

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: March 20, 2018

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

The forecast is for moderate showers and thunderstorms to the north today. A cold front currently over Florida's panhandle will push into the District this evening and then into the Florida Straits overnight. Scattered showers and thunderstorms out ahead of the front will move across central Florida this afternoon and evening and then activity will decrease in intensity as it moves through the southern half of the District overnight. Dry conditions should move in behind the front and then a dry reinforcing front will move through the area Thursday and continue the dry conditions through this coming weekend. In the extended forecast, there is the potential for a frontal system to bring some moderate to locally heavy showers and thunderstorms late next week or later.

Kissimmee

Tuesday morning stages were 56.6 feet NGVD (1.2 feet below schedule) in East Lake Toho, 53.6 feet NGVD (1.2 feet below schedule) in Toho, and 49.8 feet NGVD (1.2 feet below schedule) in Kissimmee-Cypress-Hatchineha; headwater stages were 46.6 feet NGVD at S65A and 25.8 feet NGVD at S65D. Mean recession rates for the last week were 0.12 and 0.13 feet per week in East Lake Toho and Toho, respectively (preferred range of 0.15-0.2 feet per week) and 0.13 feet per week in Kissimmee-Cypress-Hatchineha (preferred rate is to not exceed 0.2 feet per week). Tuesday morning discharges were: 380 cfs at S65, 241 cfs at S65A, and 0 cfs at S65E. Dissolved oxygen concentration in the Kissimmee River averaged 8.0 milligrams per liter (mg/L) for the week. Kissimmee River mean floodplain depth on Sunday was 0.06 feet.

Lake Okeechobee

Lake Okeechobee stage is 14.26 feet NGVD having decreased 0.23 feet over the past week and 0.85 feet over the last month. Lake stages have receded approximately 2.94 feet from the October 2017 peak following Hurricane Irma, but exceeded 15.0 feet NGVD for 161 days, the longest period since the winter of 2005/06. The high water and associated turbidity have had substantial impacts on the submerged aquatic and emergent vegetation coverage in the nearshore areas of the Lake, which would benefit from lower stages near the end of the 2018 dry season. Higher Lake stages in the summer are correlated with algal blooms on the Lake, and surface water total phosphorus (TP) concentrations remained elevated in February due to continued resuspension of sediments that were disturbed during Hurricane Irma. As a result, conditions will likely be favorable for algal blooms this spring and summer as turbidity declines and water temperatures rise.

Estuaries

Total inflow to the St. Lucie Estuary averaged 107 cfs over the past week with no flow coming from Lake Okeechobee. Salinity stayed about the same throughout the estuary. The seven-day average salinity at the US1 Bridge is in the good range for adult oysters. Average weekly dissolved oxygen levels at HR1 station in the North Fork were 5.19 mg/L near the surface and 4.17 mg/L near the bottom. The highest weekly ranges of chlorophyll a were 4.13 – 11.56 µg/L in the South Fork.

Total inflow to the Caloosahatchee Estuary averaged 675 cfs over the past week with 360 cfs coming from the Lake. Salinity stayed about the same throughout the estuary. The 30-day moving average surface salinity is 4.4 at Val I-75 and 11.4 at Ft. Myers. The 30-day moving average salinity at Val I-75 is forecast to be 4.9 in two weeks with no flow through S-79. Salinity conditions between Val I-75 and Ft. Myers are good for tape grass. Salinity conditions are in the good range for adult oysters at Cape Coral and Shell Point. Chlorophyll a concentrations were low to medium near Beautiful Island (7.49 – 17.06 µg/L), Ft. Myers (4.51 – 10.15 µg/L), and Shell Point (1.43 – 15.62 µg/L) over the last week. Dissolved oxygen levels at Beautiful Island were 6.25 – 9.02 mg/L, at Ft. Myers were 5.17 – 7.73 mg/L and at Shell Point were 5.02 – 6.18 mg/L.

Stormwater Treatment Areas

Over the past week, the STAs/FEBs received approximately 9,500 acre-feet of Lake releases. The total amount of Lake releases sent to the STAs/FEBs in WY2018 (since May 1, 2017) is approximately 97,600 acre-feet. Most STA cells are at or above target depths, except many of the STA-5/6 EAV cells which are below target. Operational restrictions are in place for vegetation rehabilitation in STA-1E and STA-2, and for construction related activities in STA-1W. This week, if 2008 LORS recommends Lake releases to the Water Conservation Areas (WCAs) and the conditions allow, releases will be sent to STA-2 Flow-way 1 and the A-1 FEB/STA-3/4 Western Flow-way.

Everglades

Recession rates across most of the Everglades are creating fair foraging conditions for wading birds, only slightly exceeding the target rate. There is little need for management of recession rate or depths in the WCAs, with the exception being northern WCA-3A. Maintaining open water conditions around the near record number of wading birds nesting at the Alley North colony is important to protect those nests from terrestrial predators. Overdrying in this part of the system also puts the peat soils at risk and increases the likelihood of damaging wild fires. Stages in Taylor Slough and the Everglades National Park panhandle decreased over the past week with the most rapid recession in the northern part of Taylor Slough. Water depths range from 1 to 14 inches above the historical averages with the highest divergence in northern Taylor Slough. In Florida Bay, salinities decreased this week, ranging from 2 psu below the historical average in the central and west to 2 psu above in the east.

Supporting Information

KESSIMMEE BASIN

Kissimmee Basin Rainfall

The Upper Kissimmee Basin received 0.07 inches of rainfall in the past week and the Lower Basin received 0.03 inches (SFWMD Daily Rainfall Report 3/19/2018).

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: 3/20/2018

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)						
							3/18/18	3/11/18	3/4/18	2/25/18	2/18/18	2/11/18	2/4/18
Lakes Hart and Mary Jane	S62	0	LKMJ	60.5	R	61.0	-0.5	-0.4	-0.3	-0.2	-0.1	0.1	0.0
Lakes Myrtle, Preston, and Joel	S57	0	S57	60.7	R	60.8	-0.1	-0.1	-0.1	-0.1	0.0	0.0	0.1
Alligator Chain	S60	0	ALLI	63.5	R	64.0	-0.5	-0.4	-0.3	-0.2	-0.1	0.0	-0.1
Lake Gentry	S63	0	LKGT	61.2	R	61.5	-0.3	-0.2	-0.1	0.0	0.0	0.0	0.1
East Lake Toho	S59	24	TOHOE	56.7	R	57.9	-1.2	-1.2	-1.1	-0.9	-0.7	-0.6	-0.4
Lake Toho	S61	96	TOHOW, S61	53.7	R	54.9	-1.2	-1.2	-1.1	-1.0	-0.8	-0.6	-0.4
Lakes Kissimmee, Cypress, and Hatchineha	S65	400	KUB011, LKIS5B	49.8	R	51.0	-1.2	-1.1	-0.8	-0.9	-1.0	-1.3	-1.7

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: 3/20/2018

Metric	Location	1-Day Average		Average for the Preceding 7-Days ¹								
		3/18/2018	3/18/18	3/11/18	3/4/18	2/25/18	2/18/18	2/11/18	2/4/18	1/28/18	1/21/18	1/14/18
Discharge (cfs)	S-65	382	400	461	715	968	1,000	810	785	583	572	567
Discharge (cfs)	S-65A	242	258	319	539	764	796	647	625	468	506	446
Discharge (cfs)	S-65D ²	242	343	430	730	1,047	1,018	940	857	656	692	764
Stage (feet NGVD)	S-65D ²	25.72	25.66	25.73	25.67	25.79	25.87	25.80	25.82	25.76	25.72	25.85
Discharge (cfs)	S-65E ²	242	317	441	733	1,088	1,059	978	899	712	730	837
Discharge (cfs)	S-67	0	0	0	0	133	389	350	346	241	97	404
DO (mg/L) ³	Phase I river channel	N/A	8.0	7.2	6.0	6.0	6.2	7.8	8.7	9.7	9.5	8.8
Mean depth (feet) ⁴	Phase I floodplain	0.06	0.07	0.09	0.14	0.19	0.22	0.23	0.26	0.19	0.21	0.24

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

² S-65D discharge combines discharge at S-65D, S-65DX1, and S-65DX2; S-65D stage averages stage at S65D and S65DX1; S65E discharge combines S65E and S65EX1.

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

⁴ 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)

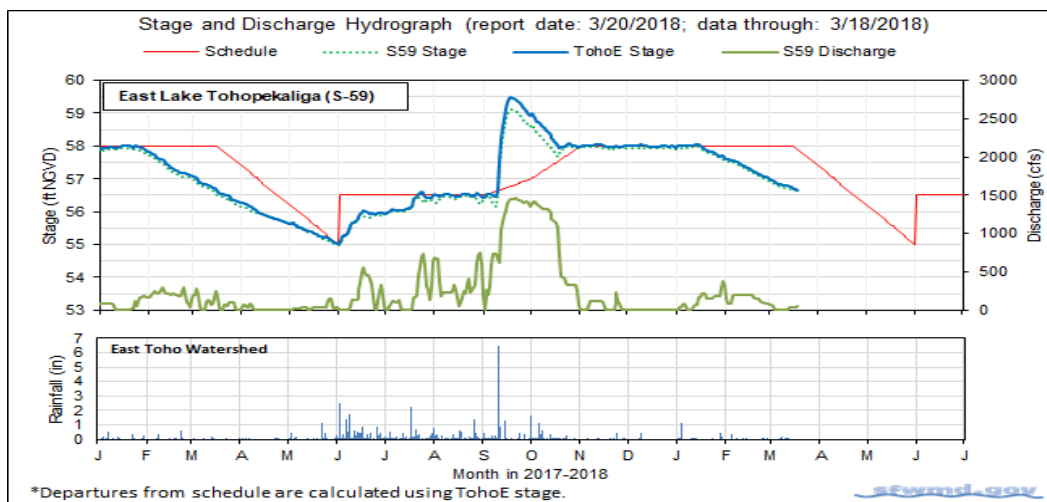


Figure 1.

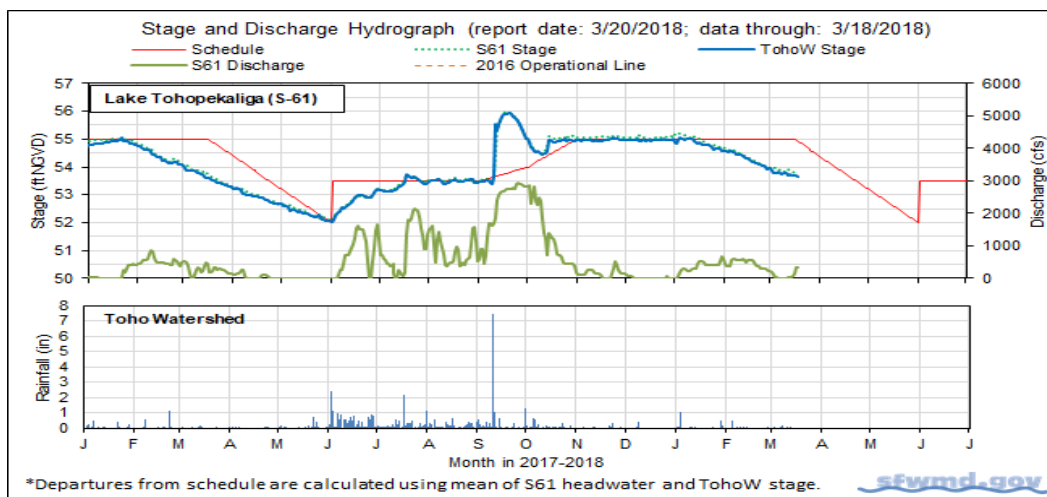


Figure 2.

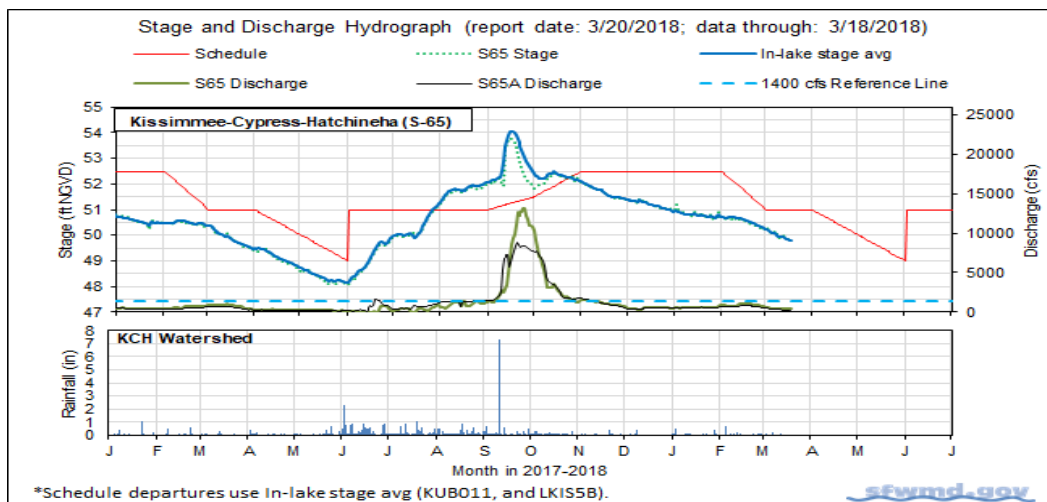


Figure 3.

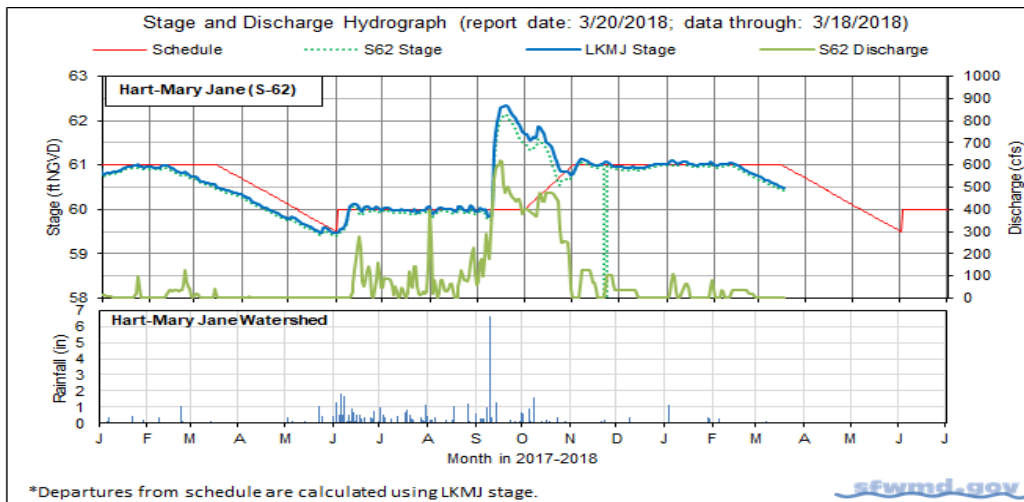


Figure 4.

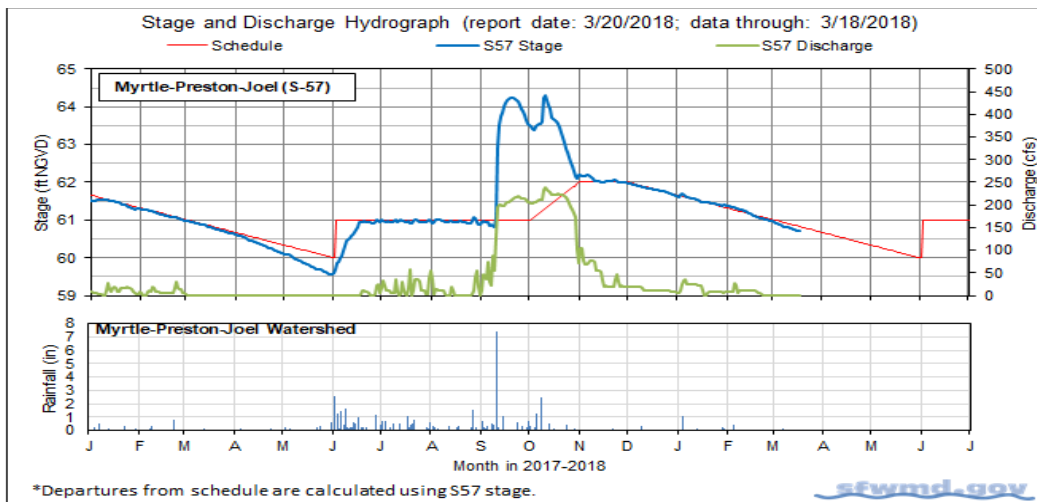


Figure 5.

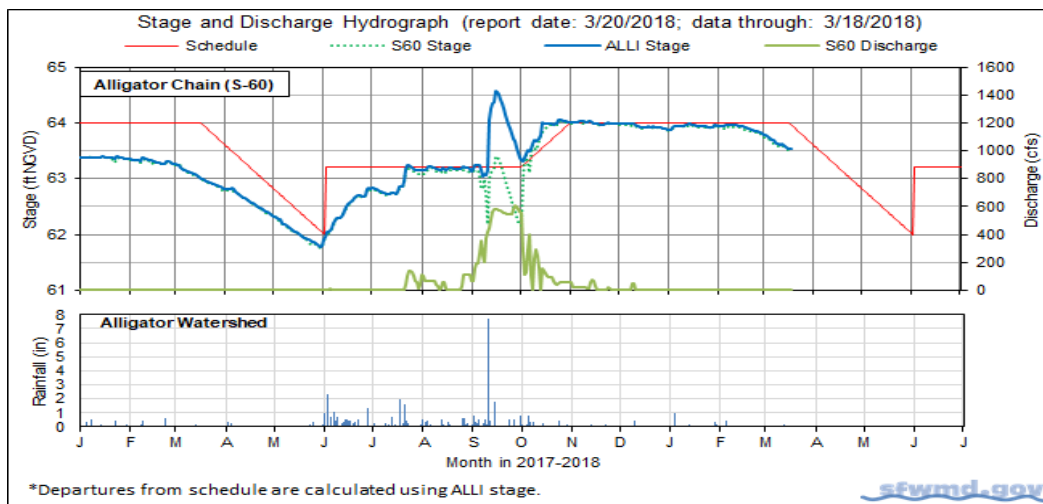


Figure 6.

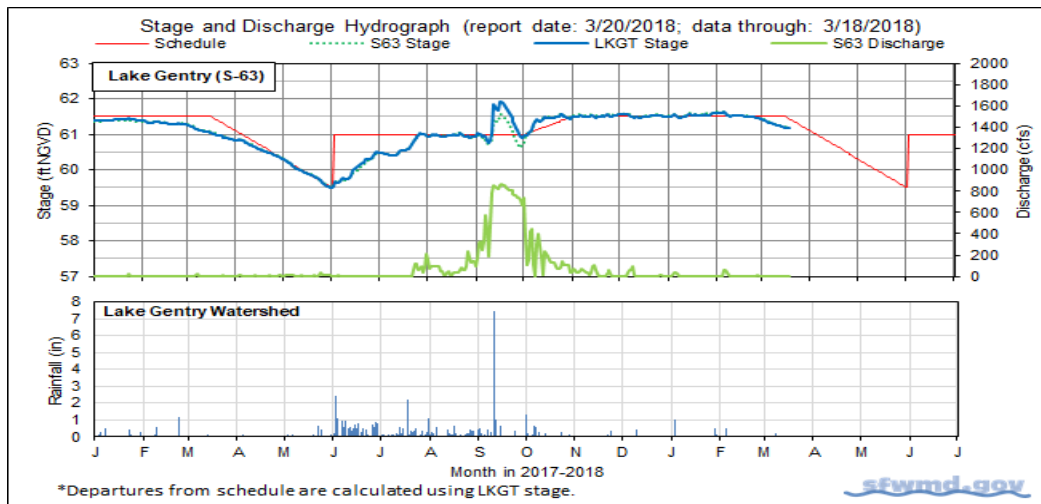


Figure 7.

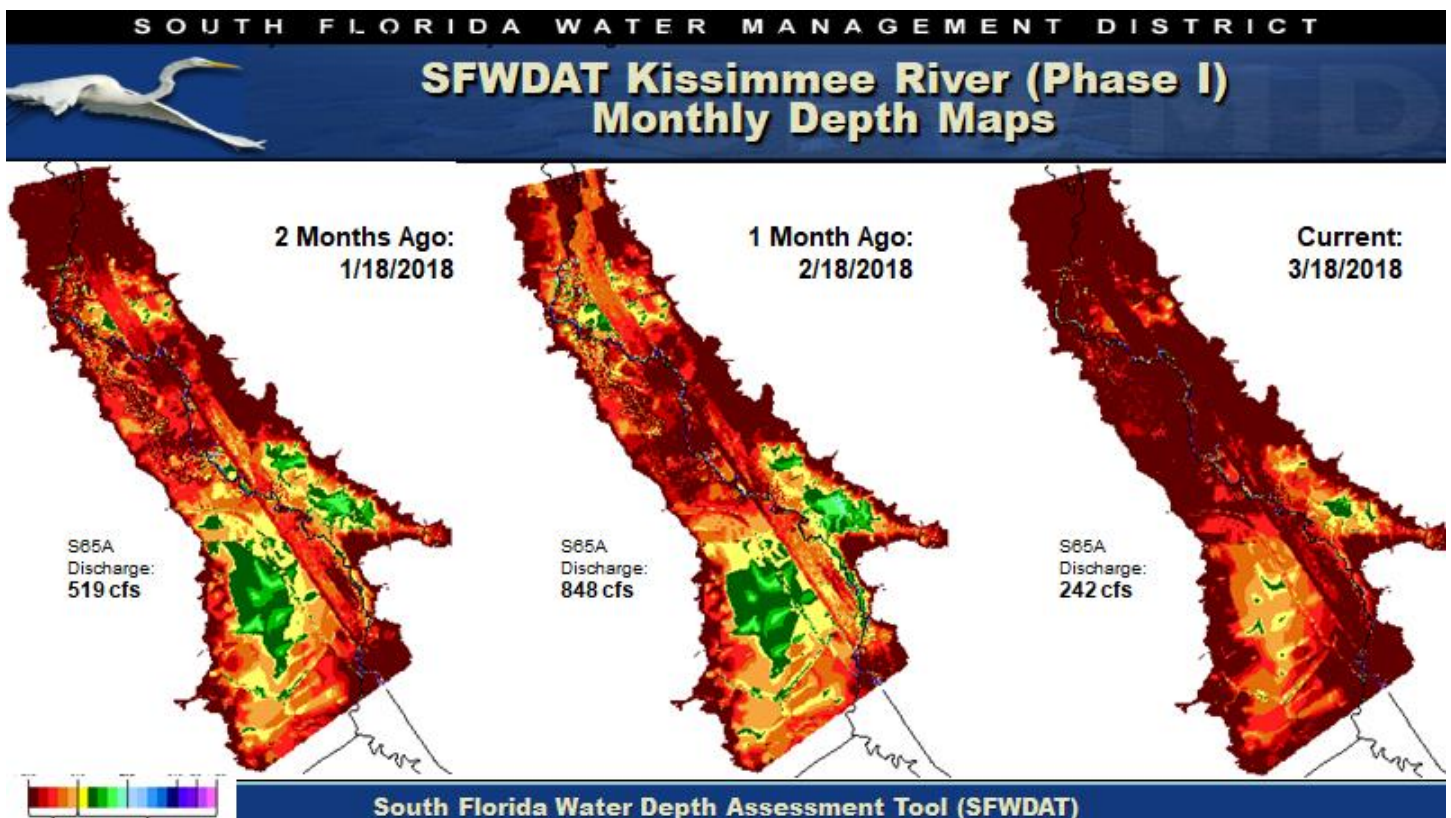


Figure 8. Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to January 16, 2012.

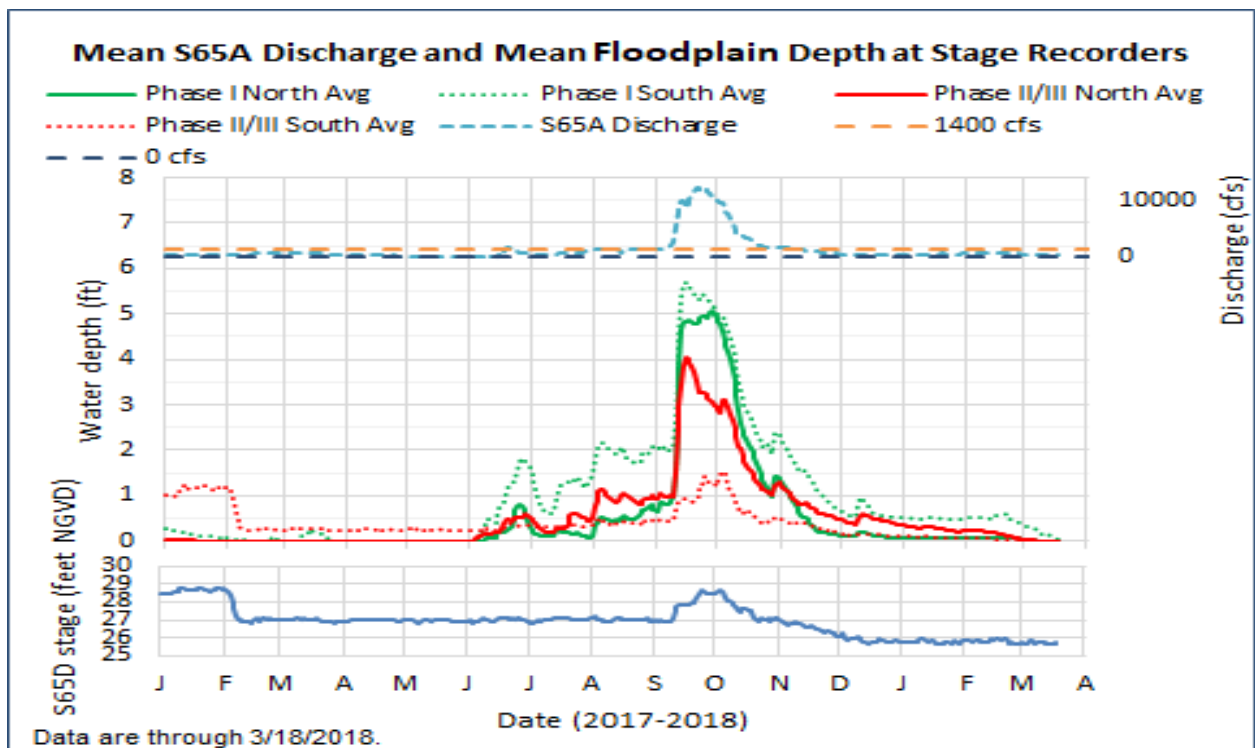
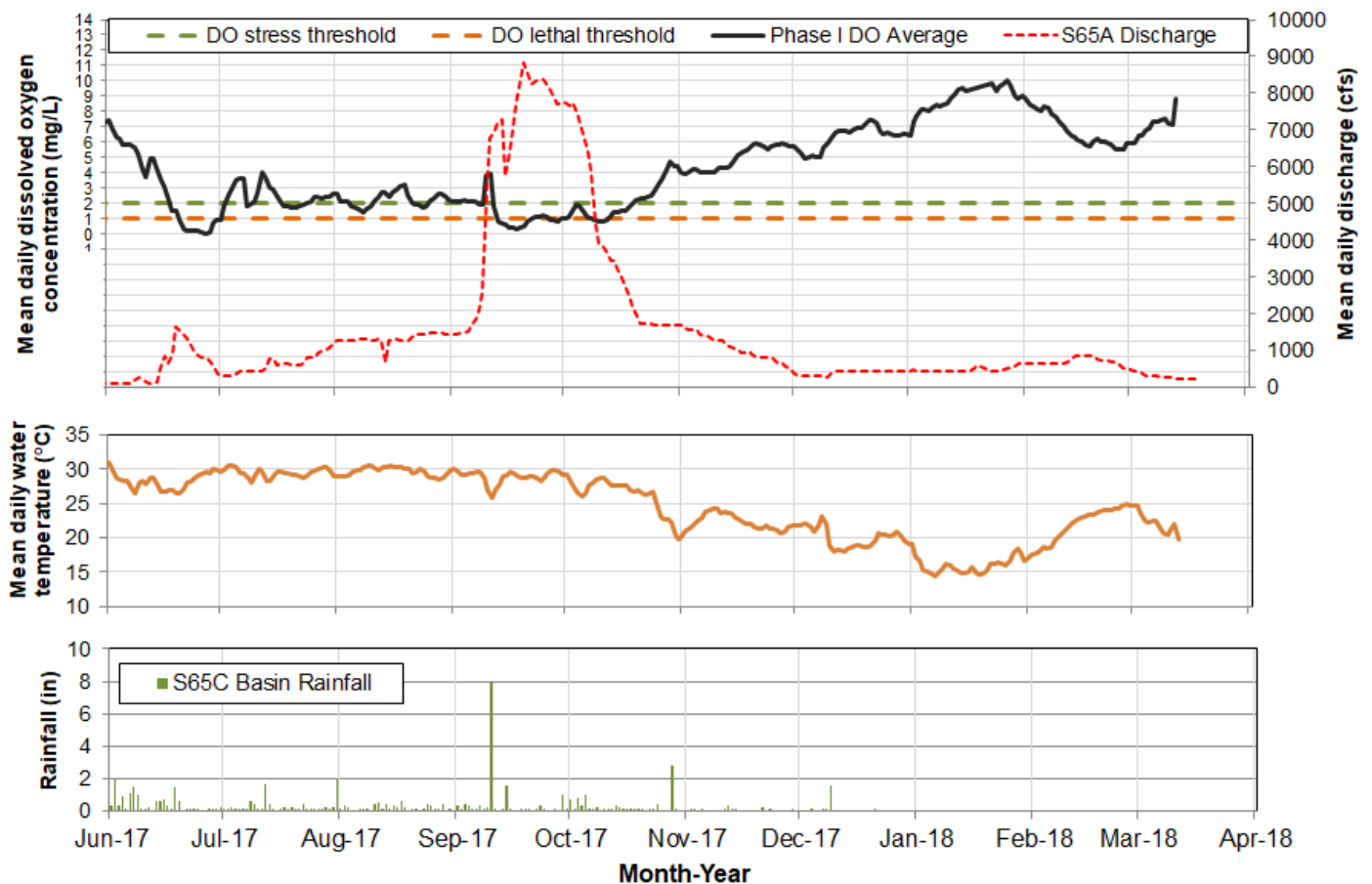


Figure 9. Mean water depth at stage recorders in the northern Phase I, southern Phase I, northern Phase II/III, and southern Phase II/III areas in relation to the S65A discharge and S65D headwater stage.



Report Date: 3/20/2018; data are through: 3/18/2018.

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

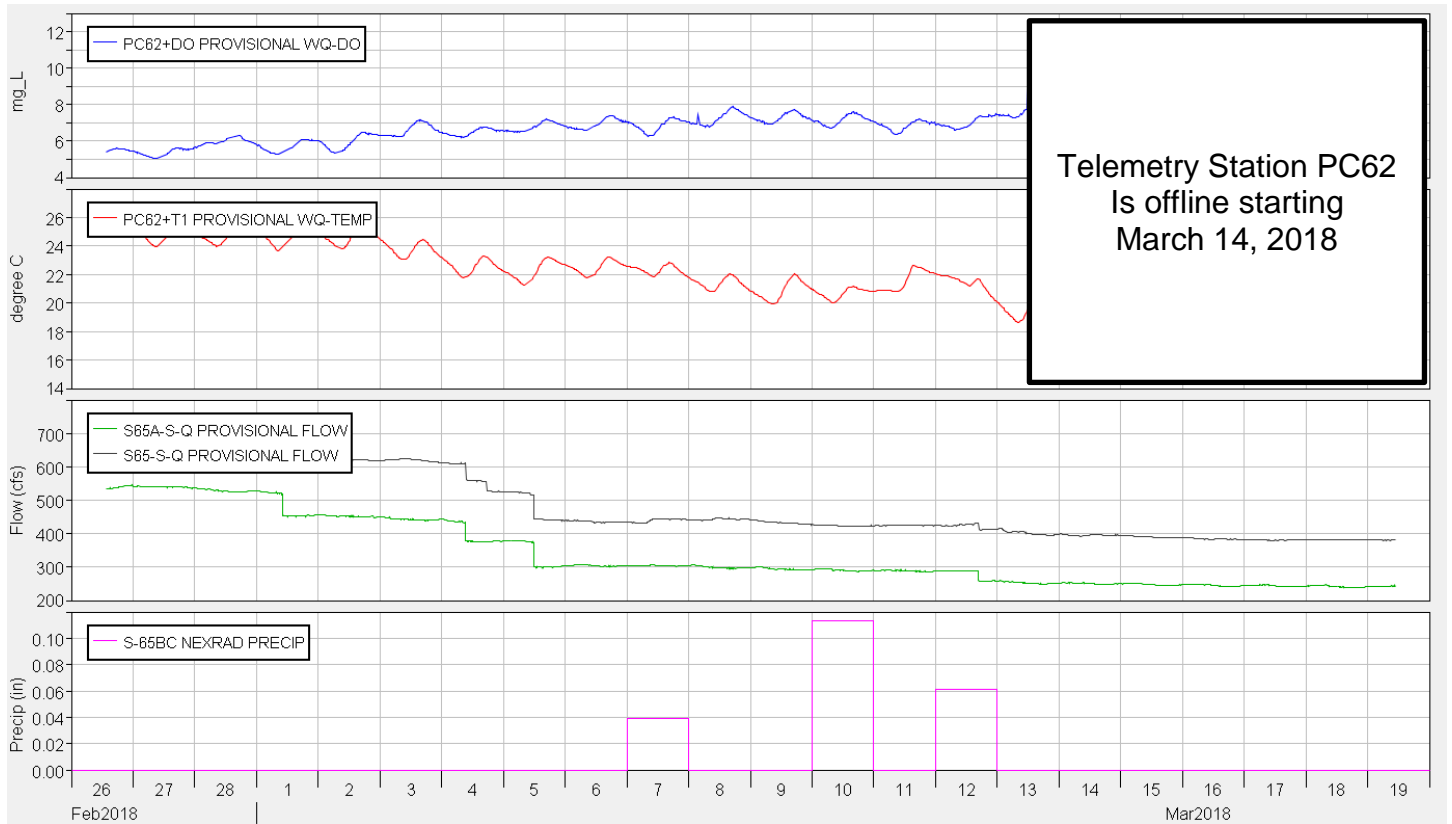


Figure 11. Phase I river channel dissolved oxygen and water temperature (measured at 15 minute intervals) and Pool BC daily rainfall.

Water Management Recommendations

Kissimmee Basin Adaptive Recommendations and Operational Actions

Date	Recommendation	Purpose	Outcome	Source
3/20/2018	No new recommendations.		N/A	
3/13/2018	No new recommendations.		N/A	
3/6/2018	No new recommendations.		N/A	
2/27/2018	No new recommendations.		N/A	
2/20/2018	No new recommendations.		N/A	
2/13/2018	No new recommendations.		N/A	
2/6/2018	No new recommendations.		N/A	
1/30/2018	No new recommendations.		N/A	
1/23/2018	No new recommendations.		N/A	
1/16/2018	No new recommendations.		N/A	
1/9/2018	No new recommendations.		N/A	
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	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	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
12/12/2017	No new recommendations.		N/A	
12/5/2017	No new recommendations.		N/A	
11/28/2017	No new recommendations.		N/A	
11/21/2017	No new recommendations.		N/A	
11/13/2017	No new recommendations.		N/A	
11/1/2017	No new recommendations.		N/A	
10/24/2017	No new recommendations.		N/A	
10/17/2017	No new recommendations.		N/A	
10/10/2017	No new recommendations.		N/A	
10/3/2017	No new recommendations.		N/A	
9/25/2017	No new recommendations.		N/A	
9/19/2017	No new recommendations.		N/A	
9/5/2017	No new recommendations.		N/A	
8/29/2017	No new recommendations.		N/A	
8/22/2017	No new recommendations.		N/A	

S65/S65A Limits on Rate of Change in Discharge

Discharge Rate of Change Limits for S65/S65A (revised 11/16/16).	
Q (cfs)	Maximum rate of increase or decrease (cfs/day)
300-650	75
650-1700	150
1700-3000	300
>3000	1000

Figure 12. Limits on rate of discharge change at S65/S65A starting with the 2016-2017 Dry Season.

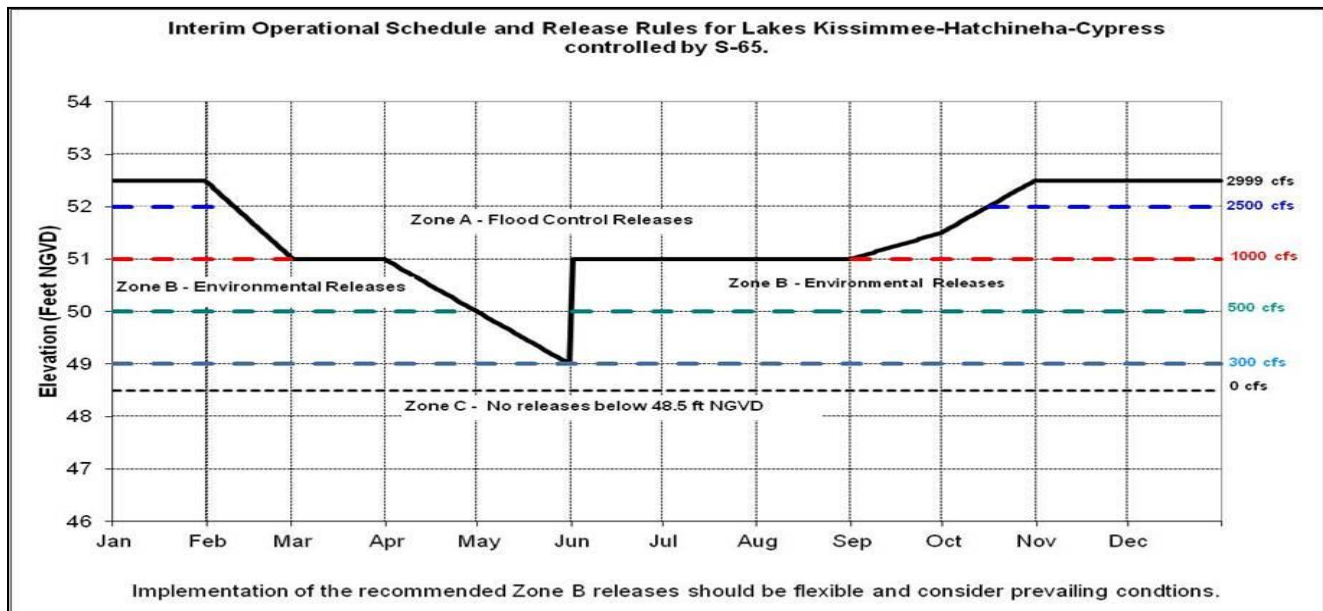


Figure 13. Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years.



Figure 14. The Kissimmee Basin.

LAKE OKEECHOBEE

According to the USACE web site, Lake Okeechobee stage is at 14.26 feet NGVD for the period ending at midnight on March 19, 2018. This value is based on the use of four interior Lake stations (L001, L005, L006 and LZ40) and four perimeter stations (S308, S352, S4 and S133). The Lake is now 0.85 feet lower than it was a month ago, 2.94 feet lower than its peak in mid-October 2017, but still 1.41 feet higher than a year ago (Figure 1). The Lake is now in the Low sub-band (Figure 2). According to RAINDAR, no rain fell over the Lake during the week March 13, 2018 – March 19, 2018 with most of the watershed experiencing similar conditions (Figure 3).

Average daily inflows to the Lake decreased from 493 cfs last week to 363 cfs this week, primarily through reductions in rainfall and Kissimmee River flows. 317 average daily cfs came from the Kissimmee River via the S65E structures this week, compared to 427 the previous week. The S71 and S72 structures and Fisheating Creek contributed a combined 46 average daily cfs as well.

Average daily outflows for the Lake decreased slightly from the previous week, going from 3,755 cfs to 3,303 cfs, primarily through decreases in all discharges except the L8 canal via Culvert 10A. S77 discharges decreased from 622 cfs the previous week to 445 cfs this past week, while the S308 structure went from 118 cfs the previous week to 15 average daily cfs this past week. Discharges south through the S350 structures decreased from an average of 2,740 cfs the previous week to 2,563 cfs this past week, and discharges to the L8 canal via Culvert 10A this week increased from an average of 275 cfs the previous week to 280 cfs this past week. The corrected evapotranspiration value for the week based on the L006 weather platform solar radiation data was 0.17 inches.

Total Lake inflows and outflows for the last 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.

Based on the Lake Okeechobee wading bird habitat suitability index, there was a slight decrease in habitats with suitable foraging depths for long-legged wading birds from the previous week, as the Lake stage is now lower than the peak available habitat. There were approximately 54,649 acres of suitable foraging depths for long-legged wading birds the previous week, compared to 51,647 acres this past week. However, there was a slight increase in suitable foraging depths for short or long-legged wading birds, going from 24,403 acres the previous week to 26,550 acres this past week (Figure 5).

A helicopter survey of foraging wading bird flocks on March 15, 2018 found approximately 7,118 individuals, which was a slight decrease from nearly 9,500 in early January (Figure 6). These reductions correspond with a considerably slower recession rate in early-mid February which may have affected wading bird presence through lower prey concentrations. However, four of the last five surveys have been similar to those in 2017, despite deeper water levels and roughly half the available foraging habitat for short-legged wading birds. If conditions are supportive of nesting, more foraging wading birds should be observed in the next few surveys.

The most recent satellite imagery using the cyanobacteria monitoring product derived from NOAA's OLCI satellite sensor showed cyanobacterial bloom potential has remained very low over the past five months, although there are now a few spots along the shore where the potential is moderate. The last potential for elevated cyanobacterial levels was in the northern portion of the Lake in early September 2017 (Figure 7).

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

INFLOWS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)
S65E & S65EX1	317	0.1
S71 & 72	36	0.0
S84 & 84X	0	0.0
Fisheating Creek	10	0.0
S154	0	0.0
S191	0	0.0
S133 P	0	0.0
S127 P	0	0.0
S129 P	0	0.0
S131 P	0	0.0
S135 P	0	0.0
S2 P	0	0.0
S3 P	0	0.0
S4 P	0	0.0
C5	0	0.0
Rainfall	0	0.0
Total	363	0.1

OUTFLOWS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)
S77	445	0.2
S308	15	0.0
S351	1075	0.4
S352	707	0.3
S354	781	0.3
L8	280	0.1
ET	3252	1.3
Total	6555	2.6

PROVISIONAL DATA

Water Management Recommendations

The Lake stage is 14.26 feet NGVD having decreased 0.23 feet from the week prior and 0.85 feet over the past month. Lake stages have been >16.0 feet NGVD three times in 2016 and 2017, exceeded 15.5 feet NGVD for 105 consecutive days this water year, and were >15.0 feet NGVD for 161 consecutive days. The high water and associated turbidity have had substantial impacts on the submerged aquatic and emergent vegetation coverage in the nearshore areas of the Lake, which would benefit from lower stages near the end of the 2018 dry season. Higher Lake stages in the summer are also correlated with algal blooms on the Lake, and surface water TP concentrations remained elevated in February due to continued resuspension of sediments that were disturbed during Hurricane Irma. Lower Lake stages near the end of WY2018 would help to mitigate impacts to nearshore vegetation communities and potentially reduce algal bloom severity and duration. Long, steady recessions of water levels throughout the dry season may help promote another productive year for wading birds on the Lake as well.

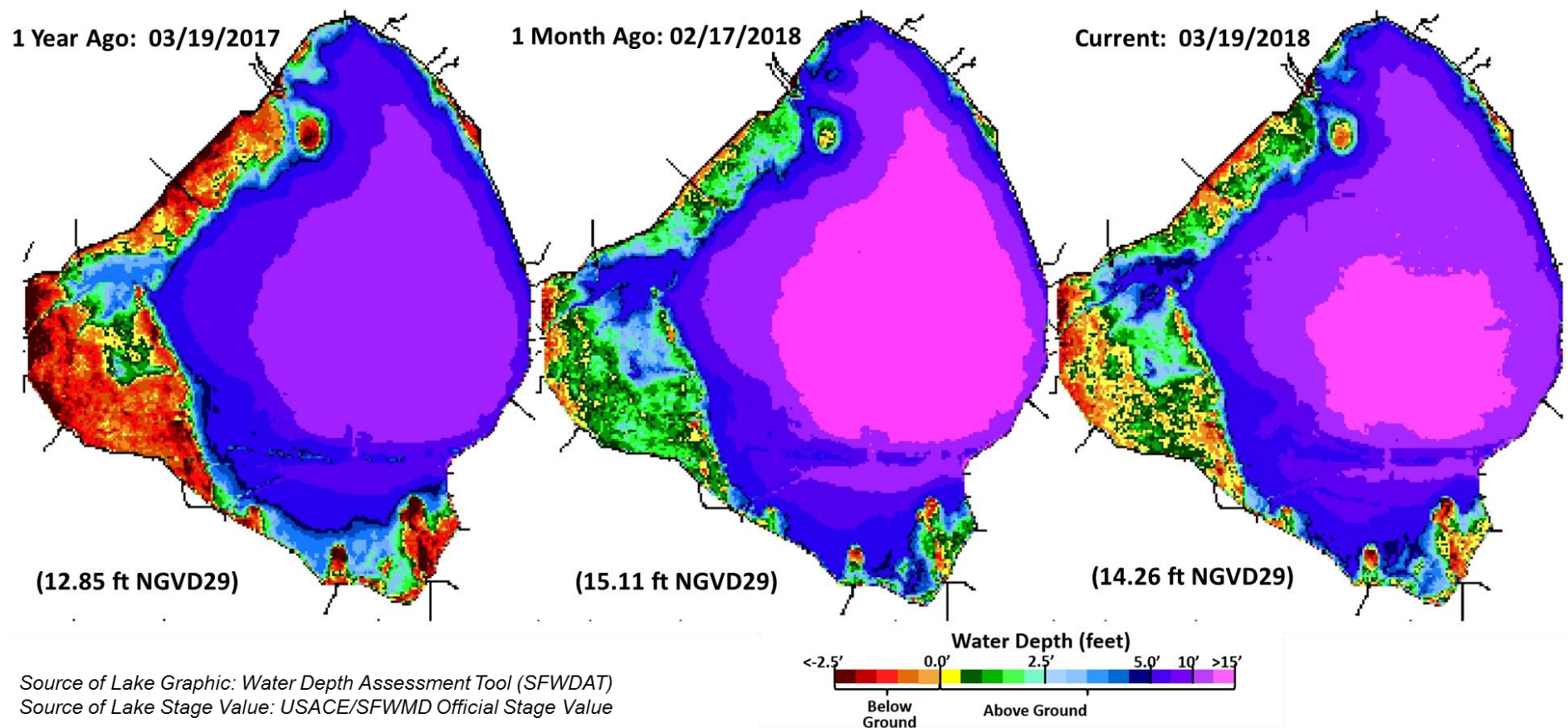


Figure 1. Water depth estimates on Lake Okeechobee based on the South Florida Water Depth Assessment Tool.

Lake Okeechobee Water Level History and Projected Stages

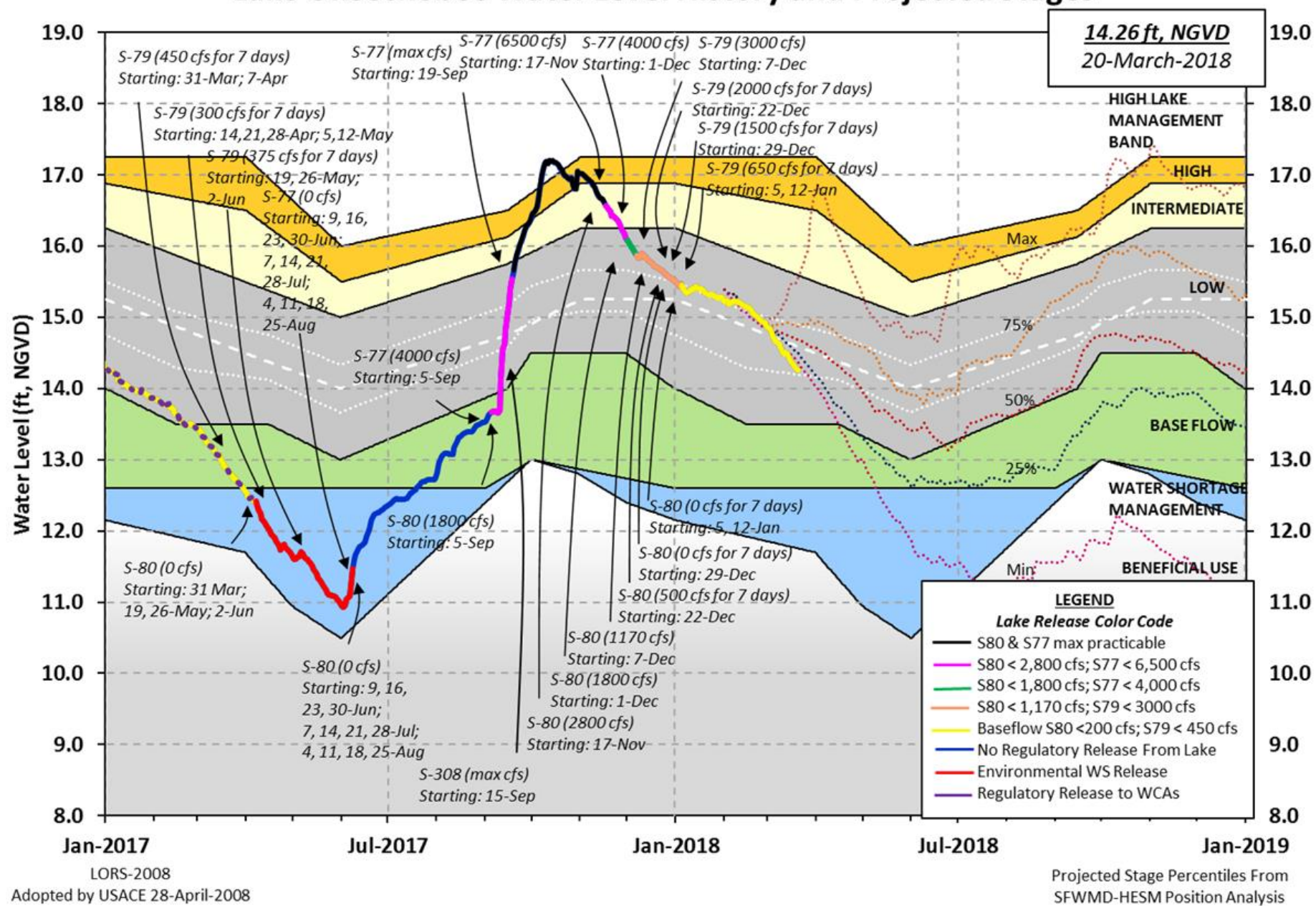


Figure 2. Recent Lake Okeechobee stage and releases, with projected stages based on a dynamic position analysis.

SFWMD PROVISIONAL RAINDAR 7-DAY BASIN RAINFALL ESTIMATES

FROM: 0515 EST, 03/13/2018 THROUGH: 0515 EST, 03/20/2018

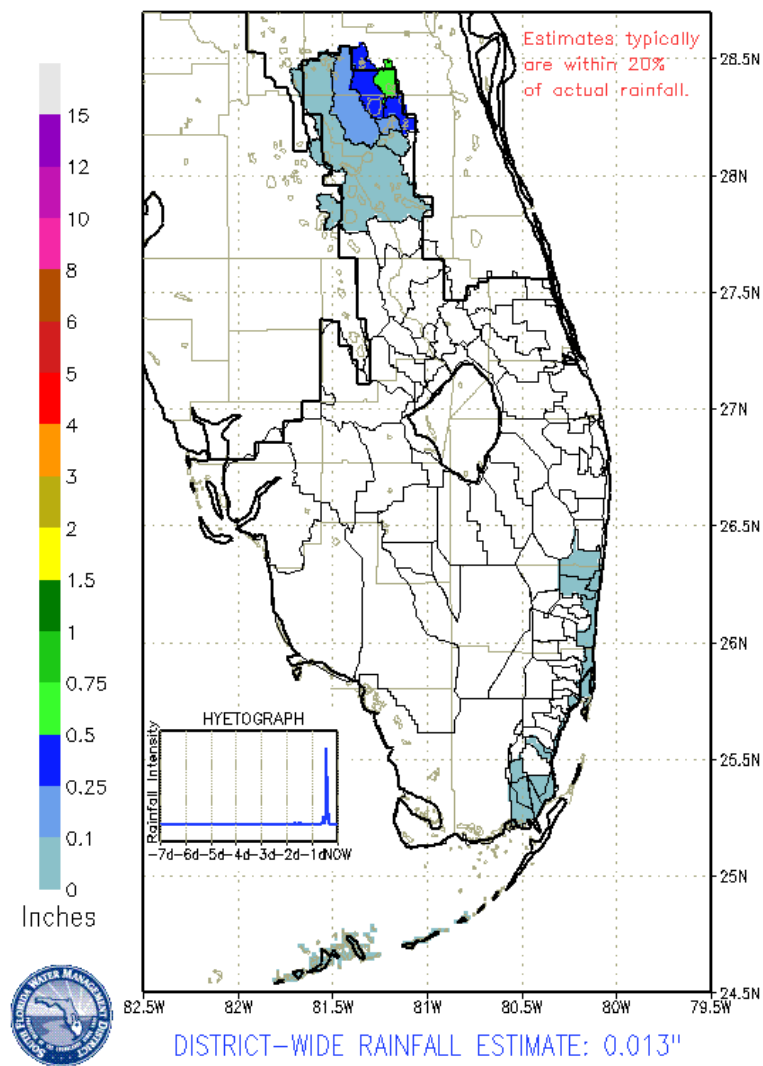
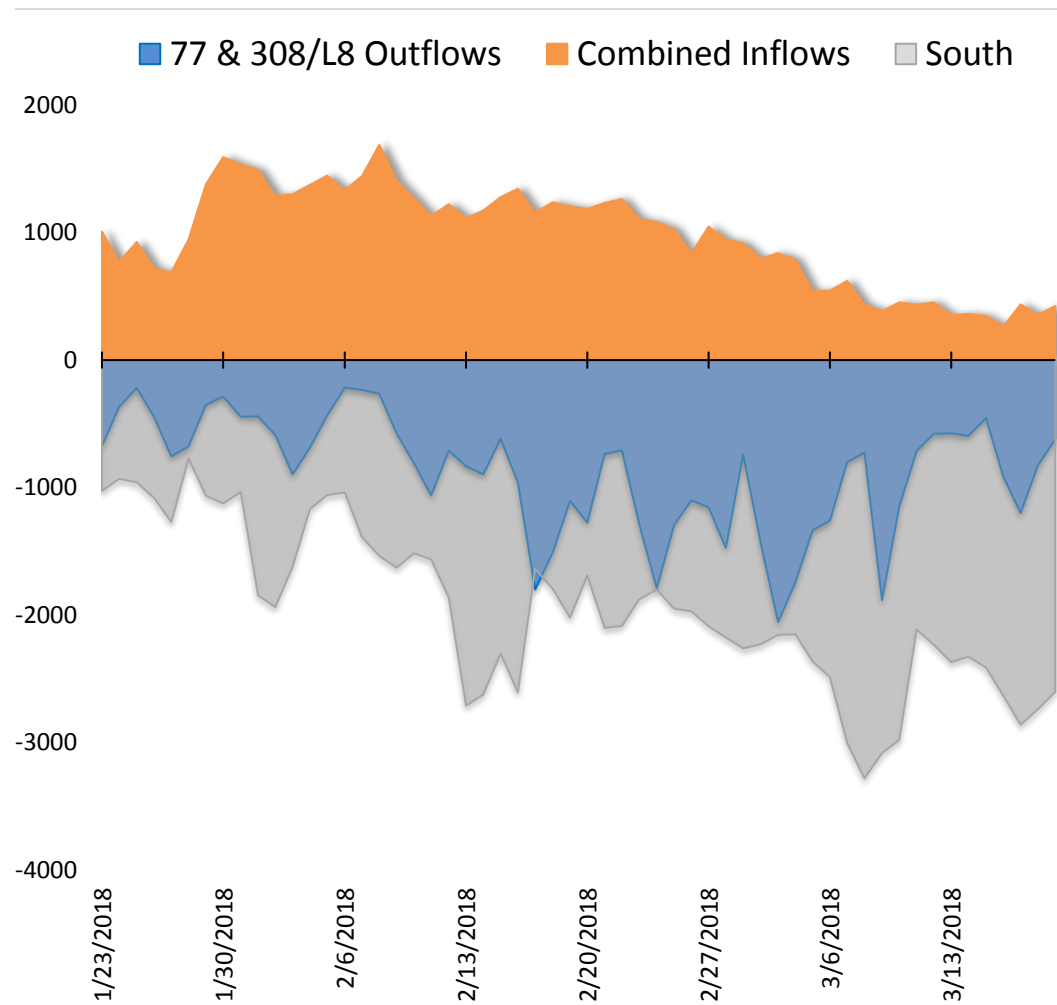
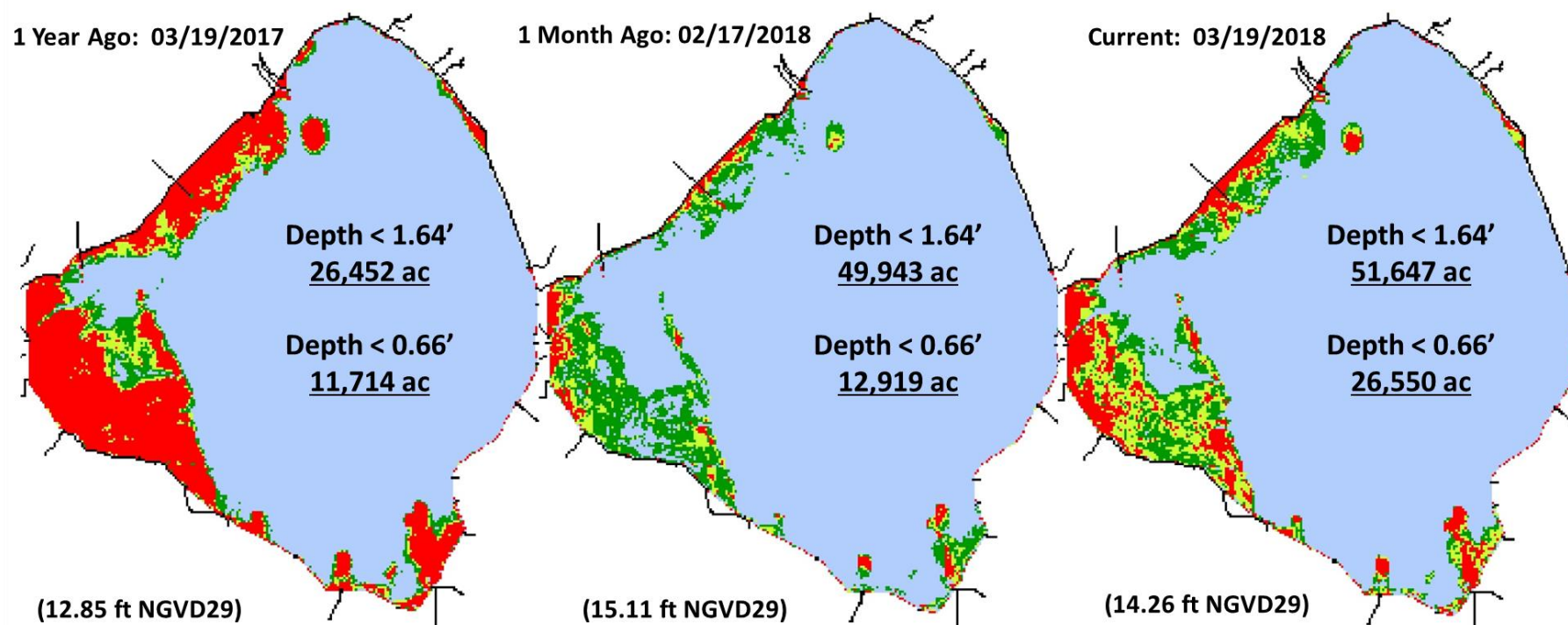


Figure 3. Rainfall estimates by basin.



PROVISIONAL DATA

Figure 4. Major inflows and outflows of Lake Okeechobee, including the S350 structures designated as South. Inflows and outflows are shown as positive and negative, respectively, for visual purposes.



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

Short and Long-legged (0.00' – 0.66')

Figure 5. Wading bird habitat suitability index for Lake Okeechobee based on the South Florida Water Depth Assessment Tool.

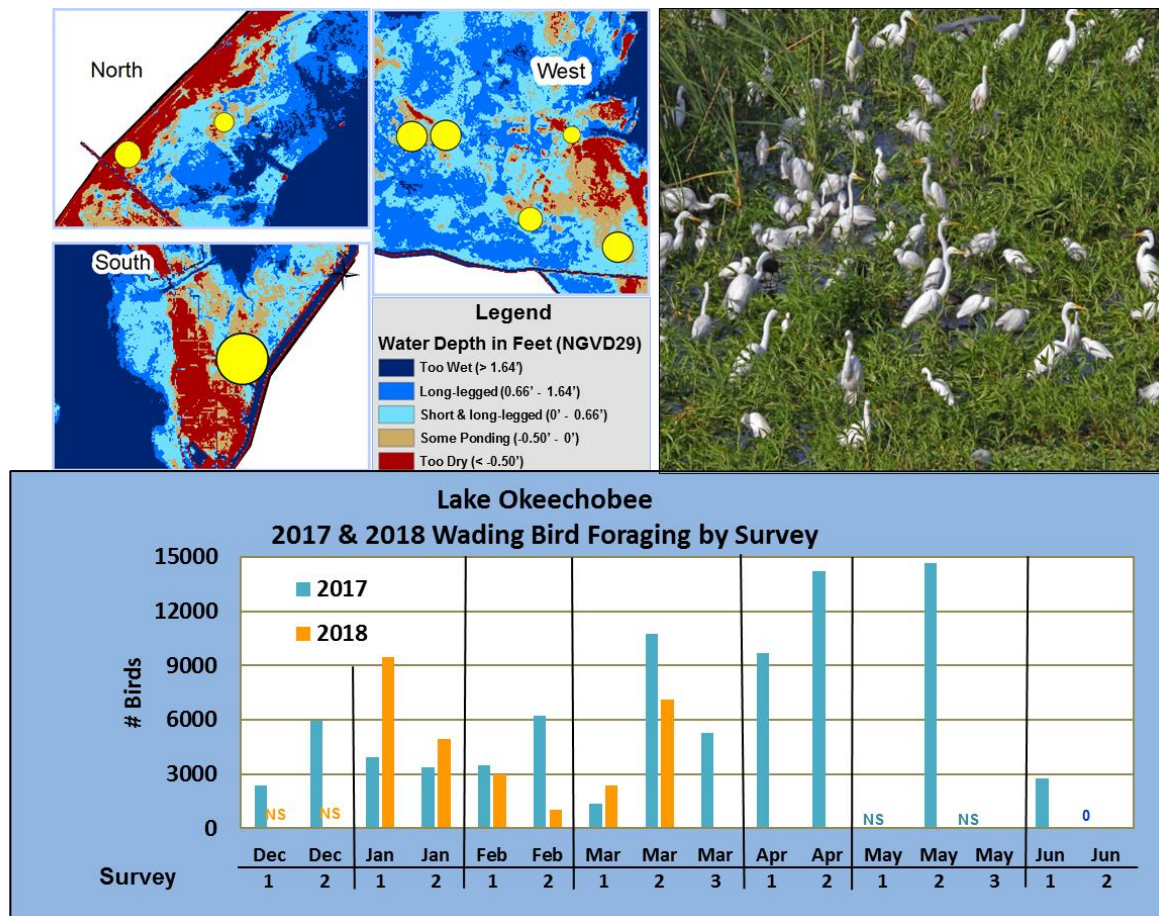
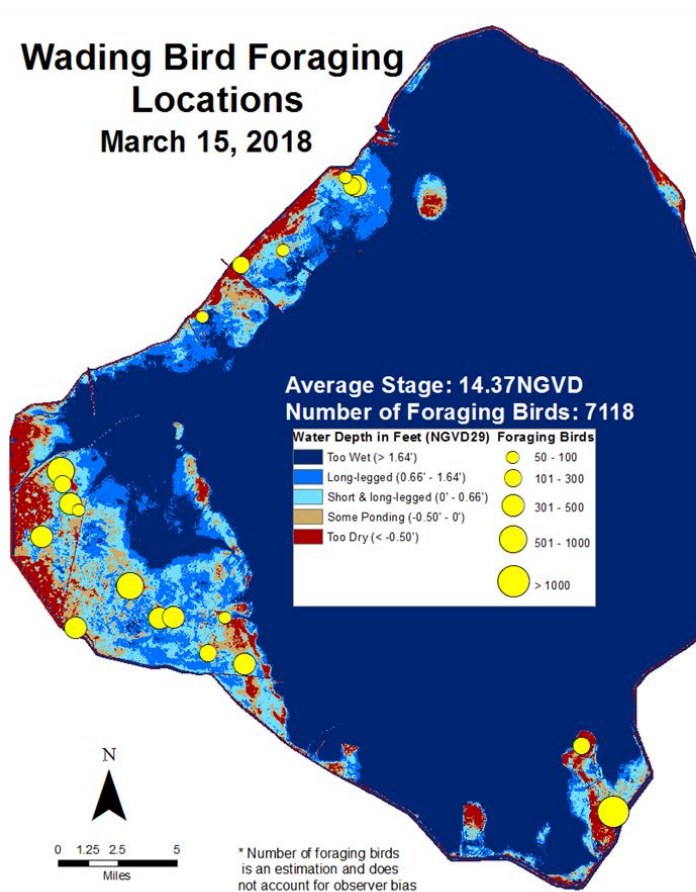


Figure 6. Wading bird foraging locations on March 15, 2018, and numbers per survey from Dec 2017 through Mar 15, 2018.

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

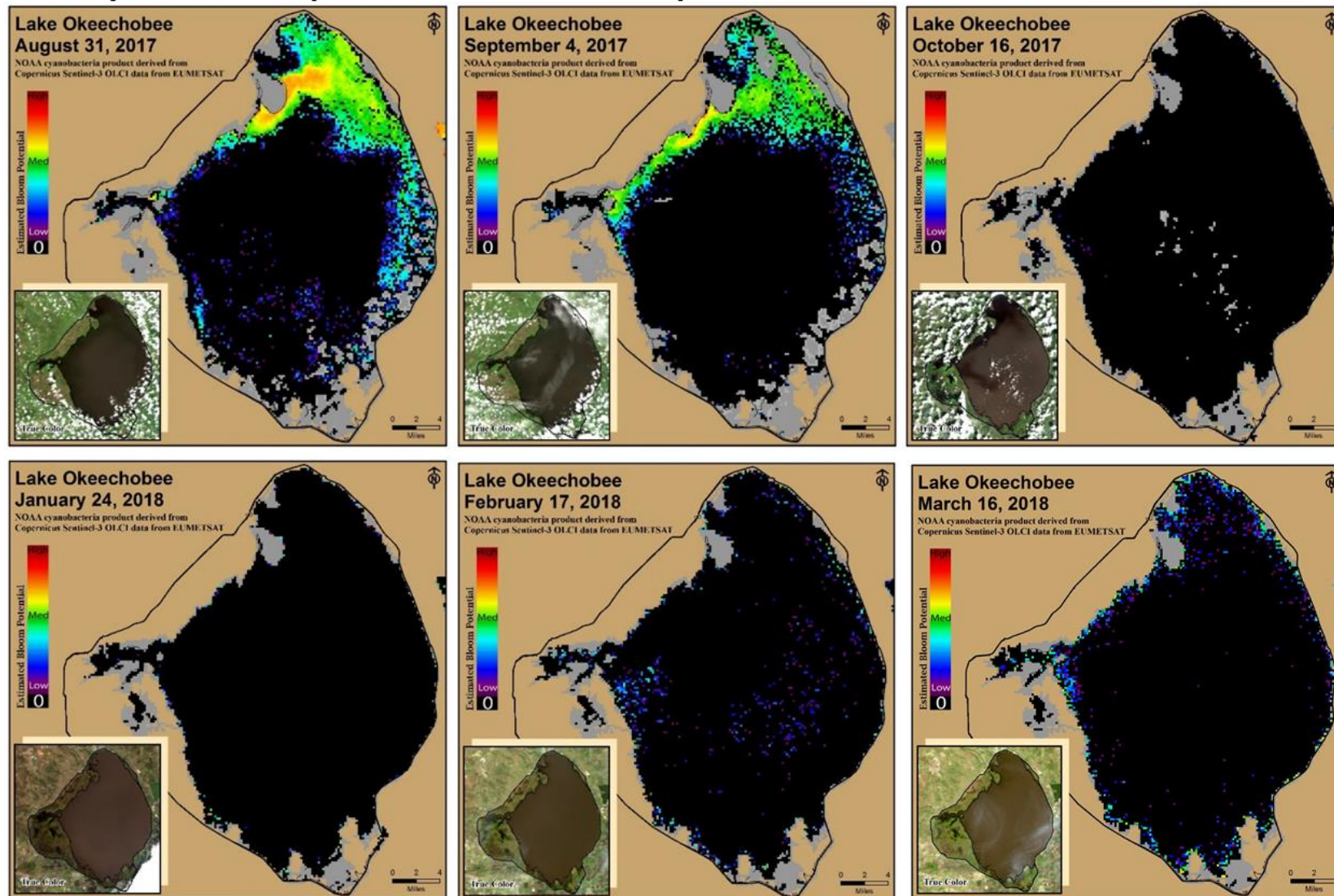


Figure 7. Potential for cyanobacterial blooms on Lake Okeechobee based on NOAA's harmful algal bloom monitoring system derived from Copernicus Sentinel-3 OLCI data from EUMETSAT.

LAKE ISTOKPOGA

Lake Istokpoga stage is 39.10 feet NGVD as of midnight March 19, 2018 and is currently 0.40 feet below its regulation schedule to accommodate construction on downstream structures (Figure 8). Average daily inflows to the lake from Josephine Creek for the week March 13 – March 19, 2018 doubled compared to the previous week, going from 11 cfs to 22 cfs. No data have been reported for Arbuckle Creek since July 4, 2017 as the gauge is being recalibrated after construction in the area. There was only 24 average daily cfs discharged via the S68 and S68X structures, as opposed to 13 daily cfs the previous week. According to RAINDAR, no rain fell in the Lake Istokpoga basin over the past week.

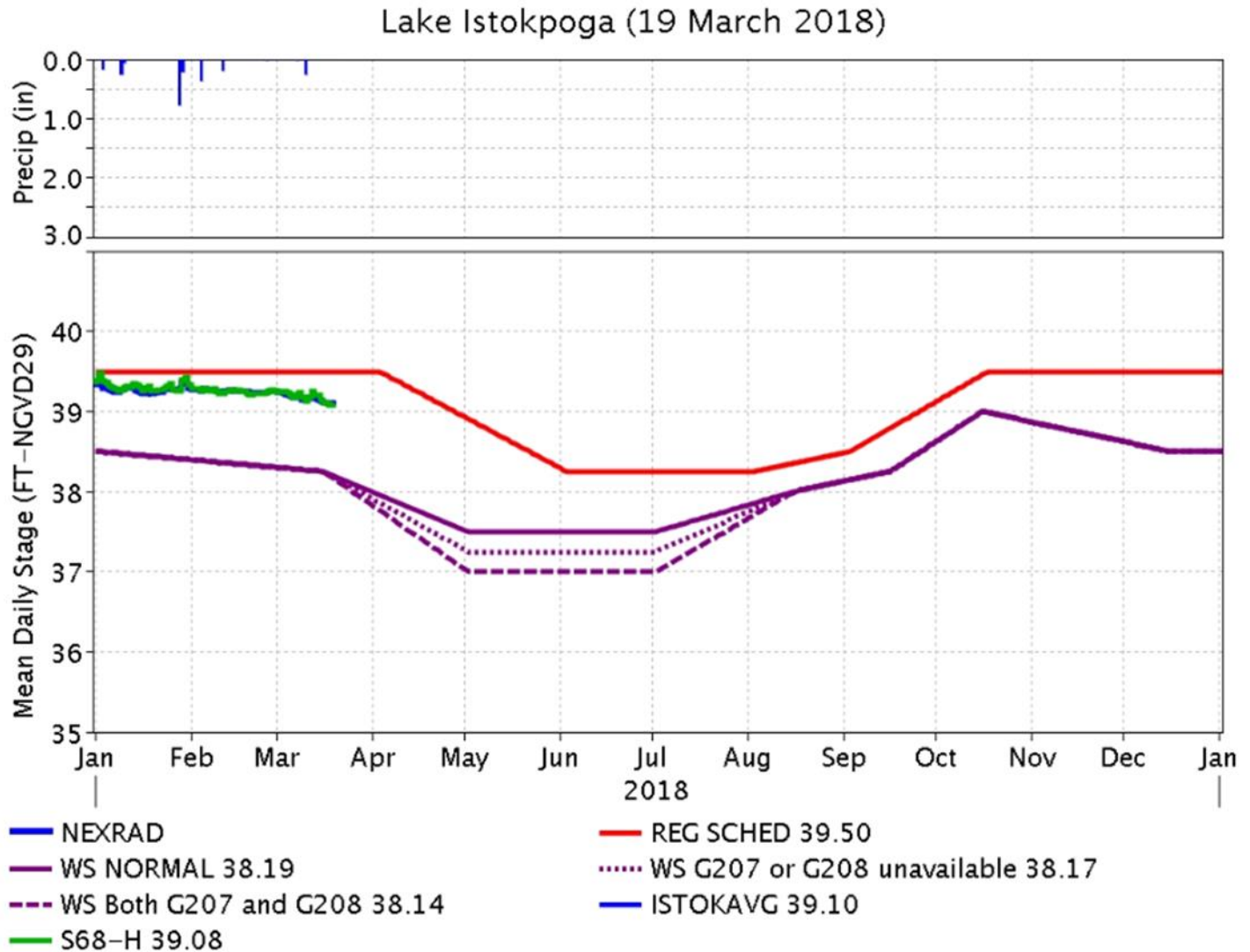


Figure 8. Recent stages on Lake Istokpoga.

ESTUARIES

St. Lucie Estuary:

Last week total inflow into the St. Lucie Estuary averaged about 107 cfs (Figures 1 and 2) and last month inflow averaged about 149 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	43
S-80	0
S-308	15
S-49 on C-24	0
S-97 on C-23	0
Gordy Rd. structure on Ten Mile Creek	64

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 25.7. Salinity conditions in the middle estuary are in the good 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)	22.9 (22.0)	25.0 (24.5)	NA ¹
US1 Bridge	25.4 (24.6)	26.1 (25.8)	10.0-26.0
A1A Bridge	30.4 (29.9)	31.6 (31.2)	NA ¹

¹Envelope not applicable.

Continuous monitoring of water quality is conducted at HR1 in the North Fork. Weekly dissolved oxygen data are summarized in Table 3.

Table 3. Weekly dissolved oxygen conditions at HR1 in the North Fork of the St. Lucie Estuary.

Location	Depth	Average DO (mg/l)	Minimum DO (mg/l)	Maximum DO (mg/l)
HR1	surface	5.19	2.53	7.57
HR1	bottom	4.17	2.45	6.73

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 4 and station location map is shown in Figure 5.

Table 4. 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	4.13 - 11.56	2.36	1.10	3.39
SF	1.59	3.7 - 7.04	7.87	6.70	9.48
NF	2.15	3.42 - 6.21	4.70	1.65	6.89
ME	1.89	2.84 - 5.31	7.38	6.57	9.60
IRL-SLE	3.66	0.41 - 3.07	6.95	6.46	7.51

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

Caloosahatchee Estuary:

Last week total inflow into the Caloosahatchee Estuary averaged about 675 cfs (Figures 6 and 7) and last month inflow averaged about 733 cfs. Last week's provisional averaged inflows from the structures are shown in Table 5.

Table 5. Weekly average inflows (data is provisional).

Location	Flow (cfs)
S-77	445
S-78	409
S-79	612
Tidal Basin Inflow	63

Over the past week, salinity remained about the same throughout the estuary (Table 6, Figures 8 & 9). The seven-day average salinity values are in the good range for adult eastern oysters at Cape Coral and in the fair range at Shell Point (Figure 10). Salinity data were not available at Sanibel. The 30-day moving average surface salinity is 4.4 at Val I-75 and 11.4 at Ft. Myers. With no flow through S-79, daily salinity at Val I-75 is forecast in two weeks to be 7.1, and the 30-day moving average is forecast to be 4.9 (Figure 11). Salinity conditions between Val I-75 and Ft. Myers are good for tape grass.

Table 6. 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)	3.4 (3.2)	3.5 (3.4)	NA ¹
*Val I75	4.5 (4.0)	7.4 (7.3)	0.0-5.0 ²
Ft. Myers Yacht Basin	11.6 (11.3)	13.6 (14.9)	NA
Cape Coral	21.1 (21.2)	21.3 (23.0)	10.0-30.0
Shell Point	29.5 (30.1)	28.5 (29.9)	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 7 as concentration ranges of chlorophyll *a* and dissolved oxygen at Beautiful Island, Ft. Myers, and Shell Point in the Caloosahatchee Estuary.

Table 7. 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)	7.49 – 17.06	4.51 – 10.15	1.43 – 15.62
Dissolved Oxygen (mg/l)	6.25 – 9.02	5.17 – 7.73	5.02 – 6.18

The Florida Fish and Wildlife Research Institute reported on March 16, 2018, that *Karenia brevis*, the *Florida red tide dinoflagellate*, was observed at background to medium concentrations in eighteen 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

Lake stage is in the Low sub-band of 2008 LORS. Tributary hydrological conditions are normal. The 2008 LORS recommends up to 450 cfs at S-79 and up to 200 cfs at S-80. Given the current estuarine conditions, there are no ecological benefits associated with freshwater releases from Lake Okeechobee.

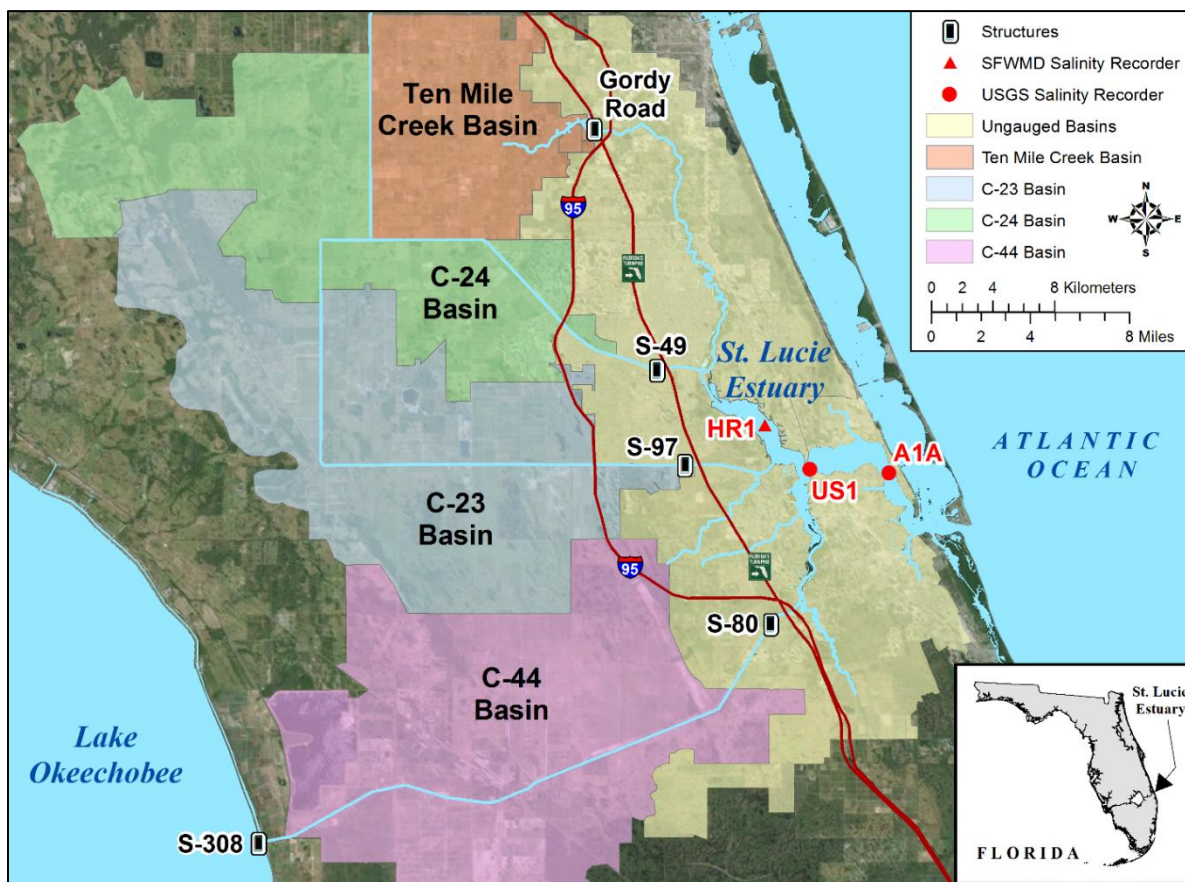


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

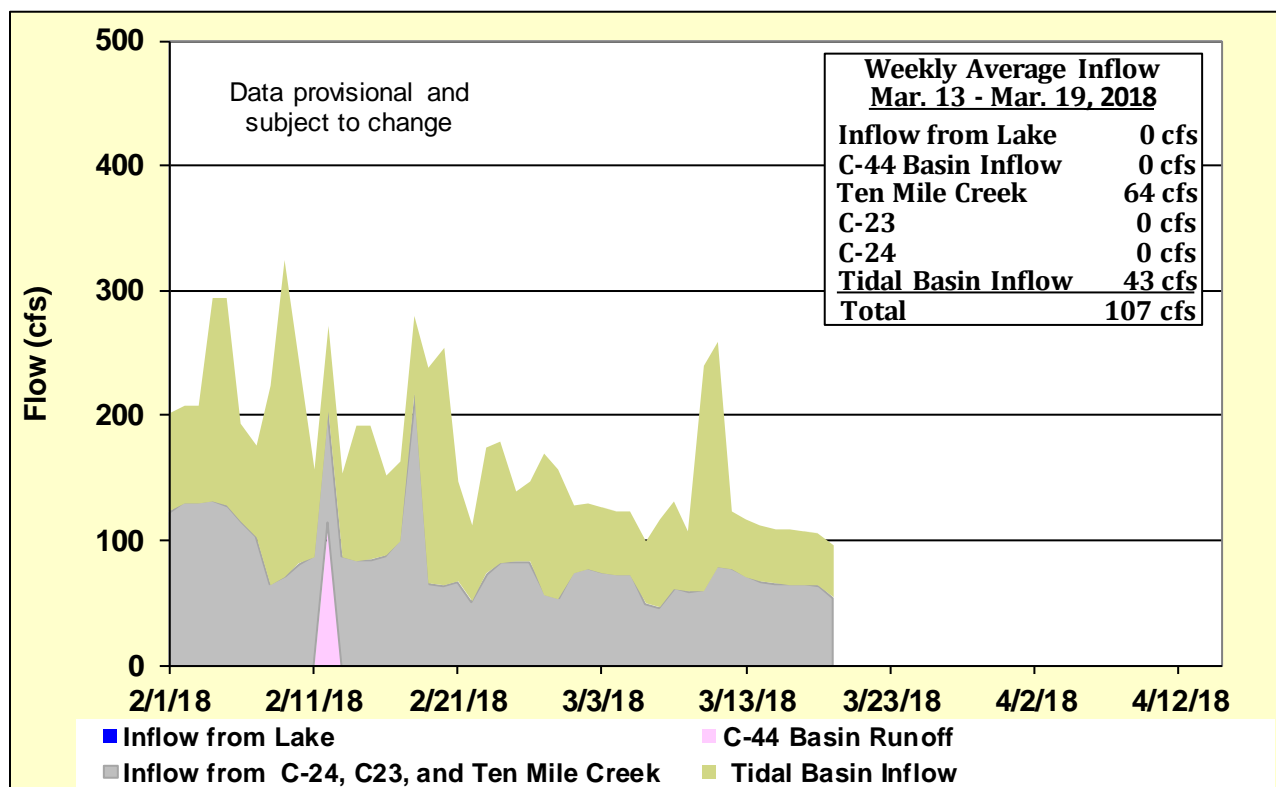


Figure 2. Estimated surface freshwater inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basins into the St. Lucie Estuary.

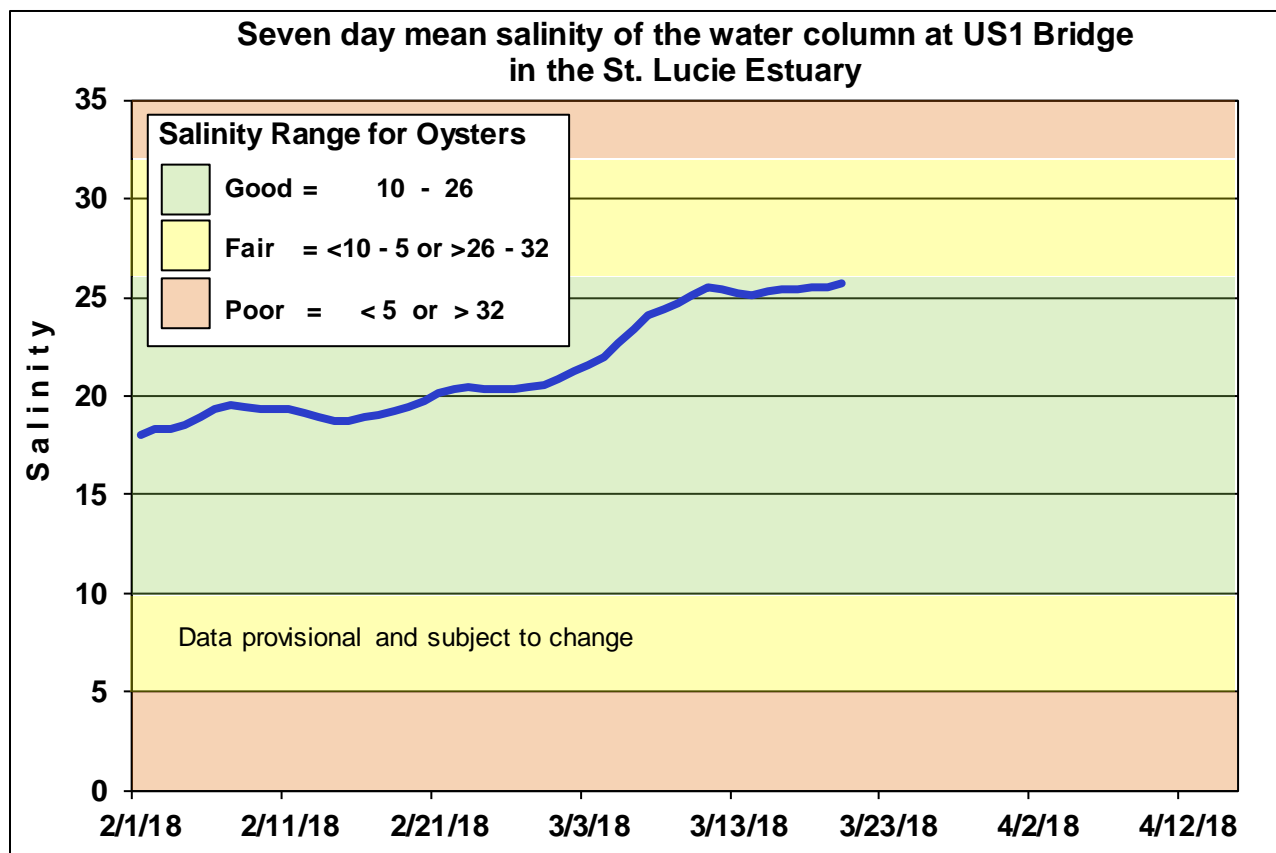


Figure 3. Seven-day mean salinity of the water column at the US1 Bridge.

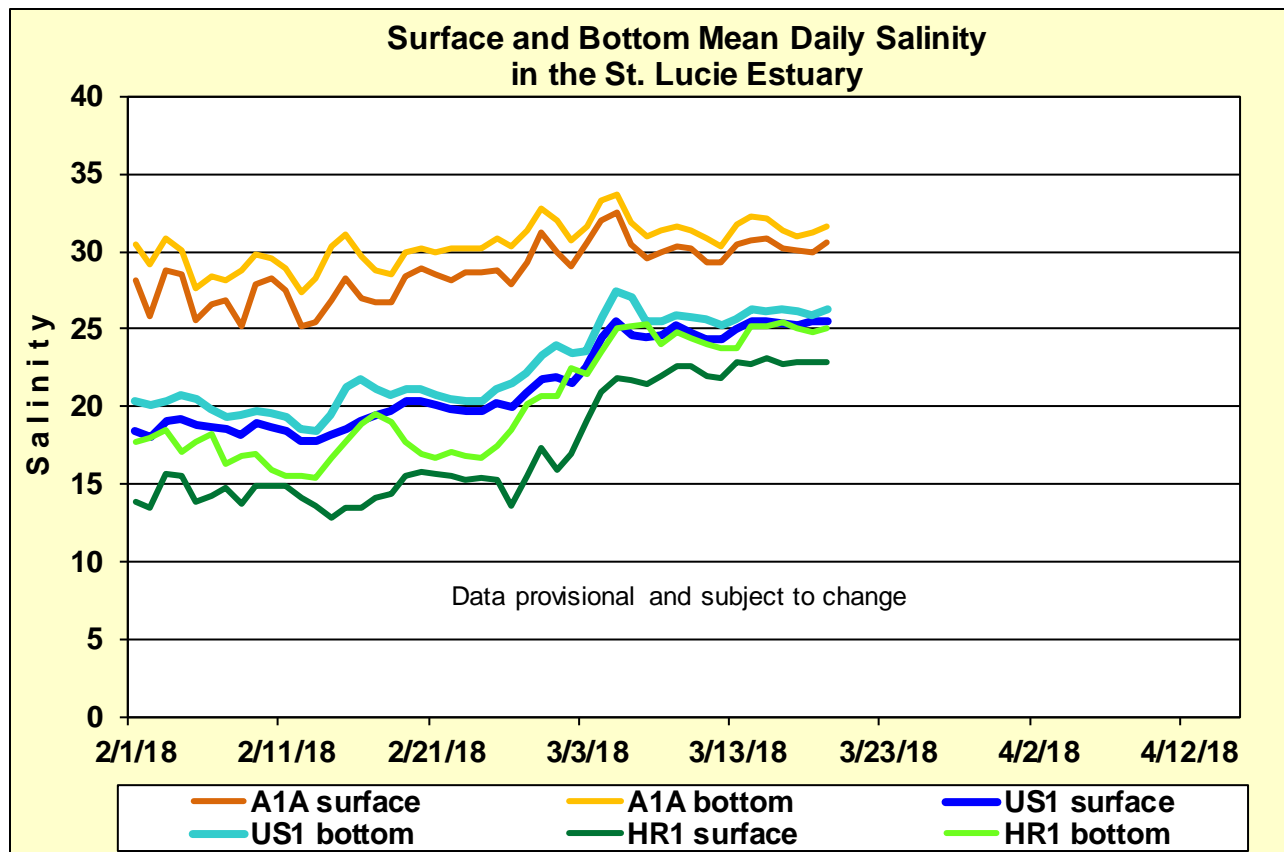


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

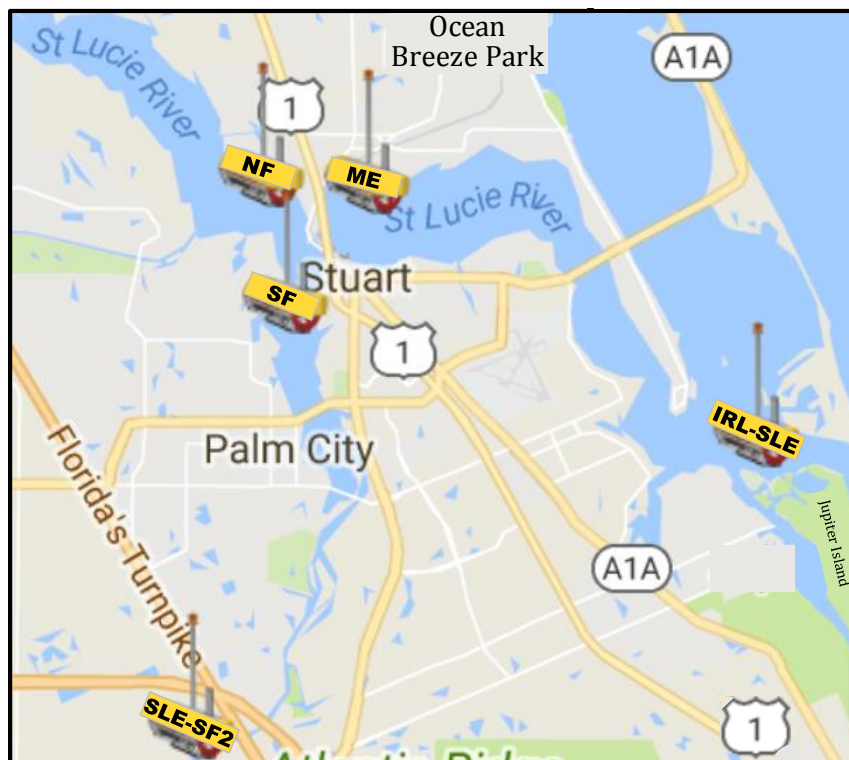


Figure 5. Location of FAU-HBOI LOBO water quality stations in the St. Lucie Estuary.

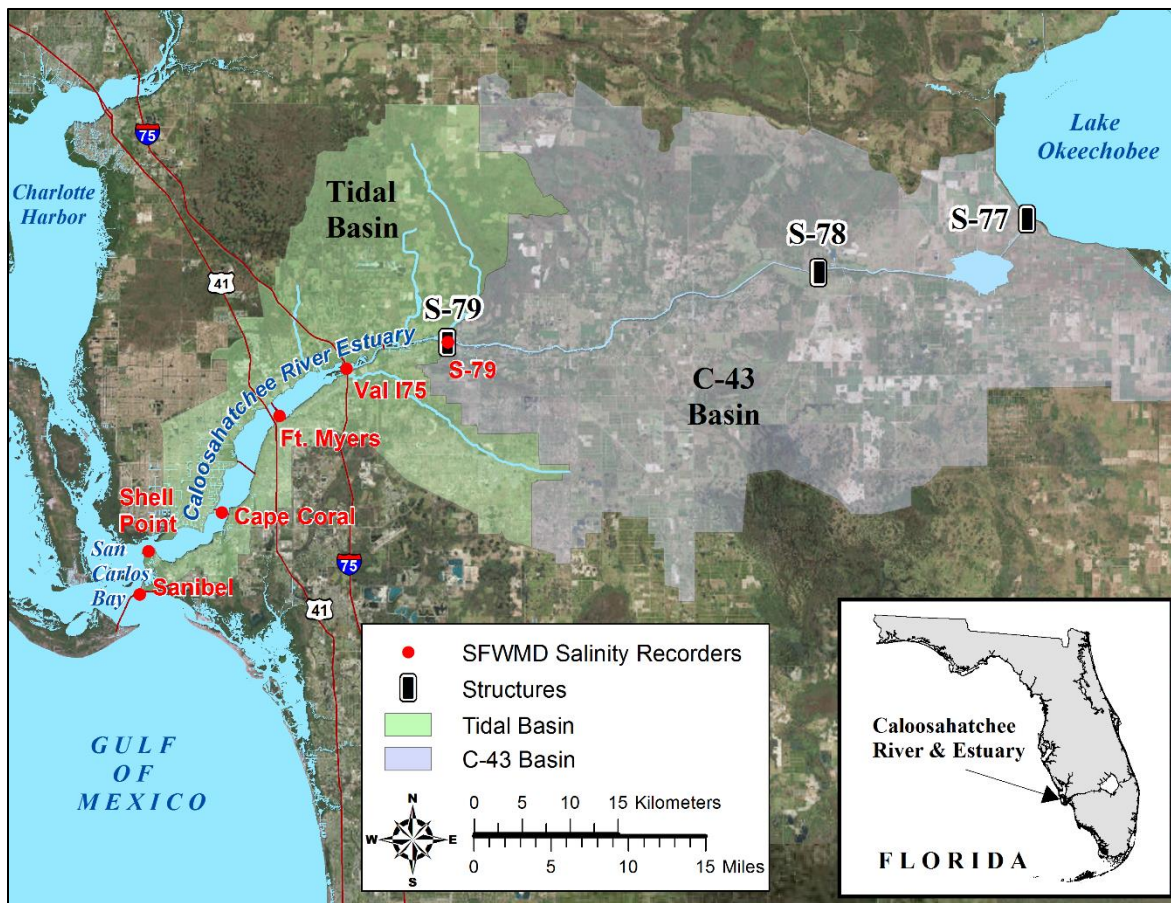


Figure 6. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

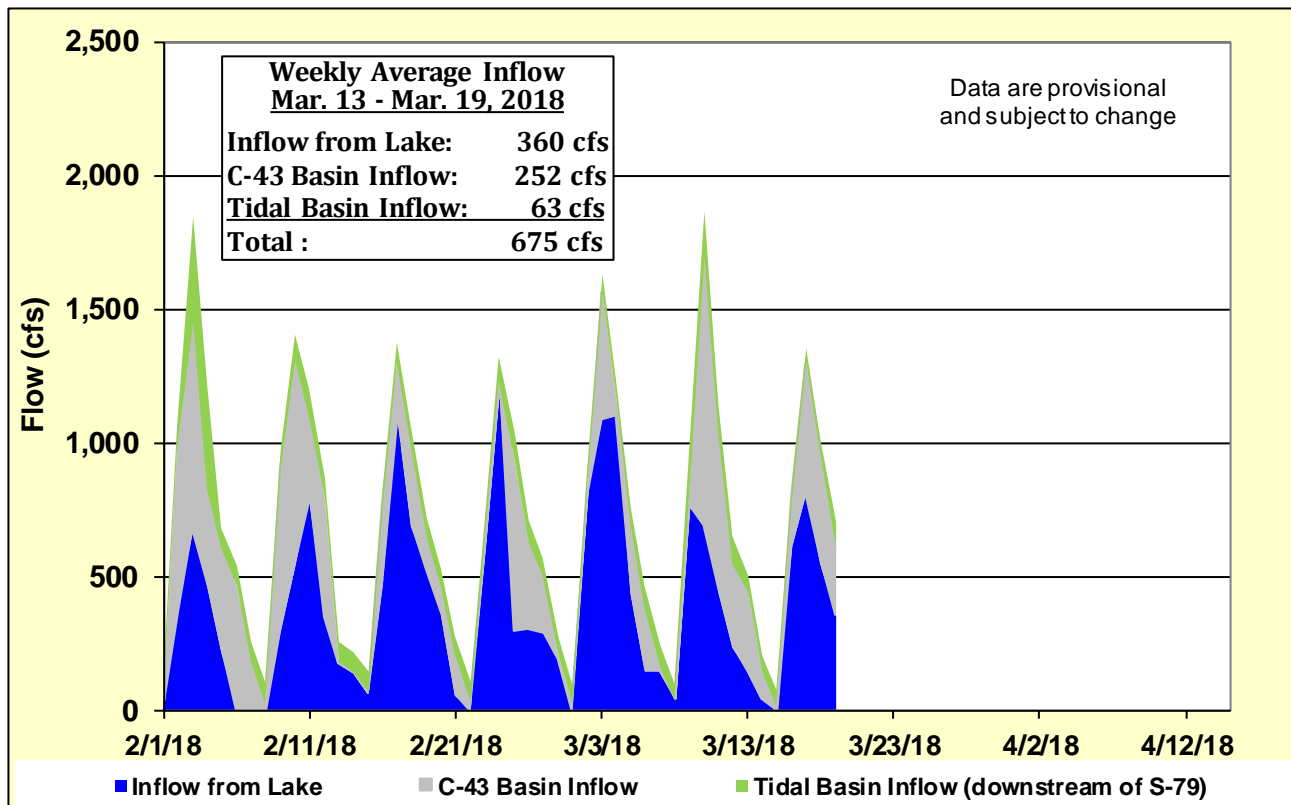


Figure 7. Freshwater inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.

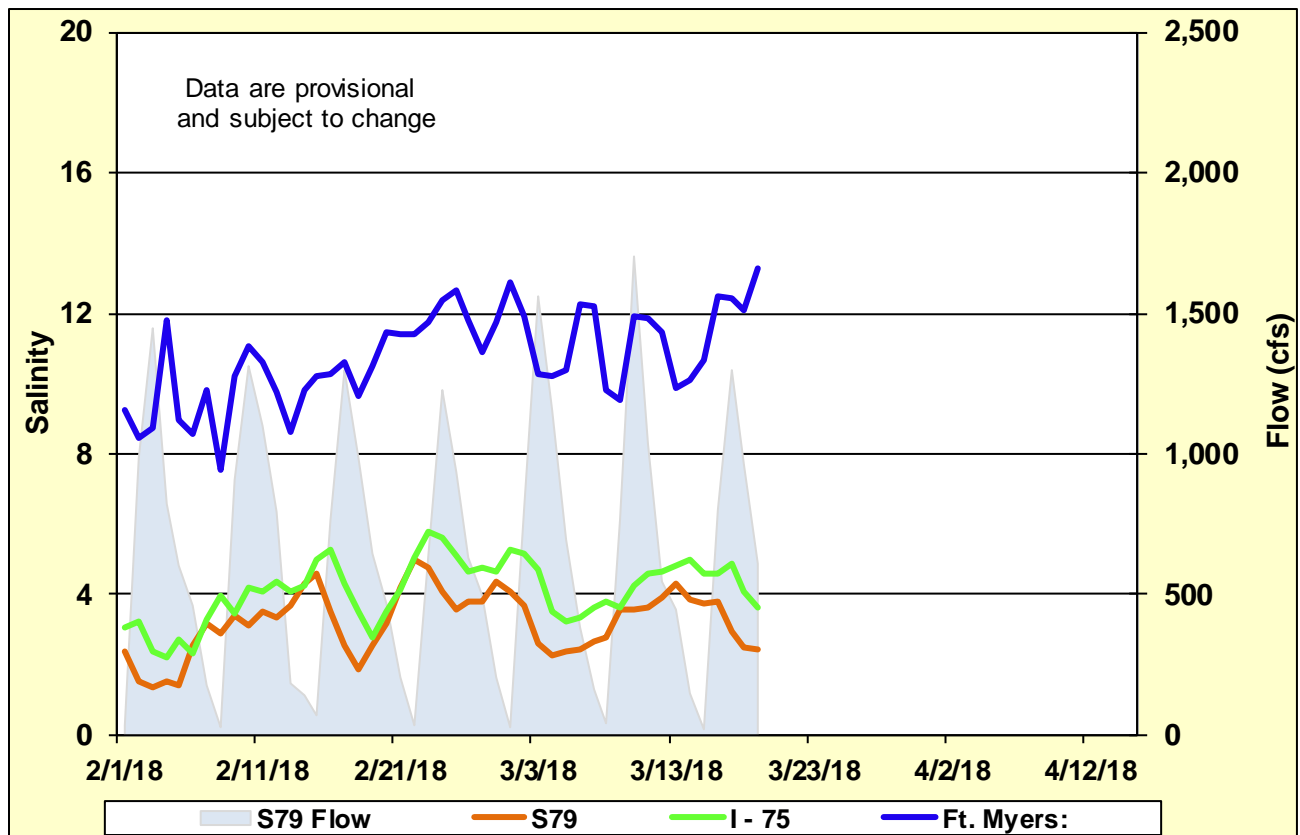


Figure 8. Daily mean flows at S-79 and salinity at upper estuary monitoring stations.

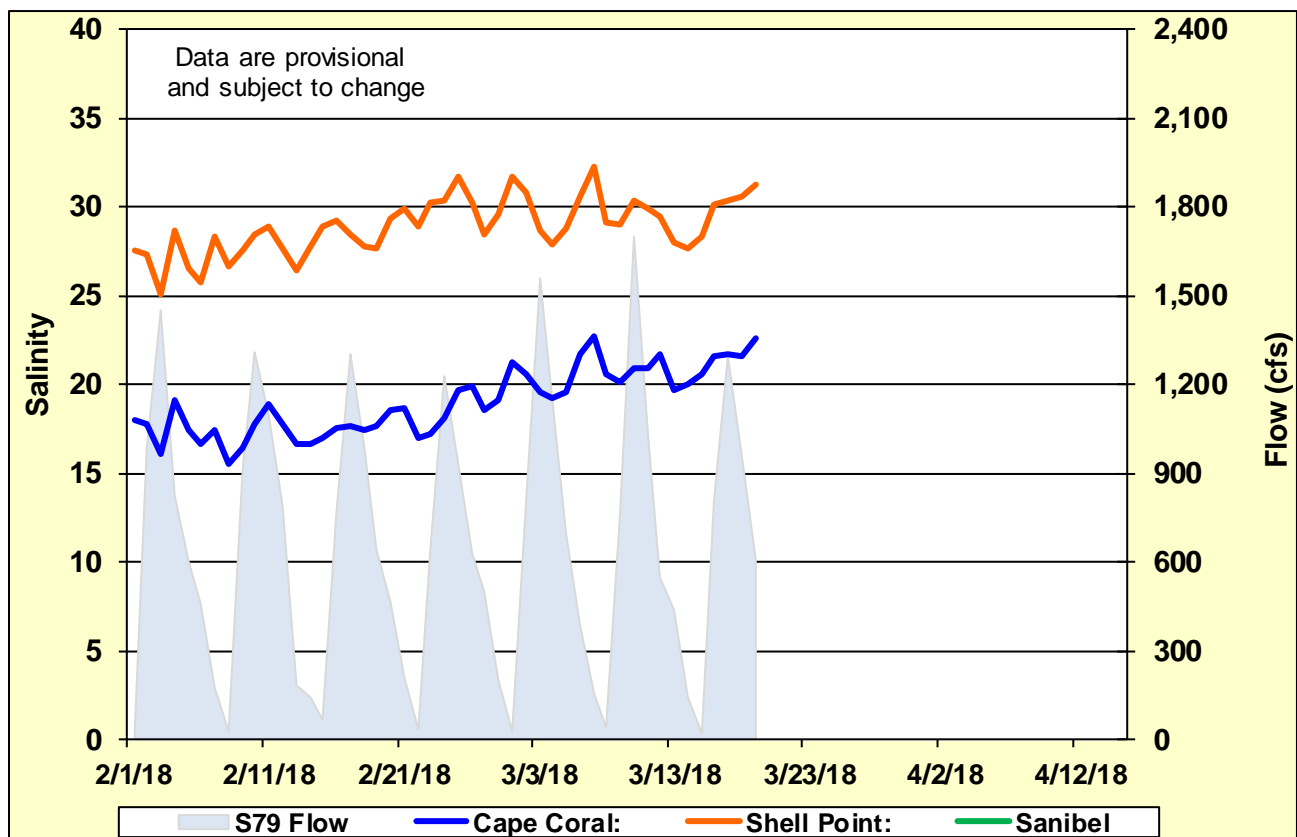


Figure 9. Daily mean flows at S-79 and salinity at lower estuary stations.

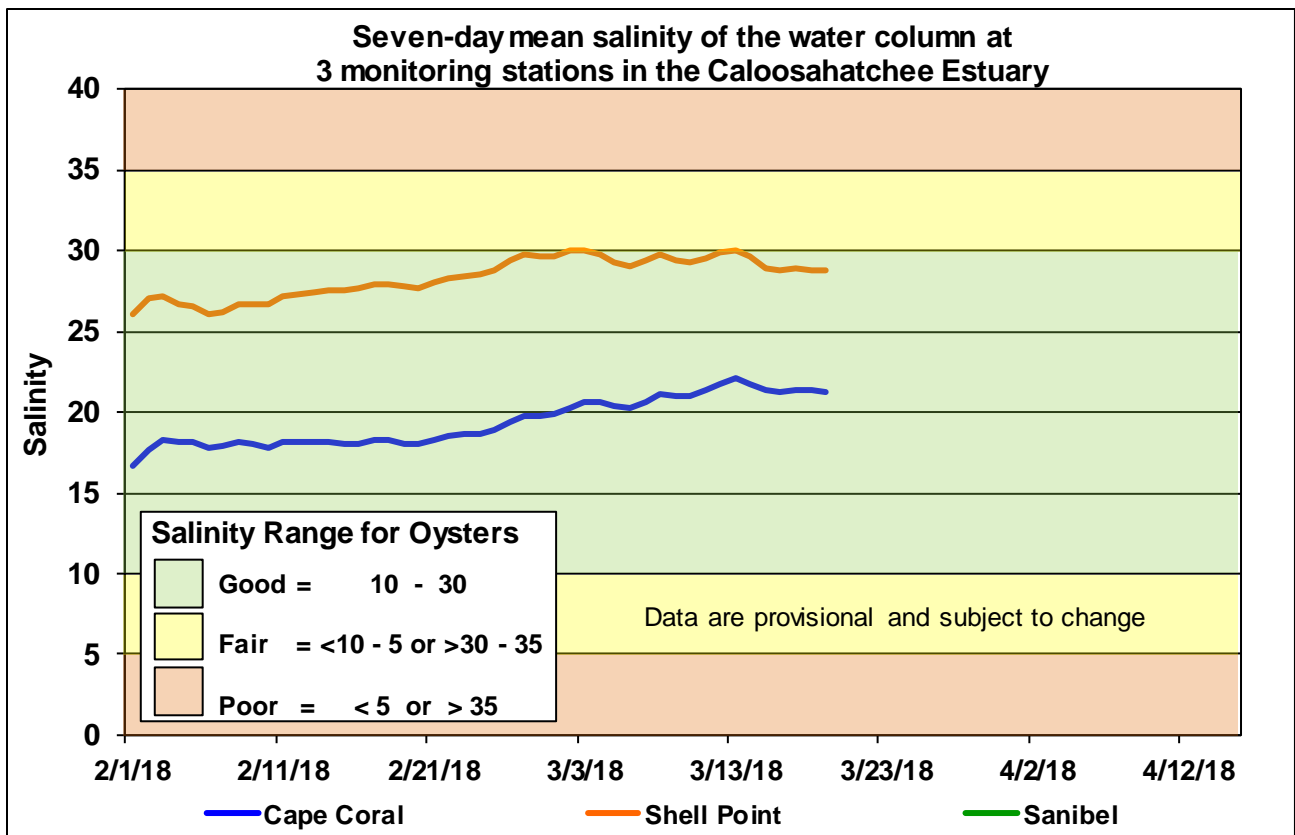


Figure 10. Seven-day mean salinity at Cape Coral Bridge, Shell Point, and Sanibel Bridge monitoring stations.

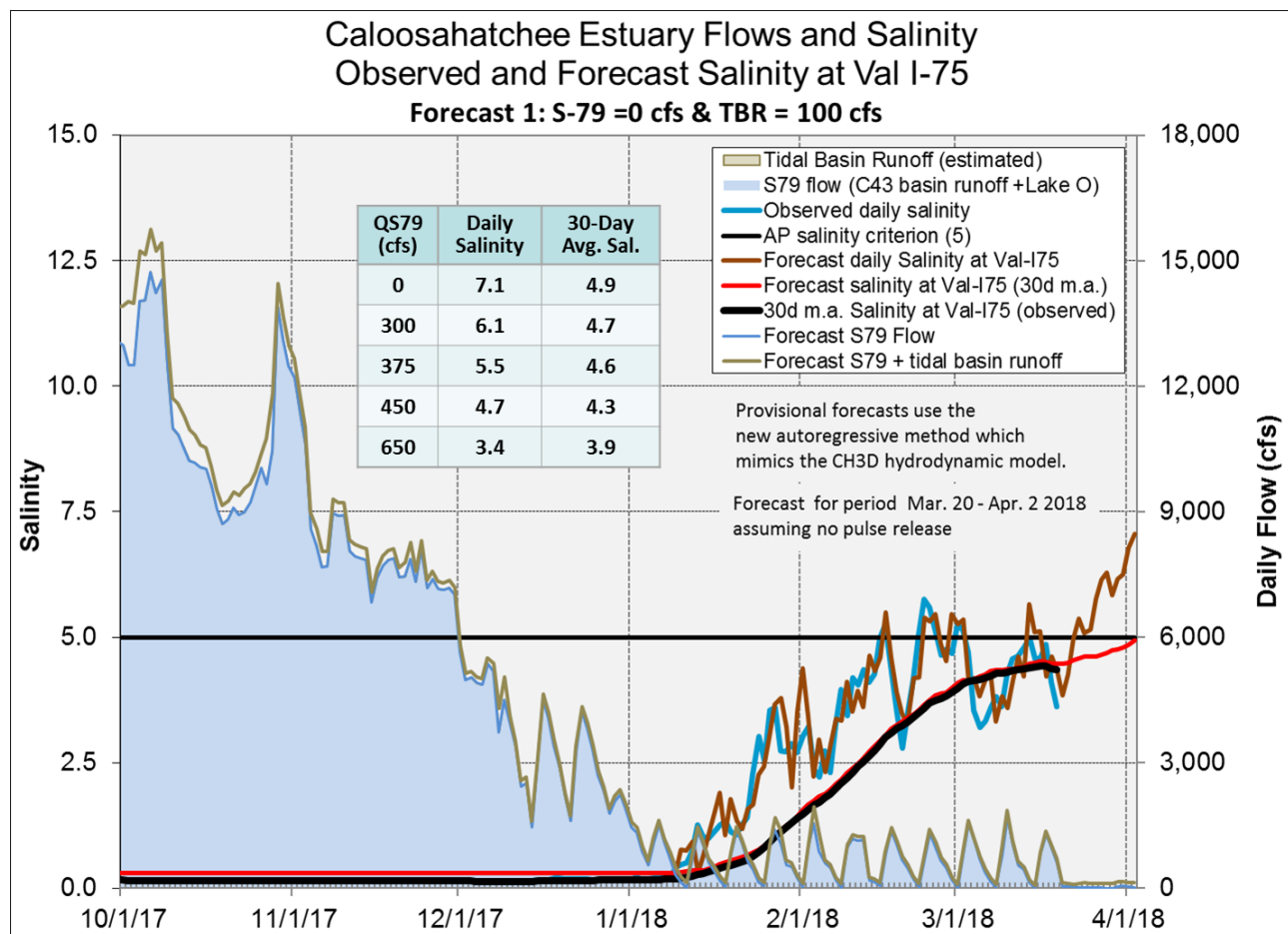


Figure 11. 14-day salinity forecast at Val I-75 assuming no releases at S-79.

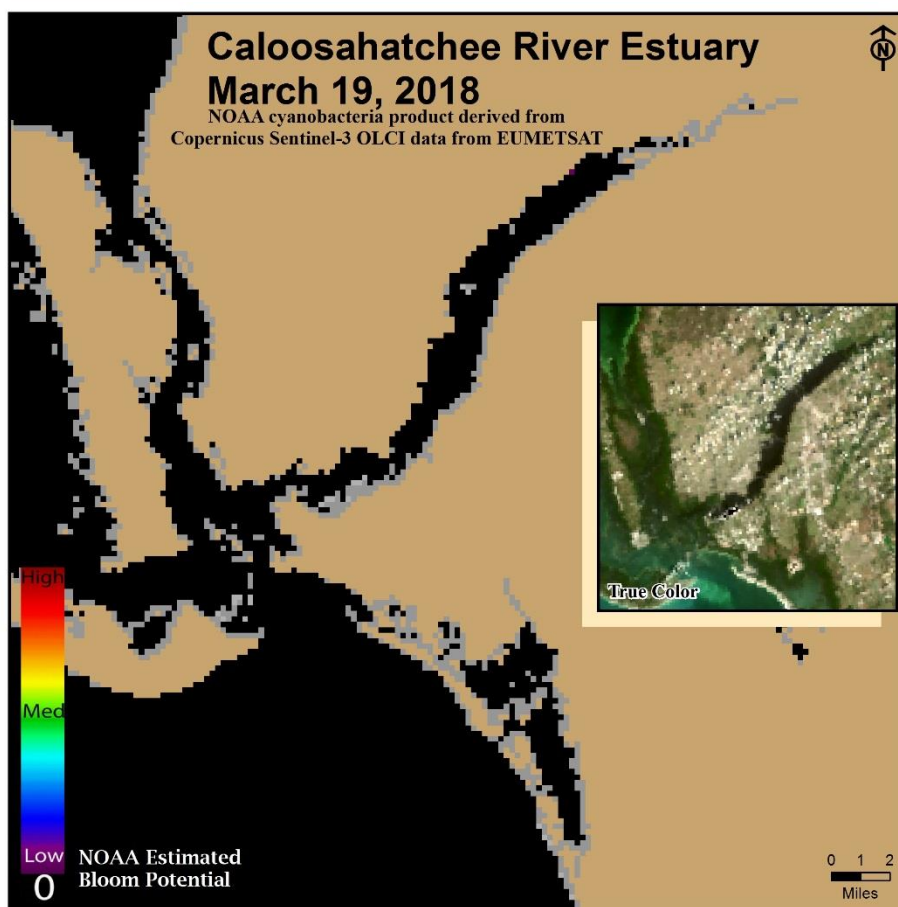
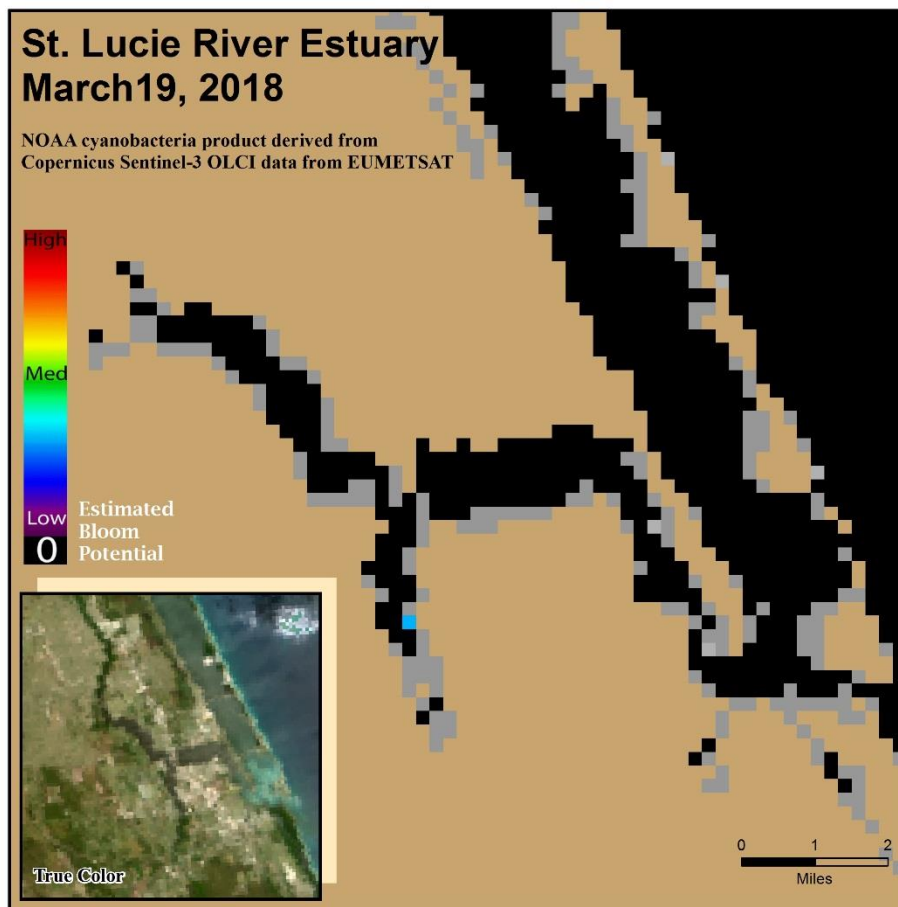


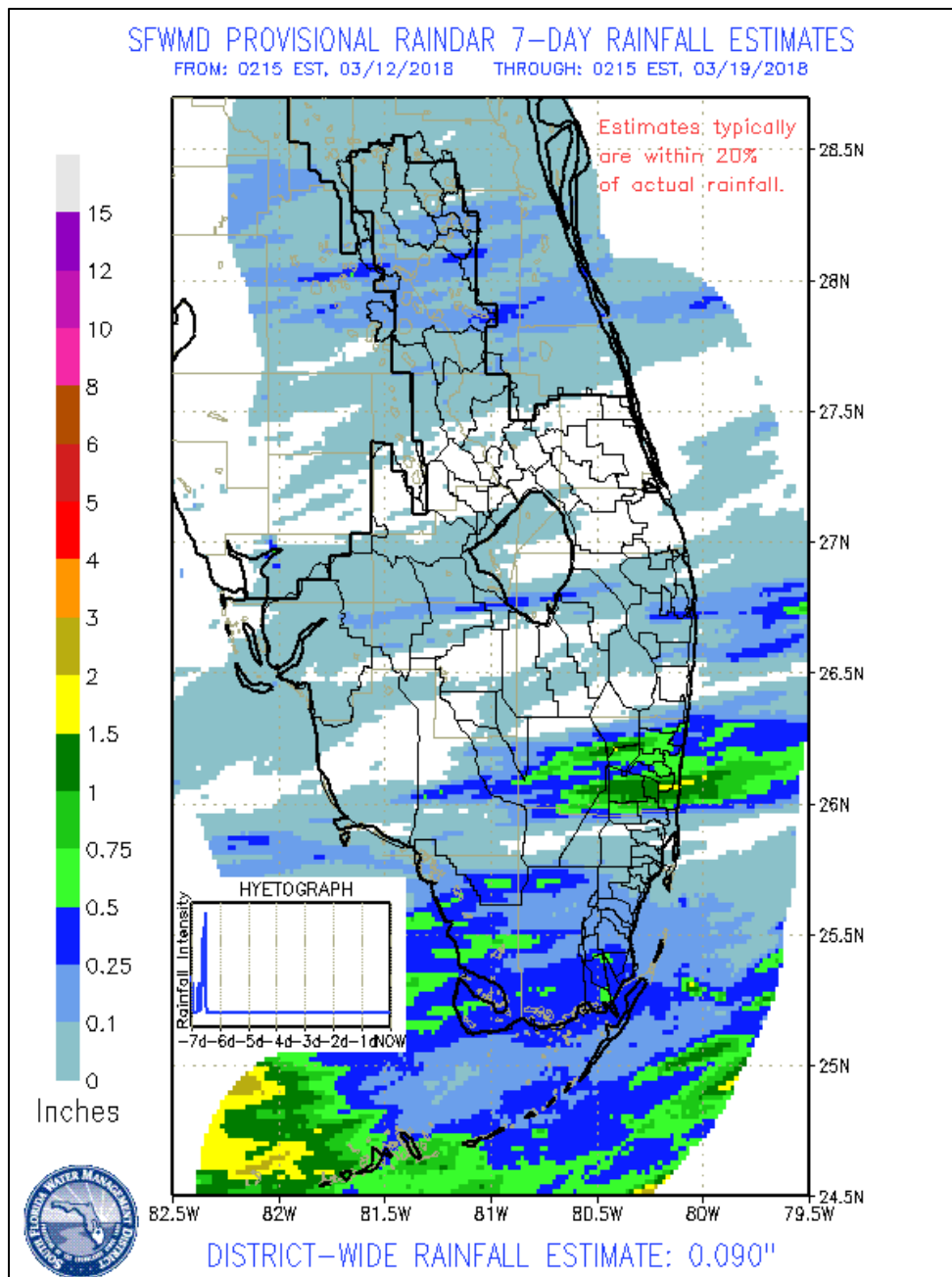
Figure 12. Sentinel 3a Satellite imagery provided by NOAA uses Ocean and Land Color Instrument (OLCI) to estimate cyanobacteria bloom potential in Caloosahatchee Estuary.

EVERGLADES

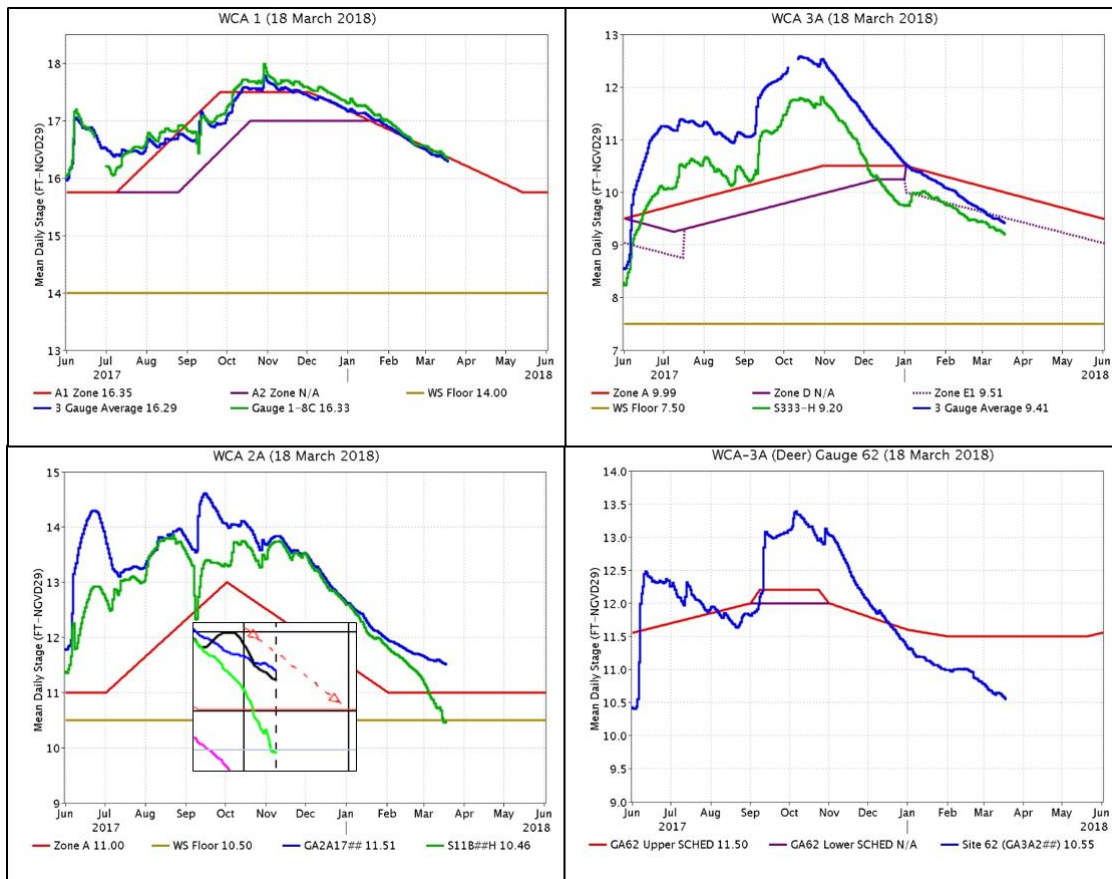
At the gauges monitored for this report, the water depth across the Everglades fell an average of 0.10 feet last week, a slight increase from the week prior. Individual gauge changes in the WCAs ranged from -0.03 feet (WCA-3B) to -0.13 feet (ENP). Pan evaporation increased again and was estimated at 2.08 inches last week.

Everglades Region	Rainfall (Inches)	Stage Change (feet)	
WCA-1	0.01	-0.11	
WCA-2A	0.20	-0.10	
WCA-2B	0.78	-0.11	
WCA-3A	0.28	-0.10	
WCA-3B	0.22	-0.07	
ENP	0.33	-0.13	

Good
 Fair
 Poor



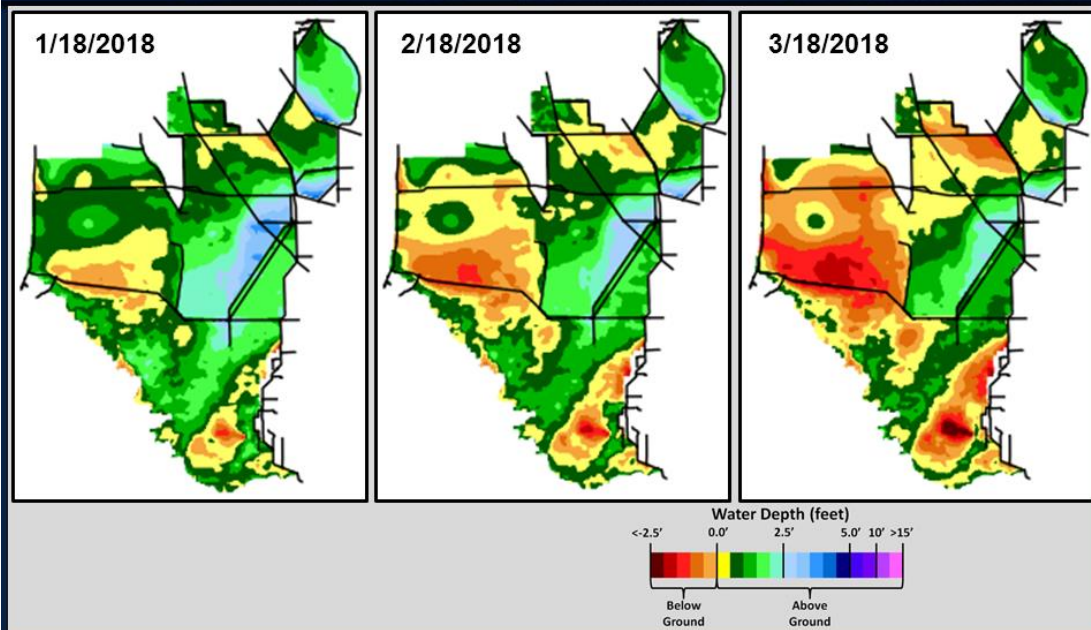
Regulation Schedules: WCA-1 three-gauge average continues trending along the Zone A1 schedule, with the three-gauge average at 0.06 feet below. WCA-2A (subject to a temporary deviation – see inset) canal stage at gauge S11B is 0.54 feet below Zone A1 and continues a steep decline. WCA-3A three-gauge average stage is 0.1 feet below Zone E1 and is falling away from the regulation line. WCA-3A at gauge 62 (northwest corner) stage is 0.95 feet below the upper schedule and is falling away from the regulation schedule.



Water Depths and Changes: The WDAT tool for spatial interpolation of depth monthly snapshots indicate the stable and drying conditions in WCA-1 and WCA-2A. Northern WCA-3A continues a more extreme depth decline with water levels now more than 1.0 feet below ground. Comparing WDAT water levels from present, water depths over the last week fell across most of the Everglades. Similar to last week, the northwestern and southeastern portions of WCA-1 rose slightly. Looking back one month, northeastern WCA-3A is significantly drier and southwestern WCA-2A is wetter. A stage gauge malfunction caused a problem with the WDAT difference maps in the Holey Land Wildlife Management Area.



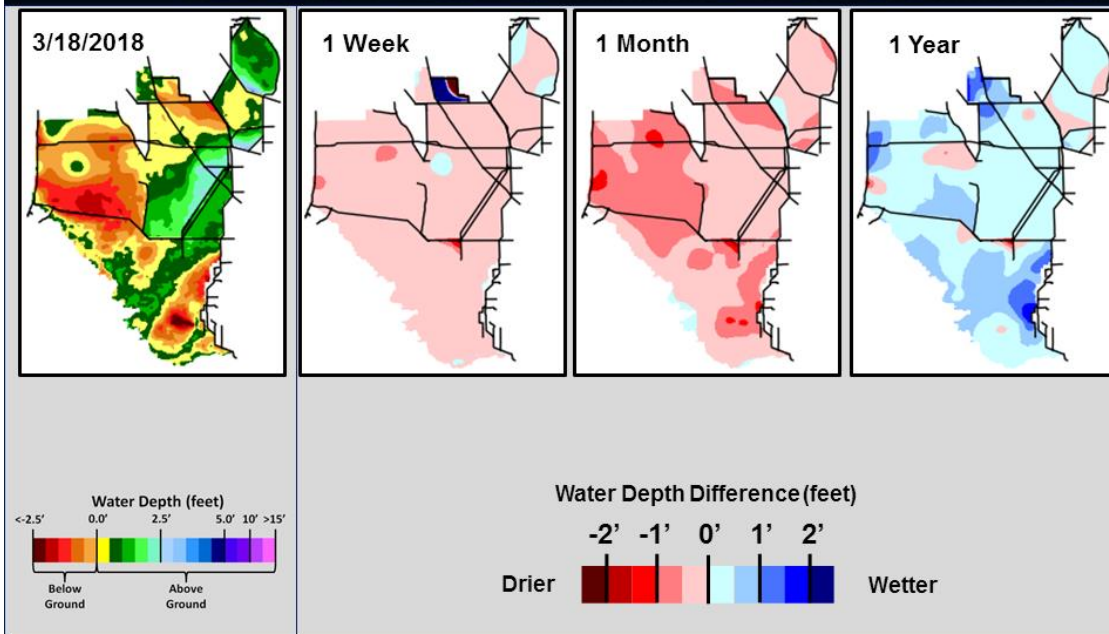
SFWDAT Water Depth Monthly Snapshots



South Florida Water Depth Assessment Tool (SFWDAT)



SFWDAT Everglades Difference Maps (Present - Past)



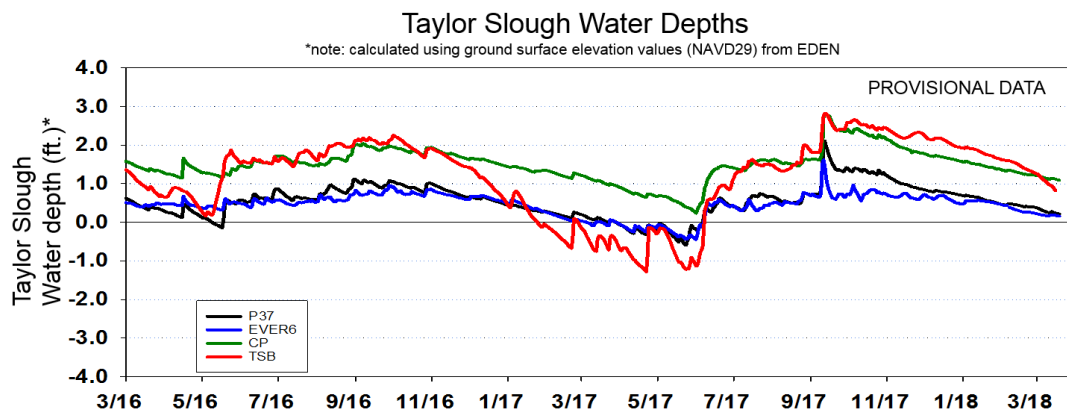
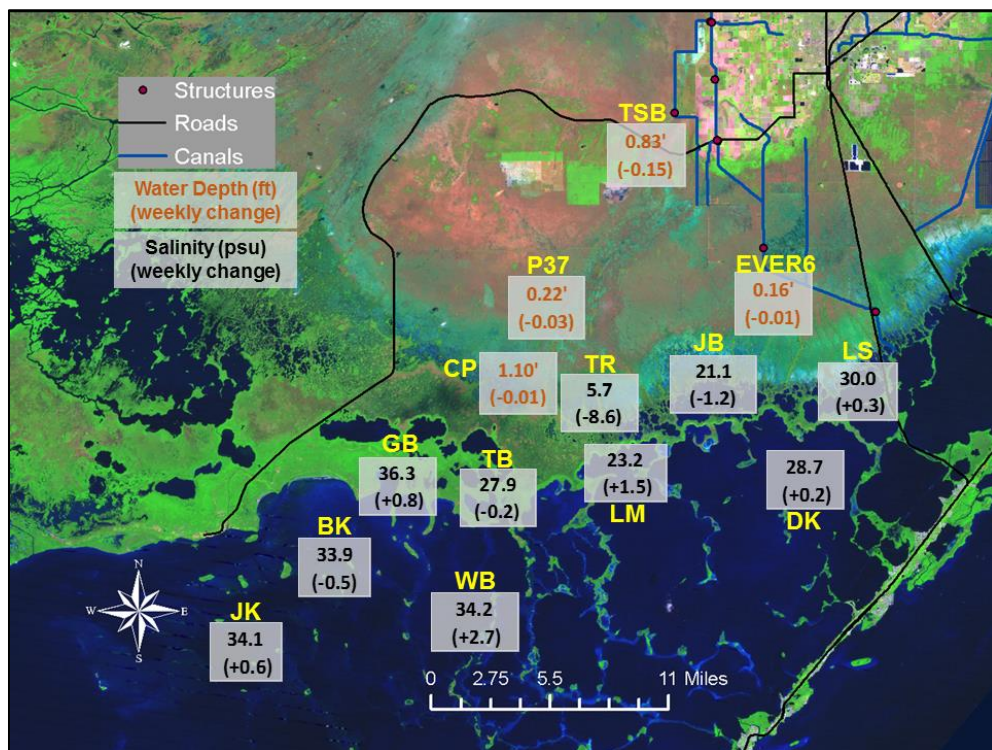
South Florida Water Depth Assessment Tool (SFWDAT)

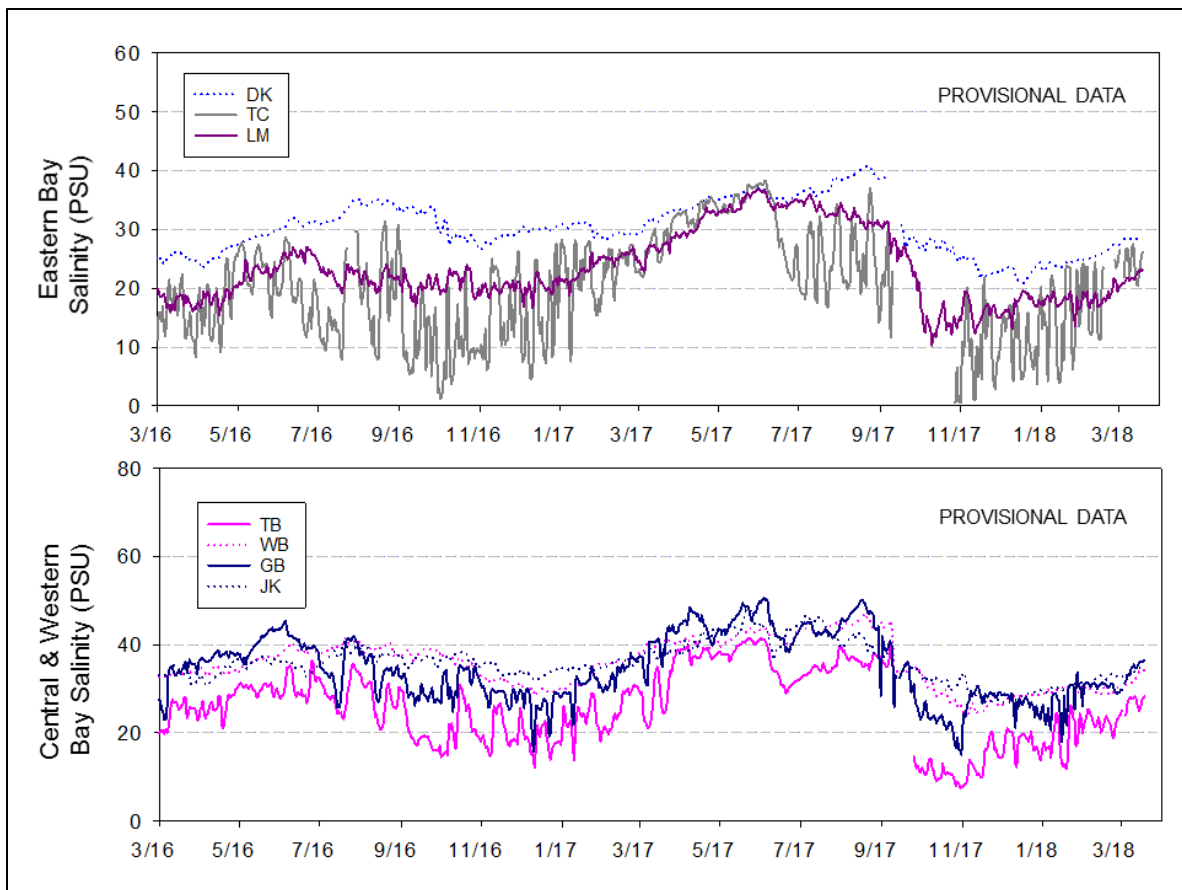
Wading bird flight conducted by SFWMD on March 19, 2018:

- Large numbers of birds are foraging in northern WCA-1, eastern WCA-2A and northern and western (L-28 tieback) WCA-3A South
- 18,000+ white ibis nests in WCA-3A Alley North (there is standing water around the island)

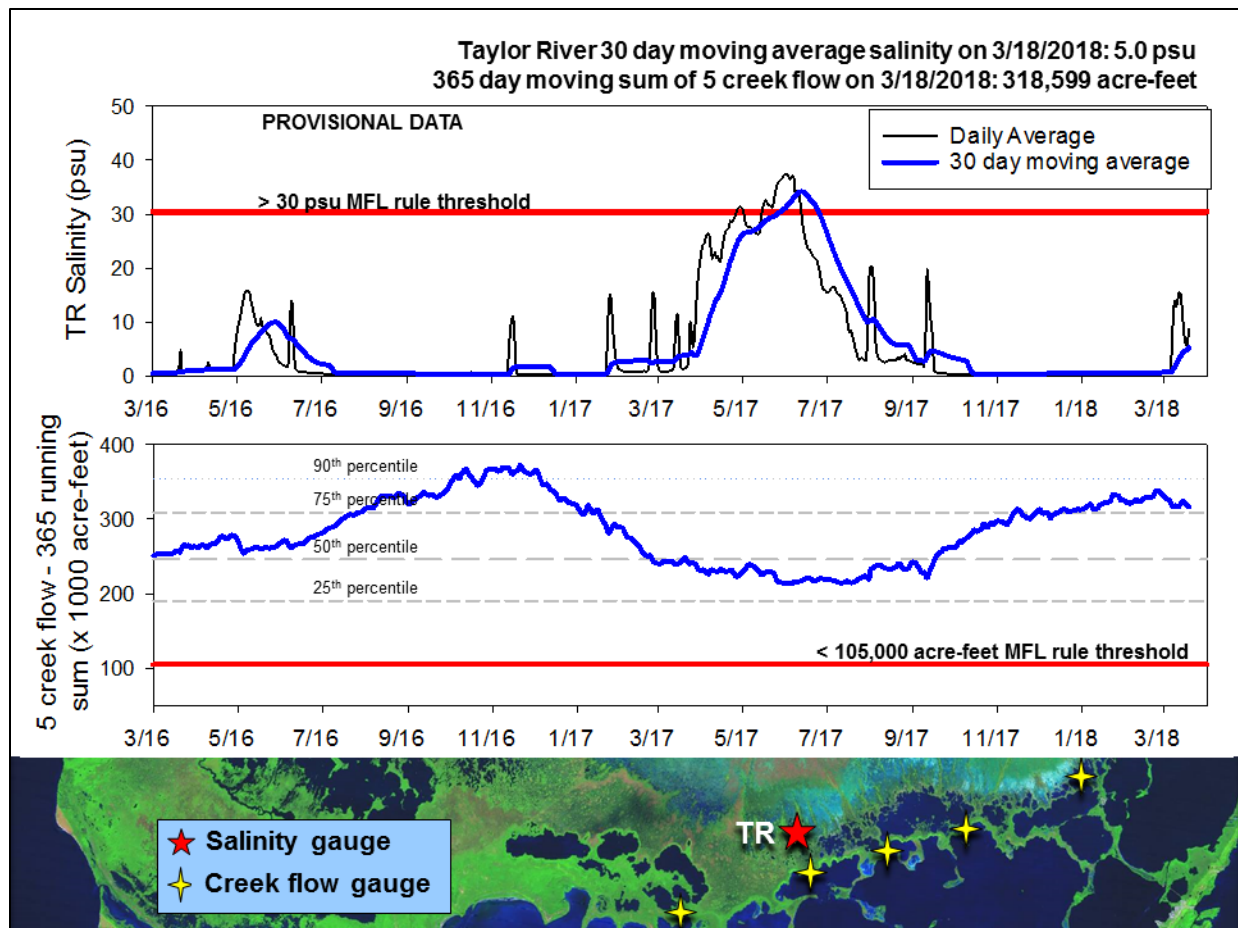
Taylor Slough Stages: Stages in Taylor Slough and the Everglades National Park panhandle decreased 0.01 feet to 0.15 feet over the past week with the most rapid recession in the northern part of Taylor Slough. Water depths range from 0.16 feet to 1.10 feet, and are 1 to 14 inches above the historical averages with the highest divergence in northern Taylor Slough.

Florida Bay Salinities: Salinities in Florida Bay decreased 0.4 psu on average this past week, with the maximum increase being 2.7 psu in central Florida Bay. Salinities ranged from 21 psu in the northeast to 34 psu in the western nearshore. This range is 1 to 2 psu below the historical average in the central and western nearshore to 2 psu above average in the east (US Highway 1 corridor).





Florida Bay MFL: Mangrove zone daily average salinity peaked at 15.4 psu before decreasing this past week to end at 5.7 psu on Sunday. The 30-day moving average rose to 5.0 psu. The weekly cumulative flow from the five creeks denoted by yellow stars on the map totaled about 2,700 acre-feet for the last week as positive flows resumed for most of the week. The 365-day moving sum of flow from the five creeks increased about 1,500 acre-feet over the last week to end at 318,599 acre-feet (still greater than the long-term average of 257,628 acre-feet). Creek flow is provisional data from the USGS and is highly variable.



Water Management Recommendations

Water management that results in slowing the recession rate in northern WCA-3A would have great ecological benefit. Maintaining open water conditions around the Alley North wading bird nesting colony in northeast WCA-3A is important to protect nests from terrestrial predators. Peat soils in that historically over-dried region may also be protected from fire risk by extending the dry season stage recession. Inflows to Taylor Slough continue to provide ecological benefit by slowing the recession rate in that region. More specific recommendations appear in the summary table below. The red text represents new or modified information or recommendations.

SFWMD Everglades Ecological Recommendations, March 20, 2018 (red is new)

Area	Weekly change	Cause(s)	Recommendation	Reasons
WCA-1	Stage decreased 0.11'	Rainfall, ET, management	Maintain current recession rates, following regulation schedule.	Foster conditions for wildlife and optimal wading bird foraging.
WCA-2A	Stage decreased 0.10'	Rainfall, ET, management	Maintain moderate recession rates between 0.05 and 0.09 feet per week	Foster conditions for wildlife and optimal wading bird foraging.
WCA-2B	Stages decreased by 0.11'	Rainfall, ET, management	Maintain depths at regulation schedule or slightly above.	Protect upstream/downstream habitat and wildlife. Foster conditions for wading bird foraging.
WCA-3A NE	Stages decreased by 0.07'	Rainfall, ET, management	Maintain current moderate recession rates between 0.05 and 0.09 feet per week, water management that provides inflows generates ecological benefit	Protect peat soils and nesting habitat.
WCA-3A NW	Stages decreased by 0.11'	Rainfall, ET, management	Maintain current moderate recession rates between 0.05 and 0.09 feet per week, water management that provides inflows generates ecological benefit	
Central WCA-3A S	Stages decreased by 0.10'	Rainfall, ET, management	Maintain moderate recession rates between 0.05 and 0.09 feet per week	Protect habitat and wildlife, foster conditions for wading bird foraging.
Southern WCA-3A S	Stages decreased by 0.10'	Rainfall, ET, management		
WCA-3B	Stages decreased by 0.07'	Rainfall, ET, management	Maintain depths at regulation schedule.	Protect habitat and wildlife.
ENP-SRS	Stages decreased by 0.13'	ET, rainfall, topography, management	Make discharges to the Park according to the 2012 WCP rainfall plan.	Keep peat wet to promote native habitat and maintain wetland plant and animal communities.
Taylor Slough	Stage decreased from -0.01' to -0.15'	Rain, ET, inflows	Move water southward as possible	When available, provide freshwater buffer for downstream conditions.
FB- Salinity	Salinities changed from -1.8 to +2.7 psu	Rain, ET, inflows, wind	Move water southward as possible	When available, provide freshwater to maintain low salinity buffer and promote water movement.