

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:** August 18, 2021

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

### **Summary**

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

Tropical Storm Grace will be passing well south of the District. As the storm passes, considerably drier air with a light concentration of Saharan Dust is expected to overspread the District from the east, with the inhibiting effects of the dust likely resulting in much reduced rain coverage and total rainfall on Wednesday. Thursday and Friday, a subtropical ridge of high pressure is forecast to strengthen, continuing the streak of below normal rainfall days that began on Sunday this week. While total rainfall may temporarily increase some this weekend, especially on Sunday, when the northern extension of a tropical wave is forecast to extend into the Florida Straits, most indications are that total rainfall would remain below the long-term average. A phenomenally dense late-season Saharan Dust outbreak is likely to reach the Bahamas and Florida by early next week, further decreasing rainfall. For the week ending next Tuesday morning, total rainfall is predicted to be less than 50% of normal, with the greatest weekly rains over parts of the southern interior, the southwest, and the west coast. This reduced rainfall is seen continuing into the week 2 period (24-30 August). If true, August 2021 will finish with total rainfall in the 30<sup>th</sup> to 50<sup>th</sup> percentile range (normal rainfall is 8.03").

#### **Kissimmee**

Flow at S-65A continues to be too low for complete inundation of the Kissimmee River floodplain, but mean floodplain depth increased to 1.08 feet on August 15, 2021. Dissolved oxygen concentration in the Kissimmee River continued to decline to an average of 0.7 mg/L for the week, with the last eight days below the 1.0 mg/L threshold considered potentially lethal for sportfish.

#### **Lake Okeechobee**

Lake Okeechobee stage was 14.35 feet NGVD on August 15, 2021, 0.91 feet higher than a month ago, and 0.52 feet higher than one year ago (**Figure LO-1**). Lake stages were above the ecological envelope from August 1, 2020 to March 30, 2021, and near or within the upper threshold of the envelope until mid-June. Lake stages have been above the ecological envelope since early-July and are now 0.85 feet above (**Figure LO-2**). Recent satellite imagery (August 11, 2021) shows a medium to high bloom potential in the

southwestern, western and northeastern regions of the Lake, driven primarily by easterly winds over the past week.

### **Estuaries**

Total inflow to the St. Lucie Estuary averaged approximately 2,138 cfs over the past week with no flow coming from Lake Okeechobee. Mean surface salinities decreased at HR1 and the US1 Bridge and increased slightly at the A1A Bridge site over the past week. Salinity at the US1 Bridge was in the fair range (10-26) for adult eastern oysters.

Total inflow to the Caloosahatchee Estuary averaged 4,654 cfs over the past week with no flow coming from the Lake. Mean surface salinities remained the same at Ft. Myers but decreased at the remaining sites in 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 poor range at Cape Coral.

### **Stormwater Treatment Areas**

For the week ending Sunday, August 15, 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 61,000 ac-feet. The total amount of inflows to the STAs in WY2022 is approximately 471,000 ac-feet. Most STA cells are near or above target stage. STA-1E Western Flow-way is offline for the Restoration Strategies project to fill and grade Cells 5 and 7, and STA-3/4 Eastern Flow-way is offline for vegetation rehabilitation/drawdown. Operational restrictions are in place in STA-1W Western, Eastern, and Northern Flow-ways, and STA-2 Flow-way 2 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. Operational restrictions are also in effect in STA-5/6 Flow-ways 2 and 3 following the Restoration Strategies project to grade non-effective treatment areas. This week, if 2008 LORS recommends Lake releases to the WCAs and conditions allow, releases will be sent to STA-2.

### **Everglades**

Rehydration rates were generally characterized as good across the Everglades Protection Area; WCA-1 experienced 0.50 feet stage rise over the past two weeks, which would be in the poor range (too quickly). Water depths were closer to average in WCA-3A but remain below average across most of that basin. In Florida Bay, salinities fell last week but remain above average, and stages increased in Taylor Slough due to heavy rainfall. Overall, this is the time of year when the lowest salinities are expected in the Southern systems, though they have been slow to decrease; but conditions remain stable in the region.

## **SUPPORTING INFORMATION**

### **Kissimmee Basin**

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

On August 15, 2021, lake stages were 56.4 feet NGVD (0.1 feet below schedule) in East Lake Toho, 53.5 feet NGVD (at schedule) in Lake Toho, and 51.3 feet NGVD (0.3 feet above schedule) in Lakes Kissimmee-Cypress-Hatchineha (KCH) (**Table KB-1, Figures KB-1-3**).

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

Discharges to the Kissimmee River on August 15, 2021 were 1,690 cfs at S-65 and 1,990 cfs at S-65A; discharges from the Kissimmee River were 2,130 cfs at S-65D and 2,490 cfs at S-65E (**Table KB-2**). Headwater stages were 46.5 feet NGVD at S-65A and 28.5 feet NGVD at S-65D on August 15, 2021. The concentration of dissolved oxygen in the Kissimmee River continued to decline, with the average for the week ending on August 15, 2021 decreasing to 0.7 mg/L; the last eight days were below the 1.0 mg/L threshold considered potentially lethal for sportfish (**Table KB-2, Figure KB-4**).

Discharge at S-65/S-65A is being managed to attempt to limit further decline of dissolved oxygen in the Kissimmee River, but the outcome is dependent on rainfall. Flow at S-65A remains too low for complete inundation of the Kissimmee River floodplain, but mean floodplain depth increased to 1.08 feet on August 15, 2021 (**Figure KB-5**).

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

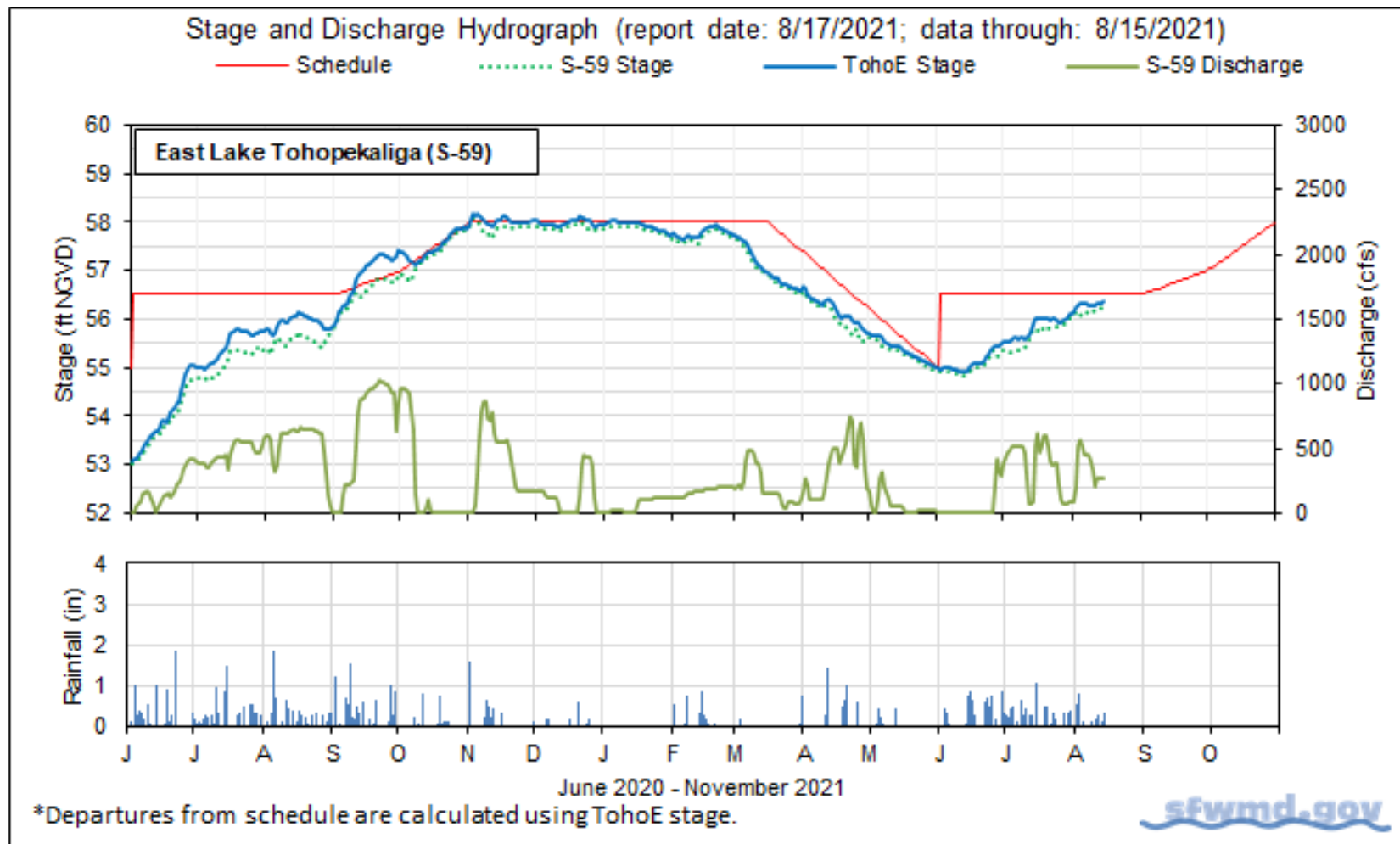
With dissolved oxygen continuing to decline in the Kissimmee River with flow at S-65A at bankfull (1,400 cfs) since mid-July and stage in KCH rising, objectives have shifted to focus on controlling the stage rise in KCH to minimize the risk of higher flows later in the season. Flow at S-65 and S-65A has been increased to approximately 2,000 cfs.

**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.

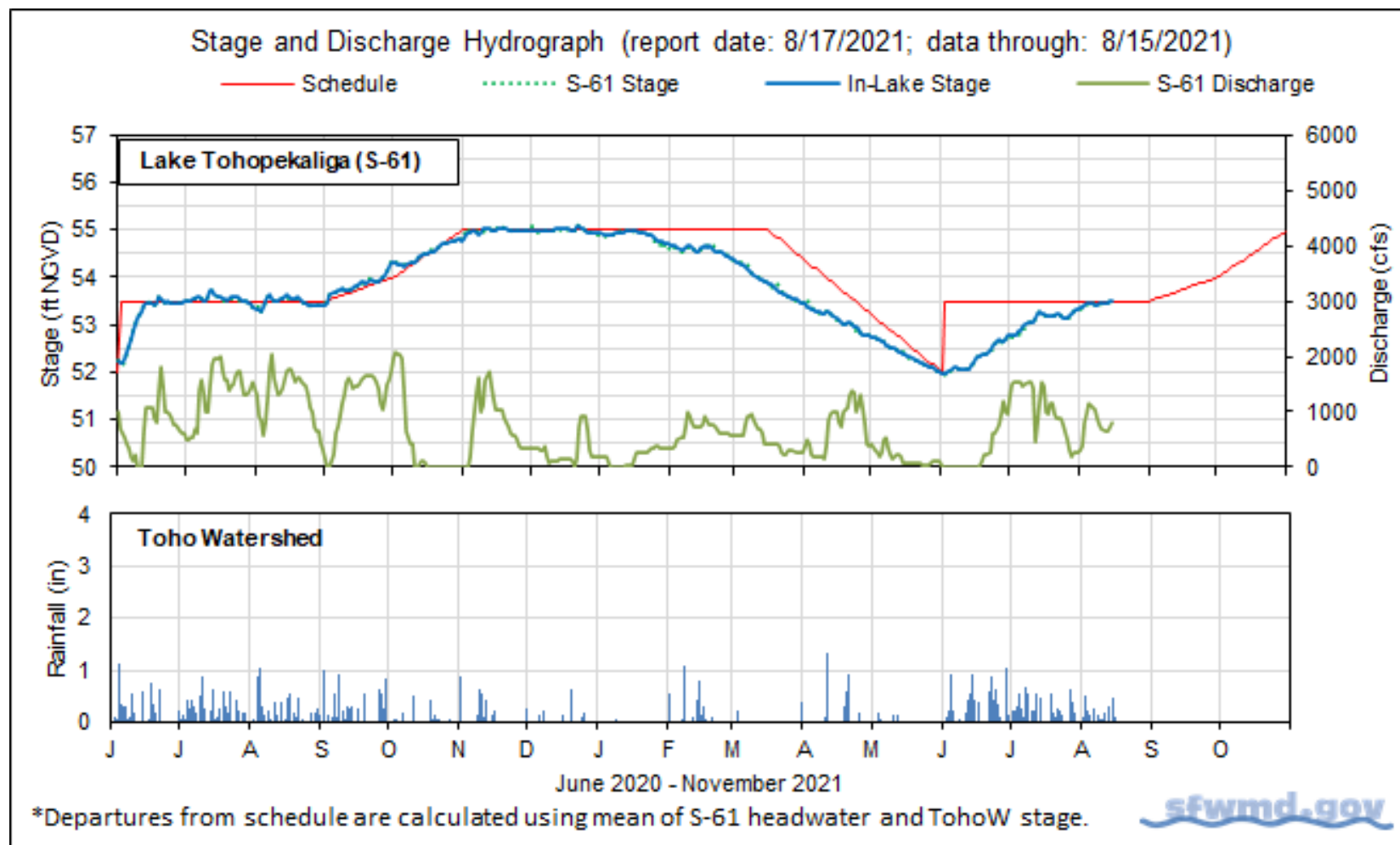
Water Body	Structure	Stage Monitoring Site	7-Day Average Discharge (cfs)	Lake Stage (feet NGVD) <sup>a</sup>	Schedule Type <sup>b</sup>	Schedule Stage (feet NGVD)	Departure from Regulation (feet)	
							8/15/21	8/8/21
Lakes Hart and Mary Jane	S-62	LKMJ	125	60.0	R	60.0	0.0	0.0
Lakes Myrtle, Preston and Joel	S-57	S-57	24	61.0	R	61.0	0.0	0.0
Alligator Chain	S-60	ALLI	11	63.2	R	63.2	0.0	0.0
Lake Gentry	S-63	LKGT	50	60.9	R	61.0	-0.1	0.0
East Lake Toho	S-59	TOHOE	292	56.4	R	56.5	-0.1	-0.2
Lake Toho	S-61	TOHOW S-61	744	53.5	R	53.5	0.0	-0.1
Lakes Kissimmee, Cypress and Hatchineha	S-65	KUB011 LKIS5B	1,473	51.3	R	51.0	0.3	0.3

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.

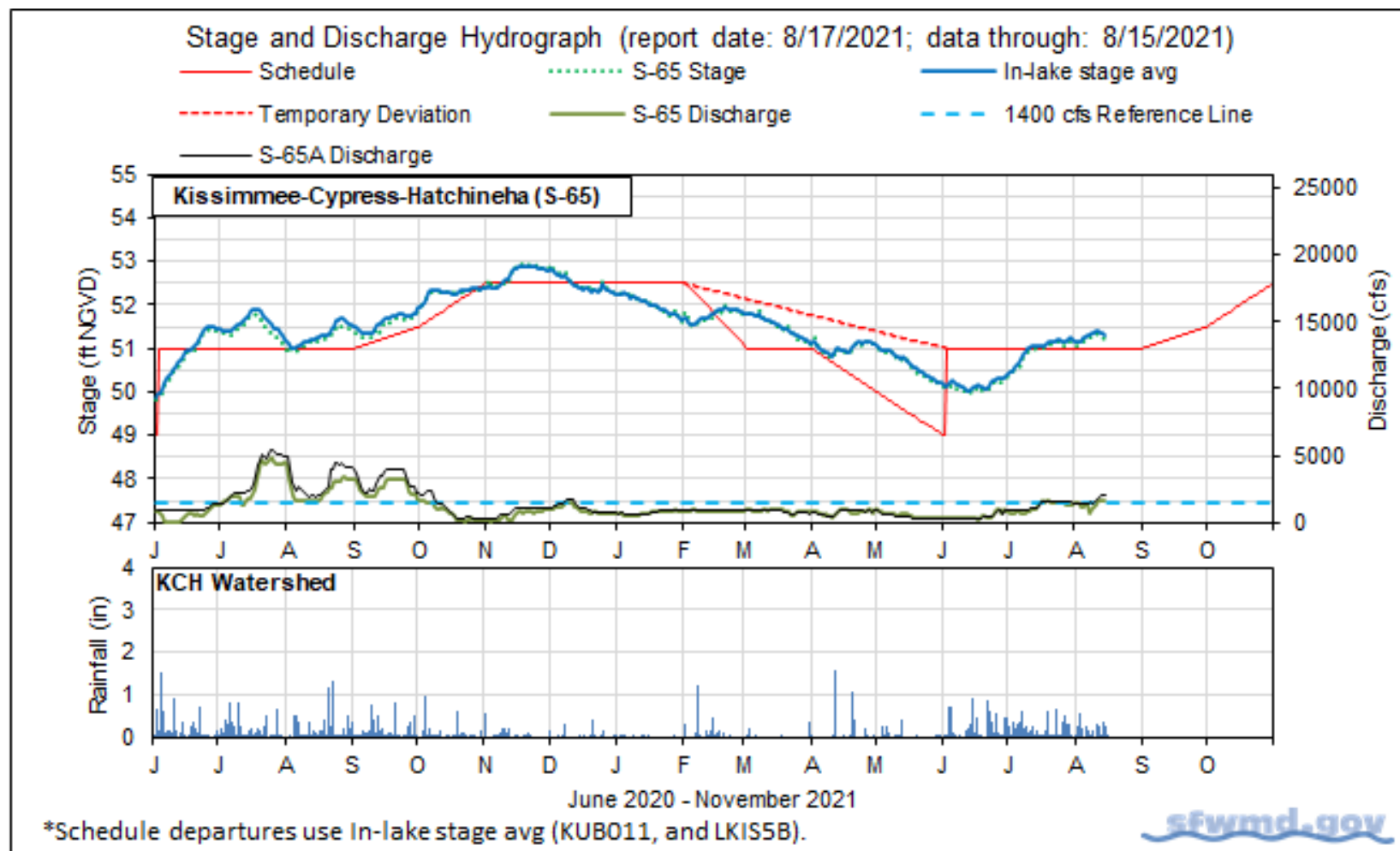
b. A: projected recession line; R: USACE regulation schedule; S: temporary recession target line; T: temporary schedule; NA: not applicable or not available.



**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			
			8/15/21	8/15/21	8/8/21	8/1/21
Discharge	S-65		1,690	1,470	1,210	1,360
Discharge	S-65A <sup>a</sup>		1,990	1,790	1,460	1,500
Headwater Stage (feet NGVD)	S-65A		46.5	46.5	46.4	46.4
Discharge	S-65D <sup>b</sup>		2,130	1,890	1,600	1,380
Headwater Stage (feet NGVD)	S-65D <sup>c</sup>		28.5	28.5	27.7	27.6
Discharge (cfs)	S-65E <sup>d</sup>		2,490	2,200	1,790	1,590
Discharge (cfs)	S-67		0	0	0	0
Dissolved Oxygen (mg/L) <sup>e</sup>	Phase I, II/III river channel		0.5	0.7	1.2	1.7
Mean depth (feet) <sup>f</sup>	Phase I floodplain		1.08	0.96	0.86	0.68

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.

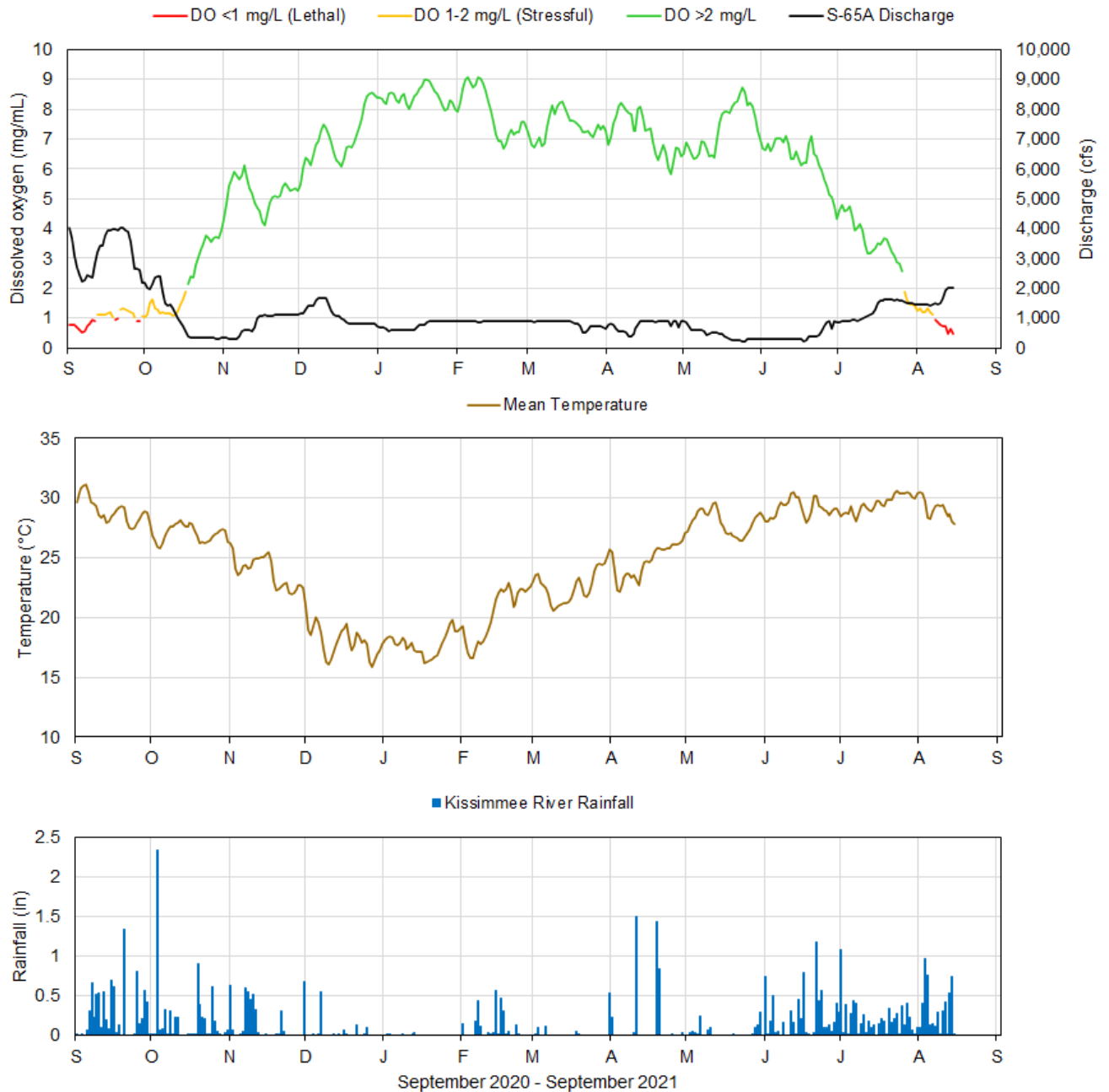
e. Dissolved oxygen is the average of values from sondes KRBN, PC62, PC63, PD62R and PD42R.

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).

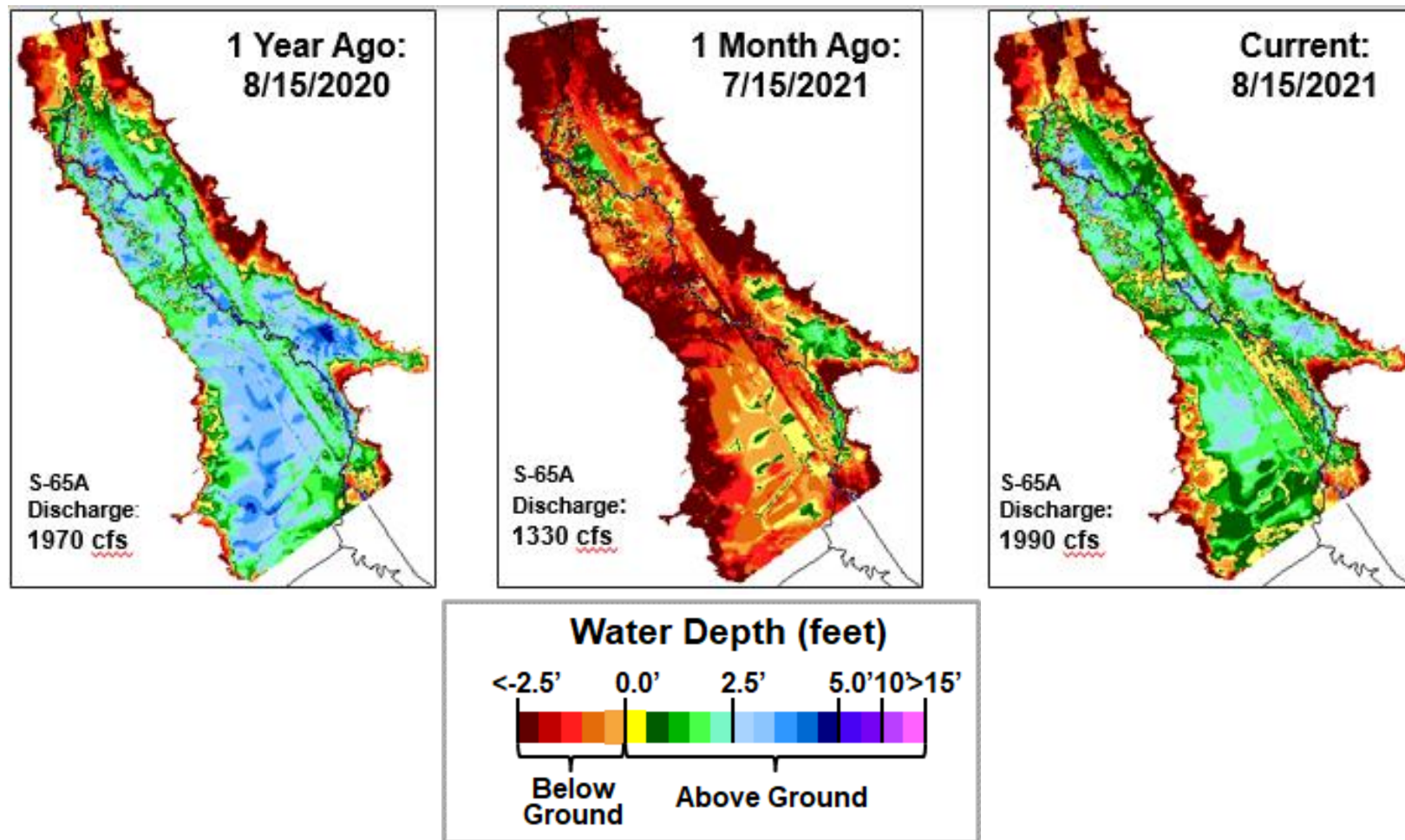
Discharge (cfs)	Maximum Rate of Increase (cfs/day)	Maximum Rate of Decrease (cfs/day)
0-300	100	-50
301-650	150	-75
651-1,400	300	-150
1,401-3,000	600	-600
>3,000	1,000	-2,000



Report Date: 8/17/2021; data are through: 8/15/2021

[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 four 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.

## Lake Okeechobee

Lake Okeechobee stage was 14.35 feet NGVD on August 15, 2021, 0.91 feet higher than a month ago, and 0.52 feet higher than one year ago (**Figure LO-1**). Lake stages were above the ecological envelope from August 1, 2020 to March 30, 2021, and near or within the upper threshold of the envelope until late-June 2021. Lake stages have increased recently due to increased precipitation and inflows over the last several weeks and have been above the ecological envelope since early-July, now 0.85 feet above (**Figure LO-2**). Lake stage remained in the Low flow sub-band last week (**Figure LO-3**). According to NEXRAD, 2.57 inches of rain fell directly on the Lake last week.

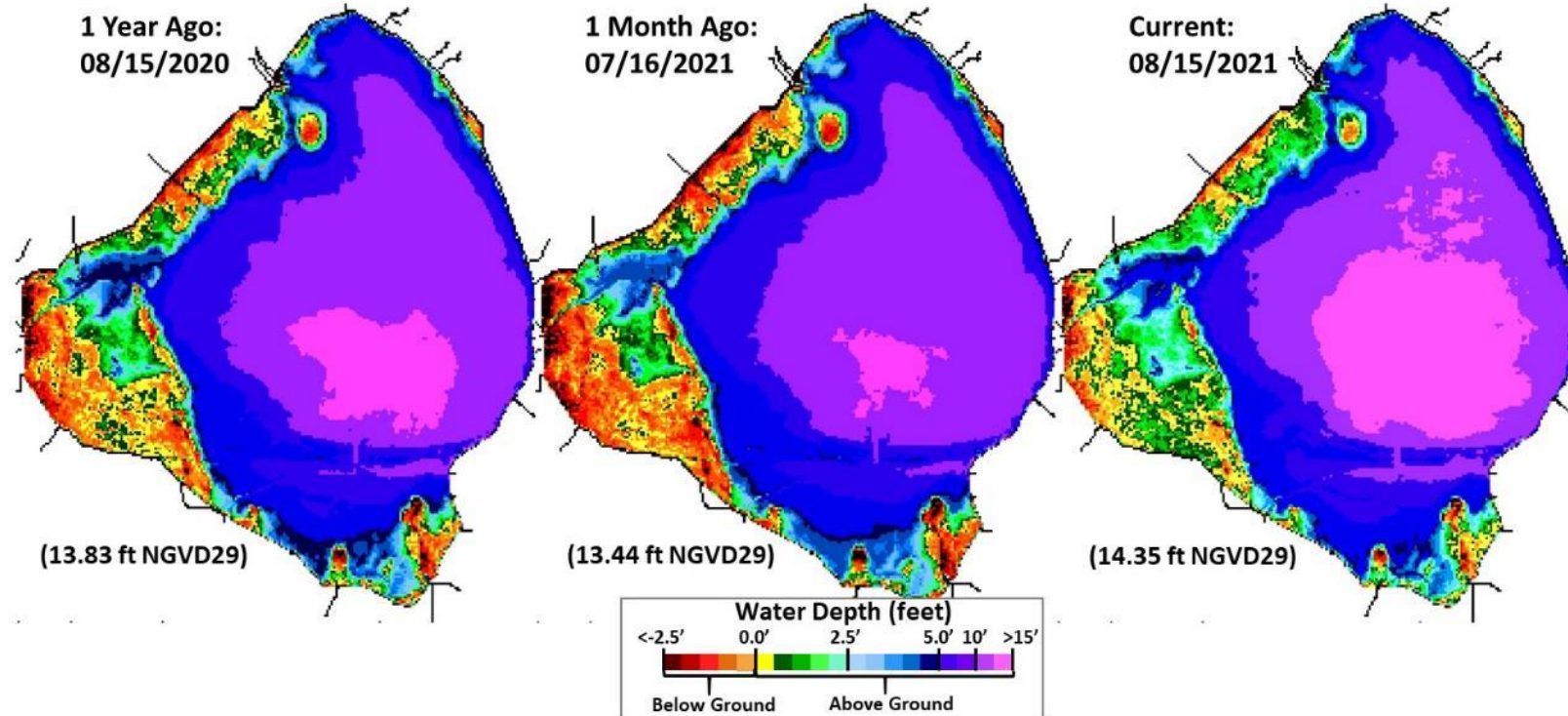
Average daily inflows (excluding rainfall) increased from the previous week, going from 5,971 cubic feet per second (cfs) to 6,386 cfs. There were essentially no outflows again (excluding evapotranspiration), with just 15 cfs this past week and 0 cfs the previous week. Most of the inflows (~73% of the total) came from the Kissimmee River (2,201 cfs through S-65E & S-65EX1) and Lake Istokpoga basin (C-41A canal [1,356 cfs through S-84 & S-84X] and C-40 & C-41 canals [1,063 cfs through S-72 & S-72]). Water flowed back into the Lake from the C-44 canal (via S-308 structure) and L-8 Canal (via S-271 structure) at average rates of 24 cfs and 102 cfs, respectively over the past week, but backflows through S-308 will cease now that lake stage is above 14 feet NGVD. Outflow to the west via S-77 was just 15 cfs, compared to 0 cfs the previous week. There was no outflow south via the S-350 structures. Average inflows and outflows through water control structures surrounding the Lake for the previous two weeks (cfs) are shown in Table LO-1, as is the resultant Lake elevation change in inches (in) due to each structure's flow for the past week. **Figure LO-4** shows the combined average daily cfs for inflows and outflows for the Lake over the past eight weeks. These data are provisional and are subject to change.

The most recent satellite image (August 11, 2021) from the NOAA cyanobacteria monitoring product derived from EUMETSAT's Sentinel 3 OLCI sensor data showed medium to high bloom potential in the southwestern, western and northeastern nearshore areas of the Lake, and low bloom potential in the central part of the Lake after easterly winds in the later part of the week (**Figure LO-5**).

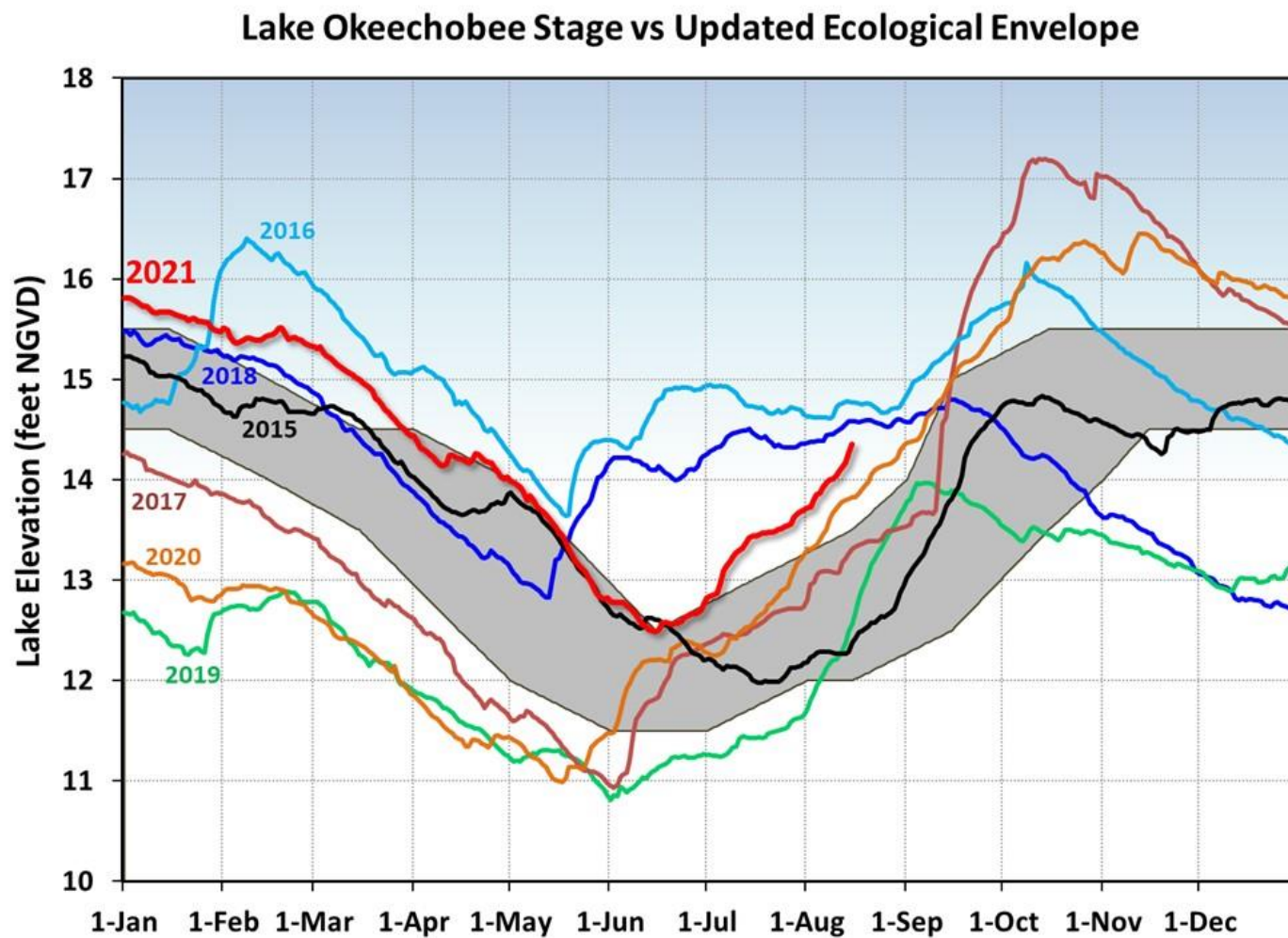
**Table LO-1.** Weekly Lake Okeechobee inflows and outflows (cfs) and as change in elevation (in).

Provisional data.

INFLOWS	Previous week Avg Daily (cfs)	Avg Daily Flow (cfs)	Equivalent Depth Week Total (in)	OUTFLOWS	Previous week Avg Daily (cfs)	Avg Daily Flow (cfs)	Equivalent Depth Week Total (in)
S-65E & S-65EX1	1787	2201	0.9	S-77	0	15	0.0
S-71 & S-72	1242	1063	0.4	*S-308	-279	-24	0.0
S-84 & S-84X	1489	1356	0.6	S-351	0	0	0.0
Fisheating Creek	513	855	0.3	S-352	0	0	0.0
S-154	50	117	0.0	S-354	0	0	0.0
S-191	64	99	0.0	*L-8 (S-271)	-197	-102	0.0
S-133 P	63	89	0.0	ET	2193	1880	0.8
S-127 P	58	117	0.0	<b>Total</b>	<b>2193</b>	<b>1895</b>	<b>0.8</b>
S-129 P	48	49	0.0				
S-131 P	52	31	0.0				
S-135 P	128	280	0.1				
S-2 P	0	0	0.0				
S-3 P	0	0	0.0				
S-4 P	0	3	0.0				
*Backflow	476	126	0.1				
Rainfall	5516	6891	2.8				
<b>Total</b>	<b>11487</b>	<b>13277</b>	<b>5.4</b>				

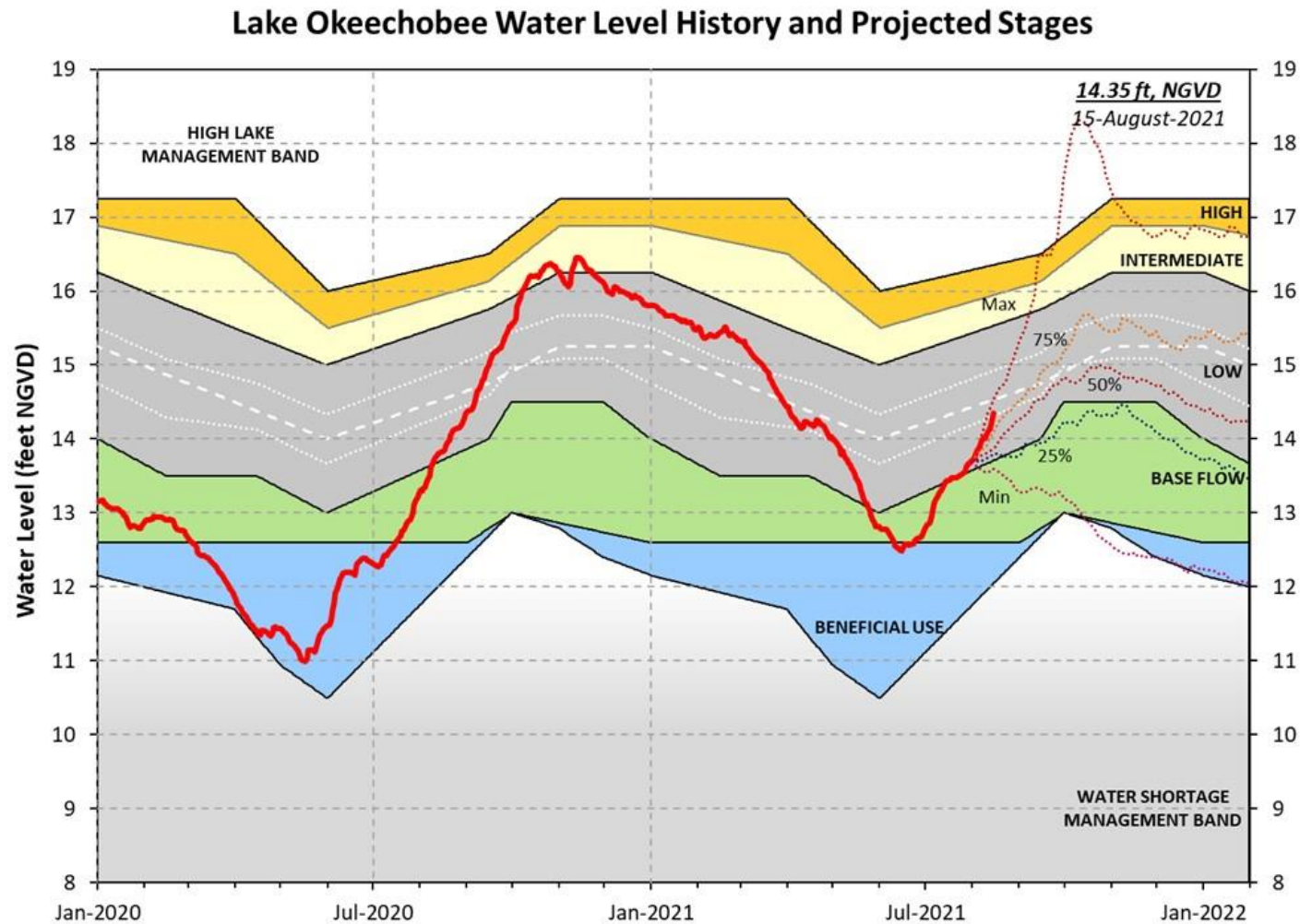


**Figure LO-1.** Lake Okeechobee water depth estimates based on South Florida Water Depth Assessment Tool (SFWDAT).



**Figure LO-2.** Select annual stage hydrographs for Lake Okeechobee in comparison to the updated ecological envelope.

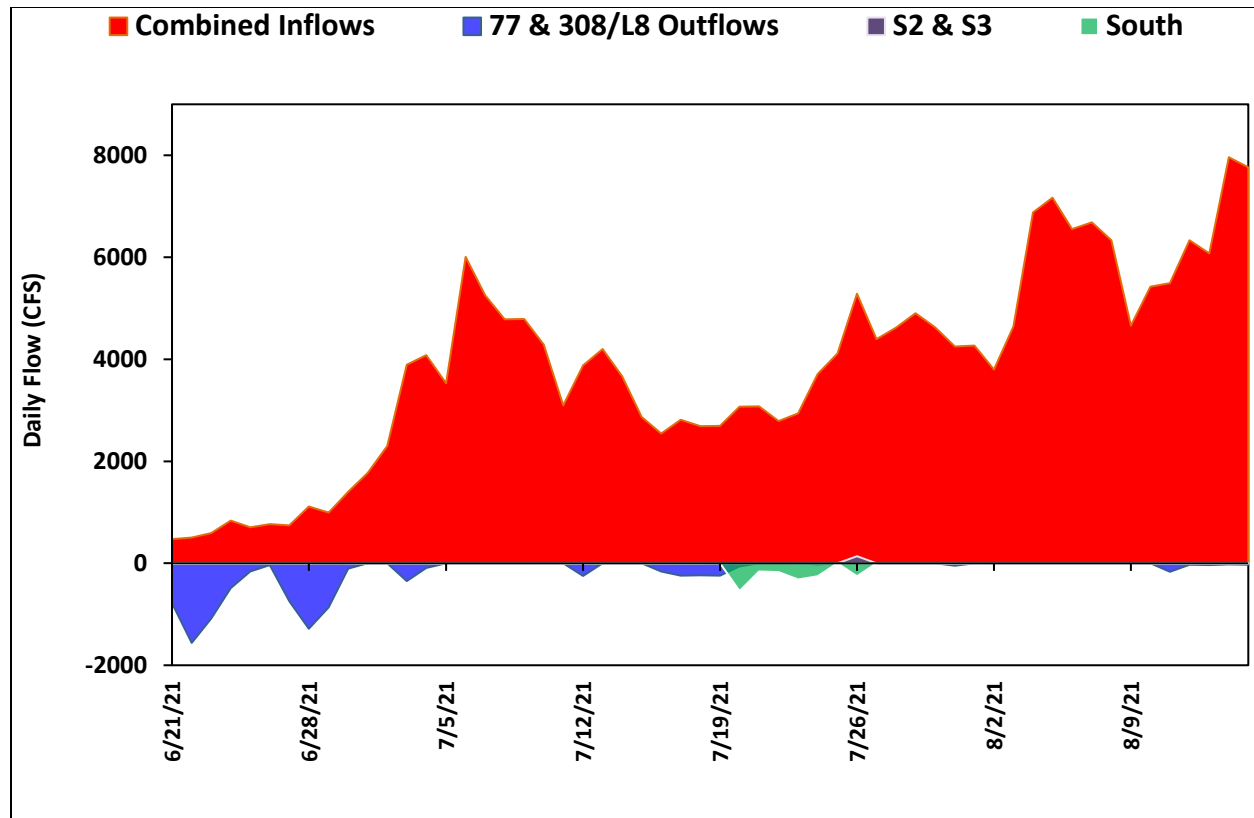




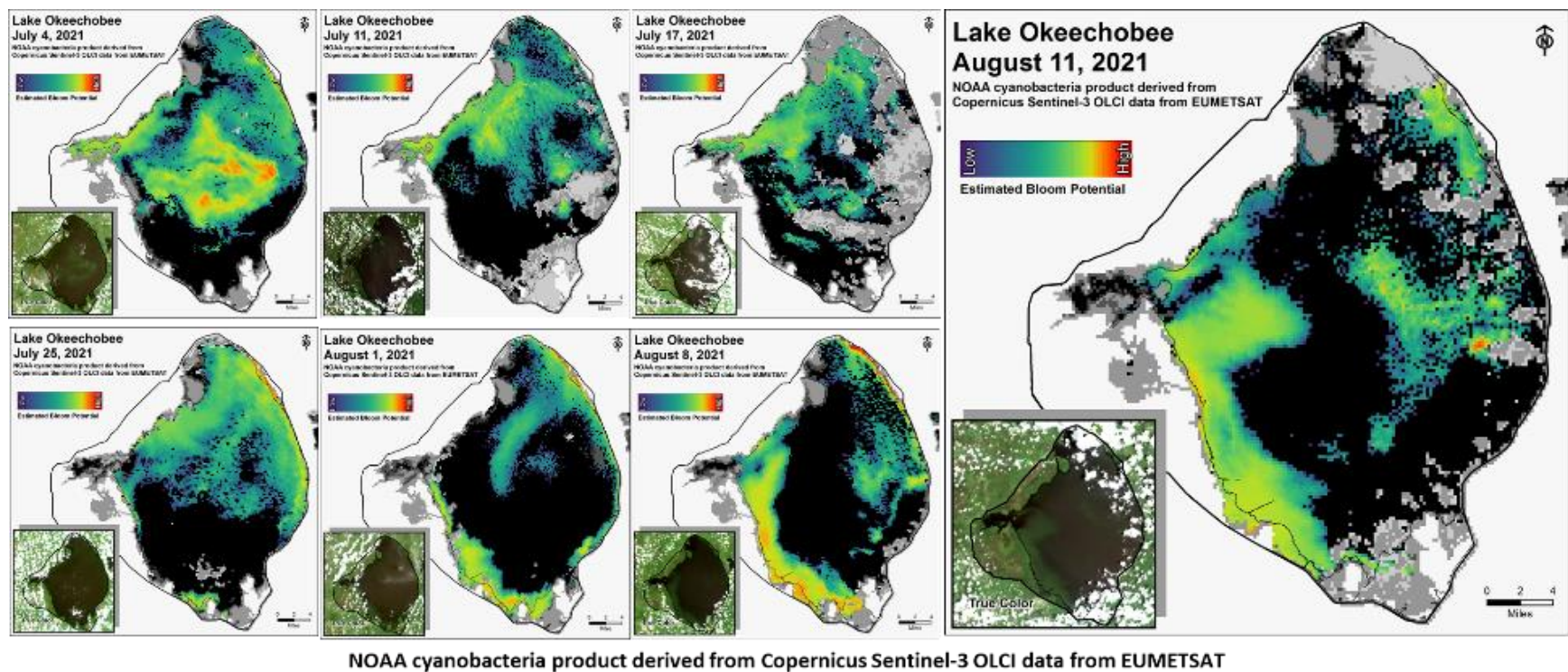
LORS-2008 - Adopted by USACE 28-April-2008

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





**Figure LO-4.** Major inflows (red) to and outflows east and west (blue) from Lake Okeechobee. Outflows south are shown in green. Back-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 due to lock openings for navigation.



**Figure LO-5.** Cyanobacteria bloom potential 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 2,138 cfs (**Figures ES-1 and ES-2**) and the previous 30-day mean inflow was approximately 1,630 cfs. For comparison, the historical provisional mean inflows from the contributing areas are shown in **Figure ES-2**.

Over the past week, mean surface salinities decreased at HR1 and the US1 Bridge and increased slightly at the A1A Bridge site (**Table ES-1 and Figure ES-3**). The seven-day moving average of the surface and bottom salinities at the US1 Bridge was 8.1. Salinity conditions in the middle estuary were estimated to be within the fair 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 4,654 cfs (**Figures ES-5 and ES-6**) and the previous 30-day mean inflow was approximately 4,293 cfs. For comparison, the historical provisional mean inflows from the contributing areas are shown in **Figure ES-6**.

Over the past week, mean surface salinities decreased at all sites in the estuary except Ft. Myers where it remained the same (**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 Sanibel and Shell Point, and in the poor 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 1500 cfs and steady releases at 2,000 and 3,000 cfs with estimated tidal basin inflows of 1,340 cfs. Model results from all scenarios predict daily salinity to be 0.4 or lower and the 30-day moving average surface salinity to be 0.3 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 August 13, 2021, that *Karenia brevis*, the Florida red tide dinoflagellate, was observed in low to medium concentrations in Charlotte County, and very low to medium concentrations in and

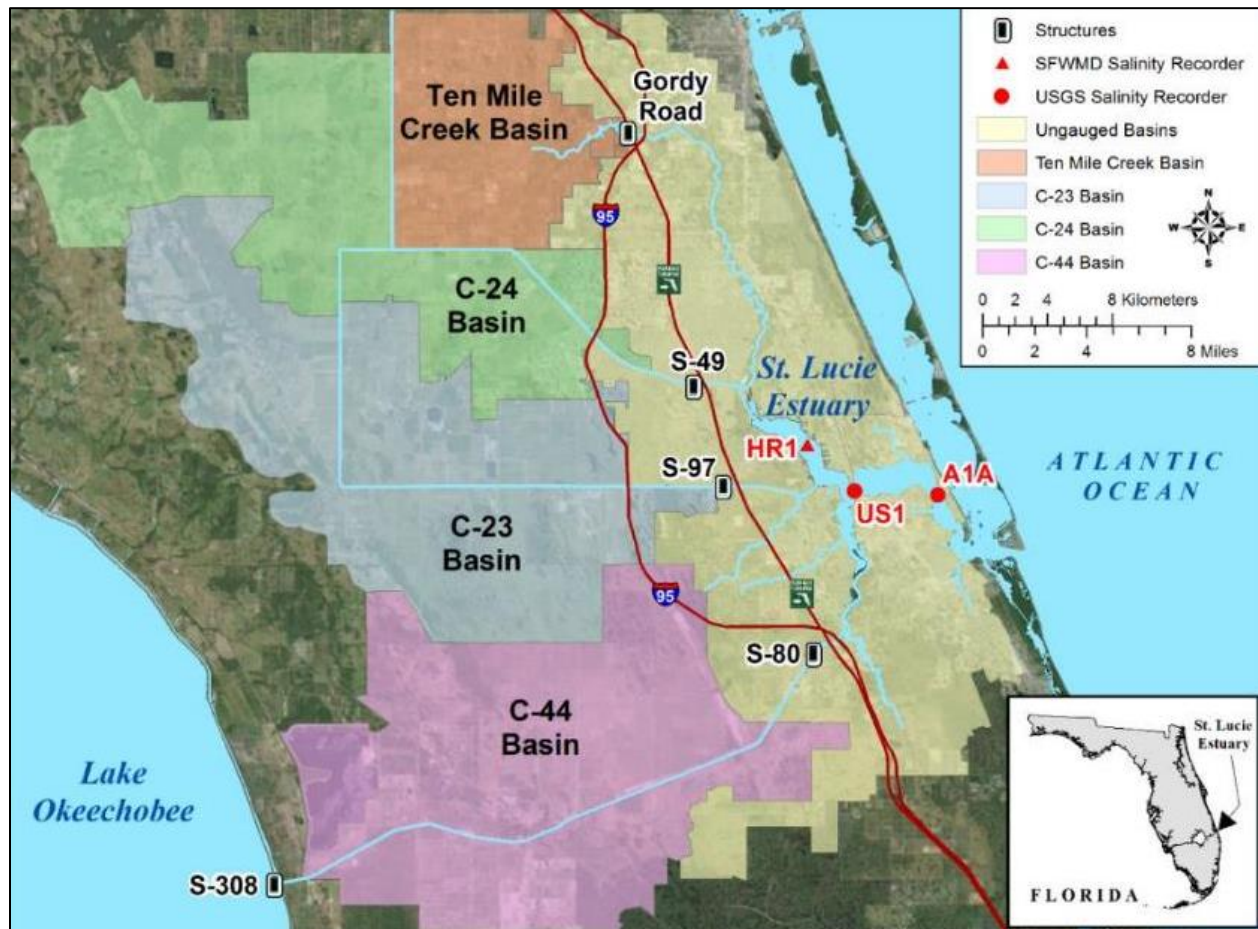
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<sup>1</sup> Qiu, C., and Y. Wan. 2013. Time series modeling and prediction of salinity in the Caloosahatchee River Estuary. *Water Resources Research* 49:5804-5816.

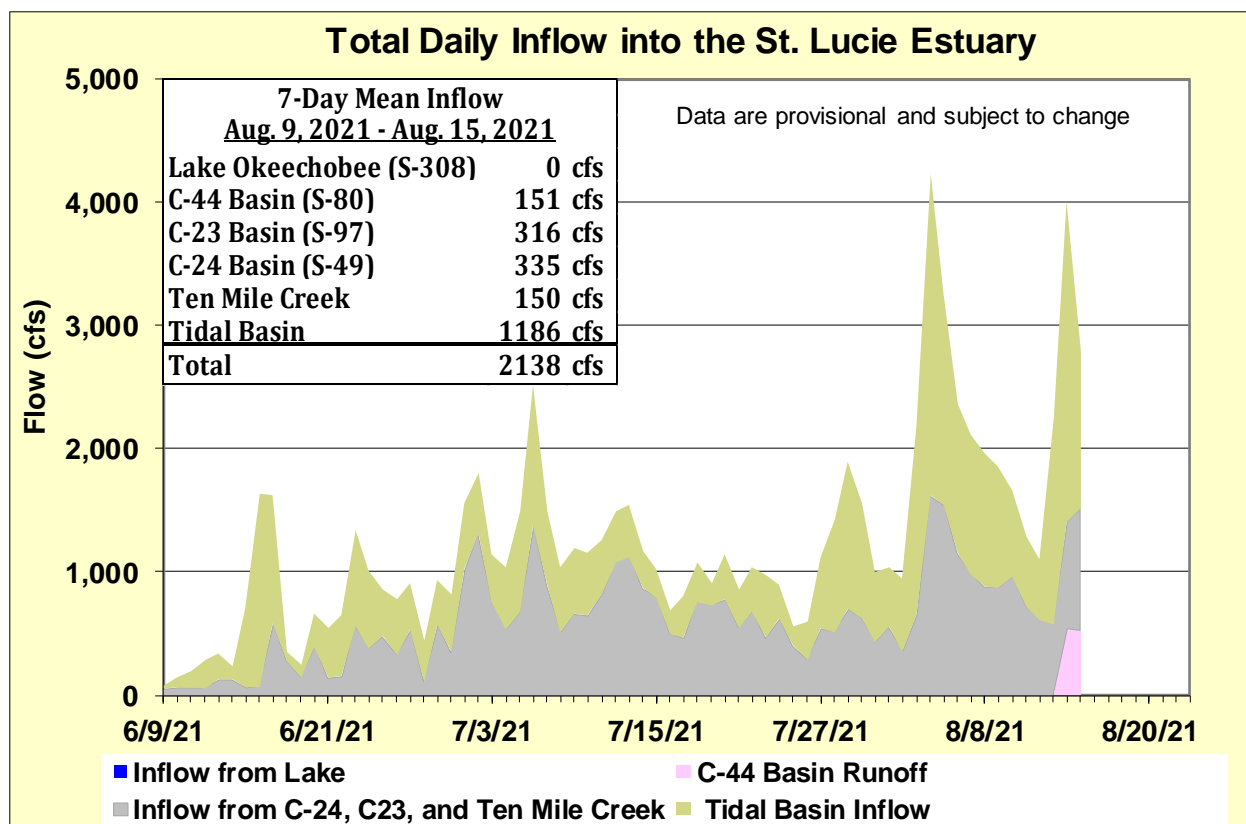
offshore of Lee County. On the east coast, red tide was not observed in samples from St. Lucie, Martin, Palm Beach or Miami-Dade counties.

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

Lake stage is in the Low Sub-Band. Tributary conditions are Very Wet. 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.

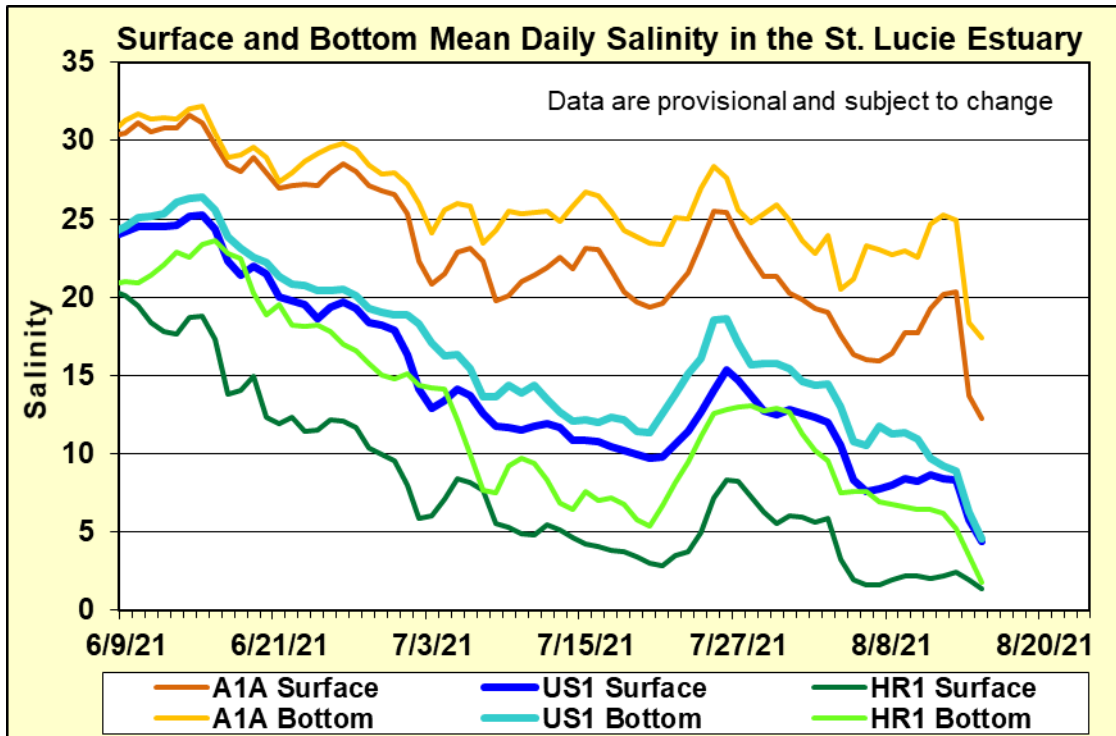


**Figure ES-2.** Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and Tidal Basins into the St. Lucie Estuary.

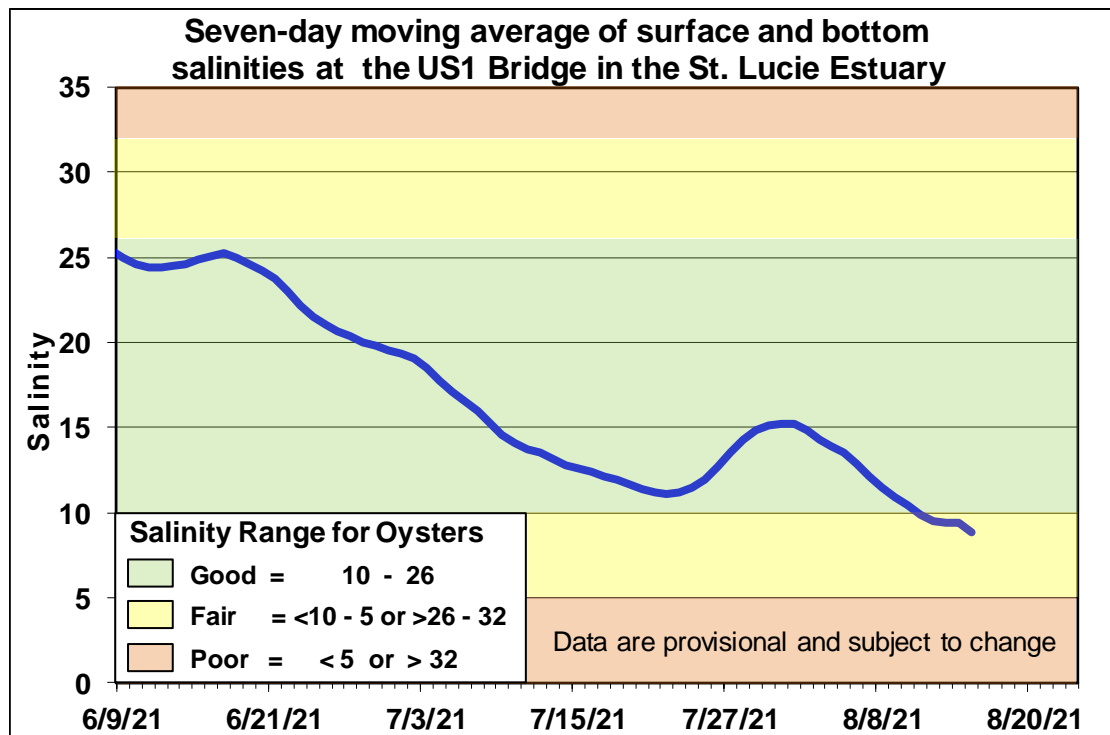
**Table ES-1.** Seven-day mean salinity at oyster monitoring sites in the St. Lucie Estuary. Current means are in bold font; previous week's means are in parentheses. The envelope reflects the preferred salinity range for adult eastern oysters (*Crassostrea virginica*) in the middle estuary. Data are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

Sampling Site	Surface	Bottom	Envelope
HR1 (North Fork)	<b>2.1</b> (3.1)	<b>5.2</b> (8.0)	NA <sup>a</sup>
US1 Bridge	<b>7.5</b> (9.5)	<b>8.7</b> (12.3)	10.0 – 26.0
A1A Bridge	<b>17.3</b> (17.2)	<b>22.3</b> (22.5)	NA <sup>a</sup>

a. The envelope is not applicable.

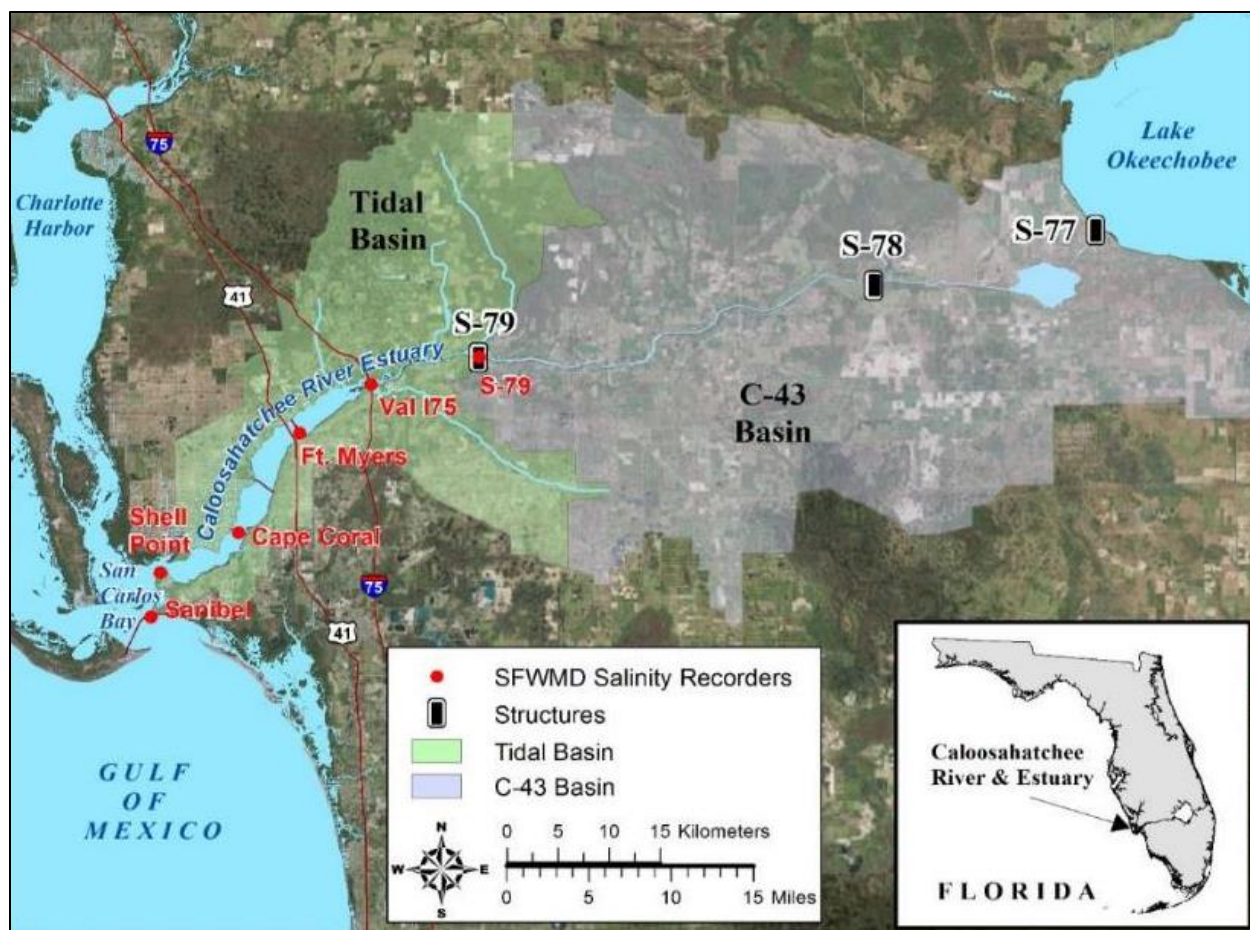


**Figure ES-3.** Mean daily salinity at the A1A, US1 and HR1 sites in the St. Lucie Estuary.

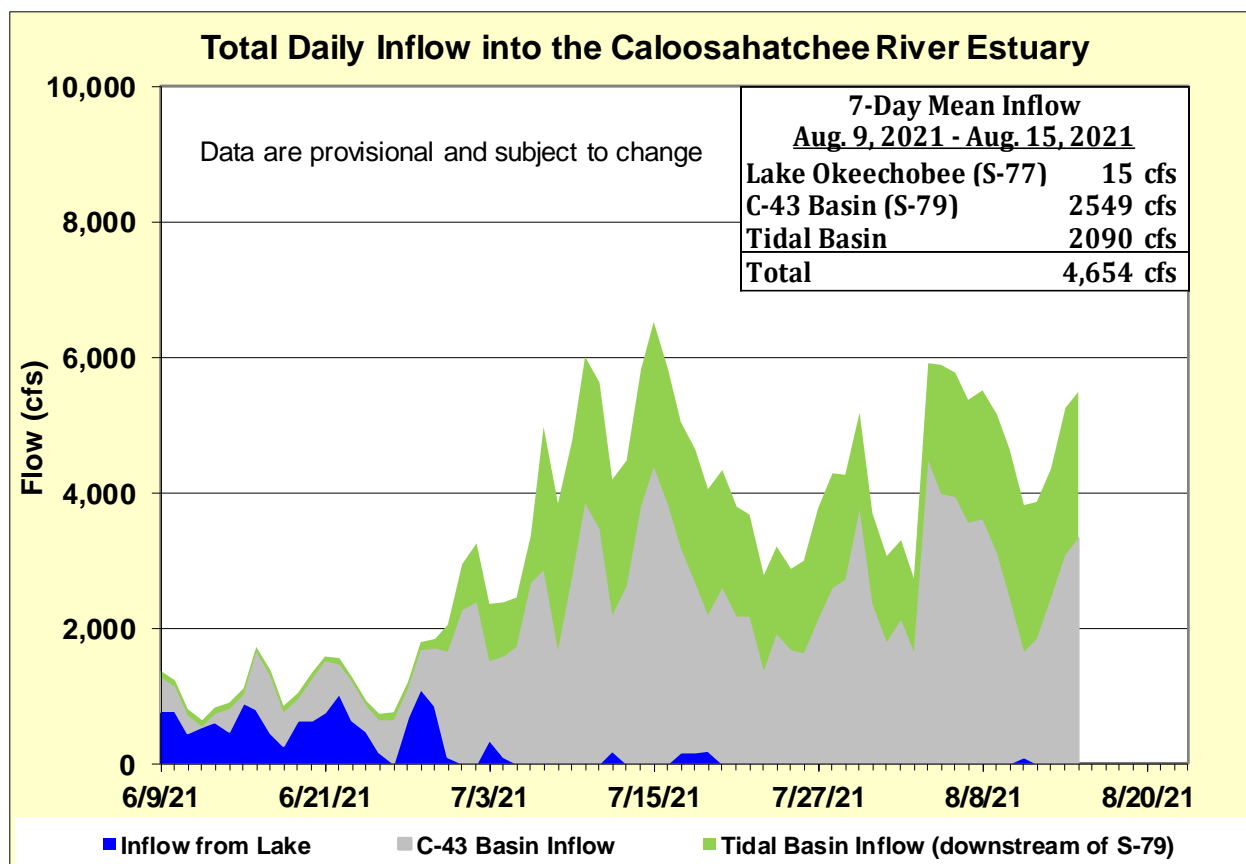


**Figure ES-4.** Seven-day moving average of the surface and bottom salinities at the US1 Bridge in the St. Lucie Estuary.





**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.

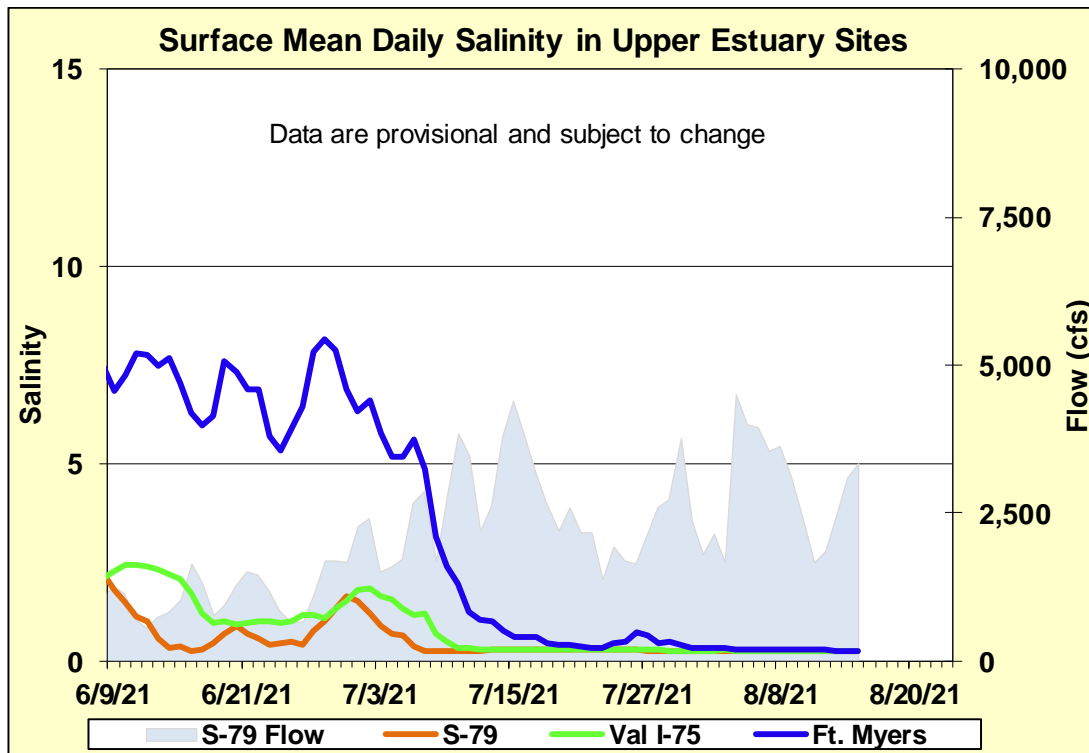
**Table ES-2.** Seven-day mean salinity at six monitoring sites in the Caloosahatchee River Estuary. Current means are in bold font; previous week's means are in parentheses. The envelope at I-75 is for the protection of tape grass in the upper estuary and the envelope in the lower estuary is the preferred salinity range for adult eastern oysters (*Crassostrea virginica*). Data are provisional.

Sampling Site	Surface	Bottom	Envelope
S-79 (Franklin Lock)	<b>0.2</b> (0.3)	<b>0.2</b> (0.2)	NA <sup>a</sup>
Val I-75	<b>0.2</b> (0.3)	<b>0.2</b> (0.3)	0.0 – 5.0 <sup>b</sup>
Fort Myers Yacht Basin	<b>0.3</b> (0.3)	<b>0.4</b> (0.4)	NA <sup>a</sup>
Cape Coral	<b>2.1</b> (3.4)	<b>3.1</b> (4.3)	10.0 – 30.0
Shell Point	<b>14.9</b> (17.7)	<b>17.2</b> (19.4)	10.0 – 30.0
Sanibel	<b>23.8</b> (25.4)	<b>26.2</b> (27.1)	10.0 – 30.0

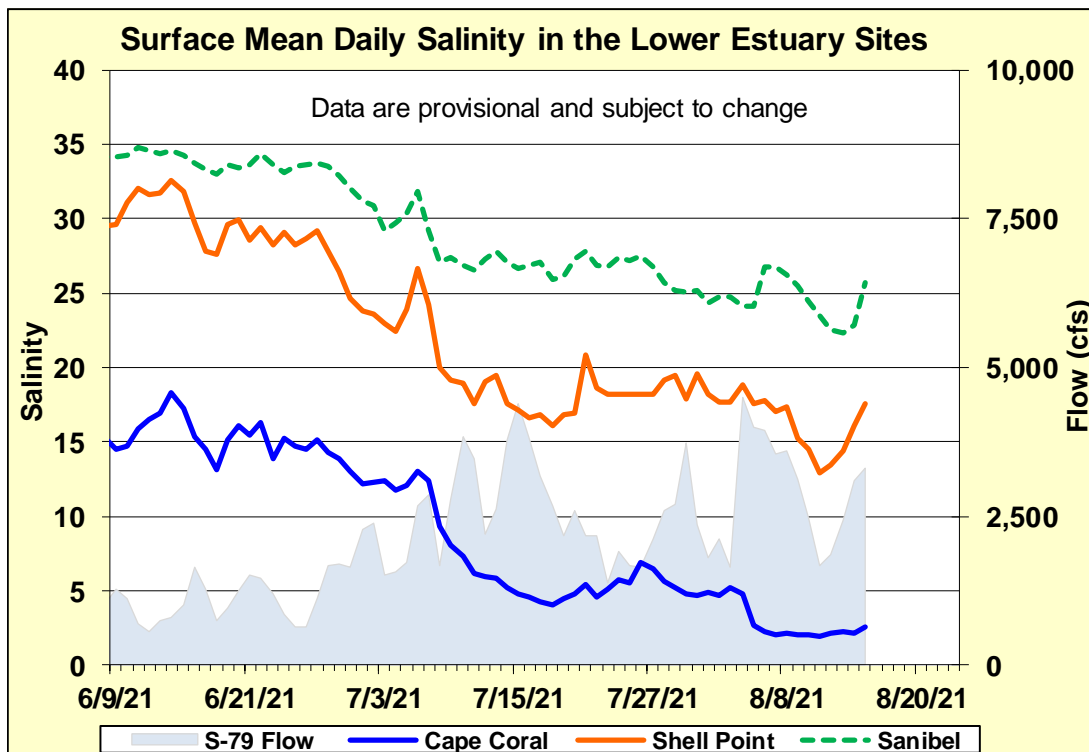
a. The envelope is not applicable.

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

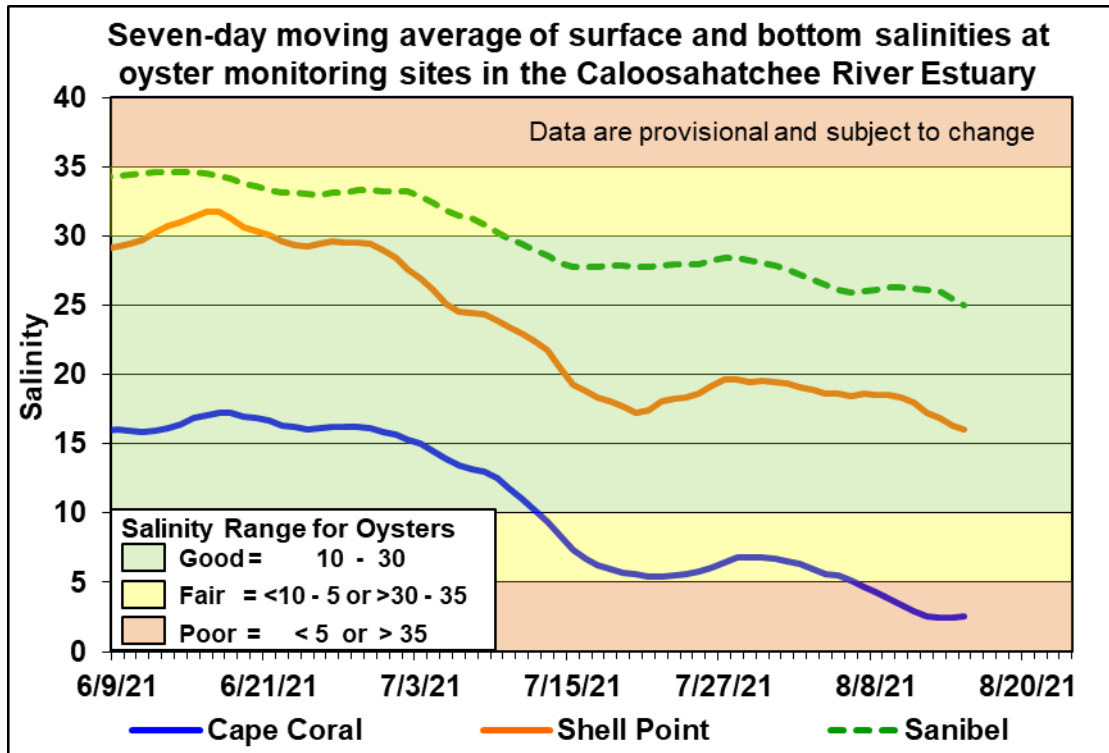




**Figure ES-7.** Mean daily salinity at upper Caloosahatchee River Estuary monitoring sites and mean daily flow at S-79.



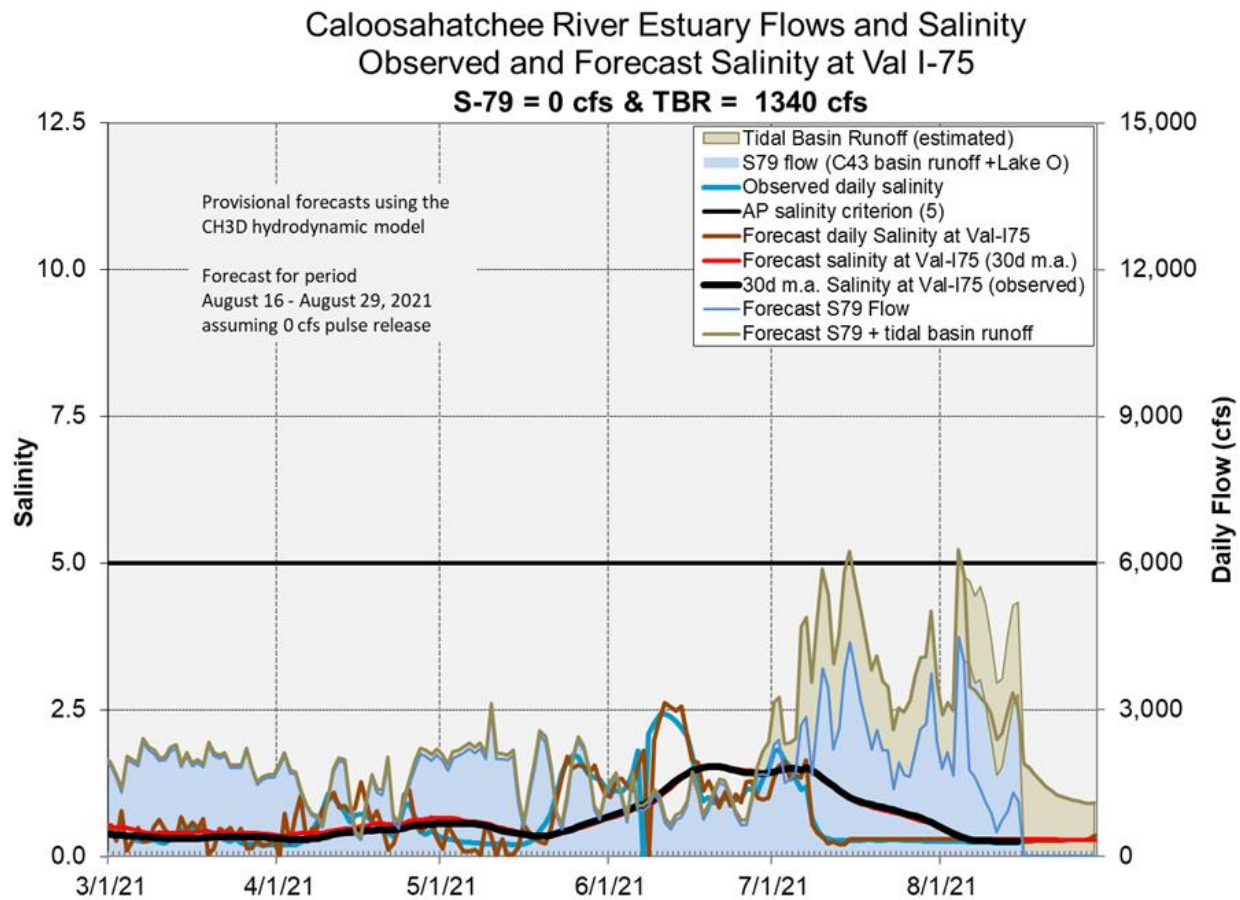
**Figure ES-8.** Mean daily surface salinity at lower Caloosahatchee River Estuary monitoring sites and mean daily flow at S-79.



**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	1340	0.4	0.3
B	450	1340	0.3	0.3
C	1000	1340	0.3	0.3
D	1500	1340	0.3	0.3
E	2000	1340	0.3	0.3
F	3000	1340	0.3	0.3



**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 near or above target stage, vegetation in these cells is stressed and highly stressed and the 365-day phosphorus loading rates (PLR) for these flow-ways are very high (**Figure S-1**).

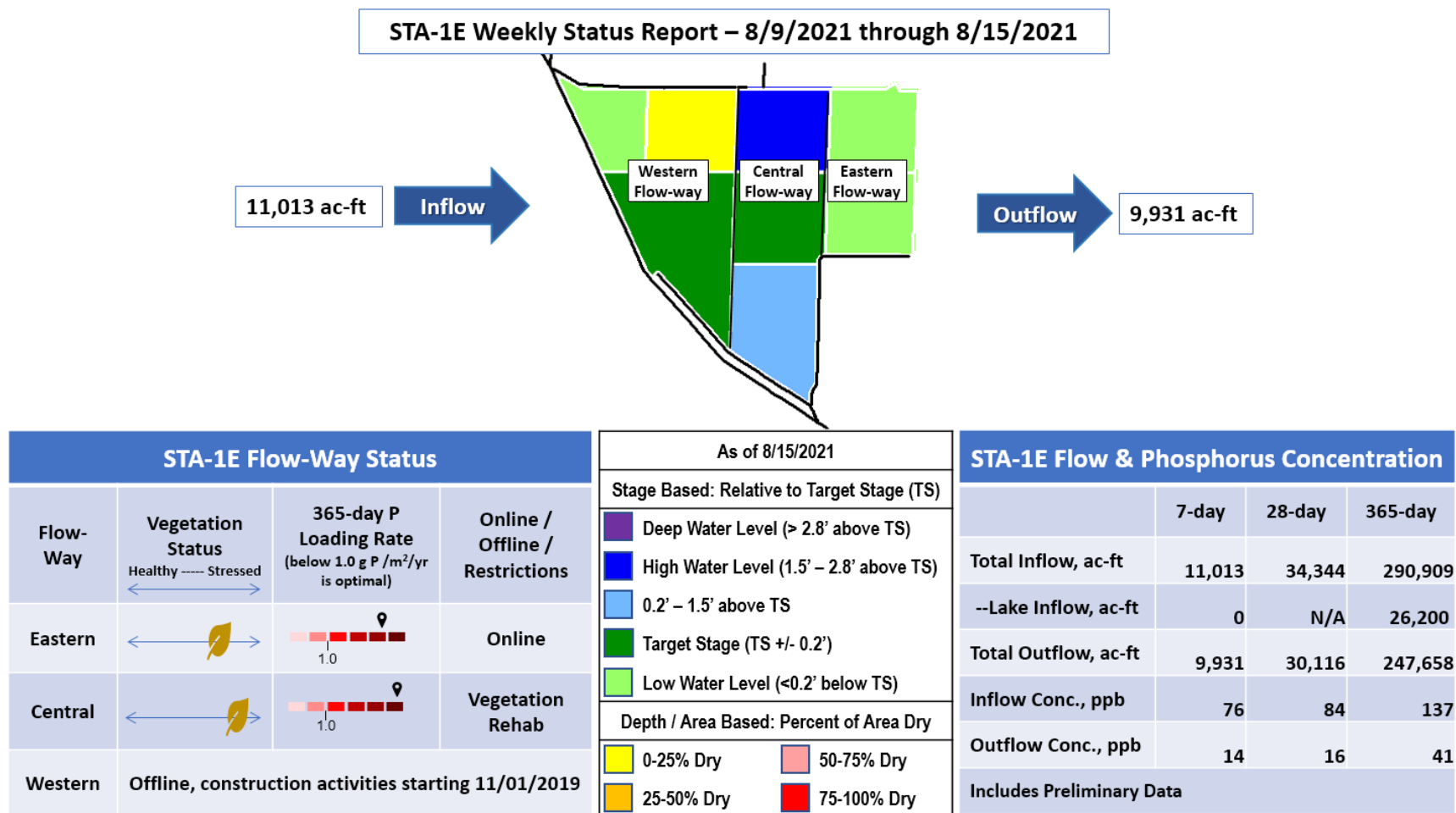
**STA-1W:** Operational restrictions are in place in STA-1W Western, Eastern, and Northern Flow-ways due to construction activities. Most treatment cells are near target stage. Vegetation in the flow-ways is stressed and highly stressed. The 365-day PLRs for most flow-ways are high (**Figure S-2**).

**STA-2:** Operational restrictions are in place in STA-2 Flow-ways 3 and 4 for vegetation management activities and in Flow-way 2 for construction activities. Most treatment cells are at or above 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 is high and for Flow-way 2 is very high (**Figure S-3**).

**STA-3/4:** STA-3/4 Eastern Flow-way is offline for vegetation rehabilitation/drawdown. Online treatment cells are at 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 all flow-ways are below 1.0 g/m<sup>2</sup>/year (**Figure S-4**).

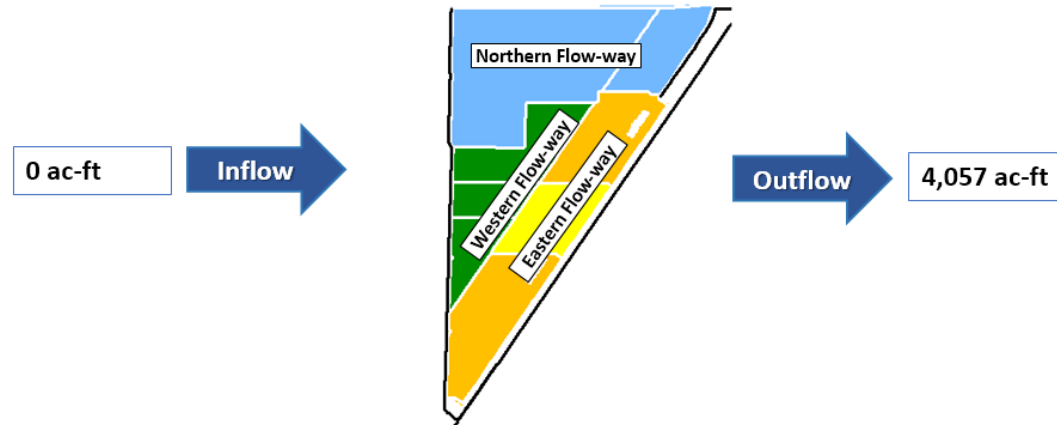
**STA-5/6:** Operational restrictions are in place in STA-5/6 Flow-ways 2 and 3 following the Restoration Strategies project to grade non-effective treatment areas. Most treatment cells are at or above target stage. The 365-day PLRs for most flow-ways are above 1.0 g/m<sup>2</sup>/year. All treatment cells have highly stressed vegetation conditions except Flow-ways 7 and 8 which are healthy (**Figure S-5** and **S-6**).

For definitions on STA operational language see glossary following figures.



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

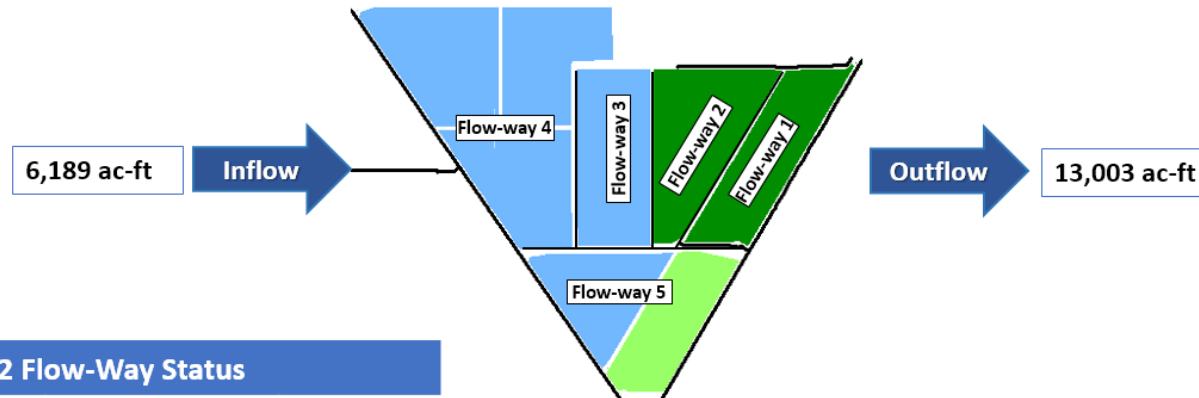
# STA-1W Weekly Status Report – 8/9/2021 through 8/15/2021



STA-1W Flow-Way Status				As of 8/15/2021				STA-1W Flow & Phosphorus Concentration			
Flow-Way	Vegetation Status <small>Healthy --- Stressed</small>	365-day P Loading Rate <small>(below 1.0 g P /m<sup>2</sup>/yr is optimal)</small>	Online / Offline / Restrictions	Stage Based: Relative to Target Stage (TS)					7-day	28-day	365-day
				<div><div></div> Deep Water Level (&gt; 2.8' above TS)</div>	<div><div></div> High Water Level (1.5' – 2.8' above TS)</div>	<div><div></div> 0.2' – 1.5' above TS</div>	<div><div></div> Target Stage (TS +/- 0.2')</div>				
Northern	<div><div></div></div>	<div><div></div></div>	Construction	Depth / Area Based: Percent of Area Dry							
Western	<div><div></div></div>	<div><div></div></div>	Construction	<div><div></div> 0-25% Dry</div>	<div><div></div> 50-75% Dry</div>						
				<div><div></div> 25-50% Dry</div>	<div><div></div> 75-100% Dry</div>						
Eastern	<div><div></div></div>	<div><div></div></div>	Construction								
Includes Preliminary Data											

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

### STA-2 Weekly Status Report – 8/9/2021 through 8/15/2021



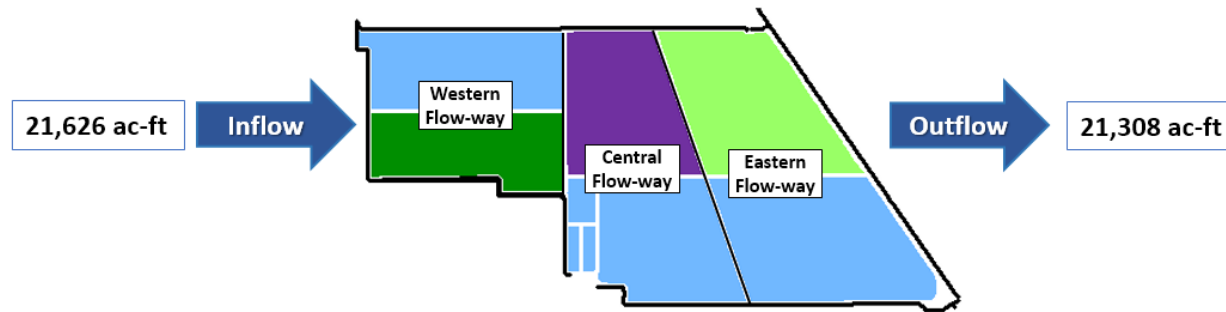
STA-2 Flow-Way Status			
Flow-Way	Vegetation Status Healthy ----- Stressed	365-day P Loading Rate (below 1.0 g P /m <sup>2</sup> /yr is optimal)	Online / Offline / Restrictions
1			Online
2			Construction
3			Vegetation Rehab
4			Vegetation Rehab
5			Online

As of 8/15/2021	
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	6,189	35,569	425,479
--Lake Inflow, ac-ft	0	N/A	90,800
Total Outflow, ac-ft	13,003	49,243	474,044
Inflow Conc., ppb	103	97	93
Outflow Conc., ppb	15	15	20
Includes Preliminary Data			

Figure S-3. STA-2 Weekly Status Report

# STA-3/4 Weekly Status Report – 8/9/2021 through 8/15/2021

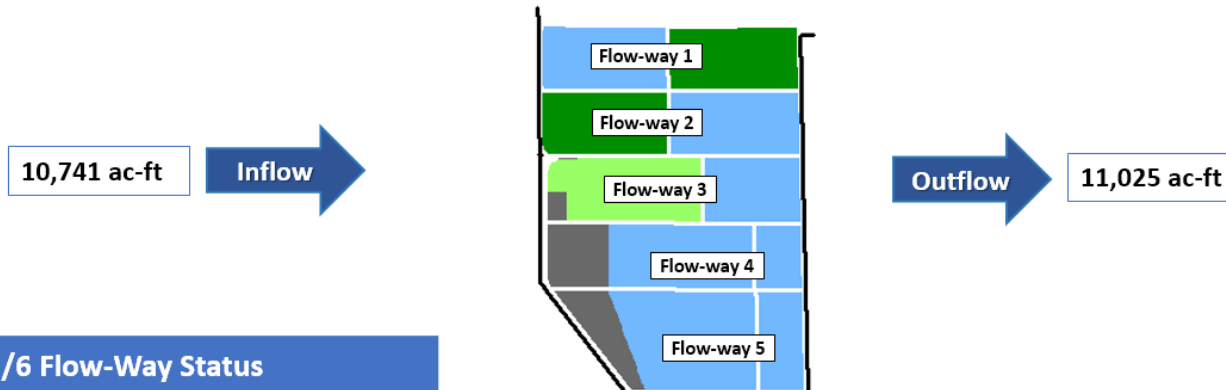


STA-3/4 Flow-Way Status				As of 8/15/2021				STA-3/4 Flow & Phosphorus Concentration			
Flow-Way	Vegetation Status Healthy ----- Stressed ←-----→	365-day P Loading Rate (below 1.0 g P / m <sup>2</sup> /yr is optimal)	Online / Offline / Restrictions	Stage Based: Relative to Target Stage (TS)					7-day	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	21,626	76,217	542,590
Central	←-----→	1.0	Online	High Water Level (1.5' – 2.8' above TS)				--Lake Inflow, ac-ft	0	N/A	61,200
Western	←-----→	1.0	Online	0.2' – 1.5' above TS				Total Outflow, ac-ft	21,308	66,773	497,704
				Target Stage (TS +/- 0.2')				Inflow Conc., ppb	70	63	63
				Low Water Level (<0.2' below TS)				Outflow Conc., ppb	11	13	14
				Depth / Area Based: Percent of Area Dry				Includes Preliminary Data			
				0-25% Dry		50-75% Dry					
				25-50% Dry		75-100% Dry					

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



STA-5/6 Weekly Status Report – 8/9/2021 through 8/15/2021



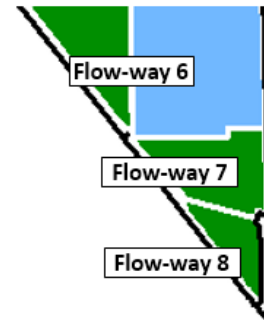
STA-5/6 Flow-Way Status			
Flow-Way	Vegetation Status Healthy ----- Stressed	365-day P Loading Rate (below 1.0 g P / m <sup>2</sup> /yr is optimal)	Online / Offline / Restrictions
1			Online
2		N/A	Post-construction
3		N/A	Post-construction
4			Online
5			Online

As of 8/15/2021	
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	10,741	32,975	139,664
--Lake Inflow, ac-ft	0	N/A	9,000
Total Outflow, ac-ft	11,025	28,808	155,006
Inflow Conc., ppb	338	287	289
Outflow Conc., ppb	52	44	71
Includes Preliminary Data			

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

## STA-5/6 Weekly Status Report – 8/9/2021 through 8/15/2021



STA-5/6 Flow-Way Status				As of 8/15/2021	
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)	
				<div><div></div> Deep Water Level (&gt; 2.8' above TS)</div> <div><div></div> High Water Level (1.5' – 2.8' above TS)</div> <div><div></div> 0.2' – 1.5' above TS</div> <div><div></div> Target Stage (TS +/- 0.2')</div> <div><div></div> Low Water Level (&lt;0.2' below TS)</div>	
6	<div><div></div><div></div></div>	<div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></di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**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: Stage at the 1-8C Gauge followed just above schedule last week and remains above the 3 Gauge average. Stage on Sunday was 0.32 feet above the Zone A1 regulation line. WCA-2A: Stage at 2A-17 remained stable last week, with the average on Sunday 0.55 feet higher than the Zone A regulation line. WCA-3A: The Three Gauge Average continues to trend upwards faster than the slope of the Zone A regulation line last week. Stage ended the week at 0.18 feet below the Zone A line. WCA-3A: Stage change at gauge 62 (Northwest corner) was moderate last week. The Sunday average was 0.18 feet below the rising Upper Schedule. (**Figures EV-1 through EV-4**)

### ***Water Depths***

The WDAT tool indicates that water levels rose significantly across the EPA over the last two months. Northeastern WCA-3A is recovering with surface water present but still drier than the surrounding regions. While downstream of S-11 and S-9, depths have exceeded 2.5 feet. North to South hydrologic connectivity rebounded with the recent rainfall, as sloughs within Everglades National Park (ENP) fill. Portions of eastern ENP remain dry or have water levels just at the ground surface (**Figure EV-5**). Over the last month, stages generally increased, most significantly in northern BCNP.

Compared to a year ago, WCA-3A is significantly drier than one year ago, especially in the east along the L-67 canals. Most of ENP remains drier than a year ago, some regions significantly so (**Figure EV-6**). Compared to the 20-year average water depths, much of the Everglades remains dryer than average except for northeastern ENP, WCA-1, and western Big Cypress. While closer to average this week, large areas of WCA-3A in the southwest, ENP and northeastern BC remain below average (**Figure EV-7**).

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

An average of 4.43 inches of rain fell over Taylor Slough (TS) and Florida Bay over the week ending Sunday (8/15) with most of the rain falling at the end of the week and over the weekend. Stage increased by an average of 0.22 feet over the week as a result of the rainfall and is expected to continue increasing as more water is moving into this area (**Figure EV-7 and Figure EV-8**). Usage of the westward moving structures has increased in the last week which will help to bring freshwater to the shoreline. The latest phosphorus measurement at S-328 on 8/10 was 14 µg/L total phosphorus. Extrapolating from past trends, the phosphorus threshold of 8 µg/L should be met this week to begin water movements towards Everglades National Park.

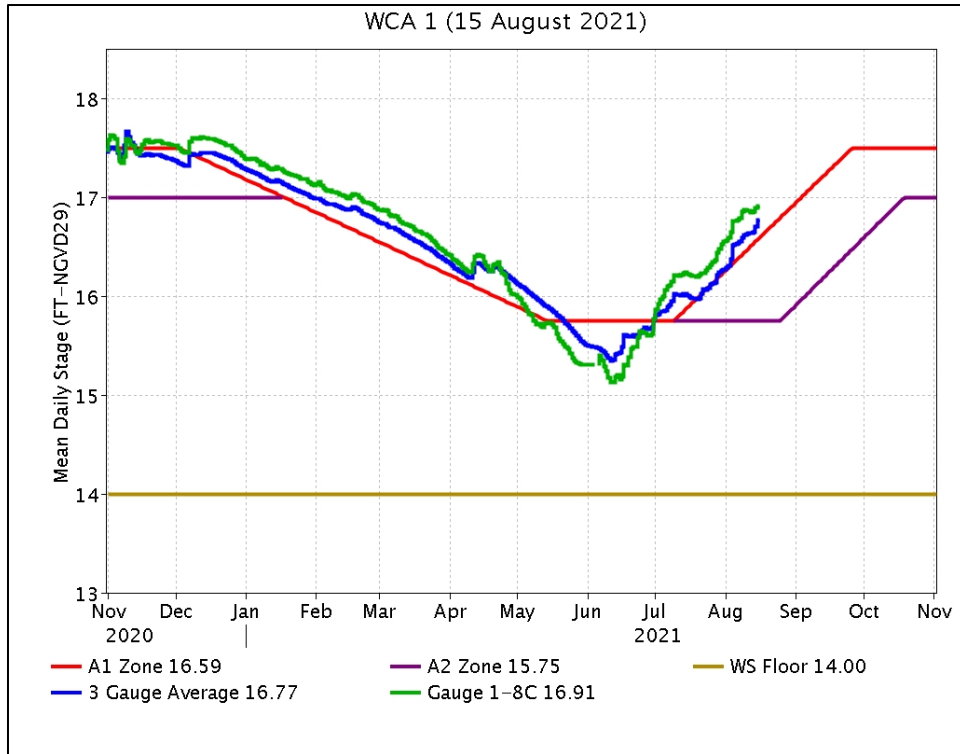
Salinities in Florida Bay averaged a decrease of 1.5 for the week ending 8/15, but individual stations had weekly changes ranging from -4.2 to +1.2 (**Figure EV-7**). The largest decreases are still in the northeast nearshore areas where-as the heavy rains at the end of the week began freshening that area, but bay-wide salinities are still 2 higher than the historical average. Freshwater deliveries will still be needed to continue to freshen the nearshore area. We are quickly reaching the time of year where the lowest salinities are expected, but salinities have been slow to decrease within the Bay (**Figure EV-9**).

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

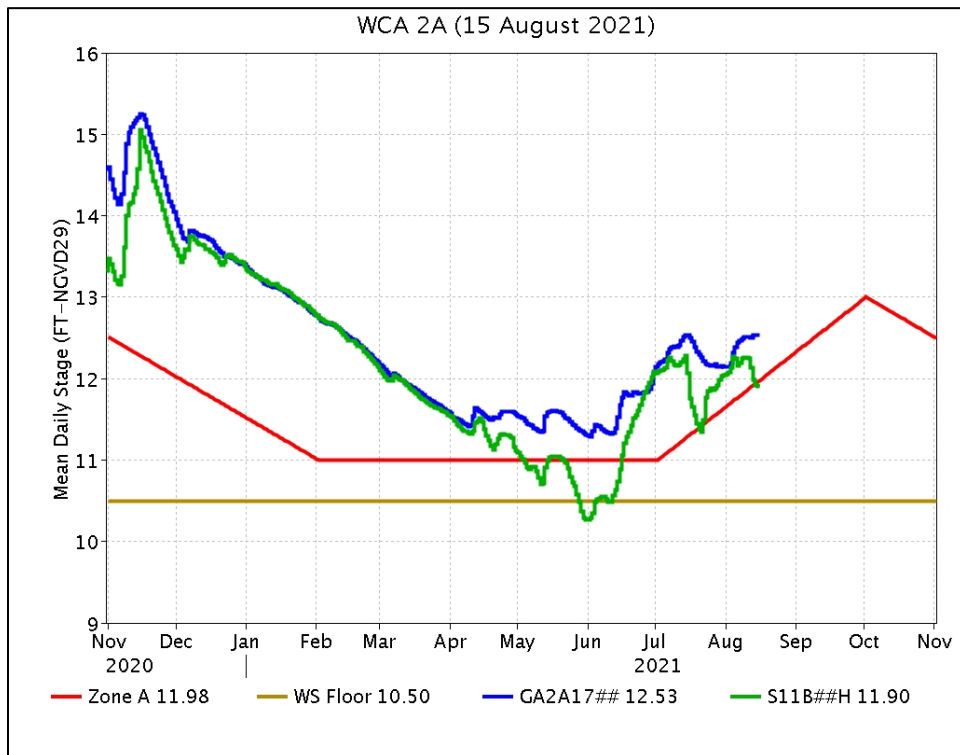
Ascension rates that do not exceed 0.25 feet per week or 0.50 feet per two weeks are considered ecologically healthy. Flows into northeastern WCA-3A continue to have an ecological benefit. In TS the areas near the S-328 continue to have elevated levels of phosphorus but should fall below 8 µg/L this week. These structures should not be opened until the phosphorus levels return to below that threshold at that structure. Individual regional recommendations can be found in **Table EV-2**.

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

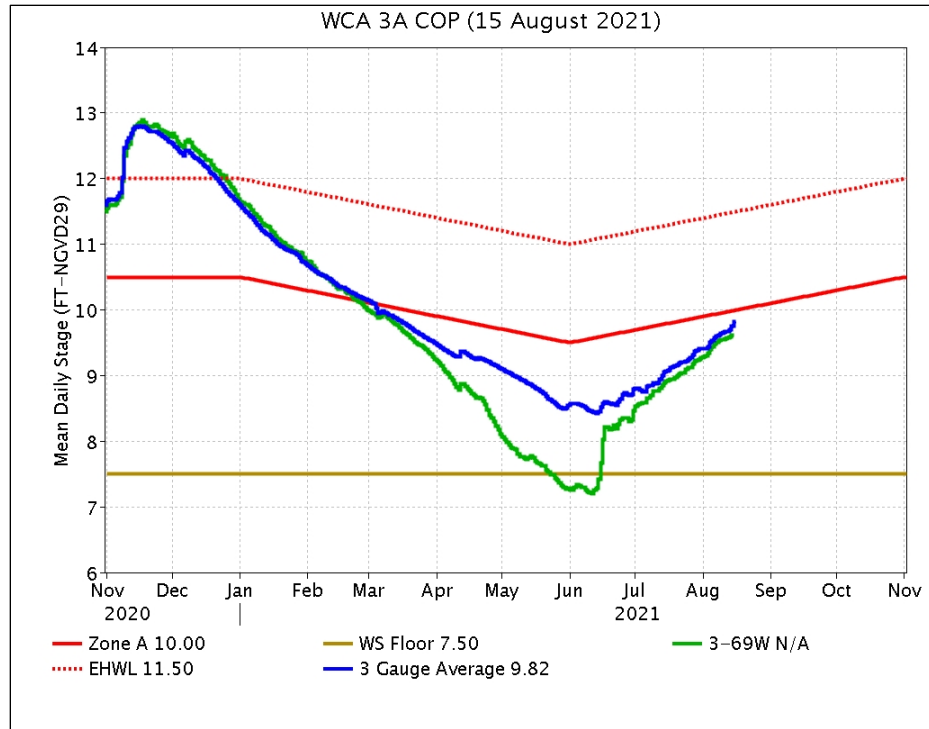
Everglades Region	Rainfall (inches)	Stage change (feet)
WCA-1	1.59	+0.16
WCA-2A	1.38	+0.01
WCA-2B	2.04	+0.09
WCA-3A	1.39	+0.17
WCA-3B	1.63	+0.08
ENP	2.80	+0.14



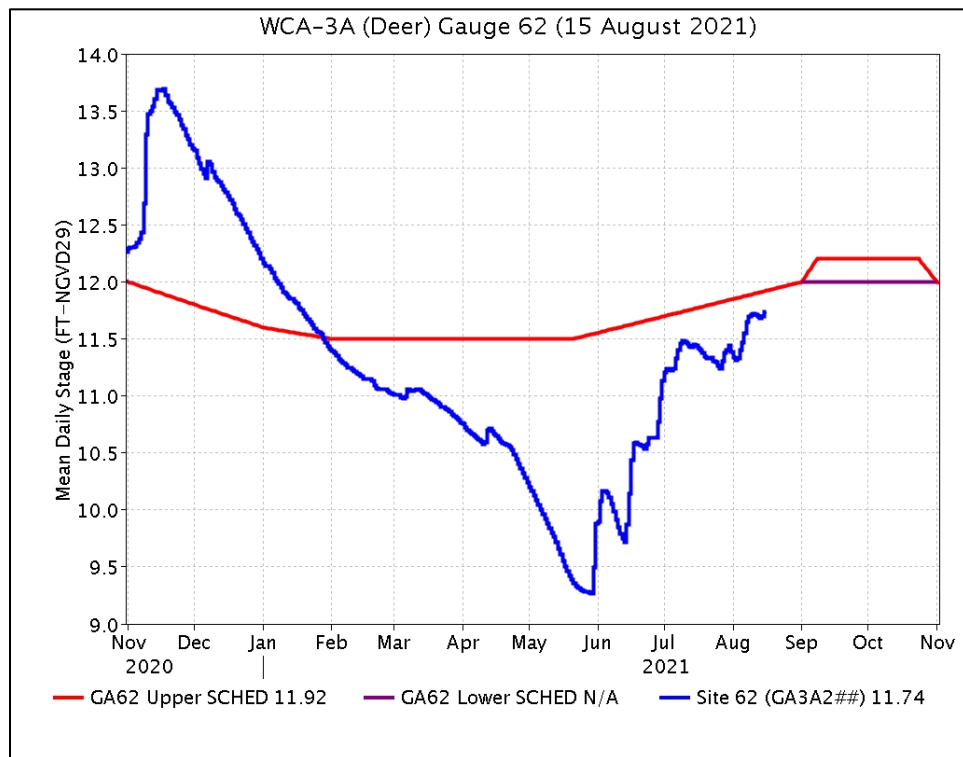
**Figure EV-1.** WCA-1 stage hydrographs and regulation schedule.



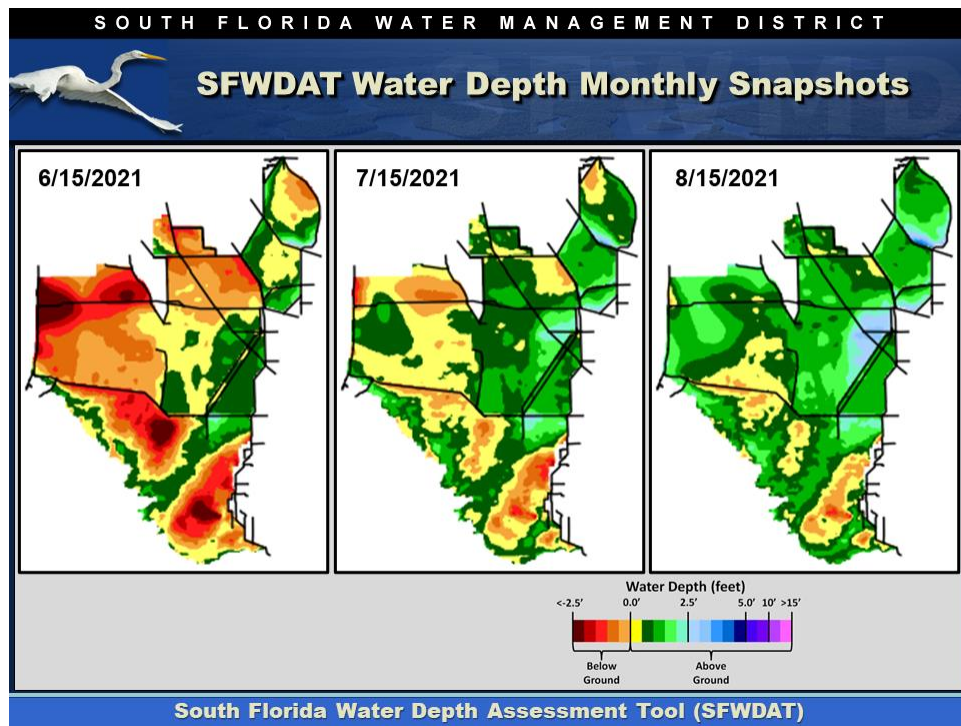
**Figure EV-2.** WCA-2A stage hydrographs and regulation schedule.



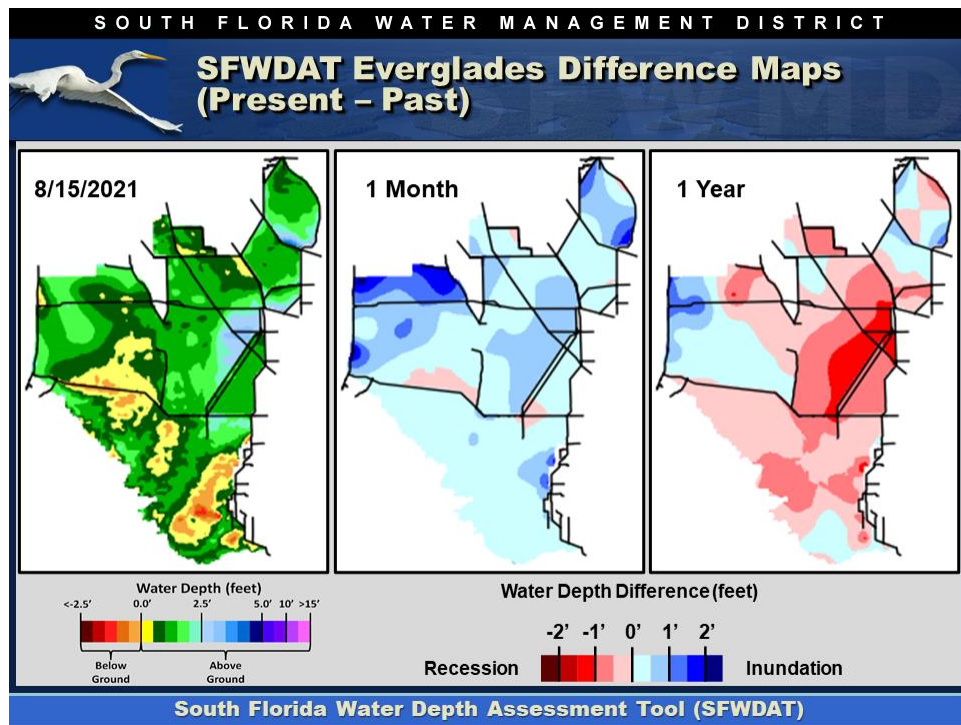
**Figure EV-3.** WCA-3A stage hydrographs (three-gauge average, S-333 headwater) and regulation schedule.



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

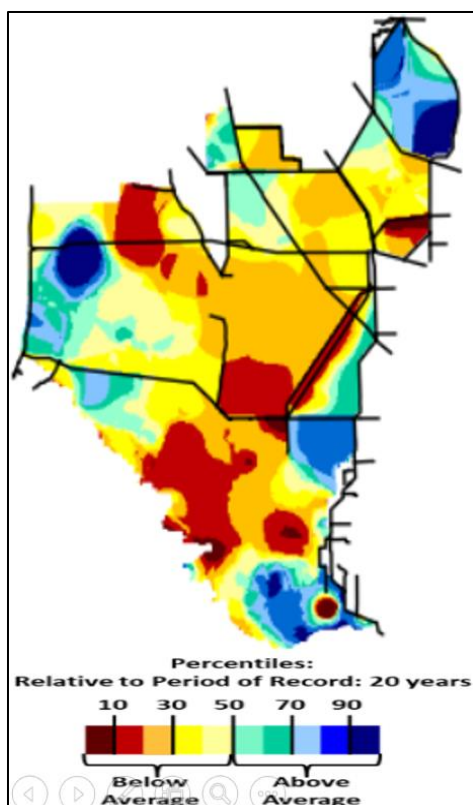


**Figure EV-5.** Everglades water depths from two months ago (left), one month ago (center) and present (right), based on SFWDAT.

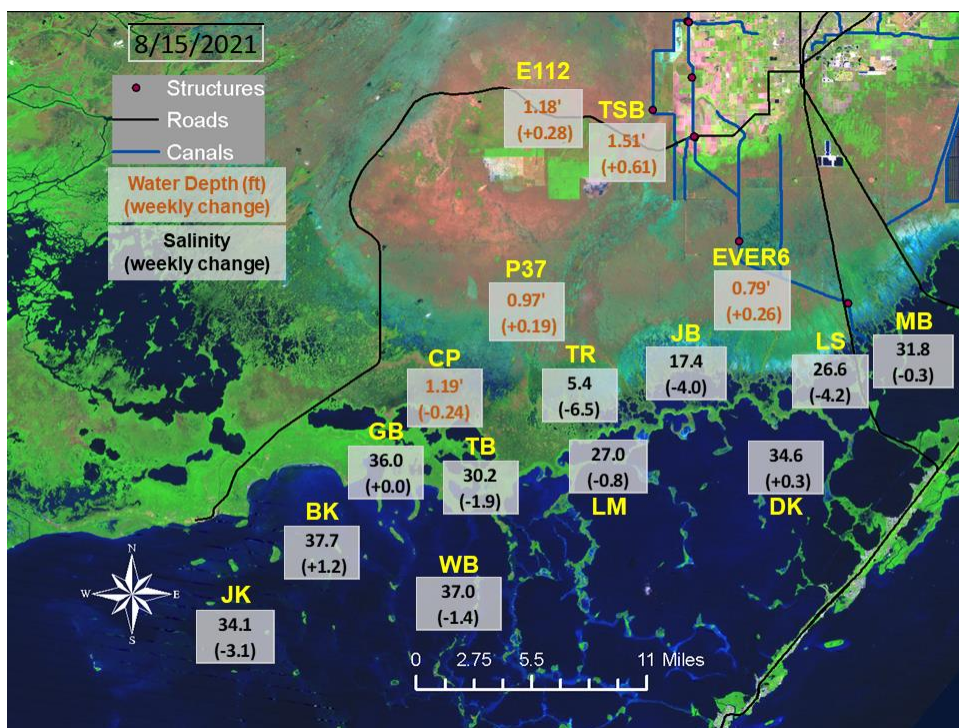


**Figure EV-6.** Present Everglades water depths (left) and water depth changes from one month (center) and one year (right) ago, based on SFWDAT.

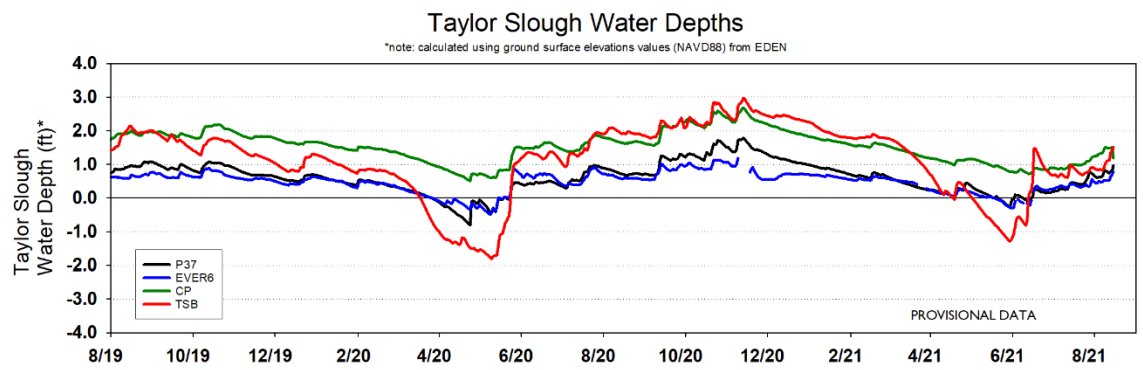




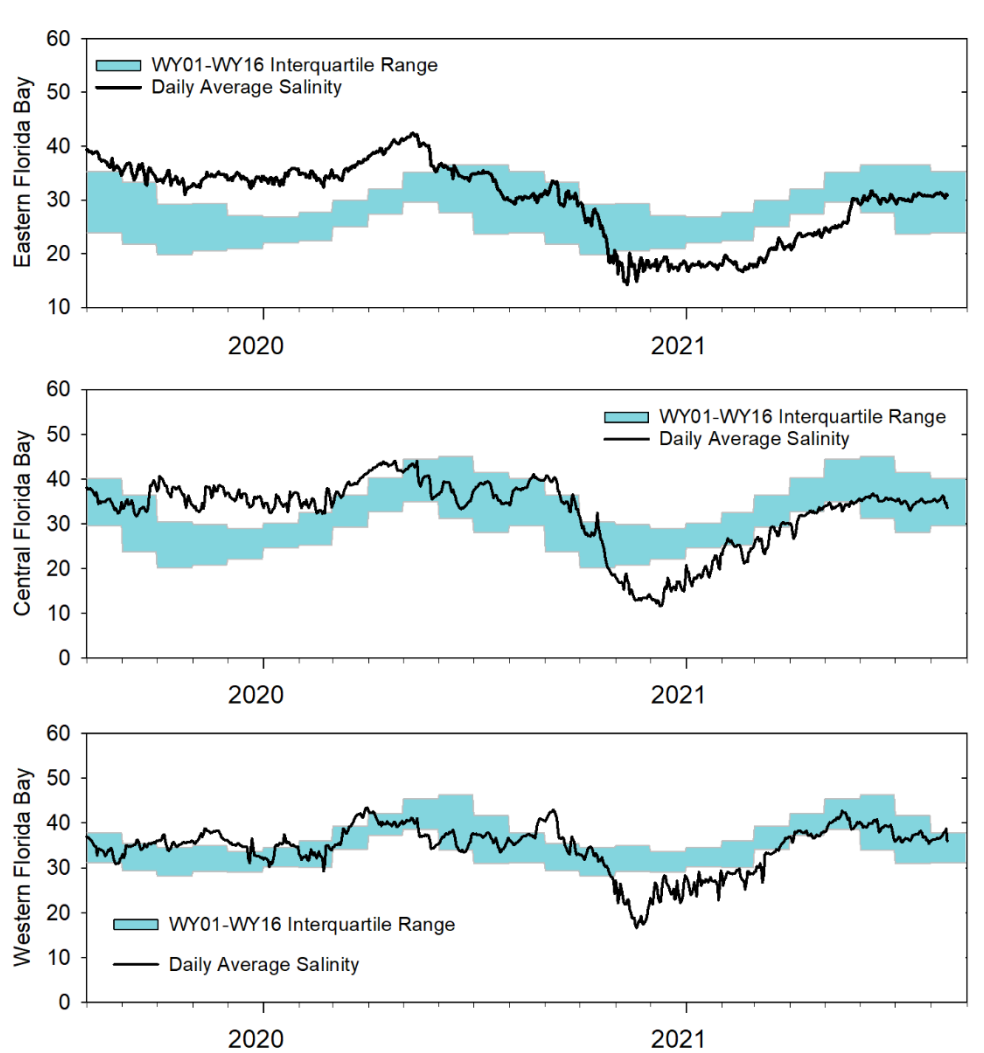
**Figure EV-7.** Present water depths compared to the day of year average over the previous 20 years.



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



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



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

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

SFWMD Everglades Ecological Recommendations, August 17th, 2021 (red is new)			
Area	Weekly change	Recommendation	Reasons
WCA-1	Stage increased by 0.16'	Maintain ascension rates of less than 0.25 feet per week or 0.50 feet per two weeks.	Protect within basin and downstream habitat and wildlife.
WCA-2A	Stage increased by 0.01'	Maintain ascension rates of less than 0.25 feet per week or 0.50 feet per two weeks.	Protect within basin and downstream habitat and wildlife.
WCA-2B	Stage increased by 0.09'	Maintain ascension rates of less than 0.25 feet per week or 0.50 feet per two weeks	Protect within basin and downstream habitat and wildlife.
WCA-3A NE	Stage increased by 0.28'	Moderate ascension rates to less than 0.50 feet per two weeks.	Protect within basin and downstream habitat and wildlife.
WCA-3A NW	Stage decreased by 0.03	Maintain ascension rates of less than 0.25 feet per week or 0.50 feet per two weeks.	
Central WCA-3A S	Stage increased by 0.17'	Maintain ascension rates of less than 0.25 feet per week or 0.50 feet per two weeks.	Protect within basin and downstream habitat and wildlife.
Southern WCA-3A S	Stage increased by 0.18'		
WCA-3B	Stage increased by 0.08'	Maintain ascension rates of less than 0.25 feet per week or 0.50 feet per two weeks.	Protect within basin and downstream habitat and wildlife.
ENP-SRS	Stage increased by 0.14'	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.
Taylor Slough	Stage changes ranged from -0.24' to +0.62'	Move water southward as possible.	When available, provide freshwater buffer for downstream conditions.
FB- Salinity	Salinity changes ranged -4.2 to +1.2	Move water southward as possible.	When available, provide freshwater to maintain low salinity buffer and promote water movement.