

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:** August 28, 2018

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

### **Summary**

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

A deep layer of moisture across the District today, combined with increased instability, should make for another day of active rains. Morning to early afternoon rains are favored in the east, and possibly again overnight along or near the east coast, thanks to a moderate easterly to east-southeasterly wind flow. This wind regime also favors more concentrated activity over the central and western interior from the afternoon to the early evening. The moisture profile today suggests that the heavy rain coverage today should be reasonably high, but it's unclear whether it will match or exceed yesterday's heavy rain distribution. Regardless, the large-scale factors suggest about average rain for late August (daily normal is ~0.30"), with some chance that the District-average rainfall would be a bit higher and fall into the above normal category. Wednesday could be similarly as wet, except that a more southeasterly flow would favor a shift in the rains farther inland and toward the west coast. Significantly drier air, mainly in the mid-levels of the atmosphere, should arrive over the District on Thursday and help to reduce District-average rainfall to below normal with relatively dry conditions persisting into Friday. The forecast for Saturday and Sunday is more uncertain as it revolves around the timing of a strong tropical wave predicted to move through the Bahamas and approach the Florida peninsula. The current guidance indicates that Saturday would most likely see no greater than normal District-average rainfall, and any increase on that day would most likely occur first in the southeastern half of the area. The District could see a multi-day heavy rain event beginning Sunday and lasting into early next week as the strong wave or weak tropical cyclone passes near or over Florida on its way into the Gulf of Mexico or southeastern U.S. It is still too early to be confident about the District-average rainfall or local maxima over this period of time but suffice to say that much above normal rainfall is possible. The guidance for the coming week has changed considerably since yesterday, owing to the addition of another day (Monday next week) and a shift toward a wetter scenario. The deterministic quantitative precipitation forecast (QPF) is now forecast to be near to above average (2.26" vs. 2.09" normal for the week – 110% of normal), but the most likely range indicated by the probabilistic model data is much wider at 80% to 140% of normal).

#### **Kissimmee**

Tuesday morning stages were 56.5 feet NGVD (at schedule) in East Lake Toho, 53.6 feet NGVD (0.1 feet above schedule) in Toho, and 51.2 feet NGVD (0.2 feet above schedule) in Kissimmee-Cypress-Hatchineha; headwater stages were 46.4 feet NGVD at S-65A and 27.9 feet NGVD at S-65D. Tuesday morning discharges were: 2,016 cfs at S-65, 2,019 cfs at S-65A, and 2,633 cfs at S-65E. Dissolved oxygen concentration in the Kissimmee River averaged 2.4 mg/L for the week. Kissimmee River mean floodplain depth on Sunday was 1.01 feet. No new recommendations were made this week.

## **Lake Okeechobee**

Lake Okeechobee stage is 14.54 feet NGVD, falling 0.05 feet from last week but rising 0.22 feet over the last 30 days. The seasonal low for 2018 (12.83 feet NGVD) was the third highest since 2011, and the third time in six years that lake stage did not reach the bottom of the preferred stage envelope (12.5 – 15.5 feet NGVD). Due to record rainfall in May, the submerged aquatic vegetation (SAV) coverage on the Lake will likely remain at minimal levels beyond next summer, prolonging impacts from high water levels associated with El Niño in 2016 and Hurricane Irma in 2017. Cyanobacteria bloom potential remained lower from mid-July to mid-August, with NOAA's analysis of satellite data (see supporting information below) suggesting most of the pelagic zone had much reduced potential for blooms compared to early June. The latest image (August 25) suggests bloom potential was lower than the previous week, likely due to windy conditions over the weekend. However, conditions will likely remain favorable for some level of recurring blooms throughout the remainder of the summer, particularly after more nutrient inputs from the watershed after rain events, or during stretches of low wind and high temperature on the Lake.

## **Estuaries**

Total inflow to the St. Lucie Estuary averaged 2,909 cfs over the past week with 1,045 cfs coming from Lake Okeechobee. Surface salinity stayed more or less the same in the North Fork and increased in the middle and lower parts of 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 5,744 cfs over the past week with 1,469 cfs coming from the Lake. Salinity remained near 0 down to Ft. Myers Yacht Basin and increased 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 the good range at 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 41,500 acre-feet of inflows (which includes approximately 21,500 acre-feet of Lake releases). The total amount of inflows to the STAs in WY2019 (since May 1, 2018) is approximately 786,900 acre-feet, which includes approximately 131,900 acre-feet of Lake releases. Most STA cells are at or above target depths. Operational restrictions are in place for a Restoration Strategies Science Plan study in STA-3/4 and 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**

Conditions within the Everglades remains stable as the WCAs all trend favorably towards the current regulation schedules with the exception of the Deer Gauge in northwest WCA-3A. Water depths on average decreased slightly across the Water Conservation Areas. In Taylor Slough water depths are about 1 foot deep and remain slightly above the historical average. Salinities in Florida Bay were impacted by a long wind event last week that increased salinities at some stations, positive creek flow resumed Sunday.

## Supporting Information

### KISSIMMEE BASIN

#### **Kissimmee Basin Rainfall**

The Upper Kissimmee Basin received 1.50 inches of rainfall in the past week and the Lower Basin received 1.55 inches (SFWMD Daily Rainfall Report 8/27/2018).

#### **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: 8/28/2018**

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)						
							8/26/18	8/19/18	8/12/18	8/5/18	7/29/18	7/22/18	7/15/18
Lakes Hart and Mary Jane	S-62	60	LKMJ	60.0	R	60.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1
Lakes Myrtle, Preston, and Joel	S-57	19	S-57	61.0	R	61.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0
Alligator Chain	S-60	76	ALLI	63.3	R	63.2	0.1	0.1	0.1	0.1	0.1	0.0	0.1
Lake Gentry	S-63	126	LKGT	61.0	R	61.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0
East Lake Toho	S-59	161	TOHOE	56.5	R	56.5	0.0	0.0	0.0	0.5	0.7	0.1	-0.1
Lake Toho	S-61	608	TOHOW, S-61	53.6	R	53.5	0.1	0.0	0.1	0.3	0.6	-0.1	0.0
Lakes Kissimmee, Cypress, and Hatchineha	S-65	1,806	KUB011, LKIS5B	51.1	R	51.0	0.1	0.1	0.4	0.7	0.6	0.2	0.1

<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: 8/28/2018

Metric	Location	1-Day Average		Average for the Preceding 7-Days <sup>1</sup>								6/24/18
		8/26/2018	8/26/18	8/19/18	8/12/18	8/5/18	7/29/18	7/22/18	7/15/18	7/8/18	7/1/18	
Discharge (cfs)	S-65	2,007	1,806	3,282	4,337	4,407	4,179	1,567	2,561	1,287	514	834
Discharge (cfs)	S-65A <sup>2</sup>	1,961	1,765	3,443	4,674	4,980	4,267	1,479	2,615	1,294	466	801
Discharge (cfs)	S-65D <sup>2</sup>	2,484	3,077	4,254	4,617	4,458	2,264	2,641	2,226	1,774	1,608	2,094
Headwater Stage (feet NGVD)	S-65D <sup>2</sup>	27.78	27.70	27.00	26.63	26.78	26.75	26.68	26.77	26.80	26.79	26.79
Discharge (cfs)	S-65E <sup>2</sup>	2,657	3,219	3,952	4,848	4,566	2,400	2,764	2,399	2,000	1,834	2,347
Discharge (cfs)	S-67	193	187	169	160	157	209	183	217	292	298	277
DO (mg/L) <sup>3</sup>	Phase I river channel	2.2	2.4	2.9	3.1	3.3	4.2	2.3	2.7	2.9	3.4	2.0
Mean depth (feet) <sup>4</sup>	Phase I floodplain	1.01	1.16	1.76	2.02	2.08	1.25	1.08	1.20	0.60	0.46	0.75

<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)

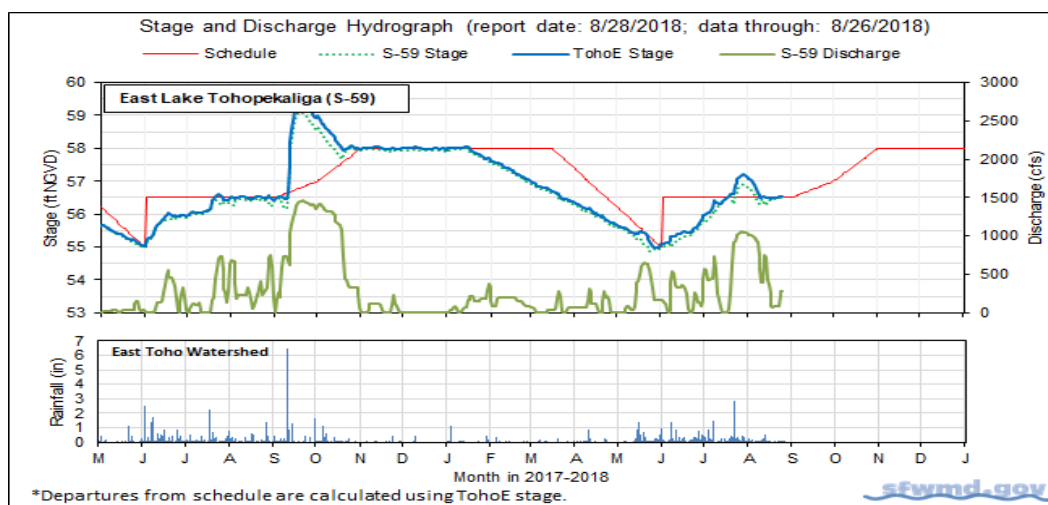


Figure 1.

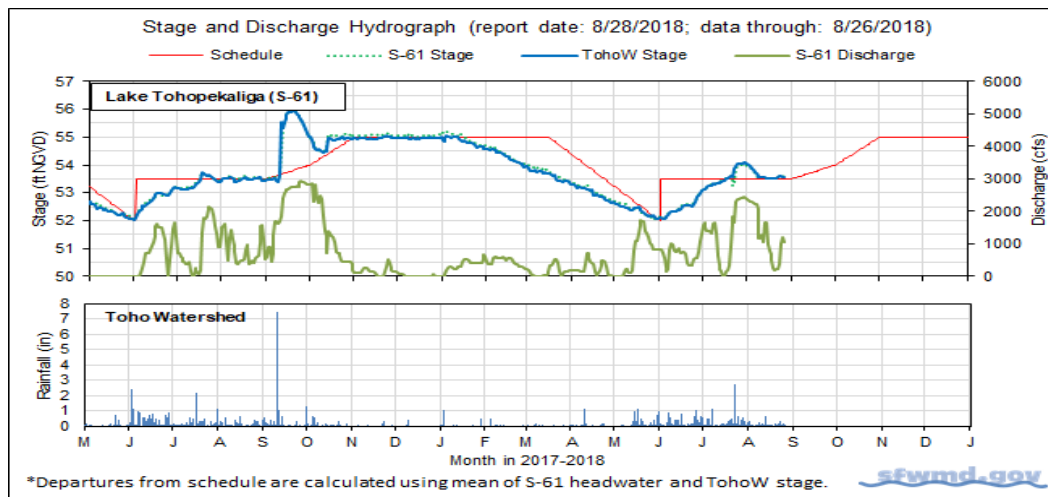


Figure 2.

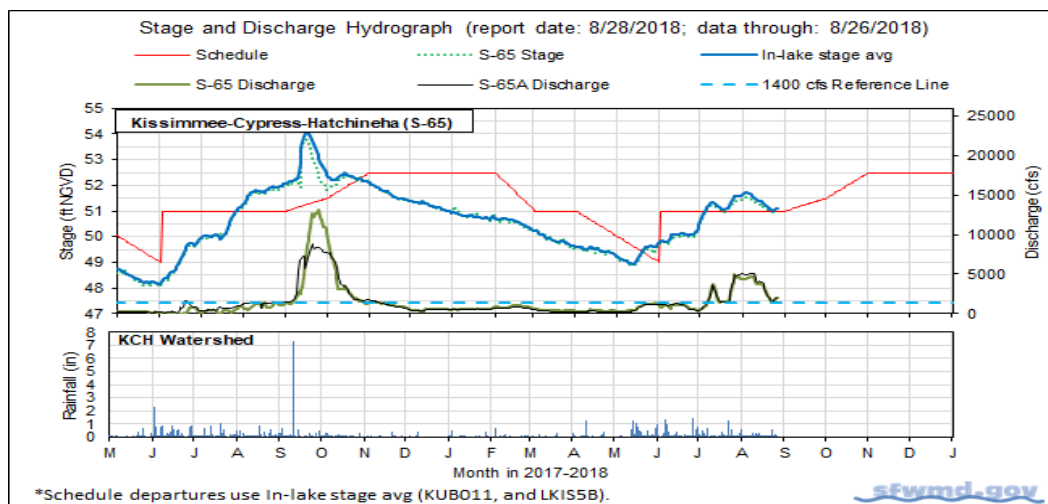


Figure 3.

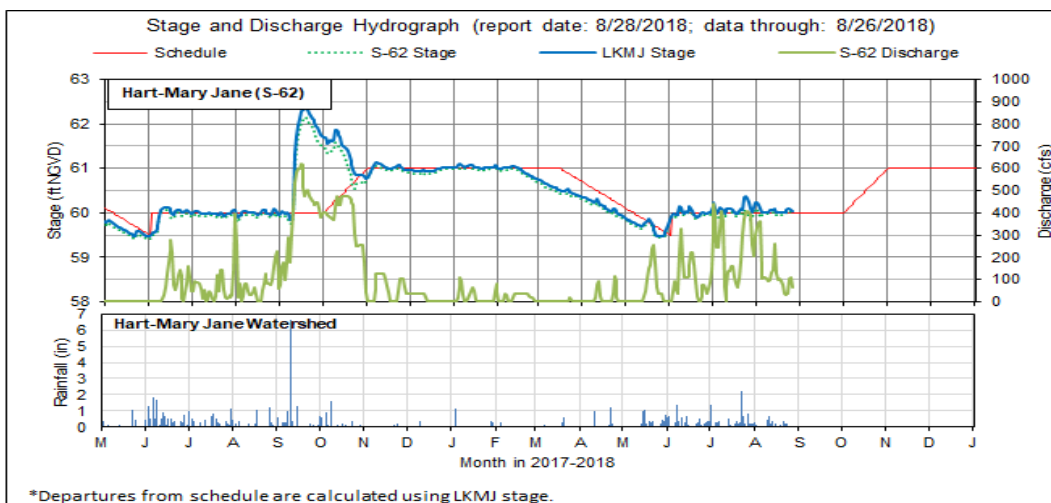


Figure 4.

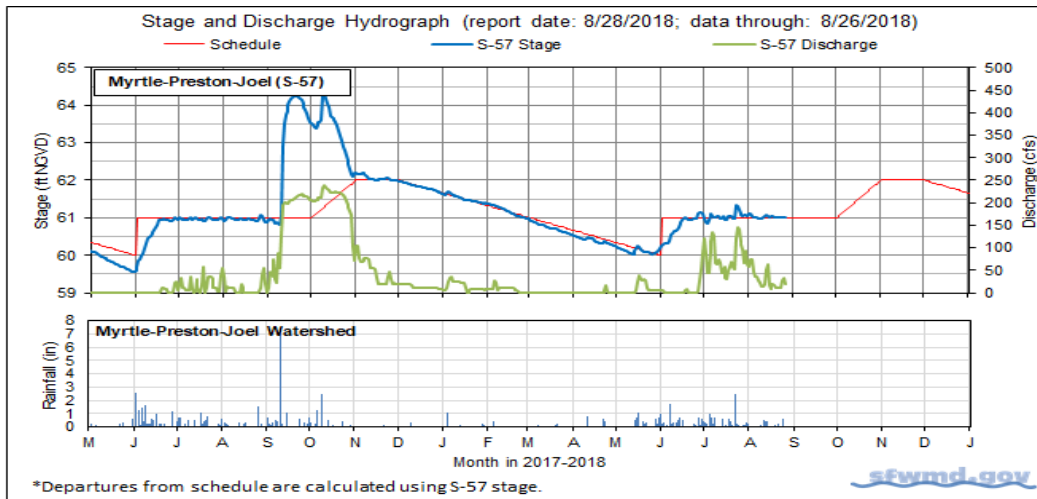


Figure 5.

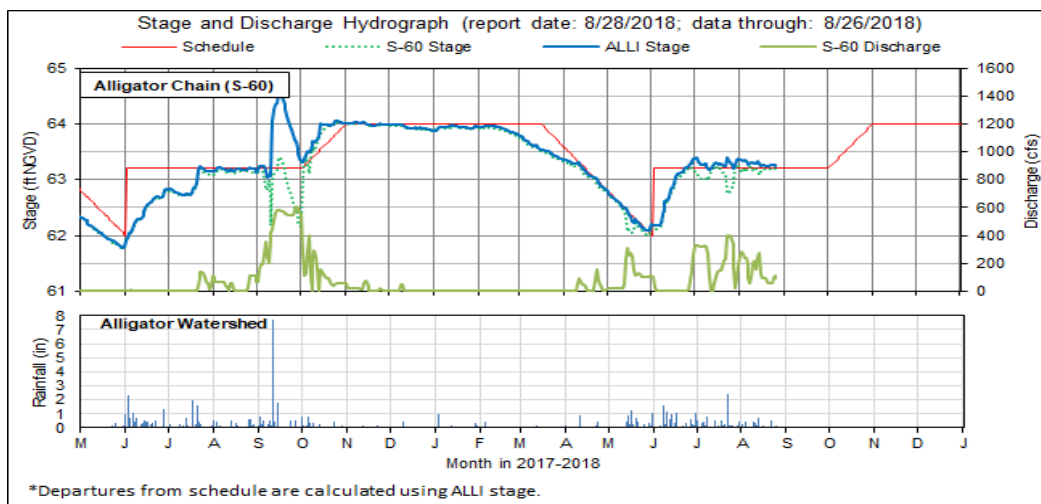


Figure 6.

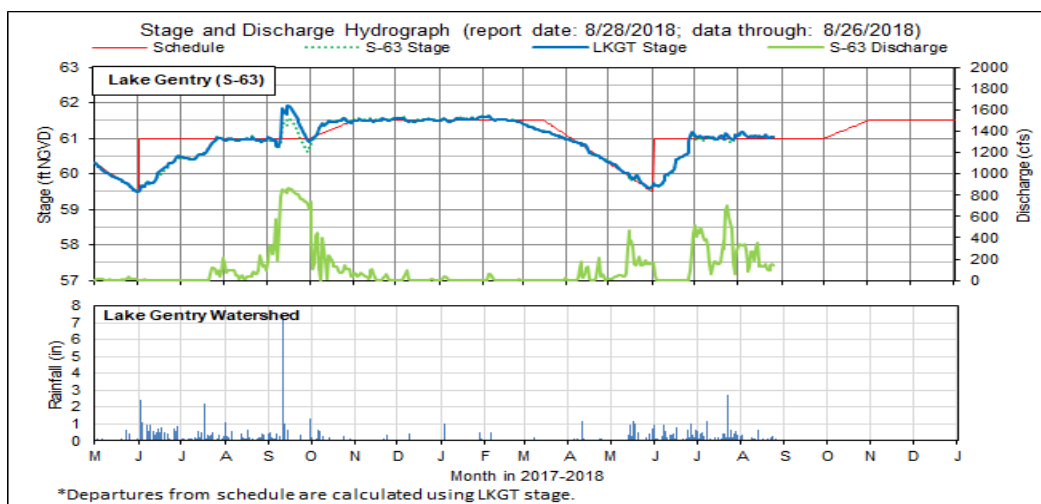
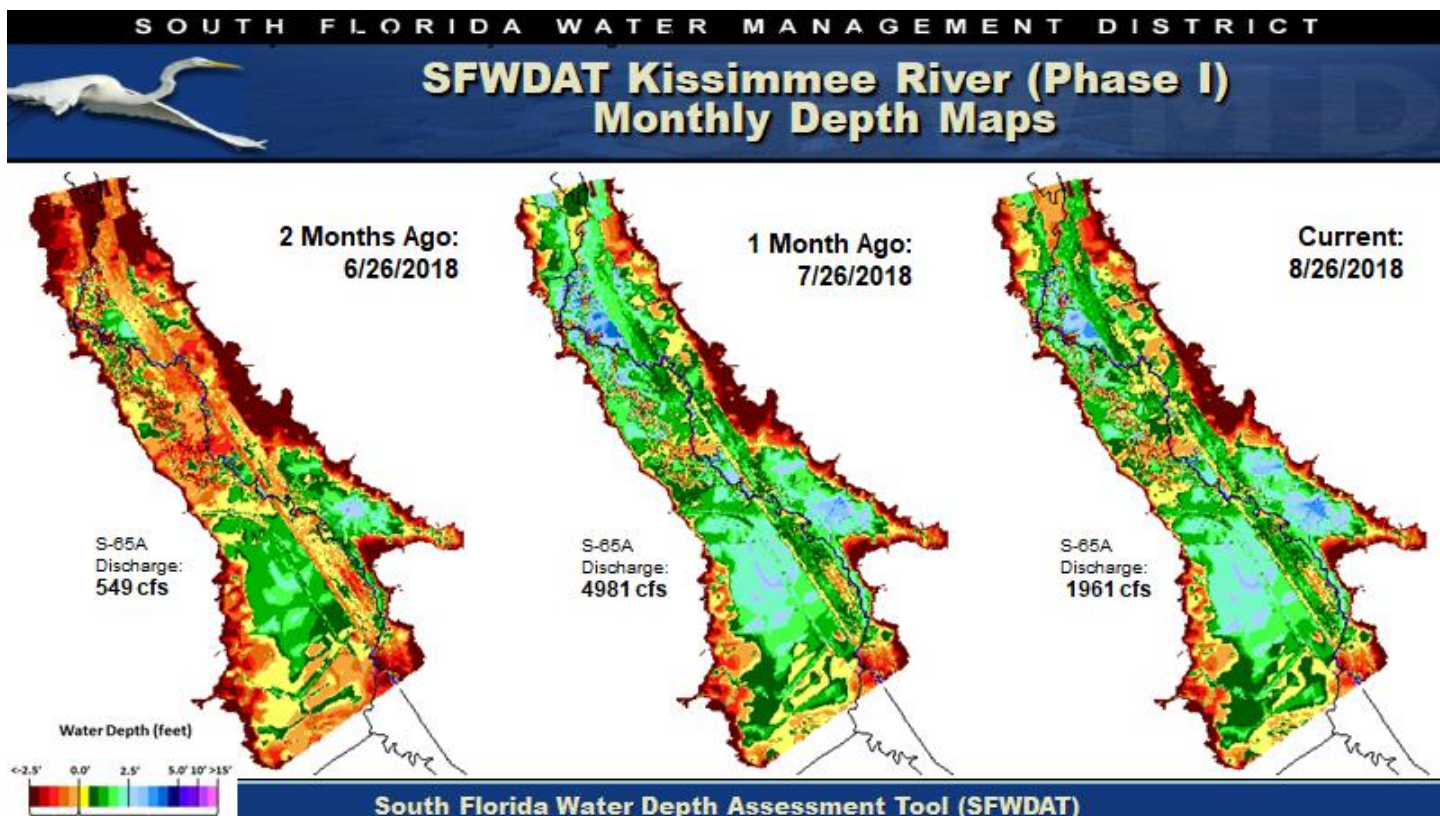
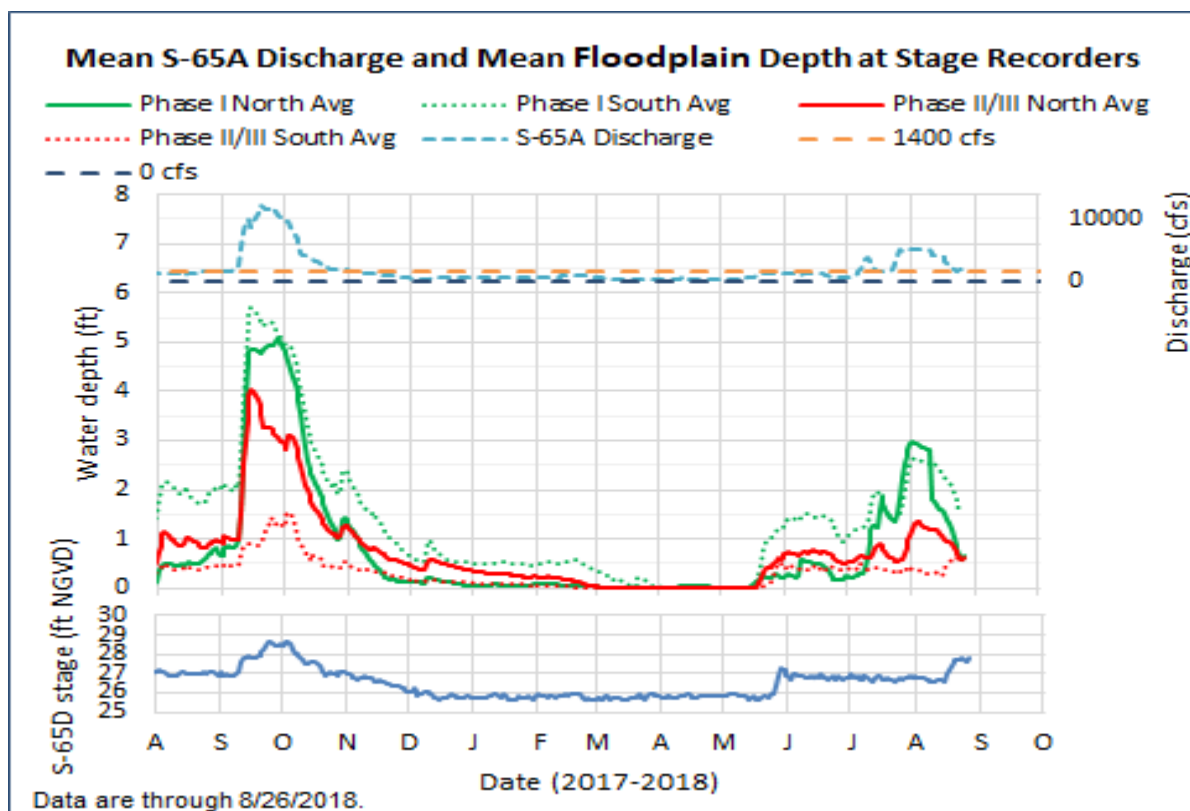


Figure 7.

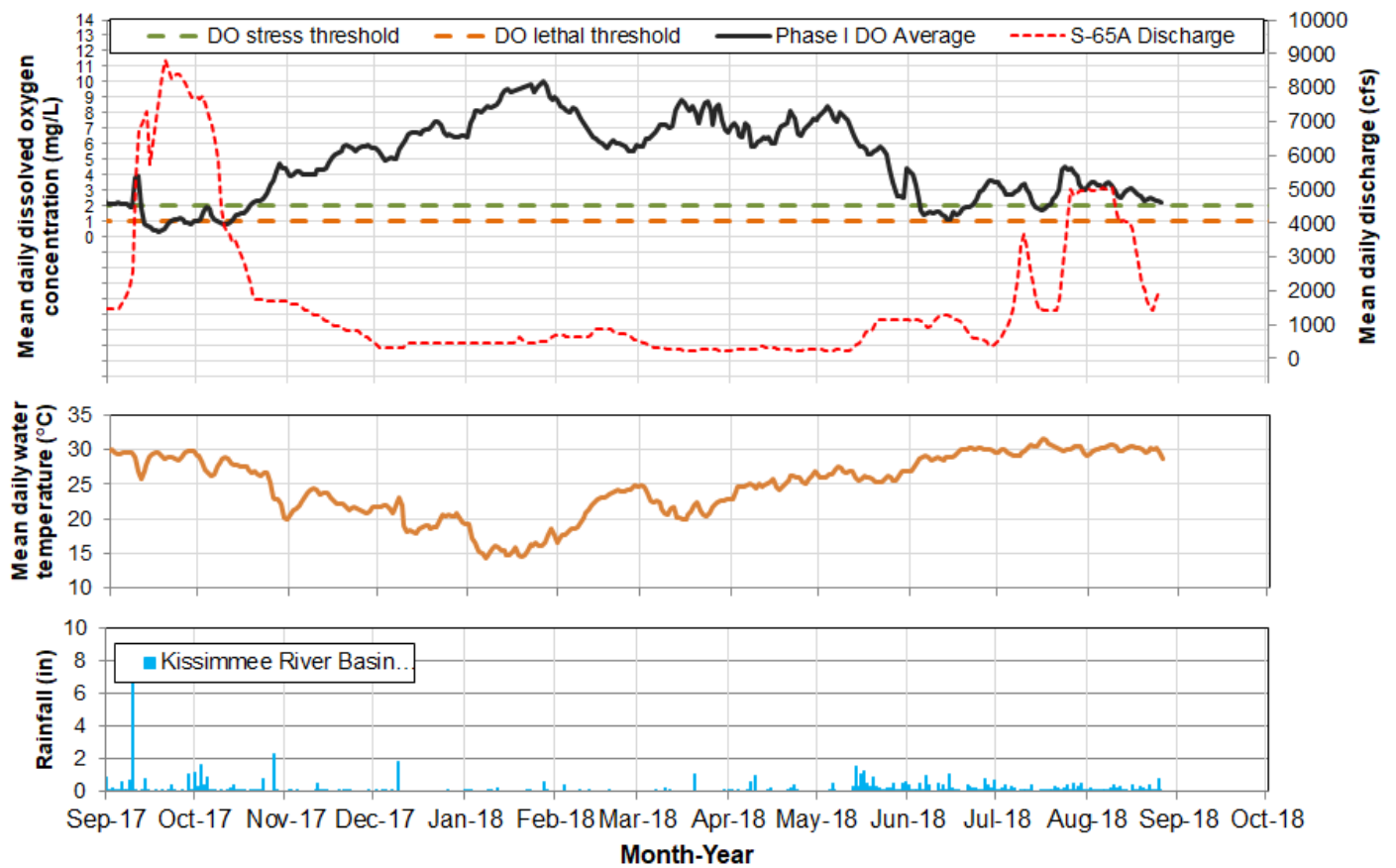




**Figure 8.** Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to January 16, 2012.



**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.



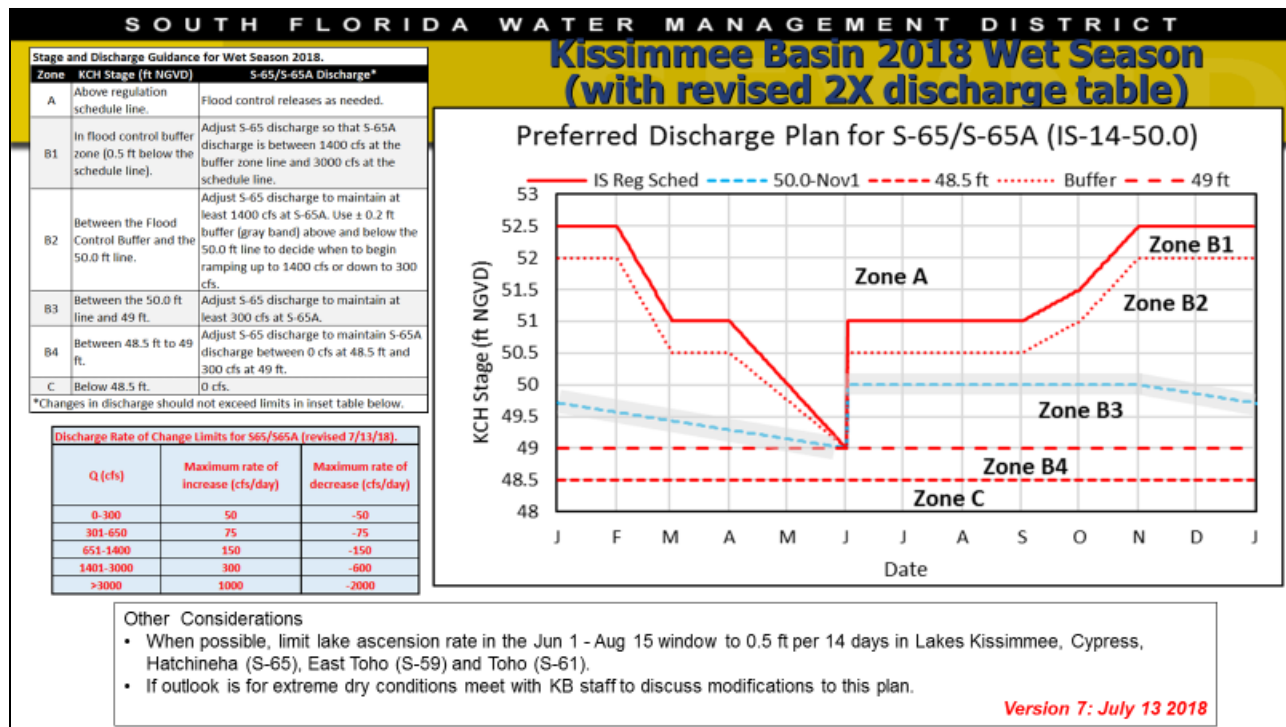
**Figure 10.** Mean daily dissolved oxygen, discharge, temperature and rainfall in the Phase I river channel.



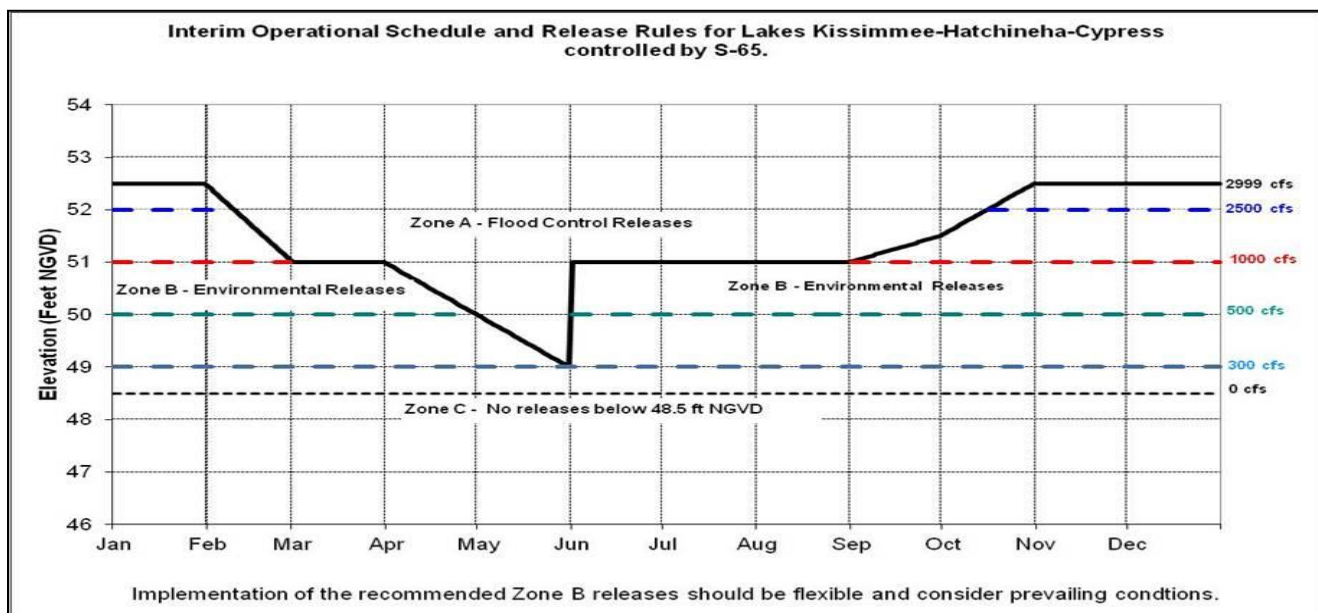
# Water Management Recommendations

## Kissimmee Basin Adaptive Recommendations and Operational Actions

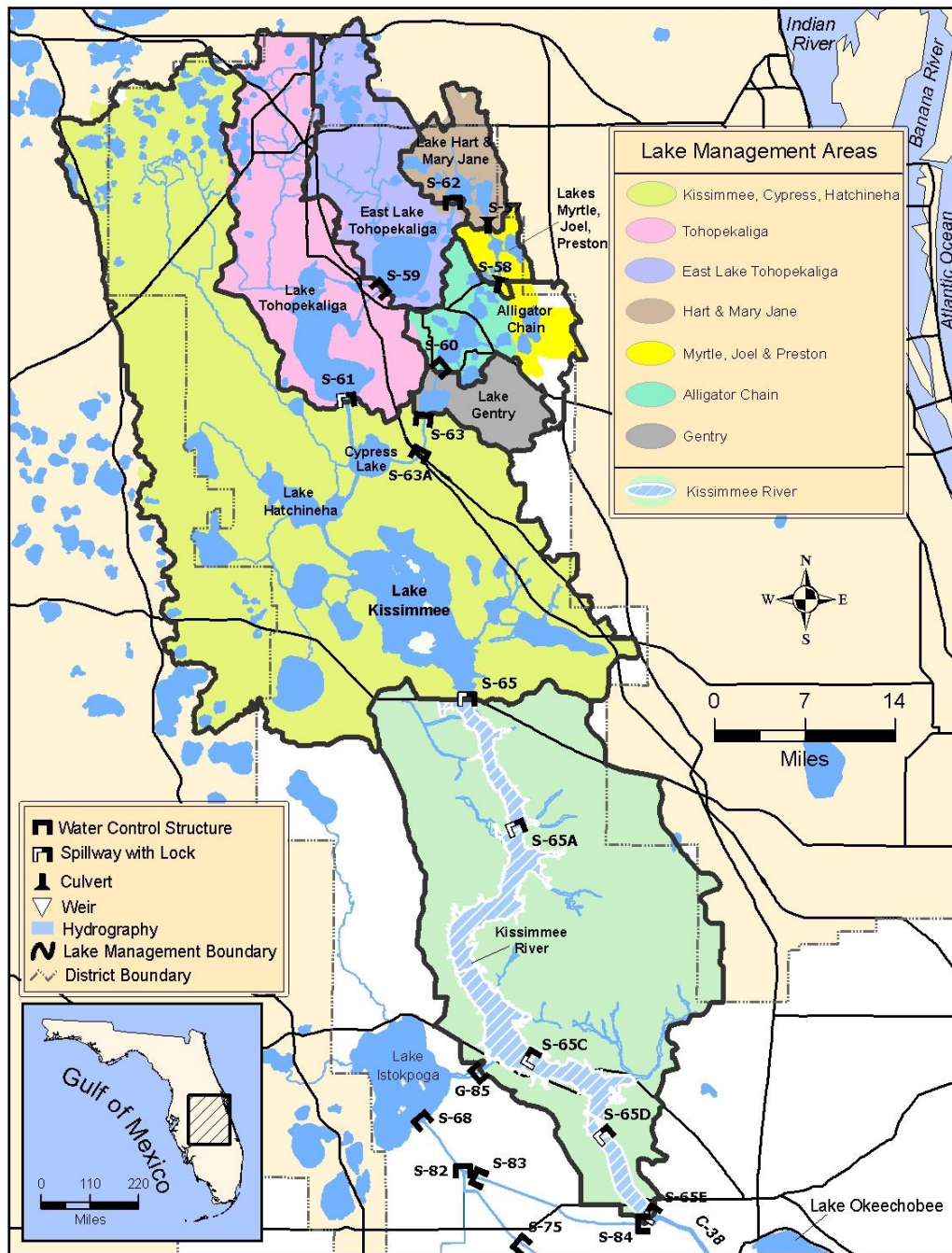
Recommendation Date	Recommendation	Purpose	Outcome	Source	Report Date
8/28/2018	No new recommendations.		N/A		8/7/2018
8/21/2018	No new recommendations.		N/A		8/7/2018
8/14/2018	No new recommendations.		N/A		8/7/2018
8/7/2018	No new recommendations.		N/A		8/7/2018
7/23/2018-7/24/2018	Increase discharge 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 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.	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
4/10/2018	No new recommendations.		N/A		4/10/2018
4/3/2018	No new recommendations.		N/A		4/3/2018
3/27/2018	No new recommendations.		N/A		3/27/2018



**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 14.54 feet NGVD for the period ending at midnight on August 27, 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 0.22 feet higher than it was a month ago and 1.04 feet higher than a year ago (Figure 1). The Lake remains in the Low sub-band (Figure 2). The August 27 lake stage was the third highest since 2011, with only 2013 and 2016 having higher stages, at 1.02 feet and 0.17 feet higher, respectively. According to RAINДАР, 1.44 inches of rain fell over the Lake during the week August 21, 2018 – August 27, 2018. Most of the watershed received more rainfall, between 1.5 and 3 inches of rain (Figure 3).

Average daily inflows to the Lake decreased from the previous week, declining to 4,357 cfs, from 5,134 cfs. Most of the decrease in inflows was from the Kissimmee River (S-65 structures), going from 4,201 cfs the previous week to 3,037 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 increased from the previous week by about 1,530 average daily cfs, rising to 4,588 cfs. The increase in outflows was primarily south through the S-350 structures and west through S-77. Discharges via the S-77 structure went from 839 cfs the previous week to 1,551 cfs this past week, while outflows to the south through the S-350 structures increased from 1,319 cfs the previous week to 1,990 cfs this past week. S-308 discharges to the east increased slightly from 903 cfs to 1,045 cfs this past week as well. The corrected average daily evapotranspiration value for the week based on the L006 weather platform solar radiation decreased from 0.16 inches the previous week to 0.12 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.

The most recent satellite imagery (August 25) using the cyanobacteria monitoring product derived from NOAA's analysis of EUMETSAT's OLCI satellite sensor showed the potential for a cyanobacteria bloom decreased recently, likely due to windy conditions towards the end of last week. As the summer progresses, periods of calm, drier weather may worsen bloom conditions periodically (Figure 5).

## **Water Management Recommendations**

Lake Okeechobee stage is 14.54 feet NGVD, 0.05 feet lower than last week and 0.22 feet higher than 30 days ago. The seasonal low for 2018 (12.83 feet NGVD) was the third highest since 2011, and the third time in six years that lake stage did not reach the bottom of the preferred stage envelope (12.5 – 15.5 feet NGVD). Due to record rainfall in May, 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 low lake stages in the summer of 2019, so efforts to prepare for such an event will help speed the rebound of this important community.

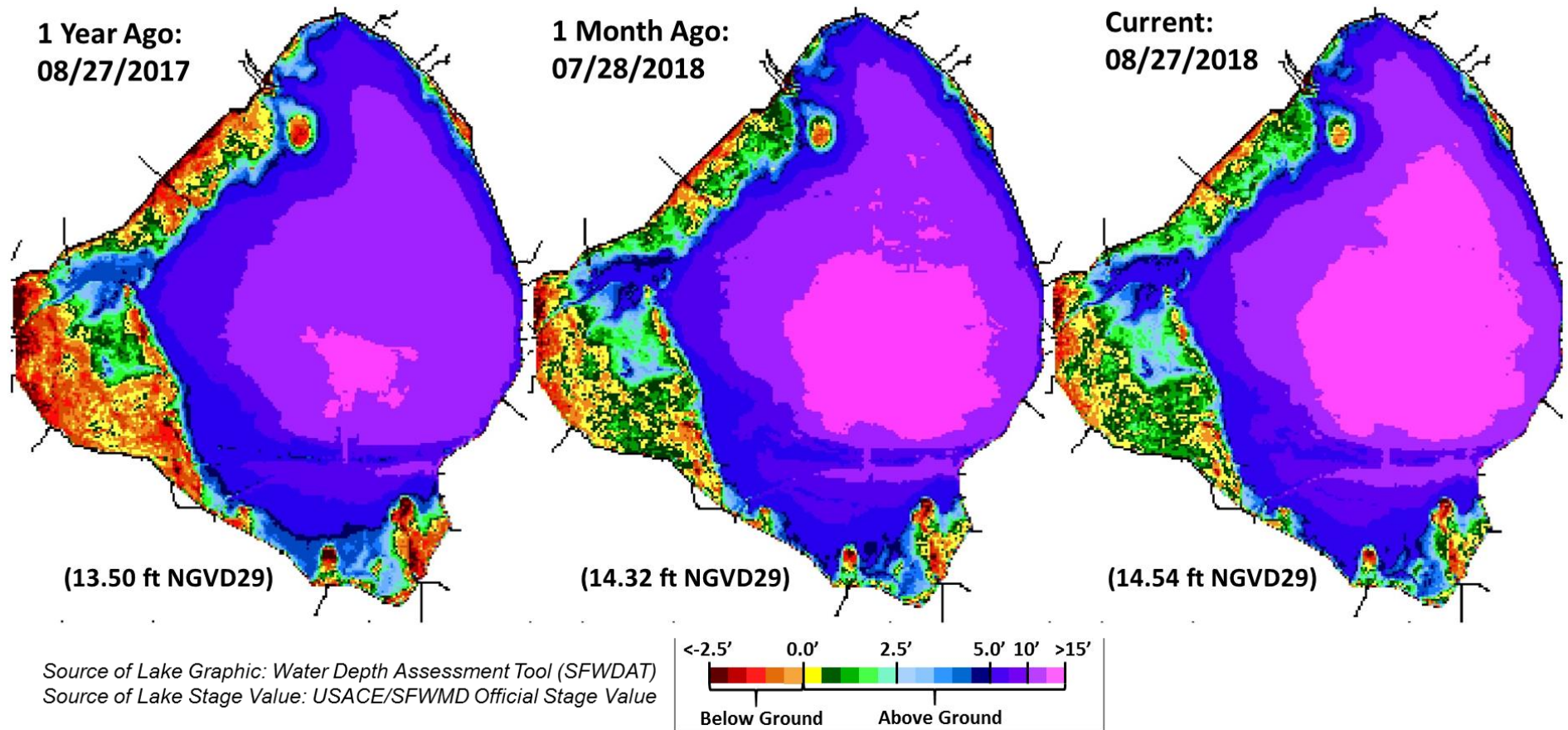
**Table 1.** Average daily inflows and outflows and the approximate depth equivalents on Lake Okeechobee for various structures.

INFLOWS	Previous Week Avg Daily cfs	Avg Daily Inflow cfs	Equivalent Depth Week Total (in)
S65E & S65EX1	4201	3037	1.2
S71 & 72	144	235	0.1
S84 & 84X	566	785	0.3
Fisheating Creek	109	133	0.1
S154	0	0	0.0
S191	34	116	0.0
S133 P	23	23	0.0
S127 P	7	4	0.0
S129 P	16	2	0.0
S131 P	0	0	0.0
S135 P	18	21	0.0
S2 P	0	0	0.0
S3 P	0	0	0.0
S4 P	0	0	0.0
L8 Backflow	16	0	0.0
Rainfall	1618	3968	1.4
<b>Total</b>	<b>6751</b>	<b>8326</b>	<b>3.2</b>

OUTFLOWS	Previous Week Avg Daily cfs	Avg Daily Outflow cfs	Equivalent Depth Week Total (in)
S77	839	1551	0.6
S308	903	1045	0.4
S351	680	876	0.4
S352	137	341	0.1
S354	502	773	0.3
L8 Outflow	0	1	0.0
ET	3059	2370	1.0
<b>Total</b>	<b>6121</b>	<b>6958</b>	<b>2.8</b>

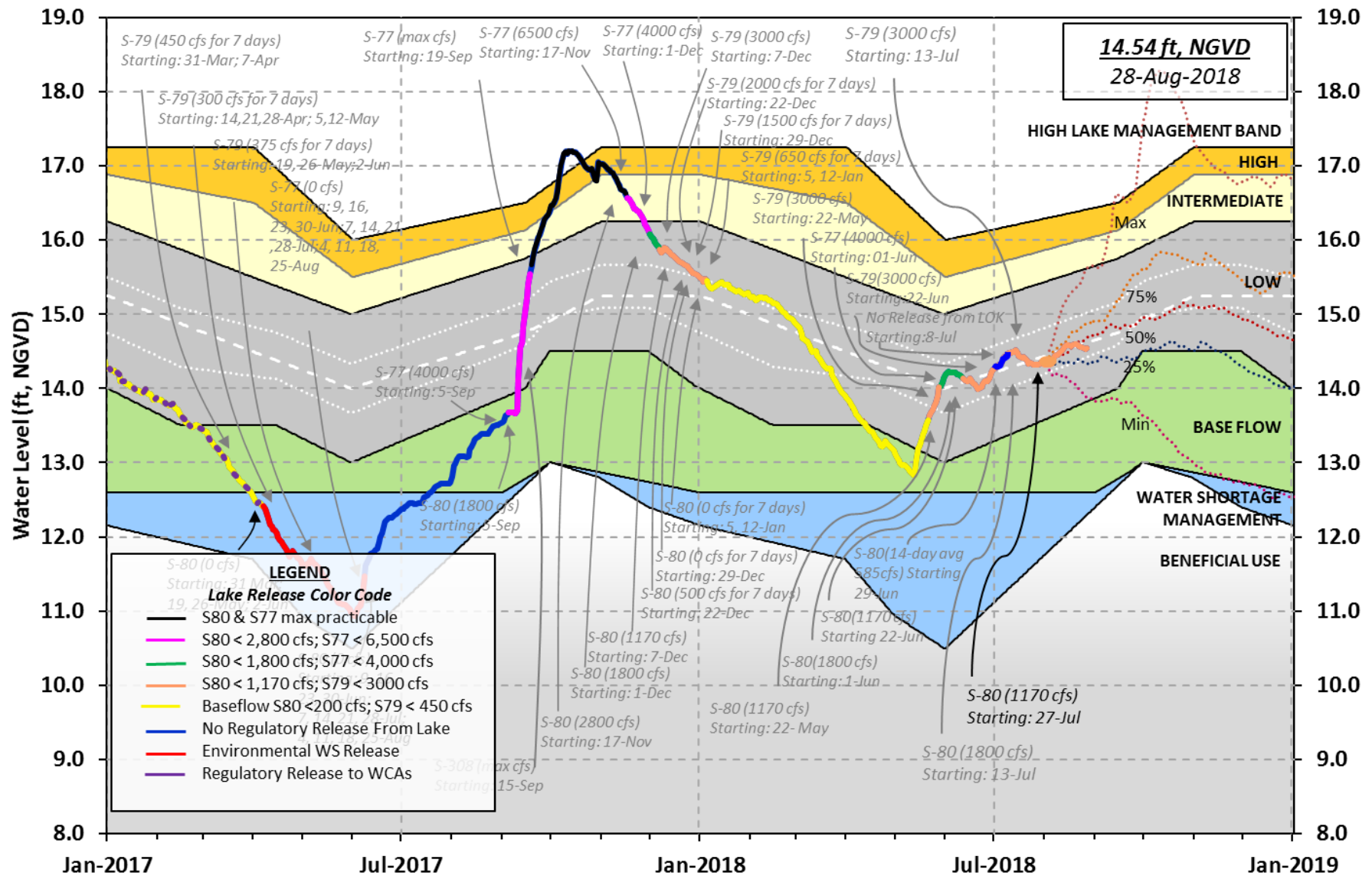
**PROVISIONAL DATA**





**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



LORS-2008

Adopted by USACE 28-April-2008

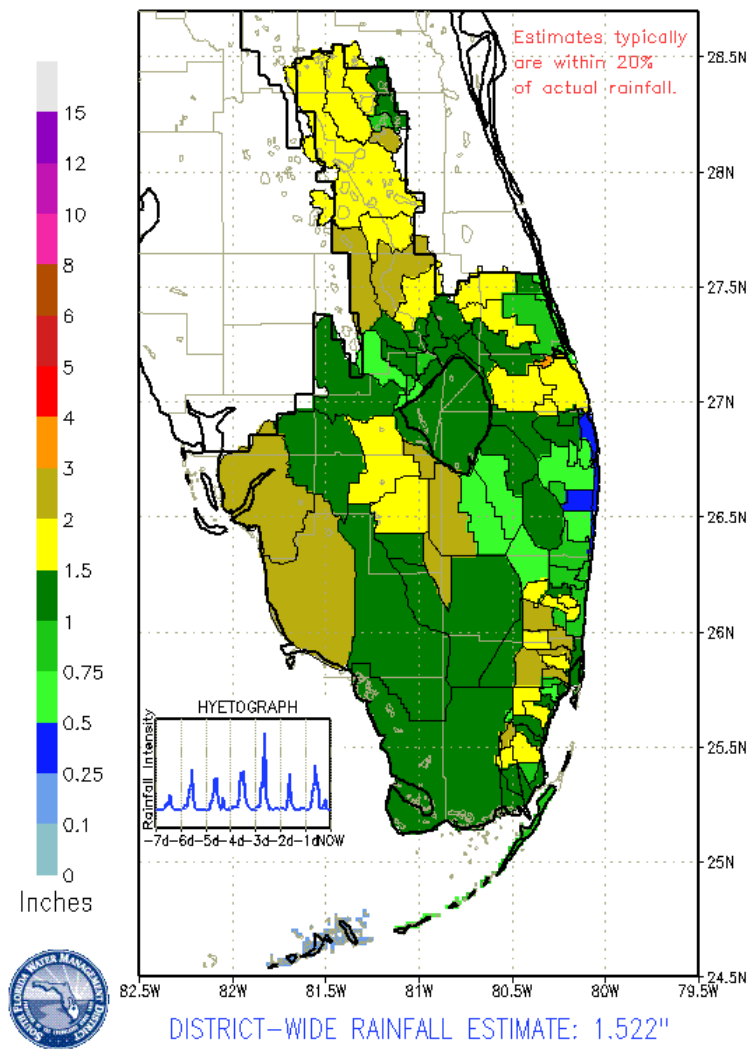
Projected Stage Percentiles From  
SFWMD-HESM Position Analysis

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

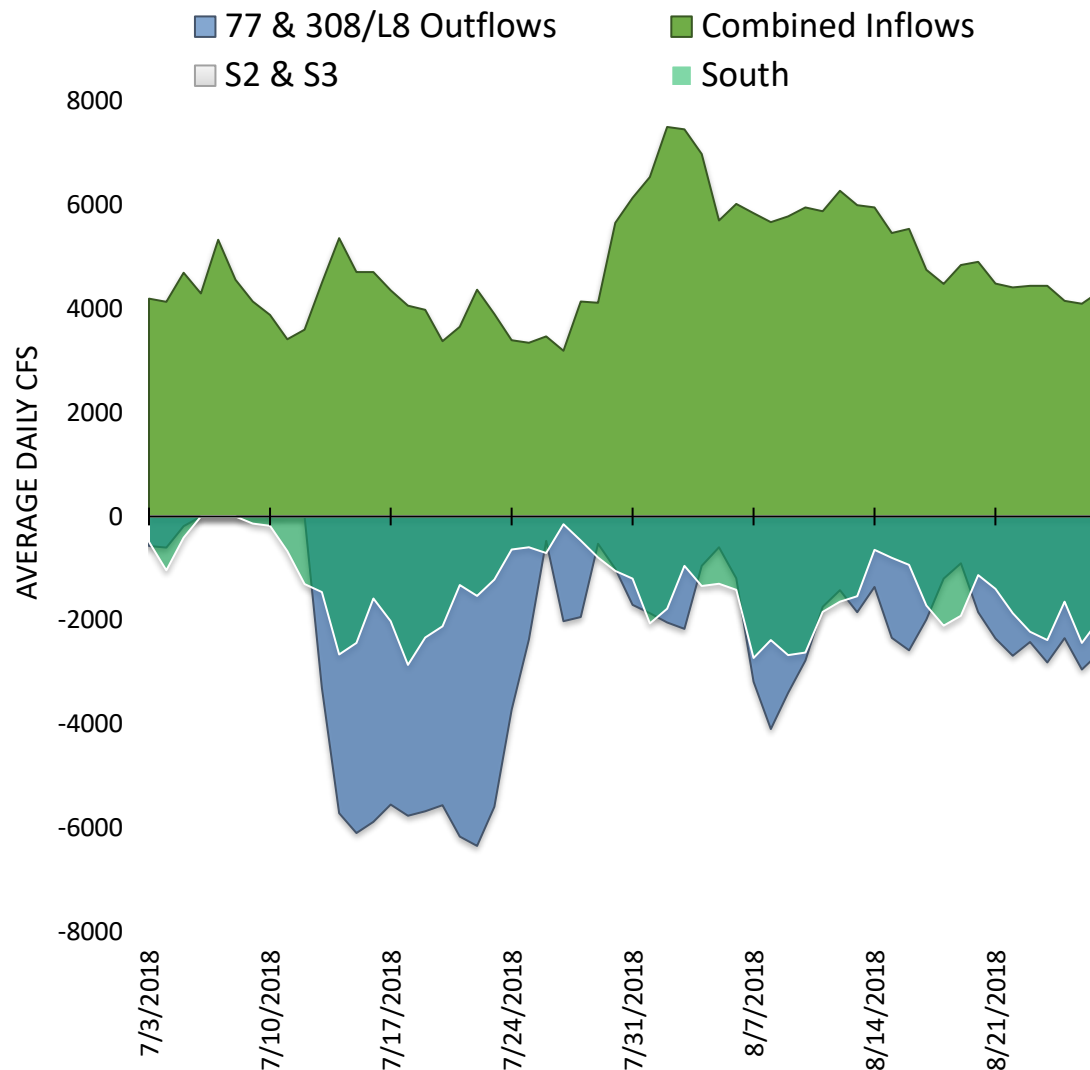


# SFWMD PROVISIONAL RAINDAR 7-DAY BASIN RAINFALL ESTIMATES

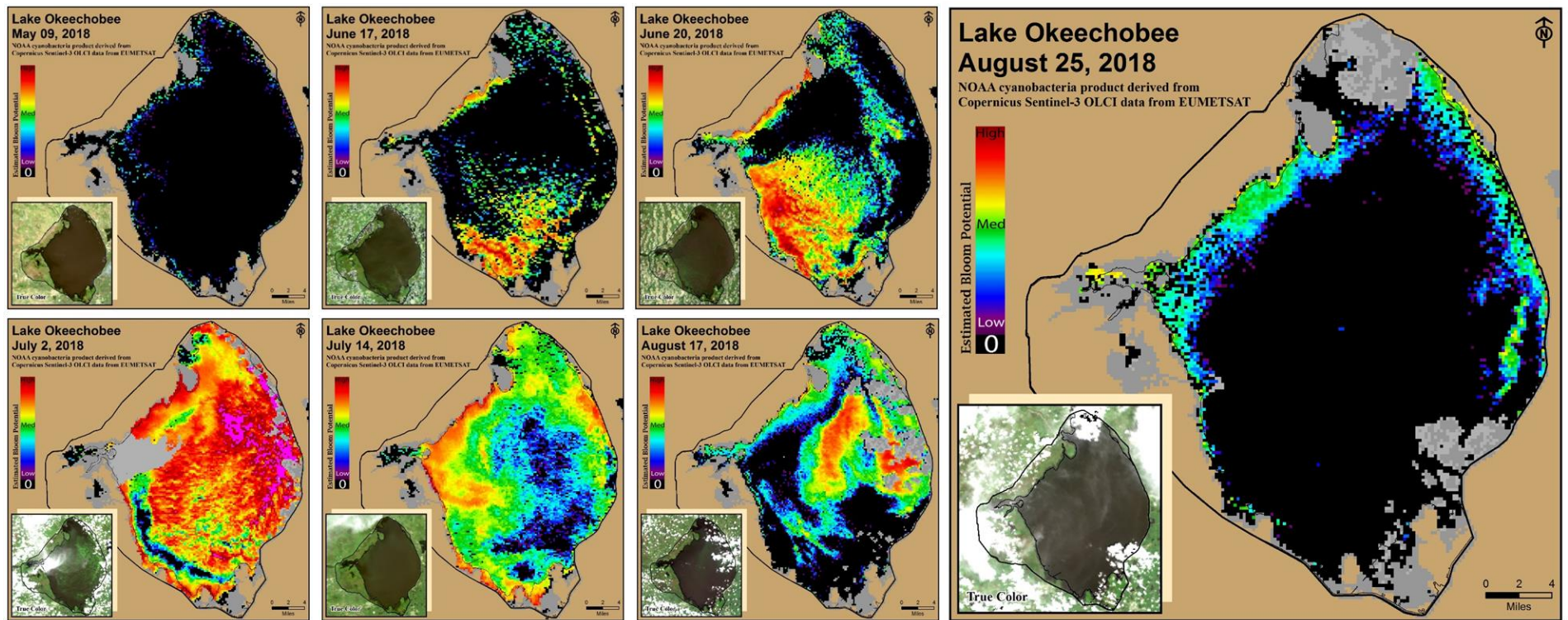
FROM: 0530 EST, 08/21/2018 THROUGH: 0530 EST, 08/28/2018



**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. Inflows and outflows are shown as positive and negative, respectively, for visual purposes.



**Figure 5.** 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 2,909 cfs (Figures 1 and 2) and last month inflow averaged about 2,303 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	872
S-80	1712
S-308	1045
S-49 on C-24	0
S-97 on C-23(estimate)	223
Gordy Rd. structure on Ten Mile Creek	102

Over the past week in the estuary, surface salinity stayed more or less the same in the North Fork (HR1) and slightly increased in the middle and lower parts of 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 5.3. 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>1.3</b> (1.4)	<b>2.3</b> (2.0)
US1 Bridge	<b>4.3</b> (3.2)	<b>6.1</b> (4.5)
A1A Bridge	<b>11.0</b> (10.5)	<b>20.9</b> (19.7)

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

### **Caloosahatchee Estuary:**

Last week total inflow to the Caloosahatchee Estuary averaged about 5,744 cfs (Figures 5 and 6) and last month inflow averaged about 4,352 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	1,551
S-78	2,398
S-79	4,294
Tidal Basin Inflow	1,623

Over the past week, salinity was near 0 down to Ft. Myers Yacht Basin and slightly decreased downstream (Table 4, Figures 7 & 8). The seven-day average salinity values are estimated to be in 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.

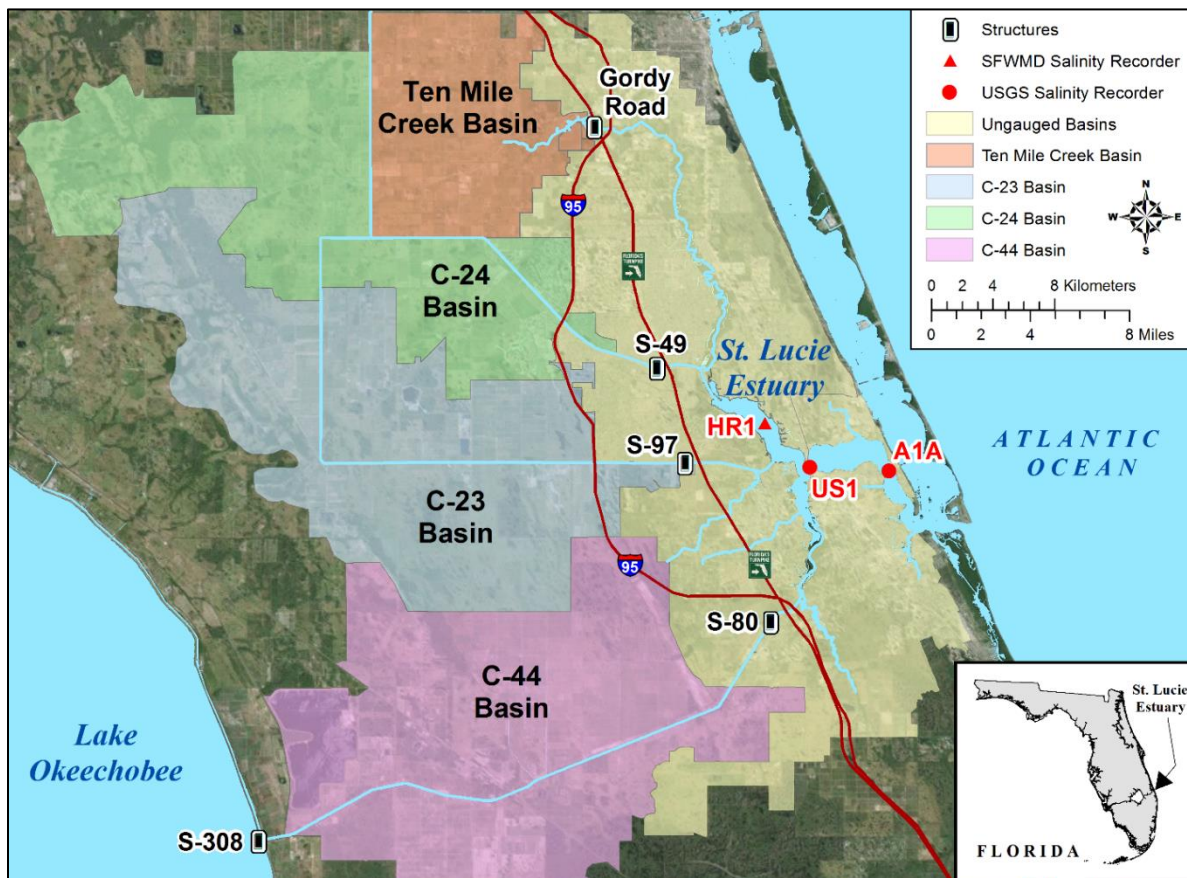
Sampling Site	Surface	Bottom
S-79 (Franklin Lock)	<b>0.2</b> (0.2)	<b>0.2</b> (0.2)
Val I75	<b>0.2</b> (0.2)	<b>0.2</b> (0.2)
Ft. Myers Yacht Basin	<b>0.2</b> (0.2)	<b>0.2</b> (0.2)
Cape Coral	<b>2.2</b> (2.4)	<b>3.5</b> (4.0)
Shell Point	<b>13.1</b> (13.9)	<b>13.3</b> (14.7)
Sanibel	<b>NR</b> <sup>3</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 August 24, 2018, that *Karenia brevis*, the Florida red tide dinoflagellate, was observed at very low to high concentrations in 35 samples collected from or offshore of Lee County. Fish kills and respiratory irritation were reported in Lee County over the past week.

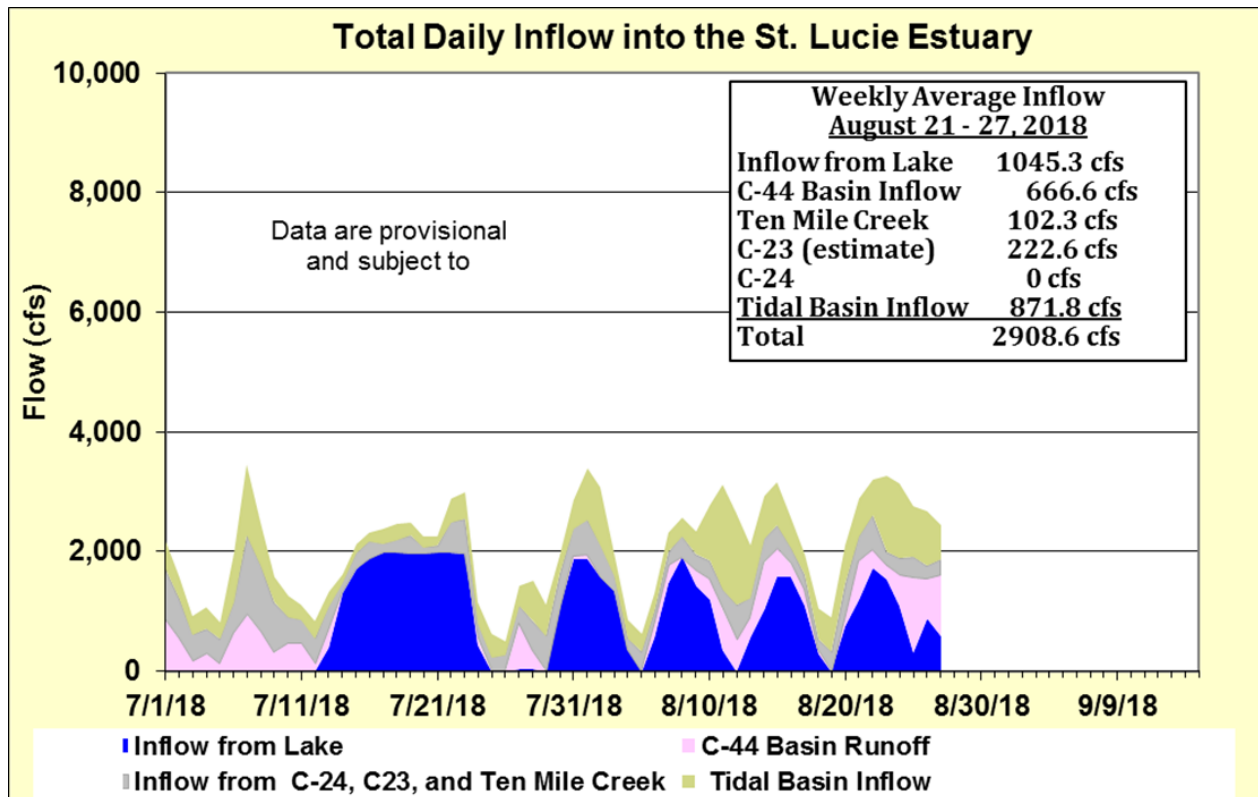
### **Water Management Recommendations**

Lake stage is in the Low sub-band of 2008 LORS. Tributary hydrological conditions are wet. The 2008 LORS recommends up to 3,000 cfs at S-79 and up to 1,170 cfs at S-80. Given the current estuarine conditions, there are no ecological benefits associated with freshwater releases from Lake Okeechobee.

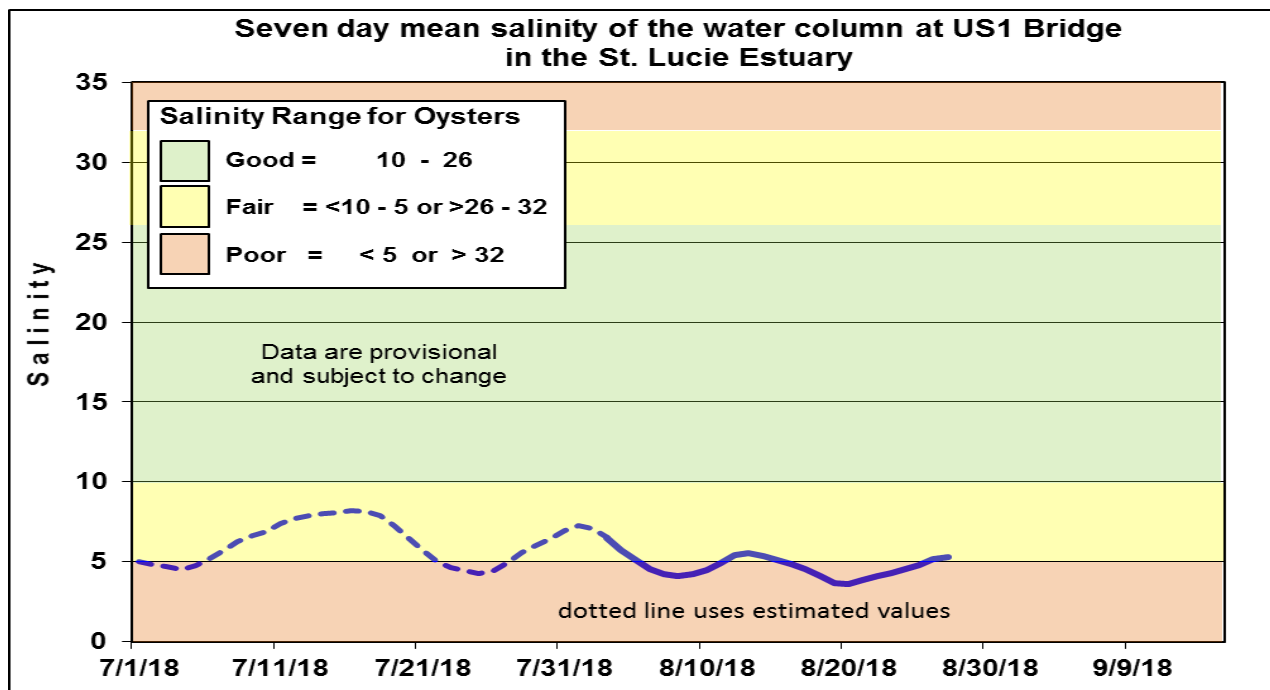


**Figure 1.** Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.





**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.

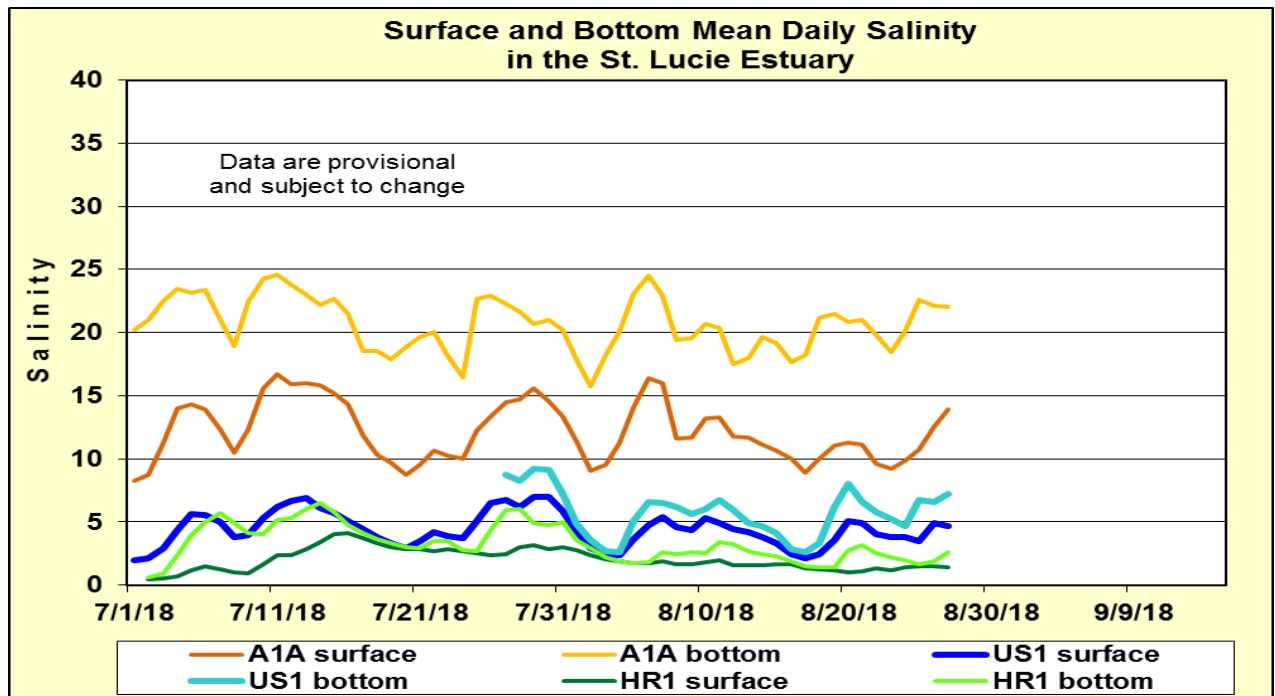


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

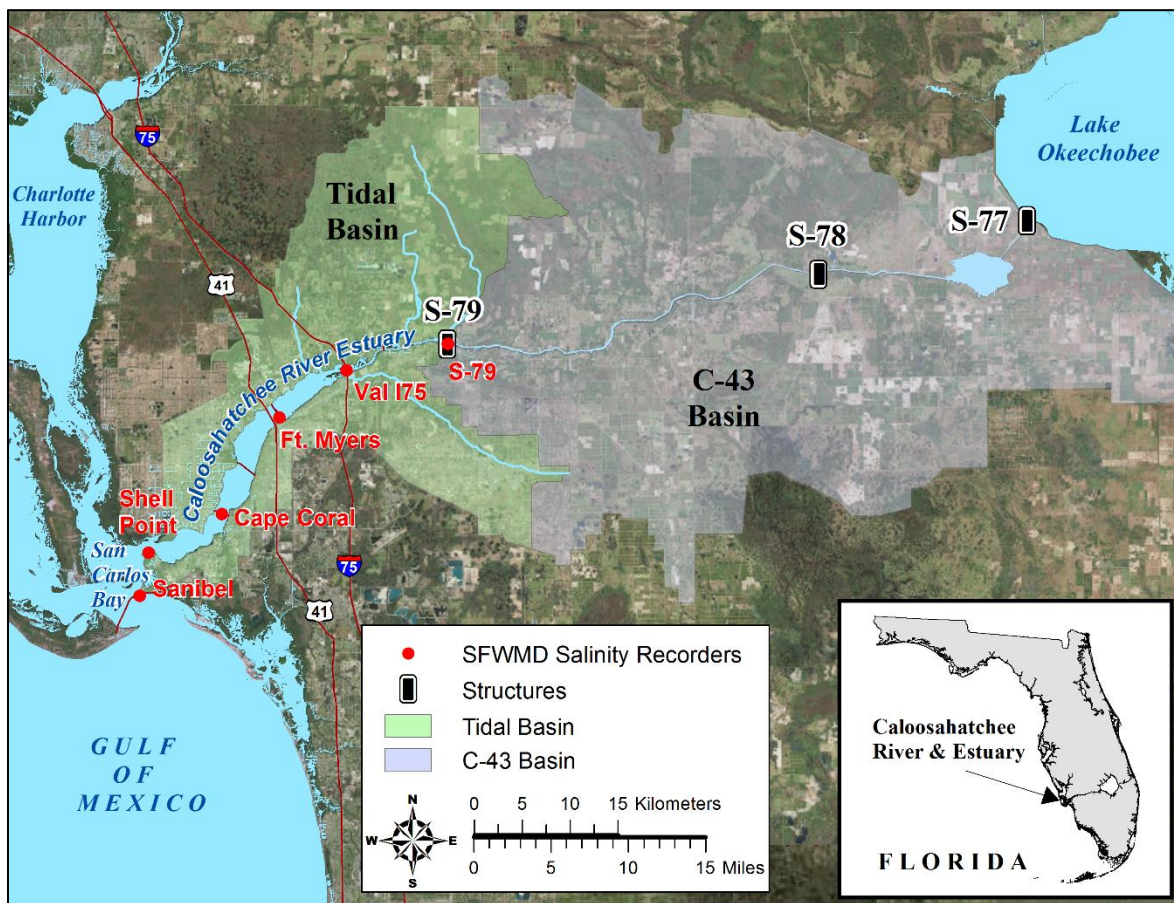
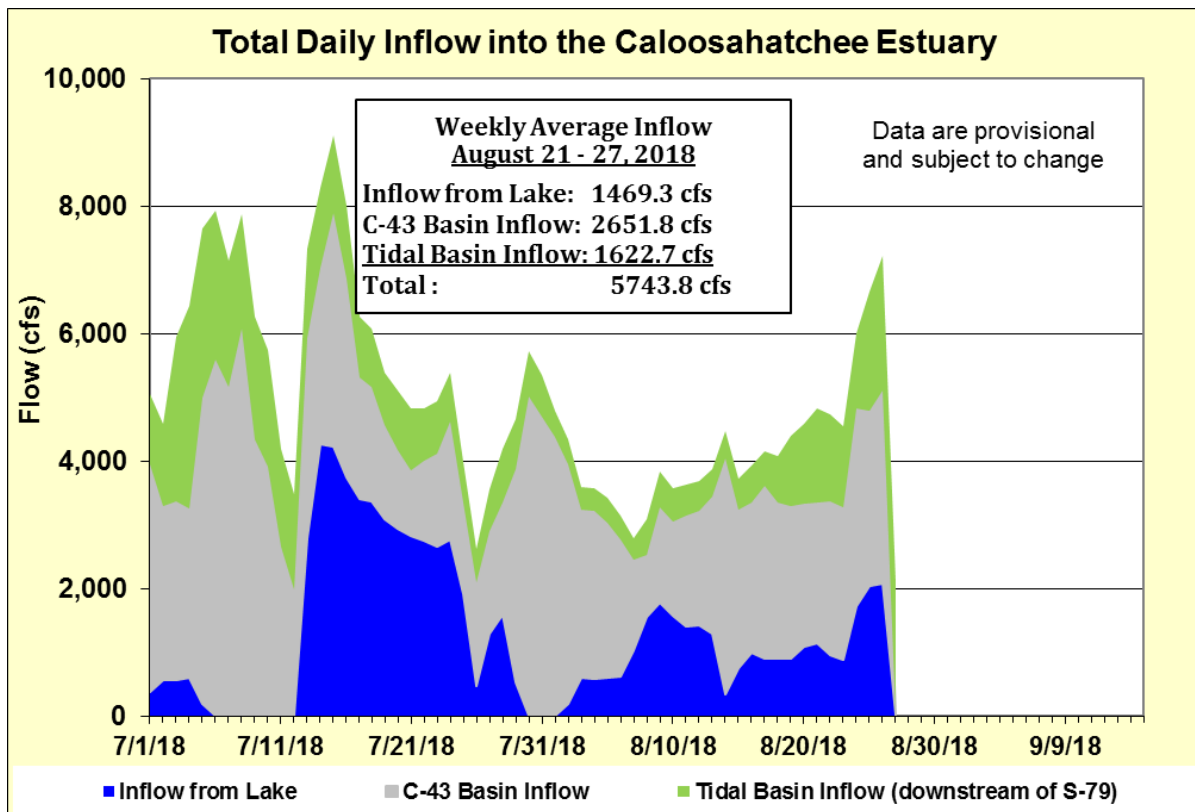
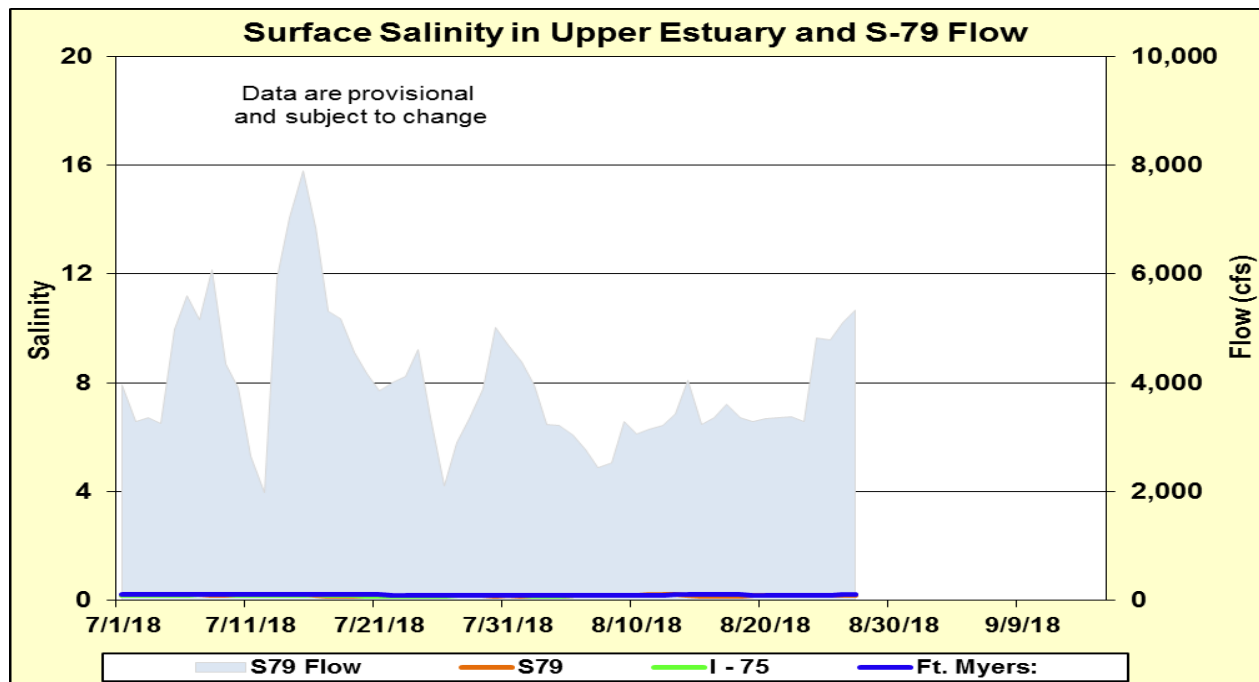


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

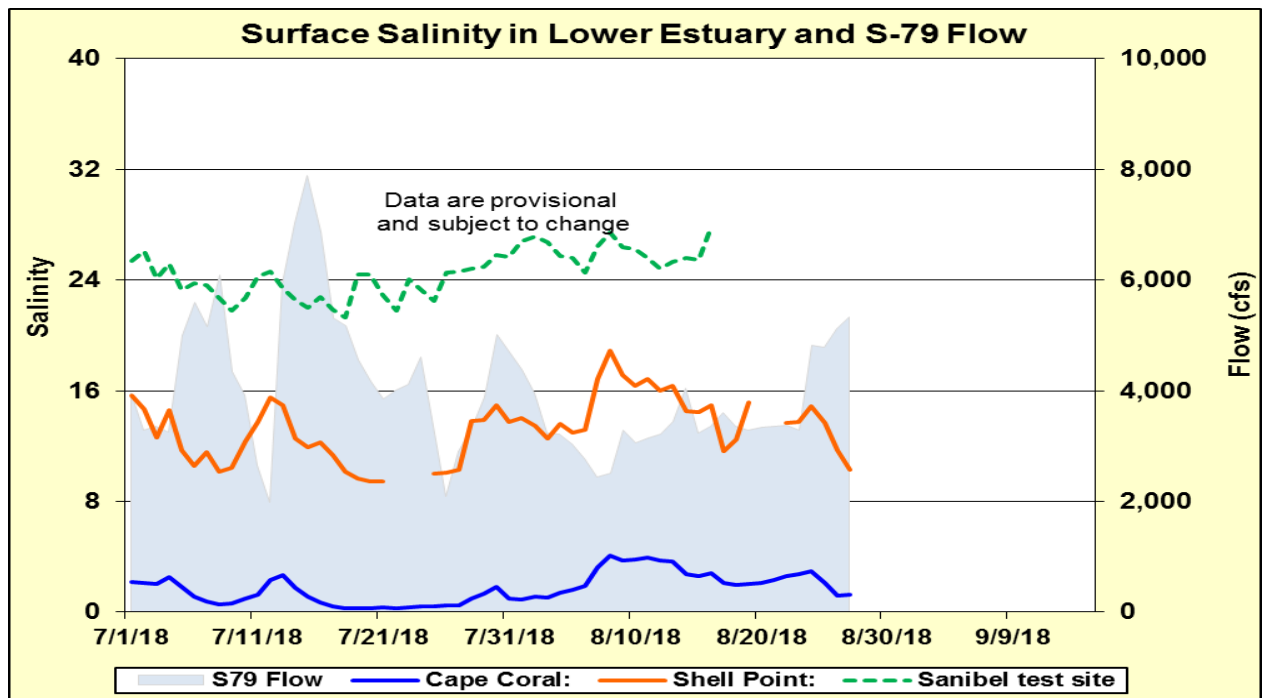


**Figure 6.** Total daily inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.

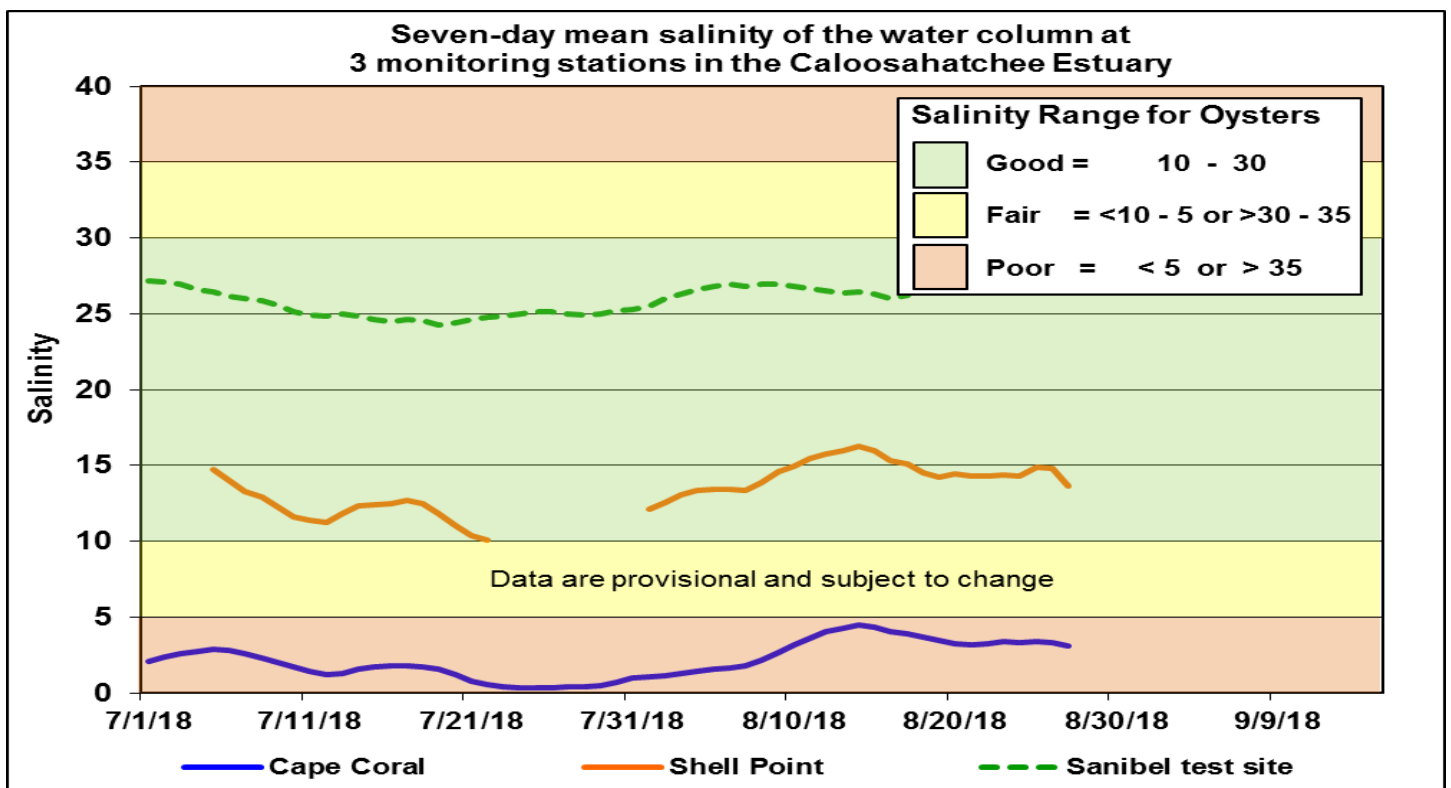


**Figure 7.** Daily mean flows at S-79 and salinity at upper estuary monitoring stations.





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

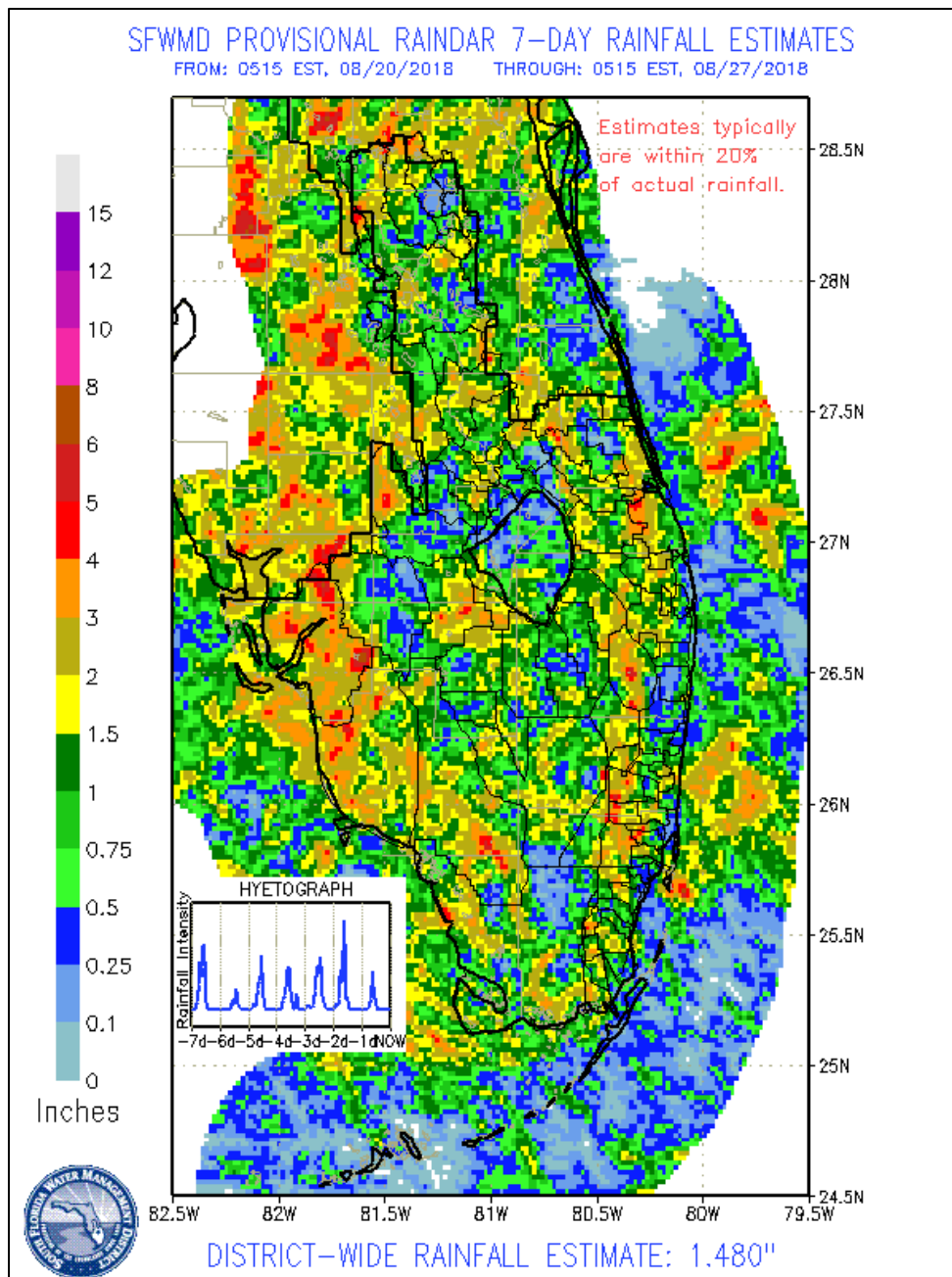


**Figure 9.** Seven-day mean salinity at Cape Coral, Shell Point, and Sanibel monitoring stations.

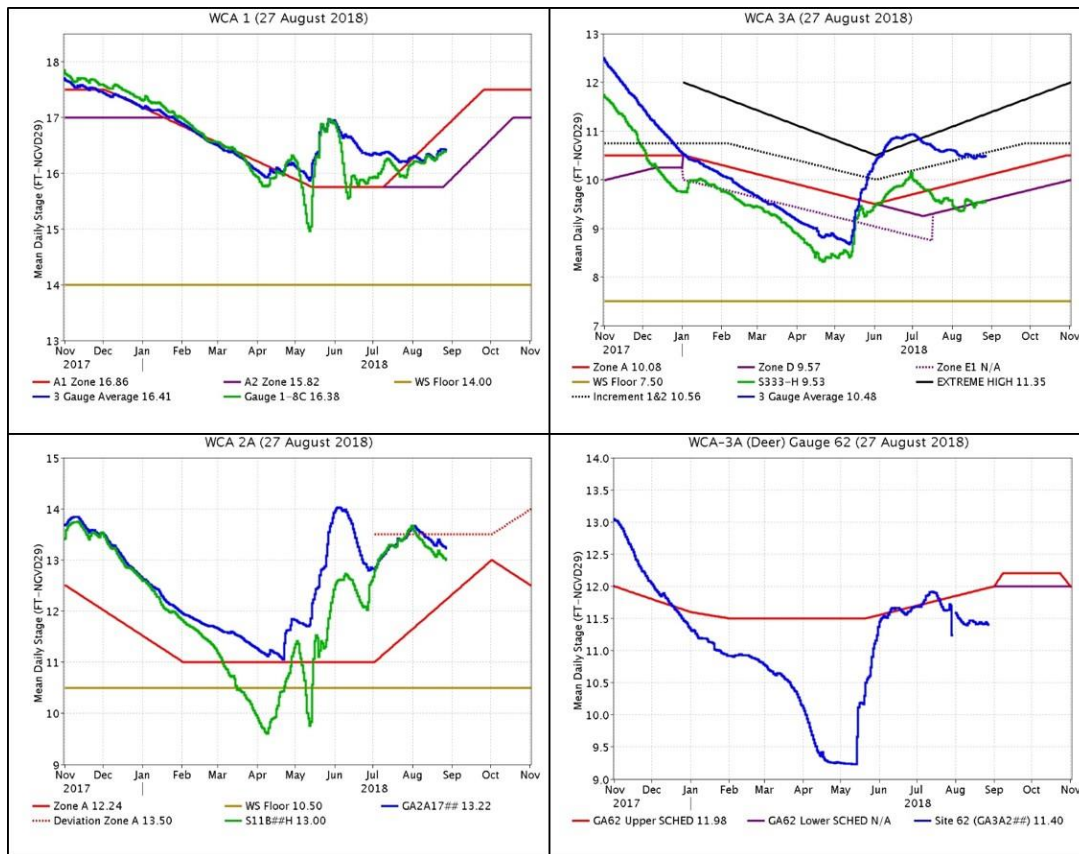
## **EVERGLADES**

At the gauge locations monitored for this report stages within the WCA-2A,2B,3A and 3B remained unchanged on average over the last week. The marsh gauges within WCA-1 rose 0.18 feet on average, the increase near the canal gauge was 0.04 feet. The most extreme individual gauge changes within the WCAs ranged from -0.16 feet (WCA-2A) to +0.20 feet (WCA-1). Pan evaporation was estimated at 1.83 inches.

<b>Everglades Region</b>	<b>Rainfall (Inches)</b>	<b>Stage Change (feet)</b>
WCA-1	2.20	+0.13
WCA-2A	1.54	-0.03
WCA-2B	2.00	-0.02
WCA-3A	1.26	+0.01
WCA-3B	1.39	+0.02
ENP	1.18	-0.02



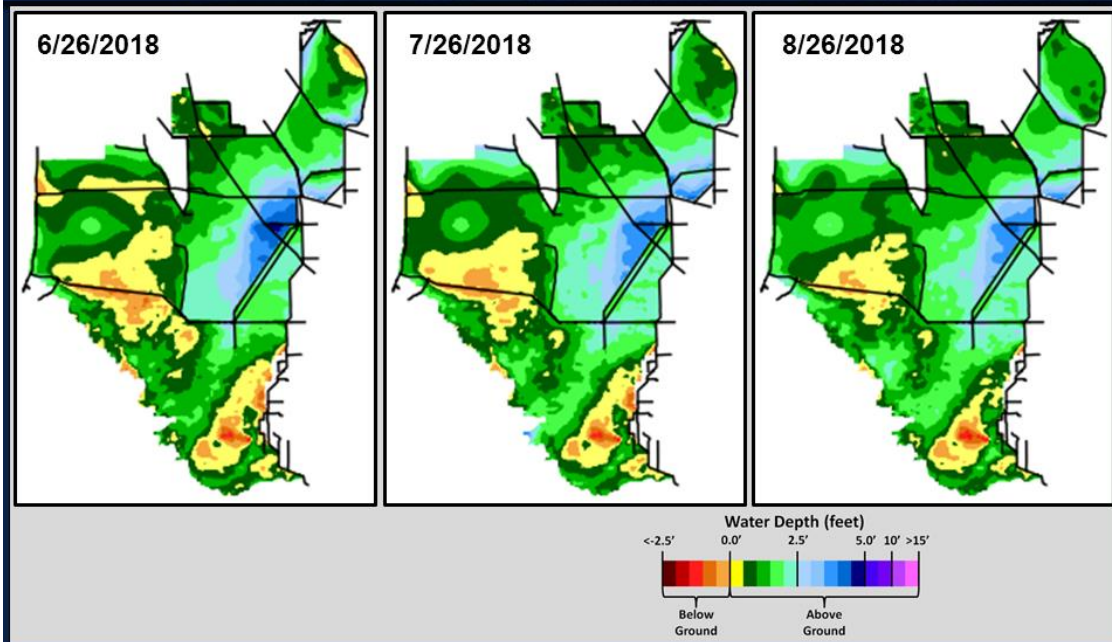
Regulation Schedules: WCA-1 three-gauge average stage is 0.45 feet below Zone A1, gauge 1-8C stage is 0.50 feet below. Both are between Zone A1 and A2. WCA-2A marsh stage is 0.28 feet below Dev. Zone A, S-11B Headwater stage is 0.50 feet below. WCA-3A three-gauge average stage is 0.08 feet below Increment 1&2, and 0.40 feet above Zone A and continues to trend towards schedule. WCA-3A stage at gauge 62 (northwest corner) remains below schedule, the stage is 0.58 feet below the rising arm of the upper schedule.



Water Depths and Changes: The WDAT tool for spatial interpolation of depth monthly snapshots indicate that depths have decreased in WCA-3A North compared to one month ago. Ponding depths are similar along the L-67 in WCA-3A South. Water depths in northern WCA-2A look very similar over the last two months, with slightly less ponded water in the south. WDAT output indicates that water depths across WCA-3A, 2A and 2B are slightly lower or unchanged compared to one month ago; WCA-3B depths are unchanged or slightly higher. The southernmost portions of all the WCAs (areas that are historically ponded) are currently significantly drier than they were a year ago.



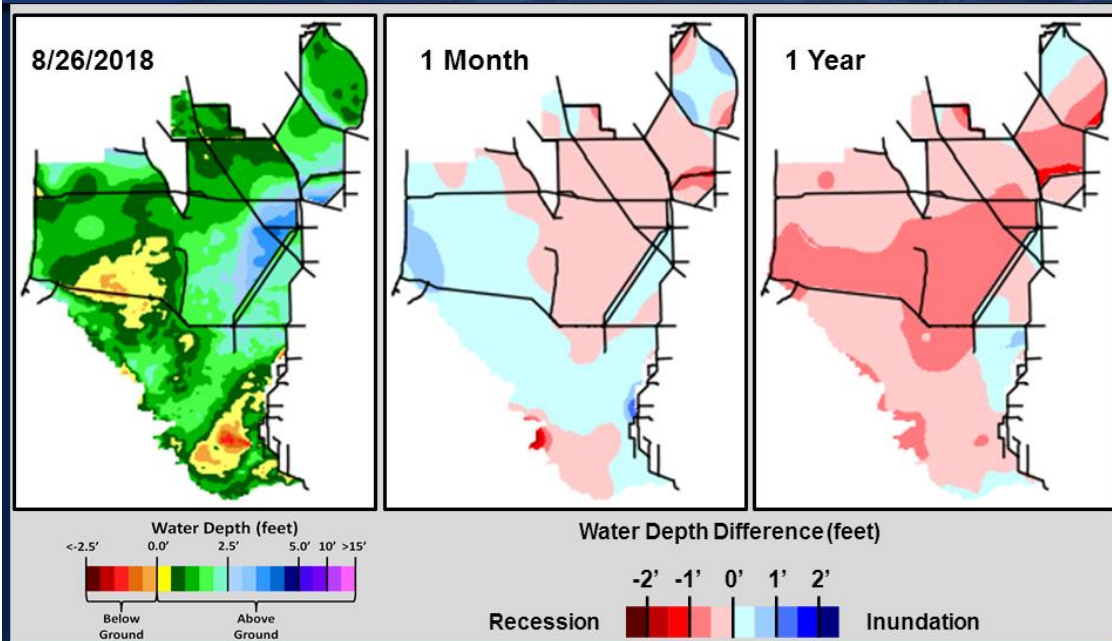
## SFWDAT Water Depth Monthly Snapshots



South Florida Water Depth Assessment Tool (SFWDAT)



## SFWDAT Everglades Difference Maps (Present – Past)

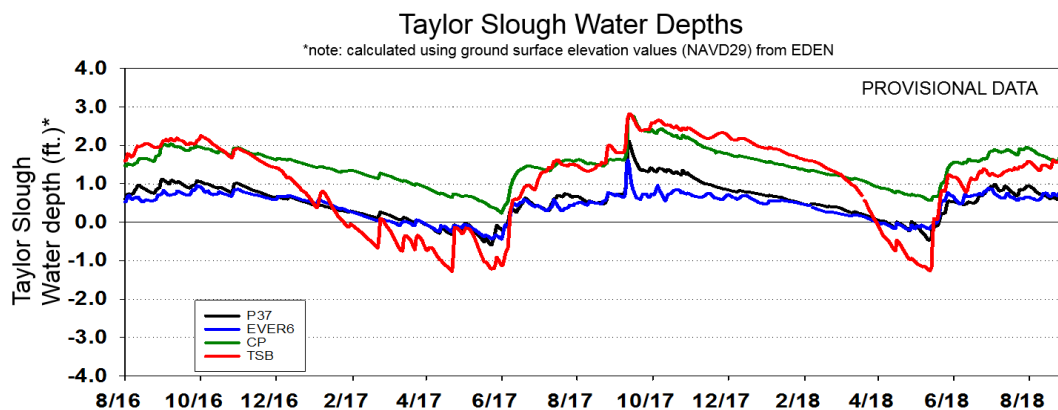
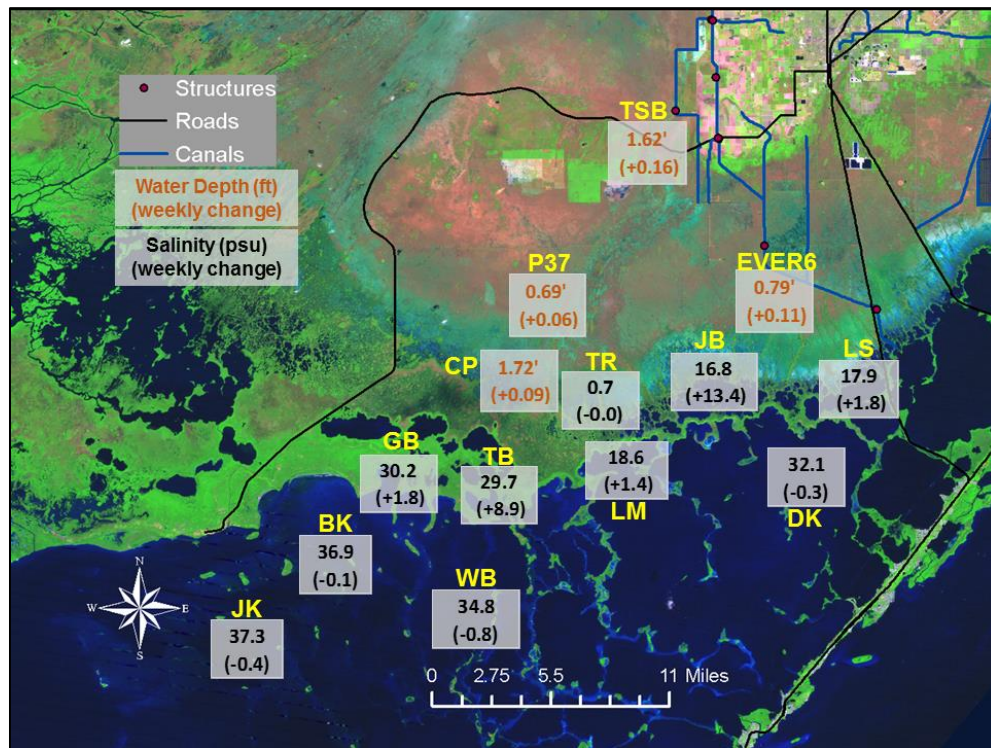


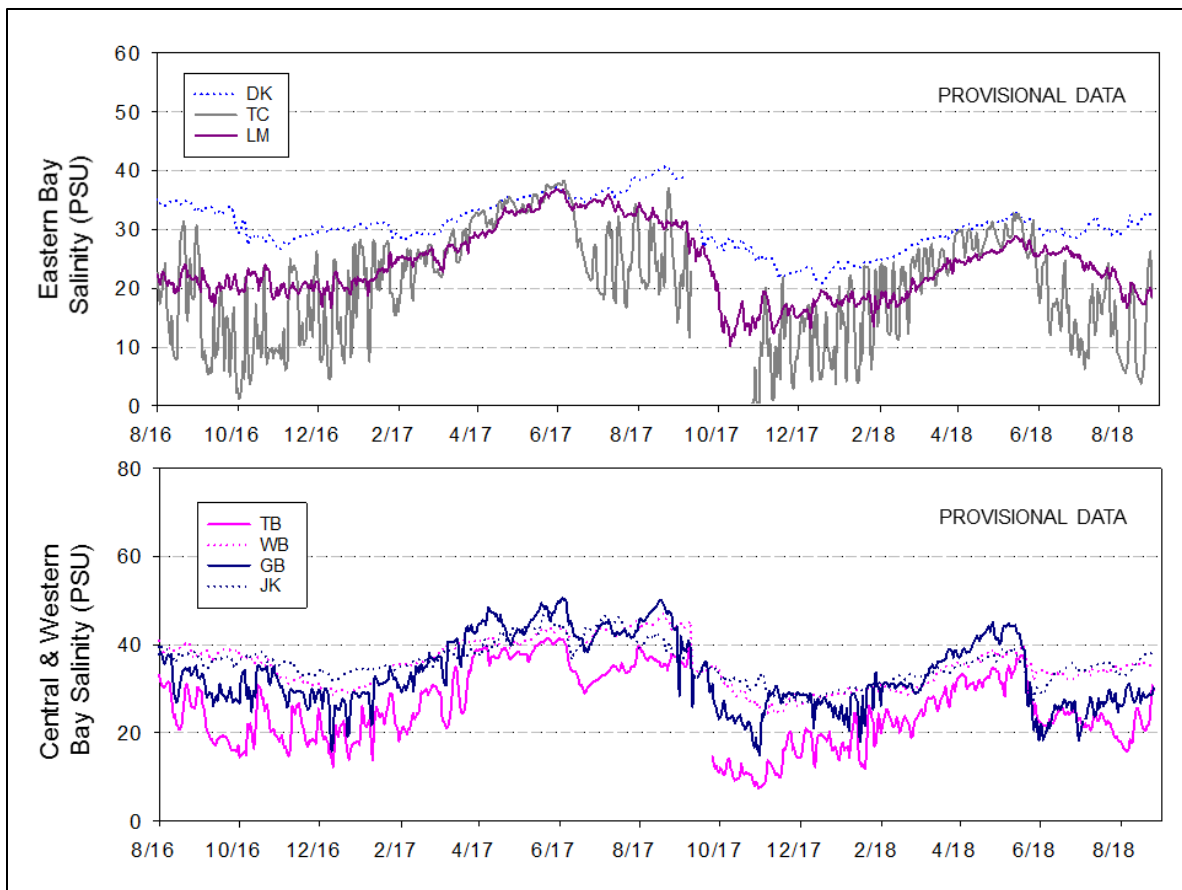
South Florida Water Depth Assessment Tool (SFWDAT)



Taylor Slough Water Levels: An average of 1.2 inches of rain fell on Taylor Slough and Florida Bay this past week, and stages averaged an increase of 0.1 feet. Water depths currently average about 1.1 feet across Taylor Slough which is still 1 to 3 inches above the historical averages at the individual stations.

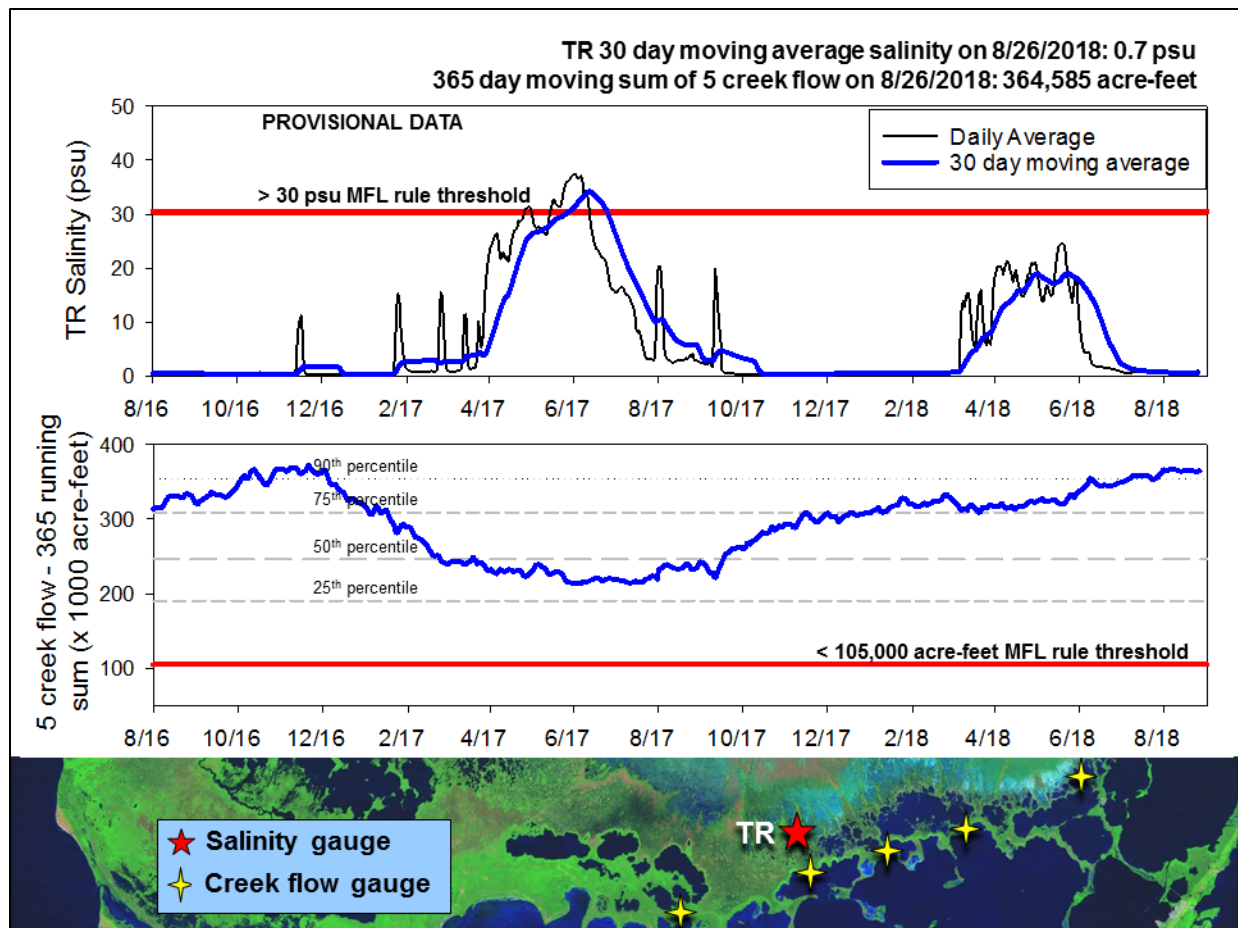
Florida Bay Salinities: Salinities in Florida Bay were impacted by a long wind event last week that pushed saline water upstream for most of the week. As a result, salinity near the shoreline increased by up to 13 psu. Salinities ranged from 17 psu in the northeast to 37 psu in the west. Positive creek flows had resumed on Sunday, and salinities are expected to decrease as a result.





Florida Bay MFL: Mangrove zone daily average salinity also increased this past week, peaking at 1.2 psu on Saturday before returning to 0.7 psu. The 30-day moving average is 0.7 psu. The weekly cumulative flow from the five creeks denoted by yellow stars on the map totaled about -2,700 acre-feet for the last week with the upstream flows. The 365-day moving sum of flow from the five creeks ended the last week at 364,585 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. As indicated by the WDAT depths across much of historically over drained WCA-3A North are less than 1.0 foot deep. Currently the stage at gauge 3-62 (located in northwest WCA-3A) is below the historical average for this time of year. These conditions contrast with conditions in WCA-3A South. 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 could serve both flood protection and ecological means. 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). Due to elevated levels of phosphorus in the S-332D detention area and the Frog Pond detention area, a recommendation is being made to limit the increase in depths within the L-31W to no more than 3 inches per day over the course of 3 to 4 weeks when S-332D, S-328, and/or G-737 are opened. More specific recommendations appear in the summary table below. The red text represents new or modified information or recommendations.

**SFWMD Everglades Ecological Recommendations, August 28th, 2018 (red is new)**

Area	Weekly change	Recommendation	Reasons
WCA-1	Stage increased by 0.13'	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 0.03'	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 0.02'	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.
WCA-3A NE	Stage increased by 0.02'	Maintain depths at regulation schedule.	Protect habitat including <u>peat soil</u> development, tree islands and wildlife.
WCA-3A NW	Stage decreased by 0.03'	Maintain depths at regulation schedule.	
Central WCA-3A S	Stage increased by 0.04'	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 was unchanged		
WCA-3B	Stage changes ranged from -0.09' to +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.
ENP-SRS	Stage decreased by 0.02'	Make discharges to the Park according to the 2012 WCP rainfall plan.	Protect upstream/downstream habitat and wildlife.
Taylor Slough	Stage changes ranged from +0.06' to +0.16'	Move water southward as possible. Limit increases in the L-31W to less than 3 inches per day for 3-4 weeks to allow for reductions in phosphorus concentrations.	When available, provide freshwater buffer for downstream conditions. Decrease potential for high phosphorus input to ENP.
FB- Salinity	Salinity changes ranged -0.8 to +13.4 psu.	Move water southward as possible	When available, provide freshwater to maintain low salinity buffer and promote water movement.