

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:** December 6, 2023

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

### **Summary**

#### **Weather Conditions and Forecast**

A vigorous upper-air disturbance will dive into the southeastern U.S. on Wednesday, rapidly propelling a secondary cold front through the SFWMD by Wednesday afternoon. Sharply cool and dry weather is likely after its passage, with some of the coolest temperatures so far this fall season by Thursday morning. A gradual warming trend will begin Thursday afternoon, with shallow moisture returning along and near the east coast on Friday and Saturday. This will fuel mainly light shower activity that could produce isolated areas of heavier rain along and near the east coast. Very light rains north of Lake Okeechobee are possible late Friday and early Saturday but are likely of little area-averaged significance. On Sunday, a widespread coverage of rainfall is expected in the afternoon into part of the evening, much of it probably moderately heavy. Most model solutions indicate that this would be the heaviest daily rainfall since mid-November. A cold front stationary from the southern Bahamas through central Cuba will bring somewhat cooler temperatures and mainly dry conditions across the SFWMD. However, a few showers are possible along and near the east coast thanks to an onshore wind. For the week ending next Tuesday morning, total SFWMD rainfall will most likely be below 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 December 3, 2023, was 810 cfs and 790 cfs at S-65 and S-65A, respectively. Mean weekly water depth on the Kissimmee River floodplain decreased by 0.08 feet to 0.21 feet over the week ending December 3, 2023. The weekly average concentration of dissolved oxygen in the Kissimmee River increased from 6.1 mg/L last week to 7.4 mg/L for the week ending December 3, 2023, which is well above the potentially lethal and stressful levels for largemouth bass and other sensitive species.

## **Lake Okeechobee**

Lake Okeechobee stage was 15.99 feet NGVD on December 03, 2023, which was 0.06 feet lower than the previous week and 0.11 feet lower than a month ago. Average daily inflows (excluding rainfall) decreased from the previous week, going from 1,250 cfs to 940 cfs. Average daily outflows (excluding evapotranspiration) increased slightly from the previous week, going from 1,380 cfs to 1,420 cfs. Seven of the 30 sites sampled between November 13-15 had chlorophyll *a* values between 20 µg/L and 40 µg/L. The cyanobacteria index level was low to moderate along the western shoreline of the Lake according to the November 30, 2023, satellite image from NOAA's Harmful Algal Bloom Monitoring System.

## **Estuaries**

Total inflow to the St. Lucie Estuary averaged 200 cfs over the past week with no flow coming from Lake Okeechobee. Mean salinities increased at all three sites in the estuary 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 1,630 cfs over the past week with 1,000 cfs coming from Lake Okeechobee. Mean surface salinity increased at Cape Coral and decreased at all remaining sites in the estuary 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, December 3, 2023, 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 WY2024 (since May 1, 2023) is approximately 7,300 ac-feet. The total amount of inflows to the STAs in WY2024 is approximately 1,087,000 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**

Last week's stage changes were elevated in WCA-3A but remained moderate in WCA-1 and WCA-2A. While deeper than average conditions in southern WCA-3A do have ecological tradeoffs, conditions continue to suggest hope for an improved upcoming Wood Stork nesting season if recession rates are such that water remains in the sloughs of WCA-3A at the end of the upcoming wading bird nesting season. Large flocks of wading birds were seen foraging in coastal ENP. There was a decline immediately after the heavy rainfall and reversal, but the birds are now back foraging in very good numbers (about 12,000 birds including ~ 1,000 storks). The Lostman's Slough area is also relatively wet and looks like it will be sufficiently deep to remain wet until March and trigger another good nesting event this year. There is some concern regarding the coastal nesting storks that seem to forage in the Big Cypress in Jan/February after the coast gets too dry, and

then in the sloughs of southern 3A in March-May; these southern slough areas are drying down quickly and may become too dry to support storks later in the season. Stages decreased across Taylor Slough last week but remain well above the historical average. Salinity increased on average in Florida Bay last week but remains below the historical average in all regions.

### **Biscayne Bay**

Total inflow to Biscayne Bay averaged 1,020 cfs and the previous 30-day mean inflow averaged 1,250 cfs. The seven-day mean salinity was 24.1 at BBCW8 and 17.8 at BBCW10, both within the ideal salinity range for estuarine organisms in this region (salinity less than 35). Data provided by Biscayne National Park.

## **Supporting Information**

### **Kissimmee Basin**

#### ***Upper Kissimmee***

On December 3, 2023, mean daily lake stages were 58.0 feet NGVD (0.0 feet from schedule) in East Lake Toho, 55.0 feet NGVD (0.0 feet from schedule) in Lake Toho, and 51.6 feet NGVD (0.9 feet below schedule) in Lakes Kissimmee-Cypress-Hatchineha (KCH) (**Table KB-1, Figures KB-1-3**).

#### ***Lower Kissimmee***

For the week ending December 3, 2023, mean weekly discharge was 810 cfs and 790 cfs at S-65 and S-65A, respectively. Mean weekly discharge from the Kissimmee River was 870 cfs at S-65D and 810 cfs at S-65E (**Table KB-2**). Mean weekly headwater stages were 46.3 feet NGVD at S-65A and 26.8 feet NGVD at S-65D on December 3, 2023, a reduction of about 0.1 ft at S-65D. Mean weekly river channel stage decreased by 0.2 feet to 35.6 feet NGVD over the week ending on December 3, 2023 (**Figure KB-4**). Mean weekly water depth on the Kissimmee River floodplain decreased by 0.08 ft to 0.21 feet over the week ending December 3, 2023 (**Table KB-2, Figure KB-5**). The weekly average concentration of dissolved oxygen in the Kissimmee River increased from 6.1 mg/L the previous week to 7.4 mg/L for the week ending December 3, 2023 (**Table KB-2, Figure KB-6**).

#### ***Water Management Recommendations***

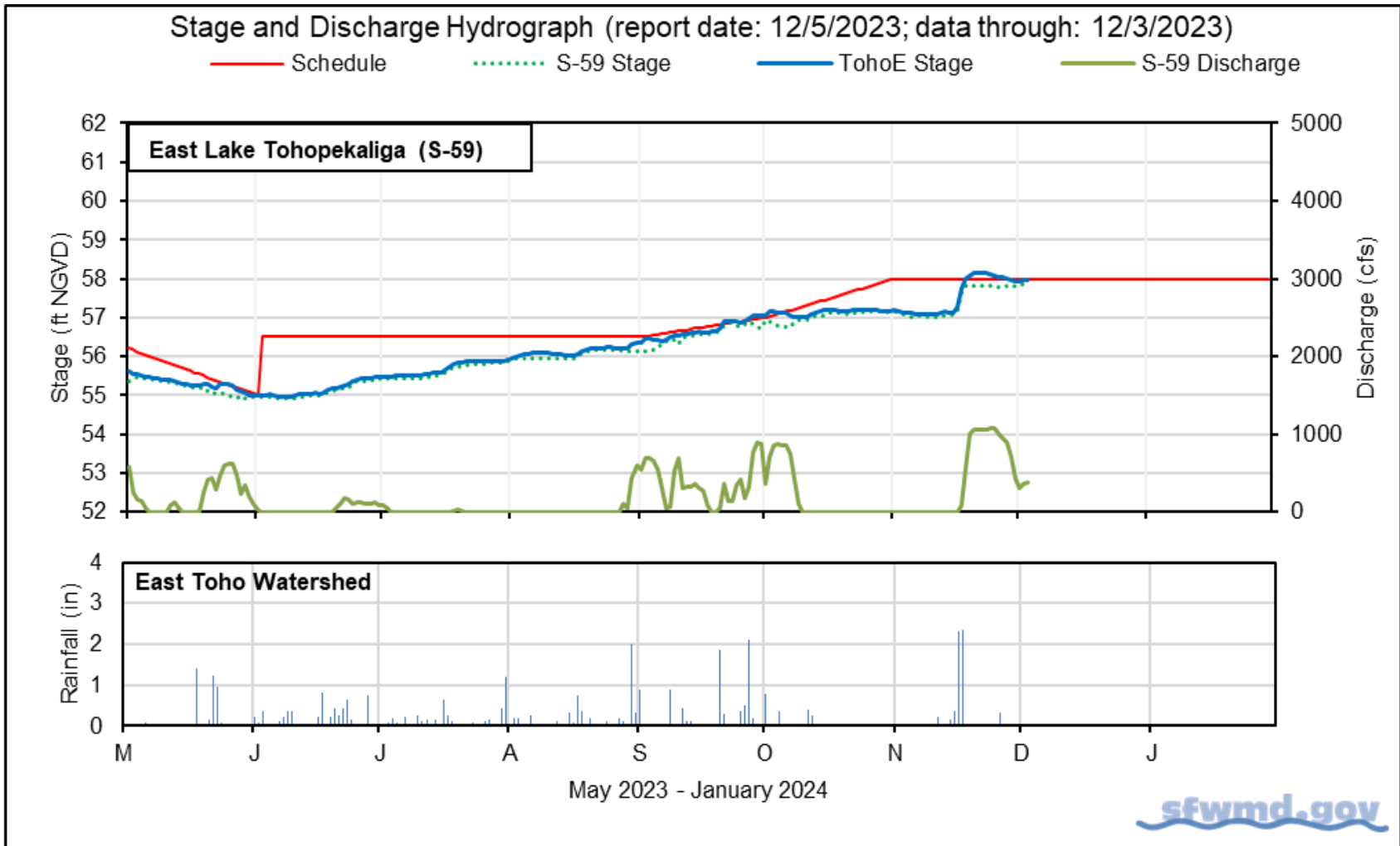
Follow the Hybrid A discharge plan (Fig. KB-7) to facilitate S-69 repairs through May 31, 2024. Maintain at least minimum flow (250-300 cfs) at S-65A. Continue the stage recession at S-65D headwater to reach 25.8 ft NGVD in early January 2024 at a recession rate of approximately 0.2 ft/week.

**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.

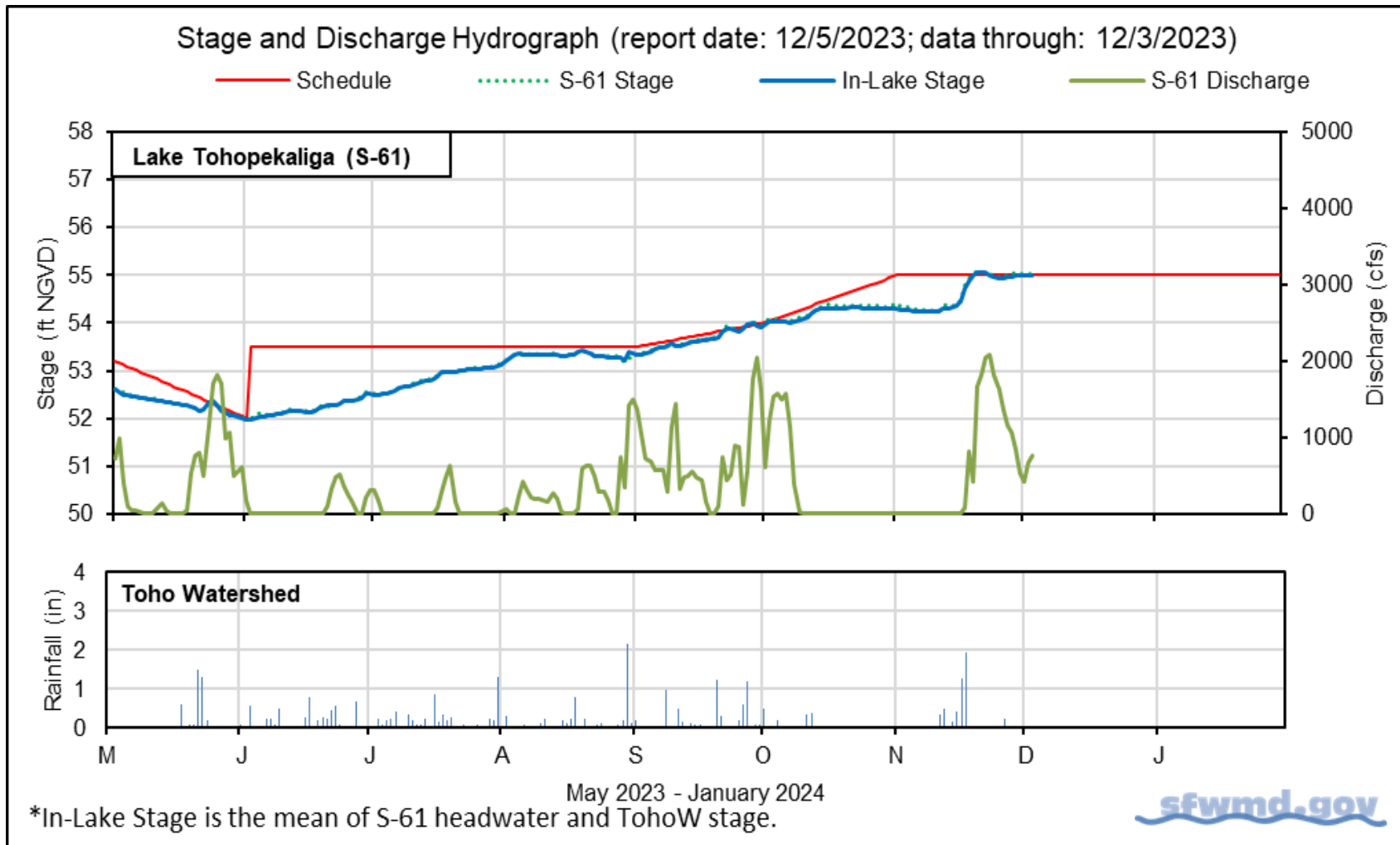
Water Body	Structure	Stage Monitoring Site	Weekly (7-Day) Average Discharge (cfs)	Sunday Lake Stage (feet NGVD) <sup>a</sup>	Schedule Type <sup>b</sup>	Sunday Schedule Stage (feet NGVD)	Sunday Departure from Regulation (feet)	
							12/3/23	11/26/23
Lakes Hart and Mary Jane	S-62	LKMJ	350	60.9	R	61.0	-0.1	0.1
Lakes Myrtle, Preston and Joel	S-57	S-57	200	62.3	R	62.0	0.3	1.3
Alligator Chain	S-60	ALLI	76	64.0	R	64.0	0.0	0.0
Lake Gentry	S-63	LKGT	120	61.5	R	61.5	0.0	0.0
East Lake Toho	S-59	TOHOE	580	58.0	R	58.0	0.0	0.1
Lake Toho	S-61	TOHOW S-61	780	55.0	R	55.0	0.0	-0.1
Lakes Kissimmee, Cypress and Hatchineha	S-65	KUB011 LKIS5B	810	51.6	R	52.5	-0.9	-1.0

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.

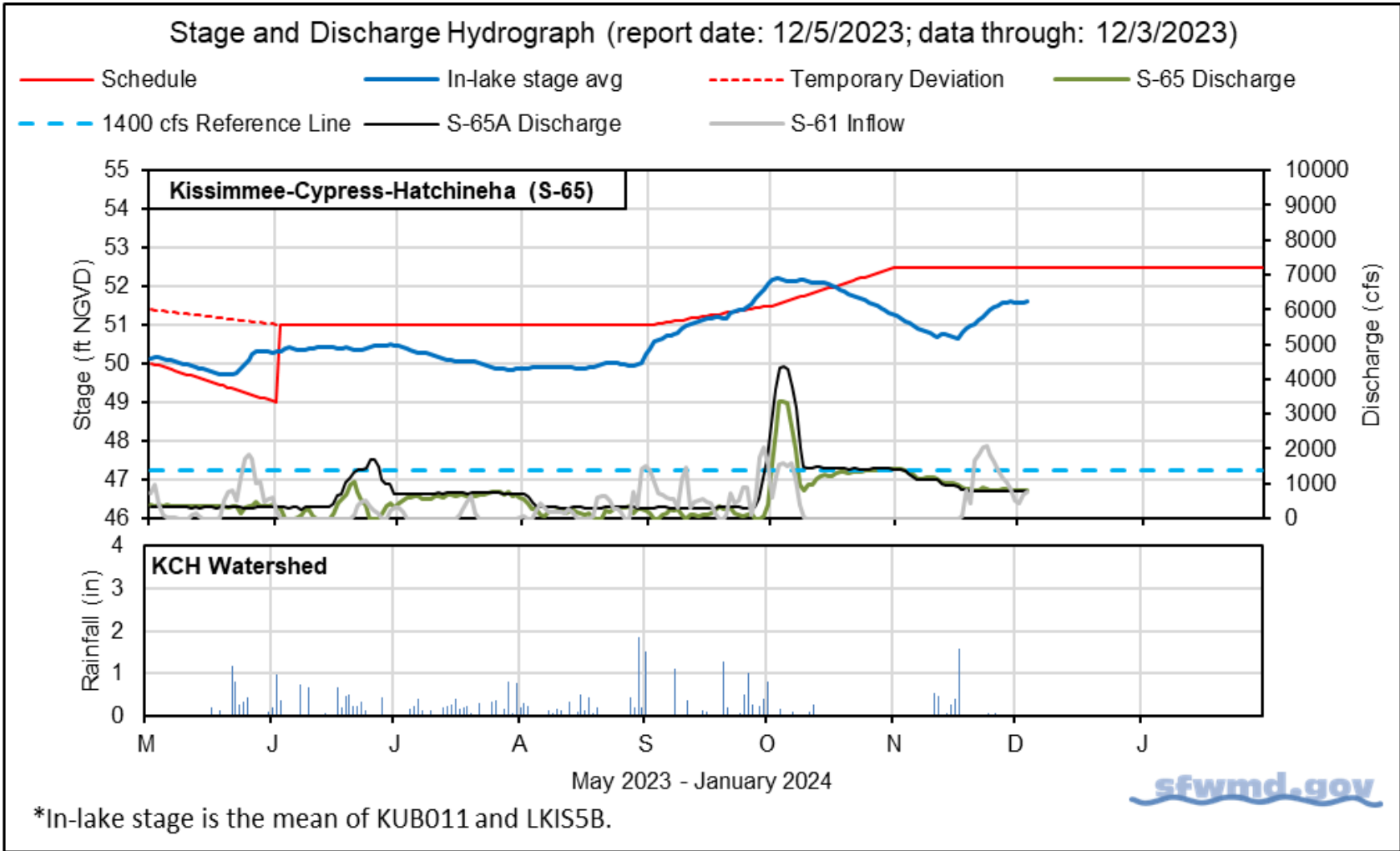
b. A: projected recession line; R: USACE regulation schedule; S: temporary recession target line; T: temporary schedule; NA: not applicable or not available.



**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			
		12/3/23	12/3/23	11/26/23	11/19/23	11/12/23
Discharge	S-65	820	810	820	940	1,100
Discharge	S-65A <sup>a</sup>	790	790	790	890	1,100
Headwater Stage (feet NGVD)	S-65A	46.3	46.3	46.3	46.2	46.2
Discharge	S-65D <sup>b</sup>	870	870	970	1,300	1,400
Headwater Stage (feet NGVD)	S-65D <sup>c</sup>	26.7	26.8	26.9	27.2	27.4
Discharge (cfs)	S-65E <sup>d</sup>	830	810	1,000	1,500	1,600
Discharge (cfs)	S-67	0	0	0	0	0
Dissolved Oxygen (mg/L) <sup>e</sup>	Phase I, II/III river channel	7.9	7.4	6.1	5.9	6.3
River channel mean stage <sup>f</sup>	Phase I river channel	35.5	35.6	35.8	36.5	37.1
Mean depth (feet) <sup>g</sup>	Phase I floodplain	0.18	0.21	0.29	0.42	0.49

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.

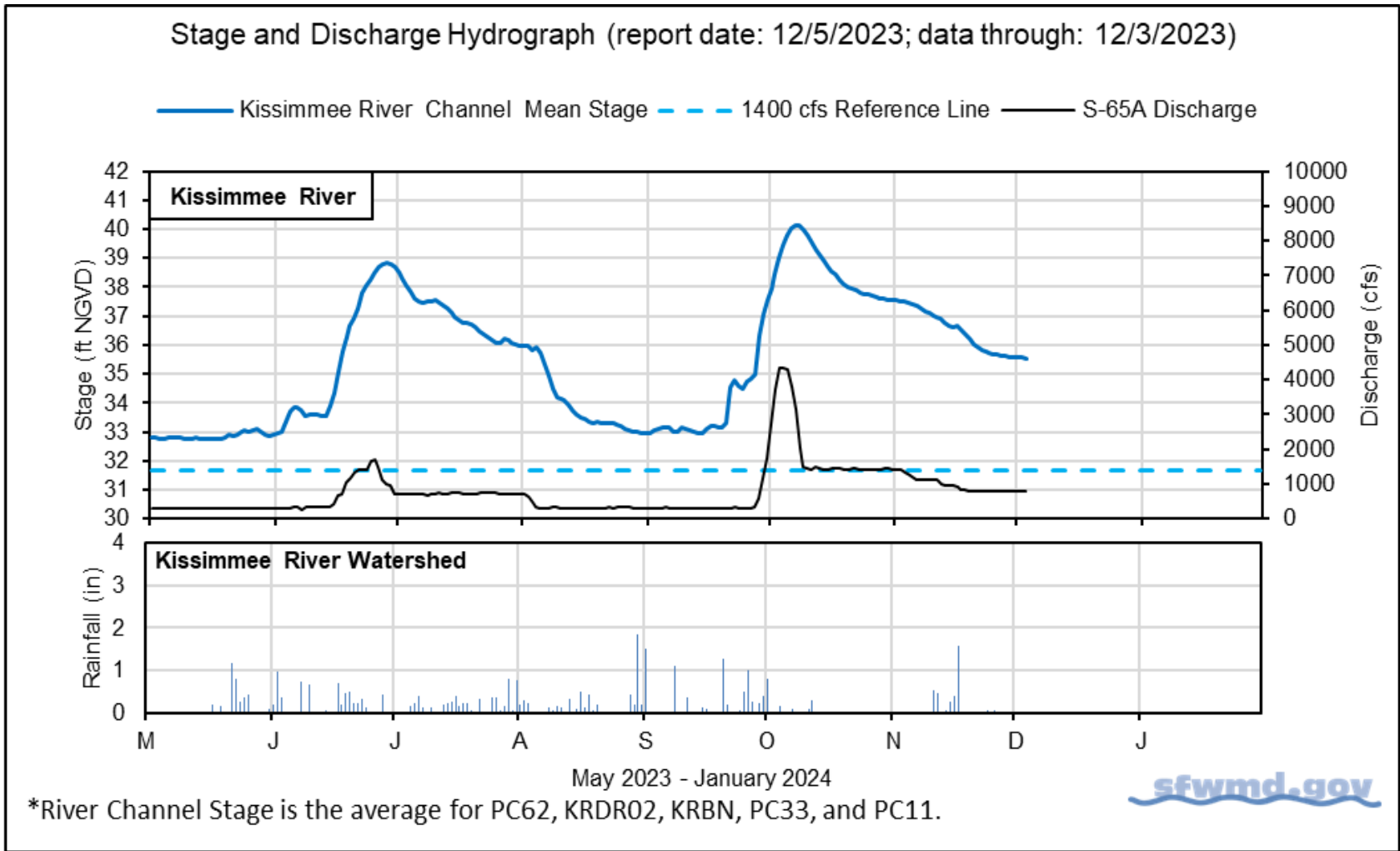
d. Combined discharge from S-65E and S-65EX1.

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

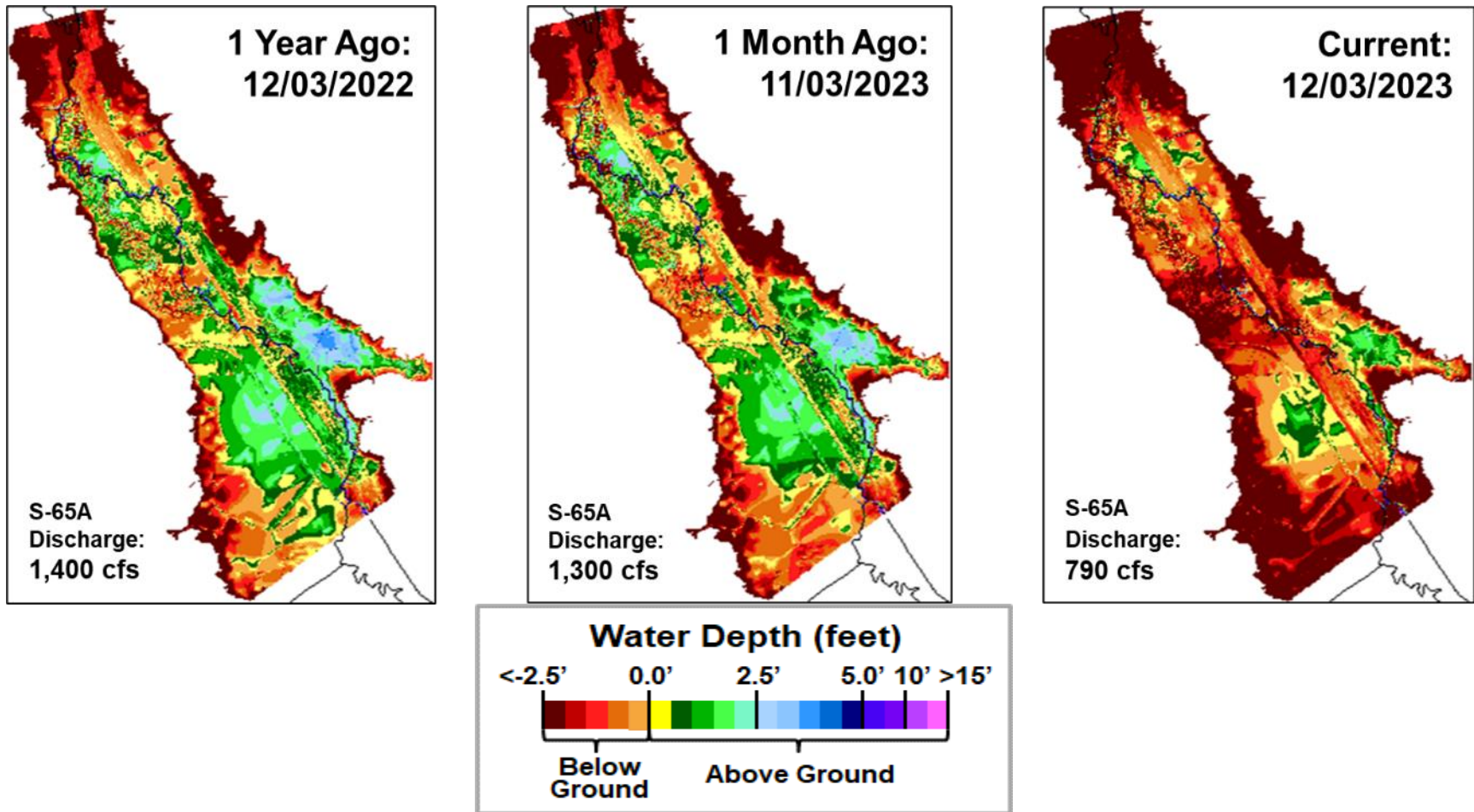
f. Mean of five river channel stations (PC62, KRDR02, KRBN, PC33, PC11) in the Phase I area.

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

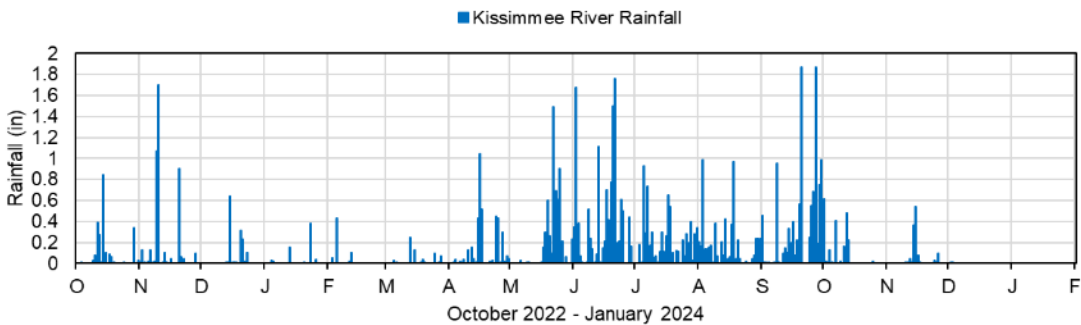
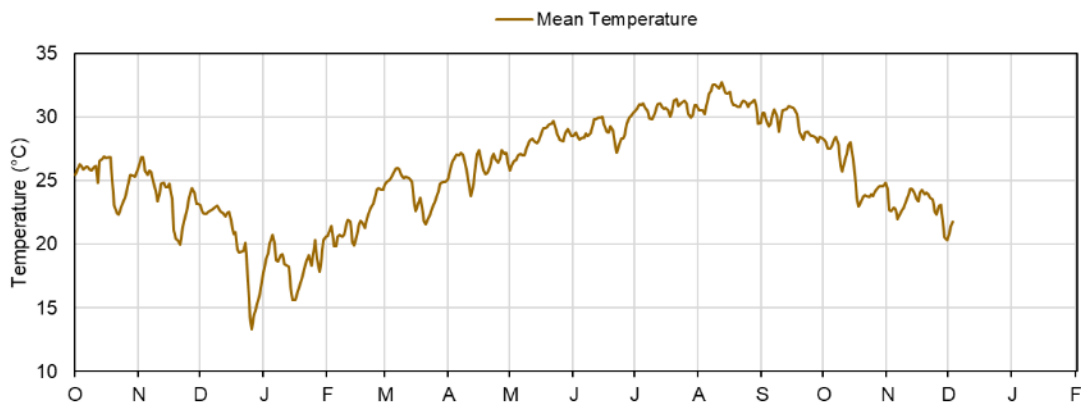
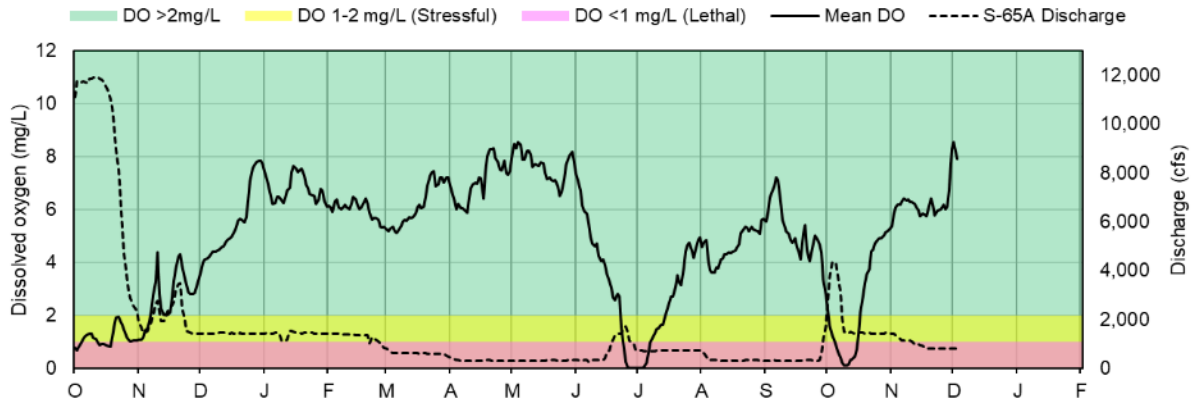




**Figure KB-4.** Kissimmee River stage, discharge, and rainfall.



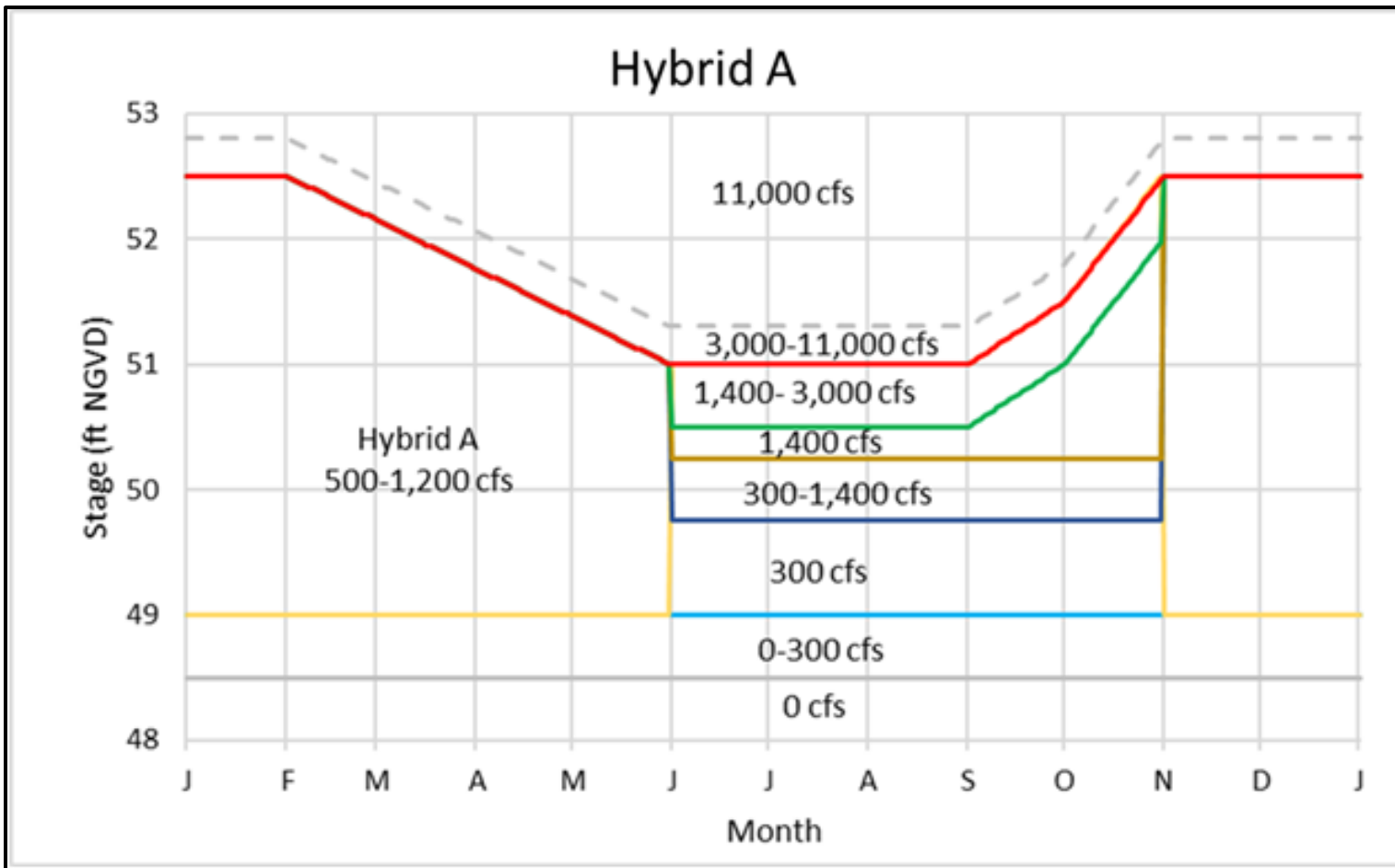
**Figure KB-5.** Phase I area Kissimmee River floodplain water depths (from left to right) one year ago, one month ago, and current.



Report Date: 12/5/2023; data are through: 12/3/2023



**Figure KB-6.** 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**).

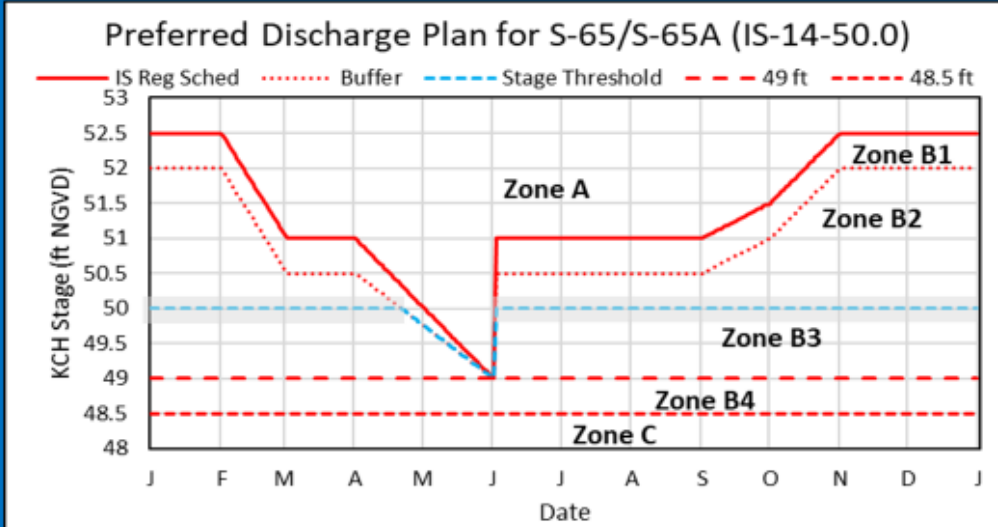
**Stage and Discharge Guidance for 2021-2023.**

Zone	KCH Stage (ft NGVD)	S-65/S-65A Discharge*
A	Above regulation schedule line.	Flood control releases as needed with no limits on the rate of discharge change.
B1	In flood control buffer zone (0.5 ft below the schedule line).	Adjust S-65 discharge so that S-65A discharge is between 1400 cfs at the buffer zone line and 3000 cfs at the schedule line.
B2	Between the Flood Control Buffer and the 50.0 ft line.	Adjust S-65 discharge to maintain at least 1400 cfs at S-65A. Use ± 0.2 ft buffer (gray band) above and below the 50.0 ft line to decide when to begin ramping up to 1400 cfs or down to 300 cfs; do not continue reducing discharge if stage rises back to or above the threshold stage line.
B3	Between the 50.0 ft line and 49 ft.	Adjust S-65 discharge to maintain at least 300 cfs at S-65A.
B4	Between 48.5 ft to 49 ft.	Adjust S-65 discharge to maintain S-65A discharge between 0 cfs at 48.5 ft and 300 cfs at 49 ft.
C	Below 48.5 ft.	0 cfs.

\*Changes in discharge should not exceed limits in inset table below.

Q (cfs)	Maximum rate of INCREASE (cfs/day)	Maximum rate of DECREASE (cfs/day)
0-300	100	-50
301-650	150	-75
651-1400	300	-150
1401-3000	600	-600
>3000	1000	-2000

## 2021-2023 Discharge Plan for S-65/S-65A



- Other Considerations**
- When possible, limit lake ascension rate in the Jun 1 - Aug 15 window to 0.25 ft per 7 days in Lakes Kissimmee, Cypress, Hatchineha (S-65), East Toho (S-59) and Toho (S-61).
  - If outlook is for extreme dry conditions meet with KB staff to discuss modifications to this plan.

Slide Revised 1/3/2022

**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 15.99 feet NGVD on December 03, 2023, which was 0.06 feet lower than the previous week and 0.11 feet lower than a month ago (**Figure LO-1**). Lake stage was in the low sub-band on December 3<sup>rd</sup> (**Figure LO-2**) and was 0.49 feet above the upper limit of the ecological envelope (**Figure LO-3**). According to NEXRAD, no rain fell directly over the Lake last week.

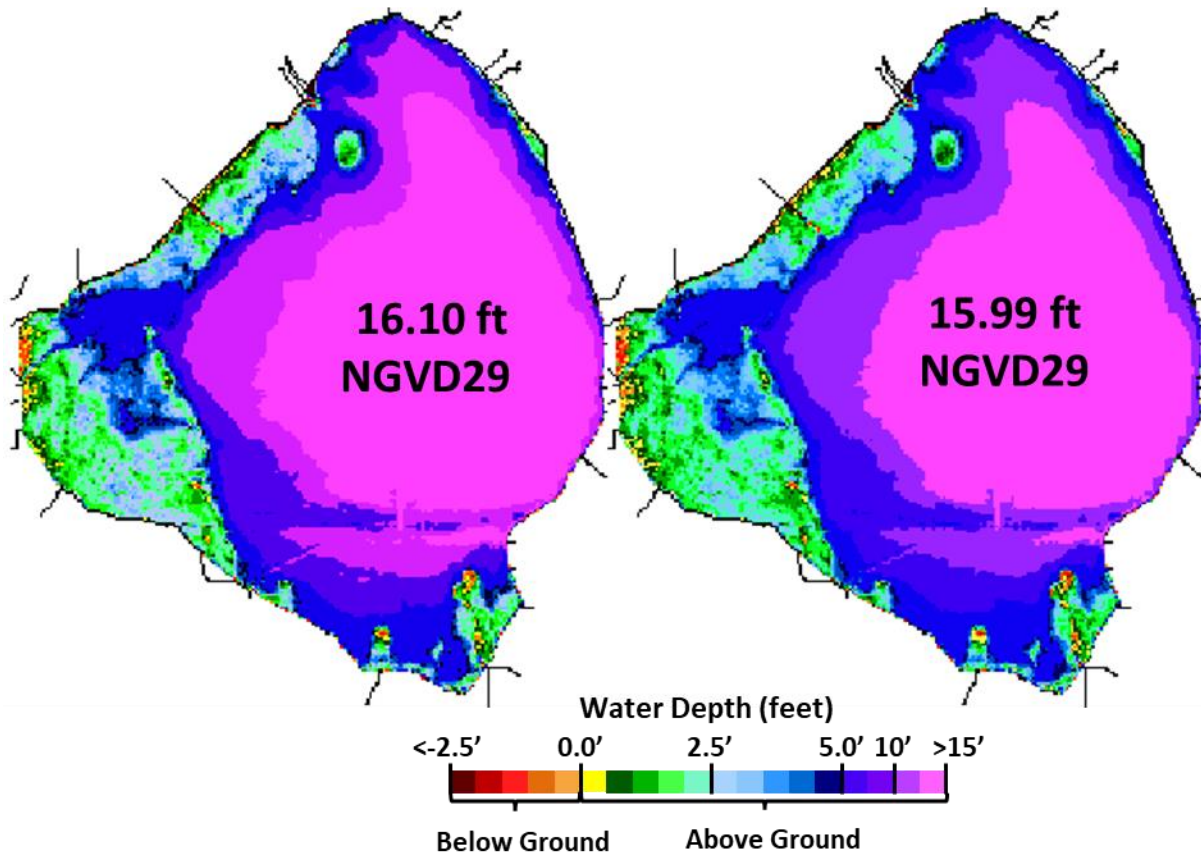
Average daily inflows (excluding rainfall) decreased from the previous week, going from 1,250 cfs to 940 cfs. The highest structure inflow came from the C-38 Canal via the S-65E/65EX1 structure (810 cfs). Average daily outflows (excluding evapotranspiration) increased slightly from the previous week, going from 1,380 cfs to 1,420 cfs. The highest average single structure outflow was recorded at the S-77 structure into the C-43 Canal (1,200 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 1<sup>st</sup>, the routine water quality and phytoplankton monitoring is 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. Bloom conditions ( $>40 \mu\text{g/L}$  chlorophyll *a*) were not recorded at any of the 30 sites, but 7 sites had chlorophyll *a* value  $>20 \mu\text{g/L}$  (**Figure LO-6**).

Recent satellite images are obscured by clouds or of poor quality. In the most recent usable image, November 30, 2023, the cyanobacteria index level was low to moderate along much of the western shoreline of the Lake according to the 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.

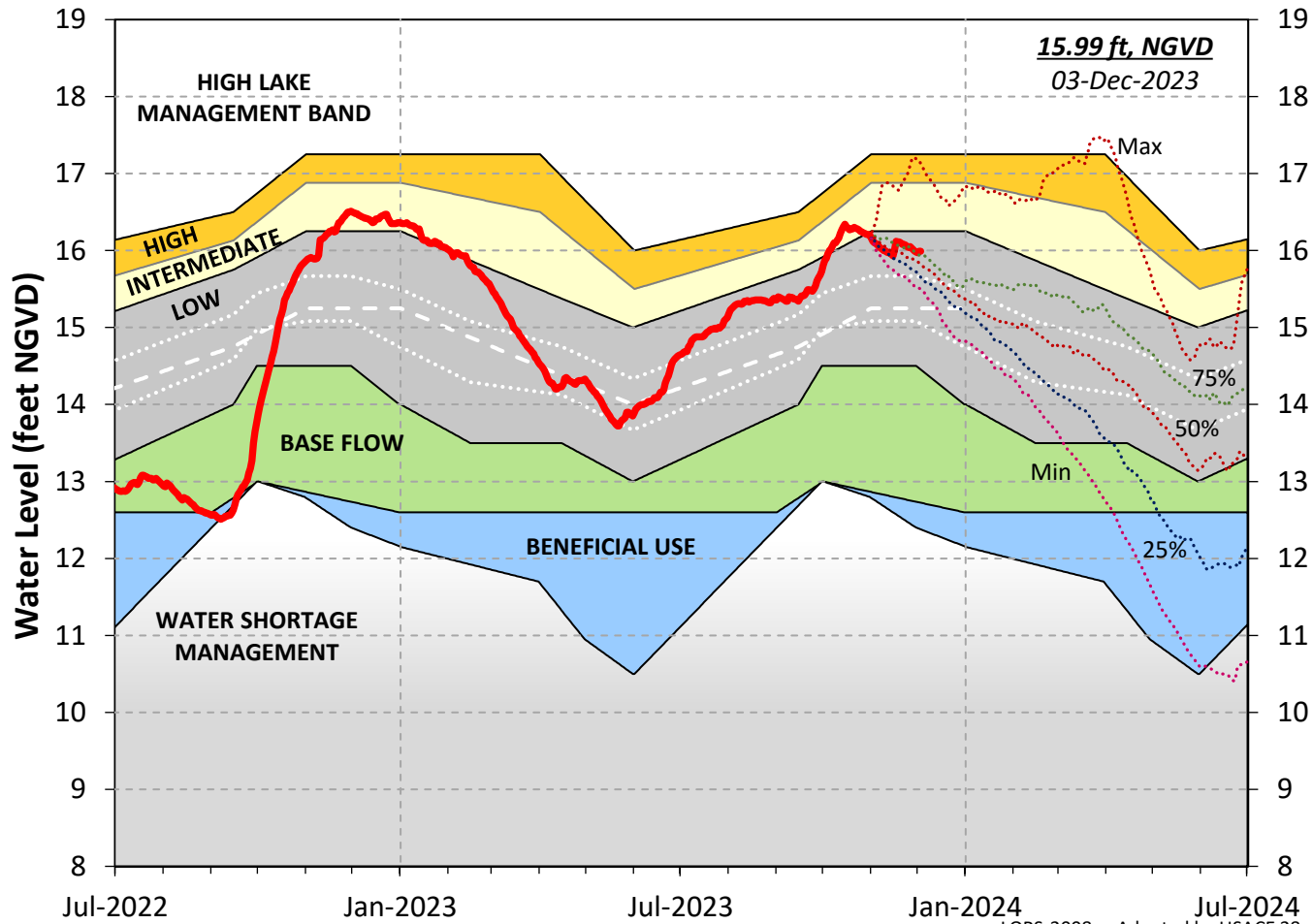
1 Month Ago:  
11/03/2023

Current:  
12/03/2023



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

## Lake Okeechobee Water Level History and Projected Stages

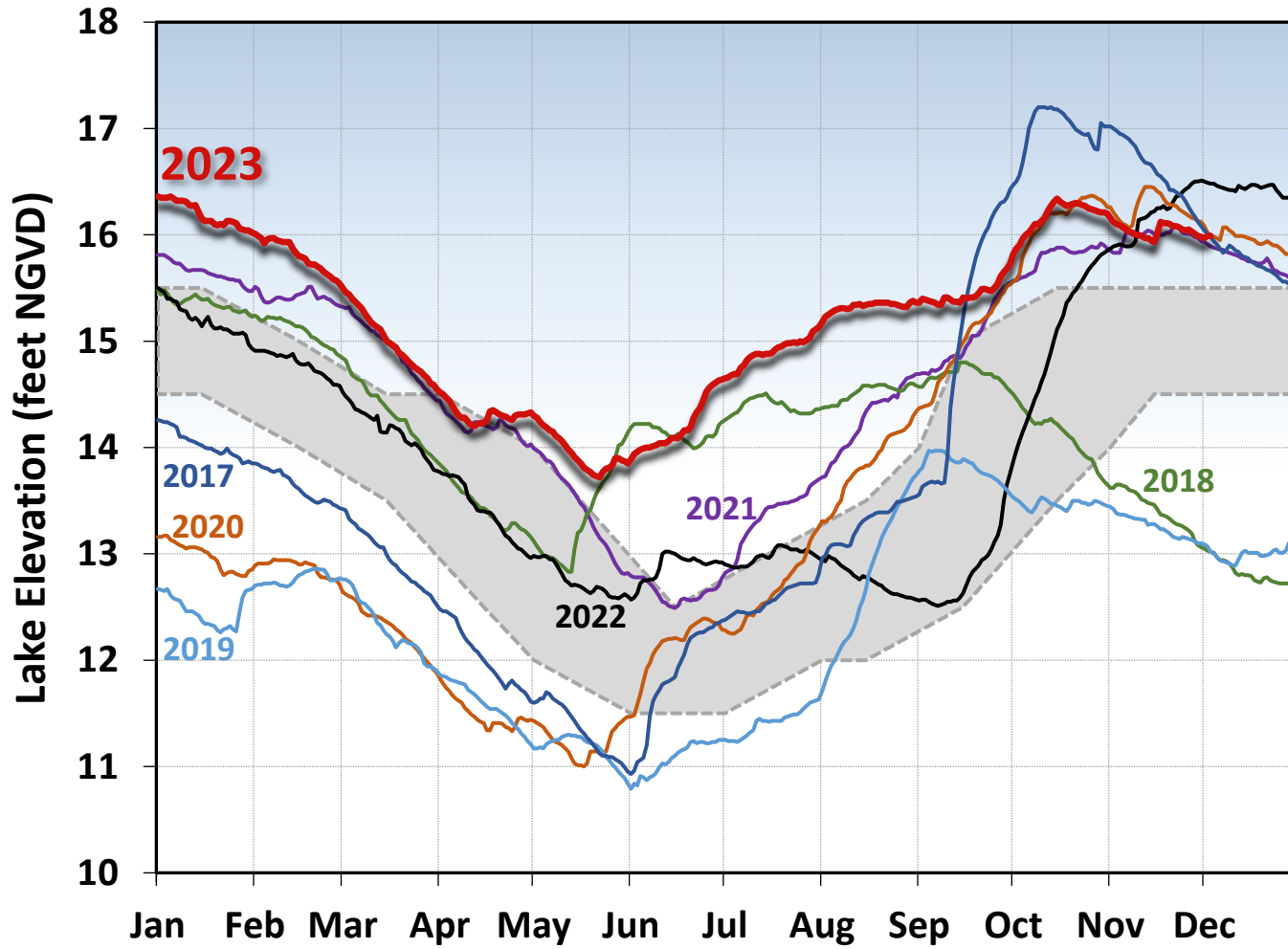


**Figure LO-2.** Recent Lake Okeechobee stages with projected stages based on a dynamic position analysis.

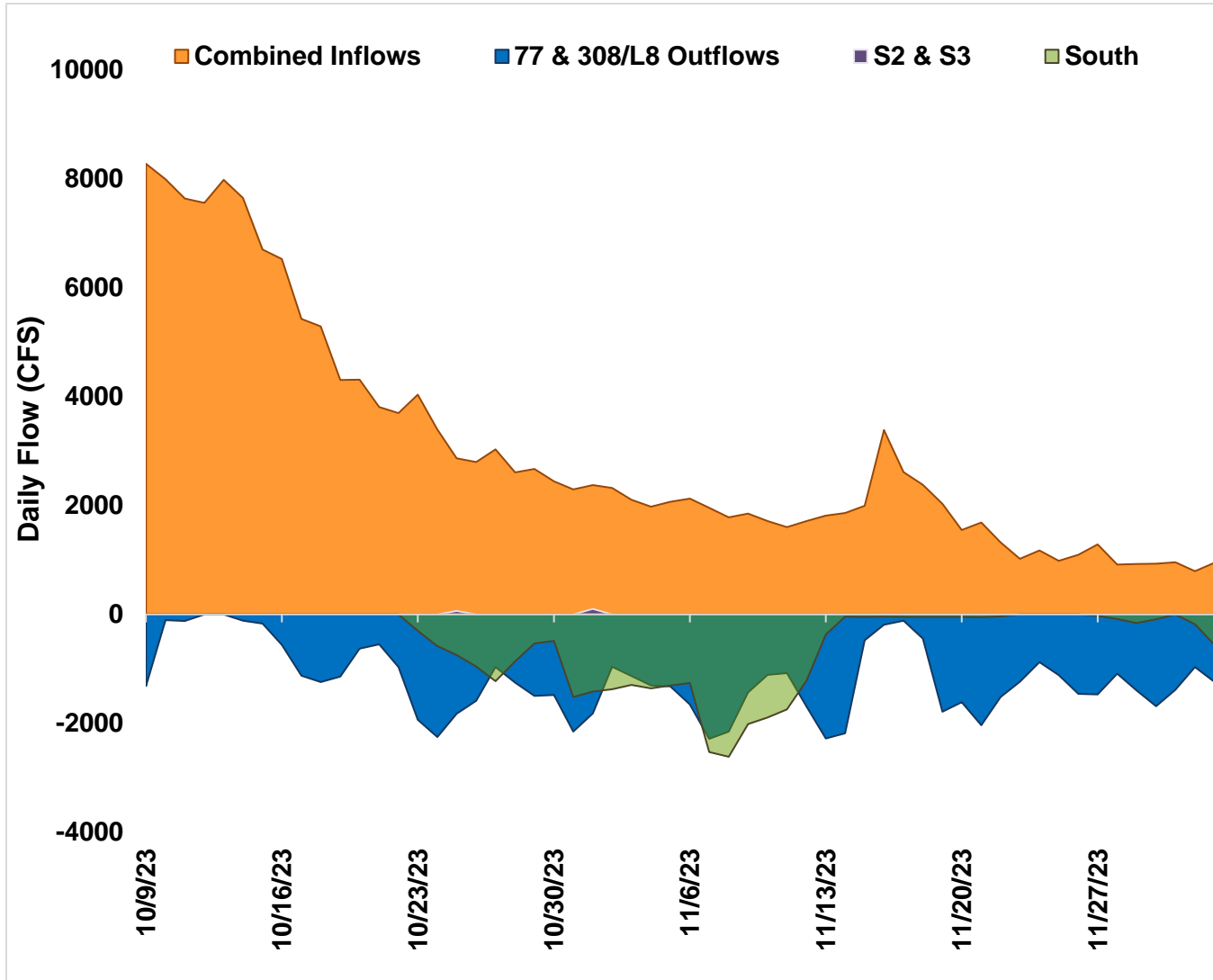
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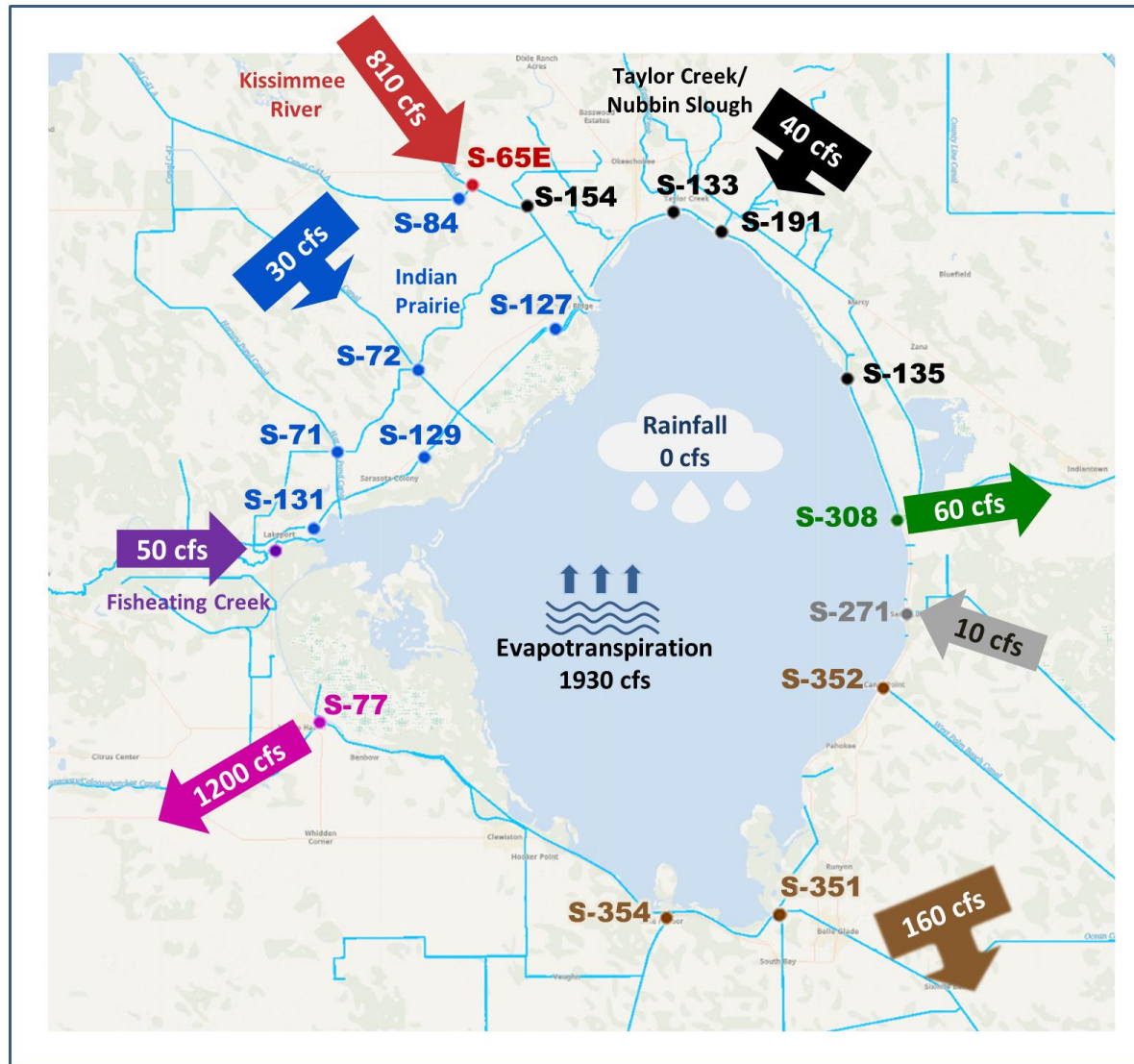
## Lake Okeechobee Stage vs Ecological Envelope



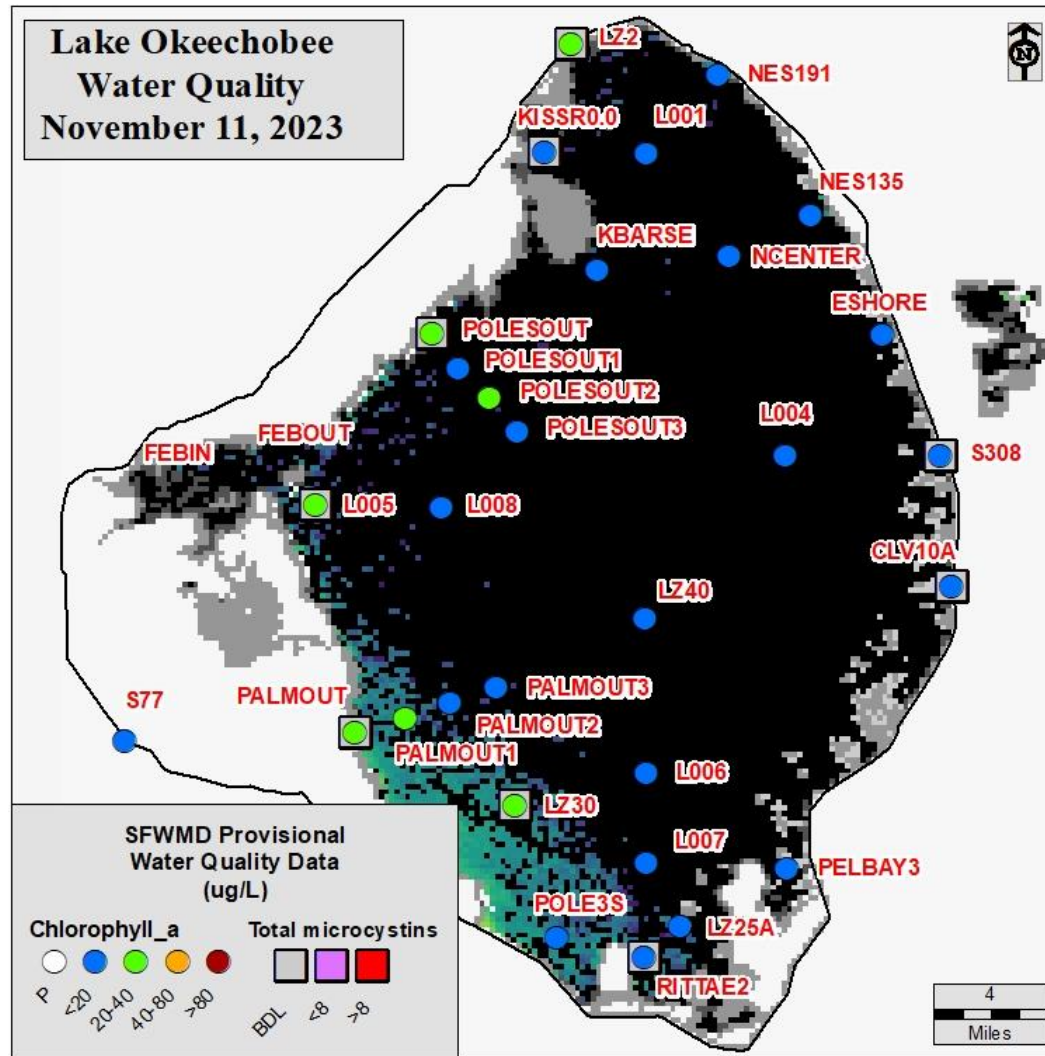
**Figure LO-3.** The selected prior years within the ten-year period of annual stage hydrographs for Lake Okeechobee in comparison to the ecological envelope.



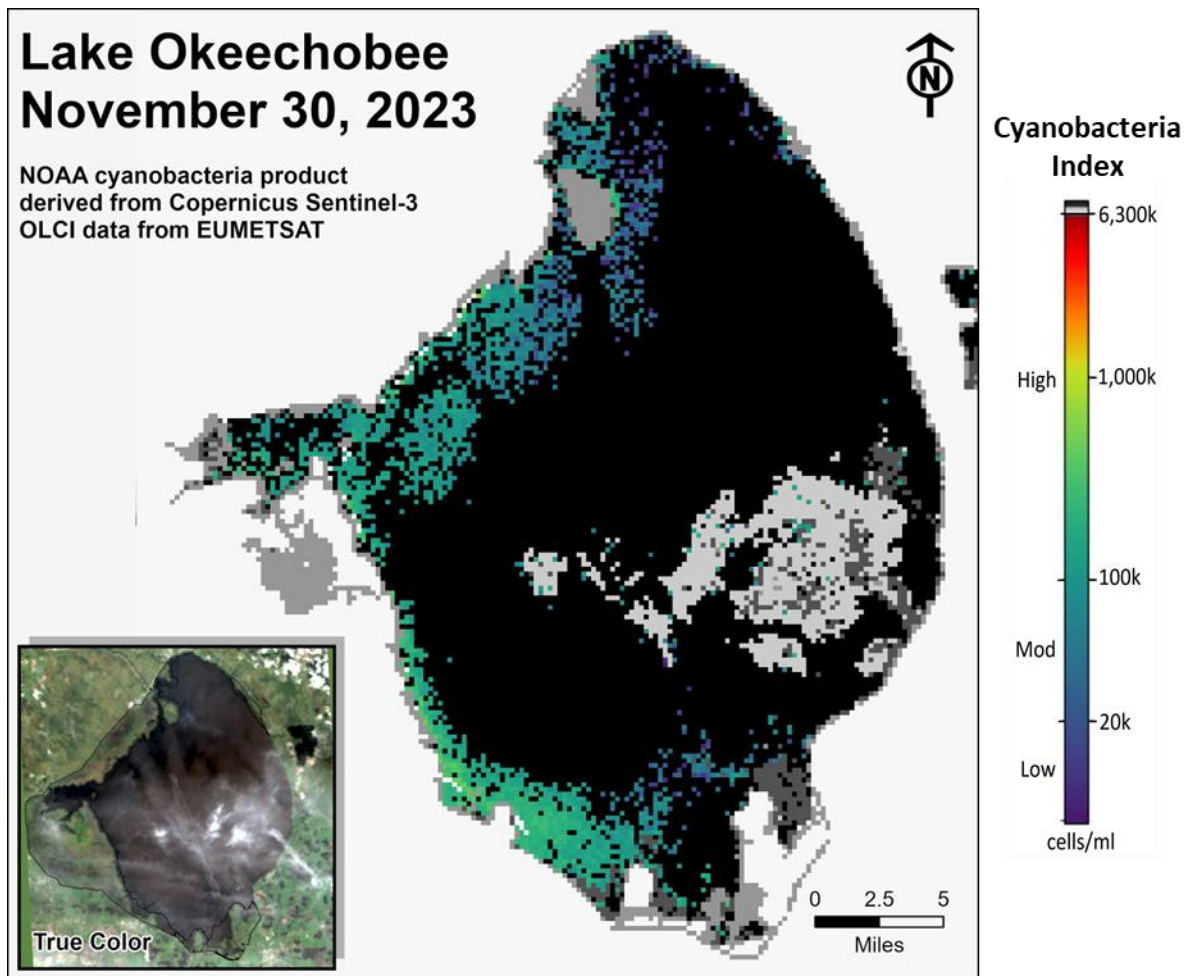
**Figure LO-4.** Major inflows (orange) to and outflows east and west (blue) from Lake Okeechobee. Outflows south are shown in green. Flows into Lake Okeechobee from the L-8 canal through S-271 (formerly Culvert 10A) or from the C-44 canal through the S-308 are included as inflows. Conversely, flows 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 27 – December 03, 2023.



**Figure LO-6.** Total microcystins ( $\mu\text{g/L}$ ) and chlorophyll *a* ( $\mu\text{g/L}$ ) data from November 13 - 15, 2023 survey. Sampling locations are overlaid on the November 11, 2023, image from NOAA's harmful algal bloom monitoring system. Gray color indicates cloud cover.



**Figure LO-7.** Cyanobacteria bloom index level on November 30, 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 201 cfs (**Figures ES-1 and ES-2**), and the previous 30-day mean inflow was 250 cfs. For comparison, the historical provisional mean inflows from the contributing areas are shown in **Figure ES-2**.

Over the past week, salinities increased at all sites within the estuary (**Table ES-1 and Figure ES-3**). The seven-day moving average of the surface and bottom salinities at the US1 Bridge was 20.9. 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 0.4 spat/shell for November, which is normal for this time of year (**Figure ES-5**).

### *Caloosahatchee River Estuary*

Over the past week, mean total inflow to the Caloosahatchee River Estuary was 1,630 cfs (**Figures ES-6 and ES-7**), and the previous 30-day mean inflow was 2,050 cfs. For comparison, the historical provisional mean inflows from the contributing areas are shown in **Figure ES-7**.

Over the past week, surface salinities increased at Cape Coral and decreased at the remaining sites in the estuary (**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 upper 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 2.9 spat/shell at Iona Cove and 6.7 spat/shell at Bird Island for November, both an increase from October (**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<sup>1</sup>) 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 125 cfs. Model results from all scenarios predict daily salinity to be 1.7 or lower and the 30-day moving average surface salinity to be 1.5 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.

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<sup>1</sup> Qiu, C., and Y. Wan. 2013. Time series modeling and prediction of salinity in the Caloosahatchee River Estuary. *Water Resources Research* 49:5804-5816.

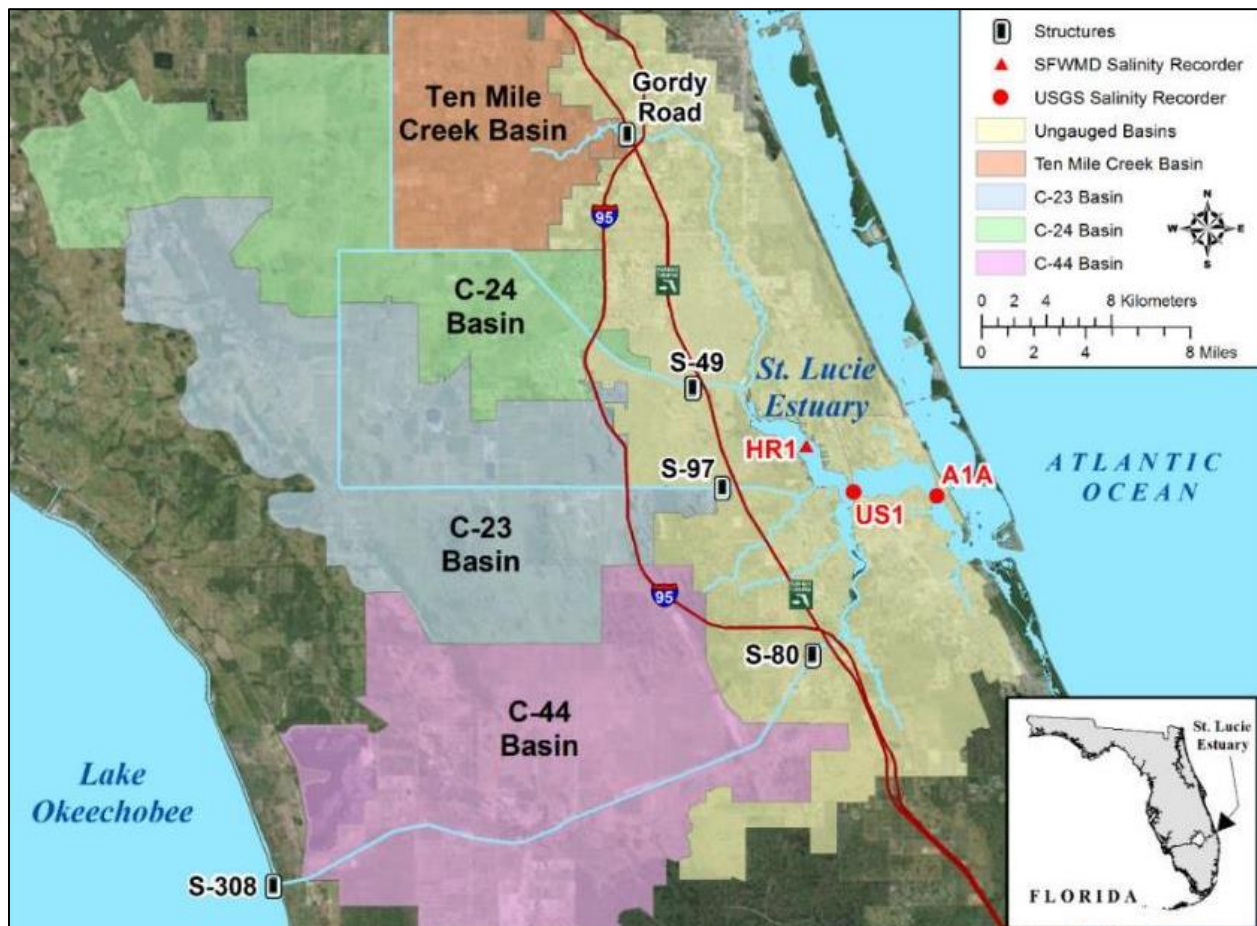


## Red Tide

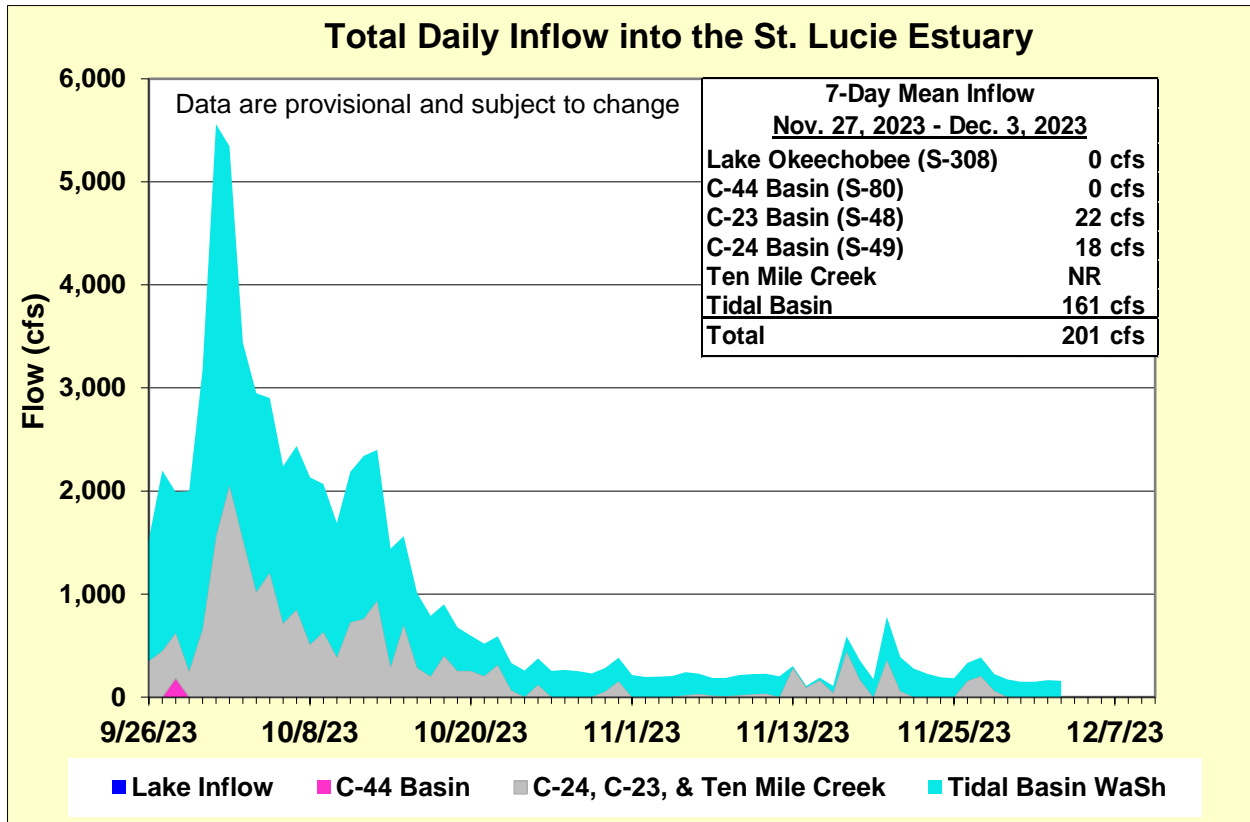
The Florida Fish and Wildlife Research Institute reported on December 1, 2023, that *Karenia brevis*, the Florida red tide dinoflagellate, was not observed in any samples collected within the District region. On the east coast, red tide was not observed in samples from Palm Beach, Broward or Miami-Dade counties.

## Water Management Recommendations

Lake stage is in the Low Sub-Band. Tributary conditions are near normal. 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.

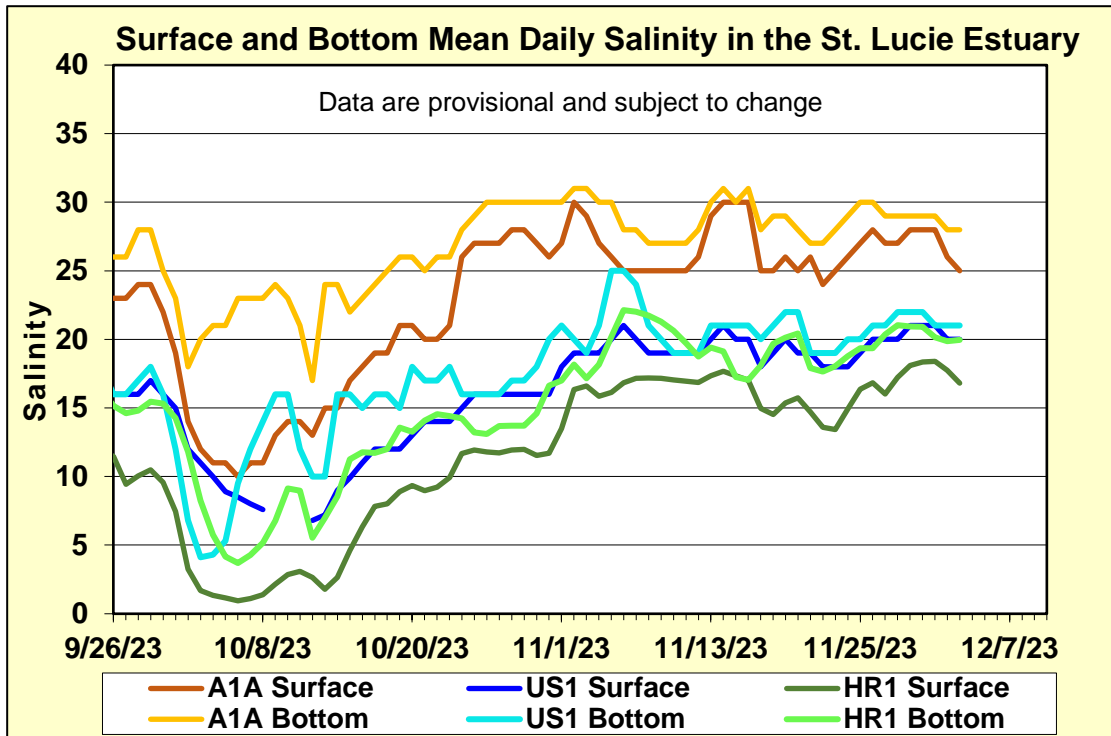


**Figure ES-2.** Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and Tidal Basins into the St. Lucie Estuary.

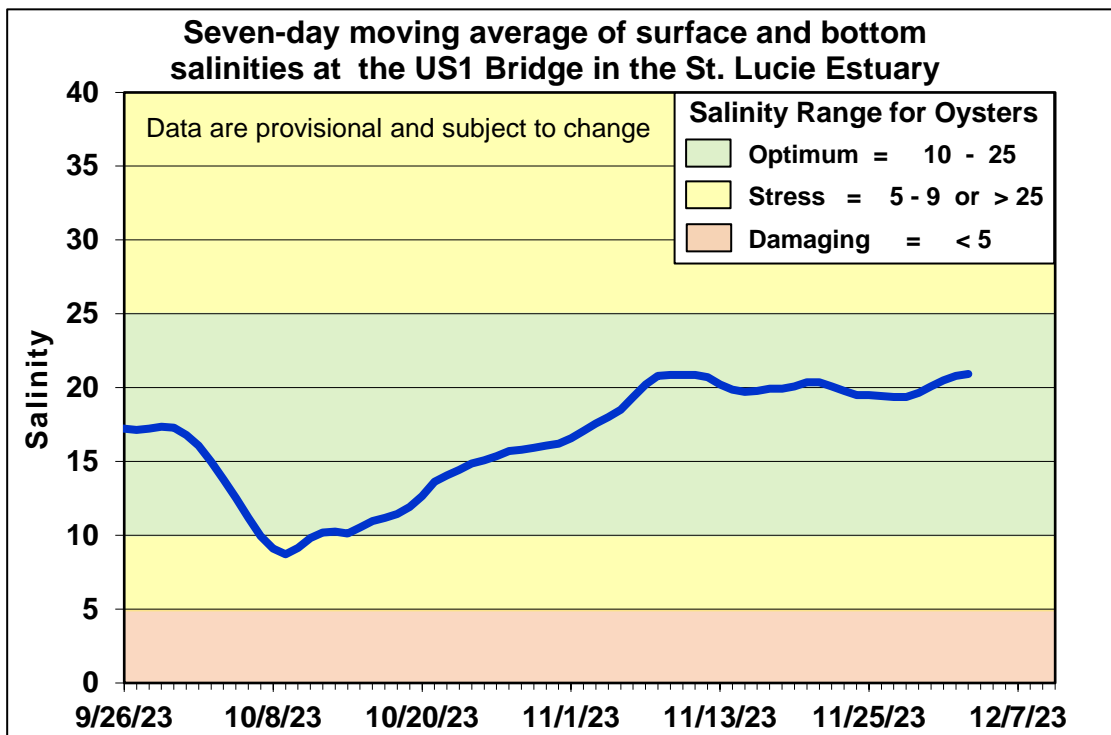
**Table ES-1.** Seven-day mean salinity at oyster monitoring sites in the St. Lucie Estuary. Current means are in bold font; previous week's means are in parentheses. The envelope reflects the optimum salinity range for adult eastern oysters (*Crassostrea virginica*) in the estuary. Data are provisional.

Sampling Site	Surface	Bottom	Optimum Envelope
HR1 (North Fork)	<b>17.5</b> (15.1)	<b>20.5</b> (18.8)	10.0 – 25.0
US1 Bridge	<b>20.4</b> (18.7)	<b>21.4</b> (20.0)	10.0 – 25.0
A1A Bridge	<b>27.0</b> (25.9)	<b>28.7</b> (28.4)	10.0 – 25.0

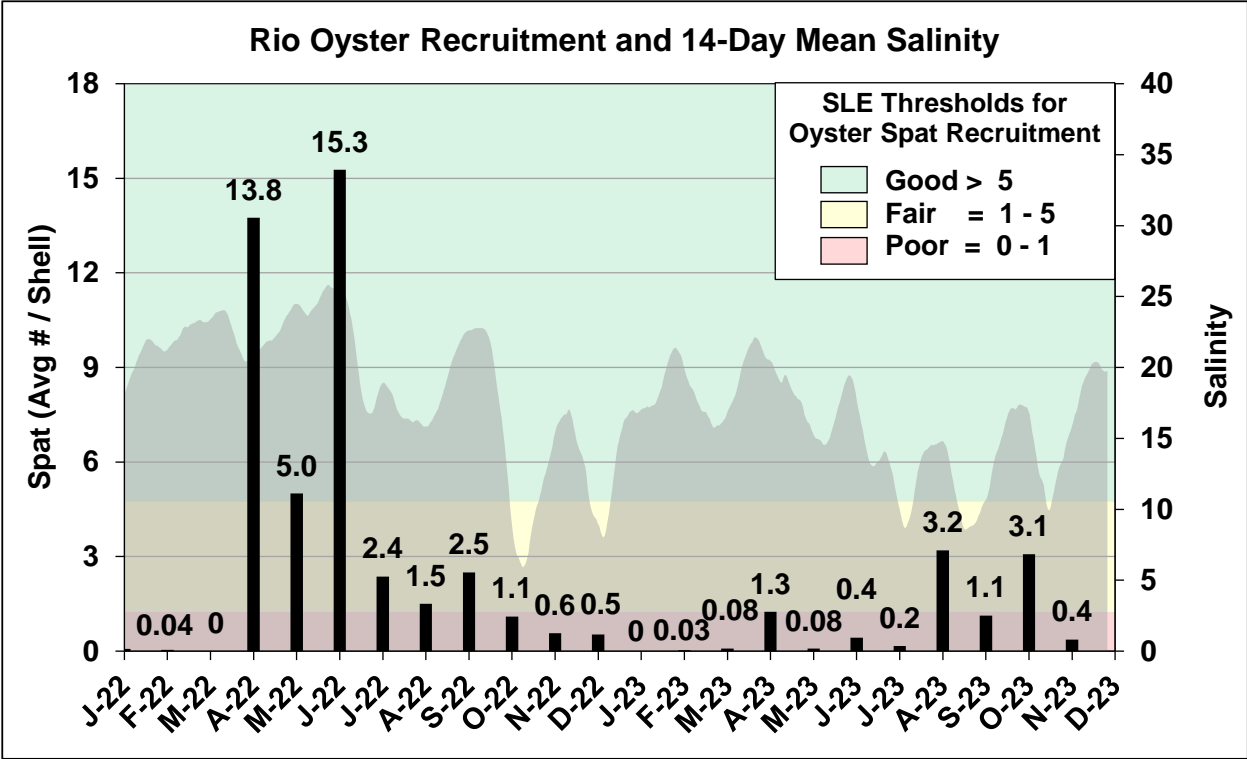




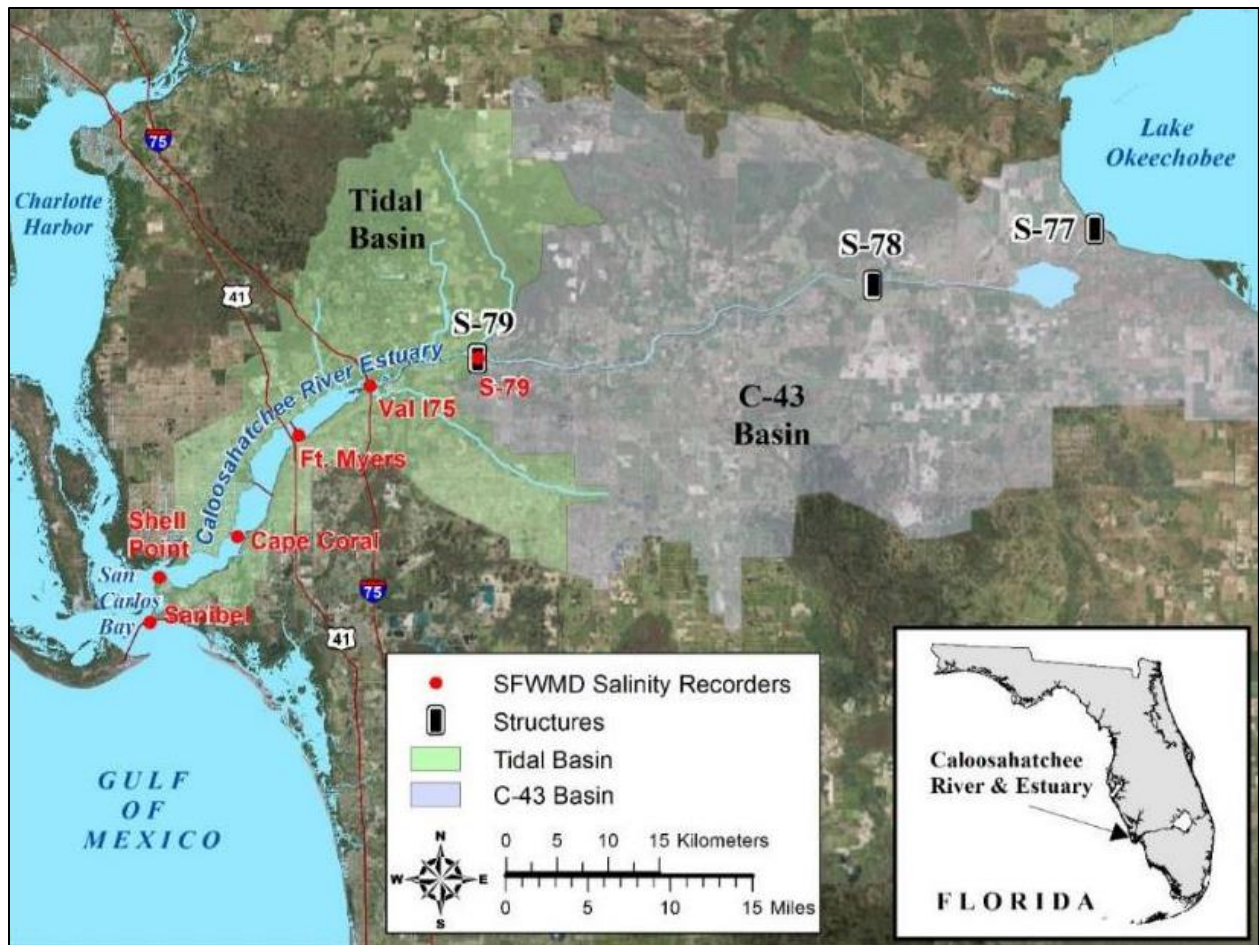
**Figure ES-3.** Mean daily salinity at the A1A, US1, and HR1 sites in the St. Lucie Estuary.



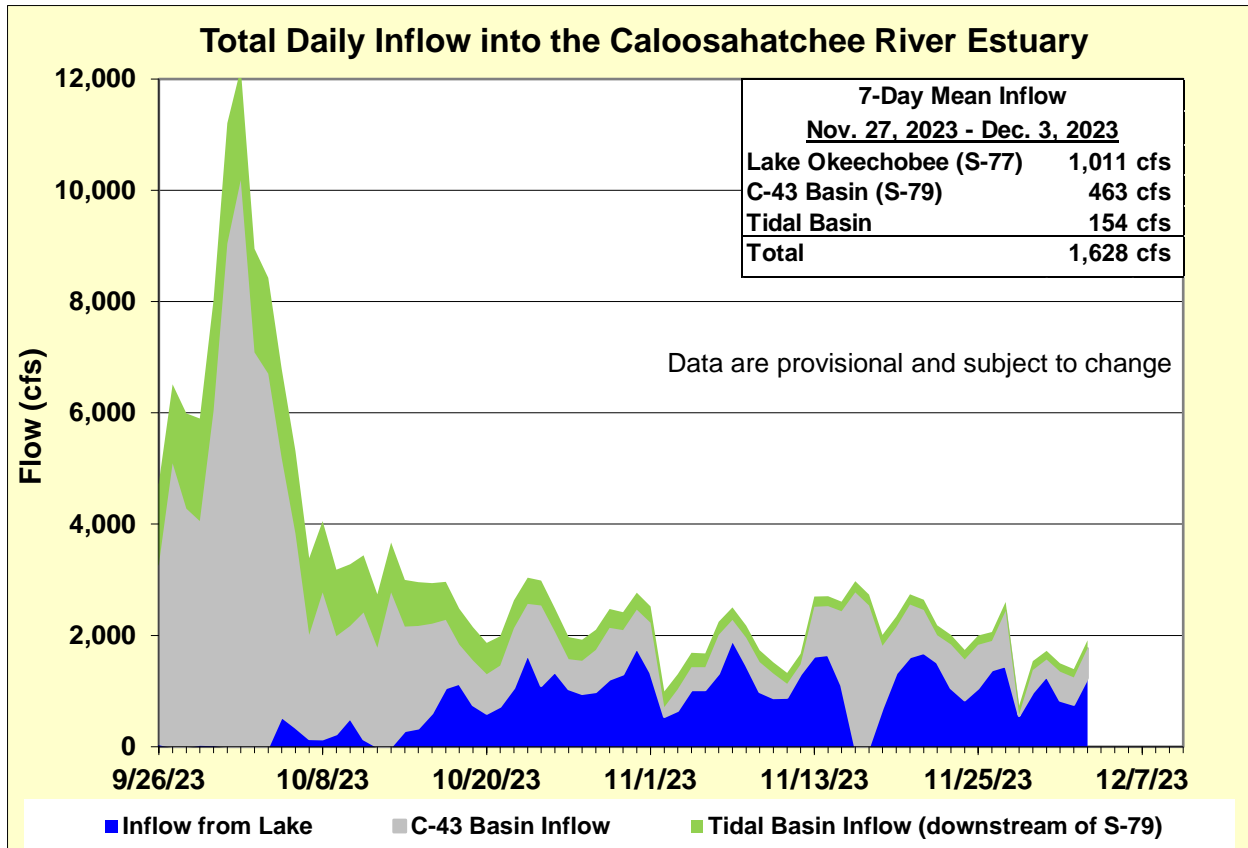
**Figure ES-4.** Seven-day moving average of the surface and bottom salinities at the US1 Bridge in the St. Lucie Estuary.



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



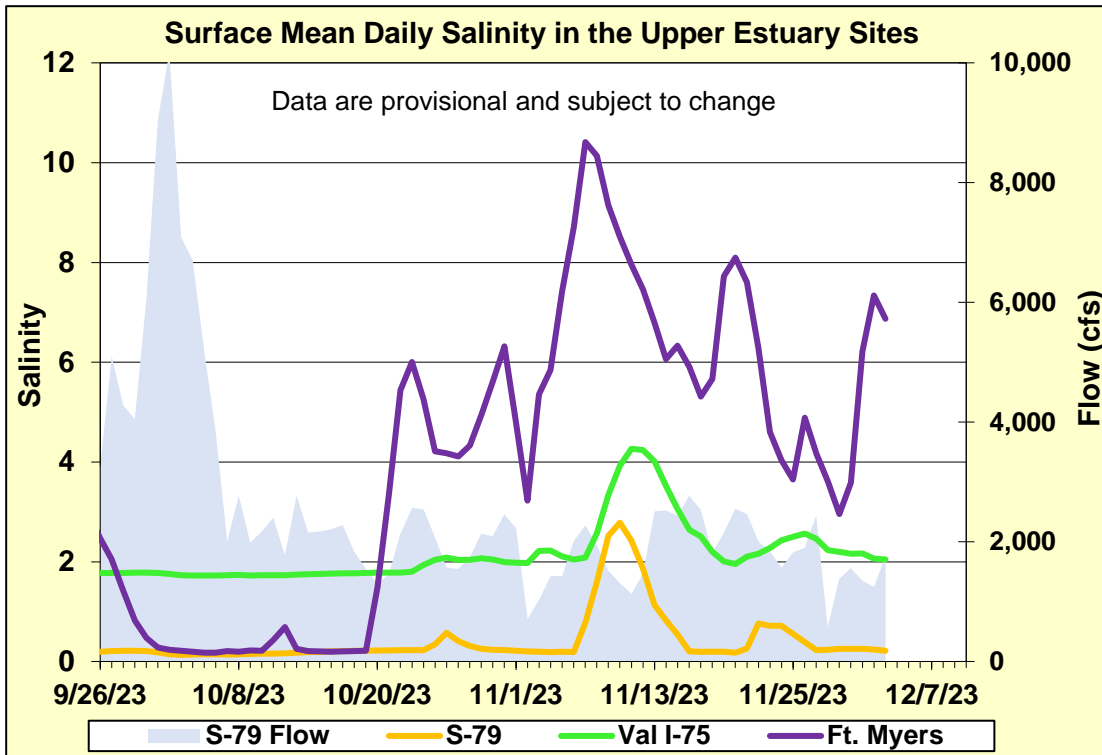
**Figure ES-6.** Basins, water control structures, and salinity monitoring sites in the Caloosahatchee River Estuary.



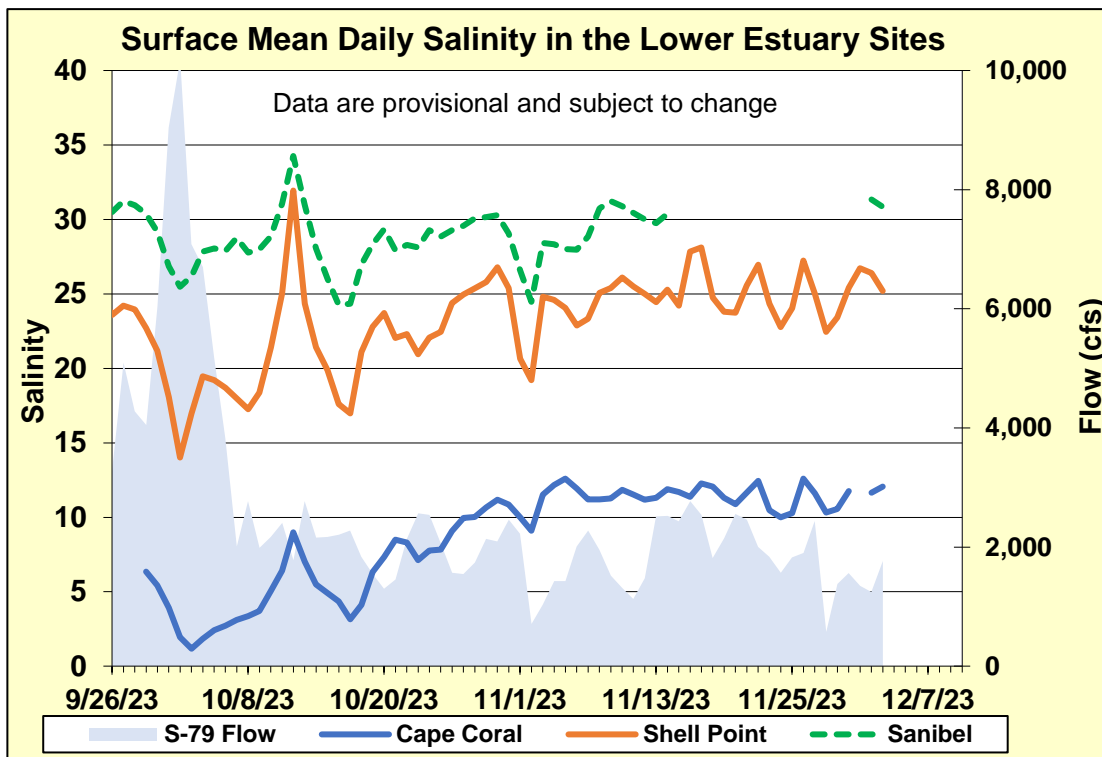
**Figure ES-7.** Total daily inflows from Lake Okeechobee, and runoff from the C-43 and Tidal basins into the Caloosahatchee River Estuary.

**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.

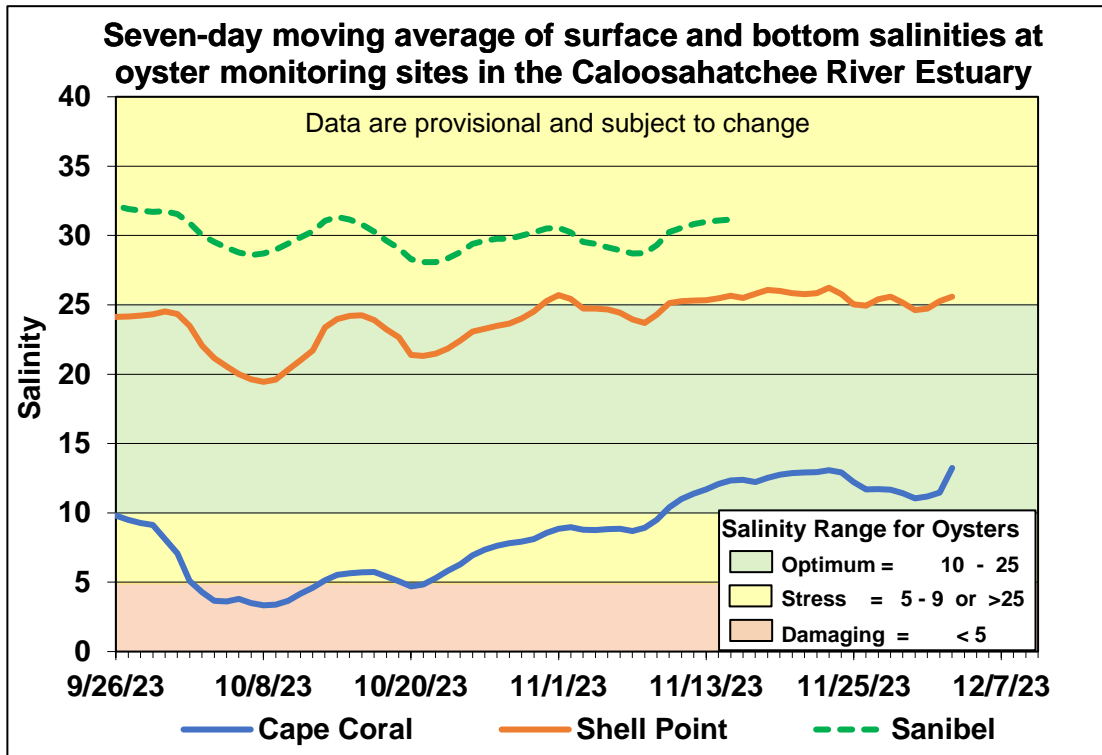
Sampling Site	Surface	Bottom	Optimum Envelope
S-79 (Franklin Lock)	<b>0.2</b> (0.5)	<b>0.2</b> (0.5)	0.0 – 10.0
Val I-75	<b>2.2</b> (2.3)	<b>2.3</b> (2.9)	0.0 – 10.0
Fort Myers Yacht Basin	<b>5.0</b> (5.6)	<b>6.7</b> (6.5)	0.0 – 10.0
Cape Coral	<b>11.3</b> (11.2)	<b>16.7</b> (12.2)	10.0 – 25.0
Shell Point	<b>24.9</b> (25.0)	<b>25.8</b> (25.9)	10.0 – 25.0
Sanibel	<b>31.1</b> (-)	<b>32.0</b> (-)	10.0 – 25.0



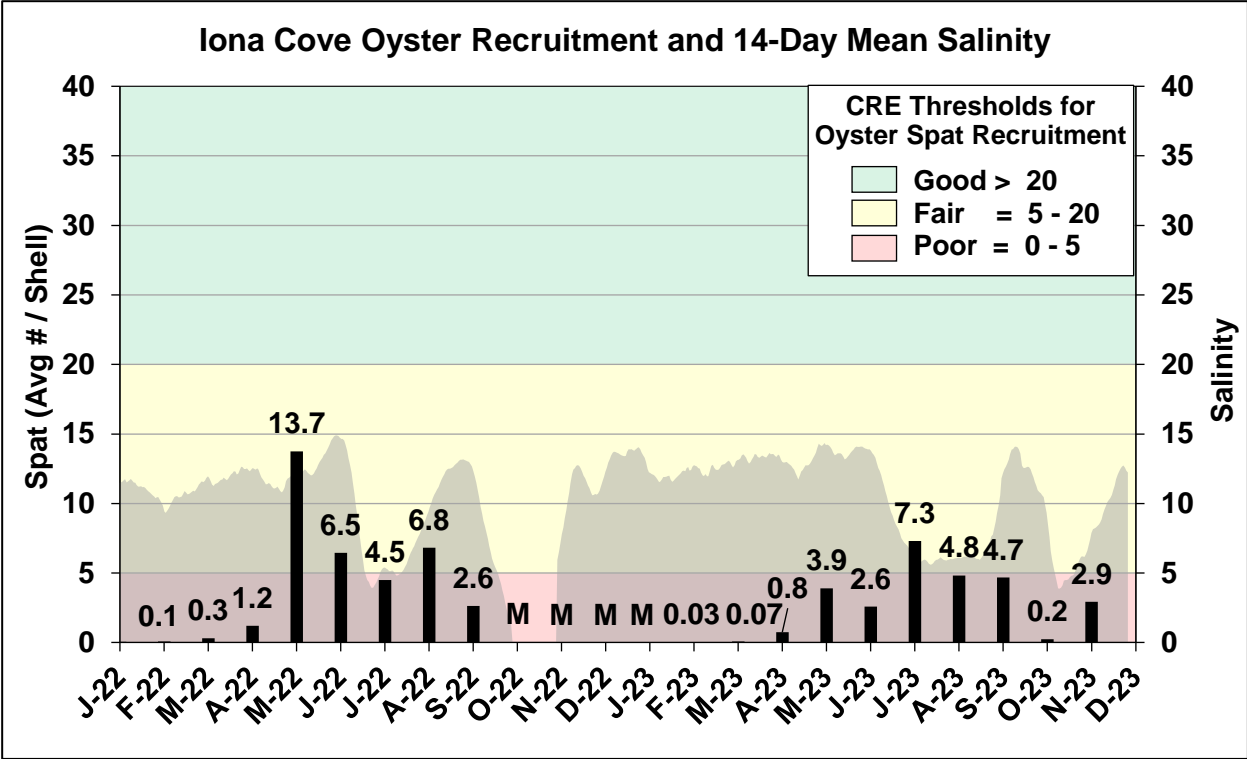
**Figure ES-8.** Mean daily salinity at upper Caloosahatchee River Estuary monitoring sites and mean daily flow at S-79.



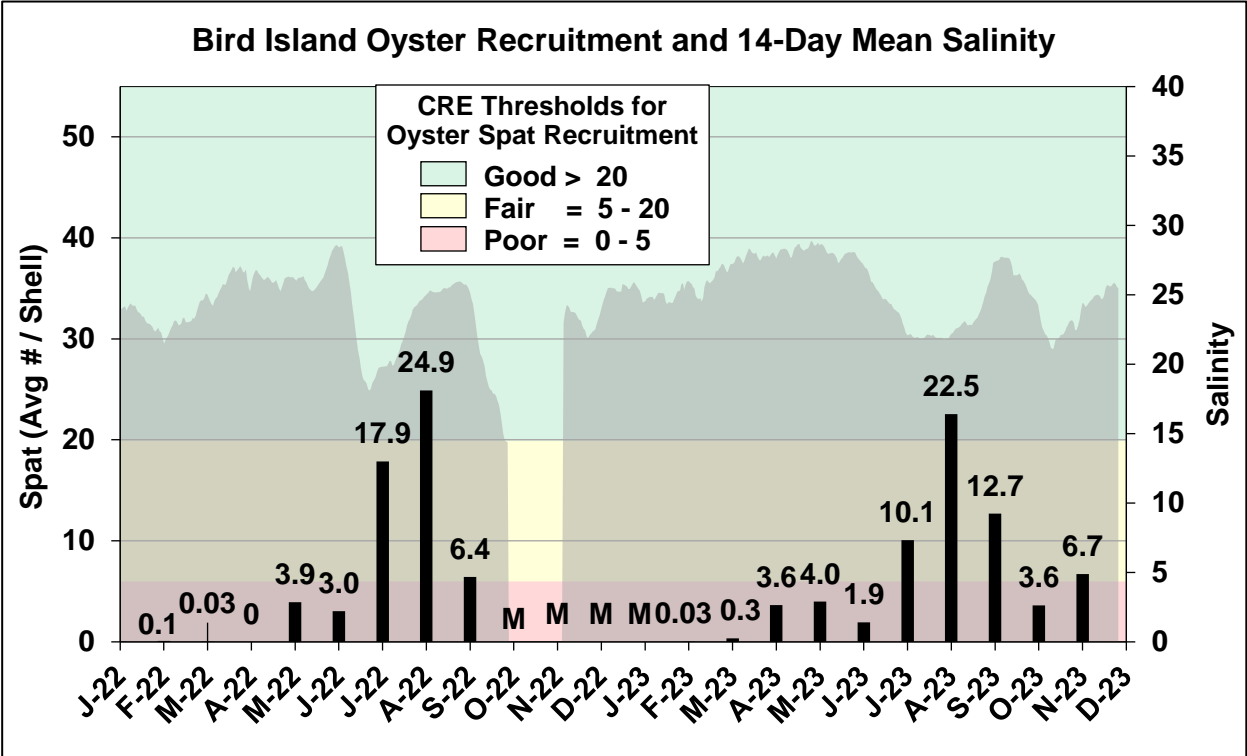
**Figure ES-9.** Mean daily surface salinity at lower Caloosahatchee River Estuary monitoring sites and mean daily flow at S-79.



**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.



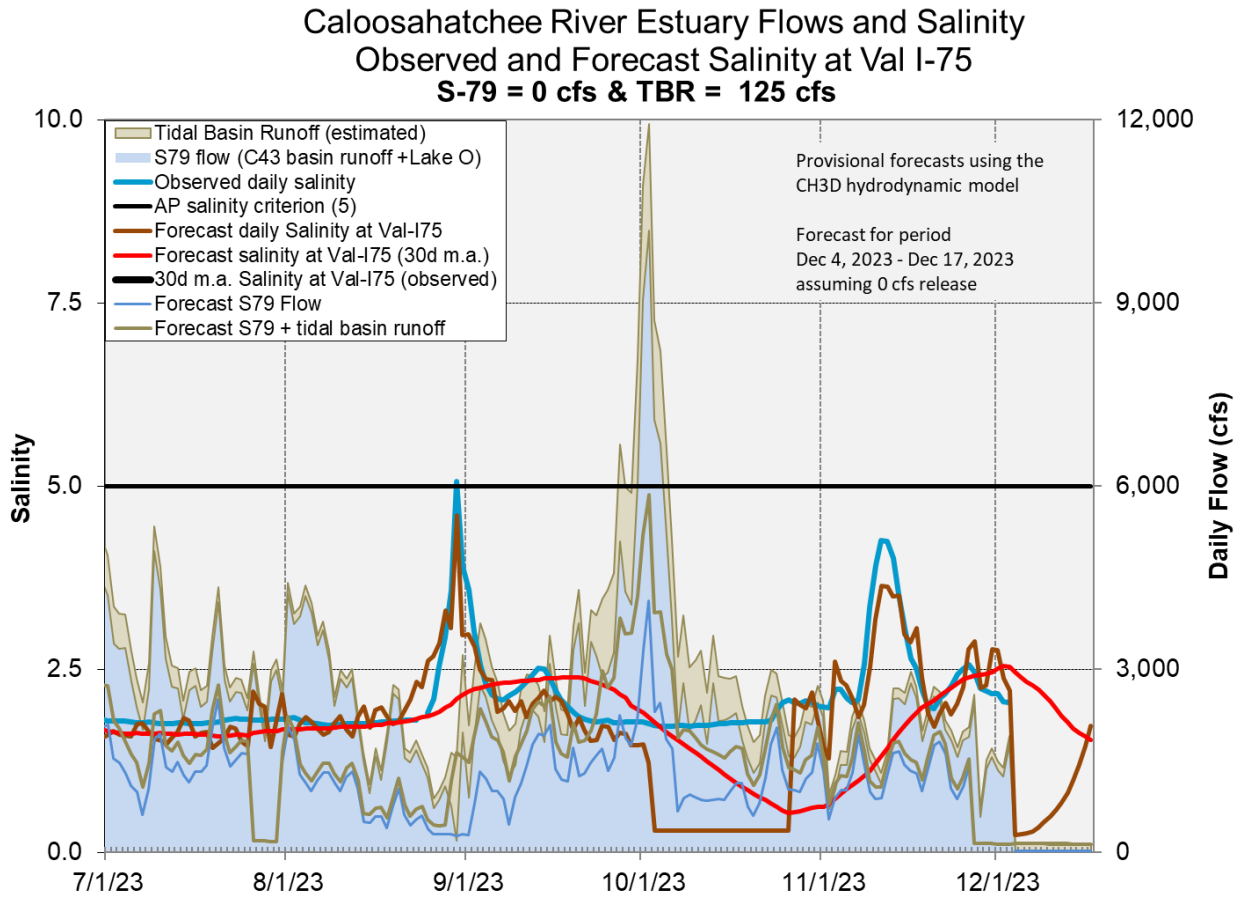
**Figure ES-11.** Mean oyster recruitment at the Iona Cove oyster monitoring station and 14-day mean salinity at Cape Coral.



**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	125	1.7	1.5
B	450	125	0.9	1.4
C	750	125	0.4	1.4
D	1,000	125	0.3	1.3
E	1,500	125	0.3	1.3
F	2,000	125	0.3	1.3



**Figure ES-13.** Forecast surface salinity at the Val I-75 site 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 above target stage. Vegetation in the flow-ways is stressed and highly stressed. The 365-day phosphorus loading rate (PLR) for the Central and Eastern Flow-ways are high. (**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 or above target stage. Vegetation in the flow-ways is stressed and highly stressed. The 365-day PLR for the Eastern Flow-way is high, and the 365-day PLRs for the Western and Northern Flow-ways are below 1.0 g/m<sup>2</sup>/year (**Figure S-1**).

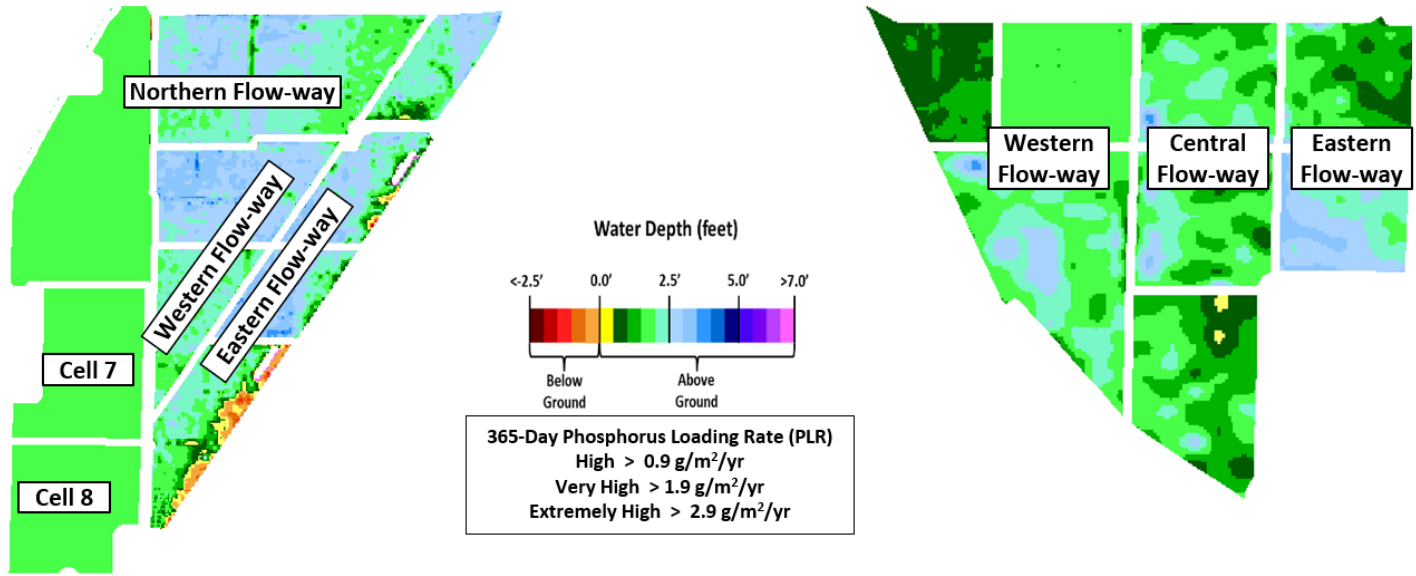
**STA-2:** Operational restrictions are in place in Flow-ways 2 and 4 for vegetation management activities. Online treatment cells are near or above target stage. Vegetation in Flow-ways 1 and 3 is stressed, and in Flow-ways 4 and 5 is highly stressed. The 365-day PLRs for Flow-ways 3, 4, and 5 are below 1.0 g/m<sup>2</sup>/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. 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<sup>2</sup>/year (**Figure S-2**).

**STA-5/6:** An operational restriction is in place in Flow-way 4 for vegetation management (prescribed burn). Treatment cells are near or above 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<sup>2</sup>/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.

## Eastern Flow Path Weekly Status Report – 11/27/2023 through 12/3/2023

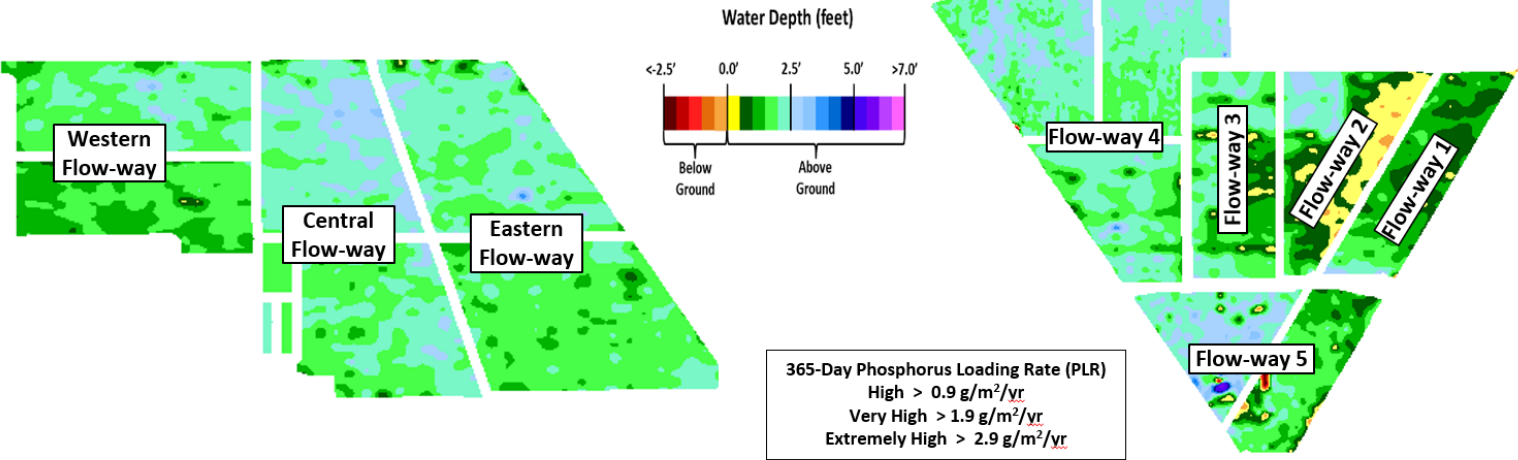


STA-1W	Flow-way Status
<b>Western</b>	<ul style="list-style-type: none"> <li>• High 365-day PLR</li> <li>• Highly stressed vegetation conditions</li> </ul>
<b>Eastern</b>	<ul style="list-style-type: none"> <li>• High 365-day PLR</li> <li>• Highly stressed vegetation conditions</li> </ul>
<b>Northern</b>	<ul style="list-style-type: none"> <li>• Highly stressed vegetation conditions</li> <li>• Planting emergent vegetation</li> </ul>
<b>Cell 7</b>	<ul style="list-style-type: none"> <li>• Stressed vegetation conditions</li> </ul>
<b>Cell 8</b>	<ul style="list-style-type: none"> <li>• Construction activities</li> </ul>

STA-1E	Flow-way Status
<b>Western</b>	<ul style="list-style-type: none"> <li>• Offline for post-construction vegetation grow-in</li> </ul>
<b>Central</b>	<ul style="list-style-type: none"> <li>• High 365-day PLR</li> <li>• Highly stressed vegetation conditions</li> </ul>
<b>Eastern</b>	<ul style="list-style-type: none"> <li>• High 365-day PLR</li> <li>• Stressed vegetation conditions</li> </ul>

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

## Central Flow Path Weekly Status Report – 11/27/2023 through 12/3/2023

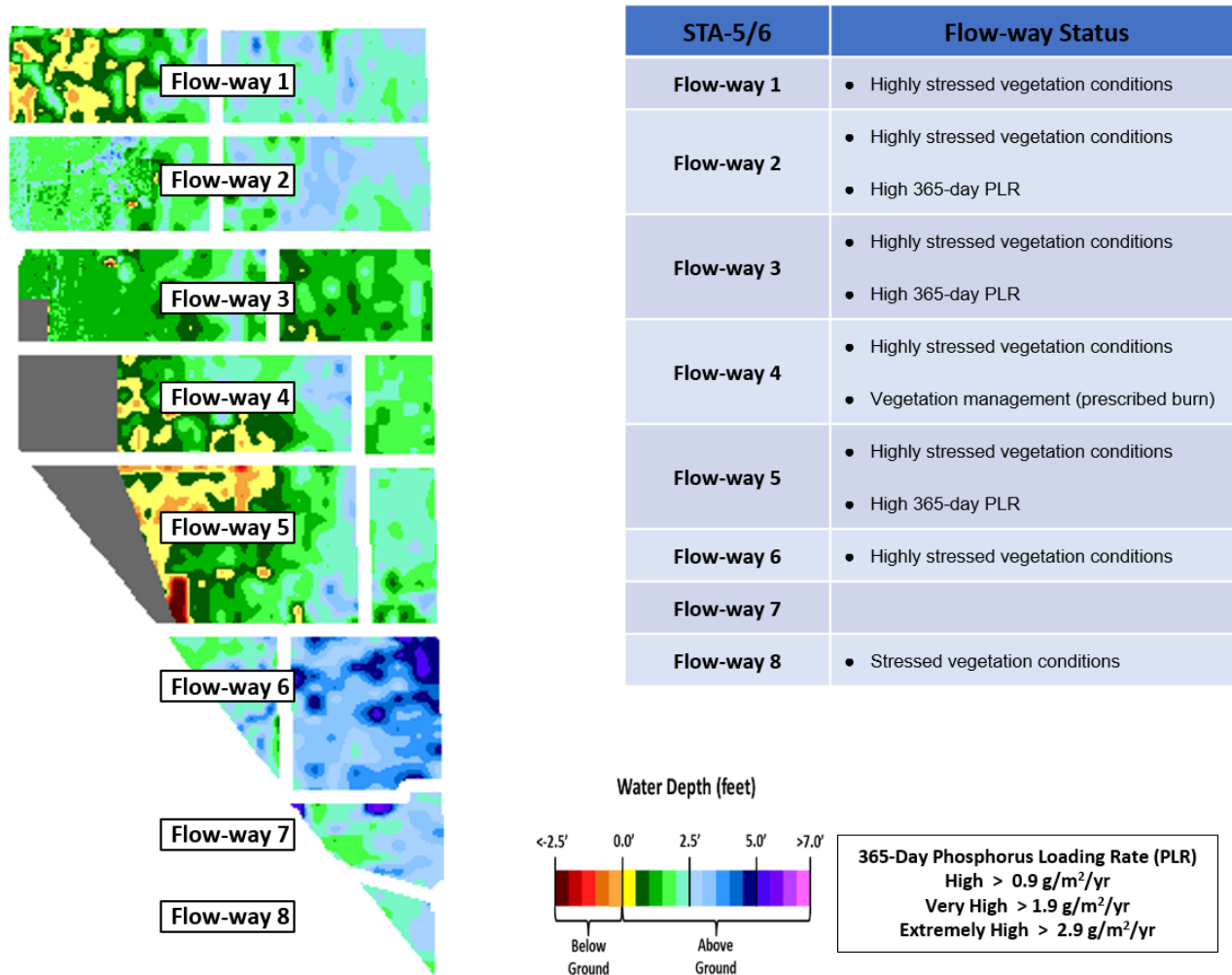


STA-3/4	Flow-way Status
Western	<ul style="list-style-type: none"> <li>Stressed vegetation conditions</li> <li>Nuisance vegetation control within inflow canal</li> </ul>
Central	<ul style="list-style-type: none"> <li>Highly stressed vegetation conditions</li> <li>Removal of floating tussocks</li> <li>Nuisance vegetation control within inflow canal</li> </ul>
Eastern	<ul style="list-style-type: none"> <li>Post-drawdown vegetation grow-in</li> <li>Nuisance vegetation control within inflow canal</li> </ul>

STA-2	Flow-way Status
Flow-way 1	<ul style="list-style-type: none"> <li>High 365-day PLR</li> <li>Stressed vegetation conditions</li> </ul>
Flow-way 2	<ul style="list-style-type: none"> <li>Post-construction vegetation grow-in</li> <li>Planting emergent vegetation</li> </ul>
Flow-way 3	<ul style="list-style-type: none"> <li>Stressed vegetation conditions</li> </ul>
Flow-way 4	<ul style="list-style-type: none"> <li>Planting emergent vegetation</li> <li>Nuisance vegetation control</li> <li>Highly stressed vegetation conditions</li> </ul>
Flow-way 5	<ul style="list-style-type: none"> <li>Highly stressed vegetation conditions</li> </ul>

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

## Western Flow Path Weekly Status Report – 11/27/2023 through 12/3/2023



**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,  $\mu\text{g/L}$  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***

There was no significant rainfall across the EPA last week and recession rates increased in most regions. WCA-1: Over the last two weeks stage has receded slowly within the Refuge to remain below the falling Zone A2 regulation line and stage on Sunday at the 1-8C gauge was .05 feet below that line. WCA-2A: Stage recession at the 2-17 remained gradual last week. The average on Sunday was 1.32 feet above the falling regulation line. WCA-3A: The 3-Gauge average recession rate increased last week. The average stage on Sunday was 0.37 feet above the flat Zone A regulation line. WCA-3A North: Stage recession at Gauge 62 (NW corner) followed the slope of the Upper schedule, and the average on Sunday was 0.16 feet below that line. See figures **EV-1** through **EV-4**.

### ***Water Depths***

The SFWDAT illustrates ponded conditions remain in the upper reaches of the L-67s but the depths are no longer in the up to 5.0-foot category. Similar conditions were in the ponded southern portions of WCA-3A where the spatial extent of flooded areas is slightly less than they were one month ago. Hydrologic connectivity remains strong within all the major sloughs of ENP, especially to the west. Comparing current WDAT water depths to one month ago, conditions within western WCA-3A are slightly shallower while the rest of the EPA system had slightly deeper conditions. Looking back a year ago, conditions are slightly wetter across most the EPA, most significantly in western ENP, with WCA-1 the exception (**Figure EV-5** and **Figure EV-6**).

Comparing current conditions to the 20-year average on December 3rd: Above average depth conditions remain across the entire region. Depths have moved closer to average in southwestern WCA-3A, and WCA-3B returns to the 90th percentile. (**Figure EV-7**).

### ***Taylor Slough and Florida Bay***

Total weekly rainfall averaged 0.03 inches in Taylor Slough and Florida Bay over the past week (Monday-Sunday) based on the 18 gauges used for this report. Total rainfall ranged from 0.0 inches at 15 stations to 0.37 inches at Long Sound (LS) in the eastern nearshore region. Most stages decreased across Taylor Slough, with an average decrease of -0.10 feet. Stage changes ranged from -0.20 feet at P37 in the southern slough, to +0.02 feet at EPSW in the southern C-111 area (**Figure EV-8** and **Figure EV-9**). Taylor Slough water levels remain above the recent average for this time of year by +10.7 inches compared to before the Florida Bay initiative (starting in 2017), a decrease of -0.7 inches relative to last week.

Average Florida Bay salinity was 20.7, which was an increase of +1.2 from last week. Following little to no rainfall, salinity began to increase at most sites. Changes ranged from -1.2 at Little Madeira Bay (LM) in the eastern nearshore region to +5.2 at Garfield Bight (GB) in the western nearshore region (**Figure EV-8**). Western salinities have climbed above the 25th percentile, while Eastern and Central salinities remain below

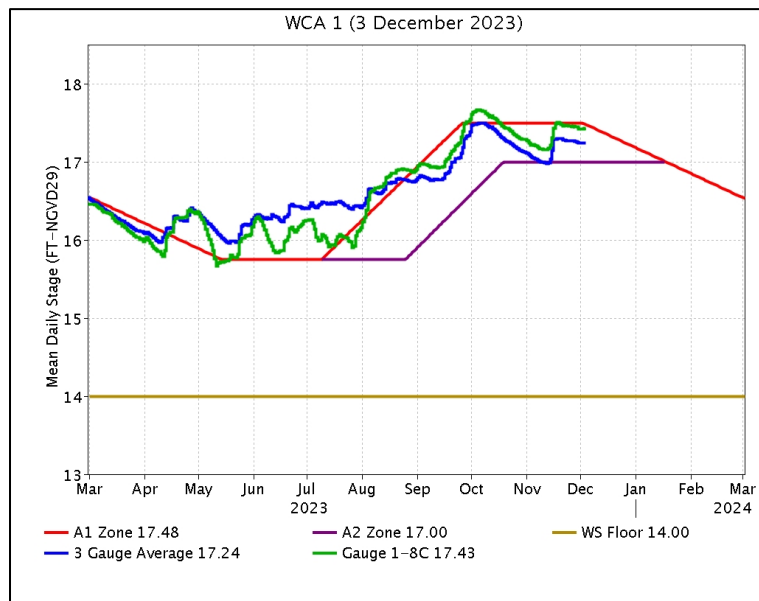
(Figure EV-10). Average Florida Bay salinity remains below its recent average for this time of year by  $-3.2$ , an increase of  $+6.5$  from the previous week.

**Water Management Recommendations**

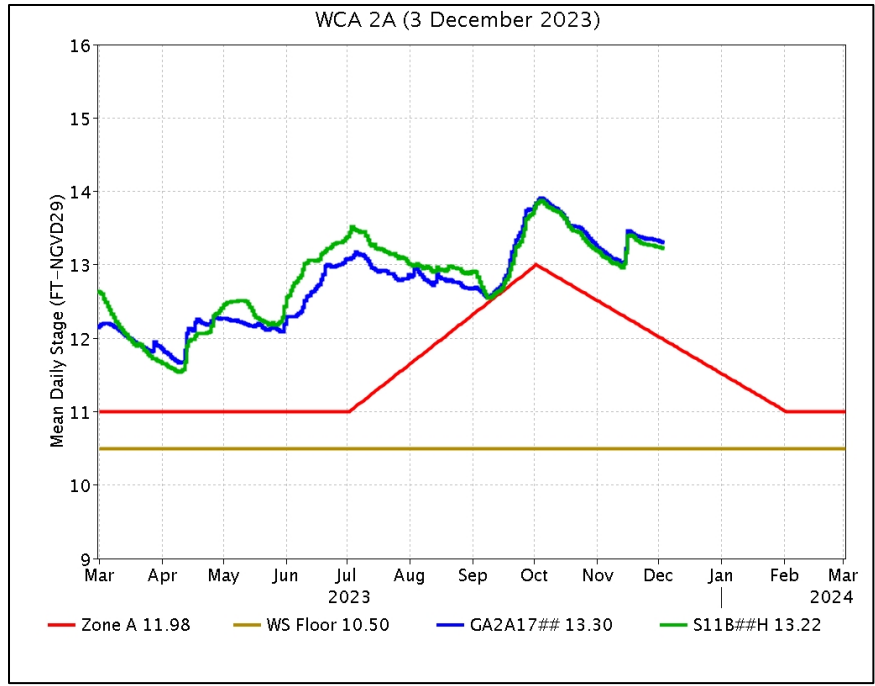
Stable depths and minimal stage changes (slow recession rates) in WCA-2A and WCA-3A North remain ecologically beneficial. The ecology of Northern WCA-3A would continue to benefit from “slow” recession rates, as conserving depths in that region has been shown to increase the likelihood of successful wading bird nesting (which may be important after two successive years of below average nesting). As conditions return to above the 90th percentile in NESRS, 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.

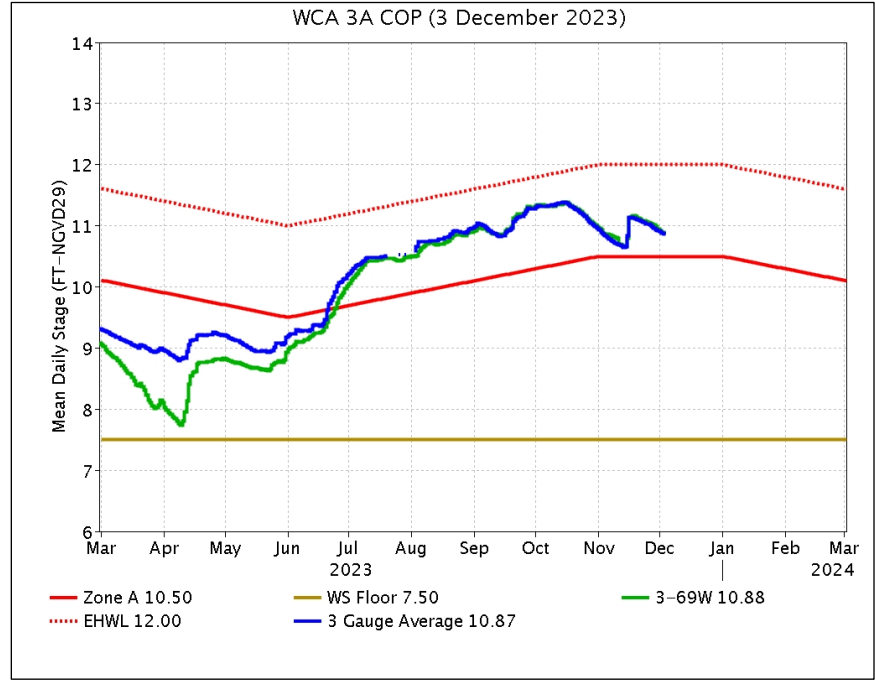
Everglades Region	Rainfall (inches)	Stage change (feet)
WCA-1	<0.01	-0.02
WCA-2A	0.00	-0.07
WCA-2B	0.00	-0.14
WCA-3A	0.00	-0.14
WCA-3B	0.00	-0.14
ENP	<0.01	+0.00



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

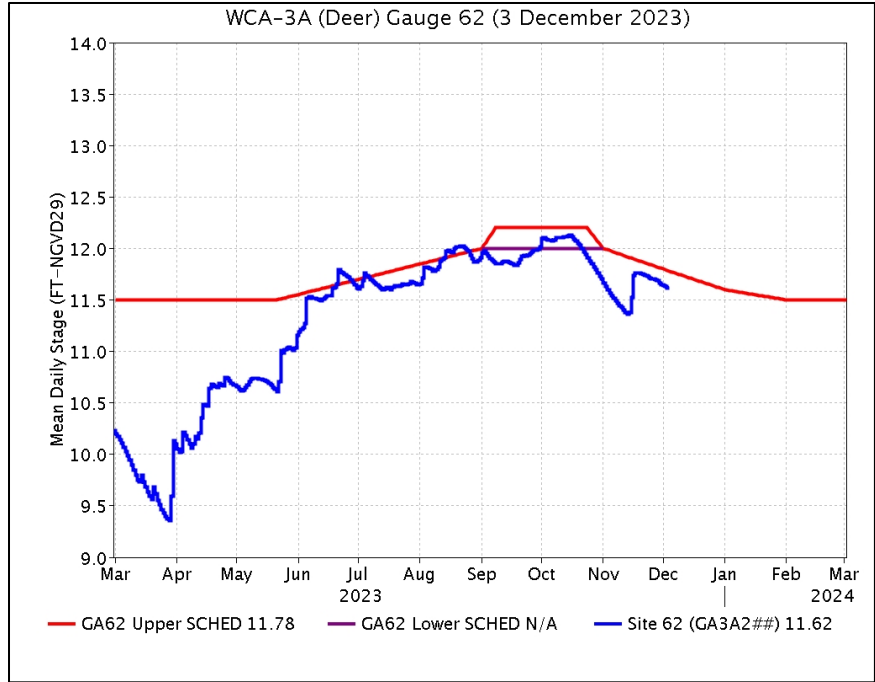


**Figure EV-2.** WCA-2A stage hydrographs and regulation schedule.

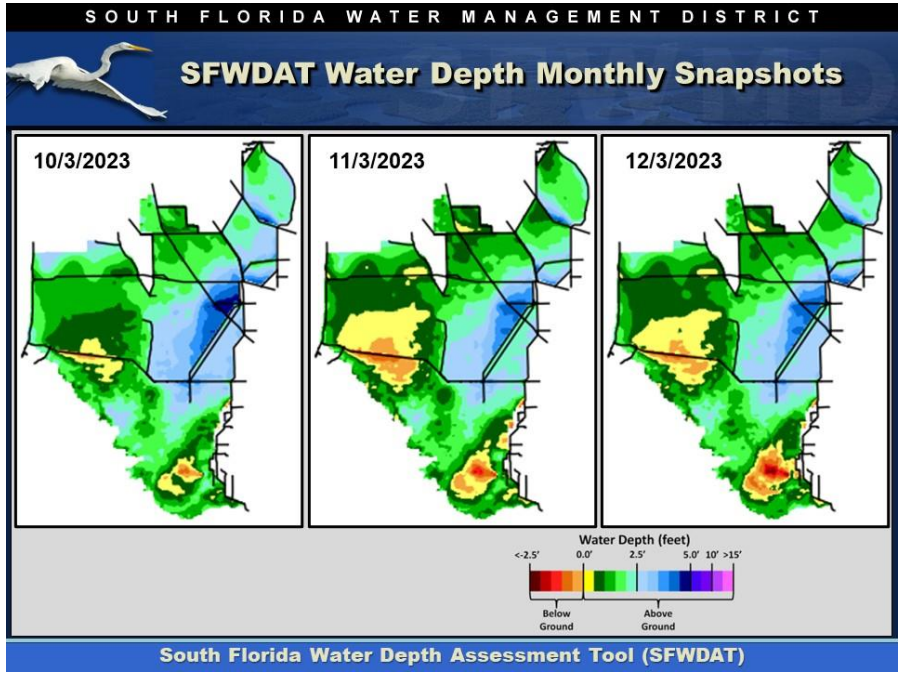


**Figure EV-3.** WCA-3A stage hydrographs (three-gauge average, 3-69W) and regulation schedule.

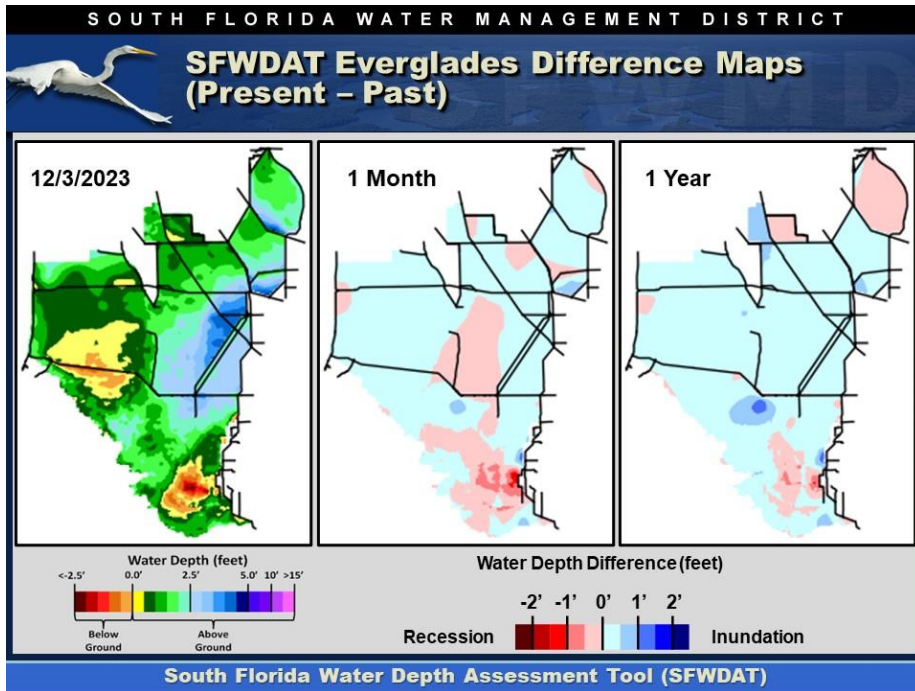




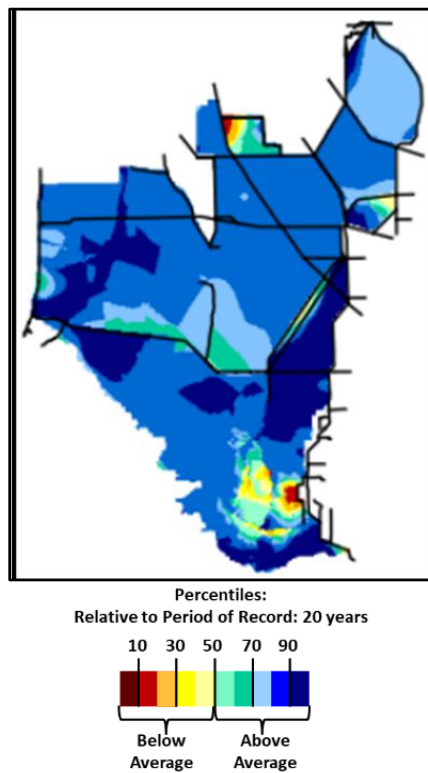
**Figure EV-4.** WCA-3A stage hydrograph (Deer gauge; Site 62) and GA62 regulation schedule.



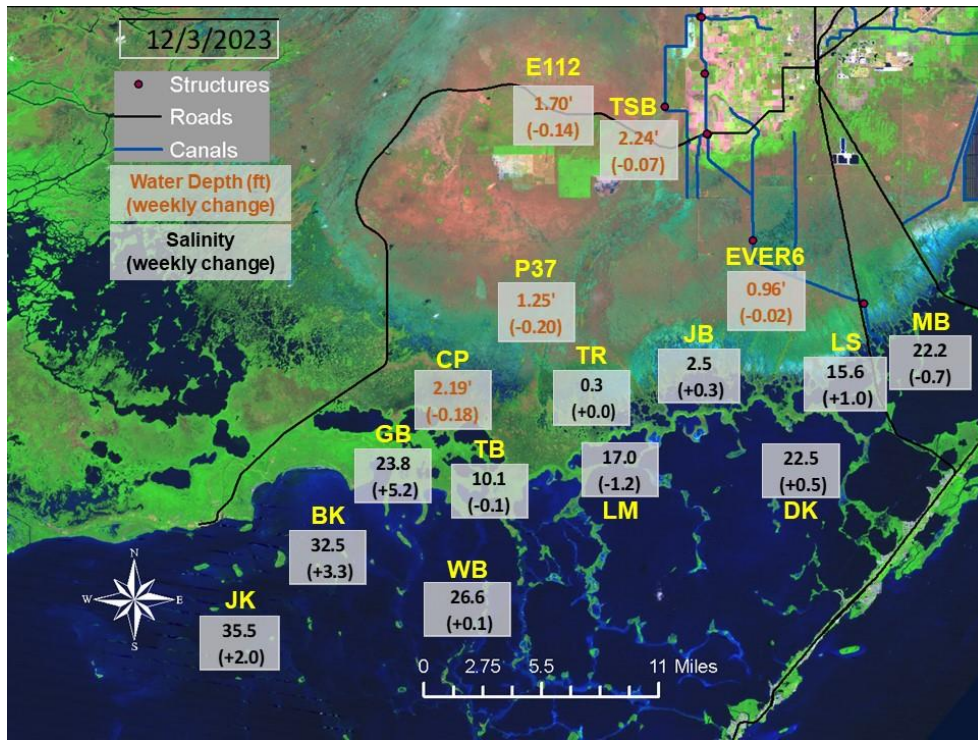
**Figure EV-5.** Everglades water depths from two months ago (left), one month ago (center) and present (right), based on SFWDAT.



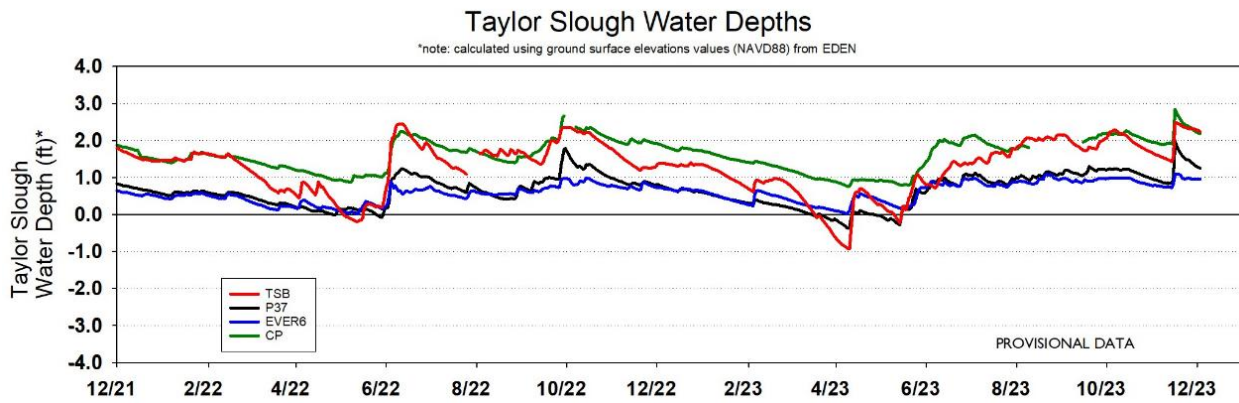
**Figure EV-6.** Present Everglades water depths (left) and water depth changes from one month (center) and one year (right) ago, based on SFWDAT.



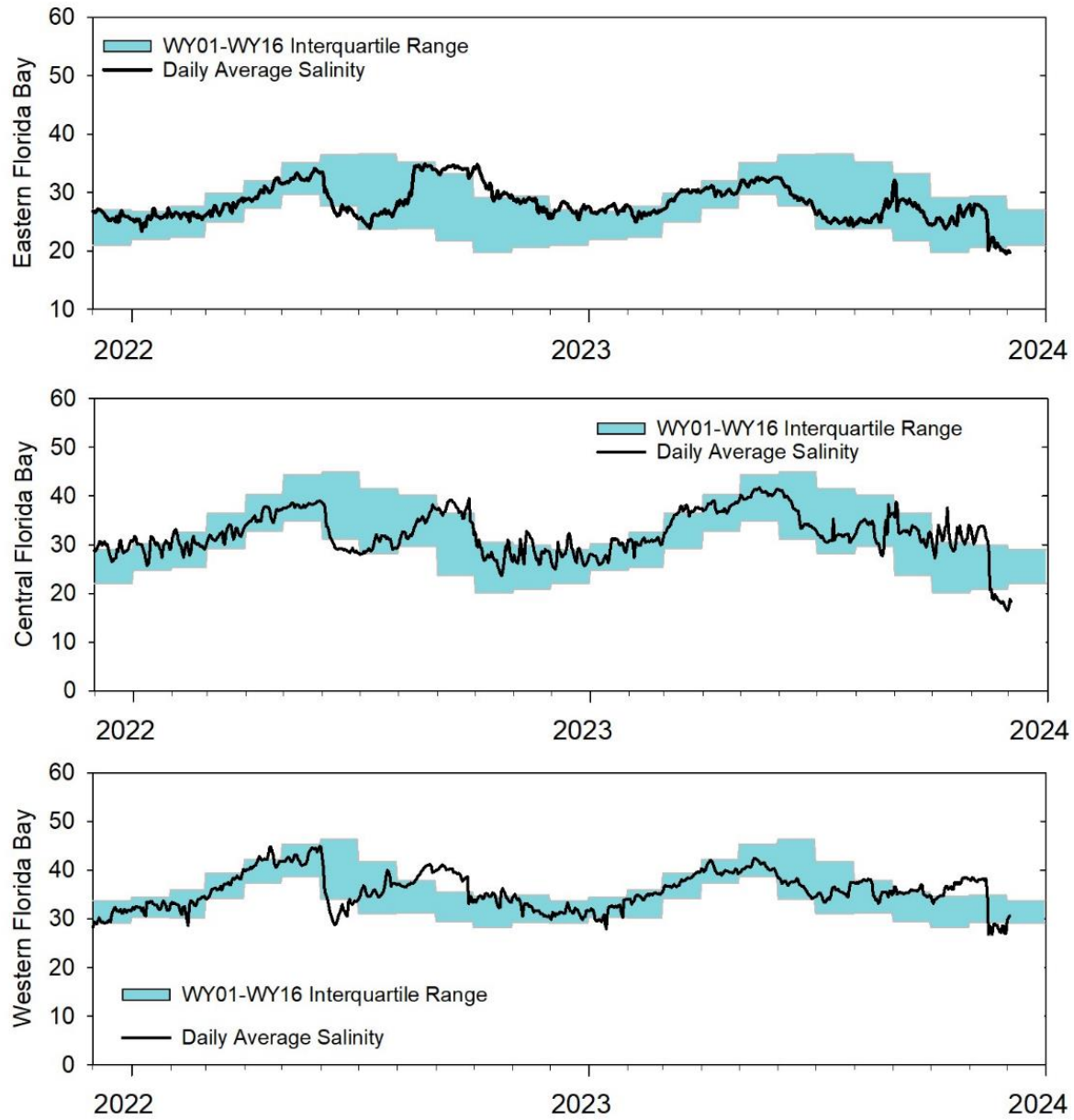
**Figure EV-7.** Present water depths (12/23/2023) compared to the day of year average over the previous 20 years.



**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.

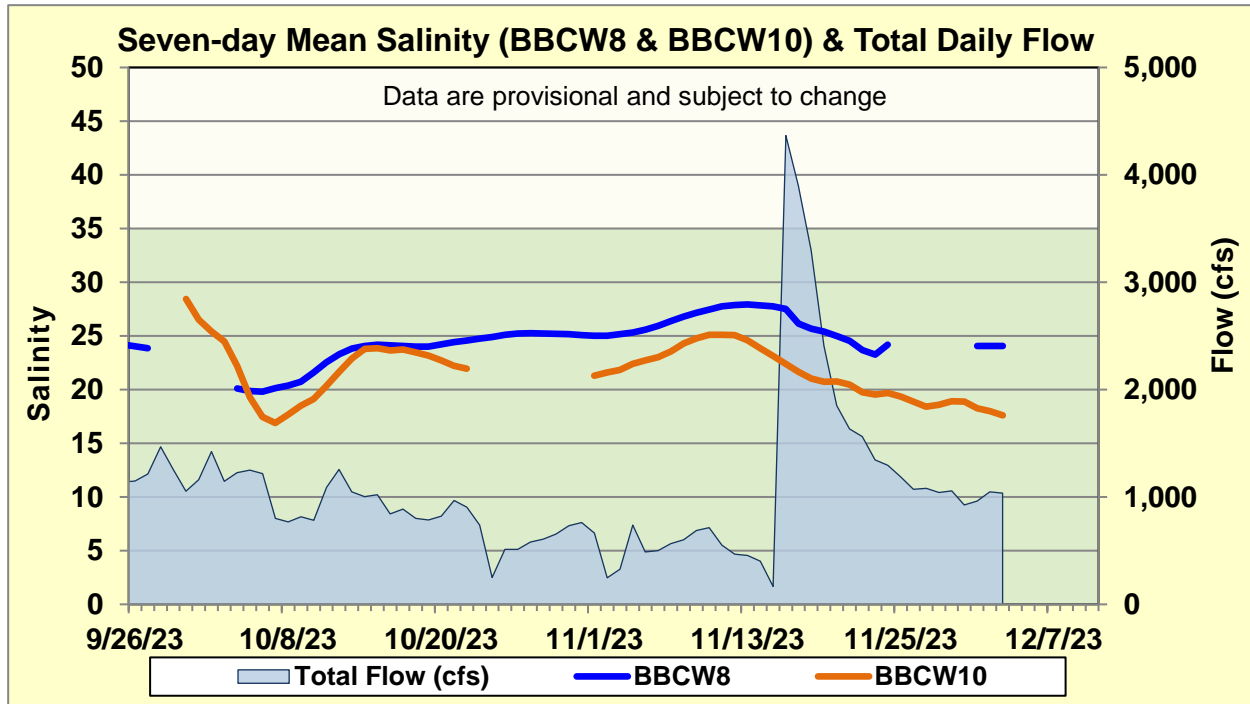
**Table EV-2.** Weekly water depth changes and water management recommendations

<b>SFWMD Everglades Ecological Recommendations, December 5, 2023 (red is new)</b>			
	Weekly change	Recommendation	Reasons
<b>WCA-1</b>	Stage decreased by 0.03'	Recession rate of less than 0.05' per week.	Protect within basin and downstream habitat and wildlife.
<b>WCA-2A</b>	Stage decreased by 0.07'	Recession rate of less than 0.05' per week.	Protect within basin and downstream habitat and wildlife. Recent rapid increase.
<b>WCA-2B</b>	Stage decreased by 0.14'	Recession rate of less than 0.05' per week.	Protect within basin and downstream habitat and wildlife.
<b>WCA-3A NE</b>	Stage decreased by 0.15'	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.
<b>WCA-3A NW</b>	Stage decreased by 0.09'	Recession rate of less than 0.05' per week.	
<b>Central WCA-3A S</b>	Stage decreased by 0.15'	Recession rate of less than 0.12' per week.	Protect within basin and downstream habitat and wildlife.
<b>Southern WCA-3A S</b>	Stage decreased by 0.15'		
<b>WCA-3B</b>	Stage decreased by 0.14'	Recession rate of less than 0.12' per week.	Protect within basin (sensitive tree islands) and downstream habitat and wildlife. Allow for flow through.
<b>ENP-SRS</b>	Stage decreased by 0.08'	Make discharges to ENP according to COP and TTF protocol while adaptively considering upstream and downstream ecological conditions.	Protect within basin and upstream habitat and wildlife (wading bird nesting).
<b>Taylor Slough</b>	Stage changes ranged from -0.12' to +0.02'	Move water southward as possible.	When available, provide freshwater to promote water movement.
<b>FB- Salinity</b>	Salinity changes ranged from -1.2 to +5.2	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 1,020 cfs, and the previous 30-day mean inflow was 1,250 cfs. The seven-day mean salinity was 24.1 at BBCW8 and 17.8 at BBCW10, both within the ideal salinity range for estuarine organisms in this region (< 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.