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: September 11, 2018

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

Enhanced moisture across southern and central Florida this morning would ordinarily result in near to above rainfall across the District this afternoon and evening. However, the added ingredients of strong upper-level convergence, a low-level divergent flow, and reduced levels of atmospheric instability should instead lead to only meager area-averaged rainfall and a reduced coverage of rain. Sounding data indicate an inversion (or cap) present across most of the area and satellite imagery shows a thick layer of middle and high clouds, both of which should generally help to delay shower and thunderstorm development until the early or middle part of the afternoon. Once afternoon rains begin to form, layer-averaged steering winds from the east-southeast near and south of Lake Okeechobee should cause the activity to concentrate from the southwestern interior through the southern and eastern side of Lake Okeechobee while the region near the southeast coast should remain relatively dry. North of Lake Okeechobee a west-southwesterly or southwesterly and somewhat greater instability should cause greater rains to concentrate over portions of the Kissimmee valley to northeast of Lake Okeechobee through the upper east coast. Overall, the District-average rainfall today should come in much below normal, most likely ranging somewhere between 30-50% of normal (daily climatological value is 0.25 inches); but with a thick cloud deck currently affecting daytime heating, the possible range is likely broader than usual. On Wednesday the combination of enhanced moisture still over the District and an upper-level low moving over the Florida peninsula should result in a significant increase in District-average rainfall and rain coverage. The large circulation of Hurricane Florence should also begin to affect the District tomorrow, with a deep layer of northerly to north-northeasterly winds helping to focus the rains over the northern and eastern areas once the east coast sea breeze becomes active and then over portions of the western interior later in the day. Hurricane Florence should continue to influence the District's weather on Thursday and Friday but indirectly. The slow-moving or stalled hurricane over the southeastern states should have a long convergent tail, extending southward through the southern portion of the District. Continued enhanced atmospheric moisture, weaker steering flow, and the convergence associated with this long band could produce localized heavy rains, most likely over the southeastern part of the District. With light steering winds, there is some potential for some significant local maxima over this region. Saturday looks to be much drier, but as the large circulation of Hurricane Florence gradually shows signs of departing the eastern United States, the models are forecasting a moist southeasterly to southerly flow across the District Sunday and Monday which could result in enhanced rainfall and the possibility of rains near or at the climatological average. For the week ending next Tuesday morning, the deterministic quantitative precipitation forecast (QPF) is about 60% of normal while the probabilistic data show the most likely range between 40% and 75%, which is somewhat broader than normal given the uncertainty regarding how long Hurricane Florence indirectly exerts its influence on Florida weather.

Kissimmee

Tuesday morning stages were 56.7 feet NGVD (at schedule) in East Lake Toho, 53.8 feet NGVD (0.1 feet above schedule) in Toho, and 51.4 feet NGVD (0.2 feet above schedule) in Kissimmee-Cypress-Hatchineha; headwater stages were 46.3 feet NGVD at S-65A and 27.7 feet NGVD at S-65D. Tuesday morning discharges were: 1,897 cfs at S-65, 2,015 cfs at S-65A, and 4,404 cfs at S-65E. Dissolved oxygen concentration in the Kissimmee River averaged 2.9 mg/L for the week. Kissimmee River mean floodplain depth on Sunday was 1.66 feet. No new recommendations were made this week.

Lake Okeechobee

Lake Okeechobee stage is 14.71 feet NGVD, rising 0.10 feet from last week and 0.21 feet over the last 30 days. The seasonal low for 2018 (12.83 feet NGVD) was the third highest since 2011, and the third time in six years that lake stage did not reach the bottom of the preferred stage envelope (12.5 – 15.5 feet NGVD). Due to record rainfall in May, the submerged aquatic vegetation (SAV) coverage on the Lake will likely remain at minimal levels beyond next summer, prolonging impacts from high water levels associated with El Niño in 2016 and Hurricane Irma in 2017. Cyanobacteria bloom potential has increased slightly over the last week, based on NOAA's analysis of satellite data (see supporting information below). The latest image (September 9) showed elevated potential in and near Fisheating Bay, as well as the central portion of the pelagic zone. Conditions will likely remain favorable for some level of recurring blooms throughout the month, particularly during stretches of low wind and high temperature on the Lake.

Estuaries

Total inflow to the St. Lucie Estuary averaged 2,624 cfs over the past week with 934 cfs coming from Lake Okeechobee. Surface salinity stayed about the same in the North Fork and increased in the middle and lower parts of the estuary. The seven-day average salinity at the US1 Bridge is in the poor range for adult eastern oysters. Total inflow to the Caloosahatchee Estuary averaged 4,219 cfs over the past week with 1,510 cfs coming from the Lake. Salinity remained near 0 down to Ft. Myers Yacht Basin and increased downstream. The 30-day moving average surface salinity is 0.2 at Val I-75 and 0.2 at Ft. Myers. Salinity conditions between Val I-75 and Ft. Myers are good for tape grass. Salinity conditions are in the poor range for adult eastern oysters at Cape Coral and in good range at Shell Point. Given the current estuarine conditions, there are no ecological benefits associated with freshwater releases from Lake Okeechobee.

Stormwater Treatment Areas

Over the past week, the STAs received approximately 8,500 acre-feet of Lake releases. The total amount of inflows to the STAs in WY2019 (since May 1, 2018) is approximately 879,000 acre-feet, which includes approximately 156,000 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. 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 2008 LORS recommends Lake releases to the WCAs and the conditions allow, releases will be sent to the STA-1E, A-1 FEB/STA-3/4 and STA-2.

Everglades

Conditions within the Everglades are generally stable as the WCAs remain close to the current regulation/deviation schedules despite the influence of Tropical Storm Gordon. Water depths on average rose across the Water Conservation Areas but not at a rate that exceeded the ascension rate recommendation (stage increase should not exceed 0.25 feet per week) which is important for Apple Snail reproduction. The average water depth at the gauges located in WCA-3A North is 1.82 feet and in WCA-3A South the average depth is 2.64 feet. Gauge 65 stage is above the threshold that indicates flooding stress to tree islands. An average of 3.6 inches of rain fell on Taylor Slough and Florida Bay this past week; stages averaged an increase of 0.23 feet. Salinities in Florida Bay were mostly stable this past week with changes staying less than 4 psu for the week.

Supporting Information

KISSIMMEE BASIN

Kissimmee Basin Rainfall

The Upper Kissimmee Basin received 1.27 inches of rainfall in the past week and the Lower Basin received 1.02 inches (SFWMD Daily Rainfall Report 9/9/2018).

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: 9/11/2018

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)						
							9/9/18	9/2/18	8/26/18	8/19/18	8/12/18	8/5/18	7/29/18
Lakes Hart and Mary Jane	S-62	93	LKMJ	60.1	R	60.0	**0.1**	0.0	0.0	0.0	0.1	0.0	0.0
Lakes Myrtle, Preston, and Joel	S-57	58	S-57	61.2	R	61.0	**0.2**	0.1	0.0	0.0	0.1	0.0	0.1
Alligator Chain	S-60	376	ALLI	63.3	R	63.2	**0.1**	0.2	0.1	0.1	0.1	0.1	0.1
Lake Gentry	S-63	541	LKGT	61.1	R	61.0	**0.1**	0.0	0.0	0.0	0.1	0.1	0.0
East Lake Toho	S-59	132	TOHOE	56.7	R	56.6	**0.1**	0.0	0.0	0.0	0.0	0.5	0.7
Lake Toho	S-61	699	TOHOW, S-61	53.7	R	53.6	**0.1**	0.1	0.1	0.0	0.1	0.3	0.6
Lakes Kissimmee, Cypress, and Hatchineha	S-65	3,538	KUB011, LKIS5B	51.3	R	51.1	**0.2**	0.5	0.1	0.1	0.4	0.7	0.6

[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: **9/11/2018**

Metric	Location	1-Day Average	Average for the Preceeding 7-Days[1]									
		9/9/2018	9/9/18	9/2/18	8/26/18	8/19/18	8/12/18	8/5/18	7/29/18	7/22/18	7/15/18	7/8/18
Discharge (cfs)	S-65	2,137	**3,538**	3,088	1,806	3,282	4,337	4,407	4,179	1,567	2,561	1,287
Discharge (cfs)	S-65A[2]	2,255	**3,808**	3,315	1,765	3,443	4,674	4,980	4,267	1,479	2,615	1,294
Discharge (cfs)	S-65D[2]	4,694	**4,313**	2,699	3,077	4,254	4,617	4,458	2,264	2,641	2,226	1,774
Headwater Stage (feet NGVD)	S-65D[2]	27.86	**27.86**	27.88	27.70	27.00	26.63	26.78	26.75	26.68	26.77	26.80
Discharge (cfs)	S-65E[2]	4,701	**4,402**	2,902	3,219	3,860	4,848	4,566	2,400	2,764	2,399	2,000
Discharge (cfs)	S-67	179	**176**	190	187	169	160	157	209	183	217	292
DO (mg/L)[3]	Phase I river channel	2.6	**2.9**	2.7	2.5	2.8	3.0	3.1	3.8	2.3	2.7	2.9
Mean depth (feet)[4]	Phase I floodplain	1.66	**1.78**	1.24	1.16	1.76	2.02	2.08	1.25	1.08	1.20	0.60

[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)

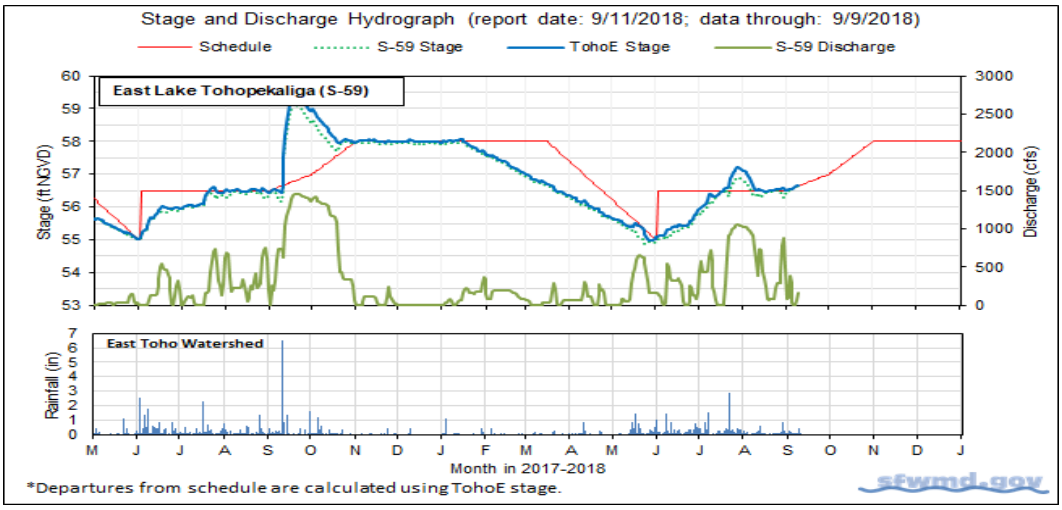


Figure 1.

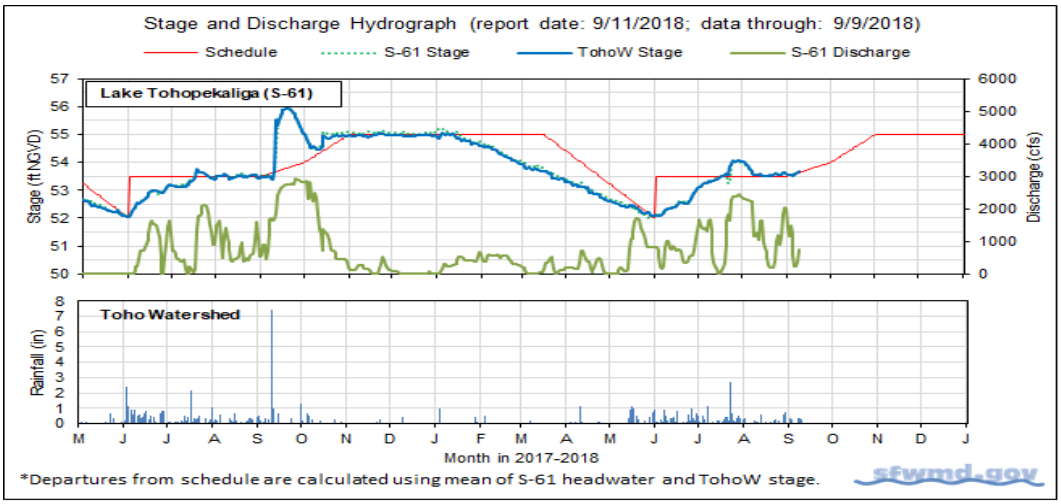


Figure 2.

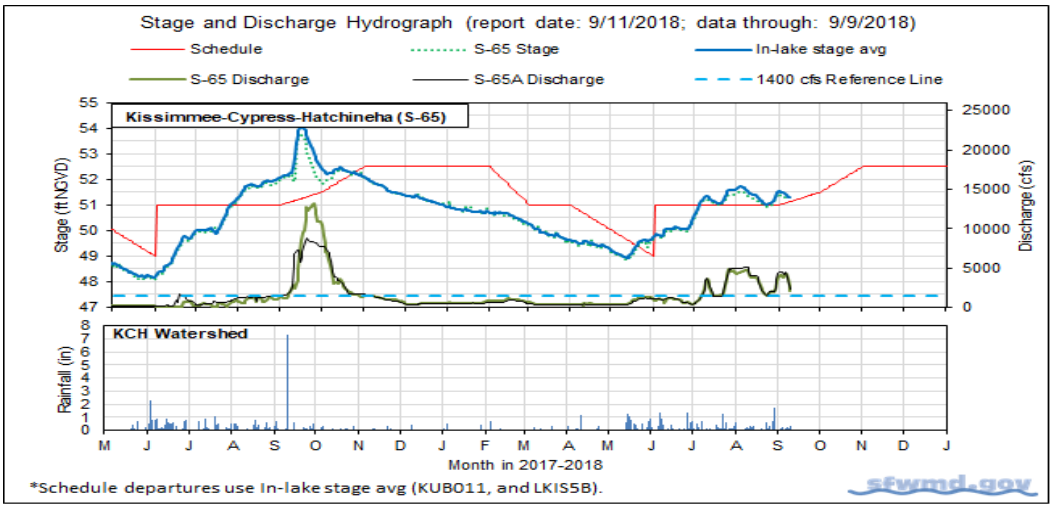


Figure 3.

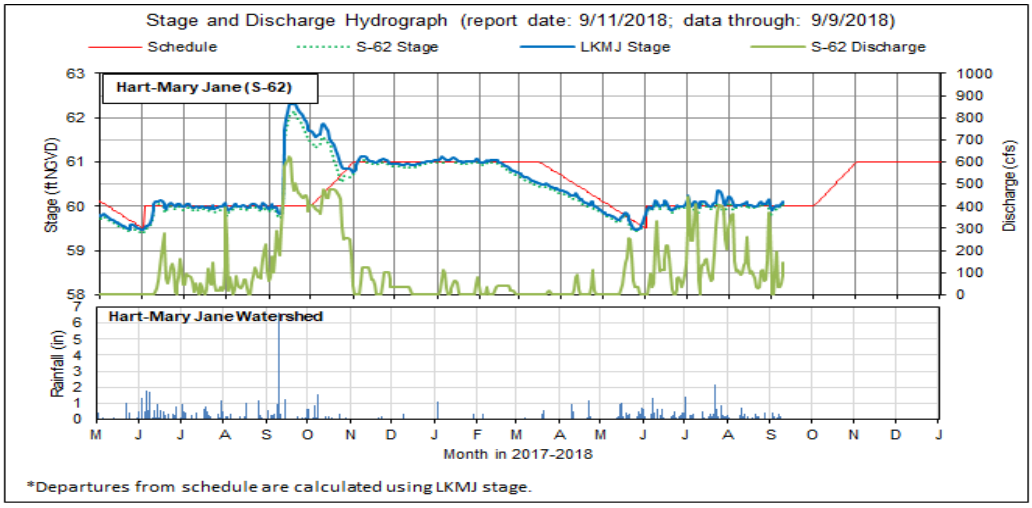


Figure 4.

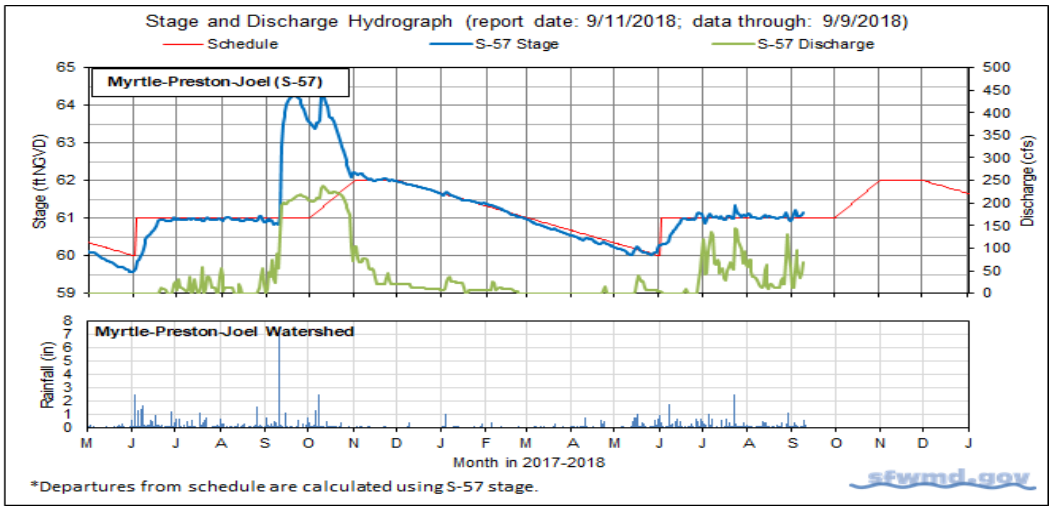


Figure 5.

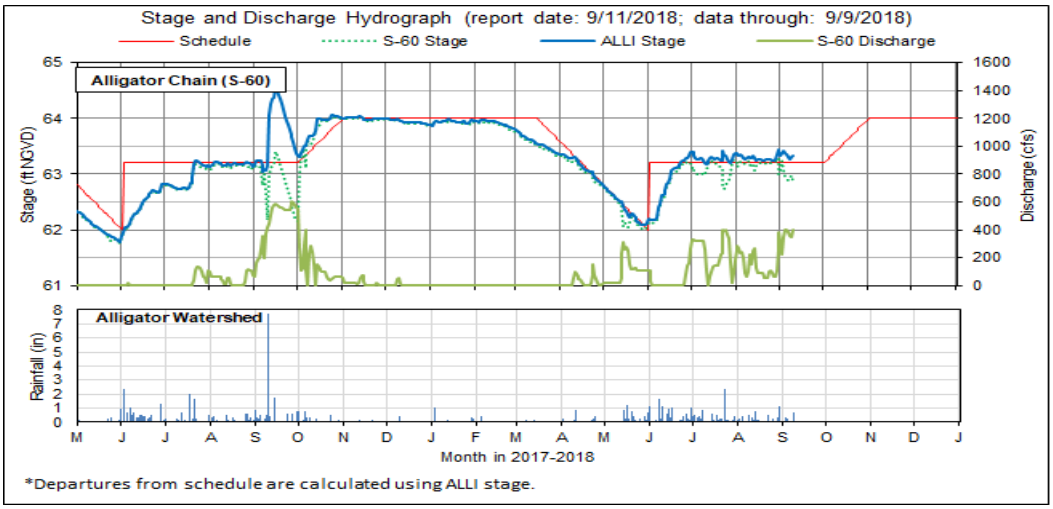


Figure 6.

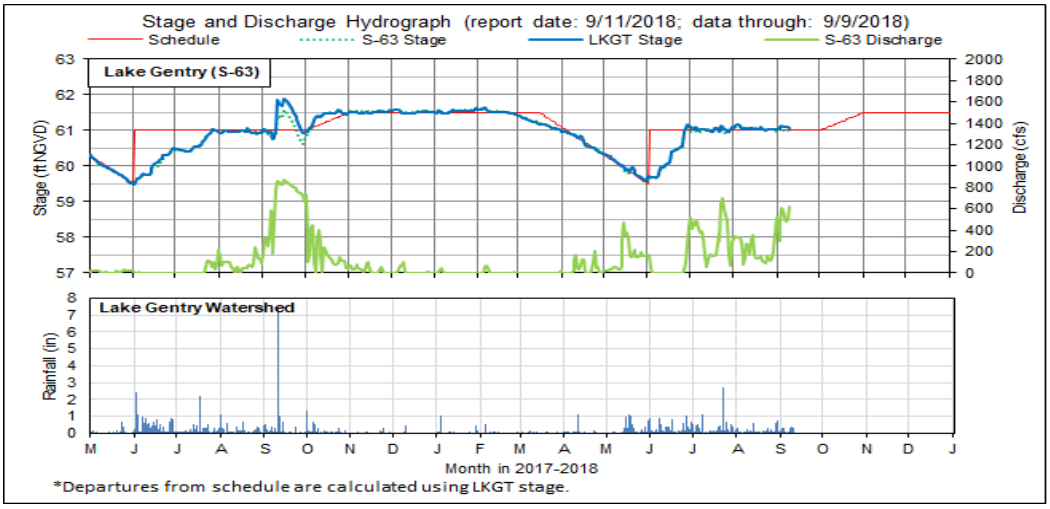


Figure 7.

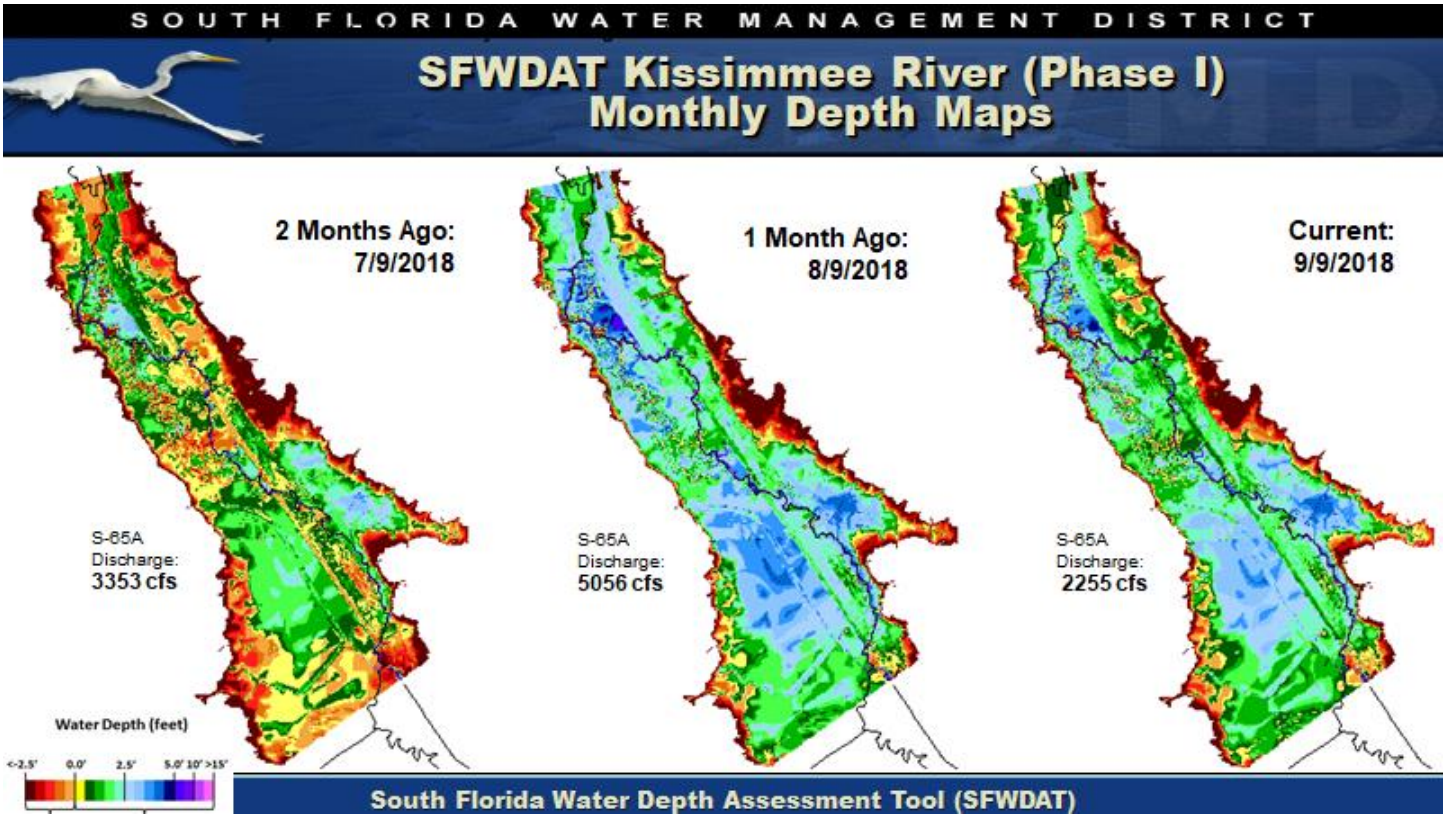


Figure 8. Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to January 16, 2012.

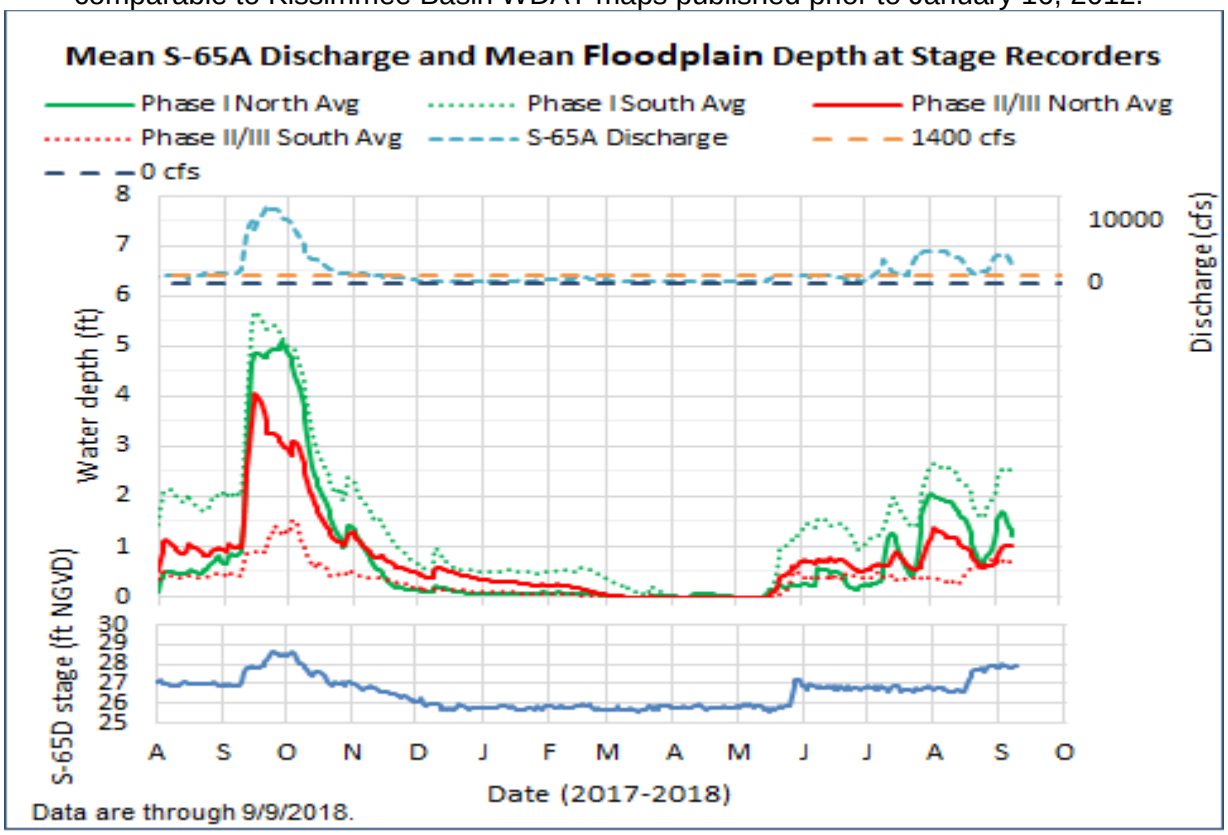
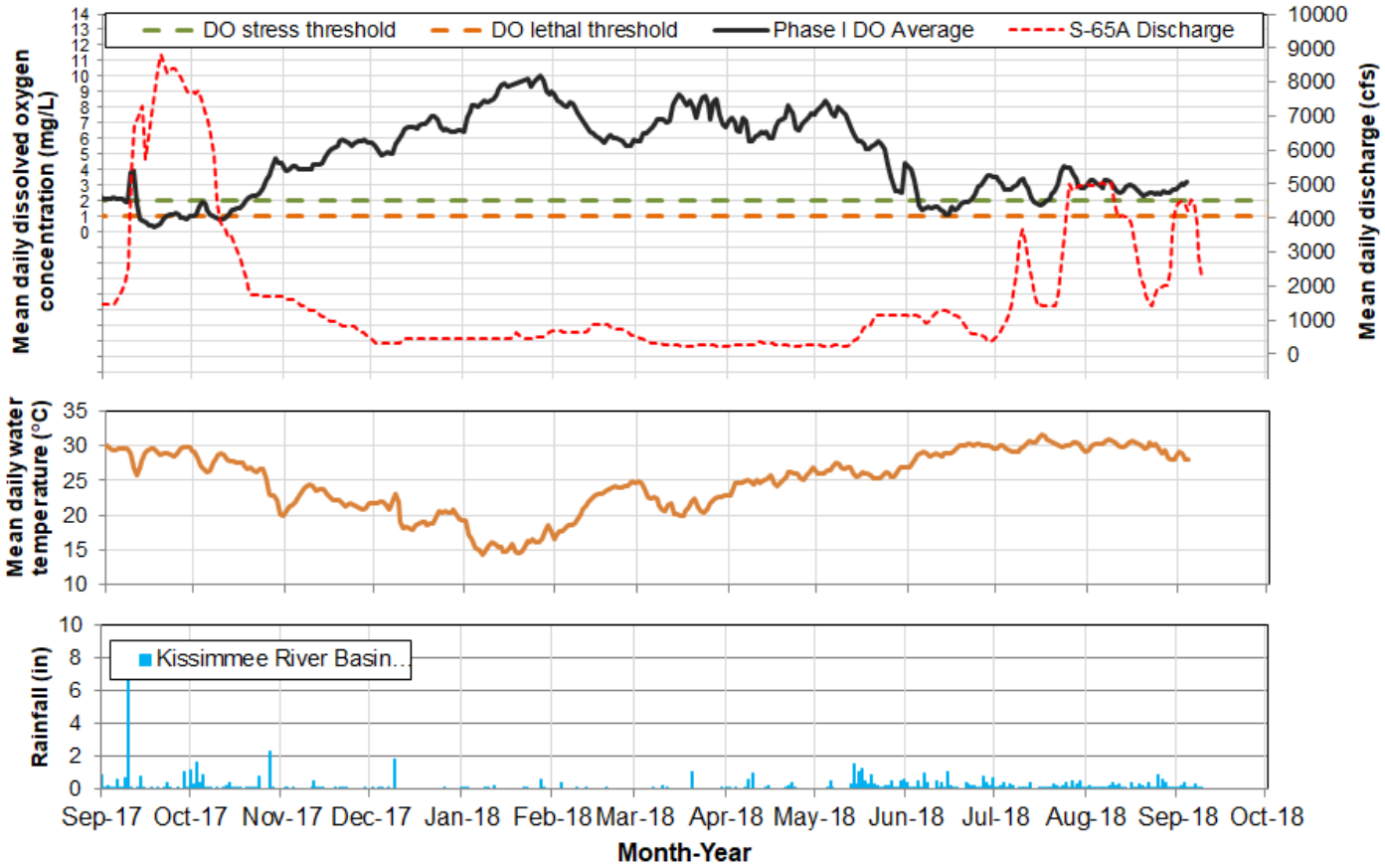


Figure 9. Mean water depth at stage recorders in the northern Phase I, southern Phase I, northern Phase II/III, and southern Phase II/III areas in relation to the S-65A discharge and S-65D headwater stage.



Report Date: 9/11/2018; data are through: 9/9/2018.

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
9/11/2018	No new recommendations.		N/A		8/7/2018
9/4/2018	No new recommendations.		N/A		8/7/2018
8/28/2018	No new recommendations.		N/A		8/7/2018
8/21/2018	No new recommendations.		N/A		8/7/2018
8/14/2018	No new recommendations.		N/A		8/7/2018
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
5/15/2018	Adjust S-65/S-65A discharge over the next few days to avoid additional stage rise in Kissimmee-Cypress-Hatchineha. Make any needed discharge changes gradually in consultation with Kissimmee Basin staff to reduce potential effects on Kissimmee River dissolved oxygen.	Protect Lake Kissimmee snail kite nests from rising water if there is additional rainfall.	N/A	KB Ops	5/22/2018
5/8/2018	No new recommendations.		N/A		5/8/2018
5/1/2018	No new recommendations.		N/A		5/1/2018
4/24/2018	No new recommendations.		N/A		4/24/2018
4/17/2018	No new recommendations.		N/A		4/17/2018
4/10/2018	No new recommendations.		N/A		4/10/2018

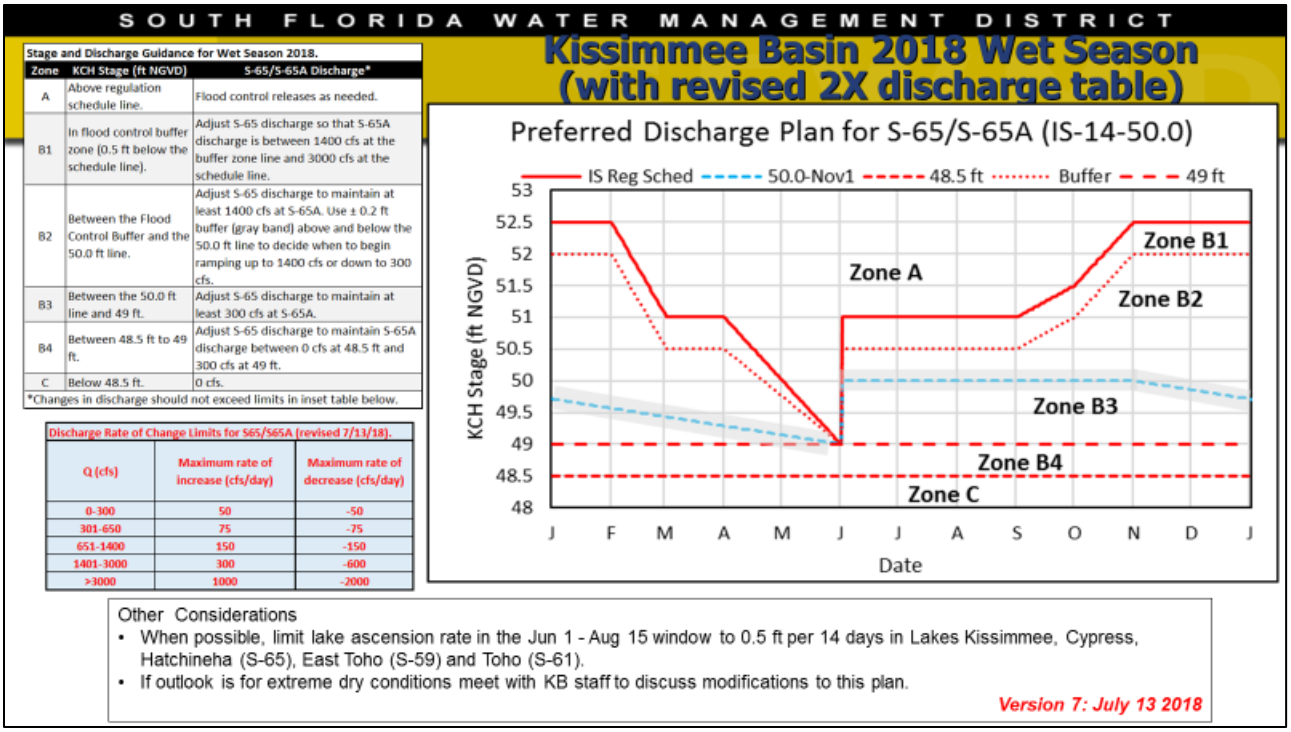


Figure 11. The 2018 Wet Season Discharge Plan for S-65/S-65A.

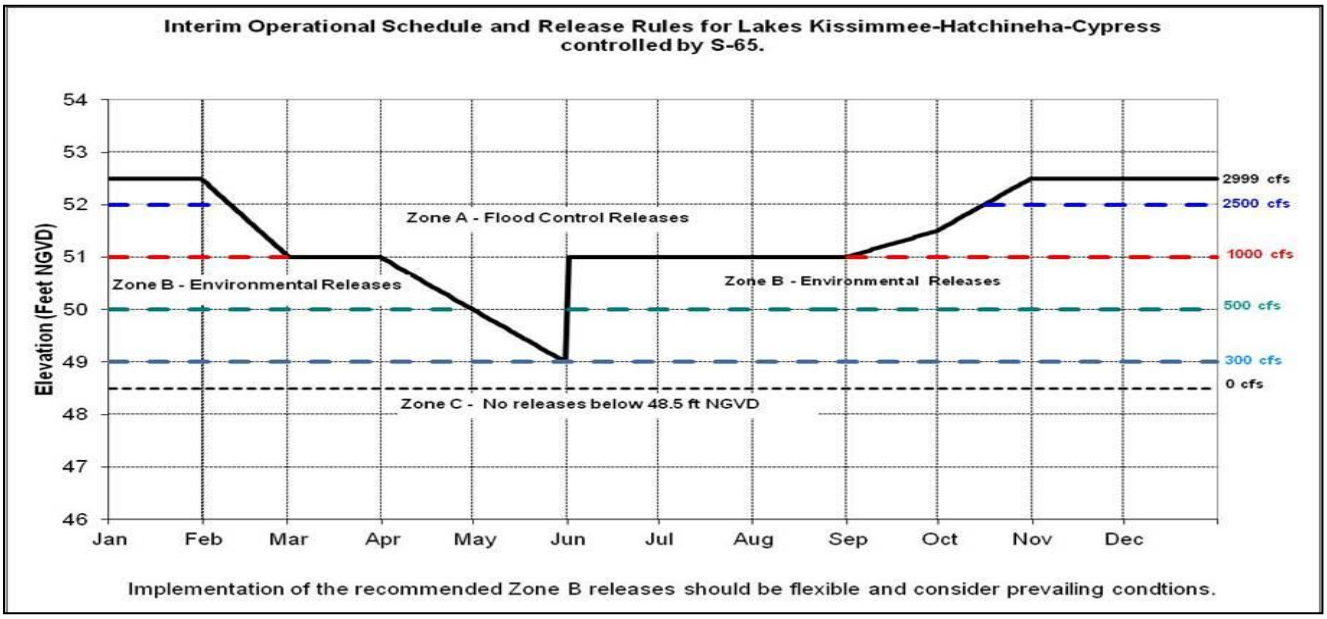


Figure 12. Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years.

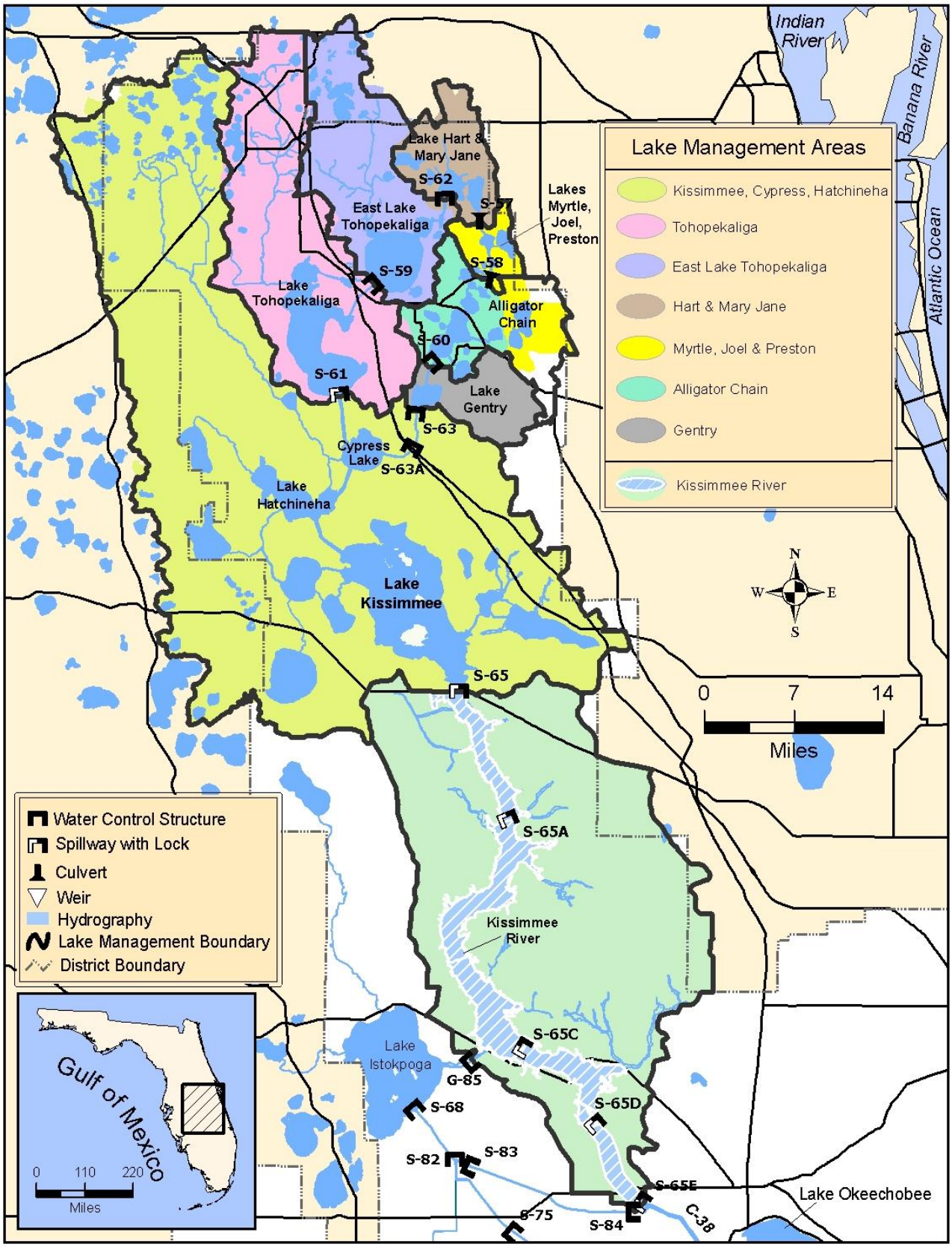


Figure 13. The Kissimmee Basin.

LAKE OKEECHOBEE

According to the USACE web site, Lake Okeechobee stage is at 14.71 feet NGVD for the period ending at midnight on September 10, 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 0.21 feet higher than it was a month ago and 0.80 feet higher than a year ago (Figure 1). The Lake remains in the Low sub-band (Figure 2). The September 10 lake stage was the fourth highest since 2008, with 2012, 2013, and 2016 having higher stages. According to RAINDAR, 0.50 inches of rain fell over the Lake during the week September 04, 2018 – September 10, 2018. Most of the watershed received more rainfall, between 0.50 and 1.5 inches of rain (Figure 3).

Average daily inflows to the Lake increased from the previous week, going from 4,693 cfs to 5,807 cfs. The increase in inflows was from the Kissimmee River via the S-65E structures, going from 3,075 cfs the previous week to 4,565 cfs this past week (Table 1). There have been no back-pumping operations from the S-2 or S-3 pumps during the wet season thus far.

Total outflows were reduced from the previous week, falling from 4,551 average daily cfs the previous week to 3,368 cfs this past week. The decreases in outflows were from reduced discharges east and west via the S-308 and S-77 structures, respectively, and from decreases in discharges south through the S350 structures. Discharges via the S-308 decreased from 1,287 cfs to 1,027 cfs this past week, while S-77 discharges decreased from 2,235 cfs to 1,554 cfs this past week. Outflows south through the S-350 structures decreased from 1,030 cfs the previous week to 787 cfs this past week. The corrected average daily evapotranspiration value for the week based on the L006 weather platform solar radiation also increased slightly from 0.12 inches the previous week to 0.14 inches this past 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 (September 9) using the cyanobacteria monitoring product derived from NOAA's analysis of EUMETSAT's OLCI satellite sensor showed slightly elevated potential for a cyanobacterial bloom in the pelagic region of the lake, likely due to calm weather conditions. As the summer progresses, periods of calm, drier weather may worsen bloom conditions periodically (Figure 5).

Water Management Recommendations

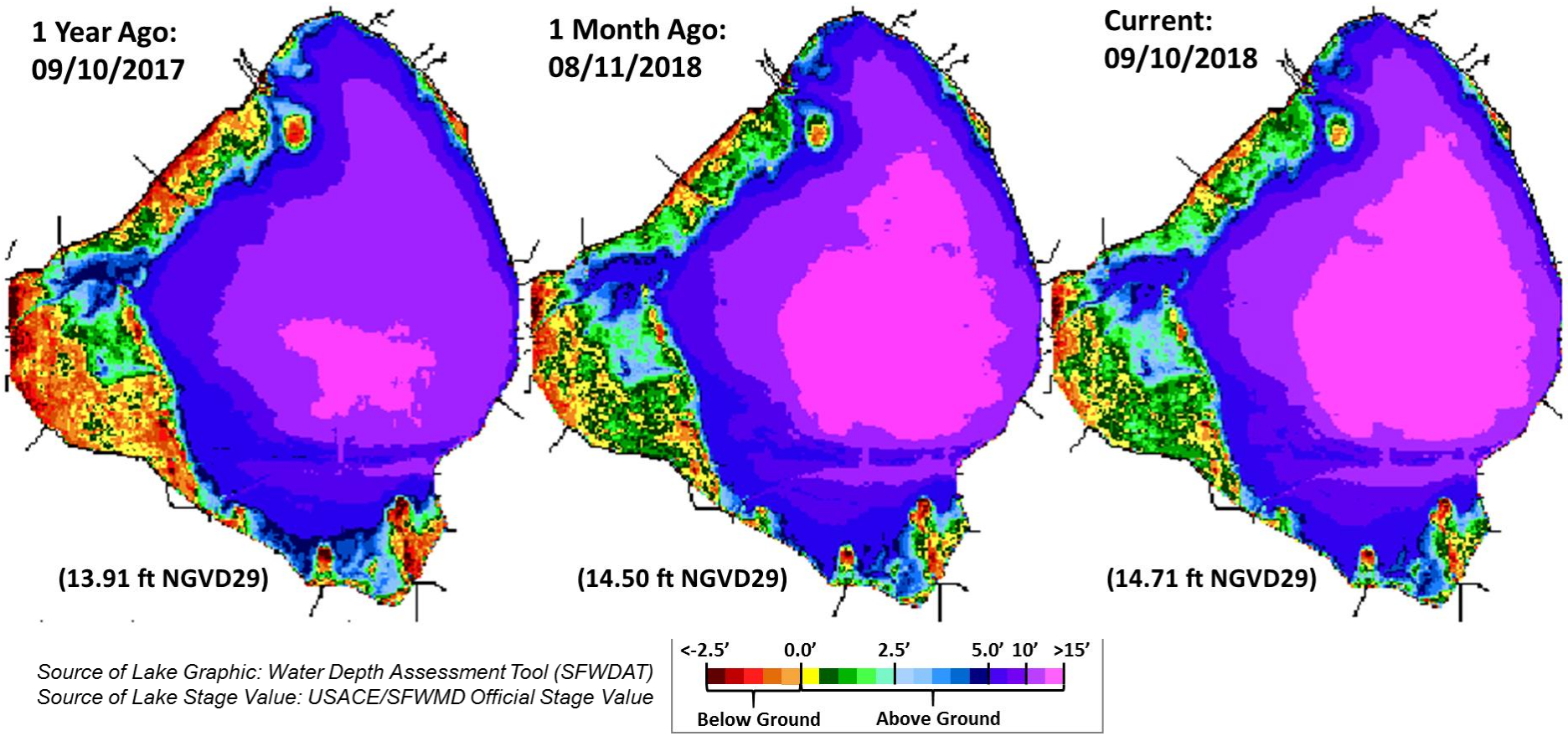
Lake Okeechobee stage is 14.71 feet NGVD, 0.10 feet higher than last week and 0.21 feet higher than 30 days ago. The seasonal low for 2018 (12.83 feet NGVD) was the third highest since 2011, and the third time in six years that lake stage did not reach the bottom of the preferred stage envelope (12.5 – 15.5 feet NGVD). Due to record rainfall in May, the submerged aquatic vegetation (SAV) coverage on the Lake will likely remain at minimal levels beyond the summer of next year, prolonging impacts from high water levels associated with El Niño in 2016 and Hurricane Irma in 2017. Recovery of SAV in the nearshore zone will require low lake stages in the summer of 2019, 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	3075	4565	1.8
S71 & 72	168	153	0.1
S84 & 84X	992	582	0.2
Fisheating Creek	168	220	0.1
S154	12	3	0.0
S191	146	97	0.0
S133 P	41	45	0.0
S127 P	12	15	0.0
S129 P	3	11	0.0
S131 P	0	2	0.0
S135 P	70	50	0.0
S2 P	0	0	0.0
S3 P	0	0	0.0
S4 P	0	0	0.0
L8 Backflow	8	65	0.0
Rainfall	4437	1386	0.5
Total	**9130**	**7194**	**2.8**

OUTFLOWS	Previous Week Avg Daily cfs	Avg Daily Outflow cfs	Equivalent Depth Week Total (in)
S77	2235	1554	0.6
S308	1287	1027	0.4
S351	637	379	0.2
S352	317	0	0.0
S354	76	408	0.2
L8 Outflow	0	0	0.0
ET	2205	2728	1.1
Total	**6755**	**6096**	**2.4**

PROVISIONAL DATA



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

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

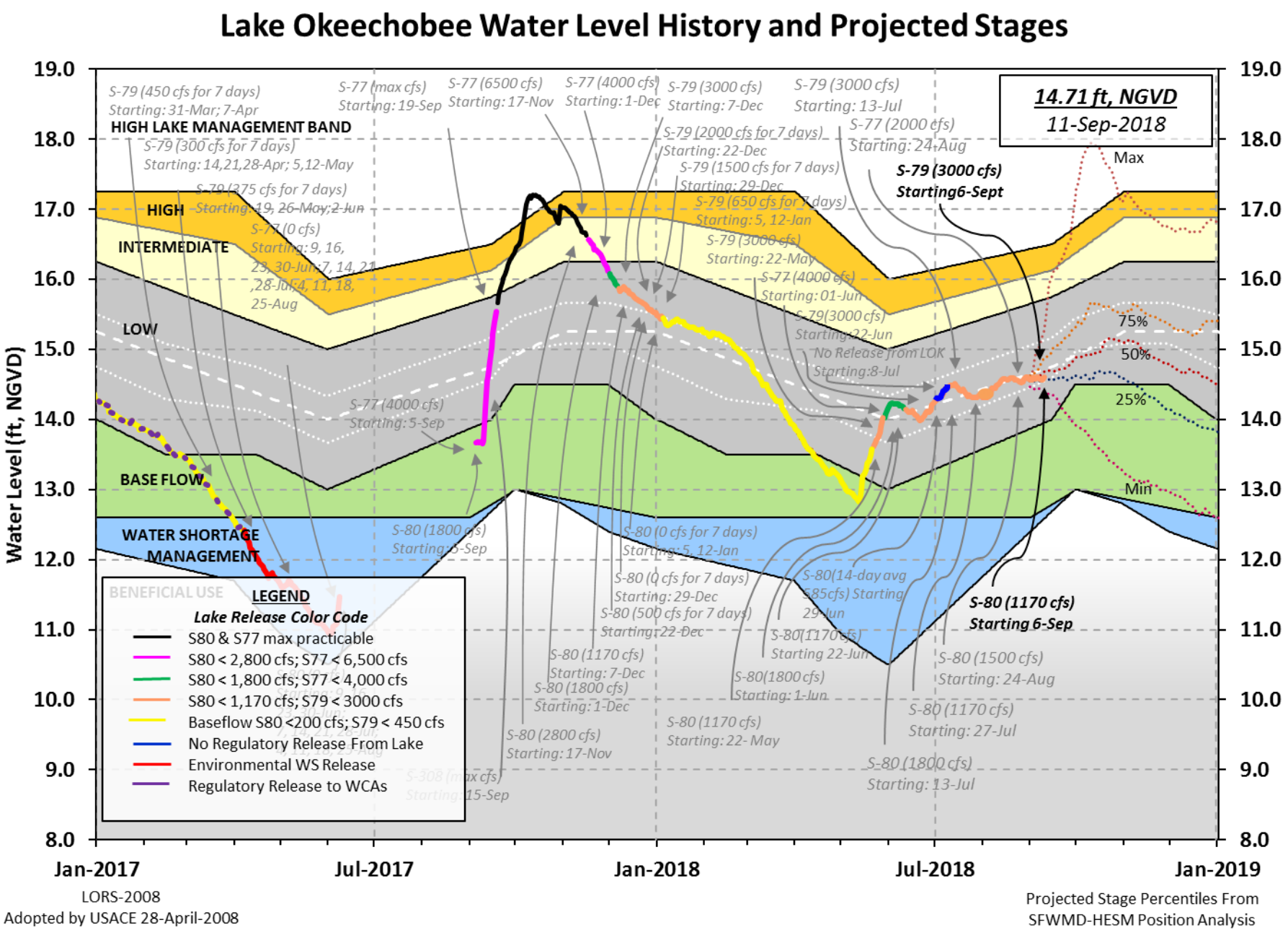


Figure 2. Recent Lake Okeechobee stage and releases, with projected stages based on a dynamic position analysis.

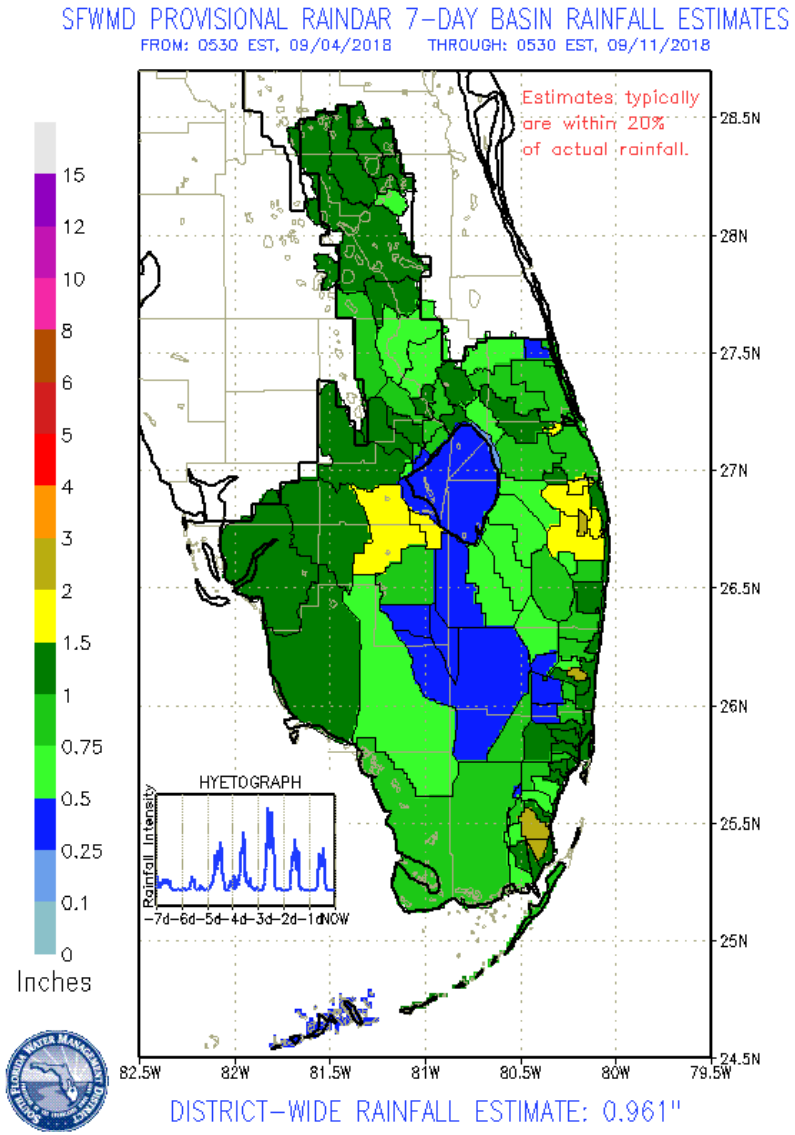


Figure 3. Rainfall estimates by basin.

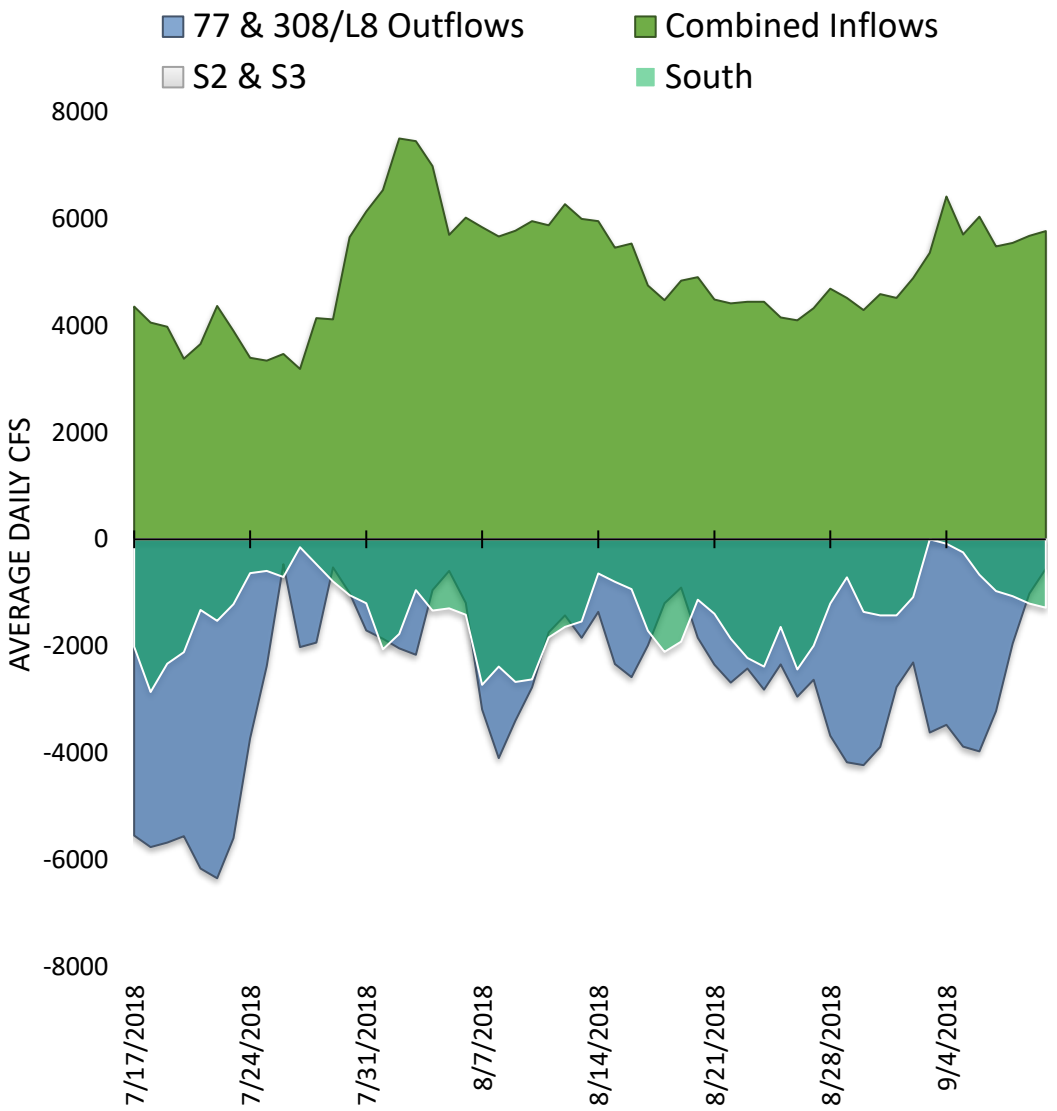


Figure 4. Major inflows and outflows of Lake Okeechobee, including the S-350 structures designated as South. The L-8 canal flows through culvert 10A are included as outflows when positive, and as inflows when backflowing into the lake. Inflows and outflows are shown as positive and negative, respectively, for visual purposes.

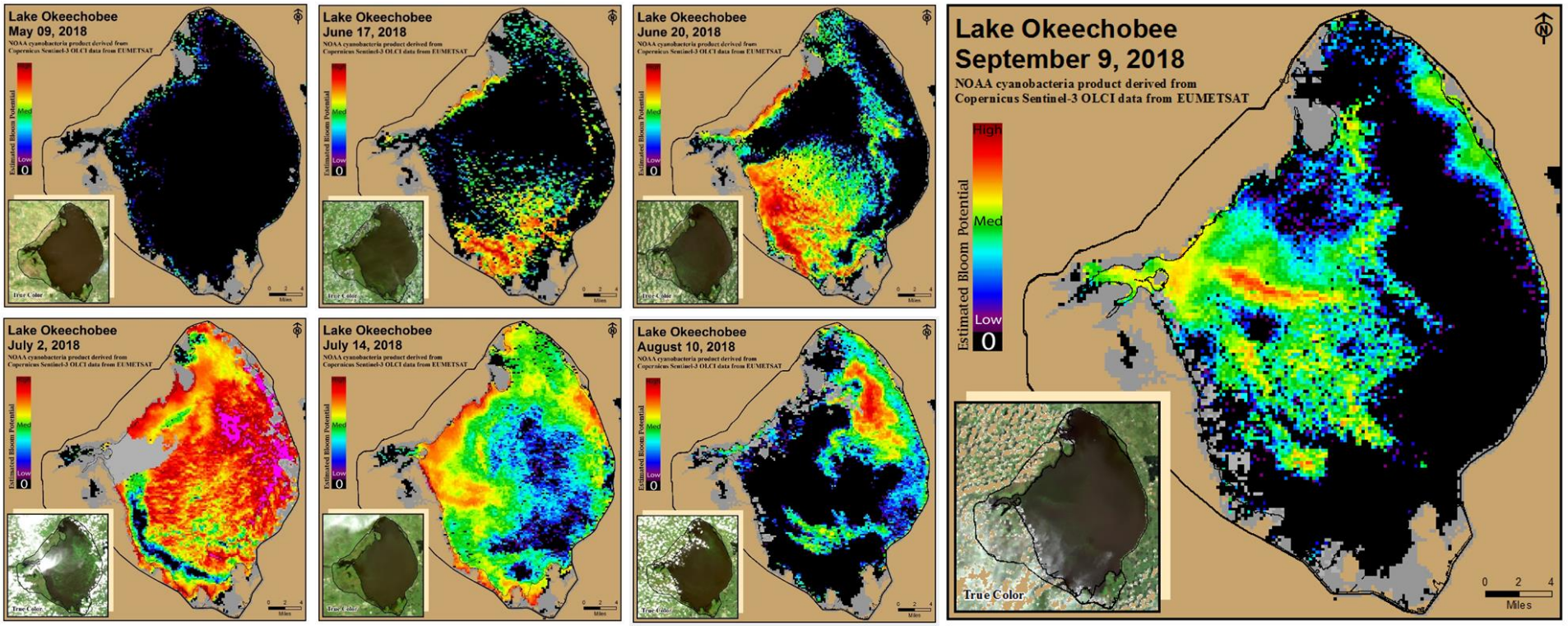


Figure 5. Potential for cyanobacterial blooms on Lake Okeechobee based on NOAA's harmful algal bloom monitoring system derived from Copernicus Sentinel-3 OLCI data from EUMETSAT. Gray indicates cloud cover. All data are experimental and unvalidated at this point in product development.

ESTUARIES

St. Lucie Estuary:

Last week total inflow to the St. Lucie Estuary averaged about 2,624 cfs (Figures 1 and 2) and last month inflow averaged about 2,579 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	720
S-80	1,606
S-308	1,027
S-49 on C-24	94
S-97 on C-23	137
Gordy Rd. structure on Ten Mile Creek	67

Over the past week in the estuary, salinity stayed about the same at HR1 (North Fork) and increased downstream of US1 Bridge (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 3.5. Salinity conditions in the middle estuary are within the poor 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)	**0.9** (1.1)	**1.3** (1.4)
US1 Bridge	**2.8** (2.1)	**4.1** (2.5)
A1A Bridge	**11.0** (9.4)	**19.9** (17.0)

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

Caloosahatchee Estuary:

Last week total inflow to the Caloosahatchee Estuary averaged about 4,219 cfs (Figures 5 and 6) and last month inflow averaged about 5,177 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	1,554
S-78	1,885
S-79	3,275
Tidal Basin Inflow	944

Over the past week, salinity was near 0 down to Ft. Myers Yacht Basin and increased downstream (Table 4, Figures 7 & 8). The seven-day average salinity values are estimated to be just within the poor range for adult eastern oysters at Cape Coral, in the good range at Shell Point, and were not available at Sanibel (Figure 9). The 30-day moving average surface salinity is 0.2 at Val I-75 and 0.2 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)	**0.2** (0.2)	**0.2** (0.2)
Val I75	**0.2** (0.2)	**0.2** (0.2)
Ft. Myers Yacht Basin	**0.3 (**0.2)	**0.3** (0.2)
Cape Coral	**3.7** (0.8)	**6.2** (1.1)
Shell Point	**17.0** (10.7)	**16.6** (10.8)
Sanibel	**NR**[3](NR)	**NR** (NR)

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

The Florida Fish and Wildlife Research Institute reported on September 7, 2018, that *Karenia brevis,* the Florida red tide dinoflagellate, was observed at background to high concentrations in 26 samples collected from or offshore of Lee County. Fish kills and respiratory irritation were reported in Lee County over the past week.

Water Management Recommendations

Lake Okeechobee stage is in the Low sub-band of 2008 LORS. Tributary hydrological conditions are very wet. The 2008 LORS recommends up to 3,000 cfs at S-79 and up to 1,170 cfs at S-80. Given the current estuarine conditions, there are no ecological benefits associated with freshwater releases from Lake Okeechobee.

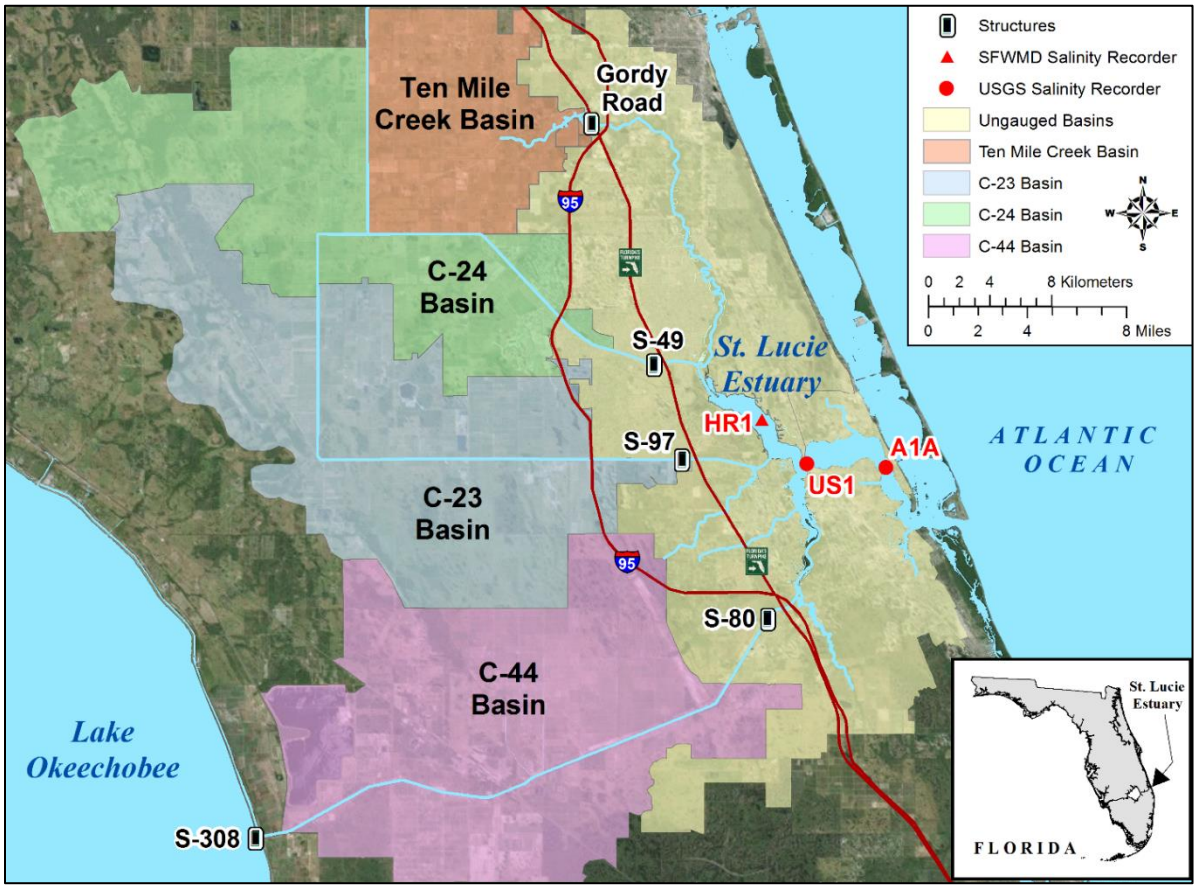


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

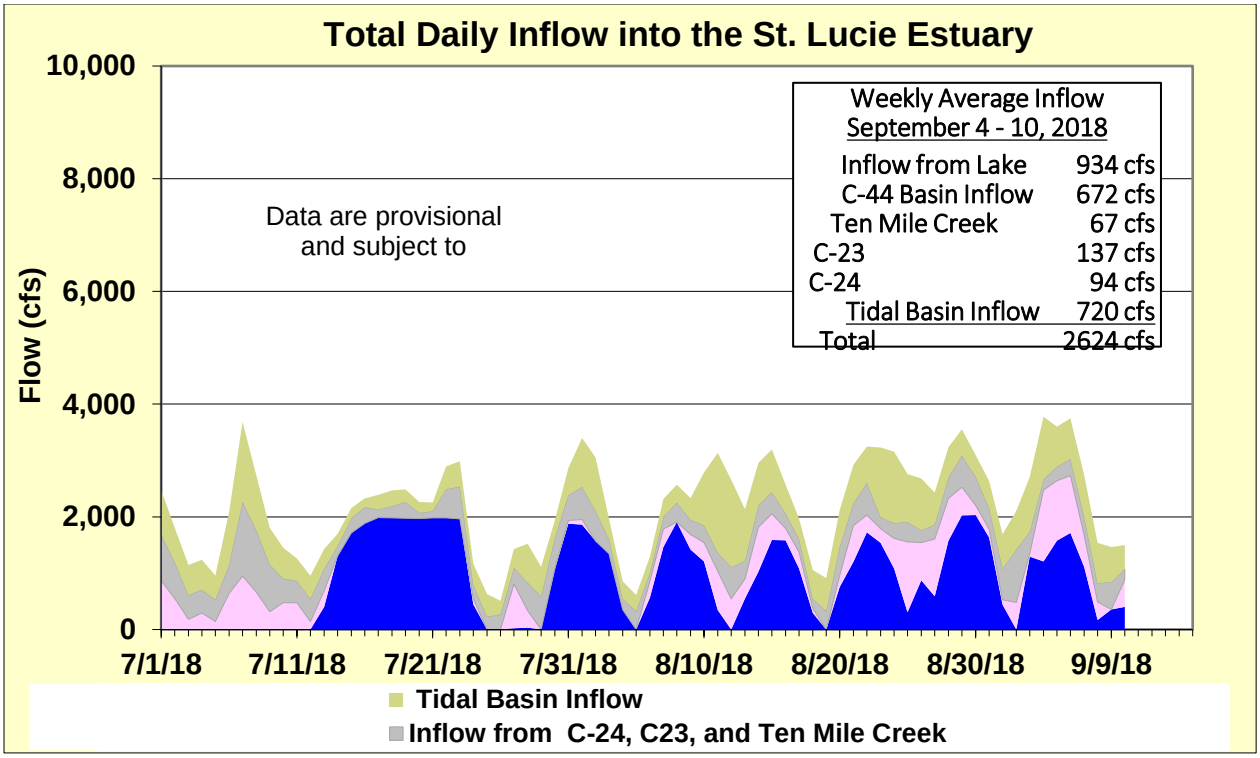


Figure 2. Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basins into the St. Lucie Estuary.

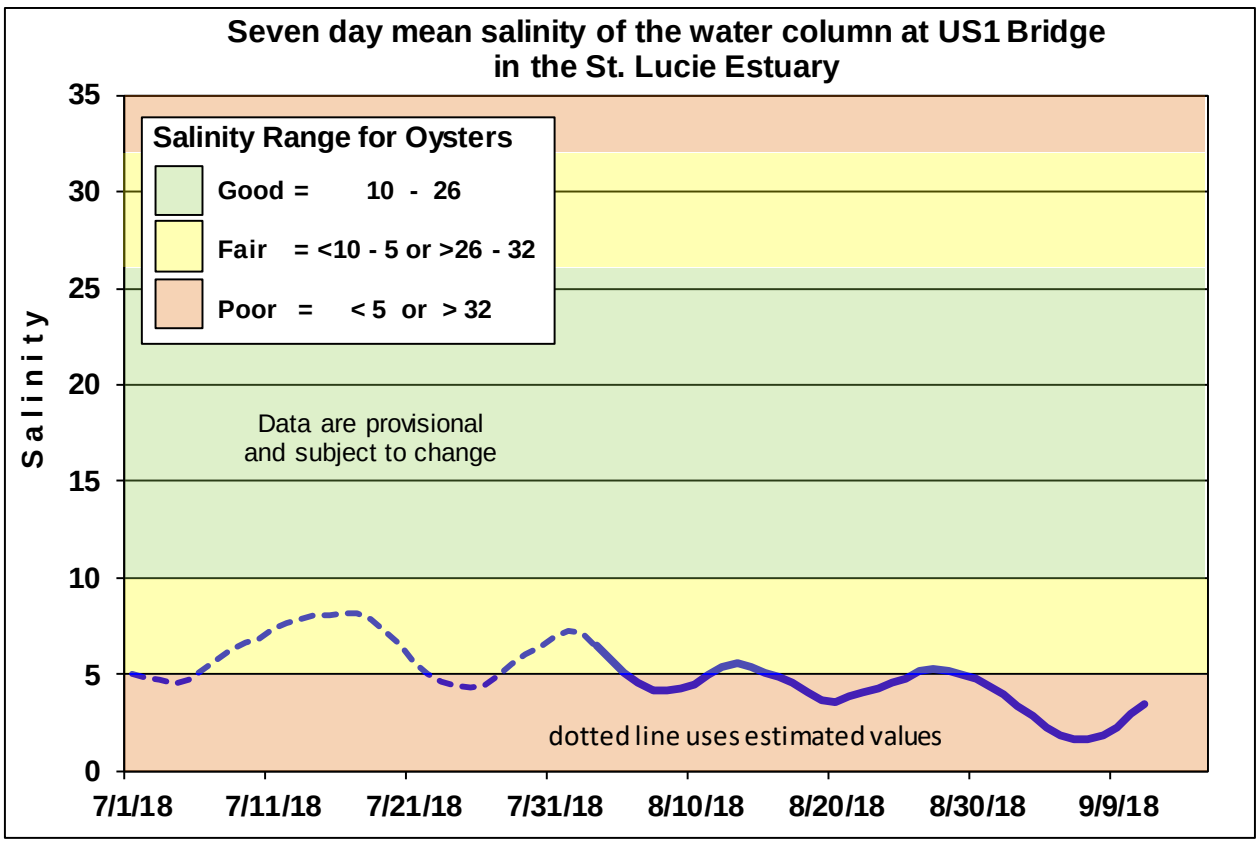


Figure 3. Seven-day mean salinity of the water column at the US1 Bridge.

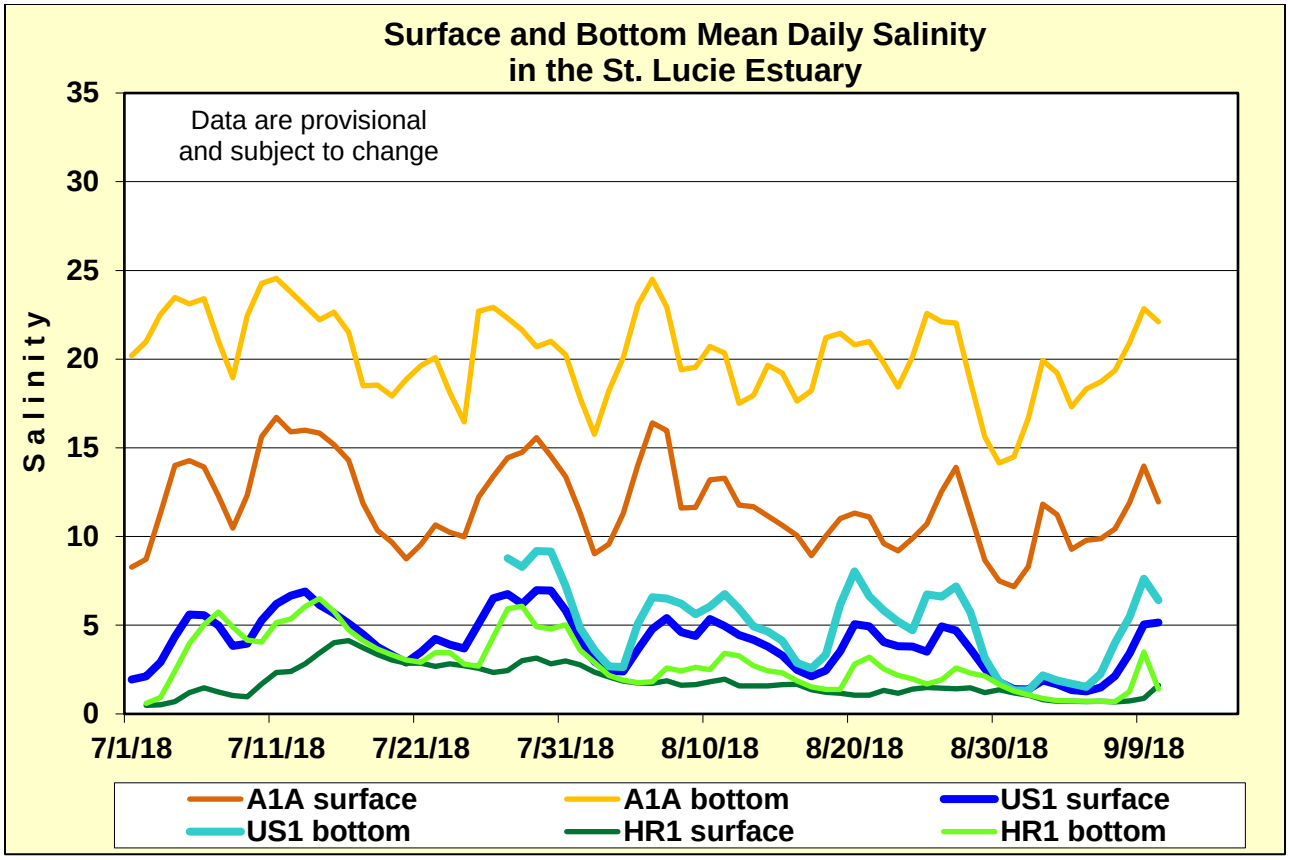


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

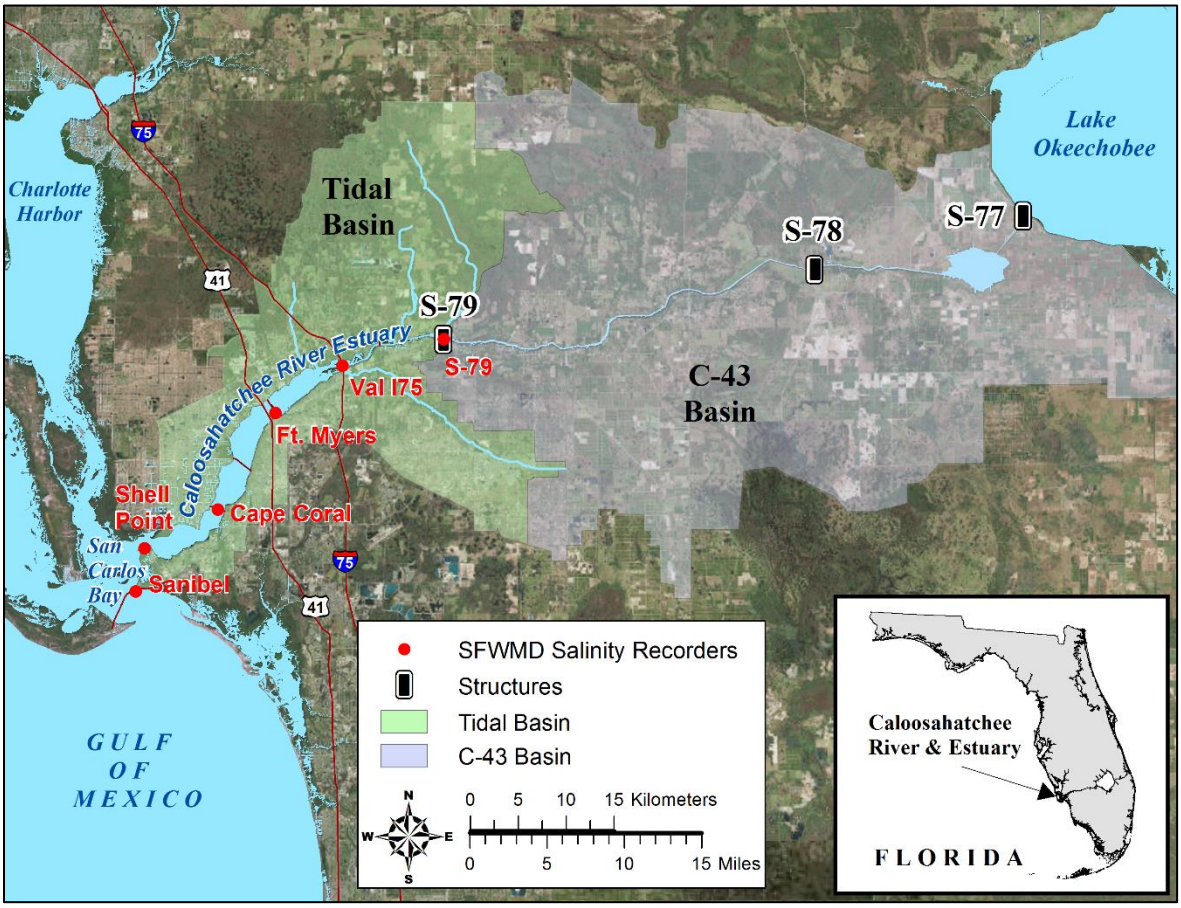


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

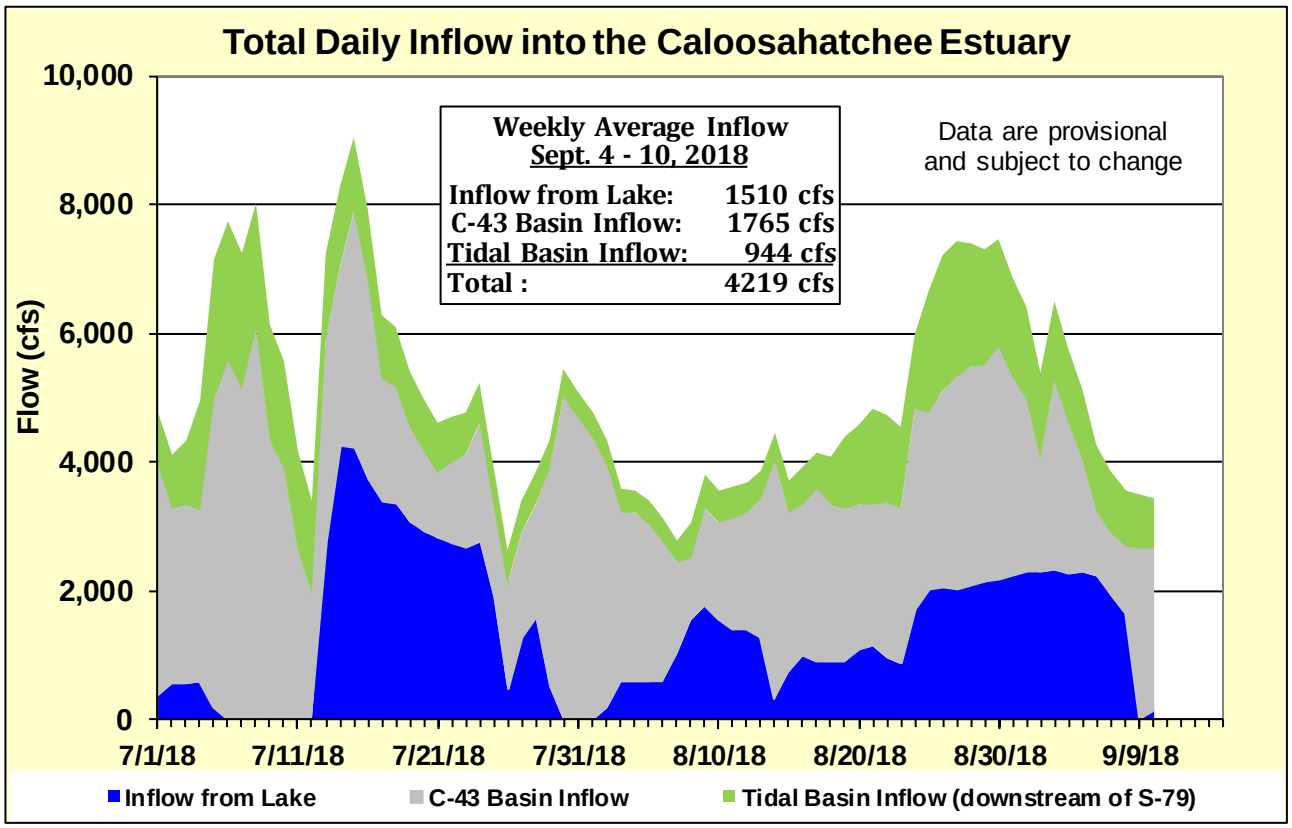


Figure 6. Total daily inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.

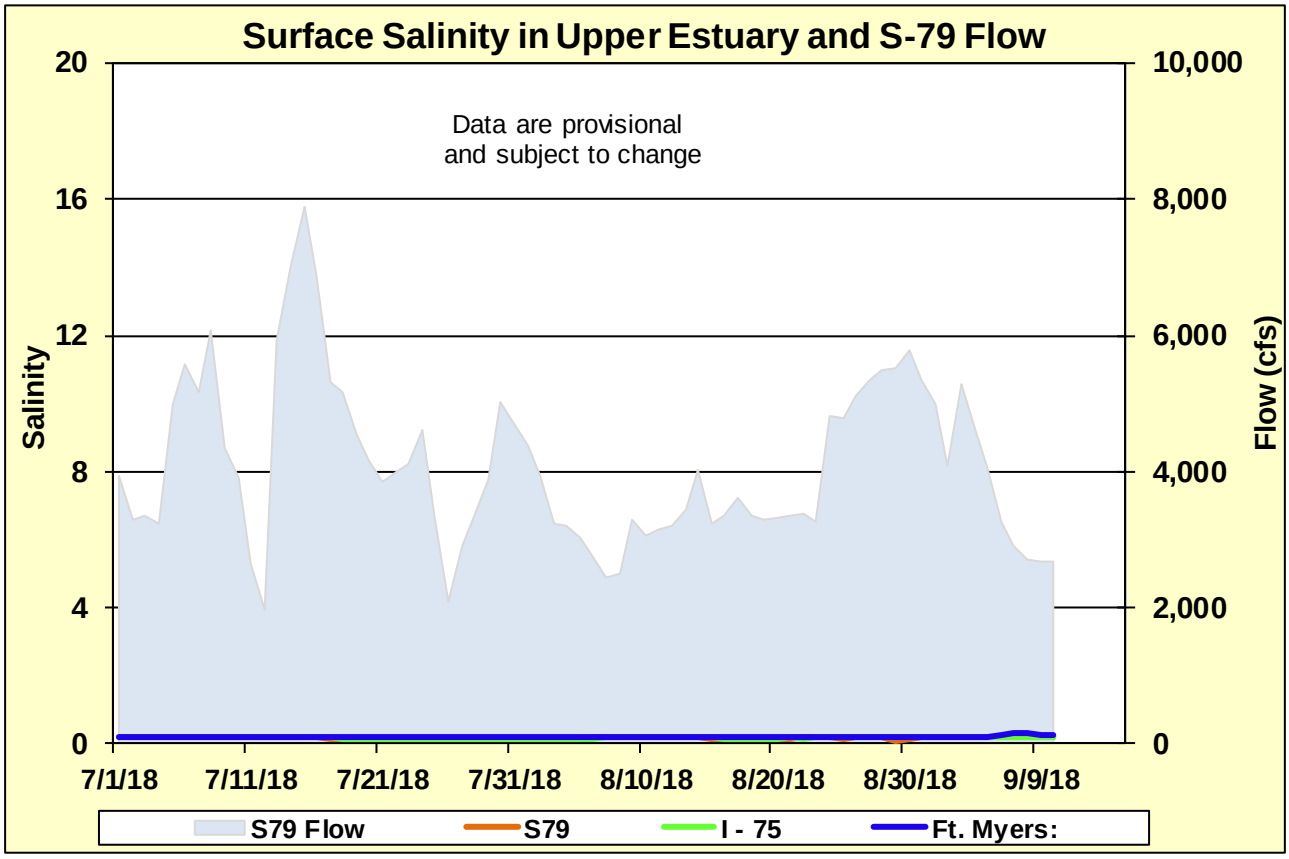


Figure 7. Daily mean flows at S-79 and salinity at upper estuary monitoring stations.

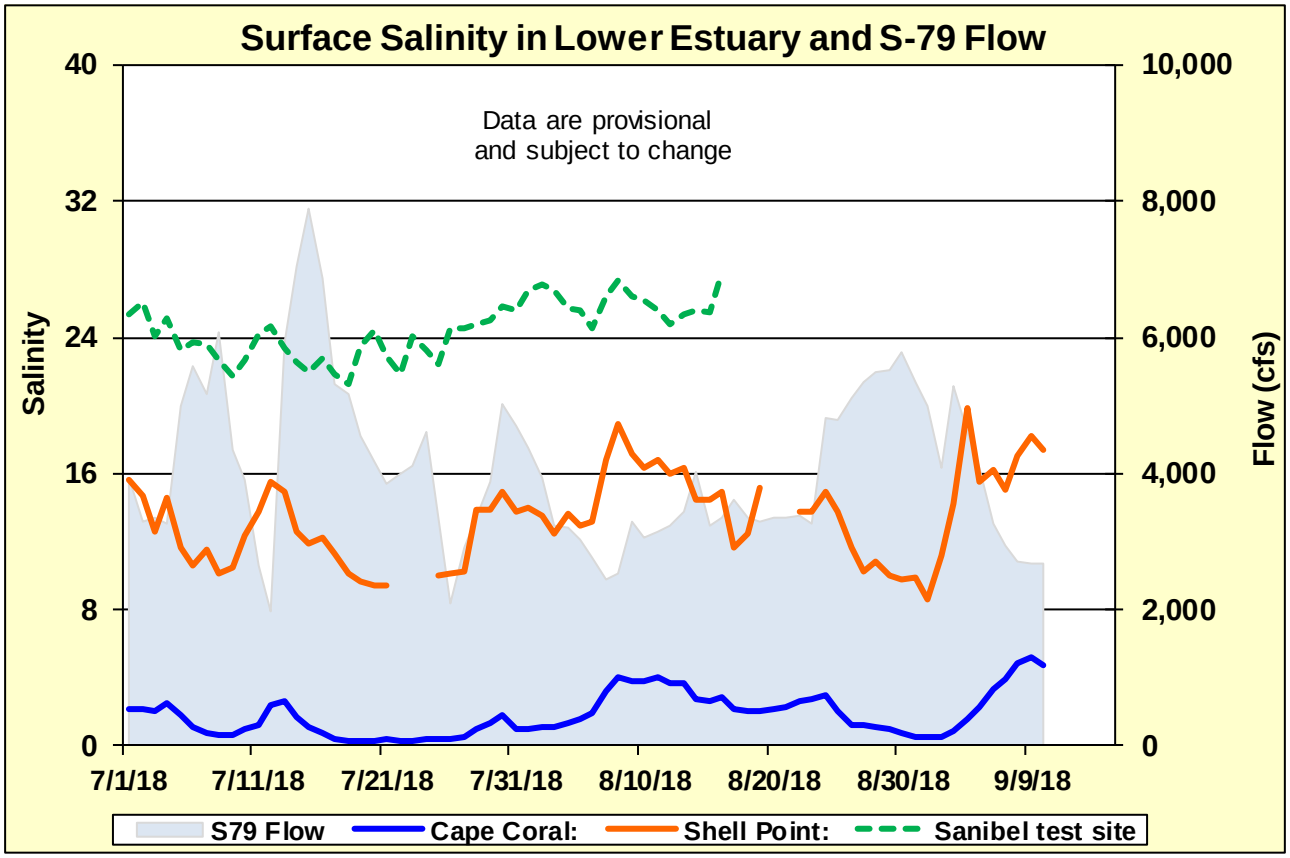


Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.

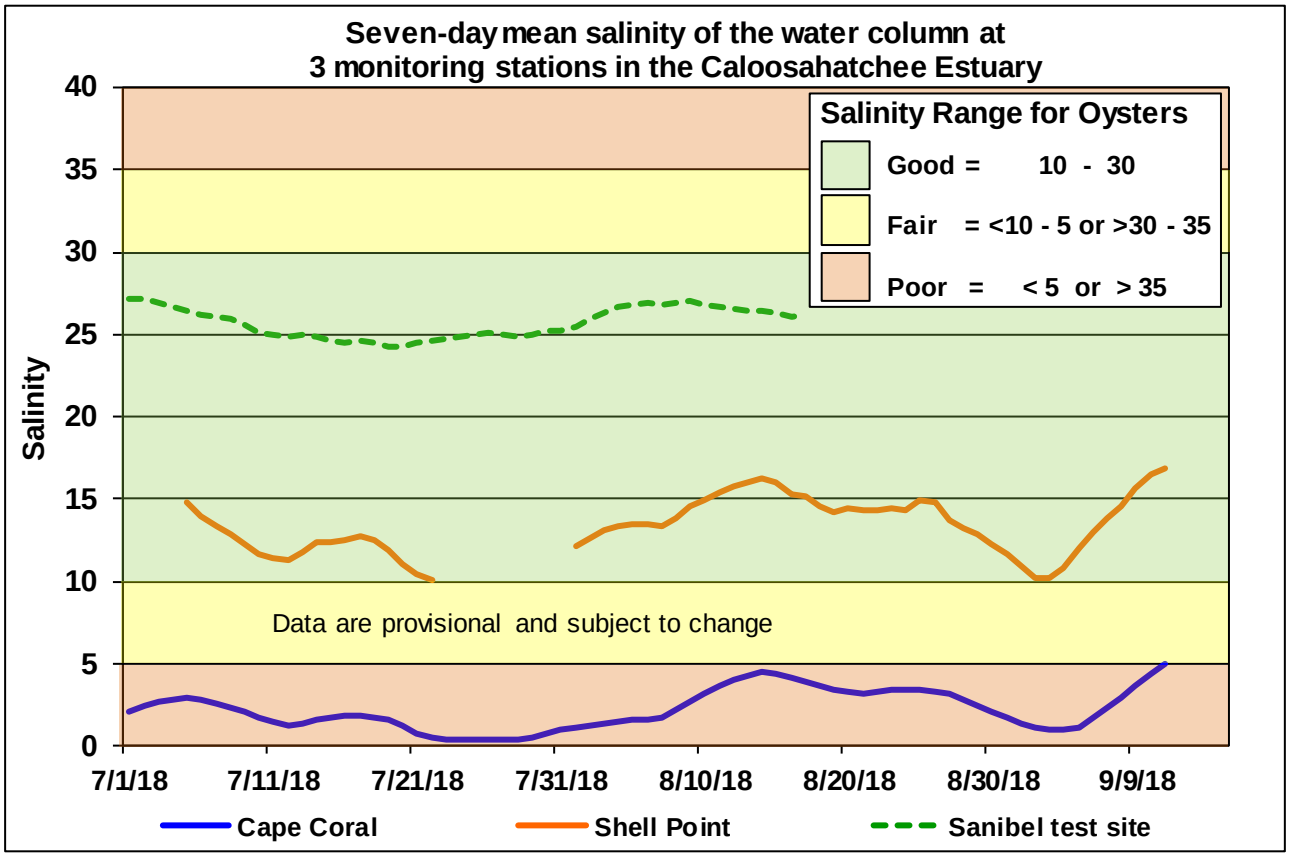
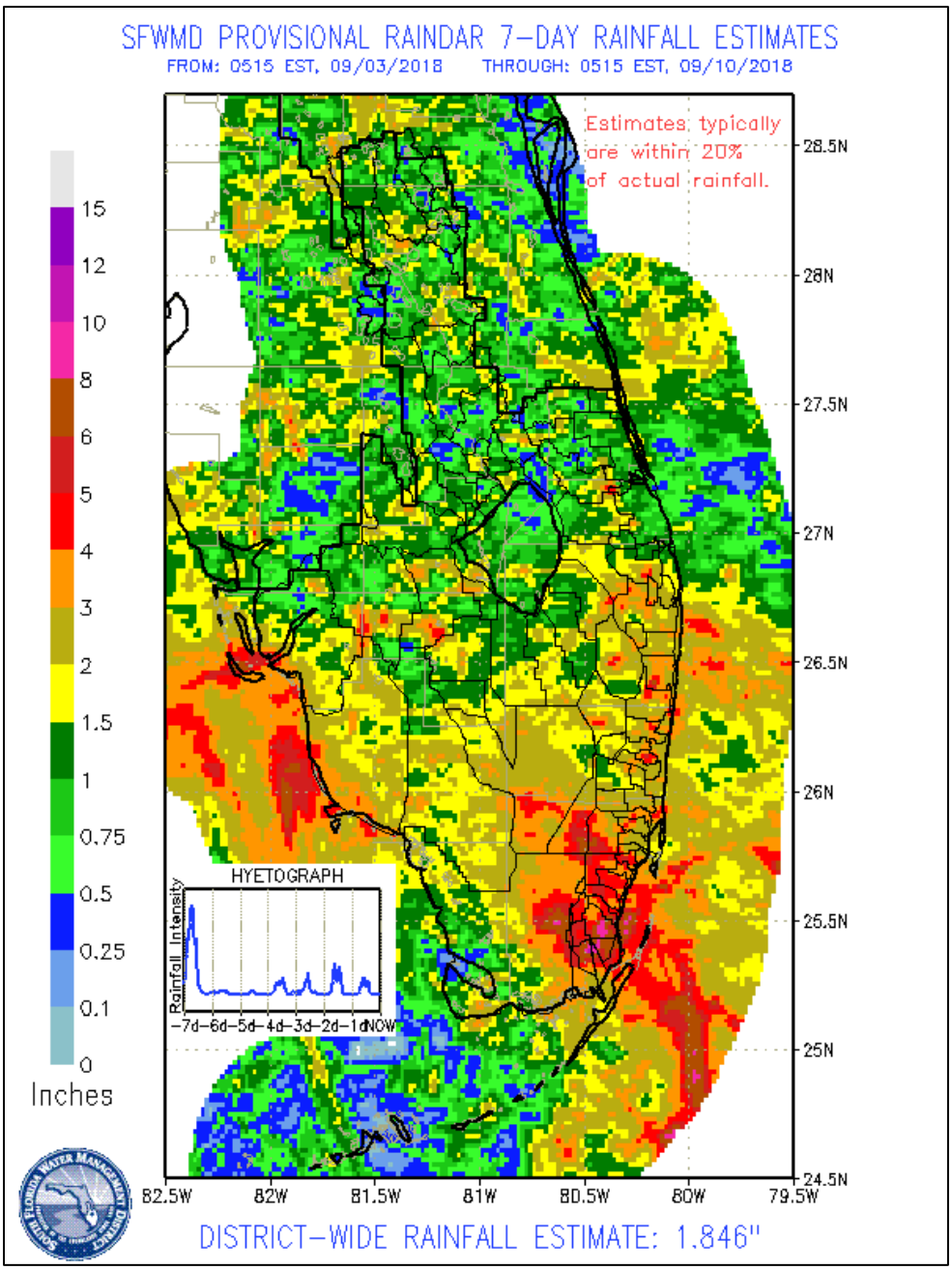


Figure 9. Seven-day mean salinity at Cape Coral, Shell Point, and Sanibel monitoring stations.

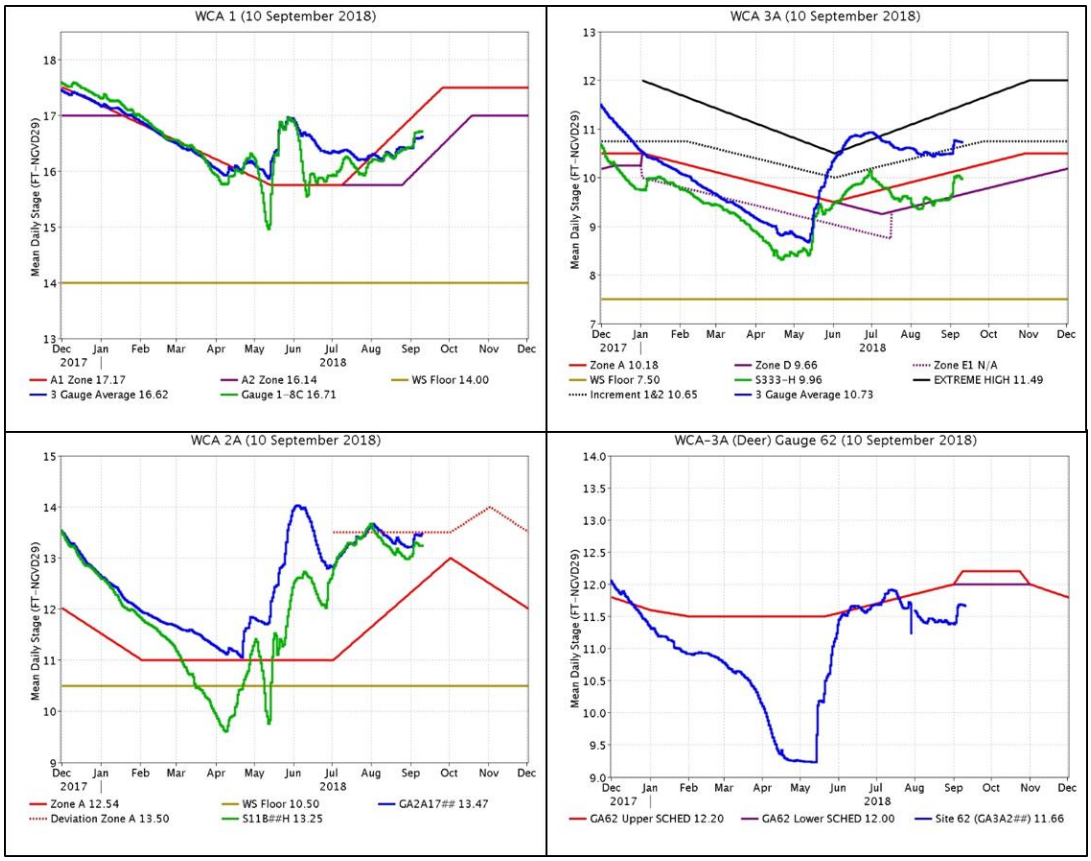
EVERGLADES

At the gauge locations monitored for this report, stages within the Everglades rose 0.19 feet on average over the last week. Only WCA-2B did not meaningfully increase in stage. The most extreme individual gauge changes within the WCAs ranged from +0.01 feet (WCA-2B) to +0.33 feet (WCA-3A South). Pan evaporation was estimated at 1.34 inches (down 0.4 inches).

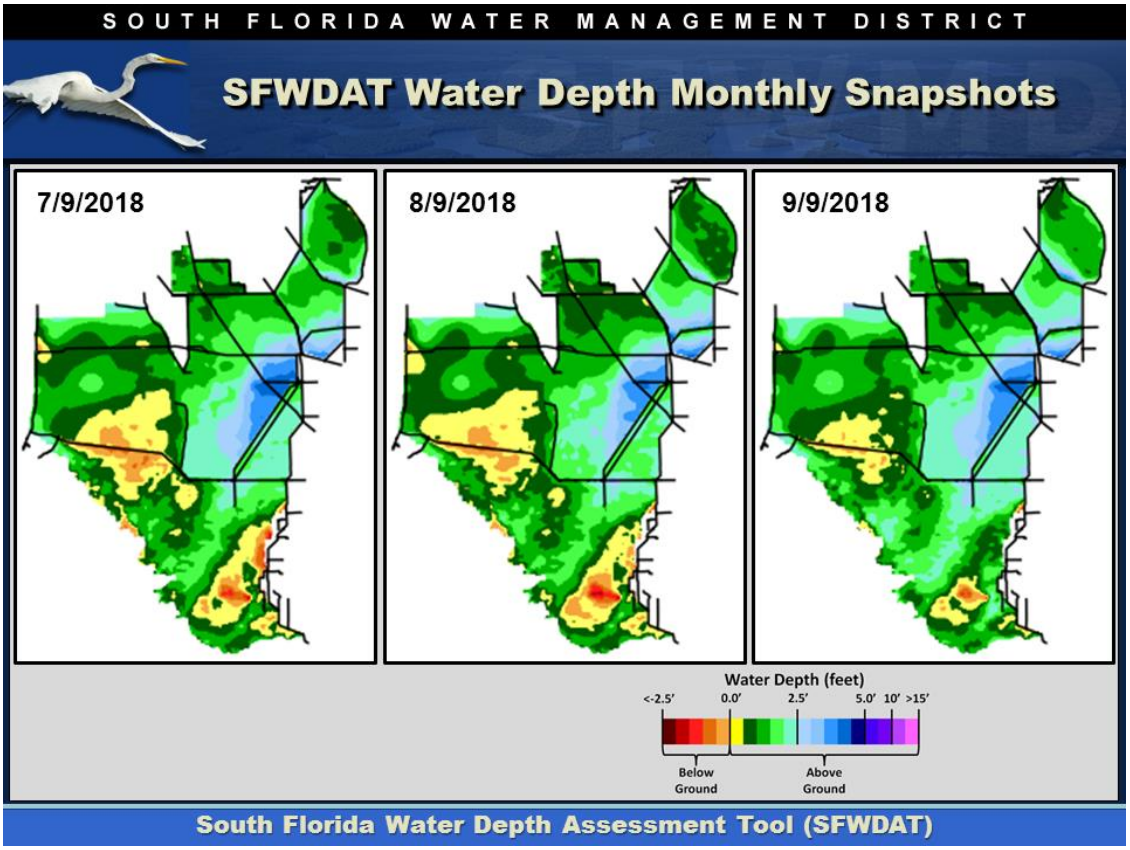
Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	2.24	+0.20
WCA-2A	2.32	+0.22
WCA-2B	2.03	+0.01
WCA-3A	2.60	+0.24
WCA-3B	3.97	+0.25
ENP	2.35	+0.13

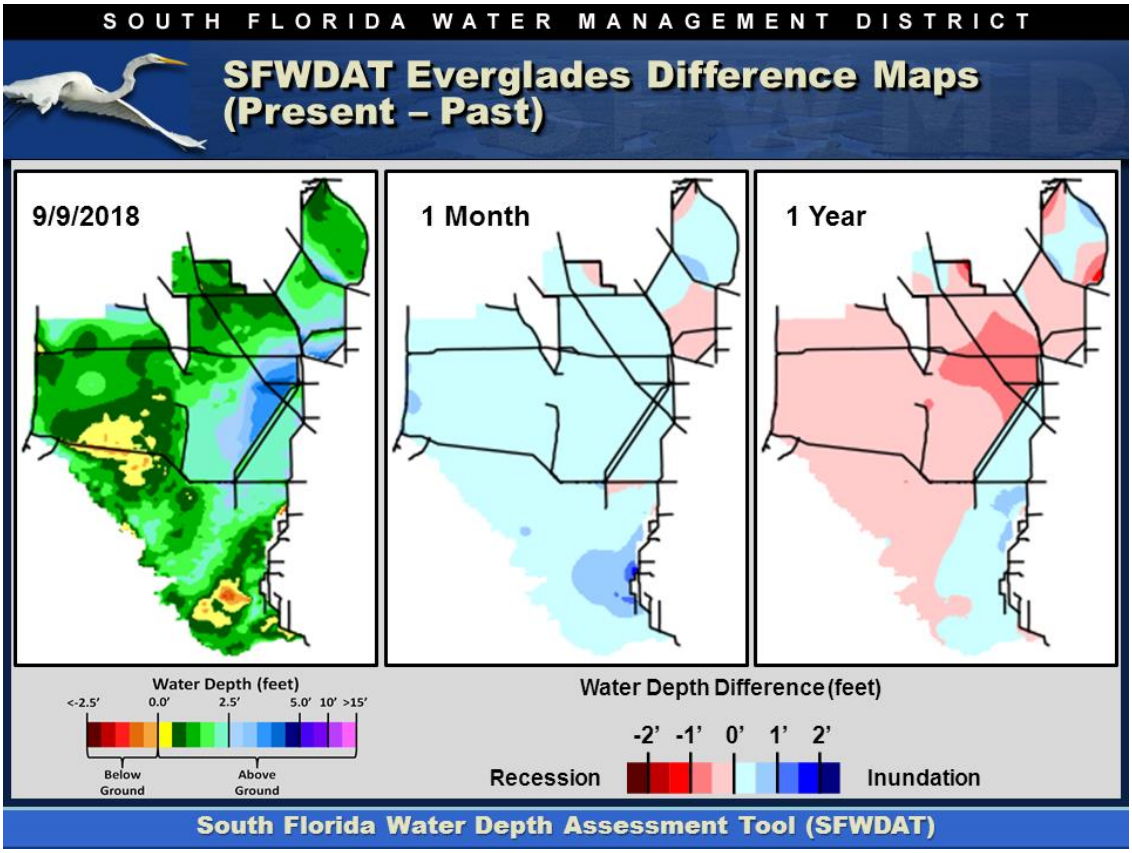


Regulation Schedules: WCA-1 three-gauge average stage is 0.55 feet below Zone A1, gauge 1-8C stage is 0.46 feet below. Both remain between Zone A1 and A2 and follow the rising limb of the line. WCA-2A marsh stage is 0.03 feet below Deviation Zone A, S11B Headwater stage is 0.25 feet below. WCA-3A three-gauge average stage is 0.08 feet above Increment 1&2, and 0.55 feet above Zone A. WCA-3A stage at gauge 62 (northwest corner) remains 0.54 feet below the Upper Schedule, and 0.34 feet below the Lower Schedule.



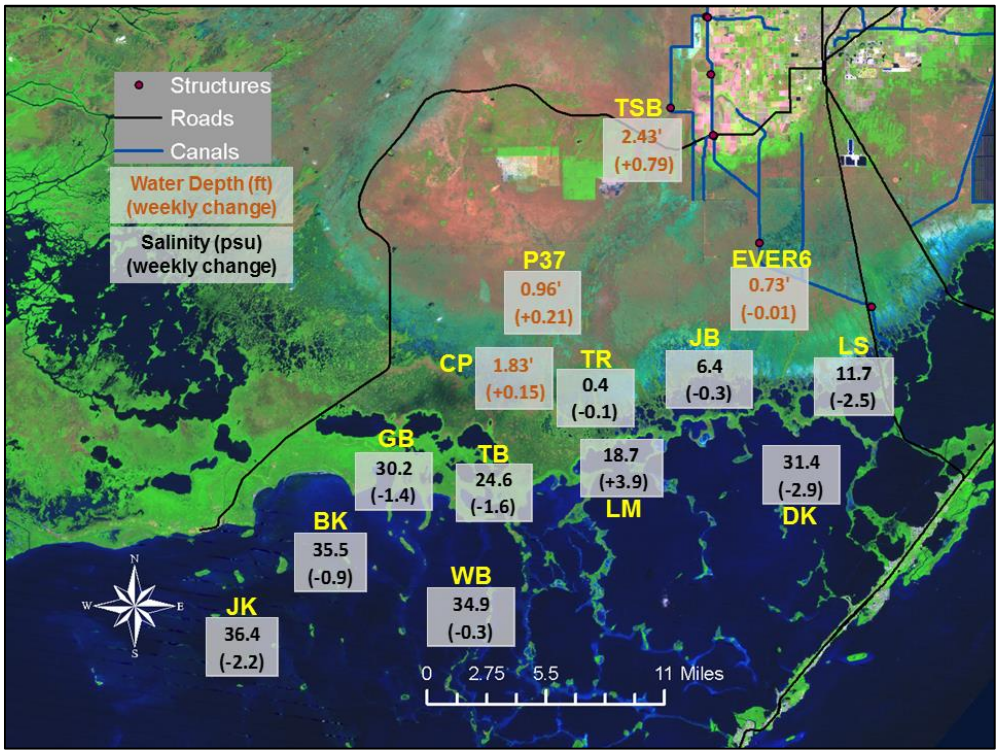
Water Depths and Changes: The WDAT tool for spatial interpolation of depth monthly snapshots indicate that depths have remained fairly stable in the WCAs over the last month. Depths across WCA-3A North range from 0.5 feet along the northern perimeter to 3.0 feet in the southeastern corner of that sub basin. WDAT output indicates that water depths across WCA-3A, 3B and WCA-1 are slightly higher or unchanged compared to one month ago; WCA-2A depths in the southern half of that basin are unchanged or slightly lower. The central region of WCA-3A is currently significantly drier than a year ago.

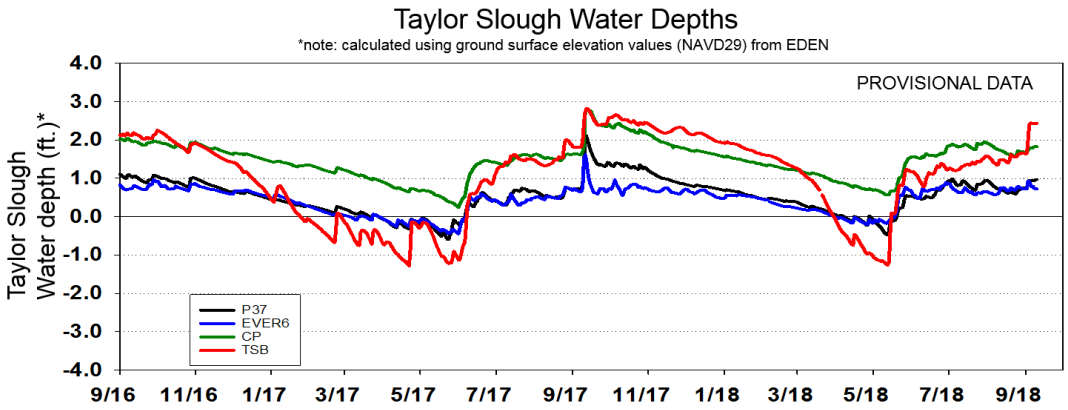


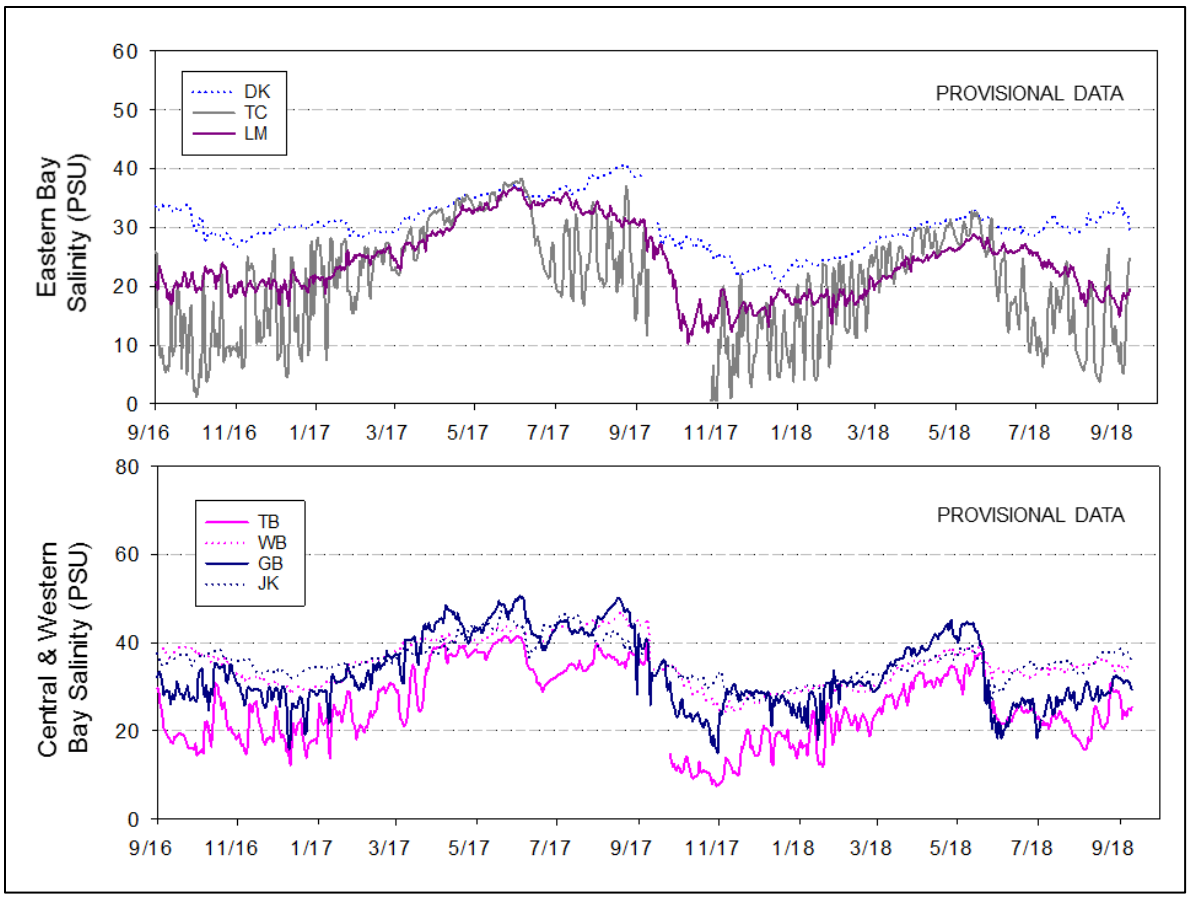


Taylor Slough Water Levels: An average of 3.6 inches of rain fell on Taylor Slough and Florida Bay this past week (includes rain from Tropical Storm Gordon), and stages averaged an increase of 0.23 feet. Water depths average about 1.3 feet across Taylor Slough which is about 3.7 inches higher than the historical averages.

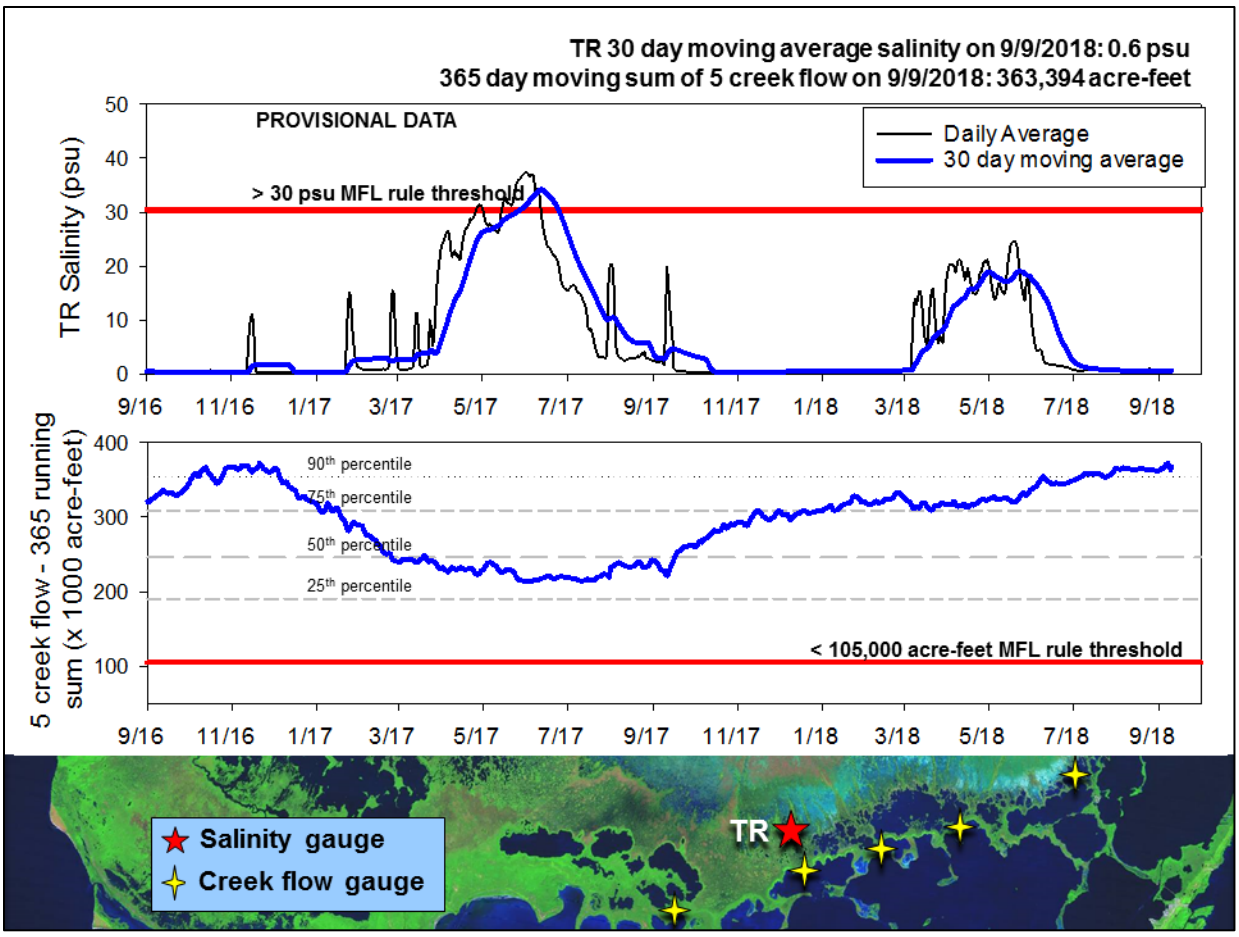
Florida Bay Salinities: Salinities were mostly stable this past week with changes staying less than 4 psu for the week. Salinities range from 6 psu in the northeast to 36 psu in the west which is 1.2 psu lower than the historical averages for this time of year. Salinities lower than the historical averages are a restoration target and considered desirable.







Florida Bay MFL: Mangrove zone daily average salinity decreased from 0.5 psu to 0.4 psu. The 30-day moving average is 0.6 psu. The weekly cumulative flow from the five creeks denoted by yellow stars on the map totaled about 8,000 acre-feet for the last week which is about 2,000 acre-feet less than the historical average for this time of year. September and October tend to be the peak flows for the year. The 365-day moving sum of flow from the five creeks ended the last week at 363,394 acre-feet (still greater than the long-term average of 257,628 acre-feet and above the 90th percentile). This value has not been changing much the past month. Creek flow is provisional data from the USGS and is highly variable.



Water Management Recommendations

Inflows to northernmost WCA-3A create lower ecological stress when compared to flows to more southern WCA-3A. WDAT output indicates that most of WCA-3A North's water depths are between 0.5 to 1.5 feet. These conditions contrast with conditions in WCA-3A South where depths along the L-67 are 2.5 to 4.5 feet. After last year's above average wet season depths in WCA-3A South, maintaining lower stages within that basin has ecological benefit to tree islands that have been stressed by flooding. WCA-2A has also experienced relatively deep-water conditions over the past two wet seasons. Water management that minimizes high water stress during the wet season but protects peat soils (especially in WCA-3A North) as the dry season approaches has increased ecological benefit this water year by allowing ecological processes time to recover from flooding. Management measures could include temporary pumping that may serve both flood protection and ecological ends.

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.

Ascension rates are now critical for apple snail reproduction in the Everglades. The current recommended stage ascension rate is less than 0.25 feet per week (or 0.5 feet per 2 weeks).

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

SFWMD Everglades Ecological Recommendations, September 11th, 2018 (red is new)			
Area	Weekly change	Recommendation	Reasons
WCA-1	Stage increased by 0.20'	Maintain depths at regulation schedule. Manage for a rate of ascension less than +0.25' per week, or less than +0.5 per 2 weeks.	Protect upstream/downstream habitat and wildlife.
WCA-2A	Stage increased by 0.22'	Maintain depths at temporary regulation schedule. Manage for a rate of ascension less than +0.25' per week, or less than +0.5 per 2 weeks.	Protect upstream/downstream habitat and wildlife.
WCA-2B	Stage increased by 0.01'	Maintain depths at temporary regulation schedule. Manage for a rate of ascension less than +0.25' per week, or less than +0.5 per 2 weeks.	Protect upstream/downstream habitat and wildlife.
WCA-3A NE	Stage increased by 0.12'	Maintain depths at regulation schedule.	Protect habitat including peat soil development, tree islands and wildlife.
WCA-3A NW	Stage increased by 0.24'	Maintain depths at regulation schedule.	
Central WCA-3A S	Stage increased by 0.26'	Maintain depths at regulation schedule. Manage for a rate of ascension less than +0.25' per week, or less than +0.5 per 2 weeks.	Protect habitat including peat soil development, tree islands and wildlife.
Southern WCA-3A S	Stage increased by 0.33'		
WCA-3B	Stage increased by 0.25'	Maintain depths at temporary regulation schedule. Manage for a rate of ascension less than +0.25' per week, or less than +0.5 per 2 weeks.	Protect upstream/downstream habitat and wildlife.
ENP-SRS	Stage increased by 0.13'	Make discharges to the Park according to the 2012 WCP rainfall plan.	Protect upstream/downstream habitat and wildlife.
Taylor Slough	Stage changes ranged from −0.01' to +0.79'	Move water southward as possible	When available, provide freshwater buffer for downstream conditions.
FB- Salinity	Salinity changes ranged −2.9 to +3.9 psu.	Move water southward as possible	When available, provide freshwater to maintain low salinity buffer and promote water movement.