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:** May 27, 2020

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

**Summary**

**Weather Conditions and Forecast**

A moist and unstable air mass circulating around a weak low on the northeast coast and the favorable orientation of an upper-level trough over the northeastern Gulf of Mexico are likely to provide the necessary ingredients for enhanced rains across a large part of the District again today most likely south and east of Lake Okeechobee. A large half-inch area is predicted over this region. The quantitative precipitation forecast (QPF) is of lower confidence north and west of Lake Okeechobee today, due to very dry mid-level air extending from the west-central coast of Florida to the northern part of the District. The predicted rains north of Lake Okeechobee are shifted northeastward due to the southwesterly steering winds. Enhanced rains may continue each day through at least late week, which is a change from the forecast yesterday that called for the possibility of some drying by the weekend. While southerly to southwesterly steering winds on Wednesday should favor the greatest rains over the interior and east, a pattern change is expected after mid-week. The new weather regime will favor early-day rains in the east and then greater rains over the western half of the area, including the Kissimmee Valley, and with a possible late-day maximum near the east coast each day from Thursday through Saturday. The easterly wind regime would likely break late in the weekend, with a possible focus of rains over the interior. A cold front is forecast to slide southward into north Florida by early Monday morning. The late-season front would pass through the remainder of the District by early Tuesday and result in a notable drying and below normal rainfall for at least a couple of days early next week. An alternate scenario would be for the front to stall over the far south or the Florida Keys/Florida Straits but with enhanced moisture lingering close to the boundary. Should this occur, enhanced rains would be favored over the south and the Keys while below-normal rainfall would be confined to around or north of Lake Okeechobee.

**Kissimmee**

Tuesday morning stages were 52.3 feet NGVD (2.9 feet below schedule) in East Lake Toho, 52.2 feet NGVD (at schedule) in Toho, and 49.4 feet NGVD (0.2 feet below schedule) in Kissimmee-Cypress-Hatchineha; headwater stages were 46.0 feet NGVD at S-65A and 25.6 feet NGVD at S-65D. Tuesday morning discharges were 599 cfs at S-65, 676 cfs at S-65A, 886 cfs at S-65D and 1001 cfs at S-65E. Dissolved oxygen concentration in the Kissimmee River averaged 7.6 mg/L for the week through Sunday. Kissimmee River mean floodplain depth on Sunday was 0.09 feet. ***This week's recommendations****:* Continue the snail kite recession on Lake Tohopekaliga to reach low pool (52 feet) on June 1st. Continue to manage discharge at S-65 for a stage recession rate in Lakes Kissimmee-Cypress-Hatchineha that is less than 0.8 ft/30 days through June 1 to the extent possible without exceeding the current USACE limit of 700 cfs on discharge at S-65A for KRR construction.

**Lake Okeechobee**

Lake Okeechobee stage was 11.24 feet NGVD on May 25, 2020, up 0.21 feet from the previous week, but still down 0.13 feet from the previous month. The Lake entered the Beneficial Use sub-band on

March 4, 2020 and is now 0.65 feet above the Water Shortage sub-band. Lake stage moved below the ecological envelope (which varies seasonally from 12 – 15 feet NGVD +/- 0.5 feet) on October 15, 2019 and is currently 0.37 feet below the bottom of the envelope. Low water levels (lake stages below the ecological envelope) will continue to benefit recovering submerged and emergent marsh vegetation at low elevations but will reduce aquatic habitat for fish and wildlife in the marshes. Wading bird and snail kite nesting efforts are low for the second consecutive year on the Lake due to low lake stages during the breeding season.

**Estuaries**

Total inflow to the St. Lucie Estuary averaged 1,089 cfs over the past week with no flow coming from Lake Okeechobee. The seven-day average salinities decreased in the estuary over the past week. Salinity at the US1 Bridge is in the good range for adult eastern oysters.

Total inflow to the Caloosahatchee Estuary averaged 883 cfs over the past week with 97 cfs coming from the Lake. The seven-day average salinity decreased in the upper estuary (S-79, VALI-75 and Ft. Myers) but little changed in the lower estuary over the past week. Salinities are in the good range (0-10) for tape grass at Val I-75 and in the poor range (>15) at Ft. Myers. Salinities are in the good range for adult eastern oysters at Cape Coral and in the fair range at Shell Point and Sanibel.

Lake stage is in the Beneficial Use sub-band of 2008 LORS. Tributary hydrological conditions are normal. The SFWMD's Lake Okeechobee Adaptive Protocol's Release Guidance suggests up to 300 cfs release at S-79 to the Caloosahatchee Estuary with supplemental release at S-77 as needed.

**Stormwater Treatment Areas**

Over the past week, 1,200 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 9,500 ac-feet. The total amount of inflows to the STAs in WY2021 is approximately 33,000 ac-feet. Most STA cells are at or above target stage, except STA-5/6 cells that continue to dry out. 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. Nests of Migratory Bird Treaty Act (MBTA) protected species have been observed in STA-1E, STA-1W, and STA-5/6. This week, if 2008 LORS recommends Lake releases to the WCAs and conditions allow, releases will be sent to STA-2.

**Everglades**

WCA-1 and WCA-2A went above schedule last week and WCA-3A rose into Zone E1 of its regulation schedule. Heavy rainfall last week meant continued stage reversals occurred across the Everglades negatively impacting wading bird nesting. The core of the wading bird nesting effort in the Everglades is taking place in WCA-1, protecting foraging conditions there by moderating reversals in particular could have great ecological benefit by prolonging the nesting effort in that region; a survey flight on 5/22/20 noted that nesting was largely unaffected by the reversal (with the exception of wood storks which suffered widespread abandonment) and foraging was limited to a few flocks in WCA-1. Heavy rains fell over Taylor Slough and Florida Bay last week and stages increased with now only the northernmost sites with stages remaining below ground. Florida Bay average salinities decreased and are within 1 of the average for this time of year, however salinities at the TR station in the mangrove zone remain over 30.

## Supporting Information

## KISSIMMEE BASIN

### Kissimmee Basin Rainfall

The Upper Kissimmee Basin received 1.09 inches of rainfall in the past week and the Lower Basin received 1.87 inches (SFWMD Daily Rainfall Report 5/22/2020).

### 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 1-3.

**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: 5/26/2020**

| 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) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 5/24/20 | 5/17/20 | 5/10/20 | 5/3/20 | 4/26/20 | 4/19/20 | 4/12/20 |
| Lakes Hart and Mary Jane | S-62 | 0 | LKMJ | 59.6 | R | 59.7 | **-0.1** | -0.2 | -0.2 | -0.2 | -0.2 | -0.2 | -0.3 |
| Lakes Myrtle, Preston, and Joel | S-57 | 0 | S-57 | 60.0 | R | 60.1 | **-0.1** | -0.1 | 0.0 | 0.0 | 0.1 | 0.0 | -0.1 |
| Alligator Chain | S-60 | 48 | ALLI | 62.2 | R | 62.2 | **0.0** | 0.0 | -0.1 | 0.0 | 0.1 | -0.2 | -0.4 |
| Lake Gentry | S-63 | 106 | LKGT | 59.6 | R | 59.7 | **-0.1** | 0.1 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 |
| East Lake Toho | S-59 | 0 | TOHOE | 52.3 | R | 55.3 | **-3.0** | -3.2 | -3.4 | -3.5 | -3.8 | -4.1 | -4.5 |
| Lake Toho | S-61 | 111 | TOHOW, S-61 | 52.2 | R | 52.3 | **-0.1** | -0.3 | -0.5 | -0.5 | -0.6 | -0.7 | -0.9 |
| Lakes Kissimmee, Cypress, and Hatchineha | S-65 | 496 | KUB011, LKIS5B | 49.3 | R | 49.3 | **0.0** | -0.1 | -0.1 | -0.1 | -0.1 | -0.3 | -0.4 |

[1] Seven-day average of weighted daily means through midnight.
[2] Names of in-lake monitoring sites and structures used to determine lake stage; if more than one site is listed, an average is reported.
[3] 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 Basin

Discharges at Lower Basin structures are shown in Table 2. SFWDAT depth maps for the Phase I restoration area are shown in Figure 4. Mean daily dissolved oxygen concentrations, discharge, temperature, and rainfall are shown in Figure 5. The 2019-2020 Discharge Plan for S-65/S-65A, the interim regulation schedule for S-65, and a map of the Kissimmee Basin are shown respectively in Figures 6-8.

**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:** **5/26/2020**

| Metric | Location | 1-Day Average | Average for the Preceeding 7-Days[1] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 5/24/2020 | 5/24/20 | 5/17/20 | 5/10/20 | 5/3/20 | 4/26/20 | 4/19/20 | 4/12/20 | 4/5/20 | 3/29/20 |
| Discharge (cfs) | S-65 | 773 | **496** | 353 | 738 | 760 | 611 | 372 | 365 | 357 | 448 |
| Discharge (cfs) | S-65A[2] | 690 | **438** | 313 | 656 | 679 | 550 | 353 | 323 | 310 | 350 |
| Discharge (cfs) | S-65D[2] | 522 | **325** | 441 | 667 | 722 | 485 | 317 | 308 | 302 | 476 |
| Headwater Stage (feet NGVD) | S-65D[2] | 25.95 | **25.84** | 25.61 | 25.81 | 25.84 | 25.84 | 25.83 | 25.75 | 25.78 | 25.71 |
| Discharge (cfs) | S-65E[2] | 494 | **312** | 411 | 617 | 677 | 435 | 282 | 283 | 262 | 433 |
| Discharge (cfs) | S-67 | 0 | **0** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| DO (mg/L)[3] | Phases I & II/III river channel | 6.4 | **7.6** | 7.9 | 8.1 | 7.9 | 7.5 | 7.9 | 7.4 | 7.4 | 6.9 |
| Mean depth (feet)[4] | Phase I floodplain | 0.09 | **0.08** | 0.07 | 0.09 | 0.14 | 0.10 | 0.06 | 0.07 | 0.07 | 0.08 |

[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 KRBN, PC62, PC33, PD62R, and PD42R.

[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)

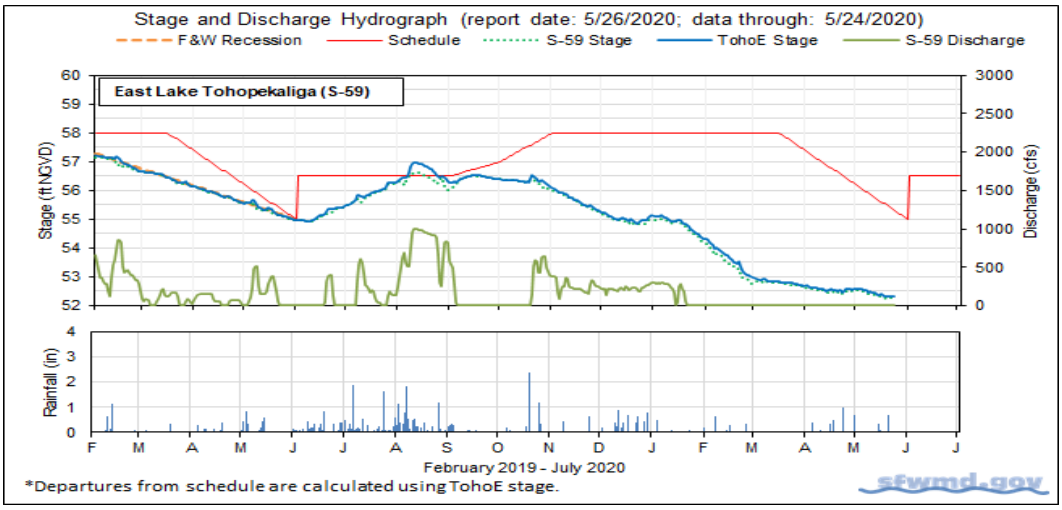



**Figure 1.**

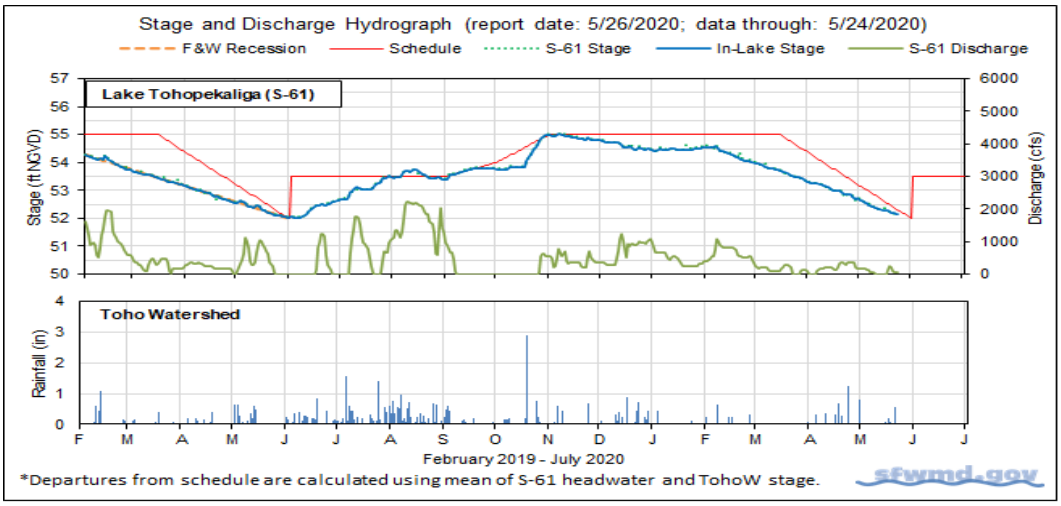



**Figure 2.**

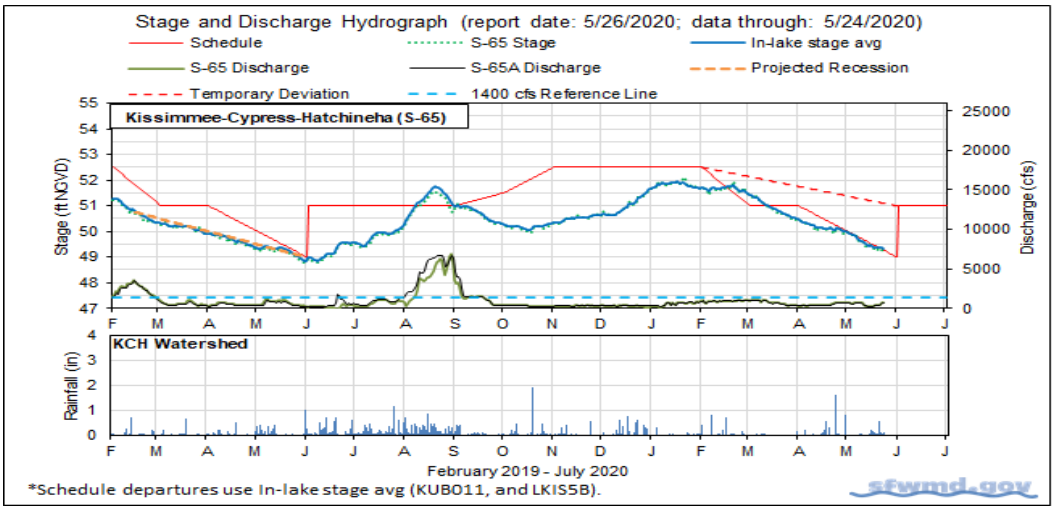



**Figure 3.**

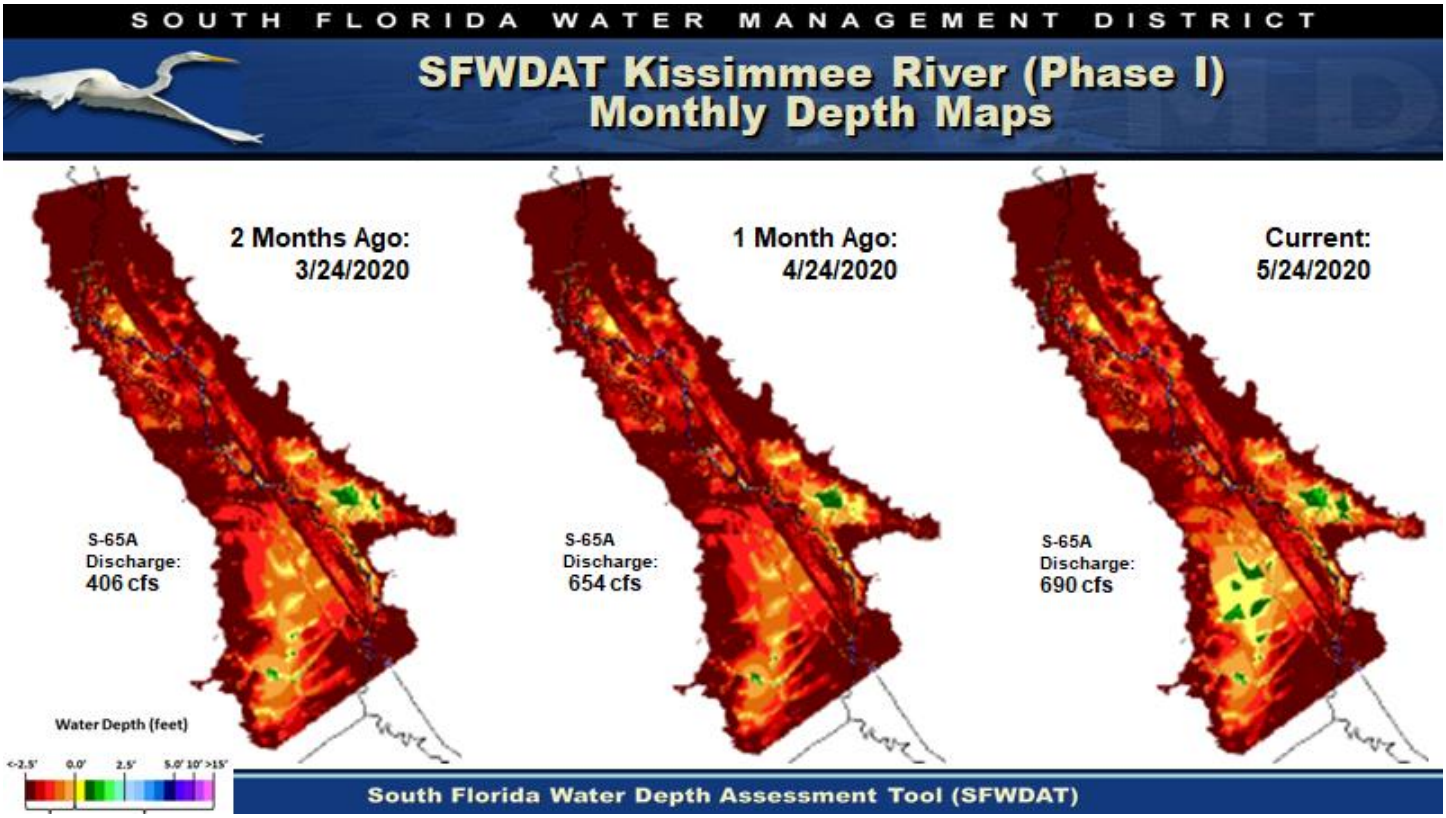



**Figure 4.** Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to January 16, 2012.

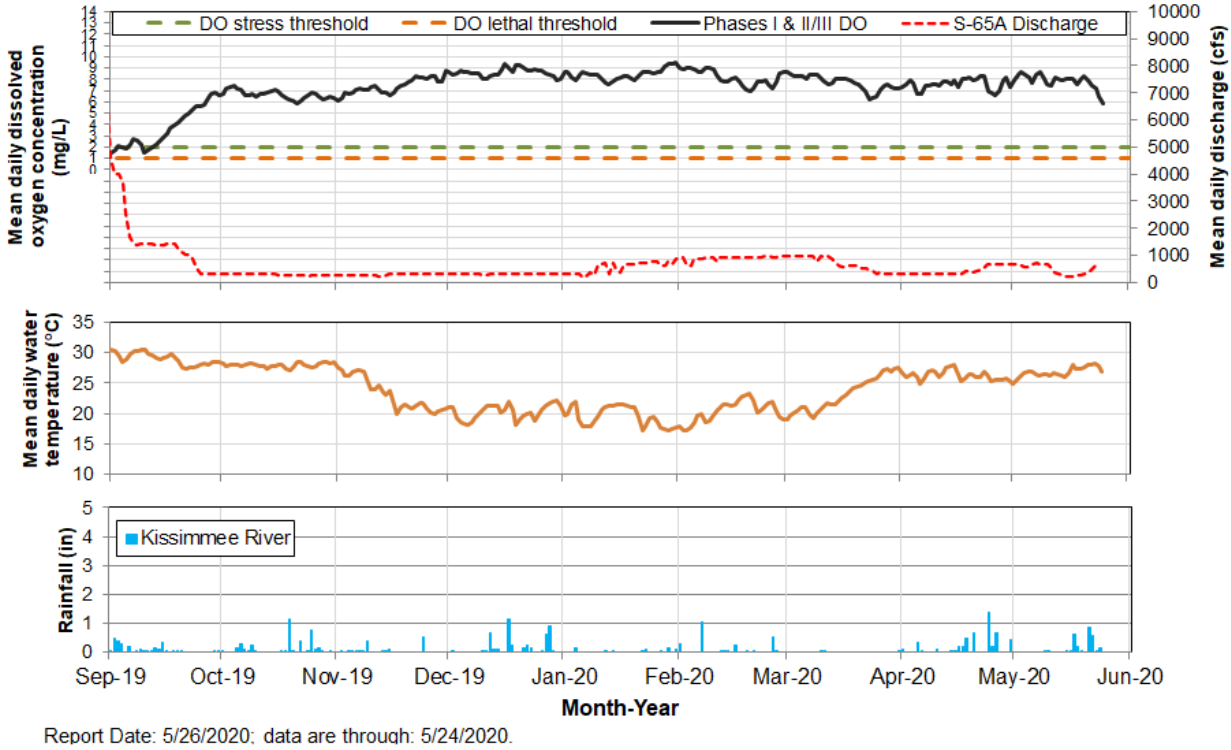



**Figure 5.** Mean daily dissolved oxygen, discharge, temperature and rainfall in the Phases I/II/III river channel.

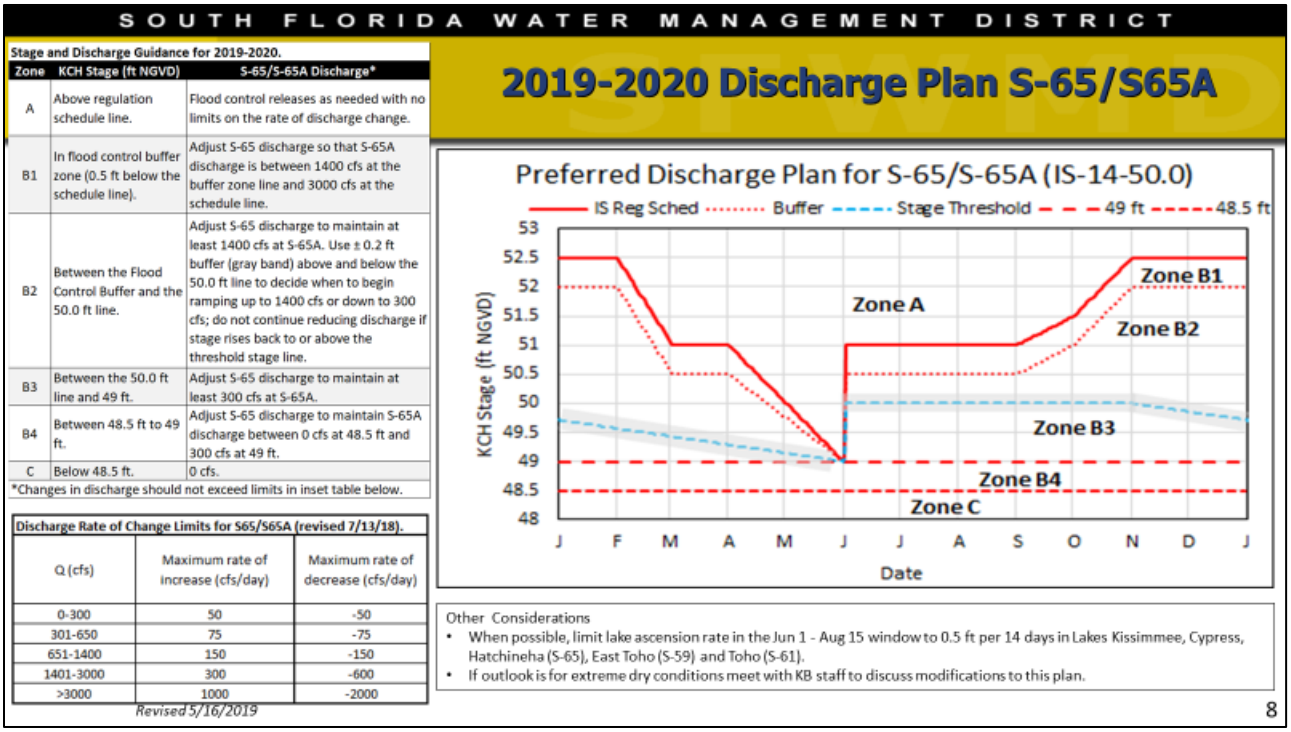



**Figure 6.** The 2019-2020 Discharge Plan for S-65/S-65A.

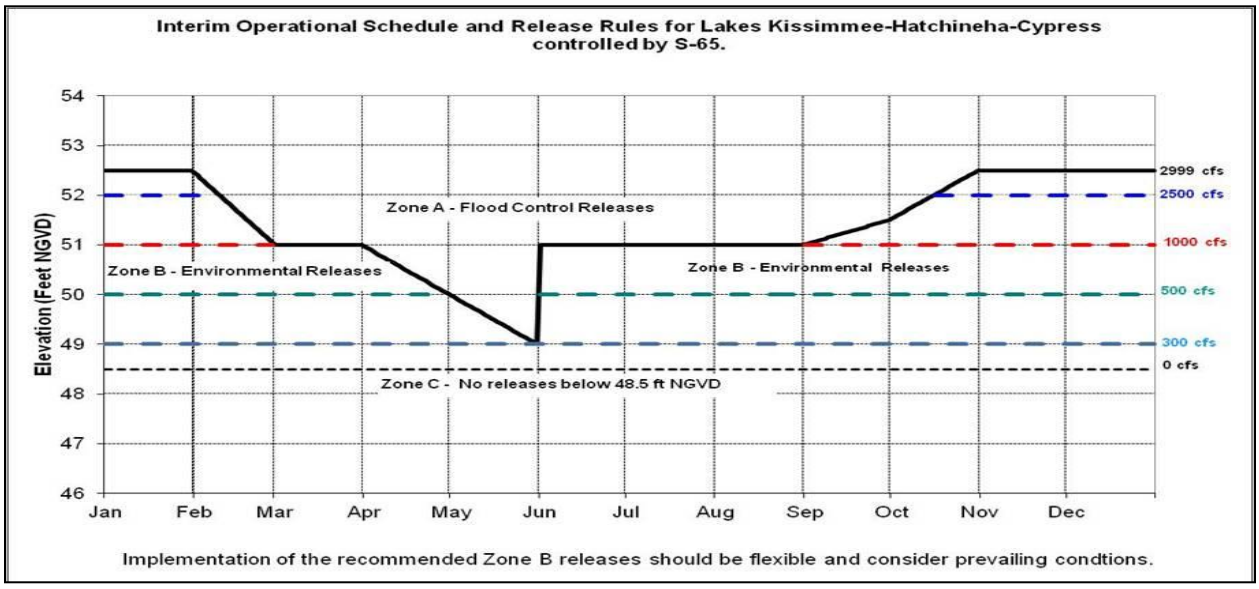



**Figure 7.** Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years.

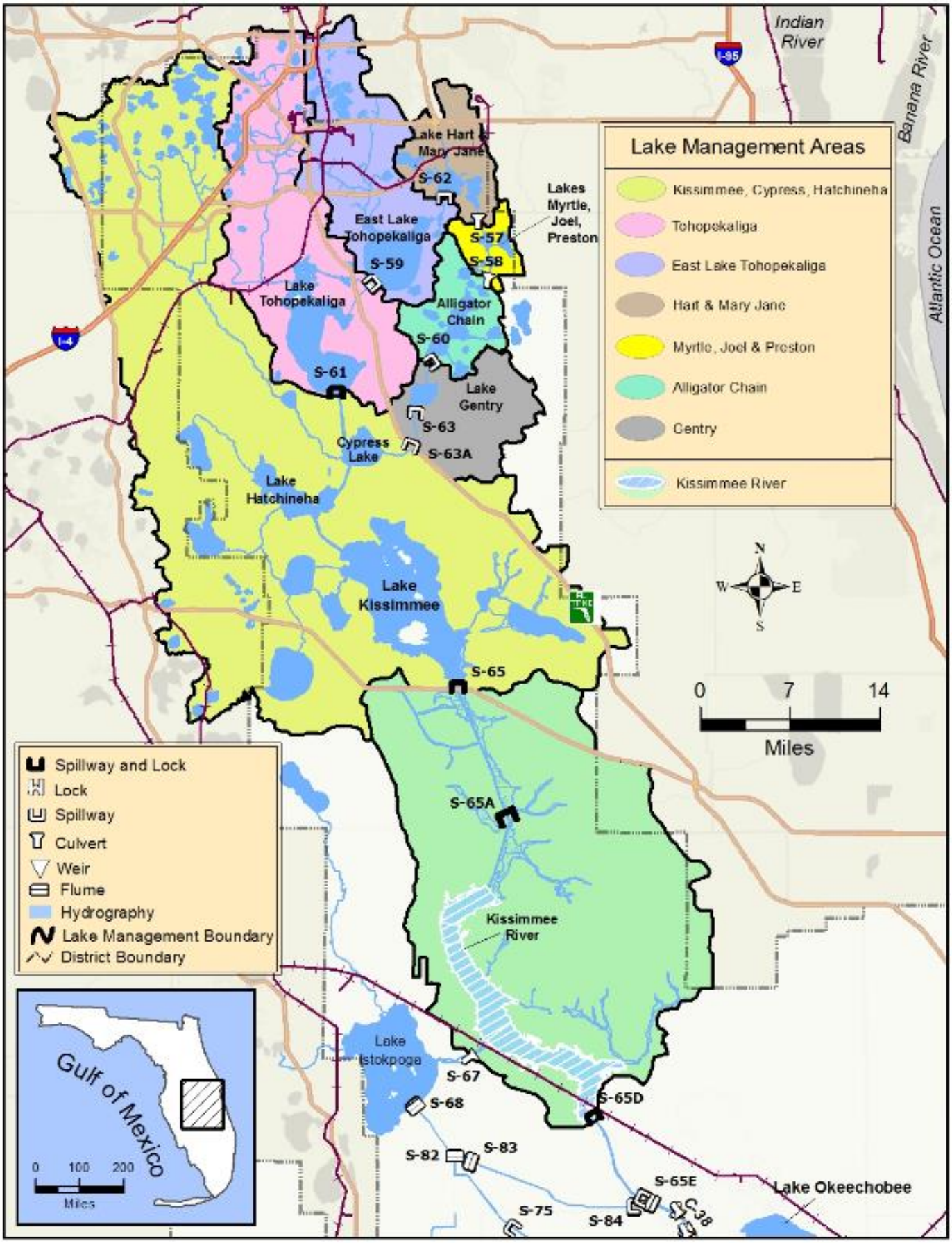



**Figure 8.** The Kissimmee Basin.

## LAKE OKEECHOBEE

Lake Okeechobee stage is 11.24 feet NGVD, 0.13 feet lower than a month ago and 0.18 feet higher than one year ago (Figure 1). The Lake is currently 0.37 feet below the preferred ecological envelope (Figure 2). Lake stage moved into the Base Flow sub-band on September 11, 2019 and entered the Beneficial Use sub-band on March 4, 2020 (Figure 3). Lake stage had been declining since late-February 2020 until the start of the wet season over the last week or two. According to RAINDAR, 2.41 inches of rain fell directly over the Lake during the past week (Figure 4). The upper Kissimmee Basin received less rainfall, around 1 inch, while the closer northern and southern watersheds received more rainfall, between 3 – 4 inches.

The average daily inflows (minus rainfall) increased slightly 342 cfs to 539 cfs, while the outflows (minus evapotranspiration) dropped precipitously, from 3,279 cfs to just 45 cfs. Most of the inflow (415 cfs) came from the Kissimmee River (S-65E & S-65EX1). Outflows were only released west through the S-77 (C-43/Caloosahatchee Canal), averaging just 93 cfs, and south through the S-352 structures, averaging just 75 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.

The most recent survey of foraging wading birds was conducted on May 21 (Figure 6). There were approximately 2,400 wading birds seen foraging around Lake Okeechobee, which was very similar to this time last year but only about 25% of the total observed in early May. However, the same pattern was seen between early and late May surveys last year, with similar water levels. Both years had an increase in lake stage between early and late May surveys, which likely improved foraging opportunities outside of the lake and caused reductions in wading birds dependent on the waterbody.

Water quality sampling occurs twice-monthly at 30 stations from May – October as part of expanded monitoring efforts to track and study Harmful Algal Blooms on the Lake. Results from early May (5-6$^{th}$) sampling show Chlorophyll *a* values were elevated (>20 µg/L) at 11 of 18 stations in nearshore areas, with 3 of those sites having bloom conditions (>40 µg/L). Similarly, 5 of 9 stations in the pelagic areas had elevated values, with 1 having bloom conditions (Figure 7). Three stations were not sampled due to low water levels and logistical issues.

The same 30 stations were resampled in late May (20-21$^{st}$), and while Chla results are not yet available, the dominant algal taxa were identified at each. *Microcystis* dominated the community at 17 of 26 stations sampled, while *Dolichospermum, Cylindrospermopsis,* and *Planktolyngbya* were dominant at one station each. Six stations were defined as having mixed communities, or no dominants. The toxin Microcystin was detected at low levels (<1.0 µg/L) at 5 of 15 stations, was not detected at 10 stations, and results are pending at the remaining 11 stations sampled. These data and others are reported on Florida's Department of Environmental Protection Algal Bloom Monitoring website. Four stations were not sampled due to low water levels and logistical issues.

Current satellite imagery (May 22, 2020) using NOAA's cyanobacteria monitoring product derived from EUMETSAT's Sentinel 3 OLCI sensor data suggested low/moderate potential for cyanobacterial blooms along the northwestern shoreline of the Lake, lower than this time last year (Figure 8). Spatially, the current bloom is focused in the western and southern regions compared to the eastern region last year at this time. Bloom conditions during this time of year can change substantially from week to week, particularly when hot, calm weather settles over the lake for several days.

### Water Management Summary

Lake Okeechobee stage was 11.24 feet NGVD on May 25, 2020, up 0.21 feet from the previous week, but still down 0.13 feet from the previous month. The Lake entered the Beneficial Use sub-band on

March 4, 2020 and is now 0.65 feet above the Water Shortage sub-band. Lake stage moved below the ecological envelope (which varies seasonally from 12 – 15 feet NGVD +/- 0.5 feet) on October 15, 2019 and is currently 0.37 feet below the bottom of the envelope. Low water levels (lake stages below the ecological envelope) will continue to benefit recovering submerged and emergent marsh vegetation at low elevations but will reduce aquatic habitat for fish and wildlife in the marshes. Wading bird and snail kite nesting efforts are low for the second consecutive year on the Lake due to low lake stages during the breeding season.

**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 | 338 | 415 | 0.2 |
| S-71 & S-72 | 0 | 11 | 0.0 |
| S-84 & S-84X | 0 | 81 | 0.0 |
| Fisheating Creek | 3 | 6 | 0.0 |
| S-154 | 0 | 0 | 0.0 |
| S-191 | 0 | 0 | 0.0 |
| S-133 P | 0 | 0 | 0.0 |
| S-127 P | 0 | 0 | 0.0 |
| S-129 P | 0 | 3 | 0.0 |
| S-131 P | 0 | 13 | 0.0 |
| S-135 P | 0 | 0 | 0.0 |
| S-2 P | 0 | 0 | 0.0 |
| S-3 P | 0 | 0 | 0.0 |
| S-4 P | 0 | 0 | 0.0 |
| L-8 Backflow | | 11 | 0.0 |
| Rainfall | 3474 | 4974 | 2.4 |
| **Total** | **3816** | **5513** | **2.7** |

| OUTFLOWS | Previous week Avg Daily CFS | Avg Daily Flow cfs | Equivalent Depth Week Total (in) |
|---|---|---|---|
| S-77 | 878 | 93 | 0.0 |
| S-308 | -9 | -123 | -0.1 |
| S-351 | 1289 | 0 | 0.0 |
| S-352 | 449 | 75 | 0.0 |
| S-354 | 659 | 0 | 0.0 |
| L-8 Outflow | 13 | | |
| ET | 2321 | 2157 | 1.0 |
| **Total** | **5600** | **2202** | **1.1** |

Provisional Data

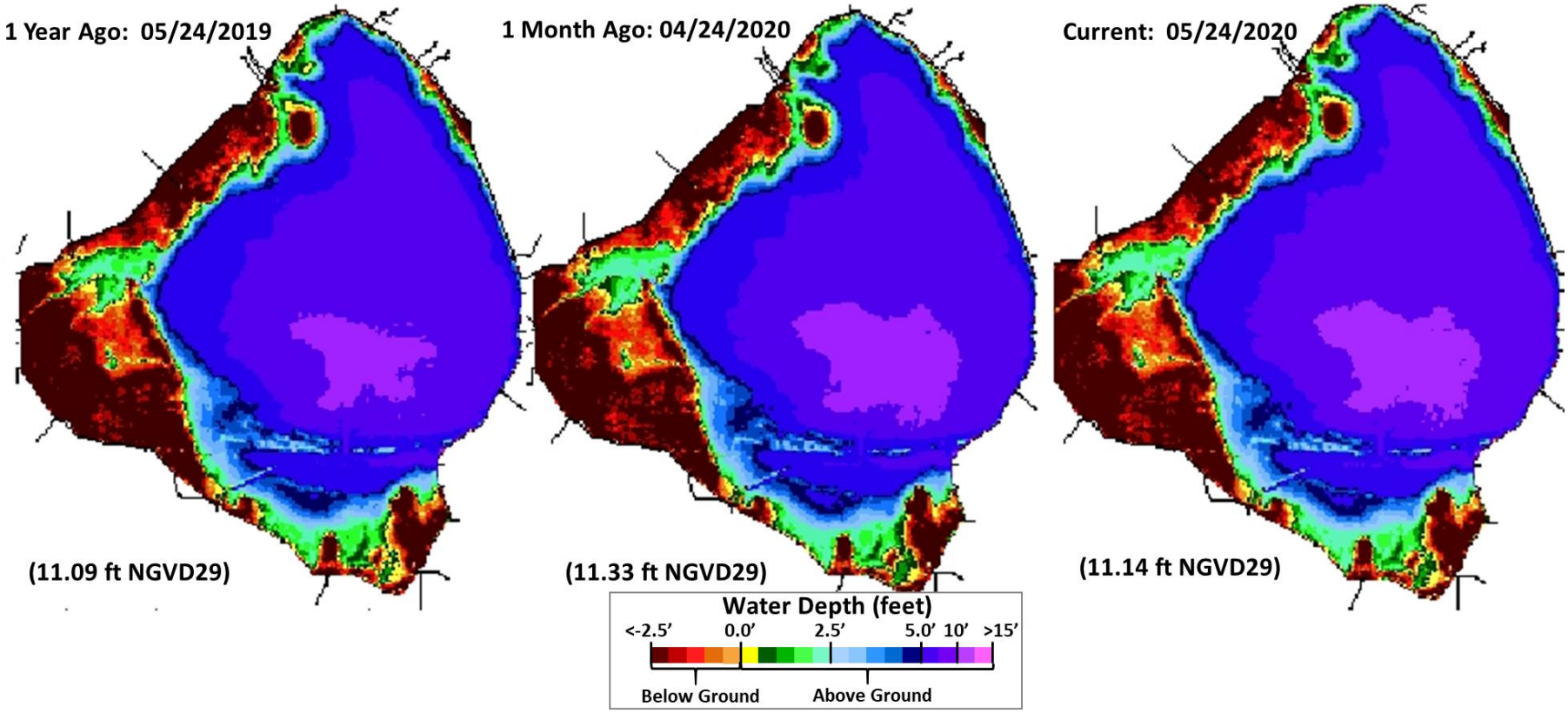



**Figure 1.** Water depth estimates on Lake Okeechobee based on the South Florida Water Depth Assessment Tool.

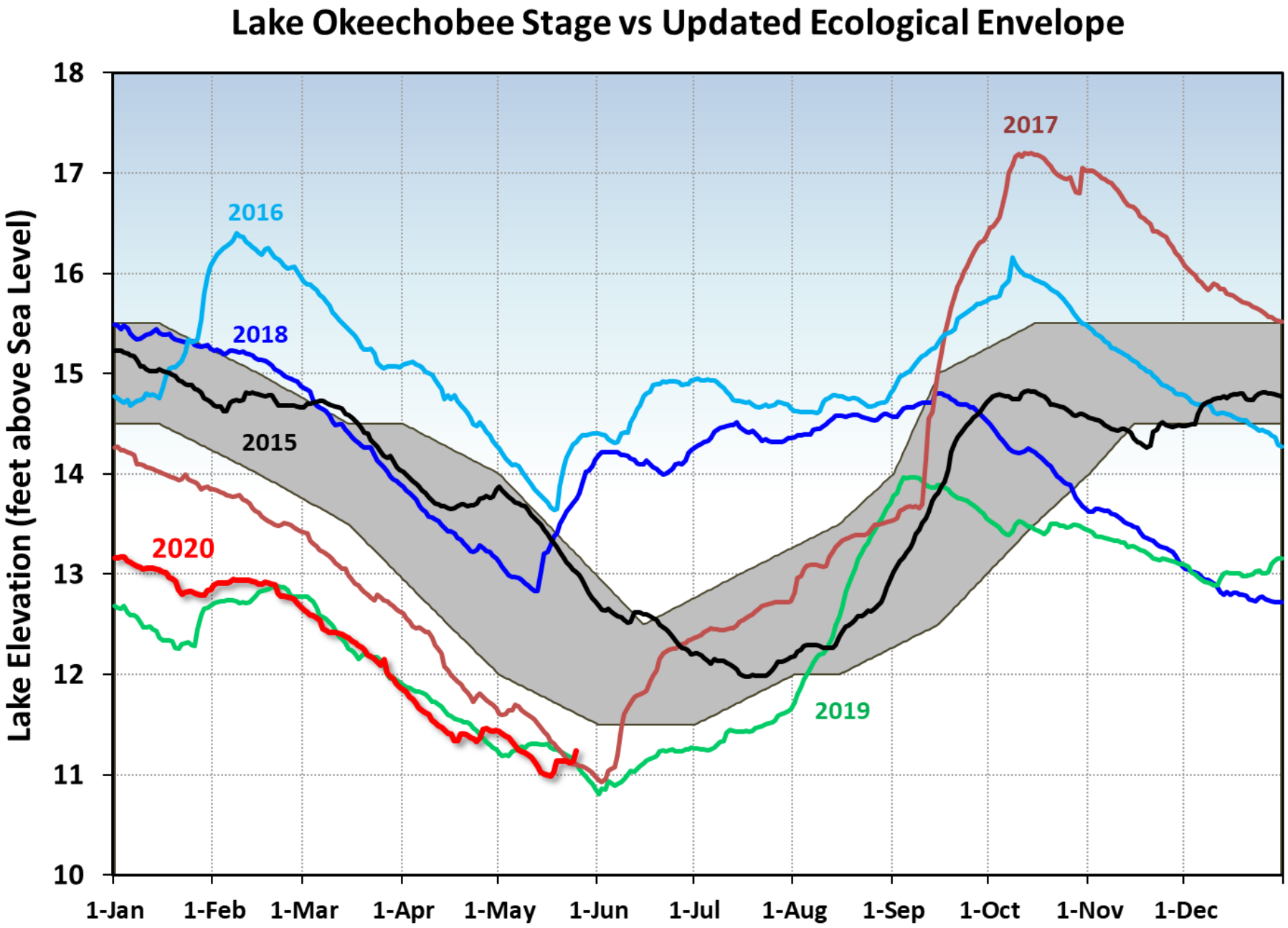



**Figure 2.** Select annual stage hydrographs for Lake Okeechobee in comparison to the updated Ecological Envelope.

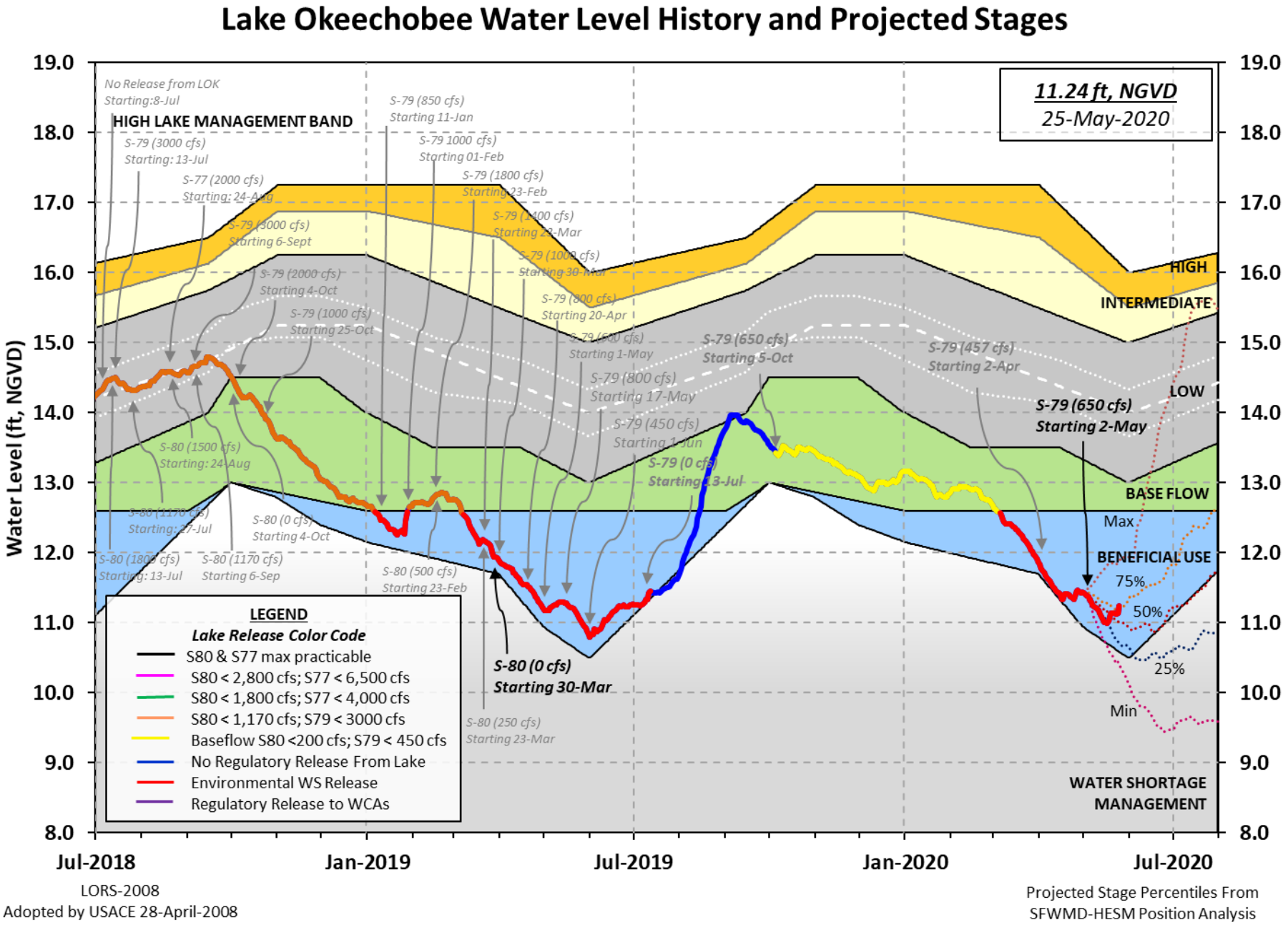



**Figure 3.** Recent Lake Okeechobee stage and releases, with projected stages based on a dynamic position analysis.

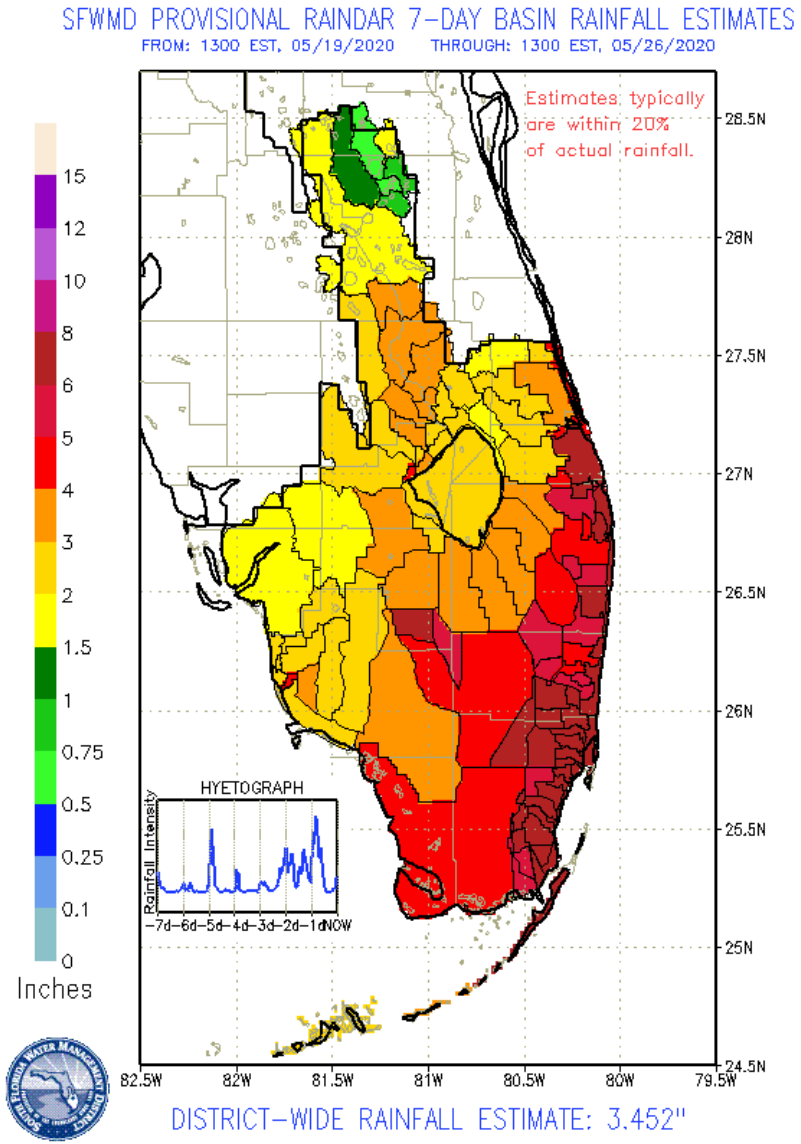



**Figure 4.** 7-Day rainfall estimates by RAINDAR.

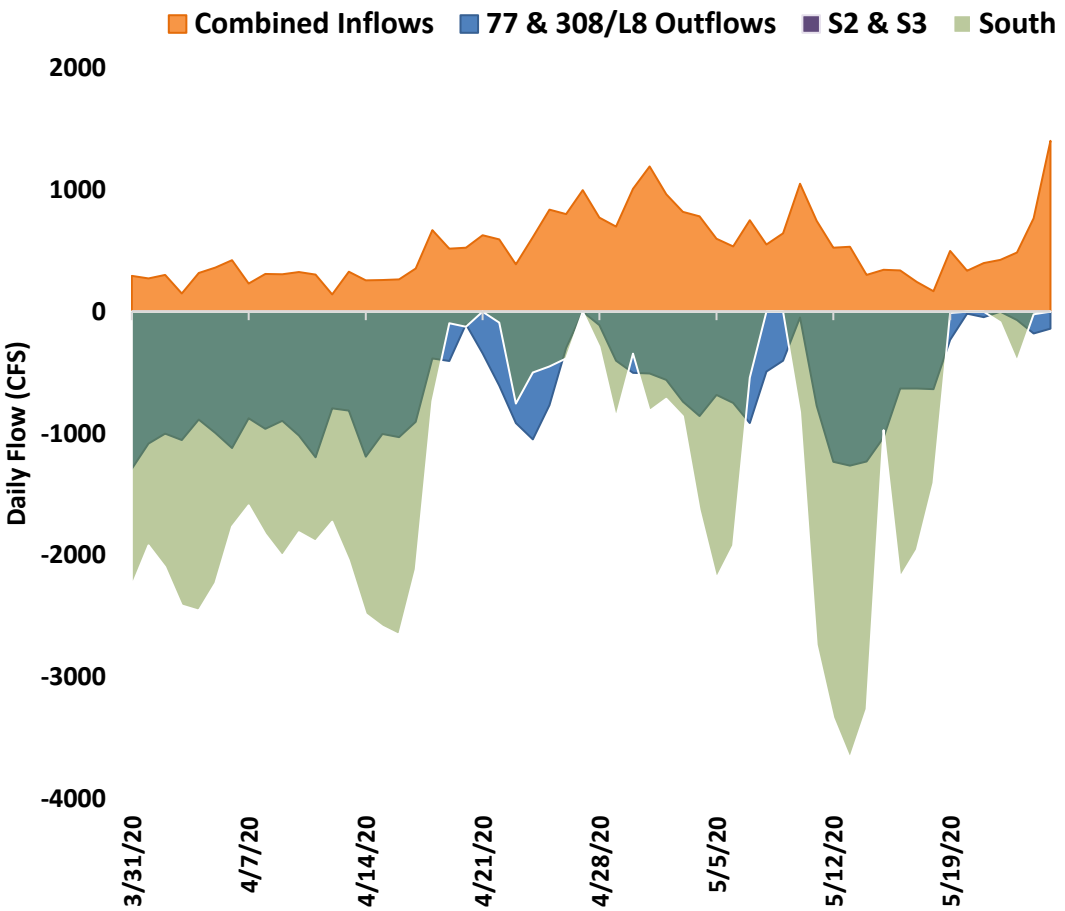
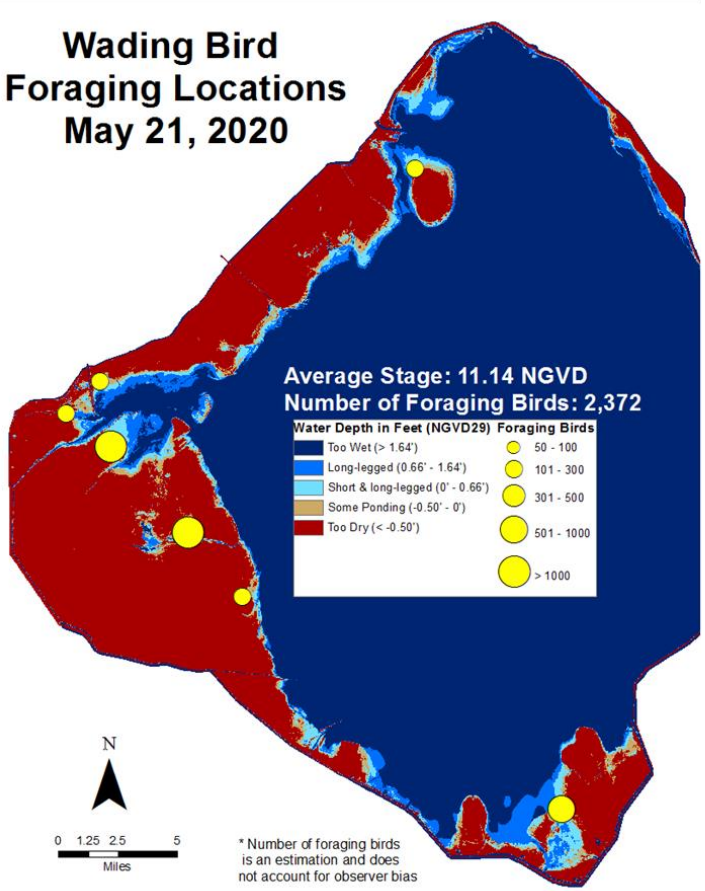



**Figure 5.** Major inflows (orange) and outflows (blue) of Lake Okeechobee, including the S-350 structures designated as South (green). The L-8 Canal flows through Culvert 10A are included as outflows when positive, and as inflows when backflowing into the Lake. All inflows and outflows are shown as 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.



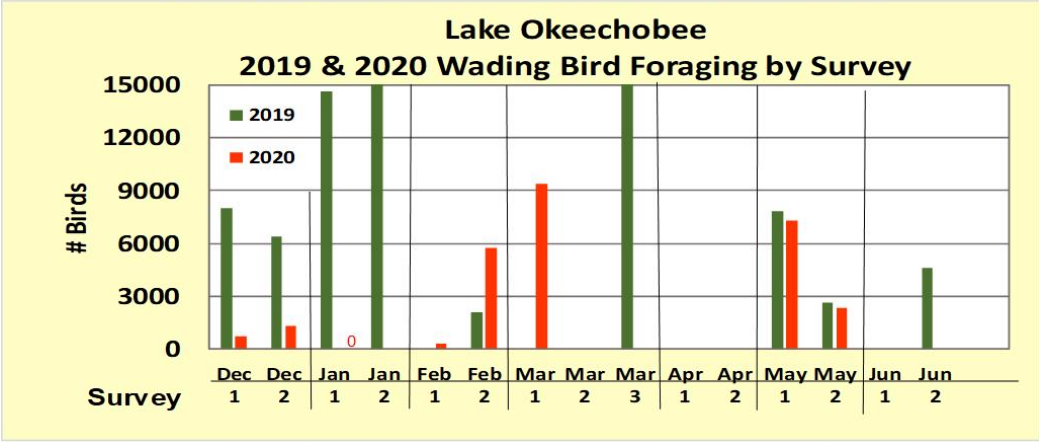




**Figure 6.** Results of wading bird survey flight from May 21, 2020, and comparison to previous surveys.

| Collected: | 5/6/20 | 5/21/20 | |
|---|---|---|---|
| **NEARSHORE** | **CHL*a* (ug/L)** | **TOXIN (ug/L)** | **TAXA** |
| FEBIN | **83.7** | NS | NS |
| FEBOUT | **26.8** | NS | NS |
| KISSR0.0 | **22.8** | BDL | Mixed |
| L005 | 13.4 | BDL | *Cylindro* |
| LZ2 | **38.3** | 0.66 | Mixed |
| KBARSE | NS | 0.33 | *Microcystis* |
| RITTAE2 | NS | NS | NS |
| **PELBAY3** | 9.2 | **P** | ***Microcystis*** |
| POLE3S | NS | P | *Microcystis* |
| LZ25A | 4.9 | NS | NS |
| PALMOUT | 6.3 | P | *Microcystis* |
| PALMOUT1 | **24.1** | P | *Microcystis* |
| **PALMOUT2** | **30.3** | **P** | ***Microcystis*** |
| PALMOUT3 | 13.4 | P | *Microcystis* |
| POLESOUT | 18.8 | BDL | Mixed |
| **POLESOUT1** | **29.6** | **0.63** | ***Microcystis*** |
| **POLESOUT2** | **44.7** | **BDL** | ***Microcystis*** |
| **POLESOUT3** | **29.5** | **BDL** | ***Microcystis*** |
| EASTSHORE | **28.2** | 0.78 | *Microcystis* |
| NES135 | 10.7 | BDL | *Microcystis* |
| NES191 | **47.5** | BDL | *Planktol* |

| Collected: | 5/6/20 | 5/21/20 | |
|---|---|---|---|
| **PELAGIC** | **CHL*a* (ug/L)** | **TOXIN (ug/L)** | **TAXA** |
| **L001** | **48.9** | **BDL** | ***Microcystis*** |
| L004 | 19.7 | BDL | Mixed |
| **L006** | 9.3 | **P** | ***Microcystis*** |
| **L007** | 19.2 | **P** | ***Microcystis*** |
| L008 | **25.5** | BDL | Mixed |
| **LZ30** | **30.5** | **P** | ***Microcystis*** |
| **LZ40** | **24.5** | **P** | ***Microcystis*** |
| **CLV10A** | 15.6 | **P** | ***Dolicho*** |
| **NCENTER** | **20.4** | **0.39** | **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 bloom
- Chlorophyll *a* analyzed by SFWMD
- Toxin and Taxa analyzed by FDEP

*Cylindro = Cylindrospermopsis*
*Planktol = Planktolyngbya*
*Dolicho = Dolichospermum*

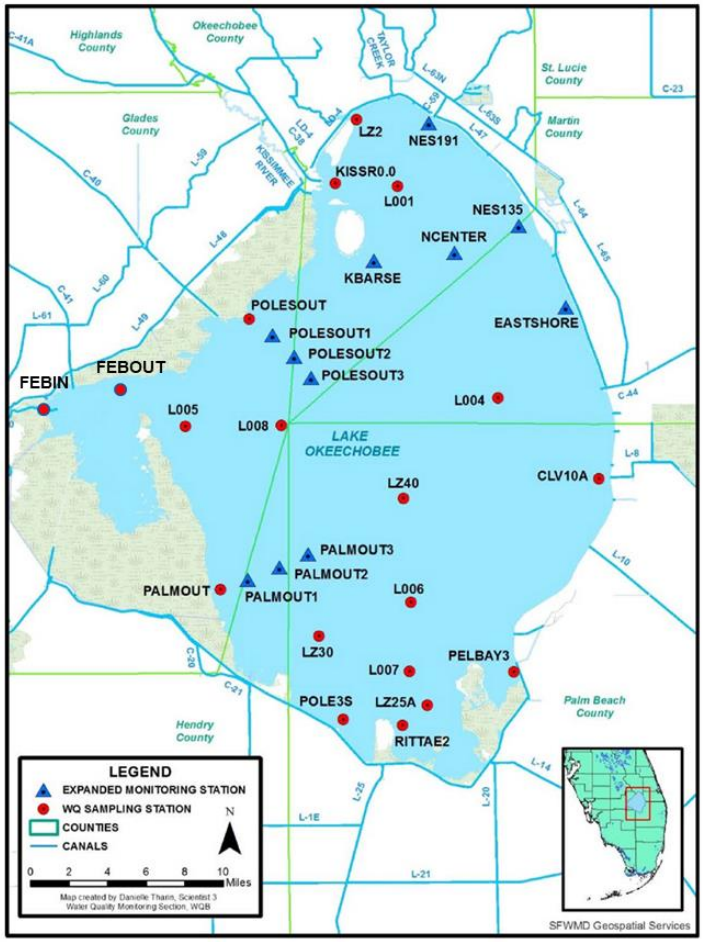



**Figure 7.** Water quality parameters at nearshore (n=21) and pelagic (n=9) stations for May 5-6th (Chlorophyll *a*) and May 20-21st (toxin and algal ID) 2020. Locations of stations are shown in the map inset. Bold site names represent locations where field crews noted algae on May 20-21, 2020, while green font indicates Chla values >20 ug/L and red indicates Chla values >40 ug/L. Toxin results are pending for 11 sites. All data are provisional.

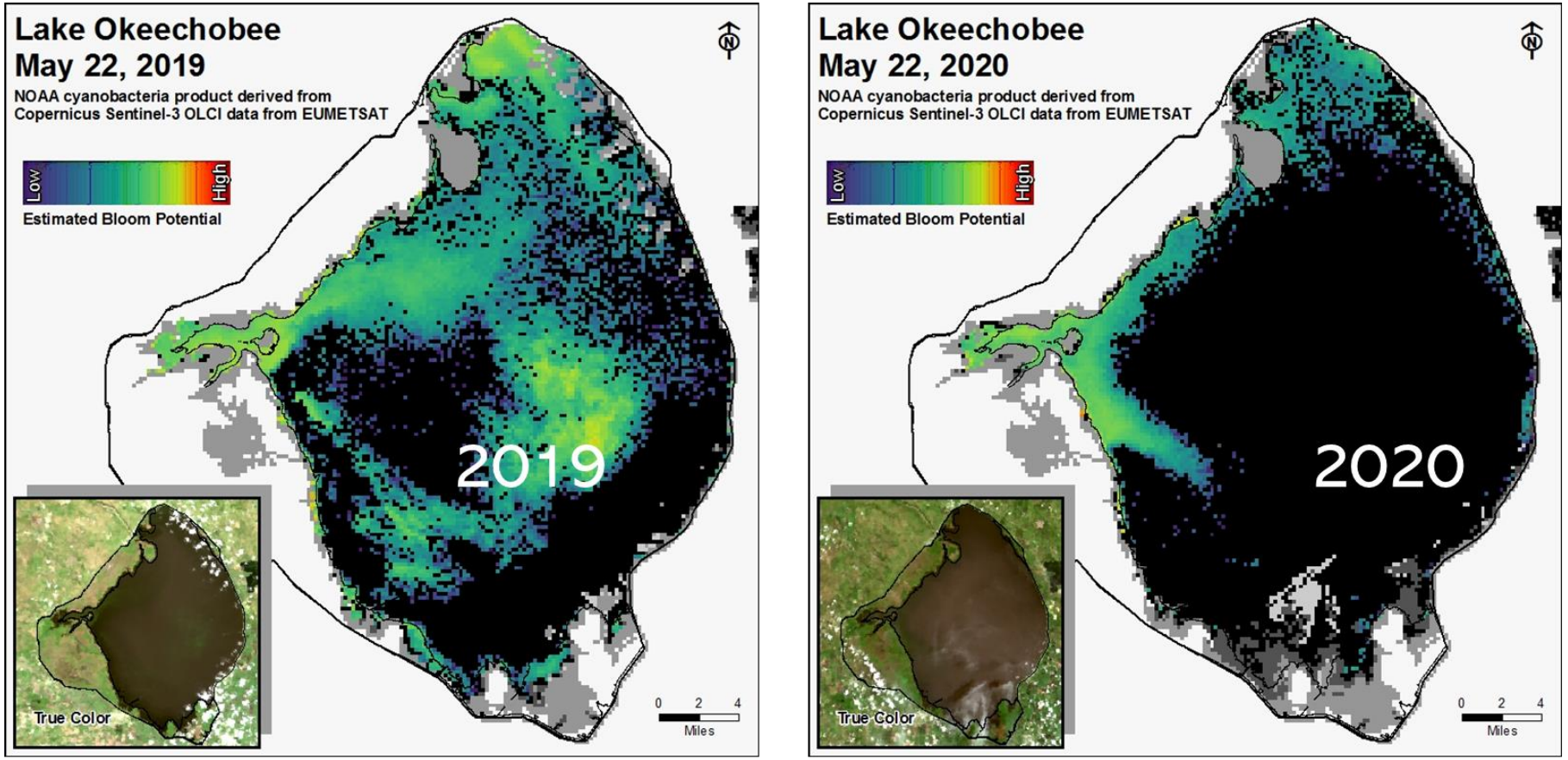



**Figure 8.** Potential for cyanobacterial blooms on Lake Okeechobee in mid-May 2019 and 2020, based on NOAA's harmful algal bloom monitoring system. Gray color indicates cloud cover.

## ESTUARIES

**St. Lucie Estuary**:

Last week total inflow to the St. Lucie Estuary averaged approximately 1,089 cfs (Figures 1 and 2) and last month inflow averaged about 540 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 | 760 |
| S-80 | 0 |
| S-308 | -123 |
| S-49 on C-24 | 77 |
| S-97 on C-23 | 107 |
| Gordy Rd. structure on Ten Mile Creek | 145 |

Over the past week, salinity increased throughout the estuary (Table 2, Figures 3 and 4). The seven-day moving average of the water column (an average of the surface and bottom salinity) at the US1 Bridge is 22.4. Salinity conditions in the middle estuary are estimated to be within the good range for adult eastern oysters (Figure 3).

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

| Sampling Site | Surface | Bottom | Envelope |
|---|---|---|---|
| HR1 (North Fork) | **15.0** (20.0) | **20.8** (22.1) | NA[1] |
| US1 Bridge | **21.8** (23.4) | **22.8** (24.7) | 10.0-26.0 |
| A1A Bridge | **28.6** (30.4) | **29.7** (31.3) | NA[1] |

[1]Envelope not applicable

**Caloosahatchee Estuary**:

Last week total inflow to the Caloosahatchee Estuary averaged approximately 883 cfs (Figures 5 and 6) and last month inflow averaged about 676 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 | 93 |
| S-78 | 543 |
| S-79 | 818 |
| Tidal Basin Inflow | 65 |

Over the past week in the estuary, salinity decreased to Ft. Myers Yacht Basin and increased downstream (Table 4, Figures 7 & 8). The seven-day average salinity values are within the good range for adult eastern oysters at Cape Coral, in the fair range at Shell Point, and in the poor range at Sanibel (Figure 9). The seven-day average surface salinities (Table 4) are in the good range (0-10) for tape grass at Val I-75 and in the poor range (>15) 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) | **0.7** (1.6) | **1.7** (2.7) | NA[1] |
| Val I75 | **5.9** (7.7) | **7.3** (8.5) | 0.0-5.0[2] |
| Ft. Myers Yacht Basin | **15.2** (16.0) | **15.8** (18.1) | NA |
| Cape Coral | **22.7** (21.4) | **23.4** (24.0) | 10.0-30.0 |
| Shell Point | **32.3** (32.0) | **32.6** (32.1) | 10.0-30.0 |
| Sanibel | **35.0** (34.7) | **35.1** (35.1) | 10.0-30.0 |

[1]Envelope not applicable, [2]Envelope is based on a 2-week forecast 30-day average.

Forecast of surface salinity (Table 5 and Figure 10) at Val I-75 for the next two weeks using the autoregression model (Qiu and Wan, 2013) coupled with a linear reservoir model for the tidal basin predicts daily salinity ranging from 4.2 to 6.8 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 105 cfs. The 30-day moving average surface salinity at Val I-75 is forecast to be between 5.2 and 6.2 (Table 5). The current salinity conditions at Val I-75 are outside of 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 | 105 | 6.8 | 6.2 |
| B | 300 | 105 | 6.0 | 6.0 |
| C | 450 | 105 | 5.4 | 5.6 |
| D | 650 | 105 | 4.5 | 5.4 |
| E | 800 | 105 | 4.2 | 5.2 |

**Red tide**

The Florida Fish and Wildlife Research Institute reported on May 22, 2020, that *Karenia brevis,* the Florida red tide dinoflagellate, was not observed in samples collected from Lee, St. Lucie, or Palm Beach counties (no samples were analyzed this week from Martin, Broward, or Miami-Dade counties).

**Water Management Recommendations**

Lake stage is in the Beneficial Use Flow sub-band. Tributary conditions are normal. The South Florida Water Management District's Lake Okeechobee Adaptive Protocol's Release Guidance suggests up to 300 cfs release at S-79 to the Caloosahatchee Estuary with supplemental release at S-77 as needed.

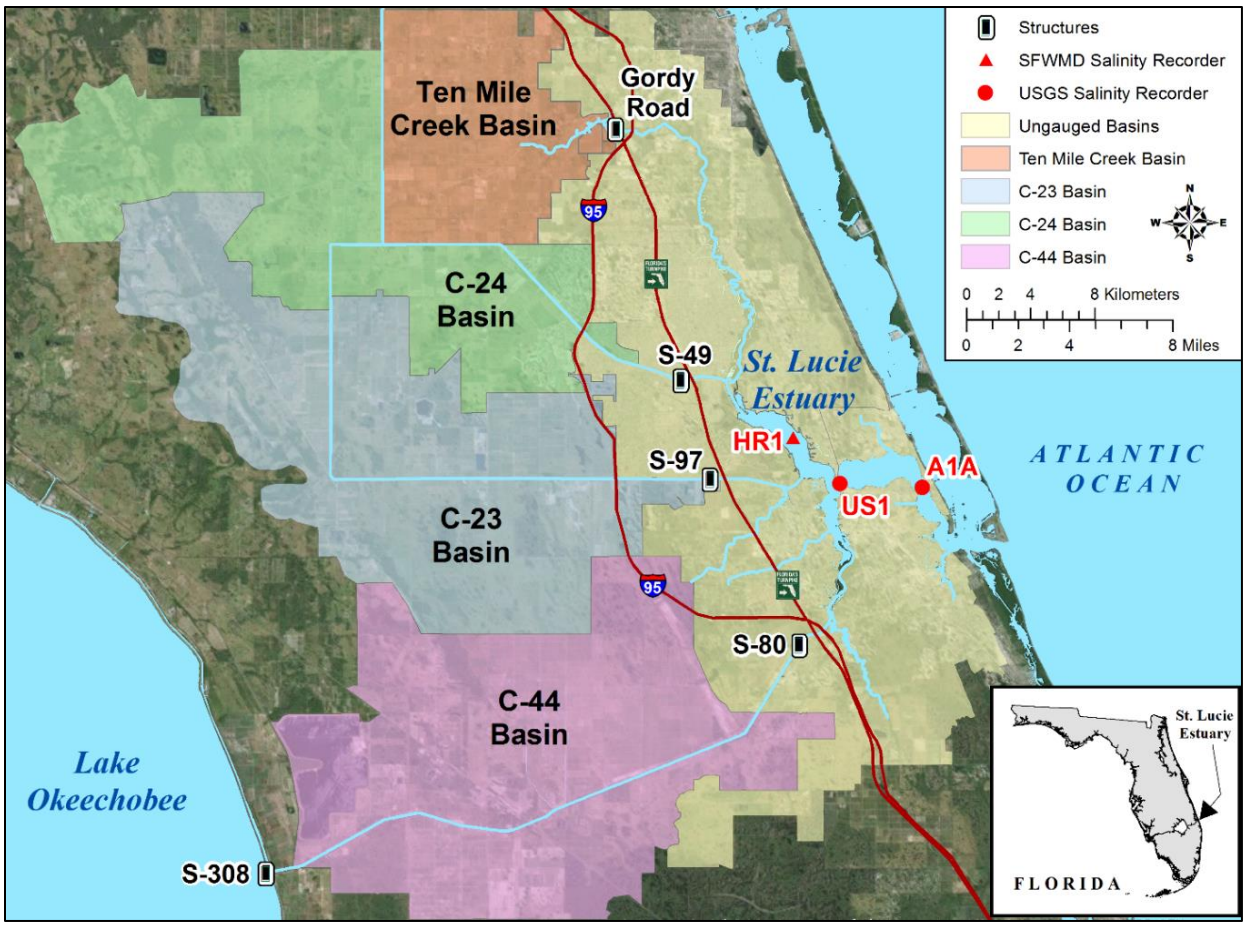



**Figure 1.** Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

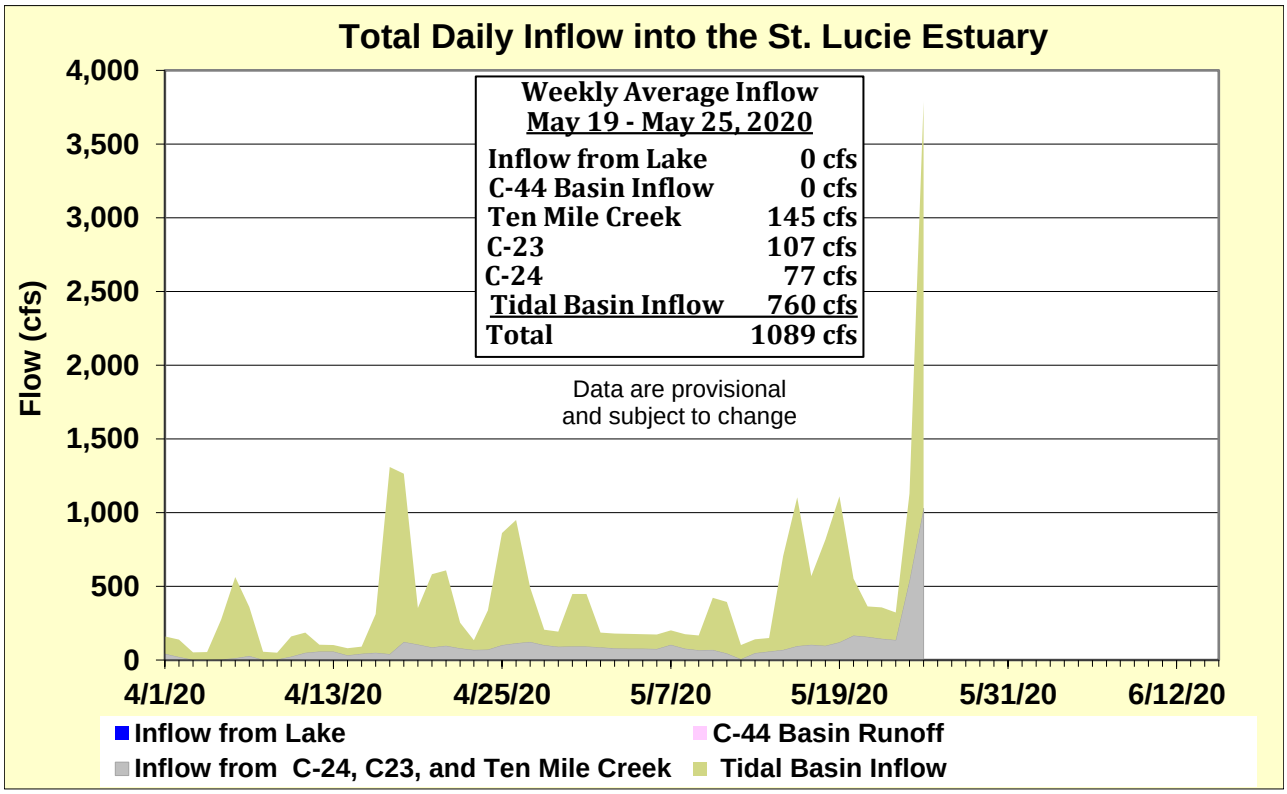



**Figure 2.** Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basin into the St. Lucie Estuary.

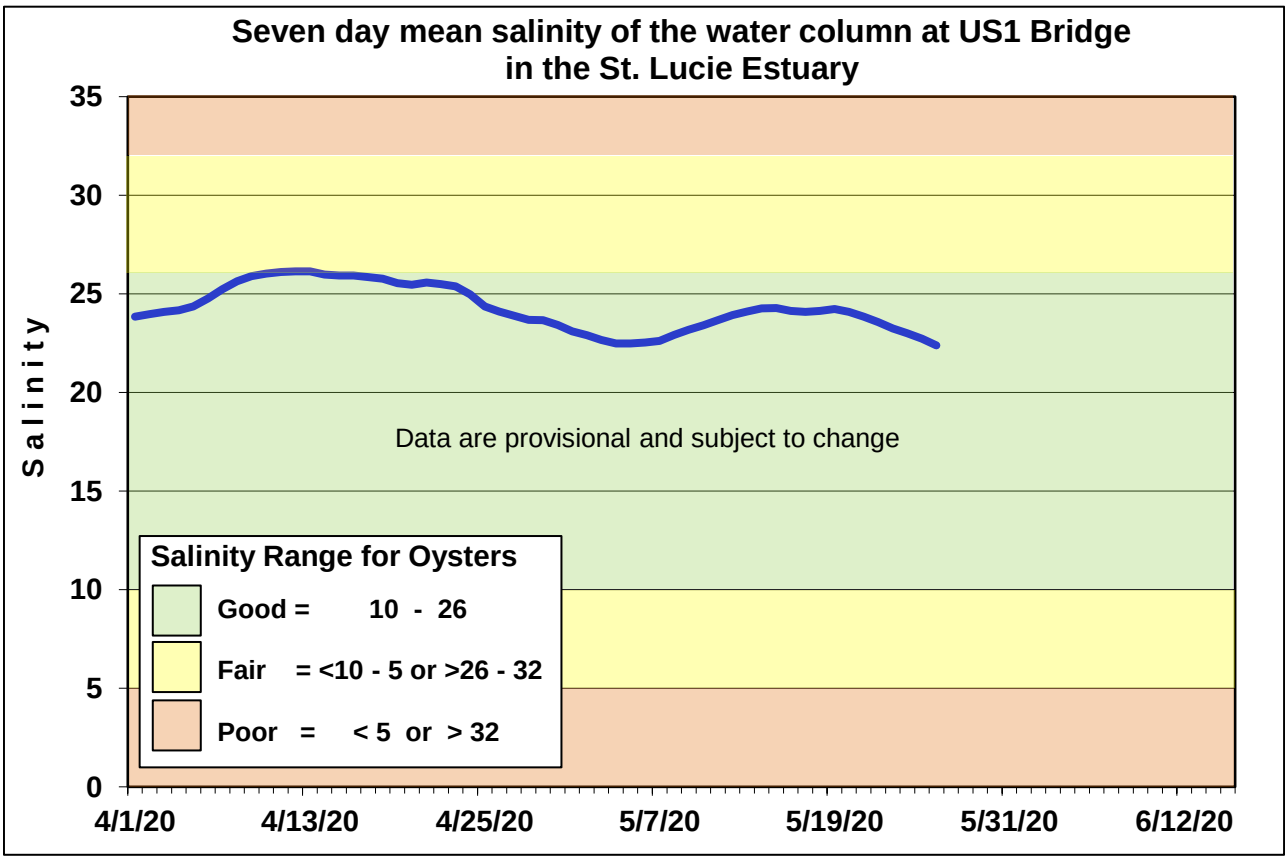



**Figure 3.** Seven-day mean salinity of the water column at the US1 Bridge.

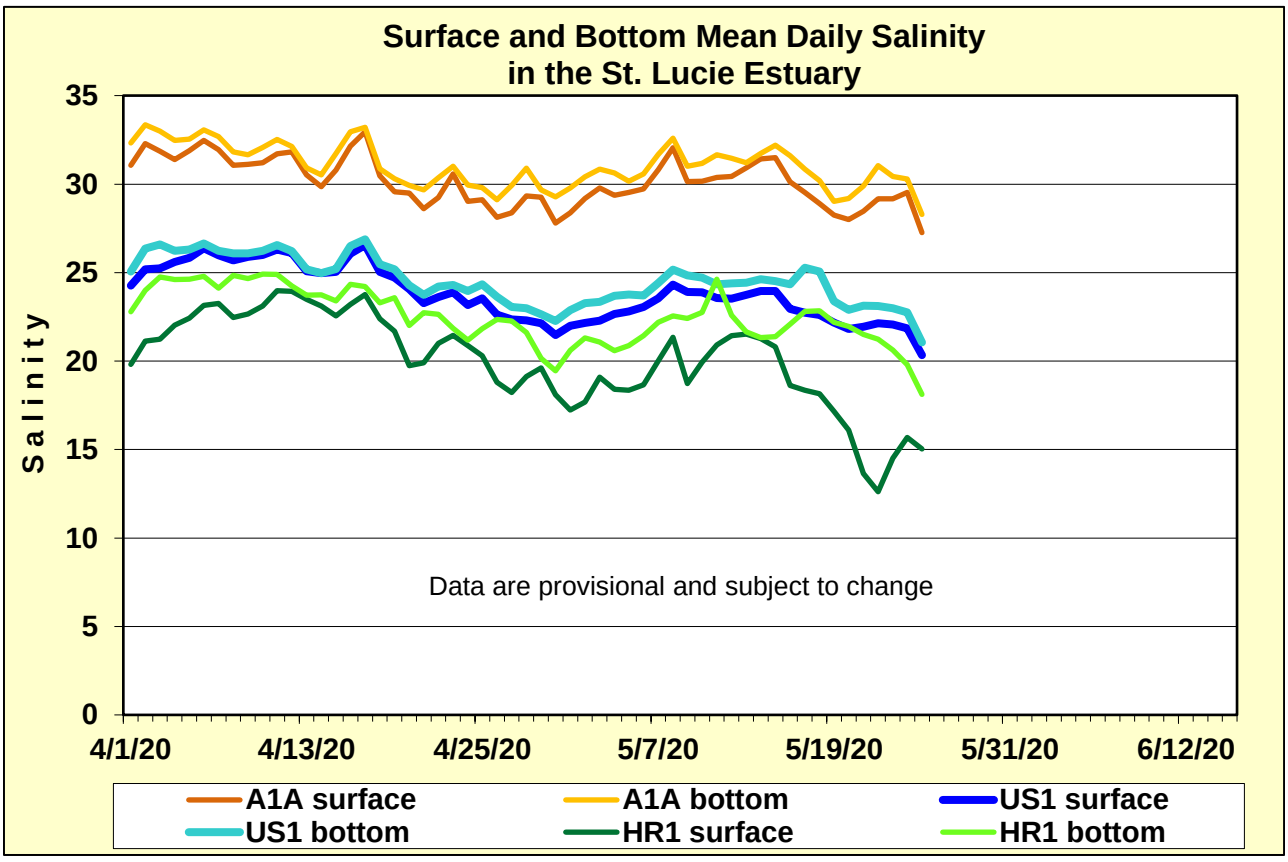



**Figure 4**. Daily mean salinity at the A1A, US1, and HR1 stations.

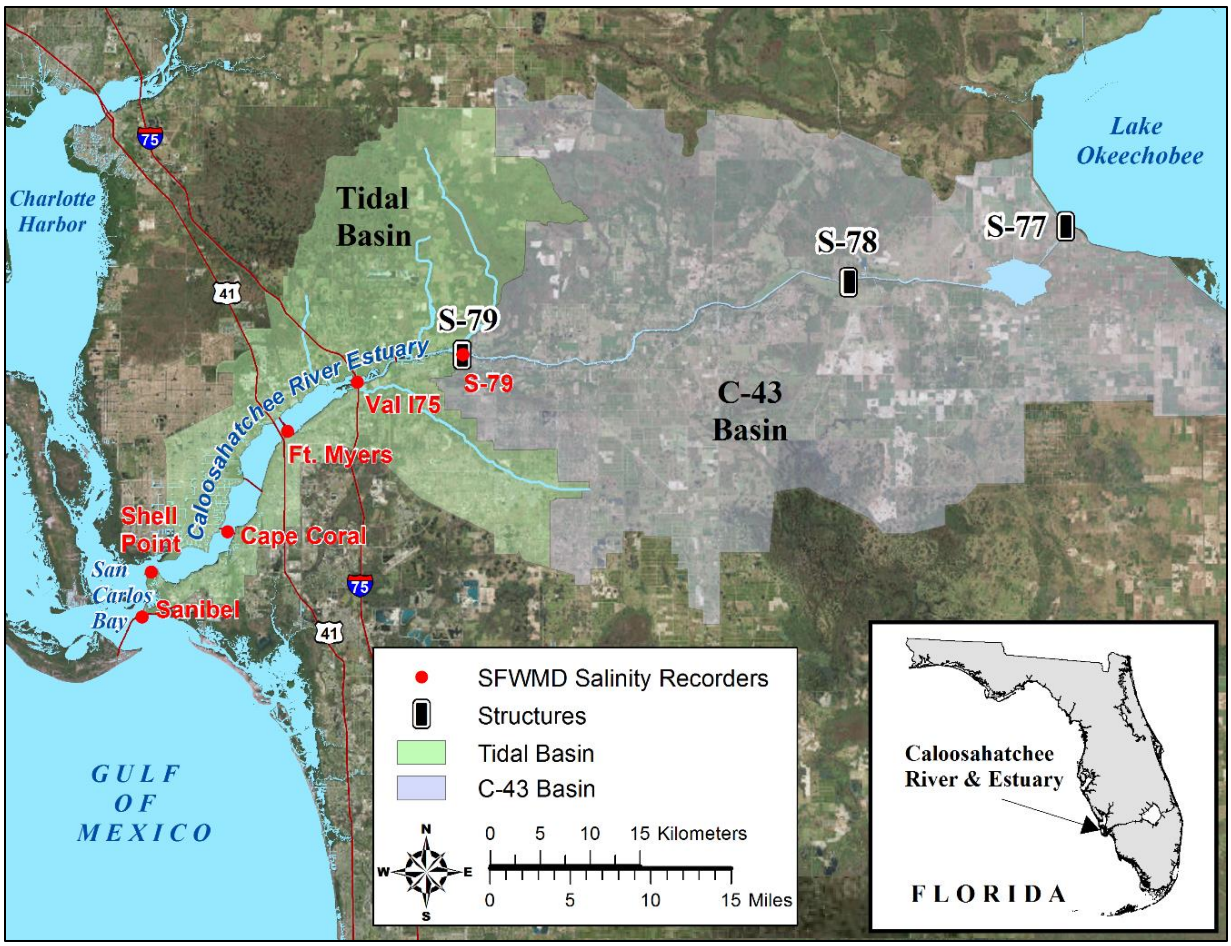



**Figure 5.** Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

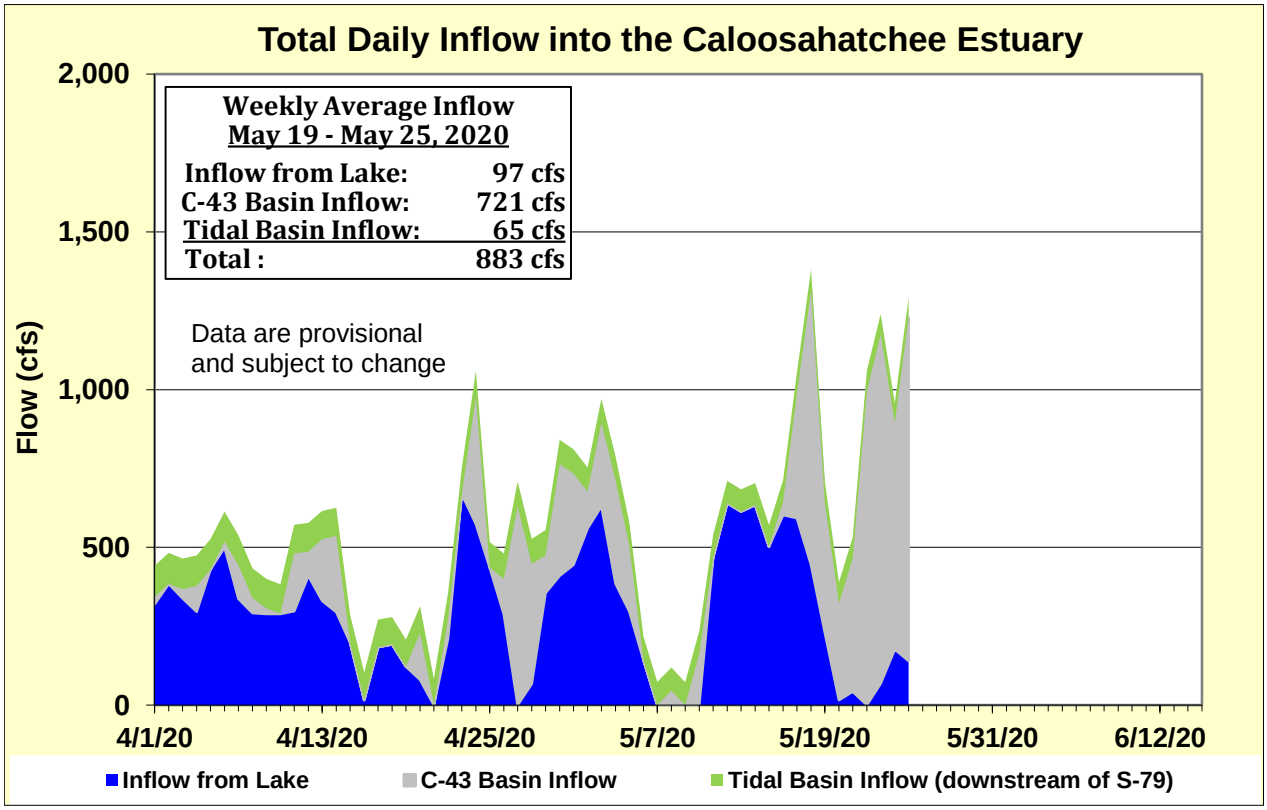



**Figure 6.** Total daily inflows from Lake Okeechobee, runoff from the C-43 basin

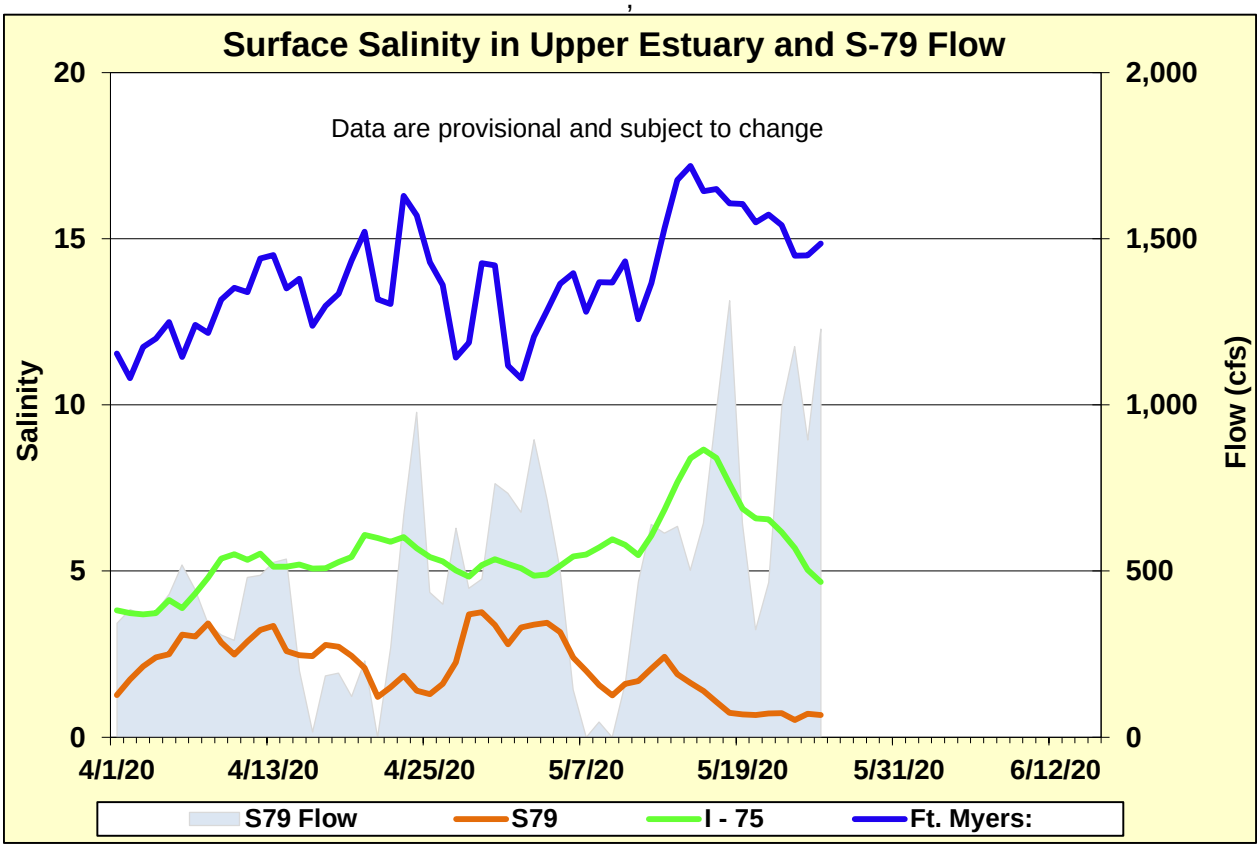



**Figure 7.** Daily mean flows at S-79 and salinity at upper estuary monitoring stations.

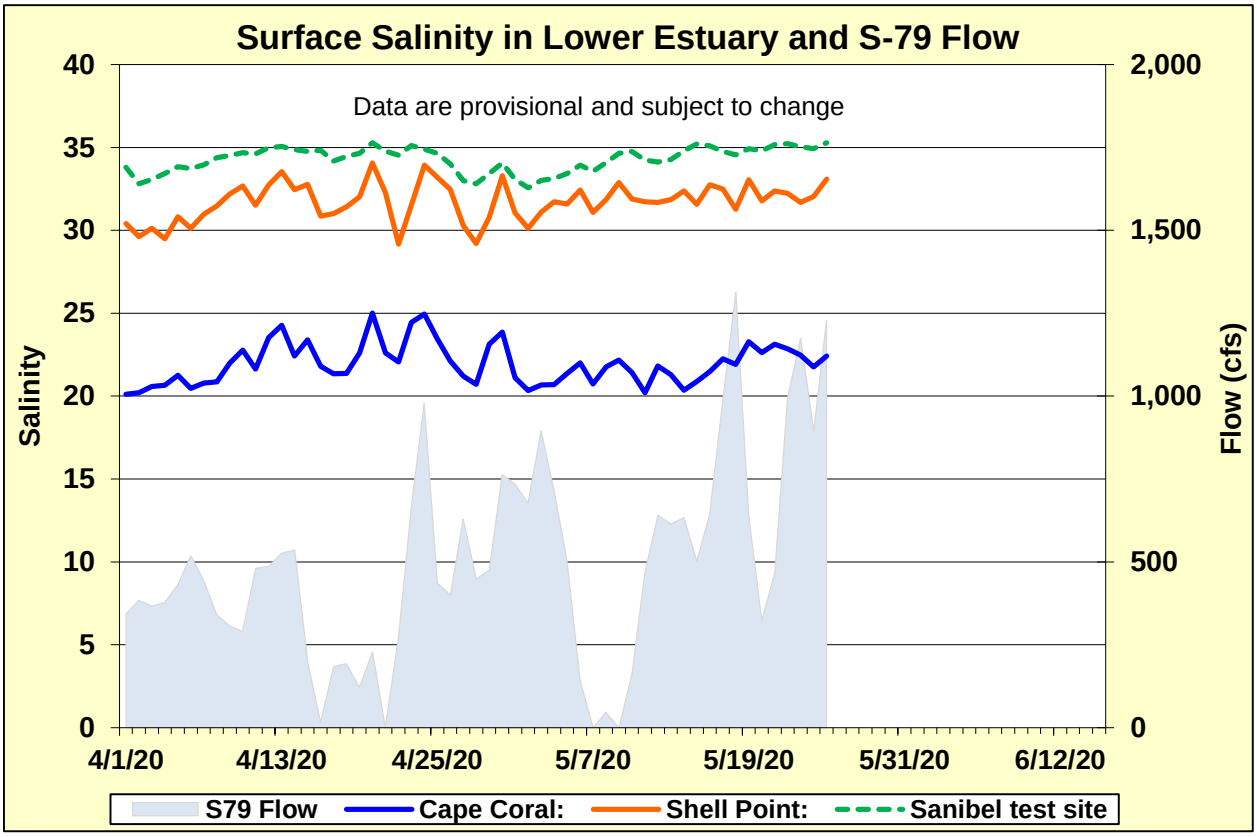



**Figure 8.** Daily mean flows at S-79 and salinity at lower estuary stations.

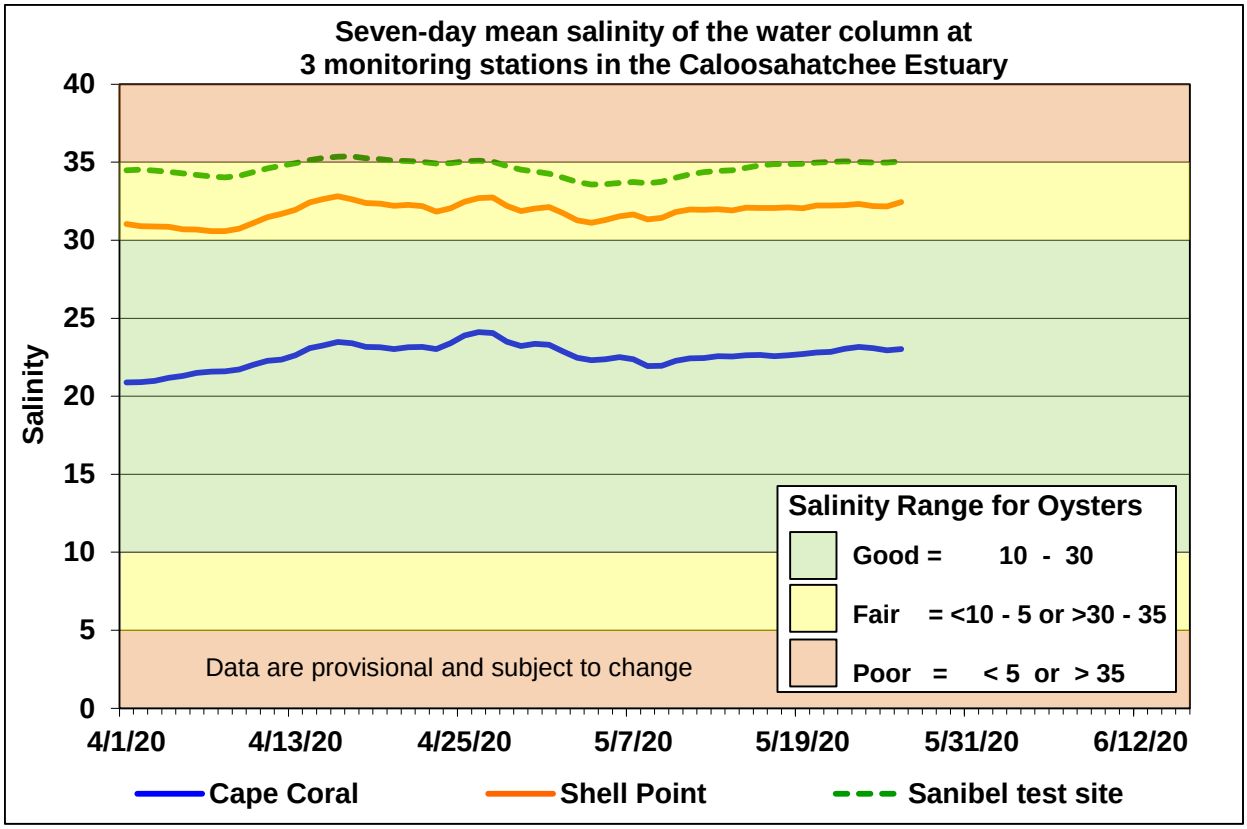



**Figure 9.** Seven-day mean salinity at Cape Coral, Shell Point, and Sanibel monitoring stations.

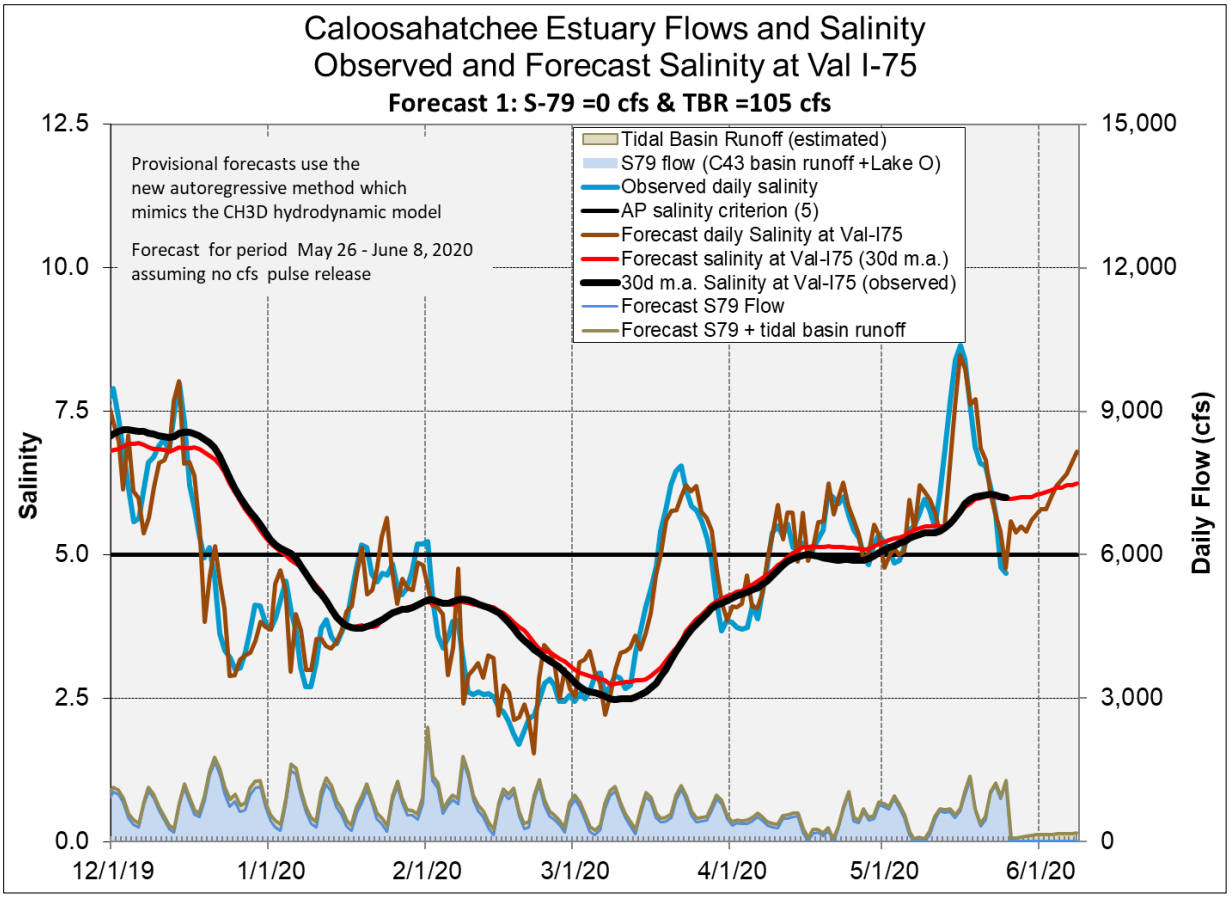


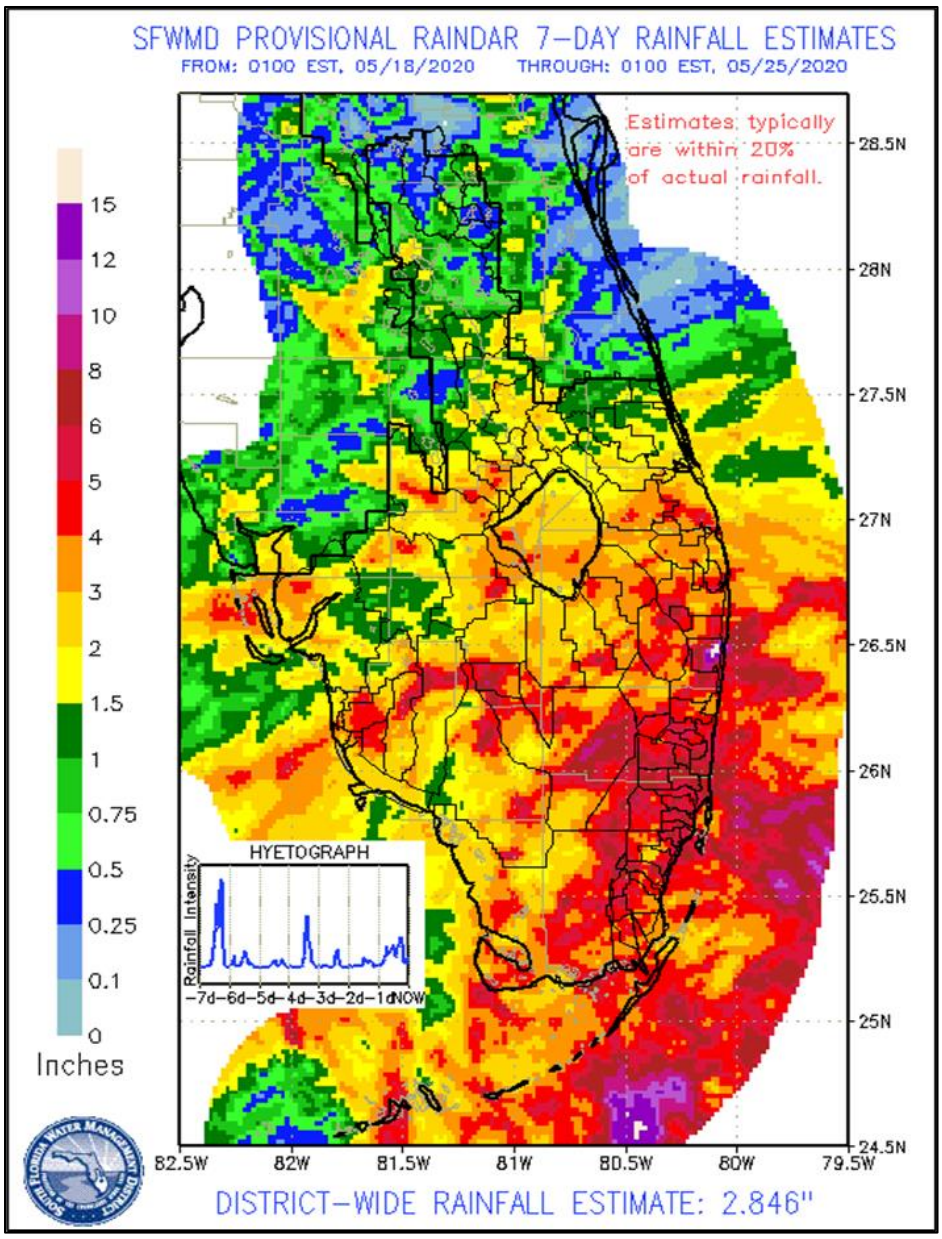

**Figure 10**. Forecasted Val I-75 surface salinity assuming no pulse release at S-79.

**EVERGLADES**

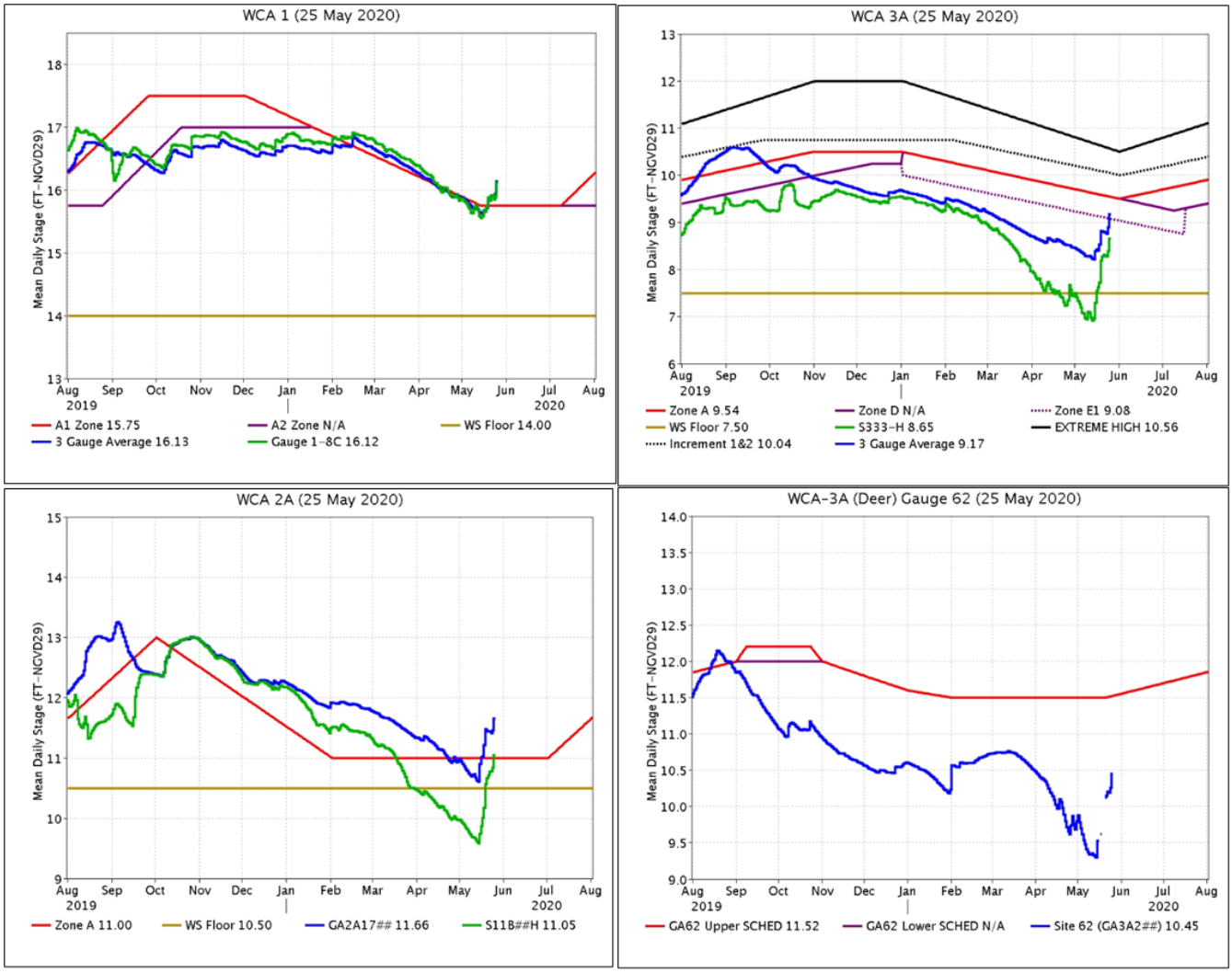
Well above average rainfall was recorded across the Everglades last week, with WCA-3A and 3B receiving the most. At the gauges monitored for this report stages rose on average 0.57 feet last week with a maximum change of +0.95 feet in WCA-3A NW and the rate of rise in stage meant all the basins rated poorly for current foraging conditions for wading birds. Evaporation was estimated at 1.66 inches last week.

| Everglades Region | Rainfall (Inches) | Stage Change (feet) |
|---|---|---|
| WCA-1 | 4.17 | +0.43 |
| WCA-2A | 3.68 | +0.45 |
| WCA-2B | 4.89 | +0.53 |
| WCA-3A | 4.34 | +0.70 |
| WCA-3B | 5.21 | +0.54 |
| ENP | 3.63 | +0.70 |

Good
Fair
Poor



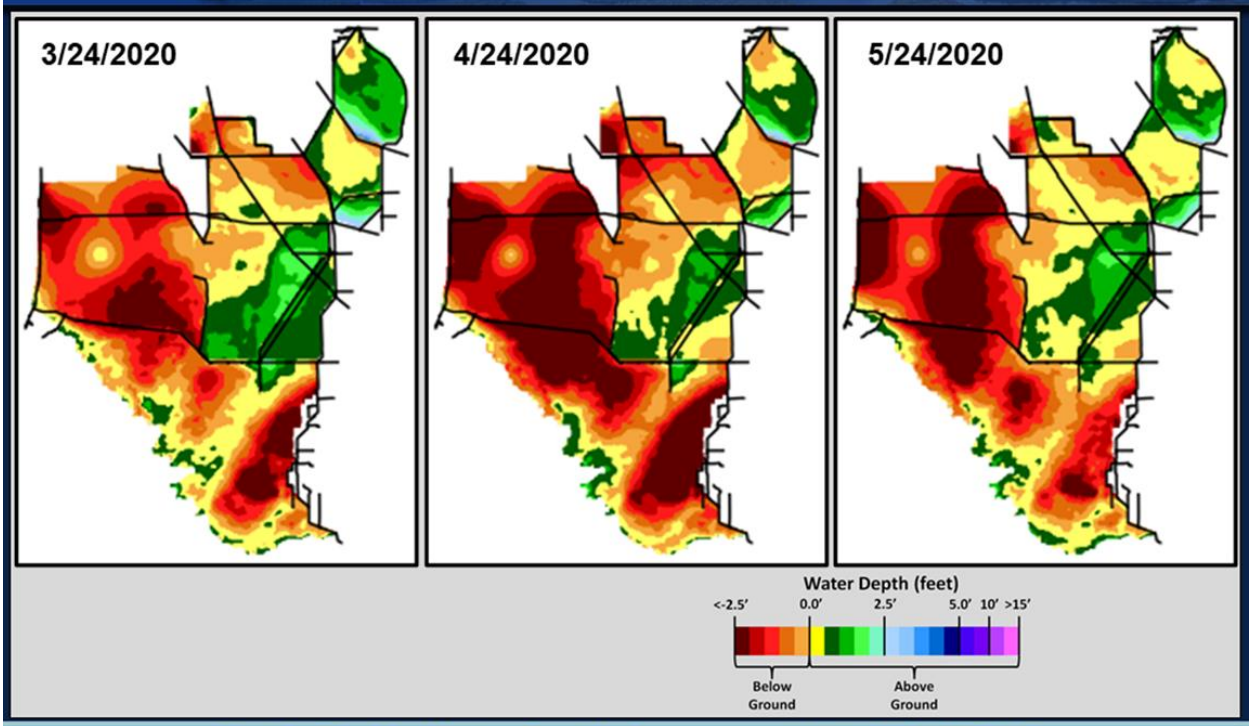

Regulation Schedules: WCA-1: Stage at the 1-8C Gauge rose sharply last week after slowing midweek, currently 0.37 feet above the Zone A1 line. WCA-2A: Stage at Gauge S11-B rose quickly to regulation schedule last week now 0.05 feet above. WCA-3A: The Three Gauge Average stage trends up and towards regulation last week moving into Zone E1, presently 0.09 feet above that regulation line. WCA-3A at gauge 62 (Northwest corner): Stages rose quickly last week and is well below the Upper Schedule at 1.07 feet below the rising target line.




Water Depths: The WDAT tool for spatial interpolation of depth monthly snapshots indicate depths remain below ground in northeastern WCA-3A, with the western side now showing the potential for water above the soil surface. Most of WCA-2A now has the potential for water above the soil surface and this was confirmed from a helicopter survey on 5/22. WCA-1 depths remain relatively stable and depths came up in the north. Shark River Slough and Taylor River are in ENP are showing signs of stages ascending to ground surface or near. Comparing WDAT water levels from present, over the last month stages rose over a majority of the WCAs with northwestern WCA-3A being the region with the greatest level of inundation and WCA-1 the least. Looking back one year the stage difference patterns are the opposite. The entirety of the WCAs are lower in stage. WCA-2A is most significantly lower in stage in the eastern regions of that basin and in WCA-3A along the L-67 canals. WCA-1 stages are similar to what they were a year ago. The WDAT model indicates a dryer conditions in the western basins compared to a year ago.

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

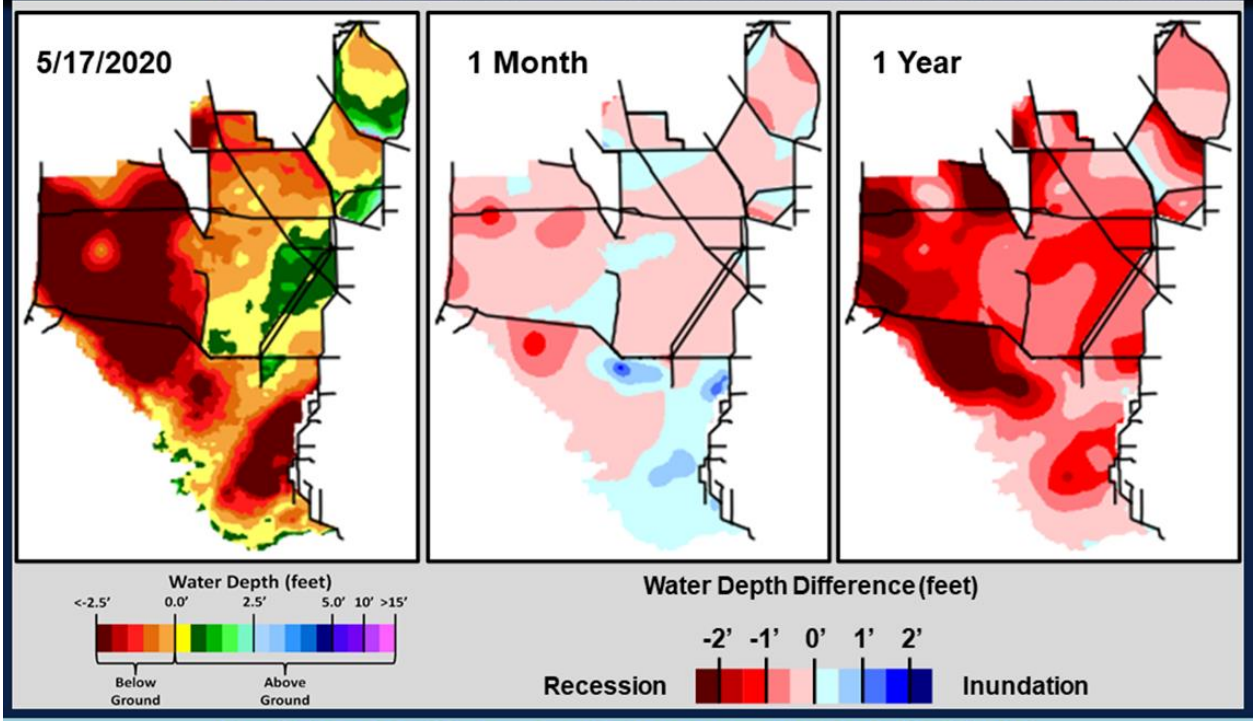
# SFWDAT Water Depth Monthly Snapshots




South Florida Water Depth Assessment Tool (SFWDAT)

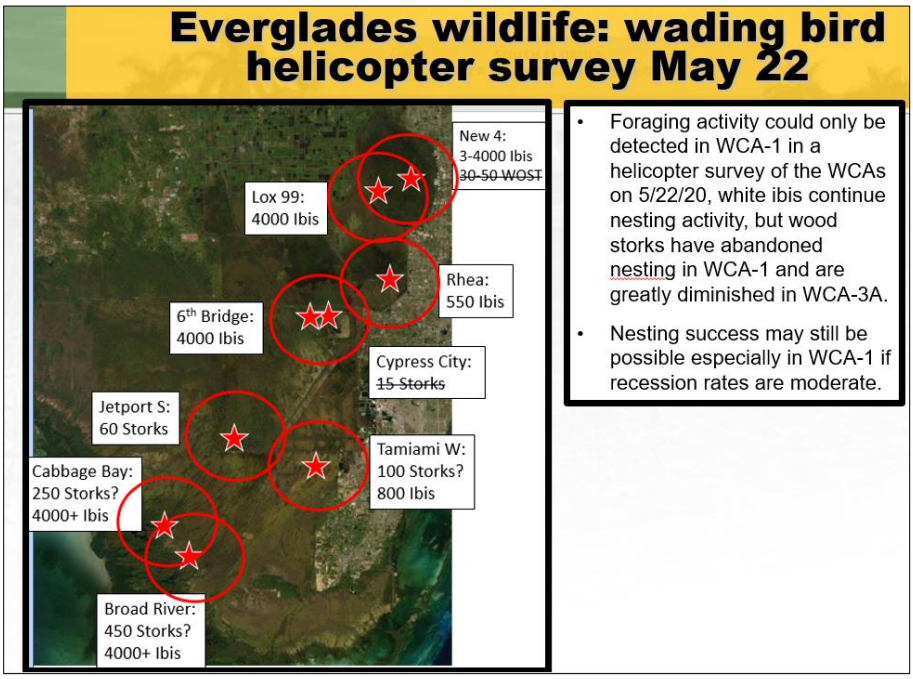
SOUTH FLORIDA WATER MANAGEMENT DISTRICT

# SFWDAT Everglades Difference Maps (Present – Past)

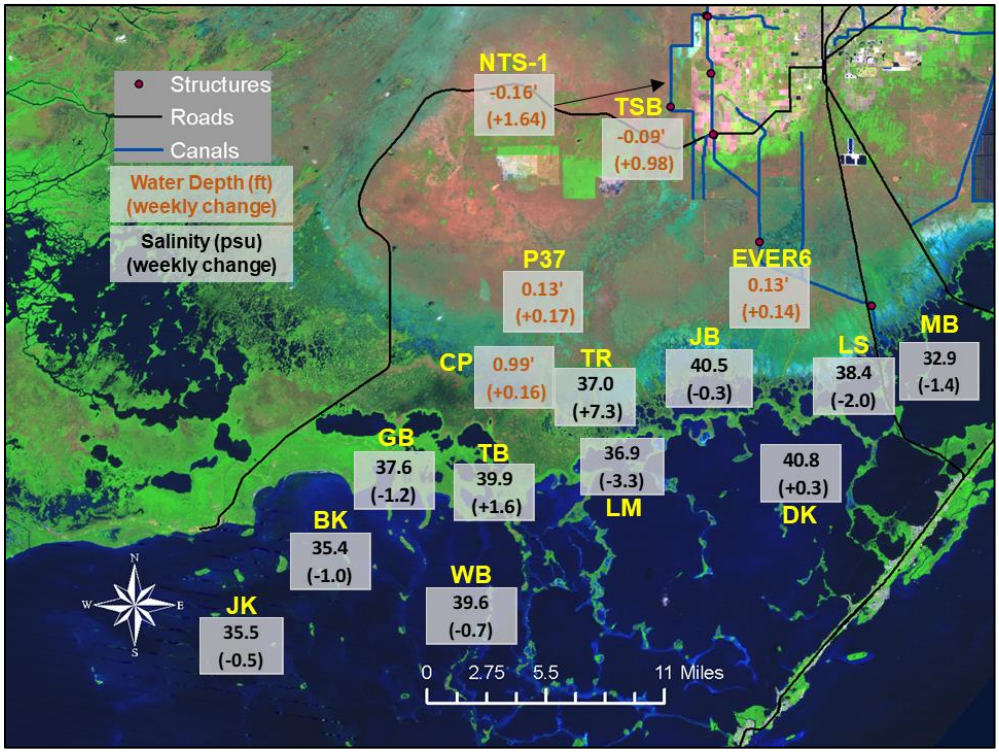


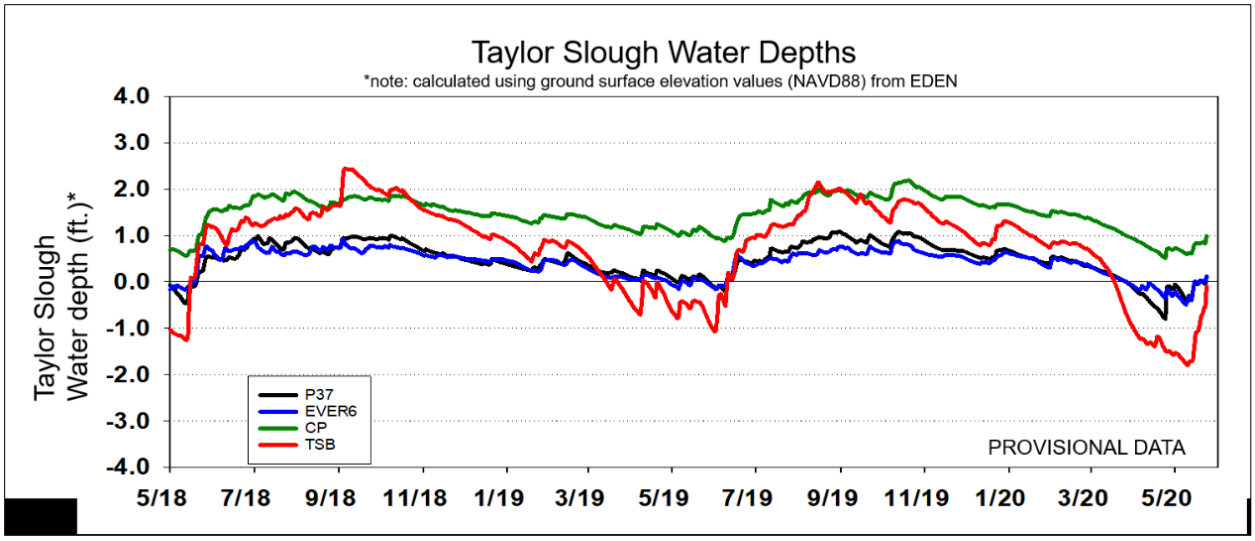

South Florida Water Depth Assessment Tool (SFWDAT)

Wildlife: Wading birds




Taylor Slough Water Levels: An average of 3.72 inches of rain fell over Taylor Slough and Florida Bay this past week and stages increased an average of 0.62 feet with only the northernmost sites remaining below ground surface. Westward water movement has begun with the S-332s turning on over the weekend. If sufficient depth, samples to test for phosphorus levels are scheduled for 5/26 to begin assessing when S-328 should be opened to minimize nutrient loading to the Park.




Taylor Slough Water Depths
*note: calculated using ground surface elevation values (NAVD88) from EDEN
Taylor Slough Water depth (ft.)*
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
-3.0
-4.0
P37
EVER6
CP
TSB
PROVISIONAL DATA
5/18
7/18
9/18
11/18
1/19
3/19
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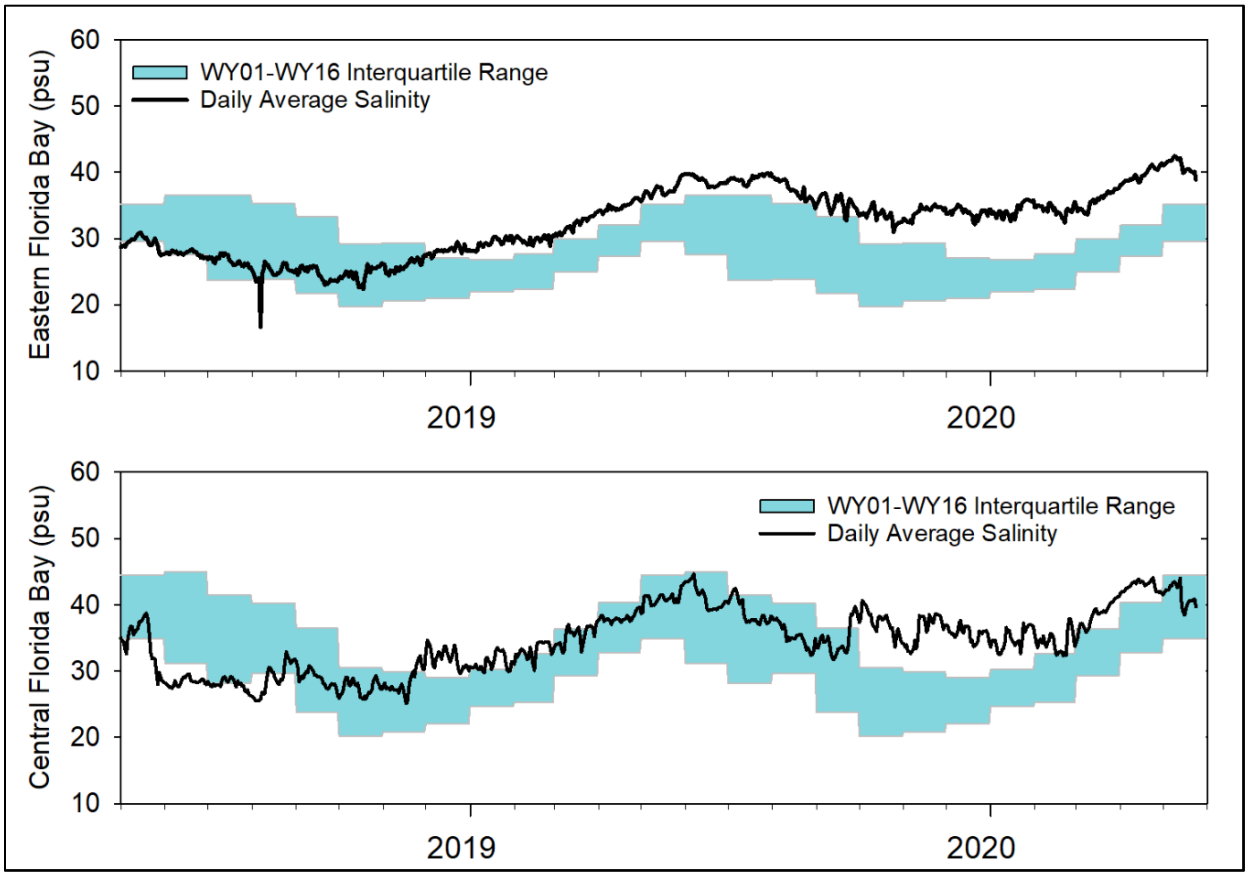
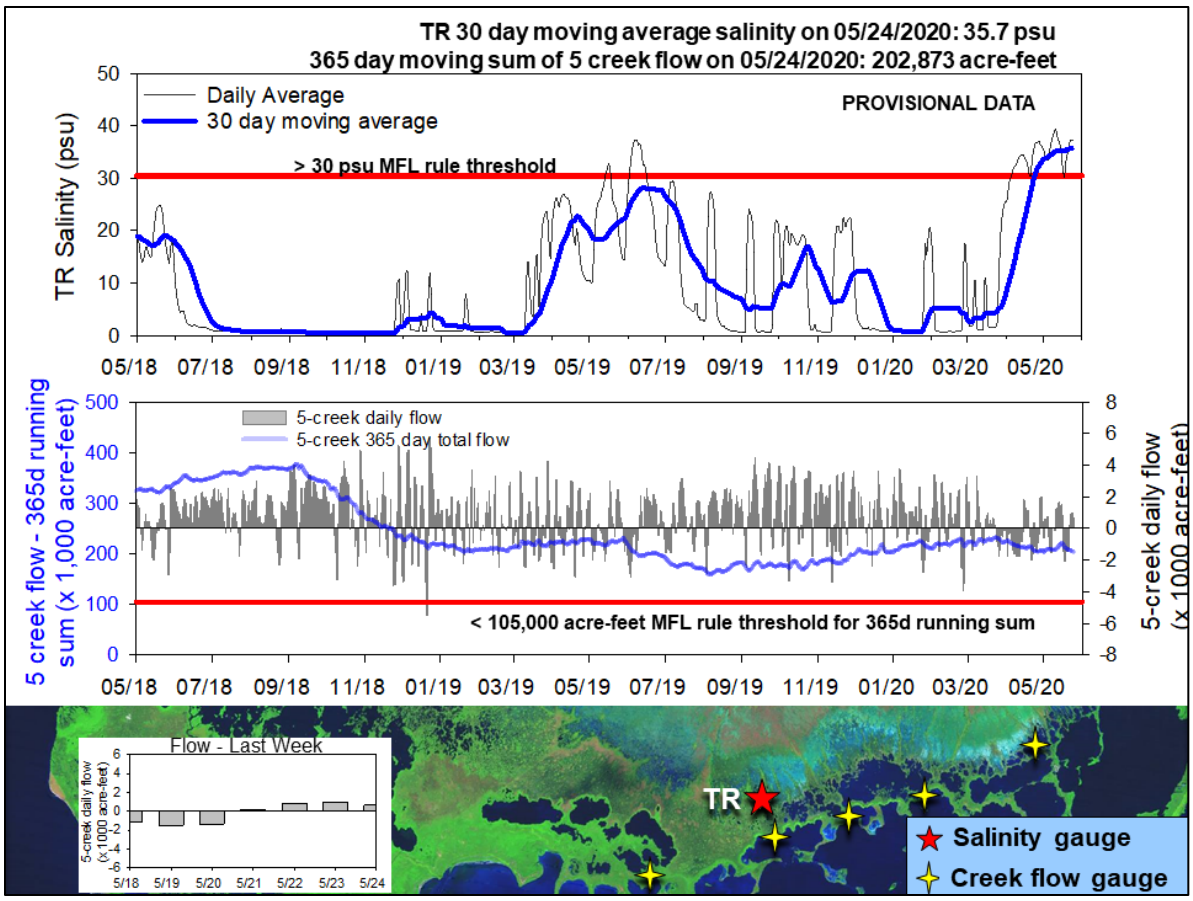
7/19
9/19
11/19
1/20
3/20
5/20


Eastern Florida Bay (psu)
WY01-WY16 Interquartile Range
Daily Average Salinity
60
50
40
30
20
10
2019
2020
Central Florida Bay (psu)
WY01-WY16 Interquartile Range
Daily Average Salinity
60
50
40
30
20
10
2019
2020




Florida Bay Salinities: Average salinity in Florida Bay decreased 0.8 this week due to competing forces of rainfall and upstream flows. Salinities are within 1 of historical average for this time of year at all stations. If the rains continue, freshwater flows from upstream will help to bring salinity down more rapidly in the nearshore areas.

Florida Bay MFL: Salinity at the TR station in the mangrove zone (tracked for the Florida Bay MFL) increased from 30 to 37 over the last week. The 30-day moving average increased 0.6 to end at 35.7. Weekly flow from the 5 creeks identified by yellow stars on the map totaled about −1,400 acre-feet last week with positive flows resuming on Thursday (5/21). The 365-day moving sum of flow from the five creeks (tracked as part of the Florida Bay MFL criteria) decreased 9,000 acre-feet this week to end at 202,873 acre-feet, between the 25th percentile (192,885 acre-feet) and the median (249,091 acre-feet). Creek flow are provisional USGS data.

**Water Management Recommendations**

Water management undertaken to minimize a reversal (trying to keep the rise in stage less than 0.25 feet per week) that would negatively impact the core wading bird foraging area in WCA-1 would have ecological benefit. Discharges into historically over drained northern WCA-3A have the potential to maintain saturated soils and protect these over-drained portions of the Everglades. The ecological benefits include conserving peat and lowering the risk of muck fires especially as depths near the seasonal low in regions with muck fire potential. While the moderation of recession rates in any part of WCA-3A North are beneficial, available water sent through the S-150 into Northeastern WCA-3A would have greater ecological value than the same amount of water discharged in Northwestern 3A. This is due in part to the greater potential for muck fire in the northeastern region versus the northwestern regions and that the WDAT for that basin continues to indicate depths below ground there. If sufficient depths are present, samples to test for phosphorus levels are scheduled for 5/26 to begin assessing when S-328 should be opened to minimize nutrient loading to the Park. 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 as nearshore salinities remain elevated, decreasing the estuarine gradient within the bay. More specific recommendations appear in the summary table below. The red text represents new or modified information or recommendations.

| SFWMD Everglades Ecological Recommendations, May 26th, 2020 (red is new) | | | |
|---|---|---|---|
| Area | Weekly change | Recommendation | Reasons |
| WCA-1 | Stage increased by 0.43' | Moderating the ascension rate to less than 0.25 feet per week or 0.50 feet per two weeks is ecologically beneficial. Moderating the recession rate in this basin has ecological benefit. | Protect downstream habitat and wildlife. Provide wading bird foraging opportunities as wading bird nesting continues in this basin. |
| WCA-2A | Stage increased by 0.45' | 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. |
| WCA-2B | Stage increased by 0.53' | 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. |
| WCA-3A NE | Stage increased by 0.76' | 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 and conserve peat soils, prevent muck fires. |
| WCA-3A NW | Stage increased by 0.95' | 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. | |
| Central WCA-3A S | Stage increased by 0.76' | 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. Protect wading bird foraging as nesting continues. |
| Southern WCA-3A S | Stage increased by 0.34' | | |
| WCA-3B | Stage increased by 0.54' | 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 tree islands, upstream/downstream habitat and wildlife. |
| ENP-SRS | Stage increased by 0.70' | Make discharges to the Park according to the 2012 WCP rainfall plan | Protect upstream/downstream habitat and wildlife. |
| Taylor Slough | Stage changes ranged from +0.14' to +1.64' | Move water southward as possible | When available, provide freshwater buffer for downstream conditions. |
| FB- Salinity | Salinity changes ranged −3.3 to +1.6 psu | Move water southward as possible | When available, provide freshwater to maintain low salinity buffer and promote water movement. |