

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 8, 2021

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

### **Summary**

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

Dry conditions are expected to prevail while southwesterly to westerly winds transport very warm air, resulting in possible record high temperatures Wednesday afternoon. Some light, fast-moving rains may move into the far northern part of the District early Thursday morning before diminishing. Warm and dry weather will persist Thursday and continue through Saturday, although some light shower activity producing light areal average rainfall could occur over the southeastern half of the District on Friday. A cold front may push into north Florida Sunday morning and through the District during the day on Sunday. Scattered, fast-moving rains are anticipated District wide in advance of the frontal boundary Sunday morning and afternoon, along with some east-coast rains possibly developing immediately after the frontal passage. Most of the rains will be light. However, a few embedded areas of heavier rain are possible. By Monday next week, cooler and drier air will filter southward through the Florida peninsula creating very breezy onshore winds along the east coast, peaking Monday through Tuesday. For the week ending next Tuesday morning, total District rainfall is very likely to be much below normal, with the greatest weekly rains possibly over the east through the far north and west. However, the week-2 period (*14-20 December*) looks to be wetter, with above or even much above normal rainfall along and near the east coast due to a possible east-coast rain event, while drier conditions and below normal rainfall prevail north and west of Lake Okeechobee.

#### **Kissimmee**

Flow at S-65A remains at minimum discharge (~300 cubic feet per second [cfs]) and water depth on the Kissimmee River floodplain continues to decline. Mean depth decreased to 0.30 feet as of December 5, 2021. The concentration of dissolved oxygen in the Kissimmee River has remained well above the region of concern, with an average of 7.7 mg/L for the week ending on December 5, 2021.

## **Lake Okeechobee**

Lake Okeechobee stage was 15.87 feet NGVD on December 05, 2021 and it was 0.05 feet lower than a month ago (**Figure LO-1**). Lake stage is currently 0.37 feet above the ecological envelope, having been either above or at the very top of the envelope for all of 2021 (**Figure LO-2**). Average daily inflows (excluding rainfall) decreased from the previous week, going from 1,218 cfs to 991 cfs. Recent satellite imagery (December 03, 2021) showed low to medium bloom potential along the southern and western shorelines (**Figure LO-6**).

## **Estuaries**

Total inflow to the St. Lucie Estuary averaged approximately 578 cfs over the past week with no flow coming from Lake Okeechobee. Mean surface salinities increased at all sites within the estuary over the past week. Salinity at the US1 Bridge was in the good range (10-26) for adult eastern oysters.

Total inflow to the Caloosahatchee Estuary averaged 2,094 cfs over the past week with 1,256 cfs coming from the Lake. Mean surface salinity increased at all sites within the estuary over the past week. Salinities were in the good range (0-10) for tape grass at Val I-75 and Ft. Myers. Salinities were also in the good range (10-30) for adult eastern oysters at Shell Point and Sanibel, and in the fair range at Cape Coral.

## **Stormwater Treatment Areas**

For the week ending Sunday, December 5, 2021, no Lake Okeechobee water was delivered to the FEBs/STAs. The total amount of Lake releases sent to the FEBs/STAs in WY2022 (since May 1, 2021) is approximately 61,100 ac-feet. The total amount of inflows to the STAs in WY2022 is approximately 940,000 ac-feet. Most STA cells are at or near target stage. STA-1E Western Flow-way is offline for the Restoration Strategies project to fill and grade Cells 5 and 7, 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 place in STA-1W Western, Eastern, and Northern Flow-ways for construction activities. Operational restrictions are in effect in STA-1E Central Flow-way 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**

Rates of stage change were generally characterized as too rapid across the Everglades with only WCA-3B being characterized as good given the drier than average conditions. Depths in WCA-2A fell below 2.5' at the 2-17 gauge. Florida Bay salinities averaged no change over the last week and stages decreased in Taylor Slough. Salinities in both the central and eastern regions are above the 75th percentile of long-term values and conditions are not ideal given drier forecasts.

## **Supporting Information**

### **Kissimmee Basin**

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

On December 5, 2021, lake stages were 58.0 feet NGVD (at schedule) in East Lake Toho, 55.0 feet NGVD (at schedule) in Lake Toho, and 50.0 feet NGVD (2.5 feet below schedule) in Lakes Kissimmee-Cypress-Hatchineha (KCH) (**Table KB-1, Figures KB-1-3**).

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

Discharges to the Kissimmee River on December 5, 2021 were 360 cfs at S-65 and 310 cfs at S-65A; discharges from the Kissimmee River were 520 cfs at S-65D and 550 cfs at S-65E (**Table KB-2**). Headwater stages were 46.3 feet NGVD at S-65A and 26.6 feet NGVD at S-65D on December 5, 2021. With lower water temperatures, little rainfall, and reduced discharge at S-65A, the concentration of dissolved oxygen has remained well above the region of concern, with an average of 7.7 mg/L for the week ending on December 5, 2021 (**Table KB-2, Figure KB-4**). Flow at S-65A remains at minimum discharge (~300 cfs) and water depth on the Kissimmee River floodplain continues to decline. Mean depth decreased to 0.30 feet as of December 5, 2021 (**Figure KB-5**).

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

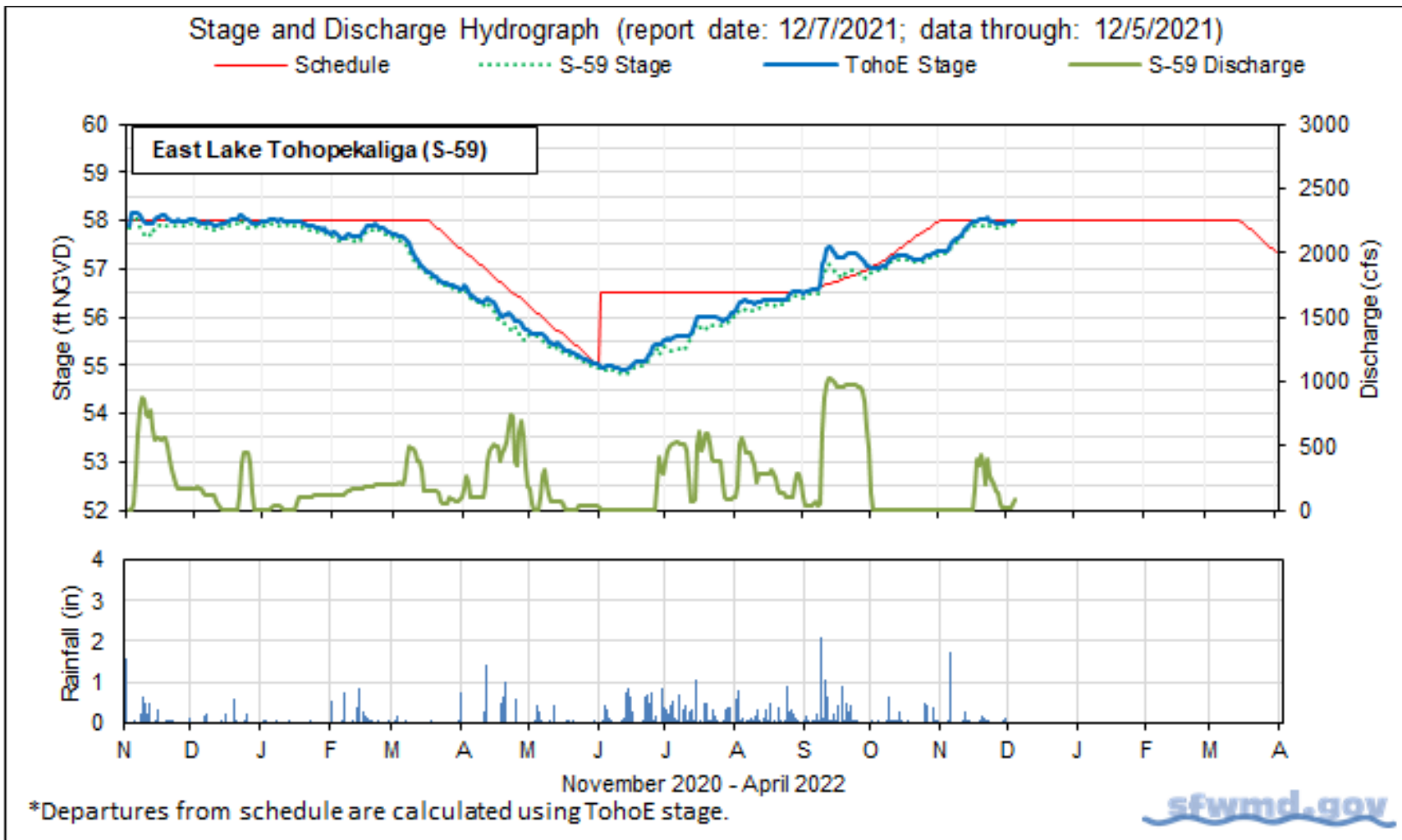
Continue to maintain at least 300 cfs discharge at S-65A per the IS-14-50 discharge plan (Figure KB-6).

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

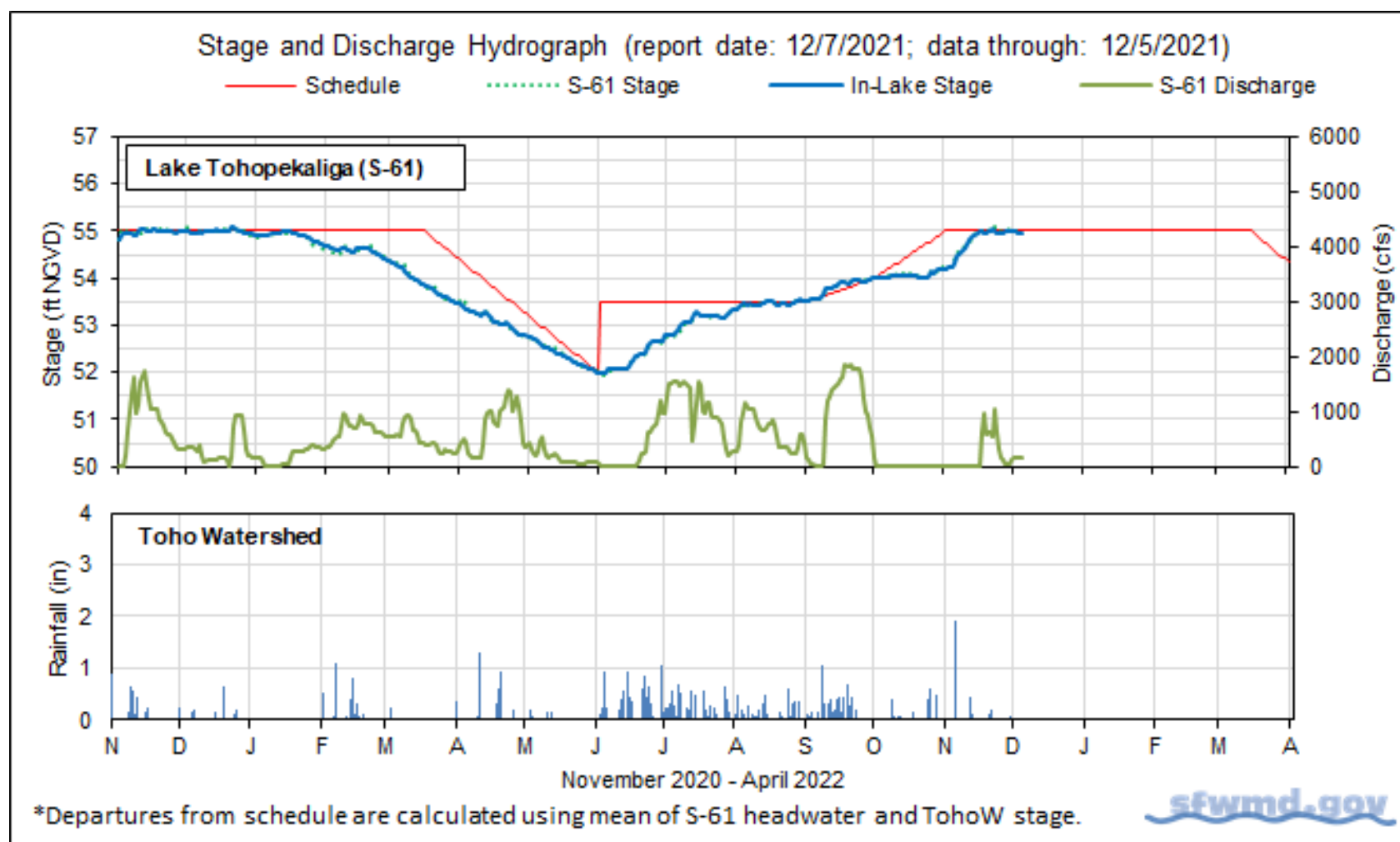
Water Body	Structure	Stage Monitoring Site	7-Day Average Discharge (cfs)	Lake Stage (feet NGVD) <sup>a</sup>	Schedule Type <sup>b</sup>	Schedule Stage (feet NGVD)	Departure from Regulation (feet)	
							12/5/21	11/28/21
Lakes Hart and Mary Jane	S-62	LKMJ	50	61.0	R	61.0	0.0	0.0
Lakes Myrtle, Preston and Joel	S-57	S-57	21	61.9	R	62.0	-0.1	0.0
Alligator Chain	S-60	ALLI	0	64.0	R	64.0	0.0	0.0
Lake Gentry	S-63	LKGT	19	61.5	R	61.5	0.0	0.0
East Lake Toho	S-59	TOHOE	28	58.0	R	58.0	0.0	-0.1
Lake Toho	S-61	TOHOW S-61	124	55.0	R	55.0	0.0	0.0
Lakes Kissimmee, Cypress and Hatchineha	S-65	KUB011 LKIS5B	352	50.0	R	52.5	-2.5	-2.5

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.

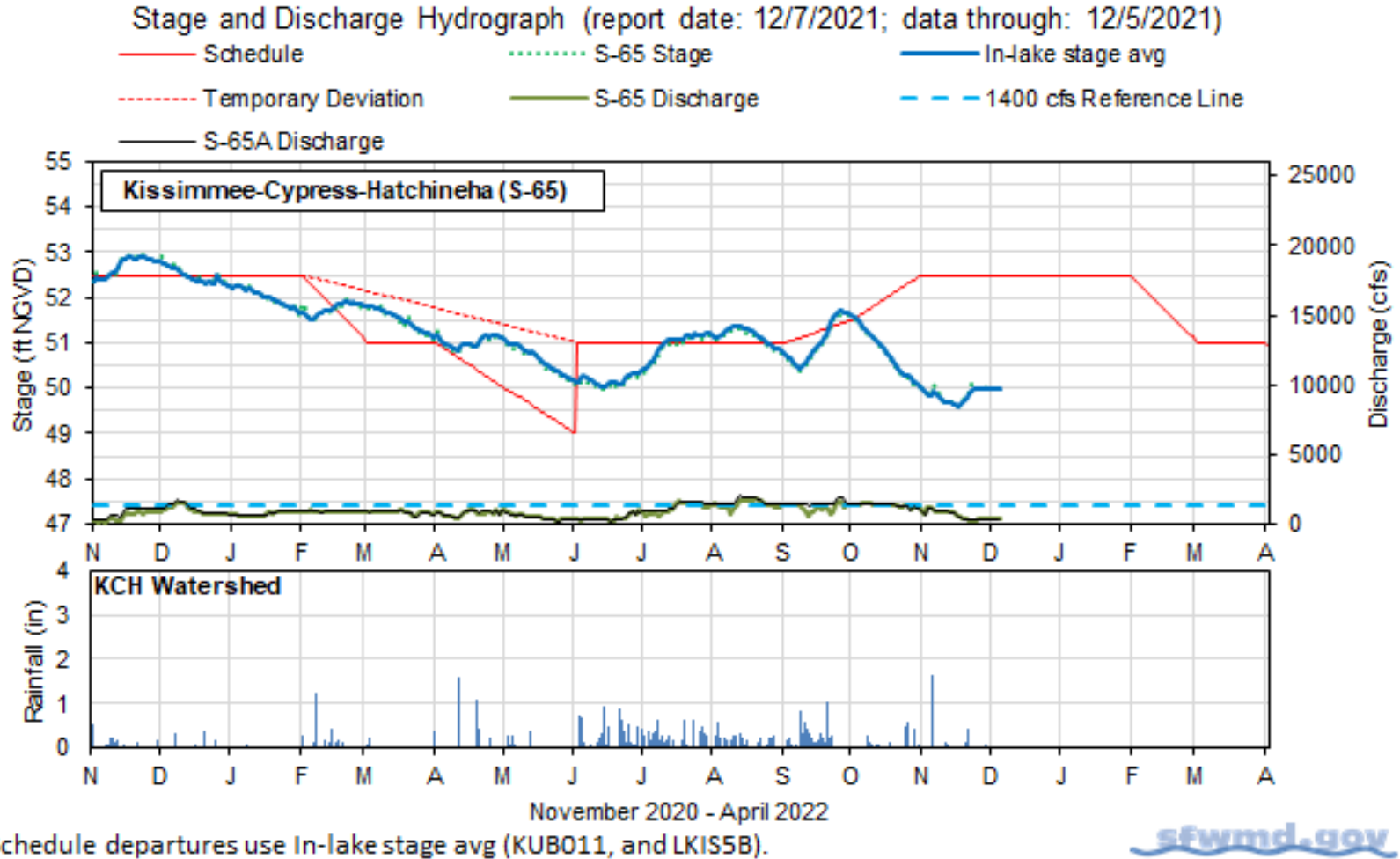
b. A: projected recession line; R: USACE regulation schedule; S: temporary recession target line; T: temporary schedule; NA: not applicable or not available.



**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	Daily Average	Average for Previous Seven Day Periods			
		12/5/21	12/5/21	11/28/21	11/21/21	11/14/21
Discharge	S-65	360	350	280	520	910
Discharge	S-65A <sup>a</sup>	310	310	310	460	900
Headwater Stage (feet NGVD)	S-65A	46.3	46.3	46.4	46.4	46.3
Discharge	S-65D <sup>b</sup>	520	540	630	1,120	1,410
Headwater Stage (feet NGVD)	S-65D <sup>c</sup>	26.6	26.8	27.0	27.0	27.0
Discharge (cfs)	S-65E <sup>d</sup>	550	530	590	1,210	1,470
Discharge (cfs)	S-67	0	0	0	0	0
Dissolved Oxygen (mg/L) <sup>e</sup>	Phase I, II/III river channel	7.7	7.7	7.0	6.0	5.6
Mean depth (feet) <sup>f</sup>	Phase I floodplain	0.30	0.32	0.39	0.55	0.77

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.

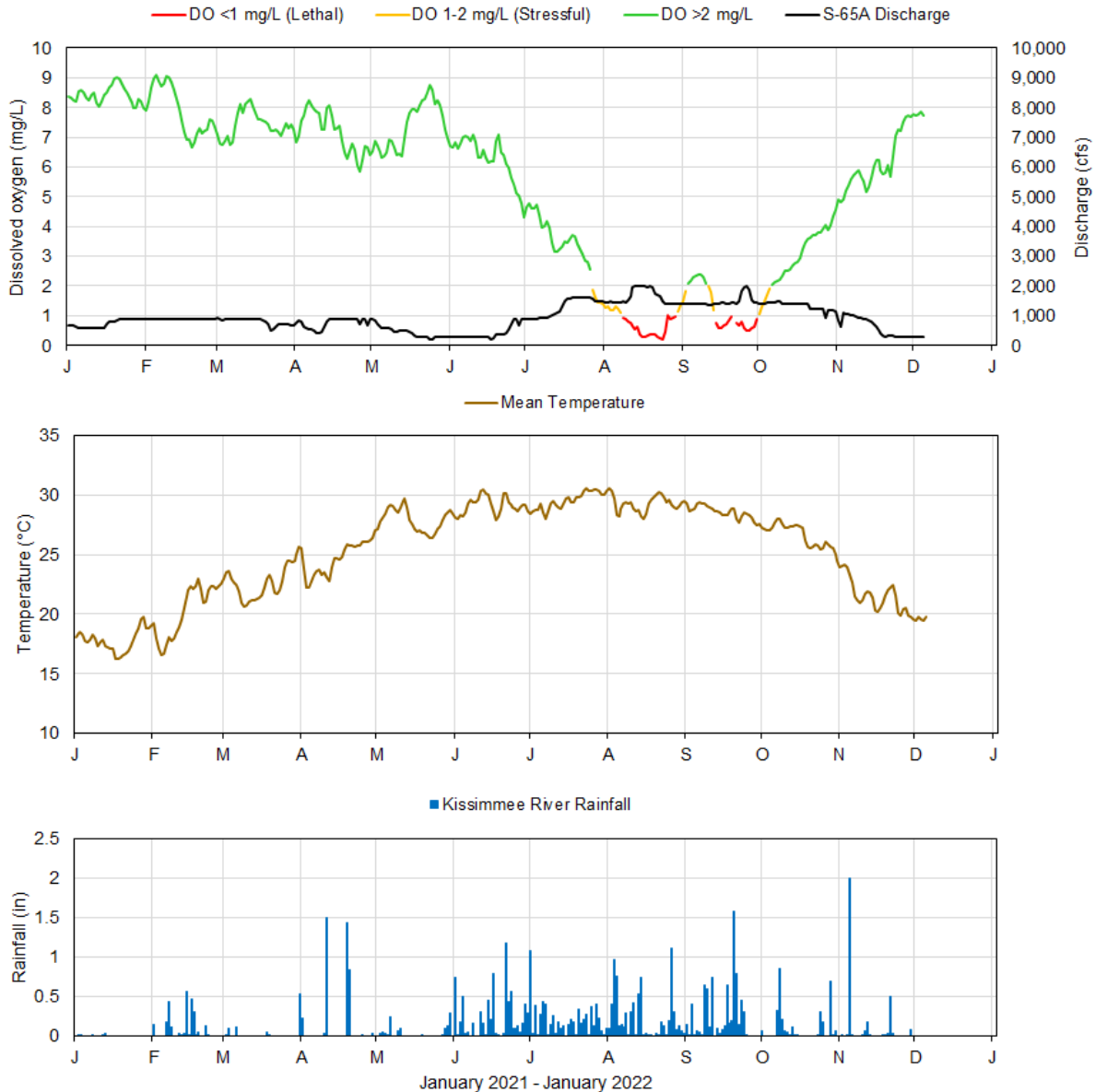
e. Dissolved oxygen is the average of values from sondes KRBN, PC62, PC33, PD62R and PD42R.

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



**Table KB-3.** Discharge rate of change limits for S65/S-65A (revised 1/14/19).

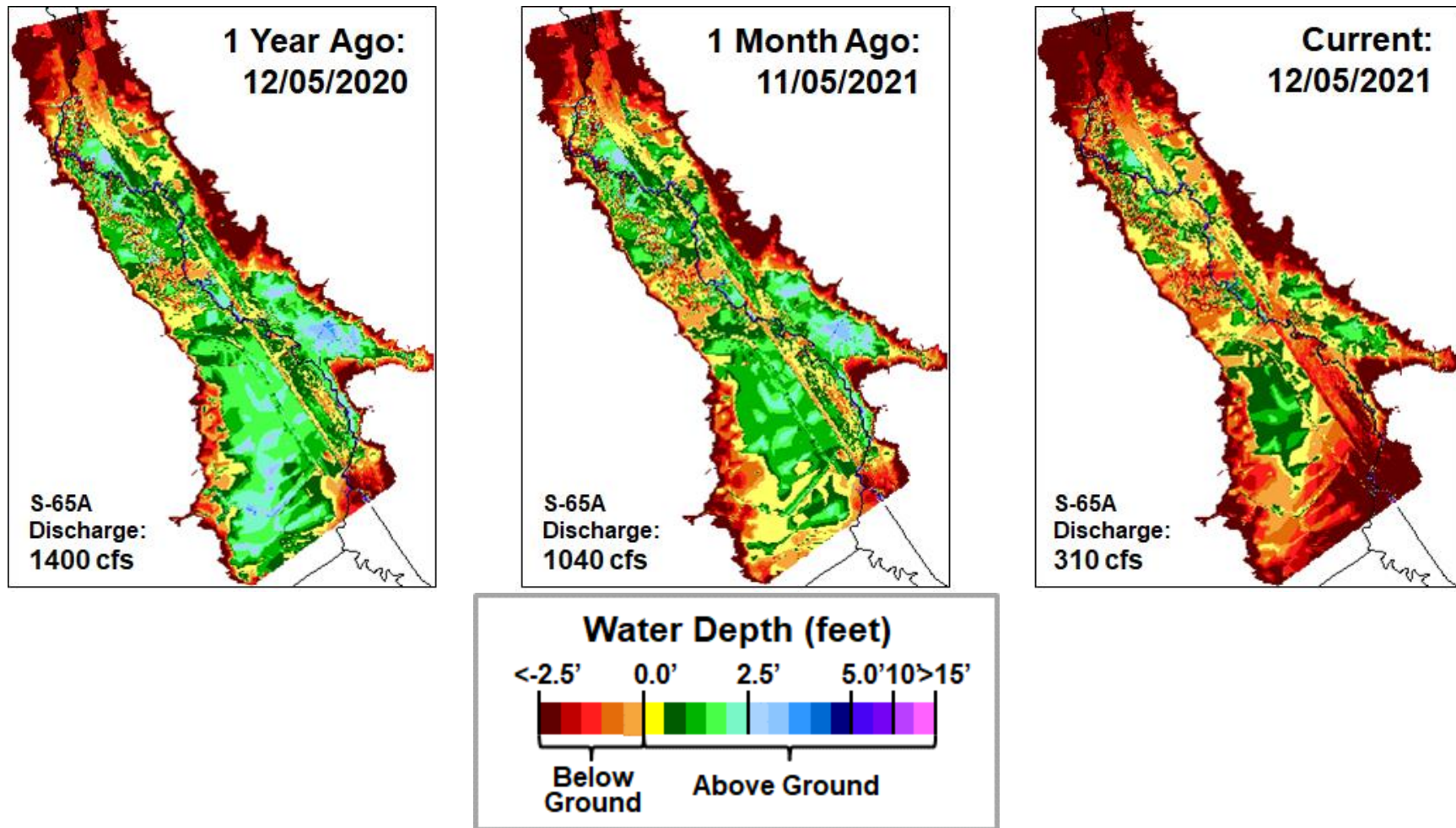
Discharge (cfs)	Maximum Rate of Increase (cfs/day)	Maximum Rate of Decrease (cfs/day)
0-300	100	-50
301-650	150	-75
651-1,400	300	-150
1,401-3,000	600	-600
>3,000	1,000	-2,000



Report Date: 12/7/2021; data are through: 12/5/2021

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

**Figure KB-4.** 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, KRBN, PC33, PD62R, and PD42R with an average of two stations reporting this week. Rainfall values are daily totals for Kissimmee River (Pool BCD) AHED watershed.



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

# 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.

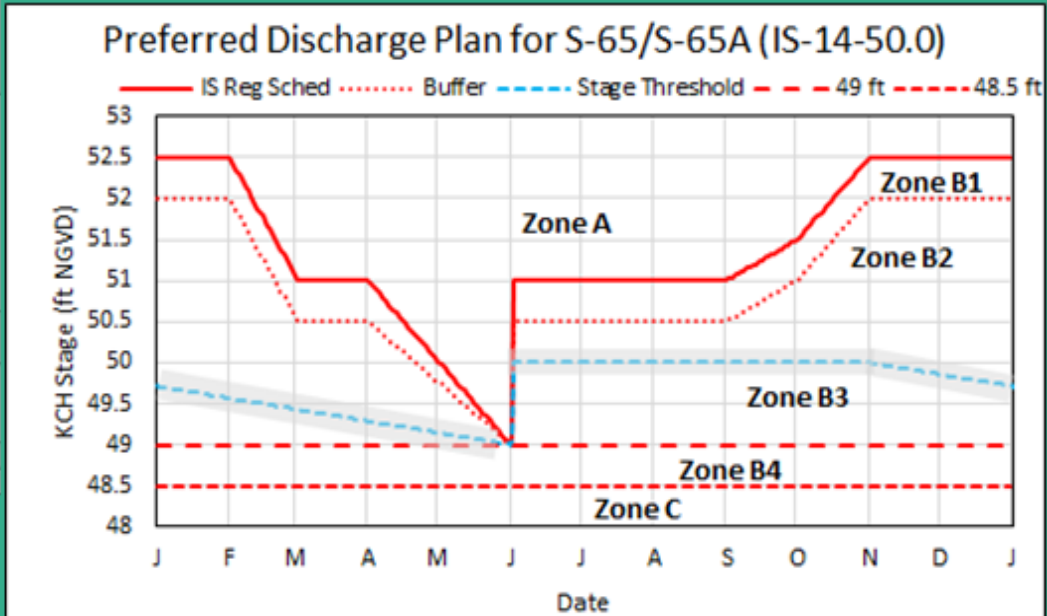
\*Changes in discharge should not exceed limits in inset table below.

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



### 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 6/1/2021

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**Figure KB-6.** IS-14-50 Discharge Plan for S65/S65A with discharge rate of change limits (revised 1/14/19).

## Lake Okeechobee

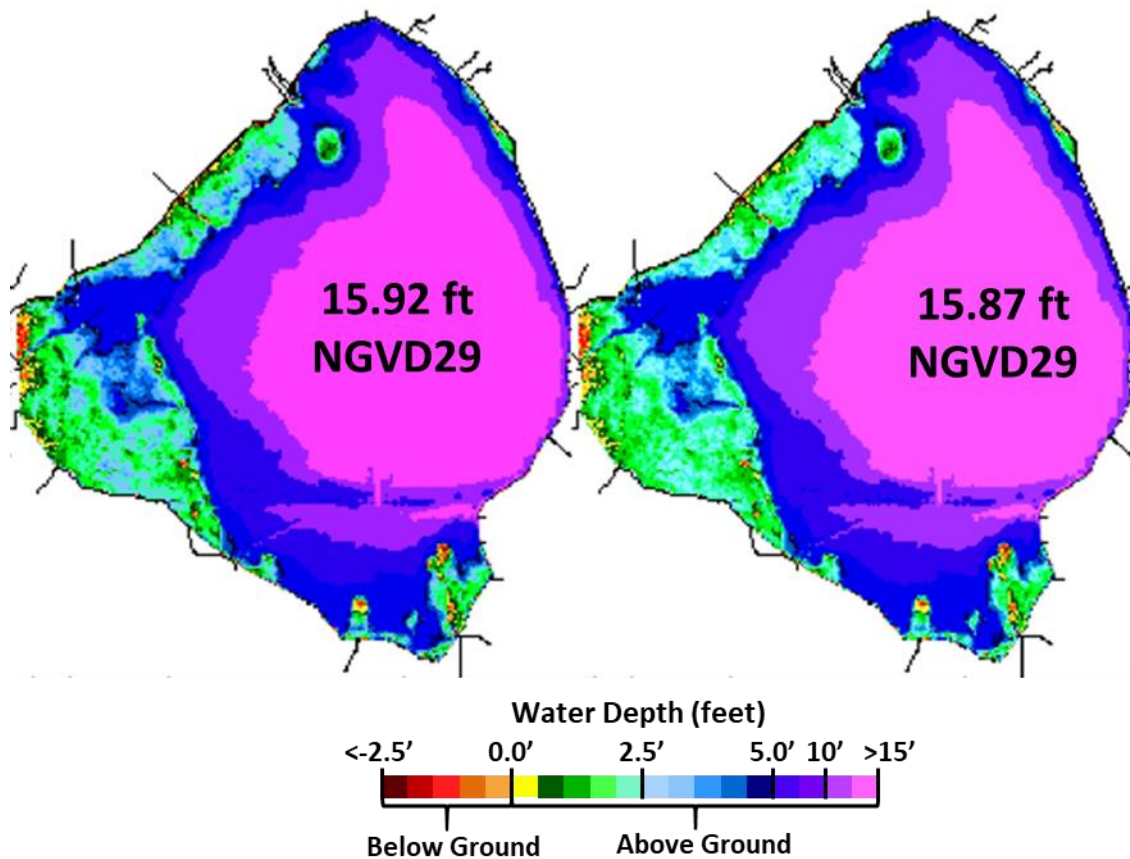
Lake Okeechobee stage was 15.87 feet NGVD on December 05, 2021, with water levels 0.05 feet lower than a month ago (**Figure LO-1**). Lake stage was approximately 0.37 feet above the ecological envelope, having been either above or at the very top of the envelope for all of 2021 (**Figure LO-2**). Lake stage remained in the Low sub-band and was 0.38 feet below the Intermediate sub-band (**Figure LO-3**). For the second consecutive week, very little rain fell directly on the Lake, less than 0.1 inches fell last week according to NEXRAD.

Average daily inflows (excluding rainfall) decreased again from the previous week, going from 1,218 cfs to 991 cfs. Average daily outflows (excluding evapotranspiration) increased from the previous week, going from 1,170 cfs to 2,213 cfs. More than half of the inflows (530 cfs) came from the Kissimmee River through the S-65E structure. The second highest inflow (227 cfs) was via the C41A canal through the S-84/84X structures. There was additional inflow through the S-271 structure via backflow from the L-8 canal, at the average daily rate of 77 cfs. There was an outflow of 1,444 cfs to the west via S-77, and 768 cfs south via the S-350 structures, but zero outflow to the east via S-308. **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.

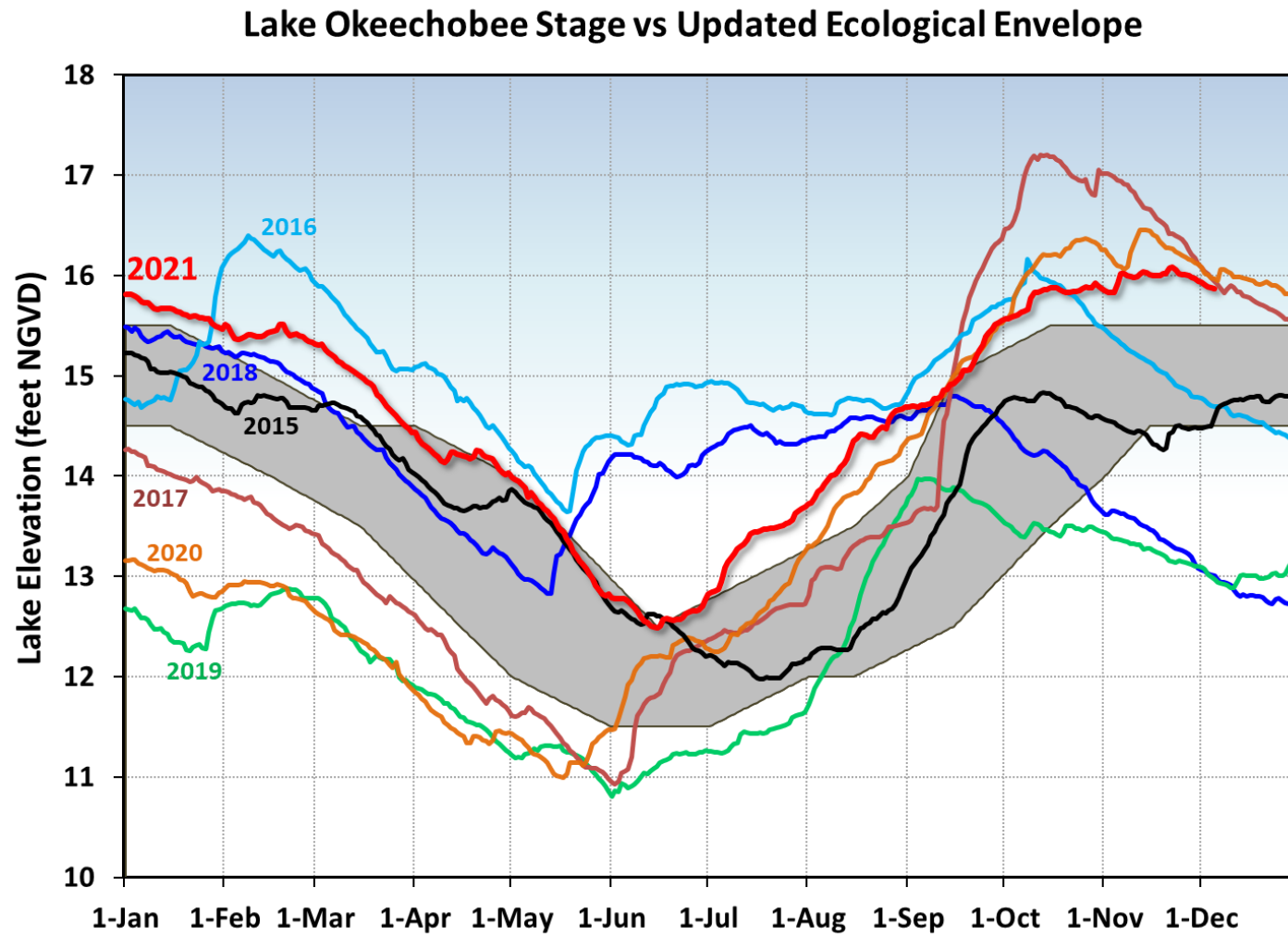
The most recent satellite image (December 03, 2021) from the NOAA cyanobacteria monitoring product derived from EUMETSAT's Sentinel 3 OLCI sensor showed low to medium bloom potential along the southern and western shorelines (**Figure LO-6**).

**1 Month Ago:**  
**11/05/2021**

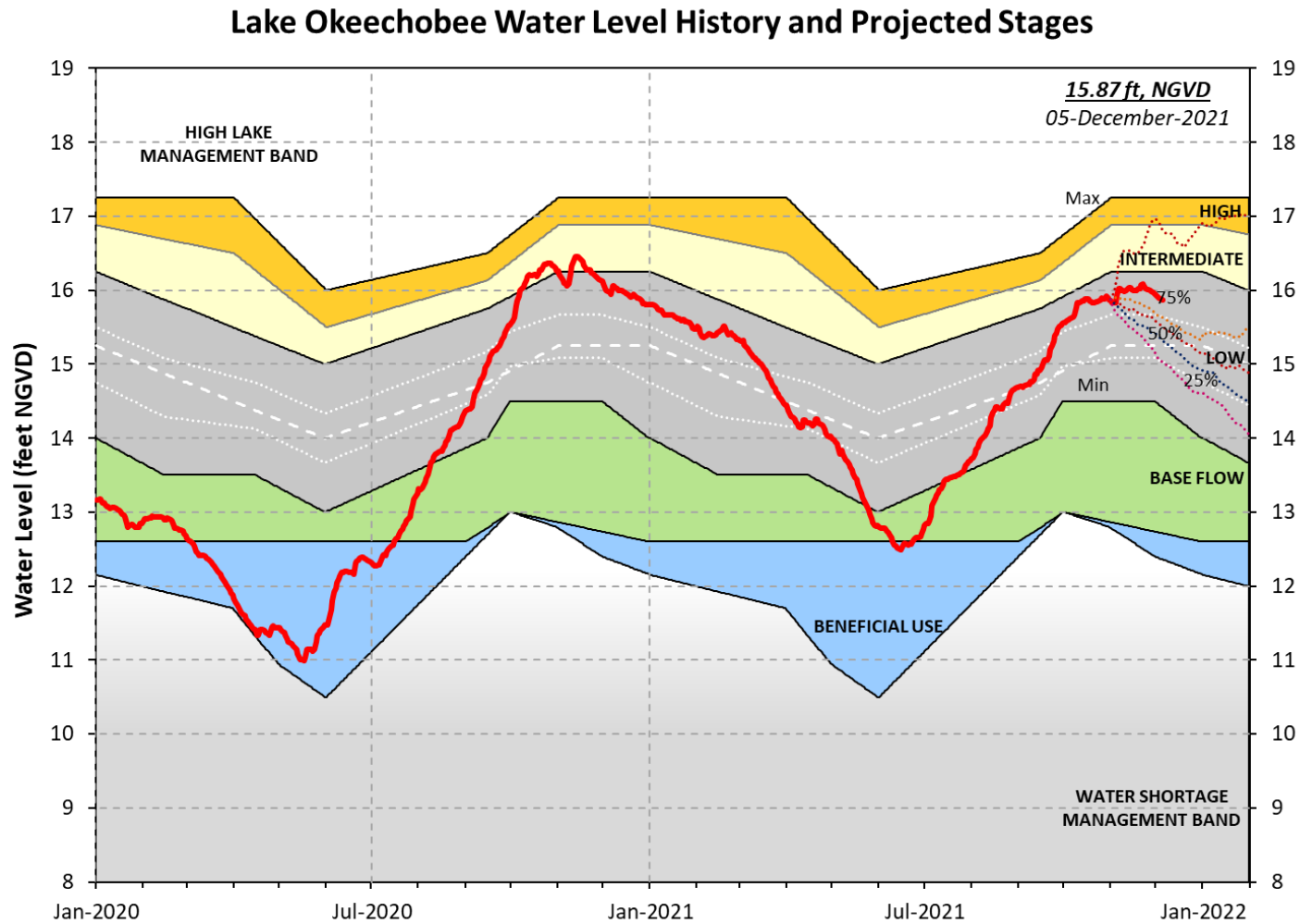
**Current:**  
**12/05/2021**



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



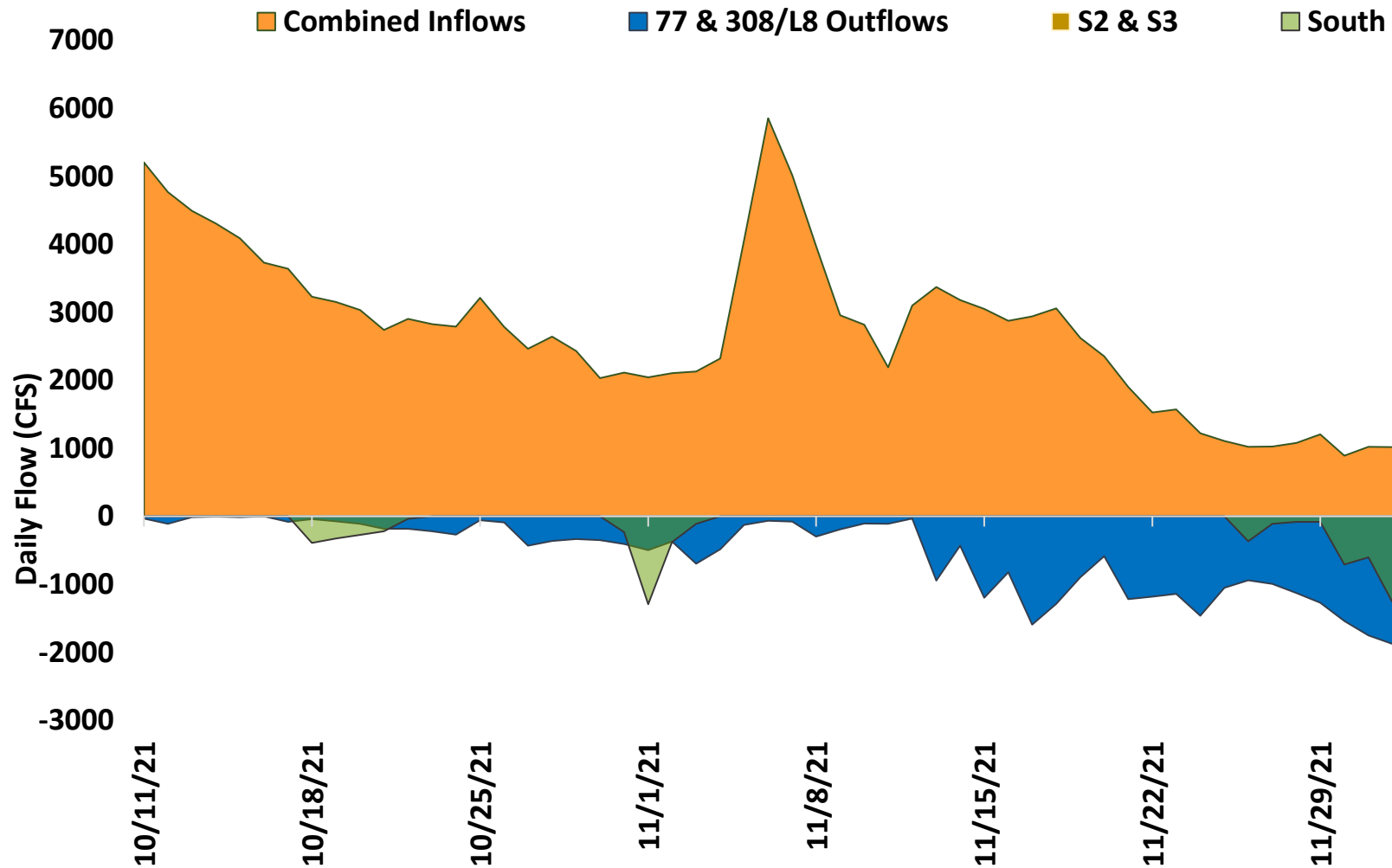
**Figure LO-2.** The prior seven years of annual stage hydrographs for Lake Okeechobee in comparison to the updated ecological envelope.



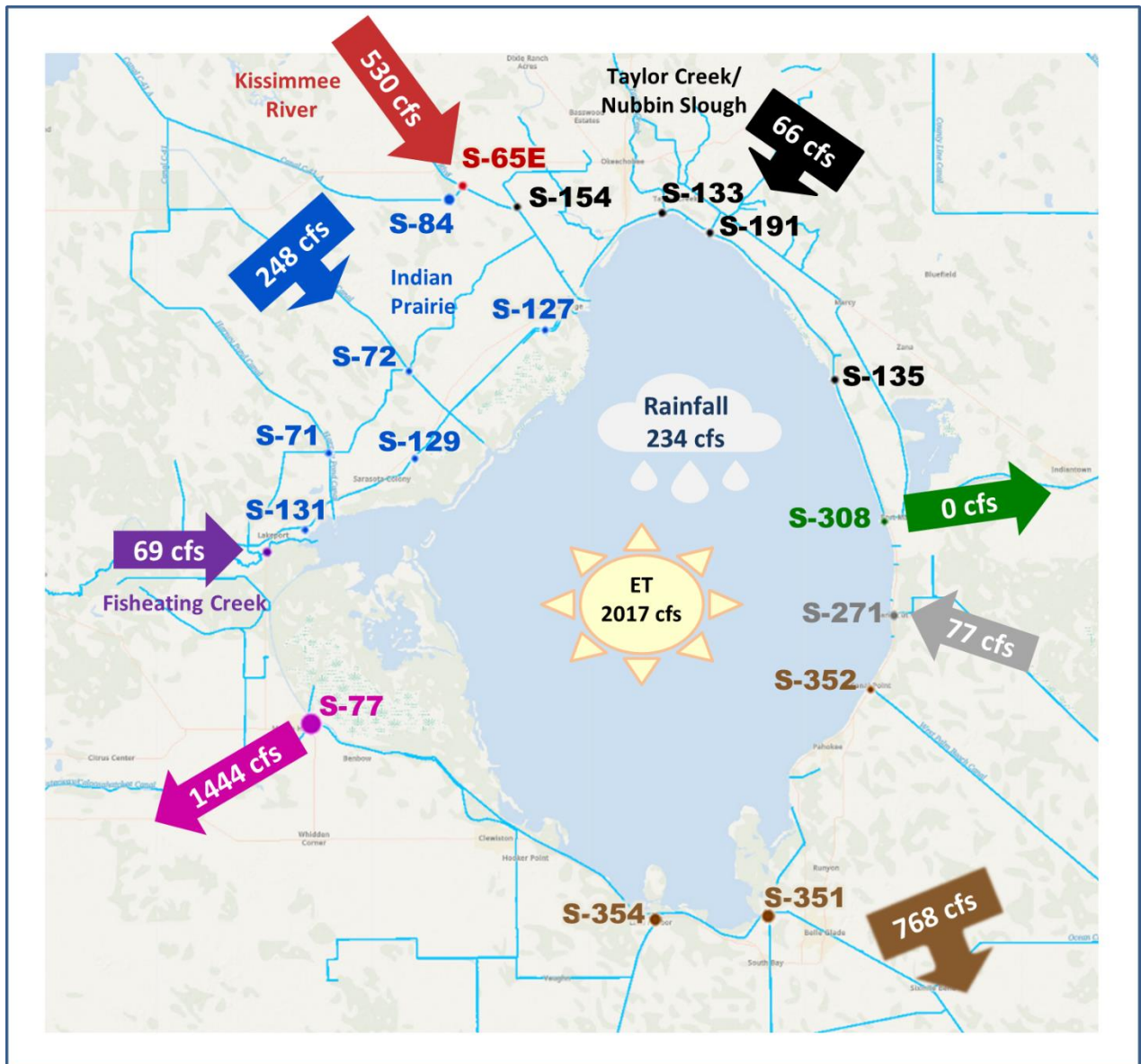
LORS-2008 - Adopted by USACE 28-April-2008

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

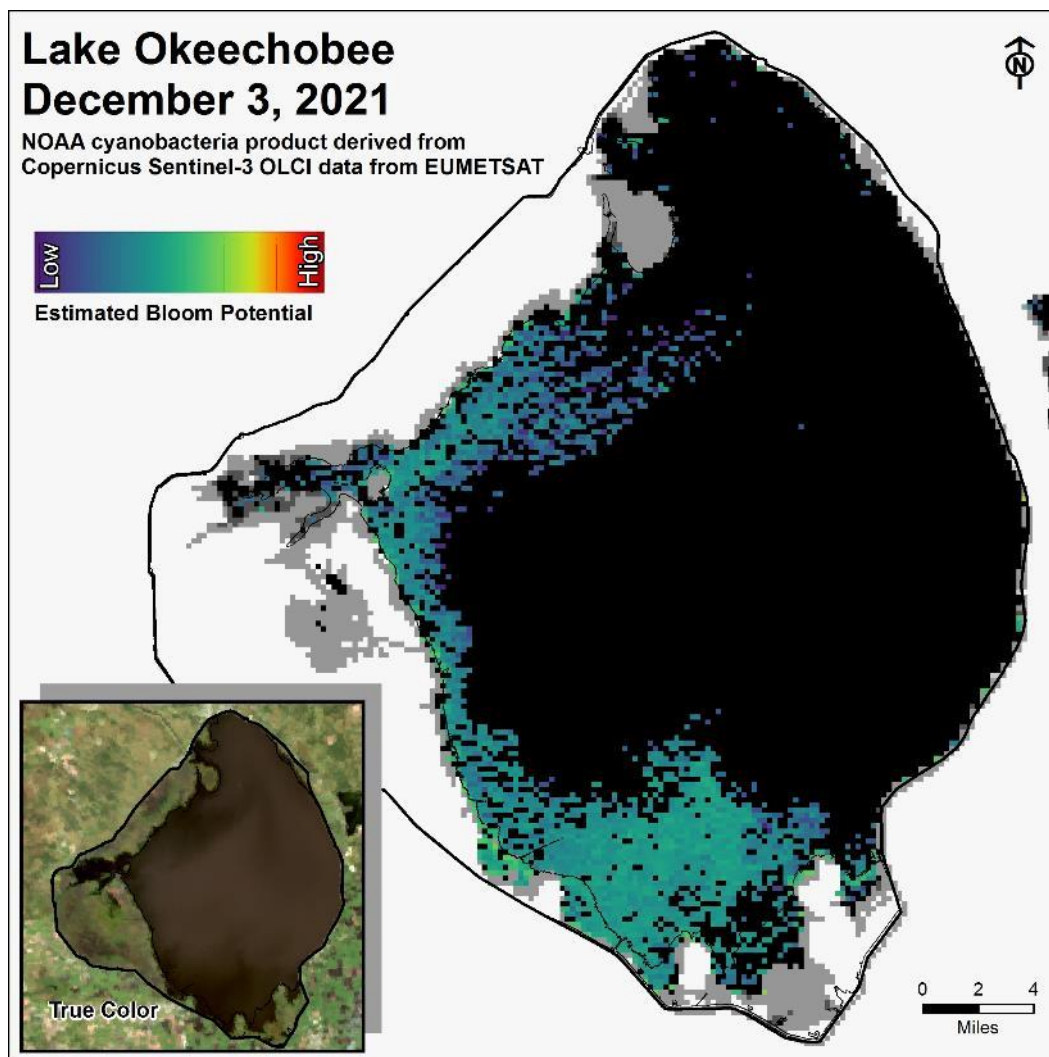




**Figure LO-4.** Major inflows (orange) to and outflows east and west (blue) from Lake Okeechobee. Outflows south are shown in green. Flows into Lake Okeechobee from the L-8 canal through S-271 (formerly Culvert 10A) or from the C-44 canal through the S-308 are included as inflows. Conversely, flows 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 from 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 29 – December 05, 2021.



**Figure LO-6.** Cyanobacteria bloom potential on December 03, 2021 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 approximately 578 cfs (**Figures ES-1 and ES-2**) and the previous 30-day mean inflow was approximately 1,121 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 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 13.9. Salinity conditions in the middle estuary were estimated to be within the good range for adult eastern oysters (**Figure ES-4**).

### *Caloosahatchee River Estuary*

Over the past week, mean total inflow to the Caloosahatchee River Estuary was approximately 2,094 cfs (**Figures ES-5 and ES-6**) and the previous 30-day mean inflow was approximately 2,685 cfs. For comparison, the historical provisional mean inflows from the contributing areas are shown in **Figure ES-6**.

Over the past week, surface salinities increased at all sites in the estuary (**Table ES-2 and Figures ES-7 and ES-8**). The seven-day mean surface salinities (**Table ES-2**) were in the good range (0-10) for tape grass at Val I-75 and at Ft. Myers. The seven-day mean surface salinity values were within the good range for adult eastern oysters at Shell Point and Sanibel, and in the fair range at Cape Coral (**Figure ES-9**).

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 steady releases at 2,000 cfs with estimated tidal basin inflows of 157 cfs. Model results from all scenarios predict daily salinity to be 1.5 or lower and the 30-day moving average surface salinity to be 0.5 or lower at Val I-75 at the end of the two-week period (**Table ES-3 and Figure ES-10**). This keeps predicted salinities at Val I-75 within the LORS 2008 salinity range (0.0-5.0).

### *Red Tide*

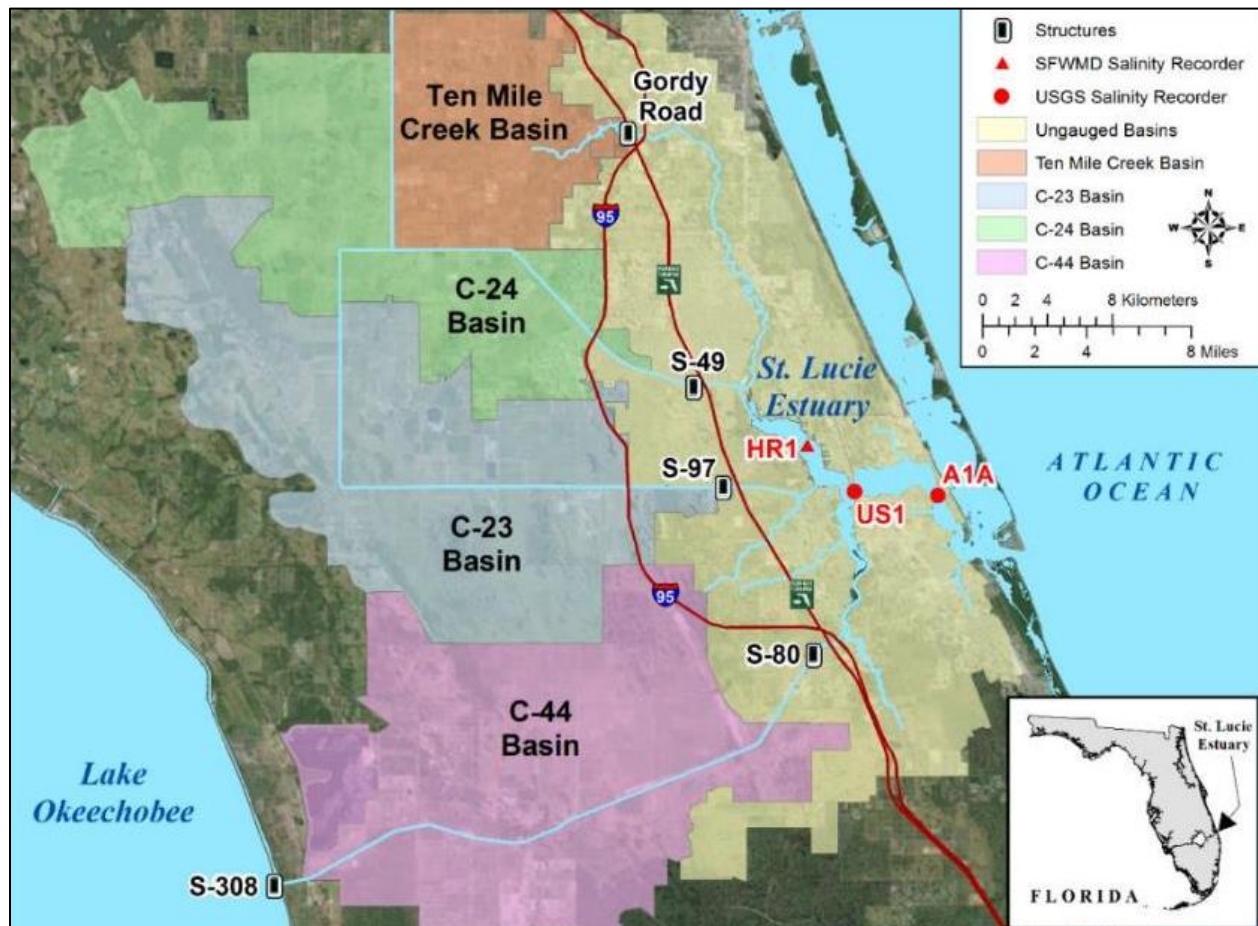
The Florida Fish and Wildlife Research Institute reported on December 3, 2021, that *Karenia brevis*, the Florida red tide dinoflagellate, was not observed at any concentrations in any District counties. On the east coast, red tide was not observed in samples from Palm Beach and Broward counties.

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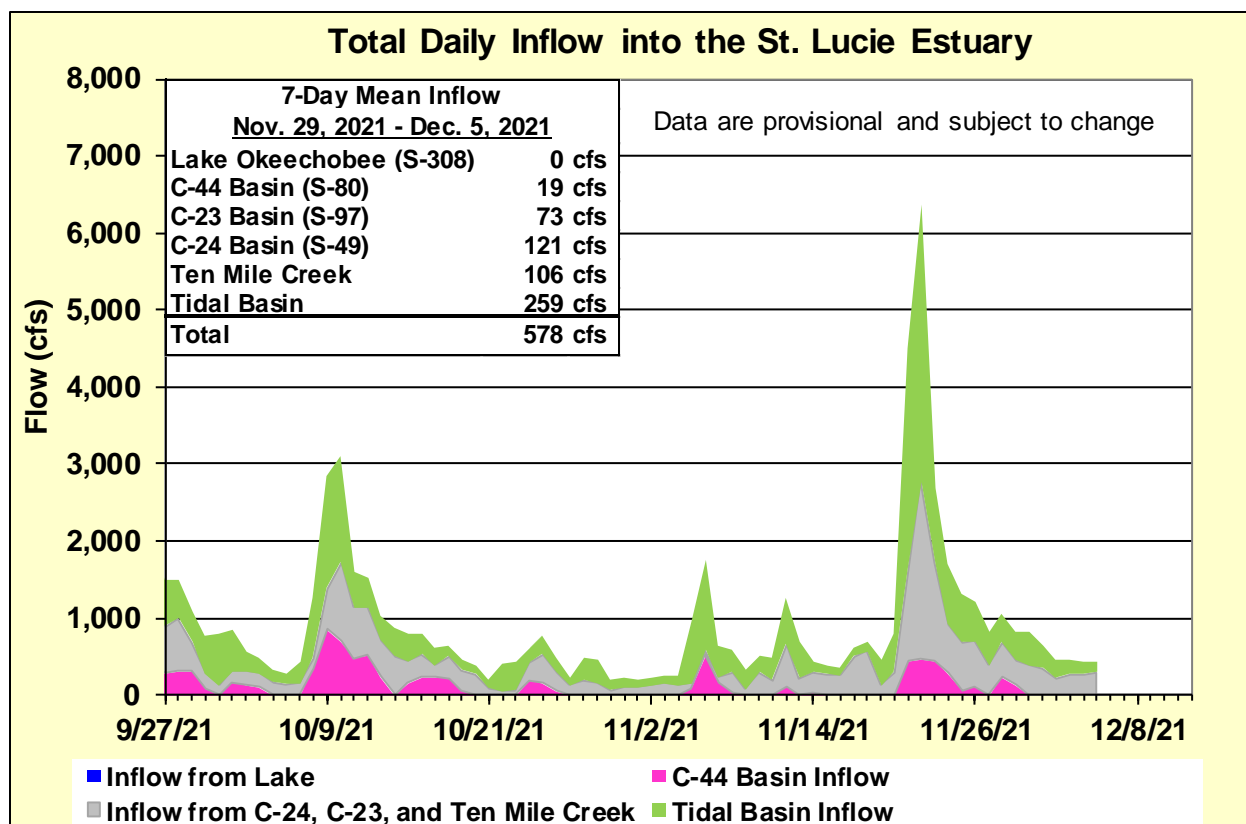
<sup>1</sup> Qiu, C., and Y. Wan. 2013. Time series modeling and prediction of salinity in the Caloosahatchee River Estuary. *Water Resources Research* 49:5804-5816.

### **Water Management Recommendations**

Lake stage is in the Low Sub-Band. Tributary conditions are near normal. The LORS2008 release guidance suggests up to 450 cfs release at S-79 to the Caloosahatchee River Estuary and up to 200 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.



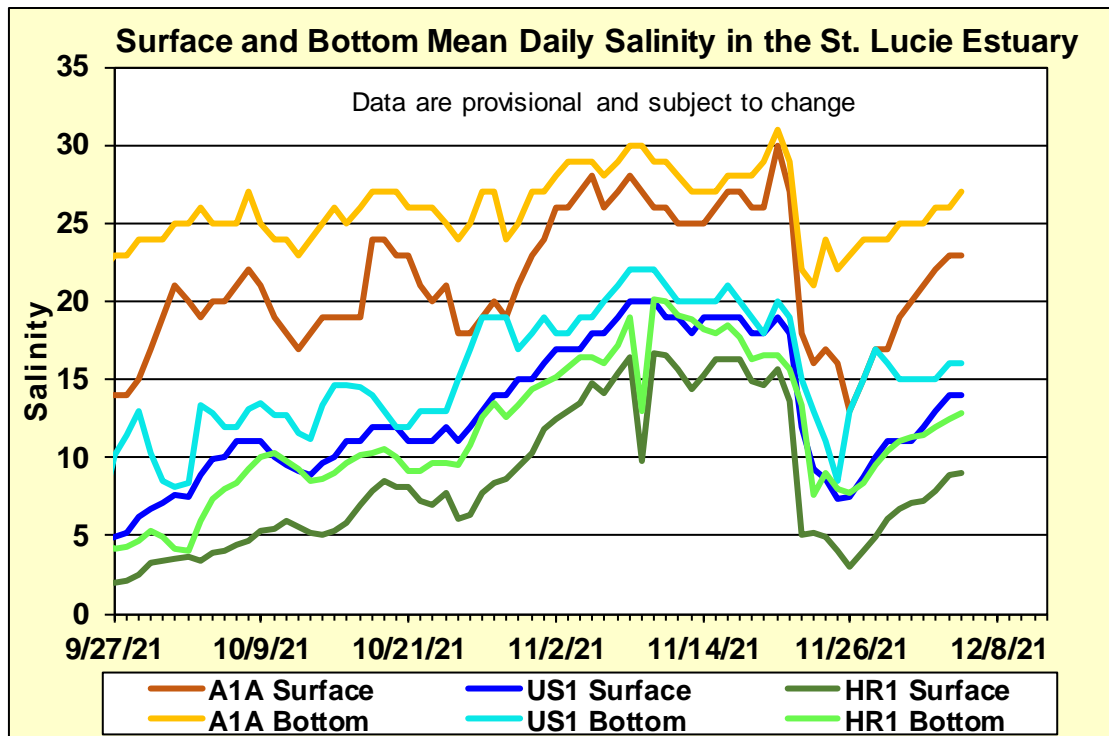
**Figure ES-2.** Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and Tidal Basins into the St. Lucie Estuary.

**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 preferred salinity range for adult eastern oysters (*Crassostrea virginica*) in the middle estuary. Data are provisional.

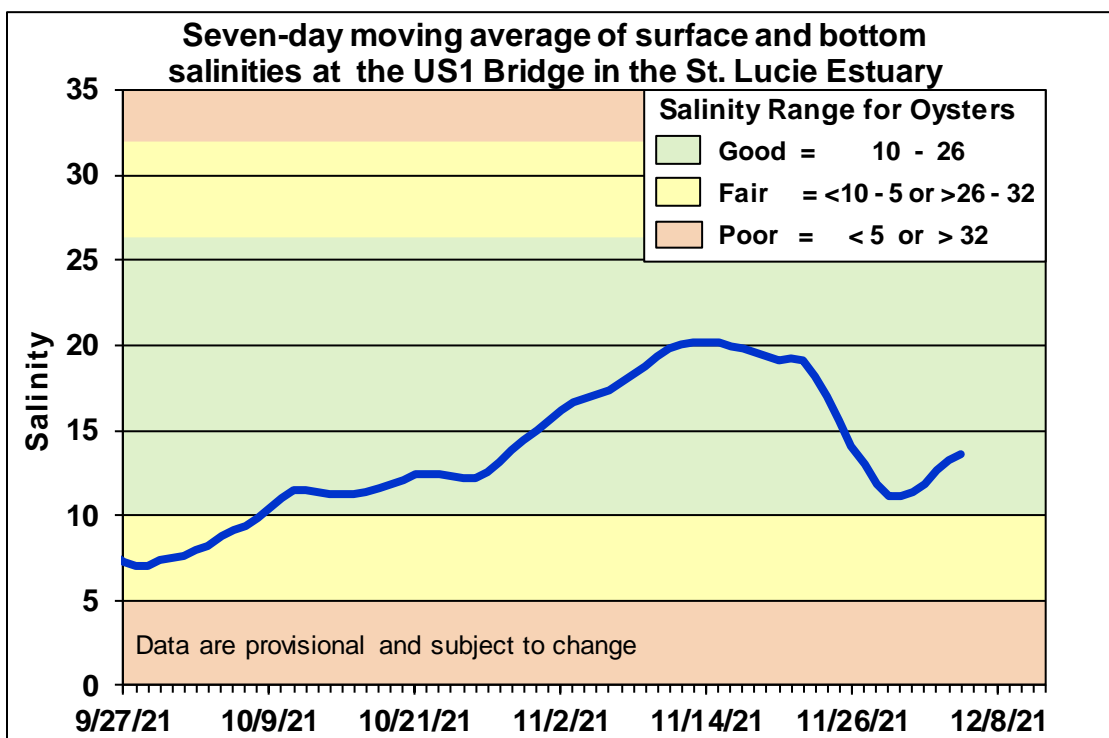
Sampling Site	Surface	Bottom	Envelope
HR1 (North Fork)	<b>7.6</b> (4.5)	<b>11.6</b> (9.1)	NA <sup>a</sup>
US1 Bridge	<b>12.3</b> (9.1)	<b>15.4</b> (13.2)	10.0 – 26.0
A1A Bridge	<b>20.7</b> (16.0)	<b>25.4</b> (22.9)	NA <sup>a</sup>

a. The envelope is not applicable.

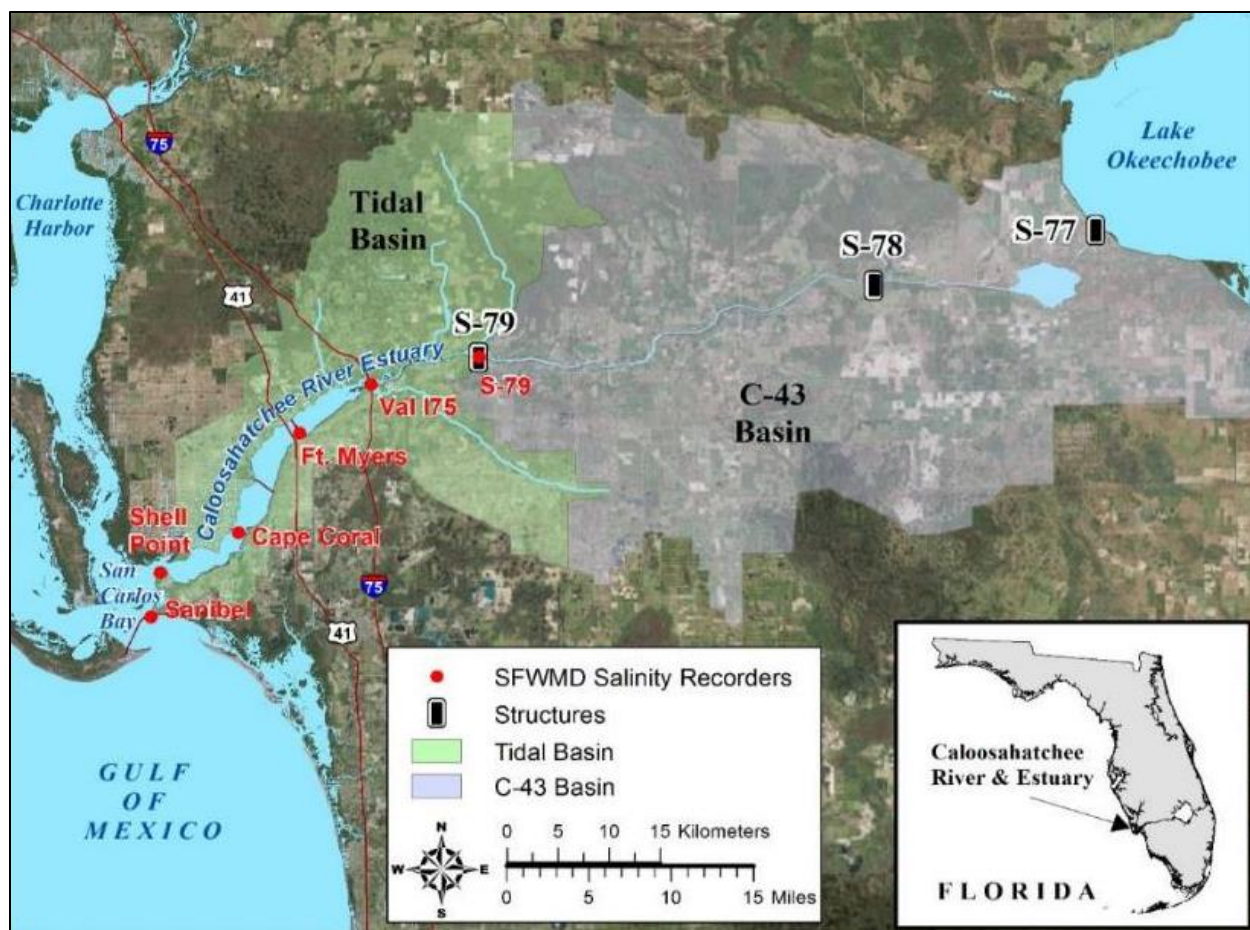




**Figure ES-3.** Mean daily salinity at the A1A, US1 and HR1 sites in the St. Lucie Estuary.

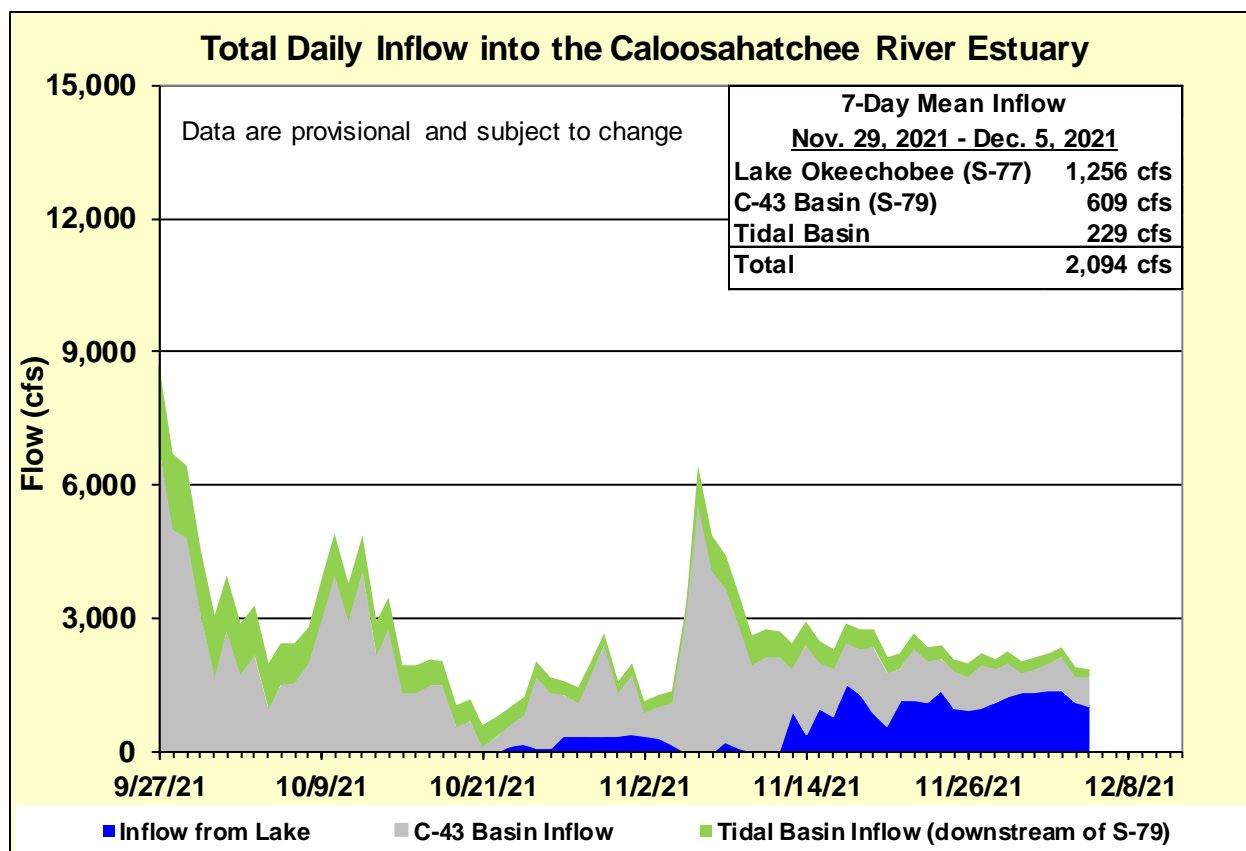


**Figure ES-4.** Seven-day moving average of the surface and bottom salinities at the US1 Bridge in the St. Lucie Estuary.



**Figure ES-5.** Basins, water control structures and salinity monitoring sites in the Caloosahatchee River Estuary.





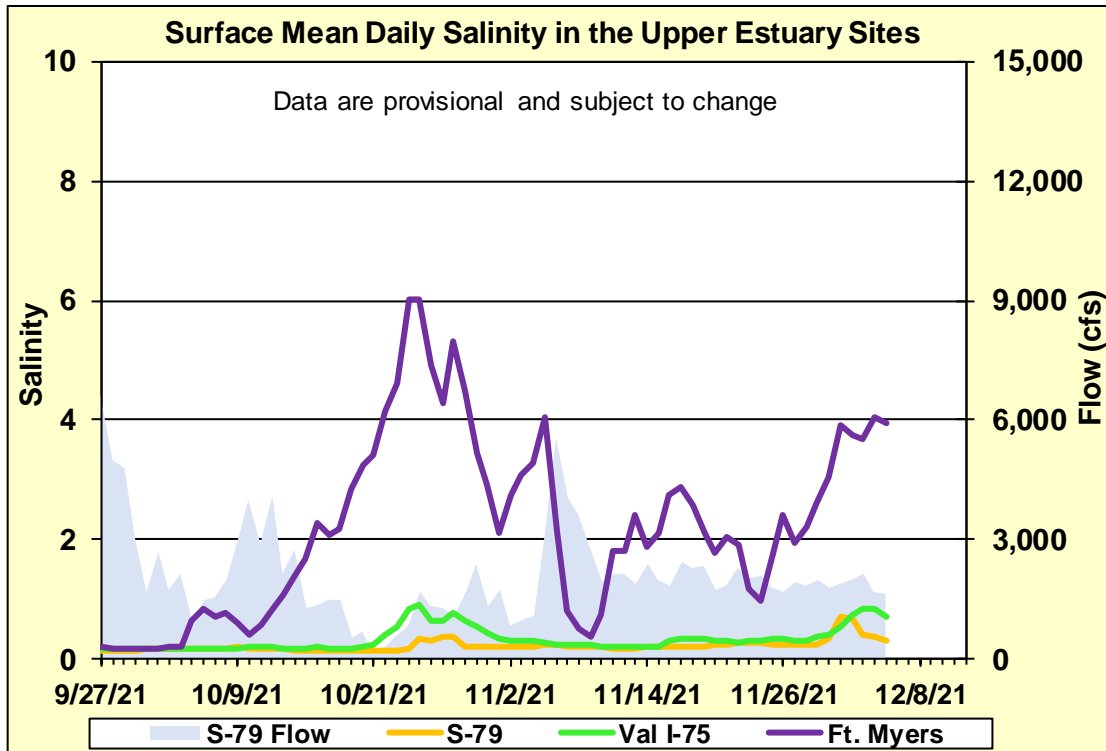
**Figure ES-6.** Total daily inflows from Lake Okeechobee, and runoff from the C-43 and Tidal basins into the Caloosahatchee River Estuary.

**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 at I-75 is for the protection of tape grass in the upper estuary and the envelope in the lower estuary is the preferred salinity range for adult eastern oysters (*Crassostrea virginica*). Data are provisional.

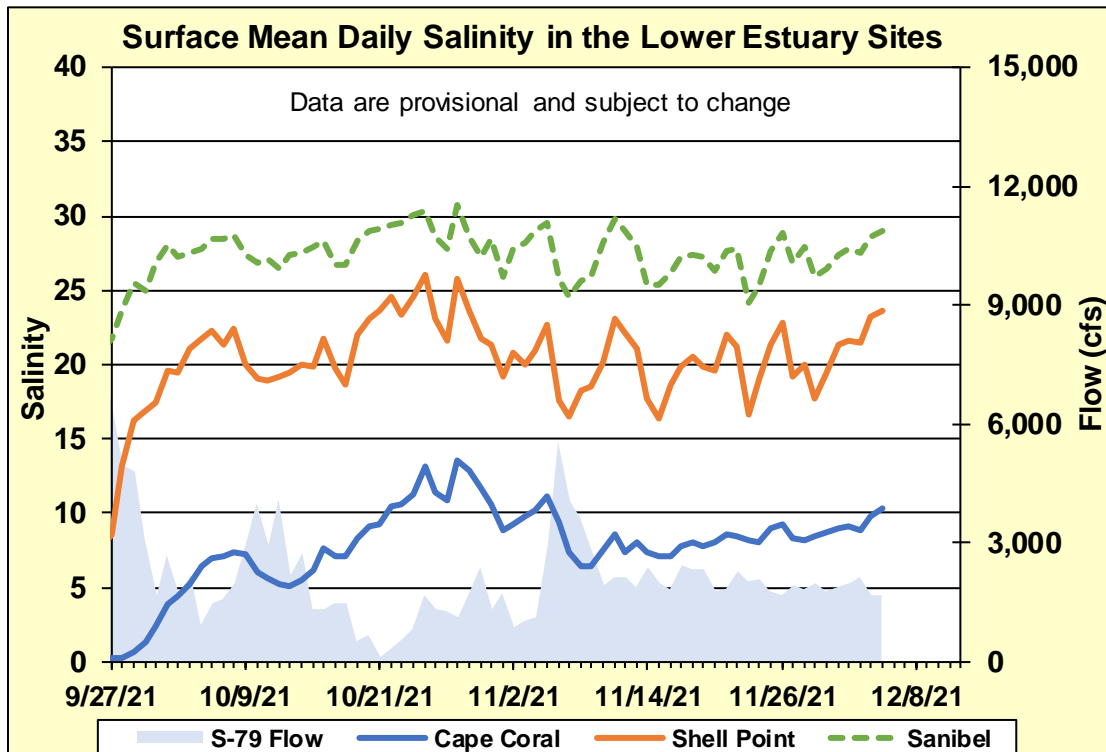
Sampling Site	Surface	Bottom	Envelope
S-79 (Franklin Lock)	<b>0.4</b> (0.3)	<b>0.4</b> (0.3)	NA <sup>a</sup>
Val I-75	<b>0.6</b> (0.3)	<b>1.1</b> (0.4)	0.0 – 5.0 <sup>b</sup>
Fort Myers Yacht Basin	<b>3.6</b> (1.8)	<b>5.3</b> (5.3)	NA <sup>a</sup>
Cape Coral	<b>9.2</b> (8.5)	<b>10.5</b> (11.2)	10.0 – 30.0
Shell Point	<b>21.2</b> (20.0)	<b>21.8</b> (22.0)	10.0 – 30.0
Sanibel	<b>27.5</b> (26.9)	<b>29.1</b> (28.9)	10.0 – 30.0

a. The envelope is not applicable.

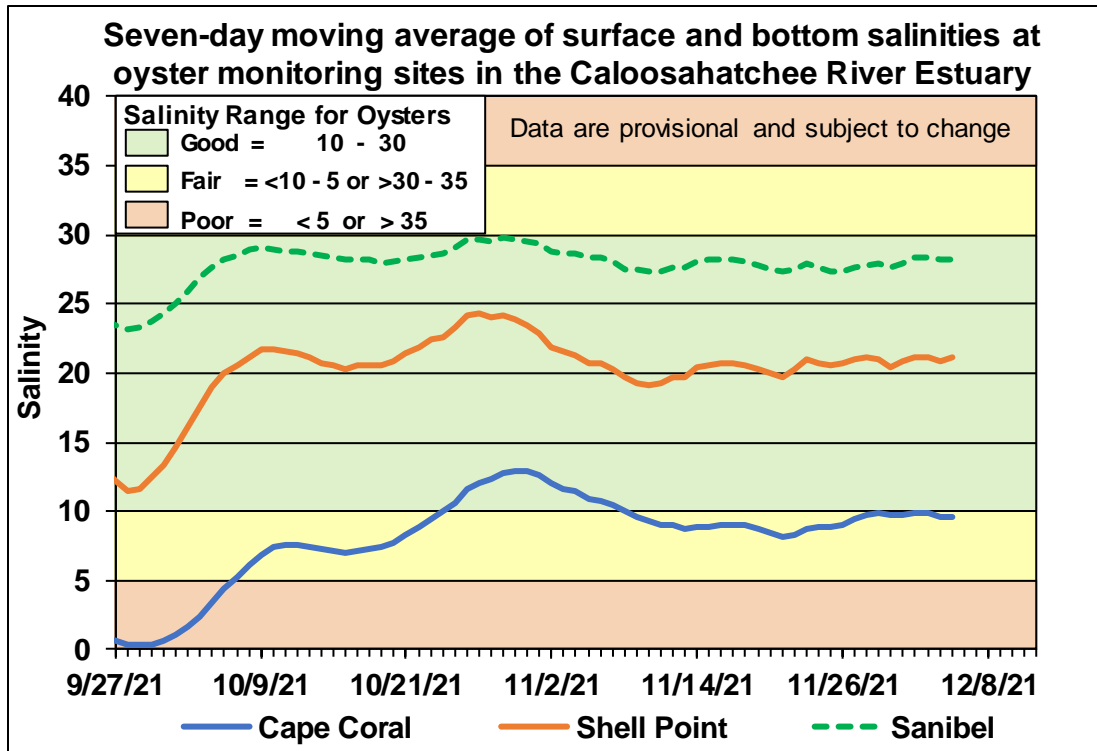
b. The envelope is based on the predicted 30-day mean for the next two weeks.



**Figure ES-7.** Mean daily salinity at upper Caloosahatchee River Estuary monitoring sites and mean daily flow at S-79.



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



**Figure ES-9.** Seven-day moving average of surface and bottom salinities at Cape Coral, Shell Point and Sanibel monitoring sites in the Caloosahatchee River Estuary.

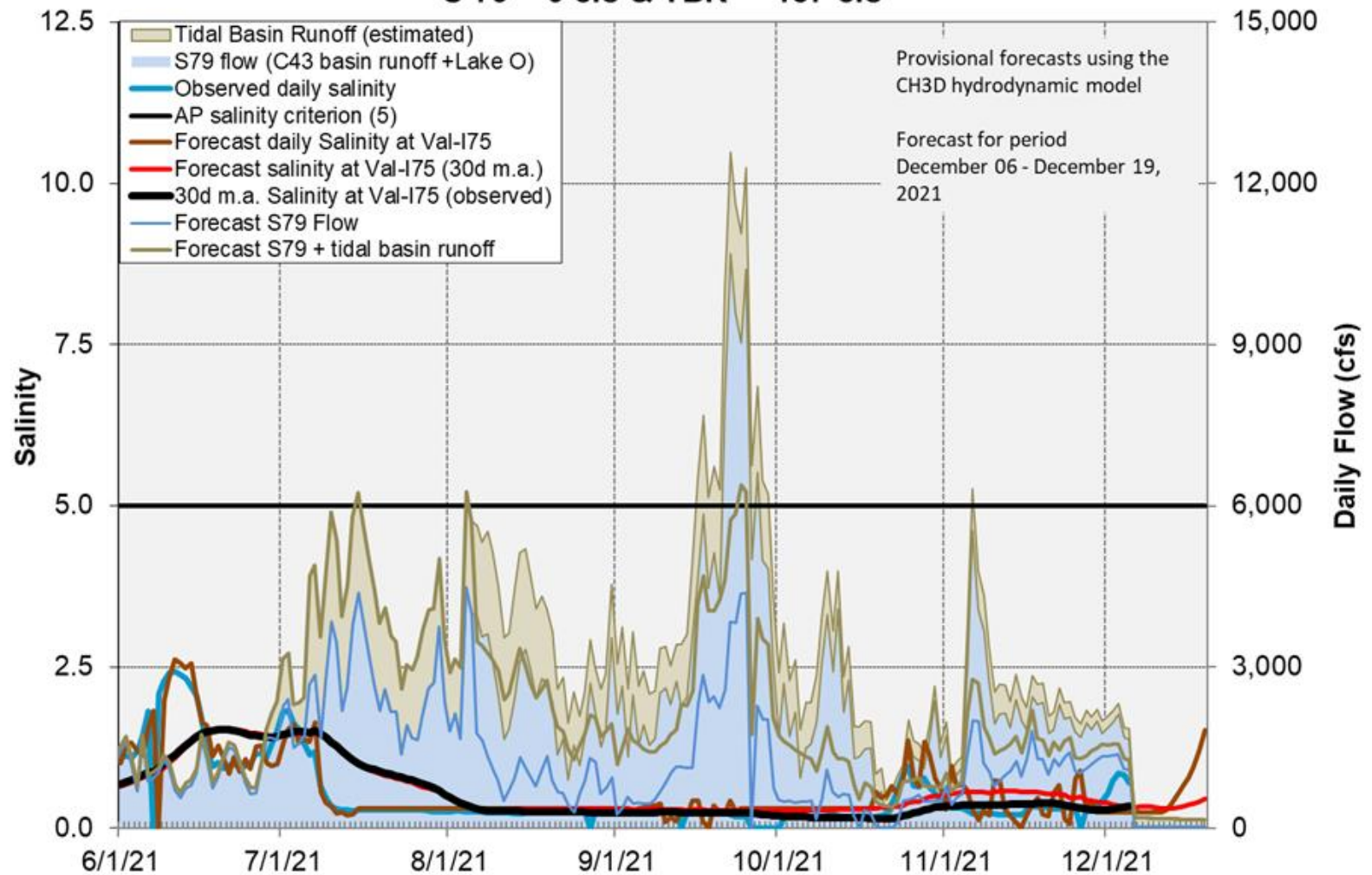
**Table ES-3.** Predicted salinity at Val I-75 in the Caloosahatchee River Estuary at the end of the forecast period for various S-79 flow release scenarios.

Scenario	Simulated S-79 Flow (cfs)	Tidal Basin Runoff (cfs)	Daily Salinity	30-Day Mean Salinity
A	0	157	1.5	0.5
B	450	157	0.6	0.3
C	800	157	0.3	0.3
D	1000	157	0.3	0.3
E	1500	157	0.3	0.3
F	2000	157	0.3	0.3

# Caloosahatchee River Estuary Flows and Salinity

## Observed and Forecast Salinity at Val I-75

**S-79 = 0 cfs & TBR = 157 cfs**



**Figure ES-10.** 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 the Restoration Strategies project to fill and grade Cells 5 and 7. Operational restrictions are in place in STA-1E Central Flow-way for vegetation management activities. Online treatment cells are at or above target stage and vegetation in these cells is stressed and highly stressed. The 365-day phosphorus loading rates (PLRs) are high for the Eastern and Central Flow-ways (**Figure S-1**).

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

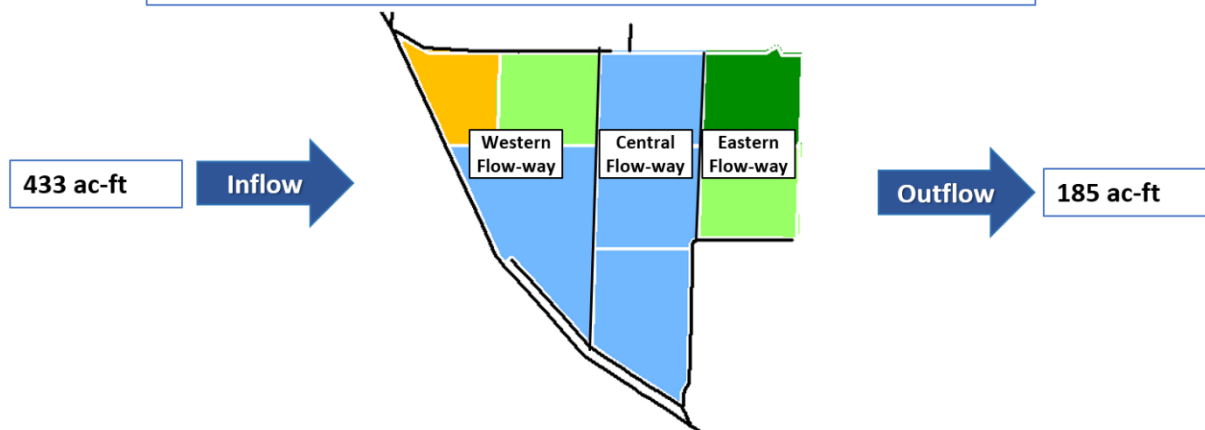
**STA-2:** STA-2 Flow-way 2 is offline for construction activities. Operational restrictions are in place in STA-2 Flow-ways 3 and 4 for vegetation management activities. Online treatment cells are at or near target stage. Vegetation in Flow-ways 1 and 3 is stressed, and in Flow-ways 2, 4 and 5 is highly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


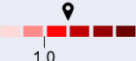


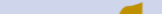
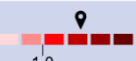
**STA-3/4:** STA-3/4 Eastern Flow-way is offline for vegetation rehabilitation/drawdown. Most online treatment cells are at or near target stage. Vegetation in the Eastern and Central Flow-ways is highly stressed and in the Western Flow-way is stressed. The 365-day PLRs for the Central and Western Flow-ways are below 1.0 g/m<sup>2</sup>/year (**Figure S-4**).










**STA-5/6:** All Flow-ways are online. Most treatment cells are near or below target stage. All treatment cells have highly stressed vegetation conditions except Flow-ways 7 and 8 which are healthy. The 365-day PLRs for flow-ways 1, 6, and 8 are below 1.0 g/m<sup>2</sup>/year. The 365-day PLRs for flow-ways 4, 5, and 7 are high. (**Figure S-5 and S-6**).

For definitions on STA operational language see glossary following figures.

# STA-1E Weekly Status Report – 11/29/2021 through 12/5/2021



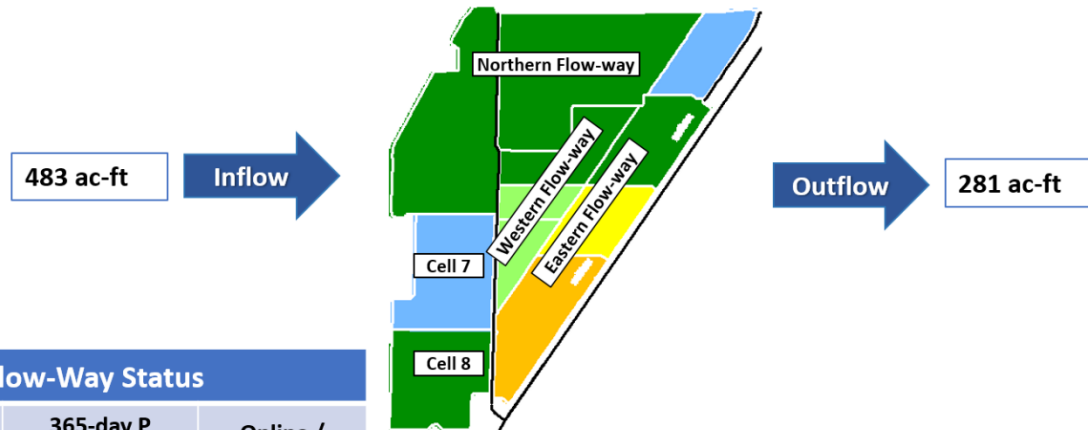
STA-1E Flow-Way Status			
Flow-Way	Vegetation Status Healthy ----- Stressed 	365-day P Loading Rate (below 1.0 g P /m²/yr is optimal) 	Online / Offline / Restrictions
Eastern			Online
Central			Vegetation Rehab
Western	Offline, construction activities starting 11/01/2019		

As of 12/5/2021			
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')		
	Low Water Level (<0.2' below TS)		
Depth / Area Based: Percent of Area Dry			
	0-25% Dry		 50-75% Dry
	25-50% Dry		 75-100% Dry

STA-1E Flow & Phosphorus Concentration			
	7-day	28-day	365-day
Total Inflow, ac-ft	433	11,855	188,371
--Lake Inflow, ac-ft	0	N/A	5,900
Total Outflow, ac-ft	185	10,214	158,303
Inflow Conc., ppb	44	103	123
Outflow Conc., ppb	18	21	26
Includes Preliminary Data			

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

STA-1W Weekly Status Report – 11/29/2021 through 12/5/2021



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			Construction
Western			Construction
Eastern			Construction
Cell 7		N/A	Construction
Cell 8		N/A	Construction

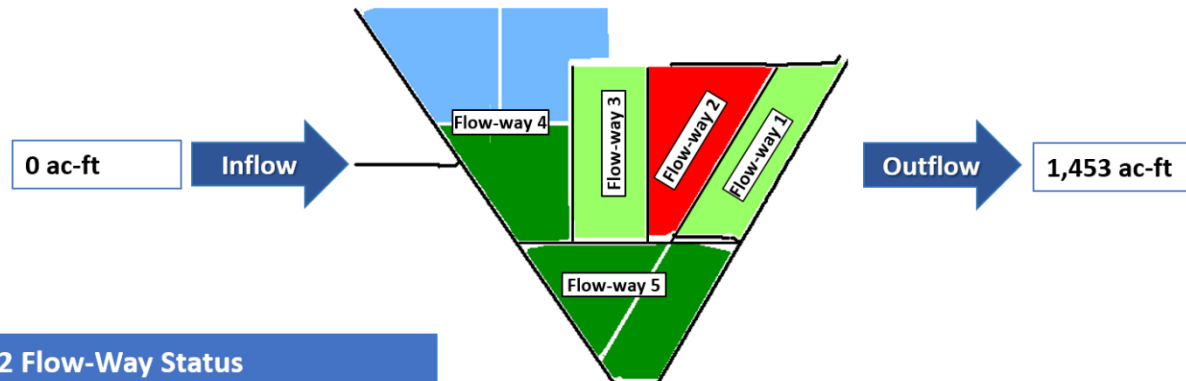
As of 12/5/2021	
Stage Based: Relative to Target Stage (TS)	
	Deep Water Level (> 2.8' above TS)
	High Water Level (1.5' – 2.8' above TS)
	0.2' – 1.5' above TS
	Target Stage (TS +/- 0.2')
	Low Water Level (<0.2' below TS)
Depth / Area Based: Percent of Area Dry	
	0-25% Dry
	25-50% Dry
	50-75% Dry
	75-100% Dry

STA-1W Flow & Phosphorus Concentration

	7-day	28-day	365-day
Total Inflow, ac-ft	483	1,926	50,186
--Lake Inflow, ac-ft	0	N/A	4,100
Total Outflow, ac-ft	281	2,243	51,019
Inflow Conc., ppb	188	159	172
Outflow Conc., ppb	27	24	24
Includes Preliminary Data			

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

# STA-2 Weekly Status Report – 11/29/2021 through 12/5/2021



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

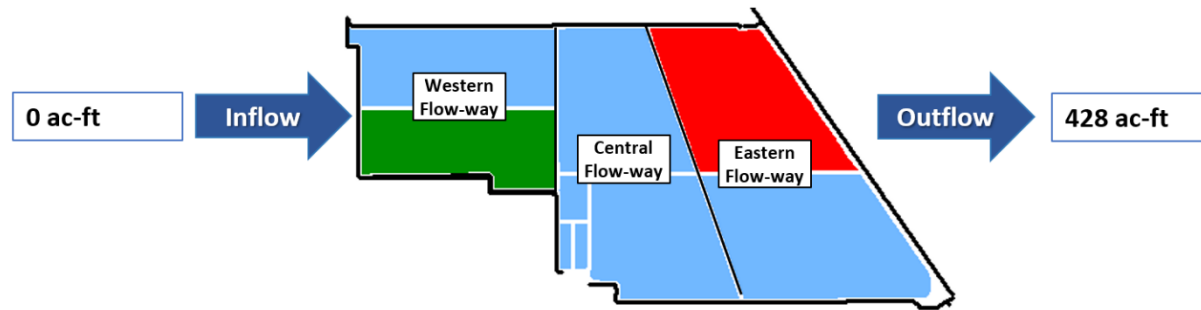
As of 12/5/2021	
Stage Based: Relative to Target Stage (TS)	
	Deep Water Level (> 2.8' above TS)
	High Water Level (1.5' – 2.8' above TS)
	0.2' – 1.5' above TS
	Target Stage (TS +/- 0.2')
	Low Water Level (<0.2' below TS)
Depth / Area Based: Percent of Area Dry	
	0-25% Dry
	25-50% Dry
	50-75% Dry
	75-100% Dry

STA-2 Flow & Phosphorus Concentration			
	7-day	28-day	365-day
Total Inflow, ac-ft	0	8,690	336,394
--Lake Inflow, ac-ft	0	N/A	65,800
Total Outflow, ac-ft	1,453	16,560	348,293
Inflow Conc., ppb	N/A	50	87
Outflow Conc., ppb	10	14	16
Includes Preliminary Data			

Figure S-3. STA-2 Weekly Status Report



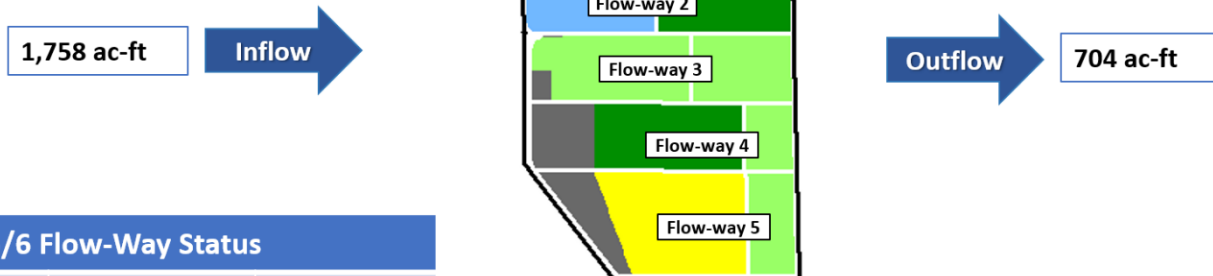
STA-3/4 Weekly Status Report – 11/29/2021 through 12/5/2021



STA-3/4 Flow-Way Status				As of 12/5/2021		STA-3/4 Flow & Phosphorus Concentration			
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)			7-day	28-day	365-day
Eastern	Offline, vegetation management drawdown as of 3/1/2021			Deep Water Level (> 2.8' above TS)		Total Inflow, ac-ft	0	12,667	388,025
				High Water Level (1.5' – 2.8' above TS)		--Lake Inflow, ac-ft	0	N/A	39,100
				0.2' – 1.5' above TS		Total Outflow, ac-ft	428	15,800	344,696
				Target Stage (TS +/- 0.2')		Inflow Conc., ppb	N/A	59	65
				Low Water Level (<0.2' below TS)		Outflow Conc., ppb	12	14	15
Central		1.0	Online	Depth / Area Based: Percent of Area Dry		Includes Preliminary Data			
				0-25% Dry	50-75% Dry				
				25-50% Dry	75-100% Dry				
Western		1.0	Online						

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

# STA-5/6 Weekly Status Report – 11/29/2021 through 12/5/2021



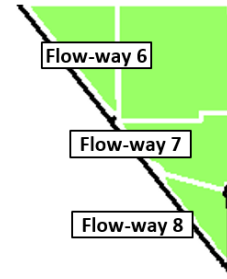
STA-5/6 Flow-Way Status			
Flow-Way	Vegetation Status Healthy ----- Stressed	365-day P Loading Rate (below 1.0 g P /m <sup>2</sup> /yr is optimal)	Online / Offline / Restrictions
1	← →		Online
2	← →	N/A	Online
3	← →	N/A	Online
4	← →		Online
5	← →		Online







As of 12/5/2021	
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')
	Low Water Level (<0.2' below TS)
Depth / Area Based: Percent of Area Dry	
	0-25% Dry
	25-50% Dry
	50-75% Dry
	75-100% Dry

STA-5/6 Flow & Phosphorus Concentration			
	7-day	28-day	365-day
Total Inflow, ac-ft	1,758	16,470	197,038
--Lake Inflow, ac-ft	0	N/A	9,000
Total Outflow, ac-ft	704	11,856	184,099
Inflow Conc., ppb	94	146	238
Outflow Conc., ppb	15	17	57
Includes Preliminary Data			

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

**STA-5/6 Weekly Status Report – 11/29/2021 through 12/5/2021**



STA-5/6 Flow-Way Status				As of 12/5/2021
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	<div> <div>Deep Water Level (&gt; 2.8' above TS)</div> <div>High Water Level (1.5' – 2.8' above TS)</div> <div>0.2' – 1.5' above TS</div> <div>Target Stage (TS +/- 0.2')</div> <div>Low Water Level (&lt;0.2' below TS)</div> </div>
7	←-----→ 		Online	Depth / Area Based: Percent of Area Dry
8	←-----→ 		Online	<div> <div>0-25% Dry</div> <div>25-50% Dry</div> <div>50-75% Dry</div> <div>75-100% Dry</div> </div>

**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***

WCA-1: The 1-8C stage decreased in parallel with the Zone A1 regulation line last week. The average on Sunday was 0.06 feet above that falling line. WCA-2A: Stage at 2A-17 continued to decrease faster than the regulation line last week; the average on Sunday was 1.24 feet higher than the falling Zone A regulation line. WCA-3A: The Three Gauge Average stages remained below the stable Zone A regulation line last week; average stage was 0.13 feet below the Zone A line on Sunday. WCA-3A: Stage at gauge 62 (Northwest corner) fell faster than the falling Upper Schedule last week and remains below, the average on Sunday was 0.59 feet below the regulation line (**Figures EV-1 through EV-4**).

### ***Water Depths***

The SFWDAT tool indicates that water depths in the WCAs are the lowest in northeastern WCA-3A and the amount of area within that sub-basin that has the potential for no surface water has expanded over the last month. North to South hydrologic connectivity is diminishing within all the sloughs in Everglades National Park and there are more areas with water levels significantly below ground in western ENP and southern BCNP (**Figure EV-5**). Comparing WDAT water levels from present over the last month, stages are decreasing in most areas except southwestern WCA-3A (**Figure EV-6**). Looking back one year, most of the Everglades, except WCA-1, is still significantly lower in depth. Comparing depths over the past 20 years, most of the WCAs remain in the upper half of that historical range. Much of western ENP has fallen below the median with the western sloughs now around the 10th percentile. Western BCNP, WCA-1, and northeastern ENP are above 80th percentile (**Figure EV-7**).

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

There was no rain for Taylor Slough and Florida Bay over the week ending Sunday (12/5) which caused stages to decrease an average of 0.11 feet (**Figure EV-8** and **Figure EV-9**). The average Slough water depth is 6 inches above the historical average for this time of year while the northern parts of the Slough are 9 inches above its historical average, which was before the modifications to levees and structures in Upper Taylor Slough. The early dry-season frontal rains had helped to maintain water levels in the Slough and provide water downstream, but stages are still 4 inches lower than this time last year (after the rains of Tropical Storm Eta) suggesting less water is available to buffer downstream conditions. Given the expectation of a drier than average dry season, maintaining water deliveries to the area would help to slow the recession in the slough so water movements south can be expedited when the wet season starts.

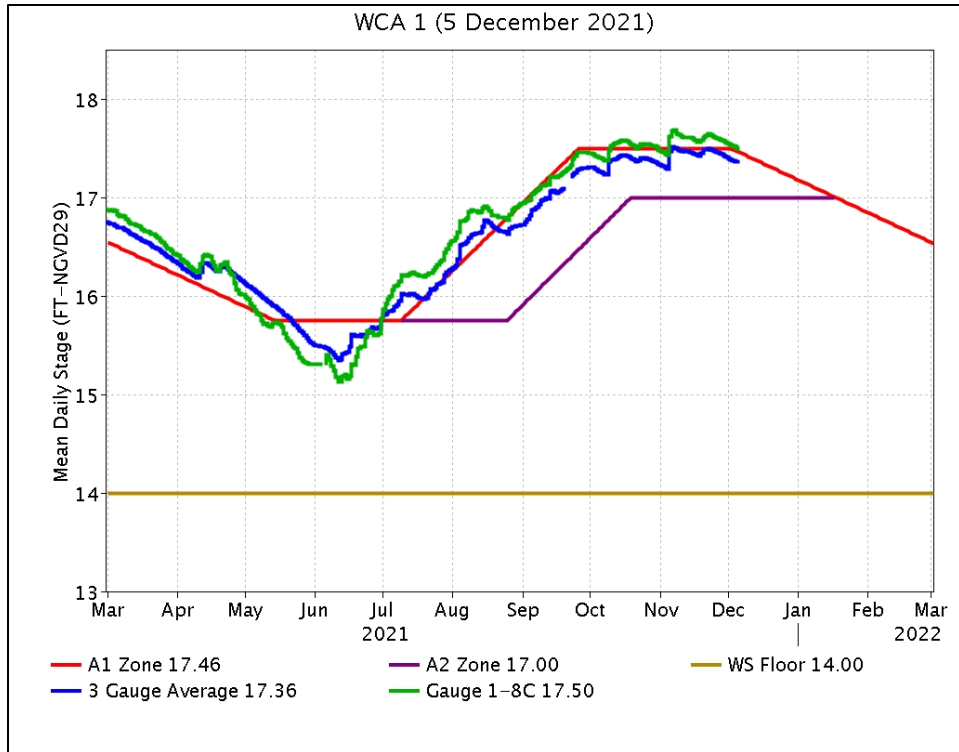
Salinities in Florida Bay averaged no change over the week ending 12/5, with individual station changes ranging from -2.5 to +2.3 (**Figure EV-8**). Only 2 stations had weekly changes larger than 1. Both the eastern and central regions of the Bay are above the 75th percentile of their historical ranges (**Figure EV-10**). The nearshore areas of the Bay remain polyhaline (18-30) which is good, but conditions are not as low as last year after Tropical Storm Eta and there is much less water available from upstream compared to last year. Conditions are not ideal for enduring a drier than average dry season.

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

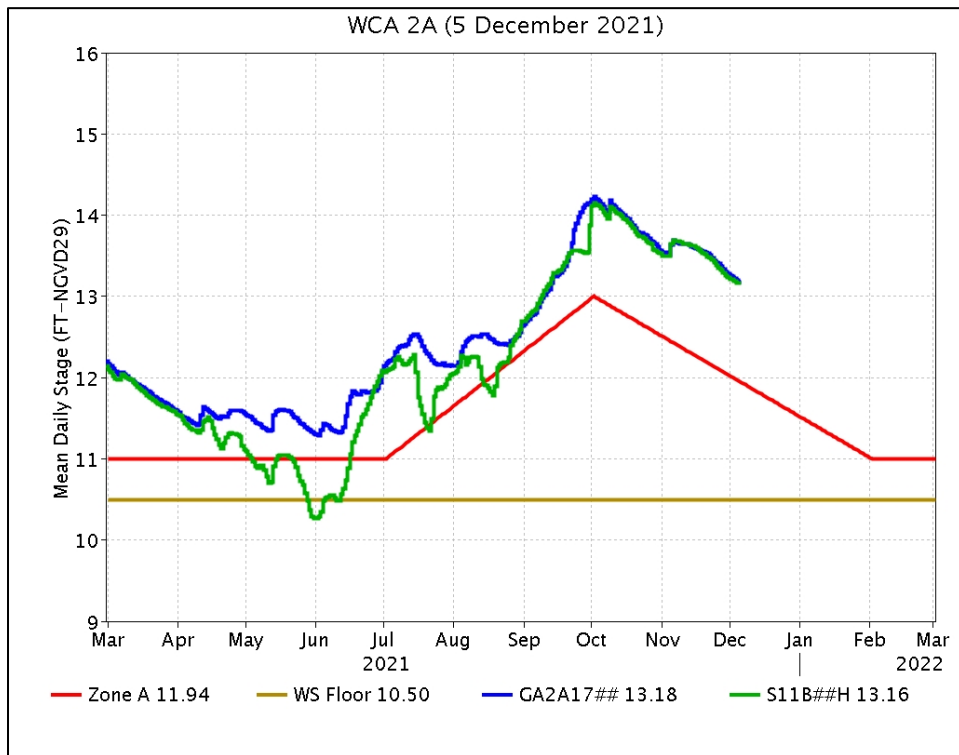
Conserving water in the northern basins, then allowing that water to move downstream maximizes the ecological benefit of freshwater on the landscape. Flows into northern WCA-3A that move downstream continue to have an ecological benefit. Continued freshwater flows to the Taylor Slough area will help expedite deliveries to the south when the wet season starts if stages can be maintained. Individual regional recommendations can be found in **Table EV-2**.

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

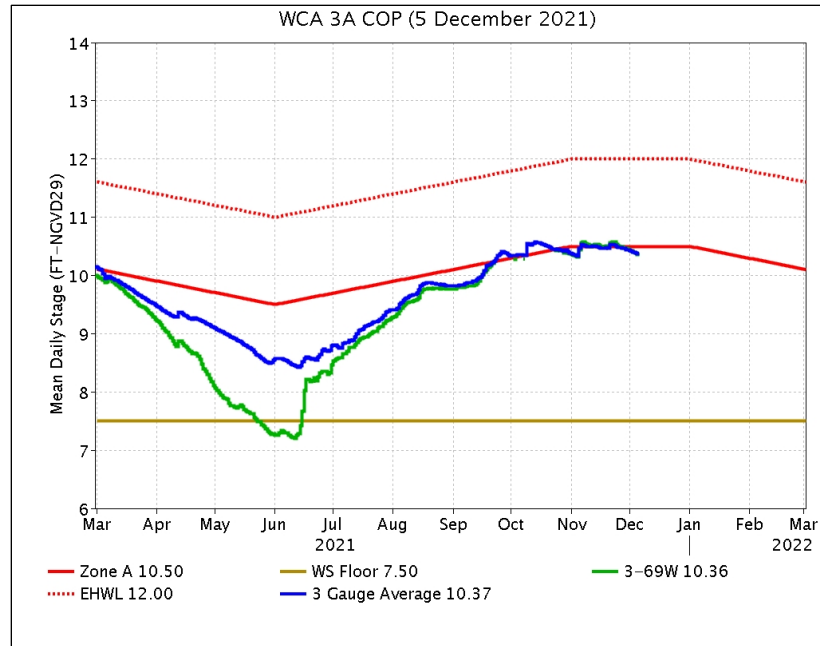
Everglades Region	Rainfall (inches)	Stage change (feet)
WCA-1	0.02	-0.07
WCA-2A	<0.01	-0.16
WCA-2B	0.07	-0.12
WCA-3A	<0.01	-0.11
WCA-3B	0.00	-0.05
ENP	<0.01	+0.08



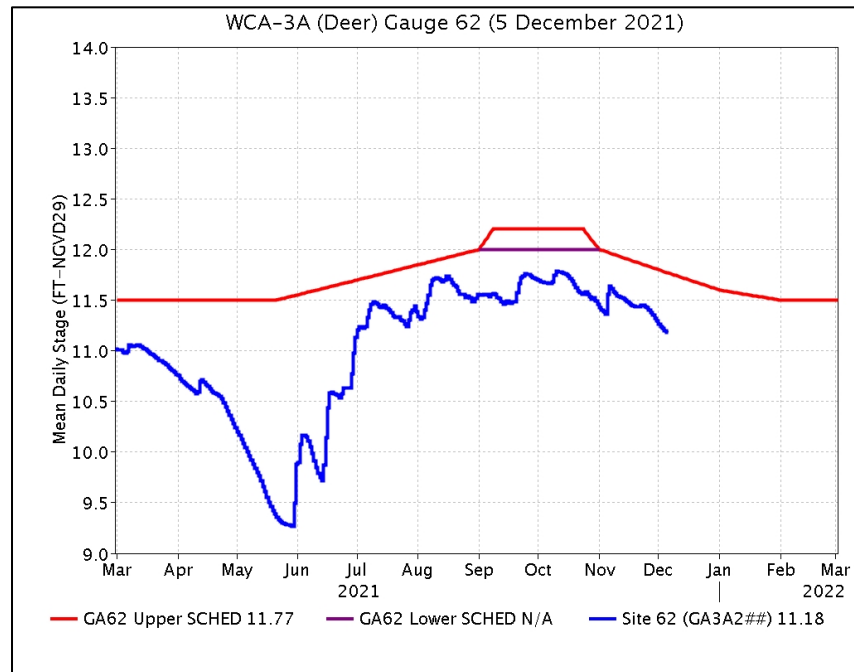
**Figure EV-1.** WCA-1 stage hydrographs and regulation schedule.



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

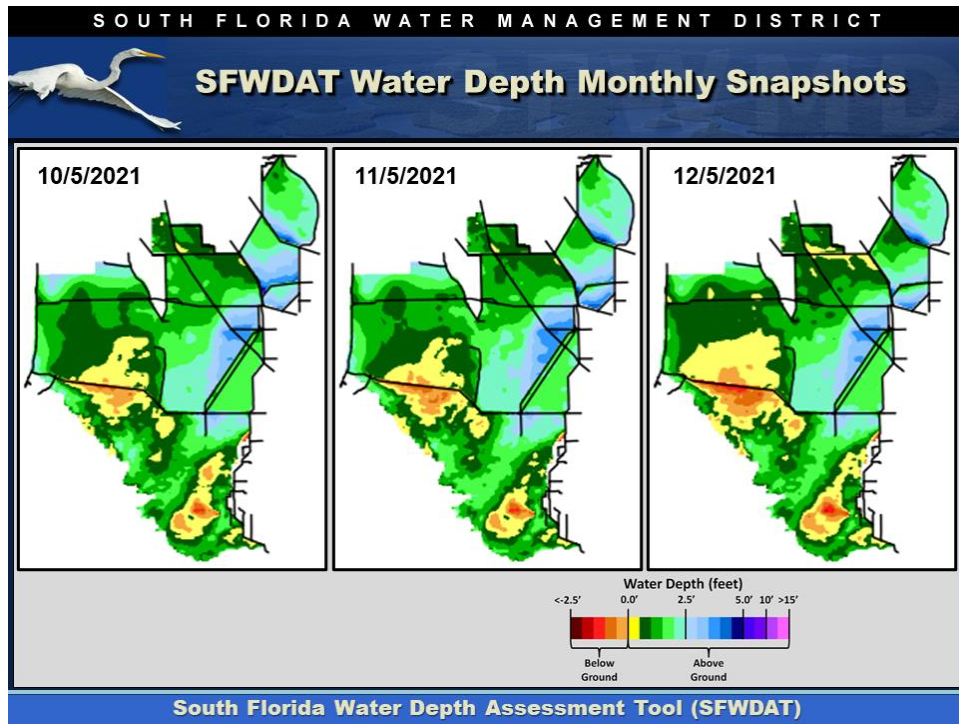


**Figure EV-3.** WCA-3A stage hydrographs (three-gauge average, S-333 headwater) and regulation schedule.

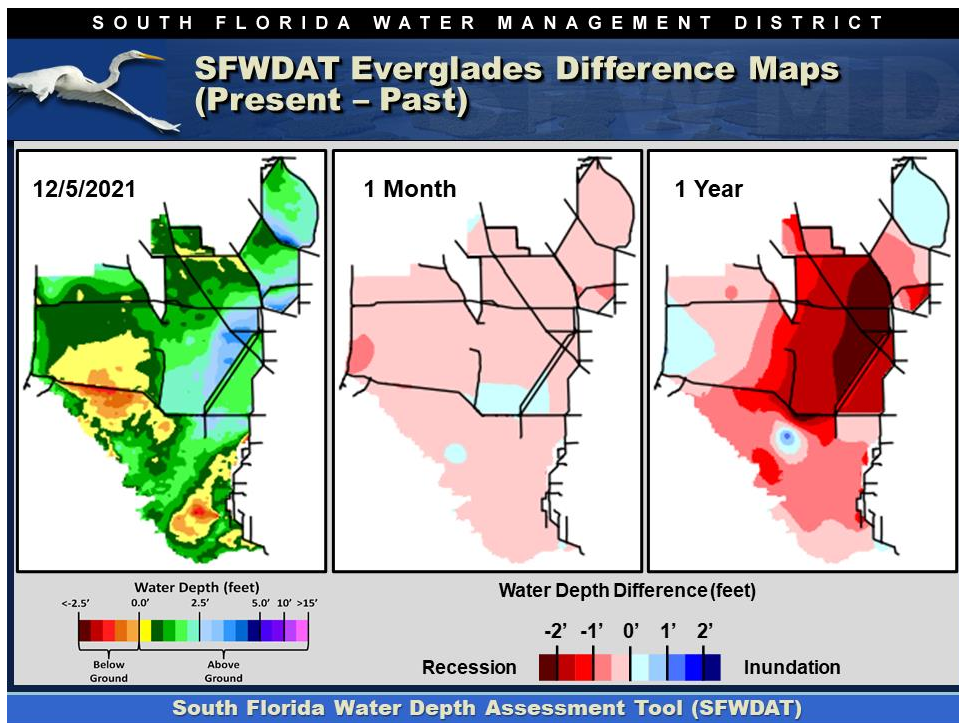


**Figure EV-4.** WCA-3A stage hydrograph (Deer gauge; Site 62) and CA62 regulation schedule.

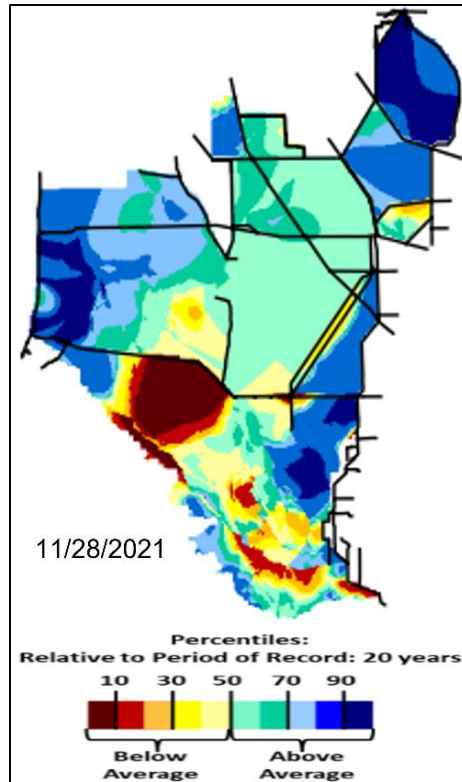




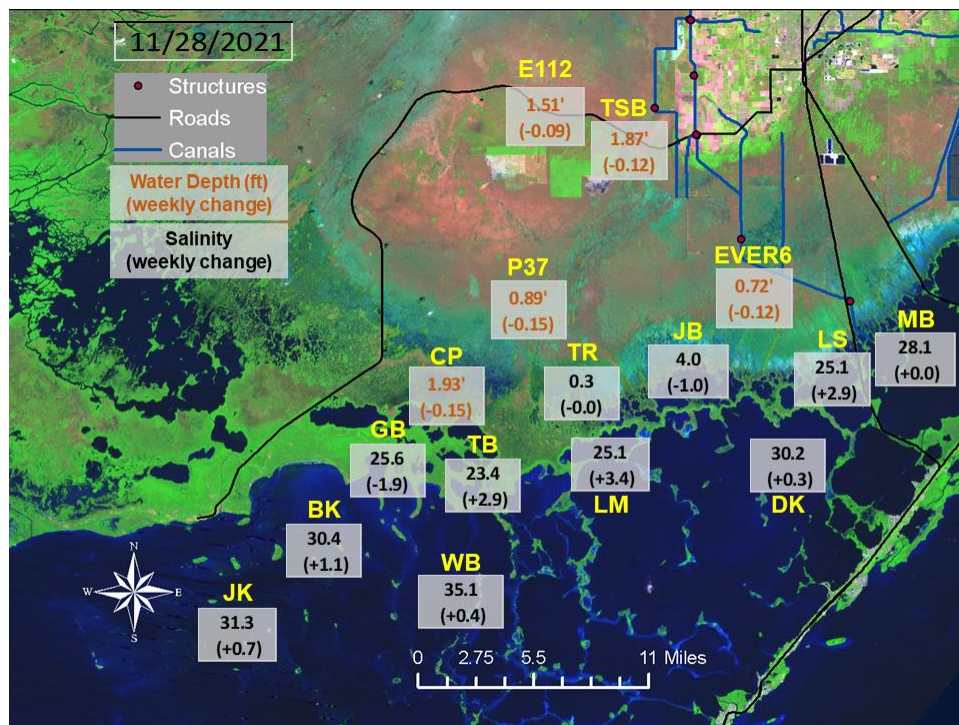
**Figure EV-5.** Everglades water depths from two months ago (left), one month ago (center) and present (right), based on SFWDAT.



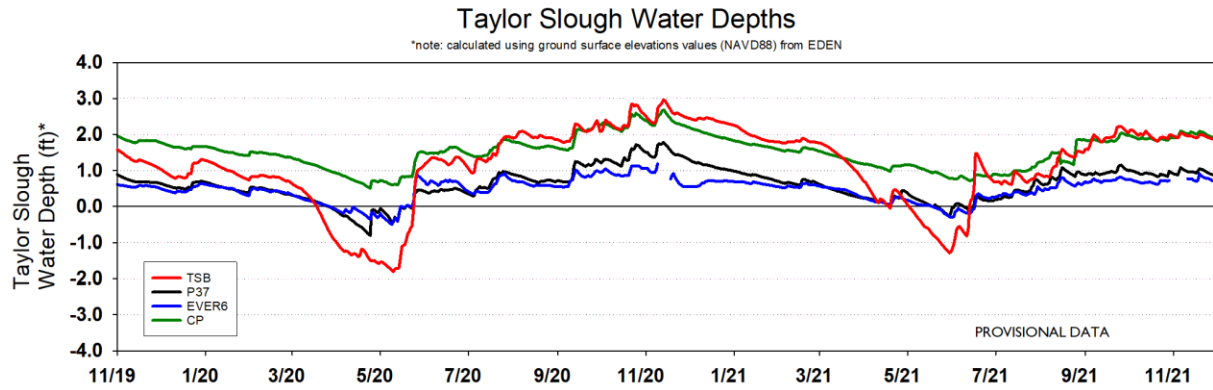
**Figure EV-6.** Present Everglades water depths (left) and water depth changes from one month (center) and one year (right) ago, based on SFWDAT.



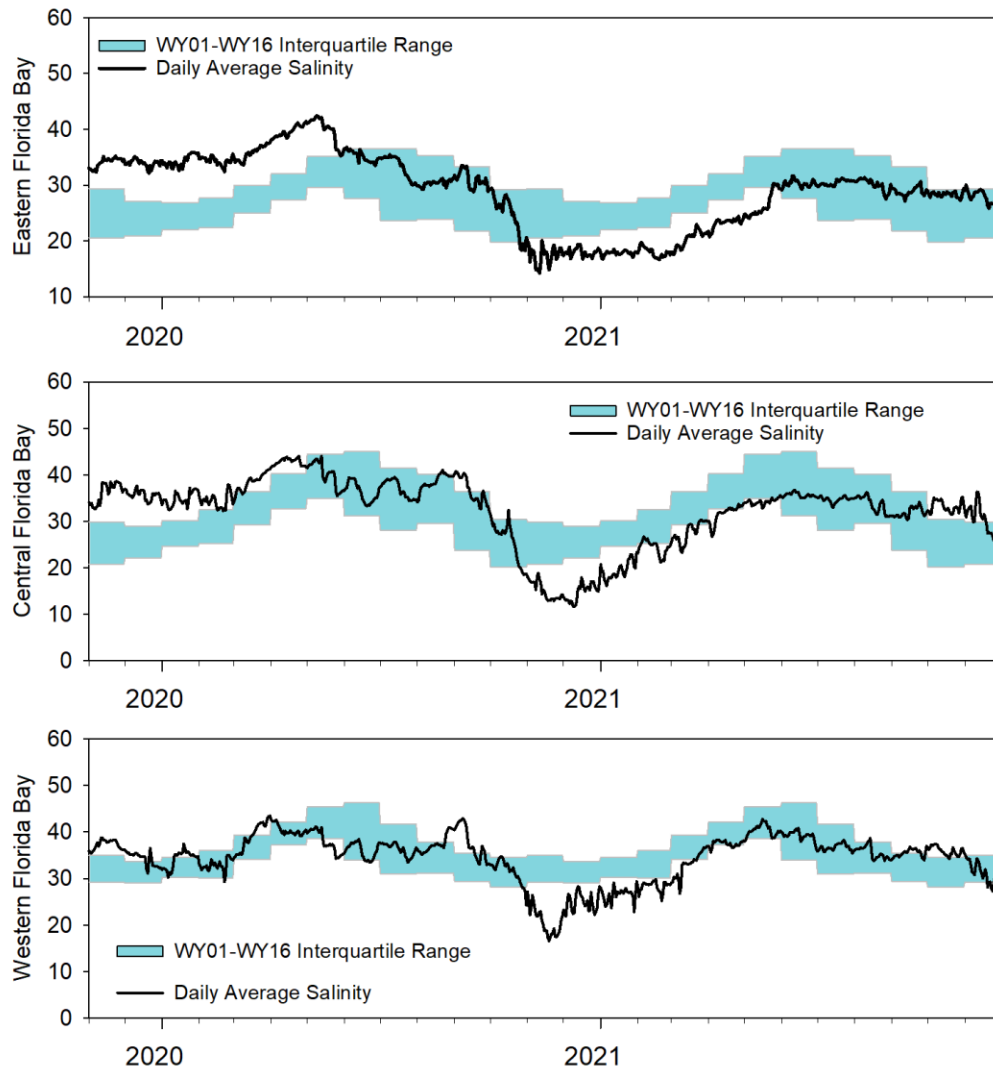
**Figure EV-7.** Present water depths compared to the day of year median over the previous 20 years.



**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 7, 2021 (red is new)</b>			
<b>Area</b>	<b>Weekly change</b>	<b>Recommendation</b>	<b>Reasons</b>
<b>WCA-1</b>	Stage decreased by 0.07'	Conserve water in this basin letting the water move south when conditions allow.	Protect within basin and downstream habitat and wildlife. Anticipated La Nina dry season.
<b>WCA-2A</b>	Stage decreased by 0.16'	Conserve water in this basin letting the water move south when conditions allow. Keeping a recession rate less than 0.10 feet per week has an ecological benefit.	Protect within basin and downstream habitat and wildlife.
<b>WCA-2B</b>	Stage decreased by 0.12'	Conserve water in this basin, maintain a minimum input to maintain stage while moving water south when conditions allow.	Protect within basin and downstream habitat and wildlife. Depths in excess of 4.0 feet.
<b>WCA-3A NE</b>	Stage increased by 0.12'	Conserve water in this basin letting the water move south when conditions allow. Keeping a recession rate less than 0.10 feet per week has an ecological benefit.	Protect within basin peat soils and downstream habitat and wildlife.
<b>WCA-3A NW</b>	Stage decreased by 0.17'	Conserve water in this basin letting the water move south when conditions allow. Keeping a recession rate less than 0.10 feet per week has an ecological benefit.	
<b>Central WCA-3A S</b>	Stage decreased by 0.08'	Conserve water in this basin letting the water move south when conditions allow. Keeping a recession rate less than 0.10 feet per week has an ecological benefit.	Protect within basin and downstream habitat and wildlife.
<b>Southern WCA-3A S</b>	Stage decreased by 0.07'		
<b>WCA-3B</b>	Stage decreased by 0.05'	Conserve water in this basin letting the water move south when conditions allow.	Protect within basin and downstream habitat and wildlife.
<b>ENP-SRS</b>	Stage increased by 0.08 feet	Make discharges to the Park according to COP and TTFF protocol while considering upstream and downstream ecological conditions.	Protect within basin and upstream habitat and wildlife.
<b>Taylor Slough</b>	Stage changes ranged from -0.04' to -0.17'	Move water southward as possible.	When available, provide freshwater buffer for downstream conditions.
<b>FB- Salinity</b>	Salinity changes ranged -2.5 to +2.3	Move water southward as possible.	When available, provide freshwater to maintain low salinity buffer and promote water movement.