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: May 15, 2018

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

A weak area of low pressure in the northeastern Gulf of Mexico should meander north-northwestward to northward over the next couple of days and move inland over the southeastern United States. With somewhat lower moisture across the District today and the best moisture convergence to the north, there should be less rain today than Sunday-Monday. The large-scale conditions should be conducive for moderate to locally heavy rains to occur south and east of Lake Okeechobee, especially over the interior and possibly near the west coast in association with a band rotating around the low in the Gulf. A plume of deep-layered moisture being drawn northward around the low should extend from south-southwest to north-northeast across the District from Wednesday through Saturday. The increase in moisture should set the stage for additional heavy rainfall across the area during this period. However, the greatest instability and upper-air forcing are predicted to be on Wednesday-Thursday, and it is during this time that the coverage and rainfall intensity should be the greatest. District-wide average rainfall could be around Monday's levels on these two days. Although rainfall should decrease slightly late this week, the rains on Friday-Saturday are still expected to be characterized as above normal. For the week ending Saturday, rains across the District are expected to be 300-500% of normal. By Sunday or Monday, high pressure over the Atlantic will build into Florida and much drier air and lower instability should result in substantially lower rain chances. With a southeasterly wind flow forecast across the area at that time, the rains that fall Sunday-Monday should preferentially form over the southwestern and western interior, and to a lesser extent, over the Kissimmee valley. The eastern zones should receive below to near normal rainfall beginning on Sunday extending into early next week. Confidence in the drying trend is moderate to high.

Kissimmee

Tuesday morning stages were 55.4 feet NGVD (0.3 feet below schedule) in East Lake Toho, 52.4 feet NGVD (0.3 feet below schedule) in Toho, and 49.1 feet NGVD (0.5 feet below schedule) in Kissimmee-Cypress-Hatchineha; headwater stages were 46.2 feet NGVD at S-65A and 25.7 feet NGVD at S-65D. Mean recession rates for the last seven days were 0.18 and 0.15 feet per week in East Lake Toho and Toho, respectively (preferred range of 0.15-0.2 feet per week) and 0.16 feet per week in Kissimmee-Cypress-Hatchineha (preferred rate is to not exceed 0.2 feet per week). Tuesday morning discharges were: 524 cfs at S-65, 404 cfs at S-65A, and 47 cfs at S-65E. Dissolved oxygen concentration in the Kissimmee River averaged 7.3 mg/L for the week. Kissimmee River mean floodplain depth on Sunday was 0.06 feet.

Lake Okeechobee

Lake Okeechobee stage is 13.04 feet NGVD having decreased 0.08 feet over the past week and 0.39 feet over the last month. There was considerable rainfall at the end of the week, raising Lake stages 0.21 feet on Monday, May 14, and bringing the first substantial reversal in stage since late October 2017. The Lake stage was below 13.0 feet NGVD for just 10 days, which could limit submerged aquatic vegetation (SAV) and emergent vegetation recovery in the nearshore zone, depending on how quickly the wet season begins. Additionally, most of the wading bird foraging activity and new nesting activity had recently moved downslope toward areas like Moonshine Bay, which may become too deep for optimal foraging, while stage reversals could disperse prey and reduce nesting activity on the Lake.

Estuaries

Total inflow to the St. Lucie Estuary averaged 453 cfs over the past week with no flow coming from Lake Okeechobee. Salinity decreased slightly throughout the estuary. The seven-day average salinity at the US1 Bridge is in the good range for adult eastern oysters. The highest weekly chlorophyll *a* concentrations were 3.23 – 14.42 µg/L in the South Fork. Total inflow to the Caloosahatchee Estuary averaged 1,183 cfs over the past week with 336 cfs coming from the Lake. Salinity slightly increased near Cape Coral and decreased slightly downstream. The 30-day moving average surface salinity is 3.9 at Val I-75 and 11.2 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 eastern oysters at Cape Coral and at Shell Point. Chlorophyll *a* concentrations over the last week were relatively low to medium near Beautiful Island (4.51 – 21.49 µg/L), Ft. Myers (3.04 – 21.45 µg/L), and Shell Point (1.14 – 17.70 µg/L). Dissolved oxygen levels at Beautiful Island were 3.70 – 8.97 mg/L, at Ft. Myers were 3.63 – 6.92 mg/L, and at Shell Point were 4.70 – 9.91 mg/L. Although the Caloosahatchee Estuary is not in need of water at this time based on the Val I-75 forecast, the continuation of the current releases does provide benefits to the estuary.

Stormwater Treatment Areas

Over the past week, the STAs/FEBs received approximately 400 acre-feet of 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 near target depths, except many of the STA-5/6 cells which have dried out. Operational restrictions are in place for vegetation rehabilitation in STA-1E, STA-2, and STA-3/4, and a Restoration Strategies Science Plan study in STA-3/4. The nests of Migratory Bird Treaty Act (MBTA) protected species have been observed in STA-2 and STA-5/6. Due to recent basin runoff, it is recommended that no Lake Releases be sent to the STAs/FEBs this week.

Everglades

Water management resulting in the recommended recession rates (see table of recommendations at the end of the report) would generate the most pronounced ecological benefit for wildlife in Rotenberger Wildlife Management Area and protect peat soils in northern WCA-3A. Over drying in the northern portions of WCA-3A puts those regions' peat soils at risk and increases the likelihood of damaging wild fires. Inflows into those areas continue to provide ecological benefit and there is little risk of a negative impact to wading bird foraging conditions in WCA-3A South. The most recent reversals due to rainfall have had little to no noticeable detrimental impact on wading bird nesting or foraging but it may be too soon to tell on the later nesting birds. System wide, both wood storks and white ibis are nesting, fledging and foraging at near record levels. Water depths in Taylor Slough range from 8 inches below to 3 inches above the historical averages. Salinity changes in Florida Bay ranged from −1.0 to +2.3 psu and are within 3 psu of the historical average for this time of year. Mangrove zone 30-day moving average decreased 0.9 ending at 17.1 psu.

Supporting Information

KISSIMMEE BASIN

Kissimmee Basin Rainfall

The Upper Kissimmee Basin received 0.79 inches of rainfall in the past week and the Lower Basin received 1.09 inches (SFWMD Daily Rainfall Report 5/14/2018).

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: 5/15/2018

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)						
							5/13/18	5/6/18	4/29/18	4/22/18	4/15/18	4/8/18	4/1/18
Lakes Hart and Mary Jane	S-62	0	LKMJ	59.7	R	59.9	-0.2	-0.2	-0.2	-0.2	-0.2	-0.3	-0.3
Lakes Myrtle, Preston, and Joel	S-57	0	S-57	60.0	R	60.2	-0.2	-0.1	-0.1	0.0	0.0	-0.2	-0.2
Alligator Chain	S-60	23	ALLI	62.5	R	62.5	0.0	0.0	-0.1	0.1	0.0	-0.1	-0.2
Lake Gentry	S-63	43	LKGT	60.0	R	60.0	0.0	0.0	0.0	0.0	0.1	0.0	-0.1
East Lake Toho	S-59	50	TOHOE	55.4	R	55.7	-0.3	-0.4	-0.6	-0.7	-0.8	-0.9	-1.1
Lake Toho	S-61	126	TOHOW, S-61	52.4	R	52.7	-0.3	-0.4	-0.6	-0.7	-0.7	-0.9	-1.1
Lakes Kissimmee, Cypress, and Hatchineha	S-65	357	KUB011, LKIS5B	48.9	R	49.6	-0.7	-0.8	-0.8	-0.9	-1.0	-1.3	-1.4

[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: **5/15/2018**

Metric	Location	1-Day Average	Average for the Preceeding 7-Days[1]									
		5/13/2018	5/13/18	5/6/18	4/29/18	4/22/18	4/15/18	4/8/18	4/1/18	3/25/18	3/18/18	3/11/18
Discharge (cfs)	S-65	492	357	343	348	392	406	340	376	361	400	461
Discharge (cfs)	S-65A	373	252	248	246	270	313	257	246	245	258	319
Discharge (cfs)	S-65D[2]	373	323	304	341	362	384	301	324	329	343	430
Stage (feet NGVD)	S-65D[2]	25.67	25.83	25.89	25.81	25.77	25.86	25.77	25.86	25.80	25.66	25.73
Discharge (cfs)	S-65E[2]	373	290	263	304	318	355	297	325	348	317	441
Discharge (cfs)	S-67	330	71	0	0	0	1	0	0	0	0	0
DO (mg/L)[3]	Phase I river channel	6.4	7.3	7.9	7.1	7.2	6.2	6.8	7.5	8.2	8.3	7.0
Mean depth (feet)[4]	Phase I floodplain	0.06	0.06	0.06	0.06	0.07	0.07	0.06	0.07	0.09	0.07	0.09

[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 S-65D and S-65DX1; S-65E discharge combines S-65E and S-65EX1.
[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)

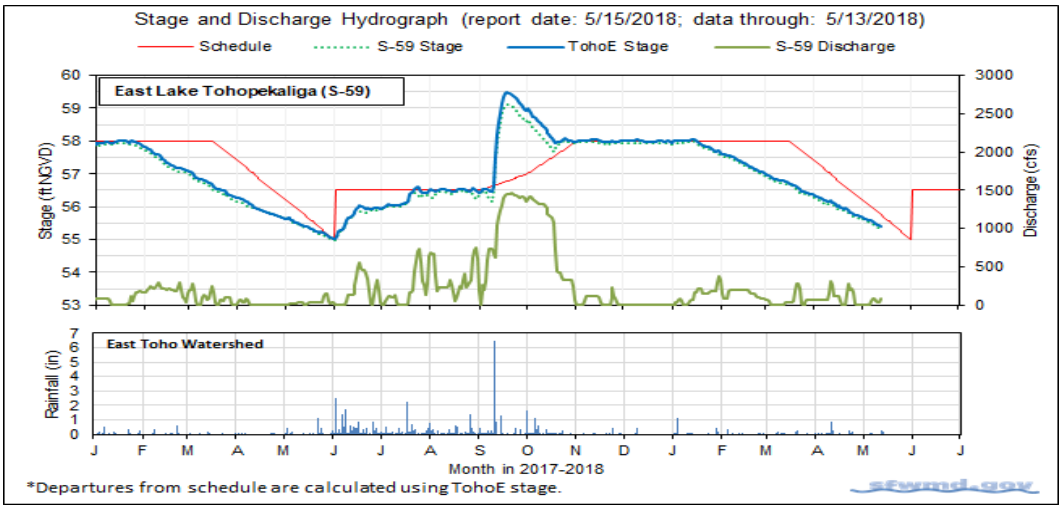


Figure 1.

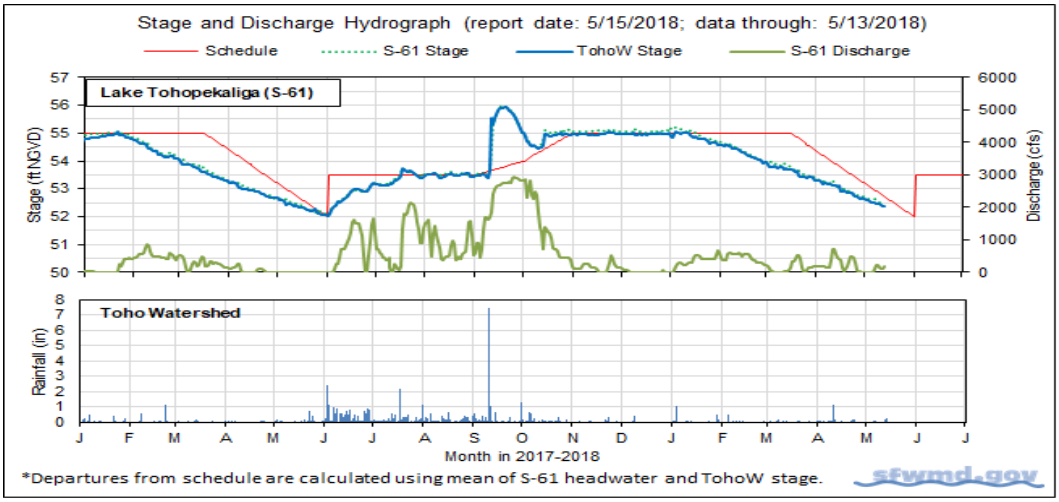


Figure 2.

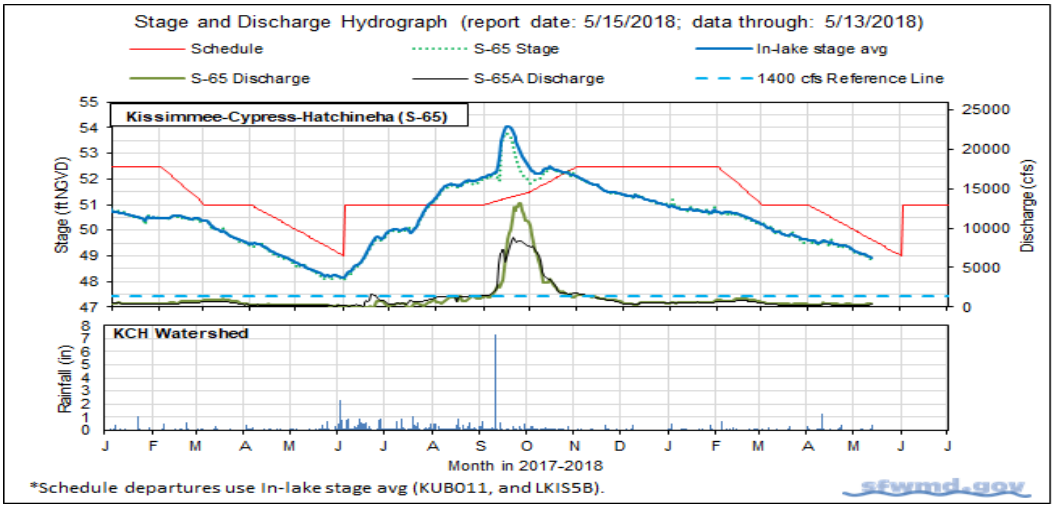


Figure 3.

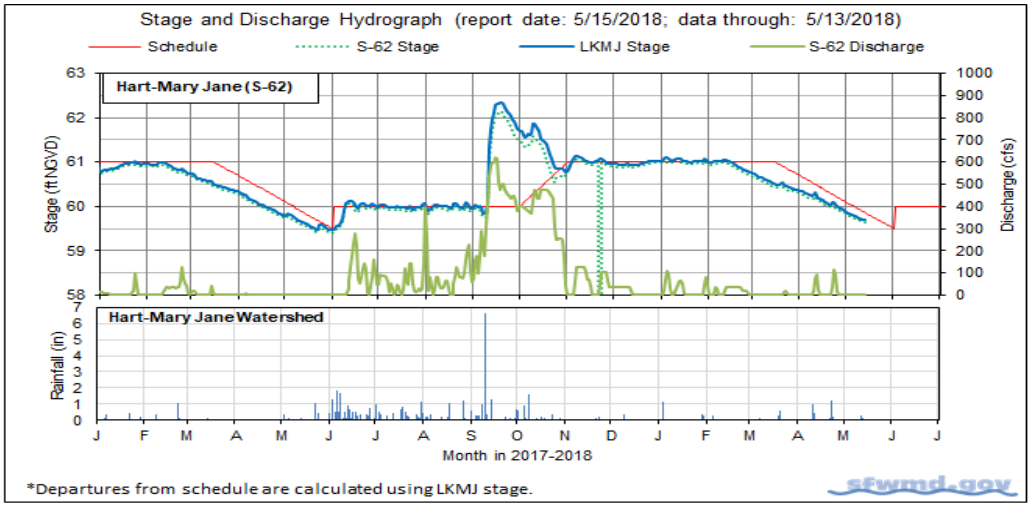


Figure 4.

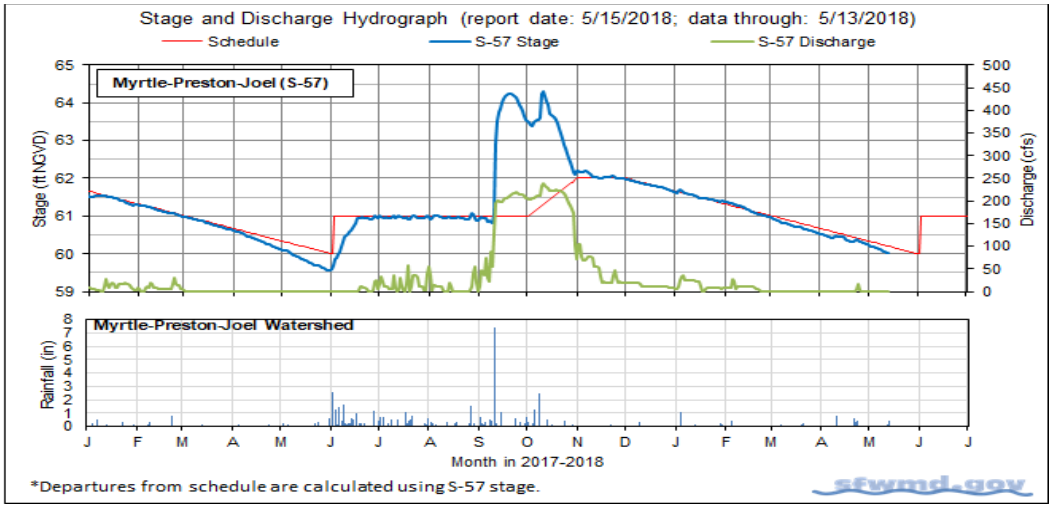


Figure 5.

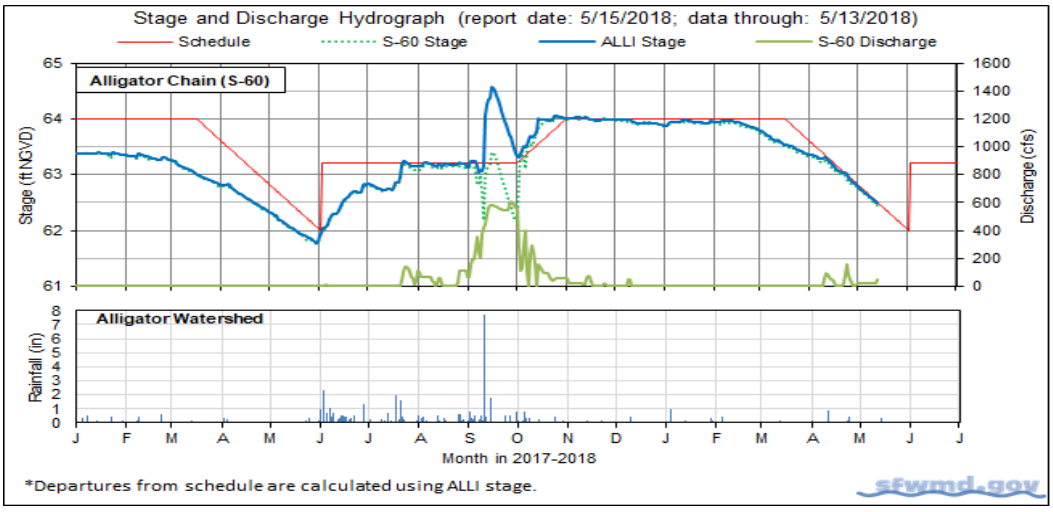


Figure 6.

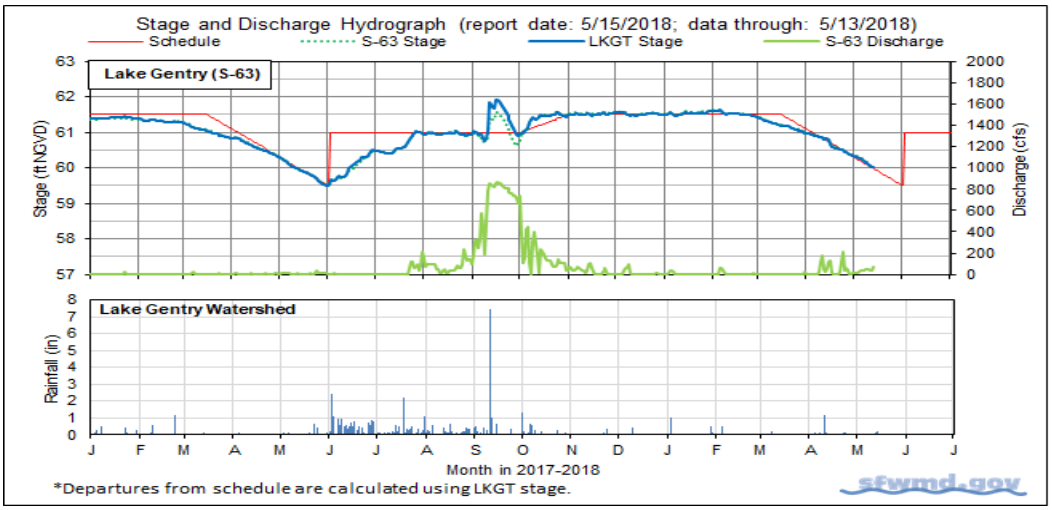


Figure 7.

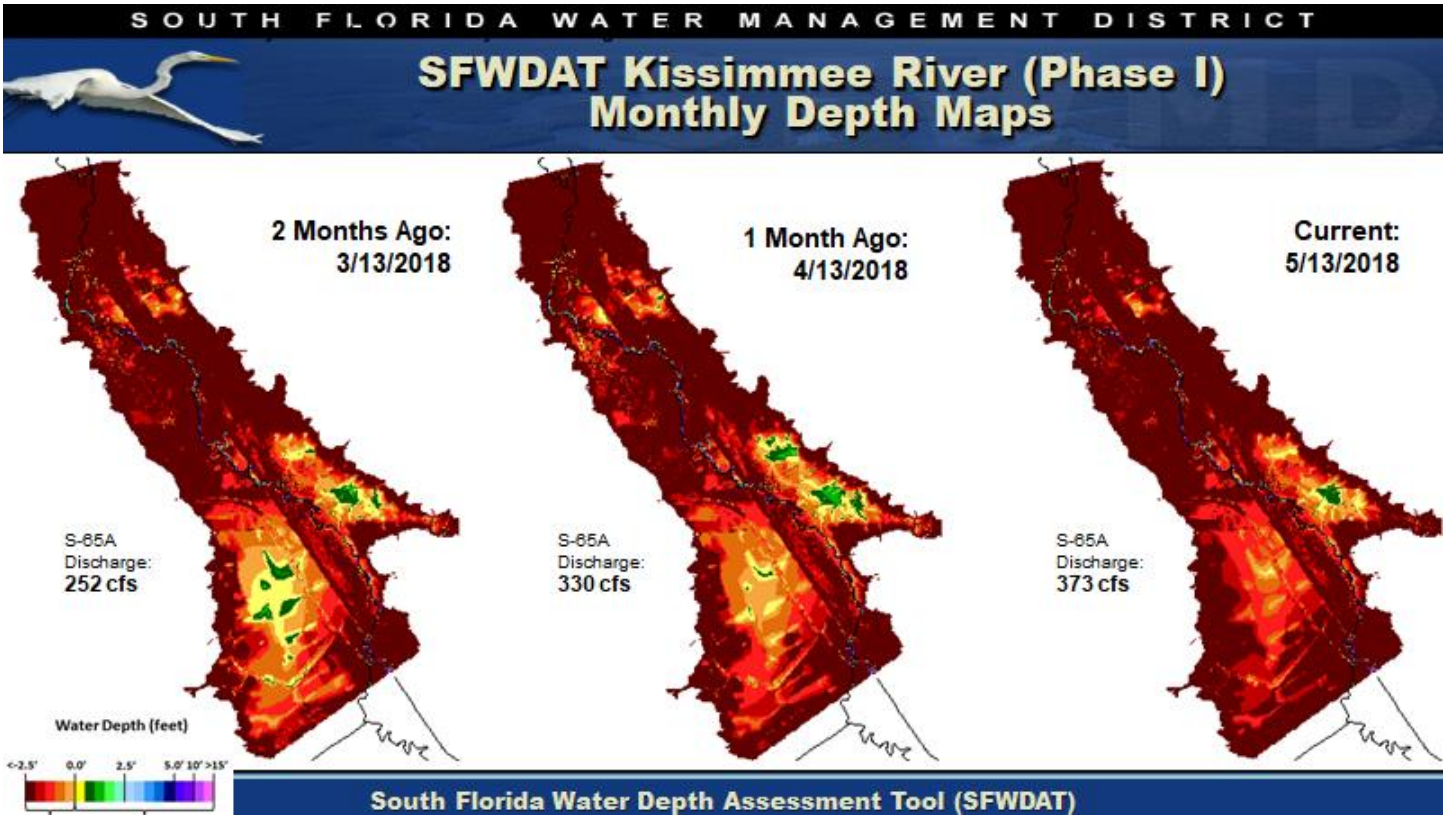


Figure 8. Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to January 16, 2012.

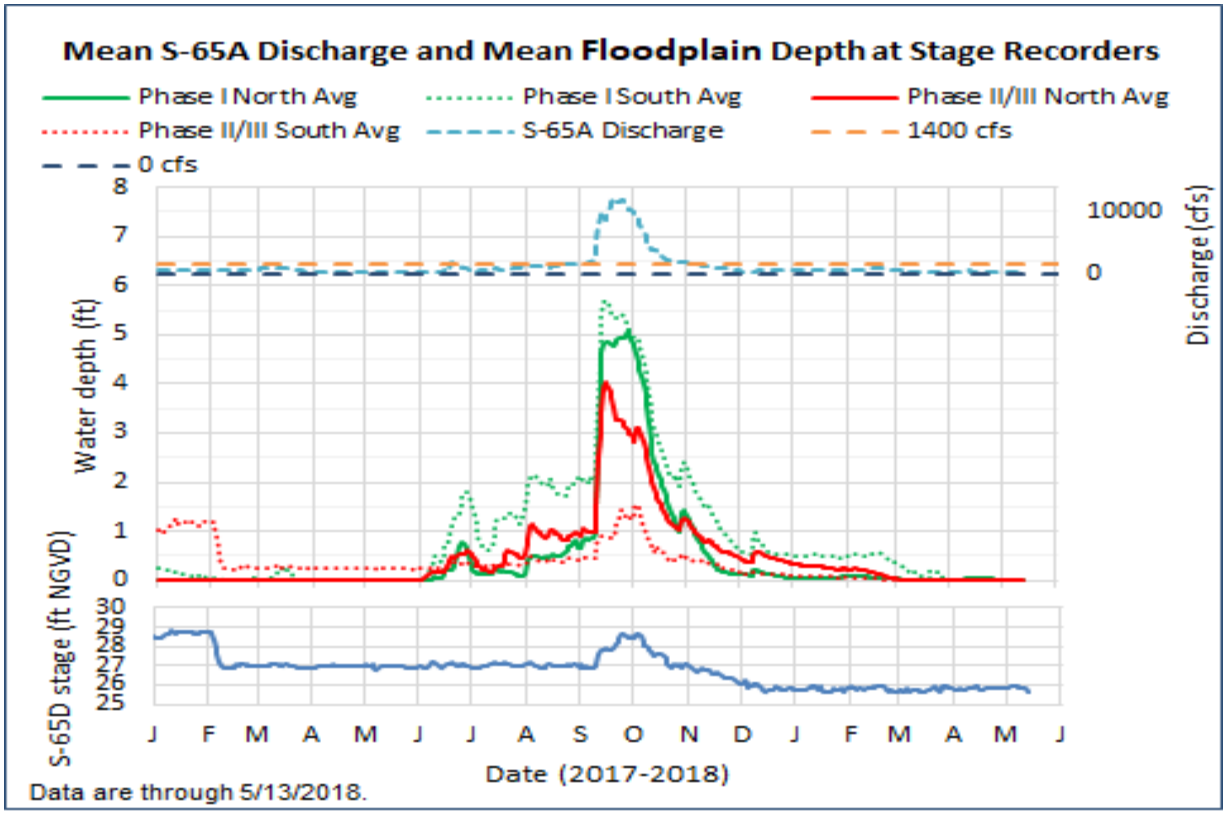


Figure 9. Mean water depth at stage recorders in the northern Phase I, southern Phase I, northern Phase II/III, and southern Phase II/III areas in relation to the S-65A discharge and S-65D headwater stage.

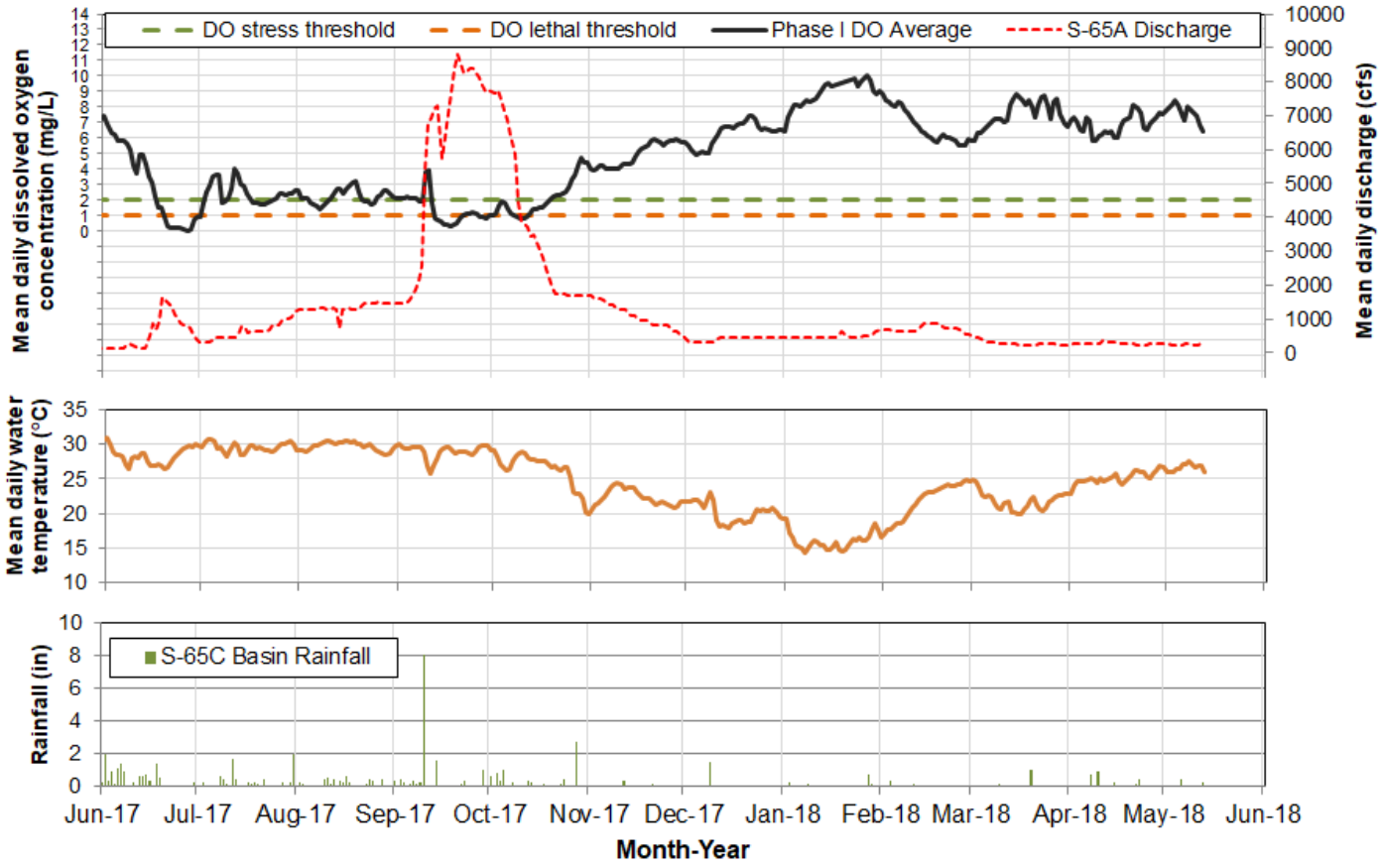


Figure 10. Mean daily dissolved oxygen, discharge, temperature and rainfall in the Phase I river channel.

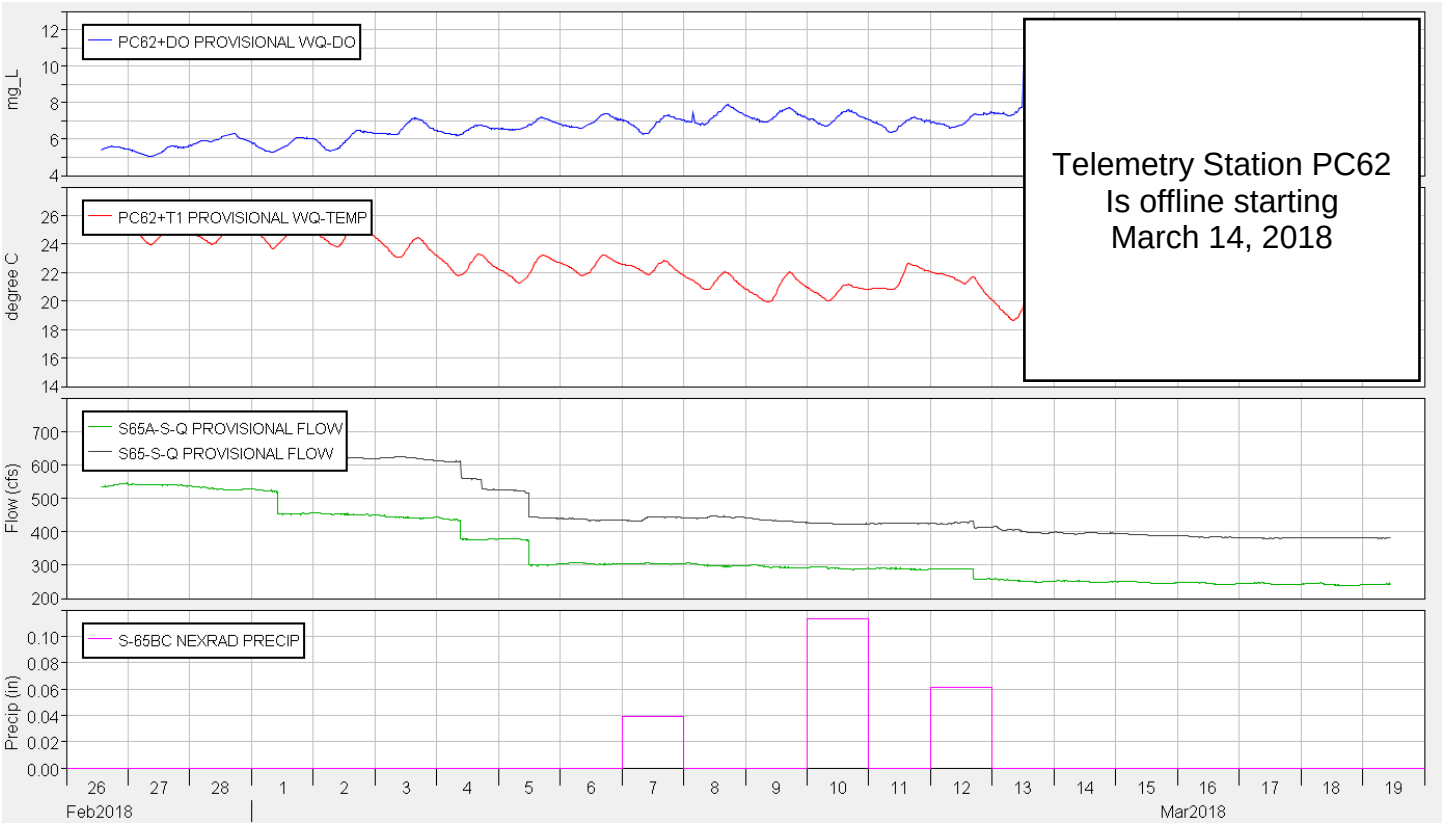


Figure 11. Phase I river channel dissolved oxygen and water temperature (measured at 15-minute intervals) and Pool BC daily rainfall.

Water Management Recommendations

Kissimmee Basin Adaptive Recommendations and Operational Actions

Date	Recommendation	Purpose	Outcome	Source
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.	Implemented	KB Ops
5/8/2018	No new recommendations.		N/A	
5/1/2018	No new recommendations.		N/A	
4/24/2018	No new recommendations.		N/A	
4/17/2018	No new recommendations.		N/A	
4/10/2018	No new recommendations.		N/A	
4/3/2018	No new recommendations.		N/A	
3/27/2018	No new recommendations.		N/A	
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	

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

S-65/S-65A Limits on Rate of Change in Discharge

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 S-65/S-65A starting with the 2016-2017 Dry Season. Revised 11/16/16.

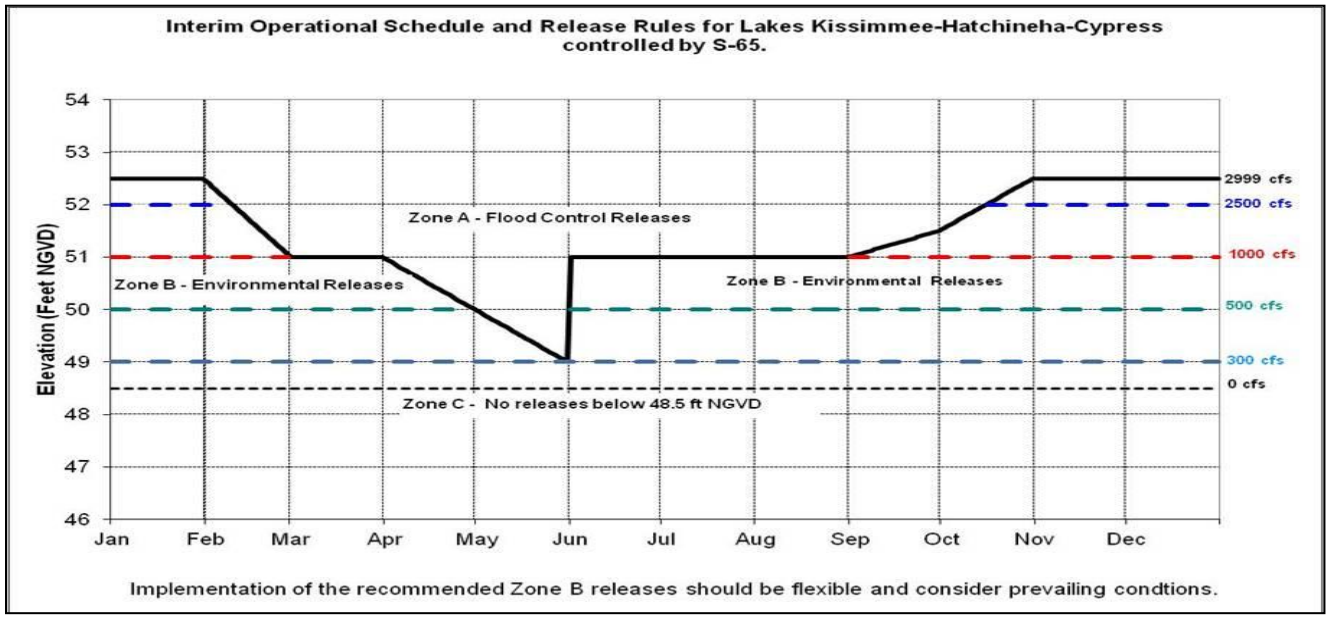


Figure 13. Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years.

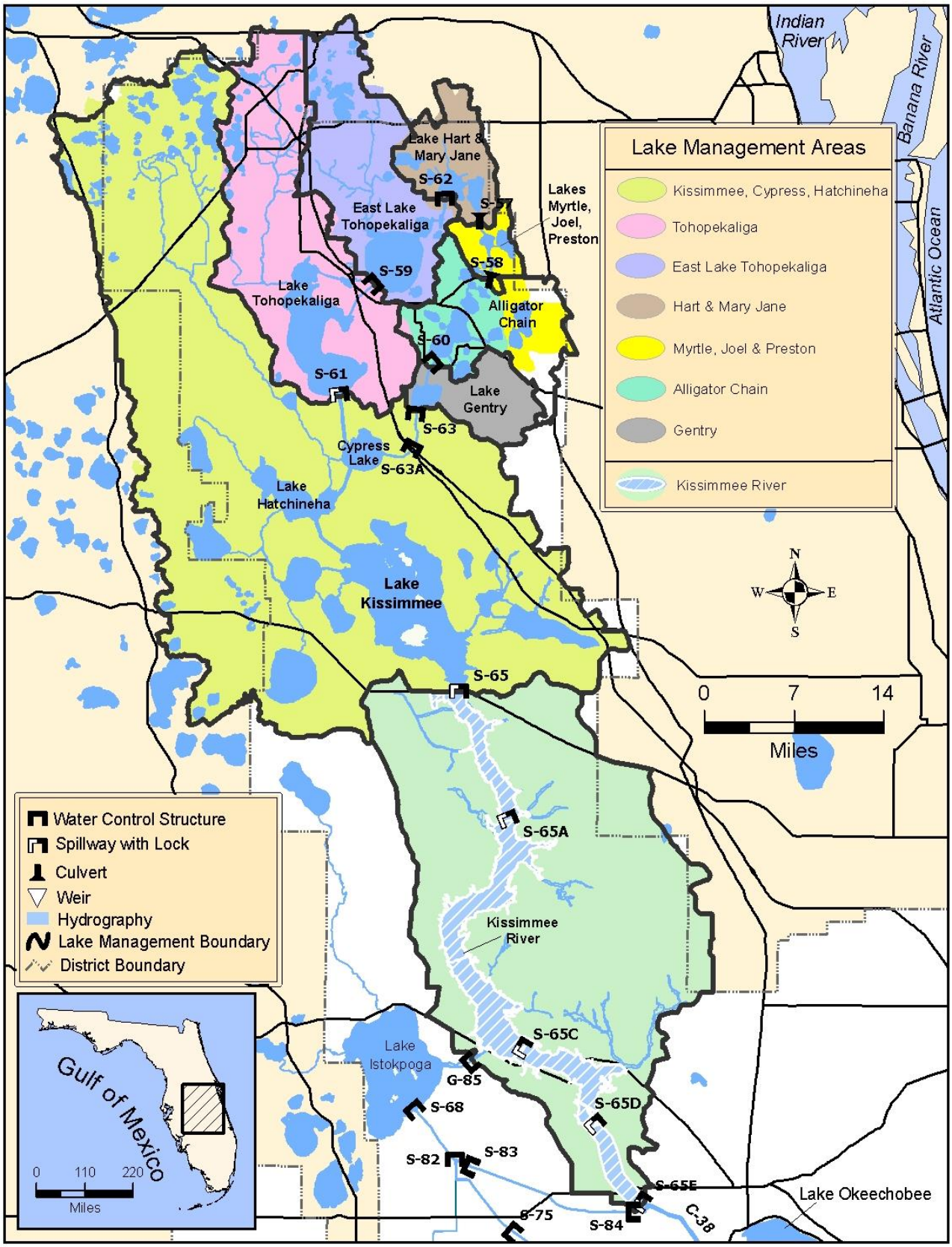


Figure 14. The Kissimmee Basin.

LAKE OKEECHOBEE

According to the USACE web site, Lake Okeechobee stage is 13.04 feet NGVD for the period ending at midnight on May 14, 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 0.39 feet lower than it was a month ago, 4.2 feet lower than its peak in mid-October 2017, and 1.61 feet higher than a year ago (Figure 1). The Lake is now in the Base Flow sub-band and is rising quickly towards the Low sub-band (Figure 2). According to RAINDAR, 3.6 inches of rain fell over the Lake during the week May 8, 2018 – May 14, 2018. Several areas on the northern shore received similar or more rainfall, between 2.0 – 5.1 inches, while much of the Kissimmee Basin received less, between 1.2 – 2.4 inches (Figure 3).

Average daily inflows to the Lake were only slightly higher than the previous week due to the rainfall occurring on the last day; total inflows averaged 720 cfs vs 340 cfs the previous week. Kissimmee River discharges through the S-65E structures increased slightly compared to the previous week, from 278 cfs to 331 cfs. Other inflows, from the S-71, S-72, S-84, S-154, S-191, and S-133 pump structures contributed a combined 384 cfs compared to just 51 cfs the previous week. Fisheating Creek inflows remained negligible at just 4 average daily cfs.

Average daily outflows for the Lake decreased from the previous week, going from 1,724 cfs to 1,070 cfs. Discharges through the S-77 decreased from 612 cfs the previous week to 364 cfs this past week, while discharges through S-308 decreased slightly from 241 cfs to 219 cfs. Discharges south through the S-350 structures decreased from the previous week, going from 747 cfs to 443 cfs. Flows to the L-8 canal via Culvert 10A decreased from the previous week as well, going from 123 cfs to 46 cfs this past week, mainly due to flows reversing and coming back into the Lake at 252 cfs on Monday, May 14. The corrected average daily evapotranspiration value for the week based on the L006 weather platform solar radiation data fell to 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.

Based on the Lake Okeechobee wading bird habitat suitability index, there was an increase of approximately 600 acres in habitats with suitable foraging depths for long-legged wading birds from the previous week, with 27,881 acres of suitable depth on May 14. There was also a small increase of roughly 400 acres of suitable foraging depths for short or long-legged wading birds, going from 12,115 acres the previous week to 12,540 acres this past week (Figure 5). However, substantial stage reversals are likely to disperse prey and disrupt foraging and nesting activity on the Lake.

The most recent satellite imagery using the cyanobacteria monitoring product derived from NOAA's OLCI satellite sensor also suggests cyanobacteria bloom potential remains low, though there were again some pixels with medium potential scattered throughout the western and northern nearshore zones (Figure 6). Last summer, the potential for elevated cyanobacterial levels increased in early July, when winds subsided and turbidity values plummeted.

Water Management Recommendations

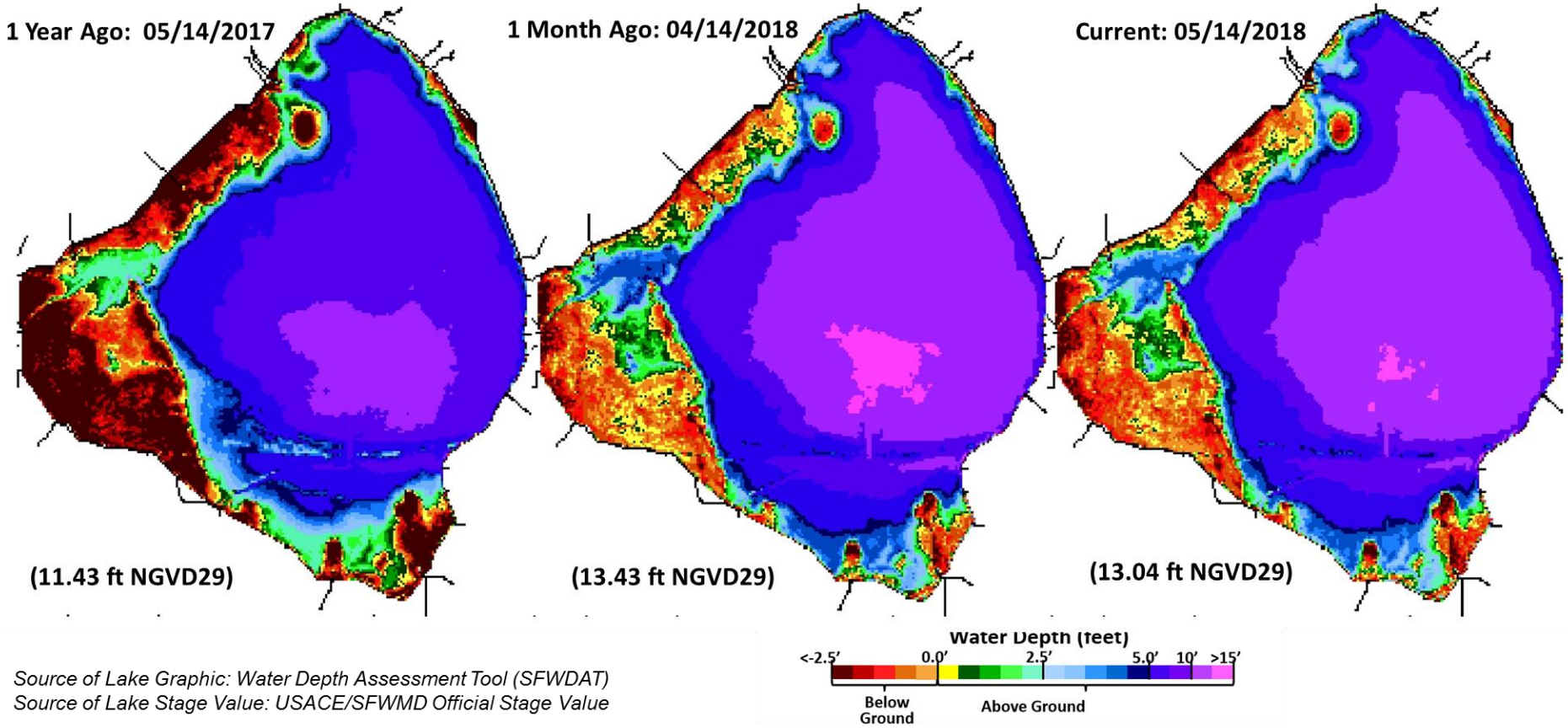
Lake Okeechobee stage is 13.04 feet NGVD having decreased 0.08 feet over the past week and 0.39 feet over the last month. There was considerable rainfall at the end of the week, bringing the first substantial stage reversal since late October 2017. The Lake stage was below 13.0 feet NGVD for just 10 days, which could limit SAV and emergent vegetation recovery in the nearshore zone if the wet season has begun and stages continue to rise. Additionally, most of the wading bird foraging activity and some new nesting activity had recently moved downslope towards areas like Moonshine Bay, which may now become too deep for optimal foraging and reduce nesting activity on the Lake. Prolonging the duration of similar or lower Lake stages this summer will increase recovery potential of the nearshore vegetation communities and continue to promote wading bird habitat.

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	331	0.1
S71 & 72	65	0.0
S84 & 84X	168	0.1
Fisheating Creek	4	0.0
S154	25	0.0
S191	52	0.0
S133 P	74	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	10031	3.6
Total	**10751**	**4.0**

OUTFLOWS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)
S77	364	0.2
S308	219	0.1
S351	181	0.1
S352	39	0.0
S354	223	0.1
L8	46	0.0
ET	3114	1.4
Total	**4184**	**1.8**

PROVISIONAL DATA



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

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

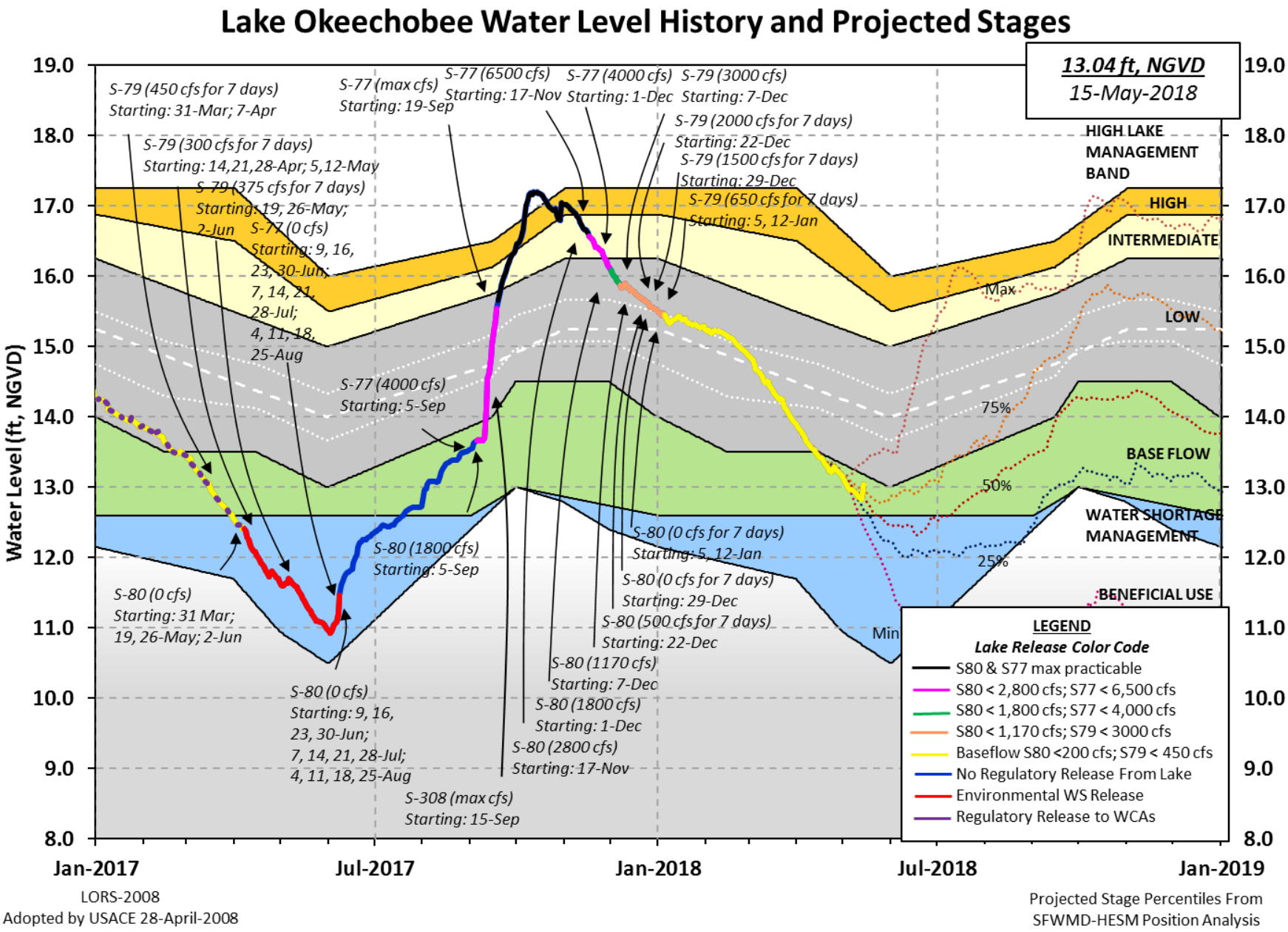


Figure 2. Recent Lake Okeechobee stage and releases, with projected stages based on a dynamic position analysis.

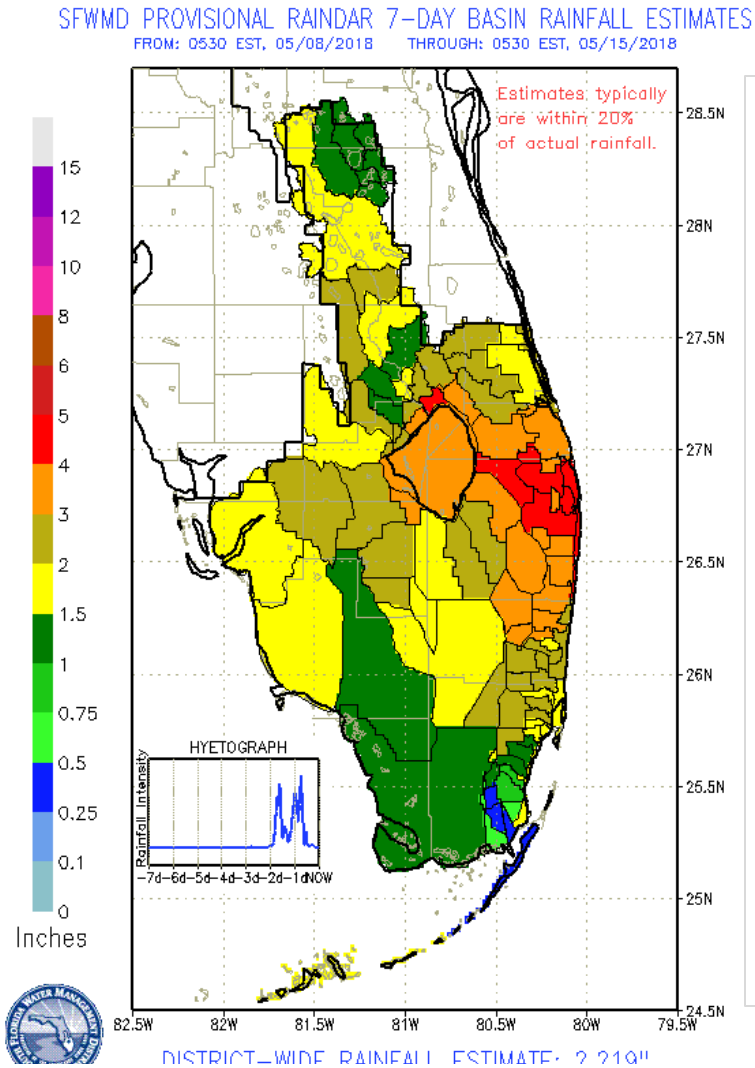
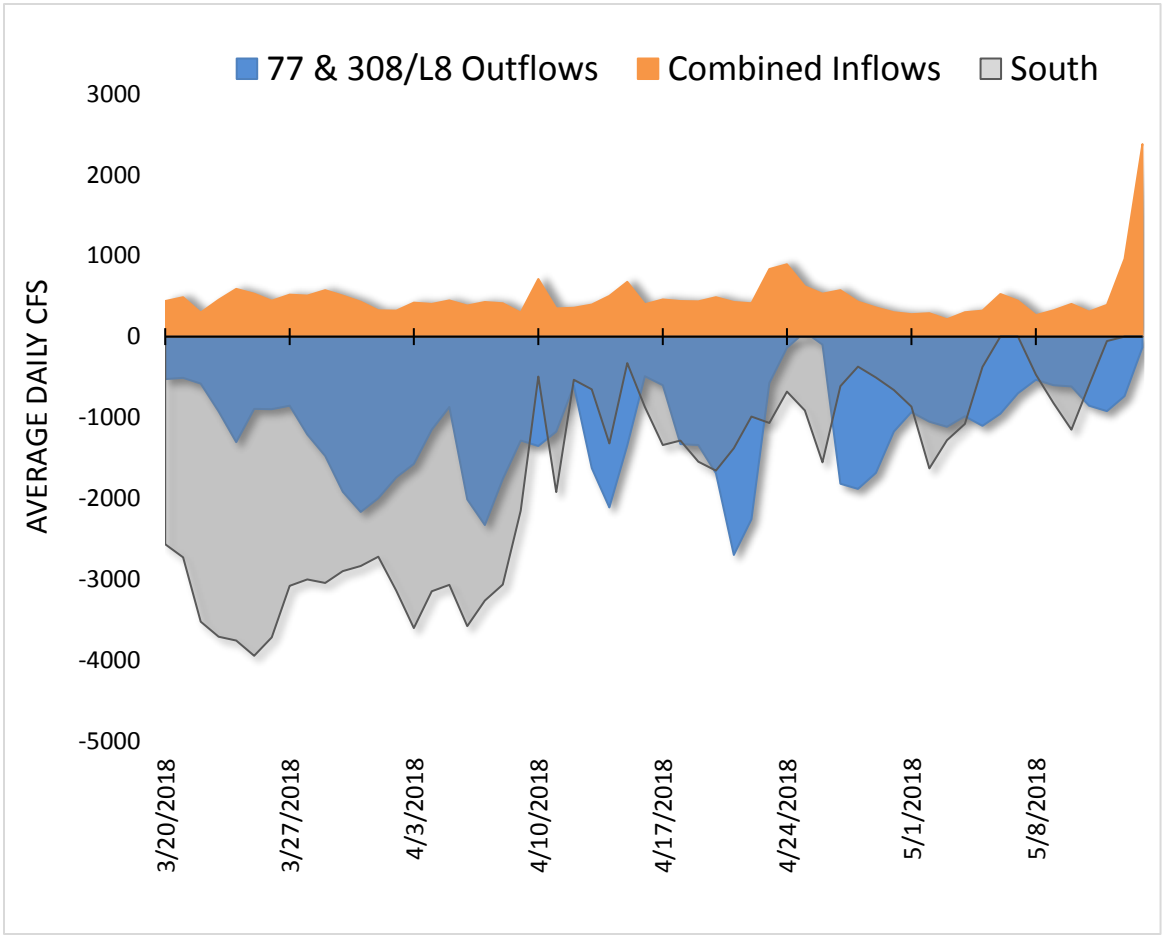
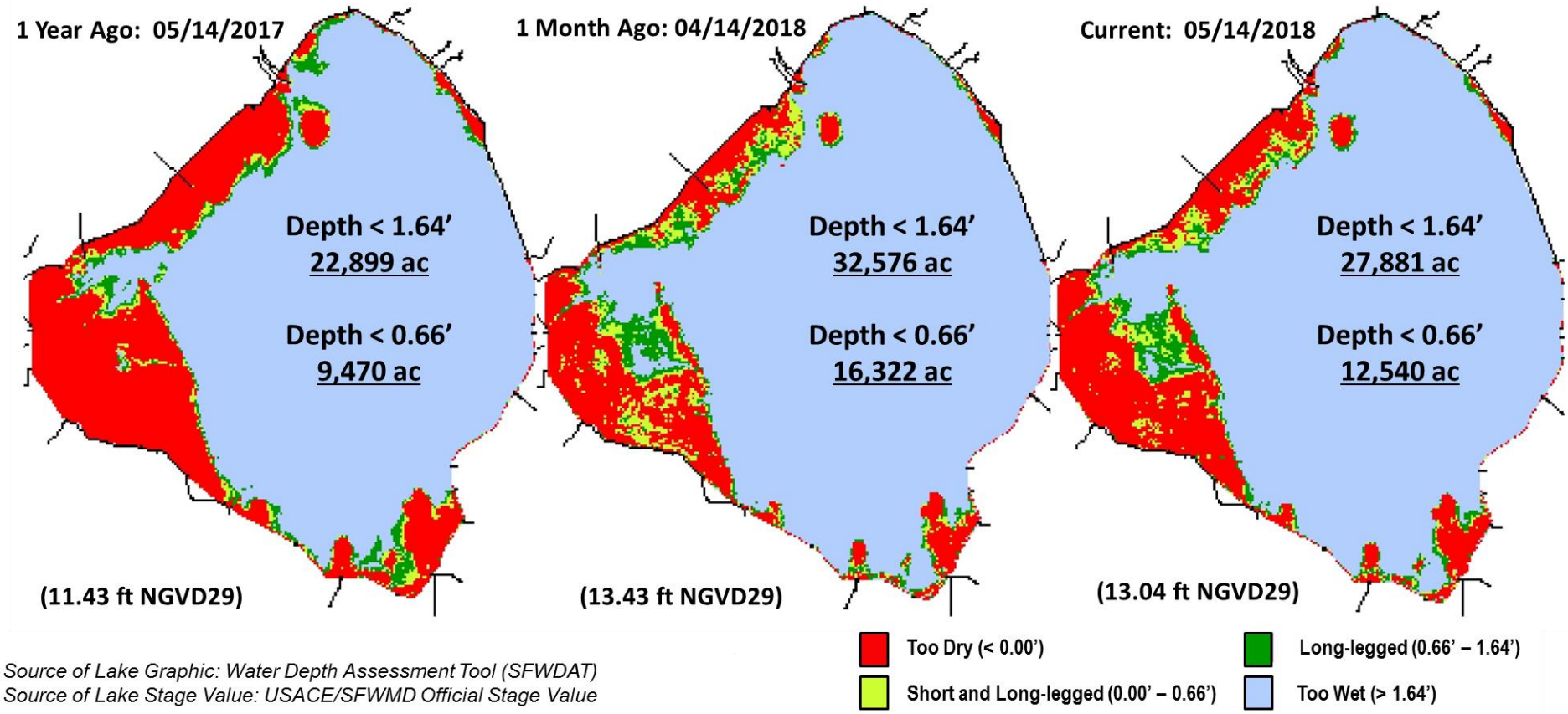


Figure 3. Rainfall estimates by basin.



PROVISIONAL DATA

Figure 4. Major inflows and outflows of Lake Okeechobee, including the S-350 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

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

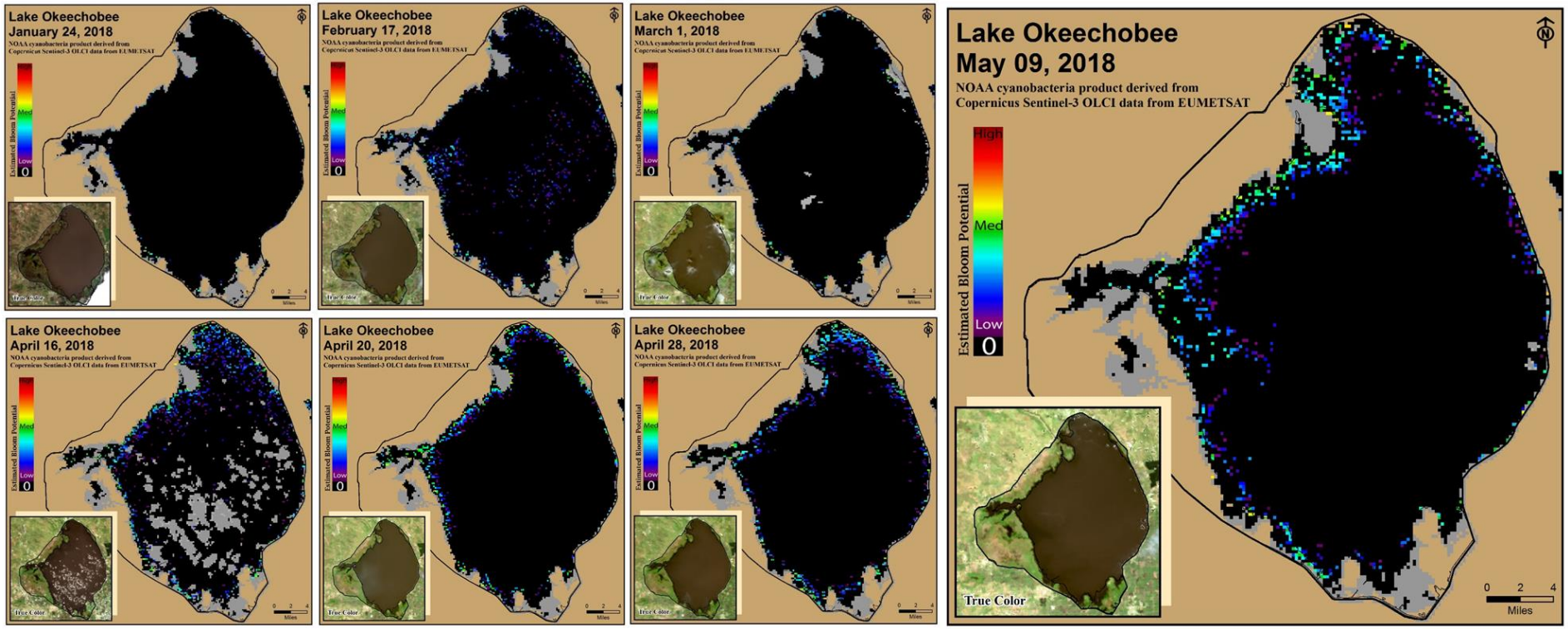


Figure 6. Potential for cyanobacterial blooms on Lake Okeechobee based on NOAA's harmful algal bloom monitoring system derived from Copernicus Sentinel-3 OLCI data from EUMETSAT.

LAKE ISTOKPOGA

Lake Istokpoga stage is 38.74 feet NGVD as of midnight May 14, 2018 and is currently 0.12 feet above its regulation schedule (Figure 7). Average daily inflows to the lake from Josephine and Arbuckle Creeks for the week May 8 – May 14, 2018 were similar to the previous week at 106 average daily cfs vs. Discharges via the S-68 and S-68X structures increased from the previous week, at 217 cfs compared to 50 cfs the previous week. According to RAINDAR, 2.1 inches of rain fell in the Lake Istokpoga basin over the past week.

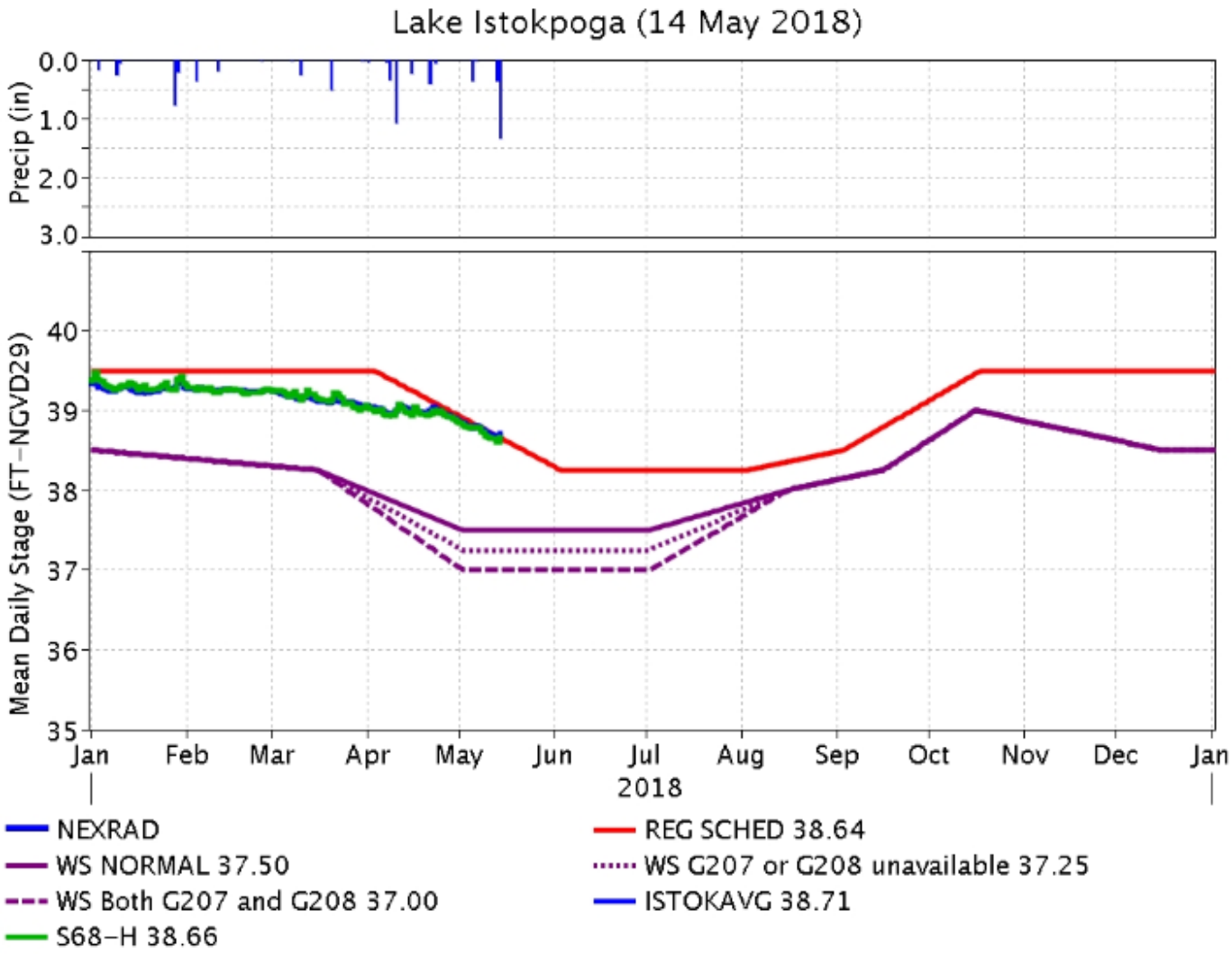


Figure 7. Recent stages on Lake Istokpoga.

ESTUARIES

St. Lucie Estuary:

Last week total inflow to the St. Lucie Estuary averaged about 454 cfs (Figures 1 and 2) and last month inflow averaged about 358 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	332
S-80	0
S-308	219
S-49 on C-24	31
S-97 on C-23	33
Gordy Rd. structure on Ten Mile Creek	58

Over the past week, salinity slightly decreased 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 24.6. Salinity conditions in the middle estuary are within 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)	**22.3** (23.8)	**23.7** (24.7)	NA[1]
US1 Bridge	**NR** (NR)	**25.3** (26.7)	10.0-26.0
A1A Bridge	**30.8** (31.5)	**32.1** (32.5)	NA[1]

[1]Envelope 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 *a* (µg/l)	Average DO (mg/l)	Minimum DO (mg/l)	Maximum DO (mg/l)
SF2	2.63	3.23 - 14.42	0.52	0.05	2.56
SF	1.61	3.4 - 9.26	5.86	4.63	7.83
NF	1.93	3.33 - 13.71	5.93	4.30	8.22
ME	1.78	2.42 - 8.44	6.45	5.49	8.07
IRL-SLE	3.57	0.44 - 3.06	6.15	5.86	6.52

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 1,183 cfs (Figures 7 and 8) and last month inflow averaged about 989 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	364
S-78	731
S-79	949
Tidal Basin Inflow	234

Over the past week in the estuary, salinity increased near Cape Coral and decreased downstream (Table 5, Figures 9 & 10). The seven-day average salinity values are in the good range for adult eastern oysters at Cape Coral and at Shell Point (Figure 11). Salinity data were not available at Sanibel. The 30-day moving average surface salinity is 3.9 at Val I-75 and 11.2 at Ft. Myers. With no flow through S-79, daily salinity at Val I-75 is forecast in two weeks to be 7.8, and the 30-day moving average is forecast to be 4.9 (Figure 13). 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)	**4.5** (2.4)	**4.8** (2.5)	NA[1]
*Val I75	**5.4** (3.1)	**9.2** (7.1)	0.0-5.0[2]
Ft. Myers Yacht Basin	**12.2** (10.6)	**16.4** (15.8)	NA
Cape Coral	**18.7** (18.6)	**20.9** (21.7)	10.0-30.0
Shell Point	**28.9** (30.2)	**27.8** (29.4)	10.0-30.0
Sanibel	**NR**[3](NR)	**NR** (NR)	10.0-30.0

[1]Envelope not applicable, [2]Envelope is based on a 30-day average, and [3]Not 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 *a* (µg/l)	4.51 – 21.49	3.04 – 21.45	1.14 – 17.70
Dissolved Oxygen (mg/l)	3.70 – 8.97	3.63 – 6.92	4.70 – 9.91

The Florida Fish and Wildlife Research Institute reported on May 11, 2018, that *Karenia brevis, the Florida red tide dinoflagellate,* was observed at background to medium concentrations in 17 samples collected from or offshore of Lee County. Fish kills were reported in Lee County over the past week.

NOAA satellite imagery indicates minimal visible cyanobacteria bloom potential in the Caloosahatchee Estuary this week (Figure 12).

Water Management Recommendations

Lake stage is in the Base Flow sub-band of 2008 LORS. Tributary hydrological conditions are dry. The 2008 LORS recommends up to 450 cfs at S-79 and up to 200 cfs at S-80. Although the Caloosahatchee Estuary is not in need of water at this time based on the Val I-75 forecast, the continuation of the current releases does provide benefits to the estuary.

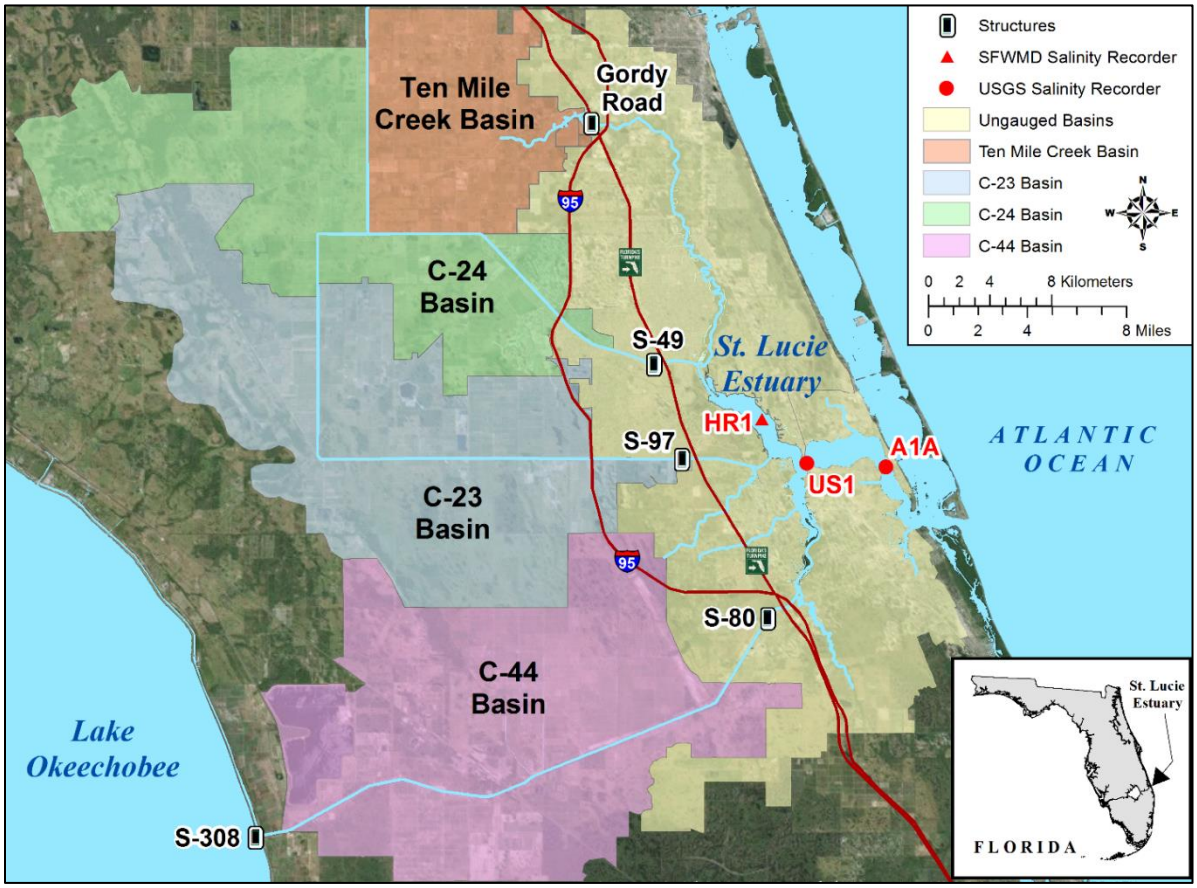


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

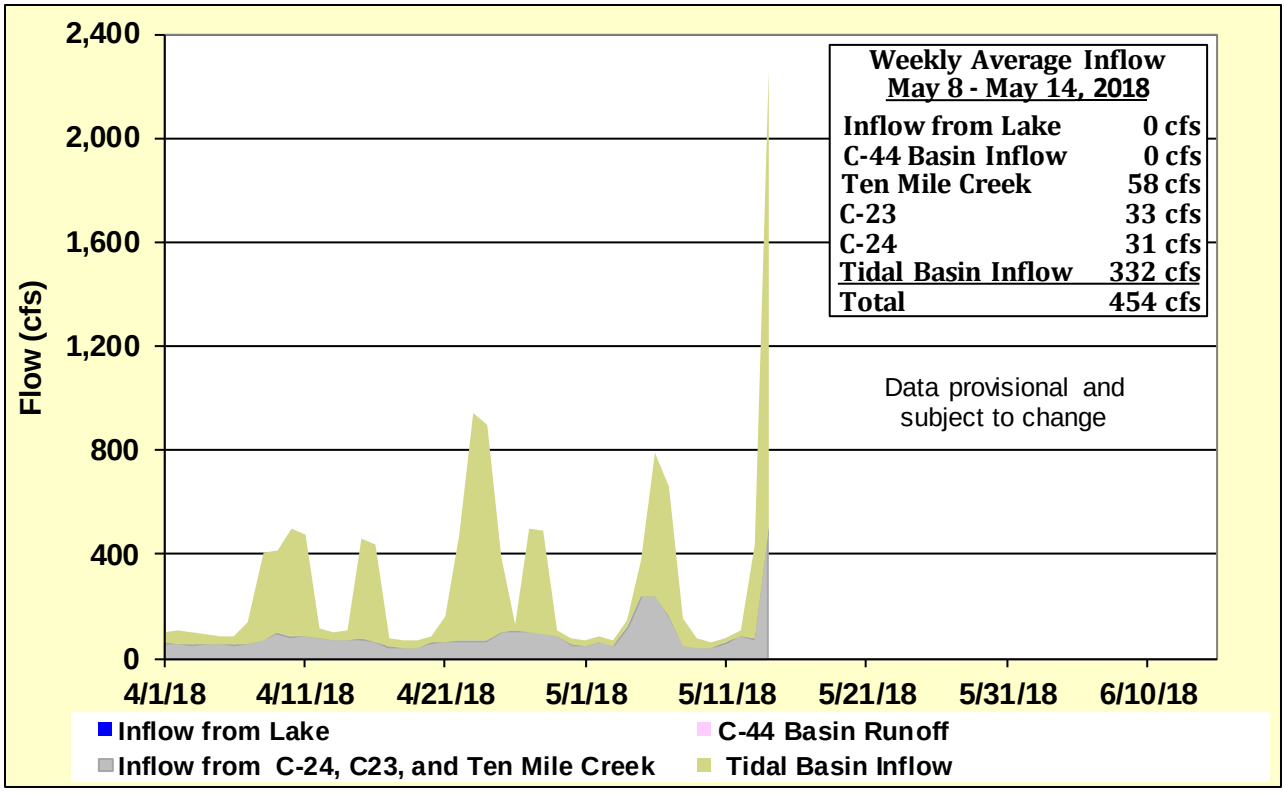


Figure 2. Estimated surface freshwater inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basins into the St. Lucie Estuary.

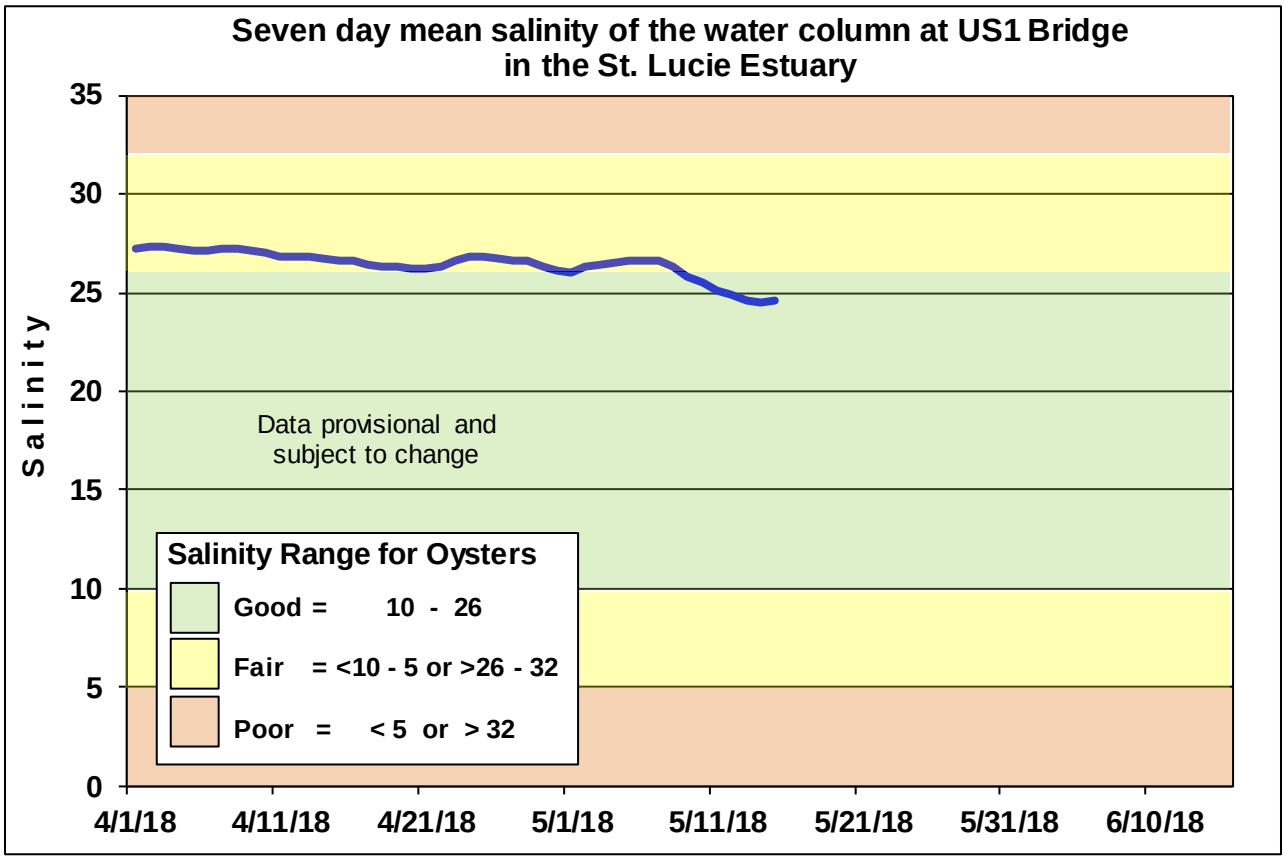


Figure 3. Seven-day mean salinity of the water column at the US1 Bridge.

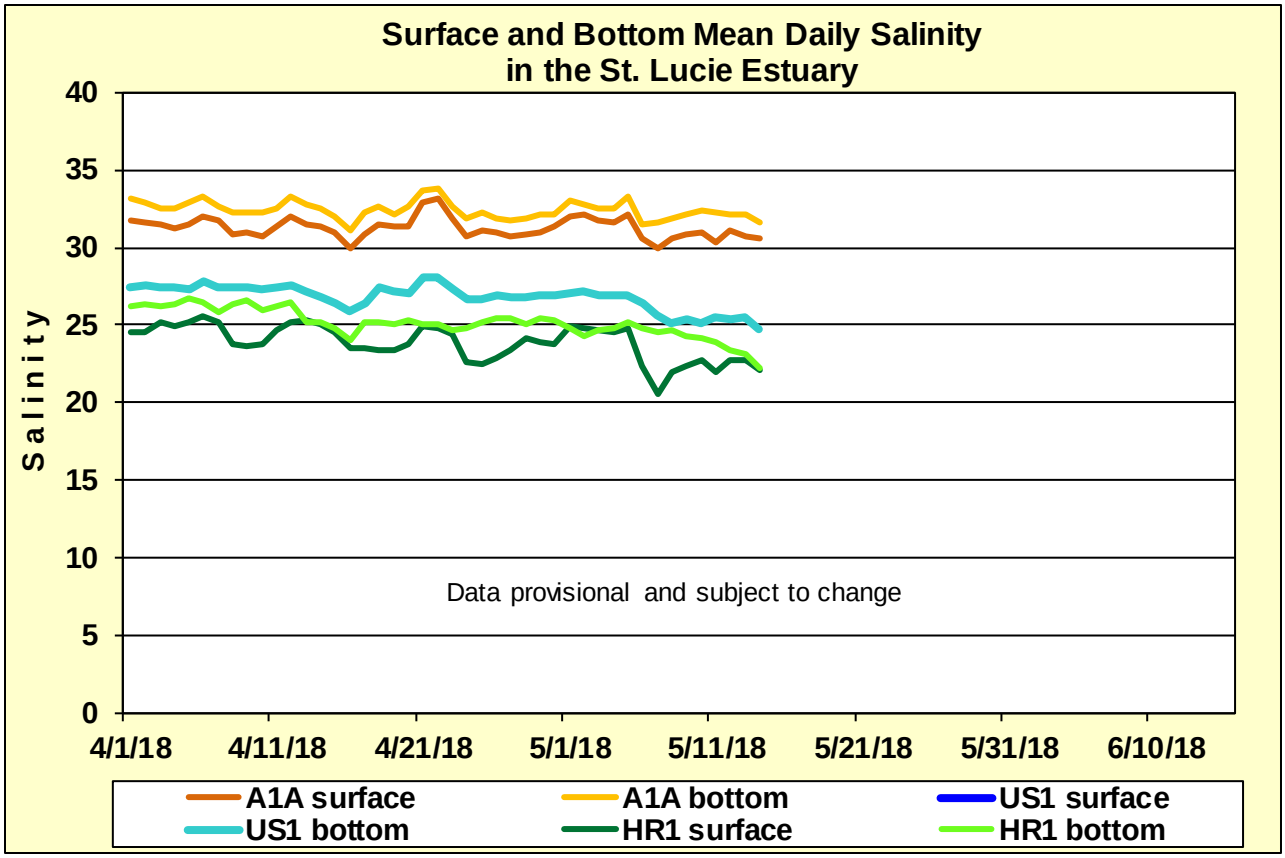


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

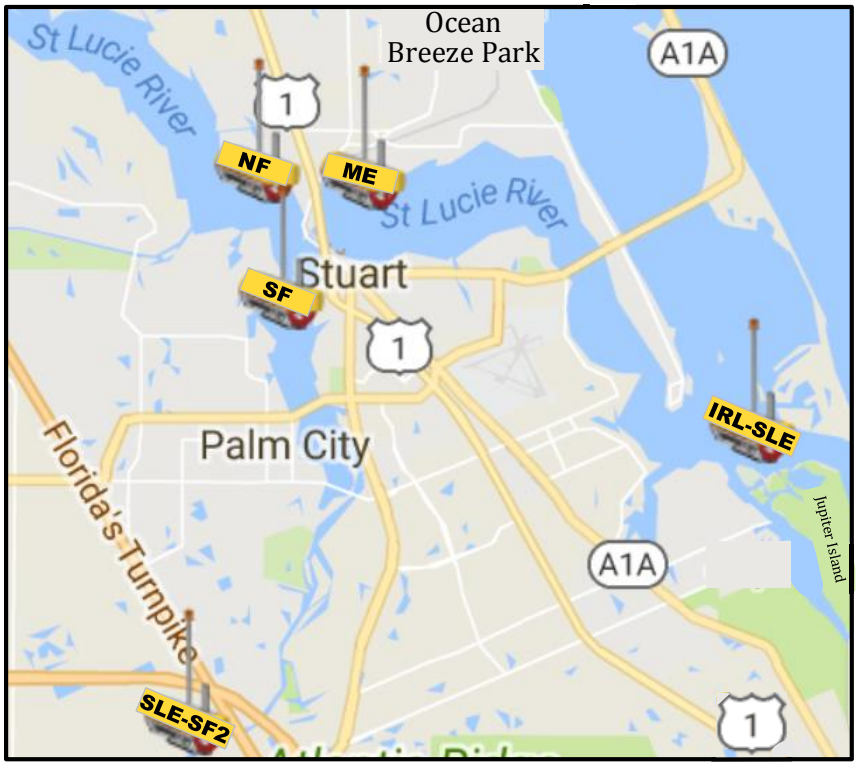


Figure 5. Location of FAU-HBOI LOBO water quality stations in the St. Lucie Estuary.

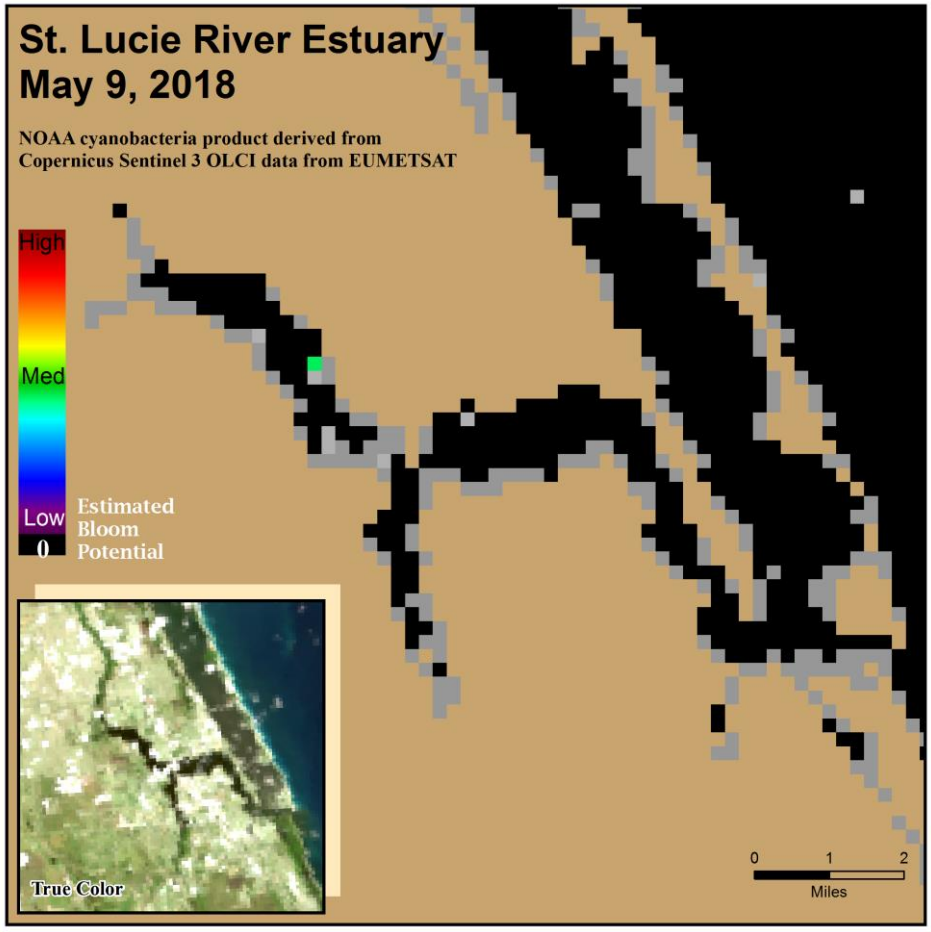


Figure 6. Sentinel 3a Satellite imagery provided by NOAA uses Ocean and Land Color Instrument (OLCI) to estimate cyanobacteria bloom potential in St. Lucie Estuary.

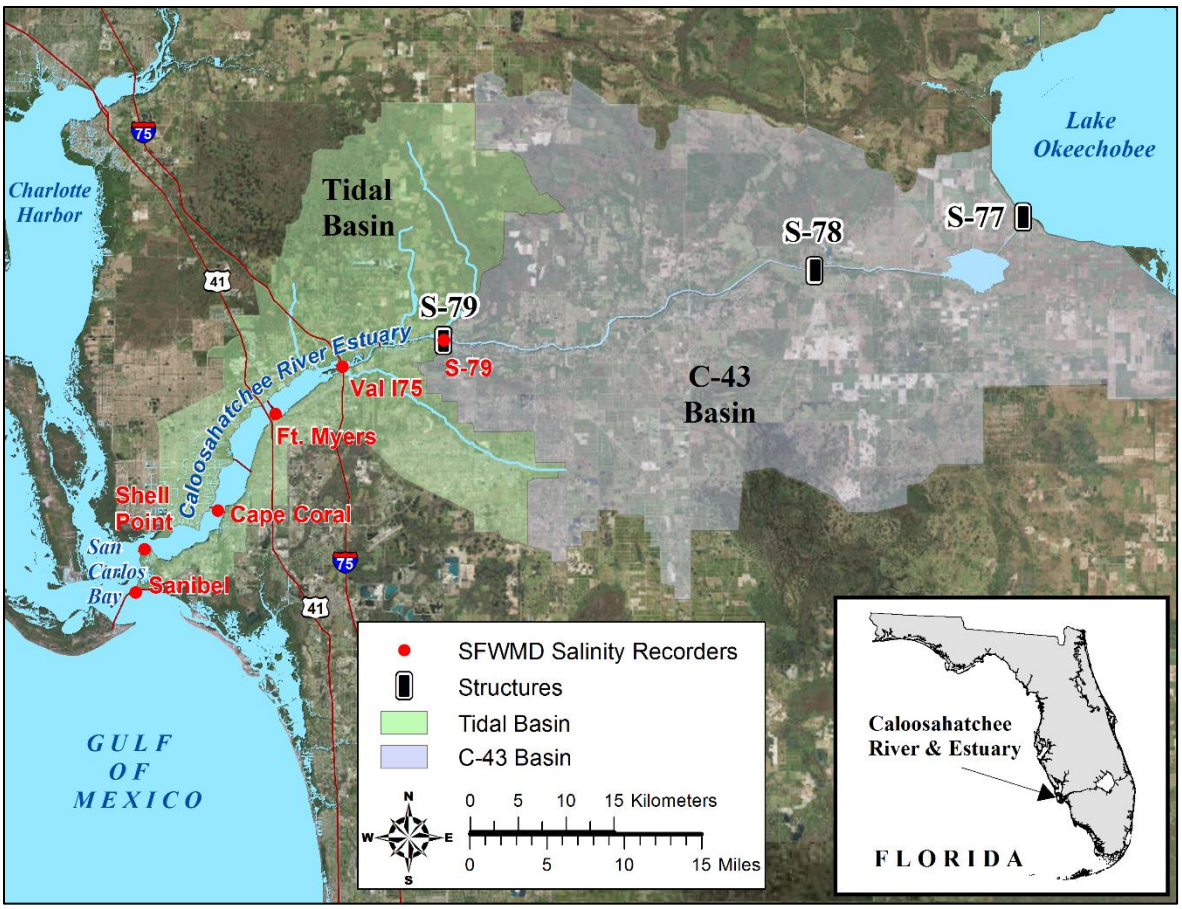


Figure 7. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

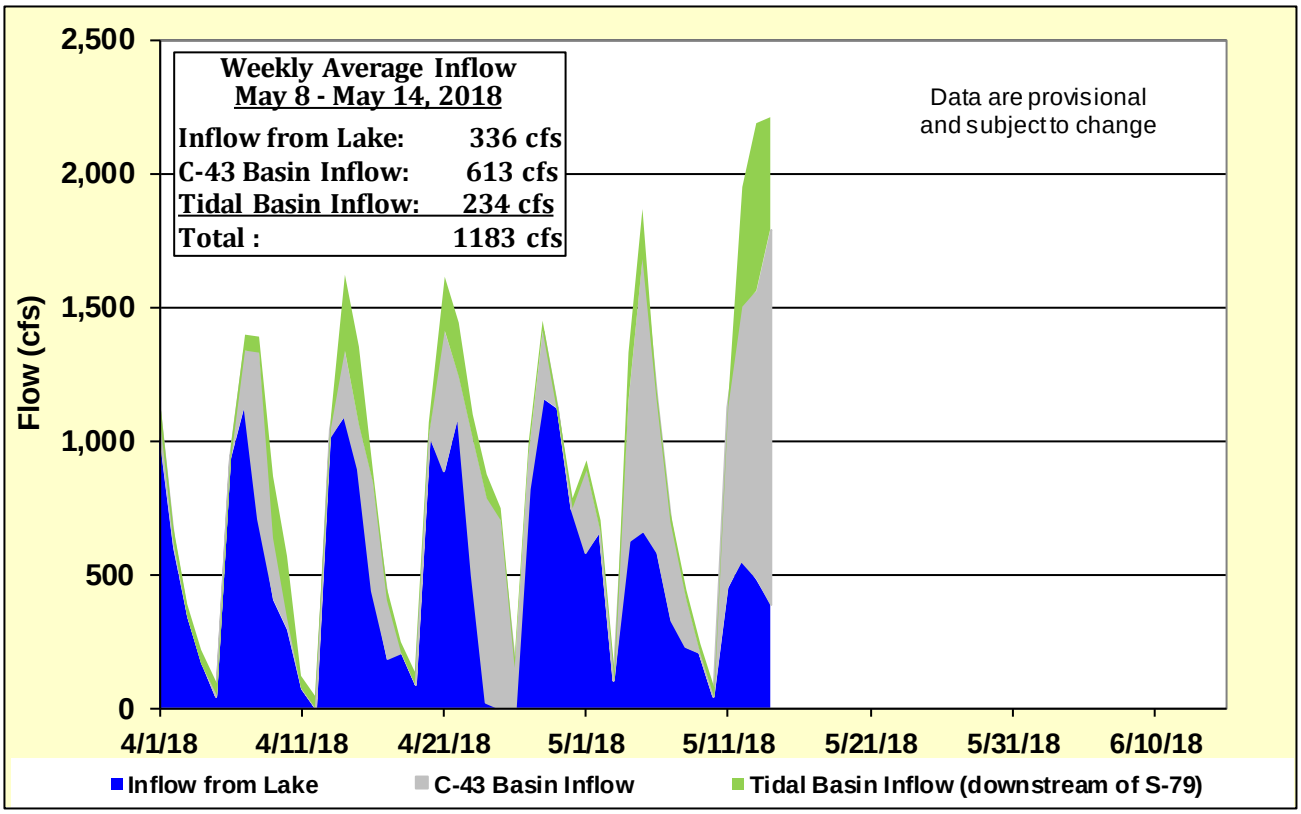


Figure 8. Freshwater inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.

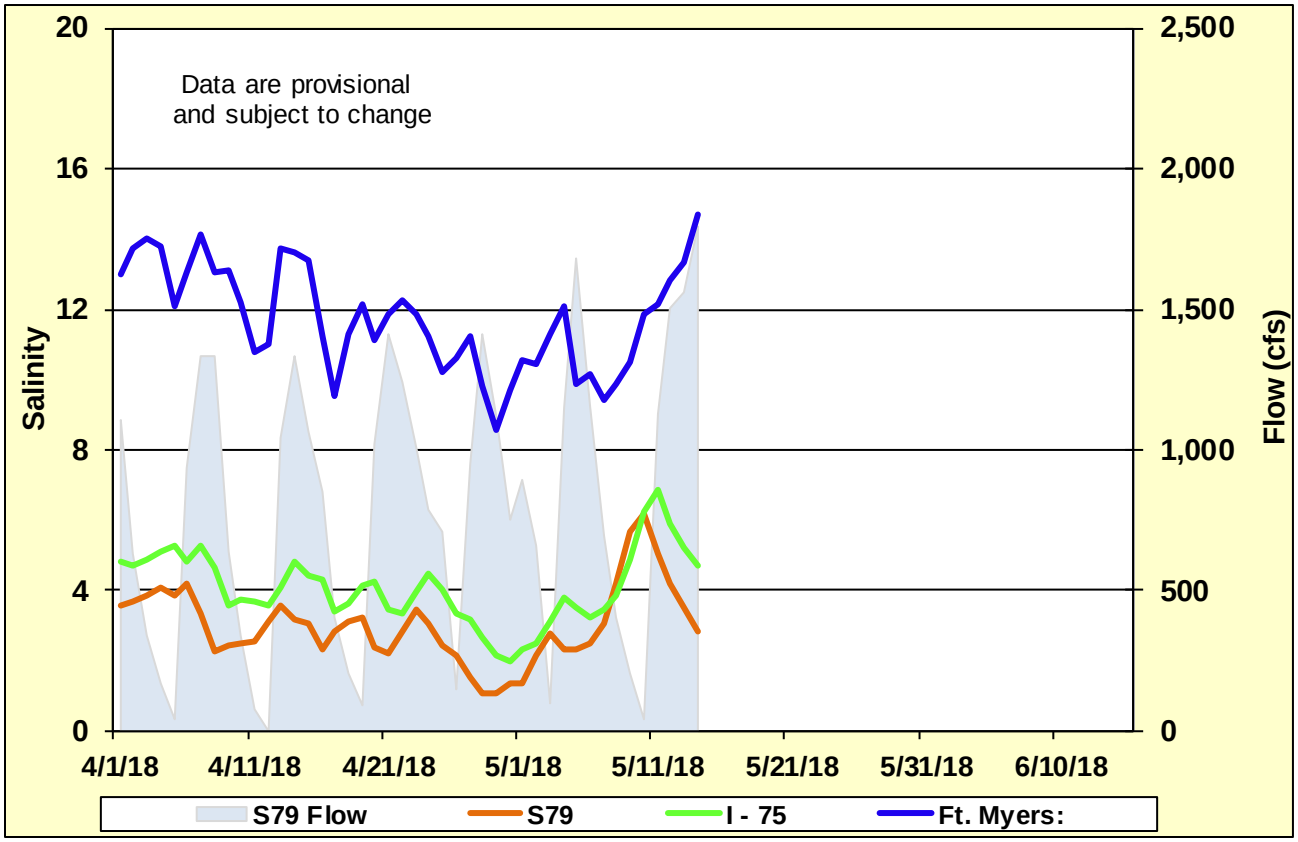


Figure 9. Daily mean flows at S-79 and salinity at upper estuary monitoring stations.

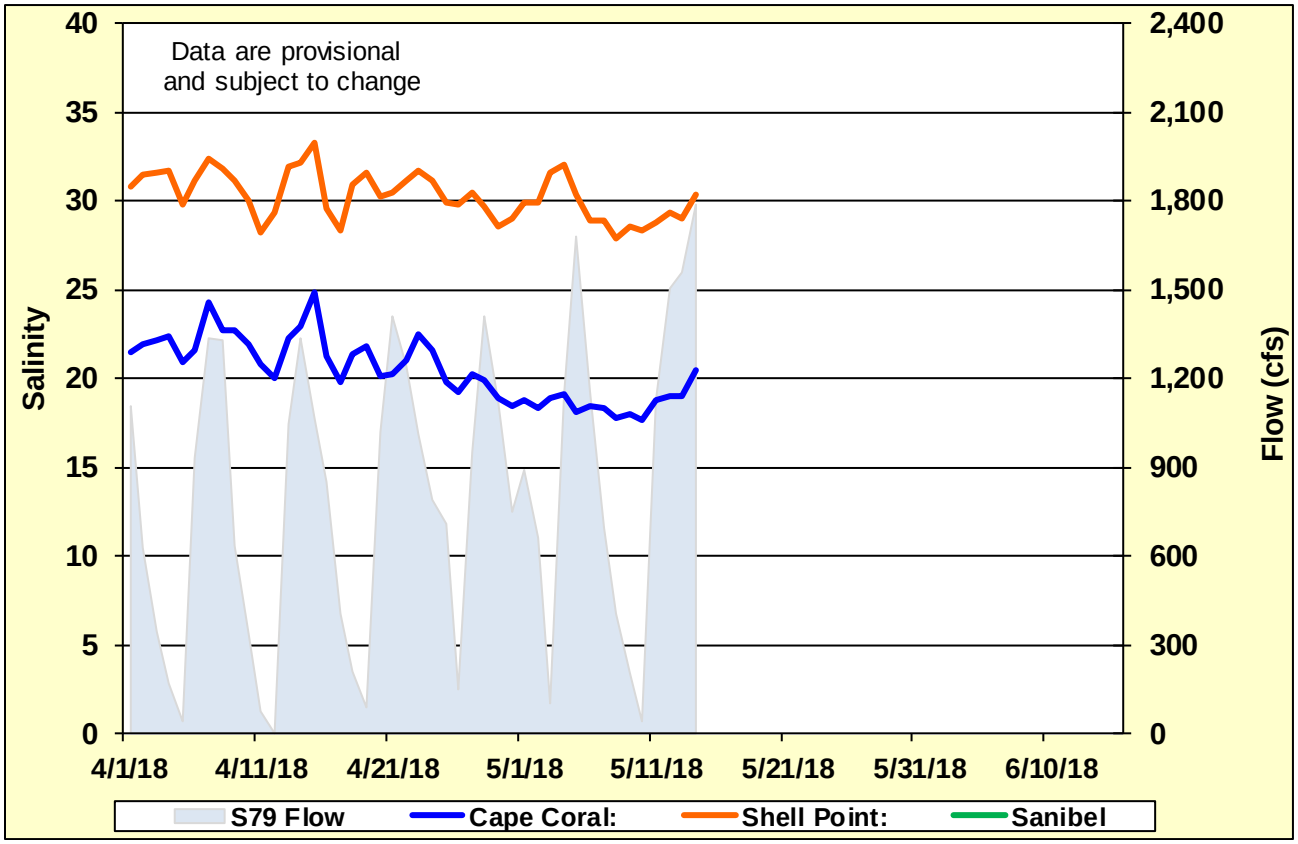


Figure 10. Daily mean flows at S-79 and salinity at lower estuary stations.

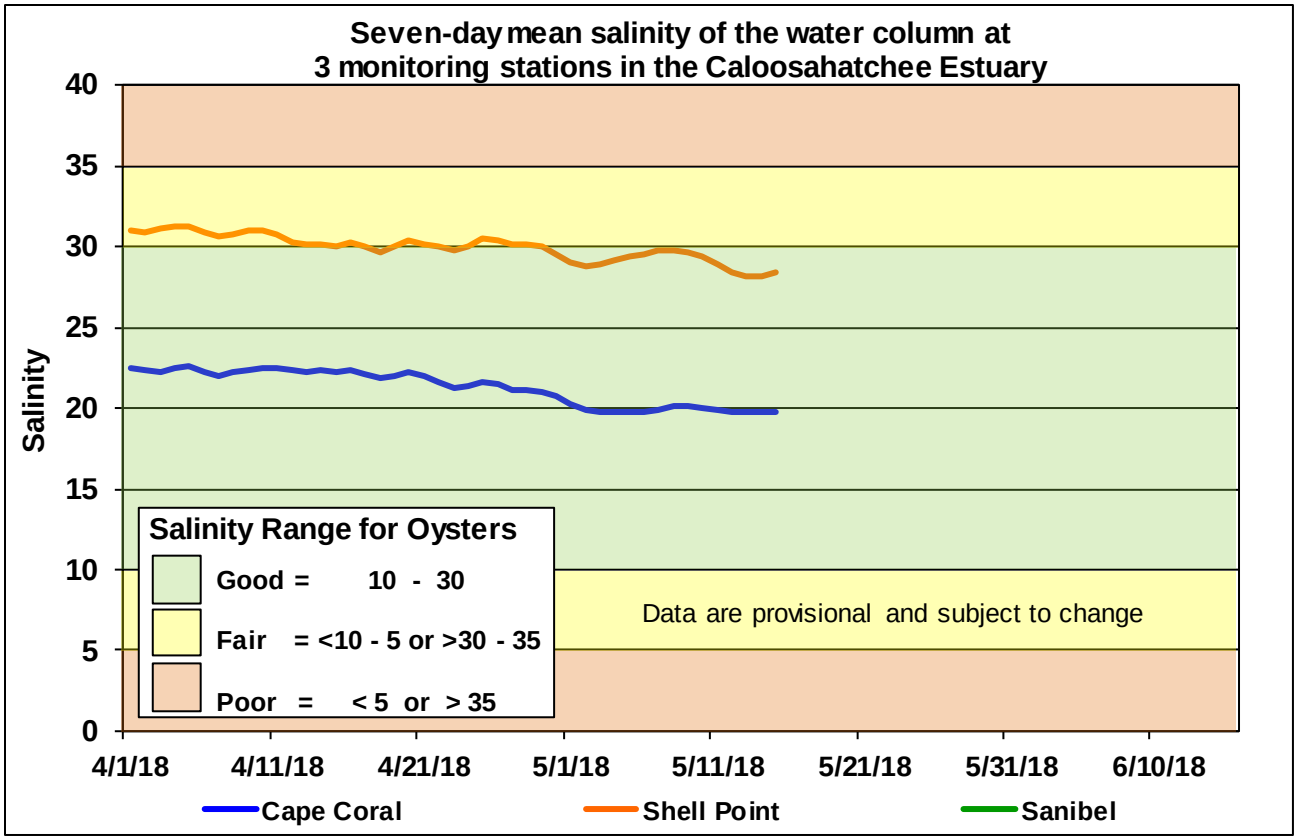


Figure 11. Seven-day mean salinity at Cape Coral Bridge, Shell Point, and Sanibel Bridge monitoring stations.

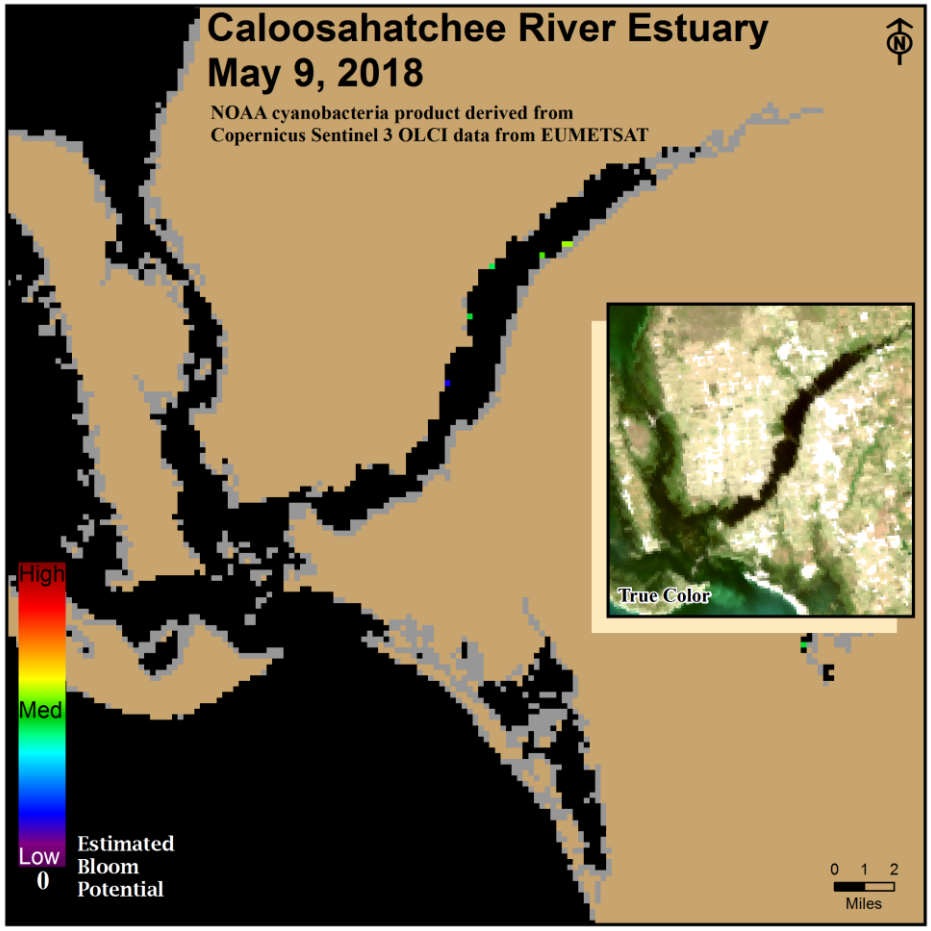


Figure 12. Sentinel 3a Satellite imagery provided by NOAA uses Ocean and Land Color Instrument (OLCI) to estimate cyanobacteria bloom potential in St. Lucie Estuary.

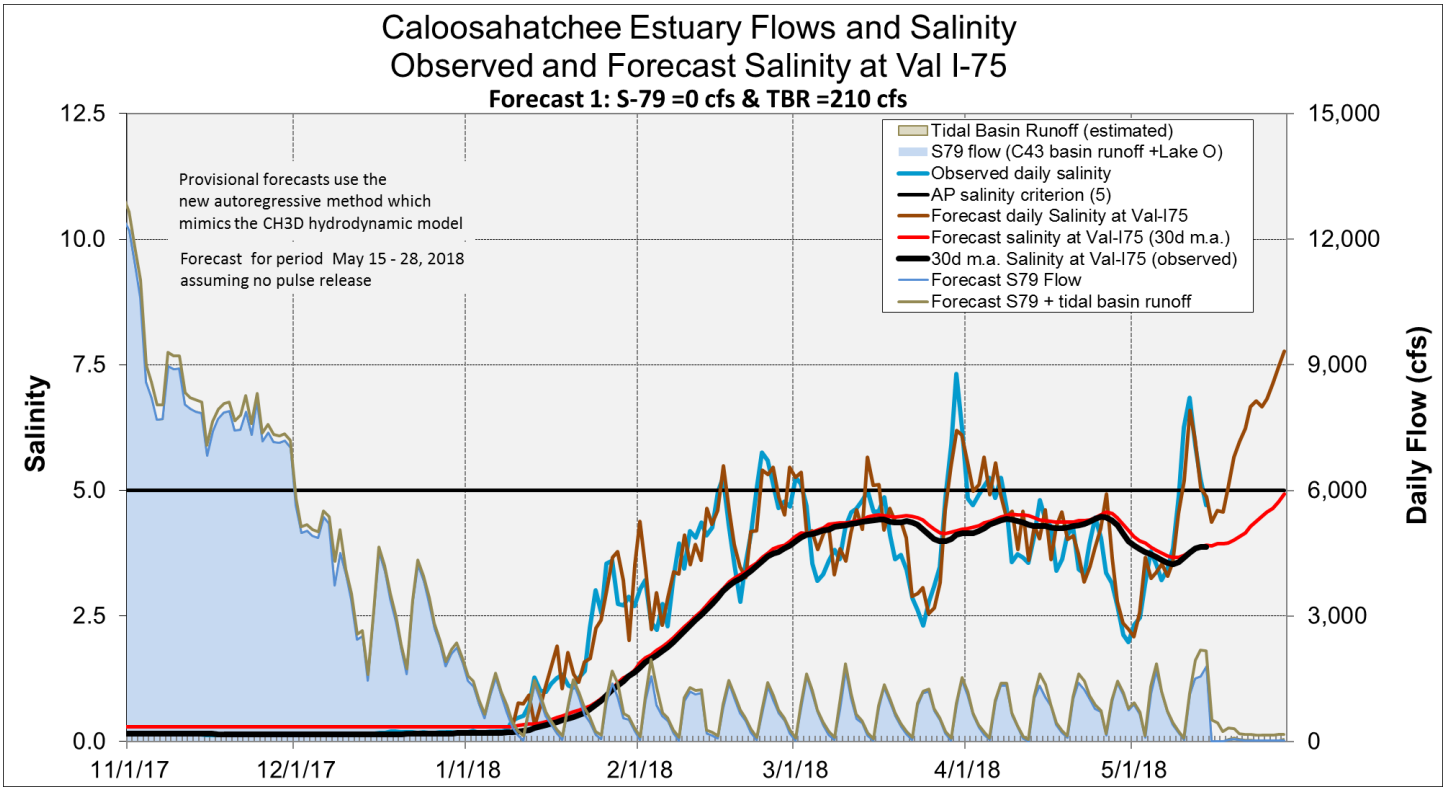


Figure 13. 14-day salinity forecast at Val I-75 assuming no releases at S-79.

Appendix A
Water quality mapping using an onboard flow-through system

The flow-through system consists of an intake ram attached to the transom of a boat, a data sonde, and intake and outlet flow. The data sonde is a YSI EXO that records temperature, salinity, turbidity, dissolved oxygen, chlorophyll *a,* phycocyanin, and lat/long. The intake ram was set at 0.5 m depth. The surface water data are integrated into an ArcGIS shapefile used to display surface water properties and facilitate the post-processing of spatial data. The data are recorded at 5-s intervals. Discrete water samples were also taken for analysis of chlorophyll *a* following the SFWMD's Standard Operating Procedures. Laboratory determination of chlorophyll *a* concentrations will be used to calibrate in situ values of chlorophyll *a* reported in the field by the optical chlorophyll probe.

The St. Lucie Estuary survey track covers the St. Lucie inlet to the Roosevelt Bridge, the North Folk to Fork Point, and the South Fork to S-80 (Figure A1). South Fork chlorophyll *a* concentrations were higher compared to other parts of the estuary (Figure A2).

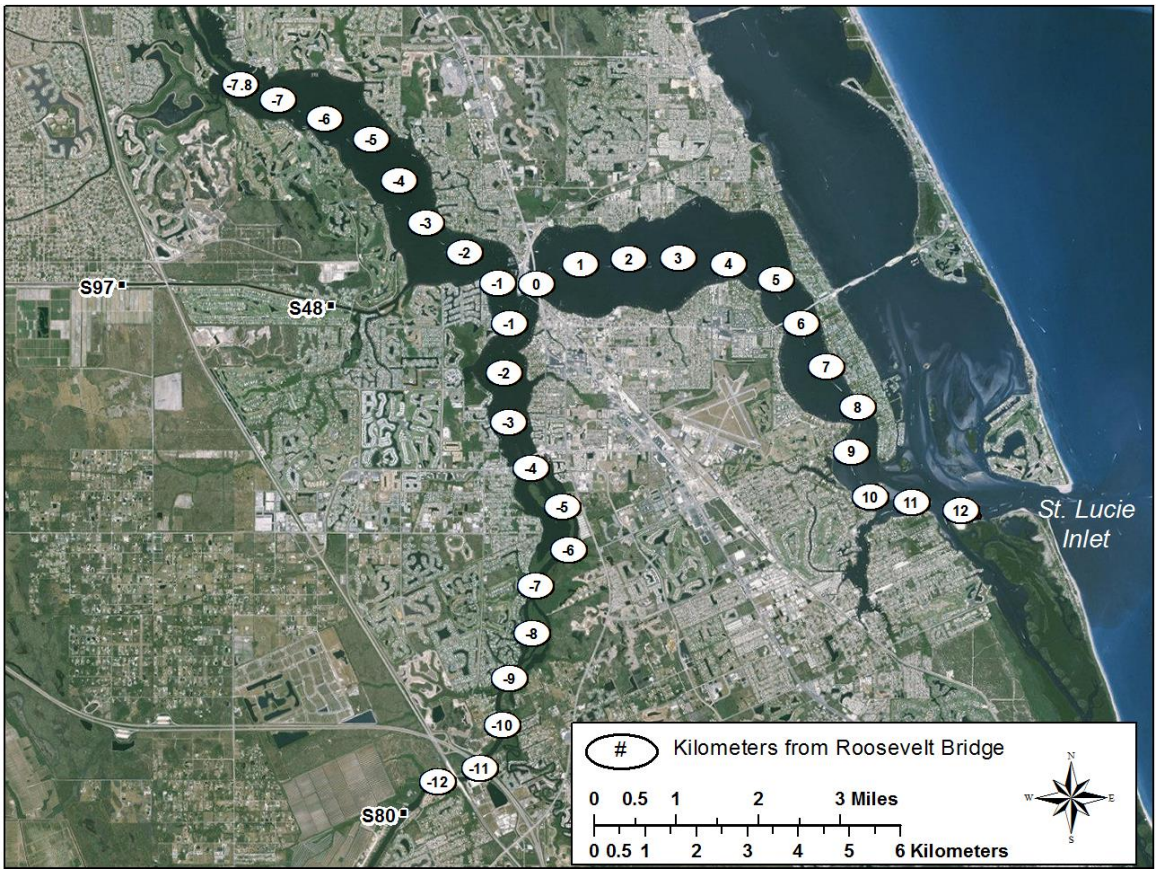


Figure A1. Water quality mapping track with river kilometers away from the Roosevelt Bridge (US1).

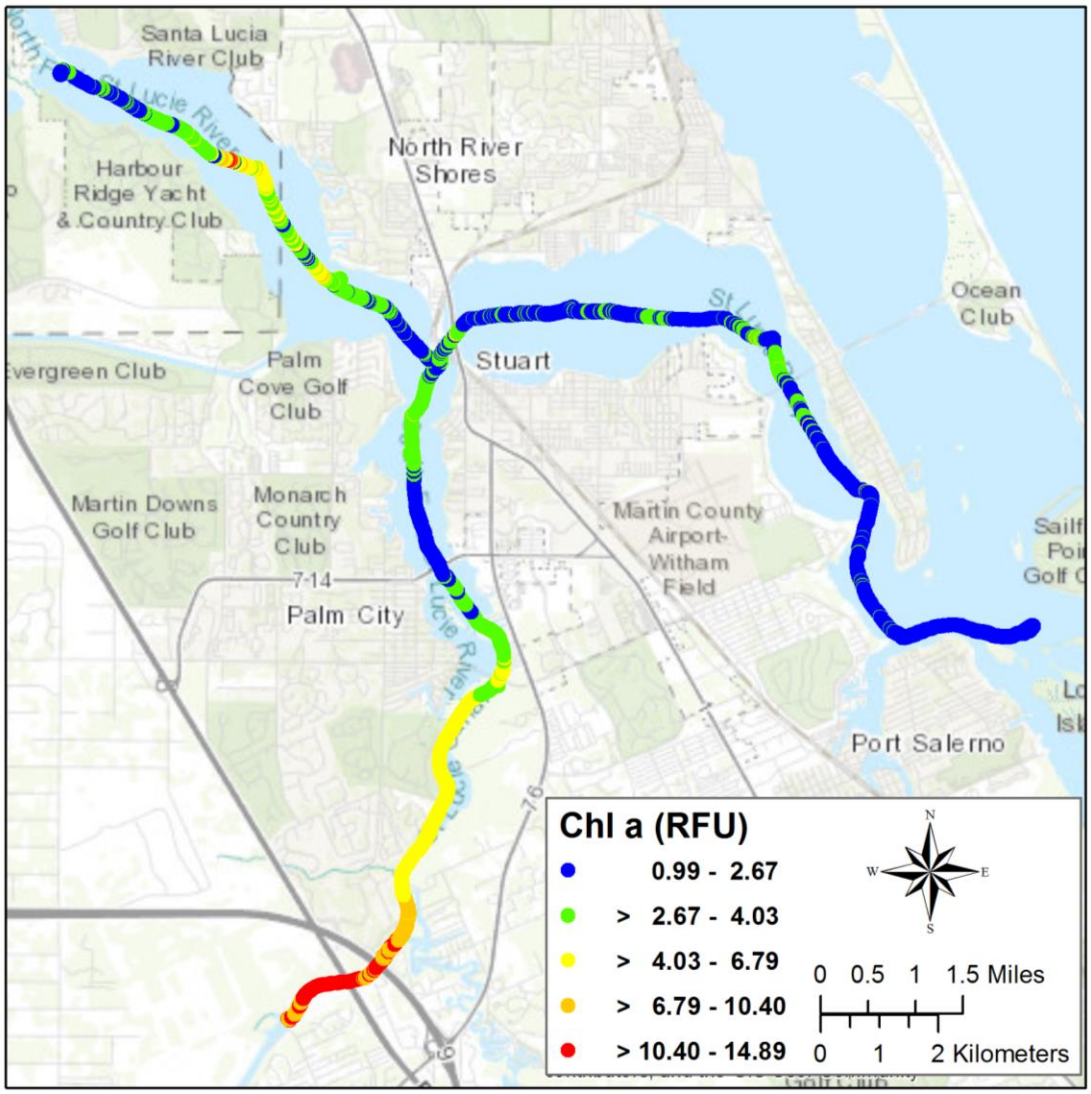


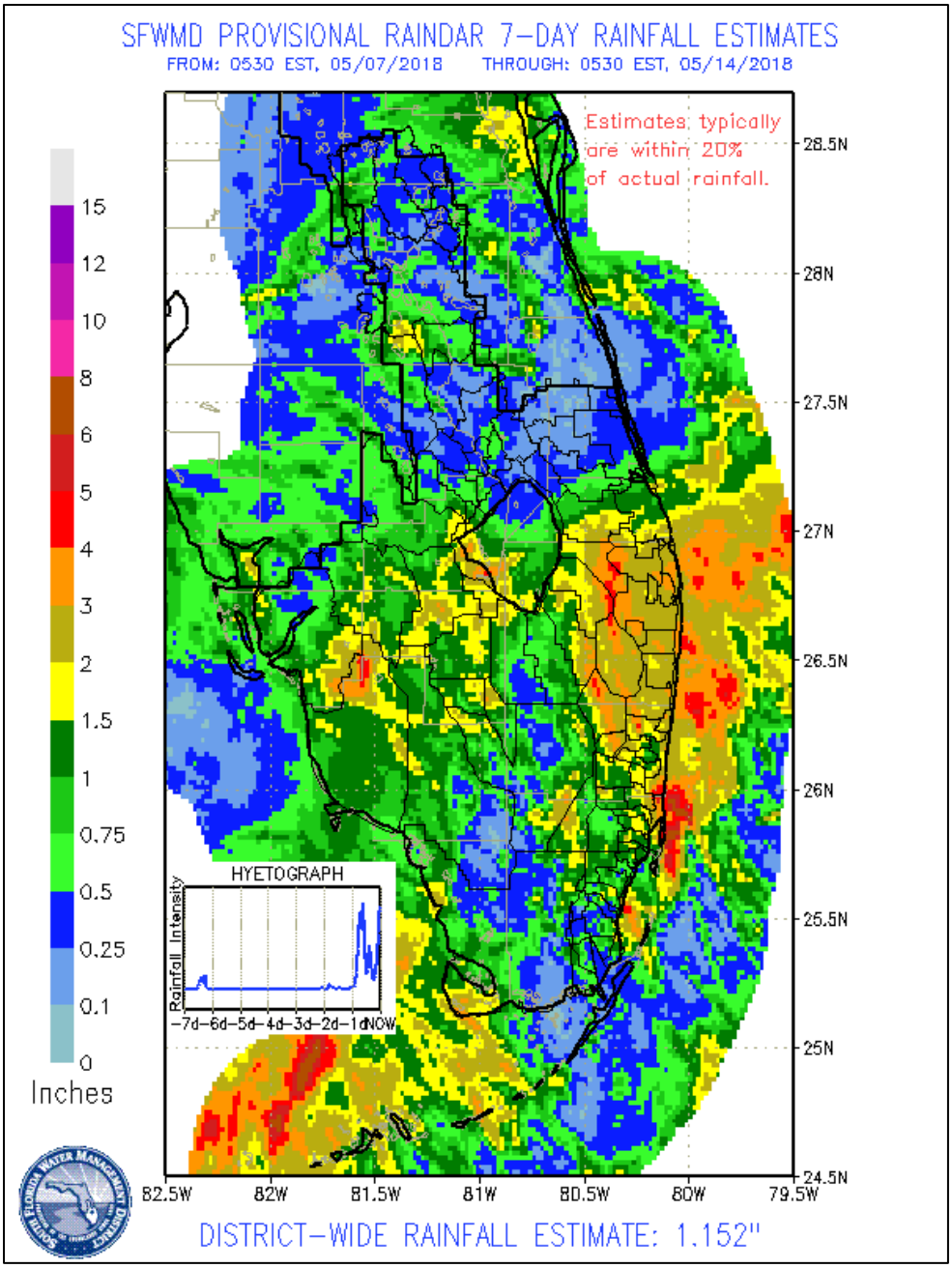
Figure A2. Chlorophyll *a* concentrations (RFU) in the St. Lucie Estuary.

EVERGLADES

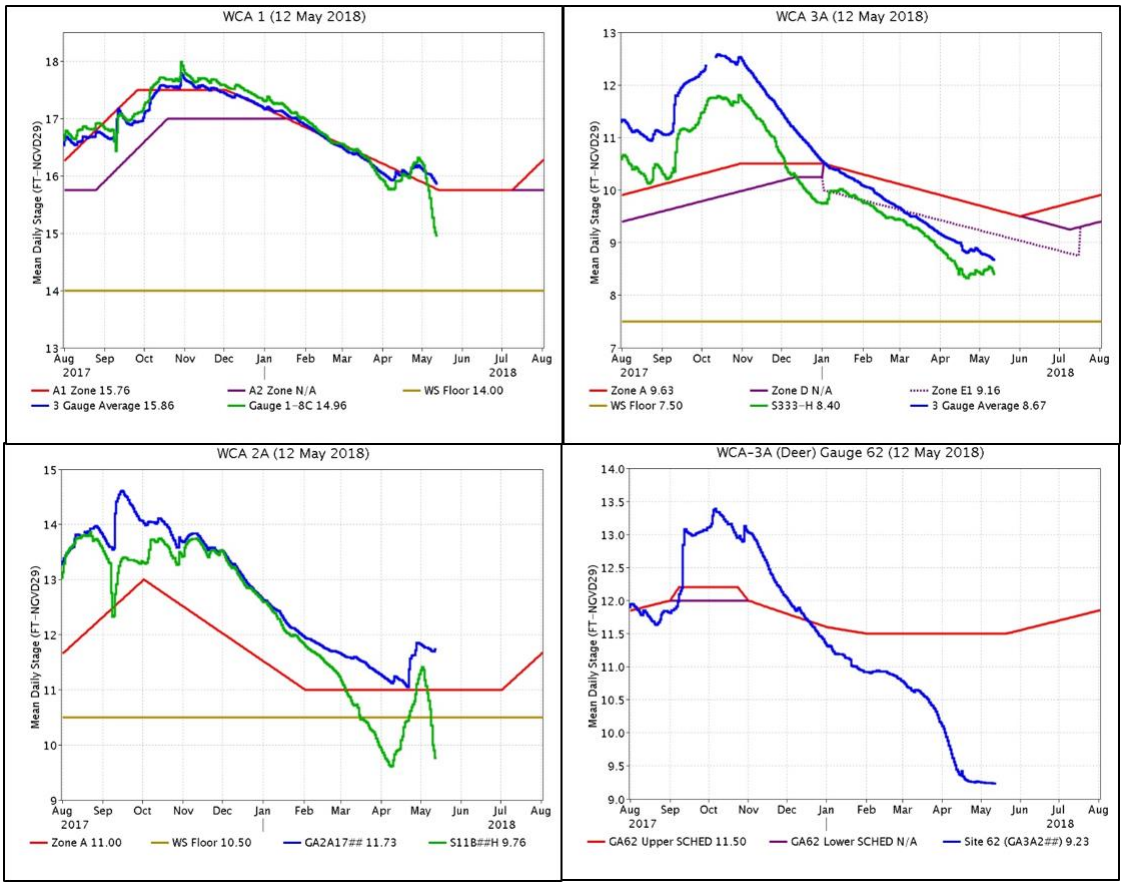
At the gauges monitored for this report, the water depths across the Everglades rose an average of 0.05 feet last week. Individual gauge changes within the WCAs ranged from +0.26 feet (WCA-2A) to −0.14 feet (WCA-1). Pan evaporation was estimated at 3.36 inches, an increase from last week.

Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	1.82	−0.01
WCA-2A	2.36	+0.26
WCA-2B	2.25	+0.02
WCA-3A	0.88	+0.01
WCA-3B	1.34	+0.11
ENP	0.76	+0.08

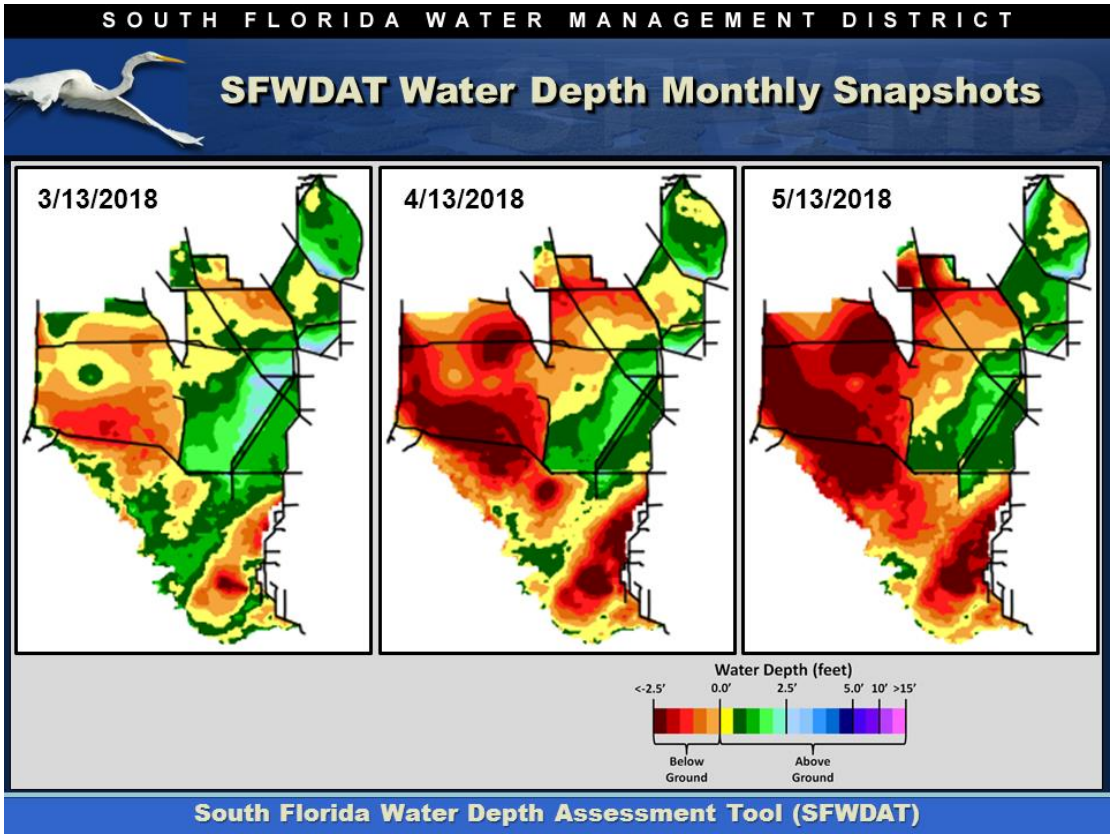
Good
Fair
Poor

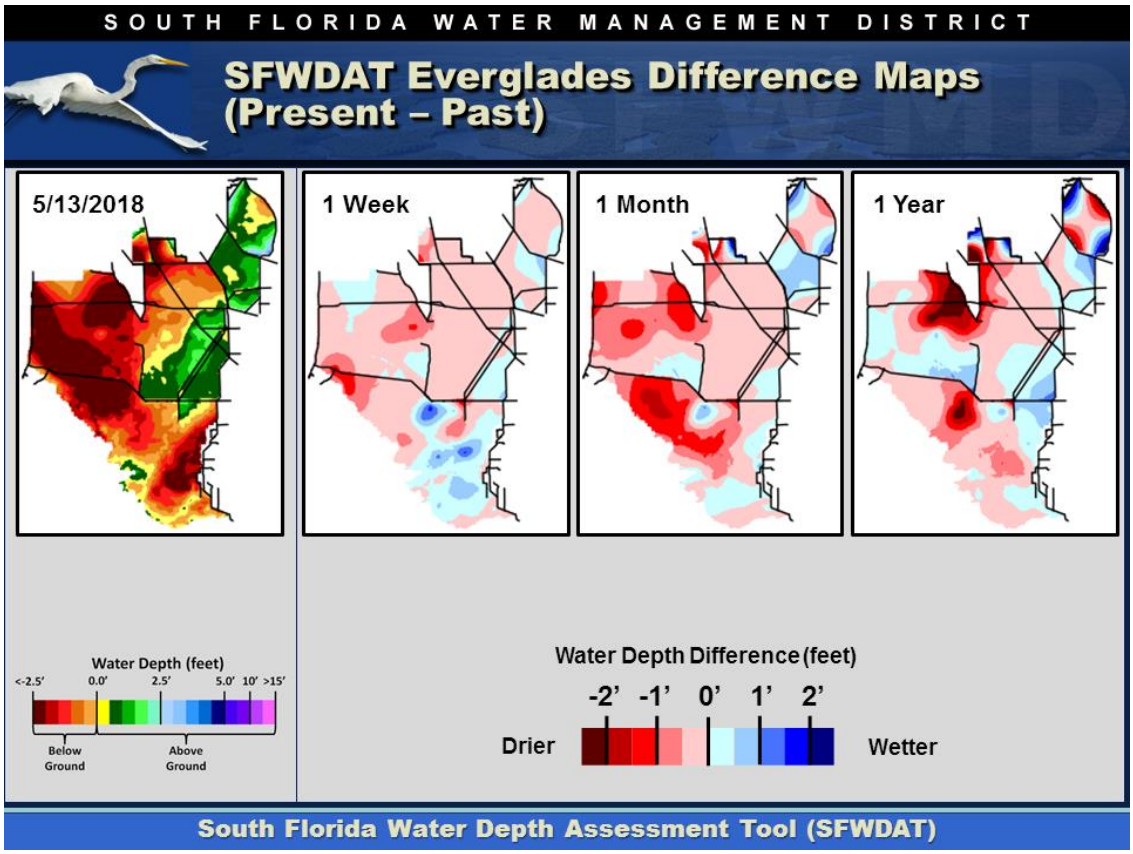


Regulation Schedules: WCA-1 three-gauge average is now 0.10 feet above Zone A1, while the canal stage is 0.60 feet below (−0.51-foot change from last week). WCA-2A canal stage continues a sharp downward trend with gauge S11B stage now 0.74 feet below the WS floor, and the marsh gauge is 0.73 feet above Zone A. WCA-3A three-gauge average stage is 0.49 feet below Zone E1. WCA-3A stage at gauge 62 (northwest corner) is 2.27 feet below the upper schedule and has been stable for the last three weeks.



Water Depths and Changes: The WDAT tool for spatial interpolation of depth monthly snapshots generally indicates drying conditions across most of the Everglades. Depths within a significant portion of interior WCA-1 are within 0.5 feet of ground surface. Northern WCA-3A continues a more extreme draw down with a significant portion of the northwest with water levels greater than 1.0 feet below ground. Comparing WDAT water levels from present, last week water levels dropped across WCA-3A. Depths across WCA-1 fell slightly. The northeastern section of WCA-2A rose slightly to significantly. The entirety of WCA-2A is deeper than it was a month ago.


SOUTH FLORIDA WATER MANAGEMENT DISTRICT
SFWDAT Water Depth Monthly Snapshots
3/13/2018
4/13/2018
5/13/2018
Water Depth (feet)
<-2.5'
0.0'
2.5'
5.0'
10'
>15'
Below Ground
Above Ground
South Florida Water Depth Assessment Tool (SFWDAT)

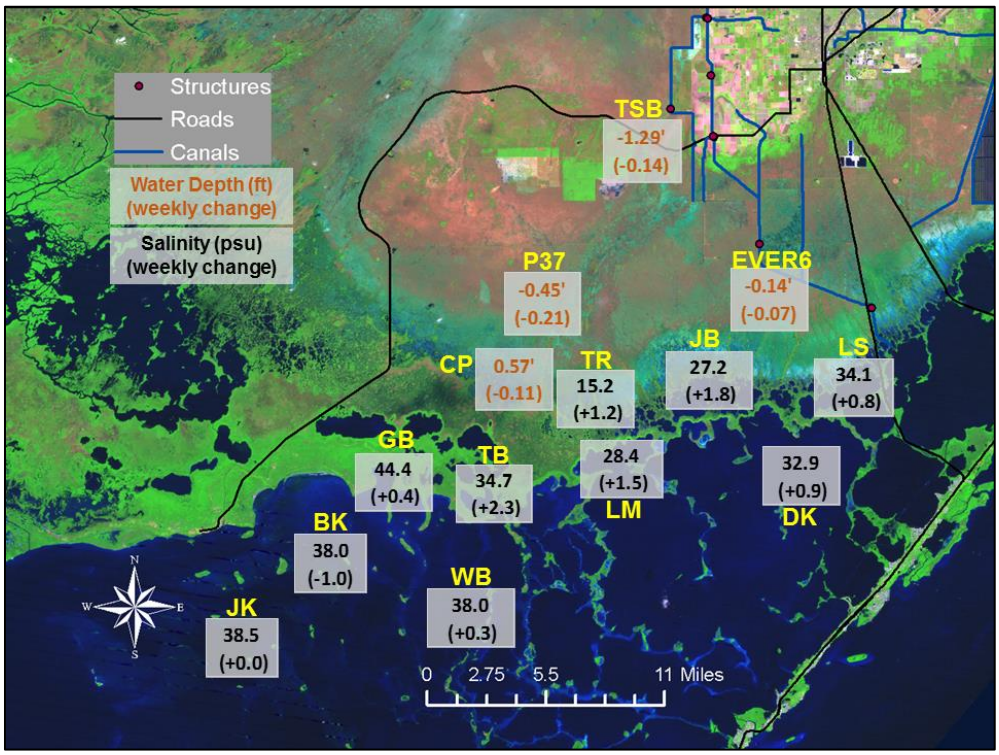

SOUTH FLORIDA WATER MANAGEMENT DISTRICT
SFWDAT Everglades Difference Maps
(Present – Past)
5/13/2018
1 Week
1 Month
1 Year
Water Depth (feet)
<-2.5'
0.0'
2.5'
5.0'
10'
>15'
Below Ground
Above Ground
Water Depth Difference (feet)
-2'
-1'
0'
1'
2'
Drier
Wetter
South Florida Water Depth Assessment Tool (SFWDAT)

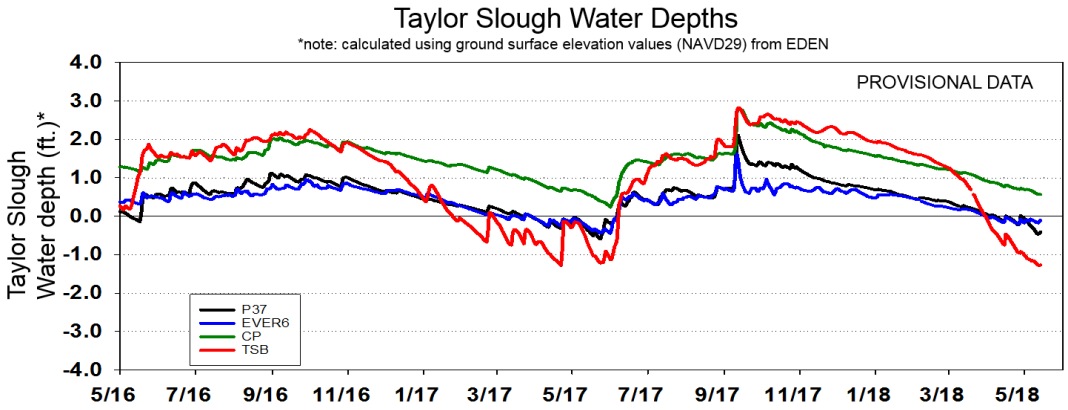
SFWMD wading bird flight (5/14/18):

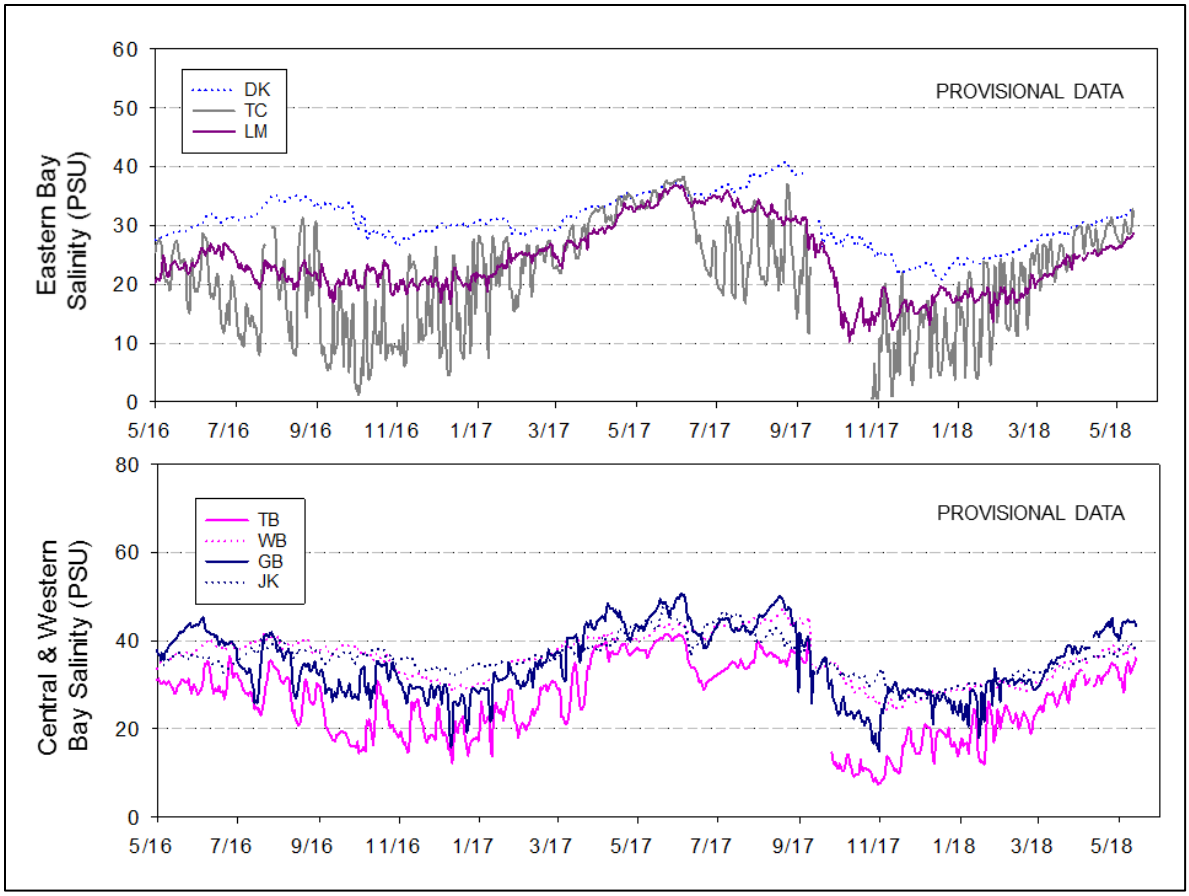
- The large mixed flocks that were previously feeding just south of the Alley North colony were not present this flight, and there were no birds foraging in WCA-1 (cloudy conditions), WCA-2A and WCA-3A North.
- 1,000 white ibis nesting in WCA-1.
- Western WCA-3A continues to support large mixed species flocks and this area is within foraging flight distance of some of the larger nesting colonies in WCA-3A and northern Everglades National Park, including Alley North, the Jetport colonies and Tamiami West.
- Recent reversals may have had an impact on the later nesting birds, but Alley North remains very active.

Taylor Slough Water Levels: An average of 0.4 inches of rain fell on Taylor Slough and Florida Bay with most of it falling on Sunday. Stage changes this week ranged from −0.07 to −0.21 feet. Water depths range from −1.29 to +0.57 feet and are 8 inches below to 3 inches above the historical averages.

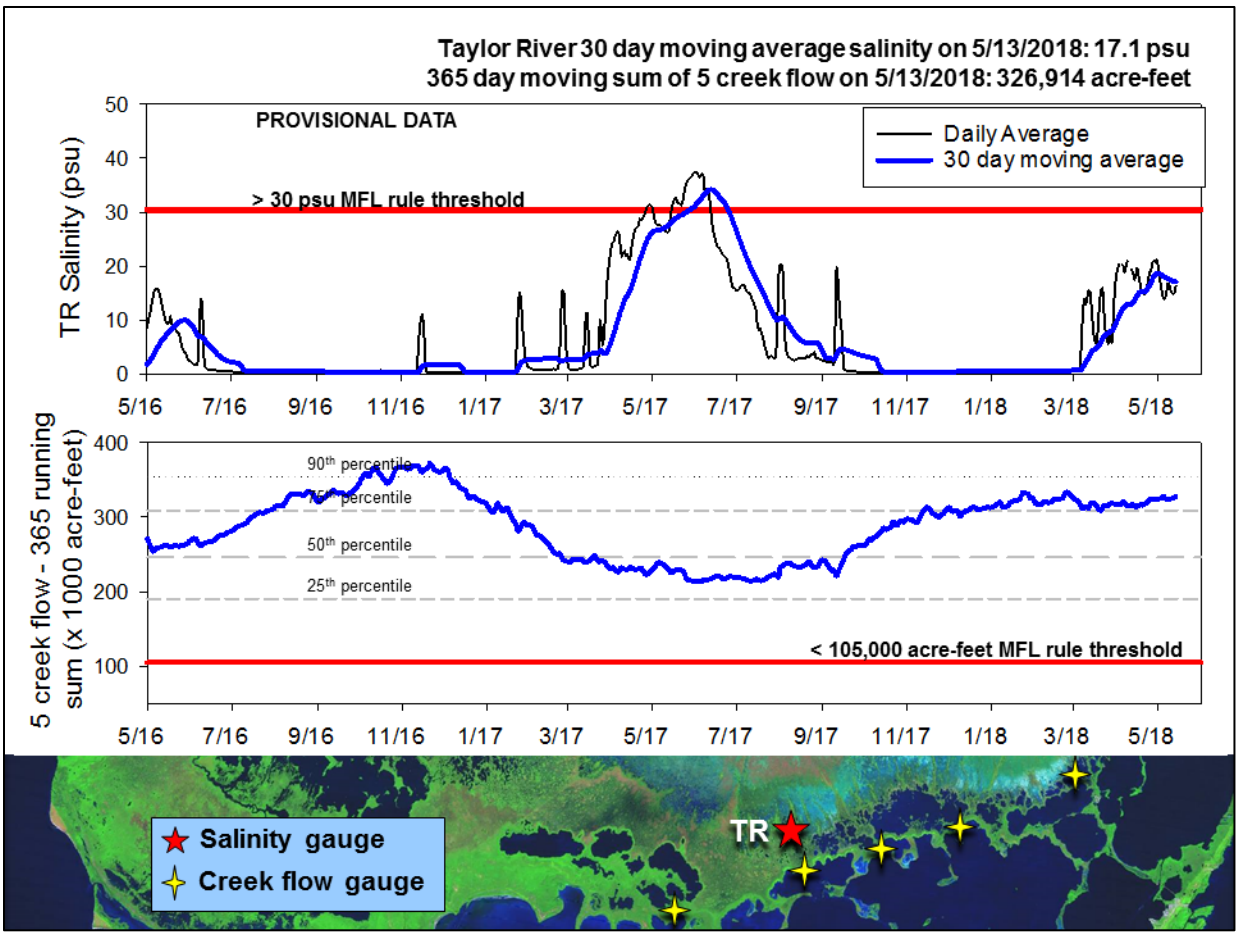
Florida Bay Salinities: Salinity changes in Florida Bay ranged from −1.0 to +2.3 psu. Salinities ranged from 27 psu in the northeast to 44 psu in the western nearshore. This range is 3 psu below to 2 psu above the historical averages.







Florida Bay MFL: Mangrove zone daily average salinity were between 15 and 17 psu this past week. The 30-day moving average salinity decreased 0.9 psu ending at 17.1 psu. The weekly cumulative flow from the five creeks denoted by yellow stars on the map totaled about 750 acre-feet for the last week with small positive flows occurring through most of the week. The 365-day moving sum of flow from the five creeks increased 1,500 acre-feet over the last week to end at 326,914 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 maintains the current recession rates along the regulation schedule or slightly above schedule in Rotenberger Wildlife Management Area has great ecological benefit for wildlife. The continuation of inflows that hydrate the northern sections of WCA-3A provides ecological benefit by protecting that area's peat soils and lessening the risk of damaging wildfires. Given little evidence that recent rain driven reversals have had a negative impact on wading bird foraging and nesting, there is little chance that water management would have a negative impact on foraging wading birds in WCA-3A South. Maintaining a recession or at least minimizing reversals in WCA-3A South would have great benefit to the wading birds foraging there and is especially important over the next few weeks as wading bird nesting season nears its end. Water management that results in optimal recession rates in WCA-1A (between 0.05 feet and 0.09 feet per week) while returning stages to target and lessening the disparity between marsh and canal stage has ecological benefit. 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, May 15th, 2018 (red is new)

Area	Weekly change	Recommendation	Reasons
WCA-1	Stage change ranged from −0.14' to +0.07	Manage rates of change to between 0.05 and 0.09 feet per week, return depths to regulation schedule, reduce the elevation disparity between the marsh and canal.	Foster conditions for wildlife and optimal wading bird foraging.
WCA-2A	Stage increased by 0.26'	Manage rates of change to between 0.05 and 0.09 feet per week, return depths to regulation schedule, reduce the elevation disparity between the marsh and canal.	Protect upstream/downstream habitat and wildlife.
WCA-2B	Stage increased by 0.02'	Maintain depths at regulation schedule.	Protect upstream/downstream habitat and wildlife.
WCA-3A NE	Stage increased by 0.03'	Maintain current rate of change, water management that provides inflows generates ecological benefit	Protect peat soils and lower risk of damaging wildfire.
WCA-3A NW	Stage remained unchanged	Maintain current rate of change, water management that provides inflows generates ecological benefit	
Central WCA-3A S	Stage increased by 0.02'	Maintain current recession rates near 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 0.02'		
WCA-3B	Stages increased by 0.11'	Maintain depths at regulation schedule.	Protect habitat and wildlife.
ENP-SRS	Stage increased by 0.08'	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 changes ranged from −0.07' to −0.21'	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 −1.0 to +2.3 psu.	Move water southward as possible	When available, provide freshwater to maintain low salinity buffer and promote water movement.