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, Operations, Engineering and Construction Bureau
Paul Linton, Chief, Operations Section

FROM: SFWMD Staff Environmental Advisory Team

DATE: November 13, 2018

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

Moderate shower activity today through Thursday, then drying out Friday and Saturday. A frontal boundary currently lying across Florida's panhandle will remain north of the District until a developing low- pressure system brings it southeastward through the District Thursday. Enough moisture and instability exist south of the front to allow daytime heating to generate showers and thunderstorms over portions of the District today with activity focused over the interior mainly during the afternoon. Showers and thunderstorms will develop again Wednesday afternoon and evening over the interior and northeast and then additional shower activity will move in from the northwest with the frontal boundary later Wednesday night. The front will then push southeastward through the District Thursday bringing light to moderate scattered showers and thunderstorms over the interior and east. Dry conditions will then move in Thursday night and persist through Saturday. The frontal boundary is forecast to lift back northward over the southern portion of the District bringing the potential for some moderate to locally heavy shower activity mainly over southeastern areas Sunday/Monday.

Kissimmee

Tuesday morning stages were 57.1 feet NGVD (0.9 feet below schedule) in East Lake Toho, 54.6 feet NGVD (0.4 feet below schedule) in Toho, and 49.7 feet NGVD (2.8 feet below schedule) in Kissimmee-Cypress-Hatchineha; headwater stages were 46.3 feet NGVD at S-65A and 26.8 feet NGVD at S-65D. Tuesday morning discharges were 327 cfs at S-65, 271 cfs at S-65A, and 315 cfs at S-65E. Dissolved oxygen concentration in the Kissimmee River averaged 5.1 mg/L for the week. Kissimmee River mean floodplain depth on Sunday was 0.20 feet. No new recommendations.

Lake Okeechobee

Lake Okeechobee stage is 13.50 feet NGVD, falling 0.14 feet from the previous week and 0.77 feet over the past 30 days. Lake stages are now the lowest they have been for this time of year since 2010 and are now 0.93 feet below the bottom of the preferred ecological envelope, which varies seasonally from 12.5 – 15.5 feet NGVD. However, given potential for heavy rainfall associated with El Niño conditions this winter and the poor condition of SAV and EAV in the nearshore zone, these lower lake stages are ideal for vegetation recovery. Cyanobacterial bloom potential decreased in the south and southwest regions of the lake but increased in the north based on the latest NOAA image (November 11).

Estuaries

Total inflow to the St. Lucie Estuary averaged 183 cfs over the past week with 0 cfs coming from Lake Okeechobee. Surface salinity increased throughout the estuary, except the surface salinity at HR1 (which stayed the same) over the last week. The seven-day average salinity at the US1 Bridge is in the good range for adult eastern oysters. Total inflow to the Caloosahatchee Estuary averaged 1,171 cfs over the past week with 756 cfs coming from the Lake. Surface salinity increased downstream of S-79. The 30-day moving average surface salinity is 1.6 at Val I-75 and 6.13 at Ft. Myers. Salinity conditions between Val I-75 and Ft. Myers are good for tape grass. Salinity conditions are in the good range for adult eastern oysters at Cape Coral and Shell Point.

Stormwater Treatment Areas

Over the past week, the STAs received approximately 6,400 acre-feet of Lake releases. The total amount of inflows to the STAs in WY2019 (since May 1, 2018) is approximately 1,140,000 acre-feet, which includes approximately 305,000 acre-feet of Lake releases. Most STA cells are at or above target depths. Operational restrictions are in place for construction related activities in STA-1W (all flow-ways) and STA-5/6 Flow-ways 4, 5 and 6. Operational restrictions are in place in STA-3/4 Western Flow-way for a Restoration Strategies Science Plan study. STA-5/6 Flow-ways 2 and 3 are offline for initiation of a Restoration Strategies project to grade non-effective treatment areas. This week, if Lake releases are sent to the WCAs and conditions allow, releases will be sent to STA-1E, STA-3/4 and STA-2.

Everglades

Over the last week water depths declined on average across the Everglades at a rate similar to previous weeks. Conditions within the Everglades are drying out unseasonably early but have stabilized over the last week. Stages remain below the respective regulation lines in the WCAs with the exceptions of WCA-2A and 2B. WCA-3A North and northern WCA-1 continue to dry out as indicated by the WDAT model output. At the gauges located in WCA-3A North, in the northwest stages rose 0.04 feet but fell in the northeast by 0.14 feet. The gauge located in southern WCA-3A (3-65) remained unchanged. Stages continued to decrease this week in Taylor Slough, yet depths remain above average for this time of year. Discharge from the five creeks nears the long-term average. Salinities in Florida Bay increased on average this past week, and conditions at the western stations remain higher than their historic averages for this time of year.

Supporting Information

KISSIMMEE BASIN

Kissimmee Basin Rainfall

The Upper Kissimmee Basin received 0.19 inches of rainfall in the past week and the Lower Basin received 0.11 inches (SFWMD Daily Rainfall Report 11/13/2018).

Upper Kissimmee Basin

Stages and departures in the Kissimmee Chain of Lakes (KCOL) are shown in **Table 1**. KCOL stage hydrographs with respective regulation schedules and rainfall are shown in Figures 1-7.

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: 11/13/2018

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)						
							11/11/18	11/4/18	10/28/18	10/21/18	10/14/18	10/7/18	9/30/18
Lakes Hart and Mary Jane	S-62	0	LKMJ	60.0	R	61.0	**-1.0**	-1.1	-0.9	-0.7	-0.3	-0.2	0.0
Lakes Myrtle, Preston, and Joel	S-57	0	S-57	61.2	R	62.0	**-0.8**	-0.8	-0.7	-0.4	-0.1	0.0	0.1
Alligator Chain	S-60	0	ALLI	63.1	R	64.0	**-0.9**	-0.9	-0.7	-0.4	-0.2	-0.1	0.0
Lake Gentry	S-63	0	LKGT	61.5	R	61.5	**0.0**	-0.1	0.0	0.1	0.1	0.1	0.1
East Lake Toho	S-59	0	TOHOE	57.1	R	58.0	**-0.9**	-1.0	-0.9	-0.6	-0.3	-0.1	0.1
Lake Toho	S-61	0	TOHOW, S-61	54.6	R	55.0	**-0.4**	-0.6	-0.5	-0.3	0.0	0.0	0.2
Lakes Kissimmee, Cypress, and Hatchineha	S-65	336	KUB011, LKIS5B	49.7	R	52.5	**-2.8**	-2.7	-2.5	-2.1	-1.4	-0.9	-0.4

[1] Seven-day average of weighted daily means through midnight.
[2] Names of in-lake monitoring sites and structures used to determine lake stage; if more than one site is listed, an average is reported.
[3] 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.
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 8. Kissimmee River floodplain stages at selected stations are shown in Figure 9.

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: 11/13/2018

Metric	Location	1-Day Average	Average for the Preceeding 7-Days[1]									
		11/11/2018	11/11/18	11/4/18	10/28/18	10/21/18	10/14/18	10/7/18	9/30/18	9/23/18	9/16/18	9/9/18
Discharge (cfs)	S-65	331	**336**	350	480	1,592	1,559	1,542	1,485	1,560	1,544	3,538
Discharge (cfs)	S-65A[2]	248	**252**	288	383	1,394	1,382	1,391	1,416	1,532	1,634	3,808
Discharge (cfs)	S-65D[2]	352	**360**	404	1,024	1,461	1,521	1,646	1,982	2,221	3,351	4,313
Headwater Stage (feet NGVD)	S-65D[2]	26.95	**27.15**	27.62	27.69	27.78	27.89	27.81	27.81	27.75	27.67	27.86
Discharge (cfs)	S-65E[2]	395	**370**	405	1,058	1,535	1,598	1,684	2,062	2,296	3,458	4,259
Discharge (cfs)	S-67	0	**0**	0	0	0	0	67	310	288	215	176
DO (mg/L)[3]	Phase I river channel	5.3	**5.1**	5.3	4.3	4.6	4.7	4.3	3.3	2.8	2.5	2.9
Mean depth (feet)[4]	Phase I floodplain	0.20	**0.23**	0.28	0.39	0.52	0.56	0.64	0.75	0.80	1.12	1.79

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

[2]S-65A discharge combines S-65A with auxillary strucutures; S-65D discharge combines discharge at S-65D, S-65DX1, and S-65DX2; S-65D stage averages stage at S-65D and S-65DX1; S-65E discharge combines S-65E and S-65EX1.

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

[4]1-day spatial average from South Florida Water Depth Assessment Tool (SFWDAT).

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

KCOL Hydrographs (through Sunday midnight)

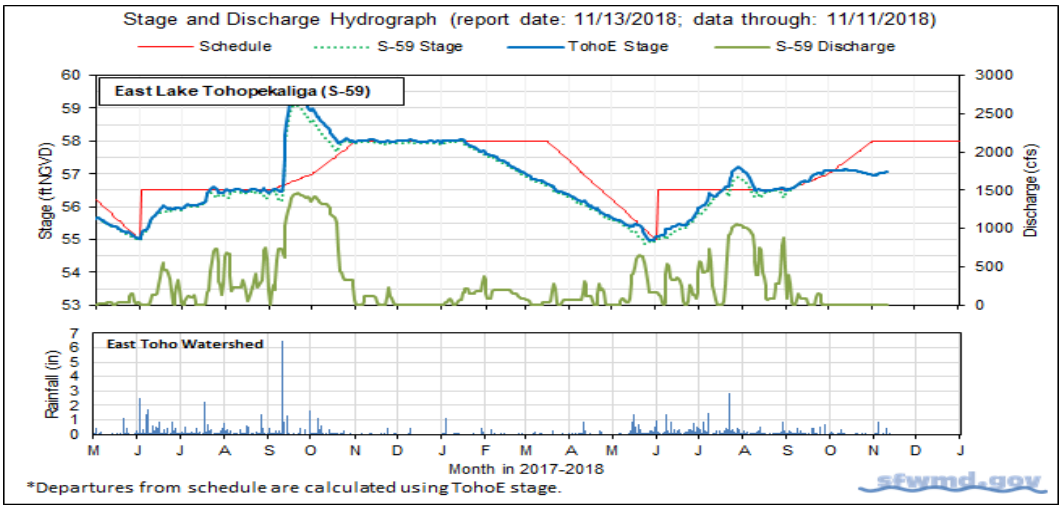


Figure 1.

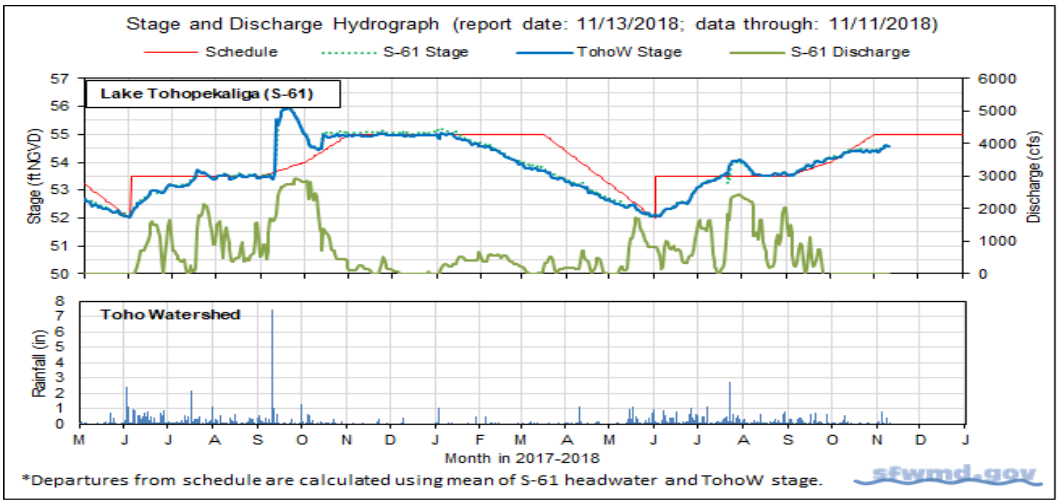


Figure 2.

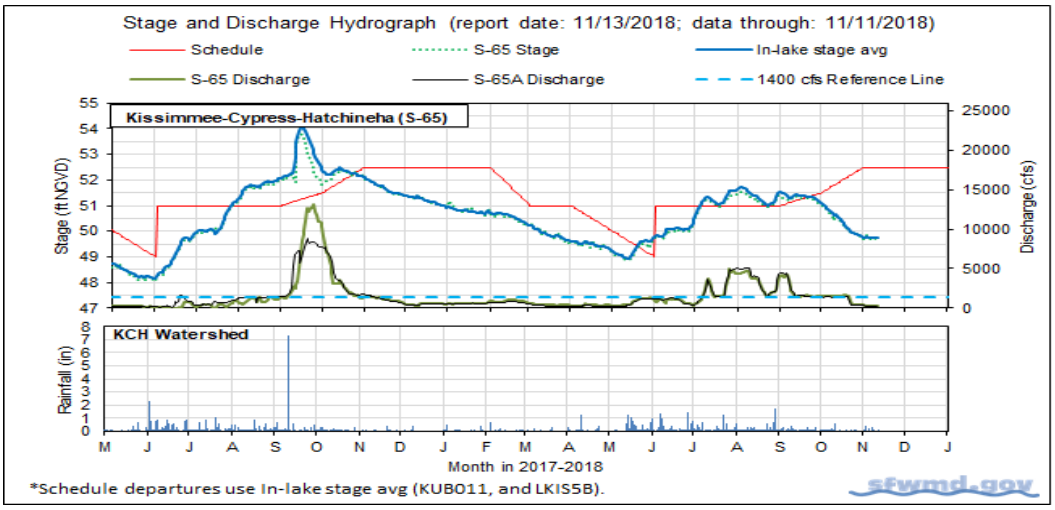


Figure 3.

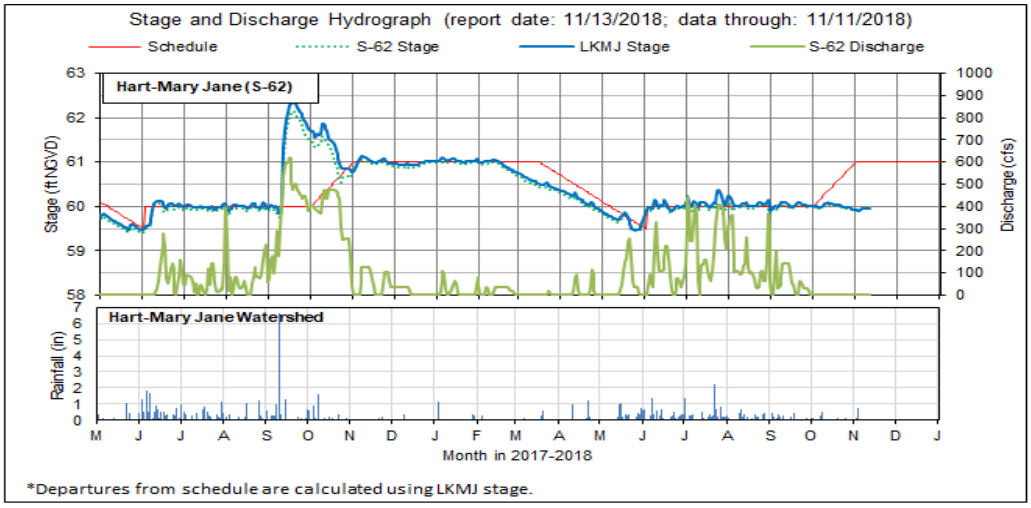


Figure 4.

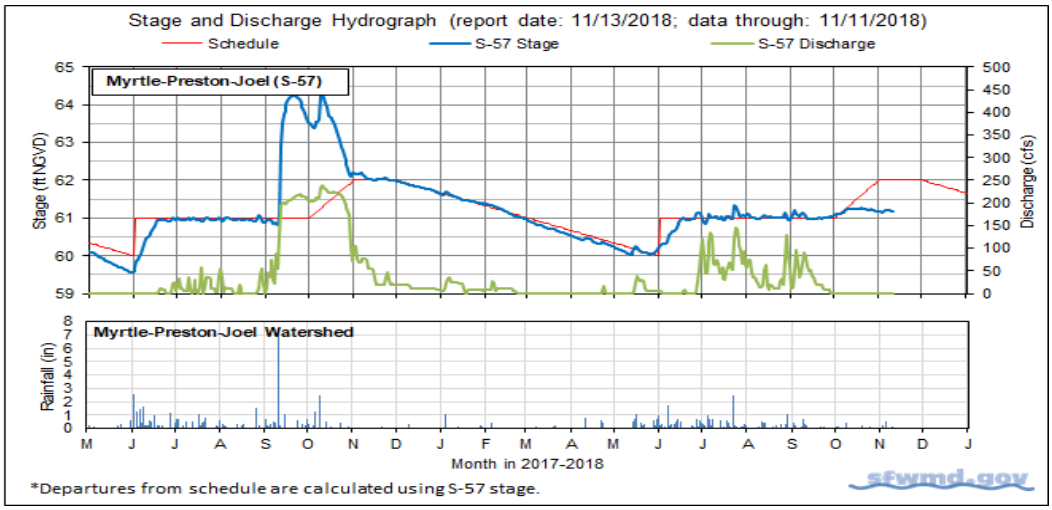


Figure 5.

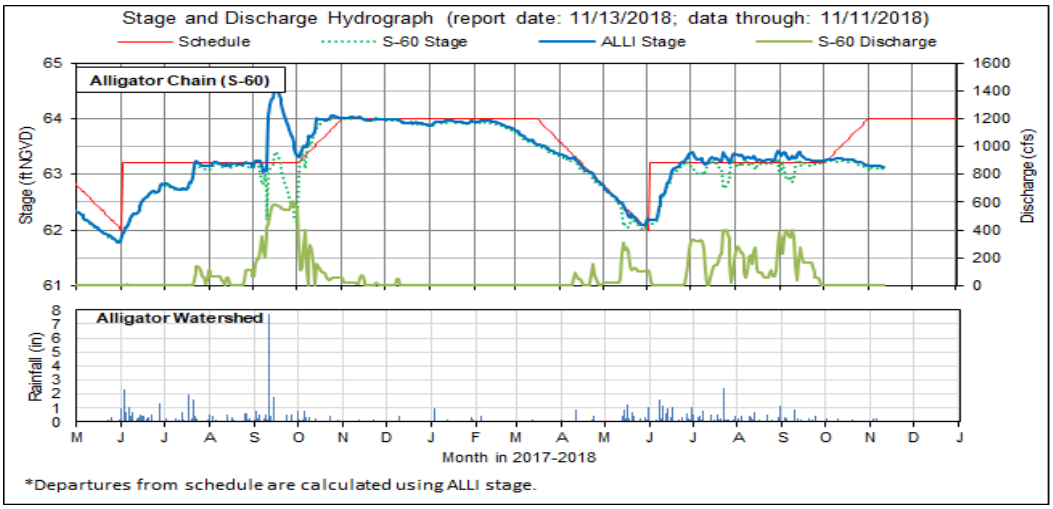


Figure 6.

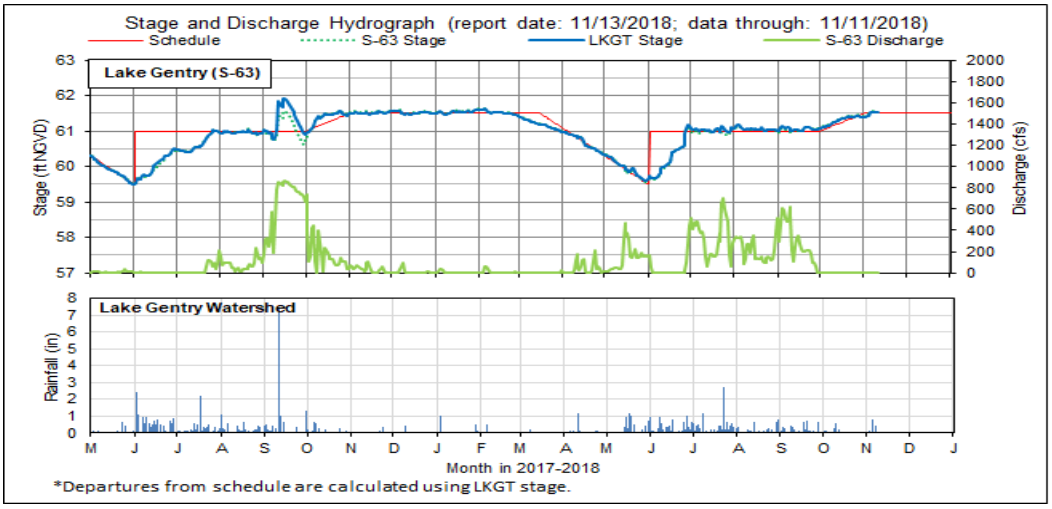


Figure 7.

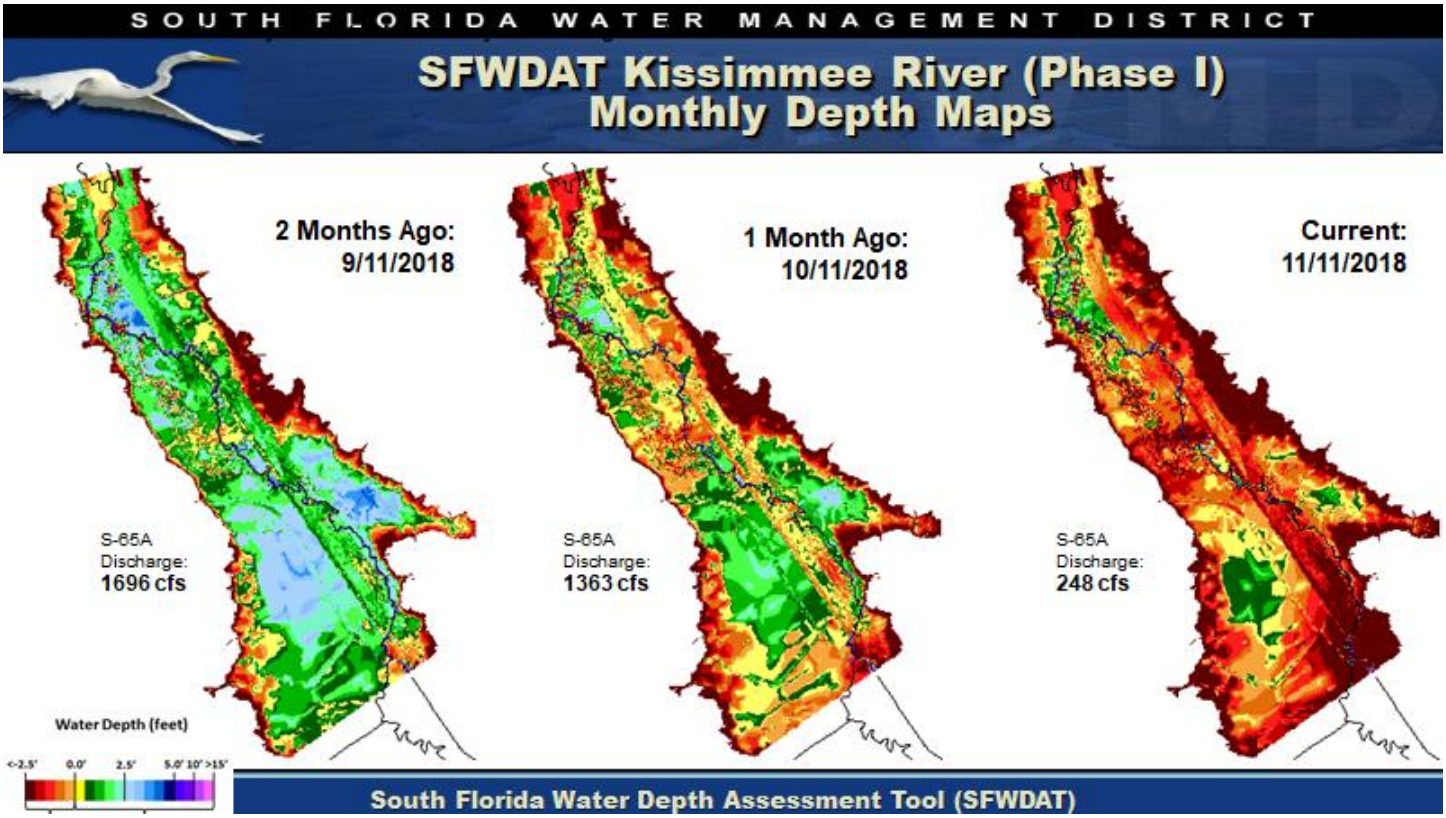


Figure 8. Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to January 16, 2012.

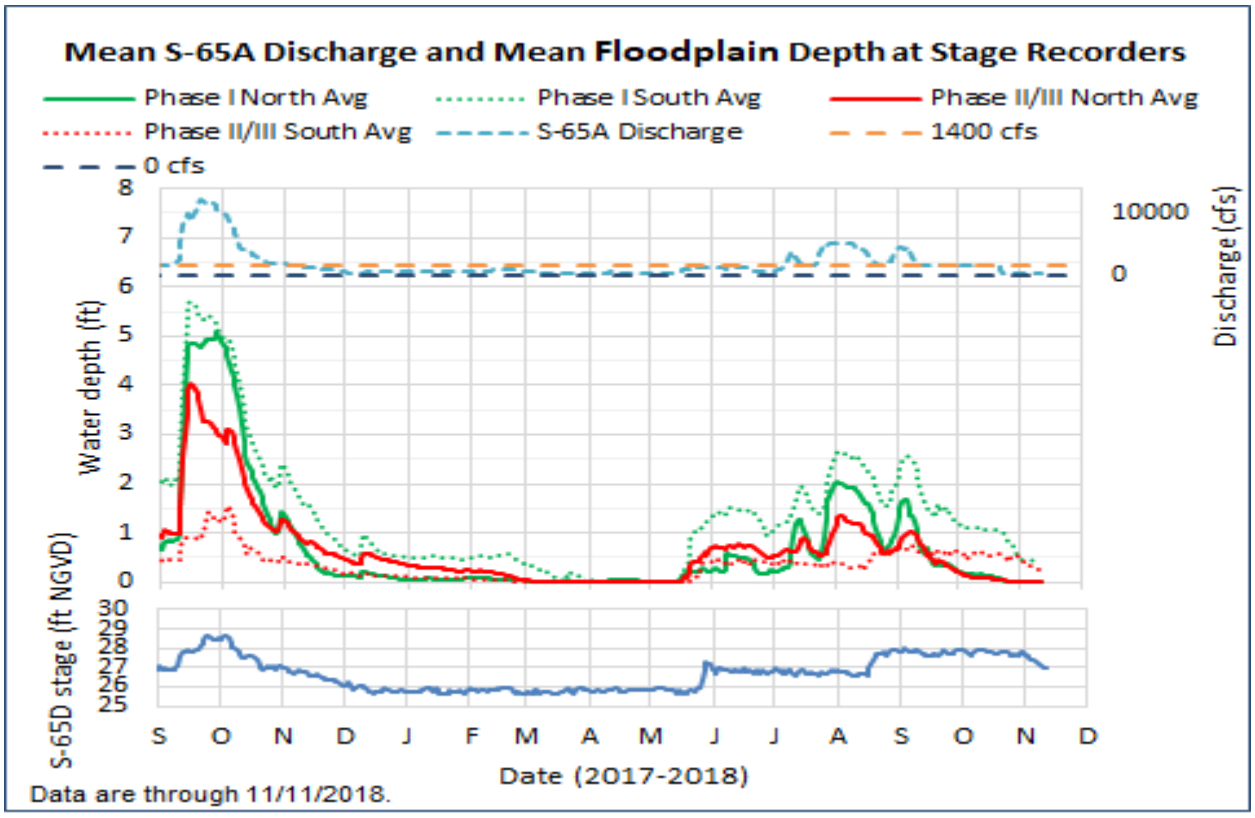


Figure 9. Mean water depth at stage recorders in the northern Phase I, southern Phase I, northern Phase II/III, and southern Phase II/III areas in relation to the S-65A discharge and S-65D headwater stage.

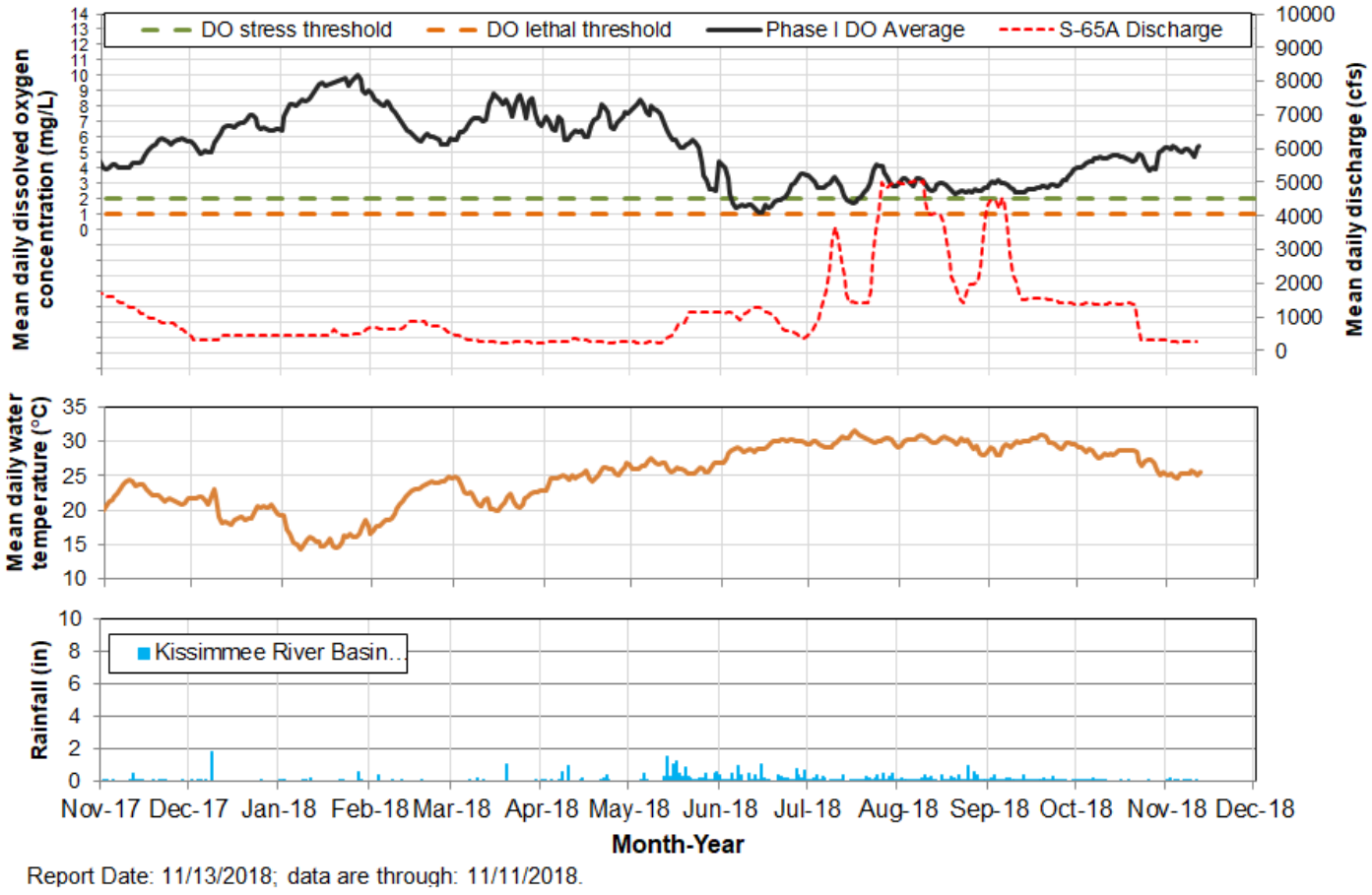


Figure 10. Mean daily dissolved oxygen, discharge, temperature and rainfall in the Phase I river channel.

Water Management Recommendations

Kissimmee Basin Adaptive Recommendations and Operational Actions

Recommendation Date	Recommendation	Purpose	Outcome	Source	Report Date
11/12/2018	No new recommendations.		N/A		11/13/2018
11/2/2018	Reduce S-65/S-65A discharge to approximately 250 cfs.	To conserve stage in Lake Kissimmee.	Implemented	SFWMD Water Mgt/KB Ops	11/6/2018
10/30/2018	No new recommendations.		N/A		10/30/2018
10/22/2018	Reduce S-65/S-65A discharge to approximately 300 cfs (minimum discharge) in one step of approximately 1100 cfs today.	Reduce rate of stage decline in lakes Kissimmee-Cypress-Hatchineha	Implemented	SFWMD Water Mgt/KB Ops	10/23/2018
10/16/2018	No new recommendations.		N/A		10/16/2018
10/9/2018	No new recommendations.		N/A		10/9/2018
10/2/2018	No new recommendations.		N/A		10/2/2018
9/25/2018	No new recommendations.		N/A		9/25/2018
9/18/2018	No new recommendations.		N/A		9/18/2018
9/11/2018	No new recommendations.		N/A		9/11/2018
9/4/2018	No new recommendations.		N/A		9/4/2018
8/28/2018	No new recommendations.		N/A		8/28/2018
8/21/2018	No new recommendations.		N/A		8/21/2018
8/14/2018	No new recommendations.		N/A		8/14/2018
8/7/2018	No new recommendations.		N/A		8/7/2018
7/23/2018-7/24/2018	Increase discharge from 1400 cfs to 3000 cfs, then 3200 cfs and 3500 cfs.	For flood control in Lake Kissimmee.	Implemented	SFWMD Water Mgt/KB Ops	7/31/2018
7/19/2018	Follow Revised (X2) 2018 Wet Season Discharge Plan to the extent possible, including 50 foot stage threshold and 0.5 foot flood control buffer.	To the extent possible, maintain sufficient discharge to keep areas under snail kites nests in Pool D hydrated until nests fledge, while avoiding large increases in discharge that might flood the nests.	N/A	KB Ops	7/24/2018
7/13/2018	Maintain at least 1400 cfs at S-65A while Lake Kissimmee stage is above 50 feet. (See revised 2018 discharge plan).	To the extent possible, maintain sufficient discharge to keep areas under snail nest kites in Pool D hydrated until nests fledge.	N/A	KB Ops	7/17/2018
7/13/2018	Reduce S-65/S-65A discharge by 600 cfs/day until 1400 cfs is reached. (See revised 2018 discharge plan, below).	Reach 1400 cfs faster to help stabilize Lake Kissimmee stage.	Implemented	SFWMD Water Mgt/KB Ops	7/17/2018
7/9/2018	Increase S-65/S-65A discharge by 300 cfs if needed.	Stablize Lake Kissimmee stage.	N/A	SFWMD Water Mgt/KB Ops	7/10/2018
7/8/2018	Increase S-65/S-65A discharge by 900 cfs today in 3 increments of 300 cfs each.	Stablize Lake Kissimmee stage.	Implemented	KB Ops	7/10/2018
7/5/2018	Increase S-65/S-65A discharge by 300 cfs/day (double the prescribed rate of increase) Thursday through Sunday .	Stablize Lake Kissimmee stage.	Implemented	SFWMD Water Mgt	7/10/2018
7/2/2018	Increase S-65/S-65A discharge by 150 cfs/day (double the prescribed rate of increase).	Stablize Lake Kissimmee stage.	Implemented	SFWMD Water Mgt/KB Ops	7/10/2018
6/30/2018	Increase S-65/S-65A discharge as slowly as feasible	Slow stage ascencsion in Kissimmee-Cypress-Hatchineha	Implemented	KB Ops/SFWMD Water Mgt	7/3/2018
6/28/2018	Continue to reduce discharge at S-65/S-65A as slowly as feasible.	Prevent stage decline in Kissimmee-Cypress-Hatchineha.	Implemented	KB Ops/SFWMD Water Mgt	7/3/2018
6/21/2018	Reduce discharge at S-65/S-65A as slowly as feasible.	Prevent stage decline in Kissimmee-Cypress-Hatchineha.	Implemented	KB Ops/SFWMD Water Mgt	6/26/2018
6/15/2018	Reduce S-65A discharge by 150-300 cfs over the weekend.	Slow or stop DO decline in Kissimmee River.	Implemented	KB Ops	6/19/2018
6/12/2018	No new recommendations.		N/A		6/12/2018
6/5/2018	No new recommendations.		N/A		6/5/2018
5/29/2018	Begin implementation of the 2018 Wet Season Discharge Plan for S-65/S-65A on June 1 (see figure).	Provide variable flow from S-65/S-65A to balance Kissimmee River and Headwaters Lakes objectives including Kissimmee River floodplain inundation, moderated rates of change in discharge, and constrained rate of stage rise in the lakes.	Planned	KB Ops/SFWMD Water Mgt/FWC/FWS	5/29/2018
5/22/2018	Hold Kissimmee-Cypress-Hatchineha at current stage of approximately 49.5 ft until June 1.	(a) Reduce impacts of rising water on DO in the Kissimmee River; and (b) limit stage reversal in KCH to <1 foot to protect snail kite nests.	Implemented	KB Ops/SFWMD Water Mgt	5/29/2018
5/18/2018-5/20/2018	Increase discharge gradually in response to rainfall in consultation with KB staff.	(a) Reduce impacts of rising water on DO in the Kissimmee River; and (b) limit stage reversal in KCH to <1 foot to protect snail kite nests.	Implemented	KB Ops	5/22/2018

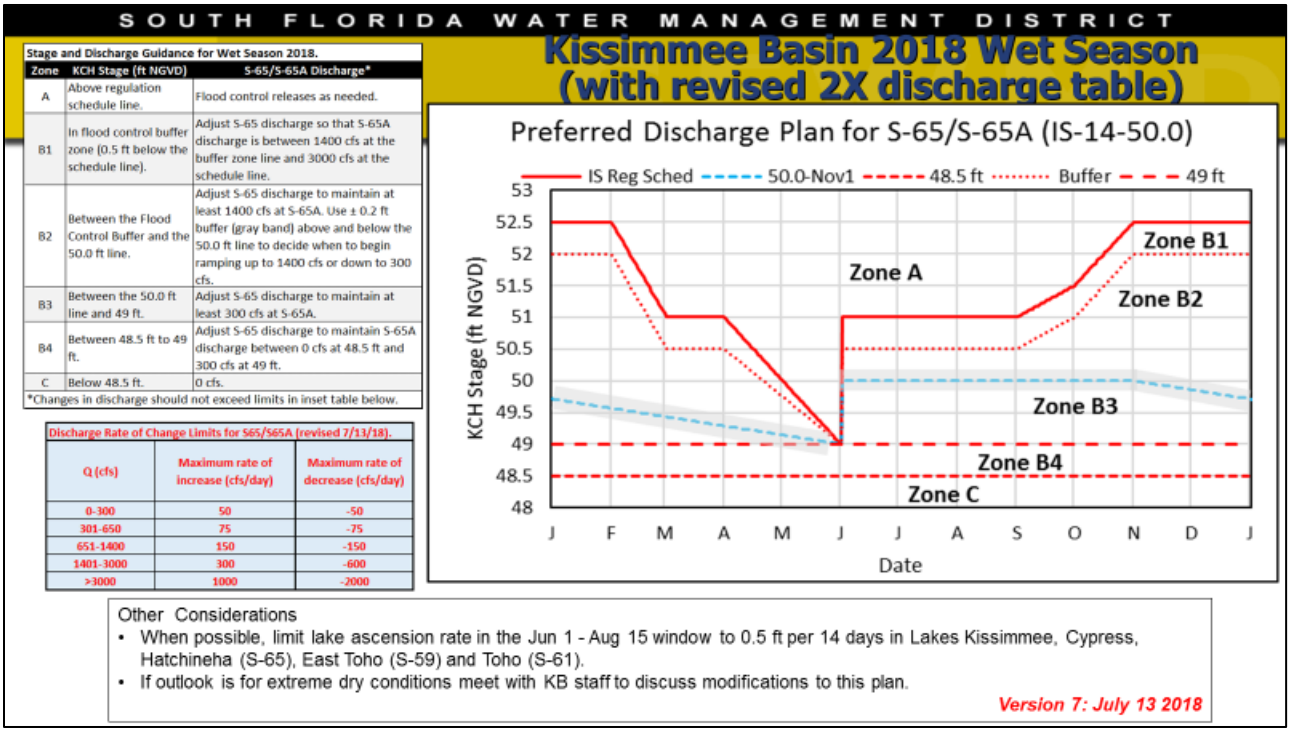


Figure 11. The 2018 Wet Season Discharge Plan for S-65/S-65A.

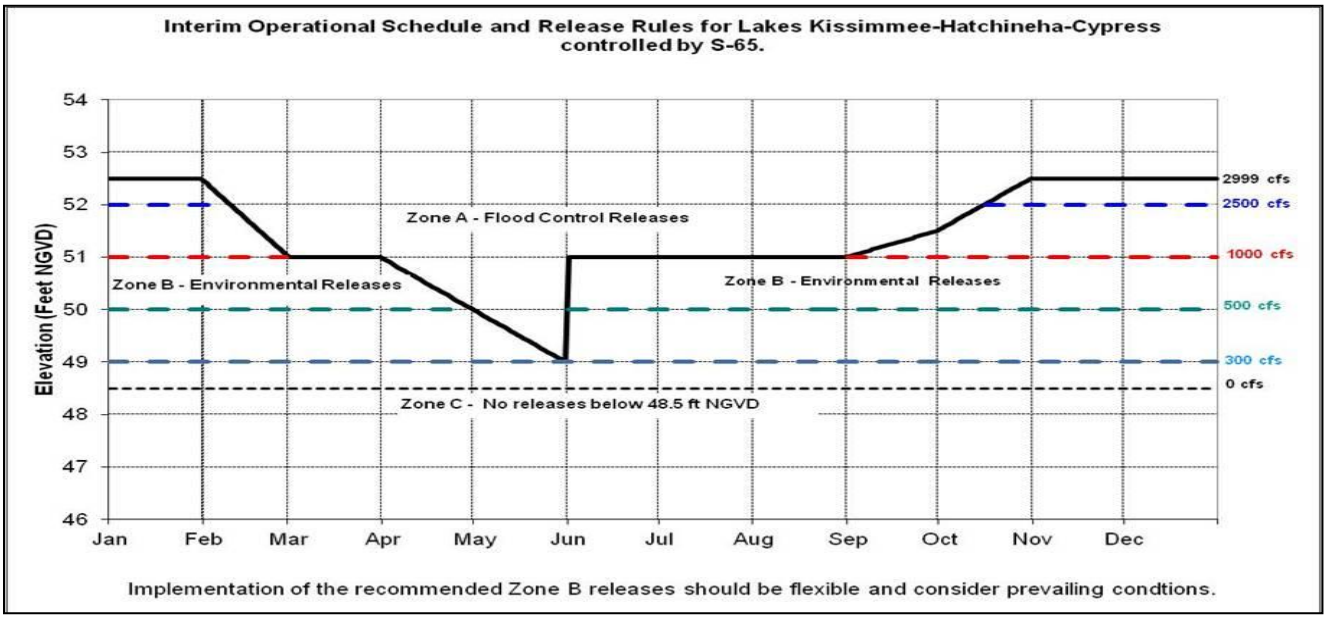


Figure 12. Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years.

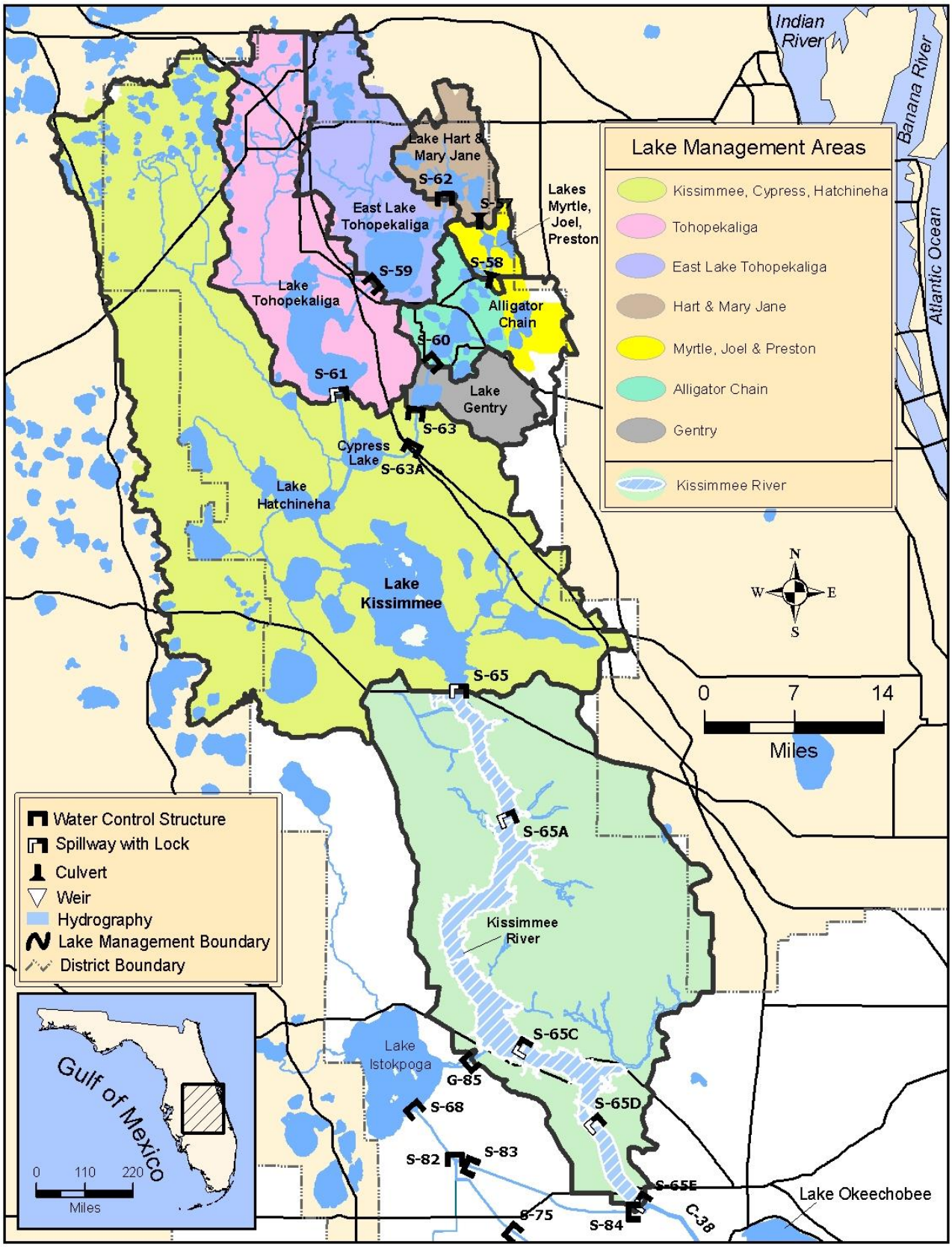


Figure 13. The Kissimmee Basin.

LAKE OKEECHOBEE

According to the USACE web site, Lake Okeechobee stage is at 13.50 feet NGVD for the period ending at midnight on November 12, 2018. This value is based on the use of four interior lake stations (L001, L005, L006 and LZ40) and four perimeter stations (S-308, S-352, S-4 and S-133). The Lake is now 0.77 feet lower than it was a month ago and 3.18 feet lower than a year ago when runoff from Hurricane Irma caused extreme high lake stages (Figure 1). The Lake is in the Base-Flow sub-band (Figure 2). According to RAINDAR, 0.16 inches of rain fell over the Lake during the week November 6, 2018 – November 12, 2018. Most of the watershed received less than 0.5 inches of rain with the exception of the east coast which received between 0.50 – 2.0 inches (Figure 3).

Average daily inflows (minus rainfall) to the Lake decreased again from the previous week, going from 566 cfs to just 398 cfs. The decrease in inflows was mostly from the Kissimmee River via the S-65E structures, going from 417 cfs the previous week to 355 cfs this past week (Table 1).

Total outflows (minus evapotranspiration) also decreased from the previous week, going from 3,216 average daily cfs the previous week to 2,717 cfs this past week (Table 1). The decreases in outflows were primarily in discharges south through the S350 structures which went from 1,993 cfs the previous week to 1,566 cfs this past week. Outflows via the S-77 decreased again from 1,066 cfs the previous week to 1,036 average daily cfs this past week while outflows through the L8 at Canal Point increased from 0 cfs to 166 cfs this week. Flows through the S-308 have been passive flows through the navigation lock and/or structure and the -52 cfs are not lake inflows. The corrected average daily evapotranspiration value for the week based on the L006 weather platform solar radiation increased from 0.11 inches last week to 0.12 inches this week.

Total lake inflows and outflows for the past 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. 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.

The most recent satellite imagery (November 11) using the cyanobacteria monitoring product derived from NOAA's analysis of EUMETSAT's OLCI satellite sensor showed a decrease in algal bloom potential in the south and southwest regions of the Lake but an increase in the north (Figure 5).

Water Management Recommendations

Lake Okeechobee stage is 13.50 feet NGVD, falling 0.14 feet from the previous week and 0.77 feet over the past 30 days. Lake stages are now the lowest they have been for this time of year since 2010 and are 0.93 feet below the bottom of the preferred ecological envelope, which varies seasonally from 12.5 – 15.5 feet NGVD. However, given potential for heavy rainfall associated with El Niño conditions this winter and the poor condition of SAV and EAV in the nearshore zone, these lower lake stages are ideal. Recovery of vegetation in the nearshore zone from Hurricane Irma impacts and 2016 El Niño-associated rainfall will require lake stages in the lower portion of the ecological envelope or lower for extended periods, so efforts to prepare for such an event will help speed the rebound of this important community.

Table 1. Average daily inflows and outflows and the approximate depth equivalents on Lake Okeechobee for various structures.

INFLOWS	Previous Week Avg Daily cfs	Avg Daily Inflow cfs	Equivalent Depth Week Total (in)
S65E & S65EX1	417	355	0.2
S71 & 72	0	11	0.0
S84 & 84X	0	0	0.0
Fisheating Creek	30	32	0.0
S154	0	0	0.0
S191	0	0	0.0
S133 P	0	0	0.0
S127 P	0	0	0.0
S129 P	0	0	0.0
S131 P	0	0	0.0
S135 P	0	0	0.0
S2 P	0	0	0.0
S3 P	0	0	0.0
S4 P	0	0	0.0
L8 Backflow	0	0	0.0
Rainfall	1918	0	0.0
Total	**2484**	**398**	**0.2**

OUTFLOWS	Previous Week Avg Daily cfs	Avg Daily Outflow cfs	Equivalent Depth Week Total (in)
S77	1066	1036	0.4
S308	37	-52	0.0
S351	909	889	0.4
S352	400	382	0.2
S354	684	295	0.1
L8 Outflow	1	166	0.1
ET	1850	2842	1.2
Total	**5065**	**5559**	**2.4**

PROVISIONAL DATA

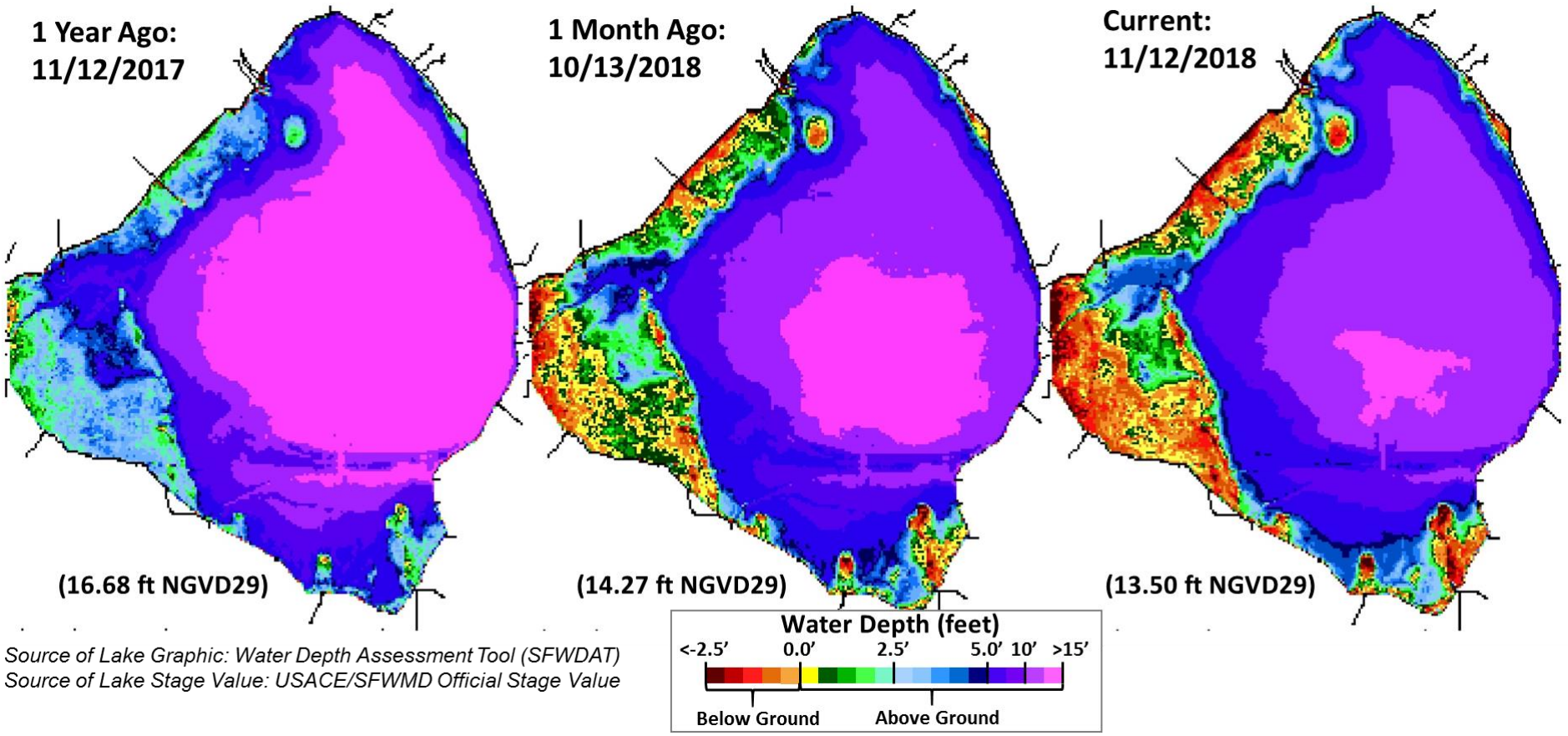


Figure 1. Water depth estimates on Lake Okeechobee based on the South Florida Water Depth Assessment Tool.

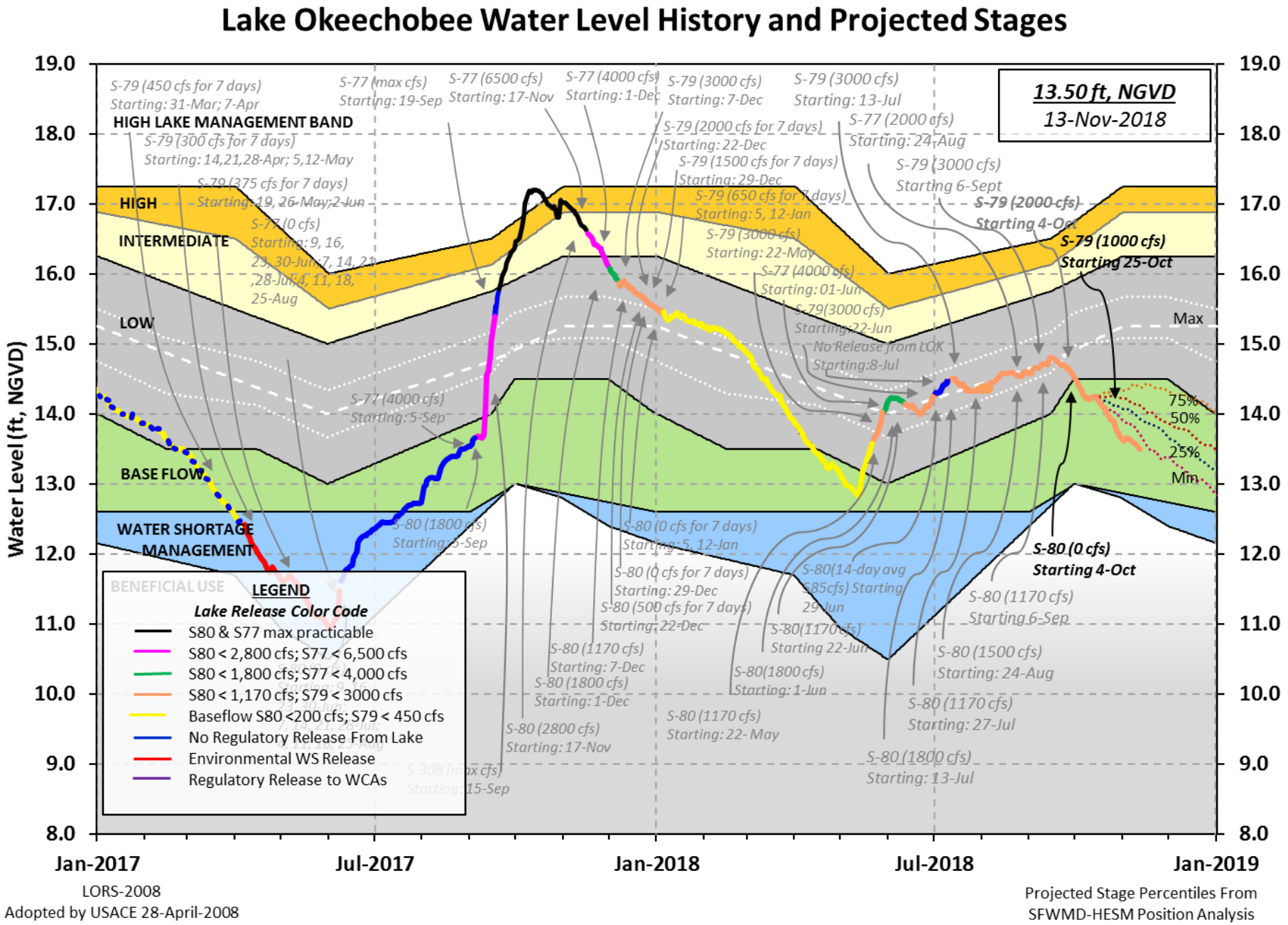


Figure 2. Recent Lake Okeechobee stage and releases, with projected stages based on a dynamic position analysis.

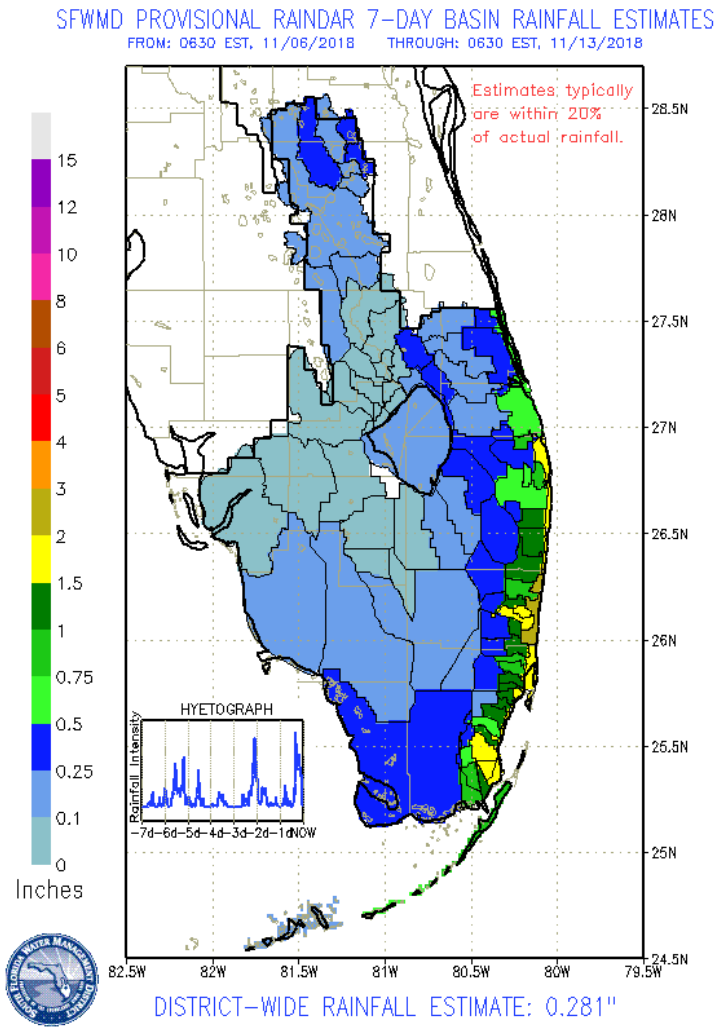


Figure 3. Rainfall estimates by basin.

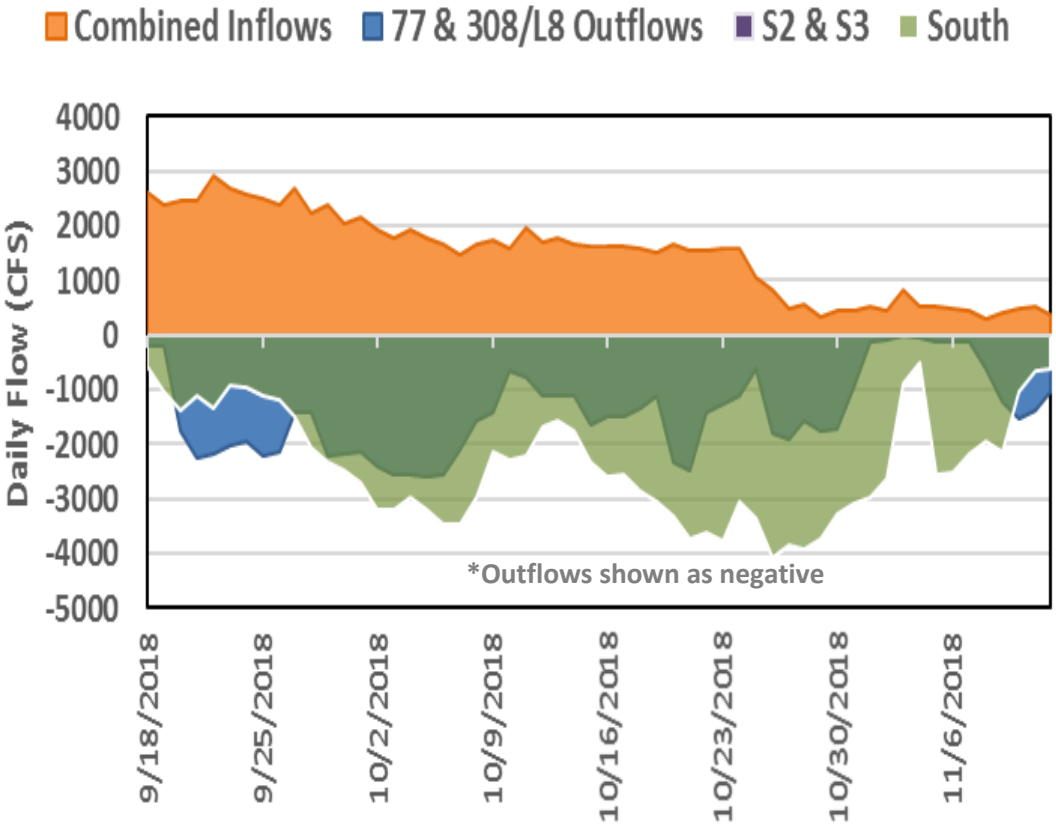


Figure 4. Major inflows and outflows of Lake Okeechobee, including the S350 structures designated as South. The L8 canal flows through culvert 10A are included as outflows when positive, and as inflows when backflowing into the lake. All inflows and outflows are shown as positive and negative, respectively, for visual purposes.

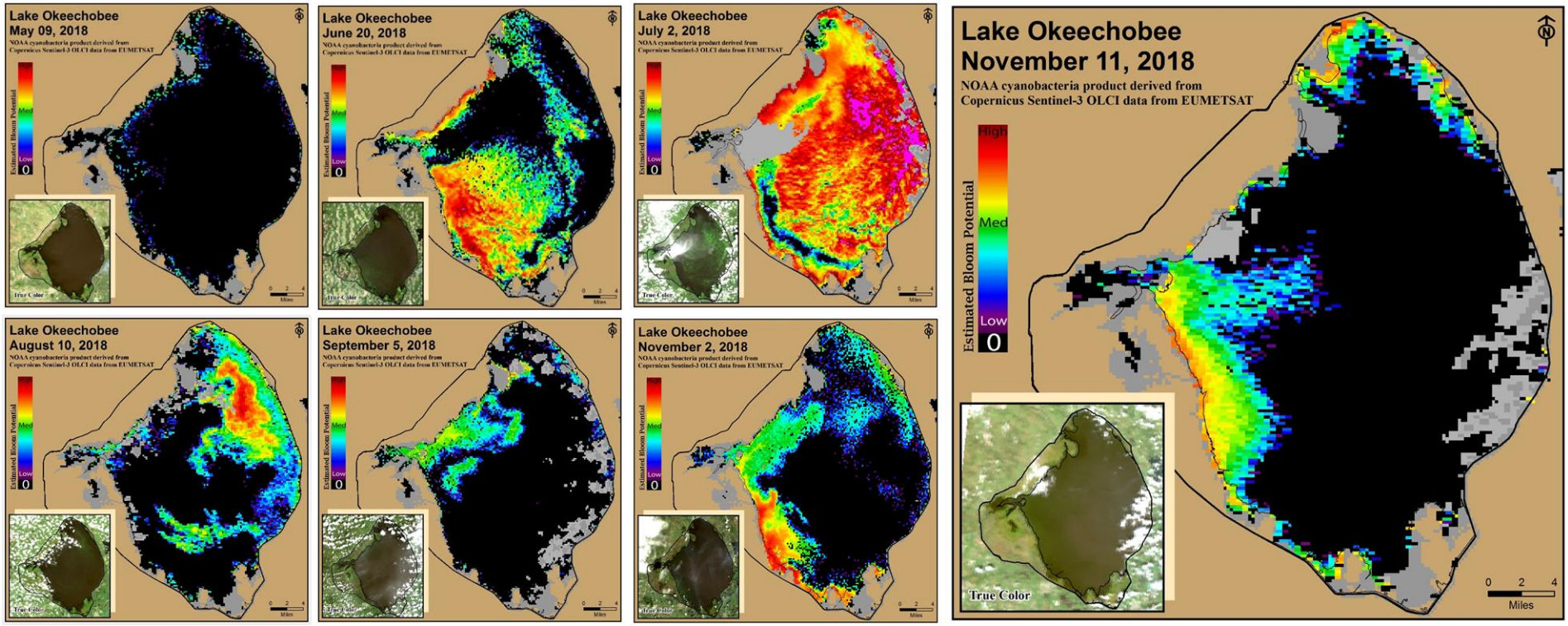


Figure 5. Potential for cyanobacterial blooms on Lake Okeechobee based on NOAA's harmful algal bloom monitoring system derived from Copernicus Sentinel-3 OLCI data from EUMETSAT. Gray indicates cloud cover. All data are experimental and unvalidated at this point in product development.

ESTUARIES:

St. Lucie Estuary:

Last week total inflow to the St. Lucie Estuary averaged about 183 cfs (Figures 1 and 2) and last month inflow averaged about 243 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 are provisional).

Location	Flow (cfs)
Tidal Basin Inflow	120
S-80	0
S-308	-52
S-49 on C-24	0
S-97 on C-23	0
Gordy Rd. structure on Ten Mile Creek	63

Salinity increased throughout the estuary except the surface salinity at HR1 (which stayed the same) over the last week (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 22.2. Salinity conditions in the middle estuary are within 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
HR1 (North Fork)	**17.5** (17.6)	**20.8** (19.7)
US1 Bridge	**22.1** (21.3)	**22.3** (21.5)
A1A Bridge	**29.2** (28.4)	**30.5** (29.7)

[1]Envelope not applicable and [2]Not Reporting.

Caloosahatchee Estuary:

Last week total inflow to the Caloosahatchee Estuary averaged about 1,171 cfs (Figures 5 and 6) and last month inflow averaged about 1,355 cfs. Last week's provisional averaged inflows from the structures are shown in Table 3.

Table 3. Weekly average inflows (data is provisional).

Location	Flow (cfs)
S-77	1,036
S-78	770
S-79	1,022
Tidal Basin Inflow	149

Over the past week, salinity remained about the same throughout the estuary (Table 4, Figures 7 & 8). The seven-day average salinity values are estimated to be within the good range for adult eastern oysters at Cape Coral and at Shell Point (Figure 9). Salinity values were not available at Sanibel. The 30-day moving average surface salinity is 1.6 at Val I-75 and 6.13 at Ft. Myers. Salinity conditions between Val I-75 and Ft. Myers are good for tape grass.

Table 4. 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
S-79 (Franklin Lock)	**1.2** (1.2)	**1.2** (1.3)
Val I75	**1.7** (1.5)	**3.5** (2.8)
Ft. Myers Yacht Basin	**7.3 (7.0)**	**9.5** (8.7)
Cape Coral	**14.3** (14.7)	**16.6** (16.6)
Shell Point	**25.6** (25.4)	**24.5** (24.3)
Sanibel	**NR**[3](NR)	**NR** (NR)

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

Forecast of surface salinity (Figure 10) at Val I-75 for the next two weeks using the autoregression model (Qiu and Wan, 2013) coupled with a linear reservoir model for the tidal basin predicts daily salinity ranging from 2.0 to 4.4 at the end of the next two weeks for pulse release at S-79 ranging from 0 to 650 cfs and Tidal Basin inflows 190 cfs.

Red tide

The Florida Fish and Wildlife Research Institute reported on November 9, 2018, that *Karenia brevis,* the Florida red tide dinoflagellate, was observed at background to high concentrations in 14 samples collected from Lee County. *Karenia brevis,* the Florida red tide dinoflagellate, was observed at background in two samples collected from and offshore of St. Lucie County, very low to low concentrations in four samples collected from Martin County, background to very low concentrations in 11 samples collected from Palm Beach County, very low concentrations in two samples collected from Miami-Dade County.

<u>Water Management Recommendations</u>

Lake stage is in the Base Flow sub-band of 2008 LORS. Tributary hydrological conditions are dry. 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.

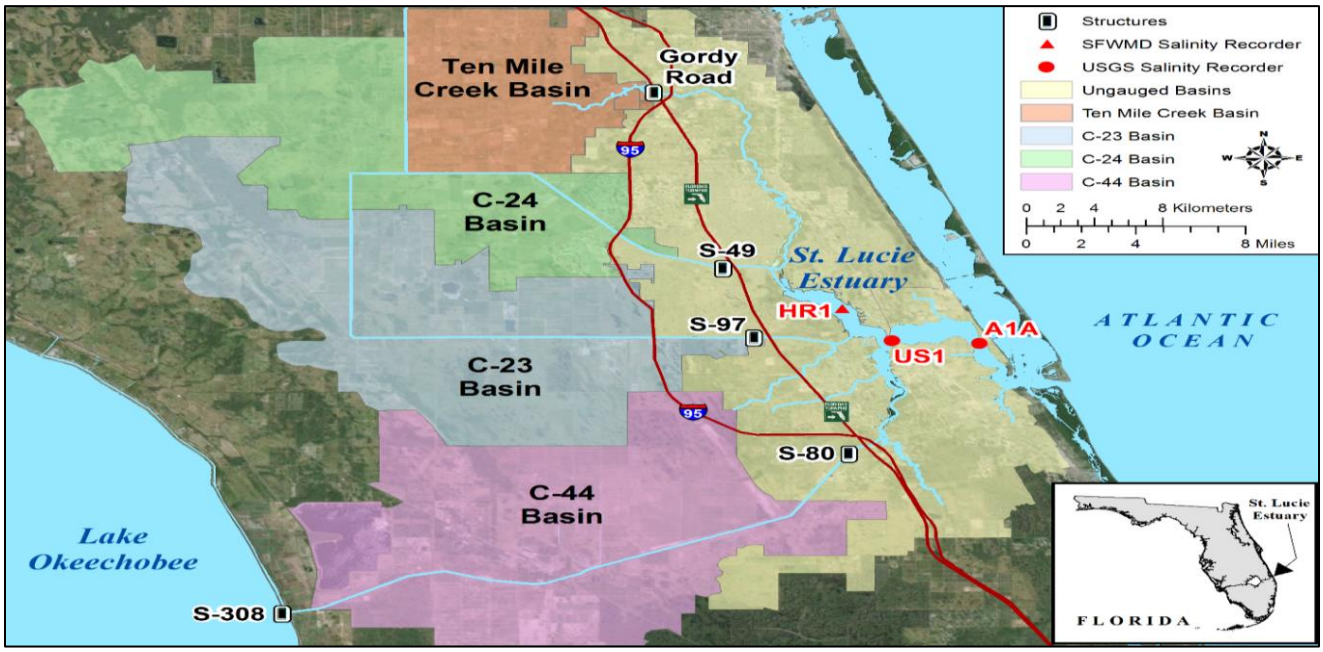


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

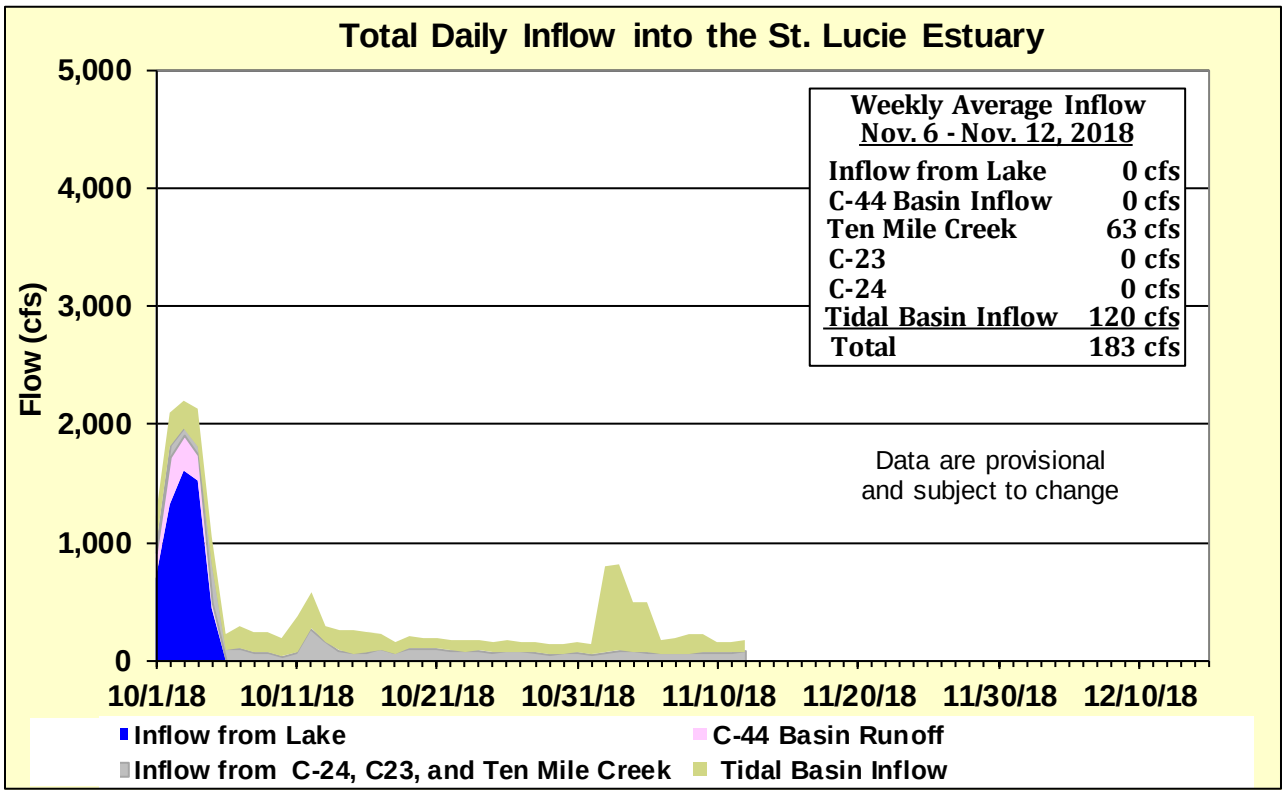


Figure 2. Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basins into the St. Lucie Estuary.

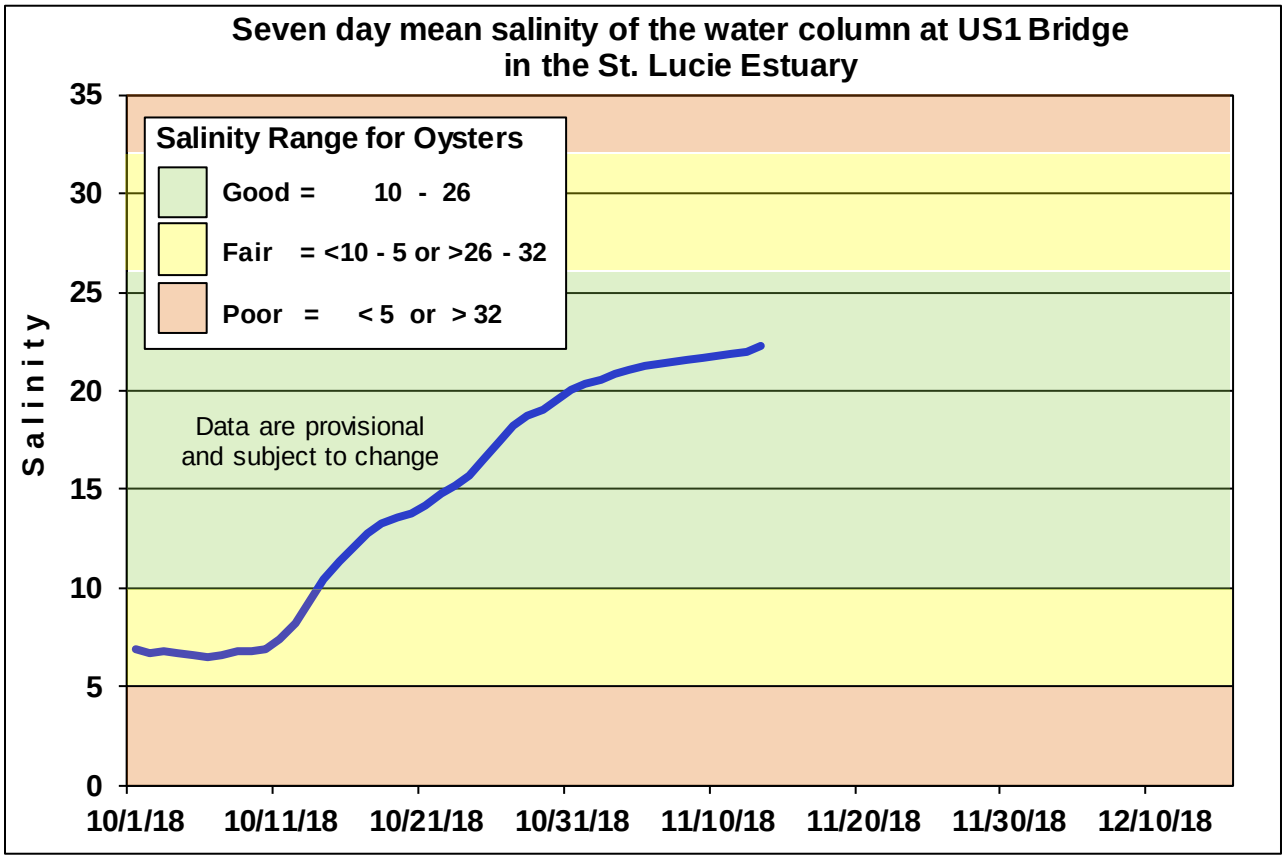


Figure 3. Seven-day mean salinity of the water column at the US1 Bridge.

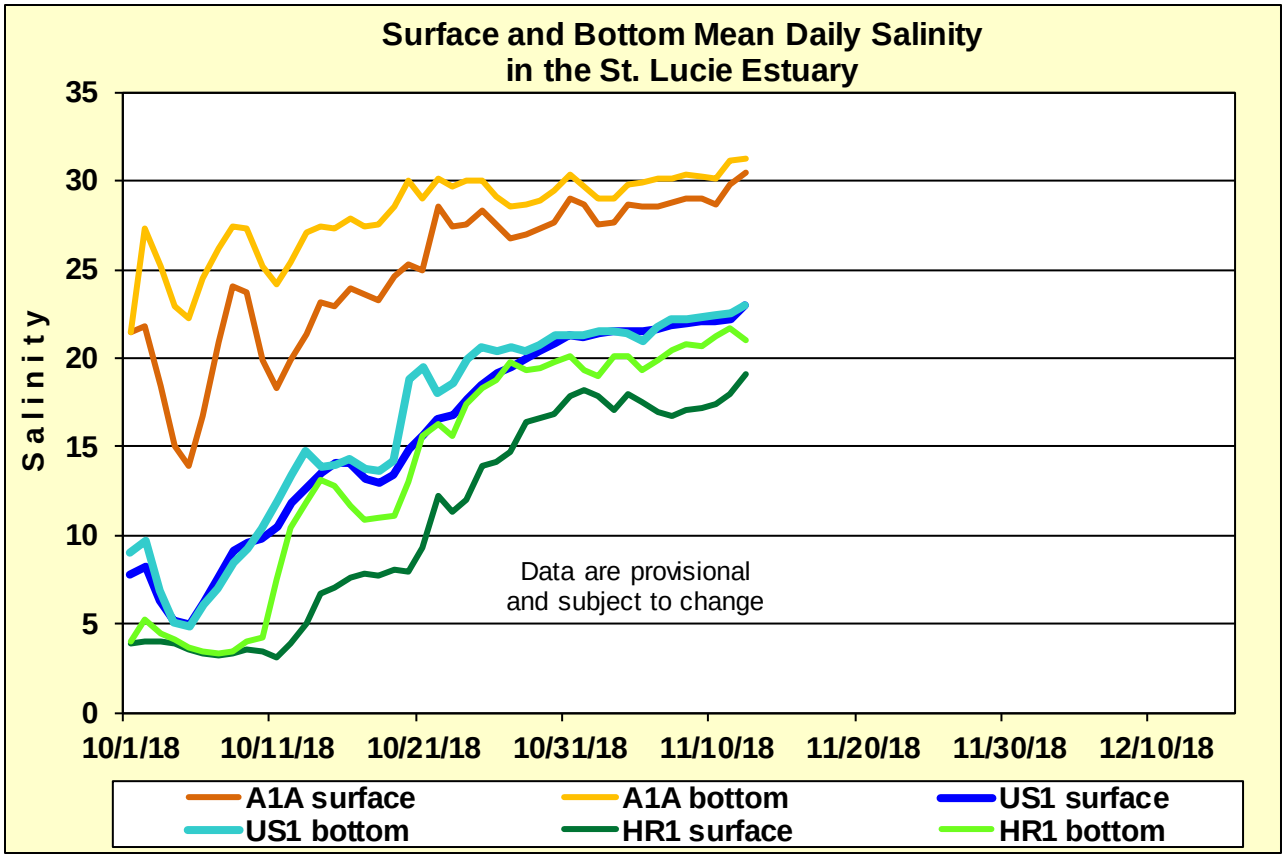


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

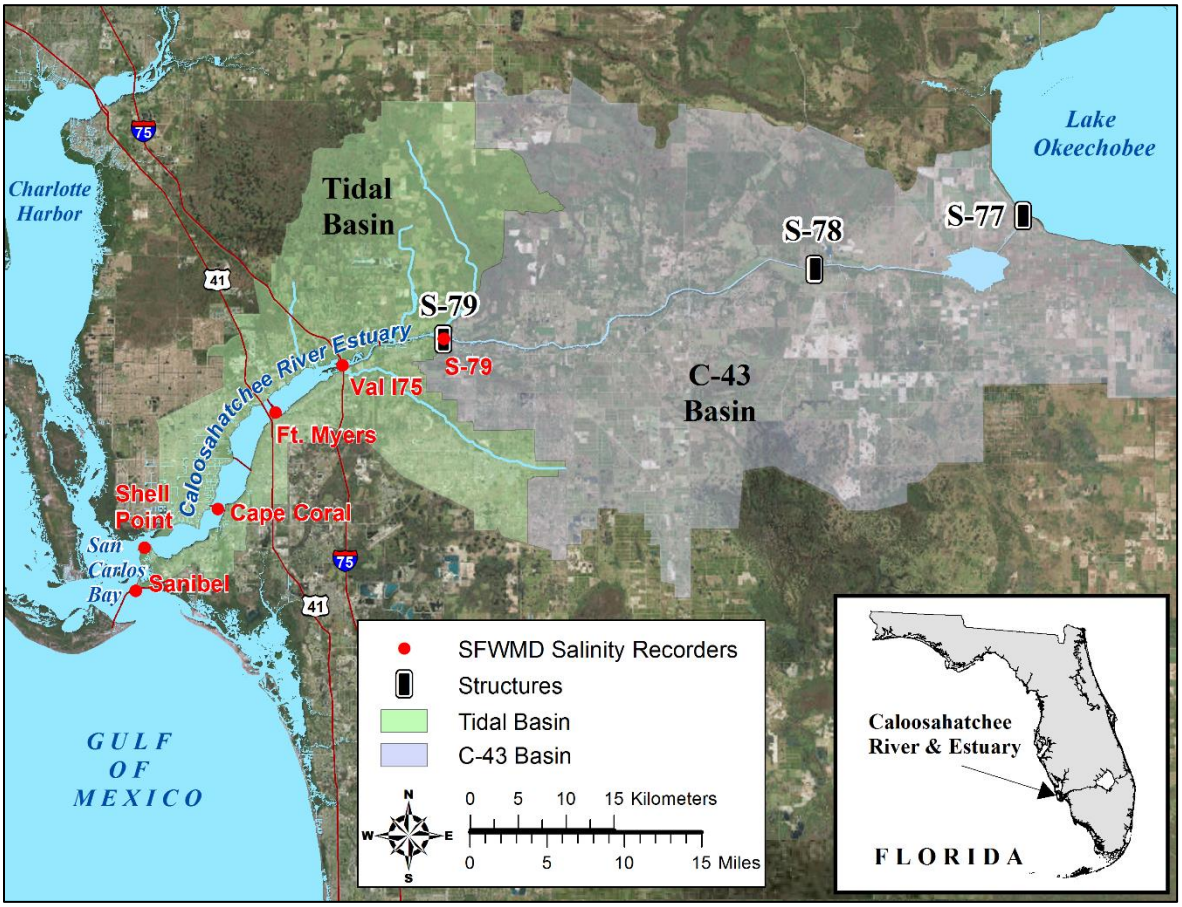


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

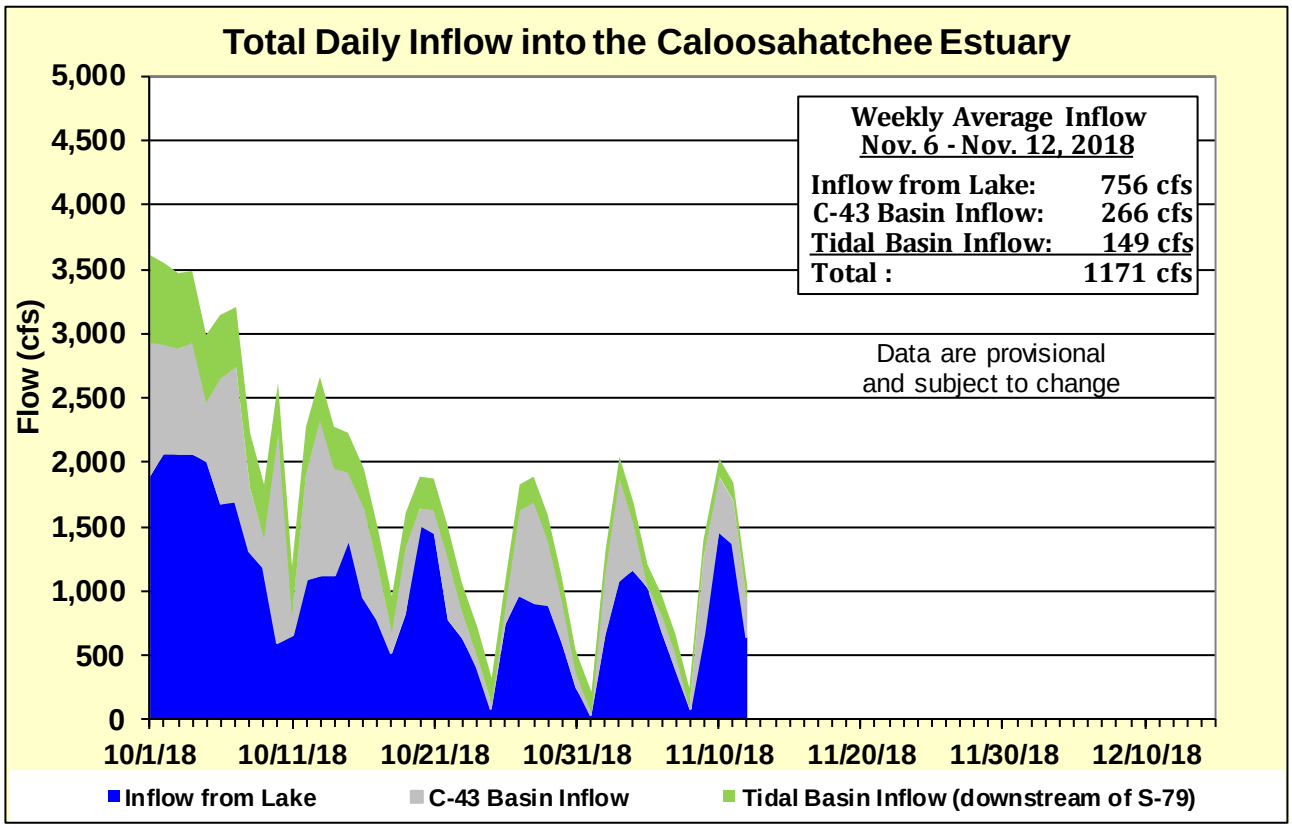


Figure 6. Total daily inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.

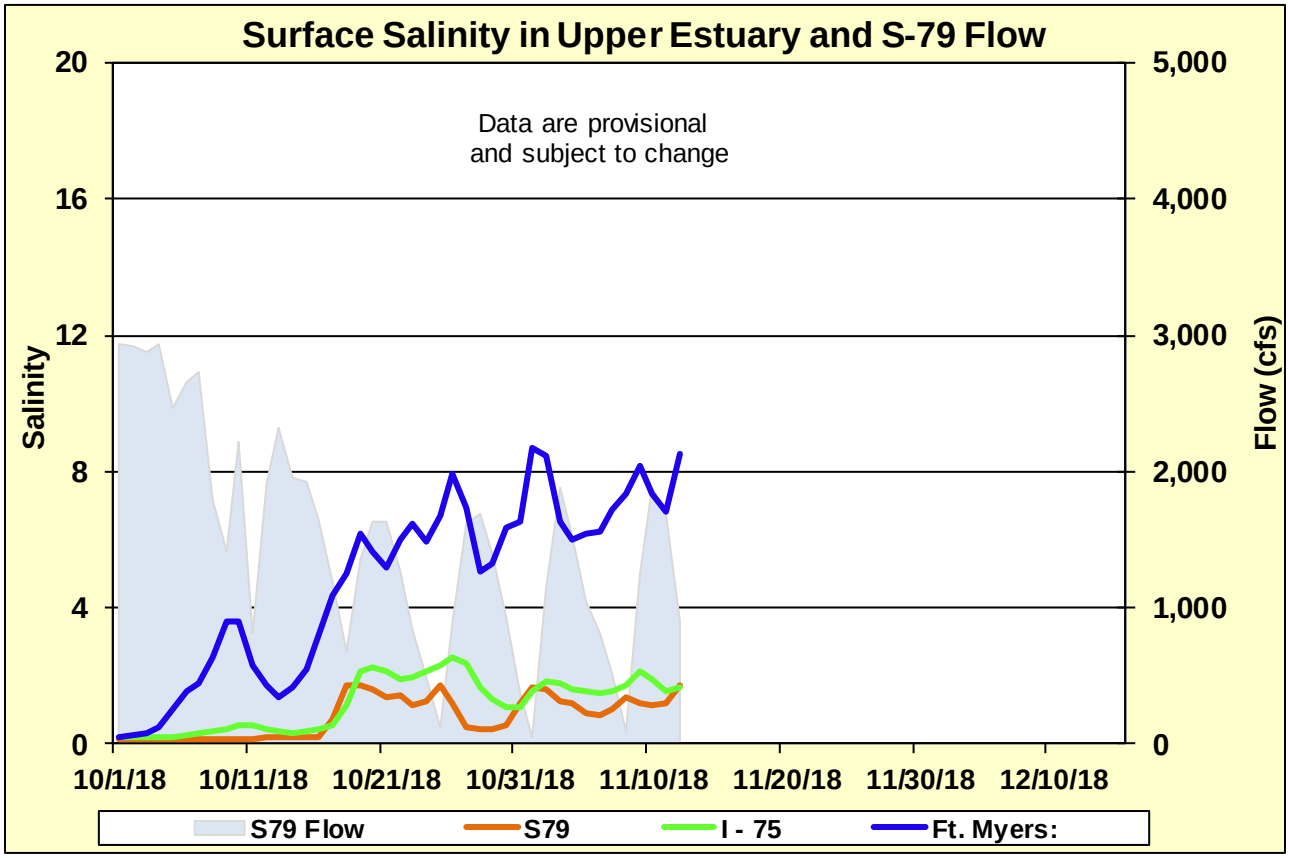


Figure 7. Daily mean flows at S-79 and salinity at upper estuary monitoring stations.

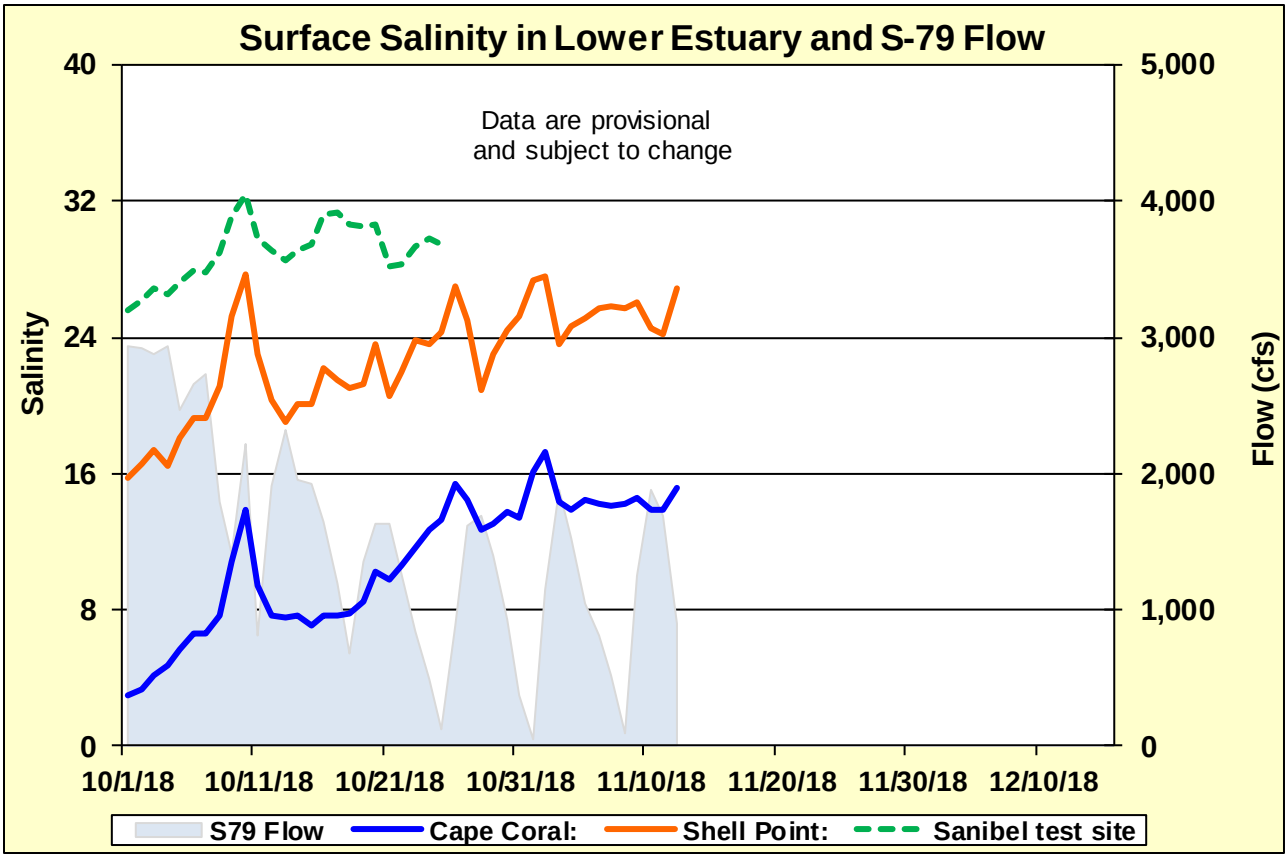


Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.

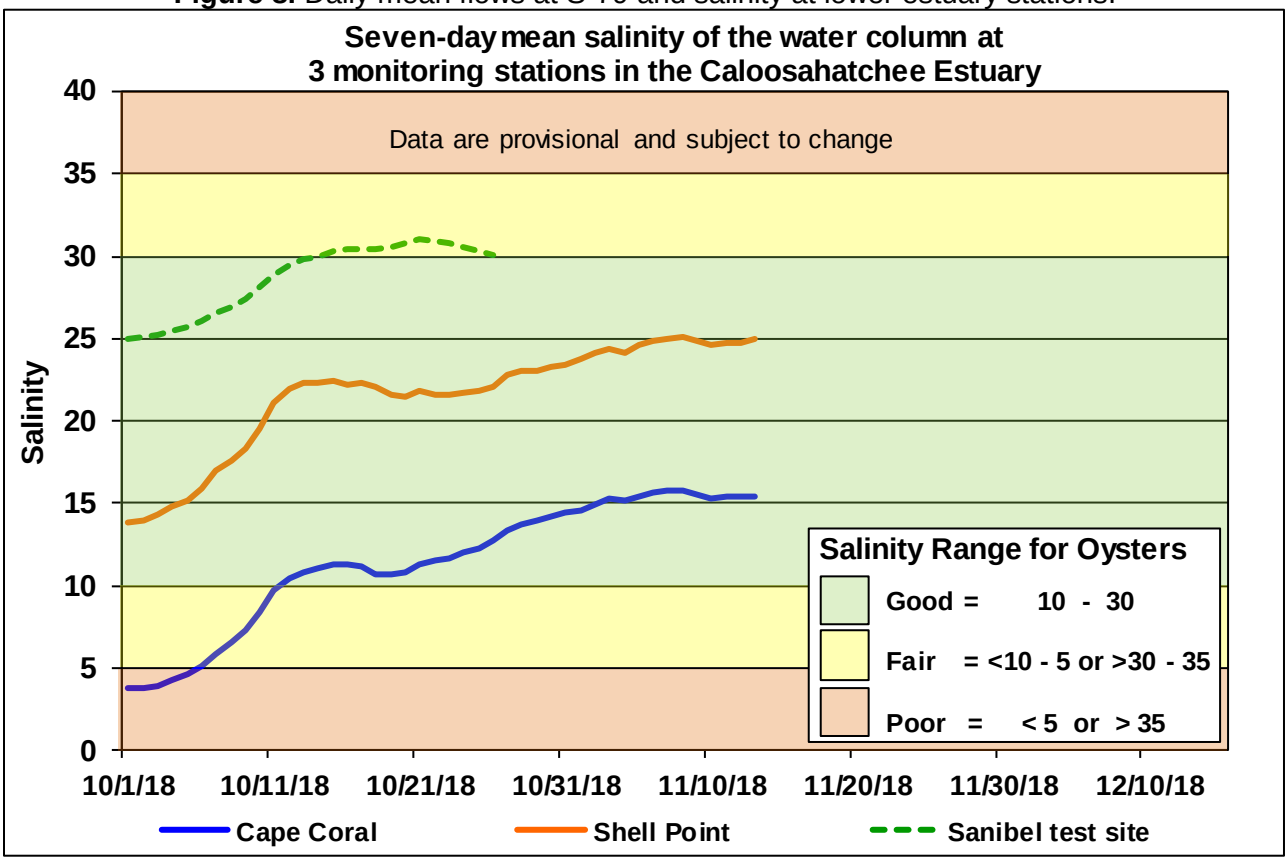


Figure 9. Seven-day mean salinity at Cape Coral, Shell Point, and Sanibel monitoring stations.

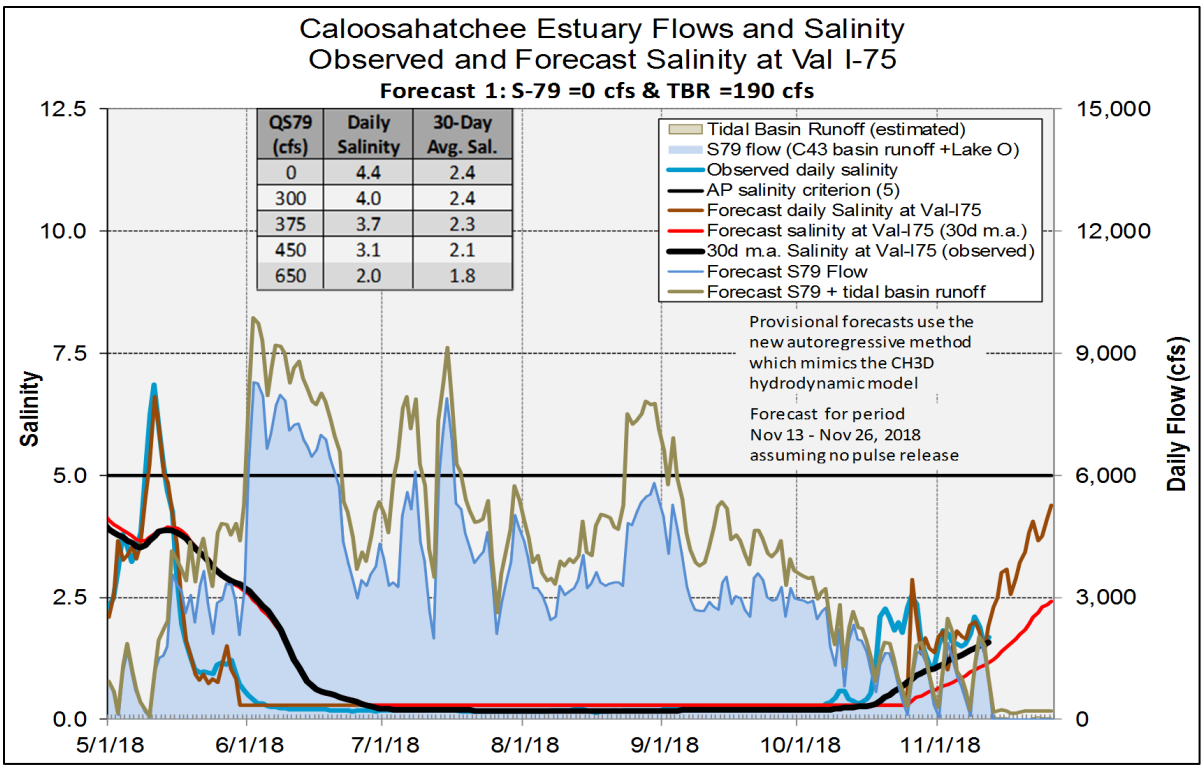
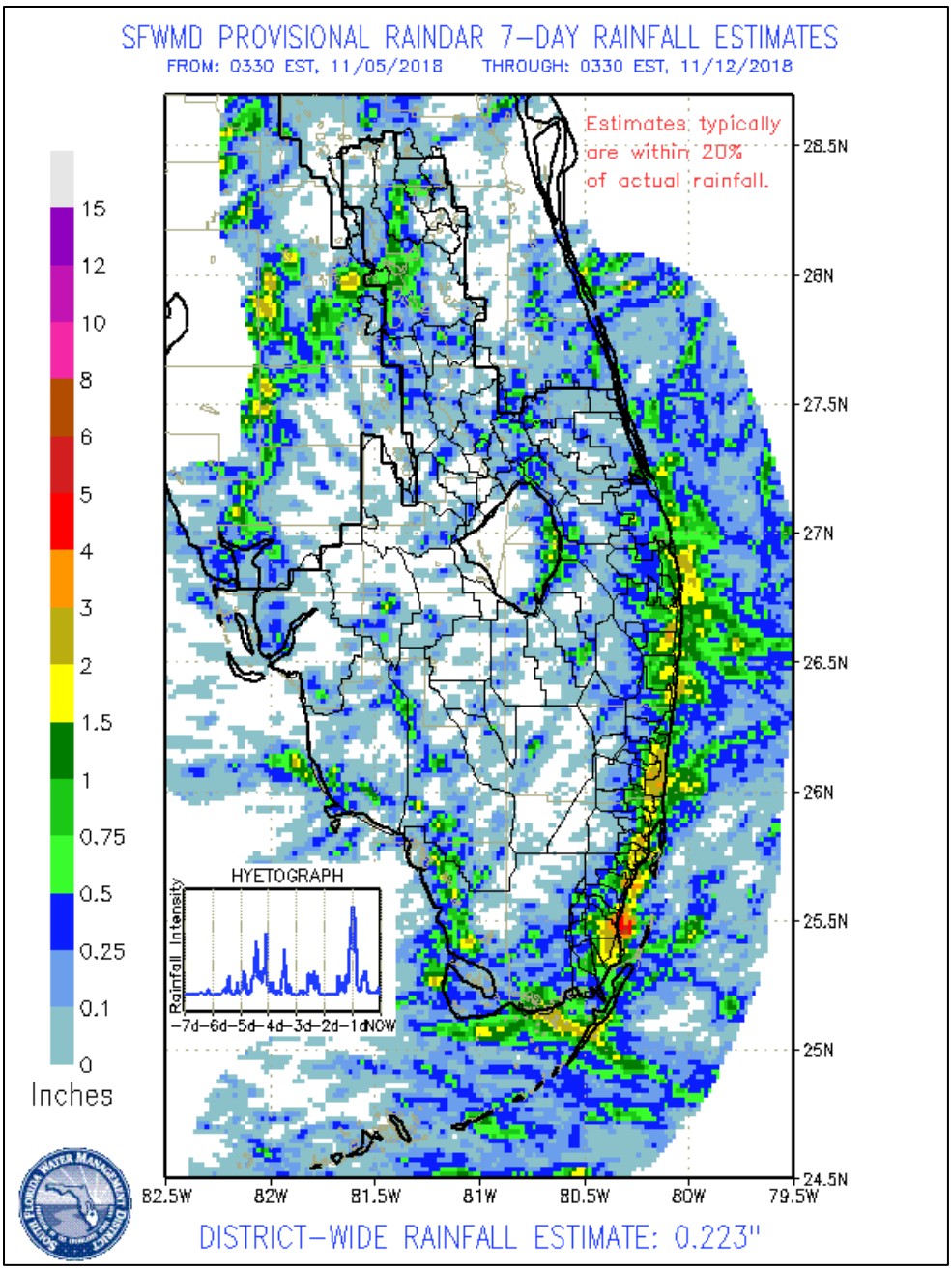


Figure 10. Val I-75 salinity assuming no pulse release at S79. The embedded table shows different pulse releases and resulting daily and 30 day moving average salinity at the end of the forecast period.

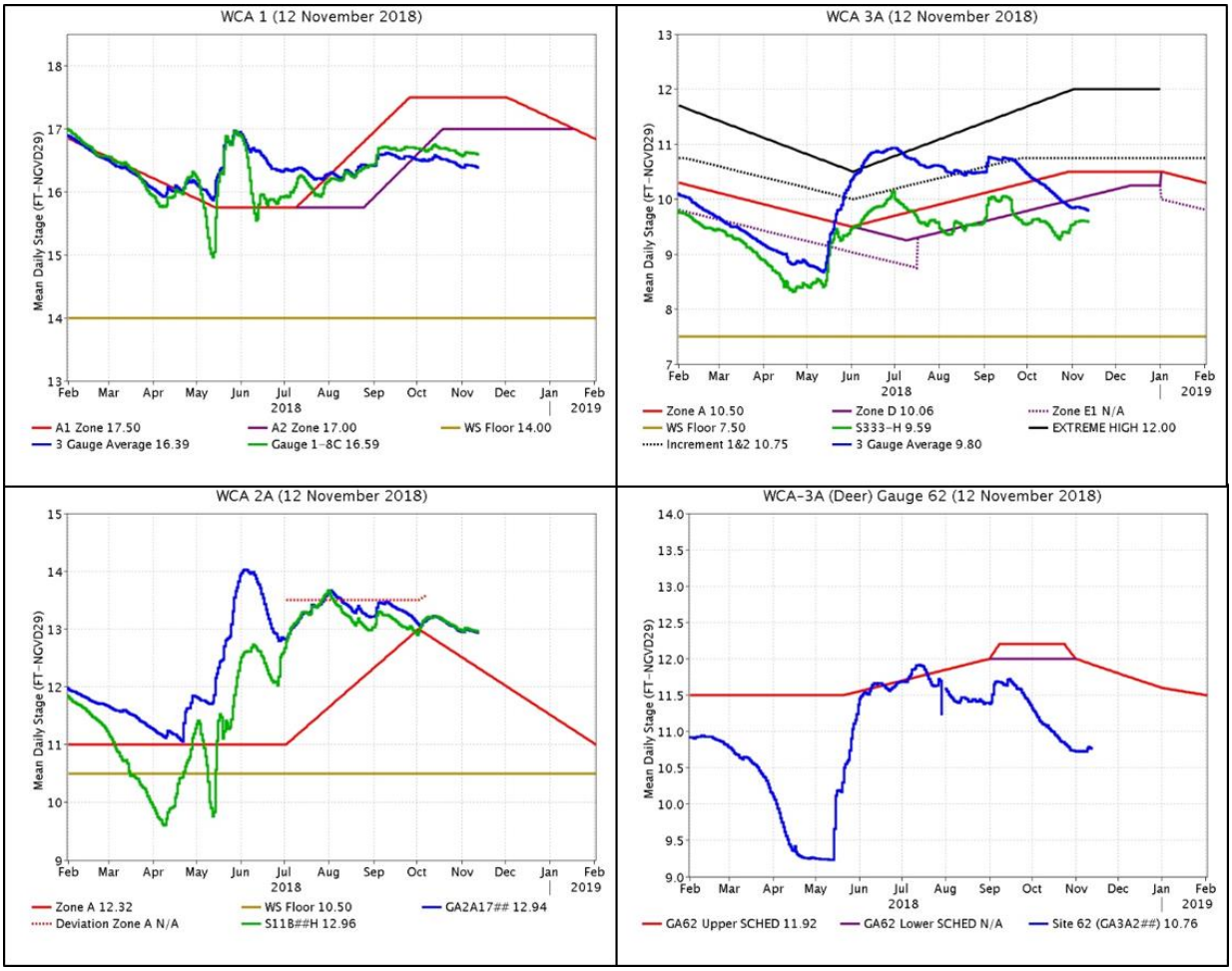
EVERGLADES

At the gauge locations monitored for this report stages within the WCAs fell 0.06 feet on average over the last week. The most extreme individual gauge changes within the WCAs ranged from +0.04 feet (WCA-3A northwest) to -0.15 feet (WCA-3B). Pan evaporation was estimated at 1.19 inches this week.

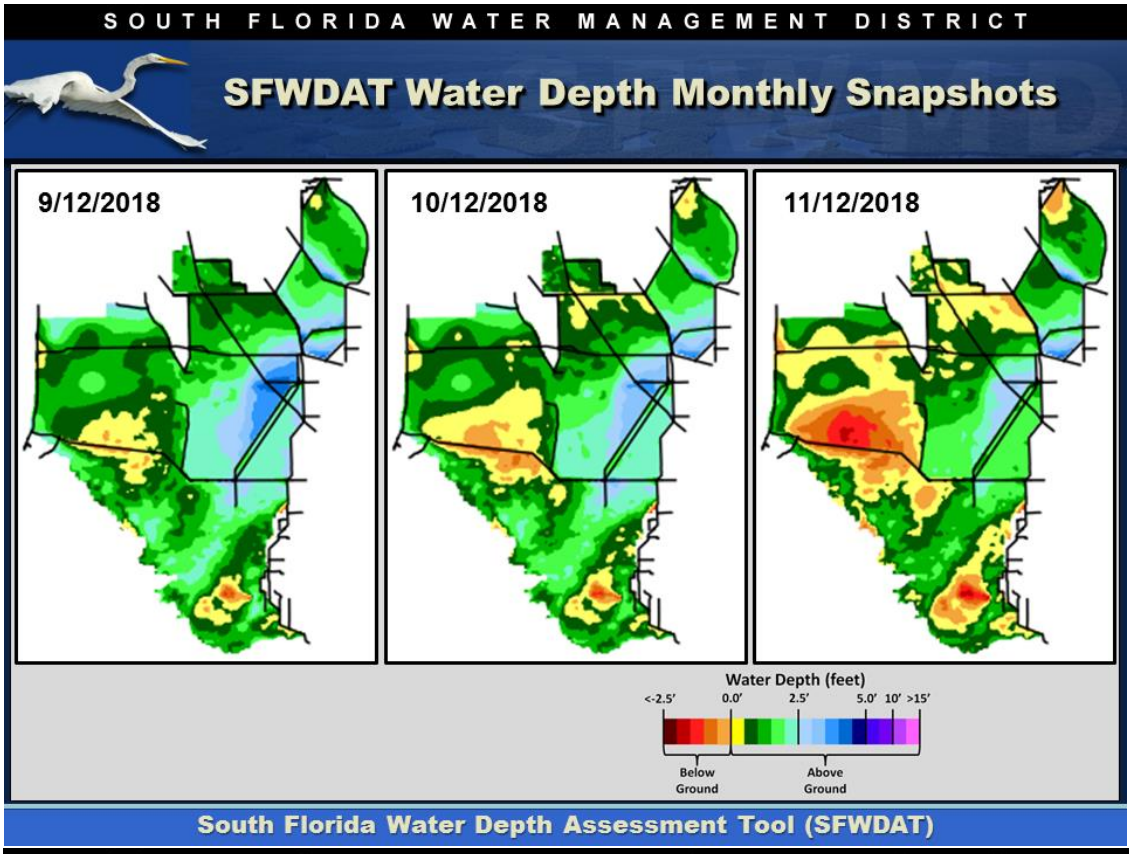
Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	0.12	−0.04
WCA-2A	0.13	−0.04
WCA-2B	0.03	−0.07
WCA-3A	0.04	−0.04
WCA-3B	<0.01	−0.10
ENP	0.31	−0.28

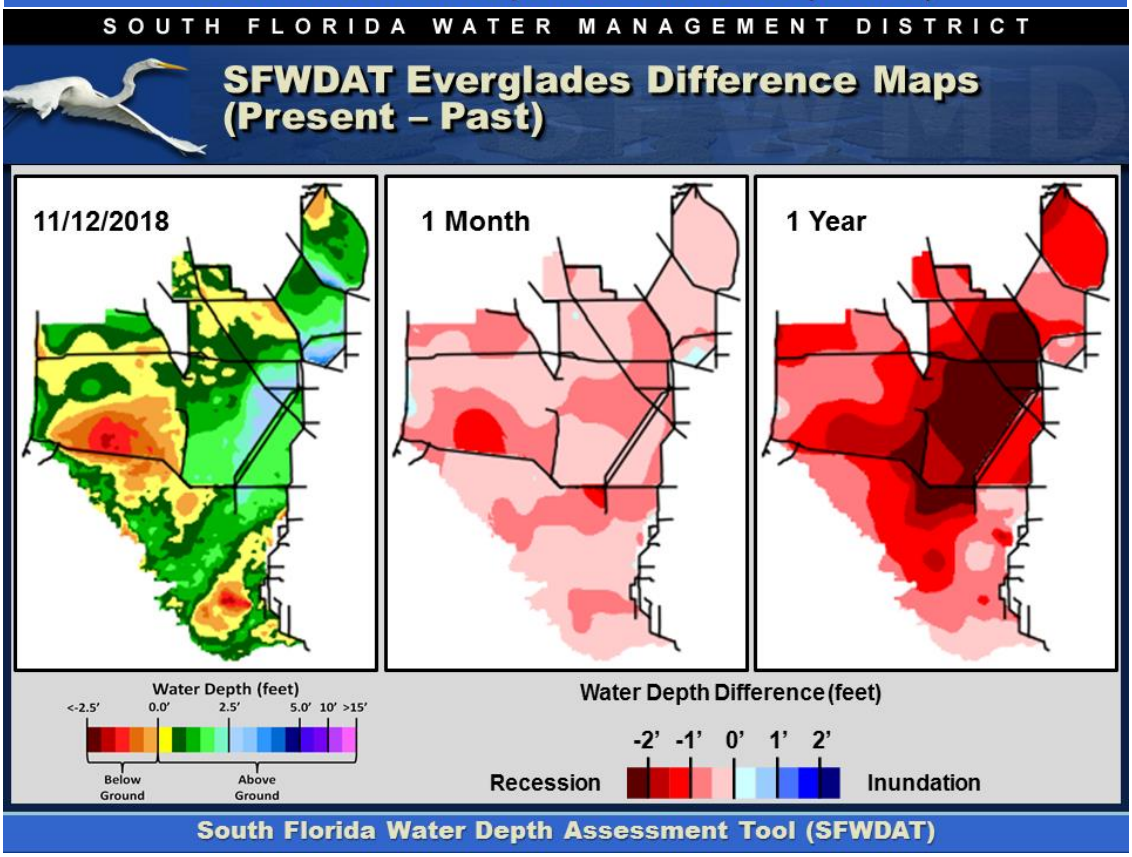


Regulation Schedules: Gauge 1-8C is 0.41 feet below the the Zone A2 regulation line. The three-gauge average remains 0.20 below the canal stage. S11B Headwater stage is 0.64 above the Zone A regulation line and the canal and marsh stage have equalized. WCA-3A three-gauge average stage is 0.26 feet below the Zone D regulation line. WCA-3A at gauge 62 (Northwest corner) is 1.16 feet below the Lower Schedule and has remained stable over the last two weeks.



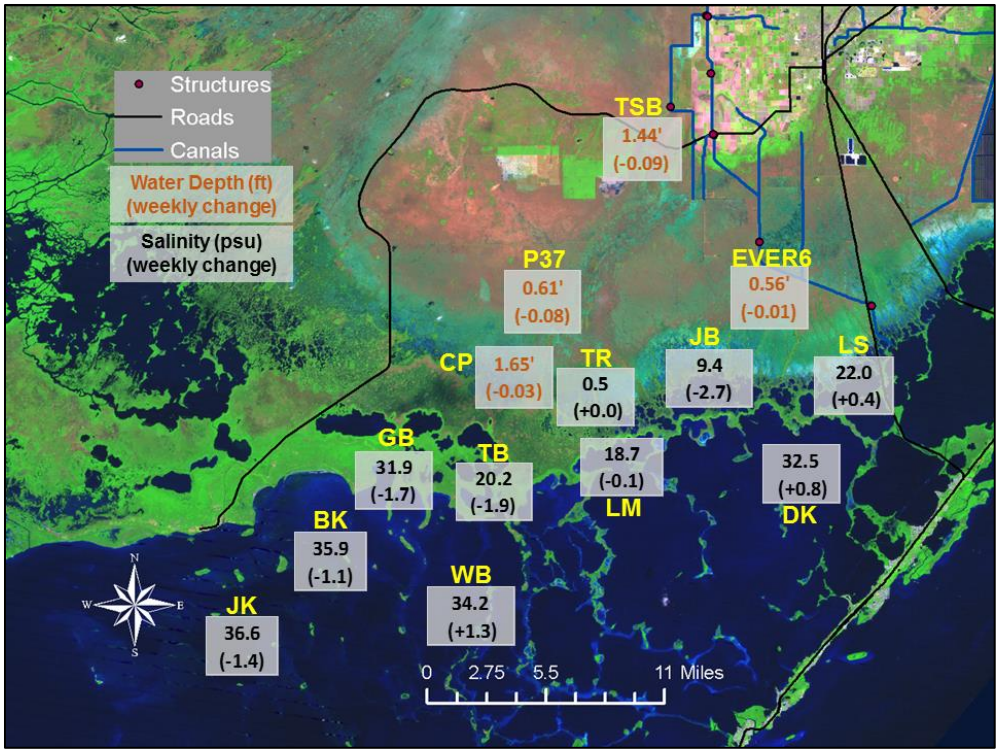
Water Depths and Changes: The WDAT tool for spatial interpolation of depth monthly snapshots indicate drying conditions. Regions with depths from 0.5 feet to 0.0 feet now cover most of WCA-3A North, and a large portion of northern WCA-1. The model is now showing expanding pockets of habitat with water depths belowground surface in both northeastern WCA-3A and WCA-1. WDAT difference output indicates that water level changes across most of South Florida are drier than they were one month ago. Ecologically important regions in WCA-3A are significantly shallower, with as much as -1.0 foot change. Over the last month the structure S-150 has been discharging just over 150 cubic feet per second on average into northeastern WCA-3A.

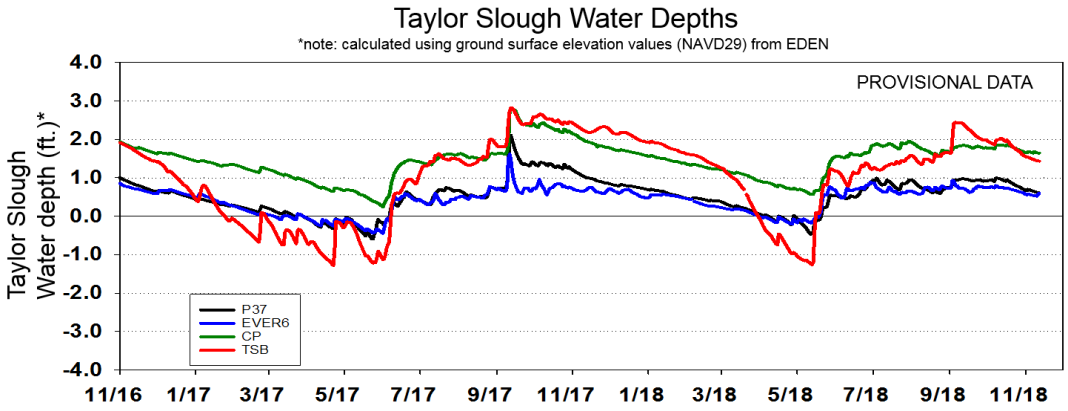


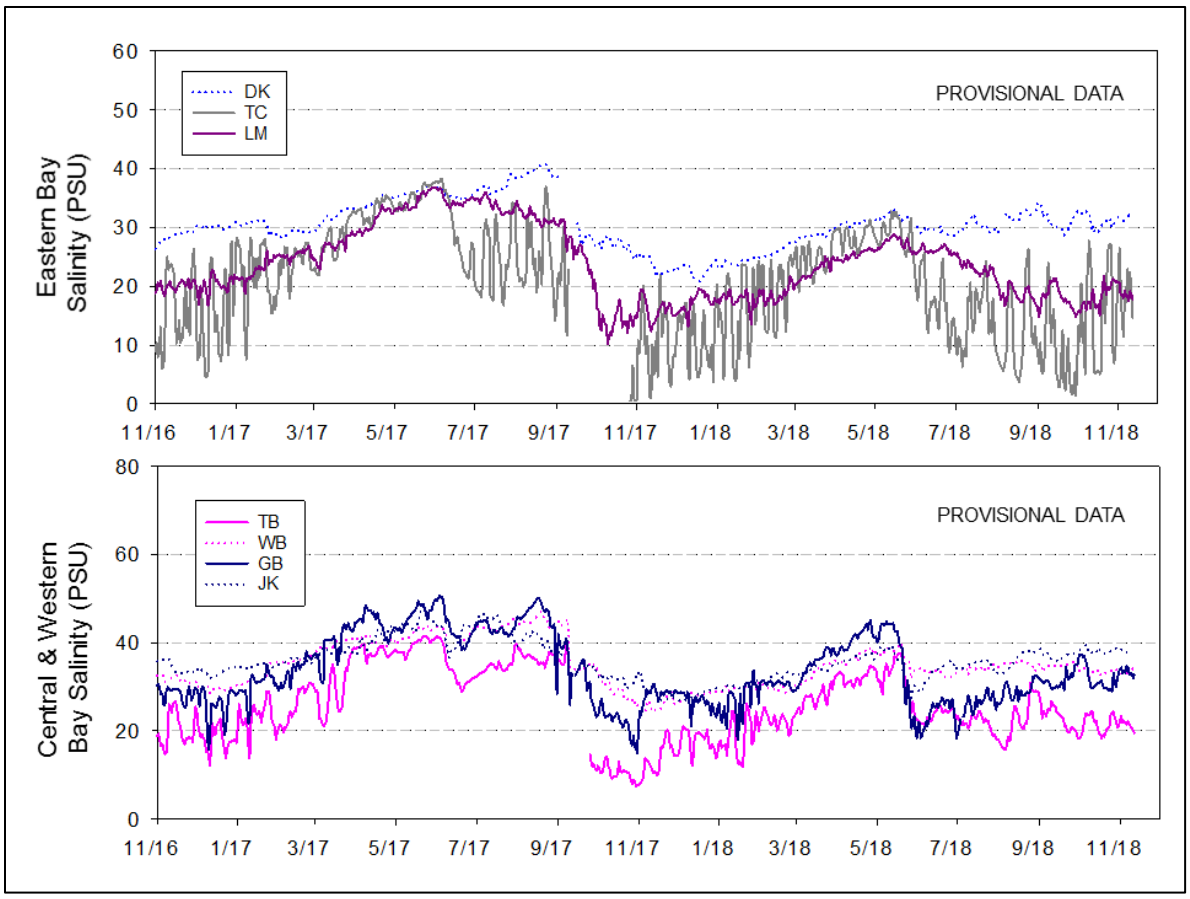


Taylor Slough Water Levels: An average of 0.6 inches of rain fell on Taylor Slough and Florida Bay this past week allowing stages to continue decreasing by an average of 0.05 feet last week. Water depths averaged 0.98 feet across Taylor Slough which is 1.5 inches higher than the historical averages for this time of year, but southern and central Taylor Slough are within 0.2 inches of average.

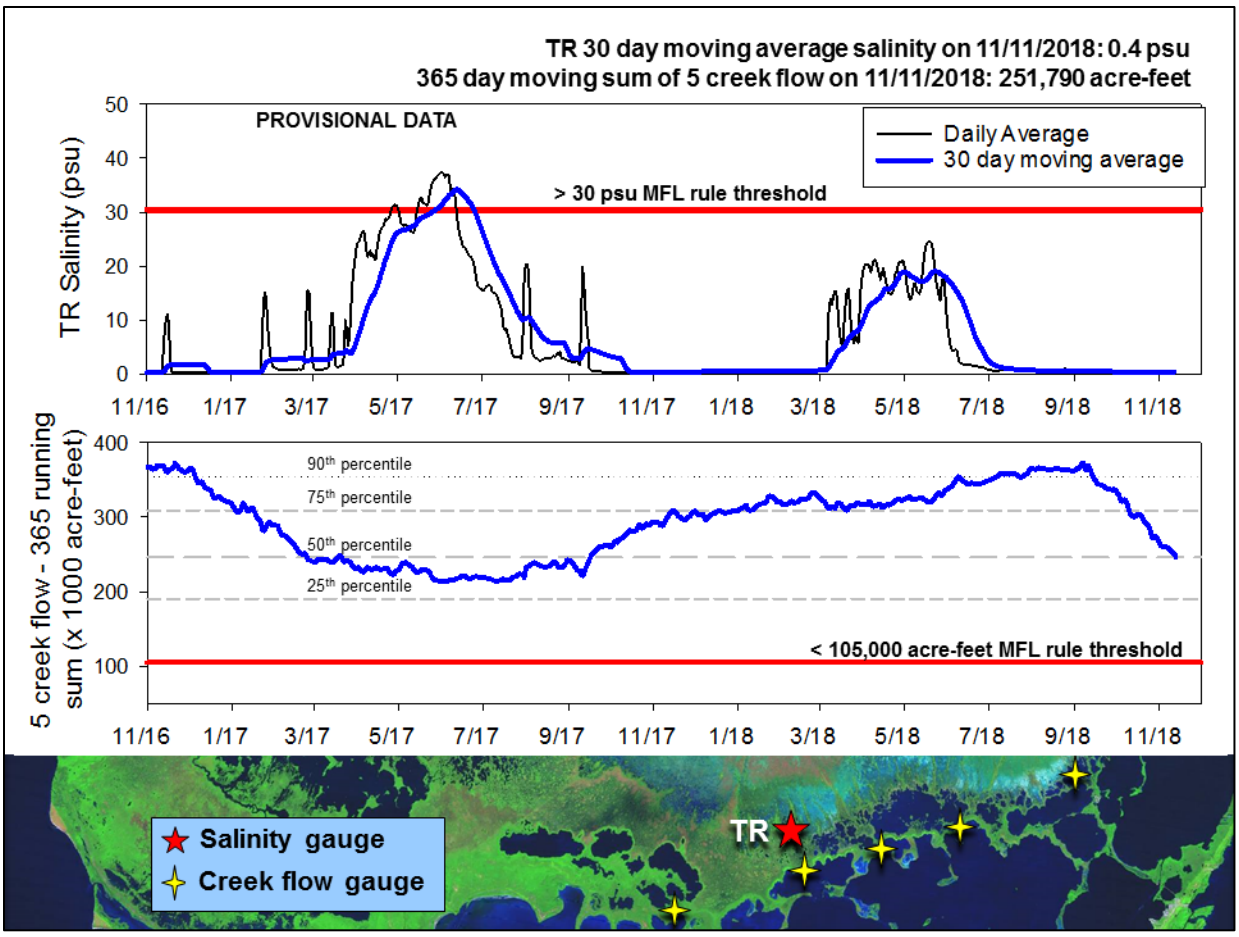
Florida Bay Salinities: Salinities decreased on average 0.7 psu this past week (individual gauge changes were less than or equal to 3 psu) and range from 9 psu in the northeast to 37 psu in the west. Conditions in western Florida Bay are 3 to 9 psu higher than their historical averages for this time of year which is undesirable at the start the dry season.







Florida Bay MFL: Mangrove zone daily average salinity remained at 0.5 psu, and the 30-day moving average is still 0.4 psu. The weekly cumulative flow from the five creeks denoted by yellow stars on the map totaled about 5,000 acre-feet for the last week which is half the historical average for this time of year. The 365-day moving sum of flow from the five creeks has been dropping rapidly with an additional decrease of 9,000 acre-feet over the last week to end at 251,790 acre-feet (now less than the long-term average of 257,628 acre-feet but still above the median). Creek flow is provisional data from the USGS and is highly variable.



Water Management Recommendations

Water management that protects peat soils (especially in WCA-3A North) as the dry season becomes established has increasing ecological benefit as unusually dry conditions pervade the WCA-3A basin. Wading bird flocks containing large numbers of juveniles were again noted feeding in northeast WCA-3A North on 11/5/18. The continued hydration of WCA-3A North serves both the conservation of peat soils and is providing suitable foraging depths for wading bird feeding. Stage conditions within WCA-2A (12.96 feet NGVD) and a relatively high stage in the L-38W (around 10.0 NGVD) are ideal to route water from the WCA-2A basin to hydrate the northeast corner (S150) of WCA-3A. The monthly average for total phosphorous detected in routine water quality samples collected at S-150 over the last ten years was 0.01 mg/L. Any water not available to protect the peat soils in WCA-3A North, would be ecologically beneficial to Holeyland and Rotenburger WMA. According to the WDAT modeling, depths in the northern portion of WCA-1 at and near ground level have expanded significantly over the last month. This historically dry area would continue to benefit from hydration as the 3-gauge average stage is now 0.61 feet below the Zone A2 regulation line but has remained steady over the last several weeks. Incremental change in the rate of structure flows (i.e., when changing flow rates from 0 cfs to 1,000 cfs, make 500 cfs adjustment per week) to the WCAs is more ecologically sensitive than abrupt rate changes. More specific recommendations appear in the summary table below. The red text represents new or modified information or recommendations.

SFWMD Everglades Ecological Recommendations, November 13th, 2018 (red is new)			
Area	Weekly change	Recommendation	Reasons
WCA-1	Stage decreased by 0.04'	Maintain depths at regulation schedule. Moderate recession rates to the extent possible.	Protect upstream/downstream habitat and wildlife.
WCA-2A	Stage decreased by 0.04'	Maintain depths at regulation schedule. Moderate recession rates to the extent possible.	Protect upstream/downstream habitat and wildlife.
WCA-2B	Stage decreased by 0.07'	Maintain depths at regulation schedule. Moderate recession rates to the extent possible.	Protect upstream/downstream habitat and wildlife.
WCA-3A NE	Stage decreased by 0.14'	Maintain depths at regulation schedule. Moderate recession rates to the extent possible.	Protect habitat including peat soil development, tree islands and wildlife.
WCA-3A NW	Stage increased by 0.04'	Maintain depths at regulation schedule. Moderate recession rates to the extent possible.	
Central WCA-3A S	Stage decreased by 0.06'	Maintain depths at regulation schedule. Moderate recession rates to the extent possible.	Protect habitat including peat soil development, tree islands and wildlife.
Southern WCA-3A S	Stage increased by 0.01'		
WCA-3B	Stage decreased by 0.10'	Maintain depths at temporary regulation schedule. Moderate recession rates to the extent possible.	Protect upstream/downstream habitat and wildlife.
ENP-SRS	Stage decreased by 0.28'	Make discharges to the Park according to the 2012 WCP rainfall plan.	Protect upstream/downstream habitat and wildlife.
Taylor Slough	Stage changes ranged from −0.09' to −0.01'	Move water southward as possible	When available, provide freshwater buffer for downstream conditions. Decrease potential for high phosphorus input to ENP.
FB- Salinity	Salinity changes ranged −2.7 to +1.3 psu.	Move water southward as possible	When available, provide freshwater to maintain low salinity buffer and promote water movement.