

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

MEMORANDUM

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

FROM: SFWMD Staff Environmental Advisory Team

DATE: Aug 22, 2018

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

Increased thunderstorm activity Thursday through Saturday. Some drier air has worked in over southeastern areas this morning which is expected to decrease thunderstorm activity over that area, but daytime heating is expected to still generate seabreeze thunderstorms focused over the western interior and north this afternoon. Daytime heating should generate scattered afternoon thunderstorms again on Wednesday with steering winds focusing activity over the interior. A trough is forecast to dig into northern and central Florida Thursday and Friday and it should bring some favorable upper level conditions for thunderstorm development yielding above-average rains over the three-day period of Thursday through Saturday. As an upper level high pressure ridge builds back in across the southeastern US, daily thunderstorm activity would be expected to step back down Sunday and Monday with steering winds focusing activity over the interior and west.

Kissimmee

Tuesday morning stages were 56.5 feet NGVD (at schedule) in East Lake Toho, 53.5 feet NGVD (at schedule) in Toho, and 51.1 feet NGVD (0.1 feet above schedule) in Kissimmee-Cypress-Hatchineha; headwater stages were 46.2 feet NGVD at S-65A and 27.7 feet NGVD at S-65D. Tuesday morning discharges were: 2,068 cfs at S-65, 2,034 cfs at S-65A, and 3,898 cfs at S-65E. Dissolved oxygen concentration in the Kissimmee River averaged 2.9 mg/L for the week. Kissimmee River mean floodplain depth on Sunday was 1.59 feet. No new recommendations were made this week.

Lake Okeechobee

Lake Okeechobee stage is 14.59 feet NGVD, rising 0.05 feet from last week and 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. However, the latest image (August 17) suggests the chances for another bloom have increased again over the last few days. 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 2,093 cfs over the past week with 903 (43%) cfs coming from Lake Okeechobee. Salinity decreased slightly throughout 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 4,163 cfs over the past week with 839 (20%) 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 good range at Shell Point. 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.

Stormwater Treatment Areas

Over the past week, the STAs received approximately 31,000 acre-feet of inflows (which includes approximately 15,100 acre-feet of Lake releases). The total amount of inflows to the STAs in WY2019 (since May 1, 2018) is approximately 754,000 acre-feet, which includes approximately 110,600 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, 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. Water depths on average decreased 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. Stages exceeded that mark from June 13 to August 4. The depth on Sunday at that location was 2.40 feet. In Taylor Slough water depths are 1 to 3 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 0.97 inches of rainfall in the past week and the Lower Basin received 0.84 inches (SFWMD Daily Rainfall Report 8/20/2018).

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: 8/21/2018

Water Body	Structure	7-day Average Discharge (cfs) ¹	Stage Monitoring Site ²	Lake Stage (feet)	Schedule Type ³	Schedule Stage (feet)	Daily Departure (feet)						
							8/19/18	8/12/18	8/5/18	7/29/18	7/22/18	7/15/18	7/8/18
Lakes Hart and Mary Jane	S-62	145	LKMJ	60.0	R	60.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1
Lakes Myrtle, Preston, and Joel	S-57	28	S-57	61.0	R	61.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0
Alligator Chain	S-60	143	ALLI	63.3	R	63.2	0.1	0.1	0.1	0.1	0.0	0.1	0.1
Lake Gentry	S-63	196	LKGT	61.0	R	61.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0
East Lake Toho	S-59	379	TOHOE	56.5	R	56.5	0.0	0.0	0.5	0.7	0.1	-0.1	-0.1
Lake Toho	S-61	927	TOHOW, S-61	53.5	R	53.5	0.0	0.1	0.3	0.6	-0.1	0.0	-0.1
Lakes Kissimmee, Cypress, and Hatchineha	S-65	3,282	KUB011, LKISSB	51.1	R	51.0	0.1	0.4	0.7	0.6	0.2	0.1	0.3

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

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

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

DATA ARE PROVISIONAL

Lower Kissimmee Basin

Discharges at Lower Basin structures are shown in Table 2. SFWDAT depth maps for the Phase I restoration area are shown in Figure 8. Kissimmee River floodplain stages at selected stations are shown in Figure 9.

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

Report Date: **8/21/2018**

Metric	Location	1-Day Average		Average for the Preceding 7-Days ¹								
		8/19/2018	8/19/18	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
Discharge (cfs)	S-65	2,167	3,282	4,337	4,407	4,179	1,567	2,561	1,287	514	834	1,110
Discharge (cfs)	S-65A ²	2,181	3,443	4,674	4,980	4,267	1,479	2,615	1,294	466	801	1,224
Discharge (cfs)	S-65D ²	4,078	4,254	4,617	4,458	2,264	2,641	2,226	1,774	1,608	2,094	2,062
Headwater Stage (feet NGVD)	S-65D ²	27.57	27.00	26.63	26.78	26.75	26.68	26.77	26.80	26.79	26.79	26.82
Discharge (cfs)	S-65E ²	4,118	4,334	4,847	4,566	2,400	2,764	2,399	2,000	1,834	2,347	2,261
Discharge (cfs)	S-67	175	169	160	157	209	183	217	292	298	277	273
DO (mg/L) ³	Phase I river channel	2.6	2.9	3.1	3.3	4.2	2.3	2.7	2.9	3.4	2.0	1.4
Mean depth (feet) ⁴	Phase I floodplain	1.59	1.76	2.02	2.08	1.25	1.08	1.20	0.60	0.46	0.75	0.84

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

²S-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.

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

⁴1-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)

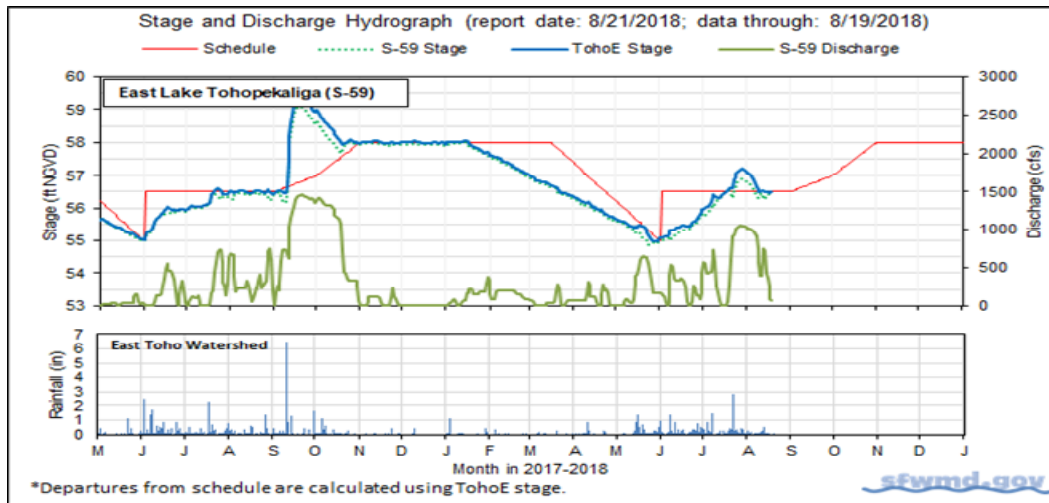


Figure 1.

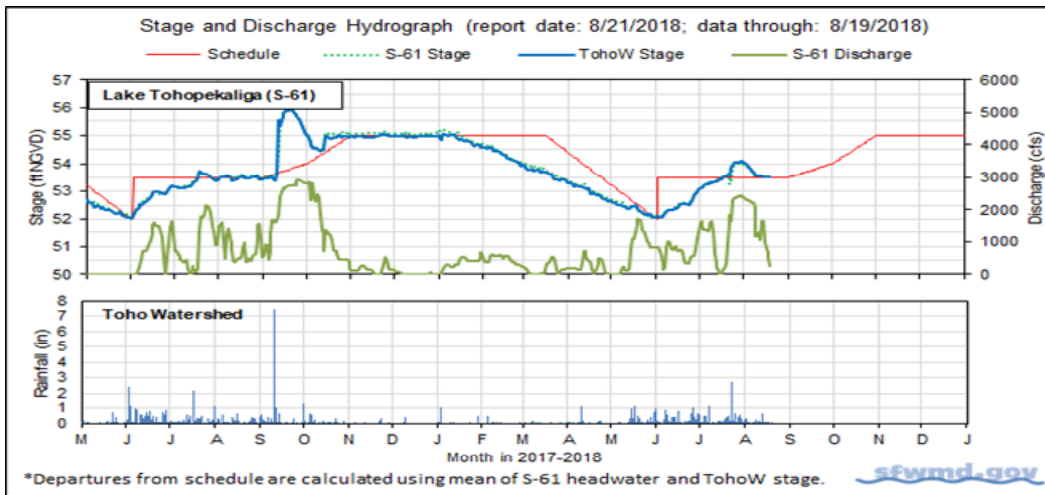


Figure 2.

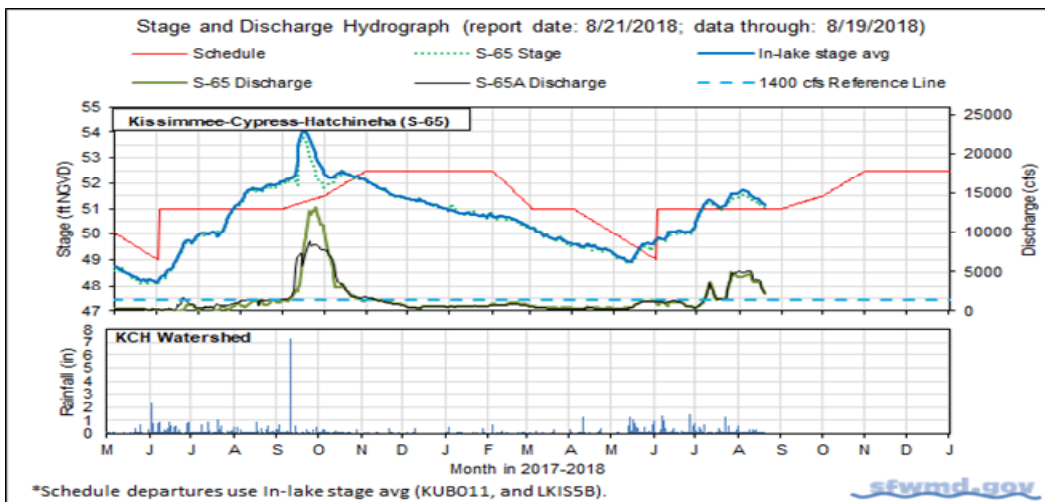


Figure 3.

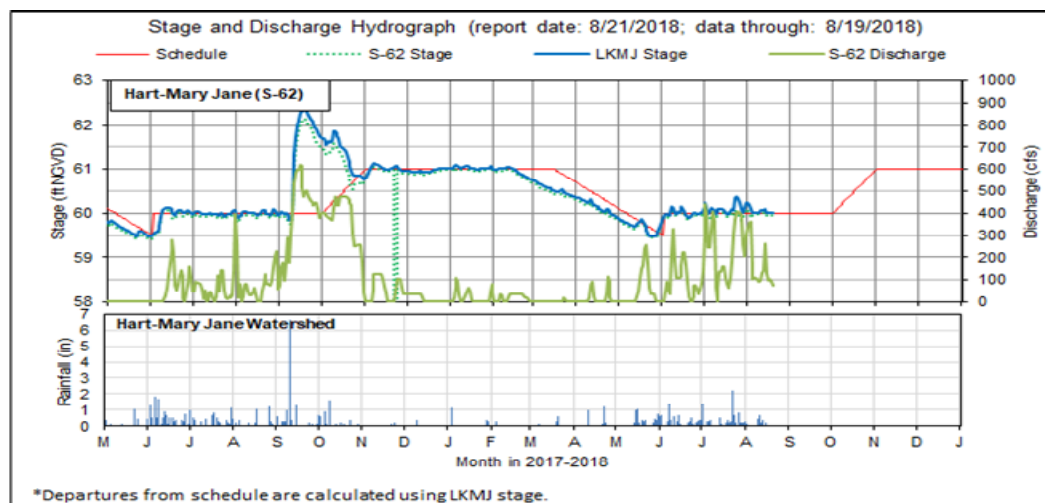


Figure 4.

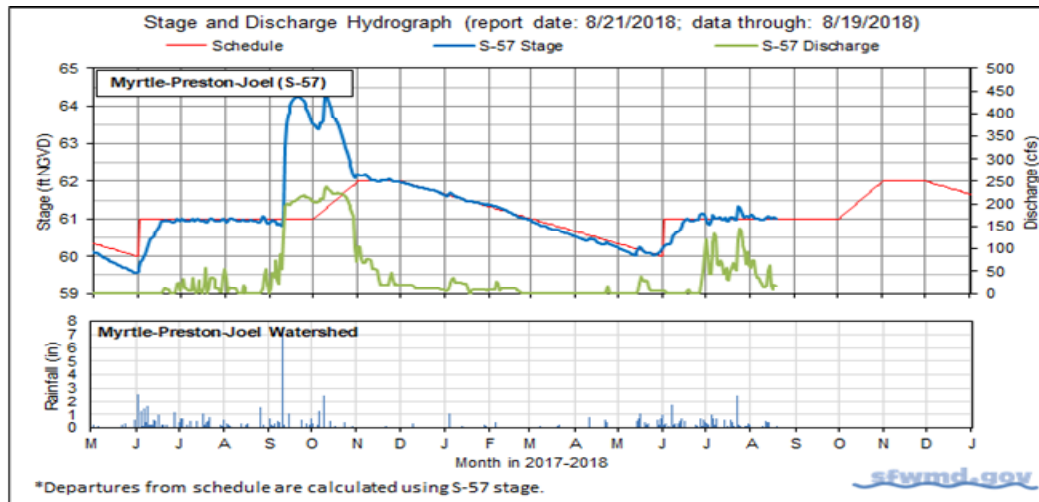


Figure 5.

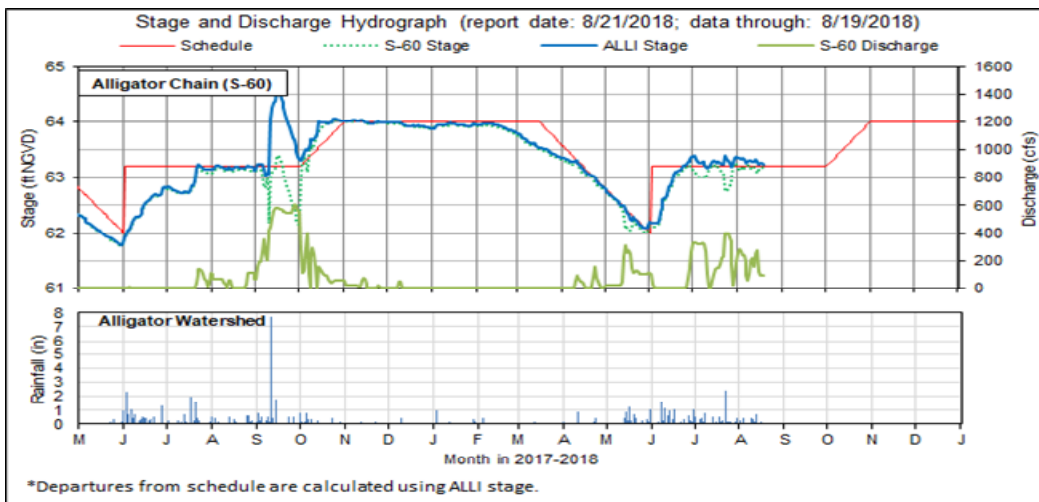


Figure 6.

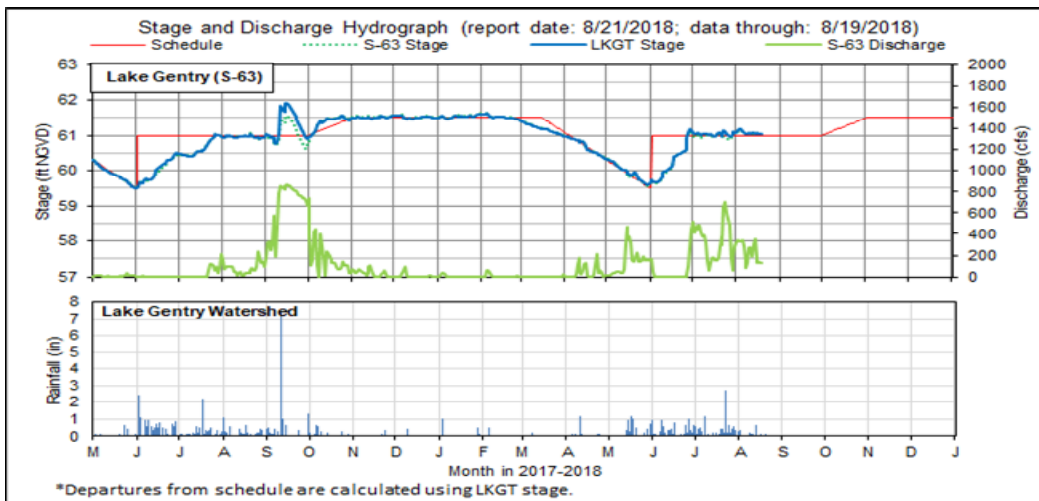


Figure 7.

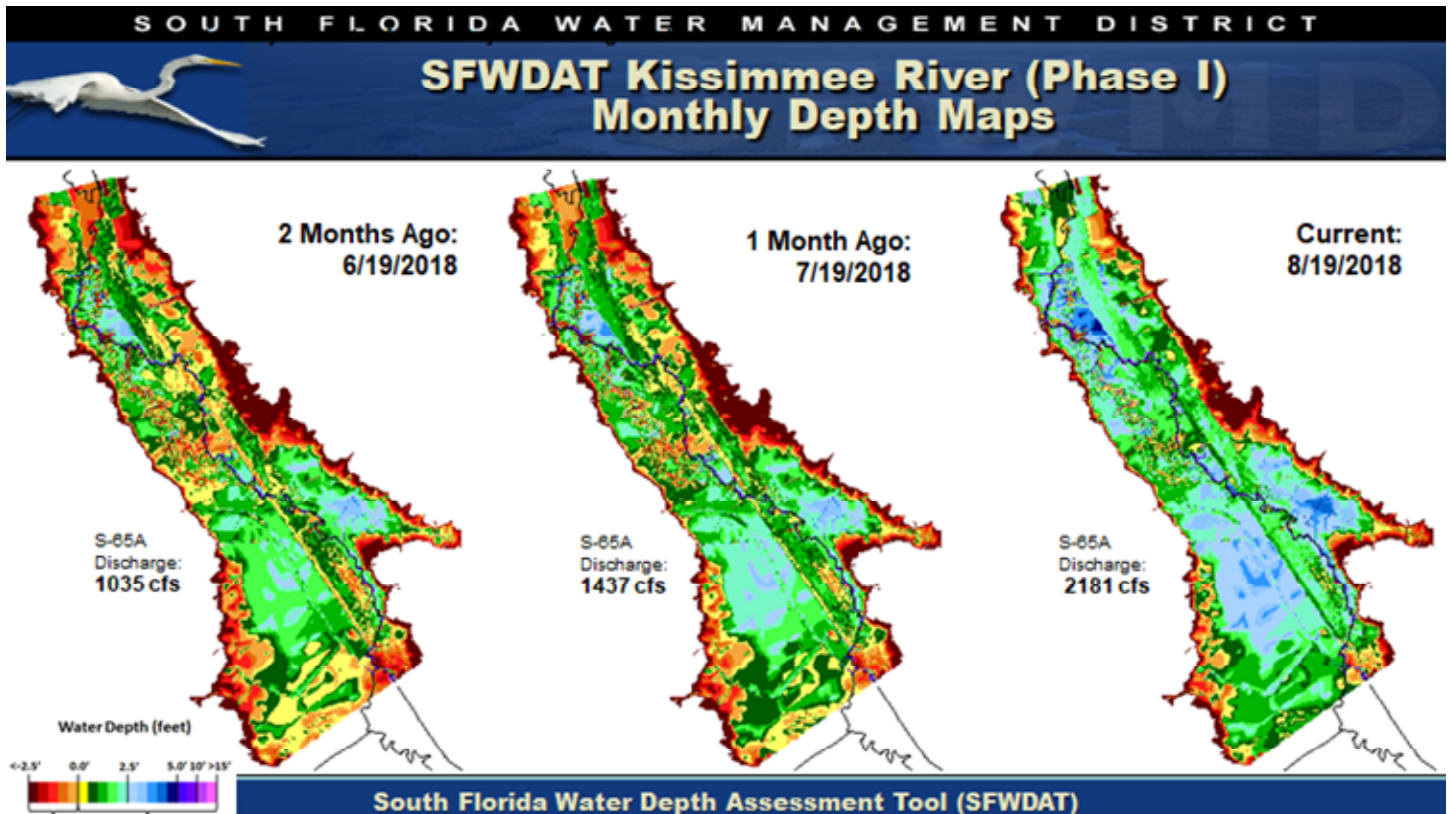


Figure 8. Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to January 16, 2012.

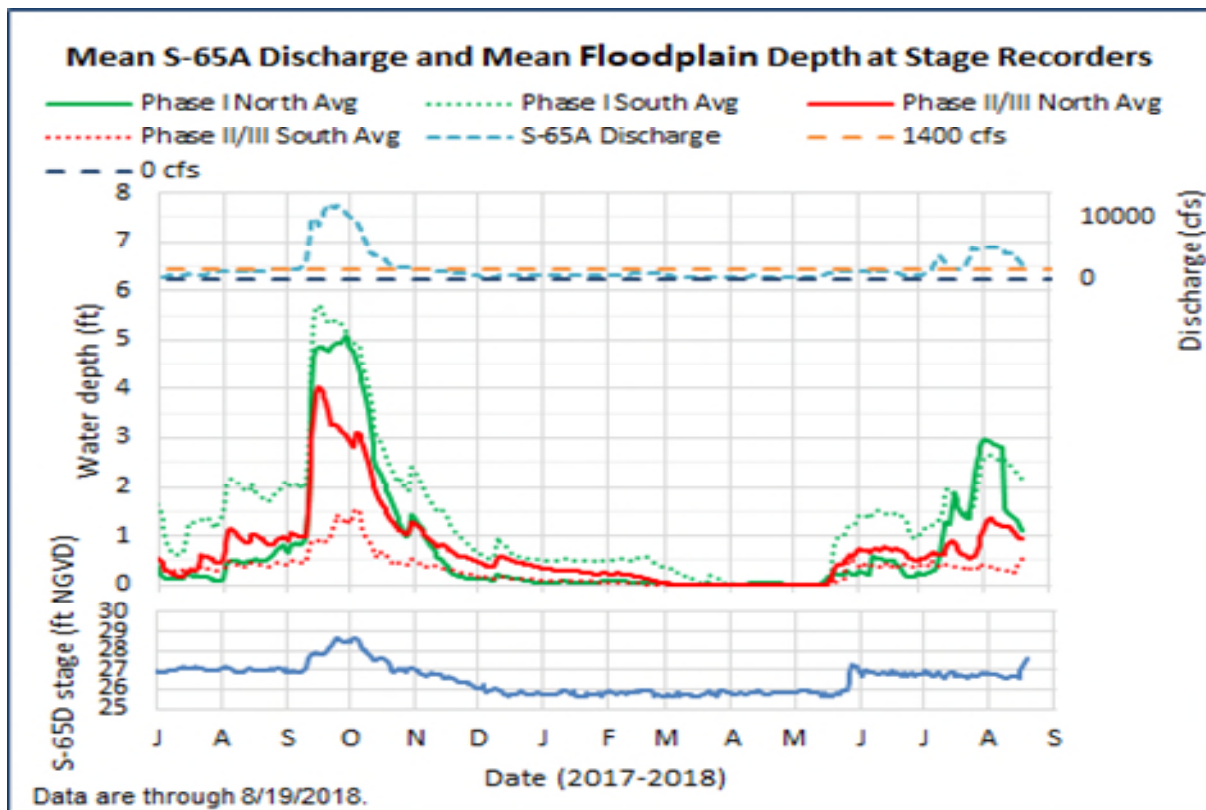
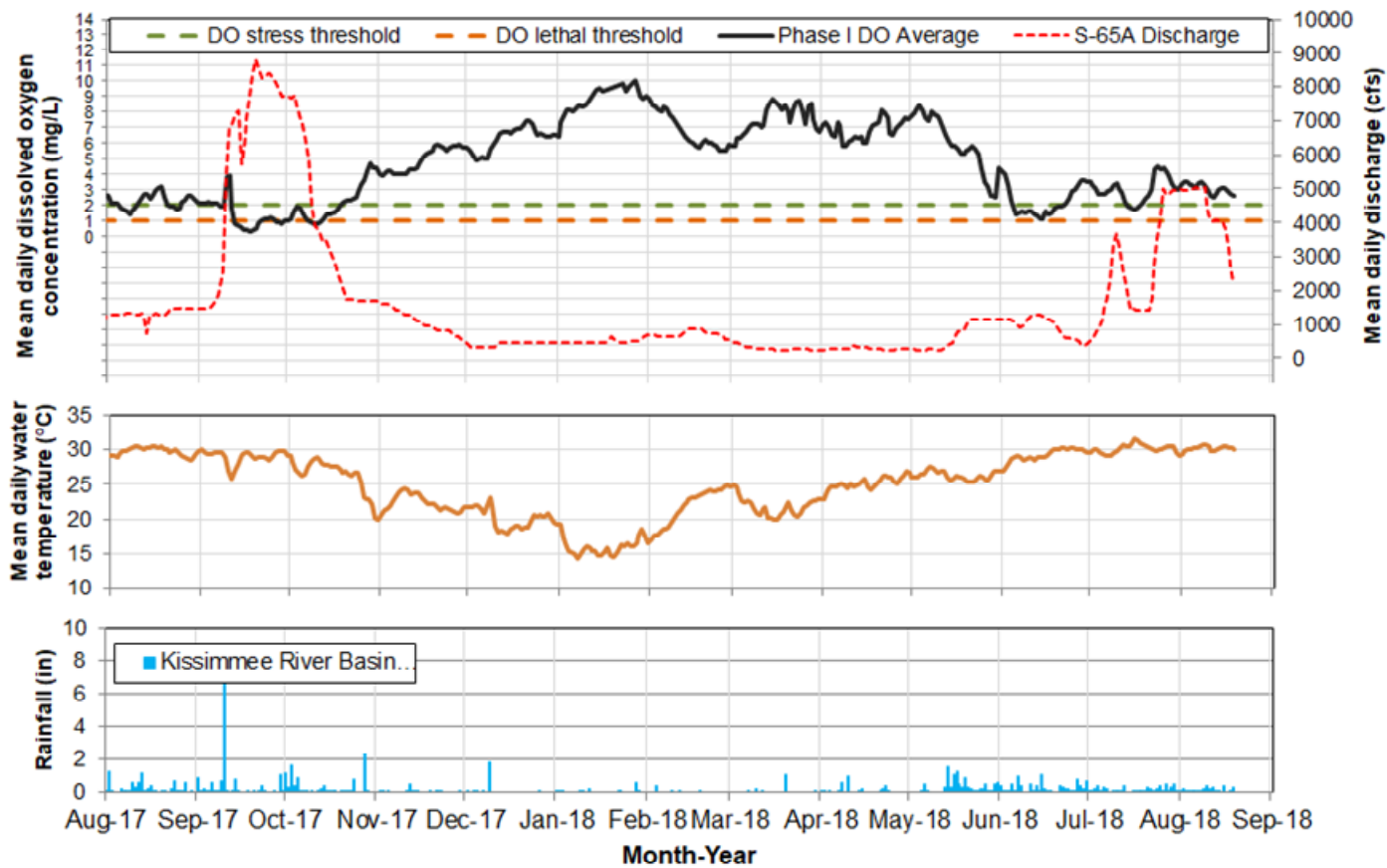


Figure 9. Mean water depth at stage recorders in the northern Phase I, southern Phase I, northern Phase II/III, and southern Phase II/III areas in relation to the S-65A discharge and S-65D headwater stage.



Report Date: 8/21/2018; data are through: 8/19/2018.

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
8/21/2018	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 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.	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
3/20/2018	No new recommendations.		N/A		3/20/2018

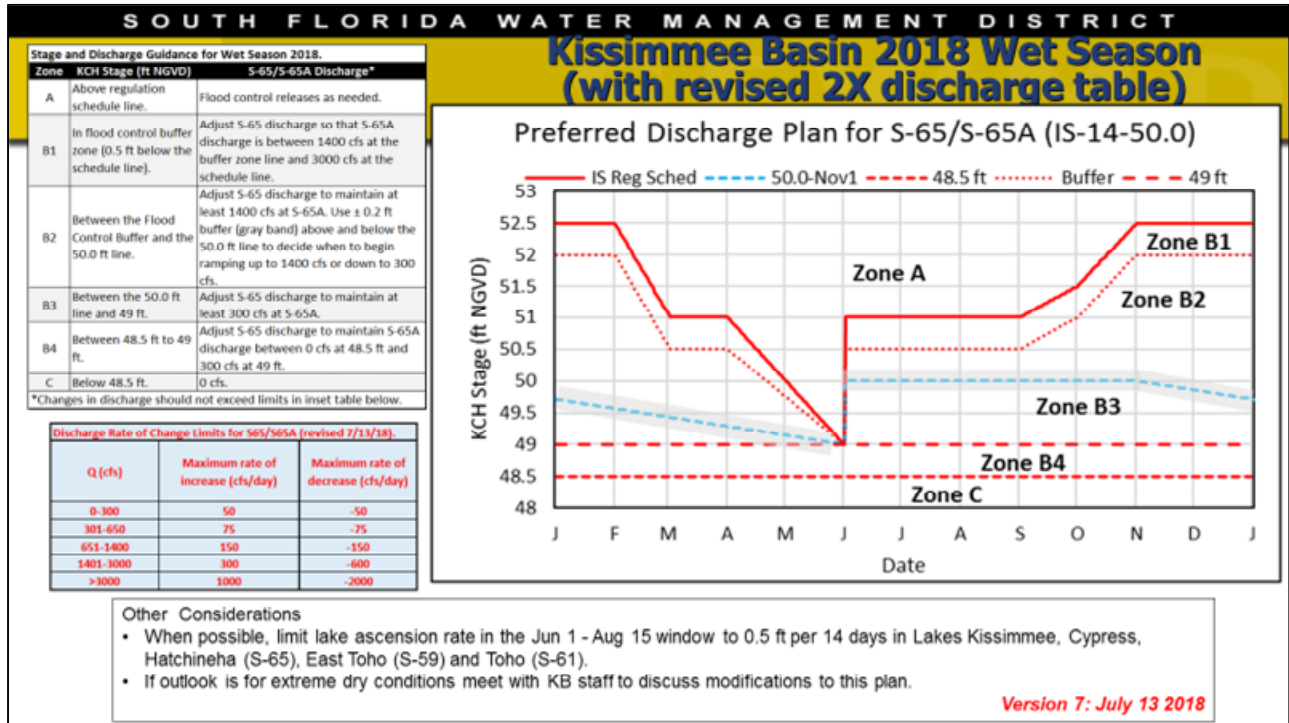


Figure 11. The 2018 Wet Season Discharge Plan for S-65/S-65A.

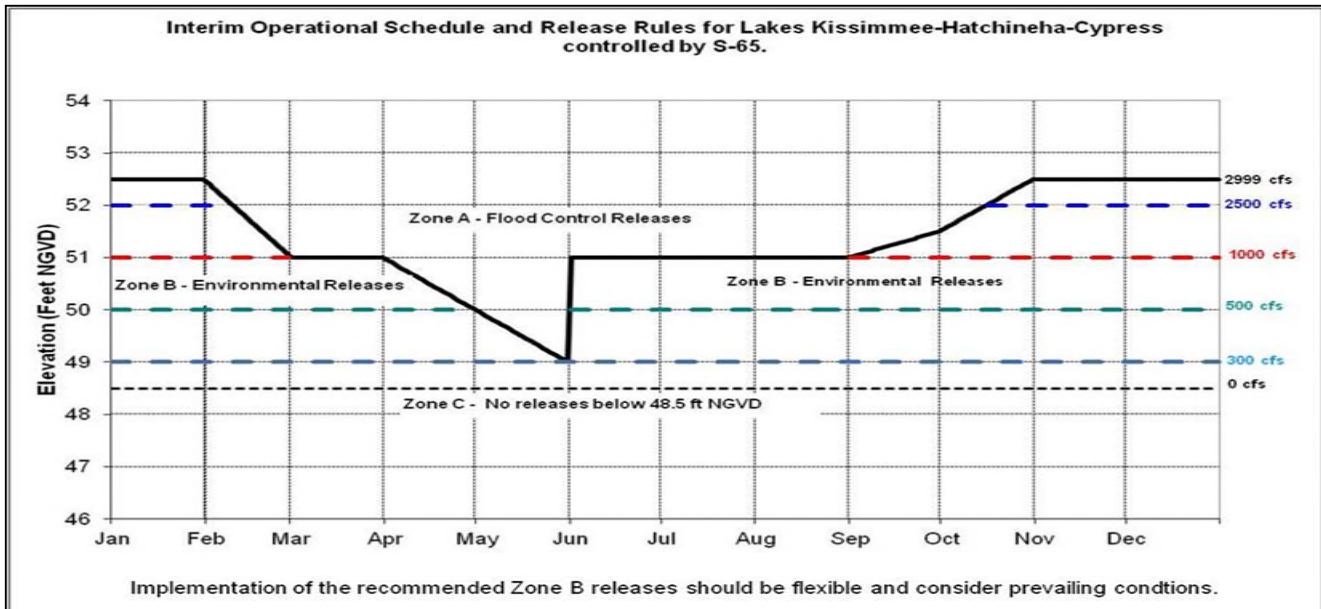


Figure 12. Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years.

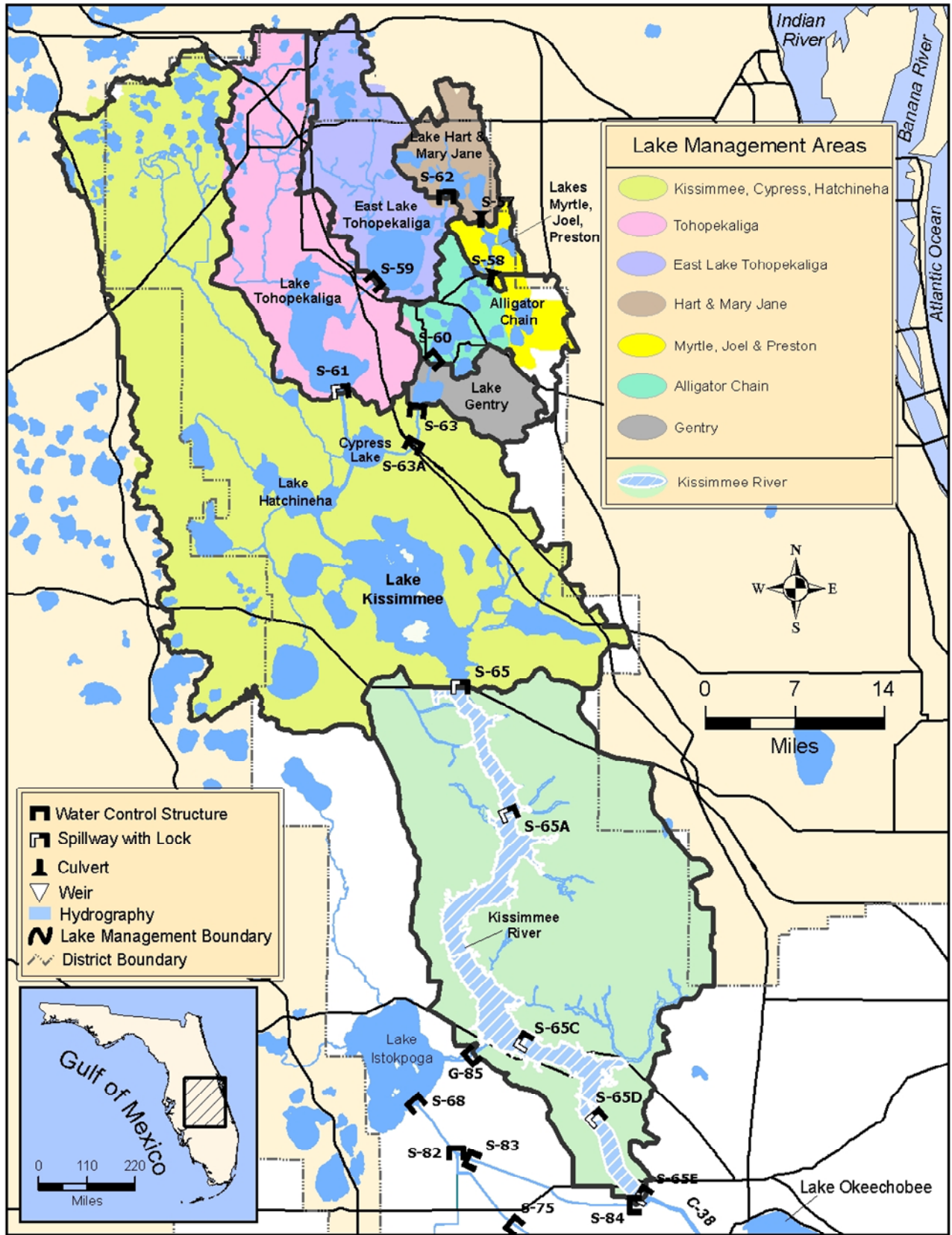


Figure 13. The Kissimmee Basin.

LAKE OKEECHOBEE

According to the USACE web site, Lake Okeechobee stage is at 14.59 feet NGVD for the period ending at midnight on August 20, 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 1.20 feet higher than a year ago (Figure 1). The Lake remains in the Low sub-band (Figure 2). The August 20 lake stage was the third highest since 2011, with only 2013 and 2016 having higher stages, at 1.11 feet and 0.17 feet higher, respectively (Figure 3). According to RAINDAR, 0.59 inches of rain fell over the Lake during the week August 14, 2018 – August 20, 2018. Most of the watershed received more rainfall, especially the west coast which received between 1.5 and 4 inches of rain (Figure 4).

Average daily inflows to the Lake decreased slightly from the previous week, declining to 5,134 cfs, from 5,939 cfs. Most of the decrease in inflows was from the Kissimmee River (S-65 structures), going from 4,836 cfs the previous week to 4,201 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 also decreased from the previous week by about 1,776 average daily cfs, declining to 3,062 cfs. The decrease in outflows was primarily south through the S-350 structures and west through S-77. Discharges via the S-77 structure went from 1,611 cfs the previous week to 839 cfs this past week, while outflows to the south through the S-350 structures decreased from 2,202 cfs the previous week to 883 cfs this past week. S-308 discharges to the east decreased slightly from 1,025 cfs to 903 cfs this past week. The corrected average daily evapotranspiration value for the week based on the L006 weather platform solar radiation decreased slightly from 0.17 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 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.

The most recent satellite imagery (August 17) using the cyanobacteria monitoring product derived from NOAA's analysis of EUMETSAT's OLCI satellite sensor showed the potential for a cyanobacteria bloom increased recently, mostly in the pelagic region. As the summer progresses, periods of calm, drier weather may worsen bloom conditions (Figure 6).

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	4836	4201	1.7
S71 & 72	155	144	0.1
S84 & 84X	644	566	0.2
Fisheating Creek	180	109	0.0
S154	0	0	0.0
S191	35	34	0.0
S133 P	25	23	0.0
S127 P	21	7	0.0
S129 P	20	16	0.0
S131 P	0	0	0.0
S135 P	17	18	0.0
S2 P	0	0	0.0
S3 P	0	0	0.0
S4 P	0	0	0.0
L8 Backflow	7	16	0.0
Rainfall	4812	1618	0.6
Total	10751	6751	2.7

OUTFLOWS	Previous Week Avg Daily cfs	Avg Daily Outflow cfs	Equivalent Depth Week Total (in)
S77	1611	839	0.3
S308	1025	903	0.4
S351	1123	680	0.3
S352	247	137	0.1
S354	832	502	0.2
L8 Outflow	0	0	0.0
ET	3224	3059	1.2
Total	8063	6121	2.5

PROVISIONAL DATA

Water Management Recommendations

Lake Okeechobee stage is 14.59 feet NGVD, 0.05 feet higher 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.

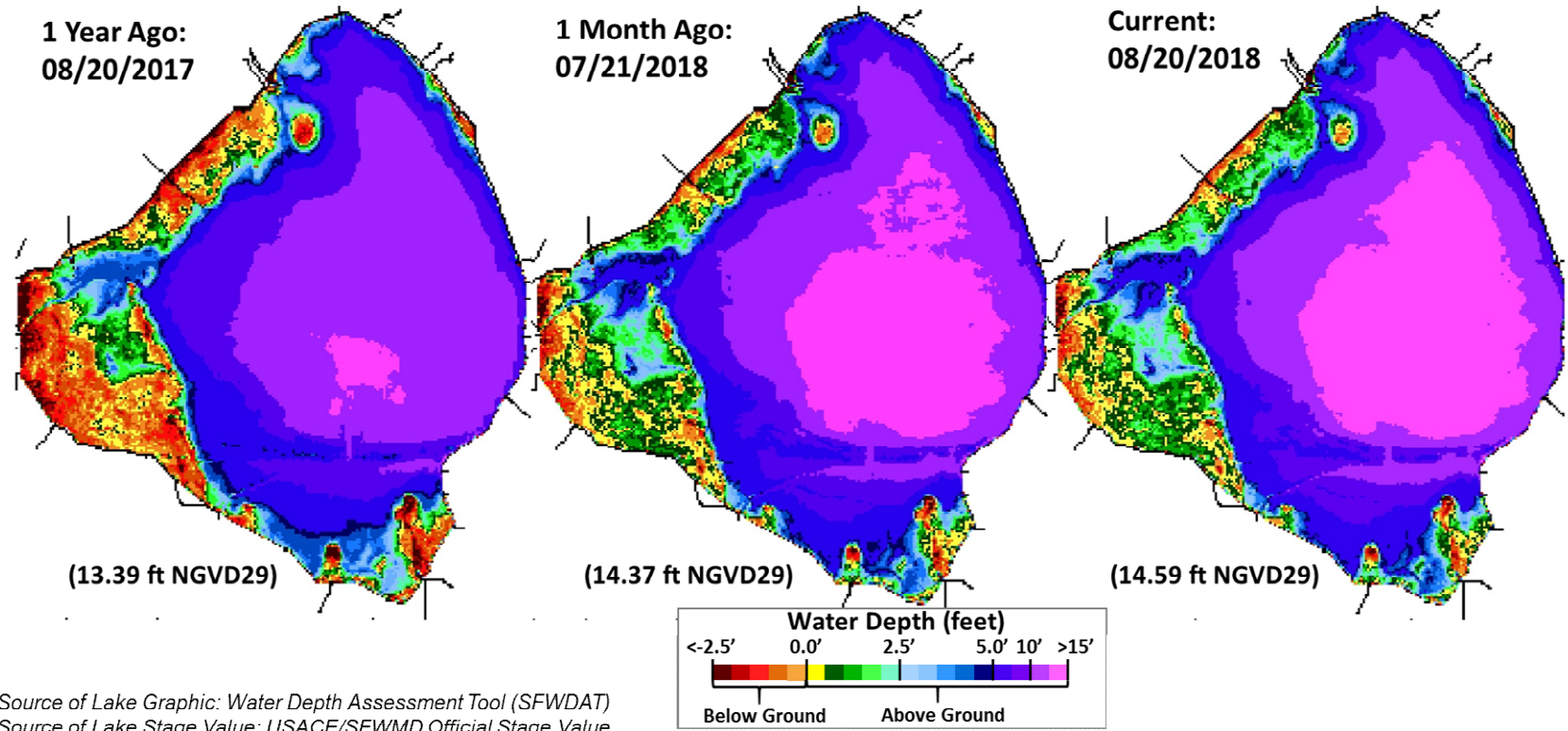
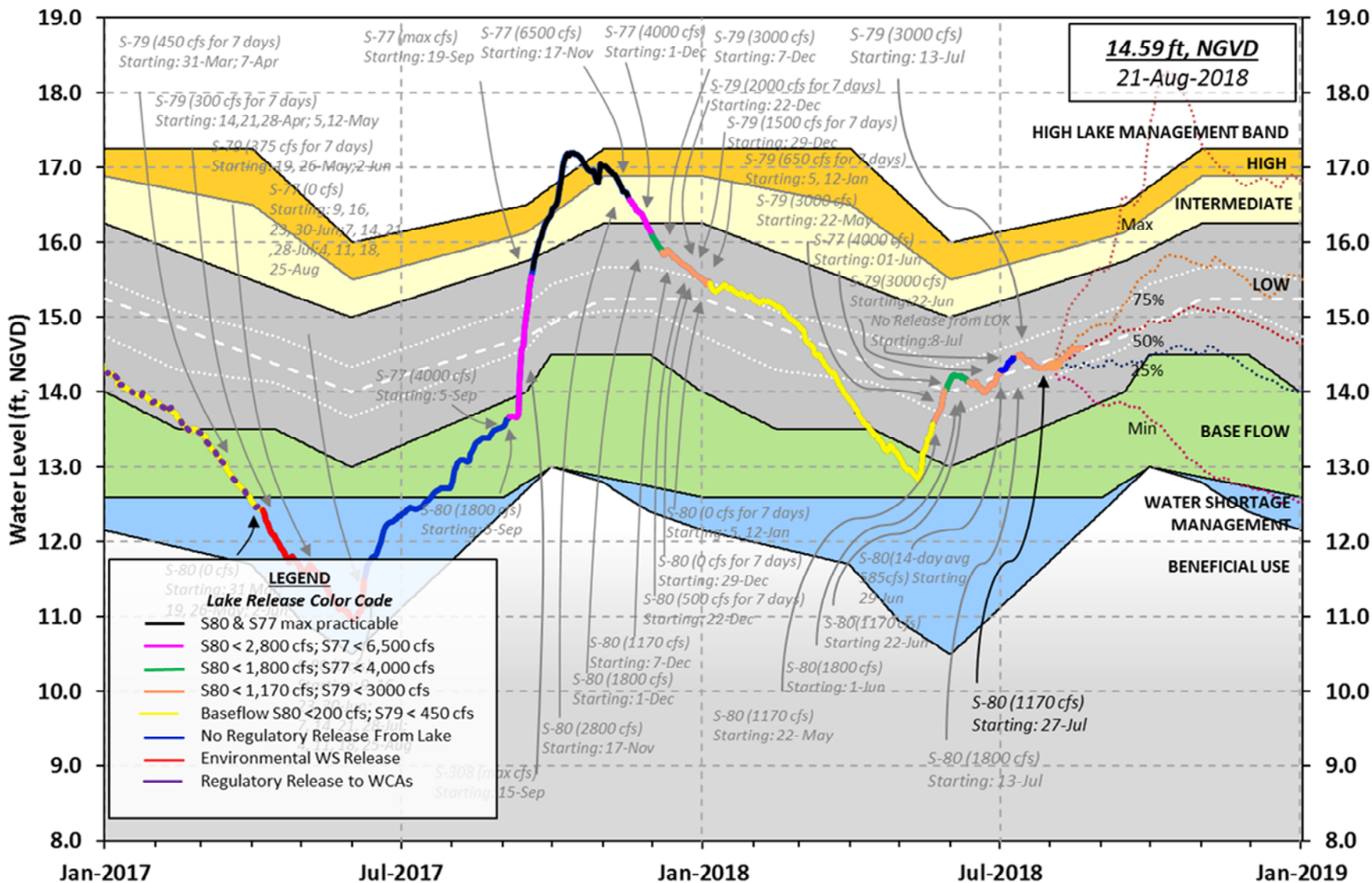


Figure 1. Water depth estimates on Lake Okeechobee based on the South Florida Water Depth Assessment Tool.

Lake Okeechobee Water Level History and Projected Stages



LORS-2008
Adopted by USACE 28-April-2008

Projected Stage Percentiles From
SFWM-D-HESM Position Analysis

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

Lake Okeechobee Water Level Comparison

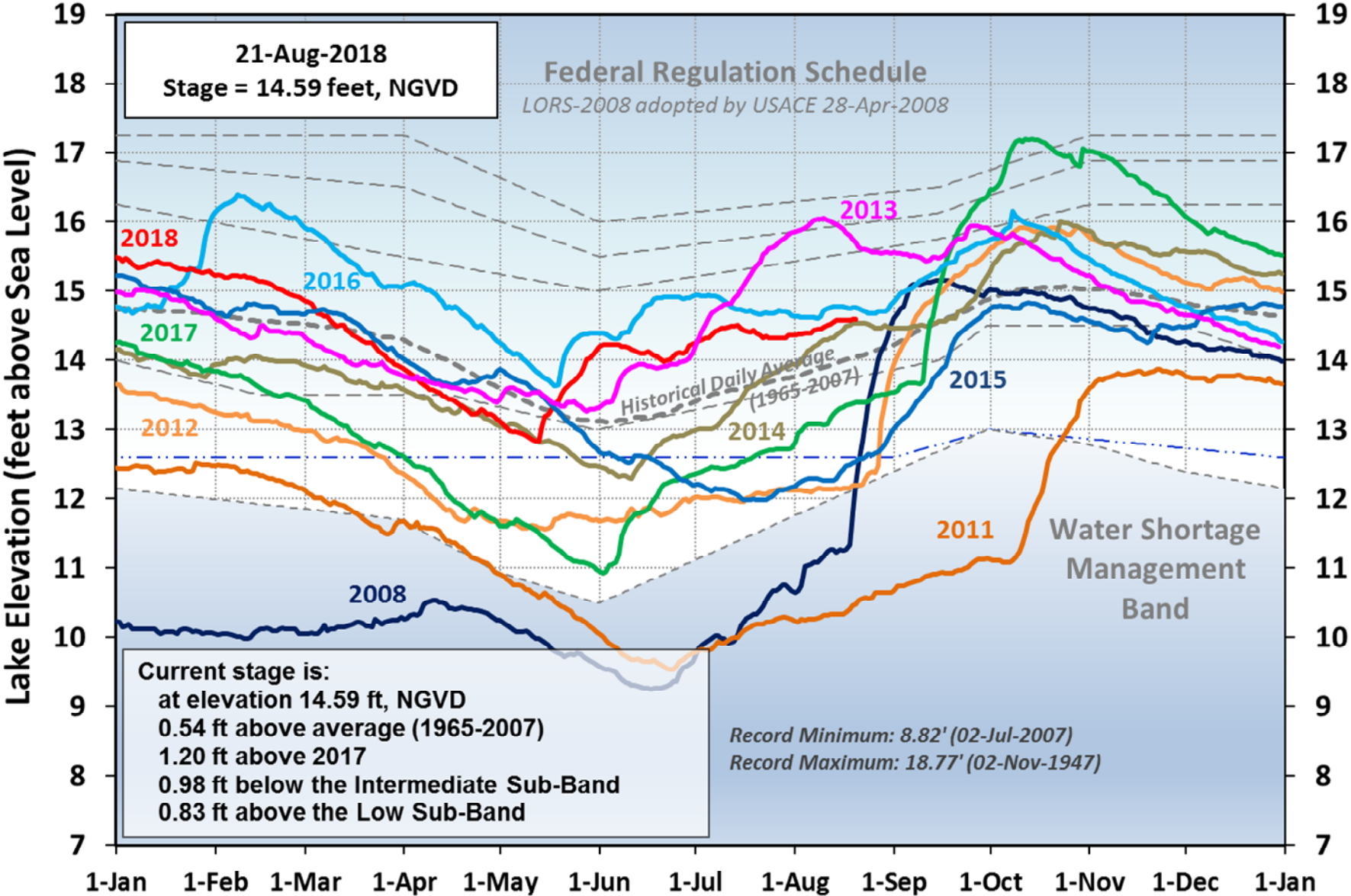
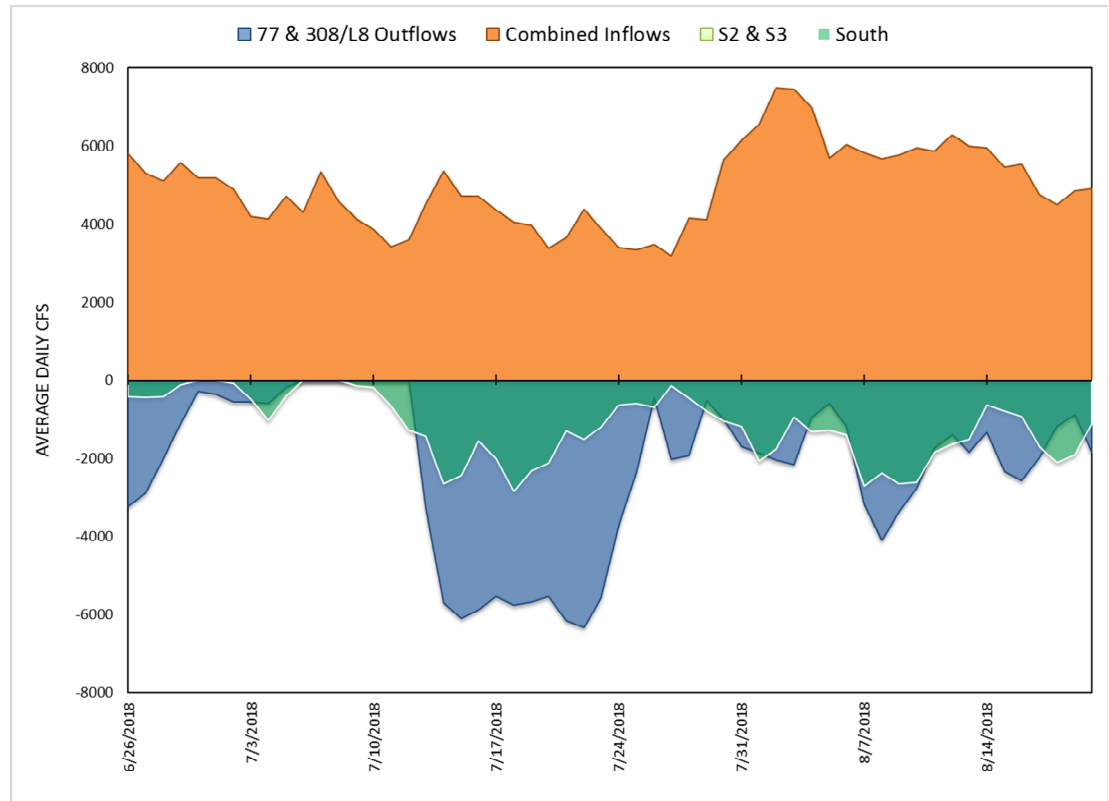
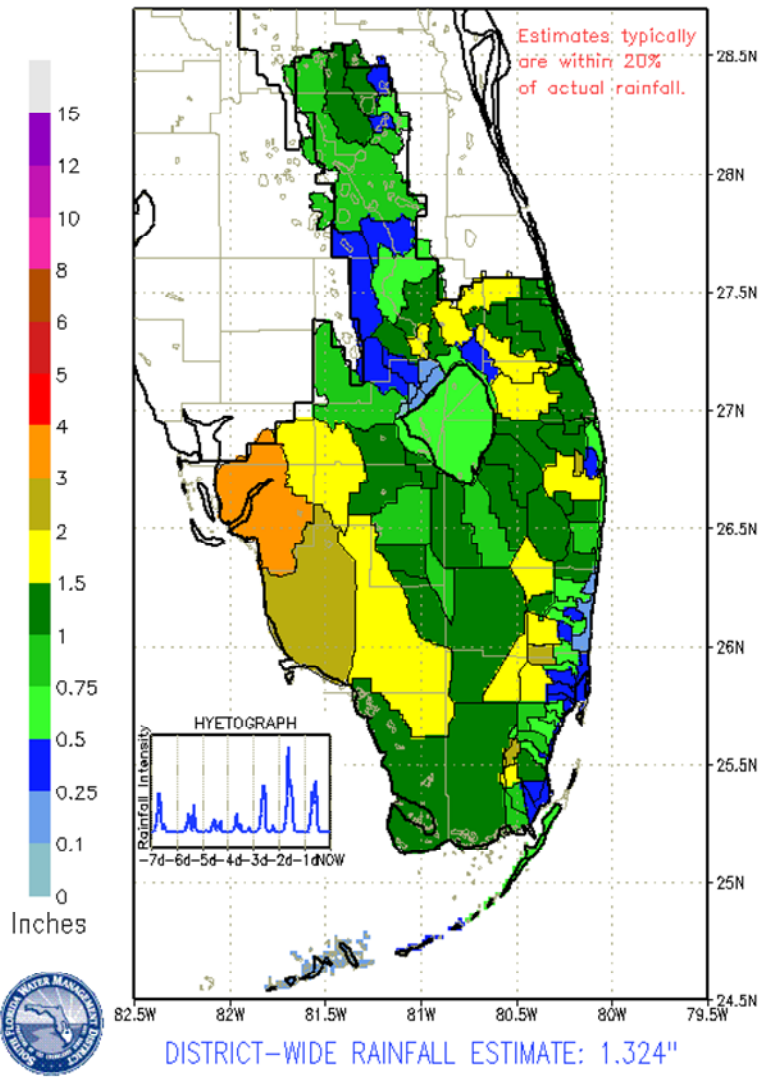


Figure 3. Annual stage hydrographs for Lake Okeechobee from 2011 – 2018.

SFWMD PROVISIONAL RAINDAR 7-DAY BASIN RAINFALL ESTIMATES

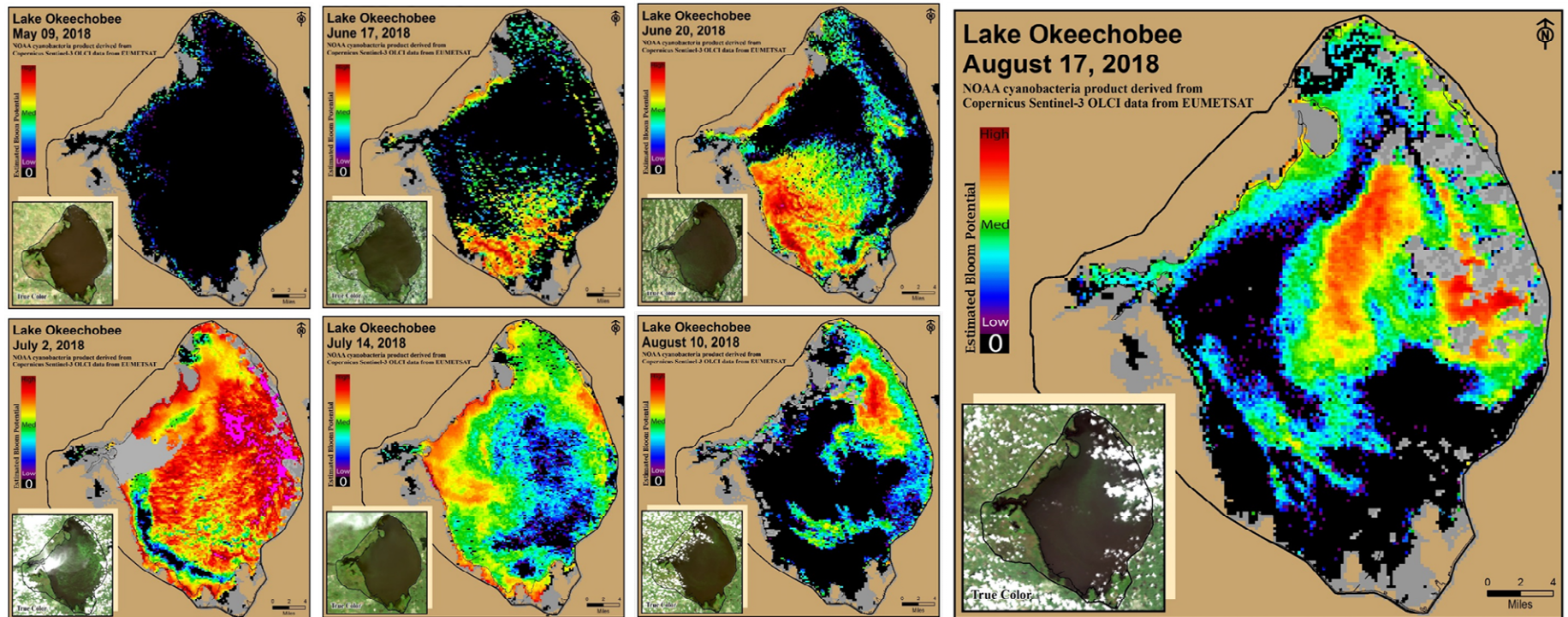
FROM: 0515 EST. 08/14/2018 THROUGH: 0515 EST. 08/21/2018



*Outflows shown as negative

Figure 4. Rainfall estimates by basin.

Figure 5. 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.



Gray = Cloud Cover

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

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

ESTUARIES

St. Lucie Estuary:

Last week total inflow to the St. Lucie Estuary averaged about 2,093 cfs (Figures 1 and 2) and last month inflow averaged about 2,152 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	573
S-80	1195
S-308	903
S-49 on C-24	10
S-97 on C-23(estimate)	164
Gordy Rd. structure on Ten Mile Creek	151

Over the past week in the estuary, surface salinity decreased in the North Fork, 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 3.6. 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)	1.4 (1.7)	2.0 (2.8)	NA ¹
US1 Bridge	3.2 (4.7)	4.5 (6.0)	10.0-26.0
A1A Bridge	10.5 (12.7)	19.7 (19.8)	NA ¹

¹Envelope not applicable and ²Not Reporting.

NOAA satellite images (Figure 5) for potential cyanobacteria bloom show increased activity in the St. Lucie Estuary from August 13 to August 17, 2018.

Caloosahatchee Estuary:

Last week total inflow to the Caloosahatchee Estuary averaged about 4,163 cfs (Figures 6 and 7) and last month inflow averaged about 4,005 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	839
S-78	1,606
S-79	3,459
Tidal Basin Inflow	704

Over the past week, salinity remained near 0 down to Ft. Myers Yacht Basin and decreased downstream (Table 4, Figures 8 & 9). 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 10). 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)	0.2 (0.2)	0.2 (0.2)	NA ¹
Val I75	0.2 (0.2)	0.2 (0.2)	0.0-5.0 ²
Ft. Myers Yacht Basin	0.2 (0.2)	0.2 (0.2)	NA
Cape Coral	2.4 (3.7)	4.0 (5.2)	10.0-30.0
Shell Point	13.9 (16.9)	14.7 (15.6)	10.0-30.0
Sanibel	NR ³ (NR)	NR (NR)	10.0-30.0

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

The Florida Fish and Wildlife Research Institute reported on August 17, 2018, that *Karenia brevis*, the Florida red tide dinoflagellate, was observed at background to high concentrations in or offshore of Lee County.

NOAA satellite images (Figure 11) for potential cyanobacteria bloom show increased activity in the Caloosahatchee River Estuary from August 13 to August 17, 2018.

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.

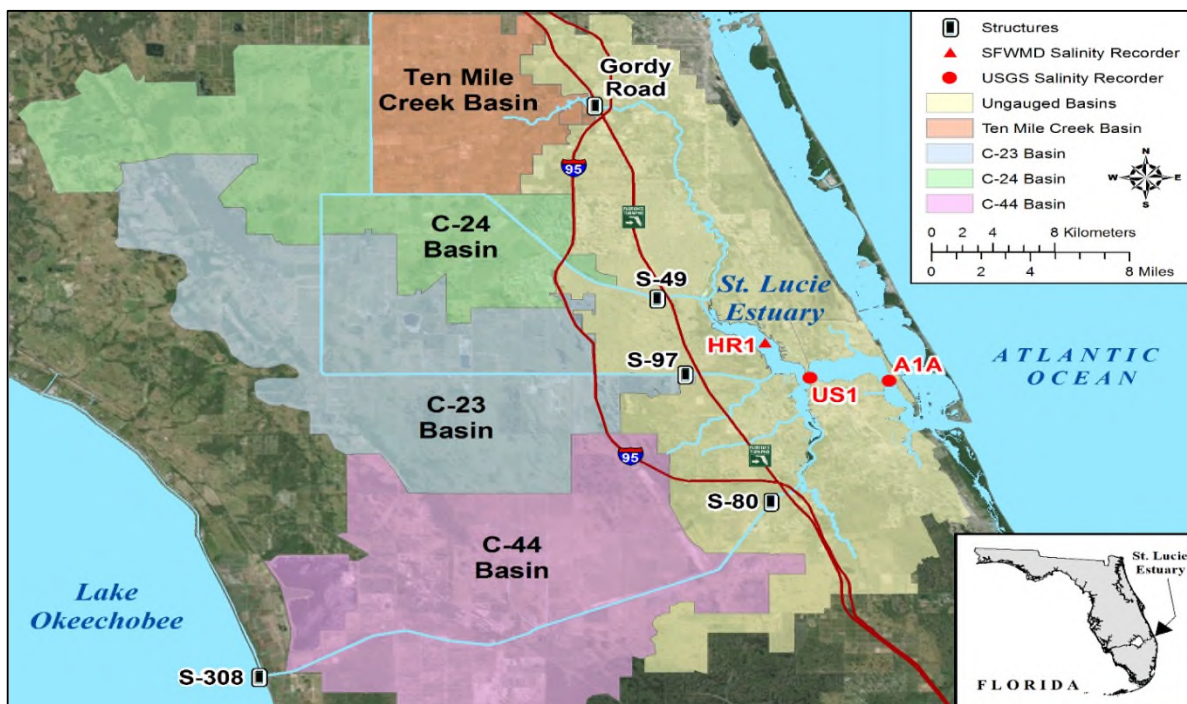


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

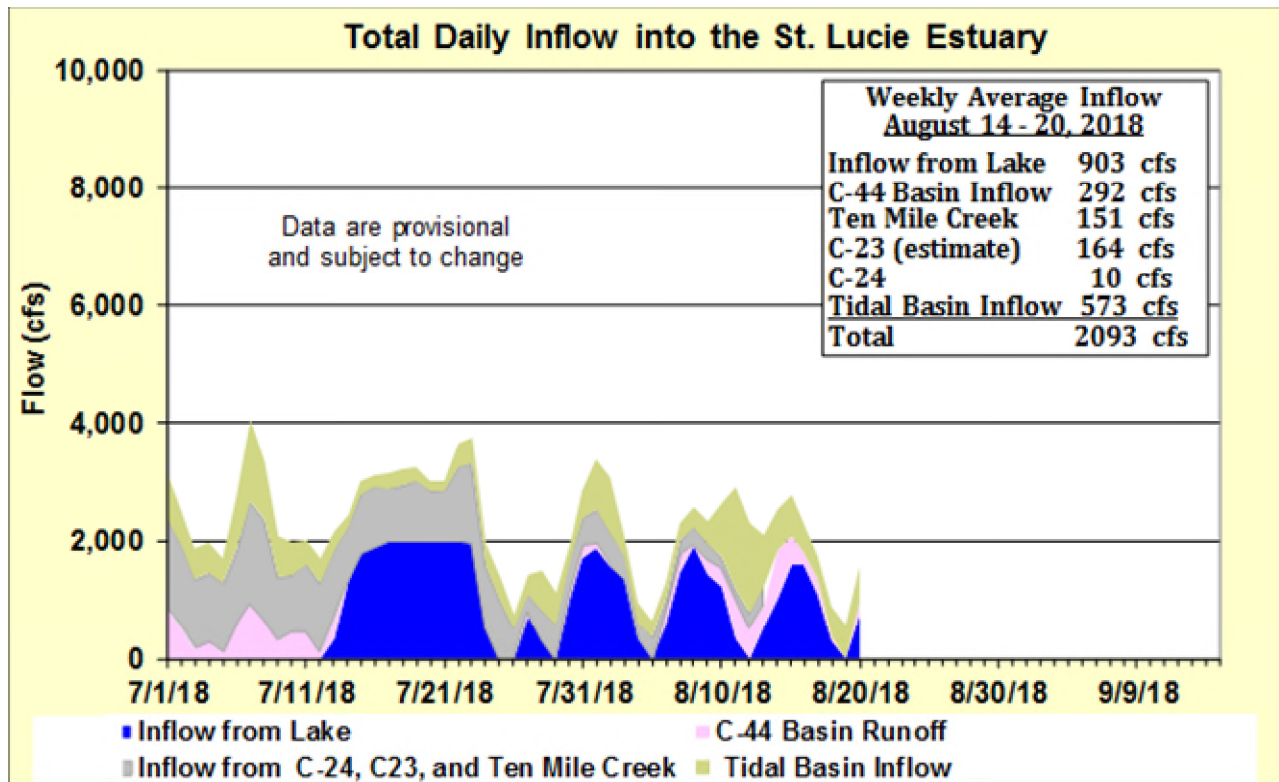


Figure 2. Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basins into the St. Lucie Estuary.

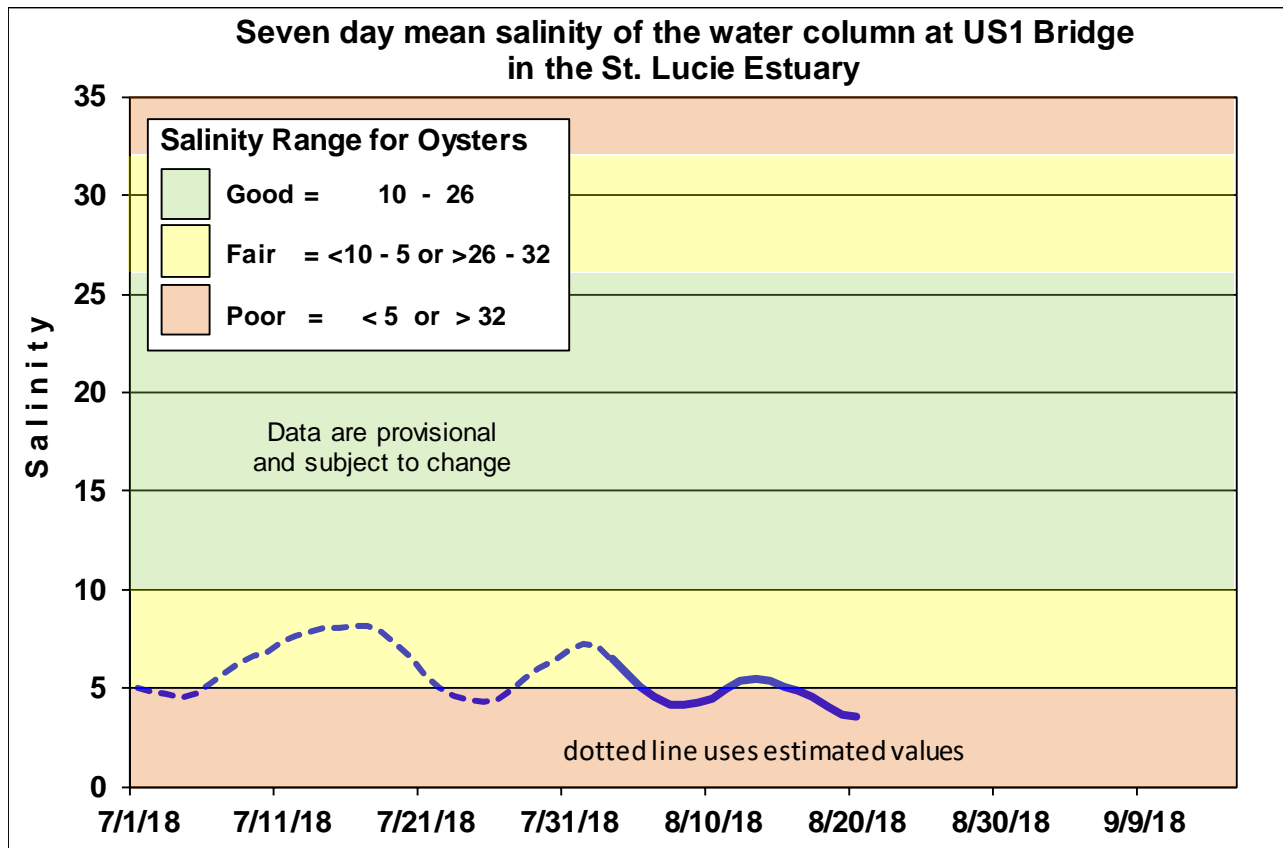


Figure 3. Seven-day mean salinity of the water column at the US1 Bridge.

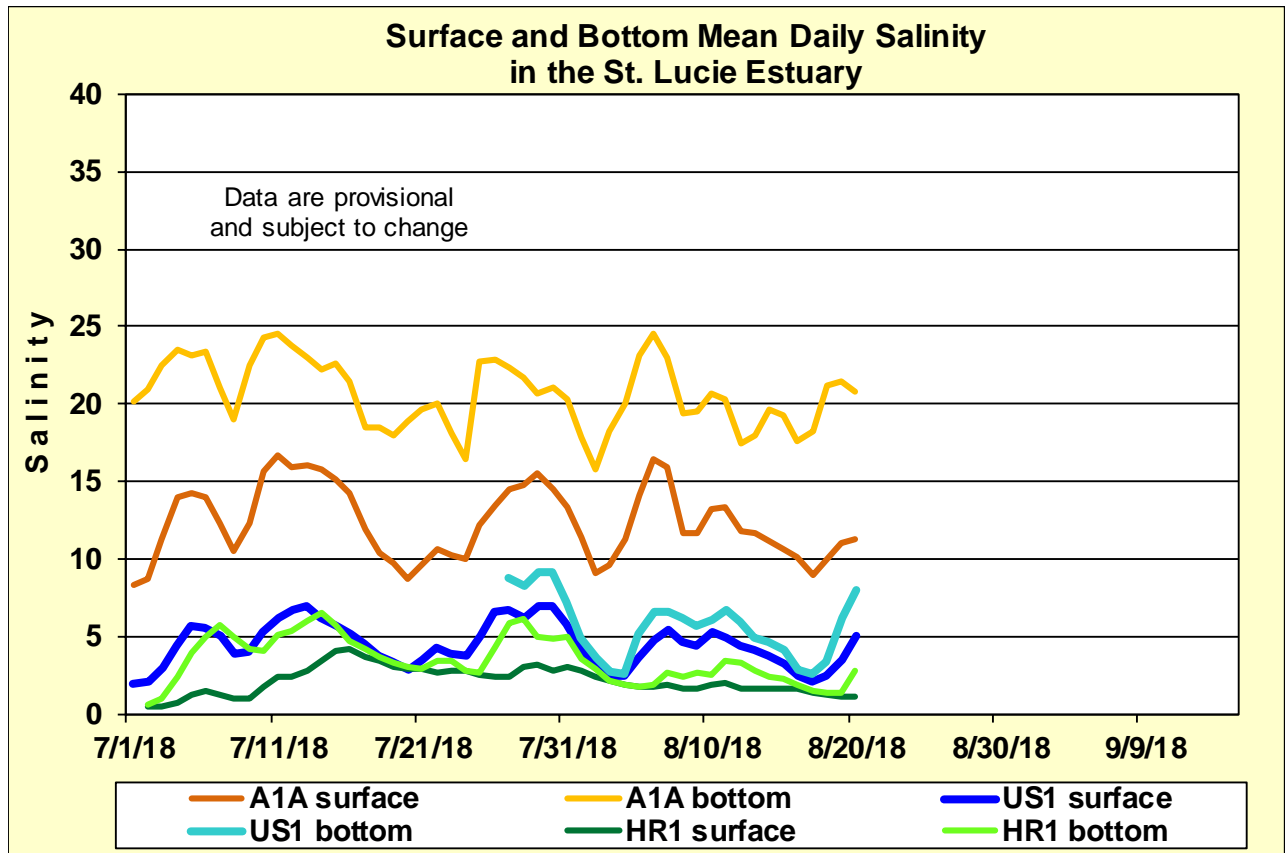


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

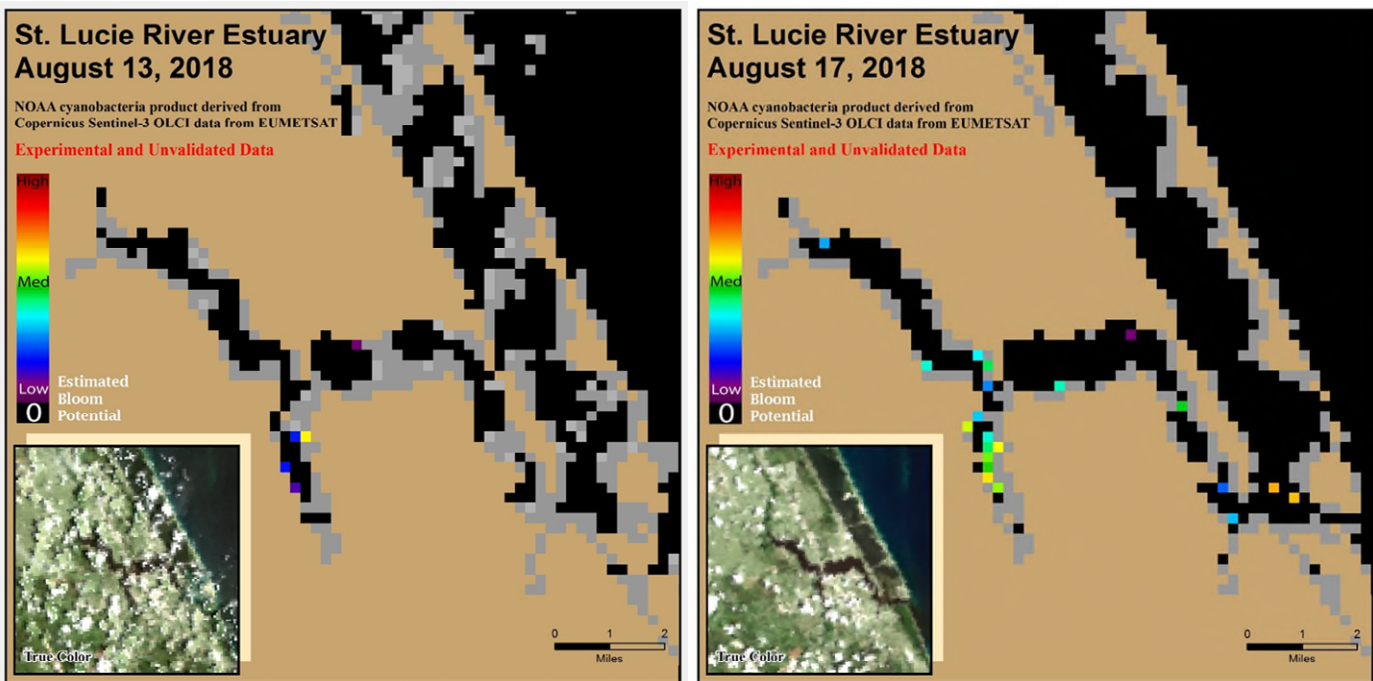


Figure 5. Potential cyanobacteria bloom, NOAA satellite image (unvalidated experimental data) for the St. Lucie Estuary on 8/13/2018 and 8/17/2018.

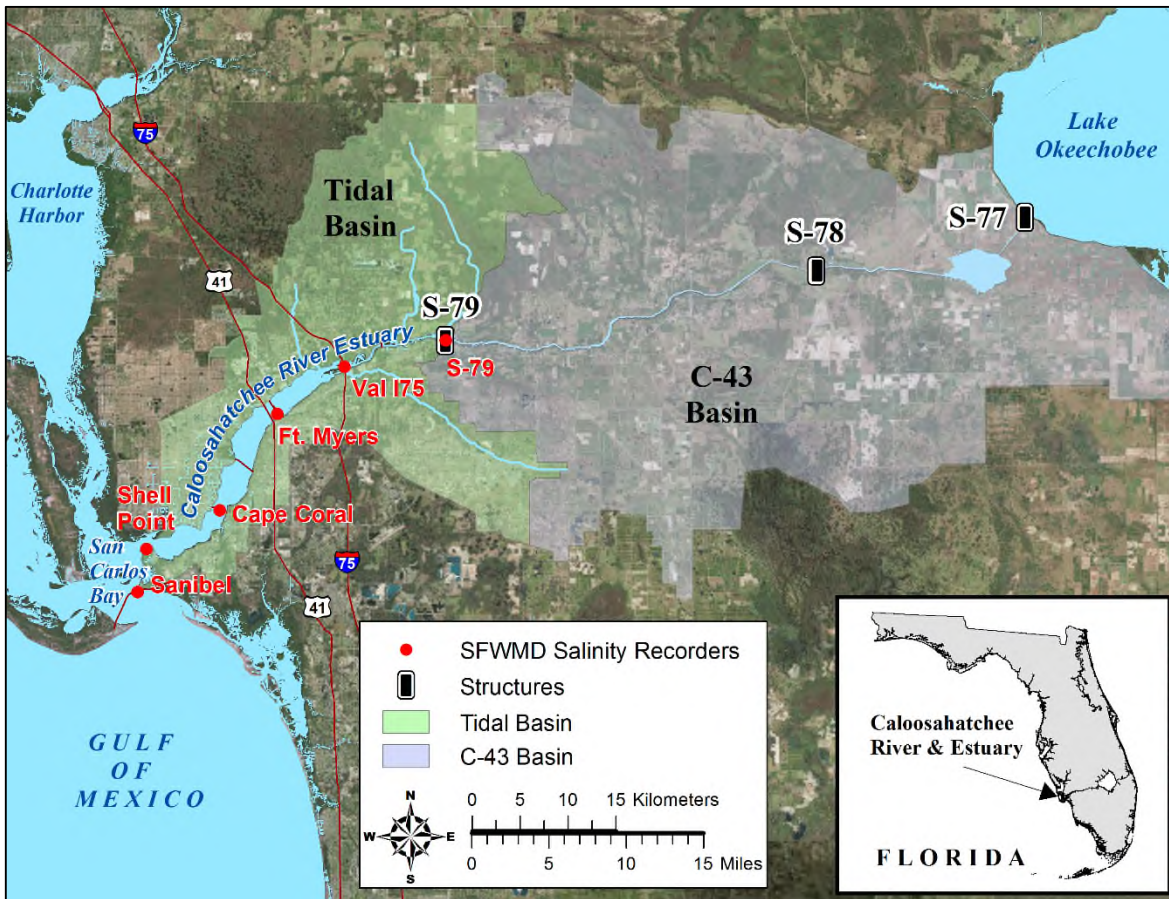


Figure 6. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

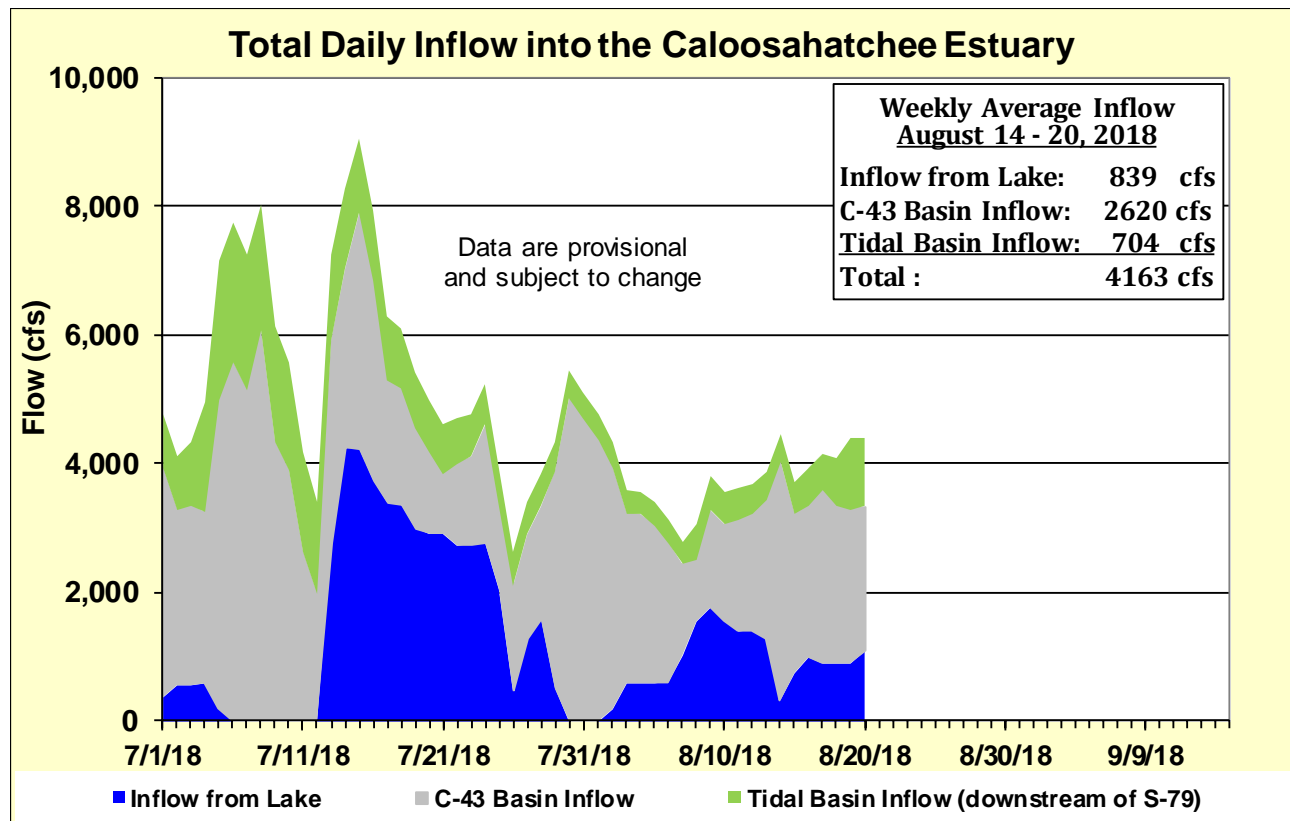


Figure 7. Total daily inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.

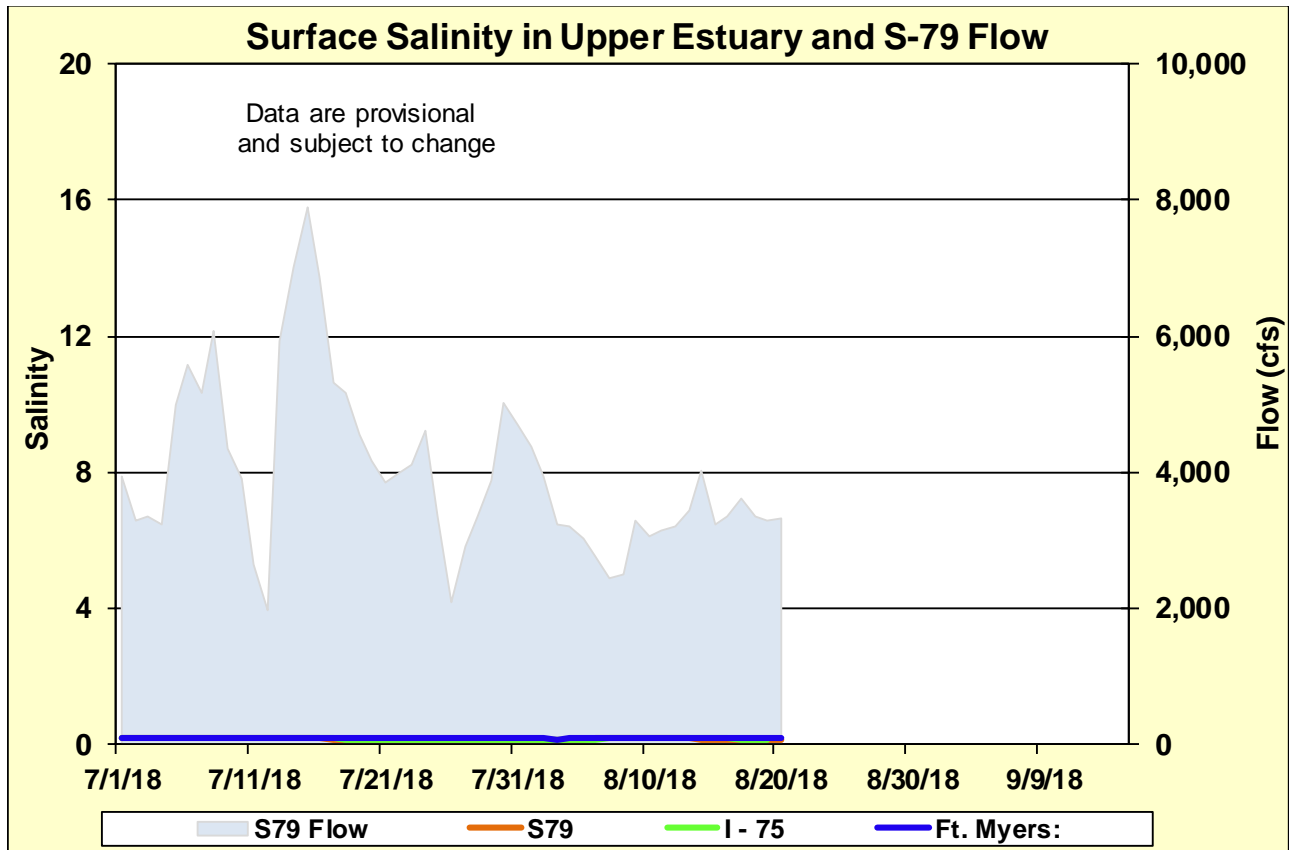


Figure 8. Daily mean flows at S-79 and salinity at upper estuary monitoring stations.

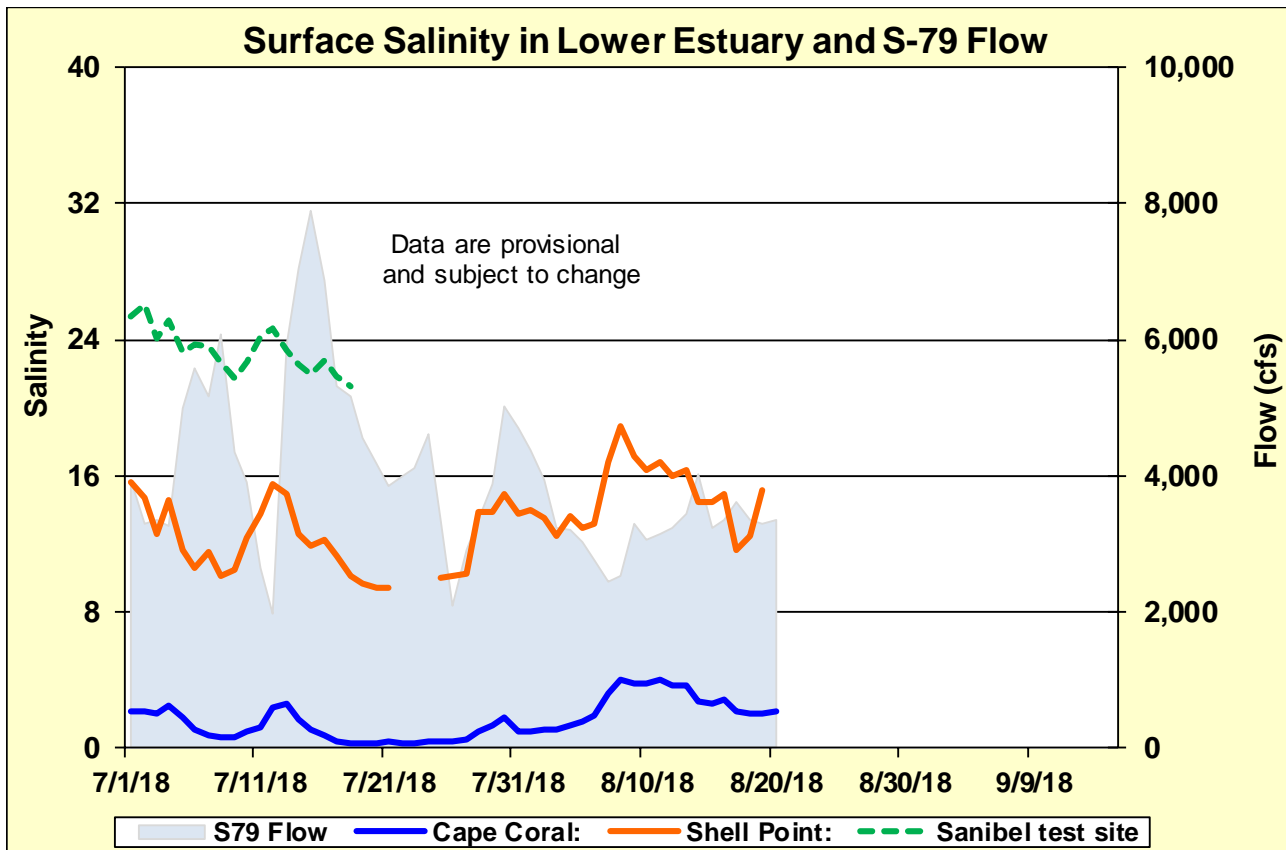


Figure 9. Daily mean flows at S-79 and salinity at lower estuary stations.

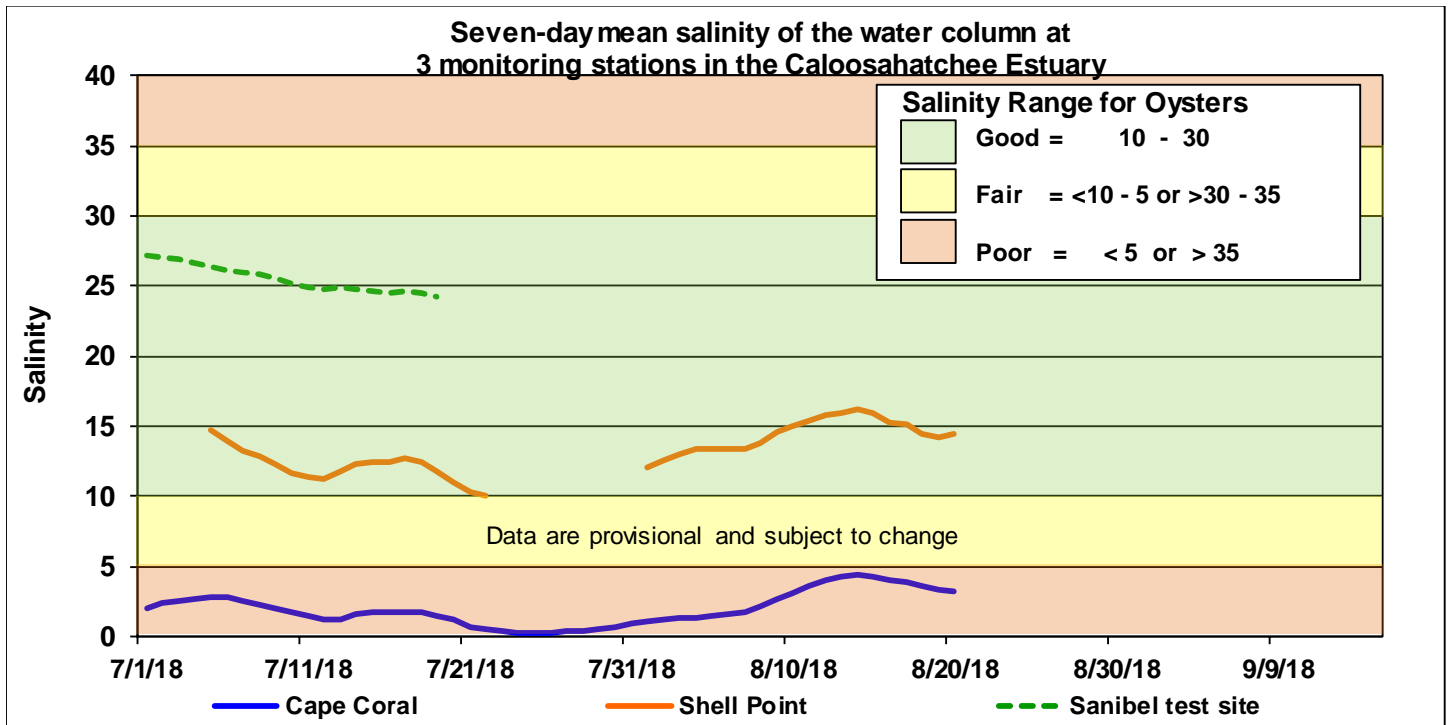


Figure 10. Seven-day mean salinity at Cape Coral, Shell Point, and Sanibel monitoring stations.

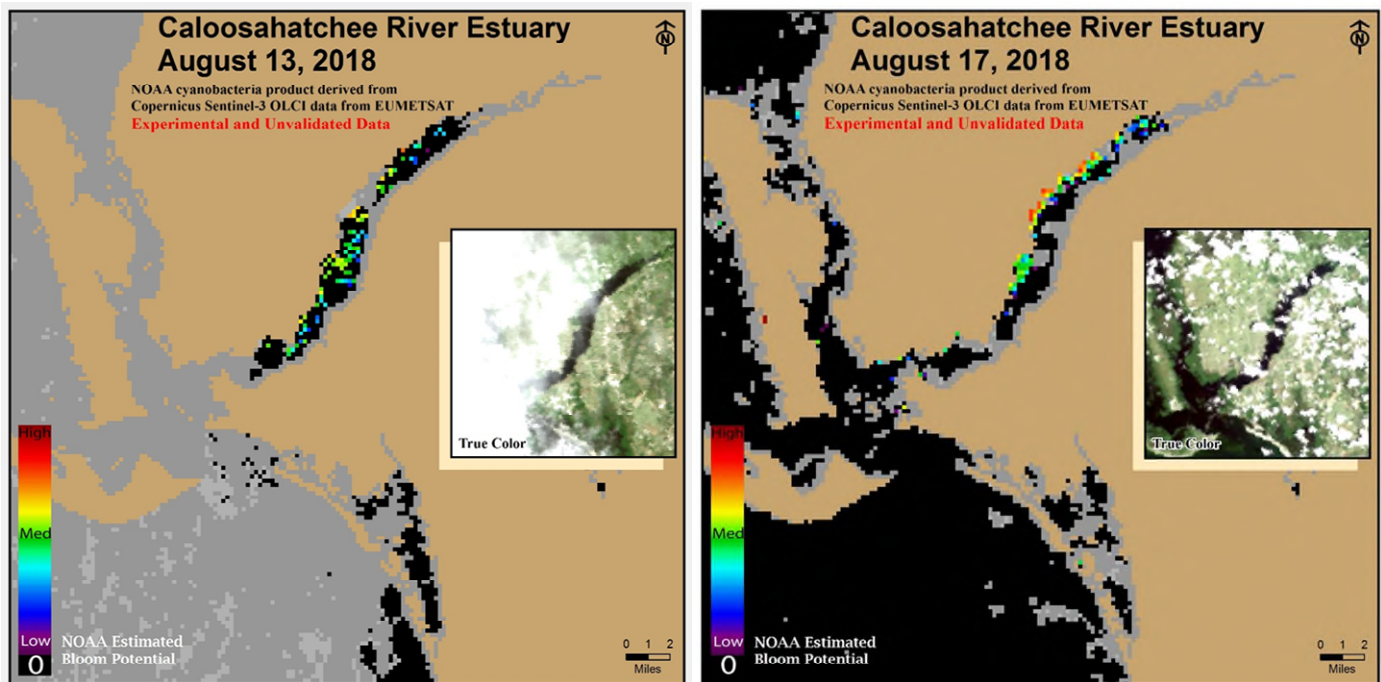
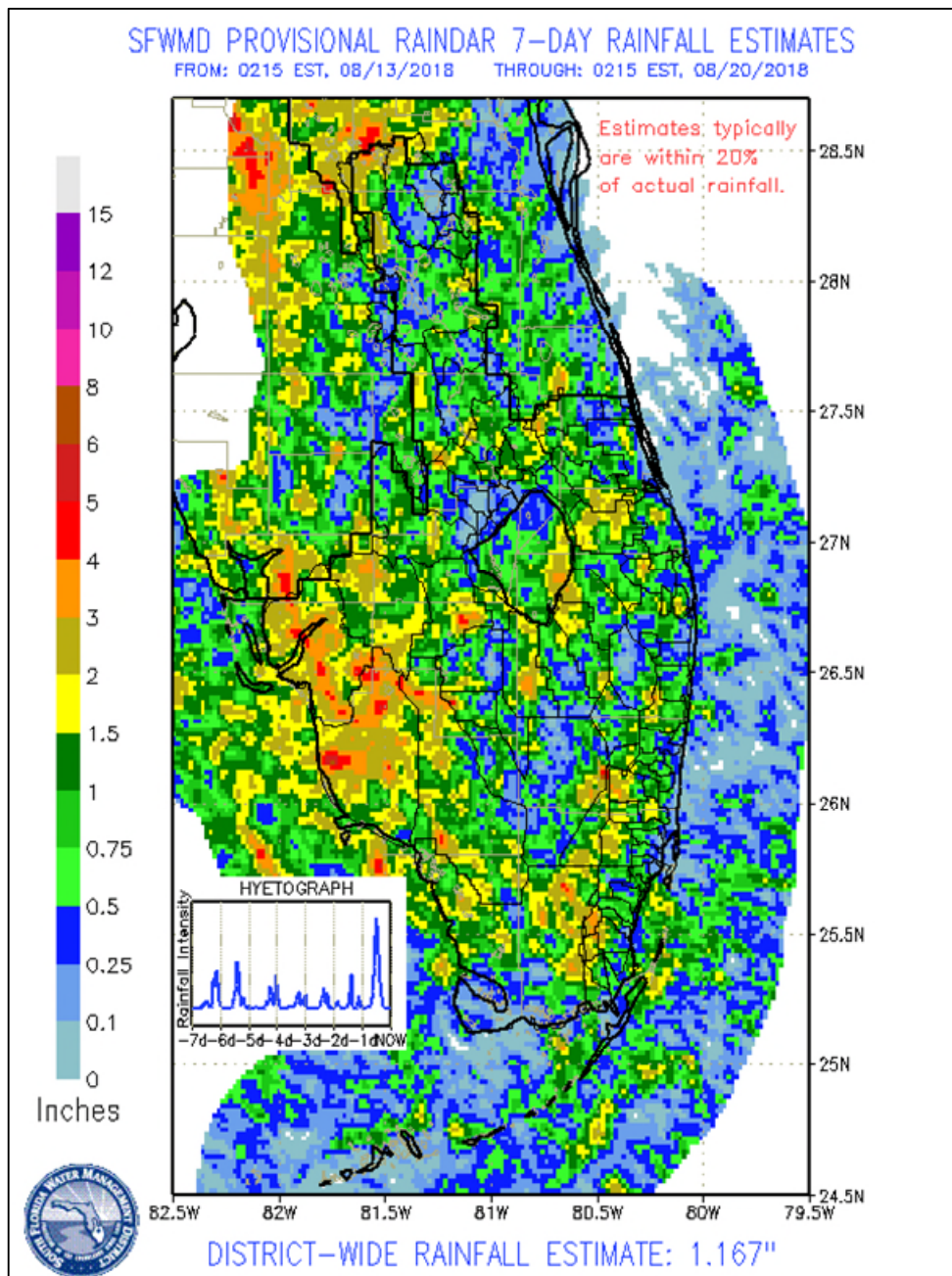


Figure 11. Potential cyanobacteria bloom, NOAA satellite image (unvalidated experimental data) for the Caloosahatchee River Estuary on 8/13/2018 and 8/17/2018.

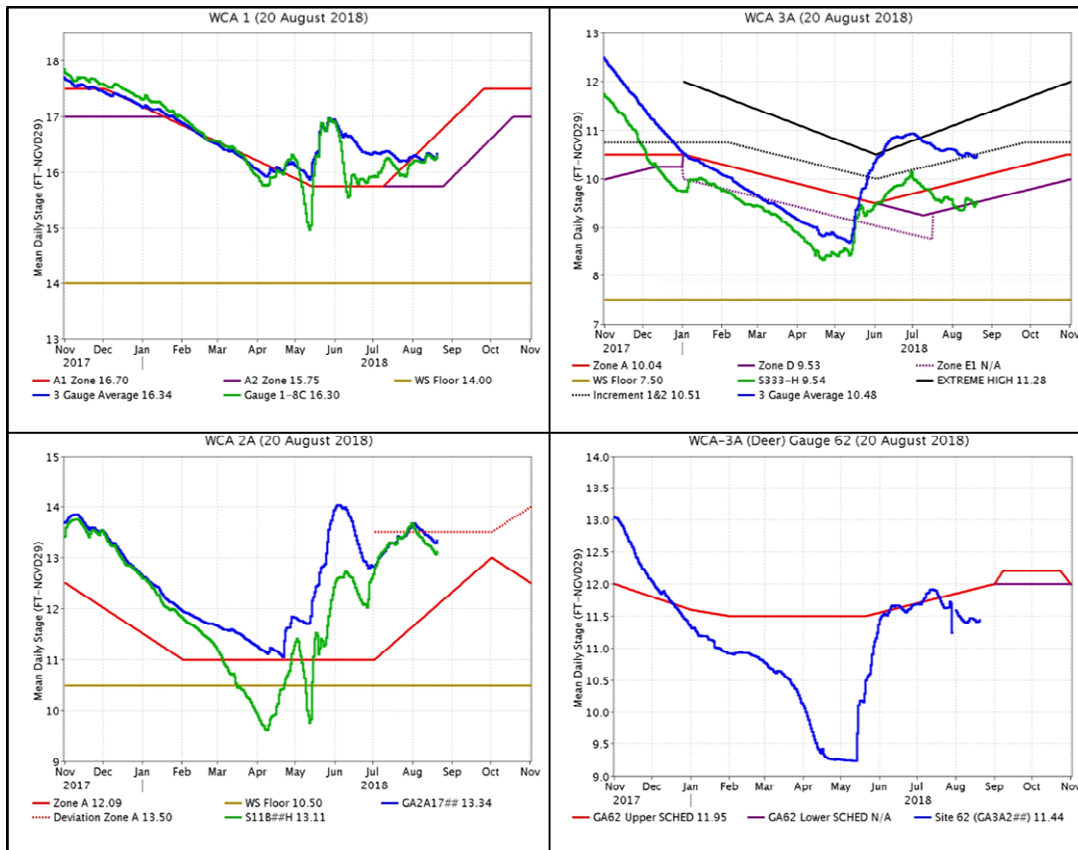
EVERGLADES

At the gauge locations monitored for this report stages within the WCAs decreased on average 0.06 feet. The most extreme individual gauge changes within the WCAs ranged from -0.16 feet (WCA-2A) to +0.07 feet (WCA-3B). Pan evaporation was estimated at 1.85 inches.

Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	0.59	-0.07
WCA-2A	0.84	-0.16
WCA-2B	1.04	-0.15
WCA-3A	0.73	-0.05
WCA-3B	1.47	+0.02
ENP	1.05	+0.03



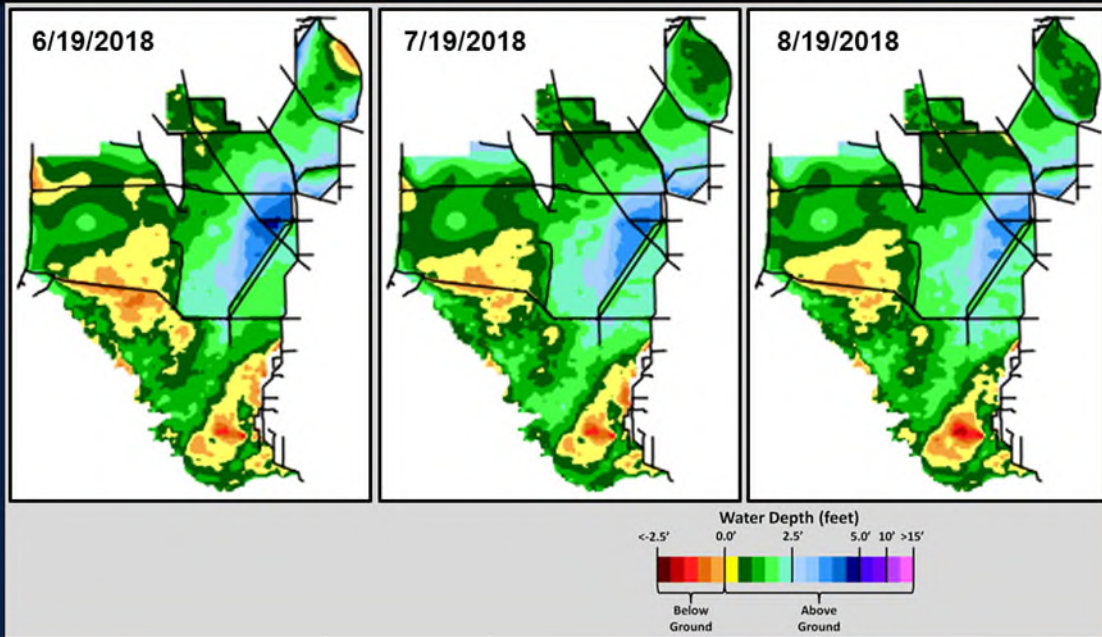
Regulation Schedules: WCA-1 three-gauge average is 0.36 feet below Zone A1, gauge 1-8C is 0.40 feet below. Both are between Zone A1 and A2. WCA-2A marsh stage is 0.16 feet below Dev. Zone A, S11B Headwater stage is 0.39 feet below. WCA-3A three-gauge average stage is now below Increment 1&2, and 0.44 feet above Zone A and continues to trend favorably towards schedule. WCA-3A at gauge 62 (Northwest corner) continues falling away from schedule, with the stage now 0.51 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 decreased in area across WCA-3A North over the last month, with lower ponding depths along the L-67 in WCA-3A South. WCA-2A water depths look very similar over the last two months. WDAT output indicates that water levels across WCA-3A, 3B, 2A and 2B decreased slightly or remained stable over the previous month. The southernmost portions of all the WCAs (areas that are historically ponded) are currently significantly drier than they were a year ago.



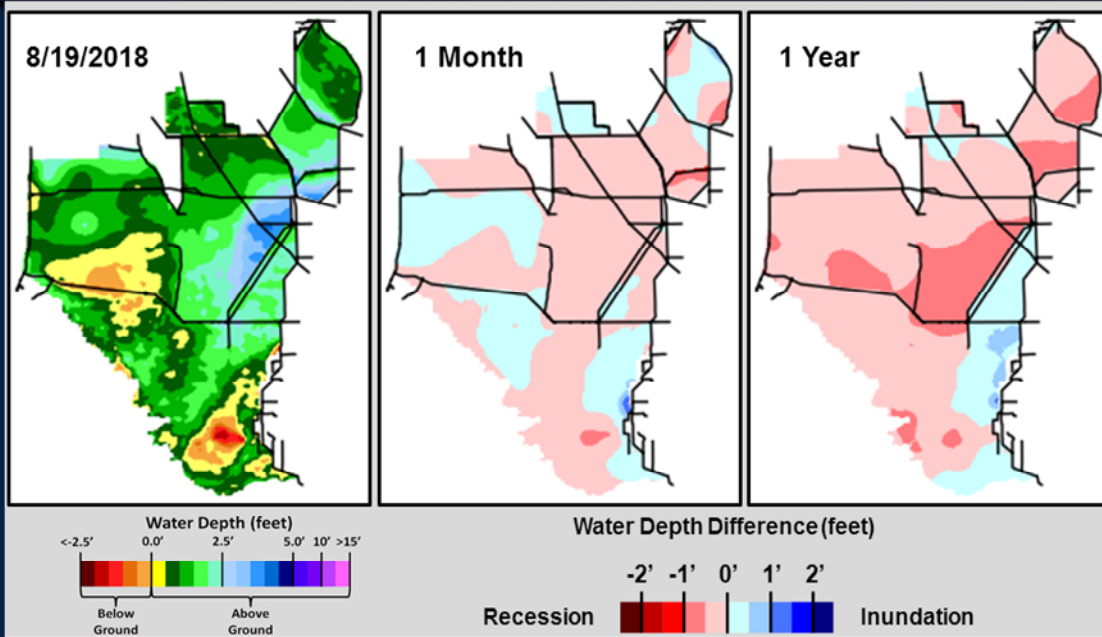
SFWDAT Water Depth Monthly Snapshots



South Florida Water Depth Assessment Tool (SFWDAT)



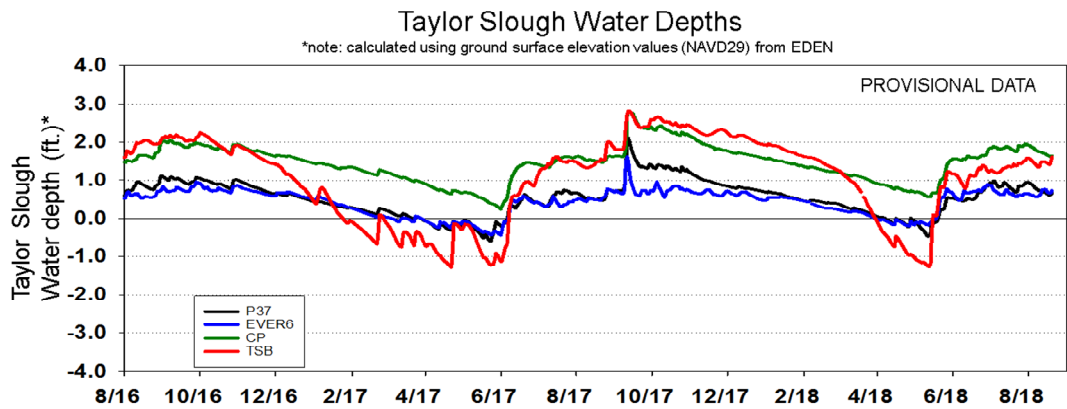
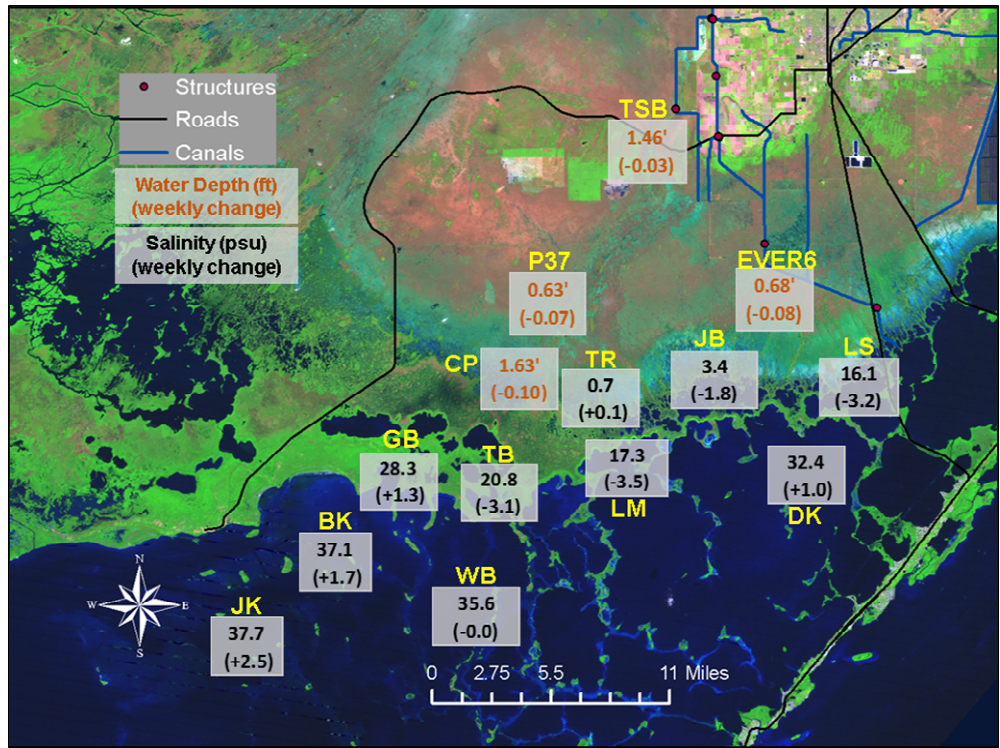
SFWDAT Everglades Difference Maps (Present - Past)

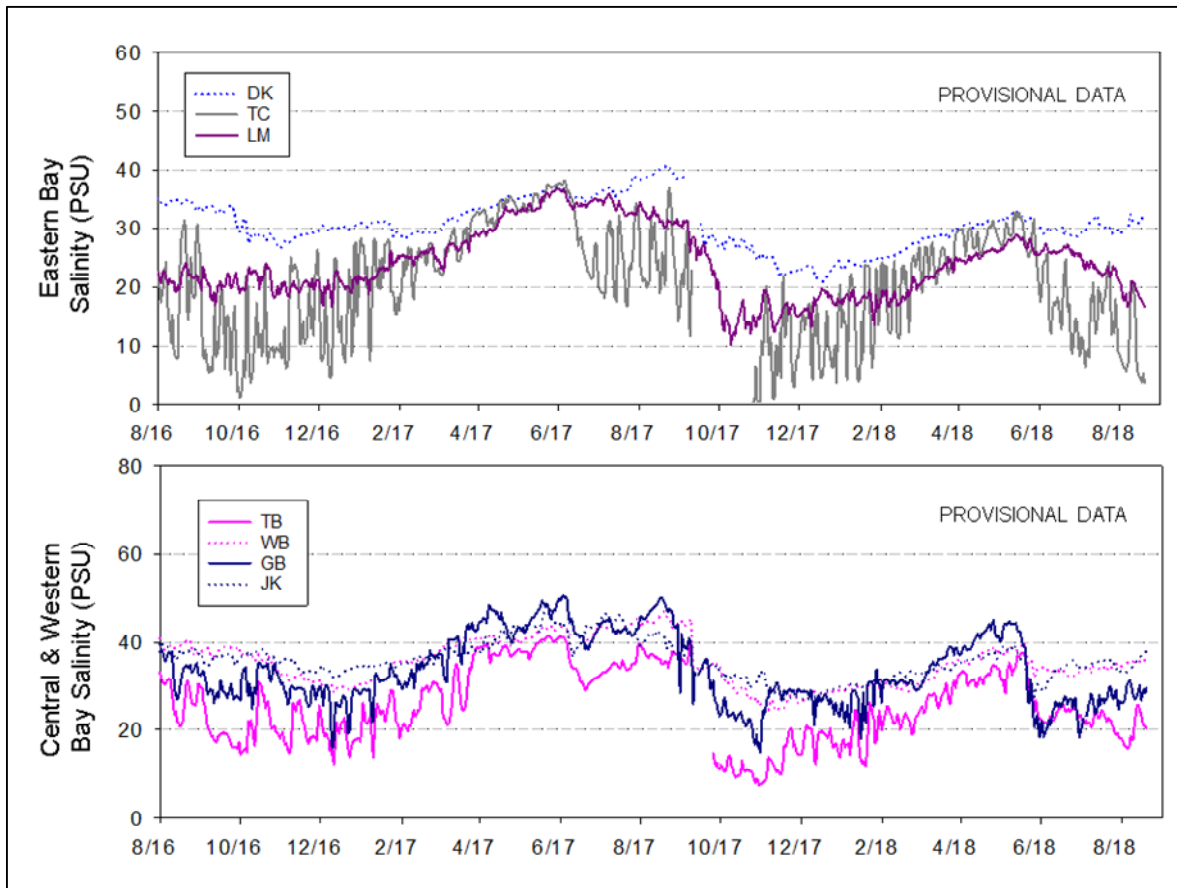


South Florida Water Depth Assessment Tool (SFWDAT)

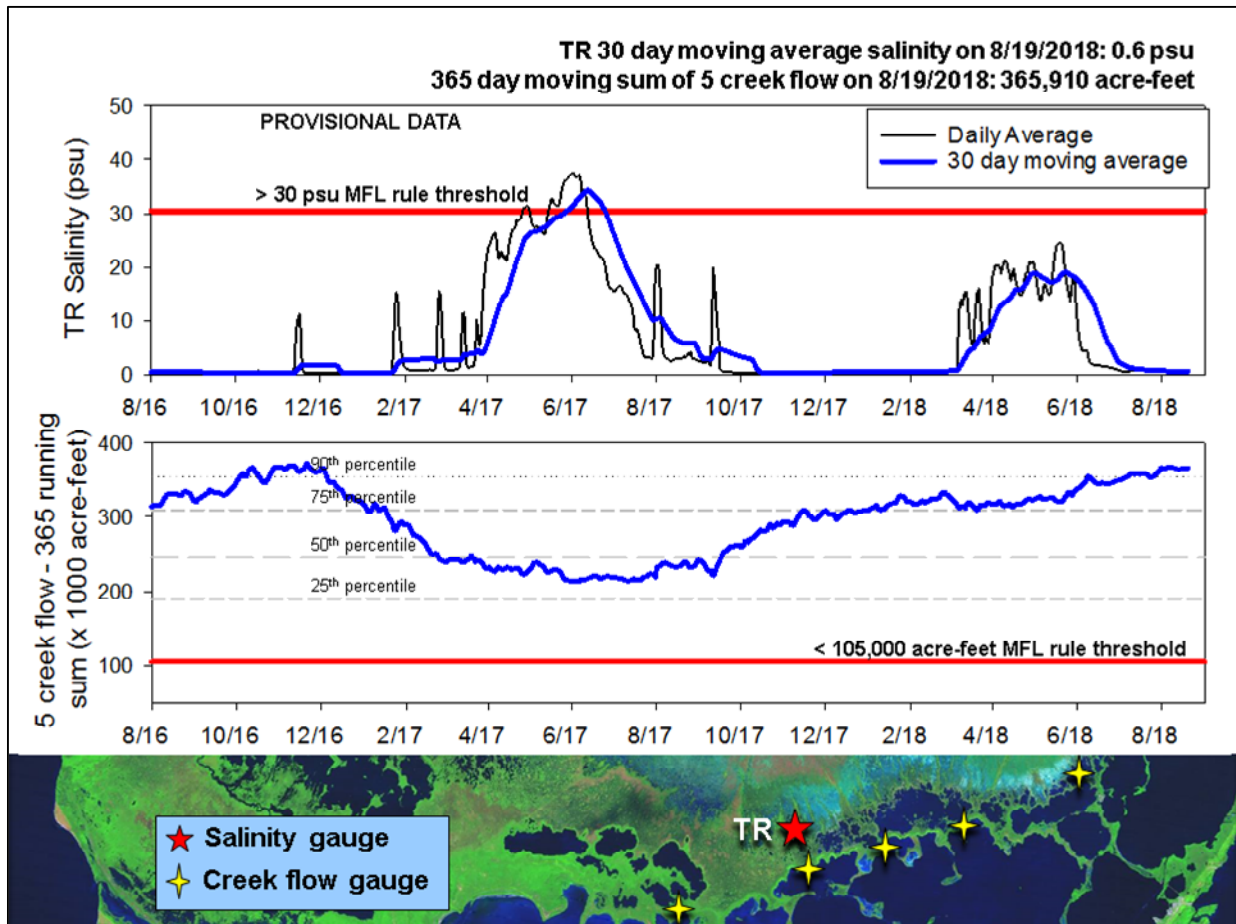
Taylor Slough Water Levels: An average of 0.7 inches of rain fell on Taylor Slough and Florida Bay this past week, and stages averaged a decrease of 0.06 feet. Individual station changes ranged from -0.10 feet to -0.03 feet. Water depths currently average about 1 foot across Taylor Slough which is 1 to 3 inches above the historical averages at the individual stations.

Florida Bay Salinities: Salinities in Florida Bay decreased a weekly average of -0.8 psu and individual station changes ranging from -3.5 psu to +2.5 psu. Salinities ranged from 3 psu in the northeast to 38 psu in the west. 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 0.7 psu. The 30-day moving average remains at 0.6 psu. The weekly cumulative flow from the five creeks denoted by yellow stars on the map totaled about 8,400 acre-feet for the last week, which is typical for the 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 365,910 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. 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 S332D detention area and the Frog Pond detention area, a recommendation is being made to limit the increase in depths within the L31W 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 21st, 2018 (red is new)

Area	Weekly change	Recommendation	Reasons
WCA-1	Stage decreased by 0.07'	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 0.16'	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 0.15'	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 decreased by 0.04'	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 decreased by 0.07'	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 decreased by 0.08'		
WCA-3B	Stage increased 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 increased by 0.03'	Make discharges to the Park according to the 2012 WCP rainfall plan.	Protect upstream/downstream habitat and wildlife.
Taylor Slough	Stage changes ranged from -0.10' to -0.03'	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 -3.5 to +2.5 psu	Move water southward as possible	When available, provide freshwater to maintain low salinity buffer and promote water movement.