

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: December 5, 2017

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

Rain is forecasted for Friday and Friday night, followed by cool weather this weekend. East winds will spread some scattered light showers inland from the east coast today and then activity will taper off after sunset. A cold front is expected to move through Florida's panhandle tonight and then temporarily stall over the District Wednesday. Some scattered shower activity should pop up with daytime heating ahead of the front mainly north and northeast Wednesday. Scattered shower activity will then develop mainly north and east on Thursday as the front slides south into central Florida. A trough is forecast to dig into the Gulf of Mexico on Friday and pump energy and moisture across the frontal zone as the trough pushes the front southward through the District. Expect areas of moderate to heavy rain to move through the District with the front Friday afternoon and Friday night. Cool and dry conditions are expected behind the front for the weekend.

Kissimmee

Tuesday morning stages were 58.0 feet NGVD (at schedule) in East Lake Toho, 55.0 feet NGVD (at schedule) in Lake Toho, and 51.3 feet NGVD (1.2 feet below schedule) in Kissimmee Cypress Hatchineha (KCH); S65A headwater stage was 46.4 feet NGVD. Tuesday morning discharges were 408 cfs at S65, 313 cfs at S65A, and 607 cfs at S65E. Dissolved oxygen concentration in the Kissimmee River averaged 5.7 milligrams per liter (mg/L) for the week. Kissimmee River mean floodplain depth on Sunday was 0.26 feet.

Lake Okeechobee

Lake Okeechobee stage is 15.98 feet NGVD having decreased 0.23 feet over the past week and 1.0 feet over the last month. Stages exceeded 16 feet NGVD for 72 days, the longest period since late 2004, which was 73 days. The submerged aquatic and emergent vegetation coverage in the nearshore areas of the Lake are expected to decline over the coming months and possibly years due to the high water conditions and turbidity from resuspended Lake sediment associated with Hurricane Irma. The high inflows and resuspended Lake sediment also increased water column total phosphorus, which could lead to algal blooms as turbidity begins to decline and water temperatures rise. Lower Lake stages near the end of WY2018 would help to recover these important communities, and long, steady recessions of water levels throughout the dry season may help promote another productive year for wading birds on the Lake as well.

Estuaries

Total inflow to St. Lucie estuary averaged 3,063 cfs over the past week (4,204 cfs week before) with 1,238 cfs coming from Lake Okeechobee. Salinity increased throughout the estuary. The seven-day average salinity at the US1 Bridge is in the poor range for adult oysters. Satellite imagery indicates low

potential for cyanobacteria bloom at just a few nearshore locations in the estuary. Average chlorophyll a concentration levels at the LOBO stations remain low (3.75 - 7.44 µg/L), with highest values reported in the North Fork (4.50 - 7.44 µg/L). Average dissolved oxygen levels were at 6.65 - 8.25 mg/L.

Total inflow to Caloosahatchee estuary averaged 6,164 cfs over the past week with 4,933 cfs coming from the Lake. The 30-day moving average surface salinity is 0.1 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 good range for adult oysters at Shell Point and in the poor range at Cape Coral. Satellite imagery indicates low potential for cyanobacteria bloom at just a few nearshore locations in the estuary. Chlorophyll a measurements show low chlorophyll a concentration levels near Ft. Myers and Shell Point (1.78 - 4.46 µg/L) over the last week. *Karenia brevis* (Red tide dinoflagellate) was observed in background to medium concentrations in fourteen samples collected from Lee County. Fish kills were reported along Lee County on 11/26/2017 and 11/29/2017. Slight respiratory irritation has been reported in some areas of Lee County over 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/FEBs did not receive Lake releases. The total amount of Lake releases sent to the STAs/FEBs in WY2018 (since 5/1/2017) is approximately 21,800 acre-feet. Most STA cells are at or near target depths. Operational restrictions are in place for vegetation rehabilitation in STA-1E and STA-2. This week, if 2008 LORS recommends Lake releases to the WCAs and the conditions allow, releases will be sent to STA-1E Eastern Flow-way.

Everglades

Water depths continued to drop across the Everglades (except for WCA-2B) at all the gauges monitored for this report. WCA-1, WCA-2A, and WCA-3A are all trending on or towards the regulation lines. Keeping depths below 2.5 feet at gauge 65 in WCA-3A is important to moderate the stress to tree islands caused by flooding when durations last longer than 60-90 days. The depth on Sunday at that location was 3.46 feet, and has exceeded 2.5 feet for 170 days.

Salinity changes in Florida Bay last week were less than 2 psu, and current levels range from 4 psu in the northeastern nearshore to 29 psu in the western nearshore. Most of the bay sites are below their historic averages for salinity with only the central and western nearshore being slightly higher than average.

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

Supporting Information

KESSIMMEE BASIN

Kissimmee Basin Rainfall

The Upper Kissimmee Basin received 0.03 inch of rainfall in the past week and the Lower Basin received 0.01 inch (SFWMD Daily Rainfall Report 12/4/2017).

Upper Kissimmee Basin

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

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

Report Date: 12/5/2017

| Water Body | Structure | 7-day Average Discharge (cfs) ¹ | Stage Monitoring Site ² | Lake Stage (feet) | Schedule Type ³ | Schedule Stage (feet) | Daily Departure (feet) | | | | | | |
|--|-----------|--|------------------------------------|-------------------|----------------------------|-----------------------|------------------------|----------|----------|----------|---------|----------|----------|
| | | | | | | | 12/3/17 | 11/26/17 | 11/19/17 | 11/12/17 | 11/5/17 | 10/29/17 | 10/22/17 |
| Lakes Hart and Mary Jane | S62 | 39 | LKMJ | 61.0 | R | 61.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.0 | 0.3 |
| Lakes Myrtle, Preston, and Joel | S57 | 21 | S57 | 62.0 | R | 62.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.3 | 1.3 |
| Alligator Chain | S60 | 0 | ALLI | 64.0 | R | 64.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.3 |
| Lake Gentry | S63 | 0 | LKGT | 61.6 | R | 61.5 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 |
| East Lake Toho | S59 | 16 | TOHOE | 58.0 | R | 58.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.3 |
| Lake Toho | S61 | 119 | TOHOW, S61 | 55.0 | R | 55.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.3 |
| Lakes Kissimmee, Cypress, and Hatchineha | S65 | 586 | KUB011, LKIS5B | 51.4 | R | 52.5 | -1.1 | -1.0 | -0.9 | -0.7 | -0.5 | -0.2 | 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 12. Kissimmee River floodplain stages at selected stations are shown in Figure 13.

Table 2. One-day and seven-day averages of discharge at S-65x structures, of dissolved oxygen concentration in the Phase I area river channel, and water depth in the Phase I area floodplain. Data are provisional real-time data from SFWMD.

Report Date: 12/5/2017

| Metric | Location | 1-Day Average | | Average for the Preceding 7-Days ¹ | | | | | | | | |
|--------------------------------|-----------------------|---------------|---------|---|----------|----------|---------|----------|----------|----------|---------|---------|
| | | 12/3/2017 | 12/3/17 | 11/26/17 | 11/19/17 | 11/12/17 | 11/5/17 | 10/29/17 | 10/22/17 | 10/15/17 | 10/8/17 | 10/1/17 |
| Discharge (cfs) | S-65 | 390 | 586 | 925 | 1,097 | 1,349 | 1,439 | 1,564 | 2,319 | 3,200 | 6,671 | 11,491 |
| Discharge (cfs) | S-65A | 312 | 486 | 817 | 1,038 | 1,346 | 1,638 | 1,703 | 2,265 | 3,723 | 7,028 | 7,972 |
| Discharge (cfs) | S-65D ² | 723 | 989 | 1,425 | 1,925 | 2,467 | 3,714 | 3,240 | 4,298 | 7,381 | 12,111 | 12,914 |
| Discharge (cfs) | S-65E ² | 673 | 980 | 1,436 | 1,988 | 2,519 | 3,938 | 3,453 | 4,551 | 7,568 | 12,702 | 13,341 |
| DO (mg/L) ³ | Phase I river channel | 5.2 | 5.7 | 5.8 | 5.0 | 4.1 | 4.2 | 3.4 | 2.0 | 1.1 | 1.4 | 1.0 |
| Mean depth (feet) ⁴ | Phase I floodplain | 0.26 | 0.34 | 0.53 | 0.81 | 1.09 | 1.48 | 1.43 | 1.94 | 2.77 | 4.18 | 4.85 |

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

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

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.

Water Management Recommendations

Kissimmee Basin Adaptive Recommendations and Operational Actions

| Date | Recommendation | Purpose | Outcome | Source |
|------------|--|---|-------------|--------------------------------|
| 12/5/2017 | No new recommendations. | | N/A | |
| 11/28/2017 | No new recommendations. | | N/A | |
| 11/21/2017 | No new recommendations. | | N/A | |
| 11/13/2017 | No new recommendations. | | N/A | |
| 11/1/2017 | No new recommendations. | | N/A | |
| 10/24/2017 | No new recommendations. | | N/A | |
| 10/17/2017 | No new recommendations. | | N/A | |
| 10/10/2017 | No new recommendations. | | N/A | |
| 10/3/2017 | No new recommendations. | | N/A | |
| 9/25/2017 | No new recommendations. | | N/A | |
| 9/19/2017 | No new recommendations. | | N/A | |
| 9/5/2017 | No new recommendations. | | N/A | |
| 8/29/2017 | No new recommendations. | | N/A | |
| 8/22/2017 | No new recommendations. | | N/A | |
| 8/15/2017 | No new recommendations. | | N/A | |
| 8/4/2017 | Increase S65A discharge by 150 cfs to about 1400 cfs. | Reduce rate of stage rise in KCH. | | SFWMD Water Mgt, KB Ops |
| 8/1/2017 | No new recommendations. | | N/A | |
| 7/25/2017 | Hold current discharge at S65A, adjusting S65 discharge to maintain current flow to the Kissimmee River. | Maintain current S65A discharge. | | SFWMD Water Mgt, KB Ops |
| 7/23/2017 | Increase S65A discharge slowly using Figure 8a toward the seasonal target of 1400 cfs. Hold at 1400 cfs while stage in KCH remains above 50 feet (+/- 0.2 foot). | Reduce current rapid rate of stage rise in KCH; provide Kissimmee River floodplain inundation if conditions stay wet. | Implemented | KB Ops |
| 7/16/2017 | Reduce S65A flow to ~600-650 cfs. As Pool A runoff diminishes keep S65A around 650 +/- 50 cfs by increasing flow from S65. | Maintain moderate discharge to the Kissimmee River from S65A while maintaining S65A headwater within its operating range using flow from S65. | Implemented | SFWMD Water Mgt, KB Ops |
| 7/6/2017 | Hold 450 cfs at S65A due to reduced forecast. | Reduced-rainfall forecast led to decision to hold 450 cfs at S65A rather than continuing to ramp up. | Implemented | KB Ops |
| 7/5/2017 | Increase S65A flow by 150 cfs today to 450 cfs and by another 150 cfs tomorrow. | Control stage in KCH and Pool A in anticipation of forecast significant rainfall; begin discharge rampup in anticipation of forecast rainfall. | Implemented | KB Ops |
| 6/28/2017 | Reduce S65A discharge by a maximum of 150 cfs per day until 300 cfs is reached. | Allow KCH stage to rise before transitioning to 2017 Wet Season discharge plan; facilitate DO recovery in the Kissimmee River by reducing depth in the river channel. | Implemented | KB Ops |
| 6/26/2017 | Hold 800 cfs at S65A until further notice. | Maintain reduced discharge to allow stages in KRR project area to decline to facilitate DO recovery. | Implemented | KB Ops |
| 6/22/2017 | Reduce discharge by 150 cfs each day on Thursday 6/22, Friday 6/23, Saturday 6/24, and Sunday 6/25. After the Sunday reduction hold at approximately 800 cfs through Monday when new DO data should be available to help guide next steps. | Attempt to allow Kissimmee River dissolved oxygen concentration to rise. | Implemented | KB Ops |
| 6/20/2017 | Maintain 1400 cfs at S65A as KCH stage continues to rise. Supplement declining S65A basin runoff by increasing discharge at S65 as needed. | Transition from current operations to 2017 Wet Season discharge plan. | Implemented | KB Ops, SFWMD Water Management |
| 6/15/2017 | Attempt to slow the rates of stage rise in Lakes Toho and East Toho by increasing discharge from S59 into Toho and S61 into KCH. | Slow rates of rise in Lakes Toho and East Toho. | Implemented | KB Ops, SFWMD Water Management |
| 6/15/2017 | Increase discharge from S65A as necessary using the discharge rates of change table in Figure 8a. | Lower stage in Pool A following rainfall directly over the S65A Basin. | Implemented | SFWMD Water Management, KB Ops |
| 6/13/2017 | No new recommendations. | | | |
| 6/6/2017 | No new recommendations. | | | |

KCOL Hydrographs (through Sunday midnight)

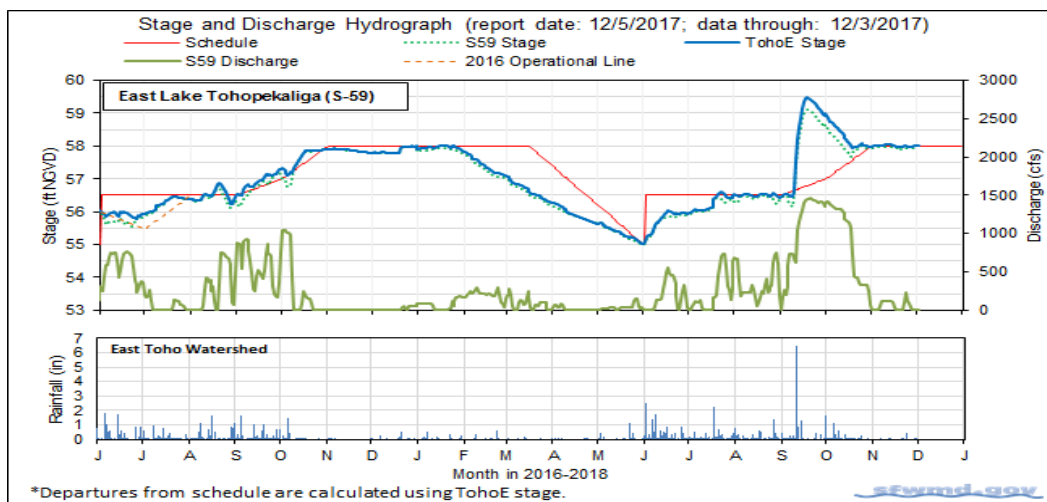


Figure 1.

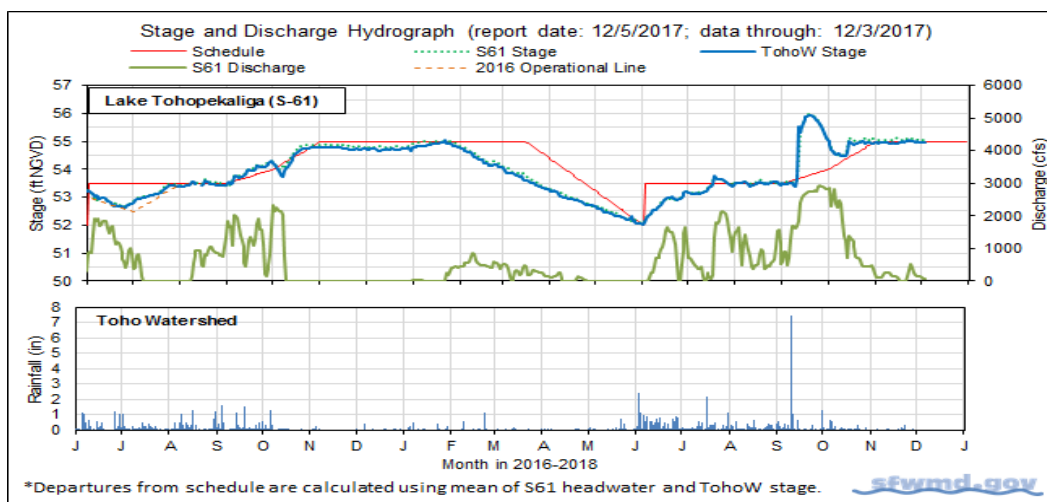


Figure 2.

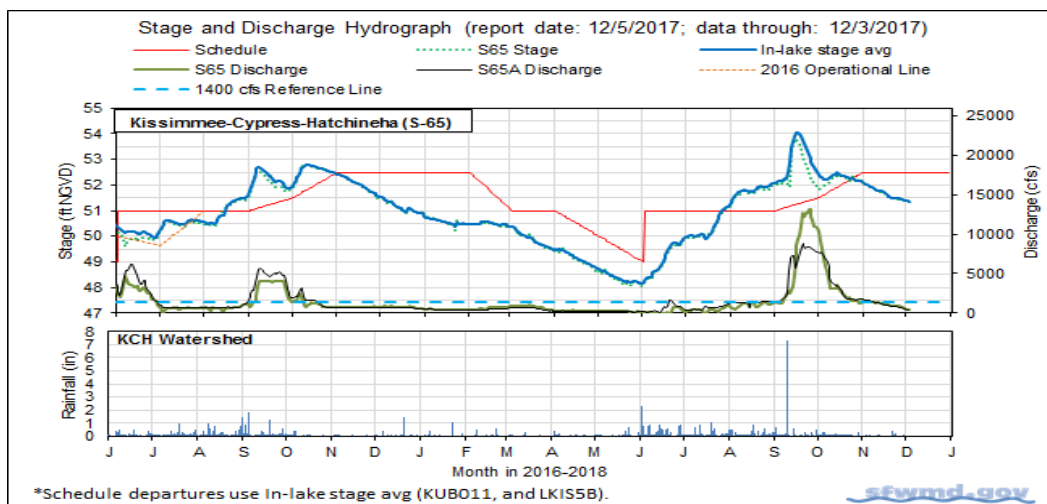


Figure 3.

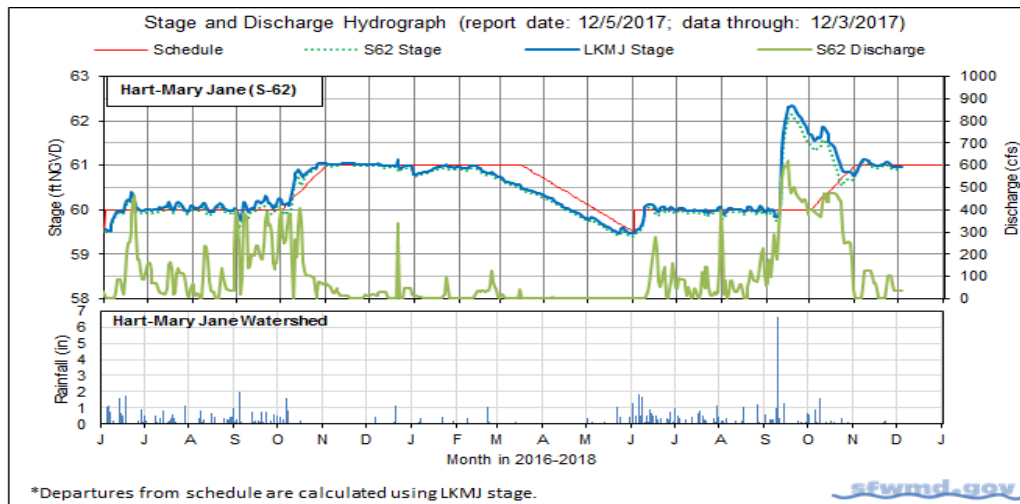


Figure 4.

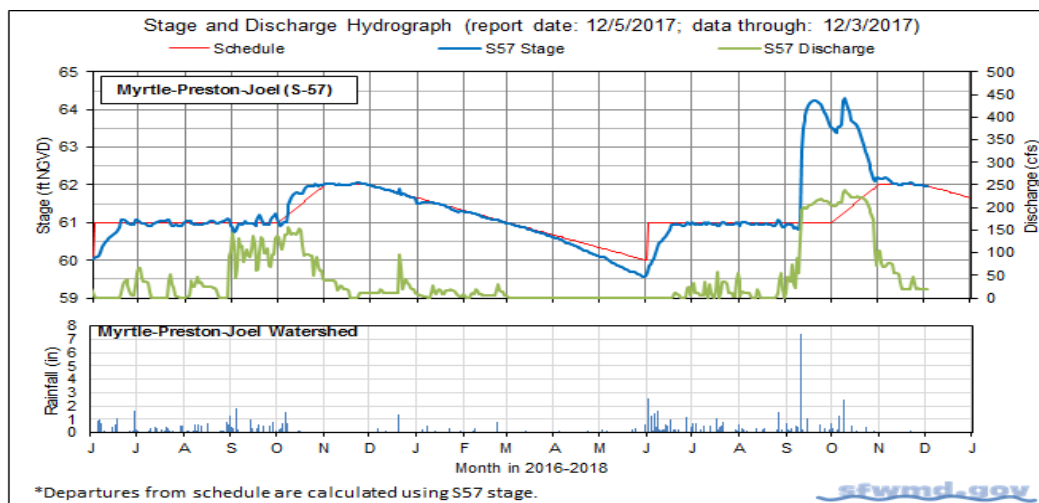


Figure 5.

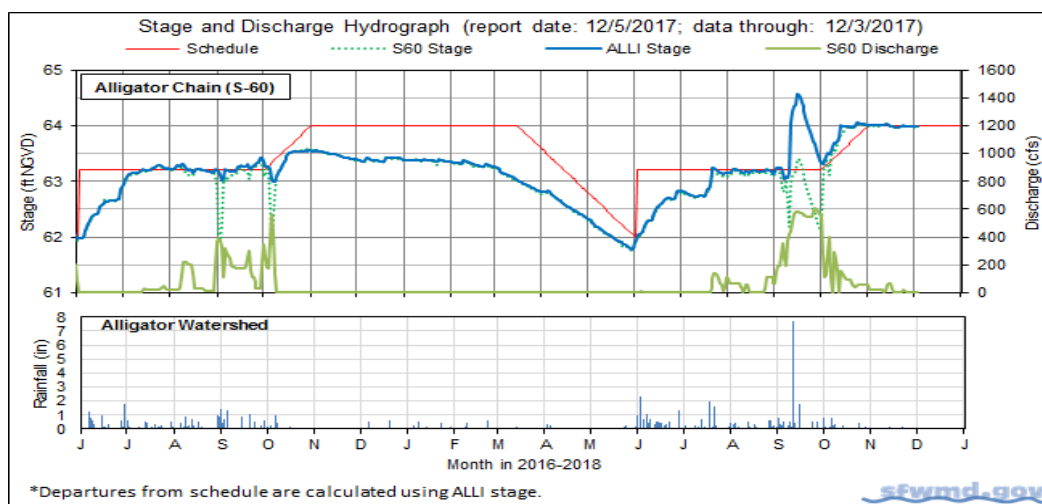


Figure 6.

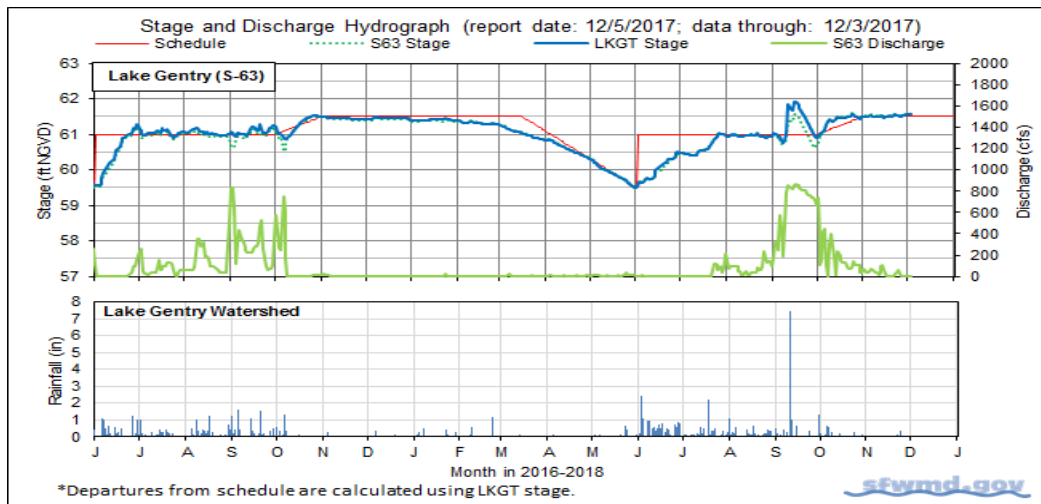


Figure 7.

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

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

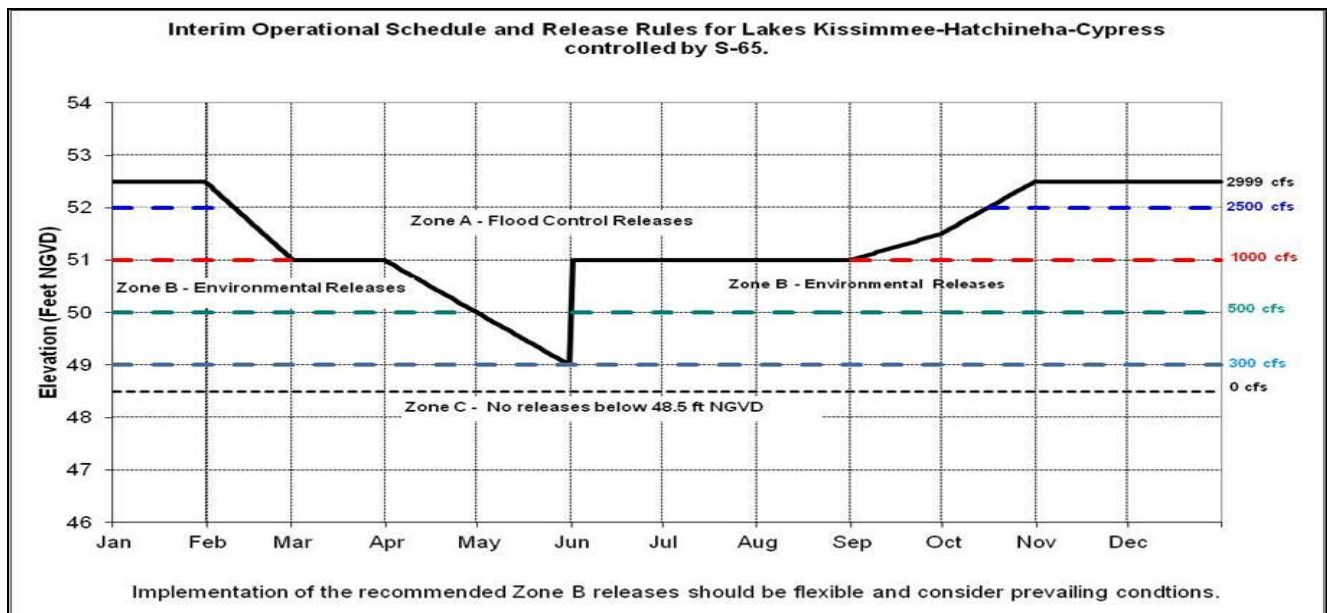


Figure 9. Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years.

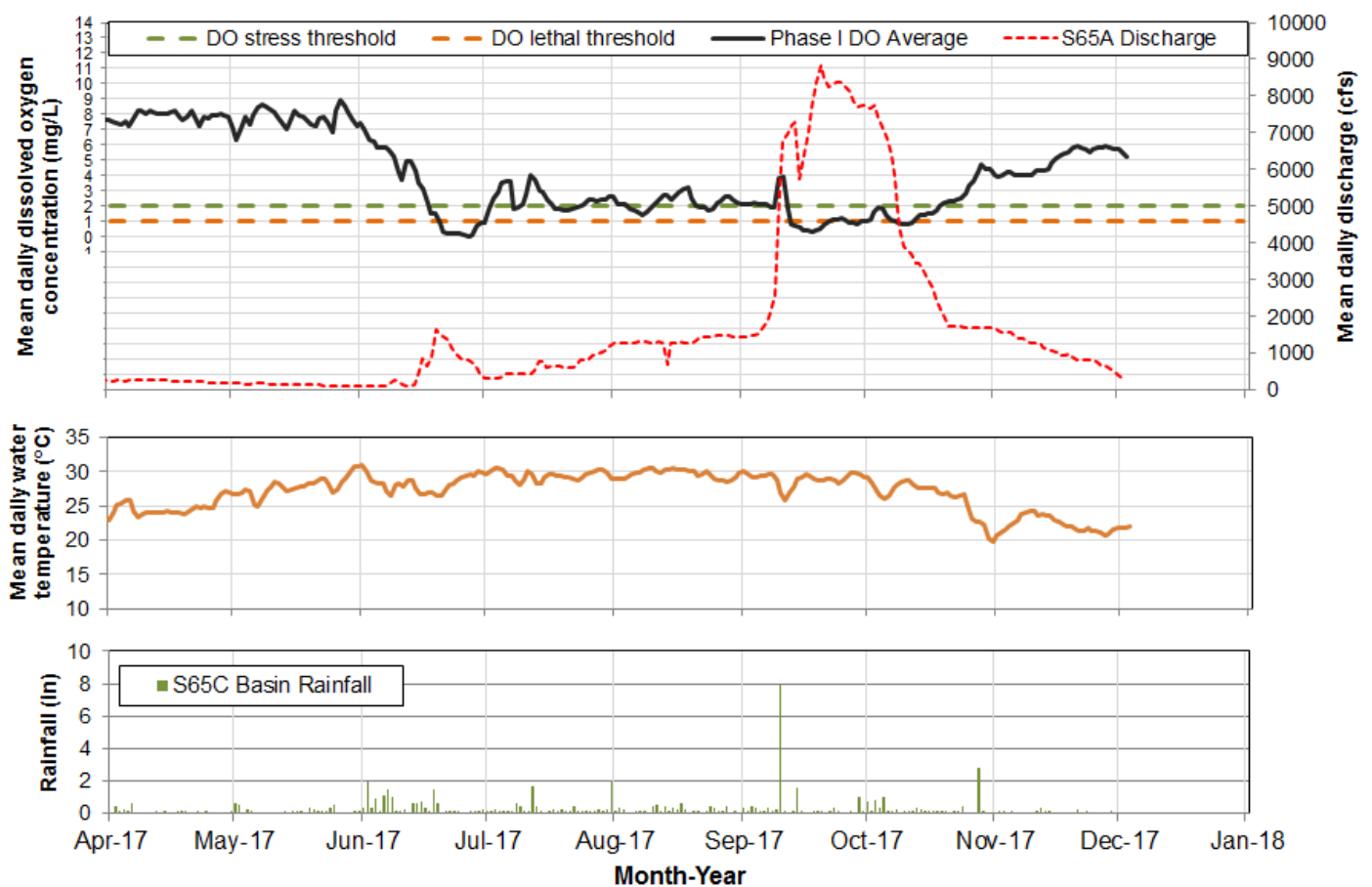


Figure 10. Mean daily Dissolved Oxygen, discharge, temperature and rainfall in the Phase I river channel.

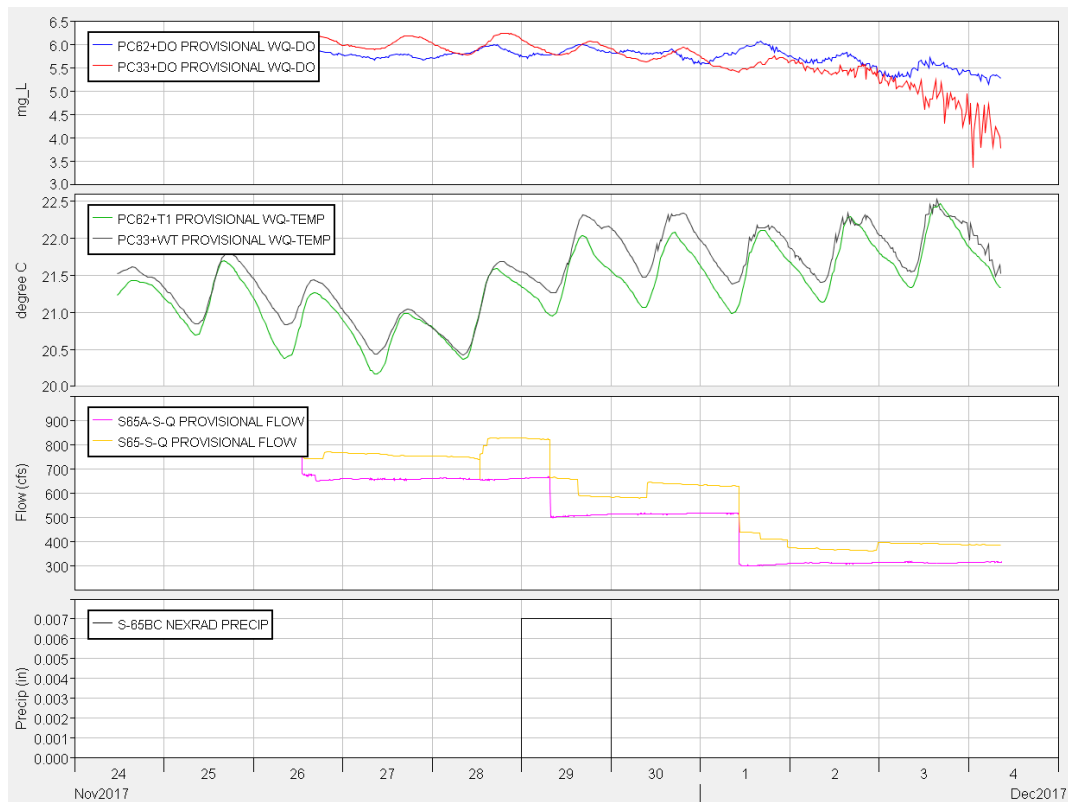


Figure 11. Phase I river channel dissolved oxygen and water temperature (measured at 15 minute intervals) and Pool BC daily rainfall.

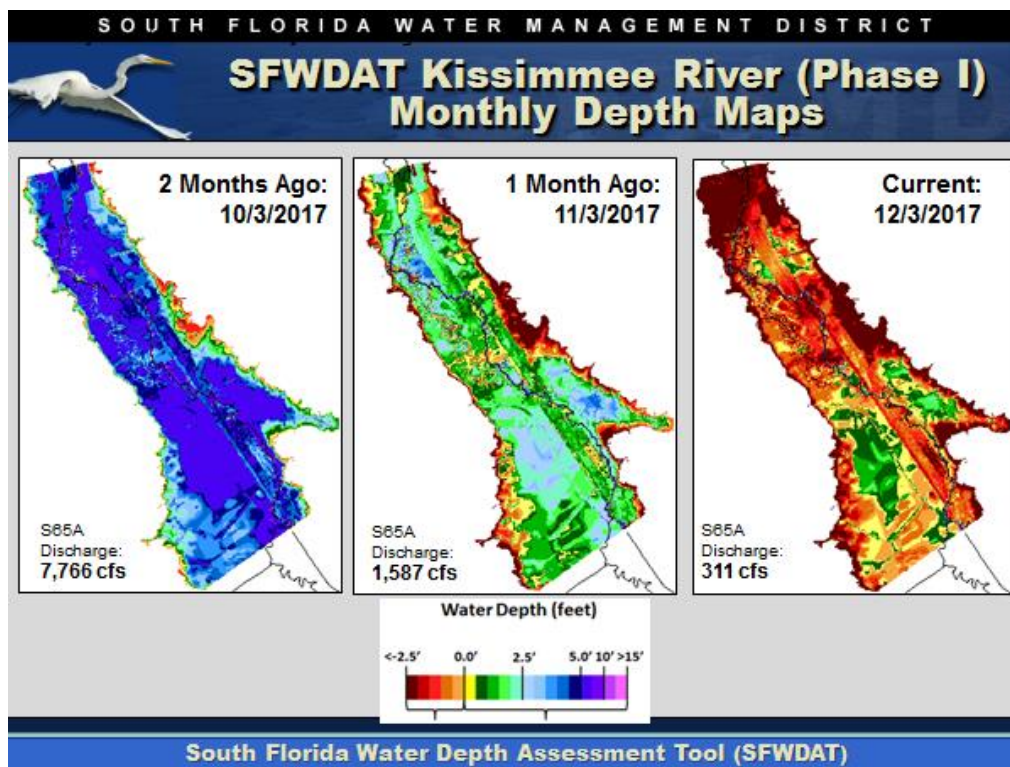
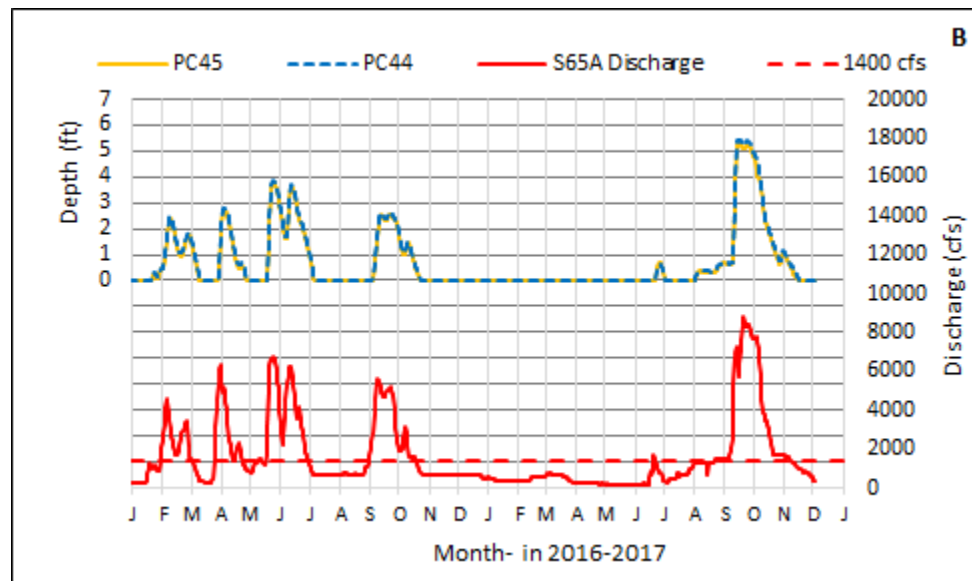
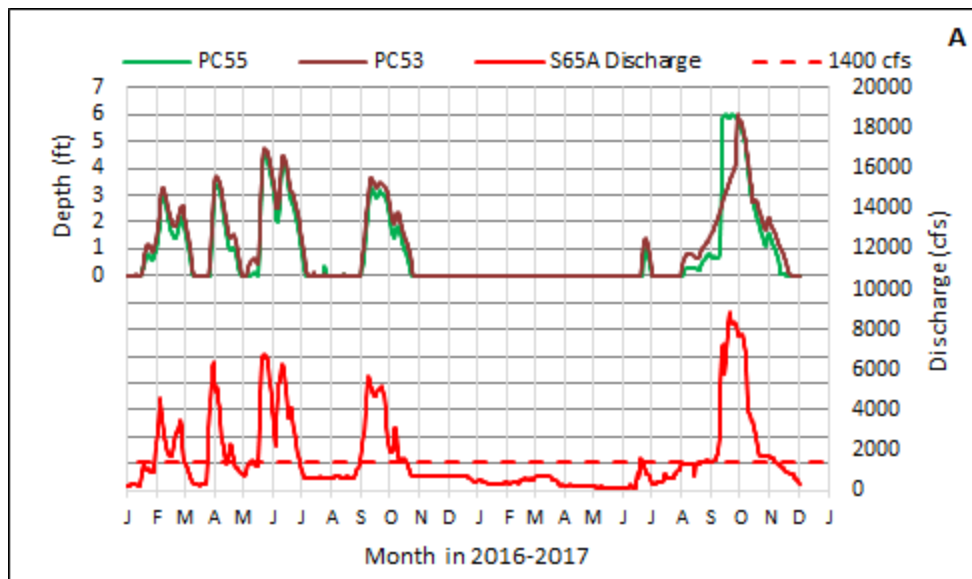
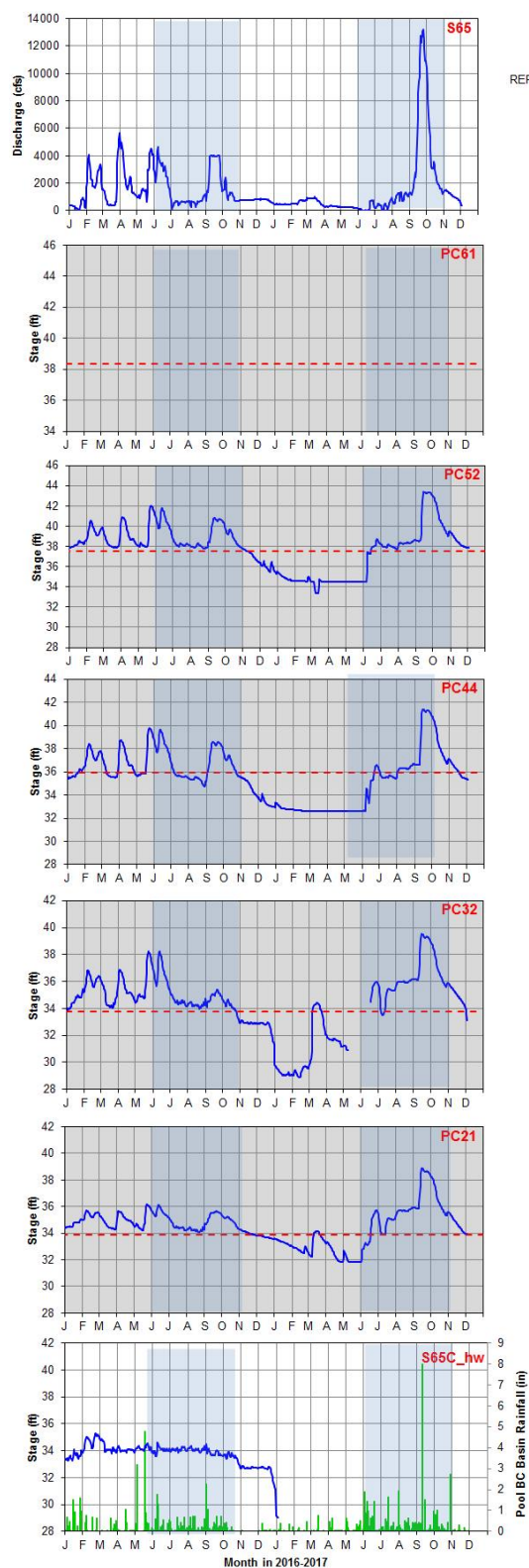


Figure 12. Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to 1/16/2012.



Insert. Water depth at selected northern Kissimmee River floodplain sites on (A) the PC5's transect and (B) the PC4's transect, with S65A discharge.

Kissimmee River Hydrographs



REPORT DATE 12/5/2017

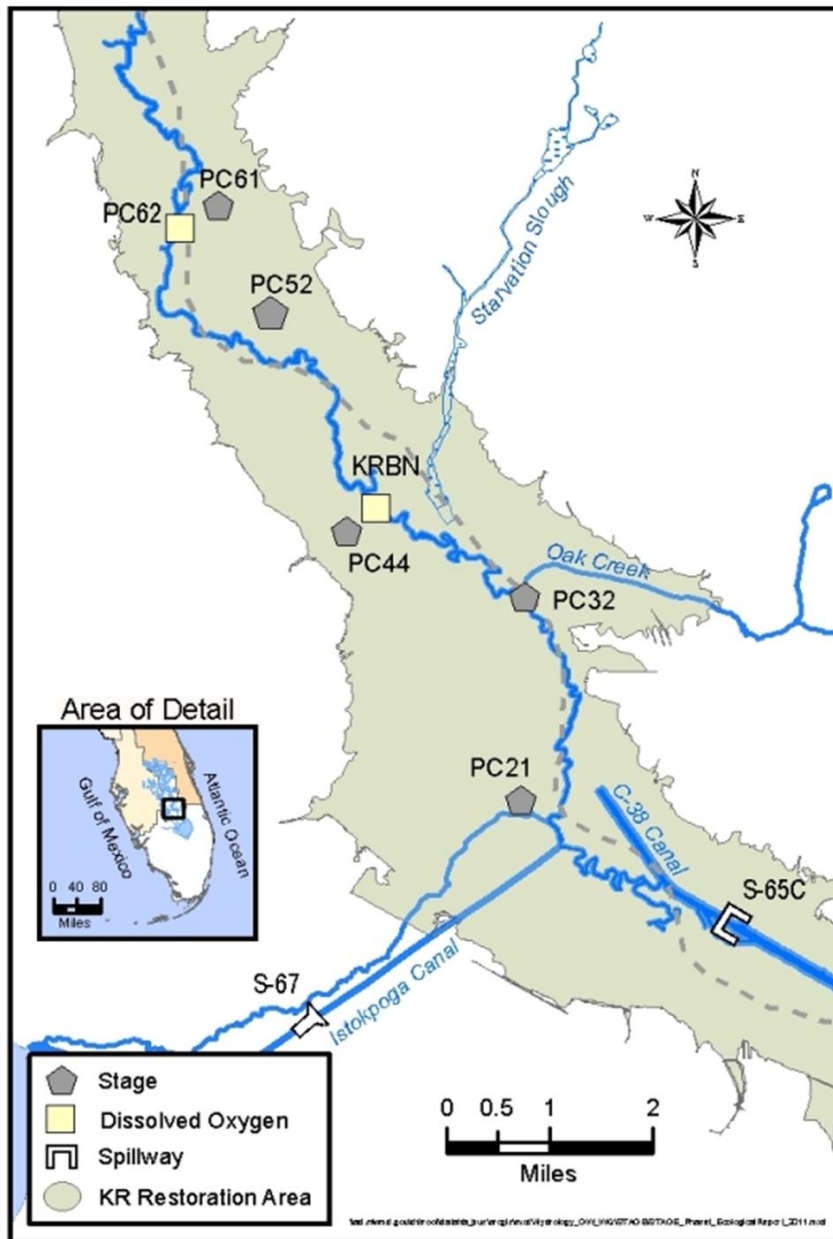


Figure 13. Discharge at S65, stages at five monitoring stations in the Phase I area of the Kissimmee River floodplain, and headwater stage at S65-C since 1/1/2016. The most recent data (~2 weeks) are provisional real-time data from SFWMD DualTrend; previous data are from SFWMD DB-HYDRO (validated). Dashed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



Figure 14. The Kissimmee Basin.

LAKE OKEECHOBEE

According to the USACE web site, Lake Okeechobee stage is at 15.98 feet NGVD for the period ending at midnight on 12/3/2017. This value is based on the use of four interior Lake stations (L001, L005, L006 and LZ40) and four perimeter stations (S308, S352, S4 and S133). Lake stage last peaked at 17.20 feet NGVD on 10/13/2017, before declining to 16.8 feet NGVD on 10/28/2017, and then back up to 17.02 feet NGVD. The Lake is now 1.0 feet lower than it was a month ago, but 1.28 feet higher than a year ago (Figure 1). The Lake is now in the Low Sub-Band (Figure 2). According to RAINДАР, 0.03 inches of rain fell directly over the Lake during the week 11/27/2017- 12/3/2017 (Figure 3), with similar rainfall throughout much of its watershed.

Average daily inflows to the Lake decreased again over the past week, from 3,356 cfs to 2,443 cfs. Most of the inflows were from the Kissimmee River via the S65E and S84 structures, which averaged 979 cfs and 466 cfs daily, respectively. S71 and S72 structures, along with Fisheating Creek, contributed a combined 849 average daily cfs as well.

Average daily outflows for the Lake were similar to the previous week, going from 7,386 cfs to 7,285 cfs, despite decreases in S77 discharges. This was due to a combined total of 581 average daily cfs flowing through the S350 structures, the first outflow south for some time. S308 discharges went from 1,347 cfs to 1,309 cfs, and S77 discharges decreased from 6,005 cfs the previous week to 5,393 cfs this past week. There were no discharges to the L8 canal via Culvert 10A. The corrected evapotranspiration value based on the L006 weather platform solar radiation data was 0.12 inches for the past week.

Total inflows and outflows for the last two weeks are detailed in Table 1, as well as the approximate change in Lake stage from each major structure's total flows over the period (midnight November 27 to midnight December 3, 2017). Figure 4 shows the combined average daily cfs for inflows and outflows for the Lake over the past eight weeks. These data are provisional, and are subject to change.

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

Table 1

| INFLOWS | Avg Daily Flow cfs | Equivalent Depth Week Total (in) |
|------------------|--------------------|----------------------------------|
| S65E & S65EX1 | 979 | 0.4 |
| S71 & 72 | 135 | 0.1 |
| S84 & 84X | 466 | 0.2 |
| Fisheating Creek | 714 | 0.3 |
| S154 | 24 | 0.0 |
| S191 | 43 | 0.0 |
| S133 P | 27 | 0.0 |
| S127 P | 13 | 0.0 |
| S129 P | 9 | 0.0 |
| S131 P | 3 | 0.0 |
| S135 P | 27 | 0.0 |
| S2 P | 0 | 0.0 |
| S3 P | 0 | 0.0 |
| S4 P | 2 | 0.0 |
| C5 | 0 | 0.0 |
| Rainfall | 1698 | 0.6 |
| Total | 4141 | 1.5 |

| OUTFLOWS | Avg Daily Flow cfs | Equivalent Depth Week Total (in) |
|--------------|--------------------|----------------------------------|
| S77 | 5393 | 2.1 |
| S308 | 1309 | 0.5 |
| S351 | 184 | 0.1 |
| S352 | 21 | 0.0 |
| S354 | 376 | 0.1 |
| L8 | 3 | 0.0 |
| ET | 2260 | 0.9 |
| Total | 9545 | 3.6 |

PROVISIONAL
DATA

Water Management Recommendations

The Lake is at 15.98 feet NGVD having decreased 0.23 feet from the week prior, and 1.0 feet over the past three weeks. Submerged and emergent vegetation communities in the nearshore region have experienced stages >16.0 feet NGVD three times in less than two years, and for 72 consecutive days, the longest period since late 2004, which was 73 consecutive days. These stages, combined with turbid conditions from Hurricane Irma's winds, will likely cause substantial declines in these communities over the coming months and/or years. Lower Lake stages near the end of WY2018 would help to recover these important communities, and long, steady recessions of water levels throughout the dry season may help promote another productive year for wading birds on the Lake as well.

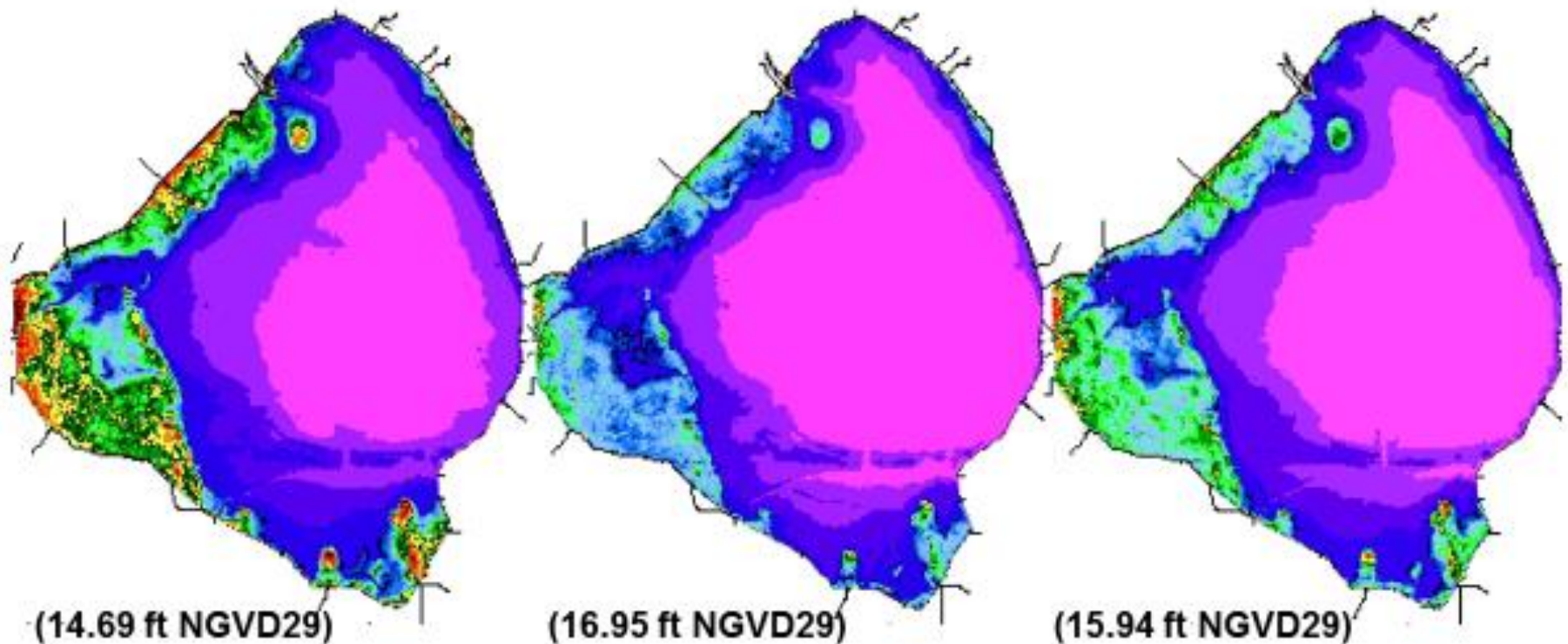
Lake Okeechobee

Water Depth Timeseries Maps

1 Year Ago: 12/04/2016

1 Month Ago: 11/04/2017

Current: 12/04/2017



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

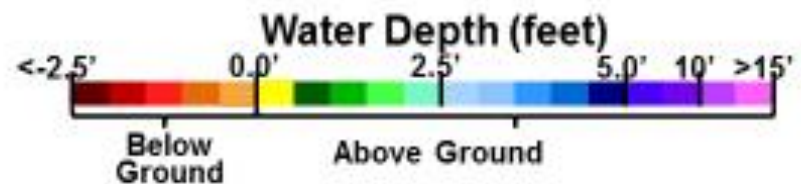
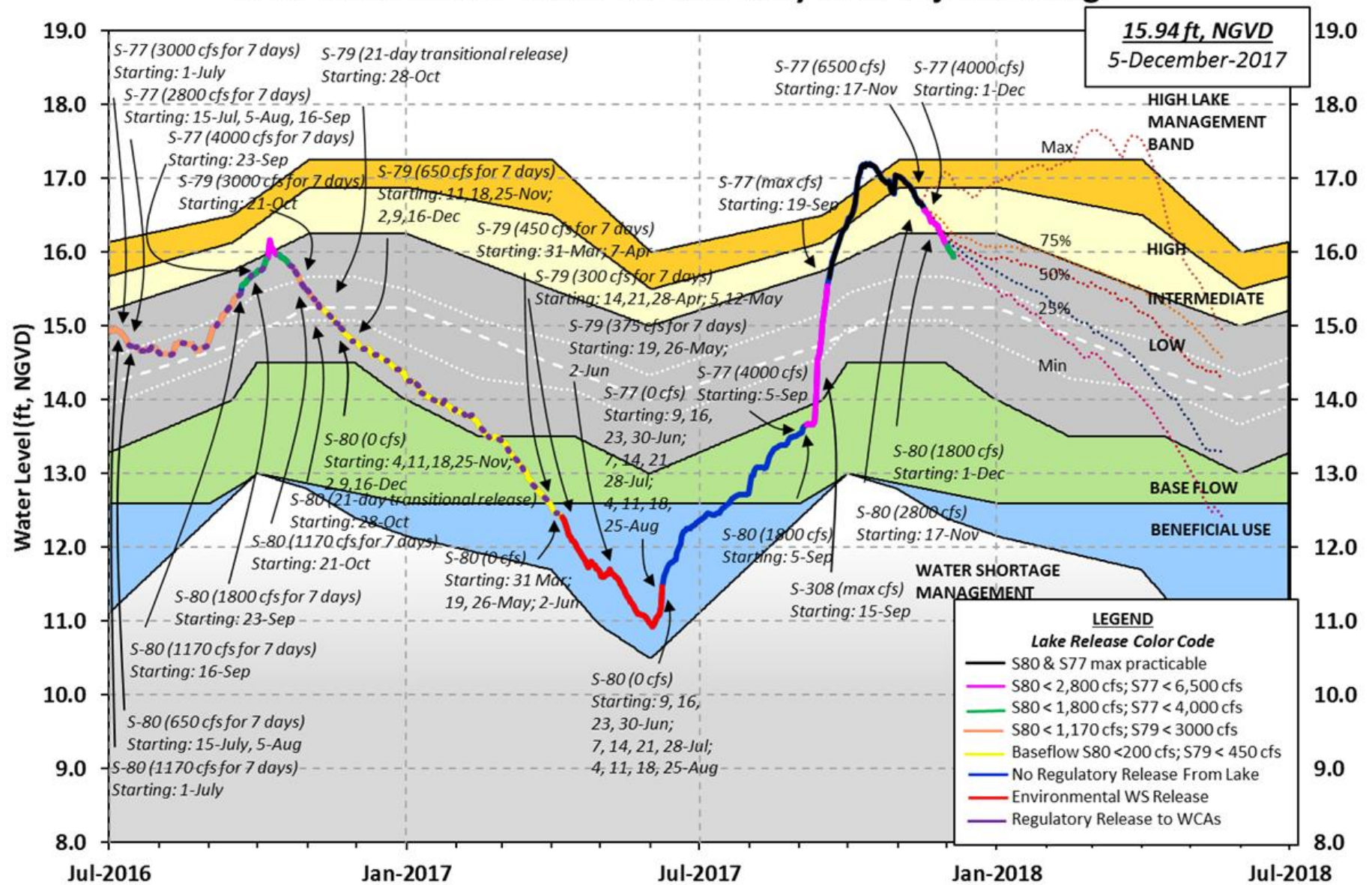


Figure 1

Lake Okeechobee Water Level History and Projected Stages



LORS-2008
Adopted by USACE 28-April-2008

Projected Stage Percentiles From SFWMD-HESM Position Analysis

Figure 2

SFWMD PROVISIONAL RAINDAR 7-DAY BASIN RAINFALL ESTIMATE

FROM: 1215 EST, 11/27/2017 THROUGH: 1215 EST, 12/04/2017

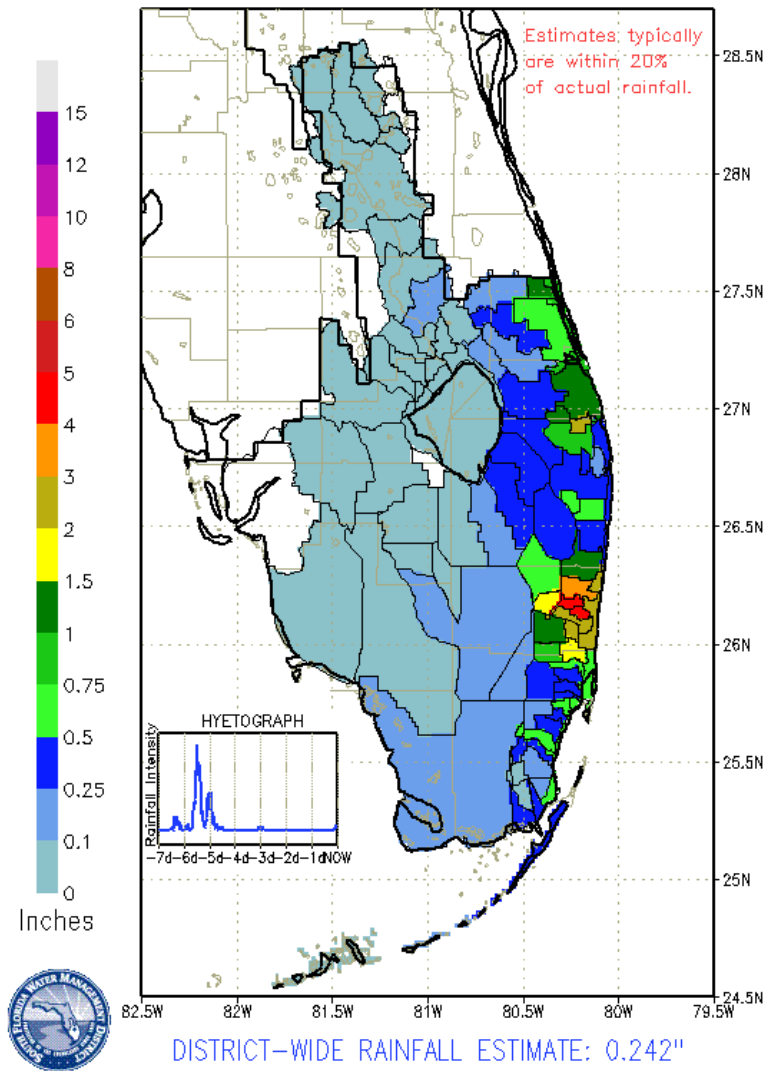
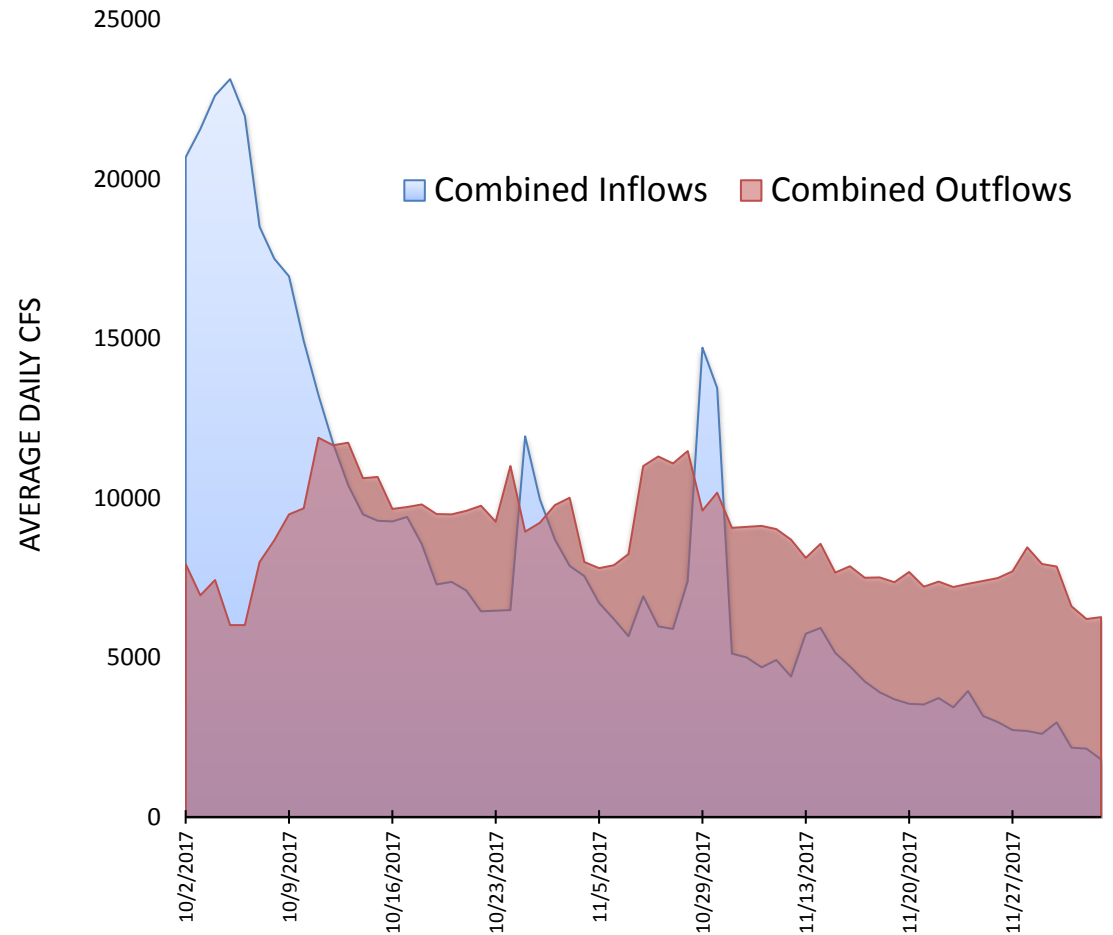


Figure 3



PROVISIONAL DATA

Figure 4

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Lake Okeechobee Cyanobacteria Bloom Potential

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

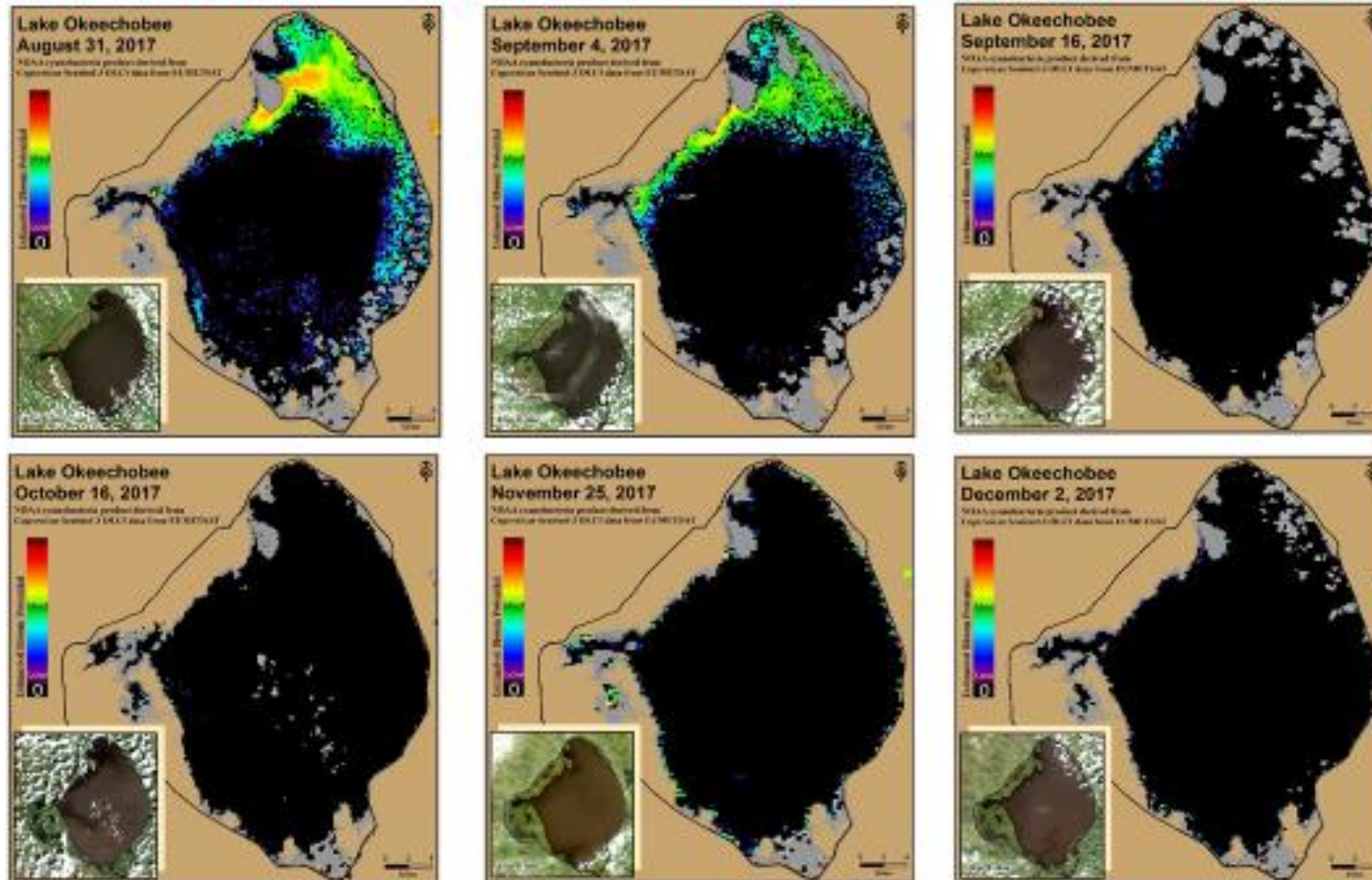


Figure 5

LAKE ISTOKPOGA

Lake Istokpoga stage is 39.26 feet NGVD as of midnight 12/3/2017 and is currently 0.24 feet below its regulation schedule to accommodate construction on downstream structures (Figure 6). Average daily flows into the lake from Josephine Creek for the week 11/27/2017 – 12/3/2017 were slightly lower than the previous week, at 96 cfs. No data have been reported for Arbuckle Creek since 7/4/2017 as the gauge is being recalibrated after construction in the area. Average daily discharge from S68 and S68X over the past week decreased, going from 799 cfs to 566 cfs. According to RAINDAR, no rain fell in the Lake Istokpoga basin over the past week.

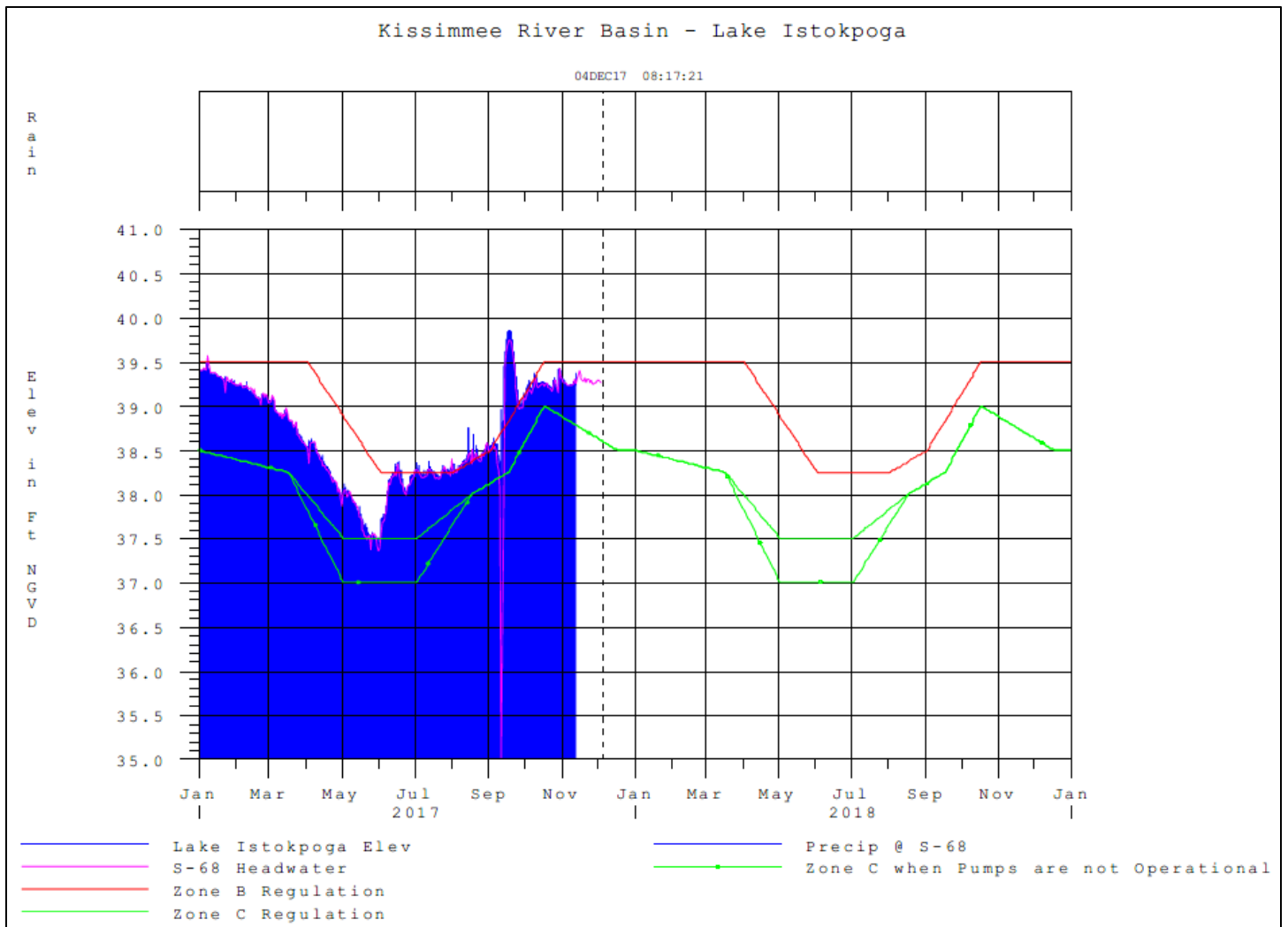


Figure 6

ESTUARIES

St. Lucie Estuary:

Last week total inflow into the St. Lucie Estuary averaged about 3,063 cfs (Figures 1 and 2) and last month inflow averaged about 4,705 cfs. Last week provisional averaged inflows from the tidal basin and the structures are shown in Table 1.

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

| Location | Flow (cfs) |
|--|-------------------|
| Tidal Basin Inflow | 331 |
| S-80 | 2,254 |
| S-308 | 1,238 |
| S-49 on C-24 | 172 |
| S-97 on C-23 | 157 |
| Gordy Rd. structure on Ten Mile Creek | 149 |

Over the past week, surface salinity increased throughout the estuary (Table 2, Figures 3 and 4). The seven-day moving average salinity of the water column (an average of the surface and bottom salinity) at the US1 Bridge is 2.9. Salinity conditions in the middle estuary are in the poor range for the adult eastern oysters (Figure 3).

Table 2. Seven-day average salinity at three monitoring sites in the St. Lucie Estuary. Current average is in bold face type, previous average in parentheses. The envelope reflects the preferred salinity range for adult eastern oysters (*Crassostrea virginica*) in the middle estuary.

| Sampling Site | Surface | Bottom | Envelope |
|----------------------|------------------|--------------------|-----------------|
| HR1 (North Fork) | 0.8 (0.5) | 1.2 (0.9) | NA ¹ |
| US1 Bridge | 1.5 (1.1) | 4.3 (4.4) | 10.0-26.0 |
| A1A Bridge | 8.6 (5.3) | 18.2 (17.9) | NA ¹ |

¹Envelope not applicable.

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

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

| Location | Depth | Average DO (mg/l) | Minimum DO (mg/l) | Maximum DO (mg/l) |
|-----------------|--------------|------------------------------|------------------------------|------------------------------|
| HR1 | surface | 6.34 | 3.07 | 8.05 |
| HR1 | bottom | 5.97 | 2.61 | 8.08 |

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

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

| Location | Depth (m) | Chlorophyll <i>a</i> (µg/l) | Average DO (mg/l) | Minimum DO (mg/l) | Maximum DO (mg/l) |
|----------|-----------------|-----------------------------|-------------------|-------------------|-------------------|
| SF2 | 2.98 | 4.4 - 4.91 | 6.65 | 6.45 | 6.79 |
| SF | 1.81 | 4.77 - 5.68 | 8.25 | 7.39 | 8.69 |
| NF | 2.25 | 4.5 - 7.44 | 7.30 | 6.74 | 7.72 |
| ME | 2.02 | 3.75 - 5.75 | 7.63 | 6.50 | 8.09 |
| IRL-SLE | NA ¹ | NA | NA | NA | NA |

¹Not available.

NOAA satellite imagery indicates low potential for cyanobacteria blooms in the St. Lucie Estuary (Figure 6).

Caloosahatchee Estuary:

Last week total inflow into the Caloosahatchee Estuary averaged about 6,164 cfs (Figures 7 and 8) and last month inflow averaged about 7,639 cfs. Last week provisional averaged inflows from the structures are shown in Table 5.

Table 5. Weekly average inflows (data is provisional)

| Location | Flow (cfs) |
|----------|------------|
| S-77 | 5,152 |
| S-78 | 4,933 |
| S-79 | 5,999 |

Over the past week in the estuary, salinity increased downstream of Ft. Myers Yacht Basin (Table 6, Figures 9 &10). The seven-day average salinity values are within the poor range for the adult eastern oysters at Cape Coral and in the good range at Shell Point (Figure 11). Salinity data was not available at Sanibel. The 30-day moving average surface salinity is 0.1 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 6. Seven-day average salinity at six monitoring stations in the Caloosahatchee Estuary. Current average is in bold face type, previous average in parentheses. The envelope reflects the preferred salinity range for tape grass (*Vallisneria americana*) at Val I-75 and for adult eastern oysters (*Crassostrea virginica*) elsewhere.

| Sampling Site | Surface | Bottom | Envelope |
|-----------------------|-----------------------------|--------------------|----------------------|
| S-79 (Franklin Lock) | 0.1 (0.1) | 0.1 (0.1) | NA ¹ |
| *Val I75 | 0.1 (0.1) | 0.2 (0.1) | 0.0-5.0 ² |
| Ft. Myers Yacht Basin | 0.2 (0.2) | 0.2 (0.2) | NA |
| Cape Coral | 1.4 (0.5) | 2.2 (0.8) | 10.0-30.0 |
| Shell Point | 11.9 (9.2) | 13.2 (12.5) | 10.0-30.0 |
| Sanibel | NR ³ (NR) | NR (NR) | 10.0-30.0 |

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

*Val I75 is temporarily unavailable (salinity values are estimated using models developed for this site).

Monitoring data collected by the River, Estuary and Coastal Observing Network of Sanibel-Captiva Conservation Foundation using continuous sensors are summarized in Table 7 as concentration ranges of chlorophyll *a* and dissolved oxygen at Beautiful Island, Ft. Myers, and Shell Point in the Caloosahatchee Estuary.

Table 7. Weekly ranges of chlorophyll *a* (a measure of algal biomass) and dissolved oxygen concentrations at three monitoring stations maintained by the Sanibel-Captiva Conservation Foundation.

| Parameter Name | RECON Monitoring Stations | | |
|-----------------------------|---------------------------|-------------|-------------|
| | Beautiful Island | Ft. Myers | Shell Point |
| Chlorophyll <i>a</i> (µg/l) | Down for maintenance | 1.78 - 4.46 | 2.20 - 4.46 |
| Dissolved Oxygen (mg/l) | Down for maintenance | No Data | 6.19 - 8.08 |

The Florida Fish and Wildlife Research Institute reported on 12/1/2017, that *Karenia brevis*, the Florida red tide dinoflagellate, was observed in background to medium concentrations in fourteen samples collected from Lee County. Fish kills were reported along Lee County on 11/26/17 and 11/29/17. Slight respiratory irritation has been reported in some areas of Lee County over the past week.

NOAA satellite imagery indicates low potential for cyanobacteria blooms in the Caloosahatchee River Estuary (Figure 12).

Water Management Recommendations

Lake stage is in the Low Sub-Band of 2008 LORS. Tributary hydrological conditions are 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.

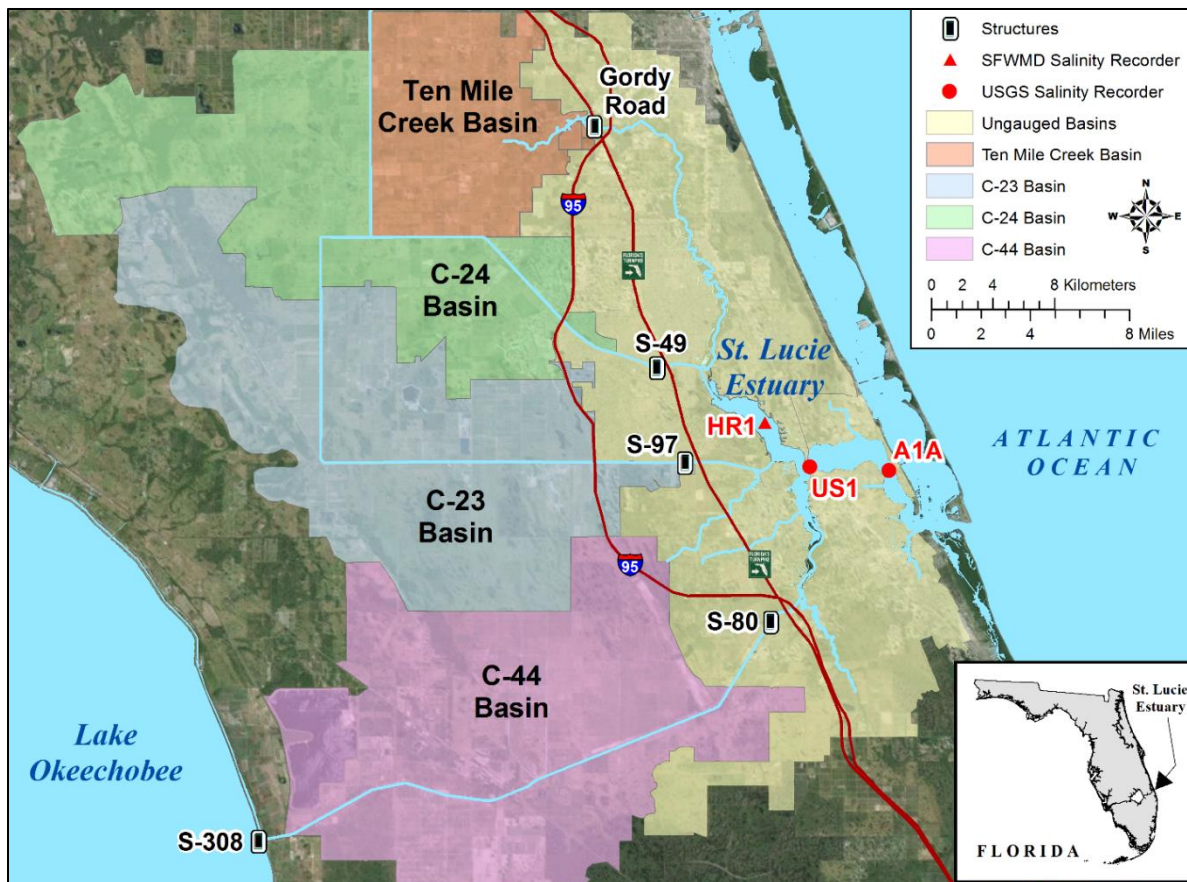


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

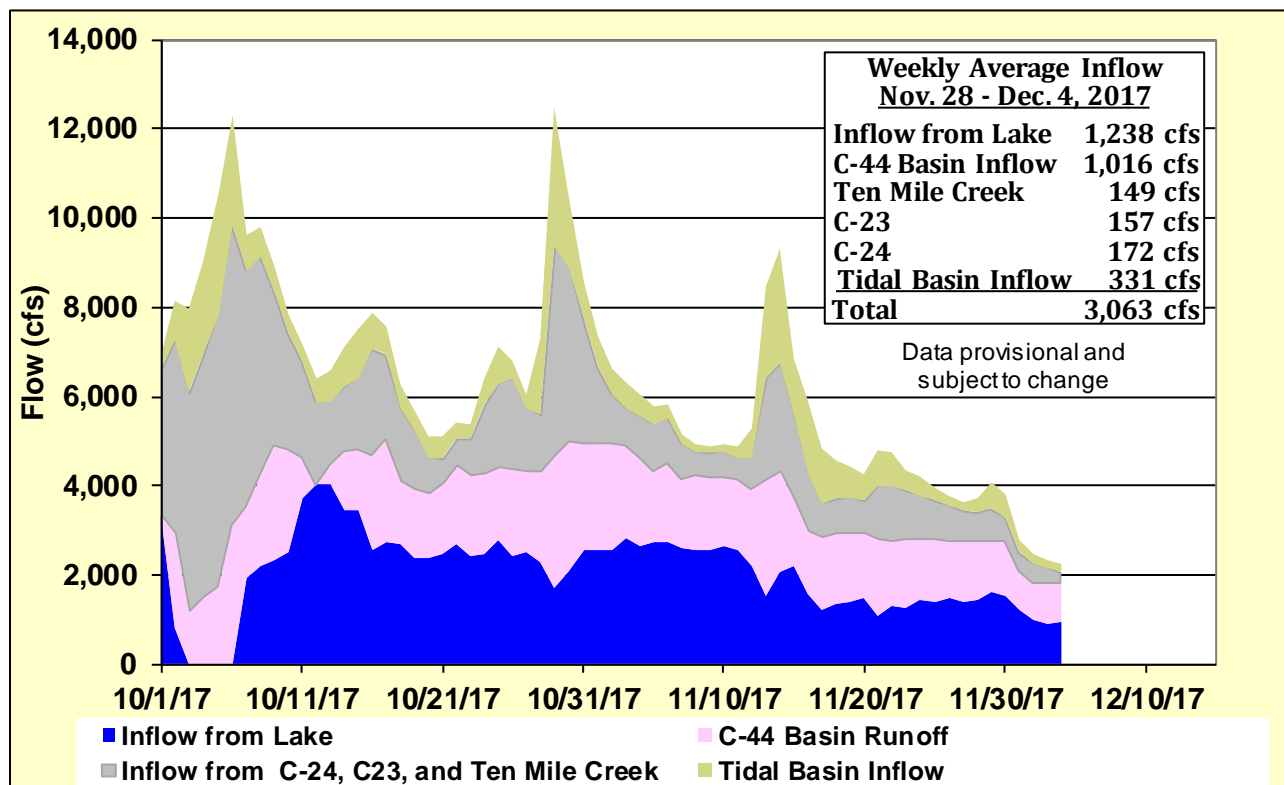


Figure 2. Estimated surface freshwater inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basins into the St. Lucie Estuary.

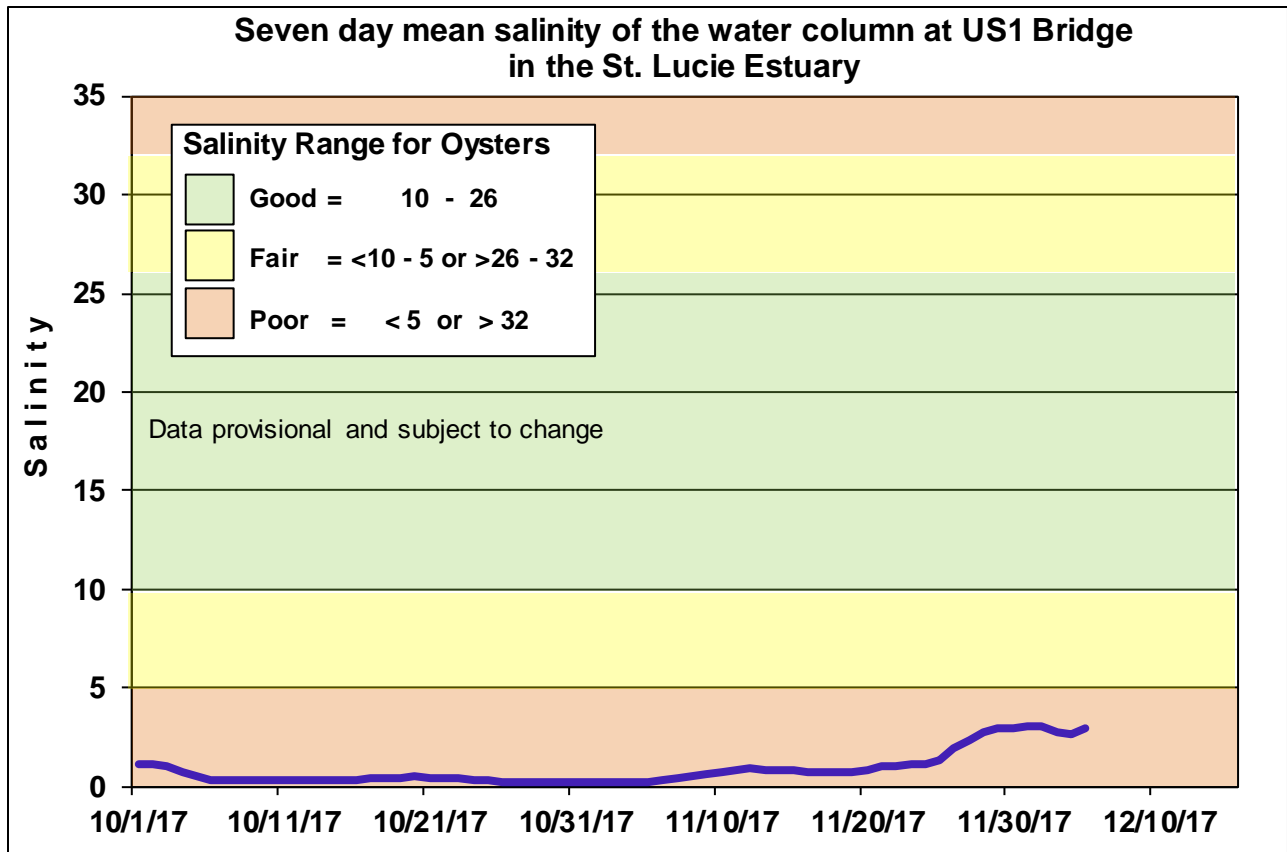


Figure 3. Seven-day mean salinity of the water column at the U.S. Highway 1 Bridge.

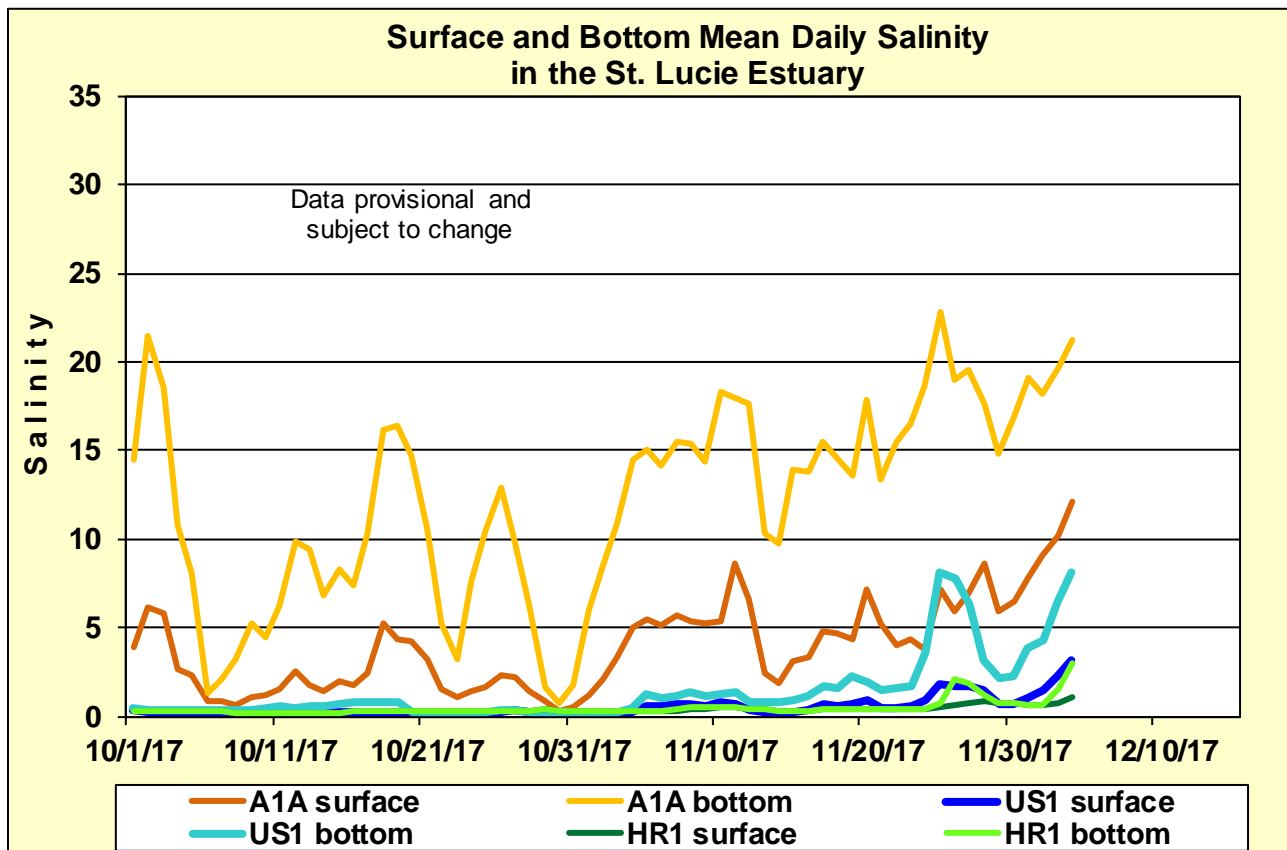


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

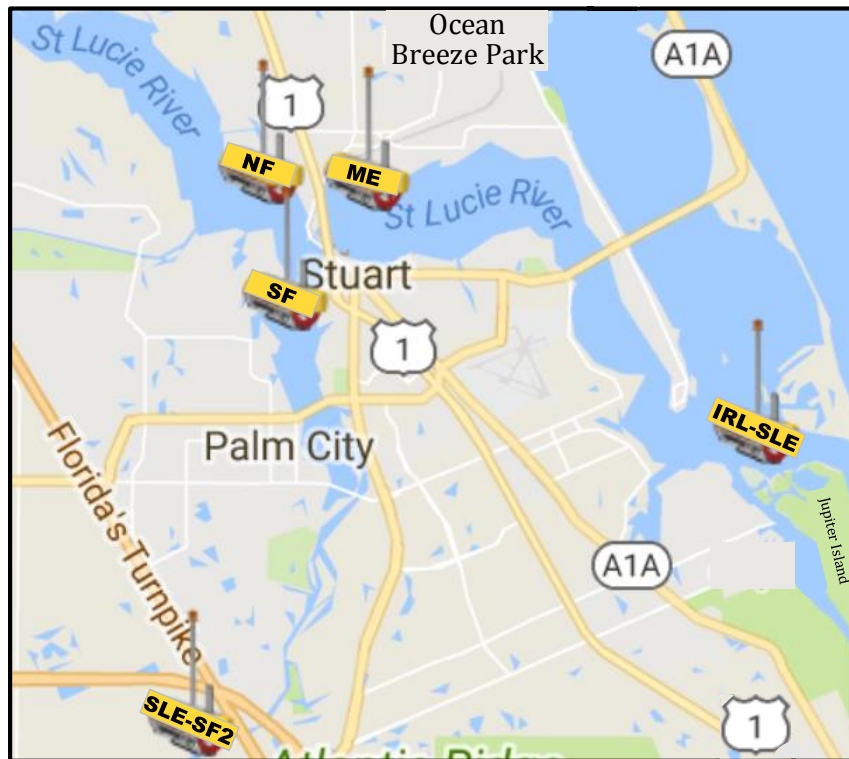


Figure 5. Location of FAU-HBOI LOBO water quality stations in the St. Lucie Estuary.

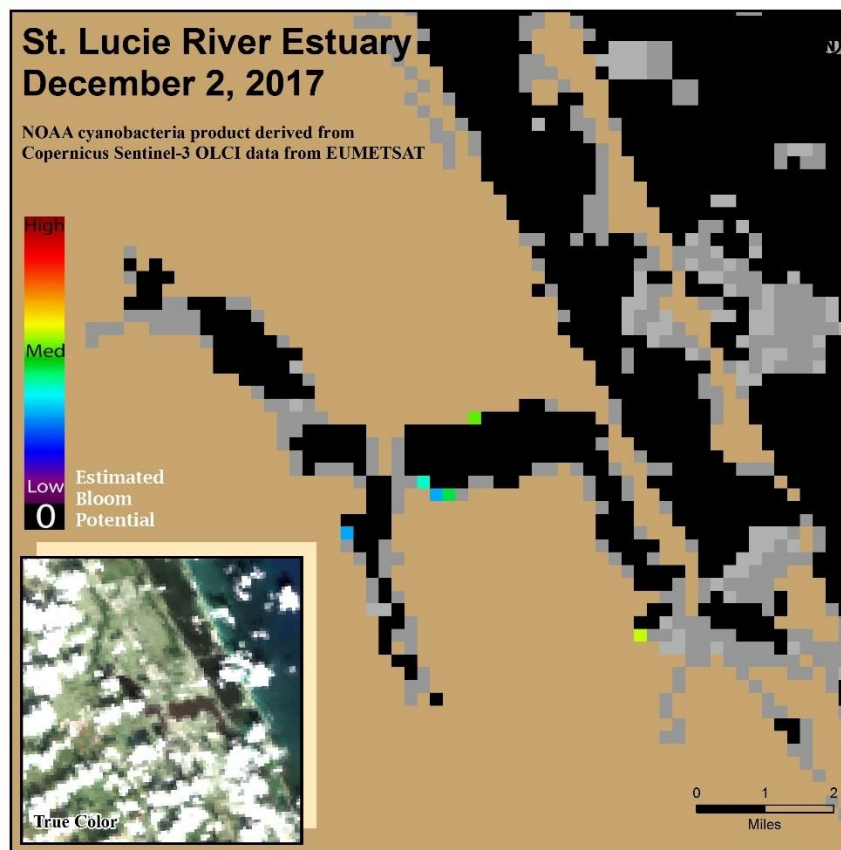


Figure 6. Sentinel 3a Satellite imagery provided by NOAA uses Ocean and Land Color Instrument (OLCI) to estimate cyanobacteria bloom potential in St. Lucie Estuary.

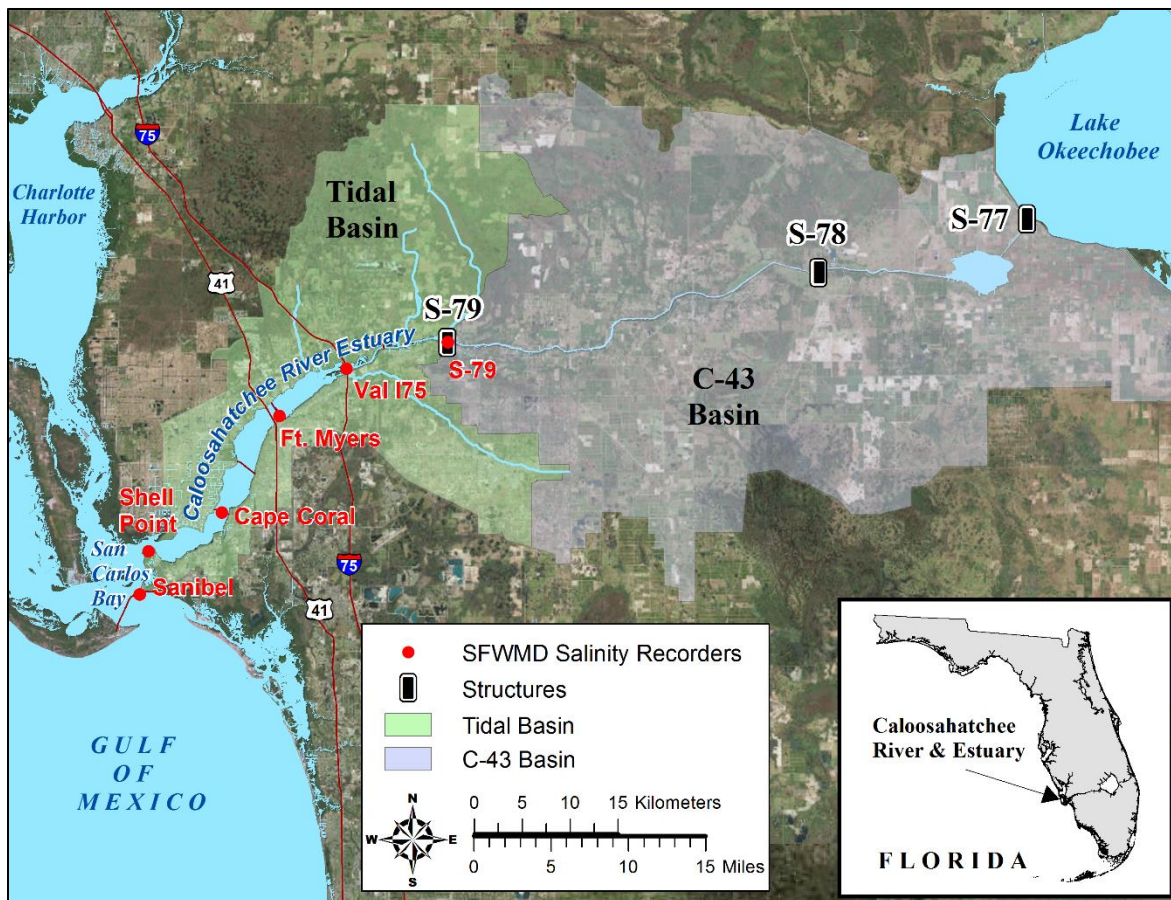


Figure 7. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

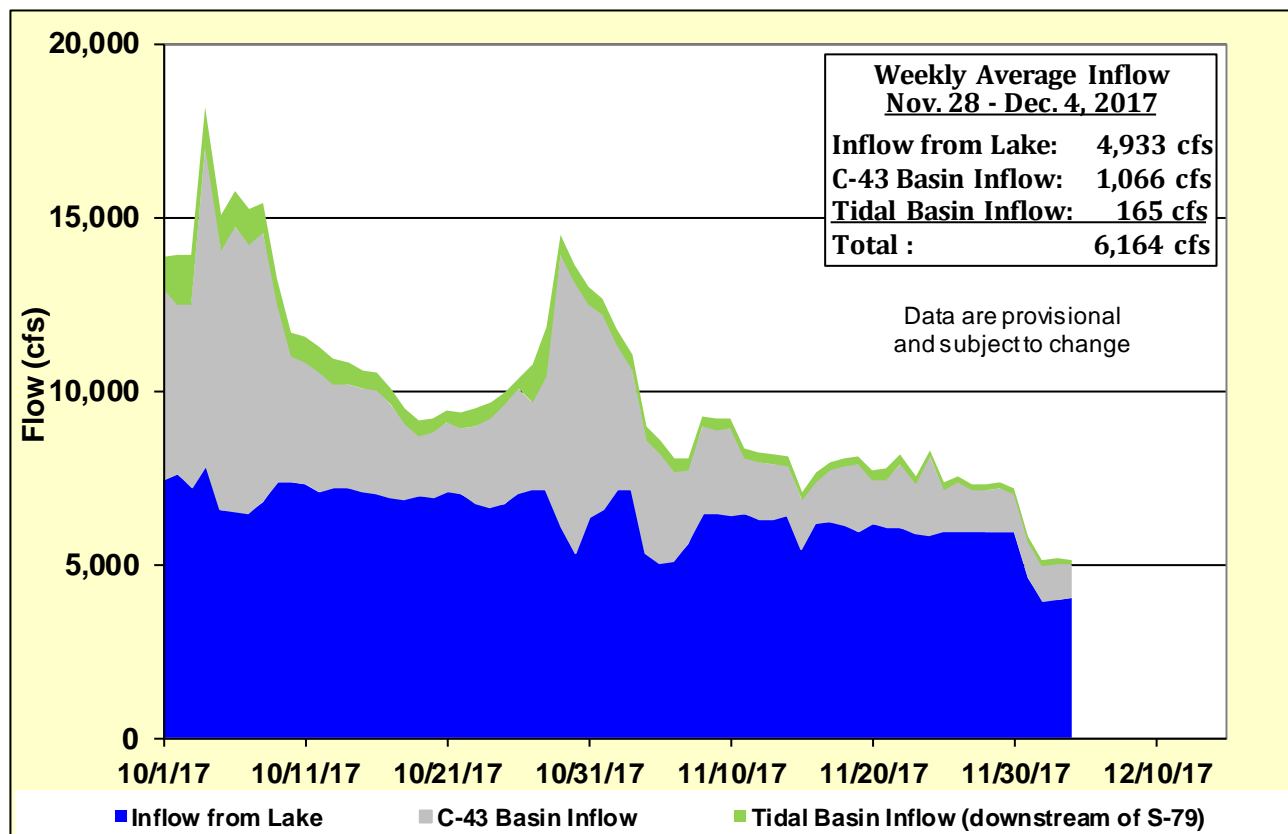


Figure 8. Freshwater inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.

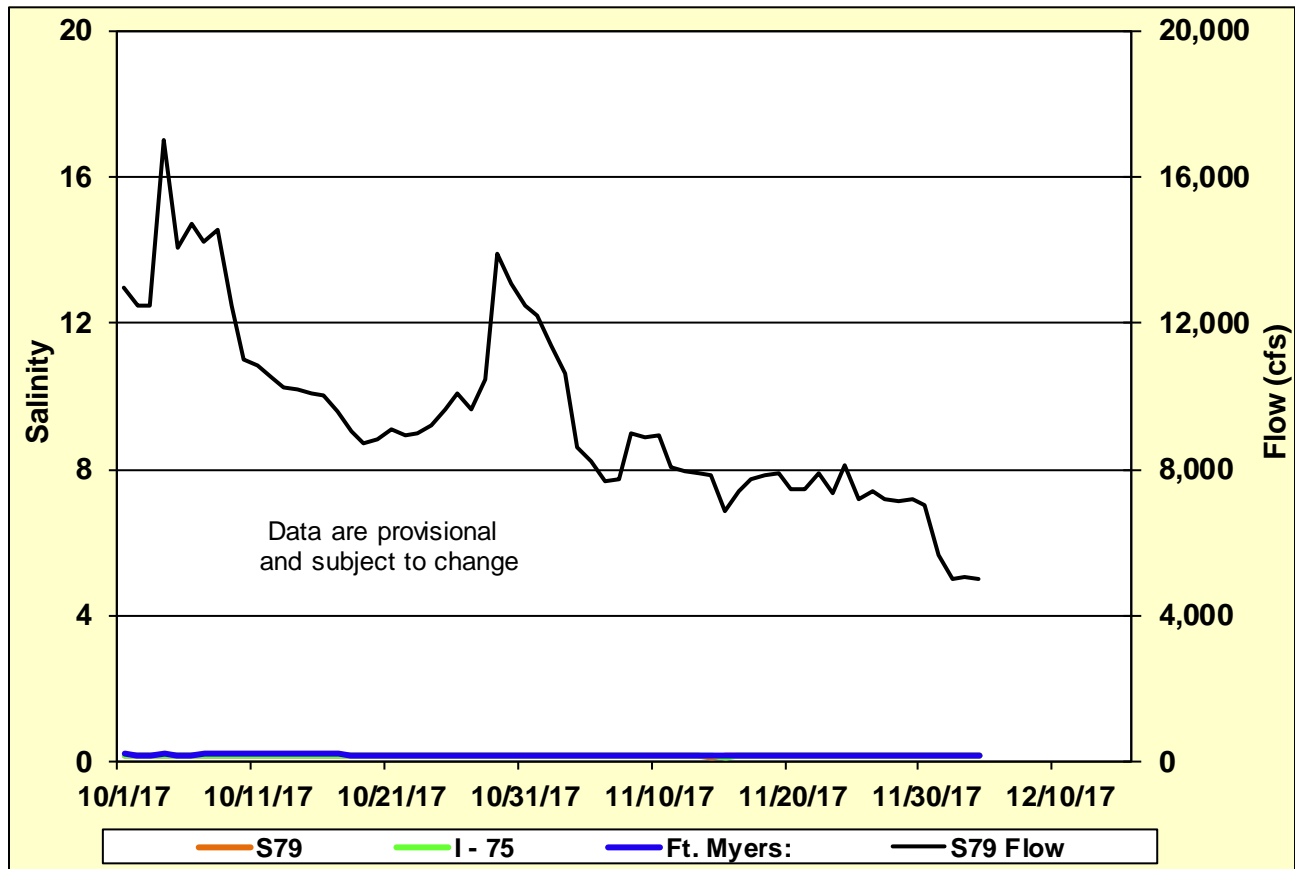


Figure 9. Daily mean flows at S-79 and salinity at upper estuary monitoring stations.

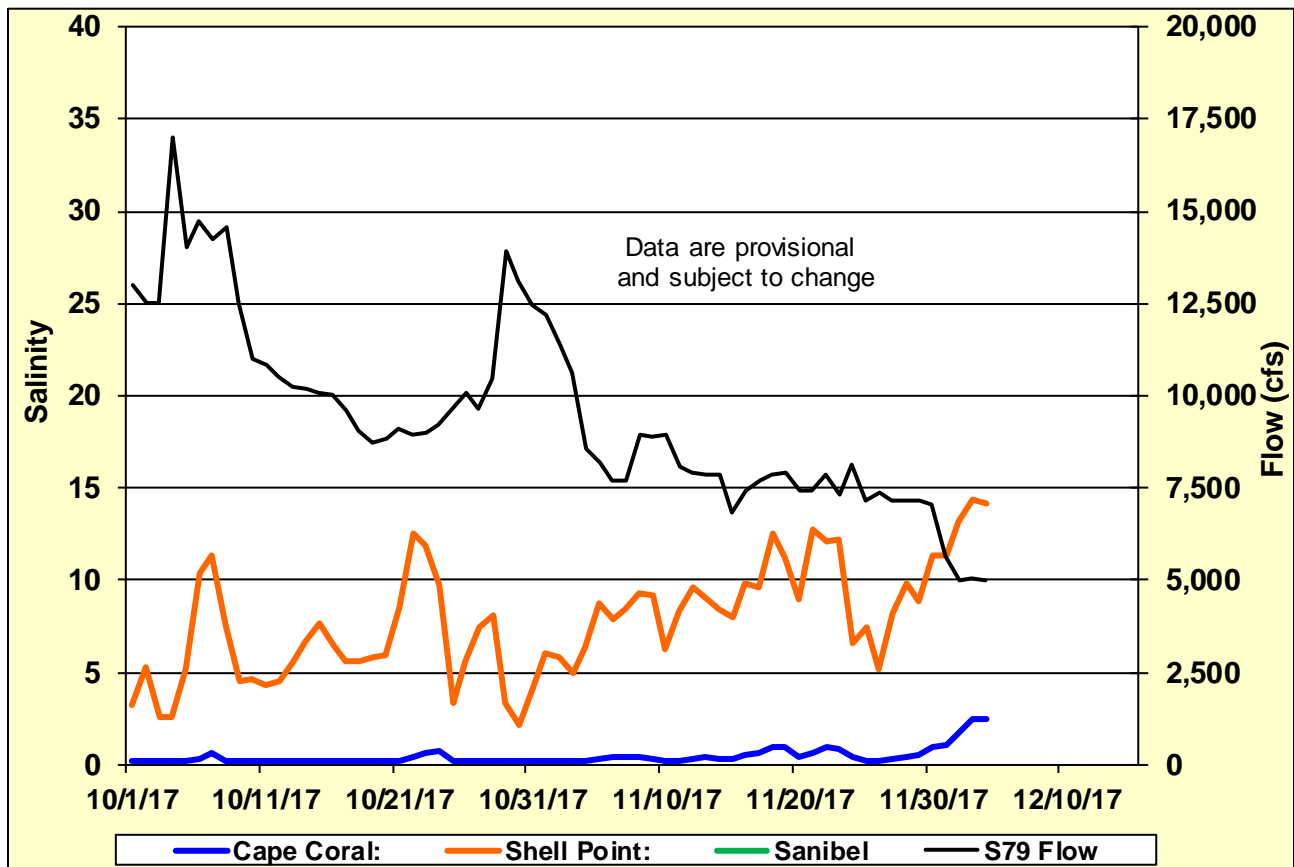


Figure 10. Daily mean flows at S-79 and salinity at lower estuary stations.

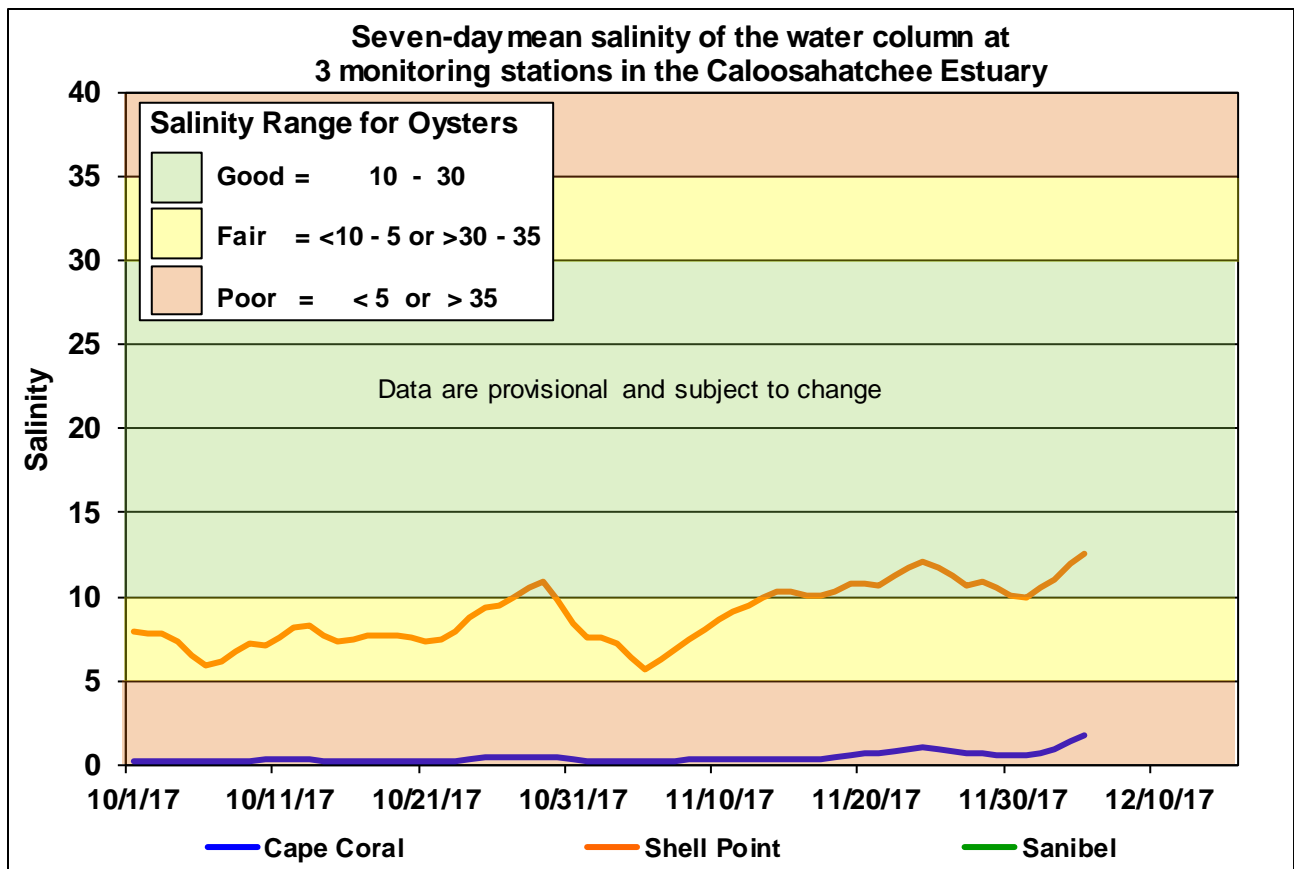


Figure 11. Seven-day mean salinity at Cape Coral Bridge, Shell Point and Sanibel Bridge monitoring stations.

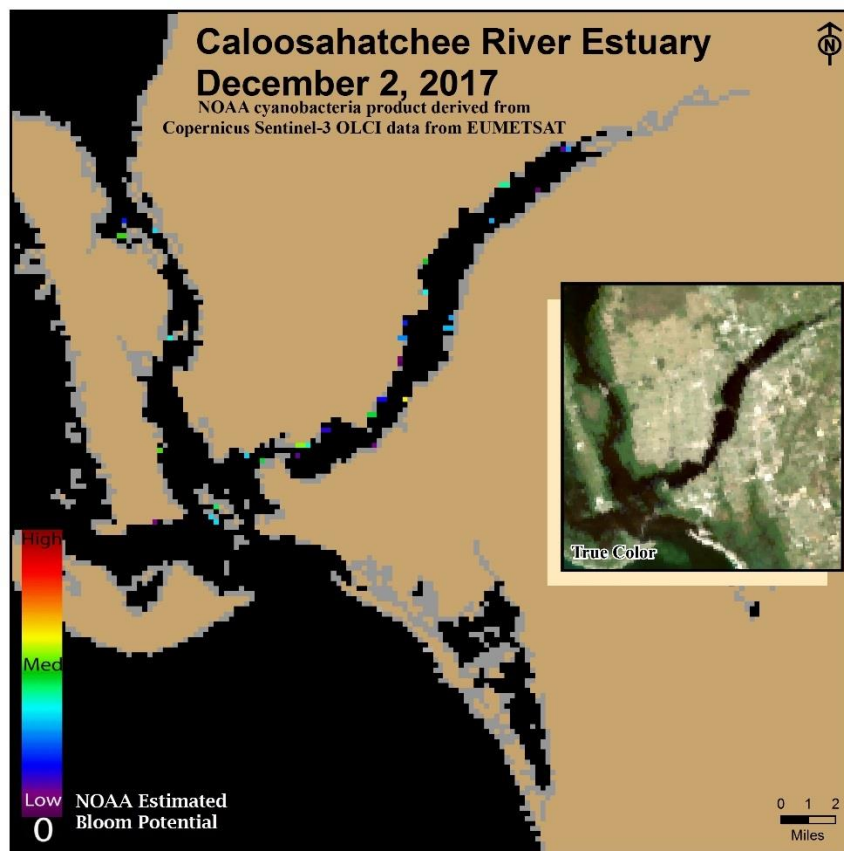
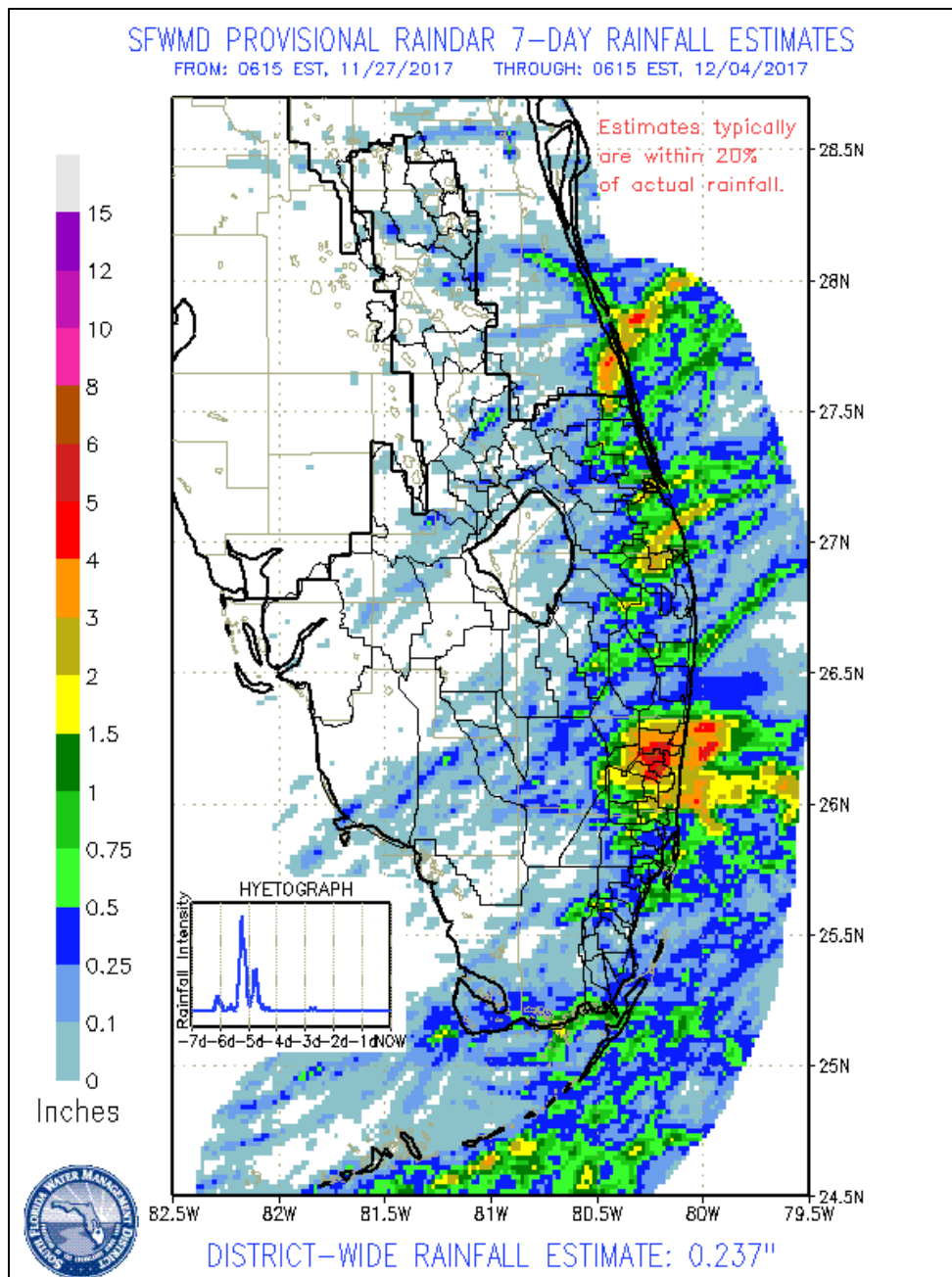


Figure 12. Sentinel 3a Satellite imagery provided by NOAA uses Ocean and Land Color Instrument (OLCI) to estimate cyanobacteria bloom potential in Caloosahatchee River Estuary.

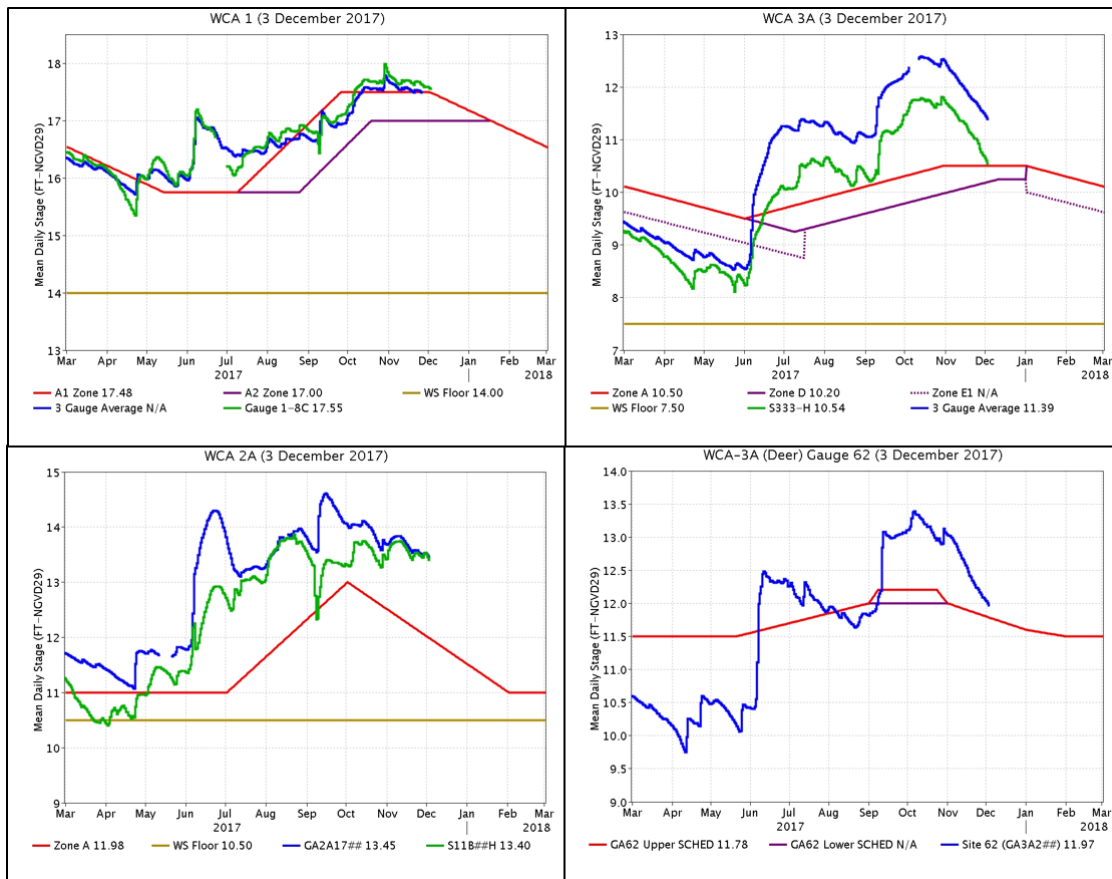
EVERGLADES

Rainfall was extremely localized with only WCA-2B getting more than an inch for the week. This rain caused WCA-2B to be the only basin that increased in stage this past week. All other basins decreased with WCA-3A having the largest change of -0.23 feet.

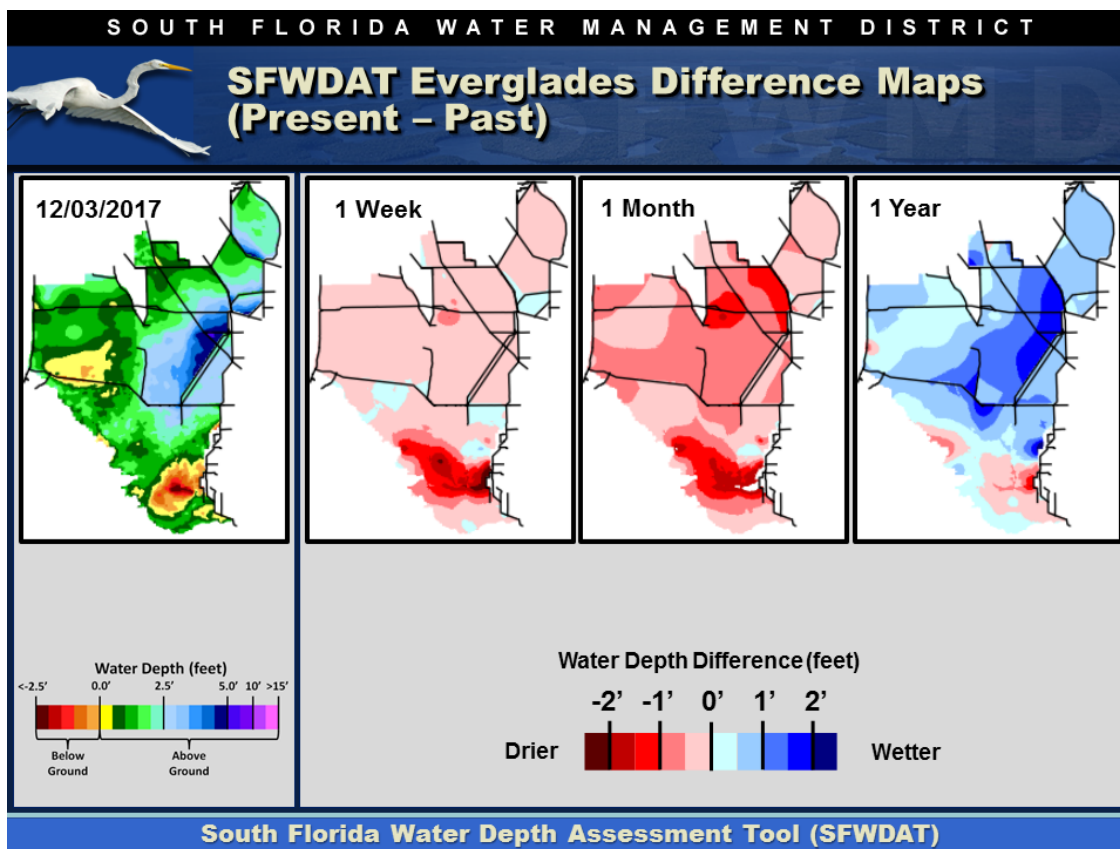
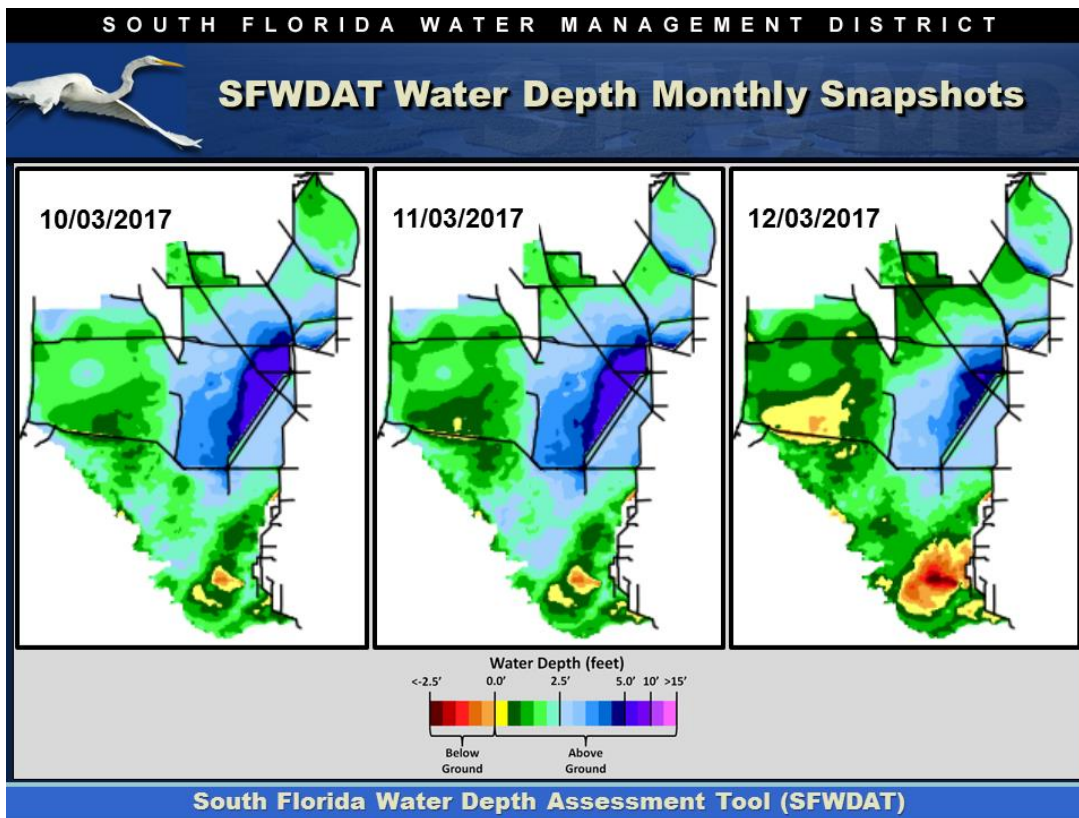
| Everglades Region | Rainfall (Inches) | Stage Change (feet) |
|------------------------------|------------------------------|------------------------------------|
| WCA-1 | 0.38 | -0.07 |
| WCA-2A | 0.63 | -0.08 |
| WCA-2B | 1.95 | +0.08 |
| WCA-3A | 0.18 | -0.23 |
| WCA-3B | 0.24 | -0.12 |
| ENP | 0.14 | +0.00 |



Regulation Schedules: WCA-1 three-gauge average was not available for 12/3/17, but it had been trending along the Zone A1 schedule. WCA-2A marsh stage at gauge GA2A17 is still subject to the temporary deviation and holding 1.47 feet above Zone A1. Marsh stage is 0.05 feet above canal stage at S11B. WCA-3A three-gauge average stage is 0.89 feet above Zone A and is rapidly decreasing. Stage difference between marsh and canal is 0.85 feet. WCA-3A at gauge 62 (northwest corner) is 0.19 feet above the upper schedule.

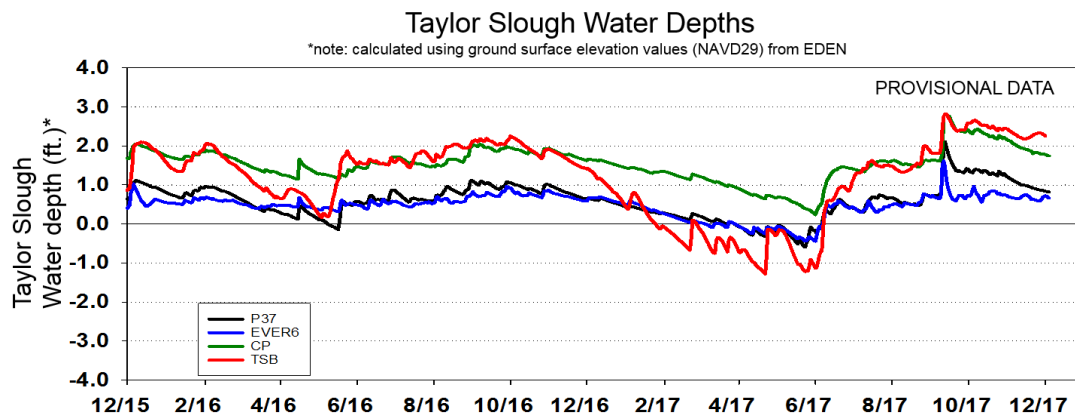
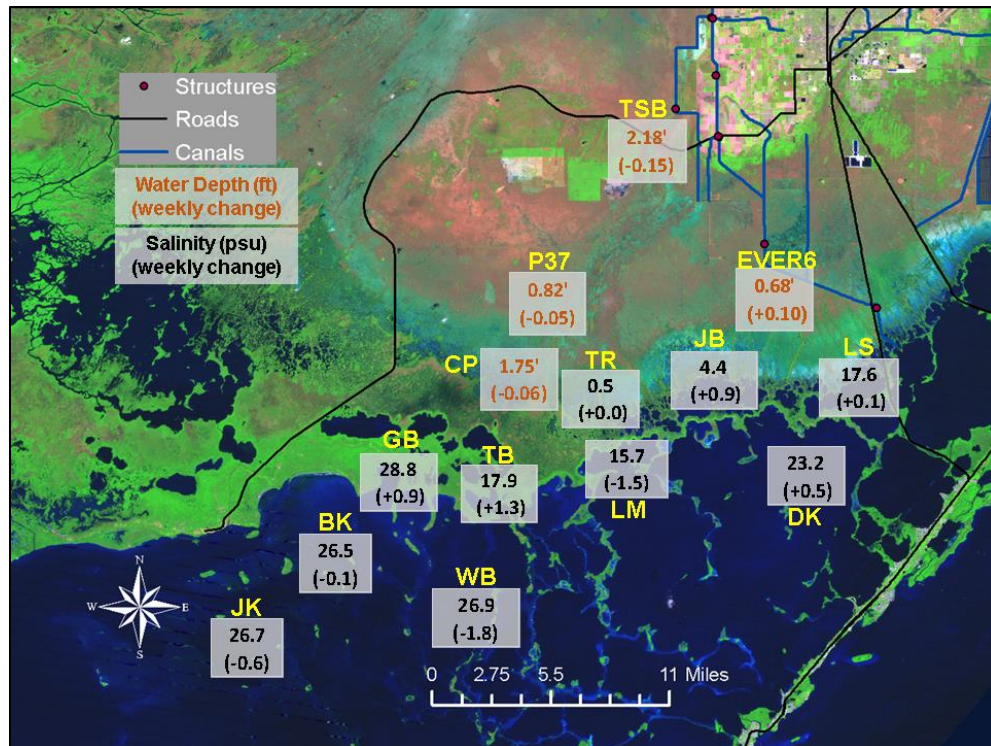


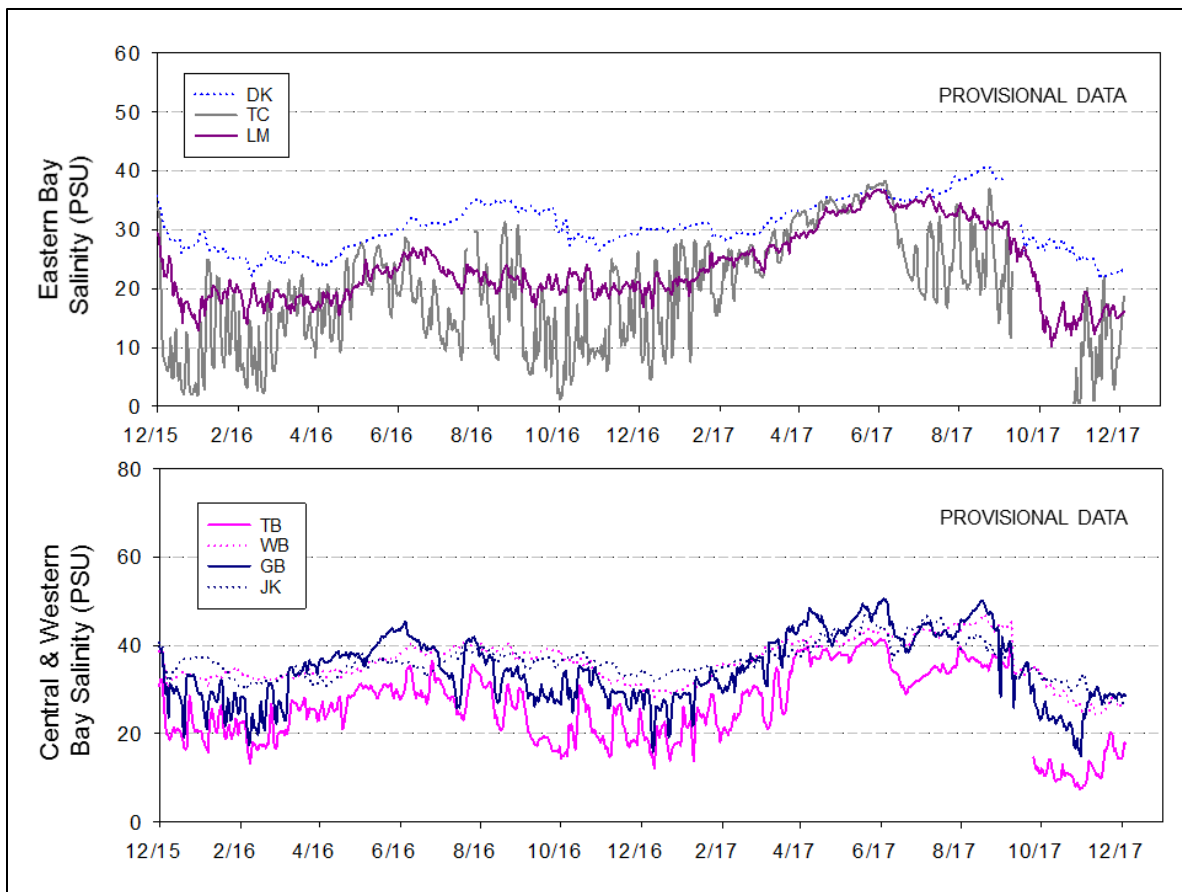
Water Depths and Changes: The WDAT tool for spatial interpolation of depth still indicates a range from a low of 0.5 feet to 1.0 feet in northwest WCA-3A to a high of 5.0+ feet in small pockets along the L-67A canal in southern WCA-3A. Comparing WDAT water levels from present, water depths over the last week fell across most of the Everglades, only rising in WCA-2B and parts of Everglades National Park (ENP). WCA-3A is again lower than it was a month ago. Over the last week individual gauge changes in the WCAs ranged from -0.06 feet (WCA-1) to -0.28 feet (southern WCA-3A).



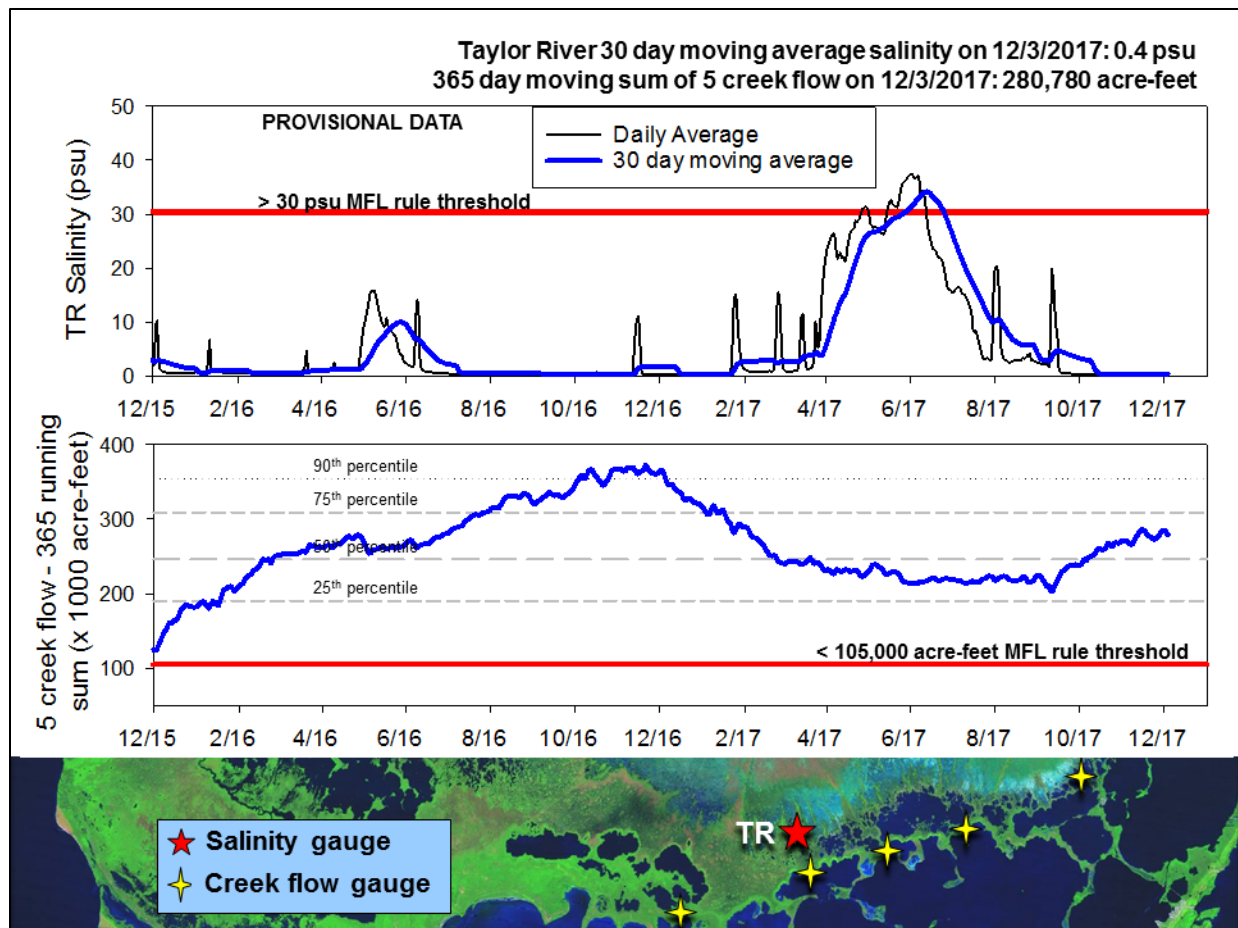
Taylor Slough stages: Water level changes ranged from -0.15 feet in northern Taylor Slough to $+0.10$ feet in ENP panhandle. Weekly rainfall in the area averaged 0.42 inches. Water levels are still three to 15 inches above the historic average for this time of year with the highest divergence occurring in northern Taylor Slough.

Florida Bay Salinities: Salinity changes for the last week were less than 2 psu, and current salinities range from 4 psu in the northeastern nearshore to 29 psu in the western nearshore area. Western bay salinities are still 7 psu below the historic averages and the eastern bay salinities are 4 psu below the historic averages. The western nearshore salinity is 5 psu above average for this time of year.





Florida Bay MFL: Mangrove zone daily average salinity remains near fresh at 0.5 psu, but it is slowly increasing. The 30-day moving average is 0.4 psu. The weekly cumulative flow from the five creeks denoted by yellow stars on the map increased to 11,400 acre-feet last week which is 70% higher than the average for this time of year. The 365-day moving sum of flow from the five creeks identified by yellow stars on the map increased about 4,000 acre-feet this past week to end at 280,780 acre-feet (still greater than the long-term average of 257,628 acre-feet). Creek flow is provisional data from the USGS and is highly variable.



Water Management Recommendations

Deep water conditions persist in WCA-3A. All practicable and novel management options should be explored in order to relieve high water conditions particularly in southern WCA-3A. Florida Bay salinities are stable, and bloom conditions continue to be helped by freshwater flushing and cooler temperatures.

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

| Everglades Ecological Recommendations, December 5th, 2017 (red is new) | | | | |
|--|--|--------------------------------------|---|---|
| Area | Current Condition | Cause(s) | Recommendation | Reasons |
| WCA-1 | Stages decreased -0.07' | Rainfall, ET, management | Maintain depths at high water targets (17.5 ft) at regulation schedule or slightly above. | Protect habitat and facilitate invasive plant treatments. |
| WCA-2A | Stages decreased -0.08' | Rainfall, ET, management | Maintain depths at temporary regulation schedule or slightly above. | Protect habitat and wildlife from high water stress. |
| WCA-2B | Stages increased +0.08' | Rainfall, ET, management | Maintain depths at regulation schedule or slightly above. | Protect habitat and wildlife from high water stress. |
| WCA-3A NE | Stages decreased -0.21' | Rainfall, ET, management | Moderate ascension rates as possible. Manage for relief of high water conditions. | Protect habitat and wildlife from high water stress. |
| WCA-3A NW | Stages decreased -0.19' | Rainfall, ET, management | | |
| Central WCA-3A S | Stages decreased -0.23' | Rainfall, ET, management | Moderate ascension rates as possible. Manage for relief of high water conditions. | Water depths above 2.5 feet at gauge 65 are indicative that tree islands are flooded and under stress. Depths exceeded that mark on 18 June, meaning the tree islands have been flooded for 170 days. |
| Southern WCA-3A S | Stages decreased -0.28' | Rainfall, ET, management | | |
| WCA-3B | Stages decreased -0.12' | Rainfall, ET, management | Maintain depths at regulation schedule. | Protect habitat and wildlife from high water stress. |
| ENP-SRS | No change | ET, rainfall, topography, management | Make discharges to the Park according to the 2012 WCP rainfall plan. | Keep peat wet to promote native habitat and maintain wetland plant and animal communities. Protect habitat and wildlife, including apple snail reproduction. |
| Taylor Slough | Stage changes ranged from -0.15' to +0.10' | Rain, ET, inflows | Move water southward as possible | When available provide freshwater buffer for ecosystems. |
| FB- Salinity | Salinity changes ranged -1.8 to +1.3 psu. | Rain, ET, inflows, wind | Move water southward as possible | When available, provide freshwater to main low salinity buffer and promote water movement. |