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:** November 21, 2023

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

## Summary

### Weather Conditions and Forecast

An upper-air disturbance moving into the southeastern U.S. will propel a cold front located over north Florida into the northern half of the SFWMD Wednesday afternoon. The front will slow down and stall near the southeast coast of Florida or the southern third of the area on Thursday morning. Preceding the cold front, a line of mainly light, fast-moving showers is likely to overspread the northern or northwestern half of the SFWMD Wednesday afternoon and evening and the southern half of the area during the early morning hours on Wednesday, with the result being a good or widespread coverage of rainfall. A relative drying is most likely on Thursday with limited shower activity along and near the lower east coast through the Everglades. Next, a vigorous upper-air disturbance has the potential for a significant influx of moisture, which could cause a large increase of rain Friday night, mainly over the northern and northwestern parts of the SFWMD. As a result, the QPFs for Friday and Saturday have been adjusted notably upward to match the latest model guidance but with the forecast rated low confidence due to the still-large variation of possible outcomes. The last of any rains would most likely exit the SFWMD either Saturday morning or afternoon, after which the cold front is forecast to sink southward enough to allow for a drying later in the weekend. For the week ending next Tuesday morning, total SFWMD rainfall is predicted to be near-normal, although the possible range is larger-than-normal resulting from the low-confidence forecast on Friday and Saturday. More than likely, rainfall north and west of Lake Okeechobee will be above normal.

### Kissimmee

Releases were made from East Lake Toho and Lake Toho to keep lake stage from exceeding the regulation schedules due to rainfall. Weekly average discharge on November 19, 2023, was 940 cfs and 890 cfs at S-65 and S-65A, respectively. Mean weekly water depth on the Kissimmee River floodplain decreased by 0.07 feet to 0.33 feet over the week ending November 19, 2023. The weekly average concentration of dissolved oxygen in the Kissimmee River decreased from 6.3 mg/L last week to 5.9 mg/L for the week ending November 19, 2023, which is well above the potentially lethal and stressful levels for largemouth bass and other sensitive species.

## Lake Okeechobee

Lake Okeechobee stage was 16.11 feet NGVD on November 19, 2023, which was 0.14 feet higher than the previous week and 0.18 feet lower than a month ago. Average daily inflows (excluding rainfall) increased to 2,260 cfs from the previous week of 1,820 cfs. Average daily outflows (excluding evapotranspiration) decreased to 1,270 cfs from the previous week of 3,580 cfs. The cyanobacteria index level was low to moderate in the southwestern region of the Lake according to the November 20, 2023, satellite image from NOAA's Harmful Algal Bloom Monitoring System**.**

## Estuaries

Total inflow to the St. Lucie Estuary averaged 256 cfs over the past week with no flow coming from Lake Okeechobee. Mean surface salinities decreased at HR1 and increased at the US1 Bridge and A1A Bridge sites over the past week. Salinity in the middle estuary was in the optimal range (10-25) for adult eastern oysters.

Total inflow to the Caloosahatchee Estuary averaged 2,580 cfs over the past week with 913 cfs coming from Lake Okeechobee. Mean surface salinities decreased at S-79, Val I-75, and Ft. Myers and increased at the remaining lower estuary sites over the past week. Salinities were in the optimal range (0-10) for tape grass in the upper estuary. Salinities were in the optimal range for adult eastern oysters at Cape Coral (10-25), and in the upper stressed range at Shell Point and Sanibel (>25).

## Stormwater Treatment Areas

For the week ending Sunday, November 19, 2023, 800 ac-ft of Lake Okeechobee water was delivered to the FEBs/STAs. The total amount of Lake releases sent to the FEBs/STAs in WY2024 (since May 1, 2023) is approximately 7,000 ac-feet. The total amount of inflows to the STAs in WY2024 is approximately 1,033,000 ac-feet. Most STA cells are near or above target stage. STA-1E Western Flow-way is offline for post-construction vegetation grow in. Operational restrictions are in effect in STA-1W Northern Flow-way, STA-2 Flow-ways 2 and 4, STA-3/4 Eastern Flow-way, and STA-5/6 Flow-way 4 for vegetation management activities. This week, if 2008 LORS recommends Lake releases to the WCAs and conditions allow, releases will be sent to STA-2.

## Everglades

Elevated rates of stage ascension meant all the WCA regions were characterized as "poor" weekly depth changes due to heavy direct rainfall and increased inflows. While deeper than average conditions in southern WCA-3A do have ecological tradeoffs, conditions this week look to have improved the probability of successful wood stork nesting success, important this year as the last two below average years led to near zero stork reproduction. Less wading bird foraging was detected along the coastal eco-tone late last week compared to two weeks ago, likely due to the reversals in stage. Stages rose significantly across Taylor Slough last week and increased to well above the historical average. Salinity decreased rapidly across Florida Bay last week and fell below the historical average in all regions. This resulted in a favorable salinity position as the dry season progresses. However, dramatic swings in salinities can be stressful to estuarine organisms and warrants careful monitoring moving forward.

## Biscayne Bay

Total inflow to Biscayne Bay averaged 2,101 cfs, and the previous 30-day mean inflow averaged 950 cfs. The seven-day mean salinity was 25.0 at BBCW8 and 20.8 at BBCW10, both within the ideal salinity range for estuarine organisms in this region (salinity less than 35). Data were provided by Biscayne National Park.

# Supporting Information

## Kissimmee Basin

### *Upper Kissimmee*

On November 19, 2023, mean daily lake stages were 58.1 feet NGVD (0.1 feet above schedule) in East Lake Toho, 55.0 feet NGVD (at schedule) in Lake Toho, and 51.0 feet NGVD (1.5 feet below schedule) in Lakes Kissimmee-Cypress-Hatchineha (KCH) (**Table KB-1**, **Figures KB-1-3**).

### *Lower Kissimmee*

For the week ending November 19, 2023, mean weekly discharge was 940 cfs and 890 cfs at S-65 and S-65A, respectively. Mean weekly discharge from the Kissimmee River was 1,300 cfs at S-65D and 1,500 cfs at S-65E (**Table KB-2**). Mean weekly headwater stages were 46.2 feet NGVD at S-65A and 27.2 feet NGVD at S-65D on November 19, 2023, a reduction of about 0.2 ft at S-65D. Mean weekly river channel stage decreased by 0.6 feet to 36.5 feet NGVD over the week ending on November 19, 2023 (**Figure KB-4**). Mean weekly water depth on the Kissimmee River floodplain decreased by 0.07 ft to 0.33 feet over the week ending November 19, 2023 (**Table KB-2**, **Figure KB-5**). The weekly average concentration of dissolved oxygen in the Kissimmee River decreased from 6.3 mg/L the previous week to 5.9 mg/L for the week ending November 19, 2023 (**Table KB-2**, **Figure KB-6**).

### *Water Management Recommendations*

Follow the Hybrid A discharge plan (Fig. KB-7) to facilitate S-69 repairs through May 31, 2024. Maintain at least minimum flow (250-300 cfs) at S-65A. Continue the stage recession at S-65D headwater to reach 25.8 ft NGVD in early January 2024 at a recession rate of approximately 0.2 ft/week.

**Table KB-1.** Average discharge for the preceding seven days, Sunday's average daily stage and Sunday's average daily departure from KCOL flood regulation lines or temporary schedules. All data are provisional.

| Water Body | Structure | Stage Monitoring Site | Weekly (7-Day) Average Discharge (cfs) | Sunday Lake Stage (feet NGVD)[a] | Schedule Type[b] | Sunday Schedule Stage (feet NGVD) | Sunday Departure from Regulation (feet) | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | *11/19/23* | *11/12/23* |
| Lakes Hart and Mary Jane | S-62 | LKMJ | 280 | 61.8 | R | 61.0 | 0.8 | -0.5 |
| Lakes Myrtle, Preston and Joel | S-57 | S-57 | 84 | 63.6 | R | 62.0 | 1.6 | -0.3 |
| Alligator Chain | S-60 | ALLI | 310 | 64.4 | R | 64.0 | 0.4 | -0.4 |
| Lake Gentry | S-63 | LKGT | 360 | 62.0 | R | 61.5 | 0.5 | -0.2 |
| East Lake Toho | S-59 | TOHOE | 240 | 58.1 | R | 58.0 | 0.1 | -0.9 |
| Lake Toho | S-61 | TOHOW S-61 | 190 | 55.0 | R | 55.0 | 0.0 | -0.7 |
| Lakes Kissimmee, Cypress and Hatchineha | S-65 | KUB011 LKIS5B | 940 | 51.0 | R | 52.5 | -1.5 | -1.7 |

a. Names of in-lake monitoring sites and structures used to determine lake stage. If more than one site is listed, an average is reported.

b. A: projected recession line; R: USACE regulation schedule; S: temporary recession target line; T: temporary schedule; NA: not applicable or not available.

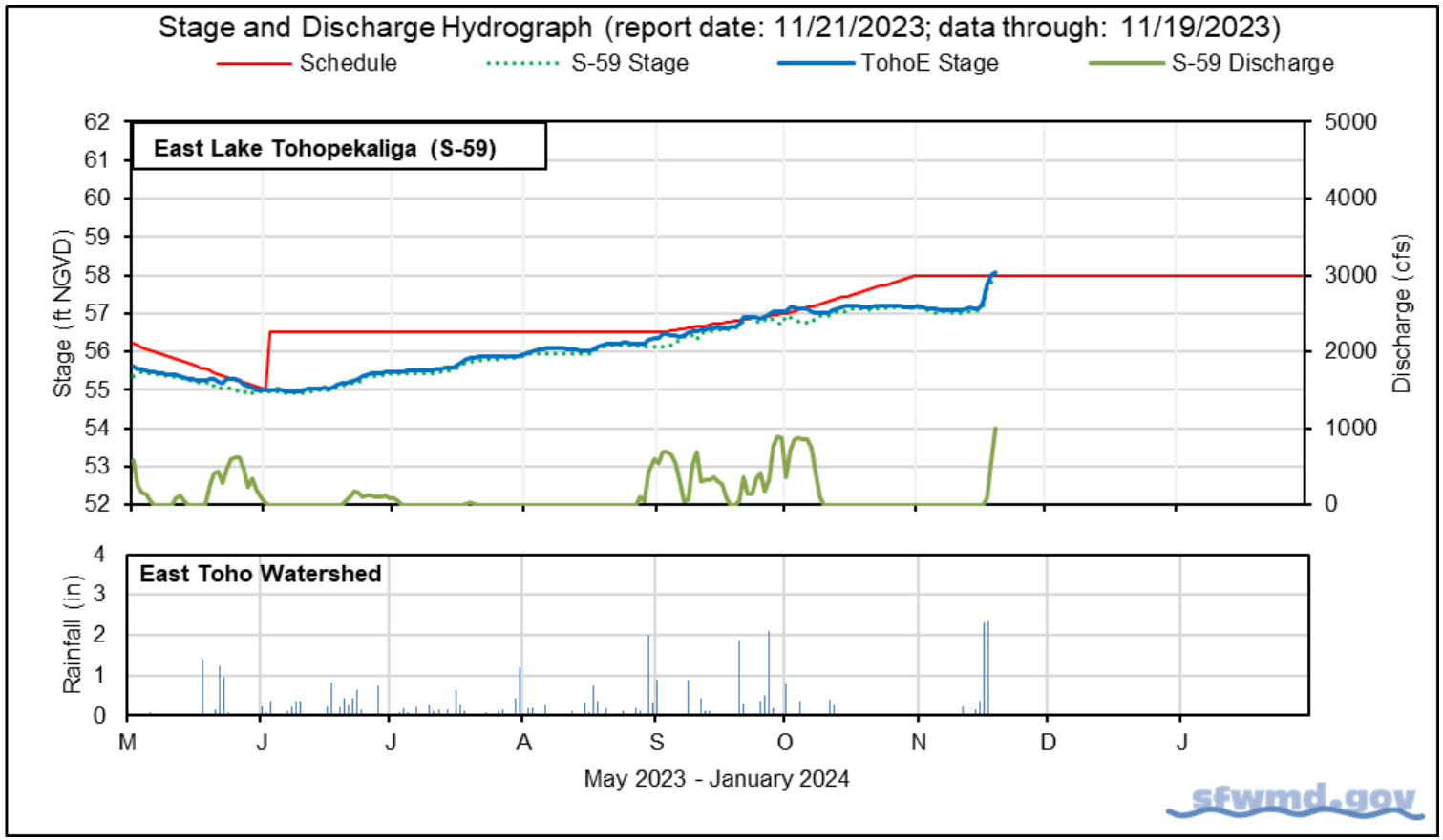



**Figure KB-1.** East Lake Toho regulation schedule, stage, discharge, and rainfall.

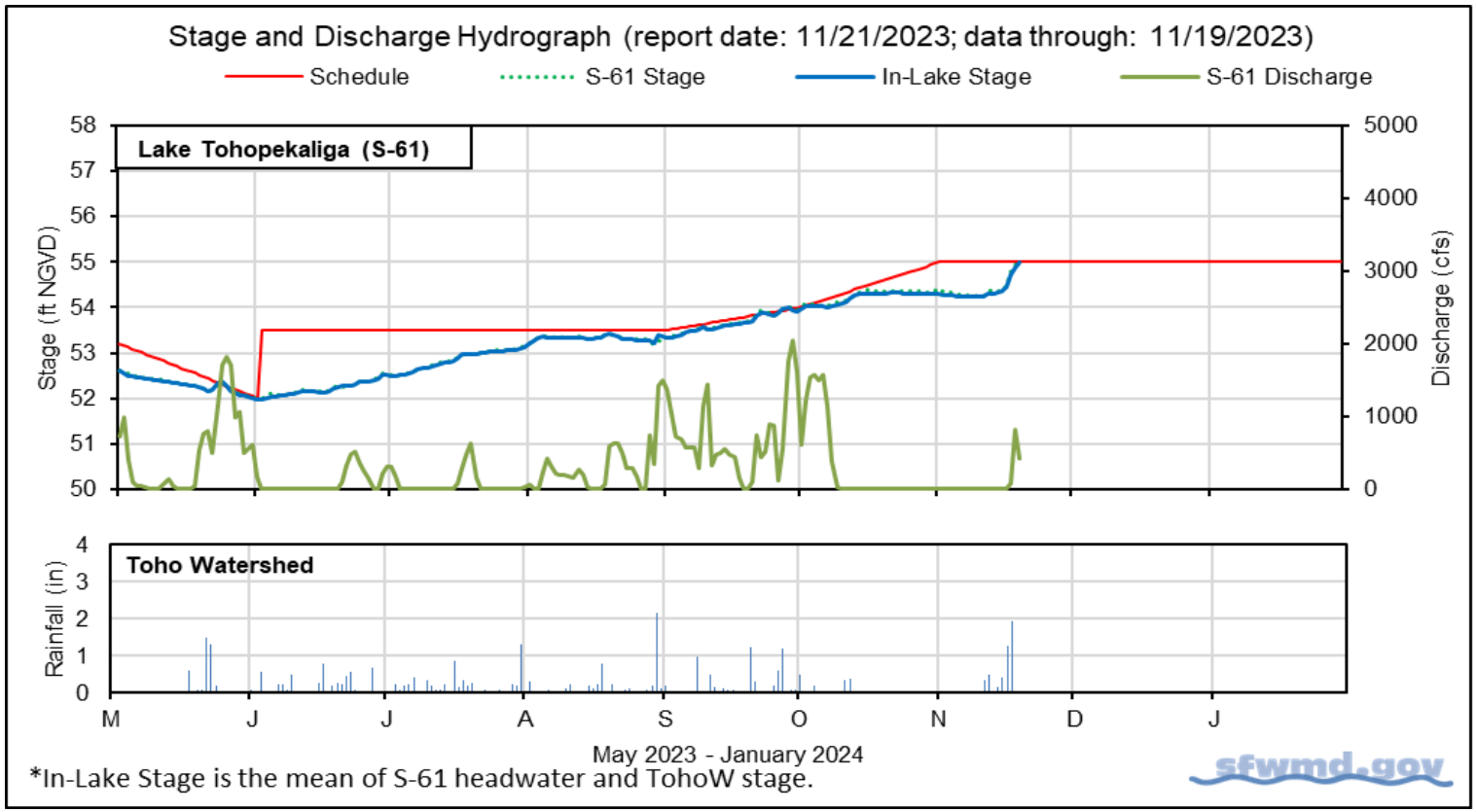



**Figure KB-2.** Lake Toho regulation schedule, stage, discharge, and rainfall.

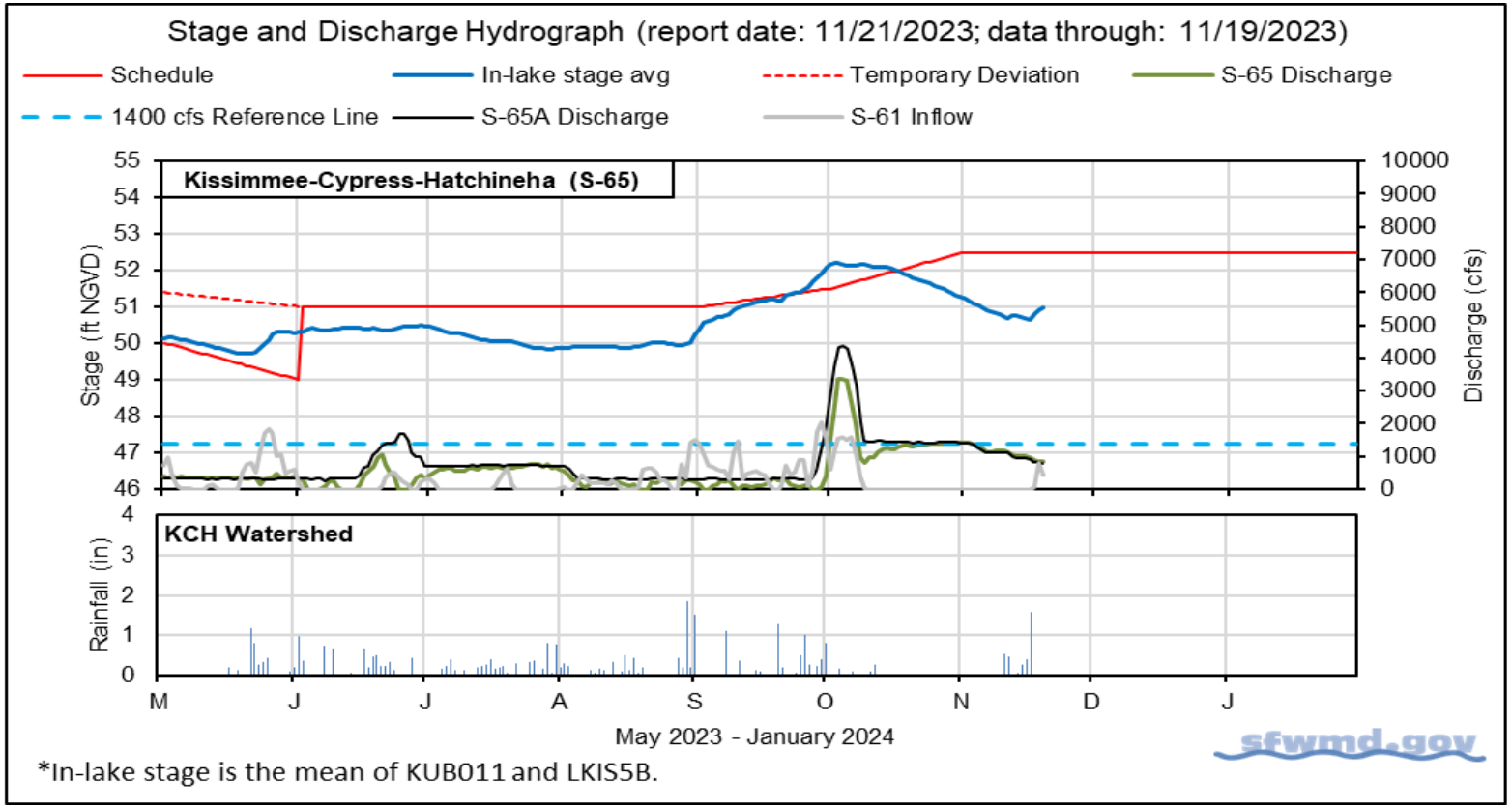



**Figure KB-3.** Lakes Kissimmee, Cypress and Hatchineha regulation schedule, stage, discharge, and rainfall.

**Table KB-2.** One- and seven-day average discharge and stage at Lower Kissimmee basin structures, river channel dissolved oxygen concentrations, and water depths in the Phase I area floodplain. All data are provisional.

| Metric | Location | Sunday Daily Average | Weekly Average for Previous Seven Day Periods | | | |
|---|---|---|---|---|---|---|
| | | 11/19/23 | 11/19/23 | 11/12/23 | 11/5/23 | 10/29/23 |
| Discharge | S-65 | 860 | 940 | 1,100 | 1,400 | 1,400 |
| Discharge | S-65A[a] | 790 | 890 | 1,100 | 1,400 | 1,400 |
| Headwater Stage (feet NGVD) | S-65A | 46.3 | 46.2 | 46.2 | 46.3 | 46.3 |
| Discharge | S-65D[b] | 1,200 | 1,300 | 1,400 | 1,600 | 1,900 |
| Headwater Stage (feet NGVD) | S-65D[c] | 27.1 | 27.2 | 27.4 | 27.6 | 27.9 |
| Discharge (cfs) | S-65E[d] | 1,300 | 1,500 | 1,600 | 1,600 | 2,000 |
| Discharge (cfs) | S-67 | 0 | 0 | 0 | 0 | 0 |
| Dissolved Oxygen (mg/L) [e] | Phase I, II/III river channel | 6.2 | 5.9 | 6.3 | 5.7 | 4.9 |
| River channel mean stage[f] | Phase I river channel | 36.2 | 36.5 | 37.1 | 37.5 | 37.7 |
| Mean depth (feet) [g] | Phase I floodplain | 0.30 | 0.33 | 0.40 | 0.48 | 0.60 |

a. Combined discharge from main and auxiliary structures.

b. Combined discharge from S-65D, S-65DX1, and S-65DX2.

c. Average stage from S-65D and S-65DX1.

d. Combined discharge from S-65E and S-65EX1.

e. Dissolved oxygen is the average of values from sondes KRBN, PC62, PC33, PD62R, and PD42R.

f. Mean of five river channel stations (PC62, KRDR02, KRBN, PC33, PC11) in the Phase I area.

g. One-day spatial average obtained from the South Florida Water Depth Assessment Tool (SFWDAT).

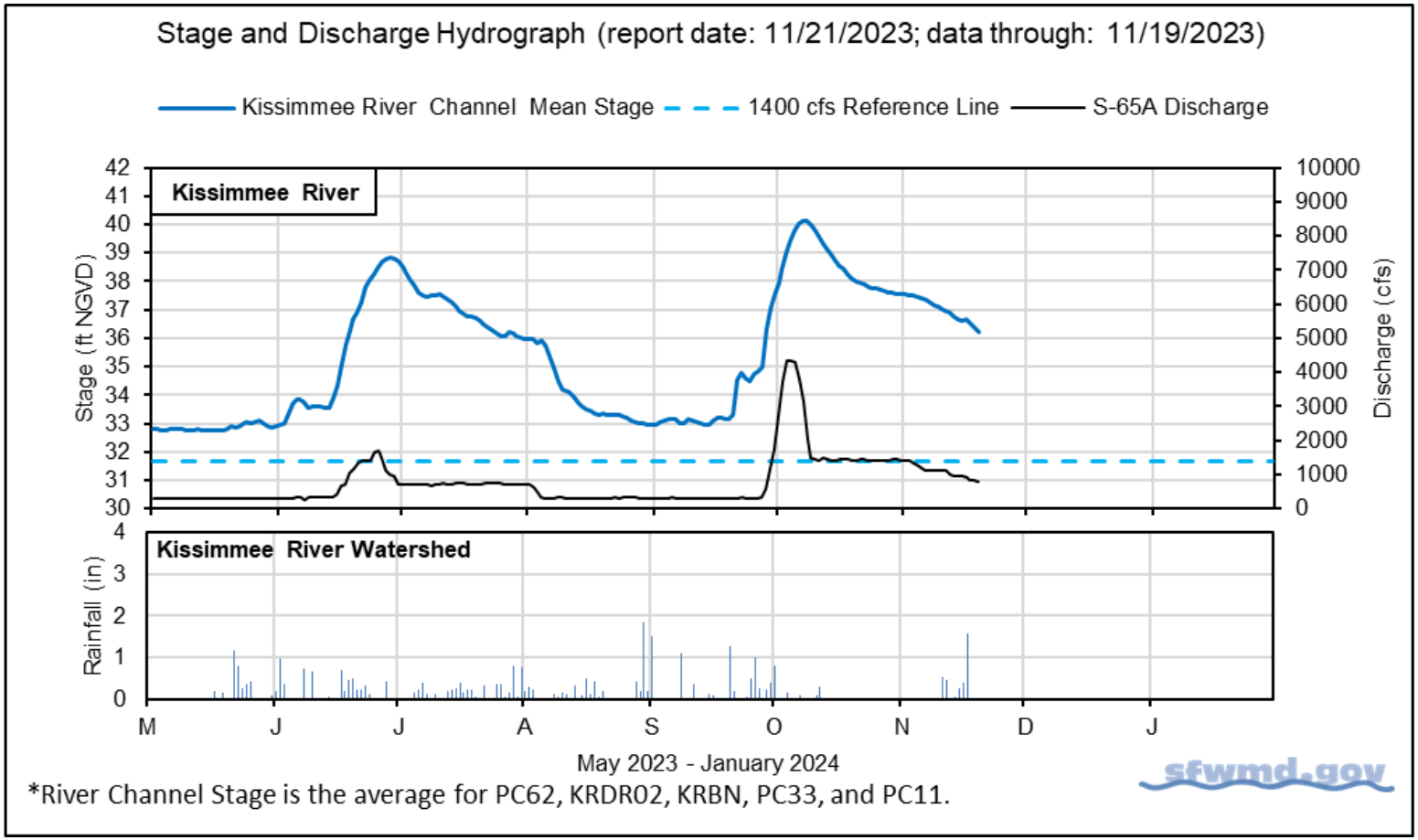



**Figure KB-4.** Kissimmee River stage, discharge, and rainfall.

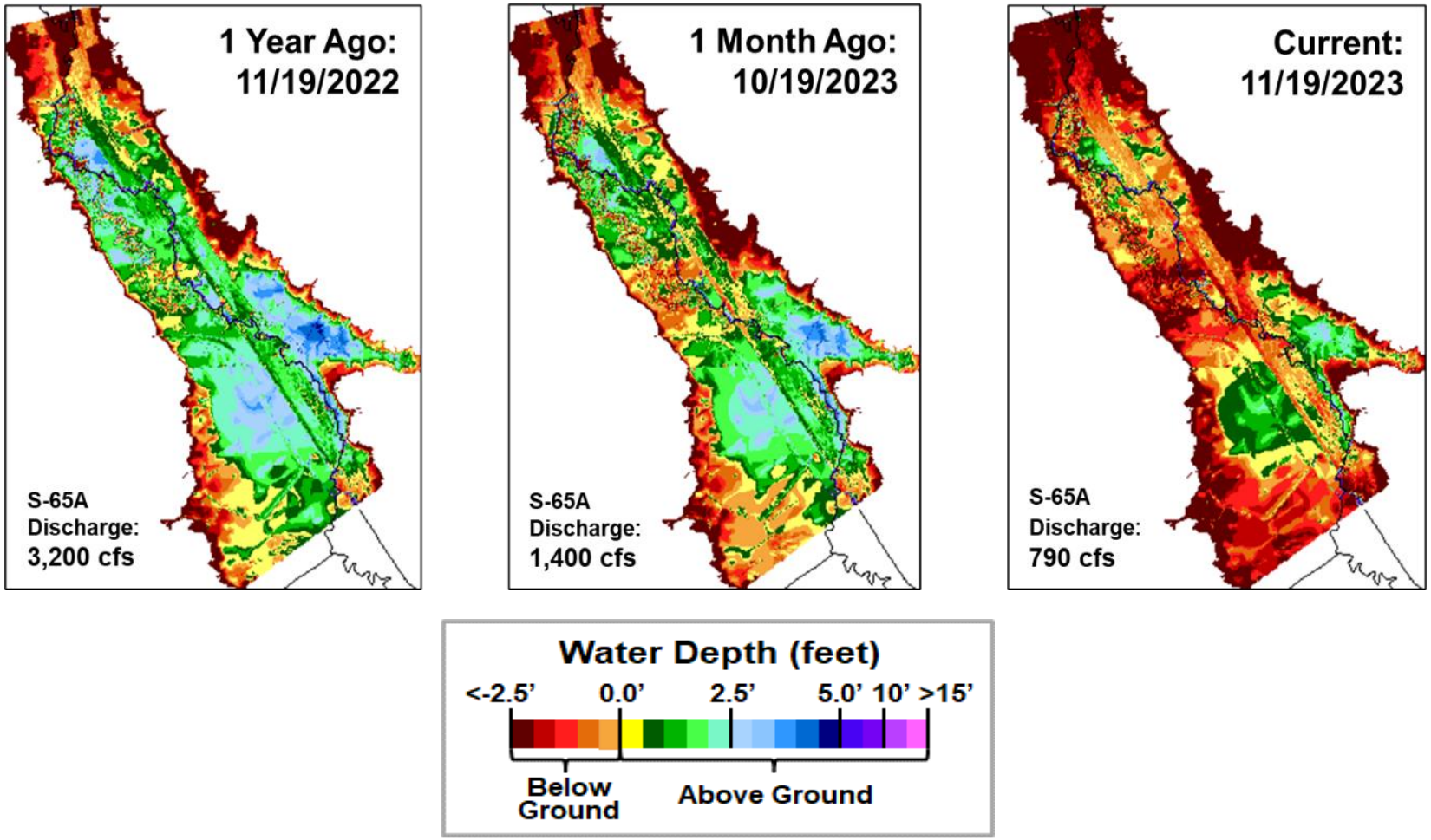



**Figure KB-5.** Phase I area Kissimmee River floodplain water depths (from left to right) one year ago, one month ago, and current.

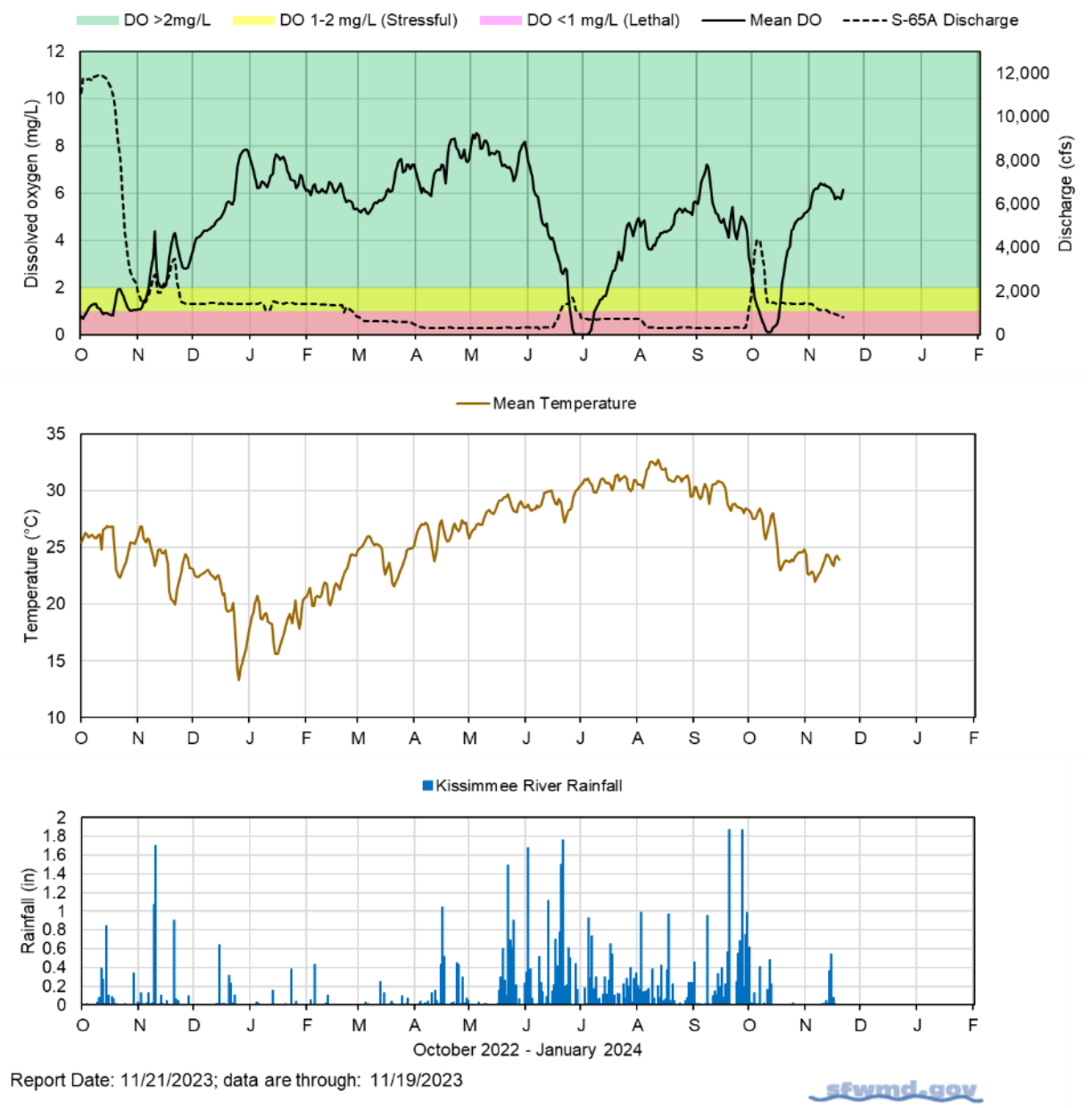



**Figure KB-6.** Restored Kissimmee River channel mean daily dissolved oxygen concentration (mg/L), S-65A discharge (cfs), temperature (°C), and rainfall (inches). Dissolved oxygen (DO) and temperature are mean daily values averaged for PC62, KRDR02, KRBN, PC33, PC11, PD62R, and PD42R with an average of five stations reporting this week. Rainfall values are daily totals for Kissimmee River (Pool BCD) AHED watershed.

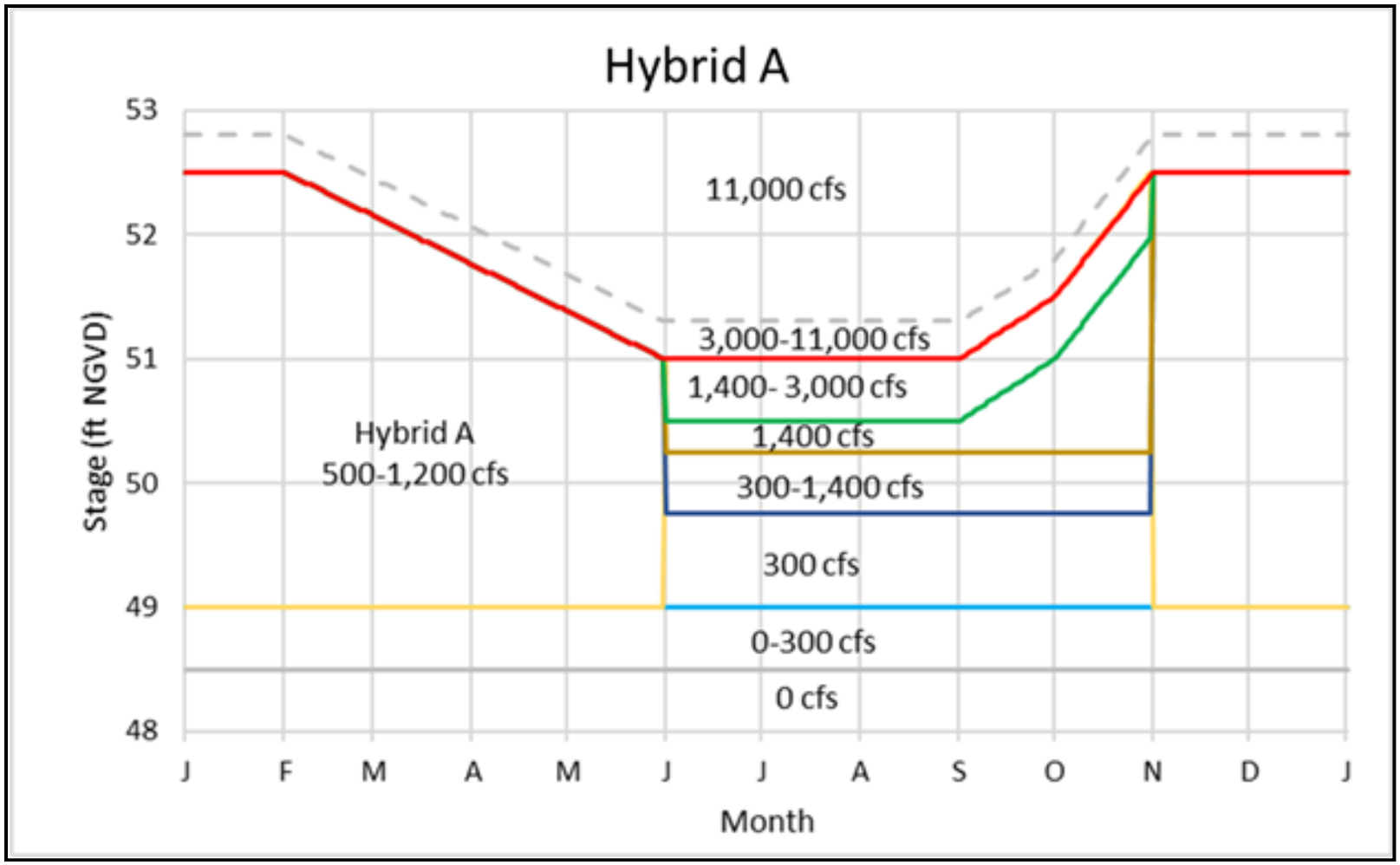



**Figure KB-7.** Hybrid A Discharge Plan for S-65/S-65A. Use discharge rate of change limits from IS-14-50 (Fig. KB-8).

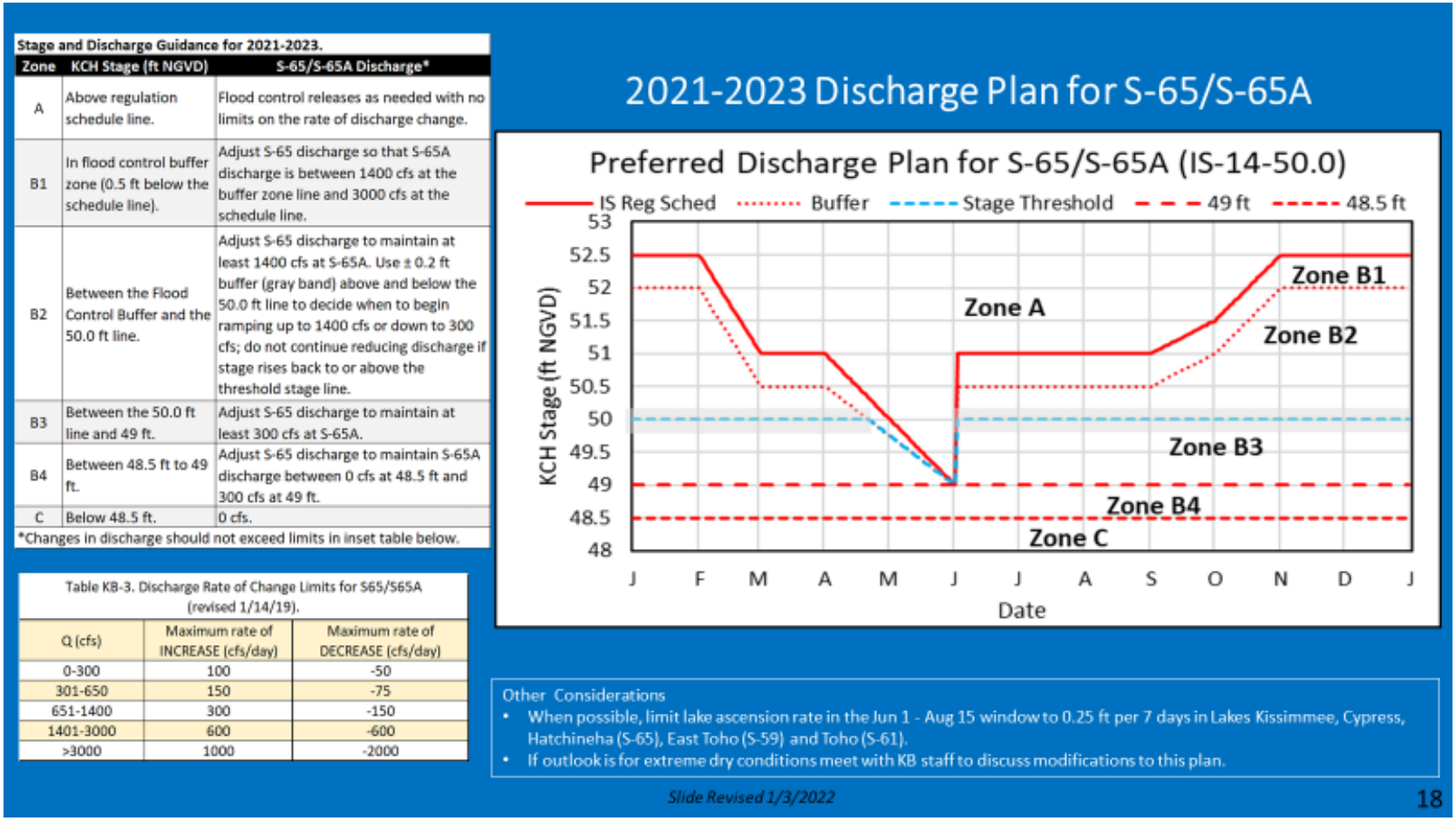



**Figure KB-8.** IS-14-50 Discharge Plan for S65/S65A with discharge rate of change limits (revised 1/14/19).

## Lake Okeechobee

Lake Okeechobee stage was 16.11 feet NGVD on November 19, 2023, which was 0.14 feet higher than the previous week and 0.18 feet lower than a month ago (**Figure LO-1**). Lake stage was in the low sub-band on November 19th (**Figure LO-2**) and was 0.61 feet above the upper limit of the ecological envelope (**Figure LO-3**). According to NEXRAD, 1.50 inches of rain fell directly over the Lake.

Average daily inflows (excluding rainfall) increased from the previous week of 1,820 cfs to 2,260 cfs. The highest structure inflow came from the C-38 Canal via the S-65E/65EX1 structure (1,460 cfs). Average daily outflows (excluding evapotranspiration) decreased from the previous week of 3,580 cfs to 1,270 cfs. The highest average single structure outflow was recorded at the S-77 structure into the C-43 Canal (1,080 cfs). **Figures LO-4 and LO-5** show the combined average daily inflows and outflows for the Lake over the past eight weeks, and average inflows and outflows last week, respectively. These data are provisional and are subject to change.

As of November 1st, the routine water quality (WQ) and phytoplankton monitoring is now on the off-bloom season schedule, with WQ samples collected once per month at all in-lake sites, and cyanobacteria taxa/toxins samples collected at 9 sites. Provisional results from the November 13-15 sampling show *Microcystis aeruginosa* was the dominant taxa at 2 sites in the south/west region of the Lake, while the remaining 7 sites had mixed communities (**Figure LO-6**). No toxins were detected at any in-lake sites.

The cyanobacteria index level was low to moderate in the southwestern region of the Lake according to the November 20, 2023, satellite image from NOAA's Harmful Algal Bloom Monitoring System (**Figure LO-7**). All data presented in this report are provisional and are subject to change.

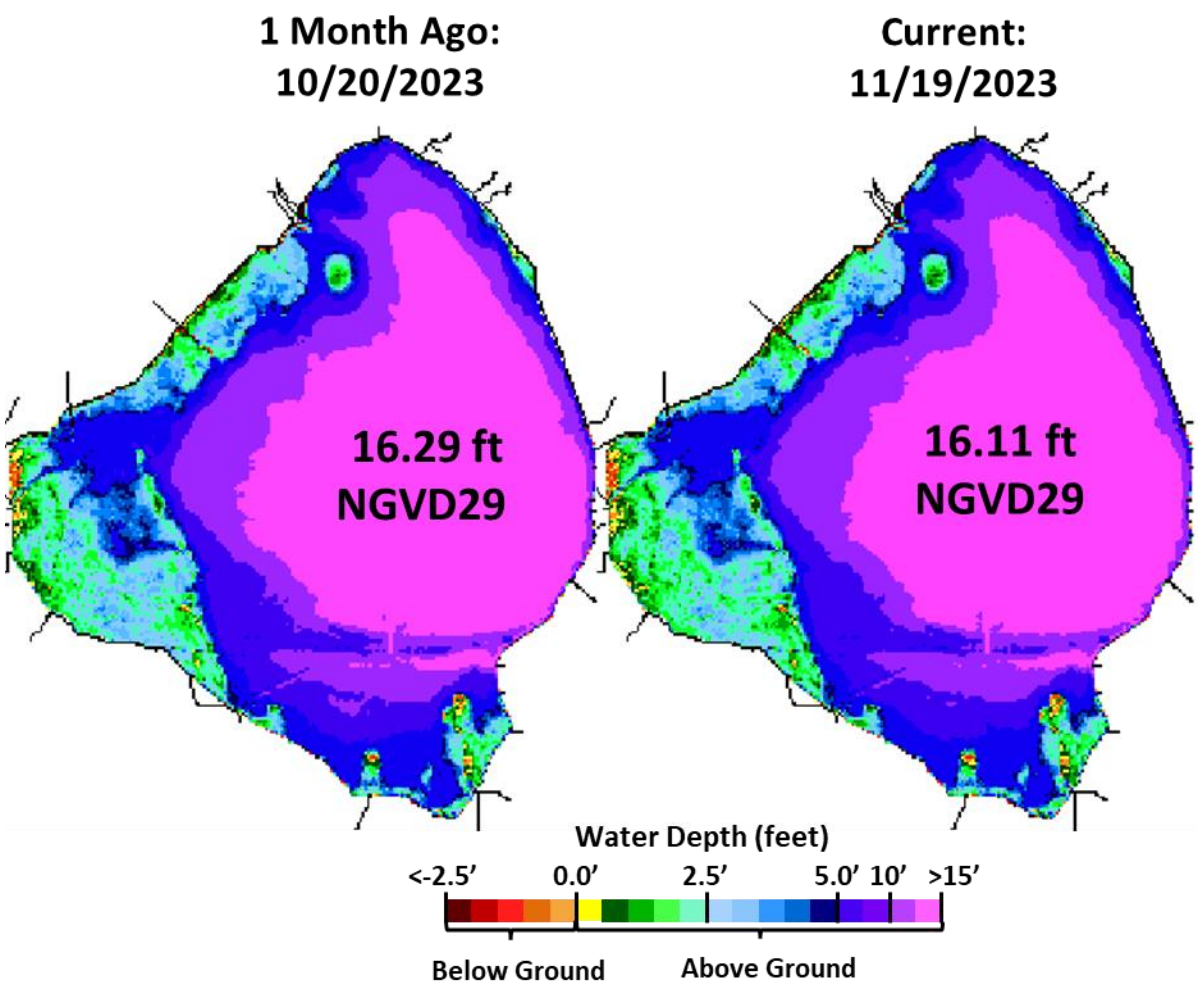



**Figure LO-1.** Lake Okeechobee water depth estimates based on South Florida Water Depth Assessment Tool (SFWDAT).

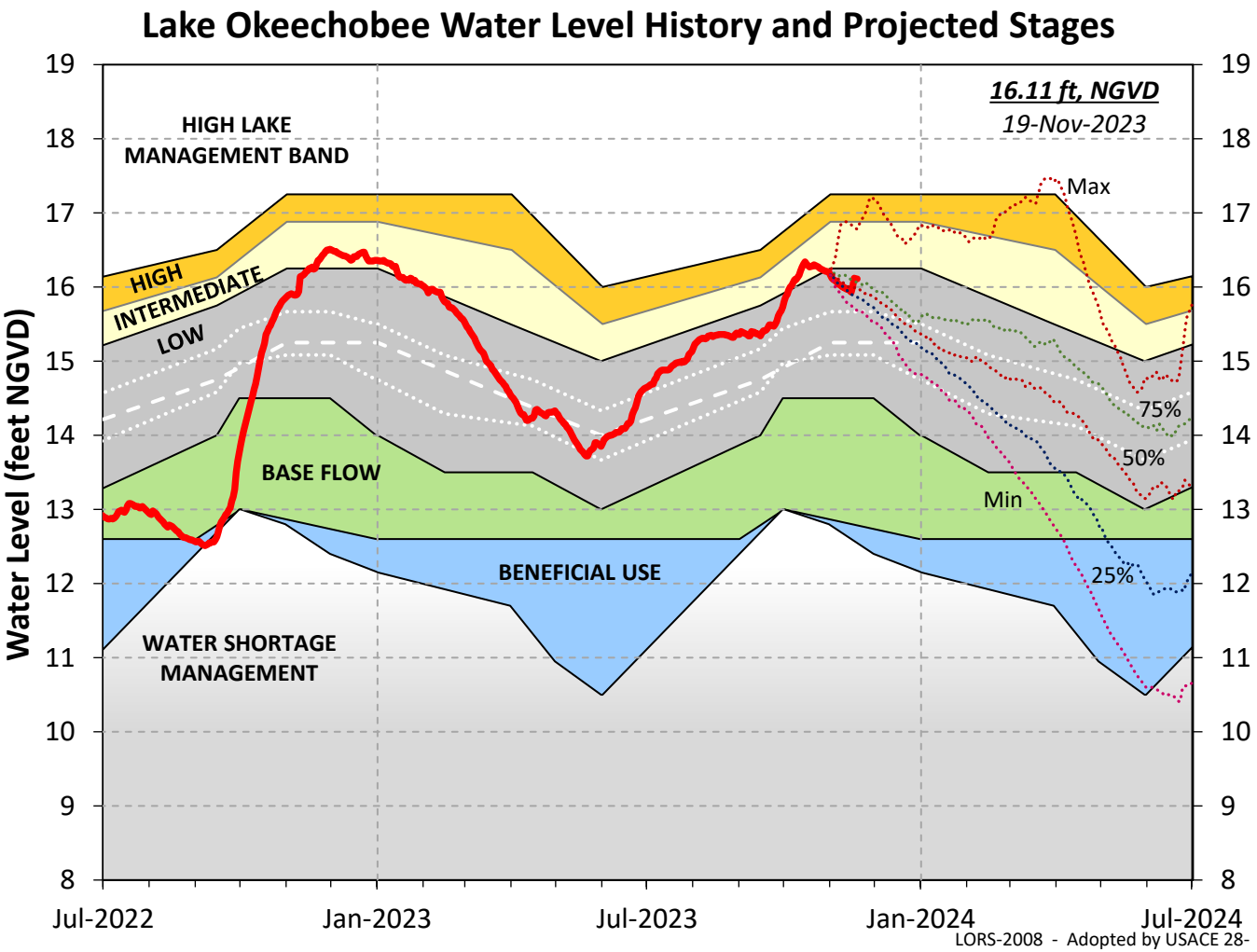



**Figure LO-2.** Recent Lake Okeechobee stages with projected stages based on a dynamic position analysis.

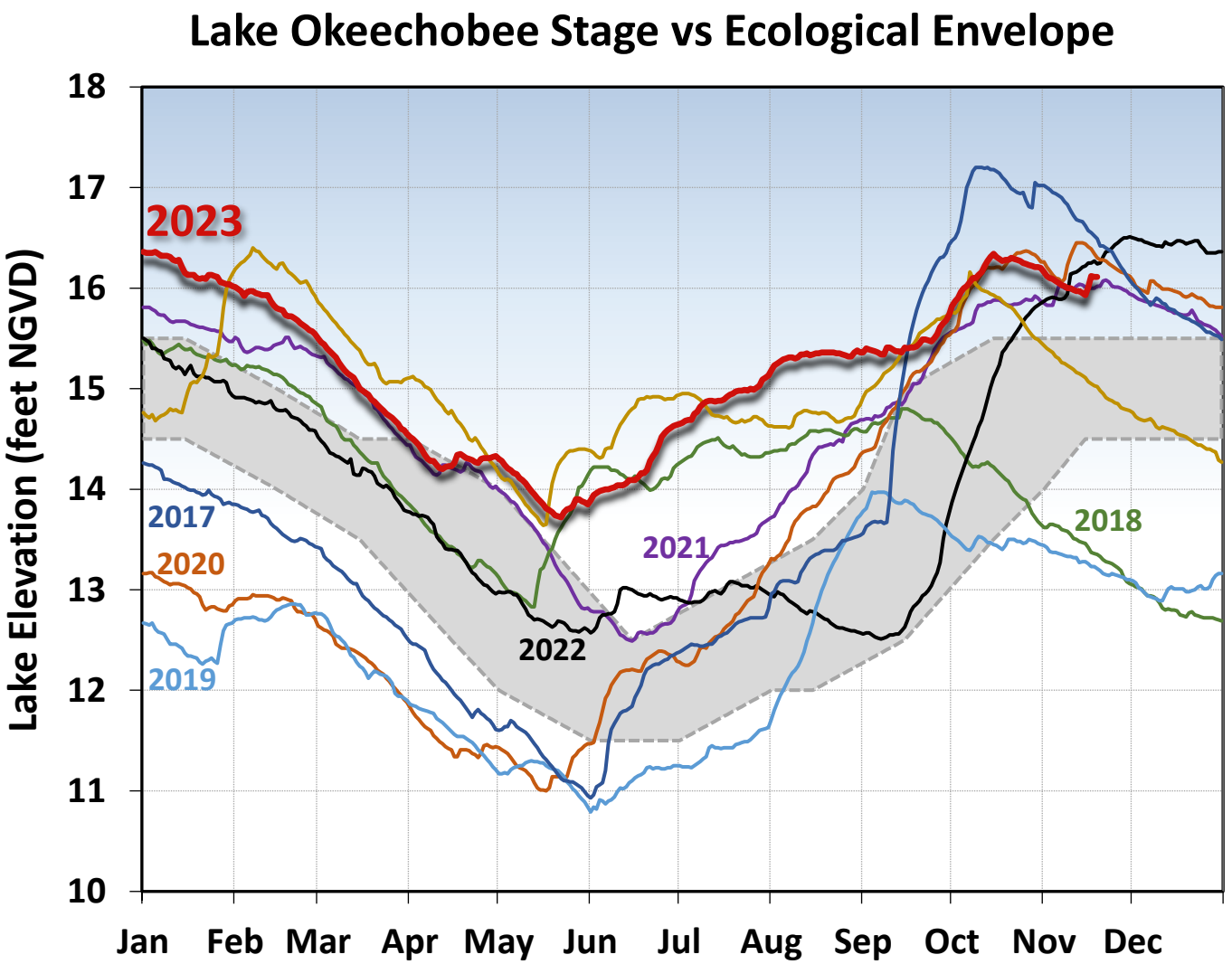



**Figure LO-3.** The selected prior years within the ten-year period of annual stage hydrographs for Lake Okeechobee in comparison to the ecological envelope.

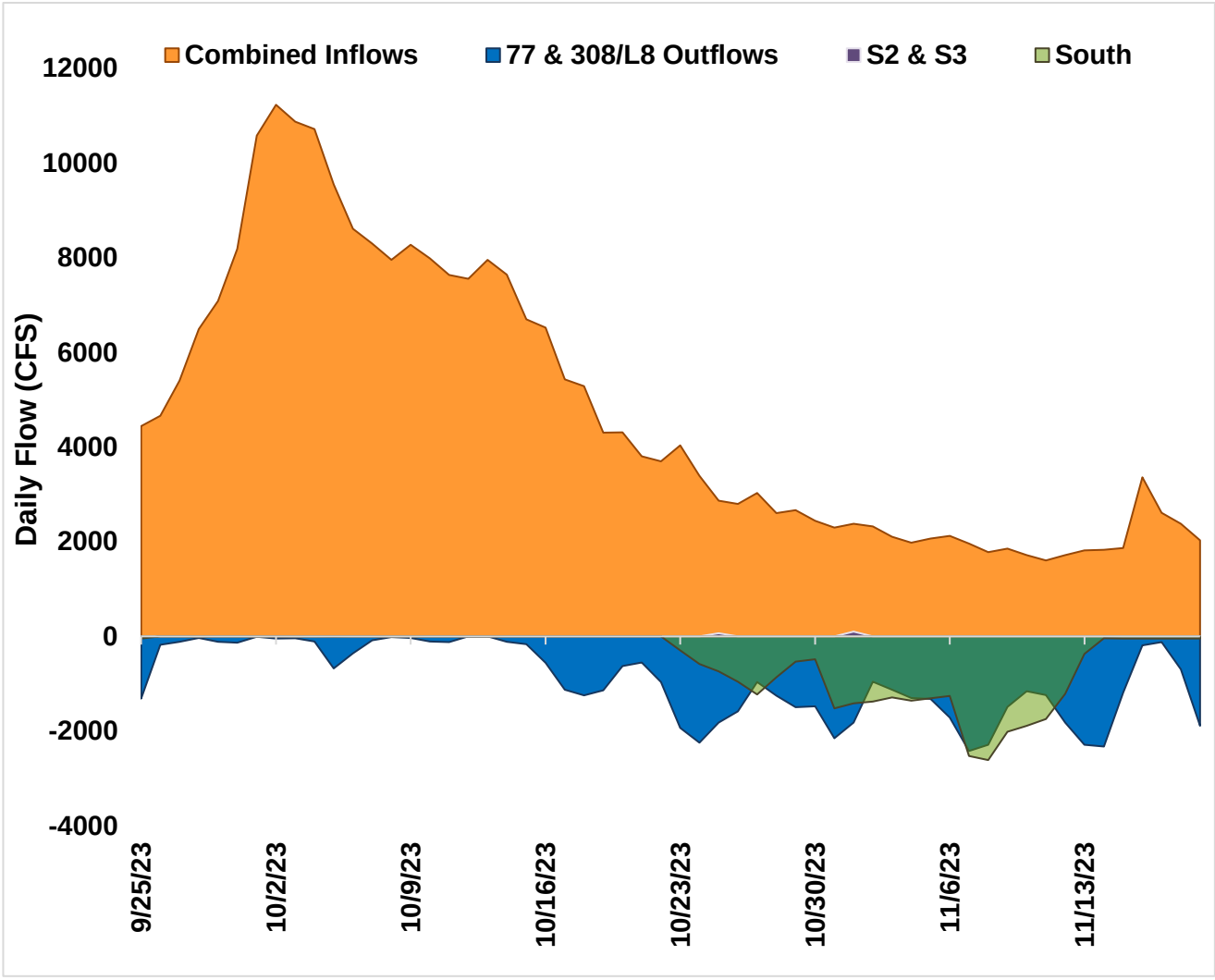



**Figure LO-4.** Major inflows (orange) to and outflows east and west (blue) from Lake Okeechobee. Outflows south are shown in green. Flows into Lake Okeechobee from the L-8 canal through S-271 (formerly Culvert 10A) or from the C-44 canal through the S-308 are included as inflows. Conversely, flows from Lake Okeechobee into the L-8 or C-44 canals are included with outflows. Inflows are shown as positive values; outflows are negative. Outflows through the S-77 (Caloosahatchee) and S-308 (C-44 Canal) structures are based on downstream gauges to include flows to lock openings for navigation.

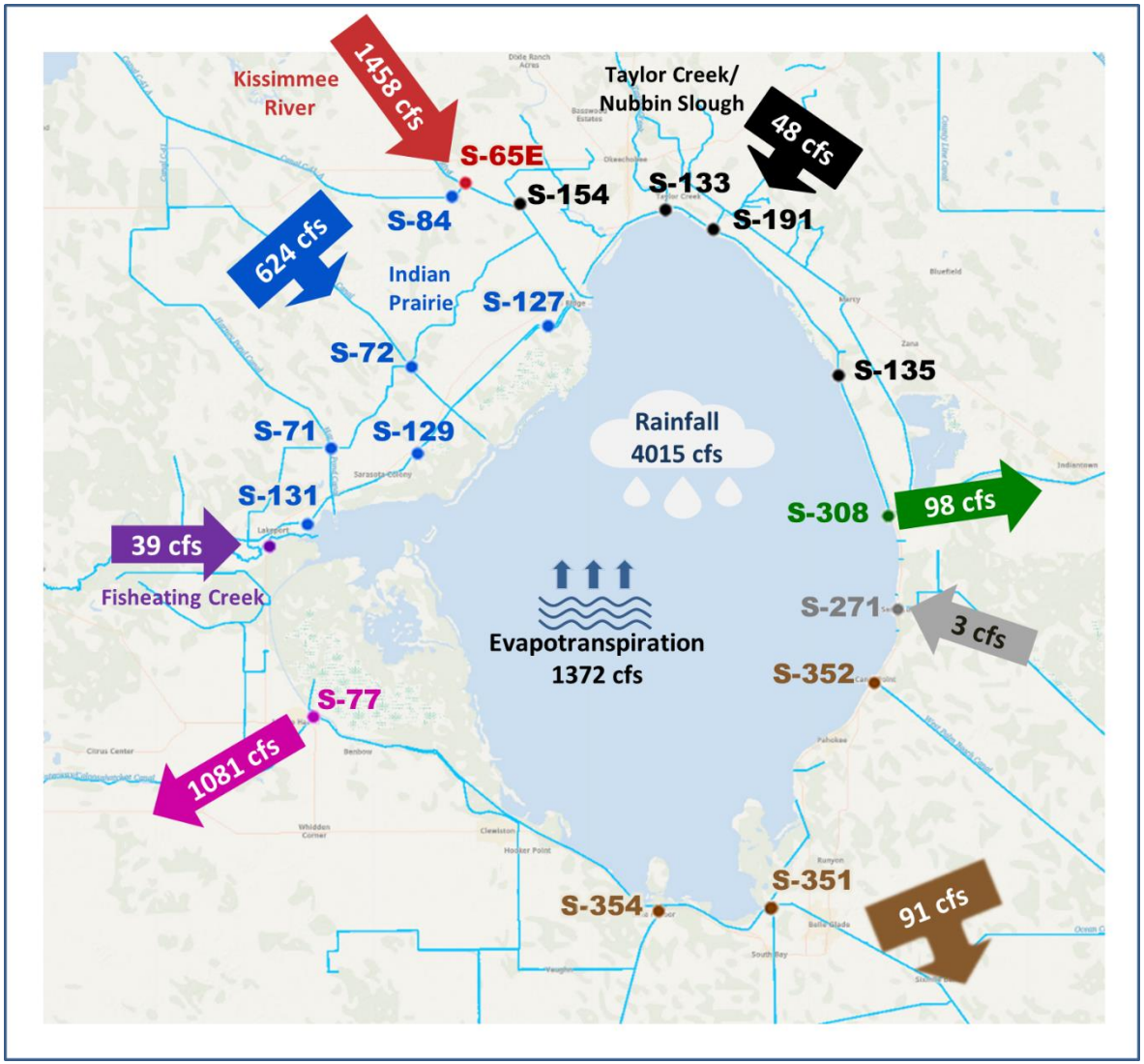



**Figure LO-5.** Inflows into Lake Okeechobee from Indian Prairie basins, Taylor Creek/Nubbin Slough, Kissimmee River and Fisheating Creek, and outflows to the west via S-77, to the east via S-308, to the south via S-351, S-352, S-354, and to southeast via S-271 (formerly Culvert 10A) for the week of November 13 –19, 2023.

**Collection Date: November 13-15, 2023**

| Station | CHL*a* (ug/L) | TOXIN (ug/L) | TAXA |
|---|---|---|---|
| FEBIN | P | | |
| FEBOUT | P | | |
| KISSR0.0 | P | BDL | *mixed* |
| L005 | P | BDL | *mixed* |
| LZ2 | P | BDL | *mixed* |
| KBARSE | P | | |
| RITTAE2 | P | BDL | *Microcys* |
| PELBAY3 | P | | |
| POLE3S | P | | |
| LZ25A | P | | |
| PALMOUT | P | BDL | *Microcys* |
| PALMOUT1 | P | | |
| PALMOUT2 | P | | |
| PALMOUT3 | P | | |
| POLESOUT | P | BDL | *mixed* |
| POLESOUT1 | P | | |
| POLESOUT2 | P | | |
| POLESOUT3 | P | | |
| EASTSHORE | P | | |
| NES135 | P | | |
| NES191 | P | | |

| Station | CHL*a* (ug/L) | TOXIN (ug/L) | TAXA |
|---|---|---|---|
| L001 | P | | |
| L004 | P | | |
| L006 | P | | |
| L007 | P | | |
| L008 | P | | |
| LZ30 | P | BDL | *mixed* |
| LZ40 | P | | |
| CLV10A | P | BDL | *mixed* |
| NCENTER | P | | |
| S308C | P | BDL | *mixed* |
| S77 | P | | |

- 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 (white squares)
- NS – Not Sampled
- Station bold font – crew observed possible BGA
- Chlorophyll *a* analyzed by SFWMD
- Toxin and Taxa analyzed by FDEP:
  *Microcys = Microcystis; Cylindro = Cylindrospermopsis; Planktol = Planktolyngbya; Dolicho = Dolichospermum*

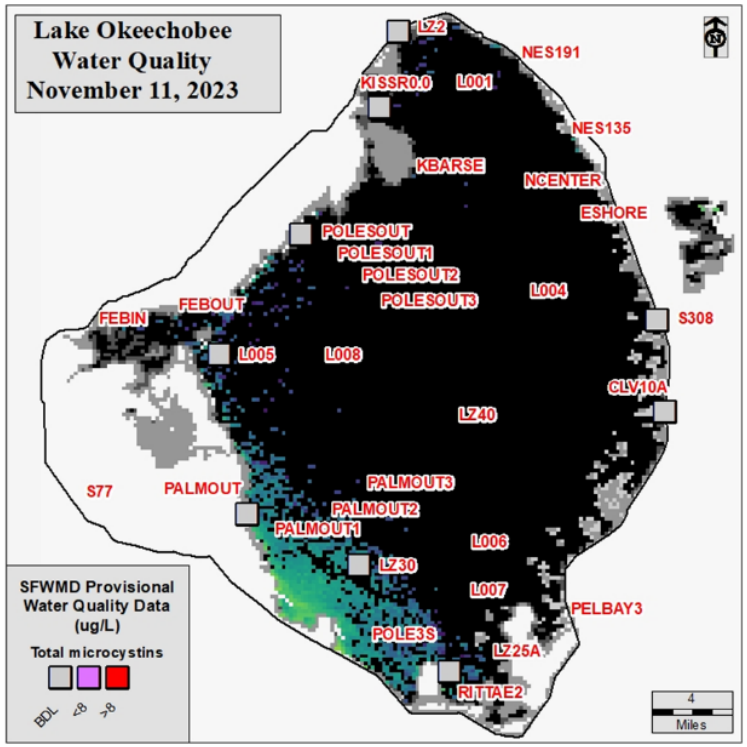



**Figure LO-6. C**hlorophyll *a* and cyanobacteria taxa/toxin results from the November 13-15, 2023, Lake Okeechobee water sample collections.

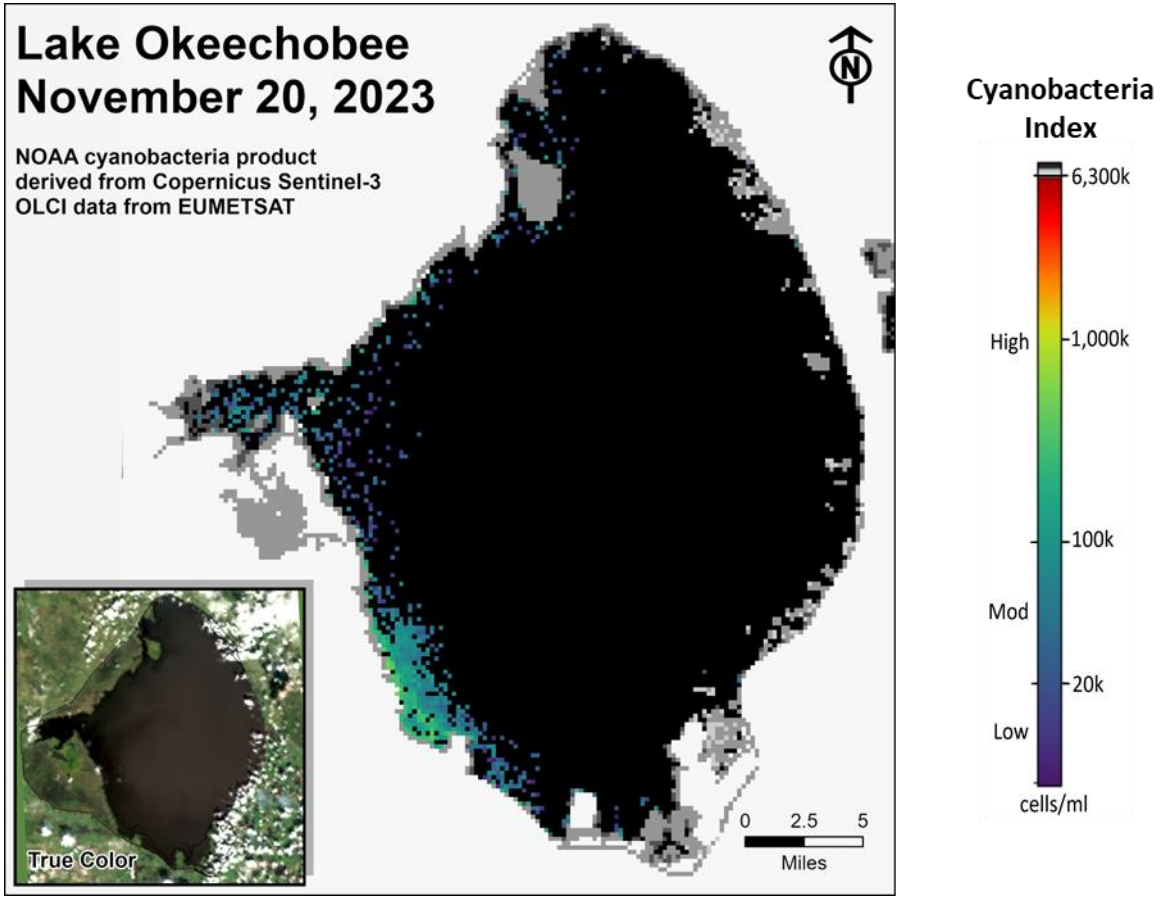



**Figure LO-7.** Cyanobacteria bloom index level on November 20, 2023, based on NOAA's harmful algal bloom monitoring system. Gray color indicates cloud cover.

## Estuaries

### *St. Lucie Estuary*

Over the past week, mean total inflow to the St. Lucie Estuary was 256 cfs (**Figures ES-1** and **ES-2**), and the previous 30-day mean inflow was 269 cfs. For comparison, the historical provisional mean inflows from the contributing areas are shown in **Figure ES-2**.

Over the past week, surface salinities decreased at the HR1 site and increased at the US1 Bridge and A1A Bridge sites (**Table ES-1** and **Figure ES-3**). The seven-day moving average of the surface and bottom salinities at the US1 Bridge was 20.4. Salinity conditions in the middle estuary were estimated to be within the optimal range for adult eastern oysters (**Figure ES-4**). The mean larval oyster recruitment rate reported by the Fish and Wildlife Research Institute (FWRI) was 3.1 spat/shell for October, which was an increase from September (**Figure ES-5**).

### *Caloosahatchee River Estuary*

Over the past week, mean total inflow to the Caloosahatchee River Estuary was 2,580 cfs (**Figures ES-6** and **ES-7**), and the previous 30-day mean inflow was 2,206 cfs. For comparison, the historical provisional mean inflows from the contributing areas are shown in **Figure ES-7**.

Over the past week, surface salinities decreased at S-79, Val I-75, and Ft. Myers and increased at the remaining lower estuary sites (**Table ES-2** and **Figures ES-8** and **ES-9**). The seven-day mean salinities (**Table ES-2**) were in the optimal range (0-10) for tape grass in the upper estuary. The seven-day mean salinity values were within the optimal range for adult eastern oysters at Cape Coral, and in the stressed range at Shell Point and Sanibel (**Figure ES-10**). The mean larval oyster recruitment rate reported by the Fish and Wildlife Research Institute was 0.2 spat/shell at Iona Cove and 3.3 spat/shell at Bird Island for October, both of which were a decrease from September (**Figures ES-11 and ES-12**).

Surface salinity at Val I-75 was forecasted for the next two weeks using an autoregression model (Qiu and Wan, 2013[1]) coupled with a linear reservoir model for the tidal basin. Model scenarios included pulse releases at S-79 ranging from 0 to 1,500 cfs, and a steady release at 2,000 cfs with estimated tidal basin inflows of 150 cfs. Model results from all scenarios predict daily salinity to be 1.3 or lower and the 30-day moving average surface salinity to be 0.9 or lower at Val I-75 at the end of the two-week period (**Table ES-3** and **Figure ES-13**). This keeps predicted salinities in the upper estuary within the optimal salinity range (0-10) for tape grass.

[1] Qui, C., and Y. Wan. 2013. Time series modeling and prediction of salinity in the Caloosahatchee River Estuary. *Water Resources Research* 49:5804-5816.

***Red Tide***

The Florida Fish and Wildlife Research Institute reported on November 17, 2023, that *Karenia brevis*, the Florida red tide dinoflagellate, was not observed at bloom concentrations in any samples collected within the District region. On the east coast, red tide was not observed in samples from Palm Beach County.

***Water Management Recommendations***

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

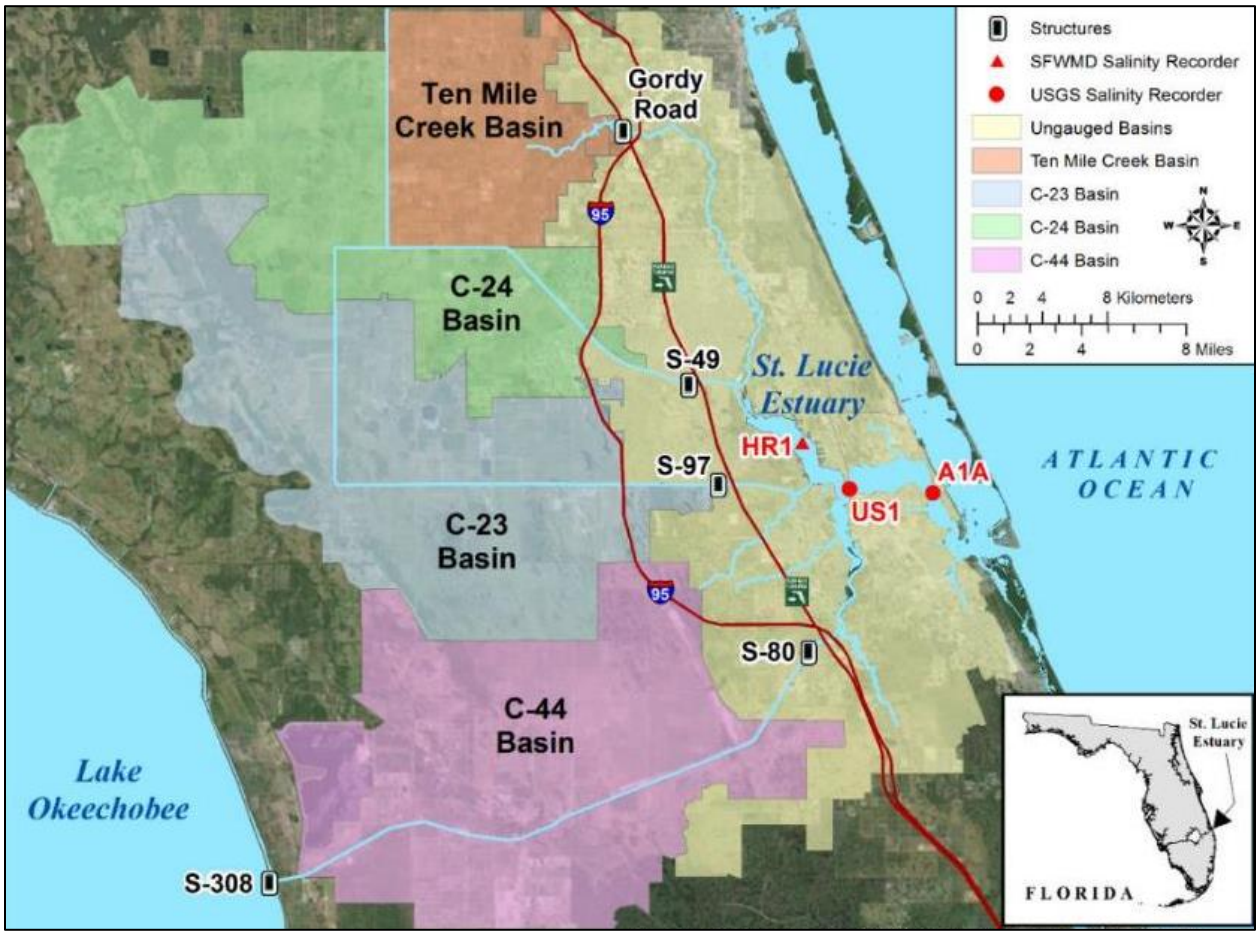



**Figure ES-1.** Basins, water control structures and salinity monitoring sites in the St. Lucie Estuary.

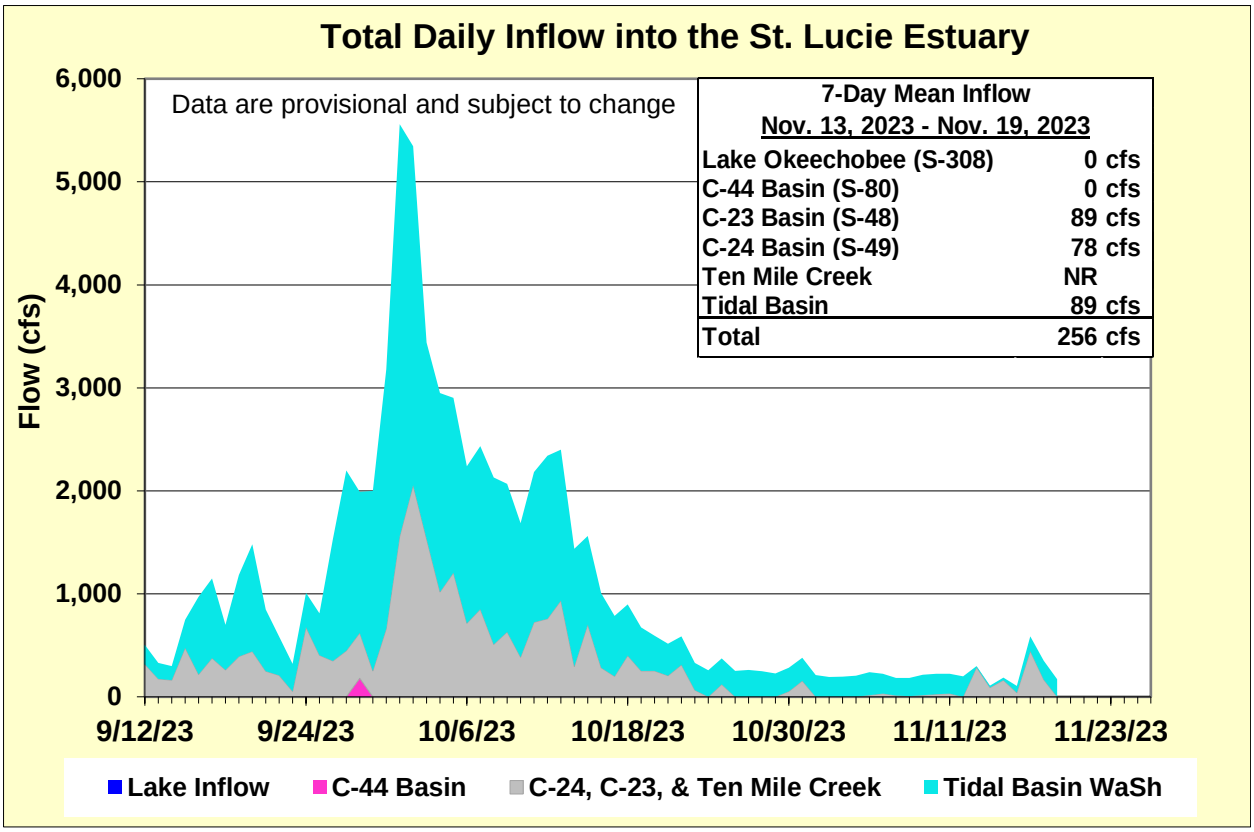



**Figure ES-2.** Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and Tidal Basins into the St. Lucie Estuary.

**Table ES-1.** Seven-day mean salinity at oyster monitoring sites in the St. Lucie Estuary. Current means are in bold font; previous week's means are in parentheses. The envelope reflects the optimum salinity range for adult eastern oysters (*Crassostrea virginica*) in the estuary. Data are provisional.

| Sampling Site | Surface | Bottom | Optimum Envelope |
|---|---|---|---|
| HR1 (North Fork) | **16.3** (17.0) | **18.7** (20.9) | 10.0 – 25.0 |
| US1 Bridge | **19.7** (19.4) | **21.0** (21.0) | 10.0 – 25.0 |
| A1A Bridge | **27.9** (25.1) | **29.7** (27.4) | 10.0 – 25.0 |

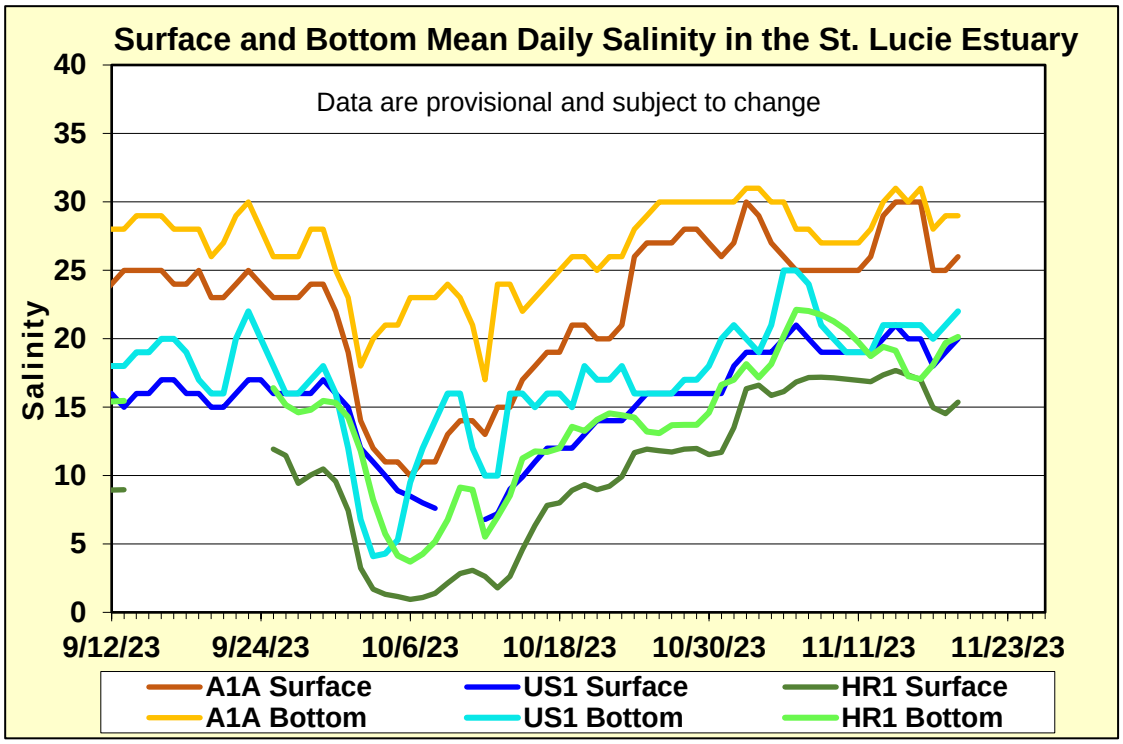



**Figure ES-3.** Mean daily salinity at the A1A, US1 and HR1 sites in the St. Lucie Estuary.

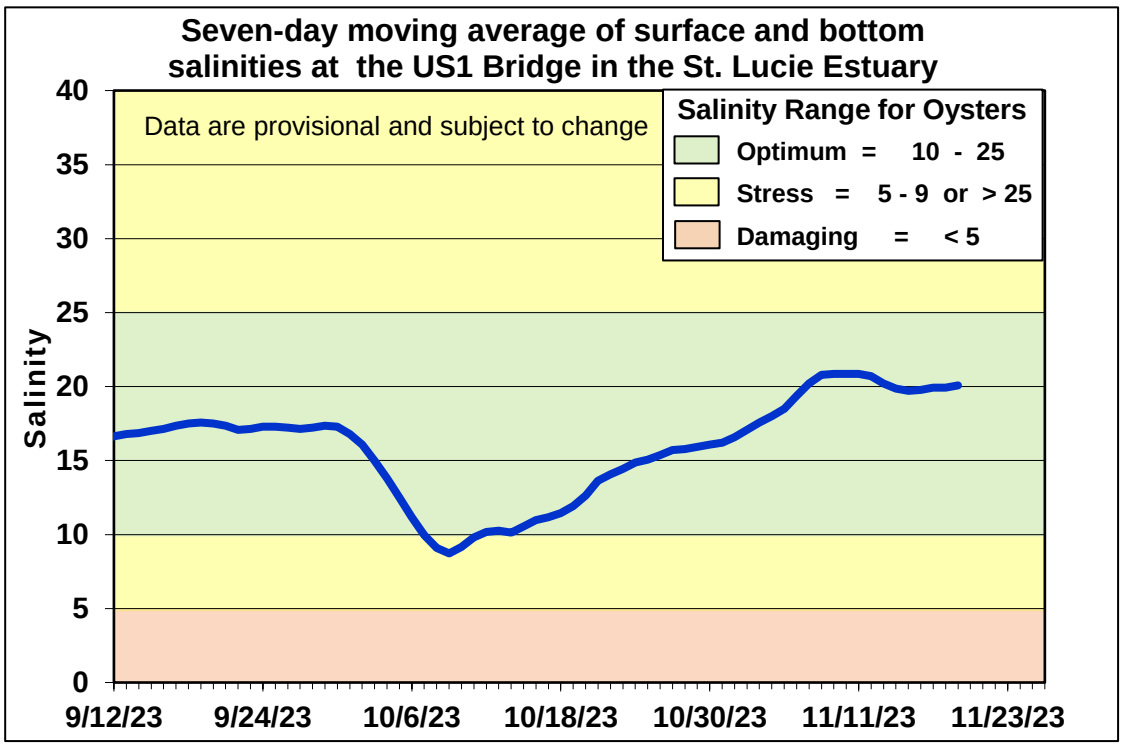



**Figure ES-4.** Seven-day moving average of the surface and bottom salinities at the US1 Bridge in the St. Lucie Estuary.

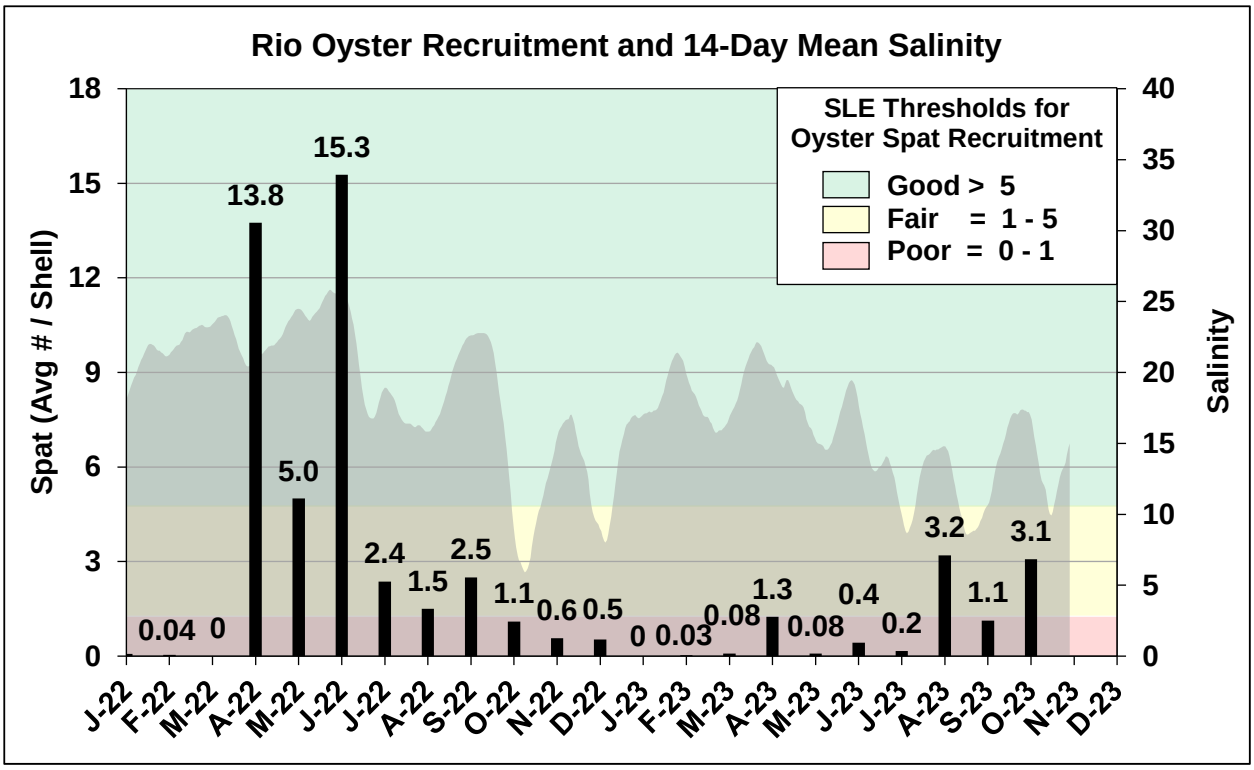



**Figure ES-5.** Mean oyster recruitment at the Rio oyster monitoring station and 14-day mean salinity at US1 Bridge.

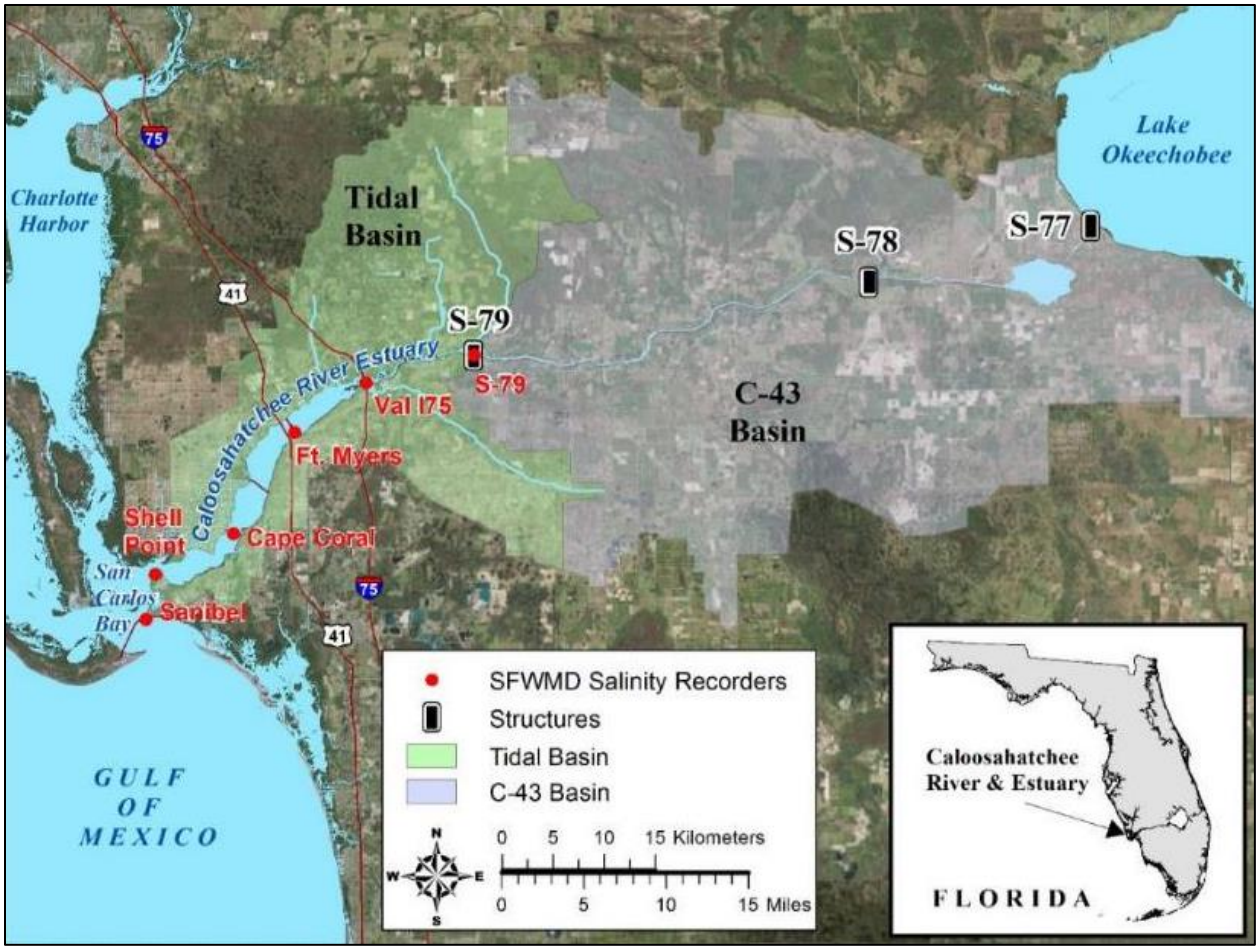



**Figure ES-6.** Basins, water control structures and salinity monitoring sites in the Caloosahatchee River Estuary.

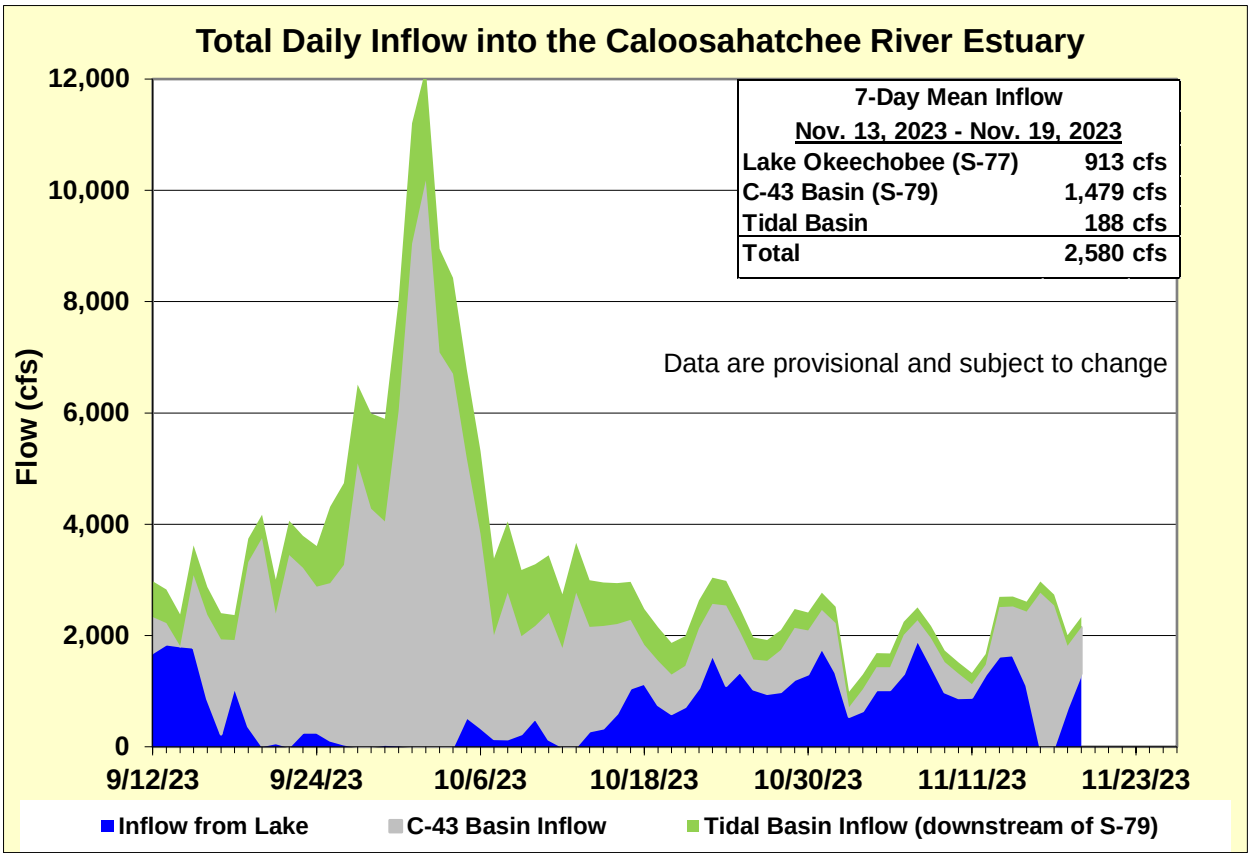



**Figure ES-7.** Total daily inflows from Lake Okeechobee, and runoff from the C-43 and Tidal basins into the Caloosahatchee River Estuary.

**Table ES-2.** Seven-day mean salinity at six monitoring sites in the Caloosahatchee River Estuary. Current means are in bold font; previous week's means are in parentheses. The envelope in the upper estuary sites is for the protection of tape grass and the envelope in the lower estuary is the optimum salinity range for adult eastern oysters (*Crassostrea virginica*). Data are provisional.

| Sampling Site | Surface | Bottom | Optimum Envelope |
|---|---|---|---|
| S-79 (Franklin Lock) | **0.5** (1.7) | **0.5** (1.8) | 0.0 – 10.0 |
| Val I-75 | **2.9** (3.2) | **3.0** (5.6) | 0.0 – 10.0 |
| Fort Myers Yacht Basin | **6.3** (8.9) | **7.3** (10.4) | 0.0 – 10.0 |
| Cape Coral | **11.7** (11.5) | **14.0** (11.9) | 10.0 – 25.0 |
| Shell Point | **25.5** (24.8) | **26.2** (25.9) | 10.0 – 25.0 |
| Sanibel | **30.1** (30.0) | **31.0** (32.0) | 10.0 – 25.0 |

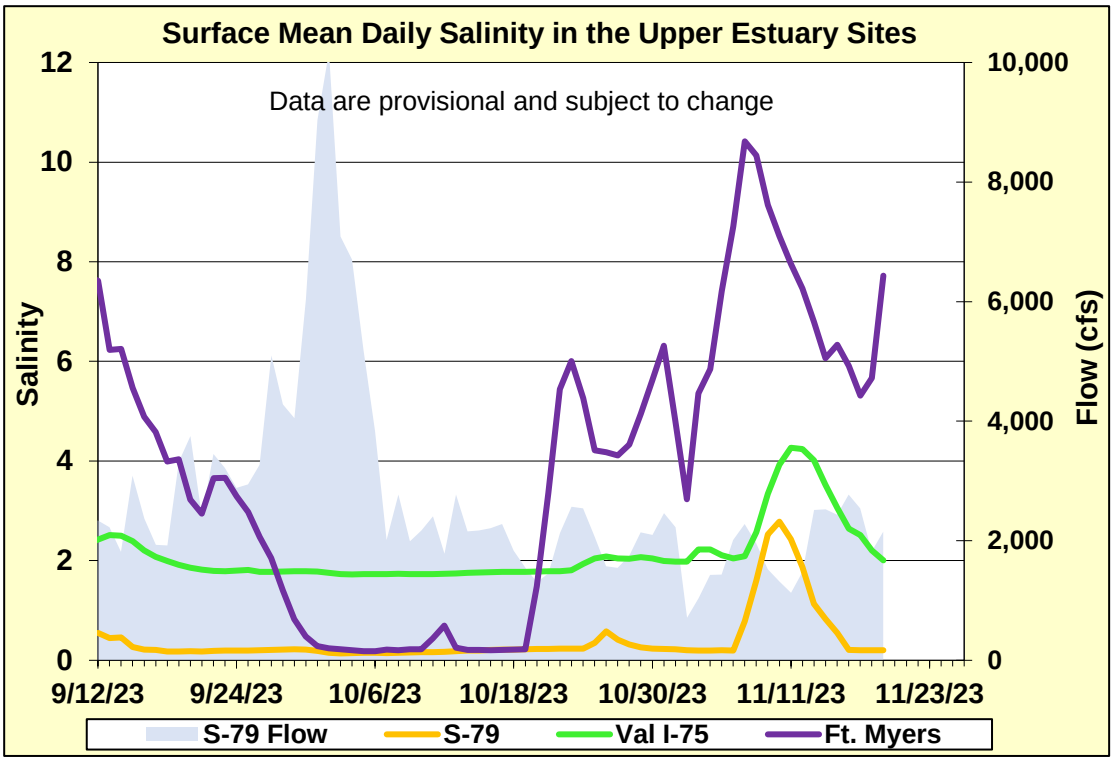



**Figure ES-8.** Mean daily salinity at upper Caloosahatchee River Estuary monitoring sites and mean daily flow at S-79.

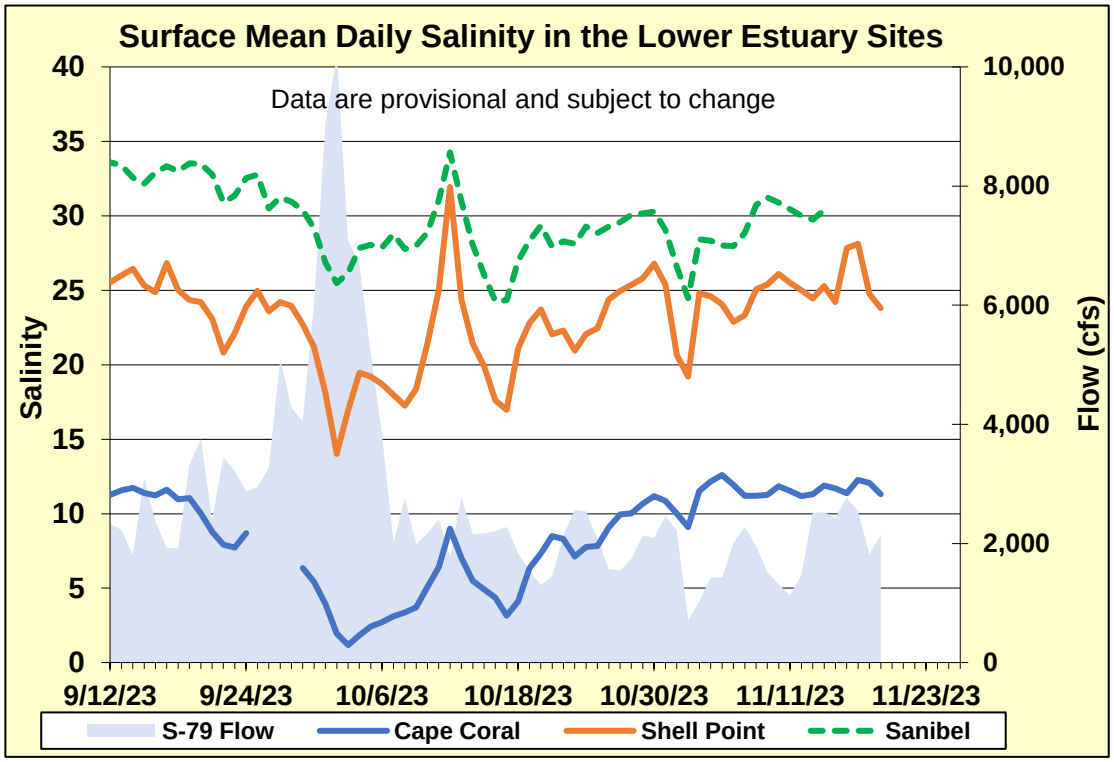



**Figure ES-9.** Mean daily surface salinity at lower Caloosahatchee River Estuary monitoring sites and mean daily flow at S-79.

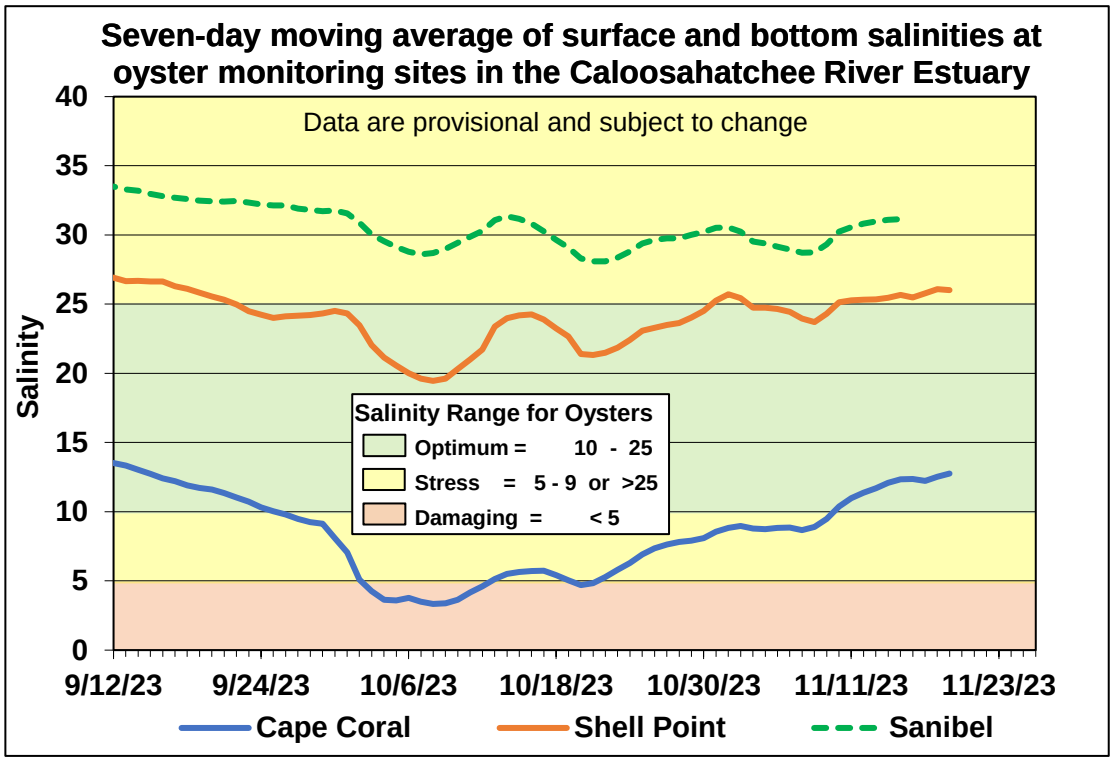



**Figure ES-10.** Seven-day moving average of surface and bottom salinities at Cape Coral, Shell Point and Sanibel monitoring sites in the Caloosahatchee River Estuary.

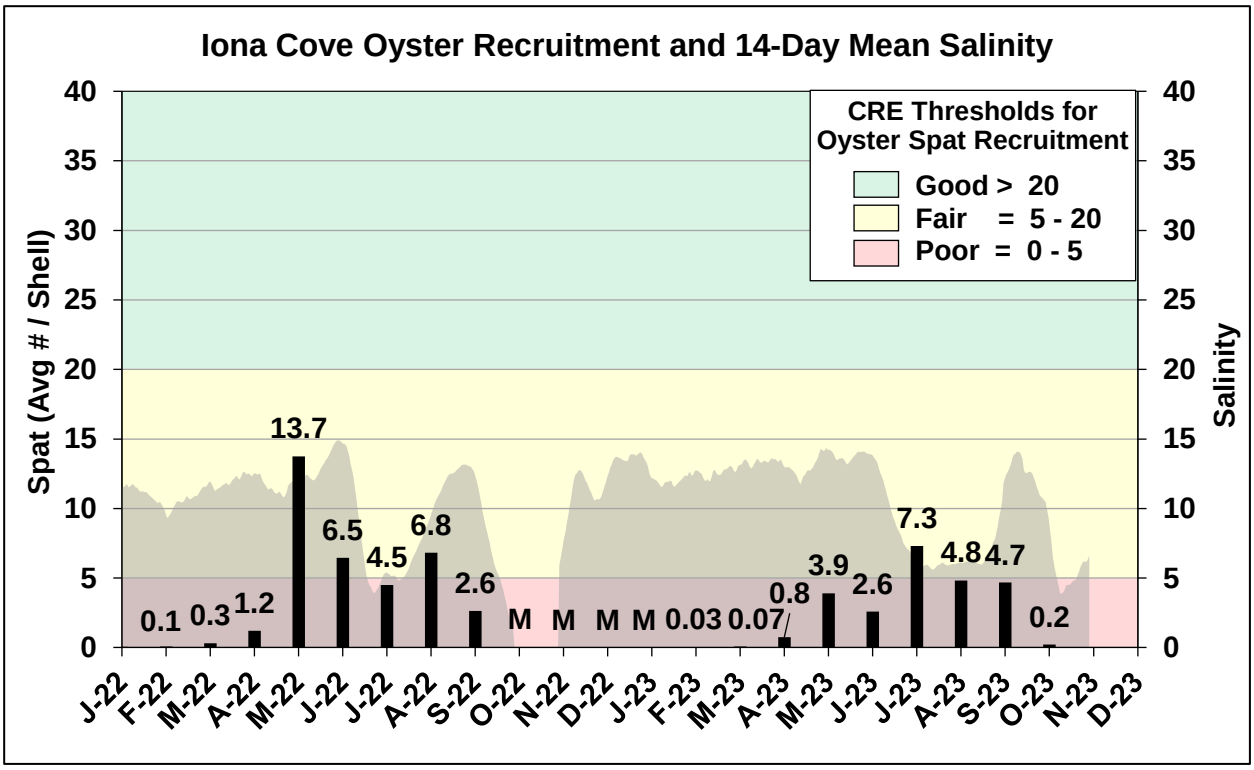



**Figure ES-11.** Mean oyster recruitment at the Iona Cove oyster monitoring station and 14-day mean salinity at Cape Coral.

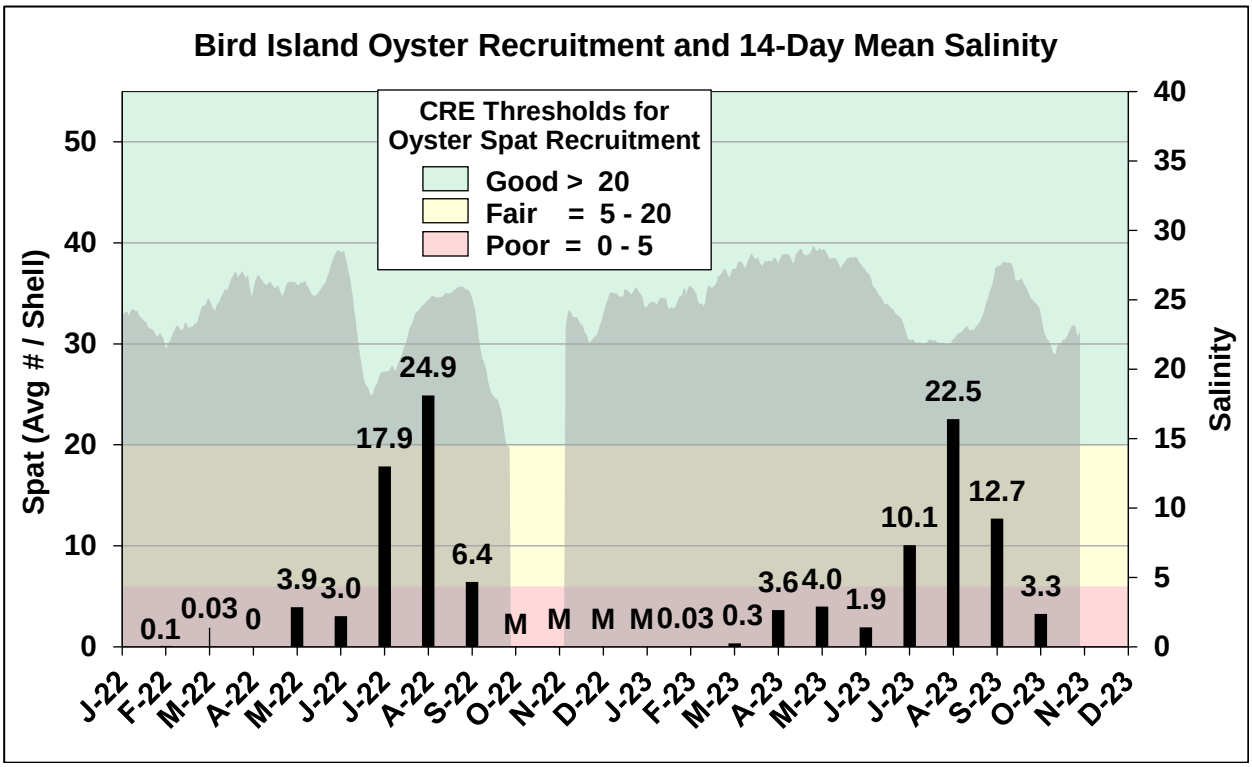



**Figure ES-12.** Mean oyster recruitment at the Bird Island oyster monitoring station and 14-day mean salinity at Shell Point.

**Table ES-3.** Predicted salinity at Val I-75 in the Caloosahatchee River Estuary at the end of the forecast period for various S-79 flow release scenarios.

| Scenario | Simulated S-79 Flow (cfs) | Tidal Basin Runoff (cfs) | Daily Salinity | 30-Day Mean Salinity |
|---|---|---|---|---|
| A | 0 | 150 | 1.3 | 0.9 |
| B | 450 | 150 | 0.8 | 0.9 |
| C | 750 | 150 | 0.4 | 0.8 |
| D | 1,000 | 150 | 0.3 | 0.8 |
| E | 1,500 | 150 | 0.3 | 0.8 |
| F | 2,000 | 150 | 0.3 | 0.8 |

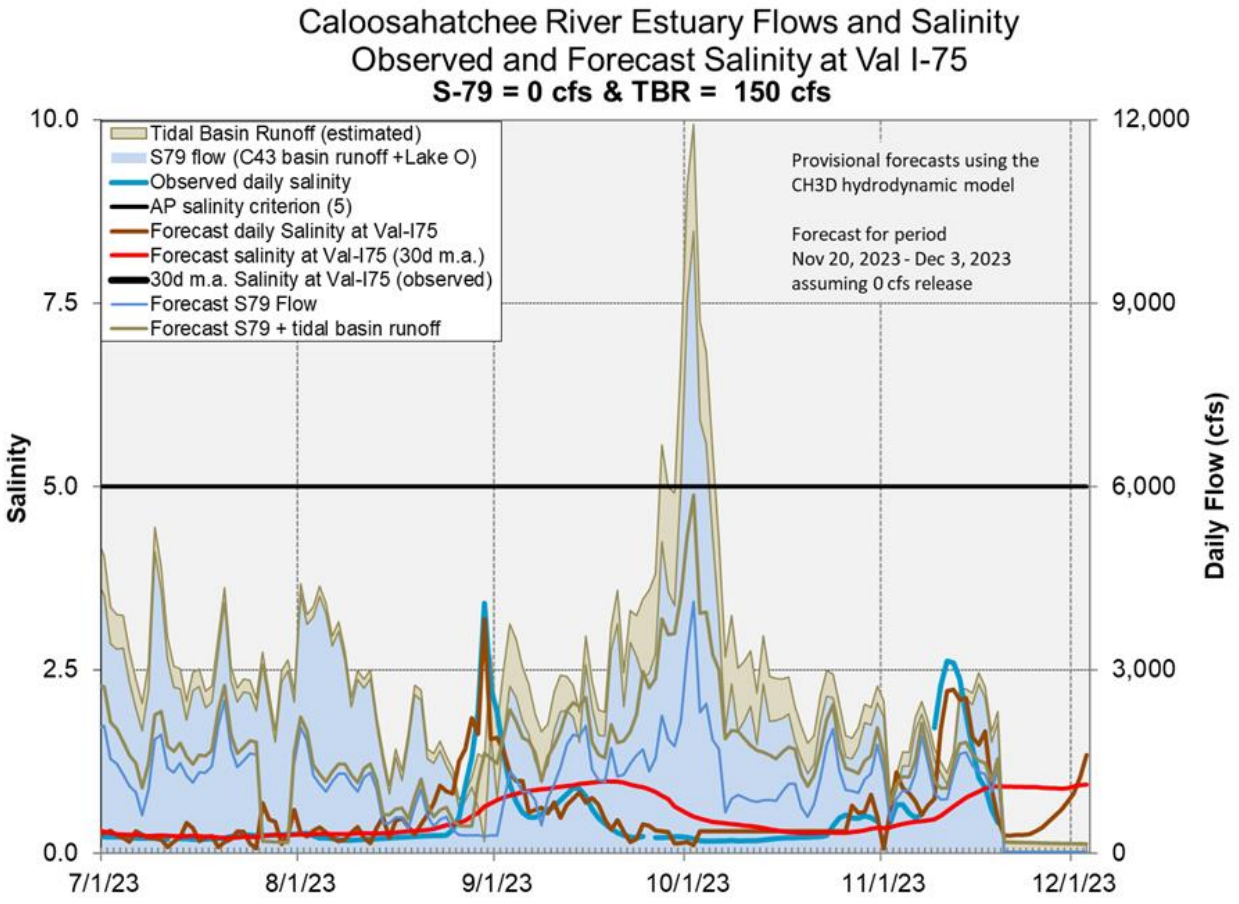



**Figure ES-13.** Forecasted Val I-75 site surface salinity assuming no pulse release at S-79.

## Stormwater Treatment Areas

**STA-1E:** STA-1E Western Flow-way is offline for post-construction vegetation grow in. Online treatment cells are near target stage. Vegetation in the flow-ways is stressed and highly stressed. The 365-day phosphorus loading rate (PLR) for the Central Flow-way is high and the 365-day PLR for the Eastern Flow-way is below 1.0 g/m$^2$/year. (**Figure S-1**).

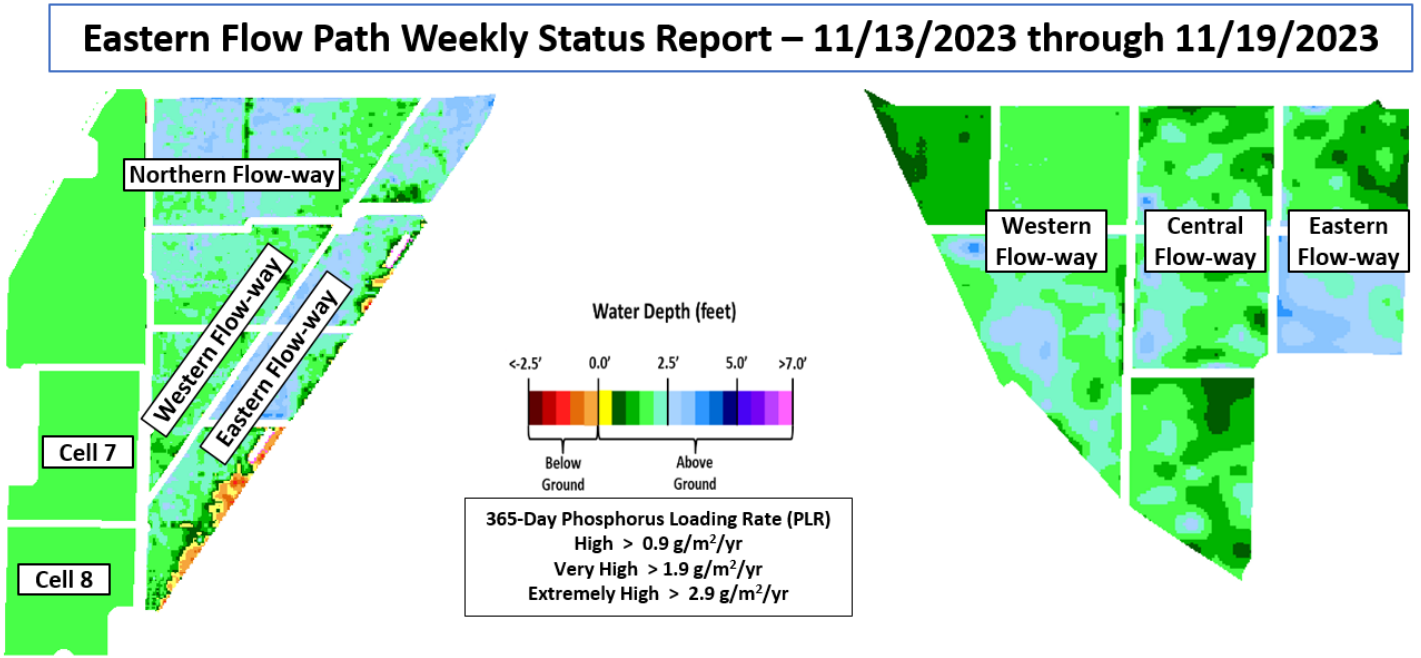
**STA-1W:** An operational restriction is in place in STA-1W Northern Flow-way for vegetation management activities. Treatment cells are near target stage. Vegetation in the flow-ways is stressed and highly stressed. The 365-day PLRs for the Eastern and Western Flow-ways are high, and the 365-day PLR for the Northern Flow-ways is below 1.0 g/m$^2$/year (**Figure S-1**).

**STA-2:** Operational restrictions are in place in Flow-ways 2 and 4 for vegetation management activities. Most online treatment cells are near target stage. Vegetation in Flow-ways 1 and 3 is stressed, and in Flow-ways 4 and 5 is highly stressed. The 365-day PLRs for Flow-ways 3, 4, and 5 are below 1.0 g/m$^2$/year. The 365-day PLR for Flow-way 1 is high (**Figure S-2).**

**STA-3/4:** An operational restriction is in place in the Eastern Flow-way for post-drawdown vegetation grow-in. Online treatment cells are at or above target stage. Vegetation in the Central Flow-way is highly stressed and in the Western Flow-way is stressed. The 365-day PLRs for the Central and Western Flow-ways are below 1.0 g/m$^2$/year (**Figure S-2**).

**STA-5/6:** An operational restriction is in place in Flow-way 4 for vegetation management (prescribed burn). Most treatment cells are near target stage. All treatment cells have highly stressed or stressed vegetation conditions except Flow-ways 7 which is healthy. The 365-day PLRs for Flow-ways 1, 4, 6, 7, and 8 are below 1.0 g/m$^2$/year, and the 365-day PLRs for Flow-ways 2, 3, and 5 are high. (**Figure S-3**).

For definitions on STA operational language see glossary following figures.

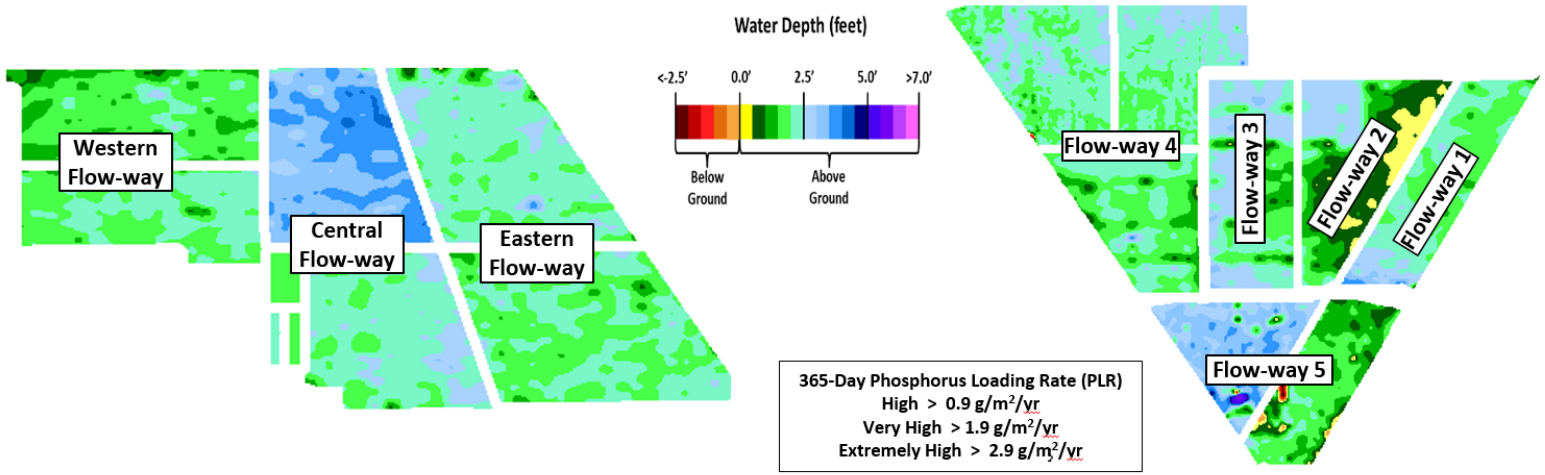



| STA-1W | Flow-way Status |
|---|---|
| Western | • High 365-day PLR<br>• Highly stressed vegetation conditions |
| Eastern | • High 365-day PLR<br>• Highly stressed vegetation conditions |
| Northern | • Highly stressed vegetation conditions<br>• Planting emergent vegetation |
| Cell 7 | • Stressed vegetation conditions |
| Cell 8 | • Construction activities |

| STA-1E | Flow-way Status |
|---|---|
| Western | • Offline for post-construction vegetation grow-in |
| Central | • Highly stressed vegetation conditions |
| Eastern | • High 365-day PLR<br>• Stressed vegetation conditions |

**Figure S-1.** Eastern Flow Path Weekly Status Report

## Central Flow Path Weekly Status Report – 11/13/2023 through 11/19/2023

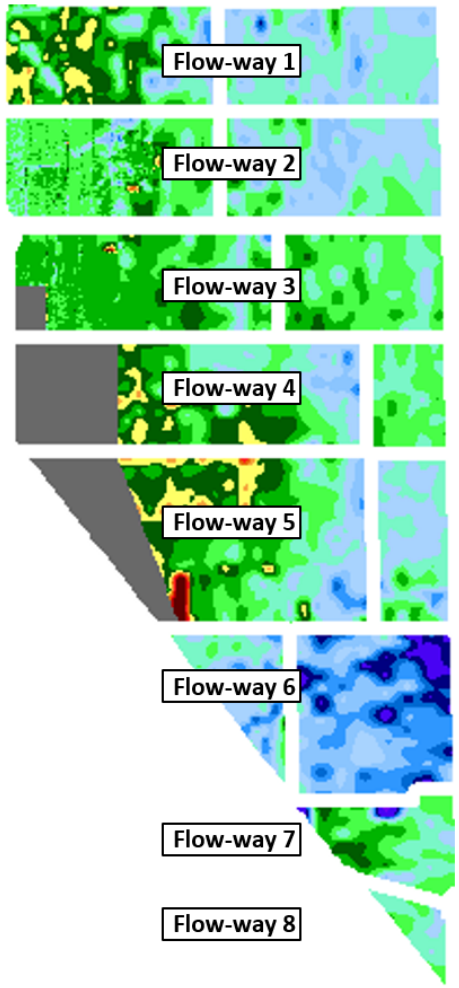



| STA-3/4 | Flow-way Status |
|---|---|
| **Western** | • Stressed vegetation conditions<br>• Nuisance vegetation control within inflow canal |
| **Central** | • Highly stressed vegetation conditions<br>• Removal of floating tussocks<br>• Nuisance vegetation control within inflow canal |
| **Eastern** | • Post-drawdown vegetation grow-in<br>• Nuisance vegetation control within inflow canal |

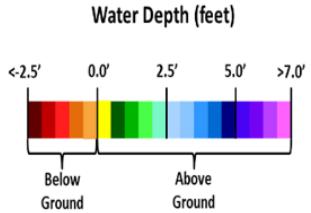
| STA-2 | Flow-way Status |
|---|---|
| **Flow-way 1** | • High 365-day PLR<br>• Stressed vegetation conditions |
| **Flow-way 2** | • Post-construction vegetation grow-in<br>• Planting emergent vegetation |
| **Flow-way 3** | • Stressed vegetation conditions |
| **Flow-way 4** | • Planting emergent vegetation<br>• Nuisance vegetation control<br>• Highly stressed vegetation conditions |
| **Flow-way 5** | • Highly stressed vegetation conditions |

**Figure S-2.** Central Flow Path Weekly Status Report

## Western Flow Path Weekly Status Report – 11/13/2023 through 11/19/2023




| STA-5/6 | Flow-way Status |
|---|---|
| Flow-way 1 | • Highly stressed vegetation conditions |
| Flow-way 2 | • Highly stressed vegetation conditions<br>• High 365-day PLR |
| Flow-way 3 | • Highly stressed vegetation conditions<br>• High 365-day PLR |
| Flow-way 4 | • Highly stressed vegetation conditions<br>• Vegetation management (prescribed burn) |
| Flow-way 5 | • Highly stressed vegetation conditions<br>• High 365-day PLR |
| Flow-way 6 | • Highly stressed vegetation conditions |
| Flow-way 7 | |
| Flow-way 8 | • Stressed vegetation conditions |




**365-Day Phosphorus Loading Rate (PLR)**
**High > 0.9 g/m²/yr**
**Very High > 1.9 g/m²/yr**
**Extremely High > 2.9 g/m²/yr**

**Figure S-3.** Western Flow Path Weekly Status Report

**Basic Concepts and Definitions for STA Weekly Status Report**

- **Inflow**: Sum of flow volume at all inflow structures to an STA.
- **Lake Inflow**: Portion of the STA total inflow volume that originates from Lake Okeechobee.
- **Outflow**: Sum of flow volume at outflow structures from an STA.
- **Total Phosphorus** (TP): Total mass of phosphorus in all its forms; including particulate, dissolved, etc.
- **Inflow Concentration**: TP concentration is the mass of TP in micrograms per liter of water, µg/L or ppb. Inflow concentration refers to the flow-weighted mean TP from all inflow structures over a period of time.
- **Outflow Concentration**: The flow-weighted mean TP from all outflow structures over a period of time. The outflow concentration represents the reduction of inflow TP achieved by STA treatment of the inflow water.
- **WQBEL**: The STA outflow concentration that is required upon completion of the Restoration Strategies projects by December 2025. The outflow concentration shall not exceed 13 ppb as an annual flow weighted mean in more than 3 out of 5 water years on a rolling basis and shall not exceed 19 ppb as an annual flow weighted in any water year.
- **Flow-Way** (FW): One or more treatment cells connected in series. Cells typically have emergent aquatic vegetation (EAV) in the front portion of the flow-way followed by a mix of EAV and submerged aquatic vegetation (SAV)
- **Vegetation Status**: Healthy means the vegetation condition is good and will allow the STA to perform as designed. Stressed means the vegetation is showing signs of poor health, such as browning or areas of vegetation die-off, or the cell contains undesirable vegetation such as floating exotic vegetation requiring treatment. The TP reduction capability of the STA is affected when the vegetation condition is poor.
- **Phosphorus Loading Rate** (PLR): Mass of inflow TP in grams, divided by total treatment area of STA in square meters, per year. In general, a 365-day value of less than 1.0 is needed for an STA to perform optimally. A PLR of 2.0 is considered very high and a PLR of 3.0 is considered extremely high. The TP reduction capability of the STA is affected when the PLR is high, very high and extremely high.
- **Online**: Online status means the FW can receive and treat inflow.
- **Online with Restriction**: The FW can receive and treat inflow, but the amount of flow or water level may be limited temporarily. For example, a vegetation rehabilitation effort may require reduced flows through an area while the new plants are establishing, or nesting by protected species may require a certain water level not to be exceeded.
- **Offline**: The FW is unable to receive and treat inflow due to repairs, construction, or other prohibitive reasons.
- **Depth**: Difference between the average surface water level in a cell and the average ground elevation in that cell. Target depths, or depths between flow events, are between 1.25 ft to 1.5 ft. As depth approaches or drops below zero, an increasing percentage of the cell is considered dry and STA conditions deteriorate. An increase in depth above target depth is expected with increasing flow. However, as depth increases much above the target depth and is sustained over a period of time, it can be detrimental to vegetation health and overall STA treatment performance.
- **Note**: The data provided in this summary report were developed using a combination of provisional and quality-assured flow and water quality data. In some cases, best professional judgment was used to estimate missing data and revise questionable data. Values provided are not considered final but are appropriate for use in STA operational decision-making.

## Everglades

### *Water Conservation Area Regulation Schedules*

Heavy rainfall across the Everglades Protection Area (EPA) caused a dramatic stage increase across the system. WCA-1: Last week stage rose quickly within the Refuge to stabilize near the Zone A1 regulation line. The 1-8C gauge average on Sunday was 0.01 feet below that line. WCA-2A: Stage at the 2-17 ascended quickly then started receding near the end of the week. The average on Sunday was 1.21 feet above the falling regulation line. WCA-3A: The 3-Gauge average rose quickly then stabilized last week. The average stage on Sunday was 0.62 feet above the flat Zone A regulation line. WCA-3A North: Stage at Gauge 62 (NW corner) rose quickly last week then slowed near the Upper Schedule line, averaging 0.11 feet below the falling line on Sunday. See figures **EV-1** through **EV-4**.

### *Water Depths*

The SFWDAT tool illustrates deeply ponded conditions return to the upper reaches of the L-67s, but the spatial extent is less than one month ago. Conditions remain ponded in the southern portions of WCA-3A, but the spatial extent of flooded areas is less than one month ago. Hydrologic connectivity remains strong within all the major sloughs of Everglades National Park (ENP). Comparing current WDAT water depths to one week ago, conditions across the Everglades are significantly deeper across the system. In comparison to one month ago, stages in WCA-3A, -2A and the Refuge have decreased. Looking back a year ago, conditions are slightly drier in the Refuge and WCA-2A, but slightly wetter across the rest of the system (**Figure EV-5 and Figure EV-6)**.

Comparing current conditions to the 20-year average on November 19$^{th}$, above average depth conditions are now present across the entire region except for southern WCA-2A (**Figure EV-7**).

### *Taylor Slough and Florida Bay*

Total weekly rainfall averaged 11.8 inches in Taylor Slough (TS) and Florida Bay over the past week (Monday-Sunday) based on the 17 gauges used for this report. Total weekly rainfall ranged from 7.1 inches at Garfield Bight (GB) in the western nearshore region to 16.9 inches at Little Madeira Bay (LM) in the eastern nearshore region. All stages increased across TS, with an average increase of 0.62 feet. Stage changes ranged from +0.12 feet at EPSW in the southern C-111 area to +0.97 feet at Taylor Slough Bridge (TSB) in the northern slough (**Figure EV-8 and Figure EV-9**). Taylor Slough water levels remain above the historical average for this time of year by 12.9 inches compared to before the Florida Bay initiative (starting in 2017), an increase of 9.2 inches relative to last week.

Average Florida Bay salinity was 20.9, a decrease of 10.5 from last week. With heavy rainfall throughout the bay, salinity decreased rapidly at all sites, declines ranging from 20.3 at Terrapin Bay (TB) in the central nearshore region to 2.5 at LM in the eastern nearshore region (**Figure EV-8**). Eastern salinities remain within the interquartile range

(IQR) (just above the 25th percentile), while Central and Western salinities have now dropped below the 25th percentile (**Figure EV-10**). Average Florida Bay salinity is now below its historical average for this time of year by 8.0, a decrease of 15.1 from the previous week.

### *Water Management Recommendations*

Stable depths and minimal stage changes (slow recession rates) in WCA-2A and WCA-3A North remain ecologically beneficial. The ecology of Northern WCA-3A would continue to benefit from a balanced distribution of flows into the northern perimeter, protecting depths and recession rates in that region has been shown to increase the likelihood of successful wading bird nesting (perhaps more important this year after two successive years of below average nesting). As conditions return to above the 90th percentile in NE Shark River Slough (SRS), continuing strong positive TS creek flows to avoid salinity swings in the nearshore areas is showing to be ecologically beneficial. Individual regional recommendations can be found in **Table EV-2**.

**Table EV-2.** Previous week's rainfall and water depth changes in Everglades basins.

| Everglades Region | Rainfall (inches) | Stage change (feet) |
|---|---|---|
| WCA-1 | 3.73 | +0.31 |
| WCA-2A | 5.01 | +0.38 |
| WCA-2B | 8.75 | +0.85 |
| WCA-3A | 4.53 | +0.44 |
| WCA-3B | 6.01 | +0.49 |
| ENP | 6.10 | +0.48 |

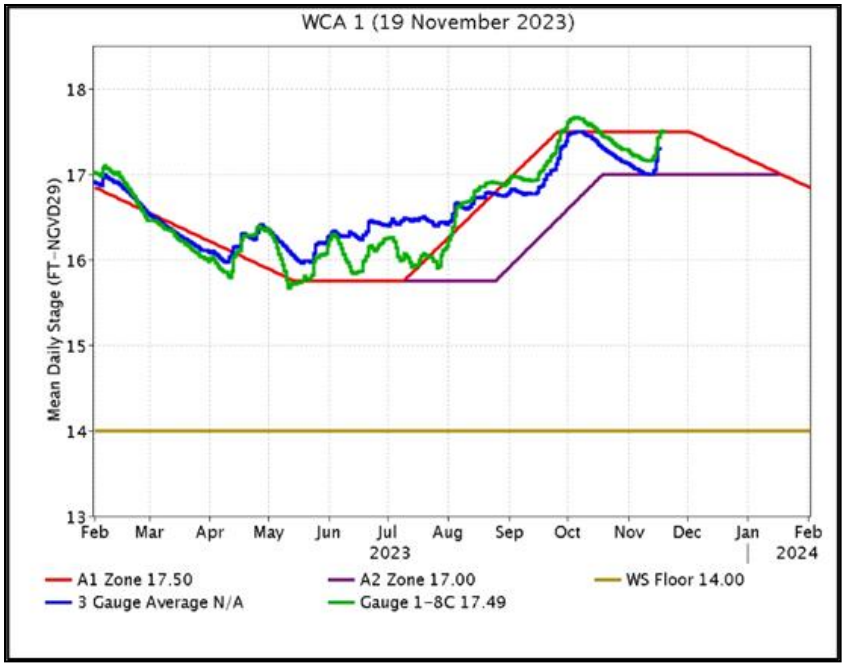



**Figure EV-1.** WCA-1 stage hydrographs and regulation schedule.

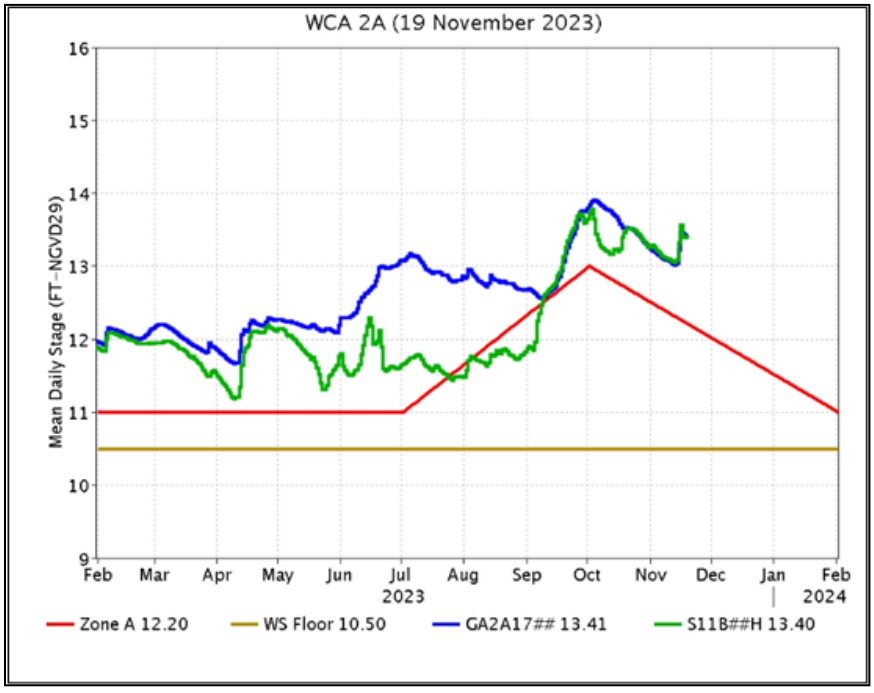



**Figure EV-2.** WCA-2A stage hydrographs and regulation schedule.

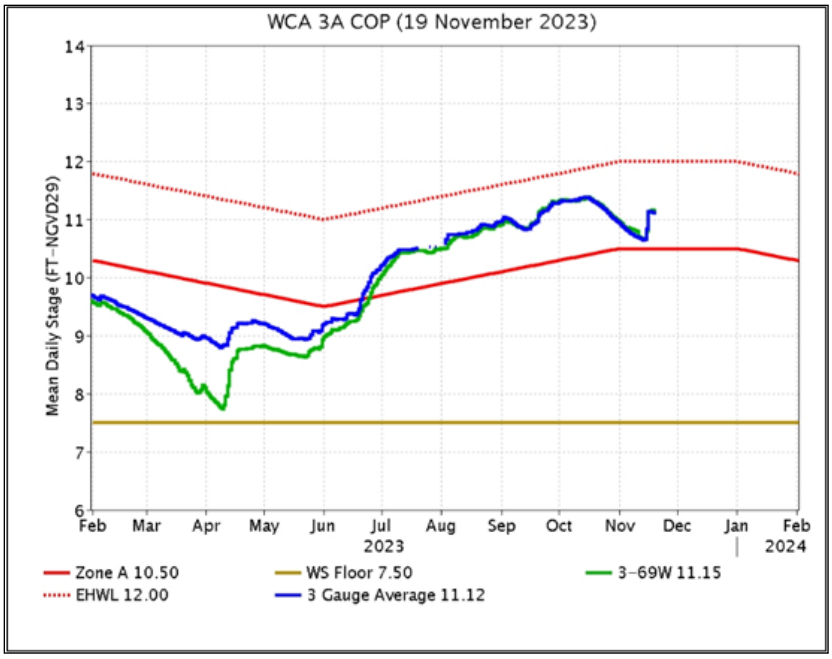



**Figure EV-3.** WCA-3A stage hydrographs (three-gauge average, 3-69W) and regulation schedule.

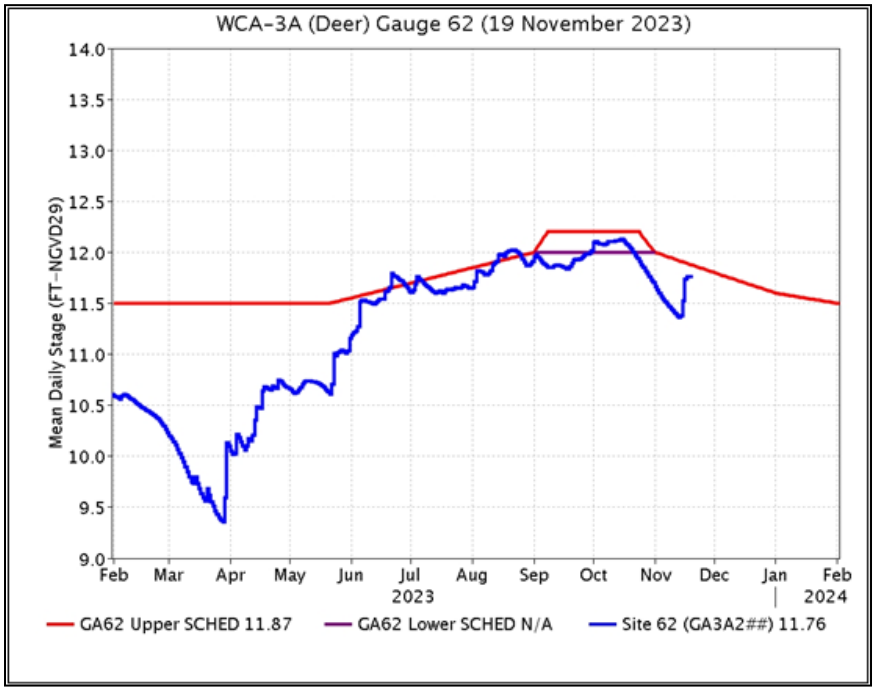



**Figure EV-4.** WCA-3A stage hydrograph (Deer gauge; Site 62) and GA62 regulation schedule.

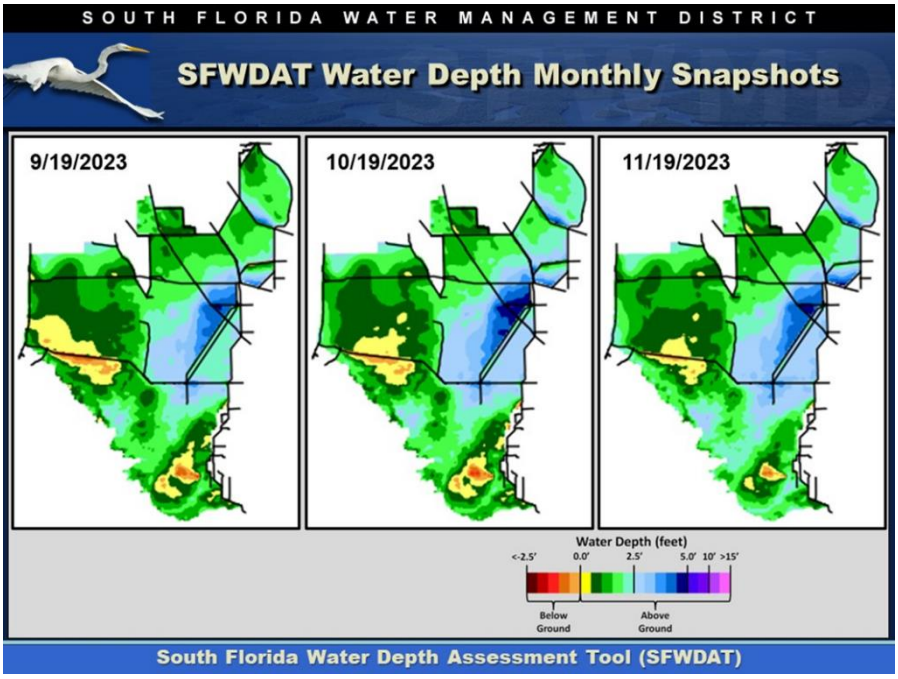



**Figure EV-5.** Everglades water depths from two months ago (left), one month ago (center) and present (right), based on SFWDAT.

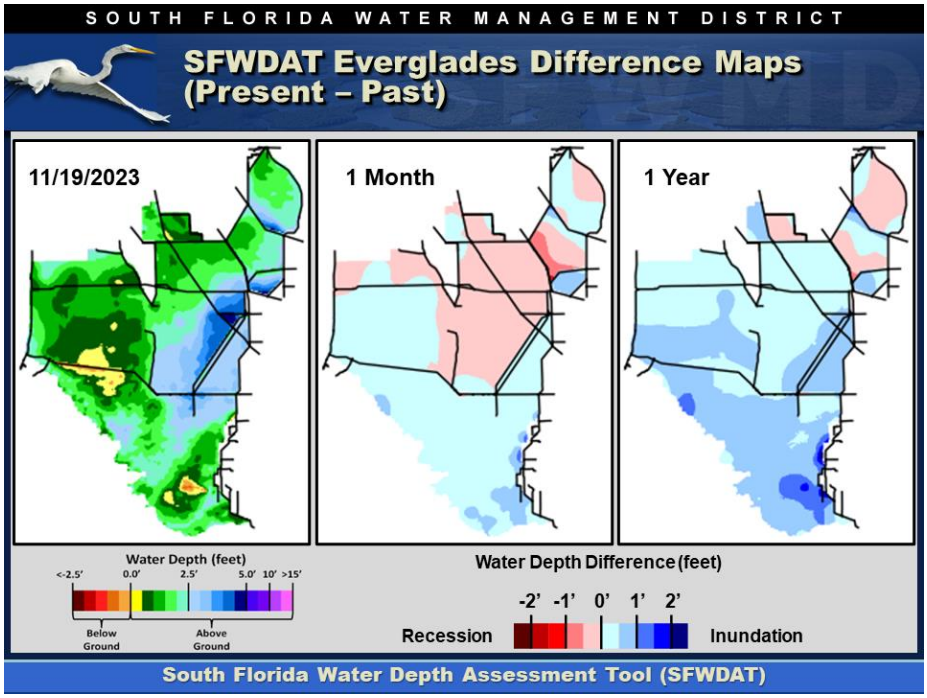



**Figure EV-6.** Present Everglades water depths (left) and water depth changes from one month (center) and one year (right) ago, based on SFWDAT.

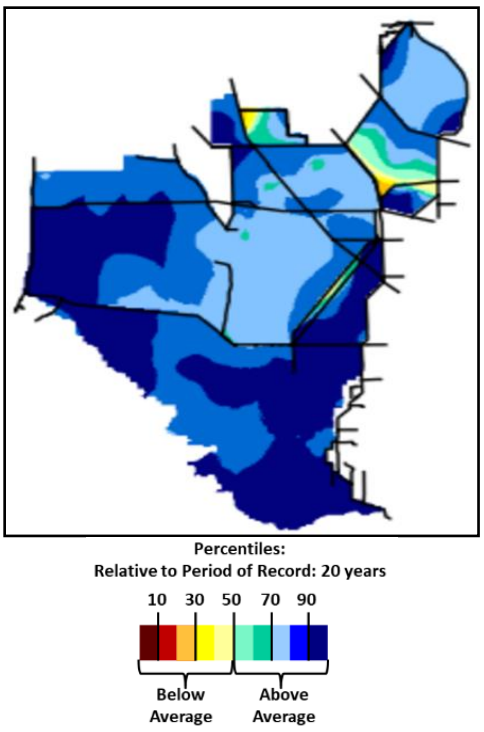



**Figure EV-7.** Present water depths (11/19/2023) compared to the day of year average over the previous 20 years.

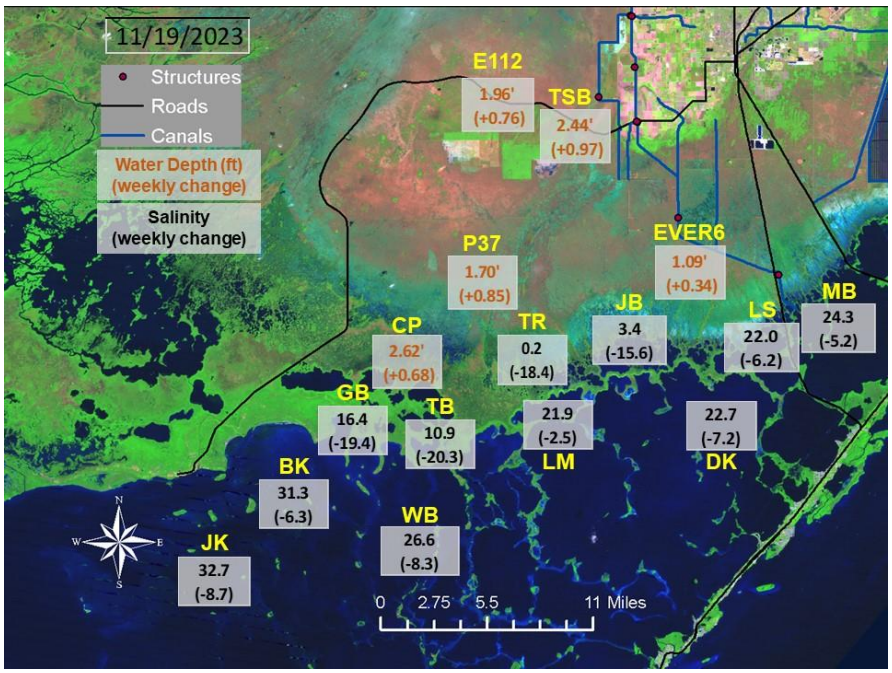



**Figure EV-8.** Taylor Slough water depths with changes since a week ago and Florida Bay salinities with changes since a week ago.

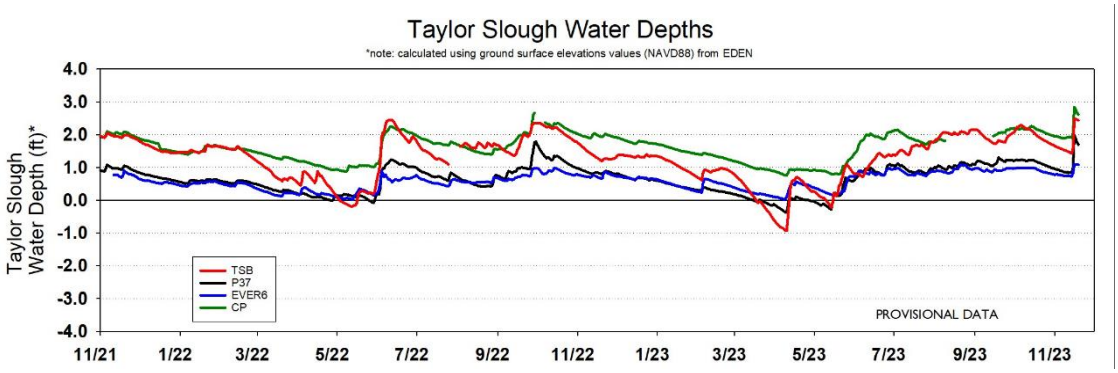



**Figure EV-9.** Taylor Slough water depth time series.

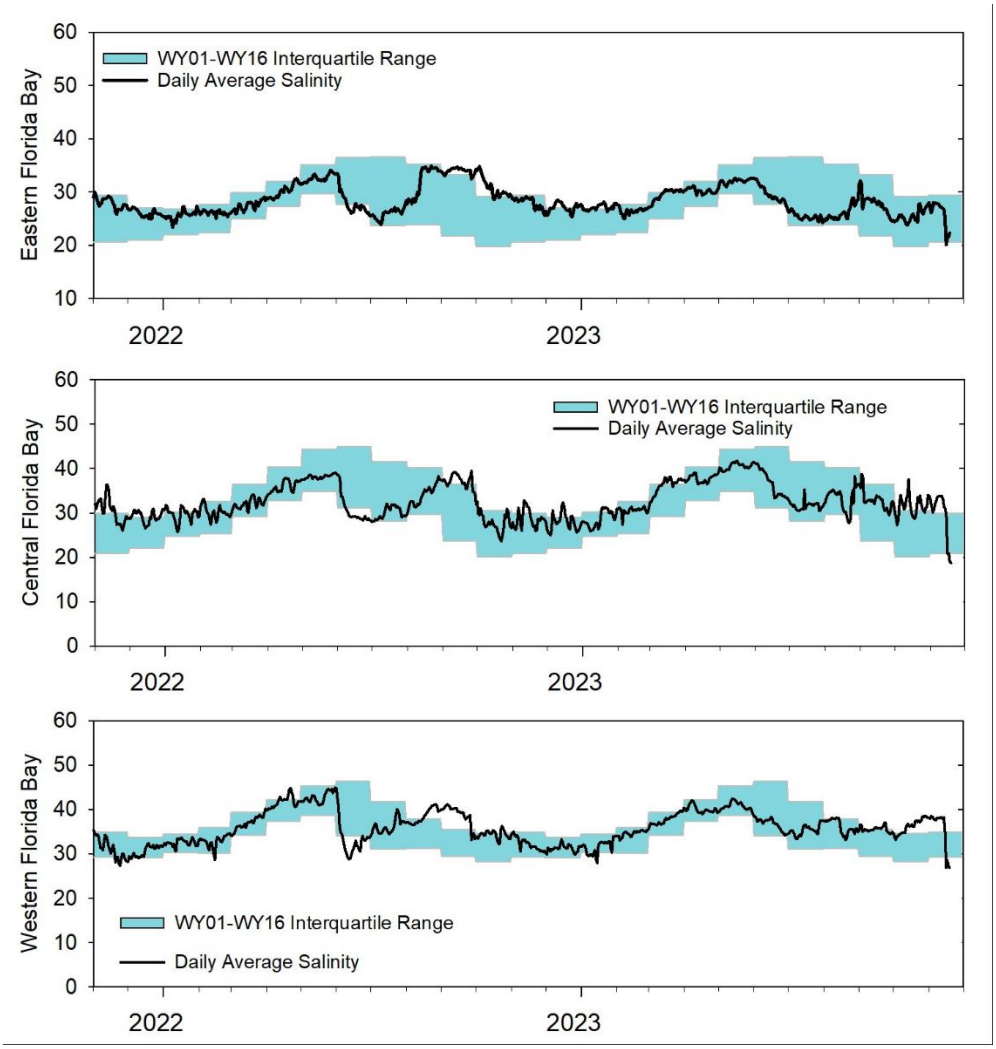



**Figure EV-10.** Eastern (top panel), Central (middle panel) and Western (bottom panel) Florida Bay daily average salinities with interquartile (25-75 percentile) ranges.

**Table EV-2.** Weekly water depth changes and water management recommendations

| SFWMD Everglades Ecological Recommendations, November 21, 2023 (red is new) | | | |
|---|---|---|---|
| | Weekly change | Recommendation | Reasons |
| **WCA-1** | Stage increased by 0.31’ | Recession rate of less than 0.05’ per week. | Protect within basin and downstream habitat and wildlife. |
| **WCA-2A** | Stage increased by 0.38’ | Recession rate of less than 0.05’ per week. | Protect within basin and downstream habitat and wildlife. Recent rapid increase. |
| **WCA-2B** | Stage increased by 0.84’ | Recession rate of less than 0.05’ per week. | Protect within basin and downstream habitat and wildlife. |
| **WCA-3A NE** | Stage increased by 0.61’ | Recession rate of less than 0.05’ per week. | Protect within basin and downstream habitat (peat soils) and wildlife (fish/crayfish reproduction). Recent rapid increase. |
| **WCA-3A NW** | Stage increased by 0.39’ | Recession rate of less than 0.05’ per week. | |
| **Central WCA-3A S** | Stage increased by 0.42’ | Recession rate of less than 0.12’ per week. | Protect within basin and downstream habitat and wildlife. |
| **Southern WCA-3A S** | Stage increased by 0.35’ | | |
| **WCA-3B** | Stage increased by 0.49’ | Recession rate of less than 0.12’ per week. | Protect within basin (sensitive tree islands) and downstream habitat and wildlife. Allow for flow through. |
| **ENP-SRS** | Stage increased by 0.48’ | Make discharges to ENP according to COP and TTFF protocol while adaptively considering upstream and downstream ecological conditions. | Protect within basin and upstream habitat and wildlife (wading bird nesting). |
| **Taylor Slough** | Stage changes ranged from +0.12’ to +0.97’ | Move water southward as possible. | When available, provide freshwater to promote water movement. |
| **FB- Salinity** | Salinity changes ranged from −20.3 to −2.5 | Move water southward as possible. | When available, provide freshwater to promote water movement. |

## Biscayne Bay

As shown in **Figure BB-1**, mean total inflow to Biscayne Bay was 2,101 cfs, and the previous 30-day mean inflow was 950 cfs. The seven-day mean salinity was 25.0 at BBCW8 and 20.8 at BBCW10, both within the ideal salinity range for estuarine organisms in this region (salinity less than 35). Data were provided by Biscayne National Park.

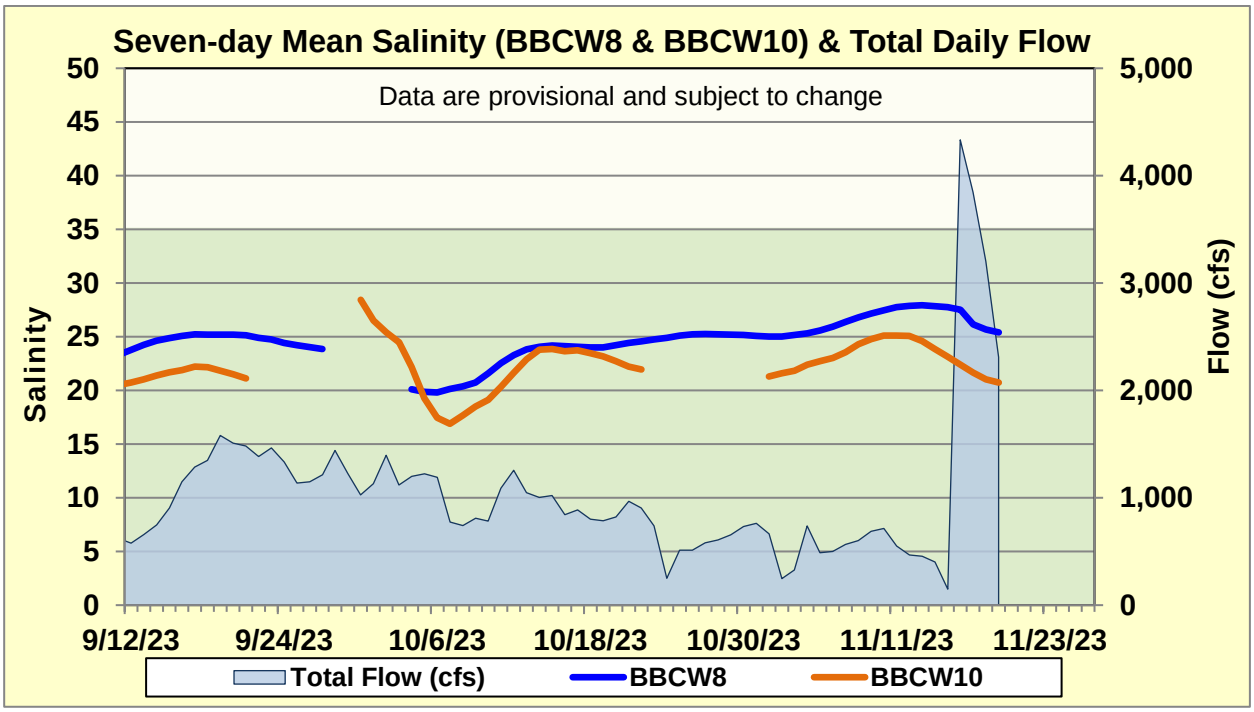



**Figure BB-1.** Seven-day mean salinity at BBCW8 and BBCW10 and total daily flow in Biscayne Bay. Total daily flow was calculated using flow from structures S20G, S20F, S21, S21A, S123, and S700P.