

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 14, 2018

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

### **Summary**

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

The weather pattern across the District today has not changed much since yesterday, except that the axis of high pressure has shifted northward from the Florida Straits to central Florida. As a result, the low-to mid-level wind flow that was south-southwesterly yesterday has become east-southeasterly to southeasterly today across the southern two-thirds of the area. The new wind regime favors widely scattered shower or thunderstorm activity near or inland of the east coast generally early in the day, followed by drying. This should be especially true today since much drier air is forecast to arrive over the southeast by this afternoon or evening and gradually spread northwestward. A greater concentration of rains is favored over the western interior to the west coast, possibly extending northward to portions of the Kissimmee valley. With the overall moisture levels forecast to decrease across the District throughout the day, the predicted District-average rainfall should be similar to yesterday's total, which would make it below normal (daily normal ~0.25 inches"). The total will ultimately be dictated by the coverage and intensity of afternoon to early evening rains out west. Extremely dry mid-level Saharan Air (with relative humidities as low as 5-10%) is forecast to reach the District tomorrow, which should greatly reduce the rain coverage/intensity and result in much below normal rainfall. The abnormally dry conditions are expected to persist through Friday before the northern end of a weak tropical wave passes through the southern part of the District from late Friday through Saturday. The greater moisture and instability associated with this feature should cause an increase in shower and thunderstorm activity Saturday morning near the east coast that should extend through the southern half of the District later on Saturday. Behind the wave on Sunday and Monday, a moist and unstable southerly wind flow across the area should continue to enhance rain chances and rain coverage but District wide. The District-average rainfall on those two days should tick upward, likely to around the daily August climatological value (0.27"). This weekend's increase of rainfall notwithstanding, the week ending next Tuesday morning should see total District rainfall below average, with the model output indicating a probability density function breaking up as follows: about an 80% chance of below normal, 15% of near normal and a 5% chance or less of above normal. For the period, the deterministic quantitative precipitation forecast (QPF) is 0.97" (about 55% of normal) while the probabilistic guidance suggests the most likely range between 40 and 75%. The predominant easterly wind flows this week ahead also suggests that on average areas over the western interior to the west coast stand the best chance of seeing the most rain while lesser values are expected to the east.

#### **Kissimmee**

Tuesday morning stages were 56.5 feet NGVD (at schedule) in East Lake Toho, 53.5 feet NGVD (at schedule) in Toho, and 51.4 feet NGVD (0.4 feet above schedule) in Kissimmee-Cypress-Hatchineha; headwater stages were 46.3 feet NGVD at S-65A and 26.7 feet NGVD at S-65D. Tuesday morning discharges were: 3,792 cfs at S-65, 4,043 cfs at S-65A, and 4,850 cfs at S-65E. Dissolved oxygen

concentration in the Kissimmee River averaged 3.1 mg/L for the week. Kissimmee River mean floodplain depth on Sunday was 2.02 feet. No new recommendations were made this week.

### **Lake Okeechobee**

Lake Okeechobee stage is 14.55 feet NGVD, rising 0.16 feet from last week and 0.04 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. Average July total phosphorus values for the pelagic and nearshore regions of the lake were reduced from June values, but the pelagic average was still the highest for the month of July since 2006, following the hurricanes in 2004 and 2005. 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 13) suggests the chances for another bloom have decreased again over the last few days. 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 1,954 cfs over the past week with 985 cfs coming from Lake Okeechobee. Surface salinity decreased 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 poor range for adult eastern oysters.

Total inflow to the Caloosahatchee Estuary averaged 3,495 cfs over the past week with 1,434 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 49,400 acre-feet of inflows (which includes approximately 17,100 acre-feet of Lake releases). The total amount of inflows to the STAs in WY2019 (since May 1, 2018) is approximately 723,000 acre-feet, which includes approximately 95,400 acre-feet of Lake releases. Most STA cells are at or above target depths. Operational restrictions are in place for vegetation rehabilitation in STA-2 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. Nests of Endangered Species Act protected species were observed in STA-1E. 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. Stage on average increased slightly across the Water Conservation Areas. Keeping depths below 2.5 feet at gauge 65 in WCA-3A is important to moderate the stress to tree islands caused by flooding when durations last longer than 60-90 days. Depths exceeded that mark from June 13 to August 4. The depth on Sunday at that location was 2.48 feet. In Taylor Slough water depths are 2 to 4 inches above the historical average. Florida Bay salinities remain close to 2 psu below average for this time of year.

## Supporting Information

### KISSIMMEE BASIN

#### **Kissimmee Basin Rainfall**

The Upper Kissimmee Basin received 1.43 inches of rainfall in the past week and the Lower Basin received 1.10 inches (SFWMD Daily Rainfall Report 8/13/2018).

#### **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: 8/14/2018**

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)						
							8/12/18	8/5/18	7/29/18	7/22/18	7/15/18	7/8/18	7/1/18
Lakes Hart and Mary Jane	S-62	112	LKMJ	60.1	R	60.0	0.1	0.0	0.0	0.1	0.1	0.1	0.2
Lakes Myrtle, Preston, and Joel	S-57	24	S-57	61.1	R	61.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0
Alligator Chain	S-60	147	ALLI	63.3	R	63.2	0.1	0.1	0.1	0.0	0.1	0.1	0.2
Lake Gentry	S-63	196	LKGT	61.1	R	61.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1
East Lake Toho	S-59	703	TOHOE	56.5	R	56.5	0.0	0.5	0.7	0.1	-0.1	-0.1	-0.5
Lake Toho	S-61	1,590	TOHOW, S-61	53.6	R	53.5	0.1	0.3	0.6	-0.1	0.0	-0.1	-0.4
Lakes Kissimmee, Cypress, and Hatchineha	S-65	4,337	KUB011, LKIS5B	51.4	R	51.0	0.4	0.7	0.6	0.2	0.1	0.3	-0.4

<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: **8/14/2018**

Metric	Location	1-Day Average		Average for the Preceding 7-Days <sup>1</sup>								
		8/12/2018	8/12/18	8/5/18	7/29/18	7/22/18	7/15/18	7/8/18	7/1/18	6/24/18	6/17/18	6/10/18
Discharge (cfs)	S-65	3,717	<b>4,337</b>	4,407	4,179	1,567	2,561	1,287	514	834	1,110	915
Discharge (cfs)	S-65A <sup>2</sup>	4,048	<b>4,674</b>	4,980	4,267	1,479	2,615	1,294	466	801	1,224	1,043
Discharge (cfs)	S-65D <sup>2</sup>	4,634	<b>4,617</b>	4,458	2,264	2,641	2,226	1,774	1,608	2,094	2,062	1,925
Headwater Stage (feet NGVD)	S-65D <sup>2</sup>	26.65	<b>26.63</b>	26.78	26.75	26.68	26.77	26.80	26.79	26.79	26.82	26.86
Discharge (cfs)	S-65E <sup>2</sup>	4,846	<b>4,847</b>	4,566	2,400	2,764	2,399	2,000	1,834	2,347	2,261	2,107
Discharge (cfs)	S-67	161	<b>160</b>	157	209	183	217	292	298	277	273	278
DO (mg/L) <sup>3</sup>	Phase I river channel	2.6	<b>3.1</b>	3.3	4.2	2.3	2.7	2.9	3.4	2.0	1.4	1.7
Mean depth (feet) <sup>4</sup>	Phase I floodplain	2.02	<b>2.06</b>	2.11	1.25	1.08	1.20	0.60	0.46	0.75	0.84	0.76

<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)

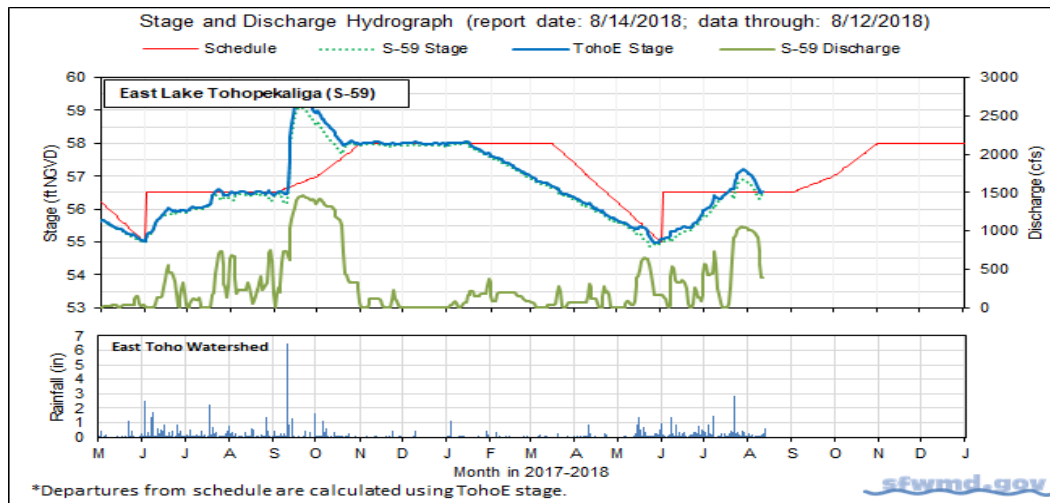


Figure 1.

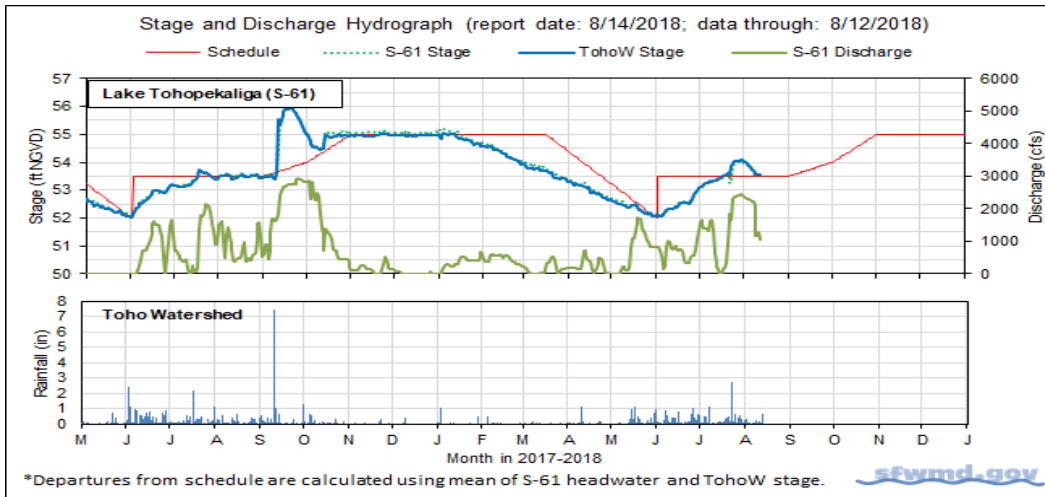


Figure 2.

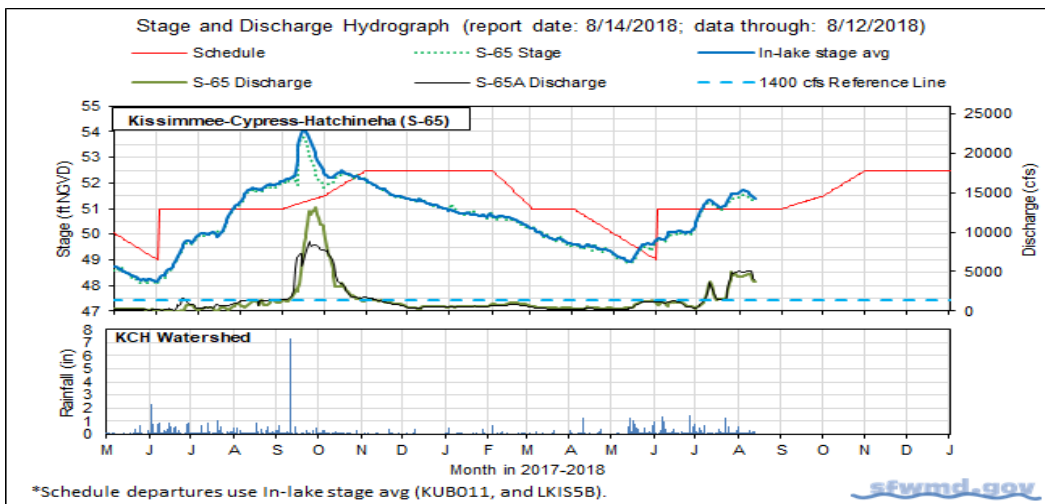


Figure 3.

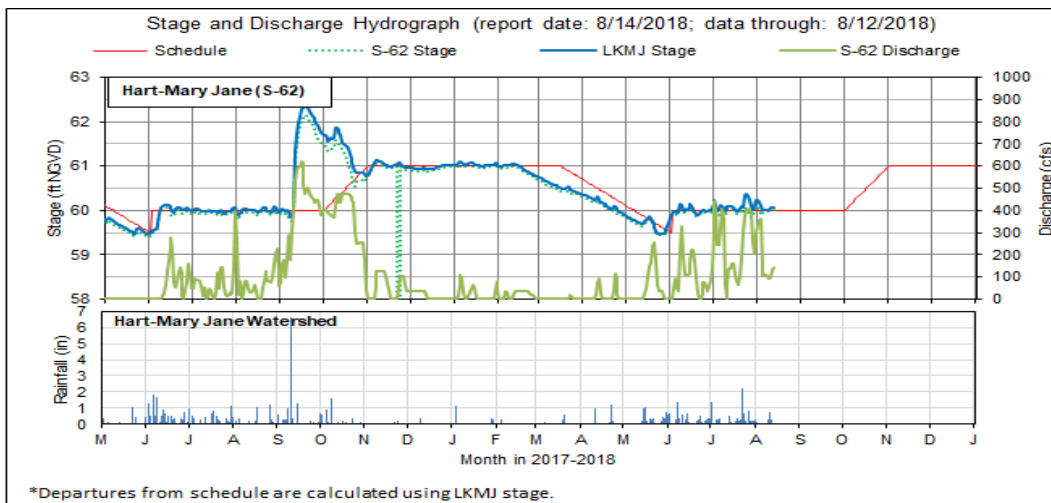


Figure 4.

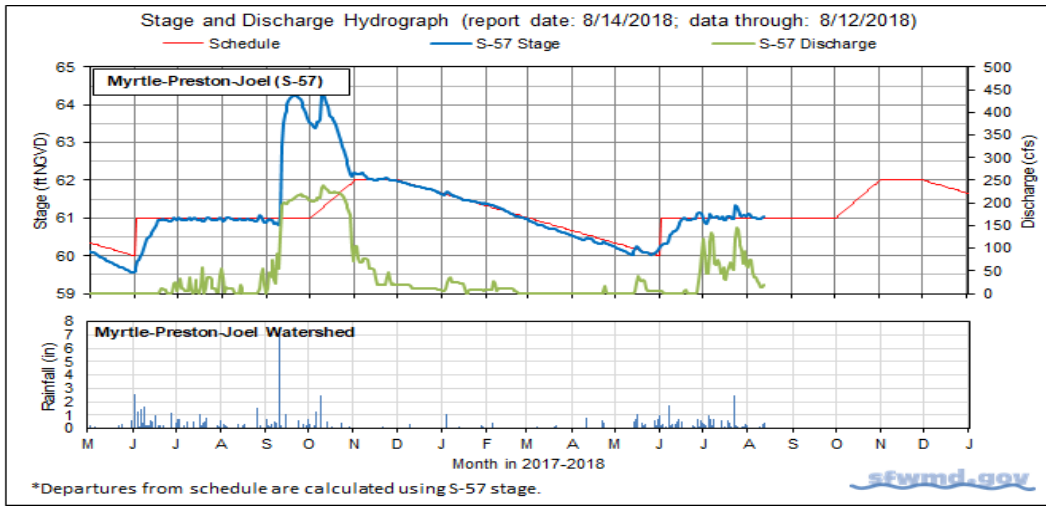


Figure 5.

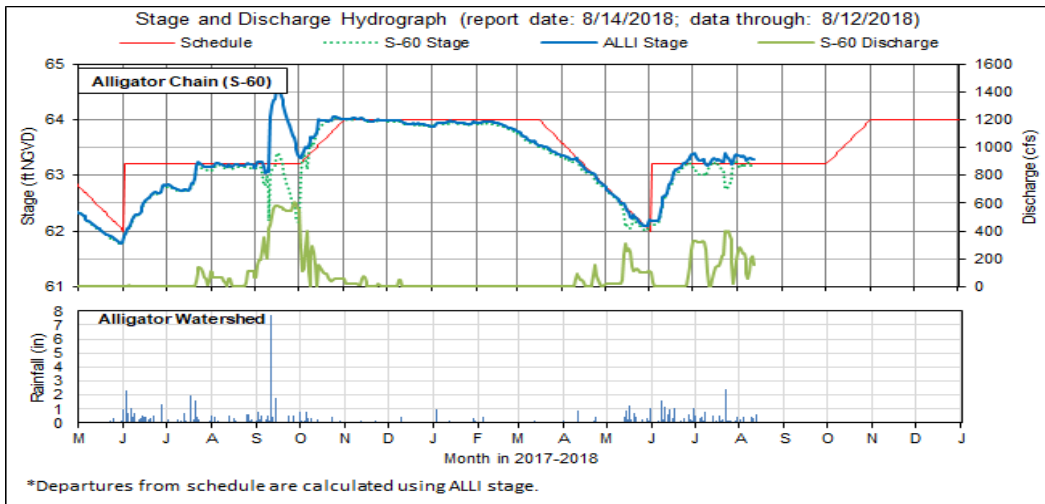


Figure 6.

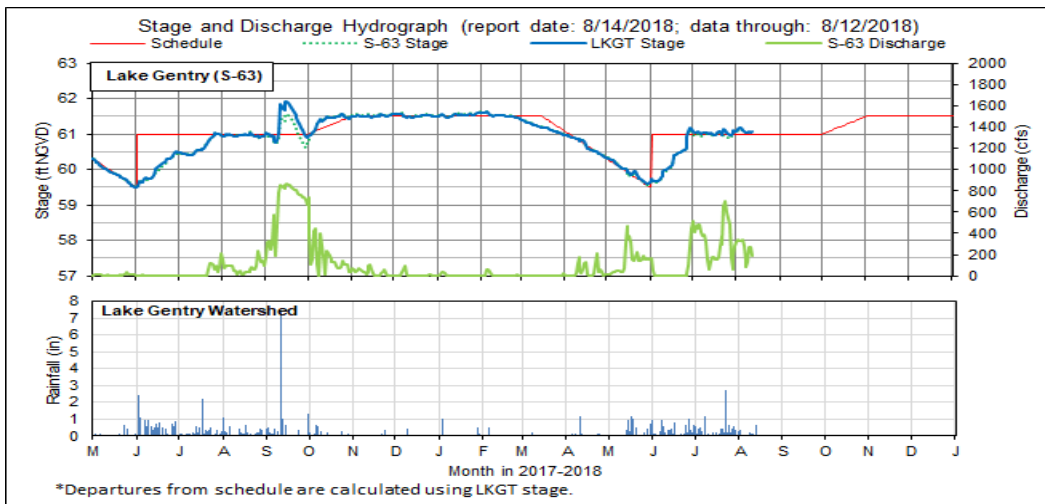
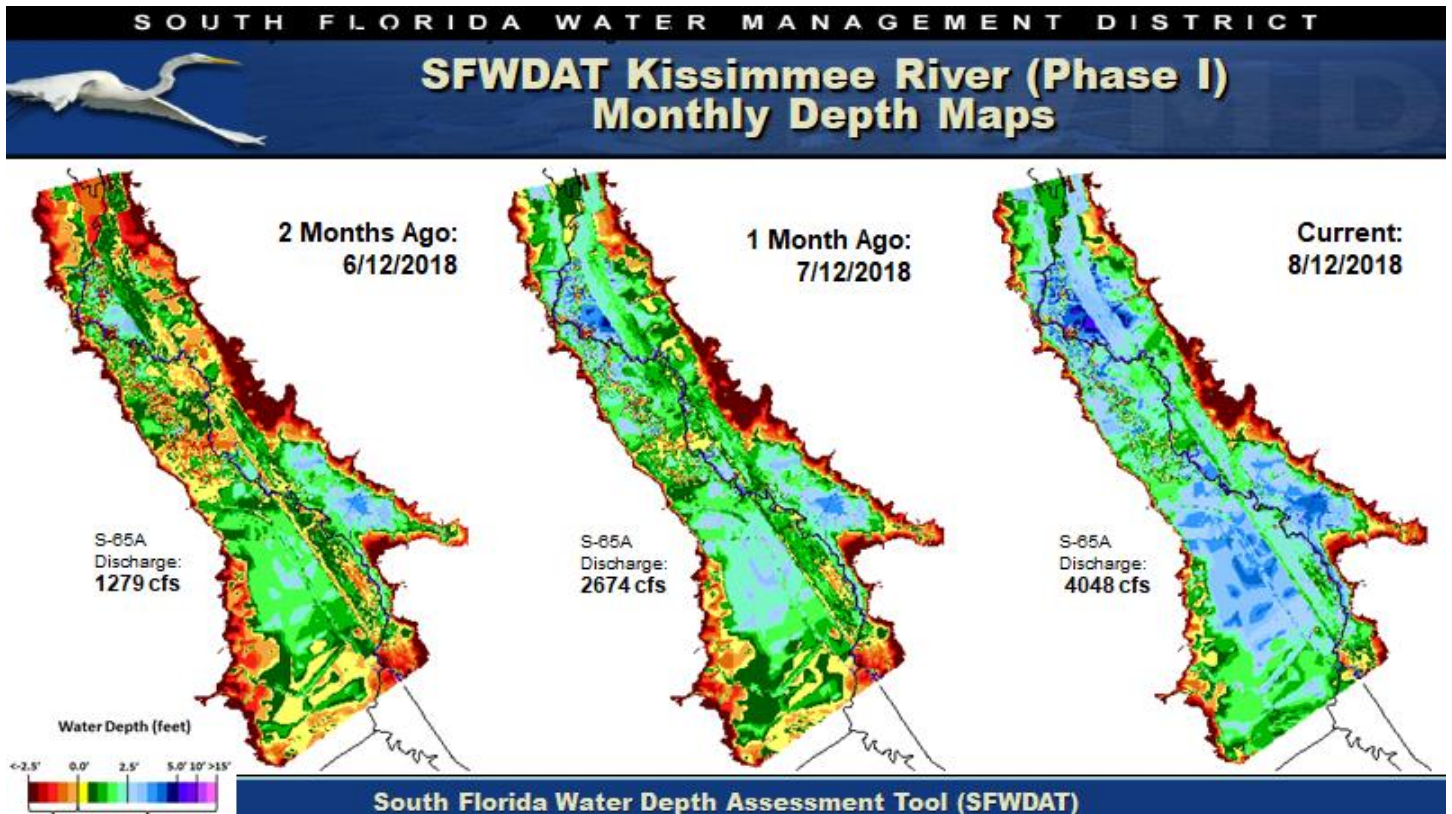
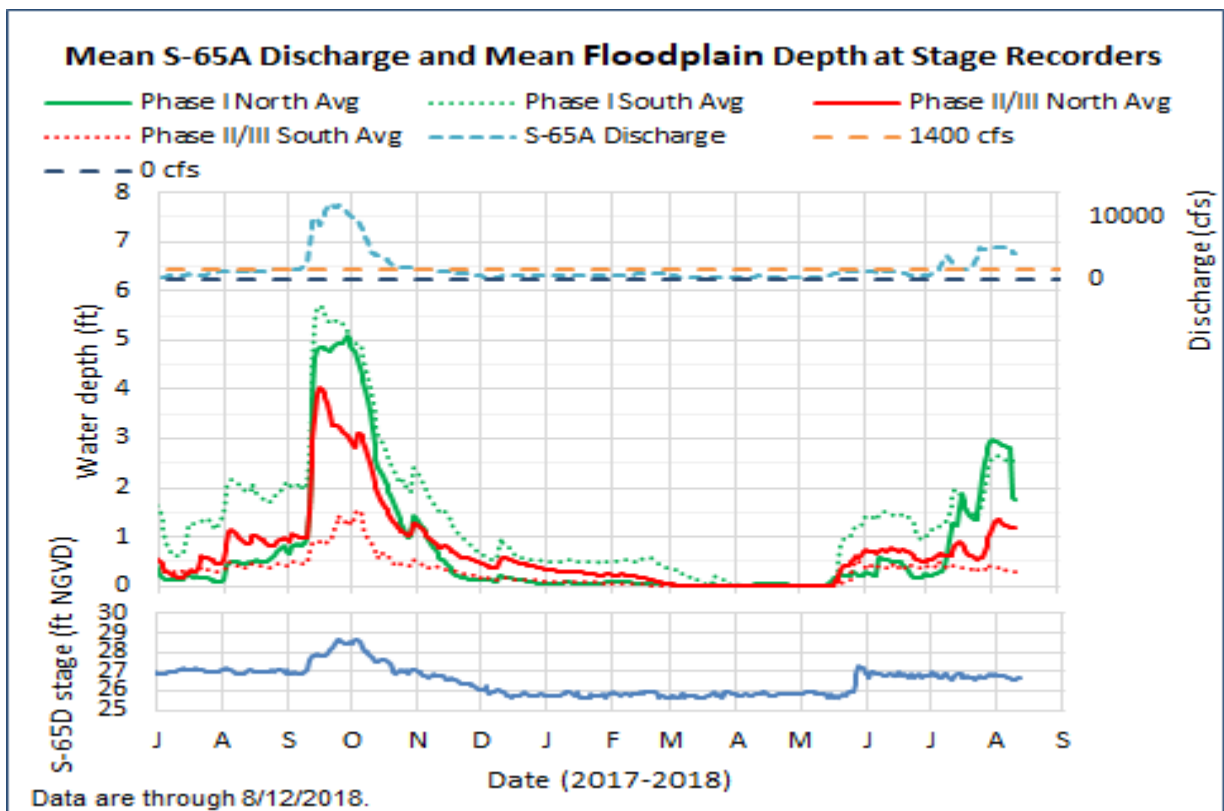


Figure 7.

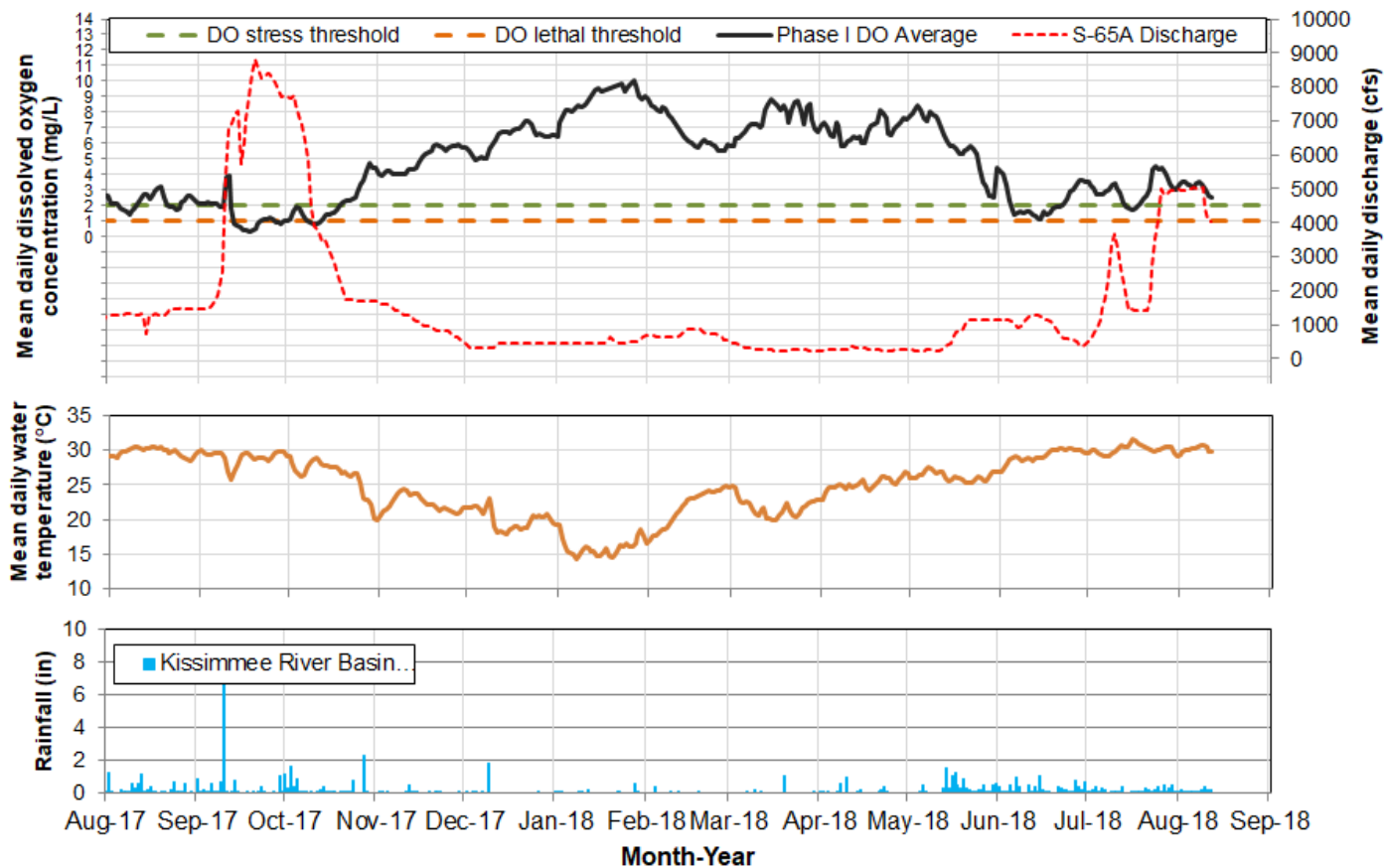




**Figure 8.** Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to January 16, 2012.



**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.



Report Date: 8/14/2018; data are through: 8/12/2018.

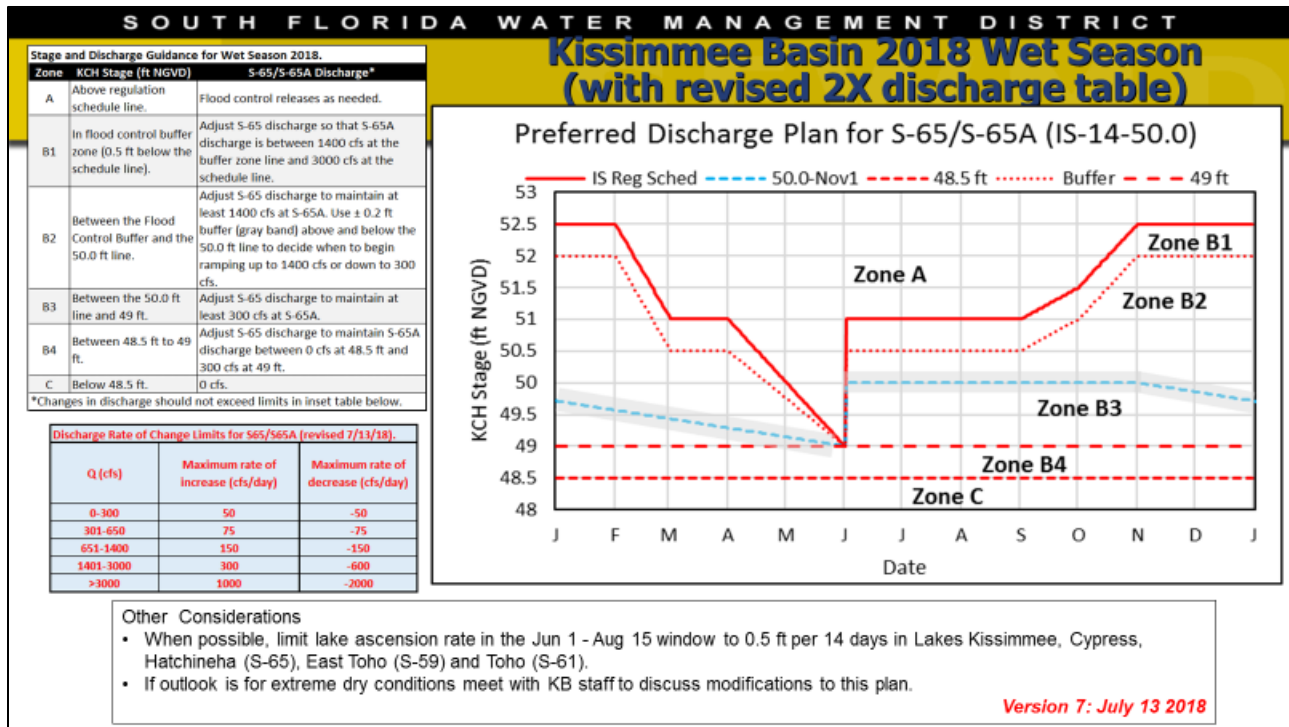
**Figure 10.** Mean daily dissolved oxygen, discharge, temperature and rainfall in the Phase I river channel.



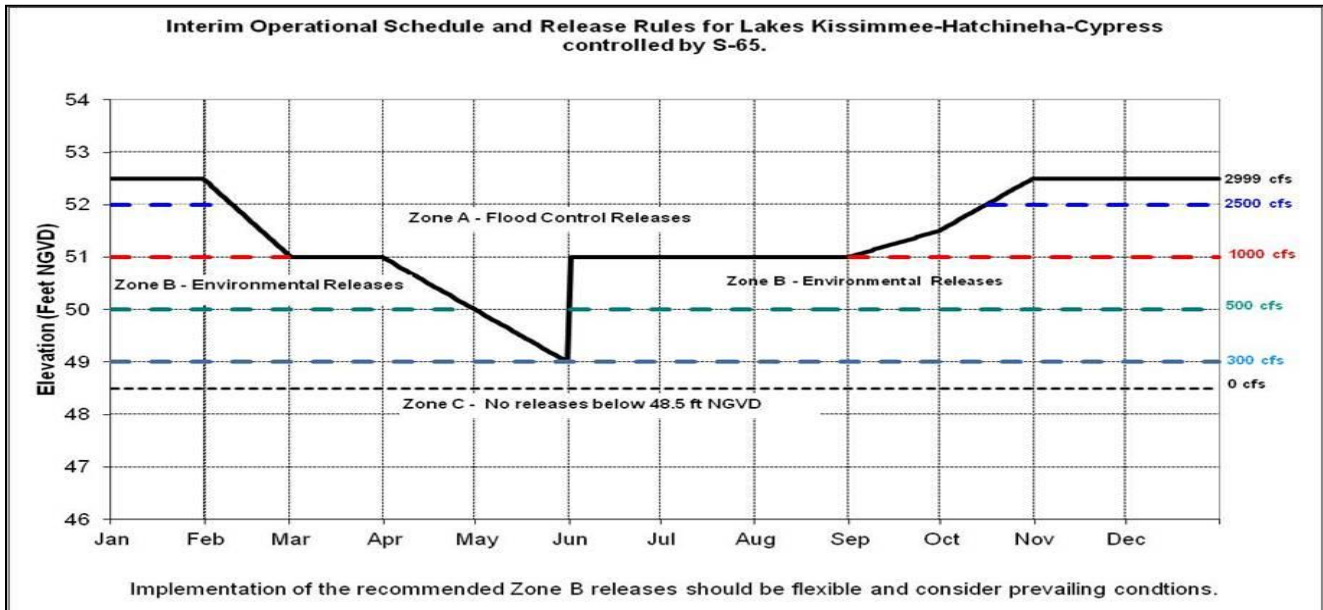
# Water Management Recommendations

## Kissimmee Basin Adaptive Recommendations and Operational Actions

Recommendation Date	Recommendation	Purpose	Outcome	Source	Report Date
8/14/2018	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 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
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
3/20/2018	No new recommendations.		N/A		3/20/2018
3/13/2018	No new recommendations.		N/A		3/13/2018



**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.

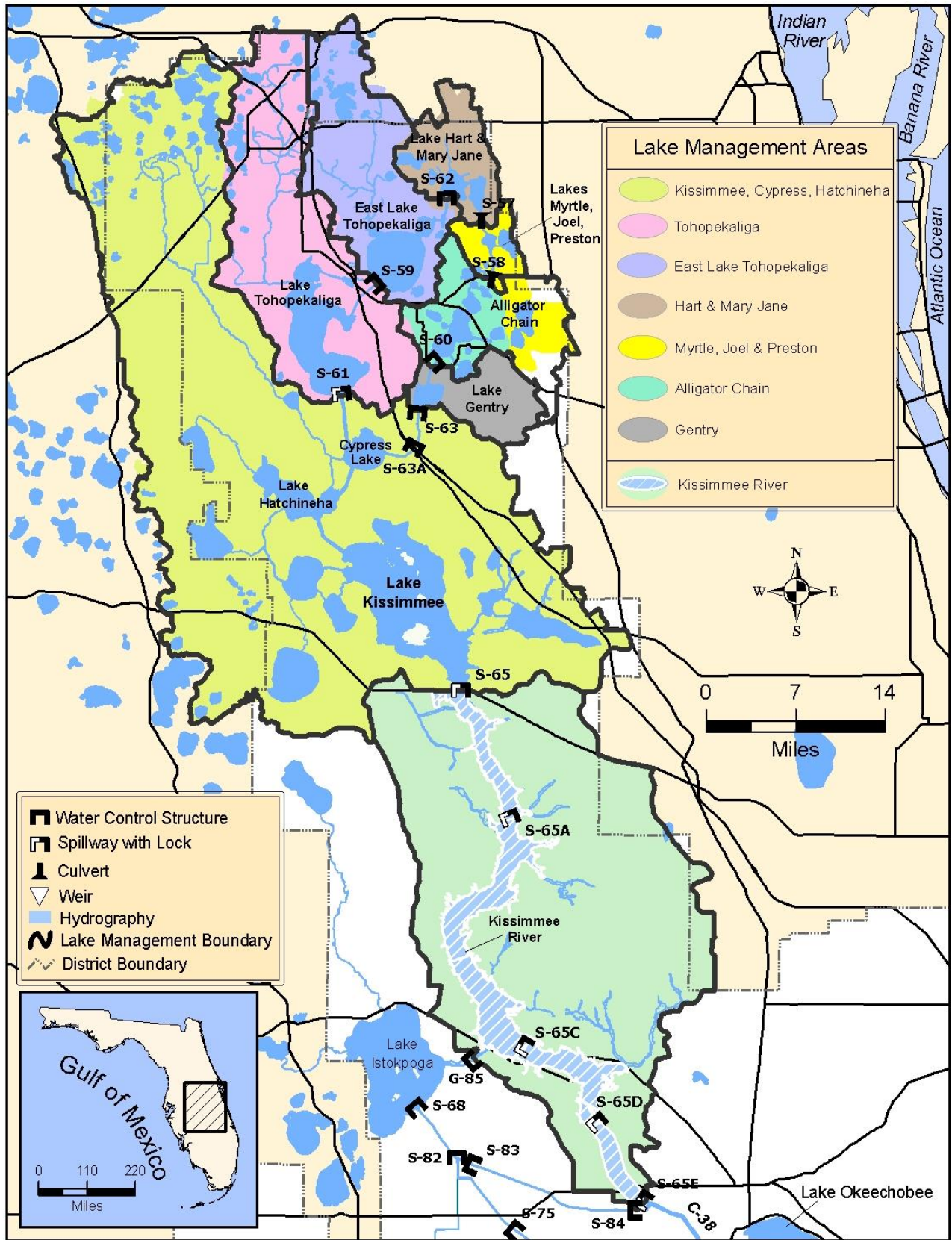


Figure 13. The Kissimmee Basin.



## **LAKE OKEECHOBEE**

According to the USACE web site, Lake Okeechobee stage is at 14.55 feet NGVD for the period ending at midnight on August 13, 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 0.04 feet higher than it was a month ago and 1.28 feet higher than a year ago (Figure 1). The Lake remains in the Low sub-band (Figure 2). The August 13 lake stage was the third highest since 2011, with only 2013 and 2016 having higher stages, at 1.44 feet and 0.23 feet higher, respectively (Figure 3). According to RAINDAR, 1.75 inches of rain fell over the Lake during the week August 7, 2018 – August 13, 2018. Most of the watershed received similar or less rainfall, between 1.0 – 2.0 inches (Figure 4).

Average daily inflows to the Lake decreased slightly from the previous week, rising to 5,939 cfs, from 6,621 cfs. Most of the decrease in inflows was from Lake Istokpoga (S-84 structures) and the Indian Prairie basin (S-71 and S-72), going from 1,042 cfs and 371 cfs the previous week, respectively, to 644 cfs and 155 cfs this past week, respectively (Table 1). Fisheating Creek flows, as measured at Lakeport, also decreased slightly from 233 cfs to 180 cfs this past week. Kissimmee River flows (via the S-65 structures) were only 46 cfs higher than the previous week, at 4,836 average daily cfs. 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 nearly 2,000 average daily cfs, rising to 4,838 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 370 cfs the previous week to 1,611 cfs this past week, while outflows to the south through the S-350 structures increased from 1,431 cfs the previous week to 2,202 cfs this past week. S-308 discharges to the east decreased slightly from 1,129 cfs to 1,025 cfs this past week. The corrected average daily evapotranspiration value for the week based on the L006 weather platform solar radiation remained at 0.17 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 5 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 from 17 nearshore and pelagic stations on July 17 – July 18 showed continued decreases in average total phosphorus (TP) values from January peaks (due to Hurricane Irma sediment disruptions) (Figure 6). However, despite consistent declining trends, average TP for the pelagic region remained higher than any other July value since 2006, which was also the year following hurricane impacts on the Lake.

The most recent satellite imagery (August 13) 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, though several days of sunny, calm weather could reverse the trend (Figure 7).

**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	4790	4836	1.9
S71 & 72	371	155	0.1
S84 & 84X	1042	644	0.3
Fisheating Creek	233	180	0.1
S154	17	0	0.0
S191	70	35	0.0
S133 P	37	25	0.0
S127 P	27	21	0.0
S129 P	34	20	0.0
S131 P	2	0	0.0
S135 P	0	17	0.0
S2 P	0	0	0.0
S3 P	0	0	0.0
S4 P	0	0	0.0
L8 Backflow	0	7	0.0
Rainfall	2684	4812	1.7
<b>Total</b>	<b>9305</b>	<b>10751</b>	<b>4.1</b>

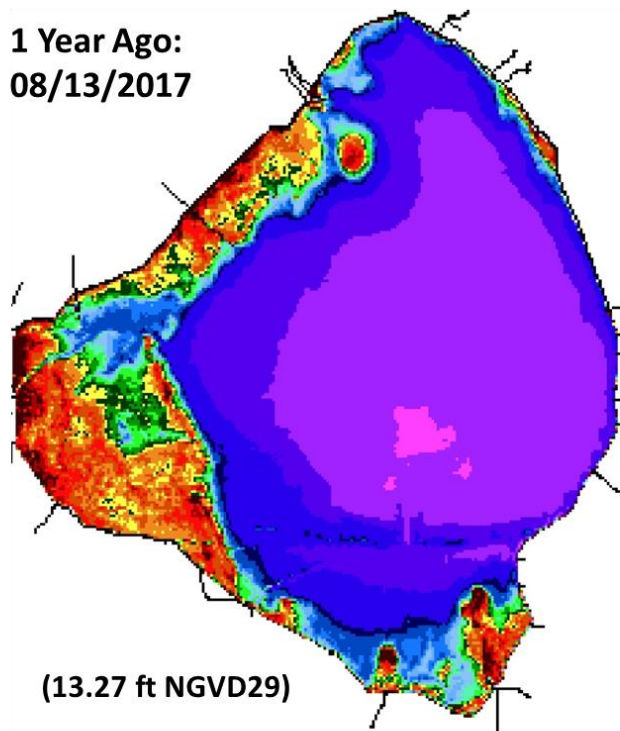
OUTFLOWS	Previous Week Avg Daily cfs	Avg Daily Outflow cfs	Equivalent Depth Week Total (in)
S77	370	1611	0.6
S308	1129	1025	0.4
S351	754	1123	0.5
S352	0	247	0.1
S354	677	832	0.3
L8 Outflow	2	0	0.0
ET	3224	3224	1.3
<b>Total</b>	<b>6156</b>	<b>8063</b>	<b>3.2</b>

PROVISIONAL DATA

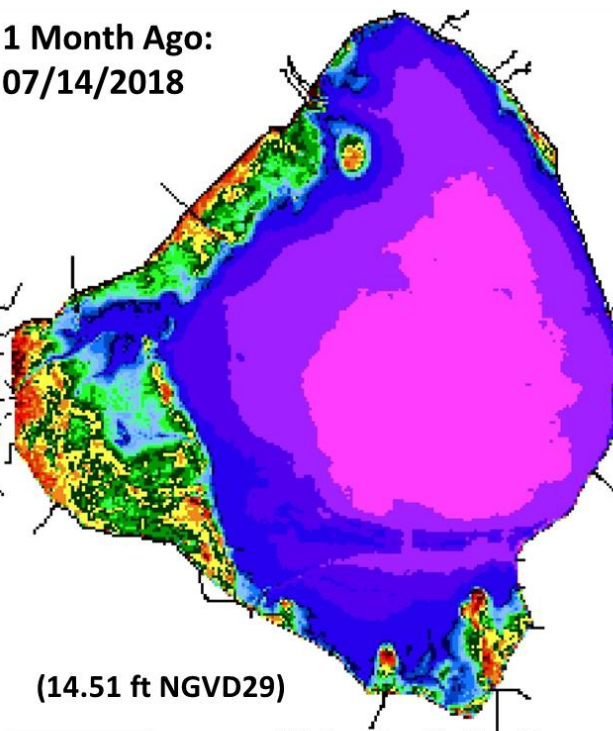
### Water Management Recommendations

Lake Okeechobee stage is 14.55 feet NGVD, 0.16 feet higher than last week and 0.04 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.

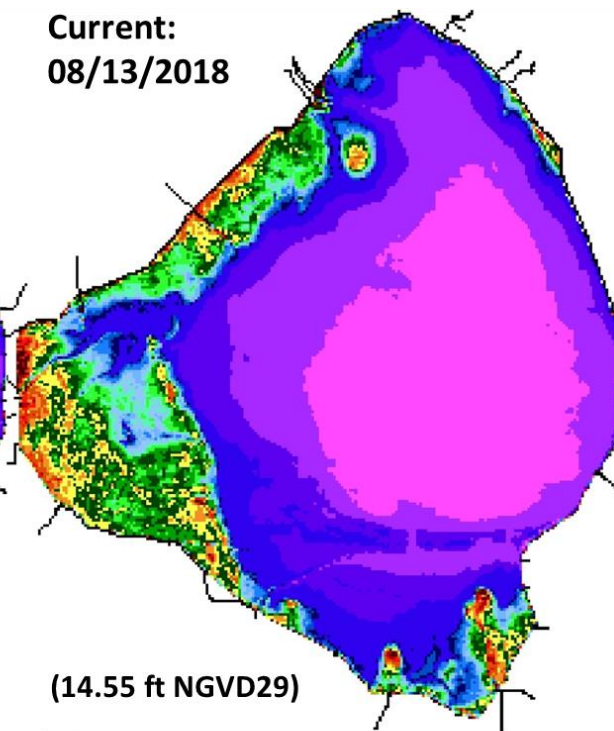
1 Year Ago:  
08/13/2017



1 Month Ago:  
07/14/2018



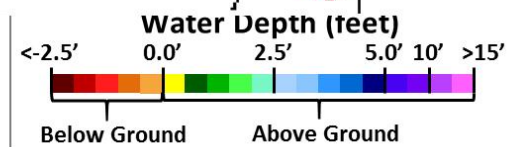
Current:  
08/13/2018



(13.27 ft NGVD29)

(14.51 ft NGVD29)

(14.55 ft NGVD29)



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

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





# Lake Okeechobee Water Level Comparison

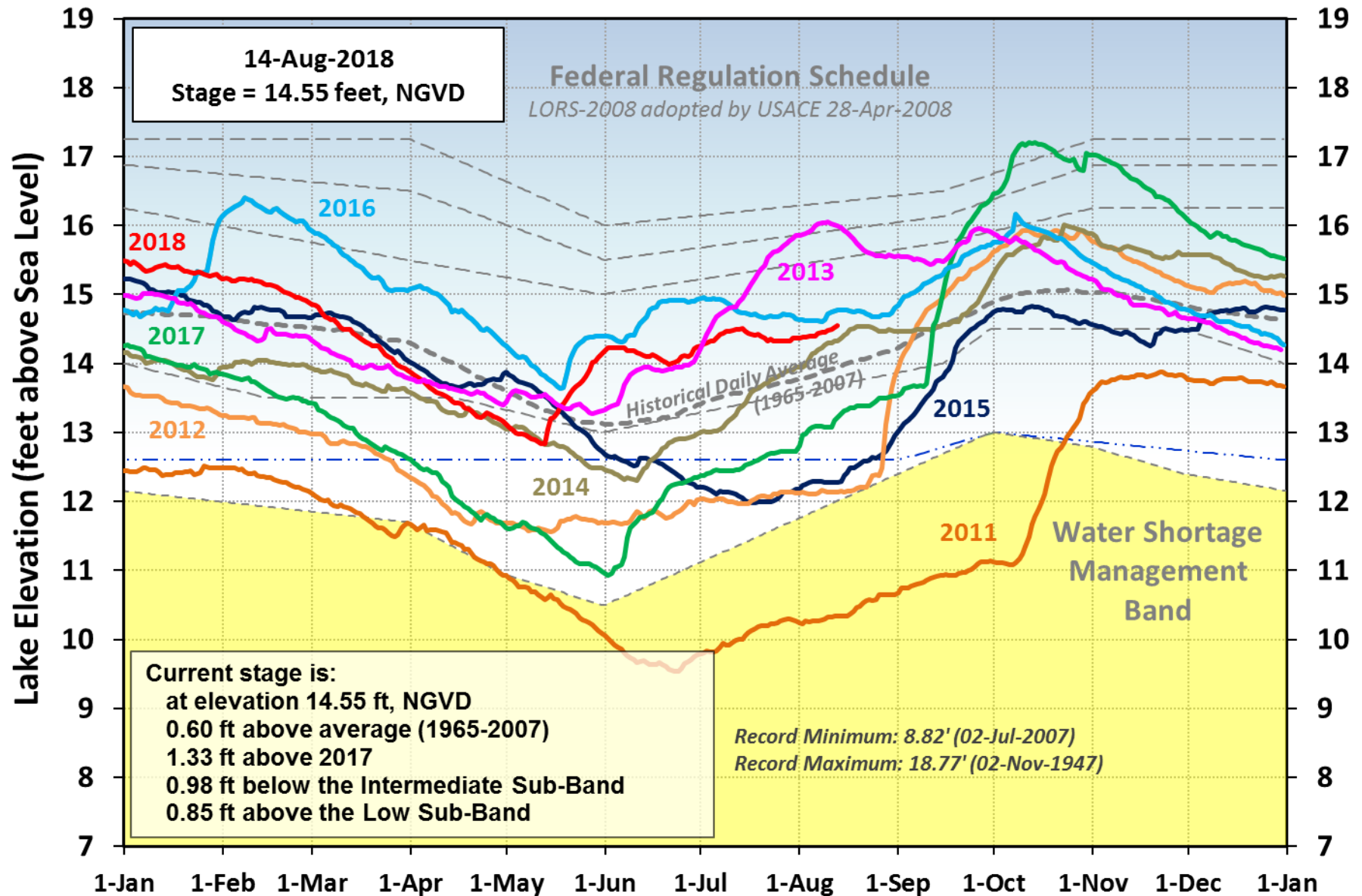


Figure 3. Annual stage hydrographs for Lake Okeechobee from 2011 – 2018.

SFWMD PROVISIONAL RAINDAR 7-DAY BASIN RAINFALL ESTIMATES  
 FROM: 0530 EST, 08/07/2018 THROUGH: 0530 EST, 08/14/2018

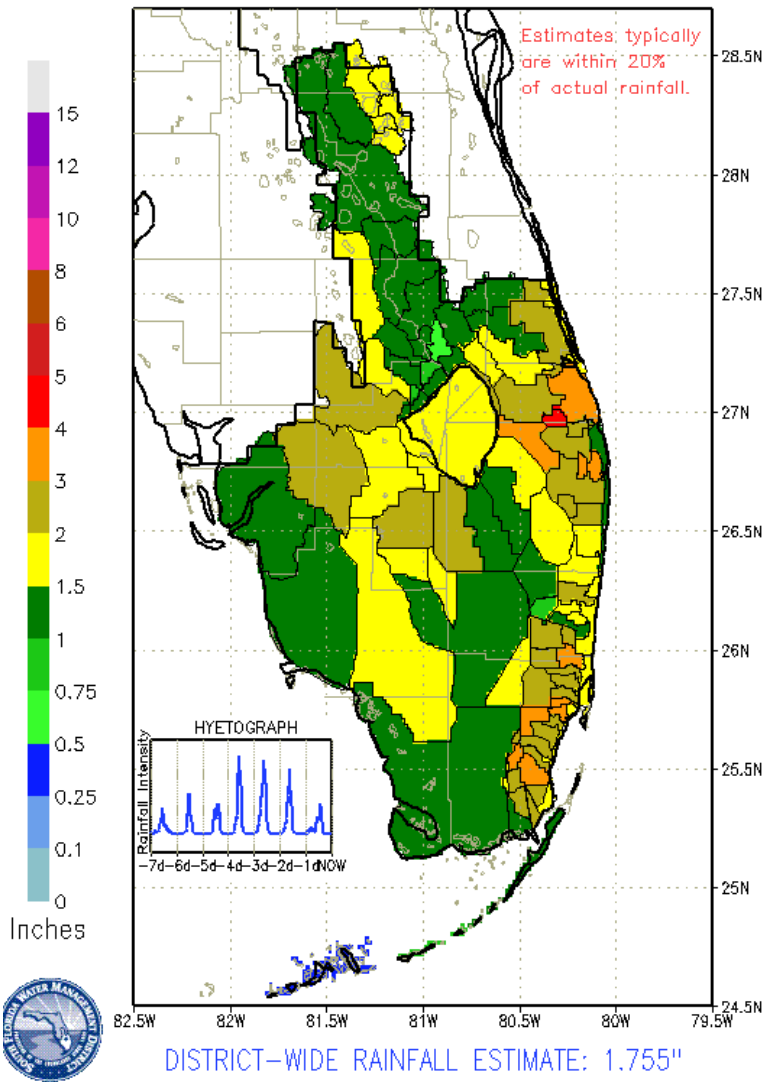


Figure 4. Rainfall estimates by basin.

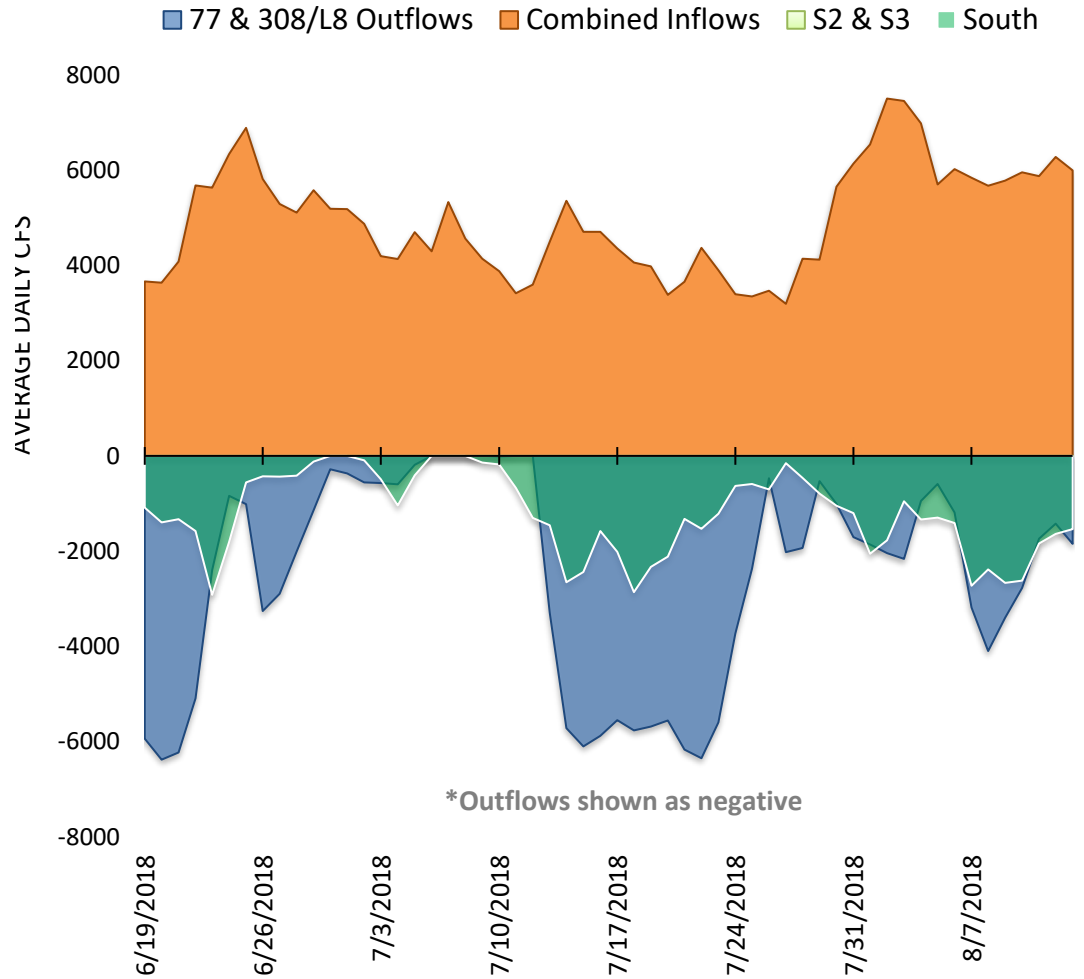
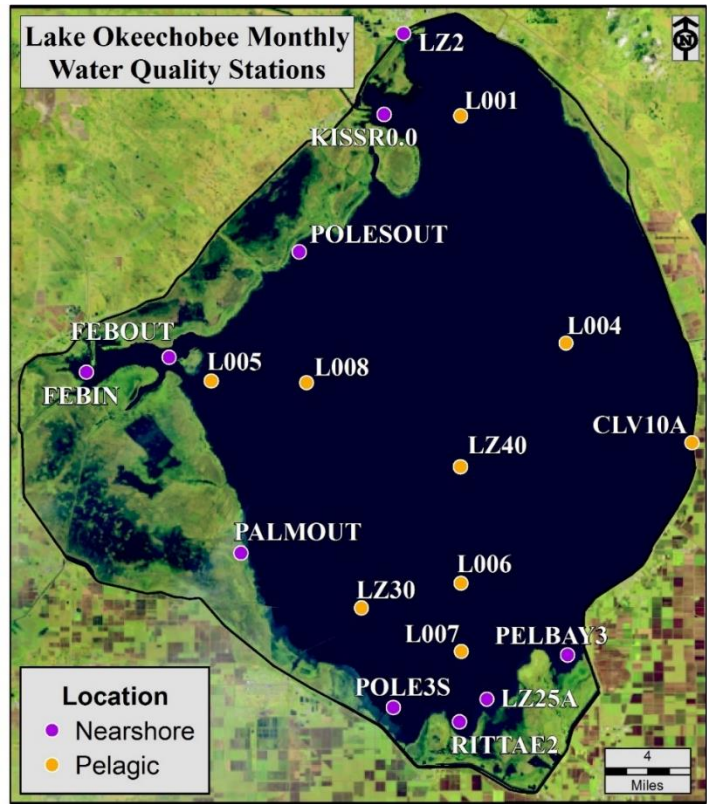
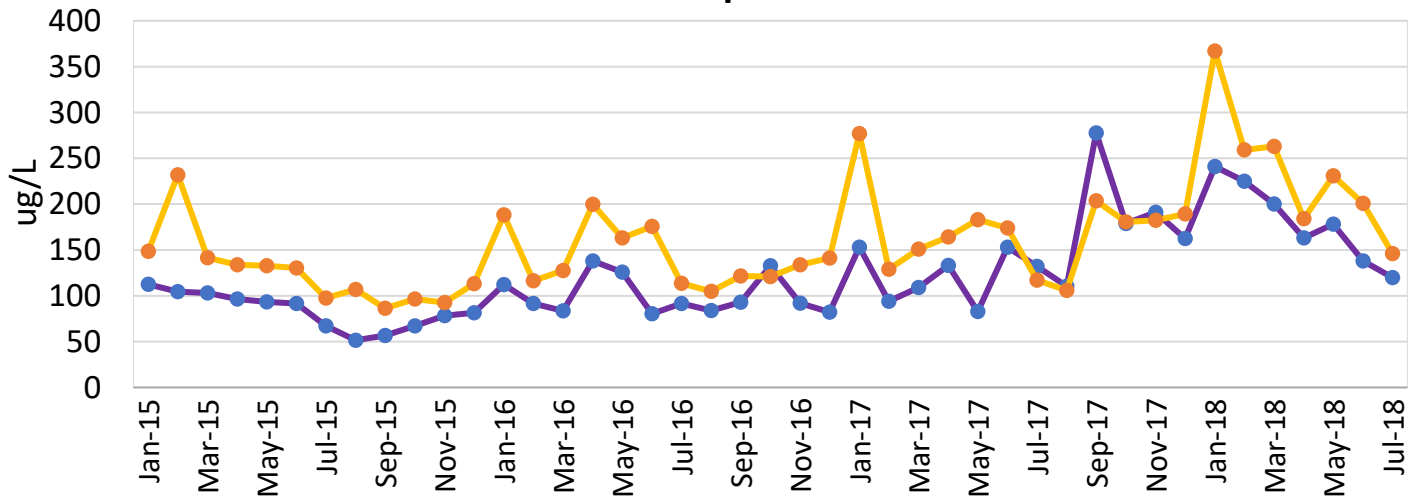


Figure 5. Major inflows and outflows of Lake Okeechobee, including the S-350 structures designated as South. The L-8 canal flows through culvert 10A are included as outflows when positive, and as inflows when backflowing into the lake. Inflows and outflows are shown as positive and negative, respectively, for visual purposes.

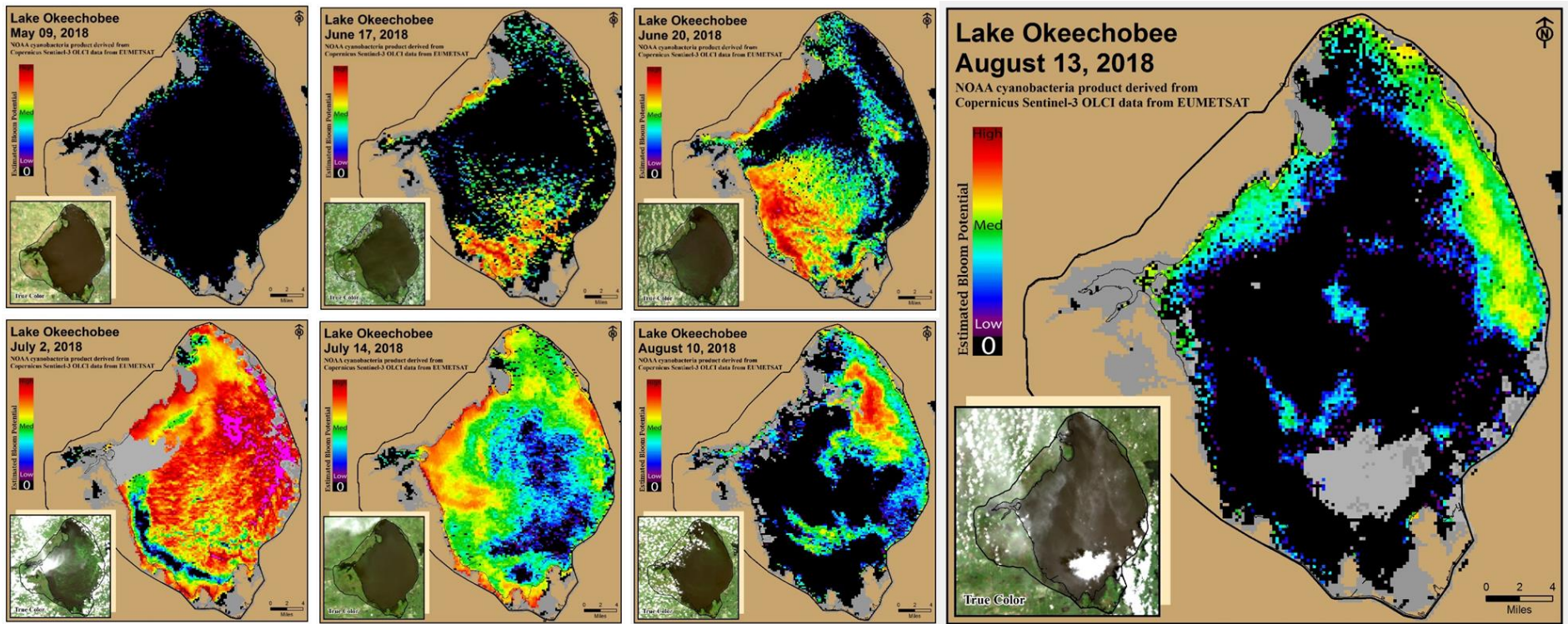


### Total Phosphorus



**Figure 6.** Water quality sampling locations on Lake Okeechobee in the nearshore and pelagic regions (top image), followed by average total phosphorus monthly values for each region from January 2015 – July 2018. Note: The FEBIN and FEBOUT stations were not included due to intermittent sampling.





Gray = Cloud Cover

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

Unvalidated and Experimental Data

**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 1,954 cfs (Figures 1 and 2) and last month inflow averaged about 1,878 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	353
S-80	1341
S-308	1127
S-49 on C-24	2
S-97 on C-23(estimate)	149
Gordy Rd. structure on Ten Mile Creek	109

Over the past week in the estuary, surface salinity decreased in the North Fork (HR1) and 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 5.5. Salinity conditions in the middle estuary are within the poor 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	Envelope
HR1 (North Fork)	<b>1.7</b> (2.2)	<b>2.8</b> (2.7)	NA <sup>1</sup>
US1 Bridge	<b>4.7</b> (3.8)	<b>6.0</b> (4.7)	10.0-26.0
A1A Bridge	<b>12.7</b> (12.2)	<b>19.8</b> (20.0)	NA <sup>1</sup>

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

### Caloosahatchee Estuary:

Last week total inflow to the Caloosahatchee Estuary averaged about 3,495 cfs (Figures 5 and 6) and last month inflow averaged about 4,506 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	1,611
S-78	1,598
S-79	3,014
Tidal Basin Inflow	481

Over the past week, salinity was near 0 down to Ft. Myers Yacht Basin and increased 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.

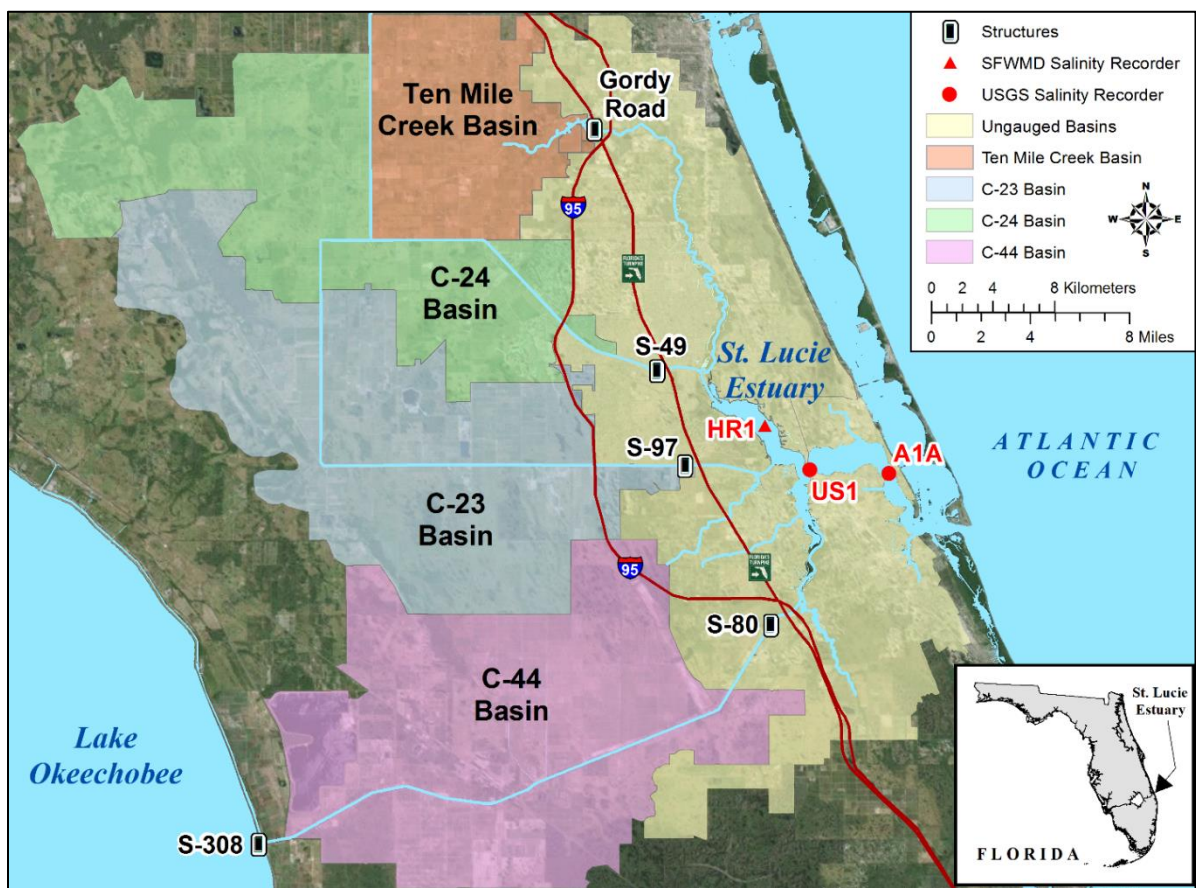
Sampling Site	Surface	Bottom	Envelope
S-79 (Franklin Lock)	<b>0.2</b> (0.2)	<b>0.2</b> (0.2)	NA <sup>1</sup>
Val I75	<b>0.2</b> (0.2)	<b>0.2</b> (0.2)	0.0-5.0 <sup>2</sup>
Ft. Myers Yacht Basin	<b>0.2</b> (0.2)	<b>0.2</b> (0.2)	NA
Cape Coral	<b>3.7</b> (1.3)	<b>5.2</b> (2.3)	10.0-30.0
Shell Point	<b>16.9</b> (13.4)	<b>15.6</b> (13.4)	10.0-30.0
Sanibel	<b>NR</b> <sup>3</sup> (NR)	<b>NR</b> (NR)	10.0-30.0

<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 10, 2018, that *Karenia brevis*, the Florida red tide dinoflagellate, was observed at background to high concentrations in 40 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 1,800 cfs at S-80. Given the current estuarine conditions, there are no ecological benefits associated with freshwater releases from Lake Okeechobee.



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



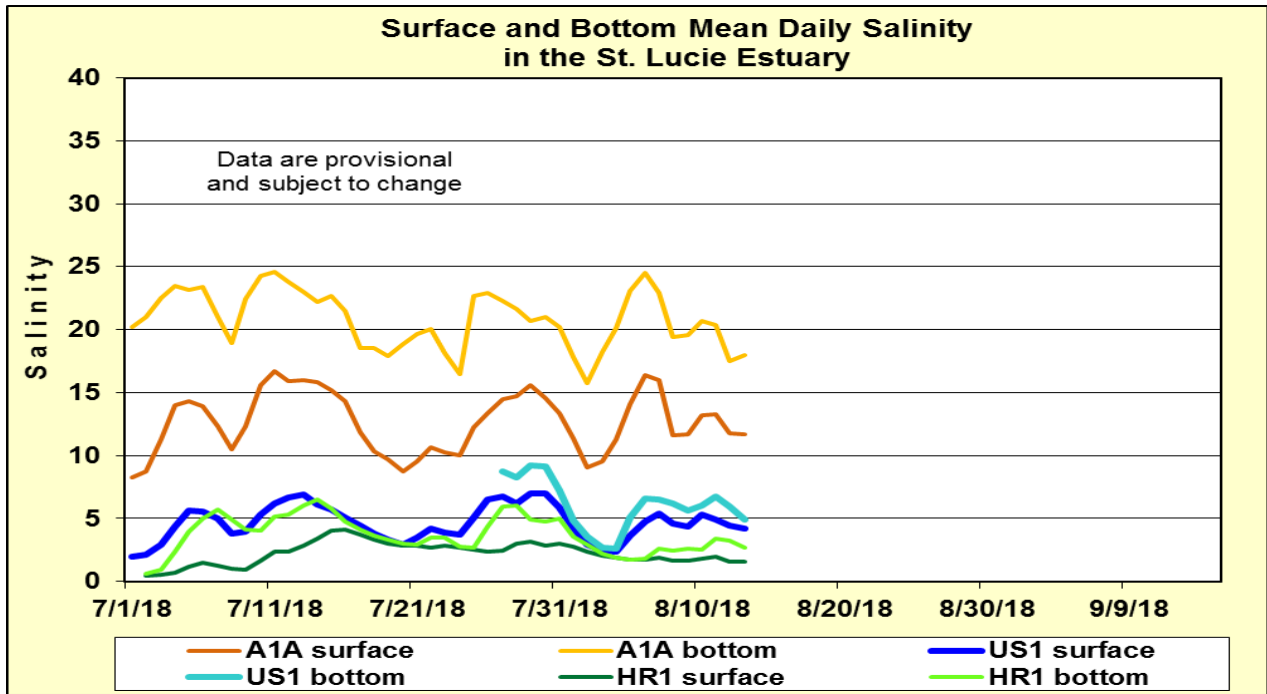


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

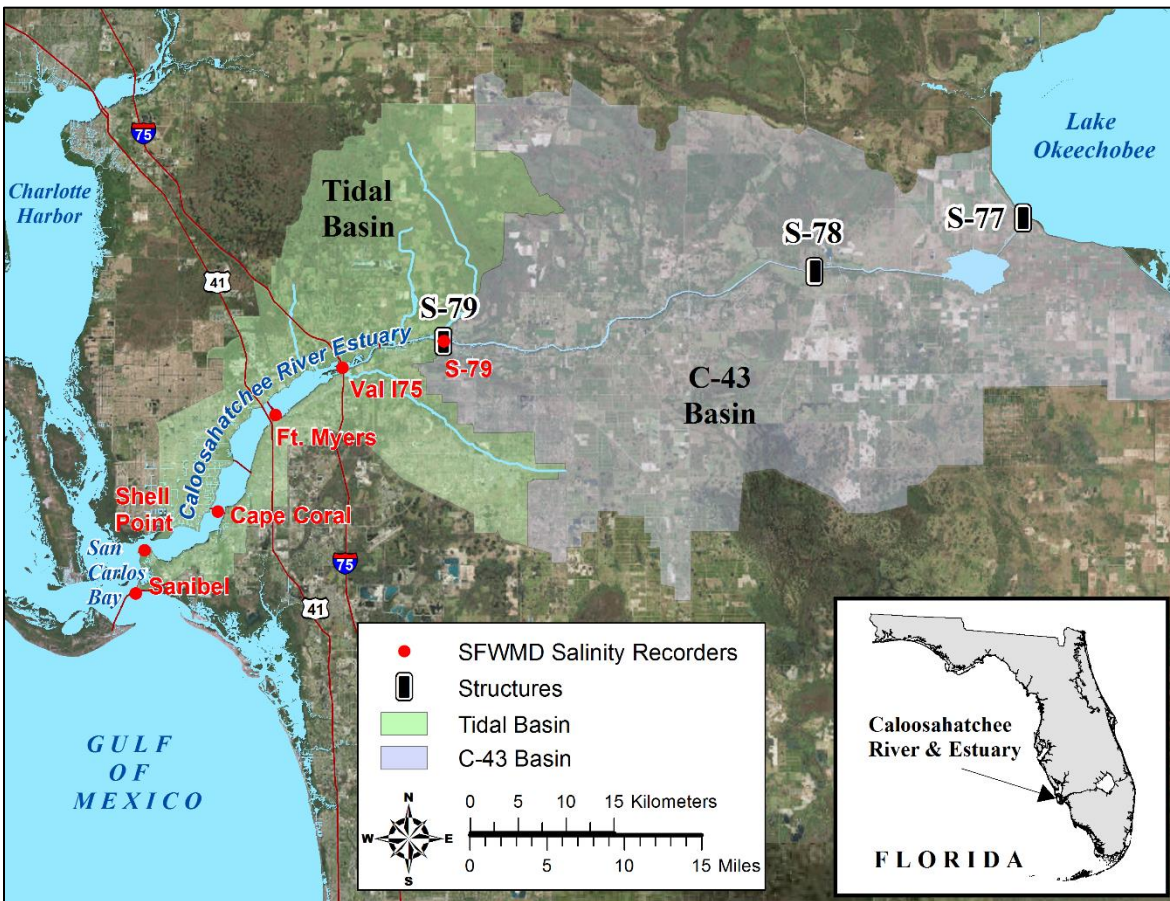
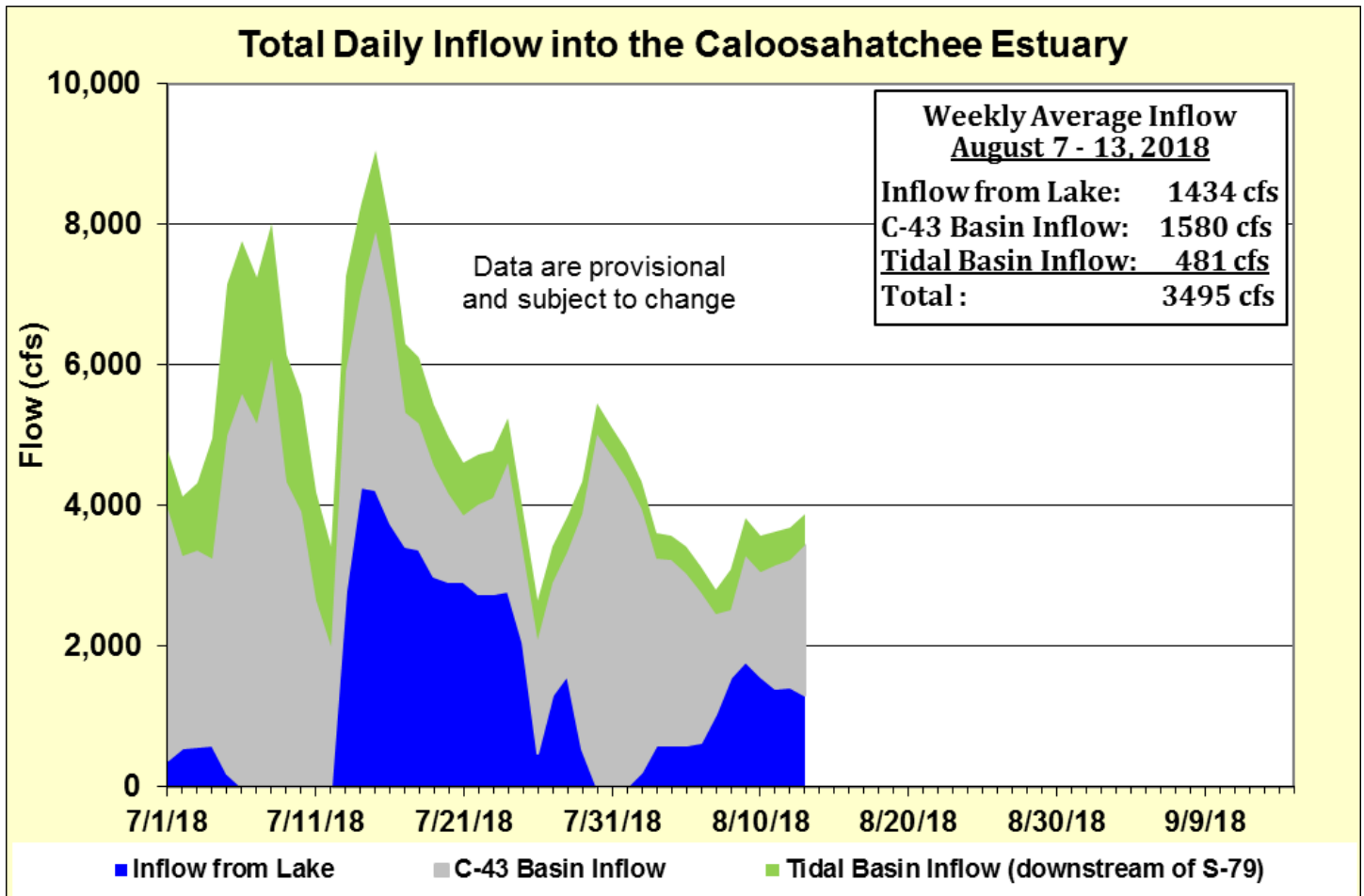
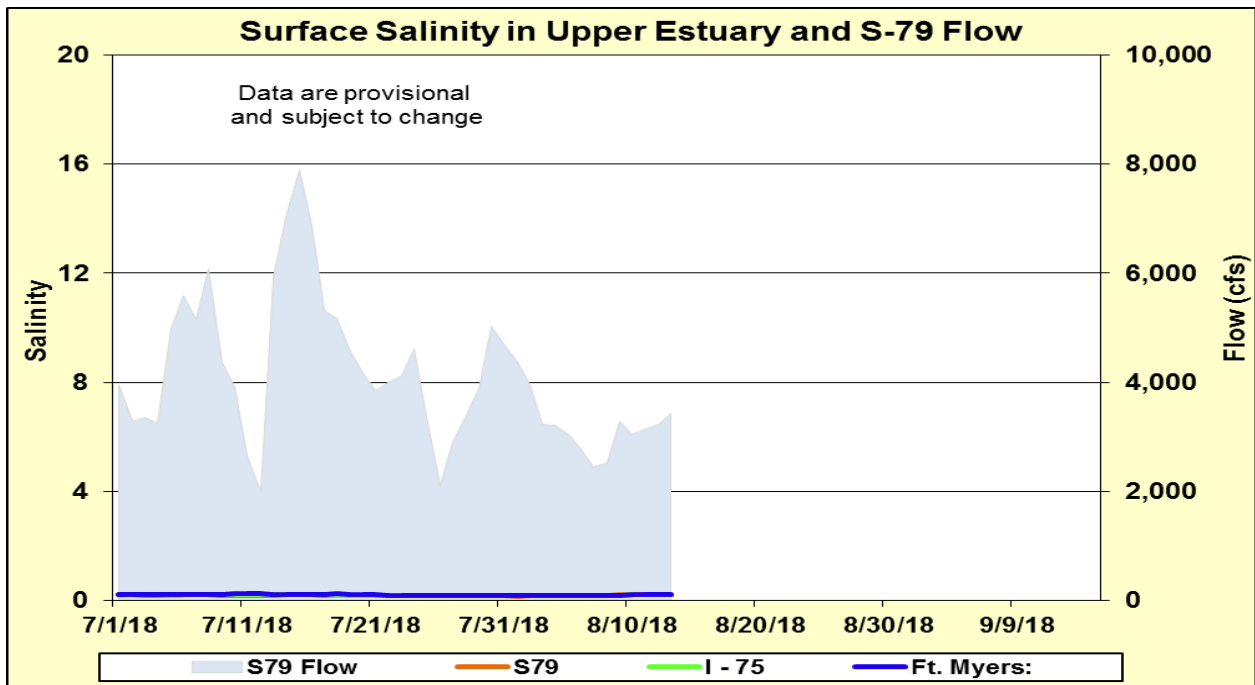


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

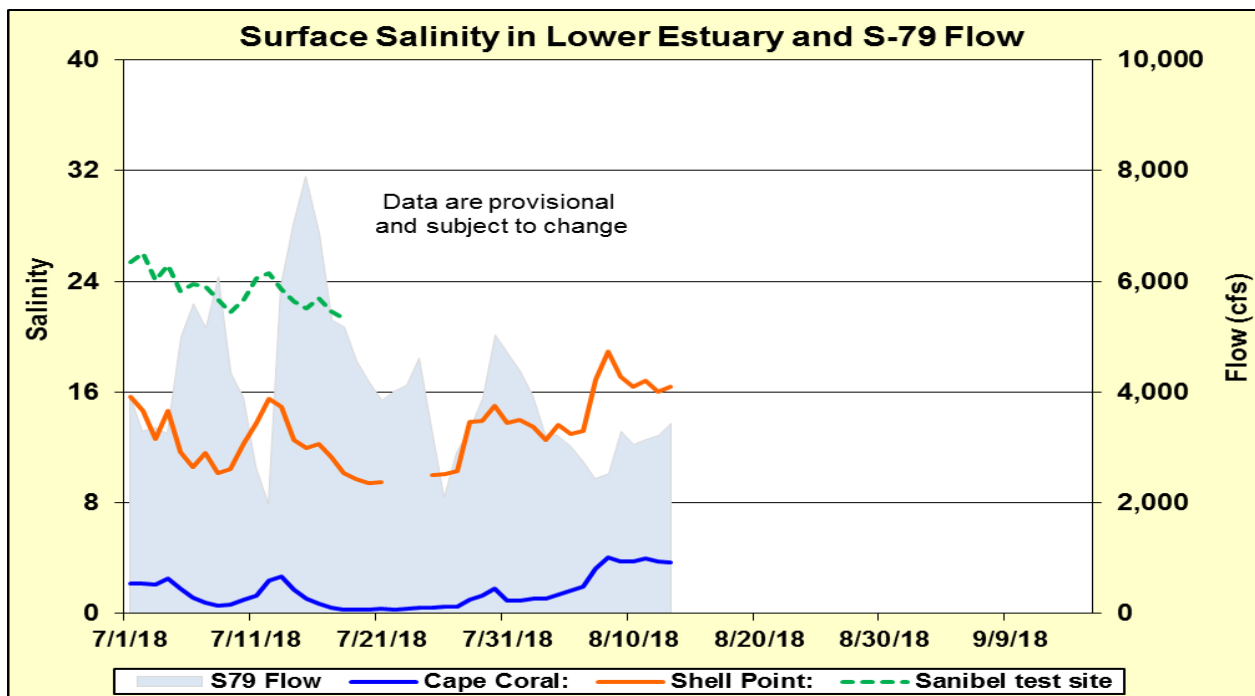


**Figure 6.** Total daily inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.

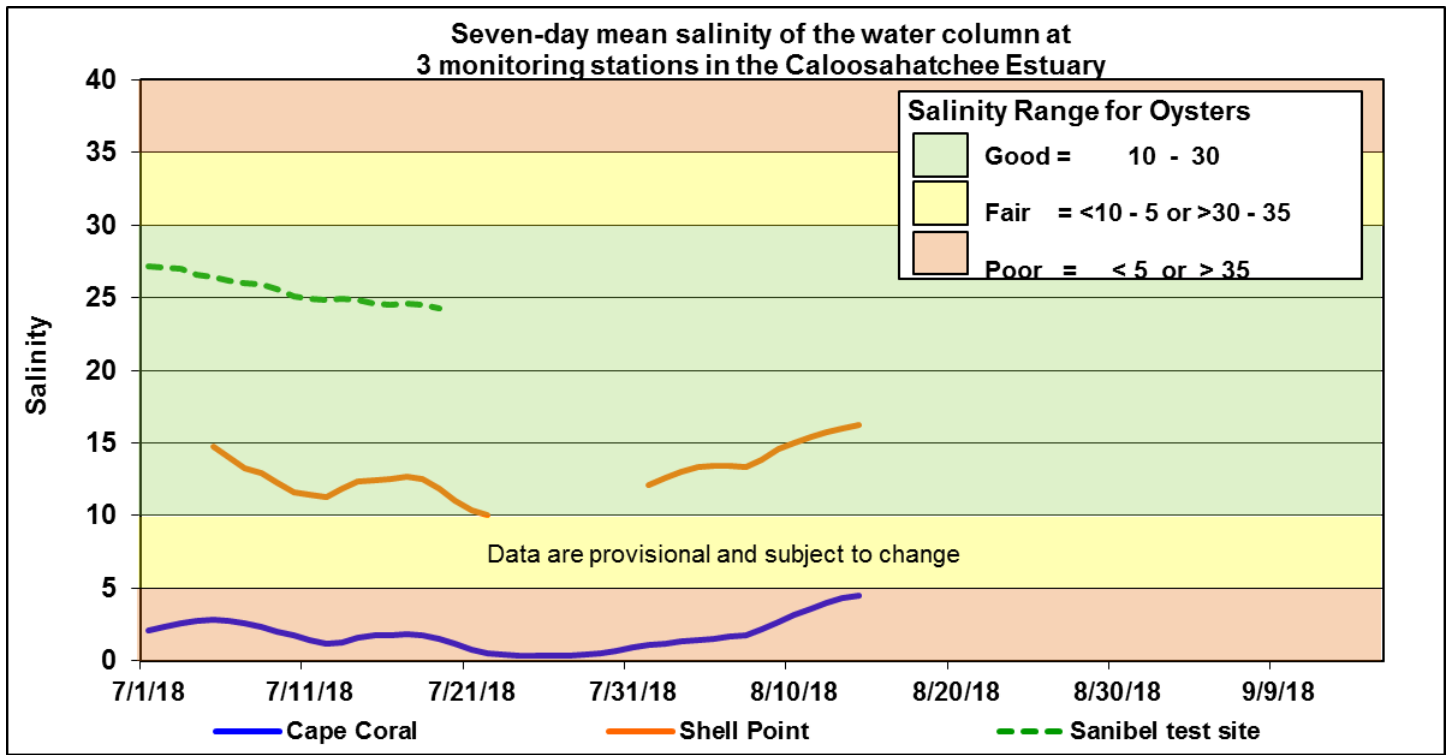




**Figure 7.** Daily mean flows at S-79 and salinity at upper estuary monitoring stations.



**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.



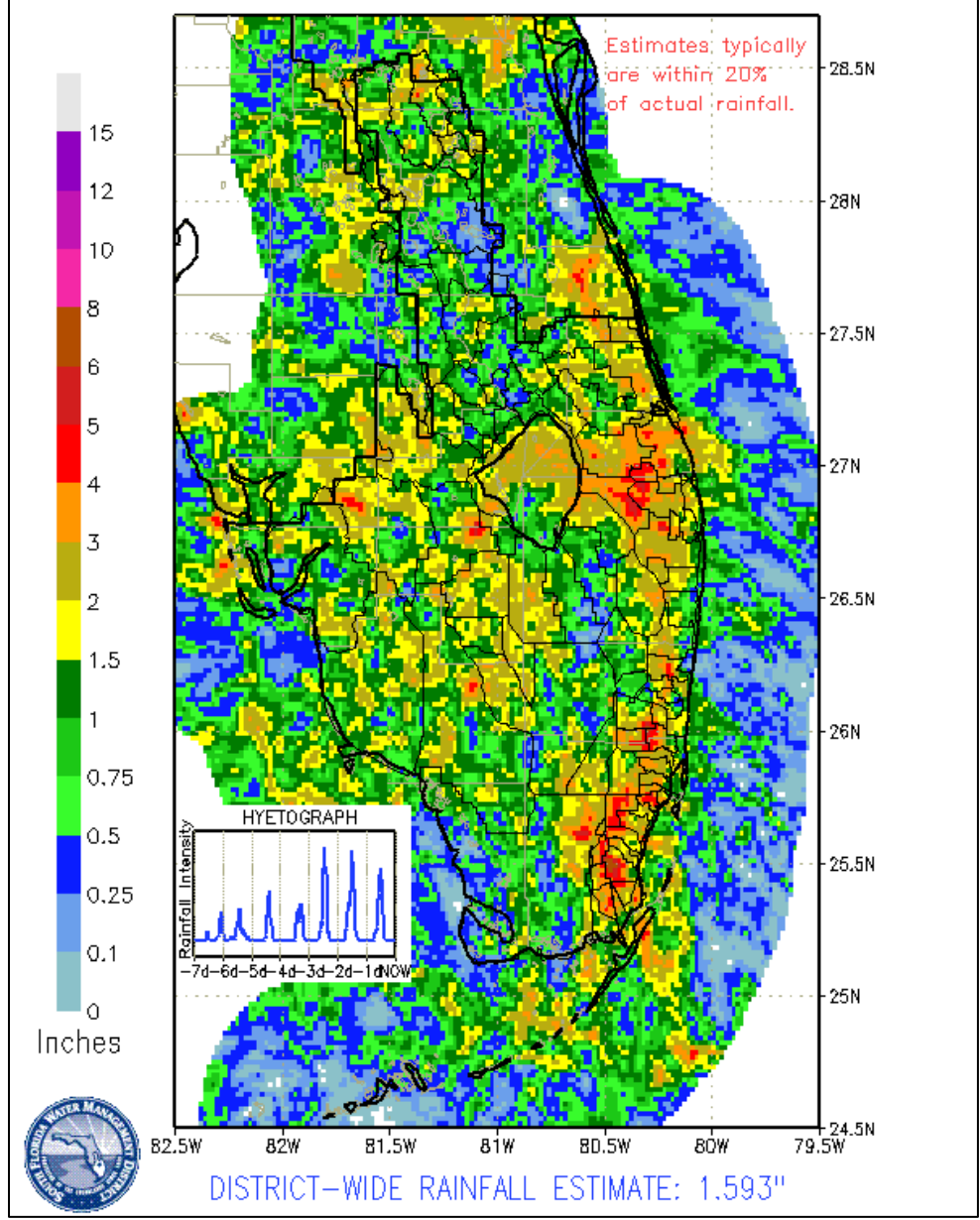
## **EVERGLADES**

At the gauge locations monitored for this report stages within the WCAs increased on average 0.01 feet. The most extreme individual gauge changes within the WCAs ranged from -0.17 feet (WCA-2B) to +0.18 feet (WCA-1). Pan evaporation was estimated at 1.82 inches.

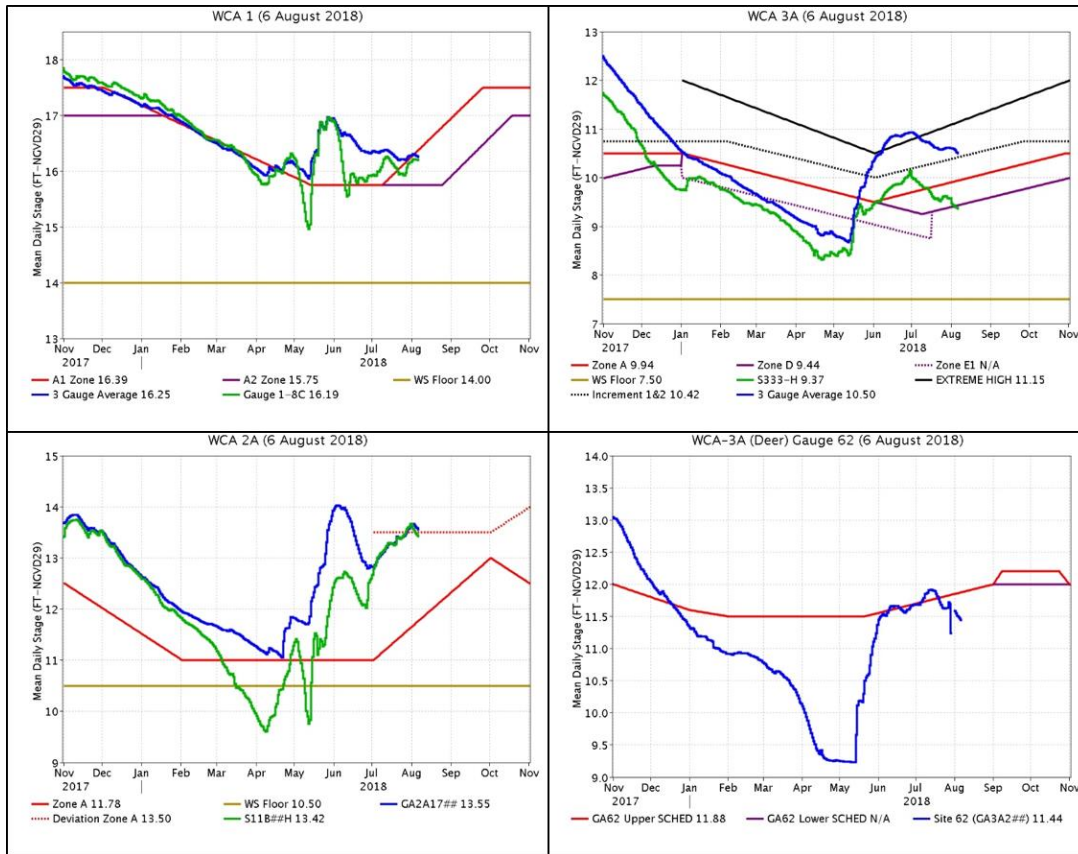
<b>Everglades Region</b>	<b>Rainfall (Inches)</b>	<b>Stage Change (feet)</b>
WCA-1	1.78	+0.09
WCA-2A	0.99	-0.14
WCA-2B	0.80	-0.17
WCA-3A	1.28	+0.02
WCA-3B	1.73	+0.07
ENP	1.04	+0.15

# SFWMD PROVISIONAL RAINDAR 7-DAY RAINFALL ESTIMATES

FROM: 0230 EST, 08/06/2018 THROUGH: 0230 EST, 08/13/2018



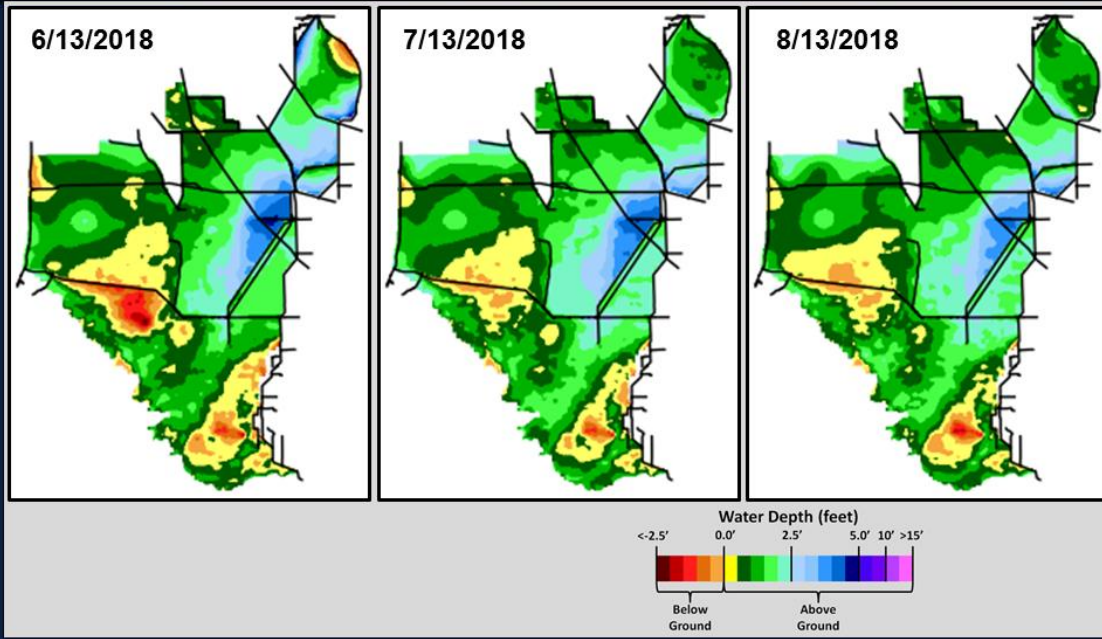
Regulation Schedules: WCA-1 three-gauge average stage is 0.21 feet below Zone A1, gauge 1-8C is 0.24 feet below. WCA-2A marsh stage is 0.08 feet below Dev. Zone A. S-11B Headwater stage is 0.26 feet below. WCA-3A three-gauge average stage is now 0.52 feet above Zone A and continues to trend favorably towards schedule. WCA-3A at gauge 62 (northwest corner) stage is 0.44 feet below the upper schedule.



Water Depths and Changes: The WDAT tool for spatial interpolation of depth monthly snapshots indicate that habitat with depths from 0.5 feet to 1.0 feet has expanded across WCA-3A North over the last month, with lower depths along the northern reaches of the L-67 in WCA-3A South. WCA-2A water depths look very similar to last month. WDAT output indicates that water depths across WCA-3A decreased slightly or remained stable over the previous month. A majority of WCA-3A South is significantly drier at this time than it was a year ago.



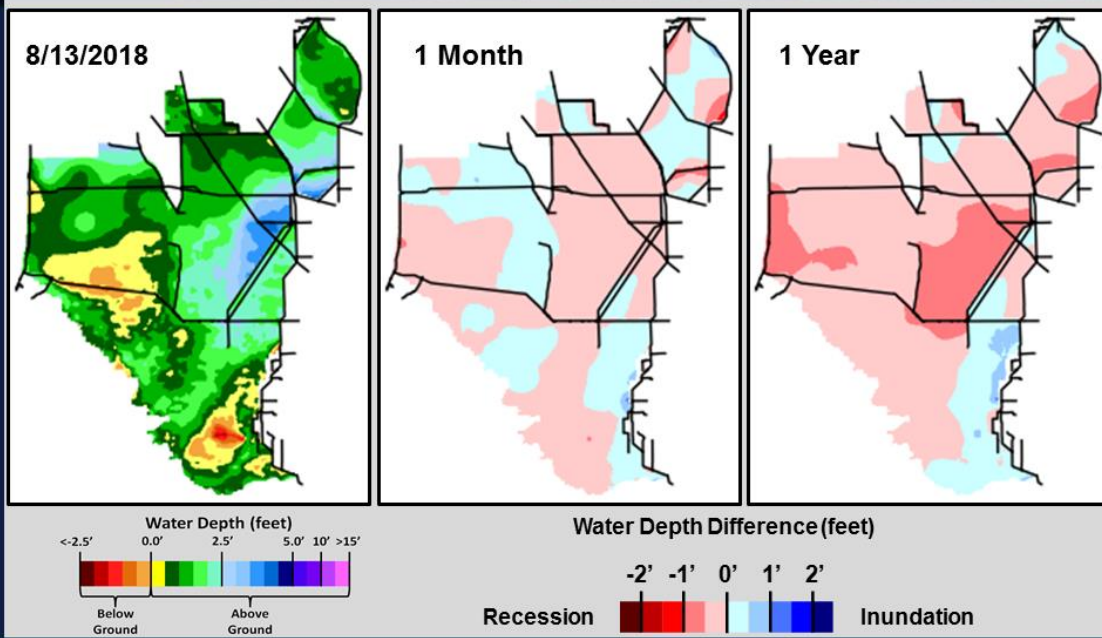
### SFWDAT Water Depth Monthly Snapshots



South Florida Water Depth Assessment Tool (SFWDAT)



### SFWDAT Everglades Difference Maps (Present - Past)

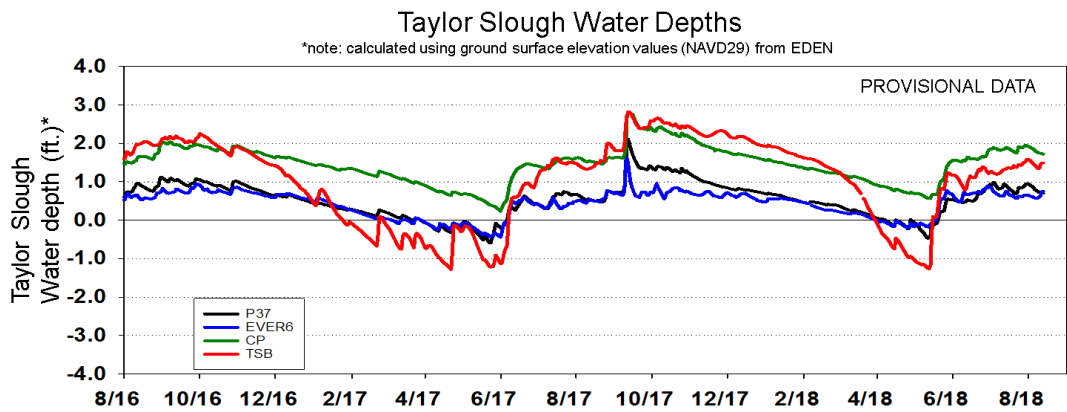
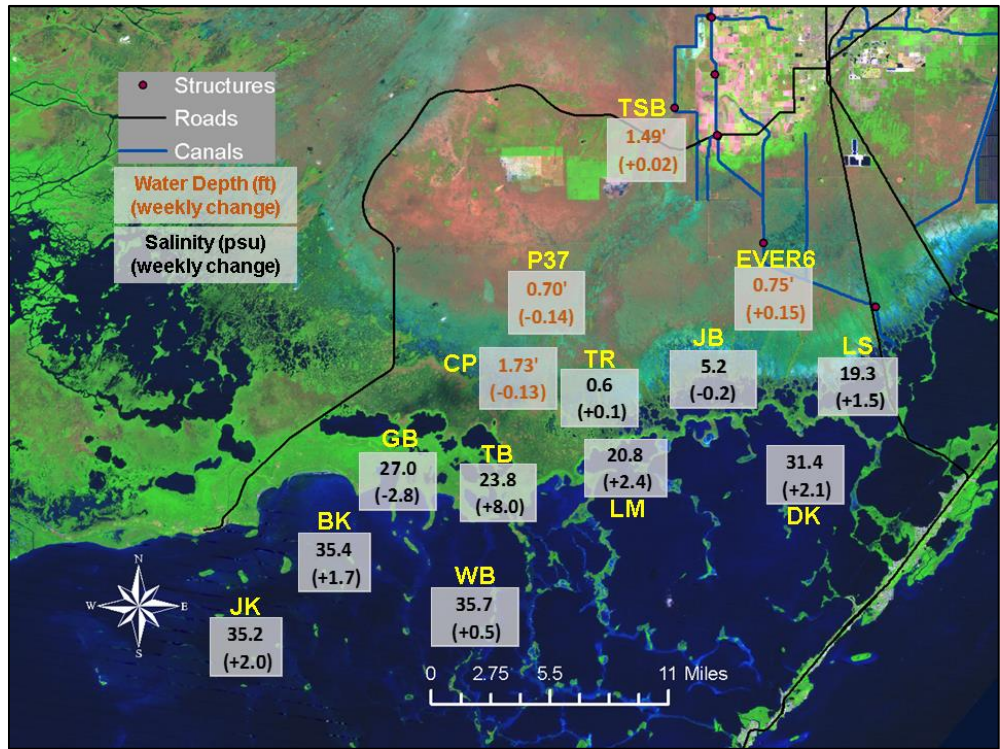


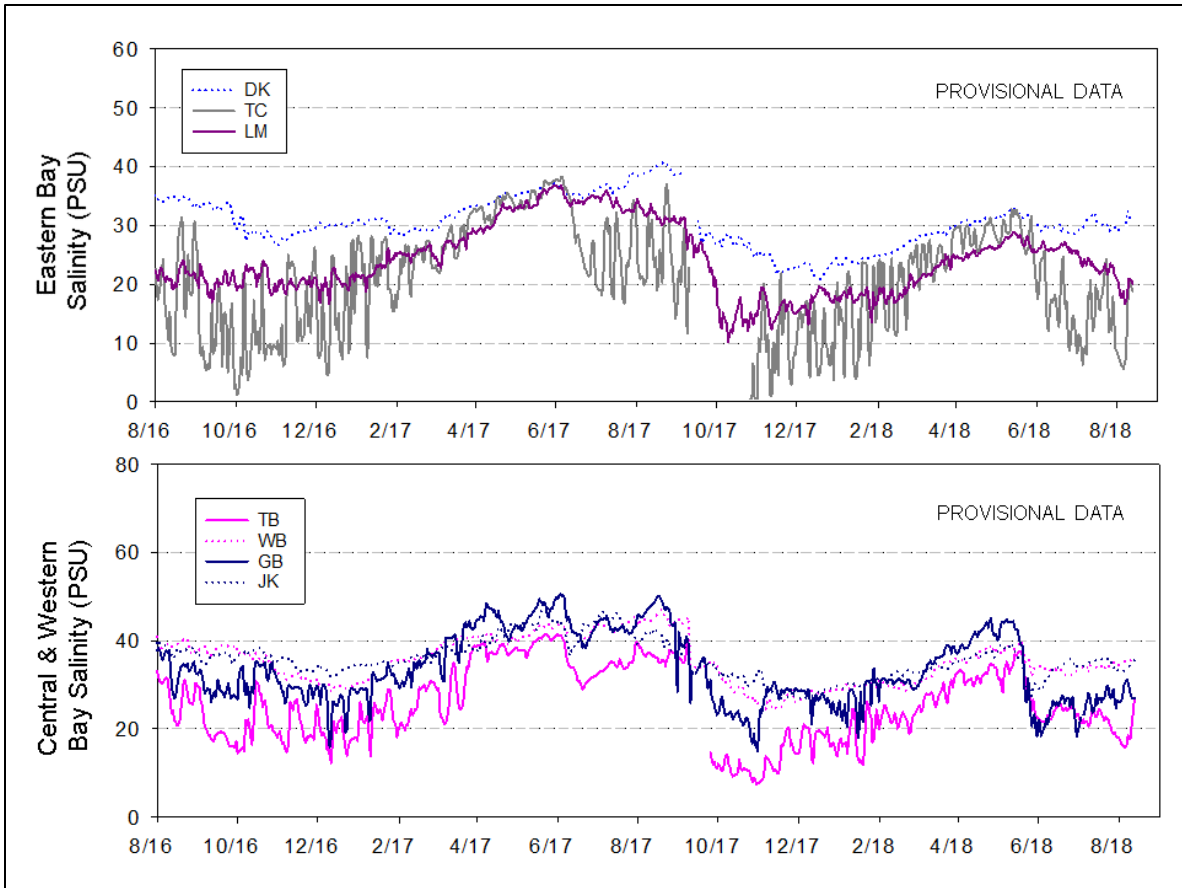
South Florida Water Depth Assessment Tool (SFWDAT)



Taylor Slough Water Levels: An average of 1 inch of rain fell on Taylor Slough and Florida Bay this past week, and stages averaged a decrease of 0.01 feet. Individual station changes ranged from -0.14 feet to +0.15 feet with the largest increase occurring in the panhandle where 2 inches of rain fell. Water depths are 2 to 4 inches above the historical averages.

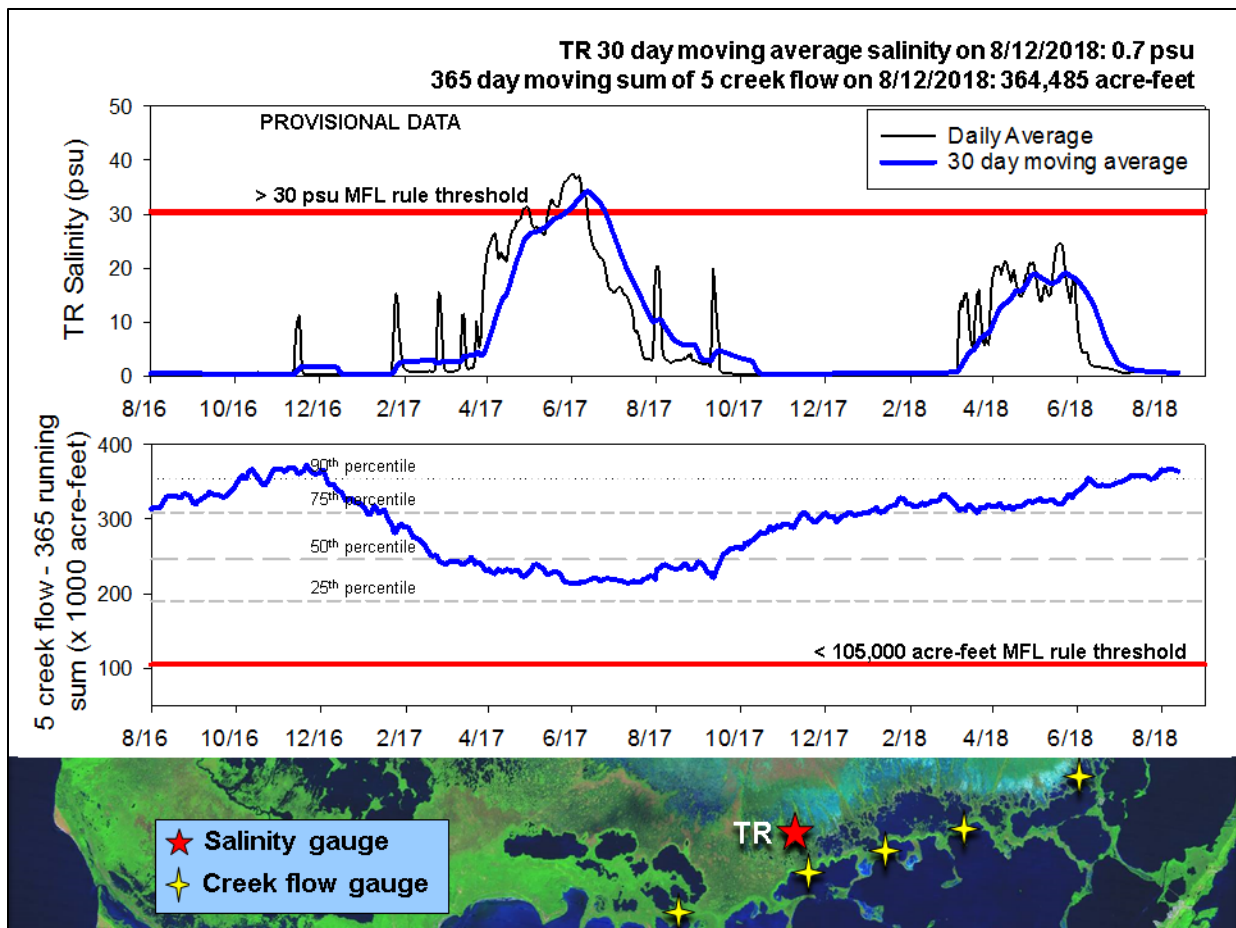
Florida Bay Salinities: Salinities in Florida Bay increased a weekly average of 1.8 psu and individual station changes ranging from -2.8 psu to +8.0 psu. Salinities ranged from 5 psu in the northeast to 36 psu in the central bay. This is averaging about 2 psu below the historical average across these stations for this time of year which is desirable.





Florida Bay MFL: Mangrove zone daily average remains near fresh this week at 0.6 psu. The 30-day moving average remains at 0.7 psu. The weekly cumulative flow from the five creeks denoted by yellow stars on the map totaled about 4,600 acre-feet for the last week, which is 65% of the average weekly five-creek flow for this time of year. The 365-day moving sum of flow from the five creeks ended the last week at 364,485 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. 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 may have increased ecological benefit this water year by allowing ecological processes time to recover from flooding. 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 14th, 2018 (red is new)

Area	Weekly change	Recommendation	Reasons
WCA-1	Stage changes from 0.00' to +0.18'	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 and wildlife.
WCA-2A	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-2B	Stage decreased by 0.17'	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 remained unchanged	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, tree islands and wildlife.
WCA-3A NW	Stage increased by 0.02'	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.	
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, tree islands and wildlife.
Southern WCA-3A S	Stage increased by 0.08'		
WCA-3B	Stage increased by 0.07'	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 increased by 0.15'	Make discharges to the Park according to the 2012 WCP rainfall plan.	Protect upstream/downstream habitat and wildlife.
Taylor Slough	Stage changes ranged from -0.14' to +0.15'	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 -2.8 to +8.0 psu.	Move water southward as possible	When available, provide freshwater to maintain low salinity buffer and promote water movement.