

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, Assistant Executive Director, Executive Office Staff

FROM: SFWMD Staff Environmental Advisory Team

DATE: October 7, 2020

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

On Wednesday, Hurricane Delta will be moving into the south-central Gulf and through the west-central Gulf of Mexico on Thursday. The strong outflow/subsidence from the hurricane and the strengthening mid-level ridge over Florida should result in a marked decrease of total rainfall mid-week, with much below normal rainfall continuing through the day on Friday. The only basin during this time that could see rainfall at or in excess of the daily climatological average would be over the far north, producing up to a quarter of an inch of large areal average rainfall. Relatively dry conditions should extend into Friday. By this weekend, the steering winds across Florida should become southerly and then southwesterly between high pressure in the western Atlantic and Hurricane Delta moving inland over the northwestern Gulf of Mexico. The southerly to southwesterly winds should draw abundant moisture in the Caribbean northward across the District. This could result in a large increase of rains, with widespread, above-normal total rainfall on Saturday and Sunday. After the remnants of Delta dissipate late in the weekend, mid-level high pressure is predicted to build over the Gulf of Mexico, causing the steering winds to become northeasterly on Monday. Less available moisture will likely result in less total rainfall, but still somewhat above the long-term daily average. There are no signs at this time that the 2020 wet season would end this coming week, which would make for a late end to the wet season (*median end date is during the first and second weeks of October*). A cold front the following week could push southward into the northern part of District and possibly farther south, which could mark the end of the wet season but forecast confidence is low.

Kissimmee

Tuesday morning stages were 57.2 feet NGVD (at schedule) in East Lake Toho, 54.2 feet NGVD (at schedule) in Toho, and 52.3 feet NGVD (0.6 feet above schedule) in Kissimmee-Cypress-Hatchineha; headwater stages were 46.6 feet NGVD at S-65A and 27.8 feet NGVD at S-65D. Tuesday morning discharges were 1,540 cfs at S-65, 2,420 cfs at S-65A, 5,390 cfs at S-65D and 5,850 cfs at S-65E. Dissolved oxygen concentration in the Kissimmee River averaged 1.4 mg/L for the week through Sunday. Kissimmee River mean floodplain depth on Sunday was 2.42 feet. Today's recommendation is to continue to use the IS-14-50 discharge plan through the 2020 wet season (the discharge rate of change limits for S-65 / S-65A may be adjusted for individual events after consultation with Kissimmee River Restoration Evaluation Program staff).

Lake Okeechobee

Lake Okeechobee stage was 15.86 feet NGVD on October 5, 2020, 0.4 feet higher than the previous week and 1.44 feet higher than the previous month. The Lake is in the Low sub-band. Lake stage moved into the ecological envelope (which varies seasonally from 12.0 – 15.0 feet NGVD +/- 0.5 feet) on June 2, 2020, after being up to 1.5 feet below since October 15, 2019. Stages have been above or near the top of the envelope since August 1, 2020 and are currently 0.53 feet above. Ascension rates have exceeded the recommended rate (<0.5 foot per 2 weeks) several times since the onset of the wet season and have been rising more quickly over the past month. Cyanobacterial bloom risk potential is likely lower over the past week due to wind and rain events, though cloud cover has negated recent satellite imagery analysis. Water quality sampling on September 24-25 showed nine stations having Chlorophyll *a* values >40 µg/L, the level considered a bloom by the District.

Estuaries

Total inflow to the St. Lucie Estuary averaged 3,996 cfs, with no flow coming from Lake Okeechobee. The seven-day average salinities decreased throughout the estuary over the past week. Salinity at the US1 Bridge is in the fair range (5-10) for adult eastern oysters.

Total inflow to the Caloosahatchee Estuary averaged 5,731 cfs over the past week, with no flow coming from the Lake. Seven-day average salinity remained almost fresh at Ft. Myers and upstream and decreased in the lower estuary over the past week. Salinities are in the good range (0-10) for tape grass at Val I-75 and Ft. Myers. Salinities are in the good range for adult eastern oysters at Shell Point (10-30) and Sanibel and in the poor range at Cape Coral (0-5).

Lake stage is in the Low sub-band of 2008 LORS. Tributary hydrological conditions are very wet. The LORS2008 Release Guidance suggests up to 3,000 cfs release at S-79 to the Caloosahatchee Estuary and up to 1,170 cfs release at S-80 to the St. Lucie Estuary.

Stormwater Treatment Areas

Over the past week, 11,900 ac-ft of Lake Okeechobee water was delivered to the FEBs/STAs. The total amount of Lake releases sent to the FEBs/STAs in WY2021 (since May 1, 2020) is approximately 36,100 ac-feet. The total amount of inflows to the STAs in WY2021 is approximately 916,000 ac-feet. Most STA cells are near or above target stage. STA-1E Western Flow-way is offline for the Restoration Strategies project to fill and grade Cells 5 and 7. Operational restrictions are in place in STA-1W Northern Flow-way related to STA-1W Expansion #1 startup activities, in STA-1E Central Flow-way, STA-2 Flow-way 3, STA-2 Flow-way 4, STA-3/4 Eastern, Central, and Western Flow-ways for vegetation management activities, and in STA-5/6 Flow-ways 2 and 3, following the Restoration Strategies project to grade non-effective treatment areas. This week, if 2008 LORS recommends Lake releases to the WCAs and conditions allow, releases will be sent to the L-8 FEB, STA-2, or the A-1 FEB/STA-3/4.

Everglades

Near average (highest in the north) rainfall was experienced across the Everglades last week. Stages remain above their historic mean for this time of year in both WCA-1 and WCA-2A but near average in WCA-3A. WCA-1 fell below schedule last week. WCA-3A remains above schedule but generally trending along with regulation. WCA-2A stages reversed directions last week and now trends away from the regulation schedule. Stages increased on average in Taylor Slough and remain above average for this time of year. Salinities decreased on average across the bay, especially important in the nearshore which remains above average. Salinities in the mangrove zone returned to near fresh.

Supporting Information

KISSIMMEE BASIN

Rainfall

The Upper Kissimmee Basin received 1.45 inches of rainfall in the past week and the Lower Basin received 3.03 inches (SFWMD Daily Rainfall Report 10/05/2020).

Upper Kissimmee

Table 1 lists stage and discharge for several KCL water bodies using data from lake outfall structures. KCL stage hydrographs with respective regulation schedules and rainfall are shown in **Figures 1-3**.

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

Report Date: 10/6/2020

| 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) | | | | | | |
|--|-----------|---|---------------------------------------|----------------------|-------------------------------|-----------------------------|------------------------|---------|---------|---------|--------|---------|---------|
| | | | | | | | 10/4/20 | 9/27/20 | 9/20/20 | 9/13/20 | 9/6/20 | 8/30/20 | 8/23/20 |
| Lakes Hart and Mary Jane | S-62 | 266 | LKMJ | 60.1 | R | 60.1 | 0.0 | 0.1 | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lakes Myrtle, Preston, and Joel | S-57 | 60 | S-57 | 61.2 | R | 61.1 | 0.1 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Alligator Chain | S-60 | 132 | ALLI | 63.3 | R | 63.3 | 0.0 | 0.0 | 0.0 | 0.2 | 0.1 | 0.0 | 0.1 |
| Lake Gentry | S-63 | 207 | LKGT | 61.0 | R | 61.1 | -0.1 | 0.1 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 |
| East Lake Toho | S-59 | 892 | TOHOE | 57.3 | R | 57.1 | 0.2 | 0.3 | 0.5 | 0.3 | -0.3 | -0.7 | -0.5 |
| Lake Toho | S-61 | 1,846 | TOHOW, S-61 | 54.3 | R | 54.1 | 0.2 | 0.2 | 0.1 | 0.1 | 0.1 | -0.1 | 0.0 |
| Lakes Kissimmee, Cypress, and Hatchineha | S-65 | 1,725 | KUB011, LKIS5B | 52.2 | R | 51.6 | 0.6 | 0.4 | 0.5 | 0.4 | 0.3 | 0.5 | 0.7 |

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 A = projected ascension line, R = USACE regulation schedule, S = temporary recession target line, T = temporary schedule, N/A= not applicable or data not available.

DATA ARE PROVISIONAL

Lower Kissimmee

Discharges at lower basin structures are shown in **Table 2**. **Figure 4** compares floodplain inundation depths from one year and one month ago with current inundation depths in the Phase I restored area of the Kissimmee River. **Figure 5** shows dissolved oxygen concentration along with S-65A discharge, water temperature and rainfall. **Figures 6-8** are included for reference: **Figure 6** is the current guide for operation of S-65 and S-65A, called the “Preferred Discharge Plan IS-14-50.0”. This is developed collaboratively each year between ecologists and SFWMD water managers based on prevailing ecological and hydrologic conditions. A preferred discharge plan and the interim regulation schedule (**Figure 7**) will be used until the Headwaters Lakes Revitalization regulation schedule is implemented. **Figure 8** is a map of the Kissimmee Basin showing Central and Southern Florida (C&SF) flood control project structures and color-coded watersheds.

Table 2. One- and seven-day average discharge at lower basin structures, dissolved oxygen concentration in phases I and II/III area river channel, and depth in the Phase I area floodplain using provisional, real-time data from SFWMD.

Report Date: 10/6/2020

| Metric | Location | 1-Day Average | | Average for the Preceding 7-Days ¹ | | | | | | | |
|--------------------------------|---------------------------------|---------------|---------|---|---------|---------|--------|---------|---------|---------|--------|
| | | 10/4/2020 | 10/4/20 | 9/27/20 | 9/20/20 | 9/13/20 | 9/6/20 | 8/30/20 | 8/23/20 | 8/16/20 | 8/9/20 |
| Discharge (cfs) | S-65 | 1,548 | 1,725 | 2,890 | 3,143 | 2,193 | 2,631 | 3,273 | 2,506 | 1,611 | 1,760 |
| Discharge (cfs) | S-65A ² | 2,149 | 2,248 | 3,578 | 3,855 | 2,700 | 3,176 | 4,247 | 3,173 | 1,990 | 2,554 |
| Discharge (cfs) | S-65D ² | 5,056 | 4,692 | 5,198 | 3,738 | 3,512 | 4,262 | 3,420 | 3,067 | 4,360 | 5,466 |
| Headwater Stage (feet NGVD) | S-65D ² | 27.82 | 27.75 | 27.73 | 27.77 | 27.63 | 27.74 | 27.75 | 27.59 | 27.57 | 27.70 |
| Discharge (cfs) | S-65E ² | 5,921 | 5,081 | 4,994 | 3,919 | 3,578 | 4,317 | 3,444 | 3,079 | 4,484 | 5,703 |
| Discharge (cfs) | S-67 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DO (mg/L) ³ | Phases I & II/III river channel | 2.1 | 1.4 | 1.2 | 1.1 | 0.9 | 0.7 | 1.1 | 1.0 | 0.4 | 0.5 |
| Mean depth (feet) ⁴ | Phase I floodplain | 2.42 | 2.40 | 2.70 | 2.31 | 2.06 | 2.42 | 2.27 | 1.76 | 2.06 | 2.60 |

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

²S-65A discharge combines S-65A with auxiliary structures; 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.

³DO is the average for sondes at KRBN, PC62, PC33, PD62R, and PD42R.

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

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

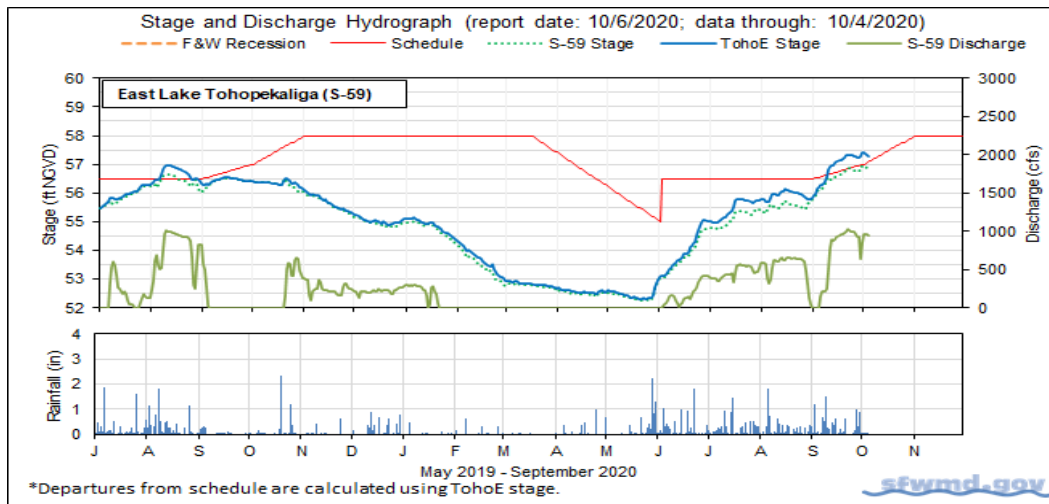


Figure 1. East Lake Toho regulation schedule, stage, discharge and rainfall.

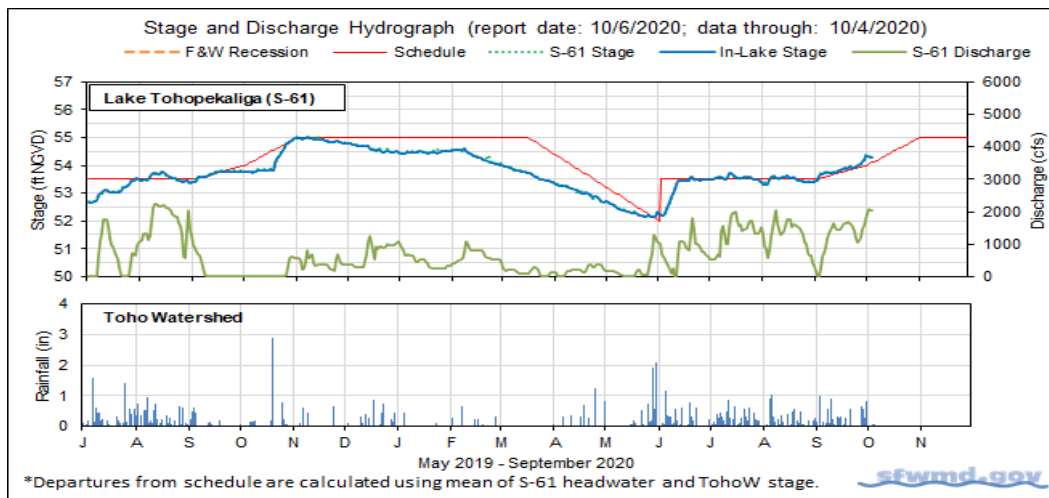


Figure 2. Lake Toho regulation schedule, stage, discharge and rainfall.

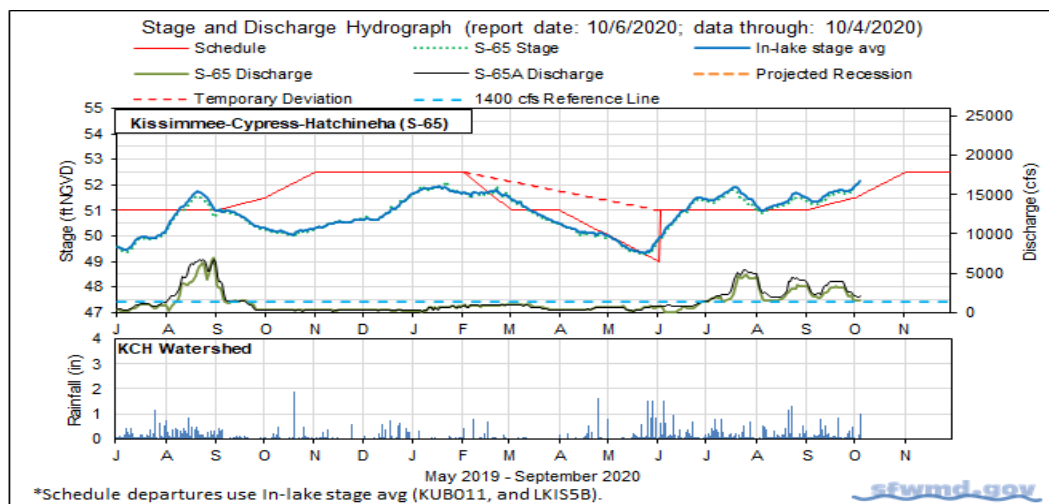


Figure 3. Lakes Kissimmee, Cypress and Hatchineha regulation schedule, stage, discharge and rainfall.

Kissimmee River Phase I Restoration Area Water Depth Maps

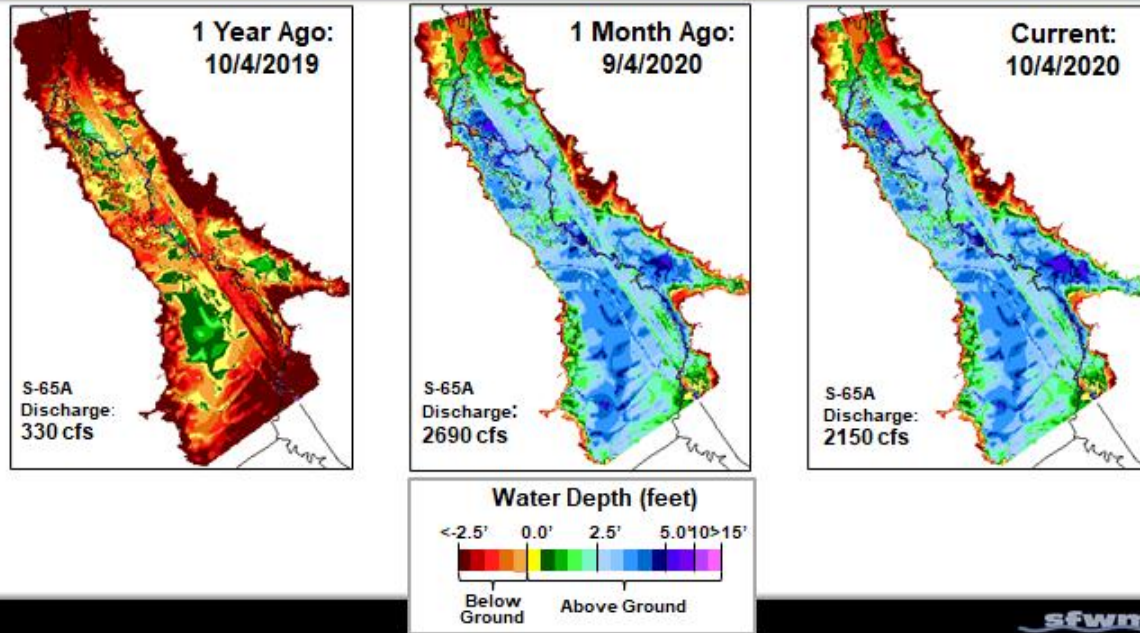


Figure 4. Phase I area floodplain water depths (from left to right) one year ago, one month ago and current. Color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to January 16, 2012.

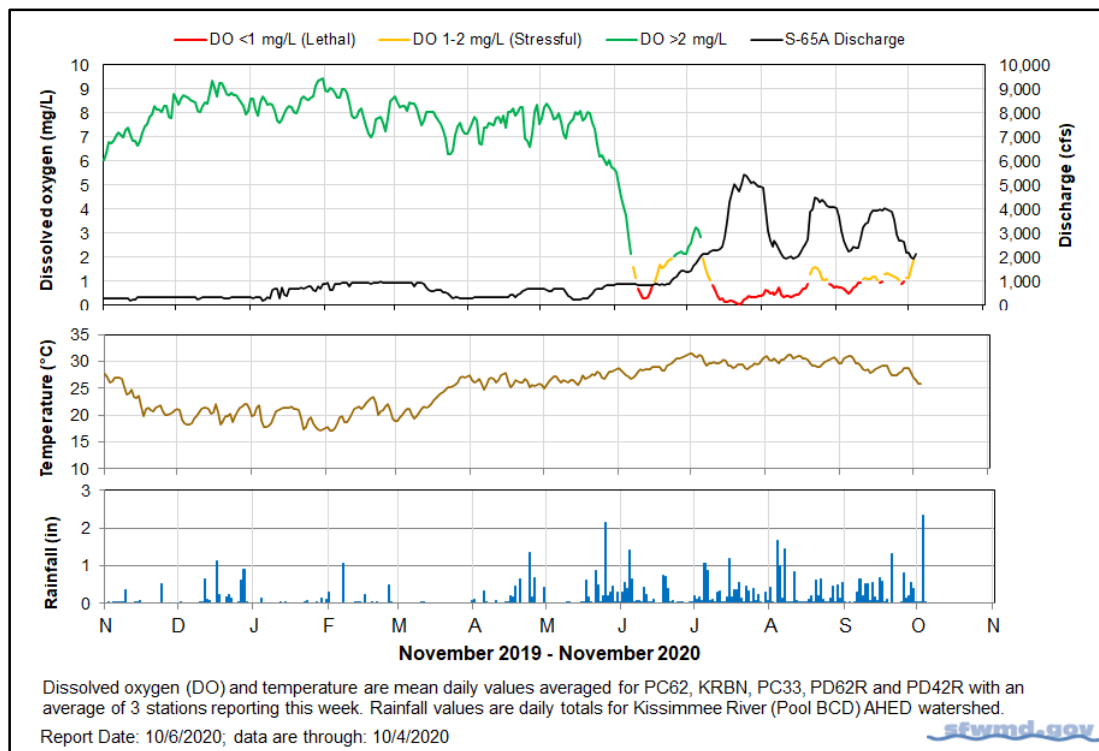


Figure 5. Restored Kissimmee river channel mean daily dissolved oxygen concentration (mg/L), S-65A discharge (cfs), temperature (°C) and rainfall (inches).

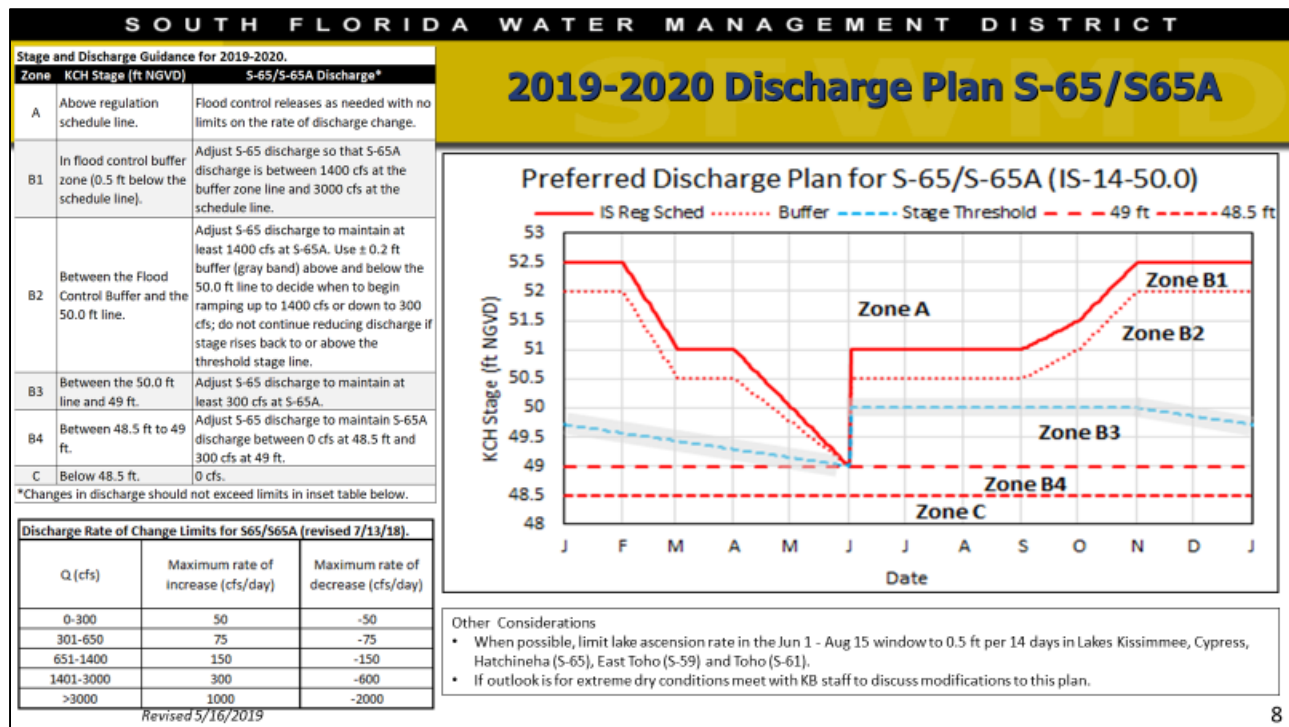


Figure 6. The 2019-2020 Discharge Plan for S-65/S-65A.

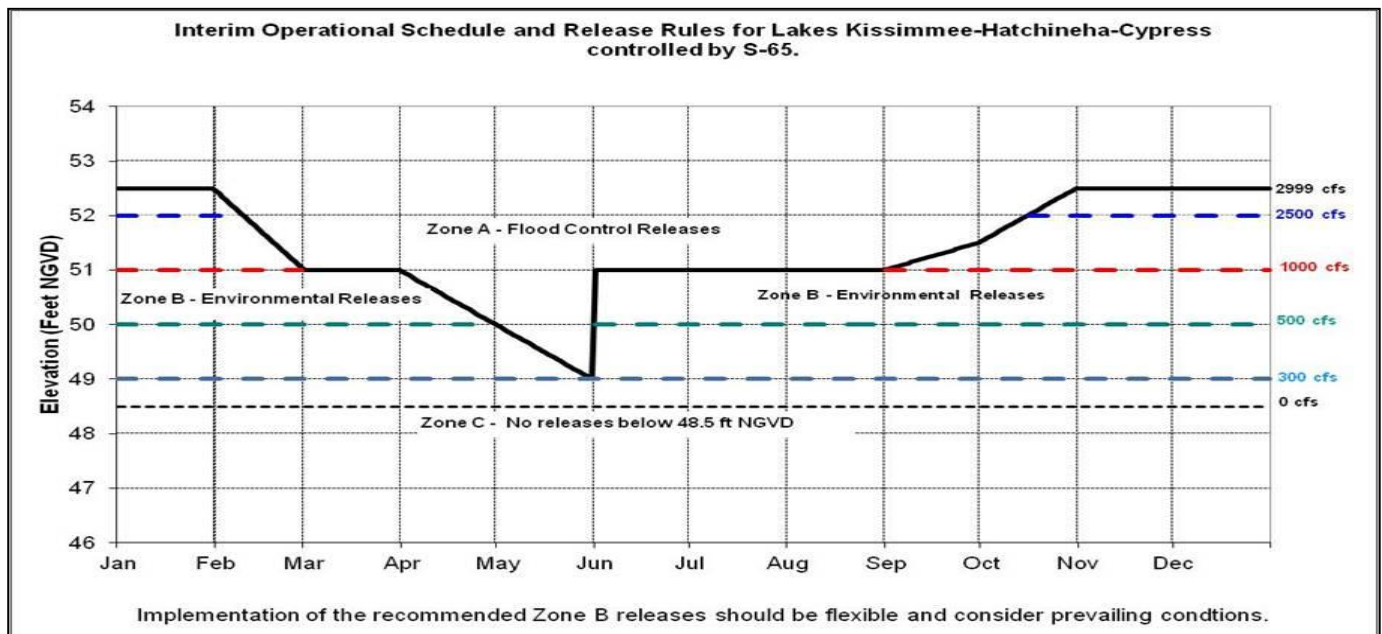


Figure 7. Interim operations schedule for S-65 (solid black line). The discharge schedule shown to the right has not been used in recent years.



Figure 8. The Kissimmee Basin.

LAKE OKEECHOBEE

Lake Okeechobee stage is 15.86 feet NGVD, 1.44 feet higher than a month ago and 2.43 feet higher than one year ago (**Figure 1**). Lake stages rose into the lower portion of the preferred ecological envelope on June 2, 2020 (**Figure 2**) but have been above the envelope since the end of July. Lake stage moved into the Beneficial Use sub-band on March 4, 2020, into the Base Flow sub-band in mid-July, and is currently in the Low sub-band (**Figure 3**). Lake stage reached a low of 10.99 feet on May 17 and has been rising at a rate near or faster than one foot per month since. According to RAINДАР, 1.68 inches of rain fell directly over the Lake through the past week, while much of the watershed received between 2.0 and 4.0 inches (**Figure 4**).

The average daily inflows (minus rainfall) increased from the previous week, from 9,061 cfs, to 11,133 cfs, and the outflows (minus evapotranspiration) were similar at just 800 cfs. Most of the inflows came from the Kissimmee River (5,176 cfs through S-65E & S-65EX1), but there were substantial increases in flow from the C-41a canal (S-84 & S-84X), going from 884 cfs to 2,226 cfs. Other inflows were similar to the prior week, including roughly 1,000 cfs from both the C-59 canal via the S-191 structure (995 cfs) and from Fisheating Creek (999 cfs). Outflows were all south through the S-350 structures, and were similar to the past week at 800 cfs. 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 5** 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.

Water quality sampling occurs twice-monthly at approximately 30 stations from May – October as part of expanded monitoring efforts to track and study Harmful Algal Blooms on the Lake. The second September sampling occurred on the 24th and 25th (**Figure 6**). Chlorophyll-a results found 9 of 30 stations with values exceeding 40 µg/L (bloom threshold), ranging from 40-89.8 µg/L, with the highest value occurring at station POLESOUT1 offshore of Indian Prairie. Six more stations had Chla values >20 µg/L (20.2-38.8 µg/L), while all other stations ranged from 5-19.7 µg/L.

The most recent clear satellite image (September 29, 2020) from NOAA's cyanobacteria monitoring product derived from EUMETSAT's Sentinel 3 OLCI sensor data suggested a reduced cyanobacteria bloom risk in the central region of the Lake, which likely declined further with recent wind and rain events (**Figure 7**).

Water Management Summary

Lake Okeechobee stage was 15.86 feet NGVD on October 5, 2020, 0.4 feet higher than the previous week and 1.44 feet higher than the previous month. The Lake is in the Low sub-band. Lake stage moved into the ecological envelope (which varies seasonally from 12 – 15 feet NGVD +/- 0.5 feet) on June 2, 2020, after being up to 1.5 feet below since October 15, 2019. Stages have been above or near the top of the envelope since August 1, 2020 and are currently 0.53 feet above. Ascension rates have exceeded the recommended rate (<0.5 foot per 2 weeks) several times since the onset of the wet season and have been rising more quickly over the past month. Cyanobacterial bloom risk potential is likely lower over the past week due to wind and rain events, though cloud cover has negated recent satellite imagery analysis. Water quality sampling on September 24-25 showed nine stations having Chlorophyll a values >40 µg/L, the level considered a bloom by the District.

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 Flow cfs | Equivalent Depth Week Total (in) |
|------------------|-----------------------------|--------------------|----------------------------------|
| S-65E & S-65EX1 | 5071 | 5176 | 2.0 |
| S-71 & S-72 | 300 | 895 | 0.3 |
| S-84 & S-84X | 884 | 2226 | 0.8 |
| Fisheating Creek | 885 | 999 | 0.4 |
| S-154 | 175 | 162 | 0.1 |
| S-191 | 1008 | 995 | 0.4 |
| S-133 P | 264 | 258 | 0.1 |
| S-127 P | 24 | 33 | 0.0 |
| S-129 P | 18 | 45 | 0.0 |
| S-131 P | 7 | 63 | 0.0 |
| S-135 P | 273 | 225 | 0.1 |
| S-2 P | 0 | 0 | 0.0 |
| S-3 P | 0 | 0 | 0.0 |
| S-4 P | 0 | 0 | 0.0 |
| L-8 Backflow | 151 | 57 | 0.0 |
| Rainfall | 3195 | 4431 | 1.7 |
| Total | 12256 | 15565 | 5.9 |

| OUTFLOWS | Previous week Avg Daily CFS | Avg Daily Flow cfs | Equivalent Depth Week Total (in) |
|--------------|-----------------------------|--------------------|----------------------------------|
| S-77 | 0 | 0 | 0.0 |
| S-308 | 0 | 0 | 0.0 |
| S-351 | 468 | 467 | 0.2 |
| S-352 | 250 | 308 | 0.1 |
| S-354 | 34 | 25 | 0.0 |
| L-8 Outflow | | | |
| ET | 2294 | 1802 | 0.7 |
| Total | 3046 | 2602 | 1.0 |

Provisional Data

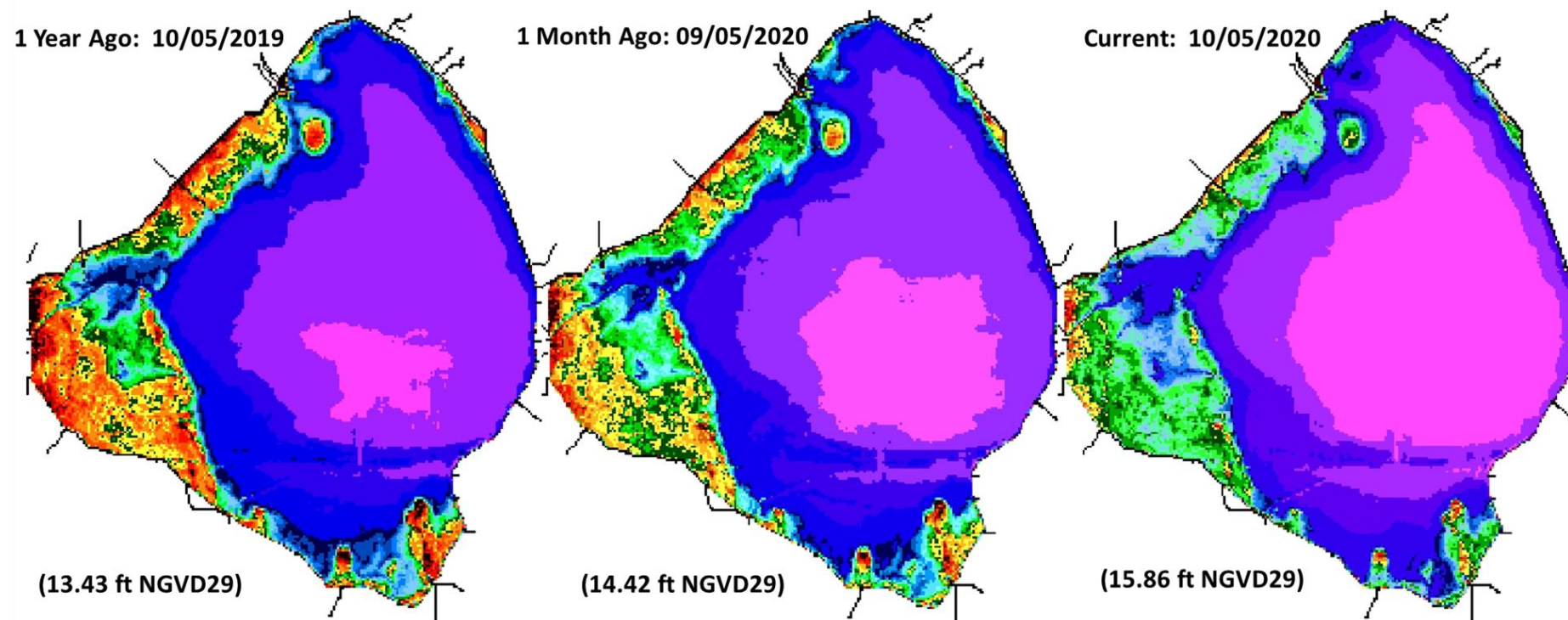


Figure 1. Water depth estimates on Lake Okeechobee based on the South Florida Water Depth Assessment Tool.

Lake Okeechobee Stage vs Updated Ecological Envelope

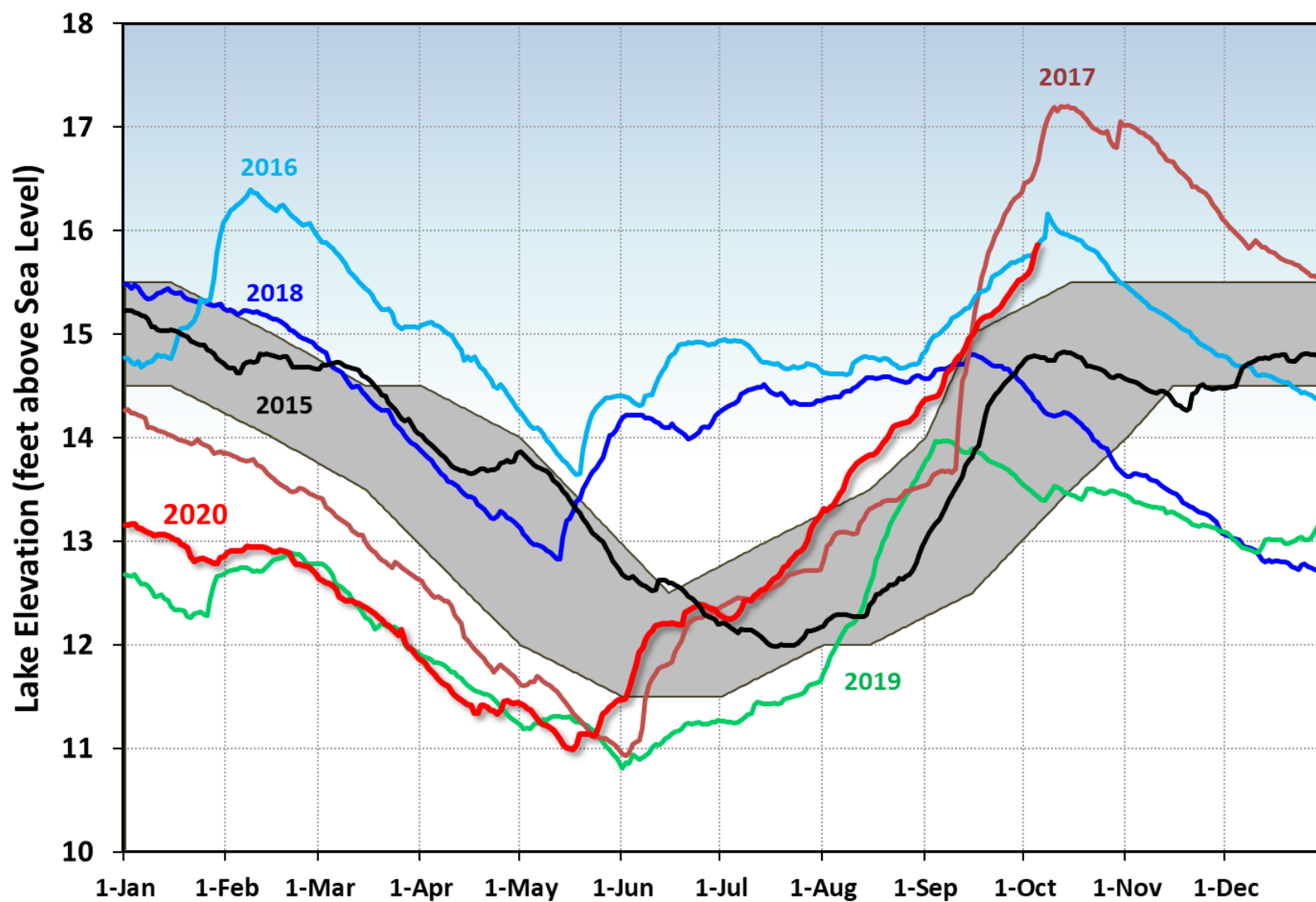


Figure 2. Select annual stage hydrographs for Lake Okeechobee in comparison to the updated Ecological Envelope.

Lake Okeechobee Water Level History and Projected Stages

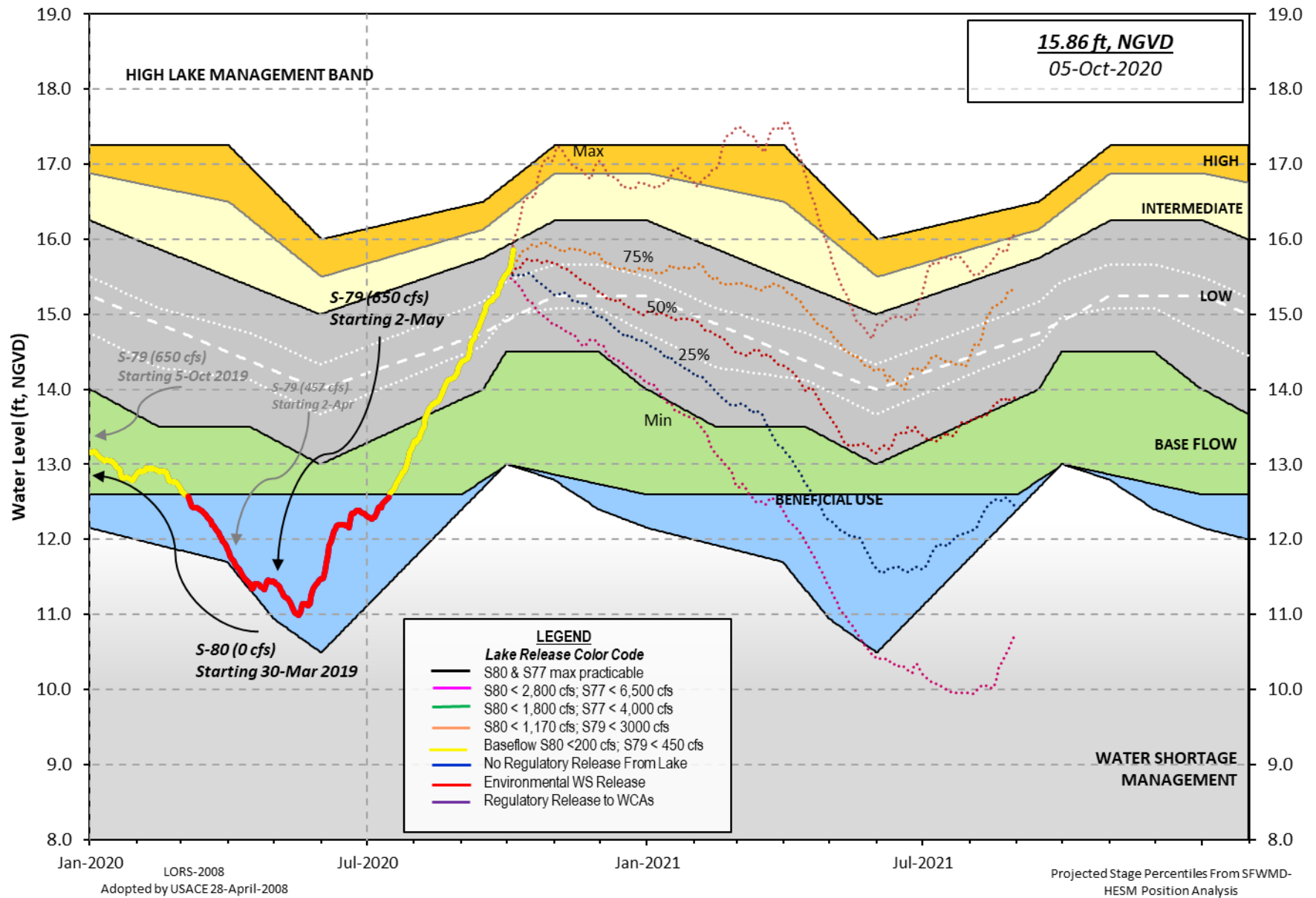


Figure 3. Recent Lake Okeechobee stage and releases, with projected stages based on a dynamic position analysis.

SFWM D PROVISIONAL RAINDAR 7-DAY BASIN RAINFALL ESTIMATES

FROM: 1000 EST, 09/29/2020 THROUGH: 1000 EST, 10/06/2020

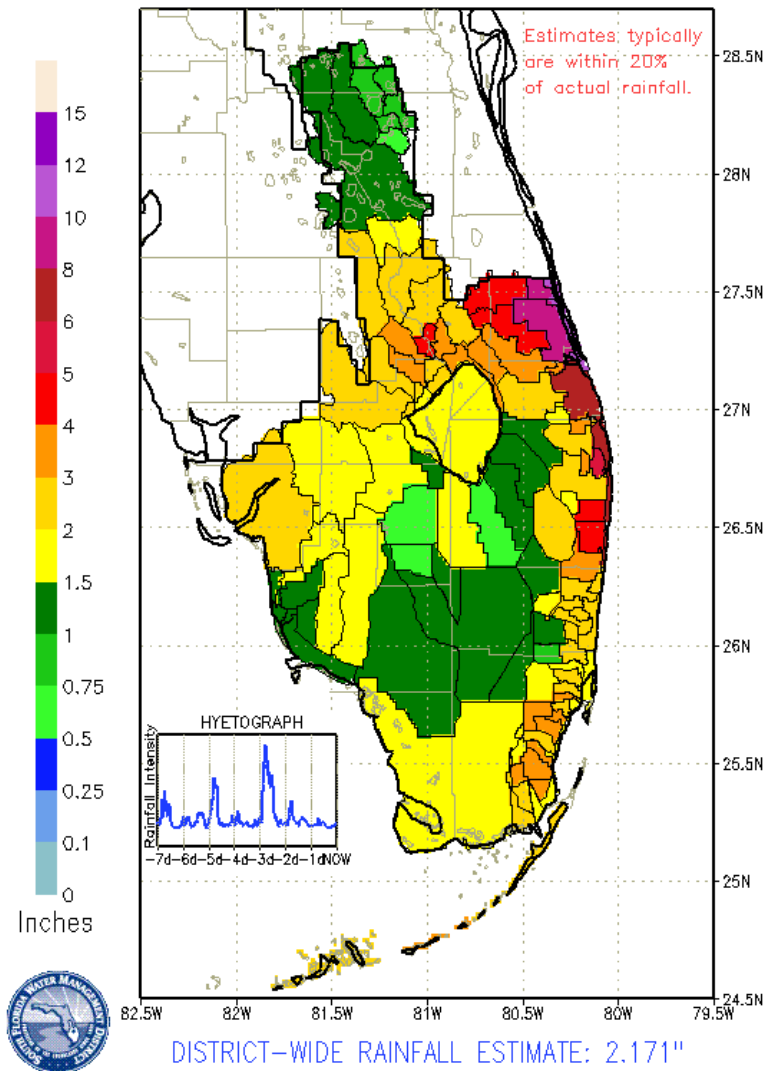


Figure 4. 7-Day rainfall estimates by RAINDAR.

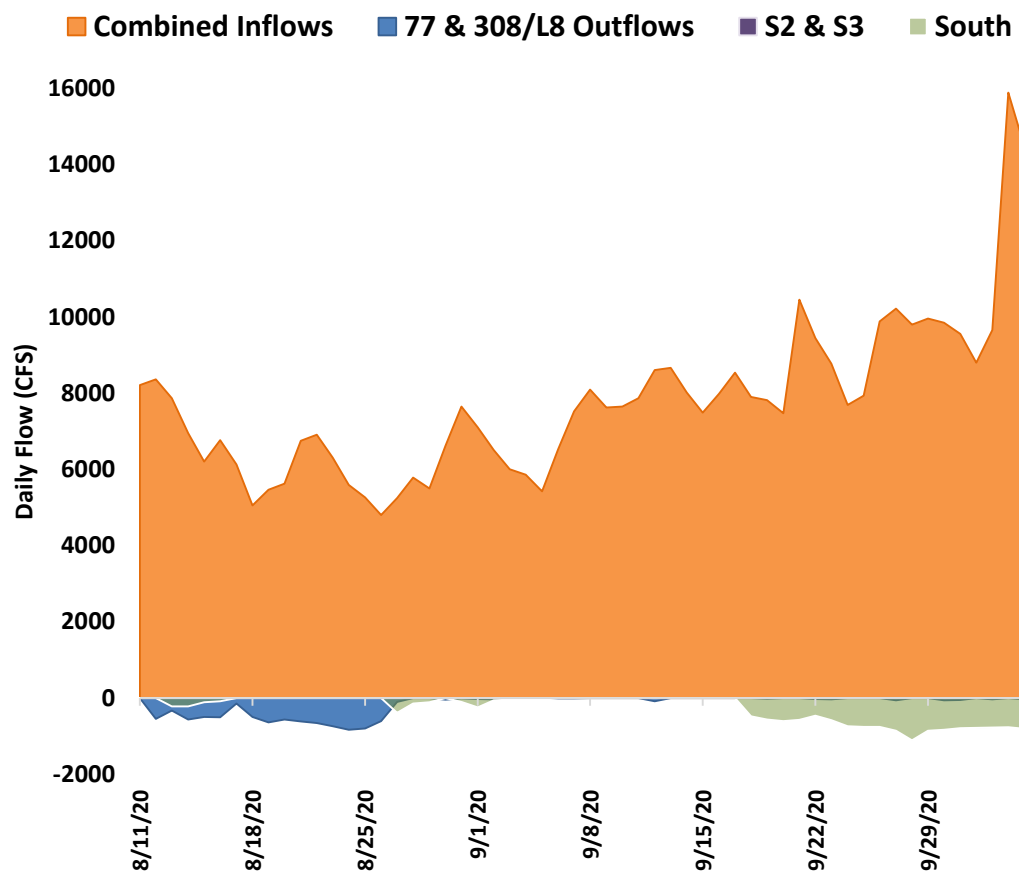


Figure 5. Major inflows (orange) and outflows (blue) of Lake Okeechobee, including the S-350 structures designated as South (green). The L-8 Canal flows through Culvert 10A are included as outflows when positive, and as inflows when backflowing into the Lake. All inflows and outflows are shown as positive and negative, respectively, for visual purposes. Outflows through the S-77 and S-308 structures are shown based on their downstream gauges to account for lock openings for navigation.

Collection Date: September 24-25, 2020

| Station | CHL _a (ug/L) | TOXIN (ug/L) | TAXA |
|------------------|----------------------------|-----------------|--------------------|
| FEBIN | | | NS |
| FEBOUT | | | NS |
| KISSRO.0 | 7.8 | BDL | mixed |
| L005 | 51.7 | 0.4 | <i>Microcys</i> |
| LZ2 | 32.2 | BDL | mixed |
| KBARSE | 54.3 | 2.2 | <i>Microcys</i> |
| RITTAE2 | 17.5 | 0.4 | mixed |
| PELBAY3 | 5.0 | 0.5 | mixed |
| POLE3S | 14.2 | 0.5 | mixed |
| LZ25A | 10.8 | 0.3 | mixed |
| PALMOUT | 37.7 | 4.3 | <i>Microcys</i> |
| PALMOUT1 | 7.1 | 0.6 | <i>Microcys</i> |
| PALMOUT2 | 8.8 | 0.5 | NS |
| PALMOUT3 | 10.4 | 0.4 | mixed |
| POLESOUT | 57.2 | 0.4 | <i>Cylindro</i> |
| POLESOUT1 | 89.8 | BDL | <i>Micro/Cylin</i> |
| POLESOUT2 | 56.8 | 1.6 | <i>Micro/Cylin</i> |
| POLESOUT3 | 19.7 | 20.0 | <i>Microcys</i> |
| EASTSHORE | 26.9 | 7.5 | <i>Microcys</i> |
| NES135 | 30.8 | 3.2 | <i>Microcys</i> |
| NES191 | 10.8 | BDL | mixed |

| Station | CHL _a (ug/L) | TOXIN (ug/L) | TAXA |
|----------------|----------------------------|-----------------|-----------------|
| L001 | 55.9 | 0.3 | mixed |
| L004 | 40.6 | 0.3 | <i>Microcys</i> |
| L006 | 6.9 | 0.5 | mixed |
| L007 | 4.8 | 0.3 | mixed |
| L008 | 40.0 | 12.0 | <i>Microcys</i> |
| LZ30 | 10.7 | 0.5 | mixed |
| LZ40 | 12.7 | 2.9 | <i>Microcys</i> |
| CLV10A | 20.2 | 0.4 | mixed |
| NCENTER | 45.6 | 46.0 | <i>Microcys</i> |

Sampled 9/21

| | | | |
|-------|-------------|------------|-------|
| S308C | 38.8 | 0.6 | mixed |
| S77 | 14.0 | BDL | mixed |

- SFWMD considers >40 µg/L Chlorophyll *a* (Chl_a) an algal bloom
 - BDL – Below Detectable Limit of **0.25** µg/L
 - ND – No Dominant taxa
 - P – Pending
 - NS – Not Sampled
 - Bold – crew observed possible BGA
 - Chlorophyll *a* analyzed by SFWMD
 - Toxin and Taxa analyzed by FDEP
- Cylindro* = *Cylindrospermopsis*
Planktol = *Planktolyngbya*
Dolicho = *Dolichospermum*

Lake Okeechobee Water Quality September 25 2020

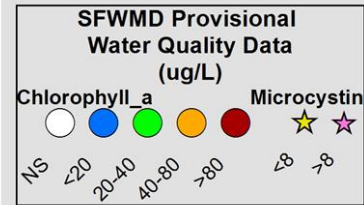
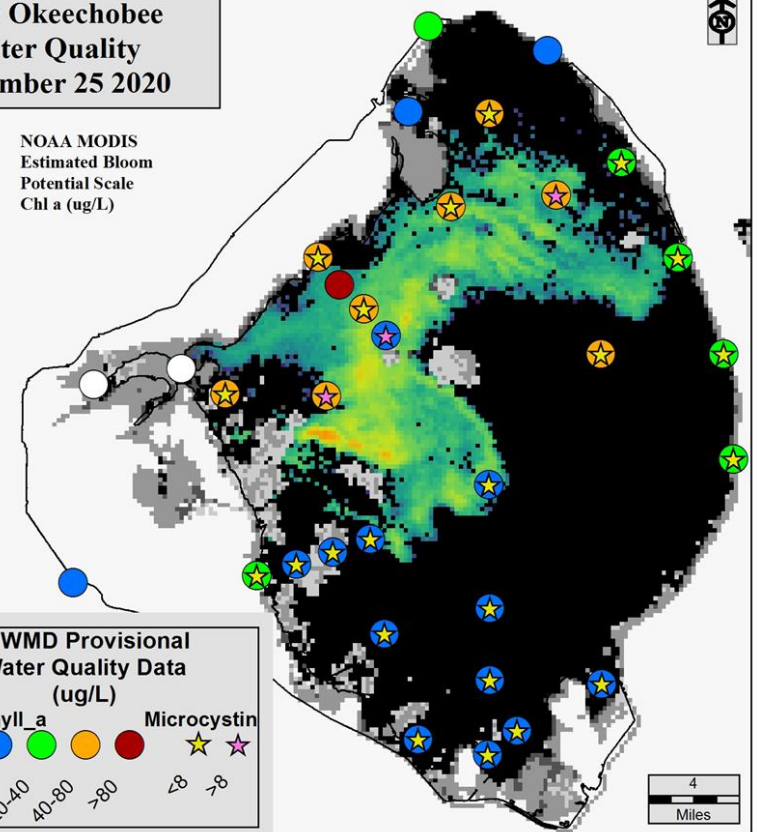


Figure 6. Provisional results from the expanded monitoring sampling trips on September 24-25, 2020

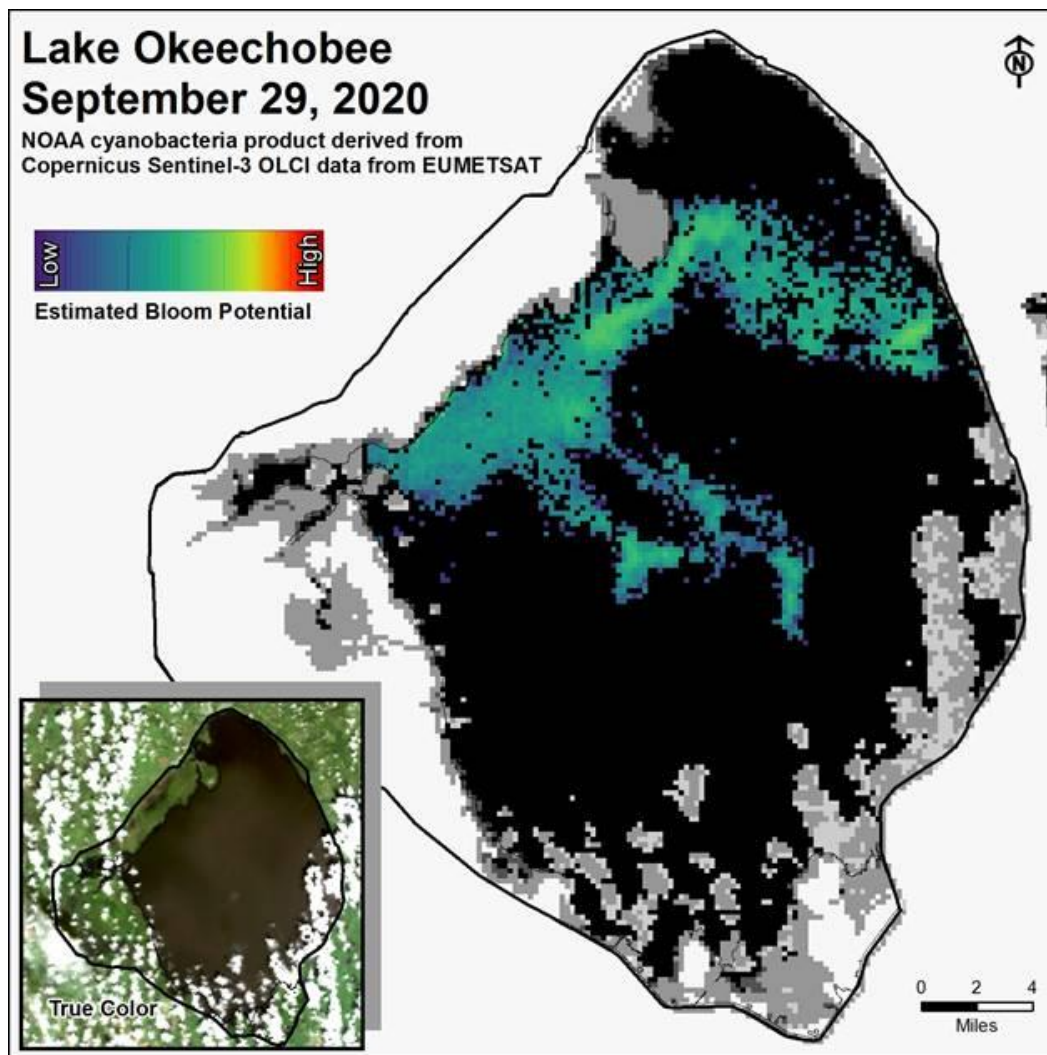


Figure 7. Potential for cyanobacterial blooms on Lake Okeechobee on September 29, 2020, based on NOAA's harmful algal bloom monitoring system. Gray color indicates cloud cover.

ESTUARIES

St. Lucie Estuary

Last week total inflow to the St. Lucie Estuary averaged approximately 3,996 cfs (**Figures 1-2**), and last month inflow averaged about 2,458 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 | 2,076 |
| S-80 | 457 |
| S-308 | 0 |
| S-49 on C-24 | 734 |
| S-97 on C-23 | 490 |
| Gordy Rd. structure on Ten Mile Creek | 239 |

Over the past week, salinity decreased throughout the estuary (**Table 2, Figures 3-4**). The seven-day moving average of the water column (an average of the surface and bottom salinity) at the US1 Bridge was 6.3. Salinity conditions in the middle estuary are estimated to be 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 | Envelope |
|----------------------|--------------------|--------------------|-----------------|
| HR1 (North Fork) | 2.2 (3.6) | 5.4 (7.5) | NA ¹ |
| US1 Bridge | 5.3 (8.3) | 7.4 (11.7) | 10.0-26.0 |
| A1A Bridge | 11.9 (18.0) | 18.8 (25.3) | NA ¹ |

¹Envelope not applicable

Caloosahatchee Estuary

Last week total inflow to the Caloosahatchee Estuary averaged approximately 5,731 cfs (**Figures 5-6**), and last month inflow averaged about 5,599 cfs. Last week's provisional averaged inflows from the structures and the tidal basin are shown in **Table 3**.

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

| Location | Flow (cfs) |
|--------------------|-------------------|
| S-77 | 0 |
| S-78 | 1,123 |
| S-79 | 4,072 |
| Tidal Basin Inflow | 1,659 |

Over the past week in the estuary, salinity remained the same to Val I75 and decreased downstream (**Table 4, Figures 7-8**). The seven-day average salinity values are within the poor range for adult eastern oysters at Cape Coral and in the good range at Shell Point and at Sanibel (**Figure 9**). The

seven-day average surface salinities are in the good range (0-10, **Table 4**) for tape grass at Val I-75 and at Ft. Myers.

Table 4. Seven-day average salinity at six monitoring stations in the Caloosahatchee Estuary. Current average is in bold, previous average in parentheses. The envelope at Val I-75 is for the protection of tape grass in the upper estuary and the envelope in the lower estuary reflects the preferred salinity range for adult eastern oysters (*Crassostrea virginica*).

| Sampling Site | Surface | Bottom | Envelope |
|-----------------------|--------------------|--------------------|----------------------|
| S-79 (Franklin Lock) | 0.2 (0.2) | 0.2 (0.2) | NA ¹ |
| Val I75 | 0.2 (0.2) | 0.2 (0.2) | 0.0-5.0 ² |
| Ft. Myers Yacht Basin | 0.2 (0.3) | 0.2 (0.3) | NA |
| Cape Coral | 2.3 (3.0) | 2.7 (5.4) | 10.0-30.0 |
| Shell Point | 14.0 (17.3) | 16.7 (20.3) | 10.0-30.0 |
| Sanibel | 24.0 (26.5) | 25.5 (27.6) | 10.0-30.0 |

¹Envelope not applicable and ²Envelope is based on a 2-week forecast 30-day average

Forecast of surface salinity (**Table 5, Figure 10**) at Val I-75 for the next two weeks using the autoregression model (Qiu and Wan, 2013) coupled with a linear reservoir model for the tidal basin predicts daily salinity to be 0.3 or lower at the end of the two week period for pulse release at S-79 ranging from 0 to 800 cfs and estimated Tidal Basin inflows of 1,200 cfs. The 30-day moving average surface salinity at Val I-75 is forecast to be 0.3 or lower (**Table 5**). The current salinity conditions at Val I-75 are within the envelope of salinity 0.0-5.0 for this site (**Table 4**).

Table 5. Predicted salinity at Val I-75 at the end of forecast period

| Scenario | Q79 (cfs) | TB runoff (cfs) | Daily salinity | 30 day Mean |
|----------|-----------|-----------------|----------------|-------------|
| A | 0 | 1200 | 0.3 | 0.3 |
| B | 300 | 1200 | 0.3 | 0.3 |
| C | 450 | 1200 | 0.3 | 0.3 |
| D | 650 | 1200 | 0.3 | 0.3 |
| E | 800 | 1200 | 0.3 | 0.3 |

Red tide

The Florida Fish and Wildlife Research Institute reported on October 2, 2020, that *Karenia brevis*, the Florida red tide dinoflagellate, was not observed in samples collected from or offshore of Lee or Palm Beach counties (no samples were analyzed this week from St. Lucie, Martin, Broward or Miami-Dade counties).

Water Management Recommendations

Lake stage is in the Low sub-band. Tributary conditions are very wet. The LORS2008 release guidance suggest up to 3,000 cfs release at S-79 to the Caloosahatchee Estuary and up to 1,170 cfs release at S-80 to the St. Lucie Estuary.

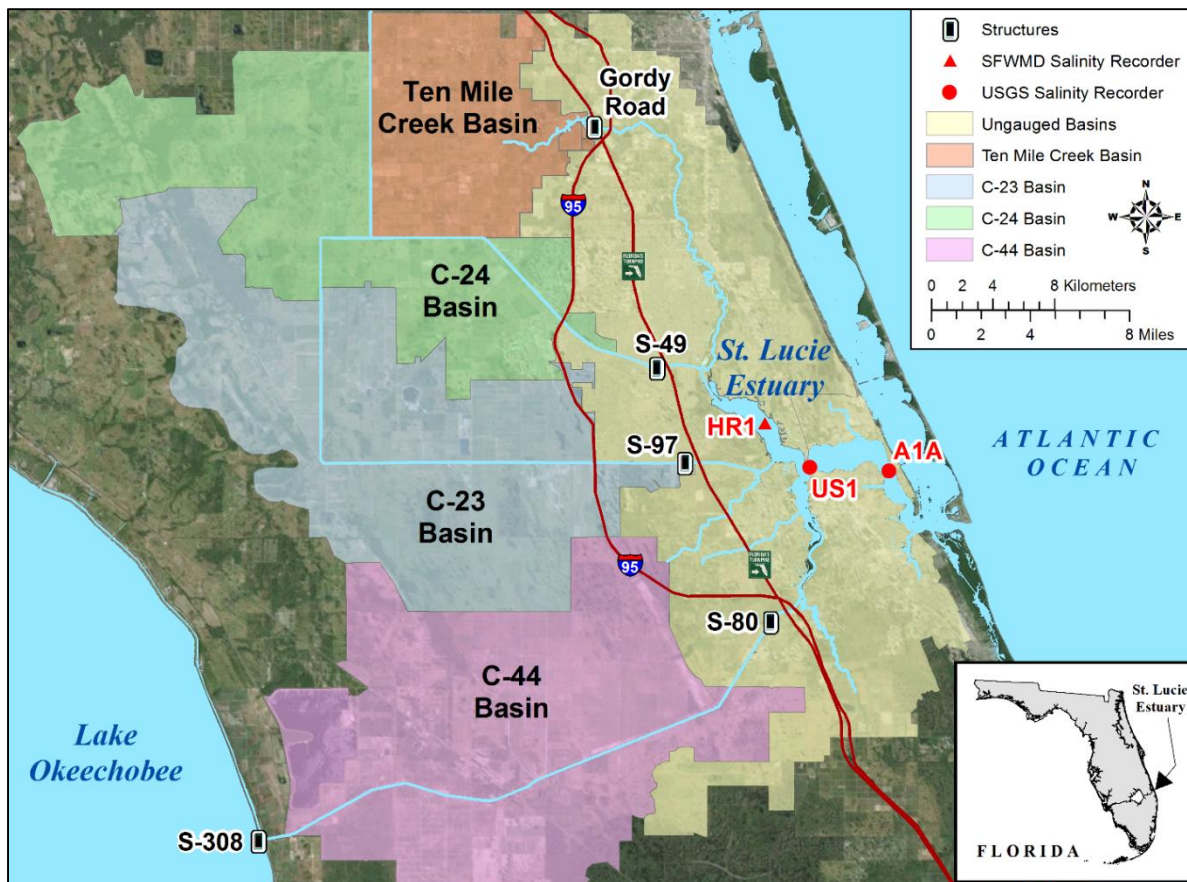


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

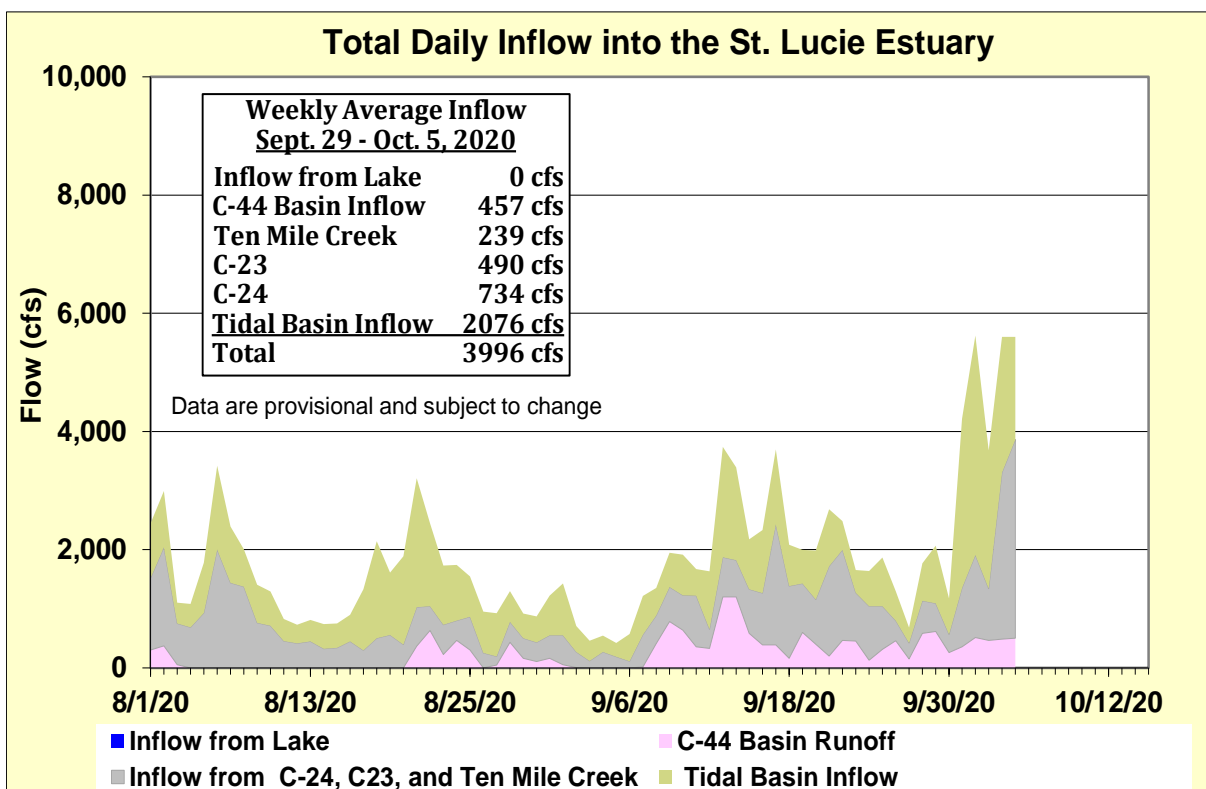


Figure 2. Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basin into the St. Lucie Estuary.

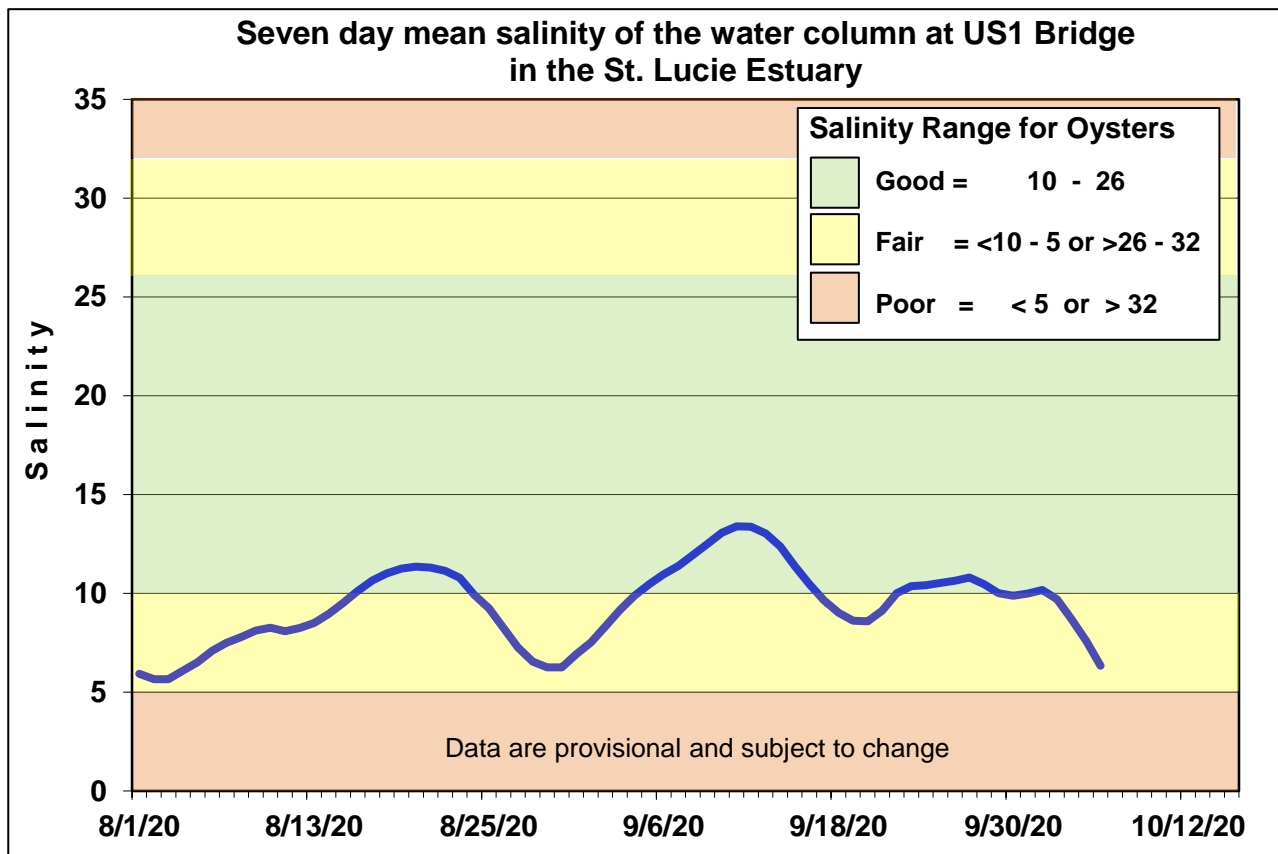


Figure 3. Seven-day mean salinity of the water column at the US1 Bridge.

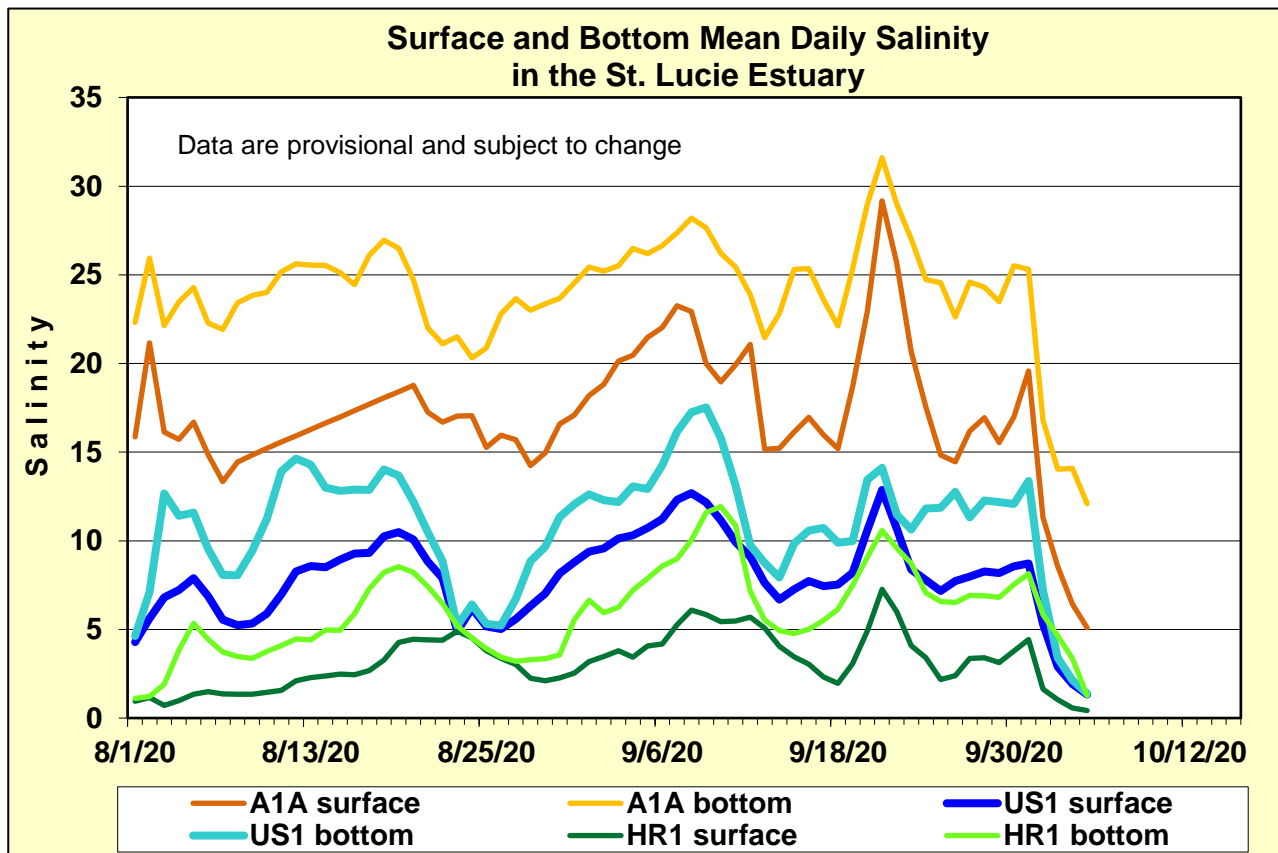


Figure 4. Daily mean salinity at the A1A, US1, and HR1 stations.

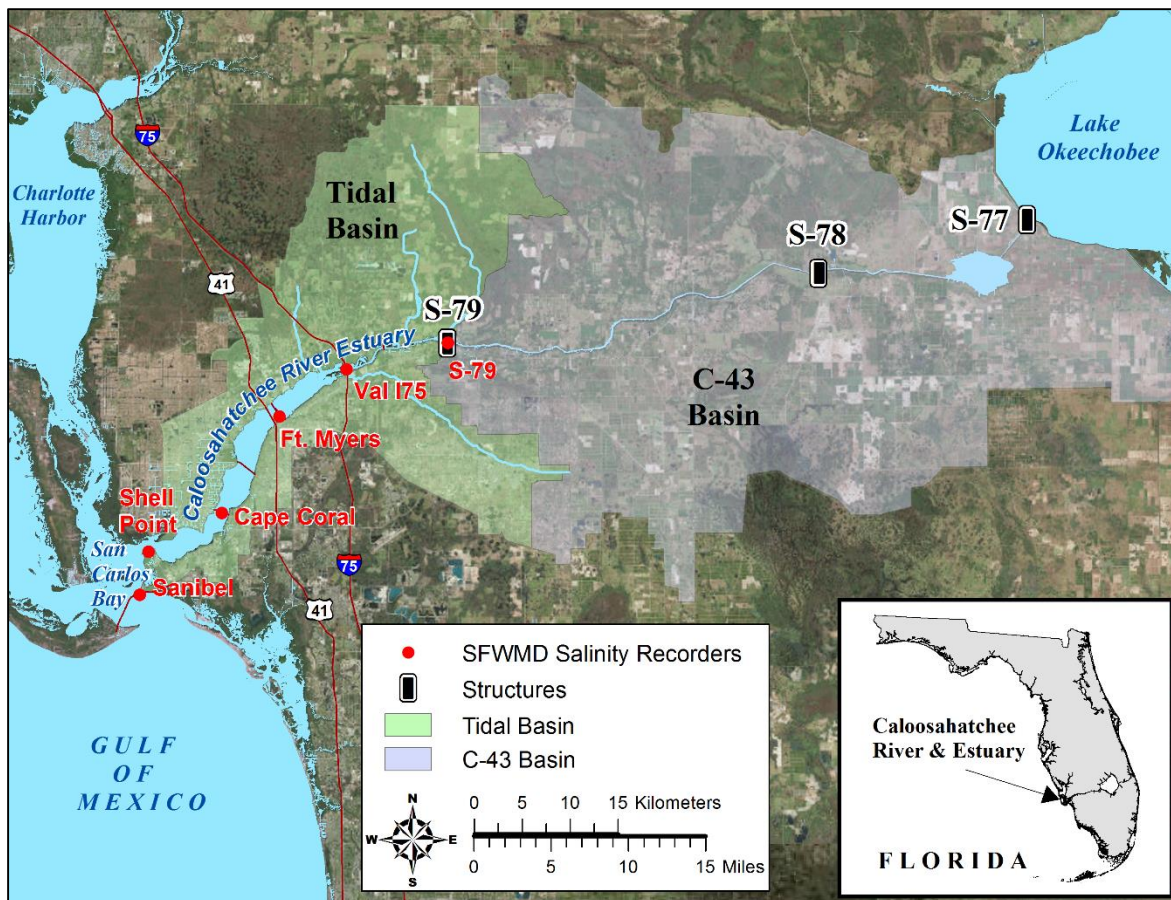


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

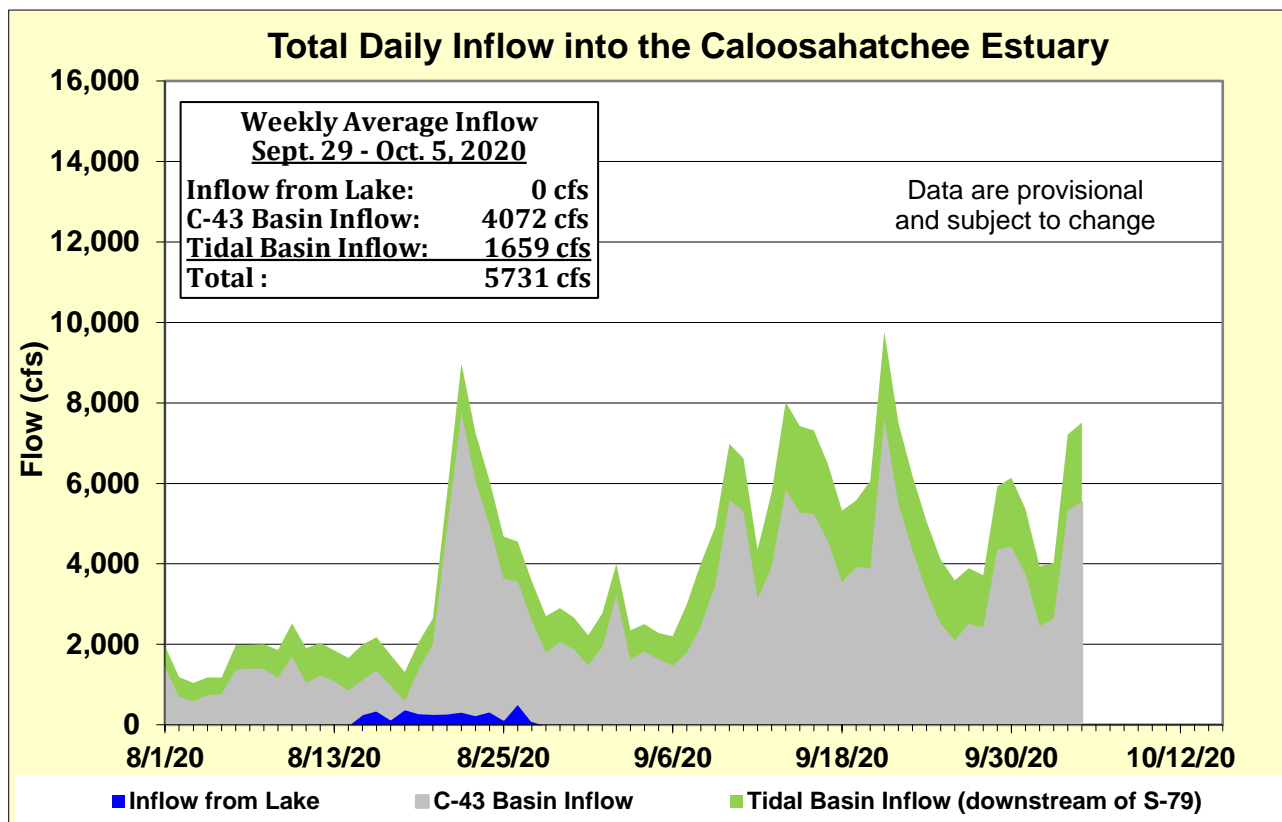


Figure 6. Total daily inflows from Lake Okeechobee, runoff from the C-43 basin

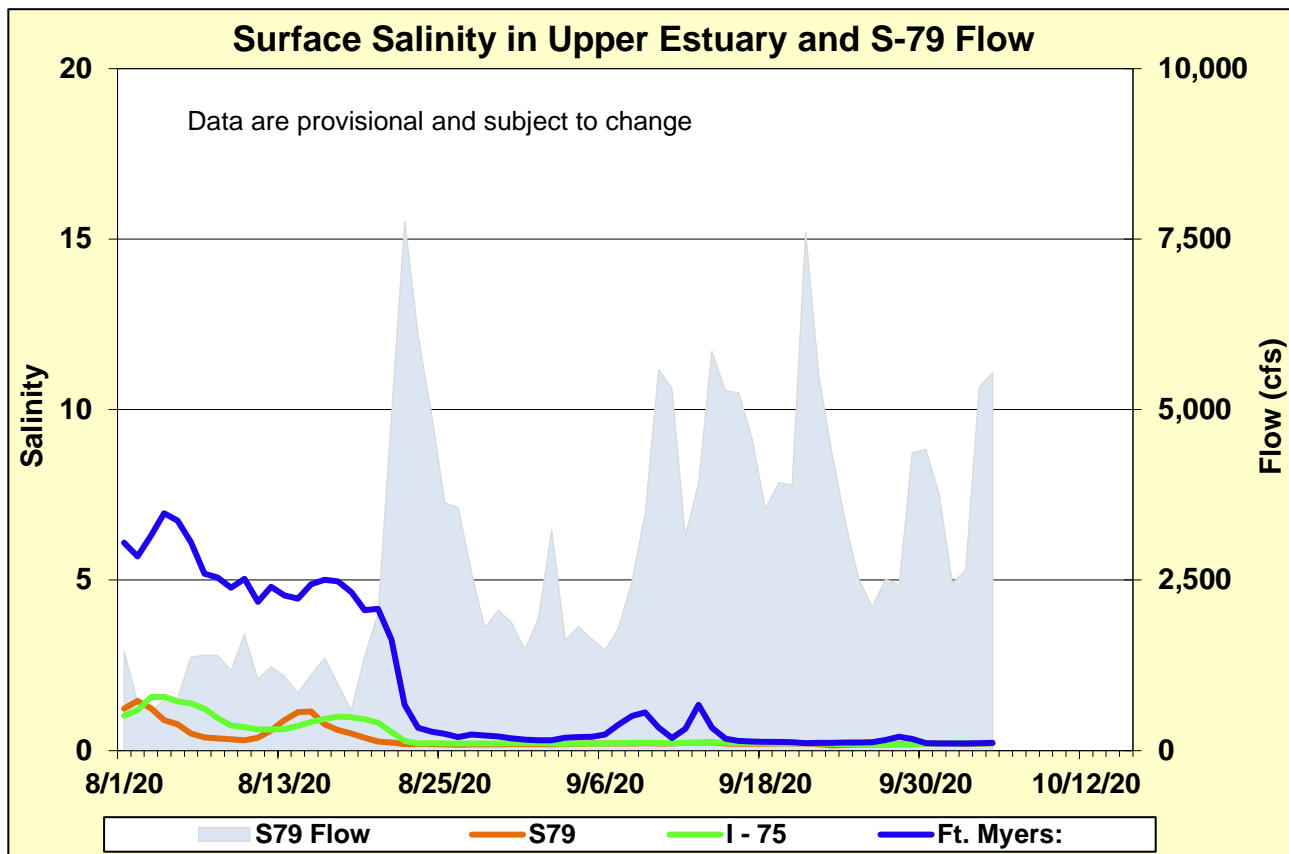


Figure 7. Daily mean flows at S-79 and salinity at upper estuary monitoring stations.

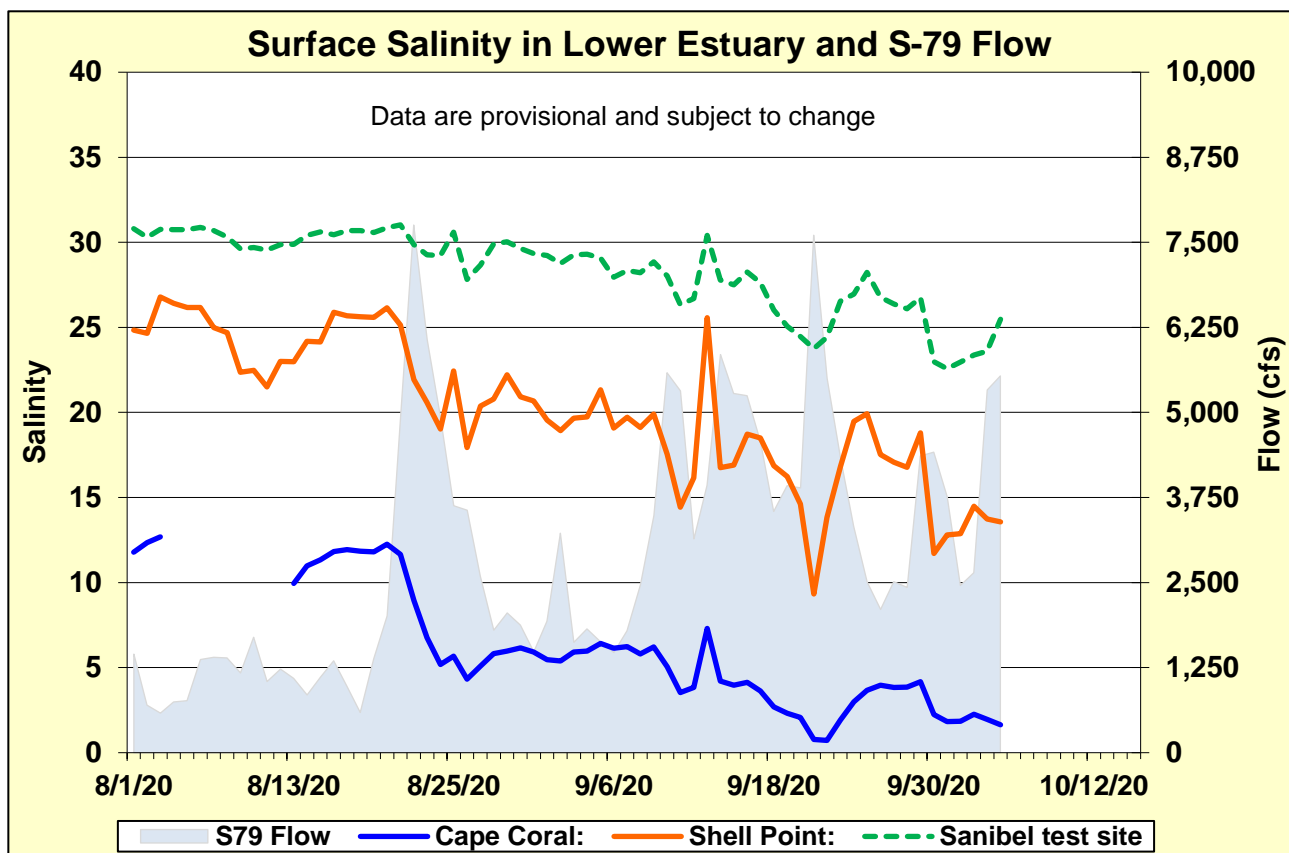


Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.

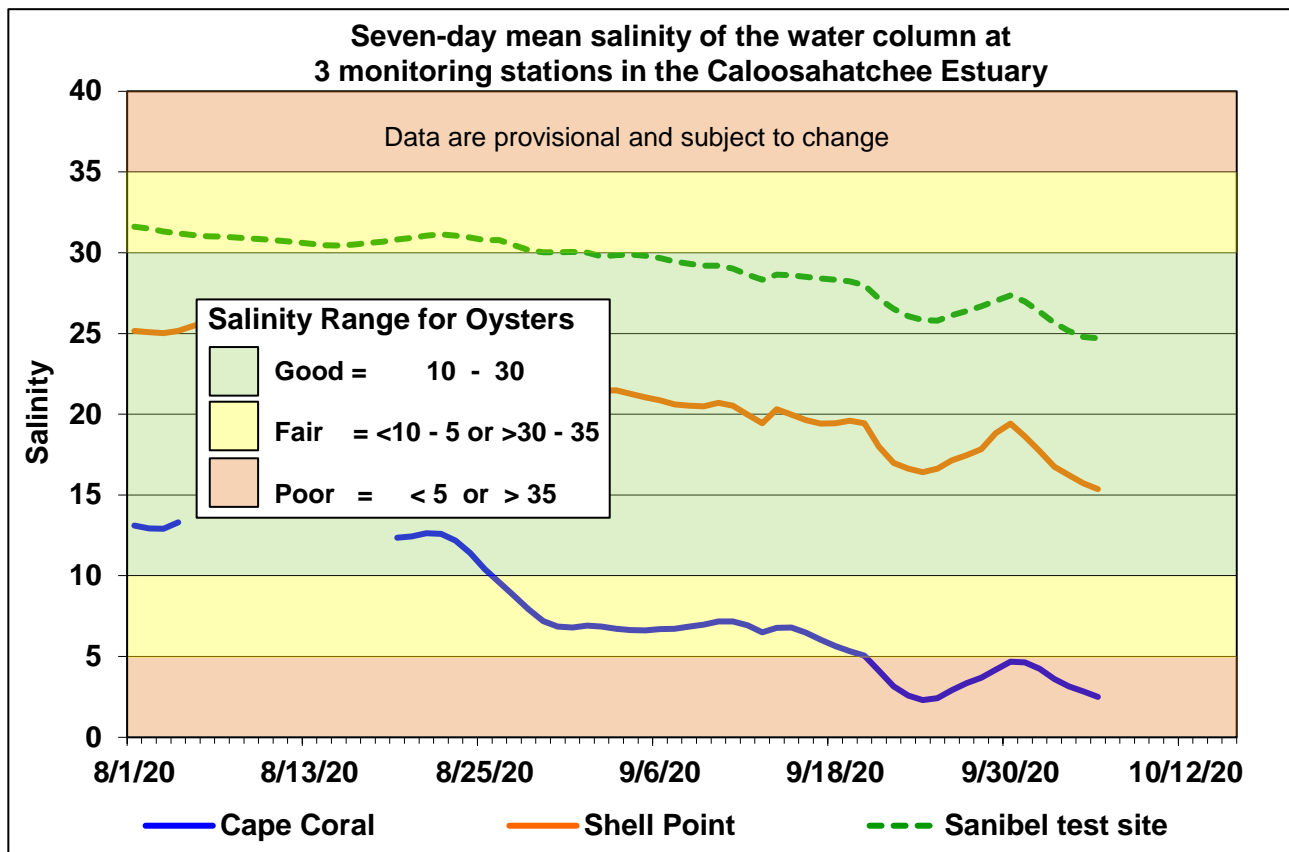


Figure 9. Seven-day mean salinity at Cape Coral, Shell Point, and Sanibel monitoring stations.

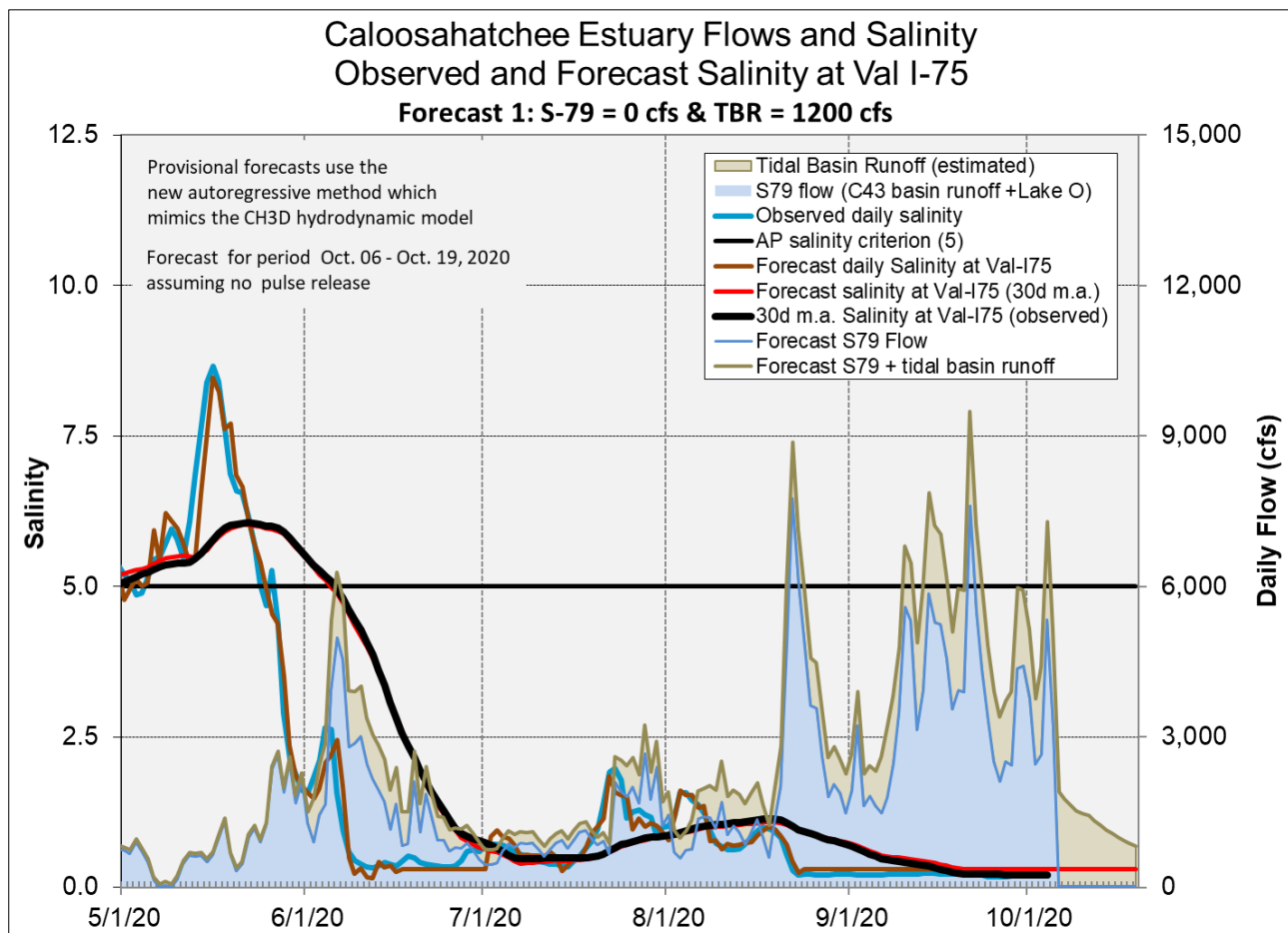
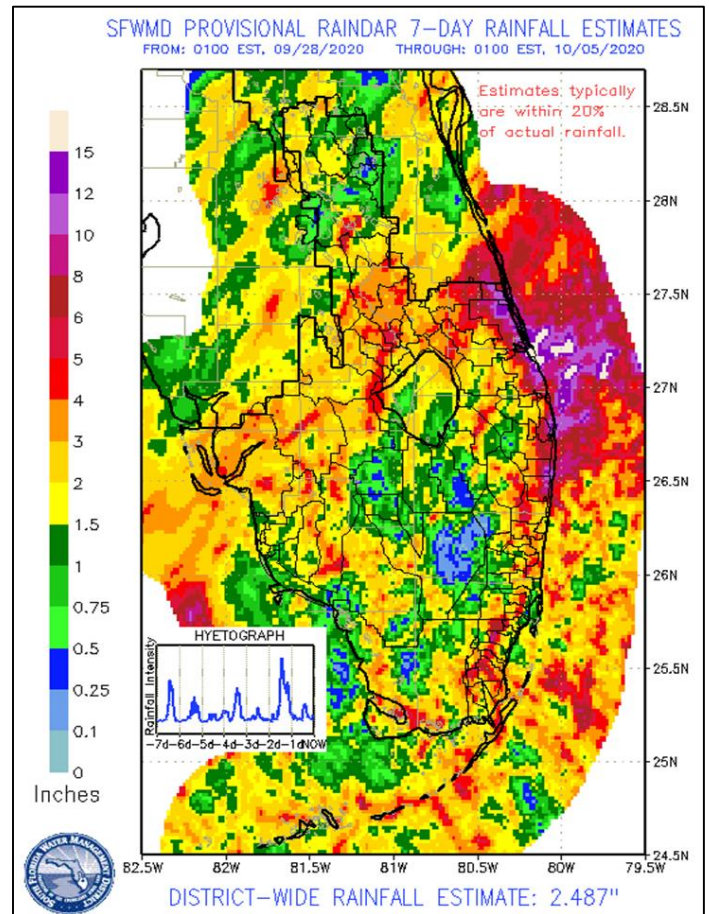


Figure 10. Forecasted Val I-75 surface salinity assuming no pulse release at S79.

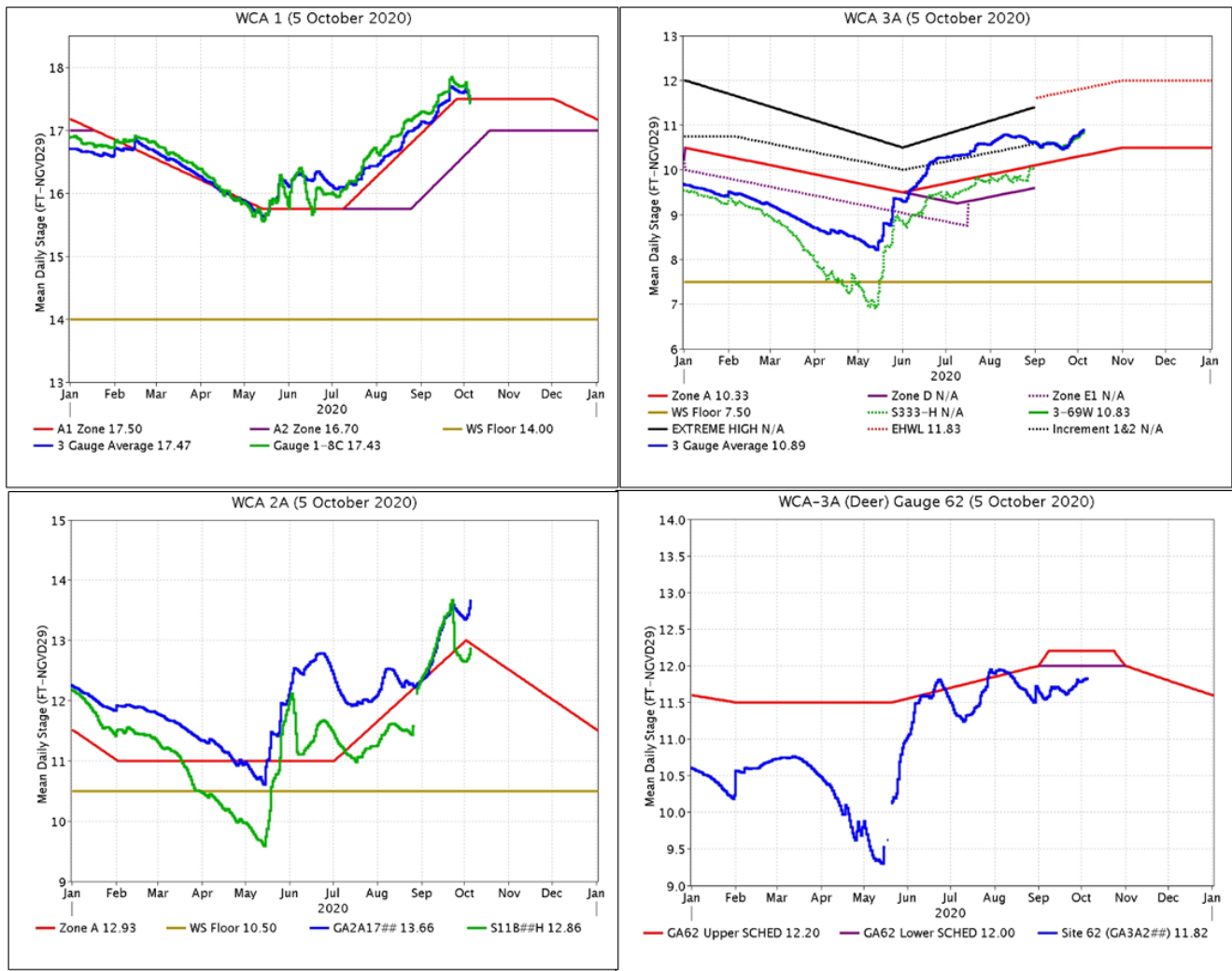
EVERGLADES

Rainfall was heaviest in the north within the Everglades last week, and lowest in WCA-3A and 3B. At the gauges monitored for this report stages increased 0.05 feet on average, with WCA-1 and northern ENP experiencing a drop in stage. Evaporation was estimated at 0.88 inches last week, and the TTFF calls for maximum releases from WCA-3A.

| Everglades Region | Rainfall (Inches) | Stage Change (feet) |
|-------------------|-------------------|---------------------|
| WCA-1 | 2.61 | -0.09 |
| WCA-2A | 1.30 | +0.17 |
| WCA-2B | 1.90 | +0.22 |
| WCA-3A | 1.14 | +0.11 |
| WCA-3B | 1.06 | +0.00 |
| ENP | 2.02 | -0.14 |



Regulation Schedules: WCA-1: Stage at the 1-8C Gauge continued the sharp turn down to the stable Zone A1 regulation line last week, currently 0.07 feet below. WCA-2A: Stages at Gauge 2-17 once again changed direction last week and trends away from the falling regulation schedule, currently 0.73 feet above. WCA-3A: The Three Gauge Average continued to trend upwards last week generally trending away from the rising Zone A regulation line, currently 0.56 feet above. WCA-3A: Stage at gauge 62 (Northwest corner) is currently 0.18 feet below the stable Lower Schedule and 0.38 feet below the Upper Schedule.

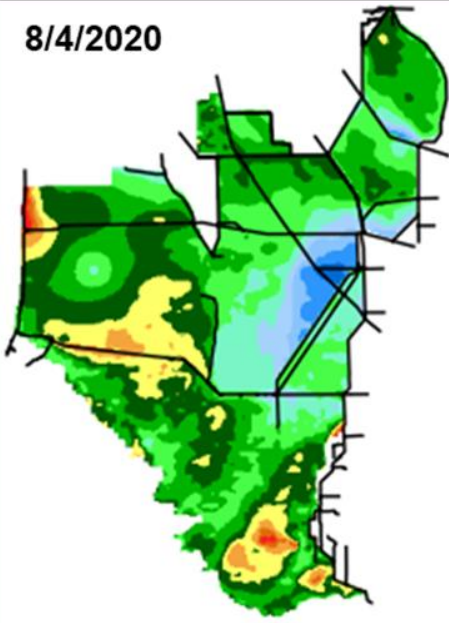


Water Depths: The WDAT tool for spatial interpolation of depth monthly snapshots over the last two months indicate current depths in excess of 4.0 feet in WCA-3A South around the upper reaches of the L-67 canal. Ponding depths (>2.5 feet) are being reached in significant portions of both southern WCA-1 (for more than one month) and across eastern WCA-2A. Hydrologic connectivity is well established within the major sloughs in Everglades National Park (ENP), and in the west we see connections forming between Big Cypress National Preserve and Everglades National Park. Comparing WDAT water levels from present, over the last week stage changes were mixed and moderate across most the Everglades system. WCA-2A is significantly deeper downstream of the S-10s. Looking back month and one year the stage difference patterns are generally deeper and more significant. WCA-1 and northern WCA-2A are both higher in stage by up to 1.5 foot compared to a year ago.

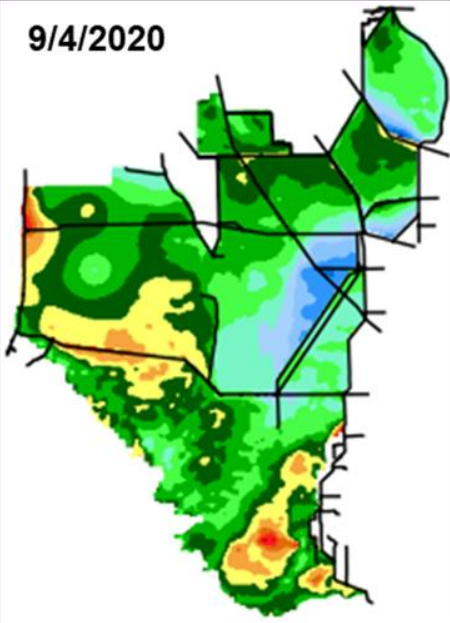


SFWDAT Water Depth Monthly Snapshots

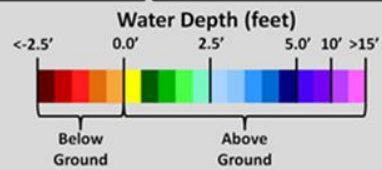
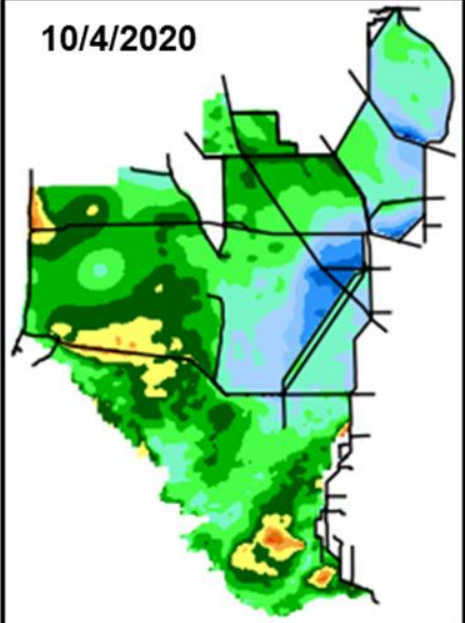
8/4/2020



9/4/2020



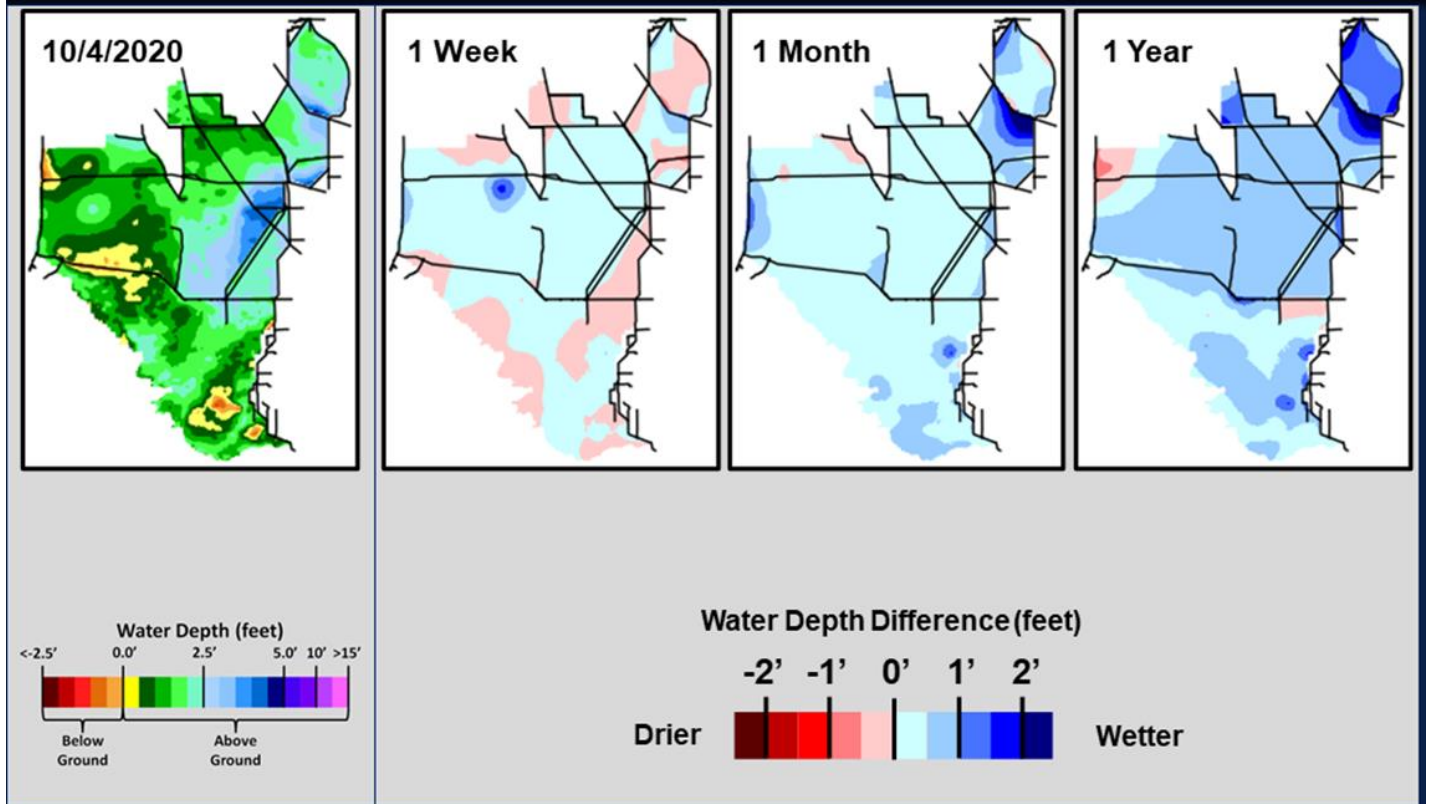
10/4/2020



South Florida Water Depth Assessment Tool (SFWDAT)



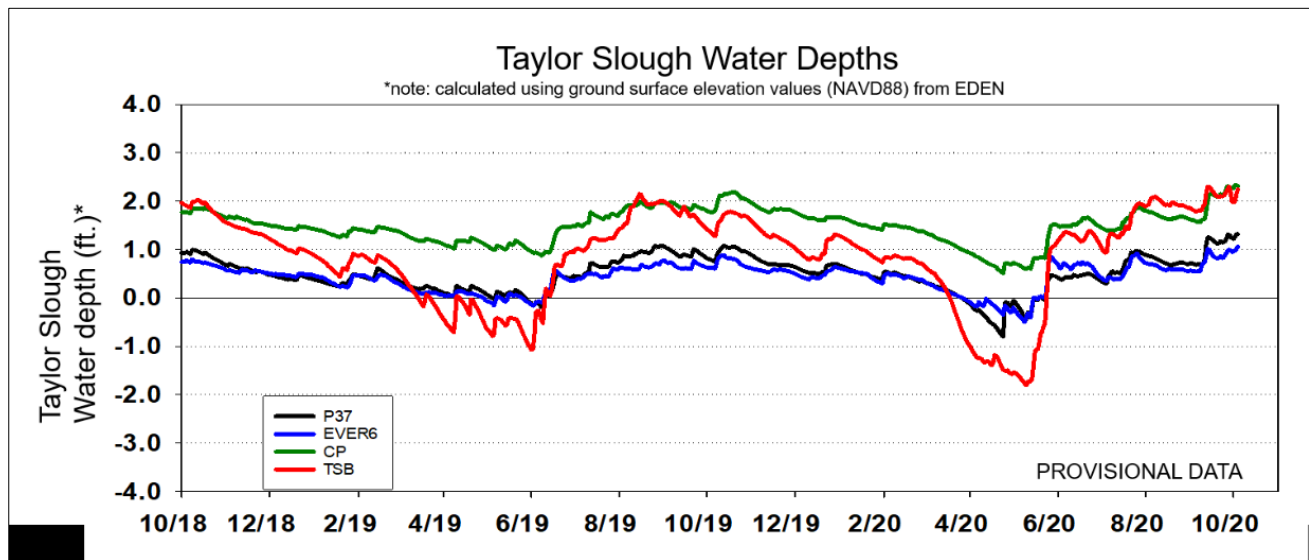
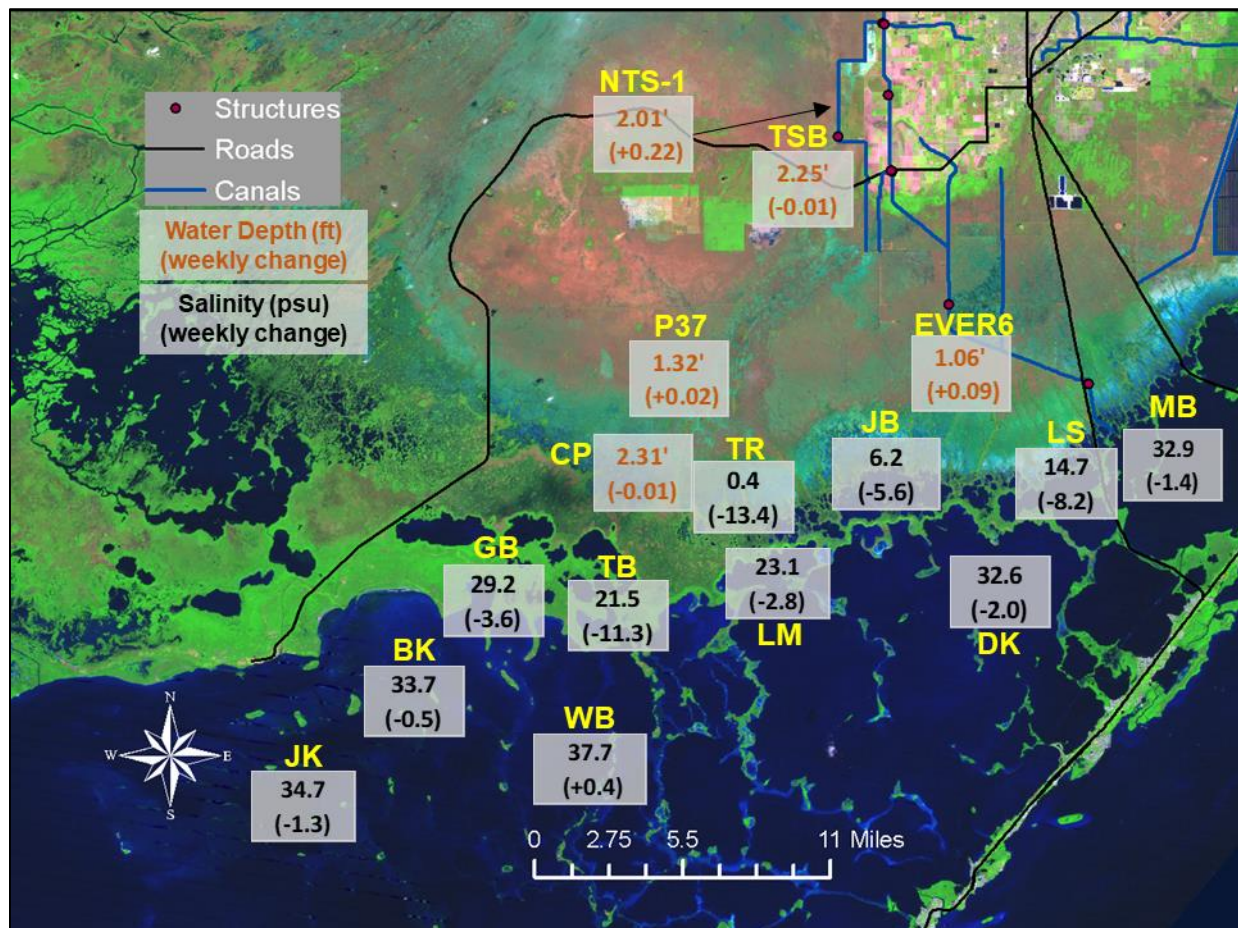
SFWDAT Everglades Difference Maps (Present – Past)

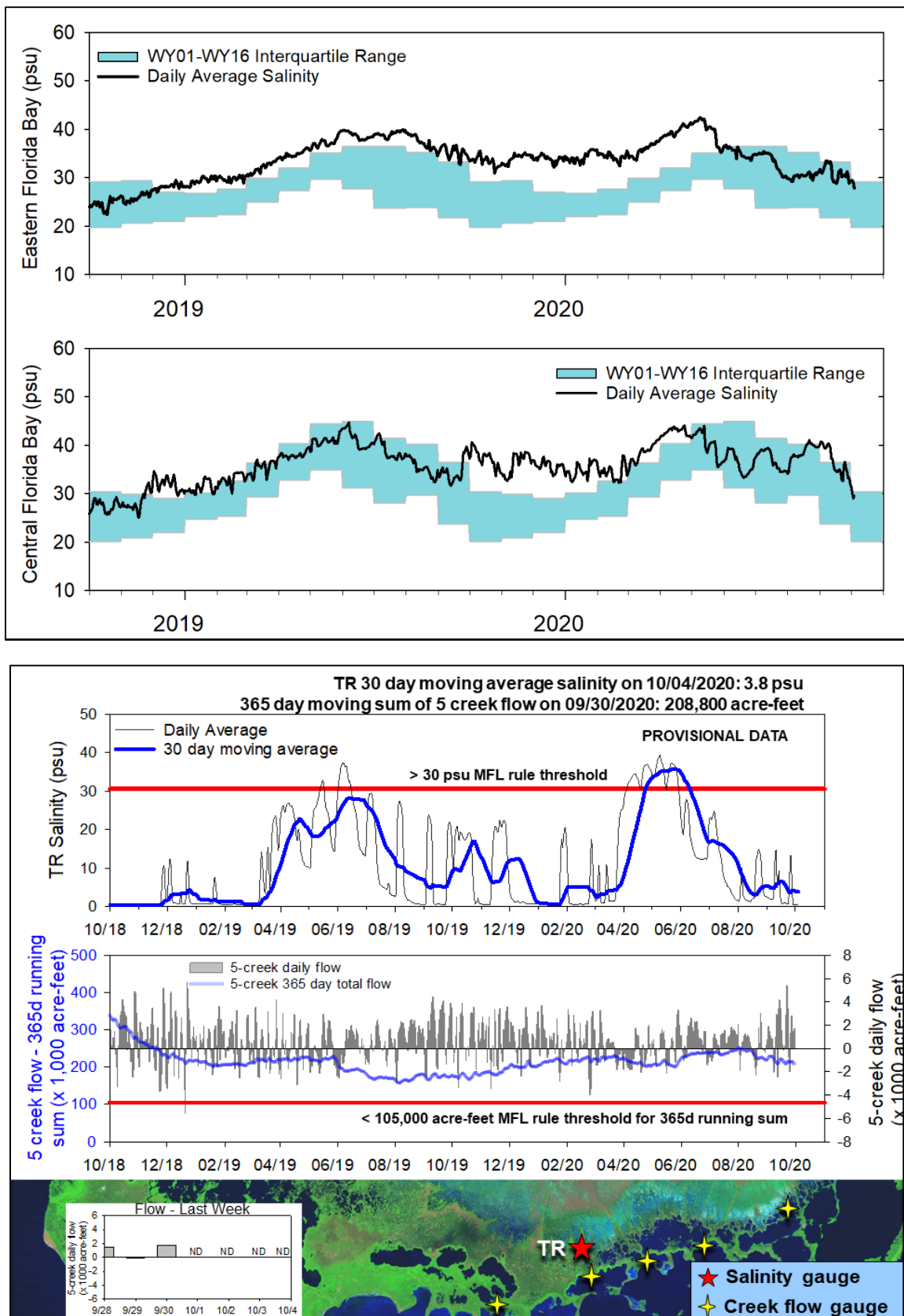


South Florida Water Depth Assessment Tool (SFWDAT)

Tree island inundation in WCA-3A, WCA-3B, and ENP: 371 Tree Islands of known elevation within WCA-3A, -3B, and Everglades National Park's Shark Slough. Current preliminary estimates using WDAT indicate that 53%, or 198 of the tree islands, are currently inundated, up from 49% the week prior. Initial islands inundated beginning May 24, 2020, with longest duration of continuous inundation at 126 days. Inundation for more than 90 days has the potential for ecological harm. Inundation for more than 120 days will cause ecological harm.

Taylor Slough Water Levels: An average of 2 inches of rain fell over Taylor Slough and Florida Bay this past week, and stages increased 0.06 feet on average. Northern Taylor Slough is 8 inches higher than the historical average (pre-Florida Bay Initiative) while the slough as a whole is still 5 inches higher than the historical average.





Florida Bay Salinities: Salinities in Florida Bay averaged a 4 psu decrease over the week with individual station changes ranging from -11.3 to +0.4 psu. Nearshore salinity decreased 6 psu to end at 25 psu (now only 3 psu higher than the historical average) as we move into the part of the year expected to have the lowest salinities. The large decrease this past week kept pace with the decrease in the 75th percentile from September to October in both the eastern and central Bay.

Florida Bay MFL: The salinity at the TR station in the mangrove zone (tracked for the Florida Bay MFL) rapidly returned to the near-fresh condition of 0.4 psu at the beginning of the week and stayed there. The 30-day moving average decreased 0.4 psu to end at 3.8 psu. The gauge at the Taylor River (the yellow star just south of the TR site) stopped reporting on September 30, so no 5-creek flow total is available after that date. Downstream salinity values suggest that positive flows continued through the rest of the week. The 365-day moving sum of flow from the five creeks (tracked as part of the Florida Bay MFL criteria) ended at 208,800 acre-feet for the period where data were available and is between the historical median (249,091 acre-feet) and the 25th percentile (192,885 acre-feet). Creek flows are provisional USGS data.

Water Management Recommendations

When water is discharged to tide its potential to benefit the ecology of the Everglades is lost. Conserving water in the WCAs and sending it southward has ecological benefit. Current climatic predictions for both tropical activity and for low rainfall amounts in the upcoming dry season makes this a particularly sensitive time of year for conserving water. Holding the water north in the system, during the historic peak, creates conditions that could provide ecological benefit to the Everglades in the next season and beyond.

Moderating rapid increases in stage to within the preferred ecological rate of less than 0.25 feet per week or 0.50 feet per two weeks has ecological benefit.

Peak stages in October in northern WCA-3A (11.5 feet NGVD 29 at gauge 3-63) provide improved conditions to support next season's wading bird nesting success at the Alley north colony by providing conditions for an increase in prey numbers, as well as providing surface water that can protect it from terrestrial predators during the nesting season. Inflows or the conservation of water within this area has ecological benefit for peat soil conservation and wading bird foraging and nesting success.

Ponding along the L-67 canal/levee system has increased, and inundation of the tree islands has persisted for greater than 120 days, which indicates the potential to do ecological harm in regions containing sensitive islands. Managing inflows/outflows within that region that decreases ponding in both spatial extent and the amount of time the region is inundated has benefit to the ecology of tree islands.

Flows towards Taylor Slough and Florida Bay freshen salinity conditions within the nearshore areas of Florida Bay and decrease the currently stressful conditions for seagrasses and fauna but require more freshwater to continue to decrease salinities in all areas of the bay towards a more ecologically preferred condition.

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

SFWMD Everglades Ecological Recommendations, October 6th, 2020 (red is new)

| Area | Weekly change | Recommendation | Reasons |
|-------------------|--|---|---|
| WCA-1 | Stage decreased by 0.09' | Moderating the ascension rate to less than 0.25 feet per week or 0.50 feet per two weeks and conserving water in this basin has ecological benefit. | Protect upstream/downstream habitat and wildlife. Apple snail reproduction is hindered by rapidly increasing stage. |
| WCA-2A | Stage increased by 0.17' | Moderating the ascension rate to less than 0.25 feet per week or 0.50 feet per two weeks. | Protect upstream/downstream habitat and wildlife. Apple snail reproduction is hindered by rapidly increasing stage. |
| WCA-2B | Stage increased by 0.22' | Moderating the ascension rate to less than 0.25 feet per week or 0.50 feet per two weeks. | Protect upstream/downstream habitat and wildlife. Apple snail reproduction is hindered by rapidly increasing stage. |
| WCA-3A NE | Stage increased by 0.15' | Moderating the ascension rate to less than 0.25 feet per week or 0.50 feet per two weeks. Conserving water in this region has ecological benefit. | Protect upstream/downstream habitat and wildlife. Apple snail reproduction is hindered by rapidly increasing stage. |
| WCA-3A NW | Stage remained unchanged | Moderating the ascension rate to less than 0.25 feet per week or 0.50 feet per two weeks. | |
| Central WCA-3A S | Stage increased by 0.14' | Moderating the ascension rate to less than 0.25 feet per week or 0.50 feet per two weeks. | Protect upstream/downstream habitat and wildlife. Apple snail reproduction is hindered by rapidly increasing stage, and tree island ecology is diminished by flooding |
| Southern WCA-3A S | Stage increased by 0.16' | | |
| WCA-3B | Stage remained unchanged | Moderating the ascension rate to less than 0.25 feet per week or 0.50 feet per two weeks. | Protect upstream/downstream habitat and wildlife. Apple snail reproduction is hindered by rapidly increasing stage. |
| ENP-SRS | Stage decreased by 0.14' | Make discharges to the Park according to COP protocol | Protect upstream/downstream habitat and wildlife. Apple snail reproduction is hindered by rapidly increasing stage. |
| Taylor Slough | Stage changes ranged from -0.01' to +0.22' | Move water southward as possible | When available, provide freshwater buffer for downstream conditions. |
| FB- Salinity | Salinity changes ranged -11.3 to +0.4 psu | Move water southward as possible | When available, provide freshwater to maintain low salinity buffer and promote water movement. |