

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 1, 2018

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

### **Summary**

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

A surge of low-level moisture spreading over the southern half of the District today and Wednesday will help to generate scattered showers, mainly from the lower to the upper east coast and over the Keys. While a few showers could be locally heavy, especially along the southeast coast, District-wide rainfall should be very light. Dry conditions will persist north and west of Lake Okeechobee. Some drying is expected Thursday and Friday over the eastern half of the District and the Keys, with the coverage of showers and areal average rainfall decreasing. Low pressure forming over the Bahamas on Friday should drift northwestward toward the Florida peninsula on Saturday and be off the east Florida coast on Sunday and Monday. A considerable increase in moisture is expected ahead of the low over the eastern half of the District on Saturday. The increasing moisture in combination with low-level convergence and instability associated with the low should result in greater rain chances early in the weekend, especially near the east coast and over the far south. While the low moves offshore and weakens, a cold front pushing into the far northern part of the District late Sunday should stall near or north of Lake Okeechobee on Monday. Lift associated with the front and the nearby low, very high low-level moisture, and strong jet stream dynamics should create an environment conducive for heavy rainfall Sunday and Monday across most of the District. The coverage of rain should expand Monday compared to Sunday, with the overall rainfall totals higher too. While our confidence in a rainy period beginning Sunday and extending well into next week is growing, confidence in details such as the timing, location, and overall rainfall totals is low. Nevertheless, the forecast calls for about two thirds to three quarters of an inch of District-wide rainfall Sunday and Monday, with the possibility of additional rains falling later in the week.

#### **Kissimmee**

Tuesday morning stages were 55.7 feet NGVD (0.5 feet below schedule) in East Lake Toho, 52.7 feet NGVD (0.5 feet below schedule) in Toho, and 49.2 feet NGVD (0.8 feet below schedule) in Kissimmee-Cypress-Hatchineha; headwater stages were 46.3 feet NGVD at S-65A and 25.9 feet NGVD at S-65D. Mean recession rates for the last seven days were 0.19 and 0.17 feet per week in East Lake Toho and Toho, respectively (preferred range of 0.15-0.2 feet per week) and 0.09 feet per seven days in Kissimmee-Cypress-Hatchineha (preferred rate is to not exceed 0.2 feet per week). Tuesday morning discharges were: 354 cfs at S-65, 250 cfs at S-65A, and 254 cfs at S-65E. Dissolved oxygen concentration in the Kissimmee River averaged 7.1 mg/L for the week. Kissimmee River mean floodplain depth on Sunday was 0.06 feet.

## **Lake Okeechobee**

Lake Okeechobee stage is 13.16 feet NGVD having decreased 0.08 feet over the past week and 0.71 feet over the last month. Recession rates have slowed considerably over the past two weeks, averaging 0.13 feet per week versus roughly 0.23 feet per week in late April and early May. The slower recession rate should aid wading bird colonies that were experiencing losses of foraging habitat but may reduce the recovery of some vegetation communities in the nearshore region by delaying light penetration to deeper areas.

## **Estuaries**

Total inflow to the St. Lucie Estuary averaged 370 cfs over the past week with no flow coming from Lake Okeechobee. Salinity remained about the same as last week's level throughout the estuary. The seven-day average salinity at the US1 Bridge is in the fair range for adult eastern oysters. The highest weekly chlorophyll *a* concentrations were 3.27 – 11.74 µg/L in the South Fork. Total inflow to the Caloosahatchee Estuary averaged 887 cfs over the past week with 554 cfs coming from the Lake. Salinity slightly decreased throughout the estuary. The 30-day moving average surface salinity is 4.0 at Val I-75 and 11.9 at Ft. Myers. The 30-day moving average salinity at Val I-75 is forecast to be 4.6 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 were relatively low to medium over the last week near Beautiful Island (4.35 – 15.74 µg/L), Ft. Myers (4.53 – 22.01 µg/L), and Shell Point (1.59 – 23.77 µg/L). Dissolved oxygen levels at Beautiful Island were 4.28 – 7.53 mg/L, at Ft. Myers were 3.80 – 8.09 mg/L, and at Shell Point were 3.94 – 10.51 mg/L. Although the Caloosahatchee 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 8,900 acre-feet of Lake releases. The total amount of Lake releases sent to the STAs/FEBs in WY2018 (since May 1, 2017) is approximately 155,000 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 for construction related activities in STA-1W. The nests of Migratory Bird Treaty Act (MBTA) protected species have been observed in STA-1E, STA-2, and STA-5/6. This week, if Lake releases are sent to the WCAs, they will be sent to STA-1E Eastern Flow-way, STA-2 Flow-way 4 and the A-1 FEB/STA-3/4 Western Flow-way.

## **Everglades**

Water management resulting in the recommended recession rates would generate the most pronounced ecological benefit for wildlife in Rotenberger Wildlife Management Area and 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 to those areas continue to provide ecological benefit and there is little risk of negative impact to wading bird foraging conditions. The recent reversals due to rainfall have had little to no noticeable detrimental impact on wading bird nesting or foraging. System wide, wood storks and white ibis are nesting, fledging and foraging at near record levels. Water depths in Taylor Slough changed little this week with depths ranging from 4 inches below to 5 inches above the historical averages. Salinity changes in Florida Bay ranged from -2.2 psu to +1.1 psu and are within 4 psu of the historical average for this time of year. Mangrove zone daily average salinity is increasing and ended at 21 psu on Sunday.

## Supporting Information

### KISSIMMEE BASIN

#### **Kissimmee Basin Rainfall**

The Upper Kissimmee Basin received 0.31 inches of rainfall in the past week and the Lower Basin received 0.62 inches (SFWMD Daily Rainfall Report 4/30/2018).

#### **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: 5/1/2018**

Water Body	Structure	7-day Average Discharge (cfs) <sup>1</sup>	Stage Monitoring Site <sup>2</sup>	Lake Stage (feet)	Schedule Type <sup>3</sup>	Schedule Stage (feet)	Daily Departure (feet)						
							4/29/18	4/22/18	4/15/18	4/8/18	4/1/18	3/25/18	3/18/18
Lakes Hart and Mary Jane	S-62	37	LKMJ	59.9	R	60.1	-0.2	-0.2	-0.2	-0.3	-0.3	-0.4	-0.5
Lakes Myrtle, Preston, and Joel	S-57	3	S-57	60.3	R	60.4	-0.1	0.0	0.0	-0.2	-0.2	-0.2	-0.1
Alligator Chain	S-60	57	ALLI	62.8	R	62.9	-0.1	0.1	0.0	-0.1	-0.2	-0.4	-0.5
Lake Gentry	S-63	70	LKGT	60.4	R	60.4	0.0	0.0	0.1	0.0	-0.1	-0.2	-0.3
East Lake Toho	S-59	126	TOHOE	55.7	R	56.3	-0.6	-0.7	-0.8	-0.9	-1.1	-1.2	-1.2
Lake Toho	S-61	262	TOHOW, S-61	52.7	R	53.3	-0.6	-0.7	-0.7	-0.9	-1.1	-1.2	-1.2
Lakes Kissimmee, Cypress, and Hatchineha	S-65	348	KUB011, LKIS5B	49.3	R	50.1	-0.8	-0.9	-1.0	-1.3	-1.4	-1.2	-1.2

<sup>1</sup> Seven-day average of weighted daily means through midnight.

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

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

#### **Lower Kissimmee Basin**

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

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

data from SFWMD.

Report Date: 5/1/2018

Metric	Location	1-Day Average		Average for the Preceding 7-Days <sup>1</sup>								
		4/29/2018	4/29/18	4/22/18	4/15/18	4/8/18	4/1/18	3/25/18	3/18/18	3/11/18	3/4/18	2/25/18
Discharge (cfs)	S-65	360	348	392	406	340	376	361	400	461	715	968
Discharge (cfs)	S-65A	256	246	270	313	257	246	245	258	319	539	764
Discharge (cfs)	S-65D <sup>2</sup>	256	341	362	384	301	324	329	343	430	730	1,047
Stage (feet NGVD)	S-65D <sup>2</sup>	25.80	25.81	25.77	25.86	25.77	25.86	25.80	25.66	25.73	25.67	25.79
Discharge (cfs)	S-65E <sup>2</sup>	256	304	318	355	297	325	348	317	441	733	1,088
Discharge (cfs)	S-67	0	0	0	1	0	0	0	0	0	0	133
DO (mg/L) <sup>3</sup>	Phase I river channel	7.6	7.1	7.2	6.2	6.8	7.5	8.2	8.3	7.0	5.9	6.0
Mean depth (feet) <sup>4</sup>	Phase I floodplain	0.06	0.06	0.07	0.07	0.06	0.07	0.09	0.07	0.09	0.14	0.19

<sup>1</sup>Seven-day average of weighted daily means through Sunday midnight.

<sup>2</sup>S-65D discharge combines discharge at S-65D, S-65DX1, and S-65DX2; S-65D stage averages stage at S-65D and S-65DX1; S-65E discharge combines S-65E and S-65EX1.

<sup>3</sup>DO is the average for sondes at PC62 and PC33.

<sup>4</sup>1-day spatial average from South Florida Water Depth Assessment Tool (SFWDAT).

DATA ARE PROVISIONAL; N/A indicates that data were not available.

## KCOL Hydrographs (through Sunday midnight)

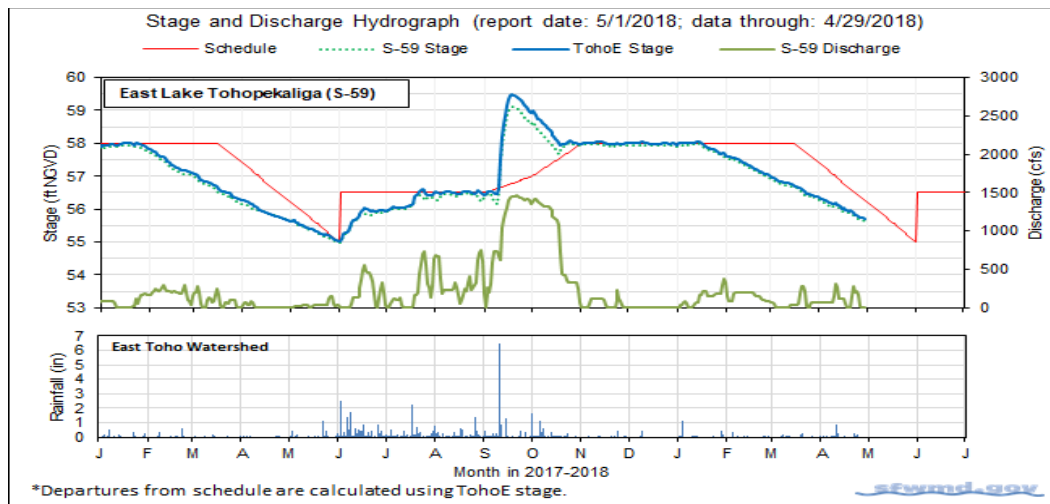


Figure 1.

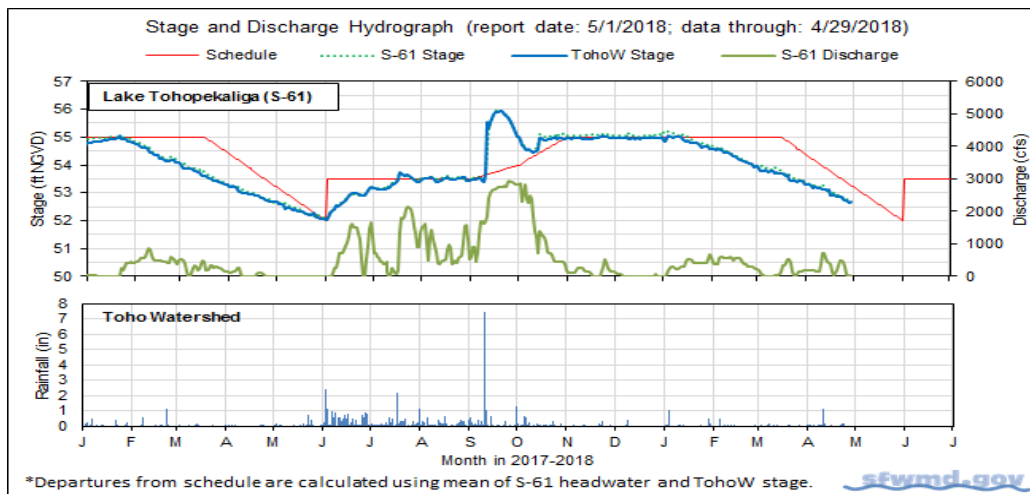


Figure 2.

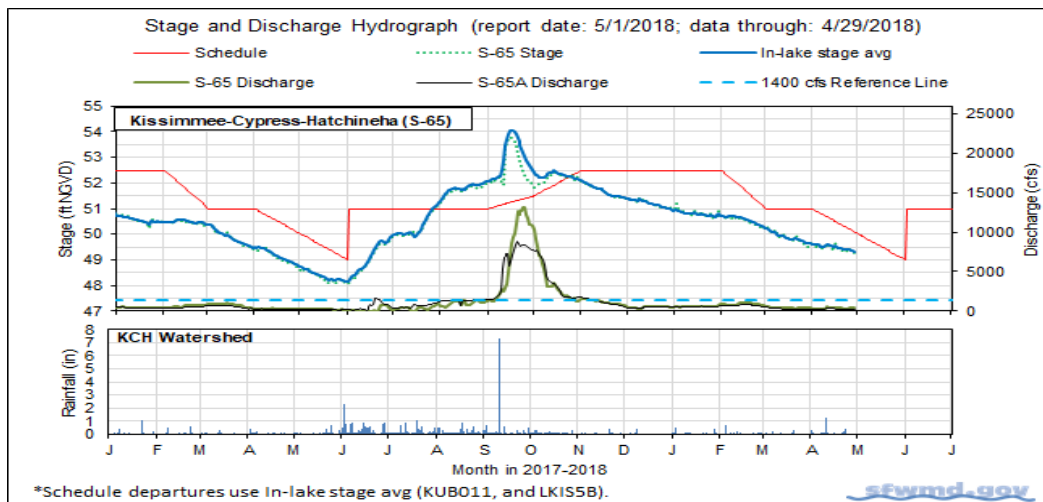


Figure 3.

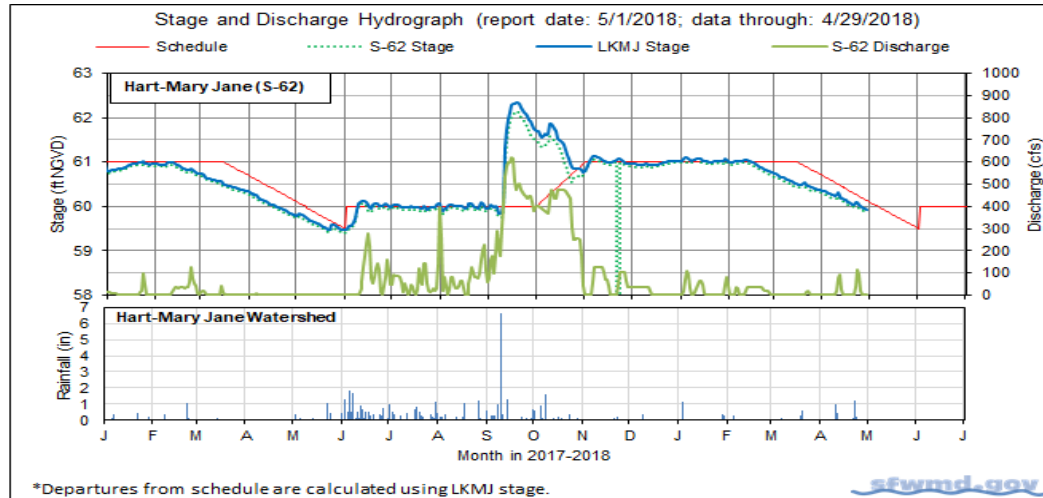


Figure 4.

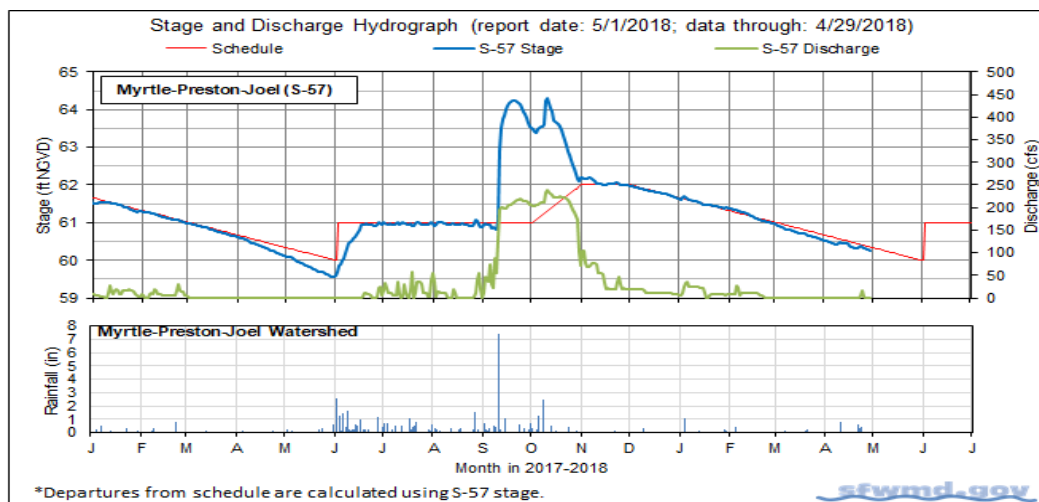


Figure 5.

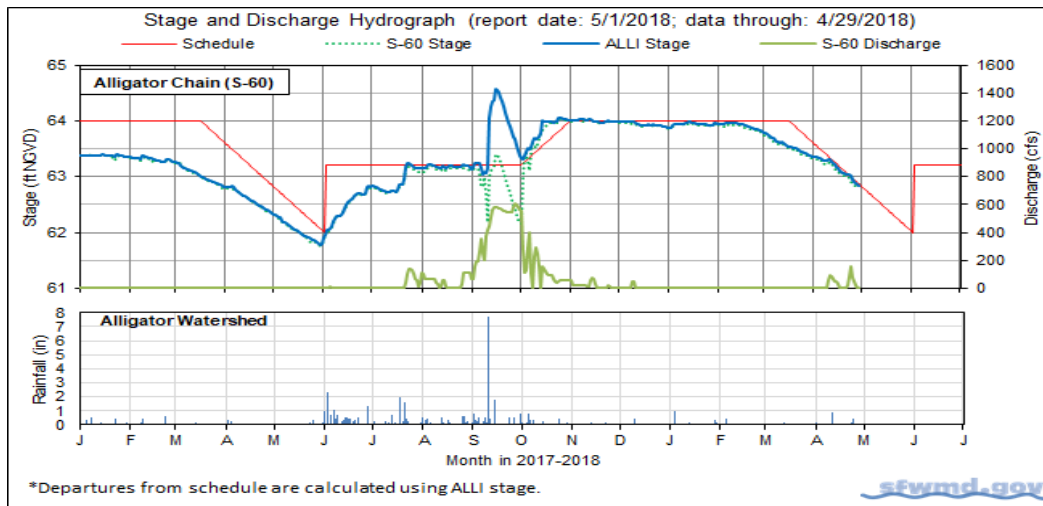


Figure 6.

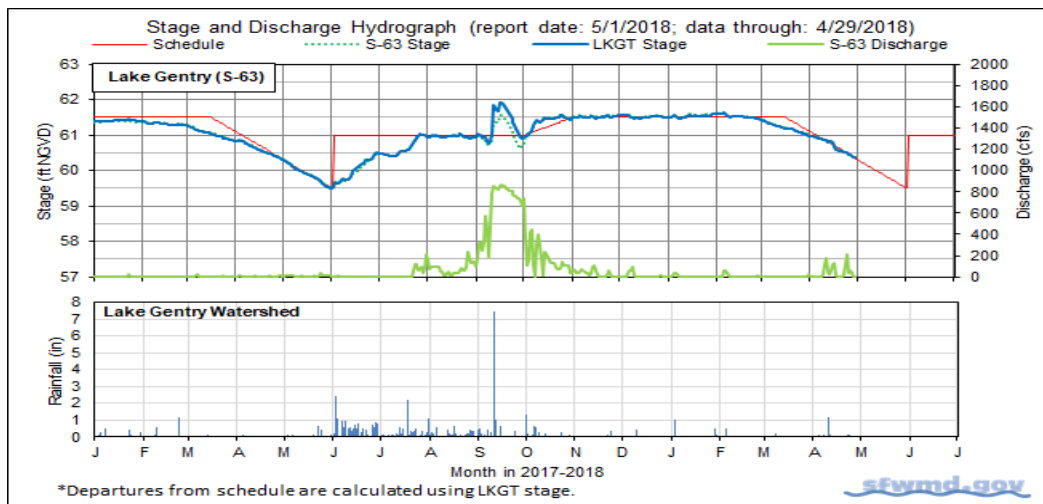
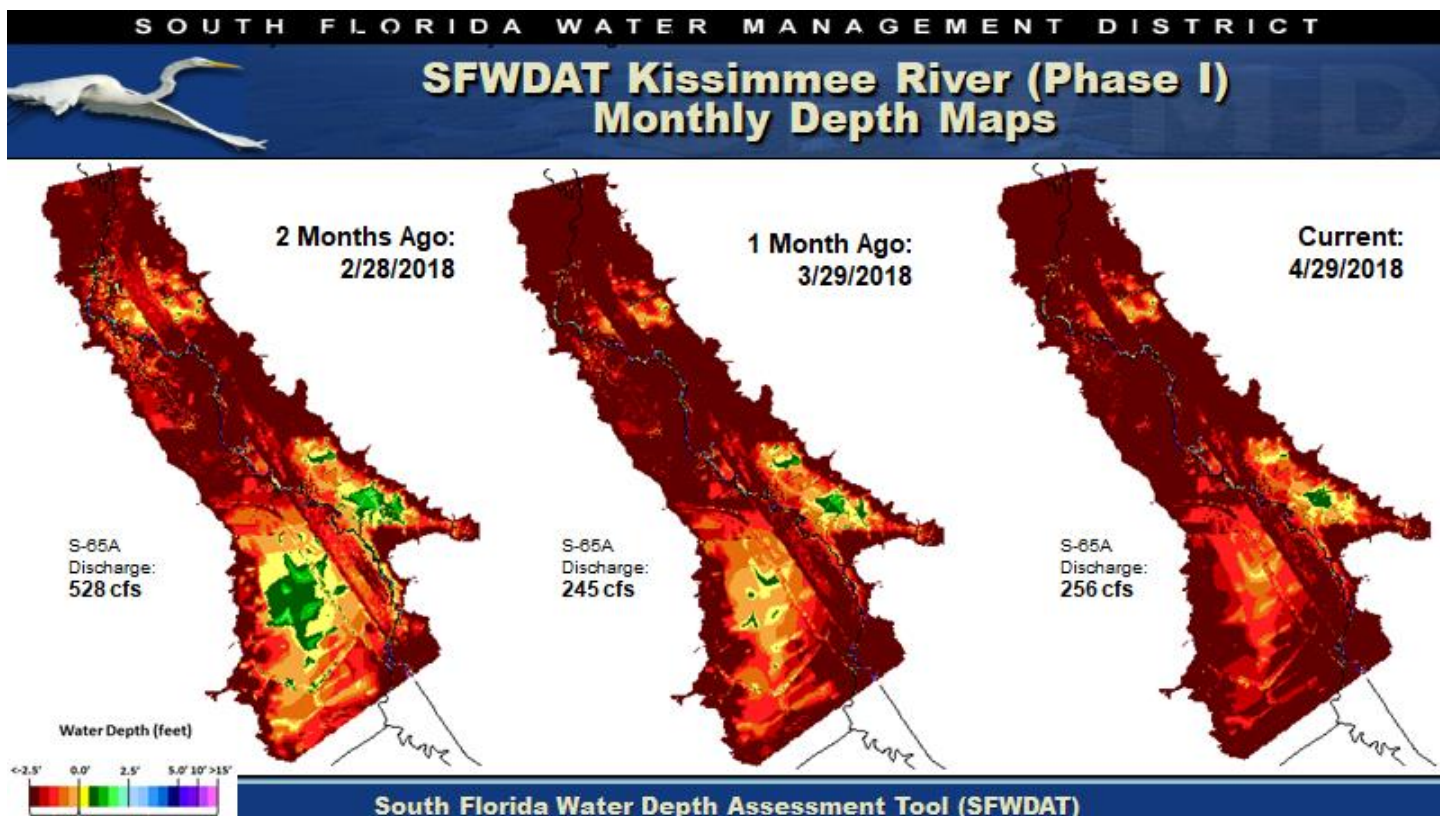
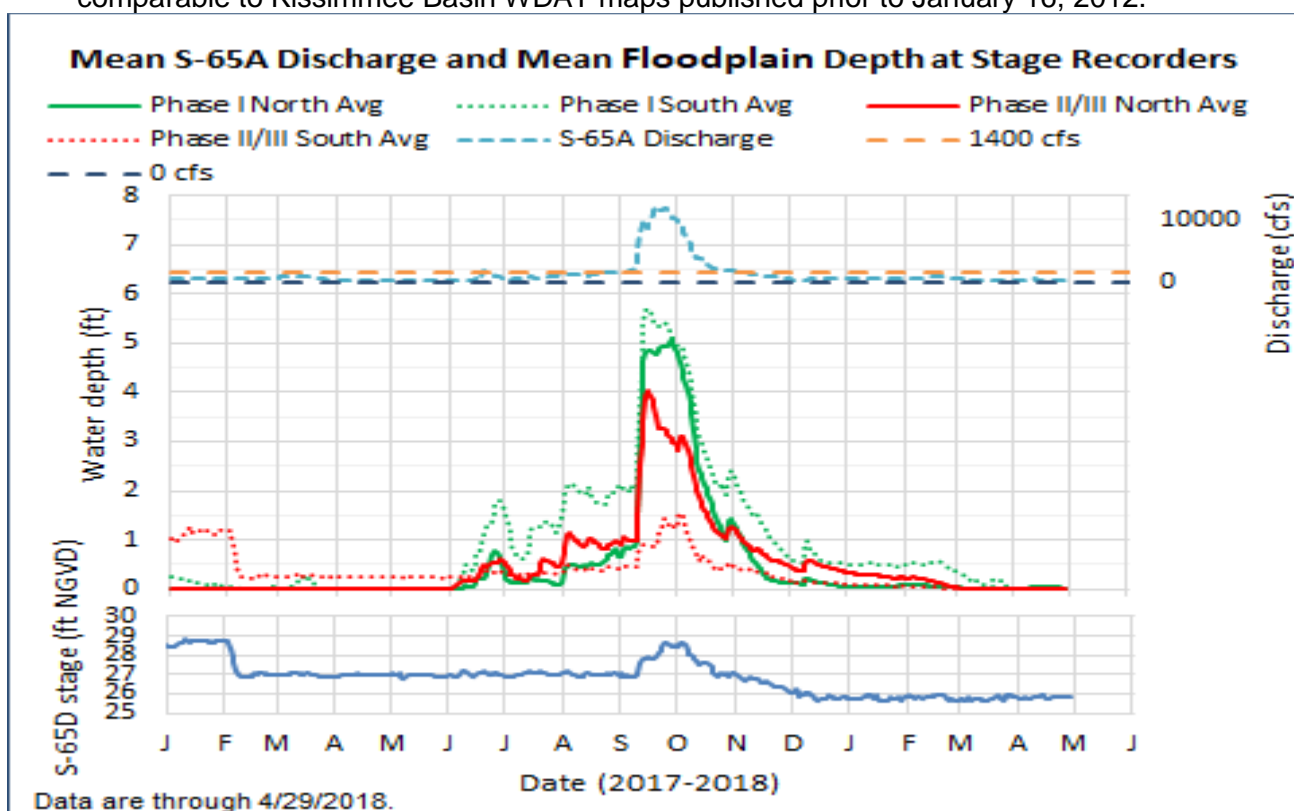


Figure 7.

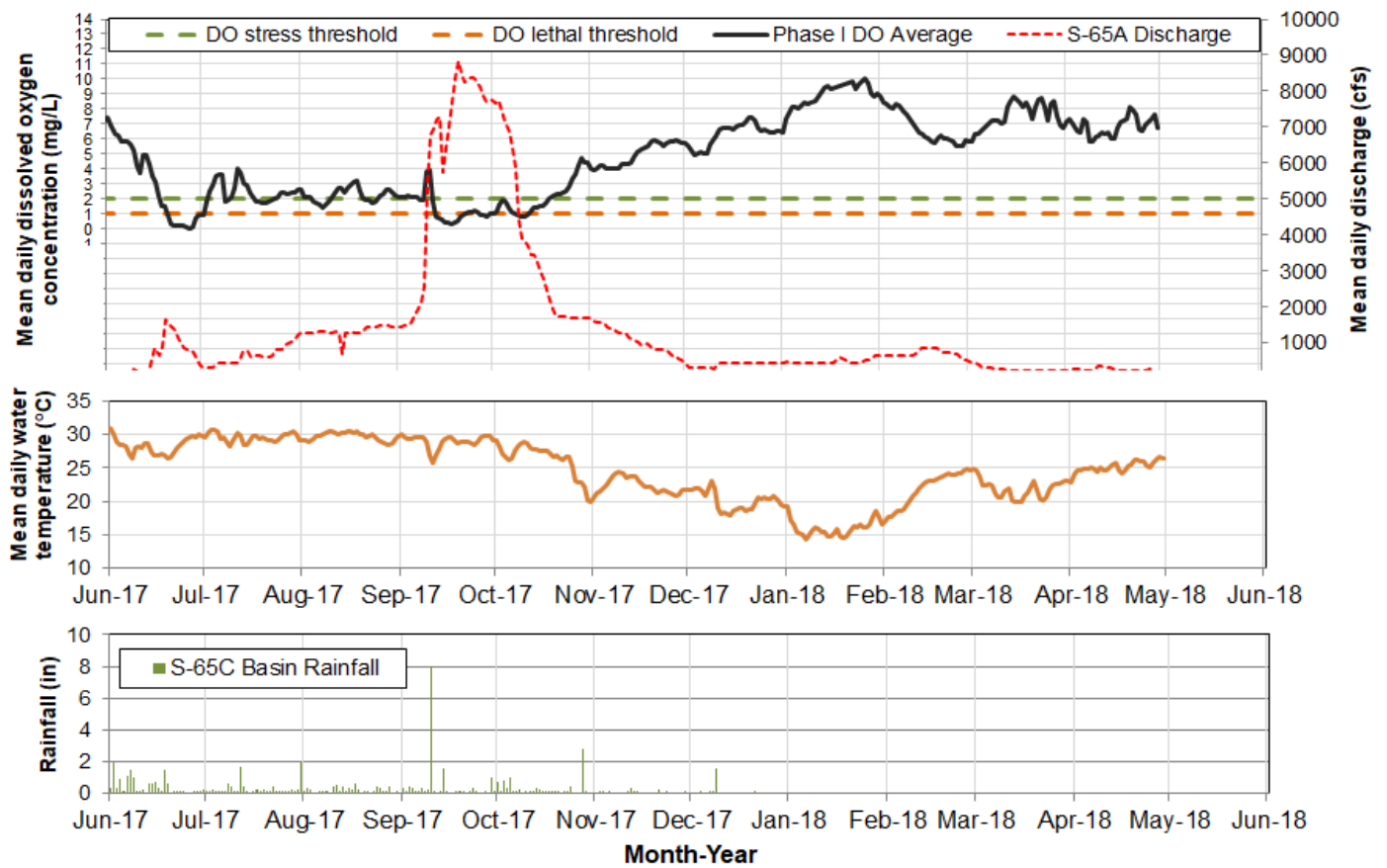


**Figure 8.** Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to January 16, 2012.



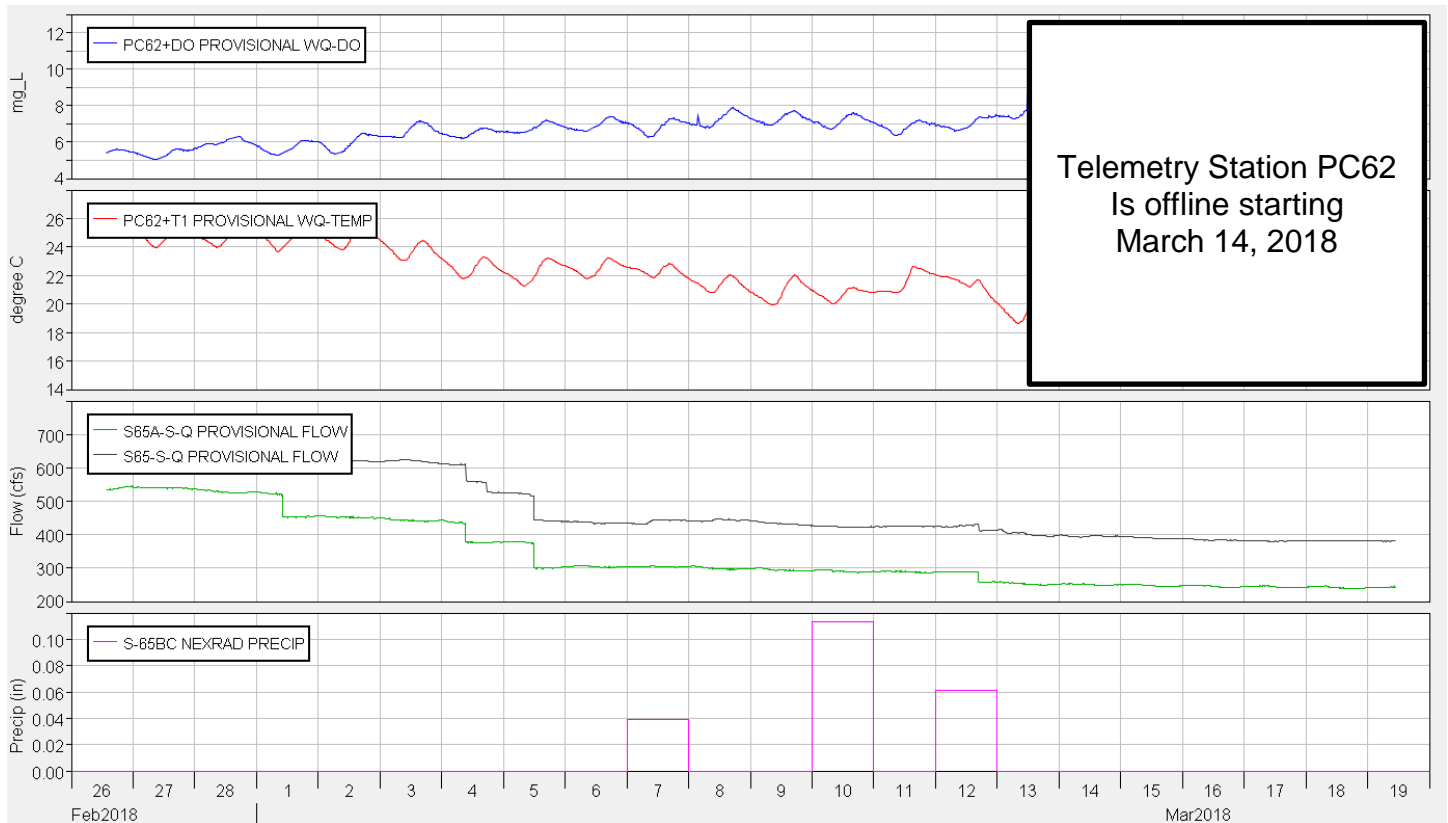
**Figure 9.** Mean water depth at stage recorders in the northern Phase I, southern Phase I, northern Phase II/III, and southern Phase II/III areas in relation to the S-65A discharge and S-65D headwater stage.





Report Date: 5/1/2018; data are through: 4/29/2018.

**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

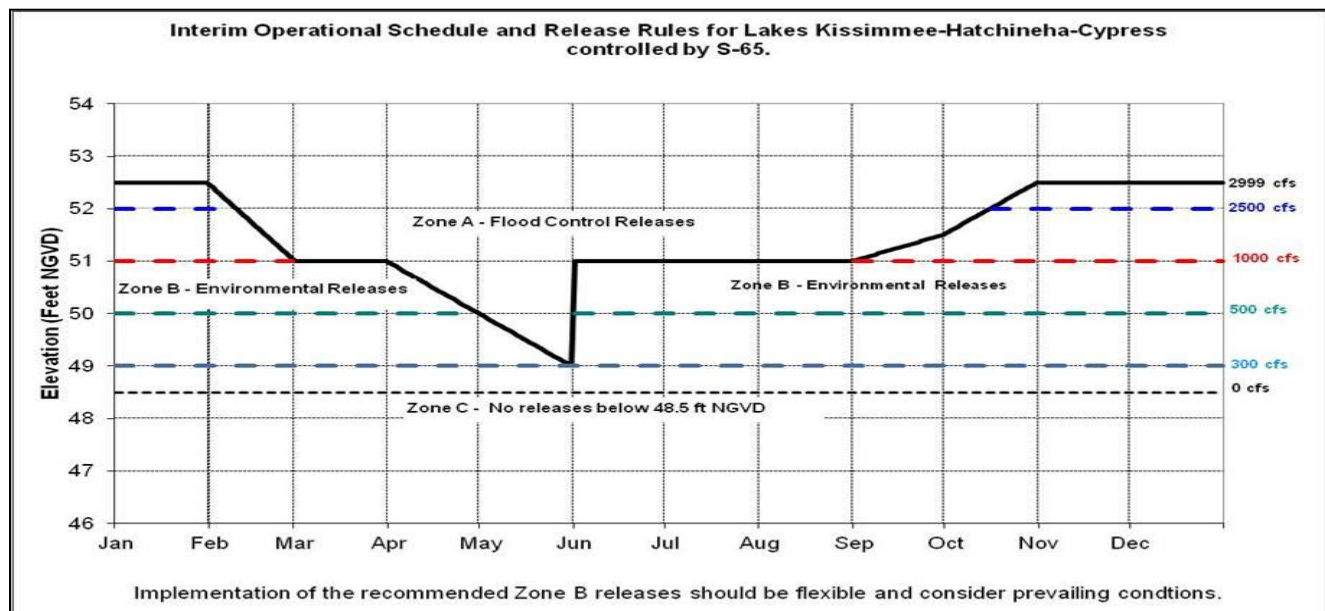
### Kissimmee Basin Adaptive Recommendations and Operational Actions

Date	Recommendation	Purpose	Outcome	Source
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	
9/5/2017	No new recommendations.		N/A	
8/29/2017	No new recommendations.		N/A	
8/22/2017	No new recommendations.		N/A	
8/15/2017	No new recommendations.		N/A	
8/4/2017	Increase S65A discharge by 150 cfs to about 1400 cfs.	Reduce rate of stage rise in KCH.		SFWMD Water Mgt, KB Ops
8/1/2017	No new recommendations.		N/A	

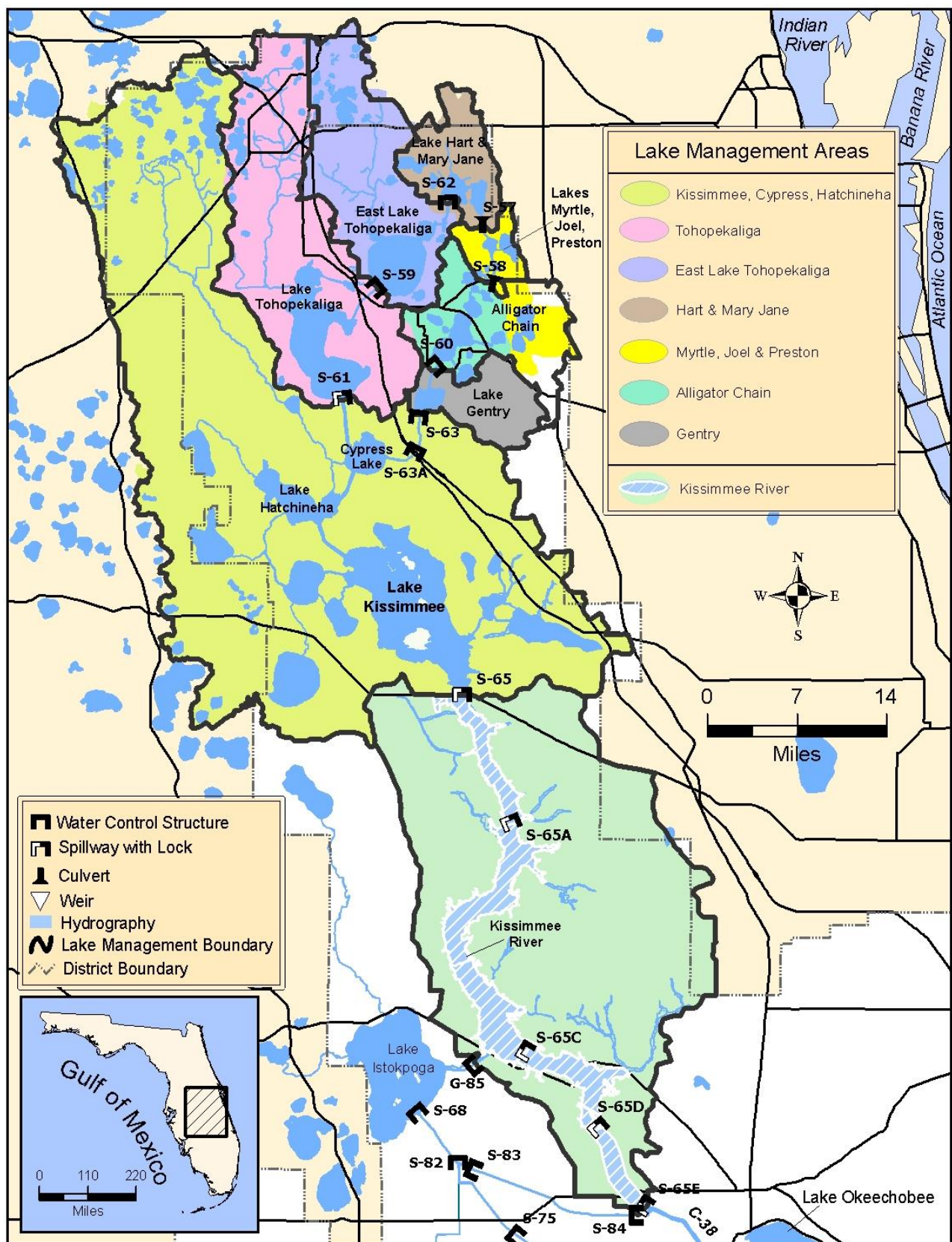
## S-65/S-65A Limits on Rate of Change in Discharge

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 at 13.16 feet NGVD for the period ending at midnight on April 30, 2018. This value is based on the use of four interior Lake stations (L001, L005, L006 and LZ40) and four perimeter stations (S-308, S-352, S-4 and S-133). The Lake is now 0.71 feet lower than it was a month ago, 4 feet lower than its peak in mid-October 2017, and 1.55 feet higher than a year ago (Figure 1). The Lake is now in the Base Flow sub-band (Figure 2). According to RAINДАР, 0.63 inches of rain fell over the Lake during the week of April 24, 2018 – April 30, 2018 with most of the upper watershed receiving no rainfall, and areas on the northern shore receiving less than 0.10 inches (Figure 3).

Average daily inflows to the Lake were very similar to the previous week at 536 cfs vs 524 cfs. Kissimmee River discharges through the S-65E structures were 291 cfs this past week, compared to 313 cfs the previous week. The S-71, S-72, and S-84 structures contributed a combined 232 cfs compared to 174 cfs the previous week, while Fisheating Creek contributed an average daily 8 cfs.

Average daily outflows for the Lake decreased substantially from the previous week, through decreases in flows through S-77 and south through the S-350 structures. Discharges went from 2,823 cfs the previous week to 1,719 cfs this past week. Discharges through S-77 decreased from 1,163 cfs the previous week to 794 cfs this past week, while discharges through S-308 increased slightly from 184 cfs to 219 cfs. Discharges south through the S-350 structures decreased from an average of 1,323 cfs the previous week to 757 cfs this past week. Flows to and from the L-8 canal via Culvert 10A were erratic, going from 244 cfs inflows to the Lake on April 25, 2018 to 92 cfs discharges from the Lake on April 30, 2018. The average for the week resulted in 50 cfs daily inflow to the Lake, compared to 152 cfs discharge the previous week. The corrected average daily evapotranspiration value for the week based on the L006 weather platform solar radiation data was 0.19 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 decrease of approximately 800 acres in habitat with suitable foraging depths for long-legged wading birds from the previous week, with 29,058 acres of suitable depth on April 30, 2018. There was also a loss of roughly 600 acres of suitable foraging depths for short or long-legged wading birds, going from 14,319 acres the previous week to 13,699 acres this past week as foraging habitats continue to dry out (Figure 5). The April 26, 2018 survey found 7,585 foraging wading birds on the Lake, similar to the last three surveys but roughly half of last year's mid- to late-April survey (Figure 6).

The most recent satellite imagery using the cyanobacteria monitoring product derived from NOAA's OLCI satellite sensor showed cyanobacteria bloom potential remains low, though some pixels are beginning to show moderate values along the shorelines (Figure 7). Last summer, the potential for elevated cyanobacterial levels increased in early July, when winds subsided and turbidity values plummeted.

## **Water Management Recommendations**

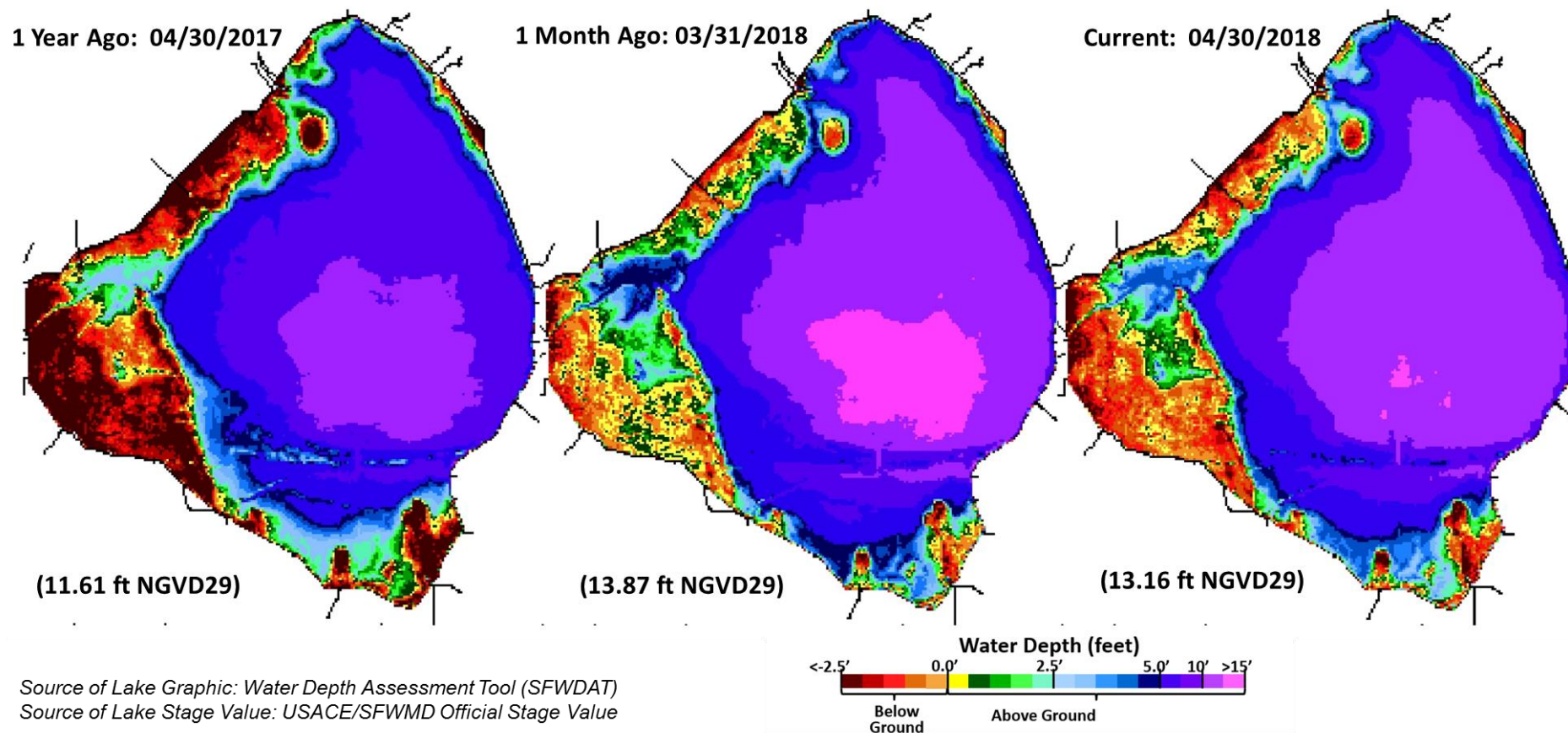
Lake Okeechobee stage is 13.16 feet NGVD having decreased 0.08 feet over the past week and 0.71 feet over the last month. Recession rates have slowed considerably over the past two weeks, averaging 0.13 feet per week versus roughly 0.23 feet per week in late April and early May. The slower recession rate should aid wading bird colonies that were experiencing losses of foraging habitat but may reduce the recovery of some vegetation communities in the nearshore region by delaying light penetration to deeper areas.

**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	291	0.1
S71 & 72	134	0.1
S84 & 84X	98	0.0
Fisheating Creek	8	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	4	0.0
S4 P	0	0.0
C5	0	0.0
Rainfall	1747	0.6
<b>Total</b>	<b>2283</b>	<b>0.9</b>

OUTFLOWS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)
S77	794	0.3
S308	219	0.1
S351	88	0.0
S352	135	0.1
S354	534	0.2
L8	-50	0.0
ET	3582	1.5
<b>Total</b>	<b>5302</b>	<b>2.3</b>

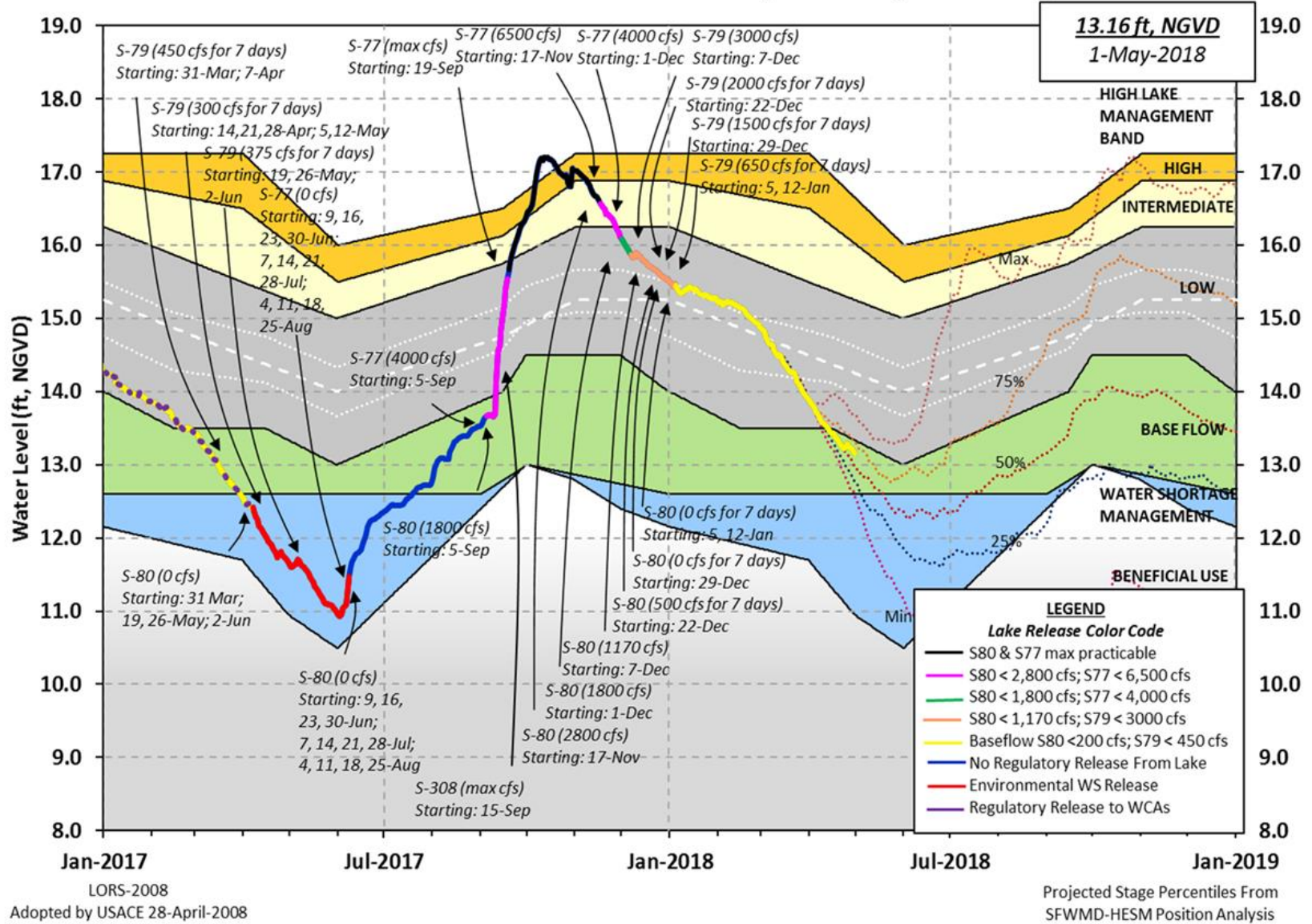
PROVISIONAL DATA



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

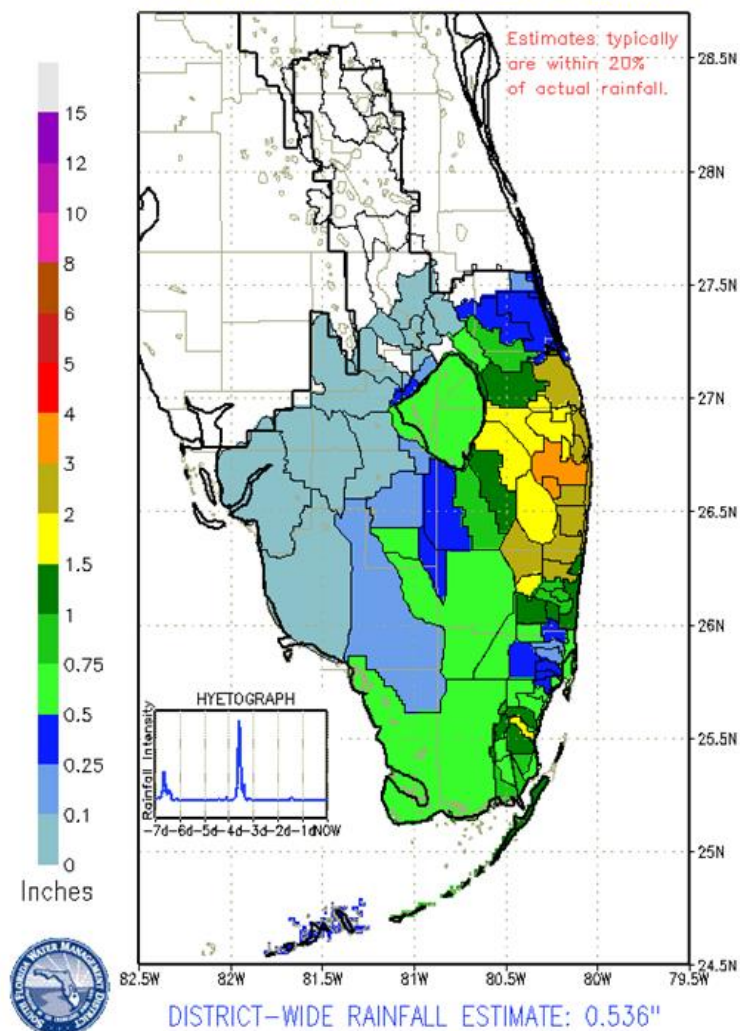


## Lake Okeechobee Water Level History and Projected Stages

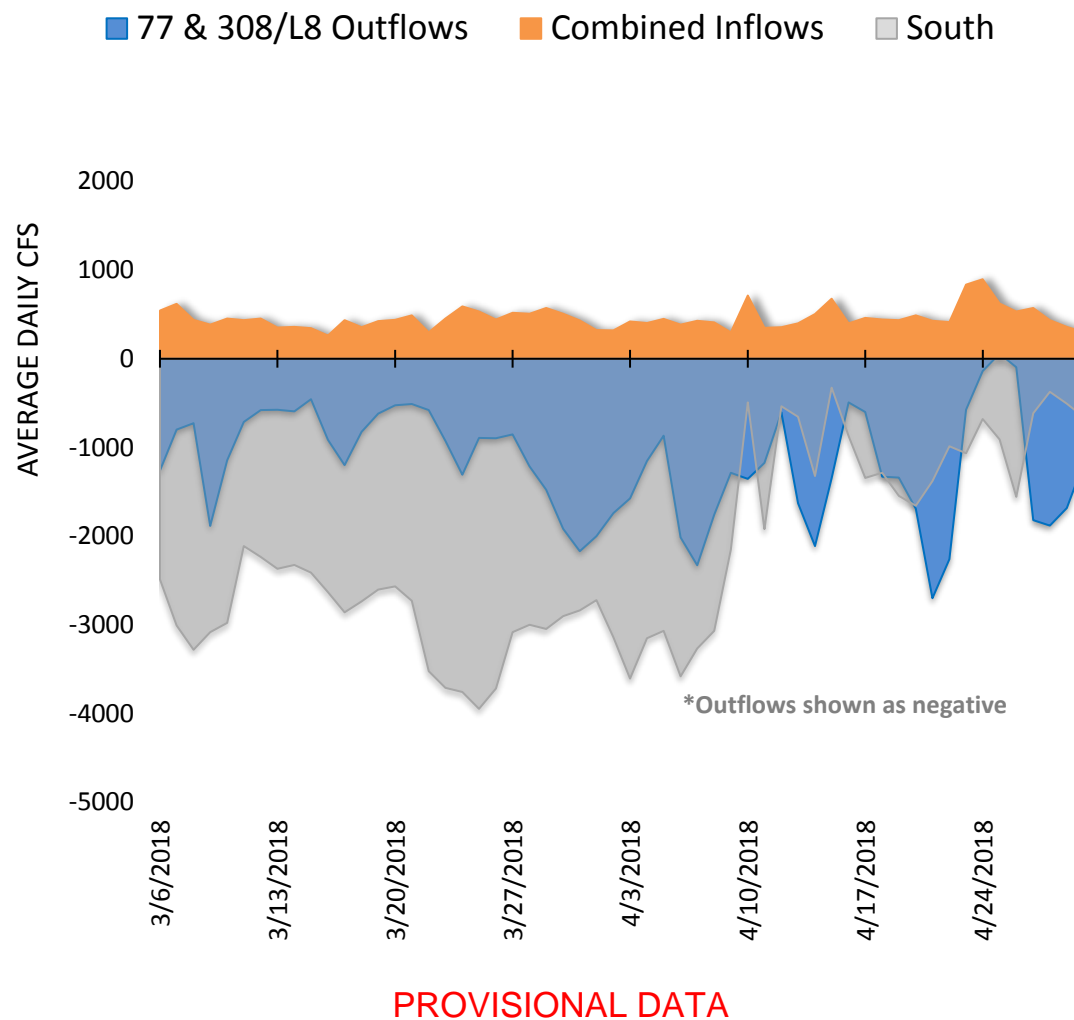


**Figure 2.** Recent Lake Okeechobee stage and releases, with projected stages based on a dynamic position analysis.

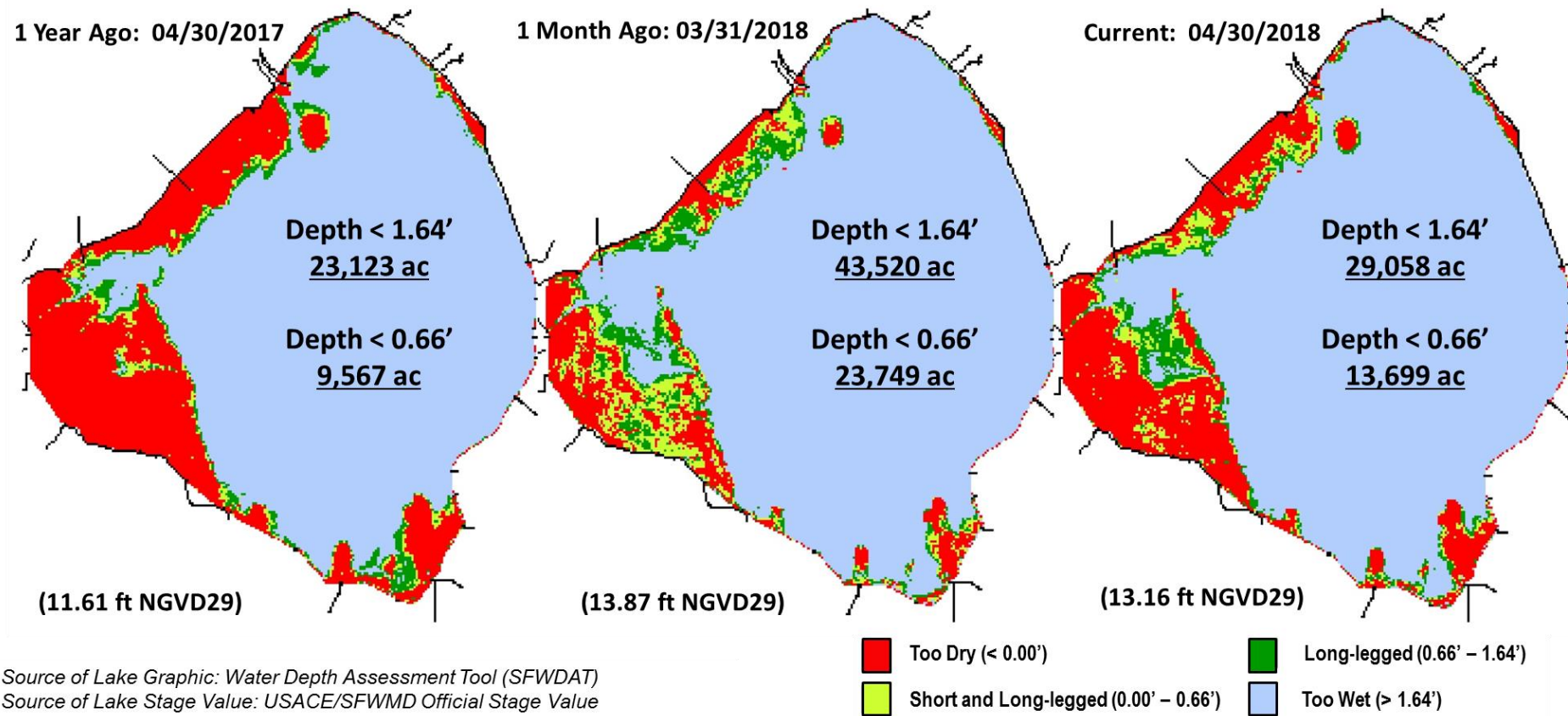
SFWMD PROVISIONAL RAINFALL 7-DAY BASIN RAINFALL ESTIMATES  
FROM: 0515 EST, 04/24/2018 THROUGH: 0515 EST, 05/01/2018



**Figure 3.** Rainfall estimates by basin.



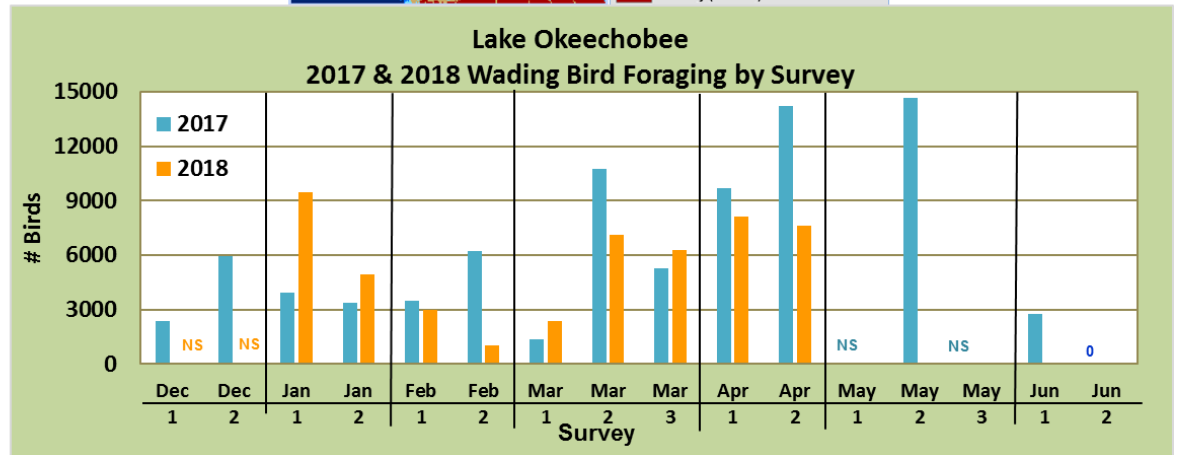
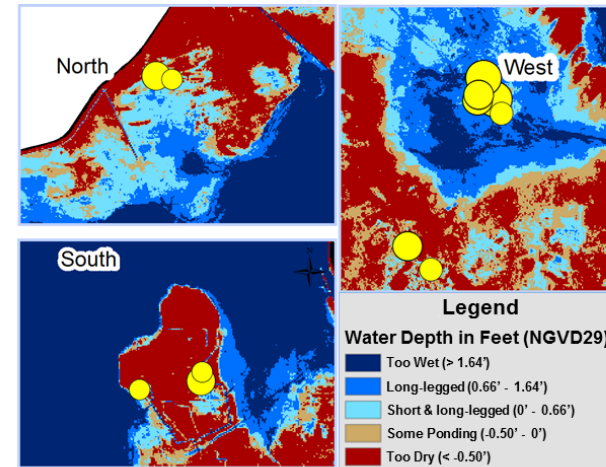
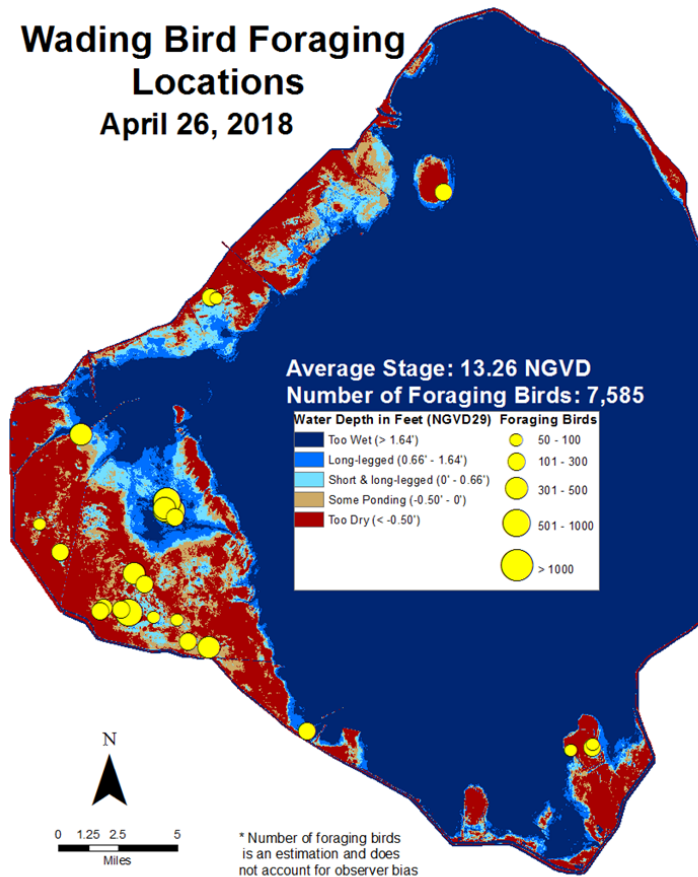
**Figure 4.** Major inflows and outflows of Lake Okeechobee, including the S350 structures designated as South. Inflows and outflows are shown as positive and negative, respectively, for visual purposes.



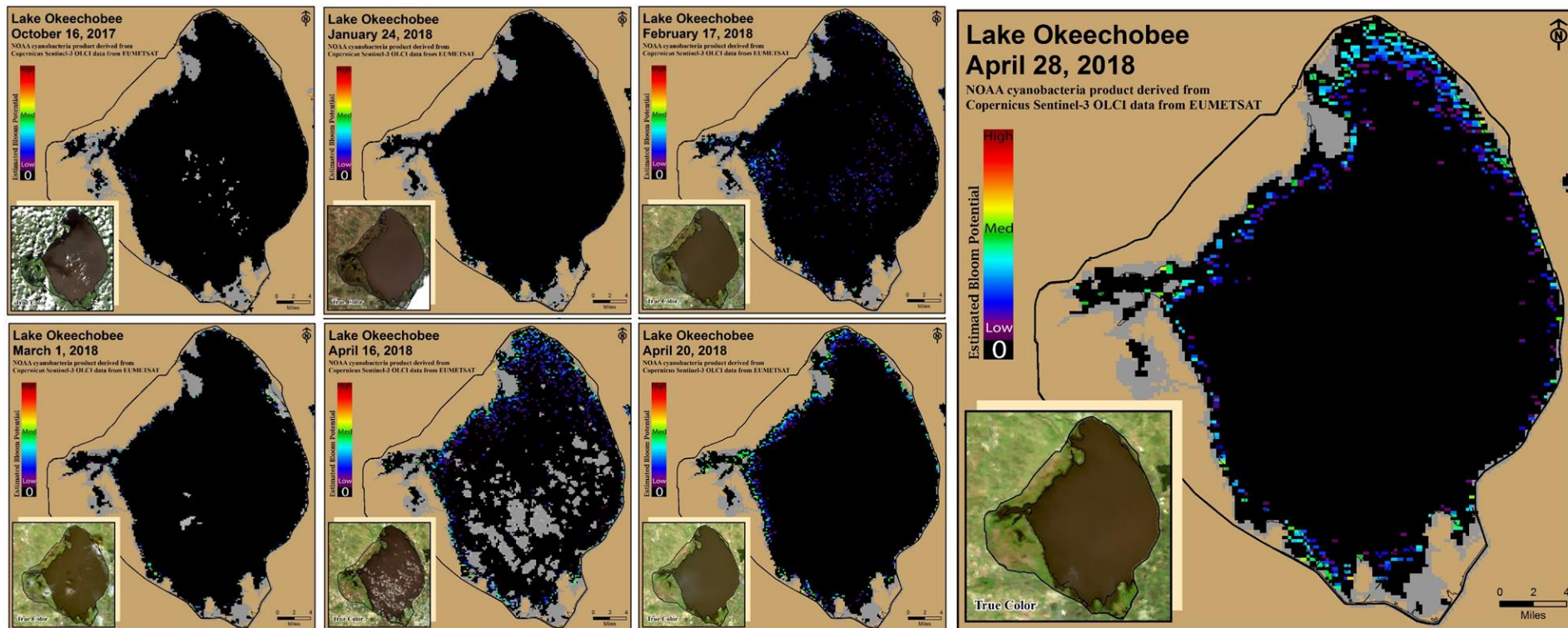
**Figure 5.** Wading bird habitat suitability index for Lake Okeechobee based on the South Florida Water Depth Assessment Tool.



# Wading Bird Foraging Locations April 26, 2018



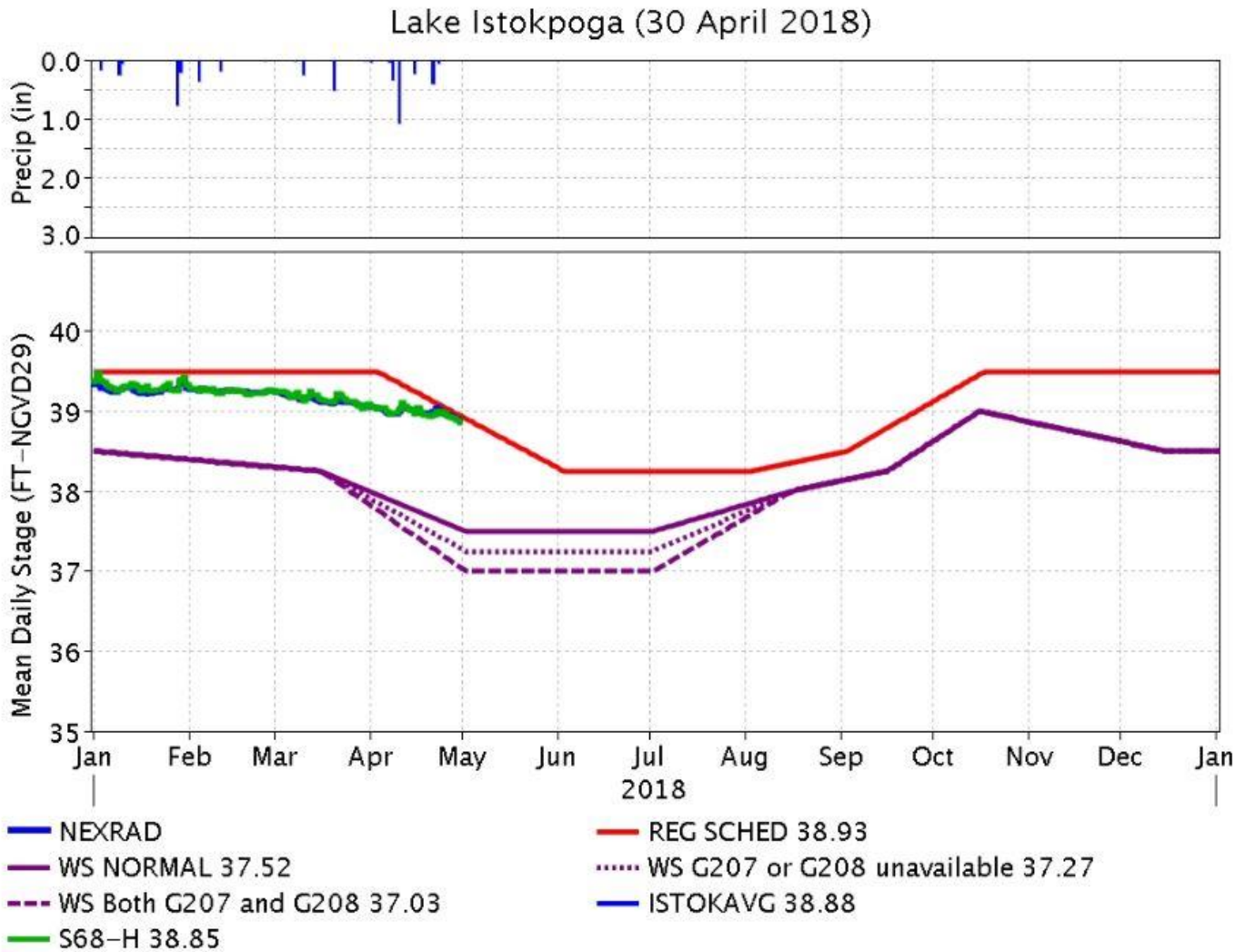
**Figure 6.** Locations of foraging flocks of wading birds observed during a monitoring flight on April 26, 2018 are shown in yellow, with circle sizes representing the size of the flocks. Previous survey totals from this season and from 2017 are compared in the bar graph.



**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 38.86 feet NGVD as of midnight April 30, 2018 and is currently 0.05 feet below its regulation schedule to accommodate construction on downstream structures (Figure 8). Average daily inflows to the lake from Josephine and Arbuckle Creeks for the week April 24 – April 30, 2018 were similar to the previous week at 112 cfs. Discharges via the S-68 and S-68X structures were also similar to the previous week at 91 cfs average daily. 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 to the St. Lucie Estuary averaged about 370 cfs (Figures 1 and 2) and last month inflow averaged about 273 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	282
S-80	0
S-308	219
S-49 on C-24	0
S-97 on C-23	0
Gordy Rd. structure on Ten Mile Creek	88

Over the past week, surface salinity 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 26.0. Salinity conditions in the middle estuary are within the fair range for adult eastern oysters (Figure 3).

**Table 2.** Seven-day average salinity at three monitoring sites in the St. Lucie Estuary. Current average is in bold face type, previous average in parentheses. The envelope reflects the preferred salinity range for adult eastern oysters (*Crassostrea virginica*) in the middle estuary.

Sampling Site	Surface	Bottom	Envelope
HR1 (North Fork)	<b>23.3</b> (23.9)	<b>25.2</b> (25.0)	NA <sup>1</sup>
US1 Bridge	<b>NR</b> (NR)	<b>26.8</b> (27.2)	10.0-26.0
A1A Bridge	<b>31.0</b> (31.6)	<b>32.0</b> (32.6)	NA <sup>1</sup>

<sup>1</sup>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 <i>a</i> (µg/l)	Average DO (mg/l)	Minimum DO (mg/l)	Maximum DO (mg/l)
SF2	2.61	4.59 - 9.26	1.36	0.38	2.19
SF	1.59	3.27 - 11.74	6.76	5.35	8.80
NF	1.91	2.52 - 8.84	6.53	5.38	8.39
ME	1.79	2.17 - 8.74	8.46	6.32	10.01
IRL-SLE	3.57	0.25 - 3.33	6.39	5.96	6.92

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 887 cfs (Figures 7 and 8) and last month inflow averaged about 839 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	794
S-78	747
S-79	839
Tidal Basin Inflow	48

Over the past week, salinity decreased throughout the estuary (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 4.0 at Val I-75 and 11.9 at Ft. Myers. With no flow through S-79, daily salinity at Val I-75 is forecast in two weeks to be 6.5, and the 30-day moving average is forecast to be 4.6 (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)	<b>1.8</b> (2.7)	<b>1.9</b> (2.8)	NA <sup>1</sup>
*Val I75	<b>3.1</b> (3.8)	<b>5.6</b> (6.3)	0.0-5.0 <sup>2</sup>
Ft. Myers Yacht Basin	<b>10.2</b> (11.4)	<b>12.1</b> (13.6)	NA
Cape Coral	<b>19.7</b> (20.9)	<b>20.7</b> (21.6)	10.0-30.0
Shell Point	<b>29.8</b> (30.4)	<b>28.3</b> (29.1)	10.0-30.0
Sanibel	<b>NR</b> <sup>3</sup> (NR)	<b>NR</b> (NR)	10.0-30.0

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

\*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.

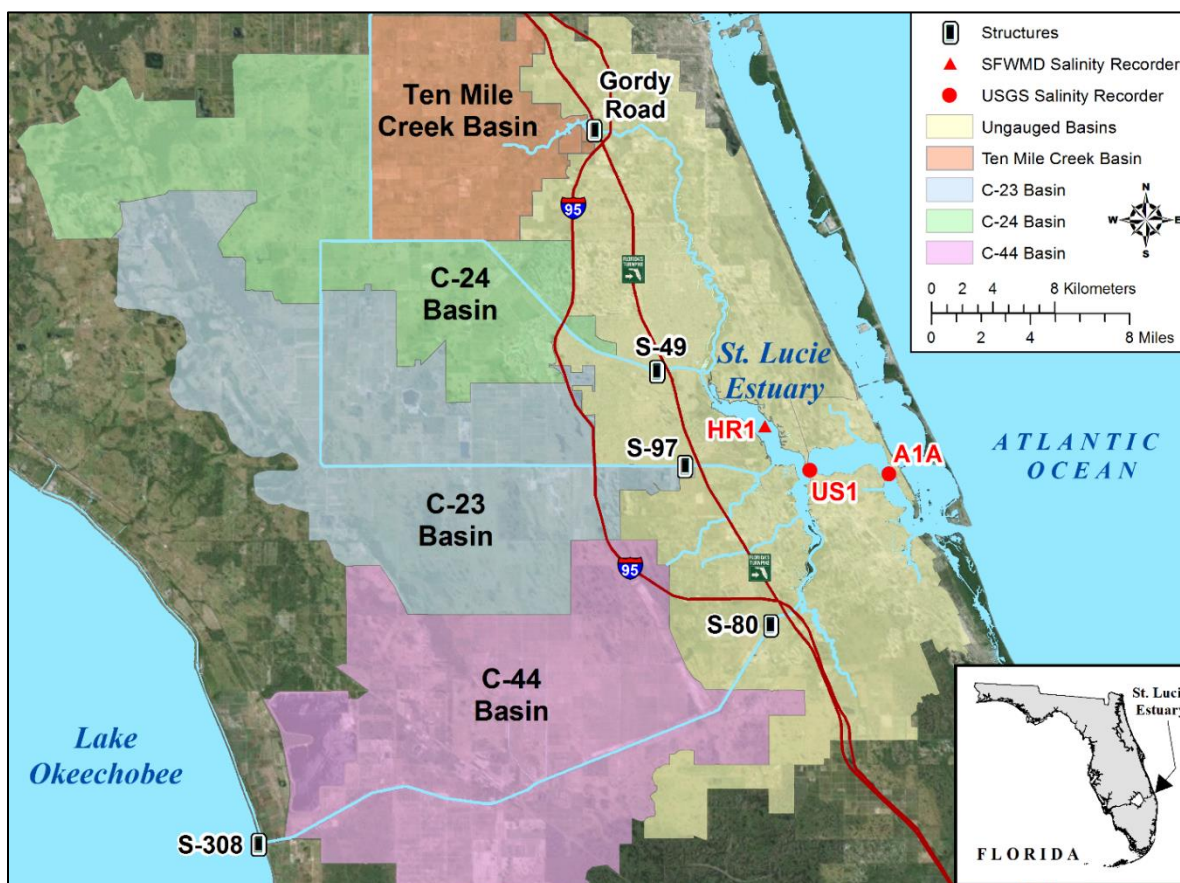
Parameter Name	RECON Monitoring Stations		
	Beautiful Island	Ft. Myers	Shell Point
Chlorophyll <i>a</i> (µg/l)	4.35 – 15.74	4.53 – 22.01	1.59 – 23.77
Dissolved Oxygen (mg/l)	4.28 – 7.53	3.80 – 8.09	3.94 – 10.51

The Florida Fish and Wildlife Research Institute reported on April 27, 2018, that *Karenia brevis*, the *Florida red tide dinoflagellate*, was observed at background to high concentrations in 36 samples collected from Lee County. Fish kills and respiratory irritation were reported in Lee County over the past week.

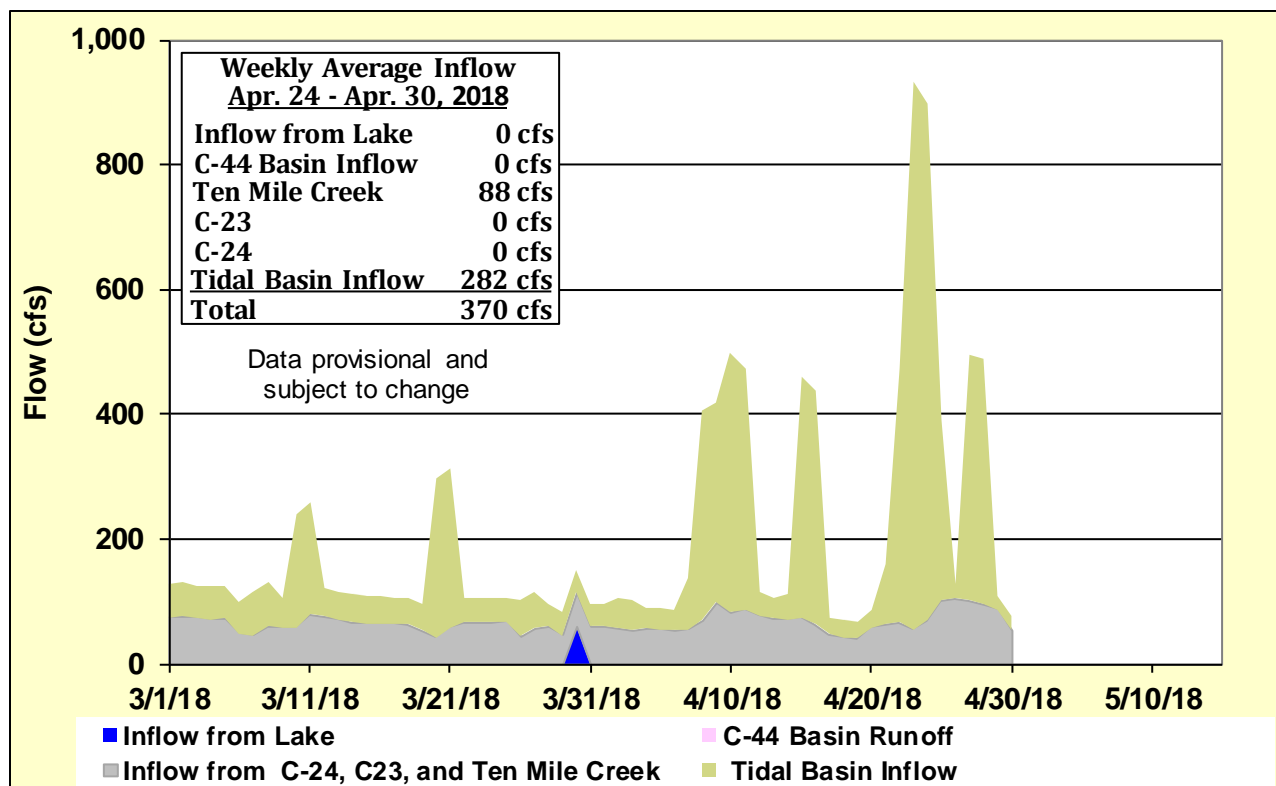
NOAA satellite imagery indicates minimal visible cyanobacteria bloom potential in the Caloosahatchee Estuary this week (Figure 12).

### **Water Management Recommendations**

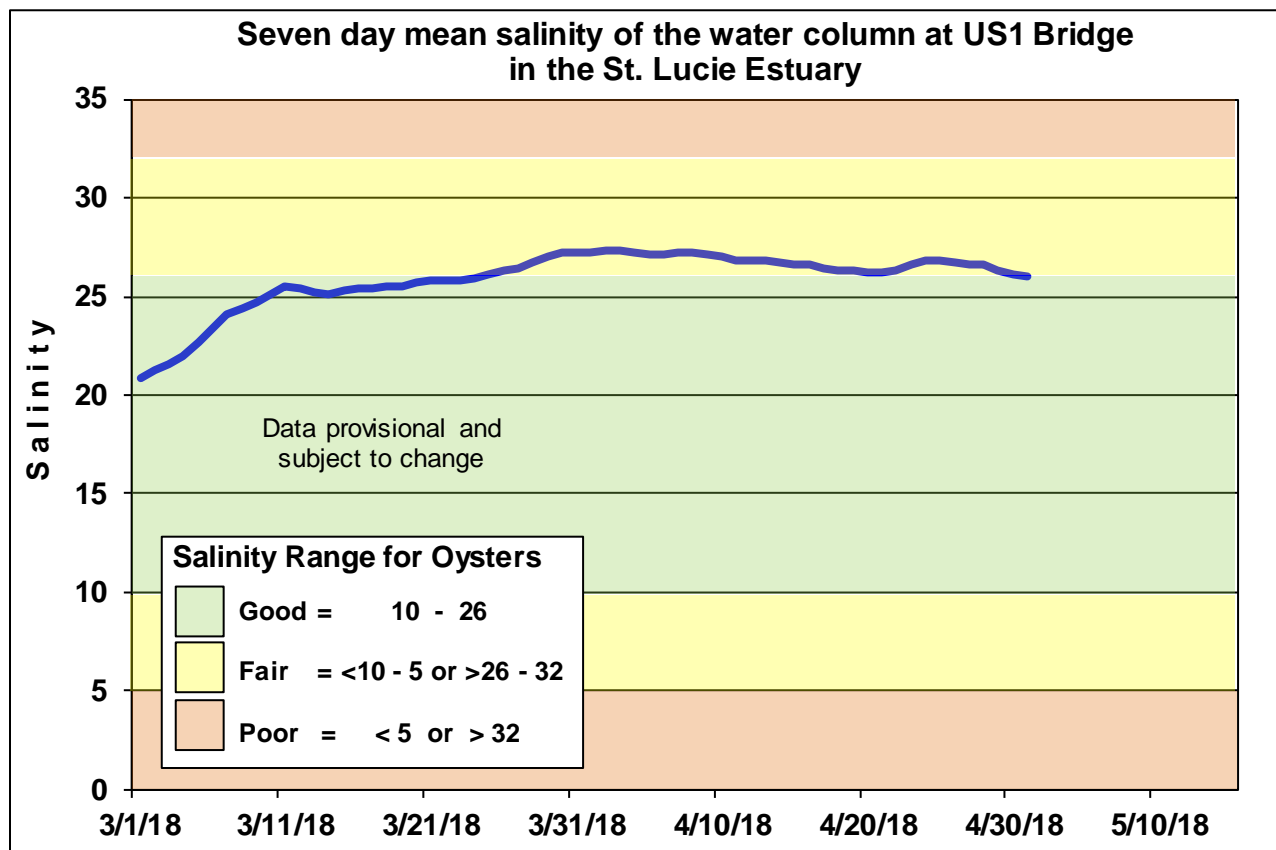
Lake stage is in the Base Flow sub-band of 2008 LORS. Tributary hydrological conditions are dry. The 2008 LORS recommends up to 450 cfs at S-79 and up to 200 cfs at S-80. Although the Caloosahatchee is not in need of water at this time based on the Val I-75 forecast, the continuation of the current releases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

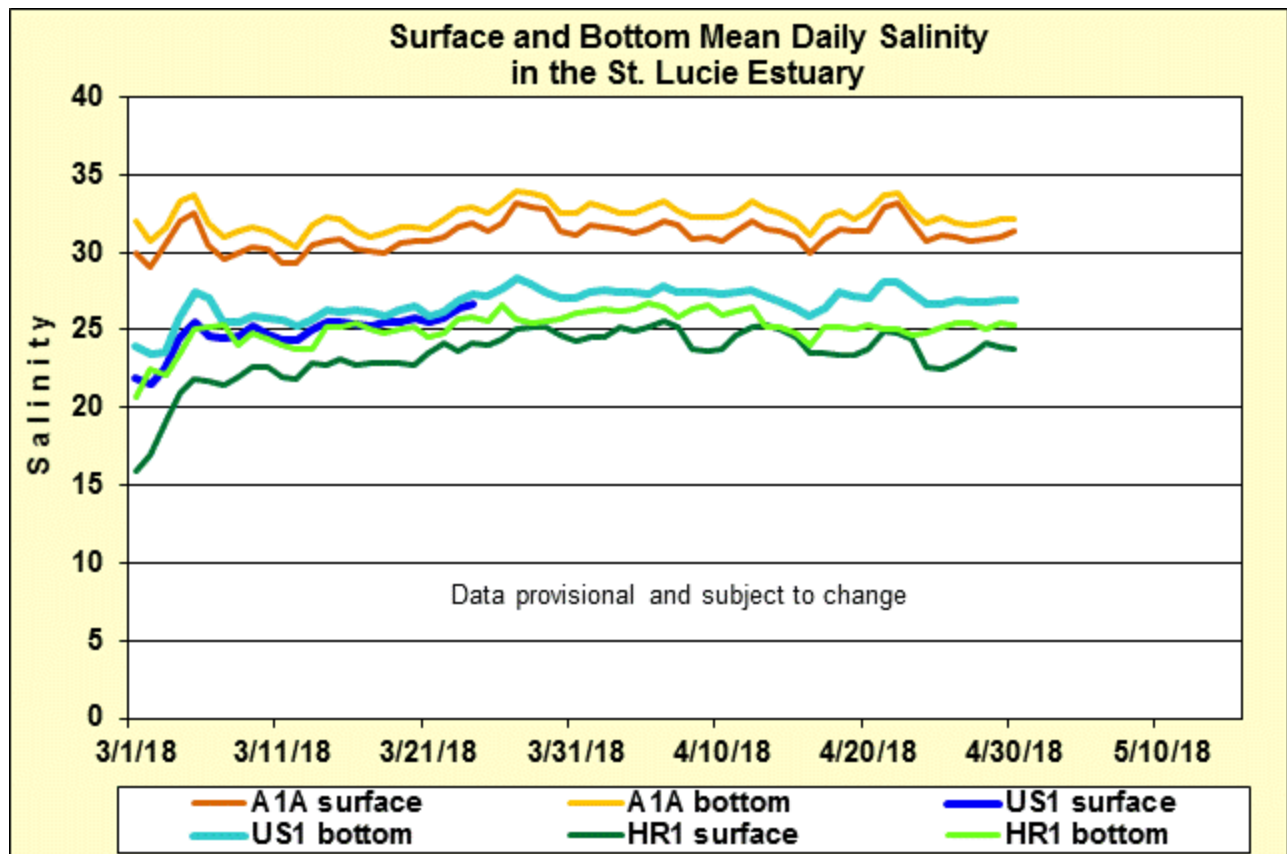


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

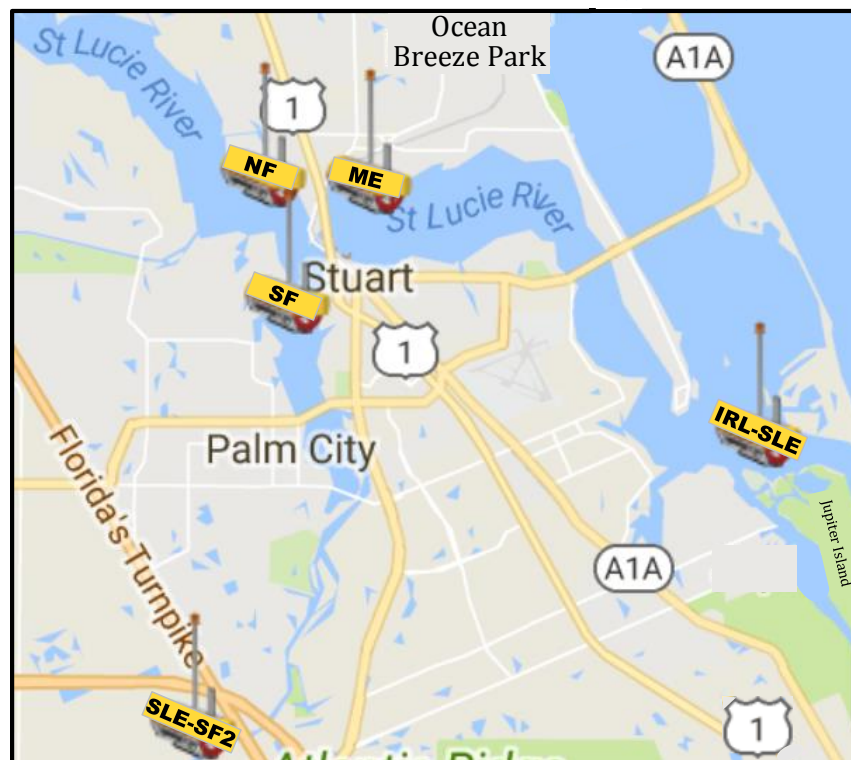
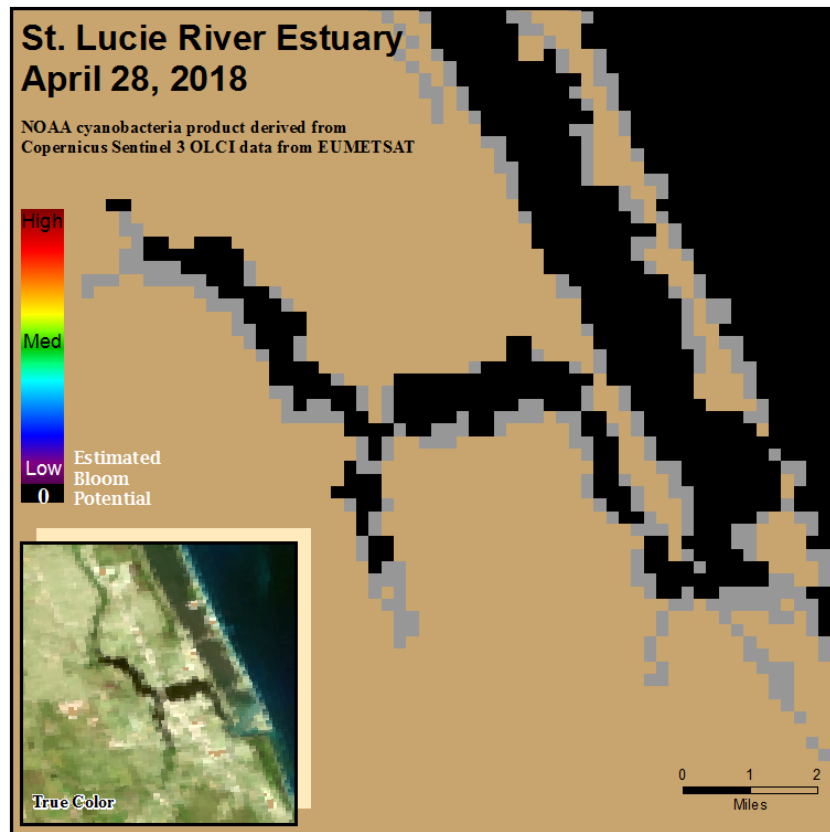
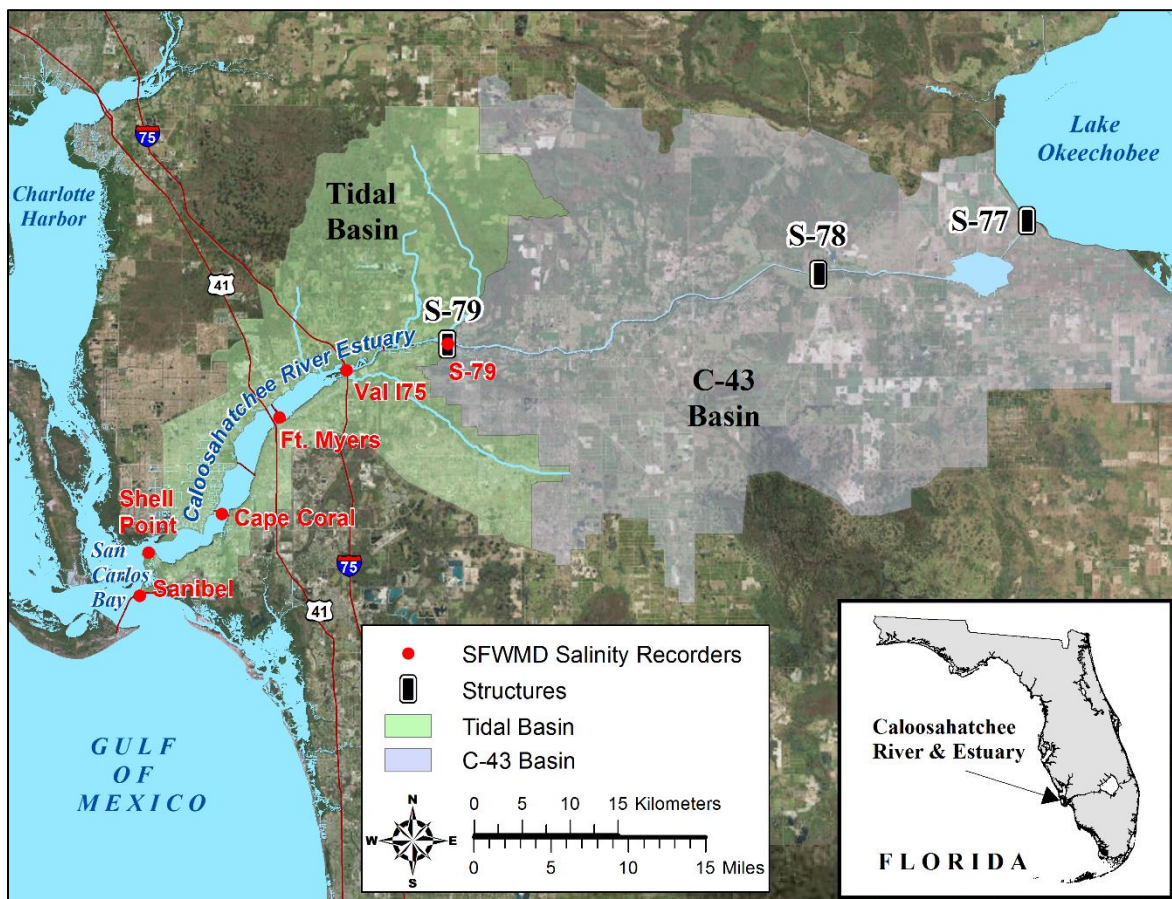


Figure 5. Location of FAU-HBOI LOBO water quality stations in the St. Lucie Estuary.

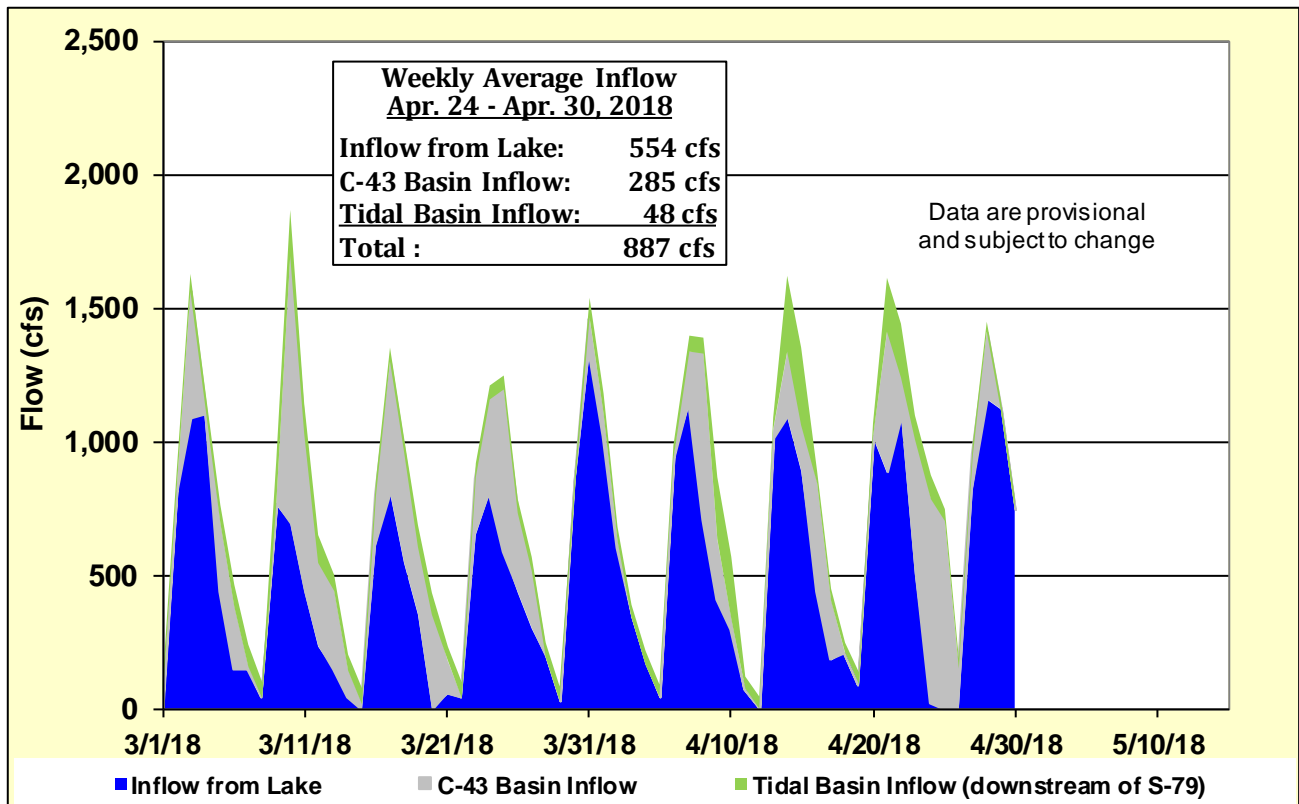




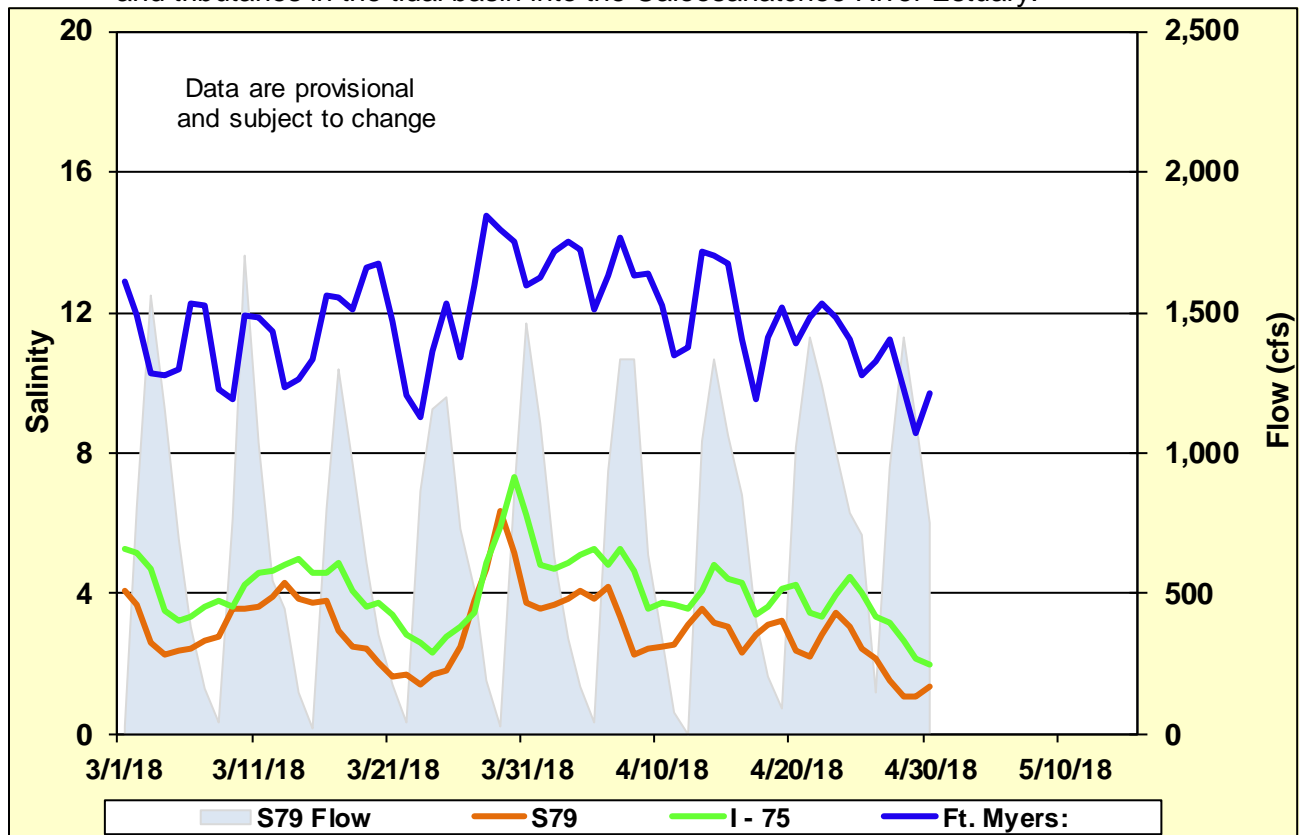
**Figure 6.** Sentinel 3a Satellite imagery provided by NOAA uses Ocean and Land Color Instrument (OLCI) to estimate cyanobacteria bloom potential in St. Lucie Estuary.



**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.

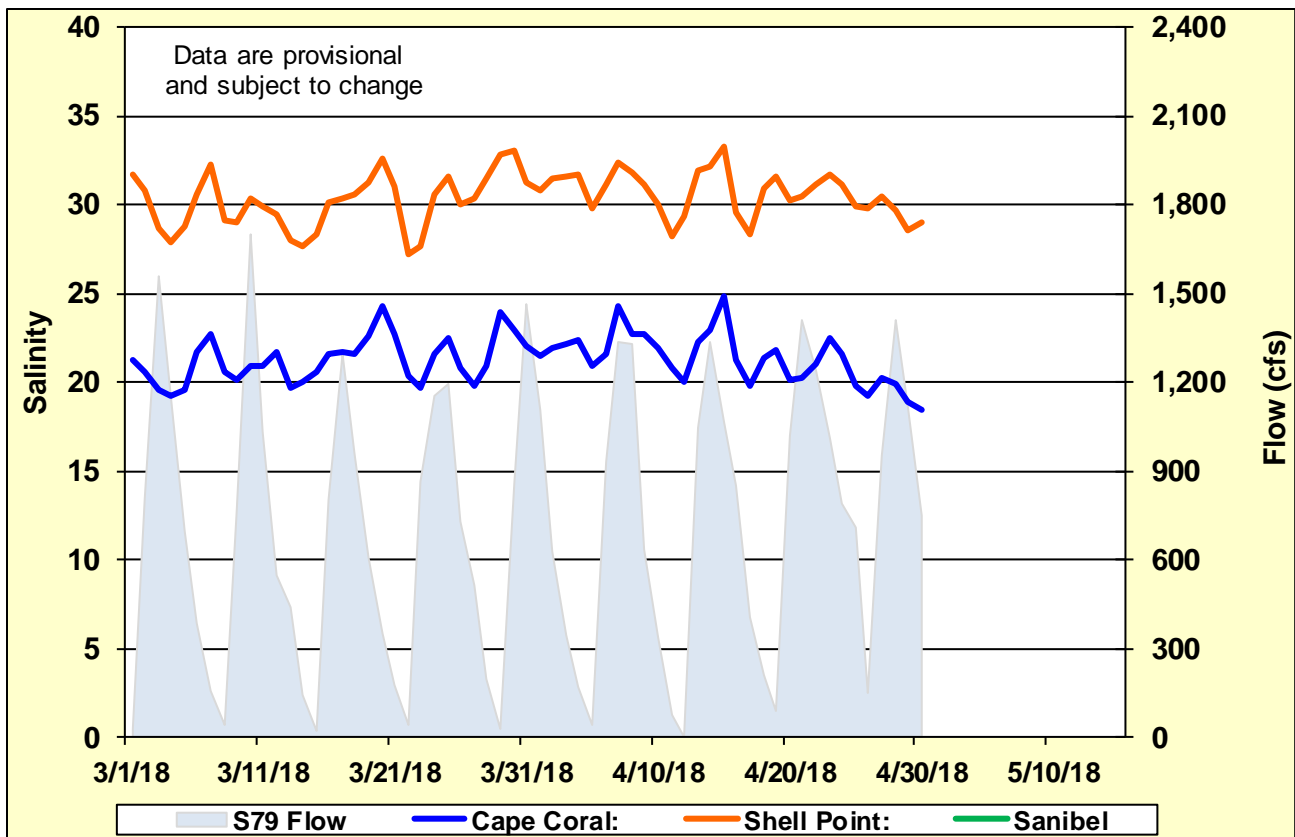


Figure 10. Daily mean flows at S-79 and salinity at lower estuary stations.

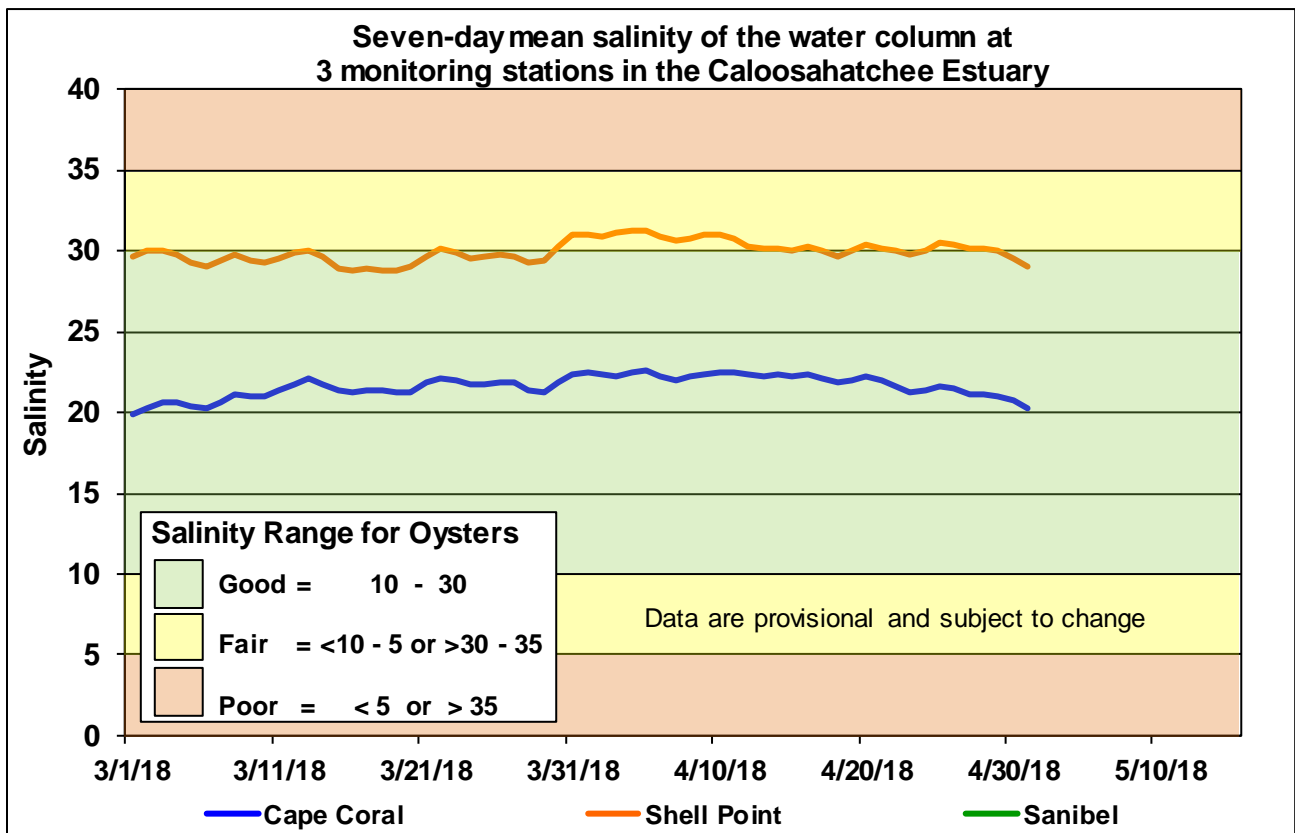
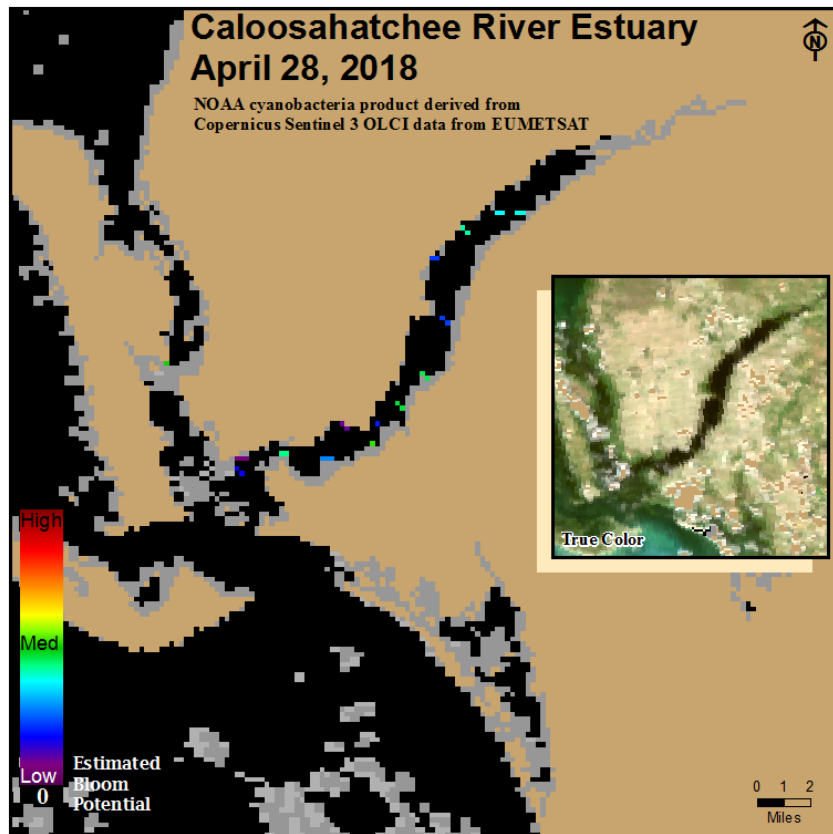
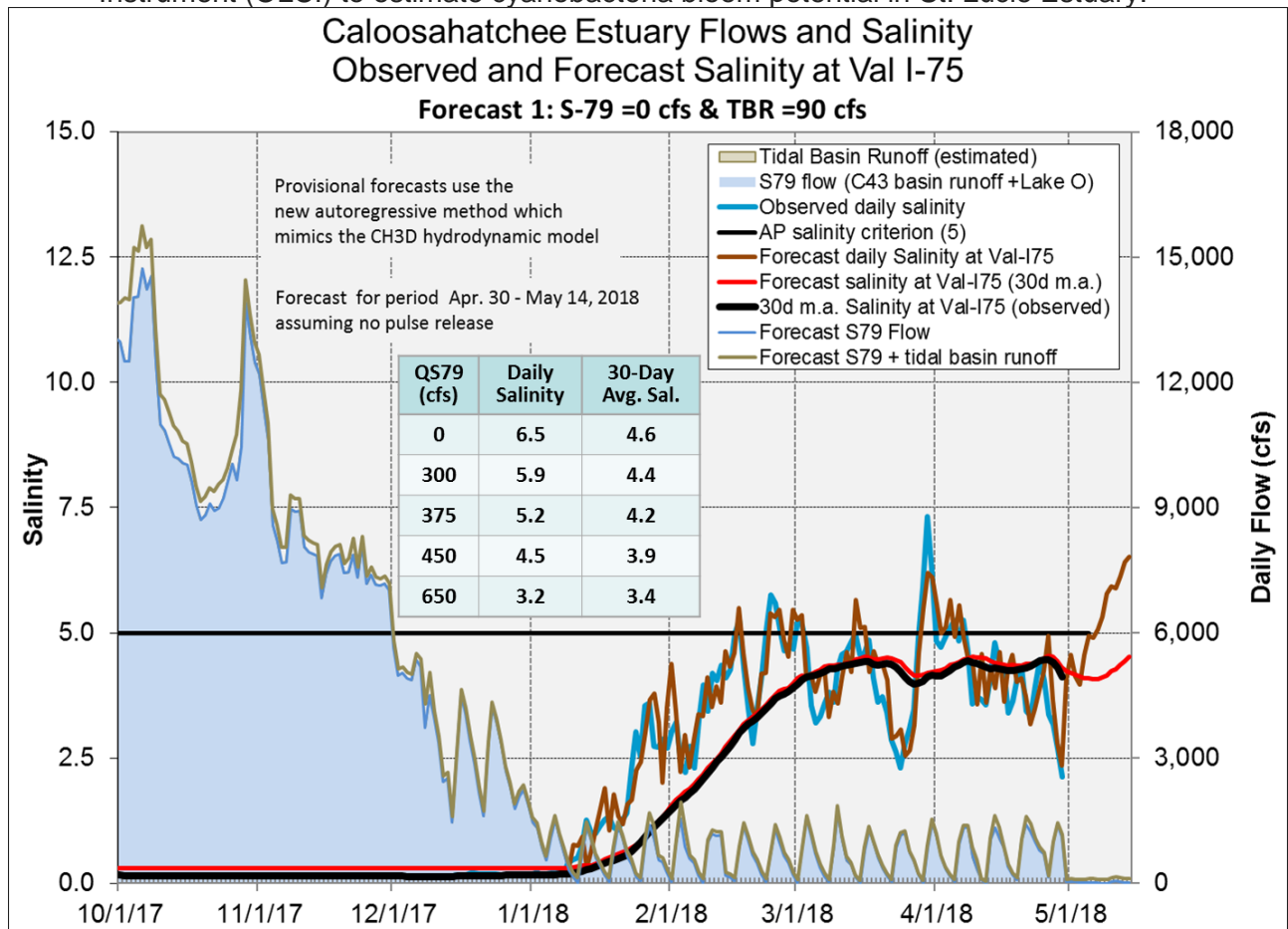


Figure 11. Seven-day mean salinity at Cape Coral Bridge, Shell Point, and Sanibel Bridge monitoring stations.






**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.

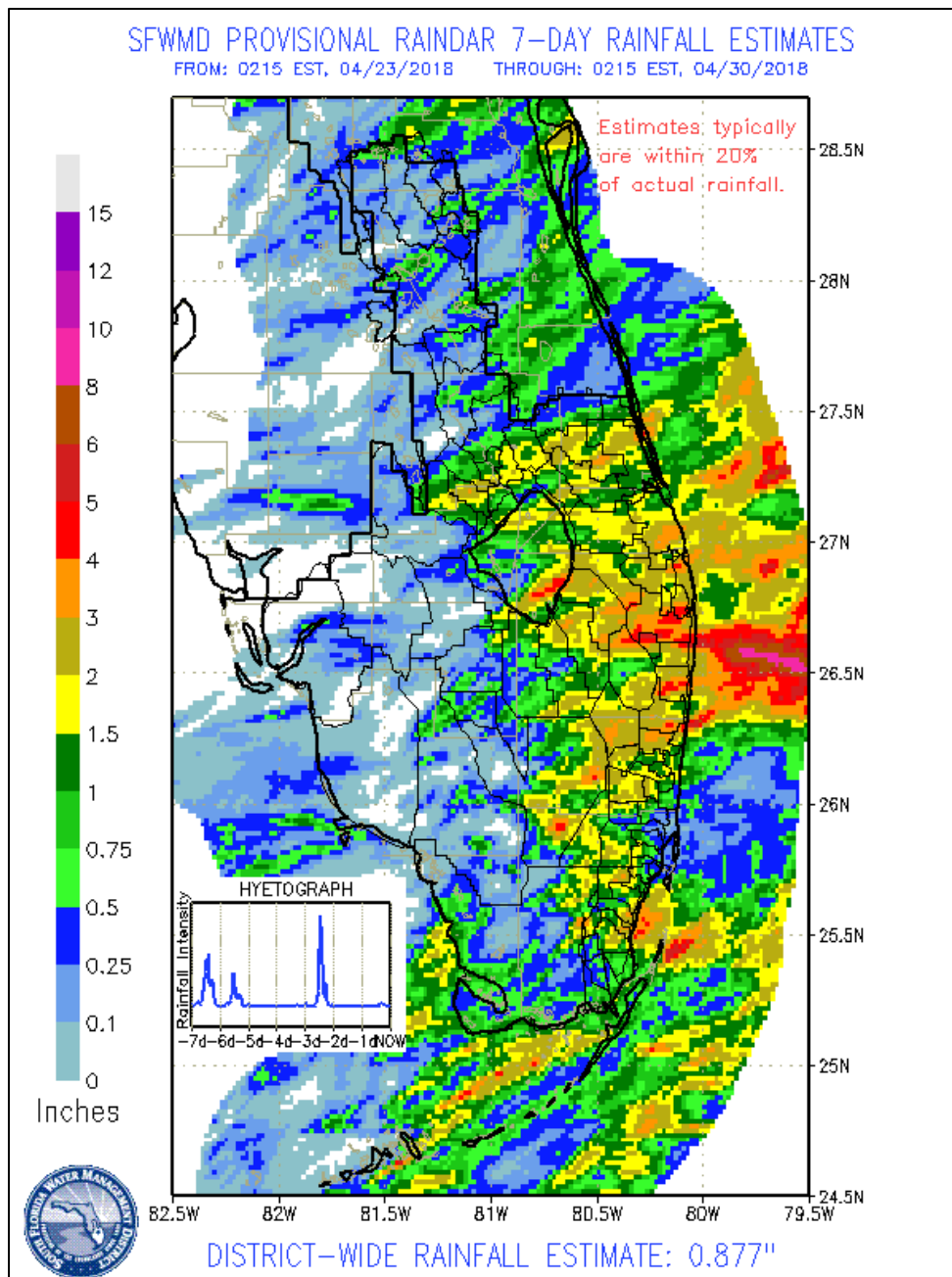


**Figure 13.** 14-day salinity forecast at Val I-75 assuming no releases at S-79.

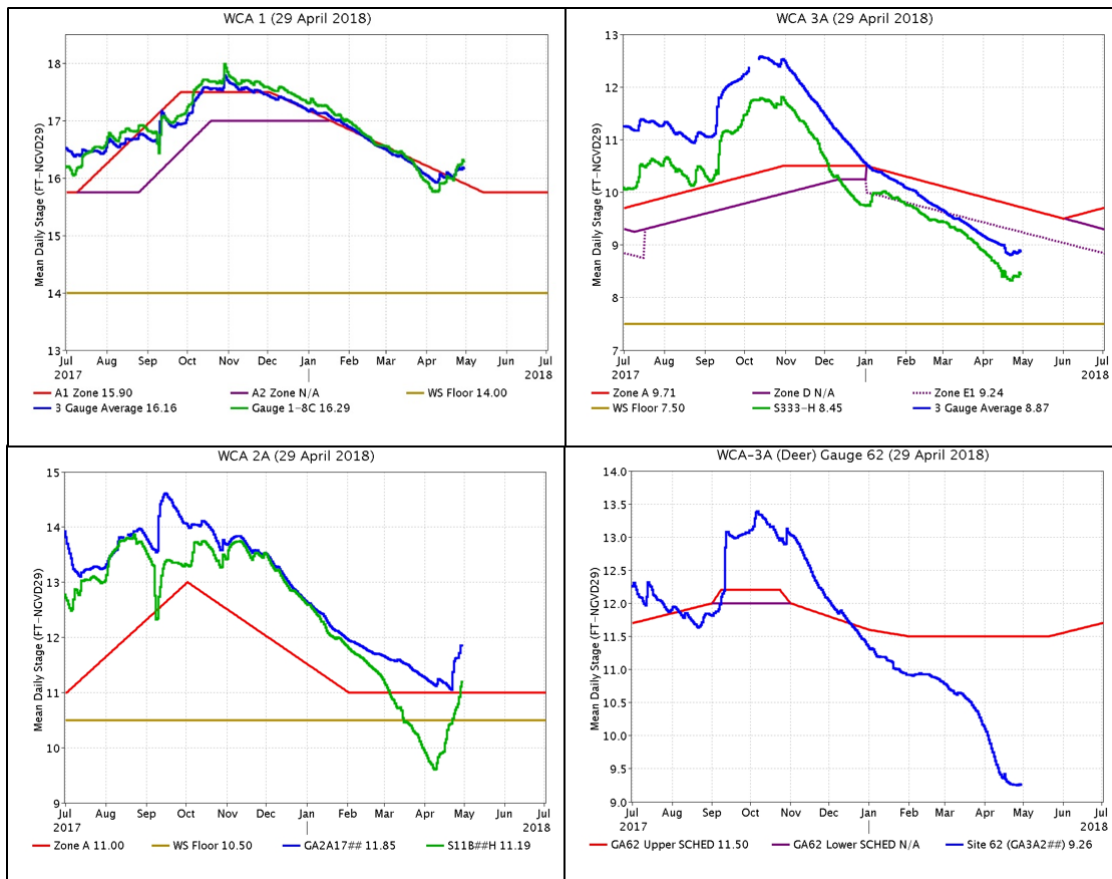
## **EVERGLADES**

At the gauges monitored for this report, water depths across the Everglades rose an average of 0.05 feet last week. On average last week, WCA-3A rose slightly but generally the north and central regions remained more hydrated while the southern end's stage receded at near optimal rates. Individual gauge changes within the WCAs ranged from +0.30 feet (WCA-2A) to -0.08 feet (southern WCA-3A). Pan evaporation was estimated at 2.70 inches last week.

Everglades Region	Rainfall (Inches)	Stage Change (feet)	
WCA-1	1.92	+0.03	 Good Fair Poor
WCA-2A	2.39	+0.30	
WCA-2B	2.25	+0.05	
WCA-3A	1.13	+0.03	
WCA-3B	1.45	+0.04	
ENP	0.58	+0.00	



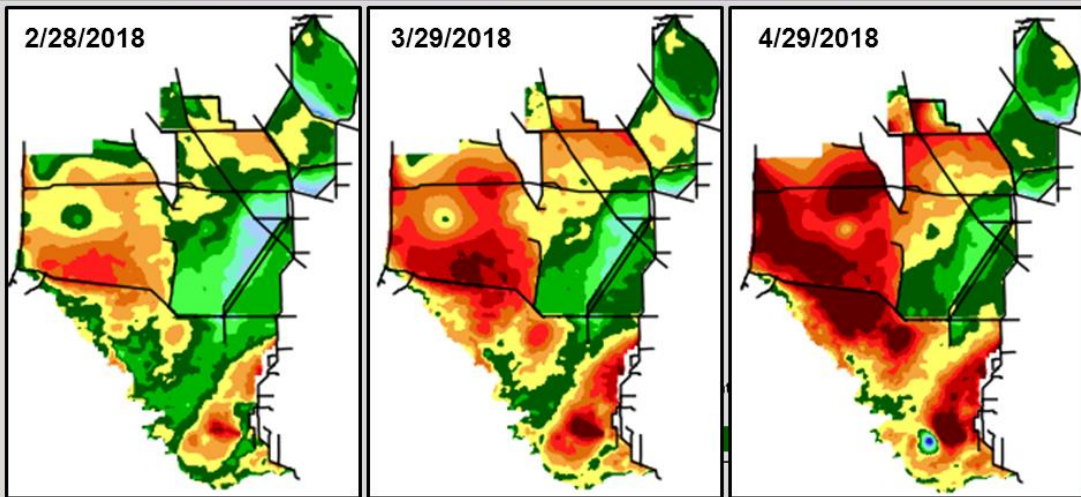
Regulation Schedules: WCA-1 three-gauge average is now 0.26 feet above Zone A1, and 0.13 feet below the canal stage. WCA-2A canal stage continues a sharp increase with gauge S11B stage now 0.69 feet above the WS Floor, and the marsh gauge is 0.85 feet above Zone A. WCA-3A three-gauge average stage is 0.37 feet below Zone E1, which is 0.1 feet closer than last week. WCA-3A stage at gauge 62 (northwest corner) is 2.24 feet below the upper schedule.



Water Depths and Changes: The WDAT tool for spatial interpolation of depth monthly snapshots indicates stable to drying conditions across the Everglades. Within WCA-3A, the drying front has generally moved from northwest to southeast over the last two months. Northern WCA-3A continues a more extreme draw down with a significant portion of that region with water levels between 1.0 to 1.5 feet below ground. Comparing WDAT water levels from present, last week water levels dropped slightly in northwest WCA-3A but rose slightly in the rest of that basin. Depths across WCA-2A rose slightly in some areas to significantly in others. WCA-1 depths increased in the extreme north while depths along eastern and western perimeter decreased. The entirety of WCA-2A is wetter than it was a month ago. A faulty gauge is causing an anomaly in the modeling output in the far south of Everglades National Park.



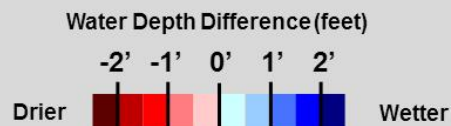
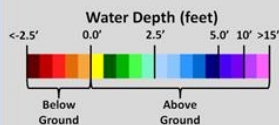
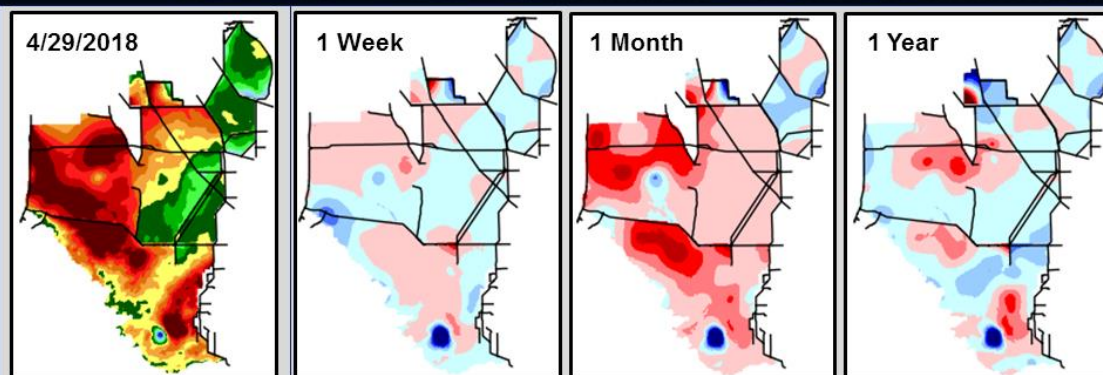
## SFWDAT Water Depth Monthly Snapshots



South Florida Water Depth Assessment Tool (SFWDAT)



## SFWDAT Everglades Difference Maps (Present - Past)



South Florida Water Depth Assessment Tool (SFWDAT)

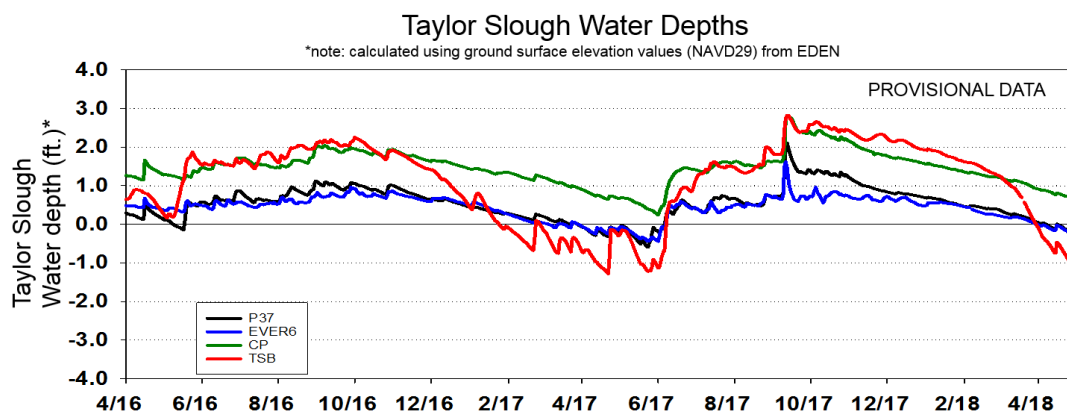
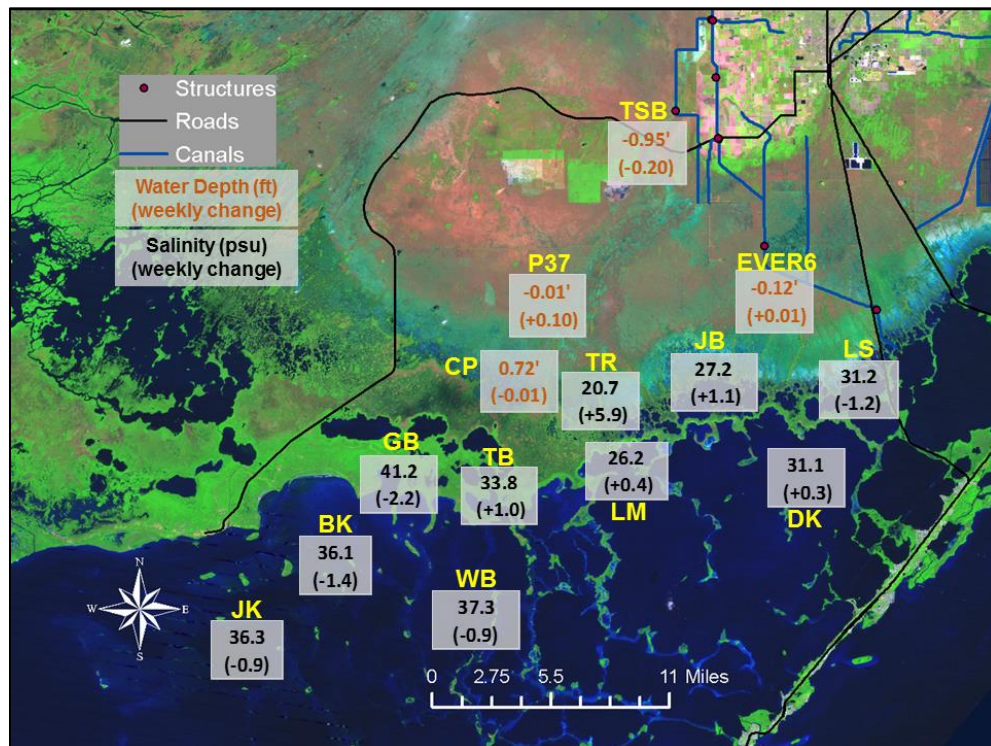


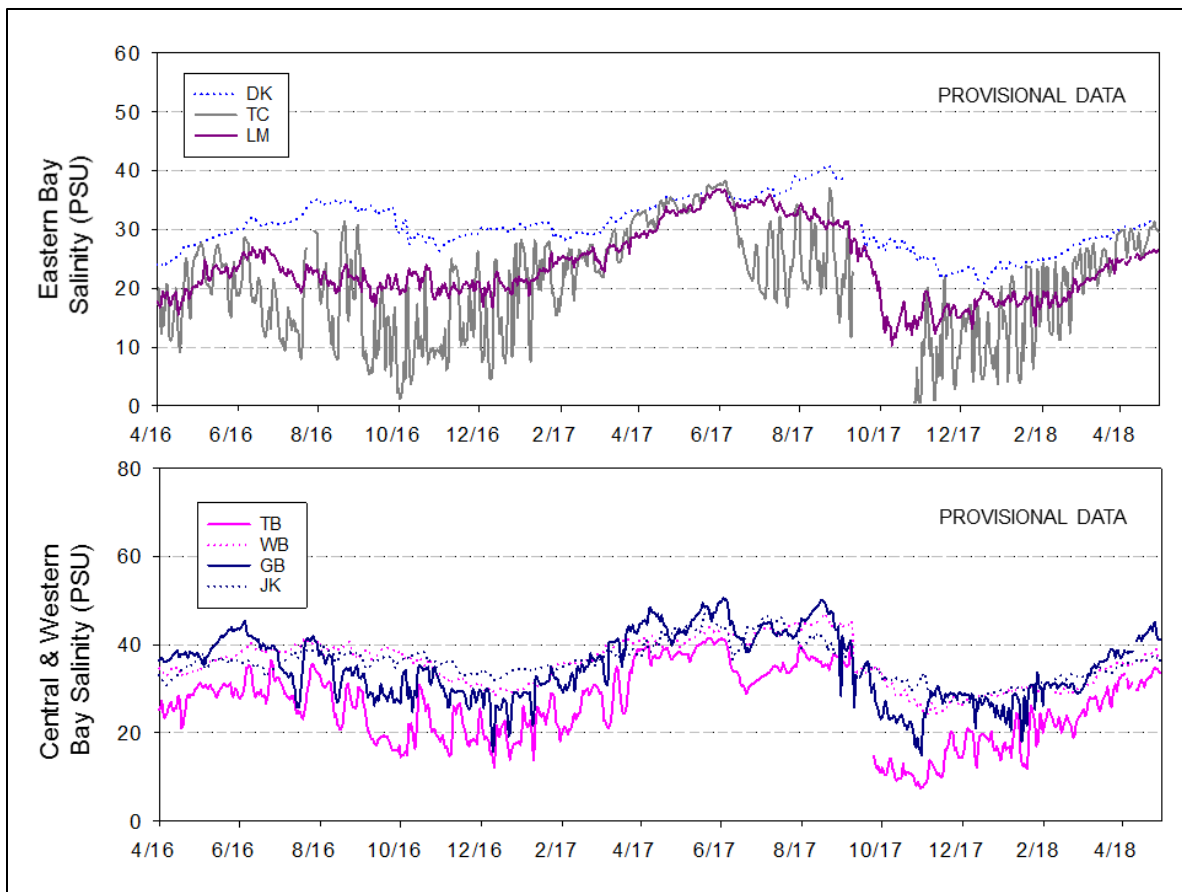
## SFWMD WCA wading bird flight (April 30, 2018):

- Approximately 1,000 white ibis nesting in WCA-1 and more birds foraging in central WCA-1
- Few birds foraging in southern WCA-2A
- Large mixed flocks feeding just south of the WCA-3A Alley North colony and in WCA-3A South
- 18,000+ white ibis nesting in WCA-3A Alley North colony and wood stork chicks beginning to forage in WCA-3A
- Recent stage reversals had little impact on foraging or nesting conditions

Taylor Slough Water Levels: Friday and Saturday brought an average of 1.2 inches of rain to Taylor Slough and Florida Bay with the highest amounts in central Florida Bay and the lowest amounts in northern Taylor Slough. Stage changes this week ranged from -0.2 feet to +0.1 feet. Water depths range from -0.95 feet to +0.72 feet and are 4 inches below to 5 inches above the historical averages.

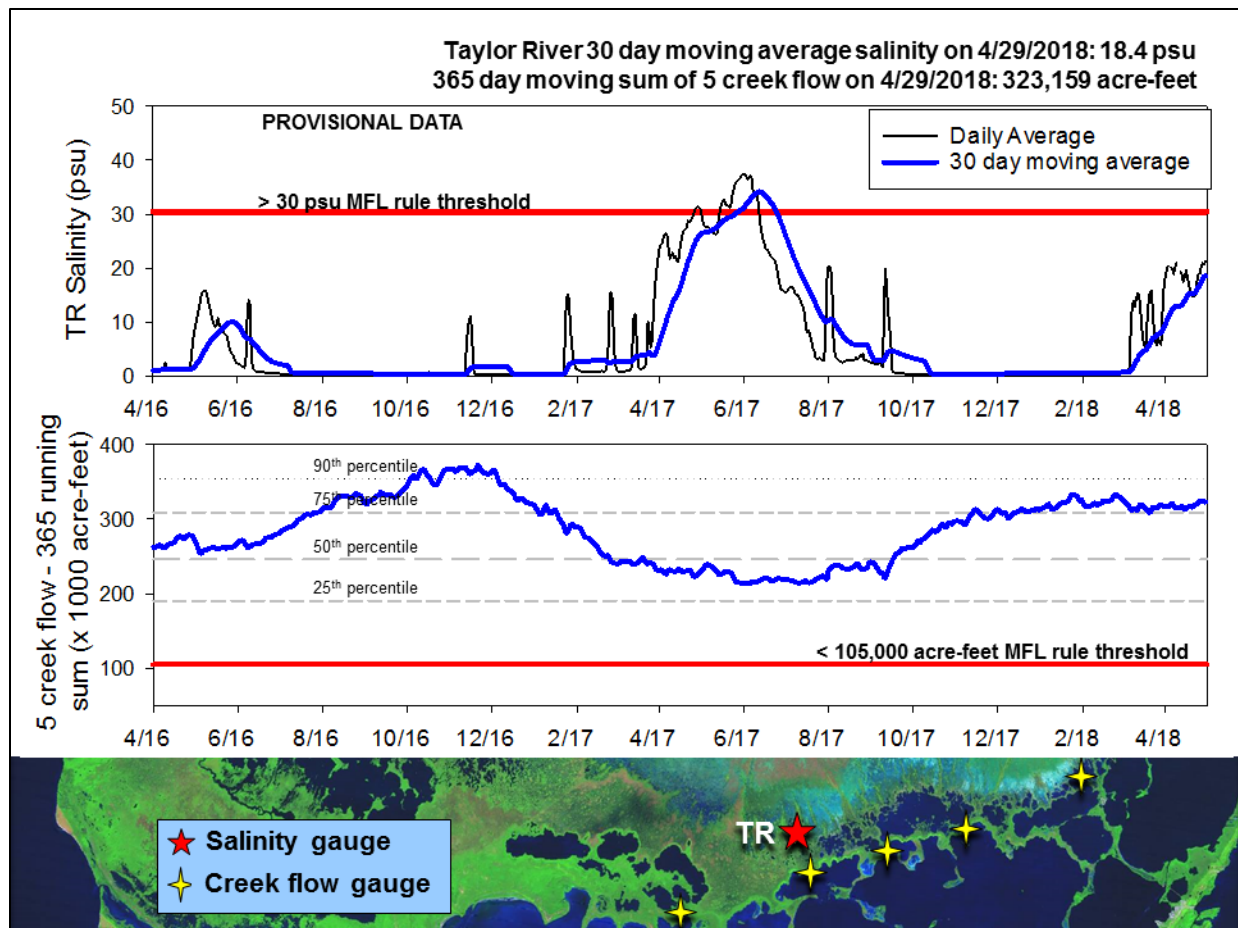
Florida Bay Salinities: Salinity changes in Florida Bay ranged from -2.2 psu to +1.1 psu, similar to last week. Salinities ranged from 26 psu in the northeast to 41 psu in the western nearshore. This range is 4 psu below to 1 psu above the historical averages.





Florida Bay MFL: Mangrove zone daily average salinity is increasing and ended at 21 psu on Sunday. The 30-day moving average rose 3 psu to 18.4 psu. At this time of the year, salinity will continue to increase until the wet season rains start. The weekly cumulative flow from the five creeks denoted by yellow stars on the map totaled about -2,900 acre-feet for the last week. The 365-day moving sum of flow from the five creeks increased 5,000 acre-feet over the last week to end at 323,159 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 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 the area's peat soils and lessening the risk of damaging wildfires. The continuation of inflows to northeast WCA-3A may also be providing wildlife benefit by slowing the recession rates near the Alley North Colony where wading birds are currently foraging in great numbers. 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 wading bird populations in WCA-3A. Water management that results in optimal recession rates in WCA-1A and WCA-2A (between 0.05 feet and 0.09 feet per week) while returning stages to target has ecological benefit. 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, May 1st, 2018 (red is new)

Area	Weekly change	Cause(s)	Recommendation	Reasons
WCA-1	Stage increased by 0.03'	Rainfall, ET, management	Manage recession rates between 0.05 and 0.09 feet per week to return depths to regulation schedule.	Foster conditions for wildlife and optimal wading bird foraging.
WCA-2A	Stage increased by 0.30'	Rainfall, ET, management	Manage recession rates between 0.05 and 0.09 feet per week to return depths to regulation schedule.	Foster conditions for optimal wading bird foraging.
WCA-2B	Stage increased by 0.05'	Rainfall, ET, management	Maintain depths at regulation schedule.	Protect upstream/downstream habitat and wildlife. Foster conditions for wading bird foraging.
WCA-3A NE	Stage increased by 0.09'	Rainfall, ET, management	Maintain current recession rates, water management that provides inflows generates ecological benefit	Protect peat soils and lower risk of damaging wildfire.
WCA-3A NW	Stages decreased by 0.01'	Rainfall, ET, management	Maintain current recession rates, water management that provides inflows generates ecological benefit	
Central WCA-3A S	Stage increased by 0.11'	Rainfall, ET, management	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 0.08'	Rainfall, ET, management		
WCA-3B	Stage increased by 0.04'	Rainfall, ET, management	Maintain depths at regulation schedule.	Protect habitat and wildlife.
ENP-SRS	Stages remain unchanged.	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 changes ranged from -0.20' to +0.10'	Rain, ET, inflows	Move water southward as possible	When available, provide freshwater buffer for downstream conditions.
FB- Salinity	Salinity changes ranged -2.2 to +1.1 psu.	Rain, ET, inflows, wind	Move water southward as possible	When available, provide freshwater to maintain low salinity buffer and promote water movement.