

Disclaimer: Information contained in the report addresses environmental conditions only and is not the official South Florida Water Management District operations recommendation or decision.

M E M O R A N D U M

TO: John Mitnik, Chief, Operations, Engineering and Construction Bureau
Paul Linton, Chief, Operations Section

FROM: SFWMD Staff Environmental Advisory Team

DATE: November 7, 2017

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

Northeast winds will bring scattered light showers mainly east again today, then shower coverage should decrease but remain focused mostly over eastern areas on Wednesday. A weak frontal boundary is forecast to push into the District and stall Friday. Daytime heating should generate some widely scattered light showers, mainly over the interior, on Thursday and then some scattered light showers should move into northern areas ahead of the front late Thursday night. Moisture lifting north ahead of the front should also produce some scattered showers southeast pre-dawn Friday. Scattered showers and a couple of thunderstorms are expected mainly northeast Friday and then east Saturday and Sunday, as the front stalls and becomes diffuse over the area.

Kissimmee

Tuesday morning stages from schedule were 58.0 feet (at schedule) in East Lake Toho, 55.0 feet (at schedule) in Lake Toho, and 51.9 feet (0.6 feet below schedule) in Kissimmee Cypress Hatchineha; S65A headwater stage was 46.4 feet. Tuesday morning discharges were 1,351 cfs at S65, 1,407 cfs at S65A, and 2,948 cfs at S65E. Dissolved oxygen concentration in the Kissimmee River averaged 4.2 milligrams per liter (mg/L) for the week. Kissimmee River mean floodplain depth on Sunday was 1.33 feet. There are no new recommendations.

Lake Okeechobee

Lake stage is 16.91 feet NGVD, having decreased -0.11 feet over the past week and -0.29 feet from its peak of 17.20 feet on October 13. Stages have exceeded 16 feet for 46 days, the longest period since the end of 2005. The submerged aquatic and emergent vegetation coverage in the nearshore areas of the Lake are expected to decline over the coming months and possibly years due to the high water conditions and turbidity from resuspended Lake sediment associated with Hurricane Irma. The high inflows and resuspended Lake sediment also increased water column total phosphorus, which could lead to algal blooms as turbidity begins to decline and water temperatures rise. Lower Lake stages near the end of WY2018 would help to recover these important communities, and long, steady recessions of water levels throughout the dry season may help promote another productive year for wading birds.

Estuaries

Total discharge to the St. Lucie estuary averaged 6,630 cfs over the past week with 2,657 cfs coming from Lake Okeechobee. Salinity remains close to 0 in the upper estuary and increased at and downstream of US1 Bridge. The seven-day average salinity at the US1 Bridge is in the poor range for adult oysters. Average chlorophyll *a* concentration levels remain low (on average at 1.8-3.2 µg/L). Average oxygen levels near the surface and the bottom at HR1 monitoring station in North Fork were 4.4-5.9 mg/L.

Total inflow to Caloosahatchee estuary averaged 10,601 cfs over the past week with 6,125 cfs 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 in the poor range for adult oysters at Cape Coral and fair range at Shell Point. Last week's Chlorophyll a concentration levels near Myers and Shell Point were low (<5.0 µg/L). Red tide dinoflagellate was not present in samples collected along the Lee County coast.

The 2008 LORS recommends up to 6,500 cfs at S-77 and up to 2,800 cfs at S-80. 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 21,700 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 basin runoff, it is recommended that no Lake releases be sent to the STAs/FEBs this week.

Everglades

Sparse precipitation across the Everglades last week resulted in stages dropping toward regulation schedule in WCA-1 and WCA-3A and rising toward the temporary deviation schedule in WCA-2A. 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 4.4 feet, and has exceeded 2.5 feet for 142 days.

In Florida Bay, salinities are currently 2 to 7 psu below the historic averages for this time of year. Most of the Florida Bay stations this past week experienced an increase in salinity of up to 12 psu with the nearshore areas showing the largest increases.

There are no new recommendations. Previous recommendations for each respective area is included at the end of this report.

Supporting Information

KISSIMMEE BASIN

Kissimmee Basin Rainfall

The Upper Kissimmee Basin received 0.03 inch of rainfall in the past week and the Lower Basin received 0.09 inch (SFWMD Daily Rainfall Report 11/6/2017).

Upper Kissimmee Basin

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

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

Report Date: 11/7/2017

Water Body	Structure	7-day Average Discharge (cfs) ¹	Stage Monitoring Site ²	Lake Stage (feet)	Schedule Type ³	Schedule Stage (feet)	Daily Departure (feet)						
							11/5/17	10/29/17	10/22/17	10/15/17	10/8/17	10/1/17	9/24/17
Lakes Hart and Mary Jane	S62	31	LKMJ	61.1	R	61.0	0.1	0.0	0.3	1.1	1.4	1.7	2.1
Lakes Myrtle, Preston, and Joel	S57	86	S57	62.2	R	62.0	0.2	0.3	1.3	2.3	2.4	2.5	3.1
Alligator Chain	S60	39	ALLI	64.0	R	64.0	0.0	0.1	0.3	0.3	0.2	0.1	0.7
Lake Gentry	S63	48	LKGT	61.5	R	61.5	0.0	0.0	0.2	0.3	0.3	0.0	0.4
East Lake Toho	S59	45	TOHOE	58.0	R	58.0	0.0	0.1	0.3	0.7	1.4	2.0	2.4
Lake Toho	S61	169	TOHOW, S61	55.0	R	55.0	0.0	0.1	0.3	0.3	0.3	1.0	1.8
Lakes Kissimmee, Cypress, and Hatchineha	S65	1,439	KUB011, LKIS5B	52.0	R	52.5	-0.5	-0.2	0.1	0.4	0.5	0.9	1.8

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

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

³ T = temporary schedule, R = USACE flood control schedule, S = temporary snail kite schedule, A = projected ascension line, N/A = not applicable or data not available.
DATA ARE PROVISIONAL

Lower Kissimmee Basin

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

Table 2. One-day and seven-day averages of discharge at S-65x structures, of dissolved oxygen concentration in the Phase I area river channel, and water depth in the Phase I area floodplain. Data are provisional real-time data from SFWMD.

Report Date: 11/7/2017

Metric	Location	1-Day Average	Average for the Preceding 7-Days ¹									
		11/5/2017	11/5/17	10/29/17	10/22/17	10/15/17	10/8/17	10/1/17	9/24/17	9/17/17	9/10/17	9/3/17
Discharge (cfs)	S-65	1,512	1,439	1,564	2,281	3,069	6,671	11,491	12,054	5,535	1,809	1,209
Discharge (cfs)	S-65A	1,572	1,638	1,703	2,262	3,706	7,028	7,972	8,336	6,779	2,375	1,465
Discharge (cfs)	S-65D ²	3,074	3,714	3,240	4,287	7,397	12,111	12,914	13,332	11,906	2,442	2,262
Discharge (cfs)	S-65E ²	3,153	3,938	3,453	4,501	7,575	12,702	13,341	13,748	13,216	2,584	2,279
DO (mg/L) ³	Phase I river channel	4.2	4.2	3.4	2.0	1.0	1.4	1.0	0.8	1.3	2.3	2.3
Mean depth (feet) ⁴	Phase I floodplain	1.33	1.48	1.43	1.93	2.77	4.18	4.85	5.17	4.86	1.58	1.53

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

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

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

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

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

Water Management Recommendations

Kissimmee Basin Adaptive Recommendations and Operational Actions

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

KCOL Hydrographs (through Sunday midnight)

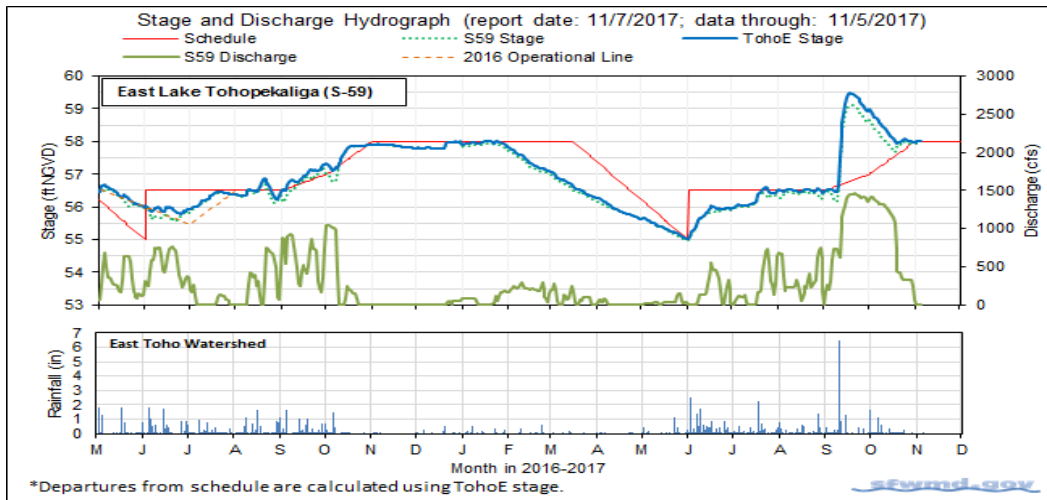


Figure 1.

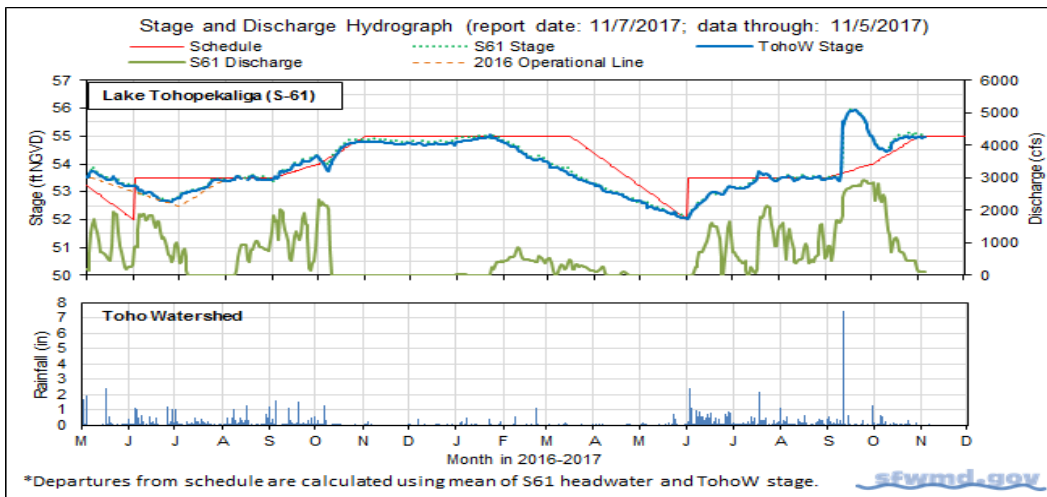


Figure 2.

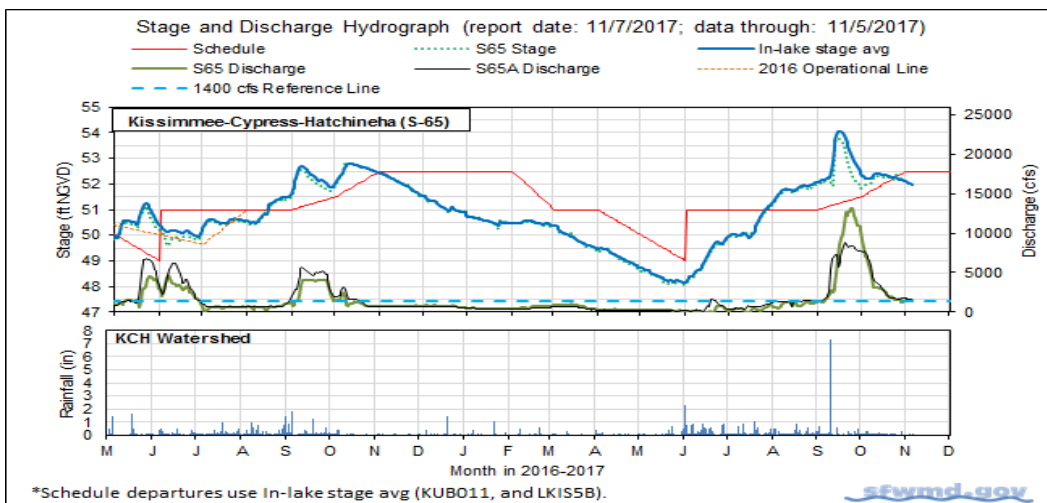


Figure 3.

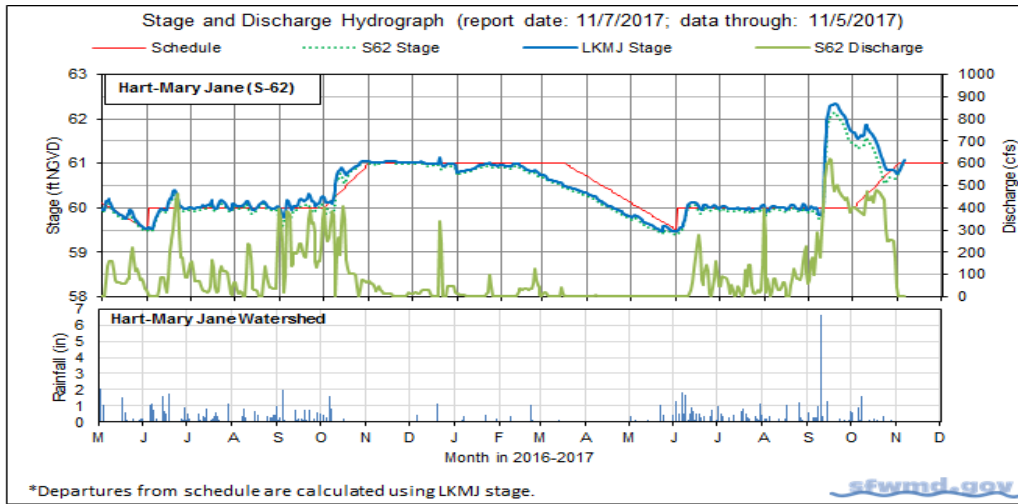


Figure 4.

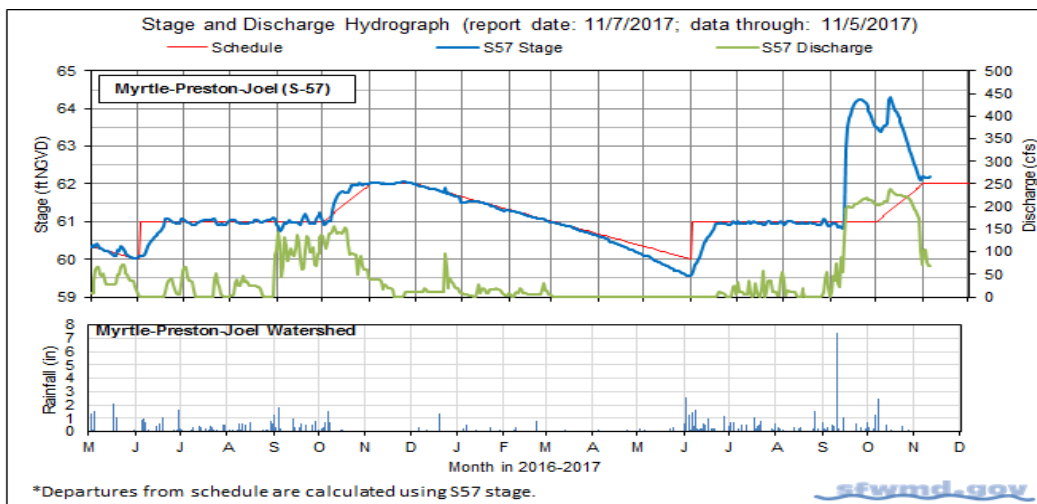


Figure 5.

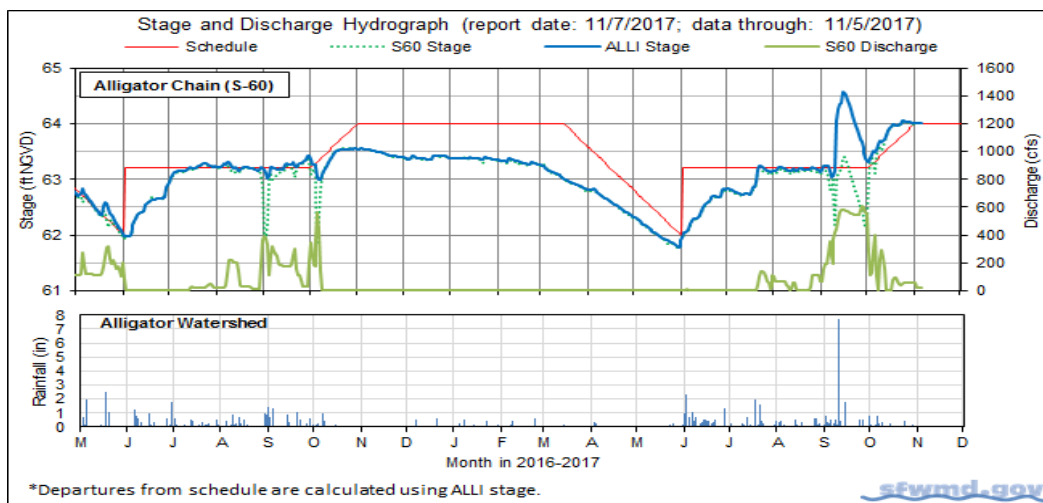


Figure 6.

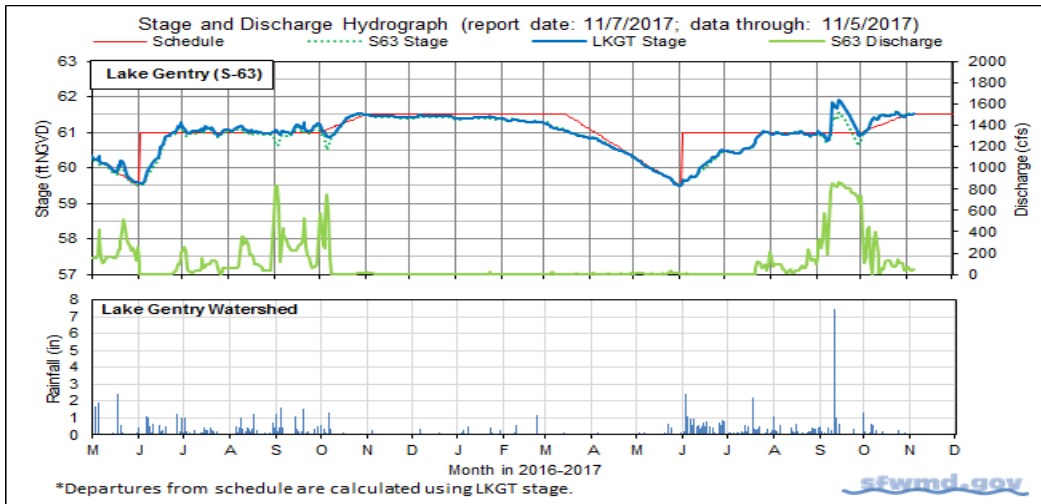


Figure 7.

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Limits on Rate of Discharge Change at S65/S65A During Dry Season 2016-2017

Discharge Rate of Change Limits for S65/S65A (revised 11/16/16).	
Q (cfs)	Maximum rate of increase or decrease (cfs/day)
300-650	75
650-1700	150
1700-3000	300
>3000	1000

15

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

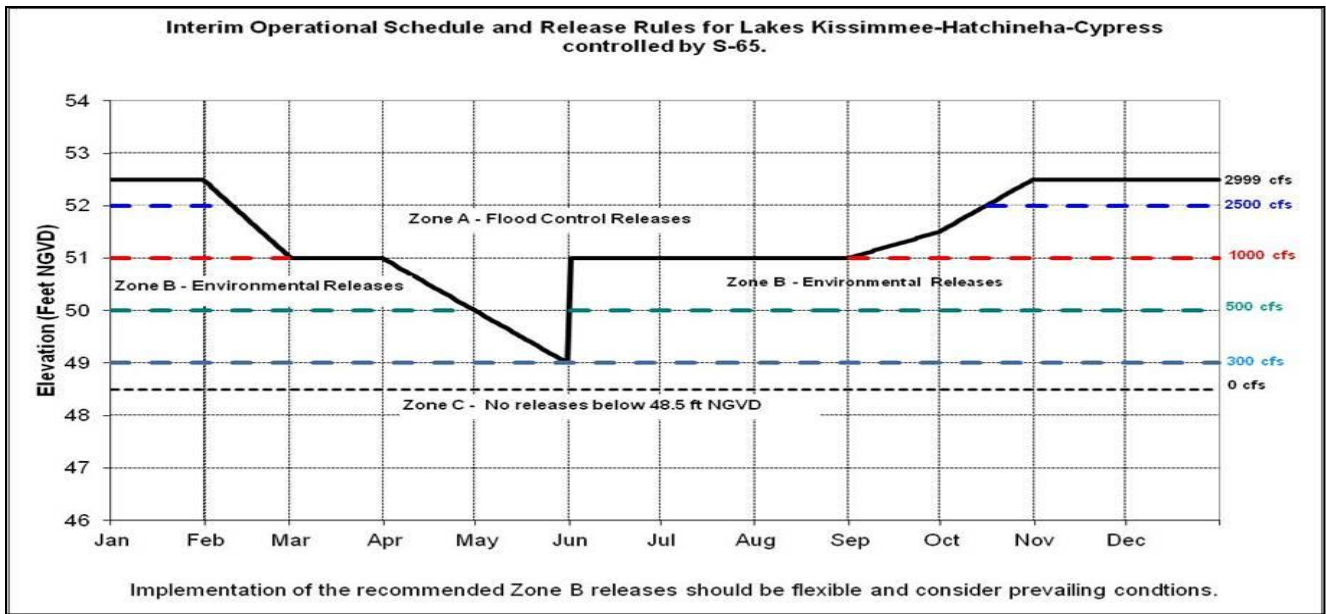


Figure 9. Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years.

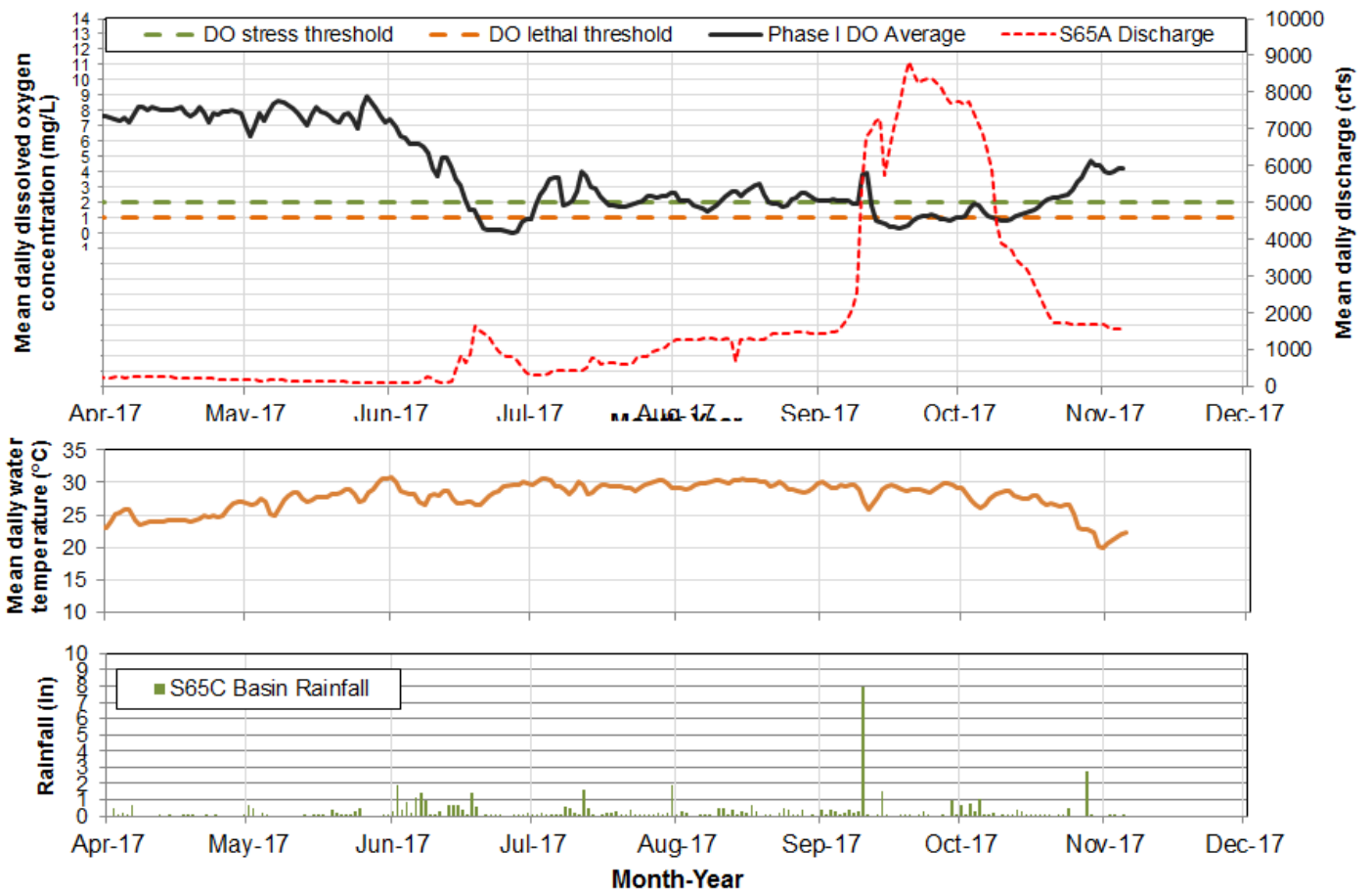


Figure 10. Mean daily Dissolved Oxygen, discharge, temperature and rainfall in the Phase I river channel.

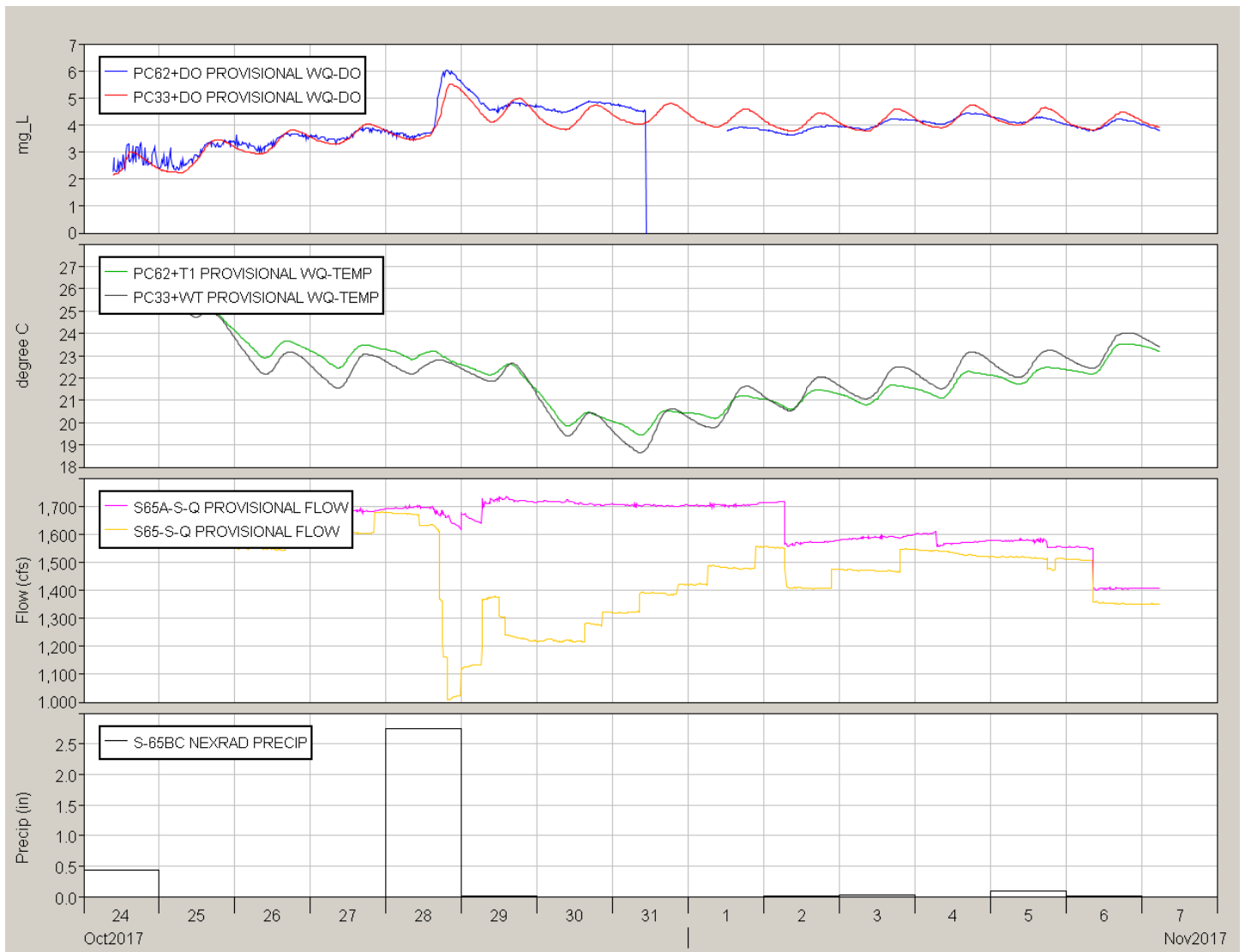


Figure 11. Phase I river channel dissolved oxygen and water temperature (measured at 15 minute intervals) and Pool BC daily rainfall.

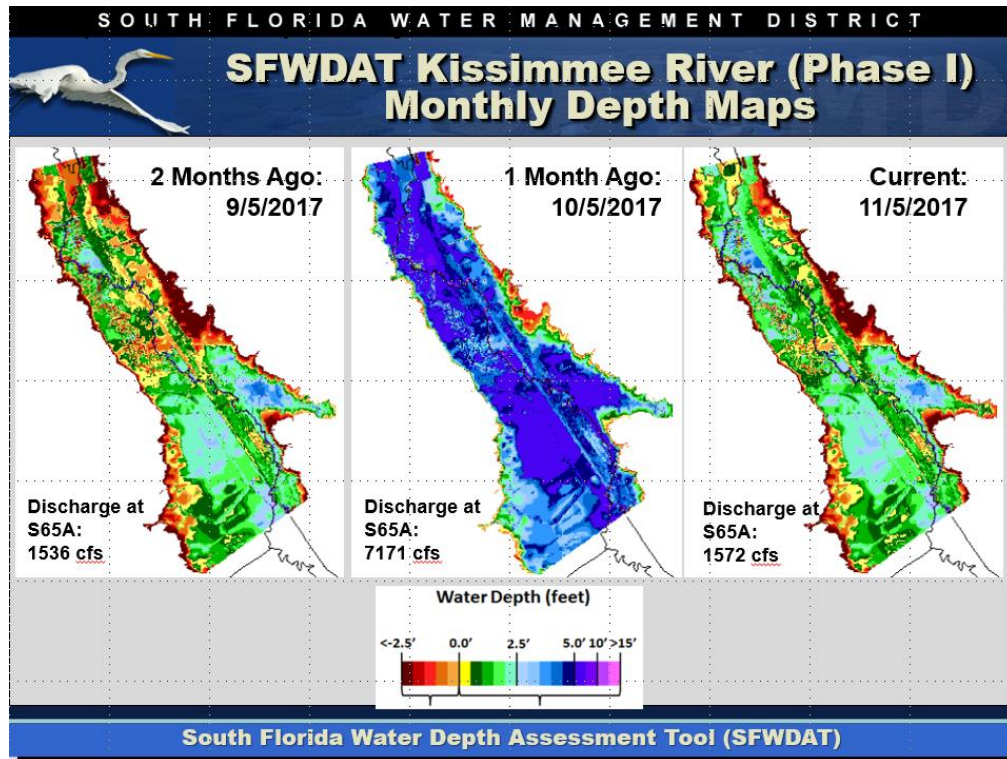
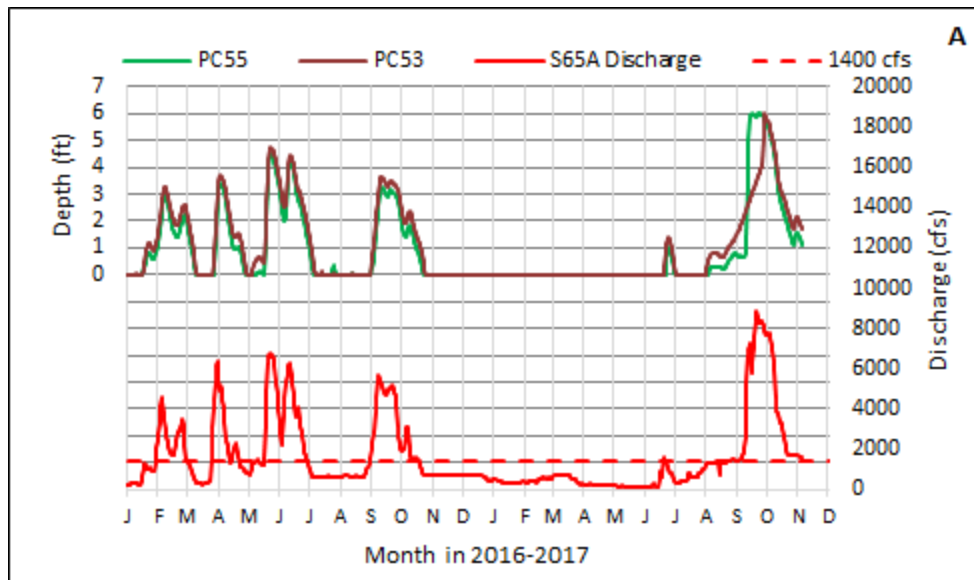
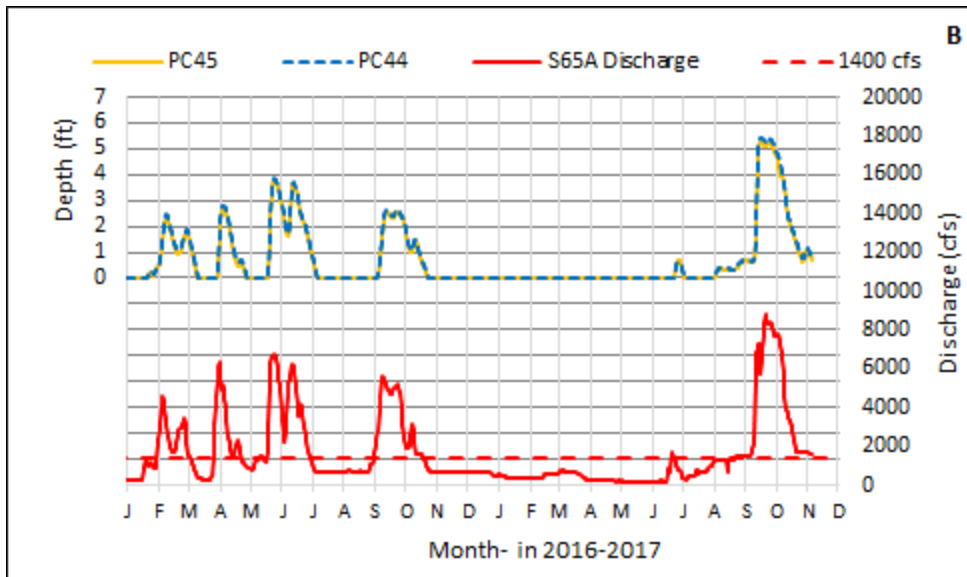


Figure 12. Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to Jan. 16, 2012.





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

REPORT DATE 11/7/2017

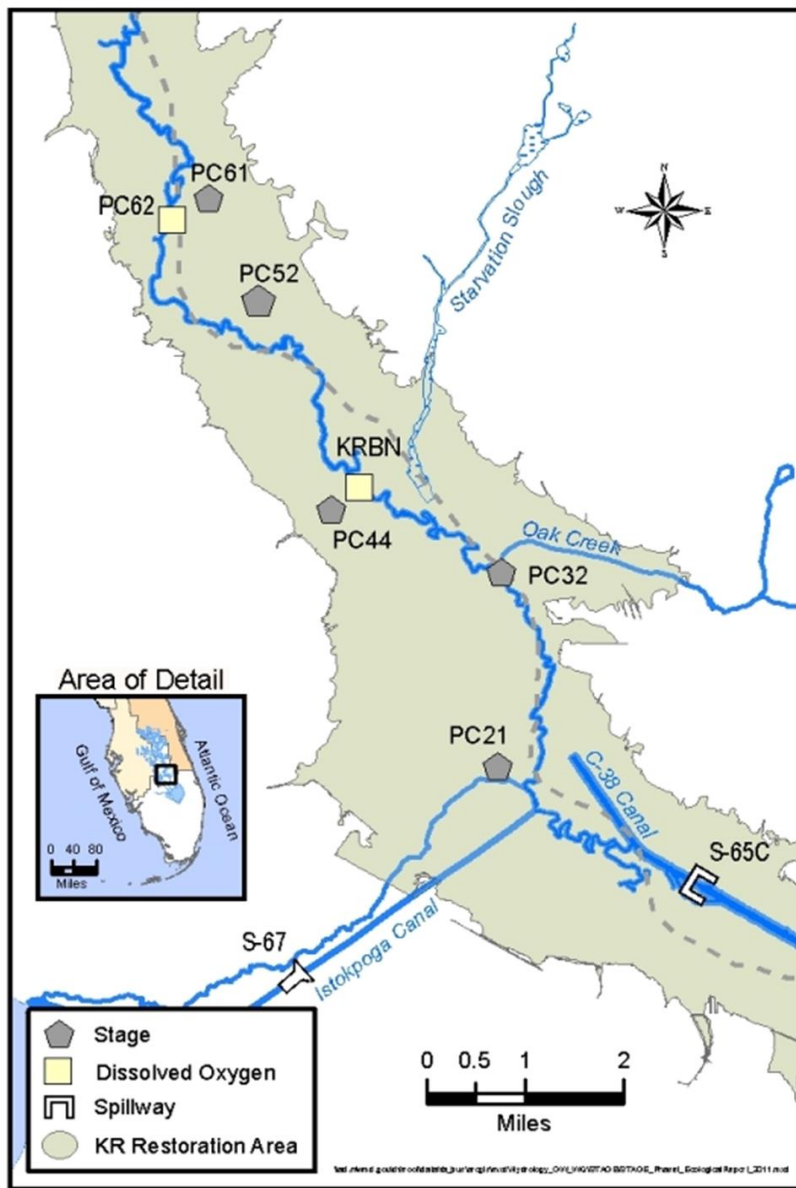
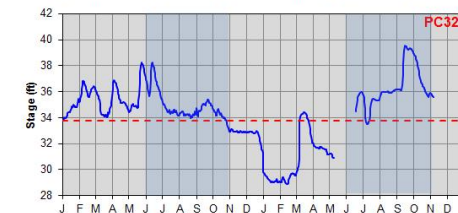
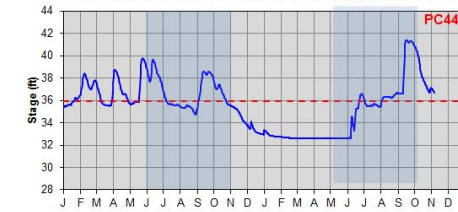
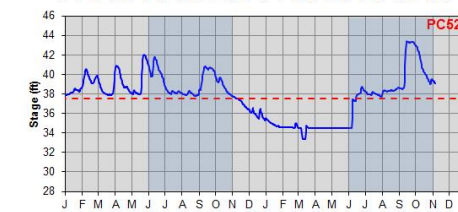
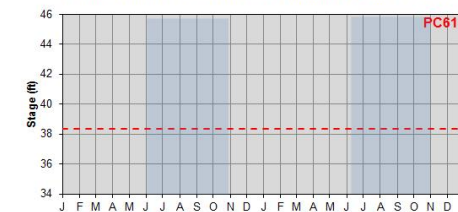


Figure 13. Discharge at S65, stages at five monitoring stations in the Phase I area of the Kissimmee River floodplain, and headwater stage at S65-C since January 1, 2016. The most recent data (~2 weeks) are provisional real-time data from SFWMD DualTrend; previous data are from SFWMD DB-HYDRO (validated).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

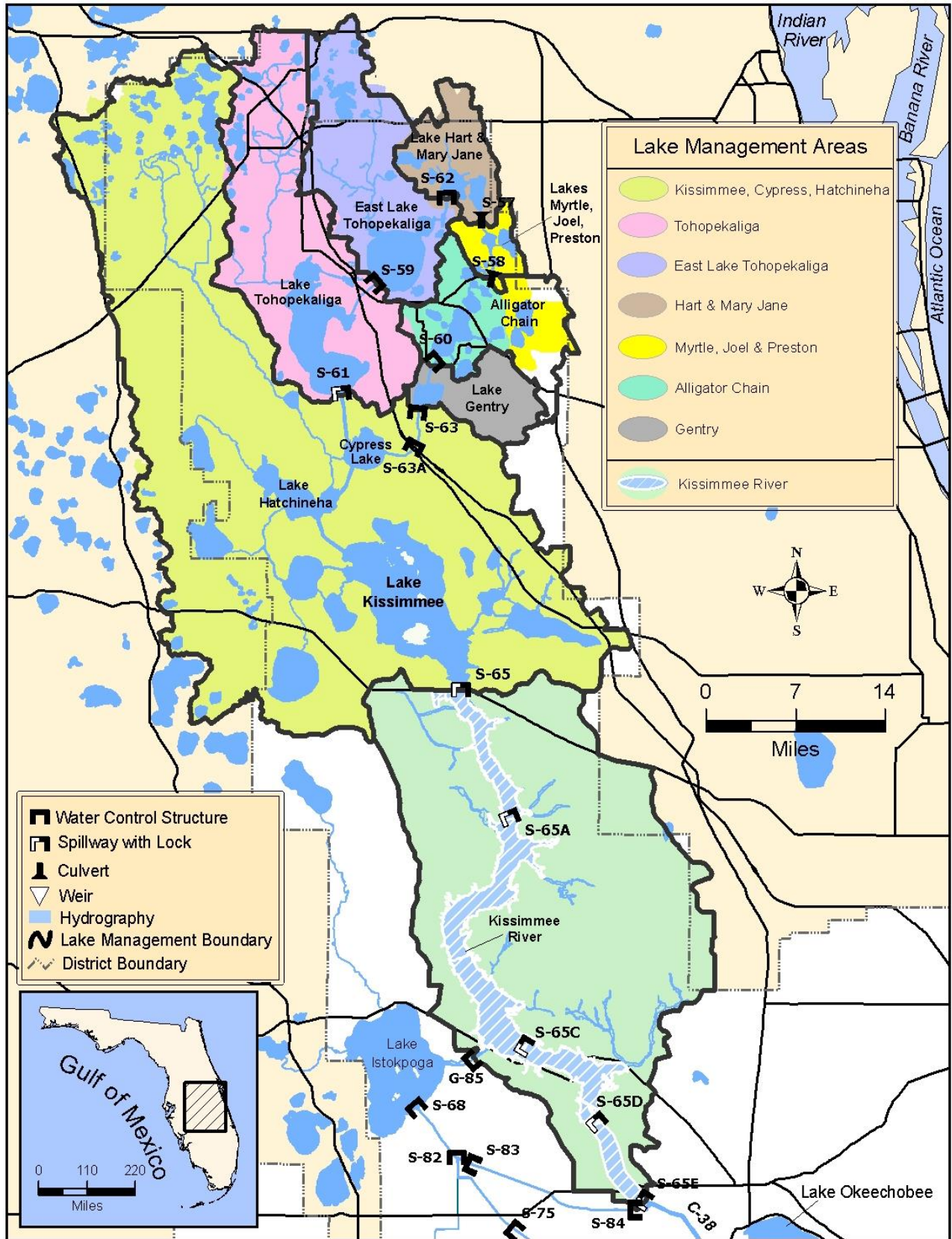


Figure 14. The Kissimmee Basin

LAKE OKEECHOBEE

According to the USACE web site, Lake Okeechobee stage is at 16.91 feet NGVD for the period ending at midnight on November 06, 2017. This value is based on the use of four interior Lake stations (L001, L005, L006 and LZ40) and four perimeter stations (S308, S352, S4 and S133). Lake stage last peaked at 17.20 feet on October 13, before declining to 16.8 feet on October 28 and then back up to 17.02 feet. The Lake is now -0.17 feet lower than it was a month ago but 1.61 feet higher than it was a year ago (Figure 1). The Lake is currently in the High sub-band (Figure 2). According to RAINDAR, rainfall was well below average with just 0.05 inches of rain directly over the Lake during the week October 31 - November 06 (Figure 3), with similar amounts throughout its watershed.

Average daily inflows to the Lake correspondingly decreased over the past week, from 9,056 cfs to 8,413 cfs. Most of the inflows were from the Kissimmee River via the S65E and S84 structures, which averaged 3,741 cfs and 1,513 cfs daily, respectively. S71 and S72 structures, along with Fisheating Creek, contributed a combined 1,983 average daily cfs as well.

Average daily outflows for the Lake were relatively unchanged from the previous week, with S77 discharges decreasing slightly from 6,614 cfs to 6,125 cfs, while discharges through S308 increased slightly from 2,308 cfs to 2,666 cfs this past week. There were no discharges south through the S350 structures or to the L8 canal via Culvert 10A. The corrected evapotranspiration value based on the L006 weather platform solar radiation data increased slightly to 0.15 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 31 to midnight November 6). 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.

Table 1

INFLOWS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)	OUTFLOWS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)
S65E & S65EX1	3741	1.4	S77	6125	2.3
S71 & 72	774	0.3	S308	2666	1.0
S84 & 84X	1513	0.6	S351	0	0.0
Fisheating Creek	1209	0.4	S352	0	0.0
S154	200	0.1	S354	0	0.0
S191	448	0.2	L8	14	0.0
S133 P	86	0.0	ET	2838	1.1
S127 P	98	0.0	Total	11643	4.3
S129 P	53	0.0			
S131 P	13	0.0			
S135 P	99	0.0			
S2 P	0	0.0			
S3 P	0	0.0			
S4 P	179	0.1			
C5	0	0.0			
Rainfall	141	0.1			
Total	8554	3.2			

**PROVISIONAL
DATA**

Satellite imagery indicates that algal bloom potential has remained very low over the past two months, based on NOAA's cyanobacteria monitoring product derived from the OLCI satellite sensor. Potential for elevated cyanobacterial levels were last observed in the northern portion of the Lake in early September (Figure 5). Along with decreasing temperatures, high winds from Hurricane Irma may have further reduced bloom potential on the Lake by increasing turbidity, but elevated total phosphorus (TP) levels from high inflows and resuspended Lake sediment are expected to produce high bloom potentials next year as turbidity declines and temperatures increase.

Water Management Recommendations

The Lake is 16.91 feet NGVD having decreased -0.11 feet from the week prior, primarily from below average rainfall. Submerged and emergent vegetation communities in the nearshore region have experienced stages >16 feet three times in less than two years, and for 46 consecutive days and counting, the longest since 2005. 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.

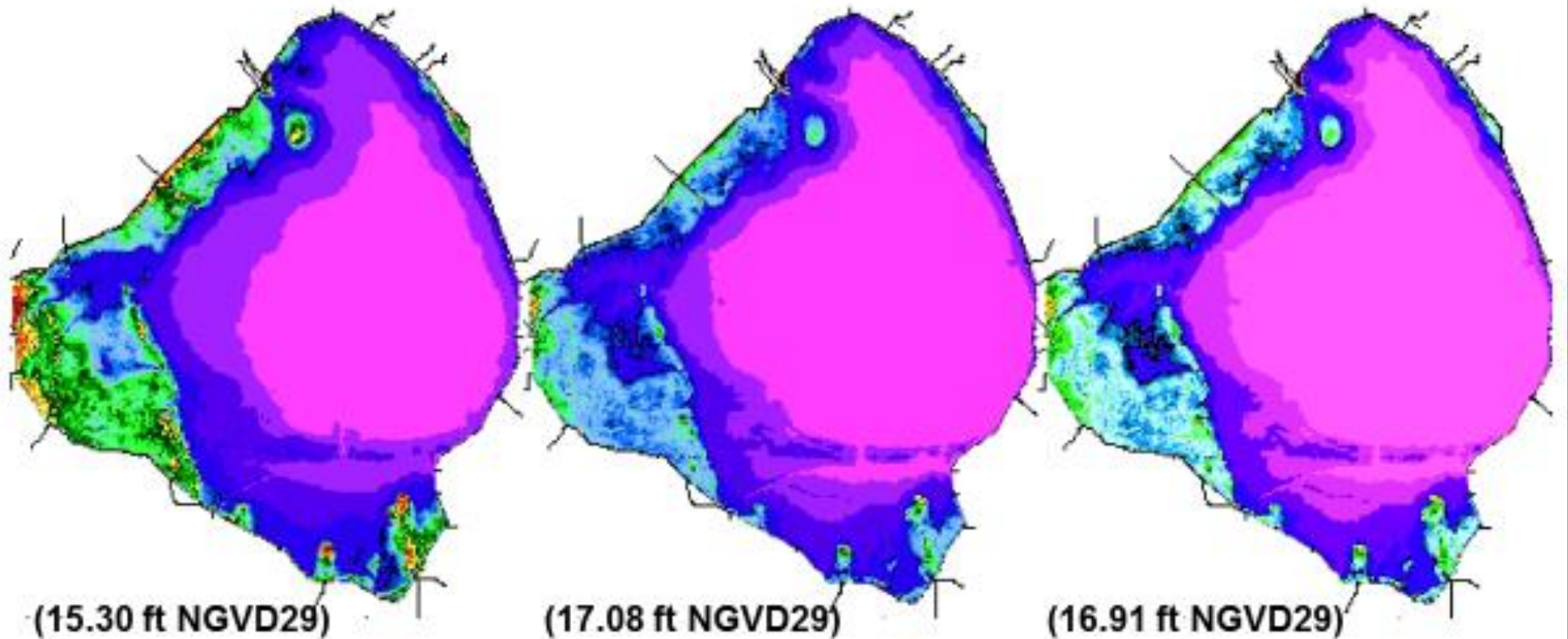
Lake Okeechobee

Water Depth Timeseries Maps

1 Year Ago: 11/06/2016

1 Month Ago: 11/07/2017

Current: 11/06/2017



Source of Lake Graphic: Water Depth Assessment Tool (SFWDAT)
Source of Lake Stage Value: USACE/SFWMD Official Stage Value

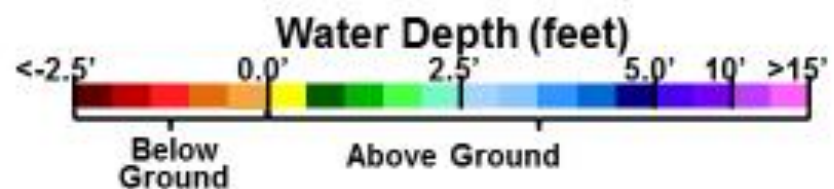
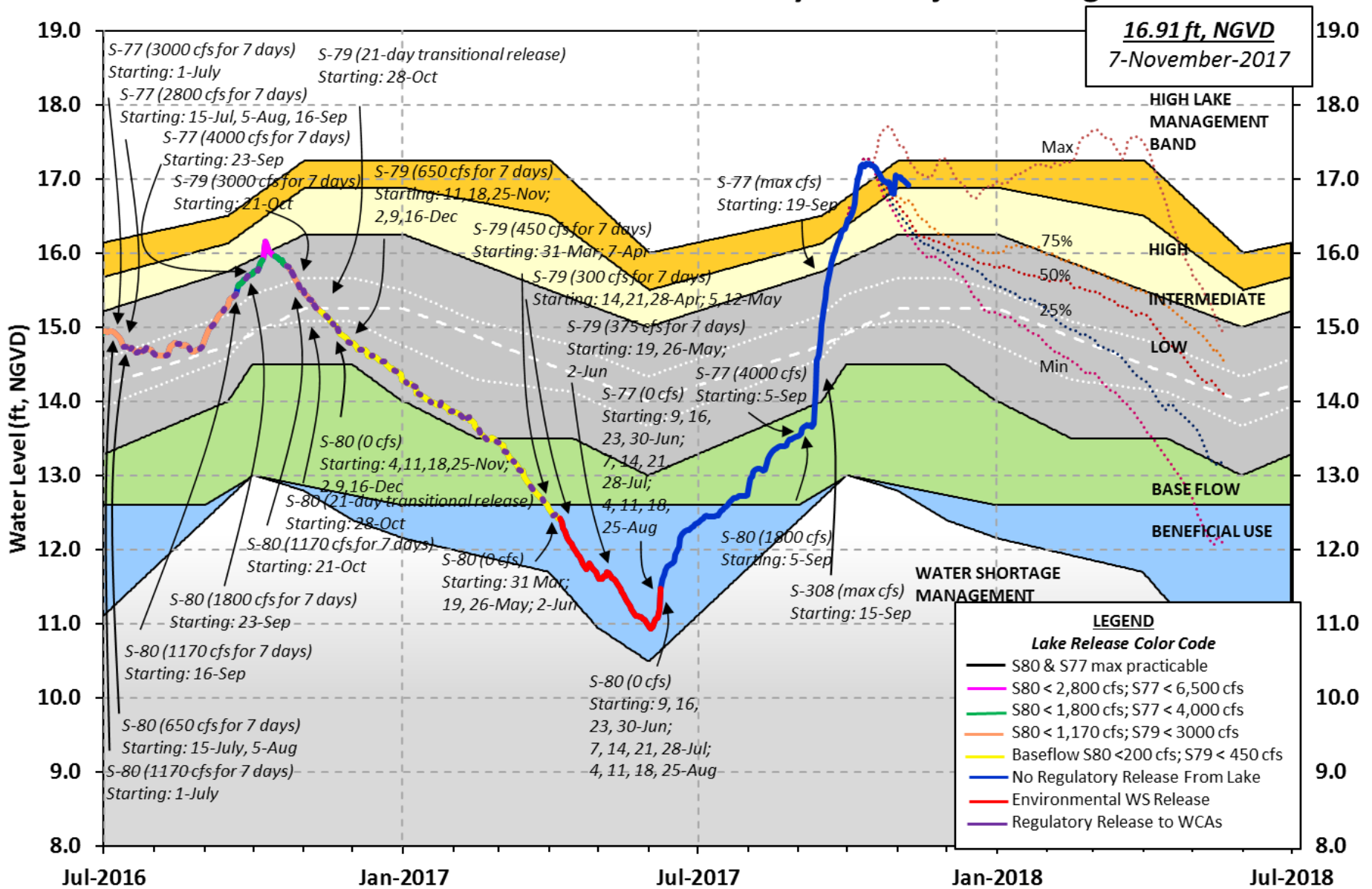


Figure 1

Lake Okeechobee Water Level History and Projected Stages



LORS-2008
Adopted by USACE 28-April-2008

Projected Stage Percentiles From
SFWMD-HESM Position Analysis

Figure 2

SFWMD PROVISIONAL RAINDAR 7-DAY BASIN RAINFALL ESTIMATES

FROM: 0630 EST, 10/31/2017 THROUGH: 0630 EST, 11/07/2017

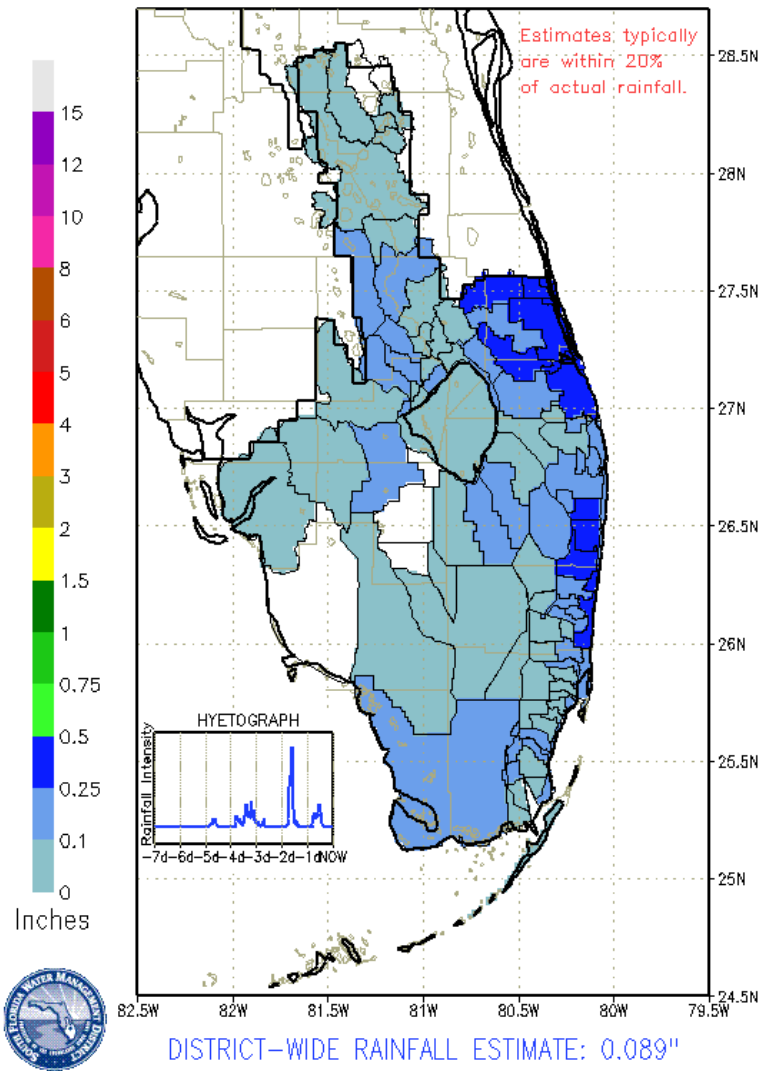


Figure 3

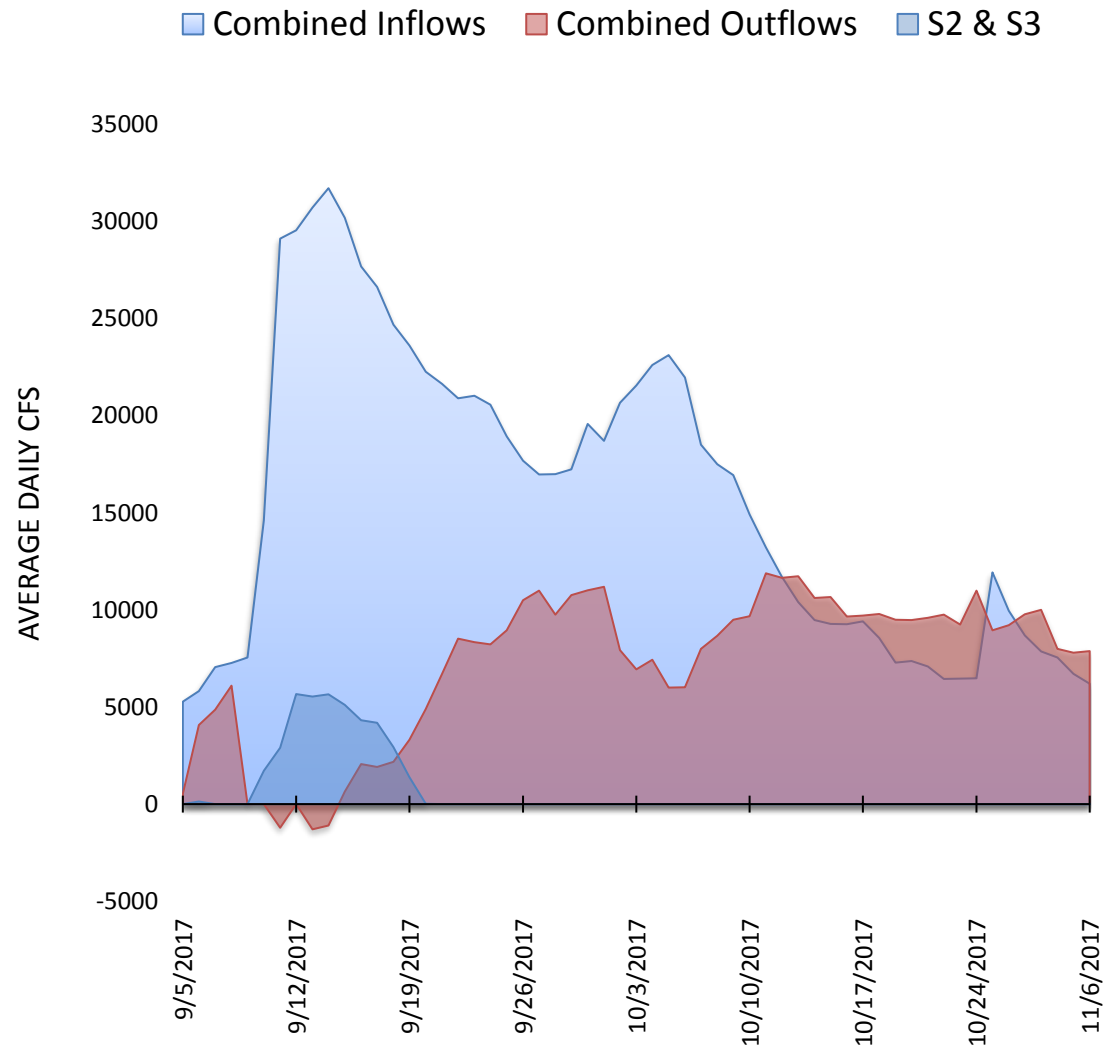


Figure 4

Lake Okeechobee Experimental Algal Bloom Potential

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

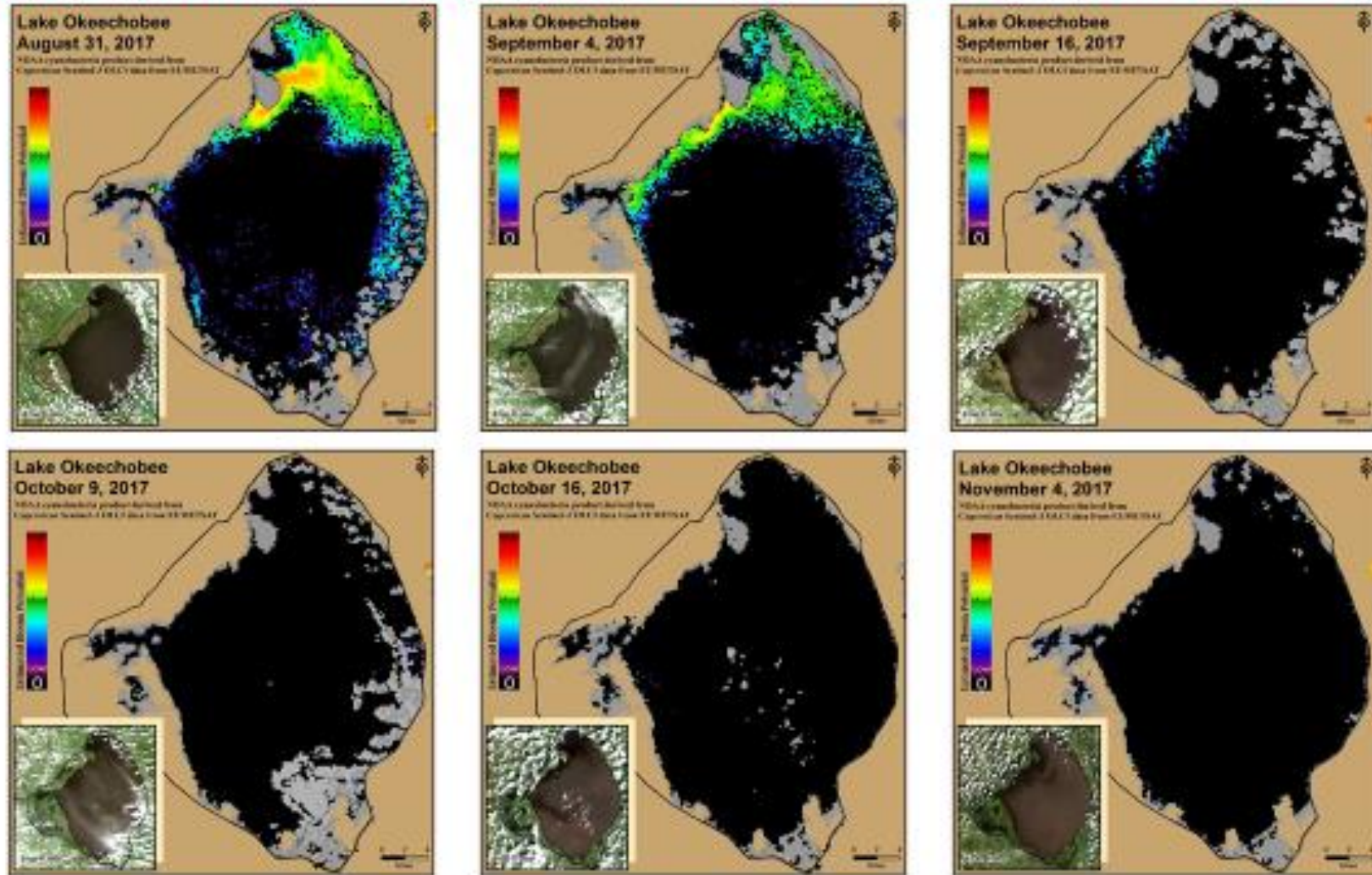


Figure 5

LAKE ISTOKPOGA

Lake Istokpoga stage is 39.23 feet NGVD as of midnight November 6, 2017 and is currently -0.27 feet below its regulation schedule to accommodate construction on downstream structures (Figure 6). Average daily flows into the Lake from Josephine Creek for the week October 31 – November 6 were slightly lower from the previous week, at 168 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 decreased slightly from the previous week, from 1,598 cfs to 1,352 cfs. According to RAINDAR, only 0.12 inches of rain fell in the Lake Istokpoga basin in the past week.

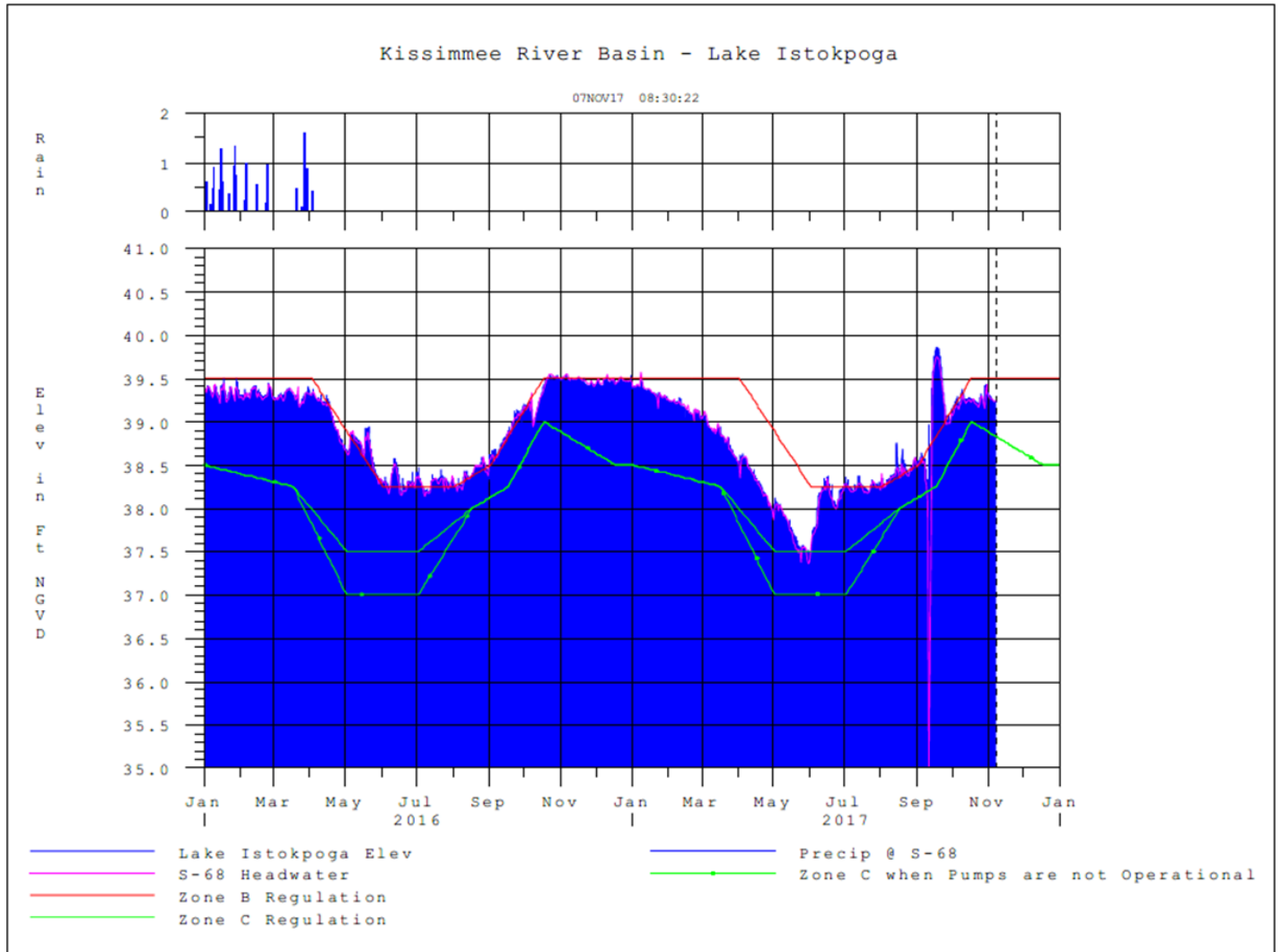


Figure 6

ESTUARIES

St. Lucie Estuary

Over the past week, provisional flows averaged about 4,746 cfs at S-80, 2,657 cfs at S-308, 457 cfs at S-49 on C-24, 485 cfs at S-97 on C-23, and 406 cfs from Ten Mile Creek at the Gordy Road Structure. Average inflow from tidal basin tributaries is estimated to be 536 cfs (Figures 1 and 2). Total inflow averaged about 6,630 cfs last week and 7,098 cfs over last month.

Over the past week in the estuary, salinity increased at and downstream of US1 Bridge (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 0.4. 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 (0.2)	0.5 (0.2)	10.0-26.0
A1A Bridge	3.2 (1.4)	10.1 (7.0)	NA ¹

¹Envelope 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	5.37*	1.90*	7.91
HR1	bottom	6.27*	2.73*	7.78

*Low confidence in data.

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 <i>a</i> (µg/l)	Average DO (mg/l)	Minimum DO (mg/l)	Maximum DO (mg/l)
SF2	3.13	3.20	4.42 - 5.11	7.24	6.76
SF	1.66	1.81	4.98 - 5.89	8.29	7.57
NF	2.19	2.25	5.17 - 8.18	7.20	6.67
ME	1.94	2.00	4.73 - 7.54	7.47	6.88
IRL-SLE	3.66	3.71	1.49 - 6.53	6.16	5.15

NOAA satellite imagery indicates low potential for cyanobacteria bloom at few locations in the St. Lucie estuary.

Caloosahatchee Estuary

During the past week, provisional flows averaged approximately 6,125 cfs at S-77, 7,084 cfs at S-78, and 10,161 cfs at S-79. Average inflow from tidal basin tributaries is estimated to be 440 cfs (Figures 6 & 7). Total inflow averaged 10,601 cfs last week and 10,909 cfs over last month.

Over the past week, surface salinity decreased at and downstream of Cape Coral Bridge (Table 4, Figures 8 and 9). The seven-day average salinity values are within the poor range for adult oysters at

Cape Coral and in the fair range at Shell Point (Figure 10). Salinity data was not available for Sanibel. 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	0.2 (0.3)	0.3 (0.4)	10.0-30.0
Shell Point	6.3 (5.7)	7.4 (11.2)	10.0-30.0
Sanibel	NR ³ (NR)	NR (NR)	10.0-30.0

¹Envelope not applicable, ²Envelope is based on a 30-day average, and ³Not 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 <i>a</i> (µg/l)	Down for maintenance	2.70 - 3.29	2.78 - 4.99
Dissolved Oxygen (mg/l)	Down for maintenance	No Data	6.18 - 8.51

The Florida Fish and Wildlife Research Institute reported on November 3, 2017, that *Karenia brevis*, the Florida red tide dinoflagellate, was not present in samples collected from Lee County.

NOAA satellite imagery indicates low potential for cyanobacteria blooms at just a few locations in the Caloosahatchee estuary.

Water Management Recommendations

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

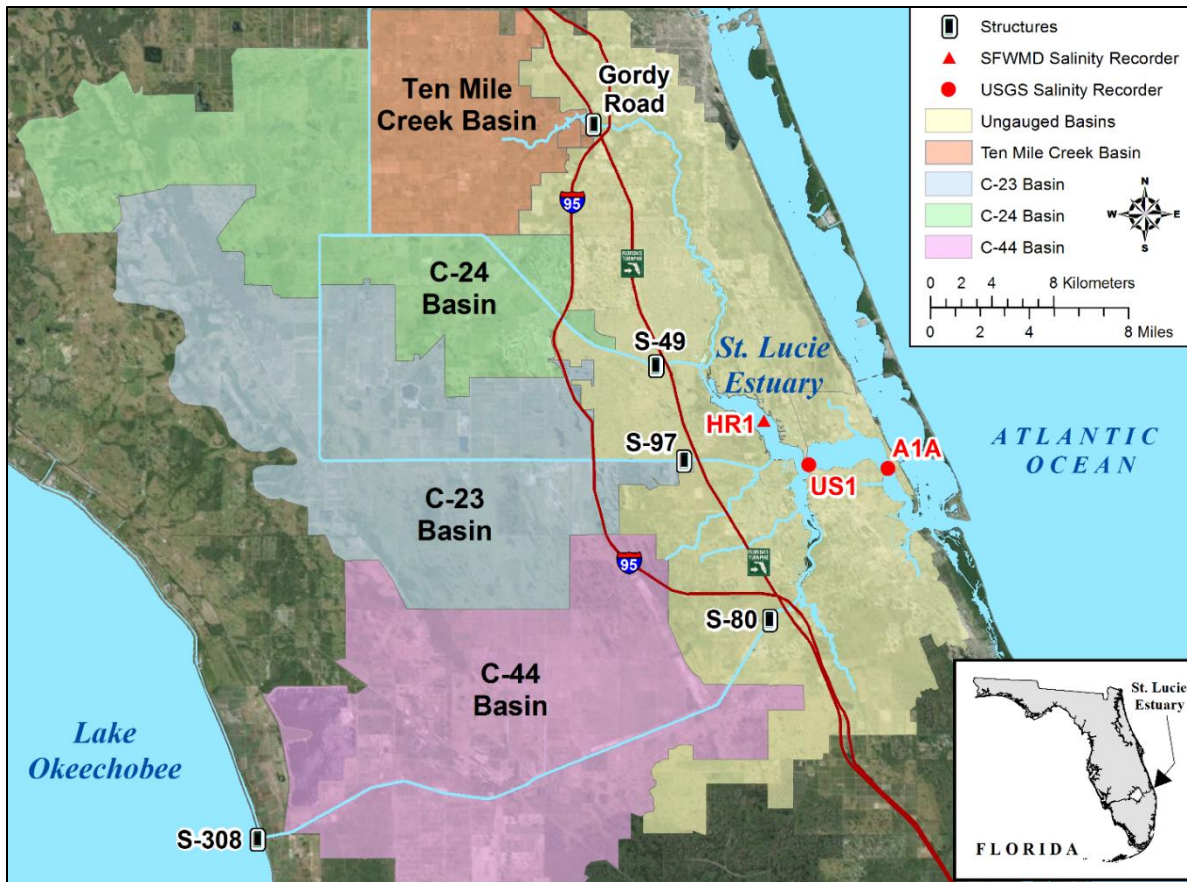


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

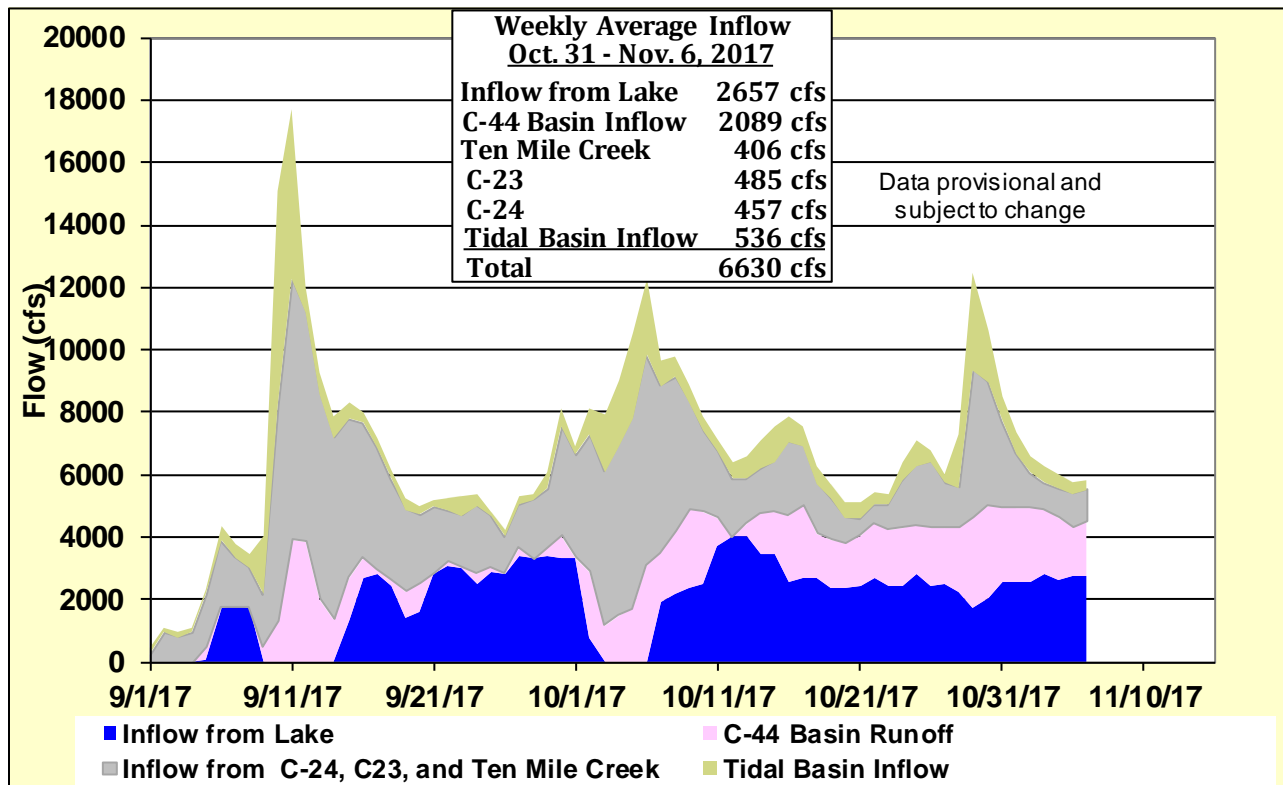


Figure 2. Estimated surface freshwater inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basins into the St. Lucie Estuary.

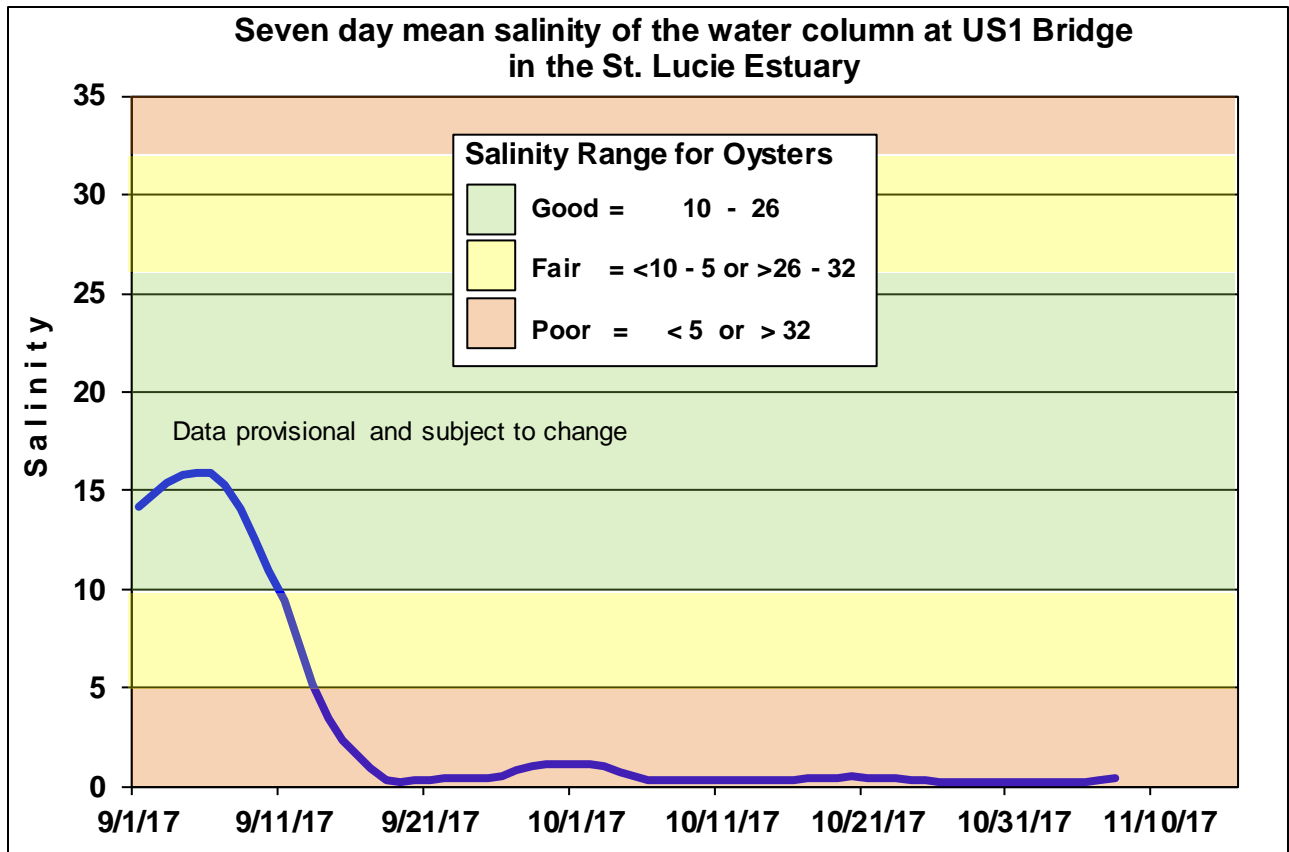


Figure 3. Seven-day mean salinity of the water column at the U.S. Highway 1 Bridge.

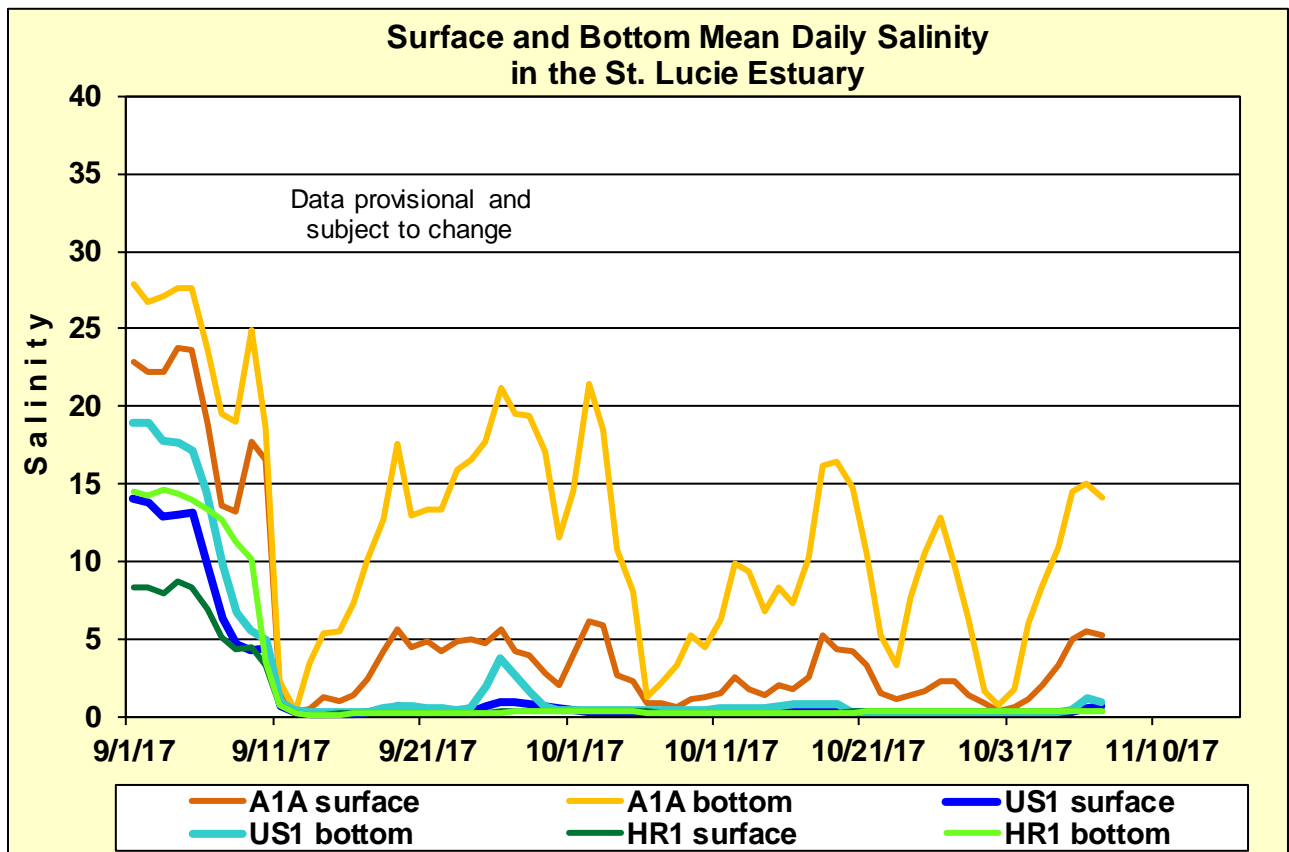


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

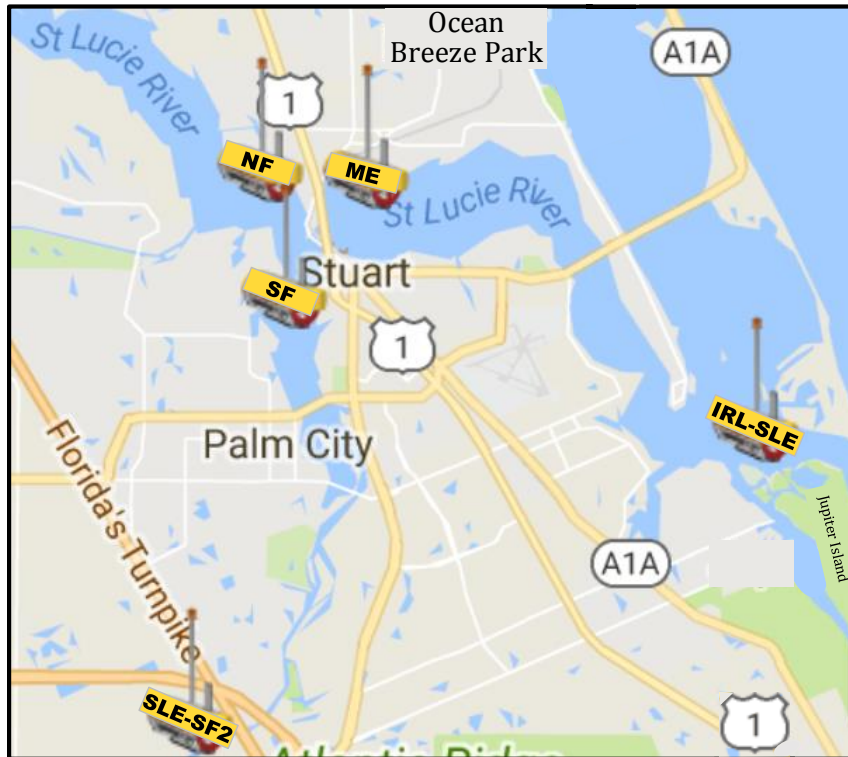


Figure 5. Location of FAU-HBOI LOBO water quality stations in the St. Lucie Estuary.

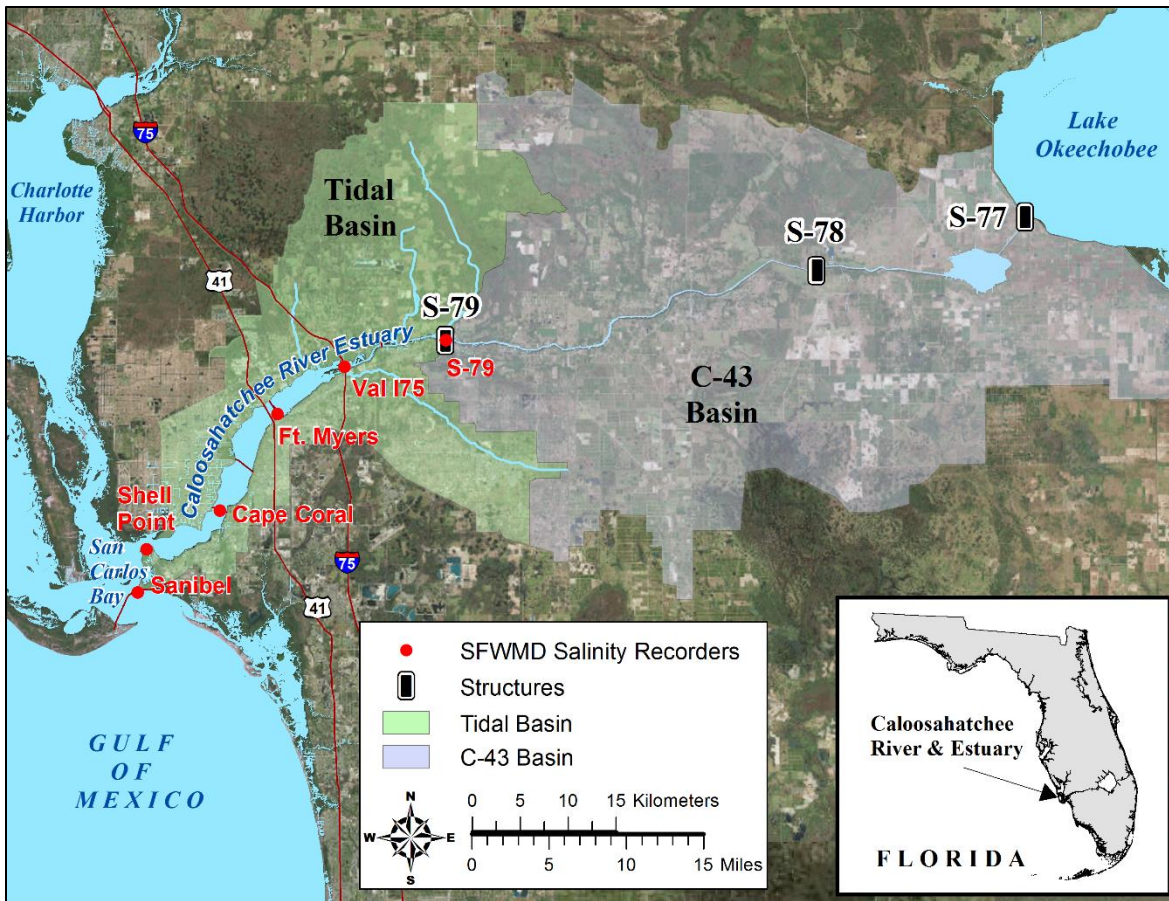


Figure 6. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

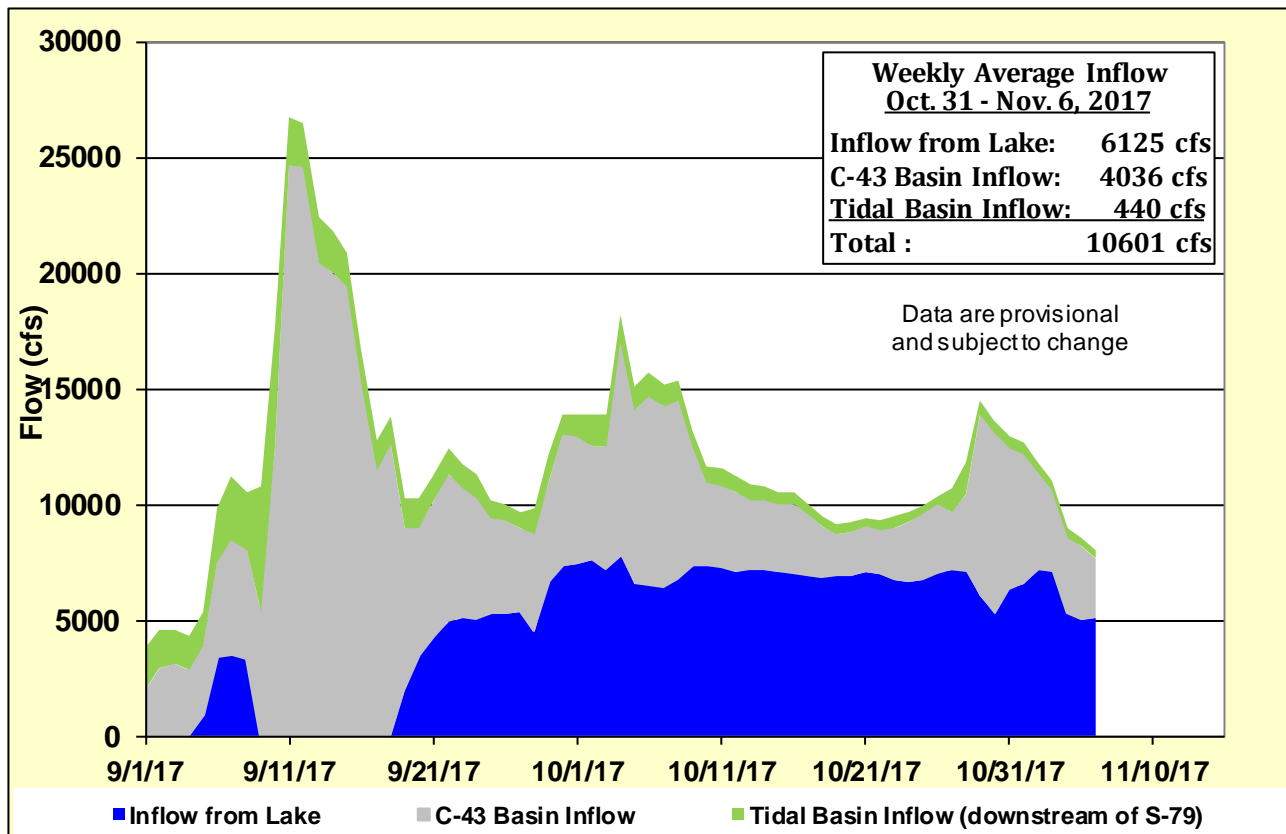


Figure 7. Freshwater inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.

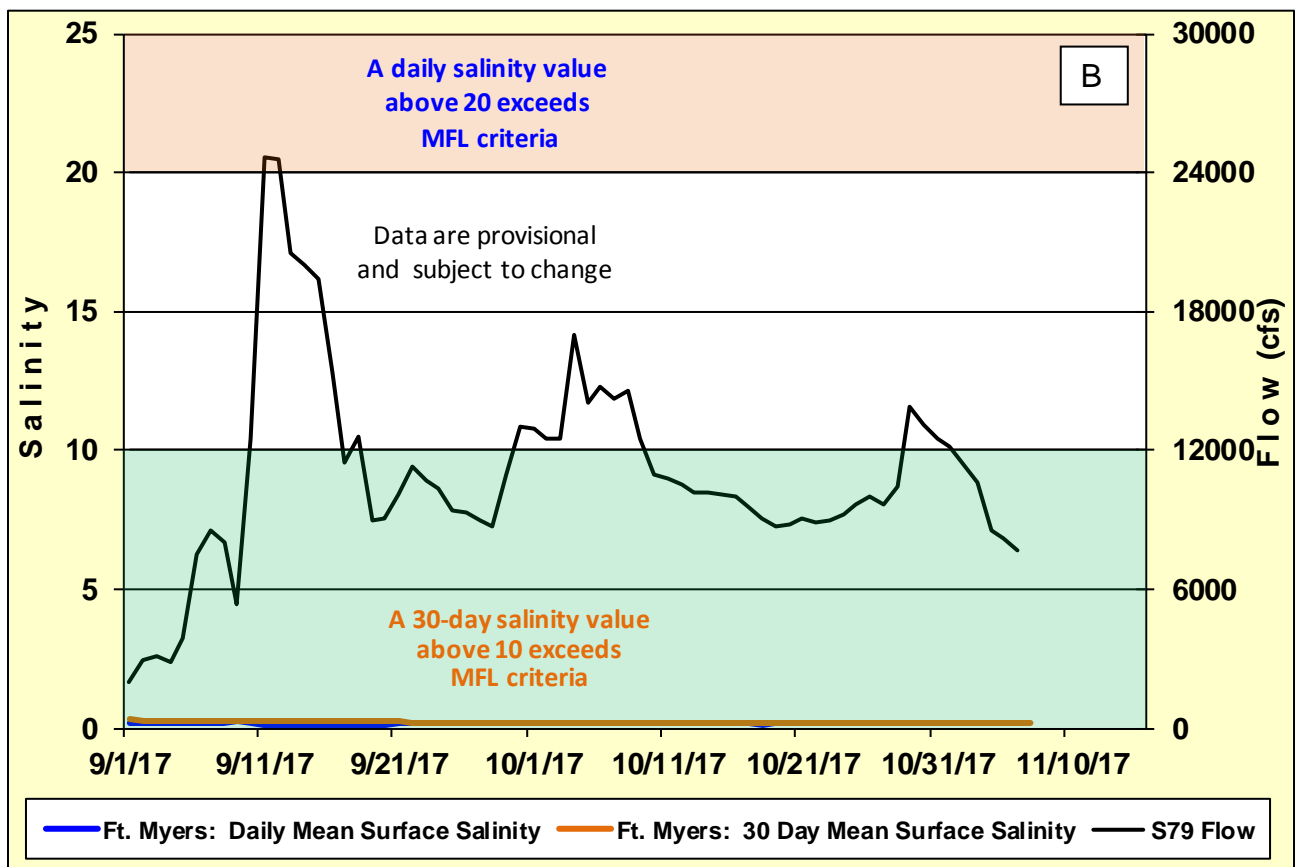
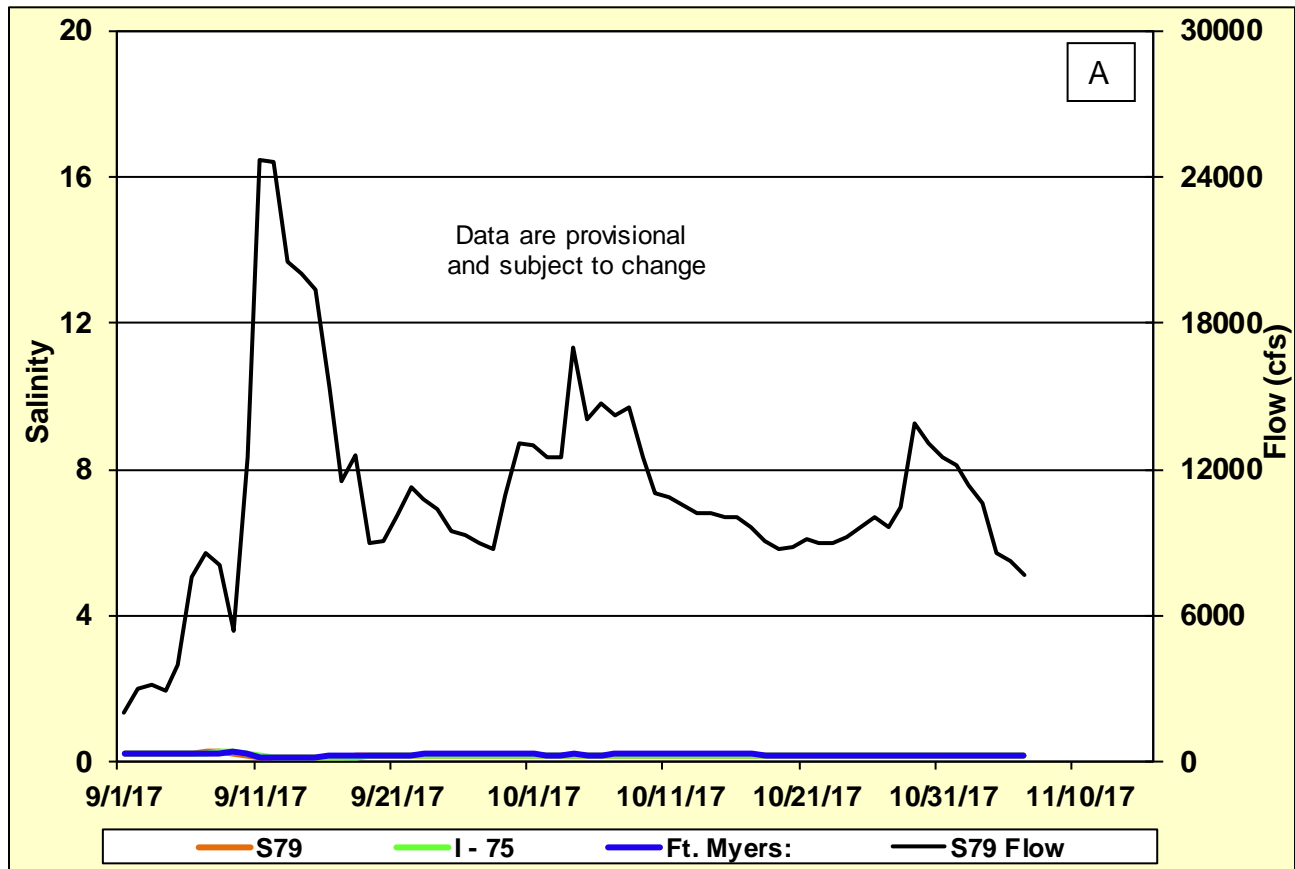


Figure 8. Daily mean flows at S-79 and salinity at upper estuary monitoring stations (A) and 30-day moving average salinity at Ft. Myers (B).

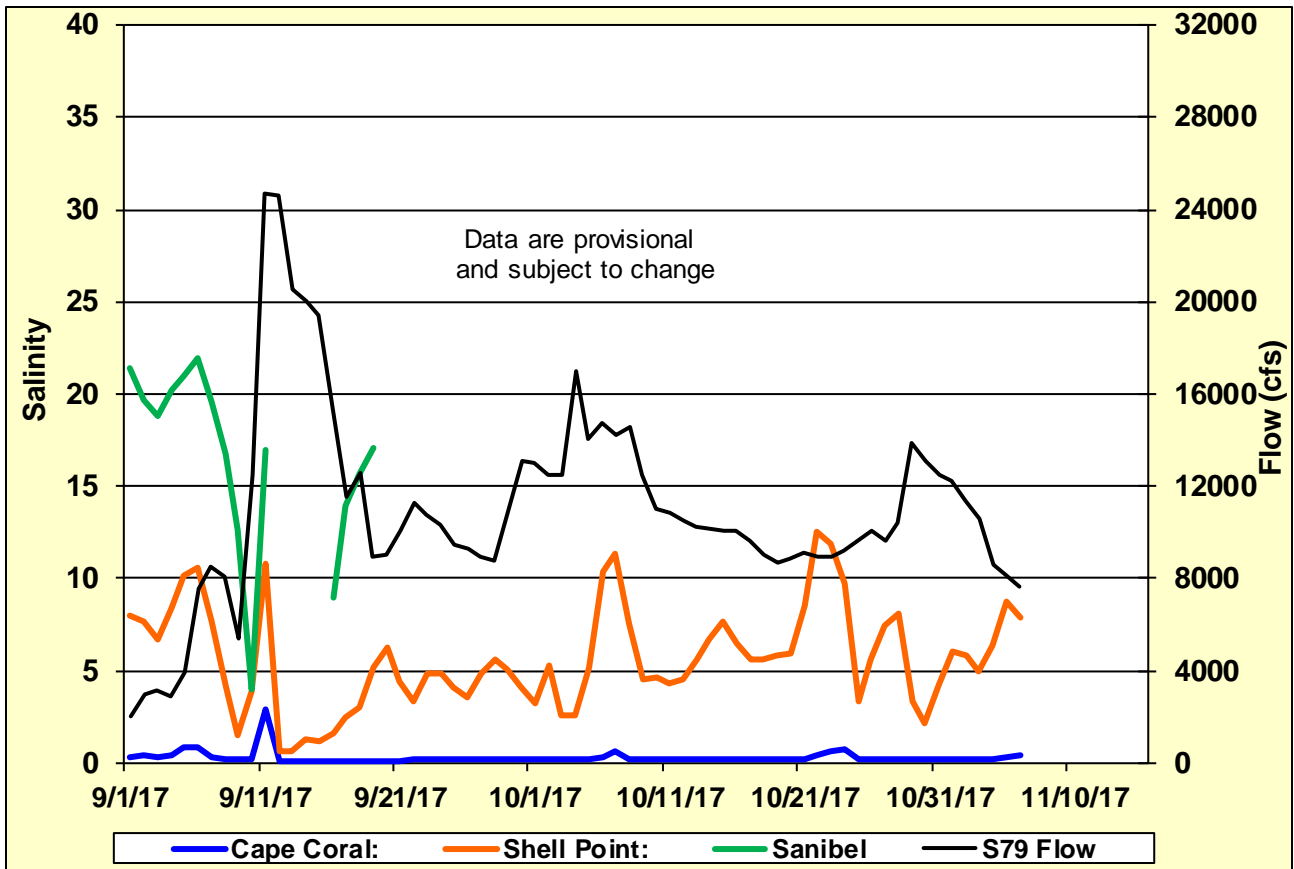


Figure 9. Daily mean flows at S-79 and salinity at lower estuary stations.

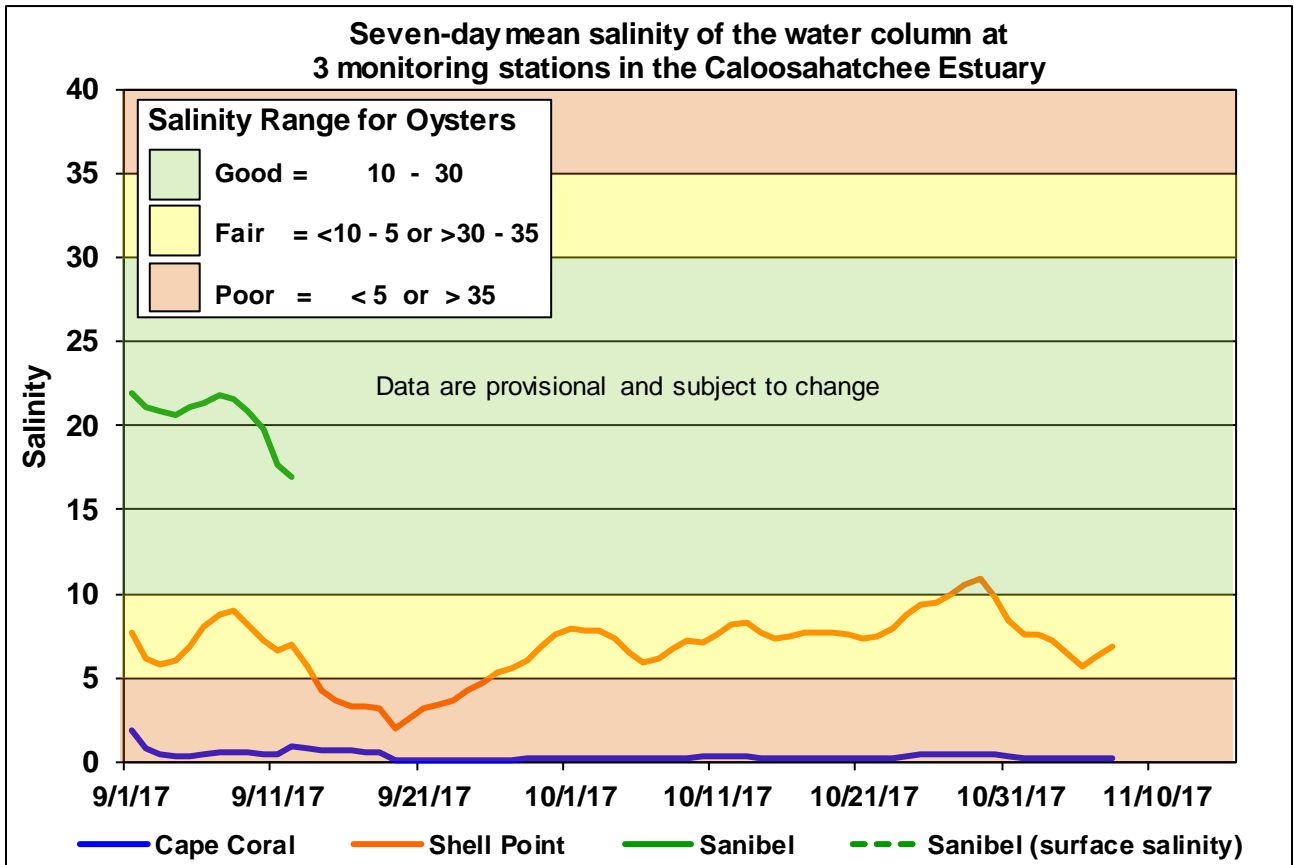


Figure 10. Seven-day mean salinity at Cape Coral Bridge, Shell Point and Sanibel Bridge monitoring stations.

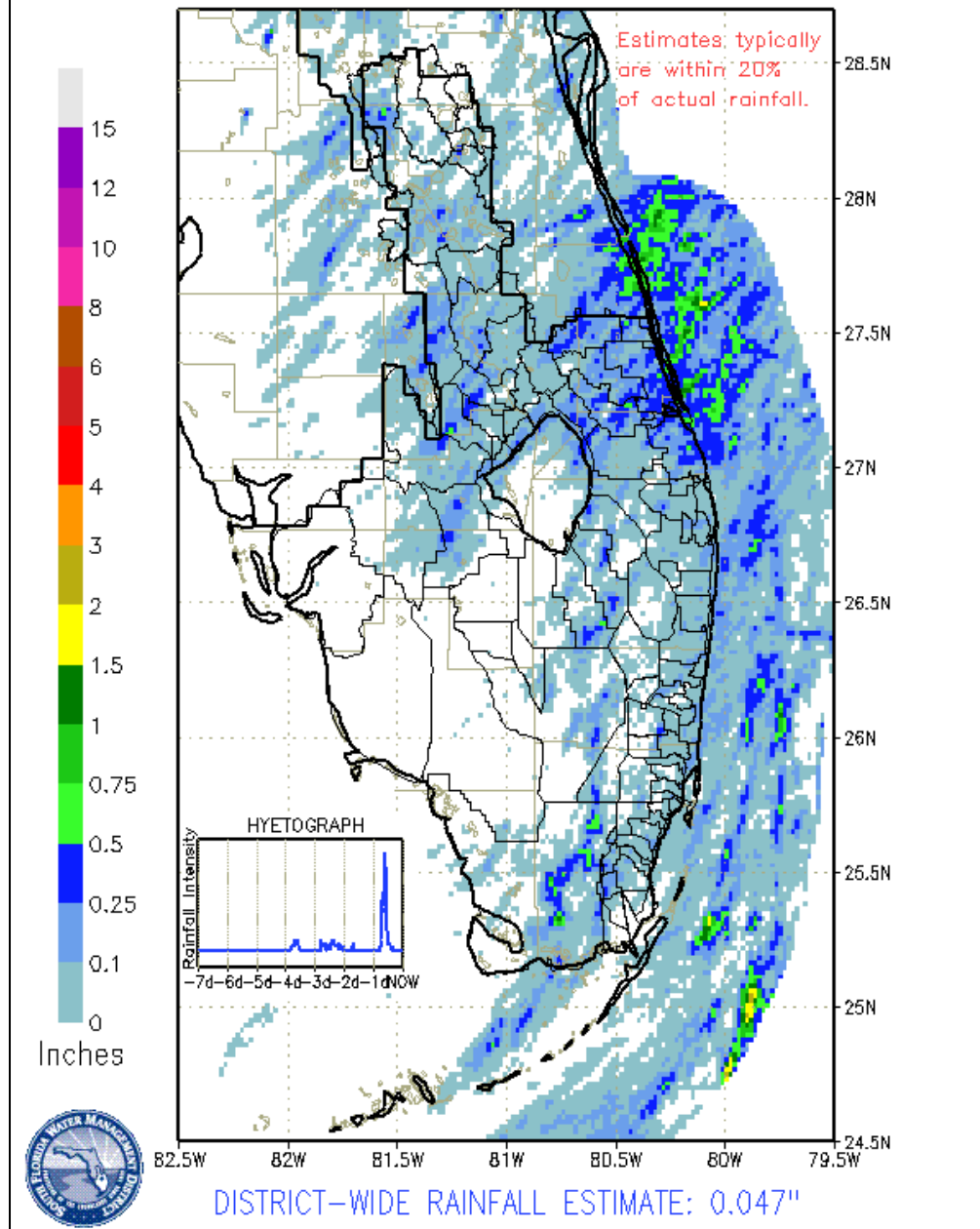
EVERGLADES

Very sparse rain fell across the Everglades last week, providing an opportunity for water management. All of the WCAs trended towards their regulation schedules.

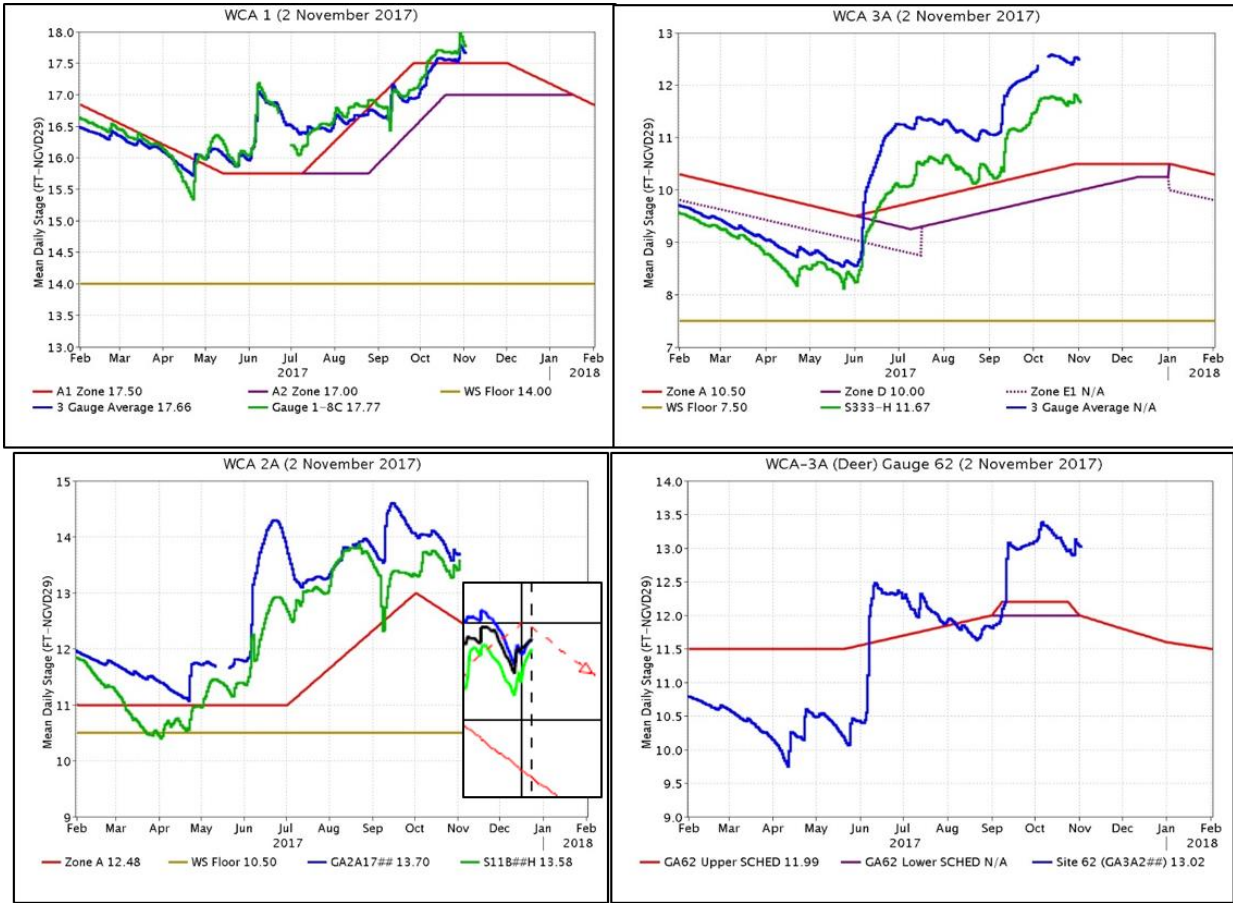
Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	0.03	-0.17
WCA-2A	0.01	+0.07
WCA-2B	<0.01	-0.16
WCA-3A	0.03	-0.17
WCA-3B	0.04	-0.12
ENP	0.06	NA

SFWM D PROVISIONAL RAINDAR 7-DAY RAINFALL ESTIMATES

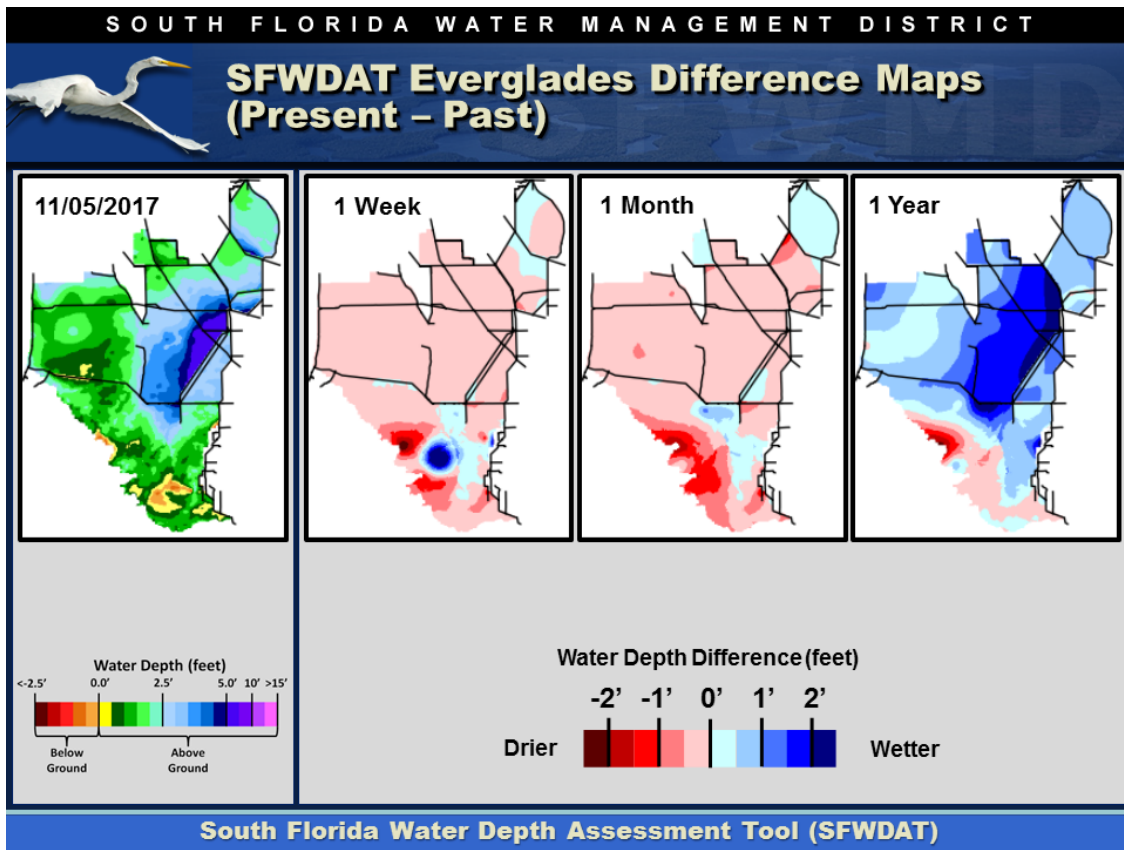
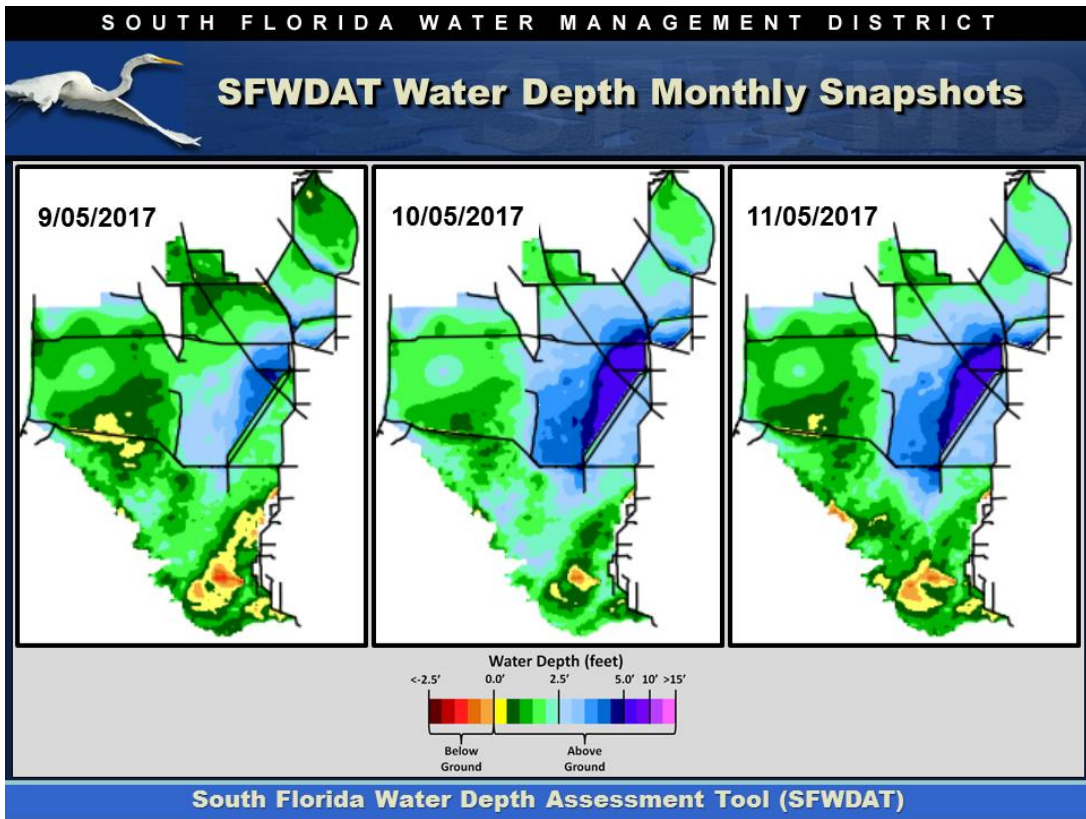
FROM: 0615 EST, 10/30/2017 THROUGH: 0615 EST, 11/06/2017



Regulation Schedules: WCA-1 three-gauge average is 0.16 feet above Zone A1, and stage difference between the marsh and the canal is 0.11 feet. WCA-2A marsh stage at gauge GA2A17 is currently 0.12 feet below the current temporary deviation. Marsh stage is 0.10 feet above canal stage at S11B. WCA-3A three-gauge average stage is approximately 1.79 feet above zone A. WCA-3A at gauge 62 (Northwest corner) is 1.03 feet above the upper schedule.

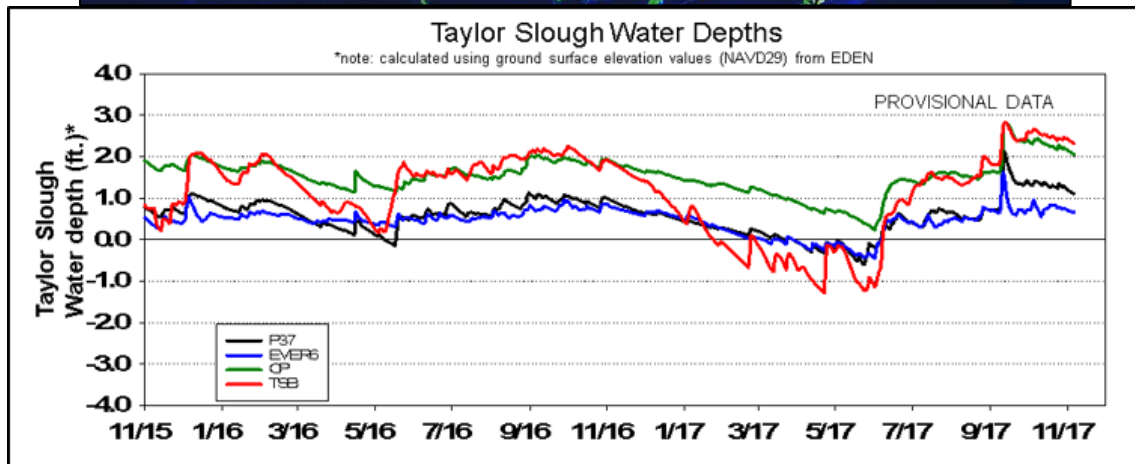
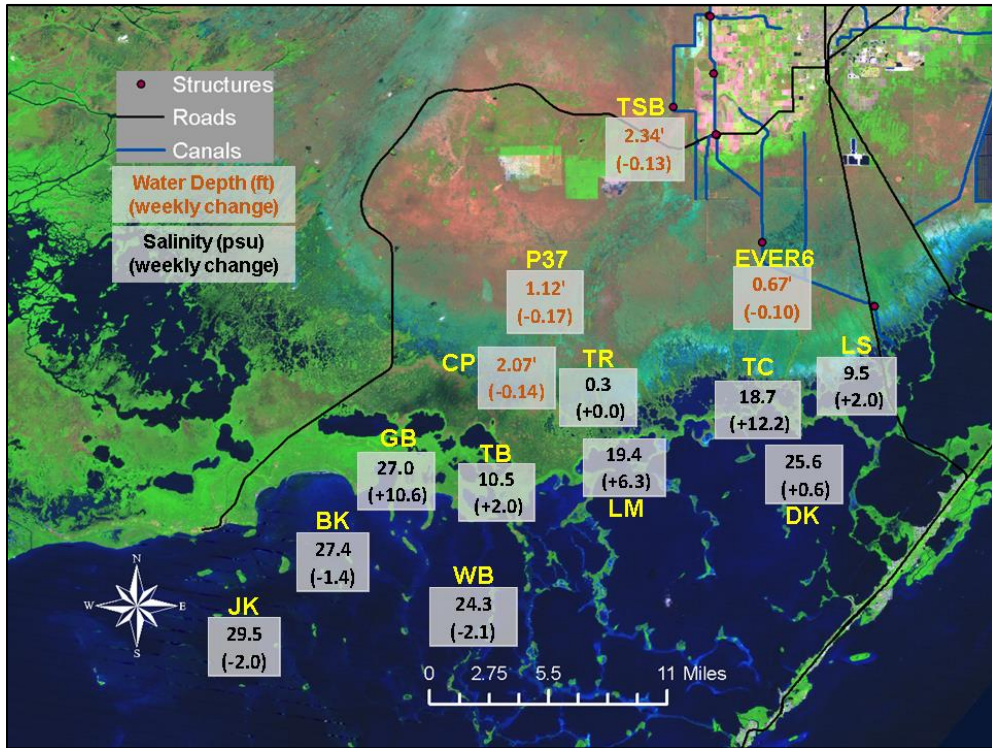


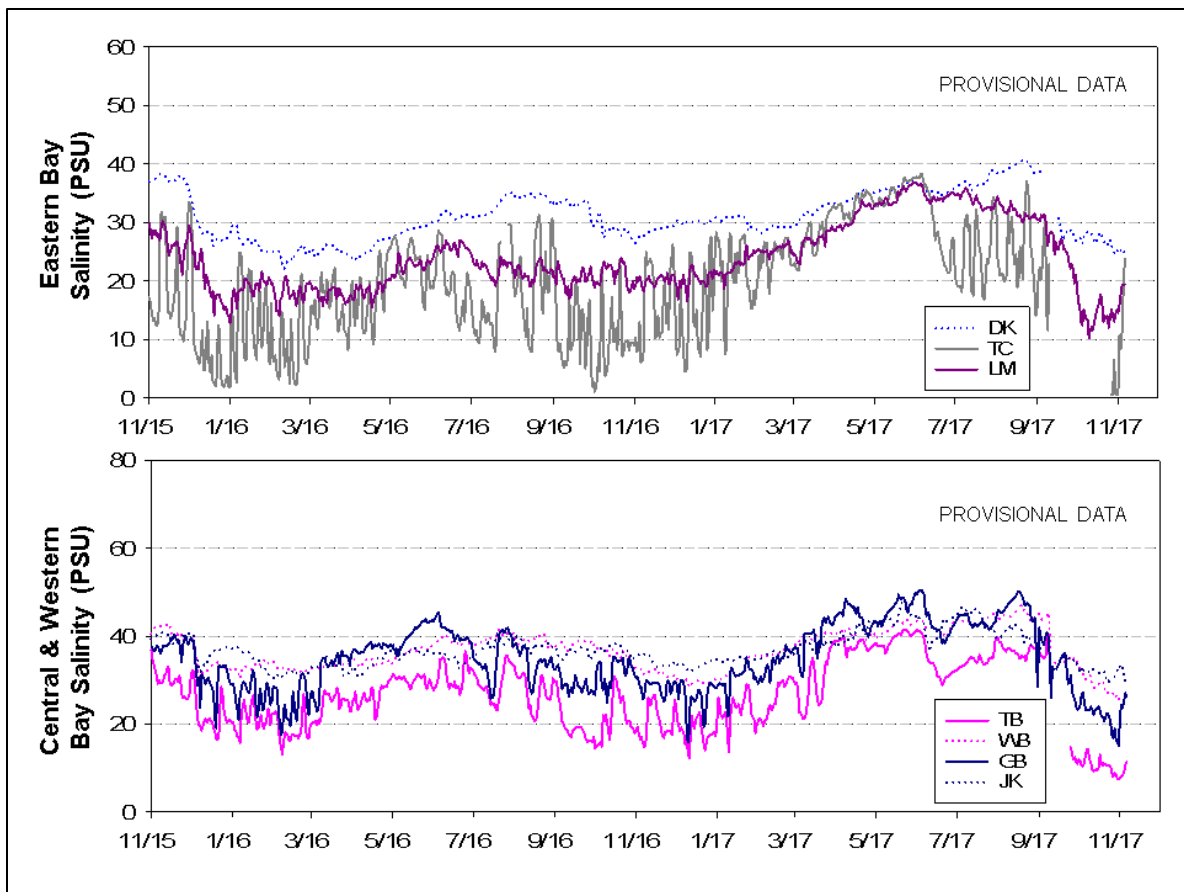
Water Depths and Changes: The WDAT tool for spatial interpolation of depth indicates a range from a low of 1.5 feet to 2.0 feet in Northwestern WCA-3A to a high of 5.0+ feet along the L-67A canal in WCA-3A South. Over the last week individual gauge changes ranged from -0.28 feet (Northeastern WCA-3A) to $+0.07$ feet (WCA-2A). Comparing WDAT water levels from present, water depths fell across WCA-3A, and rose in the northern sections of WCA-2A and along the eastern side of WCA-1. Pan evaporation remained steady this week, estimated at 1.78 inches, above the pre-project estimate of 1.02 inches.



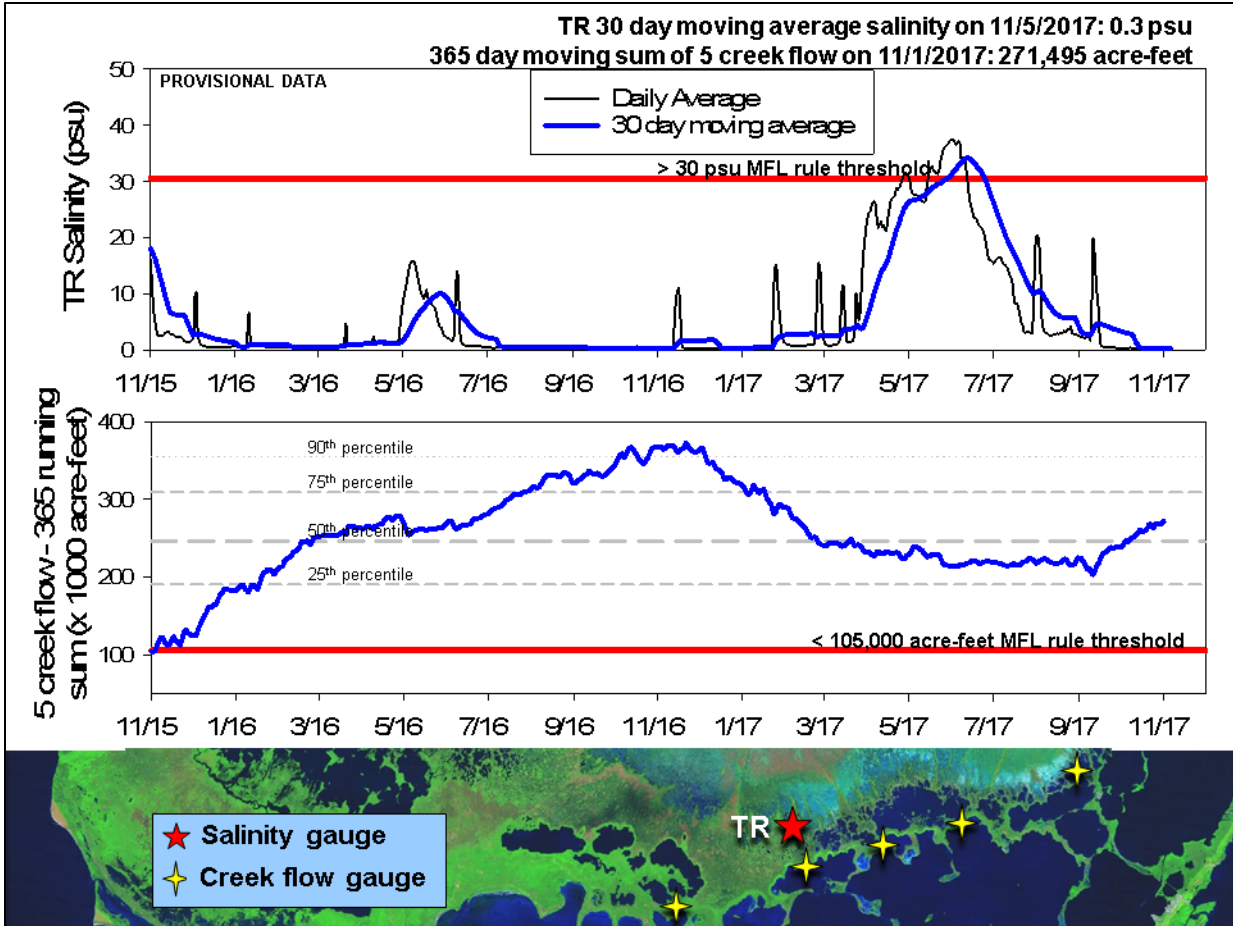
Taylor Slough stages: Water levels in Taylor Slough decreased this past week with the largest change being -0.17 feet in central Taylor Slough. Rainfall in the area was less than 0.25 inches for the week. Water levels are 2 to 12 inches above the historic average for this time of year with the highest divergence occurring in northern Taylor Slough (similar to last week).

Salinity changes for the last week ranged from -2 to +12 psu with only the central and western Bay sites showing a decrease, which is the opposite of last week. Currently, salinities range from 10 in the eastern Bay to 29 in the western Bay and are 2 to 7 psu below the historic averages at each station for this time of year.

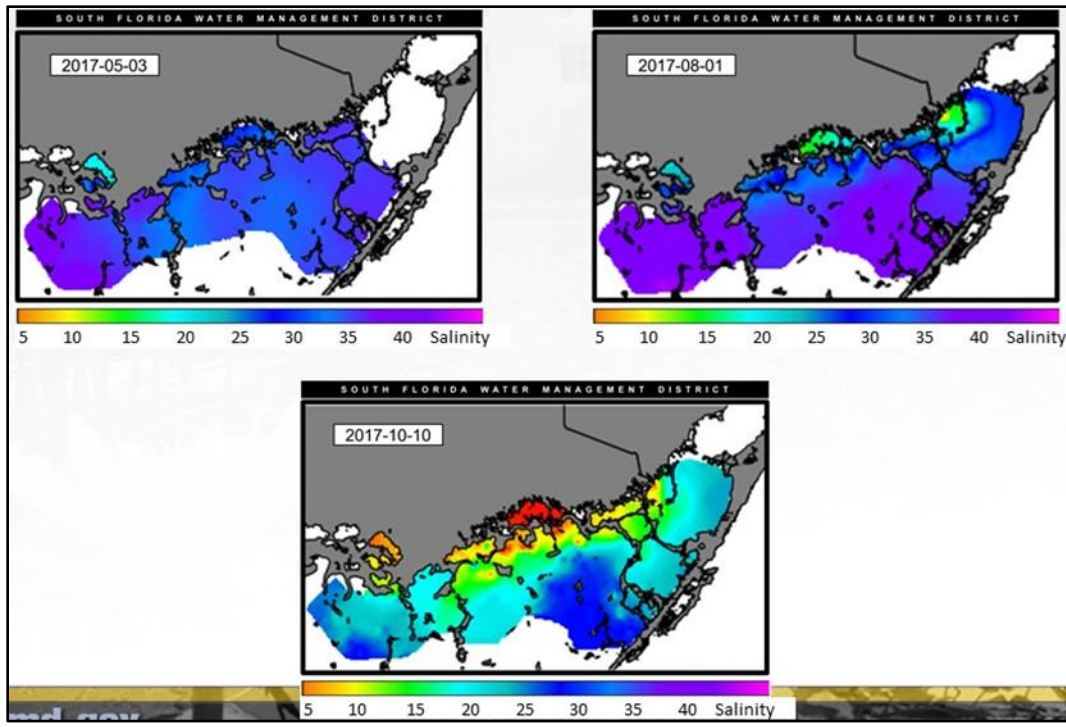




Florida Bay MFL: Mangrove zone daily average salinity remains near fresh at 0.3 psu. The 30-day moving average is also at 0.3 psu. The creek gauge at West Highway Creek (the eastern most star on the map) malfunctioned on November 1 so five creek total flow data are only available through November 1. The 365-day moving sum of flow from the five creeks identified by stars on the map was 271,495 acre-feet on November 1 (still greater than the long-term average of 257,628 acre-feet). Creek flow is provisional data from the USGS and is highly variable.



Despite high water levels in WCA-3A and attempts to move water south, salinities in Florida Bay remained elevated during most of this wet season. The top two figures below show salinities at the beginning of the wet season (May) and the middle of the wet season (August) when salinities were above average. In May 89% of the central and eastern Bay was hypersaline (>35 psu). Salinities decreased in the northeast in August, where salinities in Joe Bay and Manatee Bay were <20 psu (4% of the area). The bottom figure shows salinities in October after Hurricane Irma where salinities returned to average or slightly below average (up to 8 psu below average with highest divergence in the central and western nearshore areas). A gradient in salinity from the north to south increased from 0.57 (Joe Bay) to 32 psu. 37% of the central and eastern Bay was <20 psu, 10 times more area than in August.



Chlorophyll levels in Florida Bay remained low (at typical levels) this wet season, generally at 2 ug/L or less but with notable elevations in some coastal lakes. Chlorophyll increased rapidly to very high levels after Hurricane Irma added nutrients, stirred bottom sediments and uprooted vegetation which began to decay. Across the bay, post-Hurricane Irma levels averaged near 20 ug/L with a strong bloom of about 40 ug/L in the central bay (highest reading was 57 ug/L in Terrapin Bay/Central nearshore). With flushing from freshwater discharges and circulation from winter frontal passages, these high accumulations should break up and move out of the bay over the coming months.

Water Management Recommendations

Deep water conditions persist in WCA-3A and across most the Everglades. All practicable and novel management options should be explored in order to relieve high water conditions particularly in WCA-3A South. As shown from the Florida Bay information this week, conditions there also reflect the stress caused by the extraordinary climatic conditions this wet season.

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

Everglades Ecological Recommendations, November 7th, 2017 (red is new)

Area	Current Condition	Cause(s)	Recommendation	Reasons
WCA-1	Stages decreased from -0.05' to -0.25'	Rainfall, ET, management	Maintain depths at high water targets (17.5 ft) at regulation schedule or slightly above.	Protect habitat and facilitate invasive plant treatments.
WCA-2A	Stages increased +0.07'	Rainfall, ET, management	Moderate ascension rates as possible. Maintain depths at temporary regulation schedule or slightly above.	Protect habitat and wildlife from high water stress.
WCA-2B	Stages decreased -0.16'	Rainfall, ET, management	Moderate ascension rates as possible.	Protect habitat and wildlife from high water stress.
WCA-3A NE	Stages decreased -0.28'	Rainfall, ET, management	Moderate ascension rates as possible. Manage for relief of high water conditions.	Protect habitat and wildlife from high water stress.
WCA-3A NW	Stages decreased -0.16'	Rainfall, ET, management		
Central WCA-3A S	Stages decreased -0.17'	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 142 days.
Southern WCA-3A S	Stages decreased -0.08'	Rainfall, ET, management		
WCA-3B	Stages decreased -0.12'	Rainfall, ET, management	Moderate ascension rates as possible..	Protect habitat, wildlife and support apple snail reproduction.
ENP-SRS	NA	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 -0.10' to -0.17'	Rain, ET, inflows	Move water southward as possible	When available provide freshwater buffer for ecosystems.
FB- Salinity	Salinity changes ranged -2.1 to +12.2 psu.	Rain, ET, inflows, wind	Move water southward as possible	When available, provide freshwater to produce low salinity wet season conditions.