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M E M O R A N D U M

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

FROM: SFWMD Staff Environmental Advisory Team

DATE: May 16, 2017

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

Some showers/storms south today, then mainly showers south tomorrow. The overall atmosphere is somewhat unfavorable for shower/storm development except over far southern Florida where some moisture is beginning to leak in from the east. Look for scattered showers and embedded thunderstorms to move from interior southern sections with a focus over southern and western Collier County this afternoon. Drier air attempts to pinch in further southward on Wednesday, but some showers are still likely south through southwest of the Lake tomorrow afternoon. Thursday should see the least activity through early evening before a surge of higher moisture begins to move in from the southeast predawn Friday. Above average rainfall should then result Friday through the weekend.

Kissimmee

On Sunday, stage was 0.3 feet below regulation schedule in East Lake Toho and Lake Toho, and 1.2 feet below schedule in Kissimmee-Cypress-Hatchineha (KCH). Over the past week, discharge at S65, S65A, and S65E averaged 234, 167, and 173 cfs, respectively. Tuesday morning discharges were ~228 cfs, 162 cfs, and 200 cfs, respectively at S65, S65A, and S65E. Dissolved oxygen data in the Kissimmee River averaged 8.0 mg/L for the week (manual sondes at PC33 and PC62). Kissimmee River mean floodplain depth on Sunday was 0.05 feet. A recommendation was made to reduce discharge at S65/S65A by 40-50 cfs to reduce rate of stage decline in KCH.

Lake Okeechobee

As of midnight May 14, 2017, Lake stage was 11.43 feet NGVD, in the Beneficial Use sub-band and 0.71 feet above the Water Shortage Management Sub-band. Most of the Lake Okeechobee marsh is now dry and much of Moonshine Bay is approaching dryness as well. No new snail kite nests were recorded during the most recent survey. So far this season, there have been thirty-nine snail kite nests on Lake Okeechobee, all but two of which were in the Moonshine Bay cattail treatment areas. Of these, twenty-one nests have been deemed successful (54%), eleven nests have failed (28%) and seven nests remain active. Additionally, with the decreasing water levels, Florida Fish and Wildlife Conservation Commission (FFWCC) reported a decline of approximately 330 snail kites on the Lake since the first survey. The potential for bloom conditions may be intensifying in the north end of the Lake. For the remainder of the dry season, efforts should be made to limit the amount of water discharged from the Lake in an attempt to keep the dwindling wading bird and snail kite foraging and nesting locations hydrated.

Estuaries

Total discharge to the St. Lucie estuary averaged 63 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 are the same as 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 338 cfs over the past week with 242 cfs (72%) coming from the Lake. The 30-day average surface salinity at the Ft. Myers monitoring station is 15.6 and has been above 10 for 49 consecutive days. The 30-day average surface salinity at Val I-75 is 7.7. 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, in the fair range at Shellpoint, and likely in the fair range at the Sanibel Causeway. The 30-day moving average salinity at the I-75 Bridge is forecast to be 6.4 in the next two weeks if no flow comes through the S-79 structure, and the daily salinity is forecast to reach 7.0.

Stormwater Treatment Areas

Over the past week, the STAs/FEBs received approximately 100 acre-feet of Lake releases. The total amount of Lake releases sent to the STAs/FEBs in WY2018 (since May 1, 2017) is approximately 2,400 acre-feet. Most STA cells are at 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. Operational restrictions are in place for the STA-1W Expansion project construction in STA-1W. In addition, nests of 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 and the conditions allow, releases will be sent to STA-2 and STA-3/4.

Everglades

Below average rainfall across the system resulted in a return to seasonal recession rates for most of the WCAs. Wading bird nesting season is looking promising for Great Egrets and the small herons. Wood storks at the Jetport colonies in WCA-3A have done well, so far an estimated 800 of the 1,000 nests having produced multiple fledglings. White ibis nesting success is more uncertain, with nest abandonment noted in WCA-1, probably due to recent stage reversals. Increasing salinity conditions in Florida Bay are causing some ecological concern with mangrove zone salinities rising sharply over the last week.

Supporting Information

KISSIMMEE BASIN

Kissimmee Basin Rainfall

The Upper Kissimmee Basin received 0.07 inches of rainfall in the past week and the Lower Basin received 0.01 inches (SFWMD Daily Rainfall Report 05/15/2017).

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: 5/16/2017

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)						
							5/14/17	5/7/17	4/30/17	4/23/17	4/16/17	4/9/17	4/2/17
Lakes Hart and Mary Jane	S62	0	LKMJ	59.6	R	59.9	-0.3	-0.3	-0.3	-0.4	-0.4	-0.3	-0.4
Lakes Myrtle, Preston, and Joel	S57	0	S57	59.9	R	60.2	-0.3	-0.3	-0.3	-0.1	-0.1	-0.1	-0.1
Alligator Chain	S60	0	ALLI	62.1	R	62.5	-0.4	-0.5	-0.5	-0.5	-0.6	-0.7	-0.8
Lake Gentry	S63	3	LKGT	59.9	R	60.0	-0.1	-0.1	0.0	0.0	-0.1	-0.2	-0.3
East Lake Toho	S59	21	TOHOE	55.4	R	55.7	-0.3	-0.5	-0.7	-0.7	-0.9	-1.0	-1.0
Lake Toho	S61	0	TOHOW, S61	52.4	R	52.7	-0.3	-0.5	-0.6	-0.7	-0.8	-1.0	-1.1
Lakes Kissimmee, Cypress, and Hatchineha	S65	234	LKISSP, KUB011, LKIS5B	48.4	R	49.6	-1.2	-1.2	-1.3	-1.3	-1.3	-1.3	-1.5

* 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: 5/16/2017

Metric	Location	Sunday's 1-day average	Weekly Average**									
			5/14/17	5/7/17	4/30/17	4/23/17	4/16/17	4/9/17	4/2/17	3/26/17	3/19/17	3/12/17
Discharge (cfs)	S-65	236	234	258	283	330	344	292	361	626	885	899
Discharge (cfs)	S-65A	162	167	184	205	248	262	270	277	461	681	705
Discharge (cfs)	S-65D****	195	198	252	253	286	297	288	359	679	791	685
Discharge (cfs)	S-65E****	147	173	260	225	267	282	297	372	723	855	737
DO concentration (mg/L)***	Phase I river channel	7.1	8.0	7.4	7.9	7.8	8.1	7.7	7.8	8.9	8.8	8.4
Mean depth (feet)*	Phase I floodplain	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.07	0.11	0.17	0.12

* 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 manual sondes at PC62 and PC33; telemetry sondes have been taken offline.

**** 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
5/15/2017	Reduce discharge at S65/S65A by 40-50 cfs	Reduce rate of stage decline in KCH while maintaining discharge to the Kissimmee River.		KB Ops
5/9/2017	No new recommendations.			
5/3/2017	Reduce discharge at S65/S65A by 50 cfs	Reduce rate of stage decline in KCH		SFWMD Water Management/KB Ops
4/25/2017	Reduce discharge at S65/S65A by 50 cfs	Reduce rate of stage decline in KCH	Implemented	SFWMD Water Management/KB Ops
4/17/2017	No new recommendations.			
4/11/2017	No new recommendations.			
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	

KCOL Hydrographs (through Sunday midnight)

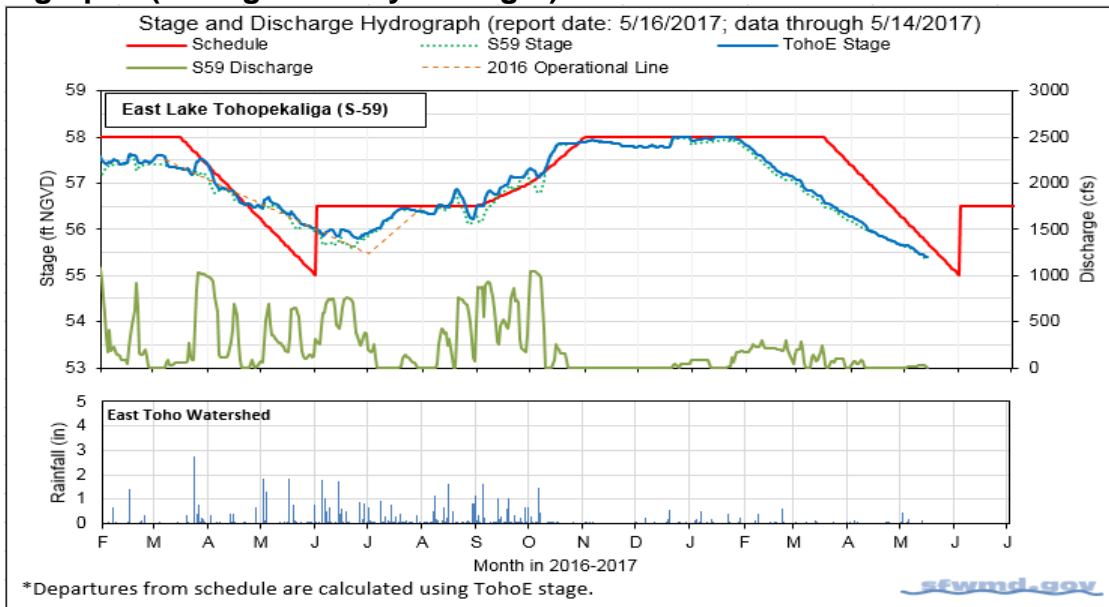


Figure 1.

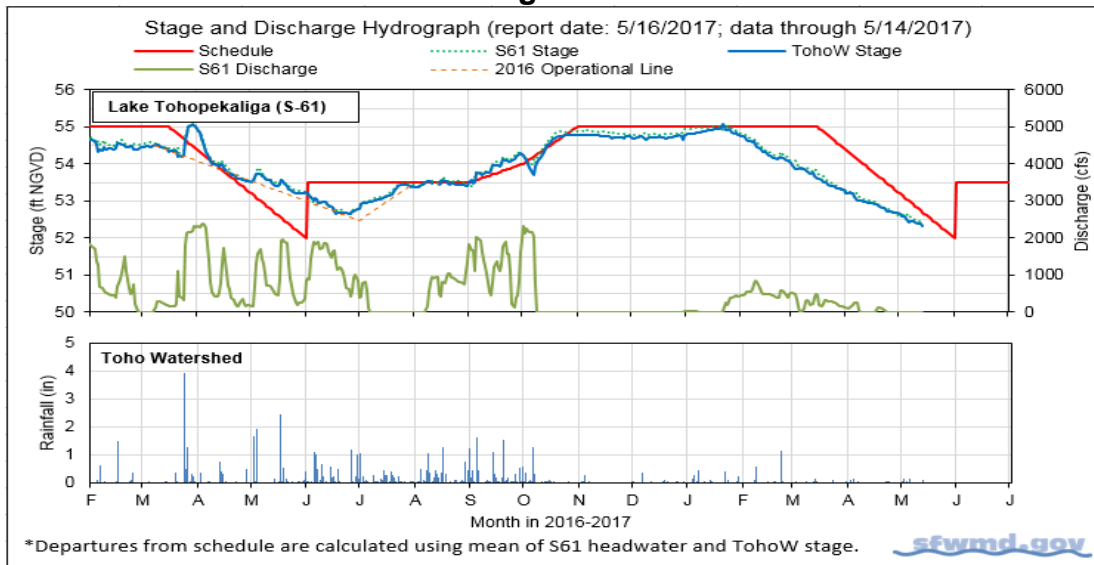


Figure 2.

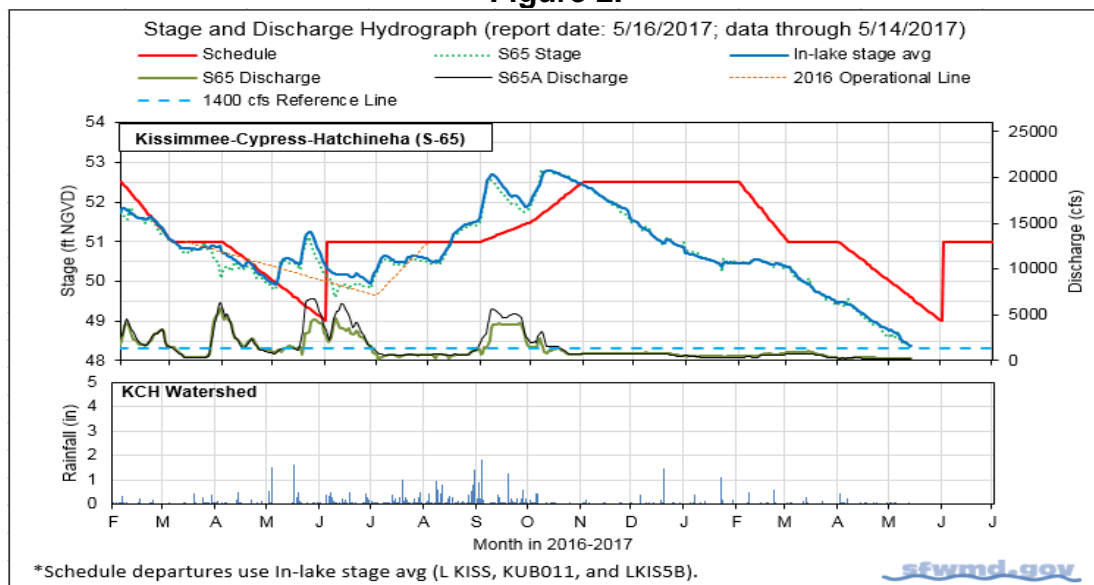


Figure 3.

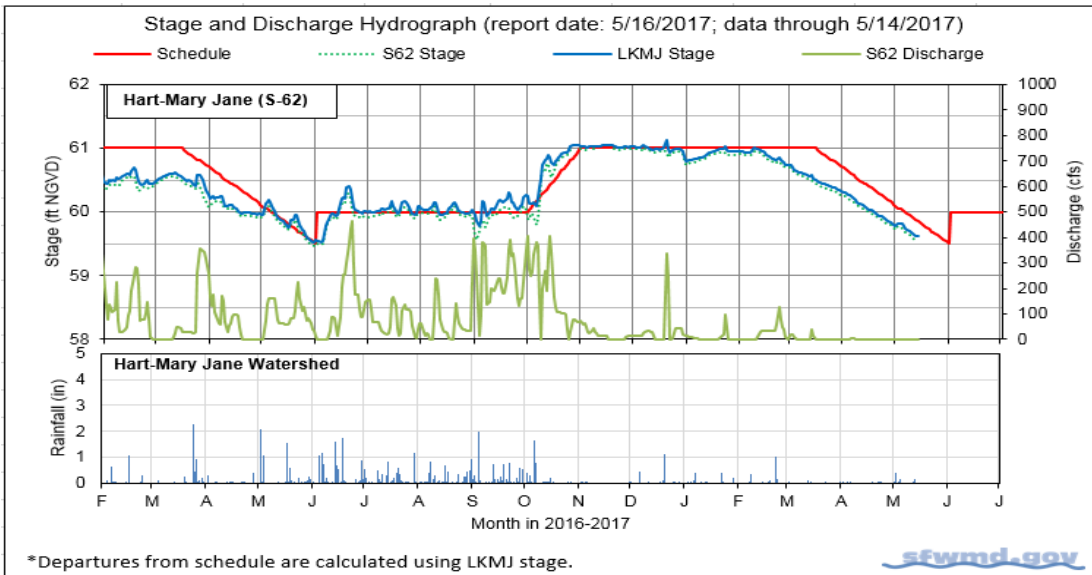


Figure 4.

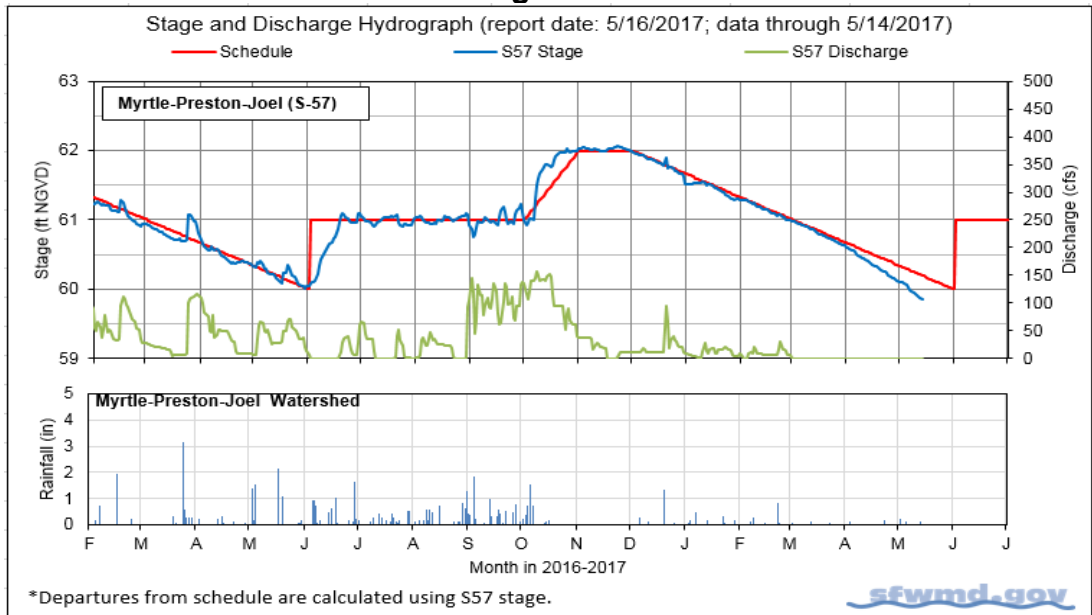


Figure 5.

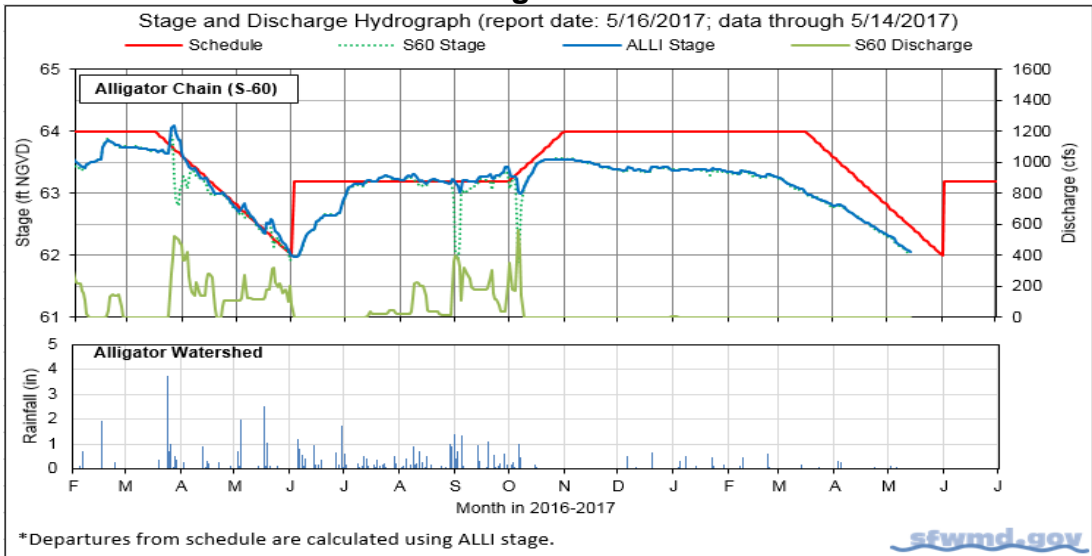


Figure 6.

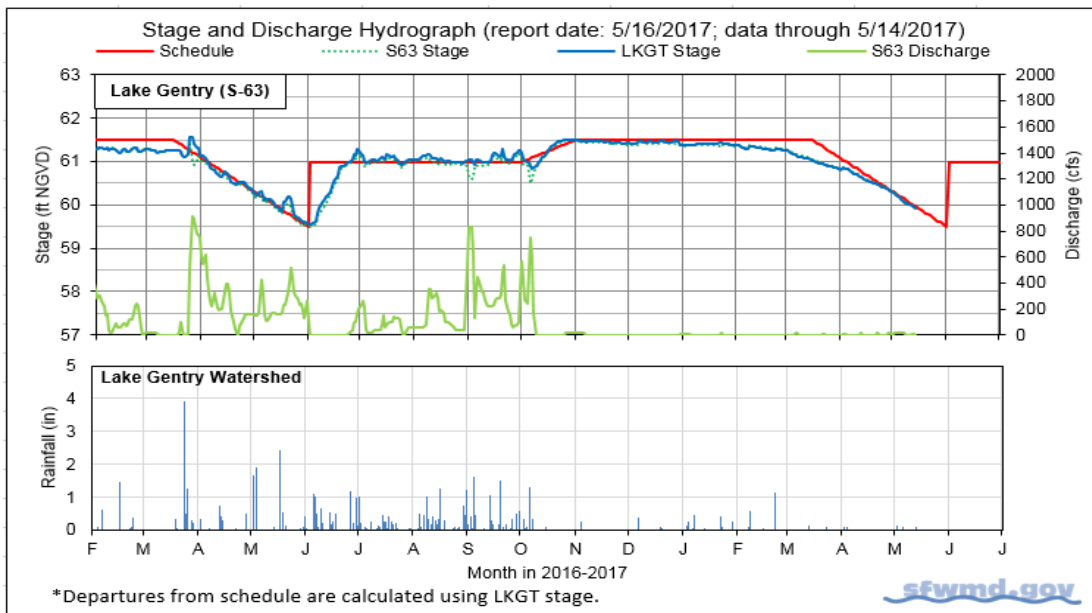


Figure 7.

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.

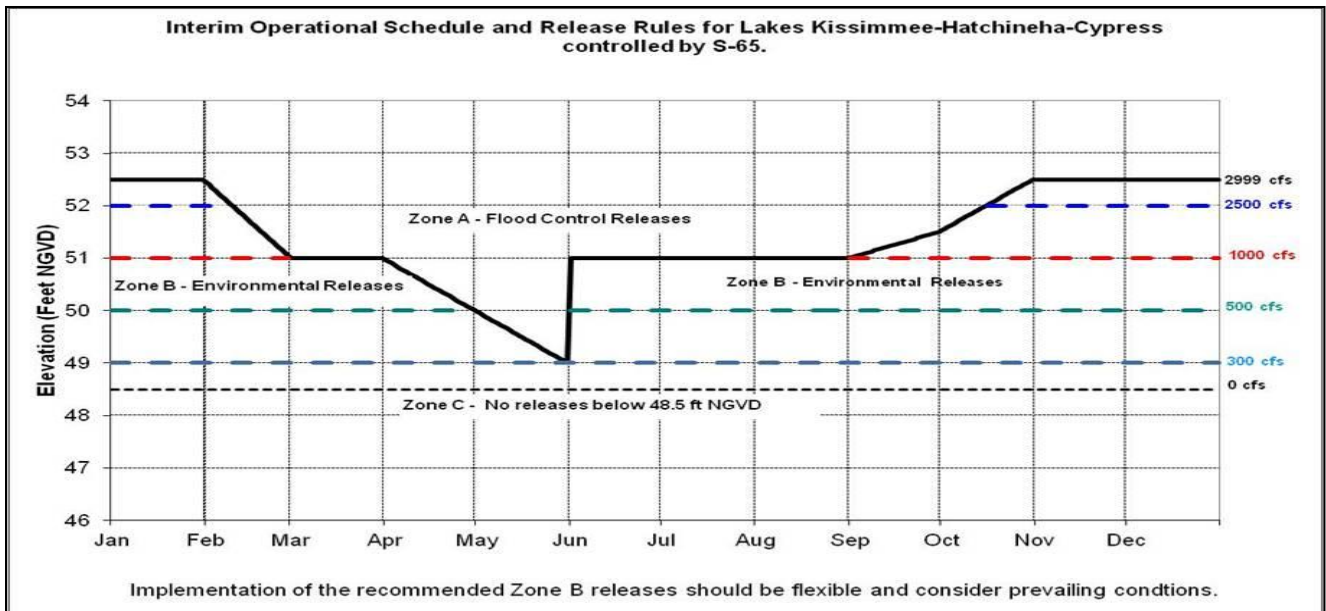


Figure 9. Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years or in Wet Season 2015.

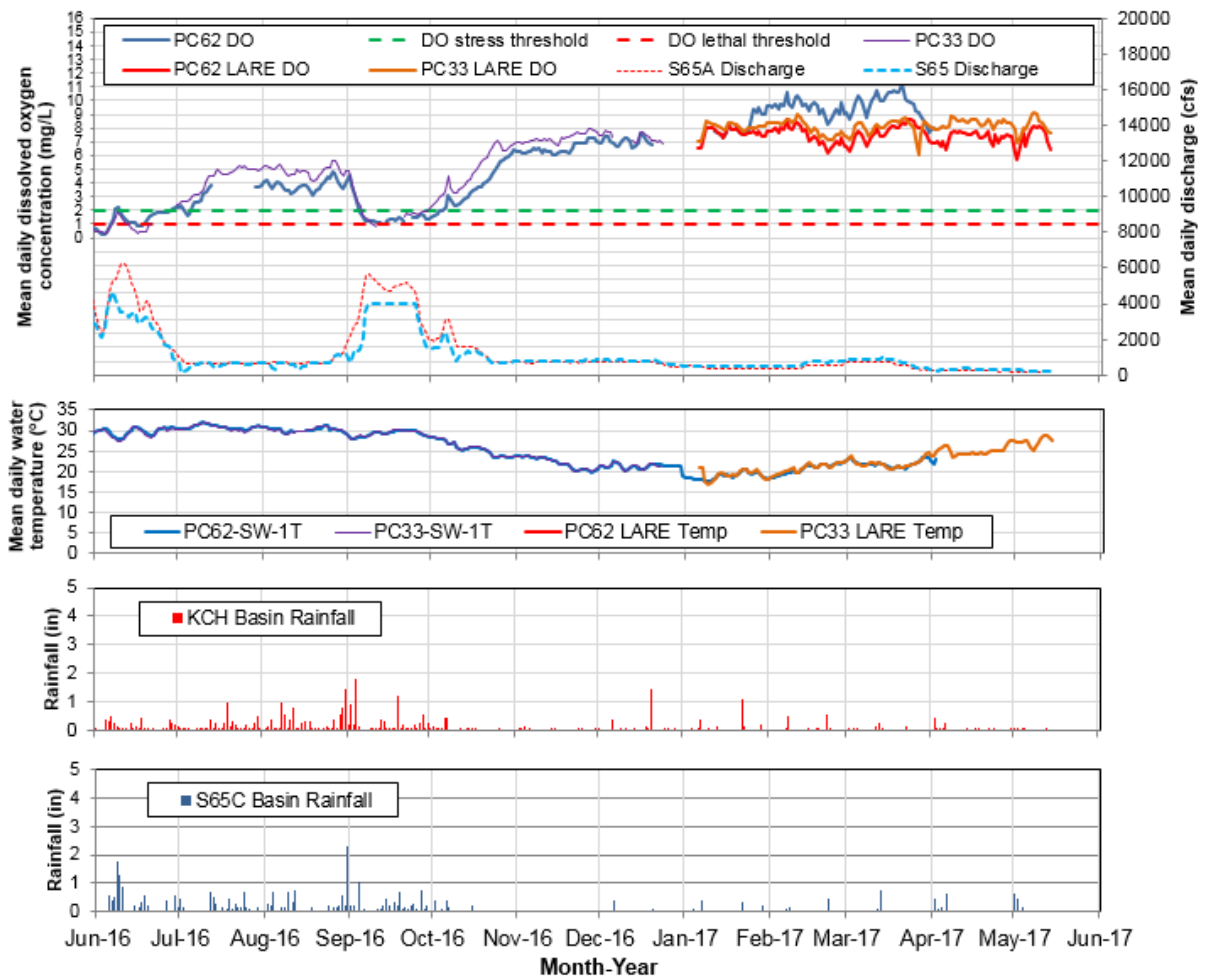


Figure 10. Mean daily Dissolved Oxygen, discharge, temperature and rainfall in the Phase I river channel.

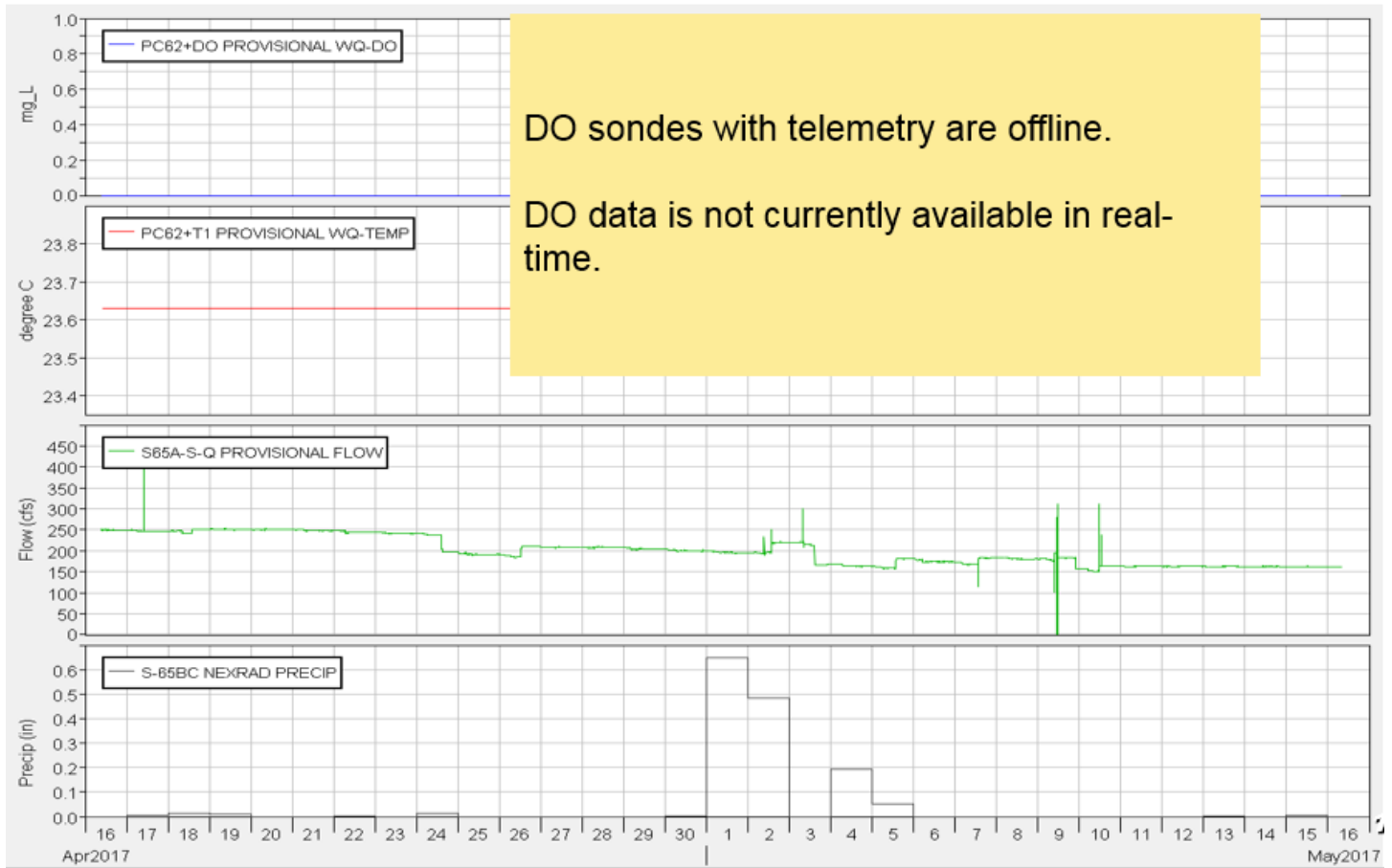


Figure 11. Phase I river channel dissolved oxygen and water temperature (measured at 15 minute intervals) and Pool BC daily rainfall.

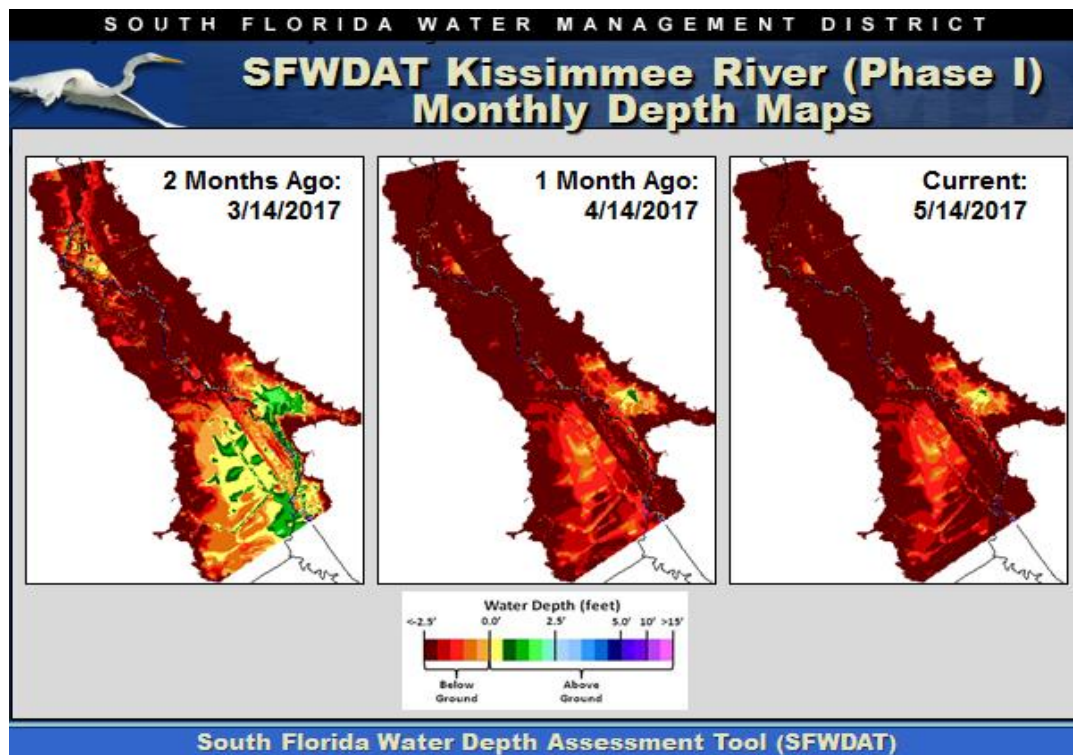
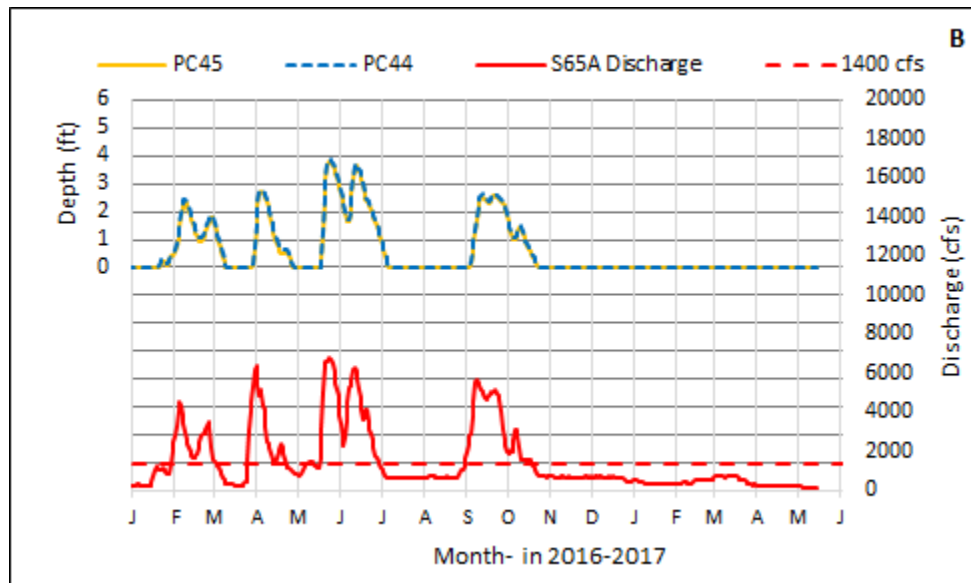
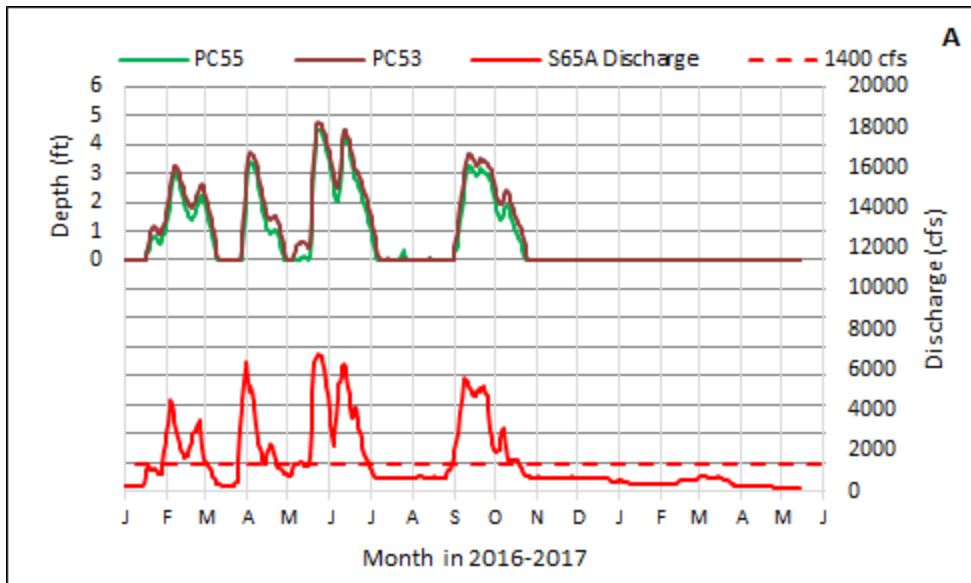


Figure 12. Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to Jan. 16, 2012.



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

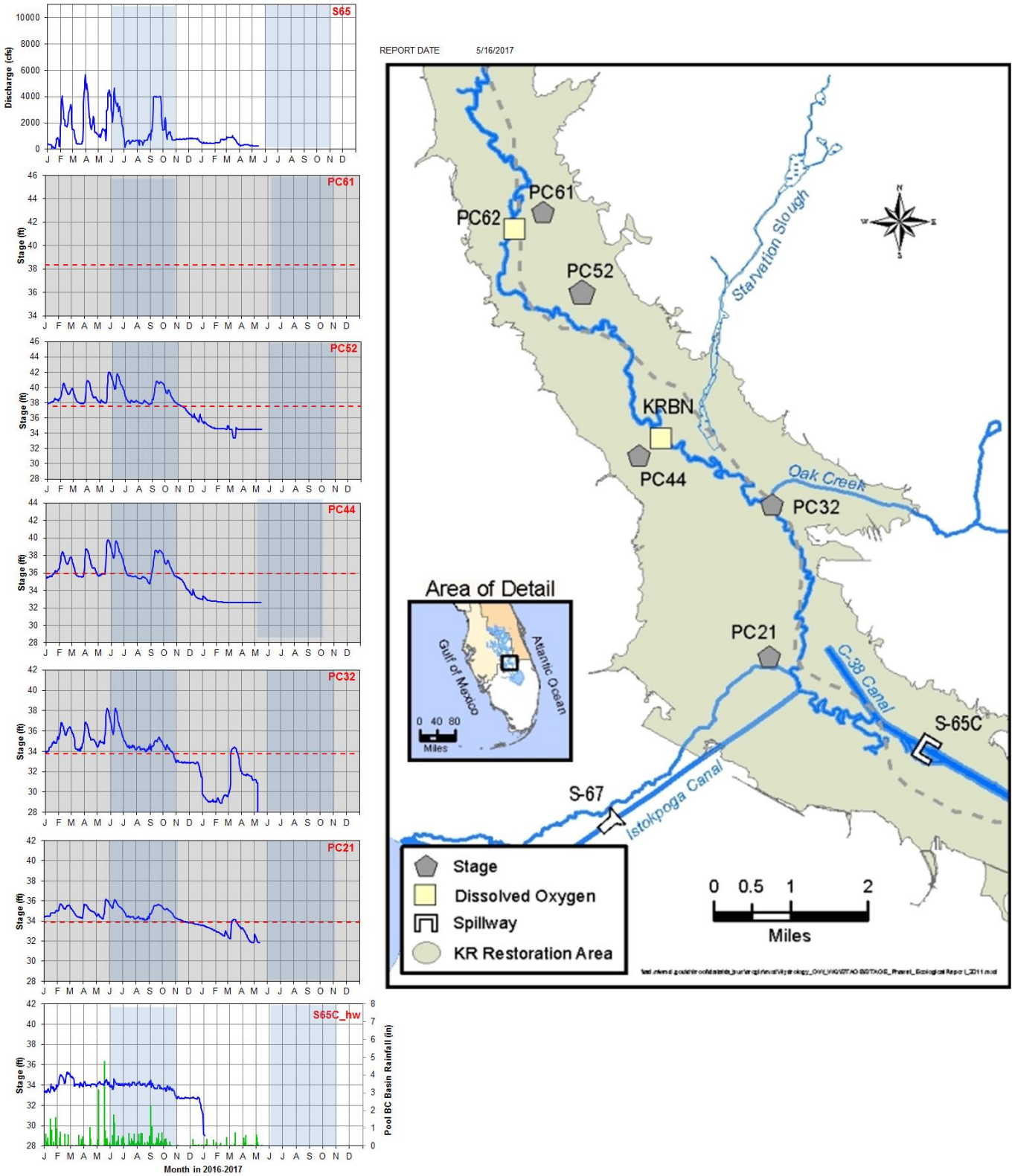


Figure 13. Discharge at S65, stages at five monitoring stations in the Phase I area of the Kissimmee River floodplain, and headwater stage at S65-C since January 1, 2015. The most recent data (~2 weeks) are provisional real-time data from SFWMD DualTrend; previous data are from SFWMD DB-HYDRO (validated).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

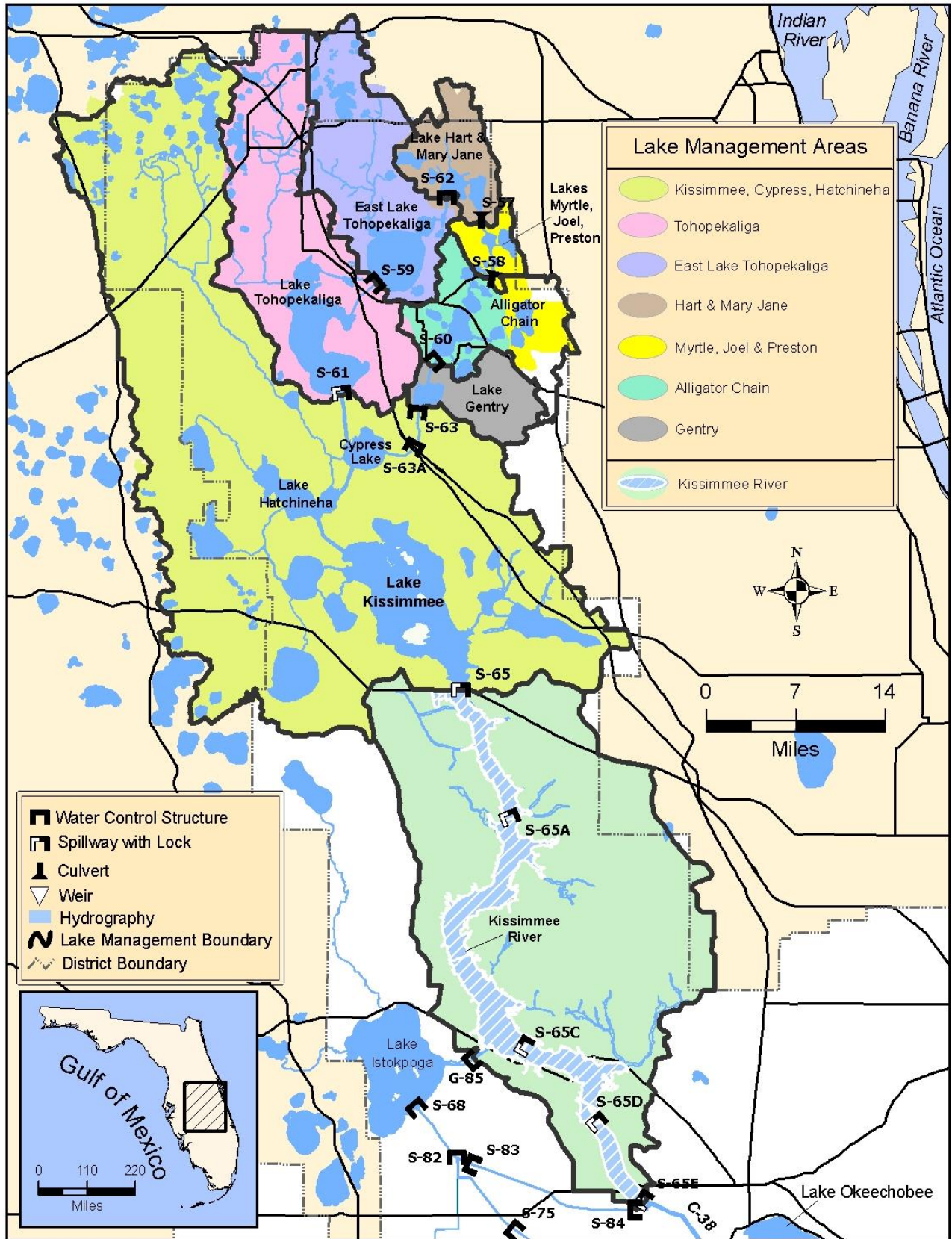


Figure 14. The Kissimmee Basin

LAKE OKEECHOBEE

According to the USACE web site, Lake Okeechobee stage is at 11.43 feet NGVD for the period ending at midnight on May 14, 2017. 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). Lake stage decreased by 0.21 feet over the past week and is 0.61 feet lower than it was a month ago and 2.29 feet lower than it was a year ago (Figure 1). The Lake is currently in the Beneficial Use sub-band and is 0.71 feet above the Water Shortage Management Sub-band (Figure 2). According to RAINDAR, 0.03 inches of rain fell directly over the Lake during the past seven days (Figure 3). Most of the surrounding watershed received little to no rainfall except for a small section of the lower east coast which received greater amounts of rainfall.

Based on USACE reported values, current Lake inflow is approximately 149 cfs as detailed below.

Structure	Flow cfs
S65E	0
S65EX1	149
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 2,434 cfs with 1,008 cfs exiting at S77 but approximately 184 cfs is entering the Lake from the L8 canal through Culvert 10A and 1 cfs is entering through S308. Approximately 1,611 cfs was 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 3,549 cfs last week to 4,437 cfs.

Change in elevation equivalents and average weekly flows (midnight May 8, 2017 to midnight May 14, 2017) for major structures are presented in Figure 4.

Based on the Lake Okeechobee wading bird habitat suitability index, there are currently approximately 22,899 acres of suitable foraging habitat for long-legged birds and 9,470 acres for long and short-legged birds on the Lake (Figure 5). Most of the Lake Okeechobee marsh is now dry and much of Moonshine Bay is approaching dryness as well.

The most recent snail kite report from the Florida Fish and Wildlife Conservation Commission (FFWCC) reported no new nests on the Lake (Figure 6). There have been thirty-nine snail kite nests on Lake

Okeechobee so far this season. Of these, twenty-one nests have been deemed successful (54%), eleven nests have failed (28%) and seven nests remain active. Additionally, with the decreasing water levels, FFWCC reported a decline of approximately 330 snail kites on the Lake since Survey 1.

The most recent imagery from the OLCI sensor (May 7 and 11, 2017) suggests the potential for bloom conditions may be intensifying in the north end of the Lake (Figure 7) but chlorophyll concentrations from the monthly water quality sampling are not yet available for validation.

Water Management Recommendations

Lake stage is 11.43 feet NGVD having decreased by 0.21 feet over the past week. The current weekly recession rate of 0.21 feet equates to a monthly recession rate of 0.84 feet which is well above the optimal 0.50 feet per month or less guideline. For the remainder of the dry season, efforts should be made to limit the amount of water discharged from the Lake in an attempt to keep wading bird and snail kite foraging and nesting locations hydrated.

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, apple snails and fish) communities.

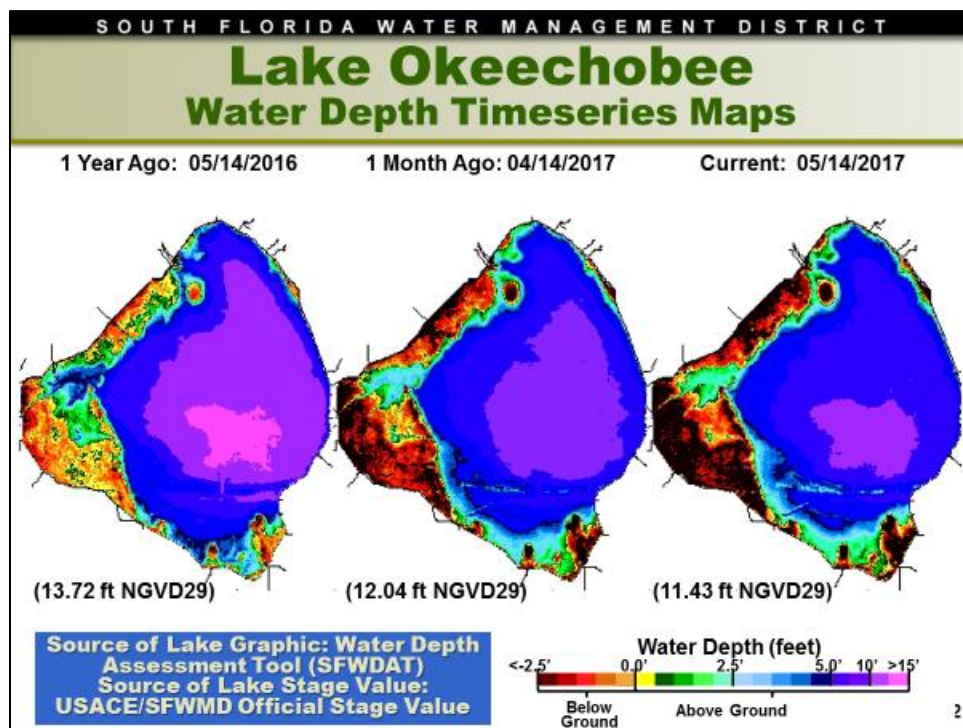


Figure 1

Weekly Stage Hydrograph

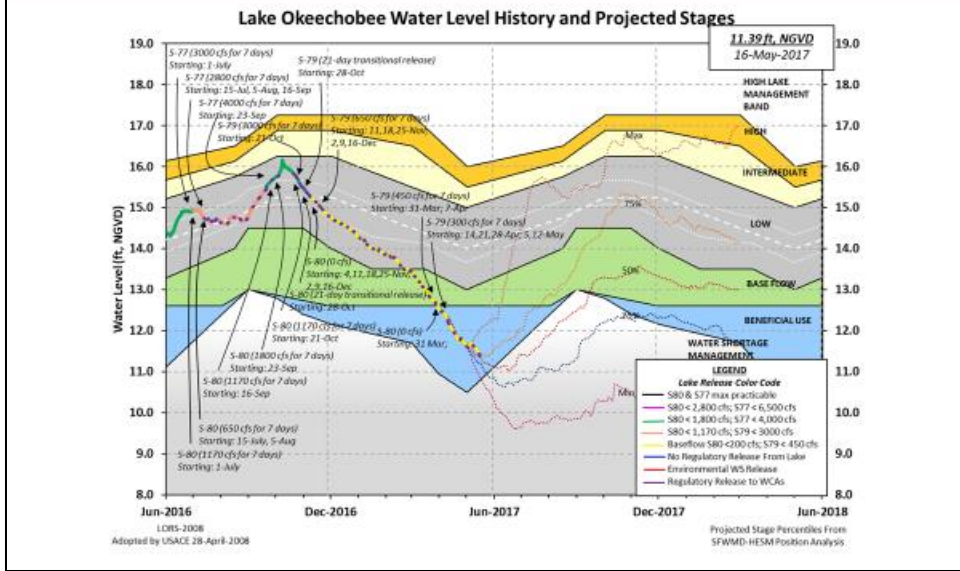
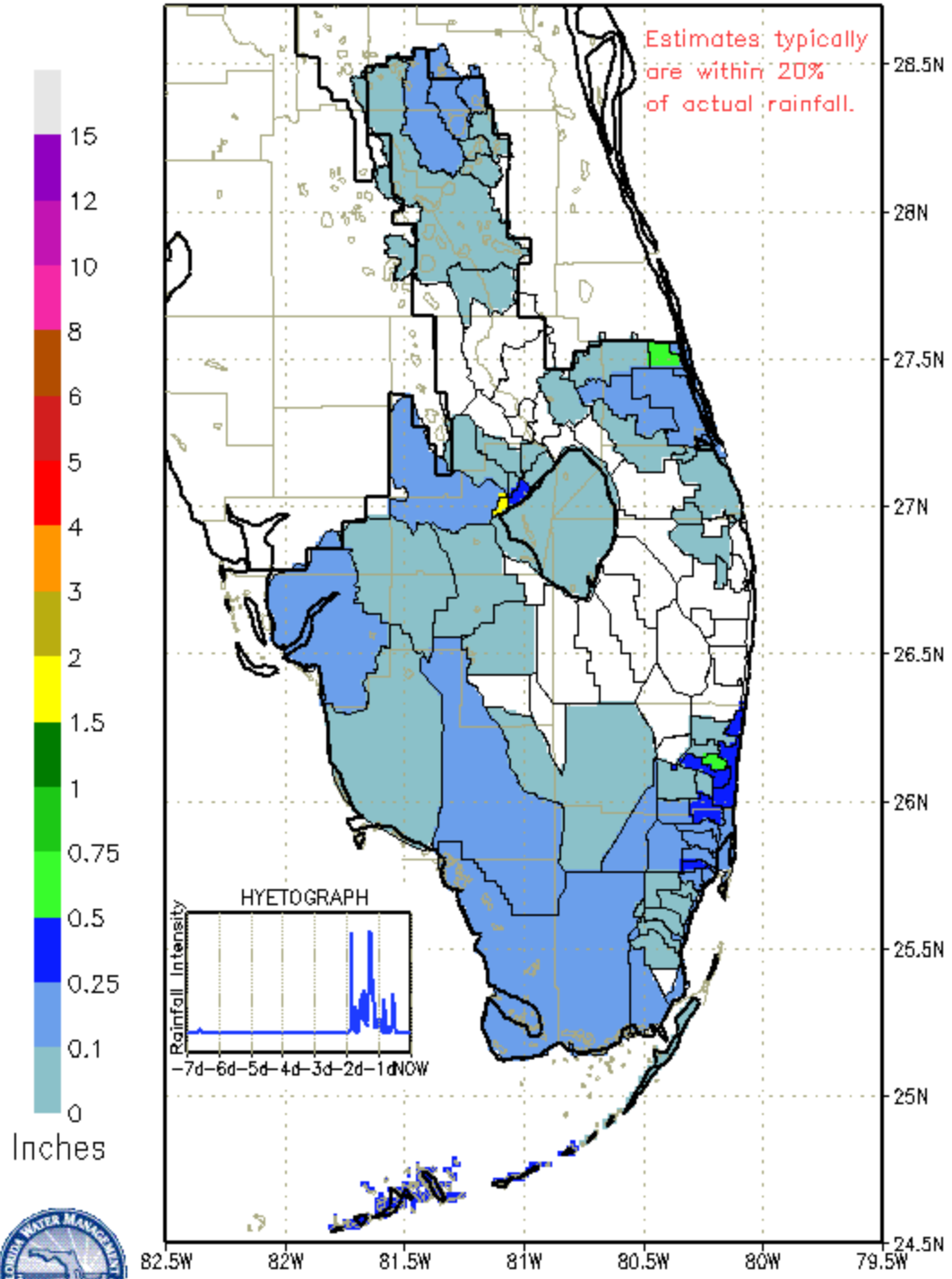


Figure 2

SFWMD PROVISIONAL RAINFALL 7-DAY BASIN RAINFALL ESTIMATES

FROM: 1030 EST, 05/08/2017 THROUGH: 1030 EST, 05/15/2017



DISTRICT-WIDE RAINFALL ESTIMATE: 0.080"

Figure 3

INFLOWS	Average Daily Flow Past Week cfs	Feet of Change Past Week
S65E & S65EX1	176	0.007
S71 & 72	0	0.000
S84 & 84X	3	0.000
Fisheating Creek	5	0.000
Rainfall	N.A.	0.003
OUTFLOWS	Average Daily Flow Past Week cfs	Feet of Change Past Week
S77	948	0.038
S308	-54	-0.002
S351	572	0.023
S352	257	0.010
S354	428	0.017
L8	-29	-0.001
ET	4437	0.178

Figure 4

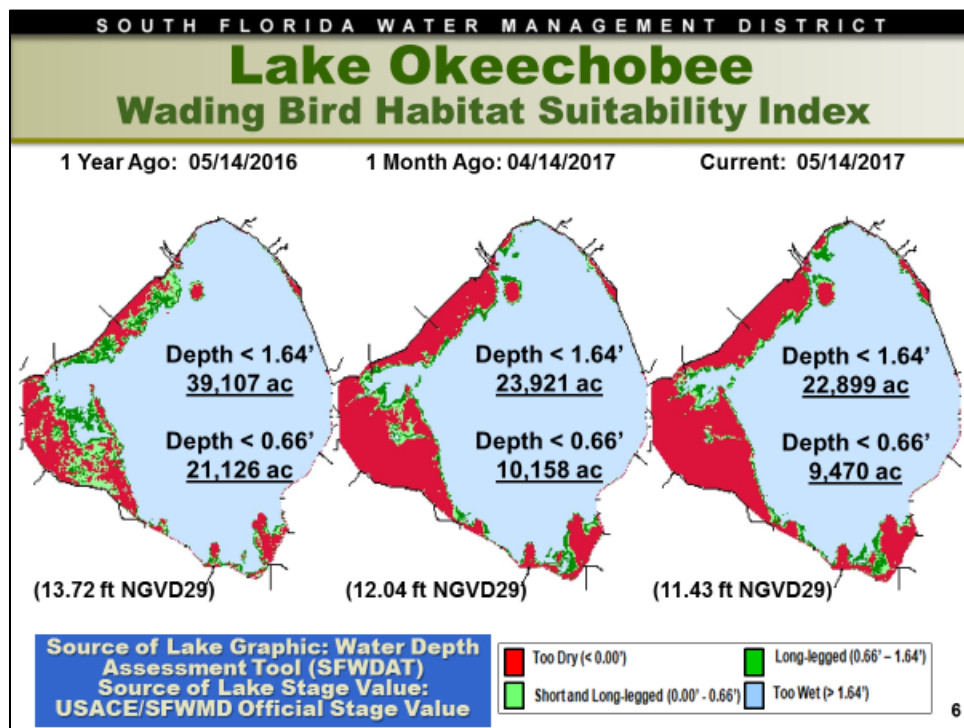


Figure 5

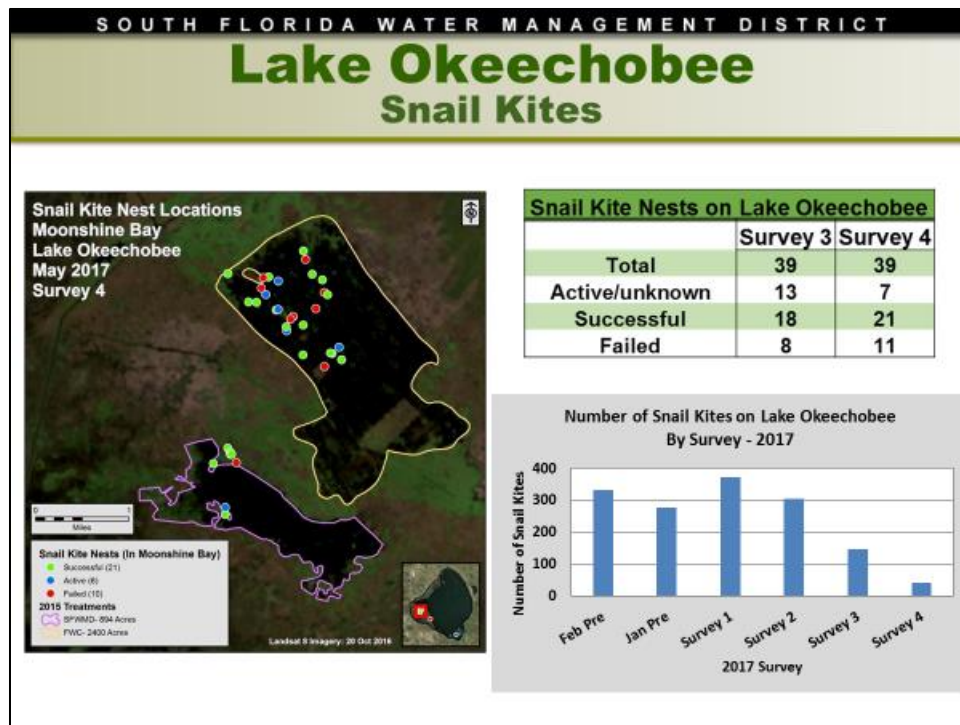


Figure 6

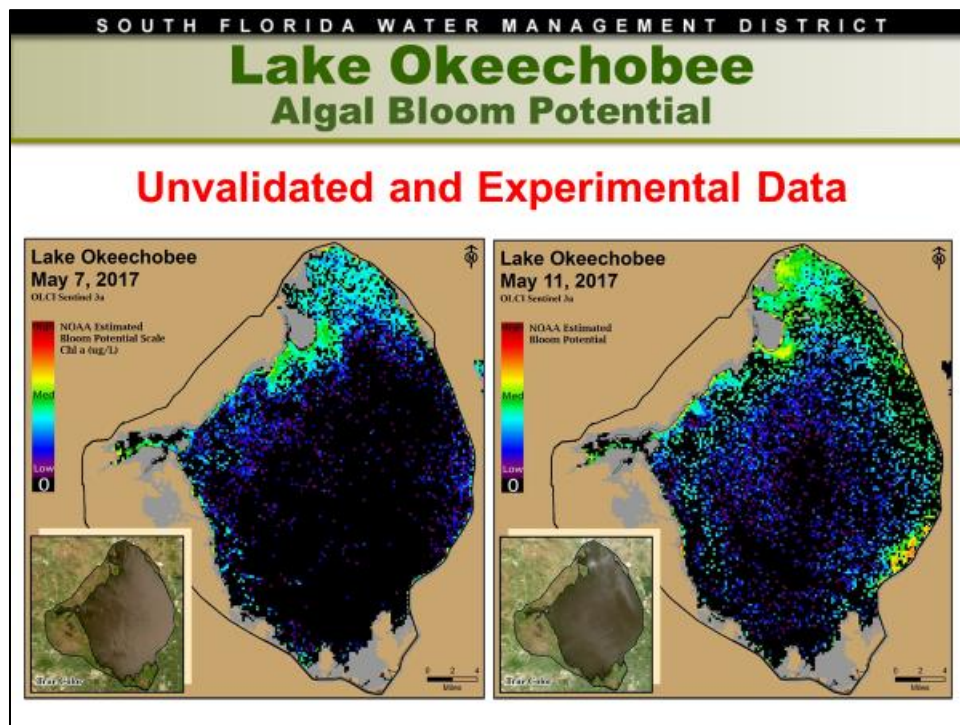


Figure 7

Lake Istokpoga

The annual recession from high pool to low pool stage on Lake Istokpoga continues. Stage is 37.76 feet NGVD as of midnight May 14, 2017 and is currently 0.86 feet below its regulation schedule of 38.62 feet NGVD (Figure 8). Average flows into the Lake from Arbuckle and Josephine creeks were -20 cfs and 4 cfs, respectively. Average discharge from S68 and S68X this past week was 66 cfs, an increase

from the previous week's flow of 21 cfs. According to RAINDAR, no rain fell in the Lake Istokpoga watershed during the past seven days.

One new snail kite nest was reported on Lake Istokpoga bringing the total number of nests so far this season to fourteen (Figure 9).

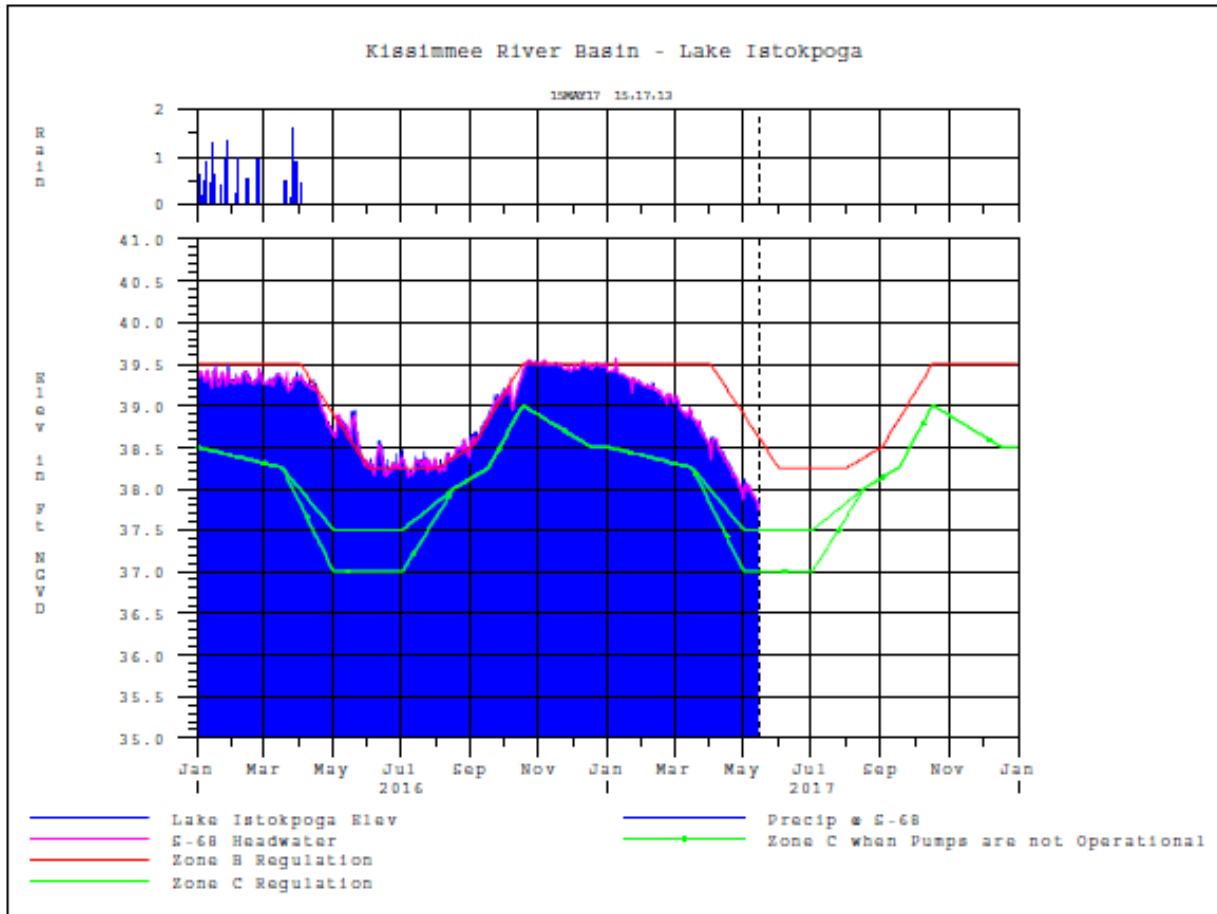


Figure 8

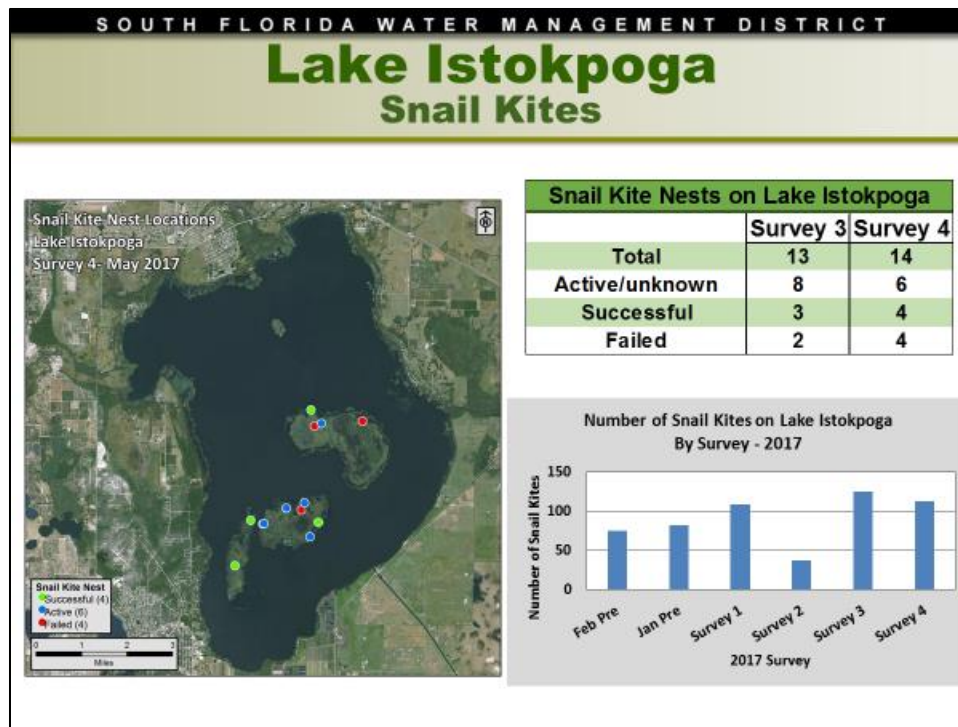


Figure 9

ESTUARIES

St. Lucie Estuary

Over the past week, provisional flows averaged about 0 cfs at S-80, 63 cfs downstream of S-308 flowing into Lake Okeechobee (gates closed, lock open during the day and closed at night), 0 cfs at S-49 on C-24, 0 cfs at S-97 on C-23, and 38 cfs from Ten Mile Creek at the Gordy Road Structure. Average inflow from tidal basin tributaries is estimated to be 25 cfs (Figures 1 and 2). Total inflow averaged about 63 cfs last week and 224 cfs over last month.

Over the past week, surface salinity remained the same throughout the rest of the estuary (Table 1, Figures 3 and 4). The seven-day moving average salinity of the water column at the US1 Bridge is about 27.2. 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)	24.4 (24.5)	26.2 (25.6)	NA ¹
US1 Bridge	26.9 (26.6)	27.6 (27.1)	10.0-26.0
A1A Bridge	32.0 (31.8)	32.8 (32.6)	NA

¹Envelope not applicable

Caloosahatchee Estuary

During the past week, provisional flows averaged approximately 818 cfs at S-77, 394 cfs at S-78, and 276 cfs at S-79. Average inflow from tidal basin tributaries is estimated to be 62 cfs (Figures 5 and 6). Total inflow averaged 338 cfs last week and 456 cfs over last month.

Over the past week in the estuary, salinity decreased in the upper estuary, remained the same at Ft. Myers Yacht Basin, and increased downstream (Table 2, Figures 7 and 8). The seven-day average

salinity values are within the good range for adult oysters at Cape Coral, within the fair range at Shell Point, and likely within the fair range at Sanibel (Figure 9). The 30-day moving average surface salinity is 7.7 at Val I-75 and 15.6 at Ft. Myers. The 30-day moving average salinity at Ft. Myers has been above 10 for 49 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 6.4 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)	4.0 (5.1)	4.0 (5.2)	NA ¹
*Val I75	5.3 (6.8)	8.0 (9.3)	0.0-5.0 ²
Ft. Myers Yacht Basin	15.1 (15.1)	15.1 (15.1)	NA
Cape Coral	23.7 (23.2)	24.1 (23.8)	10.0-30.0
Shell Point	33.5 (32.8)	32.2 (31.8)	10.0-30.0
Sanibel	34.9 (34.3)	EM ³ (EM)	10.0-30.0

¹Envelope not applicable, ²Envelope is based on a 30-day average, ³Equipment Malfunction.

*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)	4.72 – 9.64	4.37 – 8.94 one drop to 0.39	1.28 – 5.04 one drop to 0.27
Dissolved Oxygen (mg/l)	3.68 – 6.48	4.24 – 6.01	No Data

The Florida Fish and Wildlife Research Institute reported on May 12, 2017, that *Karenia brevis*, the Florida red tide organism, was observed in background concentrations in two samples collected from Lee County.

Water Management Recommendations

The 30-day average salinity at the I-75 Bridge is forecast to exceed 5 with no inflow at S-79, and the daily salinity is forecast to reach 7.0 within two weeks. Lake stage is in the Beneficial Use sub-band of 2008 LORS. The 2008 LORS/Adaptive Protocols recommend up to 300 cfs at S-79 with flow from Lake Okeechobee supplementing as needed. However, a release greater than 450 cfs is forecast to be required to achieve a 30-day average salinity below 5 at the I-75 Bridge.

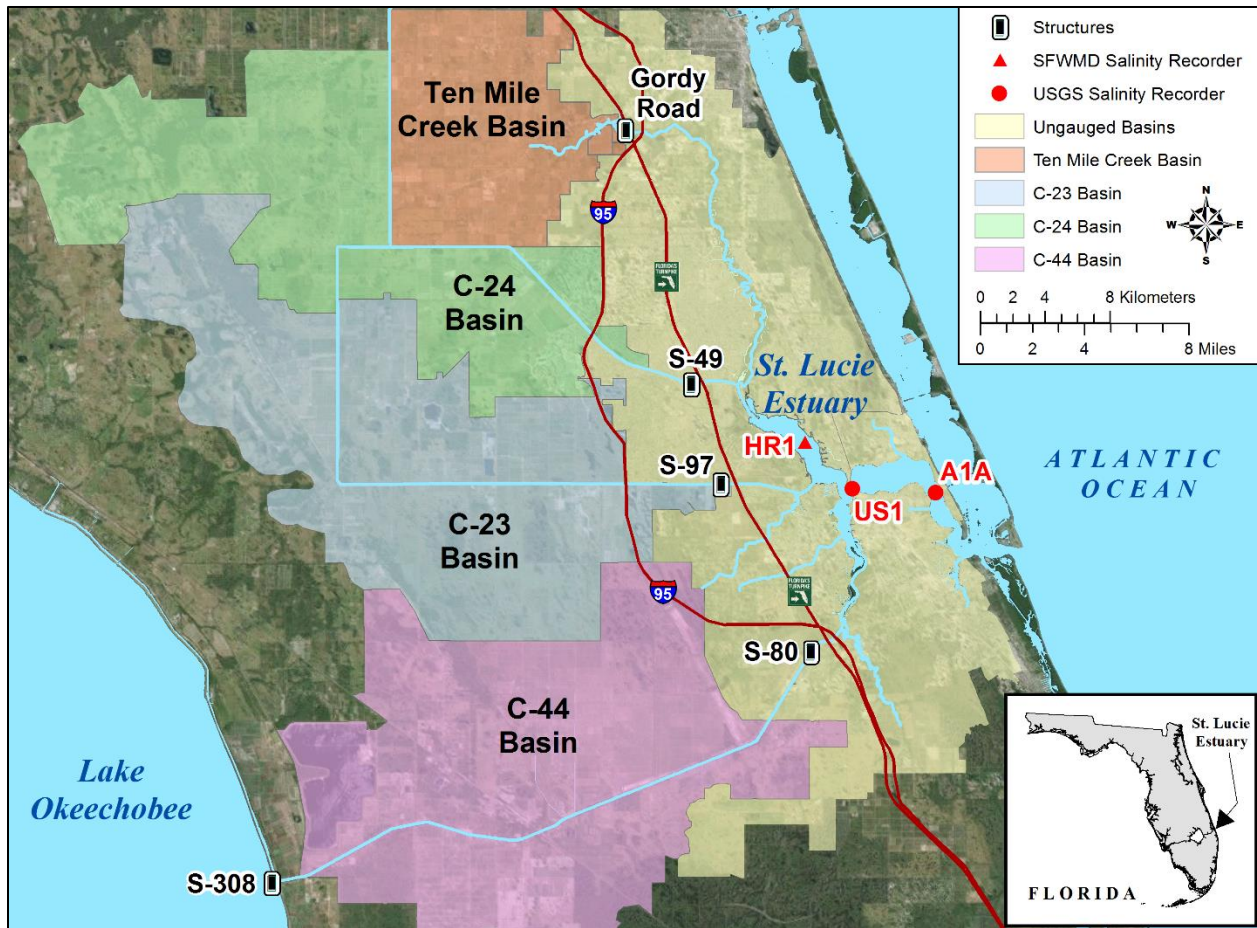


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

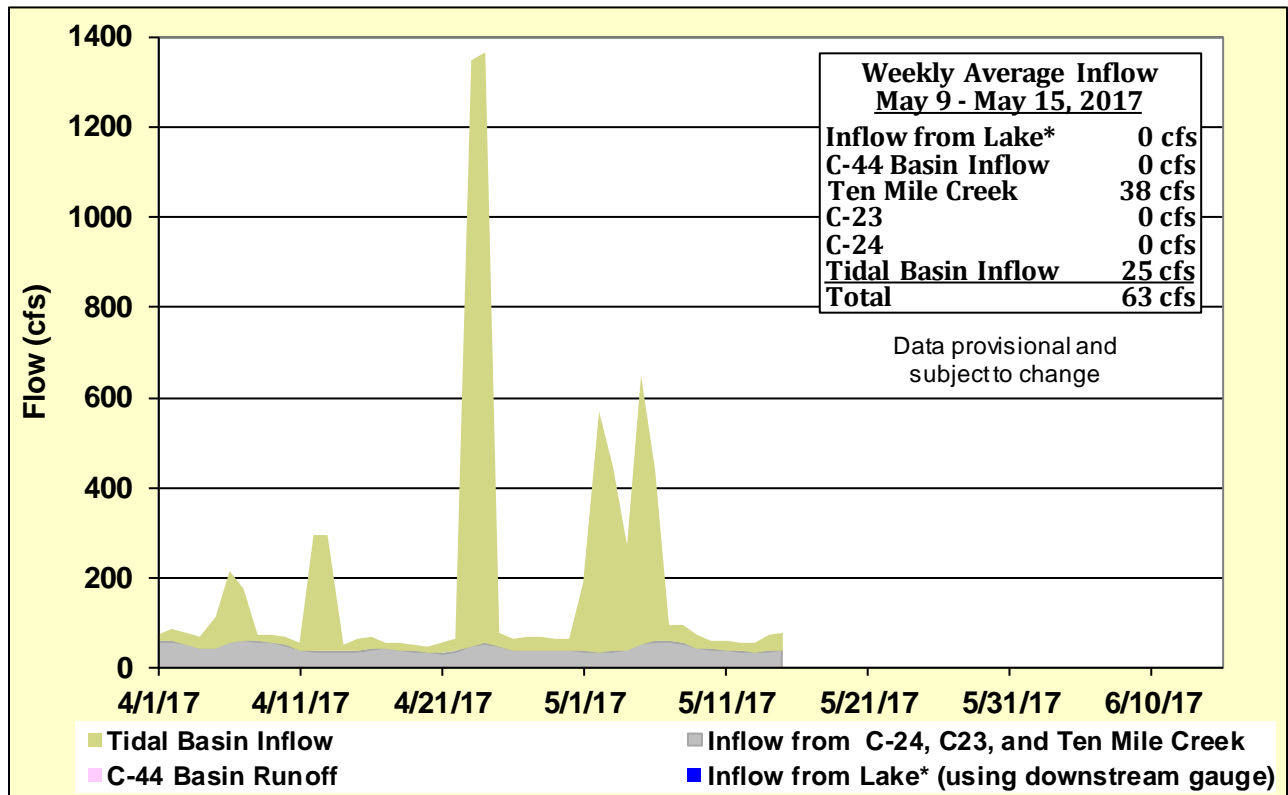


Figure 2. Estimated surface freshwater inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basins into the St. Lucie Estuary.

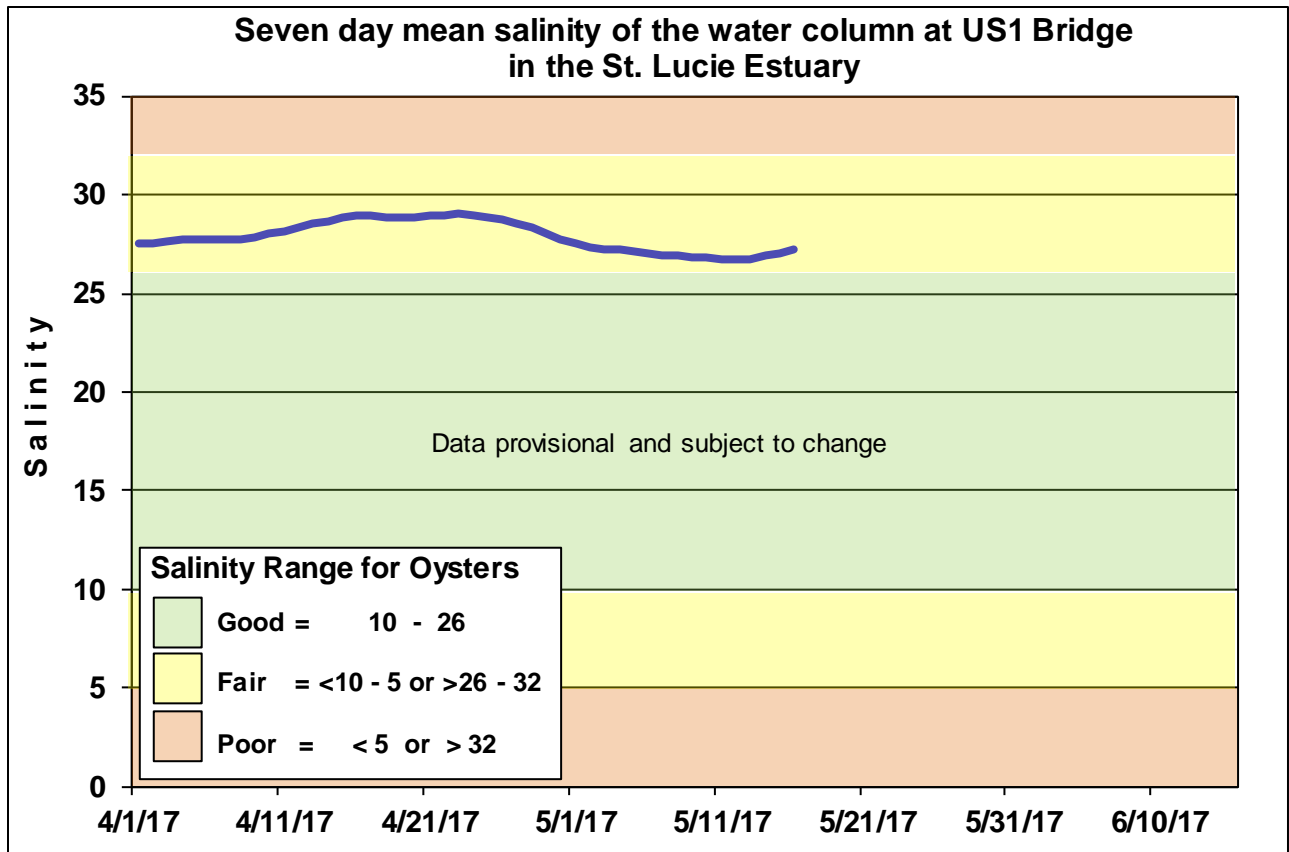


Figure 3. Seven-day mean salinity of the water column at the U.S. Highway 1 Bridge.

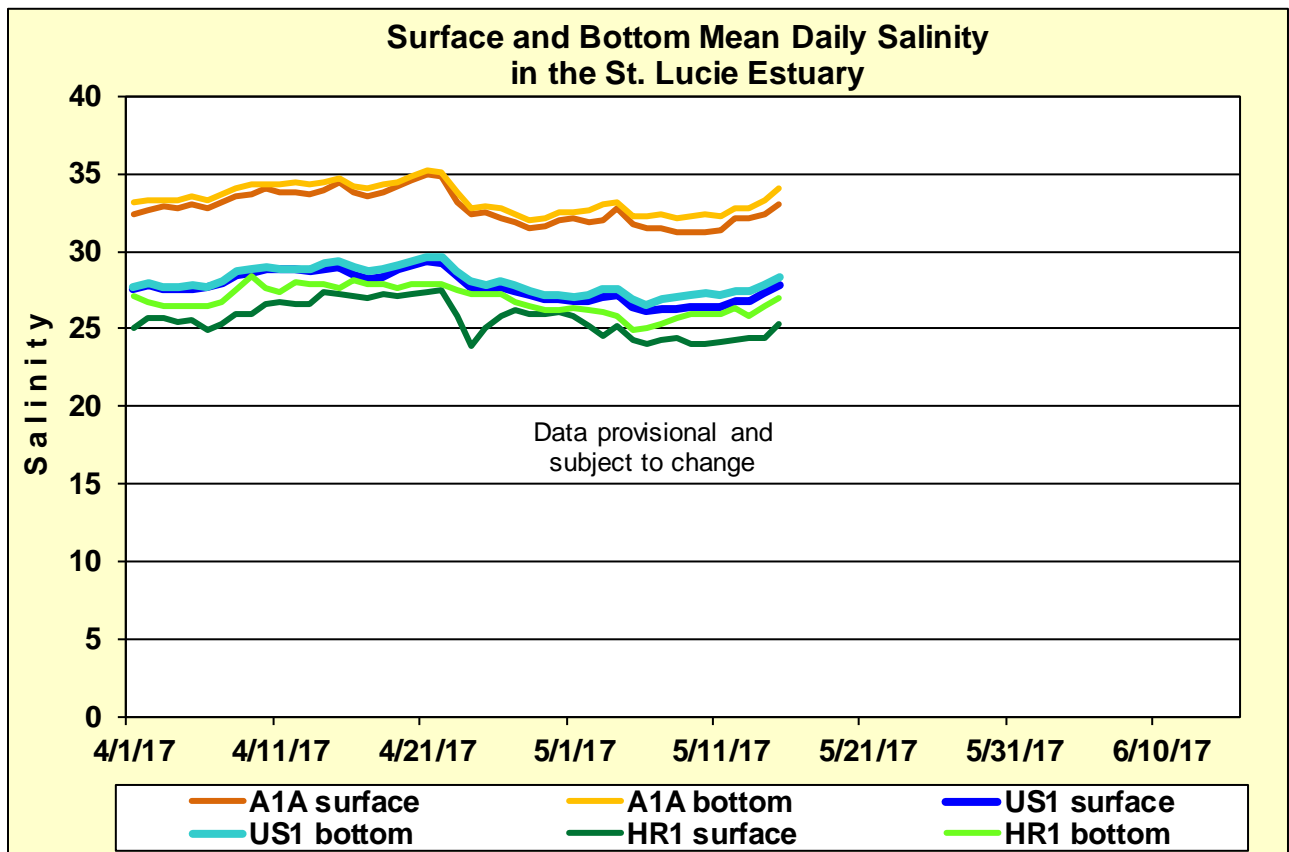


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

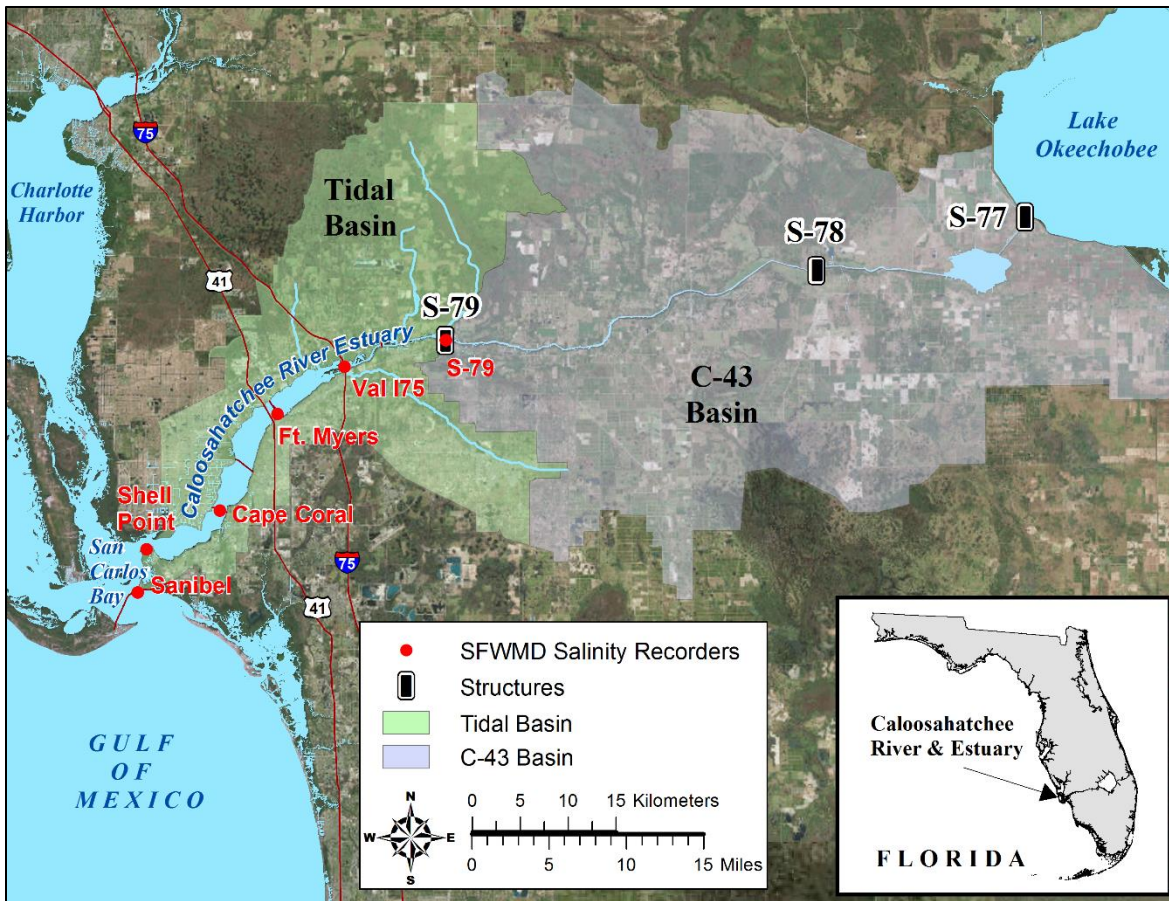


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

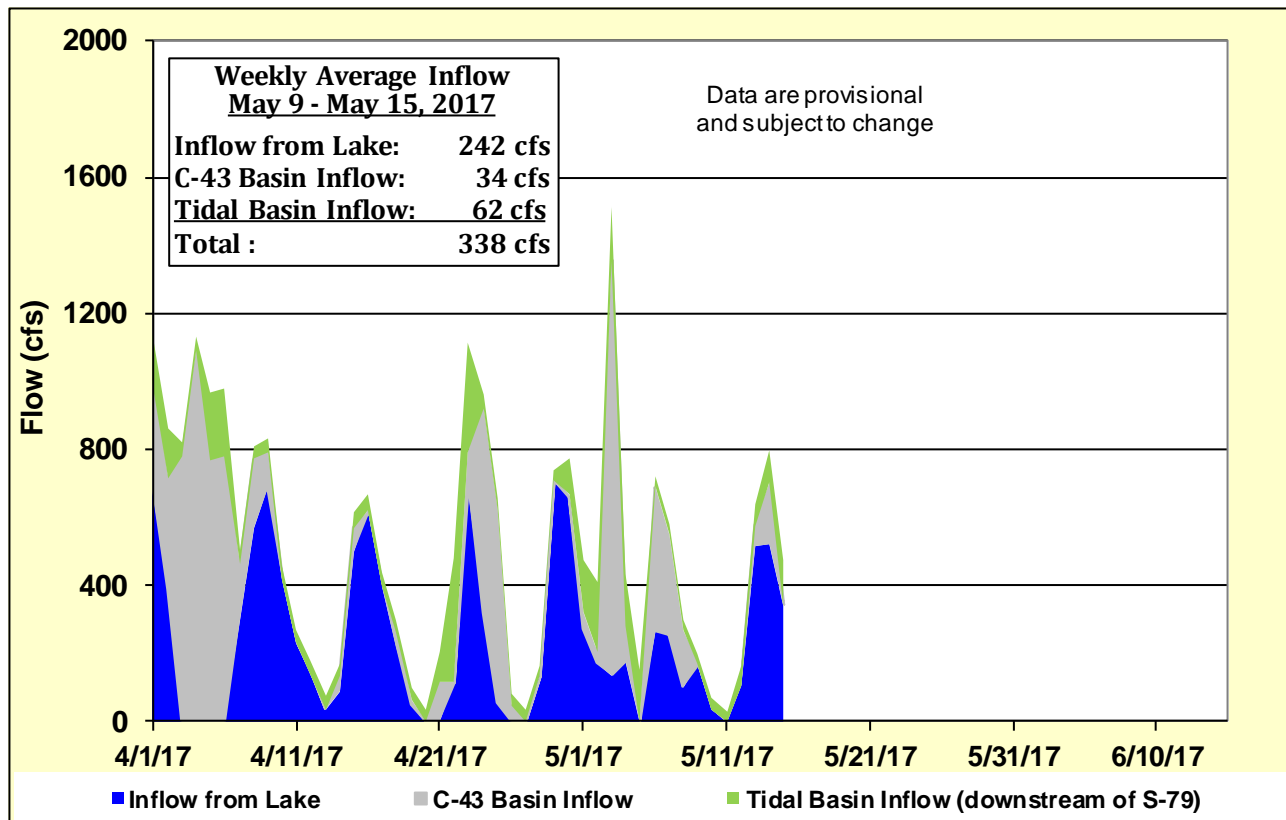


Figure 6. Freshwater inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.

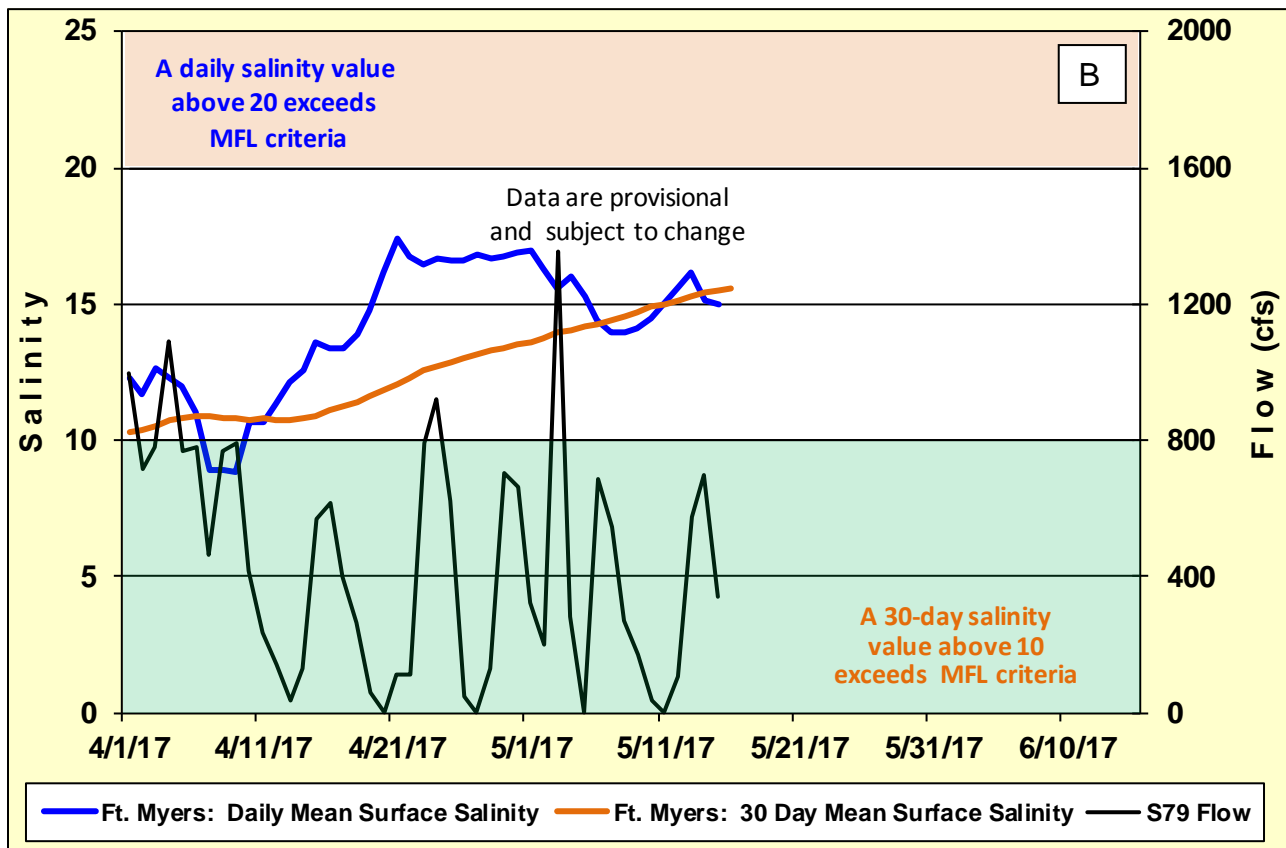
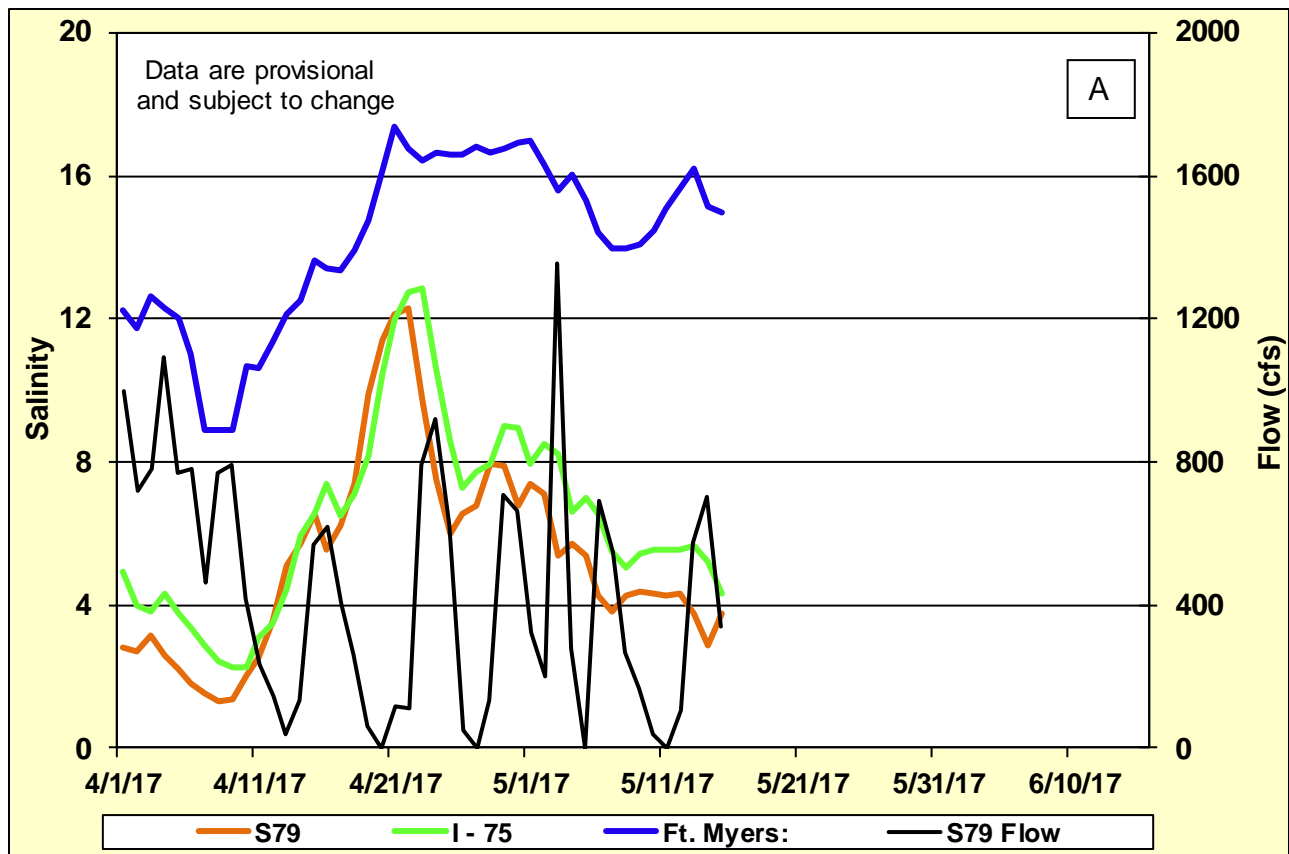


Figure 7. Daily mean flows at S-79 and salinity at upper estuary monitoring stations (A) and 30-day moving average salinity at Ft. Myers (B).

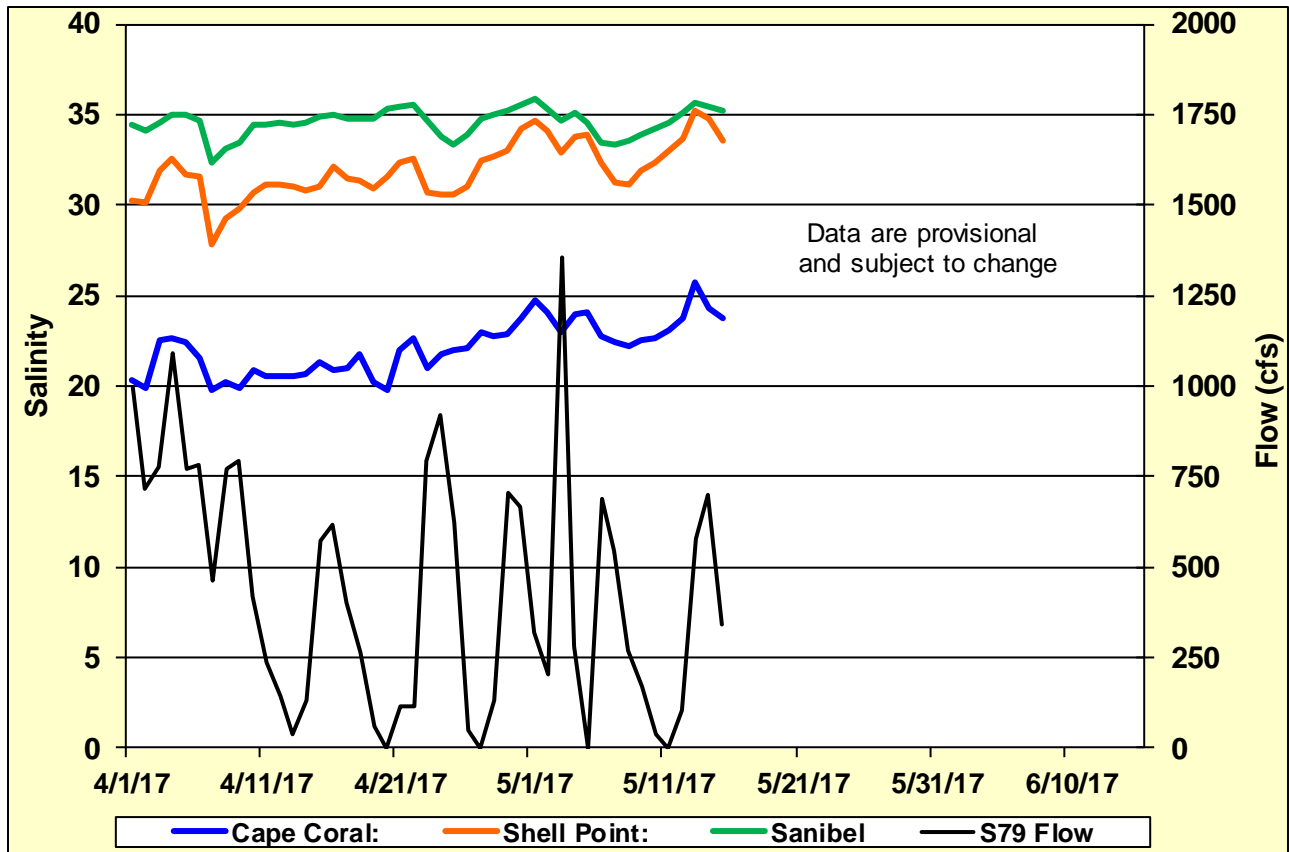


Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.

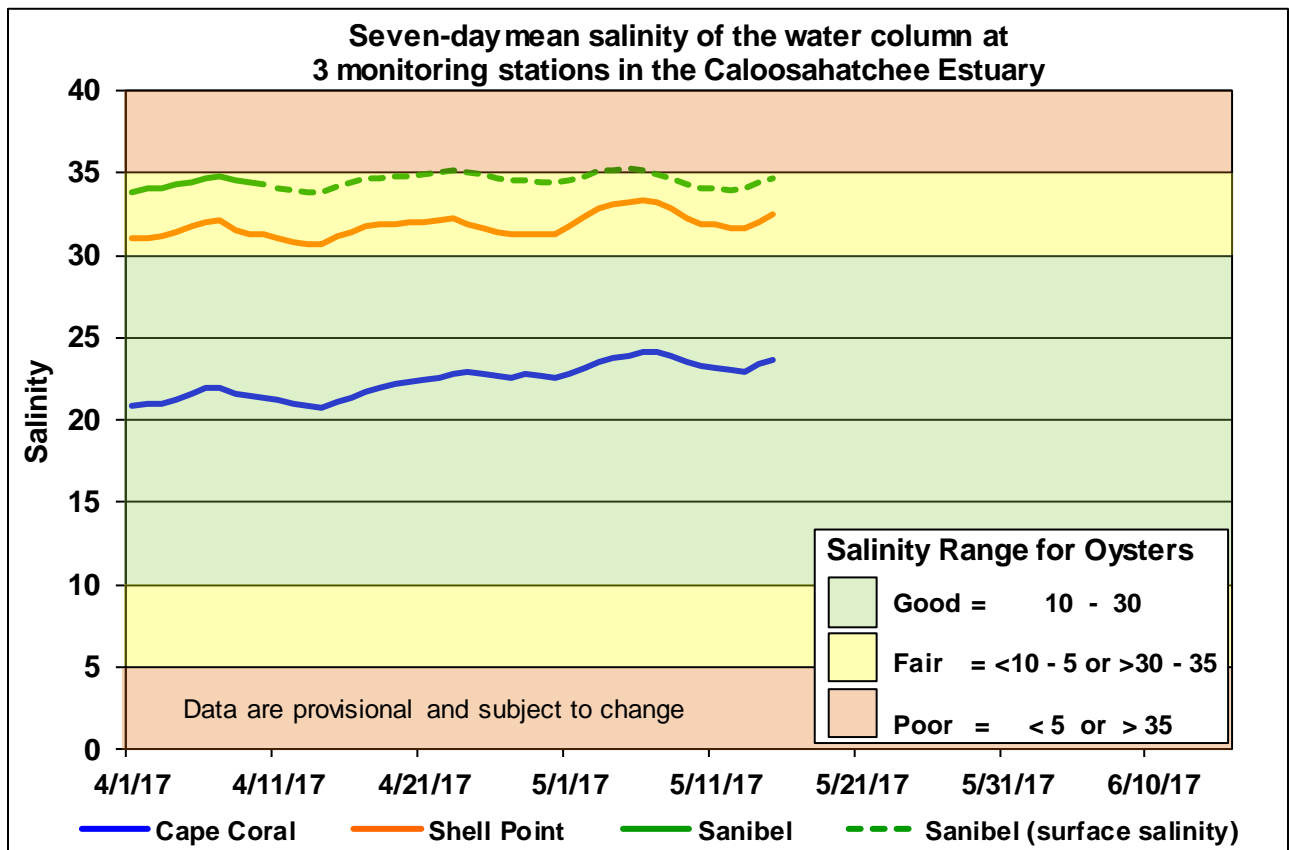


Figure 9. Seven-day mean salinity at Cape Coral Bridge, Shell Point and Sanibel Bridge monitoring stations.

Caloosahatchee Estuary Flows and Salinity Observed and Forecast Salinity at Val I-75

Forecast 1: S-79 = 0 cfs & TBR = 115 cfs

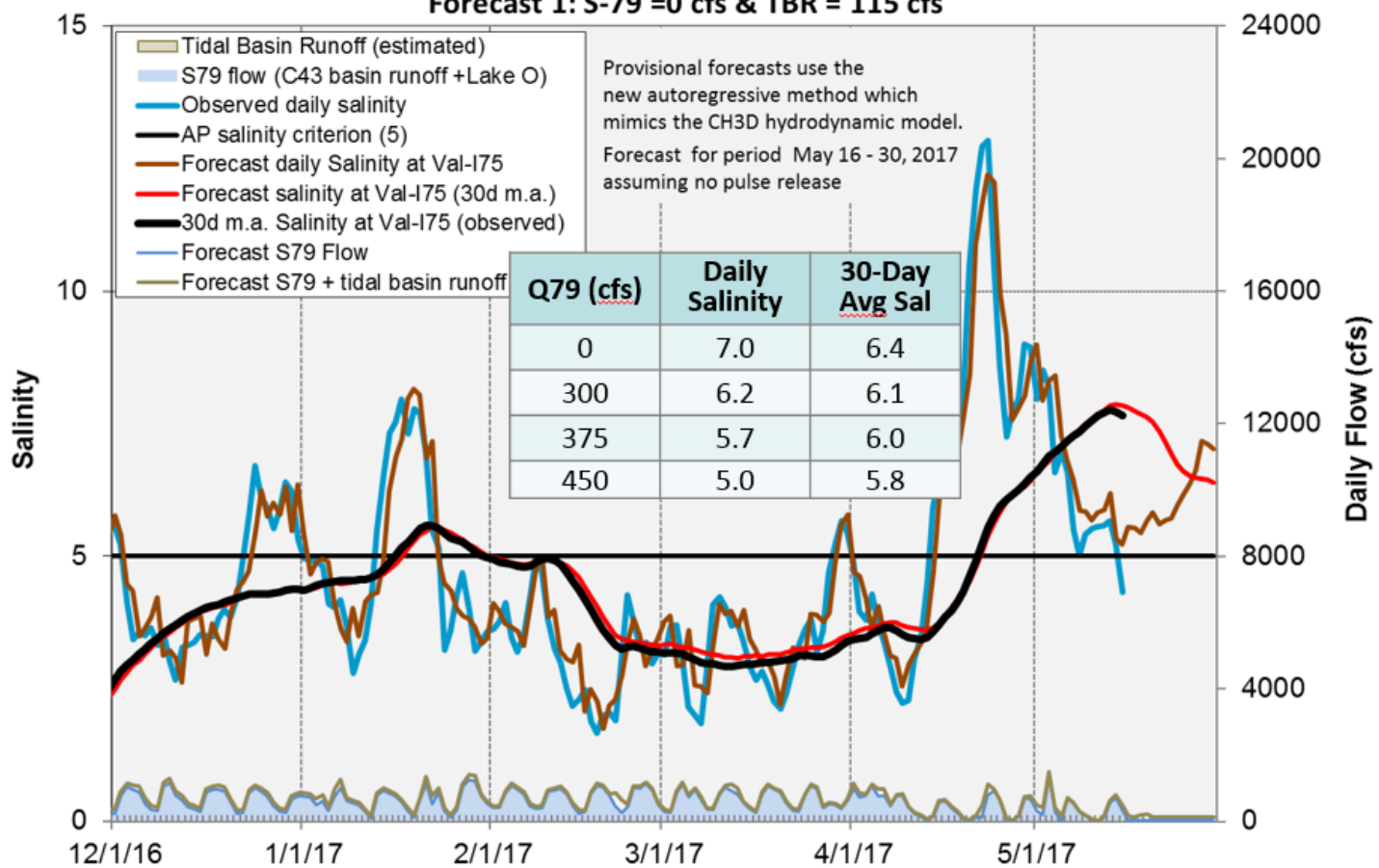


Figure 10. 14-day salinity forecast at Val I-75 assuming no releases at S-79.

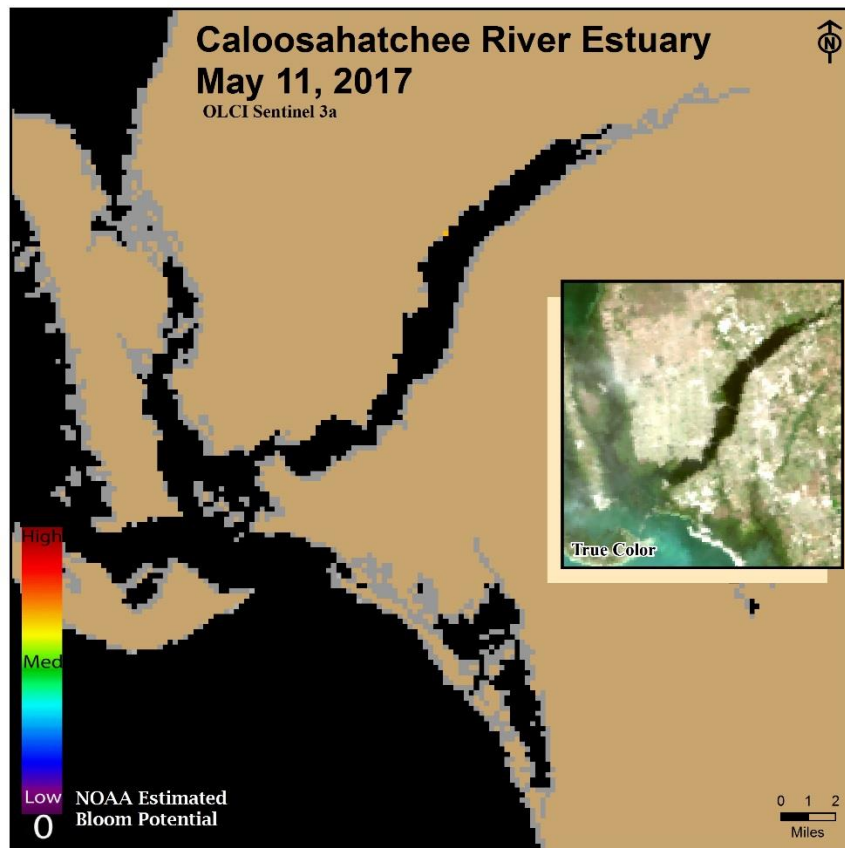
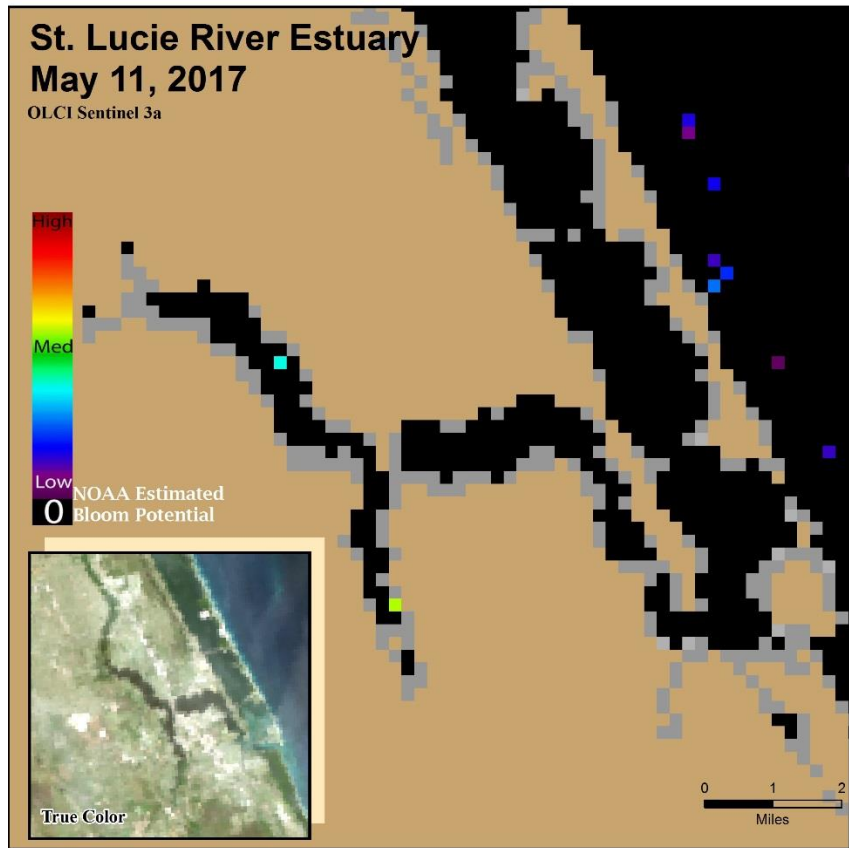


Figure 11. Sentinel 3a Satellite imagery provided by NOAA uses Ocean and Land Color Instrument (OLCI) to estimate cyanobacteria bloom potential in Caloosahatchee Estuary.

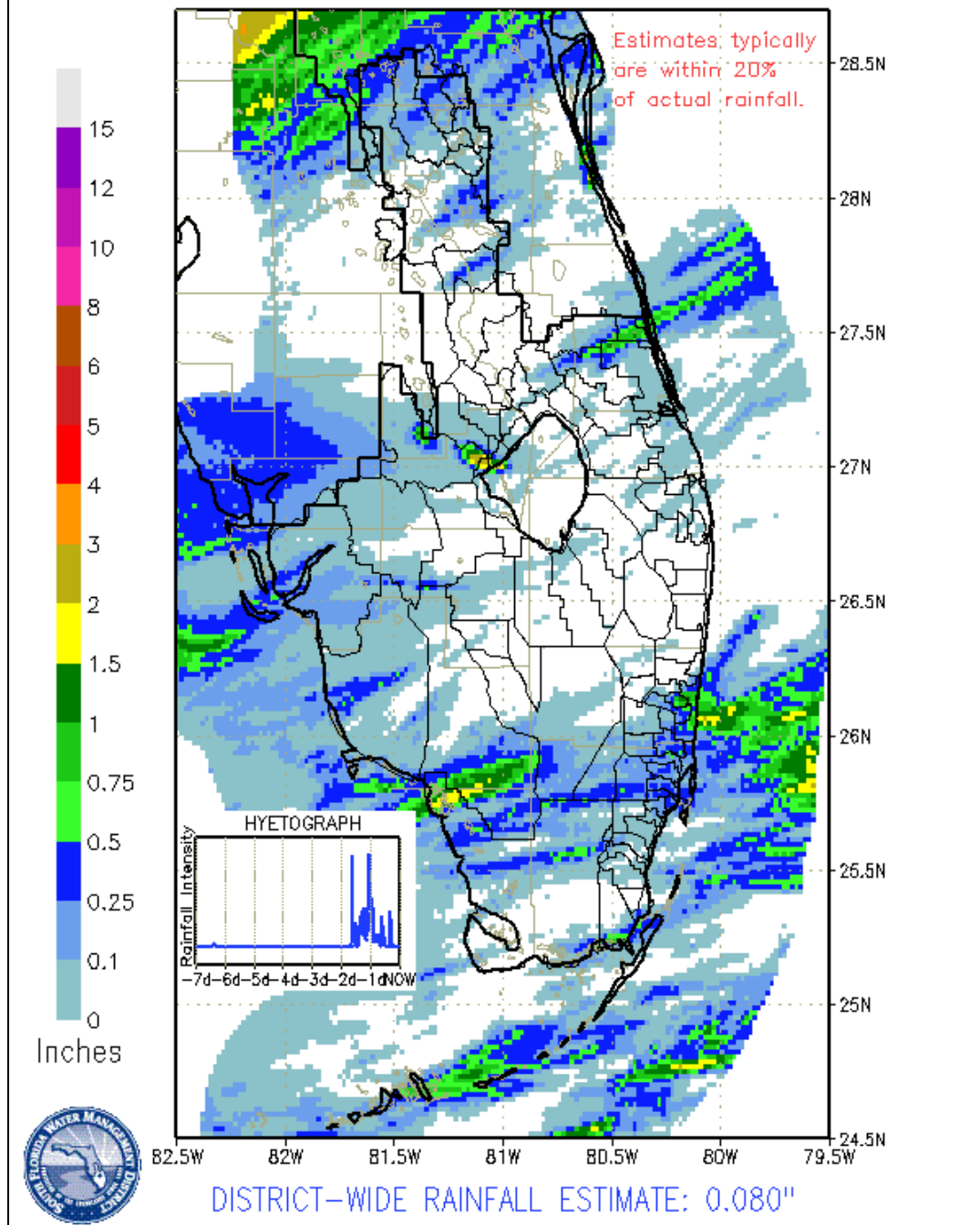
EVERGLADES

Sensor issues limited this week's stage information in WCA-2A (estimated) WCA-3B and Everglades National Park (ENP). While the stage change in WCA-1 is seasonally categorized as "Fair", the recent rain driven reversal in stage within that area suggest that the faster -0.11 foot change is in fact a good thing, potentially returning more quickly depths into the preferred range for White ibis foraging and lowering the likelihood of further nest abandonment.

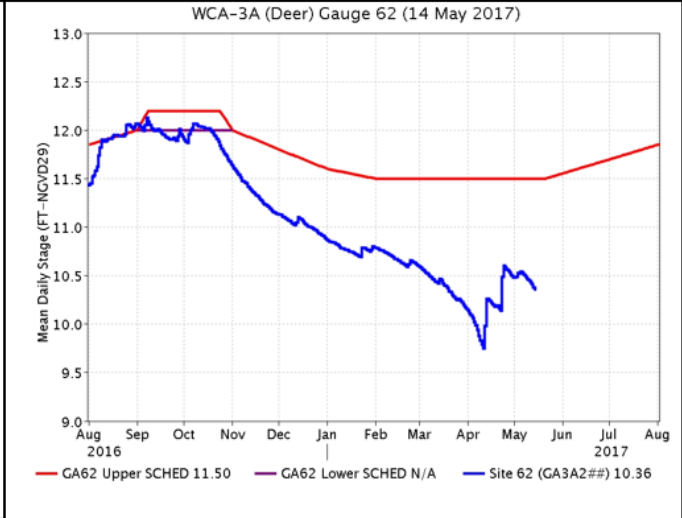
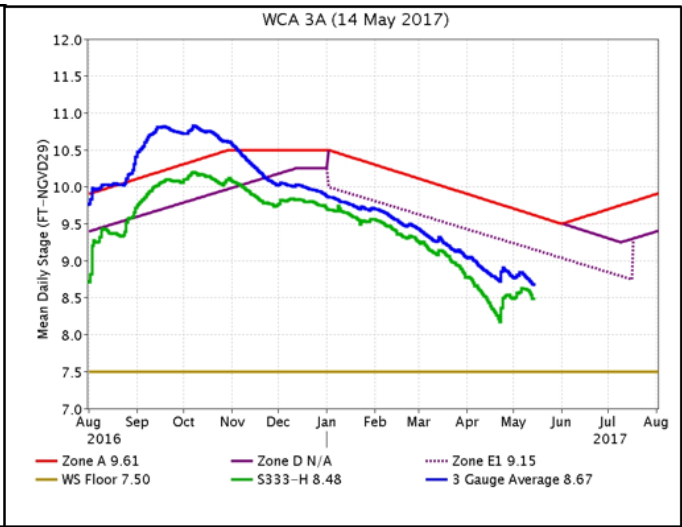
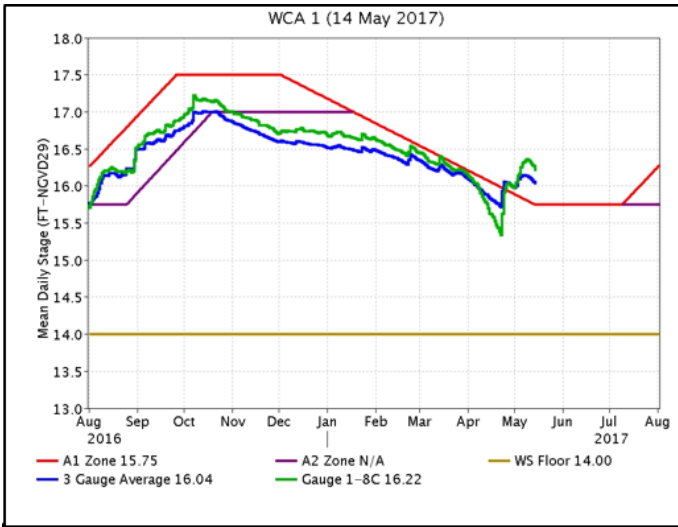
Everglades Region	Rainfall (Inches)	Stage Change (feet)	
WCA-1	0.00	-0.11	Good
WCA-2A	<0.01	-0.08	Fair
WCA-2B	<0.01	-0.19	Poor
WCA-3A	0.05	-0.15	Fair
WCA-3B	0.14	N/A	Poor
ENP	0.14	N/A	Poor

SFWMD PROVISIONAL RAINDAR 7-DAY RAINFALL ESTIMATES

FROM: 0515 EST, 05/08/2017 THROUGH: 0515 EST, 05/15/2017



Regulation Schedules: WCA-1 stage is .29 feet above Zone A. WCA-2A the marsh stage at gauge GA2A17 is currently offline and the canal stage measured at the headwaters of S11B is to 0.42 above zone A. WCA-3A three-gauge average is 0.48 feet below zone E1. WCA-3A at gauge 62 (Northwest corner) is 1.14 feet below schedule.

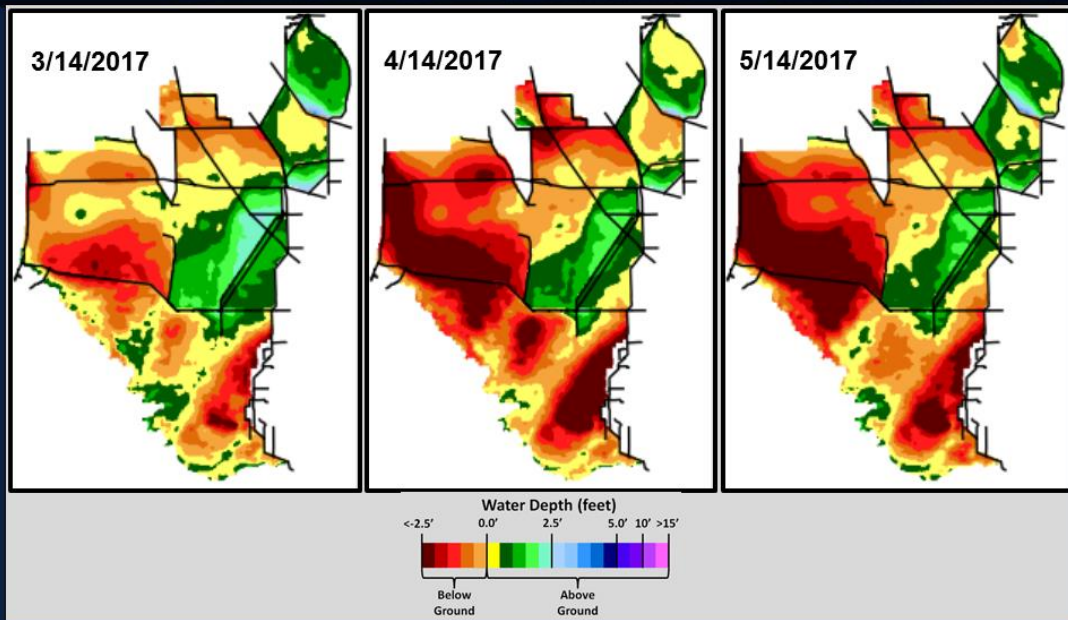


Blue – wetlands
Green – canals

Water Depths and Changes: Over the last week water depths at functioning monitored gauges other than in WCA-2B range from -0.26 feet (northeast WCA-3A) to 1.21 feet (WCA-1). Over the last week individual gauge changes ranged from -0.23 feet (WCA-2B) to -0.07 feet (WCA-3B). The WCAs 1 and 2A are wetter than they were a year and a month ago. WCAs 1, 2A and 3A North are wetter than they were a month ago.



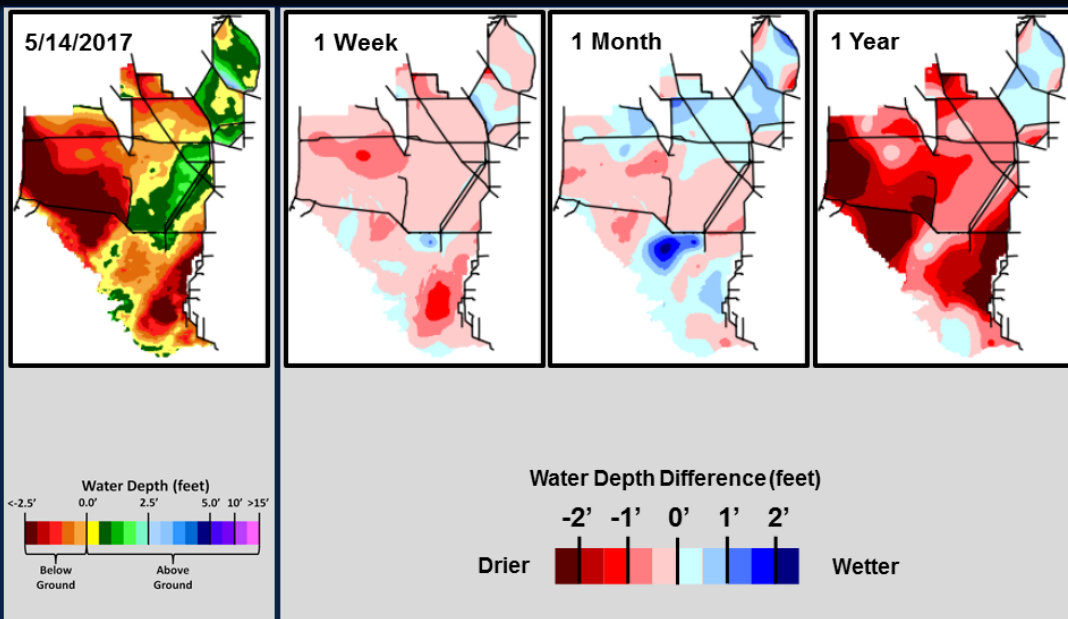
SFWDAT Water Depth Monthly Snapshots



South Florida Water Depth Assessment Tool (SFWDAT)

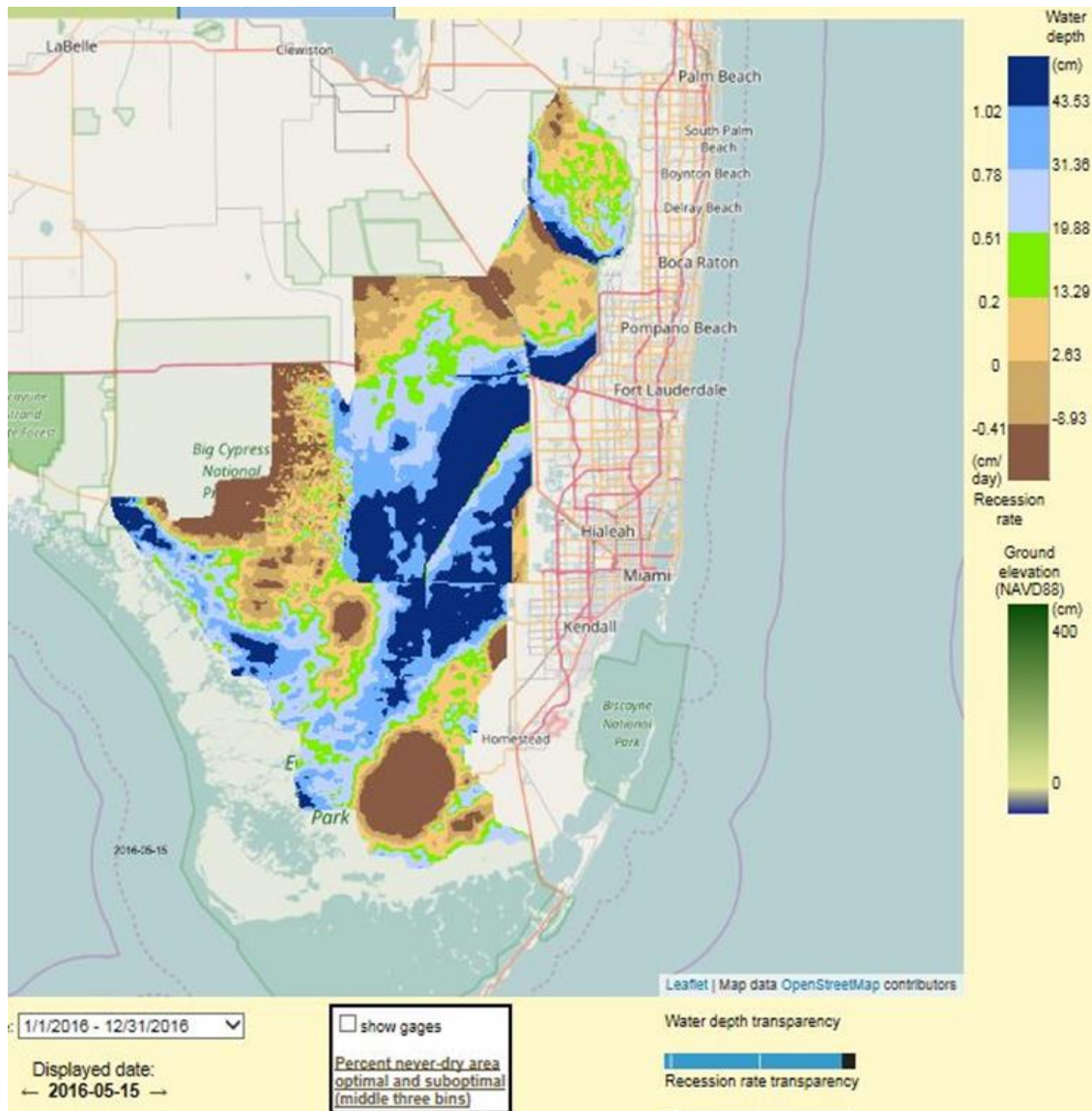


SFWDAT Everglades Difference Maps (Present - Past)



South Florida Water Depth Assessment Tool (SFWDAT)

Wading Birds: As of May 15, large numbers of wading birds continue to feed in central and southern WCA-3A just south of the drying front where depths are currently optimal for wading bird foraging (see green and pale blue areas on the depth Habitat Suitability Index below). Foraging is limited in WCAs 1 and 2A where continued reversals in water level are limiting foraging opportunities.



Wood stork nesting appears to have been relatively successful this year. As of May 15, about 80% of the 1,000 or so stork nests at the Jetport colonies are empty, and it is probable that the vast majority of these nests fledged multiple nestlings given the apparent good health of the remaining chicks and the large numbers of fledglings now foraging in the marsh.

Great Egrets have been nesting in the WCAs since December, appear to have produced many fledglings, and are continuing to lay eggs in May suggesting multiple successful cohorts of nesting. Small herons are difficult to quantify from aerial surveys but relatively large numbers of fledglings are now evident at a number of colonies suggesting that nesting effort and success is relatively high this year.

White Ibis have been less successful than the other species but continue to nest in the WCAs. Just over two weeks ago, WCAs 1 and 2A were characterized by rapidly drying but optimal foraging conditions for wading birds. These conditions attracted thousands of foraging and nesting White Ibis, and by early April there were approximately 7,000 ibis nesting in WCA-1 plus about 10,000 nesting in NE WCA-3A (within foraging distance of WCAs 1 and 2A). Since the rain event of April 23, no foraging has been noted in WCAs 1 or 2A, and WCA-1 has lost about 4,500 ibis nests. The fate of the 10,000 nest colony in Northeast WCA-3A is harder to determine because nesting there began earlier and most of the adults are no longer sitting on nests (so quantifying nest numbers is not possible). The colony continues to support thousands of chicks but there are many vultures present (a possible sign of

abandonment) and there appear to be many fewer chicks than expected given the original number of nests (although it is very difficult to quantify the dark colored nestlings).

The District conducted an extensive wading bird colony survey on May 2 (see estimated counts below) and has continued to survey a select number of the larger colonies on a weekly basis.

Nest count estimates, May 3. (WHIB = White Ibis, GREG = Great Egret, LBHE = Little Blue Heron, CAEG = Cattle Egret, TRHE = Tri-colored Heron, SNEG = Snowy Egret, WOST = Wood Stork, ROSP = Roseate Spoonbill)

WCA-1

New Colony 4: 3,000 WHIB nests; 50 GREG nests

Boat Ramp: 50 GREG nests; 800 small herons including juvenile LBHE, CAEG, plus unknown numbers of nesting LBHE, TRHE and SNEG

Lox 99: 500 GREG nests; 300 WHIB nests; 70+ small dark heron nests (primarily LBHE)

WCA-3A

Alley N: 500 GREG nests; 25 ROSP nests; 100 small heron nests (various species)

6th Bridge: 1,000 WHIB nests (plus 3,000+ nestlings), 400 GREG nests; 20 ROSP nests (plus 30 juveniles)

Jetport: 70 WOST nests

Jetport S: 180 WOST nests, 30 GREG nests; 20 ROSP juveniles

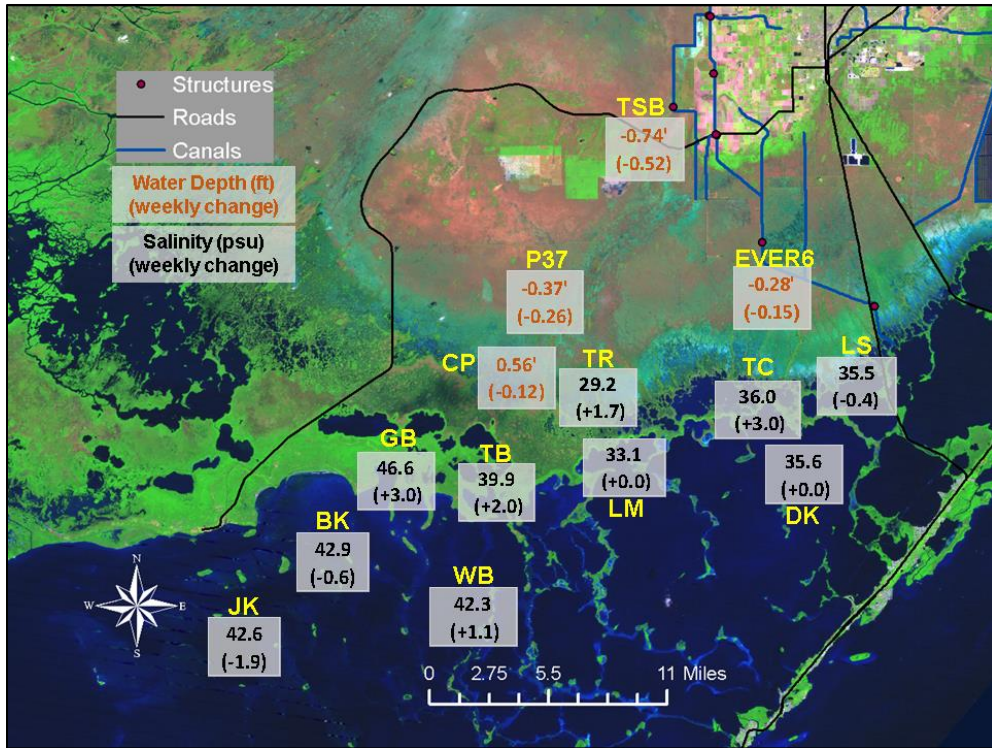
Hidden: 130 GREG nests

ENP

Tamiami W: 140 WOST nests, 2,500 WHIB nests, 800 GREG nests, 600 small heron's nests

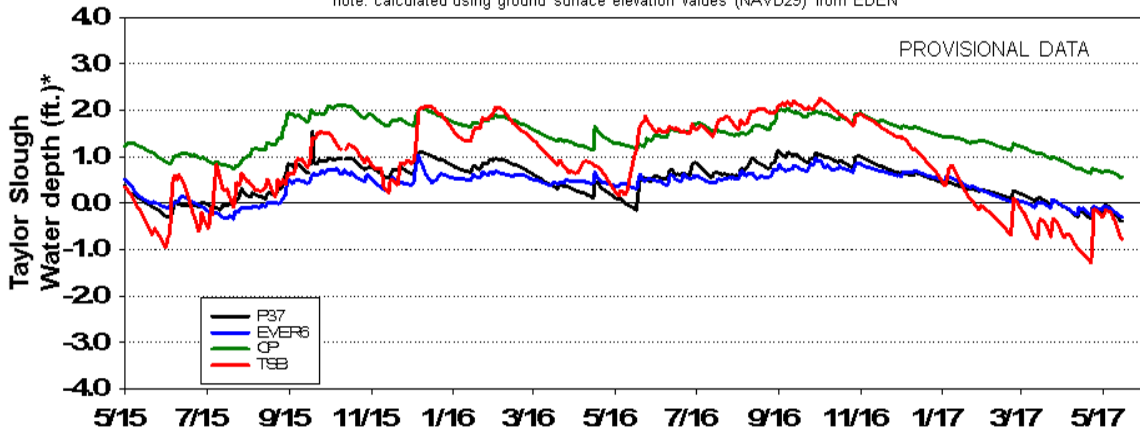
Taylor Slough: Water levels decreased rapidly in Taylor Slough last week, with changes raging from -0.12 to -0.52 feet. Only southwestern Taylor Slough (which is below sea-level) is above ground still. Northern Taylor Slough is the only area that is currently wetter than a month ago. Compared to historic averages, water levels are mostly average to one inch above average.

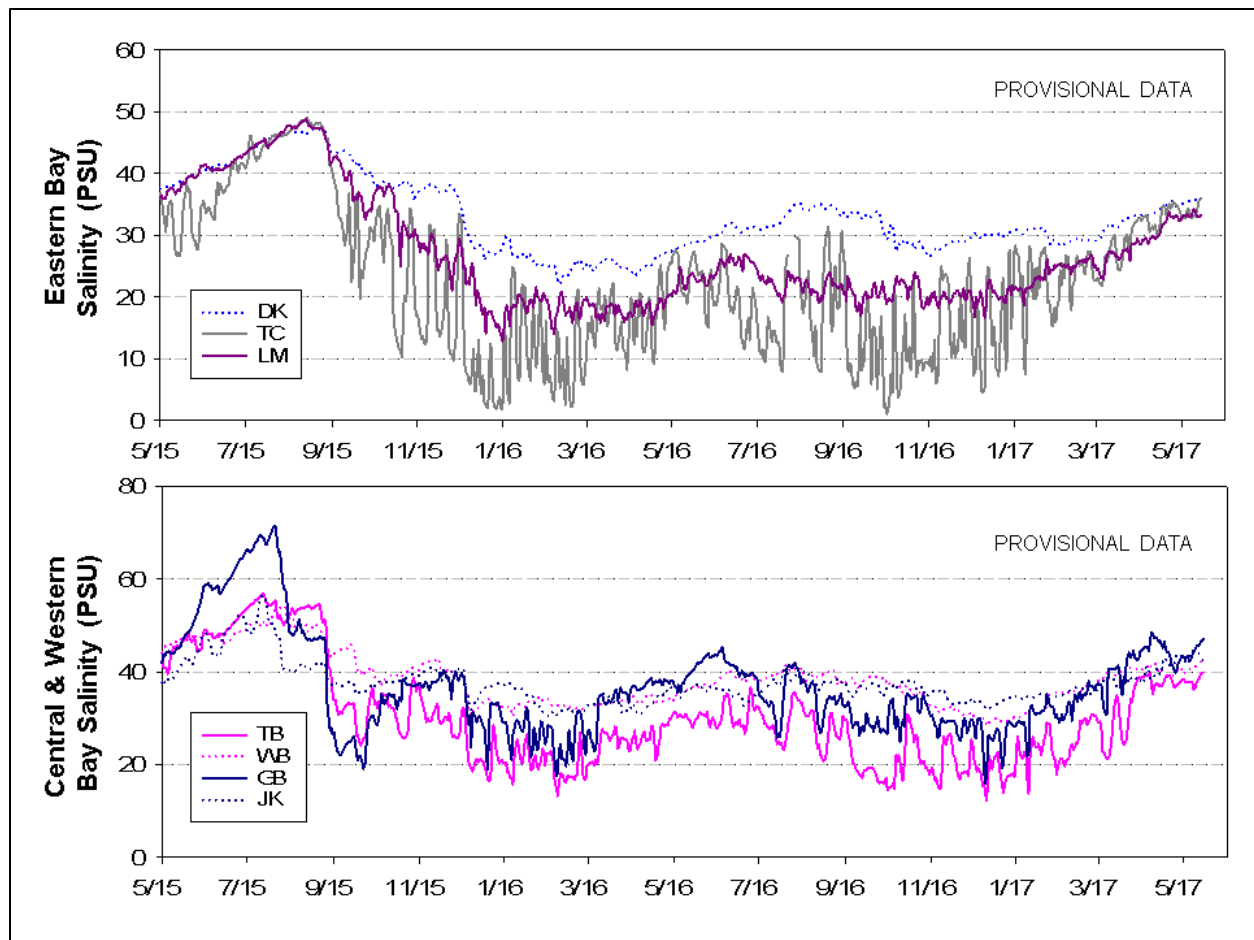
Florida Bay Salinity: Salinities are currently +2 to +6 psu above average and range from 33 psu in the eastern nearshore to 47 psu in the western nearshore. Weekly changes ranged from -2 psu to +3 psu. Negative flows have persisted since Wednesday.



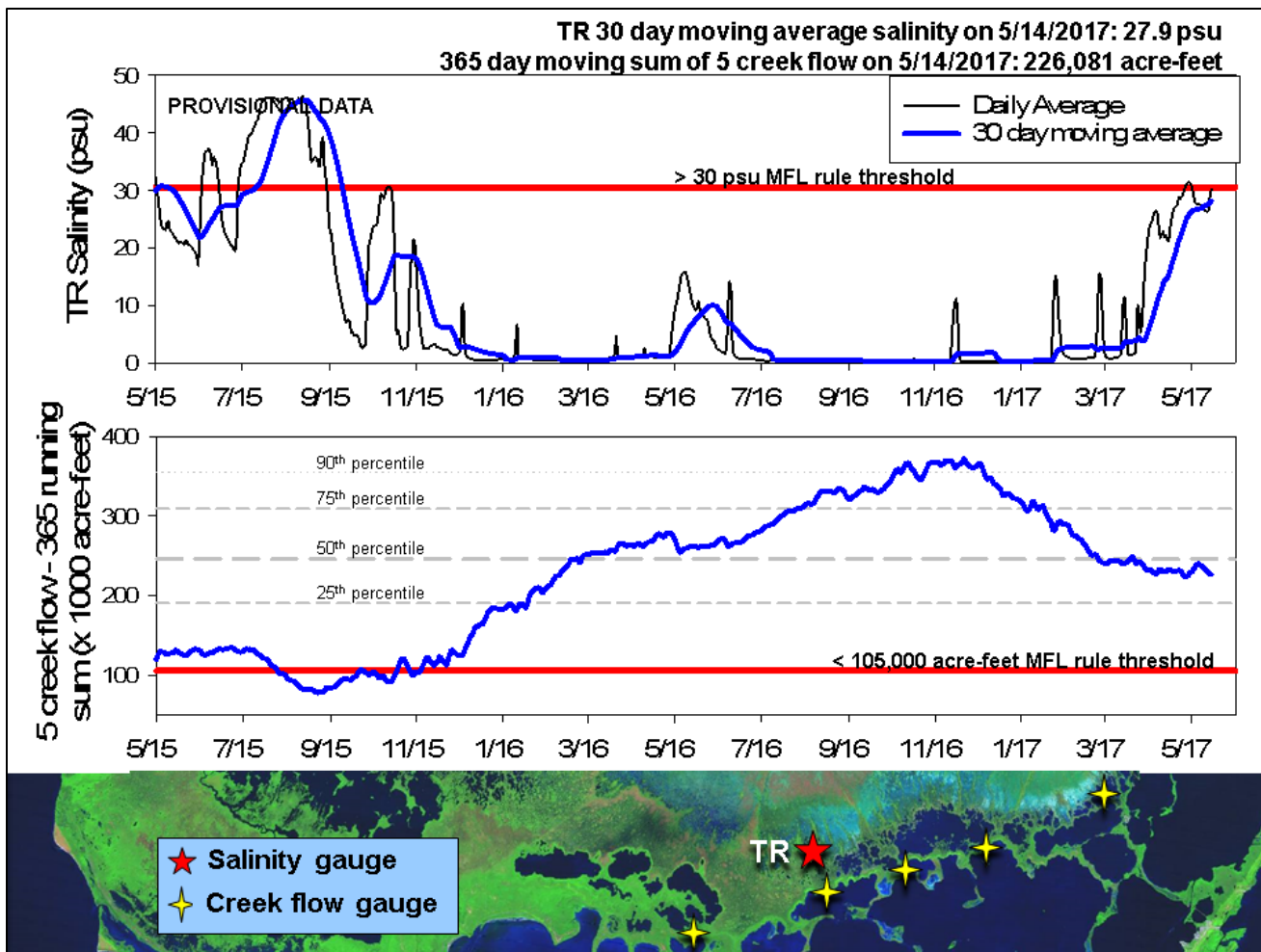
Taylor Slough Water Depths

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





Florida Bay MFL: Mangrove zone salinities rose sharply starting on Saturday ending the week at 29 which is 2 psu higher than a week ago. The 30-day moving average increased +1.1 to end the week at 27.9 psu. The weekly creek flow from the five creeks was about -3,800 acre-feet. The 365-day moving sum of flow from the five creeks identified by stars on the map decreased about -12,000 acre-feet to end at 226,081 acre-feet (below the long-term average of 257,628 acre-feet). Creek flow is provisional data from the USGS and is highly variable.



Water Management Recommendations

- Maintaining the current natural recession rates in WCA-1 is crucial in the prevention of further White ibis nest abandonment.
- Moderating accession in WCA-1 via outflow at the S-10 structures is recommended.
- Maintaining the optimal foraging conditions in Central and Southern WCA-3A by preserving a natural recession rate (-.05 to -.09 feet per week) is recommended.
- Given the current low water conditions that could lead to peat soil oxidation in the Northeast corner of WCA-3A, ecologically it would make more sense (if possible given any regulatory issues) to route the water currently being discharged from the S-11 structures instead into the Northeastern WCA-3A via S-150.

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

Everglades Ecological Recommendations, May 16th, 2017 (red is new)

Area	Current Condition	Cause(s)	Recommendation	Reasons
WCA-1	Stages decreased -0.08' to -0.15'	Rainfall, ET, management	Operate for dry season conditions and allow natural recession to resume (up to 0.15 ft/wk). Diversion of STA flows to 2A or northern 3A would be beneficial. Releasing inflows through S-10s to moderate ascension is recommended.	Retain water for the upcoming dry season while protecting habitat for apple snail, snail kite and wading bird breeding season.
WCA-2A	Stages decreased -0.08' (estimated)	Rainfall, ET, management	Allow to return to natural recession rates (up to 0.15 ft/wk). Releasing water through S-11s to moderate inflows from the STAs is recommended.	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 -0.14' to -0.23'	Rainfall, ET, management	Resume natural recession rates (up to 0.15 ft/wk).	Protect habitat and wildlife. Support apple snails and nesting wading birds.
WCA-3A NE	Stages decreased -0.17'	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. Water for northern 3A is desired with the priority being northeastern WCA-3A.	Protect habitat and wildlife. Support apple snails and nesting wading birds and snail kites. Reduce fire risk as water depths are now below ground.
WCA-3A NW	Stages decreased -0.16'	Rainfall, ET, management		
Central WCA-3A S	Stages decreased -0.14'	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). Allow to return to natural recession rates.	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 and snail kite breeding.
Southern WCA-3A S	Stages decreased -0.11'	Rainfall, ET, management		
WCA-3B	Stages decreased -0.08'	Rainfall, ET, management	Restrict recession rates to -0.05' to 0.09' per week.	Protect habitat and wildlife and prepare for wading bird and snail kite breeding season. Provide conditions to support apple snails.
ENP-SRS	Stages at or below minimum for gauge	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 and wildlife, including wading birds and snail kites.
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 ERTTP 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	Stage decreases ranged -0.12' to -0.52'	Rain, ET, inflows	Move water southward as possible	When available provide freshwater buffer for ecosystems and slow recession rates.
FB- Salinity	Salinity changes ranged -2 to +3 psu.	Rain, ET, inflows, wind	Move water southward as possible	When available provide freshwater to buffer hypersalinity conditions.