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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: June 12, 2018

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

A very moist air mass south of Lake Okeechobee and an unstable atmosphere should translate into scattered to locally numerous showers and thunderstorms during the afternoon into the early evening over the southern half of the District. The rains should be moving a bit faster than yesterday, which should lessen large pockets of heavy rain as was seen yesterday. The northern half of the District should be relatively drier, with significantly less coverage of rain compared to southern sections. An upper-level over the Yucatan and northwestern Caribbean Sea is forecast to move generally westward the next couple of days, creating an upper-air pattern more conducive for rainfall Wednesday and Thursday. With moisture levels at or above normal, the expectation is that District rains would be at least average on these days. A weak cold front should move into north-central Florida Friday or Saturday, and with a westerly wind flow ahead of it, rains would be favored more over the eastern half of the District than the west those days. With the upper-level support and front shifting southward and eastward over the weekend, there is a good chance that the northern part of the District would dry out and perhaps substantially while any rains would be favored over the southern half. Overall, the anticipated rainfall should be below normal Friday through Sunday, especially because of the inhibiting effects of a thick layer of Saharan dust which is forecast to arrive over the southern half of the area. Confidence in today's forecast package is low with regard to the location and amounts of rainfall on individual days while there is greater confidence in the described trends.

Kissimmee

Tuesday morning stages were 55.4 feet NGVD (1.1 feet below schedule) in East Lake Toho, 52.3 feet NGVD (1.2 feet below schedule) in Toho, and 50.1 feet NGVD (0.9 feet below schedule) in Kissimmee-Cypress-Hatchineha; headwater stages were 46.3 feet NGVD at S-65A and 26.9 feet NGVD at S-65D. Tuesday morning discharges were: 1,178 cfs at S-65, 1,272 cfs at S-65A, and 2,344 cfs at S-65E. Dissolved oxygen concentration in the Kissimmee River averaged 1.9 mg/L for the week. Kissimmee River mean floodplain depth on Sunday was 0.83 feet.

Lake Okeechobee

Lake Okeechobee stage is 14.15 feet NGVD having decreased 0.07 feet over the past week after rising quickly for several weeks. The Lake was below 13.0 feet NGVD for just 10 days and likely rose too quickly for many recovering submerged aquatic vegetation (SAV) communities to stay in optimal light conditions. The seasonal low for the 2018 growing season of 12.83 feet NGVD was the third highest since 2011, and the third time in six years that the stage did not reach the bottom of the preferred stage envelope (12.5 – 15.5 feet NGVD). Due to record rainfall in May, the SAV coverage on the Lake will likely remain at minimal levels throughout the growing season and well into next year, prolonging impacts from high stages in 2016 and Hurricane Irma in 2017. Additionally, wading bird foraging activity

has essentially ceased on the lake, falling under 400 individuals for the third consecutive survey, compared to nearly 15,000 in mid-May of 2017 when water levels were still quickly receding. The remaining colony on Eagle Bay Island is supported by foraging habitat outside the Lake.

Estuaries

Last week total inflow to the St. Lucie Estuary averaged 3,980 cfs with 1,315 cfs coming from Lake Okeechobee. Salinity increased over the last week throughout the estuary, although it remained low. The seven-day moving average salinity at the US1 bridge was less than 5, which is in the poor range for the adult eastern oyster. The highest chlorophyll *a* concentration was observed in the North Fork, with a peak value of 11.36 µg/L, as was the lowest dissolved oxygen concentration at 3.81 mg/L. NOAA satellite imagery indicates no visible cyanobacteria bloom potential in the St. Lucie Estuary this week. Total inflow last week to the Caloosahatchee River Estuary averaged 8,643 cfs with 4,067 cfs coming from the Lake. Salinity decreased over the past week throughout the estuary and the more upstream site of Cape Coral is in the poor range for the adult eastern oyster although salinity remains in the fair range at Shell Point. The highest chlorophyll *a* concentration was observed at Shell Point, at 18.32 µg/L, although concentrations as low as 1.83 µg/L were also observed over the week. The lowest dissolved oxygen concentrations were observed at Shell Point (3.27 mg/L) and Beautiful Island (3.46 mg/L). NOAA satellite imagery indicates no visible cyanobacteria bloom potential in the Caloosahatchee Estuary this week. Given the current estuarine conditions, there are no ecological benefits associated with freshwater releases from the Lake.

Stormwater Treatment Areas

Over the past week, the STAs/FEBs did not receive Lake releases. The total amount of Lake releases sent to the STAs/FEBs in WY2019 (since May 1, 2018) is approximately 3,800 acre-feet. Most STA cells are at or above target depths, including STA-5/6 cells which were previously in dryout. Operational restrictions are in place for vegetation rehabilitation in STA-1E, STA-2, and STA-3/4. The nests of Endangered Species Act protected species and Migratory Bird Treaty Act protected species have been observed in STA-1E. Due to recent basin runoff, it is recommended that no Lake releases be sent to the STAs/FEBs this week.

Everglades

Stages within the marsh in WCA-1 and WCA-2A steadied last week. Water depth ascension rates in WCA-3A have decreased from the previous week, primarily at the northernmost gauges. In Taylor Slough, water depths are 6 to 9 inches above the historical averages (compared to 7 to 13 inches above average from last week). Salinities increased 0.3 psu on average in Florida Bay, but remain below the historical averages. Depths next week at gauge 3-65 in southern WCA-3A will likely exceed the 2.5-foot threshold which results in flooding of tree islands.

Supporting Information

KISSIMMEE BASIN

Kissimmee Basin Rainfall

The Upper Kissimmee Basin received 2.45 inches of rainfall in the past week and the Lower Basin received 1.83 inches (SFWMD NEXRAD 6/11/2018).

Upper Kissimmee Basin

Stages and departures in the Kissimmee Chain of Lakes (KCOL) are shown in **Table 1**.

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: 6/12/2018

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)						
							6/10/18	6/3/18	5/27/18	5/20/18	5/13/18	5/6/18	4/29/18
Lakes Hart and Mary Jane	S-62	139	LKMJ	60.0	R	60.0	0.0	0.0	-0.1	0.0	-0.2	-0.2	-0.2
Lakes Myrtle, Preston, and Joel	S-57	0	S-57	60.6	R	61.0	-0.4	-0.7	0.0	0.0	-0.2	-0.1	-0.1
Alligator Chain	S-60	0	ALLI	62.6	R	63.2	-0.6	-1.0	0.0	0.0	0.0	0.0	-0.1
Lake Gentry	S-63	0	LKGT	60.0	R	61.0	-1.0	-1.3	0.1	0.2	0.0	0.0	0.0
East Lake Toho	S-59	235	TOHOE	55.3	R	56.5	-1.2	-1.4	-0.2	-0.1	-0.3	-0.4	-0.6
Lake Toho	S-61	572	TOHOW, S-61	52.3	R	53.5	-1.2	-1.4	-0.1	-0.2	-0.3	-0.4	-0.6
Lakes Kissimmee, Cypress, and Hatchineha	S-65	915	KUB011, LKIS5B	50.1	R	51.0	-0.9	-1.1	0.4	0.1	-0.7	-0.8	-0.8

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: 6/12/2018

Metric	Location	1-Day Average		Average for the Preceding 7-Days ¹								4/8/18
		6/10/2018	6/10/18	6/3/18	5/27/18	5/20/18	5/13/18	5/6/18	4/29/18	4/22/18	4/15/18	
Discharge (cfs)	S-65	845	915	1,092	1,271	854	381	338	354	372	424	340
Discharge (cfs)	S-65A ²	1,128	1,043	1,139	1,142	700	272	245	248	258	324	259
Discharge (cfs)	S-65D ²	1,958	1,925	1,869	1,495	781	323	304	341	362	384	301
Headwater Stage (feet NGVD)	S-65D ²	26.79	26.86	27.00	26.08	25.72	25.83	25.89	25.81	25.77	25.86	25.77
Discharge (cfs)	S-65E ²	2,133	2,107	2,082	1,623	824	290	263	304	318	355	297
Discharge (cfs)	S-67	274	278	282	298	332	71	0	0	0	1	0
DO (mg/L) ³	Phase I river channel	1.9	1.9	4.1	5.1	5.7	7.5	7.9	7.1	7.2	6.2	6.8
Mean depth (feet) ⁴	Phase I floodplain	0.83	0.75	0.65	0.46	0.17	0.06	0.06	0.06	0.07	0.07	0.06

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)

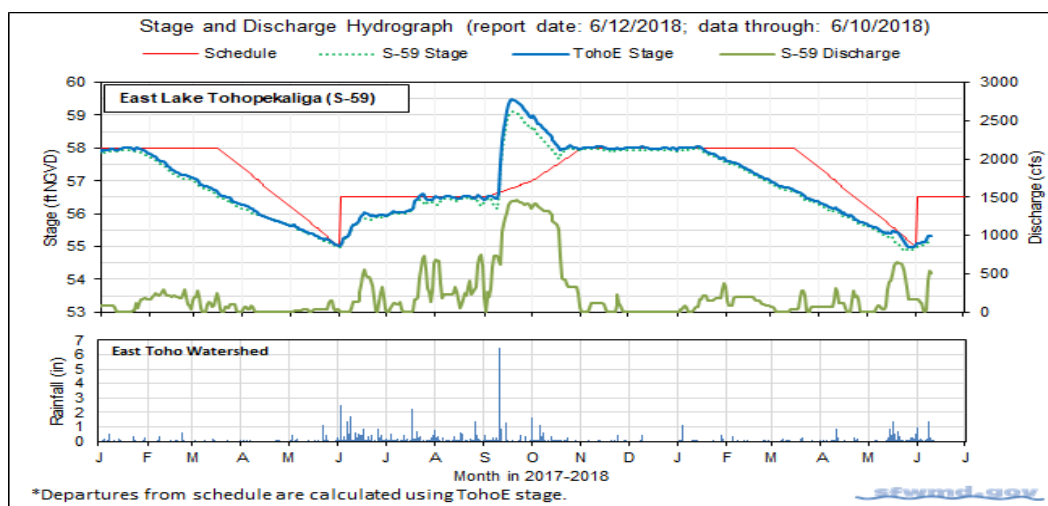


Figure 1.

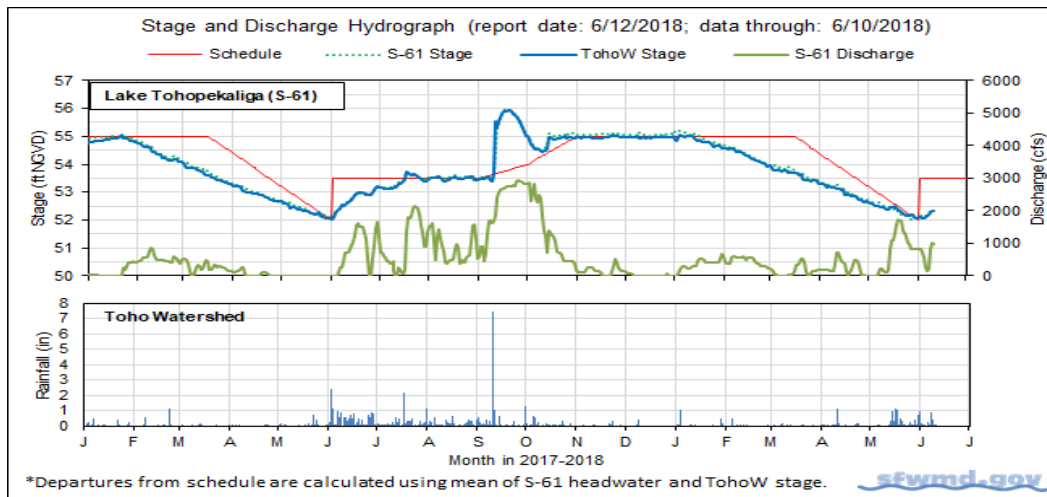


Figure 2.

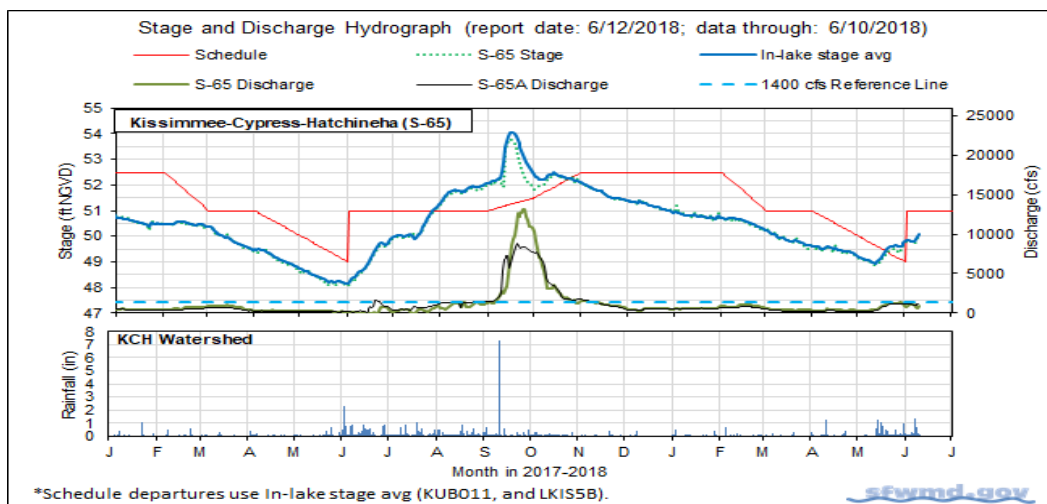


Figure 3.

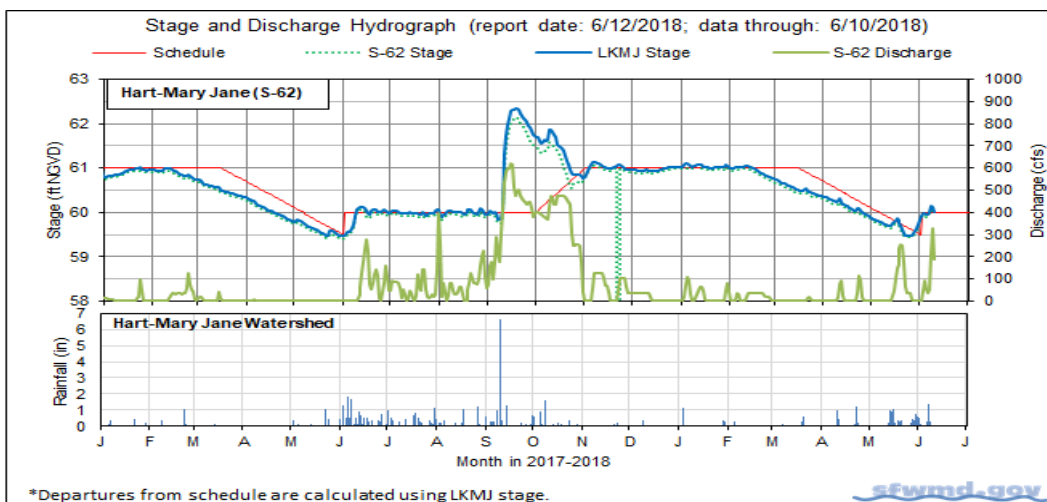


Figure 4.

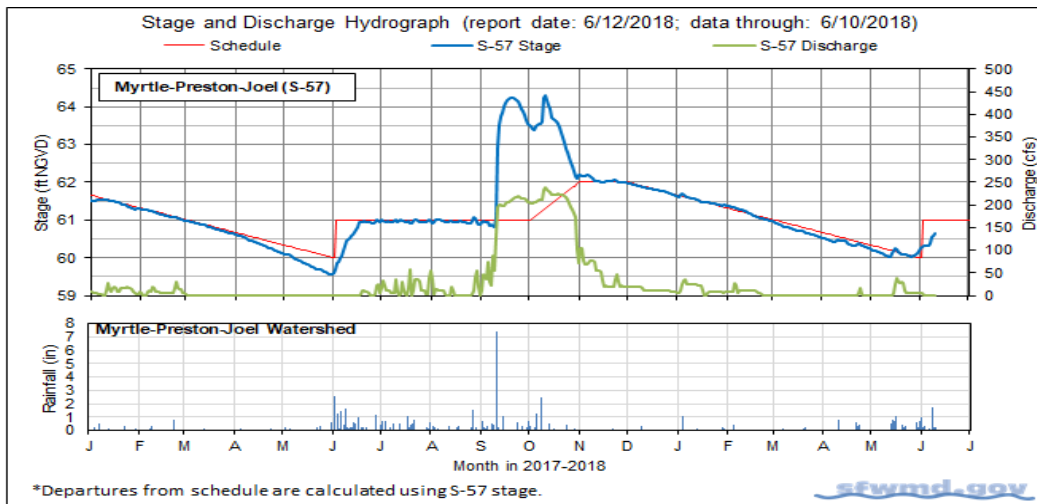


Figure 5.

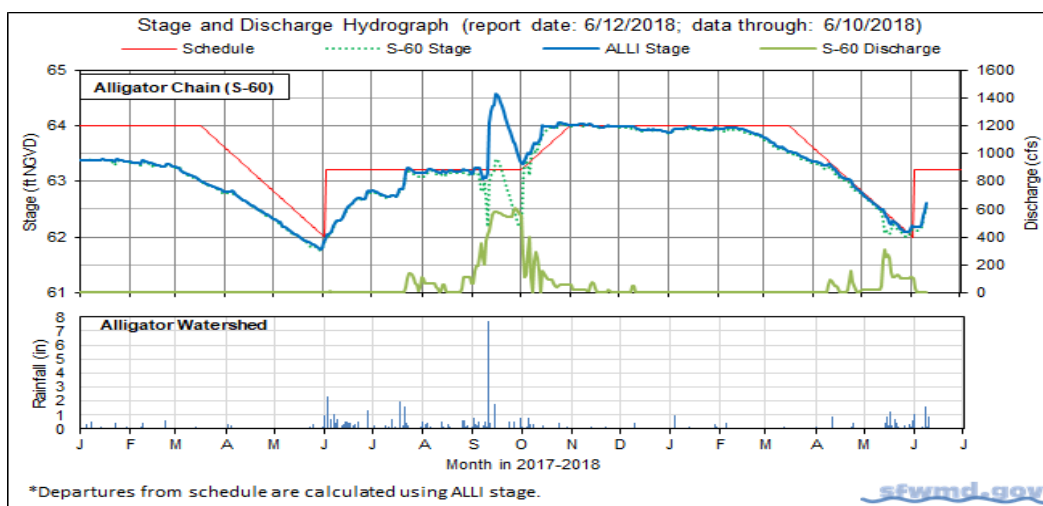


Figure 6.

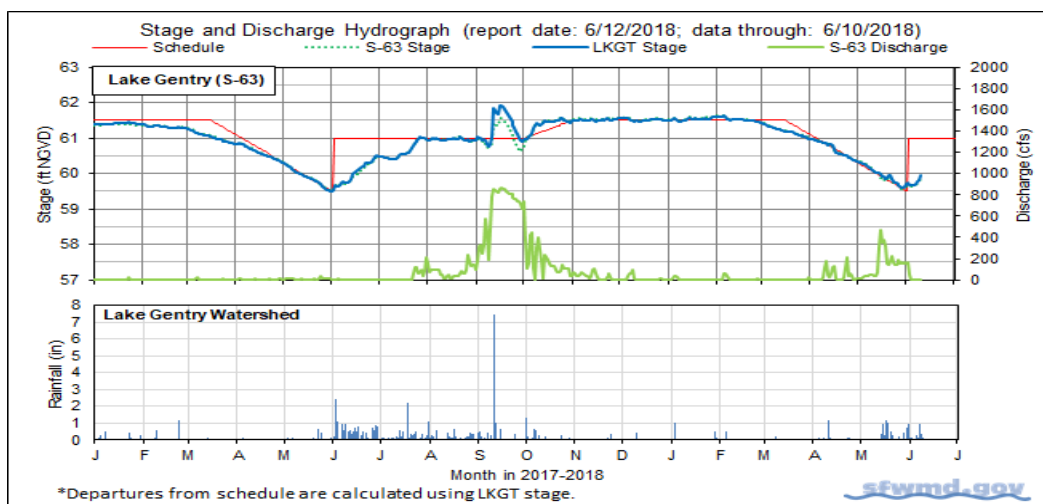


Figure 7.

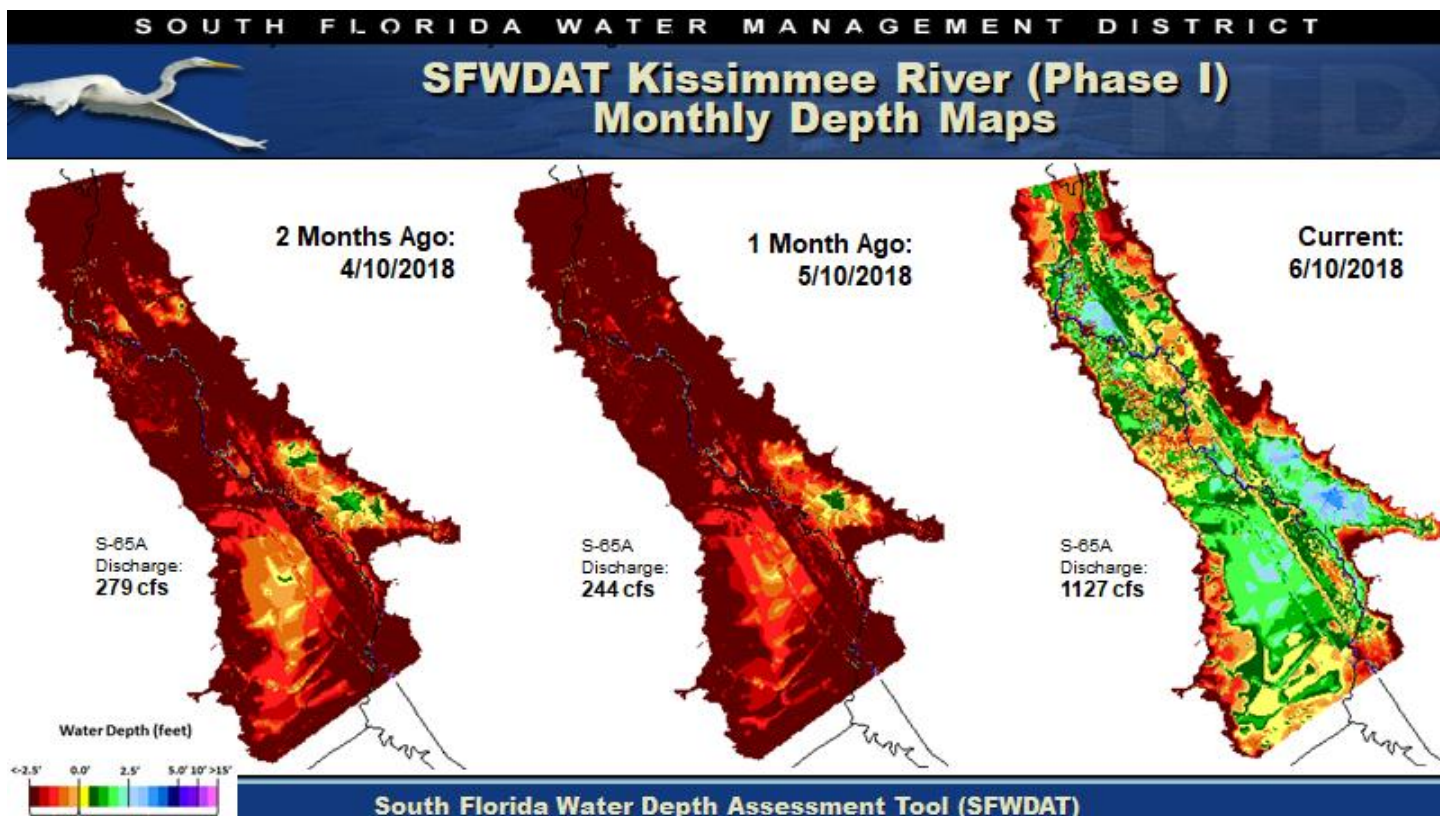


Figure 8. Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to January 16, 2012.

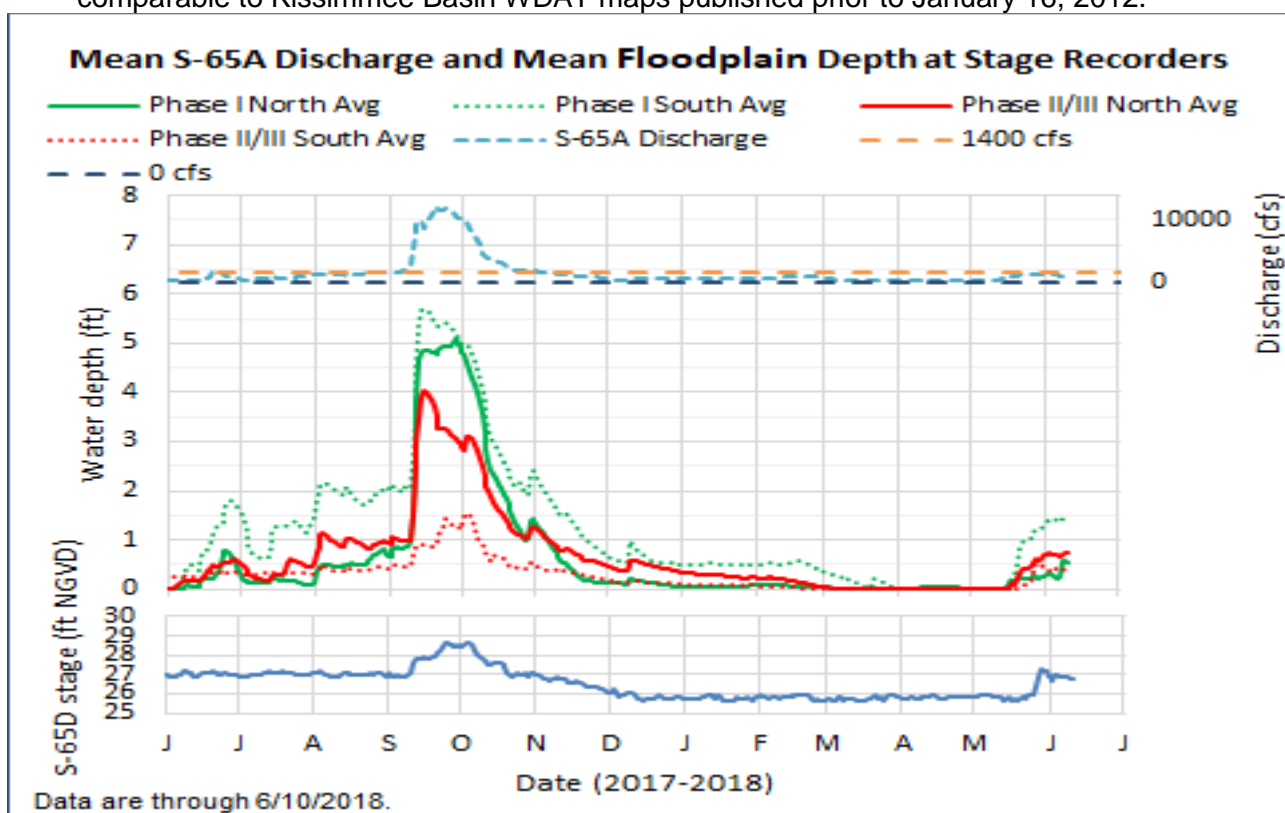


Figure 9. Mean water depth at stage recorders in the northern Phase I, southern Phase I, northern Phase II/III, and southern Phase II/III areas in relation to the S-65A discharge and S-65D headwater stage.

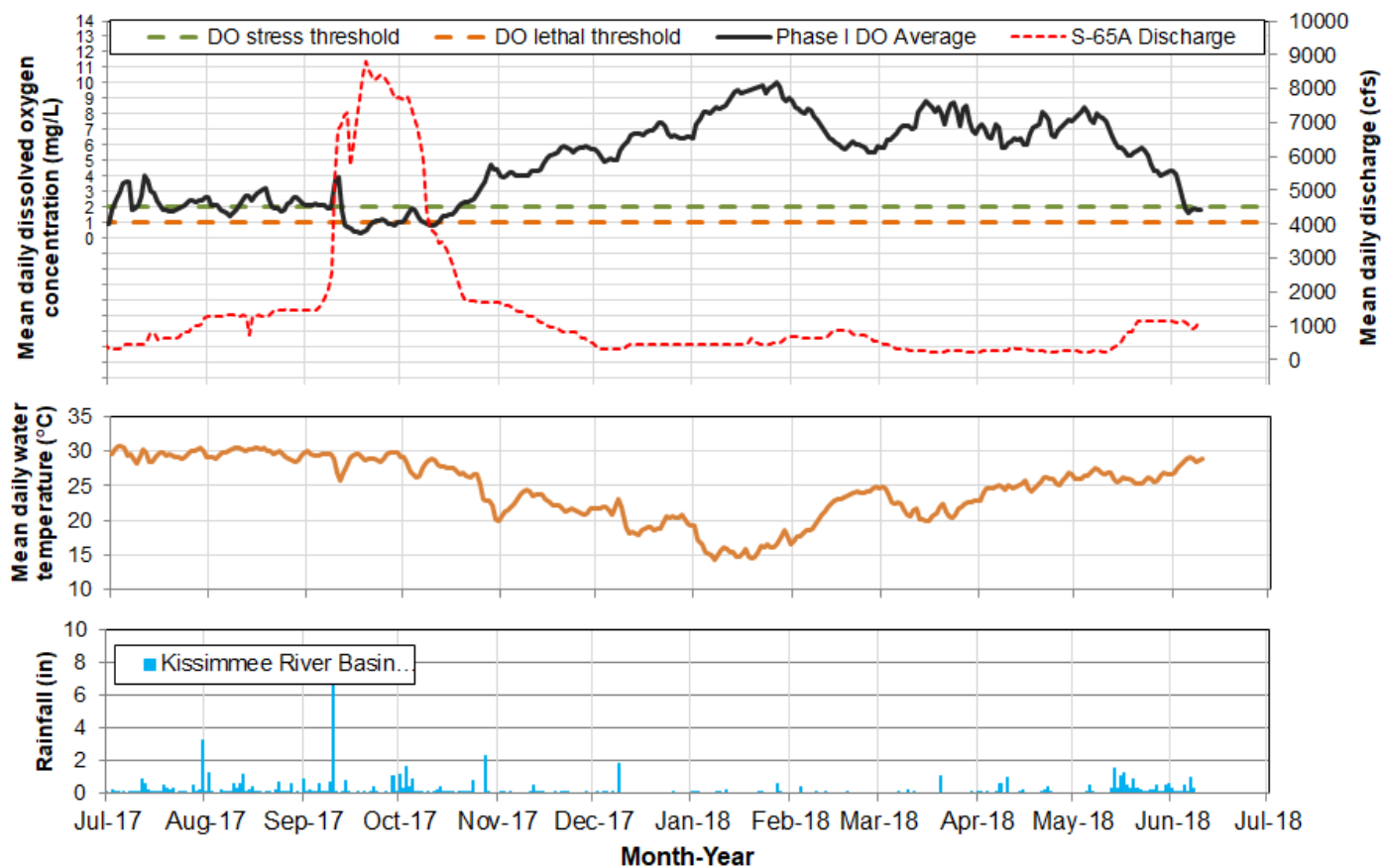


Figure 10. Mean daily dissolved oxygen, discharge, temperature and rainfall in the Phase I river channel.

Water Management Recommendations

Recommendation Date	Recommendation	Purpose	Outcome	Source	Report Date
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
3/6/2018	No new recommendations.		N/A		3/6/2018
2/27/2018	No new recommendations.		N/A		2/27/2018
2/20/2018	No new recommendations.		N/A		2/20/2018
2/13/2018	No new recommendations.		N/A		2/13/2018
2/6/2018	No new recommendations.		N/A		2/6/2018
1/30/2018	No new recommendations.		N/A		1/30/2018
1/23/2018	No new recommendations.		N/A		1/23/2018
1/16/2018	No new recommendations.		N/A		1/16/2018
1/9/2018	No new recommendations.		N/A		1/9/2018
12/19/2017	Begin discharge of 400 cfs from S67 into Istokpoga Canal.	Increase navigability by scouring channel and reducing sandbar at canal mouth.	Implemented	KB Ops/SFWMD Water Mgt	12/19/2017
12/19/2017	Begin a stage recession on January 1 in Lakes Kissimmee-Cypress-Hatchineha starting at stage on January 1 to reach low pool on May 31. Recession rate not to exceed 0.2 ft/week as possible. Subject to SFWMD planned operations hierarchy.	Achieve fish and wildlife benefits by slowing lake stage recession rates relative to the regulation schedule recession rates.	-	KB Ops/SFWMD Water Mgt	12/19/2017
12/19/2017	Begin stage recessions on January 15 in Lakes East Toho and Toho starting at stage on January 15, to reach low pools on May 31. Recession rate not to exceed 0.2 ft/week if possible. Subject to SFWMD planned operations hierarchy.	Achieve fish and wildlife benefits by slowing lake stage recession rates relative to the regulation schedule recession rates.	-	KB Ops/SFWMD Water Mgt	12/19/2017
12/12/2017	No new recommendations.		N/A		12/12/2017
12/5/2017	No new recommendations.		N/A		12/5/2017
11/28/2017	No new recommendations.		N/A		11/28/2017
11/21/2017	No new recommendations.		N/A		11/21/2017
11/13/2017	No new recommendations.		N/A		11/14/2017
11/1/2017	No new recommendations.		N/A		11/7/2017
10/24/2017	No new recommendations.		N/A		10/24/2017
10/17/2017	No new recommendations.		N/A		10/17/2017
10/10/2017	No new recommendations.		N/A		10/10/2017

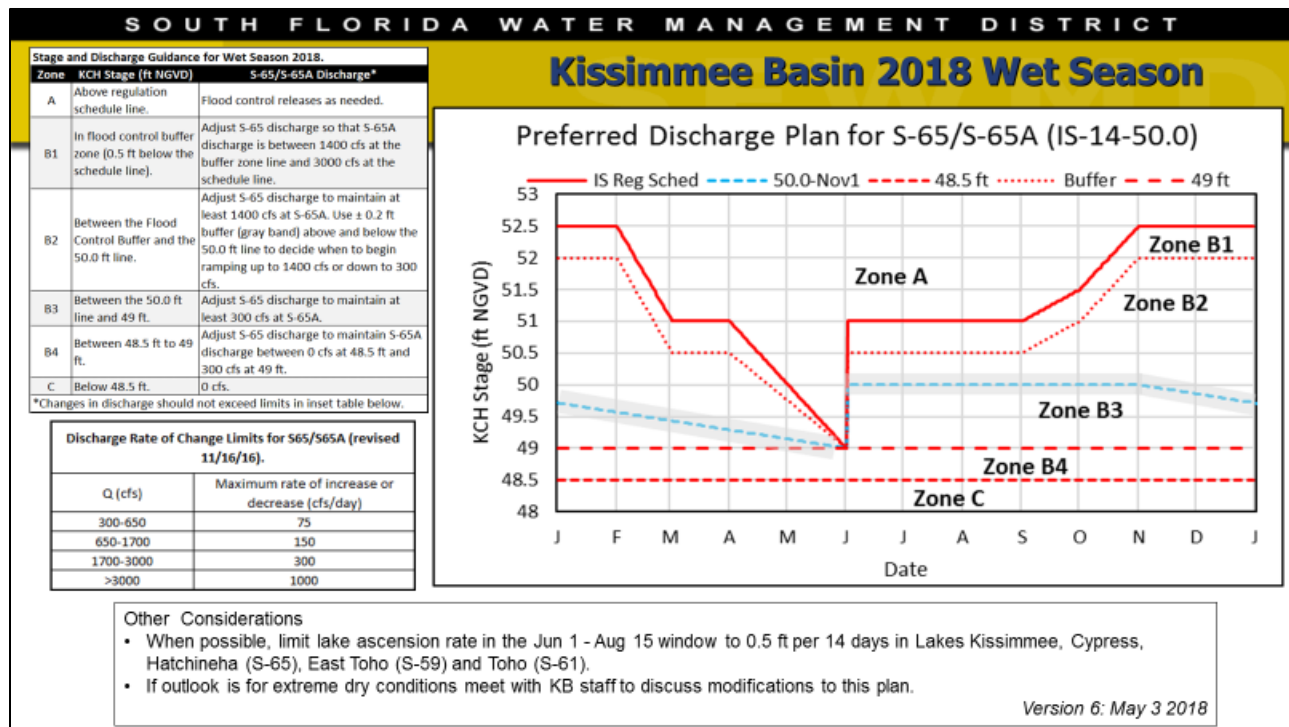


Figure 11. The 2018 Wet Season Discharge Plan for S-65/S-65A.

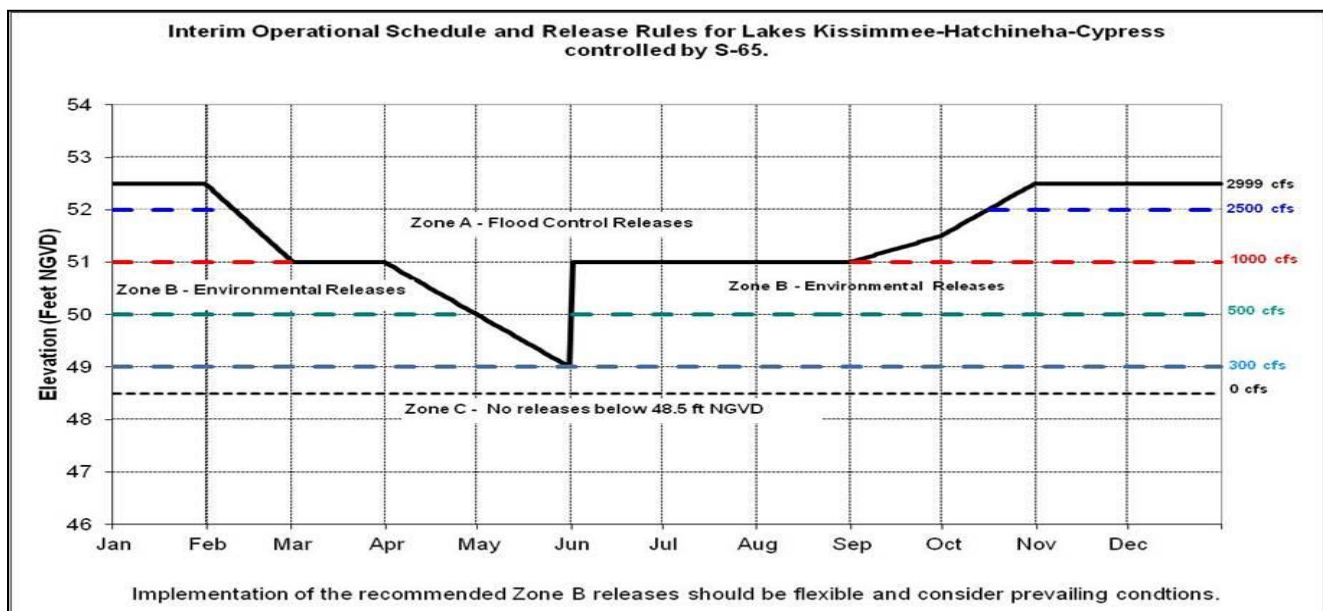


Figure 12. Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years.

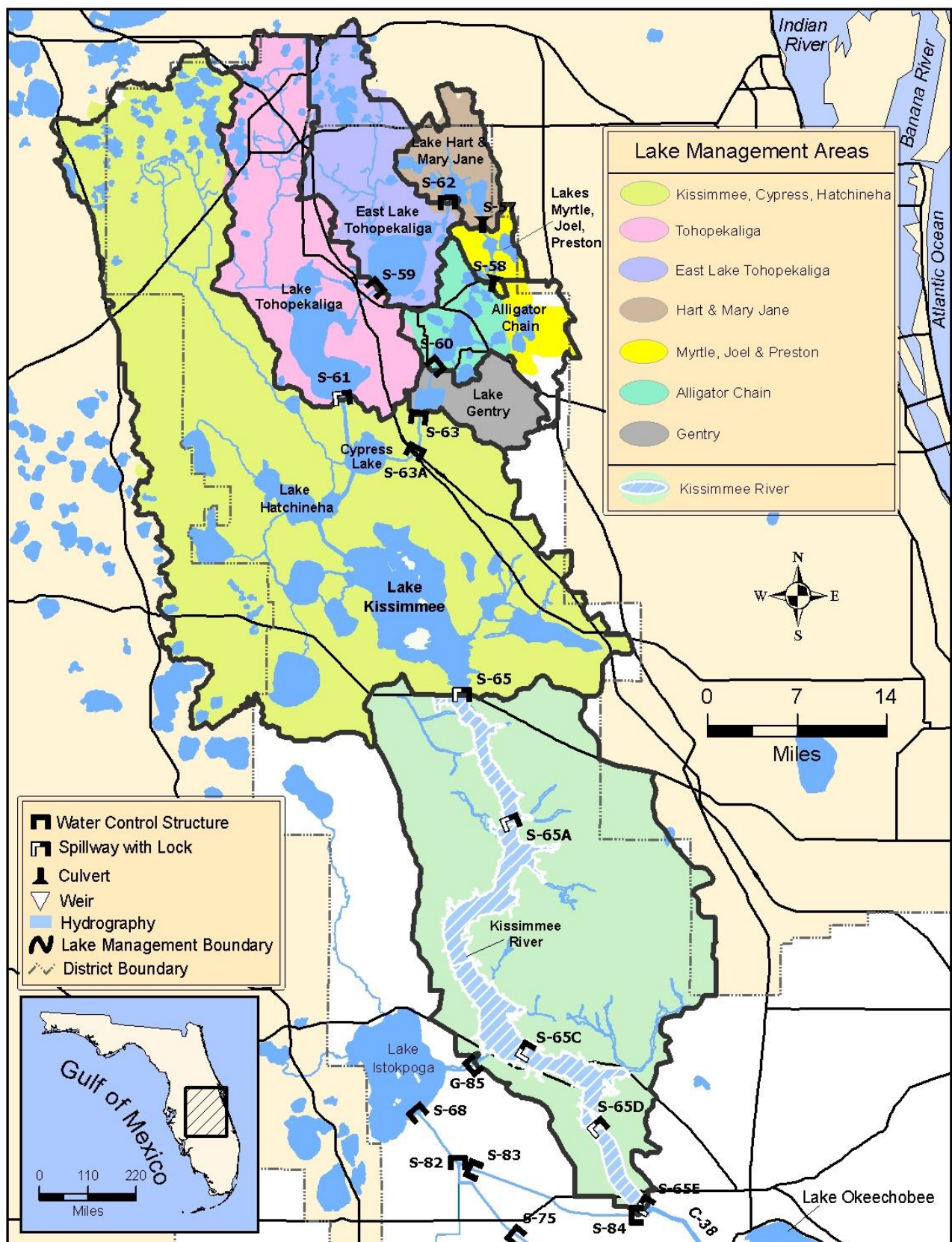


Figure 13. The Kissimmee Basin.

LAKE OKEECHOBEE

According to the USACE web site, Lake Okeechobee stage is at 14.15 feet NGVD for the period ending at midnight on June 11, 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 1.32 feet higher than it was a month ago and 2.38 feet higher than a year ago (Figure 1). The Lake is now in the Low sub-band (Figure 2). According to RAINDAR, 1.11 inches of rain fell over the Lake during the week June 05, 2018 – June 11, 2018. Most of the northern watershed received substantially more rainfall, between 2 – 3 inches (Figure 3).

Average daily inflows to the Lake decreased from the previous week, going from 6,597 cfs to just 4,713 cfs. The largest inflow was from the Kissimmee River through the S-65E structures, averaging 2,103 cfs for the week, similar to the previous week. The Istokpoga and Indian Prairie basins, with a combined 1,441 average daily cfs through the S-84 and S-71 & 72 structures had the second highest inflows, down from the previous week's flow of 1,882 cfs. Backflows through Culvert 10A from the L-8 Canal declined substantially, averaging 438 cfs for the week vs 1,089 cfs the previous week (Table 1). There have been no inflows from the S-2 or S-3 pumps during the wet season thus far.

Discharges via the S-77 and S-308 structures began on June 1, 2018, averaging 2,484 cfs for that week; those discharges increased to 5,382 cfs over the past week. S-77 flows increased from 1,901 average daily cfs to 4,067 cfs this past week, while S-308 increased from 583 cfs to 1,315 cfs this past week. The corrected average daily evapotranspiration value for the week based on the L006 weather platform solar radiation was similar to the previous week at 0.16 inches.

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.

A helicopter survey of foraging wading birds on June 7, 2018 found only 112 individuals, marking the third consecutive survey under 400. The last survey before the heavy rains and subsequent stage reversal found many active nesting colonies and nearly 7,600 individuals (Figure 5). The remaining large nesting colony on Eagle Bay Island is located near the edge of the marsh and birds there are leaving the Lake to forage. Thus far, foraging outside the Lake appears to be supporting the colony nesting efforts.

The most recent satellite imagery using the cyanobacteria monitoring product derived from NOAA's OLCI satellite sensor showed cyanobacteria bloom potential remained low lake-wide, despite reports of visible algae wind-rowed along the eastern shoreline (Figure 6). There was some slight cloud cover on the eastern shore and it is unclear whether this played a role in the few pixels of elevated bloom potential there. Ground observations and water quality samples do not suggest any sort of large-scale bloom activity at this time.

Water Management Recommendations

Lake Okeechobee stage is 14.15 feet NGVD having decreased 0.07 feet over the past week after rising quickly for several weeks. The Lake was below 13.0 feet NGVD for just 10 days and likely rose too quickly for many recovering SAV communities to stay in optimal light conditions. The seasonal low for the 2018 growing season of 12.83 feet NGVD was the third highest since 2011; the third time in six years that stage has not reached the bottom of the preferred stage envelope (12.5 – 15.5 feet NGVD); and the sixth consecutive Water Year (WY) that stages have exceeded the top of the stage envelope. Avoiding a seventh consecutive WY with stages greater than 15.5 feet NGVD would be beneficial to the struggling nearshore SAV communities. Given the lack of substantial low-water levels this dry season, the SAV coverage on the Lake will likely remain at minimal levels throughout the growing season and well into next year, prolonging impacts from high stages in 2016 and Hurricane Irma in 2017.

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	2114	2103	0.9
S71 & 72	484	272	0.1
S84 & 84X	1398	1159	0.5
Fisheating Creek	96	138	0.1
S154	146	81	0.0
S191	454	293	0.1
S133 P	223	114	0.0
S127 P	66	27	0.0
S129 P	73	36	0.0
S131 P	27	6	0.0
S135 P	134	45	0.0
S2 P	2	0	0.0
S3 P	0	0	0.0
S4 P	291	0	0.0
L8 Backflow	1089	438	0.2
Rainfall	4244	3059	1.1
Total	10841	7772	3.0

OUTFLOWS	Previous Week Avg Daily cfs	Avg Daily Outflow cfs	Equivalent Depth Week Total (in)
S77	1901	4067	1.7
S308	583	1315	0.5
S351	0	0	0.0
S352	0	0	0.0
S354	0	0	0.0
L8 Outflow	0	0	0.0
ET	2894	3031	1.2
Total	5378	8414	3.5

PROVISIONAL DATA

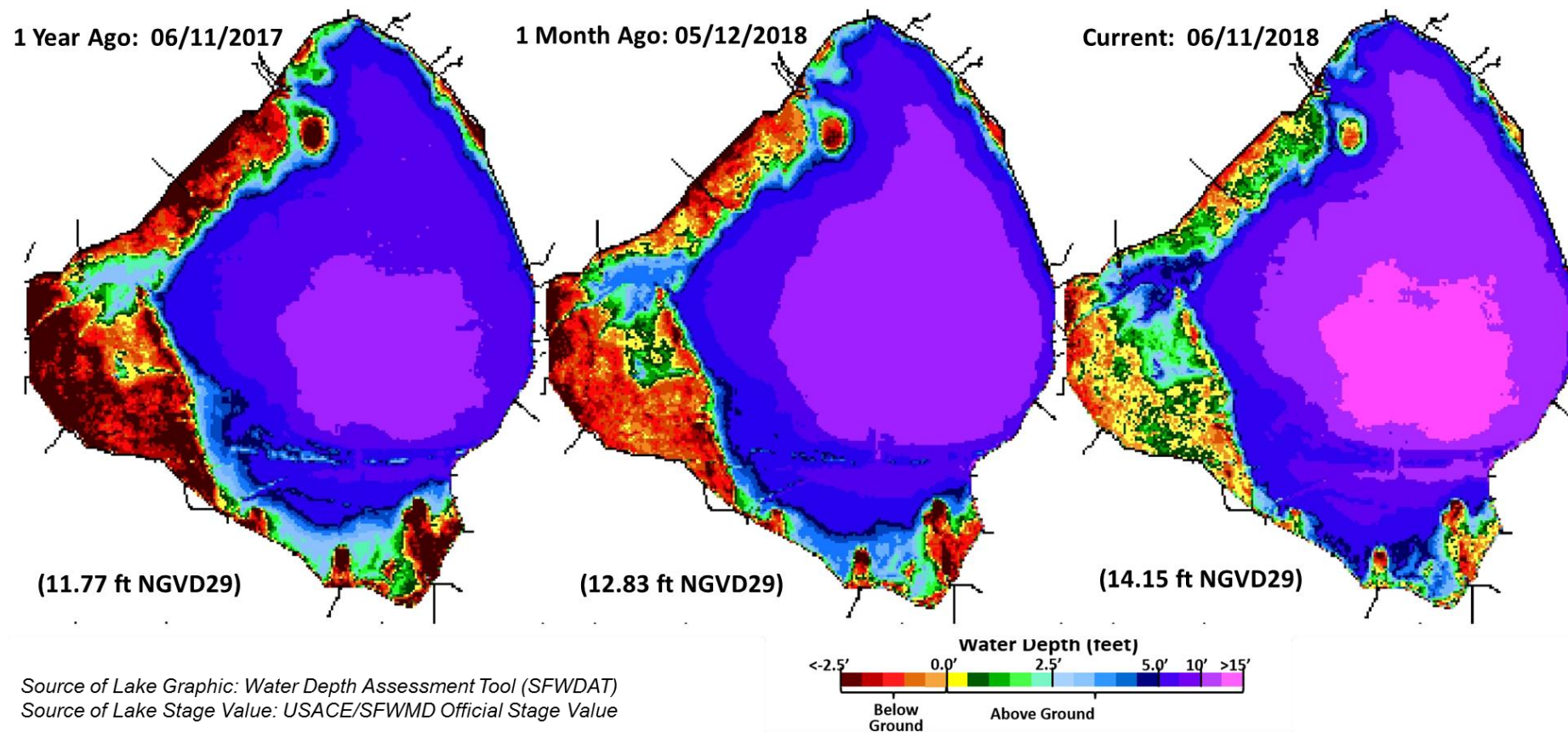


Figure 1. Water depth estimates on Lake Okeechobee based on the South Florida Water Depth Assessment Tool.

Lake Okeechobee Water Level History and Projected Stages

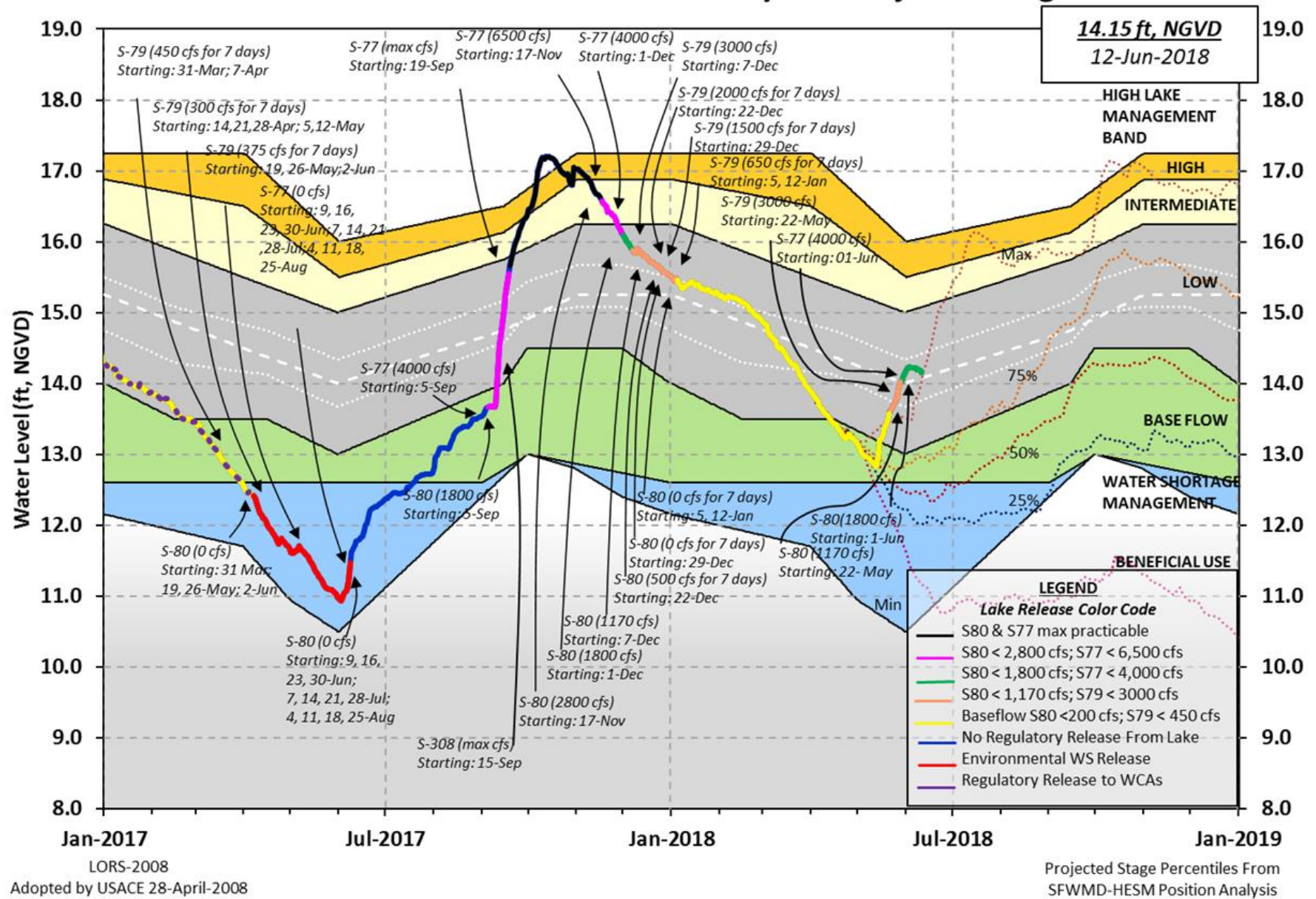


Figure 2. Recent Lake Okeechobee stage and releases, with projected stages based on a dynamic position analysis.

SFWMD PROVISIONAL RAINDAR 7-DAY BASIN RAINFALL ESTIMATES
FROM: 0515 EST, 06/05/2018 THROUGH: 0515 EST, 06/12/2018

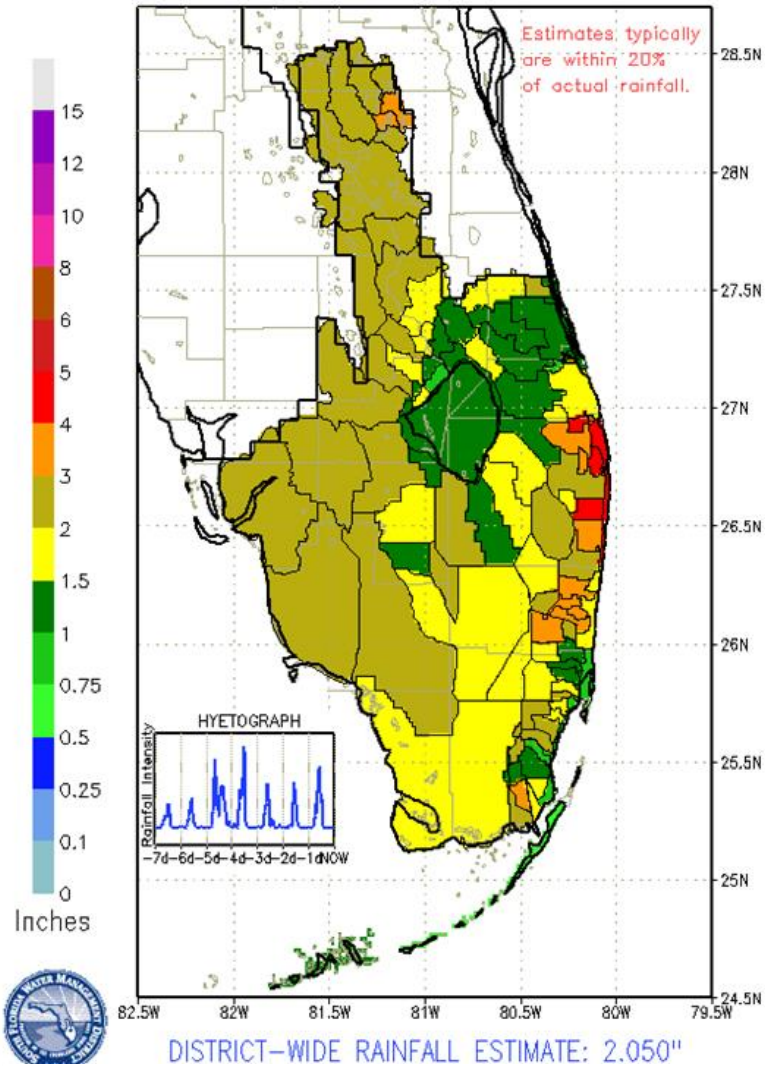


Figure 3. Rainfall estimates by basin.

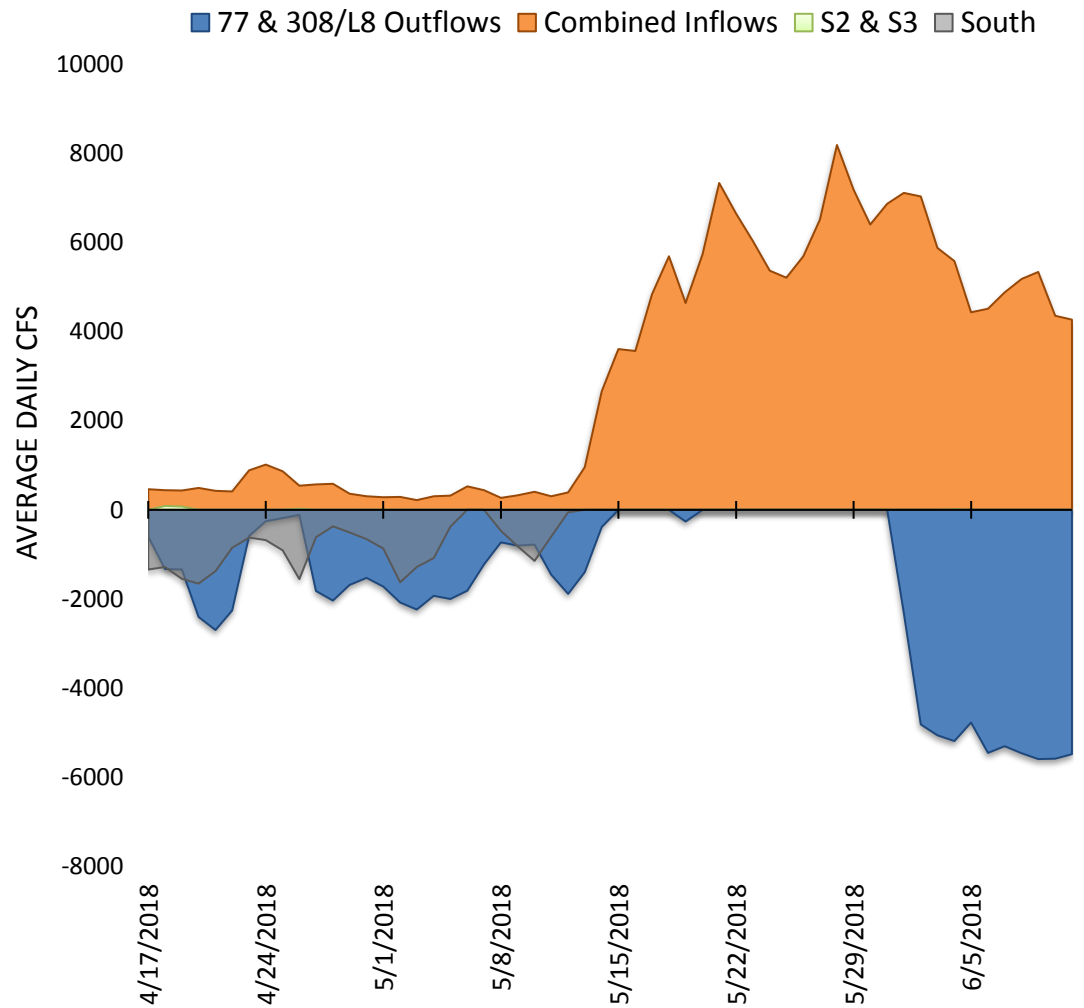


Figure 4. Major inflows and outflows of Lake Okeechobee, including the S-350 structures designated as South. The L-8 Canal flows through Culvert 10A are included as outflows when positive, and as inflows when backflowing into the lake. Inflows and outflows are shown as positive and negative, respectively,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

Wading Bird Foraging Locations June 7, 2018

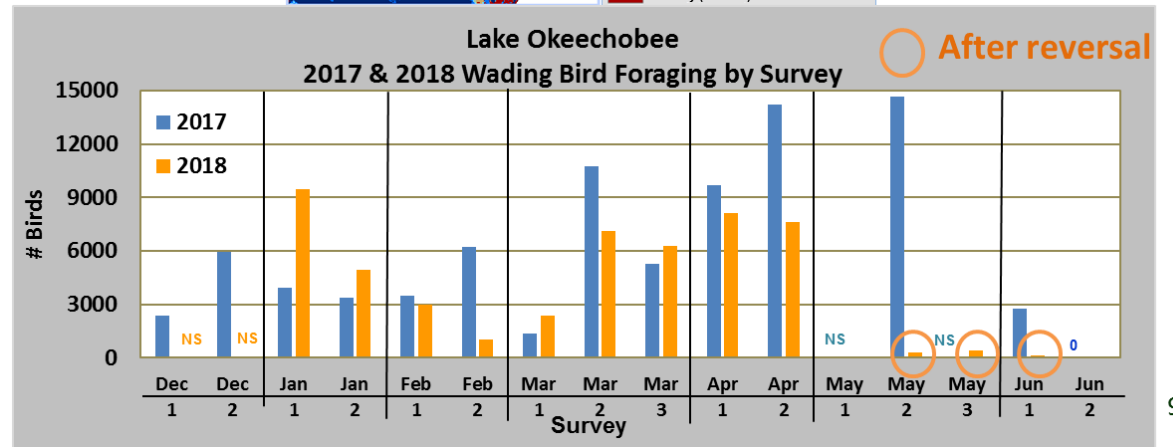
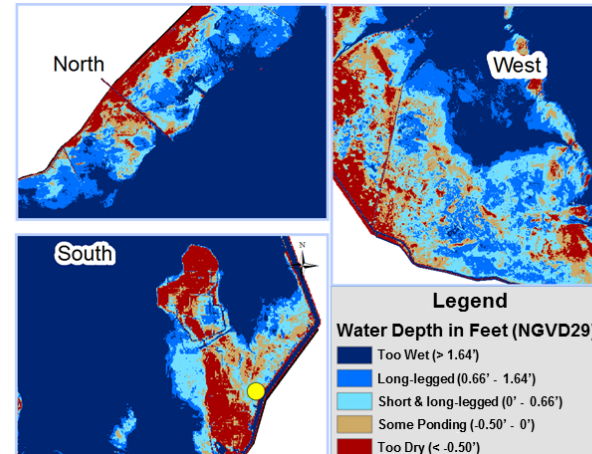
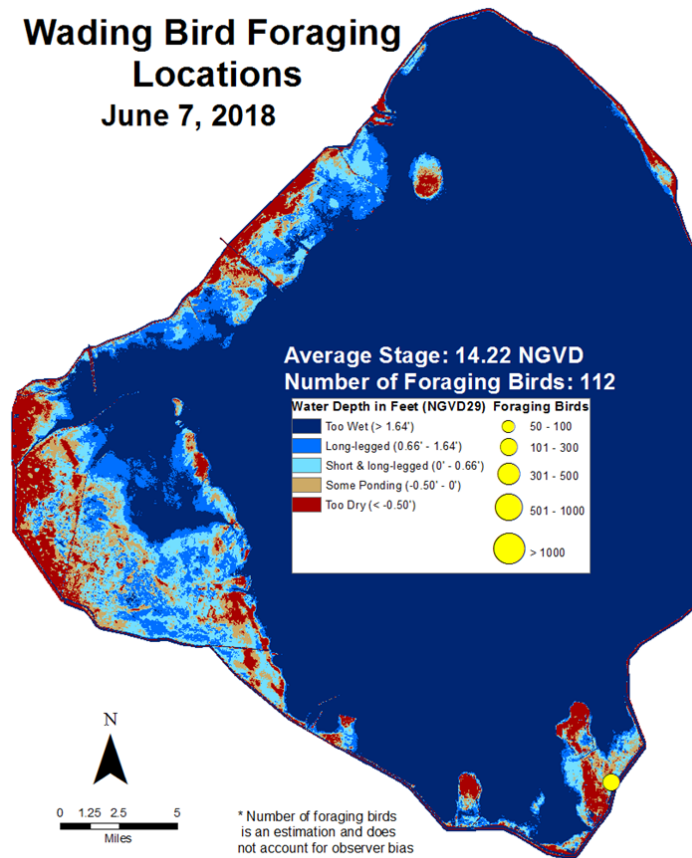


Figure 5. Locations of foraging flocks of wading birds observed during a monitoring flight on June 7, 2018 are shown in yellow, with circle sizes representing the size of the flocks. Previous survey totals from 2018 and 2017 are compared in the bar graph.

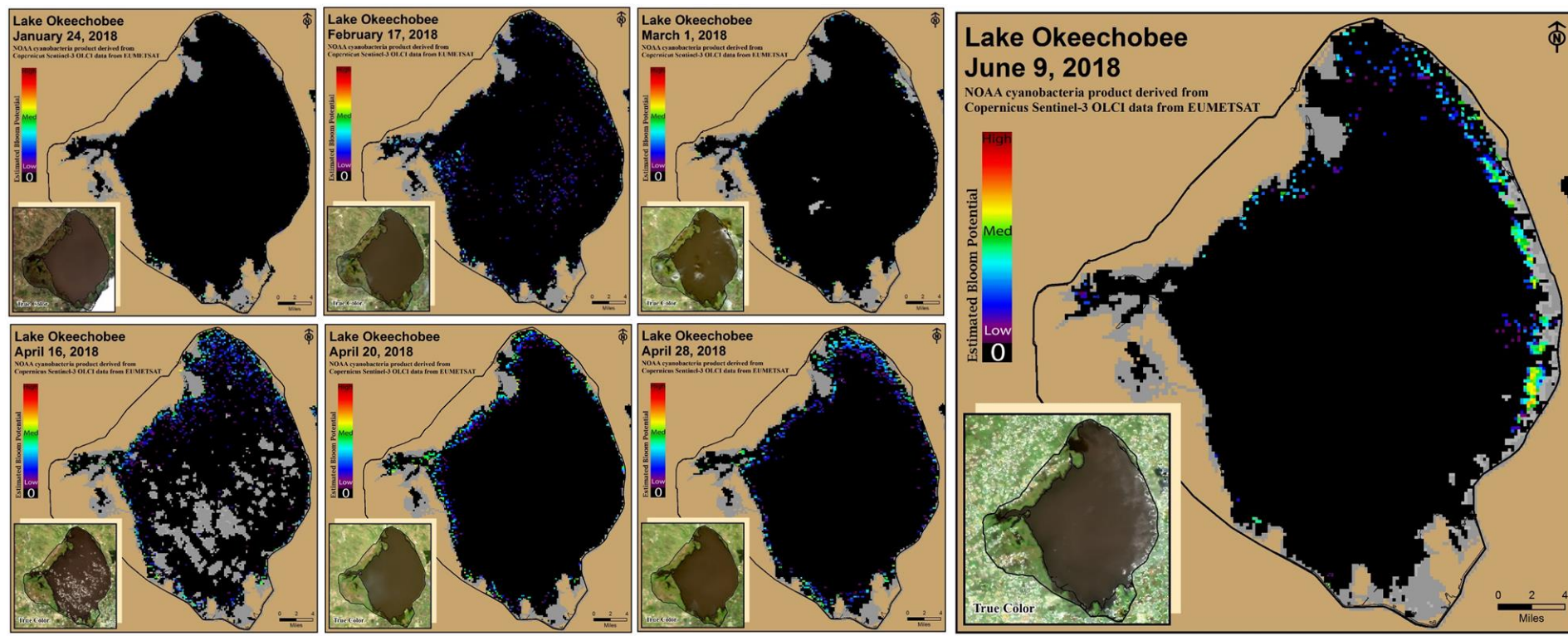


Figure 6. Potential for cyanobacterial blooms on Lake Okeechobee based on NOAA's harmful algal bloom monitoring system derived from Copernicus Sentinel-3 OLCI data from EUMETSAT.

ESTUARIES

St. Lucie Estuary:

Last week total inflow to the St. Lucie Estuary averaged about 3,980 cfs (Figures 1 and 2) and last month inflow averaged about 5,544 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 is provisional).

Location	Flow (cfs)
Tidal Basin Inflow	433
S-80	1,819
S-308	1,315
S-49 on C-24	475
S-97 on C-23	486
Gordy Rd. structure on Ten Mile Creek	767

Over the past week, salinity increased throughout the estuary (Table 2, Figures 3 and 4). The seven-day moving average salinity of the water column (an average of the surface and bottom salinity) at the US1 Bridge is estimated to be less than 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)	0.4 (0.3)	0.4 (0.3)	NA ¹
US1 Bridge	1.3 (.03)	NR (NR)	10.0-26.0
A1A Bridge	5.8 (1.8)	17.4 10.0)	NA ¹

¹Envelope not applicable, NR=not reporting

Continuous monitoring of water quality is conducted at five Land/Ocean Biogeochemical Observatory (LOBO) stations located in the St. Lucie Estuary and maintained by Florida Atlantic University/Harbor Branch Oceanographic Institute (FAU-HBOI). Data are summarized in Table 3 and station location map is shown in Figure 5.

Table 3. Weekly ranges of instrument depth, chlorophyll *a* (a measure of algal biomass) and dissolved oxygen concentrations at five FAU-HBOI LOBO stations located in the St. Lucie Estuary.

Location	Depth (m)	Chlorophyll <i>a</i> (µg/l)	Average DO (mg/l)	Minimum DO (mg/l)	Maximum DO (mg/l)
SF2	2.71	6.01 - 6.63	7.71	6.42	9.86
SF	1.60	6.21 - 8.33	6.20	5.33	7.12
NF	1.90	5.97 - 11.36	5.11	3.81	6.89
ME	1.73	5.78 - 9.92	5.30	4.34	6.28
IRL-SLE	3.51	0.75 - 6.66	6.06	5.30	7.13

NOAA satellite imagery indicates no visible cyanobacteria bloom potential in the St. Lucie Estuary this week (Figure 6).

Caloosahatchee Estuary:

Last week total inflow to the Caloosahatchee Estuary averaged about 8,643 cfs (Figures 7 and 8) and last month inflow averaged about 5,777 cfs. Last week's provisional averaged inflows from the structures are shown in Table 4.

Table 4. Weekly average inflows (data is provisional).

Location	Flow (cfs)
S-77	4,067
S-78	5,157
S-79	7,346
Tidal Basin Inflow	1,297

Over the past week, salinity decreased throughout the estuary, (Table 5, Figures 9 & 10). The seven-day average salinity values are in the fair range for adult eastern oysters at Shell Point and in the poor range at Cape Coral (Figure 11). Salinity data were not available at Sanibel. The 30-day moving average surface salinity is 1.2 at Val I-75 and 4.9 at Ft. Myers. Salinity conditions between Val I-75 and Ft. Myers are good for tape grass.

Table 5. 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 (0.3)	0.2 (0.3)	NA ¹
*Val I75	0.2 (0.5)	0.3 (0.7)	0.0-5.0 ²
Ft. Myers Yacht Basin	0.3 (1.7)	0.3 (1.7)	NA
Cape Coral	0.6 (5.9)	0.6 (6.3)	10.0-30.0
Shell Point	8.7 (16.4)	9.7 (17.4)	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.

*Val I75 is temporarily unavailable (salinity values are estimated using models developed for this site).

Monitoring data collected by the River, Estuary and Coastal Observing Network of Sanibel-Captiva Conservation Foundation using continuous sensors are summarized in Table 6 as concentration ranges of chlorophyll *a* and dissolved oxygen at Beautiful Island, Ft. Myers, and Shell Point in the Caloosahatchee Estuary.

Table 6. Weekly ranges of chlorophyll *a* (a measure of algal biomass) and dissolved oxygen concentrations at three monitoring stations maintained by the Sanibel-Captiva Conservation Foundation.

Parameter Name	RECON Monitoring Stations		
	Beautiful Island	Ft. Myers	Shell Point
Chlorophyll <i>a</i> (µg/l)	6.22 – 10.16	6.84 – 12.18	1.83 – 18.32
Dissolved Oxygen (mg/l)	3.46 – 5.33	4.54 – 6.91	3.27 – 7.55

The Florida Fish and Wildlife Research Institute reported on June 8, 2018, that *Karenia brevis*, the Florida red tide dinoflagellate, was observed at background to medium concentrations in five samples collected from Lee County. Fish kills and respiratory irritation were reported in Lee County over the past week.

NOAA satellite imagery indicates no visible cyanobacteria bloom potential in the Caloosahatchee Estuary this week (Figure 12).

Water Management Recommendations

Given the current estuarine conditions, there are no ecological benefits associated with freshwater releases from Lake Okeechobee.

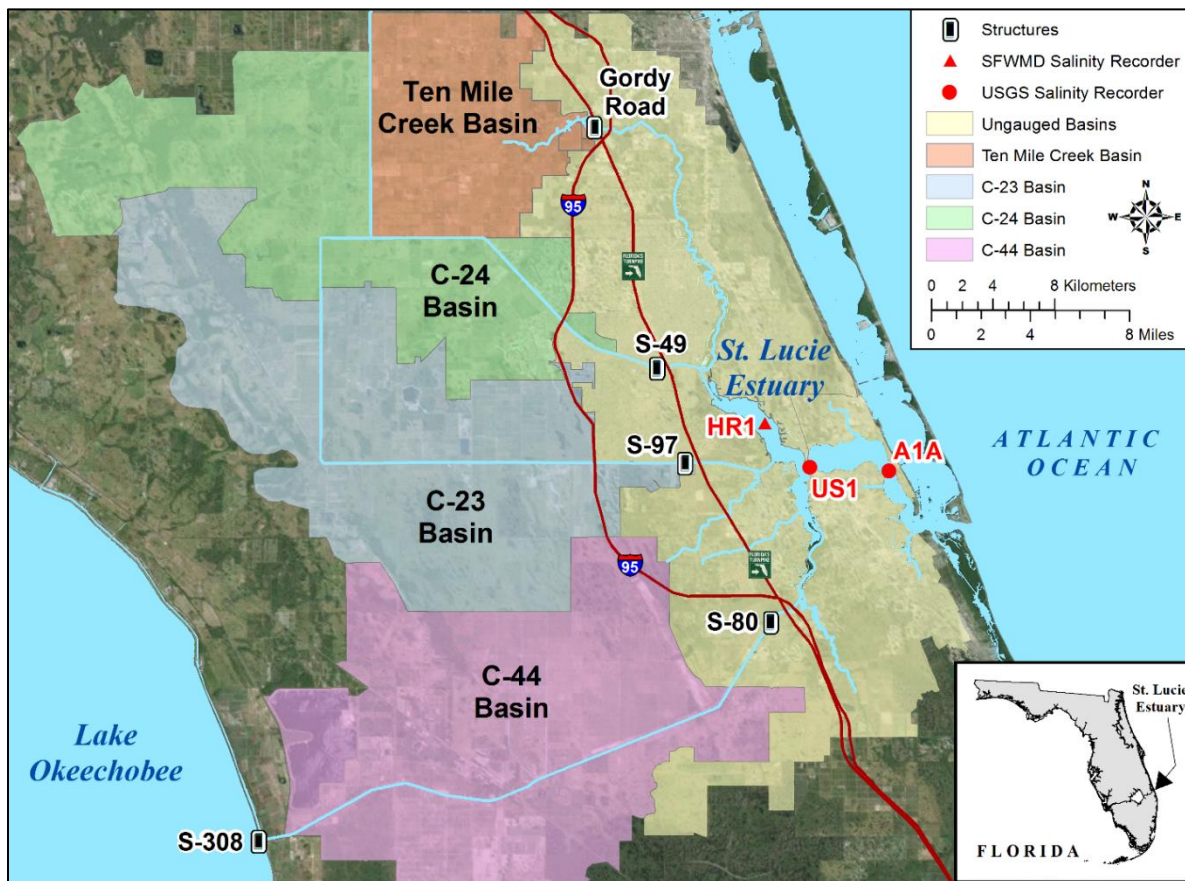


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

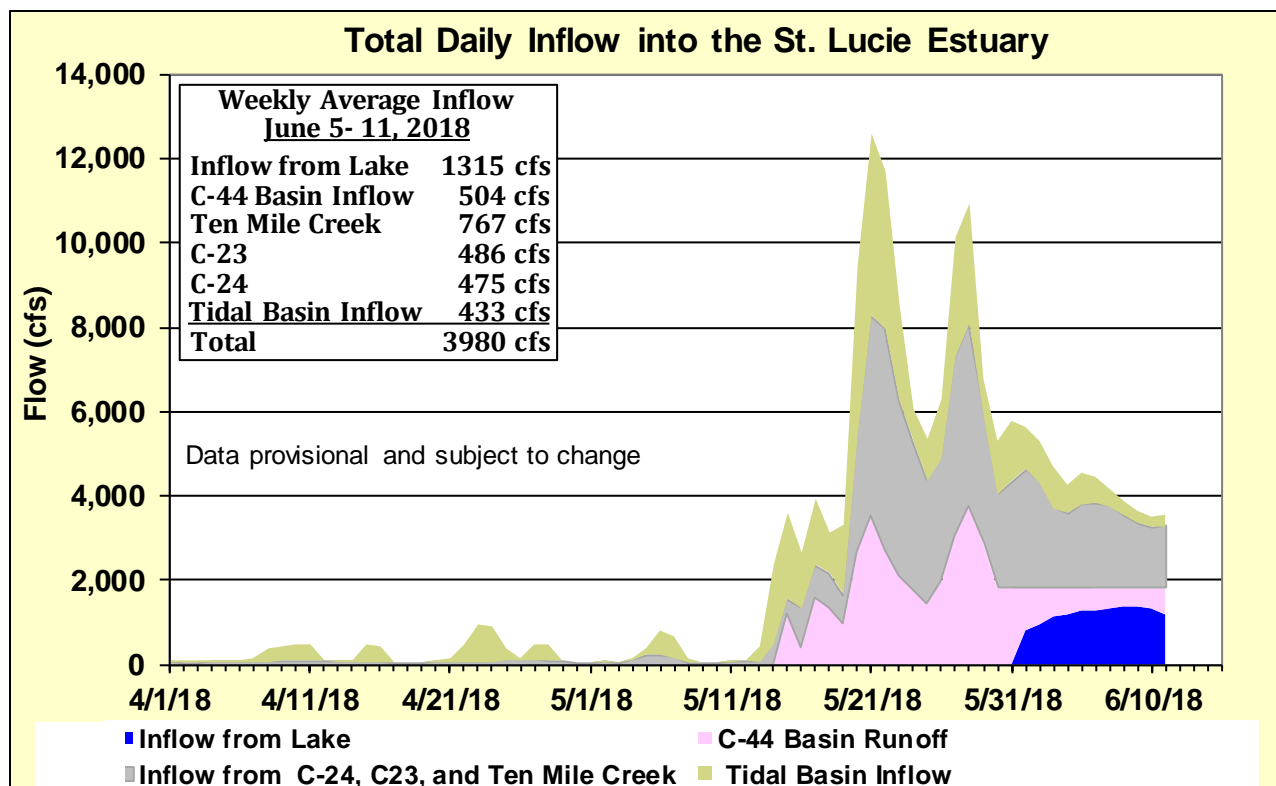


Figure 2. Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basins into the St. Lucie Estuary.

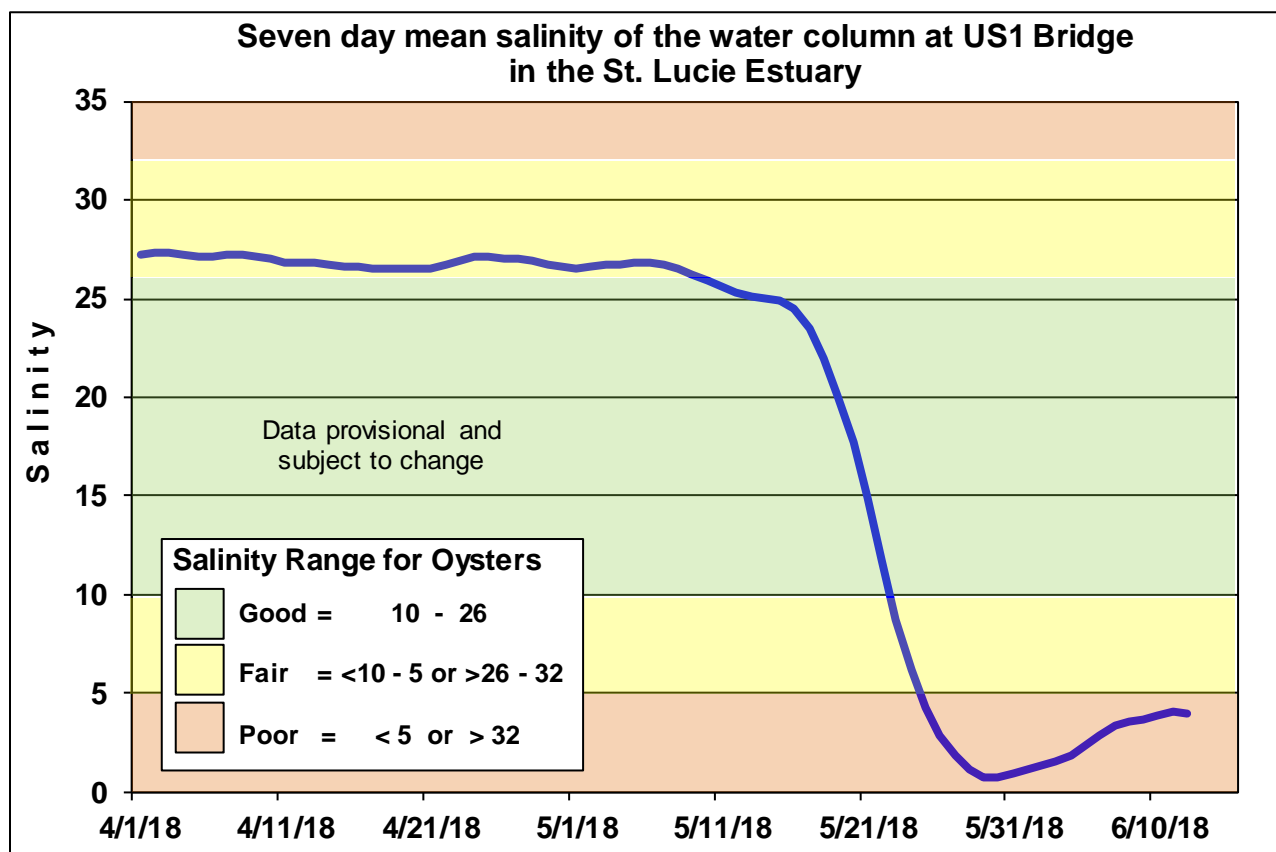


Figure 3. Seven-day mean salinity of the water column at the US1 Bridge.

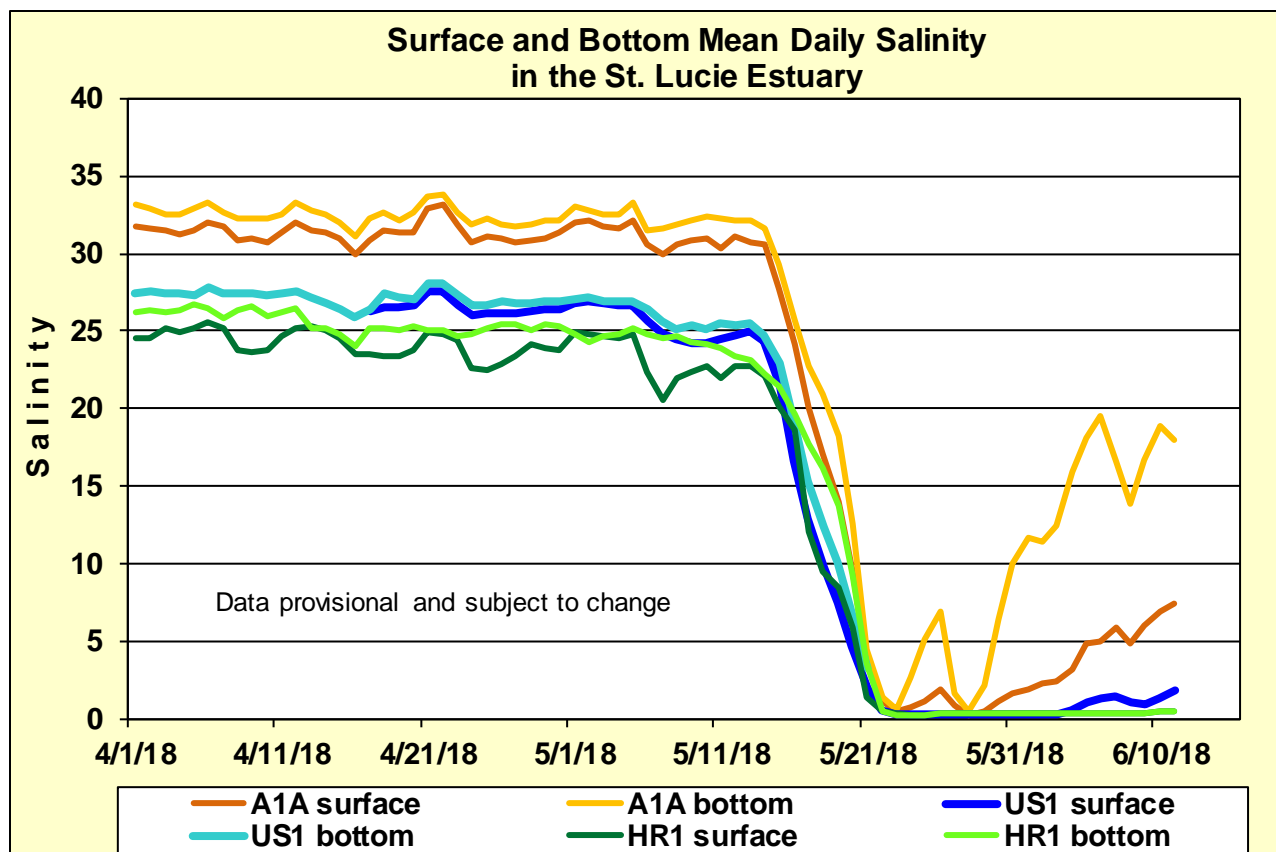


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

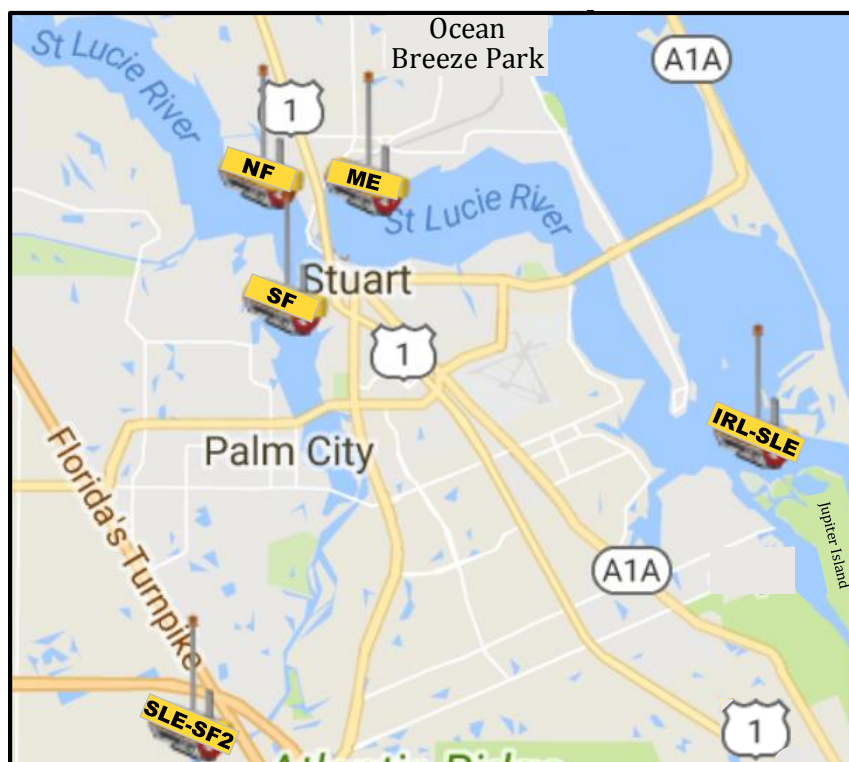


Figure 5. Location of FAU-HBOI LOBO water quality stations in the St. Lucie Estuary.

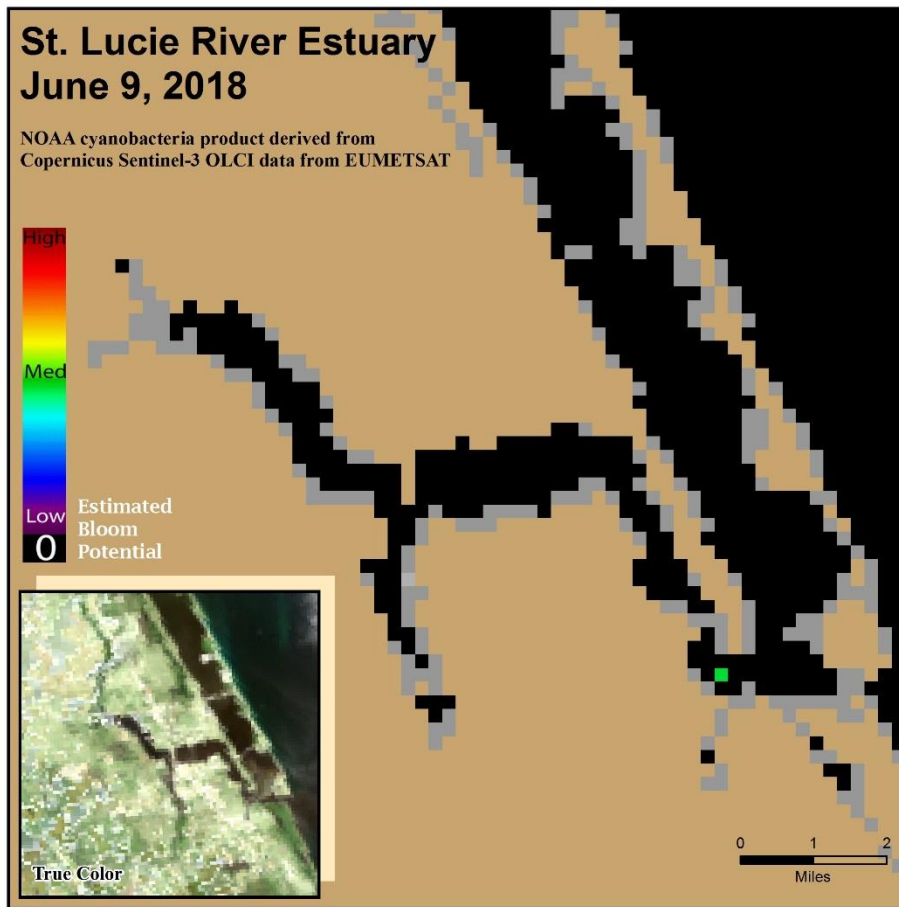


Figure 6. Sentinel 3a Satellite imagery provided by NOAA uses Ocean and Land Color Instrument (OLCI) to estimate cyanobacteria bloom potential in St. Lucie Estuary.

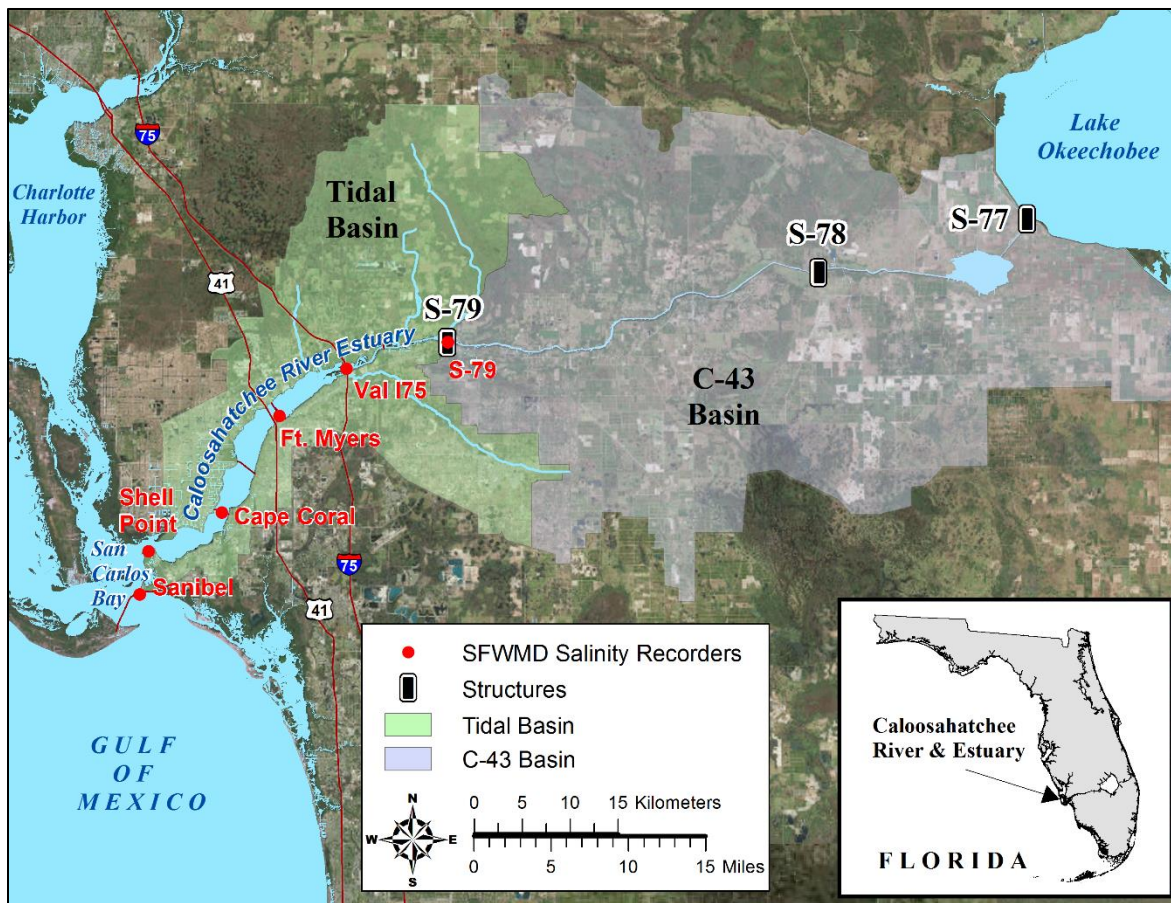


Figure 7. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

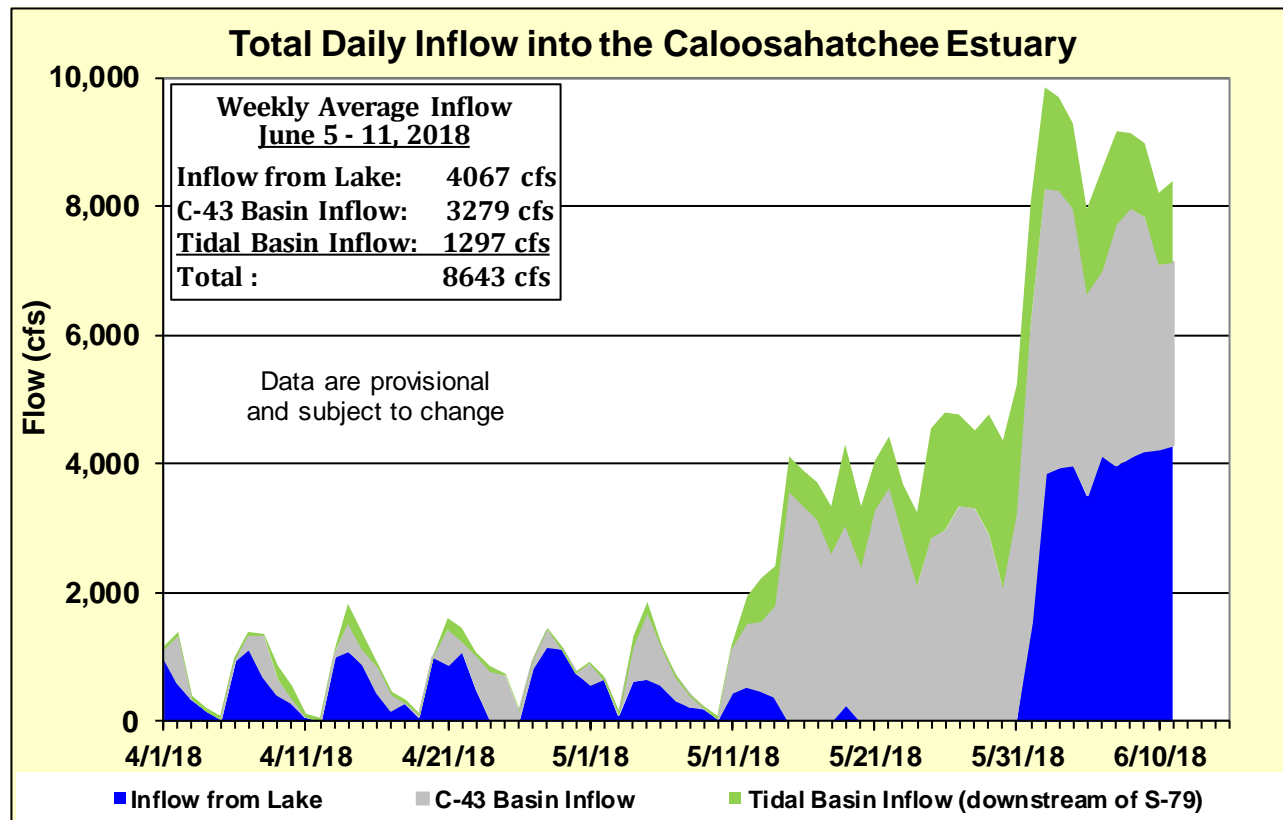


Figure 8. Total daily inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.

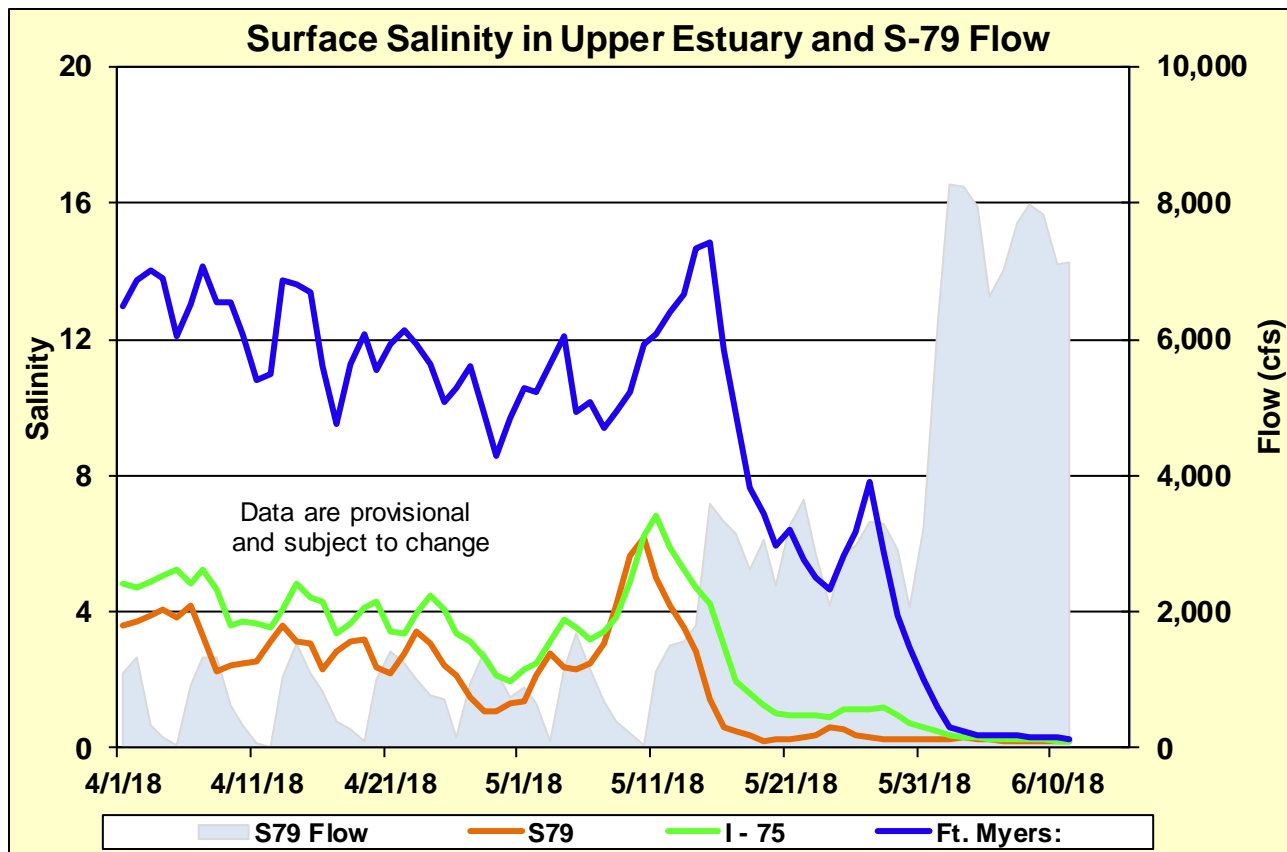


Figure 9. Daily mean flows at S-79 and salinity at upper estuary monitoring stations.

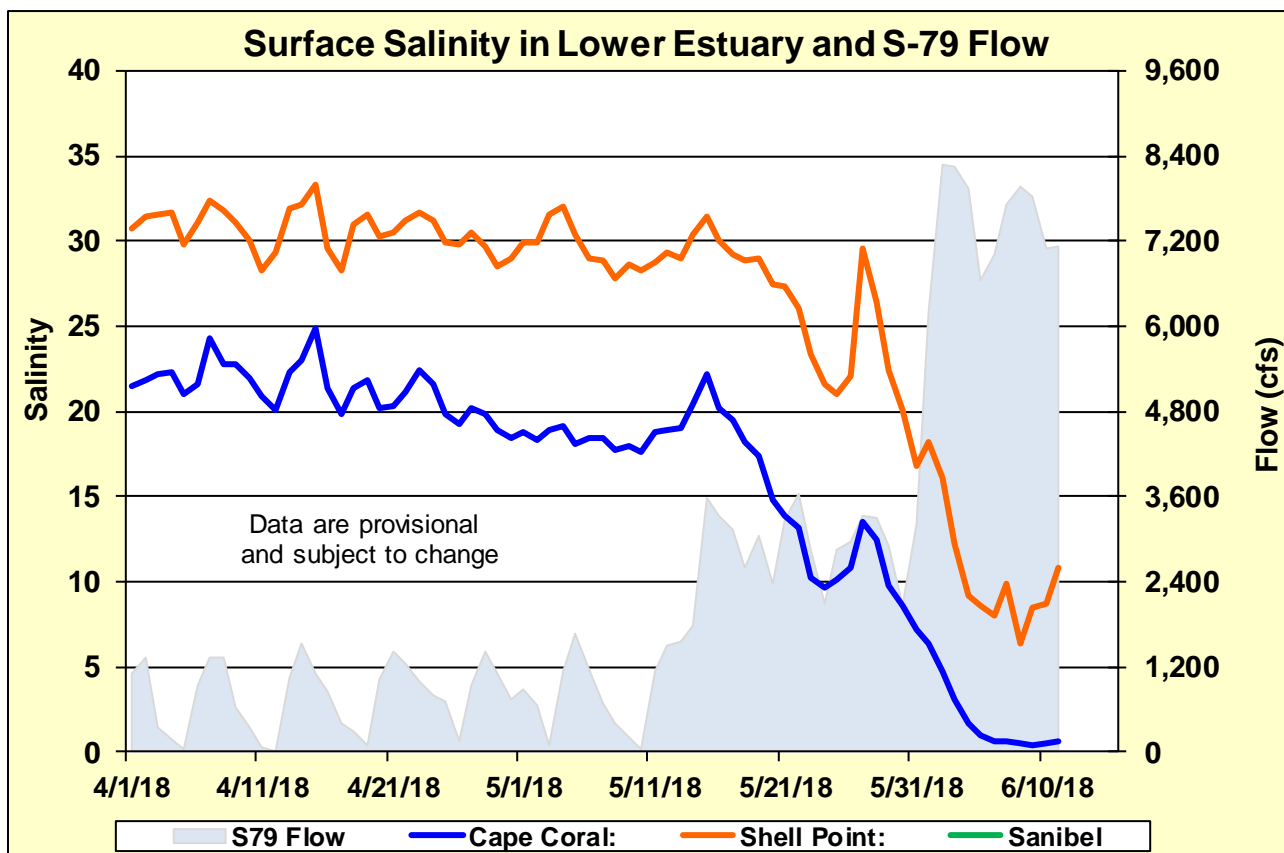


Figure 10. Daily mean flows at S-79 and salinity at lower estuary stations.

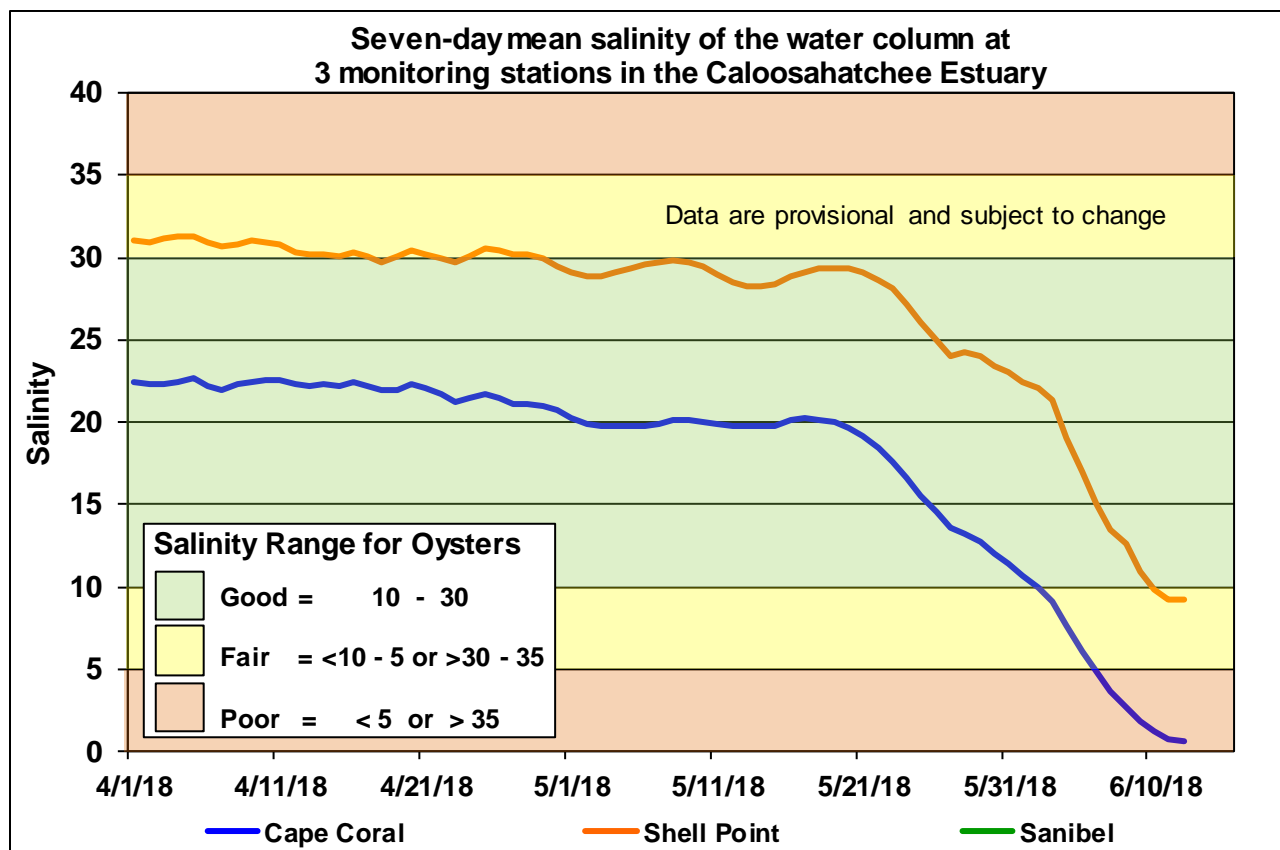


Figure 11. Seven-day mean salinity at Cape Coral Bridge, Shell Point, and Sanibel Bridge monitoring stations.

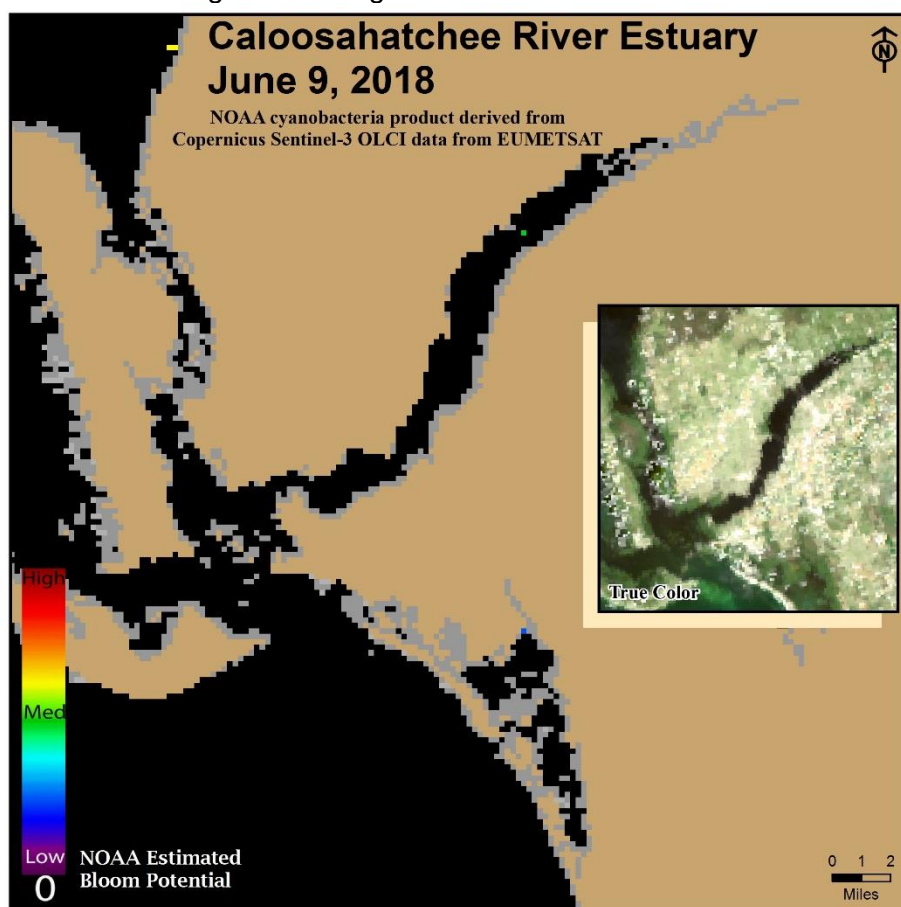
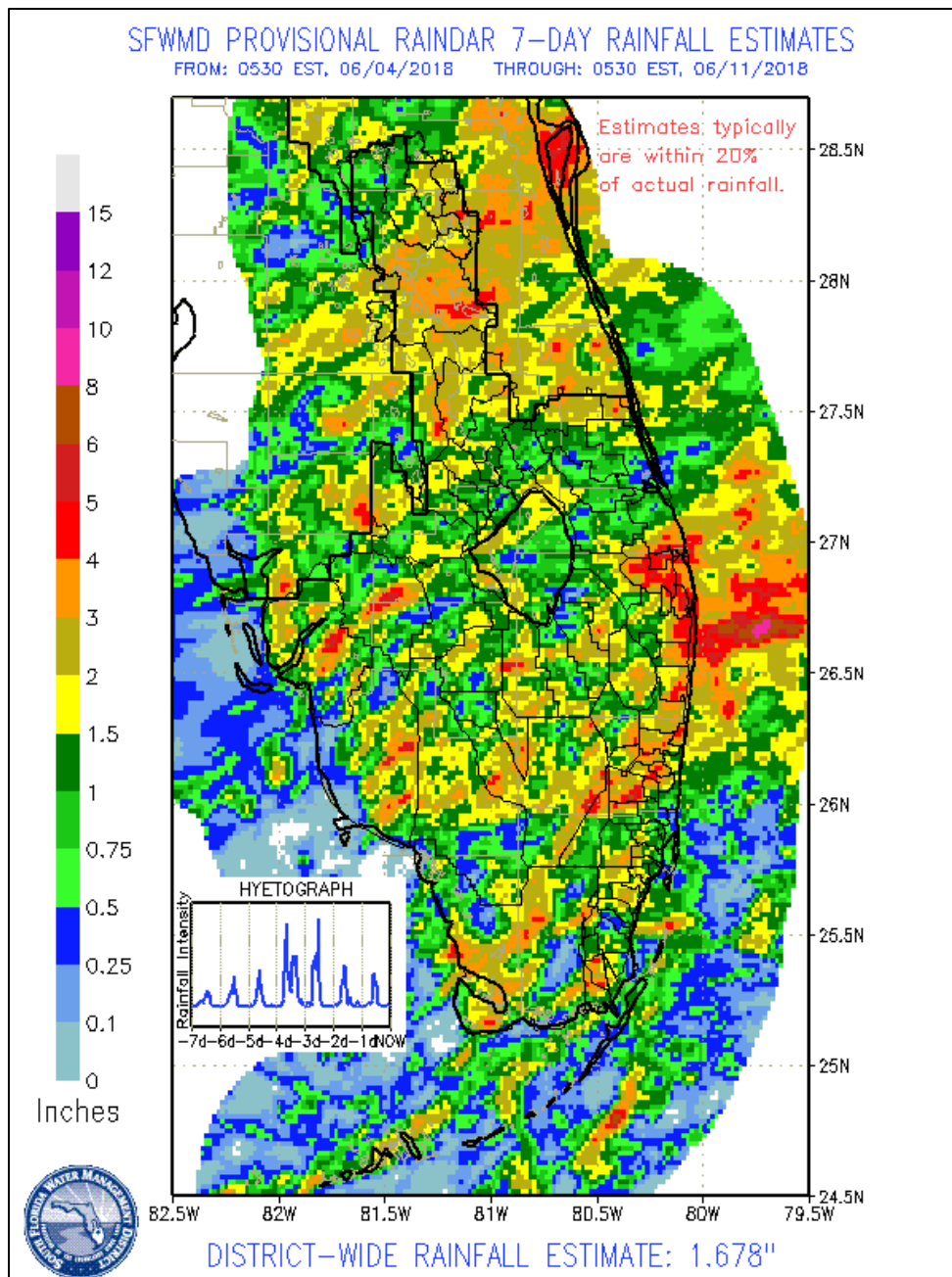


Figure 12. Sentinel 3a Satellite imagery provided by NOAA uses Ocean and Land Color Instrument (OLCI) to estimate cyanobacteria bloom potential in St. Lucie Estuary.

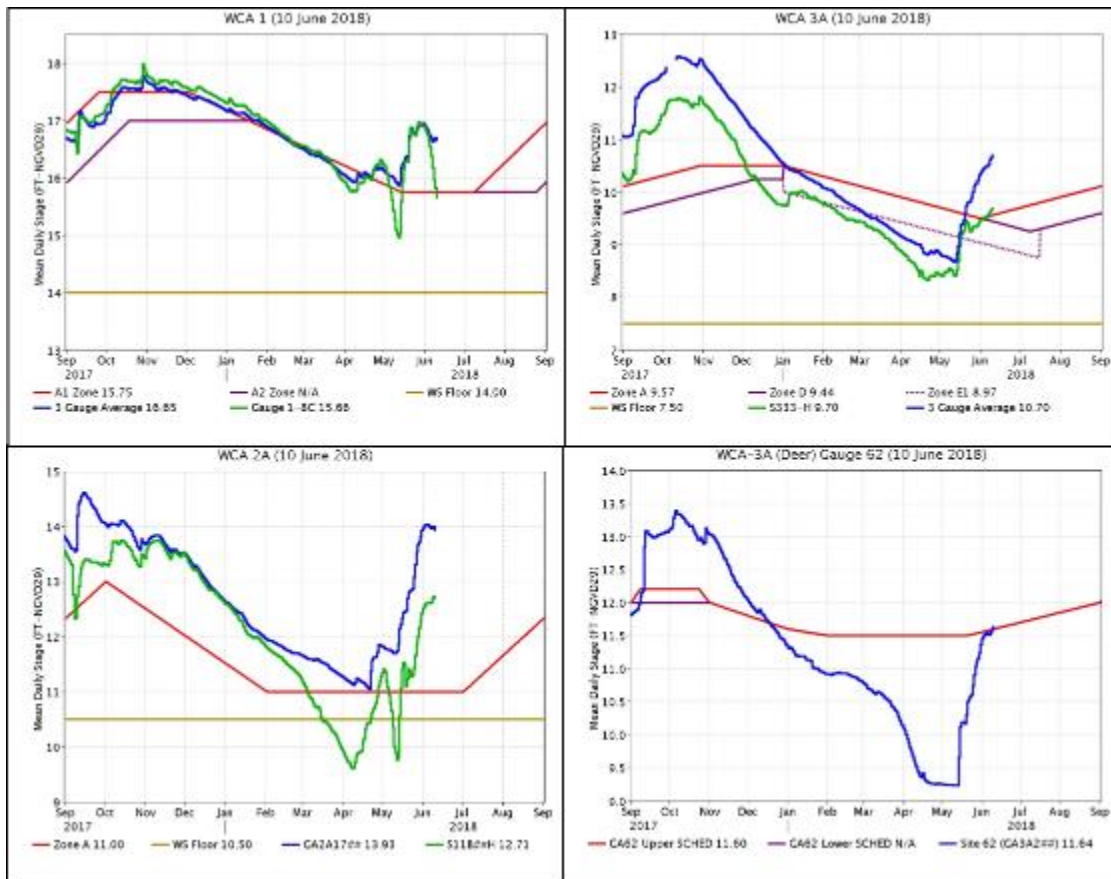
EVERGLADES

At the gauges monitored for this report, stages in WCA-1 and WCA-2A fell an average of 0.16 feet last week while the remainder of the Everglades basins rose an average of 0.15 feet. Individual gauge changes within the WCAs ranged from +0.34 feet (northeast WCA-3A, +1.87 over the last three weeks) to -0.23 feet (WCA-1). Pan evaporation was estimated at 2.64 inches.

Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	1.83	-0.17
WCA-2A	1.54	-0.13
WCA-2B	2.13	+0.07
WCA-3A	1.81	+0.23
WCA-3B	1.87	+0.12
ENP	1.52	+0.03



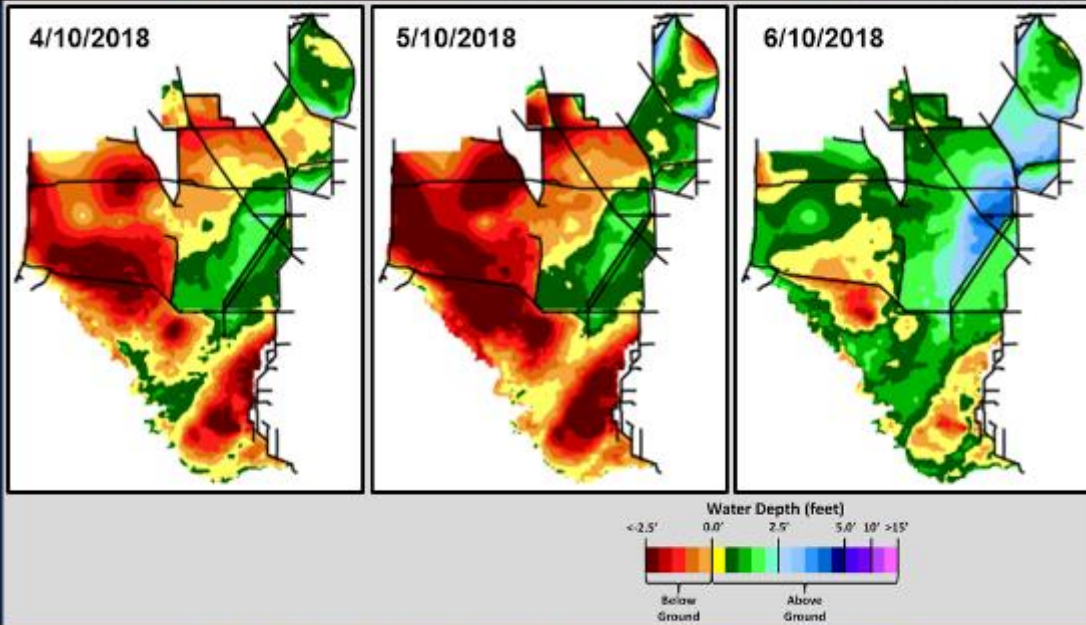
Regulation Schedules: WCA-1 three-gauge average stage is now 0.90 feet above Zone A1 and trending towards the regulation schedule. Gauge 1-8C is now below Zone A1. WCA-2A's recent increases in stage slowed, with marsh stage now 2.93 feet above Zone A and S-11B headwater stage 1.71 above. WCA-3A three-gauge average stage continues to steadily increase and is now 1.13 feet above Zone A. WCA-3A stage at gauge 62 (northwest corner) continues to increase, now 0.04 feet below the upper schedule.



Water Depths and Changes: The WDAT tool for spatial interpolation of depth monthly snapshots indicates rapidly rehydrating conditions across the Everglades. In northern WCA-3A, water depths range from 0.0 feet to greater than 2.5 feet in the southeast corner. Deep water ponding is occurring near the northern reaches of L-67. Stages in WCA-2A remain deep. Comparing WDAT water depths from present, last week the water depths dropped across WCA-1 and in WCA-2A. Water depths in WCA-3A and downstream increased slightly. The Everglades is considerably wetter currently than it was a month ago. Looking back one year ago, northwest WCA-3A is drier while the southeast is wetter. WCA-1 is significantly drier.



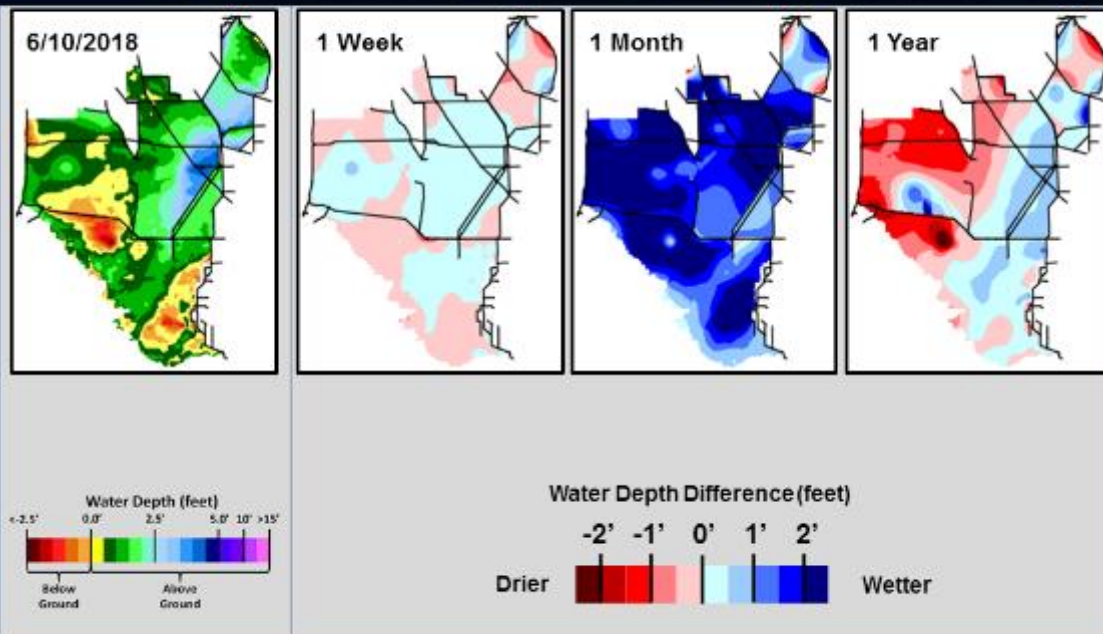
SFWDAT Water Depth Monthly Snapshots



South Florida Water Depth Assessment Tool (SFWDAT)

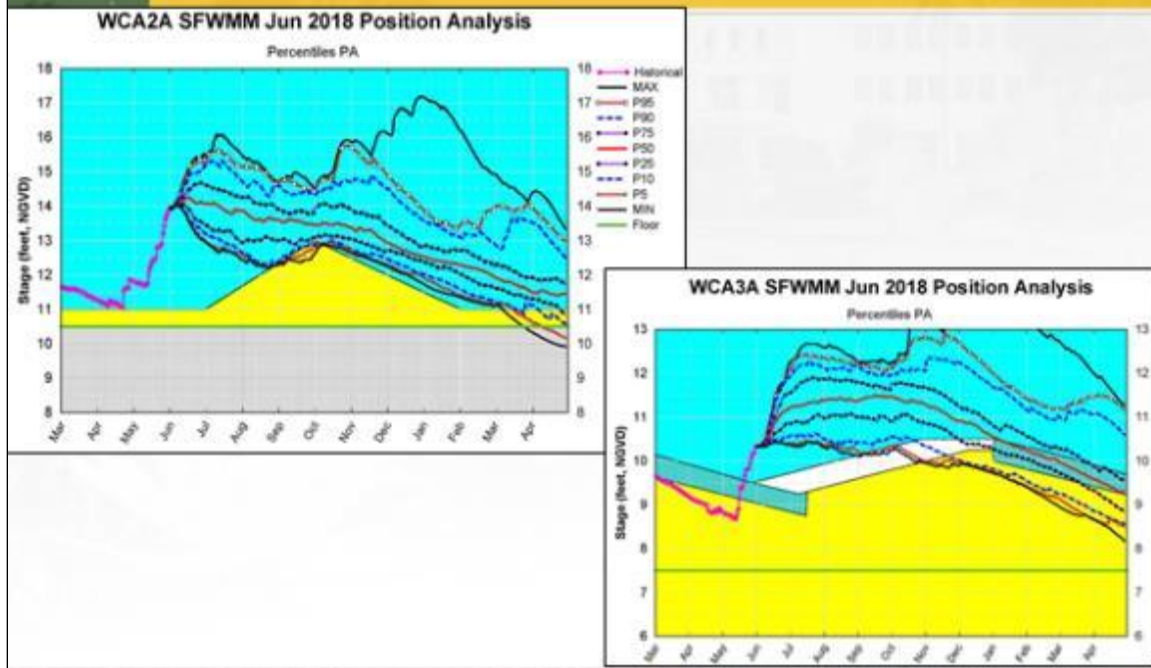


SFWDAT Everglades Difference Maps (Present - Past)



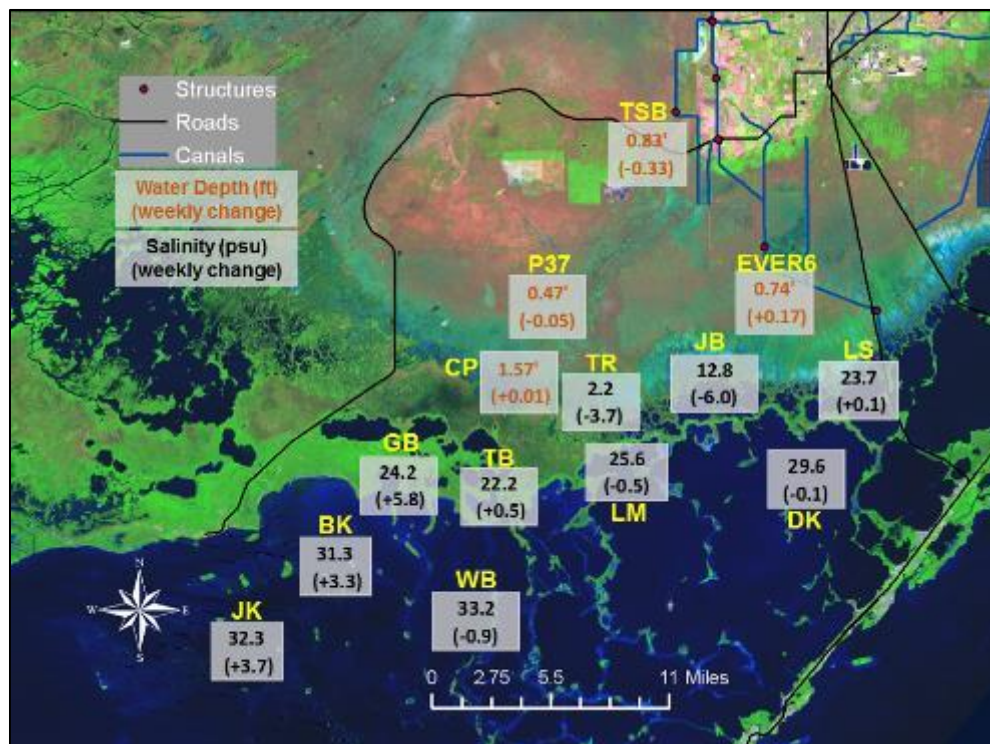
South Florida Water Depth Assessment Tool (SFWDAT)

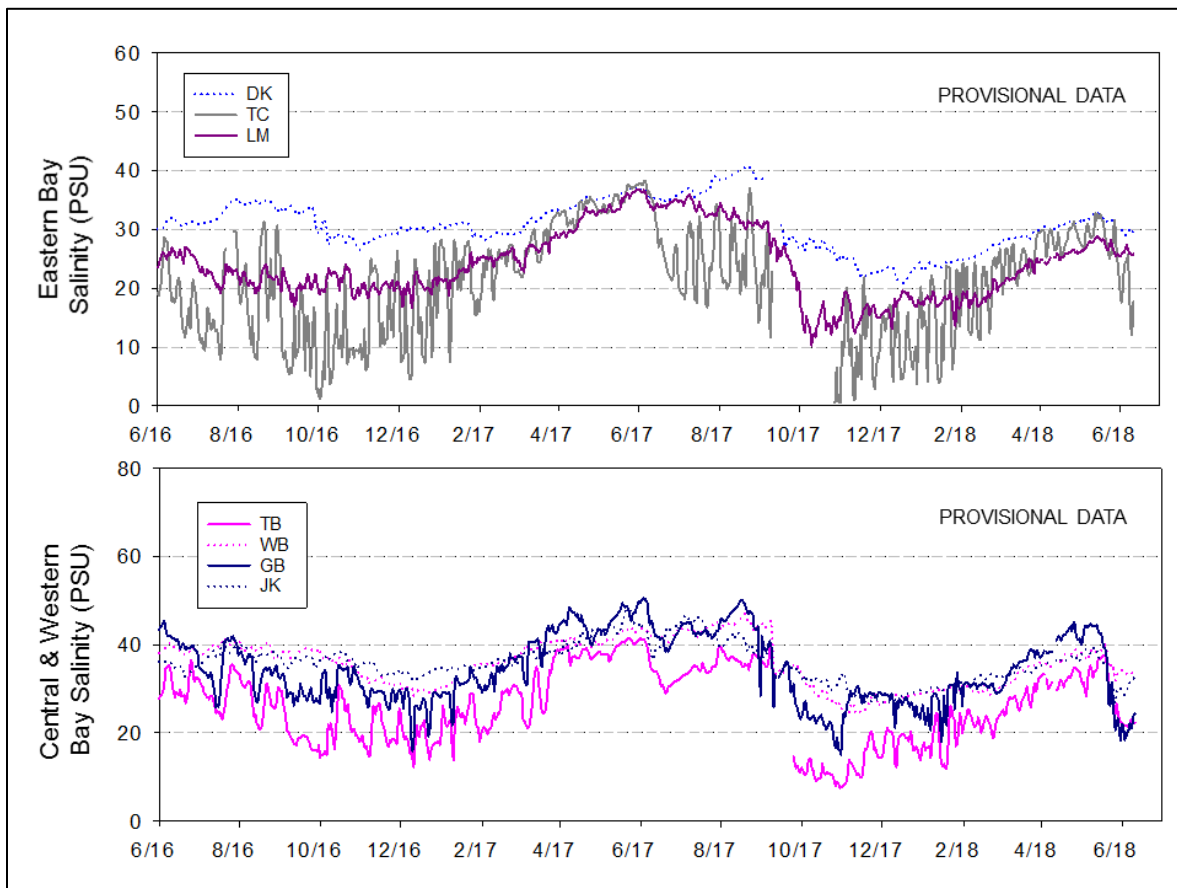
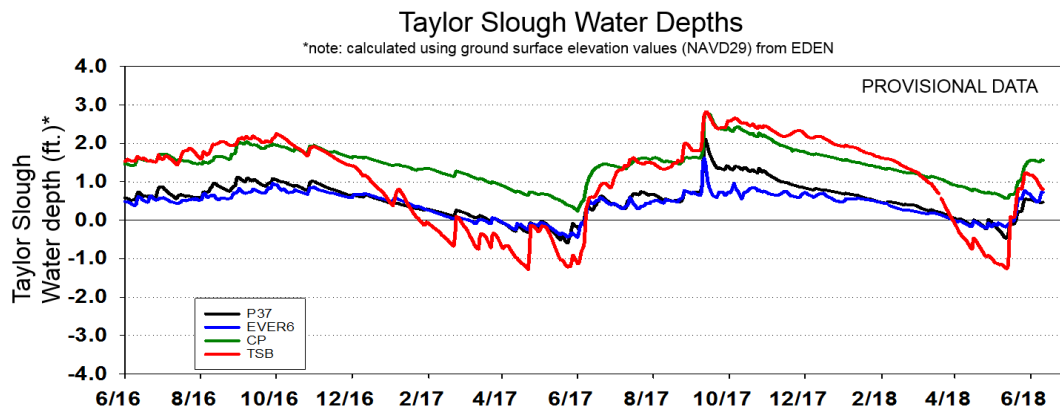
Dynamic Position Analysis for June



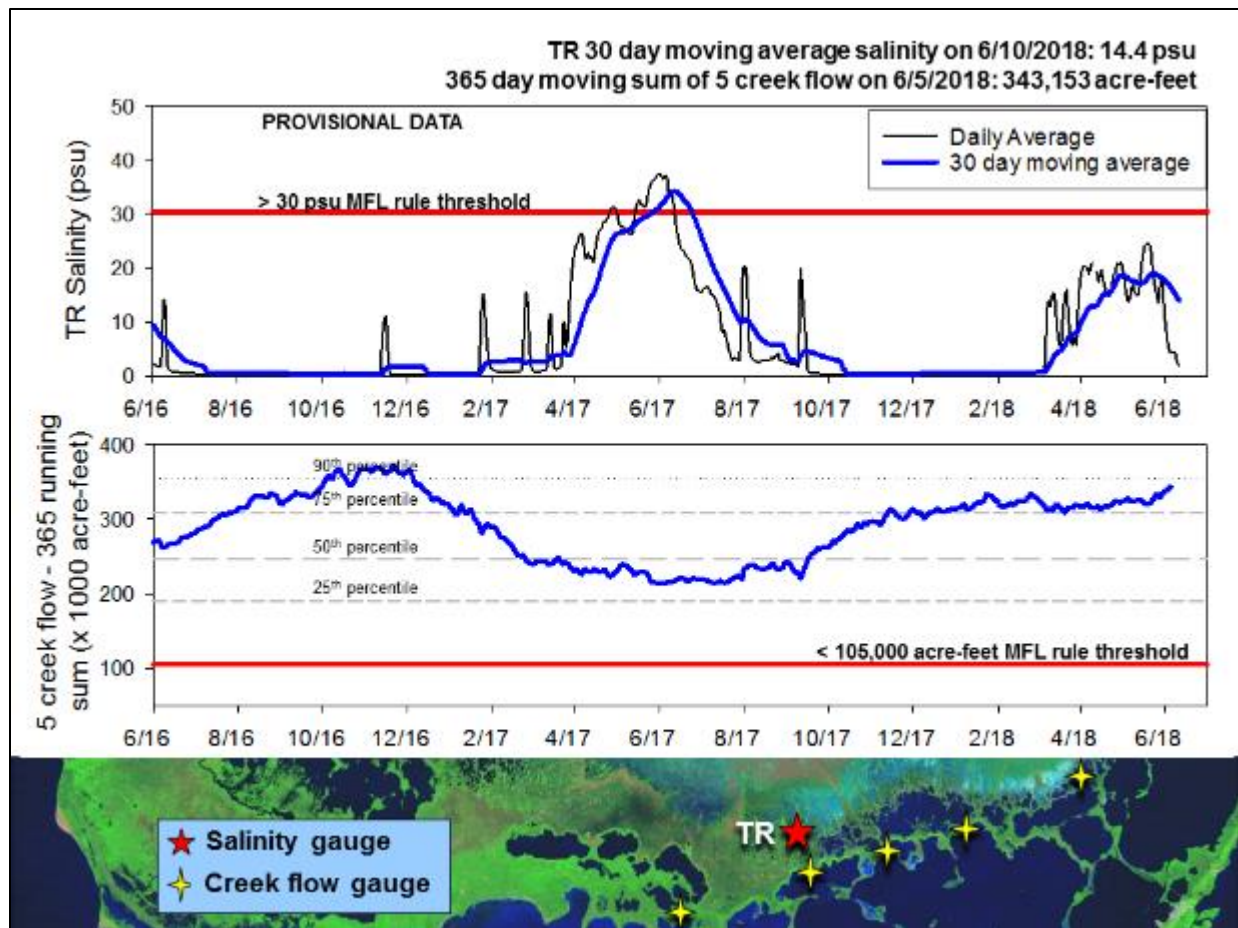
Taylor Slough Water Levels: An average of 1.1 inches of rain fell on Taylor Slough and Florida Bay with a maximum of 2.4 inches falling near EVER6 in the east. Stage changes this week ranged from -0.33 feet to $+0.17$ feet. Water depths are 6 to 9 inches above the historical averages (compared to 7 to 13 inches above average from last week).

Florida Bay Salinities: Salinities increased 0.3 psu on average in Florida Bay, with changes ranging from -6.0 psu to $+5.8$ psu. Salinities ranged from 13 psu in the northeast to 33 psu in the central bay. This range is 4 to 14 psu below the historical averages.





Florida Bay MFL: Mangrove zone daily average salinity decreased 4 psu this past week to end at 2 psu. The 30-day moving average decreased 3.3 psu this week to end at 14.4 psu. The eastern-most creek gauge had problems starting on 6/5/2018 so total creek flows for the five creeks are not available this week. The remaining 4 creeks all had positive flows for this entire week with a cumulative weekly flow total of 7,400 acre-feet.



Water Management Recommendations

As stages have risen quickly across the Everglades, inflows to northernmost WCA-3A create the least ecological stress when compared to flows to more southern WCA-3A or WCA-2A. Gauge 3-65 in southern WCA-3A nears the depth threshold for tree island flooding. WCA-2A is significantly over its regulation schedule, and predictions indicate a prolonged period of flooding in that basin is very likely. Incremental change in the rate of structural 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 rehydration rate is 0.25 feet or less per week (or 0.5 feet per 2 weeks). Due to elevated levels of phosphorus upstream of S-332, 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. More specific recommendations appear in the summary table below. The red text represents new or modified information or recommendations.

SFWMD Everglades Ecological Recommendations, June 12th, 2018 (red is new)

Area	Weekly change	Recommendation	Reasons
WCA-1	Stage change ranged from 0.00 to -0.39'	Maintain depths at regulation schedule. Manage for a rate of ascension less than +0.25' per week, or less than +0.5' per 2 weeks.	Protect upstream/downstream habitat and wildlife.
WCA-2A	Stage decreased by 0.13'	Maintain depths at 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 increased 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-3A NE	Stage increased by 0.34'	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-3A NW	Stage increased by 0.15'	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 increased by 0.27'	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.
Southern WCA-3A S	Stage increased by 0.17'		
WCA-3B	Stage change ranged from +0.01 to +0.32'	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.
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 -0.33' to +0.17'	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 -6.0 to +5.8 psu.	Move water southward as possible	When available, provide freshwater to maintain low salinity buffer and promote water movement.