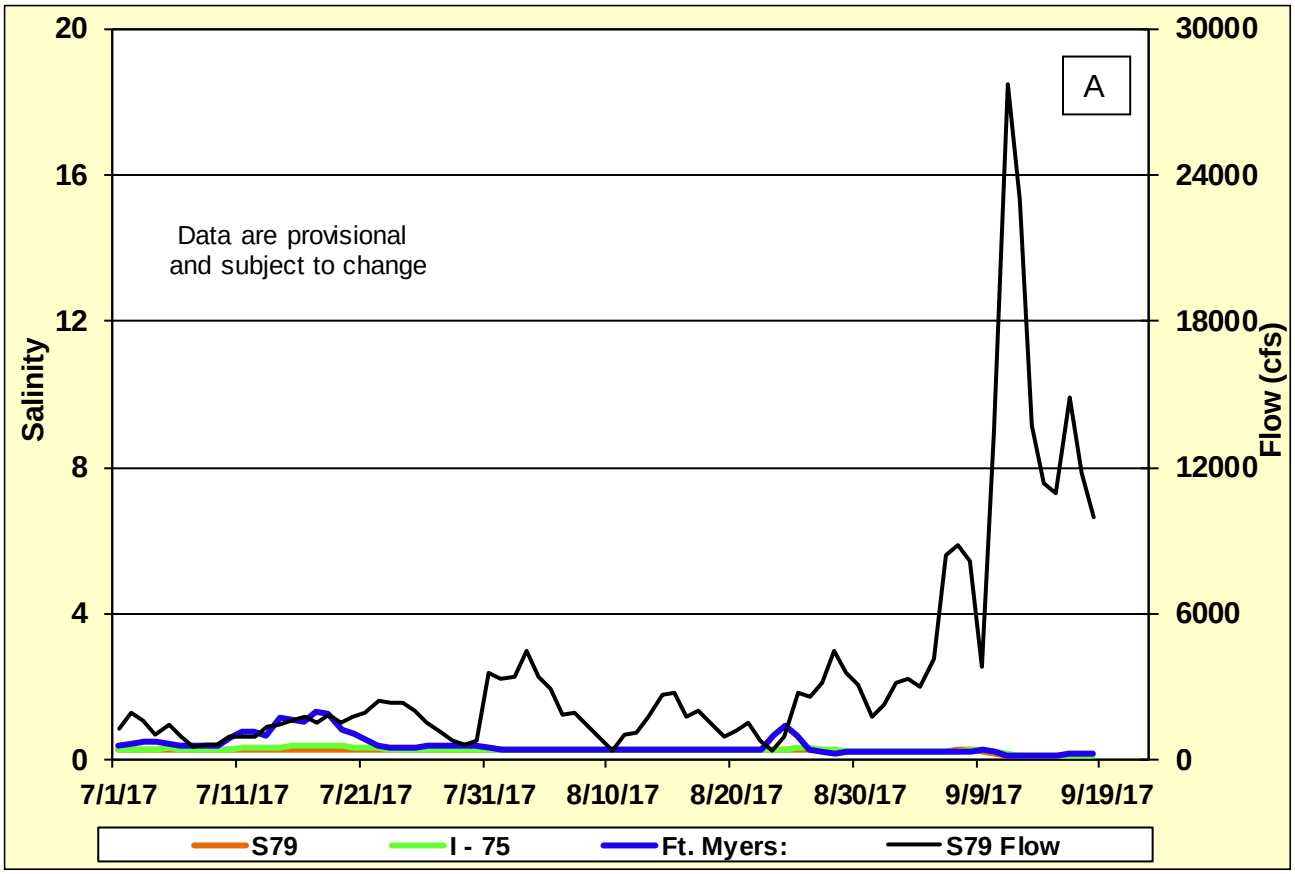


Figure 8. Freshwater inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.



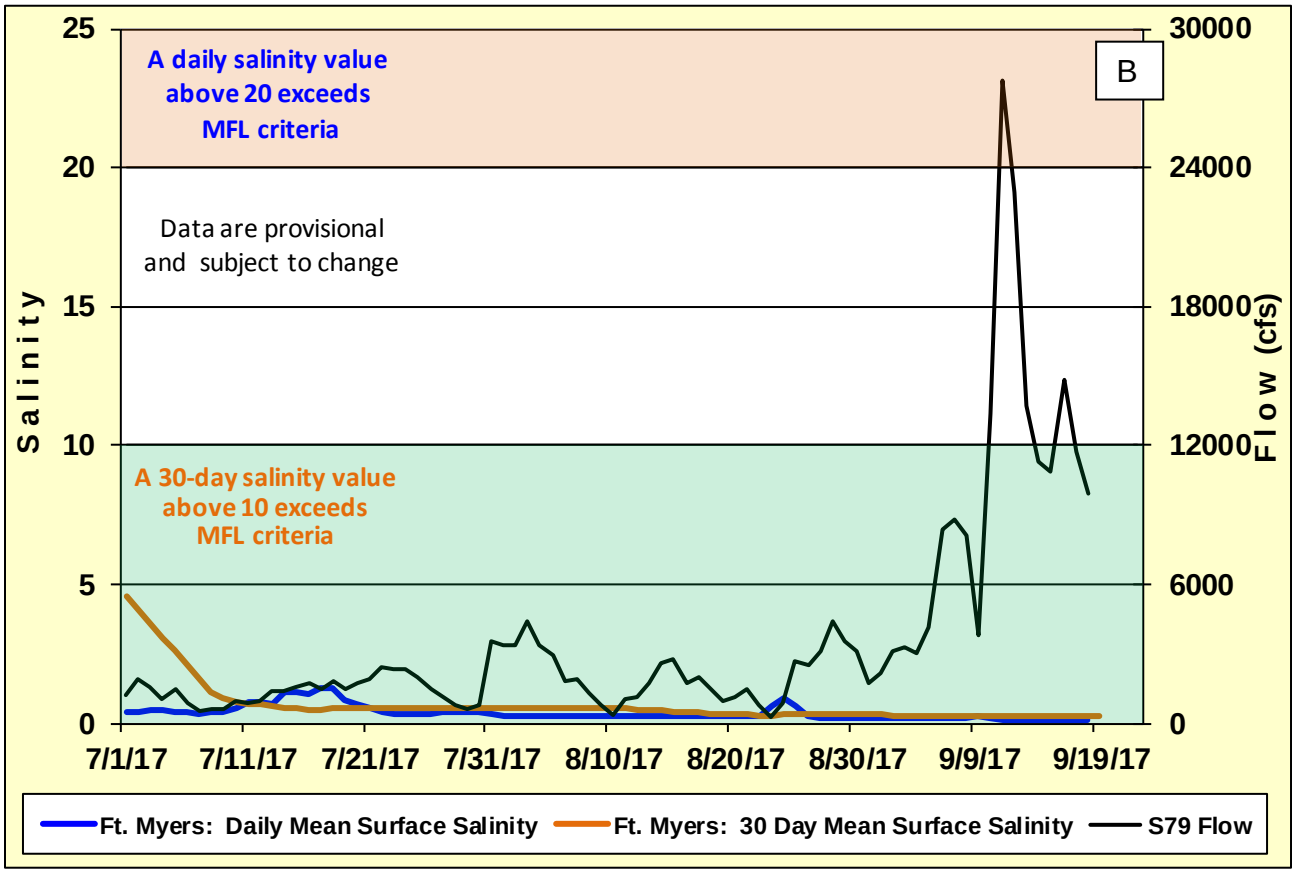


Figure 9. Daily mean flows at S-79 and salinity at upper estuary monitoring stations (A) and 30-day moving average salinity at Ft. Myers (B).

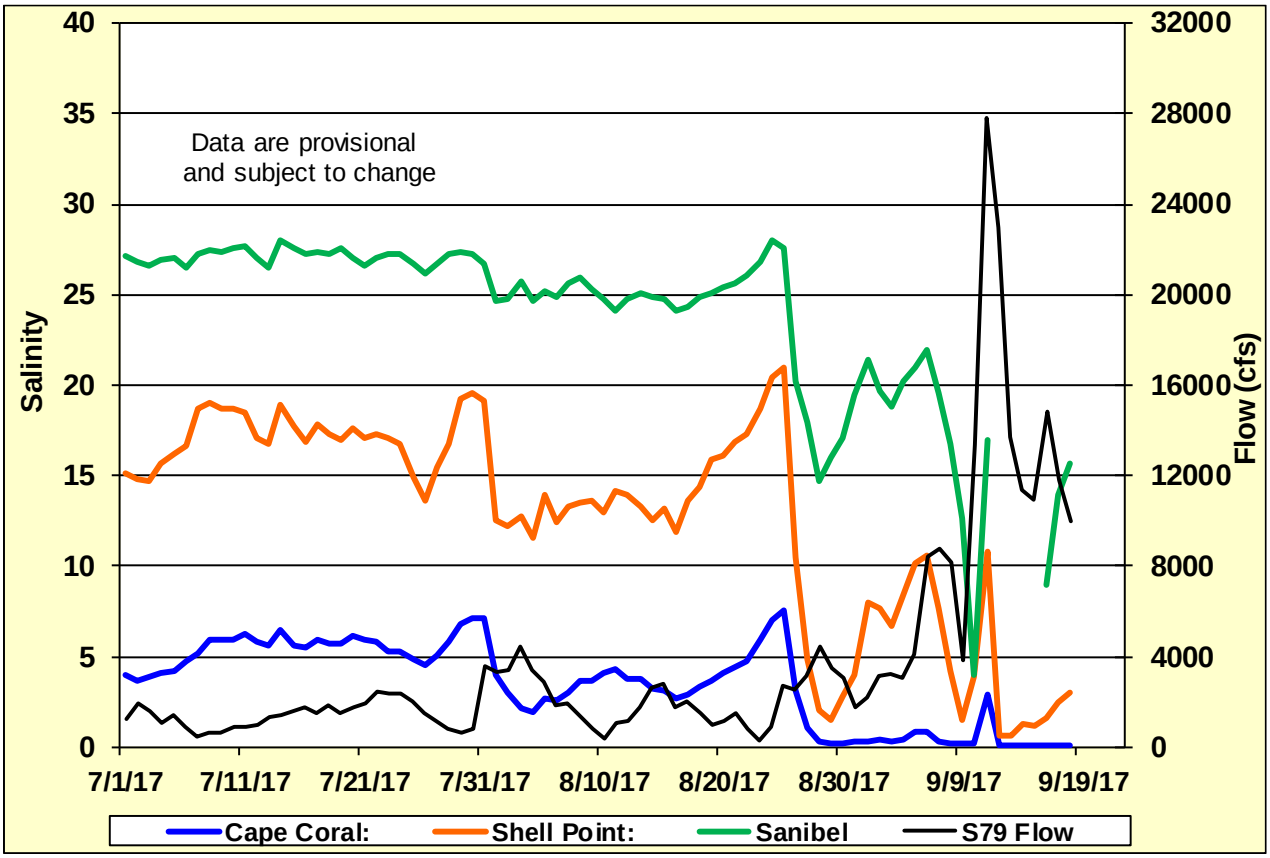


Figure 10. Daily mean flows at S-79 and salinity at lower estuary stations.

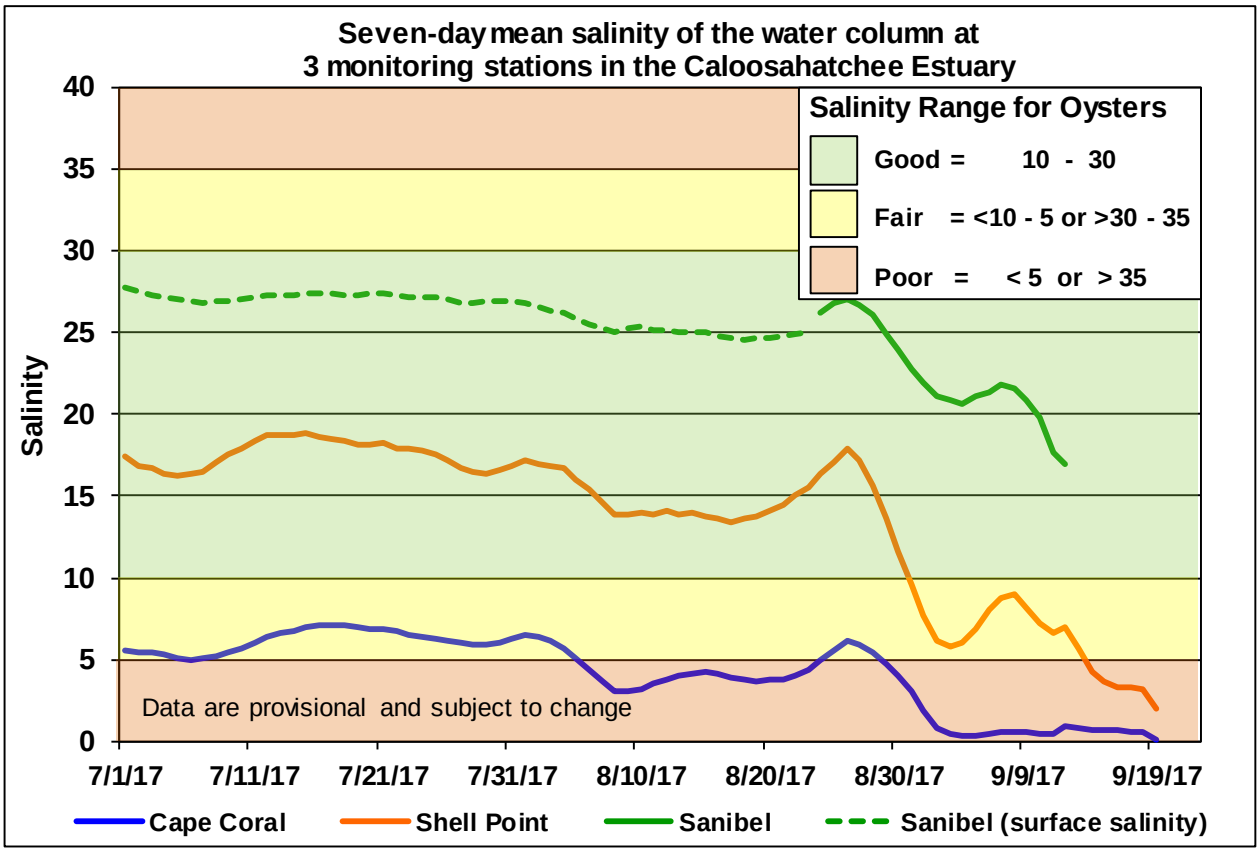


Figure 11. Seven-day mean salinity at Cape Coral Bridge, Shell Point and Sanibel Bridge monitoring stations.

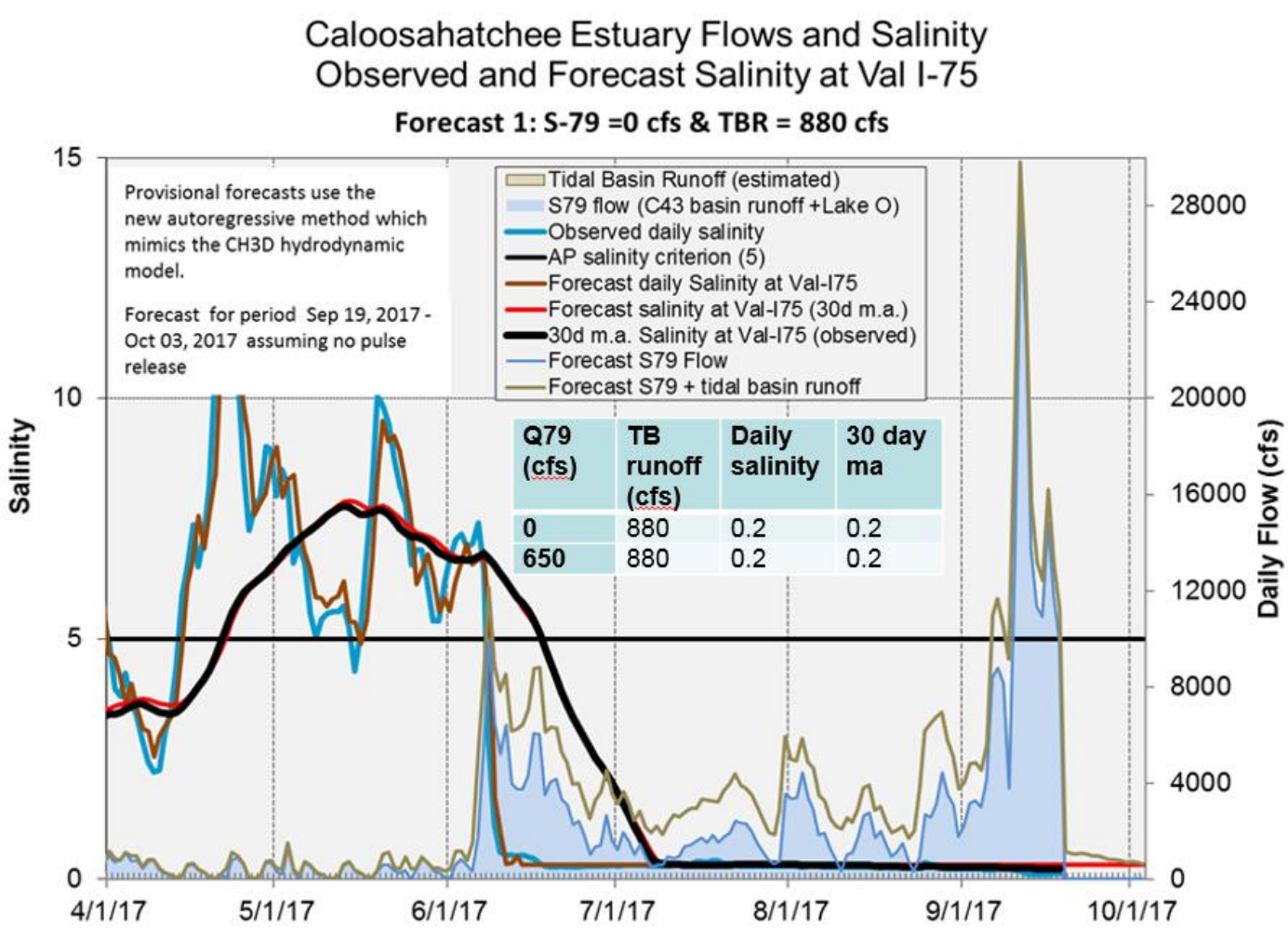


Figure 12. 14-day salinity forecast at Val I-75 assuming no releases at S-79.

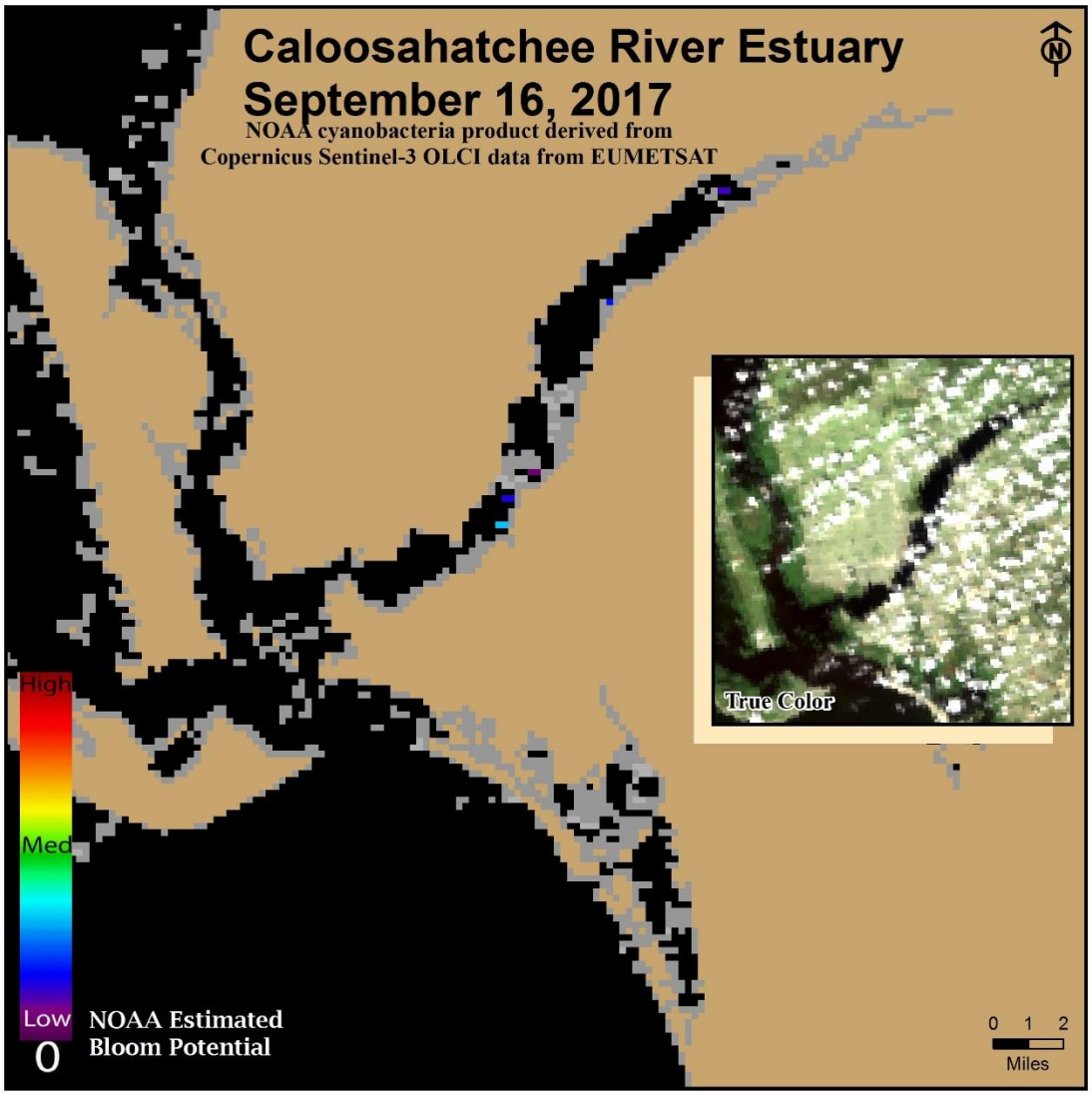
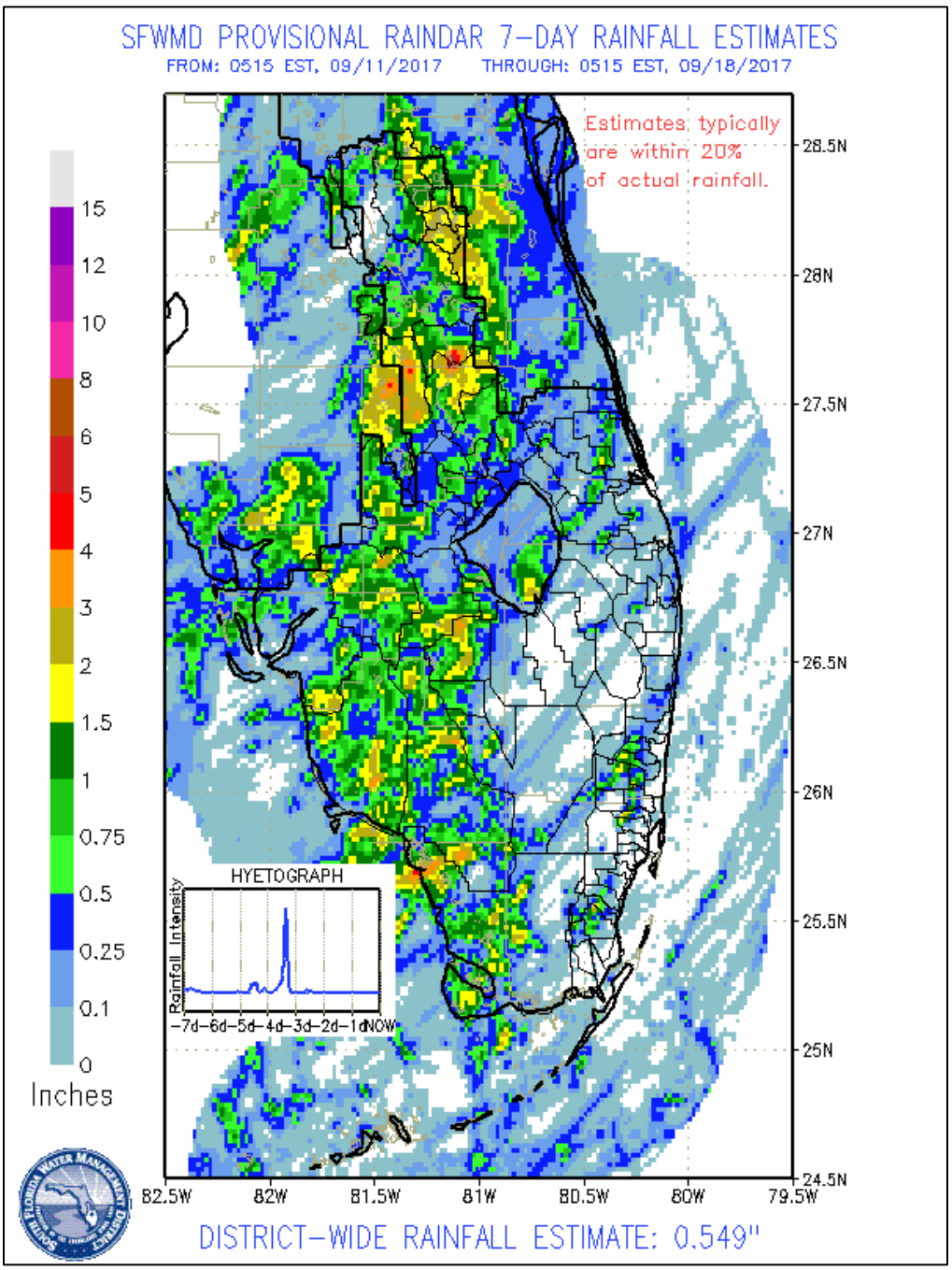


Figure 13. Sentinel 3a Satellite imagery provided by NOAA uses Ocean and Land Color Instrument (OLCI) to estimate cyanobacteria bloom potential in Caloosahatchee Estuary.

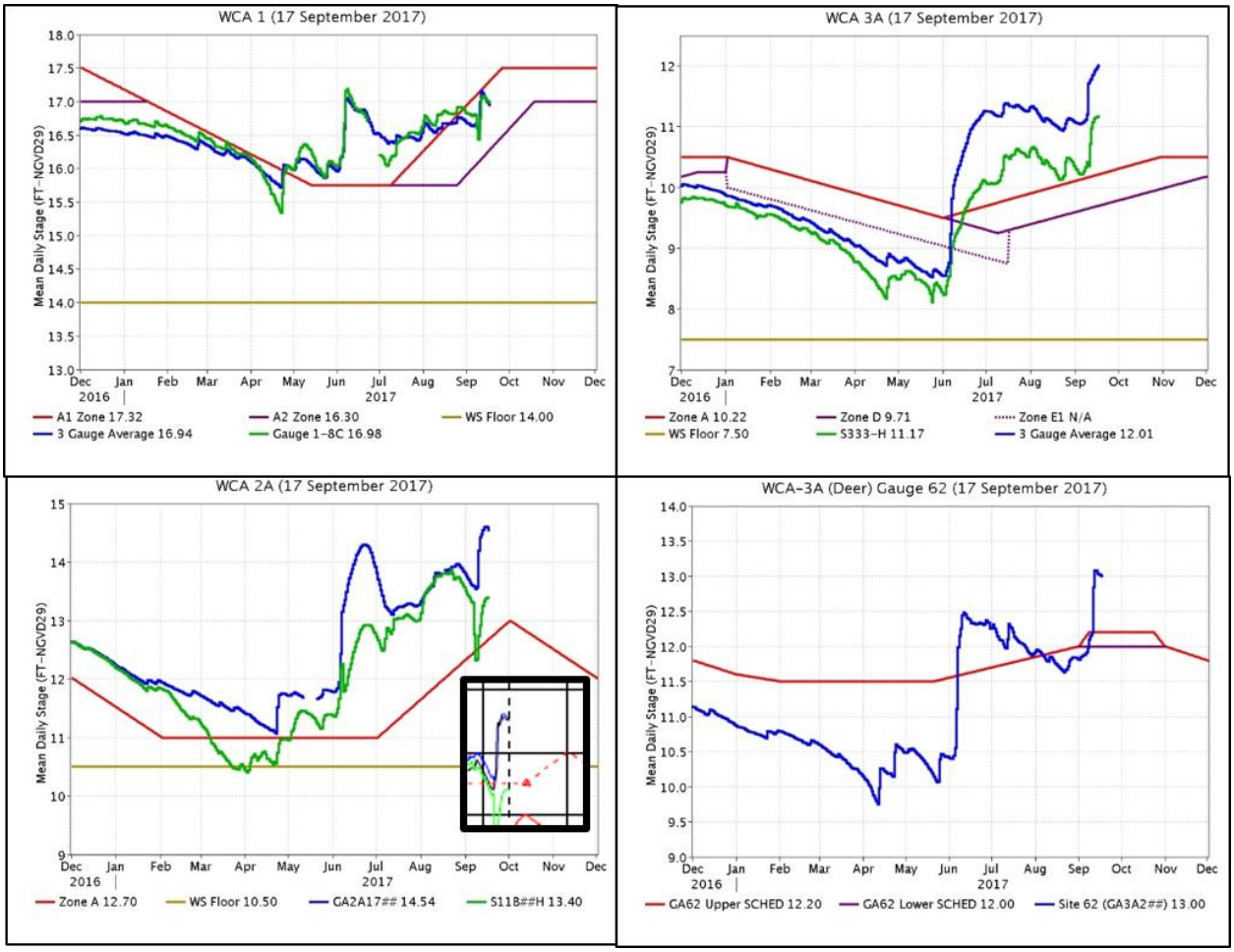
EVERGLADES

Below average rainfall fell across the Everglades last week. WCA-1 is below and WCA-2A and 3A are above regulation. Data from gauge 71 within WCA-3B was unavailable this week.

Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	0.04	−0.24
WCA-2A	0.02	+0.09
WCA-2B	0.02	+0.05
WCA-3A	0.19	+0.28
WCA-3B	0.14	ERROR
ENP	0.58	−0.07

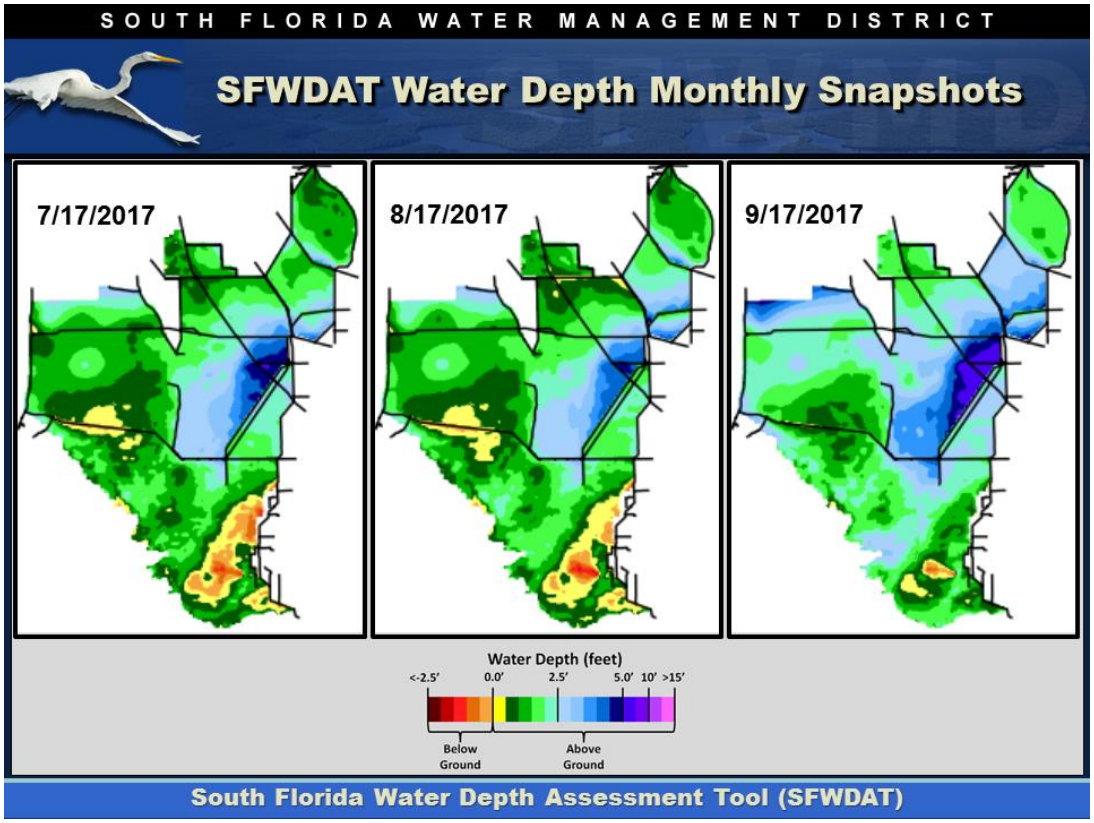


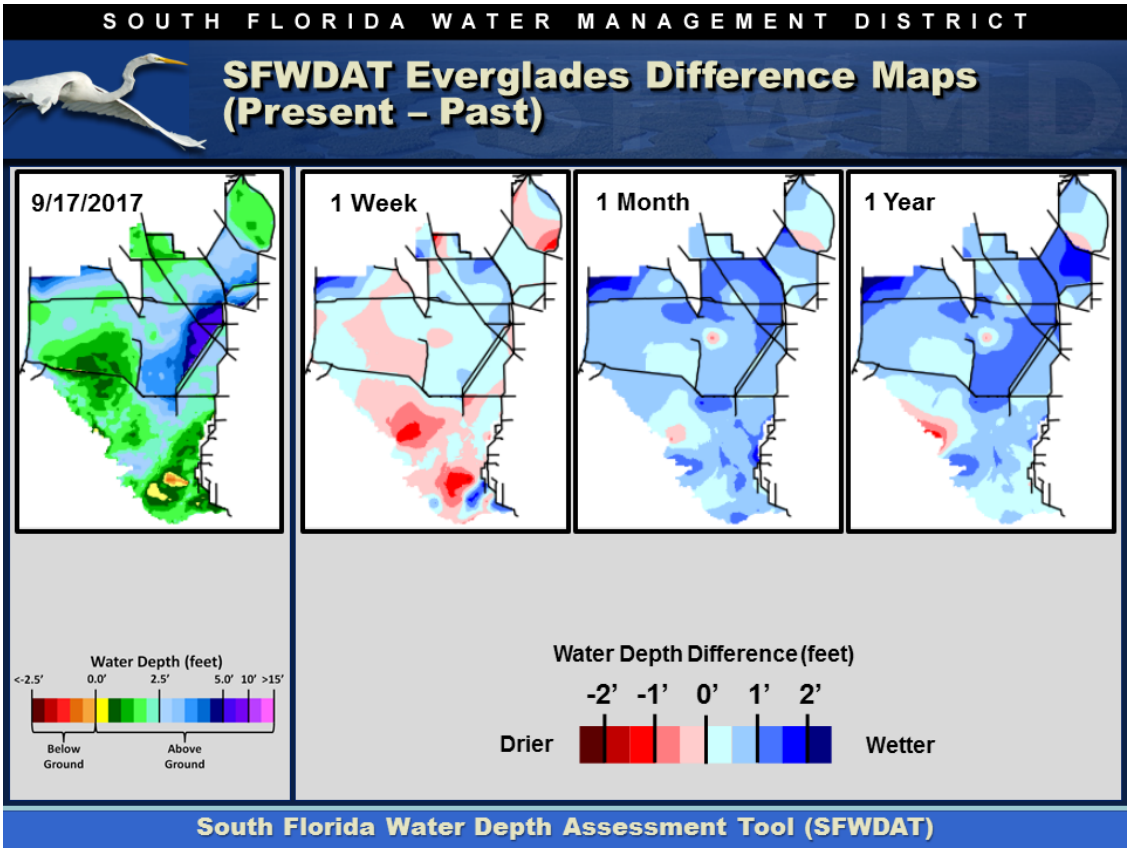
Regulation Schedules: WCA-1 three-gauge average is 0.38 feet below Zone A, and stage difference between the marsh and the canal is minimal. WCA-2A marsh stage at gauge GA2A17 is currently 1.84 feet above zone A and around 1.0 feet higher than temporary deviation. Marsh stage is 1.14 feet above canal stage at S11B. WCA-3A three-gauge average stage is 1.79 feet above zone A, and .84 feet higher than canal stage. WCA-3A at gauge 62 (Northwest corner) is 0.80 feet above the lower schedule.



Water Depths and Changes: The WDAT tool for spatial interpolation of depth indicates a range from a low of 1.0 feet in extreme Northeastern WCA-3A and portions of 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.

Over the last week individual gauge changes ranged from 0.60 feet (NW WCA-3A) to -0.49 feet (WCA-1). Comparing WDAT water levels from present, current water depths for a majority of the WCAs are higher than one week ago (with the exception of WCA-1) and one month ago.





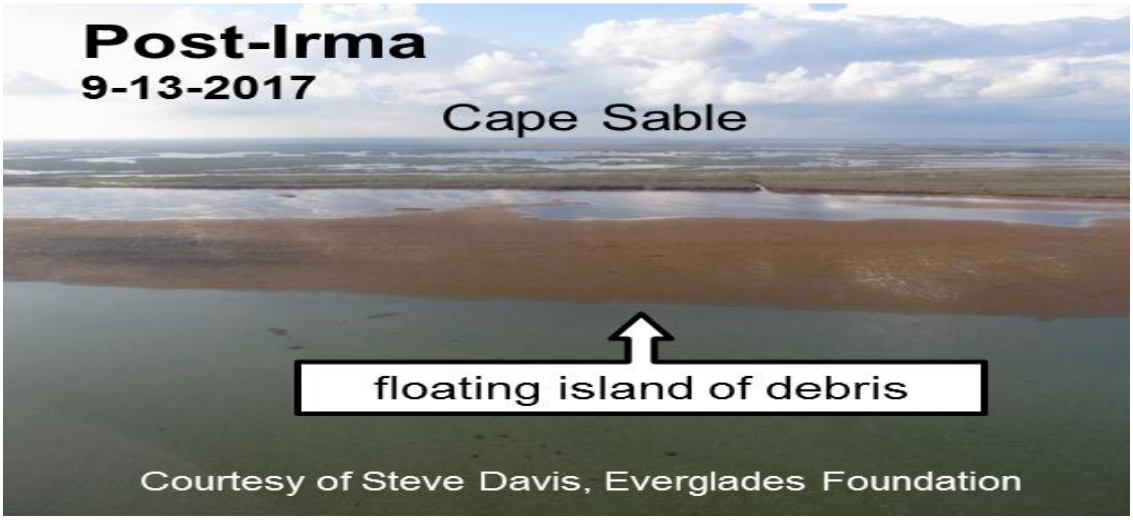
Deep Water Surrounds a Degraded (Ghost) Tree Island in WCA-3A: In the southern reaches of WCA-3A water has been piling up for the last two months. Hurricane Irma made the situation

worse as seen here looking NE to some of the deepest areas of WCA-3A. Healthy tree island are being stressed by this high water. They have been under water for some 100 days. A computer model used to estimate tree tolerances (Wu et al.) found that islands should not go under water for more than 120 days, especially two years in a row.

Study Tree Island 3AS17-6

Taylor Slough stages, Florida Bay salinity, Florida Bay MFL data used for this report was unavailable however using another source recently taken spot observations showed Florida Bay east and central shoreline salinities were 5 to 13 psu compared to the 22 to 36 psu that it was on September 6.

Western Florida Bay: Large amounts of debris floating in the western areas of Florida Bay. Does not appear to be uprooted seagrass since grass would still be green. Possibly detritus, macro-algae, and some seagrass.



<u>Water Management Recommendations</u>

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 4.07 feet, and has exceeded 2.5 feet for 94 days.

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

Everglades Ecological Recommendations, September 19th, 2017 (red is new)				
Area	Current Condition	Cause(s)	Recommendation	Reasons
WCA-1	Stage changes ranged from 0.00 to -0.49'	Rainfall, ET, management	Moderate ascension rates as possible. Maintaining water levels a minimum of 0.1 ft above WRS until early July is also recommended.	Achieve high water targets (17.5 ft) to protect habitat and facilitate invasive plant treatments.
WCA-2A	Stages increased +0.09'	Rainfall, ET, management	Moderate ascension rates as possible. Limit to +.25 feet per week.	Protect habitat, wildlife and support apple snail reproduction.
WCA-2B	Stages increased +0.05'	Rainfall, ET, management	Moderate ascension rates as possible.	Protect habitat, wildlife and support apple snail reproduction.
WCA-3A NE	Stages increased +0.09'	Rainfall, ET, management	Moderate ascension rates as possible.	Protect habitat, wildlife and support apple snail reproduction.
WCA-3A NW	Stages increased +0.60'	Rainfall, ET, management		
Central WCA-3A S	Stages decreased -0.05'	Rainfall, ET, management	Moderate ascension rates as possible.	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 94 days.
Southern WCA-3A S	Stages increased +0.48'	Rainfall, ET, management		
WCA-3B	Stages decreased -0.08'	Rainfall, ET, management	Moderate ascension rates as possible..	Protect habitat, wildlife and support apple snail reproduction.
ENP-SRS	Stages decreased -0.07'	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		Rain, ET, inflows	Move water southward as possible	When available provide freshwater buffer for ecosystems and slow recession rates.
FB- Salinity		Rain, ET, inflows, wind	Move water southward as possible	When available, provide freshwater to produce low salinity wet season conditions.