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:** October 9, 2018

**SUBJECT:** Weekly Environmental Conditions for Systems Operations

## Summary

### Weather Conditions and Forecast

A deep layer of moisture associated with Hurricane Michael covers most of the District this morning. However, the favorable moisture profile is, to some extent, counterbalanced by several significant negative factors, speed divergence of the low- to mid-level wind, weak instability and upper-level convergence near and east of the area. Overall, these ingredients are not likely to result in any more total District rainfall than what occurred yesterday (0.13") and could actually result in less. The west coast is expected to be on the periphery of Hurricane Michael's circulation for much of the day, and although some occasional rains are possible there this afternoon, the heaviest activity should remain well offshore. However, as Michael moves northward and the flow over that region shifts from the southeast to southwest, greater rains are forecast, beginning overnight and into tomorrow morning. Greater rains are possible over portions of the Kissimmee in association with a southeast-northwest band of rain that short-range models are developing this afternoon. However, there is low confidence on this feature developing. Elsewhere across the District, widely scattered to scattered showers and a few thunderstorms are expected, and with a strong east-southeasterly to southeasterly steering flow around the circulation of Michael, rain areas should again be fast-moving. This should generally mean that a relatively high rain coverage of light to moderate rain and relatively low local maxima, except in isolated areas where showers could "train" – more over the same areas repeatedly. The deep-layer wind flow should shift southwesterly tomorrow as Hurricane Michael makes landfall in the central Florida Panhandle, and greater instability and low-level convergence accompanying the shifting winds should yield greater and likely above normal District-average rainfall. Along the southwest/west coast where the low-level convergence is greatest, areal average rainfall of a half of an inch and some significant local maxima are possible. As Michael races inland over the southeastern U.S. on Thursday, a long band trailing the tropical cyclone over the District should continue to enhance rainfall, with some significant rainfall possible primarily over the southern two-thirds of the area. The band should gradually shift southeastward into Friday, with a drying expected to commence from northwest to southeast throughout the day. High pressure over the western Atlantic should build into the District over the weekend, leading to relatively dry conditions and below normal rainfall from Saturday through Monday. For the week ending next Tuesday morning the deterministic Quantitative Precipitation Forecast is about 80-85% of normal, and the ensembled-based probabilistic guidance favors a likely range between 70% and 100% of normal.

### Kissimmee

Tuesday morning stages were 57.1 feet NGVD (0.2 feet above schedule) in East Lake Toho, 54.2 feet NGVD (0.1 feet above schedule) in Toho, and 50.7 feet NGVD (1.1 feet below schedule) in Kissimmee-Cypress-Hatchineha; headwater stages were 46.4 feet NGVD at S-65A and 27.9 feet NGVD at S-65D. Tuesday morning discharges were: 1,545 cfs at S-65, 1,372 cfs at S-65A, and 1,714 cfs at S-65E.

Dissolved oxygen concentration in the Kissimmee River averaged 4.2 mg/L for the week. Kissimmee River mean floodplain depth on Sunday was 0.61 feet. No new recommendations were made this week.

**Lake Okeechobee**

Lake Okeechobee stage is 14.22 feet NGVD, falling 0.28 feet from the previous week and 0.46 feet over the last 30 days. Lake stages are now the lowest they have been for this time of year since 2011 but are in the middle of the preferred ecological envelope, which varies seasonally from 12.5 – 15.5 feet NGVD. Cyanobacterial bloom potential remained high along the western shore over the last week but may have lessened somewhat along the north and eastern regions, based on NOAA's analysis of satellite data (see supporting information below). The latest image (October 6) showed high potential for a bloom north of Fisheating Bay along Indian Prairie. Conditions for some level of recurring blooms over the next week may subside with increasing wind and rainfall potential from the influence of Hurricane Michael later this week.

**Estuaries**

Total inflow to the St. Lucie Estuary averaged 1,175 cfs over the past week with 700 cfs coming from Lake Okeechobee. Surface salinity slightly changed. The seven-day average salinity at the US1 Bridge remains in the fair range for adult eastern oysters. Total inflow to the Caloosahatchee Estuary averaged 3,157 cfs over the past week with 1,843 cfs coming from the Lake. Salinity rose to 1.0 (surface) and 1.7 (bottom) at Ft. Myers Yacht Basin from 0.2 the previous week. It remained fresh upstream of Val I-75. The 30-day moving average surface salinity is 0.2 at Val I-75 and 0.3 at Ft. Myers. Salinity conditions between Val I-75 and Ft. Myers are good for tape grass. Salinity conditions are in the fair range for adult eastern oysters at Cape Coral and in the good range at Shell Point. The Florida Fish and Wildlife Research Institute continues to monitor red tide on both the west and east coasts. Background to low concentrations of *Karenia brevis,* the Florida red tide dinoflagellate was observed on the east coast. There were fish kill reports on both coasts in the past week. 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 27,300 acre-feet of inflows (which includes approximately 24,500 acre-feet of Lake releases). The total amount of inflows to the STAs in WY2019 (since May 1, 2018) is approximately 1,045,000 acre-feet, which includes approximately 220,000 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 maintenance activities in STA-2 Flow-way 3. 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**

Over the last week water depths declined on average across the Water Conservation Areas and ENP rose slightly. Conditions within the Everglades are stable but drying as stages drop to very near or below the regulation lines. WCA-3A North and northern WCA-1 continue to dry out as indicated by the WDAT model output. The average water depth at the gauges located in WCA-3A North fell significantly for the second consecutive week and are at their lowest levels since the end of May. Near average precipitation fell on Taylor Slough and Florida Bay, and depths there fell slightly but remain above average for this time of year. Salinities in Florida Bay increased 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 0.42 inches of rainfall in the past week and the Lower Basin received 0.26 inches (SFWMD Daily Rainfall Report 10/8/2018).

### 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: 10/9/2018**

| 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) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 10/7/18 | 9/30/18 | 9/23/18 | 9/16/18 | 9/9/18 | 9/2/18 | 8/26/18 |
| Lakes Hart and Mary Jane | S-62 | 0 | LKMJ | 60.0 | R | 60.2 | **-0.2** | 0.0 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 |
| Lakes Myrtle, Preston, and Joel | S-57 | 0 | S-57 | 61.2 | R | 61.2 | **0.0** | 0.1 | 0.0 | 0.0 | 0.2 | 0.1 | 0.0 |
| Alligator Chain | S-60 | 0 | ALLI | 63.3 | R | 63.4 | **-0.1** | 0.0 | 0.0 | 0.1 | 0.1 | 0.2 | 0.1 |
| Lake Gentry | S-63 | 0 | LKGT | 61.2 | R | 61.1 | **0.1** | 0.1 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 |
| East Lake Toho | S-59 | 0 | TOHOE | 57.1 | R | 57.2 | **-0.1** | 0.1 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 |
| Lake Toho | S-61 | 0 | TOHOW, S-61 | 54.2 | R | 54.2 | **0.0** | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Lakes Kissimmee, Cypress, and Hatchineha | S-65 | 1,542 | KUB011, LKIS5B | 50.8 | R | 51.7 | **-0.9** | -0.4 | -0.1 | 0.1 | 0.2 | 0.5 | 0.1 |

[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:** **10/9/2018**

| Metric | Location | 1-Day Average | Average for the Preceeding 7-Days[1] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 10/7/2018 | 10/7/18 | 9/30/18 | 9/23/18 | 9/16/18 | 9/9/18 | 9/2/18 | 8/26/18 | 8/19/18 | 8/12/18 | 8/5/18 |
| Discharge (cfs) | S-65 | 1,567 | 1,542 | 1,485 | 1,560 | 1,544 | 3,538 | 3,088 | 1,806 | 3,282 | 4,337 | 4,407 |
| Discharge (cfs) | S-65A[2] | 1,391 | 1,391 | 1,416 | 1,532 | 1,634 | 3,808 | 3,315 | 1,765 | 3,443 | 4,674 | 4,980 |
| Discharge (cfs) | S-65D[2] | 1,478 | 1,646 | 1,982 | 2,221 | 3,351 | 4,313 | 2,699 | 3,077 | 4,254 | 4,617 | 4,458 |
| Headwater Stage (feet NGVD) | S-65D[2] | 27.82 | 27.81 | 27.81 | 27.75 | 27.67 | 27.86 | 27.88 | 27.70 | 27.00 | 26.63 | 26.78 |
| Discharge (cfs) | S-65E[2] | 1,409 | 1,684 | 2,062 | 2,296 | 3,458 | 4,259 | 2,902 | 3,219 | 3,860 | 4,848 | 4,566 |
| Discharge (cfs) | S-67 | 0 | 67 | 310 | 288 | 215 | 176 | 190 | 187 | 169 | 160 | 157 |
| DO (mg/L)[3] | Phase I river channel | 4.5 | 4.2 | 3.3 | 2.8 | 2.5 | 2.9 | 2.7 | 2.5 | 2.8 | 3.0 | 3.1 |
| Mean depth (feet)[4] | Phase I floodplain | 0.61 | 0.64 | 0.75 | 0.80 | 1.12 | 1.79 | 1.24 | 1.16 | 1.76 | 2.02 | 2.08 |

[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)

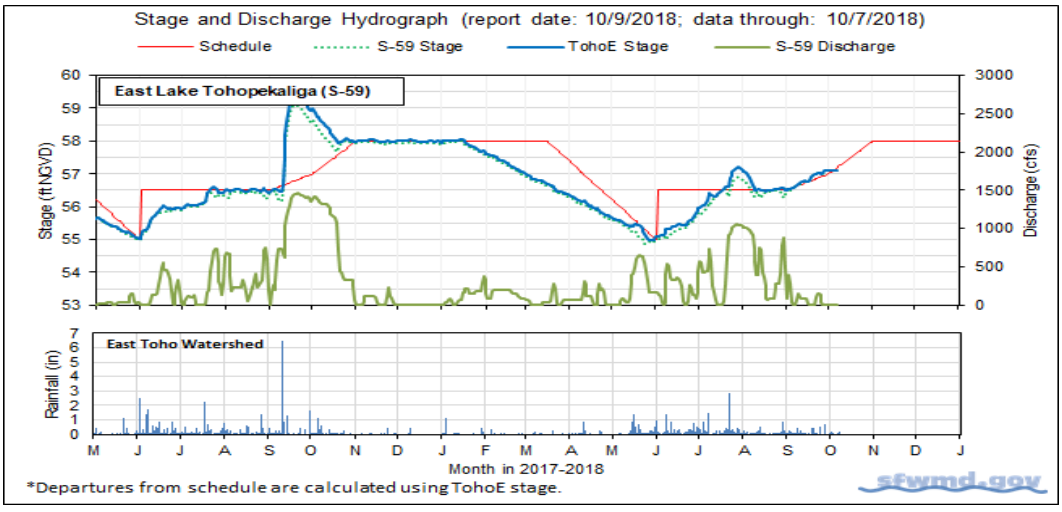



**Figure 1.**

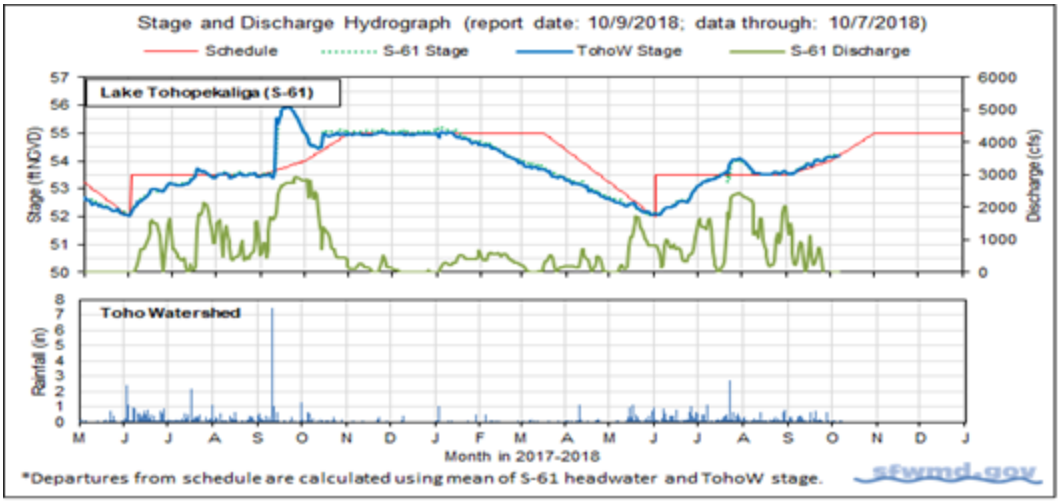



**Figure 2.**

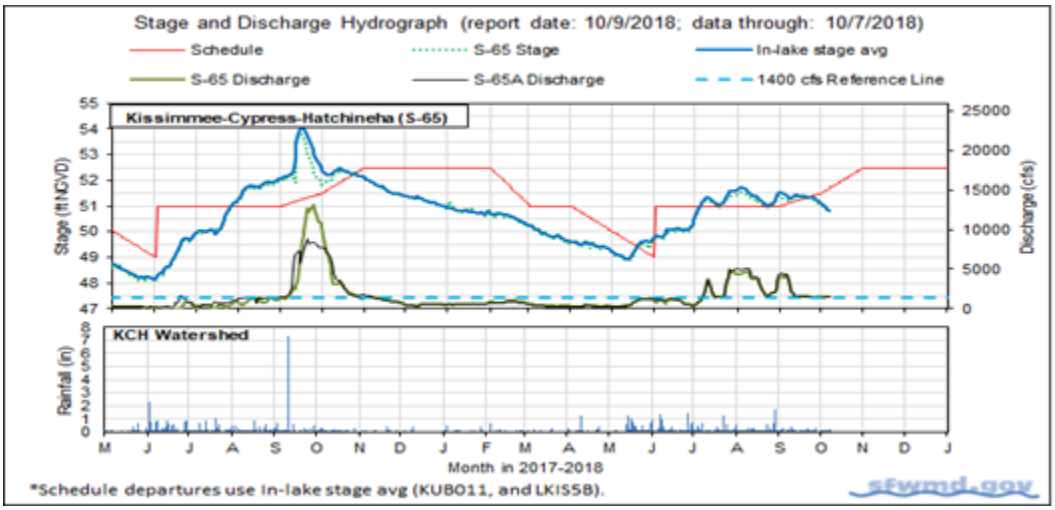



**Figure 3.**

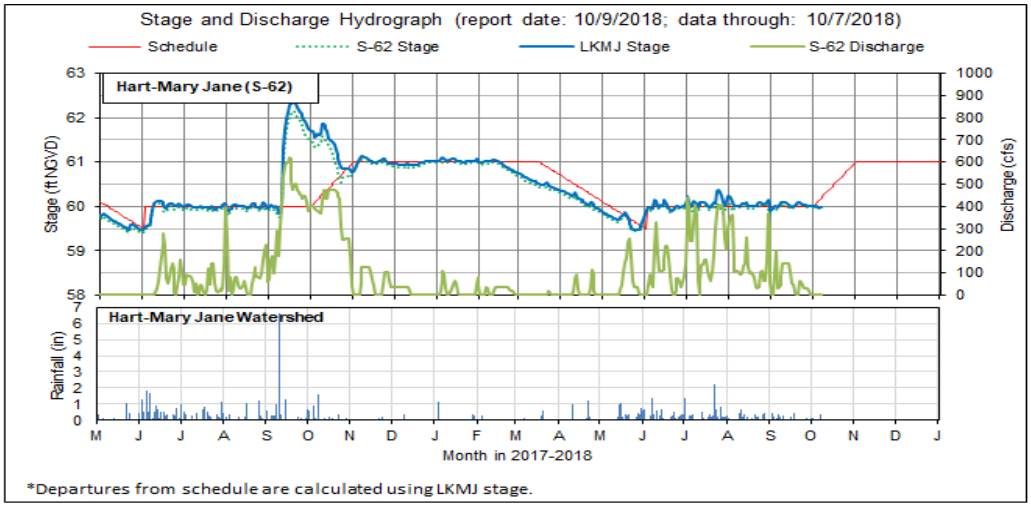



**Figure 4.**

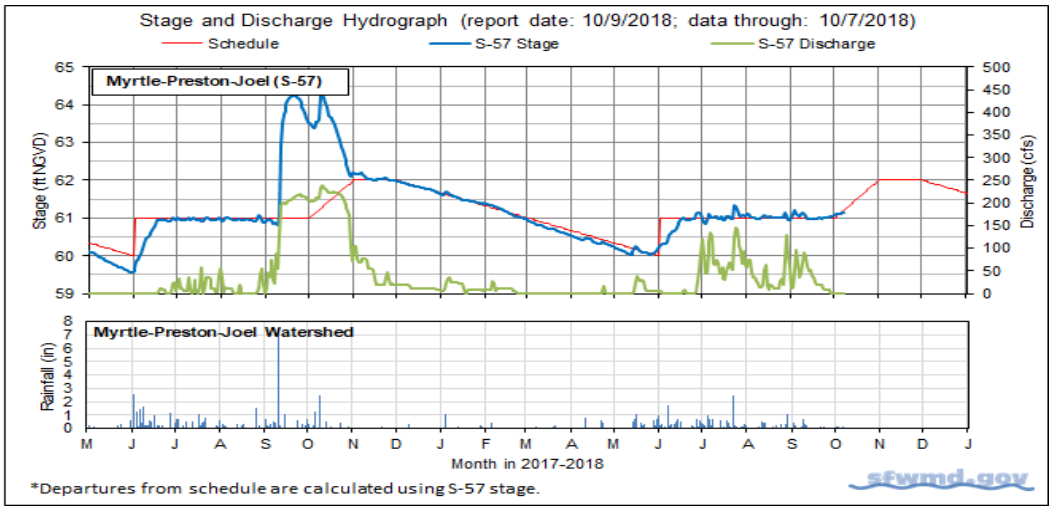



**Figure 5.**

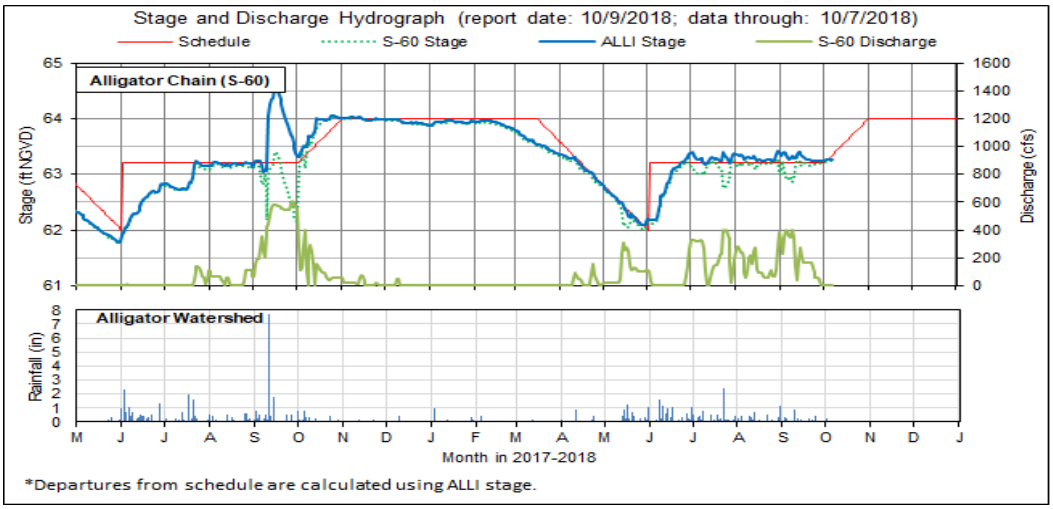



**Figure 6.**

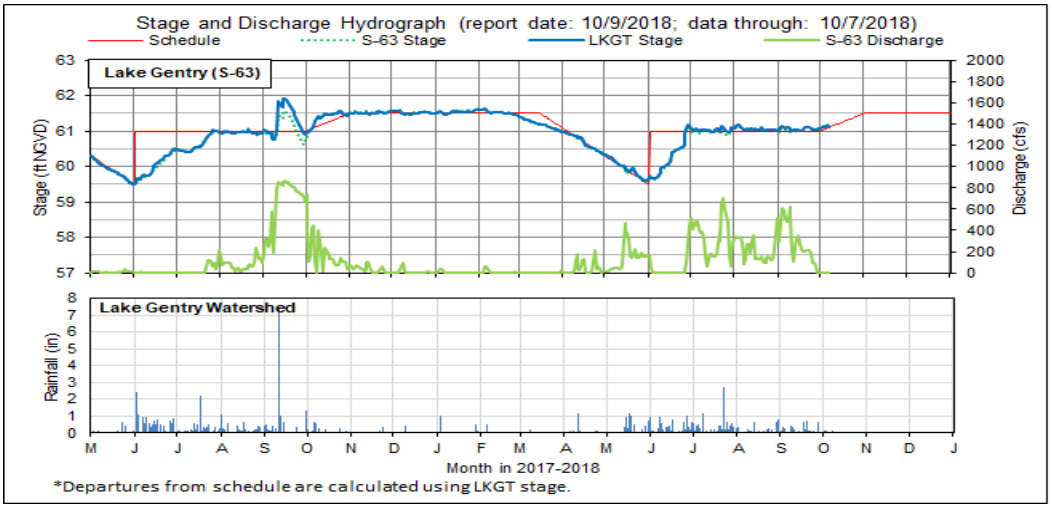



**Figure 7.**

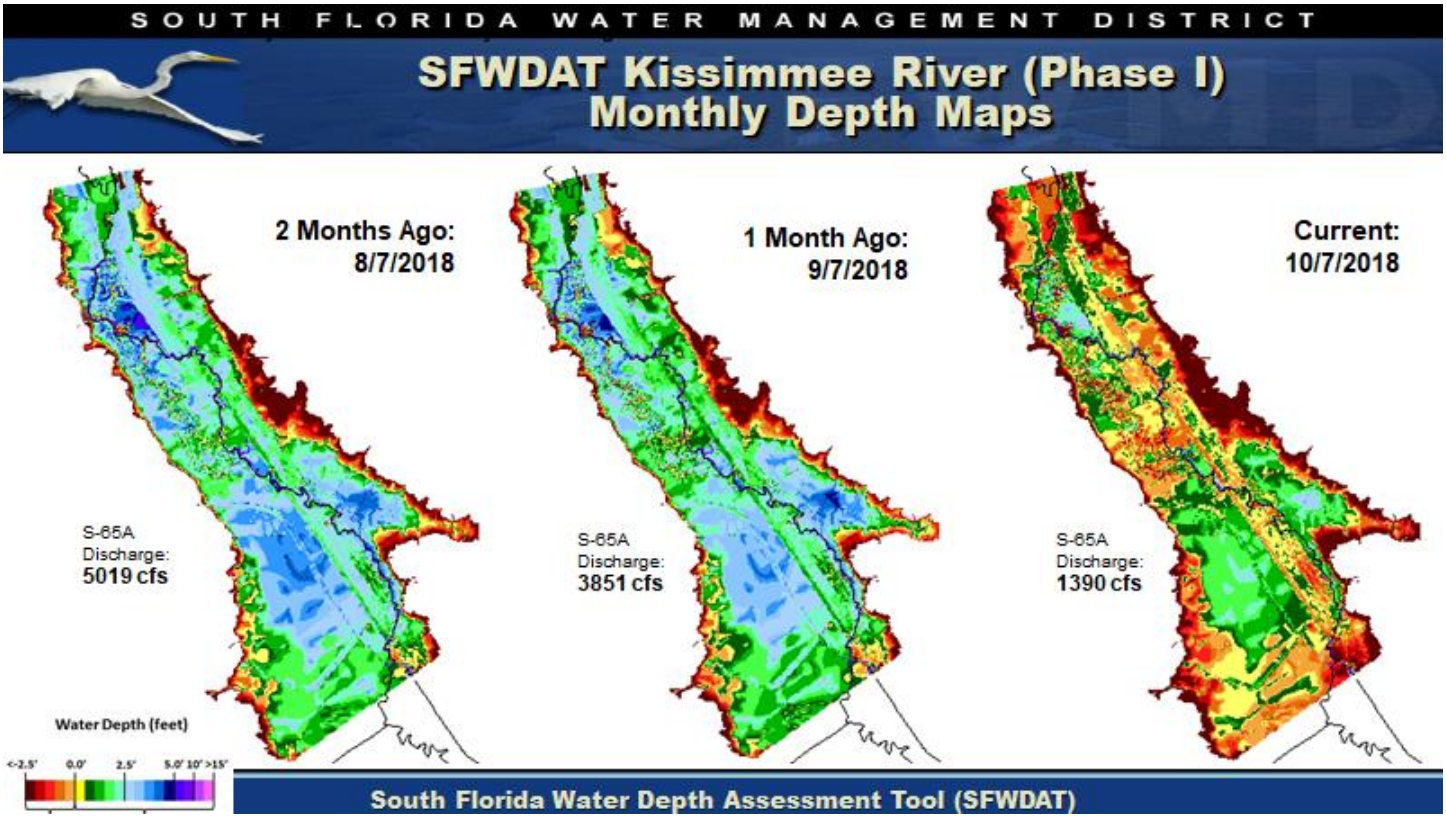



**Figure 8.** Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to January 16, 2012.

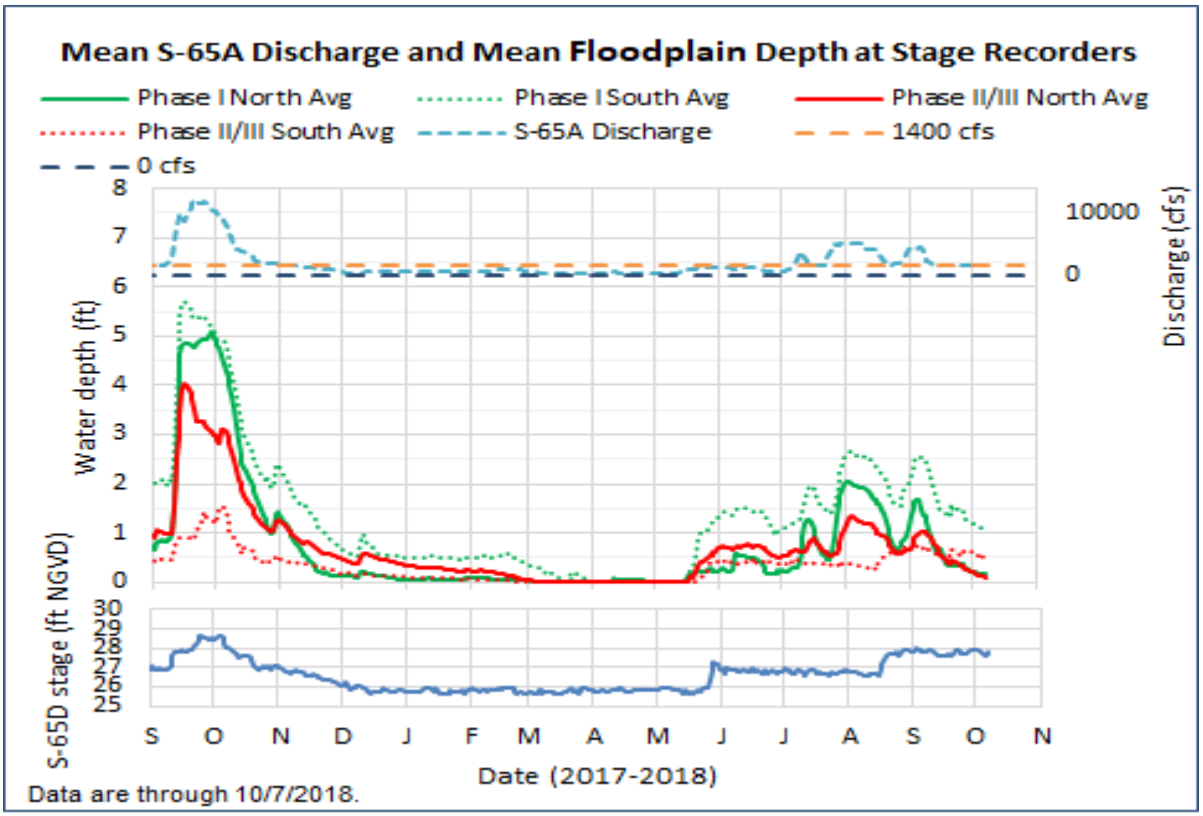
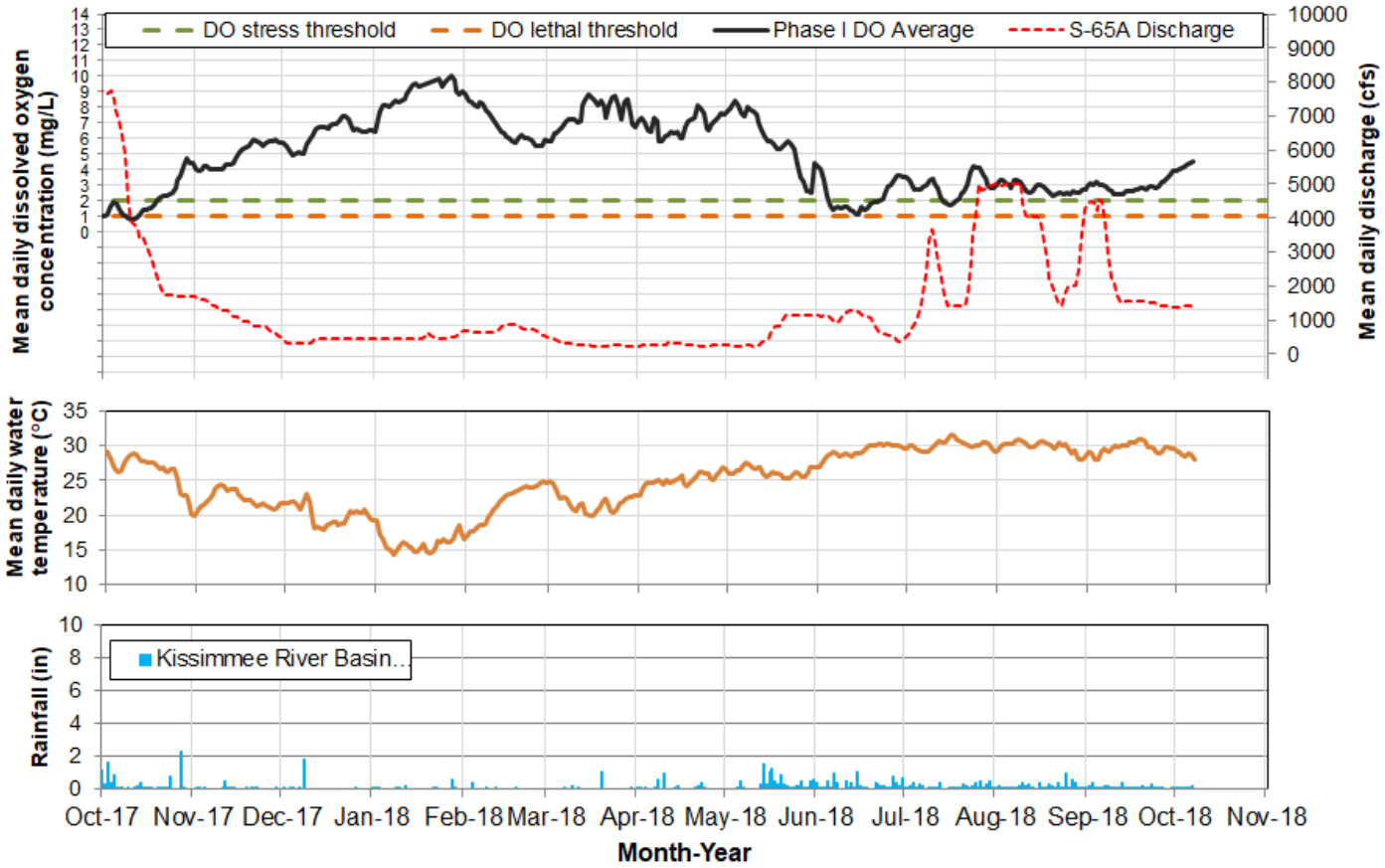



**Figure 9.** Mean water depth at stage recorders in the northern Phase I, southern Phase I, northern Phase II/III, and southern Phase II/III areas in relation to the S-65A discharge and S-65D headwater stage.




Report Date: 10/9/2018; data are through: 10/7/2018.

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

# Water Management Recommendations

| Recommendation Date | Recommendation | Purpose | Outcome | Source | Report Date |
|---|---|---|---|---|---|
| **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 |
| **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 |

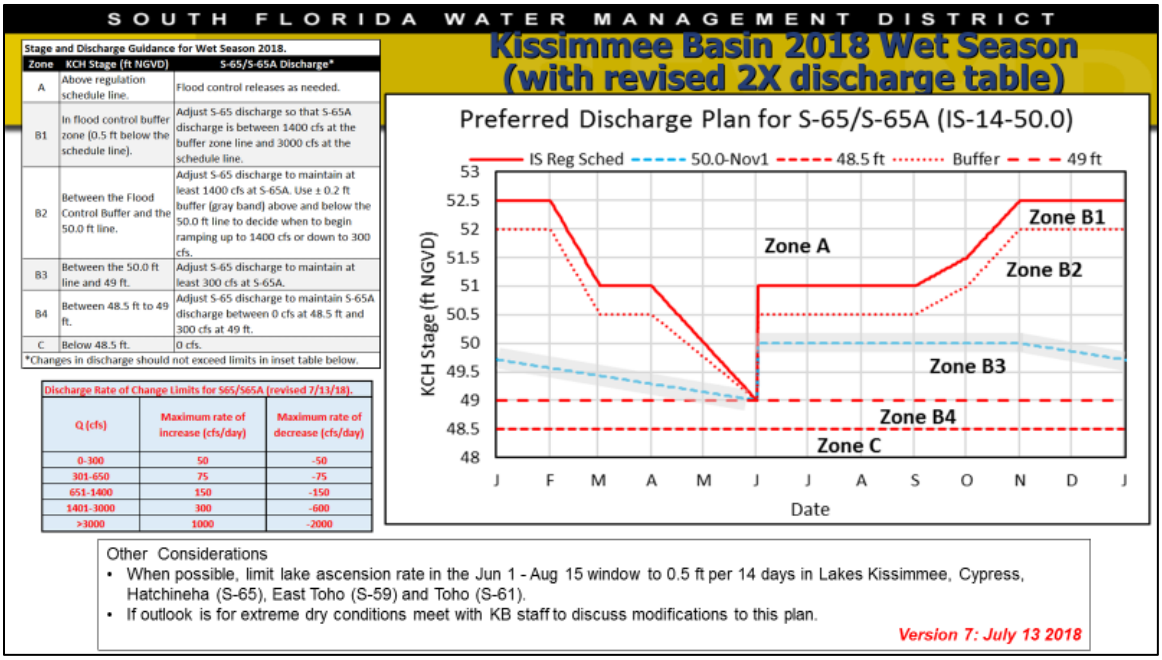



**Figure 11.** The 2018 Wet Season Discharge Plan for S-65/S-65A.

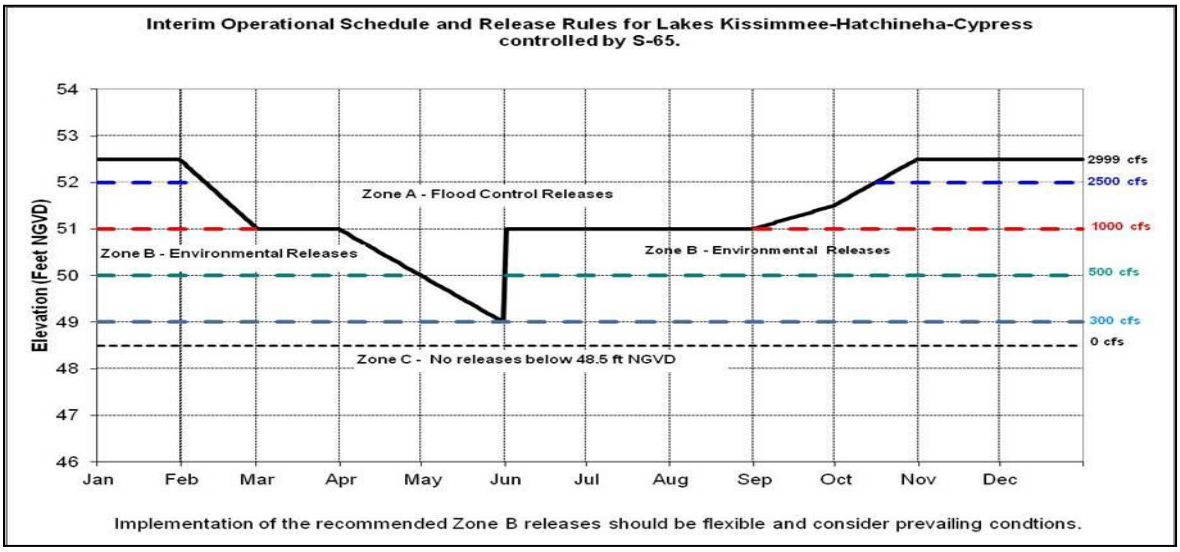



**Figure 12.** Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years.

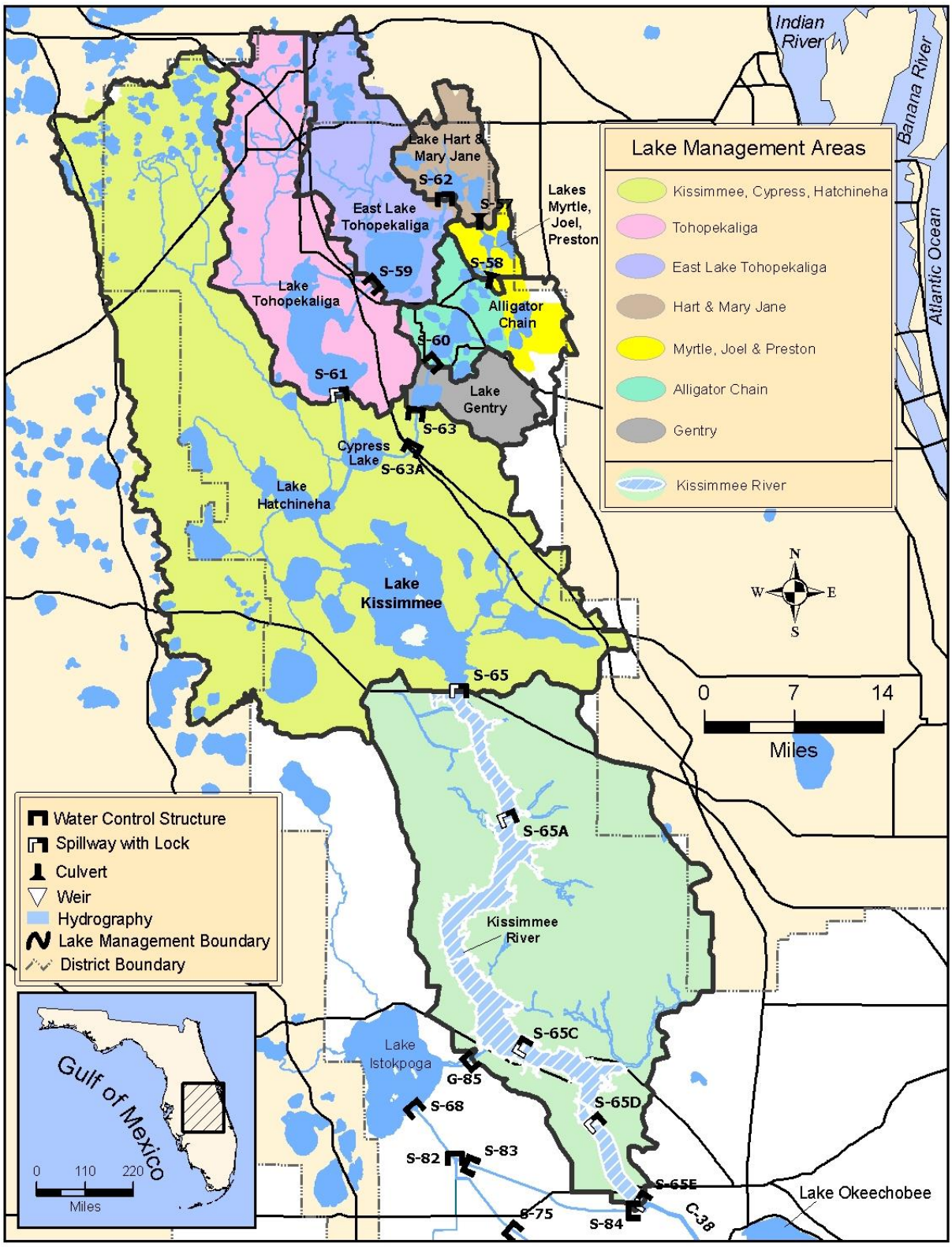



**Figure 13.** The Kissimmee Basin.

## LAKE OKEECHOBEE

According to the USACE web site, Lake Okeechobee stage is at 14.22 feet NGVD for the period ending at midnight on October 8, 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 0.28 feet lower than it was a month ago and 2.94 feet lower than a year ago (Figure 1). The Lake is now in the Base-Flow sub-band (Figure 2). According to RAINDAR, 0.30 inches of rain fell over the Lake during the week October 2, 2018 – October 8, 2018. Most of the central watershed received similar or less rainfall, between 0 and 0.5 inches, while the coastal regions and the upper Kissimmee basin received up to 2.0 inches of rain (Figure 3).

Average daily inflows to the Lake decreased from the previous week, going from 2,345 cfs to 1,741 cfs. The decrease in inflows was mostly from the Kissimmee River via the S-65E structures, going from 1,997 cfs the previous week to 1,665 cfs this past week (Table 1). Inflows also decreased by 178 cfs from the S-71, S-72 and S-84 structures, 32 cfs from S-133P, 28 cfs from S-135P, 21 cfs from Fisheating Creek and 3 cfs from S-127P. There have been no back-pumping operations from the S-2 or S-3 pumps during the wet season thus far.

Total outflows increased from the previous week again, going from 4,939 average daily cfs the previous week to 5,984 cfs this past week. The increases in outflows were primarily in discharges west via the S-77 structure and south through the S350 structures. Discharges via the S-308 decreased by 387 cfs from the previous week, while S-77 discharges increased by 376 cfs this past week. Outflows south through the S-350 structures increased by 1,056 cfs going from 1,896 cfs the previous week to 2,952 cfs this past week. The corrected average daily evapotranspiration value for the week based on the L006 weather platform solar radiation was 0.15 inches this past week, up slightly from 0.12 inches.

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 (October 6) using the cyanobacteria monitoring product derived from NOAA's analysis of EUMETSAT's OLCI satellite sensor showed the high potential for a bloom north of Fisheating Bay along Indian Prairie continued this past week while the potential in the north and eastern regions of the Lake lessened (Figure 5). Conditions for bloom occurrence will likely lessen over the next week with increasing wind and rainfall potential from the influence of Hurricane Michael later in the week.

## Water Management Recommendations

Lake Okeechobee stage is 14.22 feet NGVD, 0.28 feet lower than last week and 0.46 feet lower than 30 days ago. Lake stages are now the lowest they have been for this time of year since 2011 but are in the middle of the preferred ecological envelope, which varies seasonally from 12.5 – 15.5 feet NGVD. 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 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 | 1997 | 1655 | 0.7 |
| S71 & 72 | 134 | 0 | 0.0 |
| S84 & 84X | 44 | 0 | 0.0 |
| Fisheating Creek | 98 | 77 | 0.0 |
| S154 | 0 | 0 | 0.0 |
| S191 | 0 | 0 | 0.0 |
| S133 P | 41 | 9 | 0.0 |
| S127 P | 3 | 0 | 0.0 |
| S129 P | 0 | 0 | 0.0 |
| S131 P | 0 | 0 | 0.0 |
| S135 P | 28 | 0 | 0.0 |
| S2 P | 0 | 0 | 0.0 |
| S3 P | 0 | 0 | 0.0 |
| S4 P | 0 | 0 | 0.0 |
| L8 Backflow | 0 | 1 | 0.0 |
| Rainfall | 827 | 827 | 0.3 |
| **Total** | **3172** | **2568** | **1.0** |

| OUTFLOWS | Previous Week Avg Daily cfs | Avg Daily Outflow cfs | Equivalent Depth Week Total (in) |
|---|---|---|---|
| S77 | 1956 | 2332 | 1.0 |
| S308 | 1087 | 700 | 0.3 |
| S351 | 478 | 1113 | 0.5 |
| S352 | 347 | 477 | 0.2 |
| S354 | 1071 | 1362 | 0.6 |
| L8 Outflow | 1 | 0 | 0.0 |
| ET | 2370 | 2949 | 1.2 |
| **Total** | **7309** | **8933** | **3.7** |

PROVISIONAL DATA

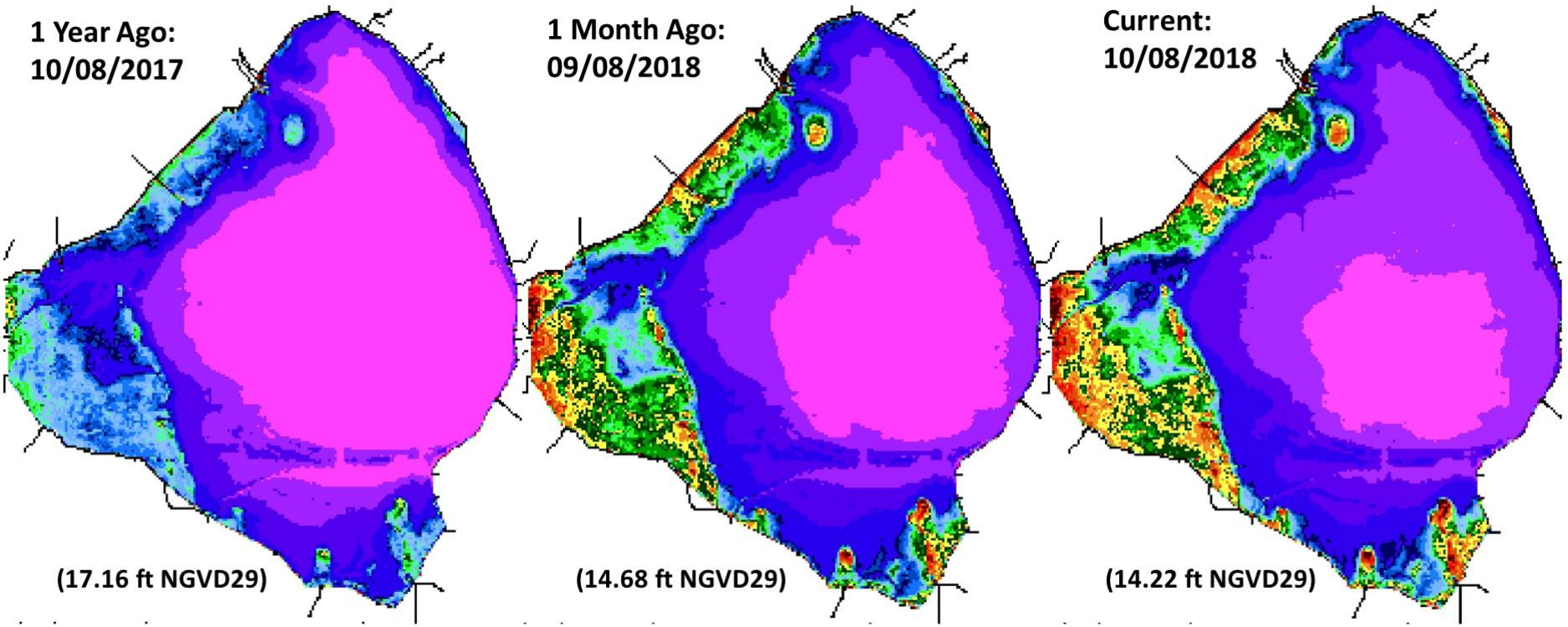



**Figure 1.** Water depth estimates on Lake Okeechobee based on the South Florida Water Depth Assessment Tool.

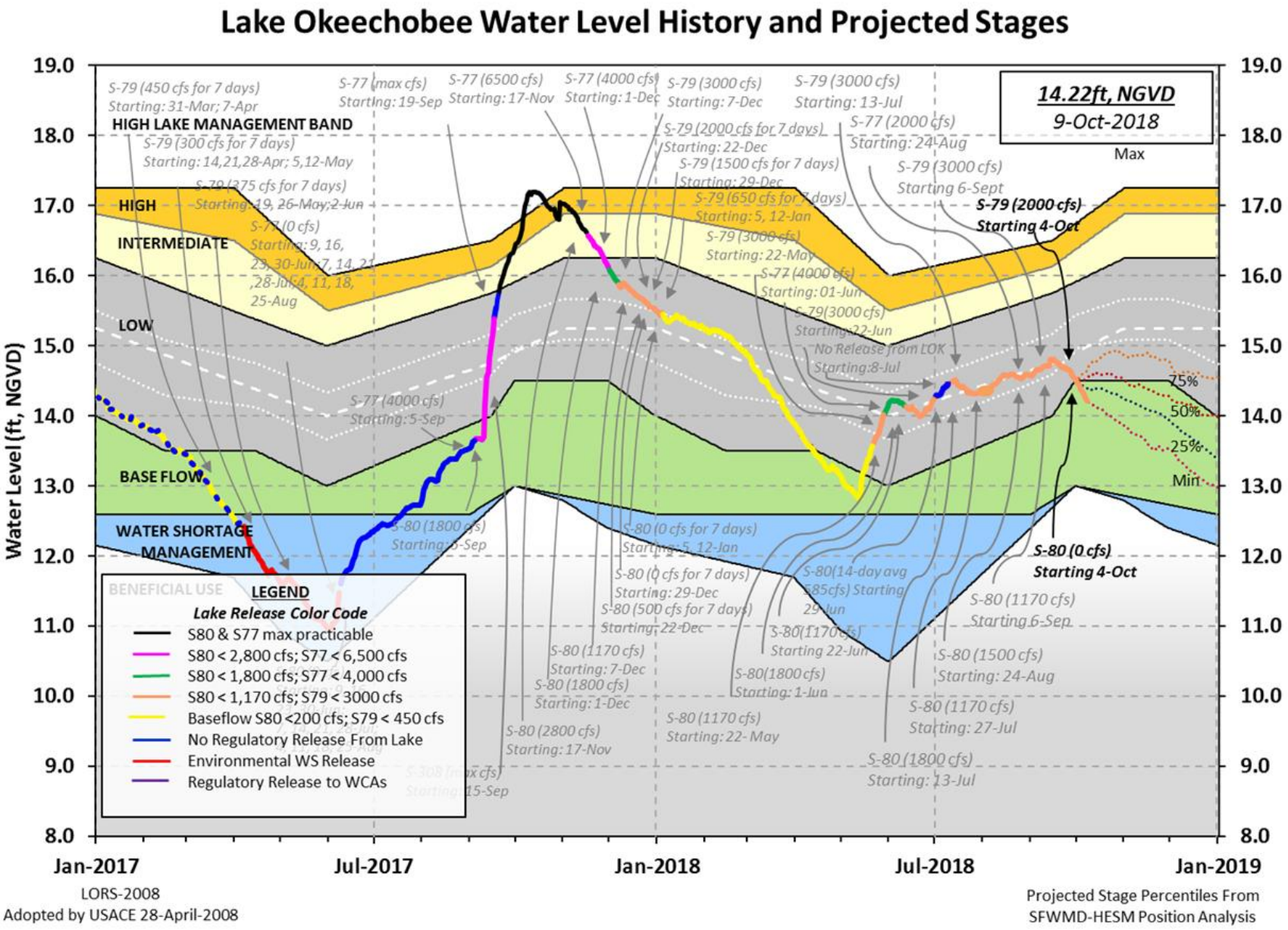



**Figure 2.** Recent Lake Okeechobee stage and releases, with projected stages based on a dynamic position analysis.

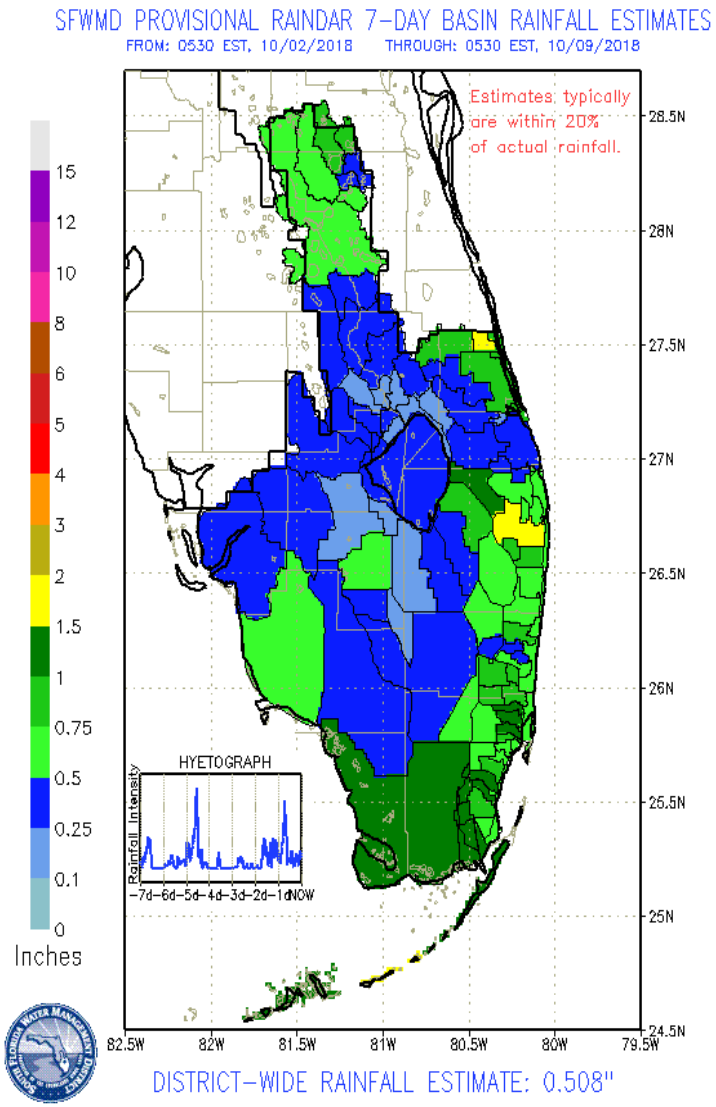



**Figure 3.** Rainfall estimates by basin.

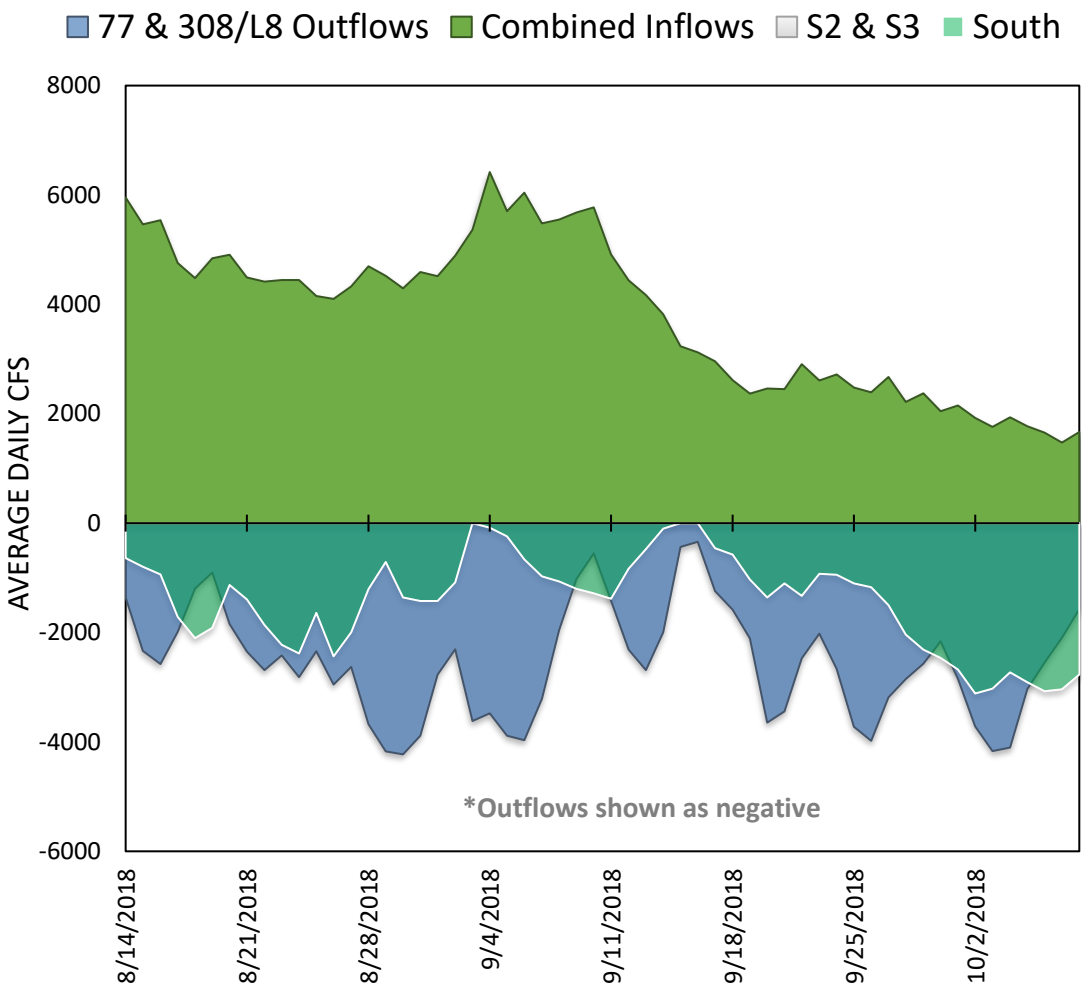



**Figure 4.** Major inflows and outflows of Lake Okeechobee, including the S-350 structures designated as South. The L-8 canal flows through culvert 10A are included as outflows when positive, and as inflows when backflowing into the lake. Inflows and outflows are shown as positive and negative, respectively,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

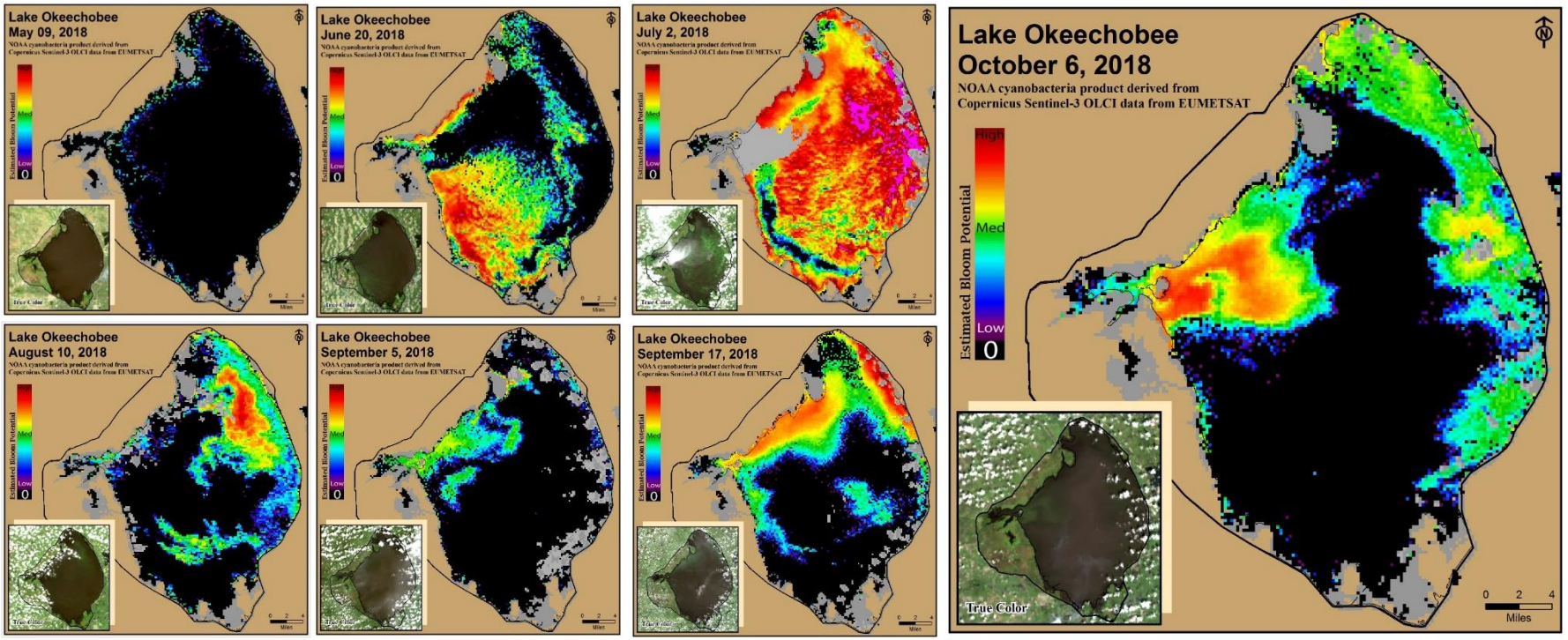



**Figure 5.** Potential for cyanobacterial blooms on Lake Okeechobee based on NOAA's harmful algal bloom monitoring system derived from Copernicus Sentinel-3 OLCI data from EUMETSAT. Gray indicates cloud cover. All data are experimental and unvalidated at this point in product development.

## ESTUARIES

**St. Lucie Estuary**:

Last week total inflow to the St. Lucie Estuary averaged about 1,175 cfs (Figures 1 and 2) and last month inflow averaged about 1,437 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 | 221 |
| S-80 | 835 |
| S-308 | 700 |
| S-49 on C-24 | 0 |
| S-97 on C-23 | 30 |
| Gordy Rd. structure on Ten Mile Creek | 89 |

Over the past week in the estuary, salinity decreased at HR1 and increased at US1 Bridge and at A1A 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 6.8. Salinity conditions in the middle estuary are within the fair 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) | **3.6** (4.0) | **4.0** (4.5) |
| US1 Bridge | **6.8** (6.5) | **6.9** (6.8) |
| A1A Bridge | **18.7** (16.3) | **25.1** (22.3) |

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

**Caloosahatchee Estuary**:

Last week total inflow to the Caloosahatchee Estuary averaged about 3,157 cfs (Figures 5 and 6) and last month inflow averaged about 3,895 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 | 2,332 |
| S-78 | 1,843 |
| S-79 | 2,626 |
| Tidal Basin Inflow | 531 |

Over the past week, salinity was near 0 down to Val I75 and increased downstream (Table 4, Figures 7 & 8). The seven-day average salinity values are estimated to be within the fair 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 0.4 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) | **0.4** (0.2) |
| Ft. Myers Yacht Basin | **1.1 (**0.2) | **1.7** (0.2) |
| Cape Coral | **5.5** (3.1) | **9.1** (4.5) |
| Shell Point | **18.3** (14.0) | **NR** (NR) |
| 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 October 5, 2018, that *Karenia brevis,* the Florida red tide dinoflagellate, was observed at background to high concentrations in 16 samples collected from or offshore of Lee County. Fish kills and respiratory irritation were reported in Lee County over the past week. *Karenia brevis,* the Florida red tide dinoflagellate, was observed at very low concentrations in two samples collected from St. Lucie County, Background to low concentrations in 7 samples collected from Martin County, very low to high concentrations in 30 samples collected from or offshore of Palm Beach County, background to low concentrations in 10 samples from Broward County, and very low to medium concentrations in 8 samples collected from or offshore of Miami-Dade County. Fish kills were reported for multiple locations in Broward and Palm Beach counties. Respiratory irritation was reported over the past week in St. Lucie County, Martin County, and Palm Beach County.

**Water Management Recommendations**

Lake stage is in the Baseflow sub-band of 2008 LORS. Tributary hydrological conditions are normal. The 2008 LORS recommends up to 4500 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.

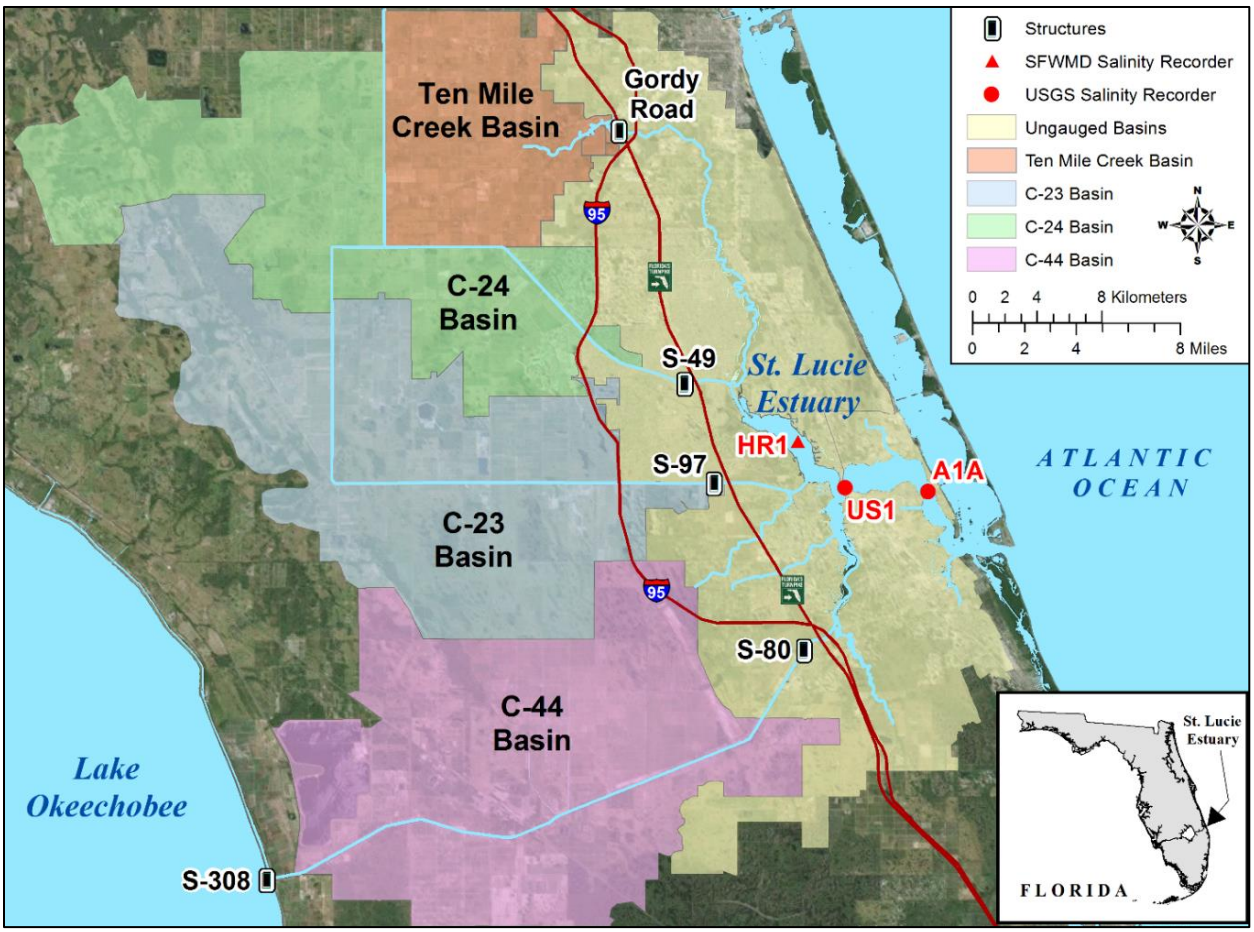



**Figure 1.** Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

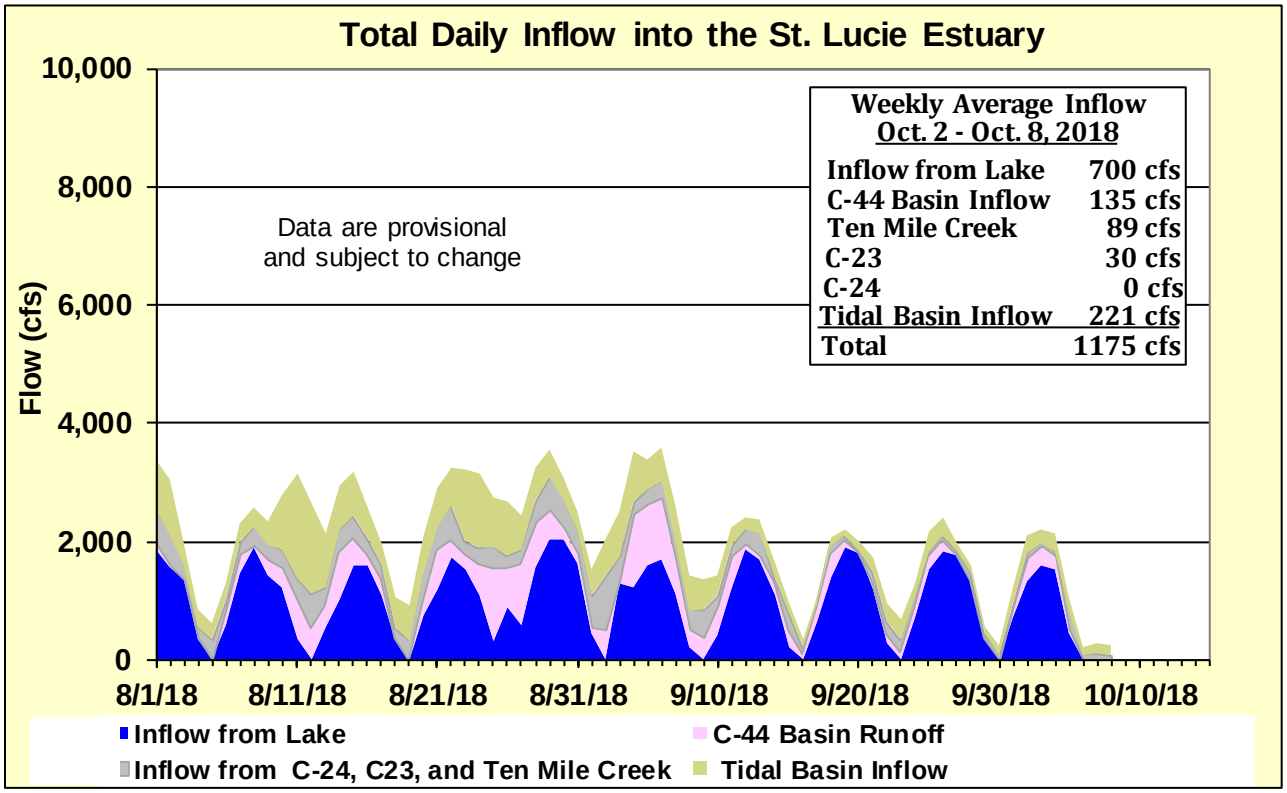



**Figure 2.** Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basins into the St. Lucie Estuary.

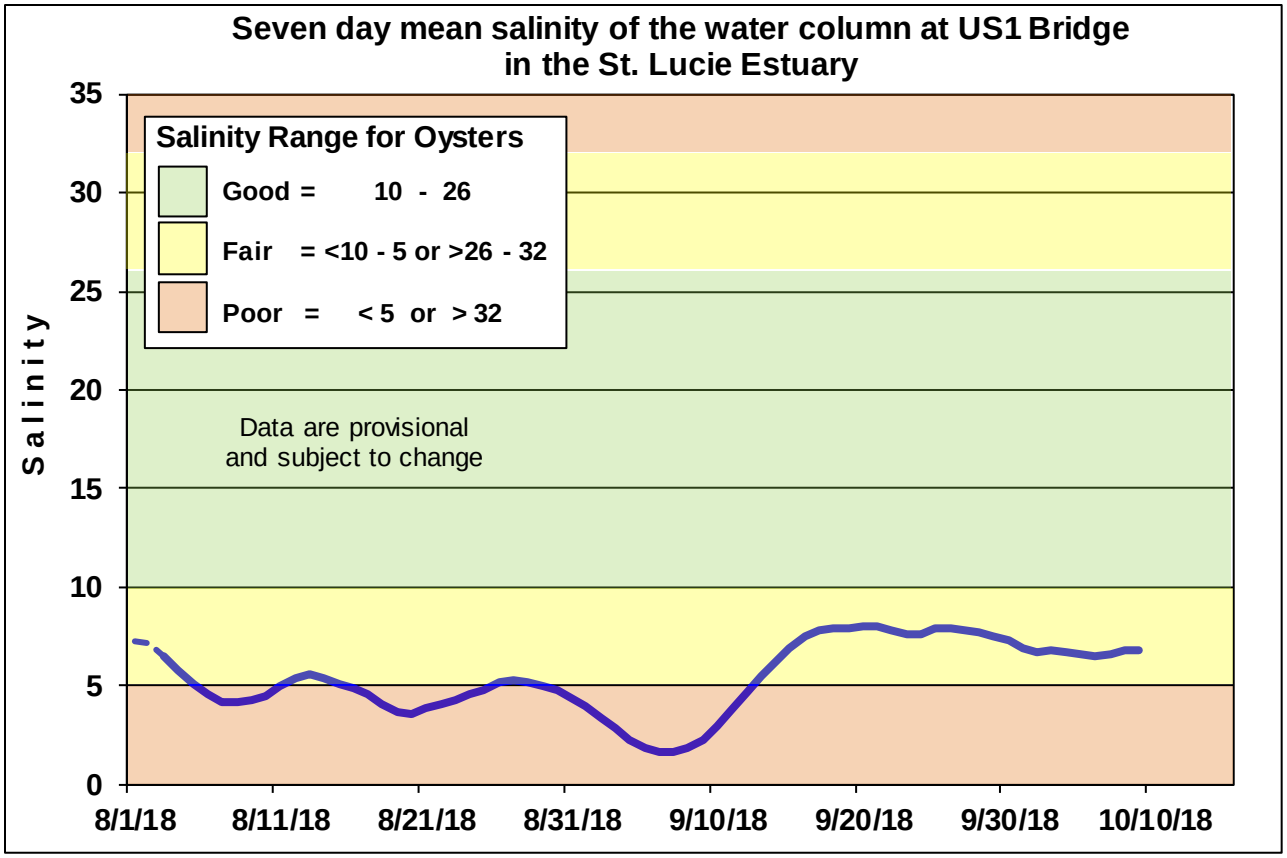



**Figure 3.** Seven-day mean salinity of the water column at the US1 Bridge.

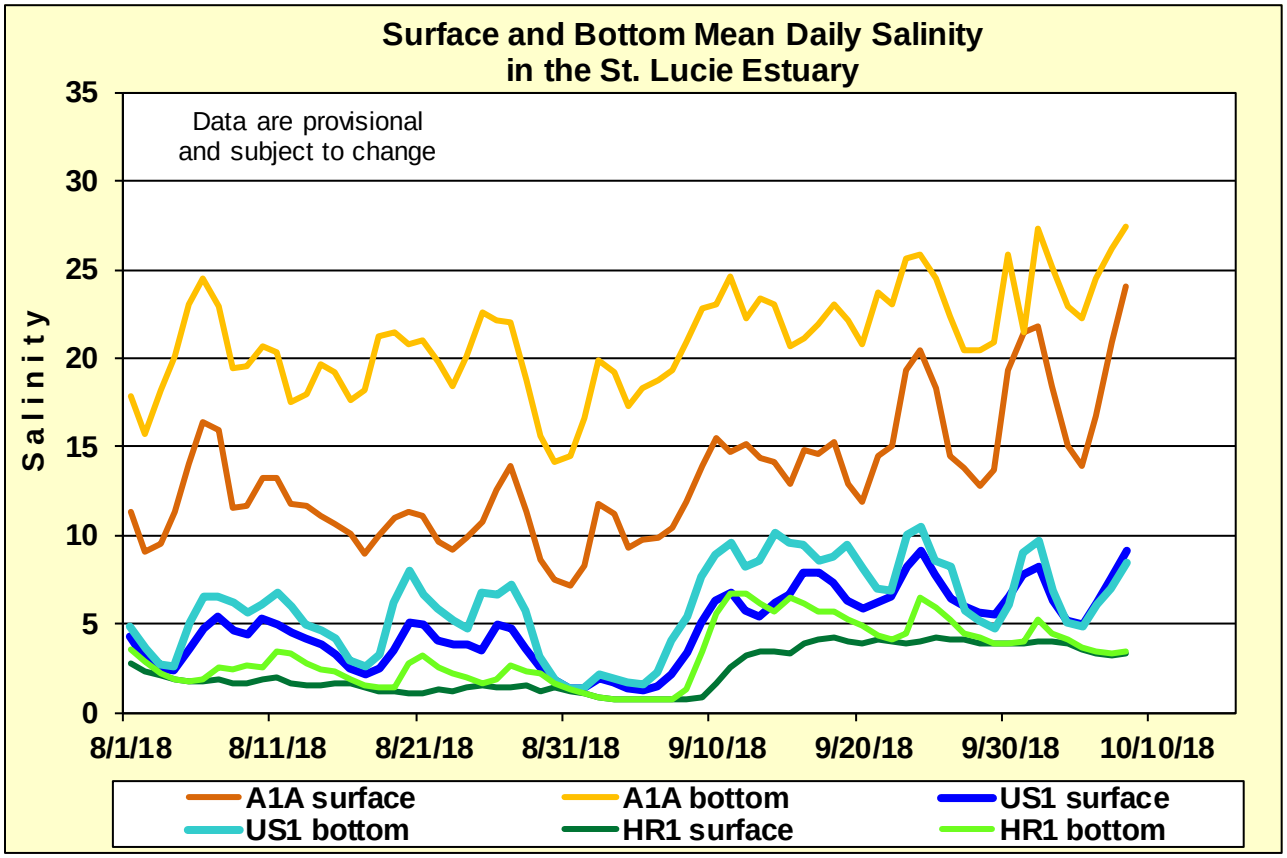



**Figure 4**. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

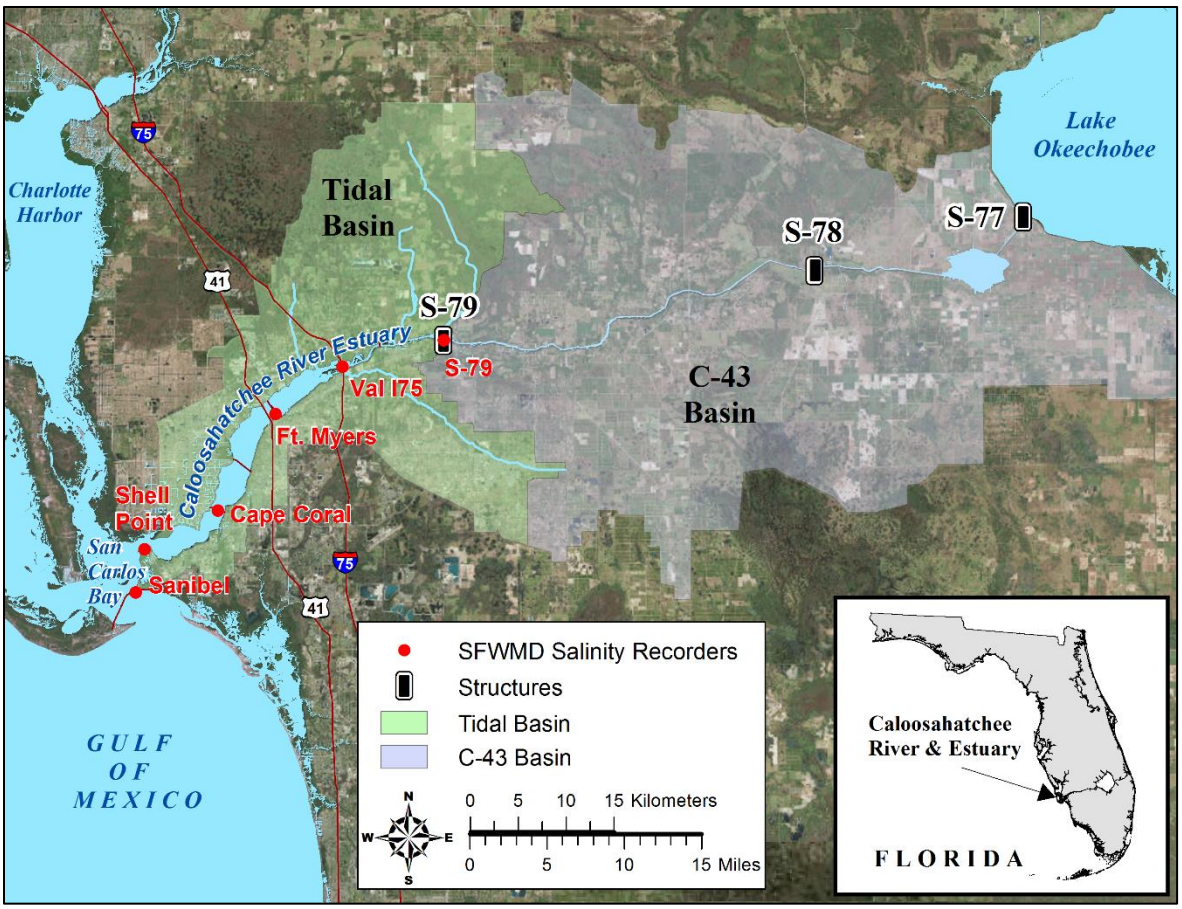



**Figure 5.** Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

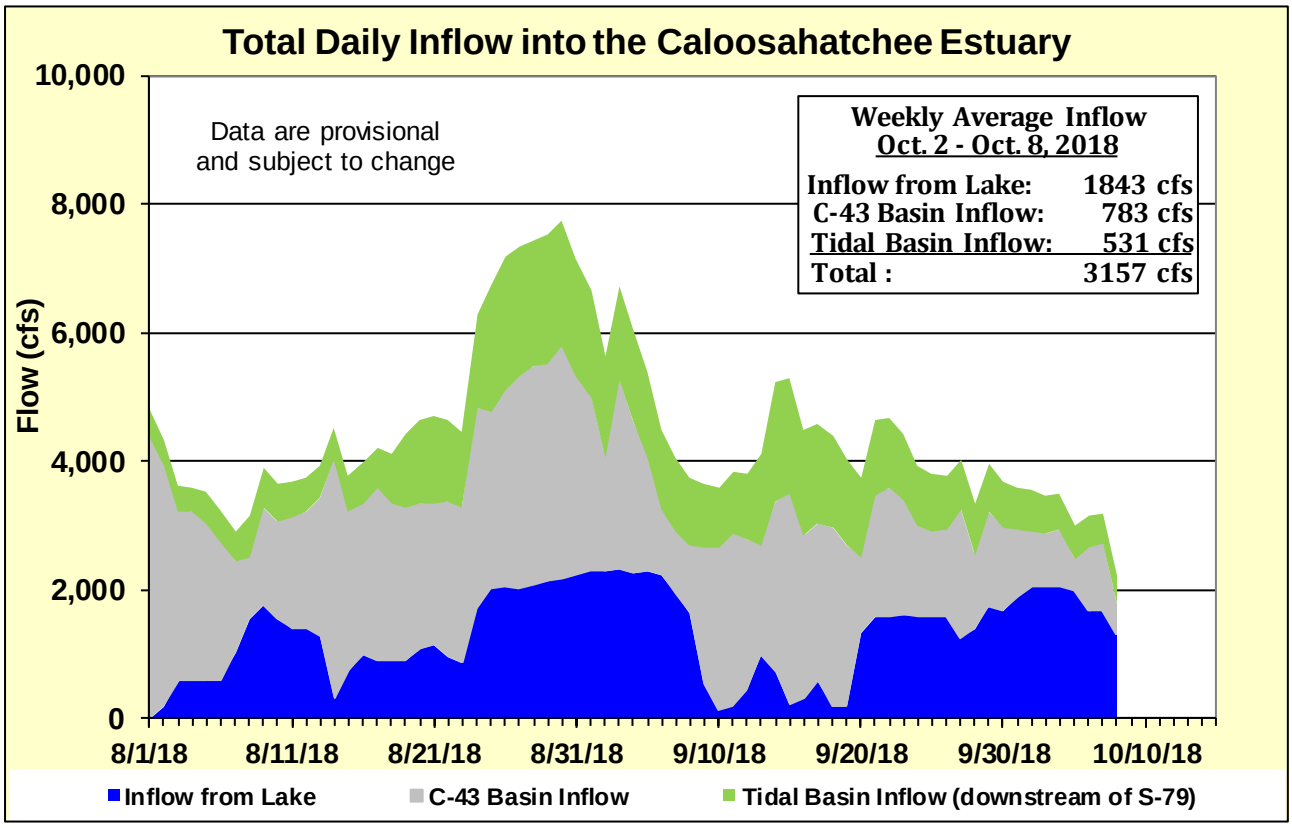



**Figure 6.** Total daily inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.

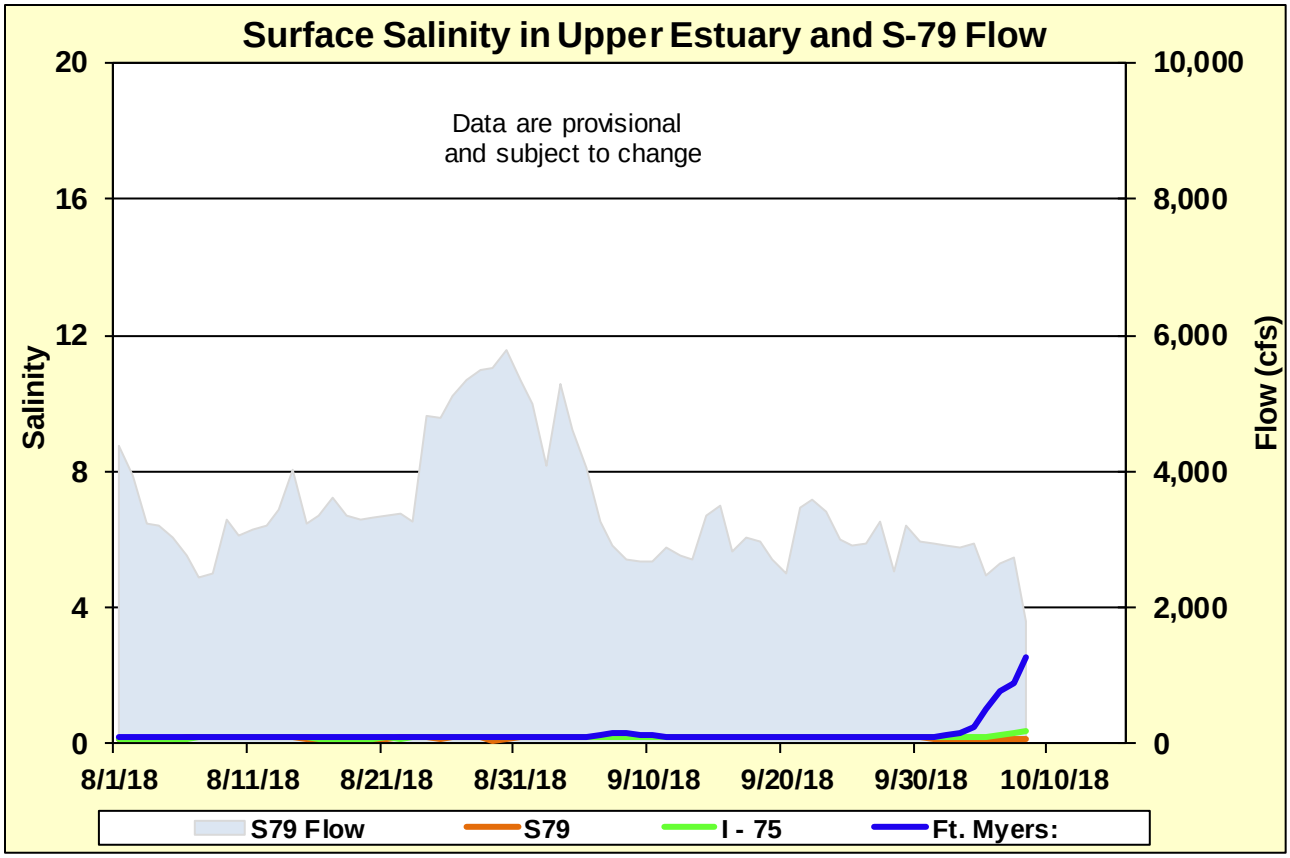



**Figure 7.** Daily mean flows at S-79 and salinity at upper estuary monitoring stations.

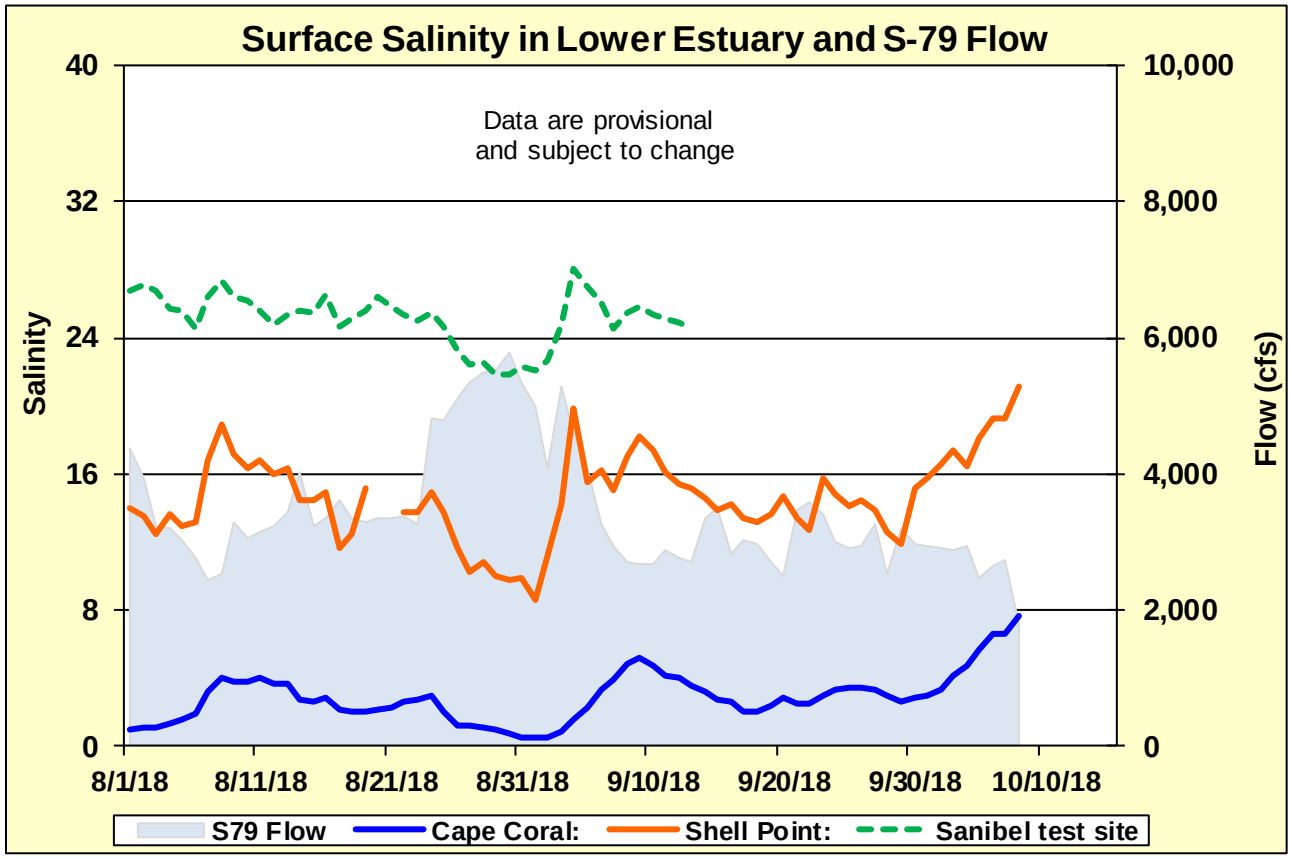



**Figure 8.** Daily mean flows at S-79 and salinity at lower estuary stations.

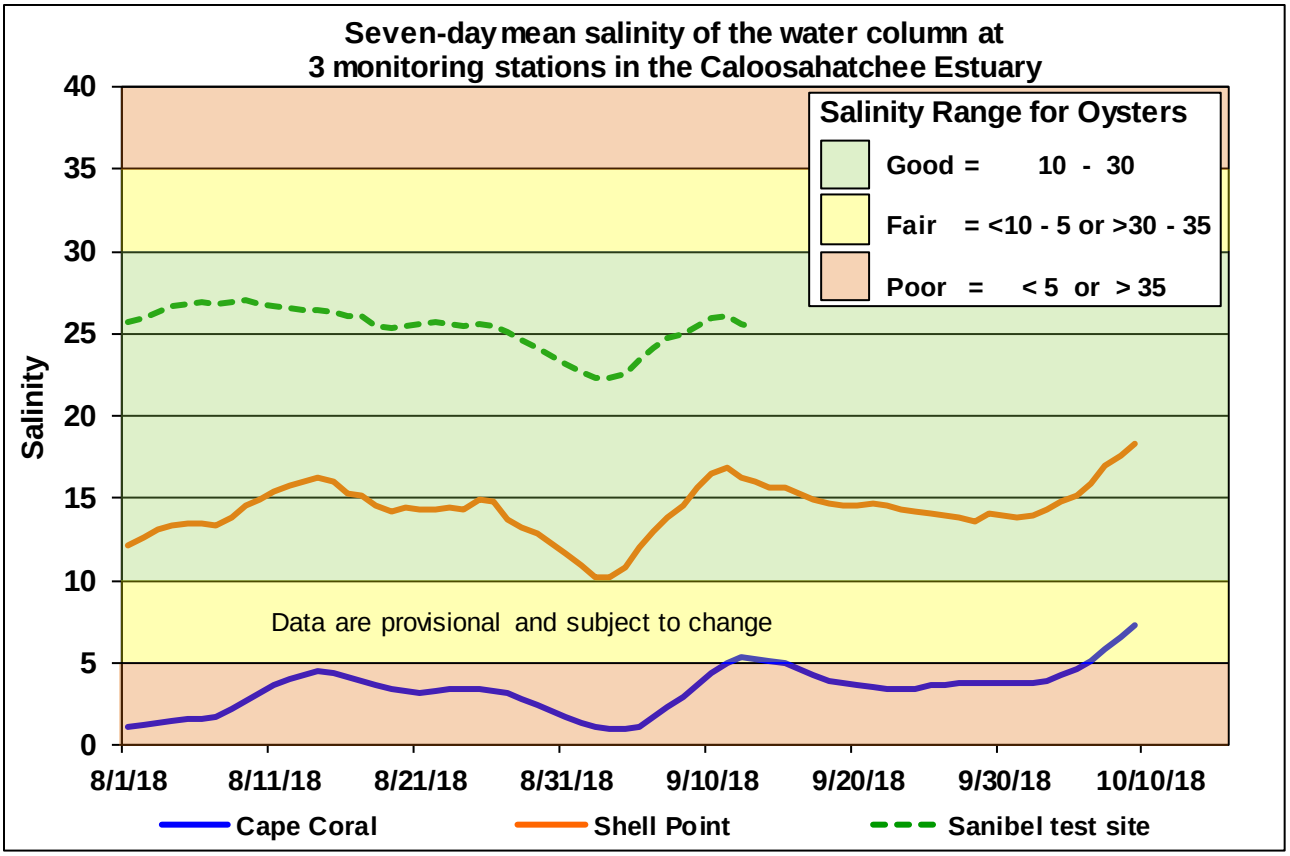
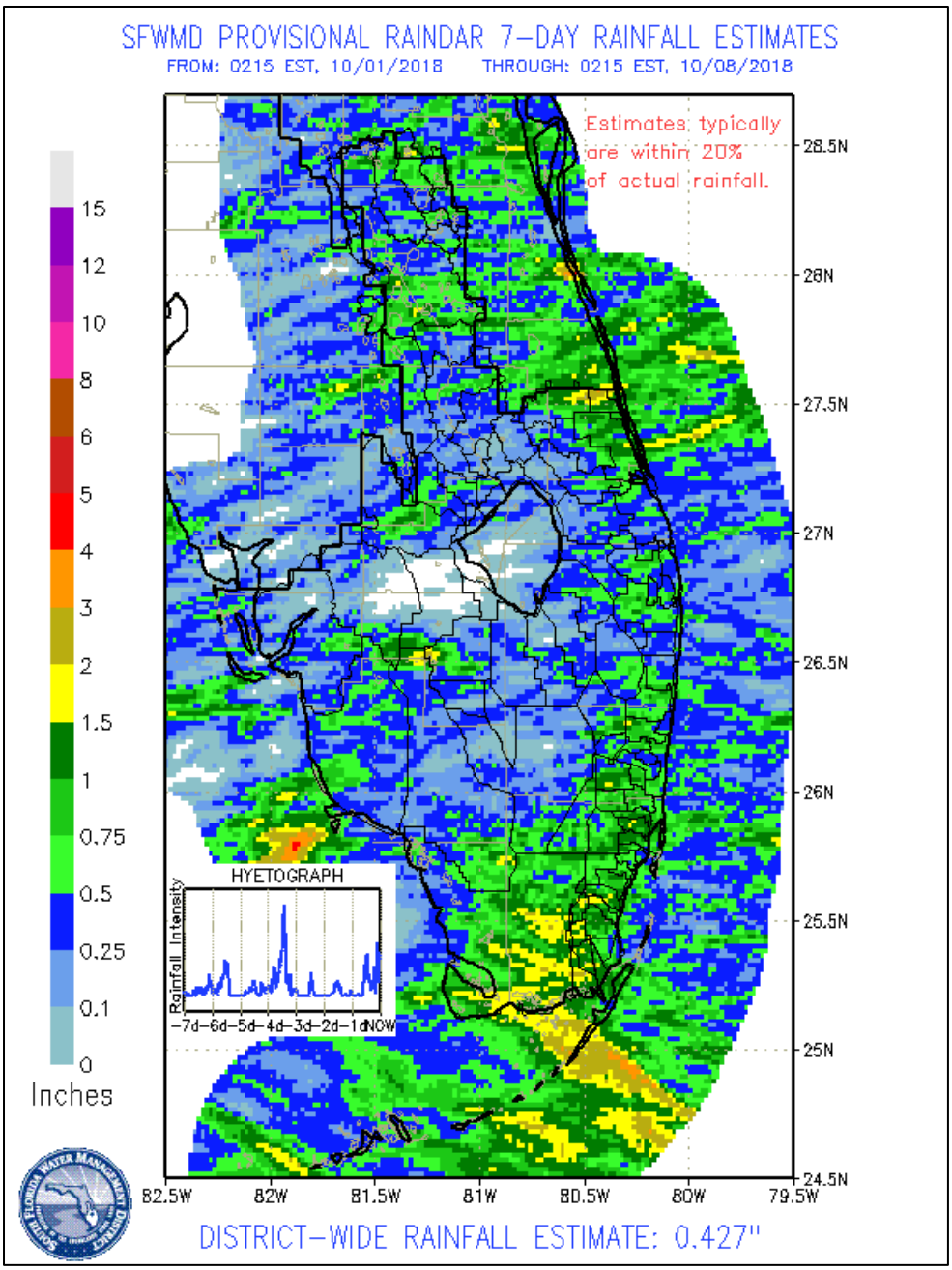



**Figure 9.** Seven-day mean salinity at Cape Coral, Shell Point, and Sanibel monitoring stations.

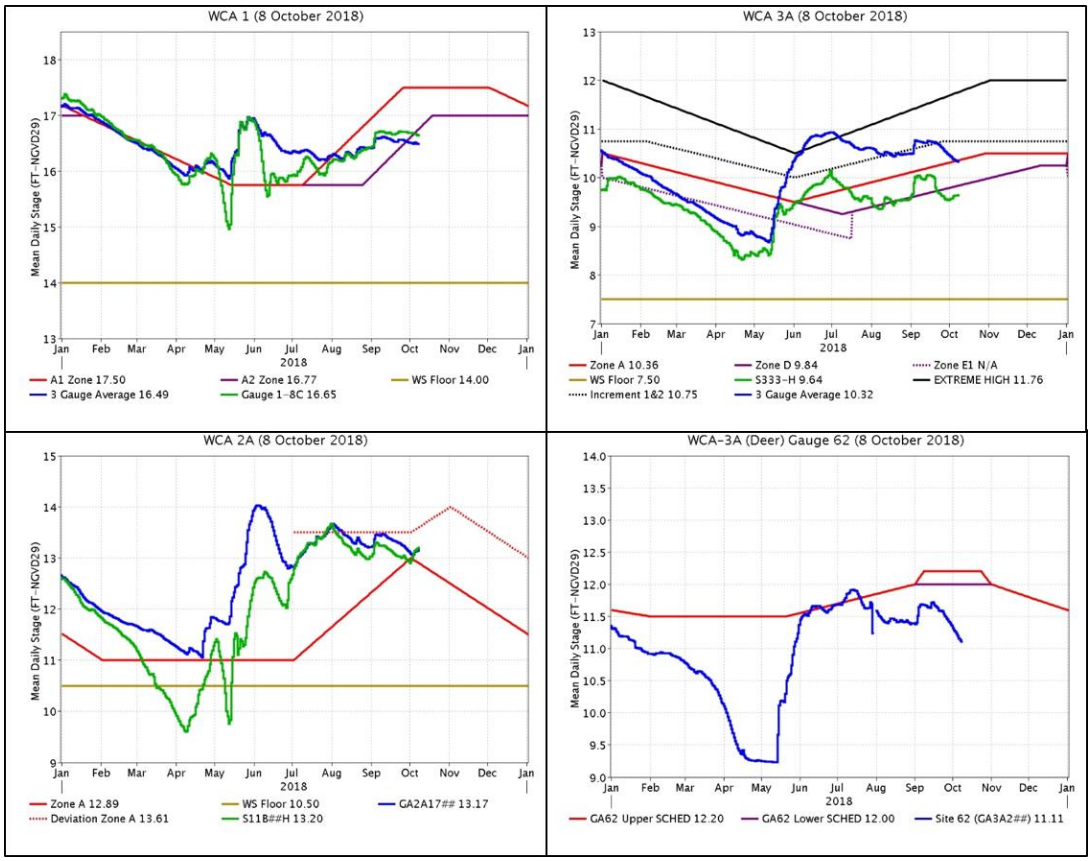
**EVERGLADES**

At the gauge locations monitored for this report, stages within the Everglades fell 0.04 feet on average over the last week. For the second week in a row WCA-3A North experienced a significant drop, falling -0.25 feet. The most extreme individual gauge changes within the WCAs ranged from +0.13 feet (WCA-2B) to -0.25 feet (WCA-3A northeast). Pan evaporation was estimated at 1.55 inches this week.

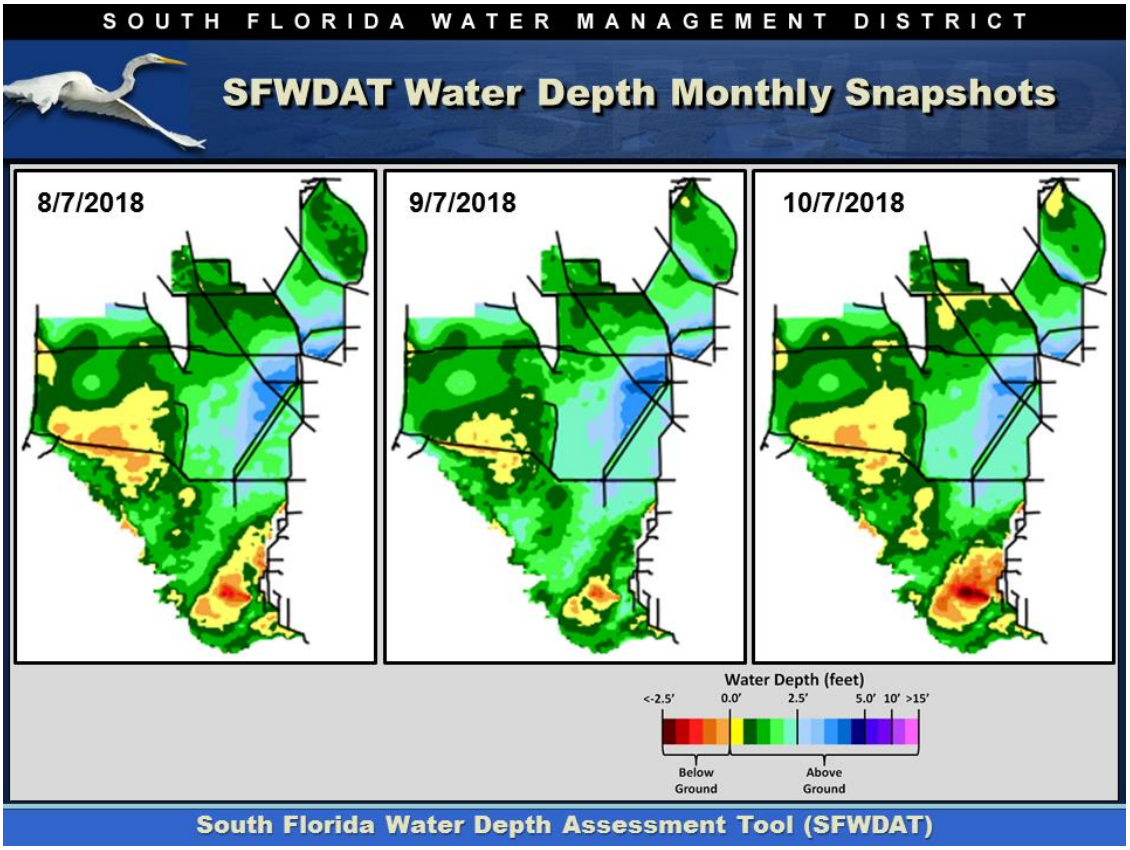
| Everglades Region | Rainfall (Inches) | Stage Change (feet) |
|---|---|---|
| WCA-1 | 0.40 | −0.03 |
| WCA-2A | 0.52 | +0.03 |
| WCA-2B | 0.51 | +0.13 |
| WCA-3A | 0.29 | −0.17 |
| WCA-3B | 0.66 | −0.04 |
| ENP | 0.98 | +0.02 |

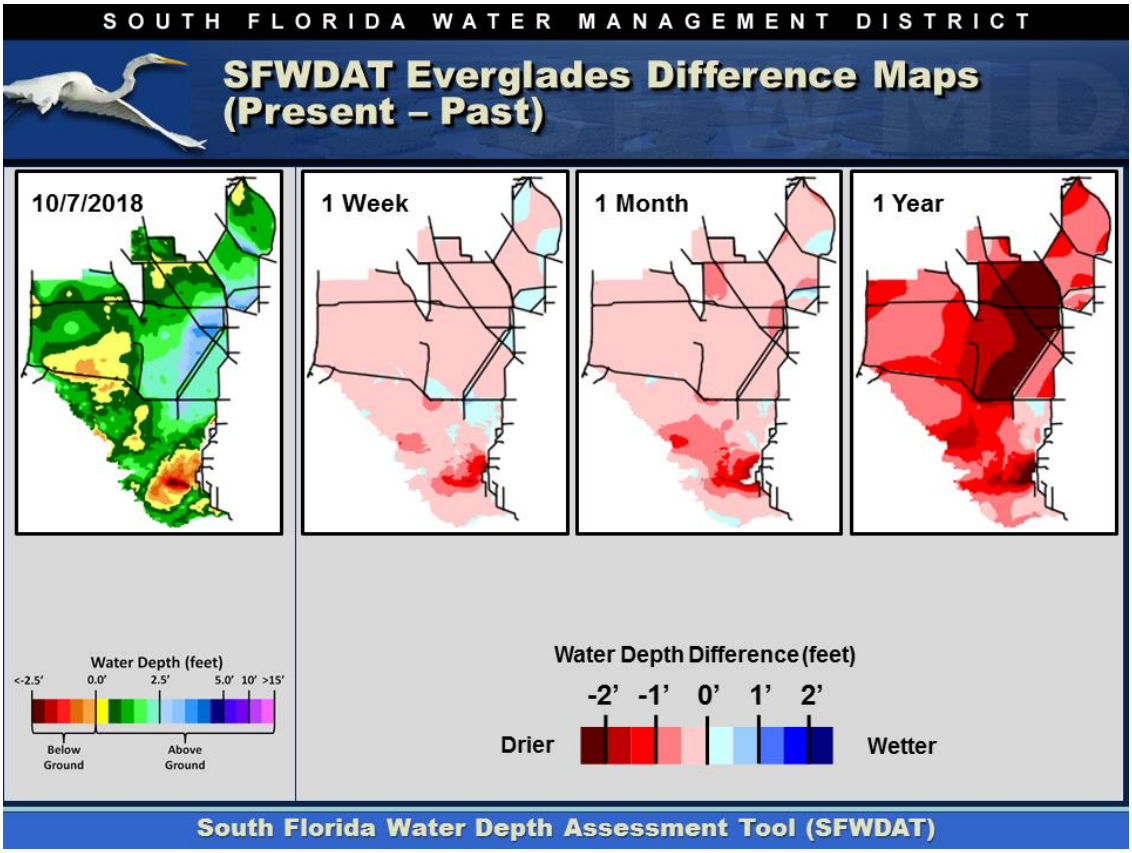



Regulation Schedules: WCA-1 three-gauge average stage is 1.01 feet below Zone A1, and 0.28 feet below the Zone A2 regulation line. WCA-2A marsh stage is equalized with canal stage. S-11B Headwater stage is 0.41 feet below the Deviation line, and 0.04 above the Zone A regulation line. WCA-3A three-gauge average stage is 0.43 feet below Increment 1&2, 0.04 feet below the Zone A regulation line. WCA-3A at gauge 62 (northwest corner) is 1.09 feet below the upper schedule and falls sharply away from the regulation line.



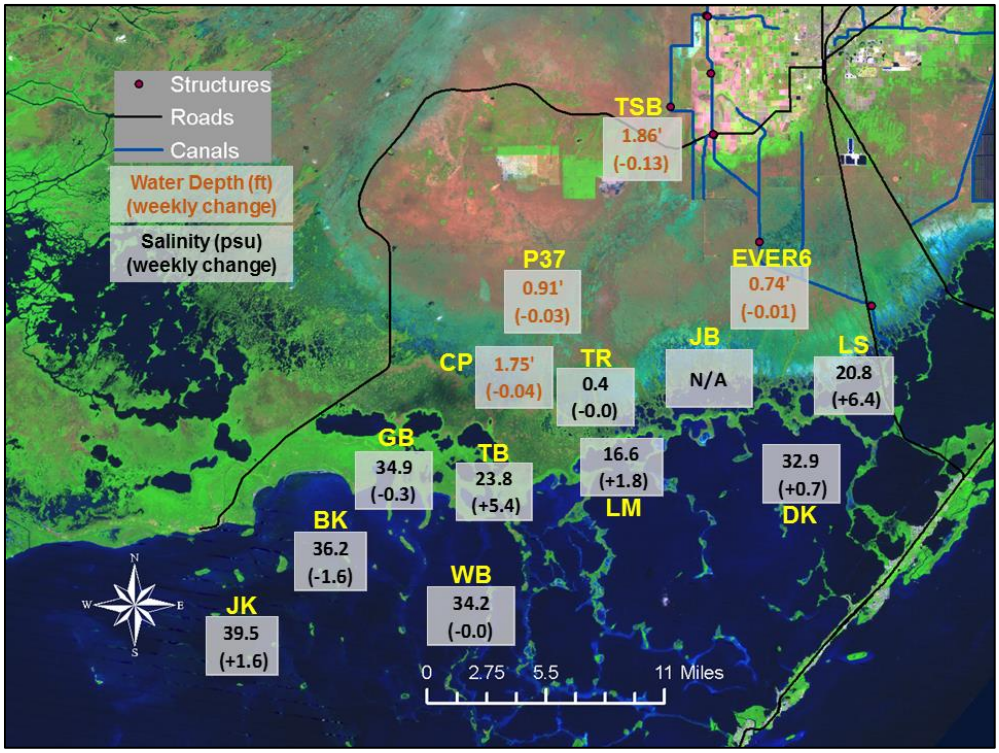

Water Depths and Changes: The WDAT tool for spatial interpolation of depth monthly snapshots indicate drying conditions, the spatial extent of ponded depths along the L-67 and in WCA-3A South has contracted compared with last month. Regions with depths down to 0.0 feet expanded greatly over the last month in WCA-3A North, and northern WCA-1. WDAT difference output indicates that water level changes across most of South Florida are drier but not highly significant. Changes of note are the significantly dryer conditions than one month ago in WCA-3A's northwest corner. In the "1 Year" inset we see the comparison between current depth conditions and post Hurricane Irma's (9/10/17) impact on water depths.

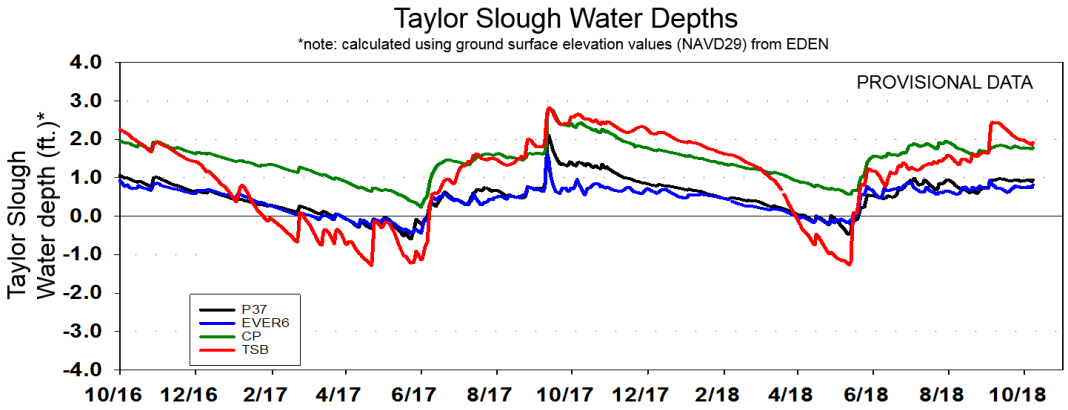

SOUTH FLORIDA WATER MANAGEMENT DISTRICT
SFWDAT Water Depth Monthly Snapshots
8/7/2018
9/7/2018
10/7/2018
Water Depth (feet)
<-2.5'
0.0'
2.5'
5.0'
10'
>15'
Below Ground
Above Ground
South Florida Water Depth Assessment Tool (SFWDAT)

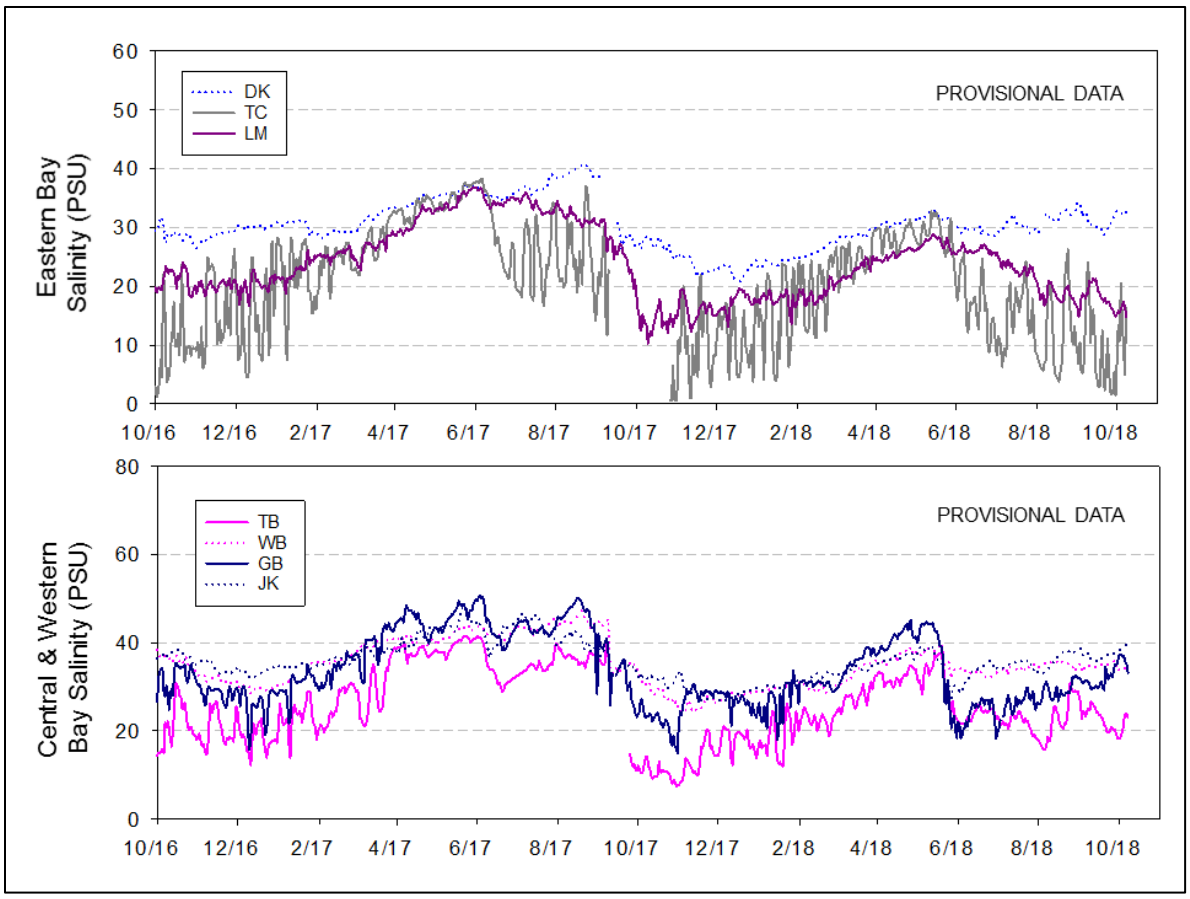

SOUTH FLORIDA WATER MANAGEMENT DISTRICT
SFWDAT Everglades Difference Maps (Present – Past)
10/7/2018
1 Week
1 Month
1 Year
Water Depth (feet)
<-2.5'
0.0'
2.5'
5.0'
10'
>15'
Below Ground
Above Ground
Water Depth Difference (feet)
-2'
-1'
0'
1'
2'
Drier
Wetter
South Florida Water Depth Assessment Tool (SFWDAT)

Taylor Slough Water Levels: An average of 0.9 inches of rain fell on Taylor Slough and Florida Bay this past week with more expected in the next few days. Stages decreased an average of 0.04 feet last week. Water depths averaged 1.19 feet across Taylor Slough which is 0.6 inches higher than the historical averages for this time of year. Water depth conditions are typical for this time of year.

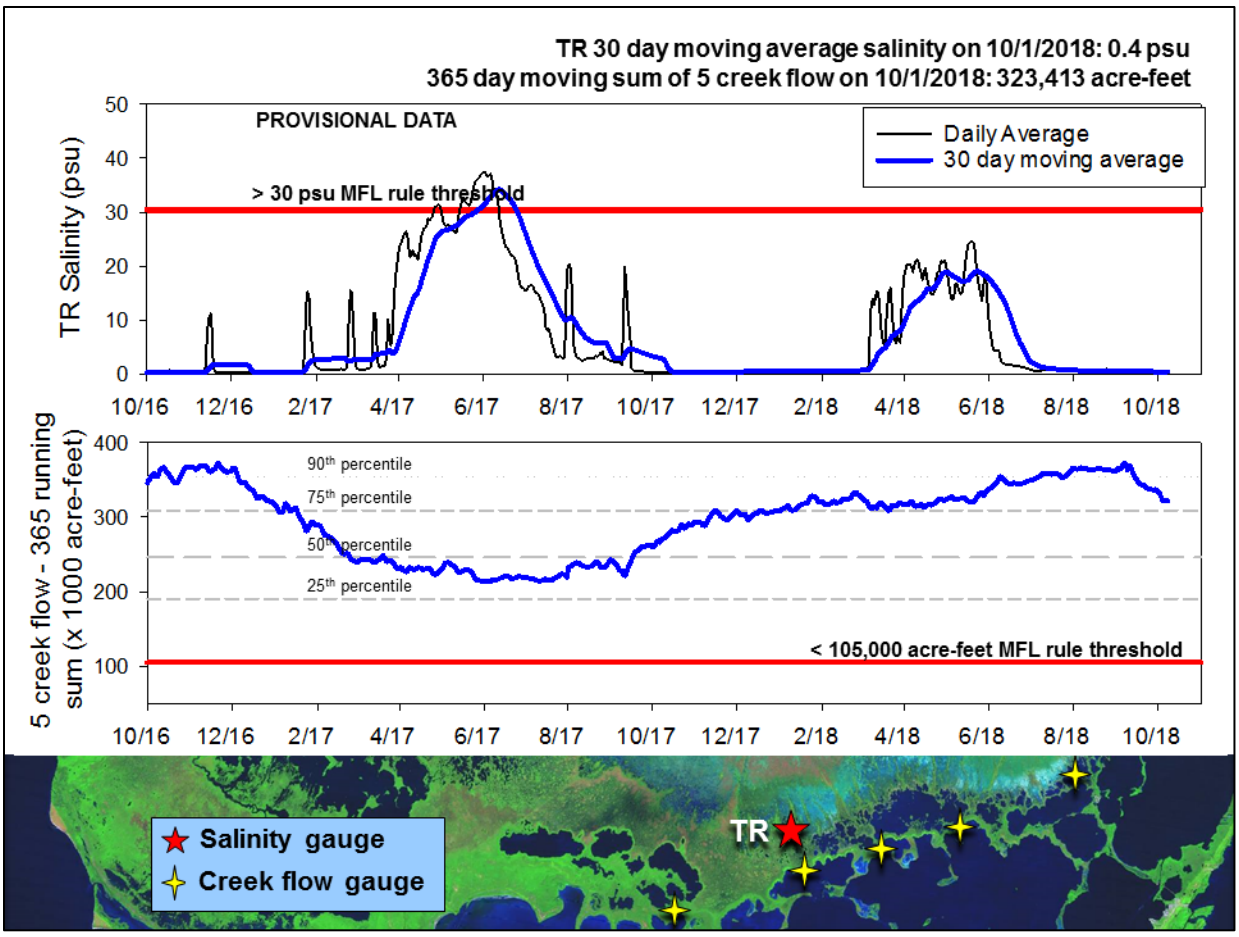
Florida Bay Salinities: Salinities increased on average 1.7 psu. Salinities range from 5 psu in the northeast to 40 psu in the west. Conditions in western Florida Bay are 4 to 10 psu higher than their historic averages for this time of year which is undesirable this late in the wet season, but expected rainfall from Hurricane Michael will likely cause decreases this week.






Florida Bay MFL: Mangrove zone daily average salinity stayed at 0.4 psu this past week, and the 30-day moving average is also 0.4 psu. The weekly cumulative flow from the five creeks denoted by yellow stars on the map totaled about 7,300 acre-feet for the last week which is less than half the 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 has been dropping rapidly with a decrease of 11,000 acre-feet over the last week to end at 323,413 acre-feet (still greater than the long-term average of 257,628 acre-feet and above the 75th percentile). 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 approaches has increased ecological benefit over high water concerns at this point. Any water not available to protect the peat soils in WCA-3A North, would be ecologically beneficial to Holeyland WMA as that basin is now in Zone C. 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 benefit from hydration as the 3-gauge average stage dips below the Zone A2 regulation line. 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, October 9th, 2018 (red is new) | | | |
|---|---|---|---|
| Area | Weekly change | Recommendation | Reasons |
| WCA-1 | Stage decreased by 0.03' | Maintain depths at regulation schedule. | Protect upstream/downstream habitat and wildlife. |
| WCA-2A | Stage increased by 0.03' | 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 0.13' | 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 decreased by 0.25' | Maintain depths at regulation schedule. | Protect habitat including peat soil development, tree islands and wildlife. |
| WCA-3A NW | Stage decreased by 0.24' | Maintain depths at regulation schedule. | |
| Central WCA-3A S | Stage decreased by 0.15' | 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 decreased by 0.04' | | |
| WCA-3B | Stage decreased by 0.04' | 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 0.02' | 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 −0.11' | Move water southward as possible | When available, provide freshwater buffer for downstream conditions. |
| FB- Salinity | Salinity changes ranged −2.3 to +4.0 psu | Move water southward as possible | When available, provide freshwater to maintain low salinity buffer and promote water movement. |