

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

MEMORANDUM

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

FROM: SFWMD Staff Environmental Advisory Team

DATE: April 4, 2017

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

Very warm with spotty showers/storms today and tomorrow afternoon, then mainly light to moderate showers District-wide ahead of a cold front on Thursday. Drier southwest flow is pushing into central and south Florida. Flow is relatively strong which should inhibit seabreeze development; but, it will still include pockets of isolated showers/storms northeast and southeast of the Lake this afternoon under 90-degree heat and strong upper level winds. Similar story tomorrow before a band of showers with a cold front pushes across the District Thursday morning through afternoon. Cooler and quite dry conditions will prevail Thursday night through Saturday.

Kissimmee

On Sunday, stage was 1.0 feet below regulation schedule in East Lake Toho, 1.1 feet below regulation schedule in Lake Toho, and 1.5 feet below schedule in Kissimmee-Cypress-Hatchineha. Over the past week, discharge at S65, S65A, and S65E averaged 361, 277, and 374 cfs, respectively. Tuesday morning discharges were ~309 cfs, 265 cfs, and 332 cfs, respectively at S65, S65A, and S65E. Dissolved oxygen data in the Kissimmee River averaged 8.8 mg/L over the past week. Kissimmee River mean floodplain depth on Sunday was 0.06 feet. A recommendation was made on March 30, 2017 to reduce discharge at S-59 and S-61 so that stage in these lakes declines to respective low pools on May 31 and to reduce discharge at S-65 to 300 cfs.

Lake Okeechobee

As of midnight April 2, 2017, Lake stage was 12.46 feet NGVD and in the Beneficial Use sub-band. The current weekly recession rate of 0.22 feet equates to a projected monthly recession rate of 0.88 feet, which is well above the recommended 0.50 feet per month or lower guideline. The goal should be to slow the current recession rate and maintain it at below 0.50 feet per month. The most recent surveys indicated that there were about 5,284 foraging wading birds and 27 active snail kite nests on the Lake, the majority of which were in the Moonshine Bay cattail treatment areas. Currently, conditions are acceptable but tenuous for wading birds and snail kites. A slower recession rate is needed to keep foraging areas hydrated and to help maintain water levels under nests thereby reducing the risk of predation by raccoons and other animals. On March 30, District employees documented a bloom in the Pahokee Marina and to the southwest of the marina along the levee.

Estuaries

Total discharge to the St. Lucie estuary averaged 75 cfs over the past week with 0 cfs (0%) coming from Lake Okeechobee as the USACE has stopped flow through the S-80 structure for the foreseeable future. Salinities throughout the estuary were similar to last week. The seven-day average salinity at the US1 Bridge remains in the fair range for adult oysters. Total inflow to the Caloosahatchee estuary

averaged 724 cfs over the past week with 530 cfs (73%) coming from the Lake. The 30-day average surface salinity at the Ft. Myers monitoring station is 10.7 and has been above 10 for the seven consecutive days. The 30-day average surface salinity at Val I-75 is 3.5. Salinity conditions between Val I-75 and Ft. Myers are deteriorating for tape grass. Salinity conditions are in the good range for adult oysters at the Cape Coral Bridge, while in the fair range at Shellpoint and the Sanibel Causeway. The 30-day moving average salinity at the I-75 Bridge is forecast to be 4.9 in the next two weeks if no flow comes through the S-79 structure; however, daily salinity is forecast to reach 7.6.

Stormwater Treatment Areas

Over the past week, the STAs/FEBs received approximately 5,500 acre-feet of Lake releases. The total amount of Lake releases sent to the STAs/FEBs in WY2017 (since May 1, 2016) is approximately 215,500 acre-feet. Most STA cells are at or near target depths, except STA-5/6 emergent aquatic vegetation cells which are drying out. Operational restrictions are in place for structure repairs and vegetation rehabilitation in STA-1E. In addition, nests of MBTA-protected species have been observed in STA-1E. This week, if Lake releases are sent to the WCAs and the conditions allow, releases will be sent to STA-2 and STA-3/4.

Everglades

District flight on March 28, 2017 noted large numbers of wading birds feeding along the drying front in WCA-2A. Marsh conditions at the north end of WCA-2 did not look conducive for wading bird foraging. This led to a recommendation supporting a change in operations that would release water upstream of S-11s. A wading bird nesting reconnaissance flight is scheduled for April 6. In Florida Bay salinities currently range from 29 psu to 45 psu and are +2 to +9 psu above their long-term averages. Mangrove zone salinities are on the rise. The daily average salinity at TR increased to 24 psu by the end of the week as it was still rising. The 30-day moving average increased 2.6 to end the week at 6.8 psu

Supporting Information

KISSIMMEE BASIN

Kissimmee Basin Rainfall

The Upper Kissimmee Basin received 0.23 inches of rainfall in the past week and the Lower Basin received 0.50 inches (SFWMD Daily Rainfall Report 04/04/2017).

Upper Kissimmee Basin

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

Table 1. Departures from KCOL flood regulation (F) or temporary schedules (T, A, or S) (feet NGVD). Discharge and stage data are provisional real-time data from SFWMD OASyS DualTrend; reported values are averages through midnight of the Sunday prior to the report date unless otherwise specified.

Report Date: 4/4/2017

Water Body	Structure/Site	Discharge (cfs), week's average**	Stage Monitoring Site***	Lake Stage (feet)	Schedule*	Regulation (R) or Target (S or T) Stage (feet)	Daily Departure (feet)						
							4/2/17	3/26/17	3/19/17	3/12/17	3/5/17	2/26/17	2/19/17
Lakes Hart and Mary Jane	S62	0	LKMJ	60.3	R	60.7	-0.4	-0.4	-0.4	-0.4	-0.4	-0.2	-0.2
Lakes Myrtle, Preston, and Joel	S57	0	S57	60.6	R	60.7	-0.1	0.0	0.0	0.0	0.0	0.0	0.0
Alligator Chain	S60	0	ALLI	62.8	R	63.6	-0.8	-0.8	-0.9	-0.9	-0.8	-0.7	-0.7
Lake Gentry	S63	0	LKGT	60.8	R	61.1	-0.3	-0.3	-0.4	-0.4	-0.3	-0.2	-0.2
East Lake Toho	S59	33	TOHOE	56.3	R	57.3	-1.0	-1.2	-1.3	-1.2	-1.1	-0.8	-0.8
Lake Toho	S61	150	TOHOW, S61	53.2	R	54.3	-1.1	-1.2	-1.3	-1.2	-1.1	-0.8	-0.8
Lakes Kissimmee, Cypress, and Hatchineha	S65	361	LKISSP, KUB011, LKIS5B	49.5	R	51.0	-1.5	-1.4	-1.3	-1.0	-0.7	-0.8	-1.1

* 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.

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

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

DATA ARE PROVISIONAL

Lower Kissimmee Basin

Discharges and stages at Lower Basin structures are shown in Table 2. SFWDAT depth maps for the Phase I restoration area are shown in Figure 12. Kissimmee River floodplain stages at selected stations are shown in Figure 13.

Table 2. Mean weekly discharge at S-65x structures, and mean weekly Phase I area river channel dissolved oxygen and floodplain mean water depth. Discharge and stage data are provisional real-time data from SFWMD OASyS DualTrend; reported values are averages through midnight of the Sunday prior to the report date unless otherwise specified.

Report Date: 4/4/2017

Metric	Location	Sunday's 1-day average	Weekly Average**									
			4/2/17	3/26/17	3/19/17	3/12/17	3/5/17	2/26/17	2/19/17	2/12/17	2/5/17	1/29/17
Discharge (cfs)	S-65	277	361	626	885	899	877	732	710	507	482	465
Discharge (cfs)	S-65A	247	277	461	681	705	682	569	550	387	378	368
Discharge (cfs)	S-65D****	304	359	679	791	685	721	688	540	538	730	1274
Discharge (cfs)	S-65E****	295	374	723	855	737	769	744	597	523	513	398
DO concentration (mg/L)***	Phase I river channel	7.9	8.8	8.9	8.8	8.4	8.0	7.7	8.3	9.0	8.5	8.1
Mean depth (feet)*	Phase I floodplain	0.06	0.07	0.11	0.17	0.12	0.07	0.07	0.06	0.06	0.06	0.06

* 1-day spatial average from South Florida Water Depth Assessment Tool (SFWDAT).

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

*** DO is the average for PC62 and PC33 .

**** S-65D discharge combines discharge at S-65D, S-65DX1, and S-65DX2; S65E discharge combines S65E and S65EX1.

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

Water Management Recommendations

Kissimmee Basin Adaptive Recommendations and Operational Actions

Date	Recommendation	Purpose	Outcome	Source
3/30/2017	Reduce discharge at S-59 and S-61 so that stage in these lakes declines to respective low pools on May 31; reduce discharge at S-65 to 300 cfs.	Reduce rate of stage decline in East Toho, Toho, and KCH.	Implemented	SFWMD Water Management/KB Ops
3/23/2017	Reduce S-65 discharge by 75 cfs per day through 3/25 for a target discharge of ~500 cfs.	Reduce rate of stage decline in KCH.	Implemented	SFWMD Water Management/KB Ops
3/16/2017	Reduce S-65 and S-65A discharge by 150 cfs.	Reduce rate of stage decline in KCH.	Implemented	SFWMD Water Management/KB Ops
3/14/2017	No new recommendations.		N/A	
3/7/2017	No new recommendations.		N/A	
2/22/2017	Increase discharge at S65 to establish and maintain a stage recession on KCH to reach low pool (49 ft) by May 1, as possible subject to rainfall and construction needs. Maintain 49 ft or lower for the month of May as possible.	Wet season storage, aquatic plant management.		KB Operations
2/21/2017	No new recommendations.		N/A	
2/14/2017	Increase S65 and S65A discharge by 200 cfs.	Allow stage to decline in KCH.	Implemented	SFWMD Water Management/KB Ops
2/7/2017	No new recommendations.		N/A	
1/25/2017	Make releases from East Lake Tohopekaliga and Lake Tohopekaliga to achieve a recession rate of 0.2 feet per week. Releases will not be made to compensate for direct rain on the lakes, but adjustments may be made for changes in inflow to maintain the 0.2 feet per week recession rate to the extent available capacity in Lake Kissimmee allows.	To prepare for the 2017 wet season, facilitate the ongoing Kissimmee River Restoration Construction (backfilling of the C-38), and provide more desirable recession rates for East Lake Tohopekaliga and Lake Tohopekaliga, the SFWMD will follow the below guiding criteria to the extent it does not conflict with other water related needs (e.g. Kissimmee River Flows, Kissimmee River Restoration Construction, and flood control).	Implemented	SFWMD Water Management Section/KB Ops
1/24/2017	No new recommendations.		N/A	
1/17/2017	No new recommendations.		N/A	
1/10/2017	No new recommendations.		N/A	
12/2/2016-1/3/2017	Reduce discharge at S65 to minimum (300 cfs +/- 50 cfs) using the table in Figure 8a. Continue reducing headwater stage at S65C at a rate of ~1 ft/week through mid-January per request from USACE.	To facilitate KRRP construction in Pool BC.	Implemented	USACE/WCO/KB Ops
12/20/2016	No new recommendations.		N/A	
12/13/2016	No new recommendations.		N/A	
12/6/2016	No new recommendations.		N/A	
11/29/2016	No new recommendations.		N/A	
11/22/2016	No new recommendations.		N/A	
11/15/2016	No new recommendations.		N/A	
11/8/2016	No new recommendations.		N/A	

KCOL Hydrographs (through Sunday midnight)

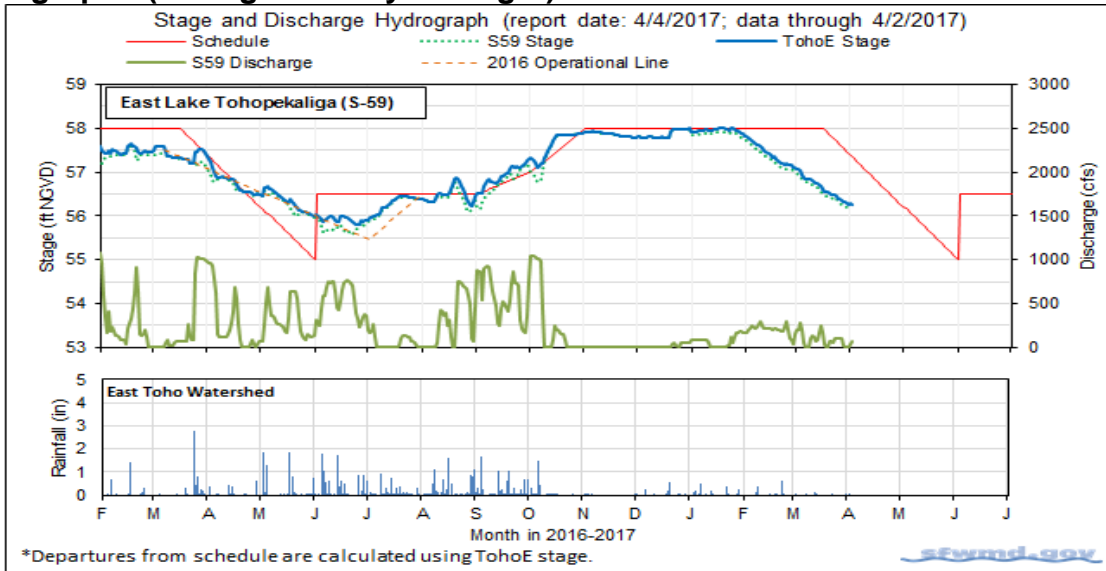


Figure 1.

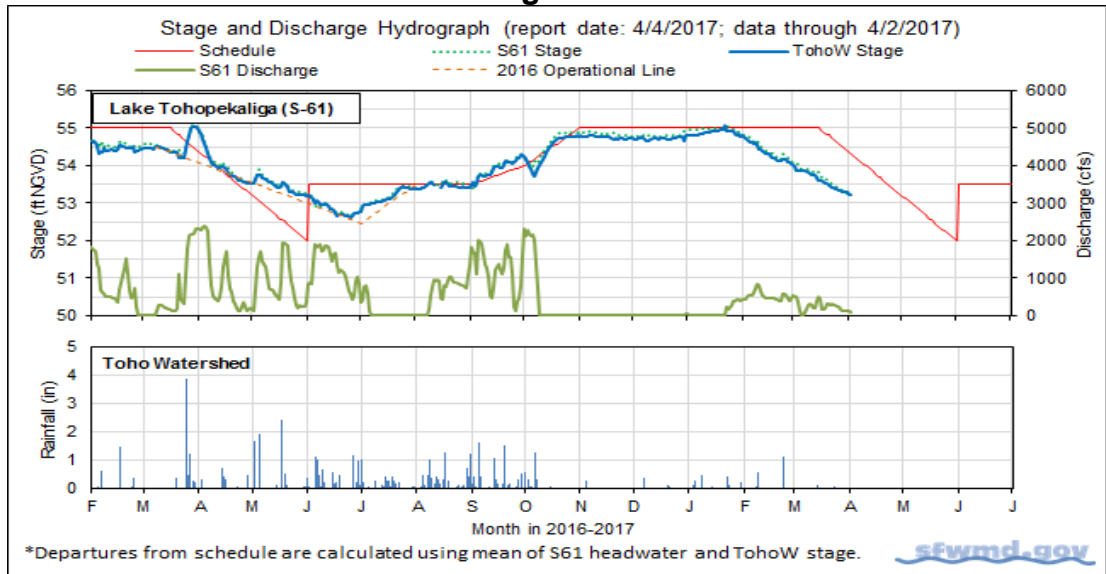


Figure 2.

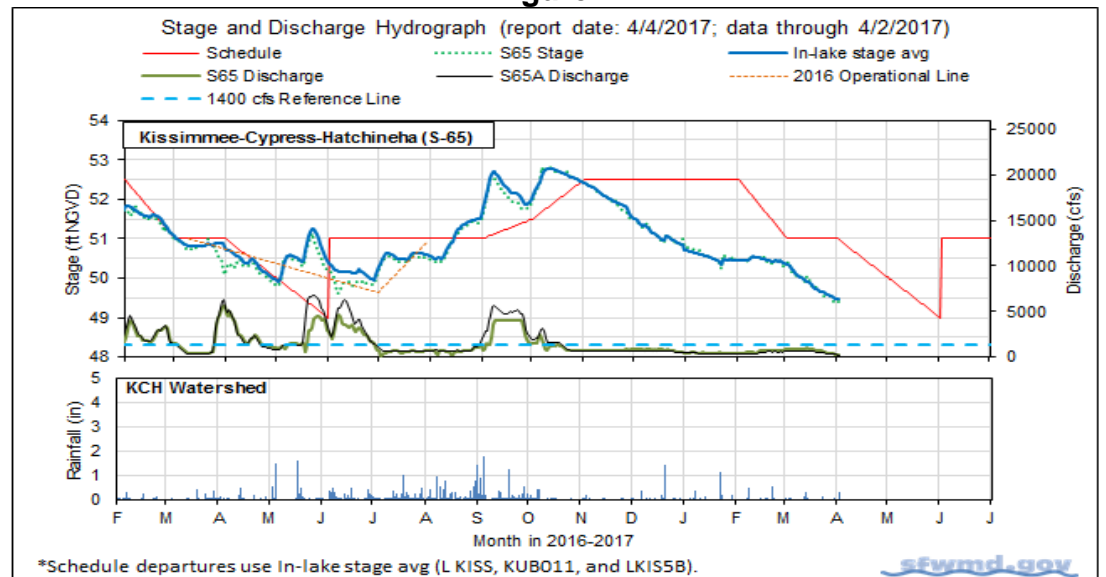


Figure 3.

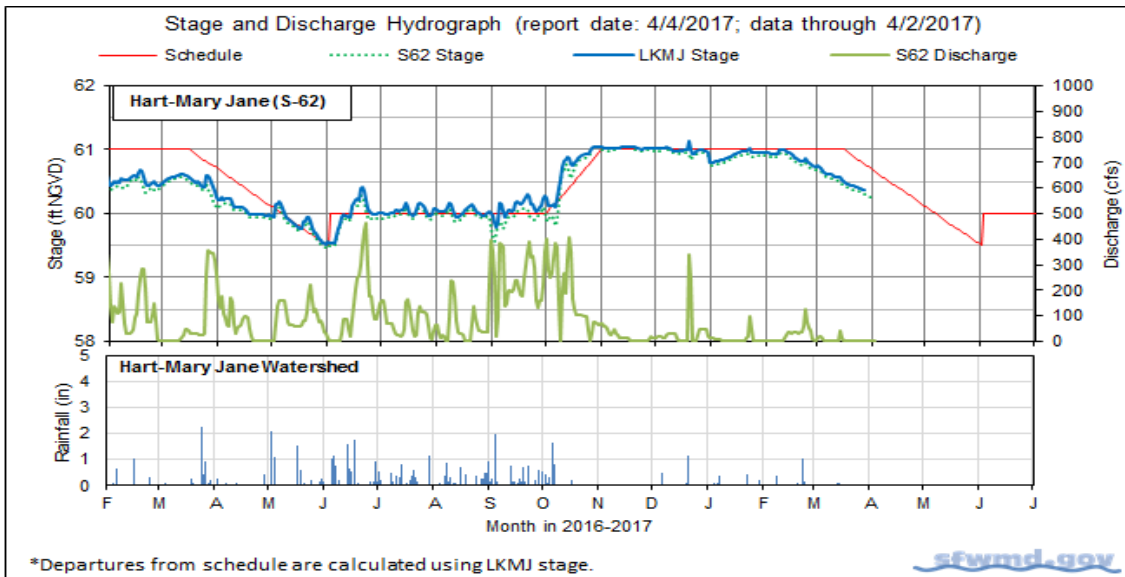


Figure 4.

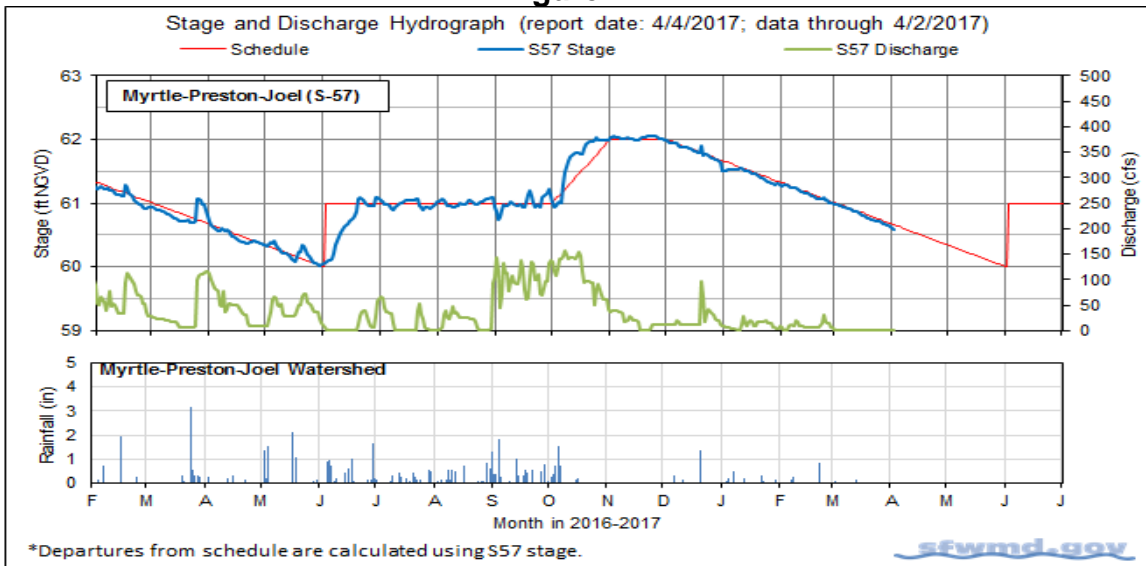


Figure 5.

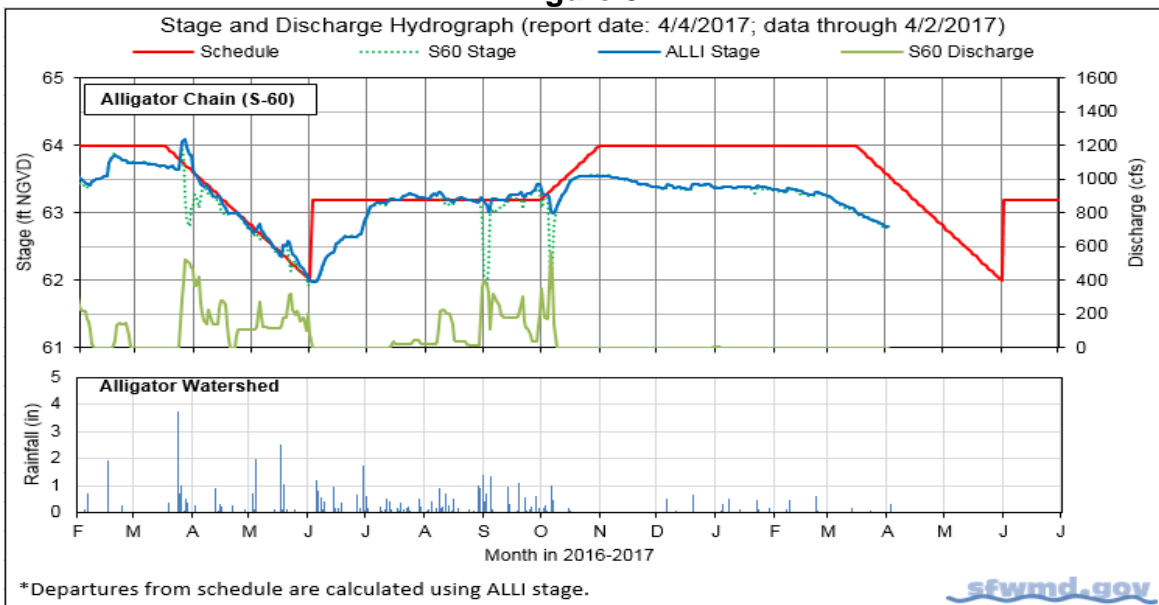


Figure 6.

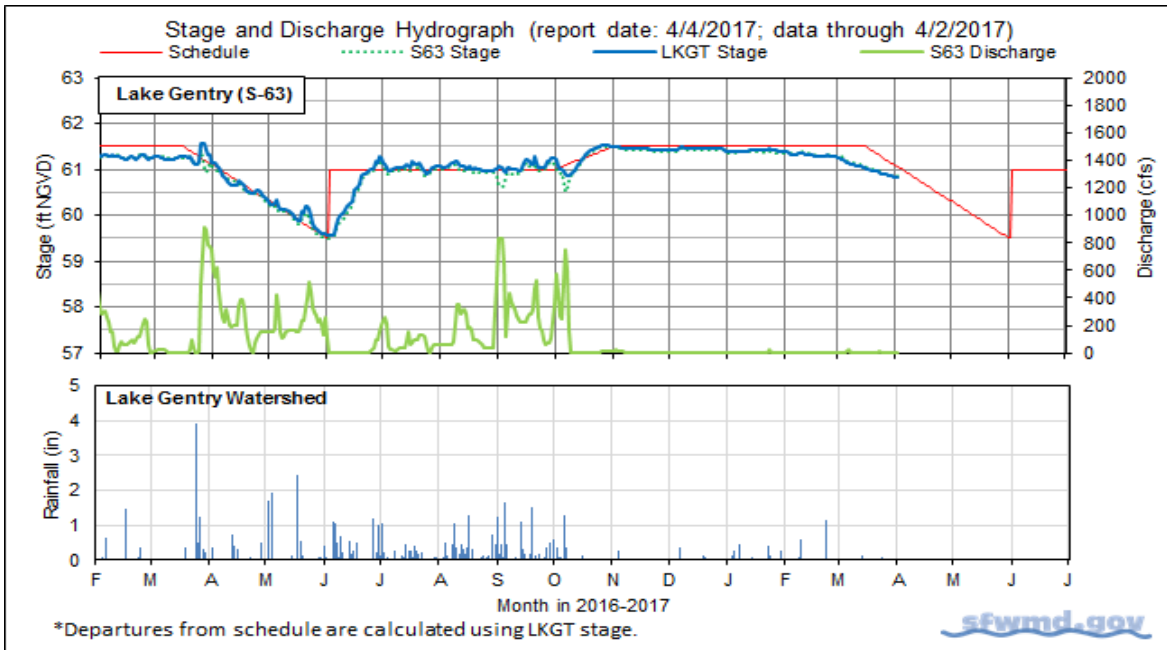


Figure 7.

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Limits on Rate of Discharge Change at S65/S65A During Dry Season 2016-2017

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

15

Figure 8. Limits on rate of discharge change at S65/S65A for the 2016-2017 Dry Season.

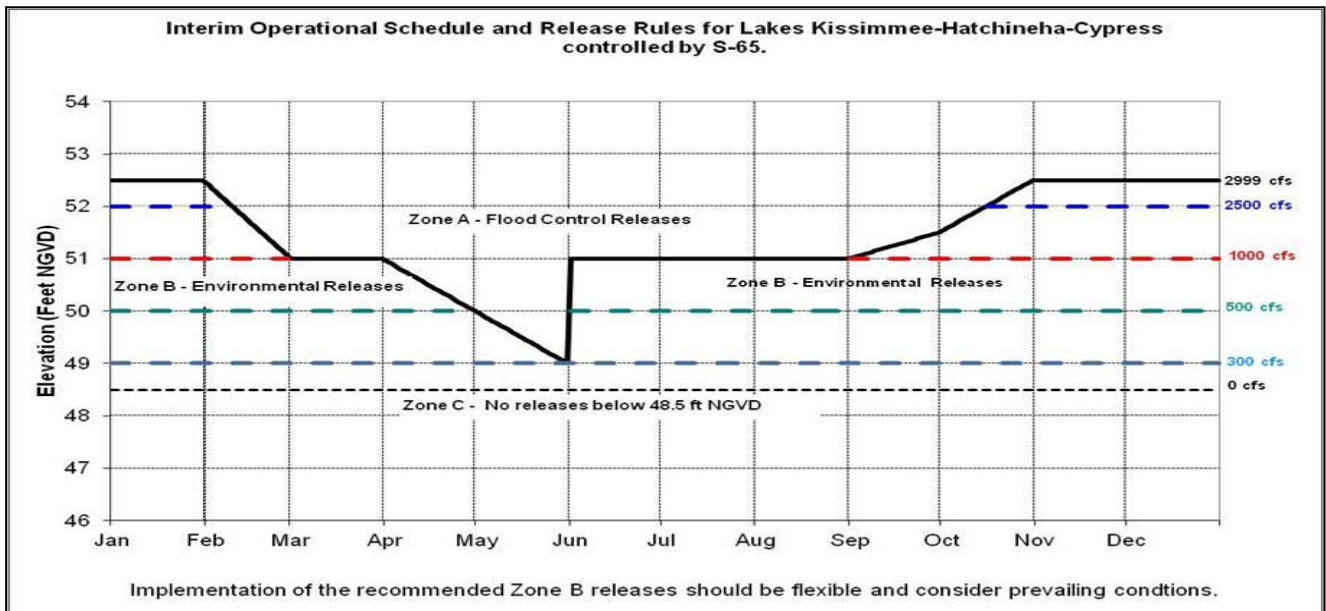


Figure 9. Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years or in Wet Season 2015.

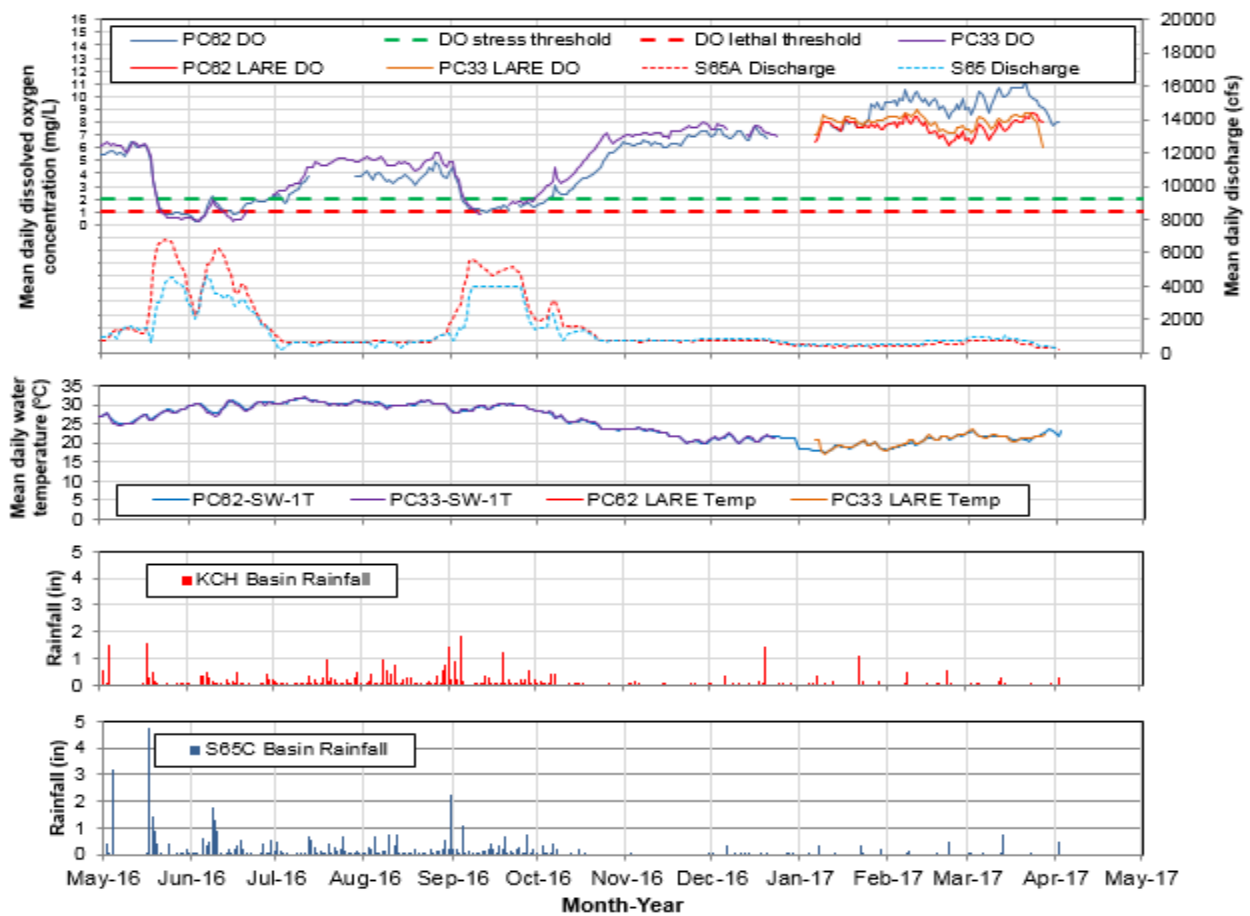


Figure 10. Mean daily Dissolved Oxygen, discharge, temperature and rainfall in the Phase I river channel.

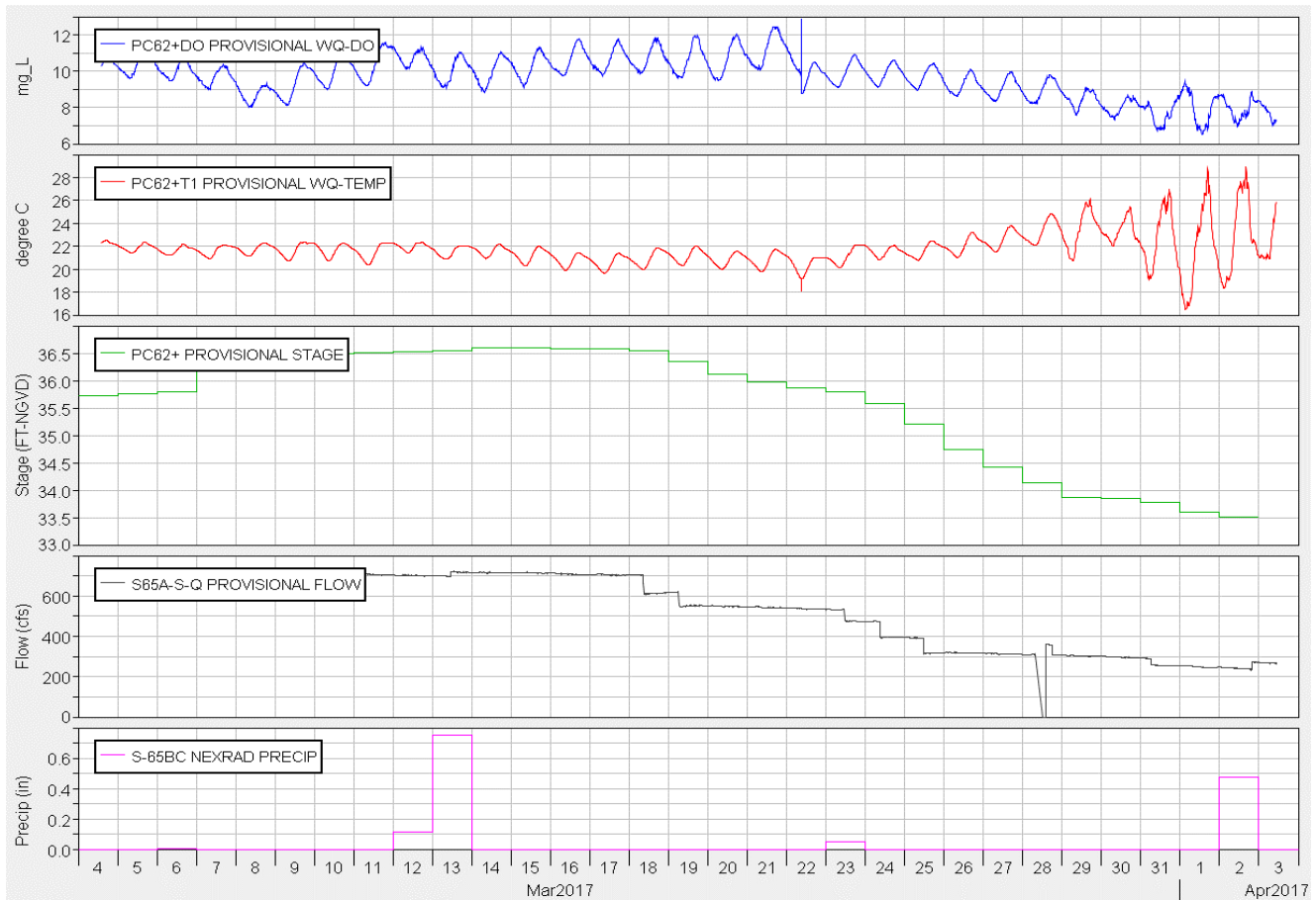


Figure 11. Phase I river channel dissolved oxygen and water temperature (measured at 15 minute intervals) and Pool BC daily rainfall.

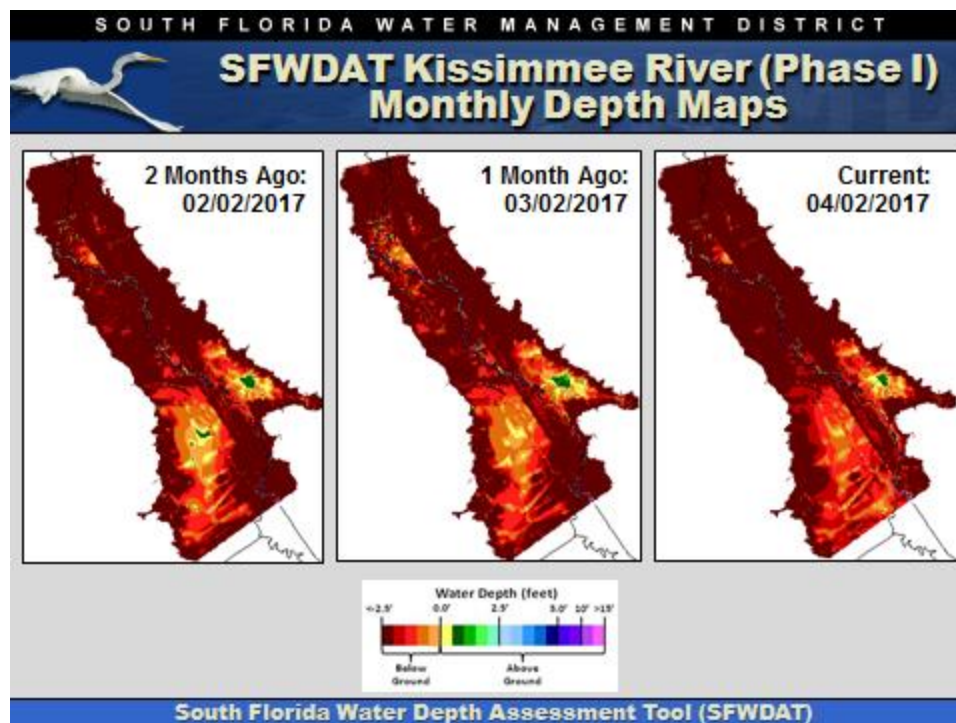
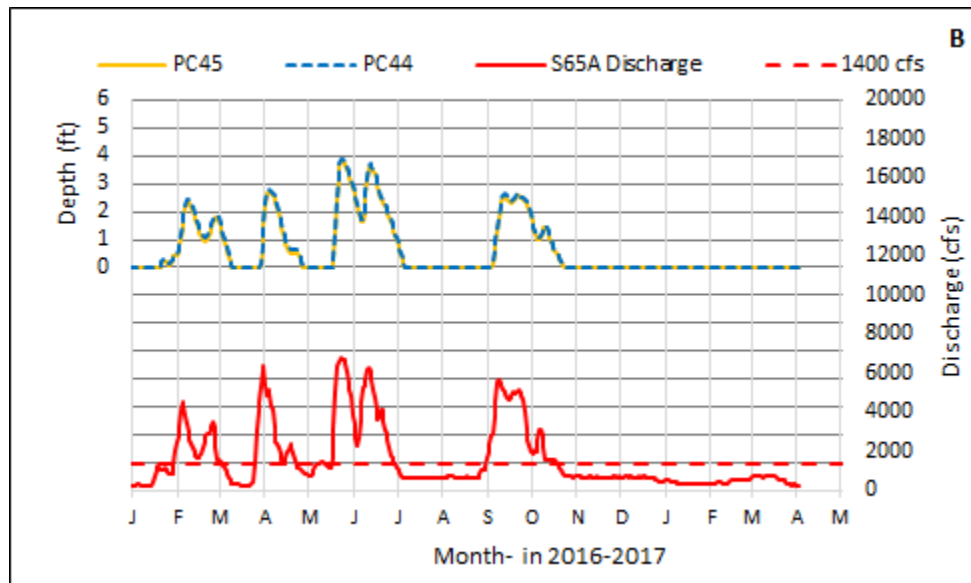
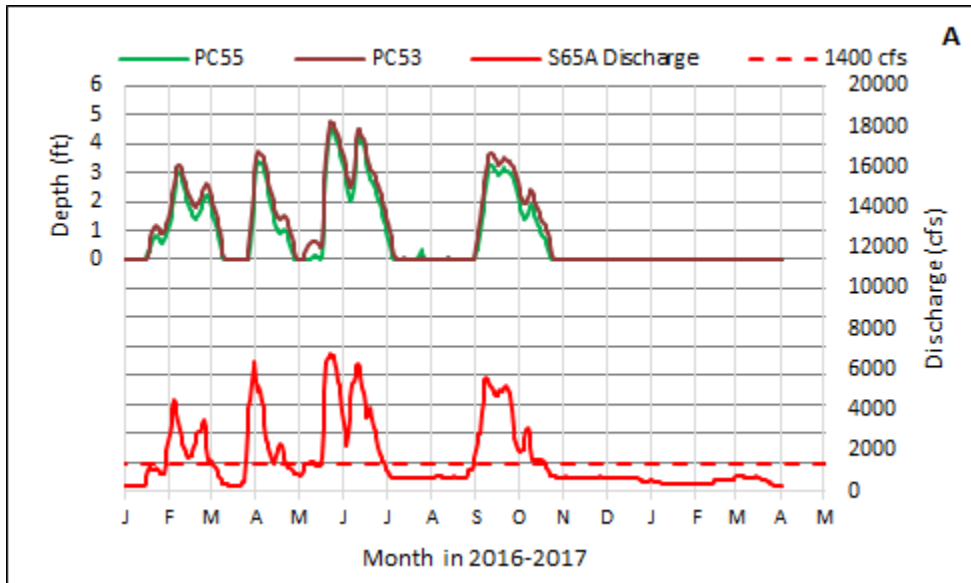


Figure 12. Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to Jan. 16, 2012.



Insert. Water depth at selected northern Kissimmee River floodplain sites on (A) the PC5's transect and (B) the PC4's transect, with S65A discharge.

Kissimmee River Hydrographs

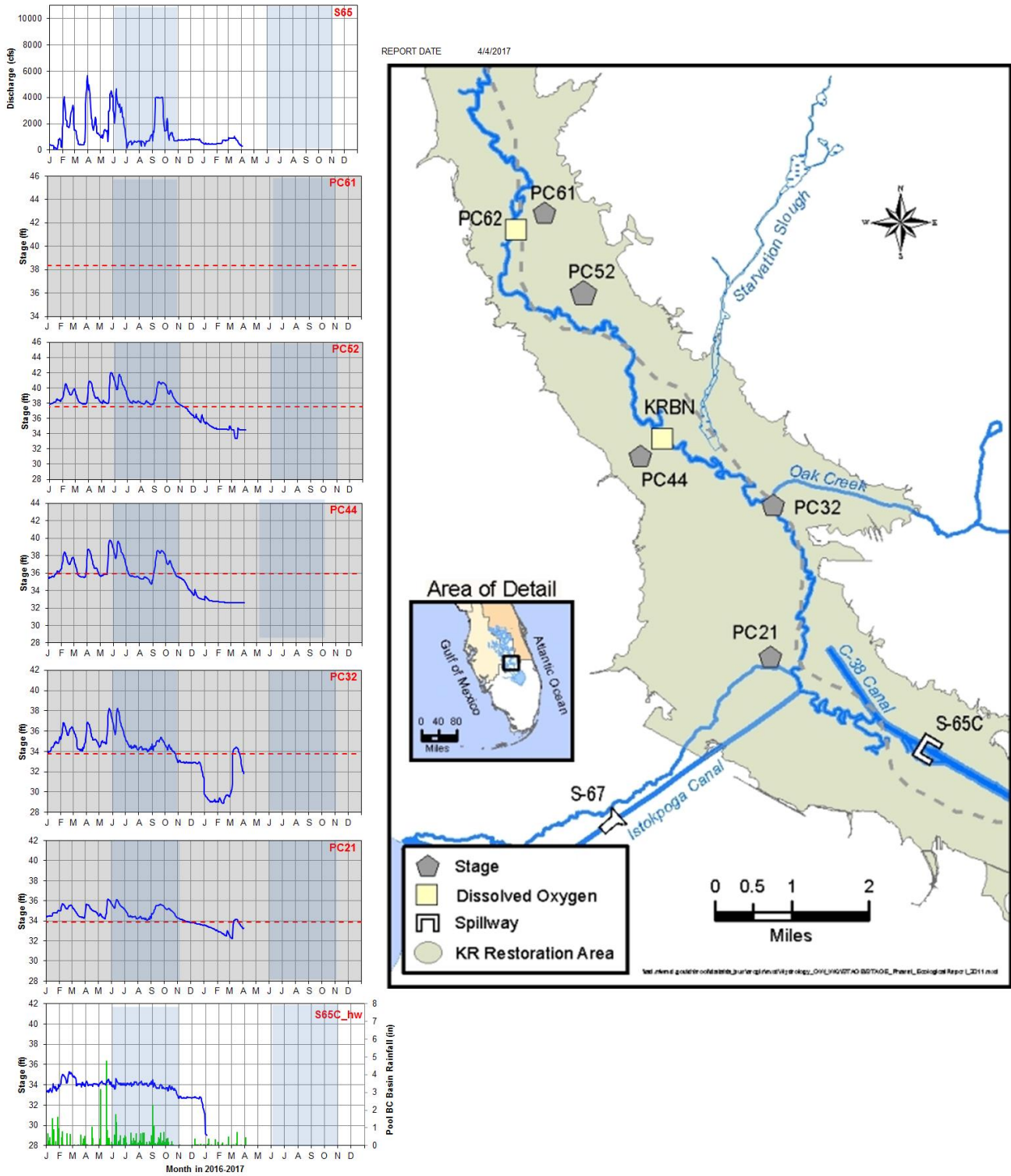


Figure 13. Discharge at S65, stages at five monitoring stations in the Phase I area of the Kissimmee River floodplain, and headwater stage at S65-C since January 1, 2015. The most recent data (~2 weeks) are provisional real-time data from SFWMD DualTrend; previous data are from SFWMD DB-HYDRO (validated). Dashed lines are ground elevations.

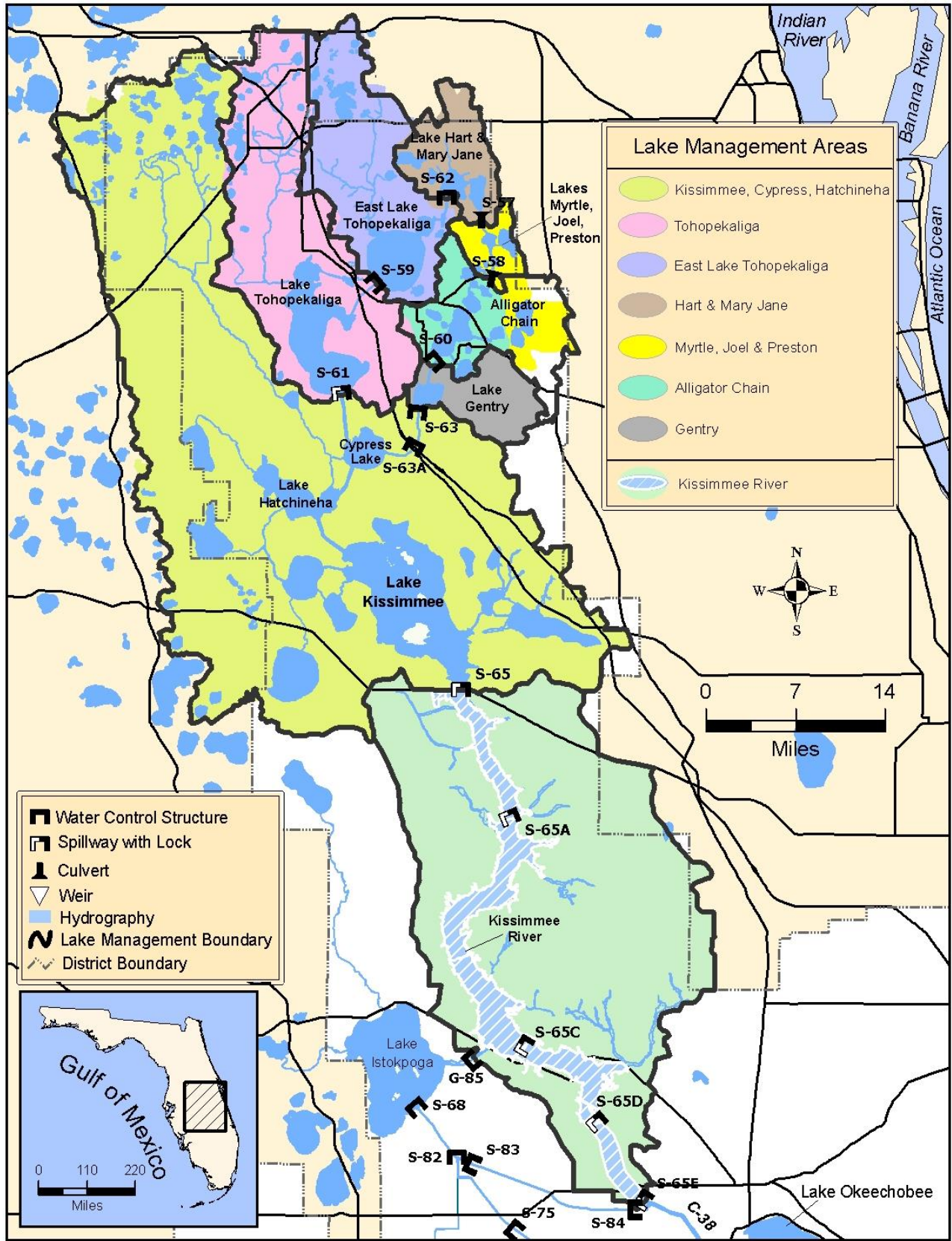


Figure 14. The Kissimmee Basin.

LAKE OKEECHOBEE

According to the USACE web site, Lake Okeechobee stage is at 12.46 feet NGVD for the period ending at midnight on April 2, 2017. This value is based on the use of four interior Lake stations (L001, L005, L006, and LZ40) and three perimeter stations (S352, S4 and S133). Lake stage decreased by 0.22 feet over the past week and is 0.87 feet lower than it was a month ago and 2.66 feet lower than it was a year ago (Figure 1). The Lake is currently in the Beneficial Use sub-band (Figure 2). According to RAINДАР, 0.43 inches of rain fell directly over the Lake during the past seven days (Figure 3). Similar or less amounts of rain fell in most of the surrounding watershed with the exception of a section to the immediate west of the Lake and a pocket in the Kissimmee Valley which received greater amounts of rainfall.

Based on USACE reported values, current Lake inflow is approximately 299 cfs as detailed below.

Structure	Flow cfs
S65E	0
S65EX1	299
S154	0
S84 & 84X	0
S71	0
S72	0
C5 (Nicodemus slough dispersed storage)	0
S191	0
S133 PUMPS	0
S127 PUMPS	0
S129 PUMPS	0
S131 PUMPS	0
S135 PUMPS	0
Fisheating Creek	0
S2 Pumps	0
S3 Pumps	0
S4 Pumps	0

Current Lake outflow is approximately 3,988 cfs with 1,090 cfs exiting at S77, 55 cfs exiting at S308 and 102 cfs exiting at the L8 canal through Culvert 10A. Approximately 2,741 cfs is being directed south through S351, S352 and S354. Corrected evapotranspiration value based on the L006 weather platform solar radiation data for this past week increased from 2,704 cfs last week to 2,894 cfs.

Change in elevation equivalents and average weekly flows (midnight March 27, 2017 to midnight April 2, 2017) for major structures are presented in Figure 4.

Based on the Lake Okeechobee wading bird habitat suitability index, there are currently approximately 24,885 acres of suitable foraging habitat for long-legged birds and 10,612 acres for long and short-legged birds on the Lake (Figure 5). The most recent wading bird foraging survey (March 30, 2017) indicated that there were about 5,284 wading birds foraging on the Lake (Figure 6), the majority of which were in the Moonshine Bay cattail treatment areas. There also were an additional 3,000+ wading birds conducting nesting activities in colonies on the Lake. Currently, conditions are acceptable but tenuous for wading birds as well as for snail kites. A much slower recession rate is needed to keep

wading bird and snail kite foraging areas hydrated and to help maintain water levels under wading bird and snail kite nests thereby reducing the risk of predation by raccoons and other animals.

The Fish and Wildlife Commission (FWC) reported fifteen new snail kite nests on Lake Okeechobee during their most recent survey (March 2017) bringing the total number of nests to thirty-five thus far this season (Figure 7). One new nest was found near Observation Island, one new nest was found in South Bay and the remainder were found in the Moonshine Bay cattail treatment areas. Of the thirty-five nests, twenty-five are still active, seven have been declared successful and three have failed. These numbers are similar to the 2011 numbers on Lake Okeechobee which was the last time it was really dry.

Satellite imagery from a higher resolution sensor (OLCI) aboard the Sentinel 3a satellite is now available. This sensor has increased spatial resolution (300 m compared to 1 km for MODIS) and more optimal spectral bands for increased detection of the phycocyanin pigments found in cyanobacteria. The most recent imagery from this new OLCI sensor (March 27, 2017) indicated potential algal bloom conditions may exist in small localized portions of the nearshore region (Figure 8). On March 30, District employees documented a bloom in the Pahokee Marina (Figure 8, top photo) and along the levee to the southwest of the marina (Figure 8, bottom photo). The bloom location is delineated in red on the satellite imagery.

Water Management Recommendations

Lake stage is 12.46 feet NGVD and is in the Beneficial Use sub-band. The current weekly recession rate of 0.22 feet equates to a projected monthly recession rate of 0.88 feet, which is well above the recommended 0.50 feet or less per month guideline. A too rapid decrease in Lake levels may jeopardize the wading bird and snail kite nesting seasons by drying out wading bird and snail kite foraging locations and lowering water levels under nests allowing for increased risk of predation.

The goal should be to slow the monthly recession rate to less than 0.50 feet per month. Actions which contribute to a slower recession are essential to protect critical components of the Lake's floral (bulrush and submerged aquatic vegetation) and faunal (wading birds, snail kites and fish) communities.

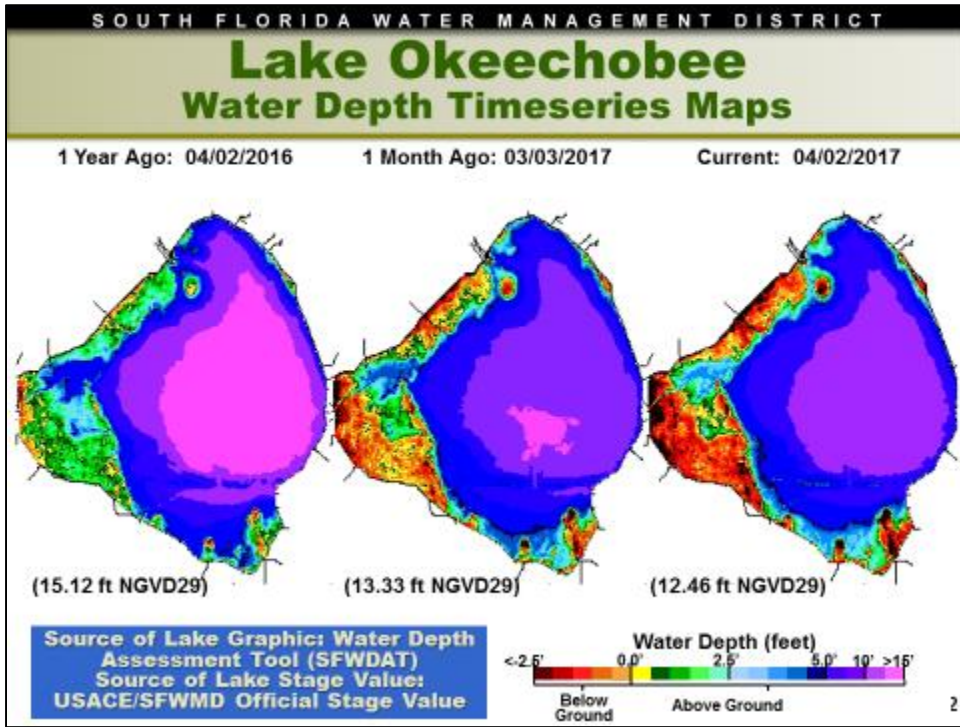


Figure 1

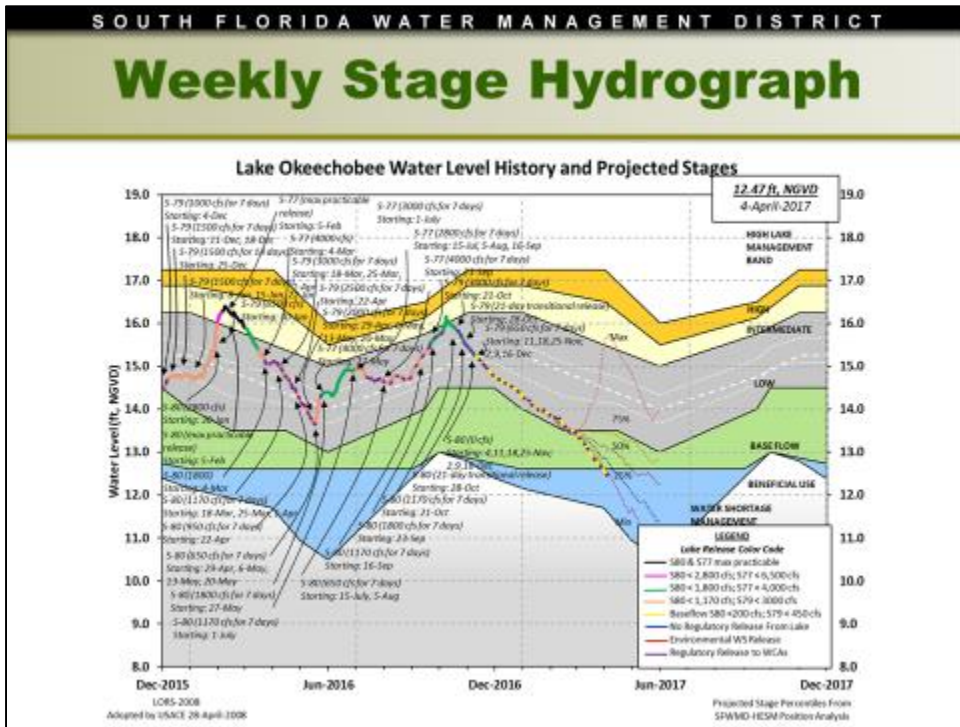
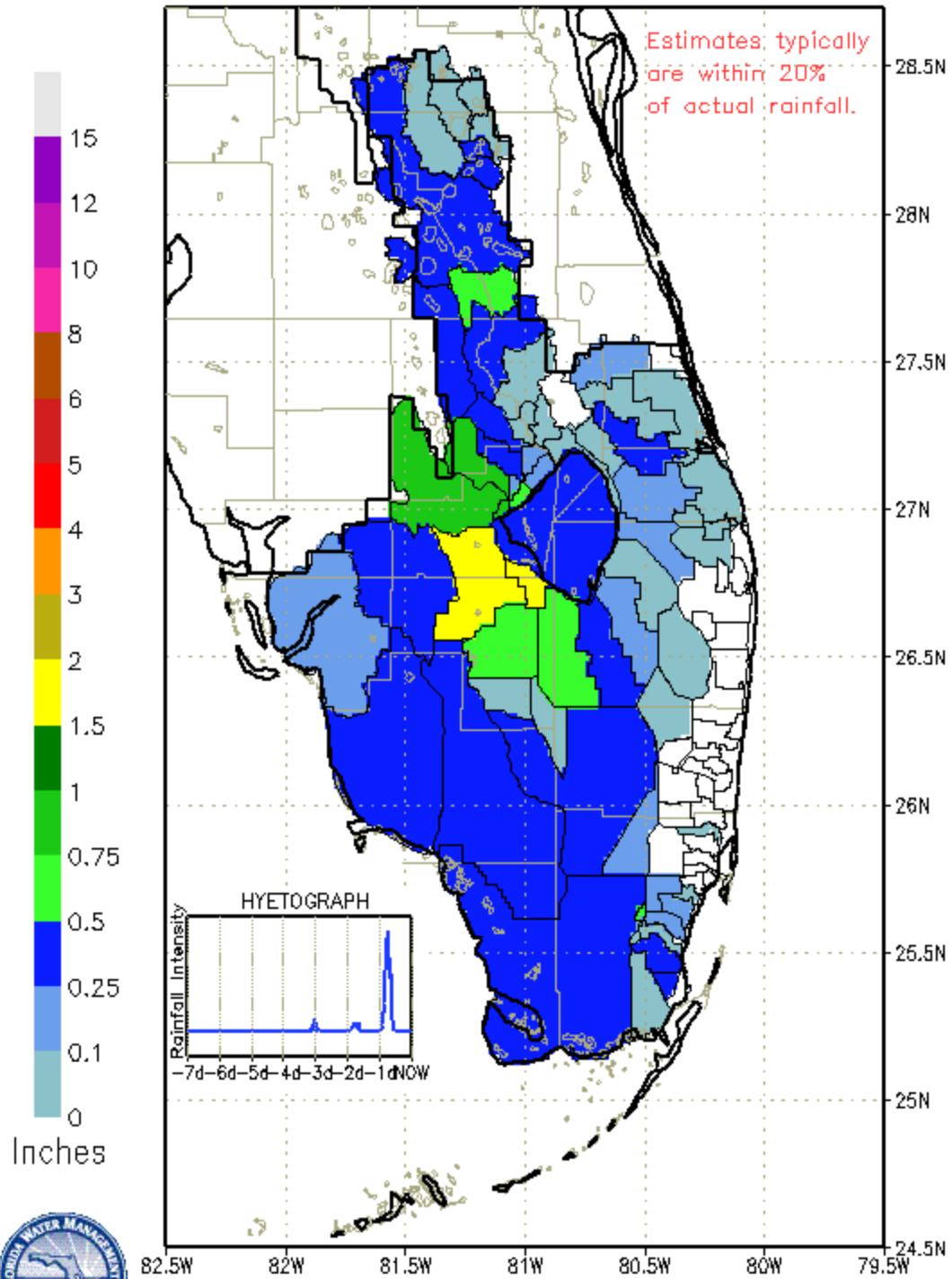


Figure 2

SFWMD PROVISIONAL RAINDAR 7-DAY BASIN RAINFALL ESTIMATES

FROM: 1115 EST, 03/27/2017 THROUGH: 1115 EST, 04/03/2017



DISTRICT-WIDE RAINFALL ESTIMATE: 0.300"



Figure 3

INFLOWS	Average Daily Flow Past Week cfs	Feet of Change Past Week
S65E & S65EX1	378	0.014
S71 & 72	0	0.000
S84 & 84X	0	0.000
Fisheating Creek	30	0.001
Rainfall	N.A.	0.033
OUTFLOWS	Average Daily Flow Past Week cfs	Feet of Change Past Week
S77	1037	0.039
S308	83	0.003
S351	1466	0.055
S352	750	0.028
S354	821	0.031
L8	163	0.006
ET	2894	0.109

Figure 4

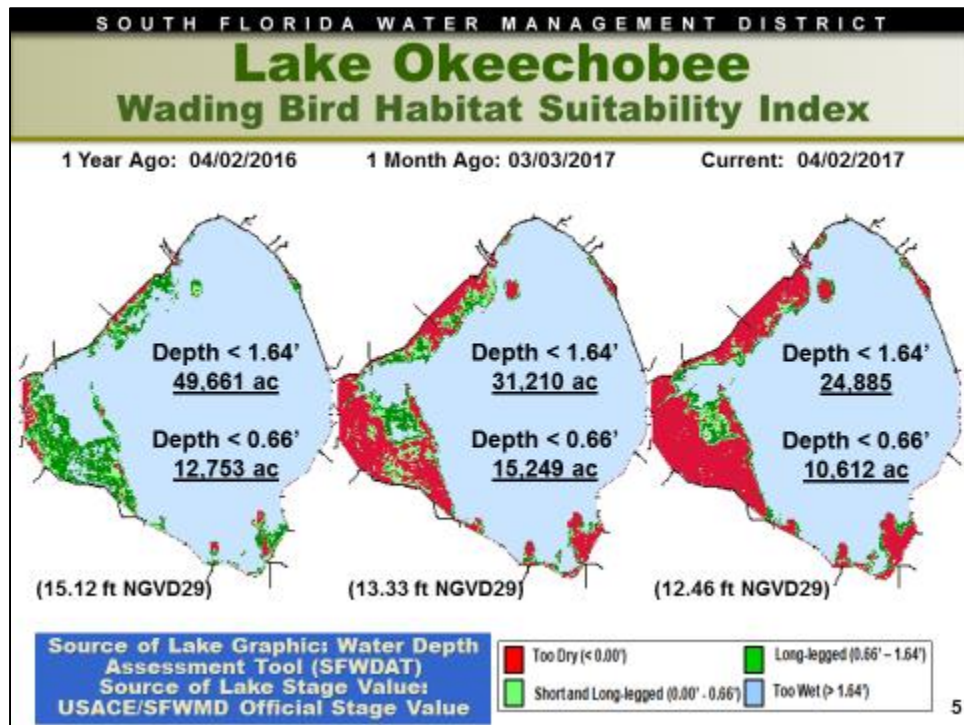


Figure 5

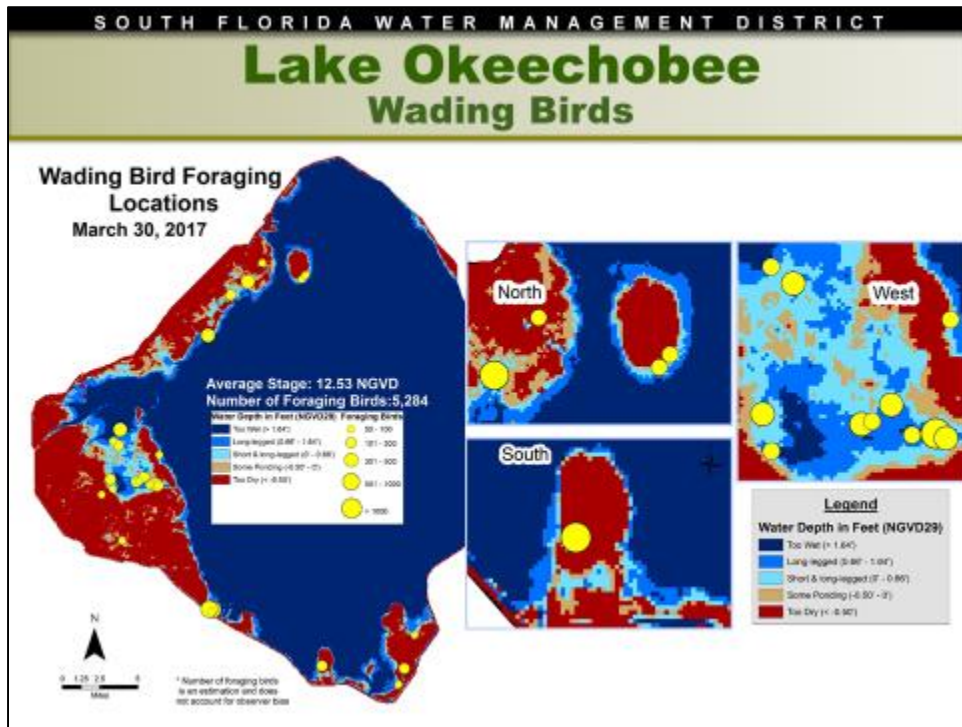


Figure 6

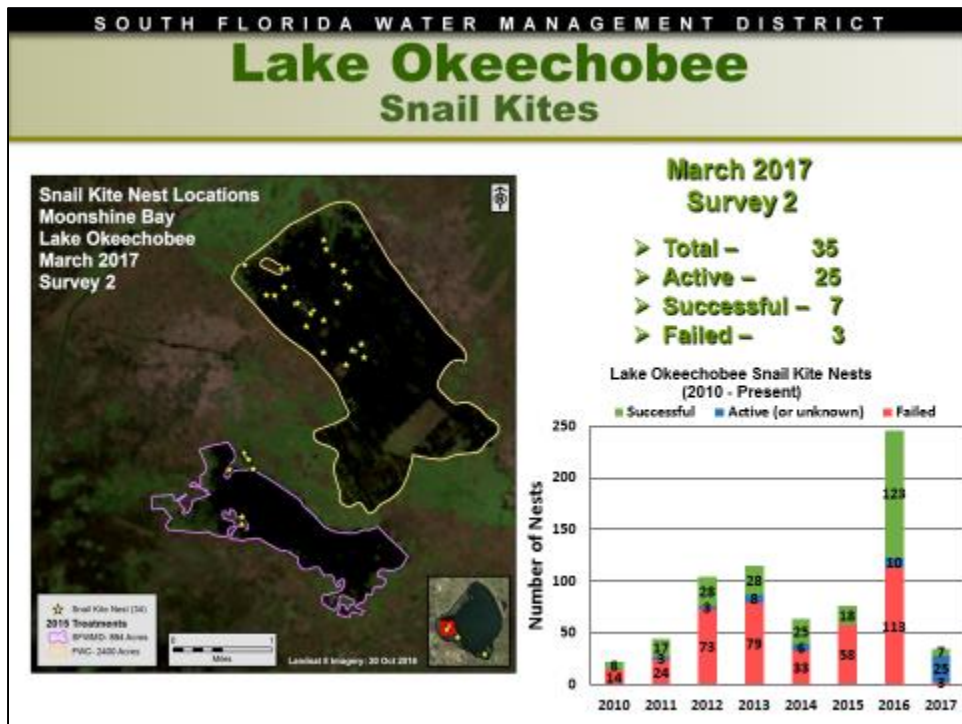


Figure 7

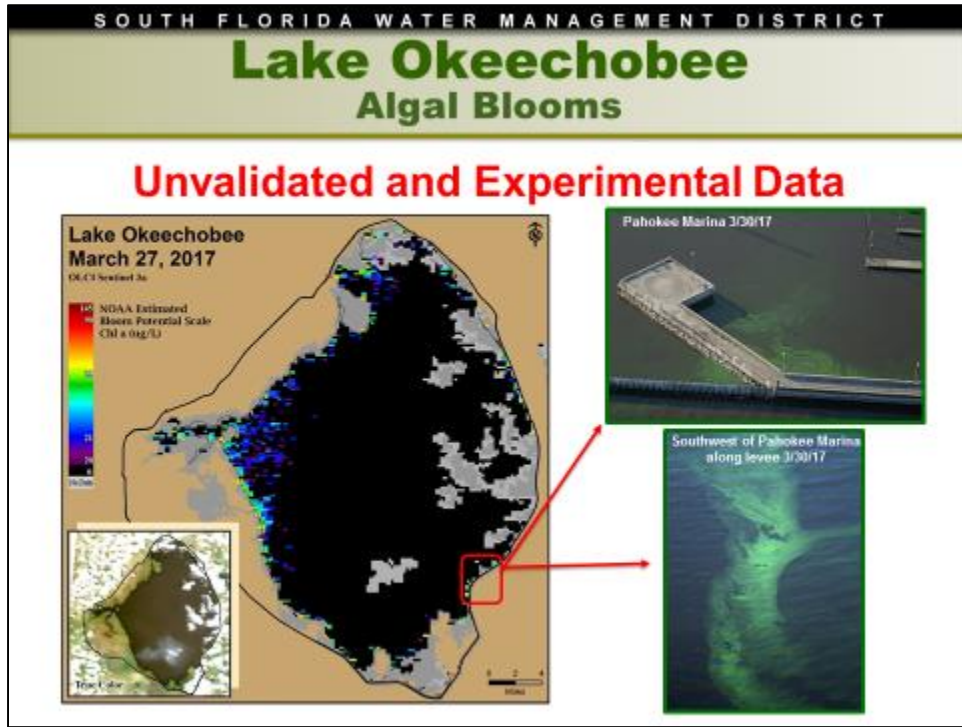


Figure 8

Lake Istokpoga

The annual recession from high pool to low pool stage on Lake Istokpoga has begun. Stage is 38.55 feet NGVD as of April 2, 2017 and is currently 0.93 feet below its regulation schedule of 39.48 feet NGVD (Figure 9). Average flows into the Lake from Arbuckle and Josephine creeks were 42 cfs and 11 cfs respectively, which is about the same as last week's total flow. Average discharge from S68 and S68X this past week was 124 cfs, a decrease from the previous week's flow. According to RAINDAR, 0.38 inches of rain fell in the Lake Istokpoga watershed during the past seven days.

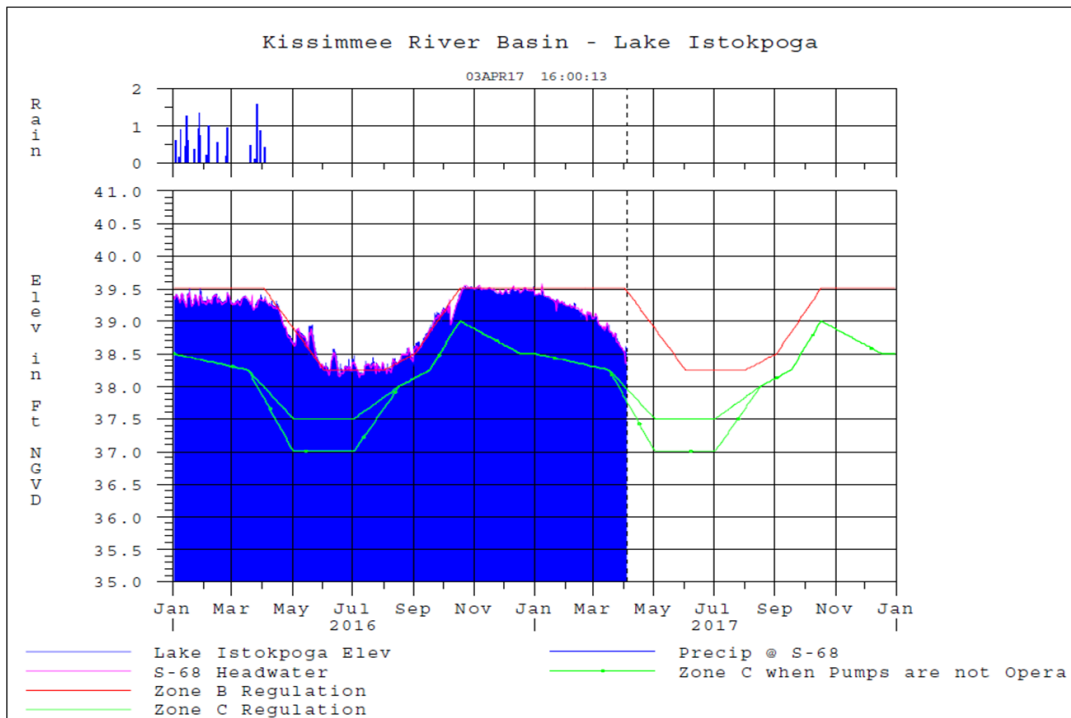


Figure 9

ESTUARIES

St. Lucie Estuary

Over the past week, provisional flows averaged about 0 cfs at S-80, 87 cfs downstream of S-308, 0 cfs at S-49 on C-24, 0 cfs at S-97 on C-23, and 55 cfs from Ten Mile Creek at the Gordy Road Structure. Average inflow from tidal basin tributaries is estimated to be 20 cfs (Figures 1 and 2). Total inflow averaged about 75 cfs last week and 122 cfs over last month.

Over the past week, salinity remained about the same throughout the estuary (Table 1, Figures 3 and 4). The seven-day moving average salinity of the water column at the US1 Bridge is about 27.7. Salinity conditions in the middle estuary are in the fair range for the adult eastern oyster.

Table 1. Seven-day average salinity at three monitoring stations 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 (N. Fork)	25.4 (NR ²)	26.8 (NR)	NA ¹
US1 Bridge	27.6 (27.2)	27.8 (27.8)	10.0-26.0
A1A Bridge	32.5 (32.7)	33.3 (33.4)	NA

¹Envelope not applicable, ²Not Reporting

Caloosahatchee Estuary

During the past week, provisional flows averaged approximately 1,071 cfs downstream of S-77, 530 cfs at S-78, and 650 cfs at S-79. Average inflow from tidal basin tributaries is estimated to be 74 cfs (Figures 5 and 6). Total inflow averaged 724 cfs last week and 742 cfs over last month.

Over the past week, salinity increased throughout the estuary (Table 2, Figures 7 and 8). The seven-day average salinity values are within the good range for adult oysters at Cape Coral and in the fair range at Shell Point and at Sanibel (Figure 9). The 30-day moving average surface salinity is 3.5 at Val I-75 and 10.7 at Ft. Myers. The 30-day moving average salinity at Ft. Myers has been above 10 for seven consecutive days. Salinity conditions between Val I-75 and Ft. Myers are likely to result in tape grass deterioration. Without discharges at S-79, the 30-day moving average salinity at Val I-75 is forecast to be 4.9 within two weeks (Figure 10).

Table 2. Seven-day average salinity at six monitoring stations in the Caloosahatchee Estuary. Current average is in bold face type, previous average in parentheses. The envelope reflects the preferred salinity range for tape grass (*Vallisneria americana*) at Val I-75 and for adult eastern oysters (*Crassostrea virginica*) elsewhere.

Sampling Site	Surface	Bottom	Envelope
S-79 (Franklin Lock)	3.7 (2.6)	3.7 (2.6)	NA ¹
*Val I75	4.8 (3.3)	7.6 (6.5)	0.0-5.0 ²
Ft. Myers Yacht Basin	12.7 (11.0)	14.0 (13.9)	NA
Cape Coral	20.8 (18.6)	21.7 (21.3)	10.0-30.0
Shell Point	30.9 (28.9)	32.0 (29.9)	10.0-30.0
Sanibel	34.2 (33.0)	34.3 (33.1)	10.0-30.0

¹Envelope not applicable, ²Envelope is based on a 30-day average.

*Val I75 is temporarily offline due to site construction,
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 3 as concentration ranges

of Chlorophyll *a* and dissolved oxygen at Beautiful Island, Ft. Myers, and Shell Point in the Caloosahatchee Estuary.

Table 3. 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.

	RECON Monitoring Stations		
	Beautiful Island	Ft. Myers	Shell Point
Chlorophyll <i>a</i> (µg/l)	4.13 – 8.61	3.93 – 11.55	1.21 – 114.22
Dissolved Oxygen (mg/l)	4.02 – 6.78	5.69 – 7.61	No Data

The Florida Fish and Wildlife Research Institute reported on March 31, 2017, that *Karenia brevis*, the Florida red tide organism, persists in Southwest Florida from Pinellas to Lee counties. *Karenia brevis* was observed in background to low concentrations in seventeen samples and one medium concentration from the March 28 sample at Boca Grande Pass collected from Lee County.

Water Management Recommendations

The 30-day average salinity at the I-75 Bridge is forecast to remain below 5 with no inflow at S-79, but the daily salinity is forecast to reach 7.6 within two weeks. Lake stage is in the Beneficial Use sub-band of 2008 LORS. The 2008 LORS/Adaptive Protocols recommend no flow from Lake Okeechobee to the Caloosahatchee Estuary. The current pulse release averaging 450 cfs will be completed this Friday. Given the high likelihood that salinity will exceed 5.0 without a release, it is recommended that a new pulse release through S-79 averaging 300 cfs be initiated.

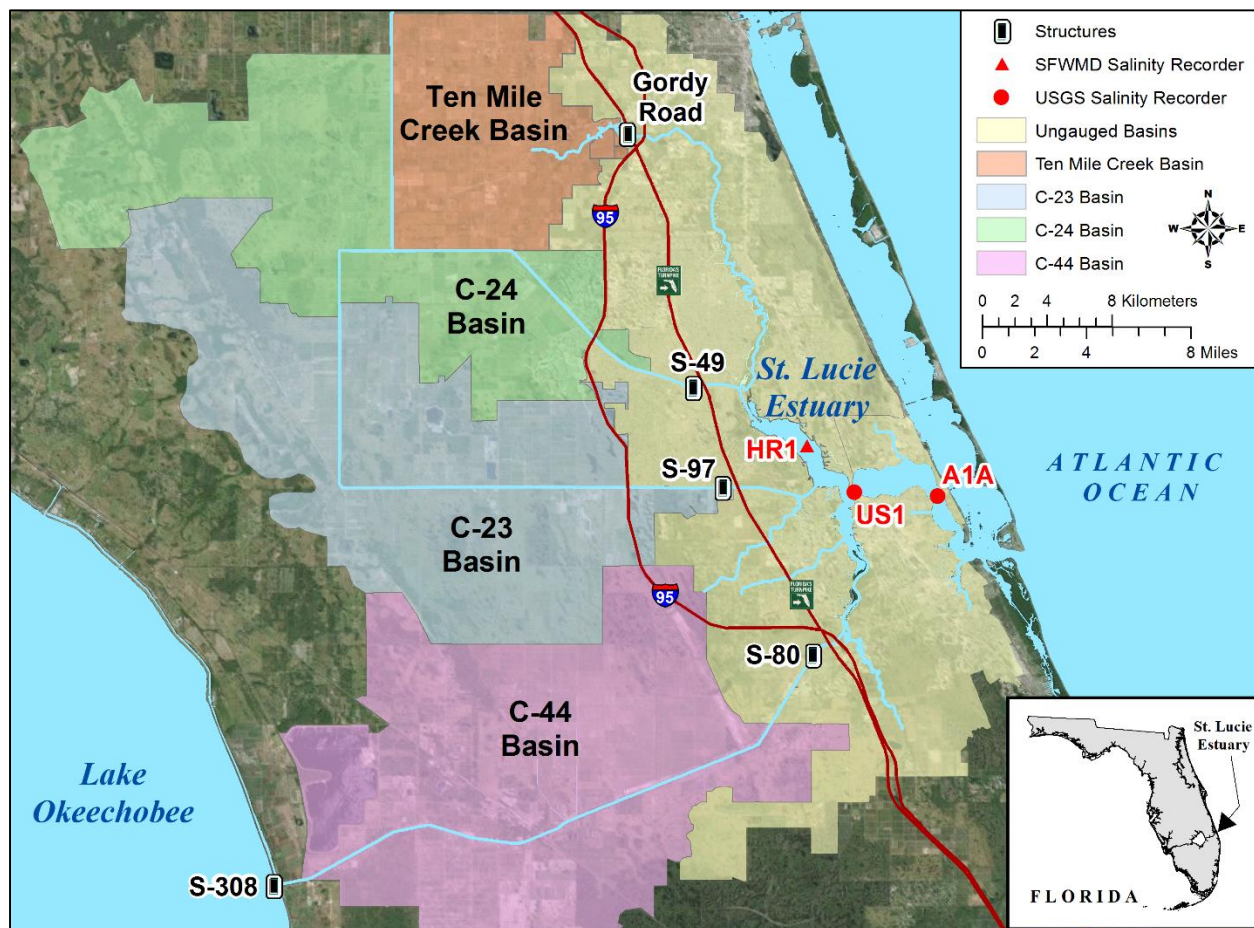


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

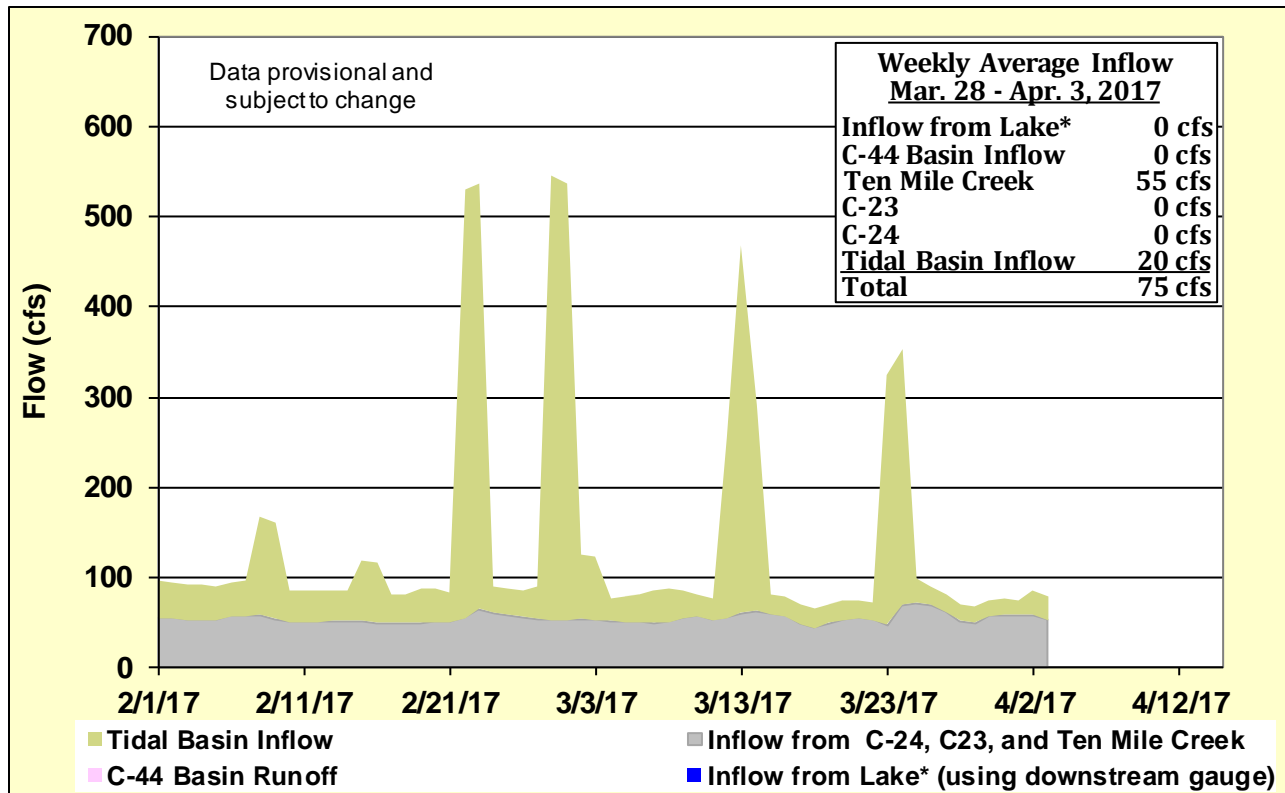


Figure 2. Estimated surface freshwater inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basins into the St. Lucie Estuary.

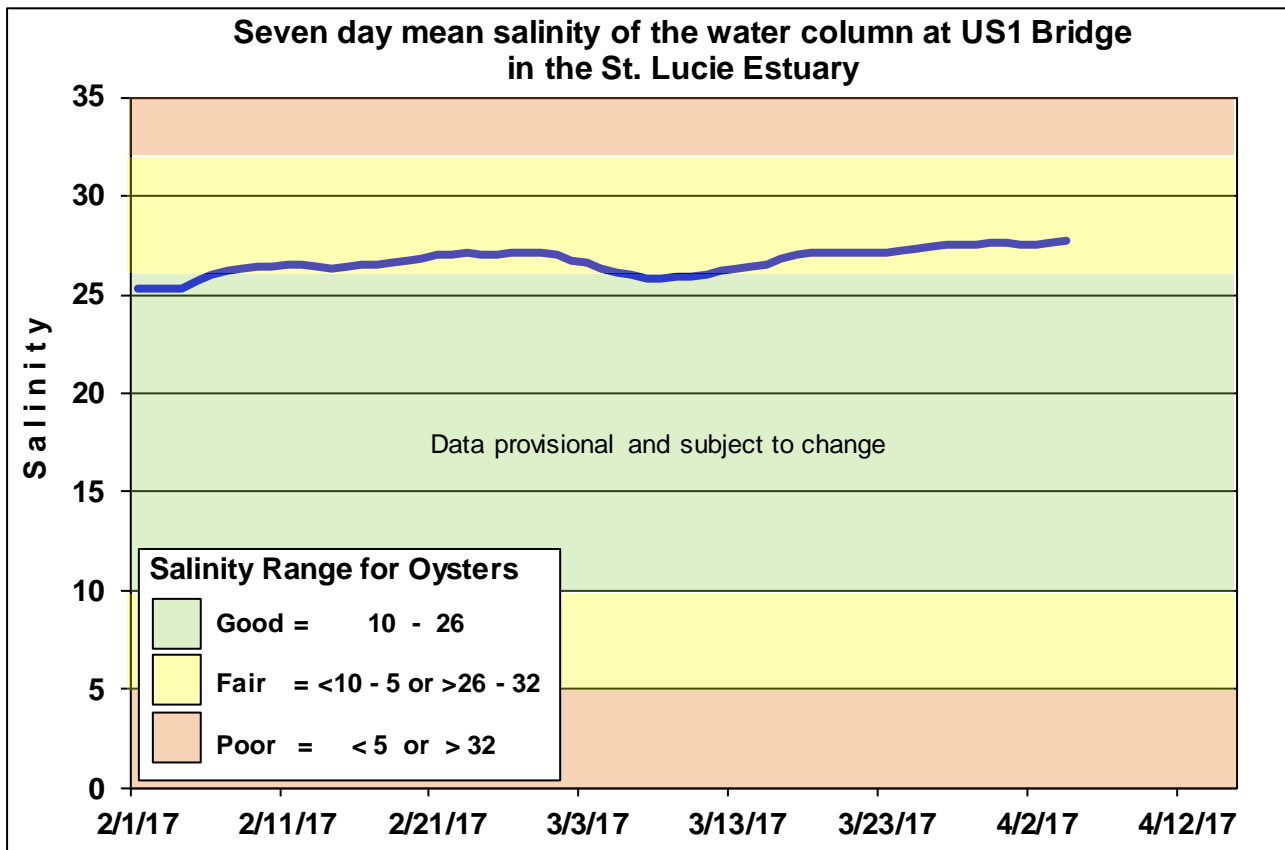


Figure 3. Seven-day mean salinity of the water column at the U.S. Highway 1 Bridge.

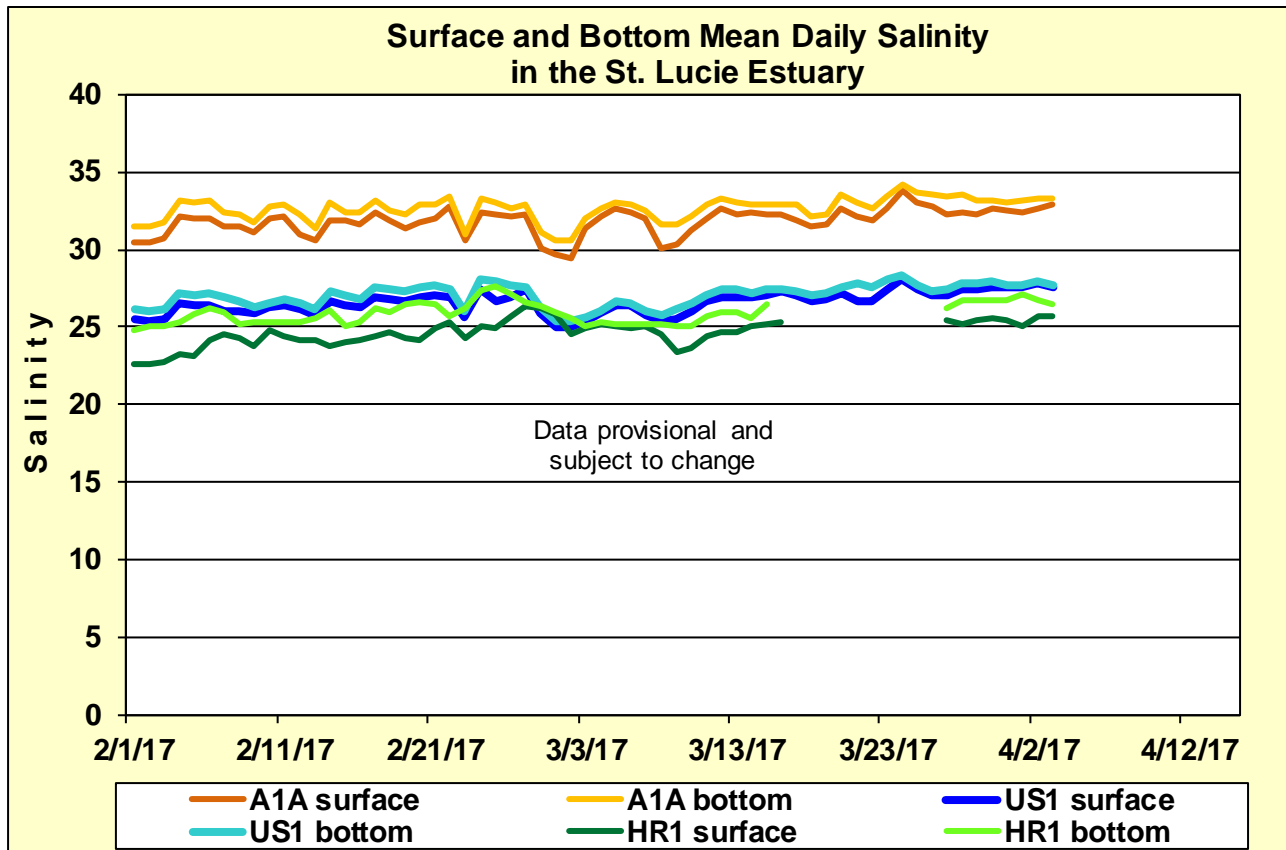


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

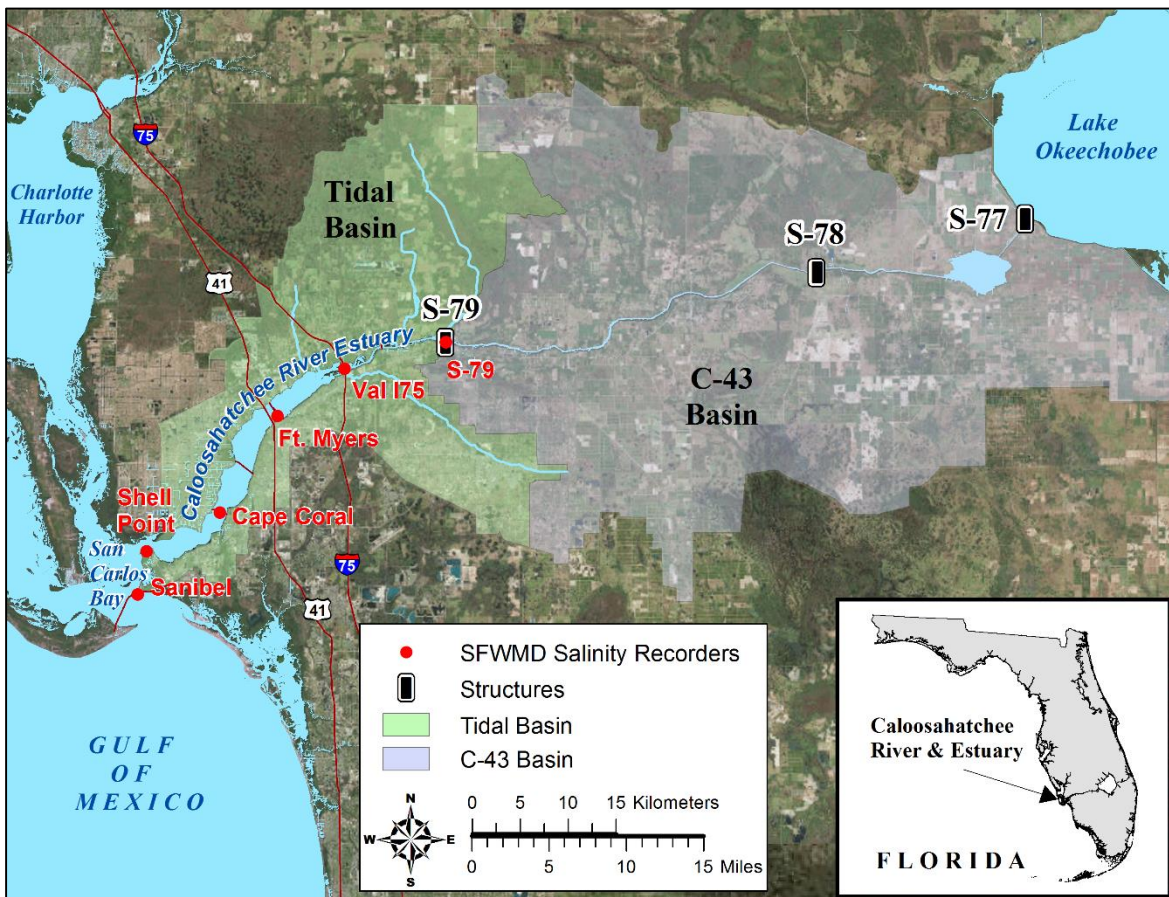


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

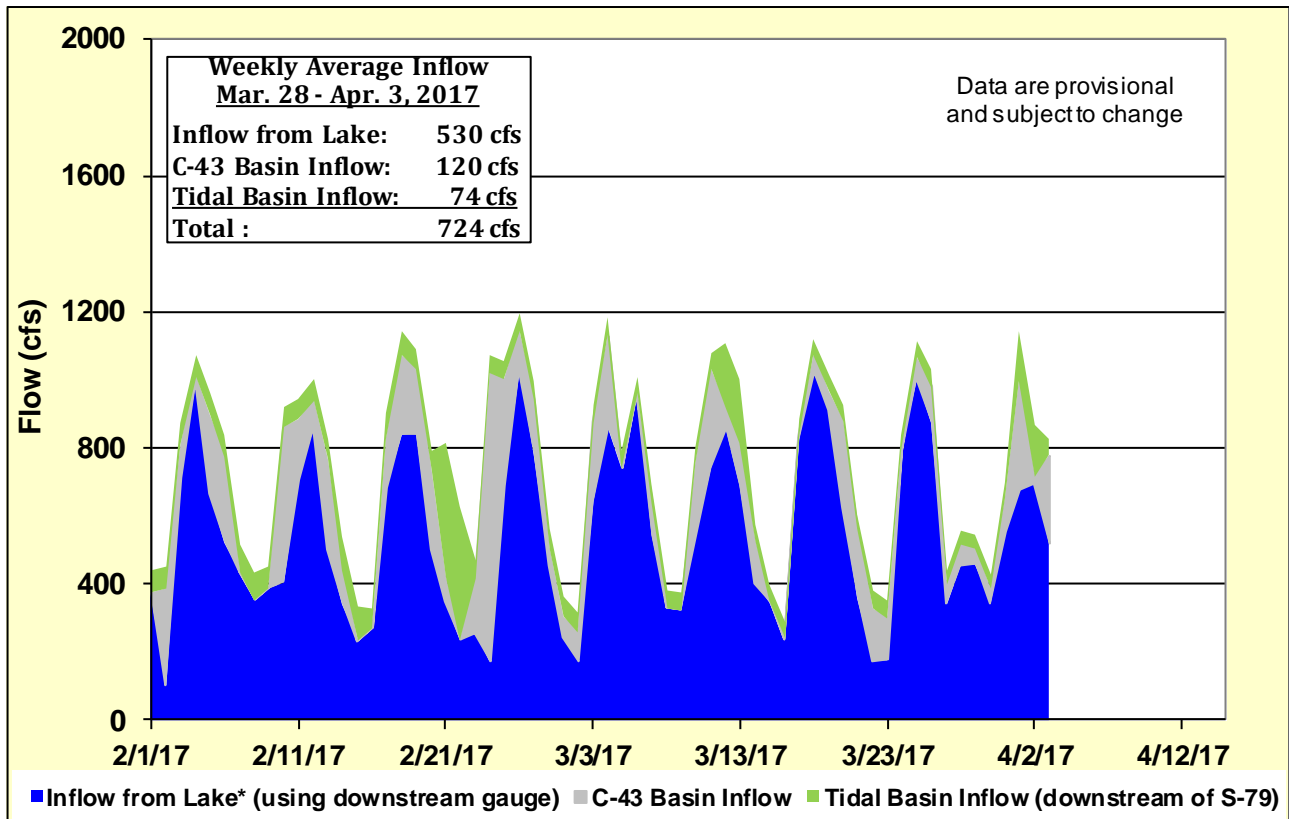
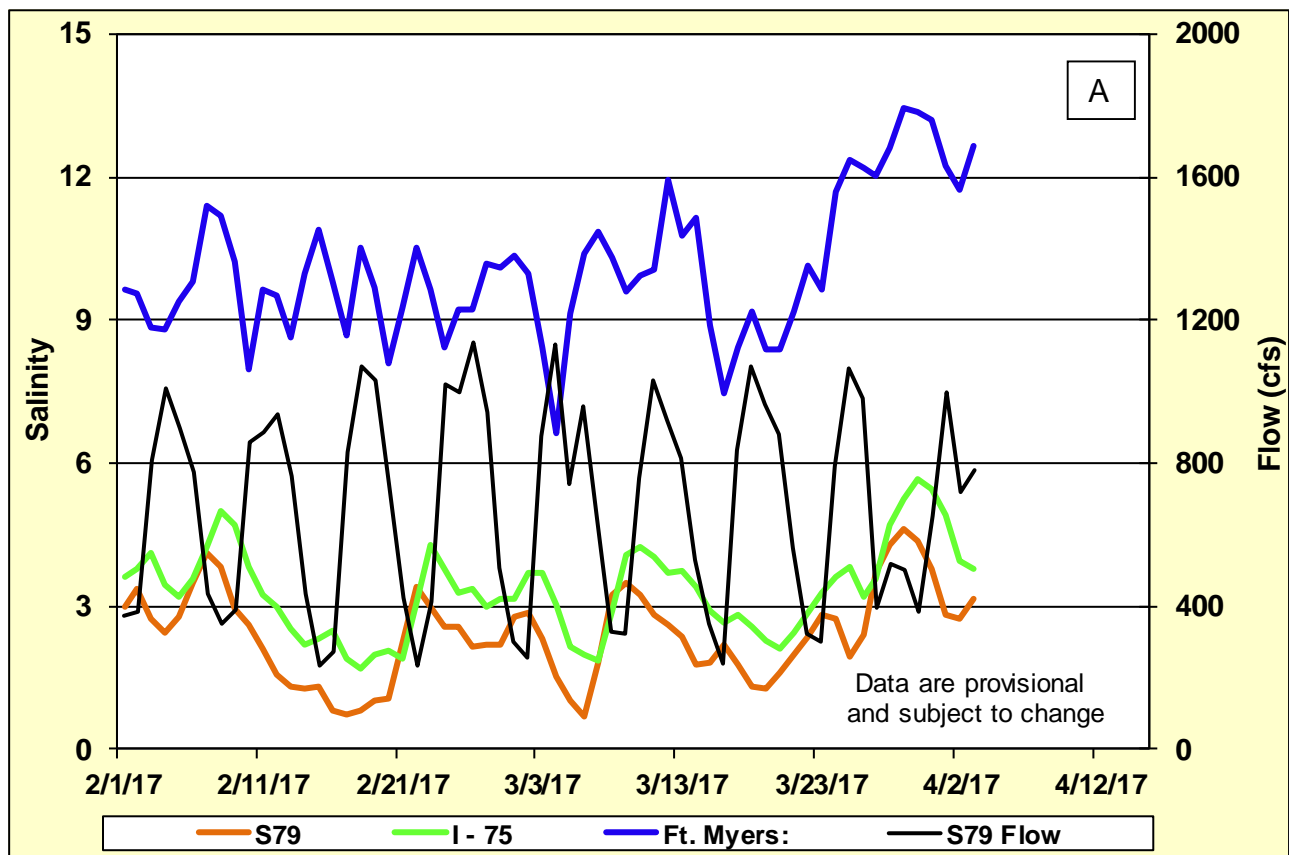


Figure 6. Freshwater inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.



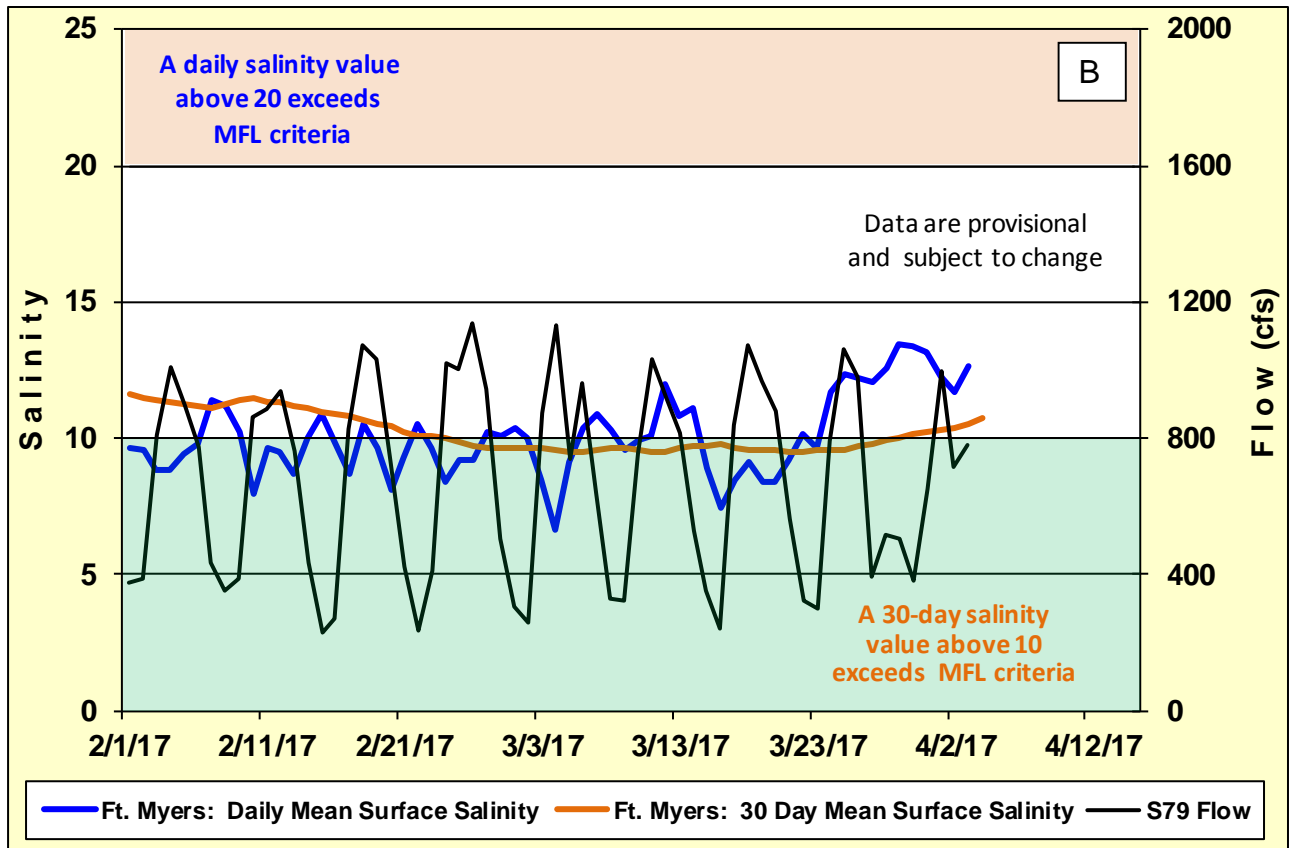


Figure 7. Daily mean flows at S-79 and salinity at upper estuary monitoring stations (A) and 30-day moving average salinity at Ft. Myers (B).

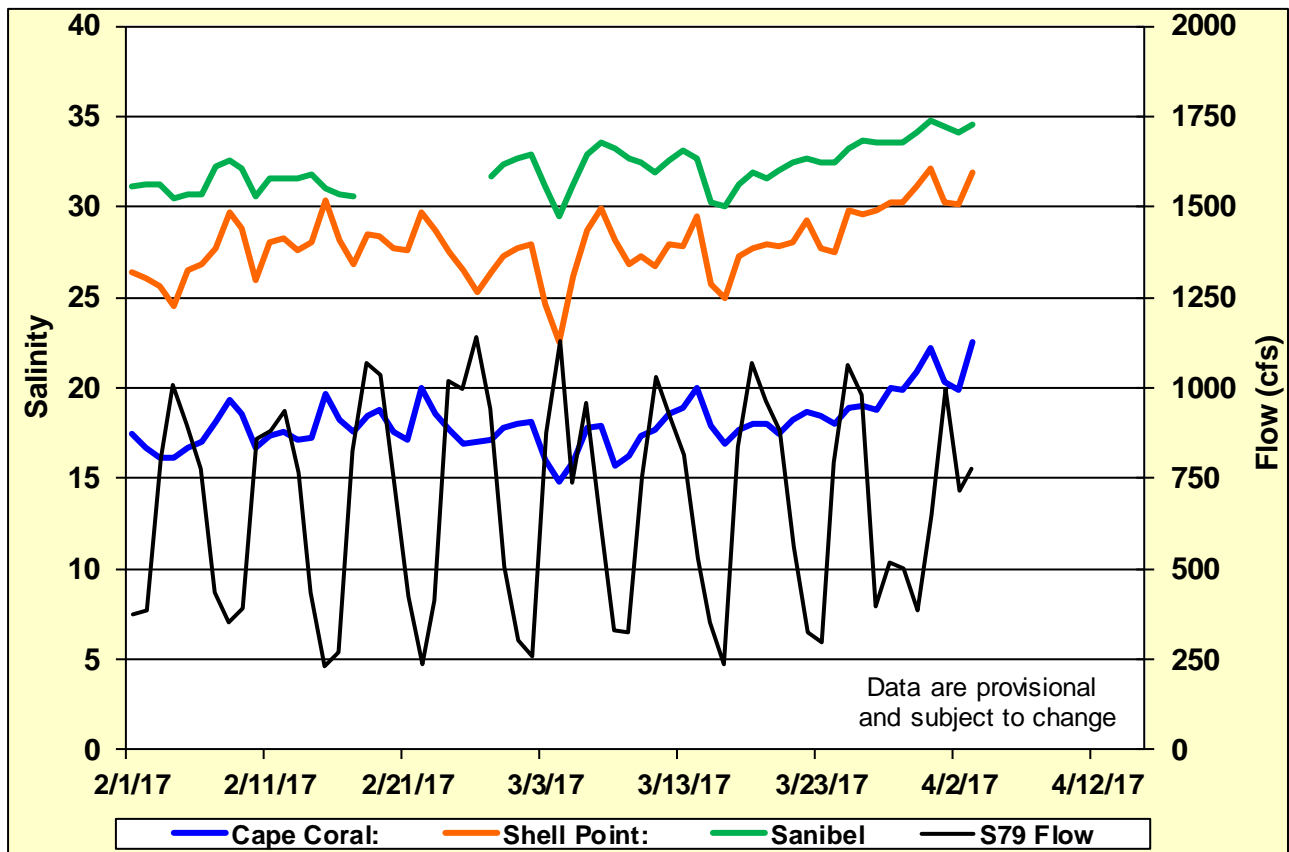


Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.

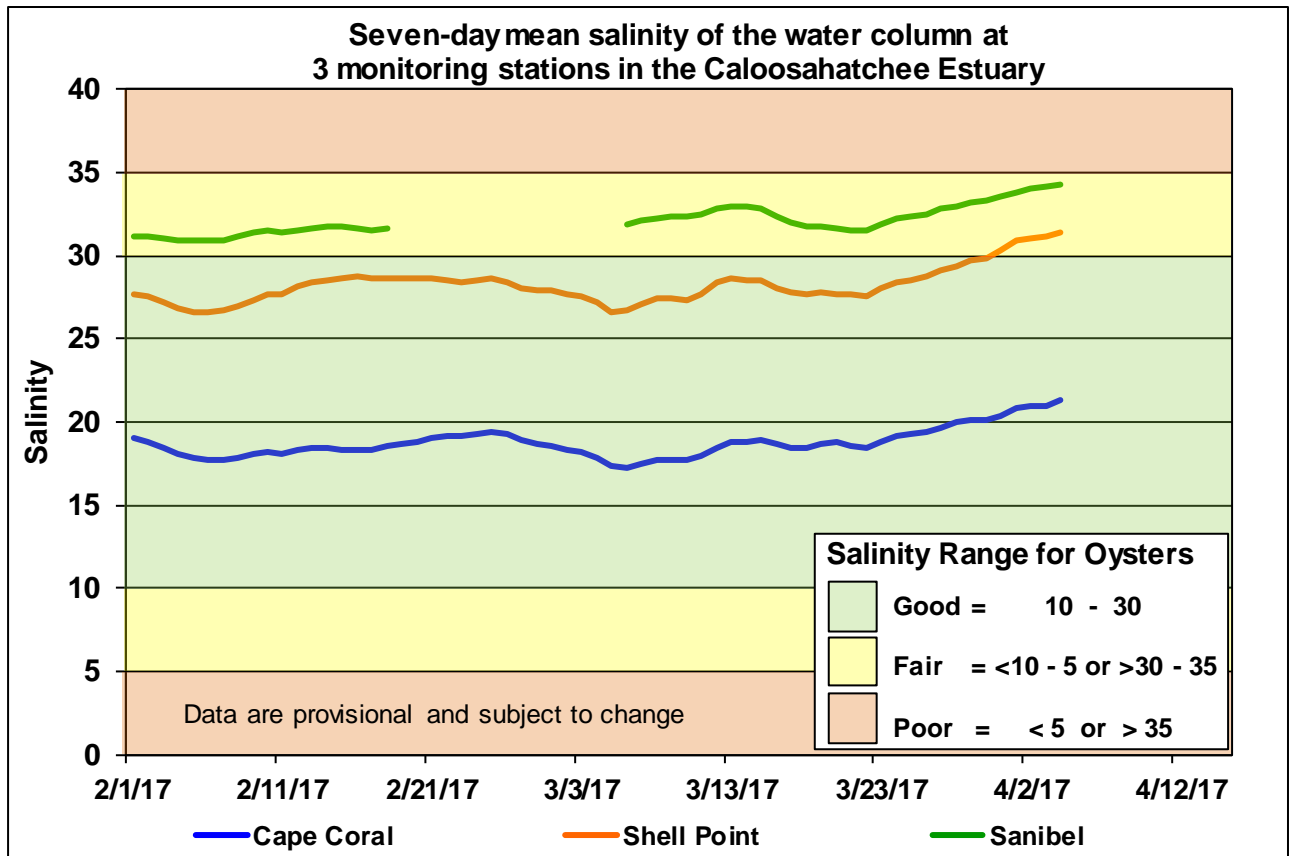


Figure 9. Seven-day mean salinity at Cape Coral Bridge, Shell Point and Sanibel Bridge monitoring stations.

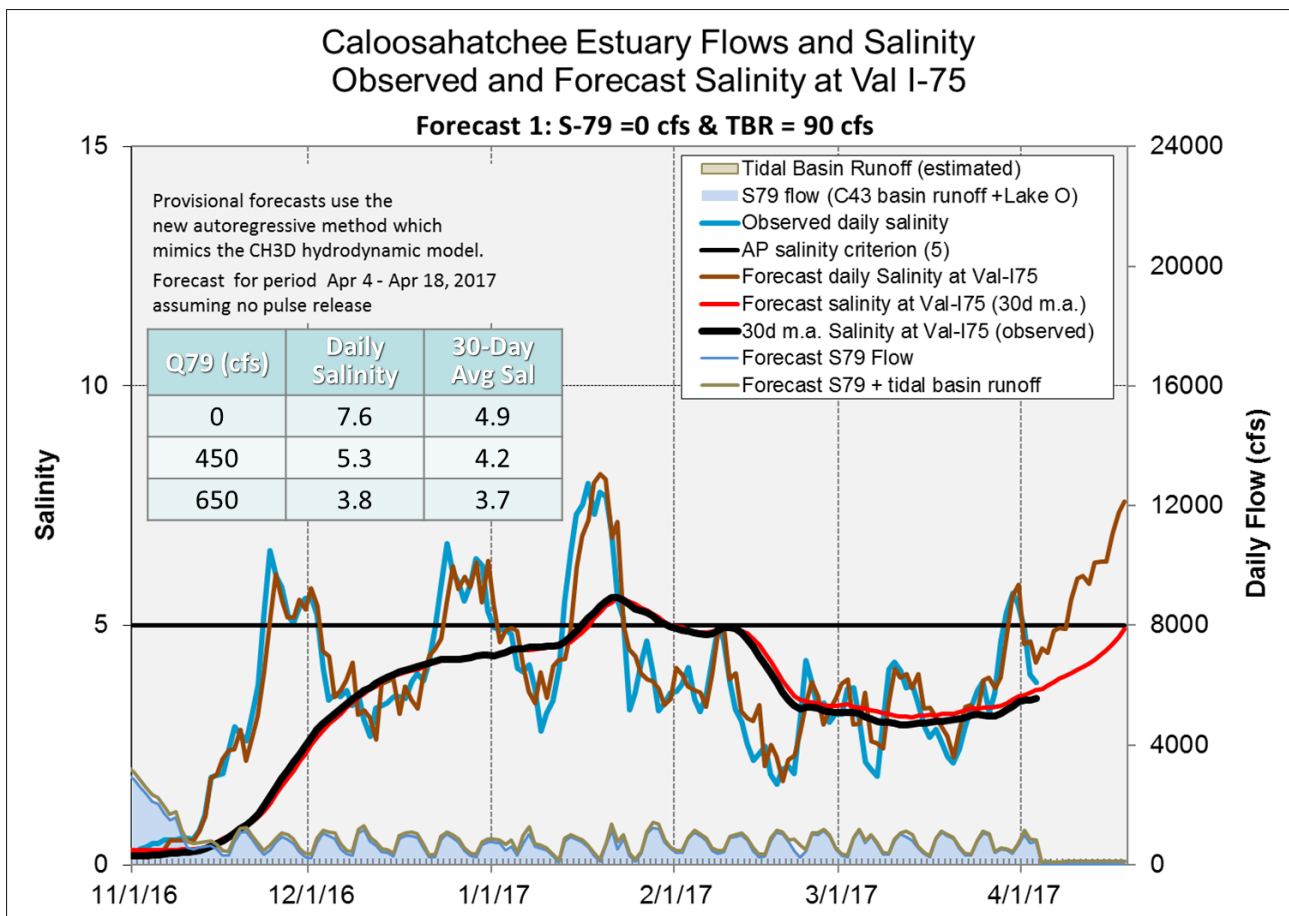


Figure 10. 14-day salinity forecast at Val I-75 assuming no releases at S-79.

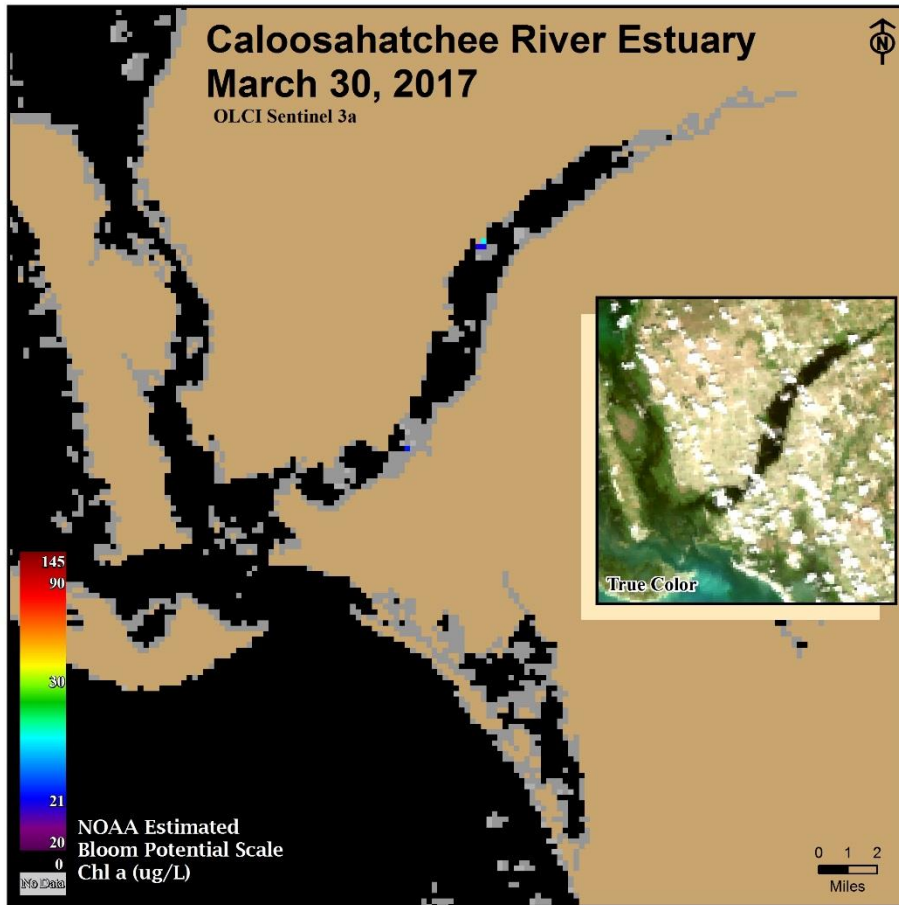


Figure 11. MODIS (Moderate Resolution Imaging Spectrometer) provided by NOAA uses Ocean and Land Color Instrument (OLCI) to estimate cyanobacteria bloom potential in Caloosahatchee Estuary.

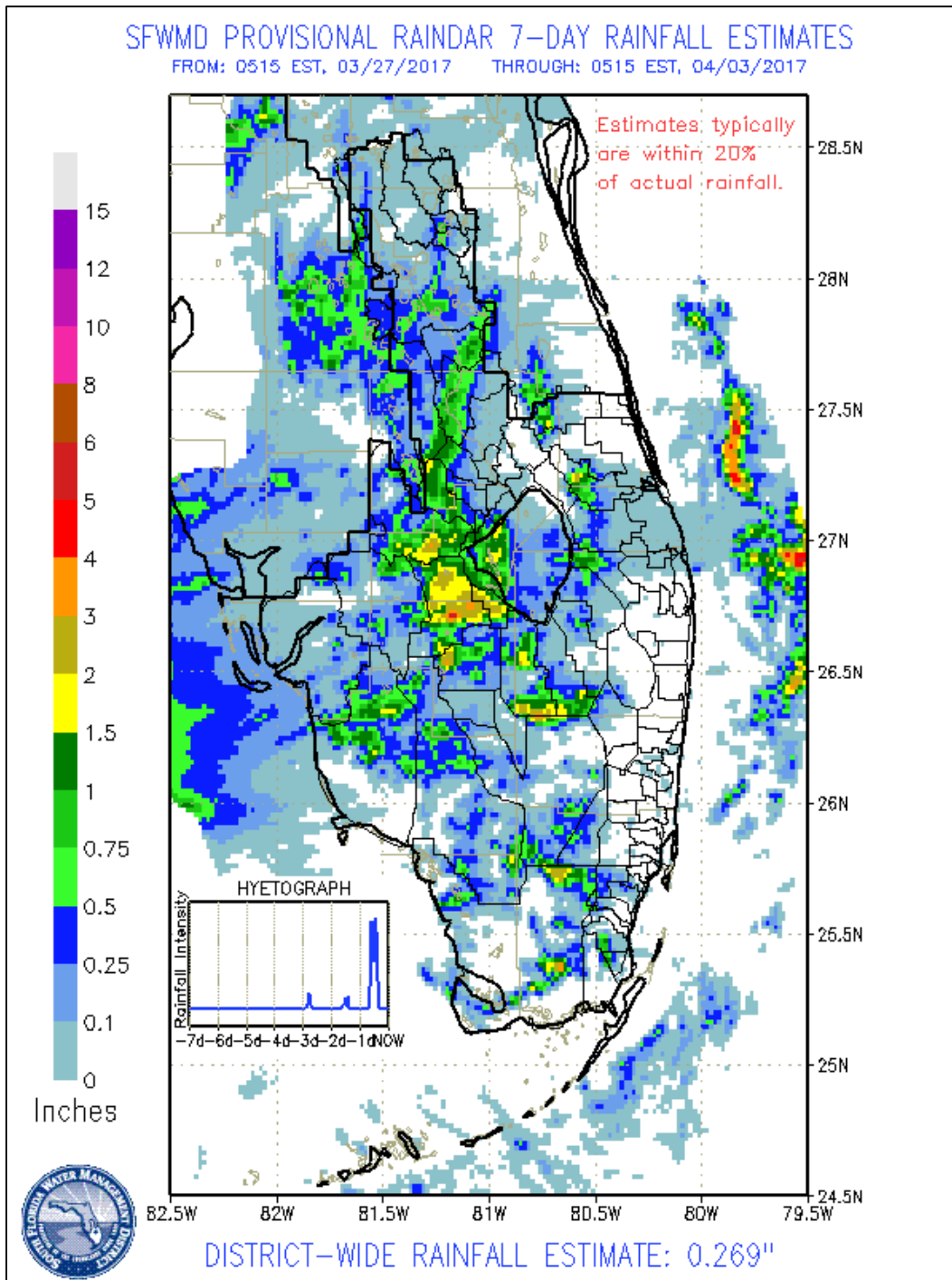
EVERGLADES

Rainfall over the last week was scattered with the most falling in WCA-1 and Everglades National Park (ENP). Recession rates were inconsistent across the system with the slower recession rates in WCA-1 and WCA-2A being desirable at this time while WCA-3A fell at a rate, though designated as “good”, was faster than current conditions suggest can sustain wading bird foraging throughout the nesting season.

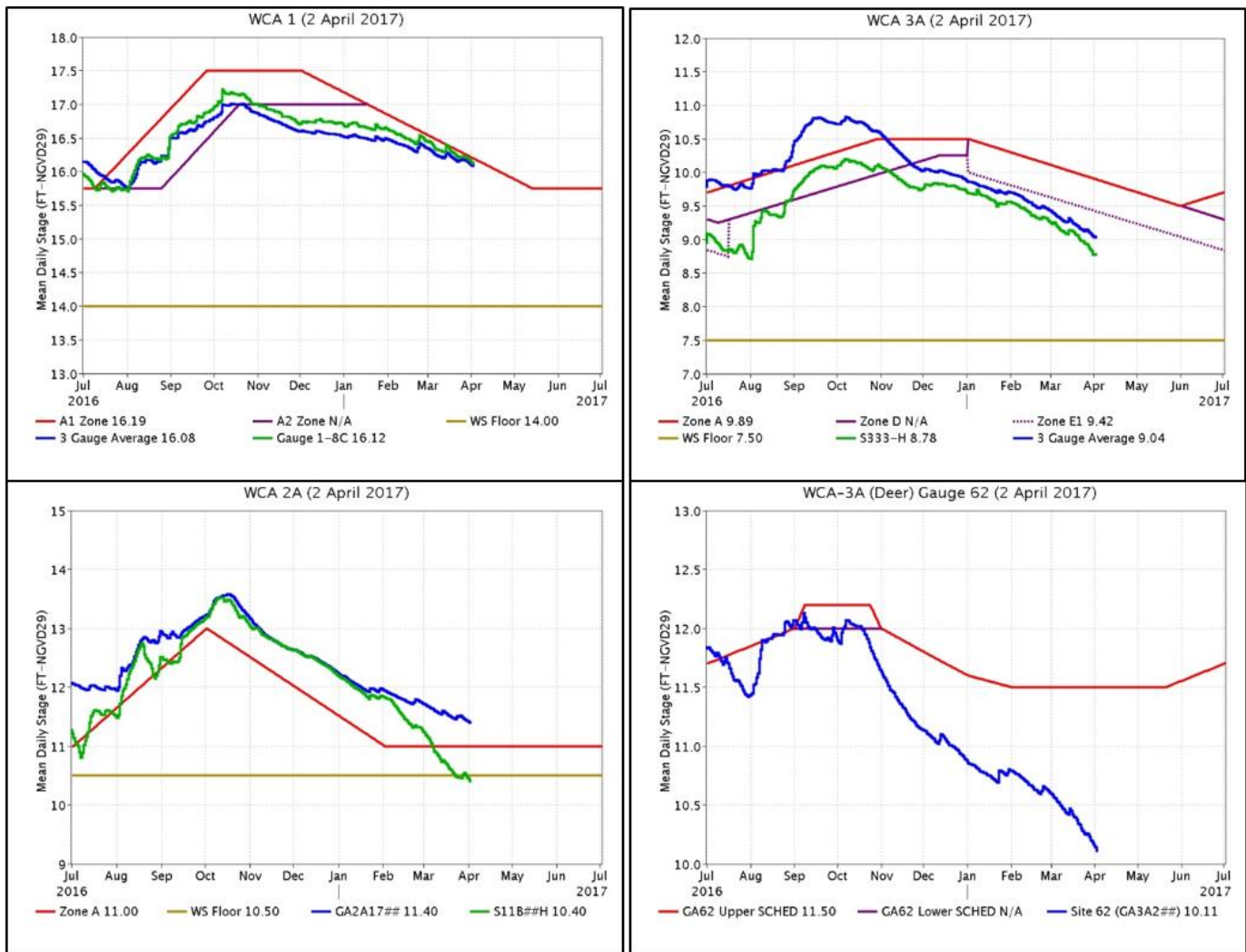
Everglades Region	Rainfall (Inches)	Stage Change (feet)	
WCA-1	0.51	-0.01	Good
WCA-2A	0.38	0.01	Fair
WCA-2B	0.44	-0.12	Poor
WCA-3A	0.18	-0.07	Good
WCA-3B	0.24	-0.05	Good
ENP	0.65	-0.10	Fair

SFWMD PROVISIONAL RAINDAR 7-DAY RAINFALL ESTIMATES

FROM: 0515 EST, 03/27/2017 THROUGH: 0515 EST, 04/03/2017



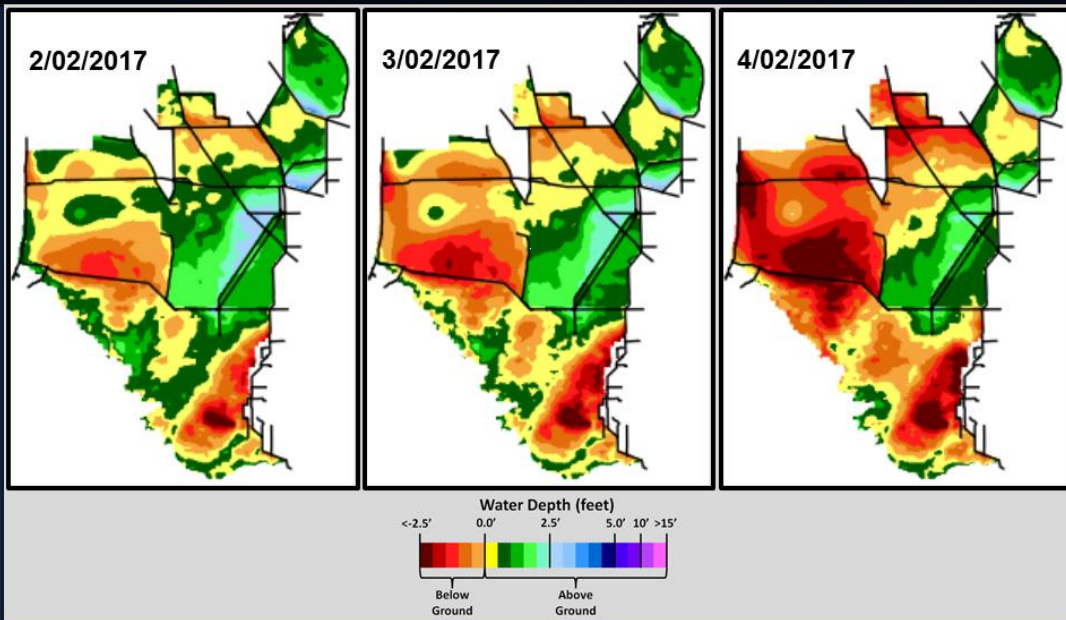
Regulation Schedules: WCA-1 remained 0.08 feet below zone A1 and tracking the regulation line. WCA-3A three-gauge average is 0.38 feet below zone E1, and is slowing deviating from trendline. In WCA-2A the canal stage at gauge GA2A17 is 0.40 feet above zone A1 while the marsh stage measured at the headwaters of S11B is 0.1 feet below the floor. WCA-3A at gauge 62 (Northwest corner) remains greater than 1 foot below schedule.



Water Depths and Changes: This week's water depths at monitored gauges other than in WCA-2B range from -0.08 feet (northeast WCA-3A) to 1.60 feet (southern WCA-3A). Stages across the Everglades are for the most part lower than they were a week and month ago, and significantly lower than one year ago (of note last year stages were above average).



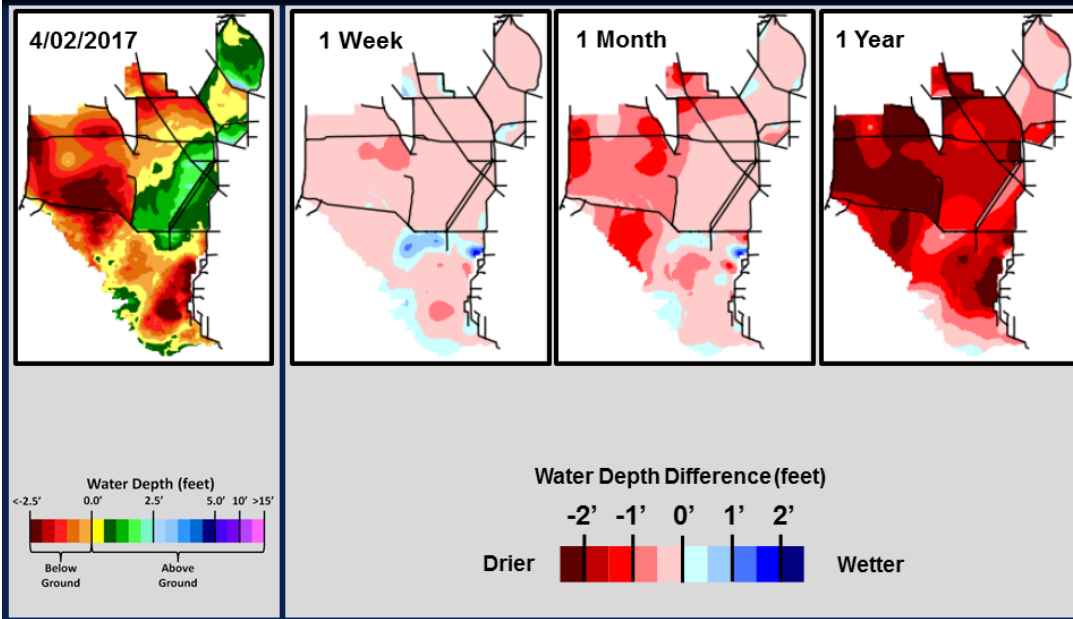
SFWDAT Water Depth Monthly Snapshots



South Florida Water Depth Assessment Tool (SFWDAT)

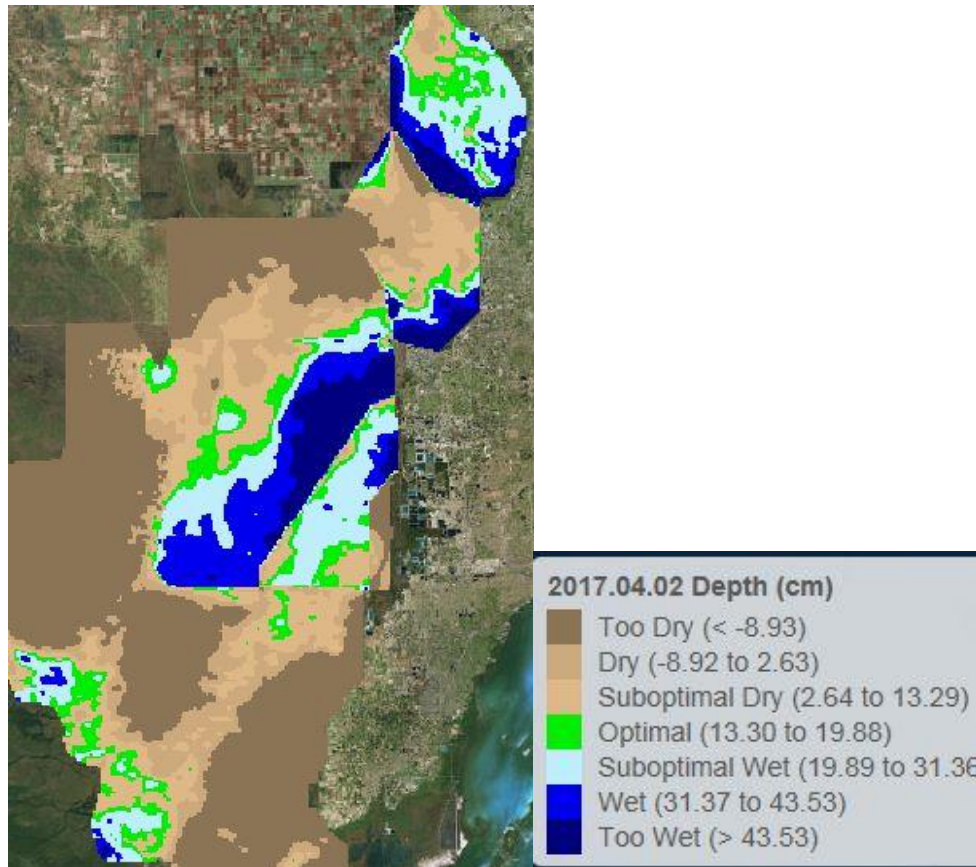


SFWDAT Everglades Difference Maps (Present - Past)



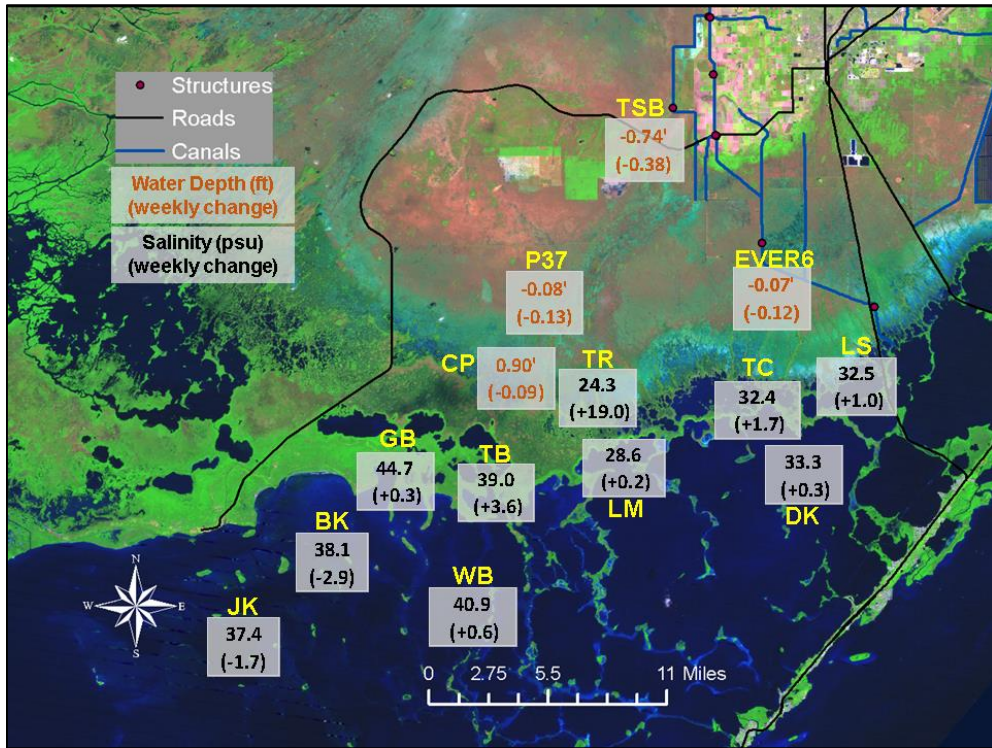
South Florida Water Depth Assessment Tool (SFWDAT)

Wading Birds: A District wading bird foraging flight was not conducted this week however it is expected that patterns are similar to last week based on the depth-based habitat suitability map below. A nesting survey flight is scheduled for April 6.



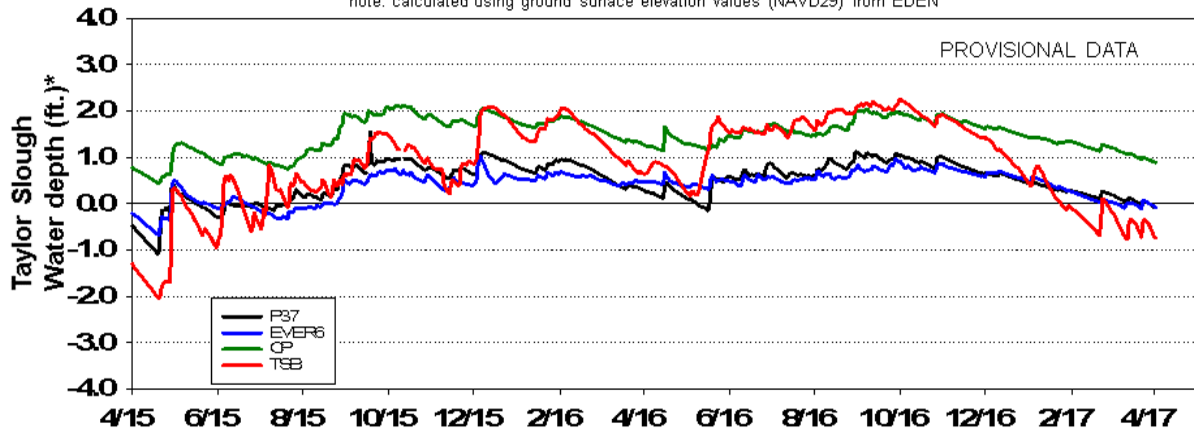
Taylor Slough: Water levels decreased last week with the most rapid change (-0.38 feet) occurring in northern Taylor Slough. Compared to historic averages, water levels range from -2 inches below average in Northern Taylor Slough to +2 inches above average in the ENP panhandle.

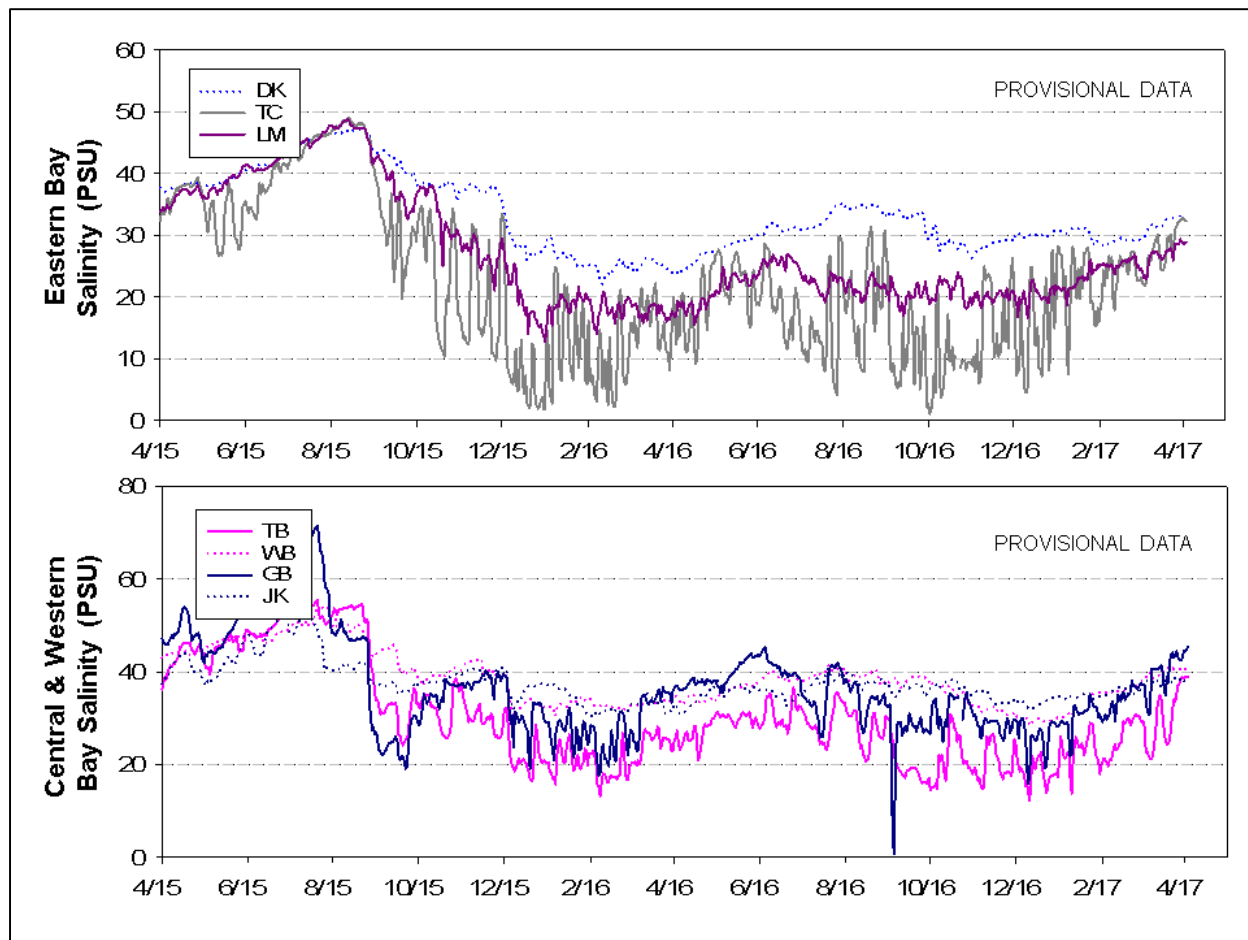
Florida Bay Salinity: Salinities in the Bay are generally rising due to evaporation. Salinities currently range from 29 psu to 45 psu and are +2 to +9 psu above their long-term averages. Decreases in salinity in the west are likely due to marine water from the Gulf (which has a lower salinity) flushing that area.



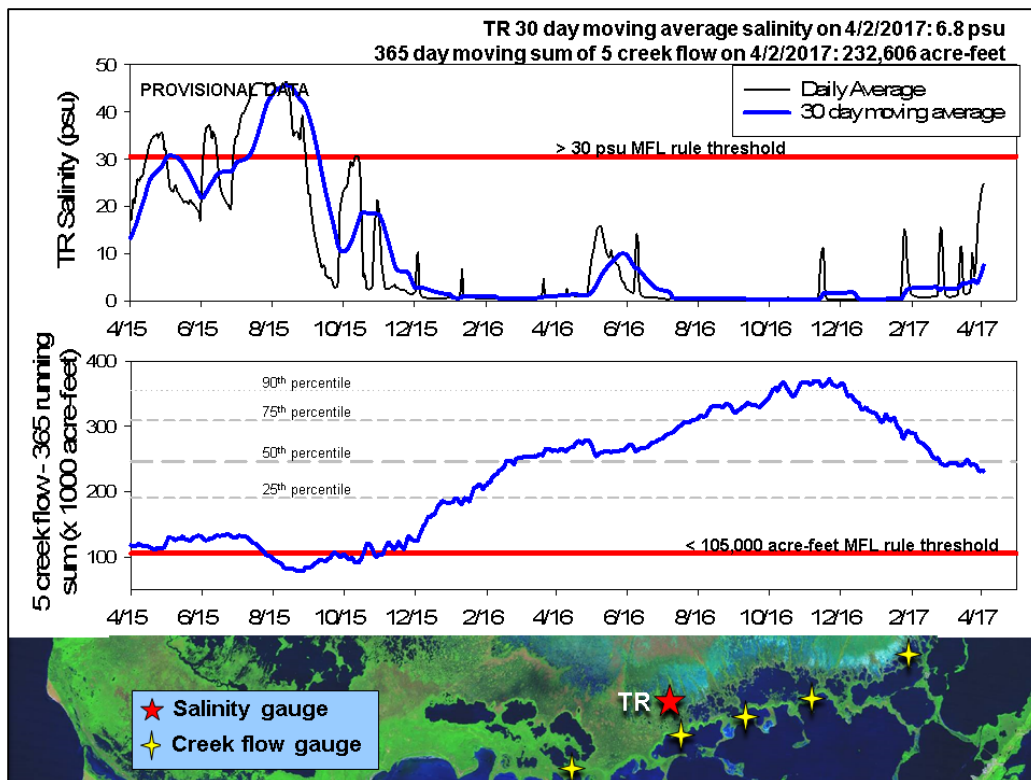
Taylor Slough Water Depths

*note: calculated using ground surface elevation values (NAVD29) from EDEN





Florida Bay MFL: Mangrove zone salinities are on the rise. The daily average salinity at TR increased to 24 psu by the end of the week and is still rising. The 30-day moving average increased 2.6 to end the week at 6.8 psu. The weekly creek flow from the five creeks was around -7,400 acre-feet with all of the last seven days experiencing negative flows. The 365-day moving sum of flow from the five creeks identified by stars on the map decreased about -8,700 acre-feet to end at 232,606 acre-feet (below the long-term average of 257,628 acre-feet).



Water Management Recommendations

- Based on current stage conditions and wading bird foraging/nest reconnaissance flights we are continuing to recommend that moderating recession rates in WCA-2A has priority over moderating recession rates in WCA-3A. However, the low water depth conditions in the northern sections of WCA-3A north at gauges 62 (0.0 feet) and 63 (-0.08 feet) suggest that available water routed into those areas would serve to protect that habitat.
- Based on current stage conditions and wading bird foraging/operations reconnaissance flights conducted on March 28 we support the water management option that would route water into WCA-2A via the S-7. This option may serve to protect or prolong the optimal foraging conditions currently being seen and modeled in WCA-2A.

More specific recommendations appear in the summary table below. The red text represents new or modified information or recommendations.

Everglades Ecological Recommendations, April 4th, 2017 (red is new)

Area	Current Condition	Cause(s)	Recommendation	Reasons
WCA-1	Stages decreased -0.08' to -0.13'	Rainfall, ET, management	Operate for dry season conditions and, when possible, restrict recession rates to -0.03' to -0.07' per week. Moderate reversals, when possible.	Retain water for the upcoming dry season while protecting habitat for apple snail and wading bird breeding season.
WCA-2A	Stages decreased -0.12'	Rainfall, ET, management	Maintain slower recession rates. Retain water and restrict recession rates to less than -0.09' per week. Continue to prioritize WCA-2A inflows.	Protect habitat and wildlife. Support apple snails and nesting wading birds. Retain water to provide foraging habitat later in the breeding season.
WCA-2B	Stages decreased -0.17' to -0.20'	Rainfall, ET, management	Restrict recession rates to -0.05' to -0.09' per week.	Protect habitat and wildlife. Support apple snails and nesting wading birds.
WCA-3A NE	Stages decreased -0.18'	Rainfall, ET, management	Restrict recession rates to -0.05' to -0.07' per week to prevent the area from drying out too early for wading bird nesting.	Protect habitat and wildlife. Support apple snails and nesting wading birds. Reduce fire risk as water depths are now below ground.
WCA-3A NW	Stages decreased -0.17'	Rainfall, ET, management	Continue moving water through S-150 as possible. Water for northwestern 3A (via the G404) is also desired.	
Central WCA-3A S	Stages decreased -0.01'	Rainfall, ET, management	Restrict recession rates to -0.05' to -0.09' per week. When flows are changed a gradual reduction is recommended (stepping down over several days).	Keeping depths below 2.5' at gauge 65 is important to allow tree island vegetation to recover from stress of the recent extended inundation duration. Protect habitat, wildlife and support wading bird breeding.
Southern WCA-3A S	Stages decreased -0.07'	Rainfall, ET, management		
WCA-3B	Stages decreased - 0.03' to - 0.06'	Rainfall, ET, management	Restrict recession rates to -0.05' to 0.-09' per week.	Protect habitat and wildlife and prepare for wading bird breeding season. Provide conditions to support apple snails.
ENP-SRS	Stages decreased -0.02'	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. Protect habitat, wildlife and wading birds.
ENP-CSSS habitats	S-12A, S-12B, S-344, S-343A, S-343B are closed. S-333 closed	Rainfall, ET, management	Follow rainfall plan for releases and current ERTD guidelines. Follow guidance in C-111 Western Spreader Canal Project operations manual. Care should be taken to avoid overdrying eastern subpopulations C and F.	Future operations need to continue to provide appropriate hydrological and habitat conditions for CSSS. Current and forecasted conditions are conducive for a successful sparrow breeding season. Dry conditions are expected for much of the sparrow breeding season.
Taylor Slough	Stages decreased by -0.09' to -0.38'	Rain, ET, inflows	Move water southward as possible	Provide freshwater buffer for ecosystems, maintain low salinity conditions downstream, and maintain slow recession rates.
FB- Salinity	+2 psu to +9 psu above average	Rain, ET, inflows, wind	Move water southward as possible	Maintain low salinity conditions and prevent early salinity increases.