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MEMORANDUM

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

FROM: SFWMD Staff Environmental Advisory Team

DATE: August 2, 2016

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Kissimmee

On Sunday, stage in East Lake Toho, Lake Toho, and Kissimmee-Cypress-Hatchineha were below schedule by 0.1, 0.1, and 0.4 feet, respectively. Over the past week, discharge at S65, S65A, and S65E averaged 643, 638, and 1,158 cfs, respectively. Tuesday morning discharges were ~749 cfs, ~635 cfs, ~980 cfs, and ~920 cfs, respectively at S65, S65A, S65C, and S65E. Dissolved oxygen in the Kissimmee River averaged 5.01 mg/L over the past week and 4.39 mg/L on Sunday. Kissimmee River mean floodplain depth on Sunday was 0.36 feet. There are no new recommendations for this week.

Lake Okeechobee

Lake Okeechobee is at 14.63 feet NGVD having remained static over the past week. The Lake remains in the Low Flow Sub-band. Lake levels are approximately a foot too high for this time of year and there is a potential for negative impacts to submerged aquatic vegetation (SAV). Various data sources indicate the presence of large dense cyanobacterial blooms on the Lake.

Estuaries

The USACE implemented a seven-day pulse schedule of 650 cfs to the St. Lucie Estuary last week. Total freshwater inflow to the St. Lucie Estuary averaged 993 cfs. Flow from the Lake was 629 cfs (63% of total flow). Salinity increased in the upper portion of the estuary and was about the same in the lower portion. The seven-day average salinity at the US1 Bridge is in the good range for adult oysters. Chlorophyll concentrations in July have tended to be highest just upstream of the US1 Bridge, but concentrations have declined over the course of the month. In the Caloosahatchee Estuary, the USACE implemented a seven-day pulse schedule at S-79 of 2,800 cfs. Total freshwater inflow averaged 4,636 cfs. Flow from the Lake was 866 cfs (19% of total flow). Salinity conditions in the upper estuary are suitable for tape grass. Salinity remained in the poor range for adult oysters at the Cape Coral Bridge and in the good range at Shell Point and Sanibel. The 30-day average salinity at the I-75 Bridge is below 5.

Stormwater Treatment Areas

Over the past week, the STAs/FEBs received approximately 17,600 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 56,000 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 ESA-protected species have been observed in STA-1E and STA-5/6. This week, as conditions allow, releases will be sent to STA-1E, STA-1W and the A-1 FEB, and A-1 FEB releases will be sent to STA-2 and STA-3/4.

Everglades

Rainfall was low and evaporation was high in the Everglades, so stages declined from -0.05 feet to -0.12 feet. Water levels are too shallow in northern WCA-3A and in WCA-1, where the northern half has been closed to airboat access. Additional water is desirable for WCA-1, central WCA-2A, and northern WCA-3A. The 30-day moving average salinity at the Florida Bay MFL site is 0.5 psu and the cumulative 365-day inflow from the five creeks into Florida Bay increased to 312,700 acre-feet.

Weather Conditions and Forecast

Scattered showers and thunderstorms over the southern half of the District today. An upper level low near south Florida is bringing favorable conditions for thunderstorm development as newly-developed Tropical Storm Earl passes westward well to our south. Thunderstorm activity developing inland of the east coast should shift westward through the day and this evening. Moisture over the area will continue to help develop showers and thunderstorms Wednesday and Thursday with heaviest activity over western areas. Some drier air working its way over the District will then decrease daily thunderstorm coverage with activity focused west Friday and then east Saturday.

KISSIMMEE BASIN

Kissimmee Basin Rainfall

The Upper Kissimmee Basin received 1.0 inches of rainfall in the past week and the Lower Basin received 0.80 inches (SFWMD Daily Rainfall Report 08/01/2016).

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: 8/2/2016

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)						
							7/31/16	7/24/16	7/17/16	7/10/16	7/3/16	6/26/16	6/19/16
Lakes Hart and Mary Jane	S62	57	LKMJ	60.1	R	60.0	0.1	0.1	0.0	0.1	0.0	0.0	0.4
Lakes Myrtle, Preston, and Joel	S57	2	S57	61.0	R	61.0	0.0	-0.1	0.1	0.0	0.0	0.0	0.1
Alligator Chain	S60	34	ALLI	63.2	R	63.2	0.0	0.1	0.0	0.0	-0.1	-0.5	-0.6
Lake Gentry	S63	40	LKGT	61.1	R	61.0	0.1	-0.1	0.2	0.0	0.0	0.1	-0.1
East Lake Toho	S59	32	TOHOE	56.4	R	56.5	-0.1	-0.1	-0.1	-0.3	-0.5	-0.7	-0.5
Lake Toho	S61	0	TOHOW, S61	53.4	R	53.5	-0.1	-0.1	-0.3	-0.4	-0.5	-0.8	-0.8
Lakes Kissimmee, Cypress, and Hatchineha	S65	643	LKISSP, KUB011, LKISSB	50.6	R	51.0	-0.4	-0.4	-0.5	-0.4	-0.5	-1.0	-0.8

* 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: 8/2/2016

Metric	Location	Sunday's 1-day average	Weekly Average**									
			7/31/16	7/24/16	7/17/16	7/10/16	7/3/16	6/26/16	6/19/16	6/12/16	6/5/16	5/29/16
Discharge (cfs)	S-65	662	643	642	545	552	857	2431	3194	3940	2899	4304
Discharge (cfs)	S-65A	637	638	660	633	660	1211	2890	4455	5649	3348	6187
Discharge (cfs)	S-65C	1014	1219	1091	1119	1489	2741	4168	6224	5091	4792	6914
Headwater stage (feet NGVD)		34.0	34.1	34.0	34.1	34.2	34.0	34.1	34.1	34.1	33.9	34.2
Discharge (cfs)	S-65D****	1097	1284	1263	1272	1835	3108	4552	7361	5471	5186	7868
Discharge (cfs)	S-65E	1008	1158	1181	1147	1755	2991	4458	7216	5255	5005	7470
DO concentration (mg/L)***	Phase I river channel	4.39	5.01	4.91	4.40	2.74	2.21	1.66	0.77	1.44	0.48	0.72
Mean depth (feet)*	Phase I floodplain	0.36	N/A	0.44	0.63	0.62	1.18	1.93	2.33	3.12	1.75	2.81

* 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
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
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

KCOL Hydrographs (through Sunday midnight)

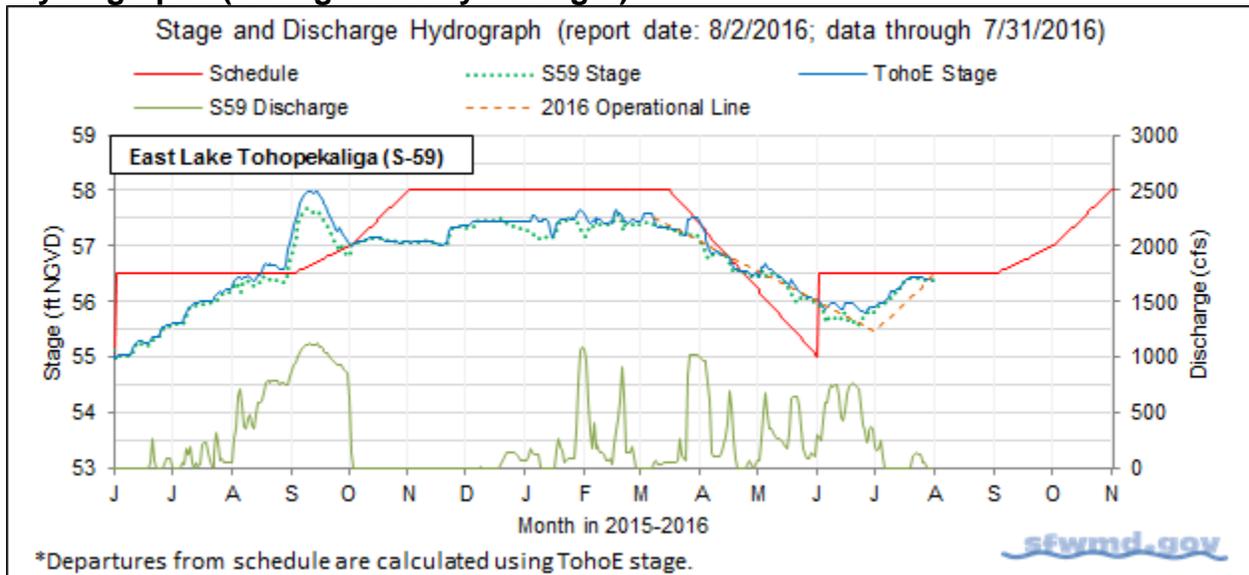


Figure 1.

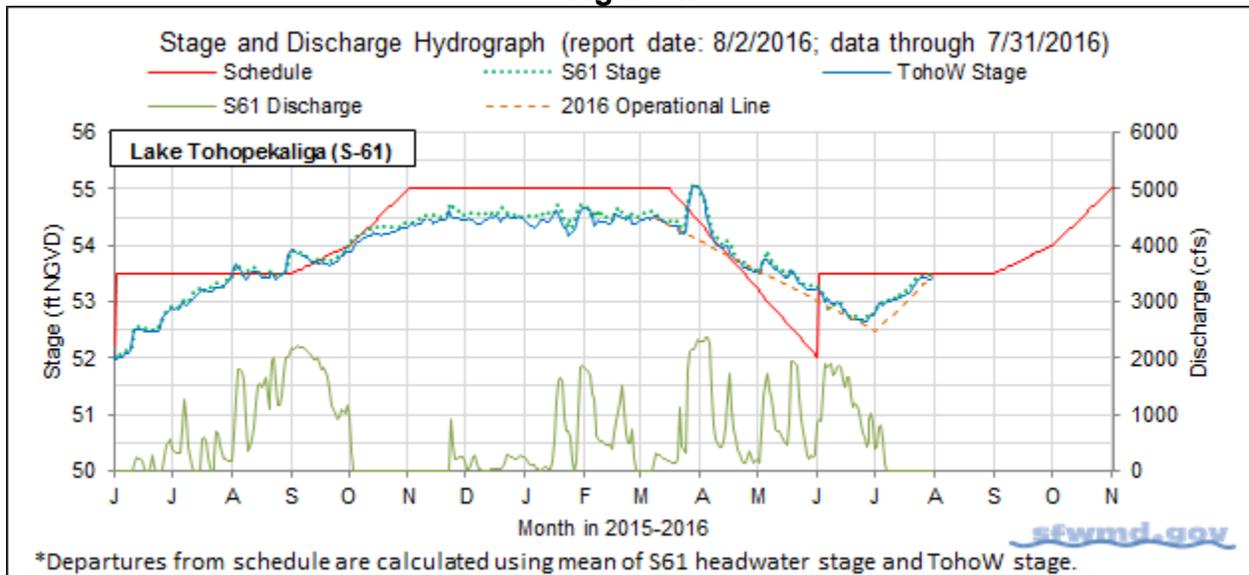


Figure 2.

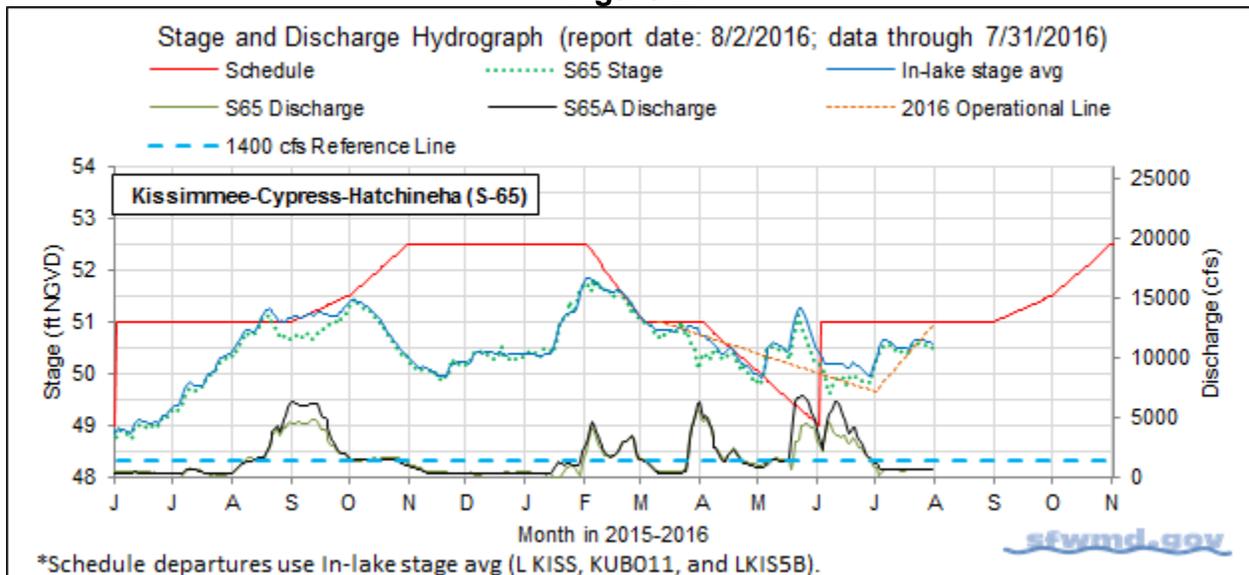


Figure 3.

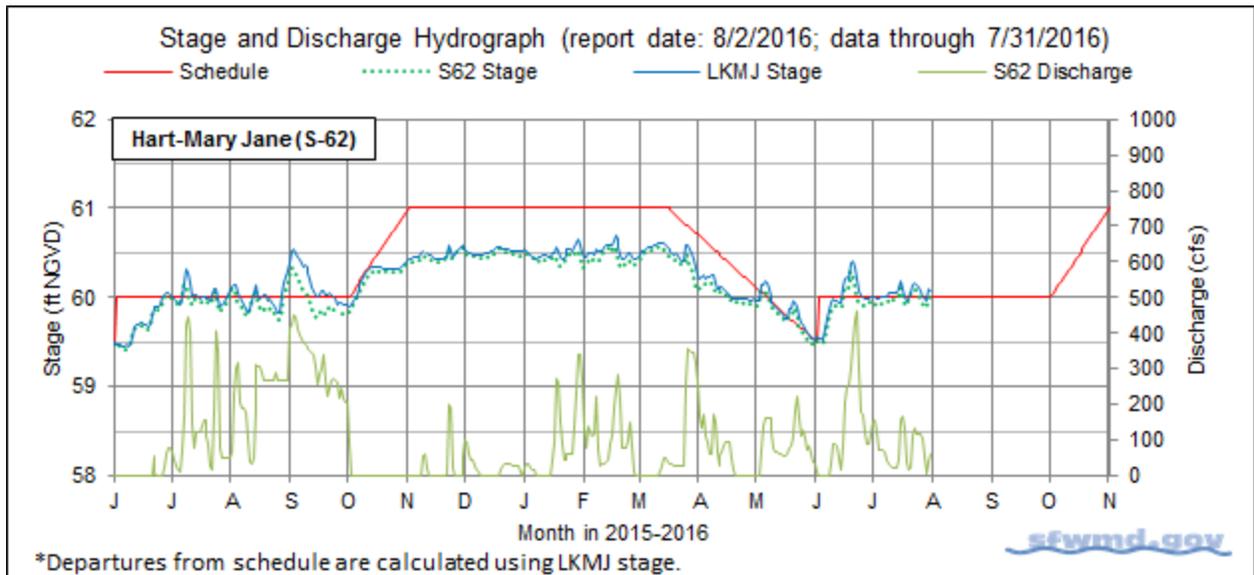


Figure 4.

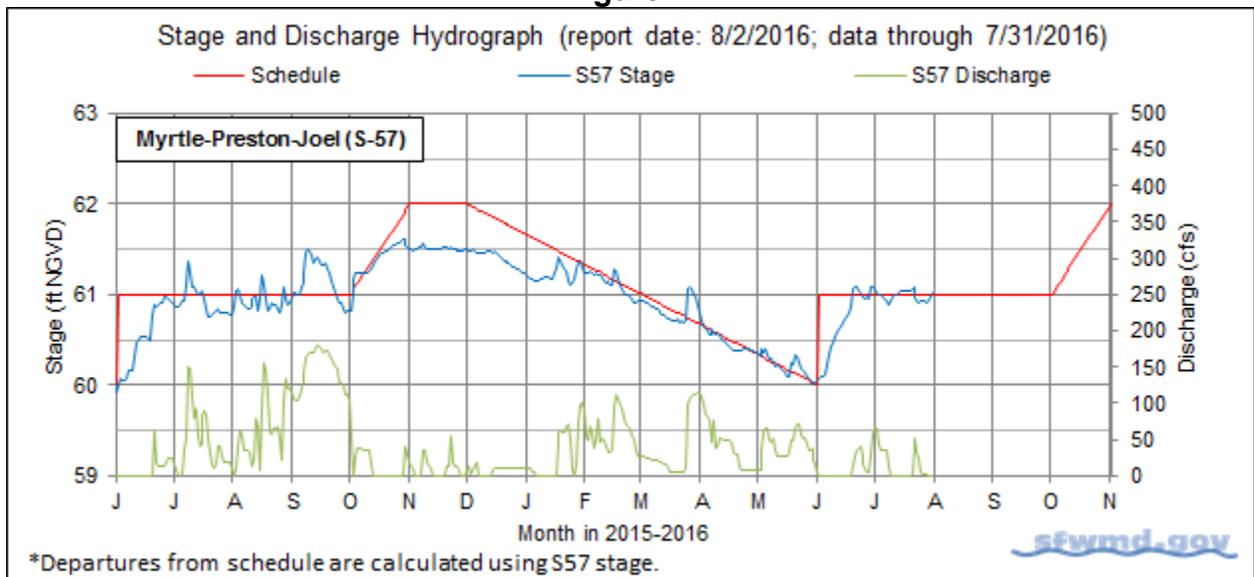


Figure 5.

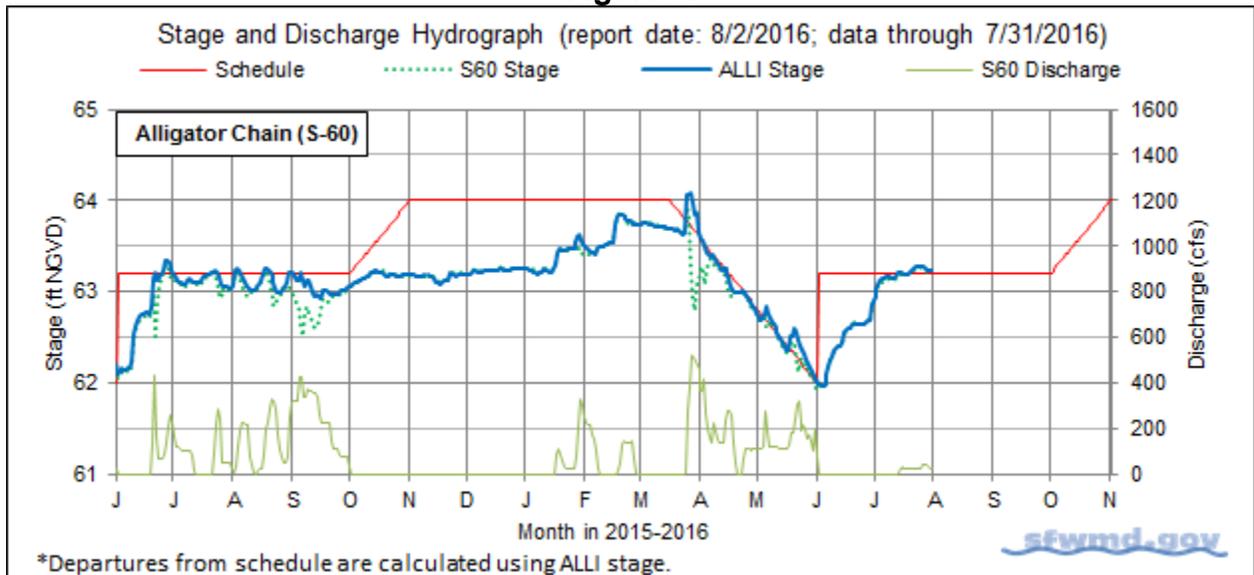


Figure 6.

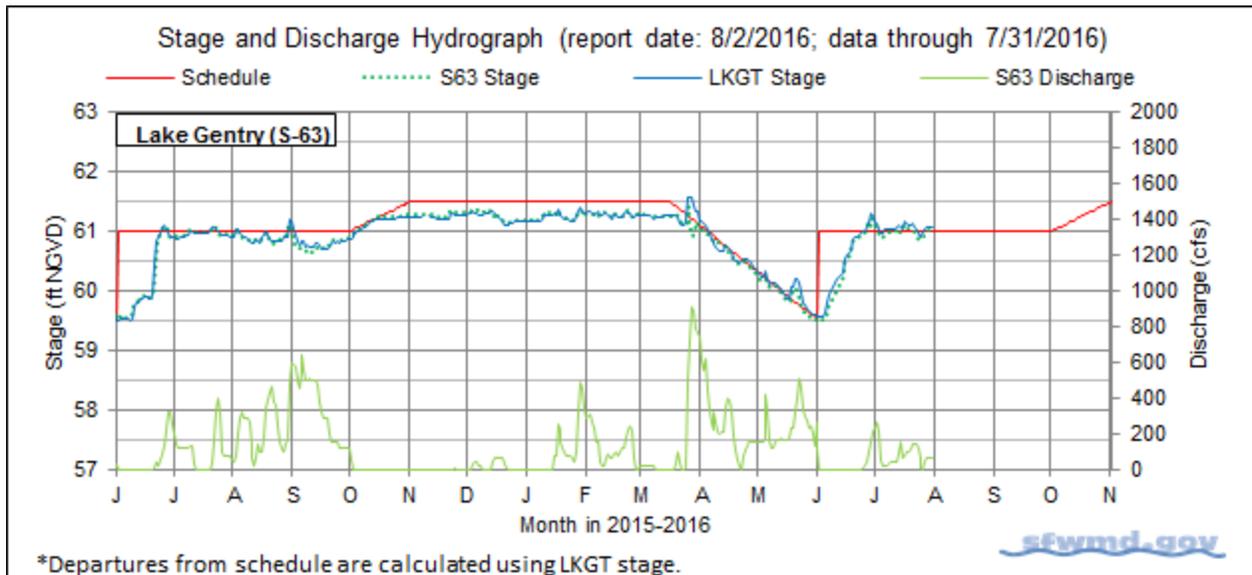


Figure 7.

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Limits on Rate of Discharge Change at S65/S65A During Wet Season 2016

Discharge Rate of Change Limits for S65/S65A (revised 6/30/16). **Rate limits apply only in Zone B**			
	Q (cfs)	Maximum rate of increase (cfs/day)	Maximum rate of decrease (cfs/day)
Zone B	650-1450	150	-150
	1450-1700	250	-250
	1700-2600	300	-300
	2600-3000	400	-400
	>3000	1000	-1000
Zone A	No limits		

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

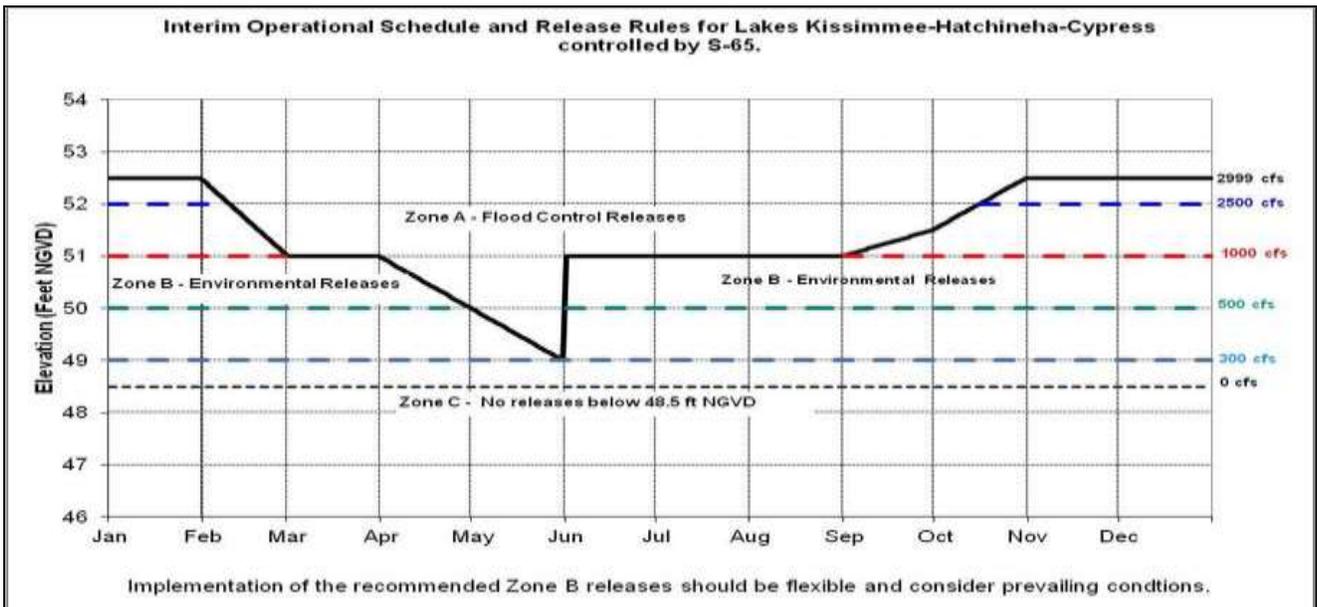


Figure 8b. Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years or in Wet Season 2015.

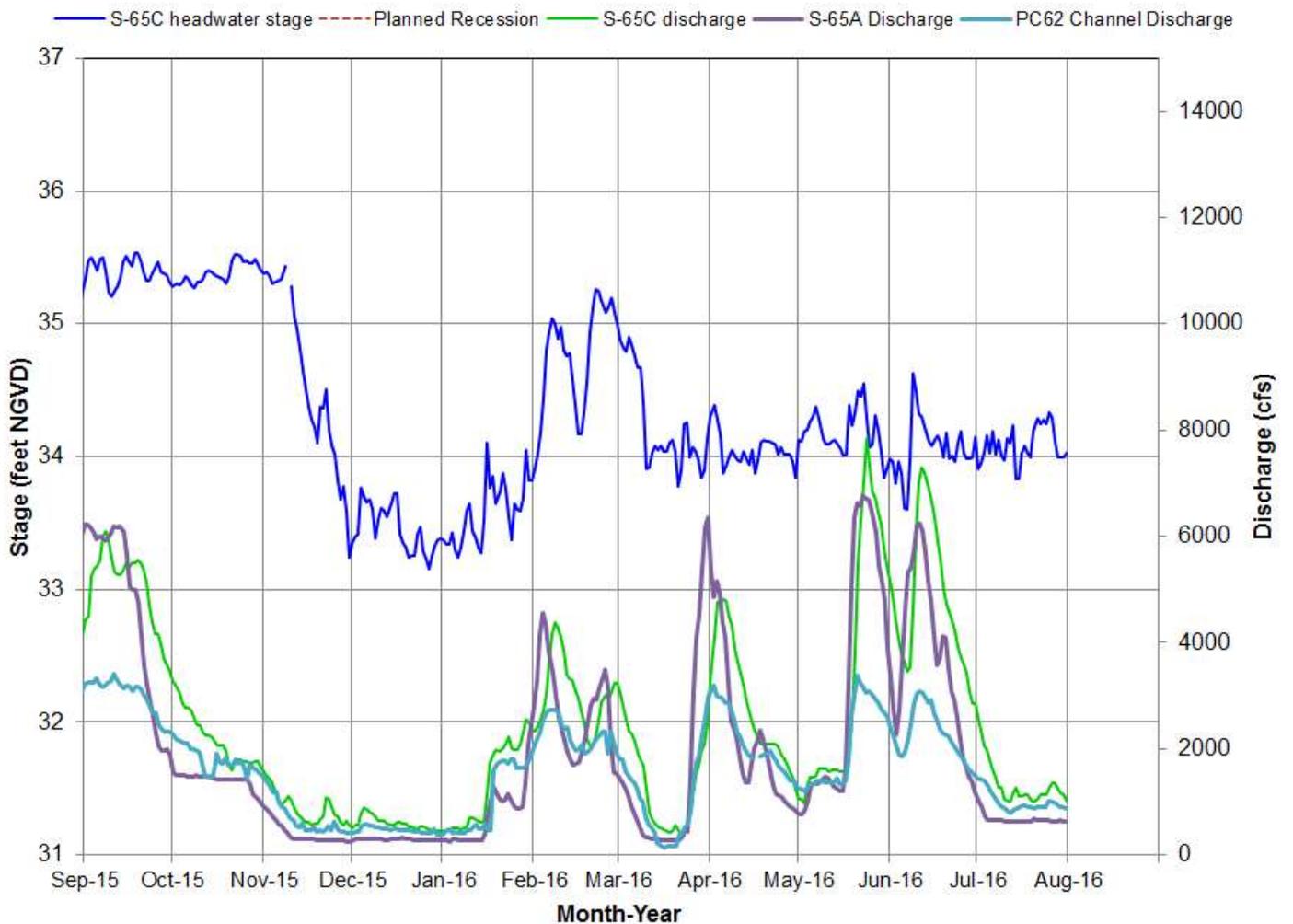


Figure 9. S-65C headwater stage in relation to discharge at S-65C, S-65A, and PC62.

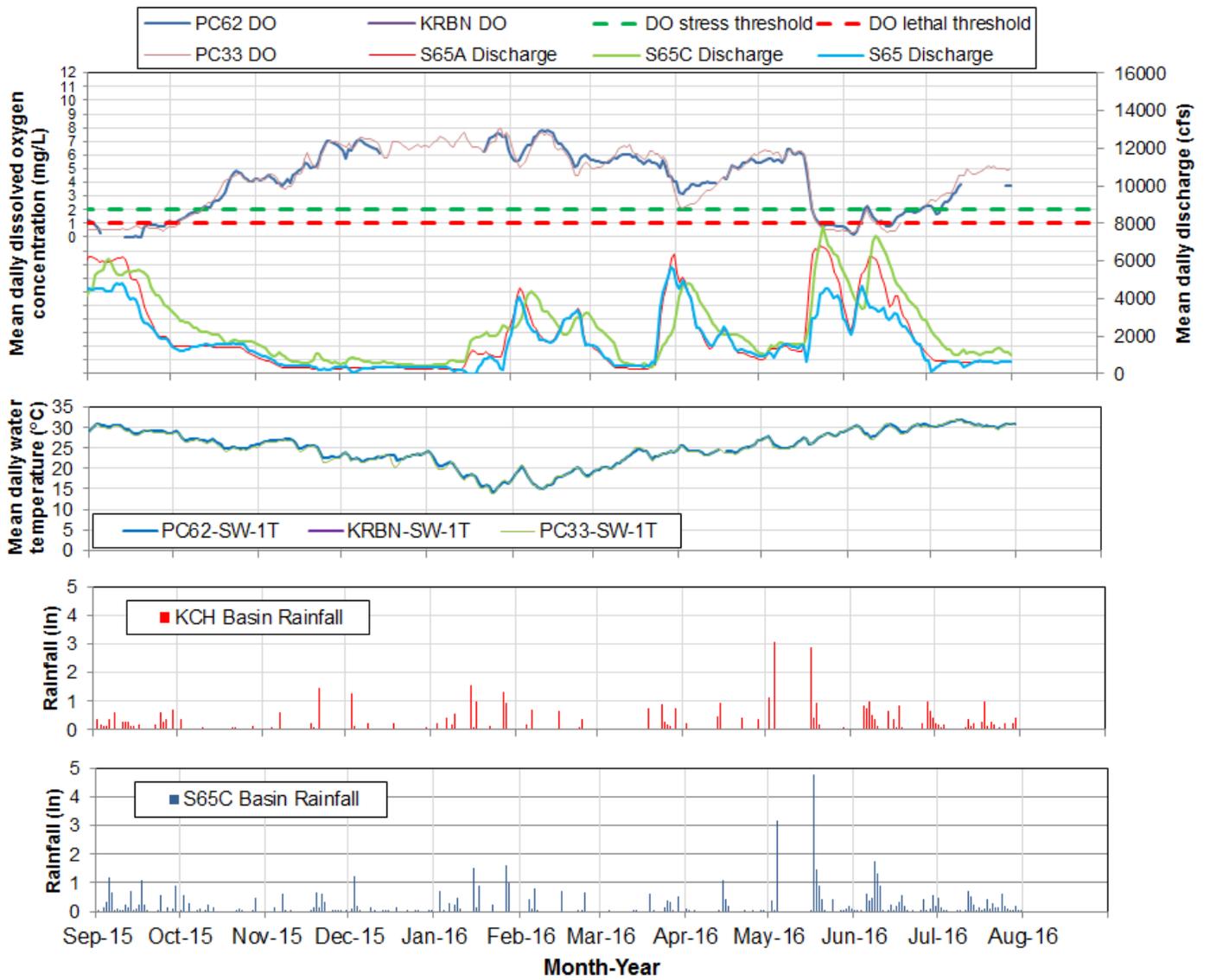


Figure 10. Mean daily Dissolved Oxygen, discharge, temperature and rainfall in the Phase I river channel.

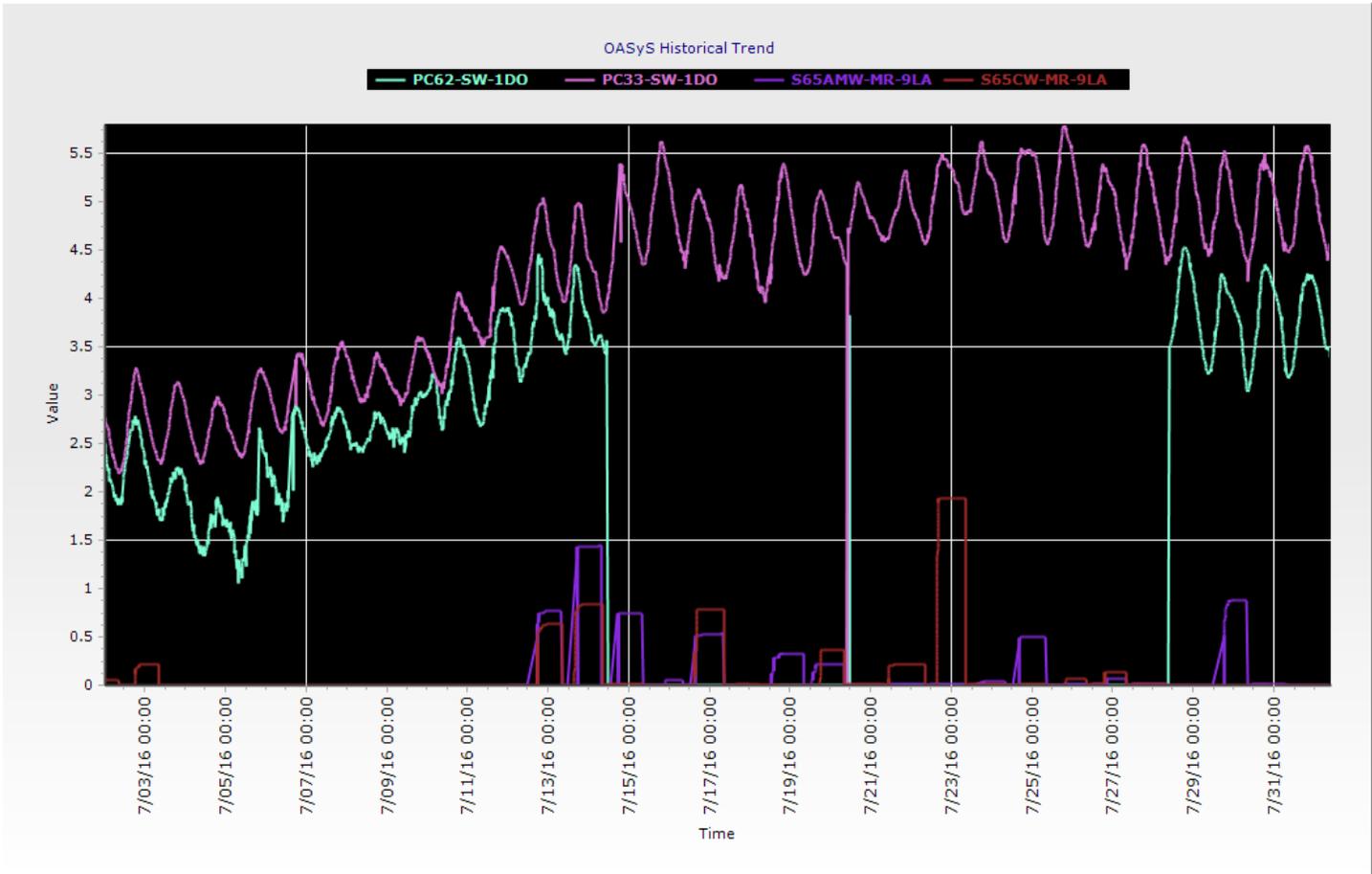


Figure 11. Phase I river channel dissolved oxygen (measured at 15 minute intervals) and rainfall at S65A and S65C.

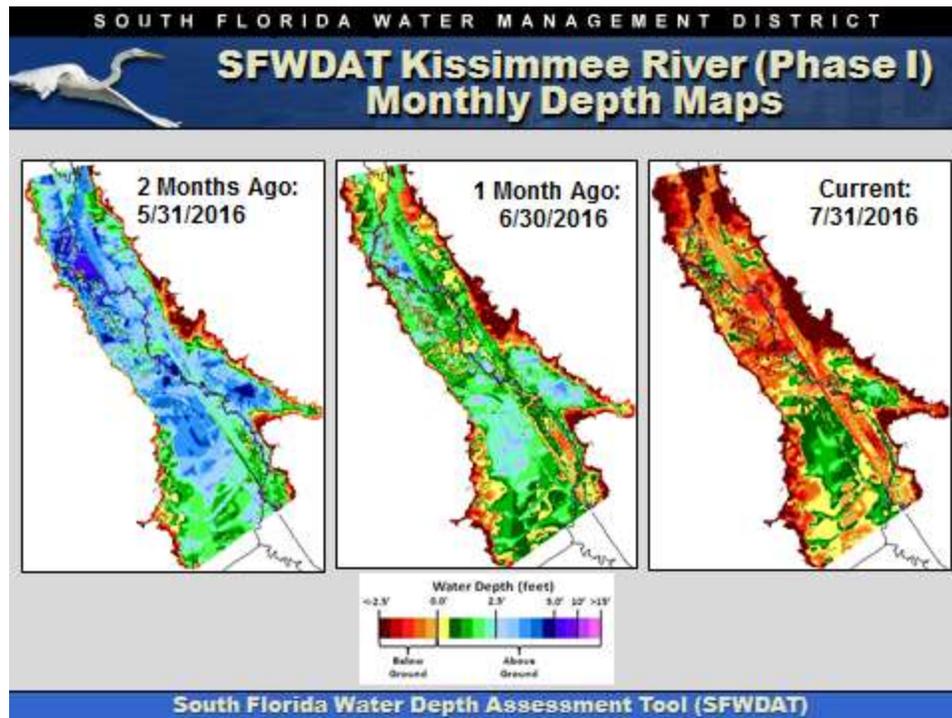
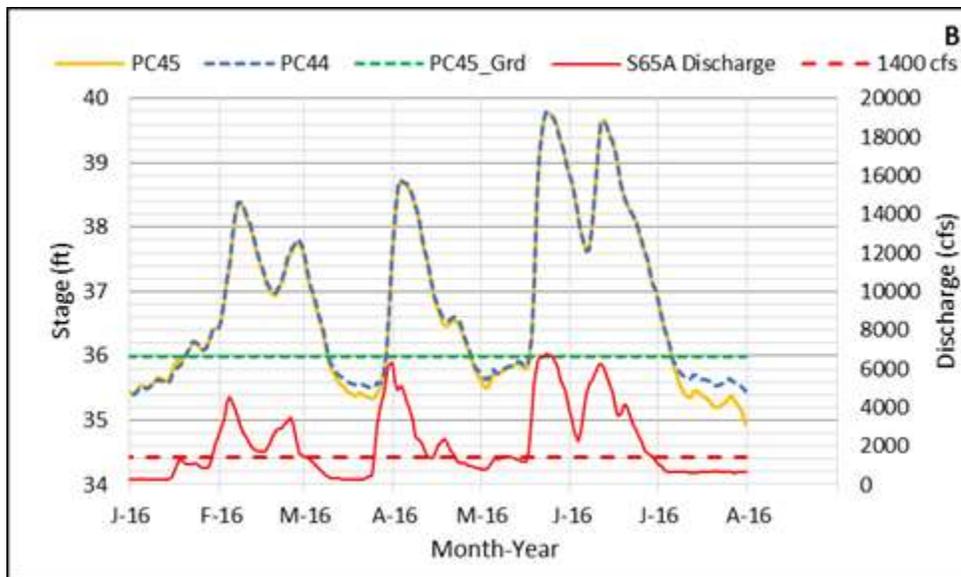
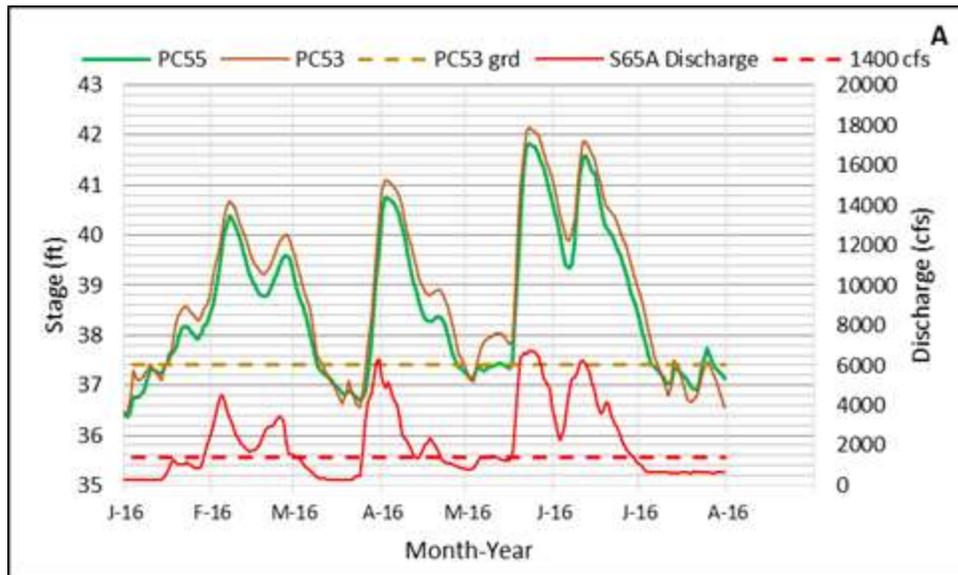


Figure 12. Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to Jan. 16, 2012.



Insert. Stage and ground elevations 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

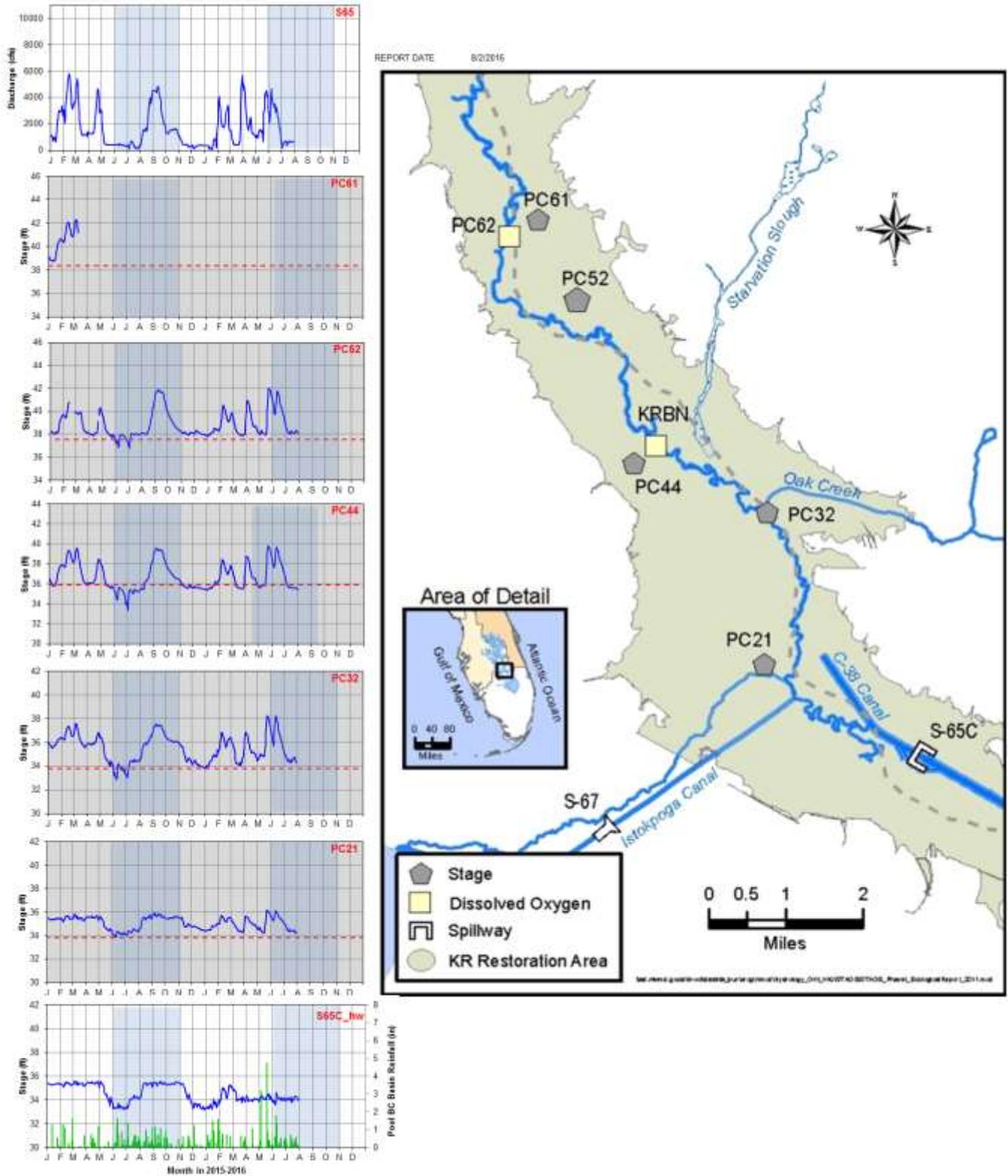


Figure 13. Discharge at S65, stages at five monitoring stations in the Phase I area of the Kissimmee River floodplain, and headwater stage at S65-C since January 1, 2015. The most recent data (~2 weeks) are provisional real-time data from SFWMD DualTrend; previous data are from SFWMD DB-HYDRO (validated).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

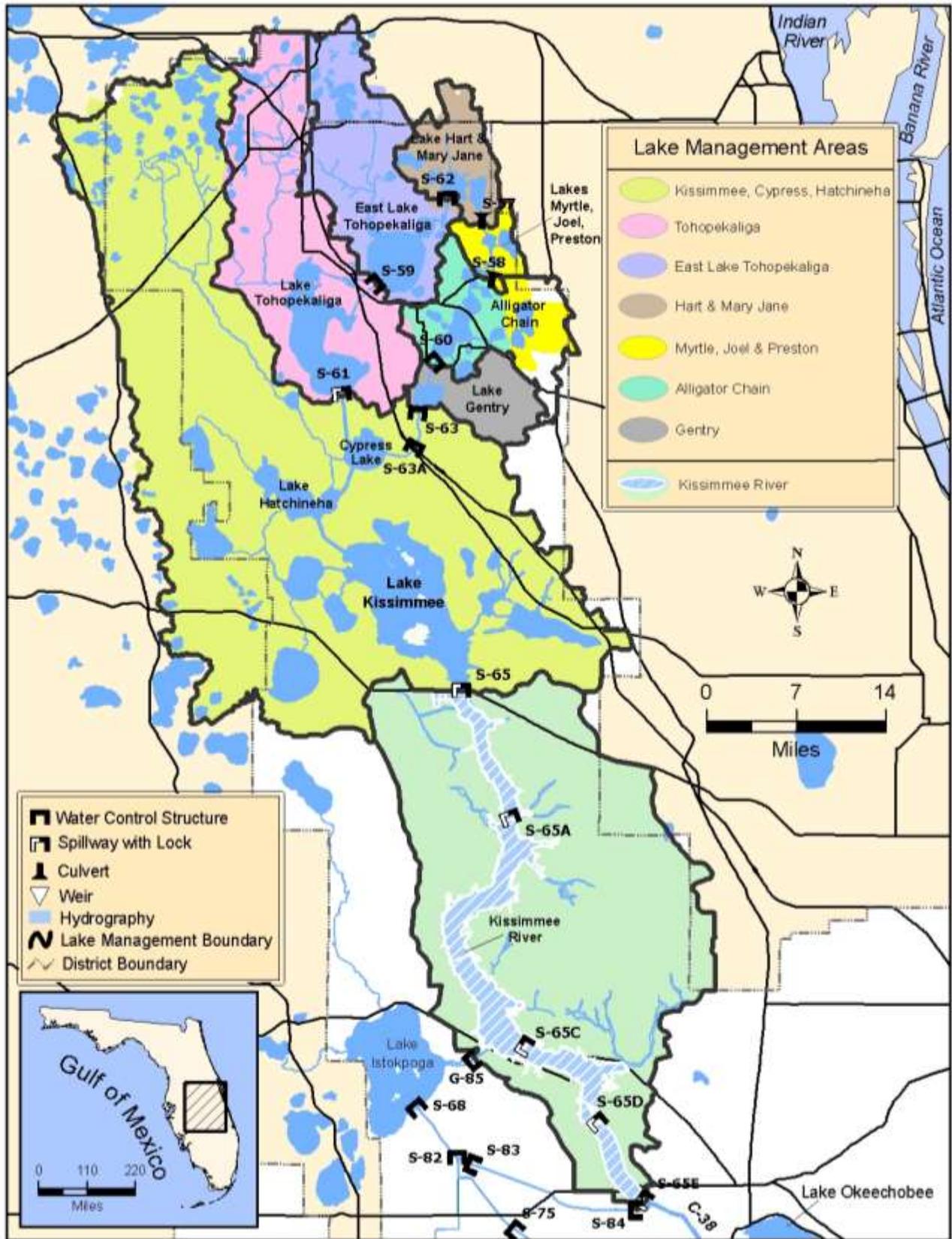


Figure 14. The Kissimmee Basin

LAKE OKEECHOBEE

According to the USACE web site, Lake Okeechobee stage is at 14.63 feet NGVD for the period ending at midnight on August 01, 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 showed a net change of 0.06 feet over the past week and is 0.32 feet lower than it was a month ago and 2.40 feet higher than it was a year ago (Figure 1). The Lake is in the Low Flow Sub-band (Figure 2). According to RAINDAR, 0.59 inches of rain fell directly over the Lake during the past seven days. The surrounding watershed experienced similar or lower rainfall amounts to the north and east but mostly higher amounts to the west and south (Figure 3).

Based on USACE reported values, current Lake inflow is approximately 2,911 cfs as detailed below.

Structure	Flow cfs
S65E	922
S154	0
S84 & 84X	1393
S71	0
S72	87
C5 (Nicodemus slough dispersed storage)	-50
S191	0
S133 PUMPS	0
S127 PUMPS	0
S129 PUMPS	0
S131 PUMPS	0
S135 PUMPS	0
Fisheating Creek	559
S2 Pumps	0
S3 Pumps	0
S4 Pumps	0

Current Lake outflow is approximately 2,228 cfs exiting at S77 (199 cfs), S308 (834 cfs) and to the L8 canal through Culvert 10A (291 cfs). Water supply demands decreased somewhat in the EAA, compared to the previous week, with a total of 904 cfs exiting through S351, S352, and S354. Corrected evapotranspiration value based on the L006 weather platform solar radiation data for this past week was 3,500 cfs, up from last week's value of 2,600 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.

The most recent satellite images (MODIS for July 30 and August 1) (Figure 5) indicate a possible lessening of bloom conditions over the past week with fewer intense (hot) colors in the north and west regions. Effects of cloud cover along the southeastern shore makes interpretation difficult in this area.

Water Management Recommendations

Lake stage has been decreasing slowly over the past month but showed minimal net change over the past week. The current Lake stage is about 1 foot too high for this time of year, which may result in an increased loss of submerged aquatic vegetation (SAV). There also appears to be an increase in the

occurrence of cyanobacterial blooms and the potential for elevated toxin levels. 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 or continue the current unseasonable recession in Lake stage to avoid exceeding the top of the preferred stage envelope (15.5 feet NGVD) during the wet season.

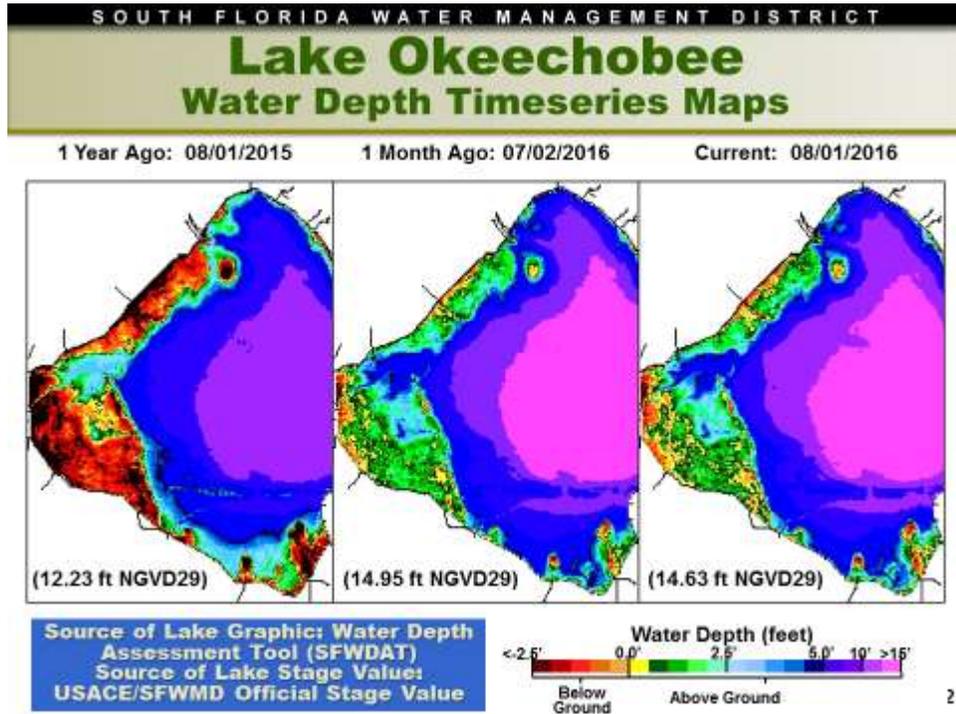


Figure 1

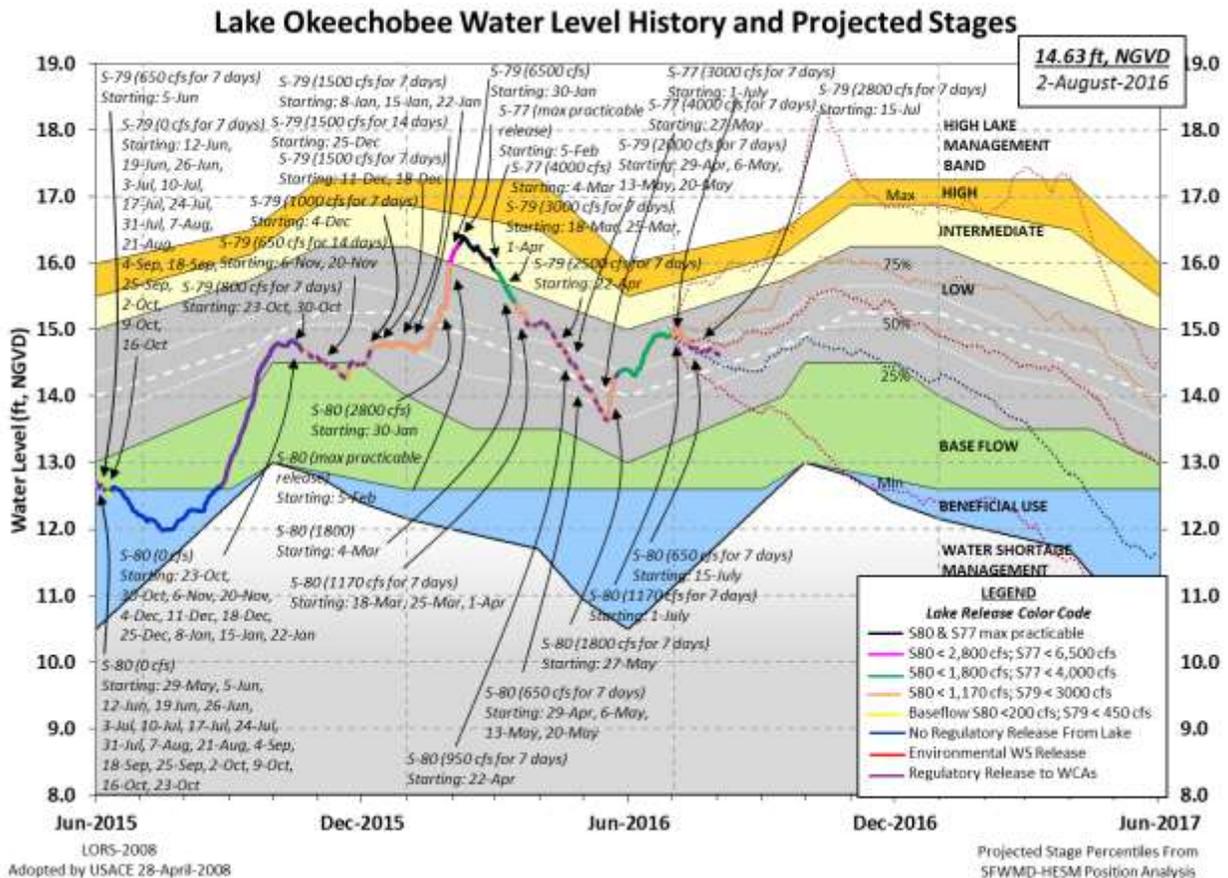


Figure 2

SFWMD PROVISIONAL RAINDAR 7-DAY BASIN RAINFALL ESTIMATES
FROM: 0530 EST, 07/26/2016 THROUGH: 0530 EST, 08/02/2016

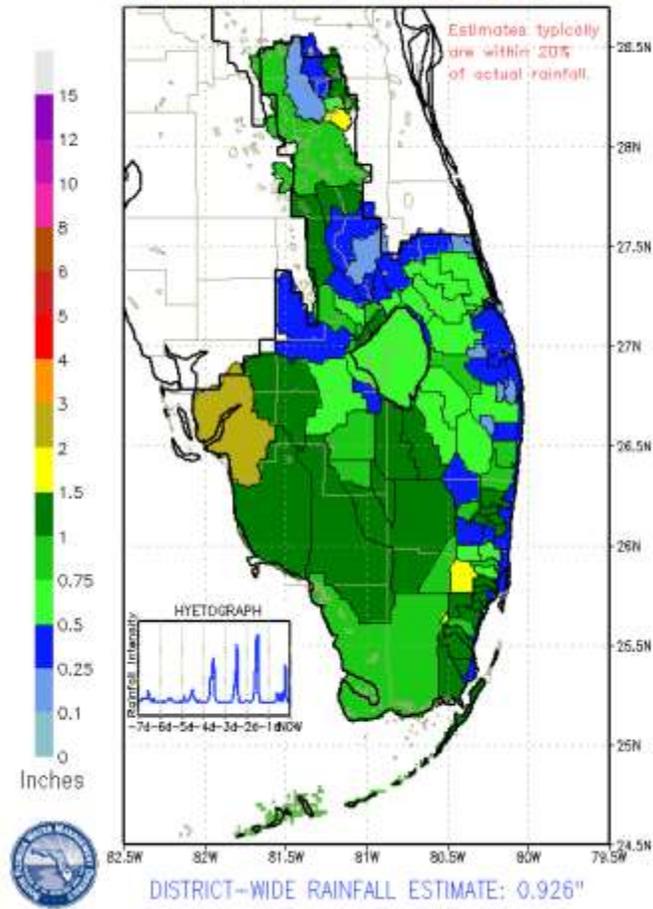


Figure 3

INFLOWS	Average Daily Flow Past Week cfs	Feet of Change Past Week
S65E	1065	0.036
S71 & 72	67	0.002
S84 & 84X	1321	0.044
Fisheating Creek	529	0.018
Rainfall	N.A.	0.049
OUTFLOWS	Average Daily Flow Past Week cfs	Feet of Change Past Week
S77	905	0.030
S308	683	0.023
S351	513	0.017
S352	492	0.016
S354	776	0.026
L8	353	0.012
ET	3500	0.117

Figure 4

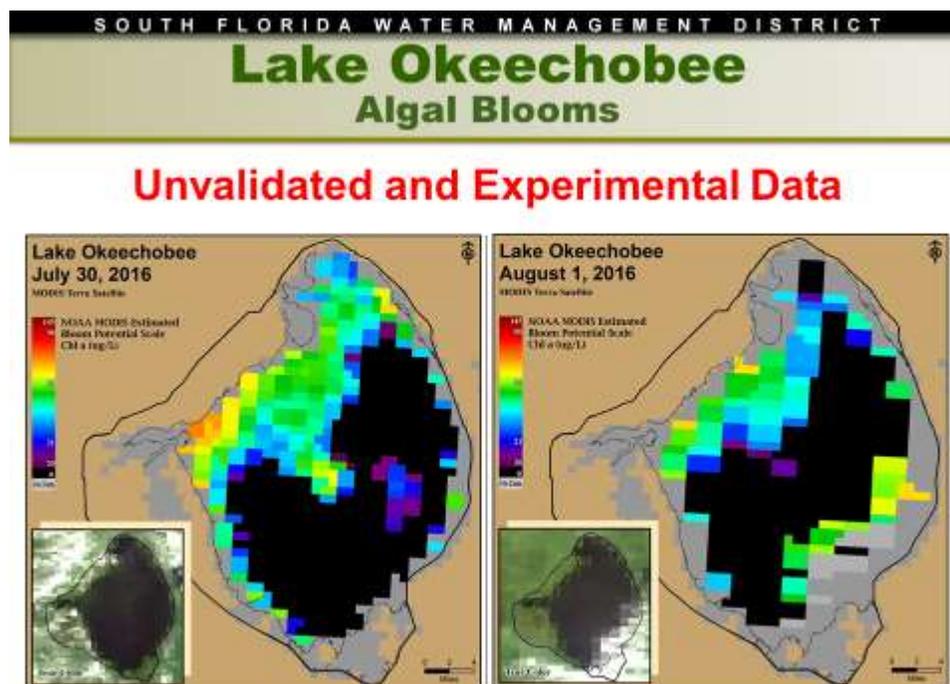


Figure 5

Lake Istokpoga

The Lake Istokpoga regulation schedule has returned to its annual low pool stage of 38.25 feet NGVD. Lake Stage is 38.26 feet NGVD and is currently 0.01 feet above regulation (Figure 6). Average flows into the Lake from Arbuckle and Josephine creeks were 944 and 240 cfs respectively, a slight decrease over the preceding week's flows. Average discharge from S68 and S68X this past week was 1,360 cfs,

a decrease from the preceding week. According to RAINDAR, 1.06 inches of rain fell in the Lake Istokpoga watershed during the past seven days.

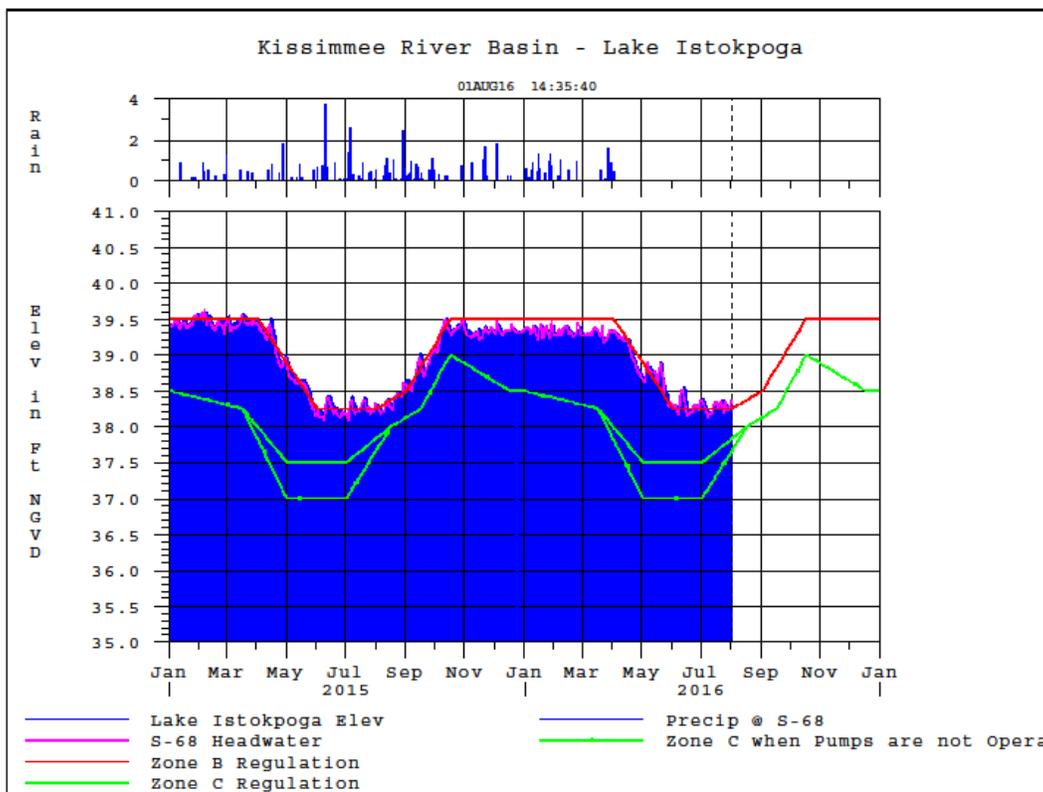


Figure 6

ESTUARIES

St. Lucie Estuary

Over the past week, provisional flows averaged about 655 cfs at S-80, 683 cfs downstream of S-308, 0 cfs at S-49 on C-24, 90 cfs at S-97 on C-23, and 85 cfs from Ten Mile Creek at the Gordy Road Structure. Average inflow from tidal basin tributaries is estimated to be 163 cfs (Figures 1 and 2). Total inflow averaged about 993 cfs last week and 1,251 cfs over last month.

Over the past week, salinity increased in the upper estuary and was about the same in the lower estuary (Table 1, Figures 3 and 4). The seven-day moving average salinity of the water column at the US1 Bridge is about 10.4. Salinity conditions in the middle estuary are just within 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)	5.5 (3.6)	7.7 (7.1)	NA ¹
US1 Bridge	9.1 (7.9)	11.6 (11.1)	10.0-26.0
A1A Bridge	23.1 (23.5)	24.8 (25.4)	NA

¹Envelope not applicable

Caloosahatchee Estuary

During the past week, provisional flows averaged approximately 905 cfs downstream of S-77, 1,154 cfs at S-78, and 3,309 cfs at S-79. Average inflow from tidal basin tributaries is estimated to be 1,327 cfs (Figures 5 and 6). Total inflow averaged 4,636 cfs last week and 4,969 cfs over last month.

Over the past week in the estuary, salinity remained about fresh to Cape Coral Bridge and about the same 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 70 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	2.4 (2.4)	4.0 (3.9)	10.0-30.0
Shell Point	13.9 (12.7)	17.8 (17.0)	10.0-30.0
Sanibel	25.4 (24.5)	27.1 (26.4)	10.0-30.0

¹Envelope not applicable, ²Envelope 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 <i>a</i> (µg/l)	5.1 – 5.7	NR*	1.8 – 6.8 one spike to 14.8
Dissolved Oxygen (mg/l)	3.2 – 4.9	NR	4.6 – 6.8

*Not Reporting

The Florida Fish and Wildlife Research Institute reported on July 29, 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.

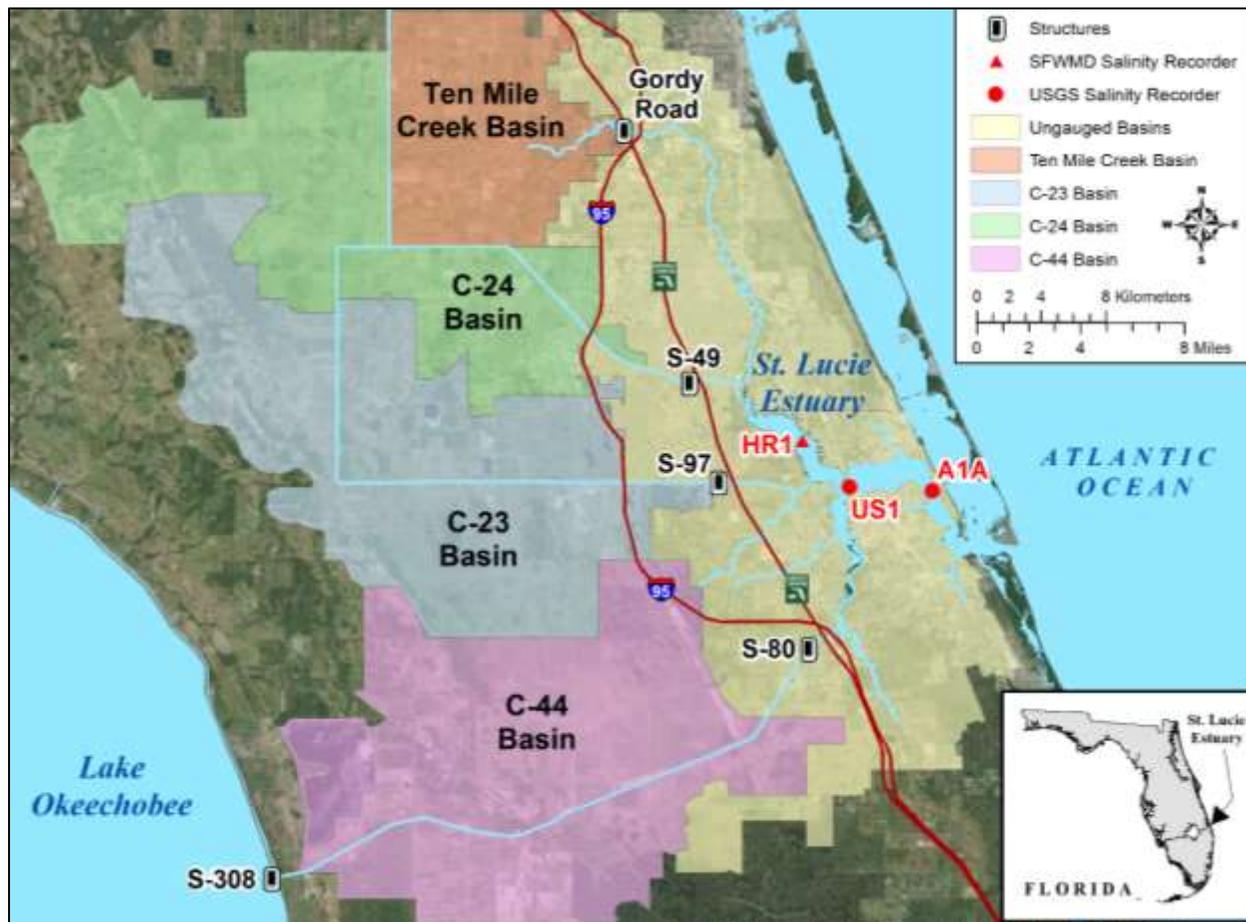


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

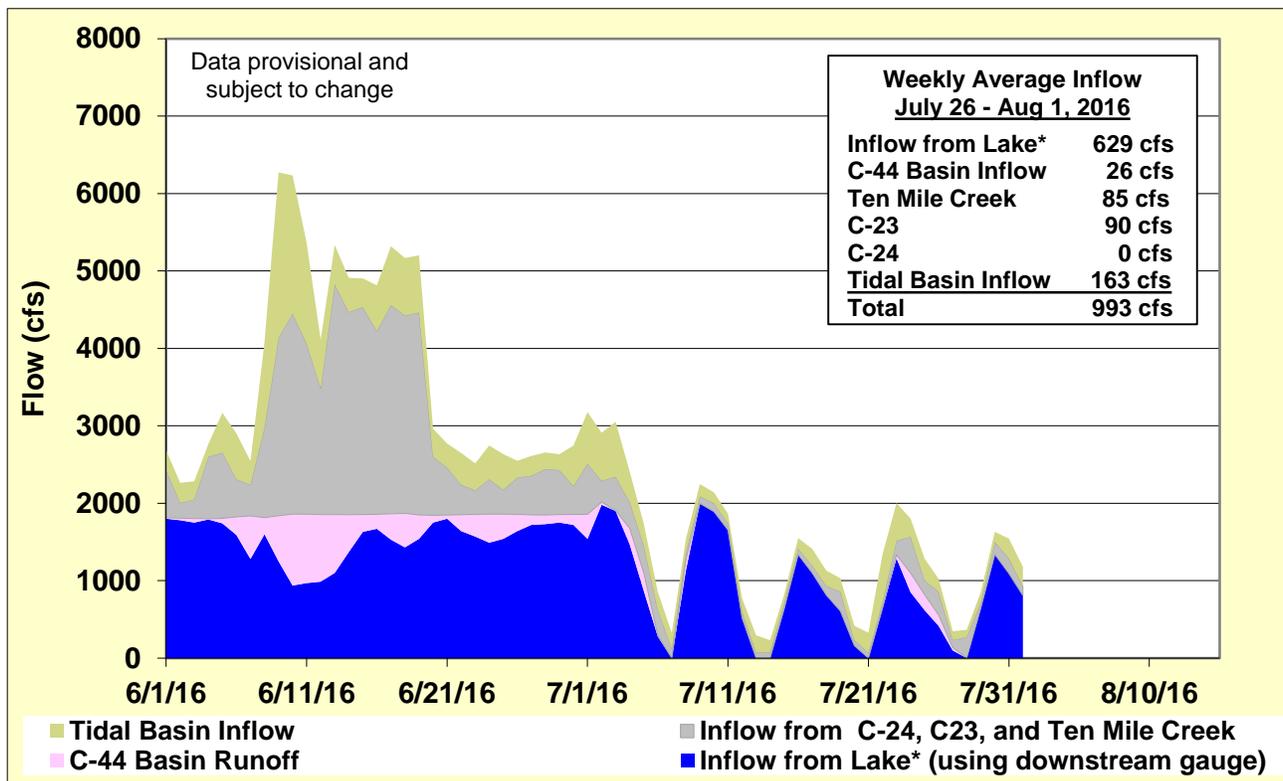


Figure 2. Estimated surface freshwater inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basins into the St. Lucie Estuary.

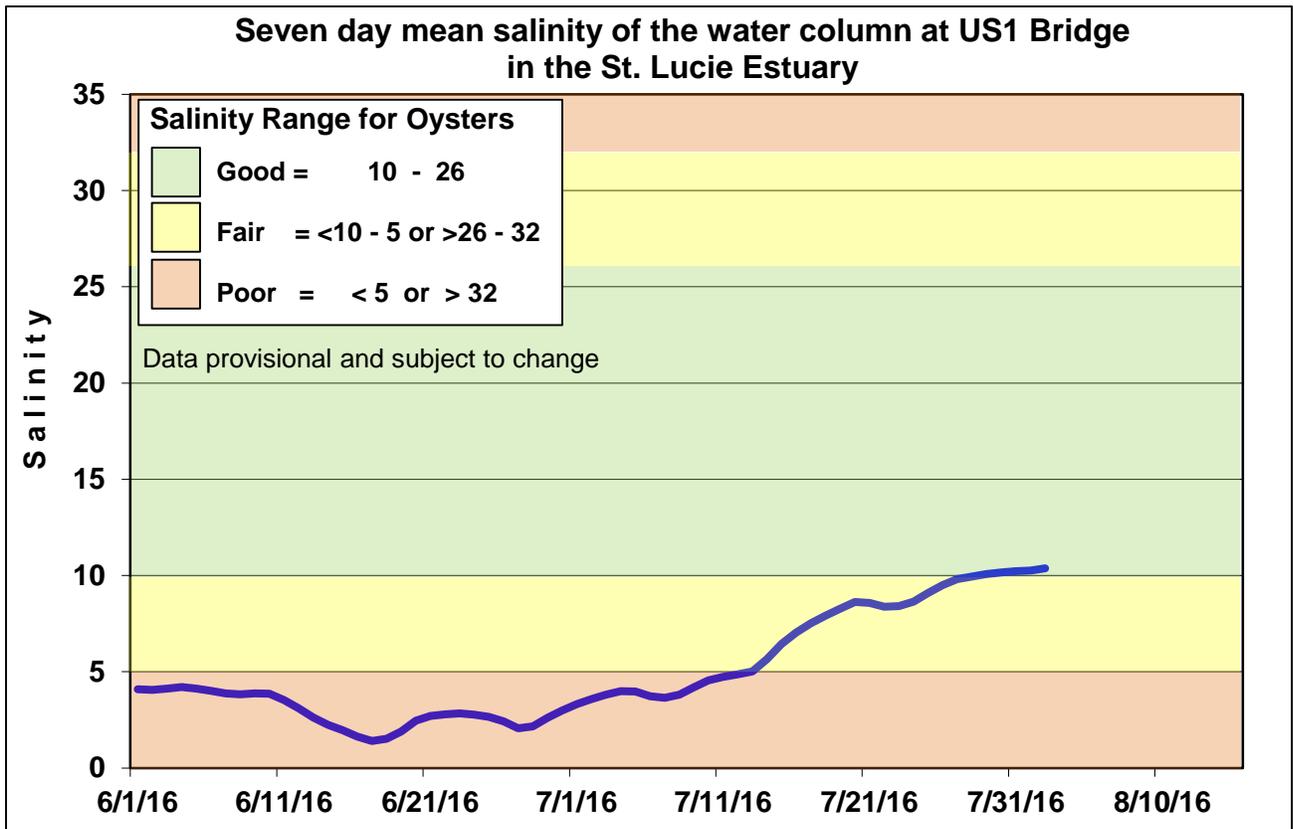


Figure 3. Seven-day mean salinity of the water column at the U.S. Highway 1 Bridge.

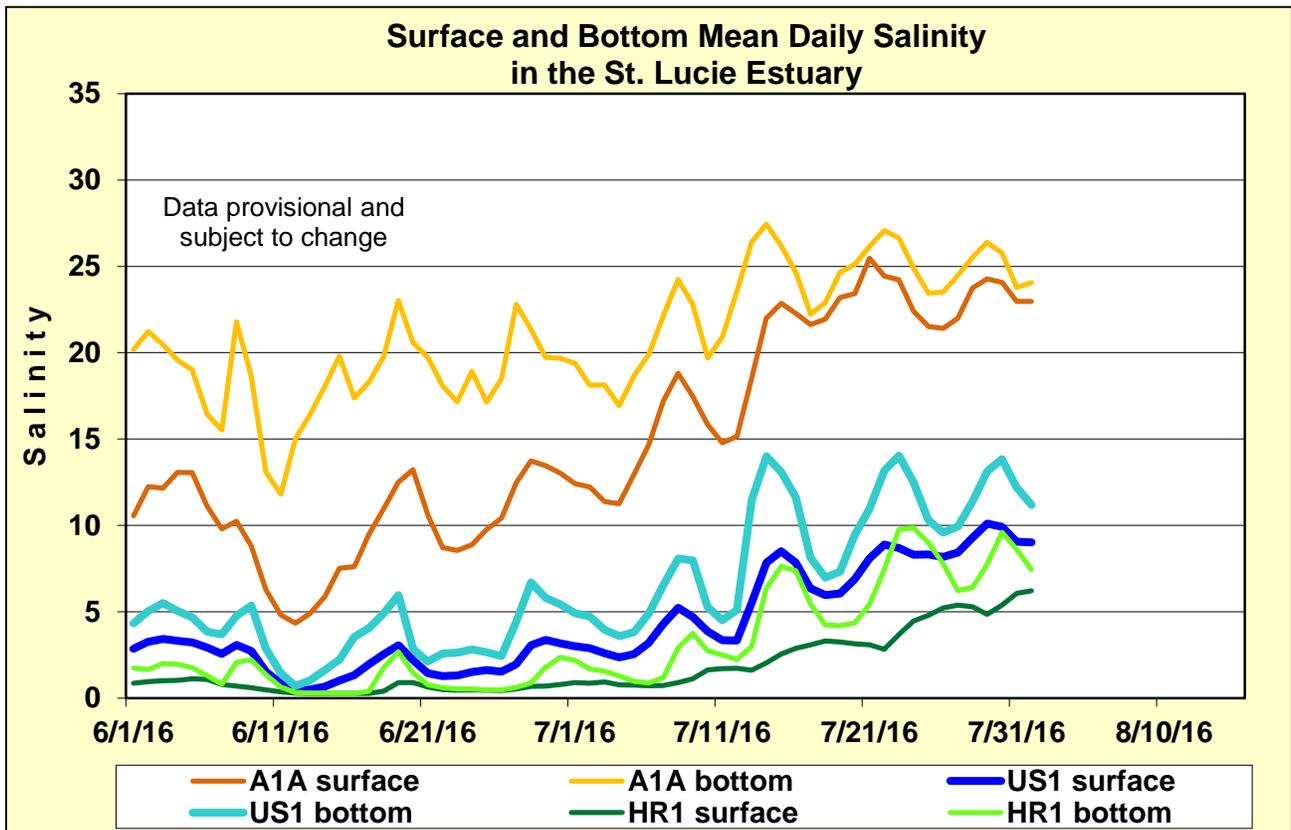


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

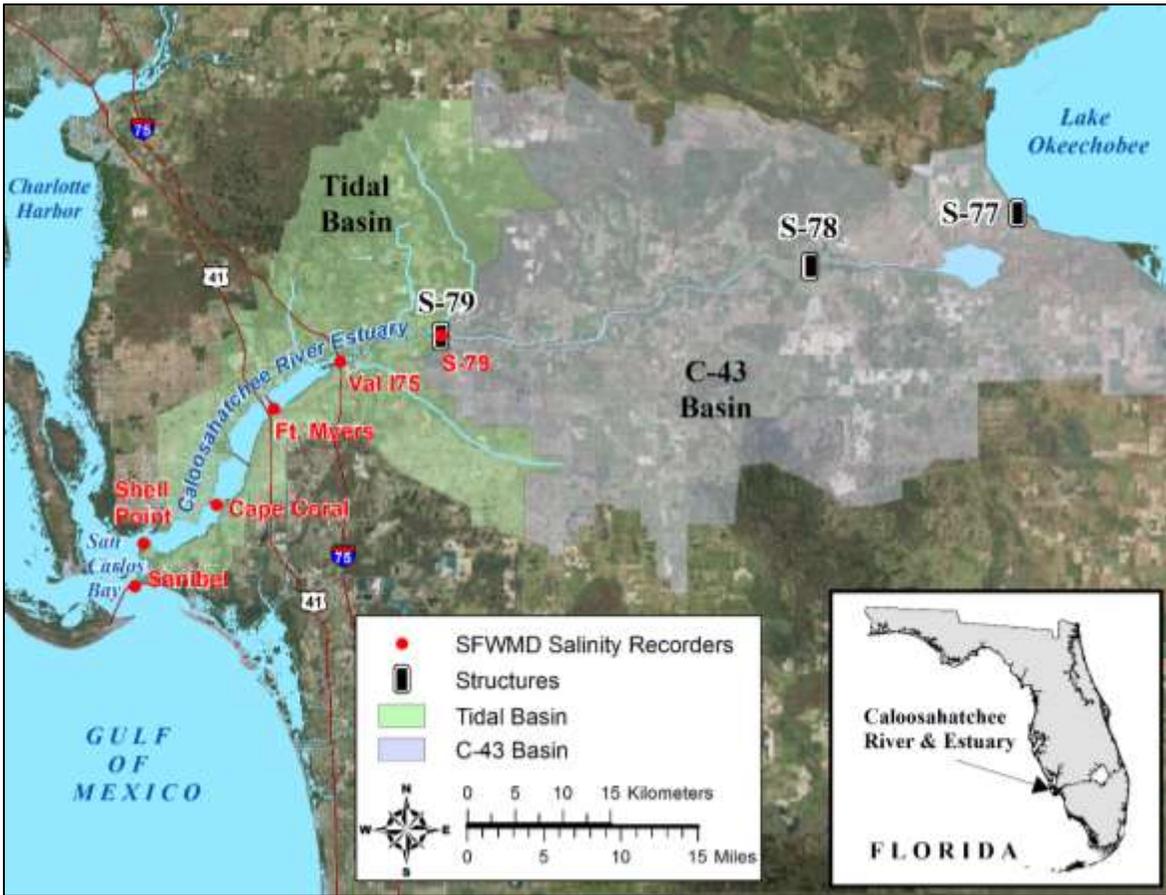


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

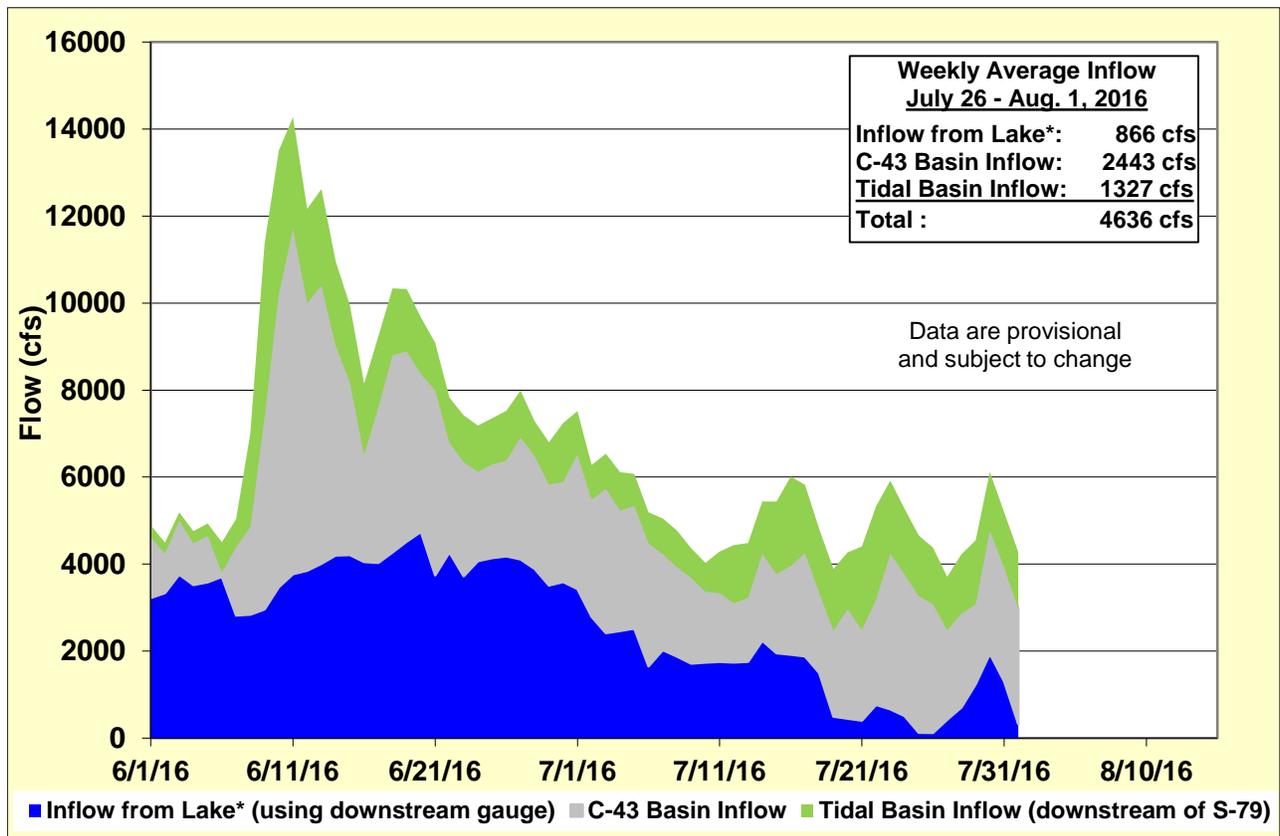


Figure 6. Freshwater inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.

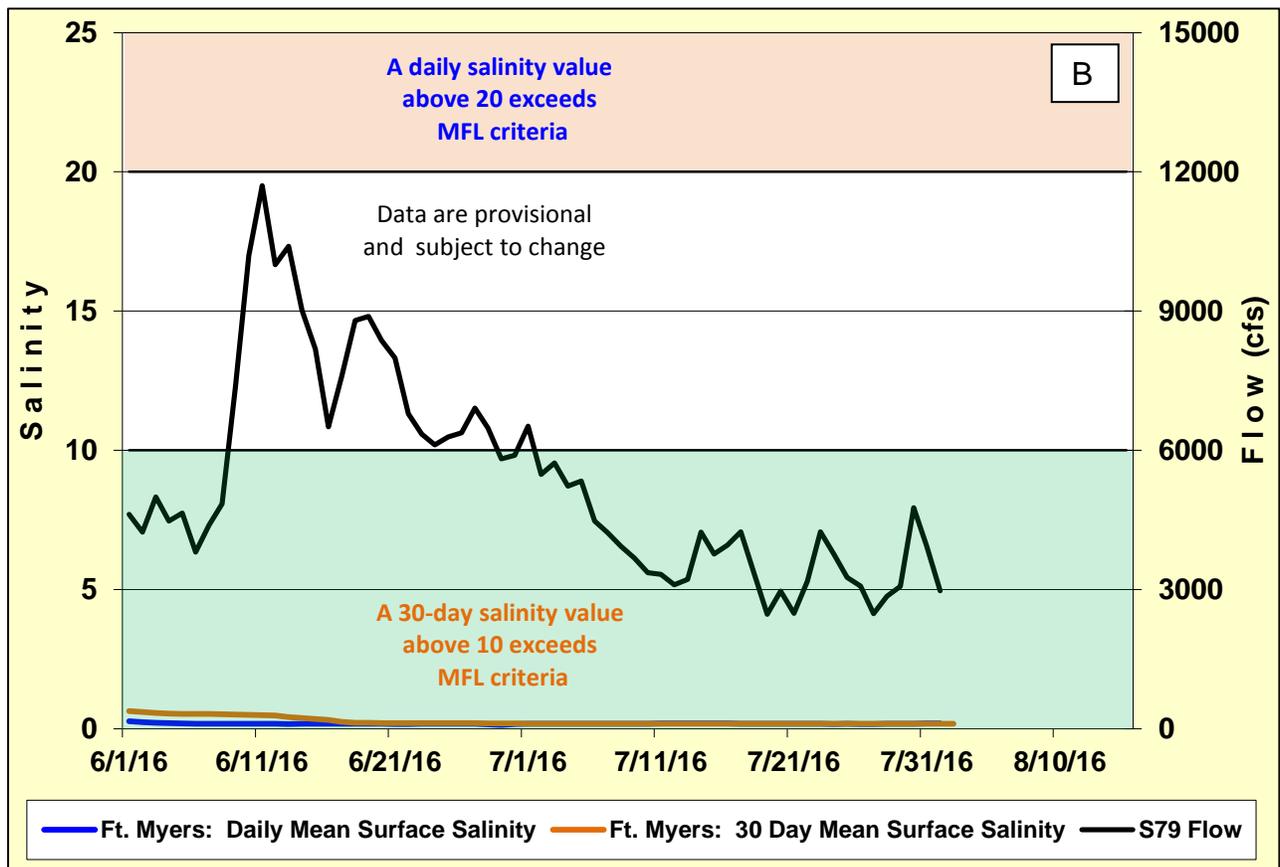
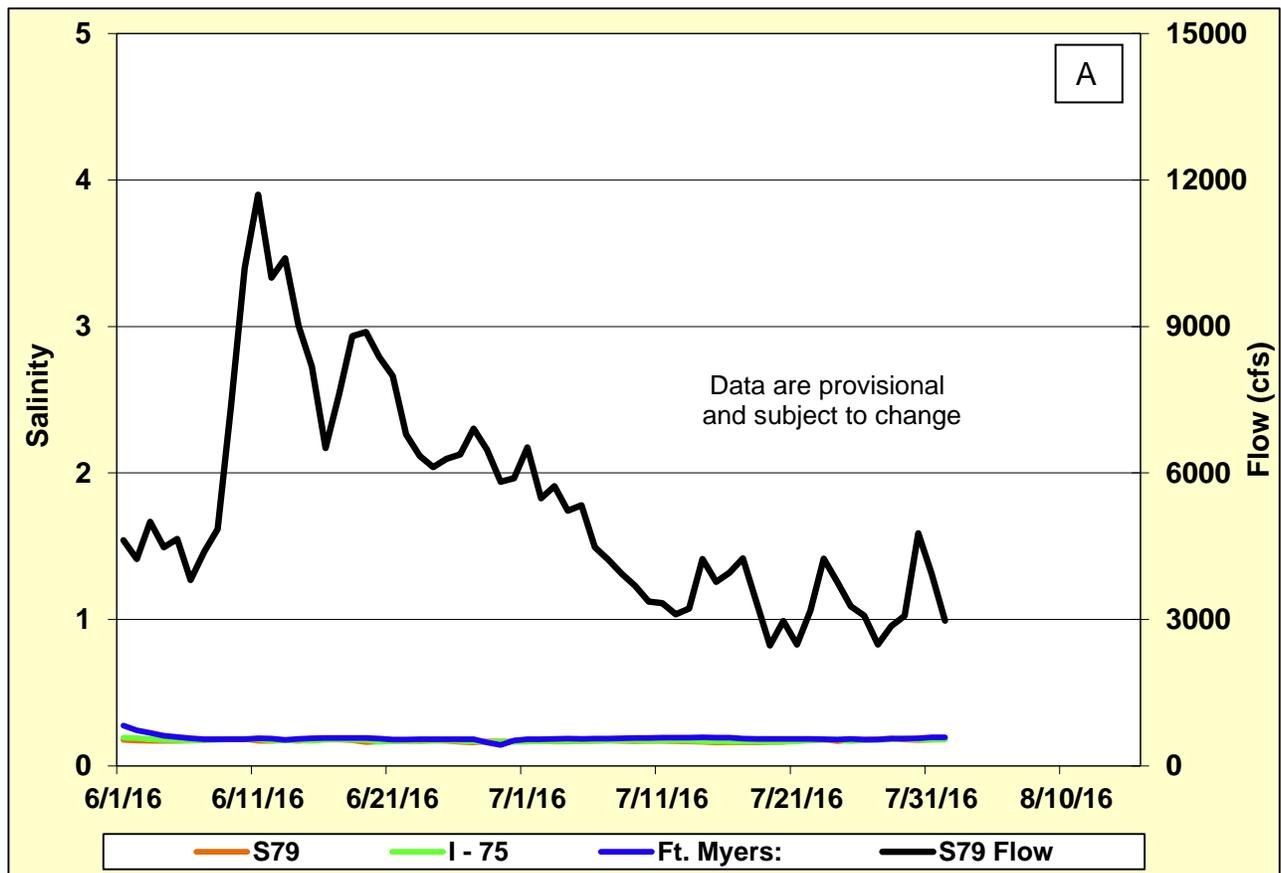


Figure 7. Daily mean flows at S-79 and salinity at upper estuary monitoring stations (A) and 30-day moving average salinity at Ft. Myers (B).

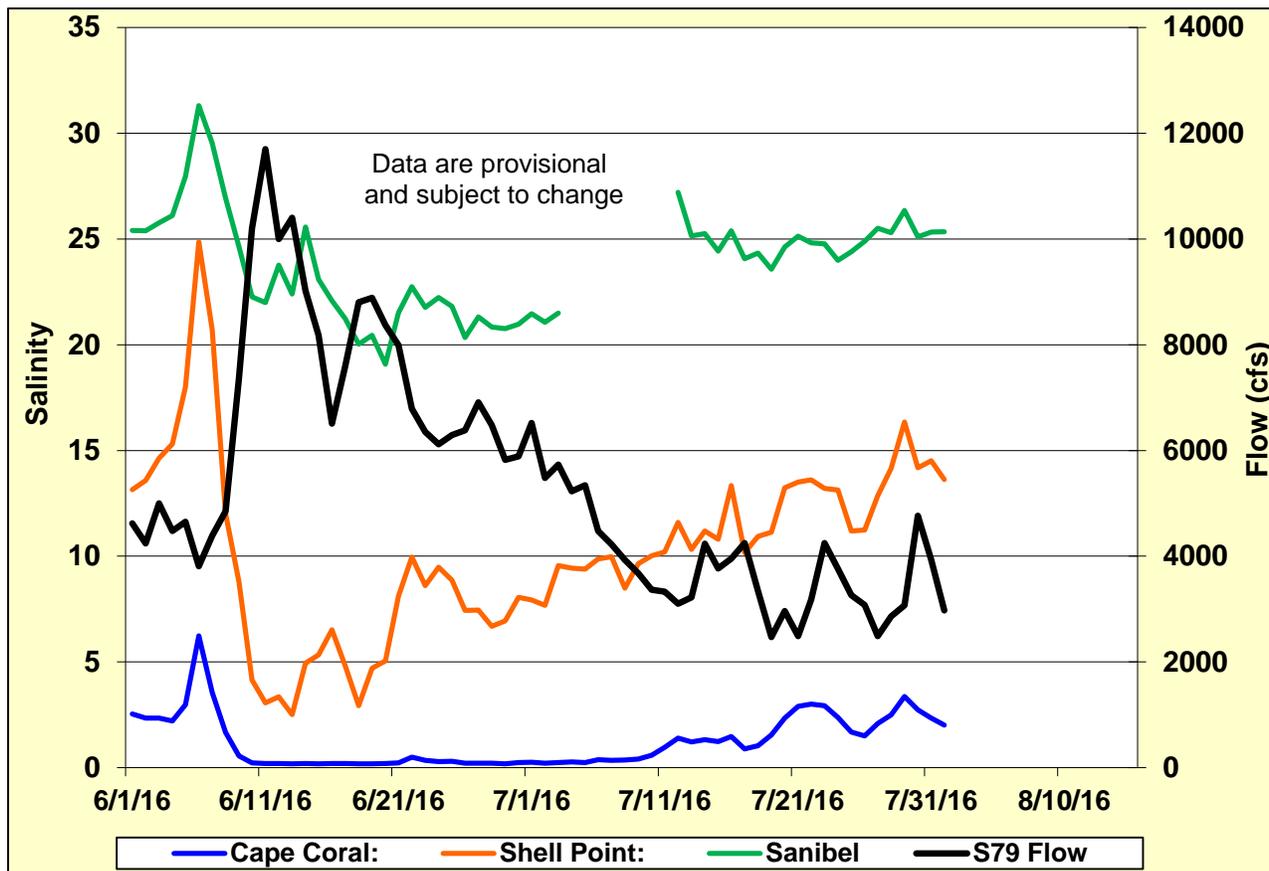


Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.

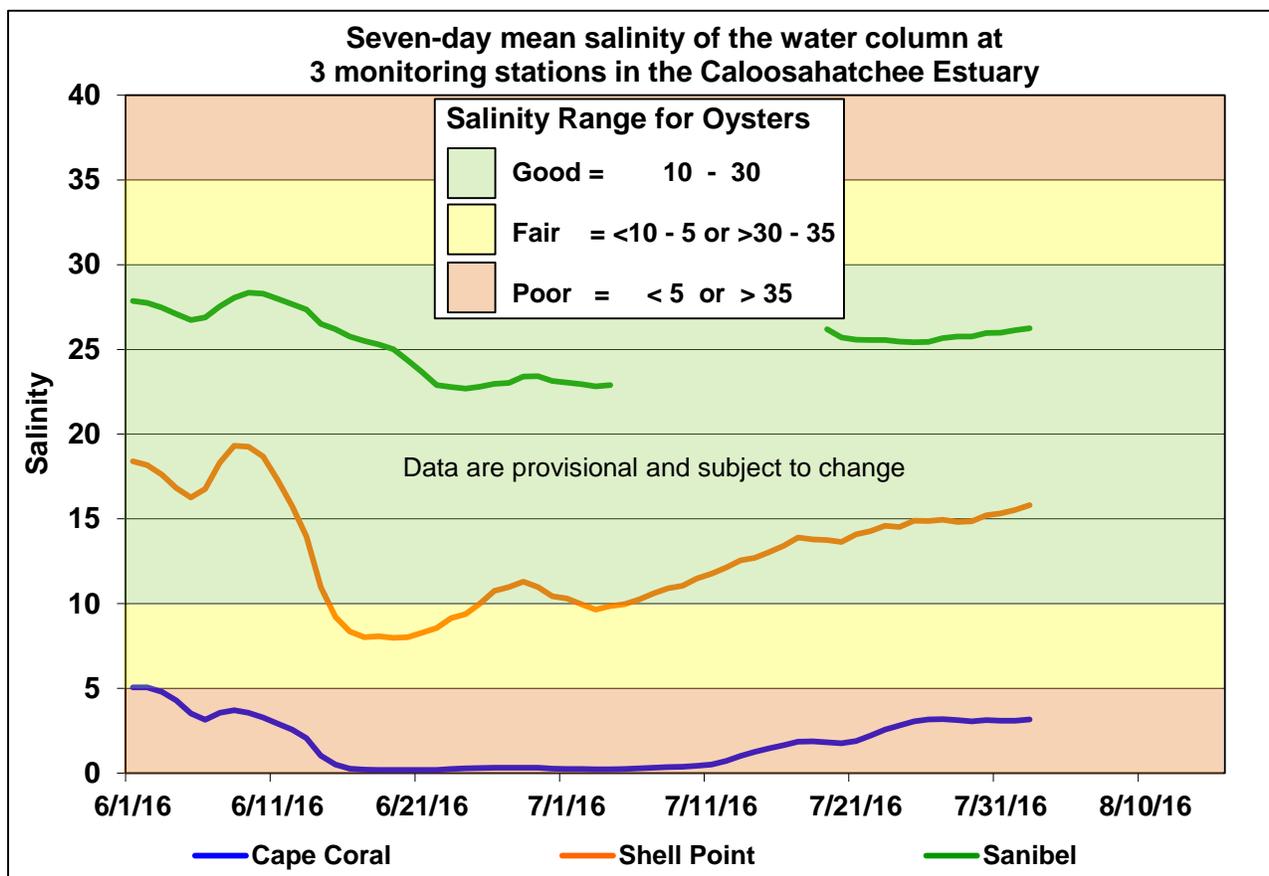


Figure 9. Seven-day mean salinity at Cape Coral Bridge, Shell Point and Sanibel Bridge monitoring stations.

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.

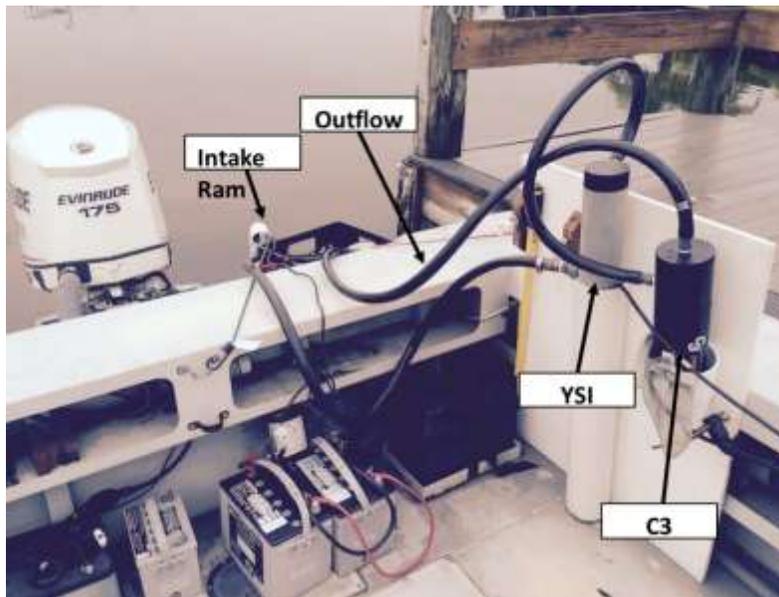


Figure A1. The flow-through system used for water quality mapping.

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). In addition, Harbor Branch Oceanographic Institute has five fixed LOBO stations throughout the estuary (Figure A3) that measure water quality at 1 m depth on 1-hour intervals. Values for chlorophyll on July 7 and 14, 2016, when releases from S-80 were 1,170 cfs pulsed average are shown on Figure A4. Figure A5 shows values for chlorophyll on July 18 and 25, 2016, when releases from S-80 were 650 cfs pulsed average. LOBO data are the average hourly measurements during the timeframe of the corresponding survey.



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

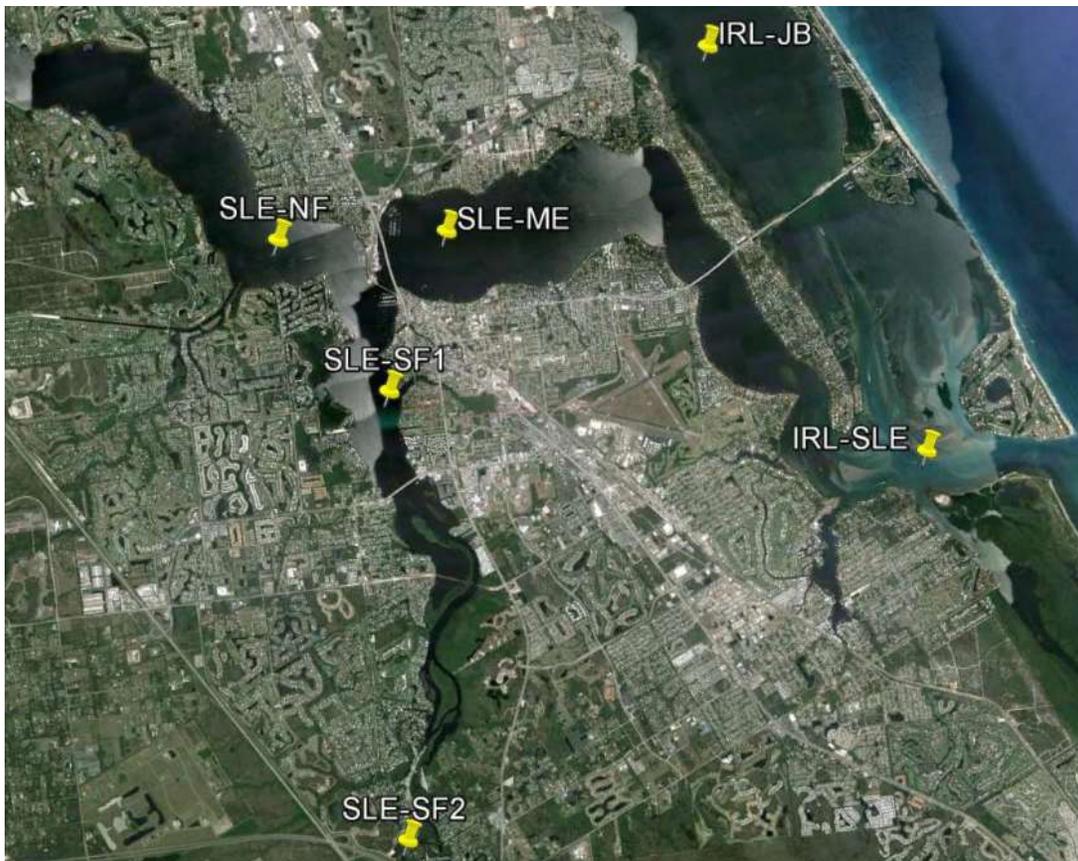


Figure A3. Location of the LOBO stations managed by Harbor Branch/FAU.

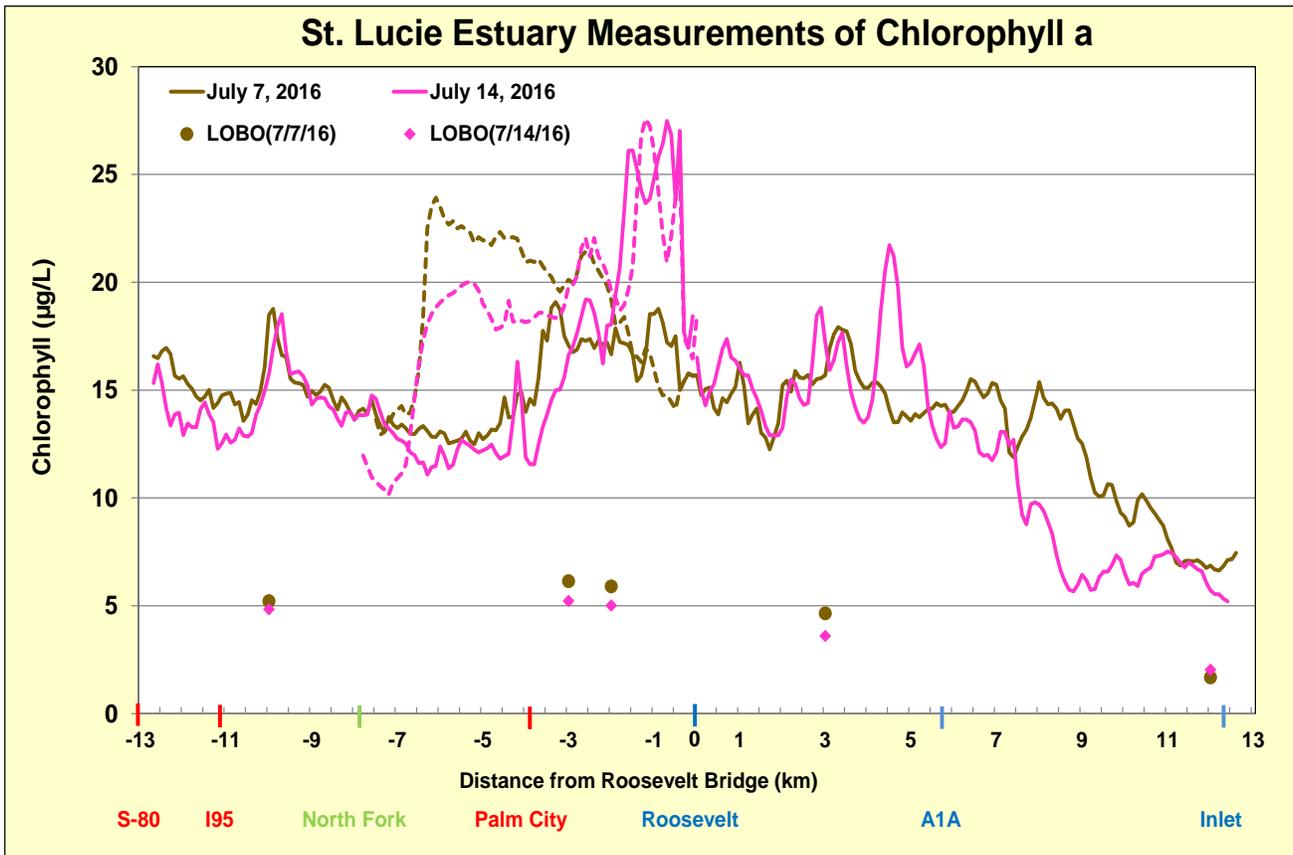


Figure A4. Water Quality Mapping chlorophyll a results from S-80 to the Inlet on July 7, 2016 and July 14, 2016. The dashed line represents the North Fork survey.

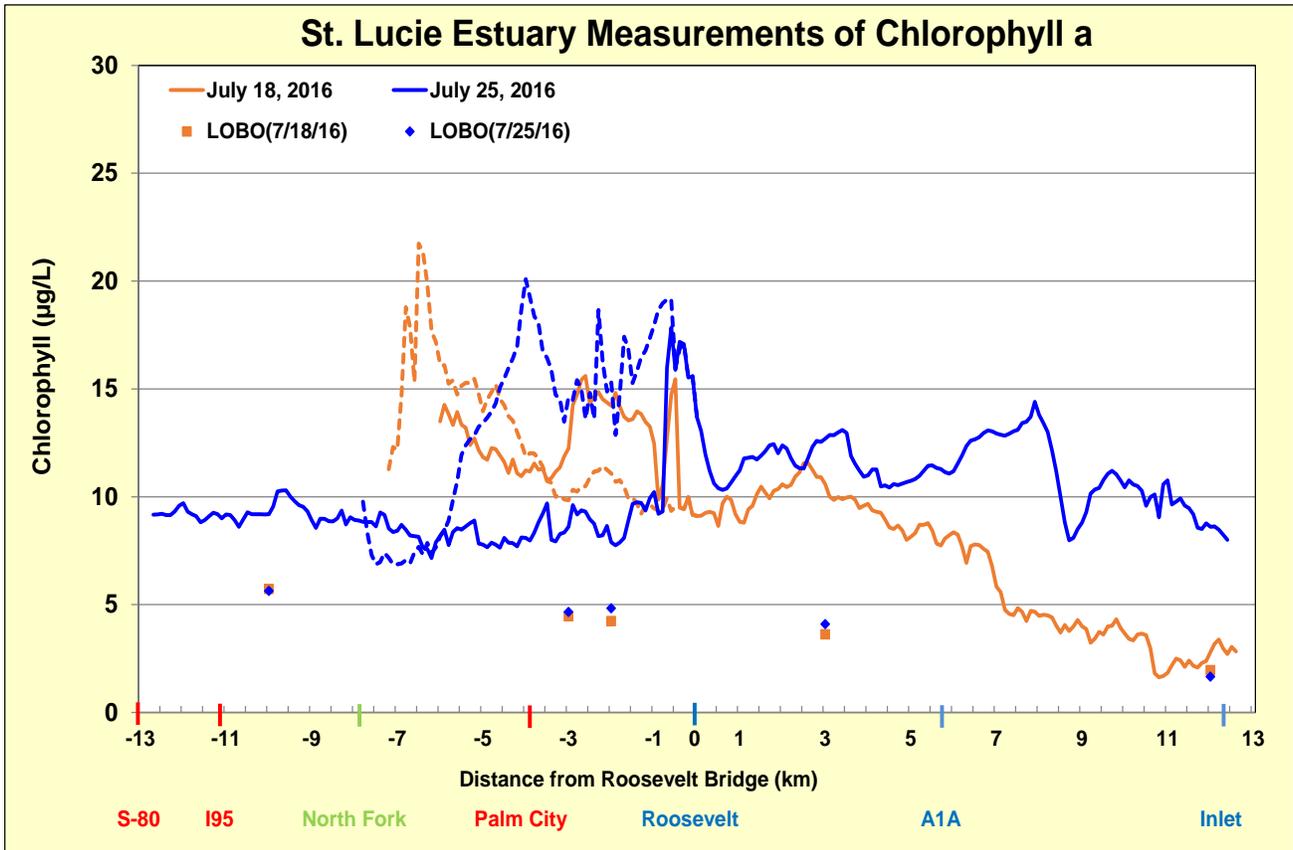
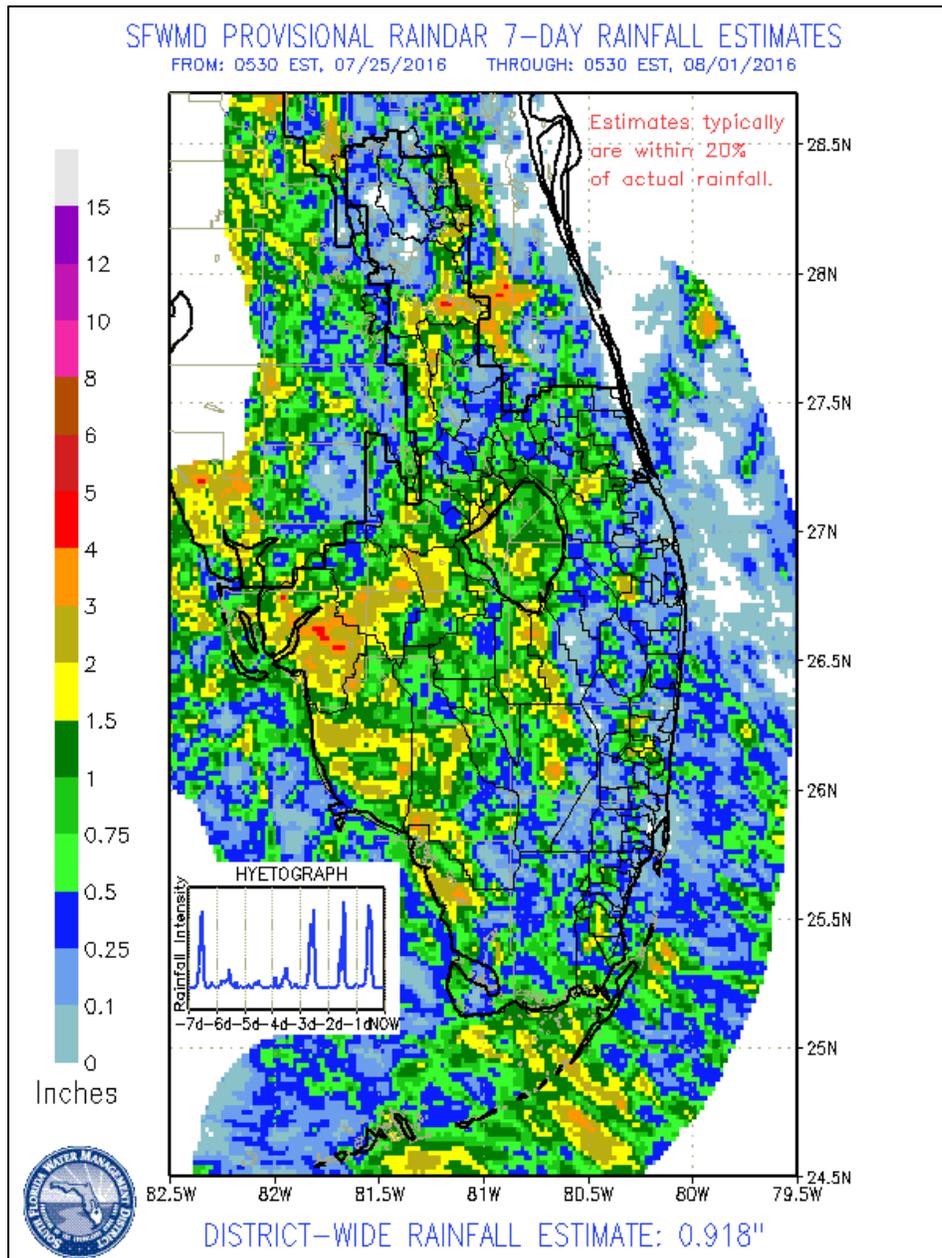


Figure A5. Water Quality Mapping for chlorophyll results from S-80 to the Inlet on July 18, 2016 and July 25, 2016. The dashed line represents the North Fork survey.

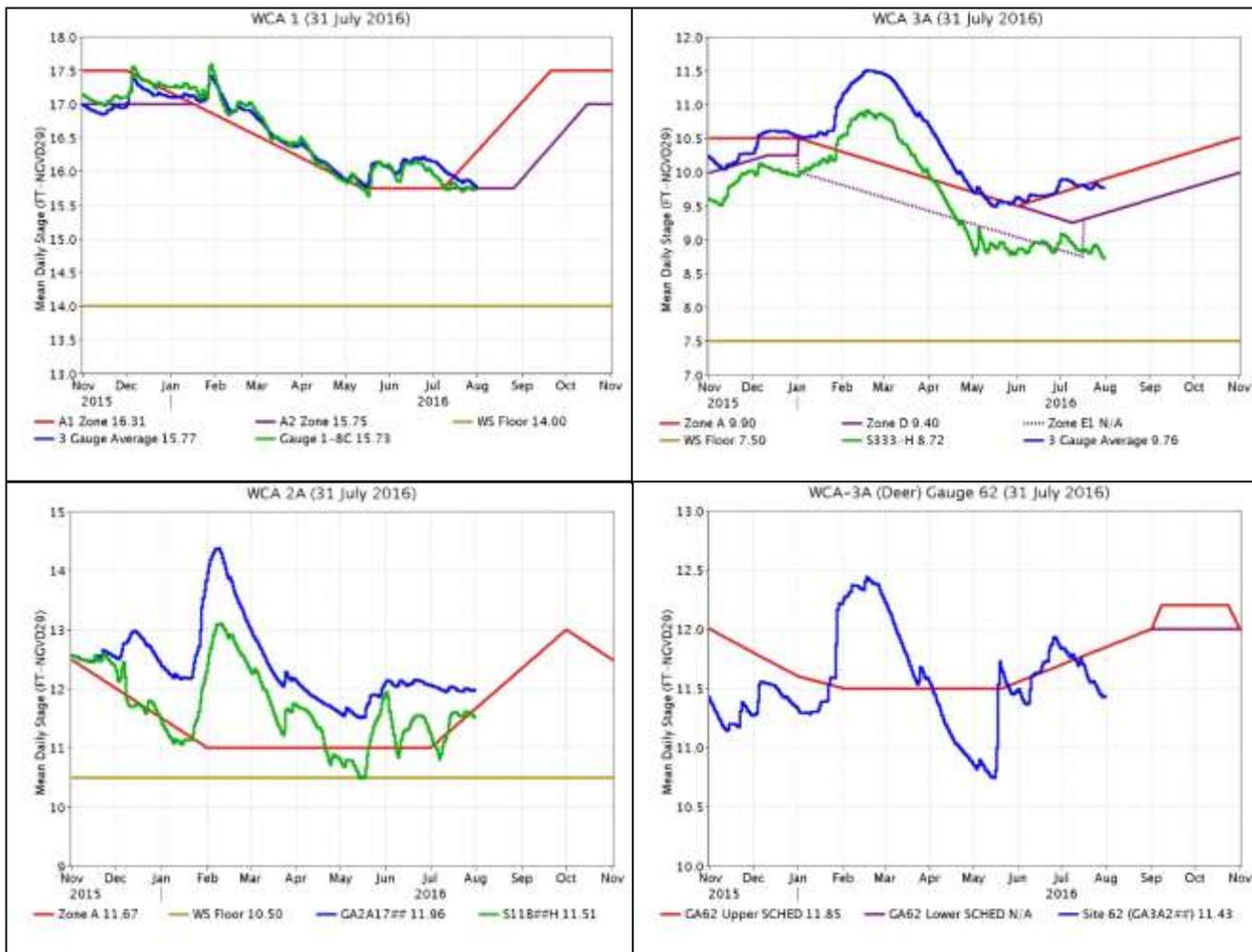
GREATER EVERGLADES

Rainfall was low last week, with basin-wide averages less than one inch. The highest rainfall occurred in WCAs 3A and western Everglades National Park (ENP). Water levels decreased with the low rainfall and high evaporation. Pan evaporation was 1.76 inches, 24 percent above the pre-project average of 1.42 inches.

Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	0.54	-0.12
WCA-2A	0.35	-0.06
WCA-2B	0.57	-0.07
WCA-3A	0.80	-0.06
WCA-3B	0.18	-0.10
ENP	0.76	-0.06

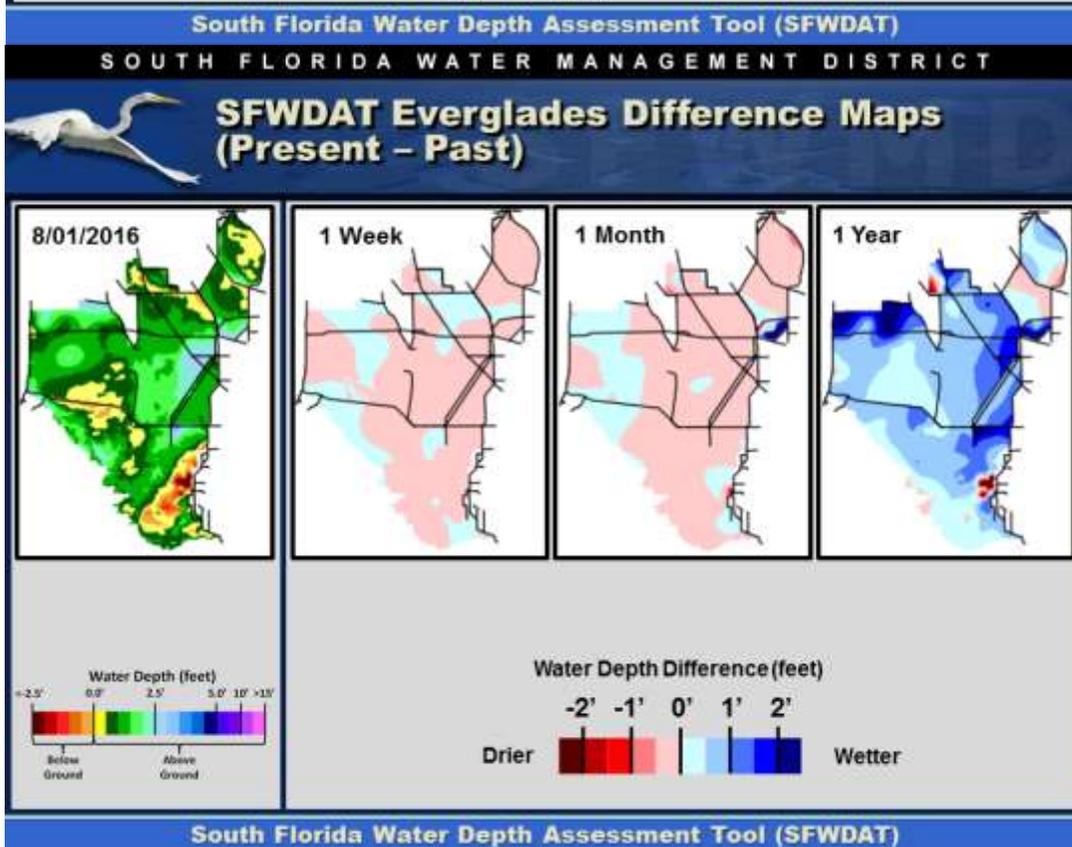
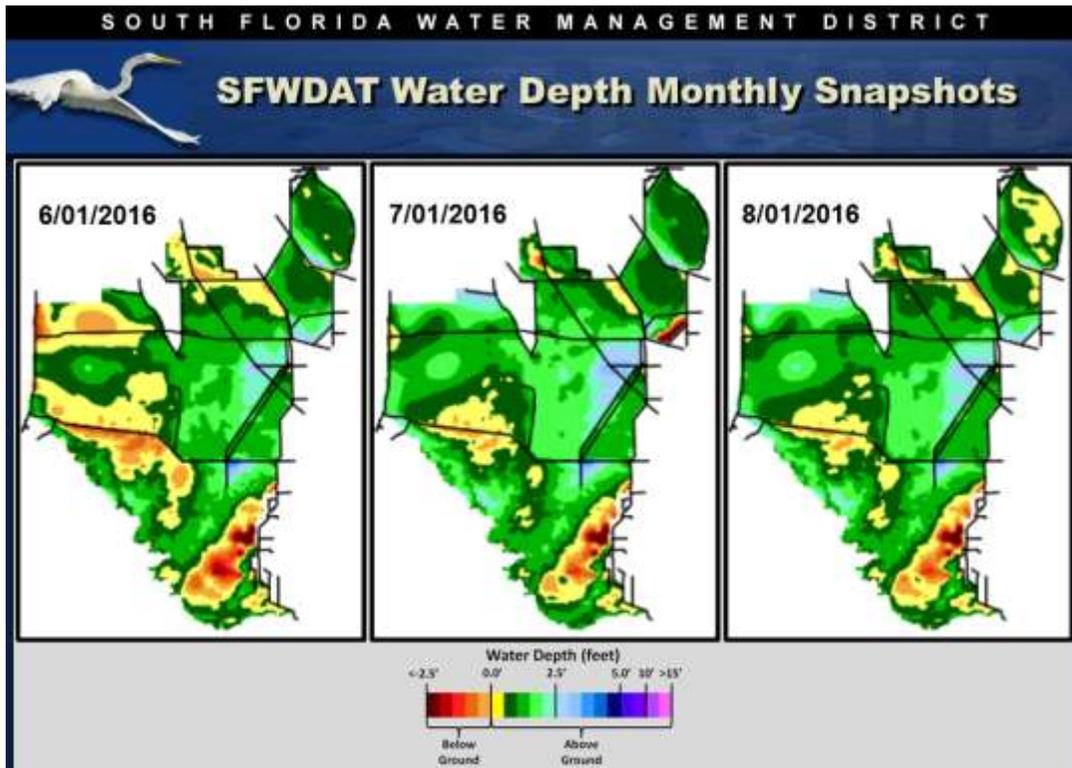


Regulation Schedules: Water levels have decreased and three of the four areas are below regulation. The WCA-1 three-gauge average is 0.54 feet below regulation. The WCA-2A stage is 0.29 feet above regulation. The WCA-3A three-gauge average stage is 0.14 feet below regulation and the northwestern WCA-3A gauge stage (gauge 62) is 0.42 feet below regulation.



Water Depths and Changes: Water levels are lower than a month ago and mixed relative to two months ago. Water depths at monitored gauges other than in WCA-2B range from 0.64 inches to 1.94 inches.

Stages generally were lower than last week with gauge changes ranging from -0.05 feet to -0.13 feet. Compared to a month ago, stages were also lower. Relative to a year ago, stages are generally higher to much higher.



Cape Sable Seaside Sparrows: Ground surveys of subpopulations A and B will continue through August 15 with weekly reports provided.

Subpopulation surveys in late July:

A: Breeding continues; males are still singing. There are eight territories with two active nests confirmed. One has chicks and one pair was feeding fledglings. Last week's nest with four eggs could

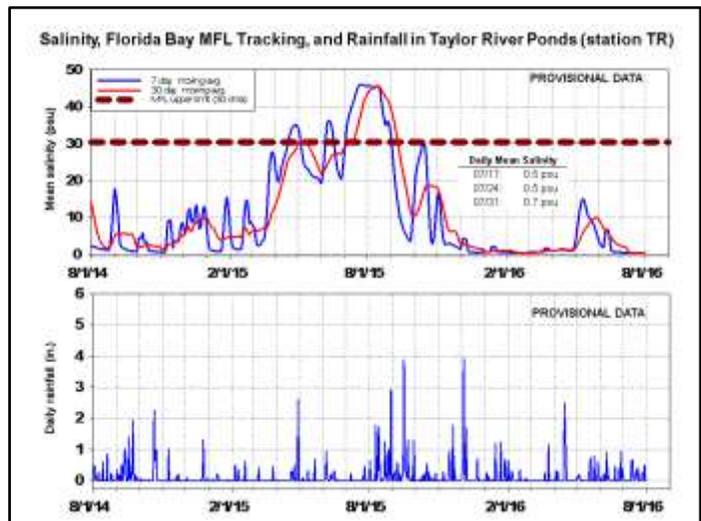
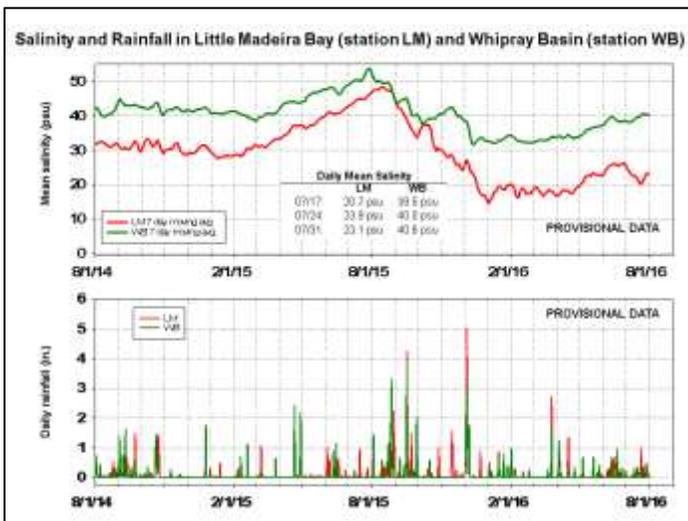
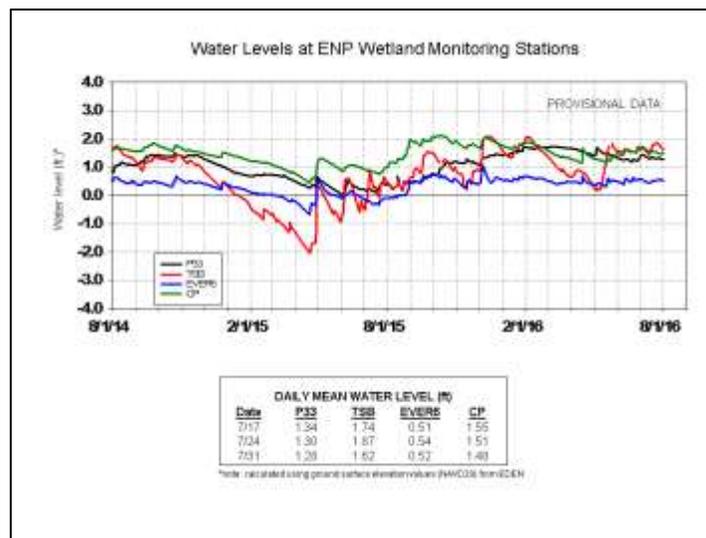
not be checked because of helicopter issues. Water coverage was 95 percent with depths lower than 5 cm.

B: Five to six territories were observed with no active nests and no singing males were heard. One pair was feeding fledglings. Water coverage was 100 percent with depths ranging from eight to 11 cm.

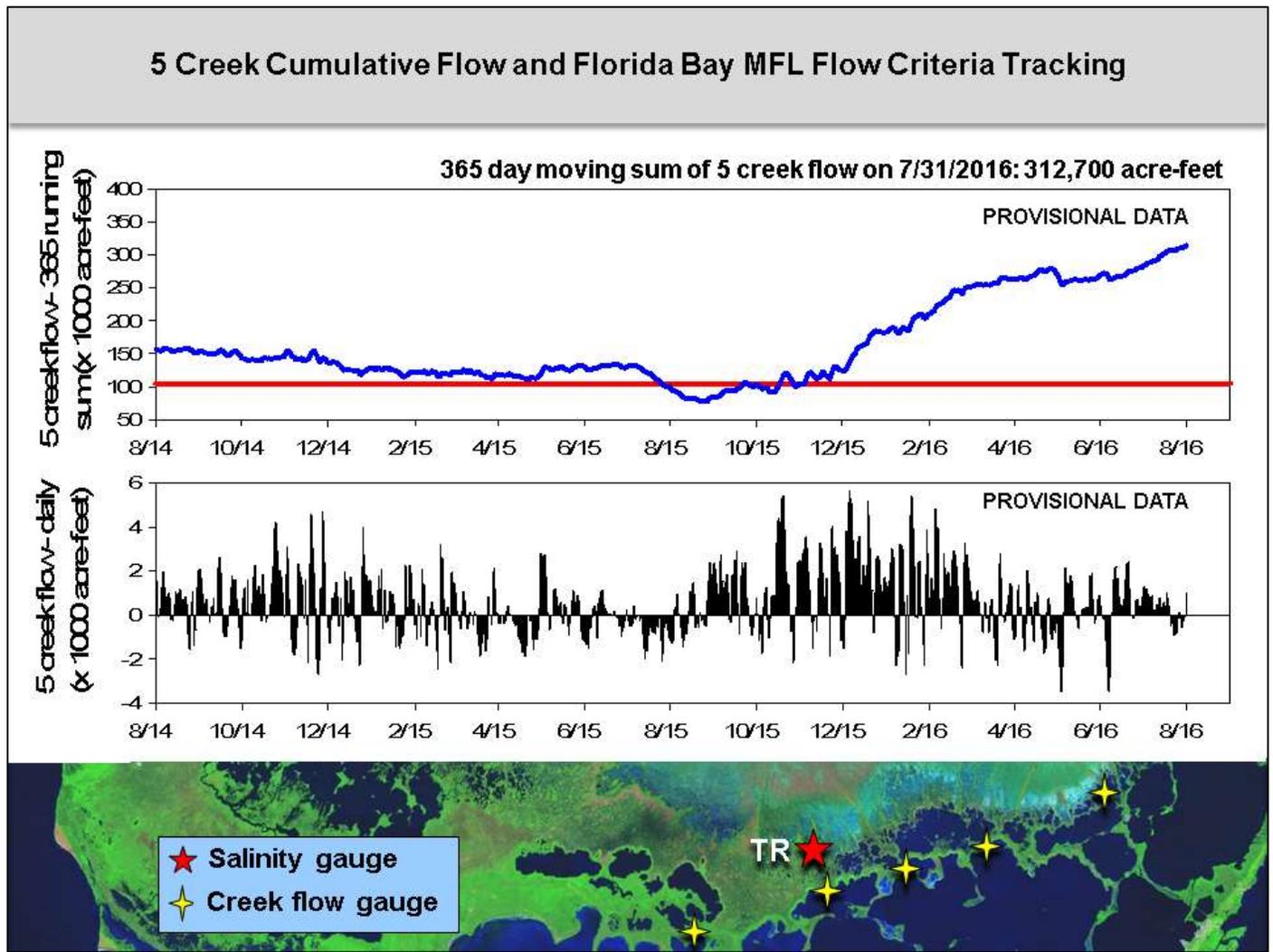
Everglades National Park (ENP) and Florida Bay: Water levels decreased last week with the largest change of -0.25 feet in northern Taylor Slough. Water levels in northern Taylor Slough are still higher than they were a month ago, while closer to the shoreline, water levels are slightly lower than a month ago. Compared to historic averages, water levels are average to five inches above average.

Salinities across Florida Bay range from average to 7 psu above average. Daily average salinities range from 15 to 41 psu with the highest salinity in central Florida Bay. The largest weekly change of -3.3 psu occurred in the western nearshore embayments; these experienced a rapid rise in salinity last week and are still 7 psu above average.

The MFL sentinel site TR in the mangrove zone remains near fresh at 0.7 psu, and the 30-day moving average salinity at TR remains at a seasonally average of 0.5 psu.



The 365-day running sum of the cumulative flow from the five creeks feeding Florida Bay has risen to 312,700 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-3A and in WCA-1. The northern half of WCA-1 has been closed to airboats because of low water and stages are declining throughout northern 3A.
- 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 1.94 feet. Ascension rates need to remain under 0.25 feet/week to protect habitat and wildlife, including apple snails, prey of the endangered snail kite.
- The Cape Sable Seaside Sparrows continue late breeding in subpopulation A. Water levels need to remain as low as possible until breeding ceases.

- The Active Marsh Improvement Project (AMI) in WCA-2A needs water levels to be over six inches for a planned burn, remaining at that depth for several weeks. Depths are still below six inches.

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

Everglades Ecological Recommendations, Aug. 2, 2016 (red is new)				
Area	Current Condition	Cause(s)	Recommendation	Reasons
WCA-1	Stages fell -0.10' to -0.13'	Rainfall, ET, management	Increase inflows to WCA-1. Limit ascension rates to extent possible with a maximum of 0.25 ft/week.	Stages are too low in northern WCA-1, leading to recent closures of northern WCA-1 to airboats. Ascension rates of <0.25'/week will protect habitat and wildlife including reproducing apple snails.
WCA-2A	Stage fell 0.06'	Rainfall, ET, management	Maintain ascension rates <0.25 ft/week. Raise water levels to at least 6" depth at experimental sites and maintain depths of 6"-12" for a controlled burn within one to two weeks.	A burn at an experimental site is necessary as part of an ongoing effort to determine how best to achieve restoration goals. Ascension rates of <0.25'/week will protect habitat and wildlife including reproducing apple snails.
WCA-2B	Stages decreased -0.06' to -0.07'	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 fell -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.	Stages are low in northeastern WCA-3A and are declining over northern WCA-3A. Increasing ascension rates while not exceeding 0.25'/week will protect habitat and wildlife including reproducing apple snails.
WCA-3A NW	Stage fell -0.07'	Rainfall, ET, management		
Central WCA-3A S	Stage fell -0.07'	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).	Moderate recession rates would benefit habitat and wildlife. Keeping depths below 2.5' 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 fell -0.06'	Rainfall, ET, management		
WCA-3B	Stages fell -0.06' to -0.13'	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 -0.06'	ET, rainfall, topography, management	Make discharges to the Park according to the ERTTP rainfall plan.	Keep peat wet to promote native habitat and maintain wetland plant and animal communities.
ENP-CSSS habitats	S-12A and S-12B remain closed to enhance dry-down.	Rainfall, ET, management	Follow rainfall plan for releases. Extend ERTTP closures for S12-A and B through mid-August. Gradual reduction in flows through S333, S12C and D, as possible, is recommended (stepping down over several days). Follow guidance in C-111 western spreader canal project operations manual.	Sparrows are continuing to breed throughout July into August, so it is important to provide appropriate hydrological and habitat conditions for breeding in subpopulation A.
Taylor Slough	Average to 5 inches above average	Rain, ET, inflows	Move water southward as needed	Provide freshwater buffer for ecosystems and maintain low salinity conditions downstream
FB- Salinity	Average to 7 psu above average	Rain, ET, inflows, wind	Move water southward as needed	Maintain lower salinity levels.