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M E M O R A N D U M

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

FROM: SFWMD Staff Environmental Advisory Team

DATE: January 2, 2018

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

The forecast is for moderate rainfall focused east through tonight. A 150-mph jet stream through central Florida is aiding low pressure development over the northern Bahamas. A weak trough extends westward from this developing low to the southeast coast of Florida. Strong low level north northeast winds will combine with the jet stream to focus light to moderate showers and possibly a few thunderstorms over the east coast through dawn. A strong upper level impulse pushes through tomorrow afternoon to end the rains and usher in the coldest weather of the season on Thursday and Friday when morning 30 degree temperatures are likely over the Kissimmee Valley and possibly down around Lake Okeechobee.

Kissimmee

Tuesday morning stages were 58.0 feet NGVD (at schedule) in East Lake Toho, 55.0 feet NGVD (at schedule) in Toho, and 51.0 feet NGVD (1.5 feet below schedule) in Kissimmee-Cypress-Hatchineha; S65A headwater stage was 46.5 feet NGVD. Tuesday morning discharges were: 530 cfs at S65, 443 cfs at S65A, and 756 cfs at S65E. Dissolved oxygen concentration in the Kissimmee River averaged 6.5 milligrams per liter (mg/L) for the week. Kissimmee River mean floodplain depth on Sunday was 0.22 feet. A recommendation was made on December 19, 2017 to begin discharge of 400 cfs from S67 into Istokpoga Canal to increase navigability by scouring the channel and reducing the sandbar at the canal mouth.

Lake Okeechobee

Lake Okeechobee stage is 15.48 feet NGVD having decreased 0.11 feet over the past week and 0.53 feet over the last month. Following Hurricane Irma, stages exceeded 16.0 feet NGVD for 72 days, the longest period since late 2004 which was 73 days. Stages also exceeded 15.5 feet NGVD for 105 days, the longest period since late 2004. The submerged aquatic and emergent vegetation coverage in the nearshore areas of the Lake are expected to decline over the coming months and possibly years due to the high water and turbidity from resuspended lake sediment. The high inflows and resuspended lake sediment associated with Hurricane Irma also increased water column total phosphorus, which could lead to algal blooms as turbidity continues to decline and water temperatures rise.

Estuaries

Total inflow to St. Lucie Estuary averaged 475 cfs over the past week with 132 cfs (28%) coming from Lake Okeechobee. Salinity increased throughout the estuary. The 7-day average salinity at the US1 Bridge is in the good range for adult oysters. Average chlorophyll a concentration levels were 3.05 – 16.38 µg/L, with highest values reported in the South Fork (5.15 – 16.38 µg/L). Average dissolved oxygen levels were 1.91 – 7.99 mg/L.

Total inflow to Caloosahatchee Estuary averaged 2,189 cfs over the past week with 1,488 cfs (68%) coming from the Lake. Salinity stayed the same throughout the estuary. The 30-day moving average surface salinity is 0.2 at Val I-75 and 0.3 at Ft. Myers. Salinity at Val I-75 is forecast to be 1.9 in two weeks with no flow through S-79. Salinity conditions between Val I-75 and Ft. Myers are good for tape grass. Salinity conditions are in the good range for adult oysters at Shell Point and in the fair range at Cape Coral. Chlorophyll a measurements show low chlorophyll a concentration levels near Shell Point (2.18 – 4.41 µg/L) over the last week. Average dissolved oxygen levels at Shell Point were 6.31 – 7.81 mg/L. *Karenia brevis* (red tide dinoflagellate) was observed in background to high concentrations in sixteen samples collected from Lee County. Numerous reports of fish kills and respiratory irritation were reported along Lee County over the past week.

Stormwater Treatment Areas

Over the past week, the STAs/FEBs did not receive Lake releases. The total amount of Lake releases sent to the STAs/FEBs in WY2018 (since May 1, 2017) is approximately 21,900 acre-feet. Most STA cells are at or near target depths. Operational restrictions are in place for vegetation rehabilitation in STA-1E and STA-2. This week, if 2008 LORS recommends Lake releases to the WCAs and the conditions allow, releases will be sent to STA-1E Eastern Flow-way and STA-2 Flow-way 1.

Everglades

Rainfall was minimal across the Everglades last week. Water management efforts and ET continue to alleviate high water conditions. Stages continue to drop rapidly in WCA-3A and WCA-2A. Keeping depths below 2.5 feet at gauge 65 in WCA-3A is important to moderate the stress to tree islands caused by flooding when durations last longer than 60-90 days. The depth on Sunday at that location was 2.68 feet, and has exceeded 2.5 feet for 199 days. In Taylor Slough, water levels are 3 to 16 inches above the historic average for this time of year, and Florida Bay salinities are up to 6 psu lower than the historic averages for this time of year.

Area-specific recommendations are summarized in the table at the end of this report.

Supporting Information

KESSIMMEE BASIN

Kissimmee Basin Rainfall

The Upper Kissimmee Basin received no rainfall in the past week and the Lower Basin received 0.01 inch (SFWMD Daily Rainfall Report 1/1/2018).

Upper Kissimmee Basin

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

Table 1. Average discharge (cfs) for the preceding seven days, one-day stage (feet NGVD), and departures from KCOL flood regulation (R) or temporary schedules (T, A, or S). Provisional, real-time data are from SFWMD.

Report Date: 1/2/2018

Water Body	Structure	7-day Average Discharge (cfs) ¹	Stage Monitoring Site ²	Lake Stage (feet)	Schedule Type ³	Schedule Stage (feet)	Daily Departure (feet)						
							12/31/17	12/24/17	12/17/17	12/10/17	12/3/17	11/26/17	11/19/17
Lakes Hart and Mary Jane	S62	0	LKMJ	61.0	R	61.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0
Lakes Myrtle, Preston, and Joel	S57	10	S57	61.7	R	61.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alligator Chain	S60	0	ALLI	63.9	R	64.0	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.0
Lake Gentry	S63	3	LKGT	61.5	R	61.5	0.0	0.0	0.0	0.0	0.1	0.0	0.0
East Lake Toho	S59	0	TOHOE	58.0	R	58.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lake Toho	S61	13	TOHOW, S61	55.0	R	55.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lakes Kissimmee, Cypress, and Hatchineha	S65	517	KUB011, LKIS5B	50.9	R	52.5	-1.6	-1.4	-1.3	-1.1	-1.1	-1.0	-0.9

¹Seven-day average of weighted daily means through midnight.

²Names of in-lake monitoring sites and structures used to determine lake stage; if more than one site is listed, an average is reported.

³T = temporary schedule, R = USACE flood control schedule, S = temporary snail kite schedule, A = projected ascension line, N/A= not applicable or data not available. DATA ARE PROVISIONAL

Lower Kissimmee Basin

Discharges 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. One-day and seven-day averages of discharge at S-65x structures, of dissolved oxygen concentration in the Phase I area river channel, and water depth in the Phase I area floodplain. Data are provisional real-time data from SFWMD.

Report Date: 1/2/2018

Report Date: 12/27/2018

Metric	Location	1-Day Average		Average for the Preceding 7-Days ¹								
		12/31/2017	12/31/17	12/24/17	12/17/17	12/10/17	12/3/17	11/26/17	11/19/17	11/12/17	11/5/17	10/29/17
Discharge (cfs)	S-65	503	517	553	540	368	586	925	1,097	1,349	1,439	1,564
Discharge (cfs)	S-65A	436	443	446	441	306	486	817	1,038	1,346	1,638	1,703
Discharge (cfs)	S-65D ²	436	718	770	796	595	989	1,425	1,925	2,467	3,714	3,240
Discharge (cfs)	S-65E ²	436	777	857	865	658	980	1,436	1,988	2,519	3,938	3,453
DO (mg/L) ³	Phase I river channel	6.6	6.5	7.1	6.4	5.2	5.7	5.8	5.0	4.1	4.2	3.4
Mean depth (feet) ⁴	Phase I floodplain	0.22	0.23	0.27	0.31	0.26	0.34	0.53	0.82	1.09	1.48	1.43

¹Seven-day average of weighted daily means through Sunday midnight.

²S-65D discharge combines discharge at S-65D, S-65DX1, and S-65DX2; S65E discharge combines S65E and S65EX1.

³DO is the average for sondes at PC62 and PC33.

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

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

Water Management Recommendations

Kissimmee Basin Adaptive Recommendations and Operational Actions

Date	Recommendation	Purpose	Outcome	Source
12/19/2017	Begin discharge of 400 cfs from S67 into Istokpoga Canal.	Increase navigability by scouring channel and reducing sandbar at canal mouth.	Implemented	KB Ops/SFWMD Water Mgt
12/19/2017	Begin a stage recession on January 1 in Lakes Kissimmee-Cypress-Hatchineha starting at stage on January 1 to reach low pool on May 31. Recession rate not to exceed 0.2 ft/week as possible. Subject to SFWMD planned operations hierarchy.	Achieve fish and wildlife benefits by slowing lake stage recession rates relative to the regulation schedule recession rates.	-	KB Ops/SFWMD Water Mgt
12/19/2017	Begin stage recessions on January 15 in Lakes East Toho and Toho starting at stage on January 15, to reach low pools on May 31. Recession rate not to exceed 0.2 ft/week if possible. Subject to SFWMD planned operations hierarchy.	Achieve fish and wildlife benefits by slowing lake stage recession rates relative to the regulation schedule recession rates.	-	KB Ops/SFWMD Water Mgt
12/12/2017	No new recommendations.		N/A	
12/5/2017	No new recommendations.		N/A	
11/28/2017	No new recommendations.		N/A	
11/21/2017	No new recommendations.		N/A	
11/13/2017	No new recommendations.		N/A	
11/1/2017	No new recommendations.		N/A	
10/24/2017	No new recommendations.		N/A	
10/17/2017	No new recommendations.		N/A	
10/10/2017	No new recommendations.		N/A	
10/3/2017	No new recommendations.		N/A	
9/25/2017	No new recommendations.		N/A	
9/19/2017	No new recommendations.		N/A	
9/5/2017	No new recommendations.		N/A	
8/29/2017	No new recommendations.		N/A	
8/22/2017	No new recommendations.		N/A	
8/15/2017	No new recommendations.		N/A	
8/4/2017	Increase S65A discharge by 150 cfs to about 1400 cfs.	Reduce rate of stage rise in KCH.		SFWMD Water Mgt, KB Ops
8/1/2017	No new recommendations.		N/A	
7/25/2017	Hold current discharge at S65A, adjusting S65 discharge to maintain current flow to the Kissimmee River.	Maintain current S65A discharge.		SFWMD Water Mgt, KB Ops
7/23/2017	Increase S65A discharge slowly using Figure 8a toward the seasonal target of 1400 cfs. Hold at 1400 cfs while stage in KCH remains above 50 feet (+/- 0.2 foot).	Reduce current rapid rate of stage rise in KCH; provide Kissimmee River floodplain inundation if conditions stay wet.	Implemented	KB Ops
7/16/2017	Reduce S65A flow to ~600-650 cfs. As Pool A runoff diminishes keep S65A around 650 +/- 50 cfs by increasing flow from S65.	Maintain moderate discharge to the Kissimmee River from S65A while maintaining S65A headwater within its operating range using flow from S65.	Implemented	SFWMD Water Mgt, KB Ops
7/6/2017	Hold 450 cfs at S65A due to reduced forecast.	Reduced-rainfall forecast led to decision to hold 450 cfs at S65A rather than continuing to ramp up.	Implemented	KB Ops

KCOL Hydrographs (through Sunday midnight)

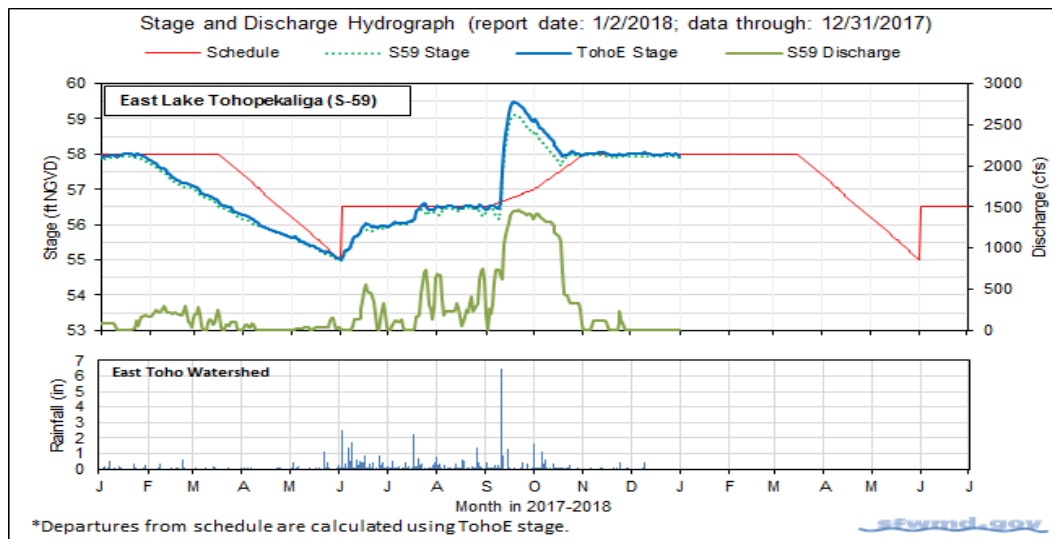


Figure 1.

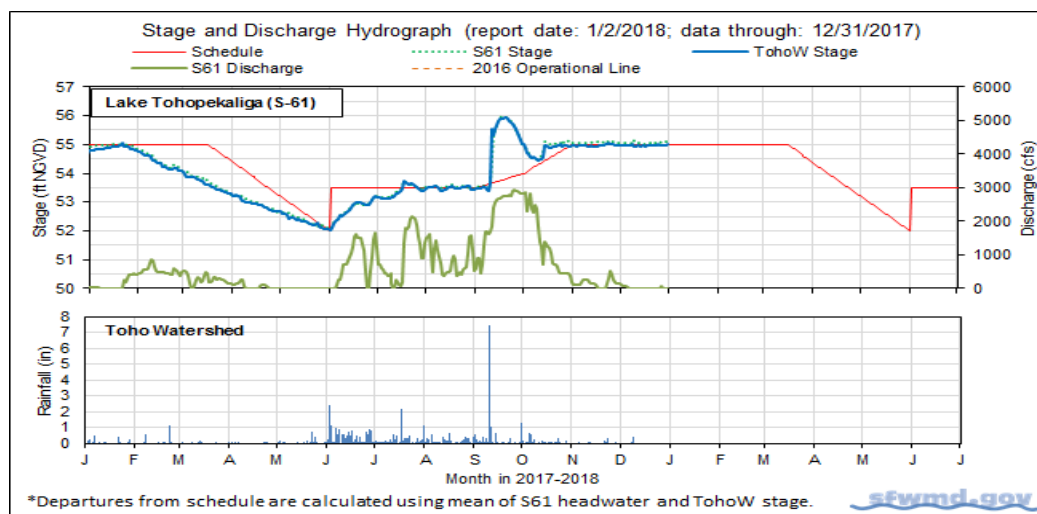


Figure 2.

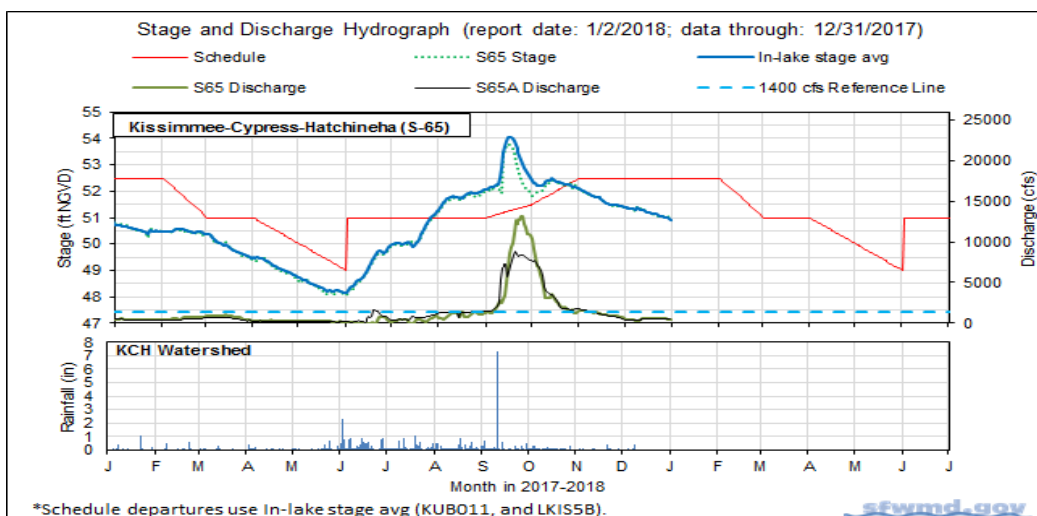


Figure 3.

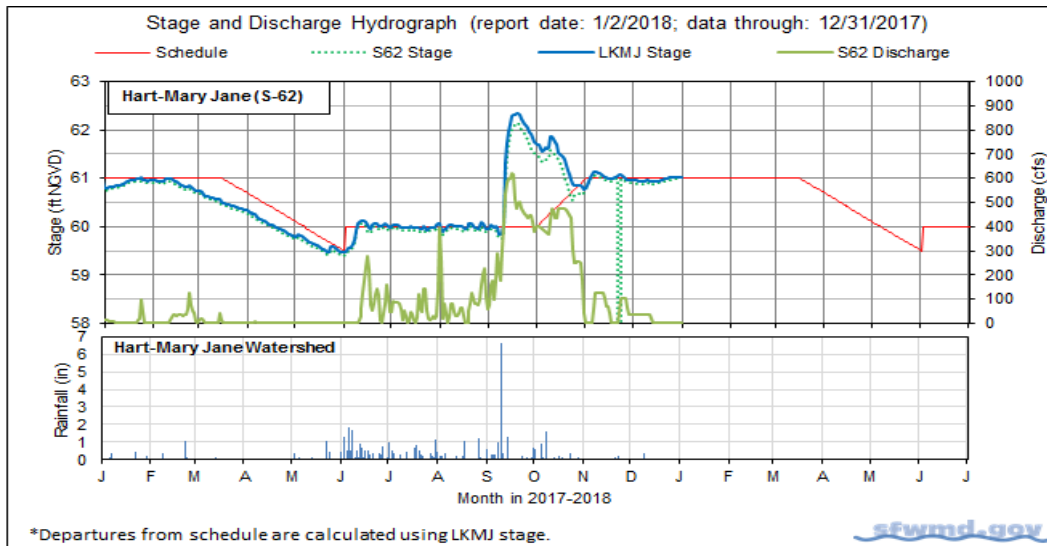


Figure 4.

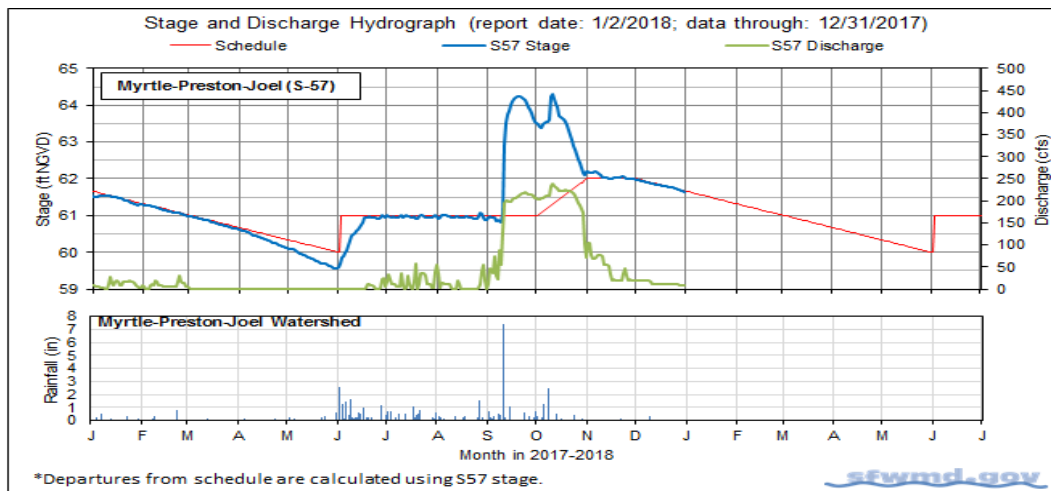


Figure 5.

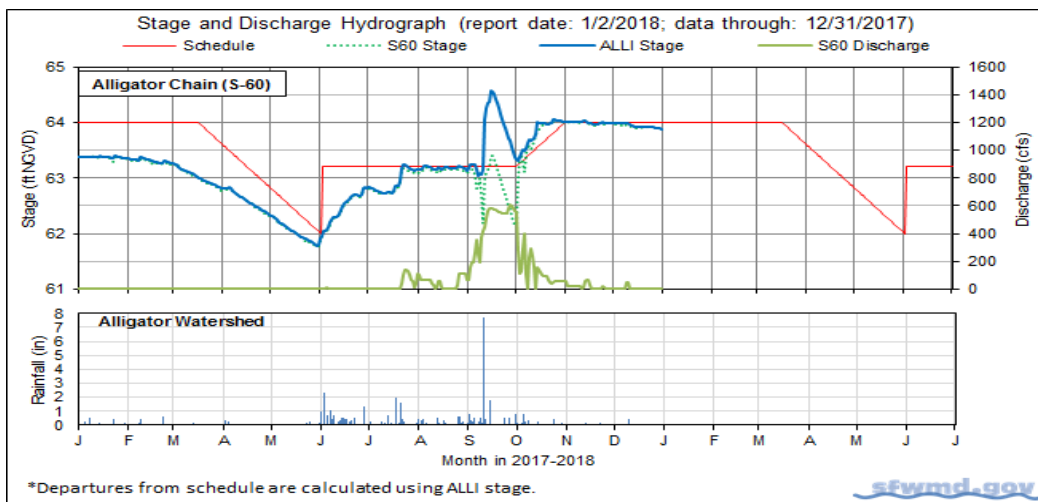


Figure 6.

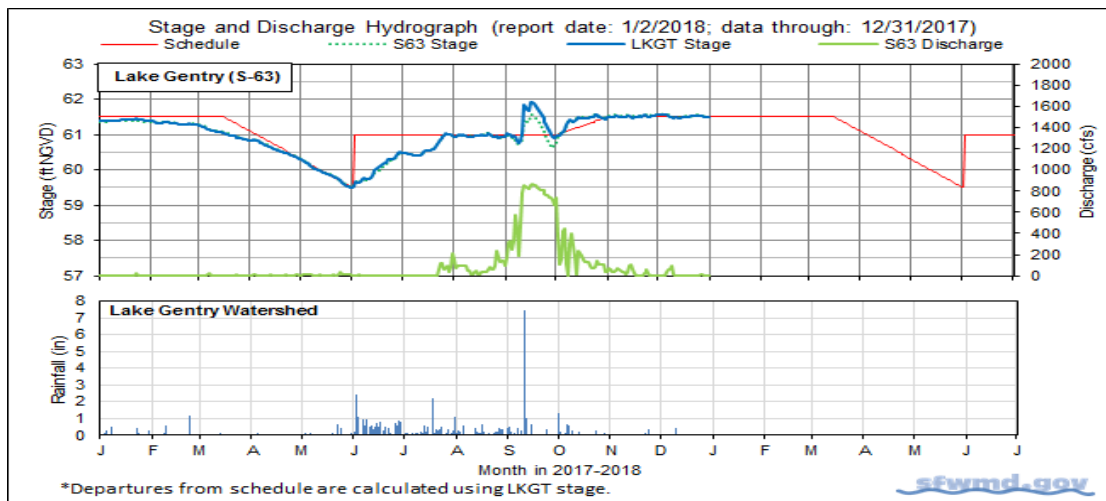


Figure 7.

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

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

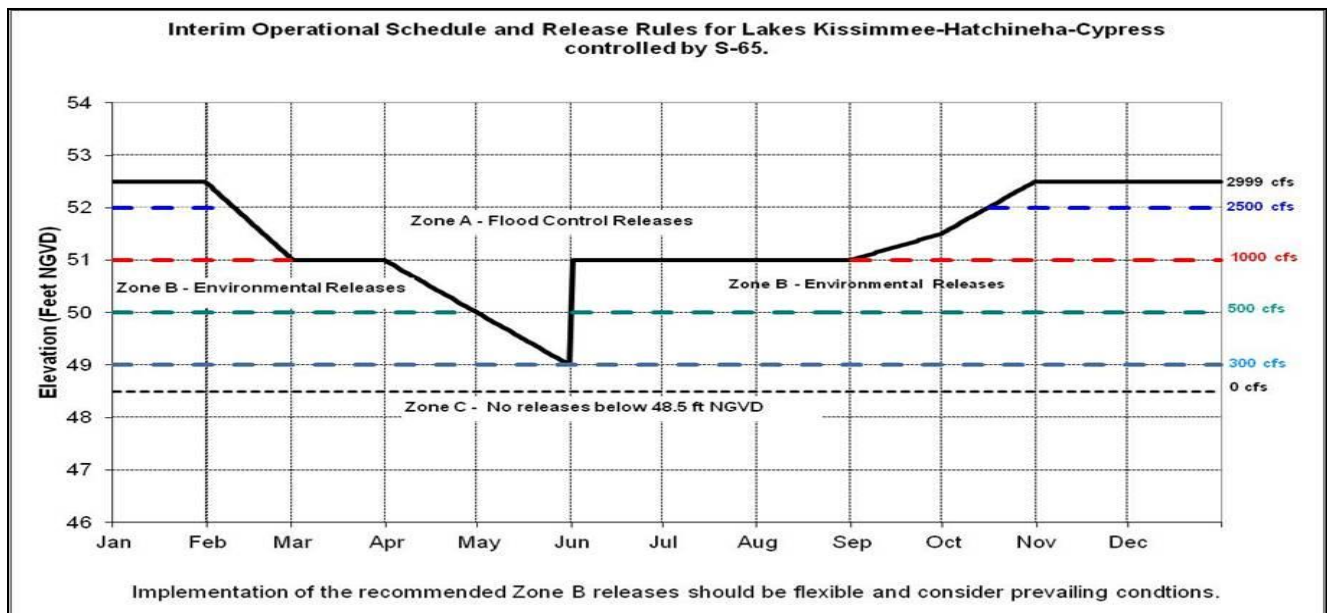
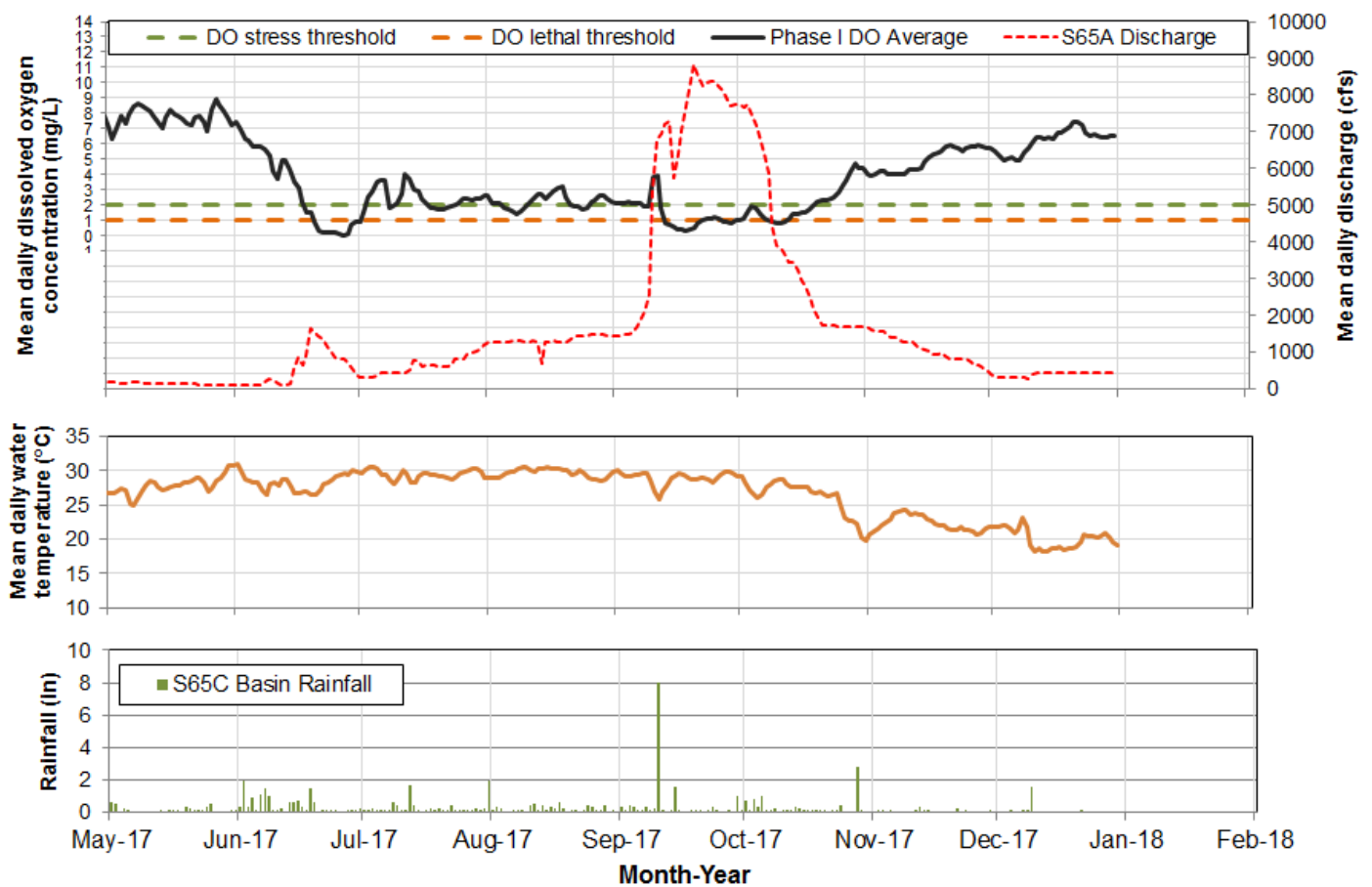


Figure 9. Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years.



Report Date: 1/2/2018; data are through: 12/31/2017.

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

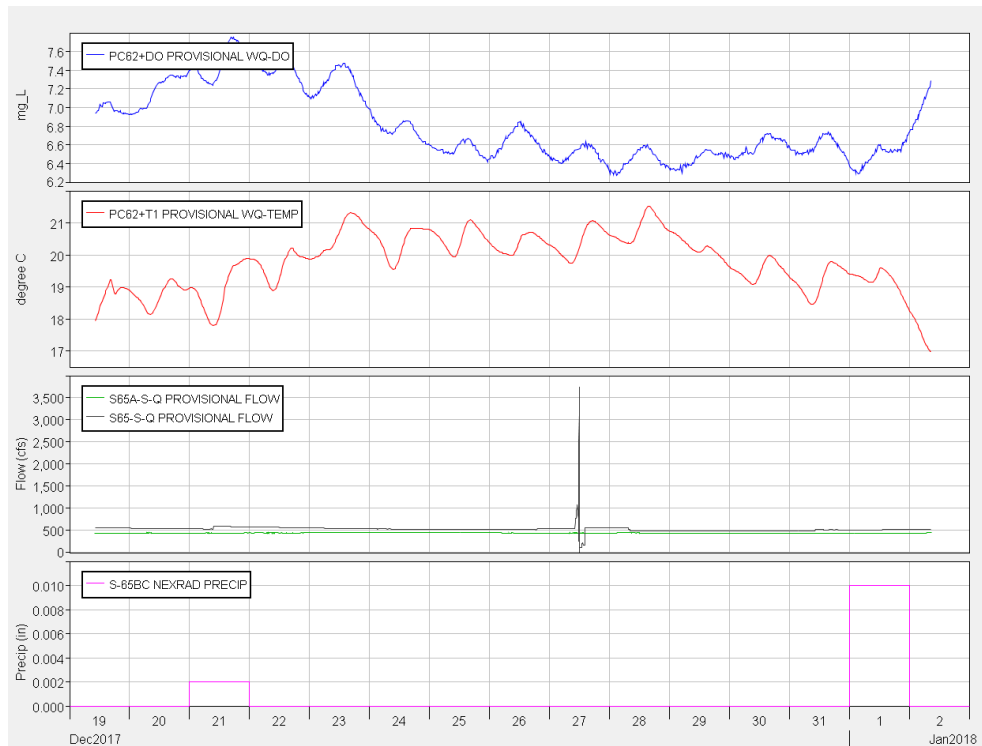


Figure 11. Phase I river channel dissolved oxygen and water temperature (measured at 15 minute intervals) and Pool BC daily rainfall.

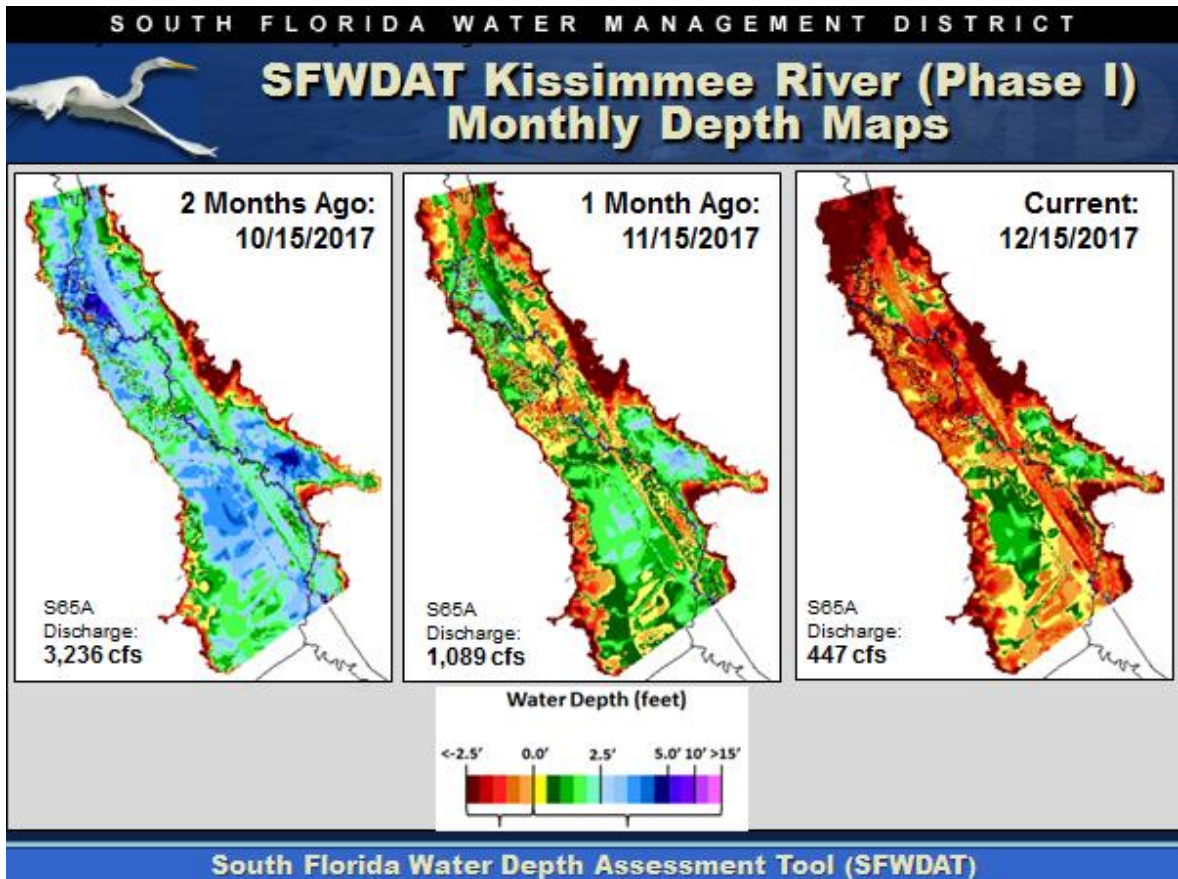
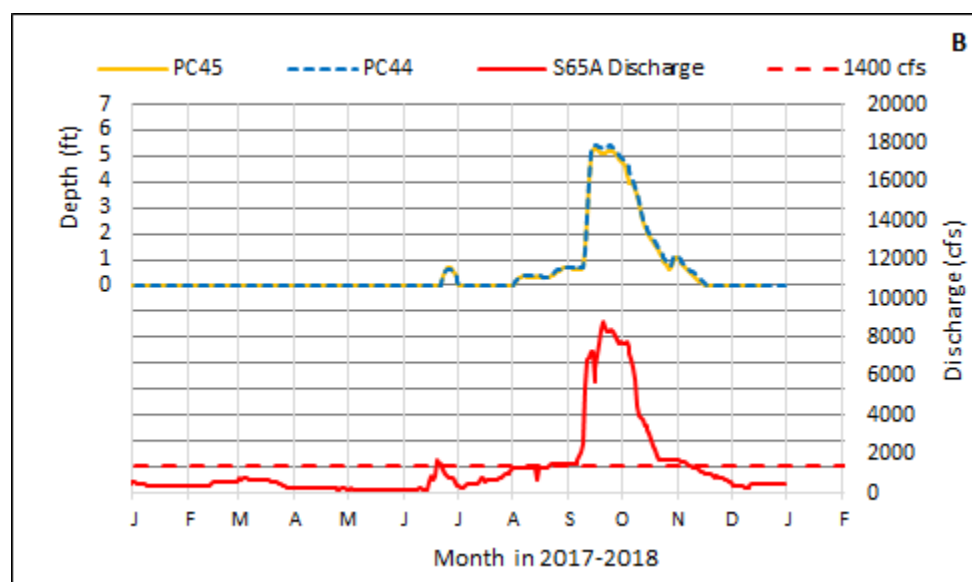
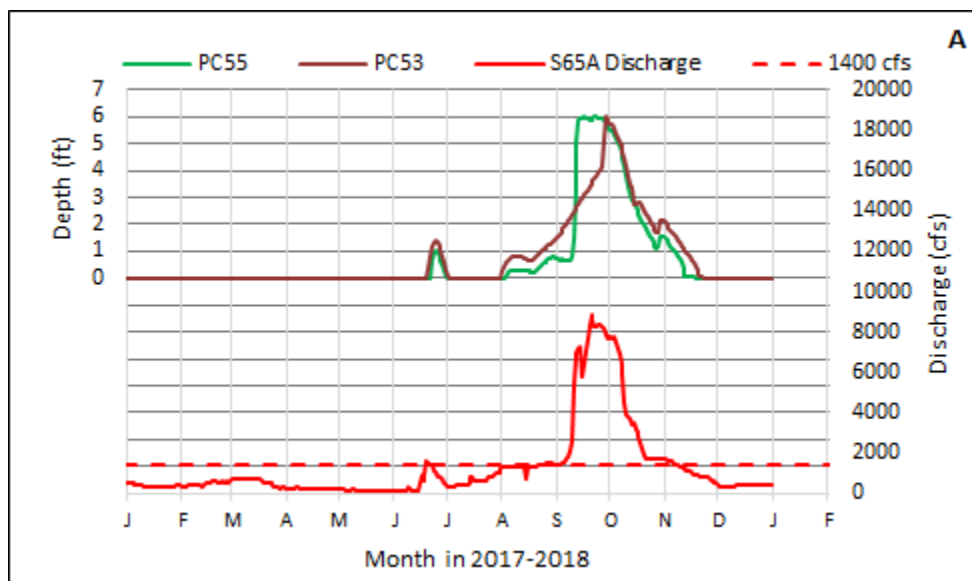


Figure 12. Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to January 16, 2012.



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

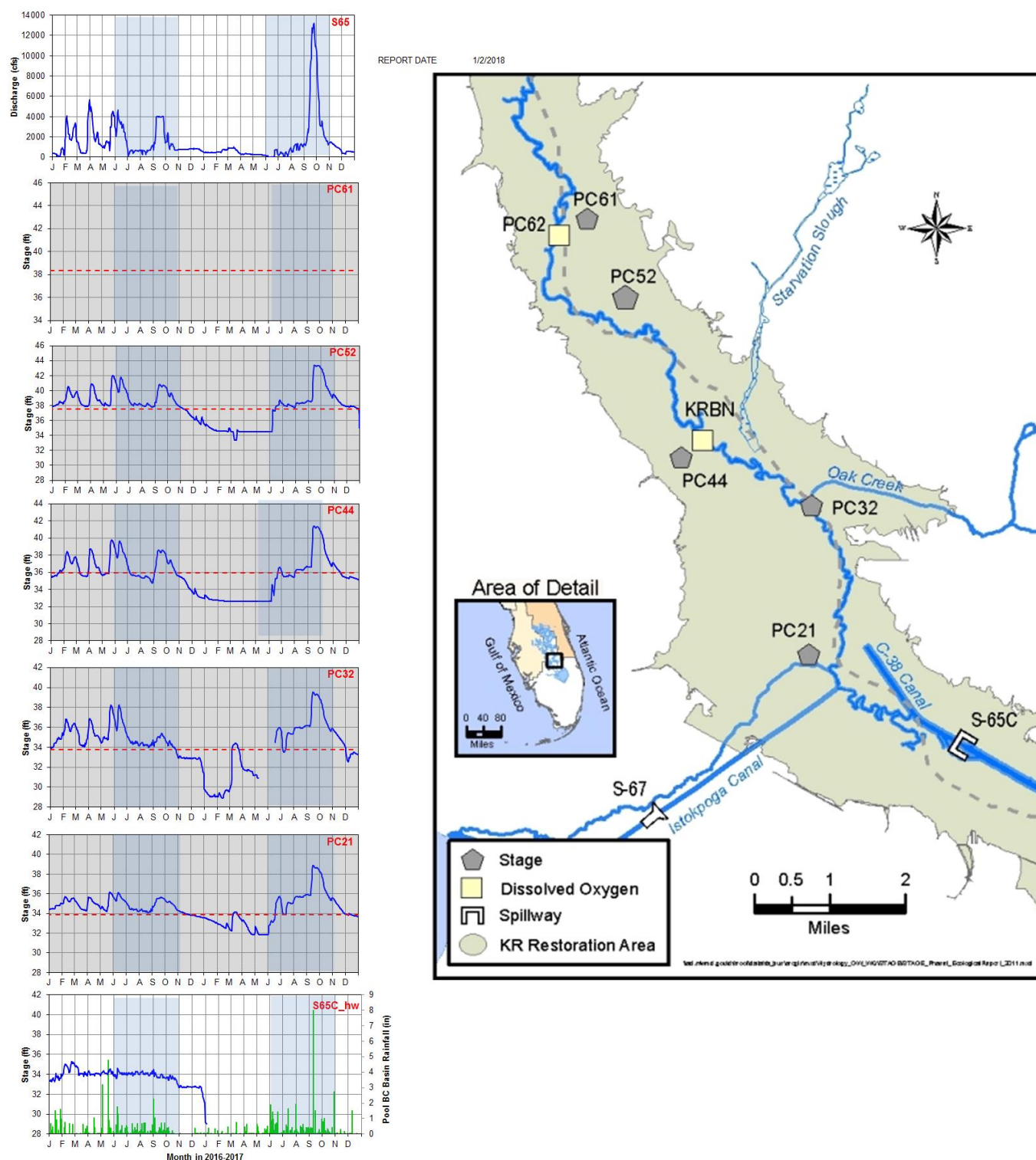


Figure 13. Discharge at S65, stages at five monitoring stations in the Phase I area of the Kissimmee River floodplain, and headwater stage at S65-C since January 1, 2016. The most recent data (~2 weeks) are provisional real-time data from SFWMD DualTrend; previous data are from SFWMD DB-HYDRO (validated). Dashed lines are ground elevations.

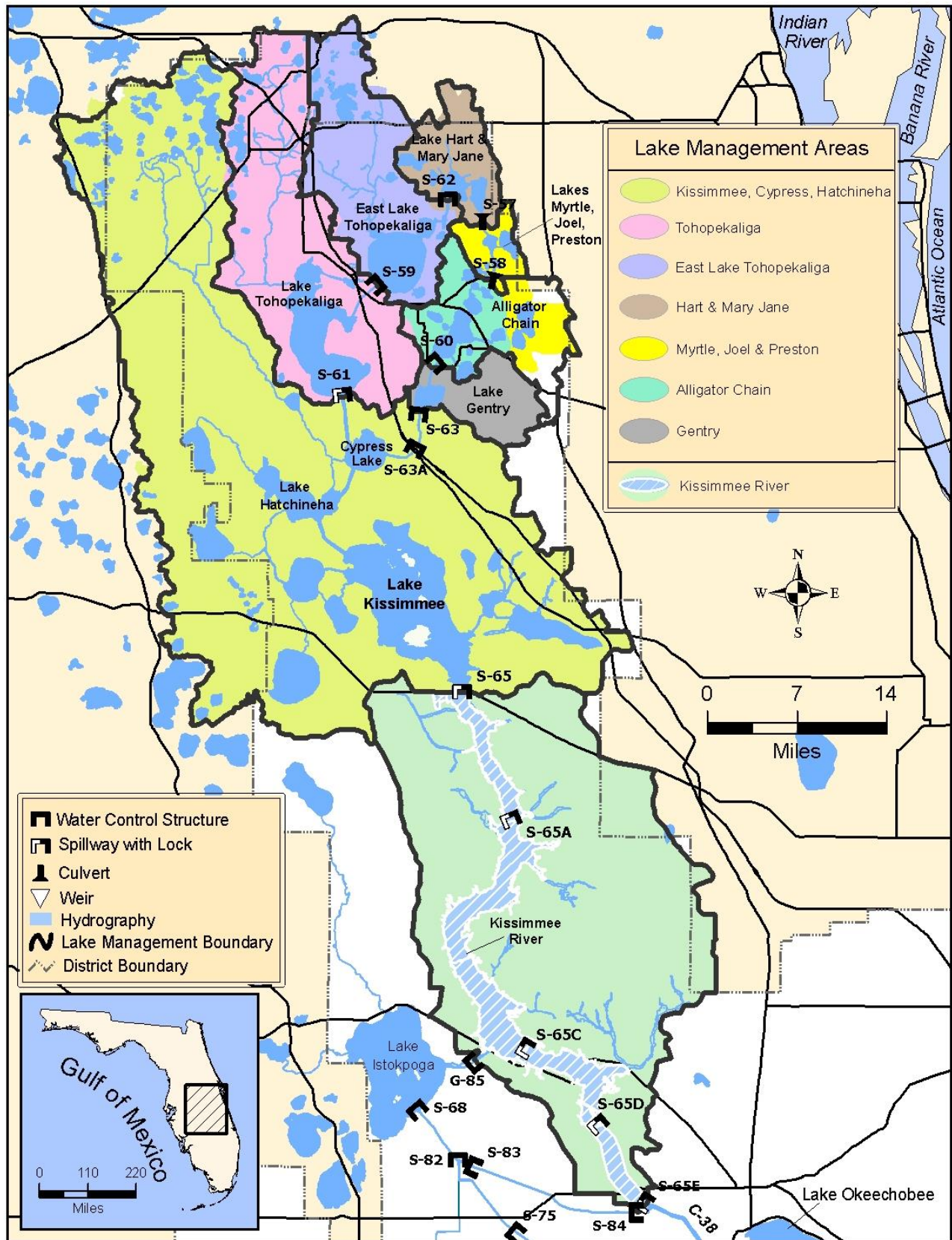


Figure 14. The Kissimmee Basin.

LAKE OKEECHOBEE

According to the USACE web site, Lake Okeechobee stage is at 15.48 feet NGVD for the period ending at midnight on January 1, 2018. This value is based on the use of four interior lake stations (L001, L005, L006 and LZ40) and four perimeter stations (S308, S352, S4 and S133). Lake stage last peaked at 17.20 feet NGVD on October 13, 2017, declining to 16.8 feet NGVD on October 28, 2017, and then back up to 17.02 feet NGVD. The Lake is now 0.53 feet lower than it was a month ago, but 1.22 feet higher than a year ago (Figure 1). The Lake is now in the Low sub-band (Figure 2). According to RAINДАР, only 0.02 inches of rain fell over the Lake during the week December 26, 2017 - January 1, 2018 with similar amounts throughout its watershed (Figure 3).

Average daily inflows to the Lake decreased again over the past week, from 1,796 cfs to 1,381 cfs. Most of the inflows were from the Kissimmee River via the S65E and S84 structures, which averaged 765 cfs and 426 cfs daily, respectively. S71 and S72 structures, along with Fisheating Creek, contributed a combined 117 average daily cfs as well.

Average daily outflows for the Lake also decreased again from the previous week, going from 3,760 cfs to 2,258 cfs, from reductions in S77 and S308 discharges. S77 discharges decreased from 2,373 cfs the previous week to 1,693 cfs this past week, while S308 discharges went from 707 cfs to 181 cfs. Discharges south through the S350 structures decreased from an average of 680 cfs the previous week to 379 cfs this past week. There were no discharges to the L8 canal via Culvert 10A (only 4 average daily cfs). The corrected evapotranspiration value based on the L006 weather platform solar radiation data decreased slightly to 0.08 inches for the past week.

Total inflows and outflows for the last week are detailed in Table 1, as well as the approximate change in Lake stage from each major structure's total flows over the period (midnight December 26, 2017 to midnight January 1, 2018). Figure 4 shows the combined average daily cfs for inflows and outflows for the Lake over the past eight weeks. These data are provisional, and are subject to change.

Satellite imagery indicates that algal bloom potential has remained very low over the past four months, based on NOAA's cyanobacteria monitoring product derived from the OLCI satellite sensor. Potential for elevated cyanobacterial levels were last observed in the northern portion of the Lake in early September 2017 (Figure 5). Along with decreasing temperatures, high winds from Hurricane Irma may have further reduced bloom potential on the Lake by increasing turbidity, but elevated Total Phosphorus (TP) levels from high inflows and resuspended lake sediment are expected to produce high bloom potentials next year as turbidity continues to decline and temperatures increase.

Table 1

INFLOWS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)	OUTFLOWS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)
S65E & S65EX1	765	0.3	S77	1693	0.7
S71 & 72	45	0.0	S308	181	0.1
S84 & 84X	426	0.2	S351	194	0.1
Fisheating Creek	72	0.0	S352	5	0.0
S154	2	0.0	S354	180	0.1
S191	0	0.0	L8	4	0.0
S133 P	36	0.0	ET	1598	0.6
S127 P	14	0.0	Total	3856	1.5
S129 P	5	0.0	PROVISIONAL DATA		
S131 P	3	0.0			
S135 P	14	0.0			
S2 P	0	0.0			
S3 P	0	0.0			
S4 P	0	0.0			
C5	0	0.0			
Rainfall	52	0.0			
Total	1434	0.6			

The TP concentrations and turbidity in the water column were very high in September 2017 after Hurricane Irma's high inflows and high winds, but declined sharply in October 2017. However, that trend did not continue through November and December 2017, particularly for TP. The lake-wide TP values were down to 108 ppb prior to Hurricane Irma, 238 ppb immediately after, and have remained above 175 ppb and relatively unchanged since October 2017 (Figure 6). The lake-wide average turbidity values were 11 NTUs prior to Hurricane Irma, 80 NTUs immediately after, and have continued to decline slowly from 50 to 36 NTUs since (Figure 6). While clearer water will help to lessen impacts to submerged and emergent vegetation, it may also increase algal blooms if TP values remain high when temperatures increase.

Water Management Recommendations

The Lake stage is 15.48 feet NGVD having decreased 0.11 feet from the week prior, and 0.53 feet over the past month. Submerged and emergent vegetation communities in the nearshore region have experienced stages >16.0 feet NGVD three times in less than two years, and stages >15.5 feet NGVD for 105 consecutive days this water year, the longest period since late 2004 (112 consecutive days). These stages, combined with turbid conditions from Hurricane Irma's winds, will likely cause substantial declines in these communities over the coming months and/or years. Lower Lake stages near the end of WY2018 would help to recover these important communities, and long, steady recessions of water levels throughout the dry season may help promote another productive year for wading birds on the Lake as well.

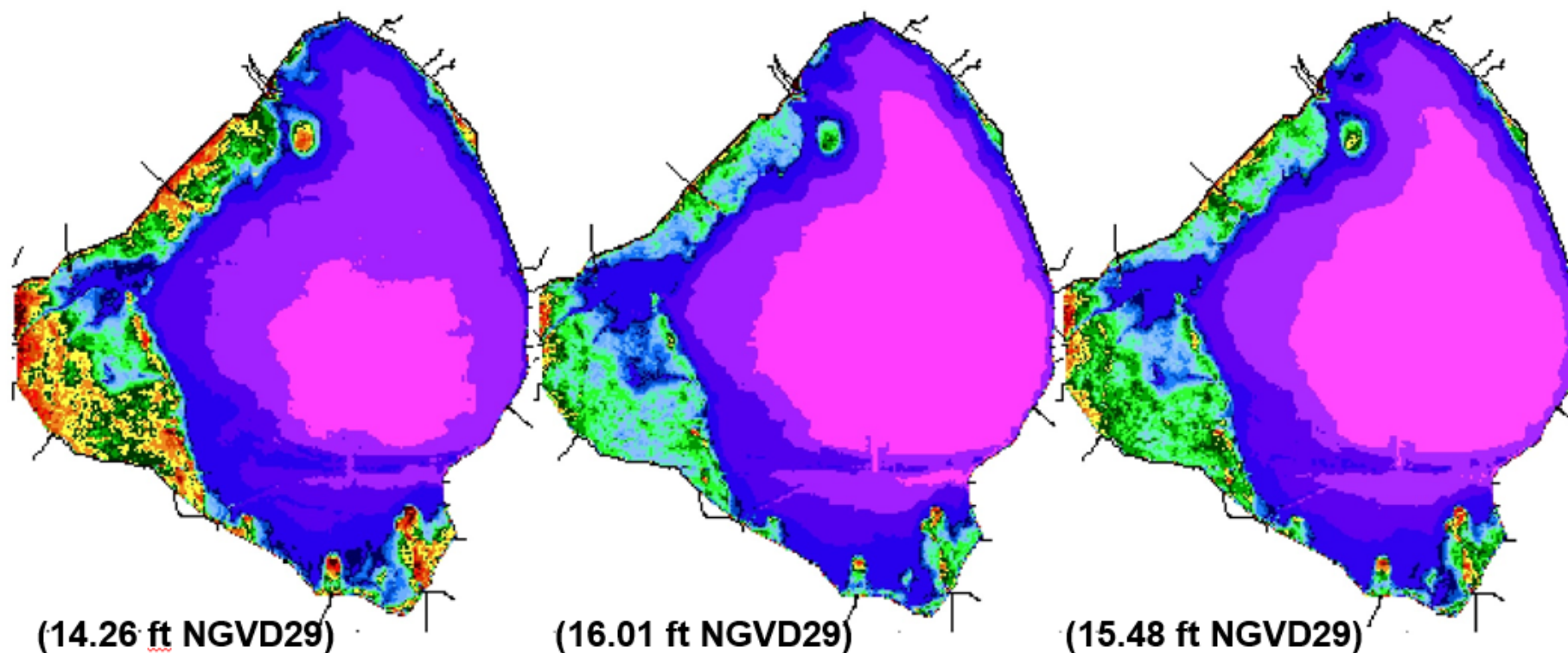
Lake Okeechobee

Water Depth Timeseries Maps

1 Year Ago: 01/01/2017

1 Month Ago: 12/01/2017

Current: 01/01/2018



Source of Lake Graphic: Water Depth
Assessment Tool (SFWDAT)
Source of Lake Stage Value:
USACE/SFWMD Official Stage Value

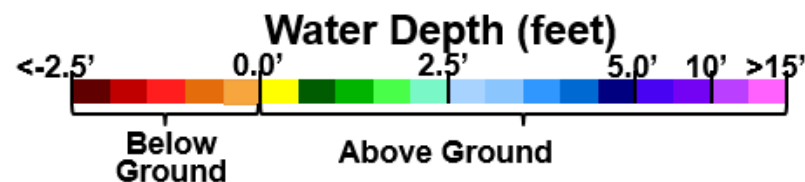
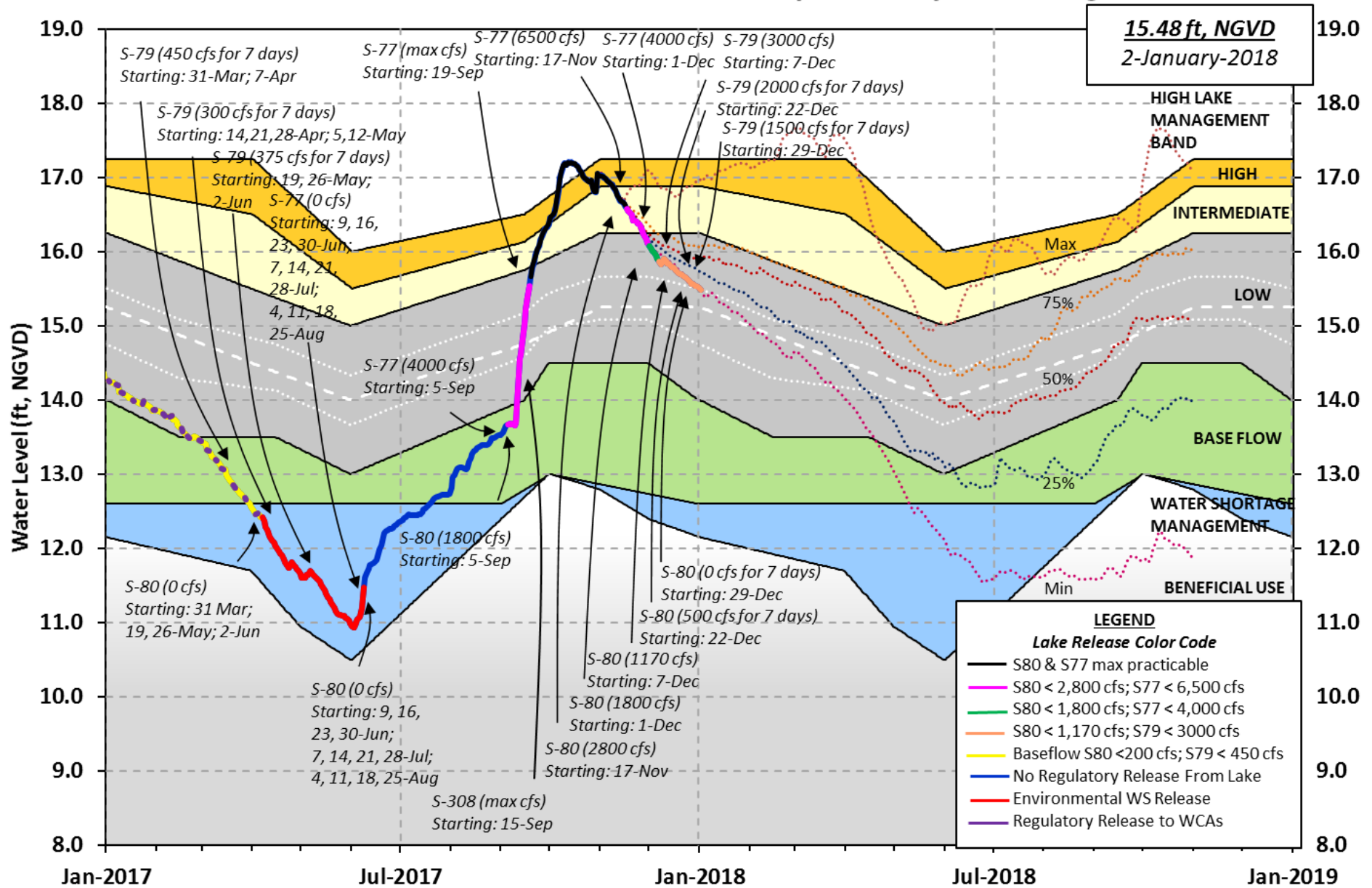


Figure 1

Lake Okeechobee Water Level History and Projected Stages



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: 0615 EST, 12/26/2017 THROUGH: 0615 EST, 01/02/2018

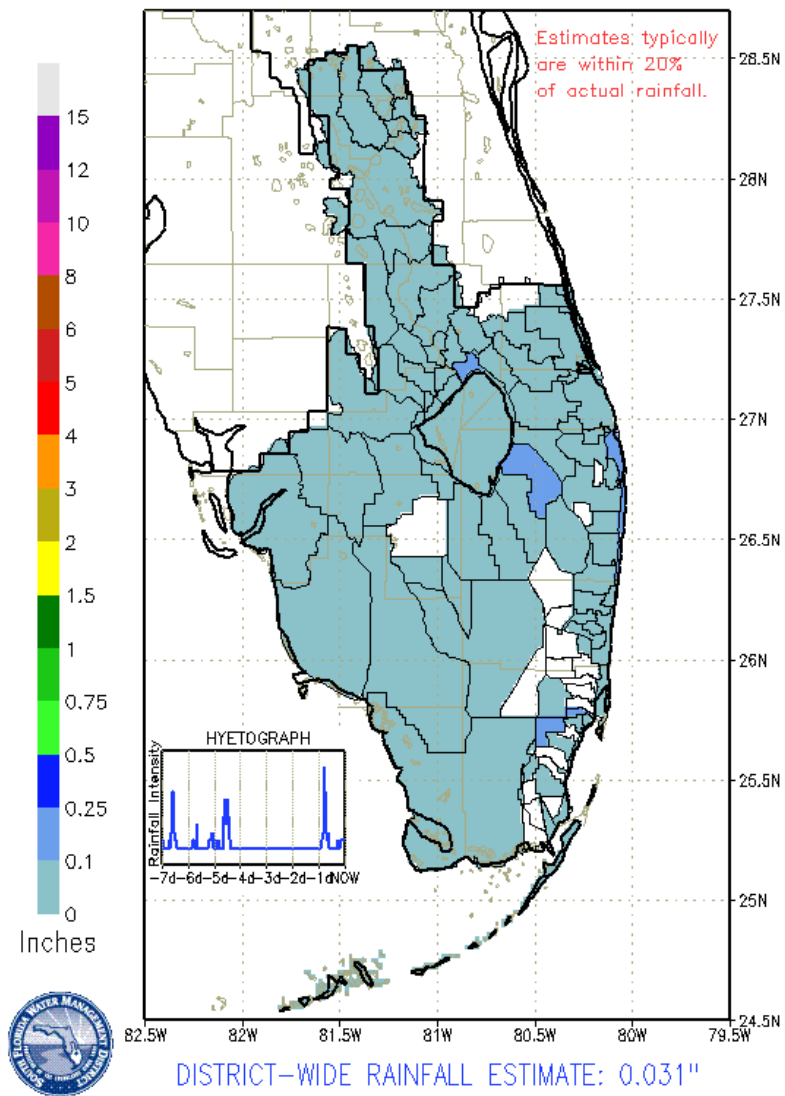


Figure 3

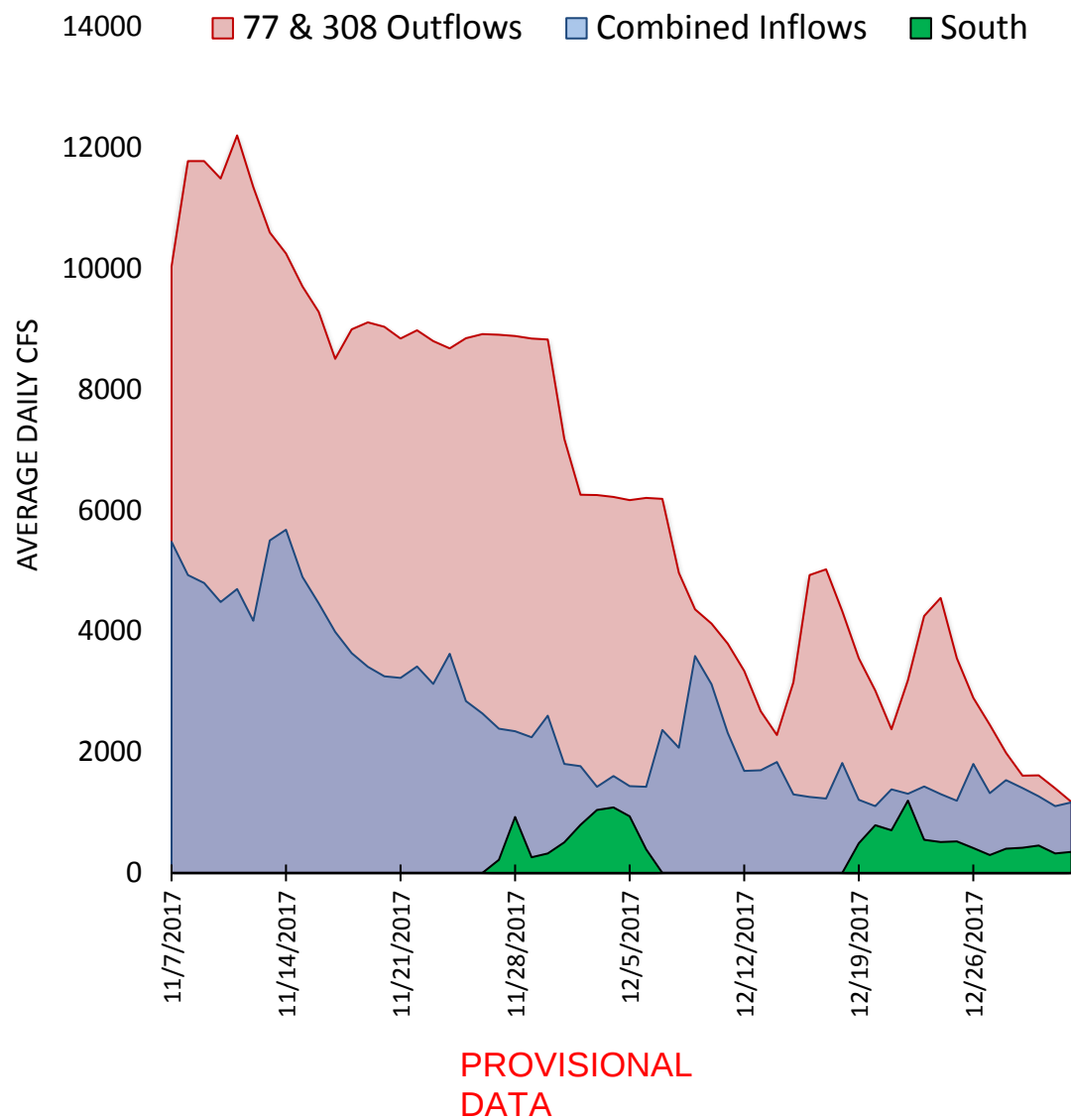


Figure 4

Lake Okeechobee Cyanobacteria Bloom Potential

NOAA cyanobacteria product derived from Copernicus Sentinel-3 OLCI data from EUMETSAT

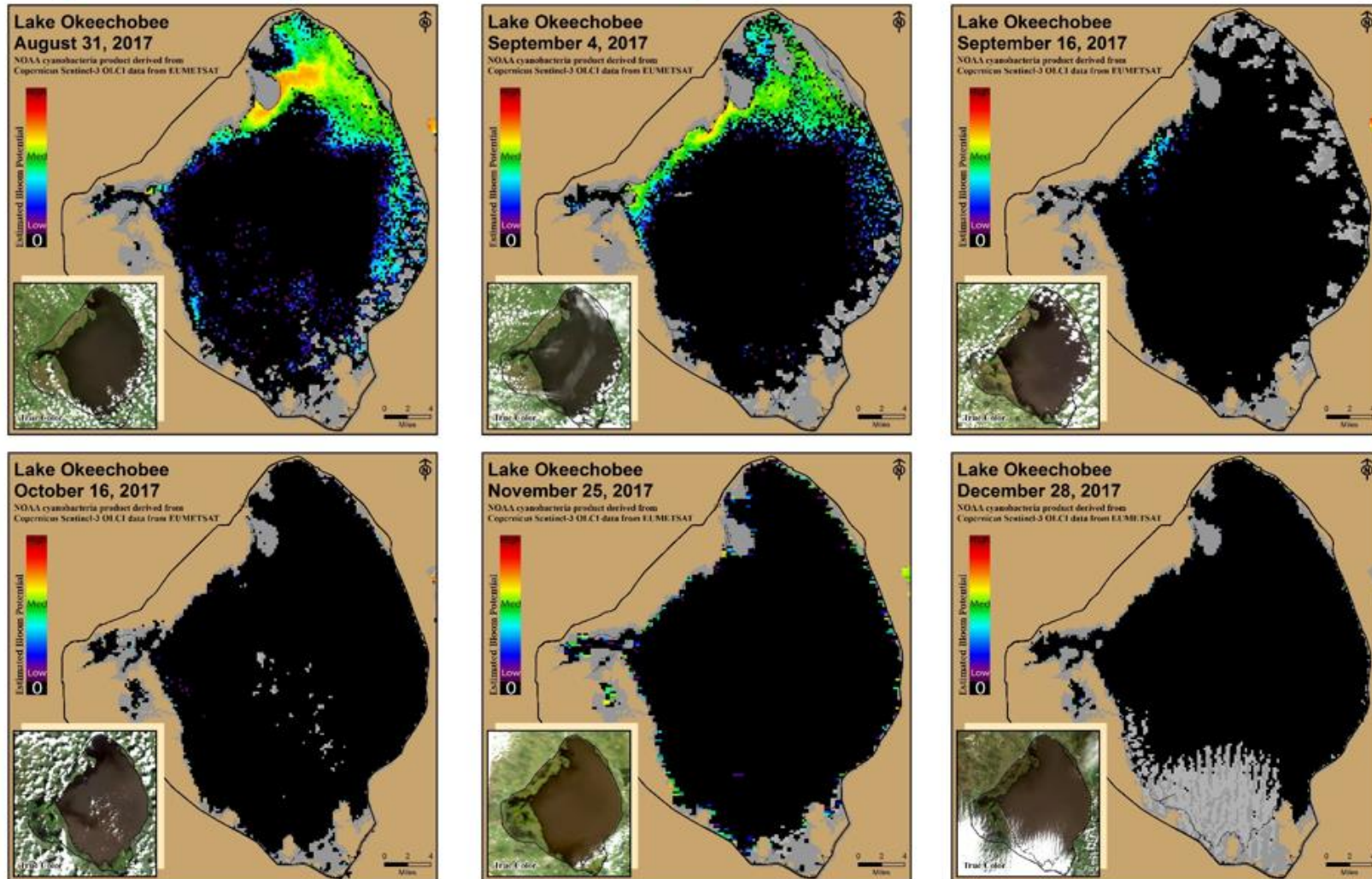


Figure 5

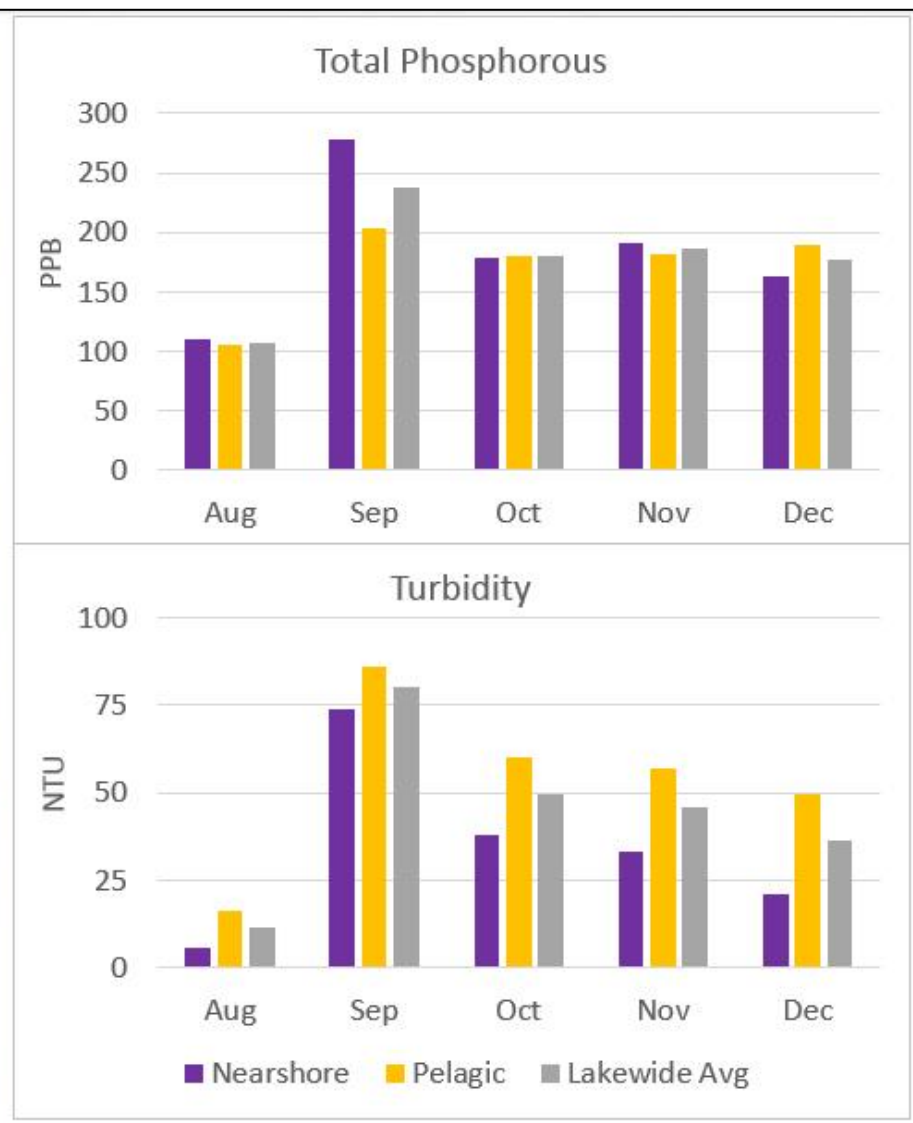


Figure 6

LAKE ISTOKPOGA

Lake Istokpoga stage is 39.33 feet NGVD as of midnight January 1, 2018 and is currently 0.17 feet below its regulation schedule to accommodate construction on downstream structures (Figure 7). Average daily flows into the Lake from Josephine Creek for the week December 26, 2017 – January 1, 2018 were down from the previous week, at 64 cfs. No data have been reported for Arbuckle Creek since July 4, 2017 as the gauge is being recalibrated after construction in the area. Average daily discharge from S68 and S68X over the past week was 518 cfs, increased from 183 cfs the week prior. According to RAINDAR, only 0.03 inches of rain fell in the Lake Istokpoga basin over the past week.

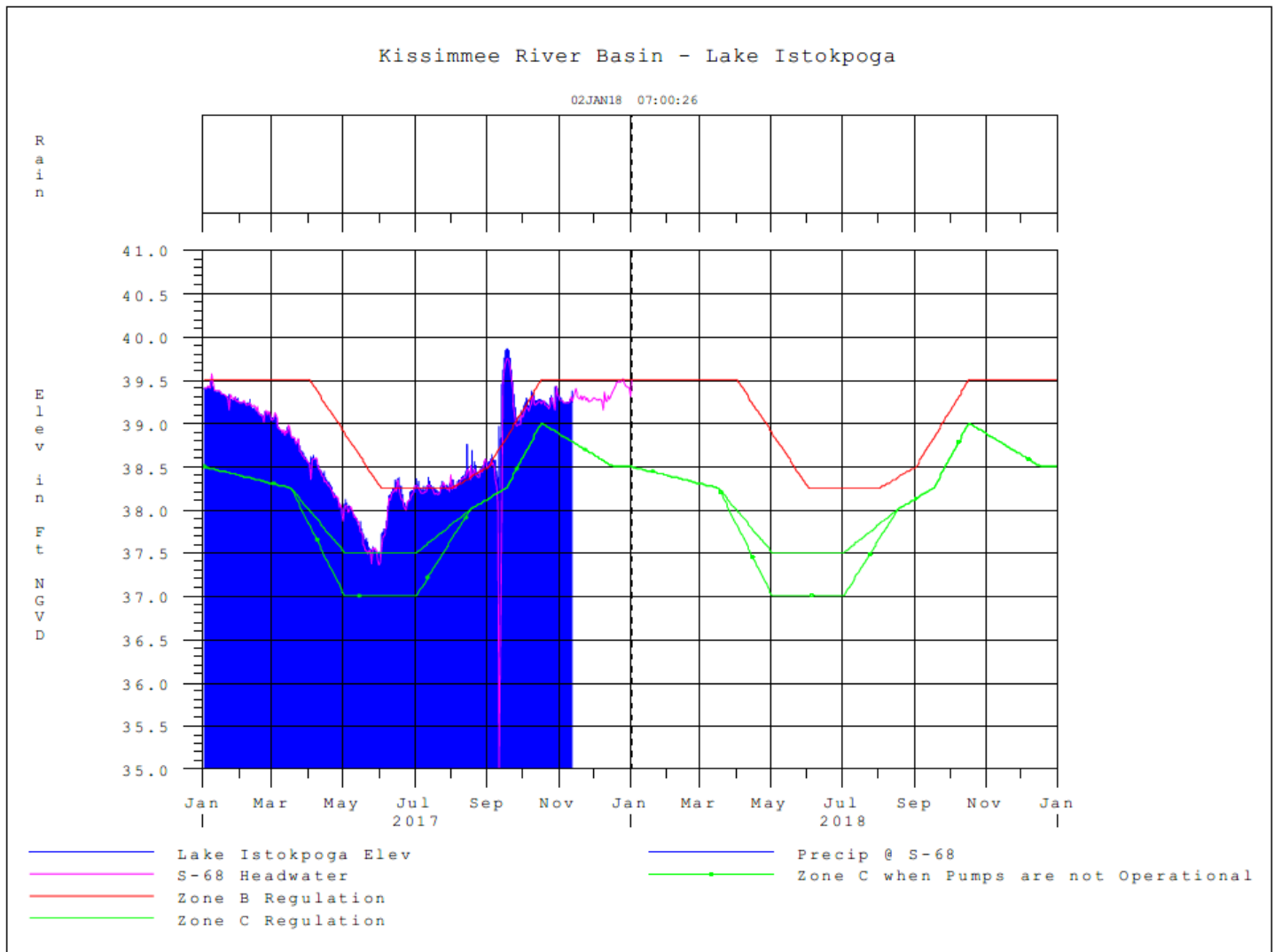


Figure 7

ESTUARIES

St. Lucie Estuary:

Last week, total inflow into the St. Lucie Estuary averaged about 475 cfs (Figures 1 and 2) and last month inflow averaged about 1,633 cfs. Last week's provisional averaged inflows from the tidal basin and the structures are shown in Table 1.

Table 1. Weekly average inflows (data is provisional).

Location	Flow (cfs)
Tidal Basin Inflow	106
S-80	143
S-308	186
S-49 on C-24	57
S-97 on C-23	68
Gordy Rd. structure on Ten Mile Creek	101

Over the past week, salinity increased throughout the estuary (Table 2, Figures 3 and 4). The seven-day moving average salinity of the water column (an average of the surface and bottom salinity) at the US1 Bridge is 14.4. Salinity conditions in the middle estuary are in the good range for adult eastern oysters (Figure 3).

Table 2. Seven-day average salinity at three monitoring sites 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 (North Fork)	7.4 (3.6)	12.1 (7.4)	NA ¹
US1 Bridge	11.0 (6.8)	17.7 (12.8)	10.0-26.0
A1A Bridge	20.6 (14.2)	26.0 (23.3)	NA ¹

¹Envelope not applicable.

Continuous monitoring of water quality is conducted at HR1 in the North Fork. Weekly dissolved oxygen data are summarized in Table 3.

Table 3. Weekly dissolved oxygen conditions at HR1 in the North Fork of the St. Lucie Estuary.

Location	Depth	Average DO (mg/l)	Minimum DO (mg/l)	Maximum DO (mg/l)
HR1	surface	5.88	3.01	9.13
HR1	bottom	5.08	1.90	7.87

Continuous monitoring of water quality is conducted at five Land/Ocean Biogeochemical Observatory (LOBO) stations located in the St. Lucie Estuary and maintained by Florida Atlantic University/Harbor Branch Oceanographic Institute (FAU-HBOI). Data are summarized in Table 4 and station location map is shown in Figure 5.

Table 4. Weekly ranges of instrument depth, chlorophyll a (a measure of algal biomass) and dissolved oxygen concentrations at five FAU-HBOI LOBO stations located in the St. Lucie Estuary.

Location	Depth (m)	Chlorophyll a (µg/l)	Average DO (mg/l)	Minimum DO (mg/l)	Maximum DO (mg/l)
SF2	2.73	4.03 - 4.7	6.11	5.56	6.69
SF	1.59	5.15 - 16.38	7.99	7.05	9.92
NF	2.09	4.72 - 12.5	7.51	5.57	9.61
ME	1.88	3.05 - 11.44	1.91	1.80	2.03
IRL-SLE ¹	NA	NA	NA	NA	NA

¹Not available (NA).

NOAA satellite imagery was unavailable in the St. Lucie Estuary.

Caloosahatchee Estuary:

Last week, total inflow into the Caloosahatchee Estuary averaged about 2,189 cfs (Figures 6 and 7) and last month inflow averaged about 3,433 cfs. Last week's provisional averaged inflows from the structures are shown in Table 5.

Table 5. Weekly average inflows (data is provisional)

Location	Flow (cfs)
S-77	1,693
S-78	1,521
S-79	2,066

Over the past week, salinity stayed the same throughout the estuary (Table 6, Figures 8 & 9). The seven-day average salinity values are within the fair range for the adult eastern oysters at Cape Coral and in the good range at Shell Point (Figure 10). Salinity data was not available at Sanibel. The 30-day moving average surface salinity is 0.2 at Val I-75 and 0.3 at Ft. Myers. Salinity at Val I-75 is forecast to be 1.9 in two weeks with no flow through S-79 (Figure 11). Salinity conditions between Val I-75 and Ft. Myers are good for tape grass.

Table 6. 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	0.4 (0.3)	0.5 (0.4)	NA
Cape Coral	4.7 (4.1)	6.4 (6.6)	10.0-30.0
Shell Point	15.9 (15.6)	16.6 (16.9)	10.0-30.0
Sanibel	NR ³ (NR)	NR (NR)	10.0-30.0

¹Envelope not applicable, ²Envelope is based on a 30-day average, and ³Not Reporting.

*Val I75 is temporarily unavailable (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 7 as concentration ranges

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

Table 7. 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.

Parameter Name	RECON Monitoring Stations		
	Beautiful Island	Ft. Myers	Shell Point
Chlorophyll <i>a</i> (µg/l)	Down for maintenance	No Data	2.18 – 4.41
Dissolved Oxygen (mg/l)	Down for maintenance	No Data	6.31 – 7.81

The Florida Fish and Wildlife Research Institute reported on December 28, 2017, that *Karenia brevis*, the Florida red tide dinoflagellate, was observed in background to high concentrations in sixteen samples collected from Lee County. Numerous reports of fish kills and respiratory irritation were reported along Lee County over the past week.

NOAA satellite imagery was unavailable in the Caloosahatchee River Estuary.

Water Management Recommendations

Lake stage is in the Low sub-band of 2008 LORS. Tributary hydrological conditions are normal. The 2008 LORS recommends up to 450 cfs at S-79 and up to 200 cfs at S-80. Given the current estuarine conditions, there are no ecological benefits associated with freshwater releases from Lake Okeechobee.

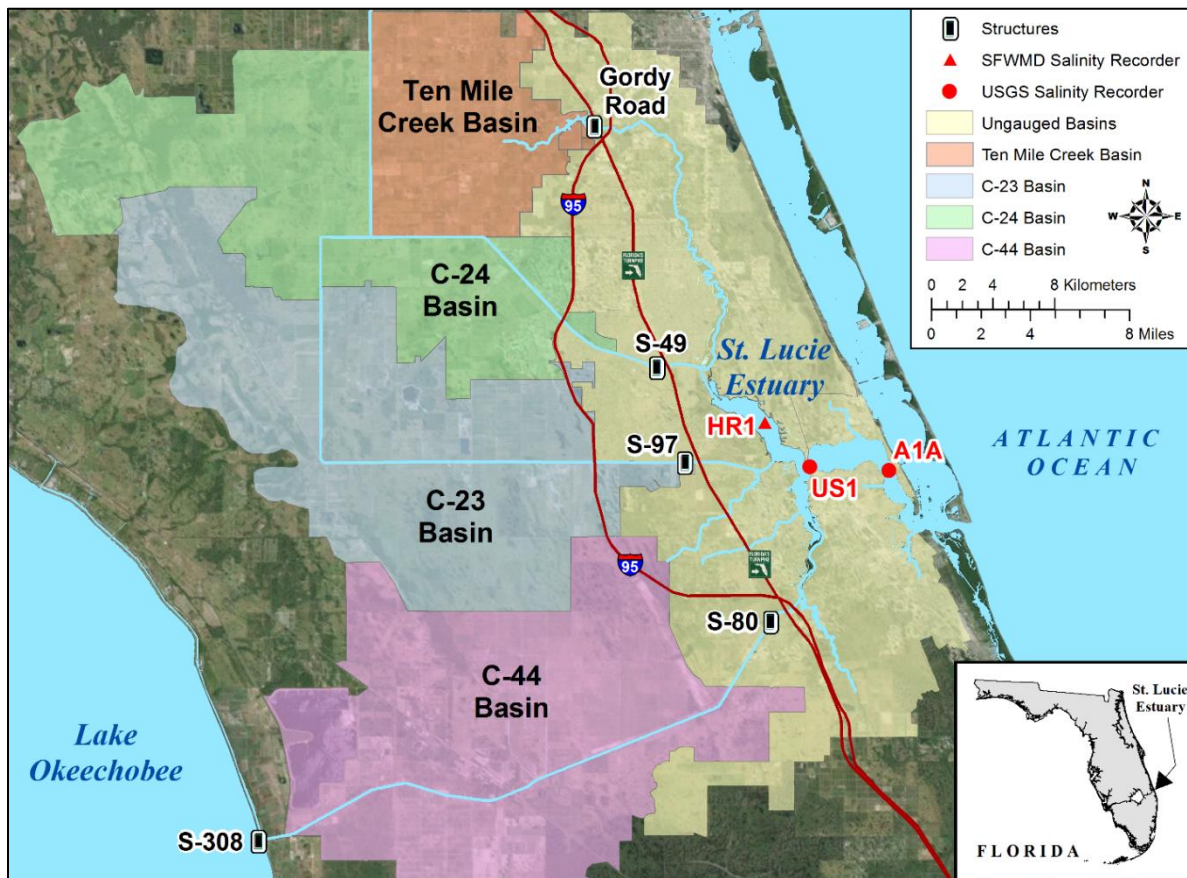


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

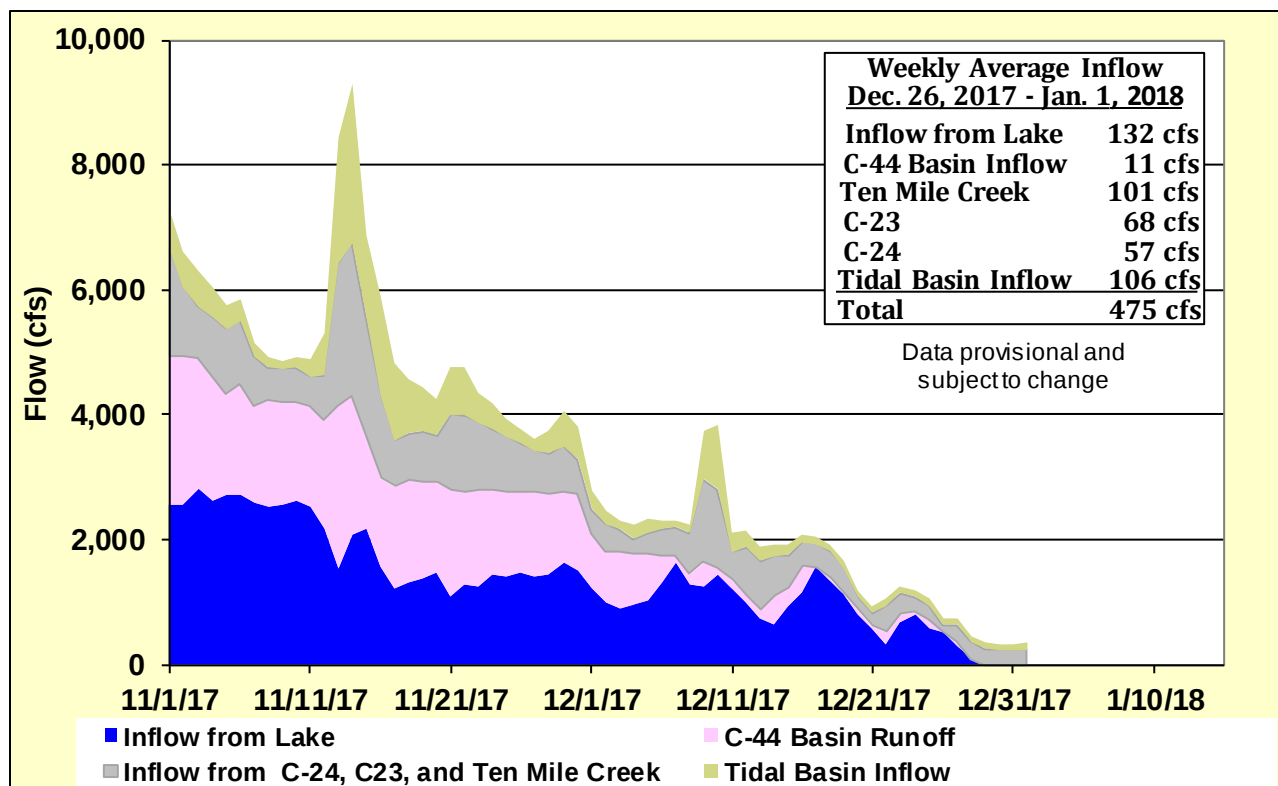


Figure 2. Estimated surface freshwater inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basins into the St. Lucie Estuary.

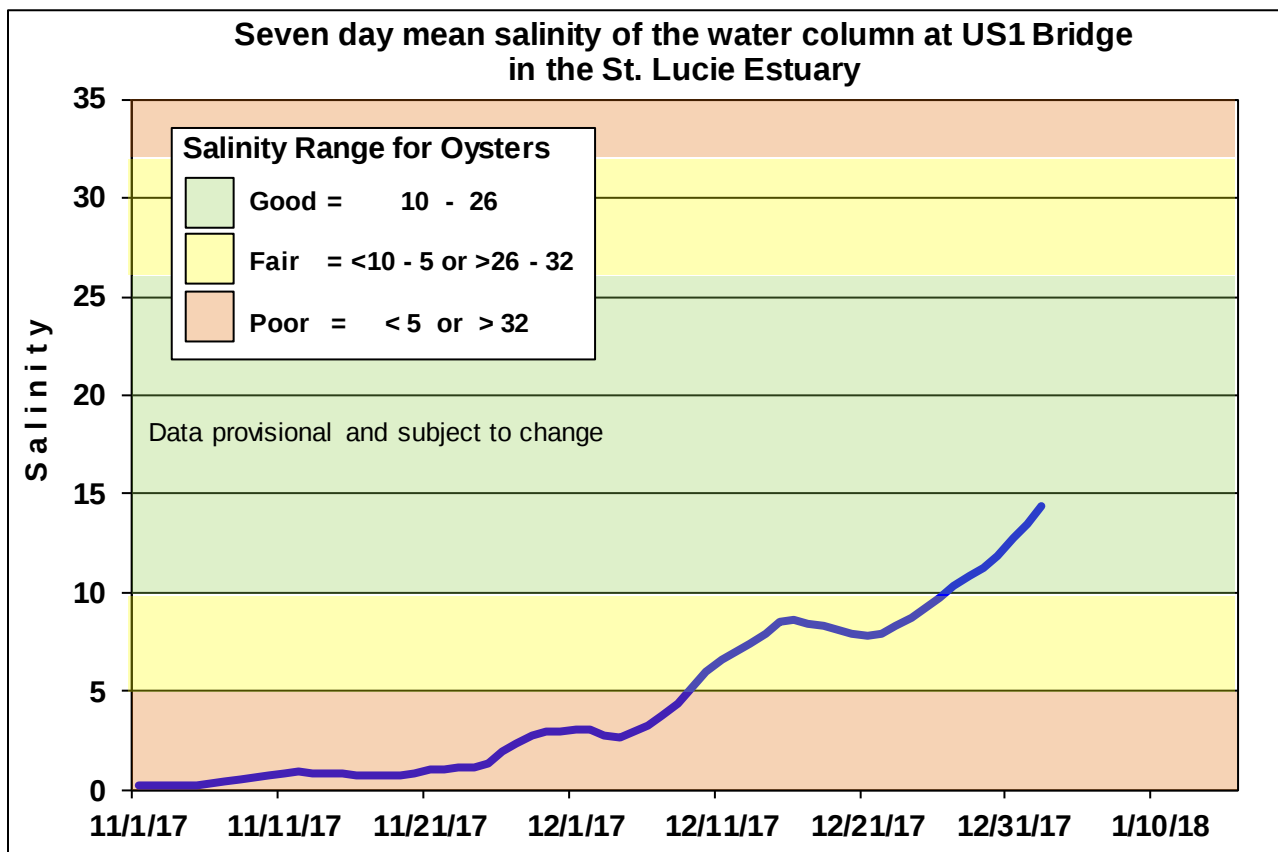


Figure 3. Seven-day mean salinity of the water column at the U.S. Highway 1 Bridge.

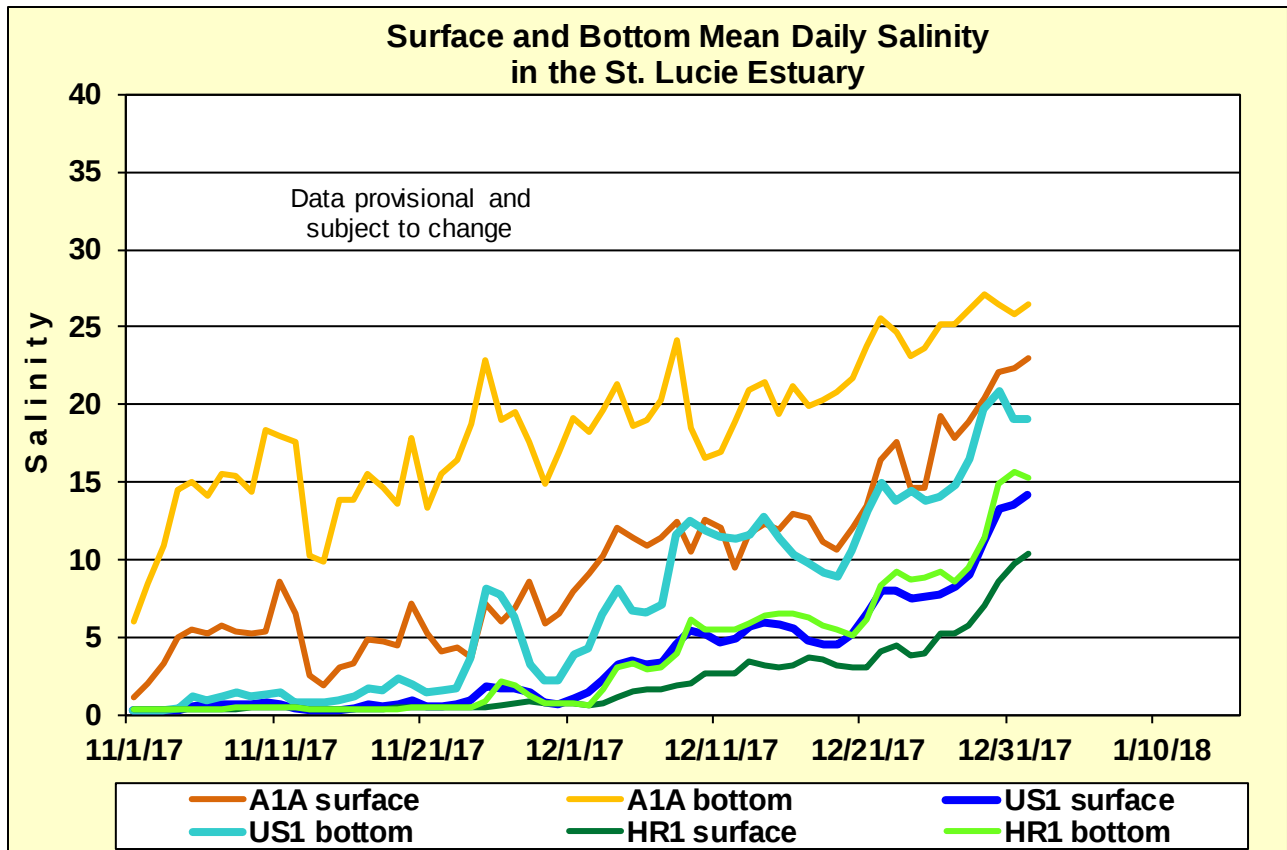


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

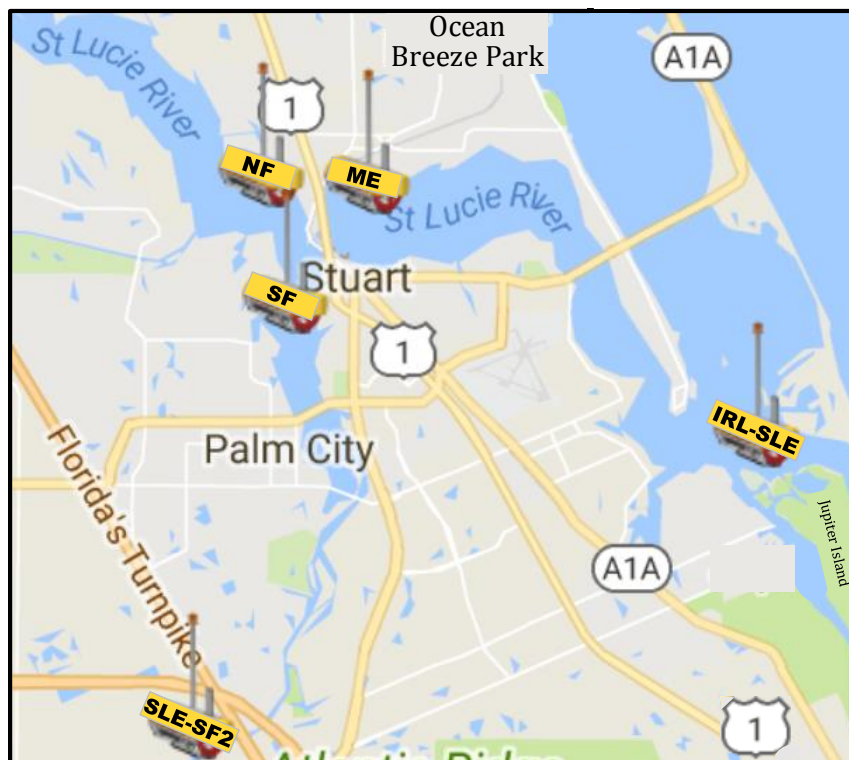


Figure 5. Location of FAU-HBOI LOBO water quality stations in the St. Lucie Estuary.

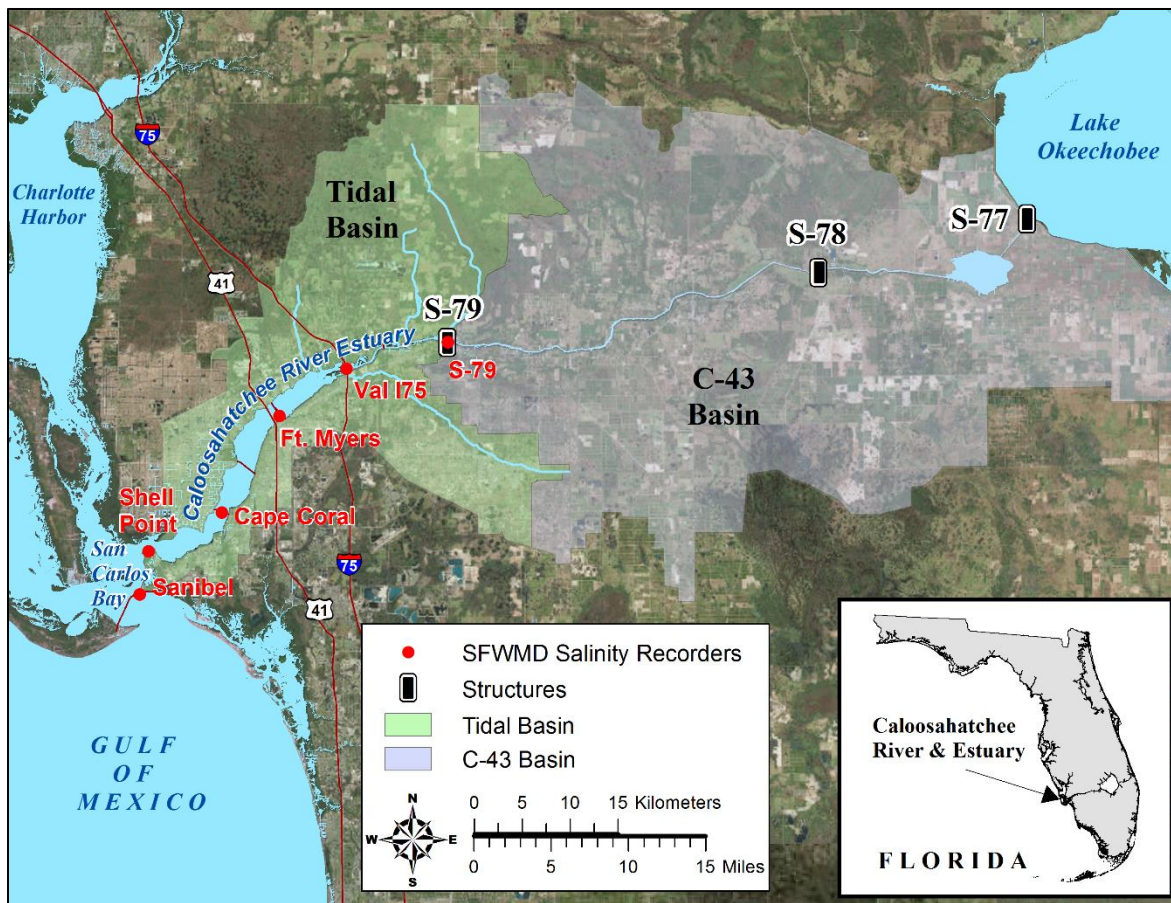


Figure 6. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

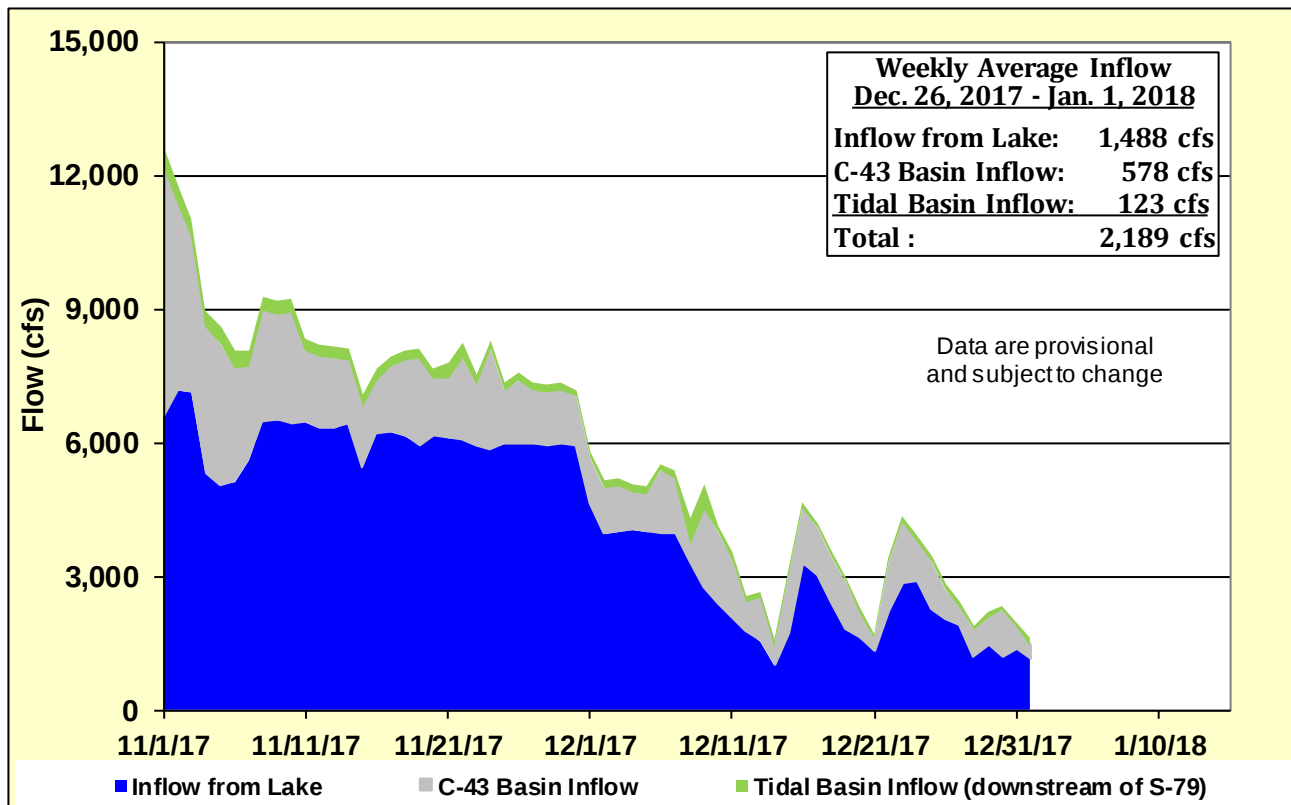


Figure 7. Freshwater inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.

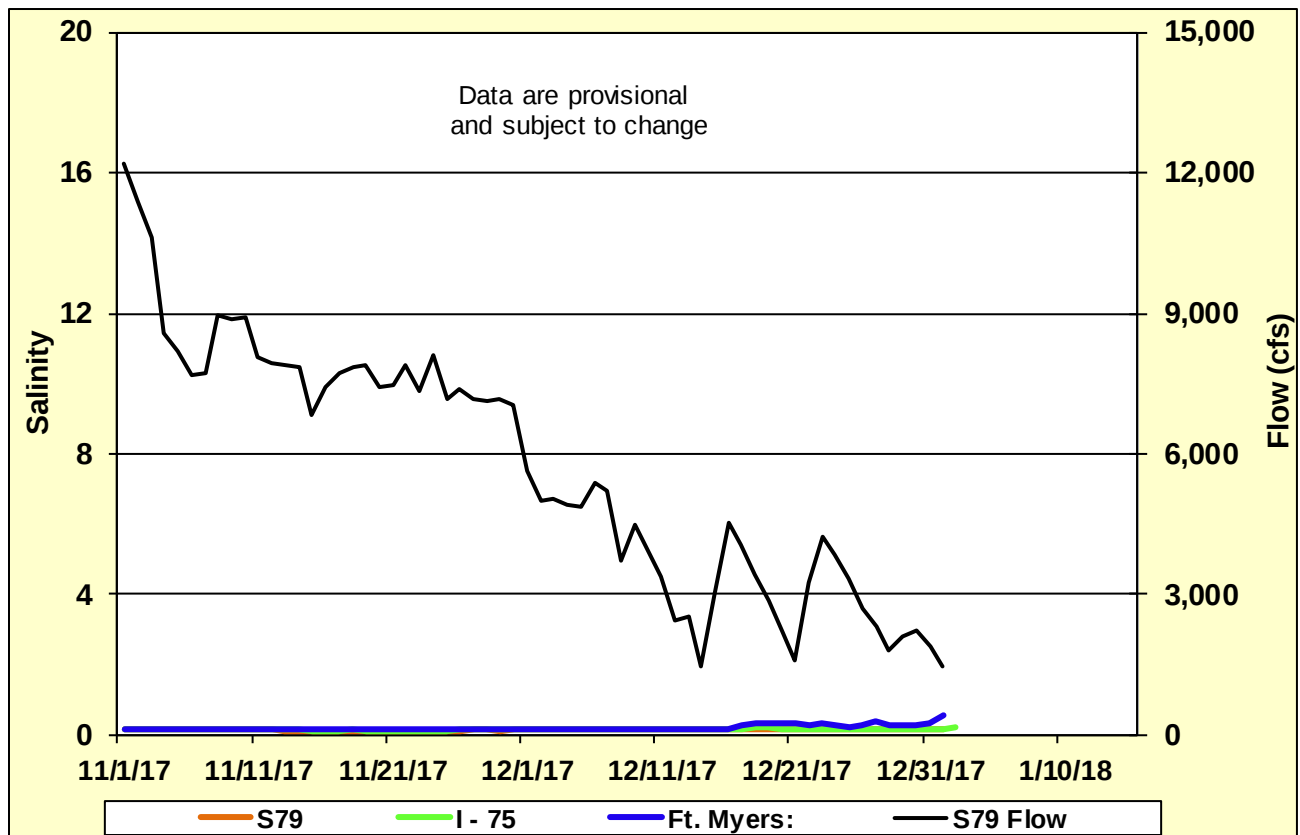


Figure 8. Daily mean flows at S-79 and salinity at upper estuary monitoring stations.

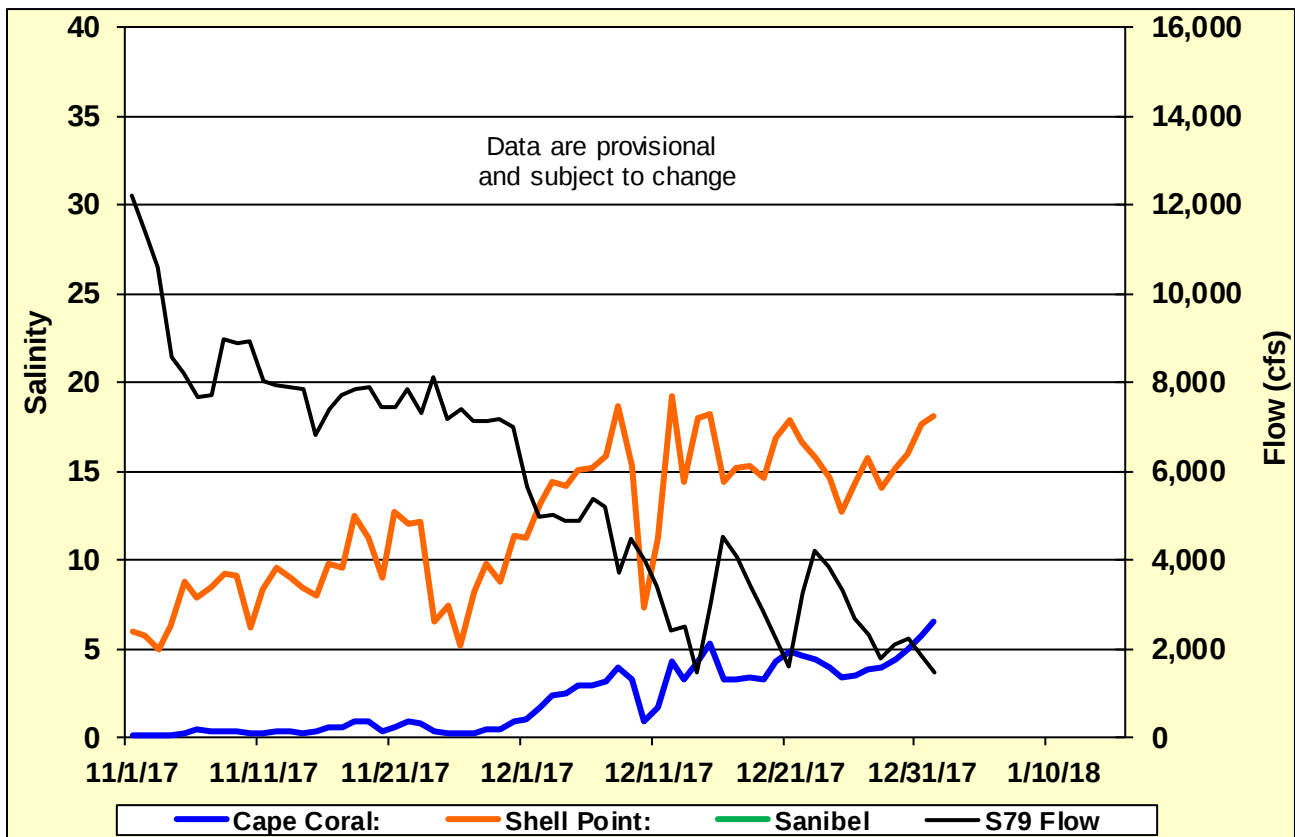


Figure 9. Daily mean flows at S-79 and salinity at lower estuary stations.

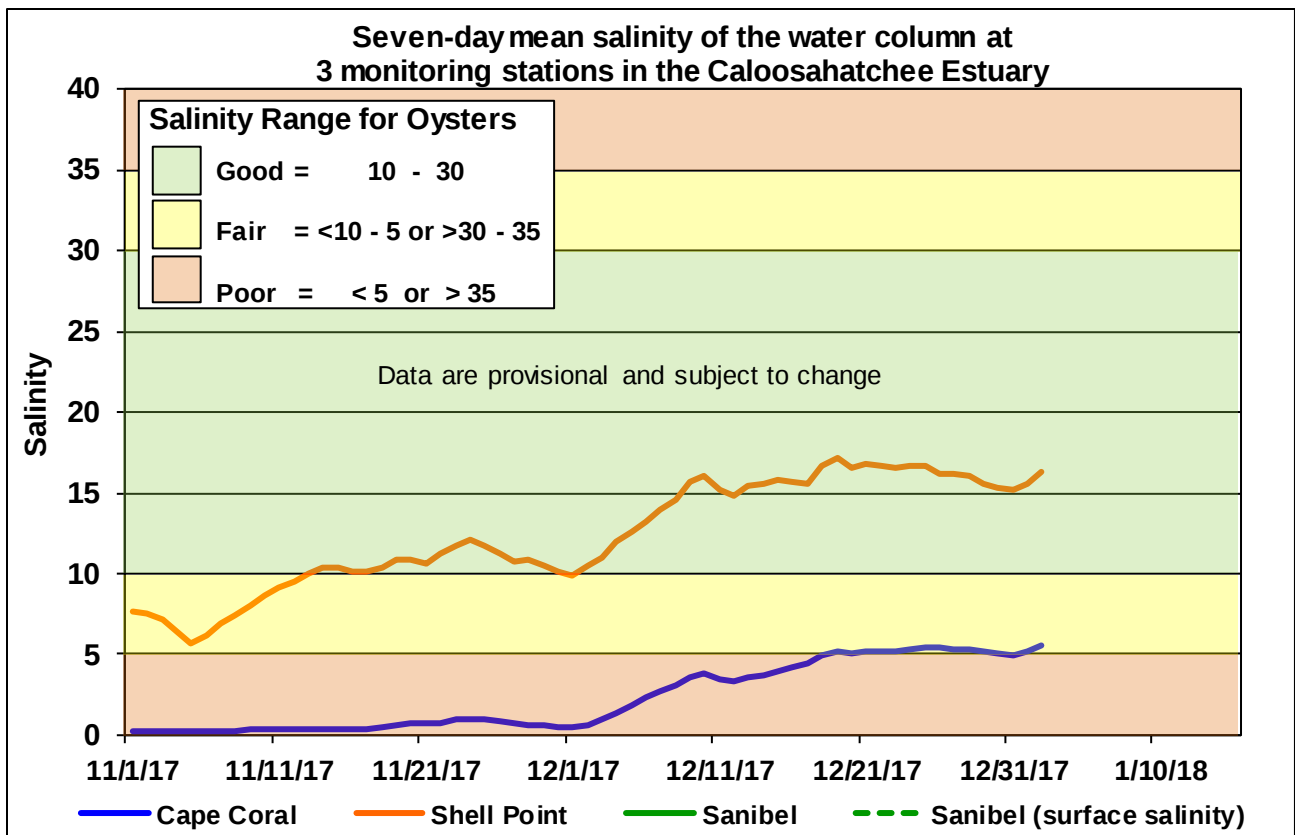


Figure 10. Seven-day mean salinity at Cape Coral Bridge, Shell Point and Sanibel Bridge monitoring stations.

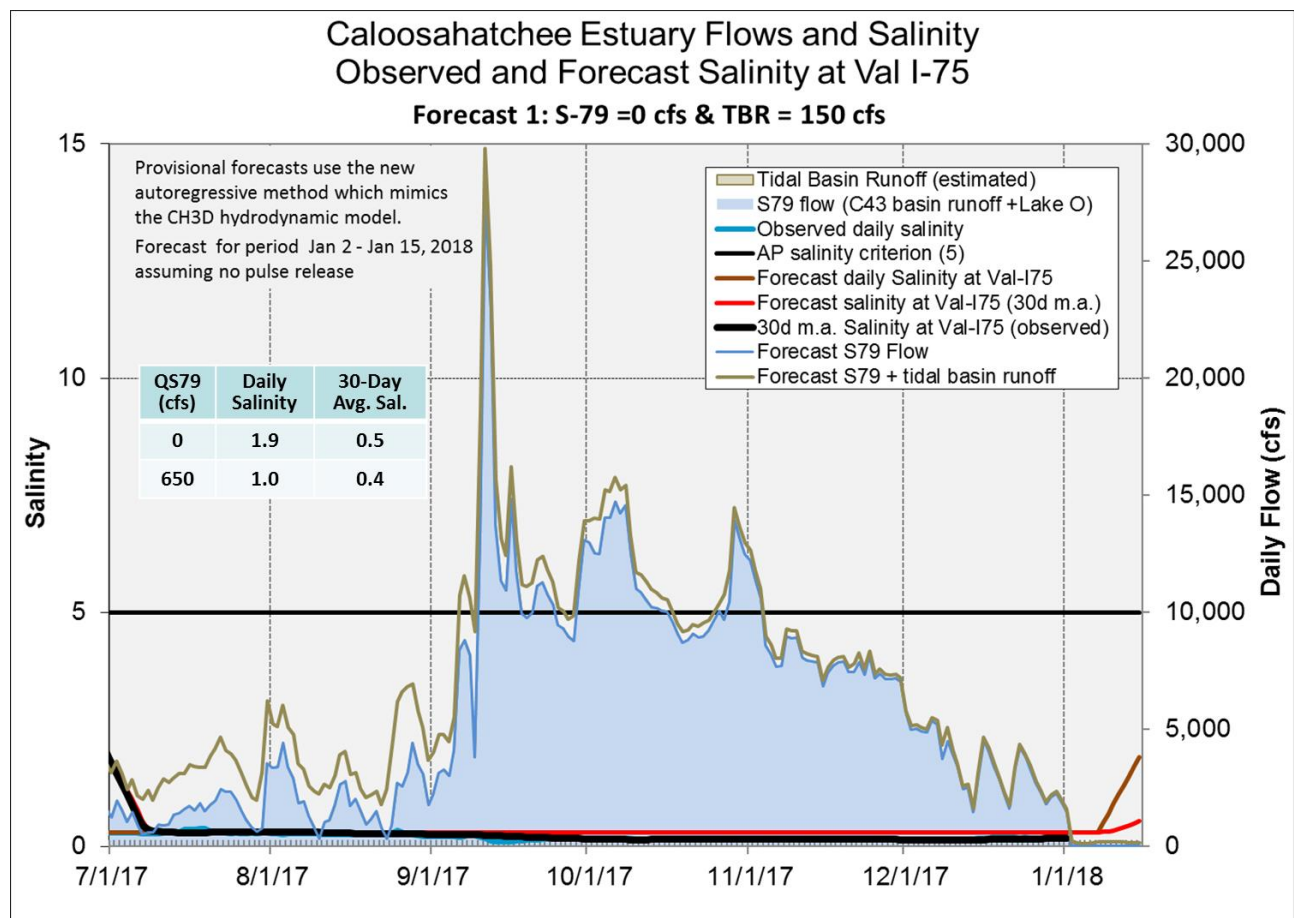
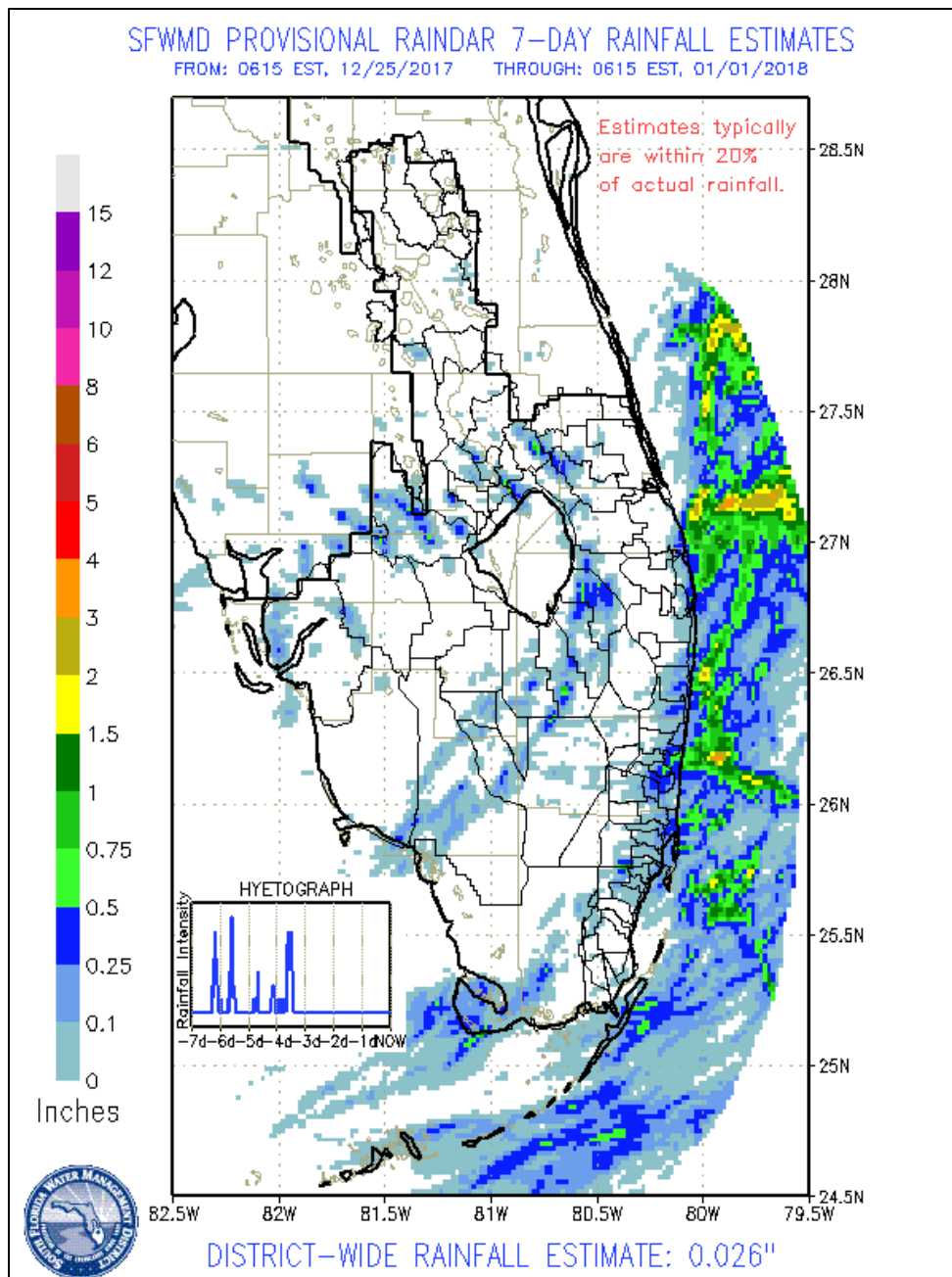


Figure 11. 14-day salinity forecast at Val I-75 assuming no releases at S-79.

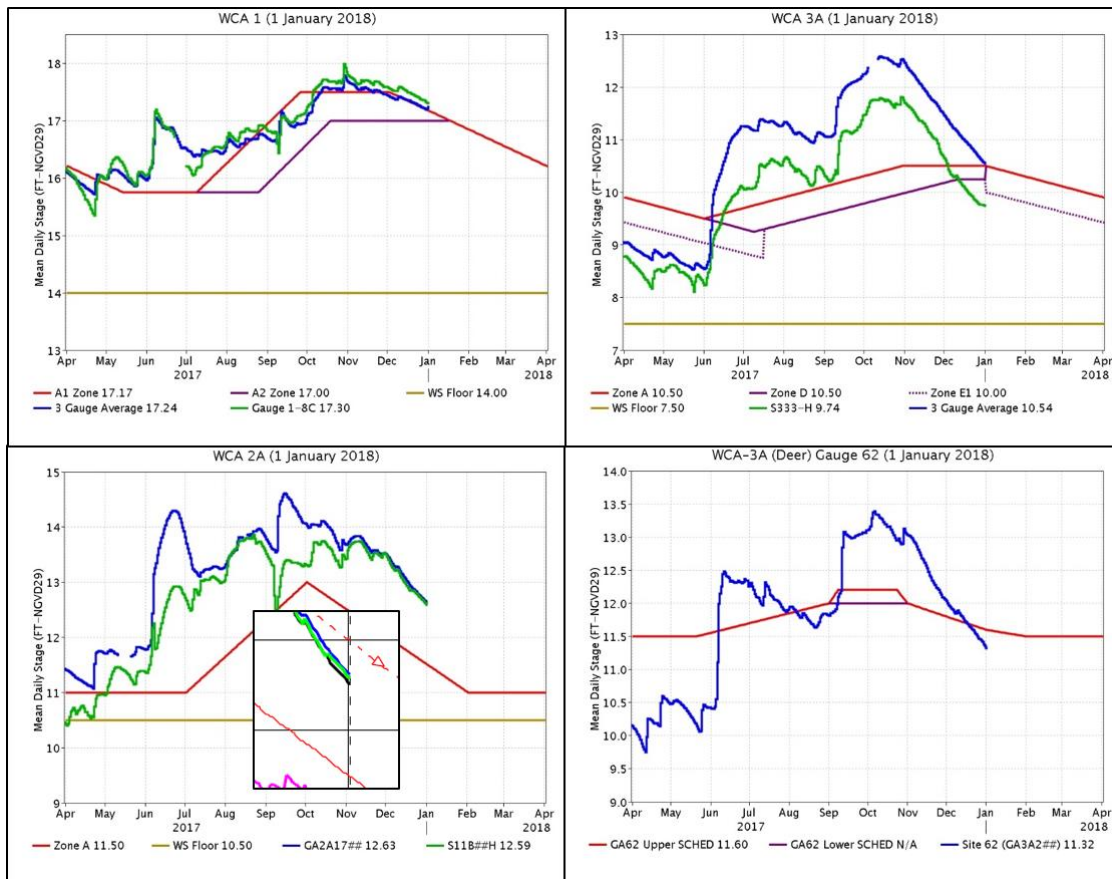
EVERGLADES

WCA-1 stages remained steady, WCA-2A dropped 0.4 feet below the current temporary schedule and the three-gauge average in WCA-3A continued the rapid decrease towards schedule.

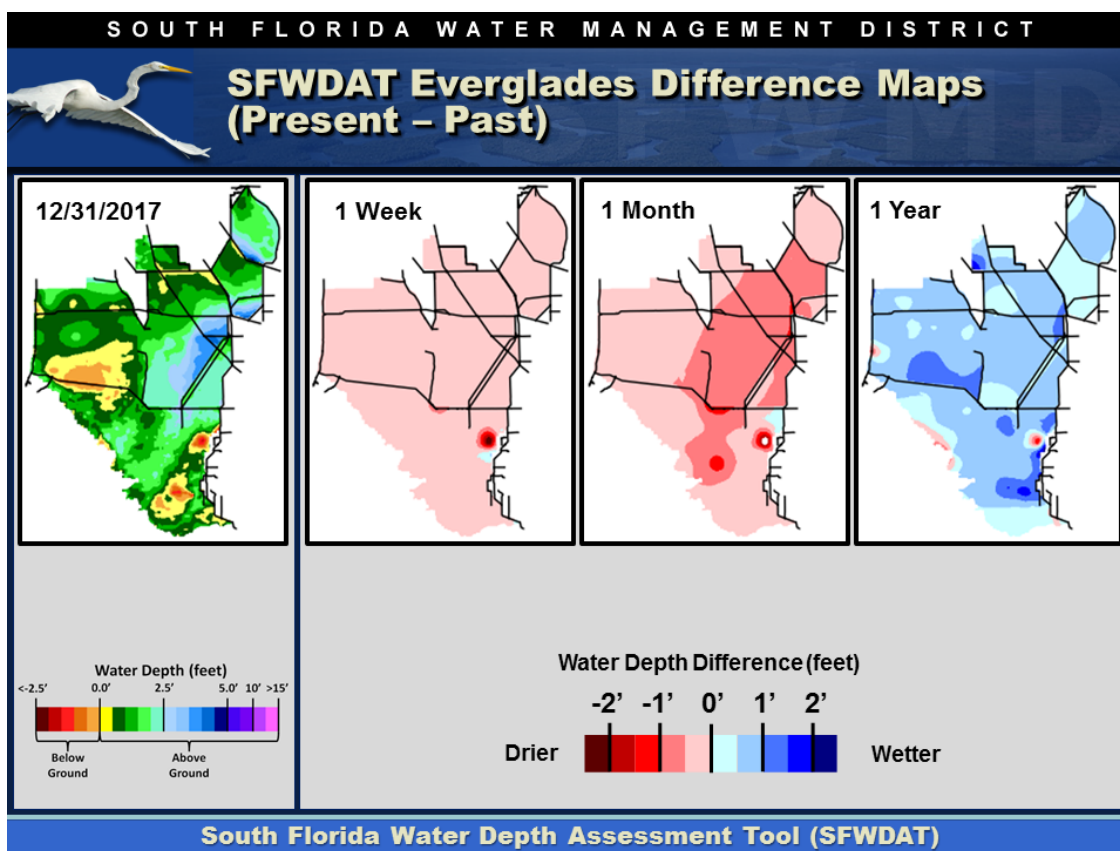
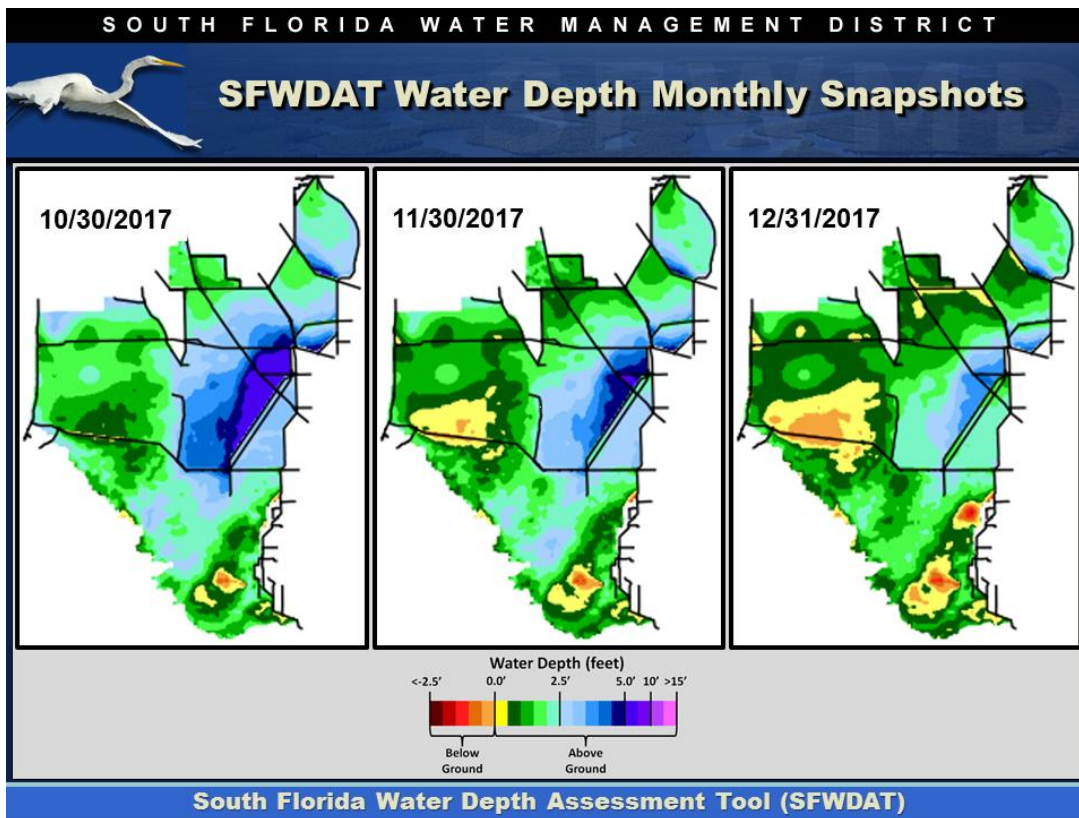
Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	<0.01	-0.02
WCA-2A	<0.01	-0.16
WCA-2B	<0.01	-0.12
WCA-3A	0.02	-0.20
WCA-3B	0.00	-0.13
ENP	0.04	-0.04



Regulation Schedules: WCA-1 three-gauge average continues trending along the top of the Zone A1 schedule, only 0.07 feet above. WCA-2A (subject to a temporary deviation – see inset) marsh stage at gauge GA2A17 is 1.13 feet above Zone A1 and below the temporary schedule, trending slightly away from temporary schedule. WCA-3A three-gauge average stage is 0.04 feet above Zone A and continues to decrease. The stage difference between the marsh and the canal is 0.80 feet. WCA-3A at gauge 62 (northwest corner) is 0.28 feet below the upper schedule.

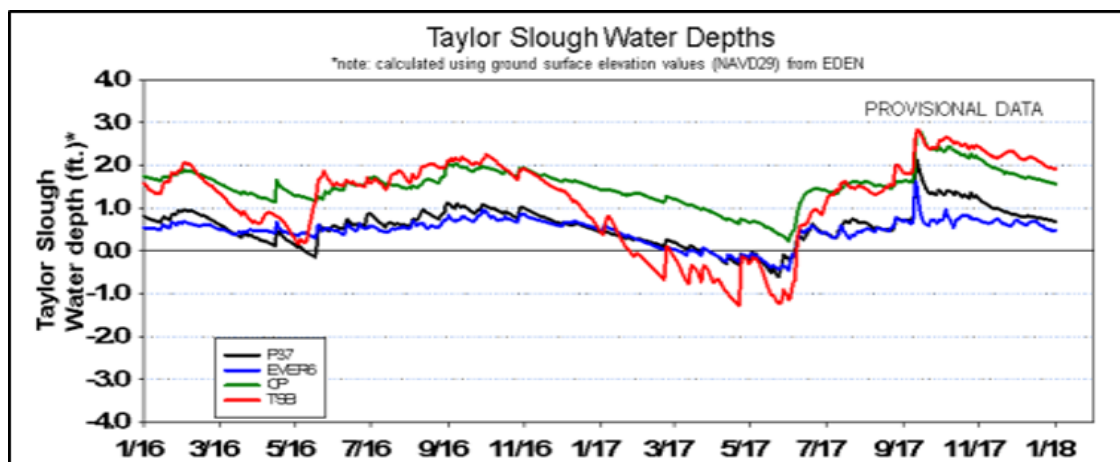
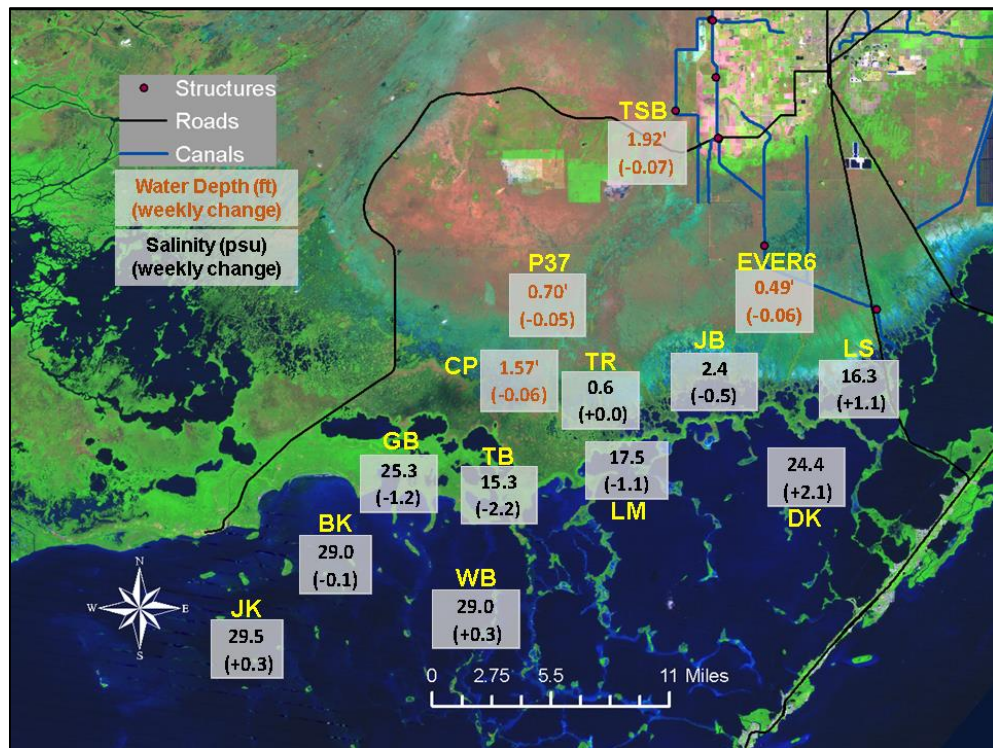


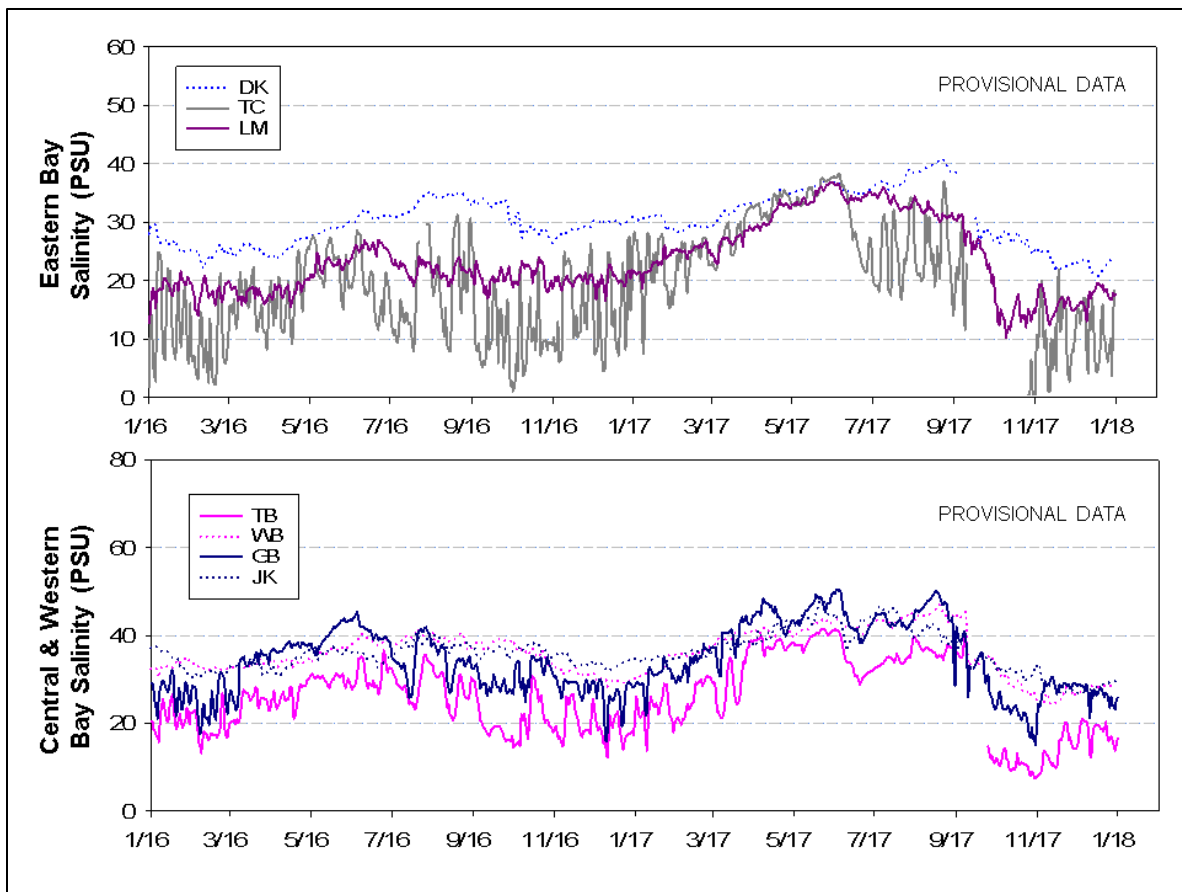
Water Depths and Changes: The WDAT tool for spatial interpolation of depth indicates a range from a low of 0.0 feet to 0.5 feet in northern WCA-3A and WCA-2A to a high of 3.5 feet to 4.0 feet along the northern L-67A canal in southern WCA-3A. Comparing WDAT water levels from present, water depths over the last week fell across the entire Everglades. Looking back one month, stages across a majority of the WCAs are significantly lower; only WCA-1 is slightly lower. Over the last week, individual gauge changes in the WCAs ranged from 0.11 feet (WCA-1) to -0.24 feet (northeastern WCA-3A).



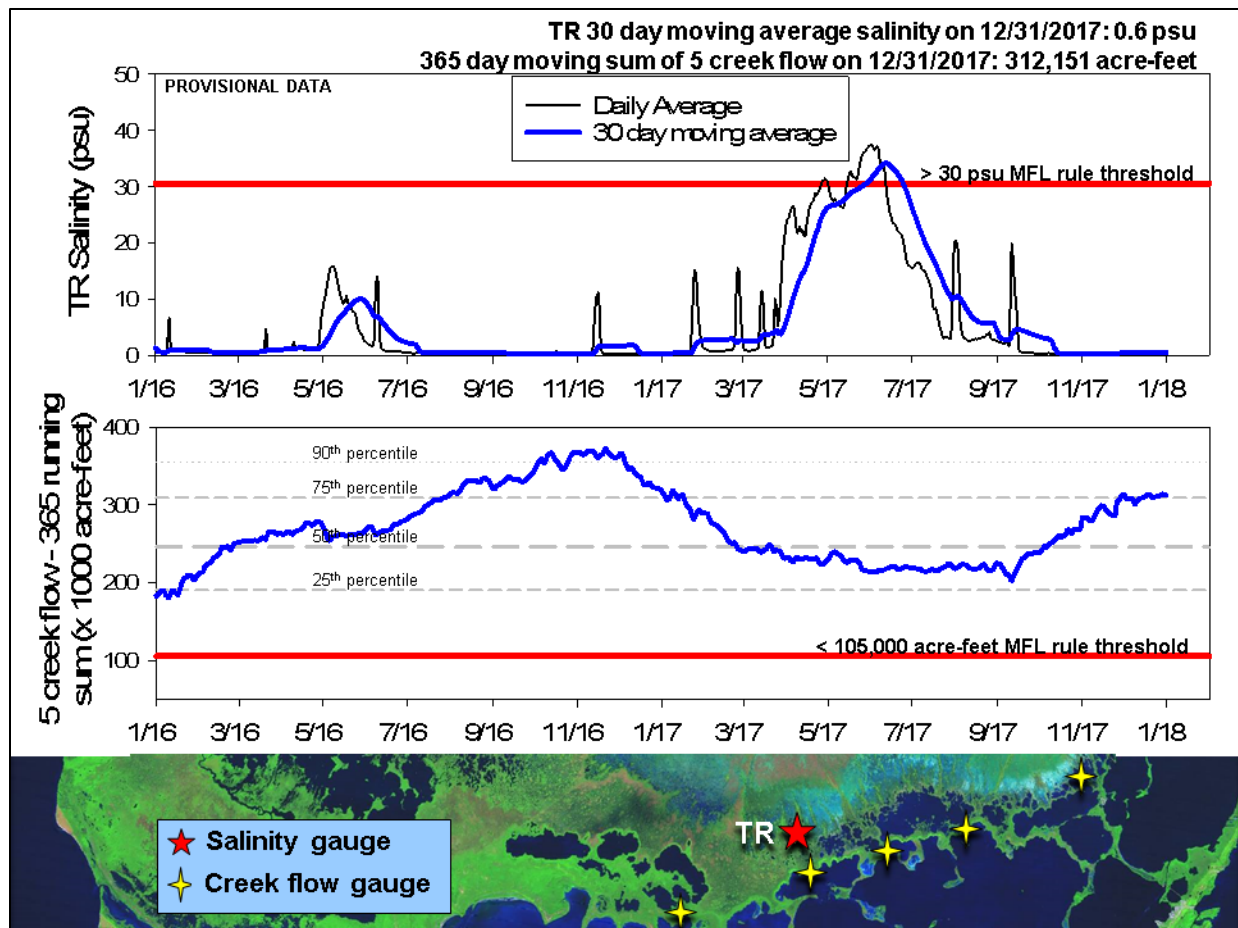
Taylor Slough stages: Water level changes ranged from -0.05 feet in central Taylor Slough to -0.07 feet in northern Taylor Slough. Weekly rainfall was very sparse with the highest recording at a single station being 0.36 inches for the week. Water levels are 3 to 16 inches above the historic average for this time of year with the highest divergence occurring in northern Taylor Slough.

Florida Bay Salinities: Salinity changes for the last week were less than 2.5 psu. Current salinities range from 2 psu in the northeastern bay to 30 in the western bay. Salinities are up to 6 psu lower than the historic averages for this time of year with the largest divergence occurring in the central nearshore.





Florida Bay MFL: Mangrove zone daily average salinity remains near fresh at 0.6 psu, but is very slowly increasing. The 30-day moving average is 0.6 psu. The weekly cumulative flow from the five creeks denoted by yellow stars on the map decreased by 4,500 acre-feet over the last two weeks to end at almost 7,000 acre-feet. This is double the average for this time of year. Flows are expected to decrease as the dry season progresses. The 365-day moving sum of flow from the five creeks identified by yellow stars on the map increased about 800 acre-feet over the last two weeks to end at 312,151 acre-feet (still greater than the long-term average of 257,628 acre-feet). Creek flow is provisional data from the USGS and is highly variable.



Water Management Recommendations

Deep water conditions persist in WCA-3A however the severity is lessening. Water managers should continue using all practicable means to lower water levels in WCA-3A until that basin reaches depths appropriate for wading bird foraging at which time a reduced recession rate may be desired.

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

Everglades Ecological Recommendations, January 2nd, 2018 (red is new)

Area	Current Condition	Cause(s)	Recommendation	Reasons
WCA-1	Stages changed from -0.09' to +0.11'	Rainfall, ET, management	Maintain depths at high end of regulation schedule or slightly above.	Protect habitat and facilitate invasive plant treatments.
WCA-2A	Stages decreased -0.16'	Rainfall, ET, management	Maintain depths at temporary regulation schedule or slightly above.	Protect habitat and wildlife from high water stress.
WCA-2B	Stages decreased -0.12'	Rainfall, ET, management	Maintain depths at regulation schedule or slightly above.	Protect habitat and wildlife from high water stress.
WCA-3A NE	Stages decreased -0.24'	Rainfall, ET, management	Moderate recession rates as stages reach regulation schedule. Manage for relief of high water conditions.	Protect habitat and wildlife from high water stress.
WCA-3A NW	Stages decreased -0.18'	Rainfall, ET, management		
Central WCA-3A S	Stages decreased -0.22'	Rainfall, ET, management	Moderate recession rates as stages reach regulation schedule. Manage for relief of high water conditions.	Water depths above 2.5 feet at gauge 65 are indicative that tree islands are flooded and under stress. Depths exceeded that mark on 18 June, meaning the tree islands have been flooded for 199 days.
Southern WCA-3A S	Stages decreased -0.15'	Rainfall, ET, management		
WCA-3B	Stages decreased -0.13'	Rainfall, ET, management	Maintain depths at regulation schedule.	Protect habitat and wildlife from high water stress.
ENP-SRS	Stages decreased -0.04'	ET, rainfall, topography, management	Make discharges to the Park according to the 2012 WCP rainfall plan.	Keep peat wet to promote native habitat and maintain wetland plant and animal communities. Protect habitat and wildlife, including apple snail reproduction.
Taylor Slough	Stage changes ranged from -0.05' to -0.07'	Rain, ET, inflows	Move water southward as possible	When available, provide freshwater buffer for downstream conditions.
FB- Salinity	Salinity changes ranged -2.2 to +2.1 psu.	Rain, ET, inflows, wind	Move water southward as possible	When available, provide freshwater to main low salinity buffer and promote water movement.