

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 18, 2018

**SUBJECT:** Weekly Environmental Conditions for Systems Operations

### **Summary**

#### **Weather Conditions and Forecast**

Well-below average thunderstorm activity today and Wednesday. High pressure over the area is bringing southeasterly to easterly steering winds to the area and some drier air is working its way in from the east. Therefore, expect widely scattered afternoon thunderstorm activity to be focused over the interior and west today and Wednesday. As a surface trough moves in from the northeast, an upper level low is forecast to develop near the northern Bahamas Thursday and then move slowly westward across Florida and into the eastern Gulf of Mexico by Saturday. This low is expected to increase daily thunderstorm activity mainly north and southwest Thursday and then mainly south and west Friday, Saturday and Sunday. Daily thunderstorm activity should then decrease again Monday as high pressure builds in and focuses activity over the interior and west.

#### **Kissimmee**

Tuesday morning stages were 56.8 feet NGVD (at schedule) in East Lake Toho, 53.9 feet NGVD (0.1 feet above schedule) in Toho, and 51.4 feet NGVD (0.1 feet above schedule) in Kissimmee-Cypress-Hatchineha; headwater stages were 46.3 feet NGVD at S-65A and 27.8 feet NGVD at S-65D. Tuesday morning discharges were: 1,582 cfs at S-65, 1,539 cfs at S-65A, and 2,681 cfs at S-65E. Dissolved oxygen concentration in the Kissimmee River averaged 2.5 mg/L for the week. Kissimmee River mean floodplain depth on Sunday was 0.87 feet. No new recommendations were made this week.

#### **Lake Okeechobee**

Lake Okeechobee stage is 14.78 feet NGVD, rising 0.07 feet from last week and 0.20 feet over the last 30 days. Cyanobacterial bloom potential has increased over the last week, based on NOAA's analysis of satellite data (see supporting information below). The latest image (September 17) showed high potential for a bloom north of Fisheating Bay along Indian Prairie, but the highest potential was along the northeast shoreline. Conditions will likely remain favorable for some level of recurring blooms throughout the month, particularly during stretches of low wind and high temperature on the Lake.

#### **Estuaries**

Total inflow to the St. Lucie Estuary averaged 1,574 cfs over the past week with 953 cfs coming from Lake Okeechobee. Surface salinity increased throughout the estuary. The seven-day average salinity at the US1 Bridge is in the fair range for adult eastern oysters. Total inflow to the Caloosahatchee Estuary averaged 4,460 cfs over the past week with 508 cfs coming from the Lake. Salinity remained near 0 down to Ft. Myers Yacht Basin and decreased downstream. The 30-day moving average surface salinity is 0.2 at Val I-75 and 0.2 at 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 eastern oysters at Cape Coral and in good range at Shell Point.

## **Stormwater Treatment Areas**

Over the past week, the STAs received approximately 45,600 acre-feet of inflows (which includes approximately 7,800 acre-feet of Lake releases). The total amount of inflows to the STAs in WY2019 (since May 1, 2018) is approximately 950,300 acre-feet, which includes approximately 163,400 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. 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**

Water depths declined on average across the Everglades except for WCA-3A and 3B where depths remained basically unchanged over the past week. Conditions within the Everglades are stable as the WCAs remain close to the current regulation/deviation schedules. The average water depth at the gauges located in WCA-3A North is 1.85 feet and in WCA-3A South the average depth is 2.62 feet (a decline of .02 feet). Gauge 65 is above the threshold that indicates flooding stress to tree islands. Well below average rainfall this week in Taylor Slough and Florida Bay this past week, with 10 of 17 stations reporting no rain. Stages in Taylor Slough are above their historical average. Salinities in Florida Bay were mostly stable this past week.

## **Supporting Information**

### **KISSIMMEE BASIN**

#### **Kissimmee Basin Rainfall**

The Upper Kissimmee Basin received 0.75 inches of rainfall in the past week and the Lower Basin received 0.88 inches (SFWMD Daily Rainfall Report 9/16/2018).

#### **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: 9/18/2018**

Water Body	Structure	7-day Average Discharge (cfs) <sup>1</sup>	Stage Monitoring Site <sup>2</sup>	Lake Stage (feet)	Schedule Type <sup>3</sup>	Schedule Stage (feet)	Daily Departure (feet)						
							9/16/18	9/9/18	9/2/18	8/26/18	8/19/18	8/12/18	8/5/18
Lakes Hart and Mary Jane	S-62	111	LKMJ	60.0	R	60.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0
Lakes Myrtle, Preston, and Joel	S-57	58	S-57	61.0	R	61.0	0.0	0.2	0.1	0.0	0.0	0.1	0.0
Alligator Chain	S-60	207	ALLI	63.3	R	63.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1
Lake Gentry	S-63	294	LKGT	61.0	R	61.0	0.0	0.1	0.0	0.0	0.0	0.1	0.1
East Lake Toho	S-59	87	TOHOE	56.8	R	56.8	0.0	0.1	0.0	0.0	0.0	0.0	0.5
Lake Toho	S-61	416	TOHOW, S-61	53.9	R	53.8	0.1	0.1	0.1	0.1	0.0	0.1	0.3
Lakes Kissimmee, Cypress, and Hatchineha	S-65	1,544	KUB011, LKIS5B	51.4	R	51.3	0.1	0.2	0.5	0.1	0.1	0.4	0.7

<sup>1</sup> Seven-day average of weighted daily means through midnight.

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

<sup>3</sup> 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: 9/18/2018

Metric	Location	1-Day Average		Average for the Preceding 7-Days <sup>1</sup>								7/15/18
		9/16/2018	9/16/18	9/9/18	9/2/18	8/26/18	8/19/18	8/12/18	8/5/18	7/29/18	7/22/18	
Discharge (cfs)	S-65	1,470	1,544	3,538	3,088	1,806	3,282	4,337	4,407	4,179	1,567	2,561
Discharge (cfs)	S-65A <sup>2</sup>	1,539	1,634	3,808	3,315	1,765	3,443	4,674	4,980	4,267	1,479	2,615
Discharge (cfs)	S-65D <sup>2</sup>	2,387	3,351	4,313	2,699	3,077	4,254	4,617	4,458	2,264	2,641	2,226
Headwater Stage (feet NGVD)	S-65D <sup>2</sup>	27.61	27.67	27.86	27.88	27.70	27.00	26.63	26.78	26.75	26.68	26.77
Discharge (cfs)	S-65E <sup>2</sup>	2,541	3,372	4,258	2,902	3,219	3,860	4,848	4,566	2,400	2,764	2,399
Discharge (cfs)	S-67	295	215	176	190	187	169	160	157	209	183	217
DO (mg/L) <sup>3</sup>	Phase I river channel	2.6	2.5	2.9	2.7	2.5	2.8	3.0	3.1	3.8	2.3	2.7
Mean depth (feet) <sup>4</sup>	Phase I floodplain	0.87	1.12	1.77	1.24	1.16	1.76	2.02	2.08	1.25	1.08	1.20

<sup>1</sup>Seven-day average of weighted daily means through Sunday midnight.

<sup>2</sup>S-65A discharge combines S-65A with auxiliary structures; 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.

<sup>3</sup>DO is the average for sondes at PC62 and PC33.

<sup>4</sup>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)

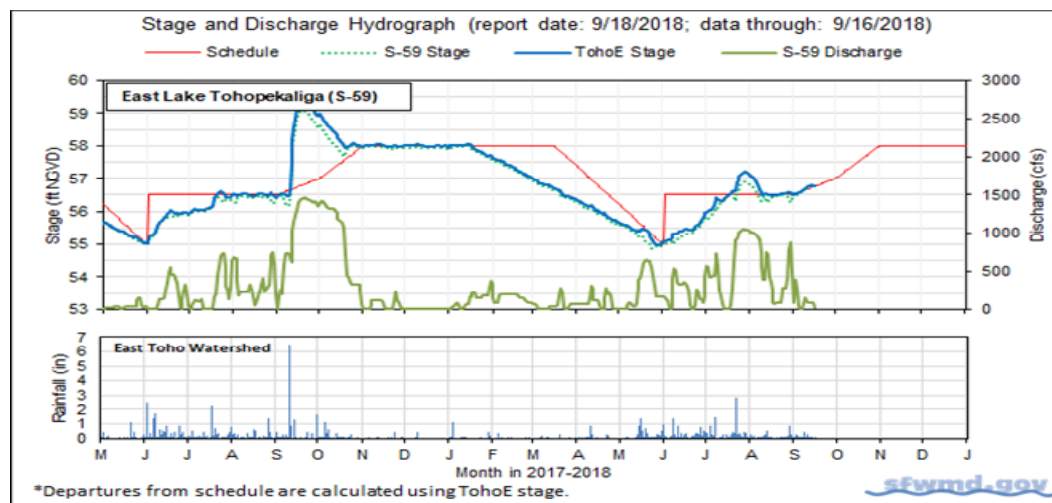


Figure 1.

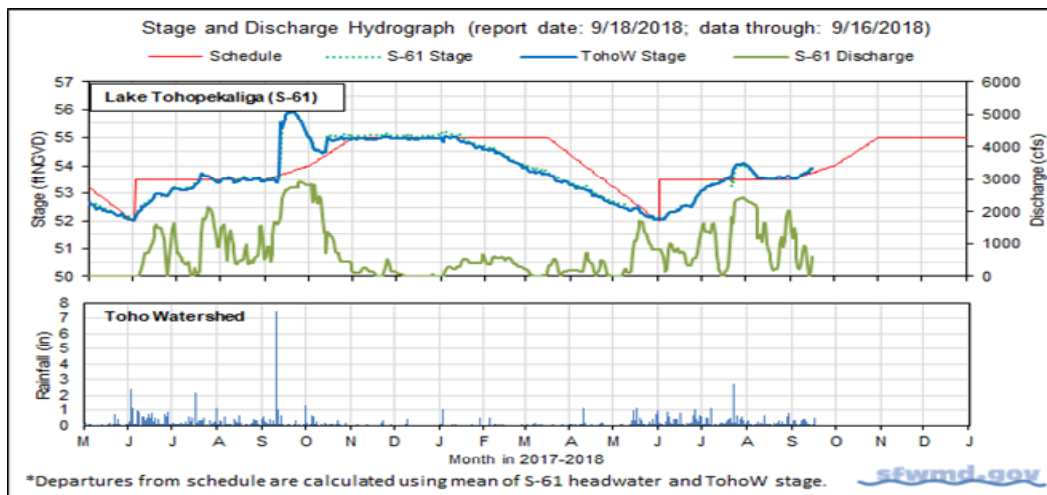


Figure 2.

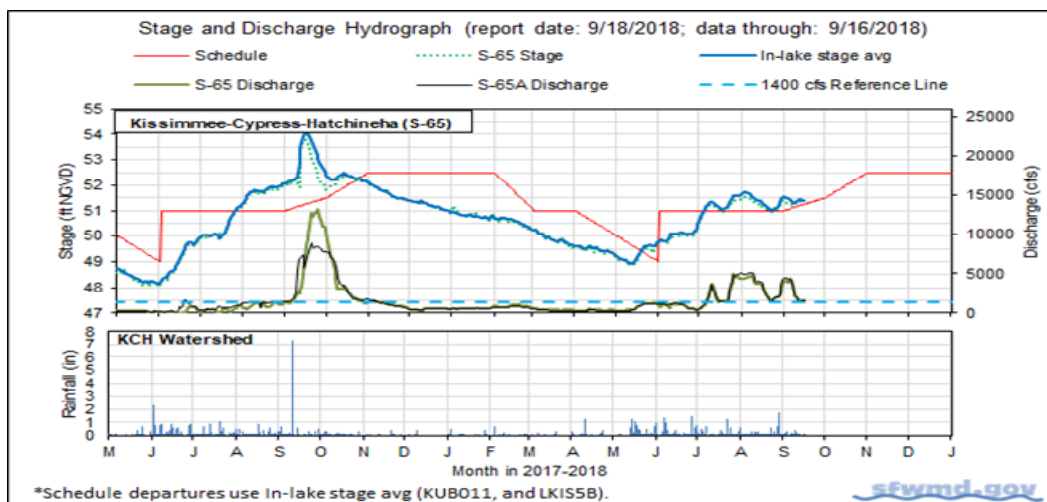


Figure 3.

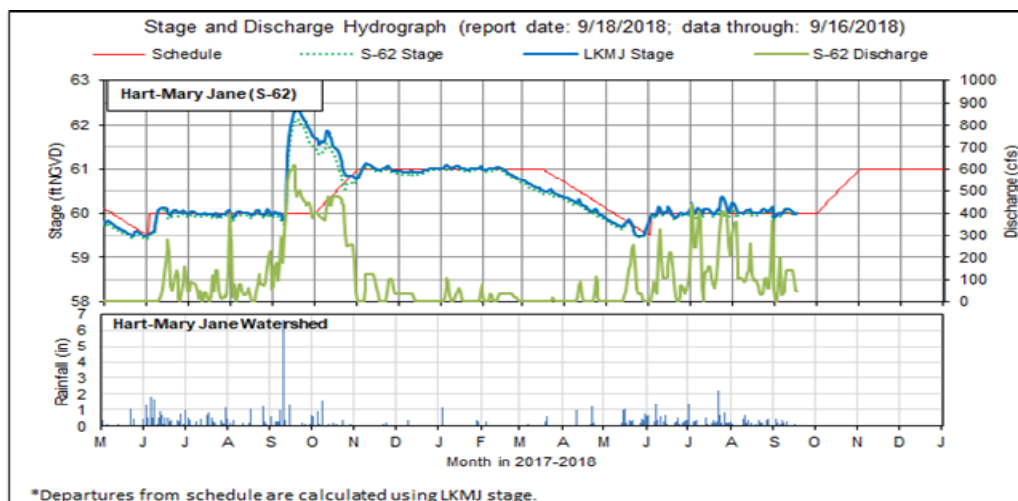


Figure 4.



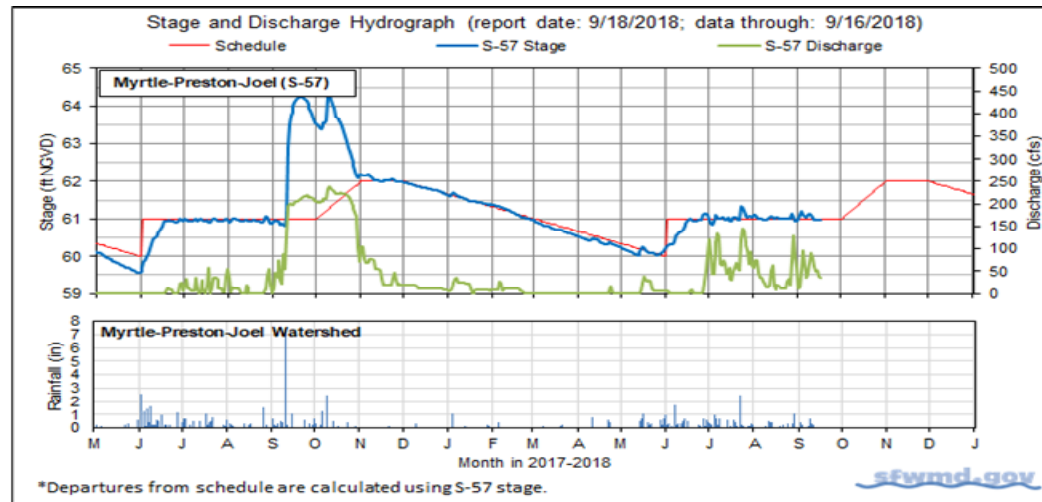


Figure 5.

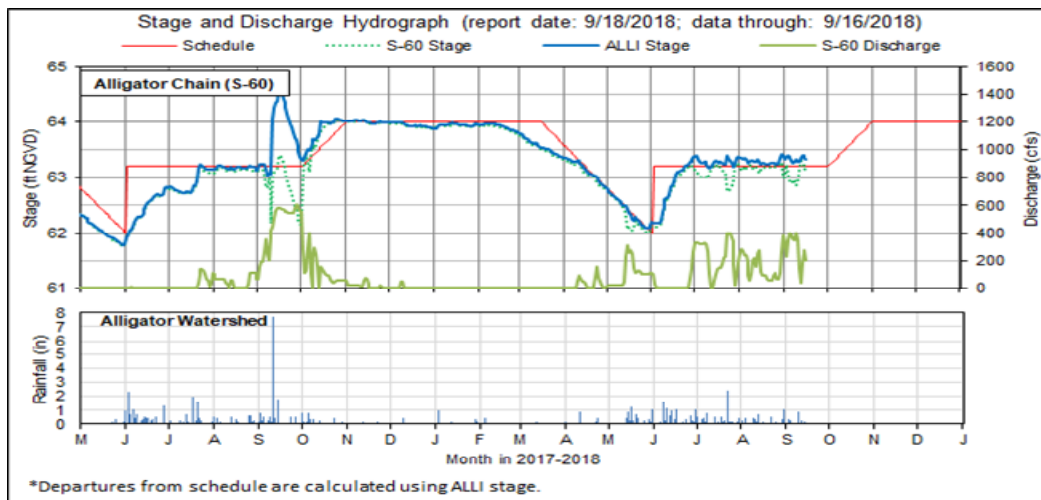


Figure 6.

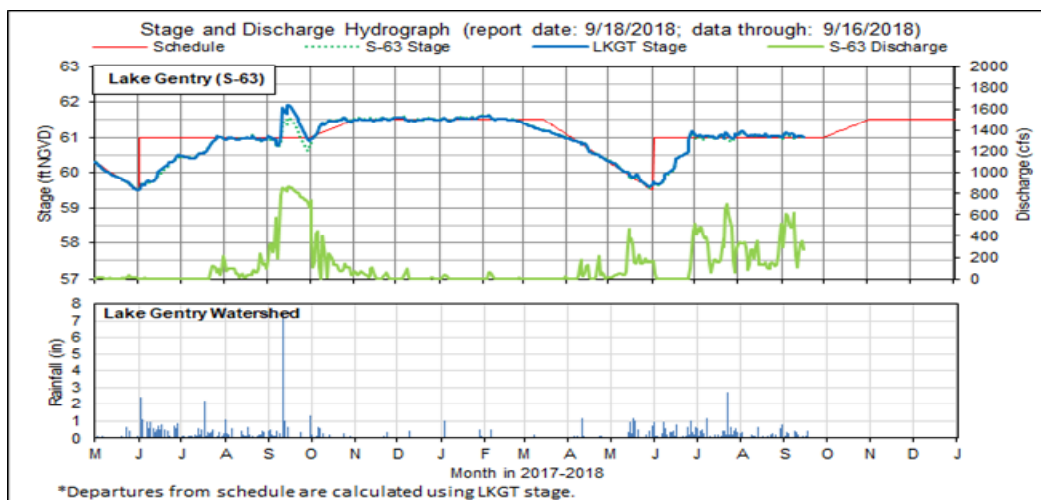
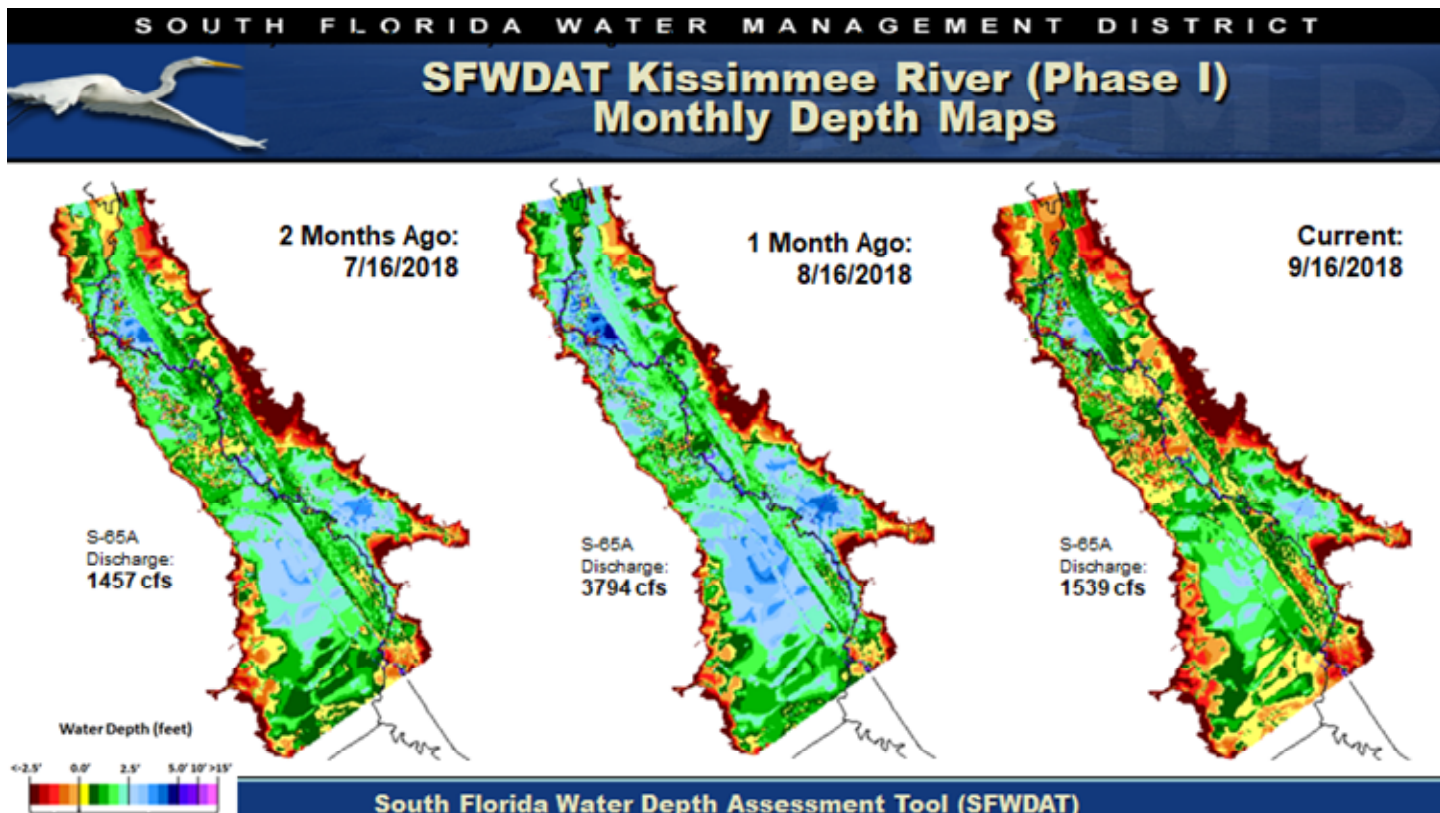
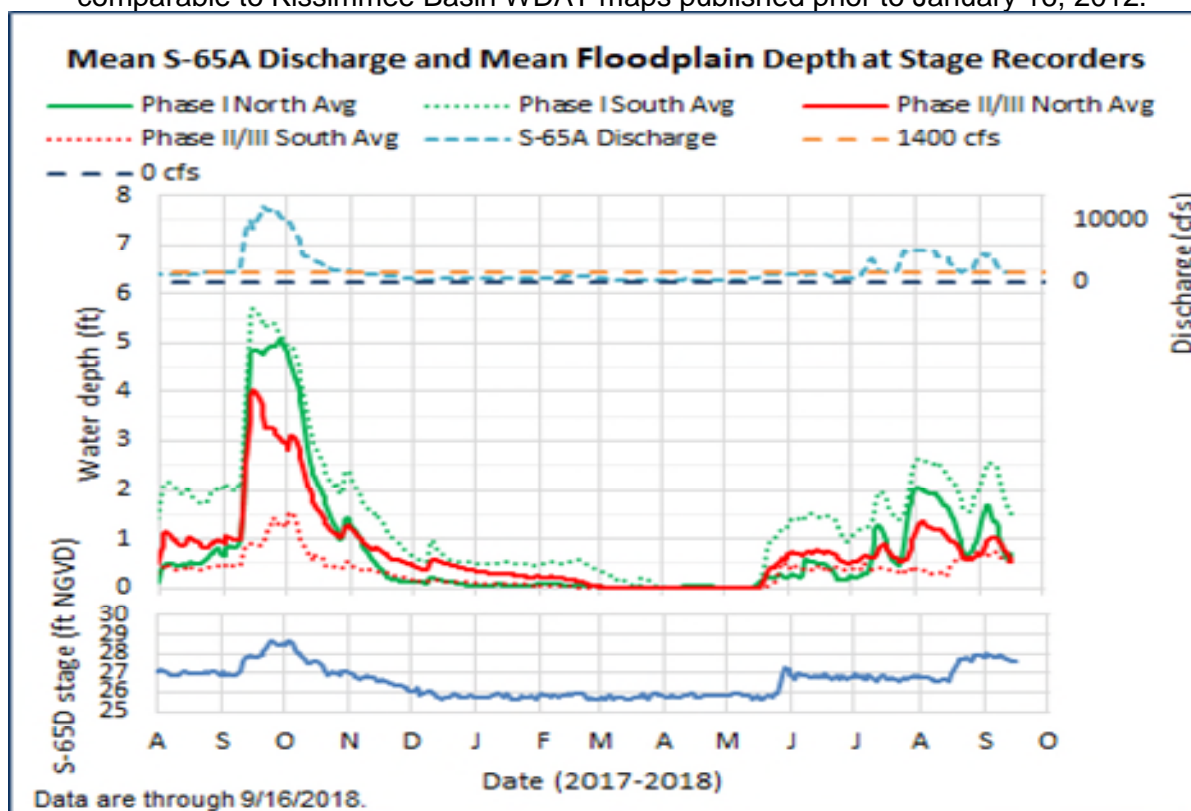


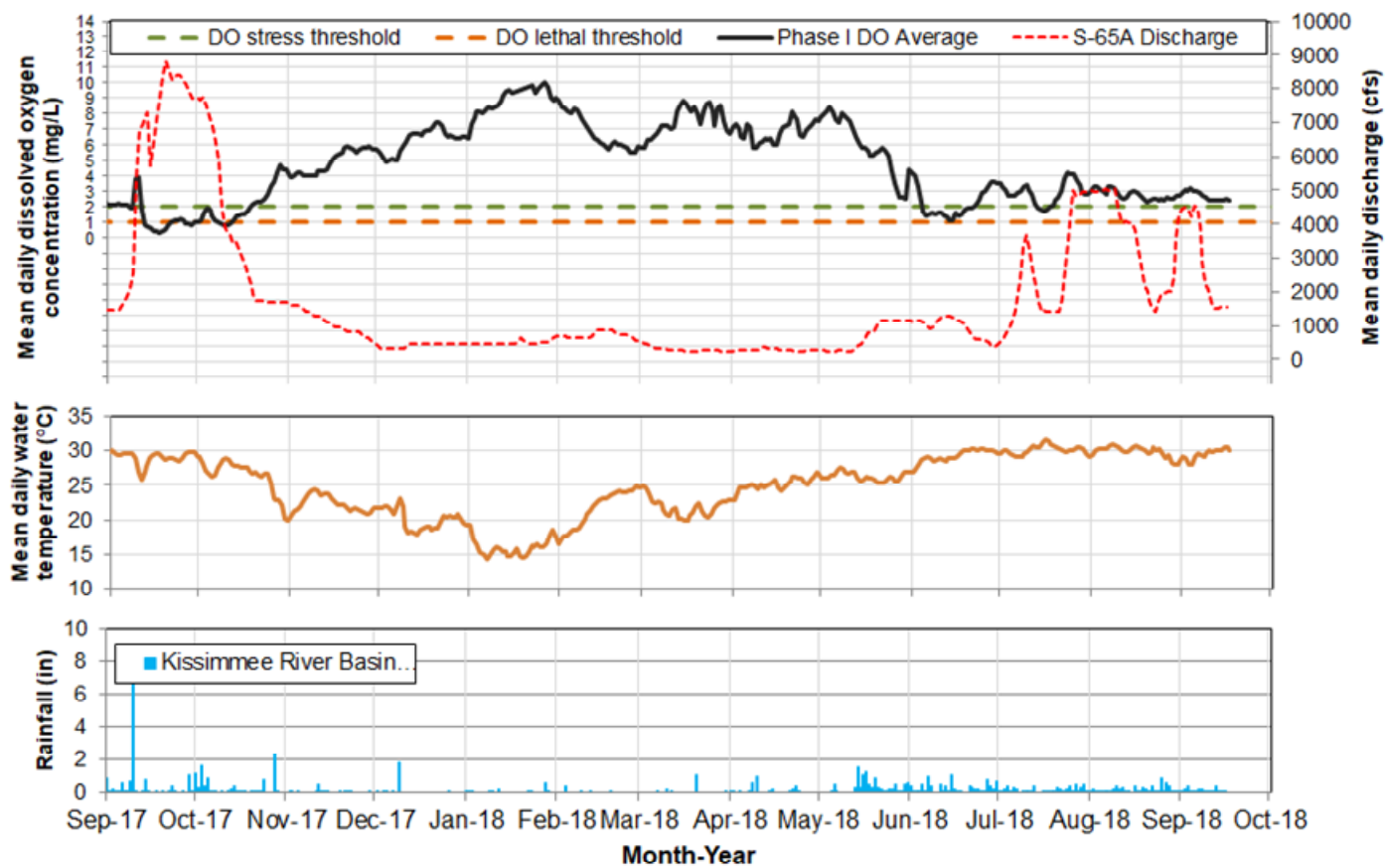
Figure 7.



**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.



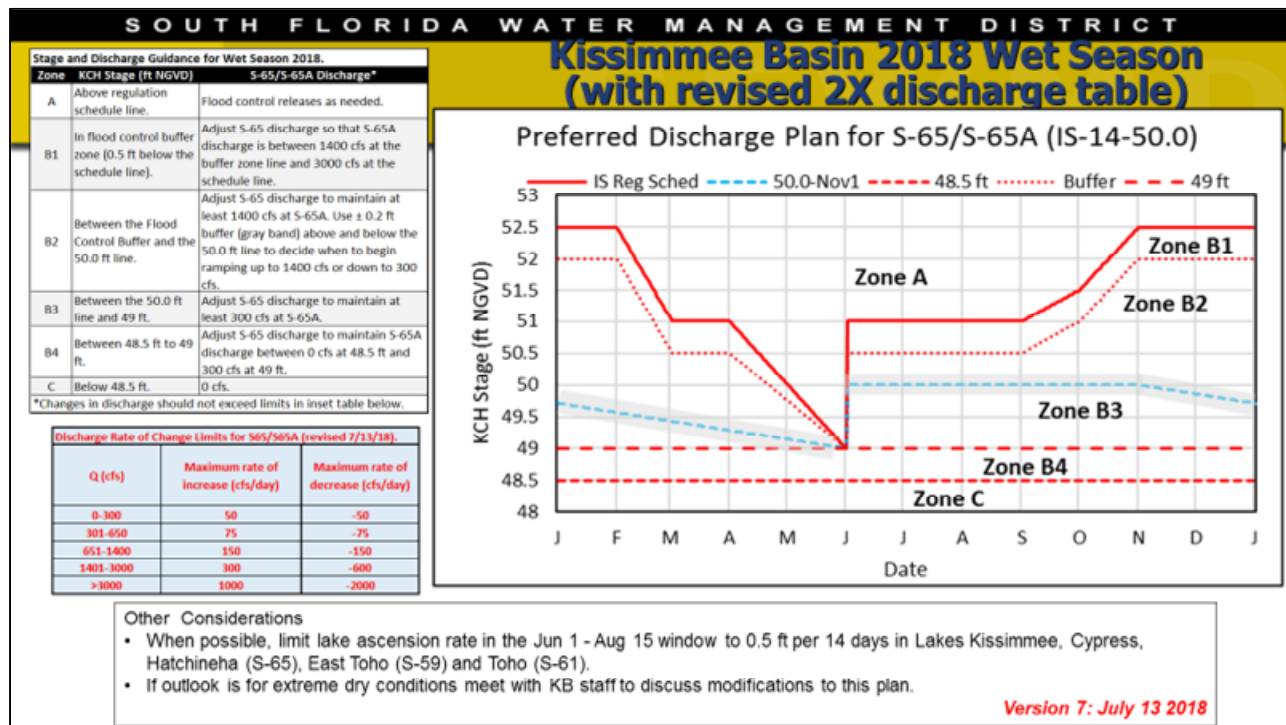
**Figure 10.** Mean daily dissolved oxygen, discharge, temperature and rainfall in the Phase I river channel.



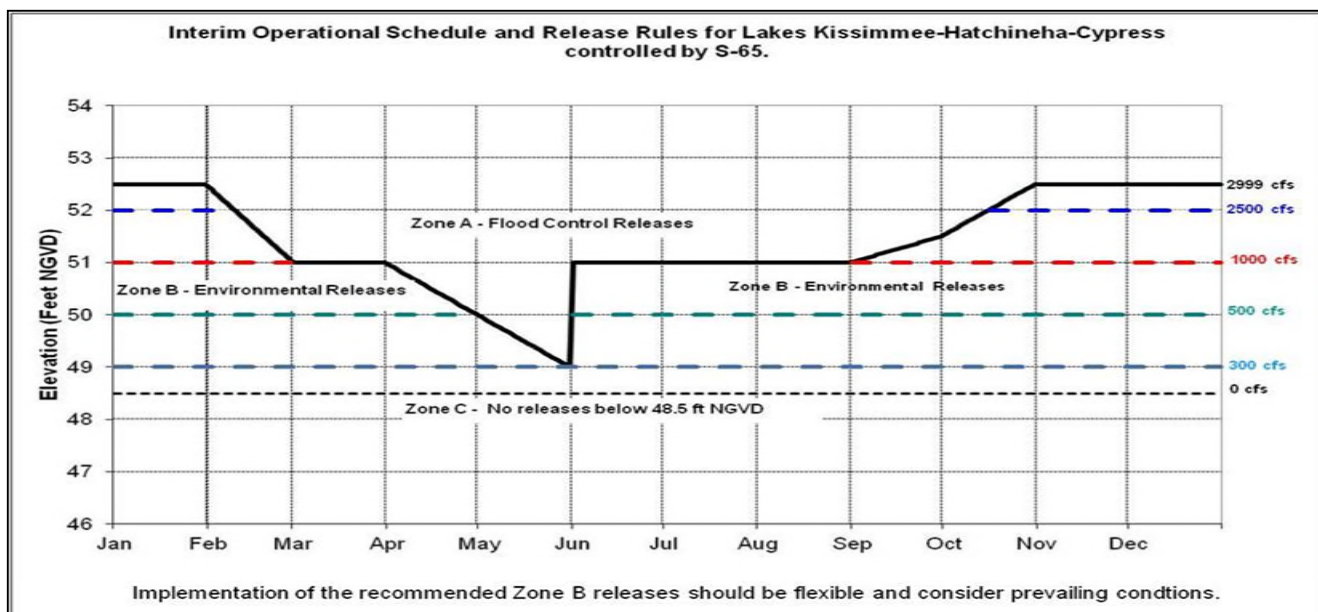
# Water Management Recommendations

## Kissimmee Basin Adaptive Recommendations and Operational Actions

Recommendation Date	Recommendation	Purpose	Outcome	Source	Report Date
9/18/2018	No new recommendations.		N/A		8/7/2018
9/11/2018	No new recommendations.		N/A		8/7/2018
9/4/2018	No new recommendations.		N/A		8/7/2018
8/28/2018	No new recommendations.		N/A		8/7/2018
8/21/2018	No new recommendations.		N/A		8/7/2018
8/14/2018	No new recommendations.		N/A		8/7/2018
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 kite 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 kite nests 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.	Stabilize 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.	Stabilize 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 .	Stabilize 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).	Stabilize Lake Kissimmee stage.	Implemented	SFWMD Water Mgt/KB Ops	7/10/2018
6/30/2018	Increase S-65/S-65A discharge as slowly as feasible	Slow stage ascension in Kissimmee-Cypress-Hatchineha	Implemented	KB Ops/SFWMD Water Mgt	7/3/2018
6/28/2018	Continue to reduce discharge at S-65/S-65A as slowly as feasible.	Prevent stage decline in Kissimmee-Cypress-Hatchineha.	Implemented	KB Ops/SFWMD Water Mgt	7/3/2018
6/21/2018	Reduce discharge at S-65/S-65A as slowly as feasible.	Prevent stage decline in Kissimmee-Cypress-Hatchineha.	Implemented	KB Ops/SFWMD Water Mgt	6/26/2018
6/15/2018	Reduce S-65A discharge by 150-300 cfs over the weekend.	Slow or stop DO decline in Kissimmee River.	Implemented	KB Ops	6/19/2018
6/12/2018	No new recommendations.		N/A		6/12/2018
6/5/2018	No new recommendations.		N/A		6/5/2018
5/29/2018	Begin implementation of the 2018 Wet Season Discharge Plan for S-65/S-65A on June 1 (see figure).	Provide variable flow from S-65/S-65A to balance Kissimmee River and Headwaters Lakes objectives including Kissimmee River floodplain inundation, moderated rates of change in discharge, and constrained rate of stage rise in the lakes.	Planned	KB Ops/SFWMD Water Mgt/FWC/FWS	5/29/2018
5/22/2018	Hold Kissimmee-Cypress-Hatchineha at current stage of approximately 49.5 ft until June 1.	(a) Reduce impacts of rising water on DO in the Kissimmee River; and (b) limit stage reversal in KCH to <1 foot to protect snail kite nests.	Implemented	KB Ops/SFWMD Water Mgt	5/29/2018
5/18/2018-5/20/2018	Increase discharge gradually in response to rainfall in consultation with KB staff.	(a) Reduce impacts of rising water on DO in the Kissimmee River; and (b) limit stage reversal in KCH to <1 foot to protect snail kite nests.	Implemented	KB Ops	5/22/2018
5/15/2018	Adjust S-65/S-65A discharge over the next few days to avoid additional stage rise in Kissimmee-Cypress-Hatchineha. Make any needed discharge changes gradually in consultation with Kissimmee Basin staff to reduce potential effects on Kissimmee River dissolved oxygen.	Protect Lake Kissimmee snail kite nests from rising water if there is additional rainfall.	N/A	KB Ops	5/22/2018
5/8/2018	No new recommendations.		N/A		5/8/2018
5/1/2018	No new recommendations.		N/A		5/1/2018
4/24/2018	No new recommendations.		N/A		4/24/2018
4/17/2018	No new recommendations.		N/A		4/17/2018

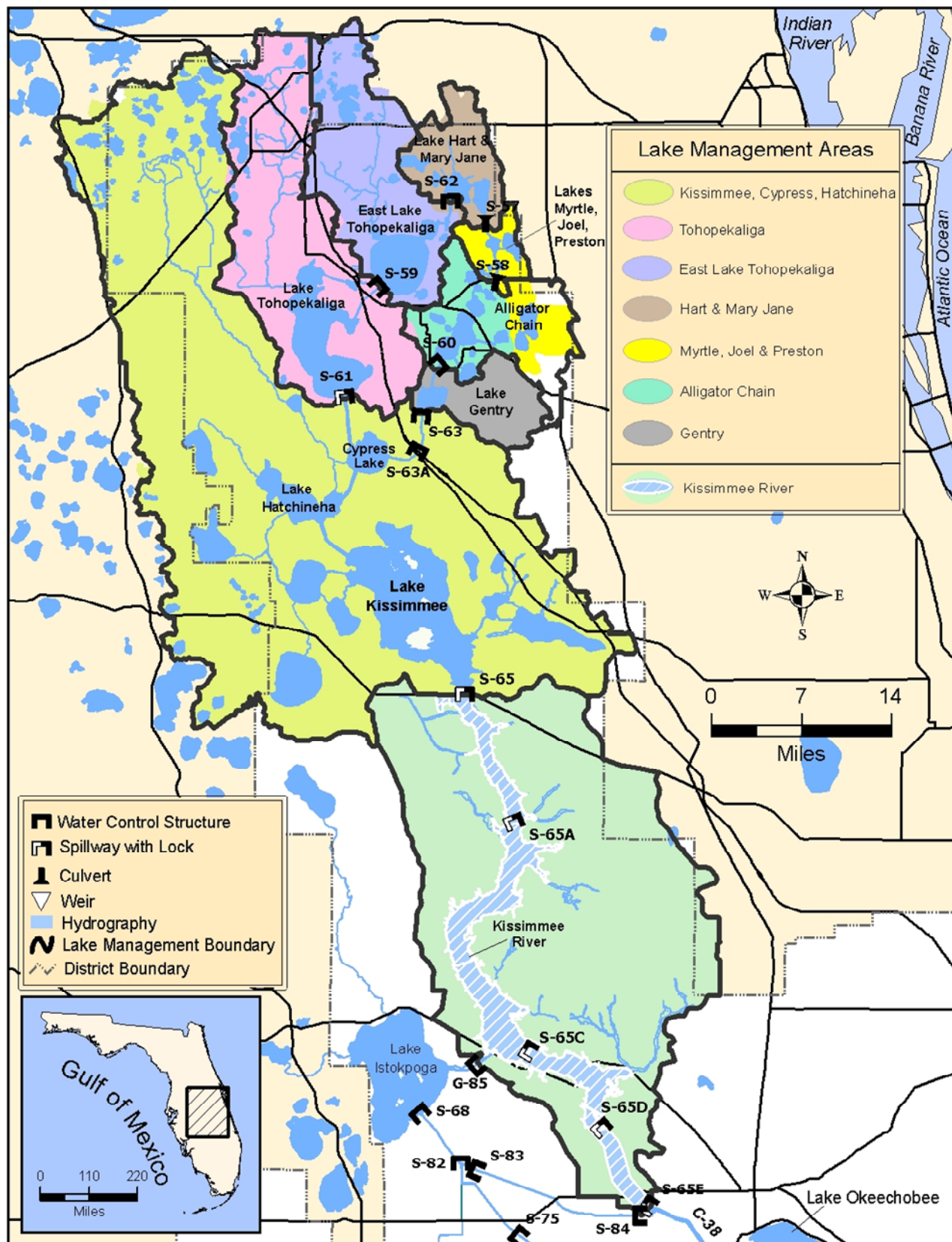


**Figure 11.** The 2018 Wet Season Discharge Plan for S-65/S-65A.



**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 14.78 feet NGVD for the period ending at midnight on September 17, 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 0.20 feet higher than it was a month ago and 0.76 feet lower than a year ago (Figure 1). The Lake remains in the Low sub-band (Figure 2). According to RAINDAR, 1.15 inches of rain fell over the Lake during the week September 11, 2018 – September 17, 2018. Most of the western and southern watershed received more rainfall, between 1.0 and 3.0 inches of rain, while the northern watershed received between 0.5 and 0.75 inches of rain (Figure 3).

Average daily inflows to the Lake decreased from the previous week, going from 5,807 cfs to 3,808 cfs. The decrease in inflows was from the Kissimmee River via the S-65E structures, going from 4,565 cfs the previous week to 3,129 cfs this past week (Table 1). There have been no back-pumping operations from the S-2 or S-3 pumps during the wet season thus far.

Total outflows were also reduced from the previous week, falling from 3,368 average daily cfs the previous week to 1,954 cfs this past week. The decreases in outflows were from reduced discharges west via the S-77 structure and from decreases in discharges south through the S350 structures. Discharges via the S-308 decreased slightly from 1,027 cfs to 953 cfs this past week, while S-77 discharges decreased from 1,554 cfs to 534 cfs this past week to accommodate runoff from western basins. Outflows south through the S-350 structures decreased from 787 cfs the previous week to 465 cfs this past week due to heavy rainfall in the southern basins. The corrected average daily evapotranspiration value for the week based on the L006 weather platform solar radiation also increased slightly from 0.14 inches the previous week to 0.16 inches this past 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 on August 14 – 15 and September 4 – 5, 2018 did not find algal blooms (defined by the District as having chlorophyll *a* (Chla) values > 40 µg/L) at any sample locations in either month, though windy conditions from Hurricane Florence to the north may have temporarily stirred the lake and resulted in lower Chla values in early September. August values were higher, with 10 of 18 stations having elevated values of between 20 – 36 µg/L Chla (Figure 5), while the September sample only had 5 of 17 stations with elevated values between 21 – 32 µg/L (Figure 6). Additionally, all 6 sampling sites had detectable levels of microcystin in both months, with the highest value of 16.0 µg/L in August recorded at CLV10A, and the highest value of 3.5 µg/L in September recorded at site L005. The most recent satellite imagery (September 17) using the cyanobacteria monitoring product derived from NOAA's analysis of EUMETSAT's OLCI satellite sensor showed high potential for a bloom north of Fisheating Bay along Indian Prairie, with the highest potential along the northeast shoreline of the Lake. Conditions will likely remain favorable for some level of recurring blooms throughout the month, particularly during stretches of low wind and high temperature on the Lake (Figure 7).

## **Water Management Recommendations**

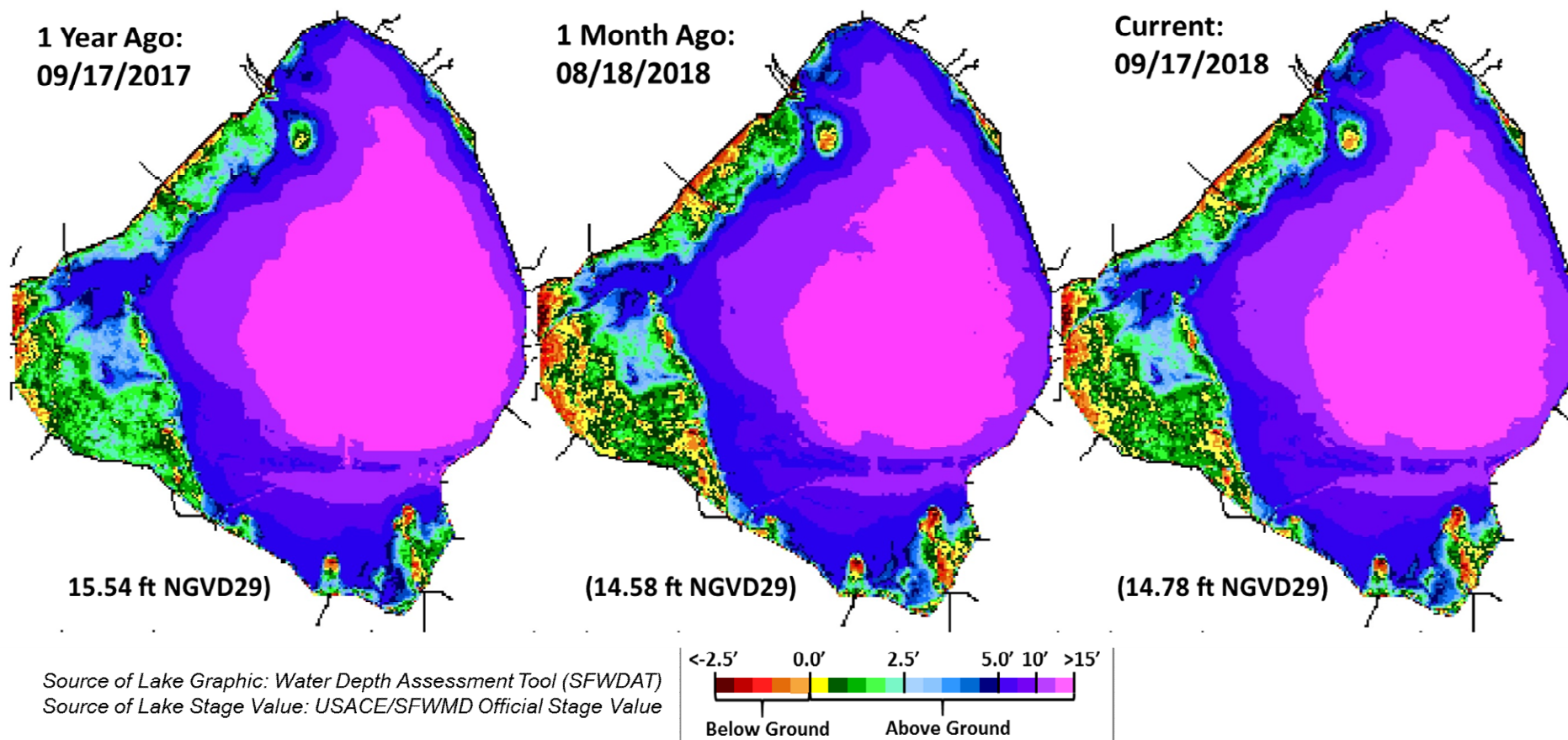
Lake Okeechobee stage is 14.78 feet NGVD, 0.07 feet higher than last week and 0.20 feet higher than 30 days ago. Due to record rainfall in May of 2018, the submerged aquatic vegetation (SAV) coverage on the Lake will likely remain at minimal levels beyond the summer of next year, prolonging impacts from high water levels associated with El Niño in 2016 and Hurricane Irma in 2017. Recovery of SAV in the nearshore zone will require lake stages in the lower portion of the ecological envelope 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	4565	3129	1.2
S71 & 72	153	200	0.1
S84 & 84X	582	155	0.1
Fisheating Creek	220	166	0.1
S154	3	8	0.0
S191	97	56	0.0
S133 P	45	40	0.0
S127 P	15	3	0.0
S129 P	11	15	0.0
S131 P	2	5	0.0
S135 P	50	30	0.0
S2 P	0	0	0.0
S3 P	0	0	0.0
S4 P	0	0	0.0
L8 Backflow	65	0	0.0
Rainfall	1386	3186	1.2
<b>Total</b>	<b>7194</b>	<b>6994</b>	<b>2.7</b>

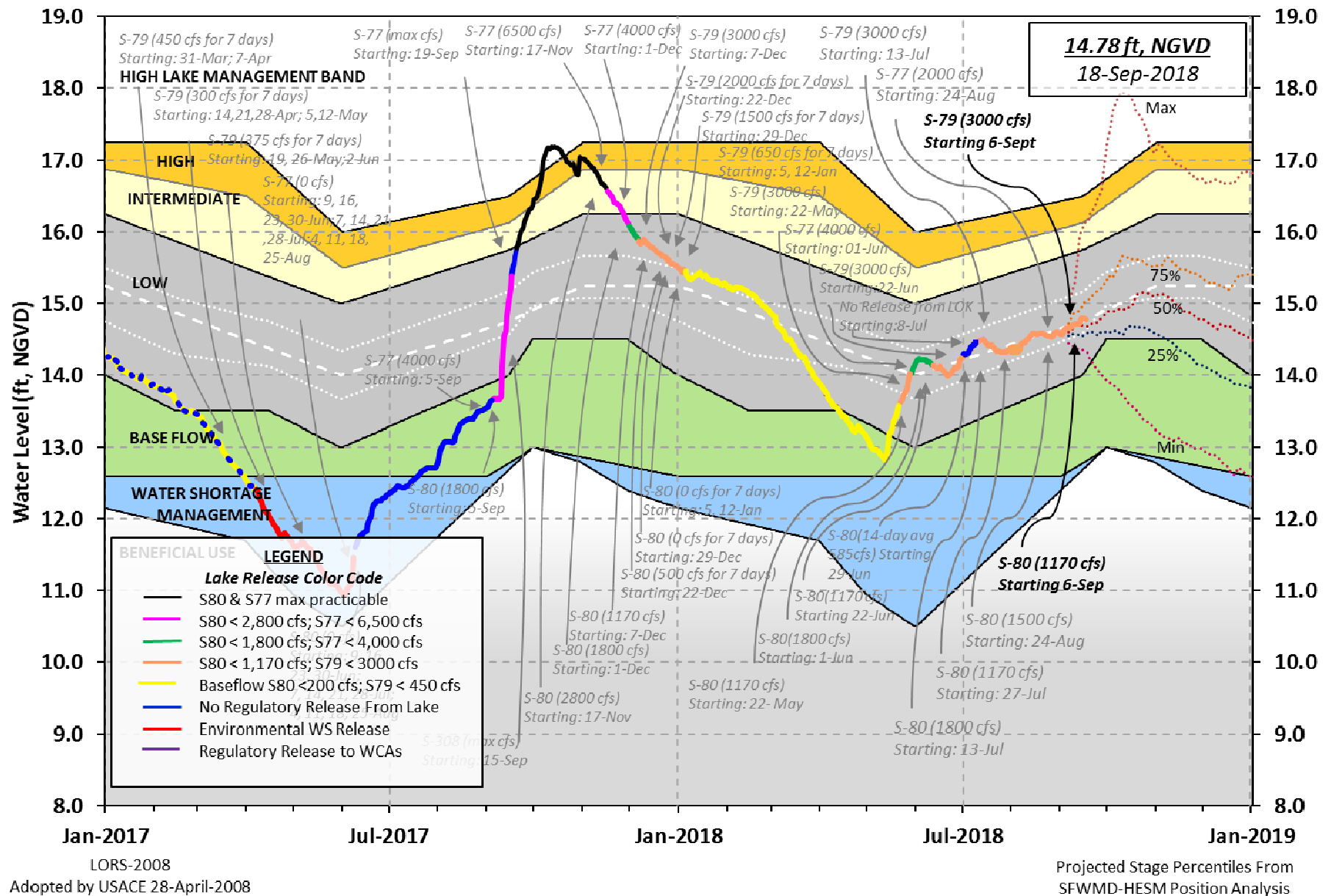
OUTFLOWS	Previous Week Avg Daily cfs	Avg Daily Outflow cfs	Equivalent Depth Week Total (in)
S77	1554	534	0.2
S308	1027	953	0.4
S351	379	153	0.1
S352	0	18	0.0
S354	408	294	0.1
L8 Outflow	0	2	0.0
ET	2728	3059	1.2
<b>Total</b>	<b>6096</b>	<b>5013</b>	<b>2.0</b>

PROVISIONAL DATA



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

# Lake Okeechobee Water Level History and Projected Stages

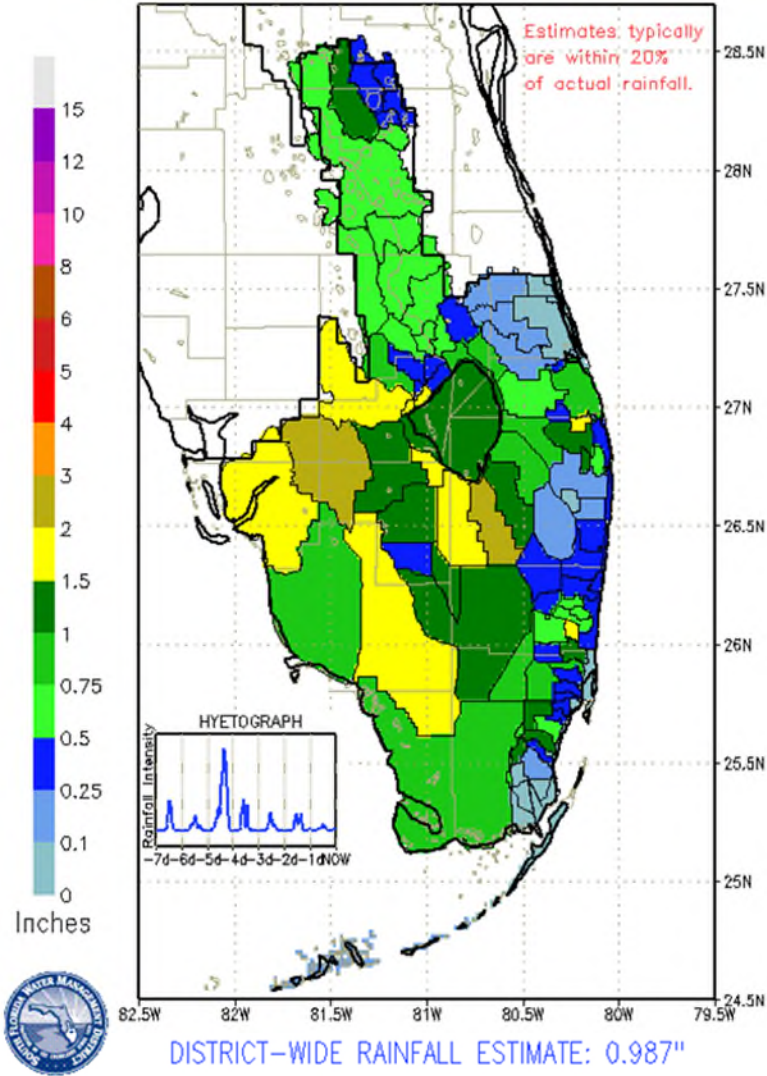


**Figure 2.** Recent Lake Okeechobee stage and releases, with projected stages based on a dynamic position analysis.

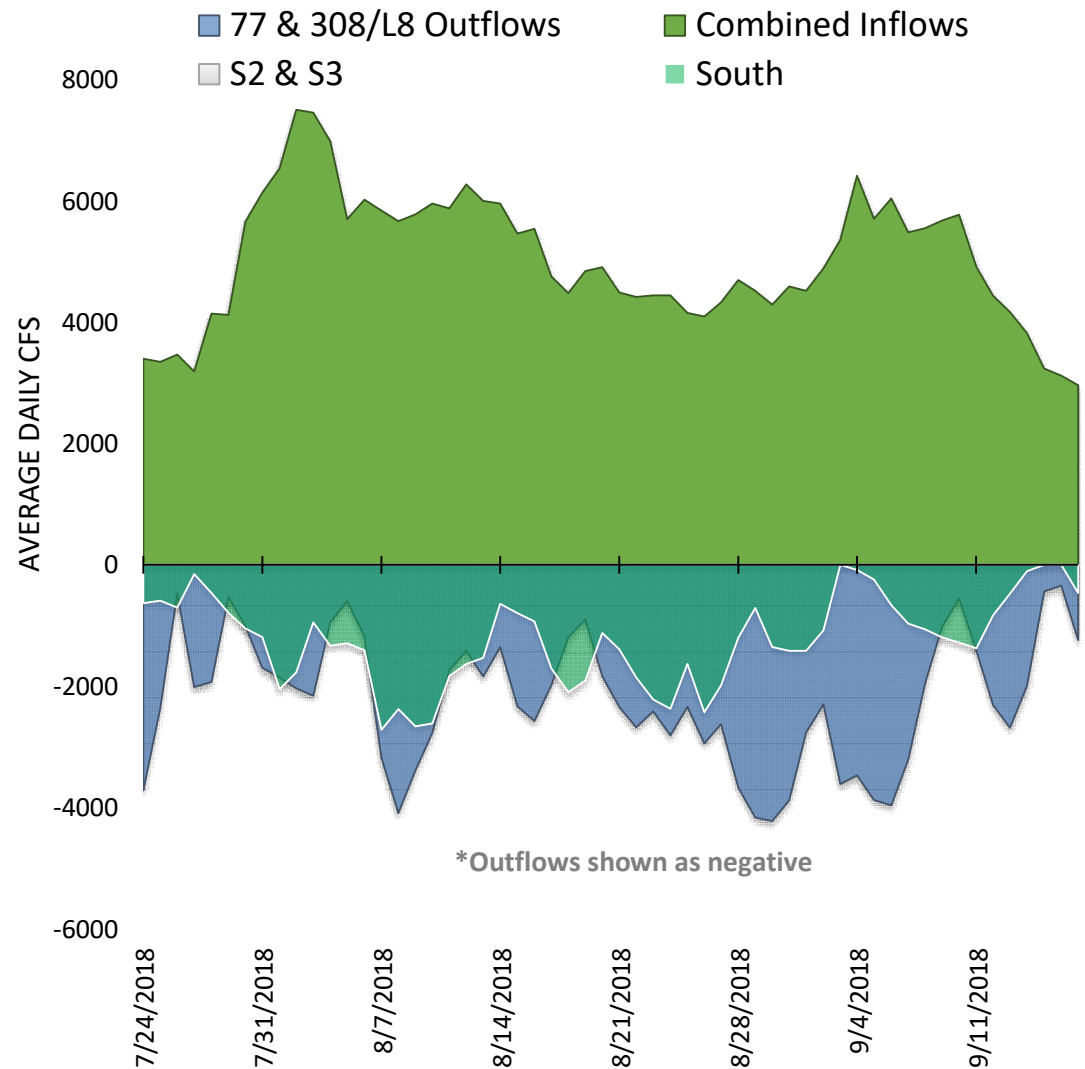


# SFWMD PROVISIONAL RAINDAR 7-DAY BASIN RAINFALL ESTIMATES

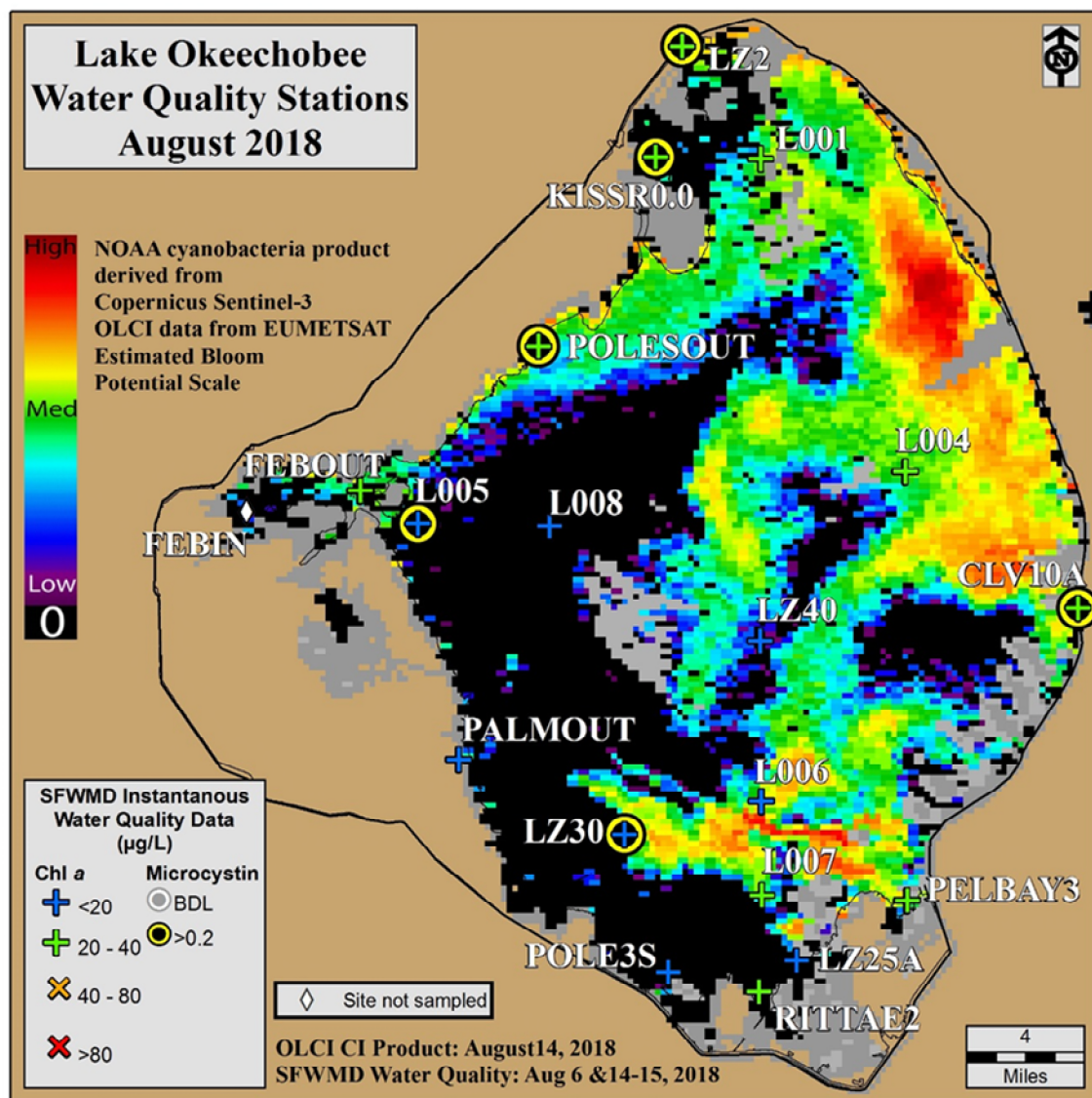
FROM: 0530 EST, 09/11/2018 THROUGH: 0530 EST, 09/18/2018



**Figure 3.** Rainfall estimates by basin.

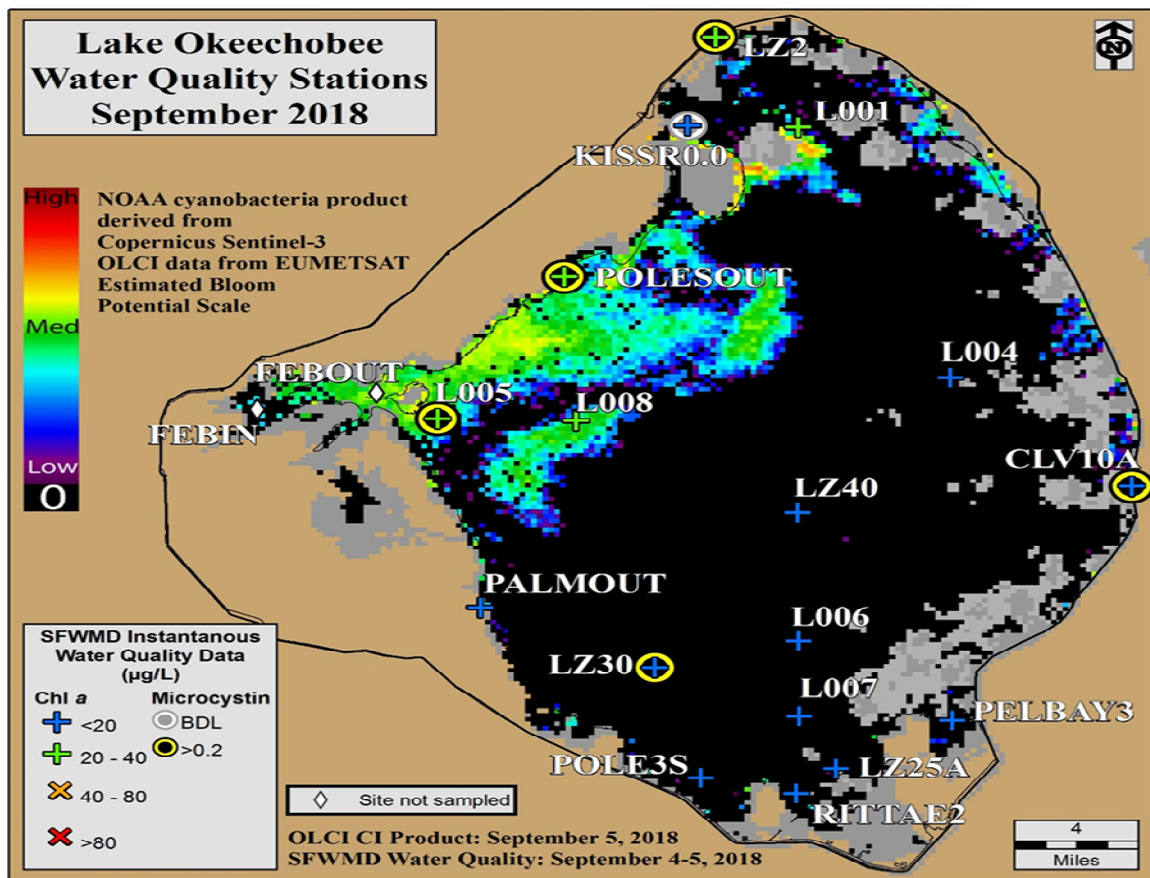


**Figure 4.** Major inflows and outflows of Lake Okeechobee, including the S350 structures designated as South. The L8 canal flows through culvert 10A are included as outflows when positive, and as inflows when backflowing into the lake. Inflows and outflows are shown as positive and negative, respectively, for visual purposes.



August 14-15, 2018		
Site	Chlorophyll a ( $\mu\text{g/L}$ )	Microcystin ( $\mu\text{g/L}$ )
<b>Nearshore Stations</b>		
KISSR0.0	21.8	1.41
LZ2	35.8	0.64
LZ25A	9.8	
PALMOUT	13.1	
PELBAY3	22.8	
POLE3S	6.2	
POLESOUT	22.0	0.25
RITTAE2	20.4	
FEBOUT	29.2	
<b>Pelagic Stations</b>		
L001	24.4	
L004	37.3	
L005	18.4	0.68
L006	5.8	
L007	20.4	
L008	11.4	
LZ30	7.2	1.83
LZ40	10.9	
CLV10A	35.8	16.00

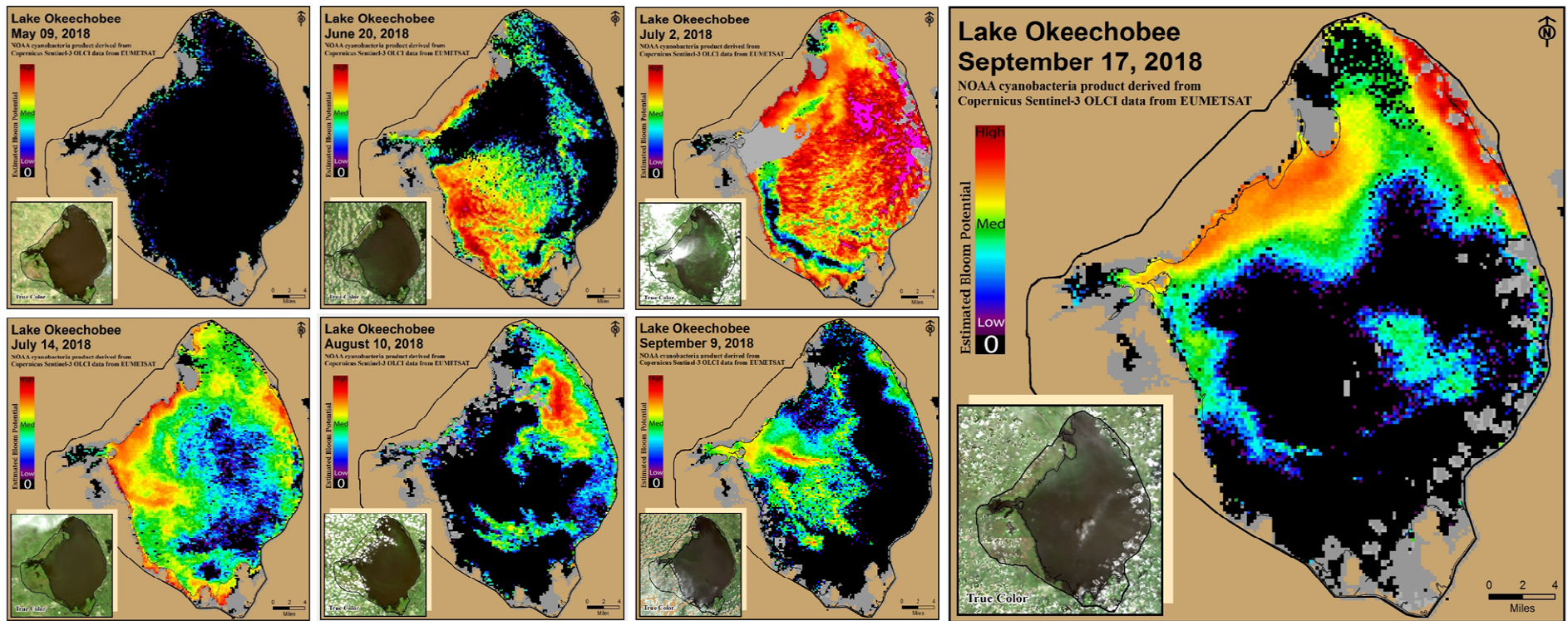
**Figure 5.** Chlorophyll a ( $\mu\text{g/L}$ ) and microcystin ( $\mu\text{g/L}$ ) values for nearshore and pelagic stations for mid-August 2018. SFWMD classifies an algal bloom as having Chla values >40  $\mu\text{g/L}$ .



September 4-5, 2018		
Site	Chlorophyll <i>a</i> (µg/L)	Microcystin (µg/L)
<b>Nearshore Stations</b>		
KISSR0.0	11.7	BDL
LZ2	32.4	0.34
LZ25A	2.5	
PALMOUT	5.7	
PELBAY3	2.8	
POLE3S	5.1	
POLESOUT	29.8	0.24
RITTAE2	7.0	
<b>Pelagic Stations</b>		
L001	21.2	
L004	4.8	
L005	26.5	3.49
L006	4.1	
L007	4.4	
L008	21.2	
LZ30	4.1	0.23
LZ40	7.0	
CLV10A	11.7	0.28

**Figure 6.** Chlorophyll *a* (µg/L) and microcystin (µg/L) values for nearshore and pelagic stations for early September 2018. SFWMD classifies an algal bloom as having Chl *a* values >40 µg/L.





**Figure 7.** 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.

## **ESTUARIES**

### **St. Lucie Estuary:**

Last week total inflow to the St. Lucie Estuary averaged about 1,574 cfs (Figures 1 and 2) and last month inflow averaged about 2,341 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).

<b>Location</b>	<b>Flow (cfs)</b>
Tidal Basin Inflow	199
S-80	1,168
S-308	953
S-49 on C-24	32
S-97 on C-23	94
Gordy Rd. structure on Ten Mile Creek	81

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 7.9. Salinity conditions in the middle estuary are within the fair 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.

<b>Sampling Site</b>	<b>Surface</b>	<b>Bottom</b>
HR1 (North Fork)	<b>3.4</b> (0.9)	<b>6.2</b> (1.3)
US1 Bridge	<b>6.6</b> (2.8)	<b>9.2</b> (4.1)
A1A Bridge	<b>14.4</b> (11.0)	<b>22.5</b> (19.9)

<sup>1</sup>Envelope not applicable and <sup>2</sup>Not Reporting.

### **Caloosahatchee Estuary:**

Last week total inflow to the Caloosahatchee Estuary averaged about 4,460 cfs (Figures 5 and 6) and last month inflow averaged about 5,433 cfs. Last week's provisional averaged inflows from the structures are shown in Table 3.

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

<b>Location</b>	<b>Flow (cfs)</b>
S-77	534
S-78	909
S-79	3,015
Tidal Basin Inflow	1,445

Over the past week, salinity was near 0 down to Ft. Myers Yacht Basin and decreased downstream (Table 4, Figures 7 & 8). The seven-day average salinity values are estimated to be within the poor range for adult eastern oysters at Cape Coral, in the good range at Shell Point, and were not available at Sanibel (Figure 9). The 30-day moving average surface salinity is 0.2 at Val I-75 and 0.2 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.

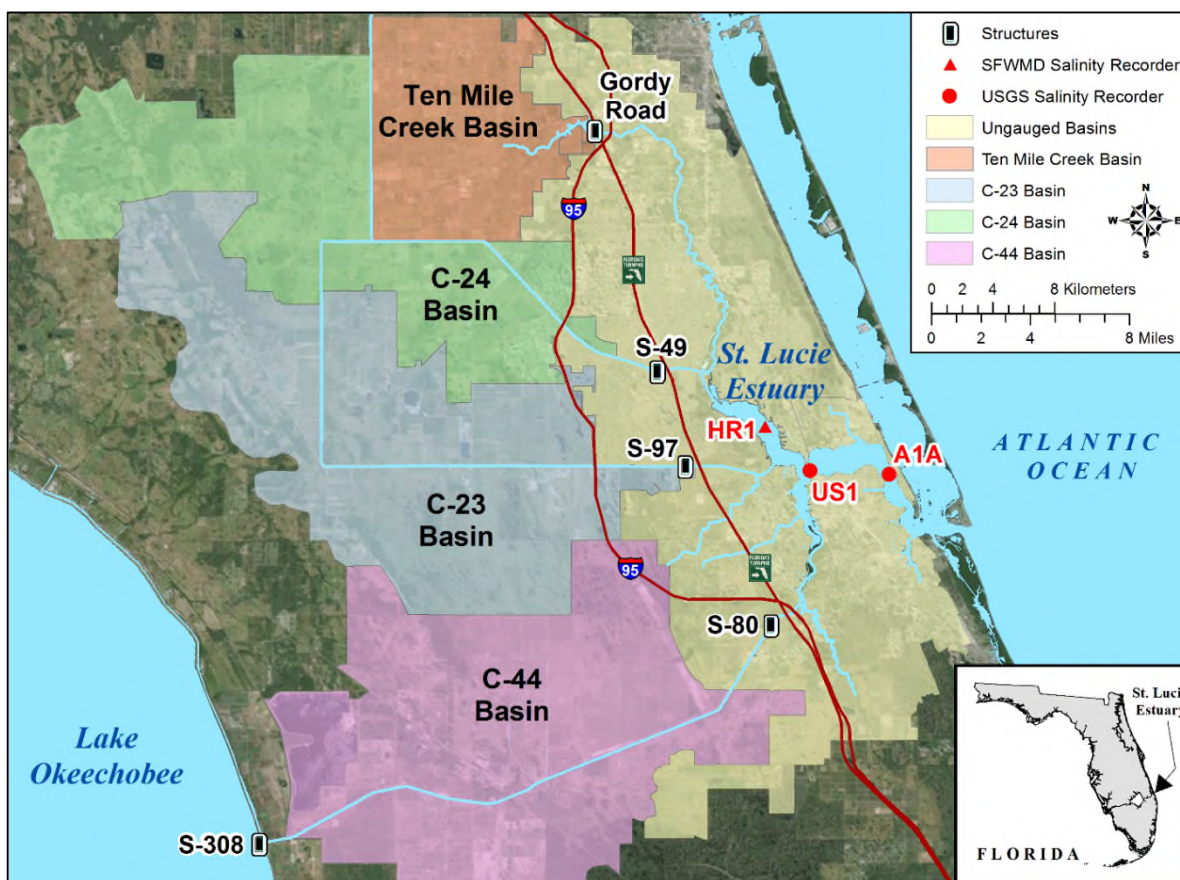
Sampling Site	Surface	Bottom
S-79 (Franklin Lock)	<b>0.2</b> (0.2)	<b>0.2</b> (0.2)
Val I75	<b>0.2</b> (0.2)	<b>0.2</b> (0.2)
Ft. Myers Yacht Basin	<b>0.2</b> (0.3)	<b>0.2</b> (0.3)
Cape Coral	<b>3.2</b> (3.7)	<b>4.7</b> (6.2)
Shell Point	<b>14.7</b> (17.0)	<b>14.6</b> (16.6)
Sanibel	<b>NR</b> <sup>3</sup> (NR)	<b>NR</b> (NR)

<sup>1</sup>Envelope not applicable, <sup>2</sup>Envelope is based on a 30-day average, and <sup>3</sup>Not Reporting.

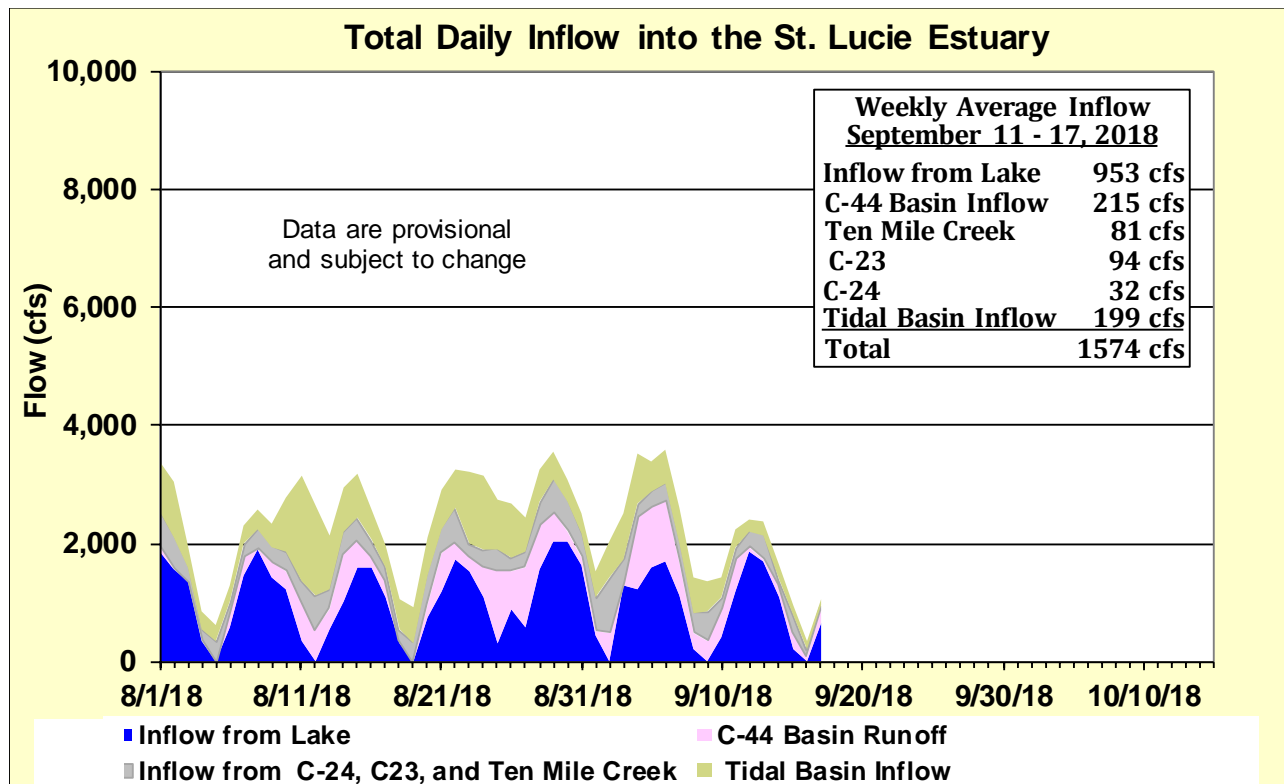
The Florida Fish and Wildlife Research Institute reported on September 14, 2018, that *Karenia brevis*, the Florida red tide dinoflagellate, was observed at background to high concentrations in 25 samples collected from or offshore of Lee County. Fish kills and respiratory irritation were reported in Lee County over the past week.

### **Water Management Recommendations**

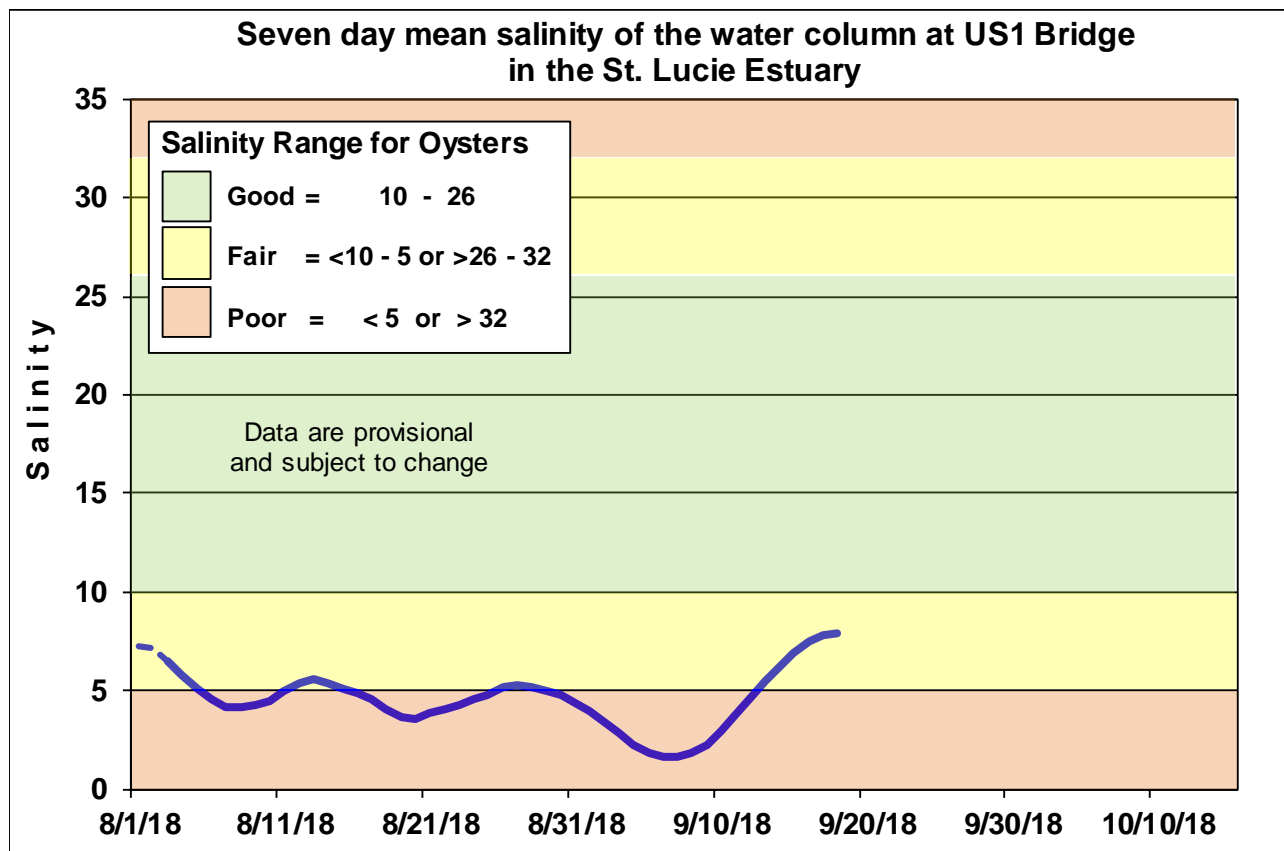
Lake stage is in the Low sub-band of 2008 LORS. Tributary hydrological conditions are very wet. The 2008 LORS recommends up to 4,000 cfs at S-77 and up to 1,170 cfs at S-80. Given the current the estuarine conditions, there are no ecological benefits associated with freshwater releases from Lake Okeechobee.



**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.

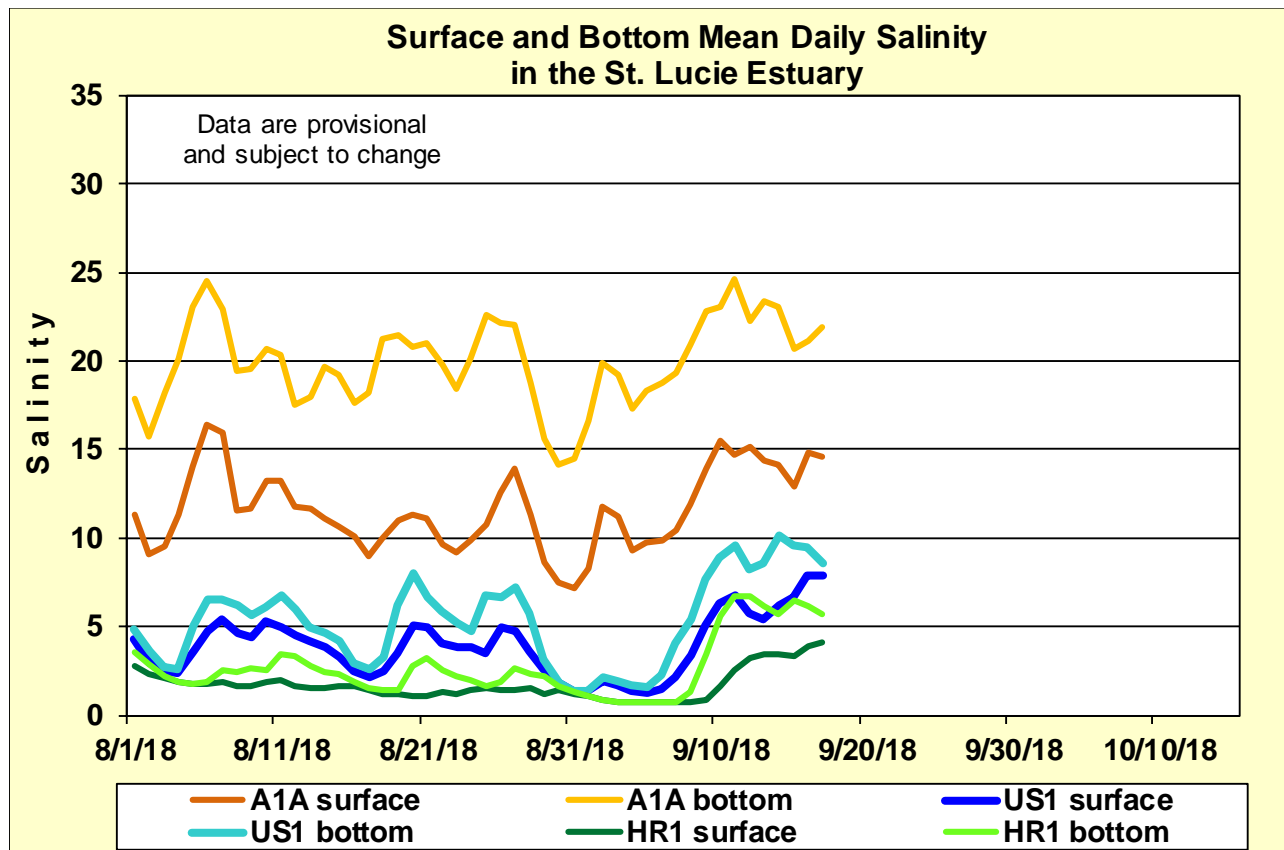


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

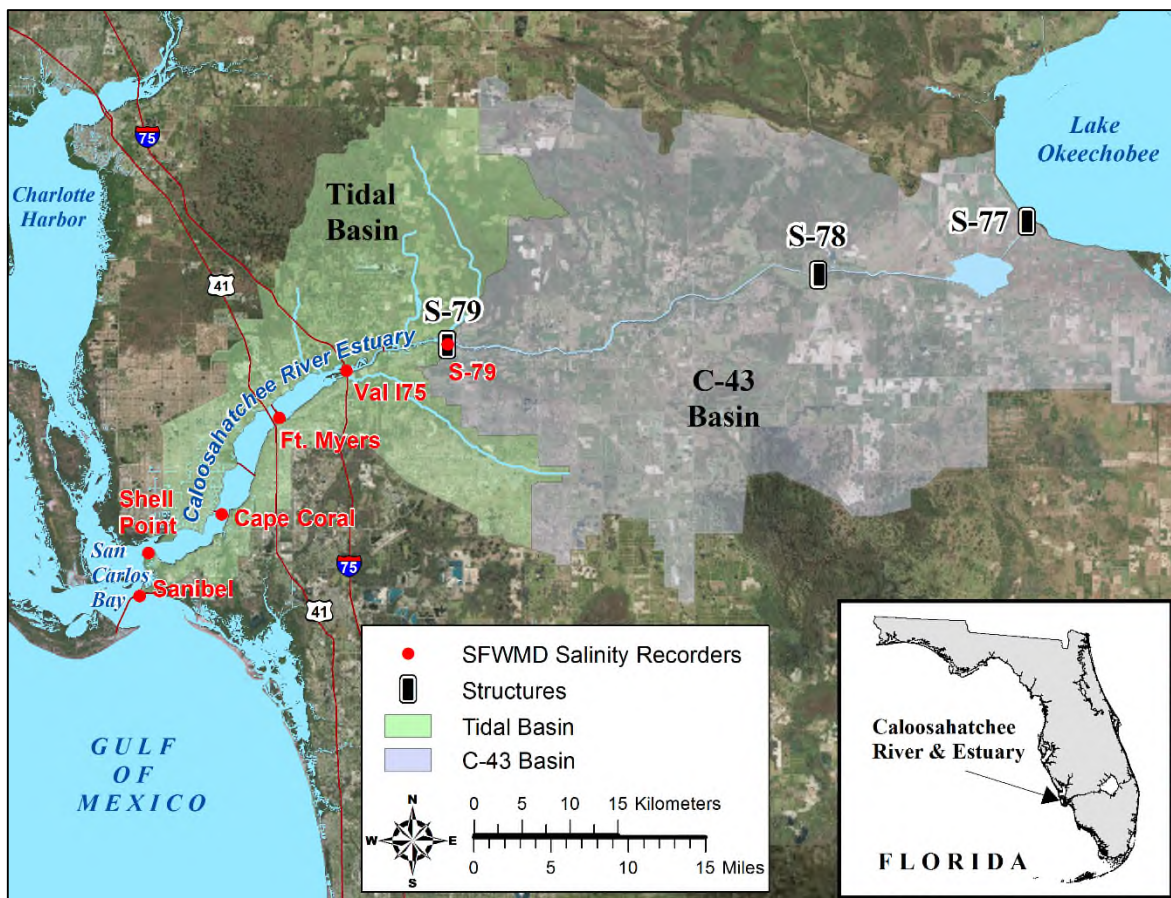
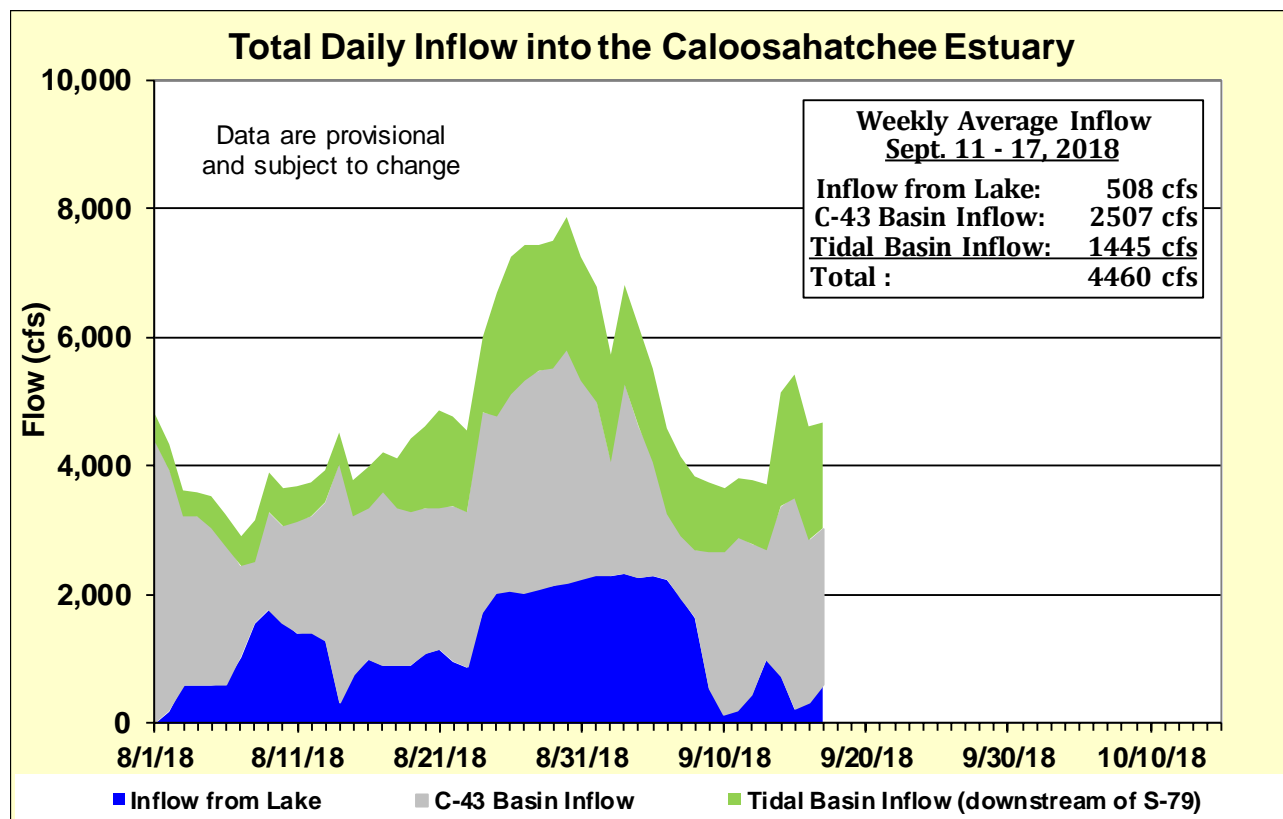
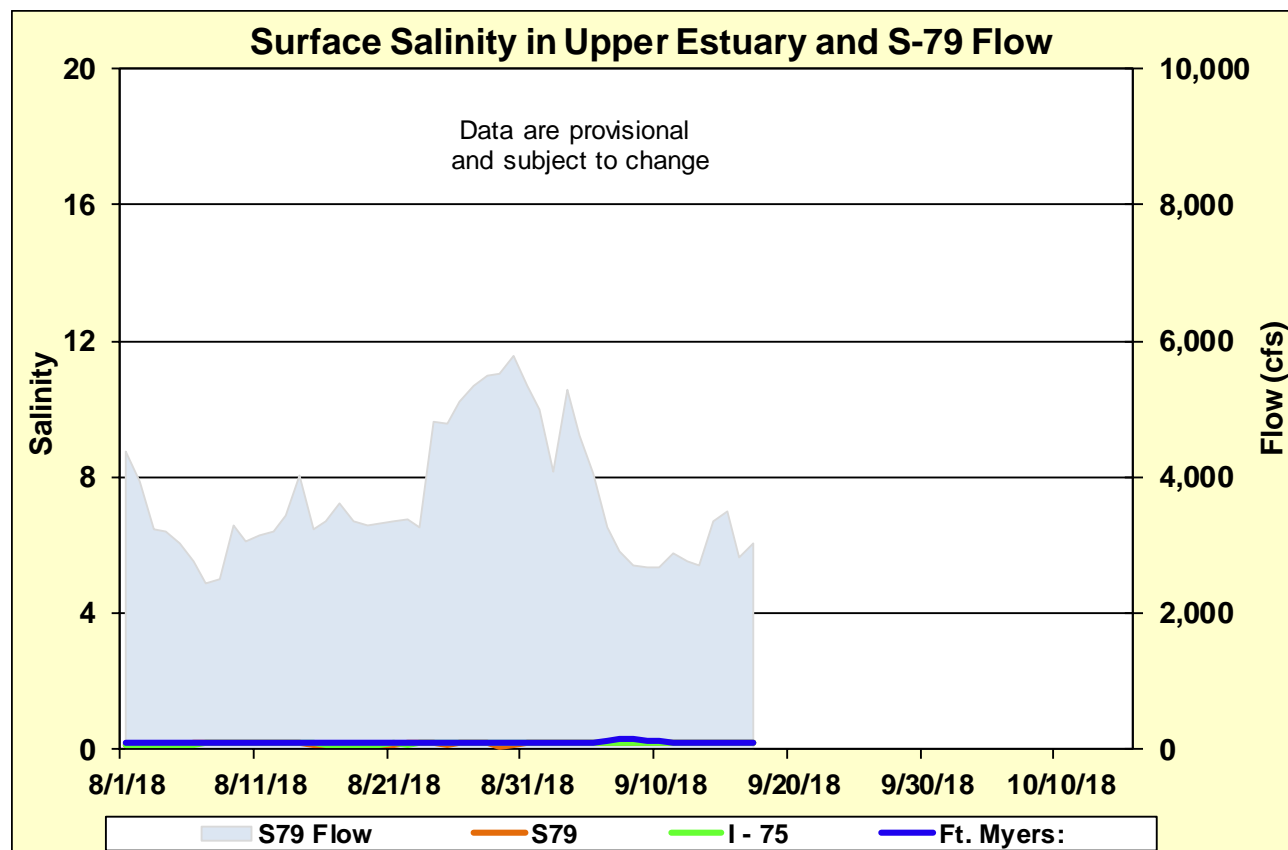


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.



**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.

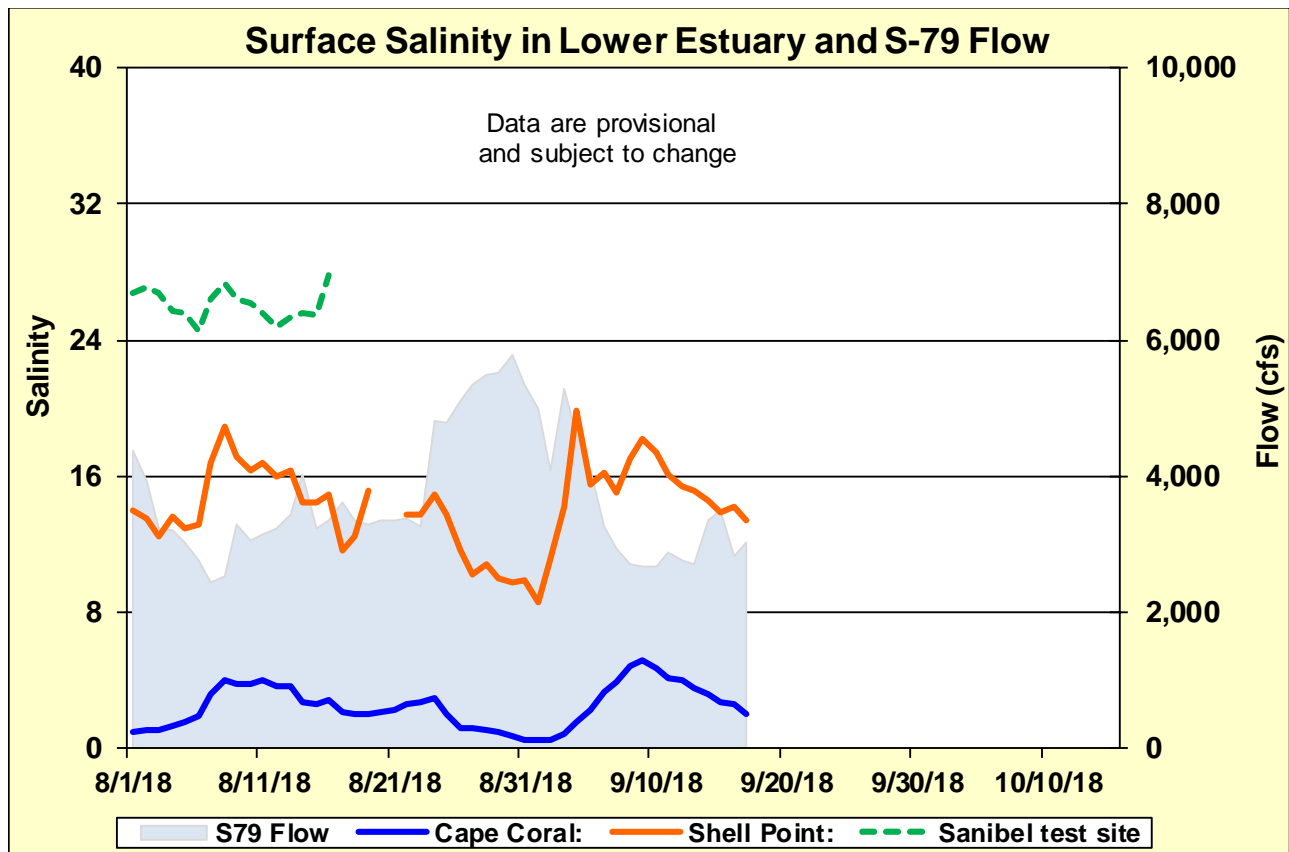


Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.

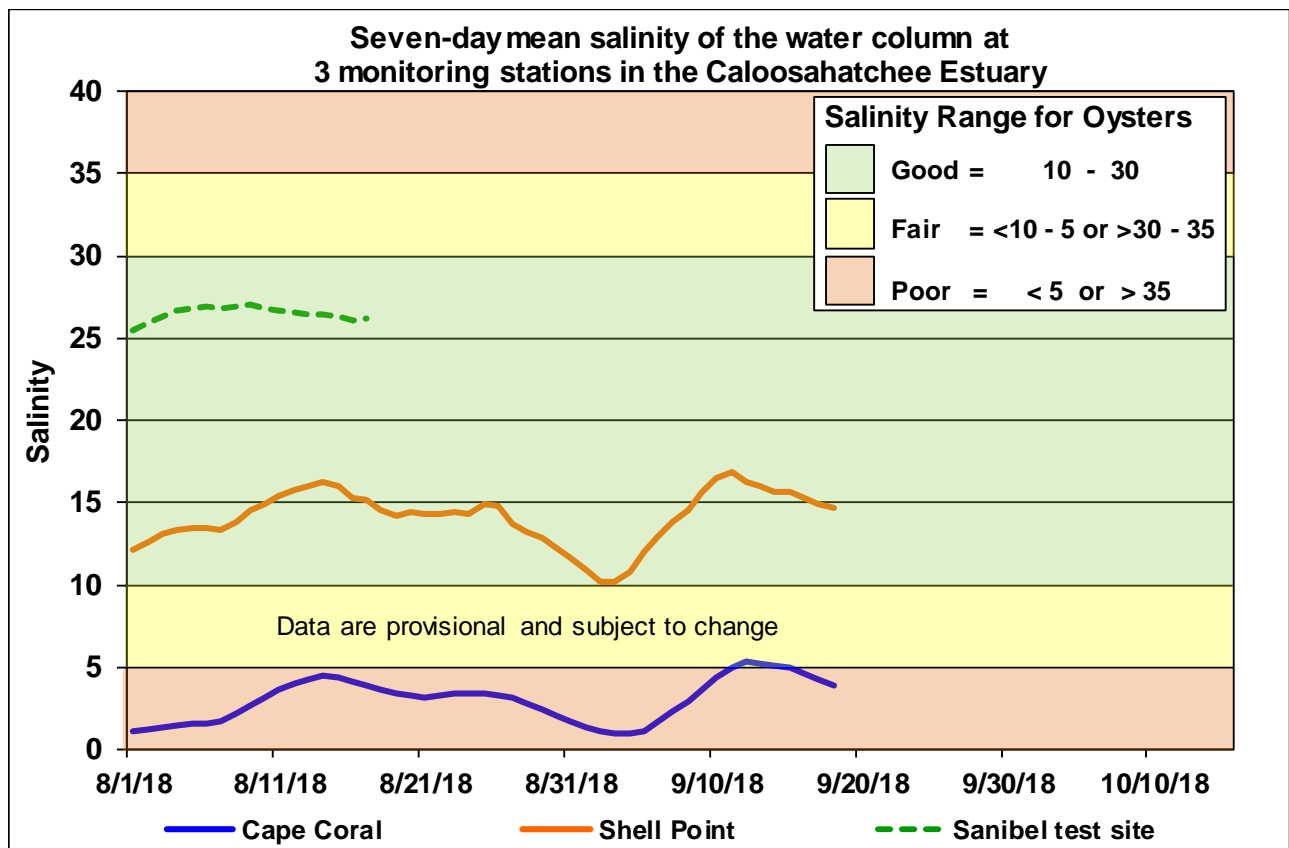


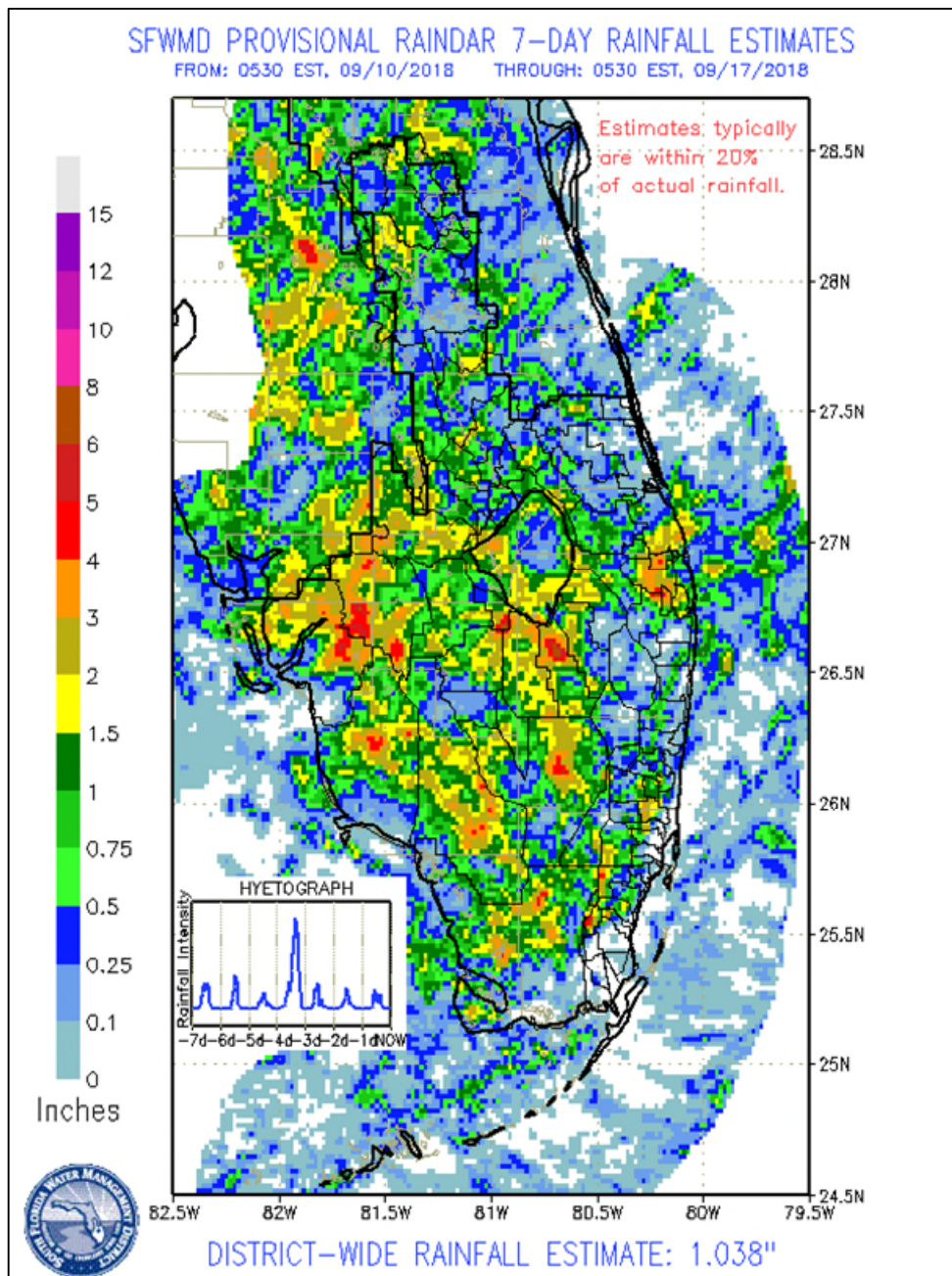
Figure 9. Seven-day mean salinity at Cape Coral, Shell Point, and Sanibel monitoring stations.



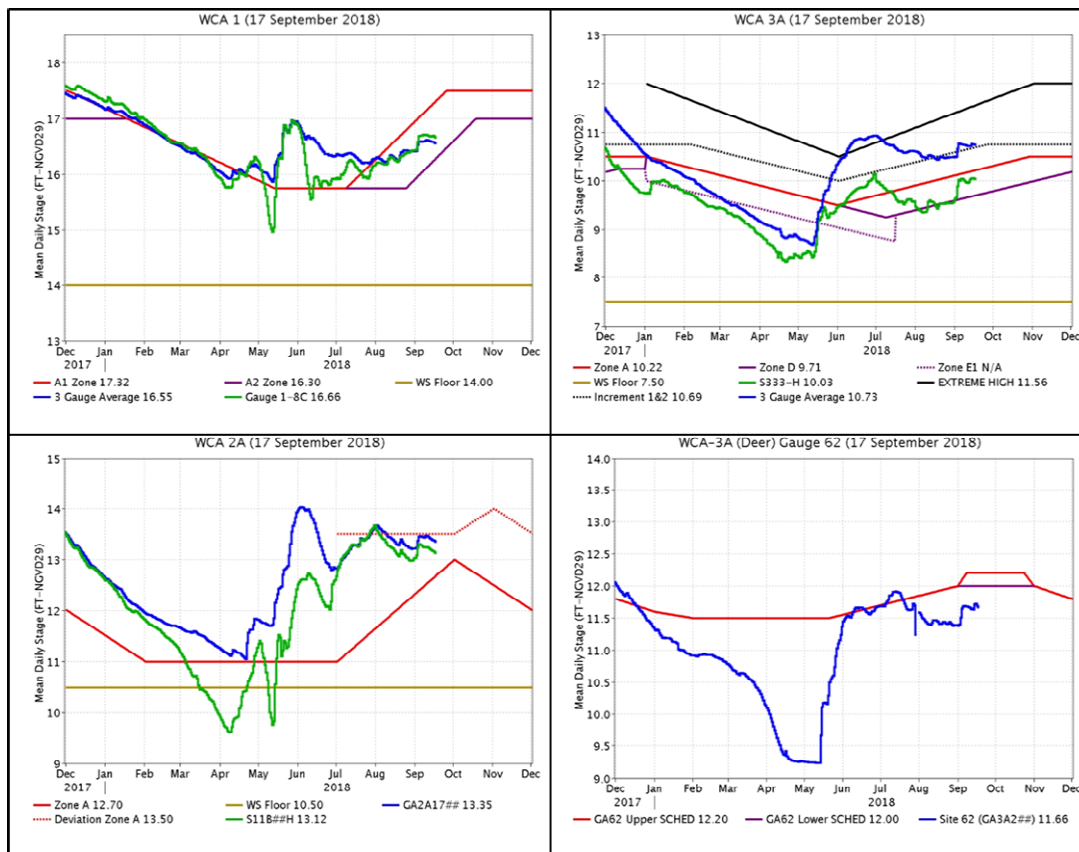
## **EVERGLADES**

At the gauge locations monitored for this report stages within the Everglades fell 0.06 feet on average over the last week. Of the sub-basins only WCA-3A and 3B did not meaningfully decrease in stage. The most extreme individual gauge changes within the WCAs ranged from +0.04 feet (WCA-3A northeast) to -0.18 feet (WCA-1). Pan evaporation was estimated at 1.31 inches.

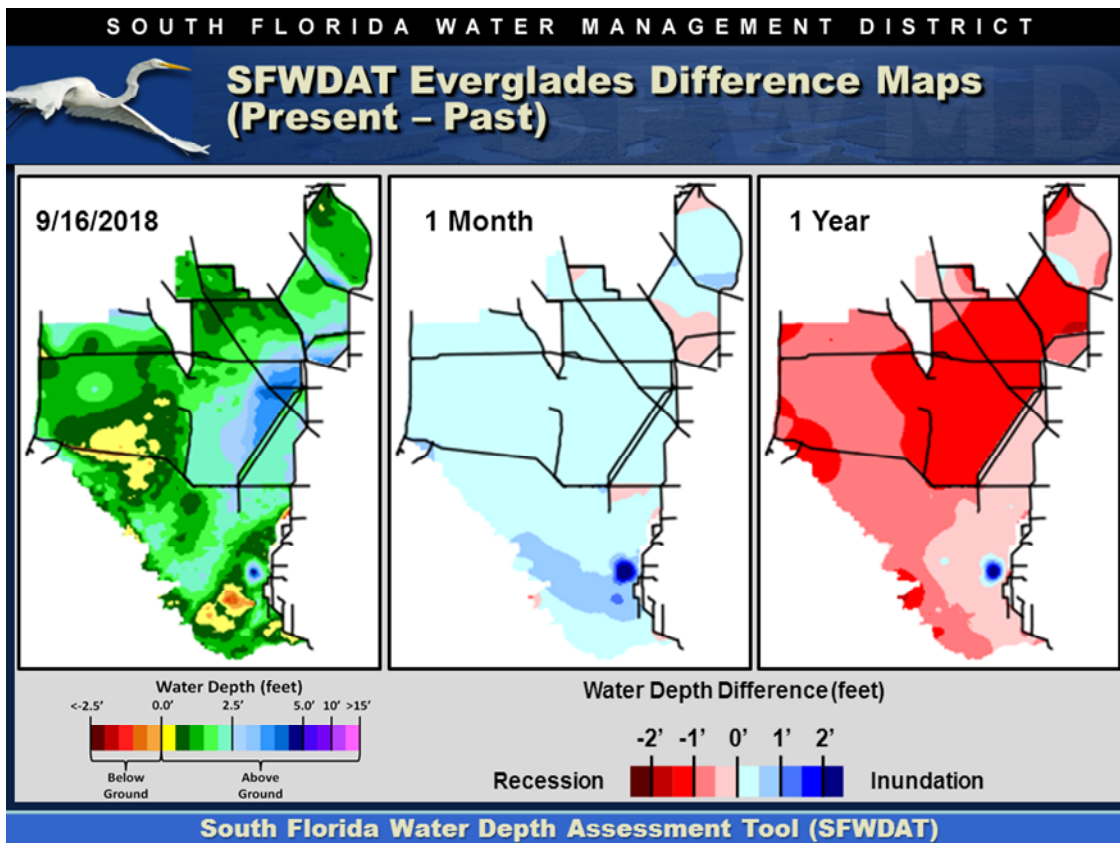
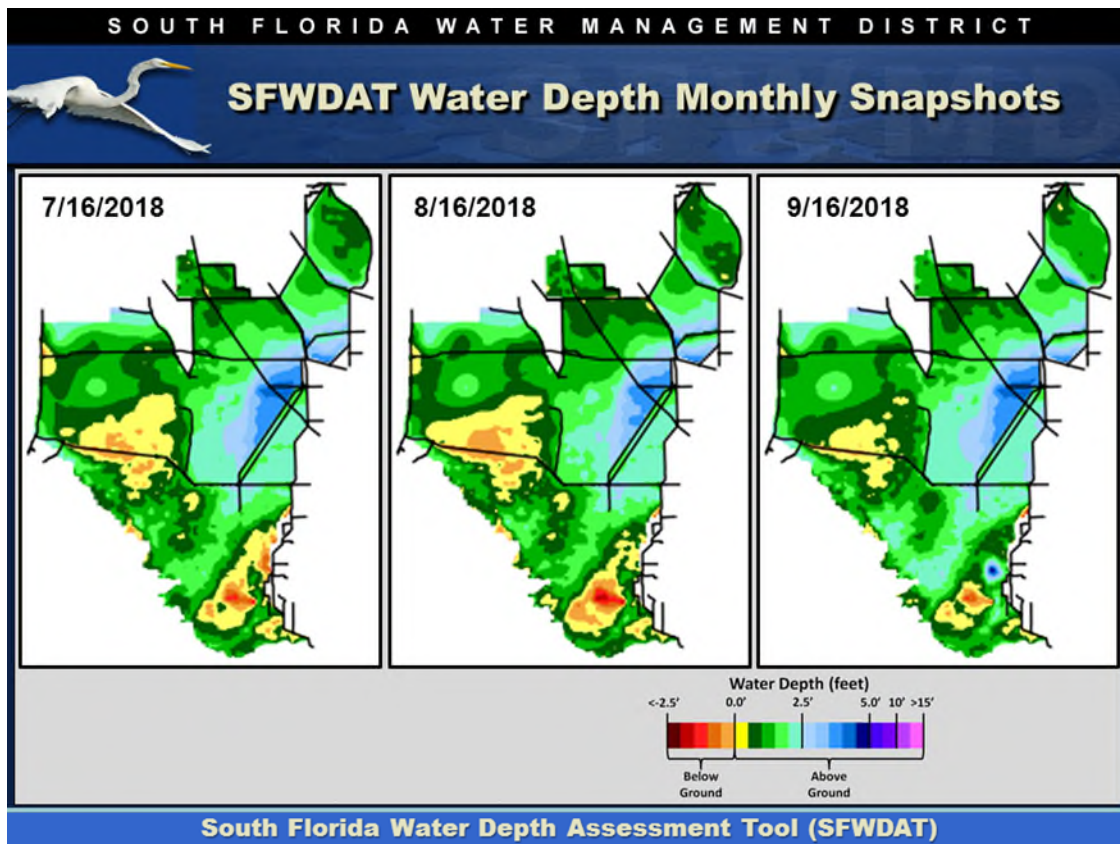
<b>Everglades Region</b>	<b>Rainfall (Inches)</b>	<b>Stage Change (feet)</b>
WCA-1	0.19	-0.08
WCA-2A	0.33	-0.13
WCA-2B	0.43	-0.14
WCA-3A	1.22	+0.01
WCA-3B	0.84	-0.02
ENP	0.82	-0.16



Regulation Schedules: WCA-1 three-gauge average is 0.77 feet below Zone A1, gauge 1-8C is 0.66 feet below. Both remain between A1 Zone and A2 and have leveled off as the limb of the regulation line rises. WCA-2A marsh stage is 0.15 feet below Dev. Zone A, S11B Headwater stage is 0.38 feet below. WCA-3A three-gauge average stage is 0.04 feet above Increment 1&2, 0.51 feet above Zone A. WCA-3A at gauge 62 (Northwest corner) remains 0.54 feet below the Upper Schedule, 0.34 feet below the Lower Schedule.



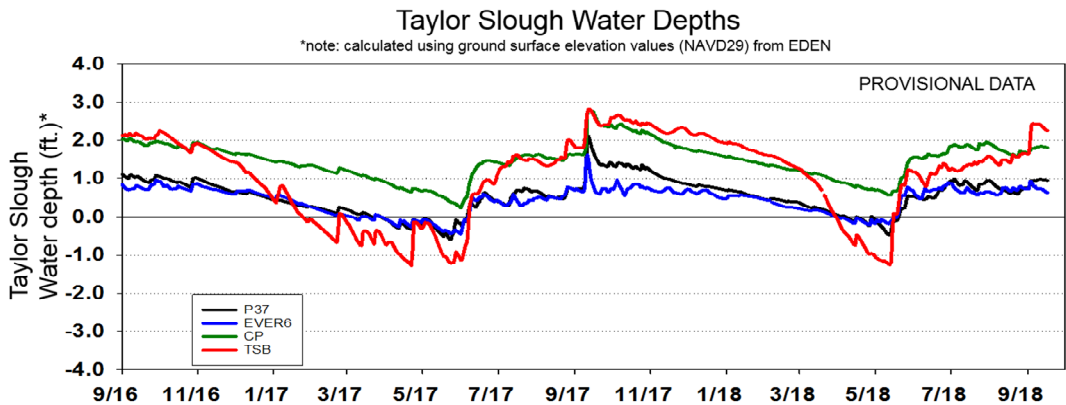
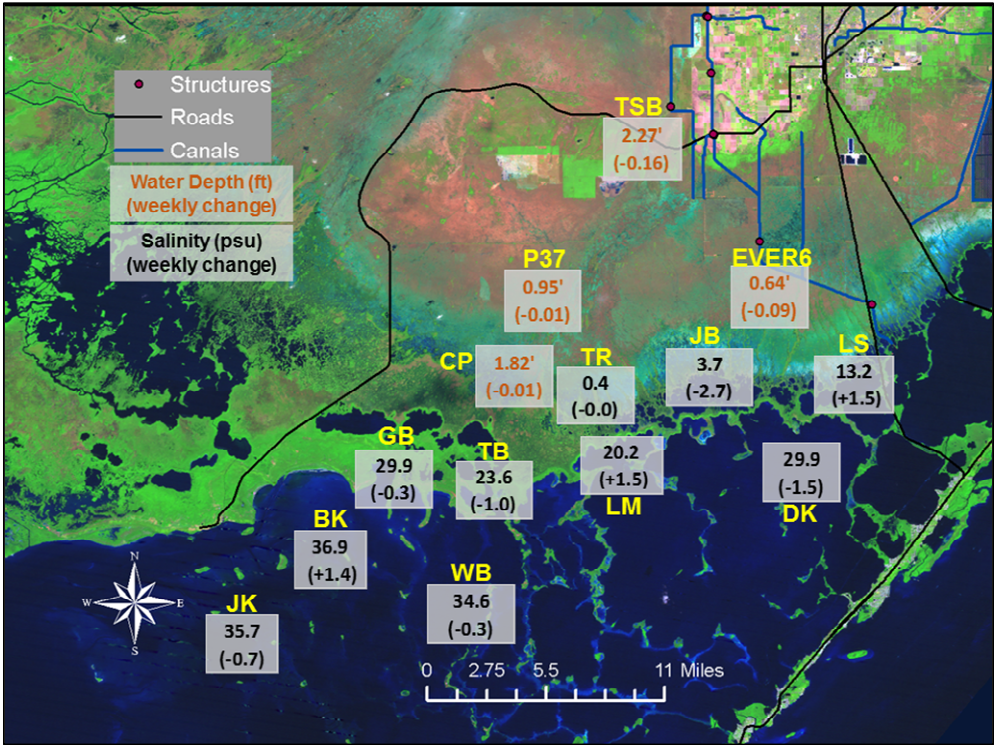
Water Depths and Changes: The WDAT tool for spatial interpolation of depth monthly snapshots indicate slightly wetter conditions, the spatial extent of ponded depths along the southern reach of the L-67 in WCA-3A has expanded compared with last month. The model is no longer showing pockets of habitat with depths down to 0.0 feet in WCA-3A North, however that is occurring in northern WCA-1. WDAT difference output indicates that water levels across most of South Florida are slightly higher or unchanged compared to one month ago; only in the southern half of WCA-2A are depths unchanged or slightly lower. 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. “Bullseye” in Dade county is likely a sensor malfunction.

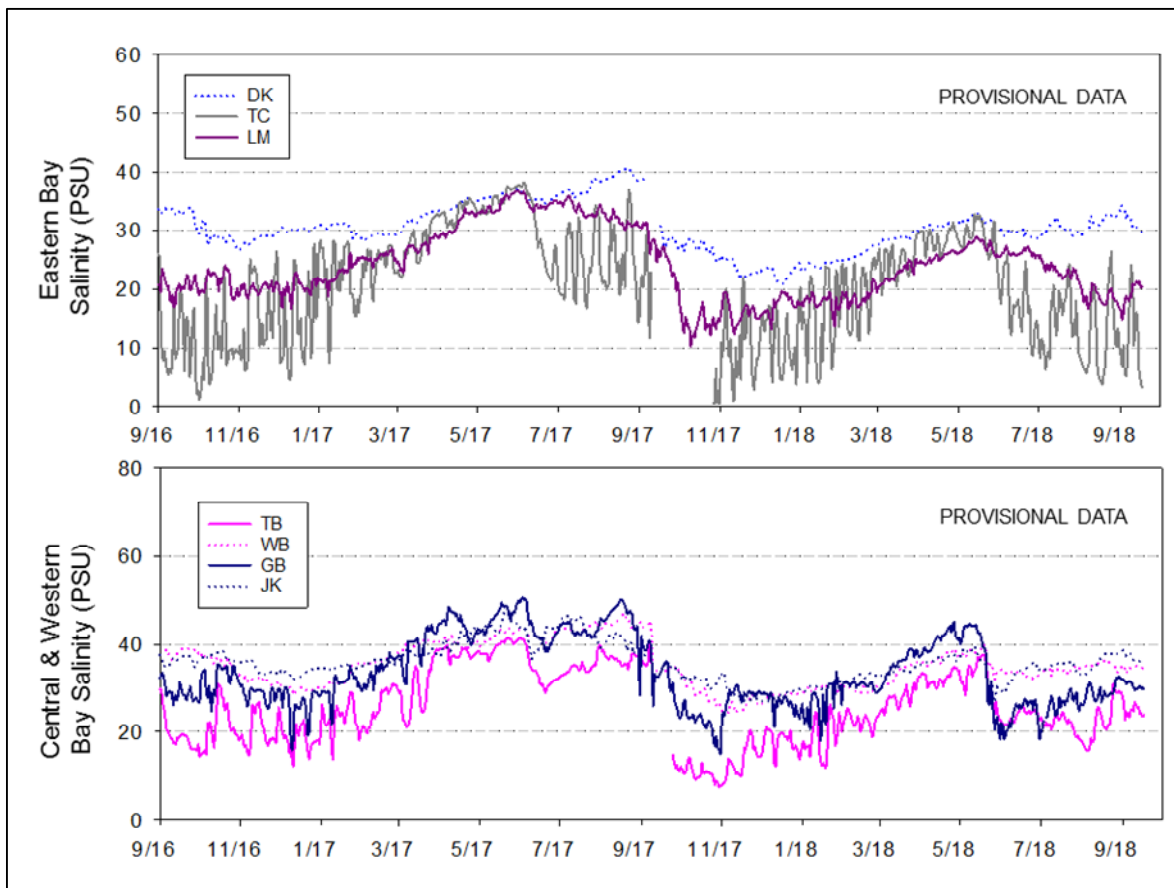


Taylor Slough Water Levels: An average of only 0.2 inches of rain fell on Taylor Slough and Florida Bay this past week, and stages averaged a decrease of 0.06 feet. Water depths average about 1.3 feet across Taylor Slough which is about 2.3 inches higher than the historical averages for this time of year.

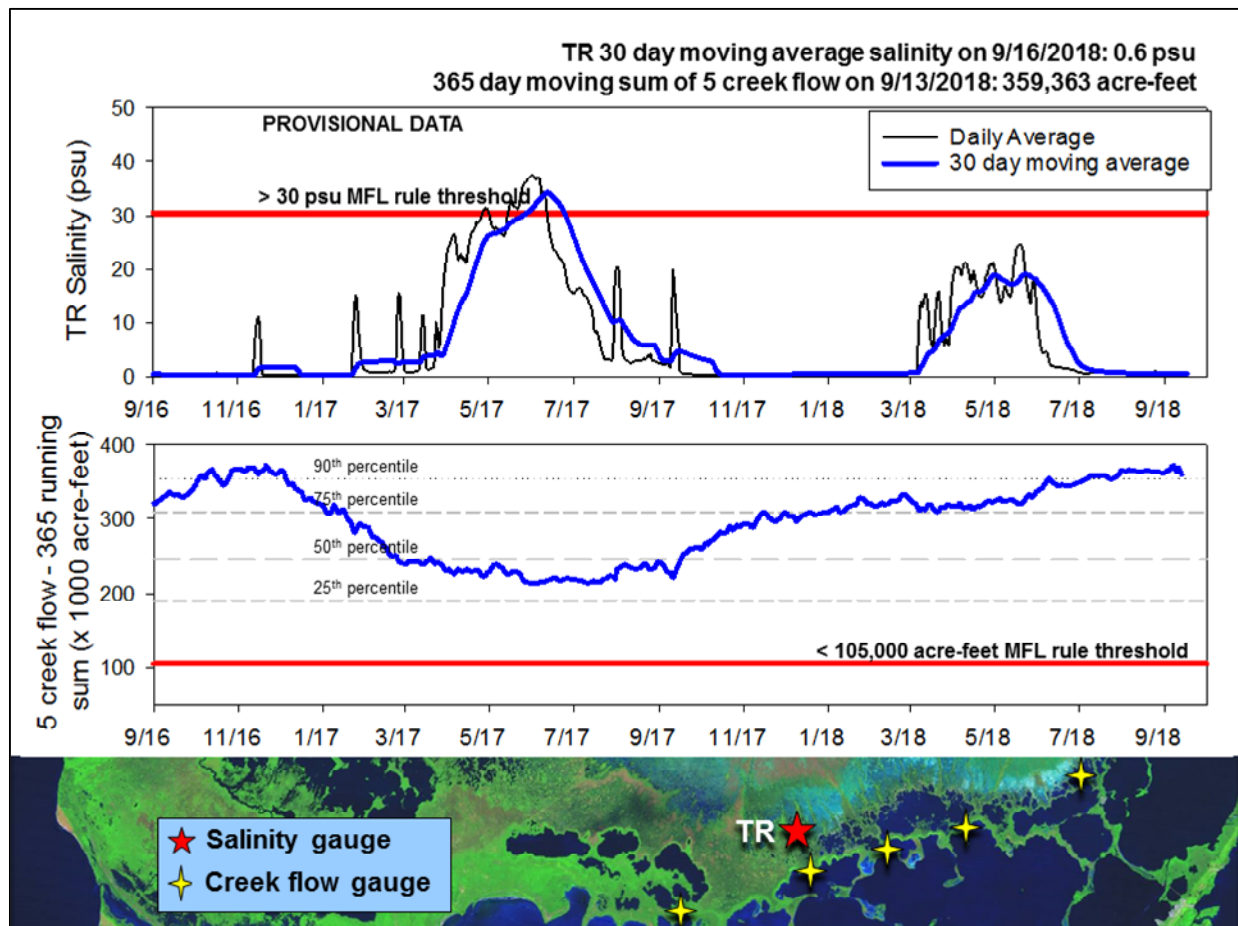


Florida Bay Salinities: Salinities were mostly stable this past week with changes staying less than 3 psu for the week. Salinities range from 4 psu in the northeast to 37 psu in the west which is near the historical averages for this time of year. Salinities lower than the historical averages are a restoration target and considered desirable.





Florida Bay MFL: Mangrove zone daily average salinity stayed at 0.4 psu this past week, and the 30-day moving average is still 0.6 psu. The western most creek of the five creeks discussed in this report was not reporting as of last Thursday, so our weekly data is incomplete. The 7-day cumulative flow from the five creeks denoted by yellow stars on the map totaled less than 4,000 acre-feet on 9/13 which is about one third of the historical average for this time of year. September and October tend to be the peak flows for the year. The 365-day moving sum of flow from the five creeks on 9/13 was 359,363 acre-feet (still greater than the long-term average of 257,628 acre-feet and above the 90th percentile). Creek flow is provisional data from the USGS and is highly variable.



### Water Management Recommendations

Inflows to northernmost WCA-3A create lower ecological stress when compared to flows to more southern WCA-3A. WDAT output indicates that most of WCA-3A North's water depths are between 0.5 to 2.0 feet. These conditions contrast with conditions in WCA-3A South where depths along the L-67 are 2.5 to 4.5 feet. After last year's above average wet season depth conditions in WCA-3A South, maintaining lower stages within that basin has ecological benefit to tree islands that have been stressed by flooding. WCA-2A has also experienced relatively deep-water conditions over the past two wet seasons. Water management that minimizes high water stress during the wet season but protects peat soils (especially in WCA-3A North) as the dry season approaches has increased ecological benefit this water year by allowing ecological processes time to recover from flooding. Management measures could include temporary pumping that may serve both flood protection and ecological ends.

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.

Ascension rates are now critical for apple snail reproduction in the Everglades. The current recommended stage ascension rate is less than 0.25 feet per week (or 0.5 feet per 2 weeks).

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

## SFWMD Everglades Ecological Recommendations, September 18th, 2018 (red is new)

Area	Weekly change	Recommendation	Reasons
WCA-1	Stage decreased by 0.08'	Maintain depths at regulation schedule. Manage for a rate of ascension less than +0.25' per week, or less than +0.5 per 2 weeks.	Protect upstream/downstream habitat and wildlife.
WCA-2A	Stage decreased by 0.13'	Maintain depths at temporary regulation schedule. Manage for a rate of ascension less than +0.25' per week, or less than +0.5 per 2 weeks.	Protect upstream/downstream habitat and wildlife.
WCA-2B	Stage decreased by 0.14'	Maintain depths at temporary regulation schedule. Manage for a rate of ascension less than +0.25' per week, or less than +0.5 per 2 weeks.	Protect upstream/downstream habitat and wildlife.
WCA-3A NE	Stage increased by 0.04'	Maintain depths at regulation schedule.	Protect habitat including <u>peat soil</u> development, tree islands and wildlife.
WCA-3A NW	Stage increased by 0.02'	Maintain depths at regulation schedule.	
Central WCA-3A S	Stage decreased by 0.03'	Maintain depths at regulation schedule. Manage for a rate of ascension less than +0.25' per week, or less than +0.5 per 2 weeks.	Protect habitat including peat soil development, <u>tree islands</u> and wildlife.
Southern WCA-3A S	Stage remained unchanged		
WCA-3B	Stage decreased by 0.02'	Maintain depths at temporary regulation schedule. Manage for a rate of ascension less than +0.25' per week, or less than +0.5 per 2 weeks.	Protect upstream/downstream habitat and wildlife.
ENP-SRS	Stage decreased by 0.16'	Make discharges to the Park according to the 2012 WCP rainfall plan.	Protect upstream/downstream habitat and wildlife.
Taylor Slough	Stage changes ranged from -0.01' to -0.16'	Move water southward as possible	When available, provide freshwater buffer for downstream conditions.
FB- Salinity	Salinity changes ranged -0.4 to +1.5 psu	Move water southward as possible	When available, provide freshwater to maintain low salinity buffer and promote water movement.