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 6, 2018

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

Scattered showers are moving across areas to the east and northeast of Lake Okeechobee this morning, but a lack of moisture will limit shower development elsewhere today. A cold front is forecast to push into Florida's panhandle today and stall. Increased instability associated with the front along with an increase in moisture should allow some scattered shower activity to develop over the District Wednesday and Thursday. Shower activity should then decrease Friday as the front returns north. A developing low over the northeastern US should push the front back south into the District bringing scattered shower activity Saturday, Sunday and Monday. A second push should then move the front through the District Tuesday bringing a couple days of dry and cooler conditions.

Kissimmee

Tuesday morning stages were 57.0 feet NGVD (1.0 feet below schedule) in East Lake Toho, 54.5 feet NGVD (0.5 feet below schedule) in Toho, and 49.7 feet NGVD (2.8 feet below schedule) in Kissimmee-Cypress-Hatchineha; headwater stages were 46.3 feet NGVD at S-65A and 27.3 feet NGVD at S-65D. Tuesday morning discharges were 339 cfs at S-65, 235 cfs at S-65A, and 398 cfs at S-65E. Dissolved oxygen concentration in the Kissimmee River averaged 5.3 mg/L for the week. Kissimmee River mean floodplain depth on Sunday was 0.25 feet. Recommendations were made on November 2, 2018 to reduce discharge at S-65/S-65A to 250 cfs to conserve stage in Lake Kissimmee.

Lake Okeechobee

Lake Okeechobee stage is 13.64 feet NGVD, falling 0.08 feet from the previous week and 0.65 feet over the past 30 days. Lake stages are now the lowest they have been for this time of year since 2010 and are now 0.53 feet below the bottom of the preferred ecological envelope, which varies seasonally from 12.5 – 15.5 feet NGVD. However, given potential for heavy rainfall associated with El Niño conditions this winter and the poor condition of SAV and EAV in the nearshore zone, these lower lake stages are ideal for vegetation recovery. Monthly water quality samples showed Chlorophyll *a* value was elevated around most of the perimeter of the lake, with 12 stations having between 21.9 and 35.9 µg/L, while 2 stations in the south had 71.6 and 89.6 µg/L. Cyanobacterial bloom potential remains elevated in the south and southwest regions of the lake based on the latest NOAA image (November 2). Additionally, long-term vegetation monitoring plots showed recovery of desirable plants along the outer edge of the southwestern marsh, though coverage remains sparse.

Estuaries

Total inflow to the St. Lucie Estuary averaged 430 cfs over the past week with no flow from Lake Okeechobee. Salinity continued to increase in the estuary. The seven-day average salinity at the US1 Bridge is in the good range for adult eastern oysters.

Total inflow to the Caloosahatchee Estuary averaged 1,163 cfs over the past week with 689 cfs from the Lake. Salinity increased downstream of S-79. The 30-day moving average surface salinity is 1.3 at Val I-75 and 5.0 at Ft. Myers. Salinity conditions between Val I-75 and Ft. Myers are good for tape grass. Salinity conditions are in the good range for adult eastern oysters at Cape Coral and Shell Point. 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 received approximately 11,000 acre-feet of Lake releases. The total amount of inflows to the STAs in WY2019 (since May 1, 2018) is approximately 1,129,000 acre-feet, which includes approximately 300,000 acre-feet of Lake releases. Most STA cells are at or above target depths. Operational restrictions are in place for construction related activities in STA-1W (all flow-ways) and STA-5/6 Flow-ways 4, 5 and 6. Operational restrictions are in place in STA-3/4 Western Flow-way for a Restoration Strategies Science Plan study. STA-5/6 Flow-ways 2 and 3 are offline for initiation of a Restoration Strategies project to grade non-effective treatment areas. This week, if 2008 LORS recommends Lake releases to the WCAs and the conditions allow, releases will be sent to the STA-1E, A-1 FEB/STA-3/4 and STA-2.

Everglades

Over the last week water depths declined on average across the Everglades at a rate lower than previous weeks. Conditions within the Everglades are drying out unseasonably early but stabilized over the last week. Stages remain below the respective regulation lines in the WCAs with the exceptions of WCA-2A and 2B. WCA-3A North and northern WCA-1 continue to dry out as indicated by the WDAT model output. The average water depth at the gauges located in WCA-3A North fell at a slower rate than last week, with an average drop of 0.04 feet. The gauge located in southern WCA-3A (3-65) rose 0.09 feet. Large flocks of foraging wading birds were detected in WCA-3A North. Stages continued to decrease this week in Taylor Slough, yet depths remain above average for this time of year. Salinities in Florida Bay increased on average this past week, and conditions at the western stations remain higher than their historic averages for this time of year. An algal bloom was reported in the western bay, and satellite imagery suggests clearing conditions.

Supporting Information

KISSIMMEE BASIN

Kissimmee Basin Rainfall

The Upper Kissimmee Basin received 0.28 inches of rainfall in the past week and the Lower Basin received 0.30 inches (SFWMD Daily Rainfall Report 11/3/2018).

Upper Kissimmee Basin

Stages and departures in the Kissimmee Chain of Lakes (KCOL) are shown in **Table 1**. KCOL stage hydrographs with respective regulation schedules and rainfall are shown in Figures 1-7.

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: 11/6/2018

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)						
							11/4/18	10/28/18	10/21/18	10/14/18	10/7/18	9/30/18	9/23/18
Lakes Hart and Mary Jane	S-62	0	LKMJ	59.9	R	61.0	**-1.1**	-0.9	-0.7	-0.3	-0.2	0.0	0.1
Lakes Myrtle, Preston, and Joel	S-57	0	S-57	61.2	R	62.0	**-0.8**	-0.7	-0.4	-0.1	0.0	0.1	0.0
Alligator Chain	S-60	0	ALLI	63.1	R	64.0	**-0.9**	-0.7	-0.4	-0.2	-0.1	0.0	0.0
Lake Gentry	S-63	0	LKGT	61.4	R	61.5	**-0.1**	0.0	0.1	0.1	0.1	0.1	0.1
East Lake Toho	S-59	0	TOHOE	57.0	R	58.0	**-1.0**	-0.9	-0.6	-0.3	-0.1	0.1	0.1
Lake Toho	S-61	0	TOHOW, S-61	54.4	R	55.0	**-0.6**	-0.5	-0.3	0.0	0.0	0.2	0.1
Lakes Kissimmee, Cypress, and Hatchineha	S-65	350	KUB011, LKIS5B	49.8	R	52.5	**-2.7**	-2.5	-2.1	-1.4	-0.9	-0.4	-0.1

[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 8. Kissimmee River floodplain stages at selected stations are shown in Figure 9.

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: **11/6/2018**

Metric	Location	1-Day Average	Average for the Preceeding 7-Days[1]									
		11/4/2018	11/4/18	10/28/18	10/21/18	10/14/18	10/7/18	9/30/18	9/23/18	9/16/18	9/9/18	9/2/18
Discharge (cfs)	S-65	323	350	480	1,592	1,559	1,542	1,485	1,560	1,544	3,538	3,088
Discharge (cfs)	S-65A[2]	254	288	383	1,394	1,382	1,391	1,416	1,532	1,634	3,808	3,315
Discharge (cfs)	S-65D[2]	395	404	1,024	1,461	1,521	1,646	1,982	2,221	3,351	4,313	2,699
Headwater Stage (feet NGVD)	S-65D[2]	27.43	27.62	27.69	27.78	27.89	27.81	27.81	27.75	27.67	27.86	27.88
Discharge (cfs)	S-65E[2]	401	405	1,058	1,535	1,598	1,684	2,062	2,296	3,458	4,259	2,902
Discharge (cfs)	S-67	0	0	0	0	0	67	310	288	215	176	190
DO (mg/L)[3]	Phase I river channel	5.4	5.3	4.3	4.6	4.7	4.3	3.3	2.8	2.5	2.9	2.7
Mean depth (feet)[4]	Phase I floodplain	0.25	0.26	0.39	0.52	0.56	0.64	0.75	0.80	1.12	1.79	1.24

[1]Seven-day average of weighted daily means through Sunday midnight.
[2]S-65A discharge combines S-65A with auxillary strucutures; S-65D discharge combines discharge at S-65D, S-65DX1, and S-65DX2; S-65D stage averages stage at S-65D and S-65DX1; S-65E discharge combines S-65E and S-65EX1.
[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.

KCOL Hydrographs (through Sunday midnight)

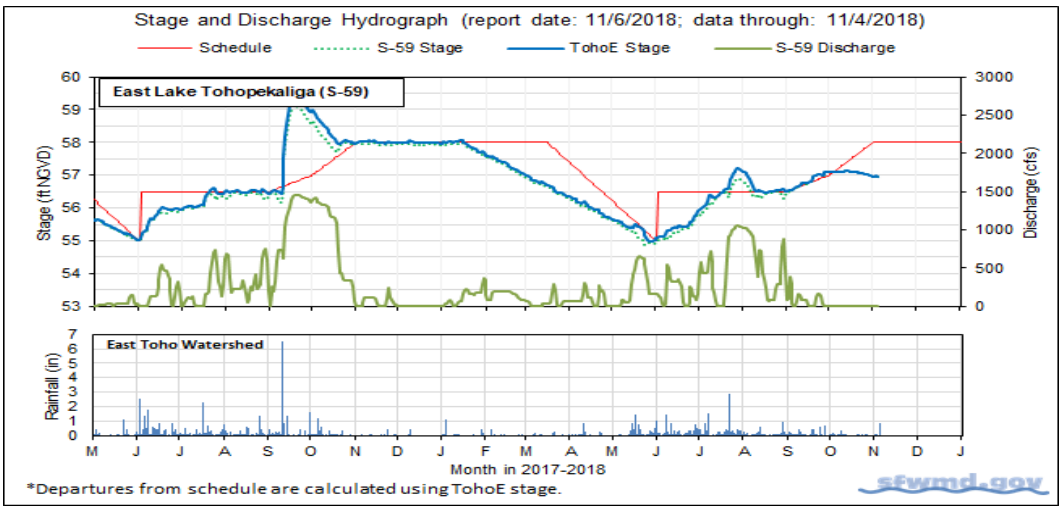


Figure 1.

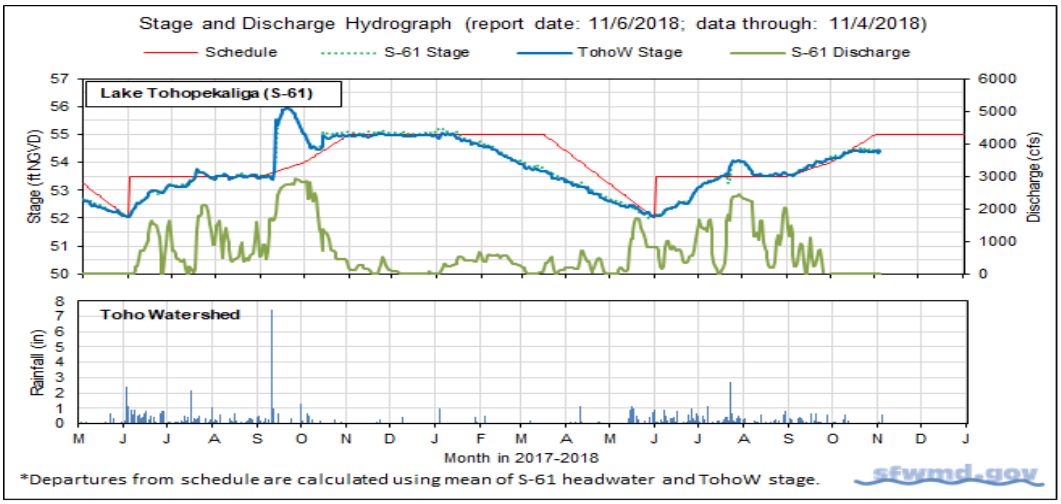
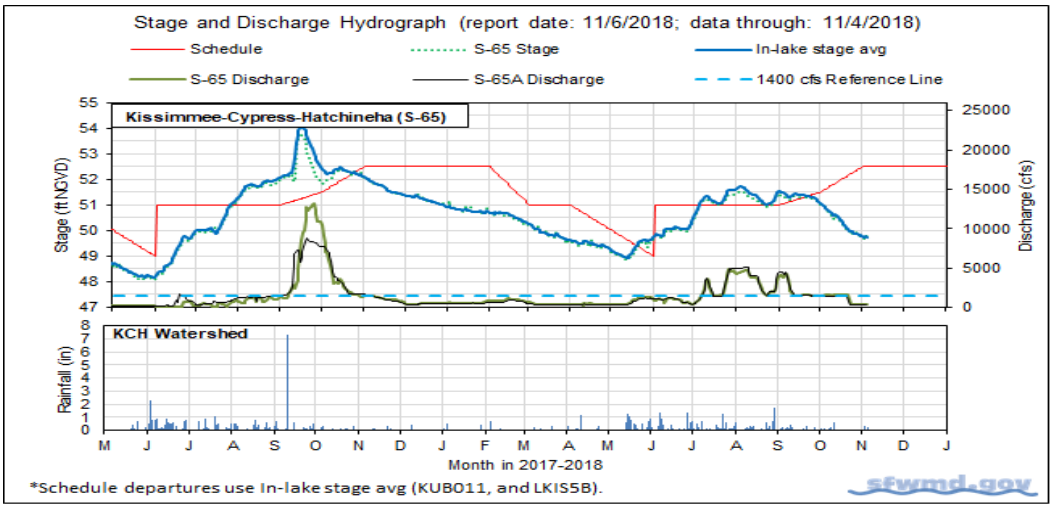


Figure 2.



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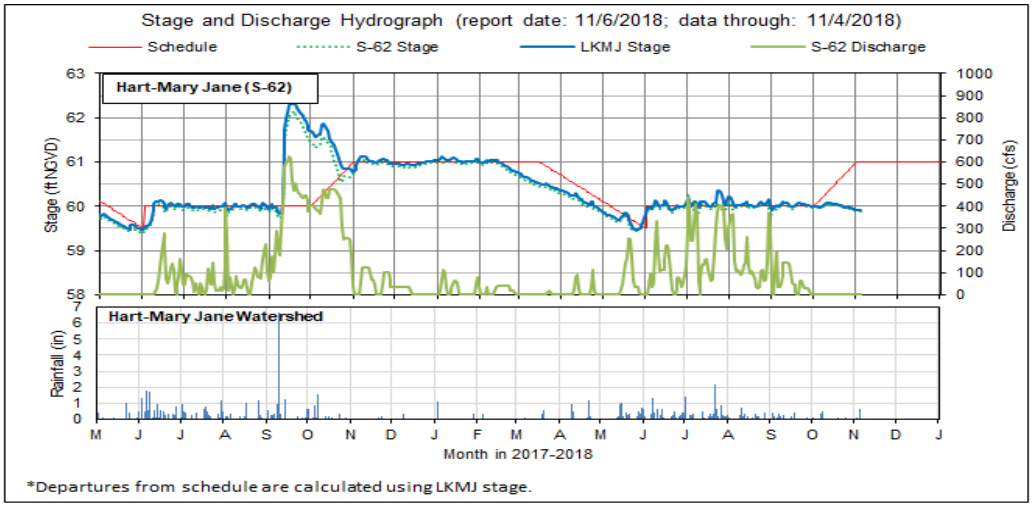


Figure 4.

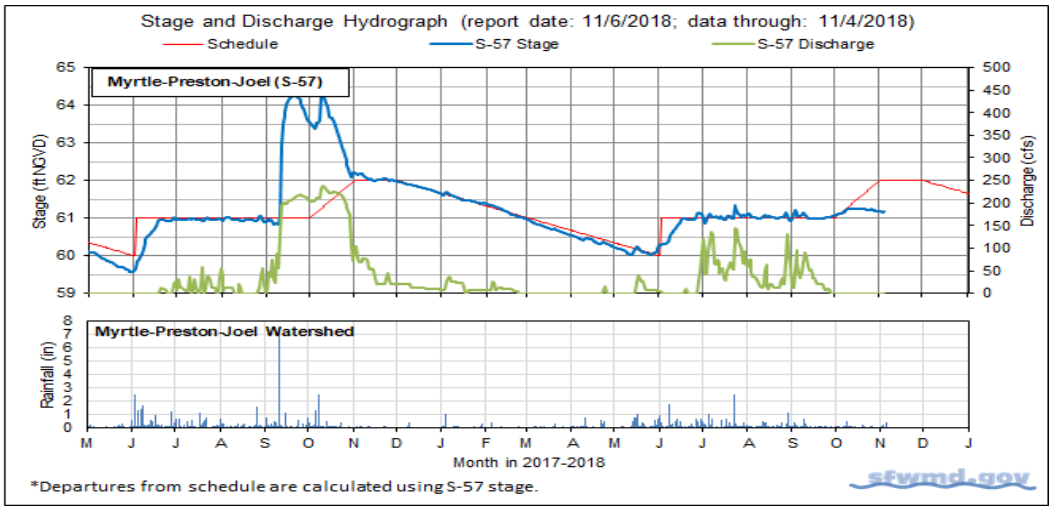


Figure 5.

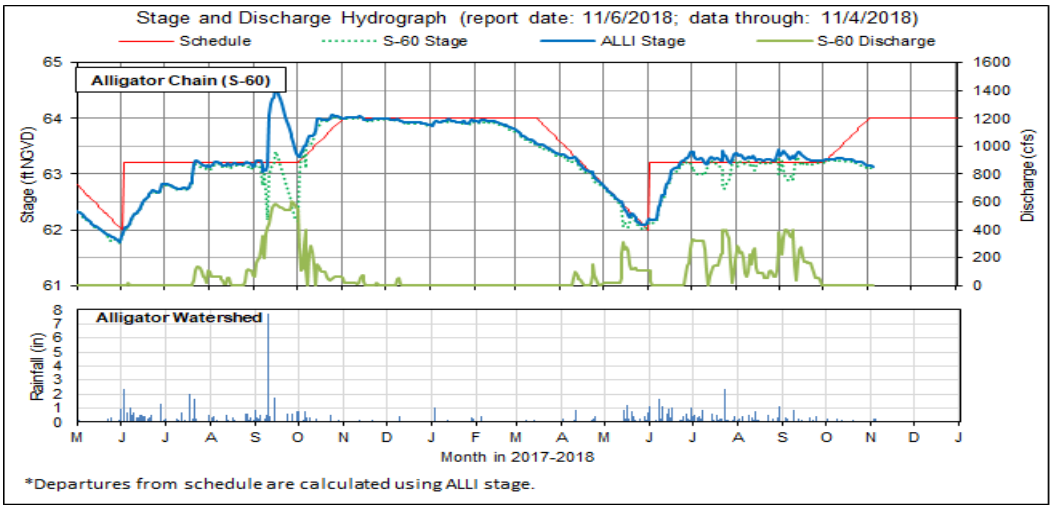


Figure 6.

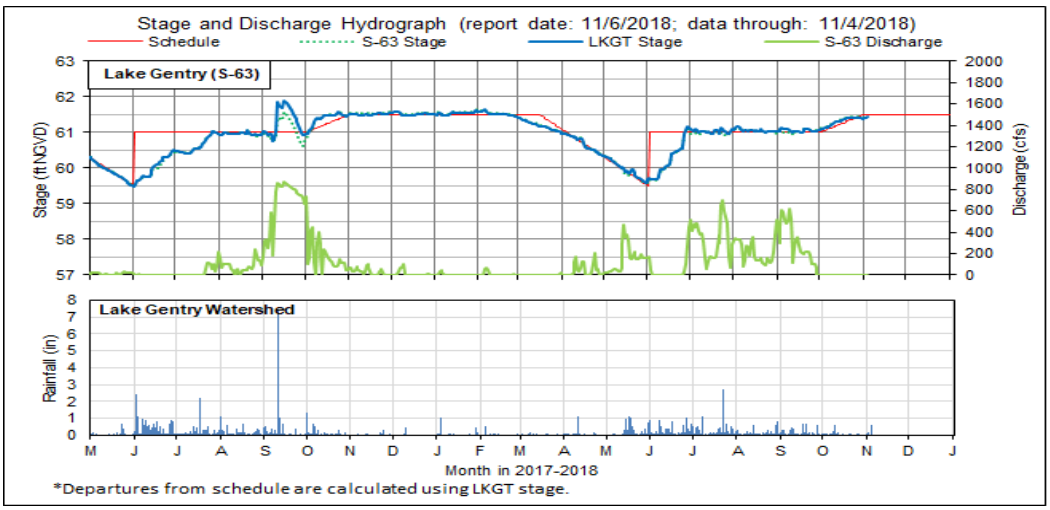


Figure 7.

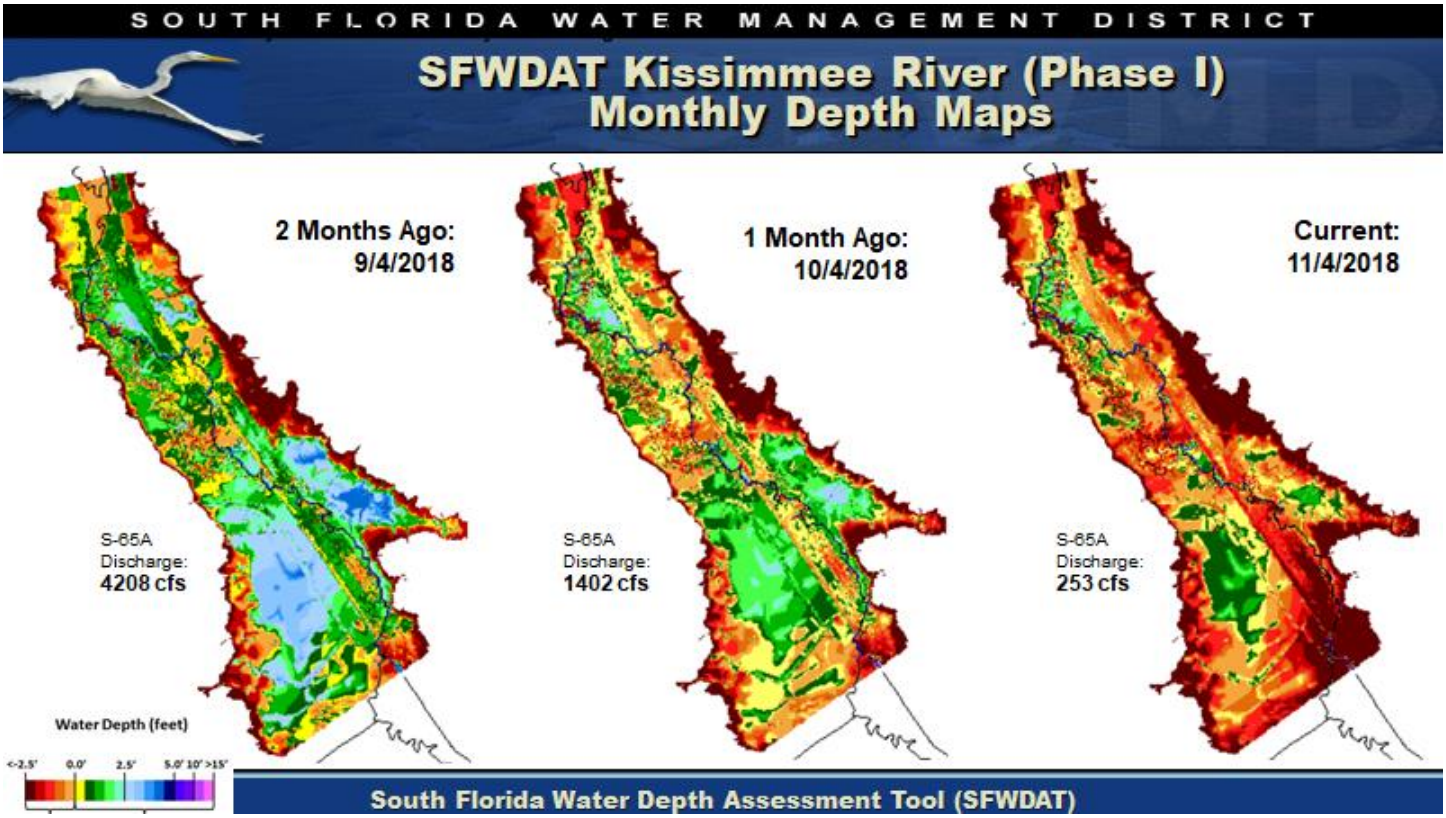


Figure 8. Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to January 16, 2012.

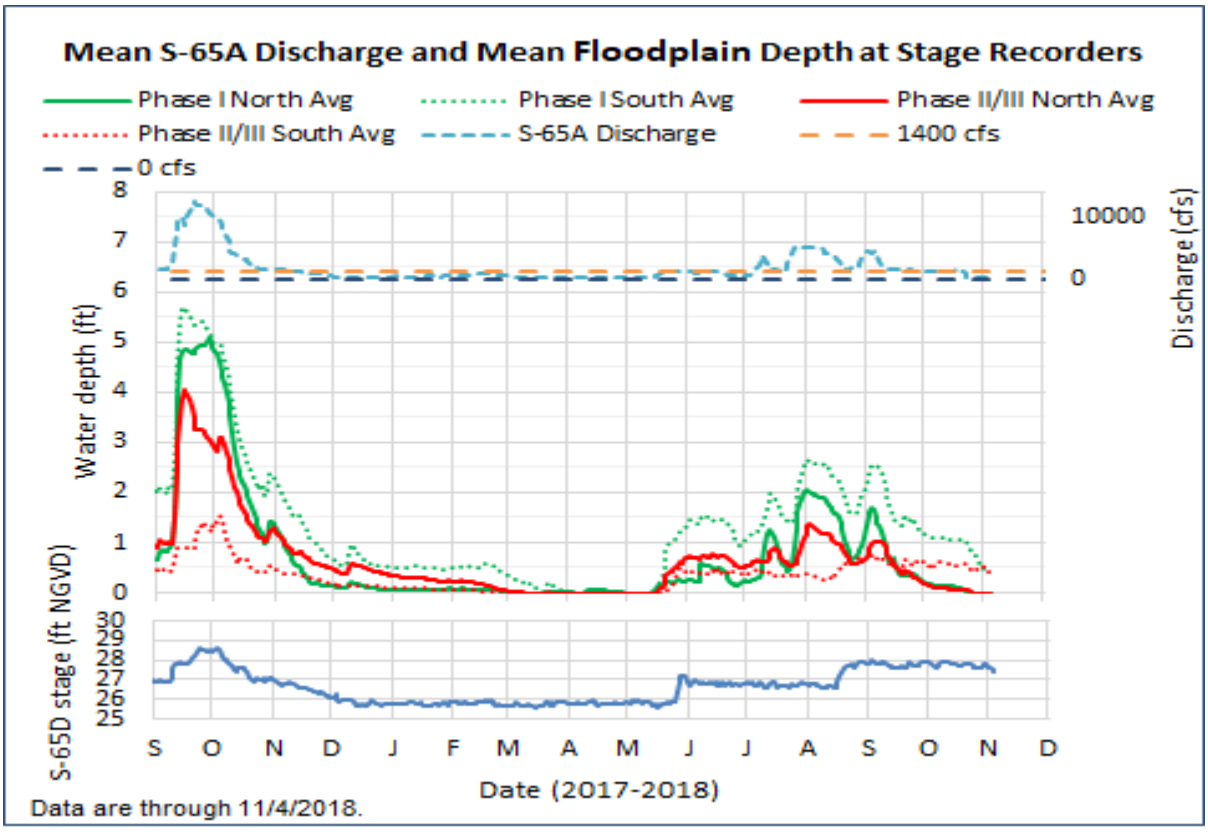


Figure 9. Mean water depth at stage recorders in the northern Phase I, southern Phase I, northern Phase II/III, and southern Phase II/III areas in relation to the S-65A discharge and S-65D headwater stage.

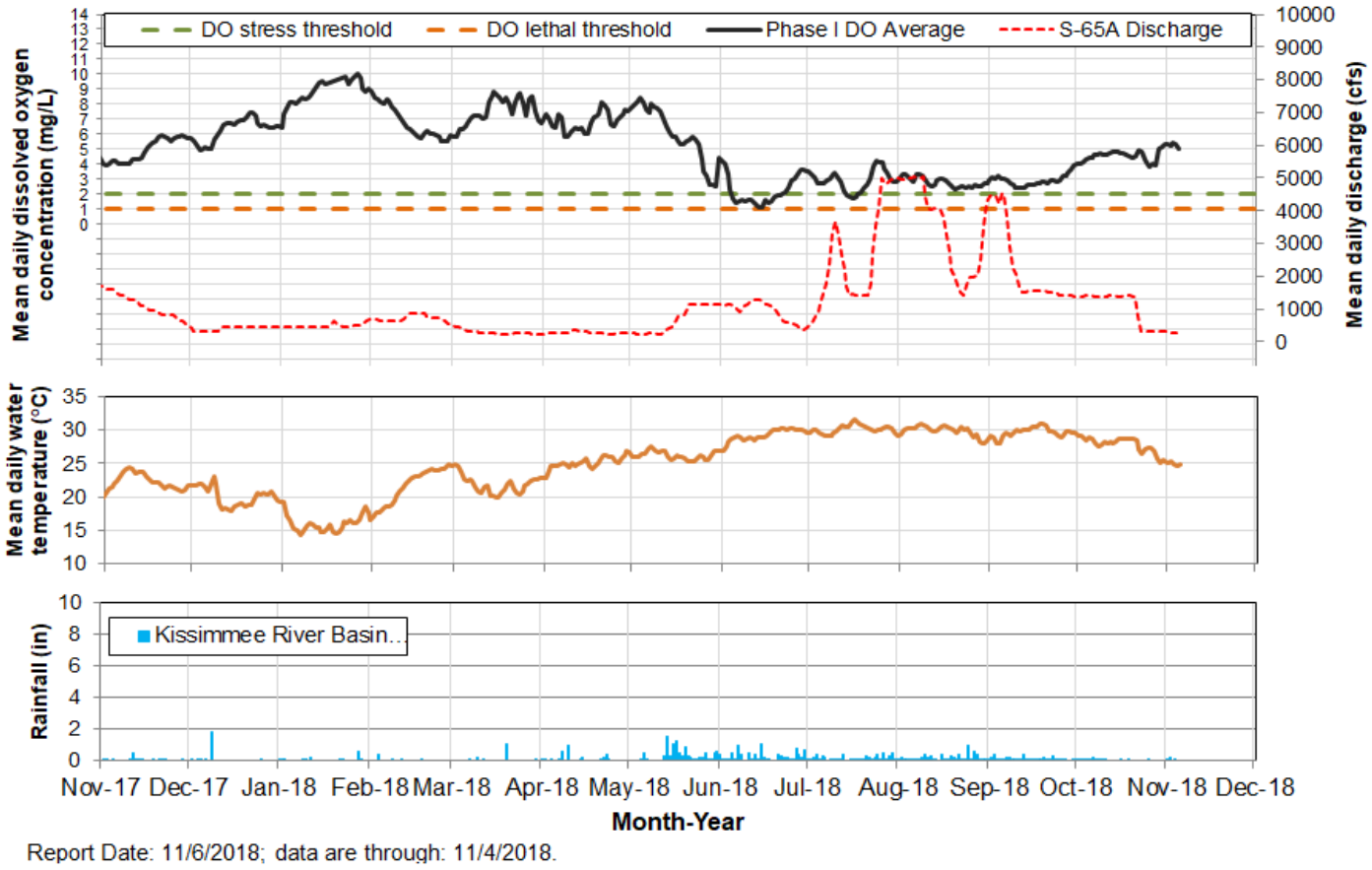


Figure 10. Mean daily dissolved oxygen, discharge, temperature and rainfall in the Phase I river channel.

Water Management Recommendations

Kissimmee Basin Adaptive Recommendations and Operational Actions

Recommendation Date	Recommendation	Purpose	Outcome	Source	Report Date
11/2/2018	Reduce S-65/S-65A discharge to approximately 250 cfs.	To conserve stage in Lake Kissimmee.	Implemented	SFWMD Water Mgt/KB Ops	11/6/2018
10/30/2018	No new recommendations.		N/A		10/30/2018
10/22/2018	Reduce S-65/S-65A discharge to approximately 300 cfs (minimum discharge) in one step of approximately 1100 cfs today.	Reduce rate of stage decline in lakes Kissimmee-Cypress-Hatchineha	Implemented	SFWMD Water Mgt/KB Ops	10/23/2018
10/16/2018	No new recommendations.		N/A		10/16/2018
10/9/2018	No new recommendations.		N/A		10/9/2018
10/2/2018	No new recommendations.		N/A		10/2/2018
9/25/2018	No new recommendations.		N/A		9/25/2018
9/18/2018	No new recommendations.		N/A		9/18/2018
9/11/2018	No new recommendations.		N/A		9/11/2018
9/4/2018	No new recommendations.		N/A		9/4/2018
8/28/2018	No new recommendations.		N/A		8/28/2018
8/21/2018	No new recommendations.		N/A		8/21/2018
8/14/2018	No new recommendations.		N/A		8/14/2018
8/7/2018	No new recommendations.		N/A		8/7/2018
7/23/2018-7/24/2018	Increase discharge from 1400 cfs to 3000 cfs, then 3200 cfs and 3500 cfs.	For flood control in Lake Kissimmee.	Implemented	SFWMD Water Mgt/KB Ops	7/31/2018
7/19/2018	Follow Revised (X2) 2018 Wet Season Discharge Plan to the extent possible, including 50 foot stage threshold and 0.5 foot flood control buffer.	To the extent possible, maintain sufficient discharge to keep areas under snail kites nests in Pool D hydrated until nests fledge, while avoiding large increases in discharge that might flood the nests.	N/A	KB Ops	7/24/2018
7/13/2018	Maintain at least 1400 cfs at S-65A while Lake Kissimmee stage is above 50 feet. (See revised 2018 discharge plan).	To the extent possible, maintain sufficient discharge to keep areas under snail nest kites in Pool D hydrated until nests fledge.	N/A	KB Ops	7/17/2018
7/13/2018	Reduce S-65/S-65A discharge by 600 cfs/day until 1400 cfs is reached. (See revised 2018 discharge plan, below).	Reach 1400 cfs faster to help stabilize Lake Kissimmee stage.	Implemented	SFWMD Water Mgt/KB Ops	7/17/2018
7/9/2018	Increase S-65/S-65A discharge by 300 cfs if needed.	Stablize Lake Kissimmee stage.	N/A	SFWMD Water Mgt/KB Ops	7/10/2018
7/8/2018	Increase S-65/S-65A discharge by 900 cfs today in 3 increments of 300 cfs each.	Stablize Lake Kissimmee stage.	Implemented	KB Ops	7/10/2018
7/5/2018	Increase S-65/S-65A discharge by 300 cfs/day (double the prescribed rate of increase) Thursday through Sunday .	Stablize Lake Kissimmee stage.	Implemented	SFWMD Water Mgt	7/10/2018
7/2/2018	Increase S-65/S-65A discharge by 150 cfs/day (double the prescribed rate of increase).	Stablize Lake Kissimmee stage.	Implemented	SFWMD Water Mgt/KB Ops	7/10/2018

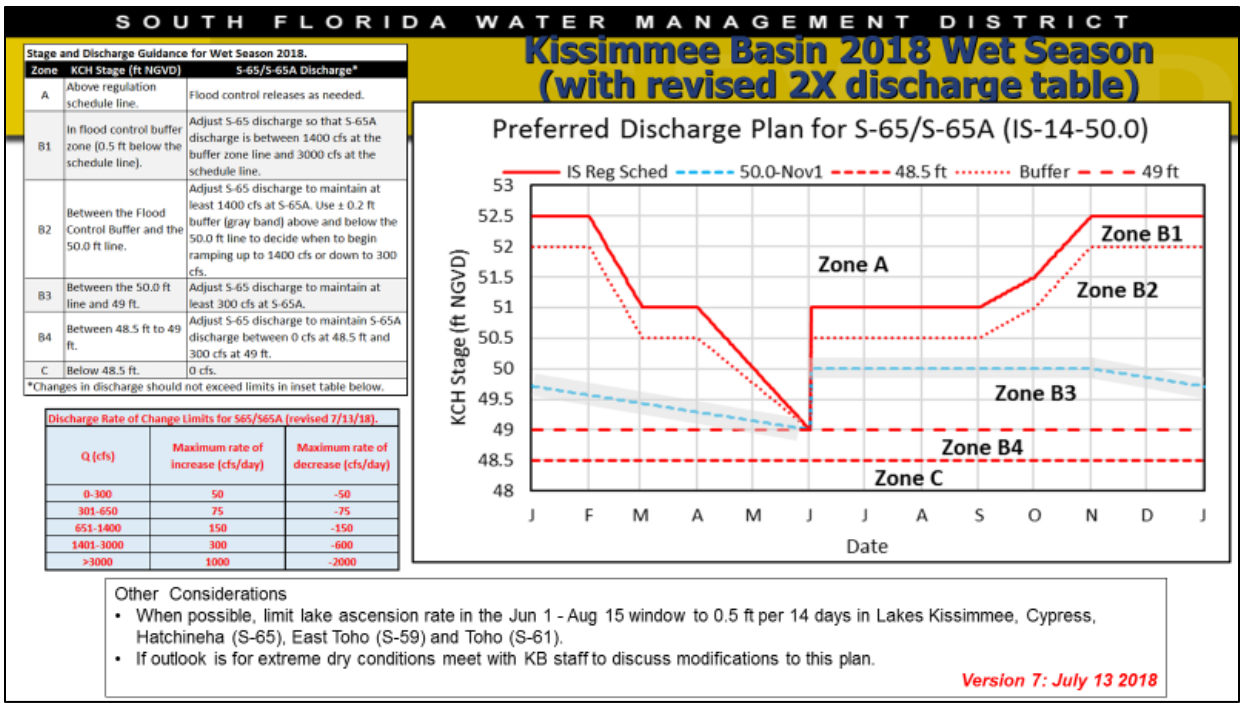


Figure 11. The 2018 Wet Season Discharge Plan for S-65/S-65A.

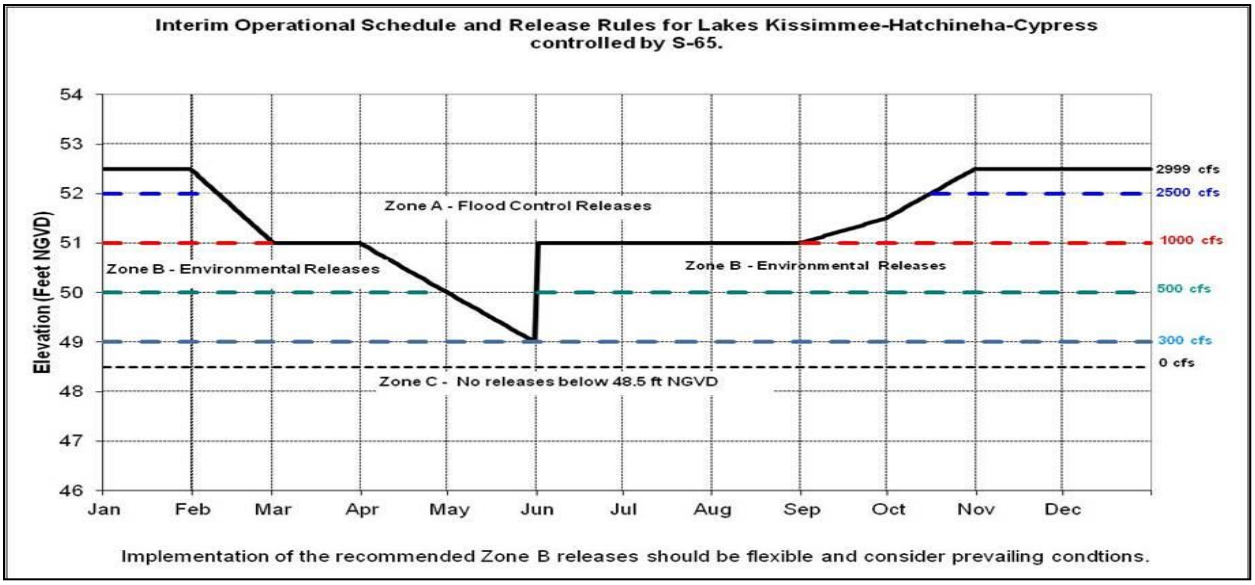


Figure 12. Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years.

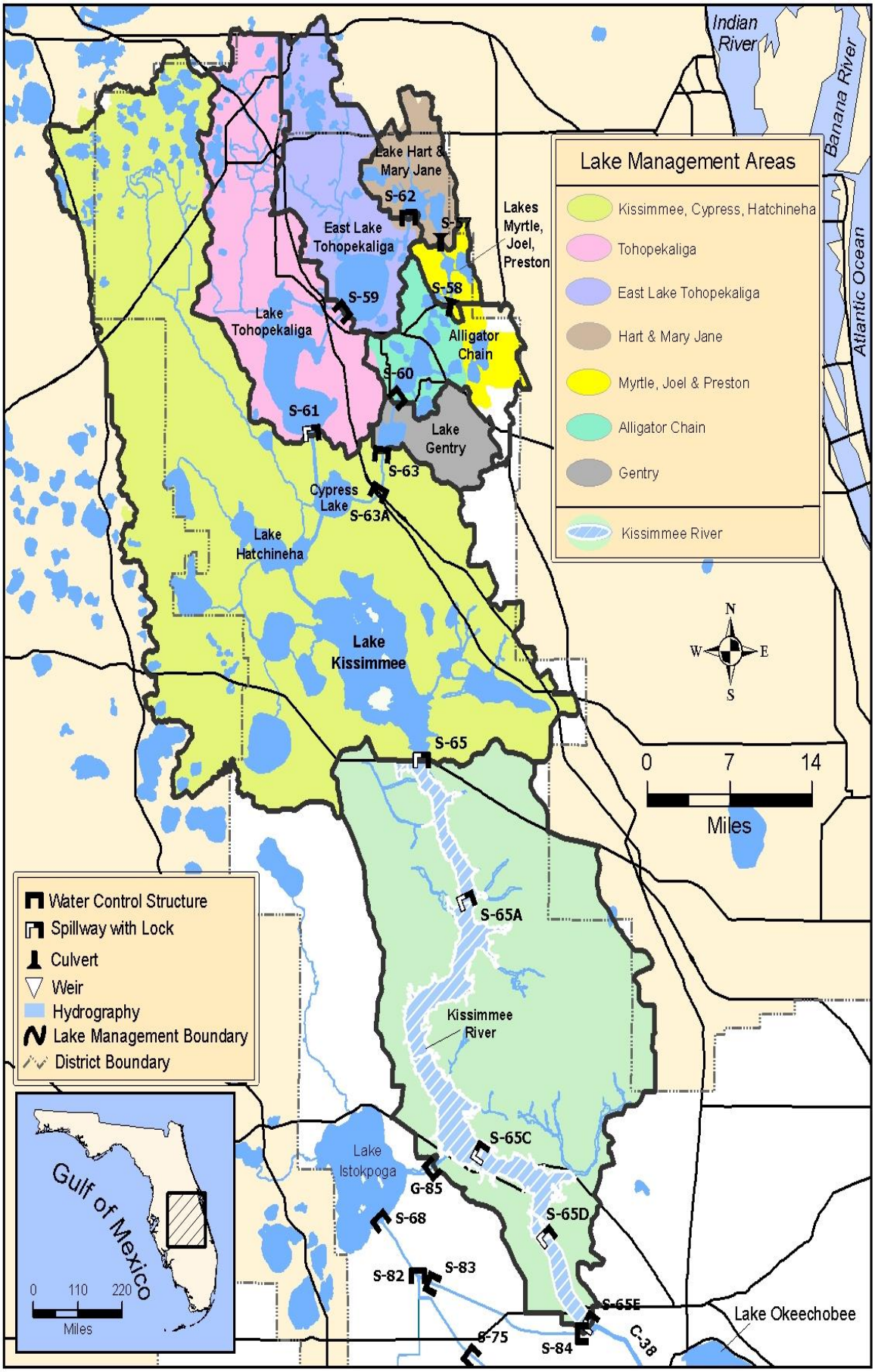


Figure 13. The Kissimmee Basin.

LAKE OKEECHOBEE

According to the USACE web site, Lake Okeechobee stage is at 13.64 feet NGVD for the period ending at midnight on November 5, 2018. This value is based on the use of four interior lake stations (L001, L005, L006 and LZ40) and four perimeter stations (S-308, S-352, S-4 and S-133). The Lake is now 0.65 feet lower than it was a month ago and 3.30 feet lower than a year ago when runoff from Hurricane Irma caused extreme high lake stages (Figure 1). The Lake is in the Base-Flow sub-band (Figure 2). According to RAINDAR, 0.87 inches of rain fell over the Lake during the week October 30, 2018 – November 5, 2018. Watershed rainfall was variable, between 0.10 – 1.5 inches (Figure 3).

Average daily inflows to the Lake decreased again from the previous week, going from 913 cfs to just 566 cfs. The decrease in inflows was mostly from the Kissimmee River via the S-65E structures, going from 884 cfs the previous week to 417 cfs this past week (Table 1).

Total outflows also decreased from the previous week, going from 8,568 average daily cfs the previous week to 5,065 cfs this past week. The decreases in outflows were primarily in discharges south through the S-350 structures and via the L-8 at Canal Point. Discharges south through the S-350 structures went from 3,679 cfs the previous week to 1,993 cfs this past week, while outflows through the L-8 at Canal Point went from 224 cfs to 0 cfs this week. Outflows via the S-77 decreased again from 1,234 cfs the previous week to 1,066 average daily cfs this past week and S-308 discharges were slightly lower than last week at 37 cfs. Flows through the S-308 have been passive flows through the navigation lock and/or structure and are not lake discharges. The corrected average daily evapotranspiration value for the week based on the L006 weather platform solar radiation decreased from 0.20 inches last week to 0.11 inches this week.

Total lake inflows and outflows for the past week are detailed in Table 1, as well as the approximate change in lake stage from each major structure's total flows over the period. 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.

Water quality samples collected from 17 stations around the Lake on October 16 – 17, 2018 showed algal blooms (defined by the District as having chlorophyll *a* (Chla) values > 40 µg/L) at two sample locations in the southern end of the lake, and with 12 of the 15 other stations having values from 21.9 - 35.9 µg/L, mostly from stations around the perimeter (Figure 5). Many of the elevated values corresponded with areas of elevated cyanobacteria bloom potential, as monitored from satellite imagery (see below).

The most recent satellite imagery (November 2) using the cyanobacteria monitoring product derived from NOAA's analysis of EUMETSAT's OLCI satellite sensor showed elevated algal bloom potential in the south and southwest regions of the Lake, a pattern that has been similar for the past several weeks (Figure 6).

Long-term vegetation monitoring plots located along the southwestern shoreline of the marsh were sampled in May of 2017, prior to Hurricane Irma, and then in April and November of 2018. These two plots consist of a grid of 50 one-hectare plots, in which the dominant and secondarily dominant species, in terms of areal coverage, are identified. There was an increase of 26 grids (of 100 total) that were dominated by open water from May 2017 to November 2018, suggesting a loss of plant coverage (Figure 7a). However, there was an increase of 16 grids from April to November of 2018 that had desirable bulrush or grasses as the second-most dominant in coverage (Figure 7b). These results suggest that while plant coverage remains sparse on the outside edge of the marsh, coverage of desirable species is increasing.

Water Management Recommendations

Lake Okeechobee stage is 13.64 feet NGVD, falling 0.08 feet from the previous week and 0.65 feet over the past 30 days. Lake stages are now the lowest they have been for this time of year since 2010 and are 0.53 feet below the bottom of the preferred ecological envelope, which varies seasonally from 12.5 – 15.5 feet NGVD. However, given potential for heavy rainfall associated with El Niño conditions this winter and the poor condition of SAV and EAV in the nearshore zone, these lower lake stages are ideal. Recovery of vegetation in the nearshore zone from Hurricane Irma impacts and 2016 El Niño-associated rainfall will require lake stages in the lower portion of the ecological envelope or lower for extended periods, so efforts to prepare for such an event will help speed the rebound of this important community.

Table 1. Average daily inflows and outflows and the approximate depth equivalents on Lake Okeechobee for various structures.

INFLOWS	Previous Week Avg Daily cfs	Avg Daily Inflow cfs	Equivalent Depth Week Total (in)
S65E & S65EX1	884	417	0.2
S71 & 72	0	0	0.0
S84 & 84X	0	0	0.0
Fisheating Creek	29	30	0.0
S154	0	0	0.0
S191	0	0	0.0
S133 P	0	0	0.0
S127 P	0	0	0.0
S129 P	0	0	0.0
S131 P	0	0	0.0
S135 P	0	0	0.0
S2 P	0		
S3 P	0	0	0.0
S4 P	0	0	0.0
L8 Backflow	0	119	0.1
Rainfall	0	1918	0.8
Total	**913**	**2484**	**1.0**

OUTFLOWS	Previous Week Avg Daily cfs	Avg Daily Outflow cfs	Equivalent Depth Week Total (in)
S77	1234	1066	0.4
S308	69	37	0.0
S351	1799	909	0.4
S352	697	400	0.2
S354	1164	684	0.3
L8 Outflow	224	120	0.1
ET	3360	1850	0.8
Total	**8547**	**5065**	**2.1**

PROVISIONAL DATA

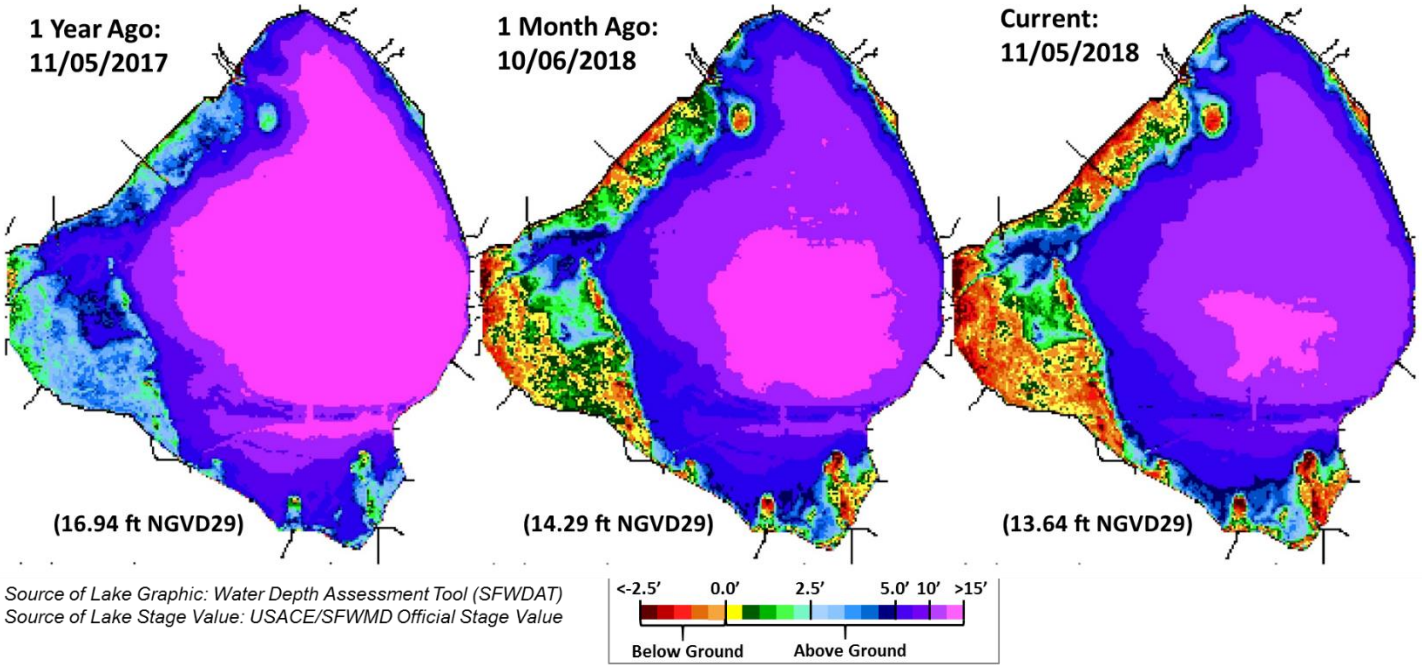


Figure 1. Water depth estimates on Lake Okeechobee based on the South Florida Water Depth Assessment Tool.

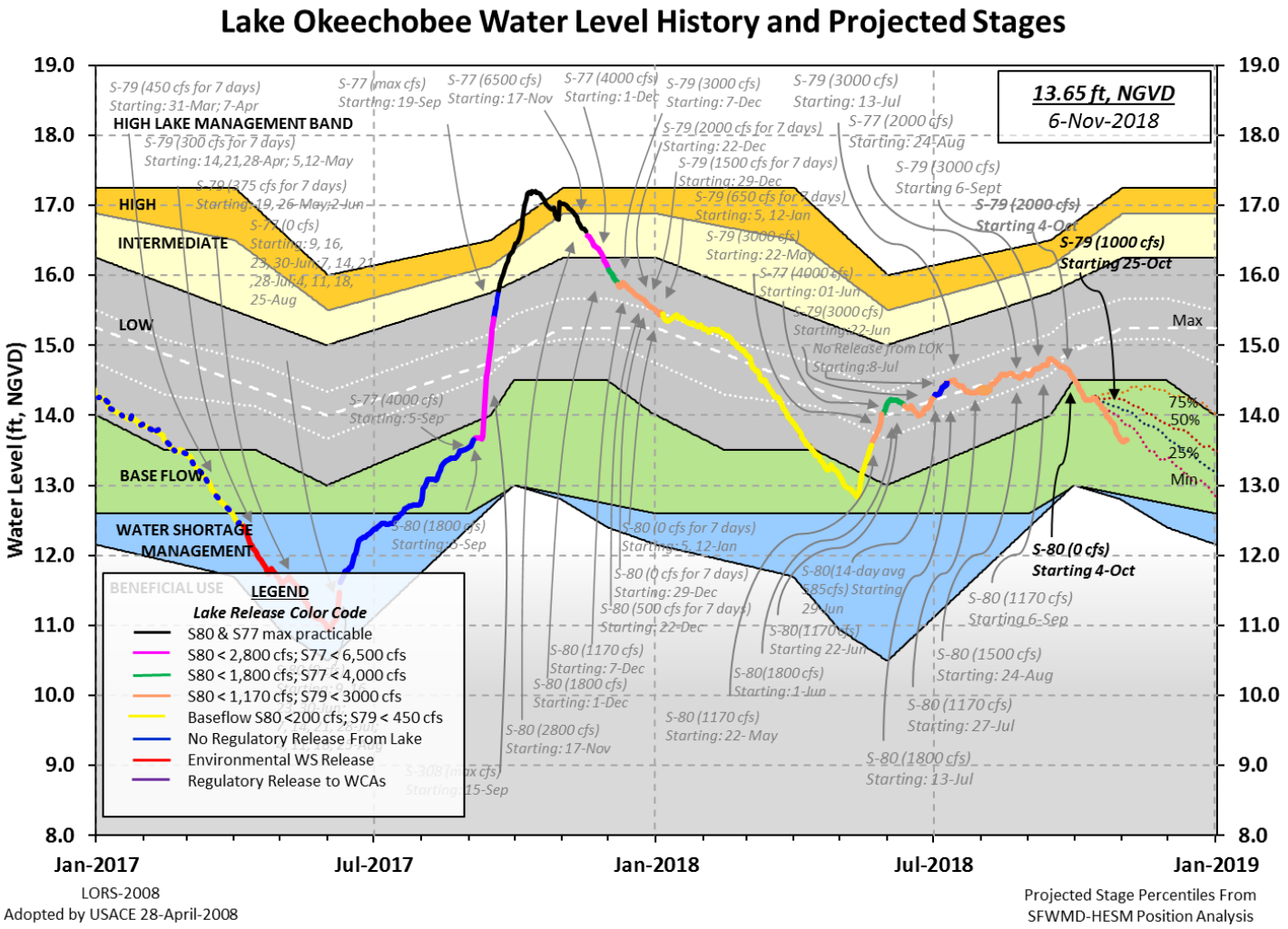


Figure 2. Recent Lake Okeechobee stage and releases, with projected stages based on a dynamic position analysis.

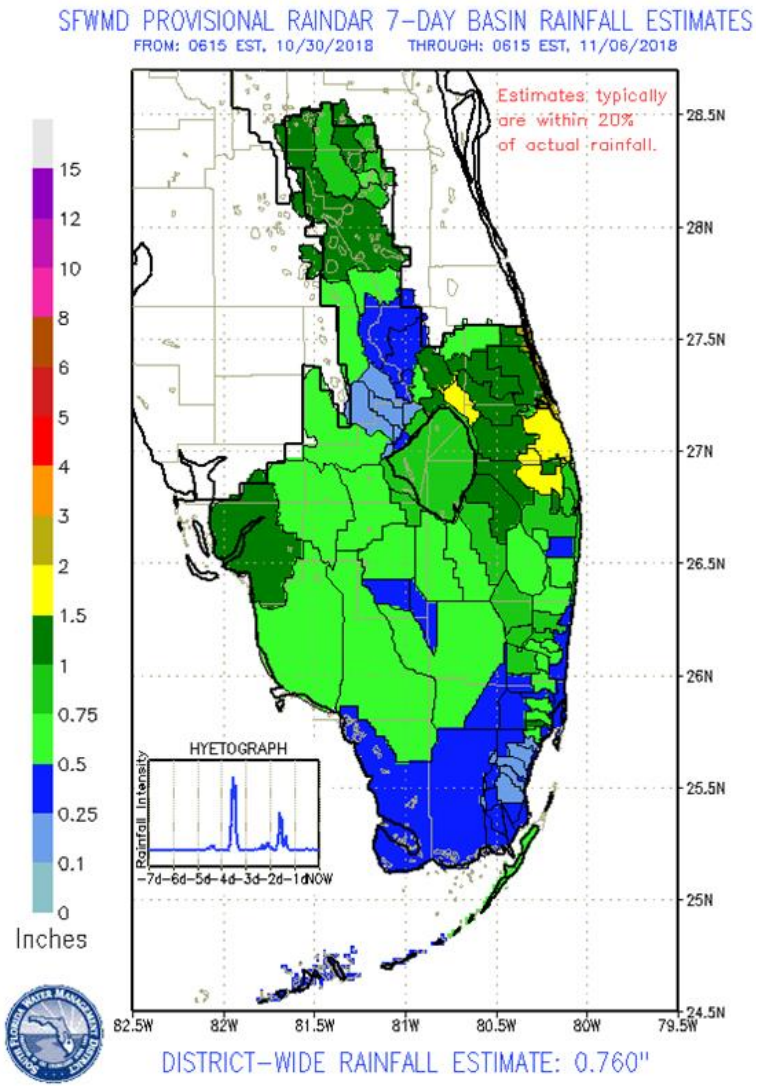


Figure 3. Rainfall estimates by basin.

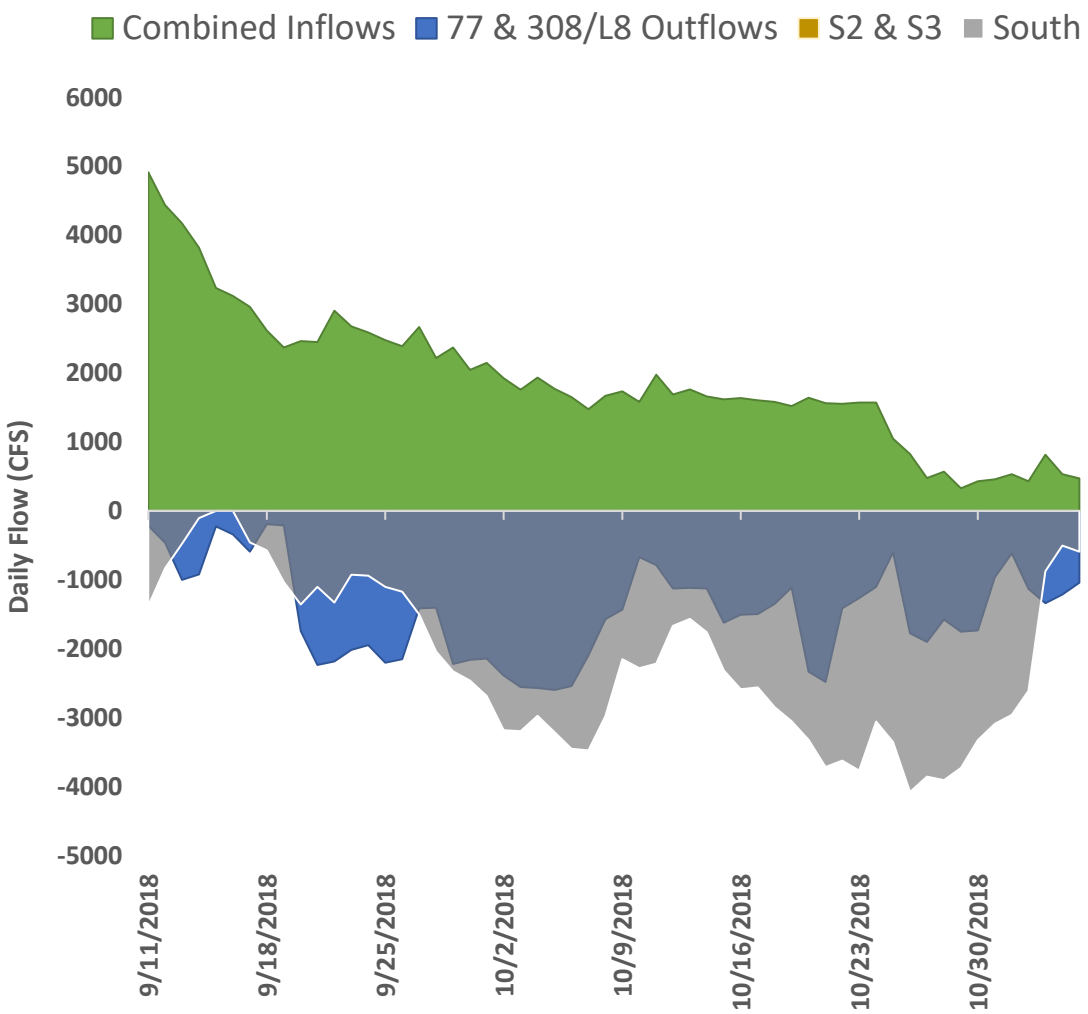
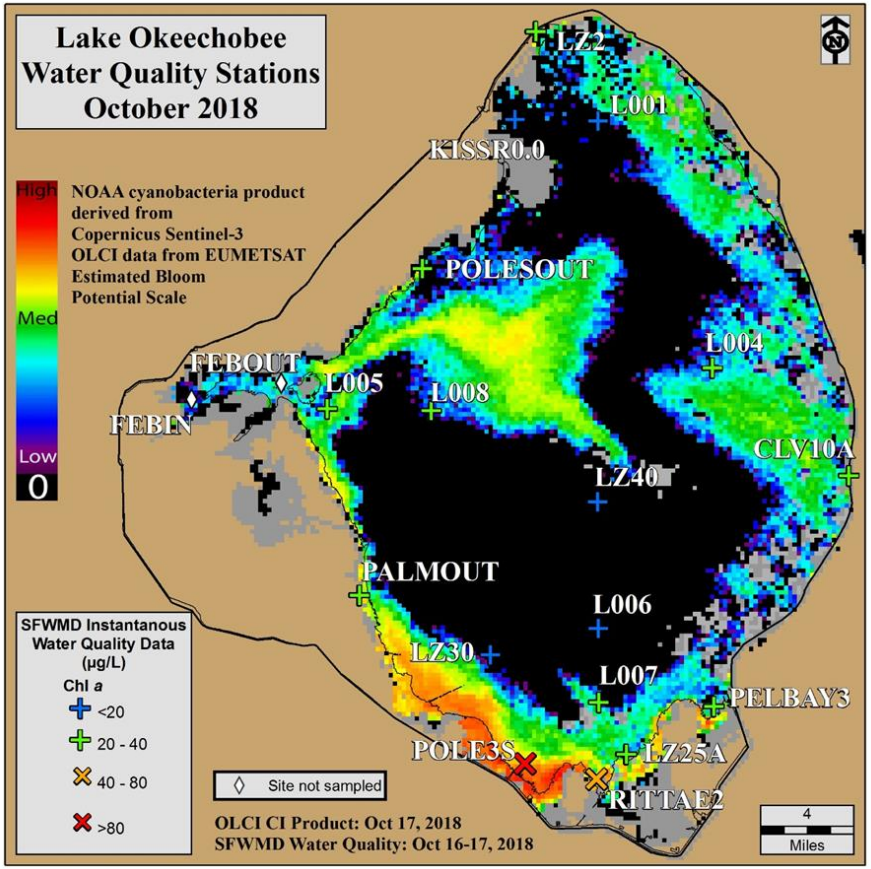


Figure 4. Major inflows and outflows of Lake Okeechobee, including the S-350 structures designated as South. The L-8 canal flows through culvert 10A are included as outflows when positive, and as inflows when backflowing into the lake. All inflows and outflows are shown as positive and negative, respectively, for visual purposes.



October 16-17, 2018

Site	Chlorophyll *a* (µg/L)	Microcystin (µg/L)
Nearshore Stations		
KISSR0.0	19.4	*
LZ2	24.4	*
LZ25A	29.2	
PALMOUT	35.9	
PELBAY3	25.4	
POLE3S	**89.6**	
POLESOUT	21.9	*
RITTAE2	**71.6**	
Pelagic Stations		
L001	14.2	
L004	35.5	
L005	28.8	*
L006	5.0	
L007	33.2	
L008	23.0	
LZ30	19.3	*
LZ40	13.8	
CLV10A	28.6	*

Figure 5. Chlorophyll *a* (µg/L) values for nearshore and pelagic stations for mid-October 2018, overlaid onto concurrent map of cyanobacterial bloom potential. SFWMD classifies an algal bloom as having Chla values >40 µg/L. Microcystin values are still being analyzed.

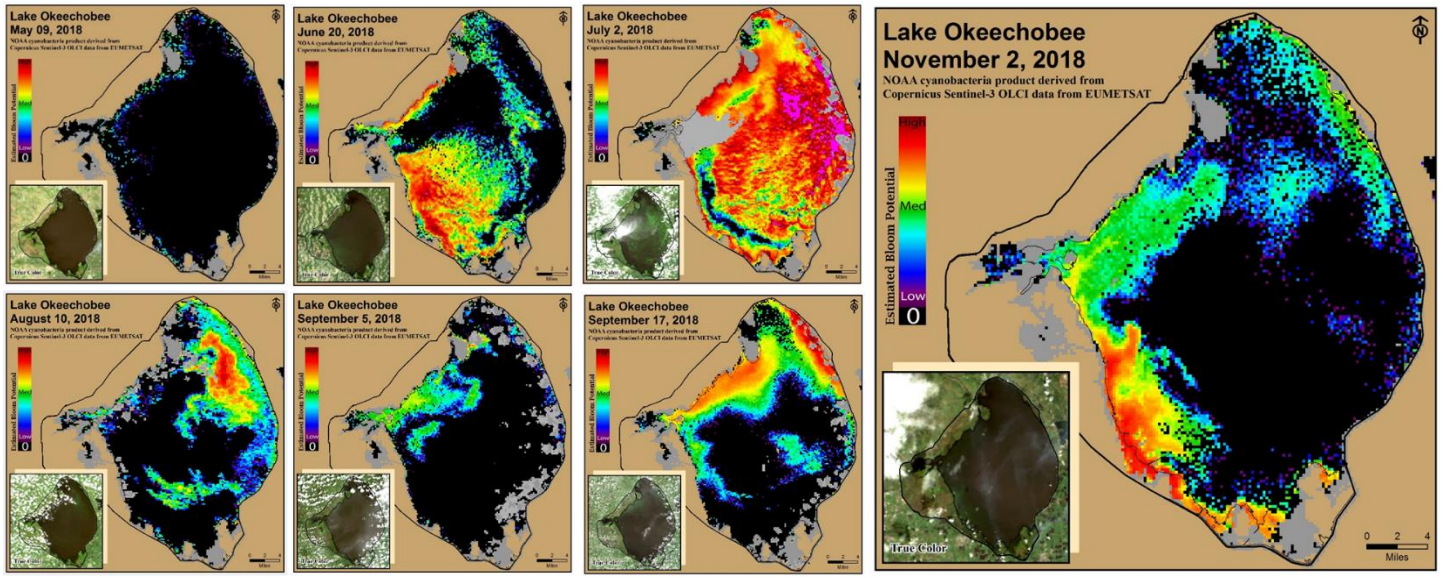


Figure 6. Potential for cyanobacterial blooms on Lake Okeechobee based on NOAA's harmful algal bloom monitoring system derived from Copernicus Sentinel-3 OLCI data from EUMETSAT. Gray indicates cloud cover. All data are experimental and unvalidated at this point in product development.

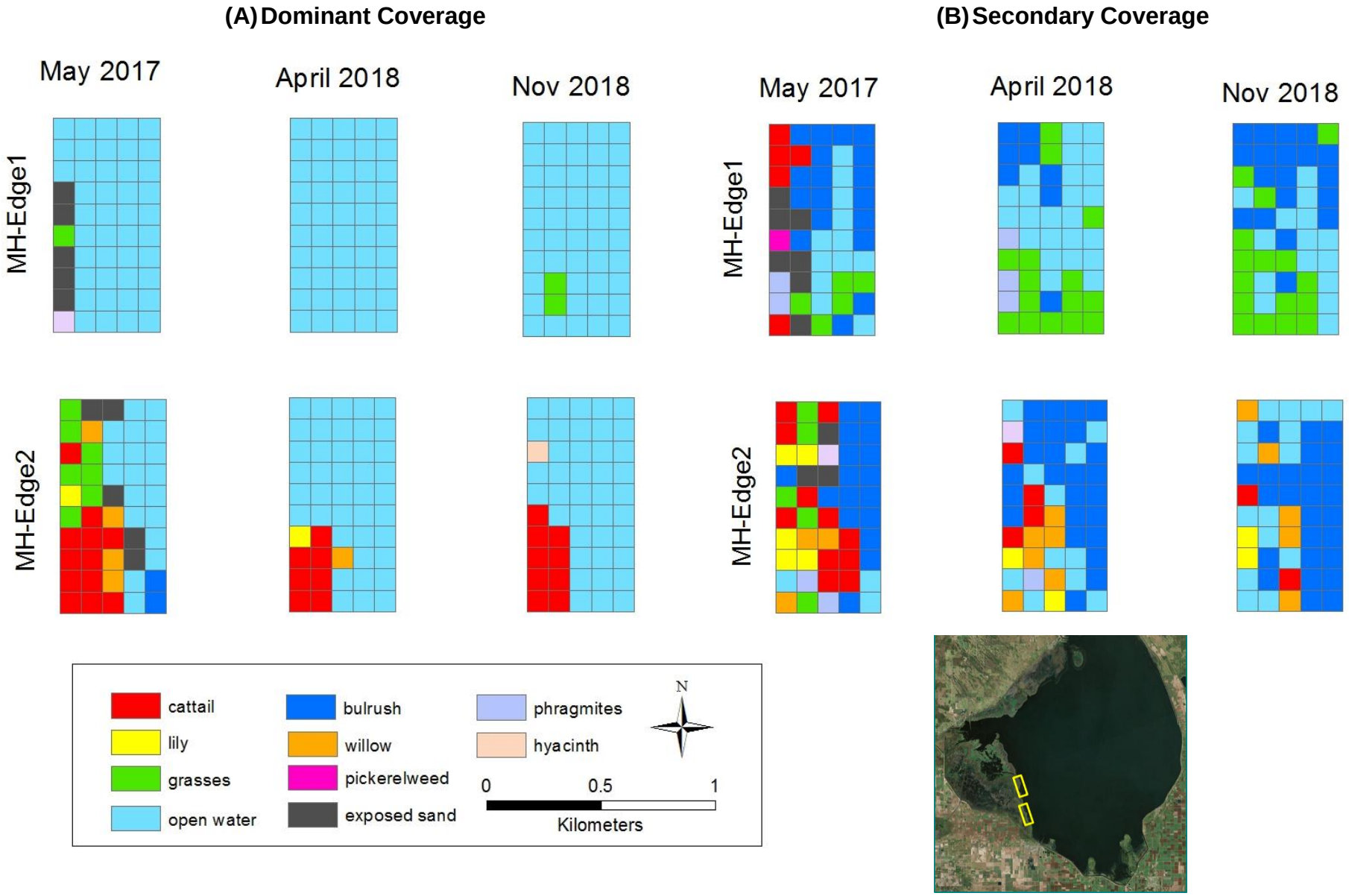


Figure 7. Two long-term monitoring plots, each consisting of a grid of 50 one-hectare plots and the (A) dominant and (B) secondary species in each, prior to Hurricane Irma (May 2017) and in April and November of 2018.

ESTUARIES

St. Lucie Estuary:

Last week total inflow to the St. Lucie Estuary averaged about 430 cfs (Figures 1 and 2) and last month inflow averaged about 273 cfs. Last week's provisional averaged inflows from the tidal basin and the structures are shown in Table 1.

Table 1. Weekly average inflows (data are provisional).

Location	Flow (cfs)
Tidal Basin Inflow	364
S-80	0
S-308	37
S-49 on C-24	0
S-97 on C-23	0
Gordy Rd. structure on Ten Mile Creek	66

Over the past week, salinity increased throughout the estuary (Table 2, 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 21.4. Salinity conditions in the middle estuary are within the good range for adult eastern oysters (Figure 3).

Table 2. Seven-day average salinity at three monitoring sites 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
HR1 (North Fork)	**17.6** (14.2)	**19.7** (18.4)
US1 Bridge	**21.3** (18.9)	**21.5** (20.2)
A1A Bridge	**28.4** (27.5)	**29.7** (29.3)

[1]Envelope not applicable and [2]Not Reporting.

Caloosahatchee Estuary:

Last week total inflow to the Caloosahatchee Estuary averaged about 1,163 cfs (Figures 5 and 6) and last month inflow averaged about 1,615 cfs. Last week's provisional averaged inflows from the structures are shown in Table 3.

Table 3. Weekly average inflows (data is provisional).

Location	Flow (cfs)
S-77	1,066
S-78	744
S-79	990
Tidal Basin Inflow	173

Over the past week, salinity increased throughout the estuary (Table 4, Figures 7 & 8). The seven-day average salinity values are estimated to be within the good range for adult eastern oysters at Cape Coral and at Shell Point (Figure 9). Salinity values were not available at Sanibel. The 30-day moving average surface salinity is 1.3 at Val I-75 and 4.98 at Ft. Myers. Salinity conditions between Val I-75 and Ft. Myers are good for tape grass.

Table 4. Seven-day average salinity at six monitoring stations in the Caloosahatchee Estuary. Current average is in bold face type, previous average in parentheses. The envelope reflects the preferred salinity range for tape grass (*Vallisneria americana*) at Val I-75 and for adult eastern oysters (*Crassostrea virginica*) elsewhere.

Sampling Site	Surface	Bottom
S-79 (Franklin Lock)	**1.2** (1.0)	**1.3** (1.0)
Val I75	**1.8** (1.7)	**2.7** (2.4)
Ft. Myers Yacht Basin	**7.0 (**6.3)	**8.7** (7.6)
Cape Coral	**14.7** (13.3)	**16.6** (15.1)
Shell Point	**25.4** (24.0)	**24.3** (22.7)
Sanibel	**NR**[3](NR)	**NR** (NR)

[1]Envelope not applicable, [2]Envelope is based on a 30-day average, and [3]Not Reporting.

Forecast of surface salinity (Figure 10) at Val I-75 for the next two weeks using the autoregression model (Qiu and Wan, 2013) coupled with a linear reservoir model for the tidal basin predicts daily salinity ranging from 2.0 to 4.7 at the end of the next two weeks for pulse release at S-79 ranging from 0 to 650 cfs and Tidal Basin inflows 210 cfs.

Red tide

The Florida Fish and Wildlife Research Institute reported on November 2, 2018, that *Karenia brevis,* the Florida red tide dinoflagellate, was observed at background to medium concentrations in four samples collected from Lee County. Respiratory irritation was also reported in Lee County*. Karenia brevis,* the Florida red tide dinoflagellate, was observed at background to very low concentrations in seven samples collected from St. Lucie County, very low to medium concentrations in 14 samples collected from Martin County, background to low concentrations in 11 samples collected from Palm Beach County, background in two samples collected from Broward County, and background to very low concentrations in two samples collected from Miami-Dade County. Fish kills were reported for multiple locations in Palm Beach County and one location in Martin County.

Water Management Recommendations

Lake stage is in the Base Flow sub-band of 2008 LORS. Tributary hydrological conditions are dry. The 2008 LORS recommends up to 450 cfs at S-79 and up to 200 cfs at S-80. Given the current estuarine conditions, there are no ecological benefits associated with freshwater releases from Lake Okeechobee.

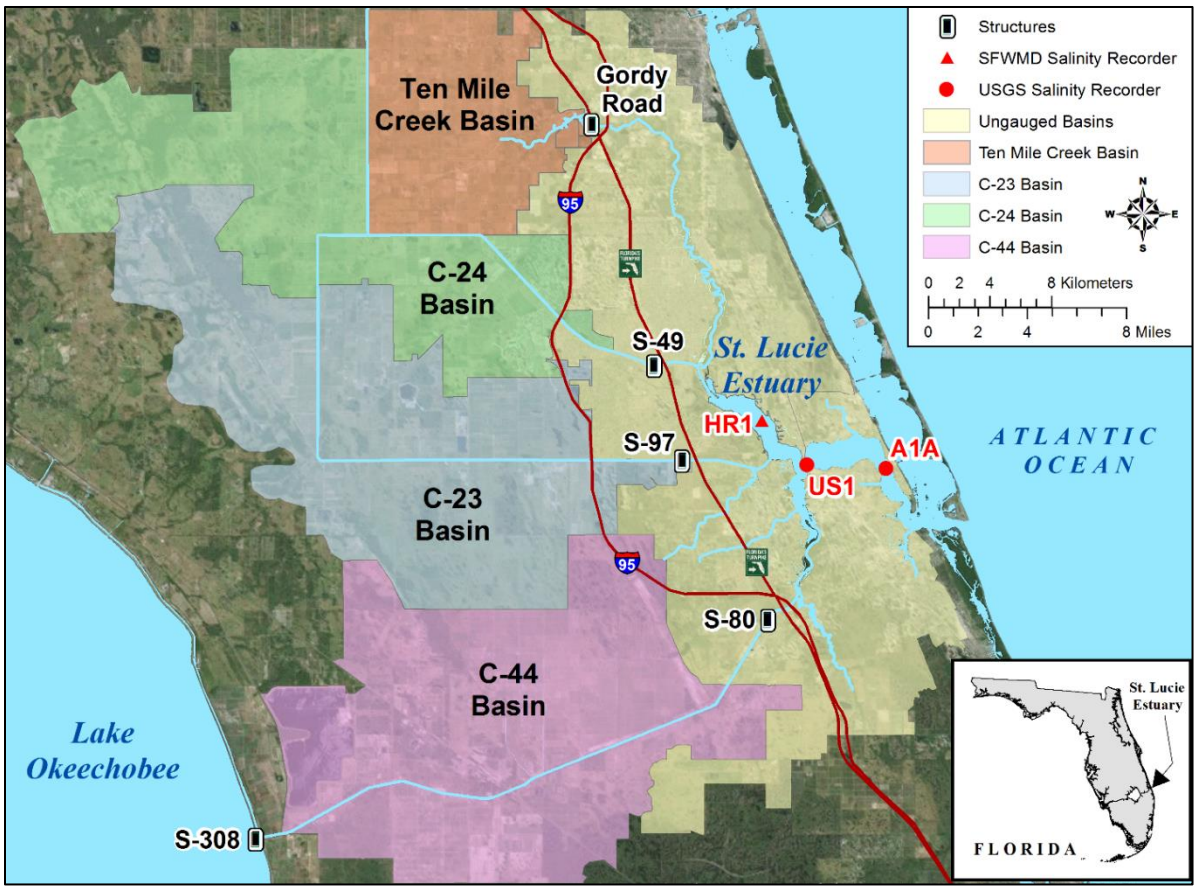


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

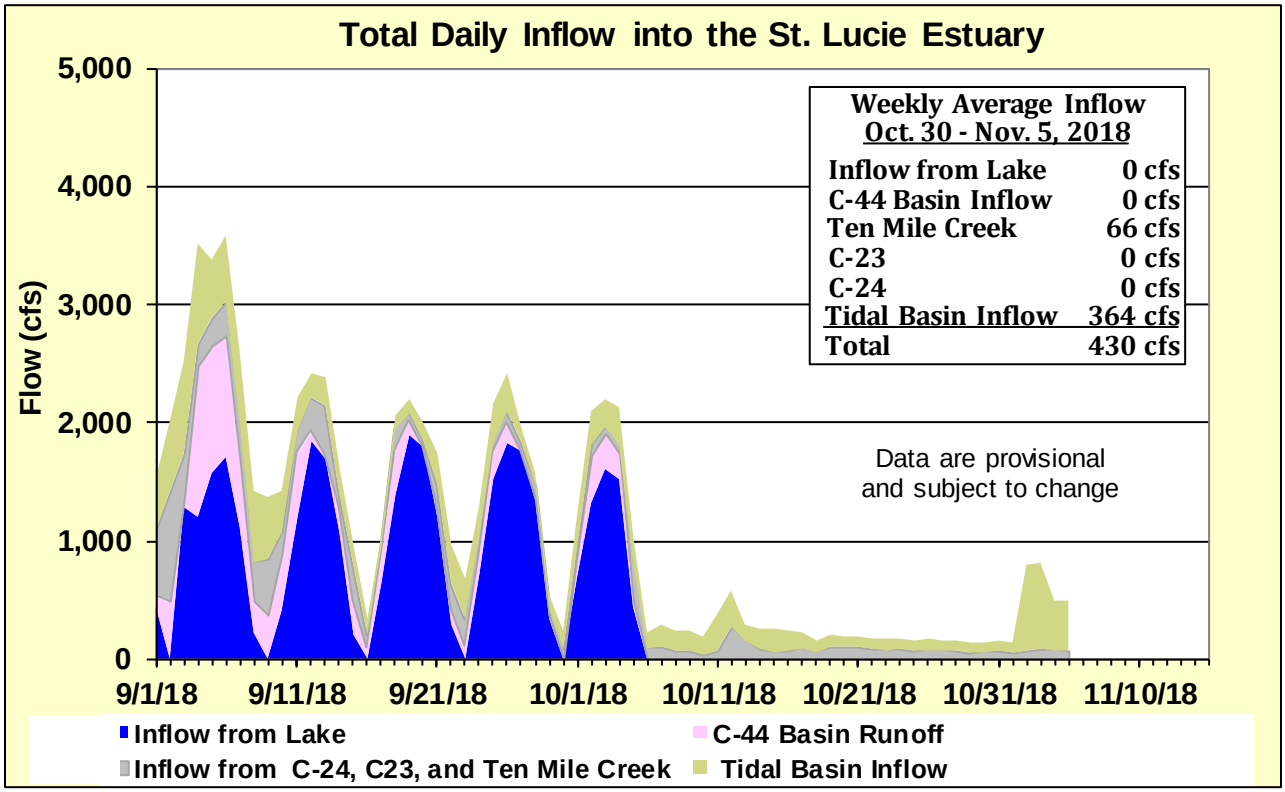


Figure 2. Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basins into the St. Lucie Estuary.

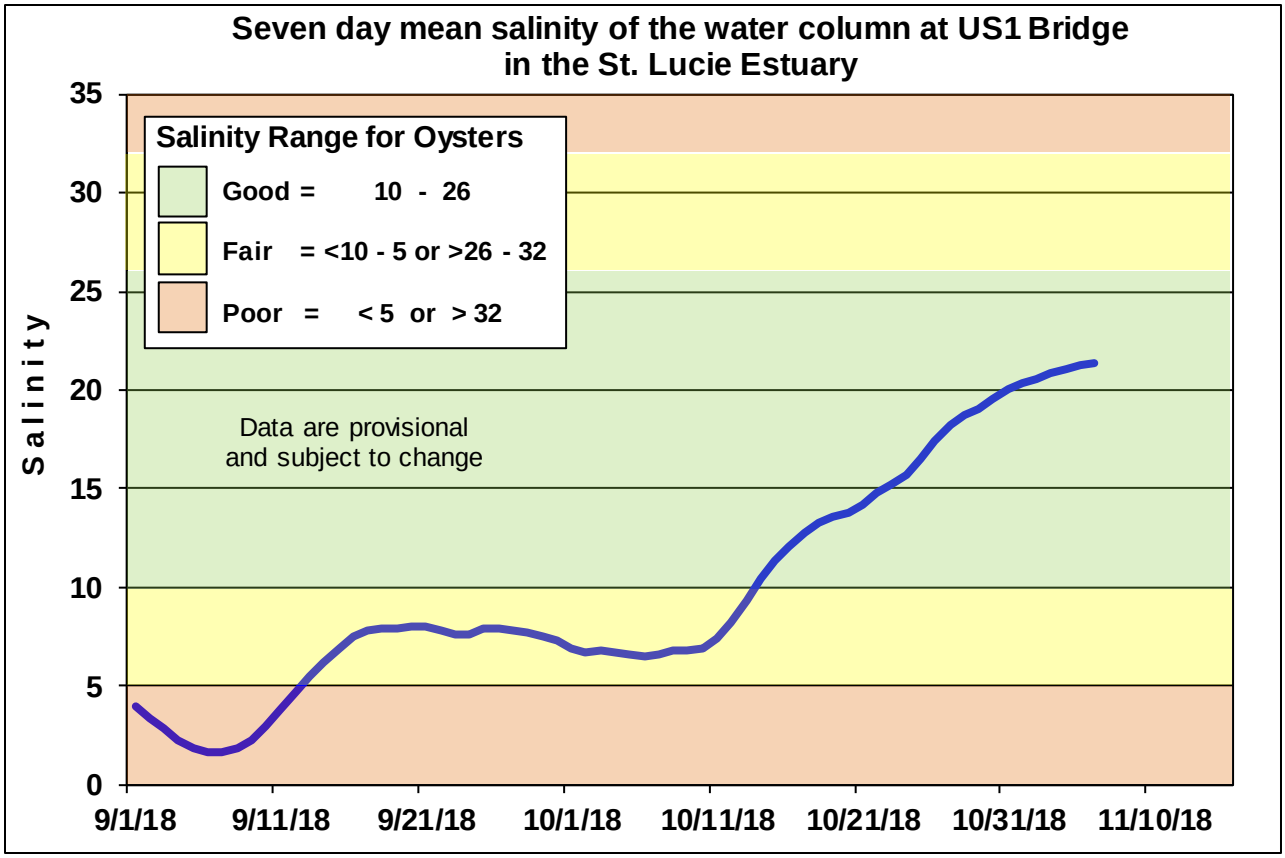


Figure 3. Seven-day mean salinity of the water column at the US1 Bridge.

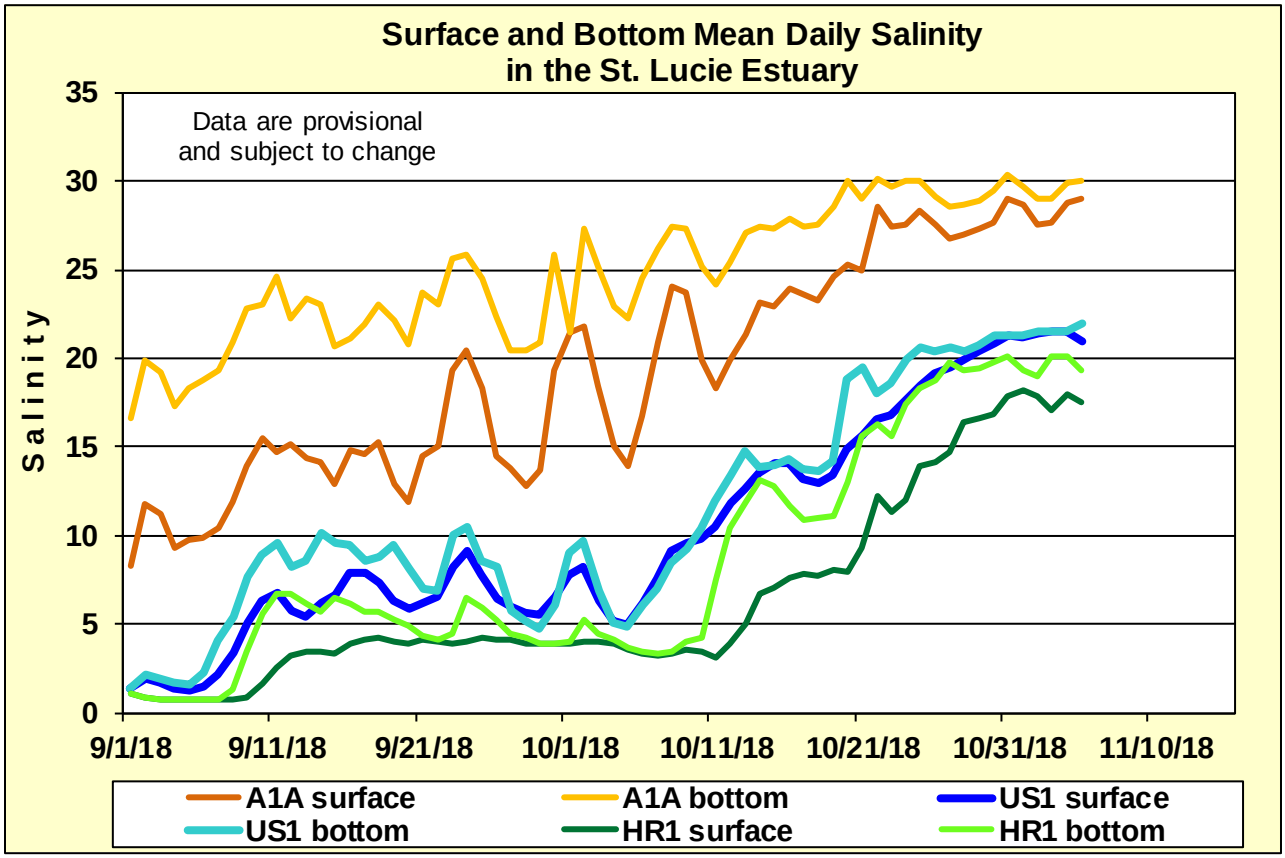


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

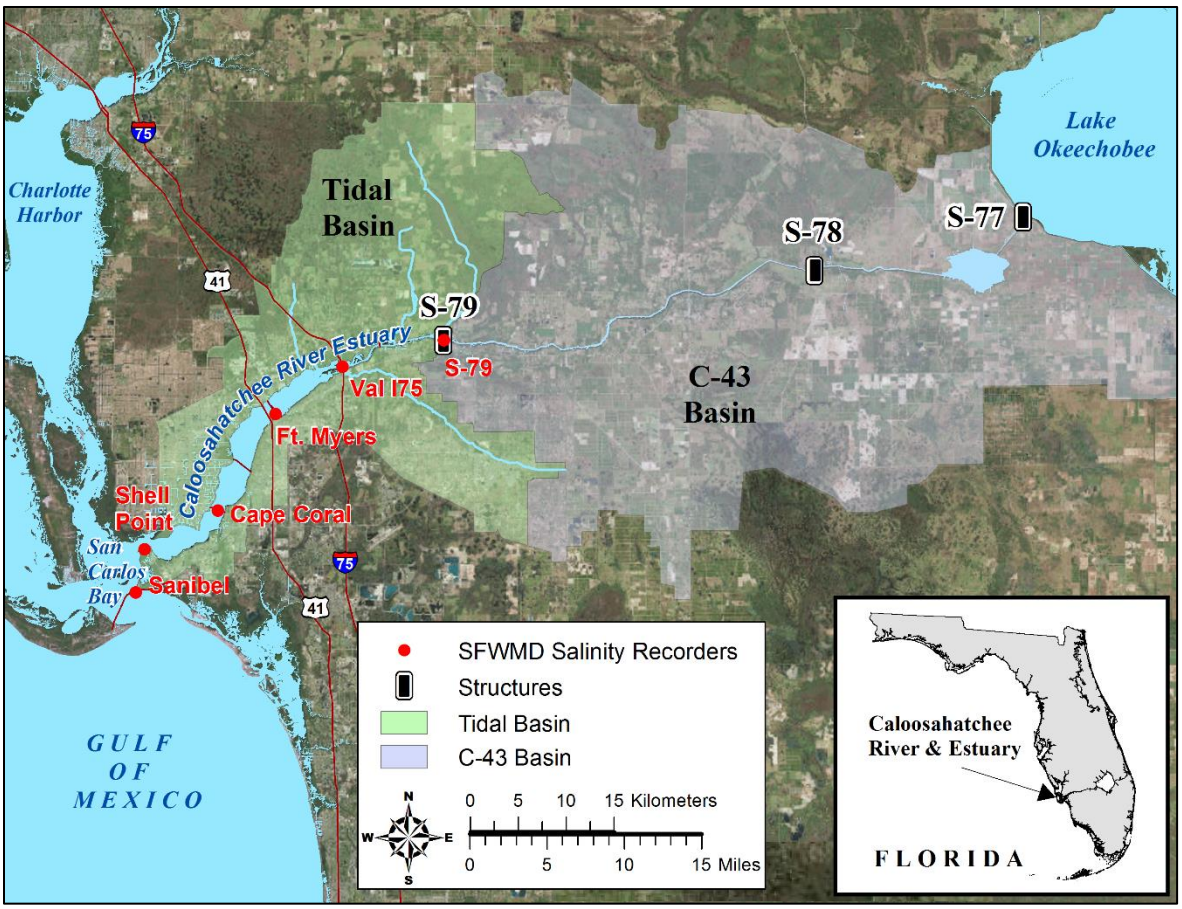


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

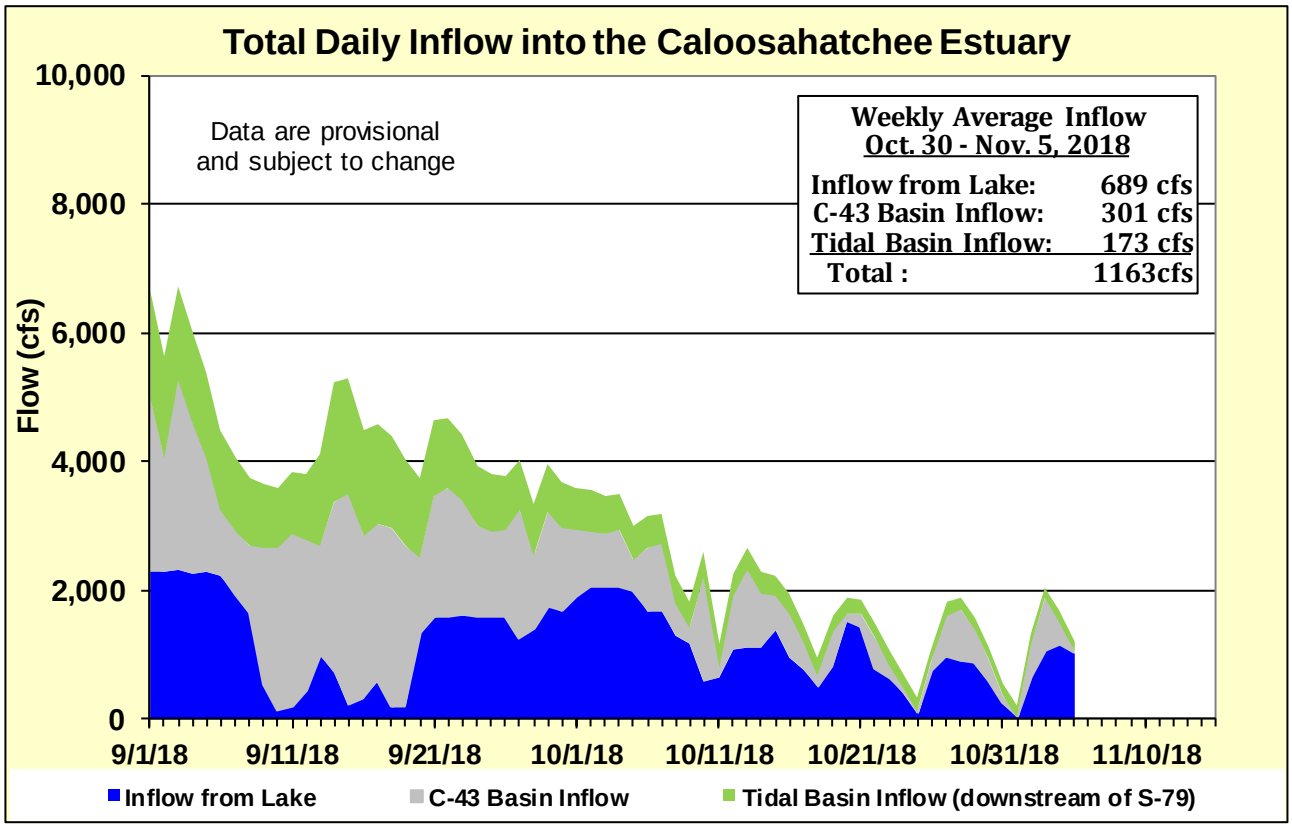


Figure 6. Total daily inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.

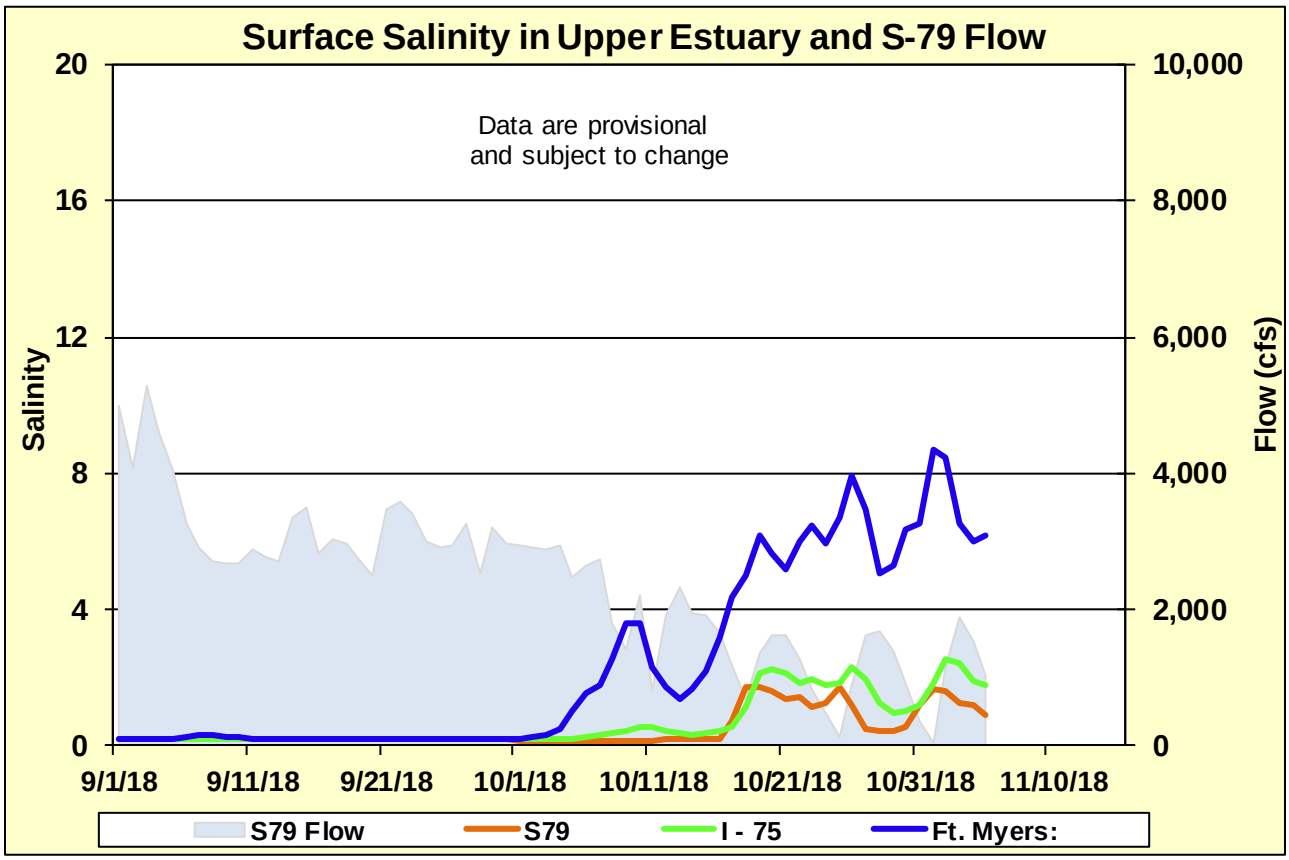


Figure 7. Daily mean flows at S-79 and salinity at upper estuary monitoring stations.

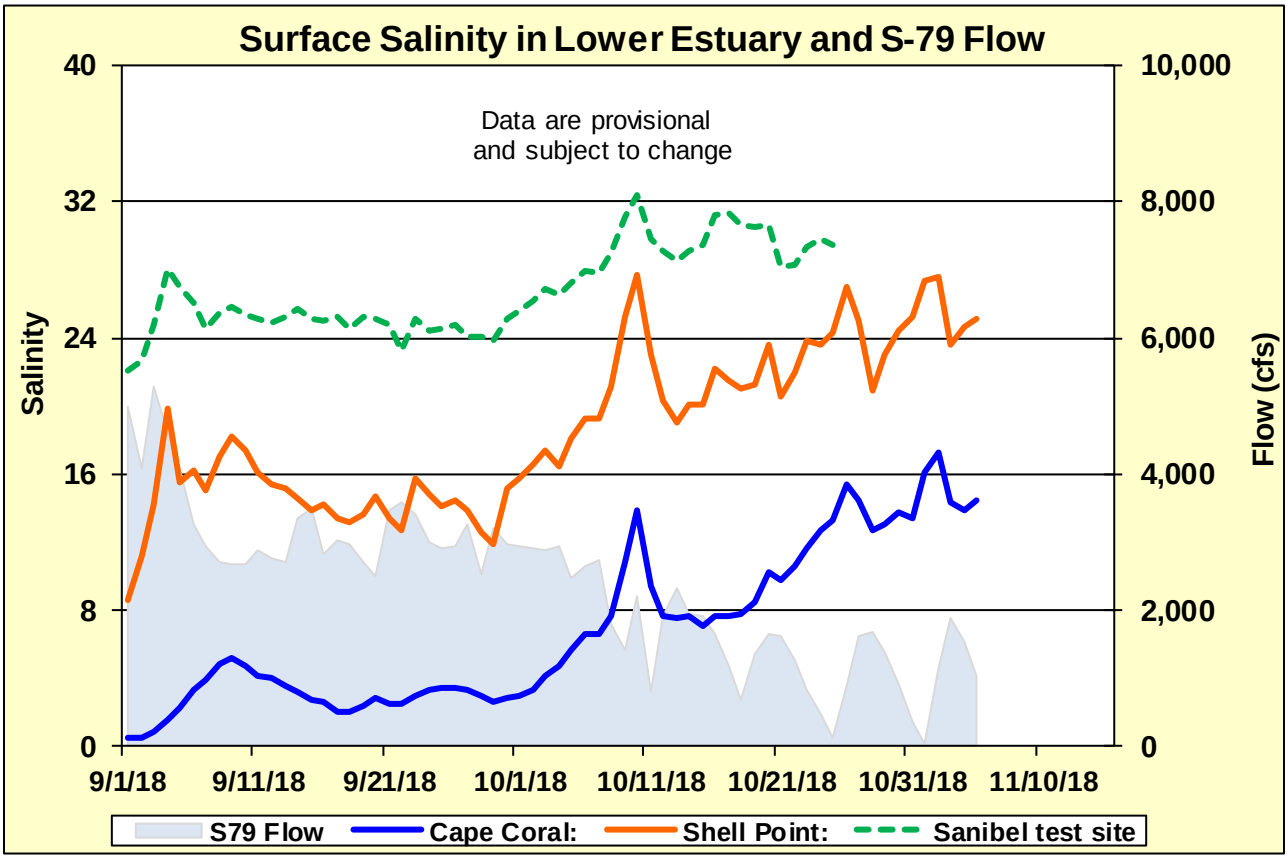


Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.

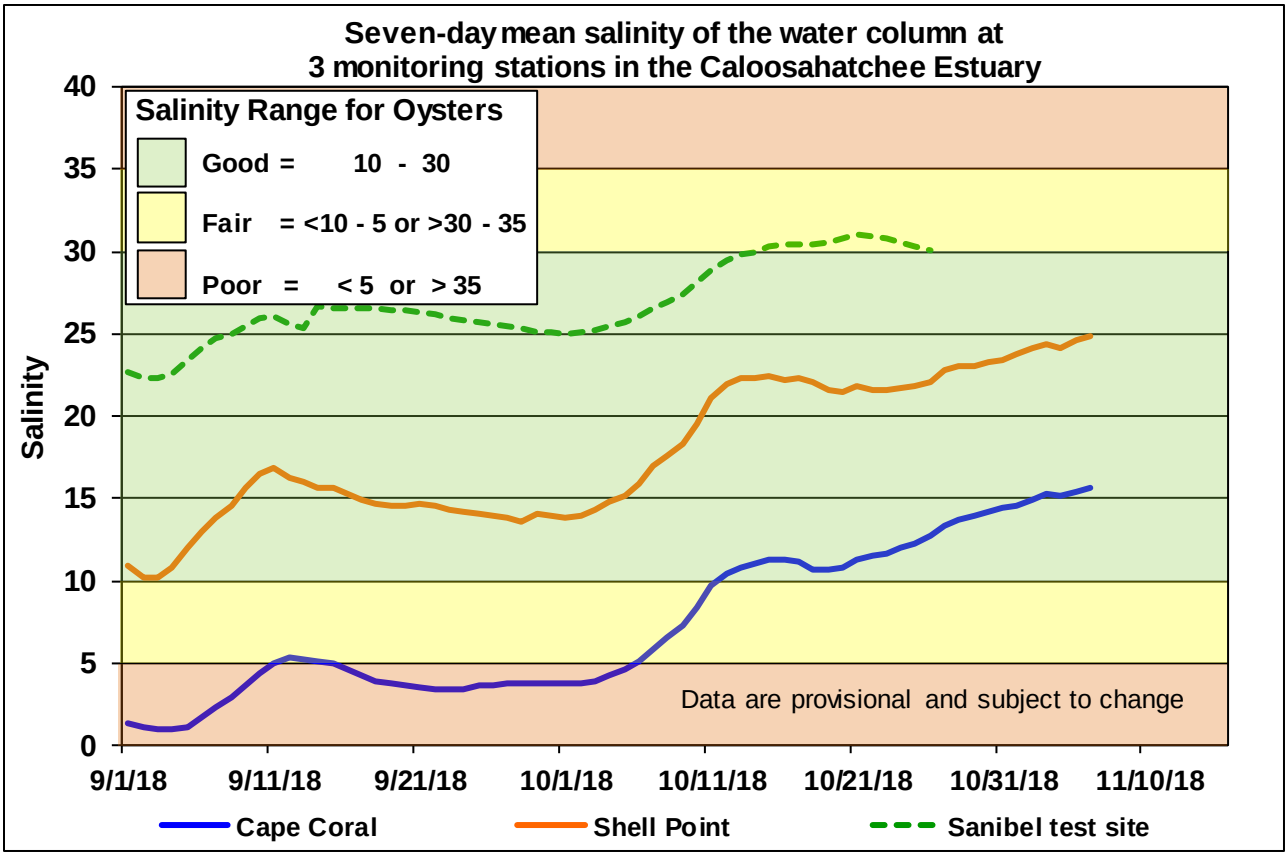


Figure 9. Seven-day mean salinity at Cape Coral, Shell Point, and Sanibel monitoring stations.

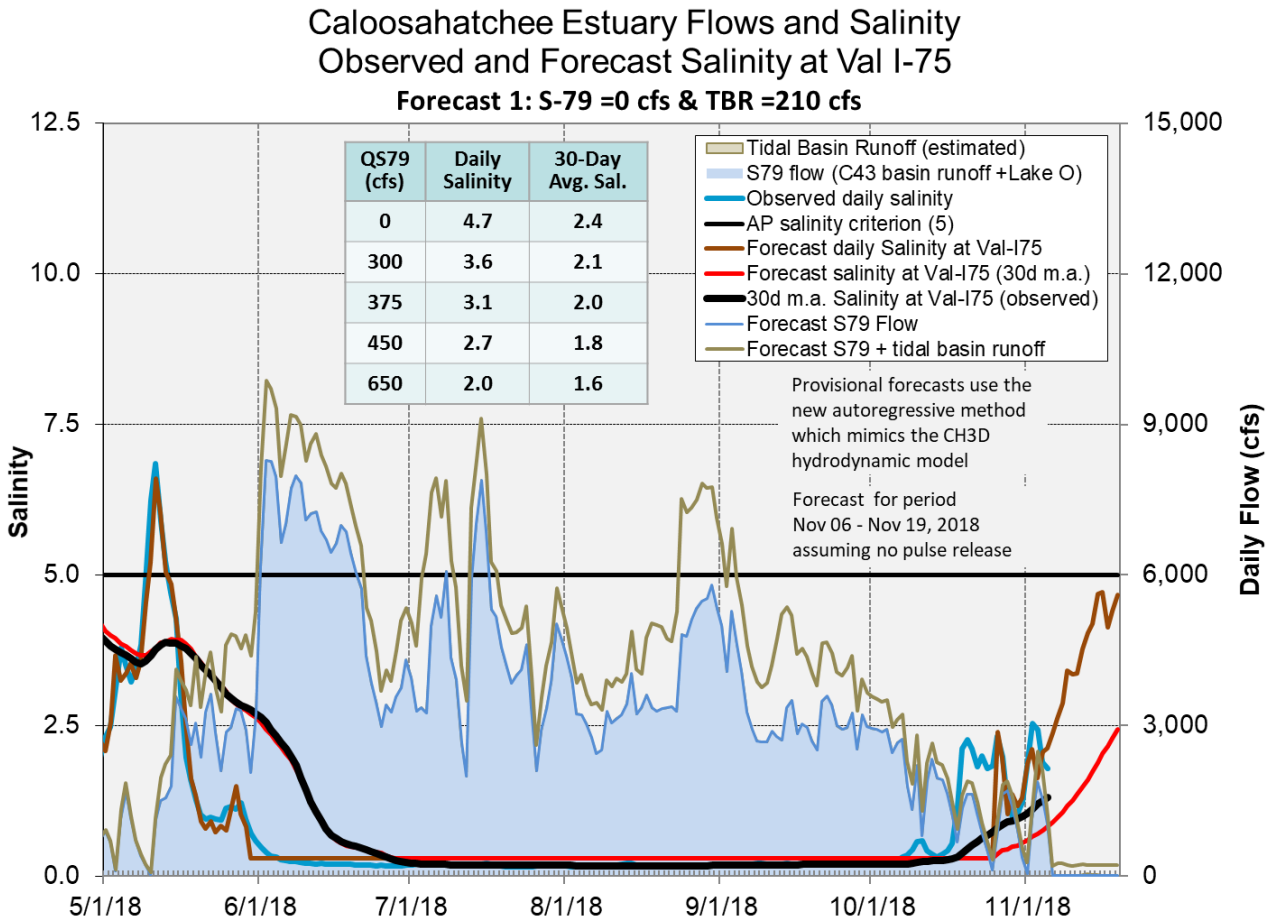
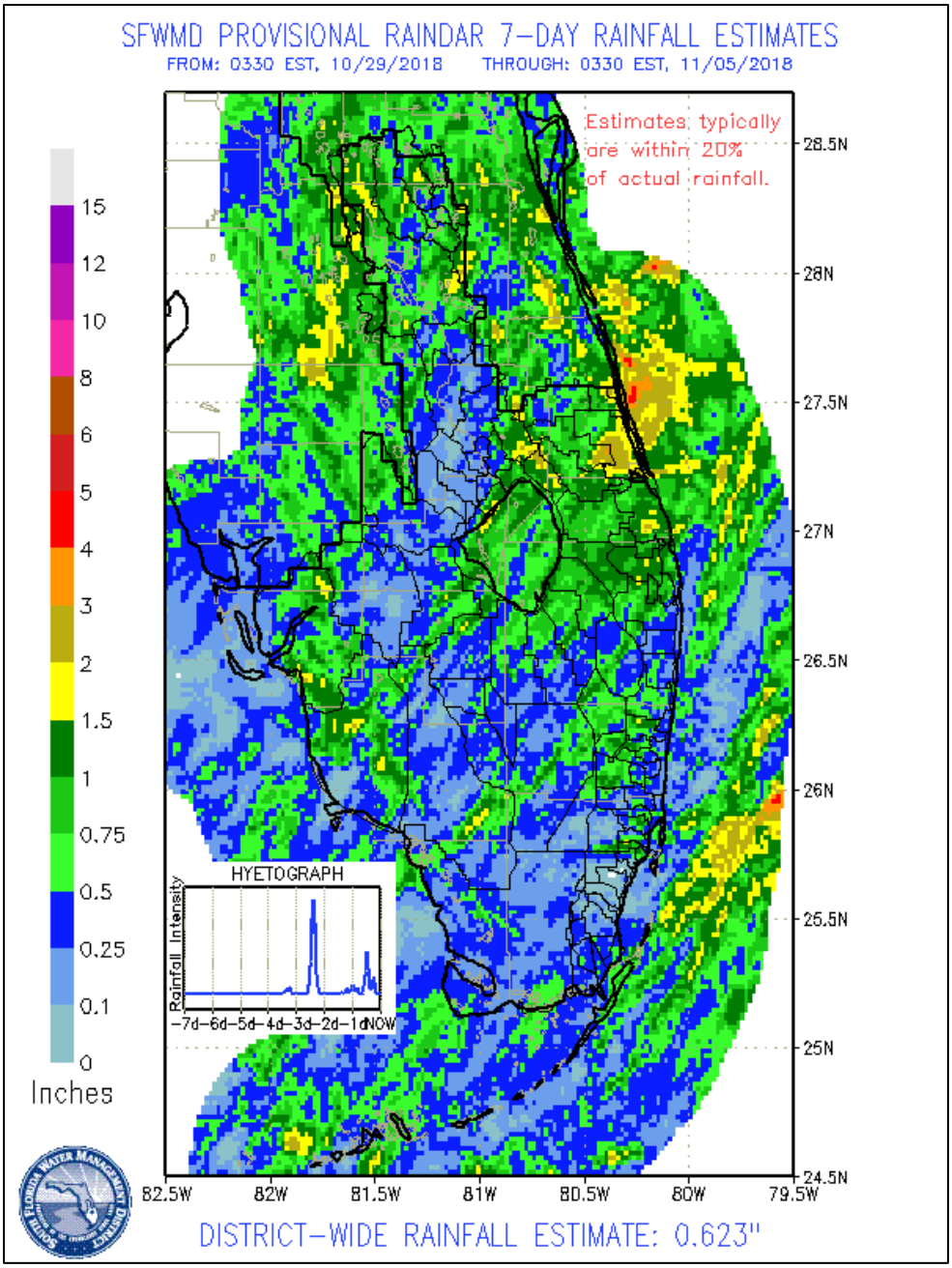


Figure 10. Val I-75 salinity assuming no pulse release at S-79. The embedded table shows different pulse releases and resulting daily and 30 day moving average salinity at the end of the forecast period.

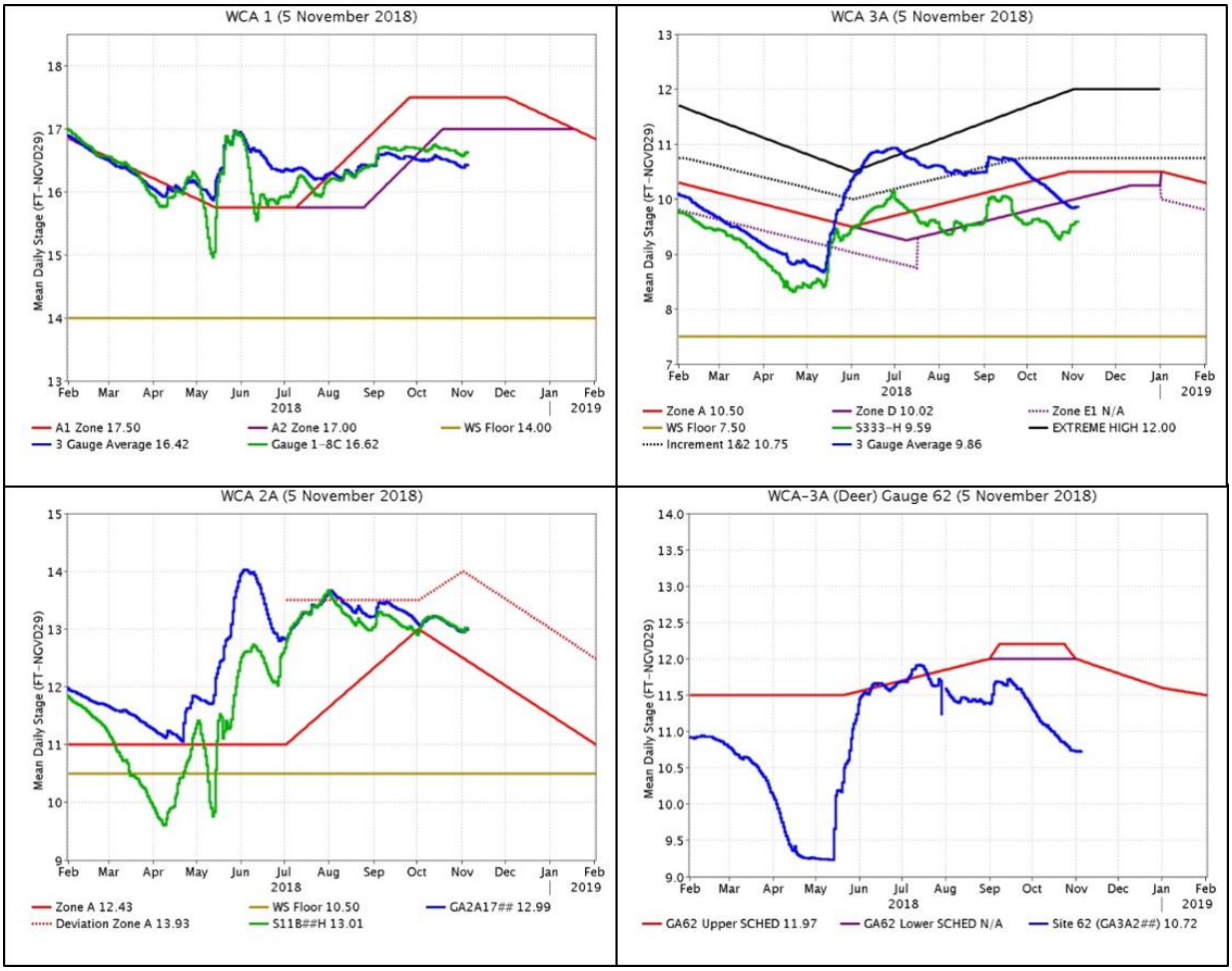
EVERGLADES

At the gauge locations monitored for this report, stages within the WCAs fell 0.02 feet on average over the last week. The most extreme individual gauge changes within the WCAs ranged from +0.09 feet (WCA-3A south) to -0.10 feet (WCA-3A central). Pan evaporation was estimated at 1.35 inches this week.

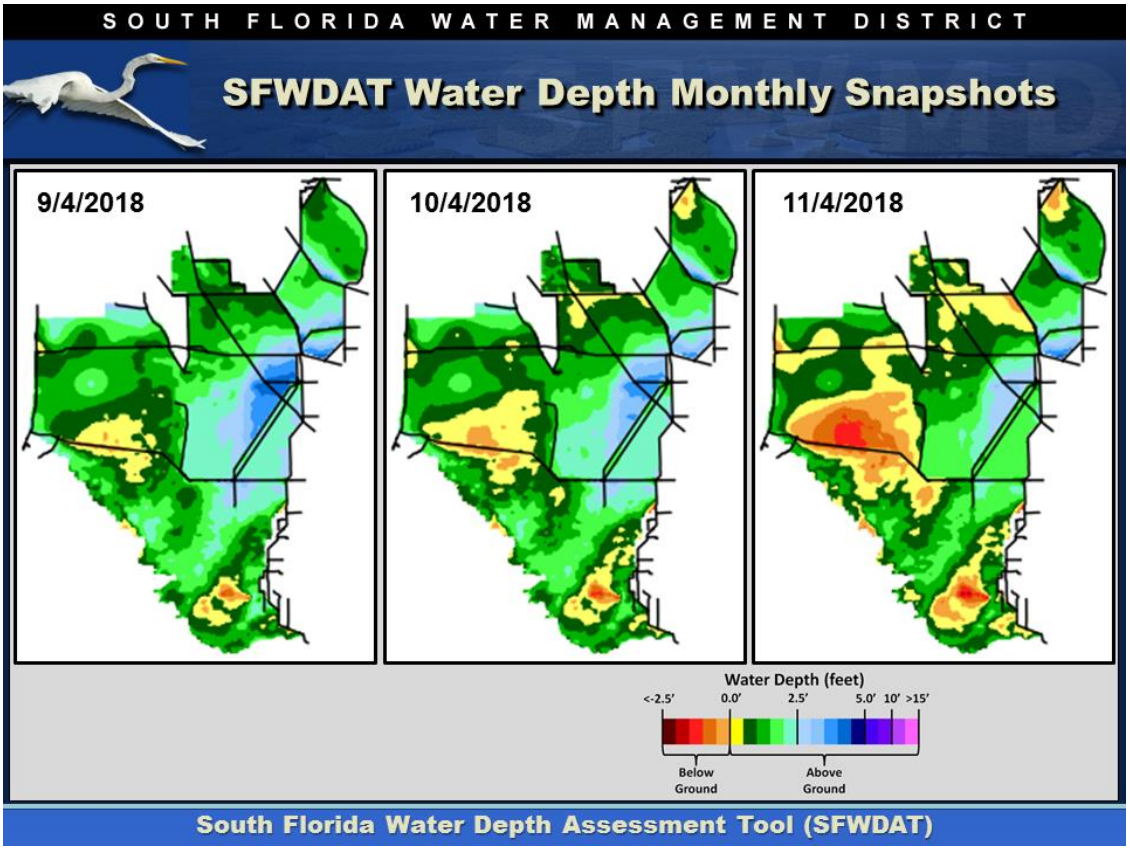
Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	0.53	+0.00
WCA-2A	0.74	+0.00
WCA-2B	0.77	+0.03
WCA-3A	0.43	−0.02
WCA-3B	0.28	−0.07
ENP	0.31	−0.28

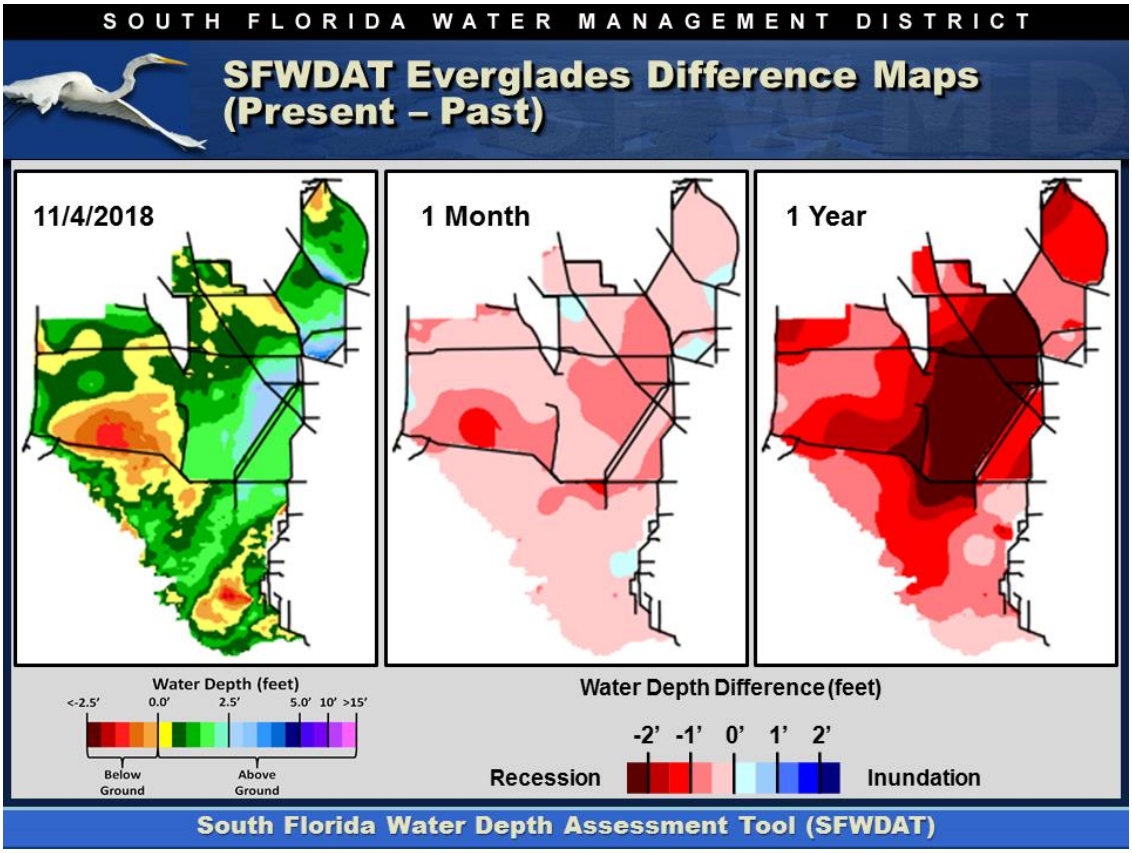


Regulation Schedules: Gauge 1-8C is 0.38 feet below the Zone A2 regulation line. The three-gauge average is 0.20 below the canal stage. S-11B Headwater stage is 0.58 above the Zone A regulation line and the canal and marsh stage have equalized. WCA-3A three-gauge average stage is 0.16 feet below the Zone D regulation line. WCA-3A at gauge 62 (northwest corner) is 1.25 feet below the lower schedule and has remained stable over the last week.



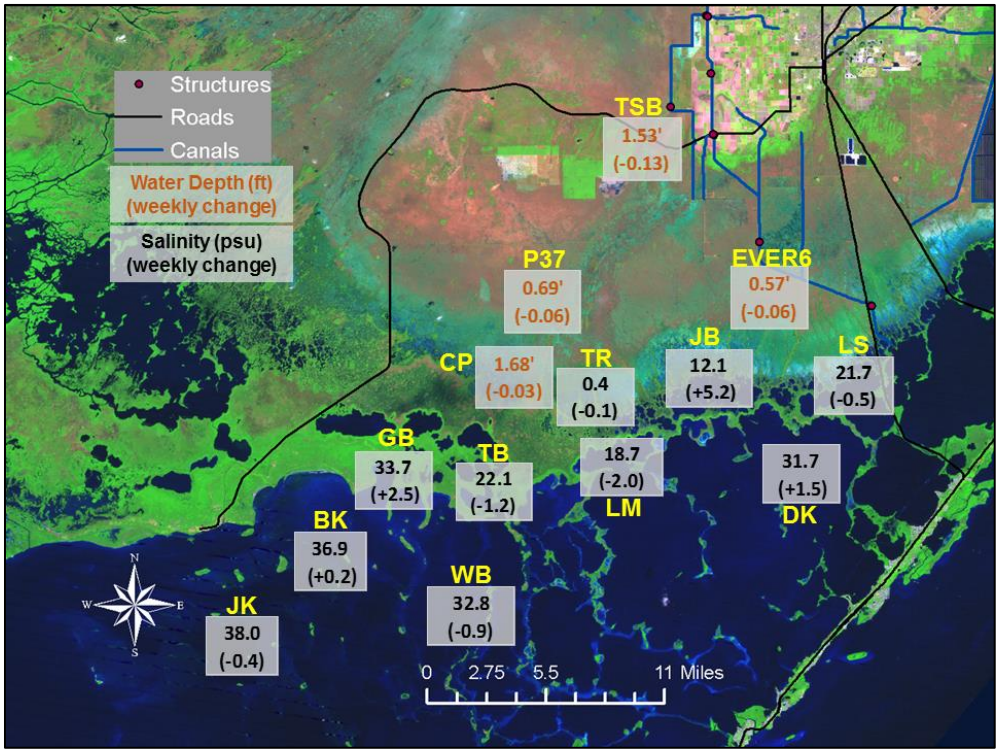
Water Depths and Changes: The WDAT tool for spatial interpolation of depth monthly snapshots indicate drying conditions. Regions with depths from 0.5 feet to 0.0 feet expanded greatly in WCA-3A North, and slightly in northern WCA-1. The model is now showing expanding pockets of habitat with water depths below ground surface in both northeastern WCA-3A and WCA-1. These are unusually dry conditions for this time of year. WDAT difference output indicates that water level changes across most of South Florida are drier than they were one month ago. Ecologically important regions in WCA-3A are significantly shallower, as much as -1.0 feet in change. In the “1 Year” inset we see the comparison between current depth conditions and post Hurricane Irma’s (9/10/17) impact on water depths.

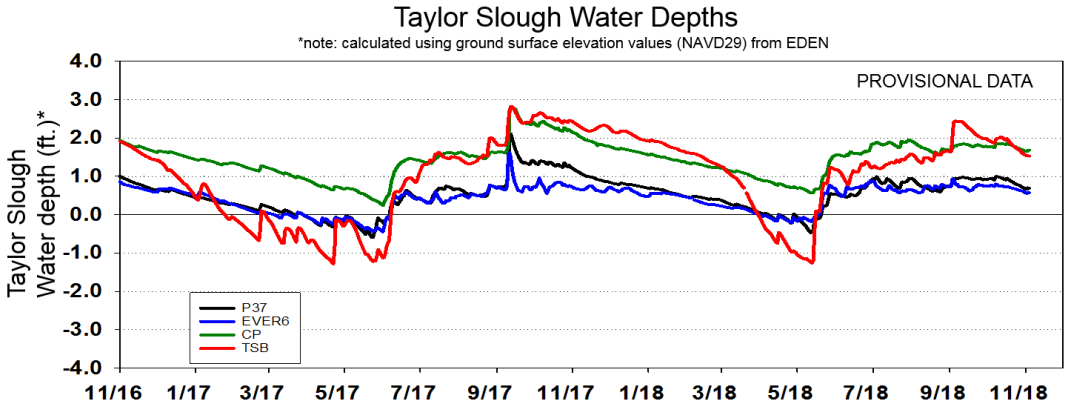

SOUTH FLORIDA WATER MANAGEMENT DISTRICT
SFWDAT Water Depth Monthly Snapshots
9/4/2018
10/4/2018
11/4/2018
Water Depth (feet)
<-2.5'
0.0'
2.5'
5.0'
10'
>15'
Below Ground
Above Ground
South Florida Water Depth Assessment Tool (SFWDAT)

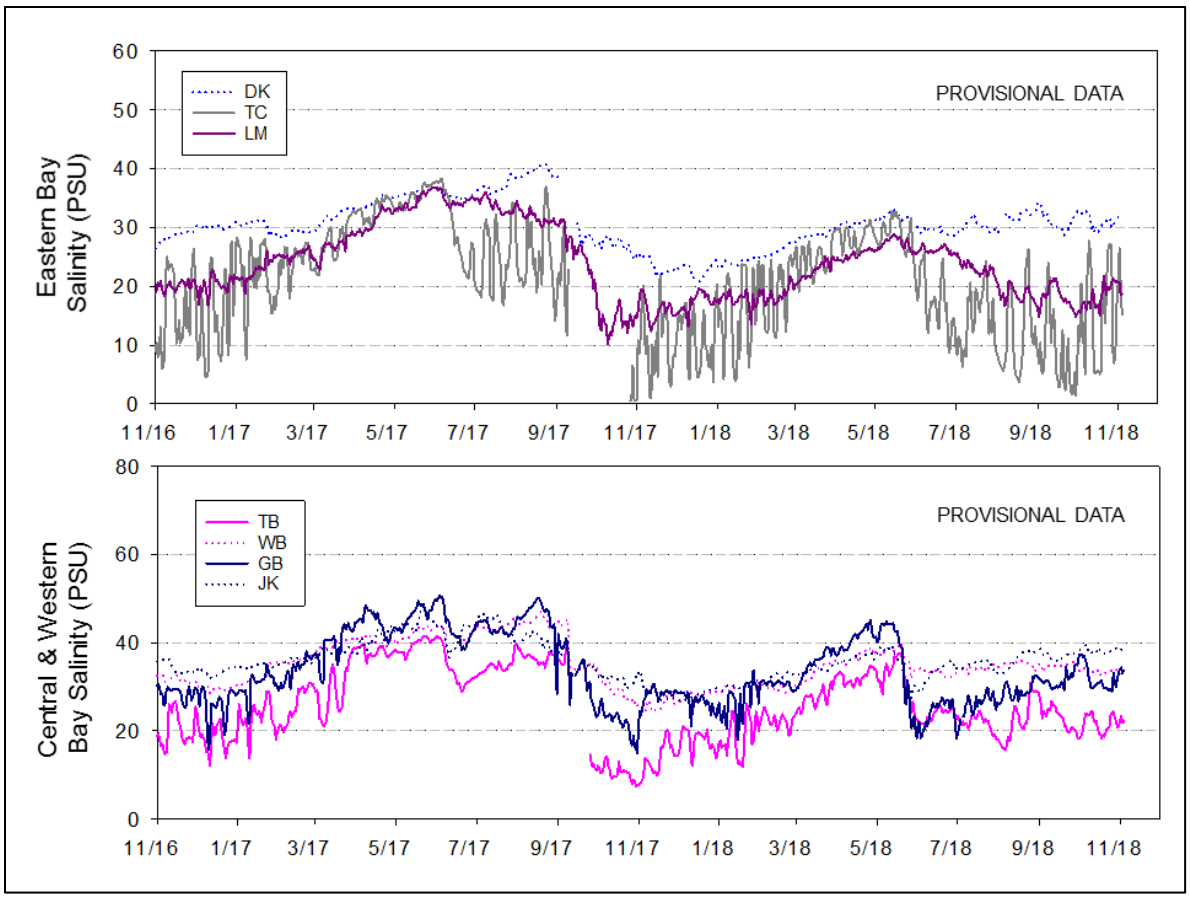

SOUTH FLORIDA WATER MANAGEMENT DISTRICT
SFWDAT Everglades Difference Maps
(Present – Past)
11/4/2018
1 Month
1 Year
Water Depth (feet)
<-2.5'
0.0'
2.5'
5.0'
10'
>15'
Below Ground
Above Ground
Water Depth Difference (feet)
-2'
-1'
0'
1'
2'
Recession
Inundation
South Florida Water Depth Assessment Tool (SFWDAT)

Taylor Slough Water Levels: An average of 0.6 inches of rain fell on Taylor Slough and Florida Bay this past week allowing stages to continue decreasing by an average of 0.06 feet last week. Water depths averaged 1.02 feet across Taylor Slough which is 1.24 inches higher than the historical averages for this time of year.

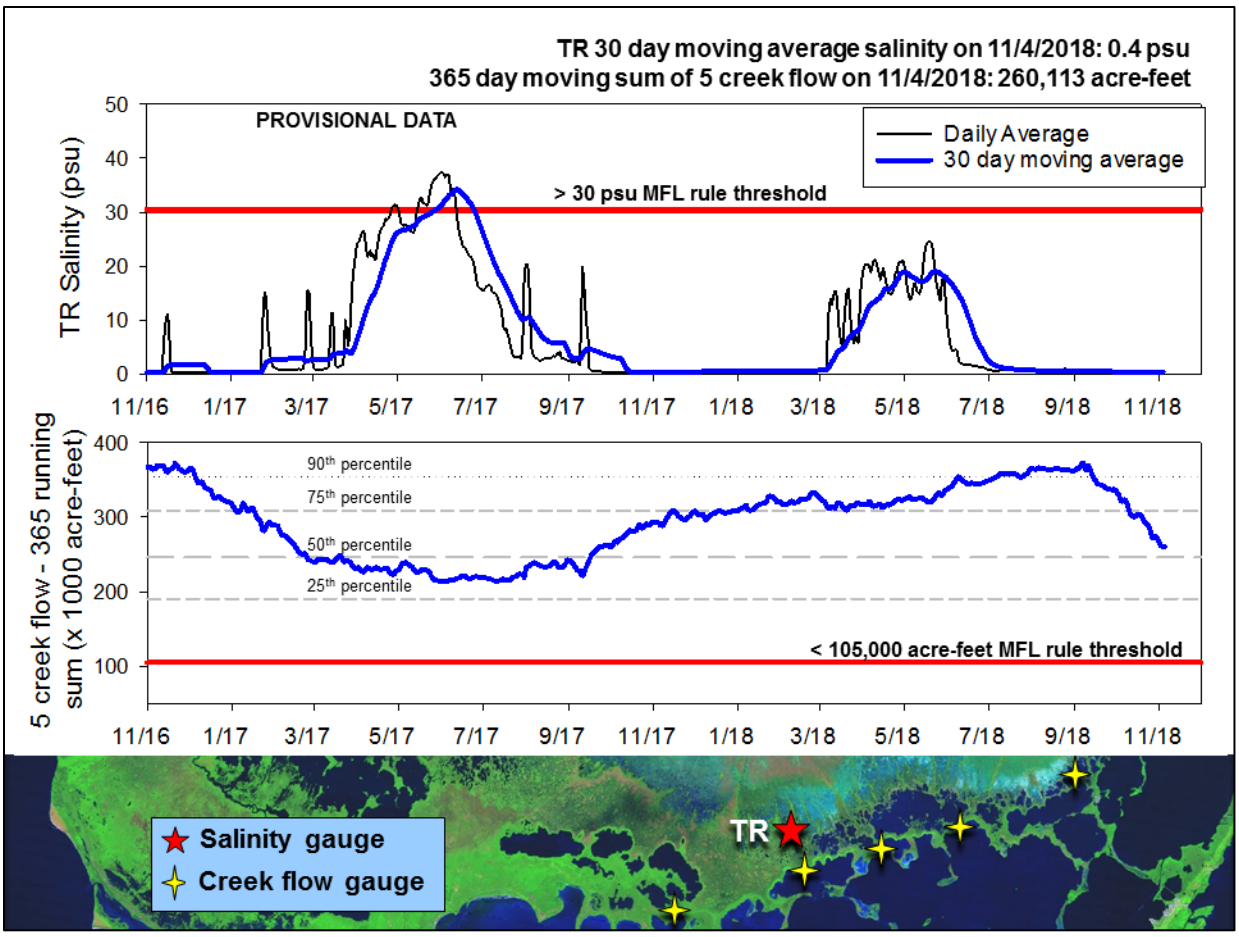
Florida Bay Salinities: Salinities increased on average 0.5 psu this past week (individual gauge changes were less than or equal to 5 psu) and range from 12 psu in the northeast to 38 psu in the west. Conditions in western Florida Bay are 3 to 11 psu higher than their historical averages for this time of year which is undesirable at the start the dry season.







Florida Bay MFL: Mangrove zone daily average salinity remained at 0.5 psu, and the 30-day moving average is still 0.4 psu. The weekly cumulative flow from the five creeks denoted by yellow stars on the map totaled about 8,300 acre-feet for the last week which is about 2,300 acre-feet lower than the historical average for this time of year. The 365-day moving sum of flow from the five creeks has been dropping rapidly with an additional decrease of 13,000 acre-feet over the last week to end at 260,113 acre-feet (still greater than the long-term average of 257,628 acre-feet and above the median). Creek flow is provisional data from the USGS and is highly variable.



Water Management Recommendations

Water management that protects peat soils (especially in WCA-3A North) as the dry season becomes established has increasing ecological benefit as unusually dry conditions pervade the WCA-3A basin. Wading bird flocks containing large numbers of juveniles were again noted feeding in northeast WCA-3A North on 11/5/18. The continued hydration of WCA-3A North serves both the conservation of peat soils and is providing suitable foraging depths for wading bird feeding. Stage conditions within WCA-2A (12.99 feet NGVD) and a relatively high stage in the L-38W (around 10.0 NGVD) are ideal to route water from the WCA-2A basin to hydrate the northeast corner (S-150) of WCA-3A. The monthly average for total phosphorous detected in routine water quality samples collected at S-150 over the last ten years was 0.01 mg/L. Any water not available to protect the peat soils in WCA-3A North, would be ecologically beneficial to Holeyland and Rotenburger WMA as those basins are now in Zone C. According to the WDAT modeling, depths in the northern portion of WCA-1 at and near ground level have expanded significantly over the last month. This historically dry area would continue to benefit from hydration as the 3-gauge average stage is now 0.52 feet below the Zone A2 regulation line but has remained steady over the last several weeks. Incremental change in the rate of structure flows (i.e., when changing flow rates from 0 cfs to 1,000 cfs, make 500 cfs adjustment per week) to the WCAs is more ecologically sensitive than abrupt rate changes. More specific recommendations appear in the summary table below. The red text represents new or modified information or recommendations.

SFWMD Everglades Ecological Recommendations, November 6th, 2018 (red is new)			
Area	Weekly change	Recommendation	Reasons
WCA-1	Stage remained unchanged	Maintain depths at regulation schedule. Moderate recession rates to the extent possible.	Protect upstream/downstream habitat and wildlife.
WCA-2A	Stage remained unchanged	Maintain depths at regulation schedule. Moderate recession rates to the extent possible.	Protect upstream/downstream habitat and wildlife.
WCA-2B	Stage increased by 0.03'	Maintain depths at regulation schedule. Moderate recession rates to the extent possible.	Protect upstream/downstream habitat and wildlife.
WCA-3A NE	Stage decreased by 0.18'	Maintain depths at regulation schedule. Moderate recession rates to the extent possible.	Protect habitat including peat soil development, tree islands and wildlife.
WCA-3A NW	Stage decreased by 0.11'	Maintain depths at regulation schedule. Moderate recession rates to the extent possible.	
Central WCA-3A S	Stage decreased by 0.17'	Maintain depths at regulation schedule. Moderate recession rates to the extent possible.	Protect habitat including peat soil development, tree islands and wildlife.
Southern WCA-3A S	Stage decreased by 0.11'		
WCA-3B	Stage decreased by 0.13'	Maintain depths at temporary regulation schedule. Moderate recession rates to the extent possible.	Protect upstream/downstream habitat and wildlife.
ENP-SRS	Stage decreased by 0.08'	Make discharges to the Park according to the 2012 WCP rainfall plan.	Protect upstream/downstream habitat and wildlife.
Taylor Slough	Stage changes ranged from −0.13' to −0.03'	Move water southward as possible	When available, provide freshwater buffer for downstream conditions. Decrease potential for high phosphorus input to ENP.
FB- Salinity	Salinity changes ranged −2.0 to +5.2 psu	Move water southward as possible	When available, provide freshwater to maintain low salinity buffer and promote water movement.