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: August 23, 2016

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

Below average rains today and tomorrow before increasing Thursday through the weekend. The mid to upper levels of the atmosphere are quite warm making for relatively poor instability. Therefore, the seabreeze will struggle again today with a few showers/storms popping late afternoon/early evening near the west coast. A little more moisture is expected to advect over the area by tomorrow, so we should see some increase in showers/storms but still another below average rain day. Higher moisture arrives on Thursday which could yield average rainfall then.

Kissimmee

On Sunday, stages in East Lake Toho, Lake Toho, and Kissimmee-Cypress-Hatchineha were above schedule by 0.3, 0, and 0.4 feet, respectively. Over the past week, discharge at S65, S65A, and S65E averaged 624, 666, and 1061 cfs, respectively. Tuesday morning discharges were ~695 cfs, ~656 cfs, ~909 cfs, and ~942 cfs, respectively at S65, S65A, S65C, and S65E. Dissolved oxygen in the Kissimmee River averaged 4.04 mg/L over the past week and 4.02 mg/L on Sunday. Kissimmee River mean floodplain depth on Sunday was 0.30 feet. There are no new recommendations for this week.

Lake Okeechobee

Lake Okeechobee is at 14.70 feet NGVD having decreased by 0.06 feet over the past week. The Lake remains in the Low Flow Sub-band. Lake stage has been above optimal levels since the February rain event resulting in the loss of submerged aquatic vegetation. Cyanobacterial bloom conditions on the Lake improved over the past couple of weeks but appear to have made a recent resurgence.

Estuaries

Total discharge to the St. Lucie estuary average 1,098 over the past week with 586 cfs (53%) coming from Lake Okeechobee. Salinity at the US1 Bridge is in the fair range for oysters. Total inflow to the Caloosahatchee estuary averaged 3,703 cfs over the past week with 906 cfs (24%) coming from the Lake. Salinity conditions are good for tape grass in the upper estuary. Salinity conditions are good for oysters at the Sanibel Causeway and Shellpoint, but in the poor range at the Cape Coral Bridge.

Stormwater Treatment Areas

Over the past week, the STAs/FEBs received no Lake regulatory releases. The total amount of Lake regulatory releases sent to the STAs/FEBs in WY2017 (since May 1, 2016) is approximately 58,600 acre-feet. All STA cells are at or above target depths. Operational restrictions are in place for vegetation rehabilitation in STA-1E and STA-5/6 and structure repairs are underway in STA-1E. In addition, nests of Endangered Species Act (ESA) protected species have been observed in STA-5/6. This week, as conditions allow, Lake releases will be sent to STA-1E and STA-1W.

Everglades

Rainfall was under an inch last week, so stage changes were mixed. Water levels remain shallow in northeastern WCA-3A and in WCA-1, where the northern half has been closed to airboat access. Additional water is requested for WCA-1 and northeastern WCA-3A. The 30-day moving average salinity at the Florida Bay MFL site remains 0.6 psu and the cumulative 365-day inflow from the five creeks into Florida Bay decreased slightly to 330,121 acre-feet.

KISSIMMEE BASIN

Kissimmee Basin Rainfall

The Upper Kissimmee Basin received 1.11 inches of rainfall in the past week and the Lower Basin received 0.47 inches (SFWMD Daily Rainfall Report 08/22/2016).

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: 8/23/2016

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)						
							8/21/16	8/14/16	8/7/16	7/31/16	7/24/16	7/17/16	7/10/16
Lakes Hart and Mary Jane	S62	39	LKMJ	60.1	R	60.0	0.1	0.0	0.1	0.1	0.1	0.0	0.1
Lakes Myrtle, Preston, and Joel	S57	23	S57	61.0	R	61.0	0.0	0.0	0.0	0.0	-0.1	0.1	0.0
Alligator Chain	S60	50	ALLI	63.2	R	63.2	0.0	0.0	0.1	0.0	0.1	0.0	0.0
Lake Gentry	S63	130	LKGT	61.0	R	61.0	0.0	0.0	0.1	0.1	-0.1	0.2	0.0
East Lake Toho	S59	255	TOHOE	56.8	R	56.5	0.3	0.0	-0.2	-0.1	-0.1	-0.1	-0.3
Lake Toho	S61	787	TOHOW, S61	53.5	R	53.5	0.0	0.0	0.0	-0.1	-0.1	-0.3	-0.4
Lakes Kissimmee, Cypress, and Hatchineha	S65	624	LKISSP, KUB011, LKIS5B	51.4	R	51.0	0.4	-0.1	-0.5	-0.4	-0.4	-0.5	-0.4

* 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: 8/23/2016

Metric	Location	Sunday's 1-day average	Weekly Average**									
			8/21/16	8/14/16	8/7/16	7/31/16	7/24/16	7/17/16	7/10/16	7/3/16	6/26/16	6/19/16
Discharge (cfs)	S-65	692	624	532	579	643	642	545	552	857	2431	3194
Discharge (cfs)	S-65A	656	666	661	694	638	660	633	660	1211	2890	4455
Discharge (cfs)	S-65C	947	1024	1081	1000	1219	1091	1119	1489	2741	4168	6224
Headwater stage (feet NGVD)		33.8	34.0	34.1	34.3	34.1	34.0	34.1	34.2	34.0	34.1	34.1
Discharge (cfs)	S-65D****	1033	1140	1142	1037	1284	1263	1272	1835	3108	4552	7361
Discharge (cfs)	S-65E	900	1061	1137	986	1158	1181	1147	1755	2991	4458	7216
DO concentration (mg/L)***	Phase I river channel	4.02	4.04	4.09	4.58	3.51	4.17	4.40	2.74	2.21	1.66	0.77
Mean depth (feet)*	Phase I floodplain	0.30	0.37	0.39	0.36	0.44	0.63	0.62	1.18	1.93	2.33	3.12

* 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 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

DATA ARE PROVISIONAL

Water Management Recommendations

Kissimmee Basin Adaptive Recommendations and Operational Actions

Date	Recommendation	Purpose	Outcome	Source
8/23/2016	No new recommendations.			
8/16/2016	No new recommendations.			
8/9/2016	No new recommendations.			
8/2/2016	No new recommendations.			
7/26/2016	No new recommendations.			
7/19/2016	No new recommendations.			
7/12/2016	No new recommendations.			
6/30/2016	Ramp down S65/S65A discharge by 150 cfs per day to 650 cfs and hold at 650 cfs until lake stage rises to Zone A of the schedule. When stage enters Zone A, ramp up S65 discharge to 1,400 cfs as stage rises from 0.0 to 0.6 feet above the regulation line unless there is a large rainfall event. This ramp up schedule will be reevaluated when the regulation schedule reaches 52.0 feet NGVD.	The ramp down in S65/S65A discharge is intended to lessen the impact of Lake Okeechobee releases on naturally occurring algal blooms. Holding discharge at 650 cfs reflects consideration for the Snail Kites nesting in the Kissimmee River floodplain.	Implemented	SFWMD Operations Control
6/28/2016	No new recommendations.			
6/21/2016	No new recommendations.			
6/14/2016	No new recommendations.			
6/7/2016	No new recommendations.			
5/31/2016	No new recommendations.			
5/24/2016	No new recommendations.			
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

KCOL Hydrographs (through Sunday midnight)

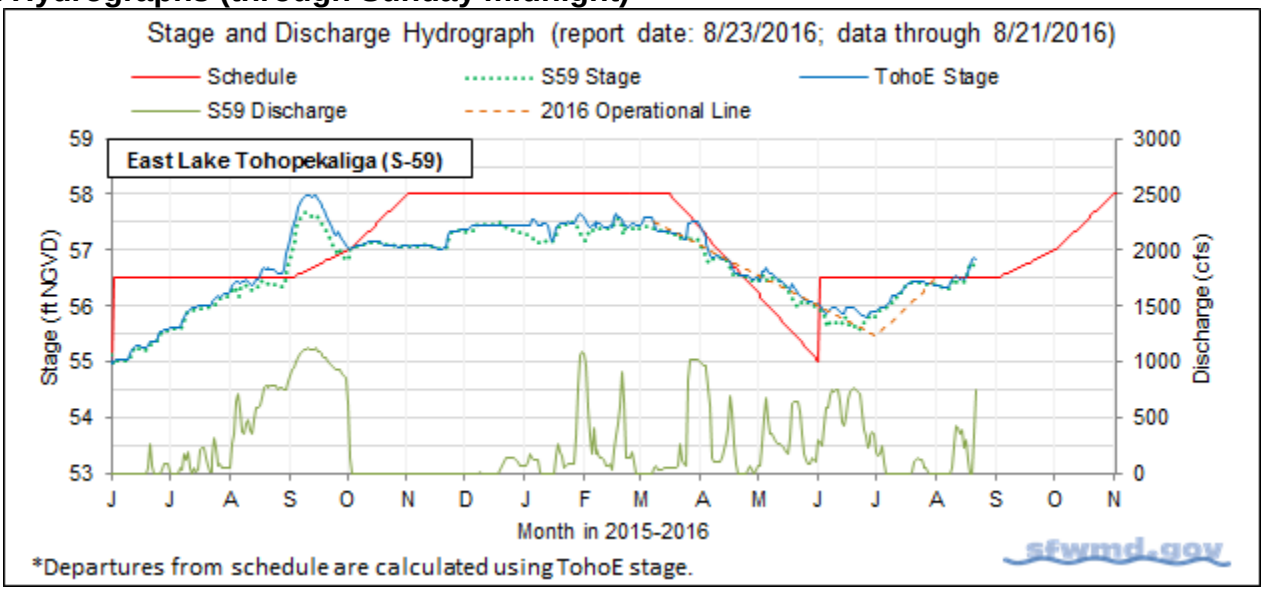


Figure 1.

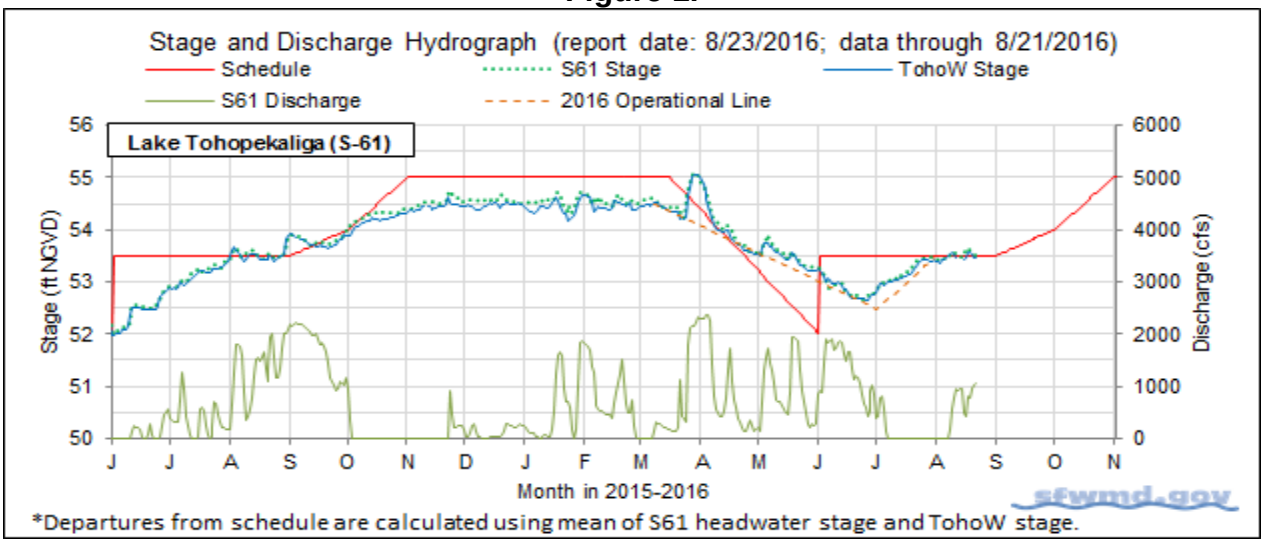


Figure 2.

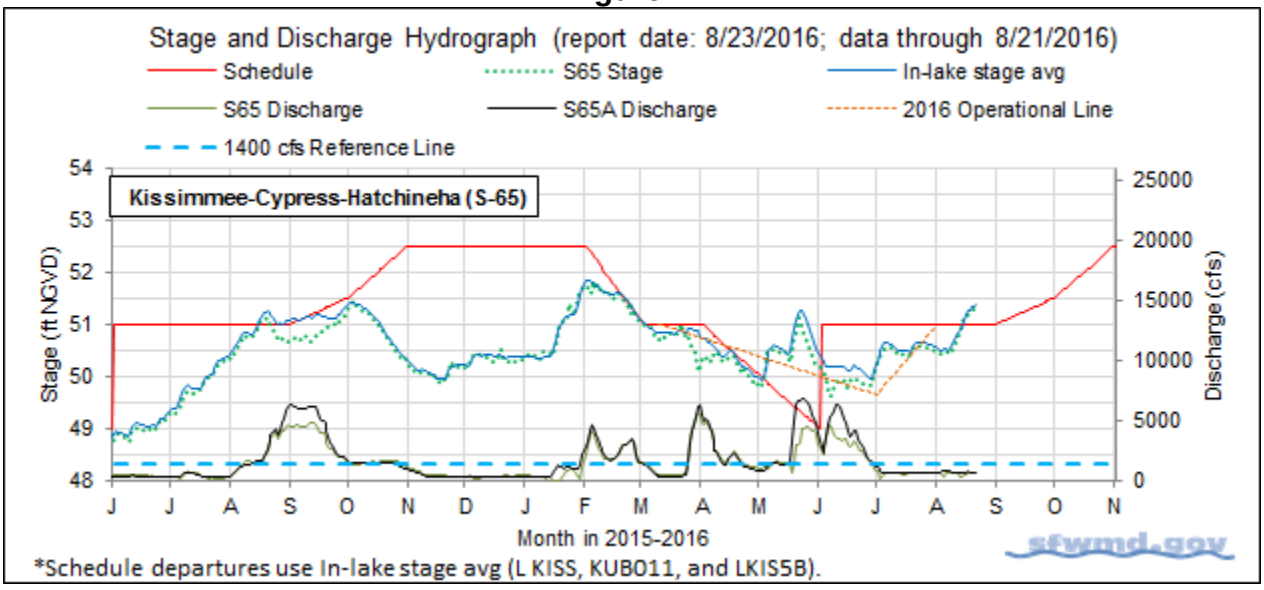


Figure 3.

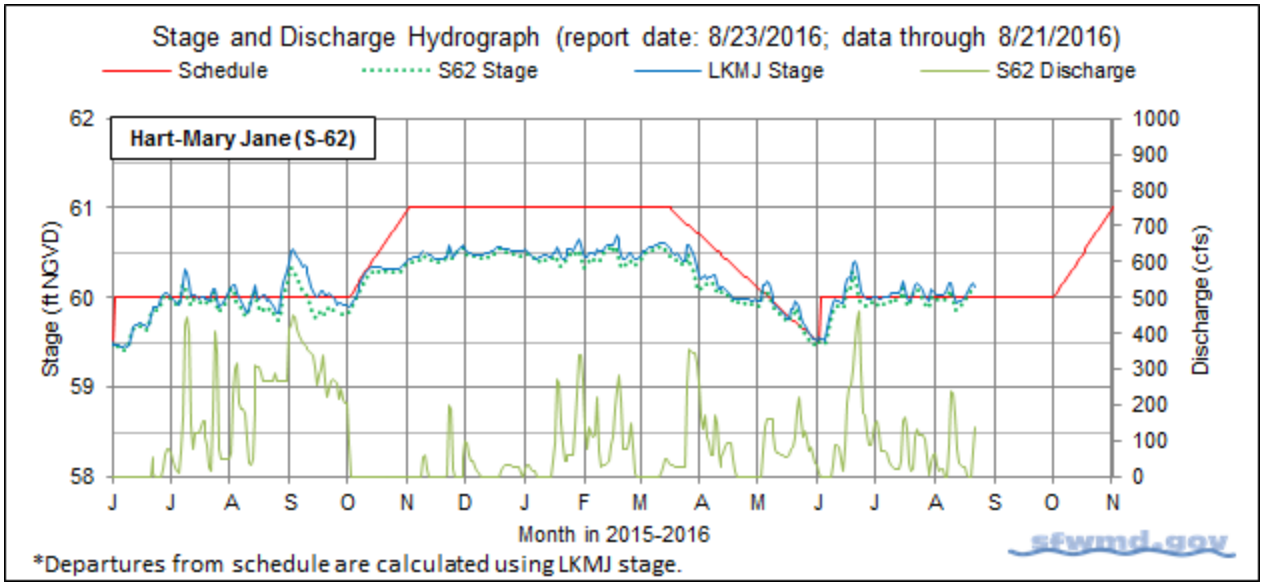


Figure 4.

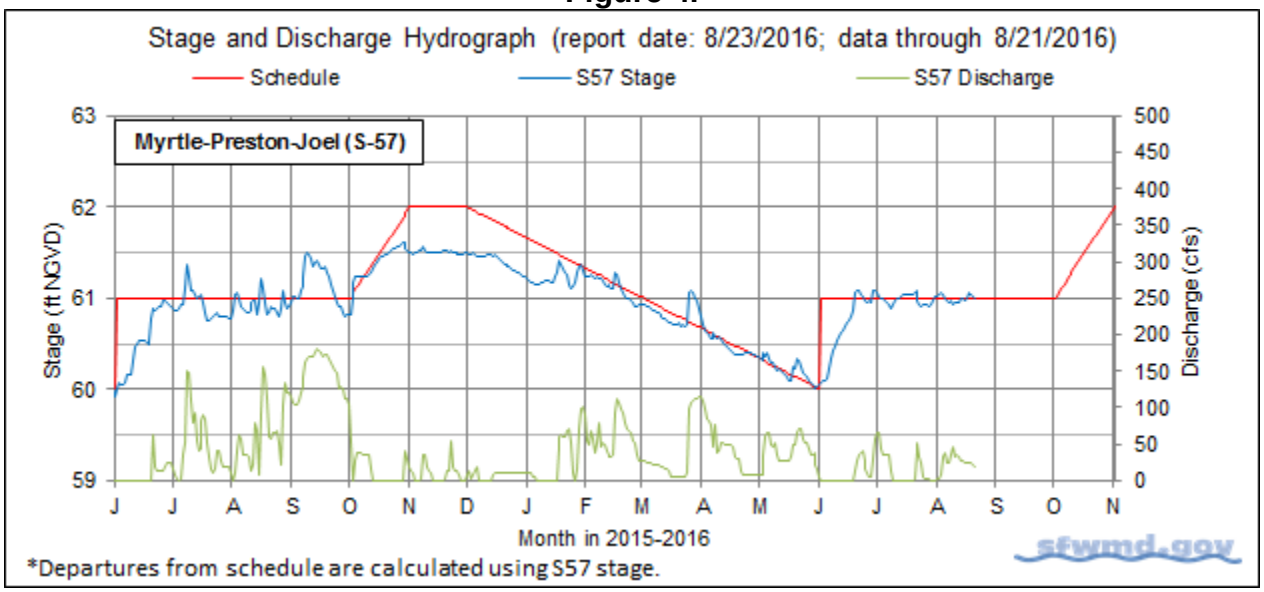


Figure 5.

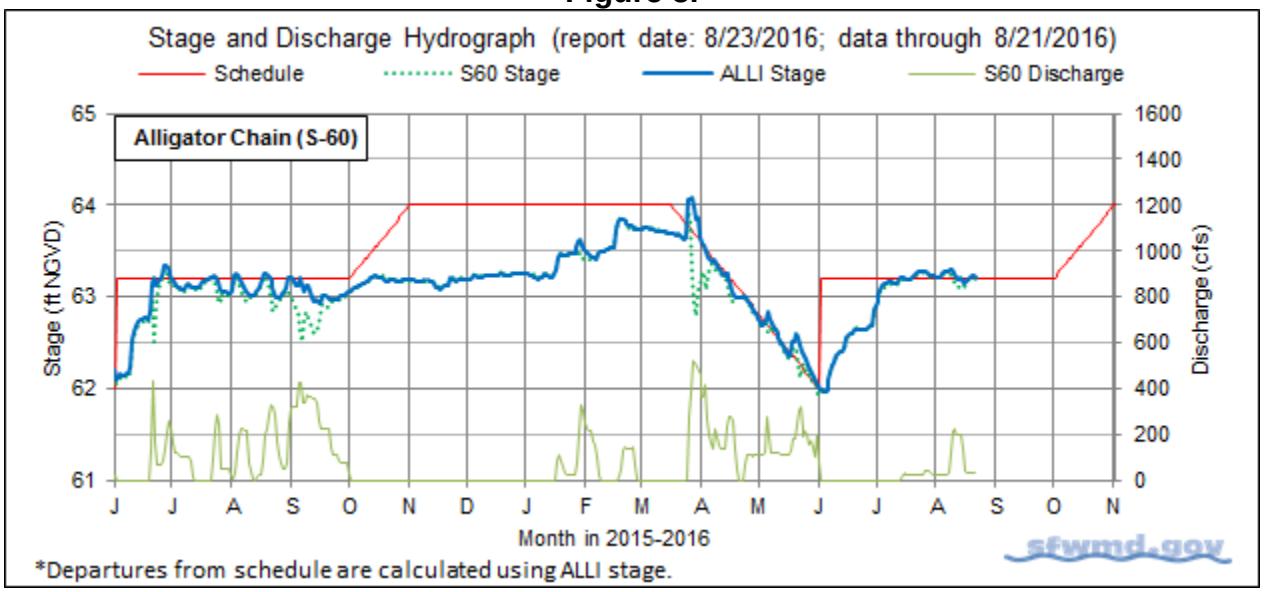


Figure 6.

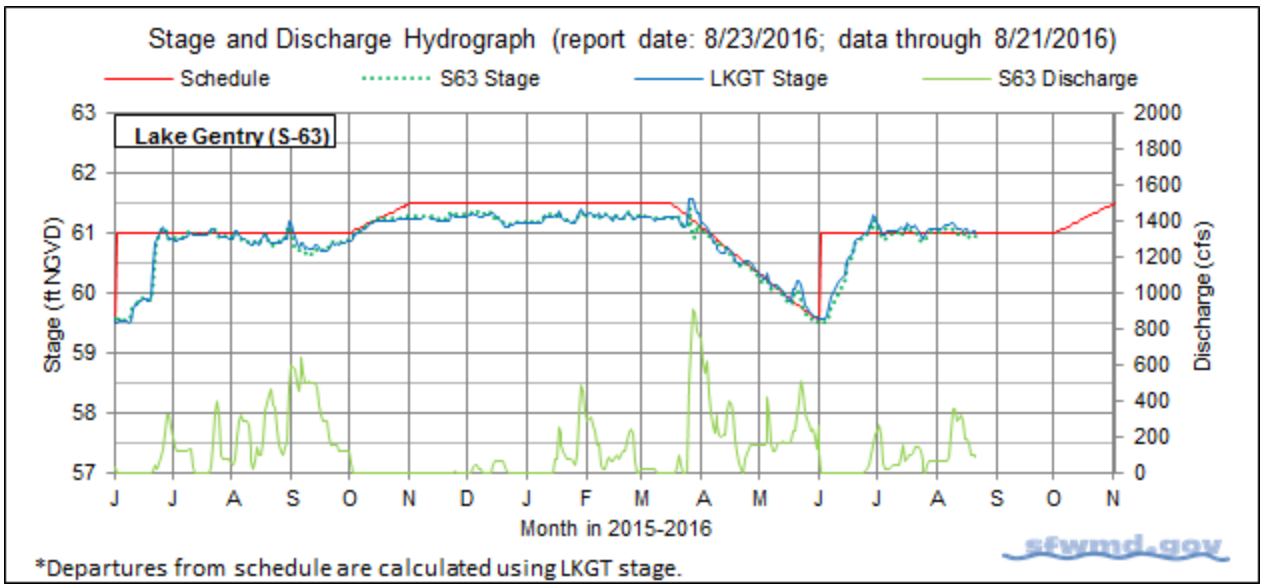
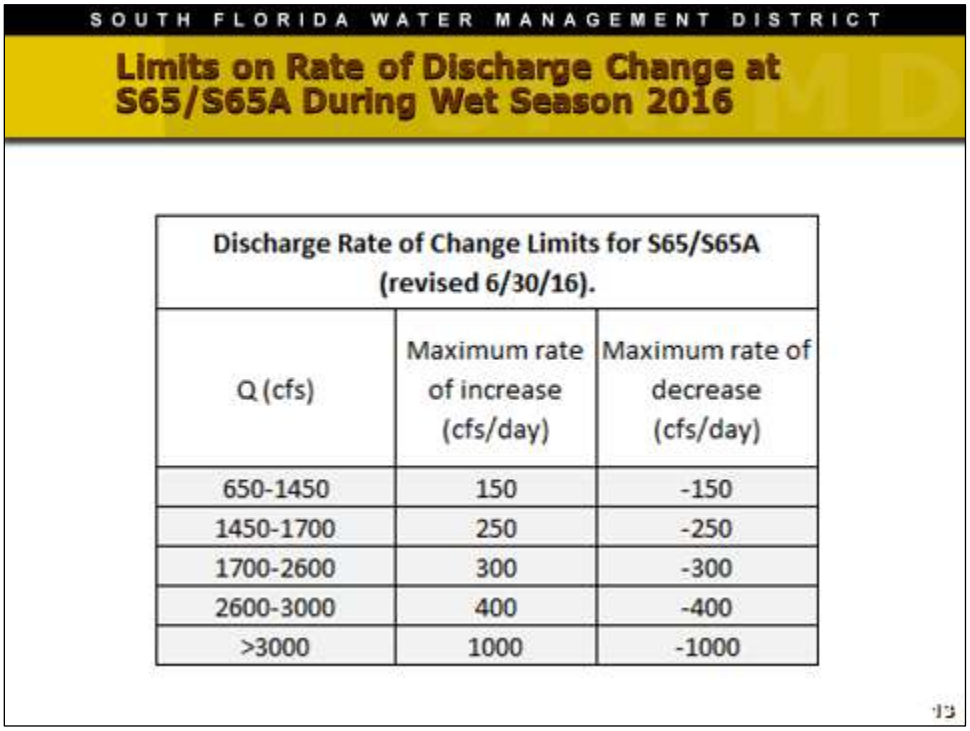


Figure 7.



Discharge Rate of Change Limits for S65/S65A (revised 6/30/16).		
Q (cfs)	Maximum rate of increase (cfs/day)	Maximum rate of decrease (cfs/day)
650-1450	150	-150
1450-1700	250	-250
1700-2600	300	-300
2600-3000	400	-400
>3000	1000	-1000

Figure 8a. Limits on rate of discharge change at S65/S65A for the 2016 Wet Season.

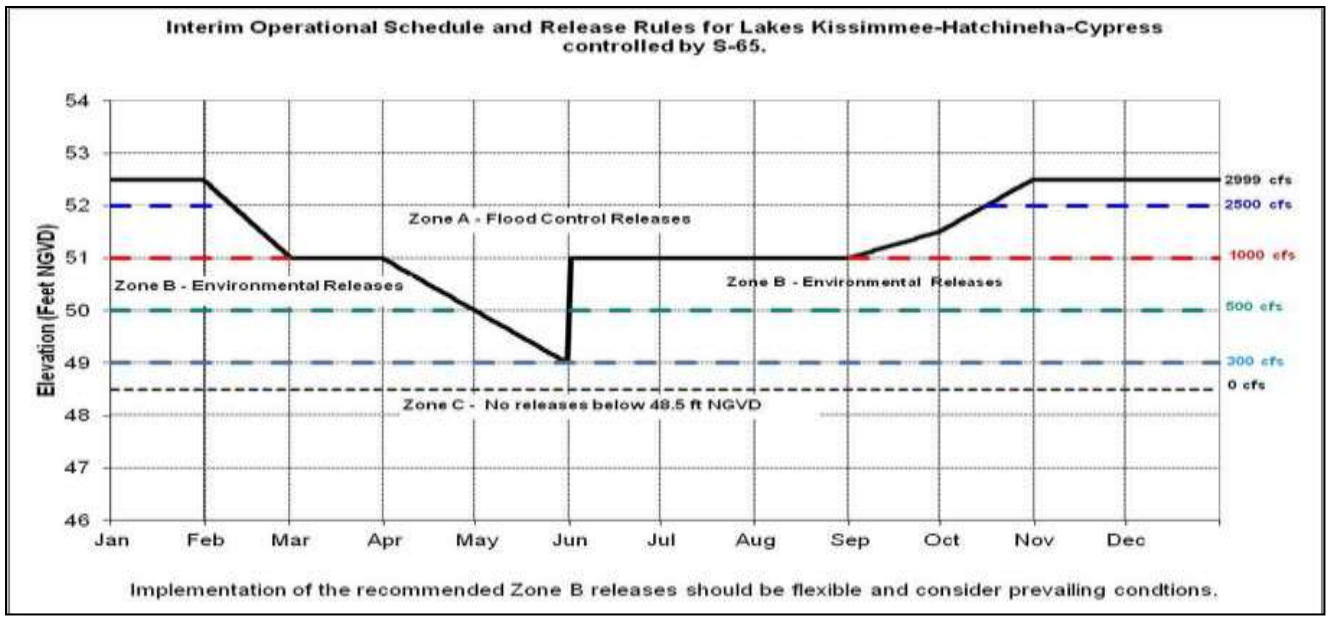


Figure 8b. Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years or in Wet Season 2015.

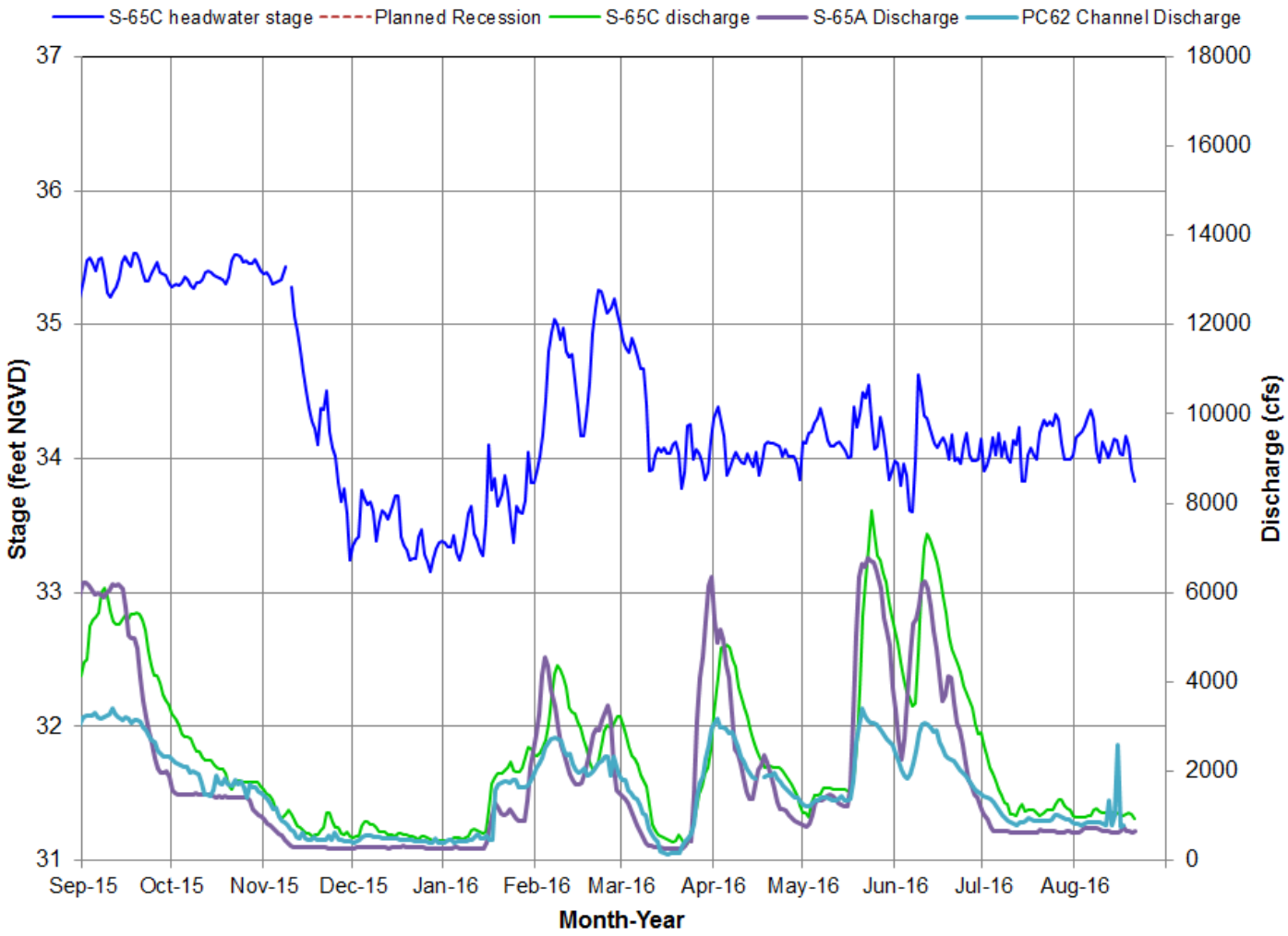


Figure 9. S-65C headwater stage in relation to discharge at S-65C, S-65A, and PC62.

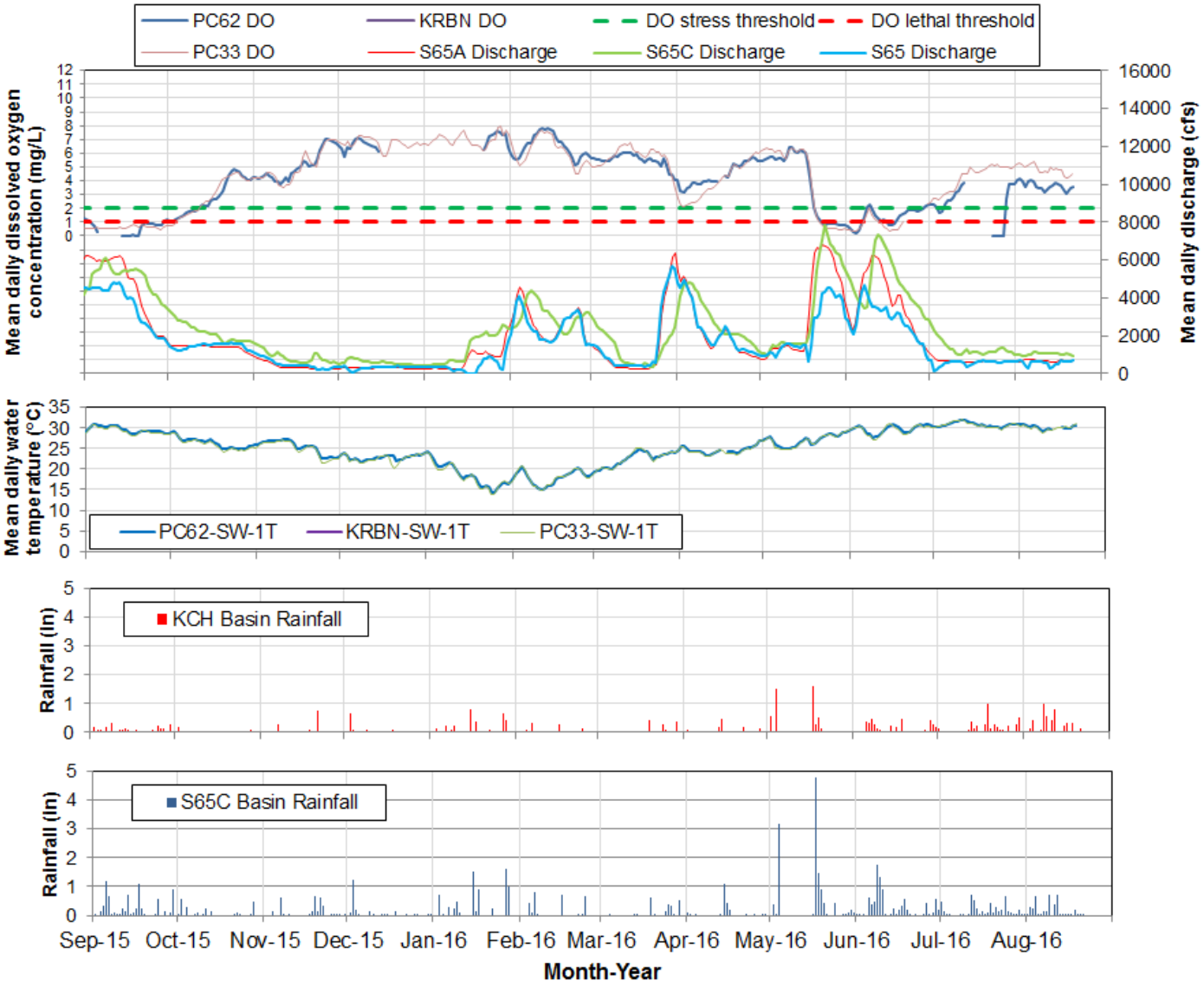


Figure 10. Mean daily Dissolved Oxygen, discharge, temperature and rainfall in the Phase I river channel.

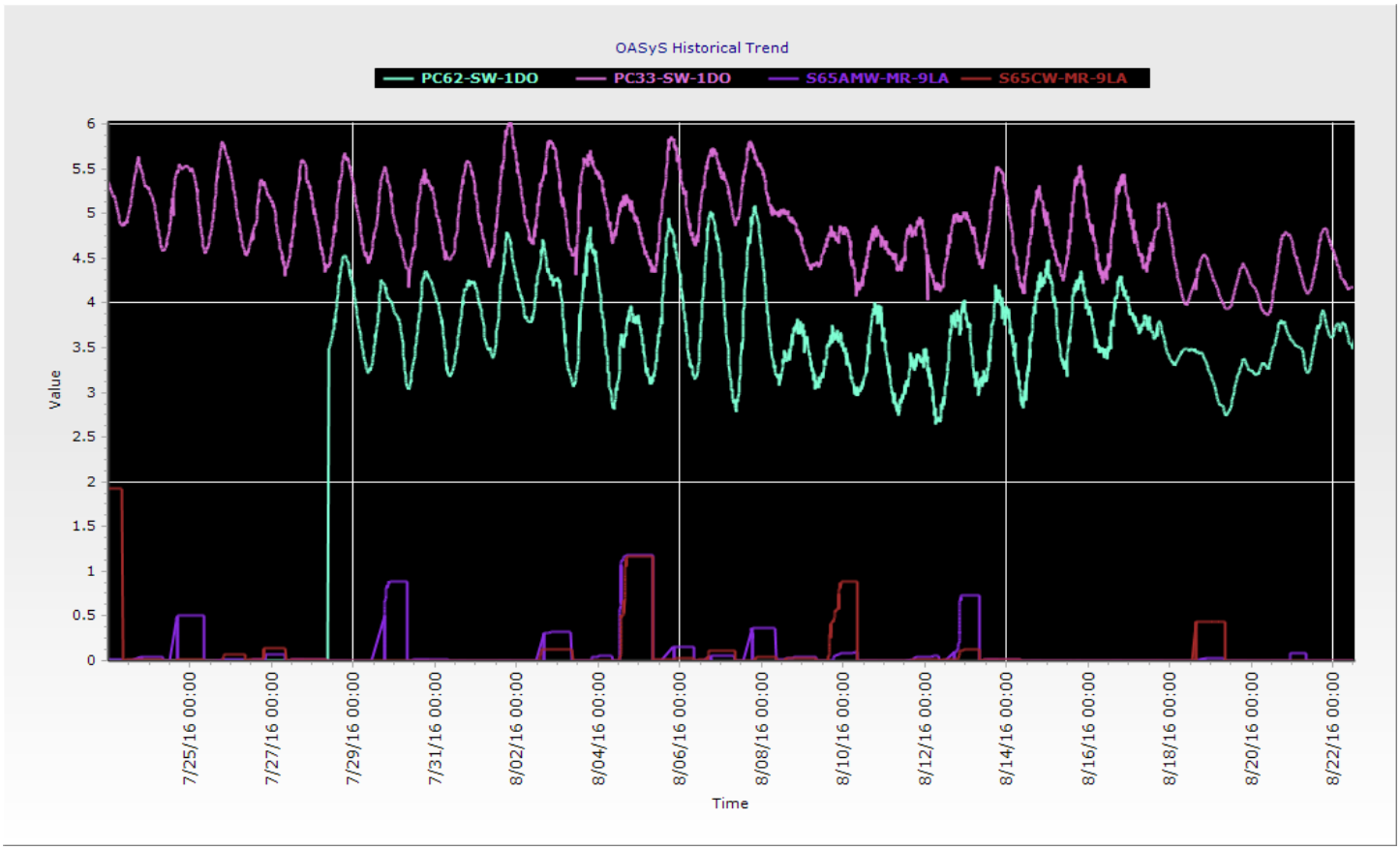


Figure 11. Phase I river channel dissolved oxygen (measured at 15 minute intervals) and rainfall at S65A and S65C.

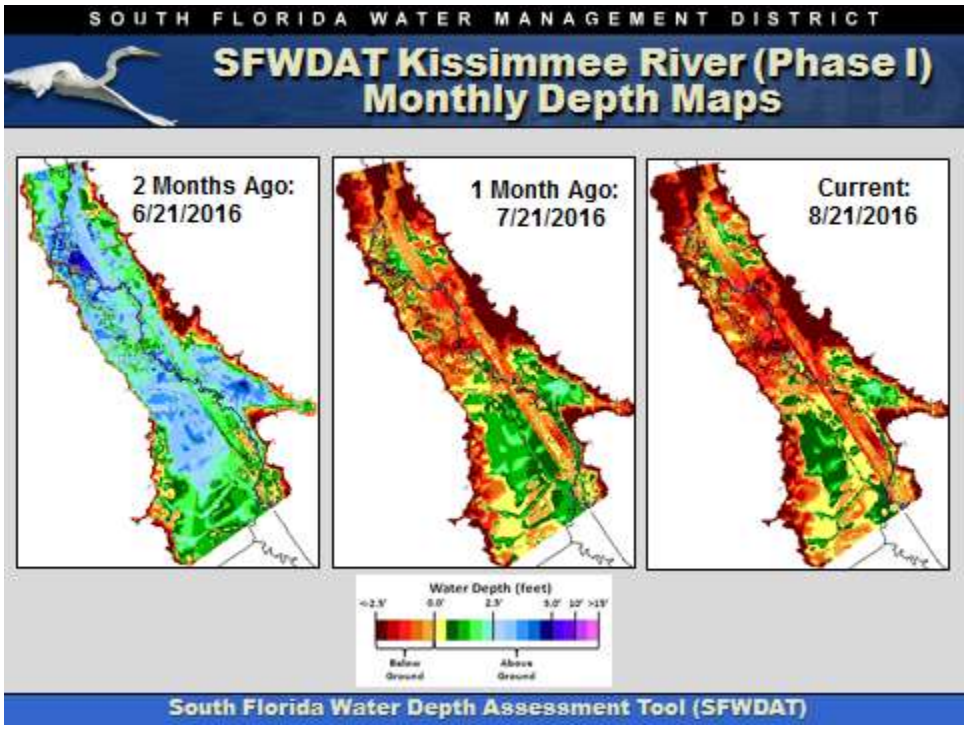
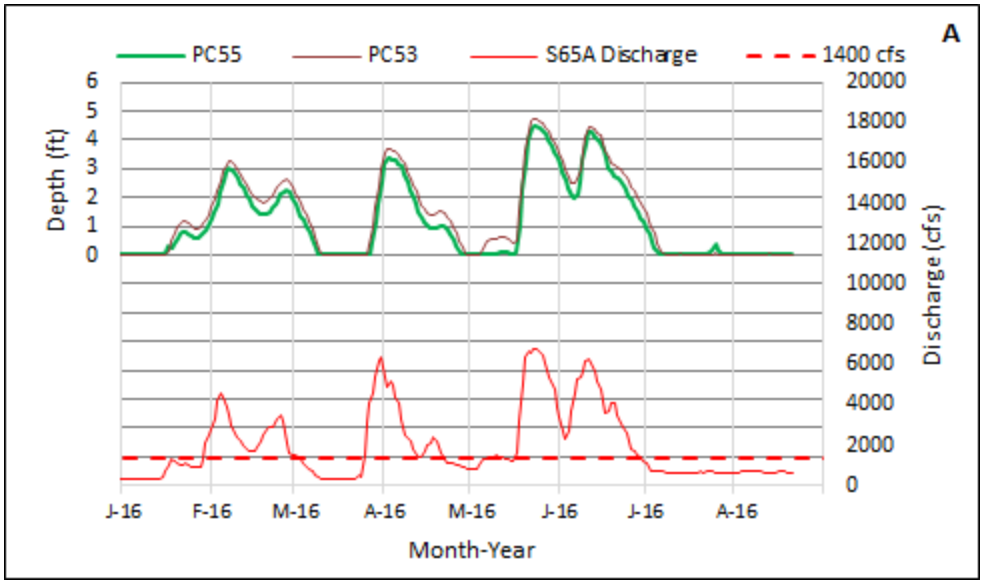
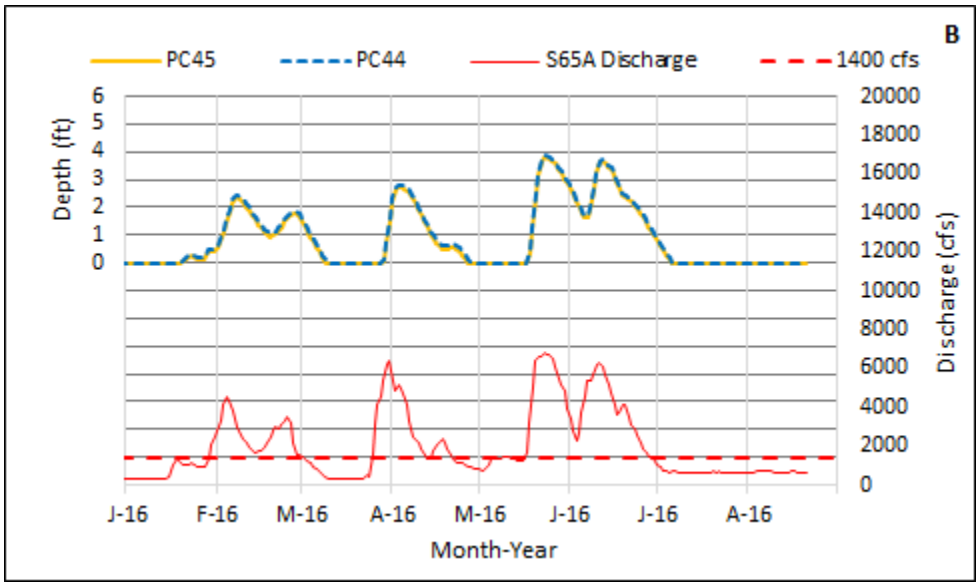


Figure 12. Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to Jan. 16, 2012.





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

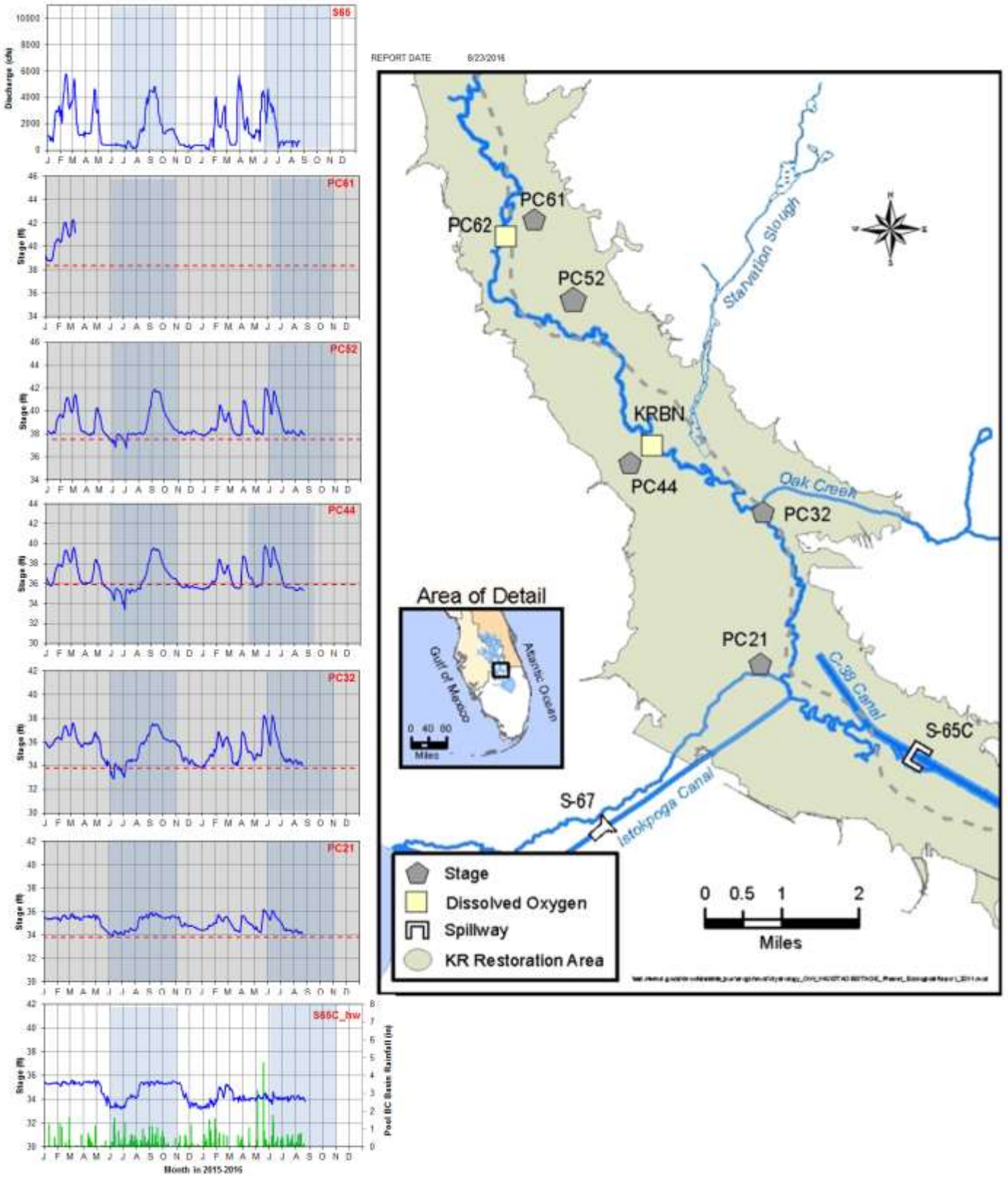


Figure 13. Discharge at S65, stages at five monitoring stations in the Phase I area of the Kissimmee River floodplain, and headwater stage at S65-C since January 1, 2015. The most recent data (~2 weeks) are provisional real-time data from SFWMD DualTrend; previous data are from SFWMD DB-HYDRO (validated).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

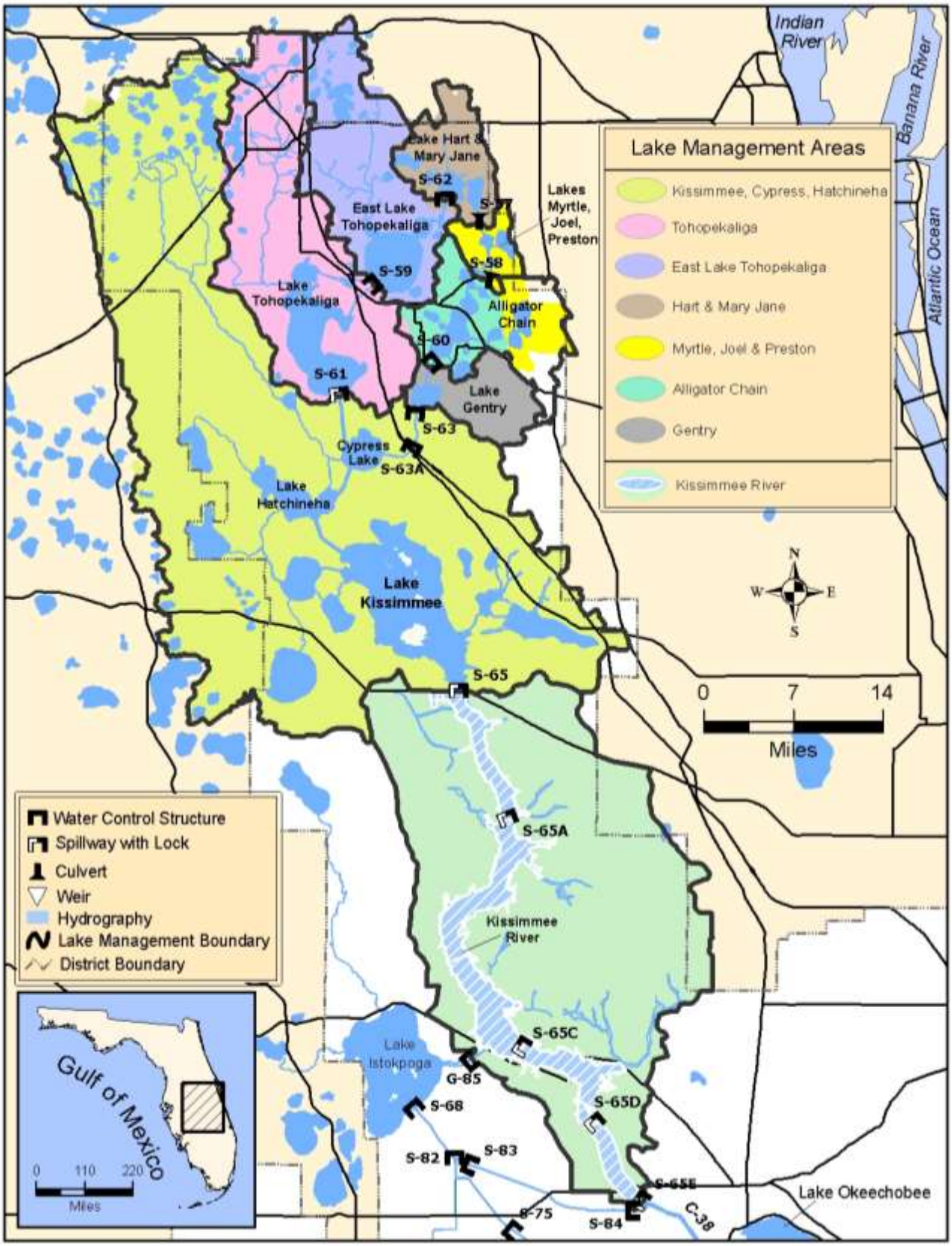


Figure 14. The Kissimmee Basin

LAKE OKEECHOBEE

According the USACE web site, Lake Okeechobee stage is at 14.70 feet NGVD for the period ending at midnight on August 22, 2016. This value is based on the use of four interior Lake stations (L001, L005, L006, and LZ40) and four perimeter stations (S352, S308, S4 and S133). Lake stage decreased by 0.06 feet over the past week and is 0.03 feet higher than it was a month ago and 2.10 feet higher than it was a year ago (Figure 1). The Lake is in the Low Flow Sub-band (Figure 2). According to RAINDAR, 0.44 inches of rain fell directly over the Lake during the past seven days. The surrounding watershed experienced similar rainfall amounts to the east but higher amounts to the north, west, and south (Figure 3).

Based on USACE reported values, current Lake inflow is approximately 1,809 cfs as detailed below.

Structure	Flow cfs
S65E	871
S154	0
S84 & 84X	496
S71	60
S72	0
C5(Nicodemus slough dispersed storage)	-115
S191	50
S133 PUMPS	188
S127 PUMPS	0
S129 PUMPS	0
S131 PUMPS	0
S135 PUMPS	0
Fisheating Creek	259
S2 Pumps	0
S3 Pumps	0
S4 Pumps	0

Current Lake outflow is approximately 2,962 cfs exiting at S77 (1465 cfs), S308 (664 cfs) and to the L8 canal through Culvert 10A (198 cfs). Water supply demands increased in the EAA, compared to the previous week, with 635 cfs exiting through S351, S352, and S354 combined. Corrected evapotranspiration value based on the L006 weather platform solar radiation data for this past week was 2,971 cfs, up from last week's value of 1,800 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.

August chlorophyll and microcystin data collected on August 1-3 indicated the presence of blooms at six of the 10 nearshore sampling sites and two of the nine pelagic sites (Figure 5). Four of the six routine microcystin sampling sites had values above the analytical limit of detection.

The most recent satellite images (MODIS for August 13 and 19) (Figure 6) indicate a possible resurgence of bloom conditions with approximately 35 square miles of surface area affected.

Preliminary results from the annual submerged aquatic vegetation (SAV) mapping indicate a total areal coverage of 18,031 acres (Figure 7). This coverage is a substantial decrease from the 33,345 acres

recorded in August of last year and the lowest coverage recorded since the hurricane impacted years of 2005 and 2006, which yielded 10,872 acres and 2,965 acres, respectively.

Water Management Recommendations

Although Lake stage has remained essentially static over the past month and a half, it decreased slightly over the past week and is still over two feet higher than it was relative to this date last year. From an ecological perspective, Lake stage has been above optimal levels since the February rain event resulting in the loss of SAV and an increase in the occurrence of cyanobacterial blooms relative to recent years. Future short-term recommendations are highly dependent on near-term rainfall patterns and amounts. The goal should be to limit the rate of Lake stage increase to avoid exceeding the top of the preferred stage envelope (15.5 feet NGVD) during the wet season.

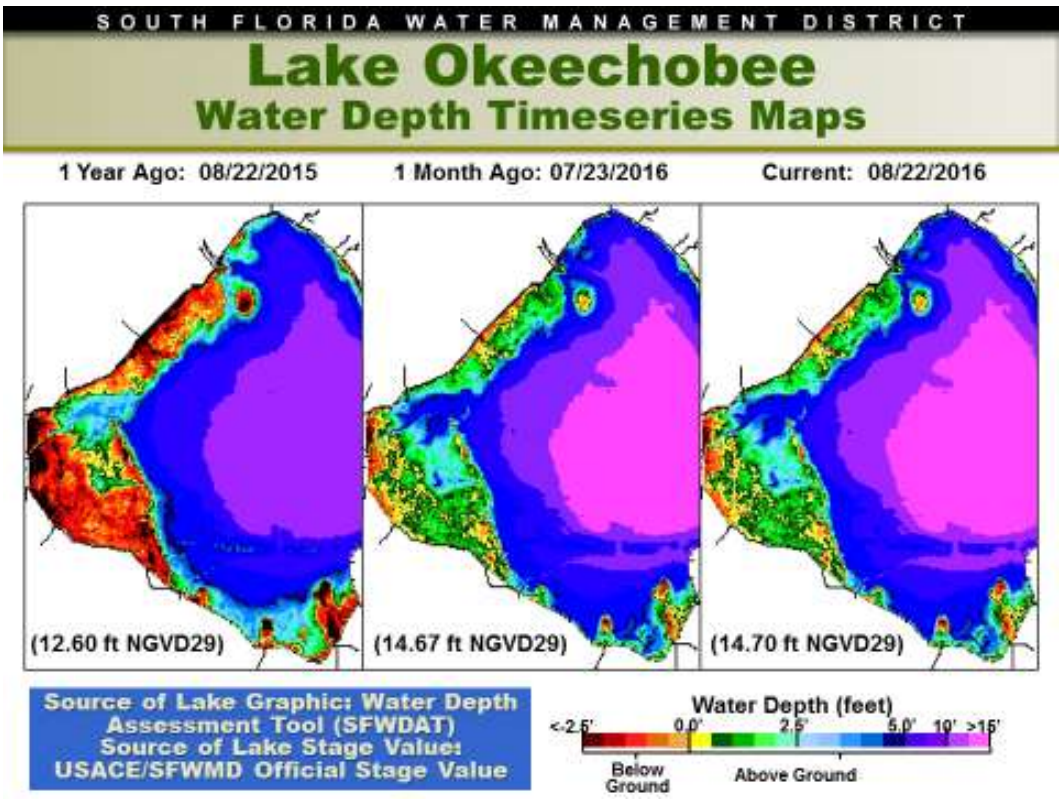


Figure 1

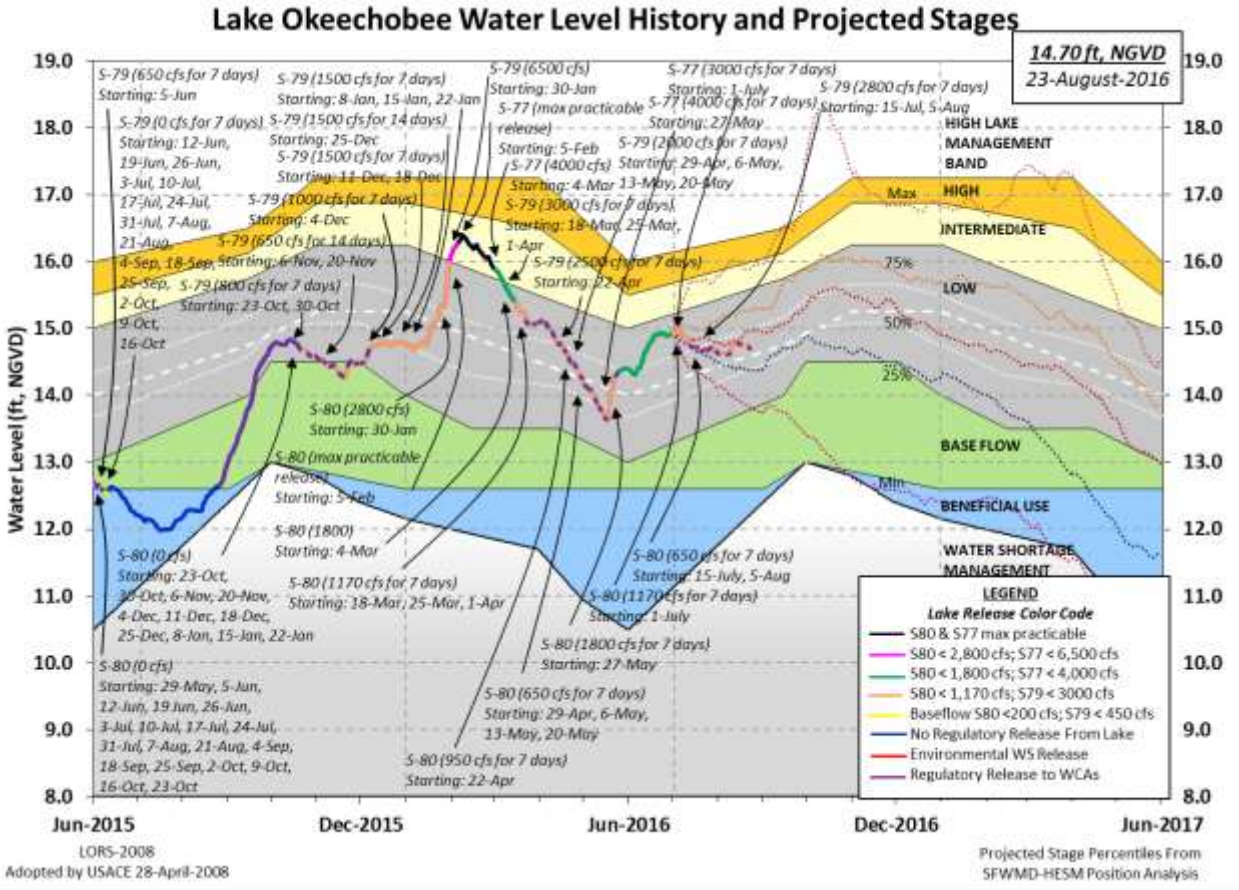

Lake Okeechobee Water Level History and Projected Stages
14.70 ft, NGVD
23-August-2016
Water Level (ft, NGVD)
HIGH LAKE MANAGEMENT BAND
Max
HIGH
INTERMEDIATE
75%
LOW
50%
25%
BASE FLOW
Min
BENEFICIAL USE
WATER SHORTAGE MANAGEMENT
S-79 (650 cfs for 7 days) Starting: 5-Jun
S-79 (0 cfs for 7 days) Starting: 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-77 (3000 cfs for 7 days) Starting: 1-July
S-77 (4000 cfs for 7 days) Starting: 27-May
S-79 (2800 cfs for 7 days) Starting: 15-Jul, 5-Aug
S-79 (2000 cfs for 7 days) Starting: 29-Apr, 6-May, 13-May, 20-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 (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
S-80 (950 cfs for 7 days) Starting: 22-Apr
S-80 (650 cfs for 7 days) Starting: 29-Apr, 6-May, 13-May, 20-May
S-80 (1800 cfs for 7 days) Starting: 27-May
S-80 (1170 cfs for 7 days) Starting: 1-July
S-80 (650 cfs for 7 days) Starting: 15-July, 5-Aug
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
Jun-2015
Dec-2015
Jun-2016
Dec-2016
Jun-2017
LORS-2008
Adopted by USACE 28-April-2008
Projected Stage Percentiles From SFWMD-HESM Position Analysis

Figure 2

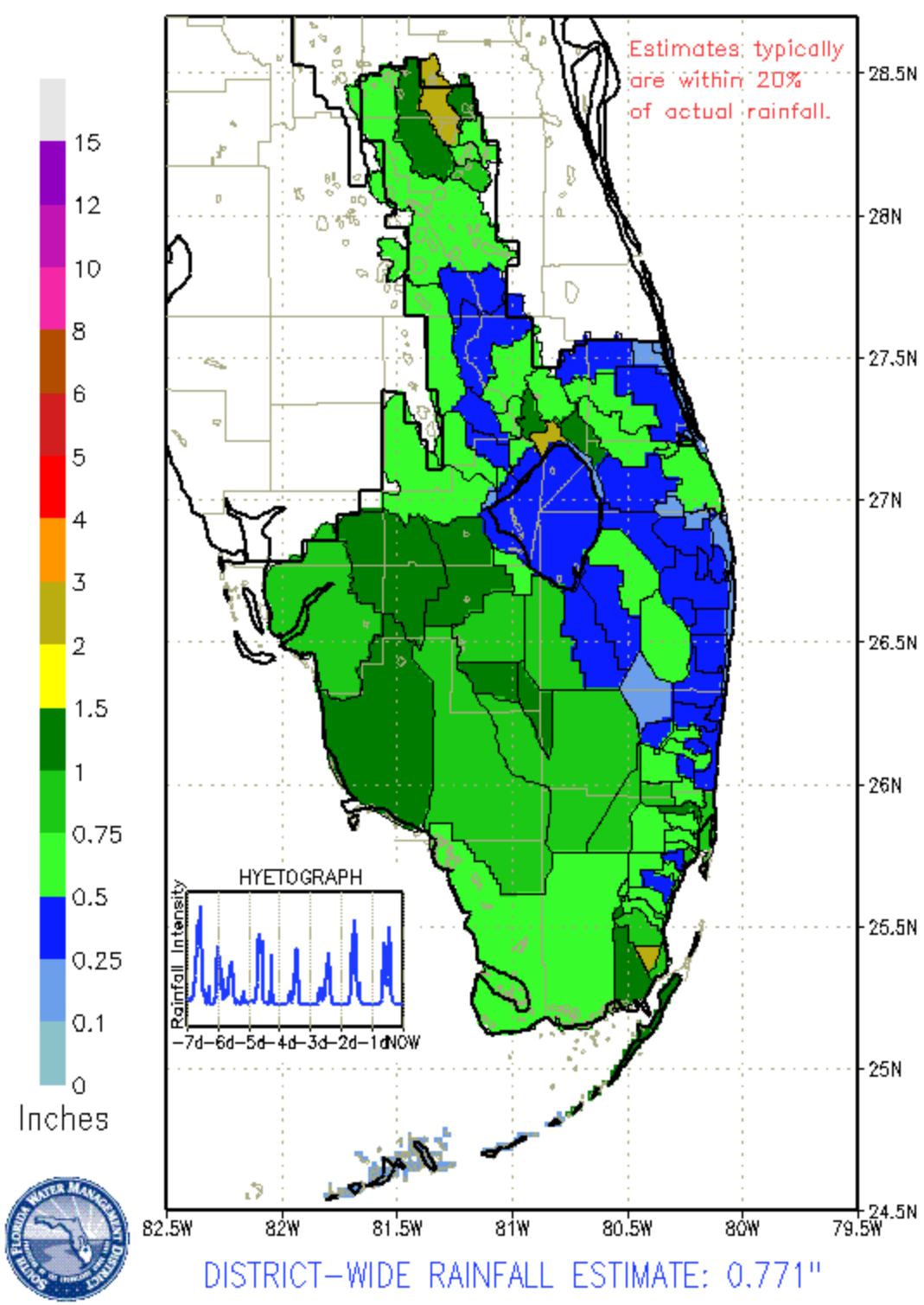

SFWMD PROVISIONAL RAINDAR 7-DAY BASIN RAINFALL ESTIMATES
FROM: 0530 EST, 08/16/2016 THROUGH: 0530 EST, 08/23/2016
Estimates typically are within 20% of actual rainfall.
15
12
10
8
6
5
4
3
2
1.5
1
0.75
0.5
0.25
0.1
0
Inches
HYETOGRAPH
Rainfall Intensity
-7d-6d-5d-4d-3d-2d-1dNOW
28.5N
28N
27.5N
27N
26.5N
26N
25.5N
25N
24.5N
82.5W
82W
81.5W
81W
80.5W
80W
79.5W
DISTRICT-WIDE RAINFALL ESTIMATE: 0.771"

Figure 3

INFLOWS	Average Daily Flow Past Week cfs	Feet of Change Past Week
S65E	1045	0.035
S71 & 72	247	0.008
S84 & 84X	497	0.017
Fisheating Creek	629	0.021
Rainfall	N.A.	0.037
OUTFLOWS	**Average Daily Flow Past Week cfs**	**Feet of Change Past Week**
S77	894	0.030
S308	697	0.023
S351	0	0.000
S352	0	0.000
S354	0	0.000
L8	212	0.007
ET	2971	0.099

Figure 4

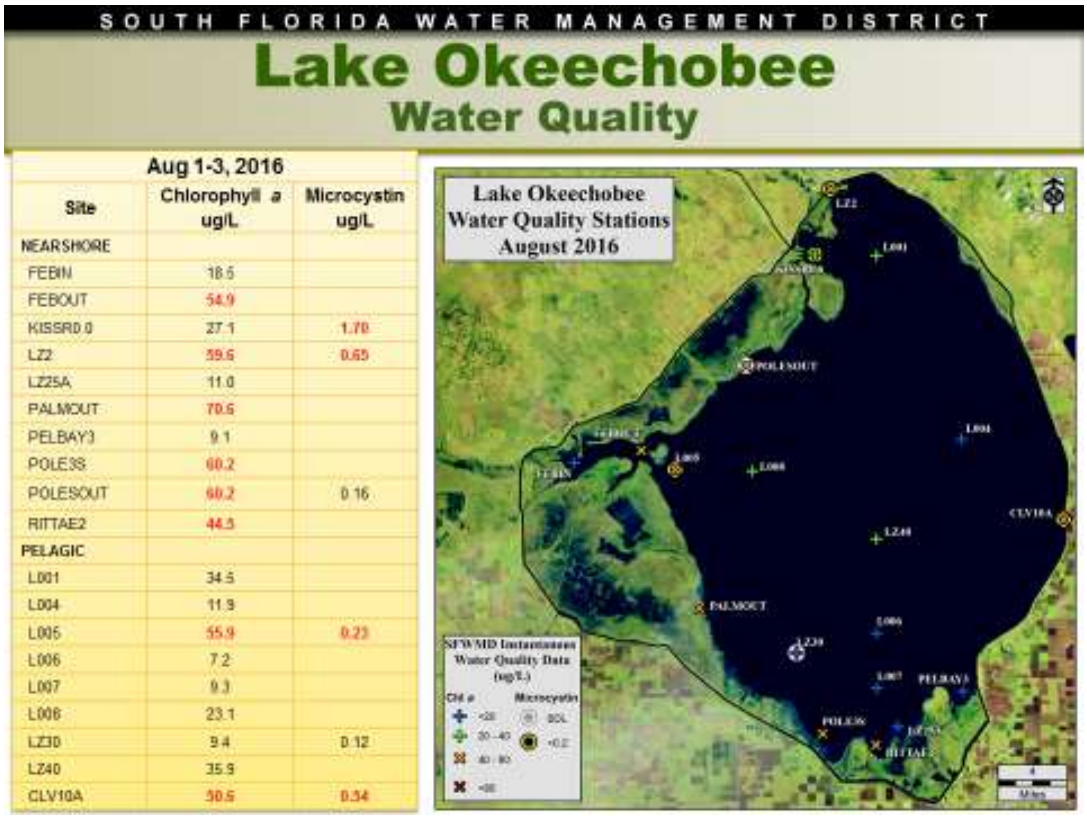


Figure 5

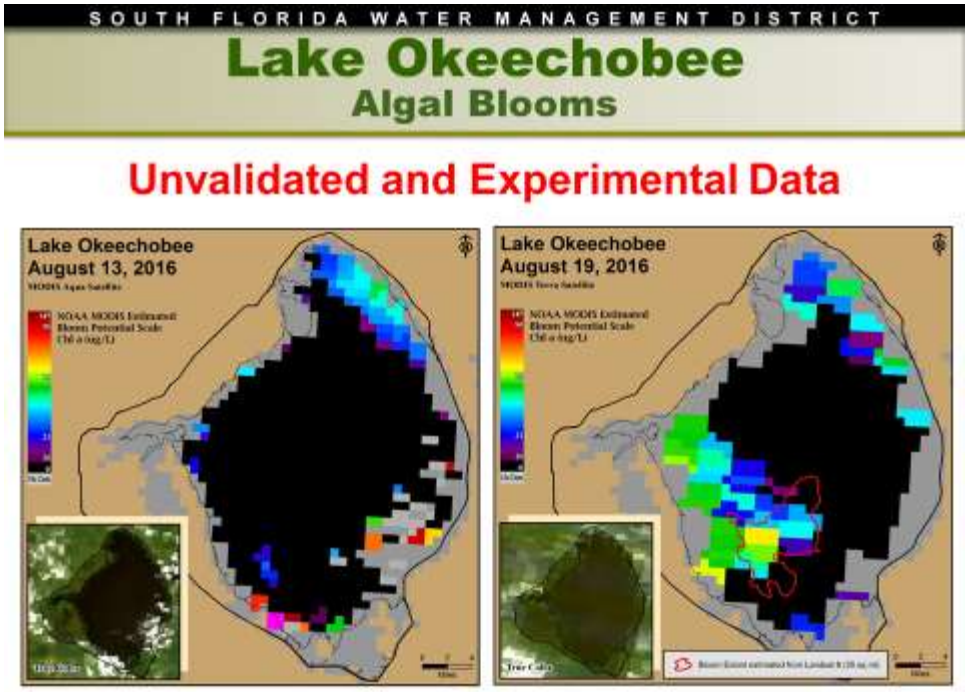


Figure 6

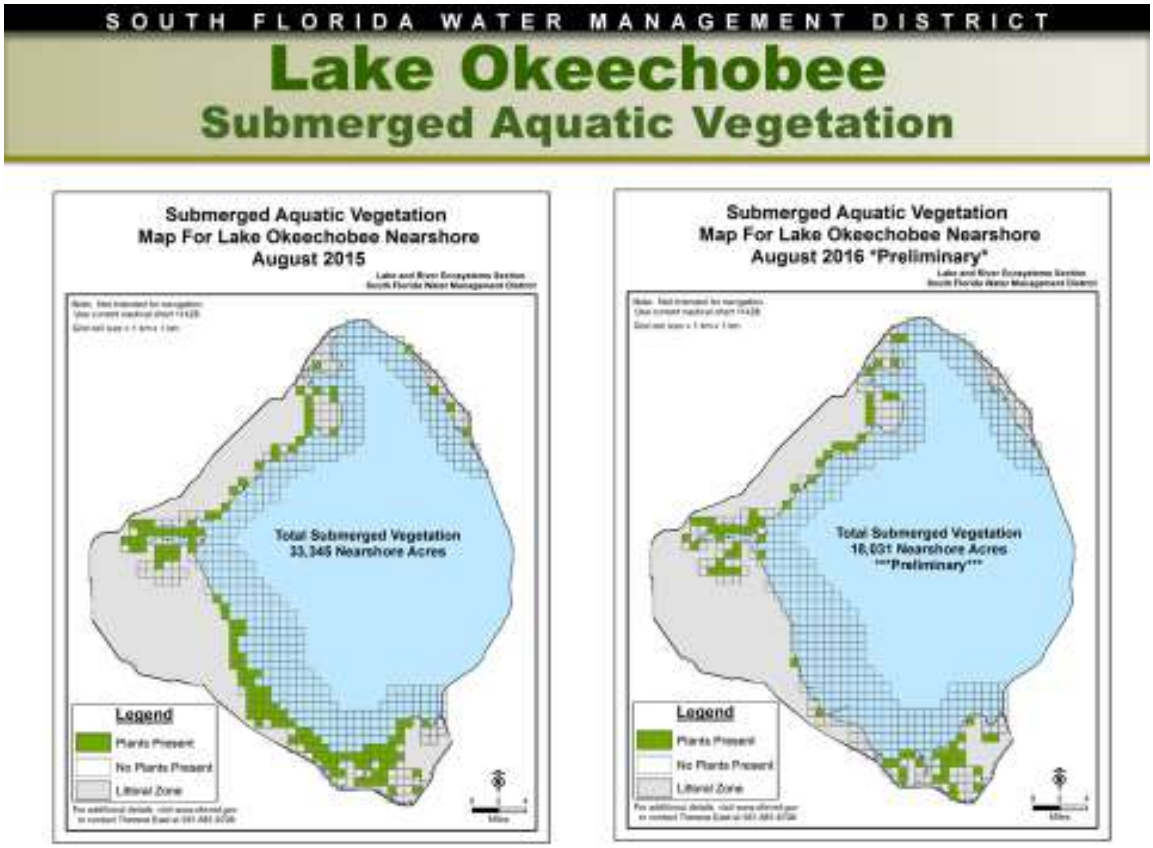


Figure 7

Lake Istokpoga

The Lake Istokpoga regulation schedule began its ascension towards winter pool stage of 39.50 feet NGVD on August 2, 2016. Lake Stage is 38.46 feet NGVD and is currently 0.04 feet above its regulation stage of 38.42 feet NGVD (Figure 8). Average flows into the Lake from Arbuckle and Josephine creeks were 658 cfs and 115 cfs respectively. Average discharge from S68 and S68X this past week was 586 cfs, a decrease from the preceding week. According to RAINDAR, 0.67 inches of rain fell in the Lake Istokpoga watershed during the past seven days.

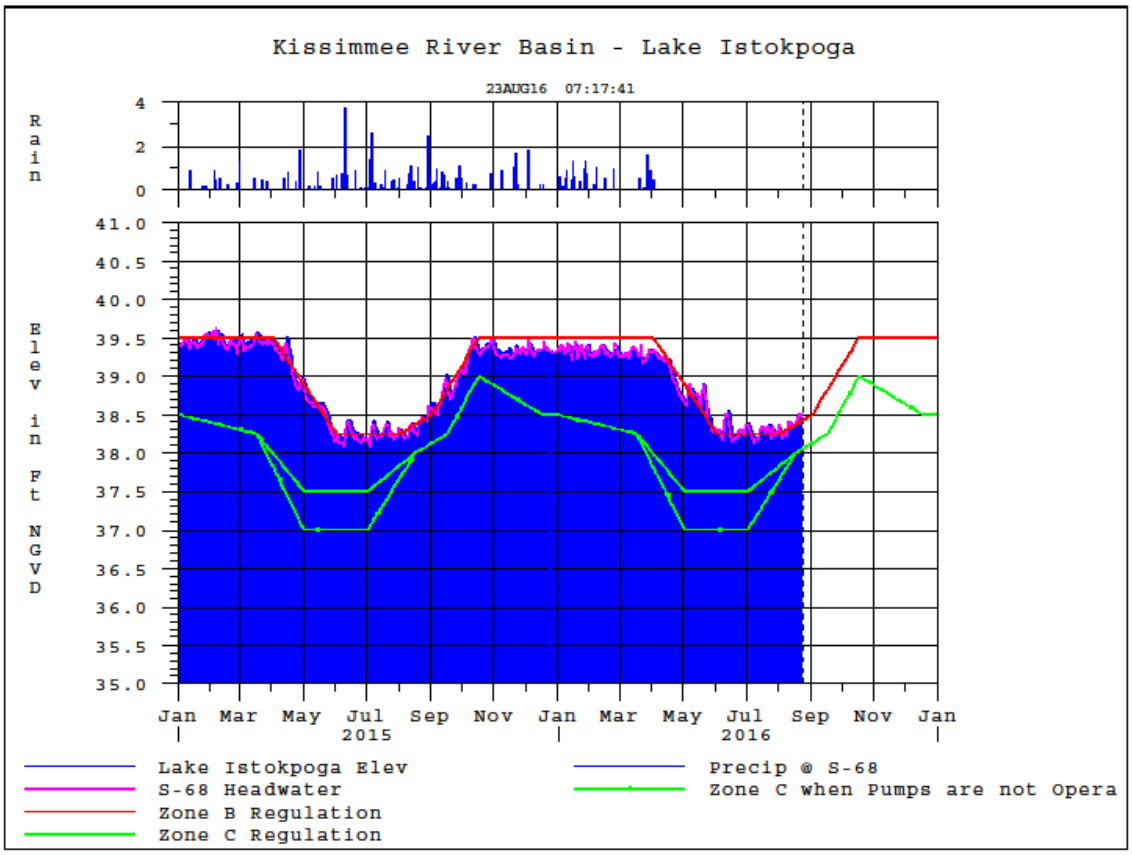


Figure 8

ESTUARIES

St. Lucie Estuary

Over the past week, provisional flows averaged about 672 cfs at S-80, 697 cfs downstream of S-308, 0 cfs at S-49 on C-24, 0 cfs at S-97 on C-23, and 126 cfs from Ten Mile Creek at the Gordy Road Structure. Average inflow from tidal basin tributaries is estimated to be 300 cfs (Figures 1 and 2). Total inflow averaged about 1,098 cfs last week and 1,654 cfs over last month.

Over the past week, throughout the estuary salinity increased except for surface salinity at HR1 (Table 1, Figures 3 and 4). The seven-day moving average salinity of the water column at the US1 Bridge is about 7.7. Salinity conditions in the middle estuary are within 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)	**1.9** (2.3)	**5.0** (4.2)	NA[1]
US1 Bridge	**6.0** (4.3)	**9.4** (6.0)	10.0-26.0
A1A Bridge	**21.4** (15.9)	**24.0** (19.7)	NA

[1]Envelope not applicable

Caloosahatchee Estuary

During the past week, provisional flows averaged approximately 894 cfs downstream of S-77, 1,180 cfs at S-78, and 2,952 cfs at S-79. Average inflow from tidal basin tributaries is estimated to be 751 cfs (Figures 5 and 6). Total inflow averaged 3,703 cfs last week and 4,372 cfs over last month.

Over the past week in the estuary, salinity remained about fresh to Cape Coral Bridge and increased downstream (Table 2, Figures 7 and 8). The seven-day average salinity values are within the good range for adult oysters at Shell Point and at Sanibel and has been in the poor range at Cape Coral for 91 consecutive days (Figure 9). The 30-day moving average surface salinity is 0.2 at Val I-75 and 0.2 at Ft. Myers. Salinity conditions at Val I-75 are in the good range for tape grass.

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	**0.2***(0.2*)	**0.2***(0.2*)	0.0-5.0[2]
Ft. Myers Yacht Basin	**0.2** (0.2)	**0.2** (0.2)	NA
Cape Coral	**3.3** (1.3)	**5.1** (2.4)	10.0-30.0
Shell Point	**14.3** (11.5)	**18.6** (16.7)	10.0-30.0
Sanibel	**~25.8** (EM[3])	**EM** (EM)	10.0-30.0

[1]Envelope not applicable, [2]Envelope is based on a 30-day average, [3]Equipment Malfunction.
Sanibel surface salinity is a 4-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)	5.37 – 5.77	5.4 – 8.0	1.8 – 6.5
Dissolved Oxygen (mg/l)	3.5 – 5.4	5.0 – 7.4	4.7 – 6.7

The Florida Fish and Wildlife Research Institute reported on August 19, 2016, that *Karenia brevis*, the Florida red tide organism, was not detected in samples collected from Lee County.

Water Management Recommendations

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

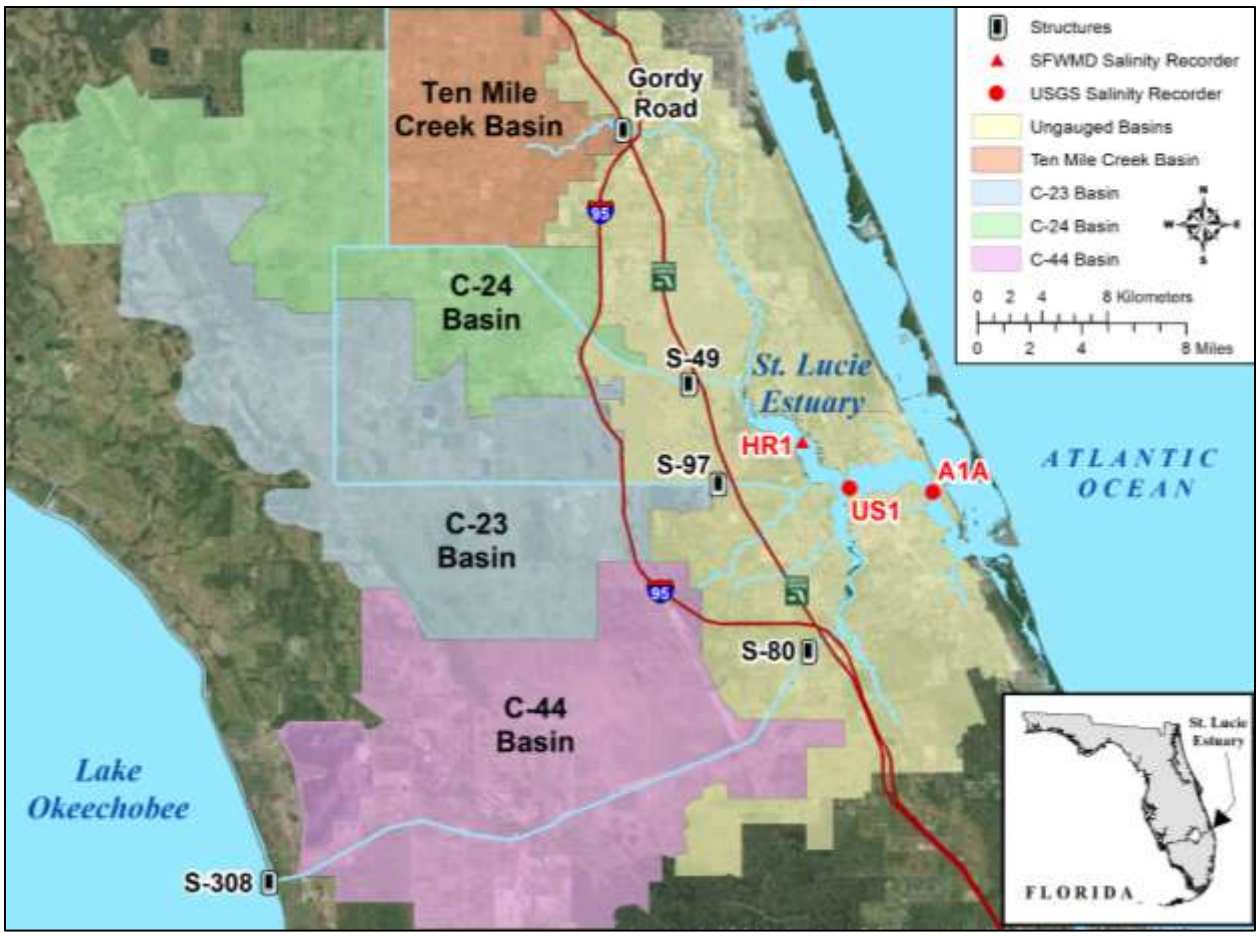


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

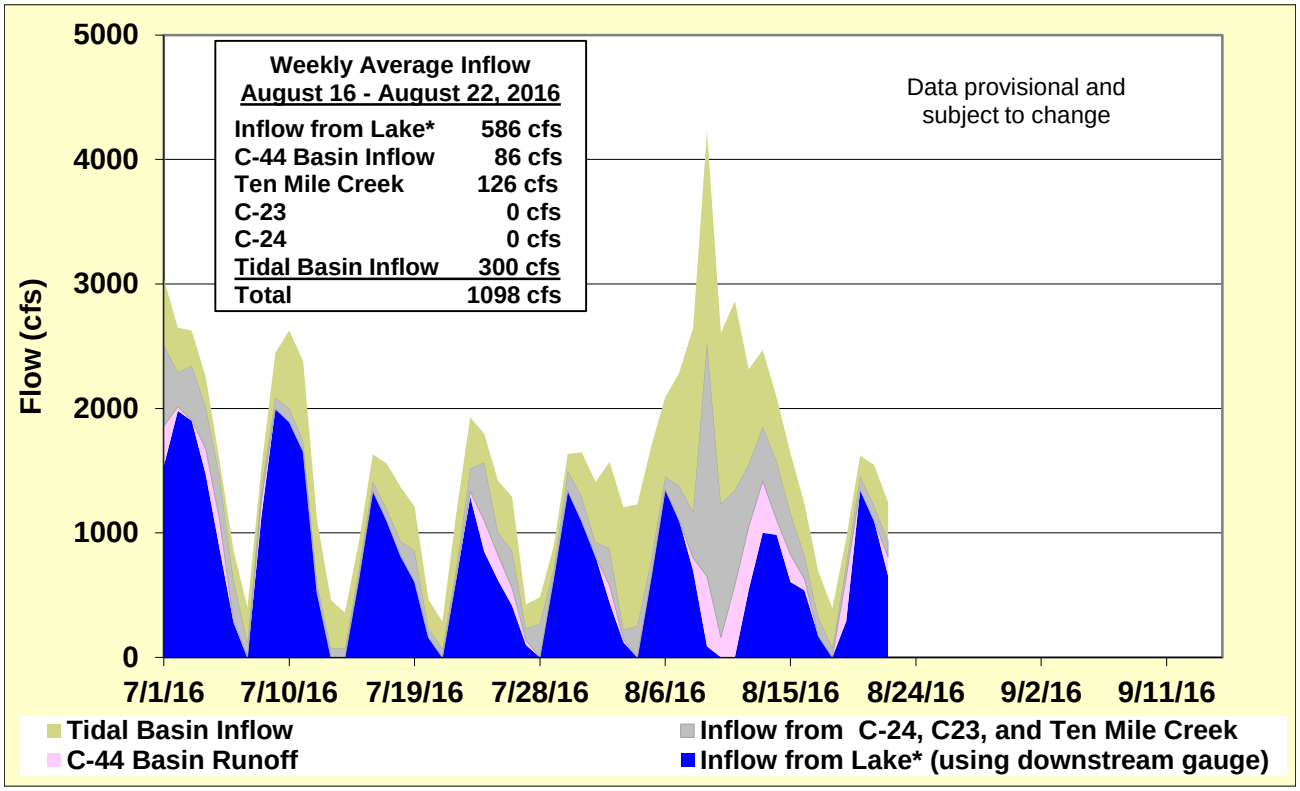


Figure 2. Estimated surface freshwater inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basins into the St. Lucie Estuary.

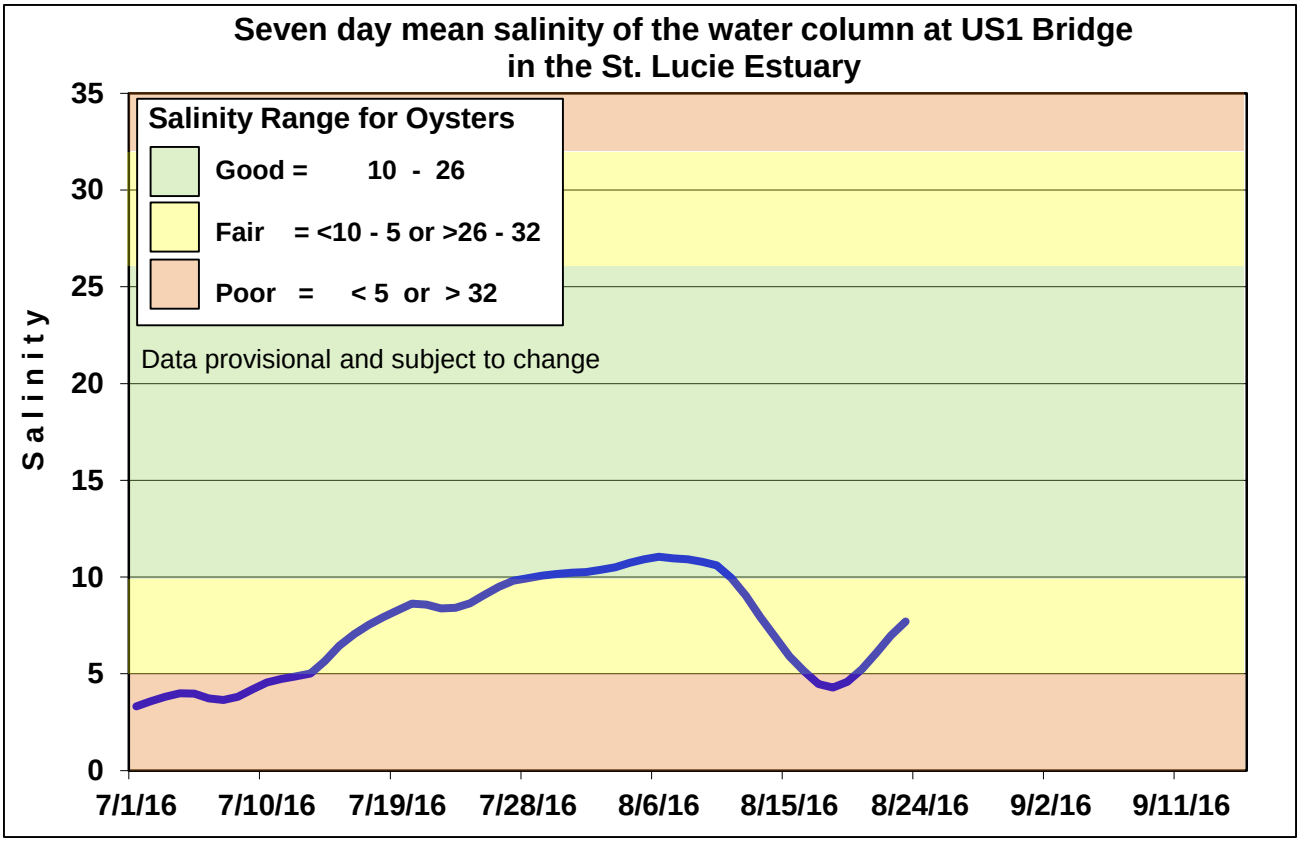


Figure 3. Seven-day mean salinity of the water column at the U.S. Highway 1 Bridge.

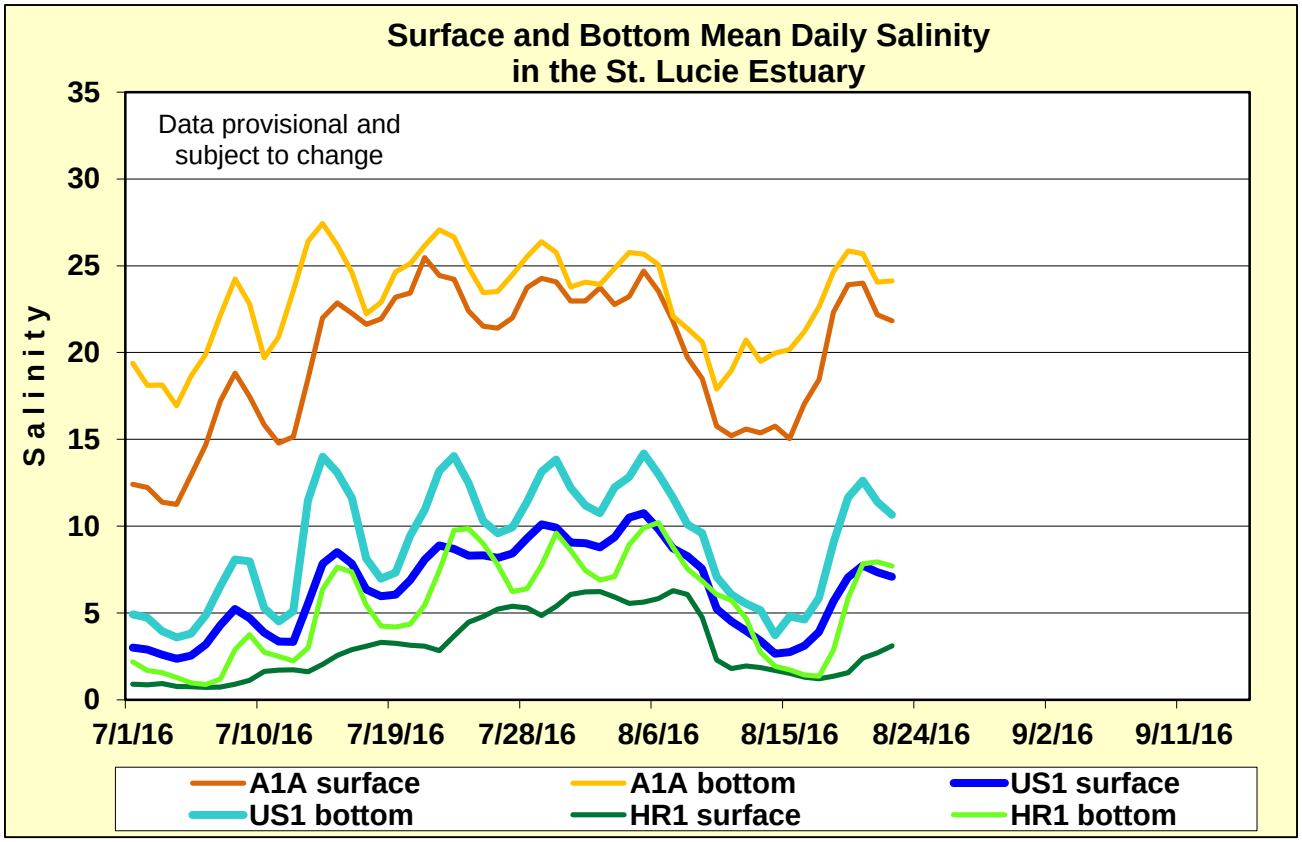


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

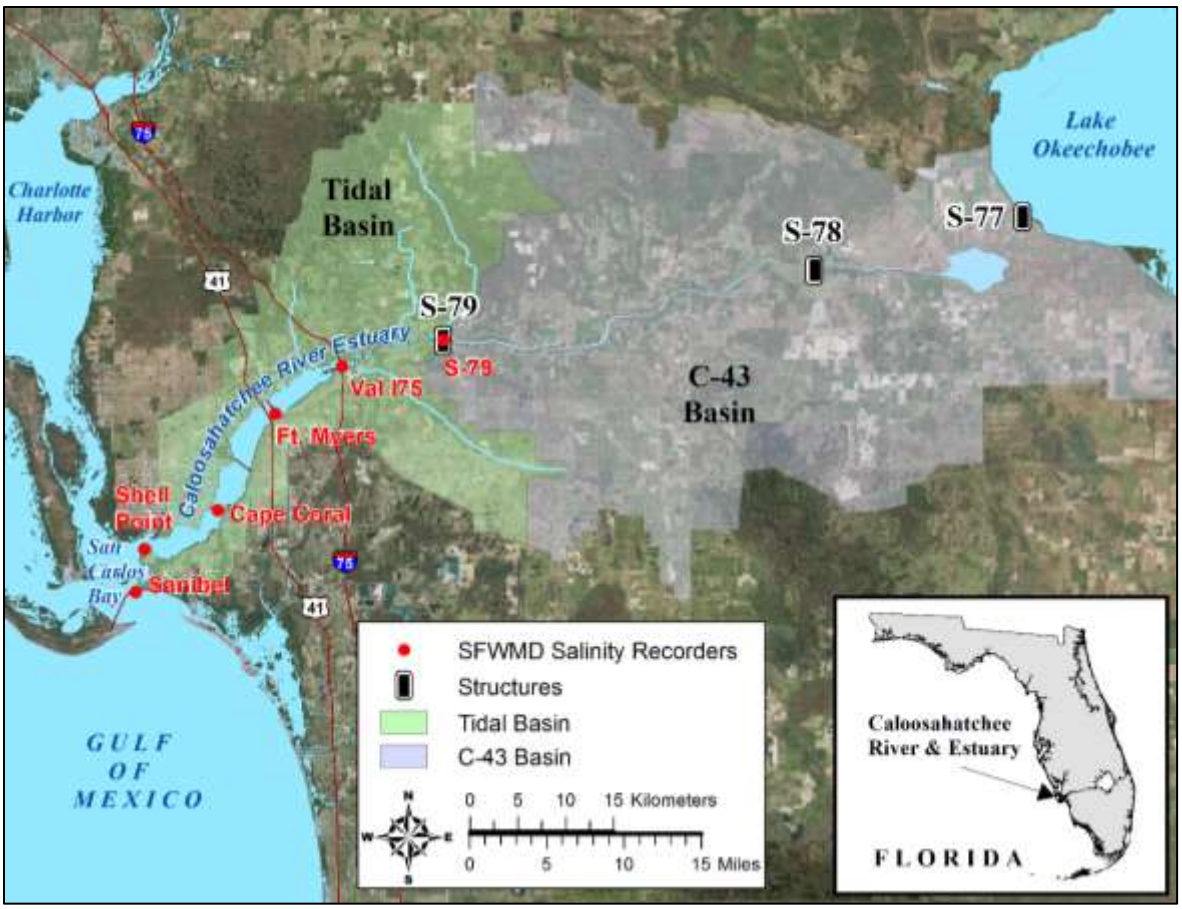


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

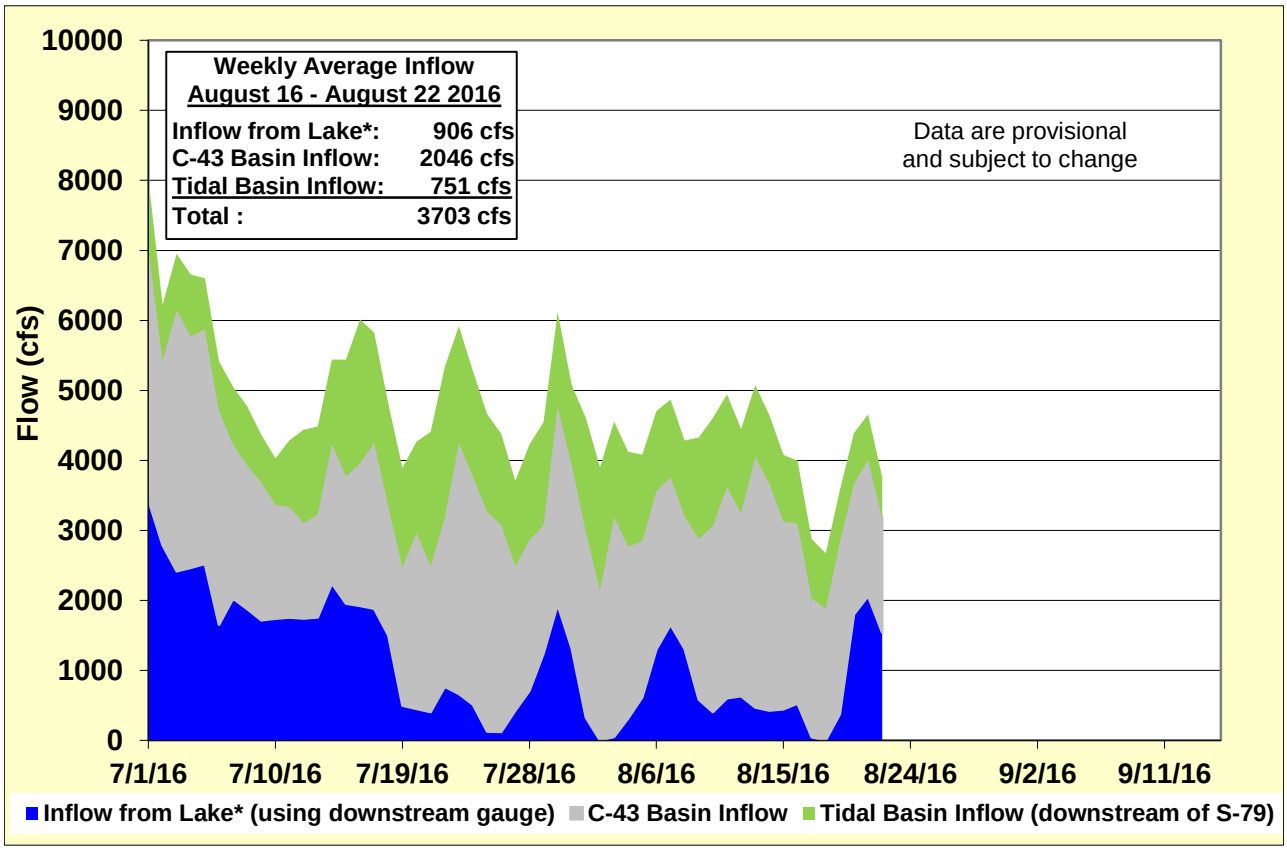
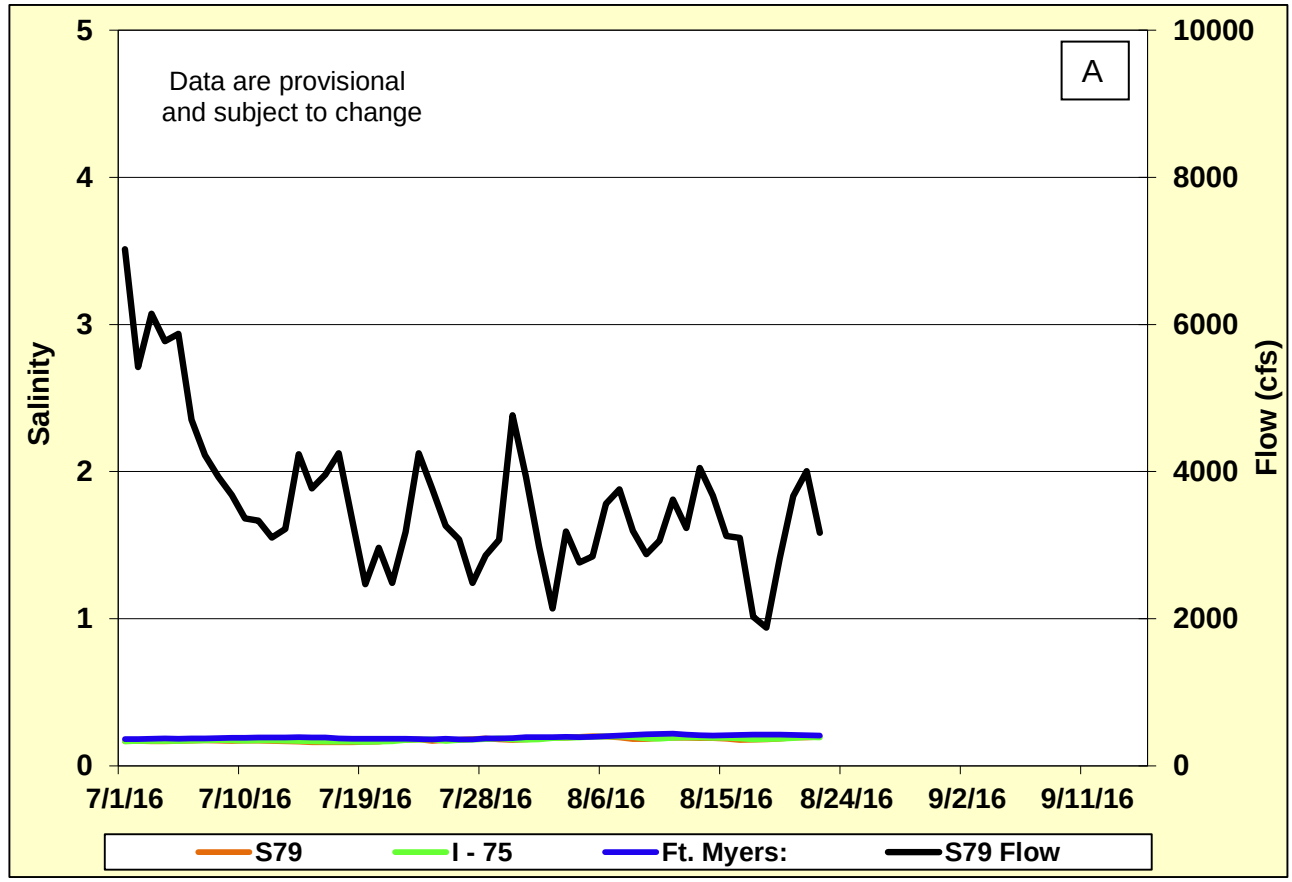


Figure 6. Freshwater inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.



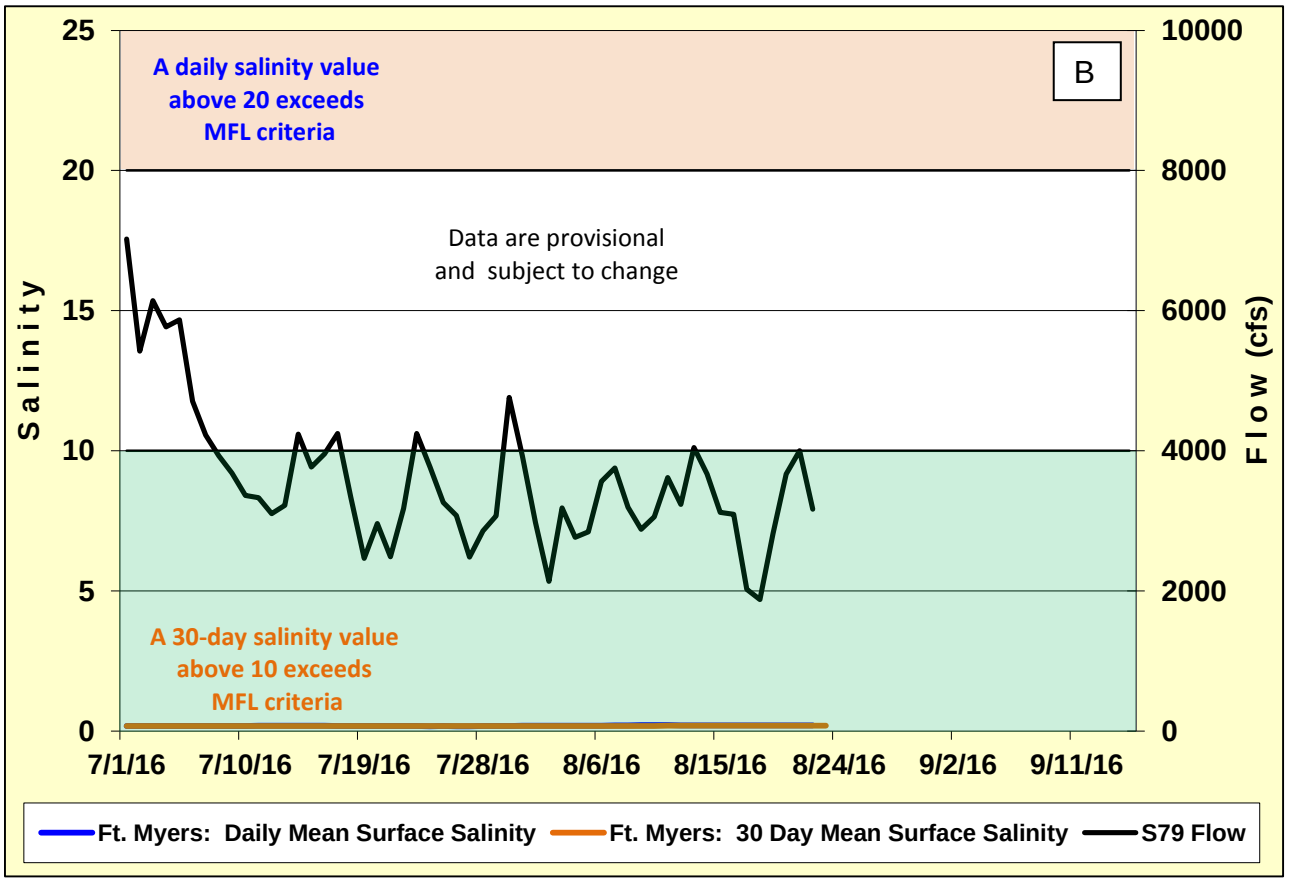


Figure 7. Daily mean flows at S-79 and salinity at upper estuary monitoring stations (A) and 30-day moving average salinity at Ft. Myers (B).

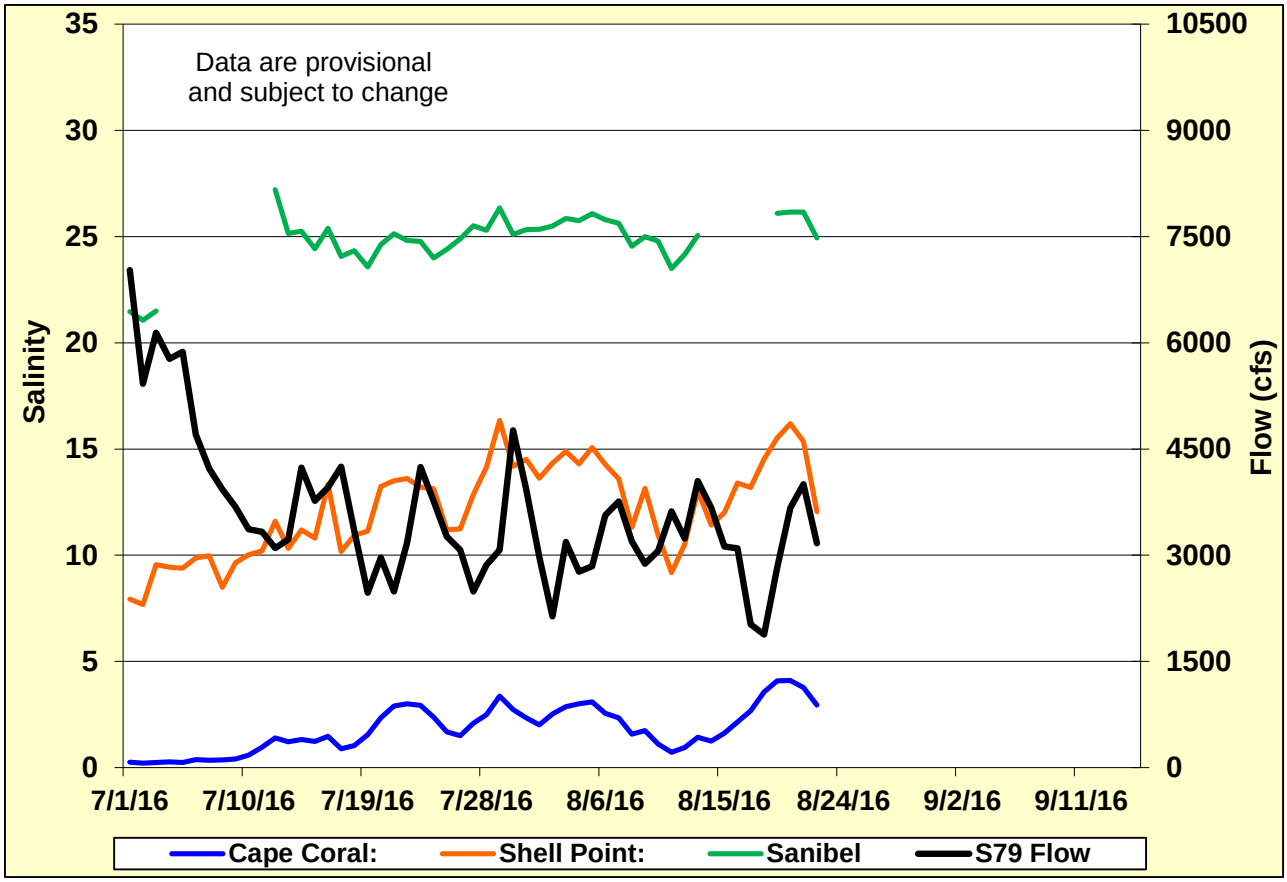


Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.

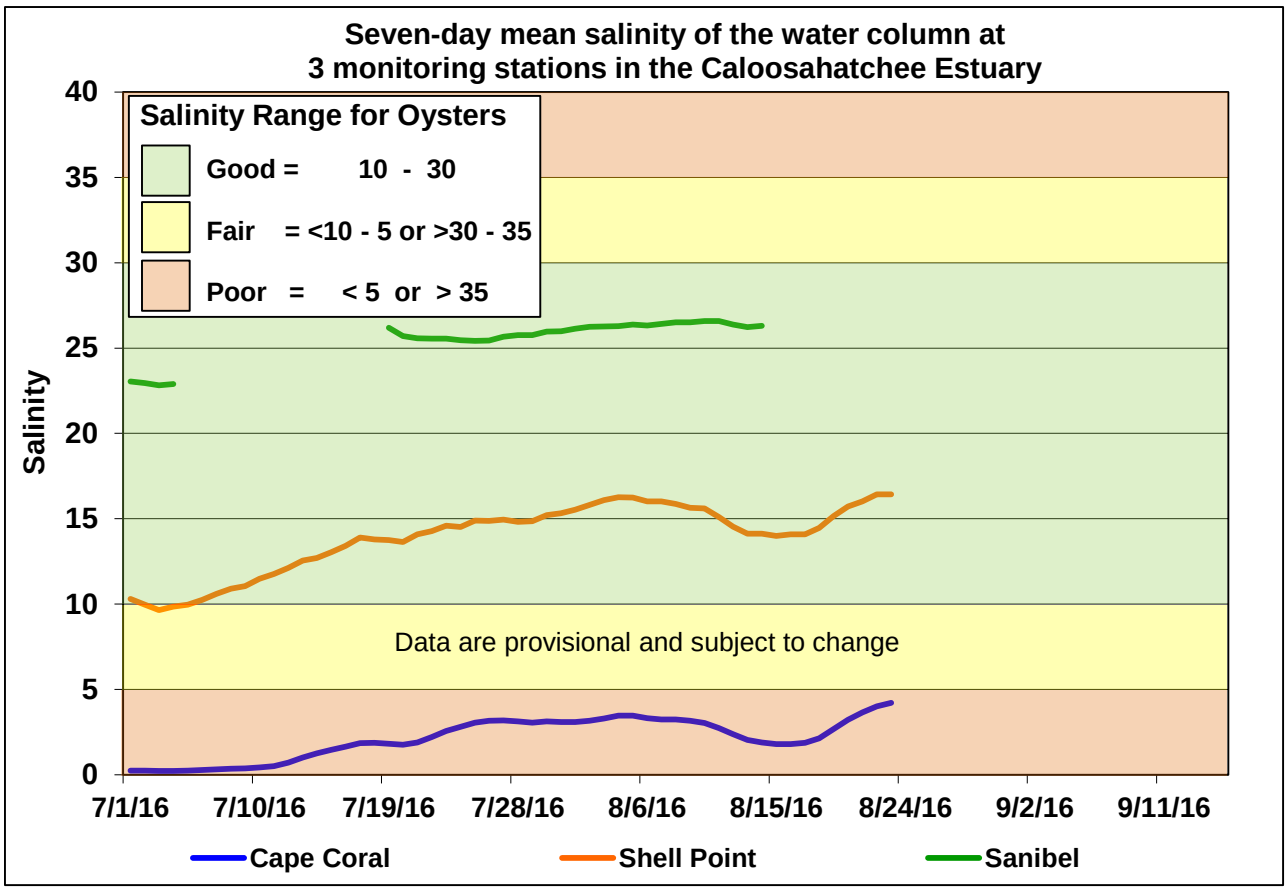


Figure 9. Seven-day mean salinity at Cape Coral Bridge, Shell Point and Sanibel Bridge monitoring stations.

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.

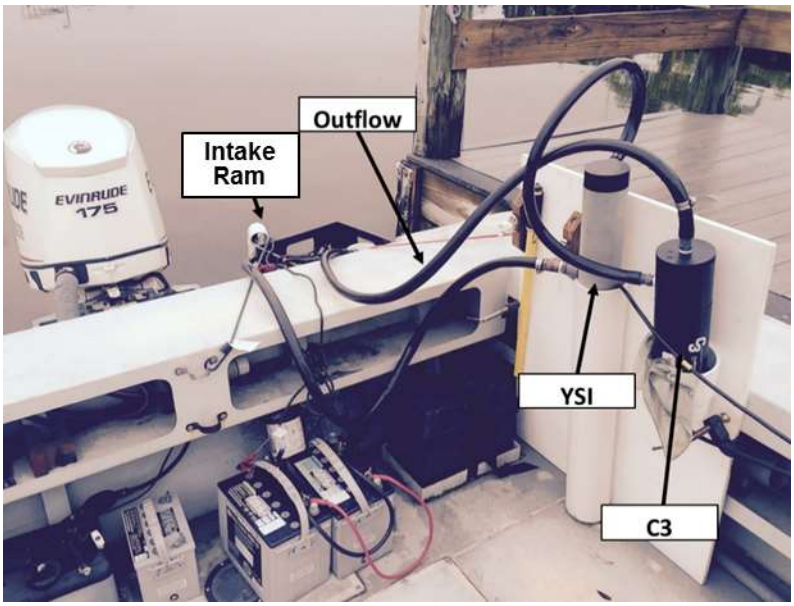
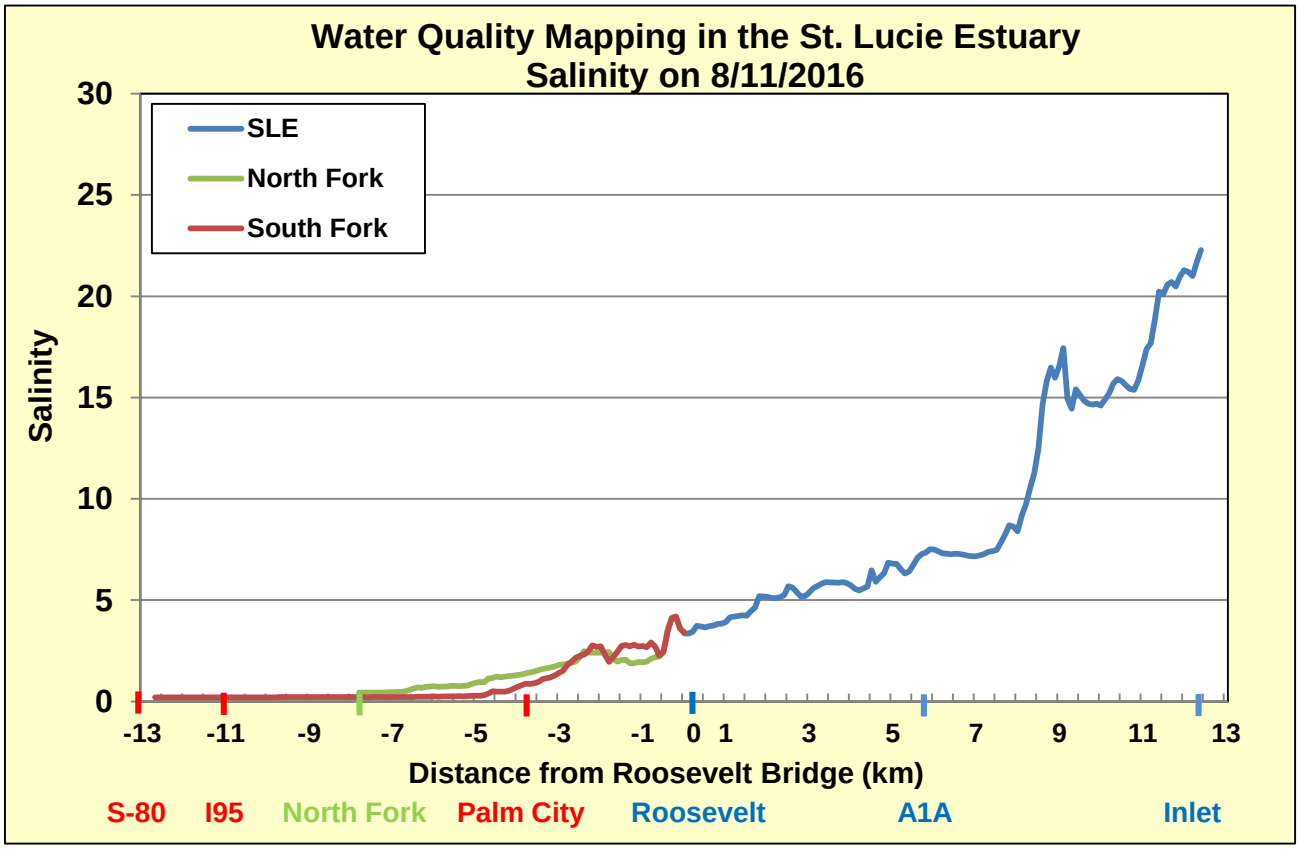


Figure A1. The flow-through system used for water quality mapping.

The St. Lucie Estuary survey track covers the St. Lucie inlet to the Roosevelt Bridge, the North Folk up to Fork Point, and the South Fork to S-80 (Figure A2). Values for chlorophyll on August 11, 2016, when releases from S-80 were 650 cfs pulsed average are shown on Figure A3. The data from all surveys conducted in the St. Lucie estuary in 2016 were separated by each section of the estuary. The distance-weighted mean of chlorophyll *a* concentrations was calculated by dividing the area of the curve by the transect distance to normalize the mean chlorophyll concentration of each segment (Figure A4).

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



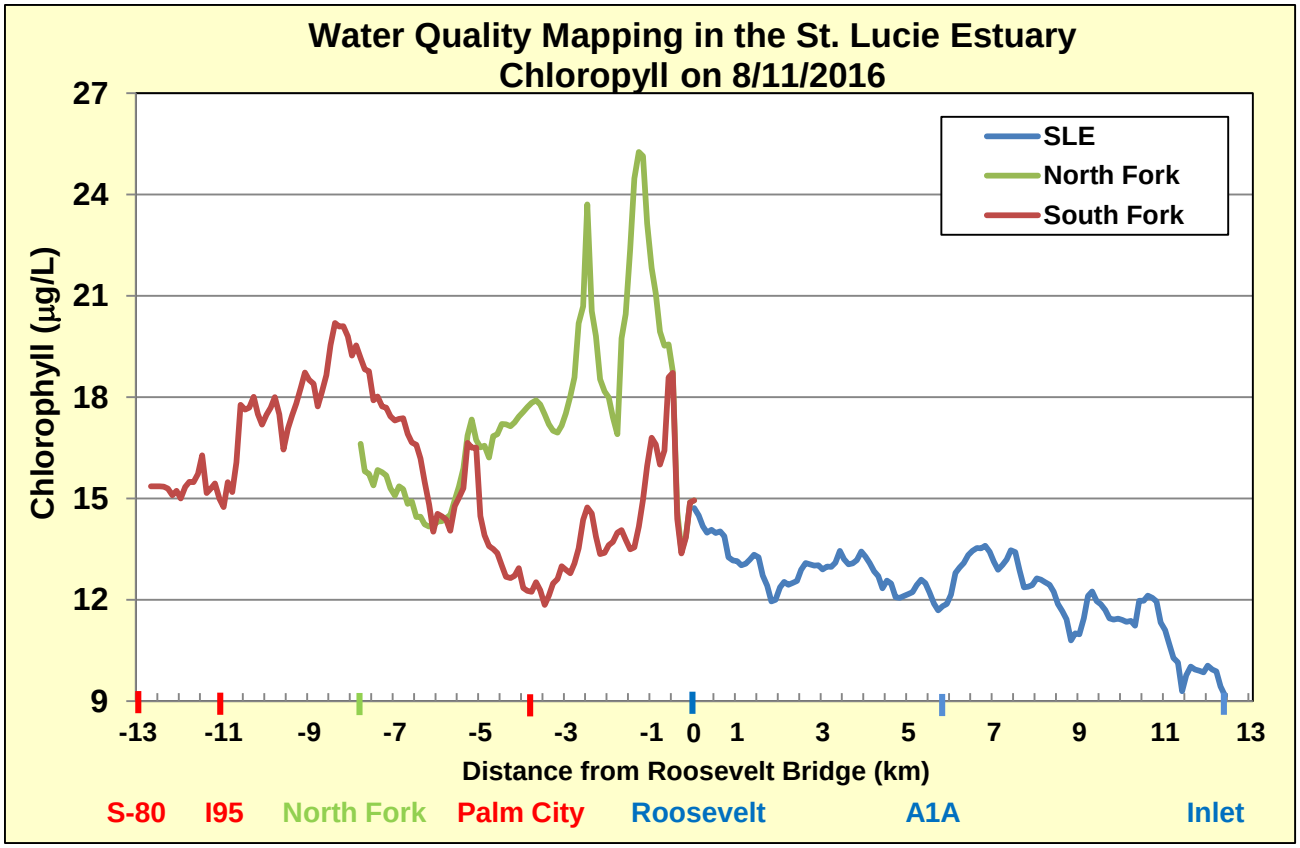
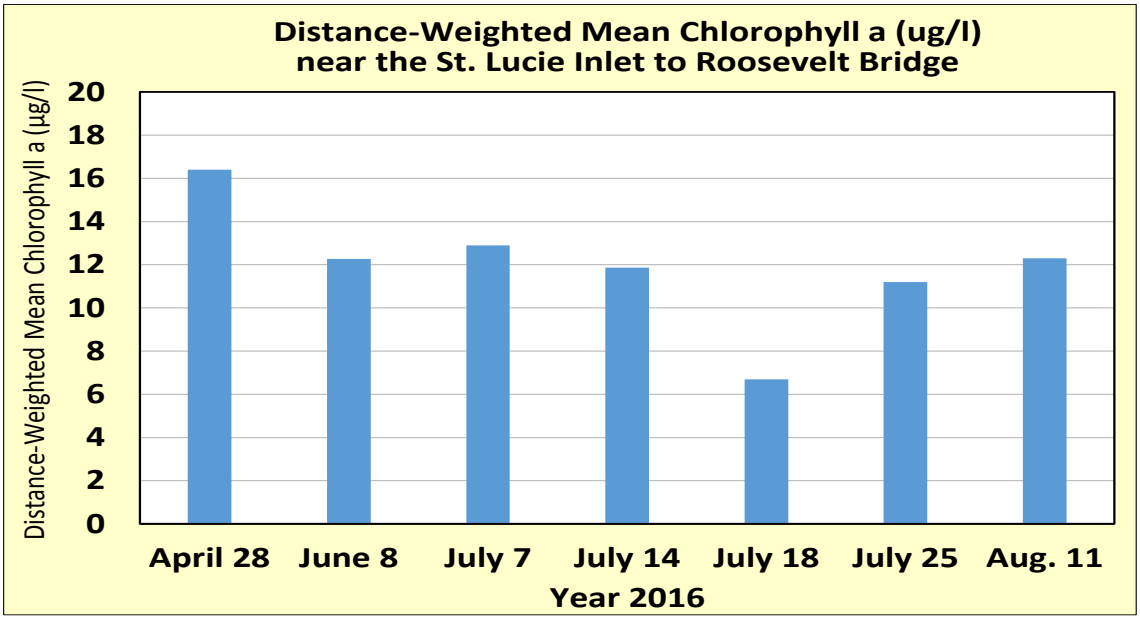
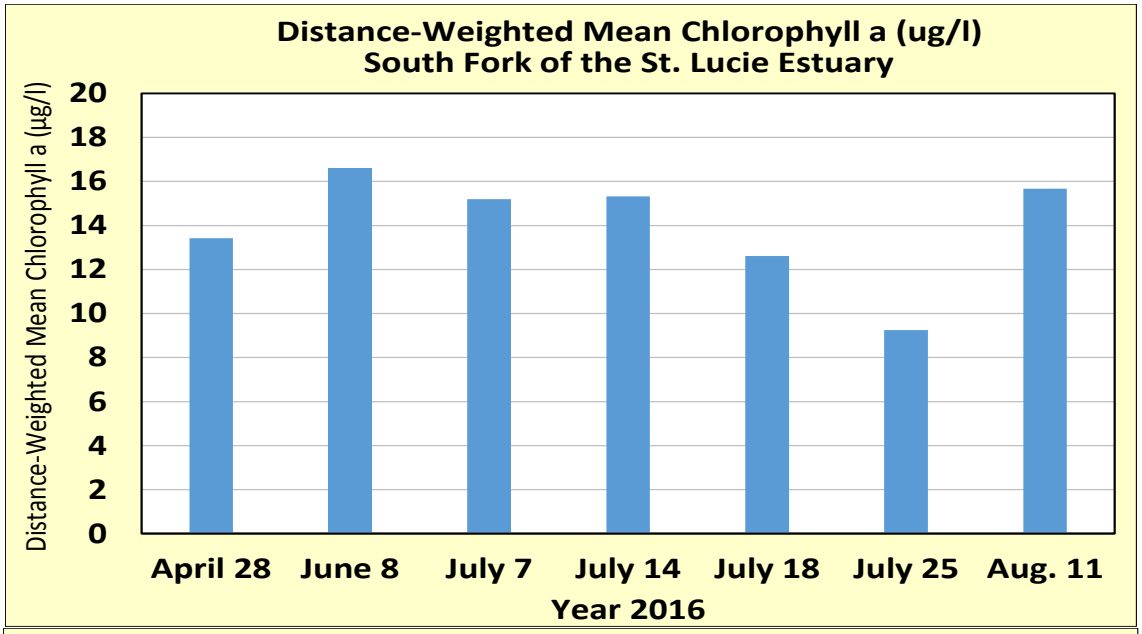


Figure A3. Water Quality Mapping for salinity and chlorophyll results from S-80 to the Inlet on August 11, 2016.





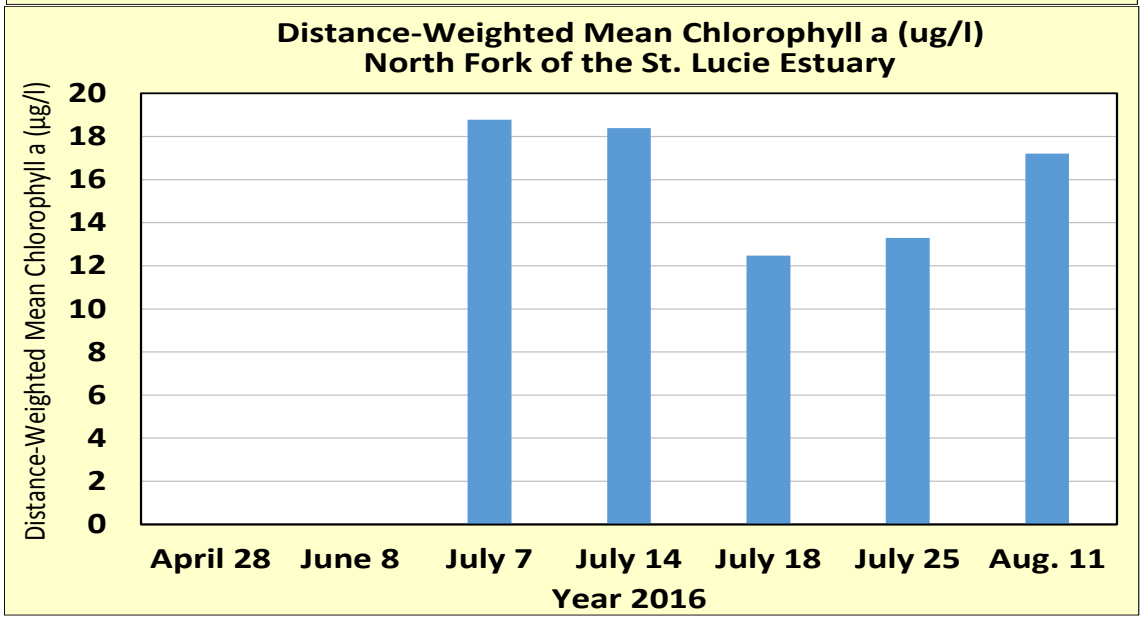
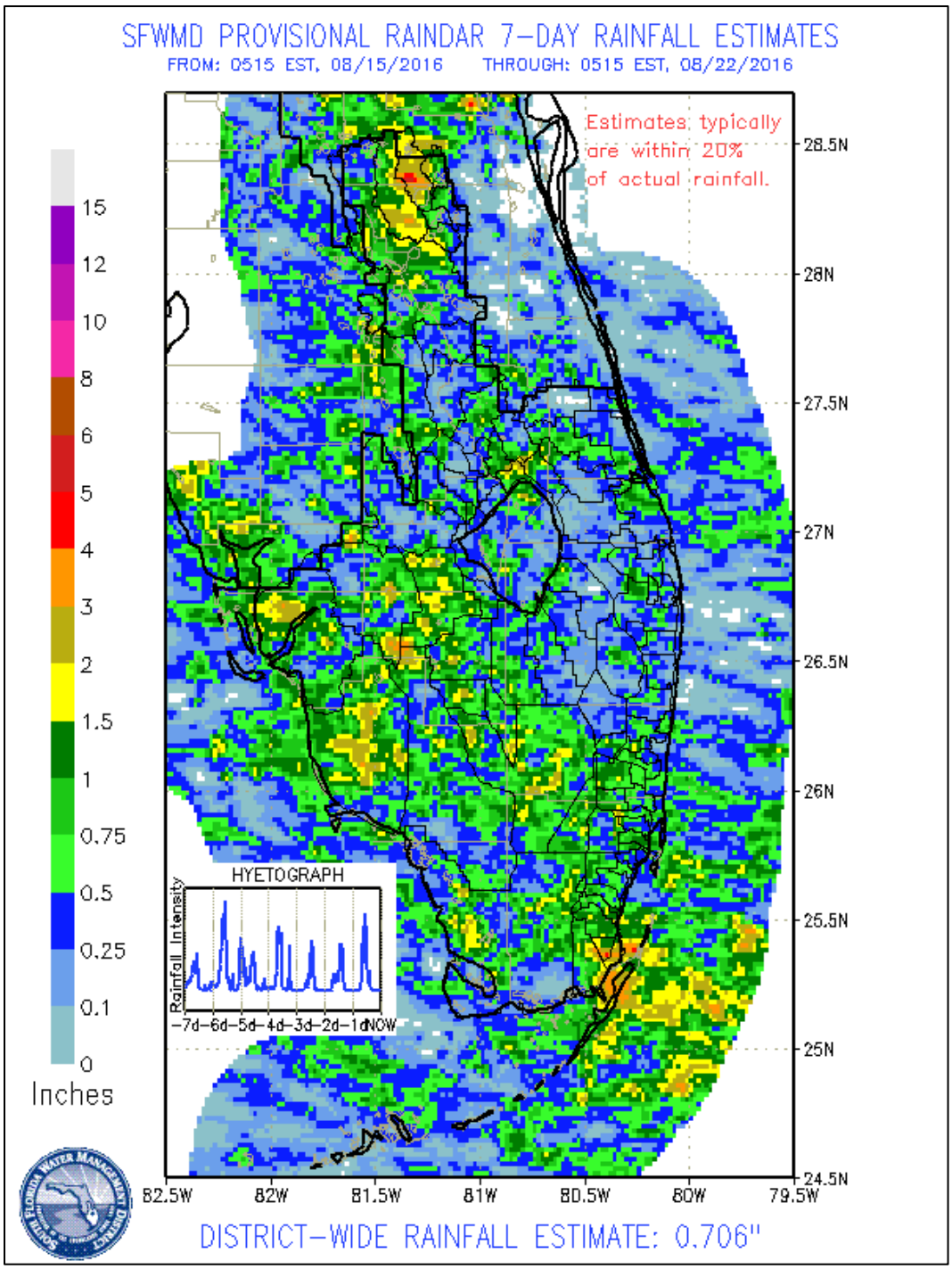


Figure A4. Distance-weighted mean of all 2016 surveys for each section of the St. Lucie River Estuary.

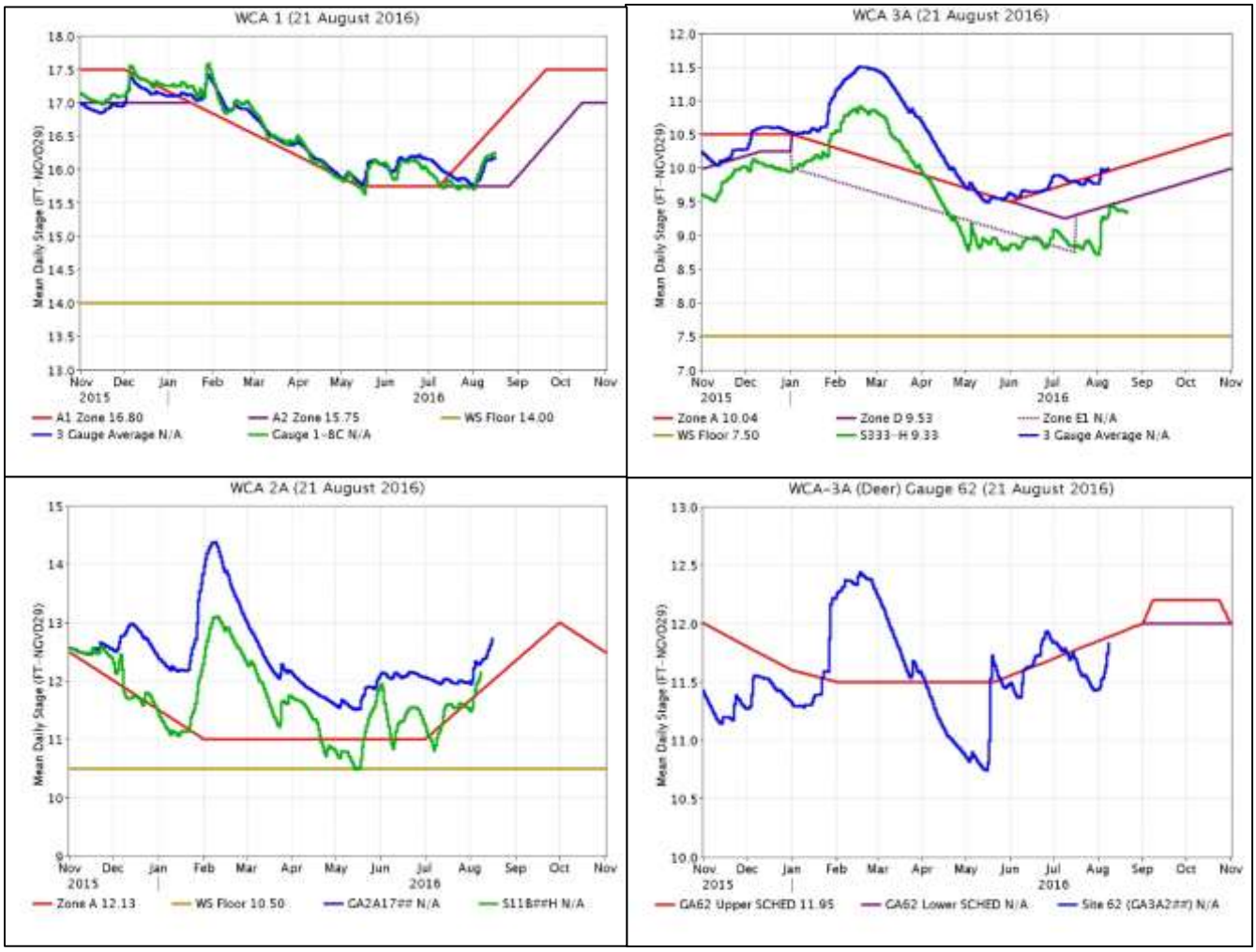
GREATER EVERGLADES

Rainfall was light last week, with basin-wide averages under one inch. The highest local rainfall of 2.92 inches occurred in WCA-3A. Pan evaporation was 1.78 inches, 27 percent above the pre-project average of 1.40 inches.

Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	0.34	-0.01
WCA-2A	0.20	0.17
WCA-2B	0.65	0.04
WCA-3A	0.89	0.02
WCA-3B	0.90	-0.01
ENP	0.61	-0.02

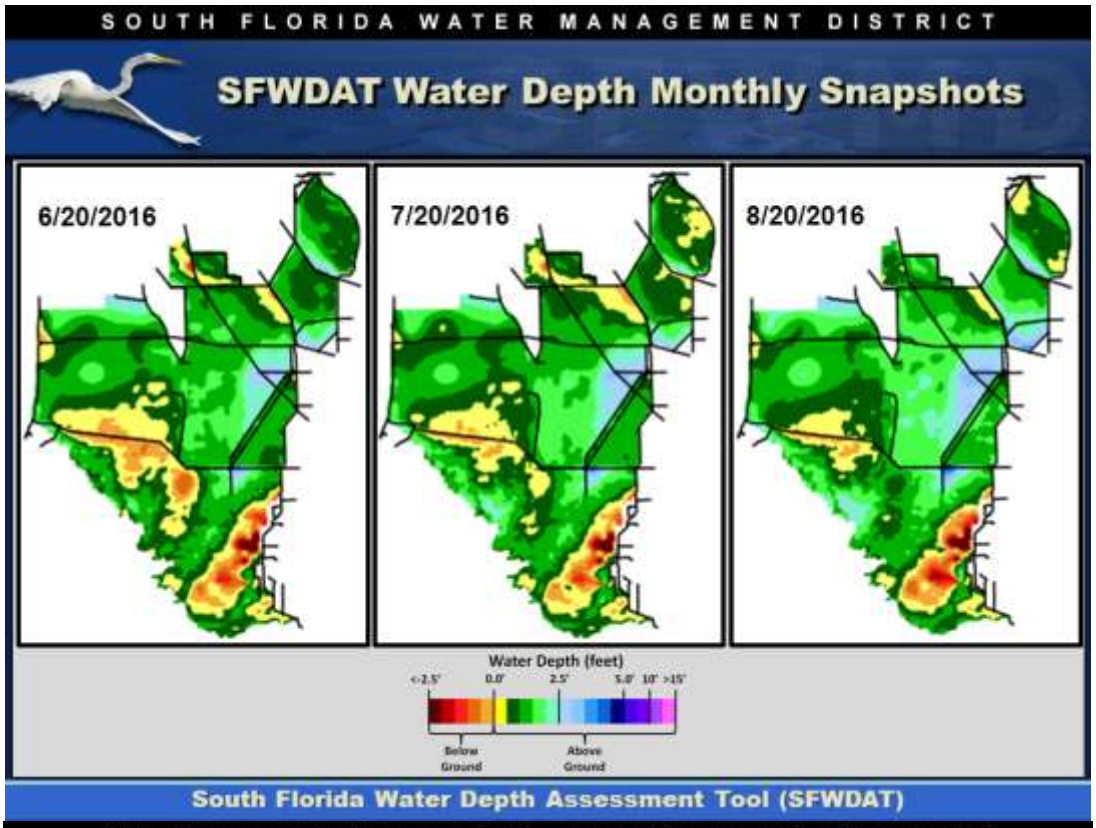


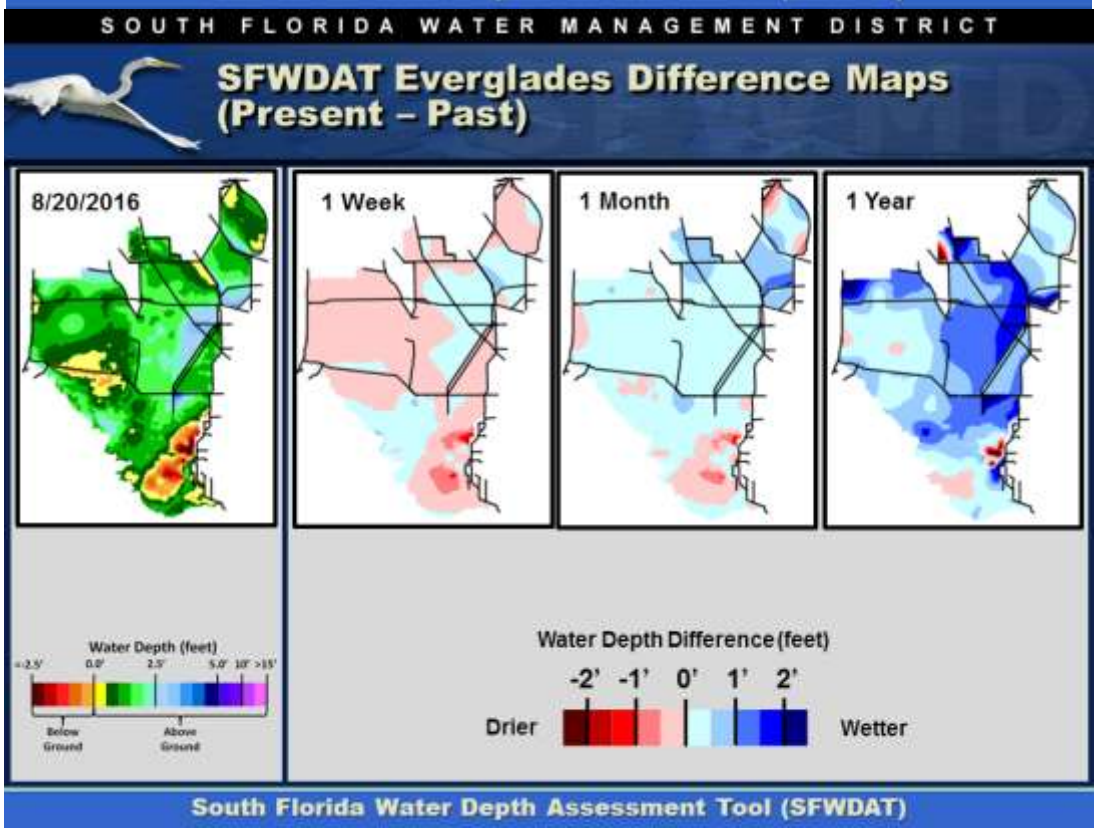
Regulation Schedules: Water levels have both increased and decreased with low rainfall last week. The WCA-1 three-gauge average is 0.63 feet below regulation. The WCA-2A stage is 0.68 feet above regulation. Both of the WCA-3A gauges are close to regulation: the WCA-3A three-gauge average stage is -0.01 feet below regulation and the northwestern WCA-3A gauge stage (gauge 62) is -0.01 feet below the schedule.



Water Depths and Changes: Water levels are higher than those in July and June. Water depths at monitored gauges other than in WCA-2B range from 1.03 feet to 2.17 feet.

Stage changes were mixed last week. Gauge changes ranged from -0.07 feet (WCA-1) to 0.17 feet (WCA-2A). Stages are higher than a month ago and higher to much higher than a year ago.



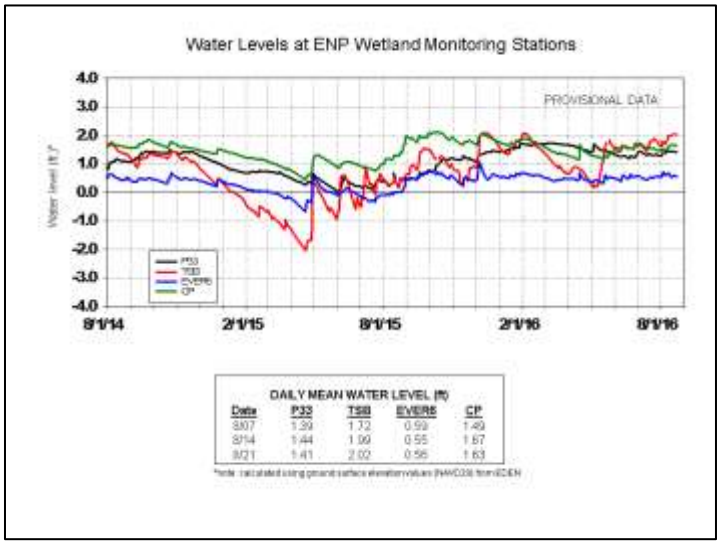


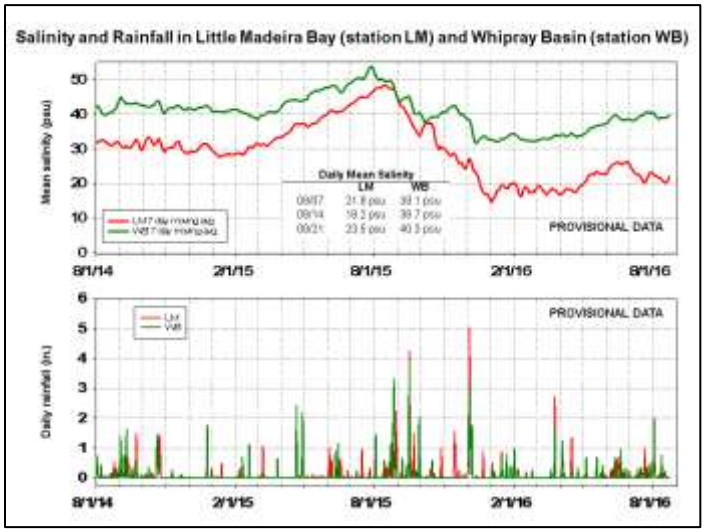
Cape Sable Seaside Sparrows: Ground surveys of subpopulations A and B are complete, and the sparrows are finished breeding for this year.

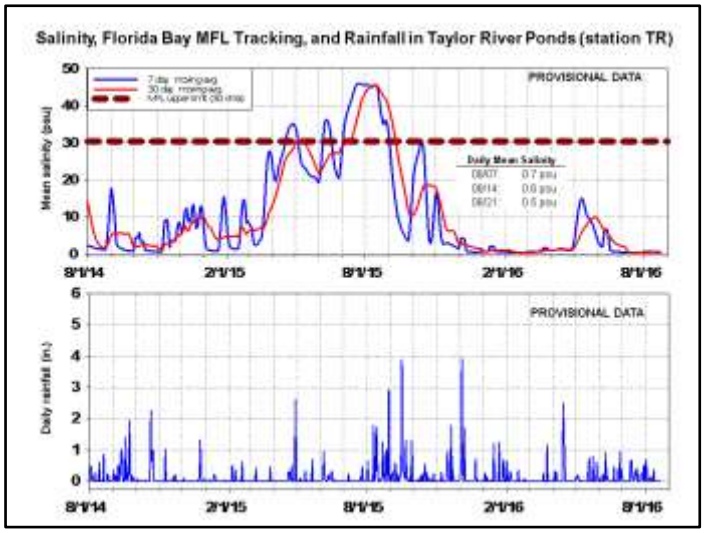
Everglades National Park (ENP) and Florida Bay: Water level changes were mixed last week with the western areas of Taylor Slough decreasing and the northern and eastern areas increasing slightly. Stages in all areas are higher than a month ago at average to seven inches above average.

Salinities across Florida Bay are above average by one to five psu. Daily average salinities remain from 17 to 40 psu with the highest salinity still in central Florida Bay.

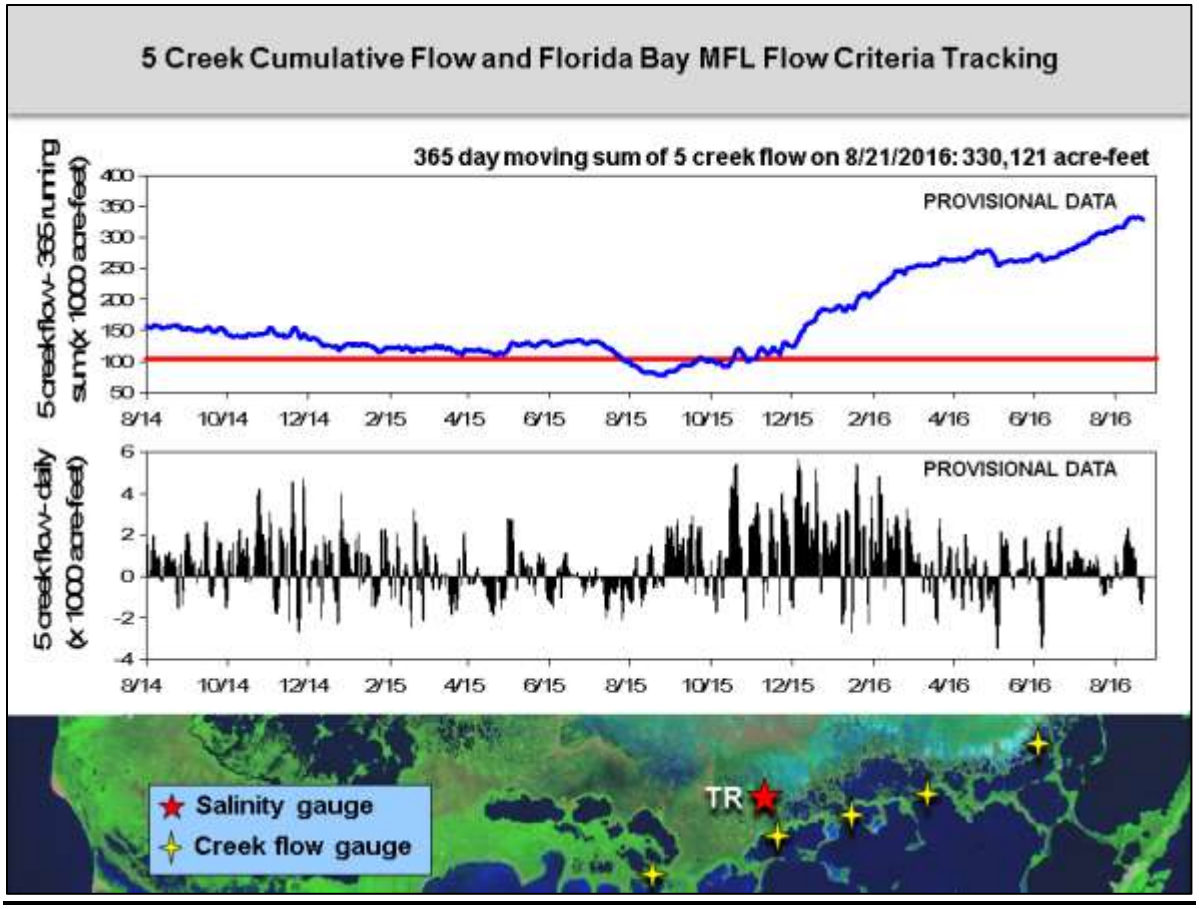
The MFL sentinel site TR in the mangrove zone remains near fresh at 0.5 psu, and the 30-day moving average salinity at TR is also at a seasonal 0.6 psu.







The 365-day running sum of the cumulative flow from the five creeks feeding Florida Bay has decreased slightly to 330,121 acre-feet (above the average of 257,628 acre-feet). Creek flow is provisional data from the USGS and is highly variable.



Water Management Recommendations

- Water levels need to increase in northern WCA-1 to re-open the Refuge following low water closures to airboat traffic.

- We recommend keeping water depths in southern WCA-3A below 2.5 feet throughout the wet season to protect tree island forests. The depth at gauge 65 is 2.17 feet.

- Ascension rates need to remain under 0.25 feet per week to protect habitat and wildlife, including apple snails, prey of the endangered snail kite.

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

Everglades Ecological Recommendations, Aug. 23, 2016 (red is new)

Area	Current Condition	Cause(s)	Recommendation	Reasons
WCA-1	Stages changed 0'.04 to -0.07'	Rainfall, ET, management	Provide additional water to WCA-1. Limit ascension rates to a maximum of 0.25 ft/week.	Higher water levels are needed to reopen the Refuge to airboats. Ascension rates of <0.25'/week will protect habitat and wildlife including reproducing apple snails.
WCA-2A	Stage rose 0.17'	Rainfall, ET, management	Maintain ascension rates <0.25 ft/week. The two-week ascension rate has been 0.52 feet.	Ascension rates of <0.25'/week will protect habitat and wildlife including reproducing apple snails, prey for endangered snail kites.
WCA-2B	Stages rose 0.02' to 0.06'	Rainfall, ET, management	Follow normal seasonal practices. Limit ascension rates to extent possible with a maximum of 0.25 ft/week.	Ascension rates of <0.25'/week will protect habitat and wildlife including reproducing apple snails.
WCA-3A NE	Stage rose 0.05'	Rainfall, ET, management	Increase inflow into northeastern WCA-3A. Increase ascension rates to extent possible with a maximum of 0.25 ft/week.	Water levels are too low in northeastern WCA-3A. Ascension rates not exceeding 0.25'/week will protect habitat and wildlife including reproducing apple snails.
WCA-3A NW	Stage rose 0.02'	Rainfall, ET, management		
Central WCA-3A S	Stage rose 0.02'	Rainfall, ET, management	Limit ascension rates to extent possible with a maximum of 0.25 ft/week. Water depths at gauge 65 should remain below 2.5 feet over this upcoming wet season. When flows are changed a gradual reduction is recommended (stepping down over several days).	Keeping depths below 2.5' at gauge 65 is important to allow tree island vegetation to recover from stress of the recent extended inundation duration. Ascension rates of <0.25'/week will protect habitat and wildlife including reproducing apple snails.
Southern WCA-3A S	Stage dropped -0.02'	Rainfall, ET, management		
WCA-3B	Stages changed 0.02' to -0.04'	Rainfall, ET, management	Follow normal seasonal practices. Limit ascension rates to extent possible with a maximum of 0.25 ft/week.	Ascension rates of <0.25'/week will protect habitat and wildlife including reproducing apple snails.
ENP-SRS	Stage fell -0.02'	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 have been opened.	Rainfall, ET, management	Follow rainfall plan for releases. Gradual reduction in flows through S333, and the S-12 structures when they decrease is recommended (stepping down over several days). Follow guidance in C-111 western spreader canal project operations manual.	Sparrows have ceased breeding for 2016. Future operations need to continue to provide appropriate hydrological and habitat conditions for breeding in subpopulation A.
Taylor Slough	Average to 7 inches above average	Rain, ET, inflows	Move water southward as needed	Provide freshwater buffer for ecosystems and maintain low salinity conditions downstream
FB- Salinity	1 to 5 psu above average	Rain, ET, inflows, wind	Move water southward as needed	Maintain lower salinity levels.