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, Engineering and Construction Bureau
Paul Linton, Administrator, Water Control Operations Section

FROM: SFWMD Staff Environmental Advisory Team

DATE: May 17, 2016

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Kissimmee

On Sunday, stage in East Lake Toho was 0.7 feet above schedule; Lake Toho was 0.8 feet above schedule and Kissimmee-Cypress-Hatchineha (KCH) was 0.9 feet above schedule. Over the past week, discharge at S65 averaged 1480 cfs and at S65A 1352 cfs; discharge at S65E averaged 1531 cfs. Tuesday morning discharges: S65 ~1448 cfs; S-65A ~1208 cfs; S65C ~1550 cfs; S65E ~1742 cfs .Dissolved Oxygen in the Kissimmee River averaged 6.06 mg/L over the past week and 6.23 mg/L on Sunday. Kissimmee River mean floodplain depth is currently 0.71 feet.

Lake Okeechobee

The recession in Lake Stage continued last week and the Lake dropped 0.26 feet. The Lake is at 13.64 feet NGVD and is in the low flow sub-band. Ecological conditions for wading birds appear to be improving, but outcomes will depend on whether the recession continues and when the wet season begins.

Estuaries

Total freshwater inflow to the St. Lucie Estuary decreased compared to last week, averaging 768 cfs with 566 (74%) coming from Lake Okeechobee. Salinity was in the good range for adult oysters at the US1 Bridge. Total freshwater inflow to the Caloosahatchee Estuary decreased compared to last week and averaged 2248 cfs with 1721 (77%) coming from Lake Okeechobee. Salinity conditions in the upper estuary are suitable for Tape Grass. At the Cape Coral Bridge, salinity is in the fair range for adult oysters and is in the good range at the Shell Point and Sanibel monitoring stations. The 30-day average salinity at the I-75 Bridge is below five and forecast to remain so for the next two weeks.

Stormwater Treatment Areas

Over the past week, the STAs/FEBs received approximately 5,600 acre-feet of Lake regulatory releases. The total amount of Lake regulatory releases sent to the STAs/FEBs in WY2017 (since May 1, 2016) is approximately 13,800 acre-feet. Most STA cells are at or near target depths; however dryout is occurring in some cells in STA-5/6. Operational restrictions are in place for vegetation rehabilitation in STA-1E, STA-1W, STA-3/4 and STA-5/6 and structure repairs are underway in STA-1E. In addition, nests of ESA and/or MBTA-protected species have been observed in STA-1E, STA-1W, STA-2, STA-3/4, and STA-5/6. This week, if 2008 LORS recommends Lake Releases to the WCAs and the

conditions allow, releases will be sent to the A-1 FEB, and A-1 FEB releases will be sent to STA-2 and STA-3/4.

Everglades

Water level generally decreased this past week within the WCAs and Everglades National Park. In the WCAs, water levels and recession have been mostly favorable for wading bird foraging, and large multi-species foraging flocks were witnessed again this week. The 30-day moving average salinity at the Florida Bay MFL site remains low (7.2 psu compared to the average of 23 psu) and the cumulative inflow from the five creeks into Florida Bay is above the long-term average at 261,957 acre-feet. Florida Bay salinities are below average for this time of year, which are desirable and a restoration target.

Weather Conditions and Forecast

Daily afternoon seabreeze thunderstorms through Sunday. Warm, moist air has spread over the District and an upper level impulse currently over the east-central Gulf of Mexico will move across the District this evening. Expect this combination to produce widespread moderate to heavy afternoon thunderstorm activity this afternoon and evening focused north and east. While not as widespread, daily afternoon seabreeze thunderstorms should persist the remainder of the week and steering winds should focus activity over the interior and east Wednesday, the interior Thursday and Friday, and then the interior and east again Saturday. A surface trough is forecasted to move into the District Saturday and Sunday. The strength of this trough will determine whether or not dry air spreads over the District Monday. Dry air would kill off the daily seabreeze cycle but the lack of dry air would allow daily thunderstorm activity to continue into next week.

KISSIMMEE BASIN

Kissimmee Basin Rainfall
The Upper Kissimmee Basin received 0.02 inches of rainfall in the past week and the Lower Basin received 0.02 inches (SFWMD Daily Rainfall Report 05/16/2016).

Upper Kissimmee Basin
Stages and departures in the Kissimmee Chain of Lakes (KCOL) are shown in Table1.

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: **5/17/2016**

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)	Sunday Departure (feet)						
							5/15/16	5/8/16	5/1/16	4/24/16	4/17/16	4/10/16	4/3/16
Lakes Hart and Mary Jane	S62	73	LKMJ	59.8	R	59.8	**0.0**	0.0	-0.1	-0.2	-0.4	-0.4	-0.5
Lakes Myrtle, Preston, and Joel	S57	32	S57	60.1	R	60.2	**-0.1**	0.0	0.0	0.0	-0.1	0.0	0.0
Alligator Chain	S60	117	ALLI	62.4	R	62.4	**0.0**	0.1	-0.1	0.0	-0.1	0.0	0.0
Lake Gentry	S63	155	LKGT	59.9	R	59.9	**0.0**	0.0	0.0	0.0	0.9	0.4	-0.7
East Lake Toho	S59	257	TOHOE	56.4	R	55.7	**0.7**	0.7	0.3	0.1	-0.1	-0.1	-0.1
Lake Toho	S61	692	TOHOW, S61	53.5	R	52.7	**0.8**	0.8	0.3	0.1	0.0	0.0	0.4
Lakes Kissimmee, Cypress, and Hatchineha	S65	1480	LKISSP, KUB011, LKIS5B	50.5	R	49.6	**0.9**	0.8	0.0	-0.1	0.0	-0.2	-0.2

* 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: **5/17/2016**

Metric	Location	Sunday's 1-day average	Weekly Average**									
			5/15/16	5/8/16	5/1/16	4/24/16	4/17/16	4/10/16	4/3/16	3/27/16	3/20/16	3/13/16
Discharge (cfs)	S-65	1381	**1480**	1091	1125	1775	1812	3289	5062	1668	402	505
Discharge (cfs)	S-65A	1206	**1352**	1143	925	1656	1710	3395	5407	1461	280	408
Discharge (cfs)	S-65C	1584	**1603**	1337	1543	2082	2759	4387	2902	746	492	1237
Headwater stage (feet NGVD)		34.1	**34.1**	34.3	34.0	34.1	34.0	34.0	34.1	34.0	34.1	34.2
Discharge (cfs)	S-65D****	1576	**1641**	1391	1584	2132	2872	4648	2755	753	534	1375
Discharge (cfs)	S-65E	1481	**1531**	1268	1471	1983	2766	4507	2657	717	487	1360
DO concentration (mg/L)***	Phase I river channel	6.23	**6.06**	5.94	5.65	4.84	3.82	3.12	3.83	5.74	5.98	5.98
Mean depth (feet)*	Phase I floodplain	0.71	N/A	0.80	0.57	0.94	1.08	1.76	2.32	0.70	0.48	0.52

* 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 starting June 2.PC33 omitted for week of Aug16. DO for week of Sept 15-22 is for PC33 only.

**** S-65D discharge combines discharge at S-65D, S-65DX1, and S-65DX2

***** 1-day spatial average from field measurements in Pools A and BC

N/A Not applicable or data not available.

DATA ARE PROVISIONAL

Water Management Recommendations

Kissimmee Basin Adaptive Recommendations and Operational Actions

Date	Recommendation	Purpose	Outcome	Source
5/17/2016	No new recommendations.			
5/10/2016	No new recommendations.			
5/3/2016	No new recommendations.			
4/26/2016	No new recommendations.			
4/19/2016	No new recommendations.			
4/12/2016	No new recommendations.			
4/5/2016	No new recommendations.			
3/29/2016	No new recommendations.			
3/22/2016	No new recommendations.			
3/15/2016	No new recommendations.			
3/8/2016	No new recommendations.			
3/1/2016	No new recommendations.			
2/23/2016	No new recommendations.			
2/16/2016	No new recommendations.			
2/9/2016	No new recommendations.			
2/1/2016	Begin F&W recessions in East Toho, Toho, and KCH per the requested recession lines shown in the 2015-16 Dry Season Standing Recommendation (SR). Use Table 2 for guidance on rates of change in discharge to control departures from the line in KCH, and the reversal guidelines shown in the SR for Toho and East.	Initiate and manage lake stage recessions in East Toho, Toho, and KCH for the benefit of fish and wildlife, while avoiding harm to the Kissimmee River	TBD	KB Tech Team
1/20/2016	Continue to adjust discharge at S65 to follow the 2015-16 Dry Season SR guidelines for rampdown at S65A. Balance discharge at the two structures to maintain at least minimum discharge to the river. As stage rises above 51 ft in KCH, temporarily bypass the Fig 1 discharge plan in the SR and manage discharge to let KCH stage rise to 51.5 ft (the Feb 1 recession starting stage) if conditions allow while following rampdown guidelines. If KCH stage rises further than 51.5 ft, we will reevaluate. As changes in discharge become necessary, continue to follow the Table 1 guidelines in the SR. Switch to Table 2 rampup/rampdown guidelines on Feb 1 or when the recession line is intercepted for management of the recession in KCH.	If conditions allow, let stage increase to 51.5 ft to intersect the Feb 1 starting stage for KCH F&W recession line.	Implemented	KB Tech Team
12/10/2015	Temporarily raise from 50.5 ft to 51 ft the threshold stage for increasing discharge at S65/S65A to 1400 cfs. This is a temporary modification of the current draft 2015-16 dry season Standing Recommendation (SR). Discontinue last week's temporary change in the rate of discharge increase and return to the original per-day rates shown in Table 1 of the draft SR - i.e., increase discharge to 1400 cfs at a rate of 150 cfs/day rather than 150 cfs/2 days. If KCH stage should start to decline while ramping up but before reaching 1400 cfs, begin to ramp back down using the rates in Table 1.	Slow the effect of discharge on KCH stage, balance KCH stage and KRRP discharge objectives.	Implemented	KB Tech Team

KCOL Hydrographs (through Sunday midnight)

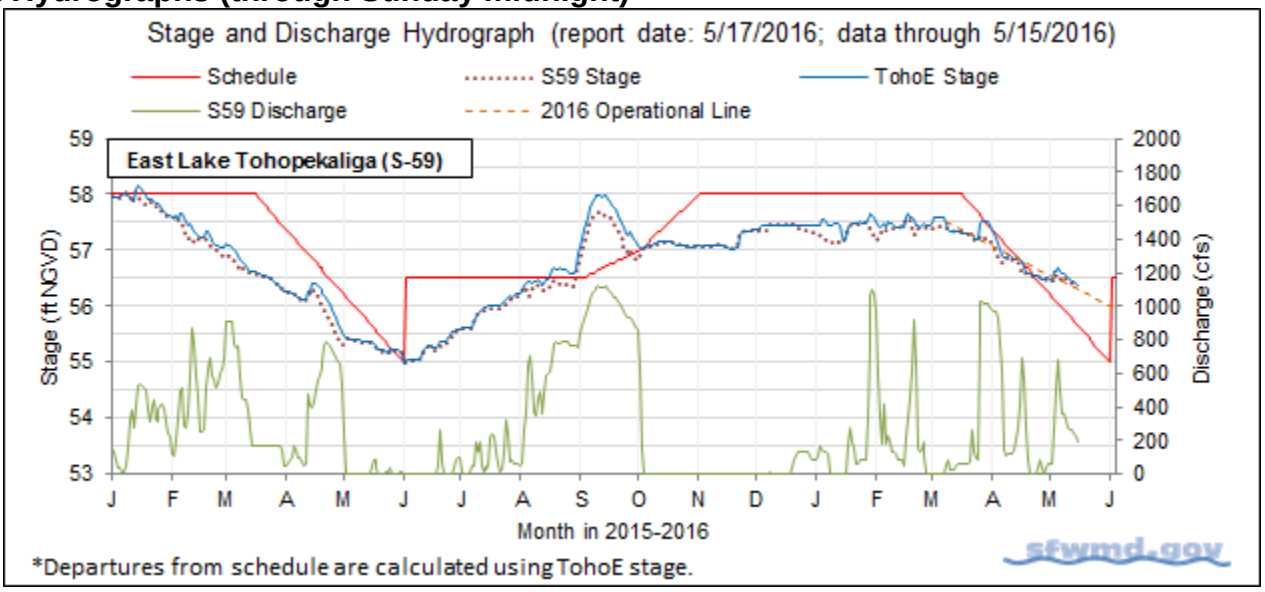


Figure 1.

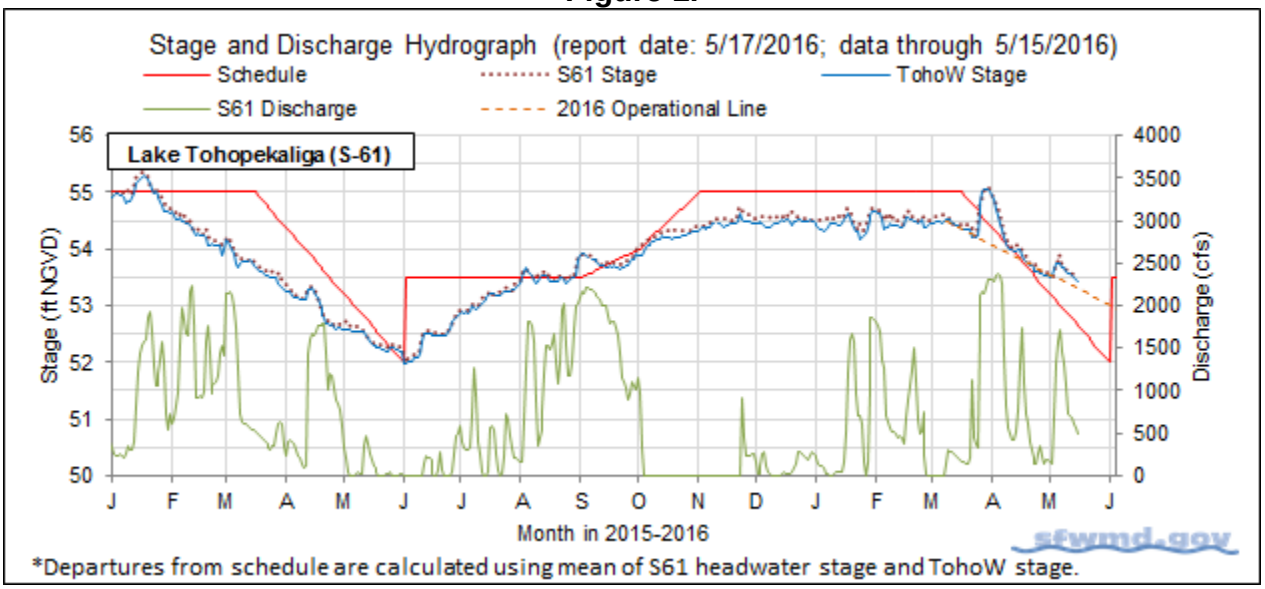


Figure 2.

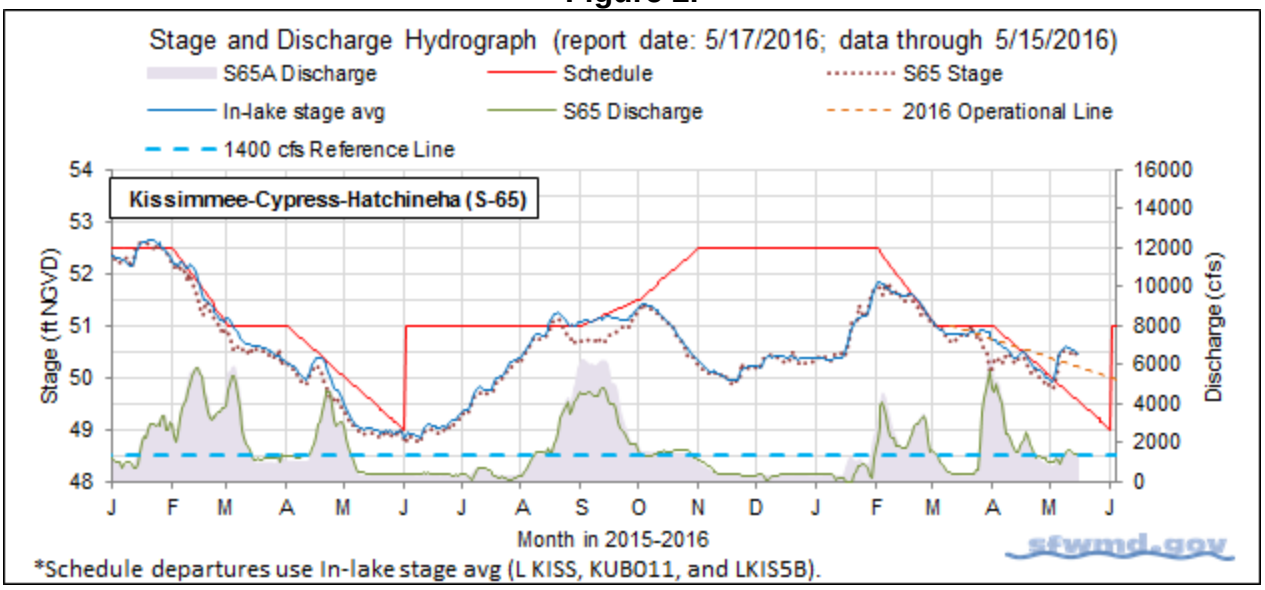


Figure 3.

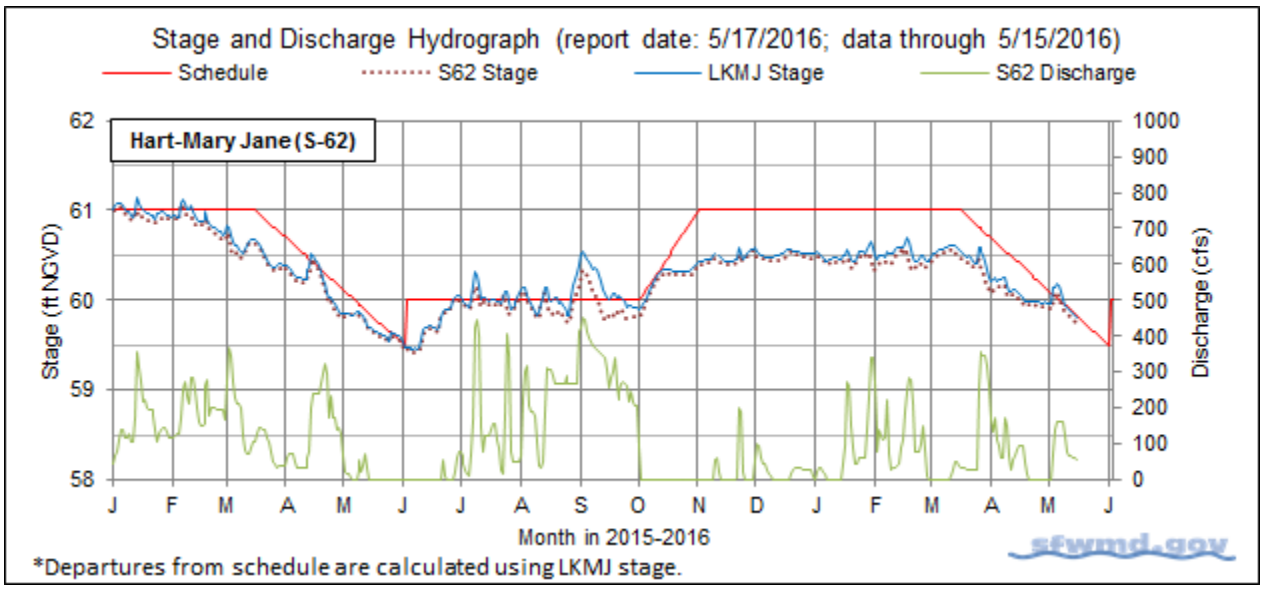


Figure 4.

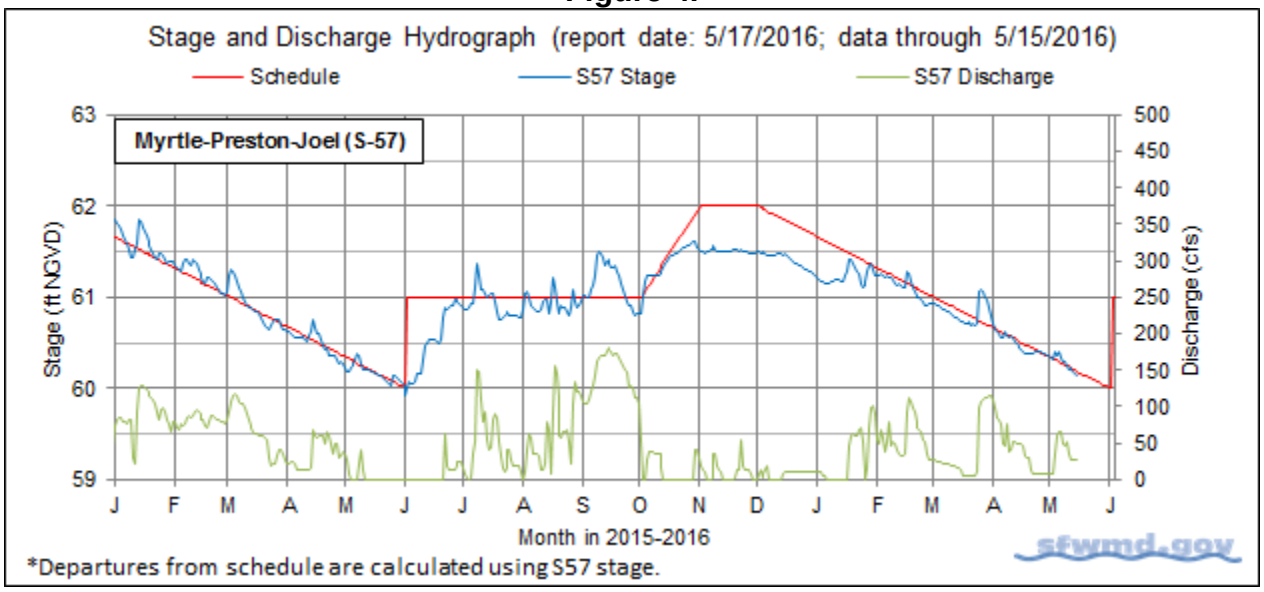


Figure 5.

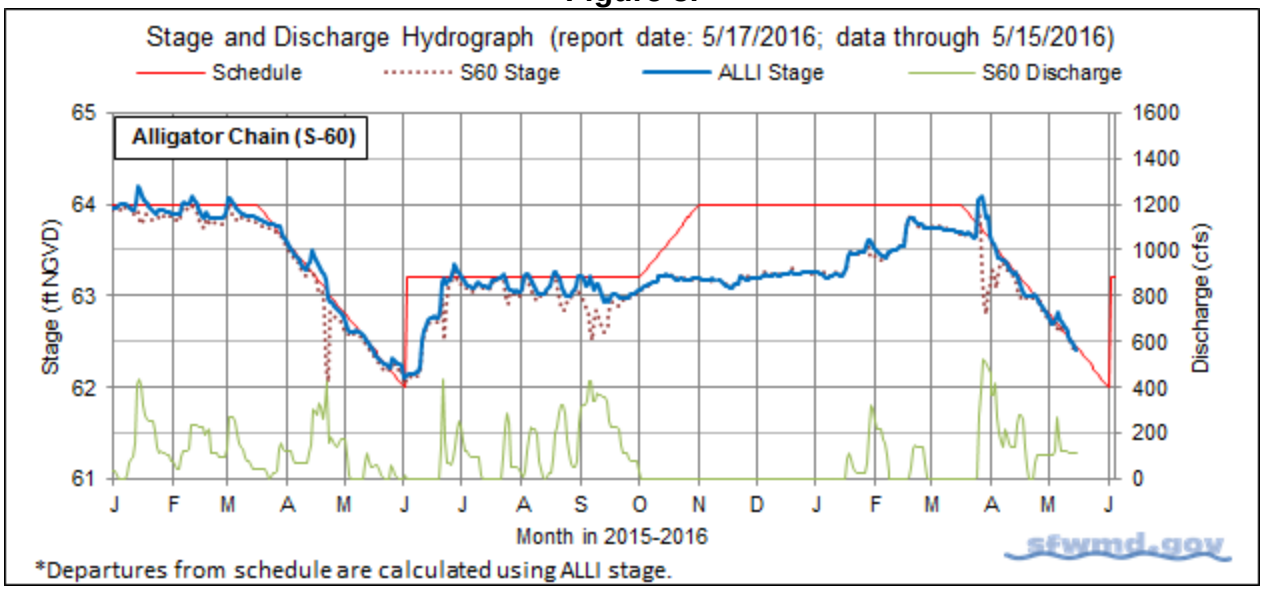


Figure 6.

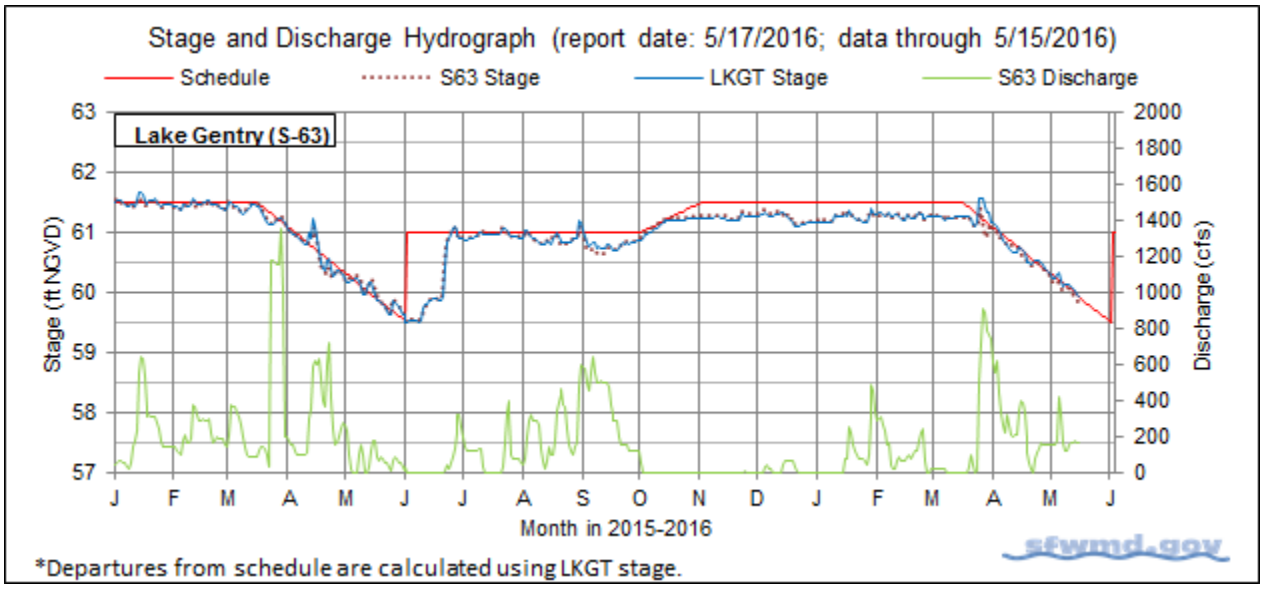


Figure 7.

Table 1. Discharge Rate of Change Limits for S65/S65A (Rate limits apply only in Zone B)			
	Q (cfs)	Maximum rate of increase (cfs/day)	Maximum rate of decrease (cfs/day)
Zone B	0-300	50	-50
	300-1400	150*	-75
	1400-2500	300	-300
	2500-3000	1000	-1000
Zone A	No limits		

***DRY FLOODPLAIN RULE**. When the Kissimmee River floodplain is dry (>7 days at 300 cfs), increases above 1200 cfs should be made in consultation with LRE Operations (Steve Bousquin and David Anderson).

Figure 8a. Limits on rate of discharge change at S65/S65A during F&W recession for dry season 2015-2016. Table 1 is from the 2015-2016 Dry Season Standing Recommendation.

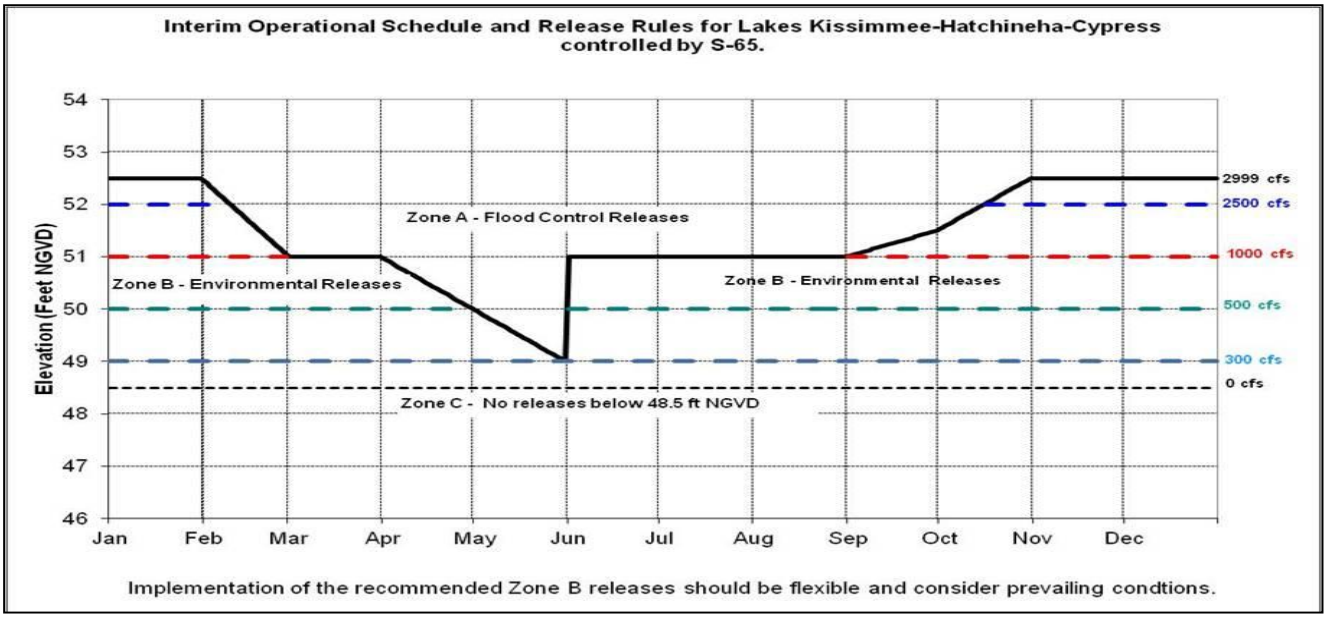


Figure 8b. Interim operations schedule for S65. The discharge schedule shown to the right has not been used in recent years or in Wet Season 2015.

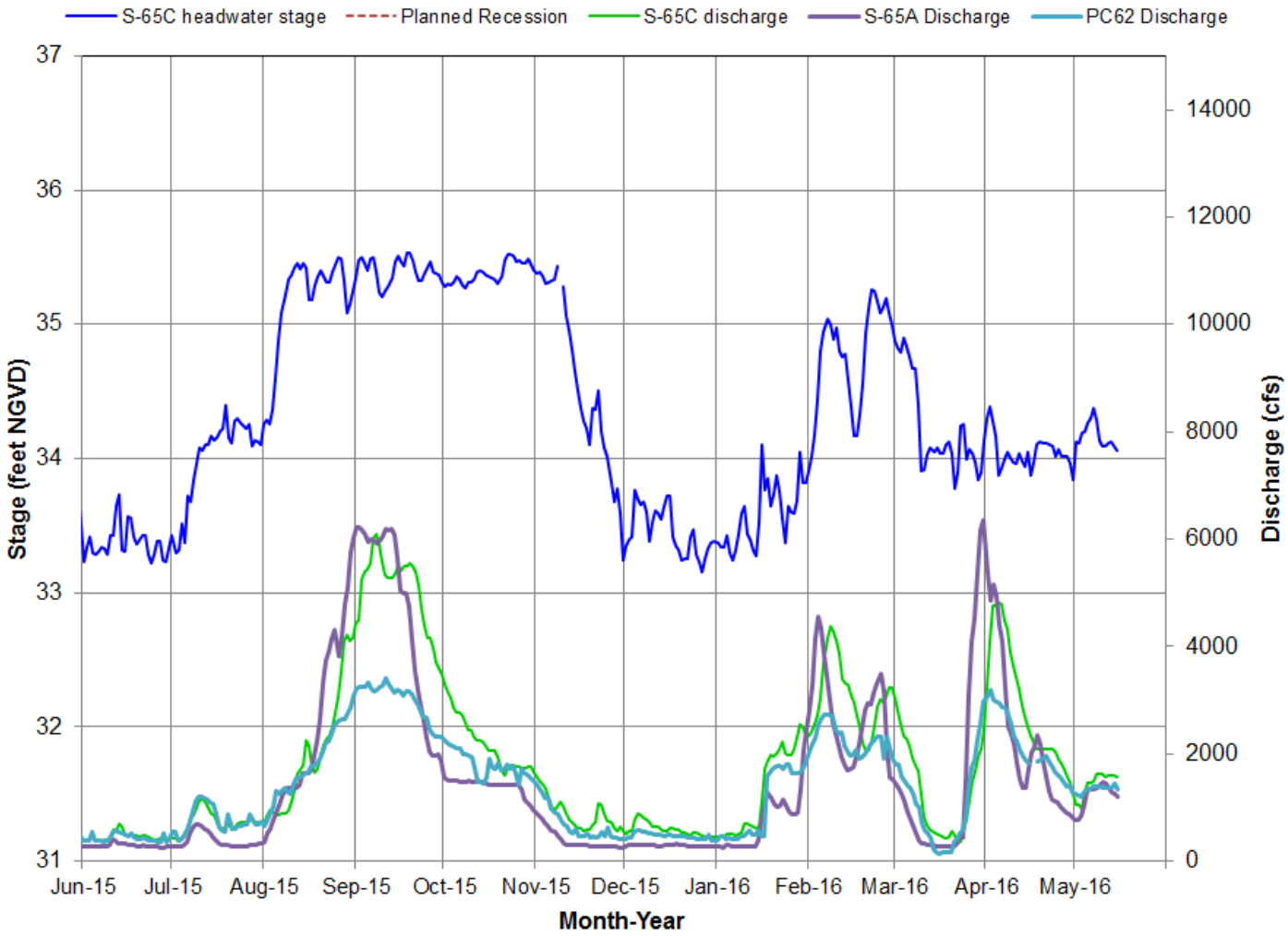


Figure 9. S65C headwater stage in relation to discharge at S65C, S65A, and PC62.

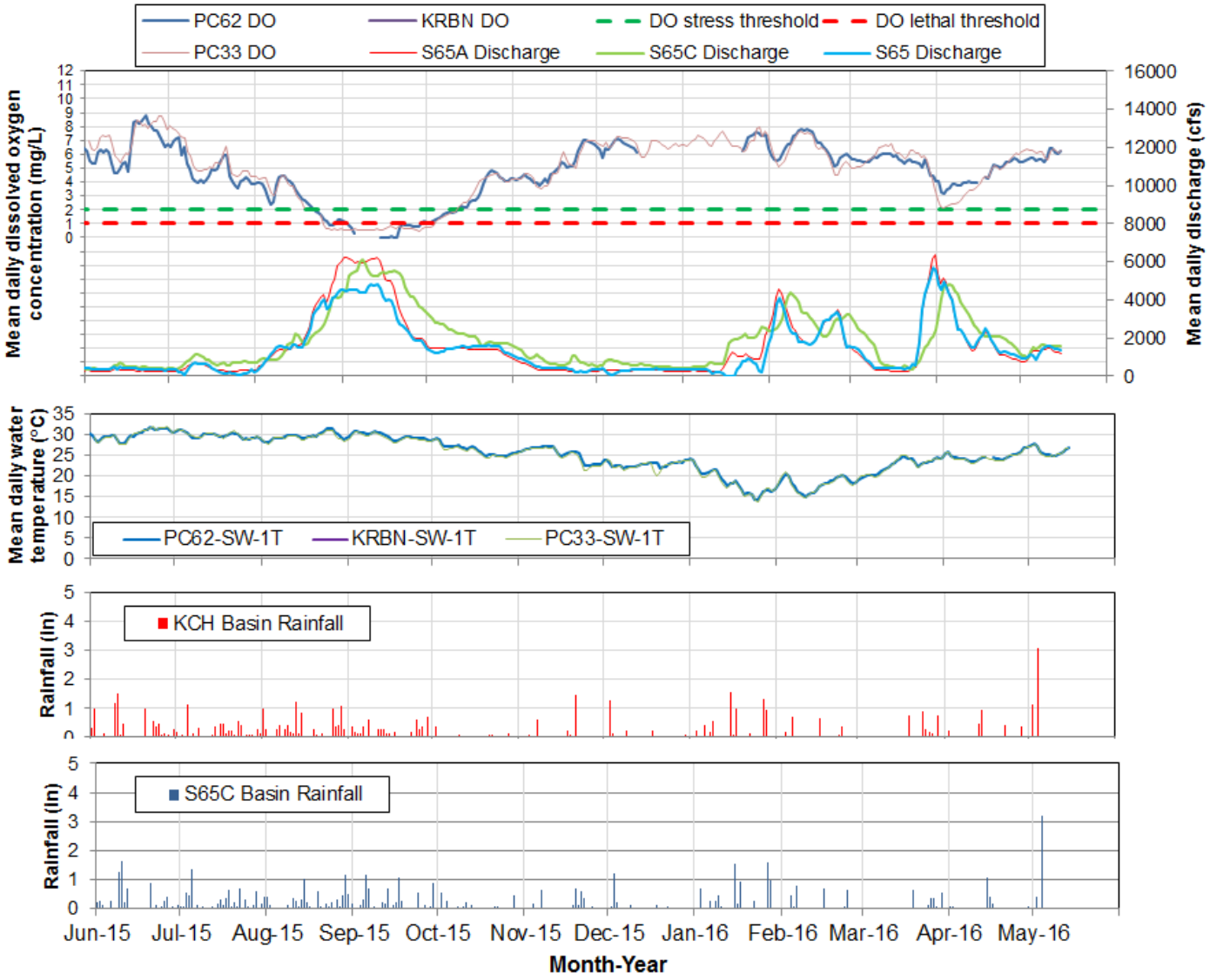


Figure 10. Mean daily Dissolved Oxygen, discharge, temperature and rainfall in the Phase I river channel.

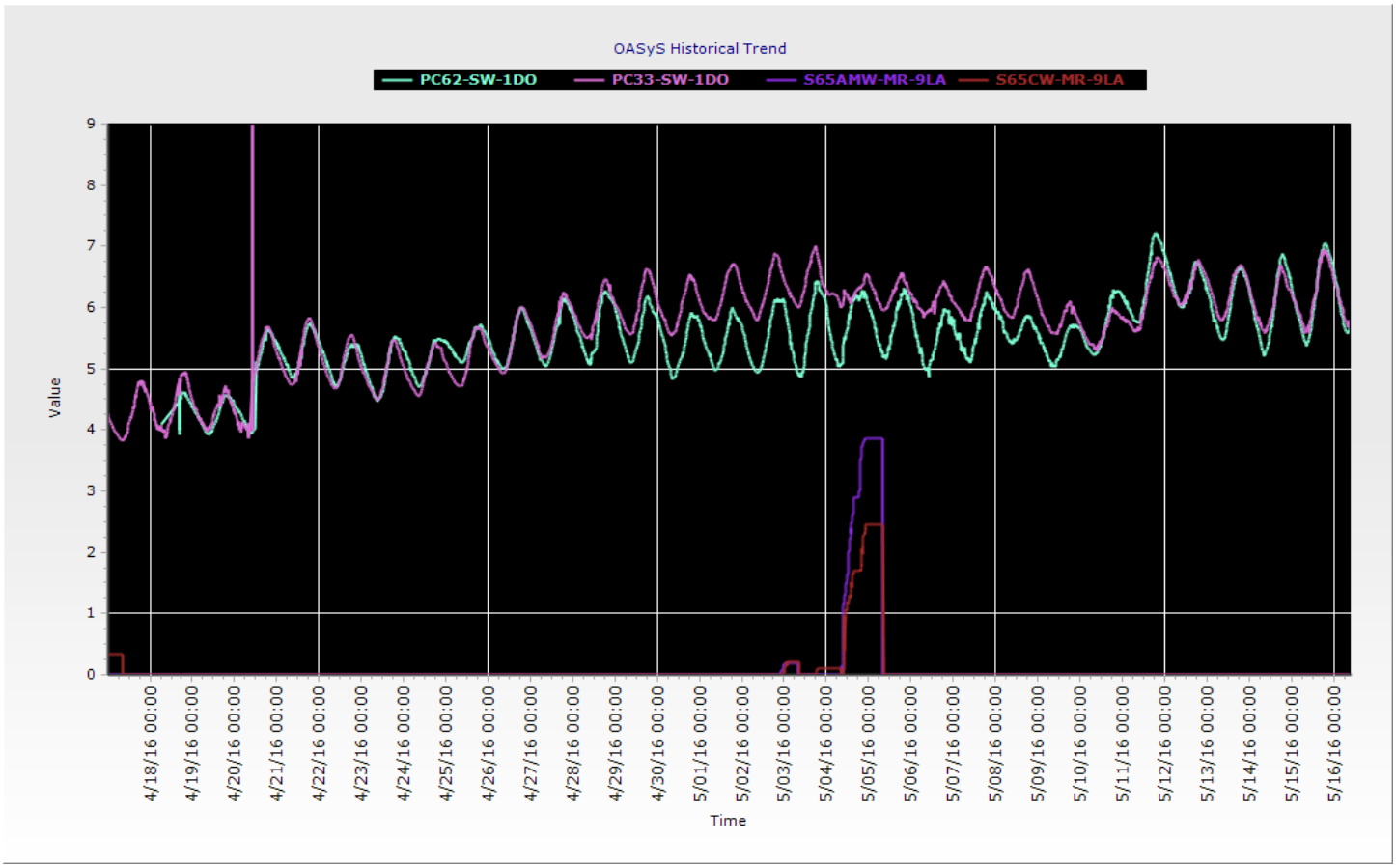


Figure 11. Phase I river channel dissolved oxygen (measured at 15 minute intervals) and rainfall at S65A and S65C.

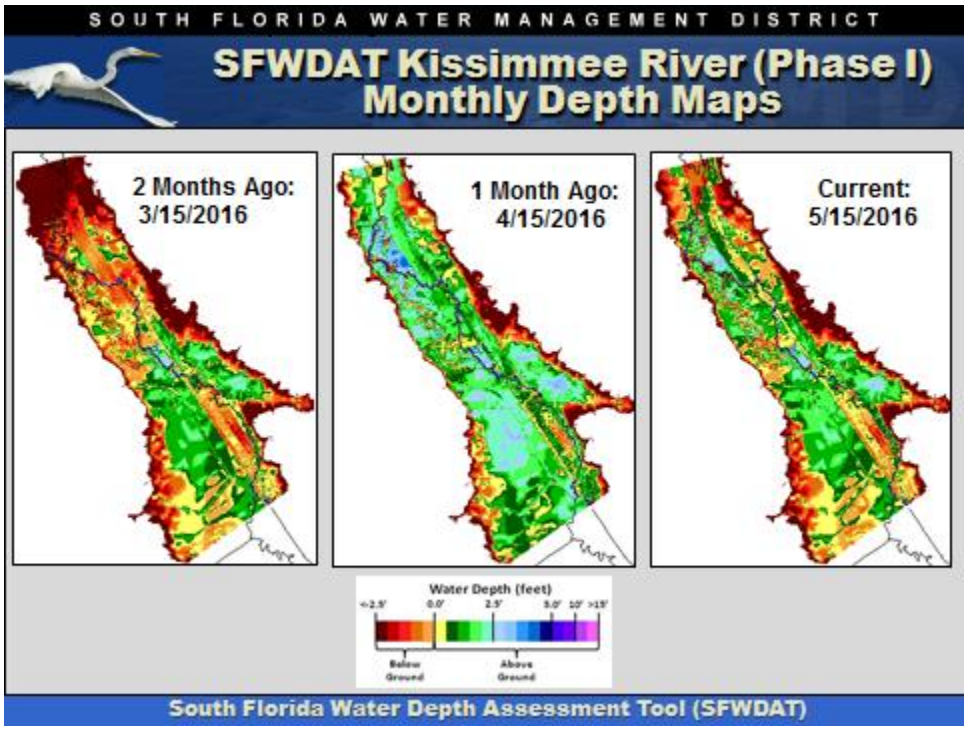


Figure 12. Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater

water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to Jan. 16, 2012.

Kissimmee River Hydrographs

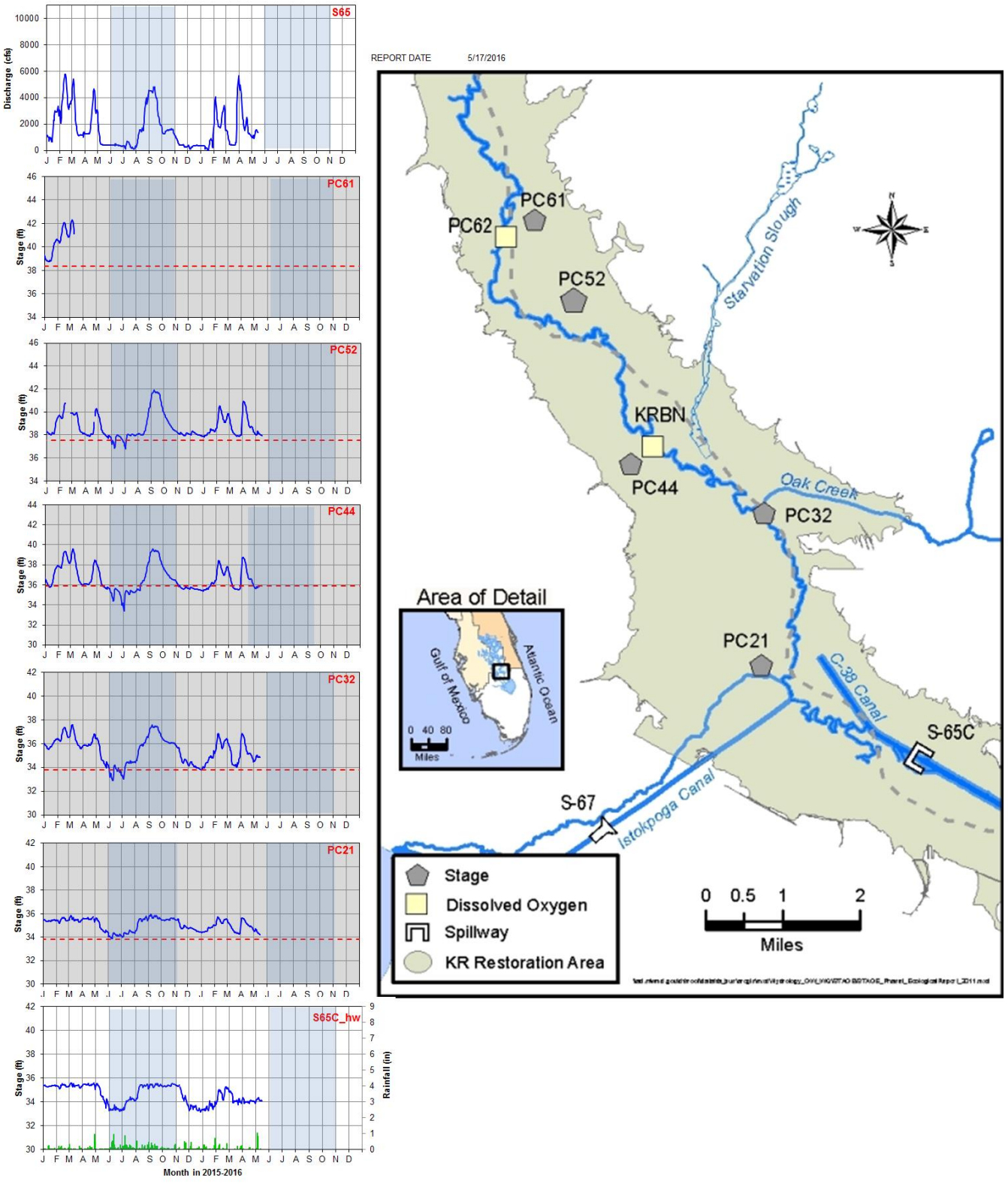


Figure 13. Discharge at S65, stages at five monitoring stations in the Phase I area of the Kissimmee River floodplain, and headwater stage at S65-C since January 1, 2015. The most recent data (~2

weeks) are provisional real-time data from SFWMD DualTrend; previous data are from SFWMD DB-HYDRO (validated). Dashed lines are ground elevations.

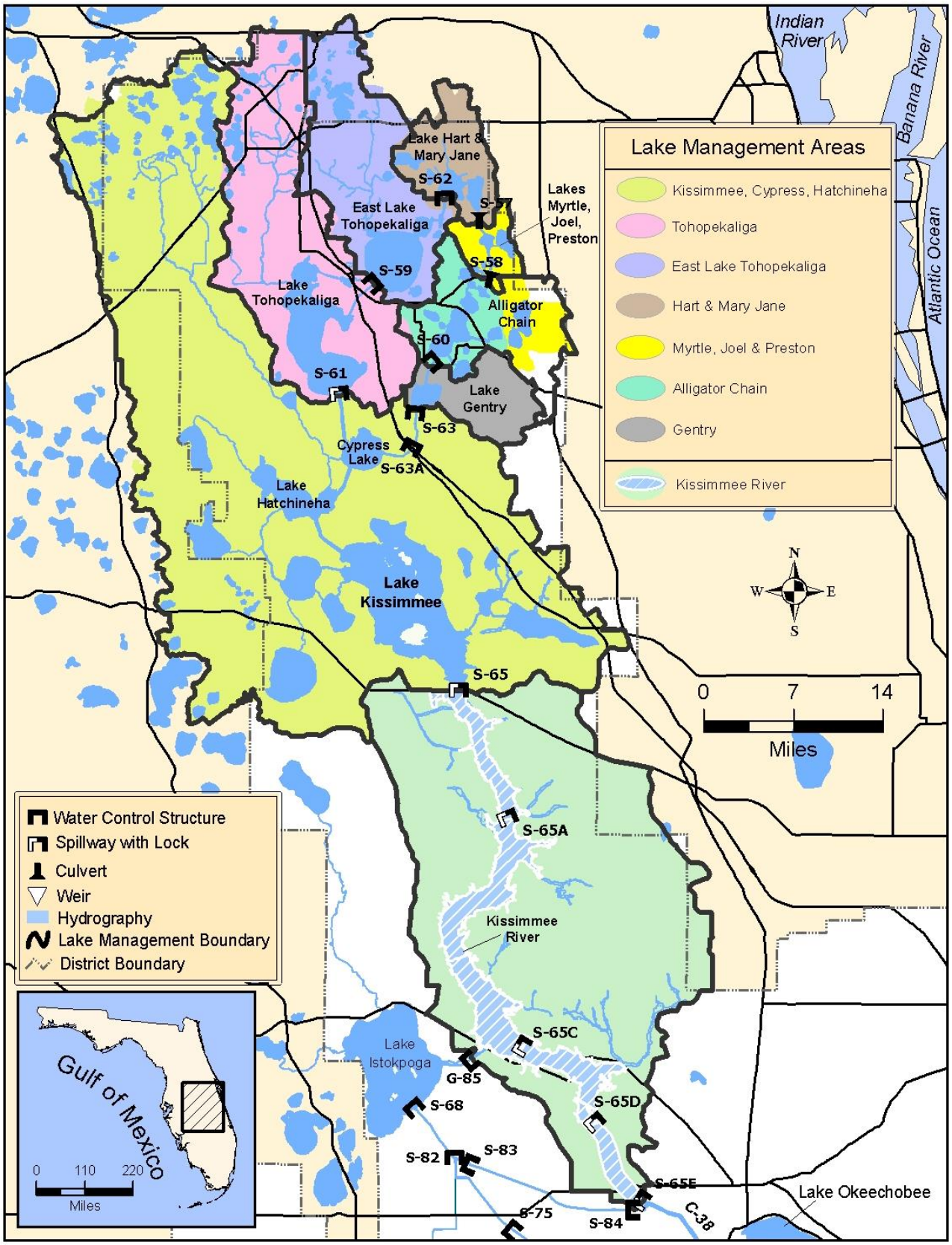


Figure 14. The Kissimmee Basin.

LAKE OKEECHOBEE

According to the United States Army Corps of Engineers (USACOE) web site, Lake Okeechobee stage is at 13.64 feet NGVD for the period ending at midnight on May 16, 2016. This value is based on the use of four interior Lake Stations (L001, L005, L006, and LZ40) and four perimeter stations (S352, S4, S308 and S133). Lake Stage has decreased by 0.26 feet over the past week and is 1.09 feet lower than it was a month ago and 0.29 feet higher than it was a year ago (Figure 1). The Lake is in the low flow sub-band (Figure 2). According to RAINDAR, 0.20 inches of rain fell directly over the Lake during the past seven days. Similar or lesser amounts of rain fell in the most of the watershed with slightly more falling to the east and south of the Lake (Figure 3).

Based on USACOE reported values, current Lake inflow is approximately 2,047 cfs, consisting of flows as indicated below.

Structure	Flow cfs
S65E	1,591
S154	0
S84 & 84X	509
S71	0
S72	0
C5(Nicodemus slough dispersed storage)	-92
S191	0
S133 PUMPS	0
S127 PUMPS	0
S129 PUMPS	0
S131 PUMPS	0
S135 PUMPS	0
Fisheating Creek	39
S2 Pumps	0
S3 Pumps	0
S4 Pumps	0

Current Lake outflow is approximately 5,878 cfs exiting at S77 (2,358 cfs), S308 (731 cfs), S351 (1,099 cfs), S352 (757 cfs), S354 (729 cfs) and to the L8 canal through Culvert C10A (204 cfs). Water supply demands have increased in the EAA contributing to more water moving south. Corrected ET value based on the L006 weather platform solar radiation data for this past week was 3600 cfs.

Change in elevation equivalents and average weekly flows for major structures are presented in Figure 4. Weekly average values for S77 and S308 are based on USGS data for the below structure gauges.

Based on the Lake Okeechobee wading bird habitat suitability index, there are currently approximately 37,046 acres of potentially suitable foraging habitat on the Lake for long-legged wading birds, and 19,828 acres of potentially suitable foraging habitat for short-legged wading birds (Figure 5). Available habitat for all species is now decreasing as Lake levels continue to fall and the marsh dries out. On the May 12 wading bird survey, 16 wading bird flocks and 1,784 foraging birds were observed (Figure 6) continuing the trend of underutilization of the Lake as foraging habitat this season. However, nesting activity appears to be increasing, although outcomes of this breeding season will depend on whether the recession continues and when the rainy season and associated ascension in Lake Stage begins.

The May nearshore SAV sentinel sites indicate that SAV areal coverage is similar to the February survey (Figure 7) and still has not recovered to levels recorded the November survey.

Field crews reported a number of areas of potential bloom this week however there are no MODIS satellite images or water quality results available at this time.

Water Management Recommendations

The winter/spring dry season recession is continuing with a decrease last week of 0.26 feet. The Lake Stage decrease reflects the continuing difference between outflows and inflows with a small decrease in tributary inflows this past week, a small increase in discharges west and south of the Lake and the seasonally high ET rate.

Future short term recommendations are highly dependent on the near-term rainfall patterns and amounts. Actions which contribute to continuing the recession are essential to position the Lake for the wet season ascension.

The goal is to avoid reversals and maintain a steady recession in Lake Stage to achieve an end of dry season elevation as close to 12.5 feet NGVD as possible. The current recession rate is probably beneficial to Lake fauna such as snail kites and wading birds although it may be too fast for apple snails due to the potential to strand adults and dry the marsh under developing egg clutches.

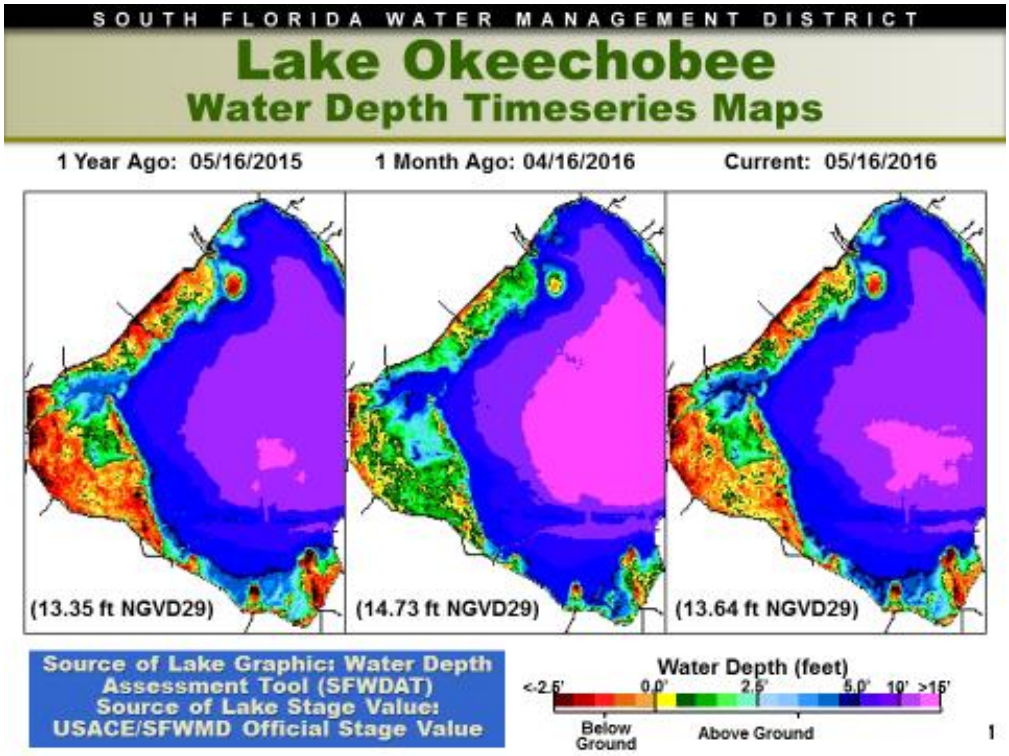


Figure 1

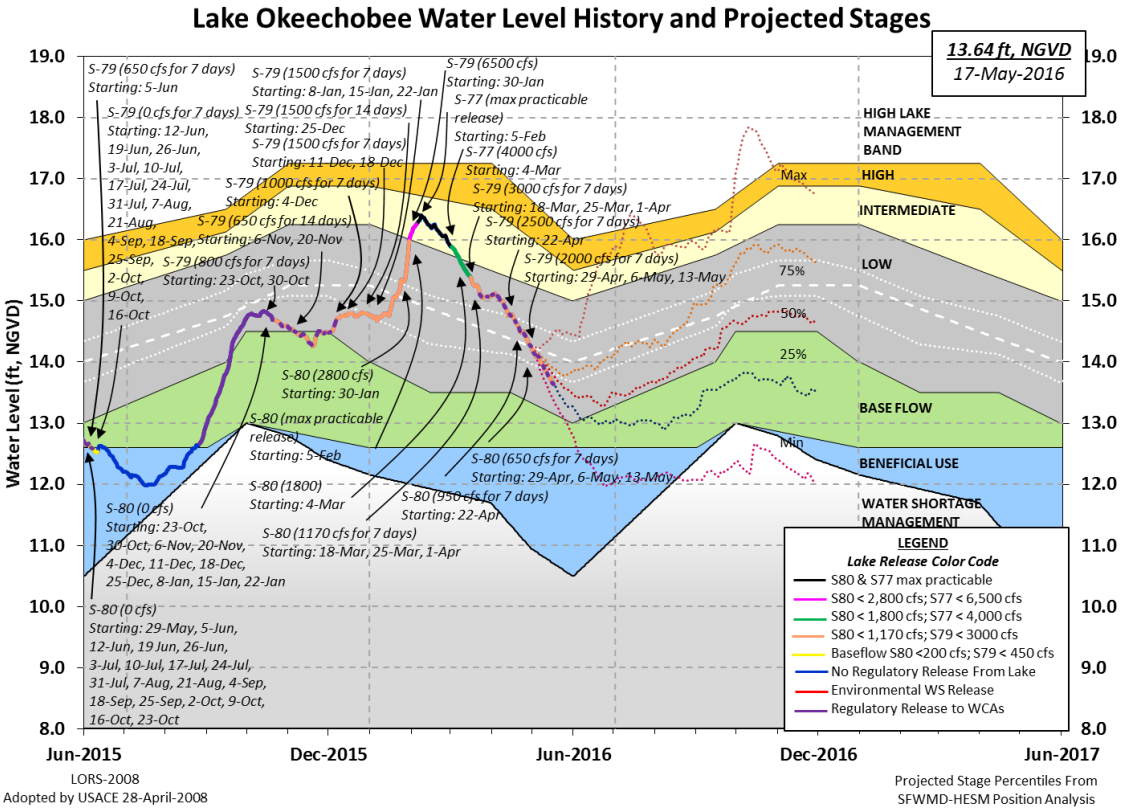

Lake Okeechobee Water Level History and Projected Stages
13.64 ft, NGVD
17-May-2016
Water Level (ft, NGVD)
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
11.0
10.0
9.0
8.0
Jun-2015
Dec-2015
Jun-2016
Dec-2016
Jun-2017
HIGH LAKE MANAGEMENT BAND
HIGH
INTERMEDIATE
LOW
BASE FLOW
BENEFICIAL USE
WATER SHORTAGE MANAGEMENT
Max
75%
50%
25%
Min
S-79 (650 cfs for 7 days) Starting: 5-Jun
S-79 (0 cfs for 7 days) Starting: 12-Jun, 19-Jun, 26-Jun, 3-Jul, 10-Jul, 17-Jul, 24-Jul, 31-Jul, 7-Aug, 21-Aug, 4-Sep, 18-Sep, 25-Sep, 2-Oct, 9-Oct, 16-Oct
S-79 (1500 cfs for 7 days) Starting: 8-Jan, 15-Jan, 22-Jan
S-79 (1500 cfs for 14 days) Starting: 25-Dec
S-79 (1500 cfs for 7 days) Starting: 11-Dec, 18-Dec
S-79 (1000 cfs for 7 days) Starting: 4-Dec
S-79 (650 cfs for 14 days) Starting: 6-Nov, 20-Nov
S-79 (800 cfs for 7 days) Starting: 23-Oct, 30-Oct
S-79 (6500 cfs) Starting: 30-Jan
S-77 (max practicable release) Starting: 5-Feb
S-77 (4000 cfs) Starting: 4-Mar
S-79 (3000 cfs for 7 days) Starting: 18-Mar, 25-Mar, 1-Apr
S-79 (2500 cfs for 7 days) Starting: 22-Apr
S-79 (2000 cfs for 7 days) Starting: 29-Apr, 6-May, 13-May
S-80 (2800 cfs) Starting: 30-Jan
S-80 (max practicable release) Starting: 5-Feb
S-80 (1800) Starting: 4-Mar
S-80 (1170 cfs for 7 days) Starting: 18-Mar, 25-Mar, 1-Apr
S-80 (950 cfs for 7 days) Starting: 22-Apr
S-80 (650 cfs for 7 days) Starting: 29-Apr, 6-May, 13-May
S-80 (0 cfs) Starting: 23-Oct, 30-Oct, 6-Nov, 20-Nov, 4-Dec, 11-Dec, 18-Dec, 25-Dec, 8-Jan, 15-Jan, 22-Jan
S-80 (0 cfs) Starting: 29-May, 5-Jun, 12-Jun, 19 Jun, 26-Jun, 3-Jul, 10-Jul, 17-Jul, 24-Jul, 31-Jul, 7-Aug, 21-Aug, 4-Sep, 18-Sep, 25-Sep, 2-Oct, 9-Oct, 16-Oct, 23-Oct
LEGEND
Lake Release Color Code
S80 & S77 max practicable
S80 < 2,800 cfs; S77 < 6,500 cfs
S80 < 1,800 cfs; S77 < 4,000 cfs
S80 < 1,170 cfs; S79 < 3000 cfs
Baseflow S80 <200 cfs; S79 < 450 cfs
No Regulatory Release From Lake
Environmental WS Release
Regulatory Release to WCAs
LORS-2008
Adopted by USACE 28-April-2008
Projected Stage Percentiles From SFWMD-HESM Position Analysis

Figure 2

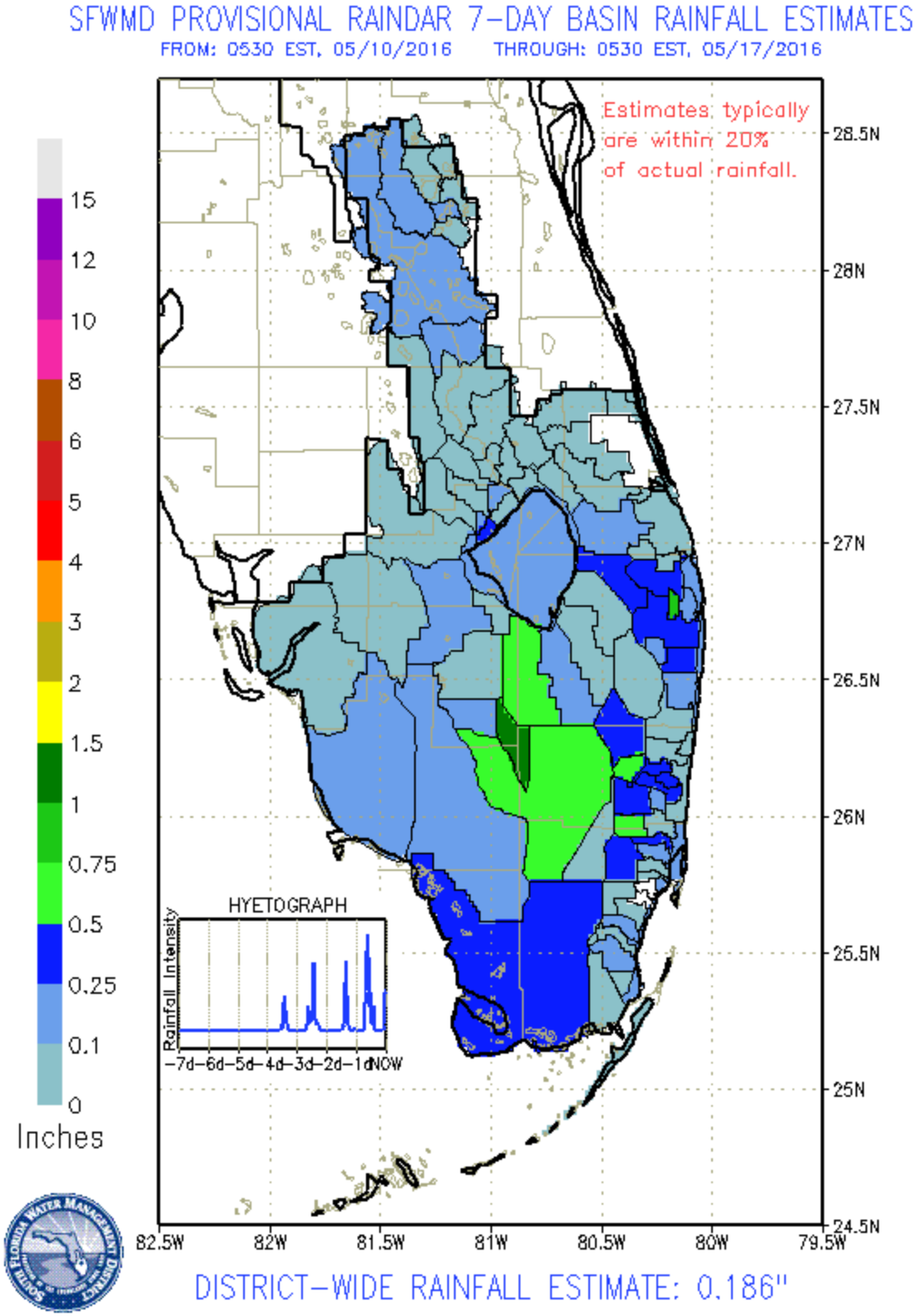

SFWMD PROVISIONAL RAINDAR 7-DAY BASIN RAINFALL ESTIMATES
FROM: 0530 EST, 05/10/2016 THROUGH: 0530 EST, 05/17/2016
Estimates typically are within 20% of actual rainfall.
15
12
10
8
6
5
4
3
2
1.5
1
0.75
0.5
0.25
0.1
0
Inches
HYETOGRAPH
Rainfall Intensity
-7d-6d-5d-4d-3d-2d-1dNOW
28.5N
28N
27.5N
27N
26.5N
26N
25.5N
25N
24.5N
82.5W
82W
81.5W
81W
80.5W
80W
79.5W
DISTRICT-WIDE RAINFALL ESTIMATE: 0.186"

Figure 3

INFLOWS	Average Daily Flow Past Week cfs	Feet of Change Past Week
S65E	1498	0.053
S71 & 72	0	0.000
S84 & 84X	396	0.014
Fisheating Creek	47	0.002
Rainfall	N.A.	0.017
OUTFLOWS	**Average Daily Flow Past Week cfs**	**Feet of Change Past Week**
S77	2273	0.080
S308	526	0.018
S351	1246	0.044
S352	526	0.018
S354	956	0.034
L8	294	0.010
ET	3600	0.127

Figure 4

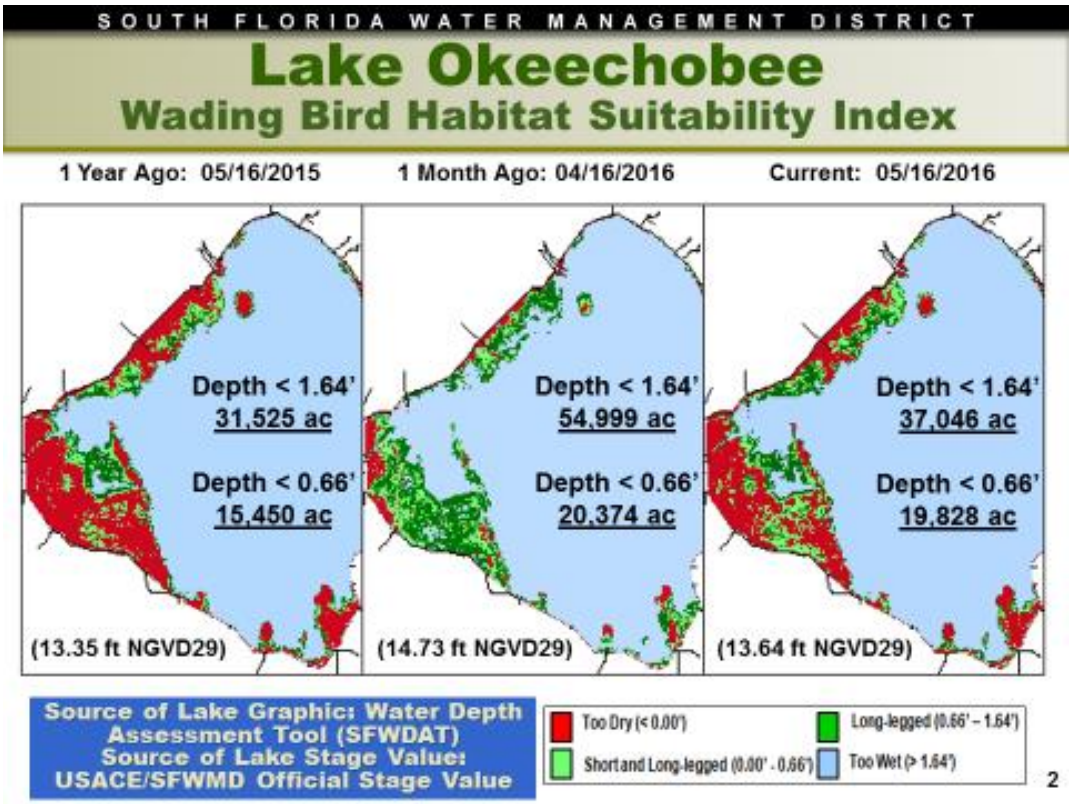


Figure 5

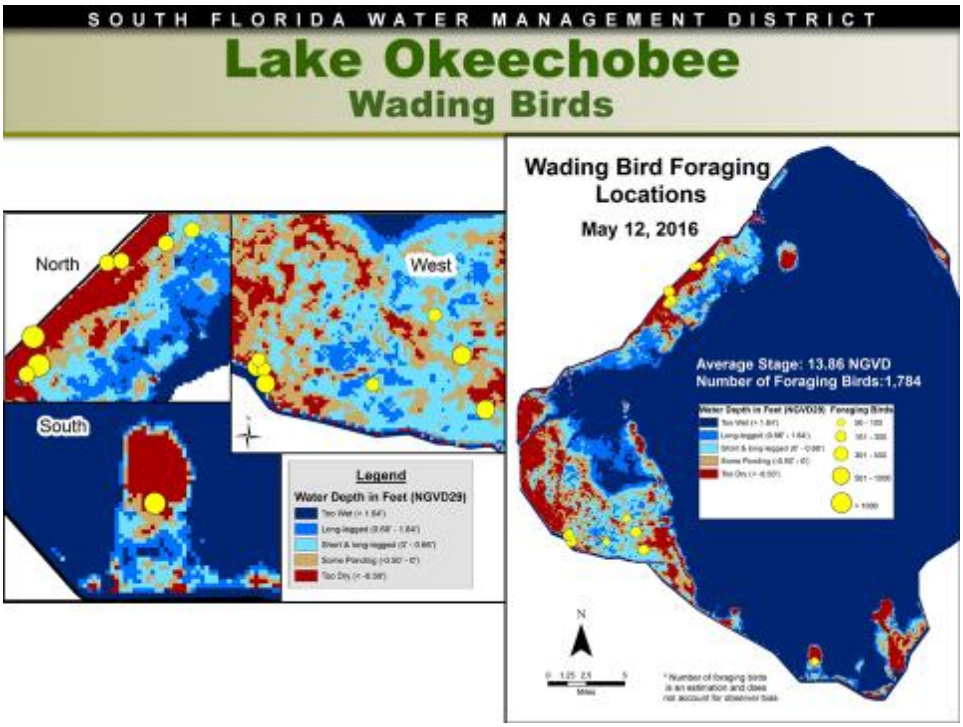


Figure 6

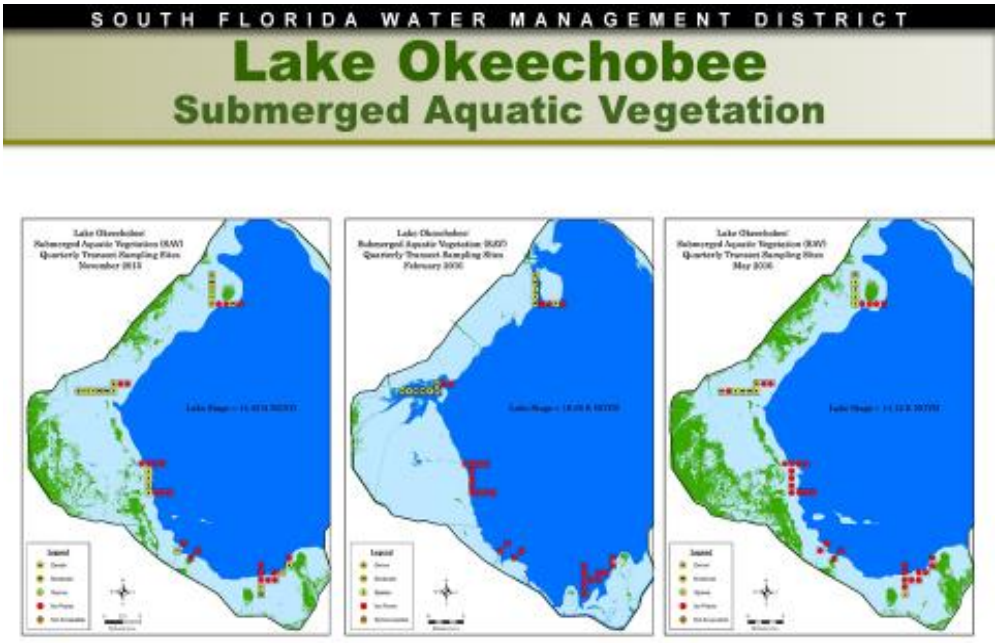


Figure 7

Lake Istokpoga:

The spring recession recommenced last week with Lake Stage decreasing by 0.22 feet. Lake Stage is 38.58 feet NGVD today and is currently at its regulation schedule (Figure 8). Average flows into the Lake from Arbuckle and Josephine creeks were 155 and 26 cfs respectively, a decrease from the preceding week. Average discharge from S68 and S68X this past week was 632 cfs, an increase compared to the preceding week. According to RAINDAR, 0.02 inches of rain fell in the Lake Istokpoga watershed during the past seven days.

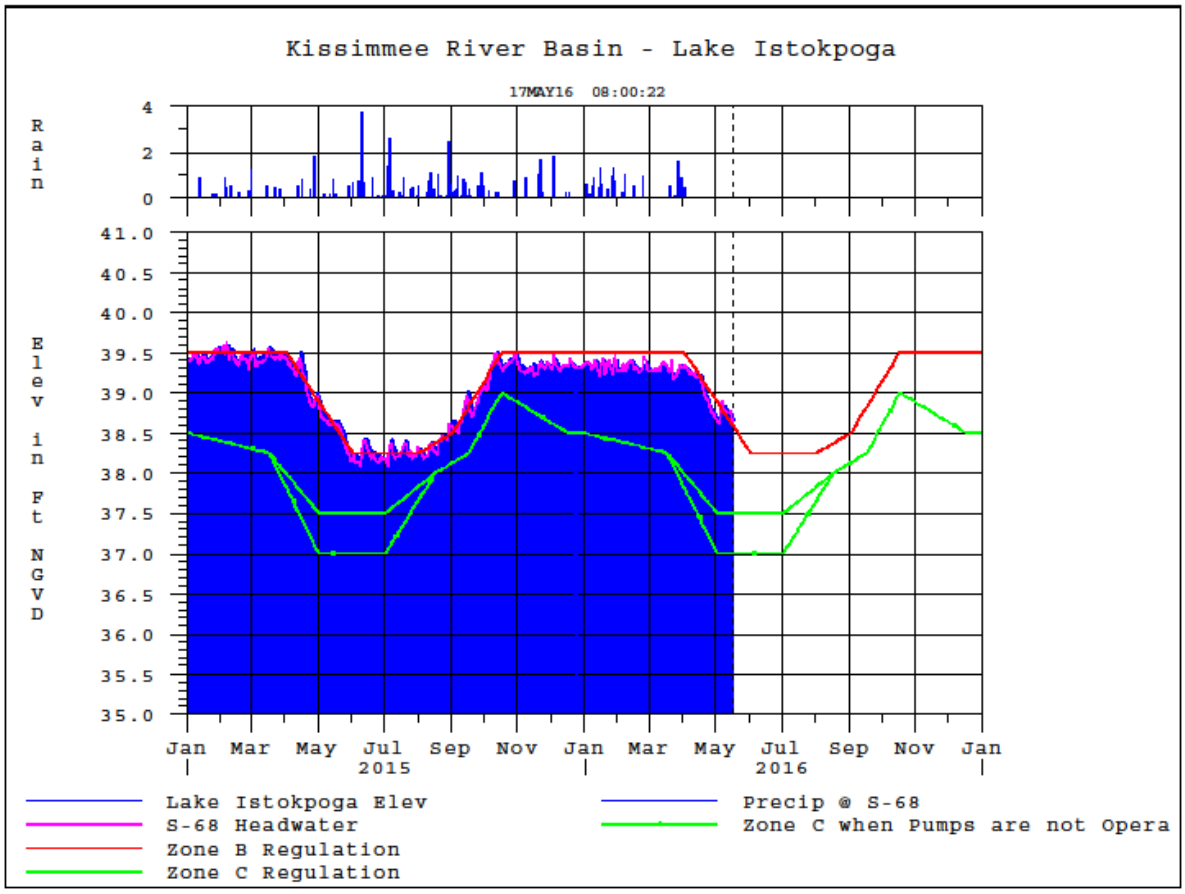


Figure 8

ESTUARIES

St. Lucie Estuary:
Over the past week, provisional flows averaged about 642 cfs at S-80, 583 cfs downstream of S-308, 0 cfs at S-49 on C-24, 2 cfs at S-97 on C-23, and 64 cfs from Ten Mile Creek at the Gordy Road Structure. Average inflow from tidal basin tributaries is estimated to be 60 cfs (Figures 1 and 2). Total inflow averaged about 768 cfs last week and 1106 cfs over last month.

Over the past week, surface salinity increased 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 13.6. Salinity conditions in the middle estuary are in the good 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)	**10.1** (7.3)	**11.7** (11.8)	NA[1]
US1 Bridge	**12.6** (11.5)	**14.7** (14.5)	10.0-26.0
A1A Bridge	**21.8** (20.9)	**26.5** (25.9)	NA

[1]Envelope not applicable

Caloosahatchee Estuary:
During the past week, provisional flows averaged approximately 2273 cfs downstream of S-77, 1721 cfs at S-78, and 2164 cfs at S-79. Average inflow from tidal basin tributaries is estimated to be 84 cfs (Figures 5 and 6). Total inflow averaged 2248 cfs last week and 2569 cfs over last month.

Over the past week, salinity remained about fresh in the upper estuary from S-79 to Ft. Myers Yacht Basin and remained about the same downstream (Table 2, Figures 7&8). The seven-day average salinity values are within the good range for adult oysters at Shell Point and at Sanibel and in the fair range at Cape Coral (Figure 9). The 30-day moving average surface salinity is 0.3 at Val I-75 and 0.9 at Ft. Myers. Salinity conditions at Val I-75 are in the good range for tape grass, and are forecasted to remain so in following two weeks even without discharges at S-79 (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)	**0.2** (0.2)	**0.2** (0.2)	NA[1]
*Val I75	**0.3***(0.3*)	**0.8***(0.3*)	0.0-5.0[2]
Ft. Myers Yacht Basin	**1.1** (0.6)	**3.5** (0.7)	NA
Cape Coral	**6.6** (7.7)	**10.8** (9.3)	10.0-30.0
Shell Point	**18.7** (19.7)	**22.0** (23.0)	10.0-30.0
Sanibel	**28.0** (28.0)	**29.5** (28.6)	10.0-30.0

[1]Envelope not applicable, [2]Envelope is based on a 30-day average.
*Val I75 is temporarily offline due to bridge 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 *a* (µg/l)	4.2 – 7.7	2.8 – 10.1	1.5 – 3.9
Dissolved Oxygen (mg/l)	6.0 – 9.7	1.1 – 8.5	5.4 – 7.1

The Florida Fish and Wildlife Research Institute reported on May 13, 2016, that *Karenia brevis, the Florida red tide organism,* was observed at background concentrations in one sample from Lee County.

Water Management Recommendations

Given the current estuarine conditions, there are no ecological benefits associated with additional releases from Lake Okeechobee.

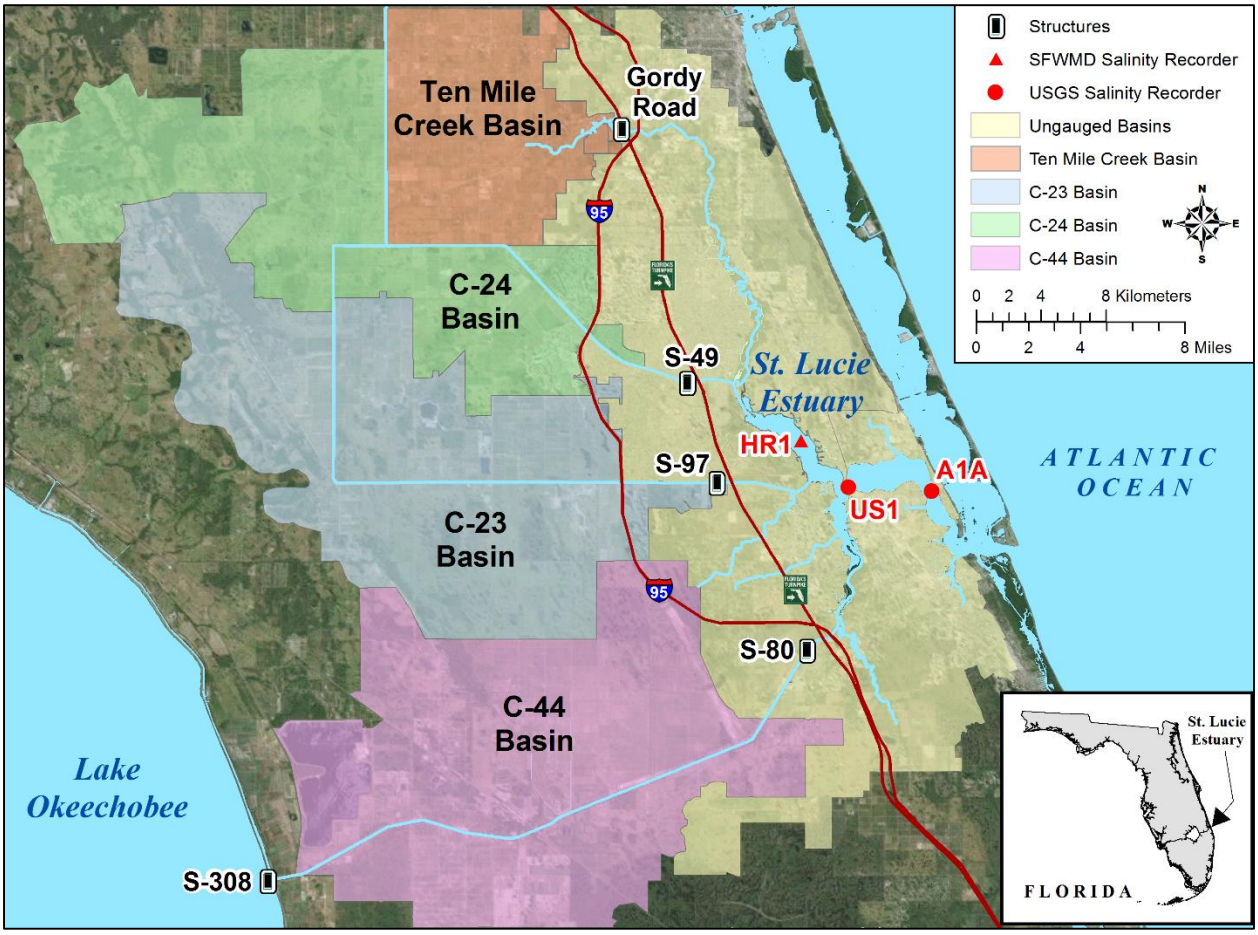


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

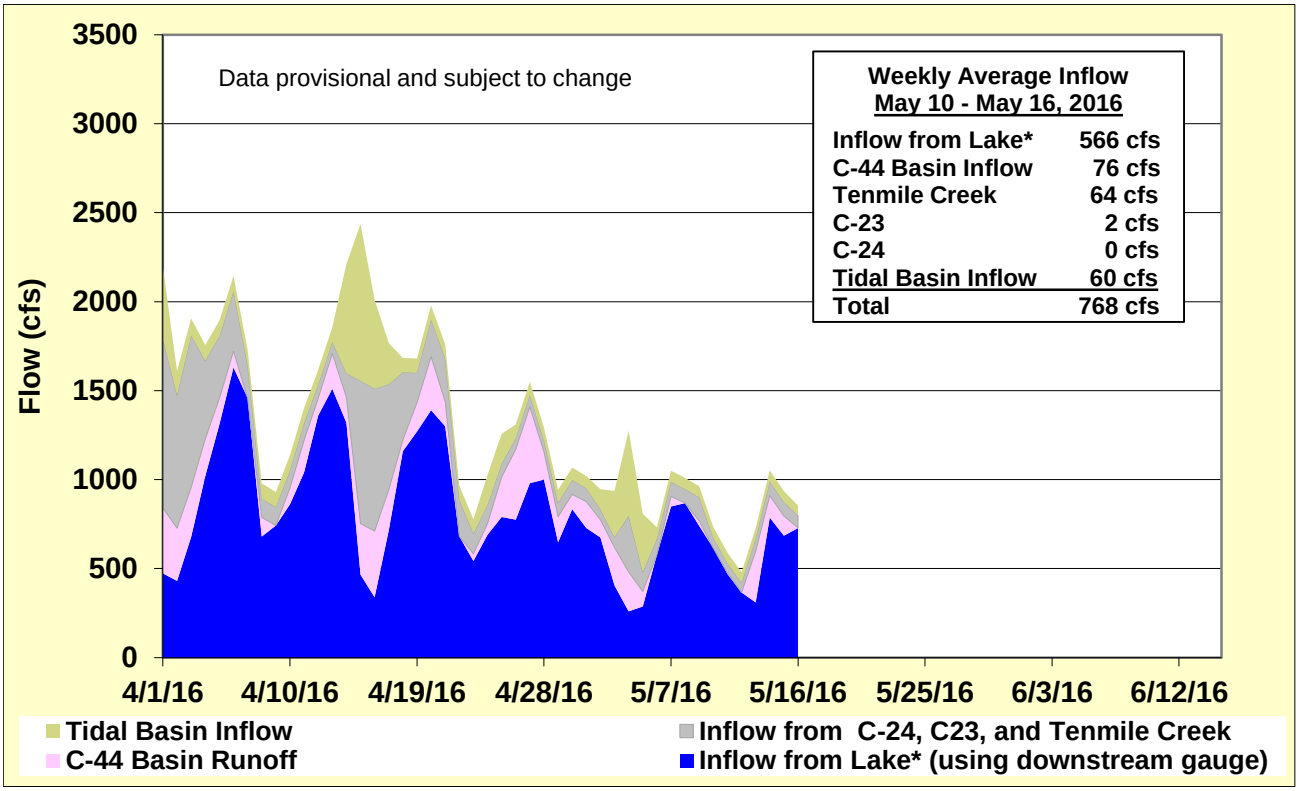


Figure 2. Estimated surface freshwater inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basins into the St. Lucie Estuary.

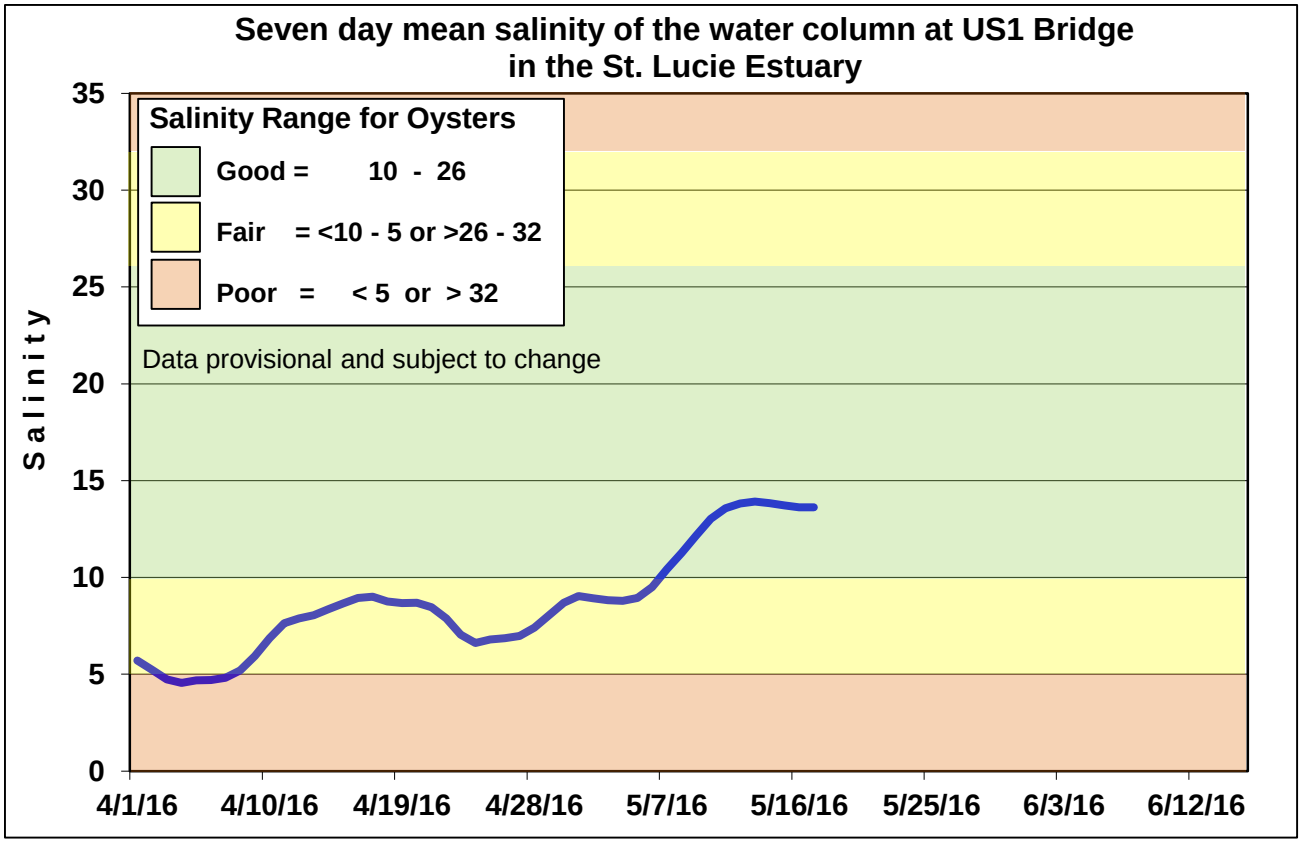


Figure 3. Seven-day mean salinity of the water column at the U.S. Highway 1 Bridge.

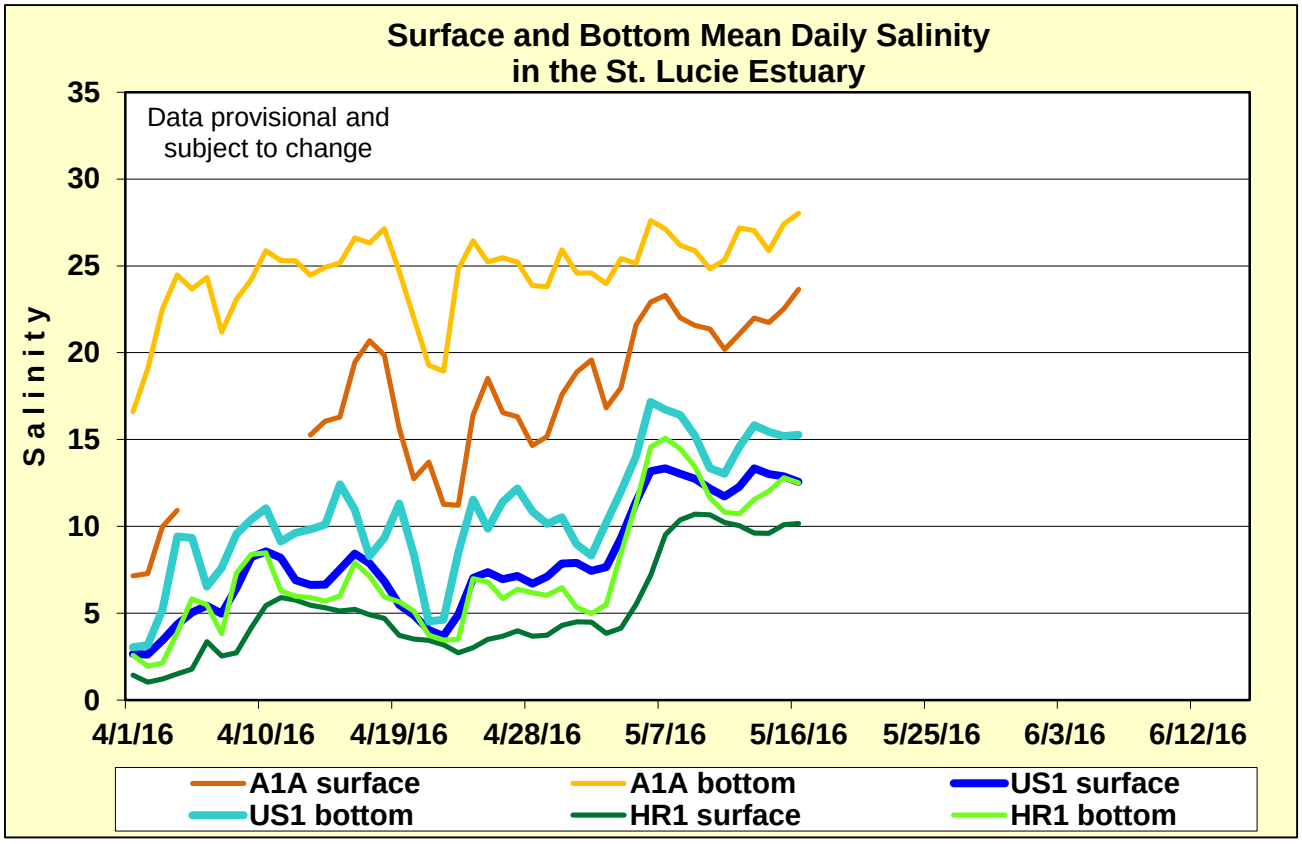


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

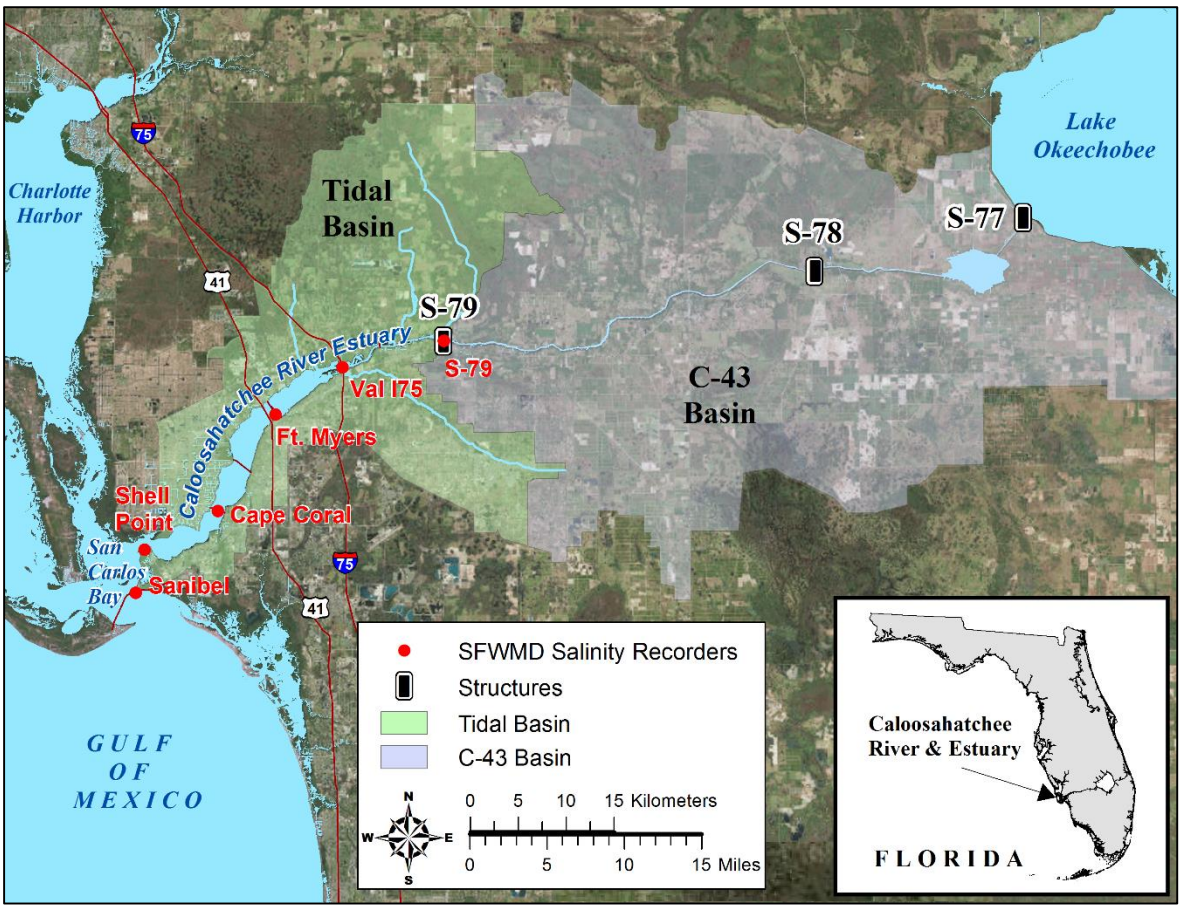


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

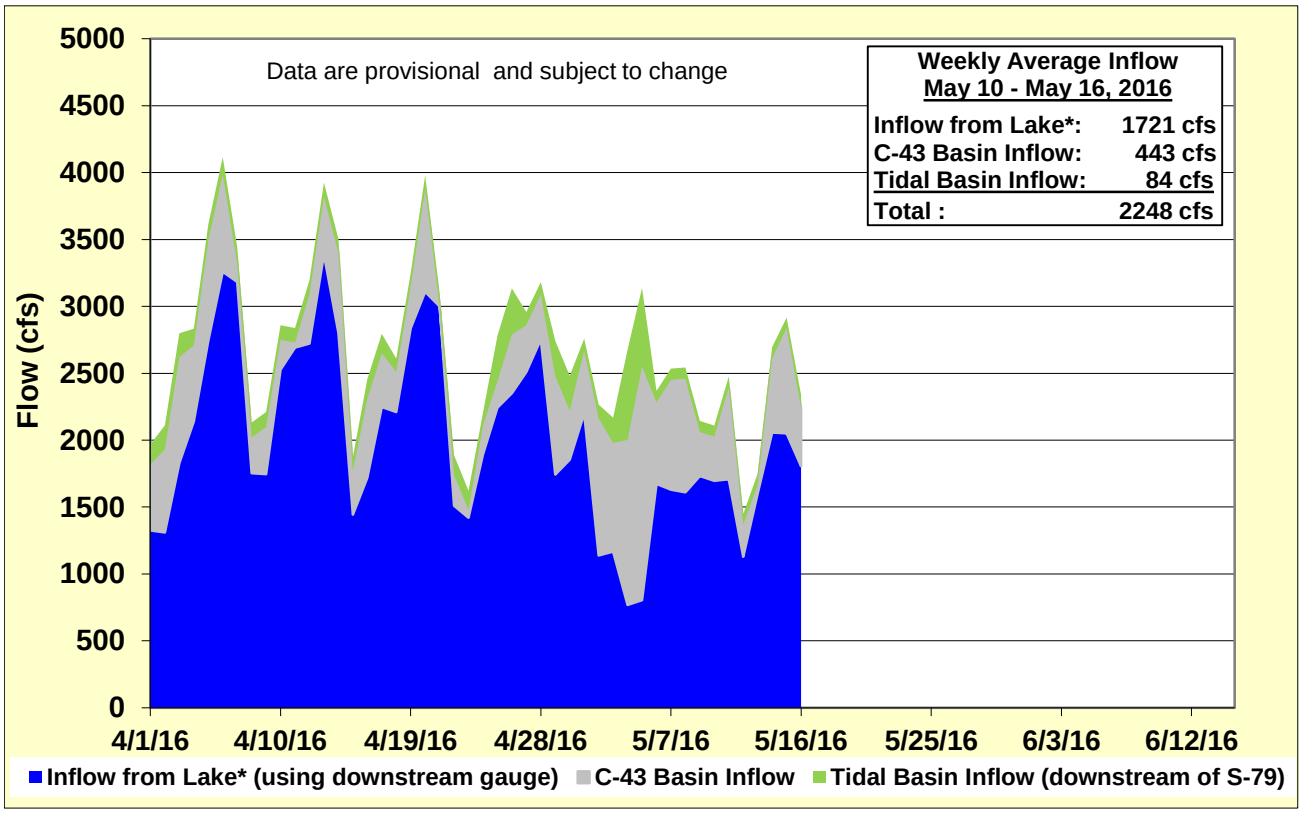
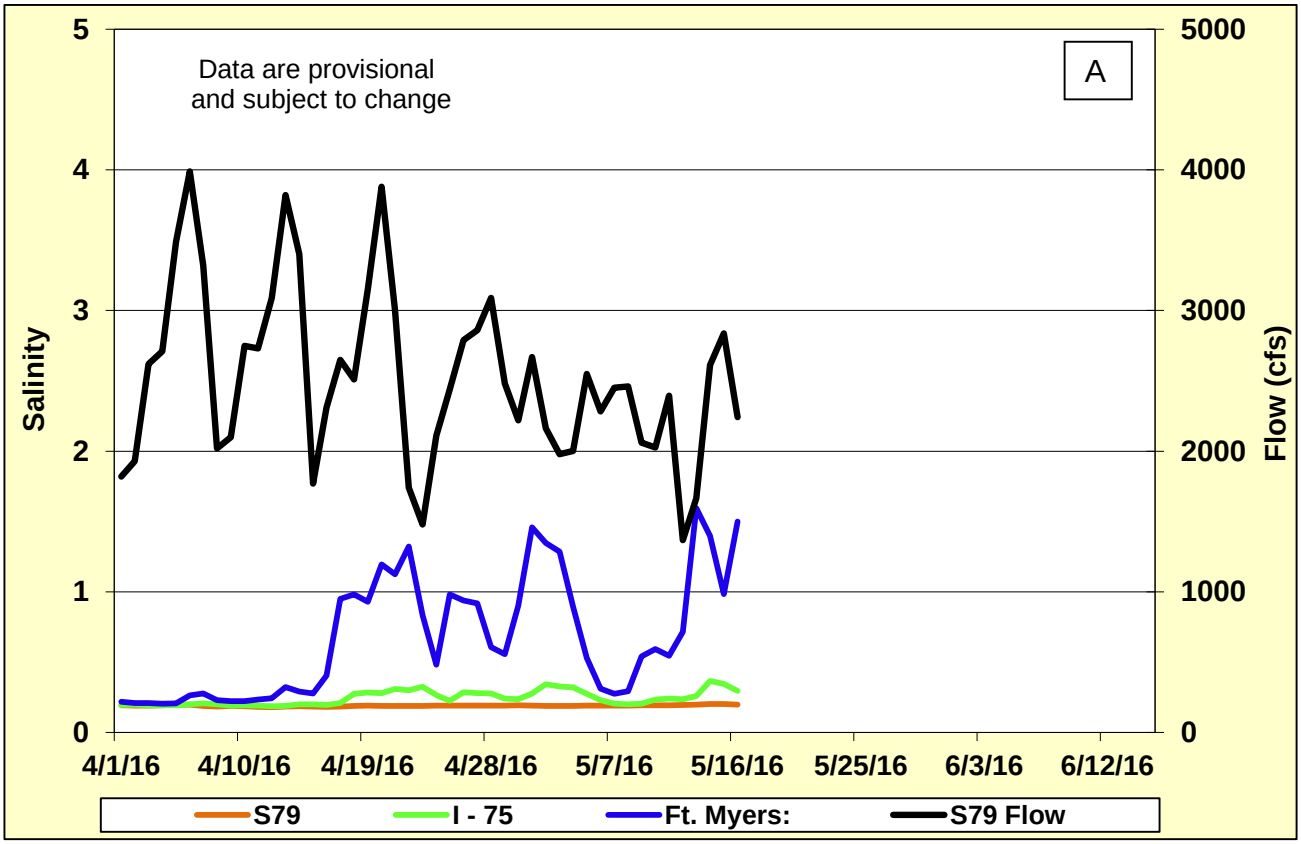


Figure 6. Freshwater inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.



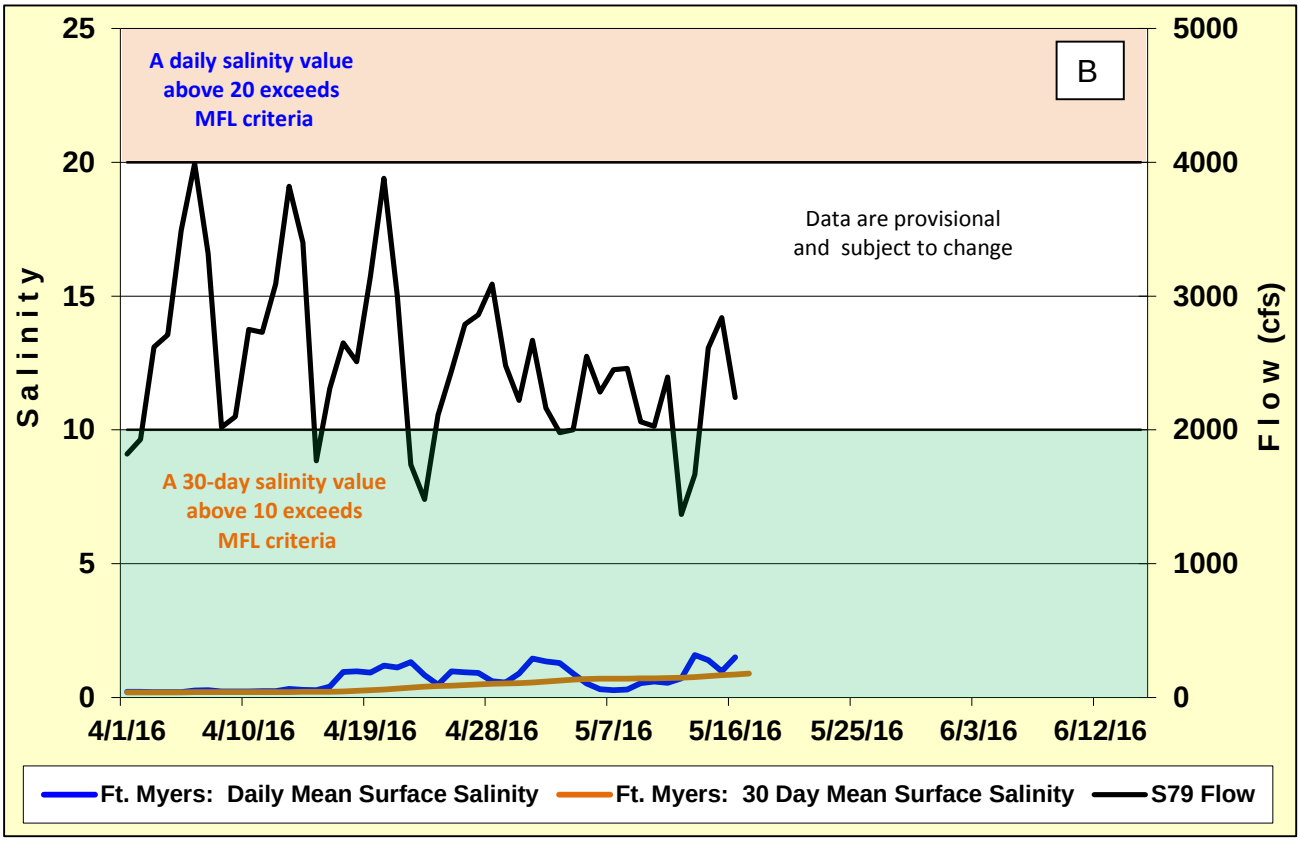


Figure 7. (A) Daily mean flows at S-79 and salinity at upper estuary monitoring stations (B) 30-day moving average salinity at Ft. Myers.

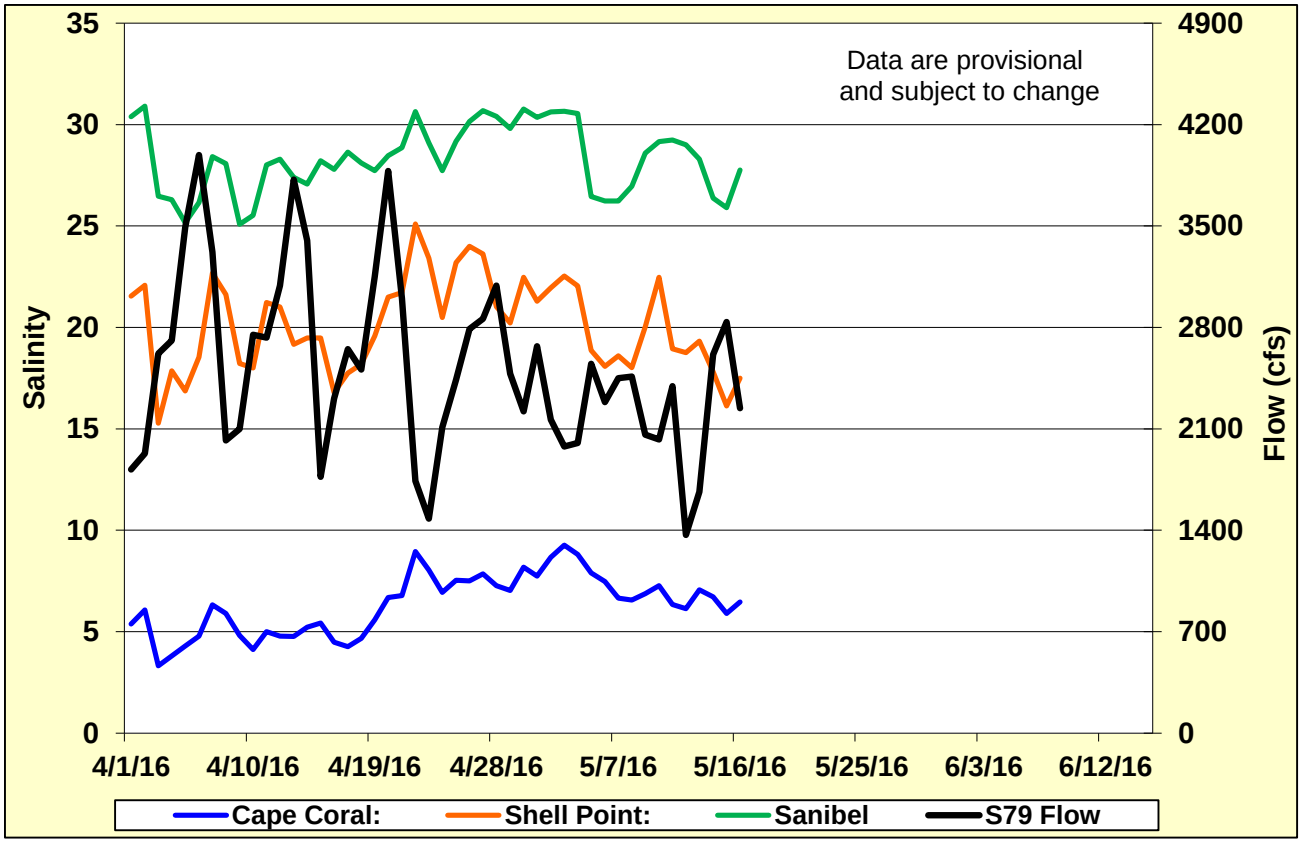


Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.

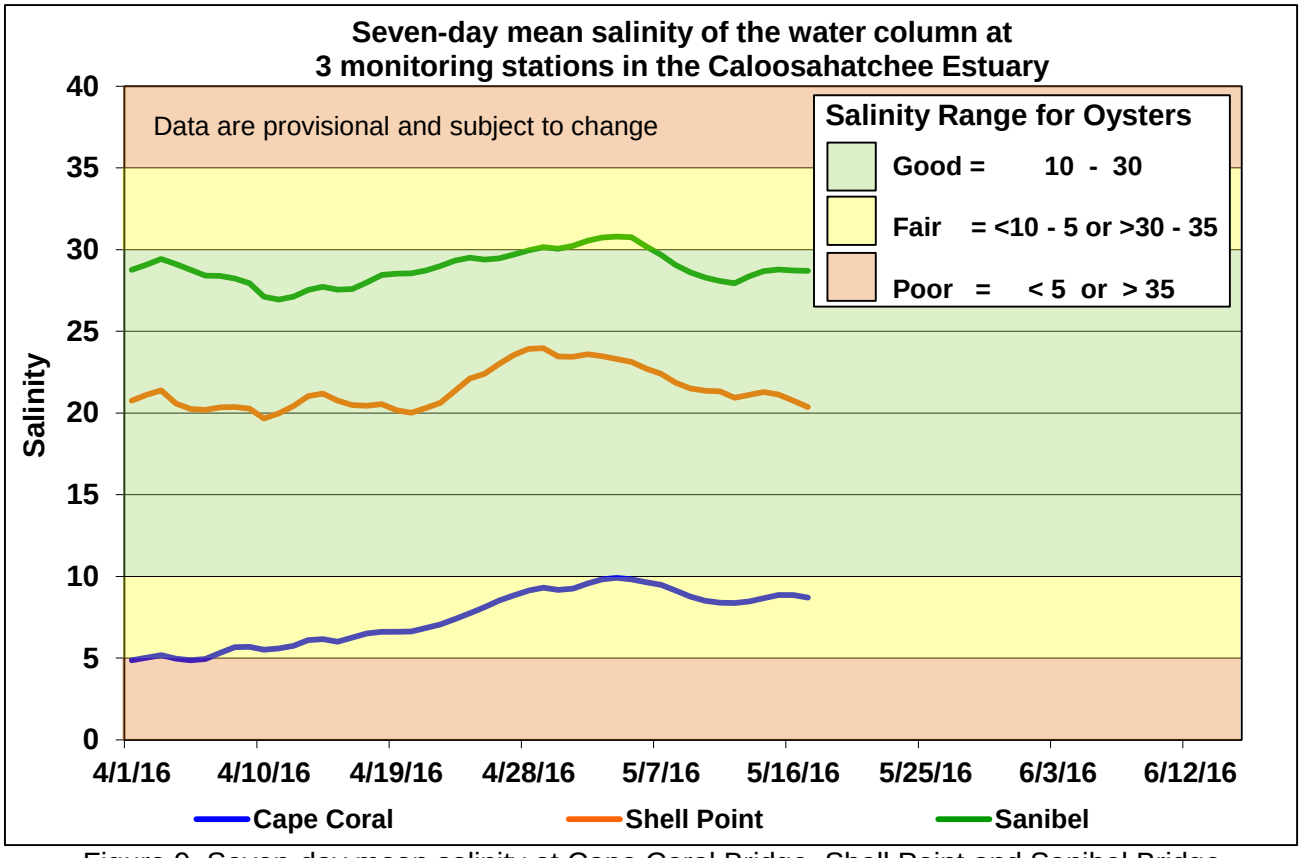


Figure 9. Seven-day mean salinity at Cape Coral Bridge, Shell Point and Sanibel Bridge monitoring stations.

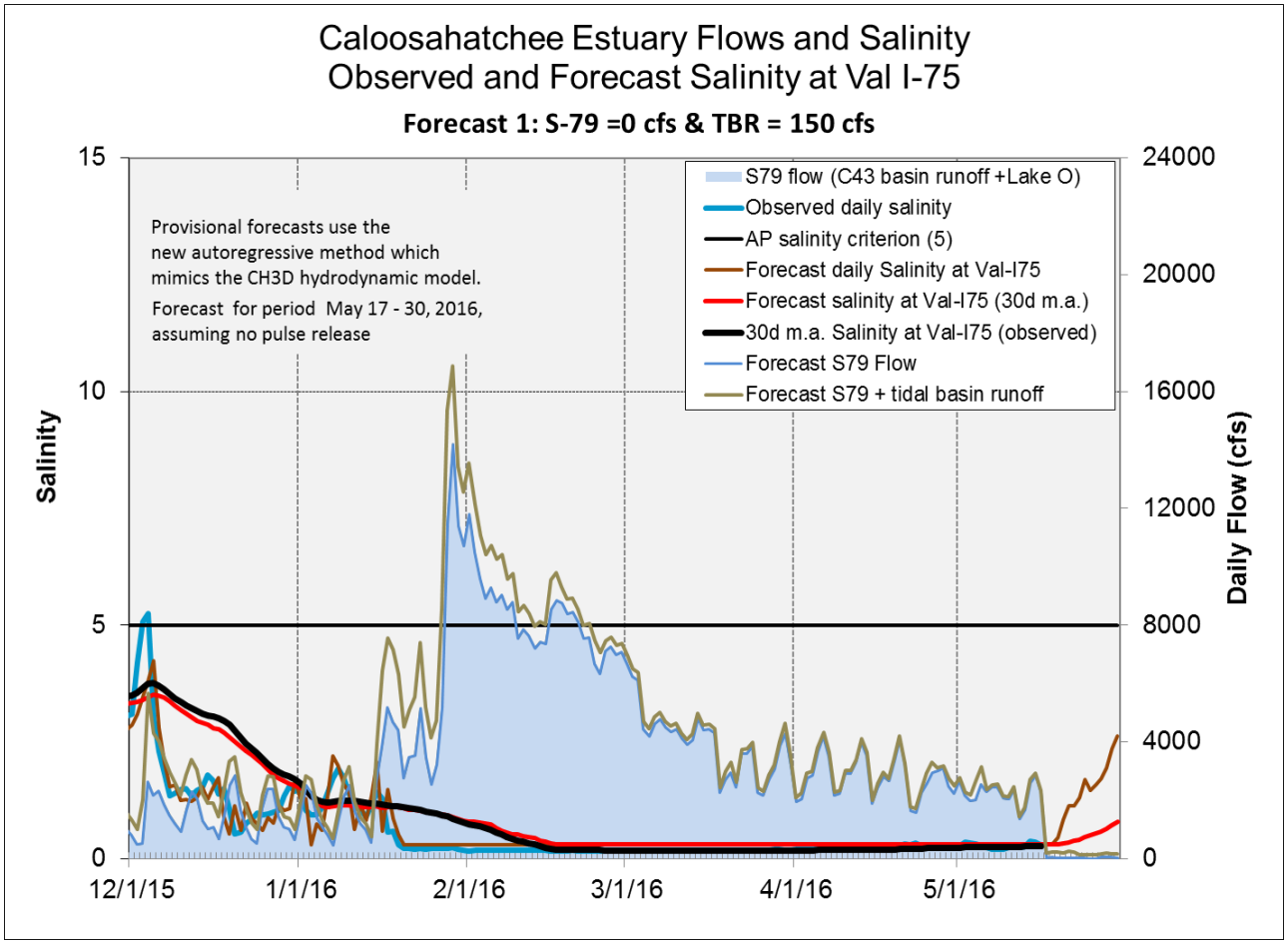


Figure 10. 14-day salinity forecast at Val I-75 assuming no releases at S-79.

Appendix A
Water quality mapping using an onboard flow through system

The flow through system consists of an intake ram attached to the transom of a boat, a flow meter, Garmin GPSMap_78S, YSI 6600 multi-parameter water quality instrument, C3 submersible fluorometer, and laptop computer with Streamline GEO software (Figure A1). The YSI 6600 was set up to record temperature, salinity, turbidity, dissolved oxygen, and chlorophyll *a*. The C3 measures temperature, colored dissolved organic matter, chlorophyll a, and turbidity. The intake ram was set at 0.5 m depth. Streamline Geo software permitted integration of the GPS and surface water data into an ArcGIS shapefile used to display surface water properties and facilitate the post-processing of spatial data. The GPS, YSI, and C3 recorded spatial and hydrographic information at 5-s intervals. Discrete water samples were also taken for analysis of chlorophyll *a* following the SFWMD's Standard Operating Procedures. Laboratory determination of chlorophyll *a* concentrations will be used to calibrate in situ values of chlorophyll *a* reported in the field by the optical chlorophyll probe.

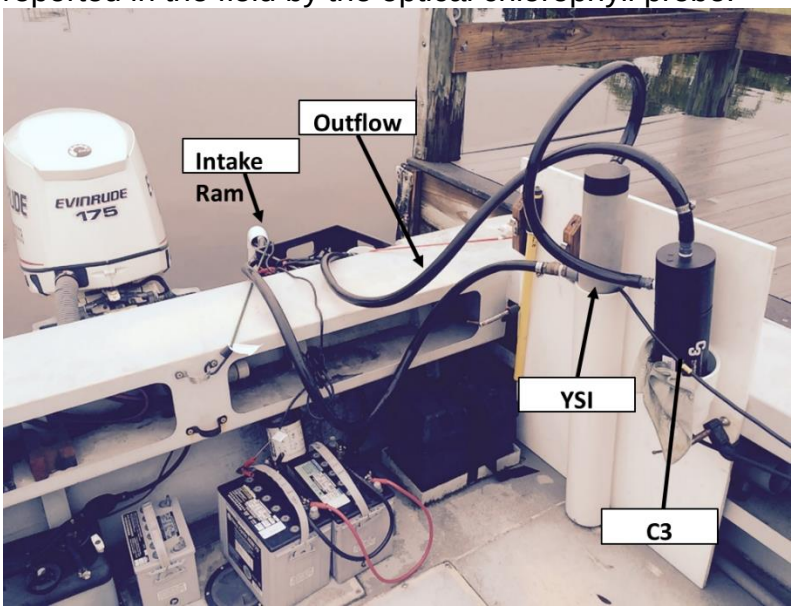


Figure A1. The flow-through system used for water quality mapping.

A map showing the water quality survey track in the St. Lucie Estuary taken on April 28, 2016 (Figure A2). Values for salinity, chlorophyll and turbidity are shown on Figure A3 and Figure A4. Surface water was fresh from S-80 to Palm City then increased toward the inlet. Turbidity followed the opposite pattern being high at S-80 then declining rapidly after Palm City toward the inlet. Chlorophyll was highest in the lower estuary with a maxima near the A1A Bridge.

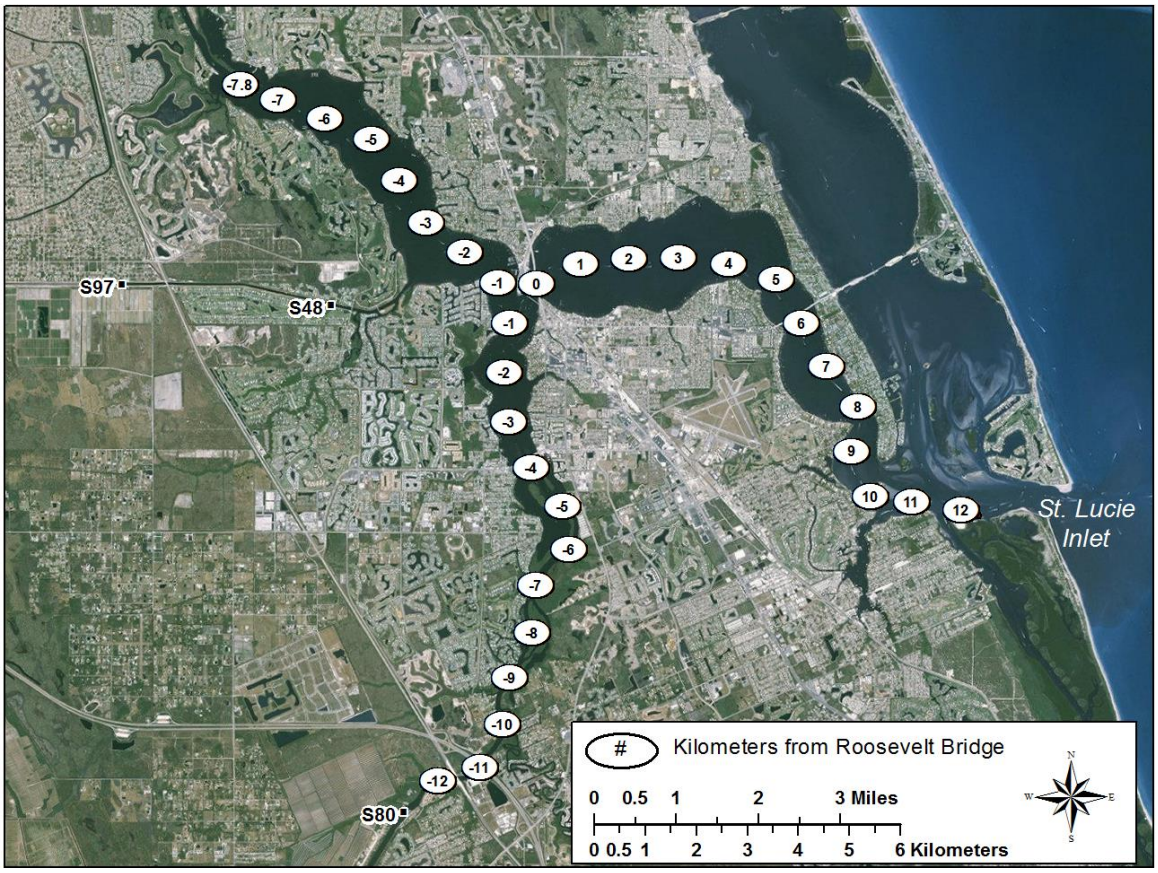


Figure A2. Water quality mapping track with river kilometers away from the Roosevelt Bridge (US1).

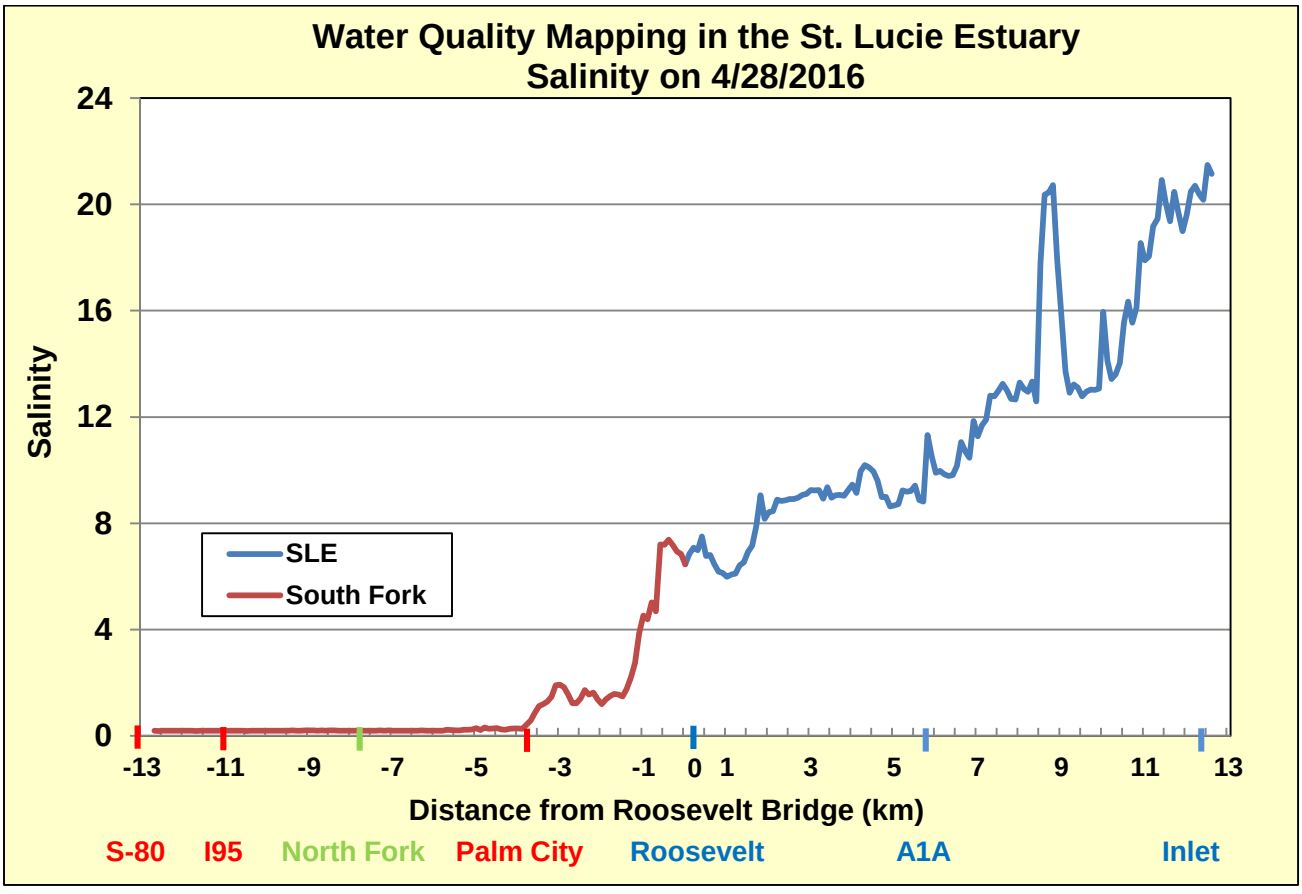
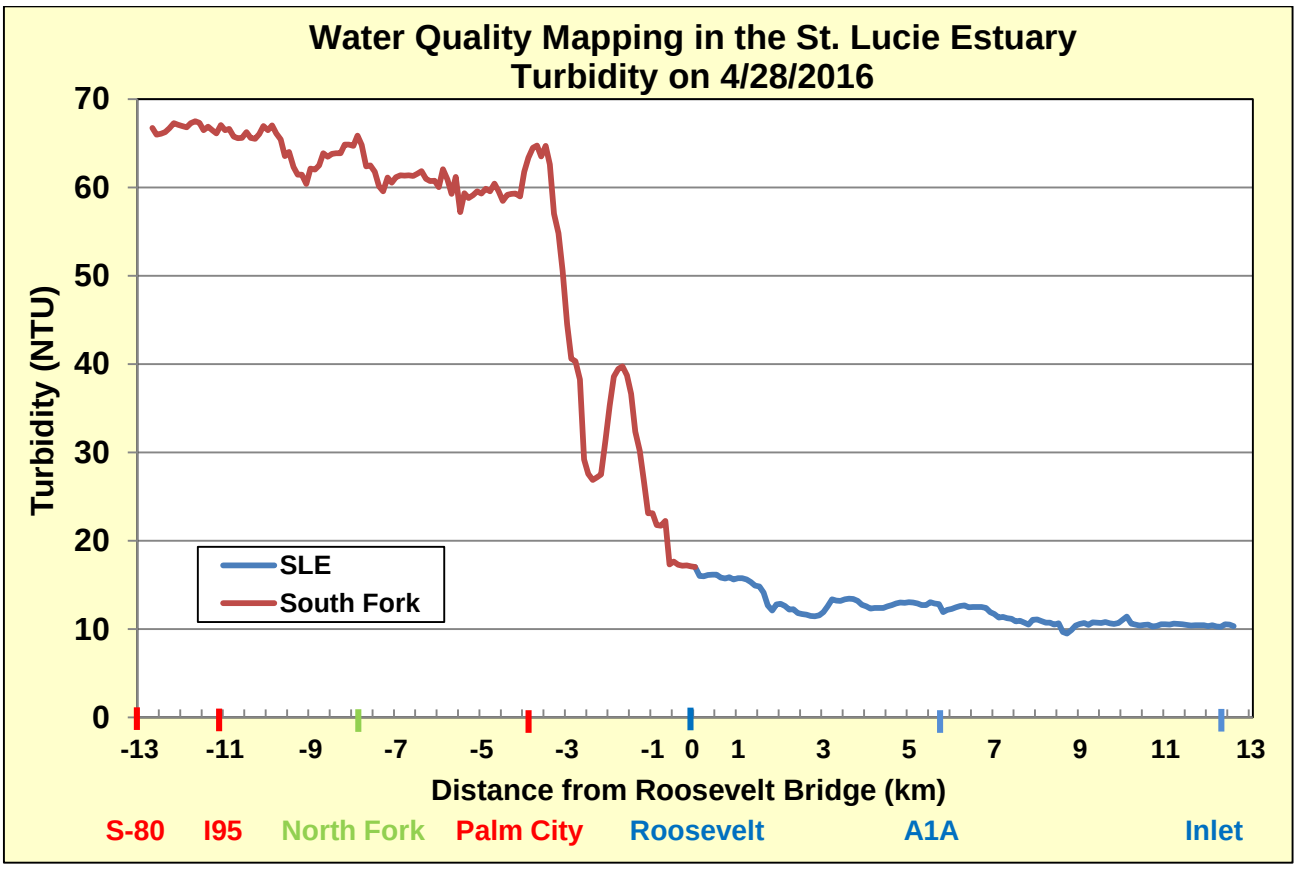


Figure A3. Water Quality Mapping salinity results from S-80 to the Inlet on April 28, 2016.



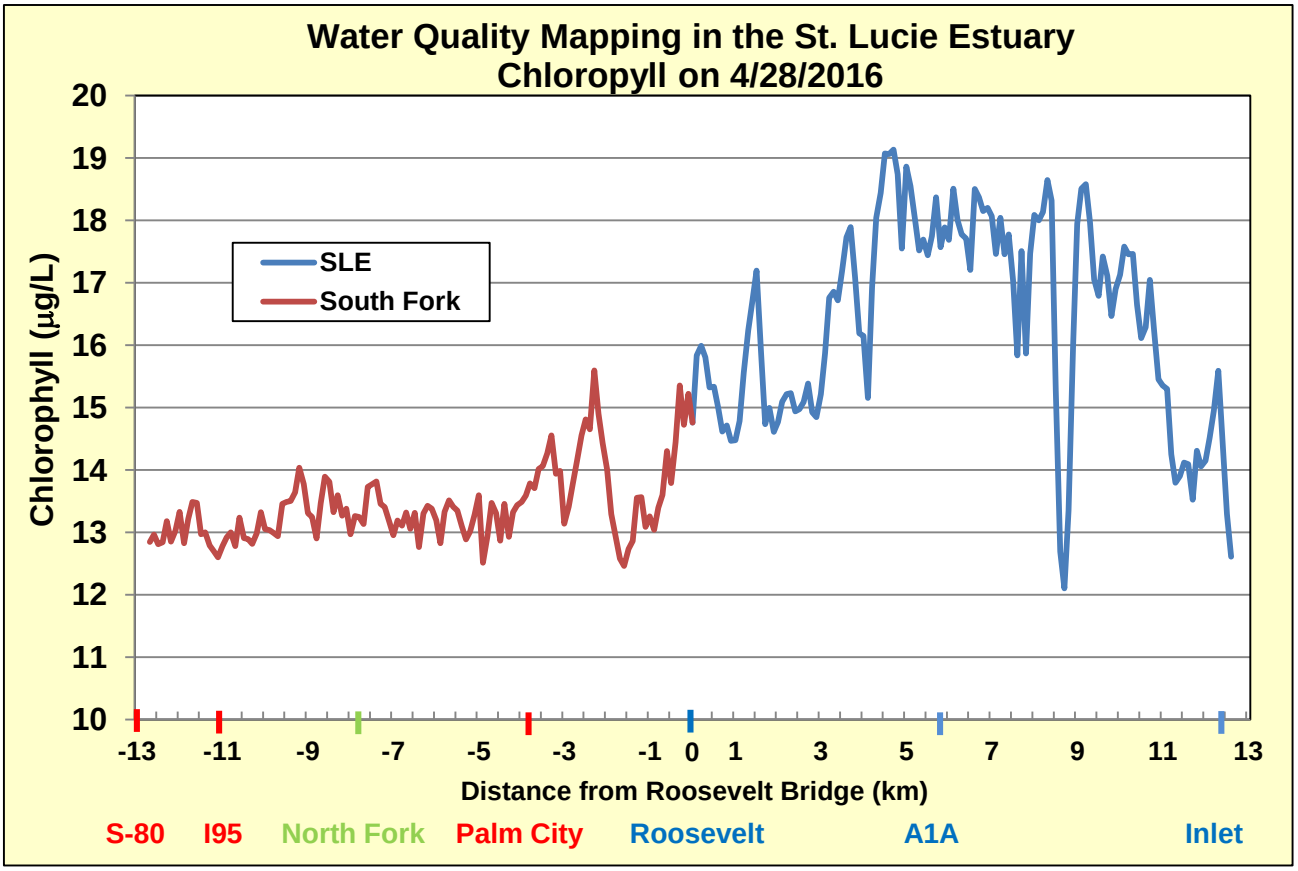
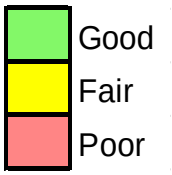


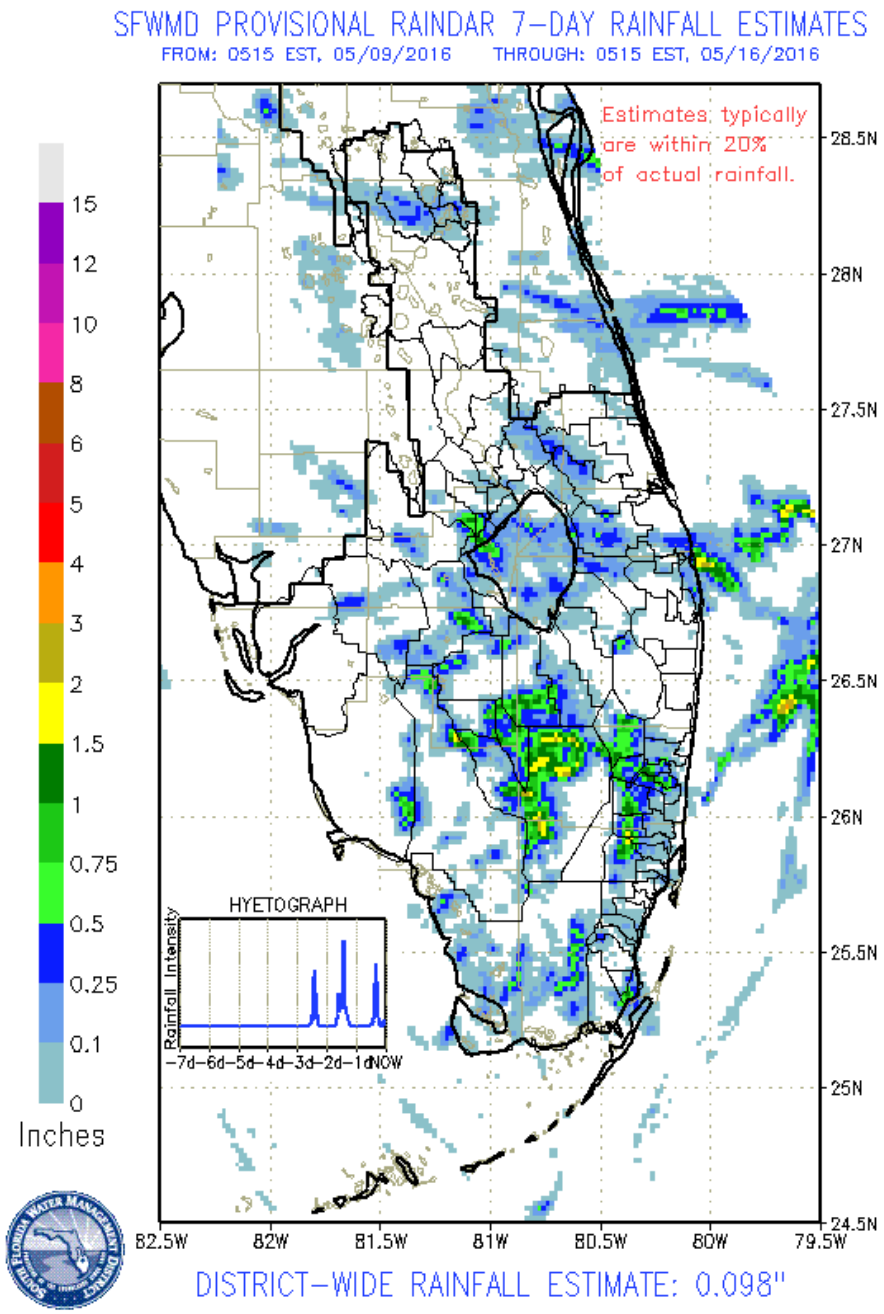
Figure A4. Water Quality Mapping turbidity and chlorophyll results from S-80 to the Inlet on April 28, 2016.

GREATER EVERGLADES

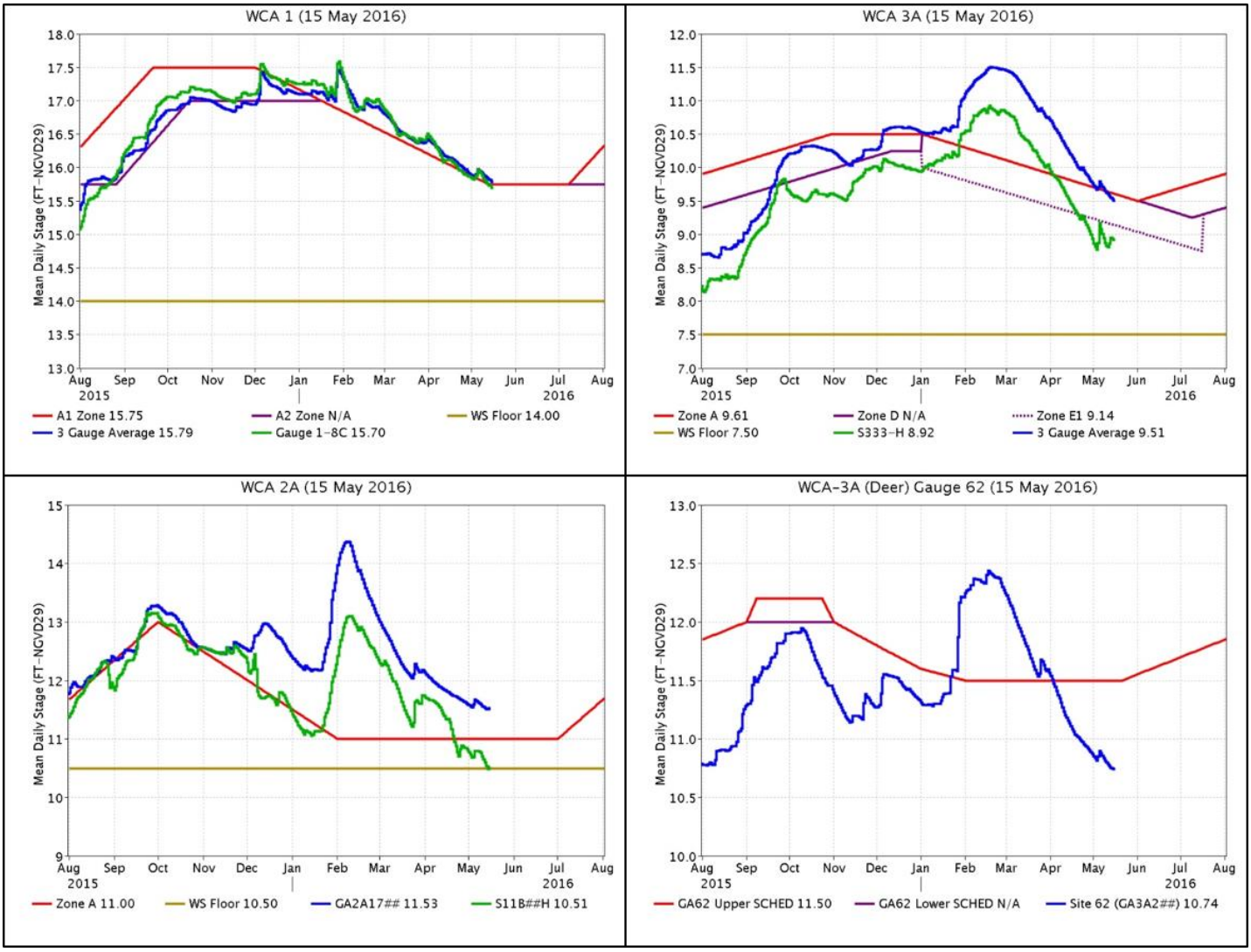
Rainfall was sparse and extremely patchy last week. Basin stage changes ranged from −0.22 feet to −0.03 feet. Pan evaporation was 1.98 inches, which is higher than the historic average of 1.62 inches.

Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	0.04	-0.15
WCA-2A	0.37	-0.08
WCA-2B	0.52	-0.15
WCA-3A	0.45	-0.14
WCA-3B	0.00	-0.14
ENP	0.07	-0.29

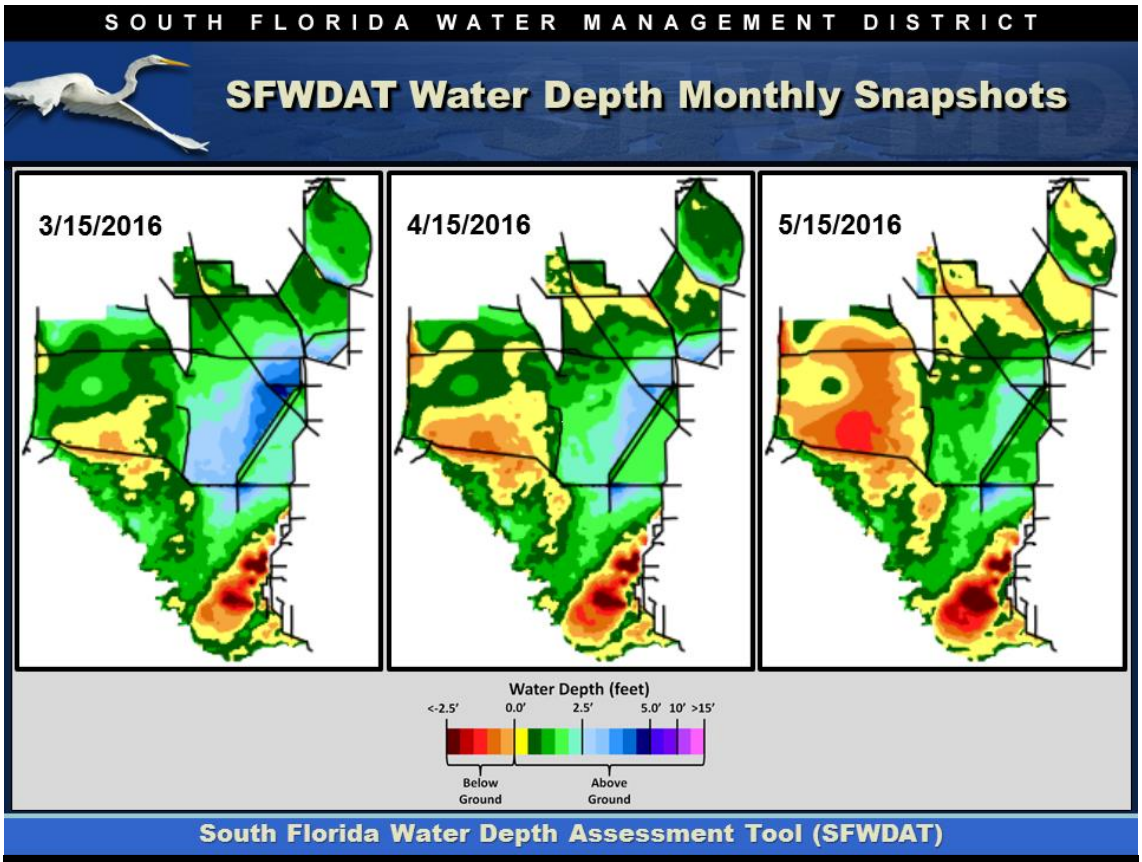


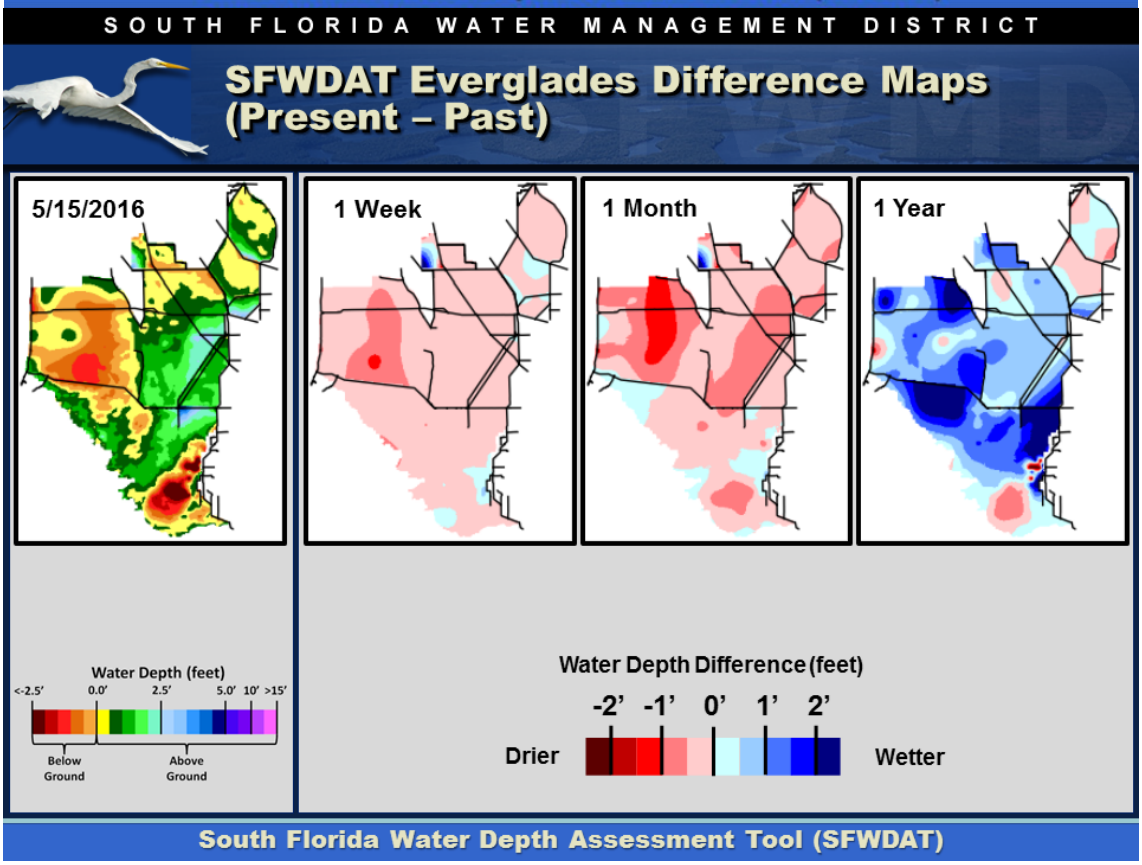


Regulation Schedules: Water levels are decreasing, and WCA-1 and WCA-3A stages are near regulation with WCA-1 being 0.04 feet above and WCA-3A being 0.1 feet below (within Zone E1). The WCA-2A stage decreased to 0.53 feet above regulation, and the northwestern WCA-3A gauge stage (gauge 62) has decreased slightly to -0.76 feet below the upper schedule.



Water Depths and Changes: Water levels continue to decrease and are lower than they were one week, one month, and two months ago, with the notable exception of Rotenberger. Water depths at the monitored gauges (except WCA-2B) range from 0.41 feet to 1.96 feet (in northern ENP). Relative to a year ago, stages are mostly higher.





Wading birds: Water levels continue to be good for foraging in some of the longer hydroperiod marshes, and the birds are responding by foraging in quite large numbers. Flocks were a mix of all species including wood storks and spoonbills and were similar in number to last week with the exception of northeast WCA-1, which had about 2,500 birds instead of the 1,000, witnessed last week.

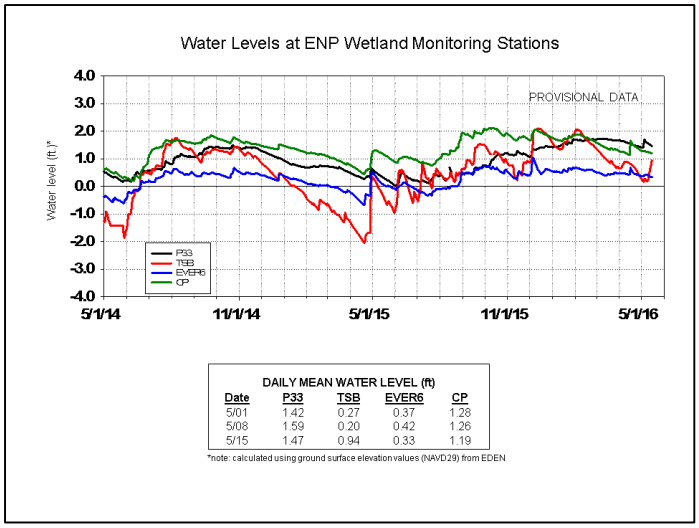
Snail Kites: Nesting in WCA-3A and -3B has crashed. All 12 previously active nests (nine in WCA-3A and three in WCA-3B) have failed since the last survey. No new nests have been discovered in either WCA-3A or -3B and only one bird was observed (in WCA-3A). WCA-1 has four active nests, of which one is new, and 12 birds were observed. ENP had one new nest found and four birds observed.

Cape Sable Seaside Sparrows: Surveys have started, and there are signs that breeding has started. Maximizing late season breeding opportunities will be beneficial, if conditions improve by June.

Everglades National Park (ENP) and Florida Bay: Water level changes were mixed last week in Taylor Slough with most areas decreasing, but Northern Taylor Slough increased. Northern Taylor Slough increased 0.75 feet (now 20 inches above average) while southern Taylor Slough decreased by −0.07 feet (still 8-10 inches above average). Northern Taylor Slough is typically dry by mid-February, but currently is 0.9 feet deep.

Salinity changes in Florida Bay were mixed last week ranging from a decrease of -2 psu to an increase of 3 psu. Salinities are -2 to -9 psu below average and range from 23 to 41 psu with the highest salinity occurring in the nearshore western embayments. The daily average salinity at the MFL sentinel site of TR decreased to 9.7 psu, and it remains below the seasonal average of 25 psu. The 30-day moving average salinity at TR increased to 7.2 psu while the typical 30-day moving average salinity for this time of year is about 23 psu and rising. Below average conditions in salinity are desirable and are a restoration target.

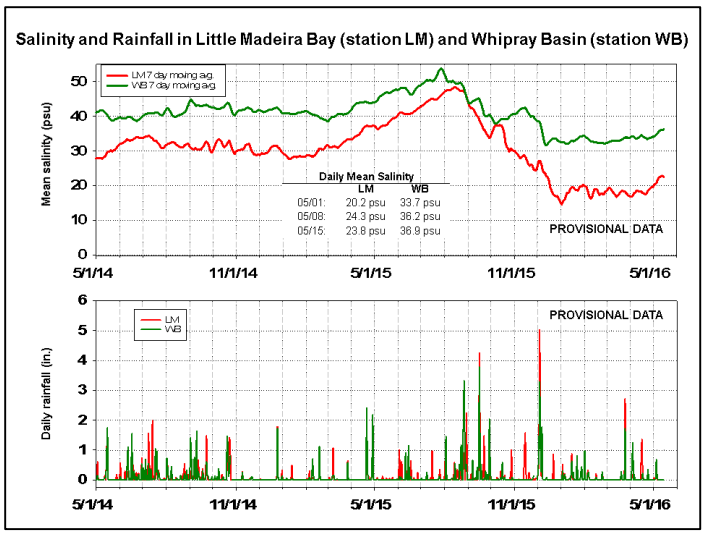
The 365-day running sum of the cumulative flow from the five creeks feeding Florida Bay increased slightly to 261,957 acre-feet this week, which is higher than the average 365-day running sum for the five creek flow of 257,628 acre-feet (this number is not seasonal). The weekly (5/9 – 5/15) cumulative flow from the five creeks was 6,730 acre-feet which is above average for this time of year (typically negative). Creek flow is provisional data from the USGS and is highly variable.

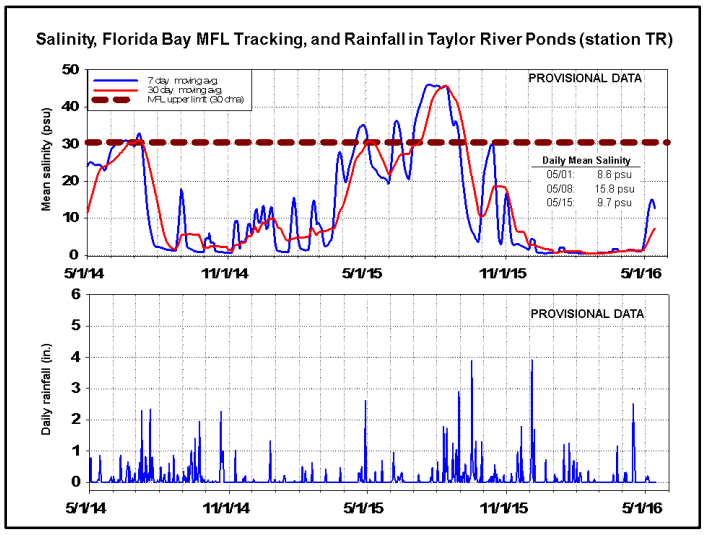


DAILY MEAN WATER LEVEL (ft)

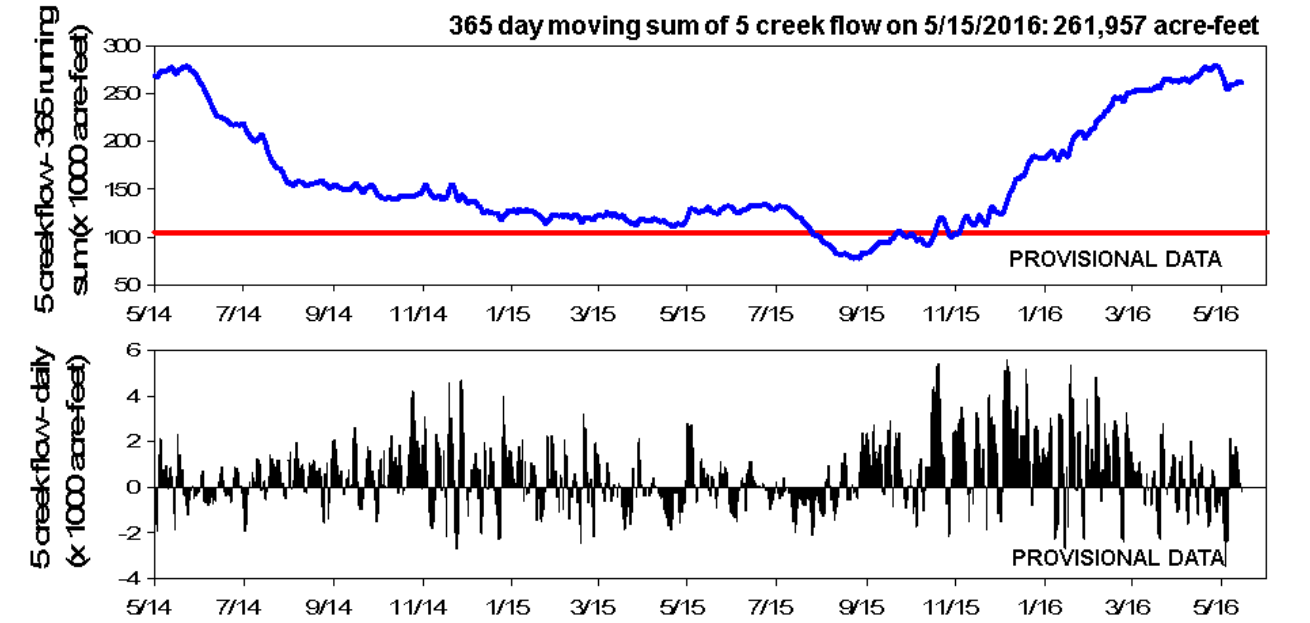
Date	P33	TSB	EVER6	CP
5/01	1.42	0.27	0.37	1.28
5/08	1.59	0.20	0.42	1.26
5/15	1.47	0.94	0.33	1.19

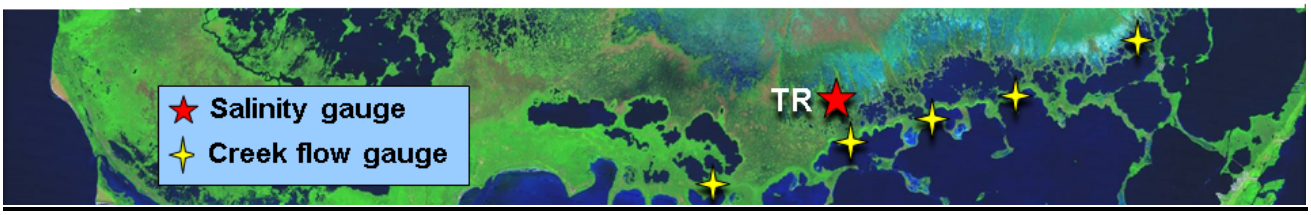
*note: calculated using ground surface elevation values (NAVD29) from EDEN





5 Creek Cumulative Flow and Florida Bay MFL Flow Criteria Tracking





Water management recommendations

- For the upcoming wet season, water depths should remain below 2.5 feet in far southern WCA-3A to protect the island forests.

- In general, conditions have improved for wading bird foraging and nesting. Now that conditions have improved, slower recession rates through the end of May are desired to support foraging and nesting.

- Inflows into WCA-2A and northern WCA-3A may occur so long as they do not cause increases in stage. Lower stages throughout the WCAs are ecologically necessary for wading bird foraging and ecosystem improvement through June.

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

Everglades Ecological Recommendations, May 17, 2016 (red is new)

Area	Current Condition	Cause(s)	Recommendation	Reasons
WCA-1	Stages decreased −0.22' to −0.12'	Rainfall, ET, management	Match inflows with outflows to achieve regulation schedule recession while allowing water levels to reflect variation in annual rainfall. Prevent repeated or ongoing reversals as much as possible.	Provide moderate recession rates to support wading bird foraging, necessary for successful nesting.
WCA-2A	Stage increased −0.08'	Rainfall, ET, management	With depths below 1', manage recession rates to favor wading bird foraging (-0.05' to 0.12' per week).	Recession rates should be managed to favor wading bird foraging and nesting (-0.05' to 0.12'). WCA-2A is now open again to the public.
WCA-2B	Stages decreased −0.15'	Rainfall, ET, management	Follow normal seasonal practices.	High stages generally preclude wading bird use, but can provide good habitat for wading bird foraging as stages decline at the end of the dry season.
WCA-3A NE	Stage decreased −0.15'	Rainfall, ET, management	Small inflows into WCA-2A and northern WCA-3A may occur so long as they do not cause increases in stage. Lower stages throughout the WCAs are ecologically necessary for wading bird foraging and ecosystem improvement.	Recession rates should be managed to favor wading bird foraging (-0.05' to 0.12') in northeast WCA-3A. WCA-3A is now open again to the public.
WCA-3A NW	Stage decreased −0.03'	Rainfall, ET, management		
Central WCA-3A S	Stage decreased −0.17'	Rainfall, ET, management	Prevent repeated or ongoing reversals. Water depths are below 2.5'. **Water depths should remain below 2.5 feet over this upcoming wet season to protect the island forests.** When flows are reduced, a gradual reduction is recommended (stepping down over several days).	Continue to provide moderately fast recession rates to reach suitable depths for avian foraging and nesting. **Keeping depths below 2.5' is important to allow tree island vegetation to recover from stress of the recent extended inundation duration.**
Southern WCA-3A S	Stage decreased −0.20'	Rainfall, ET, management		
WCA-3B	Stages decreased −0.18' to −0.10'	Rainfall, ET, management	Follow normal seasonal practices. Prevent repeated or ongoing reversals as much as possible.	Continue to provide moderately fast recession rates to reach suitable depths for avian foraging and nesting. Once depths are closer to 1', manage recession rates to favor wading bird and snail kite nesting and foraging (-0.05' to 0.12').
ENP-SRS	Stages decreased −0.29'	ET, rainfall, topography, management	Make discharges to the Park according to the ERTP rainfall plan.	Keep peat wet to promote native habitat and maintain wetland plant and animal communities.
ENP-CSSS habitats	S-12A and S-12B are closed to enhance dry-down.	Rainfall, ET, management	Follow rainfall plan for releases. Adhere to ERTP closures for S12-A and B. Gradual reduction in flows through S333, S12C and D, as possible, is recommended (stepping down over several days). Reduced flows through S333 would benefit wildlife Follow guidance in C-111 western spreader canal project operations manual.	Provide appropriate hydrological and habitat conditions for wildlife.
Taylor Slough	8-20 inches above average	Rain, ET, inflows	Move water southward as needed	Provide freshwater buffer for ecosystems and maintain low salinity conditions downstream
FB- Salinity	−2 to −9 psu below average	Rain, ET, inflows, wind	Move water southward as needed	Maintain lower salinity levels.