

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 22, 2022

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

### **Summary**

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

Moderate to heavy shower activity will continue along the east coast throughout much of Tuesday. Overnight and through the early part of Wednesday morning, there could be an increase in shower activity over the northern interior. This more uniform zone of showers will gradually dissipate by daybreak Wednesday. Mid-level high pressure will then build over the western Atlantic, which will cause the persistent frontal boundary that has brought rainfall to the SFWMD over the last few days to finally retreat north and diffuse. Thus, lighter shower activity is expected on Wednesday. The region of mid-level high pressure will grow stronger on Thursday, causing temperatures to rebound and the mid-layers of the atmosphere to dry out and stabilize. With only low levels of moisture present, light afternoon shower activity is expected on Thursday through Saturday. An upper disturbance set to move into the Pacific Northwest on Wednesday will amplify and dig southward over the central U.S. this weekend. While the upper disturbance moves through the eastern U.S., it will send a strong cold front southward into Florida on Sunday. With such a dry atmosphere out ahead of this front, only light shower activity is expected on Sunday while the front crosses through the state. There is high confidence for little to no rainfall following the frontal passage on Monday. Near to slightly above average rainfall is expected for the seven-day period ending next Tuesday morning.

#### **Kissimmee**

In most lakes, stage has returned to the regulation schedule; however, releases continue to be made for local basin runoff. Weekly average discharges on November 20, 2022, at S-65 and S-65A were 2,300 cfs and 2,700 cfs, respectively, both of which were higher than the previous week. Mean weekly water depth on the Kissimmee River floodplain decreased from the previous week to 1.18 feet. The weekly average concentration of dissolved oxygen in the Kissimmee River increased from 2.8 mg/L the previous week to 2.9 mg/L on November 20, 2022, above both the potentially lethal level and the physiologically stressful range for largemouth bass and other sensitive species.

## **Lake Okeechobee**

Lake Okeechobee stage was 16.25 feet NGVD on November 20, 2022, with water levels 0.07 feet higher than previous week and 0.77 feet higher than a month ago. Lake stage is on the boundary between the Low and the Intermediate sub-bands and is 0.75 inches above the upper limit of the ecological envelope. This makes the third year in a row Lake stages have exceeded 16 feet NGVD at the beginning of the dry season. Average daily inflows (excluding rainfall) decreased by 425 cfs, and outflows (excluding evapotranspiration) increased by 8 cfs from the previous week. The most recent satellite image (November 19, 2022) from the NOAA Harmful Algal Bloom Monitoring System showed no bloom potential for the Lake.

## **Estuaries**

Total inflow to the St. Lucie Estuary averaged 1,040 cfs over the past week with no flow coming from Lake Okeechobee. Mean salinities decreased at all 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 1,060 cfs over the past week with no flow coming from Lake Okeechobee. Mean salinities decreased at all 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 Shell Point (10-25) and in the stressed range at Cape Coral (5-10) and Sanibel (>25).

## **Stormwater Treatment Areas**

For the week ending Sunday, November 20, 2022, no Lake Okeechobee water was delivered to the FEBs/STAs. The total amount of Lake releases sent to the FEBs/STAs in WY2023 (since May 1, 2022) is approximately 12,600 ac-feet. The total amount of inflows to the STAs in WY2023 is approximately 939,000 ac-feet. STA cells are at or near target stage. STA-1E Western Flow-way is offline for post-construction vegetation grow in, STA-3/4 Eastern Flow-way is offline for vegetation rehabilitation/drawdown, and STA-2 Flow-way 2 is offline for construction activities. Operational restrictions are in effect in STA-1E Central and Eastern Flow-ways, STA-1W Eastern, Western, and Northern Flow-ways, and STA-2 Flow-ways 3 and 4 for vegetation management activities. This week, there is no capacity for Lake releases in the STAs.

## **Everglades**

Last week rates of stage change in all regions of the WCAs were in the “fair” or “good” category as depths remained stable. Depths are very near average across WCA-3A and average conditions in that basin are not ecologically advantageous (too dry in the north, too wet in the south). Taylor slough stages fell at most stations last week but overall remain above the pre-Florida Bay initiative average. Average salinity notably decreased last week in Florida Bay but remained above average. Salinities in all regions are now within the desired interquartile range..

## **Biscayne Bay**

Total inflow to Biscayne Bay averaged 590 cfs and the previous 30-day mean inflow averaged 620 cfs. The seven-day mean salinity was 26.3 at BBCW8 and 25.4 at BBCW10, both are within the ideal salinity range for estuarine animals in this region (salinity less than 35). Data was provided by Biscayne National Park.

## **Supporting Information**

### **Kissimmee Basin**

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

On November 20, 2022, mean daily lake stages were 57.9 feet NGVD (0.1 feet below schedule) in East Lake Toho, 54.9 feet NGVD (0.1 below schedule) in Lake Toho, and 53.0 feet NGVD (0.5 above schedule) in Lakes Kissimmee-Cypress-Hatchineha (KCH) (**Table KB-1, Figures KB-1-3**).

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

On November 20, 2022, mean weekly discharge was increased to 2,300 cfs at S-65 and increased to 2,700 cfs at S-65A in response to rising water levels in KCH and Pool A. Mean weekly discharge from the Kissimmee River was not available at S-65D and was 3,000 cfs at S-65E (**Table KB-2**). Mean weekly headwater stages were 46.5 feet NGVD at S-65A and 28.5 feet NGVD at S-65D on November 20, 2022. With S-65A discharge rising, mean weekly river channel stage increased from the previous week's mean of 38.4 feet to 38.6 feet on November 20, 2022 (**Figure KB-4**). Mean weekly water depth on the Kissimmee River floodplain increased from 1.04 feet the previous week to 1.18 feet on November 20, 2022 (**Table KB-2, Figure KB-5**). The weekly average concentration of dissolved oxygen in the Kissimmee River increased from 2.8 mg/L the previous week to 2.9 mg/L on November 20, 2022 (**Table KB-2, Figure KB-6**).

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

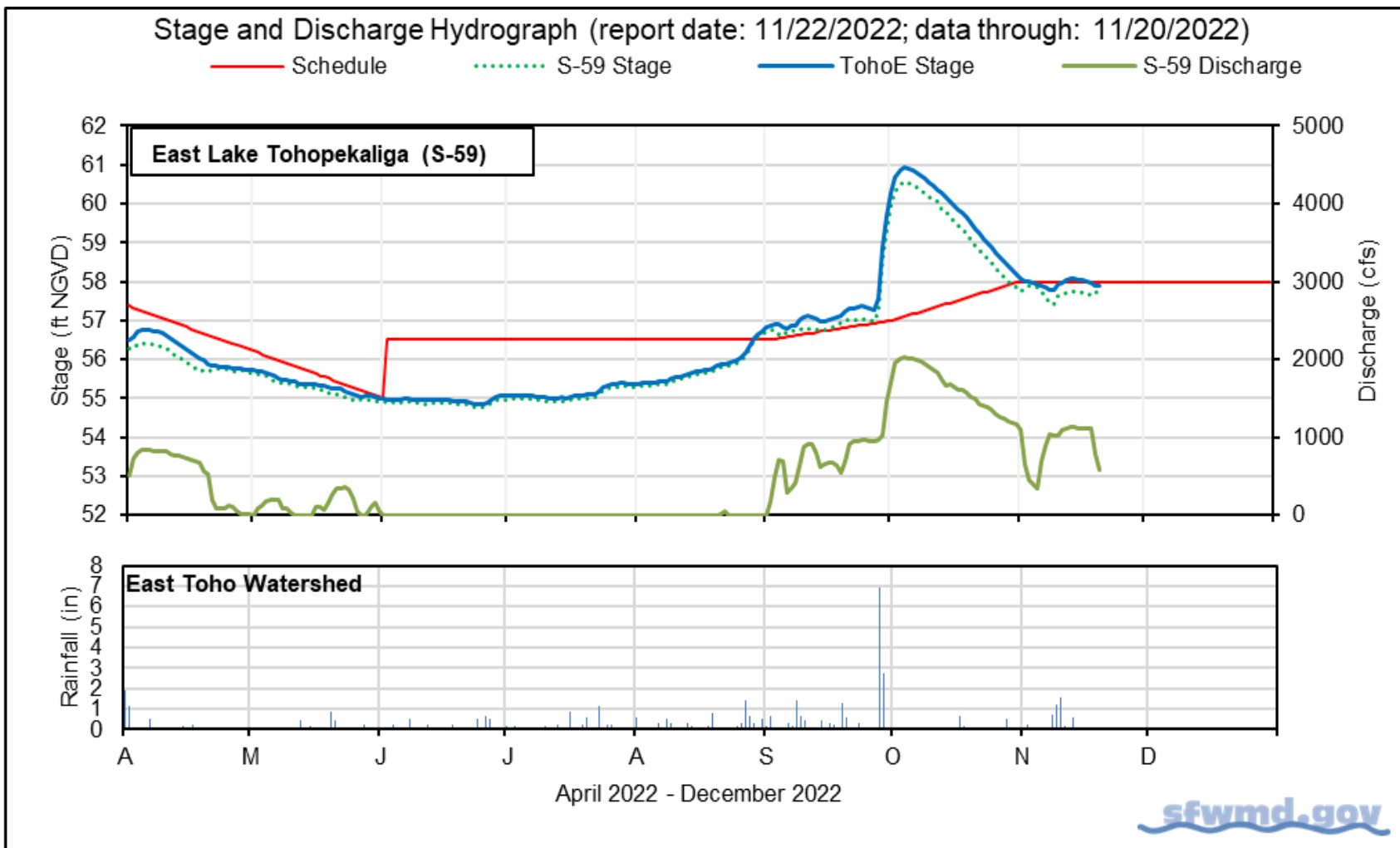
Per the IS-14-50.0 discharge plan, adjust S-65 discharge to maintain a minimum flow of at least 1,400 cfs at S-65A to the Kissimmee River. Note general guidance for discharge and maximum rates of change in discharge (**Figure KB-7**).

**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.

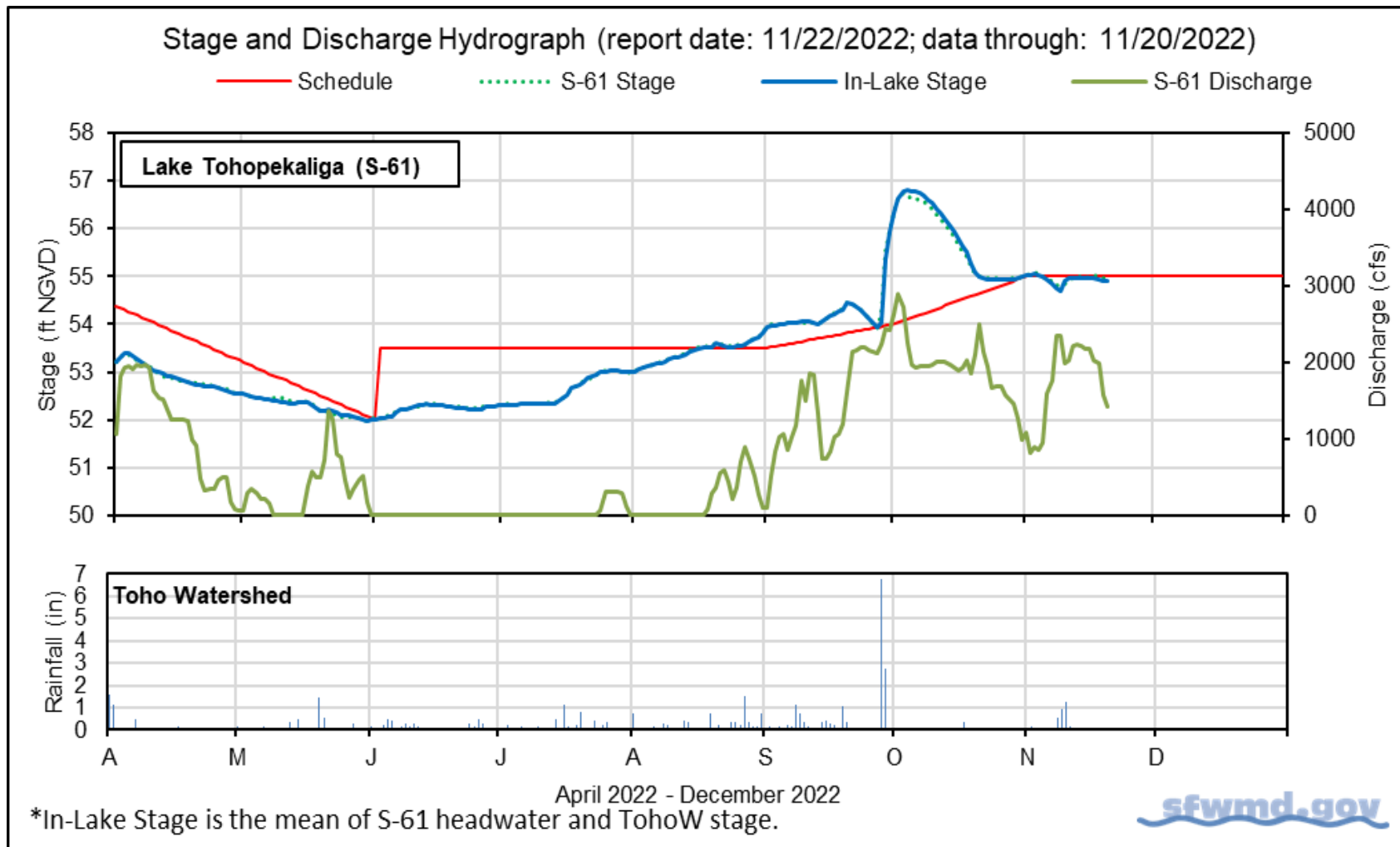
Water Body	Structure	Stage Monitoring Site	Weekly (7-Day) Average Discharge (cfs)	Sunday Lake Stage (feet NGVD) <sup>a</sup>	Schedule Type <sup>b</sup>	Sunday Schedule Stage (feet NGVD)	Sunday Departure from Regulation (feet)	
							11/20/22	11/13/22
Lakes Hart and Mary Jane	S-62	LKMJ	340	60.9	R	61.0	-0.1	0.2
Lakes Myrtle, Preston and Joel	S-57	S-57	110	62.0	R	62.0	0.0	0.4
Alligator Chain	S-60	ALLI	160	63.9	R	64.0	-0.1	0.0
Lake Gentry	S-63	LKGT	210	61.4	R	61.5	-0.1	0.0
East Lake Toho	S-59	TOHOE	990	57.9	R	58.0	-0.1	0.1
Lake Toho	S-61	TOHOW S-61	1900	54.9	R	55.0	-0.1	0.0
Lakes Kissimmee, Cypress and Hatchineha	S-65	KUB011 LKIS5B	2300	53.0	R	52.5	0.5	0.4

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.

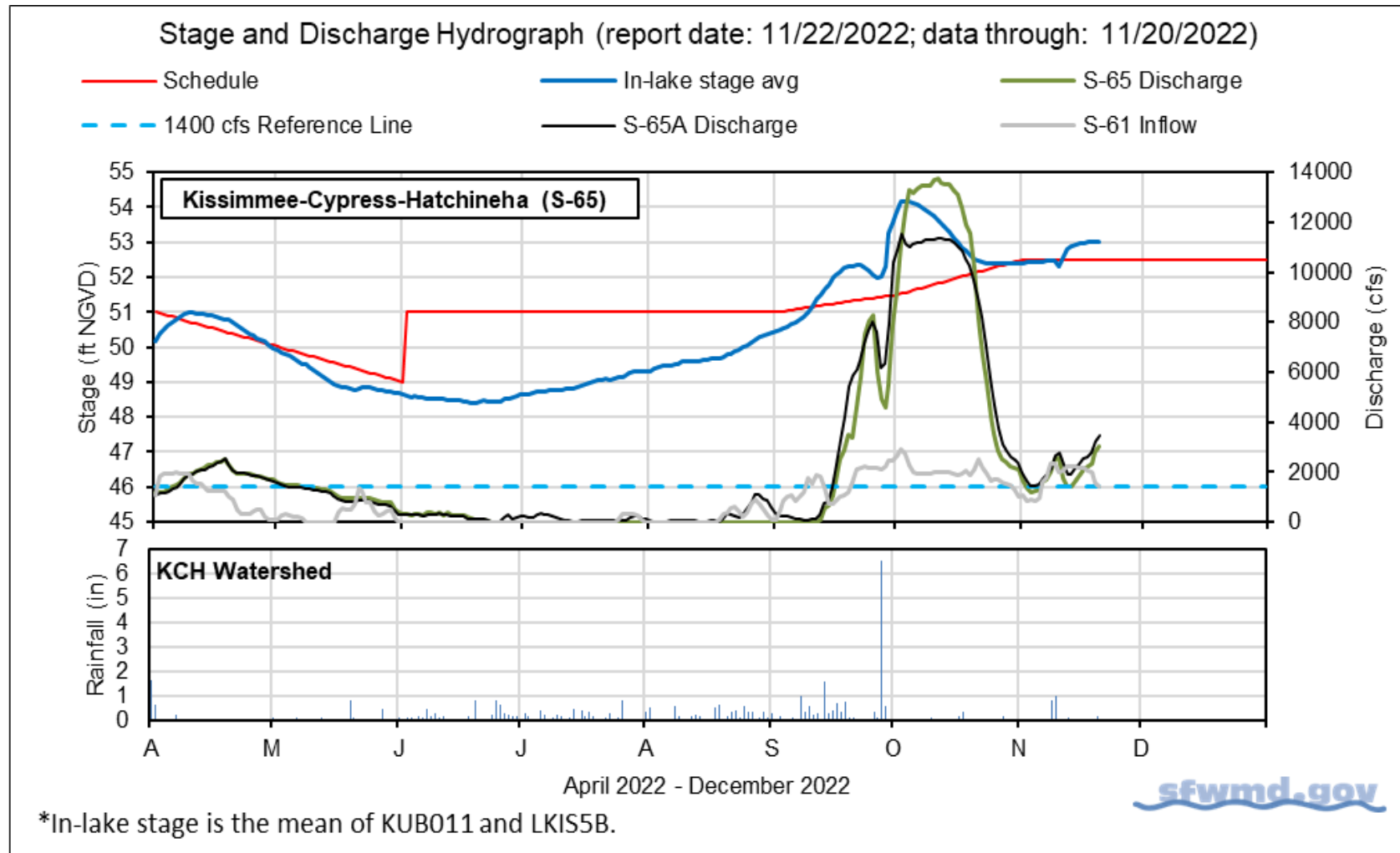
b. A: projected recession line; R: USACE regulation schedule; S: temporary recession target line; T: temporary schedule; NA: not applicable or not available.



**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 11/20/22	Weekly Average for Previous Seven Day Periods			
			11/20/22	11/13/22	11/6/22	10/30/22
Discharge	S-65	3,000	2,300	1,900	1,500	2,800
Discharge	S-65A <sup>a</sup>	3,500	2,700	2,200	1,700	3,600
Headwater Stage (feet NGVD)	S-65A	46.7	46.5	46.7	46.3	46.7
Discharge	S-65D <sup>b</sup>	N/A	N/A	2,600	3,700	8,100
Headwater Stage (feet NGVD)	S-65D <sup>c</sup>	28.5	28.5	28.3	28.4	28.5
Discharge (cfs)	S-65E <sup>d</sup>	2,700	3,000	2,700	3,700	7,900
Discharge (cfs)	S-67	0	0	0	0	0
Dissolved Oxygen (mg/L) <sup>e</sup>	Phase I, II/III river channel	4.2	2.9	2.8	1.3	1.2
River channel mean stage <sup>f</sup>	Phase I river channel	38.8	38.6	38.4	38.6	40.4
Mean depth (feet) <sup>g</sup>	Phase I floodplain	1.19	1.18	1.04	1.26	2.66

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.

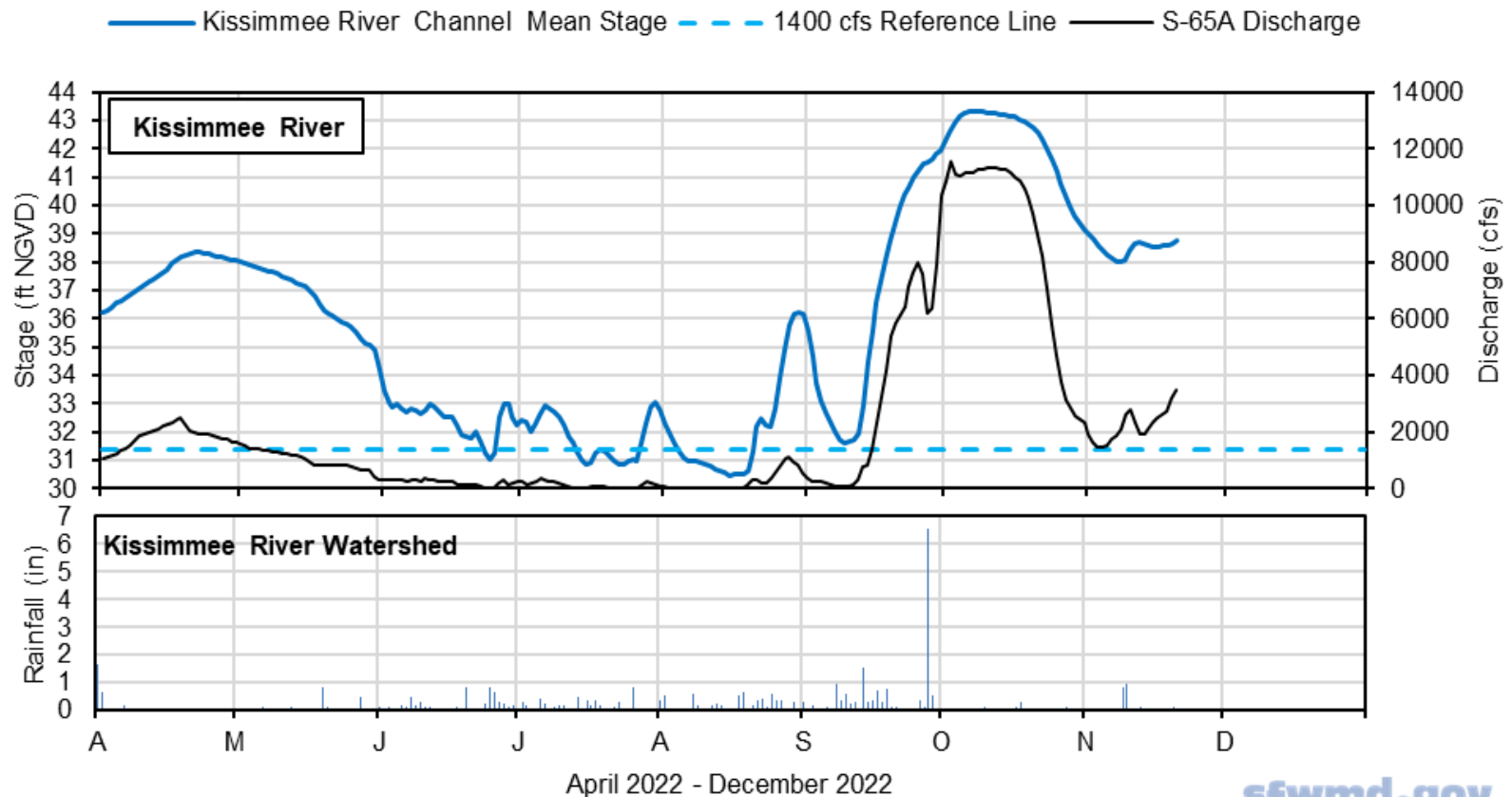
d. Combined discharge from S-65E and S-65EX1.

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.

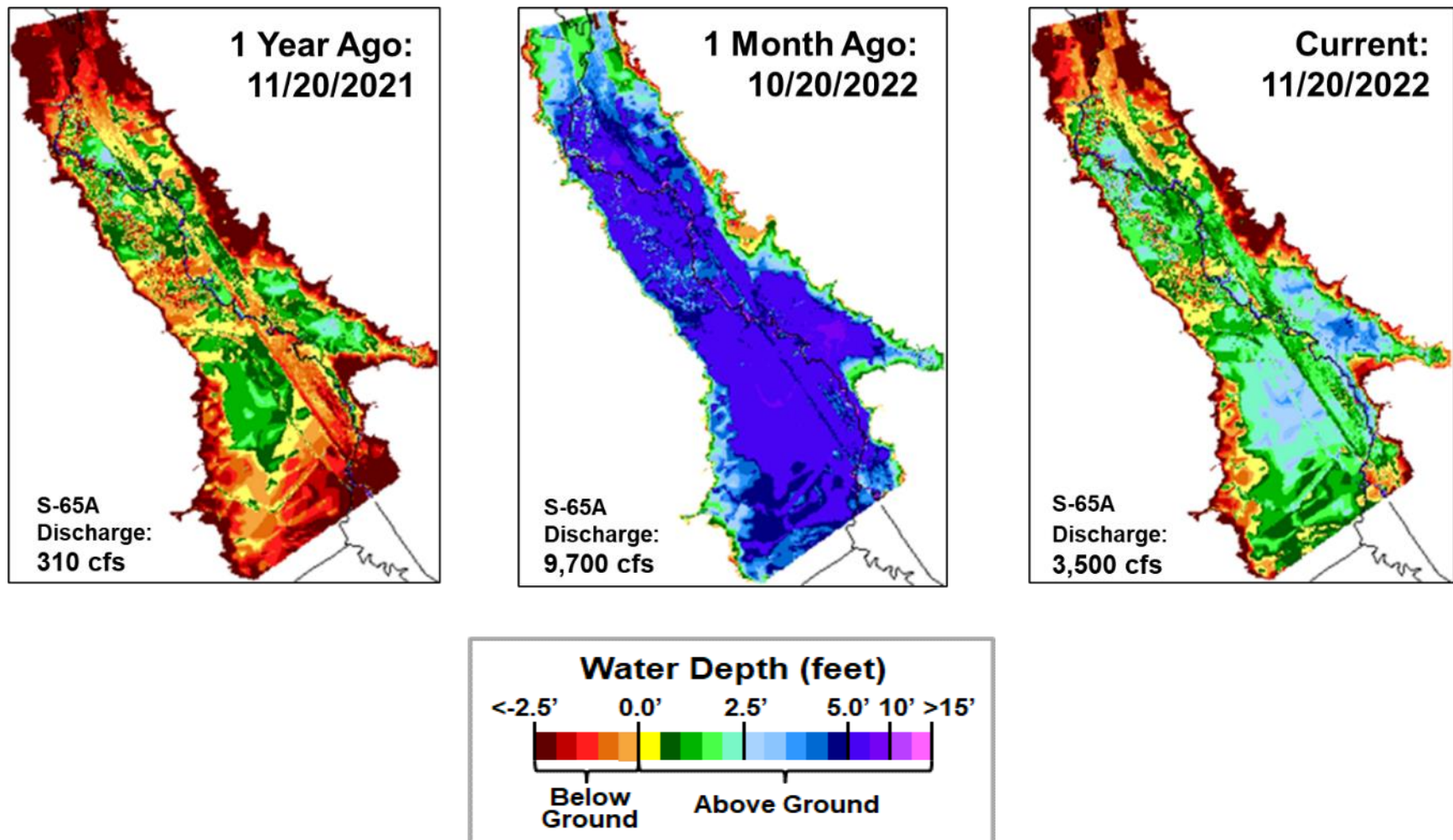
g. One-day spatial average obtained from the South Florida Water Depth Assessment Tool (SFWDAT).

Stage and Discharge Hydrograph (report date: 11/22/2022; data through: 11/20/2022)

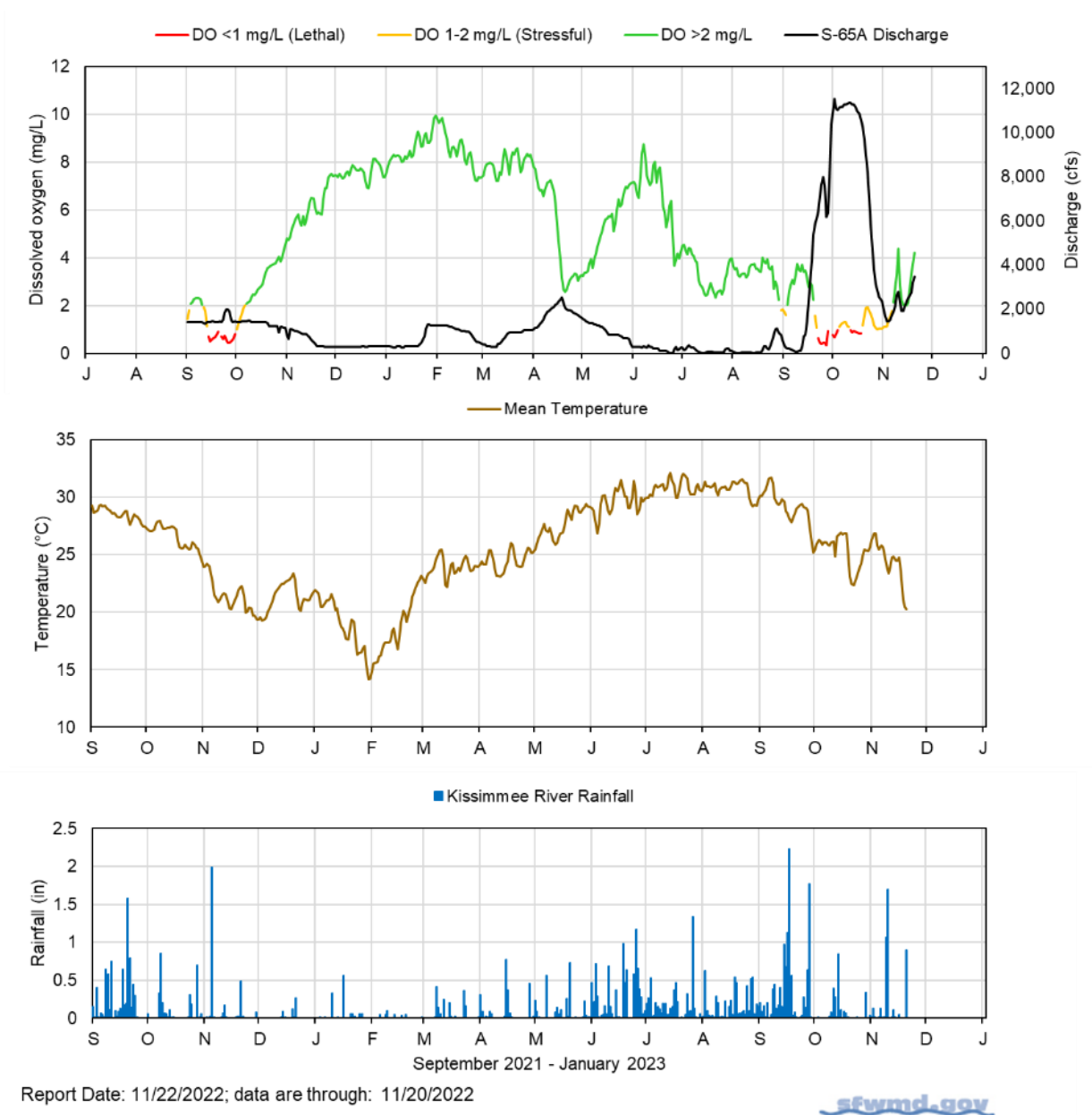


\*River Channel Stage is the average for PC62, KRDR02, KRBN, PC33, and PC11.

**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 six stations reporting this week. Rainfall values are daily totals for Kissimmee River (Pool BCD) AHED watershed.

# SOUTH FLORIDA WATER MANAGEMENT DISTRICT

## Stage and Discharge Guidance for 2021-2022.

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 $\pm 0.2$ 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.

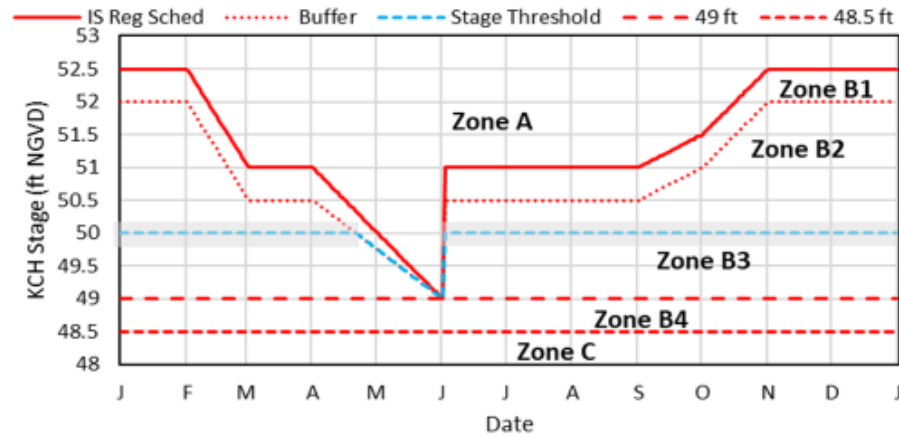
Table KB-3. Discharge Rate of Change Limits for S65/S65A (revised 1/14/19).

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

[sfwmd.gov](http://sfwmd.gov)

## 2021-2022 Discharge Plan for S-65/S-65A

### Preferred Discharge Plan for S-65/S-65A (IS-14-50.0)



#### 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

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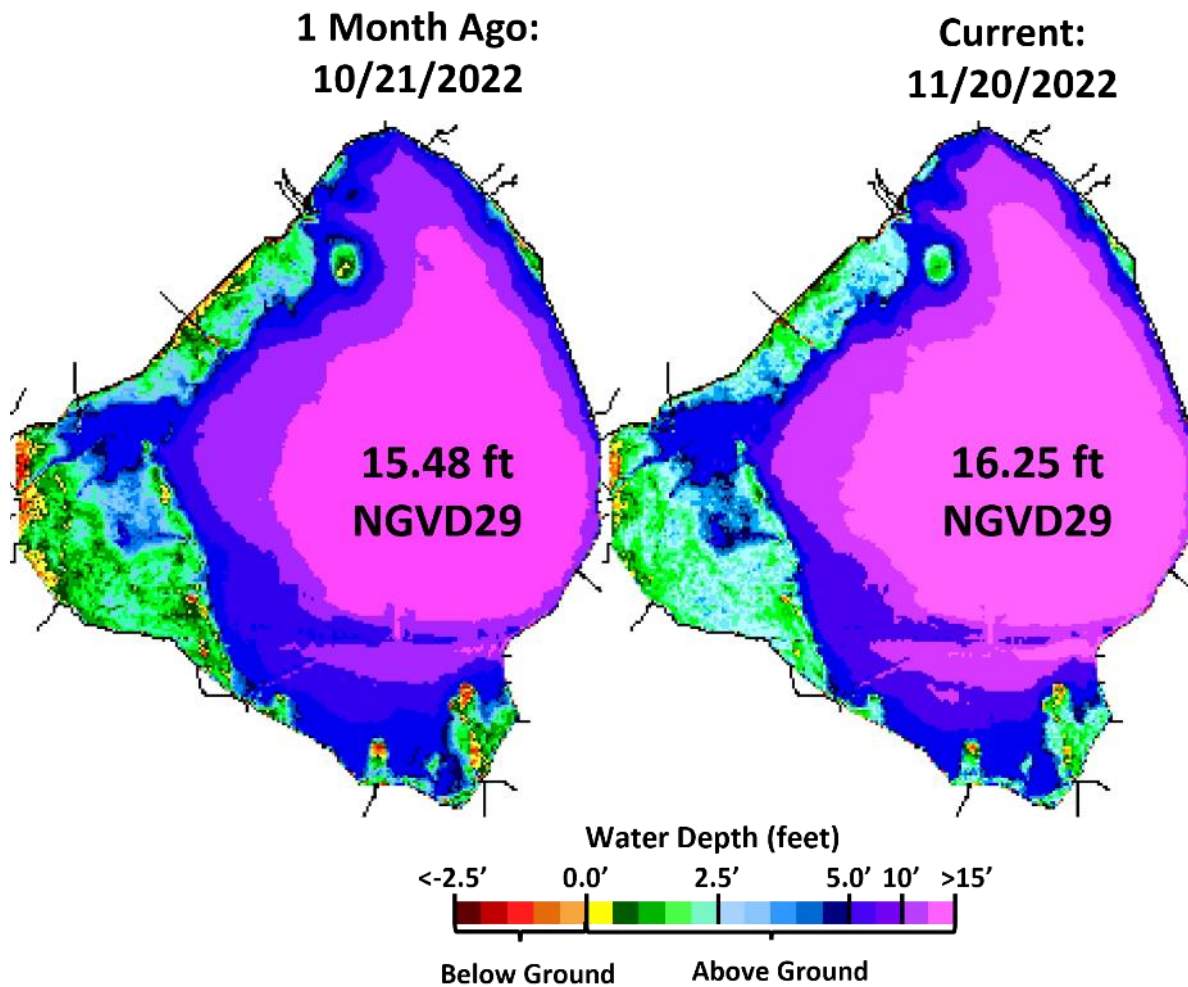
**Figure KB-7.** IS-14-50 Discharge Plan for S65/S65A with discharge rate of change limits (revised 1/14/19).

## Lake Okeechobee

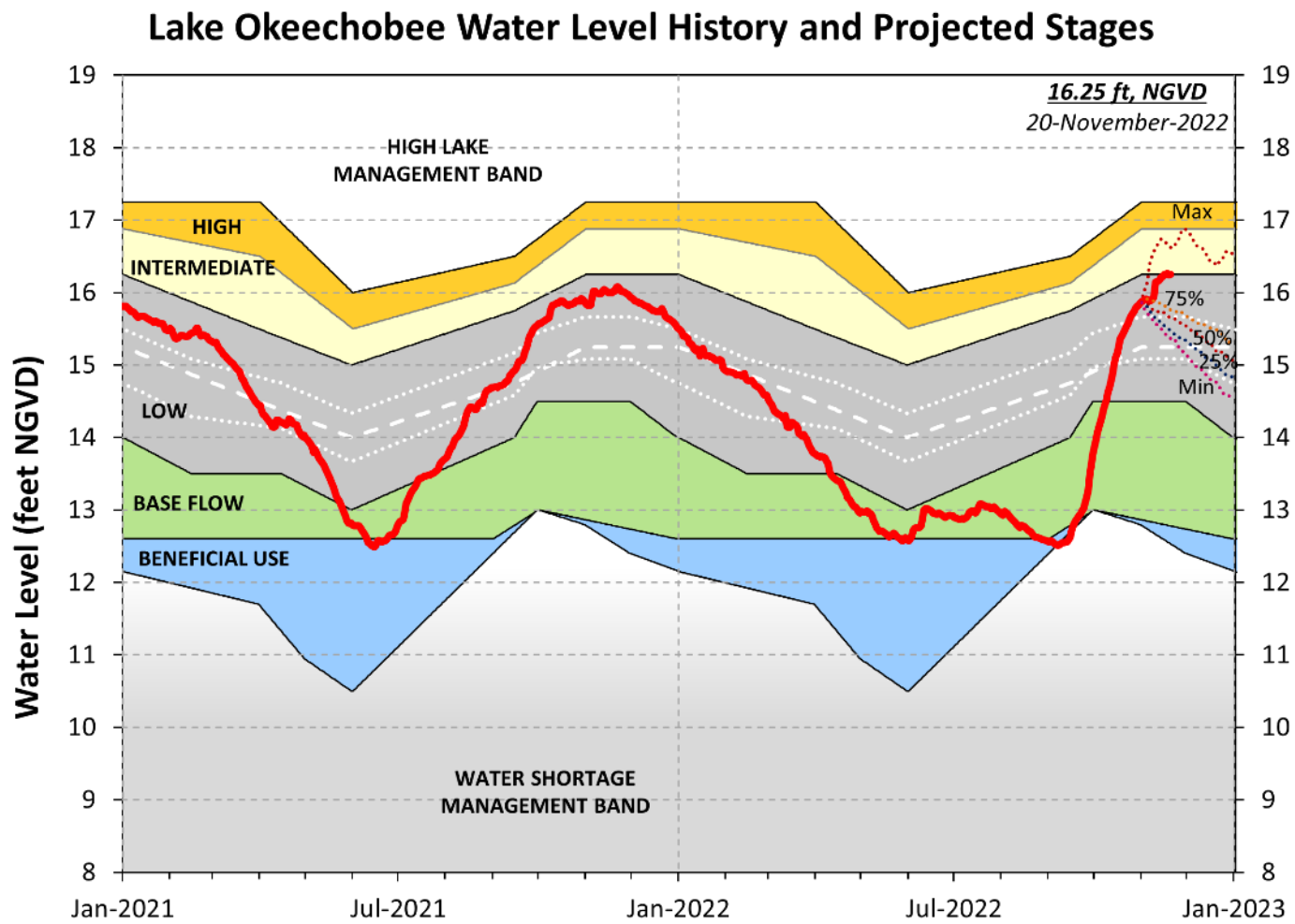
Lake Okeechobee stage was 16.25 feet NGVD on November 20, 2022, with water levels 0.07 feet higher than the previous week and 0.77 feet higher than a month ago (**Figure LO-1**). During the passage of tropical storm Nicole, water levels rose more than 3 inches in 2 days. Lake stage is on the boundary between the Low and the Intermediate sub-bands (**Figure LO-2**) and is currently 0.75 feet above the upper limit of the ecological envelope (**Figure LO-3**). According to NEXRAD, 0.35 inches of rain fell directly on the Lake last week.

Average daily inflows (excluding rainfall) decreased from the previous week, going from 5,644 cfs to 5,219 cfs. Average daily outflows (excluding evapotranspiration) increased from the previous week going from 9 cfs to 17 cfs. The highest inflow came from the Kissimmee River (C-38 Canal; 2,985 cfs), followed by the C-41A Canal (1,017 cfs via S-84 & S-84X) and the C-41 & C-40 Canals (367 cfs via S-71 & S-72). There was no outflow to the west via the S-77 structure or to the east via the S-308 structure. Flows to the south via the S-350 structures averaged 17 cfs. There was minimal backflow from the L-8 through the S-271 structure. **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.

The most recent satellite image (November 19, 2022) from the NOAA Harmful Algal Bloom Monitoring System showed no bloom potential for the Lake (**Figure LO-6**).

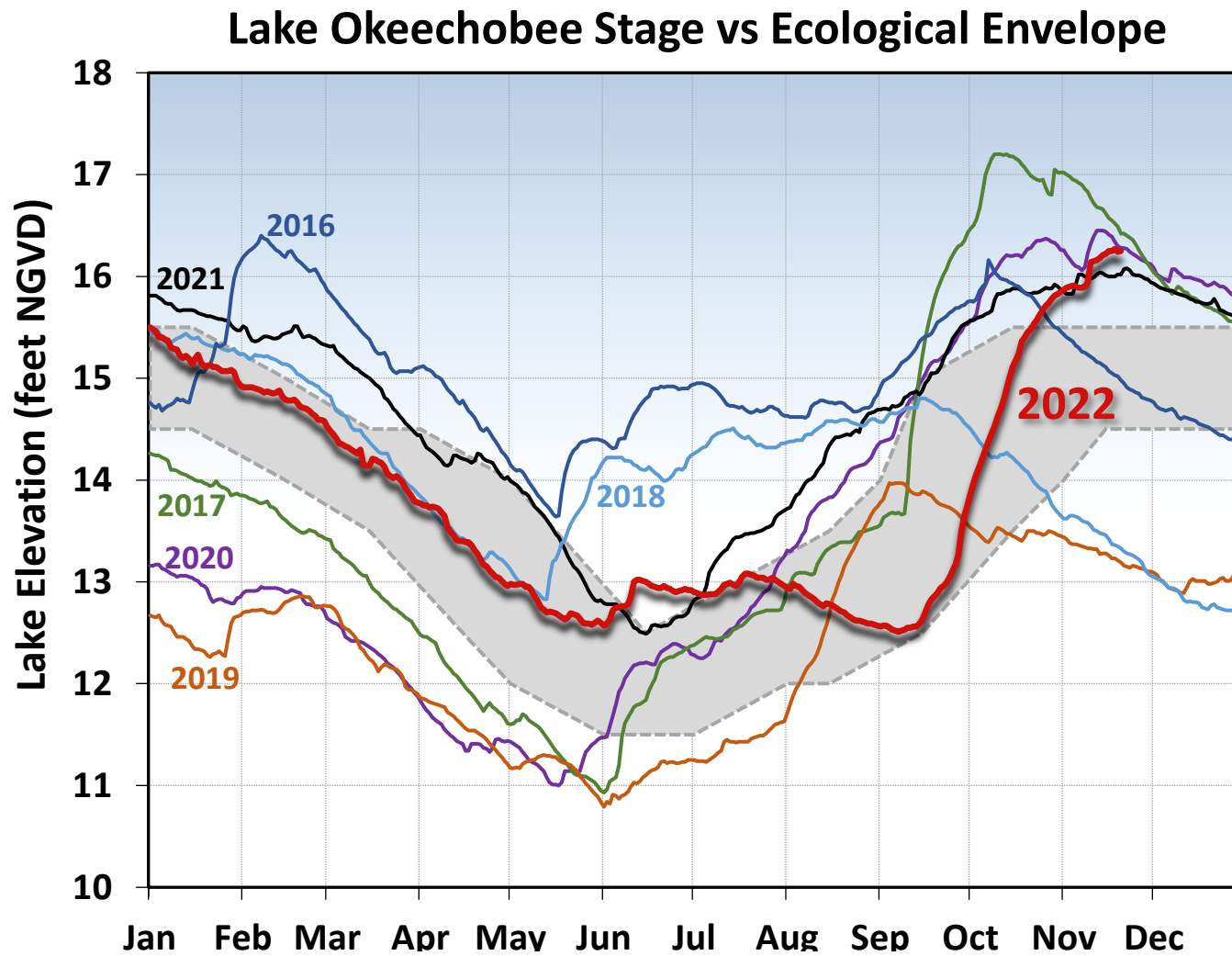


**Figure LO-1.** Lake Okeechobee water depth estimates based on South Florida Water Depth Assessment Tool (SFWDAT).

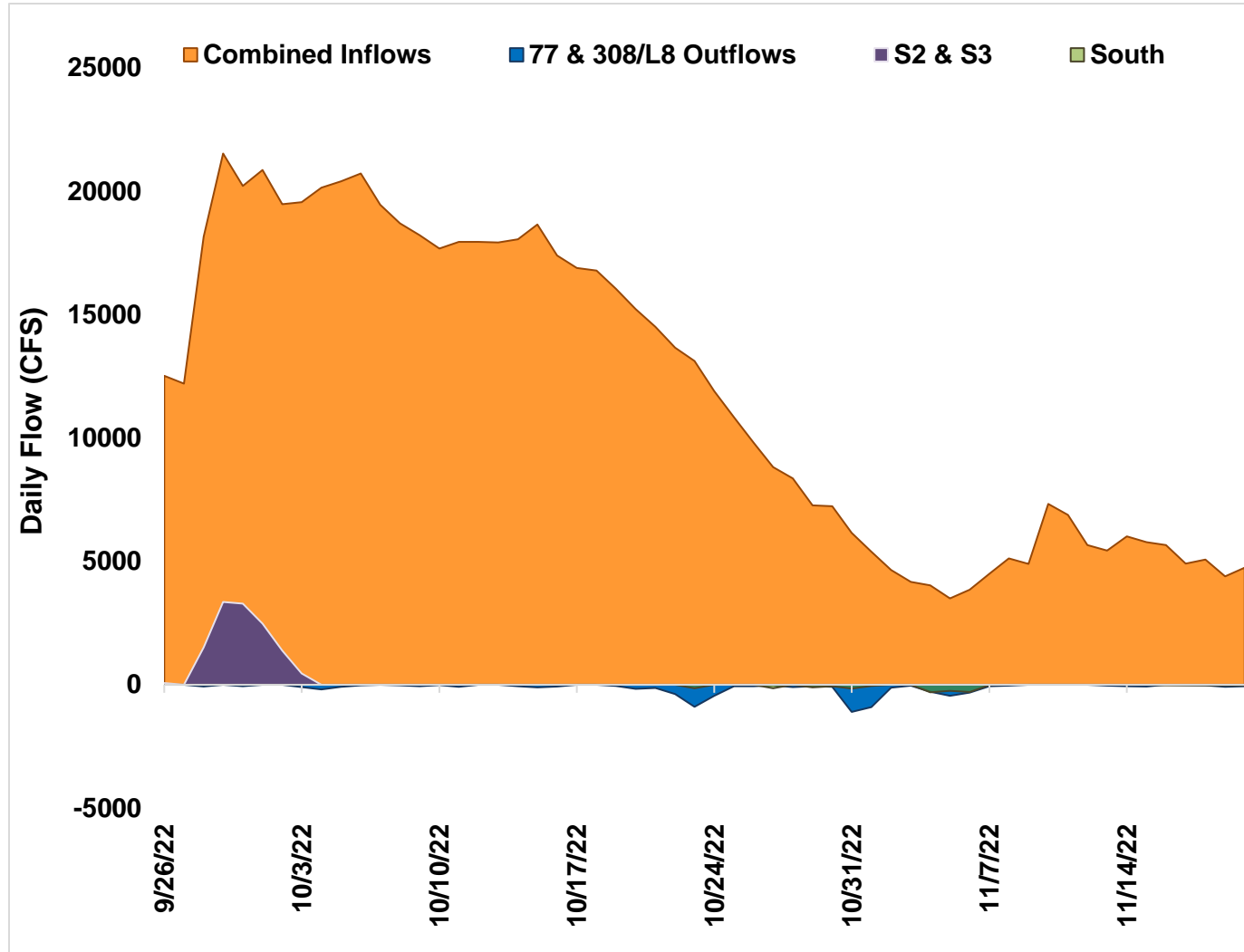


LORS-2008 - Adopted by USACE 28-April-2008

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



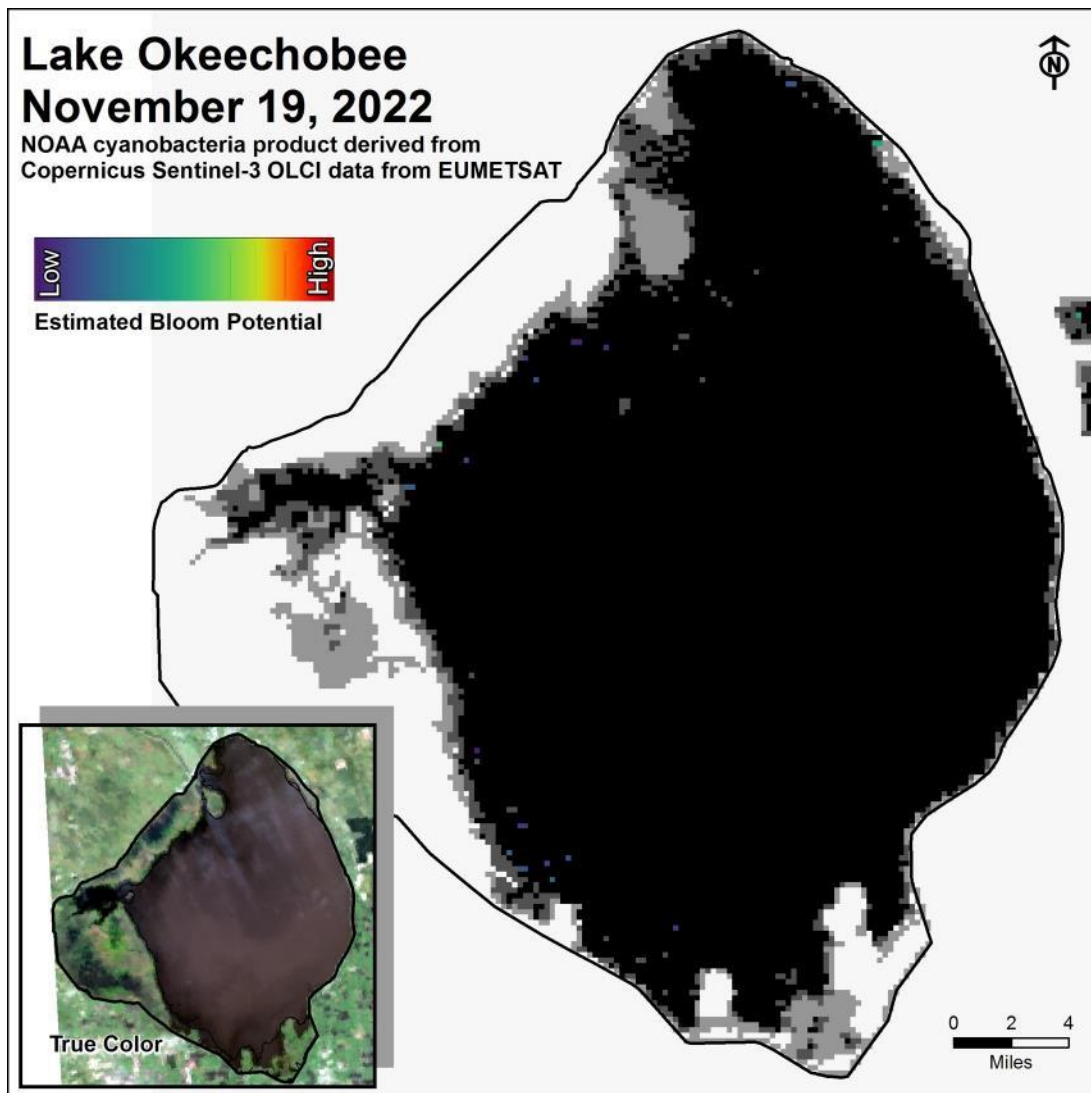
**Figure LO-3.** The prior six years of annual stage hydrographs for Lake Okeechobee in comparison to the ecological envelope.



**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 14 - 20, 2022.



**Figure LO-6.** Cyanobacteria bloom potential on November 19, 2022, 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 1,040 cfs (**Figures ES-1 and ES-2**) and the previous 30-day mean inflow was 960 cfs. For comparison, the historical provisional mean inflows from the contributing areas are shown in **Figure ES-2**.

Over the past week, salinities decreased at all sites in 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 12.4. 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 1.1 spat/shell for October (**Figure ES-5**).

### *Caloosahatchee River Estuary*

Over the past week, mean total inflow to the Caloosahatchee River Estuary was 1,880 cfs (**Figures ES-6 and ES-7**) and the previous 30-day mean inflow was 1,870 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 all 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 Shell Point, and in the stressed range at Cape Coral and Sanibel (**Figure ES-10**). Oyster recruitment data in the CRE are not available at this time; FWRI will redeploy recruitment collectors once water quality conditions improve.

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 1500 cfs, and a steady release at 2,000 cfs with estimated tidal basin inflows of 390 cfs. Model results from all scenarios predict daily salinity to be 2.0 or lower and the 30-day moving average surface salinity to be 0.8 or lower at Val I-75 at the end of the two-week period (**Table ES-3 and Figure ES-11**). This keeps predicted salinities in the upper estuary within the optimal salinity range (0-10) for tape grass.

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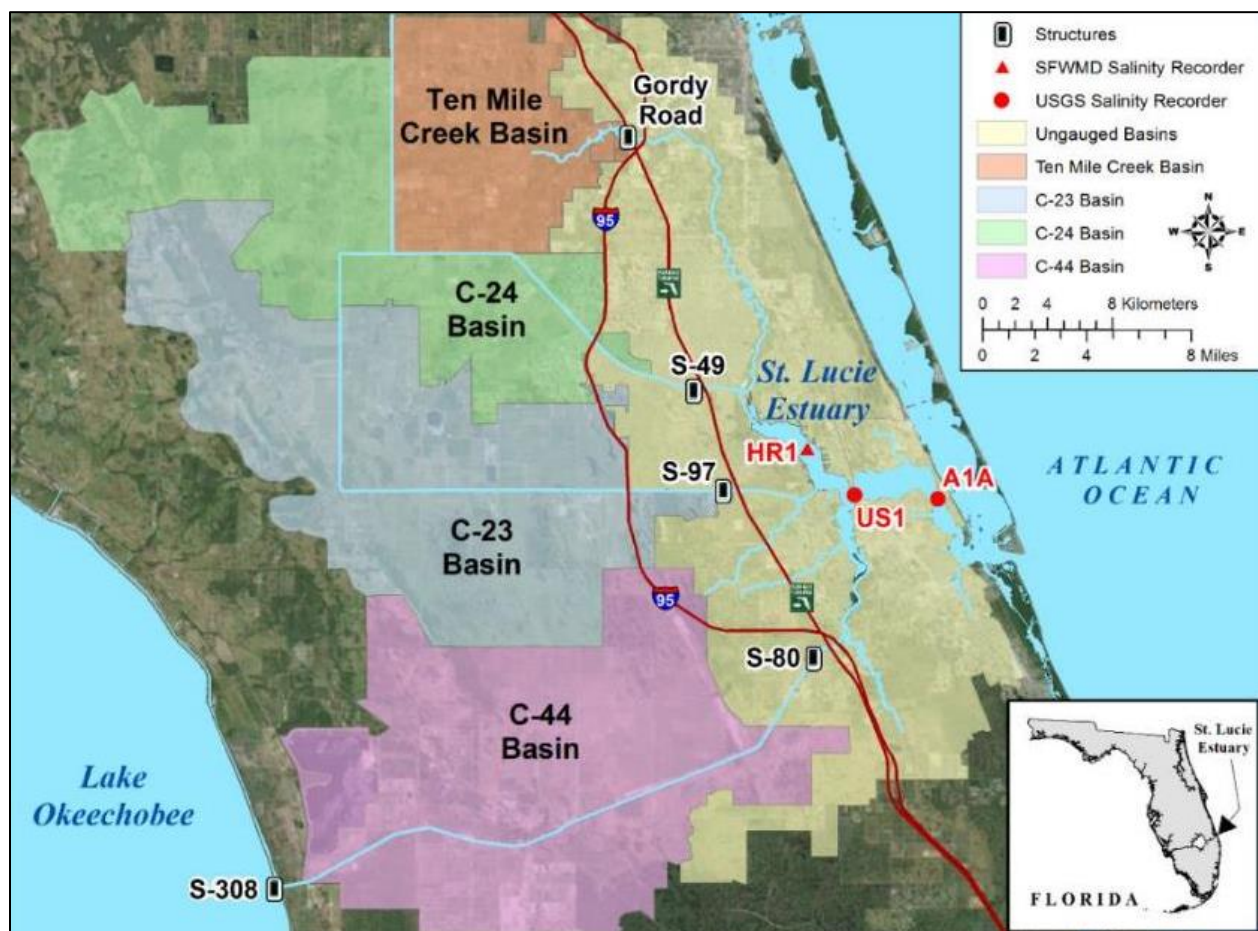
<sup>1</sup> Qiu, C., and Y. Wan. 2013. Time series modeling and prediction of salinity in the Caloosahatchee River Estuary. *Water Resources Research* 49:5804-5816.

## Red Tide

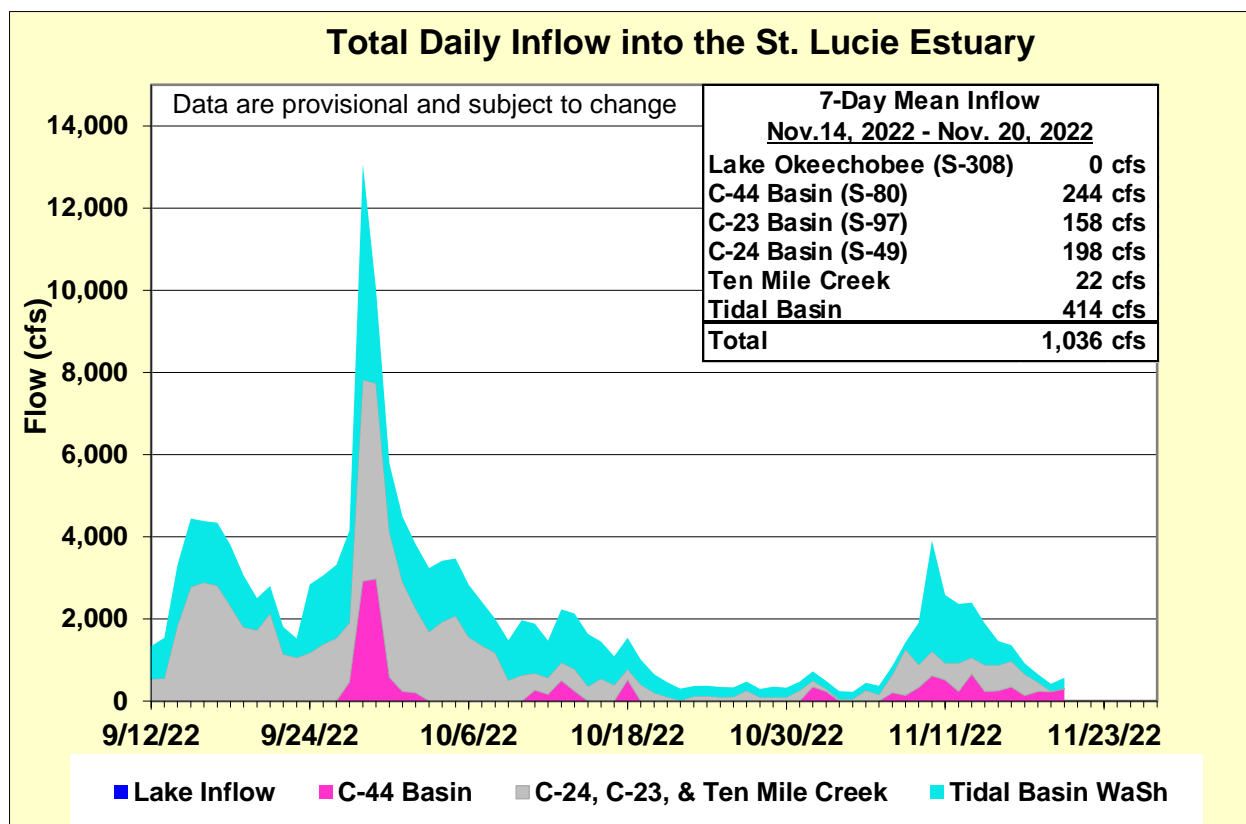
The Florida Fish and Wildlife Research Institute reported on November 18, 2022, that *Karenia brevis*, the Florida red tide dinoflagellate, was observed at bloom concentrations in samples collected from Charlotte, Lee and Collier counties over the past week. On the east coast, red tide was not observed 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 4,000 cfs release at S-77 and up to 1,800 cfs release at S-80 to the St. Lucie Estuary.



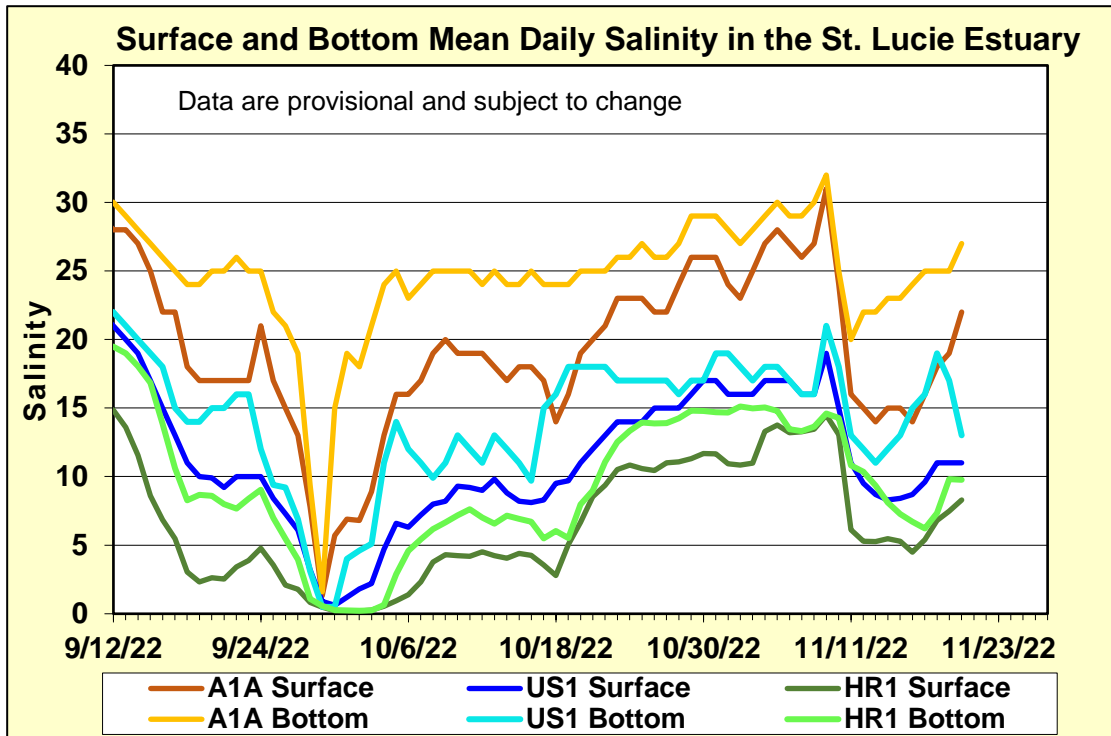
**Figure ES-1.** Basins, water control structures and salinity monitoring sites in the St. Lucie Estuary.



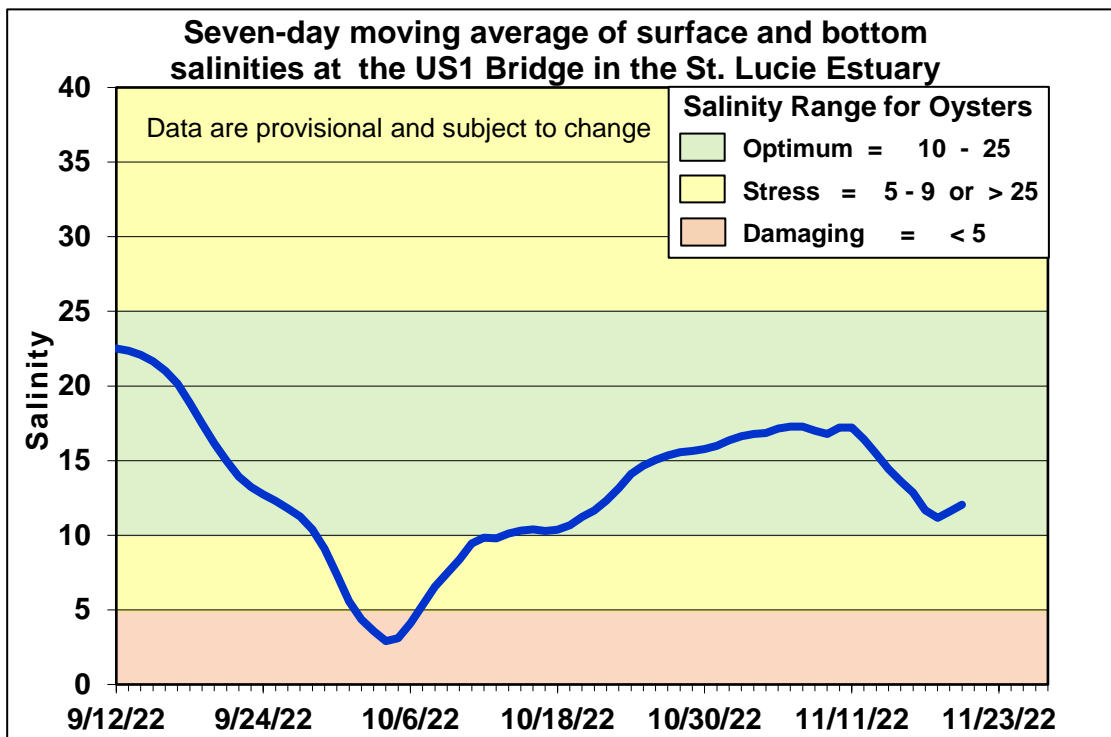
**Figure ES-2.** Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and Tidal Basins into the St. Lucie Estuary.

**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.

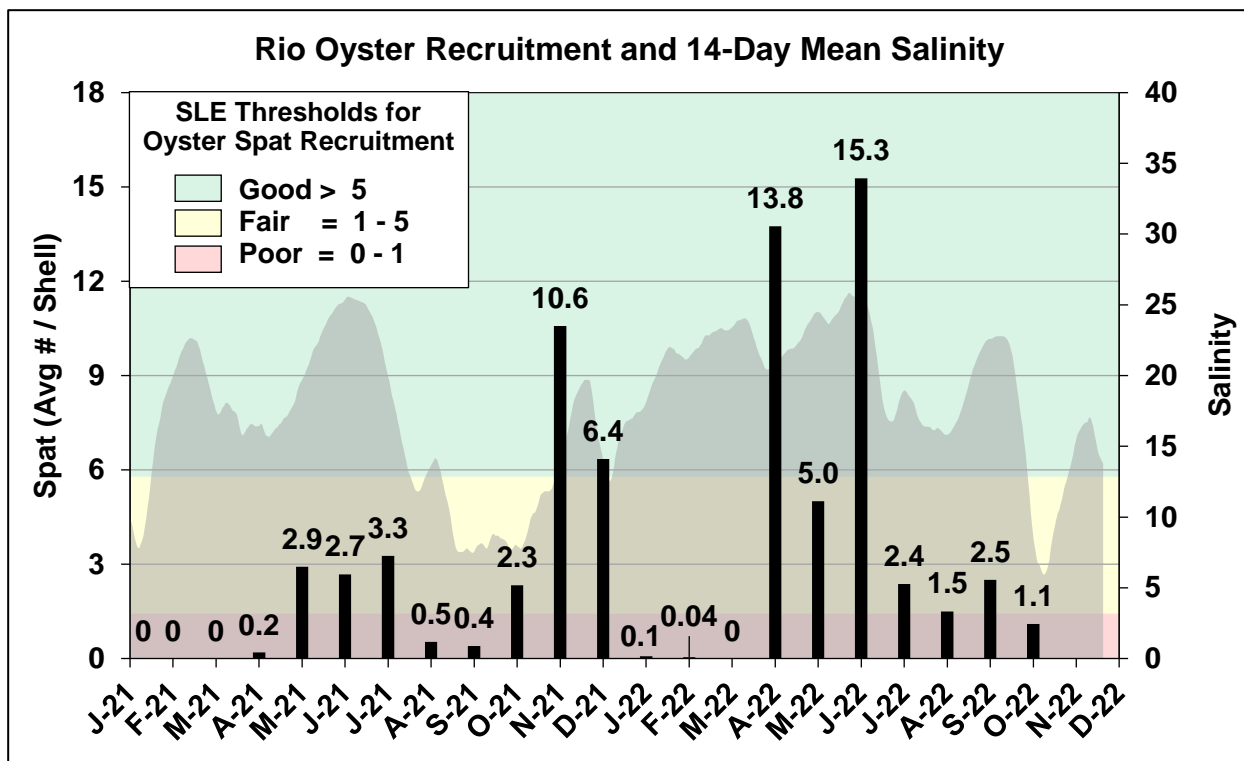
Sampling Site	Surface	Bottom	Optimum Envelope
HR1 (North Fork)	<b>6.2</b> (10.1)	<b>7.9</b> (12.3)	10.0 – 25.0
US1 Bridge	<b>9.7</b> (13.6)	<b>15.0</b> (15.3)	10.0 – 25.0
A1A Bridge	<b>17.0</b> (21.9)	<b>24.6</b> (25.7)	10.0 – 25.0



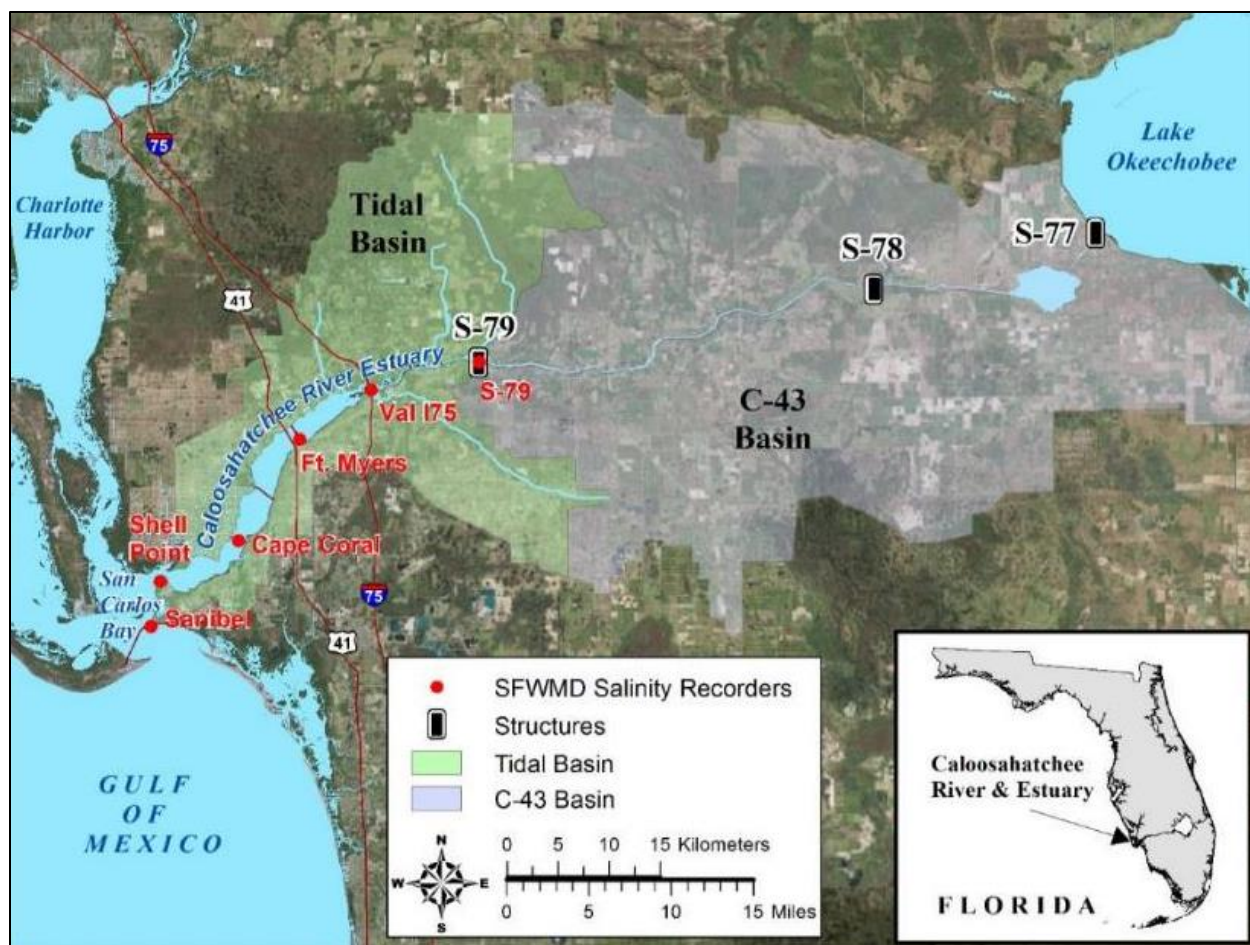
**Figure ES-3.** Mean daily salinity at the A1A, US1 and HR1 sites in the St. Lucie Estuary.



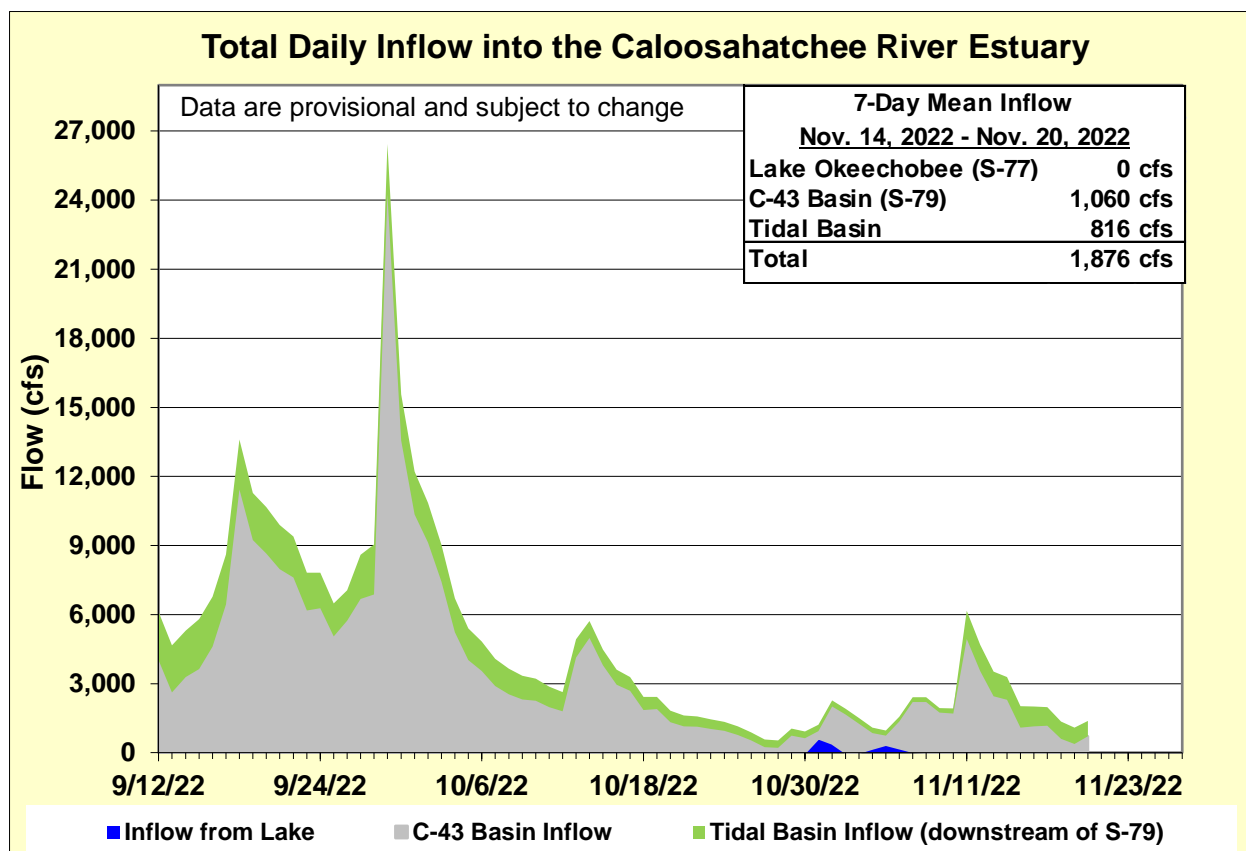
**Figure ES-4.** Seven-day moving average of the surface and bottom salinities at the US1 Bridge in the St. Lucie Estuary.



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



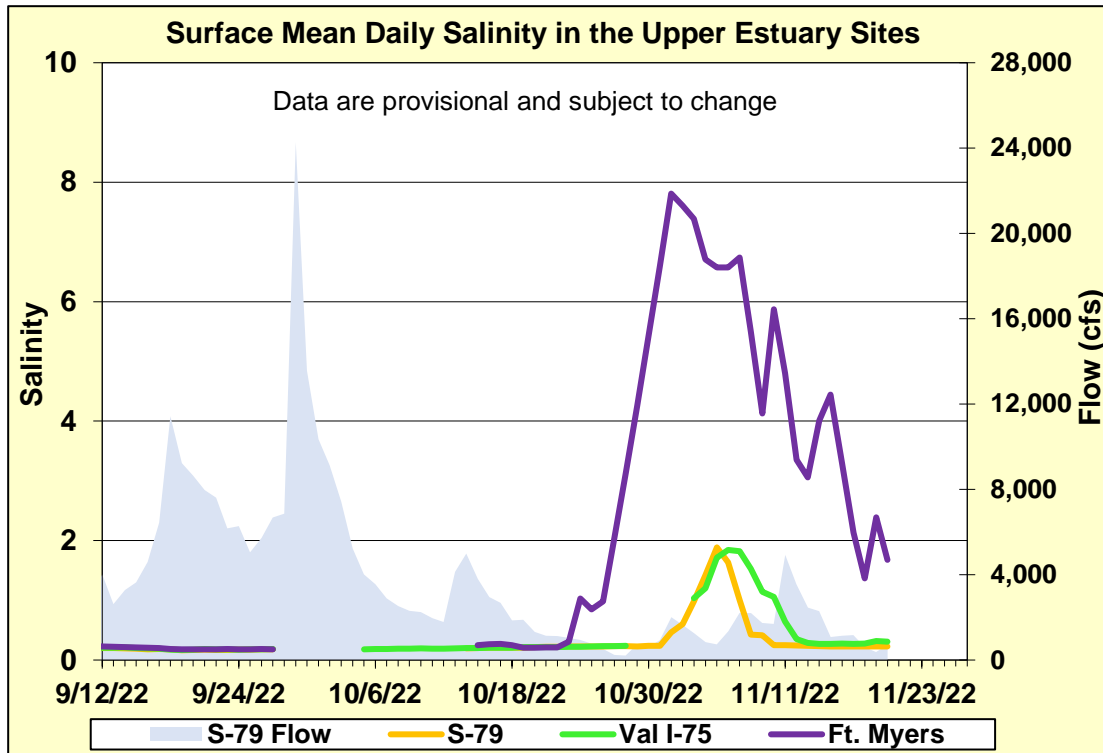
**Figure ES-6.** Basins, water control structures and salinity monitoring sites in the Caloosahatchee River Estuary.



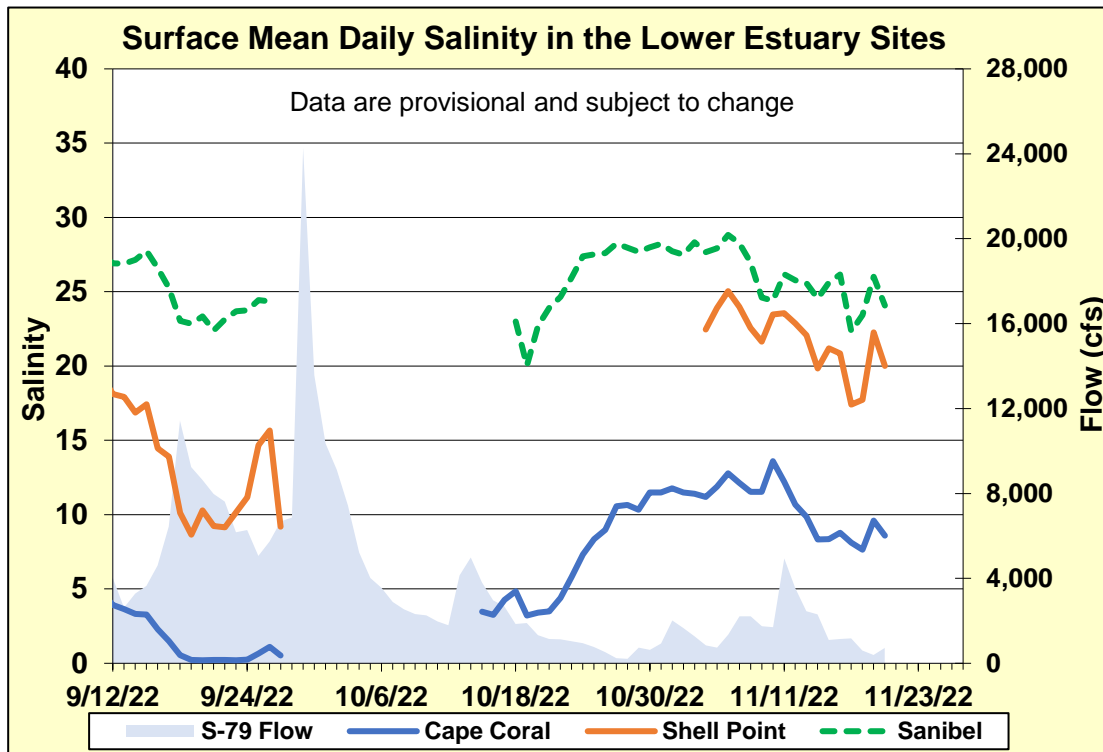
**Figure ES-7.** Total daily inflows from Lake Okeechobee, and runoff from the C-43 and Tidal basins into the Caloosahatchee River Estuary.

**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.

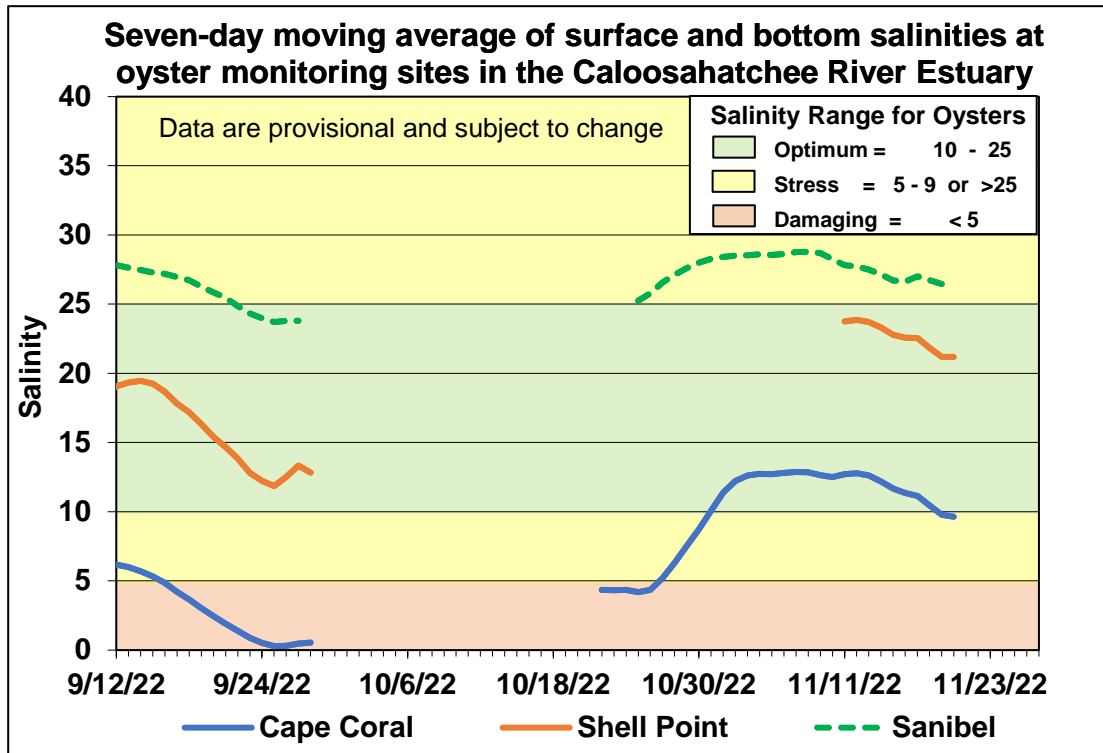
Sampling Site	Surface	Bottom	Optimum Envelope
S-79 (Franklin Lock)	<b>0.2</b> (0.4)	<b>0.2</b> (0.4)	0.0 – 10.0
Val I-75	<b>0.3</b> (1.0)	<b>0.3</b> (1.1)	0.0 – 10.0
Fort Myers Yacht Basin	<b>2.8</b> (4.8)	<b>5.2</b> (5.0)	0.0 – 10.0
Cape Coral	<b>8.5</b> (11.7)	<b>10.4</b> (12.7)	10.0 – 25.0
Shell Point	<b>19.9</b> (22.9)	<b>22.1</b> (23.7)	10.0 – 25.0
Sanibel	<b>24.6</b> (26.0)	<b>28.0</b> (28.3)	10.0 – 25.0



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



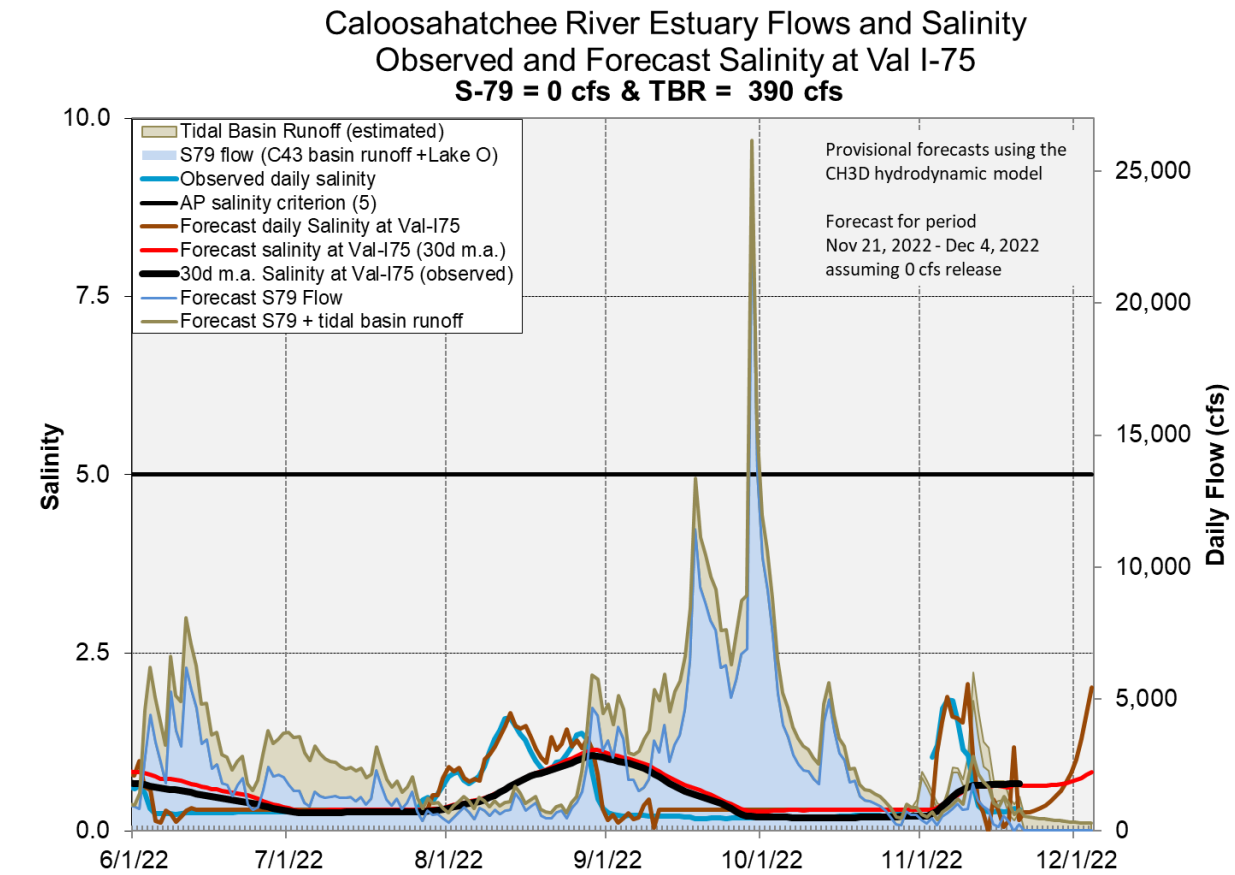
**Figure ES-9.** Mean daily surface salinity at lower Caloosahatchee River Estuary monitoring sites and mean daily flow at S-79.



**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.

**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	390	2.0	0.8
B	450	390	1.1	0.7
C	750	390	0.6	0.6
D	1000	390	0.4	0.6
E	1500	390	0.3	0.6
F	2000	390	0.3	0.6



**Figure ES-11.** 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. Operational restrictions are in place in STA-1E Central and Eastern Flow-ways for vegetation management activities. Online treatment cells are at or near target stage and vegetation in the flow-ways is stressed and highly stressed. The 365-day phosphorus loading rates (PLRs) are high for the Eastern and Central Flow-way (**Figure S-1**).

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

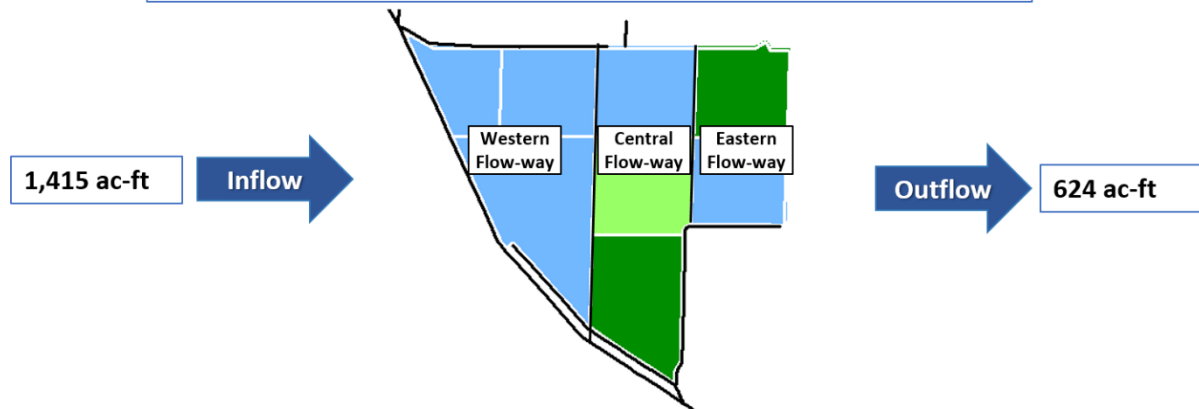
**STA-2:** STA-2 Flow-way 2 is offline for construction activities. Operational restrictions are in place in STA-2 Flow-ways 3 and 4 for vegetation management activities. Online treatment cells are at or near target stage. Vegetation in Flow-ways 1 and 3 is stressed, and in Flow-ways 2, 4 and 5 is highly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

**STA-3/4:** STA-3/4 Eastern Flow-way is offline for vegetation rehabilitation/drawdown. Online treatment cells are near or above target stage. Vegetation in the Eastern and Central Flow-ways 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-4**).

**STA-5/6:** All flow-ways in STA-5/6 are online. Treatment cells are at or near target stage. All treatment cells have highly stressed vegetation conditions except Flow-ways 7 and 8 which are healthy. The 365-day PLRs for most flow-ways are below 1.0 g/m<sup>2</sup>/year, except Flow-way 4 which is high (**Figure S-5** and **S-6**).

For definitions on STA operational language see glossary following figures.

# STA-1E Weekly Status Report – 11/14/2022 through 11/20/2022















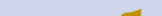

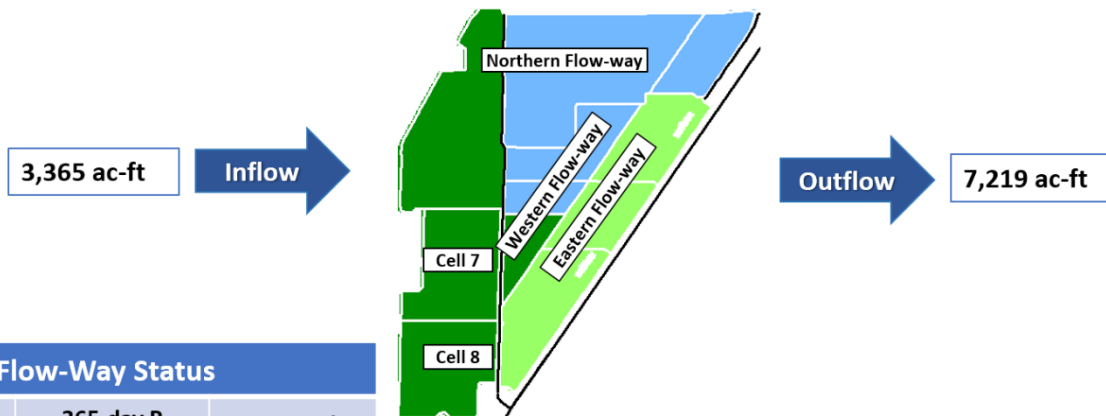
STA-1E Flow-Way Status				As of 11/20/2022				STA-1E Flow & Phosphorus Concentration			
Flow-Way	Vegetation Status <small>Healthy ----- Stressed</small> 	365-day P Loading Rate <small>(below 1.0 g P /m²/yr is optimal)</small> 	Online / Offline / Restrictions	Stage Based: Relative to Target Stage (TS)				Total Inflow, ac-ft	7-day	28-day	365-day
				 Deep Water Level (> 2.8' above TS)	 High Water Level (1.5' – 2.8' above TS)	 0.2' – 1.5' above TS	 Target Stage (TS +/- 0.2')				
Eastern			Vegetation management	 0.2' – 0.5' below TS	 0.5' – 1.0' below TS	 Low Water Level (1.0' – 1.2' below TS)	 Extreme Low Water (> 1.2' below TS)	Total Outflow, ac-ft	624	3,894	104,226
Central			Vegetation rehabilitation					Inflow Conc., ppb	134	142	110
Western	Offline, post-construction grow in starting 3/28/2022							Outflow Conc., ppb	33	35	25
								Includes Preliminary Data			

Figure S-1. STA-1E Weekly Status Report

# STA-1W Weekly Status Report – 11/14/2022 through 11/20/2022



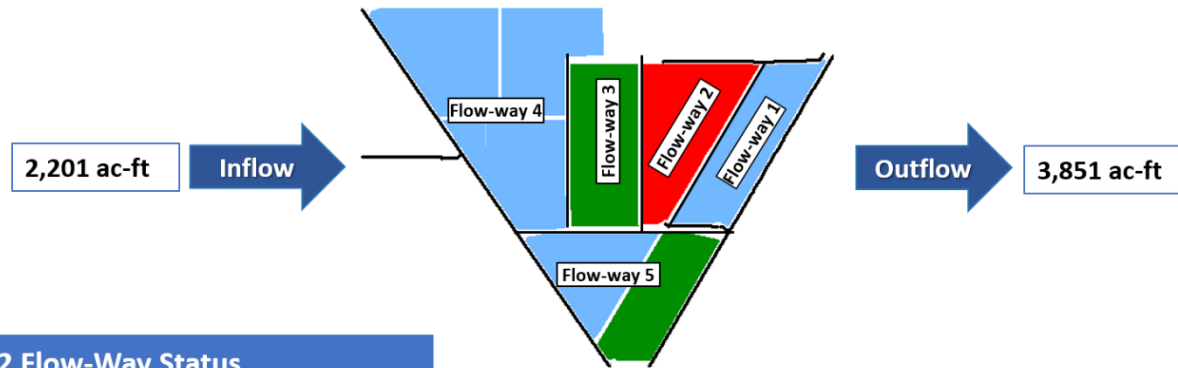
STA-1W Flow-Way Status			
Flow-Way	Vegetation Status Healthy --- Stressed	365-day P Loading Rate (below 1.0 g P /m <sup>2</sup> /yr is optimal)	Online / Offline / Restrictions
Northern			Vegetation management
Western			Vegetation management
Eastern			Vegetation management
Cell 7		N/A	Online
Cell 8		N/A	Construction

As of 11/20/2022	
Stage Based: Relative to Target Stage (TS)	
	Deep Water Level (> 2.8' above TS)
	High Water Level (1.5' – 2.8' above TS)
	0.2' – 1.5' above TS
	Target Stage (TS +/- 0.2')
	0.2' – 0.5' below TS
	0.5' – 1.0' below TS
	Low Water Level (1.0' – 1.2' below TS)
	Extreme Low Water (> 1.2' below TS)

STA-1W Flow & Phosphorus Concentration			
	7-day	28-day	365-day
Total Inflow, ac-ft	3,365	17,396	134,802
--Lake Inflow, ac-ft	0	N/A	2,000
Total Outflow, ac-ft	7,219	17,950	137,236
Inflow Conc., ppb	196	178	200
Outflow Conc., ppb	18	18	20
Includes Preliminary Data			

**Figure S-2.** STA-1W Weekly Status Report

# STA-2 Weekly Status Report – 11/14/2022 through 11/20/2022



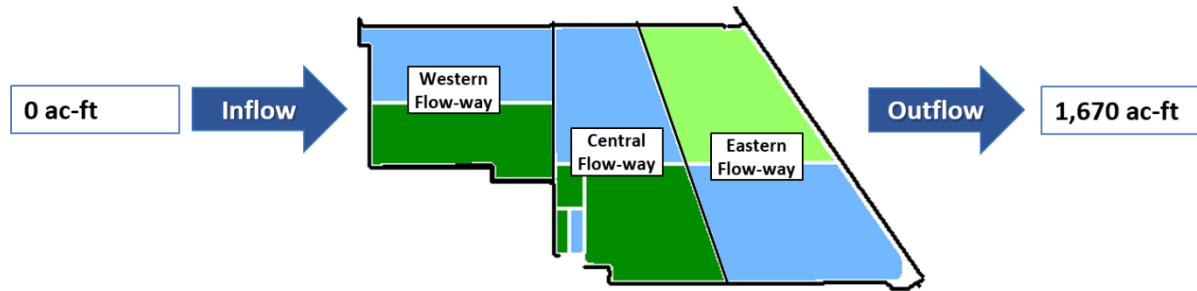
STA-2 Flow-Way Status			
Flow-Way	Vegetation Status Healthy ----- Stressed	365-day P Loading Rate (below 1.0 g P /m <sup>2</sup> /yr is optimal)	Online / Offline / Restrictions
1			Online
2	Offline, construction activities as of 9/7/2021		
3			Vegetation Rehab
4			Vegetation Rehab
5			Online



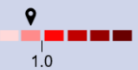

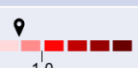
As of 11/20/2022	
Stage Based: Relative to Target Stage (TS)	
	Deep Water Level (> 2.8' above TS)
	High Water Level (1.5' – 2.8' above TS)
	0.2' – 1.5' above TS
	Target Stage (TS +/- 0.2')
	0.2' – 0.5' below TS
	0.5' – 1.0' below TS
	Low Water Level (1.0' – 1.2' below TS)
	Extreme Low Water (> 1.2' below TS)









STA-2 Flow & Phosphorus Concentration			
	7-day	28-day	365-day
Total Inflow, ac-ft	2,201	14,302	311,098
--Lake Inflow, ac-ft	0	N/A	27,700
Total Outflow, ac-ft	3,851	14,259	330,245
Inflow Conc., ppb	60	61	114
Outflow Conc., ppb	22	22	30
Includes Preliminary Data			

**Figure S-3.** STA-2 Weekly Status Report

# STA-3/4 Weekly Status Report – 11/14/2022 through 11/20/2022



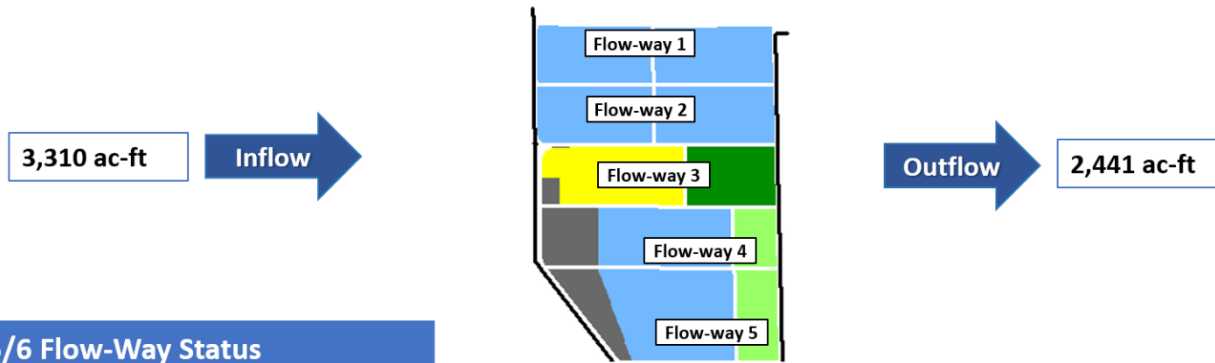
STA-3/4 Flow-Way Status			
Flow-Way	Vegetation Status <small>Healthy ----- Stressed</small> 	365-day P Loading Rate <small>(below 1.0 g P /m²/yr is optimal)</small>	Online / Offline / Restrictions
Eastern	Offline, vegetation management drawdown as of 3/1/2021		
Central			Online
Western			Online











As of 11/20/2022			
Stage Based: Relative to Target Stage (TS)			
	Deep Water Level (> 2.8' above TS)		
	High Water Level (1.5' – 2.8' above TS)		
	0.2' – 1.5' above TS		
	Target Stage (TS +/- 0.2')		
	0.2' – 0.5' below TS		
	0.5' – 1.0' below TS		
	Low Water Level (1.0' – 1.2' below TS)		
	Extreme Low Water (> 1.2' below TS)		









STA-3/4 Flow & Phosphorus Concentration			
	7-day	28-day	365-day
Total Inflow, ac-ft	0	6,822	299,976
--Lake Inflow, ac-ft	0	N/A	5,300
Total Outflow, ac-ft	1,670	12,041	295,790
Inflow Conc., ppb	N/A	86	93
Outflow Conc., ppb	16	17	16
Includes Preliminary Data			

**Figure S-4.** STA-3/4 Weekly Status Report

# STA-5/6 Weekly Status Report – 11/14/2022 through 11/20/2022



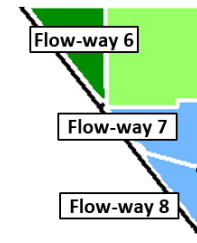
STA-5/6 Flow-Way Status			
Flow-Way	Vegetation Status Healthy ----- Stressed	365-day P Loading Rate (below 1.0 g P /m <sup>2</sup> /yr is optimal)	Online / Offline / Restrictions
1	← → 		Online
2	← → 		Online
3	← → 		Online
4	← → 		Online
5	← → 		Online

As of 11/20/2022	
Stage Based: Relative to Target Stage (TS)	
	Deep Water Level (> 2.8' above TS)
	High Water Level (1.5' – 2.8' above TS)
	0.2' – 1.5' above TS
	Target Stage (TS +/- 0.2')
	0.2' – 0.5' below TS
	0.5' – 1.0' below TS
	Low Water Level (1.0' – 1.2' below TS)
	Extreme Low Water (> 1.2' below TS)

STA-5/6 Flow & Phosphorus Concentration			
	7-day	28-day	365-day
Total Inflow, ac-ft	3,310	18,193	150,172
--Lake Inflow, ac-ft	0	N/A	0
Total Outflow, ac-ft	2,441	13,642	140,352
Inflow Conc., ppb	293	278	272
Outflow Conc., ppb	32	35	40
Includes Preliminary Data			

**Figure S-5.** STA-5/6 Weekly Status Report (Flow-ways 1 – 5)

**STA-5/6 Weekly Status Report – 11/14/2022 through 11/20/2022**



STA-5/6 Flow-Way Status				As of 11/20/2022
Flow-Way	Vegetation Status Healthy ----- Stressed	365-day P Loading Rate (below 1.0 g P / m <sup>2</sup> /yr is optimal)	Online / Offline / Restrictions	Stage Based: Relative to Target Stage (TS)
6			Online	Deep Water Level (> 2.8' above TS)
7			Online	High Water Level (1.5' – 2.8' above TS)
8			Online	0.2' – 1.5' above TS

**Figure S-6.** STA-5/6 Weekly Status Report (Flow-ways 6 – 8)

## 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***

Last week the Everglades Protection Area (EPA) received a small amount of rainfall, the least in the south. WCA-1: Stage at the 1-8C gauge rose slightly last week. The average on Sunday was 0.07 feet below the flat Zone A1 regulation line. WCA-2A: Stage receded at the 2-17 gauge. The average on Sunday was 1.15 feet above the falling regulation line. WCA-3A: Over the last week the Three Gauge Average reduced 0.06 feet. The average stage was at the flat regulation line on Sunday. WCA-3A North: At gauge 62 (Northwest corner) stage again fell at a slower rate than previous weeks, the average on Sunday was 0.49 feet below the falling Upper schedule line. (**Figures EV-1 through EV-4**).

### ***Water Depths***

The SFWDAT tool illustrates current stages in the WCAs were slightly affected by last week's precipitation. Regions with deeper conditions expanded in southern WCA-1 but decreased in WCA-2A and -3A. Along the northern reach of the L-67s the spatial extent of the area with depths over 4.0 feet decreased and the extent of the "ponded" contracted over the last month. In contrast, shallower conditions are expanding in northern WCA-3A and connectivity in the sloughs of ENP is lessening.

Comparing current WDAT water depths to one month ago conditions within the EPA are generally drier, significantly so in WCA-3A North and southern WCA-2A. Looking back a year ago, WCA-1 and WCA-2A are slightly shallower; conditions are slightly deeper in eastern WCA-3A and northern ENP. (**Figure EV-5 and Figure EV-6**). Comparing current conditions to the 20-year average on November 20th: Conditions are slightly above average in WCA-3A, above average in 2A and significantly above average in WCA-1, -3B and northeastern SRS. (**Figure EV-7**).

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

Taylor Slough and Florida Bay received an average of 1.13 inches of total rain this past week based on 18 gauges used in this report. Weekly totals ranged from 0.00 inches in Johnson Key (JK) in the western Bay to 4.16 inches in Manatee Bay (MB) in the eastern nearshore region. Taylor Slough stages decreased at almost all stations, with an average change of -0.09 feet (**Figure EV-8 and Figure EV-9**). Taylor Slough water levels remain above the historical average for this time of year by 3.27 inches compared to before the Florida Bay initiative (starting in 2017), a decrease of 0.40 inches from last week.

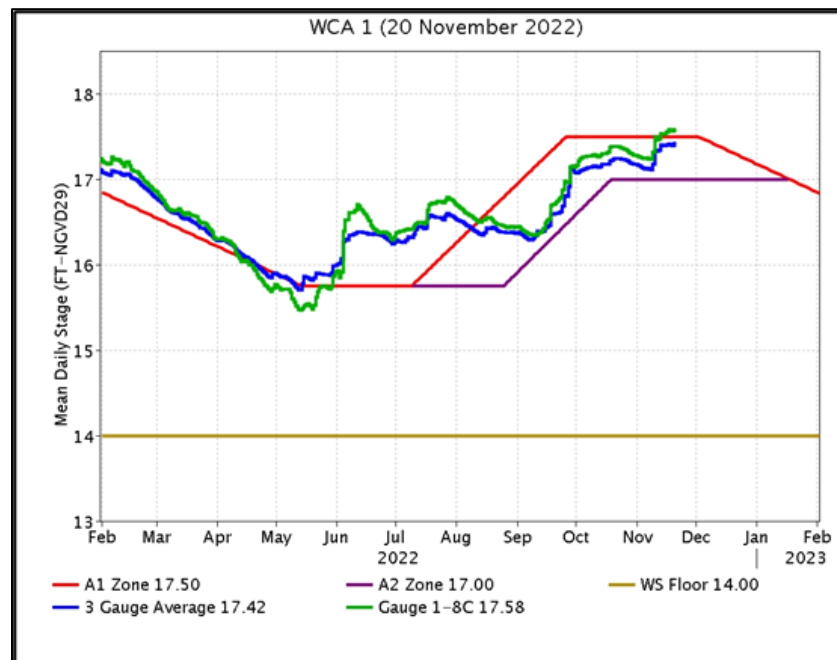
Average Florida Bay salinity is 27.3, a decrease of 3.1 from the previous week. Following localized precipitation and northern winds coinciding with positive creek flow, salinities decreased at most nearshore locations. Salinity changes ranged from a decrease of 12.2 in Joe Bay (JB) in the eastern nearshore to an increase of 1.2 at Buoy Key in the western bay (**Figure EV-8**). Salinities in Eastern, Central, and Western regions are now all within the IQR (**Figure EV-10**). Florida Bay salinity is 3.1 above its historical average for this time of year, a decrease of 2.0 from the previous week.

## Water Management Recommendations

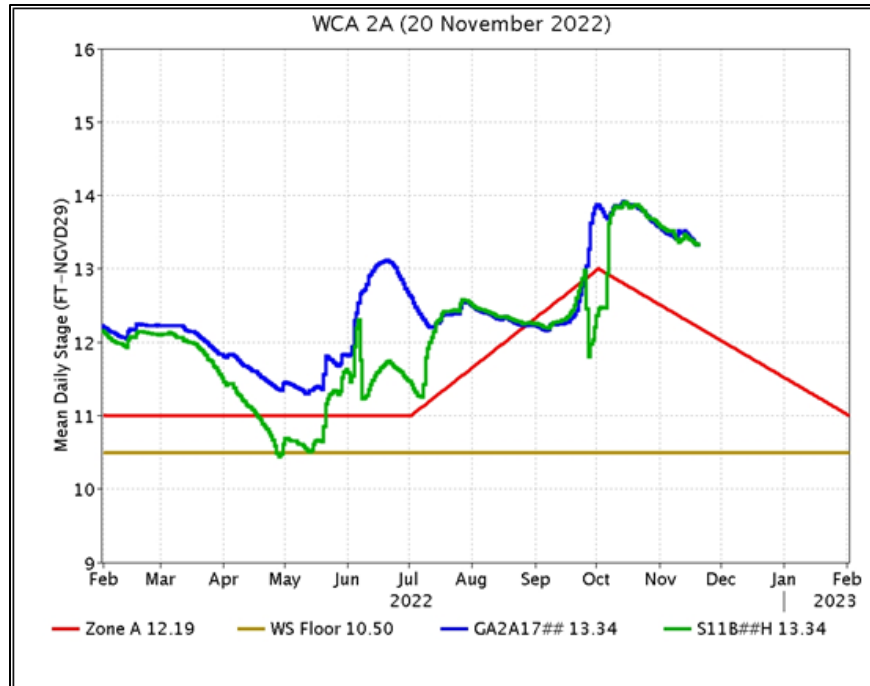
Maintaining a moderate rate of stage change within the marshes of WCAs, avoiding abrupt changes in water depth and conserving water north in the system has an ecological benefit. We recommend continuing discussion and utilizing strategies that could prevent further degradation of NE-WCA3A. Conserving water in this region may prove critical for the upcoming wading bird nesting season. Given current stages in WCA-3A northwest, continuing to maximize the volume of water moving into the northern perimeter of WCA-3A will benefit the ecology of that region as conditions transition to a dry season predicted to be drier than average. When water is available discharge downstream through Taylor Slough. Individual regional recommendations can be found in **Table EV-2**.

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

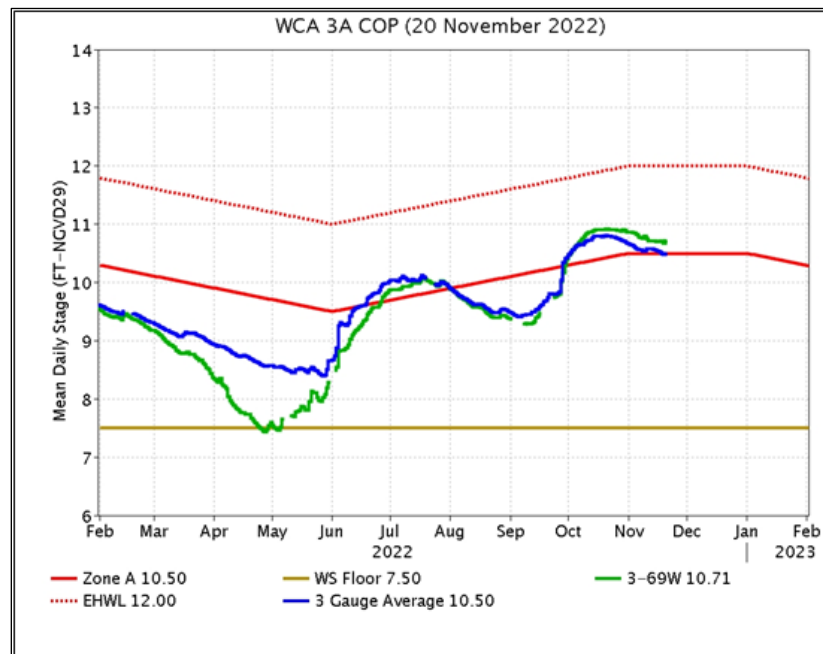
Everglades Region	Rainfall (inches)	Stage change (feet)
WCA-1	0.53	+0.06
WCA-2A	0.99	-0.11
WCA-2B	1.63	+0.01
WCA-3A	0.37	-0.06
WCA-3B	0.99	+0.02
ENP	0.31	+0.00



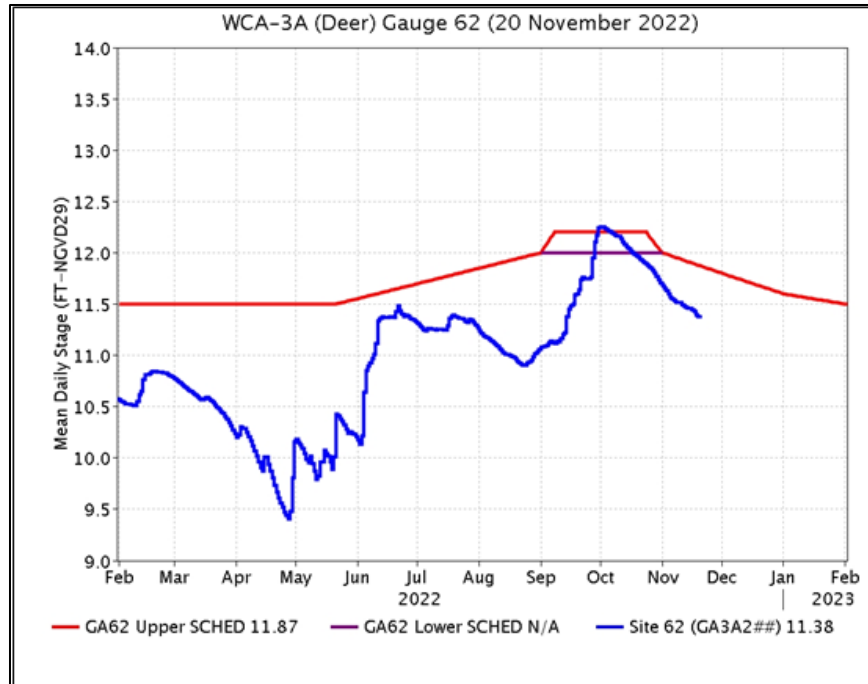
**Figure EV-1.** WCA-1 stage hydrographs and regulation schedule.



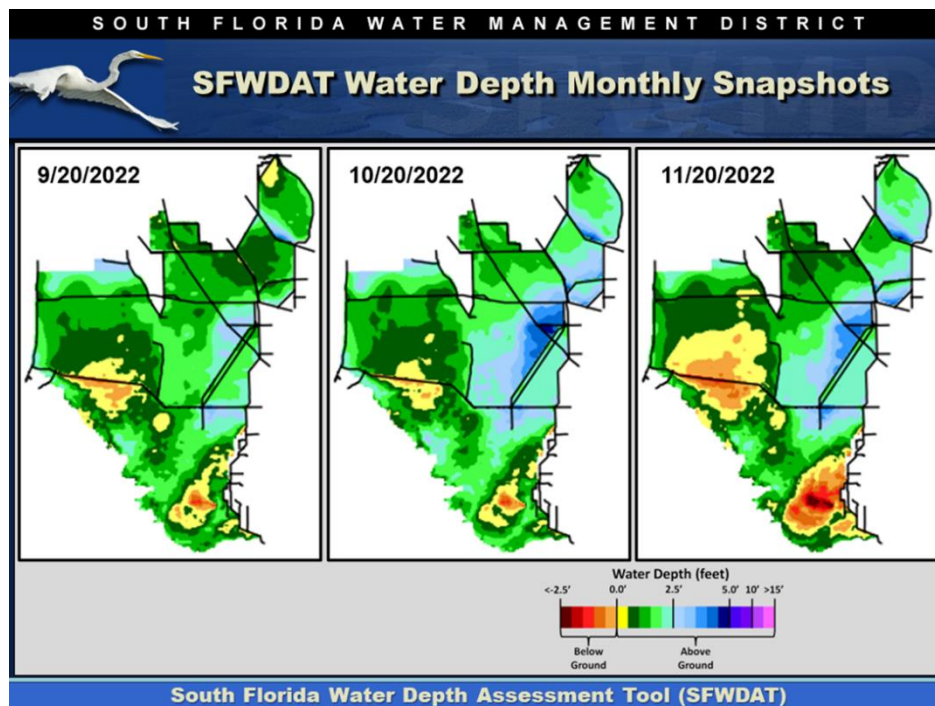
**Figure EV-2.** WCA-2A stage hydrographs and regulation schedule.



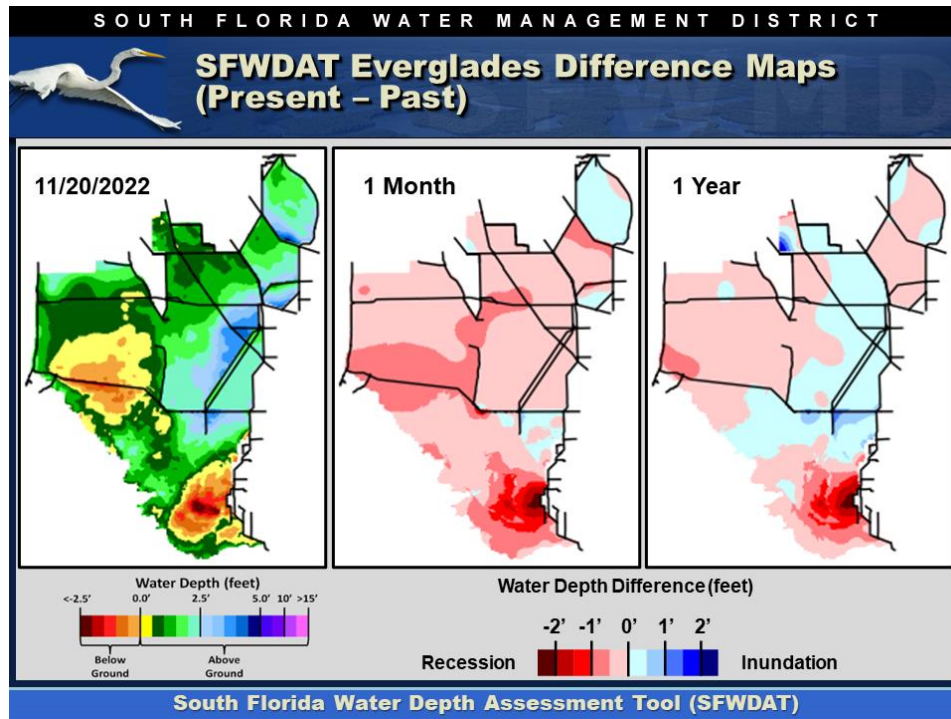
**Figure EV-3.** WCA-3A stage hydrographs (three-gauge average, S-333 headwater) and regulation schedule.



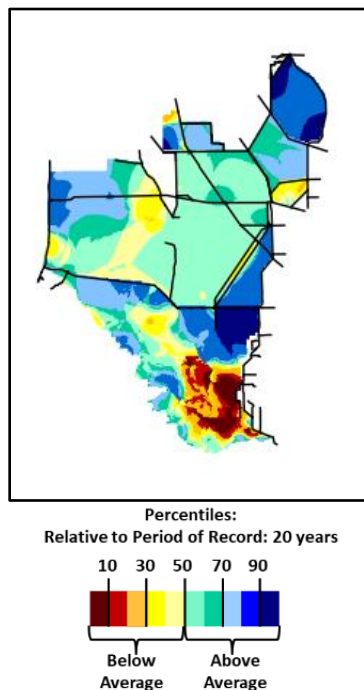
**Figure EV-4.** WCA-3A stage hydrograph (Deer gauge; Site 62) and CA62 regulation schedule.



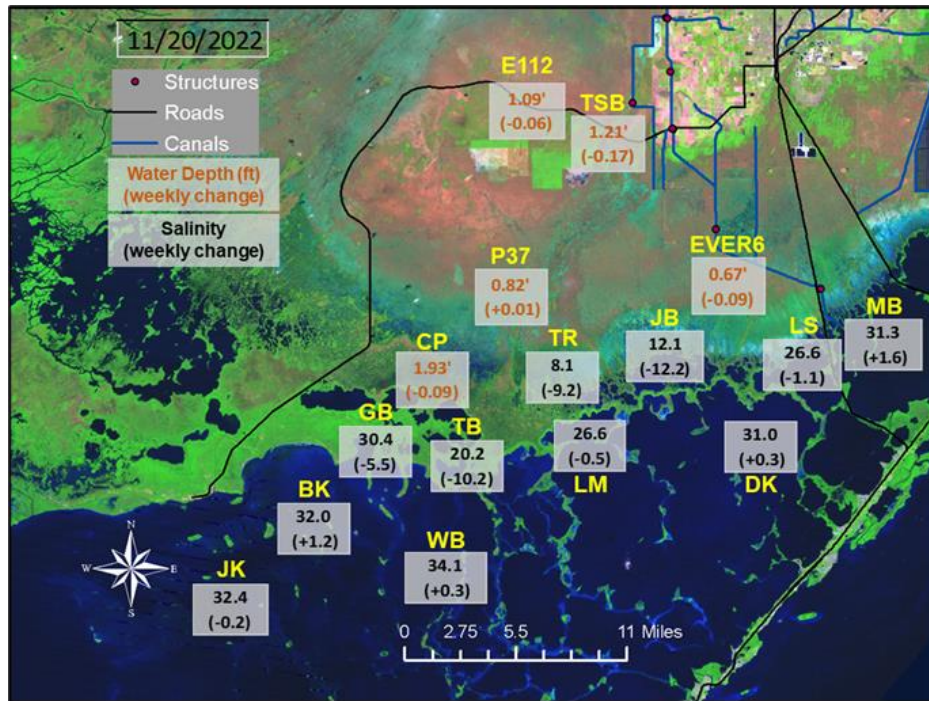
**Figure EV-5.** Everglades water depths from two months ago (left), one month ago (center) and present (right), based on SFWDAT.



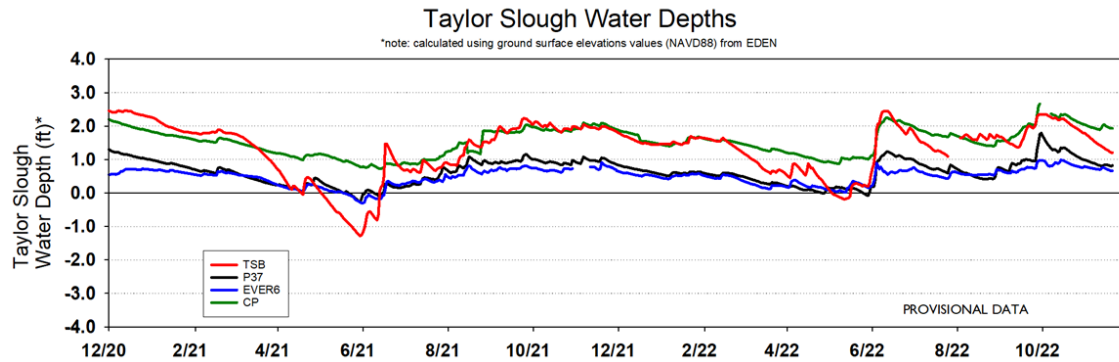
**Figure EV-6.** Present Everglades water depths (left) and water depth changes from one month (center) and one year (right) ago, based on SFWDAT.



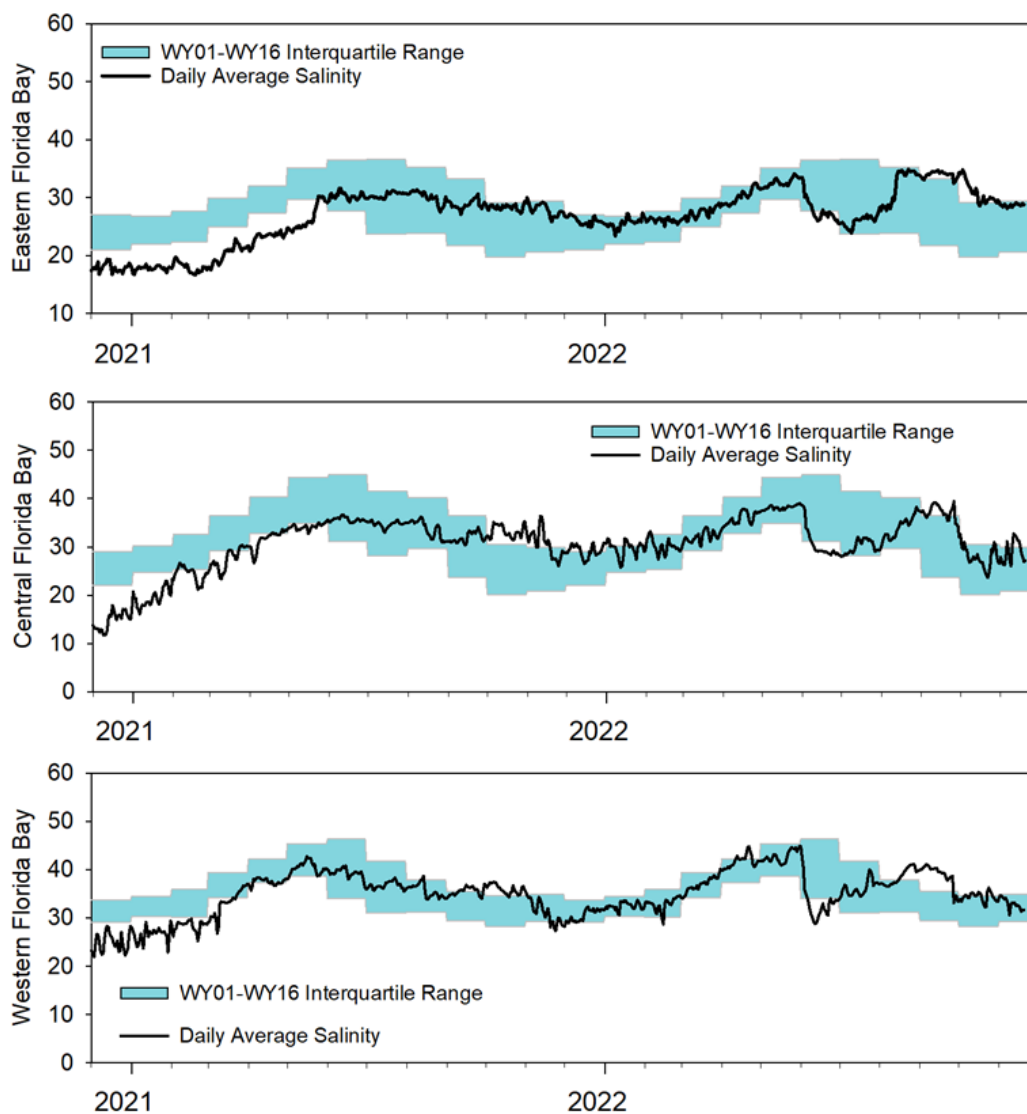
**Figure EV-7.** Present water depths (11/20/2022) compared to the day of year average over the previous 20 years.



**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.



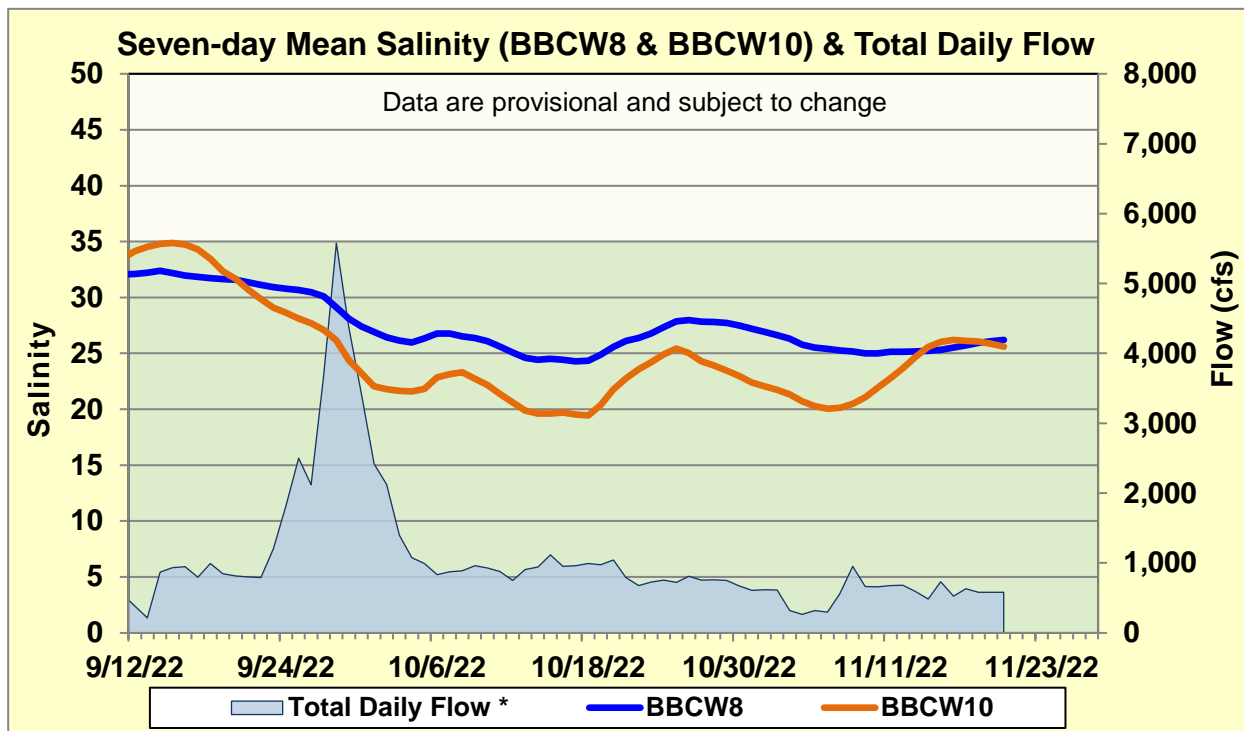
**Figure EV-10.** Eastern (top panel), Central (middle panel) and Western (bottom panel) Florida Bay daily average salinities with interquartile (25-75 percentile) ranges.

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

<b>SFWMD Everglades Ecological Recommendations, November 22nd, 2022 (red is new)</b>			
<b>Area</b>	<b>Weekly change</b>	<b>Recommendation</b>	<b>Reasons</b>
<b>WCA-1</b>	Stage increased by 0.06'	Conserve water in this basin as possible. Recession rate of less than 0.04' per week.	Protect within basin and downstream habitat and wildlife.
<b>WCA-2A</b>	Stage decreased by 0.11'	Conserve water in this basin as possible. Recession rate of less than 0.04' per week.	Protect within basin and downstream habitat and wildlife. Protect conditions conducive to wading bird foraging later in the season.
<b>WCA-2B</b>	Stage increased by 0.01'	Ascension rate of less than 0.25 feet per week.	Protect within basin and downstream habitat and wildlife.
<b>WCA-3A NE</b>	Stage decreased by 0.11'	Conserve water in this basin as possible. Recession rate of less than 0.04' per week	Protect within basin and downstream habitat and wildlife. Protect conditions conducive to wading bird foraging later in the season.
<b>WCA-3A NW</b>	Stage decreased by 0.07'	Conserve water in this basin as possible. Recession rate of less than 0.04' per week	
<b>Central WCA-3A S</b>	Stage decreased by 0.05'	Conserve water in this basin as possible. Recession rate of less than 0.12' per week	Protect within basin and downstream habitat and wildlife.
<b>Southern WCA-3A S</b>	Stage stayed the same.		
<b>WCA-3B</b>	Stage increased by 0.02'	Recession rate of less than 0.12' per week.	Protect within basin and downstream habitat and wildlife. Lower fire risk.
<b>ENP-SRS</b>	Stage stayed the same.	Make discharges to ENP according to COP and TTFF protocol while adaptively considering upstream and downstream ecological conditions. Discussions on water management within the system should be continued.	Protect within basin and upstream habitat and wildlife.
<b>Taylor Slough</b>	Stage changes ranged from -0.017' to +0.01'	Move water southward as possible.	When available, provide freshwater buffer for downstream conditions.
<b>FB- Salinity</b>	Salinity changes ranged from -12.2 to +1.2	Move water southward as possible	When available, provide freshwater to maintain low salinity buffer and promote water movement.

## Biscayne Bay

As shown in **Figure BB-1**, mean total inflow to Biscayne Bay was 590 cfs and the previous 30-day mean inflow was 618 cfs. The seven-day mean salinity was 26.3 at BBCW8 and 25.4 at BBCW10, both within the ideal salinity range for estuarine animals in this region (salinity less than 35). Data was 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.