

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 4, 2021

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

### **Summary**

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

Rain may push into areas north and west of Lake Okeechobee Wednesday, resulting in an enhanced coverage and above normal rainfall for this region. There is also likely to be a separate area of enhanced rains over some portion of the southern interior to around Lake Okeechobee during the afternoon, although it is hard to know exactly which areas will be affected. Confidence in rain quantity and location is not especially high due to a transitional weather regime from a retreating trough. On Thursday a subtropical ridge of high pressure will nose into the Florida peninsula and favor good coverage of interior rains but quantity no greater than the daily climatological average. Late this week, another upper-air trough will pass through the eastern U.S. The influence of this weather feature could enhance rains over the interior and the western parts of the District Saturday afternoon and evening, with the enhanced rains possibly resulting in total rainfall above the daily climatological average. Early next week a developing easterly wind regime will favor overnight and early-day rains in the east and then generally more concentrated rains over the interior and the west but with low confidence concerning overall rainfall amounts on Sunday and Monday. For the week ending next Tuesday morning total rainfall is most likely to be near normal but could end up somewhat above the long-term average if the rains through Wednesday and on Saturday are heavier than currently forecast.

#### **Kissimmee**

Flow at S-65A continues to be too low for extensive inundation of the Kissimmee River floodplain, but mean floodplain depth increased to 0.73 feet on August 1, 2021. Dissolved oxygen concentration in the Kissimmee River continued to decline to an average of 1.7 mg/L for the week, which is below the 2.0 mg/L threshold considered stressful to sportfish.

#### **Lake Okeechobee**

Lake Okeechobee stage was 13.72 feet NGVD on August 1, 2021, 0.88 feet higher than a month ago, and 0.41 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 the early-July (**Figure LO-2**). Recent satellite imagery (August

1, 2021) shows a medium to high bloom potential in the northeastern, southwestern and southern nearshore areas of the Lake.

### **Estuaries**

Total inflow to the St. Lucie Estuary averaged 1,196 cfs over the past week with no flow coming from Lake Okeechobee. Mean salinities increased at all sites in 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 3,896 cfs over the past week with no flow coming from the Lake. Mean surface salinities remained the same at S-79 and Val I-75, decreased at Sanibel, and increased 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 fair range at Cape Coral.

### **Stormwater Treatment Areas**

For the week ending Sunday, August 1, 2021, 200 ac-ft of Lake Okeechobee water was delivered to the FEBs/STAs. The total amount of Lake releases sent to the FEBs/STAs in WY2022 (since May 1, 2021) is approximately 61,000 ac-feet. The total amount of inflows to the STAs in WY2022 is approximately 353,000 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 better in WCA-2A and WCA-3A-North last week. Depth conditions are below average across most of WCA-3A and -2A. In Florida Bay salinities are generally stable with some wind driven flows changing direction last week and stages increased in Taylor Slough. Overall conditions remain good in the Southern systems, but freshwater flows will be needed to prevent late season salinity increases.

## **Supporting Information**

### **Kissimmee Basin**

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

On August 1, 2021, lake stages were 56.1 feet NGVD (0.4 feet below schedule) in East Lake Toho, 53.4 feet NGVD (0.1 feet below schedule) in Lake Toho, and 51.2 feet NGVD (0.2 feet above schedule) in Lakes Kissimmee-Cypress-Hatchineha (KCH) (**Table KB-1, Figures KB-1-3**).

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

Discharges to the Kissimmee River were 1,410 cubic feet per second (cfs) at S-65 and 1,460 cfs at S-65A; discharges from the Kissimmee River were 1,540 cfs at S-65D and 1,590 cfs at S-65E (**Table KB-2**). Headwater stages were 46.3 feet NGVD at S-65A and 27.5 feet NGVD at S-65D on August 1, 2021. The concentration of dissolved oxygen in the Kissimmee River continued to decline, with the average for the week ending on August 1, 2021 decreasing to 1.7 mg/L, which is below the 2.0 mg/L threshold considered stressful to 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 extensive inundation of the Kissimmee River floodplain, but mean floodplain depth increased to 0.73 feet on August 1, 2021 (**Figure KB-5**).

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

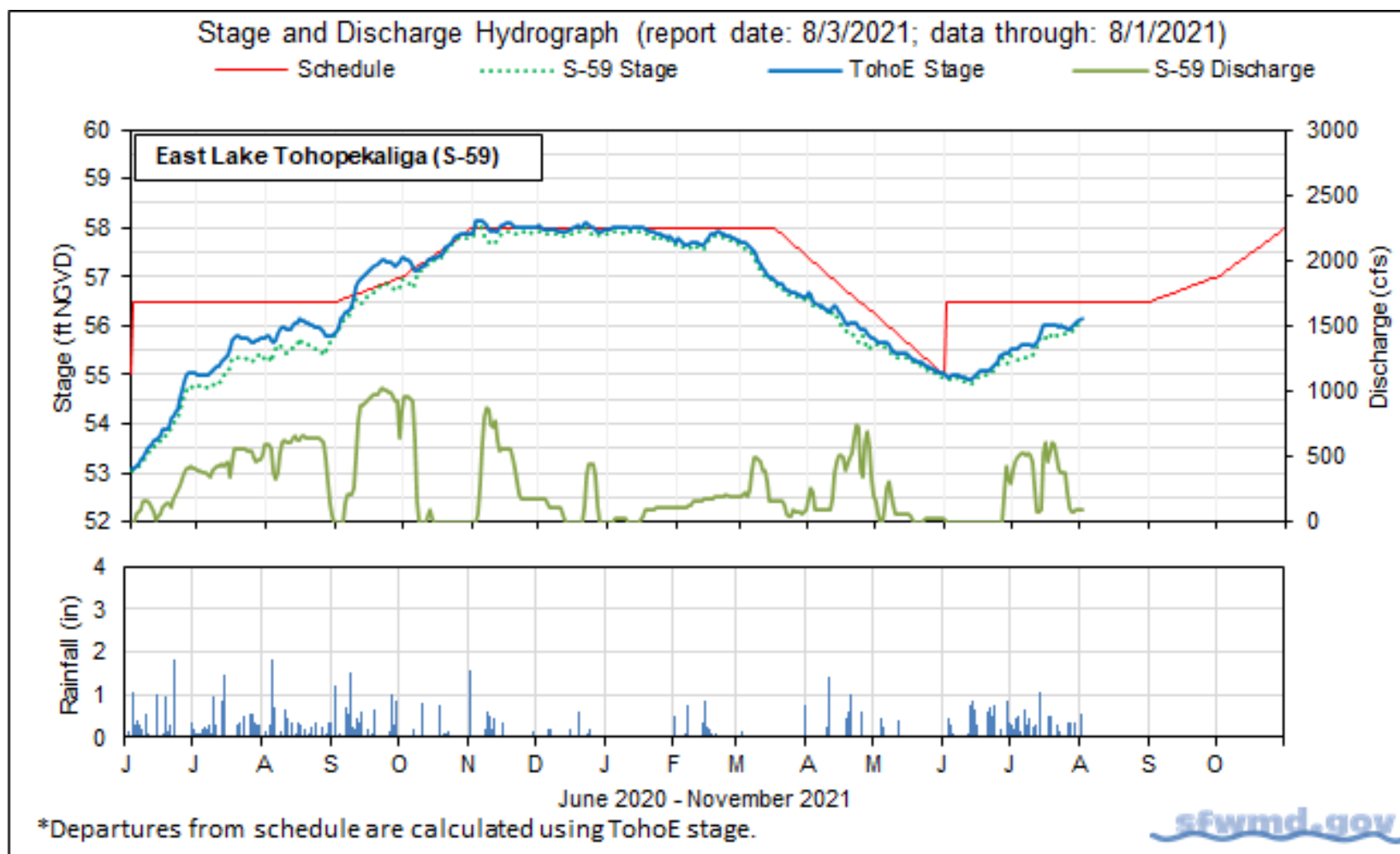
Due to the recent trend of dissolved oxygen decline in the Kissimmee River, we are continuing to make recommendations several times per week to adaptively manage flow at S-65 and S-65A. The current objective is to continue to maintain flow above bankfull (>1,400 cfs) without causing a persistent dissolved oxygen decline, while avoiding excessive stage rise in KCH. We are also balancing the rates of stage rise in Lakes KCH, Toho and East Toho by managing flow at S-61 and S-59.

**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.

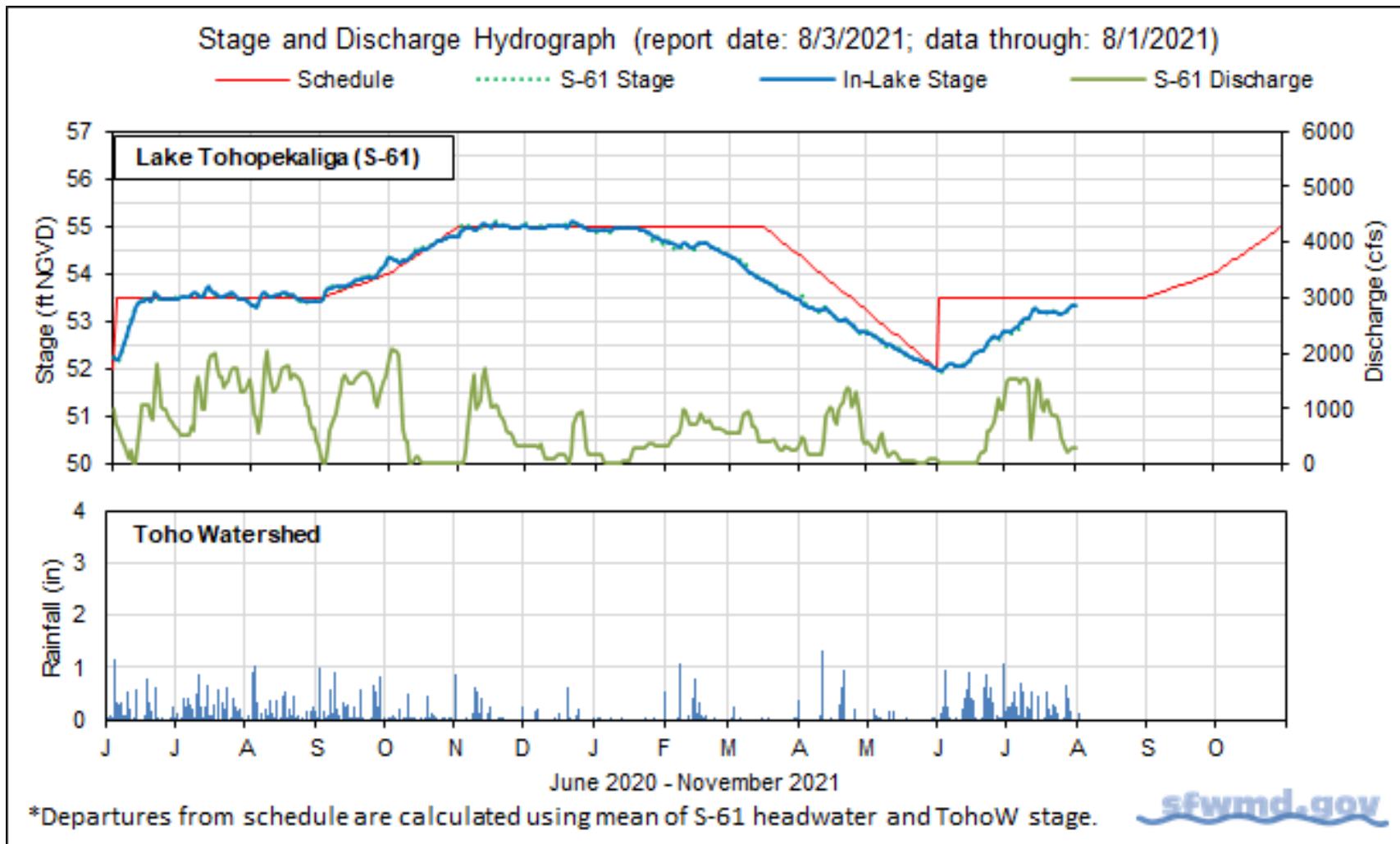
Water Body	Structure	Stage Monitoring Site	7-Day Average Discharge (cfs)	Lake Stage (feet NGVD) <sup>a</sup>	Schedule Type <sup>b</sup>	Schedule Stage (feet NGVD)	Departure from Regulation (feet)	
							7/25/21	7/18/21
Lakes Hart and Mary Jane	S-62	LKMJ	112	60.1	R	60.0	0.1	-0.1
Lakes Myrtle, Preston and Joel	S-57	S-57	12	61.1	R	61.0	0.1	-0.1
Alligator Chain	S-60	ALLI	1	63.1	R	63.2	-0.1	-0.1
Lake Gentry	S-63	LKGT	12	61.0	R	61.0	0.0	-0.1
East Lake Toho	S-59	TOHOE	107	56.1	R	56.5	-0.4	-0.5
Lake Toho	S-61	TOHOW S-61	299	53.4	R	53.5	-0.1	-0.3
Lakes Kissimmee, Cypress and Hatchineha	S-65	KUB011 LKIS5B	1,356	51.2	R	51.0	0.2	0.2

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.

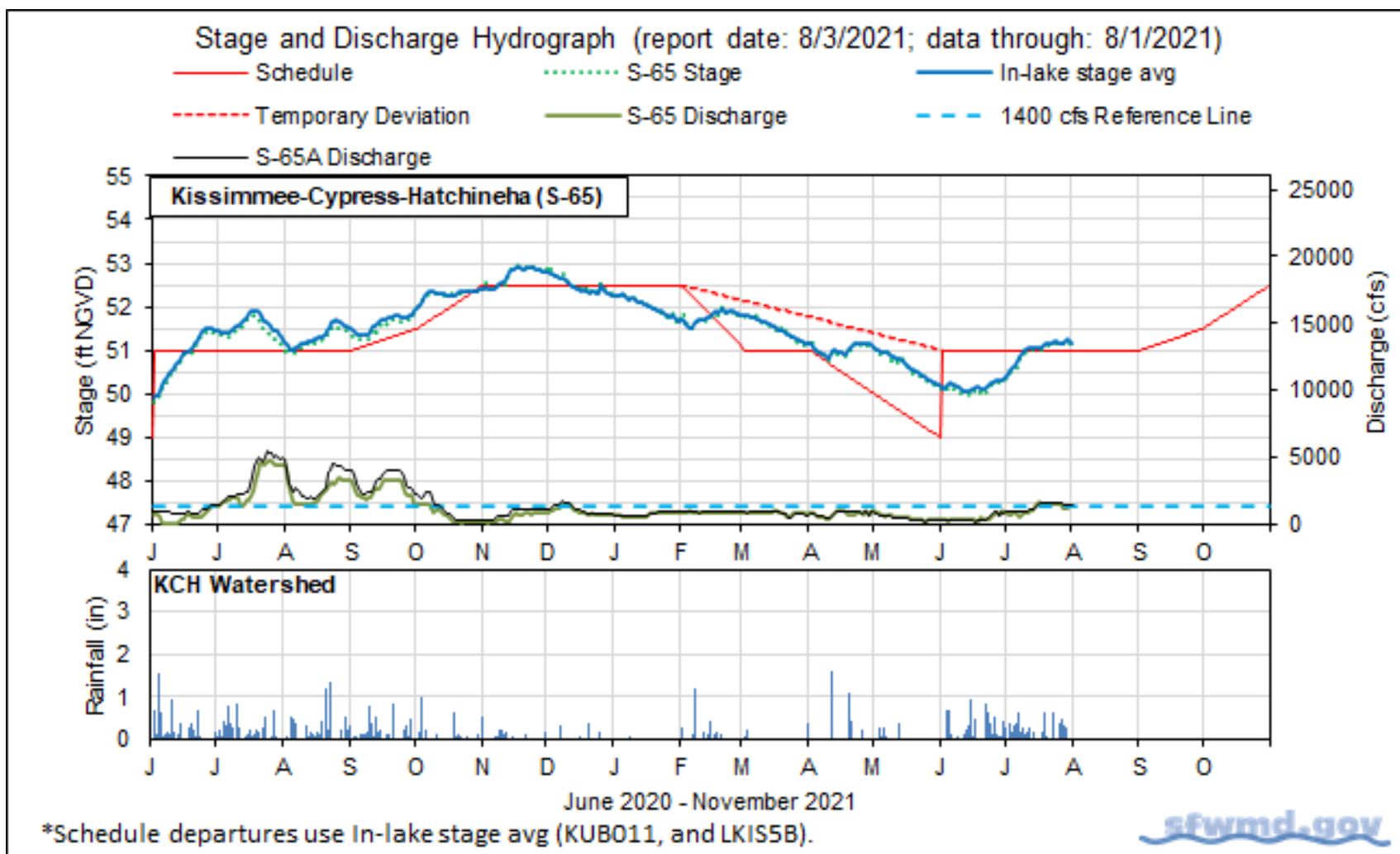
b. A: projected recession line; R: USACE regulation schedule; S: temporary recession target line; T: temporary schedule; NA: not applicable or not available.



**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 8/1/21	Average for Previous Seven Day Periods			
			8/1/21	7/25/21	7/18/21	7/11/21
Discharge	S-65	1,410	1,360	1,540	1,270	760
Discharge	S-65A <sup>a</sup>	1,460	1,500	1,610	1,320	940
Headwater Stage (feet NGVD)	S-65A	46.3	46.4	46.3	46.2	46.2
Discharge	S-65D <sup>b</sup>	1,540	1,380	1,240	1,120	970
Headwater Stage (feet NGVD)	S-65D <sup>c</sup>	27.5	27.6	27.5	27.5	27.4
Discharge (cfs)	S-65E <sup>d</sup>	1,590	1,590	1,360	1,200	1,070
Discharge (cfs)	S-67	0	0	0	0	0
Dissolved Oxygen (mg/L) <sup>e</sup>	Phase I, II/III river channel	1.2	1.7	3.3	3.4	4.1
Mean depth (feet) <sup>f</sup>	Phase I floodplain	0.73	0.71	0.36	0.19	0.19

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.

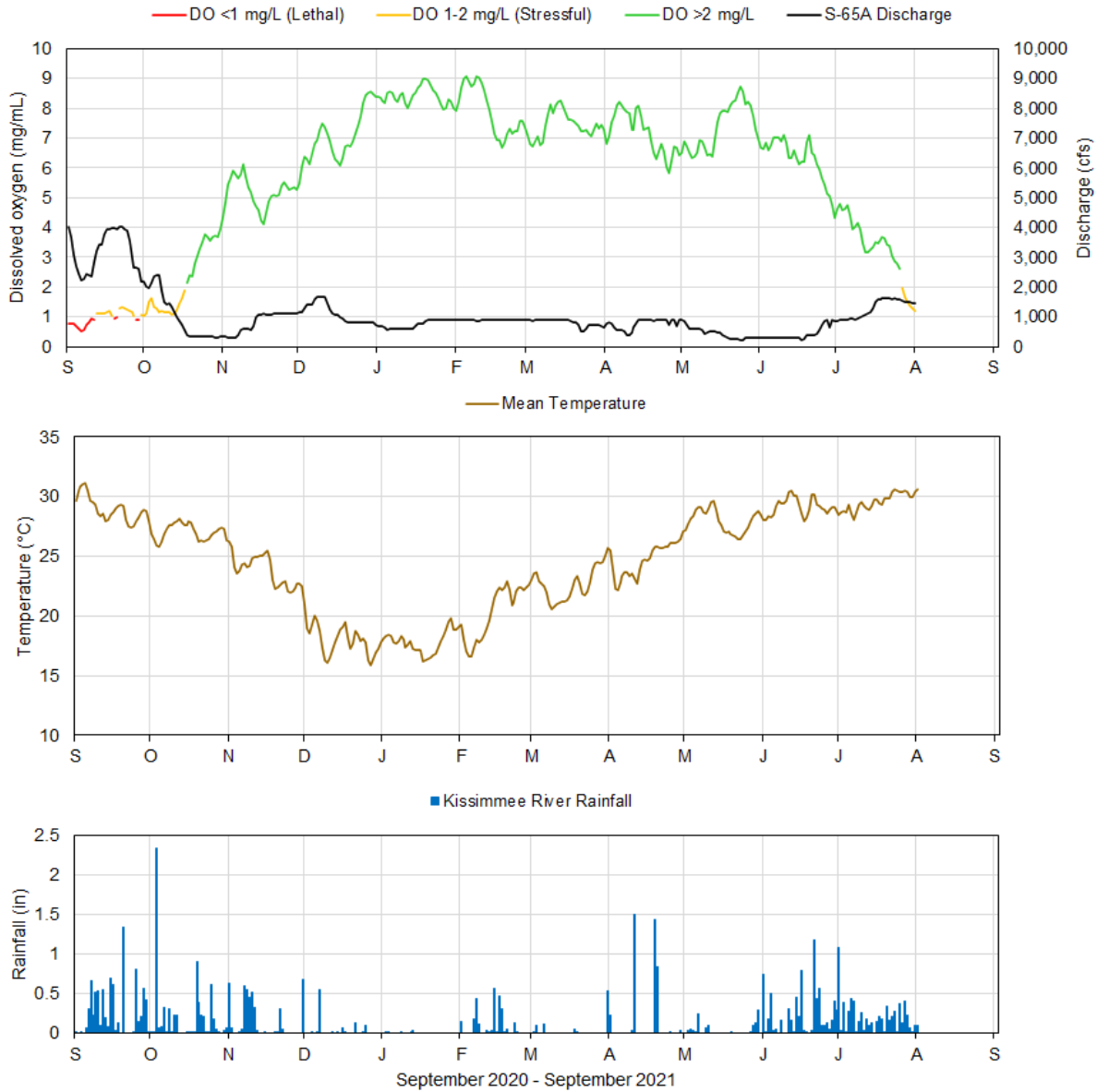
e. Dissolved oxygen is the average of values from sondes KRBN, PC62, PC63, PD62R and PD42R.

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).

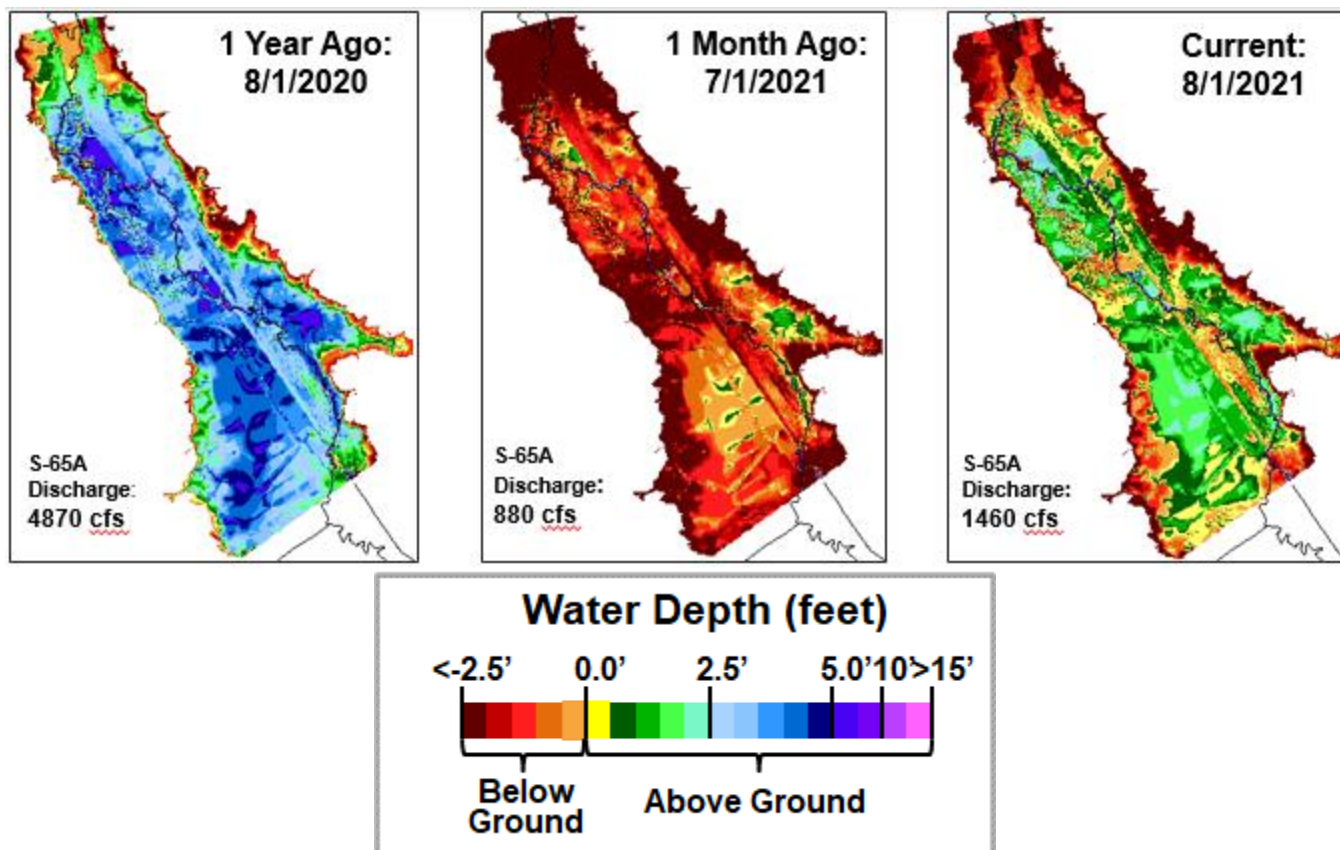
Discharge (cfs)	Maximum Rate of Increase (cfs/day)	Maximum Rate of Decrease (cfs/day)
0-300	100	-50
301-650	150	-75
651-1,400	300	-150
1,401-3,000	600	-600
>3,000	1,000	-2,000



Report Date: 8/3/2021; data are through: 8/1/2021

[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 13.72 feet NGVD on August 1, 2021, 0.88 feet higher than a month ago, and 0.41 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 (**Figure LO-2**). Lake stage remained in the Low flow sub-band last week (**Figure LO-3**). According to NEXRAD, 1.47 inches of rain fell directly on the Lake last week.

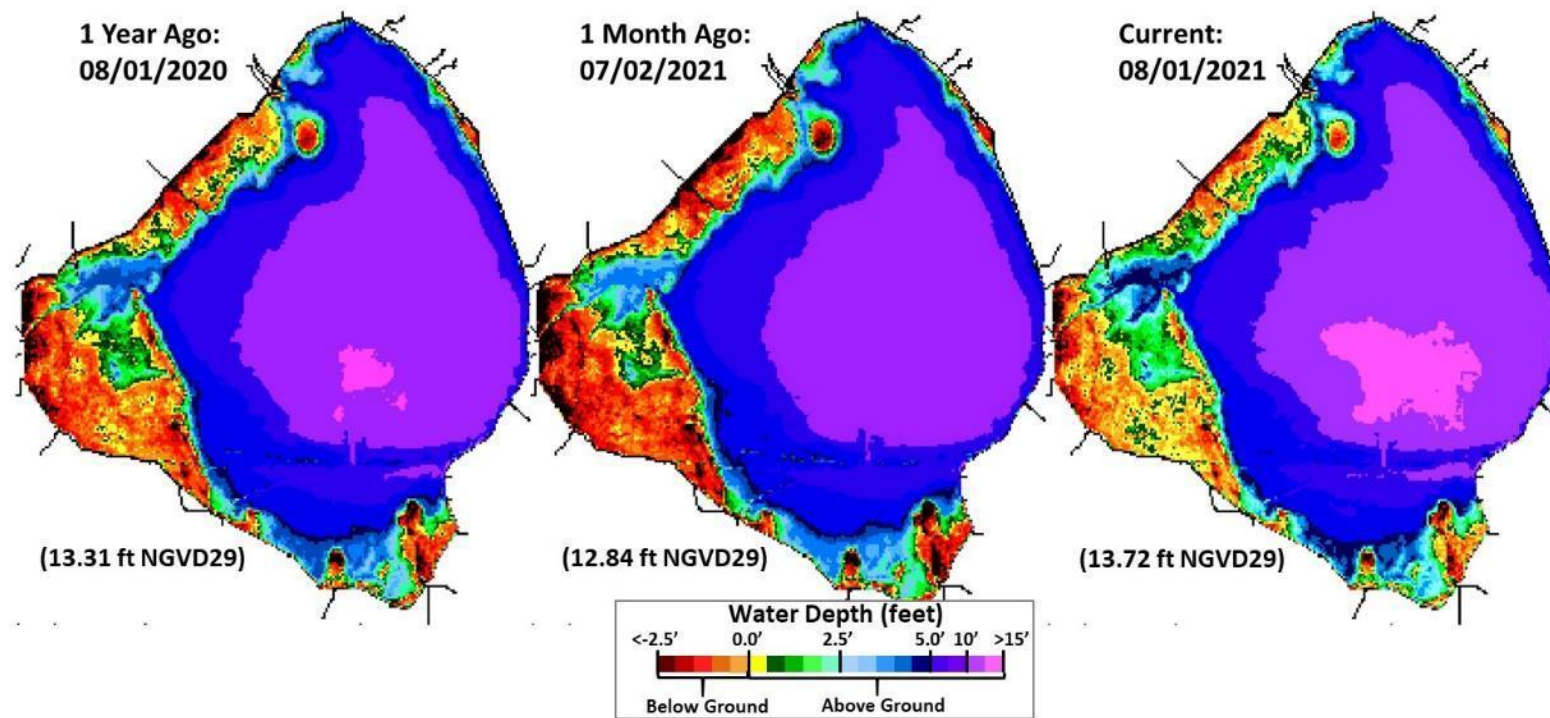
Average daily inflows (excluding rainfall) increased from the previous week, going from 3,145 cfs to 4,591 cfs. Outflows (excluding evapotranspiration) decreased, going from 236 cfs to 36 cfs. Most of the inflows (~69% of the total) came from the Kissimmee River (1,591 cfs through S-65E & S-65EX1) and S-84 and S-84X structures (1,357 cfs). Water flowed back from the C-44 canal (via S-308 structure) and L-8 Canal (via S-271 structure) into the Lake at average rates of 85 cfs and 256 cfs, respectively over the past week. Releases to the west via S-77 decreased from 28 cfs to 0 cfs, and releases south through the S-350 structures decreased from 207 cfs to 36 cfs last week. Average inflows and outflows through water control structures surrounding the Lake for the previous two weeks 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 1, 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 and eastern nearshore areas of the Lake. Overall, bloom potential increased in the southwestern and southern parts of the Lake from the previous week and remains low in south-central part of the Lake (**Figure LO-5**).

The latest water quality survey results from July 19 - 21, 2021 revealed that total phytoplankton biomass (chlorophyll *a* is a proxy for total phytoplankton biomass) was highest in northwestern and northern parts of the Lake. Bloom conditions (chl *a* > 40 µg/L) were recorded at 10 sites (or 31%). The highest biomass (142 µg/L) was recorded at POLESOUT1 in the northwestern part of the Lake. The number of sites with bloom conditions increased by 6% (from 8 to 10 sites) since early July. Bloom conditions persisted in the northwestern and the northeastern parts of the Lake and remained low in the southern part (**Table LO-2** and **Figure LO-6**).

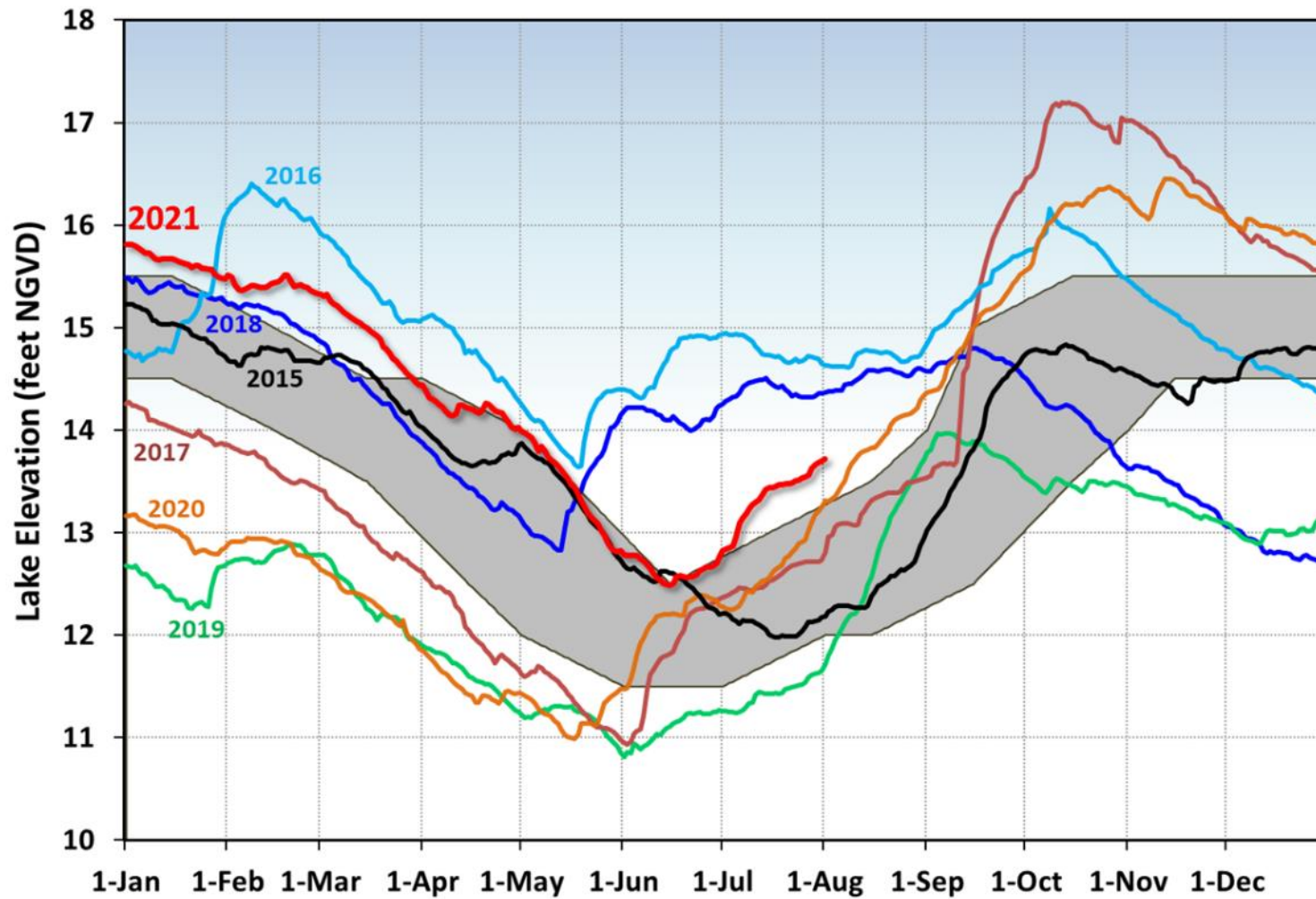
**Table LO-1.** Weekly Lake Okeechobee inflows and outflows (cfs) and as change in elevation (in).  
Provisional data.

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	1356	1591	0.7	S-77	28	0	0.0
S-71 & S-72	326	696	0.3	*S-308	-27	-85	0.0
S-84 & S-84X	679	1357	0.6	S-351	87	14	0.0
Fisheating Creek	415	340	0.1	S-352	120	3	0.0
S-154	44	32	0.0	S-354	0	19	0.0
S-191	0	0	0.0	*L-8 (S-271)	-9	-256	-0.1
S-133 P	59	28	0.0	ET	3172	3166	1.3
S-127 P	48	44	0.0	<b>Total</b>	<b>3408</b>	<b>3202</b>	<b>1.3</b>
S-129 P	4	35	0.0				
S-131 P	15	30	0.0				
S-135 P	163	70	0.0				
S-2 P	0	11	0.0				
S-3 P	0	9	0.0				
S-4 P	0	9	0.0				
*Backflow	36	341	0.1				
Rainfall	2812	3956	1.7				
<b>Total</b>	<b>5957</b>	<b>8547</b>	<b>3.6</b>				



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

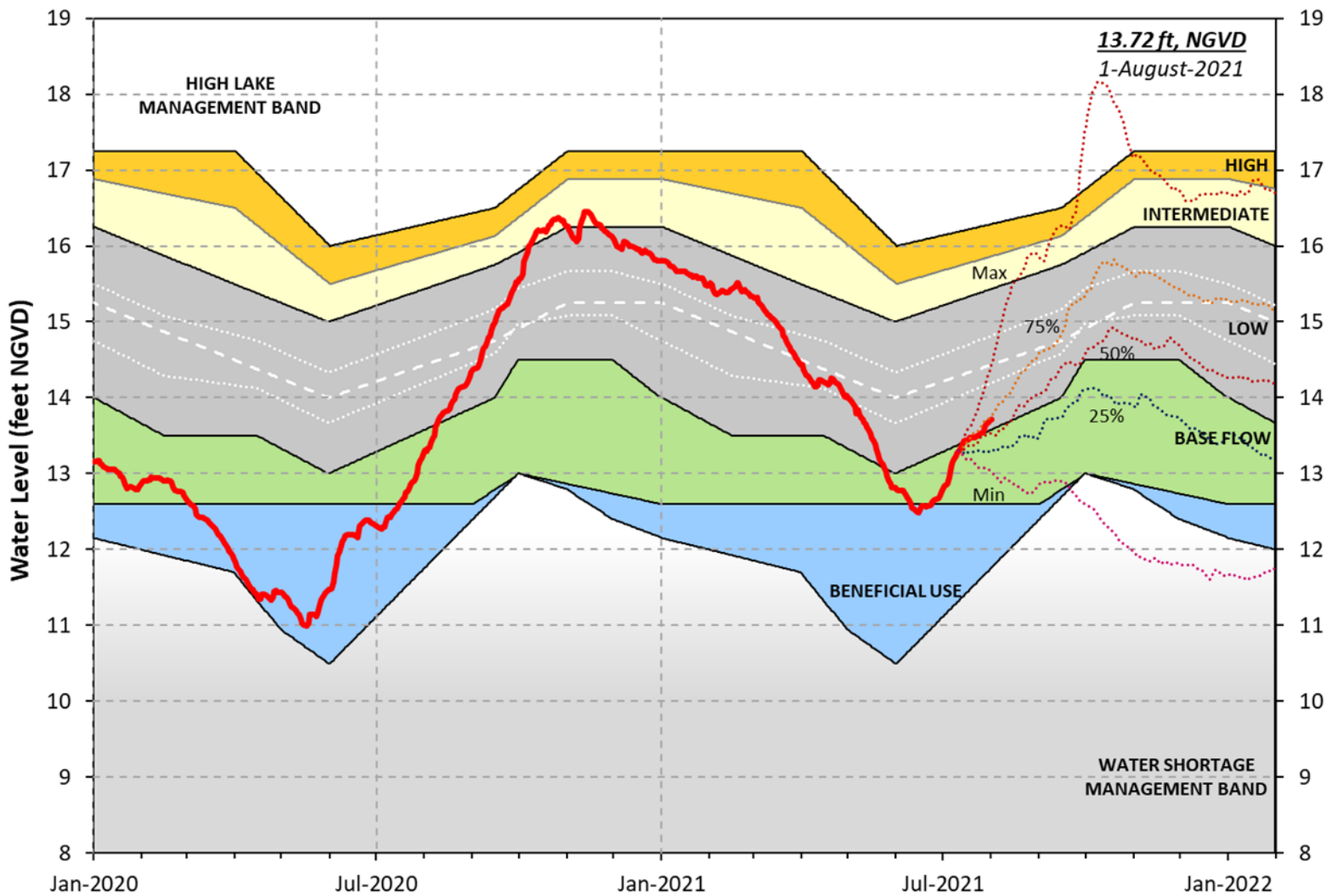
## Lake Okeechobee Stage vs Updated Ecological Envelope



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



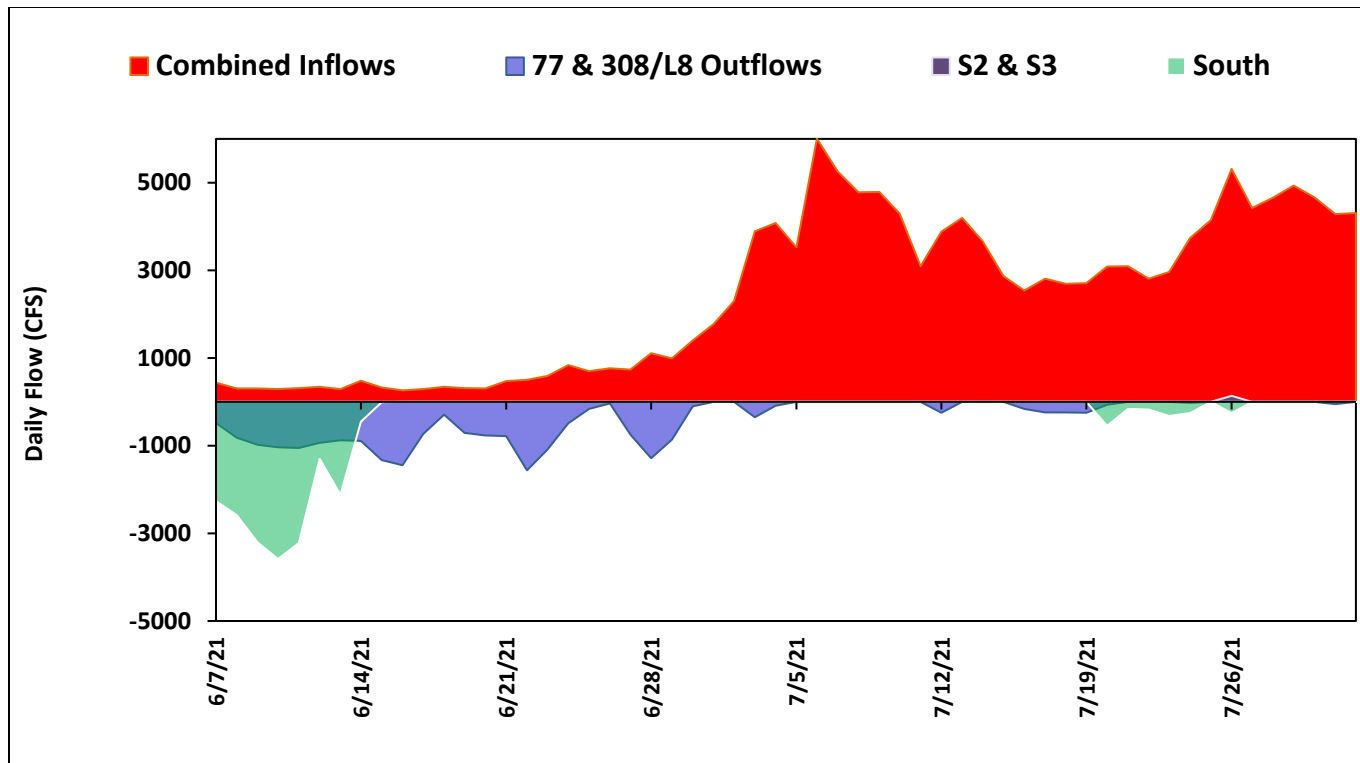
## Lake Okeechobee Water Level History and Projected Stages



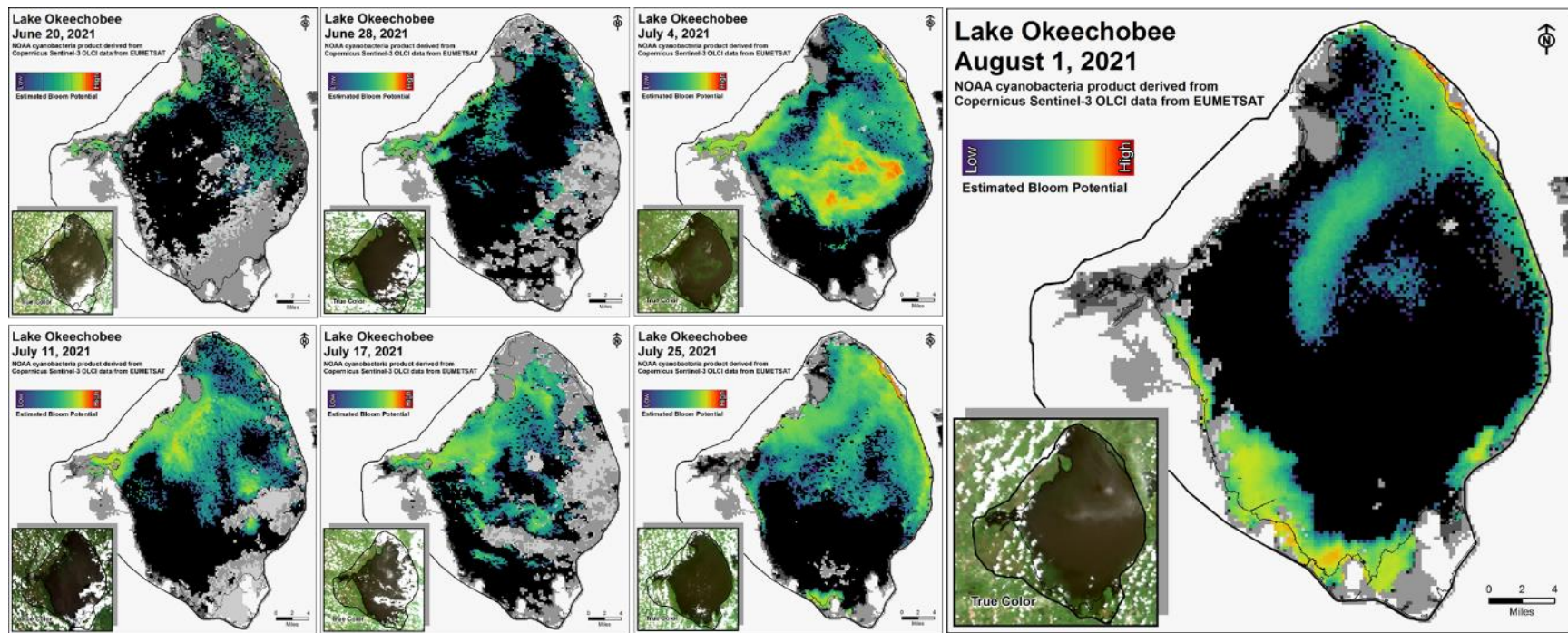
LORS-2008 - Adopted by USACE 28-April-2008

**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. Flows into Lake Okeechobee from the L-8 canal through S-271 (formerly Culvert 10A) are included as inflows. Conversely, flows from Lake Okeechobee into the L-8 Canal 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.



NOAA cyanobacteria product derived from Copernicus Sentinel-3 OLCI data from EUMETSAT

**Figure LO-5.** Cyanobacteria bloom potential based on NOAA's harmful algal bloom monitoring system. Gray color indicates cloud cover

**Table LO-2.** Provisional results of chlorophyll *a* concentrations and cyanobacteria taxa from sampling trips on July 19 - 21, 2021. Color coding generally follows the legend in **Figure LO-6**.

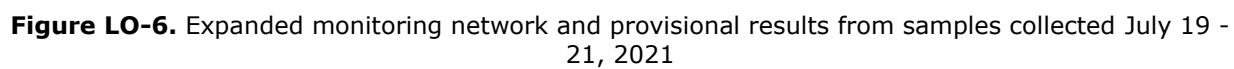
**Collection Date: July 19-21, 2021**

Station	CHLa (ug/L)	TOXIN (ug/L)	TAXA
FEBIN	37.6	BDL	<i>Cylindro</i>
FEBOUT	76.6	BDL	<i>mixed</i>
KISSR0.0	20.9	BDL	<i>mixed</i>
L005	67.6	BDL	<i>mixed</i>
LZ2	55.1	BDL	<i>mixed</i>
KBARSE	43.6	13.0	<i>Microcys</i>
RITTAE2	2.7	BDL	<i>mixed</i>
PELBAY3	7.4	0.3	<i>Microcys</i>
POLE3S	2.8	BDL	<i>mixed</i>
LZ25A	7.3	BDL	<i>Microcys</i>
PALMOUT	7.3	BDL	<i>mixed</i>
PALMOUT1	15.7	BDL	<i>mixed</i>
PALMOUT2	9.6	1.8	<i>Microcys</i>
PALMOUT3	24.8	5	<i>Microcys</i>
POLESOUT	125.0	0.3	<i>Micro/Cylin</i>
POLESOUT1	142.0	0.5	<i>Microcys</i>
POLESOUT2	120.0	0.5	<i>Microcys</i>
POLESOUT3	58.1	6.7	<i>Microcys</i>
EASTSHORE	29.2	0.4	<i>mixed</i>
NES135	40.5	0.3	<i>mixed</i>
NES191	64.9	BDL	<i>Microcys</i>

Station	CHLa (ug/L)	TOXIN (ug/L)	TAXA
L001	15.2	6.7	<i>Microcys</i>
L004	21.2	BDL	<i>mixed</i>
L006	10.5	0.5	<i>mixed</i>
L007	11.1	0.3	<i>Microcys</i>
L008	18.1	3.3	<i>Microcys</i>
LZ30	8.6	1.7	<i>Microcys</i>
LZ40	24.7	9.7	<i>Microcys</i>
CLV10A	28.4	0.3	<i>mixed</i>
NCENTER	20.9	5.0	<i>Microcys</i>

S308C	P	0.3	<i>mixed</i>
S77	P	BDL	<i>mixed</i>

- SFWMD considers >40 µg/L Chlorophyll *a* (Chla) an algal bloom
- BDL – Below Detectable Limit of 0.25 µg/L
- ND – No Dominant taxa
- P – Pending
- NS – Not Sampled
- Station bold font – crew observed possible BGA
- Chlorophyll *a* analyzed by SFWMD
- Toxin and Taxa analyzed by FDEP:
  - Microcys* = *Microcystis*;
  - Cylindro* = *Cylindrospermopsis*;
  - Planktol* = *Planktolyngbya*;
  - Dolicho* = *Dolichospermum*



## Estuaries

### ***St. Lucie Estuary***

Over the past week, mean total inflow to the St. Lucie Estuary was 1,196 cfs (**Figures ES-1 and ES-2**), and the previous 30-day mean inflow was 1,163 cfs. For comparison, the historical provisional mean inflows from the contributing areas are shown in **Figure ES-2**.

Over the past week, salinities increased at all sites within the estuary (**Table ES-1 and Figure ES-3**). The seven-day moving average of the surface and bottom salinities at the US1 Bridge was 14.8. 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 3,896 cfs (**Figures ES-5 and ES-6**), and the previous 30-day mean inflow was 4,145 cfs. For comparison, the historical provisional mean inflows from the contributing areas are shown in **Figure ES-6**.

Over the past week, surface salinities remained the same at S-79 and Val I-75, decreased at Sanibel, and increased at the remaining sites in the estuary (**Table ES-2 and Figures ES-7 and ES-8**). The seven-day mean surface salinity values (**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 1500 cfs and a steady release at 2,000 cfs with estimated tidal basin inflows of 693 cfs. Model results from all scenarios predict daily salinity to be 0.6 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 July 30, 2021, that *Karenia brevis*, the Florida red tide dinoflagellate, was observed at medium to high concentrations in Charlotte County, background to medium concentrations in and offshore of Lee County, and background to very low concentrations in Collier County. On the east coast, red tide was not observed in samples from Palm Beach County.

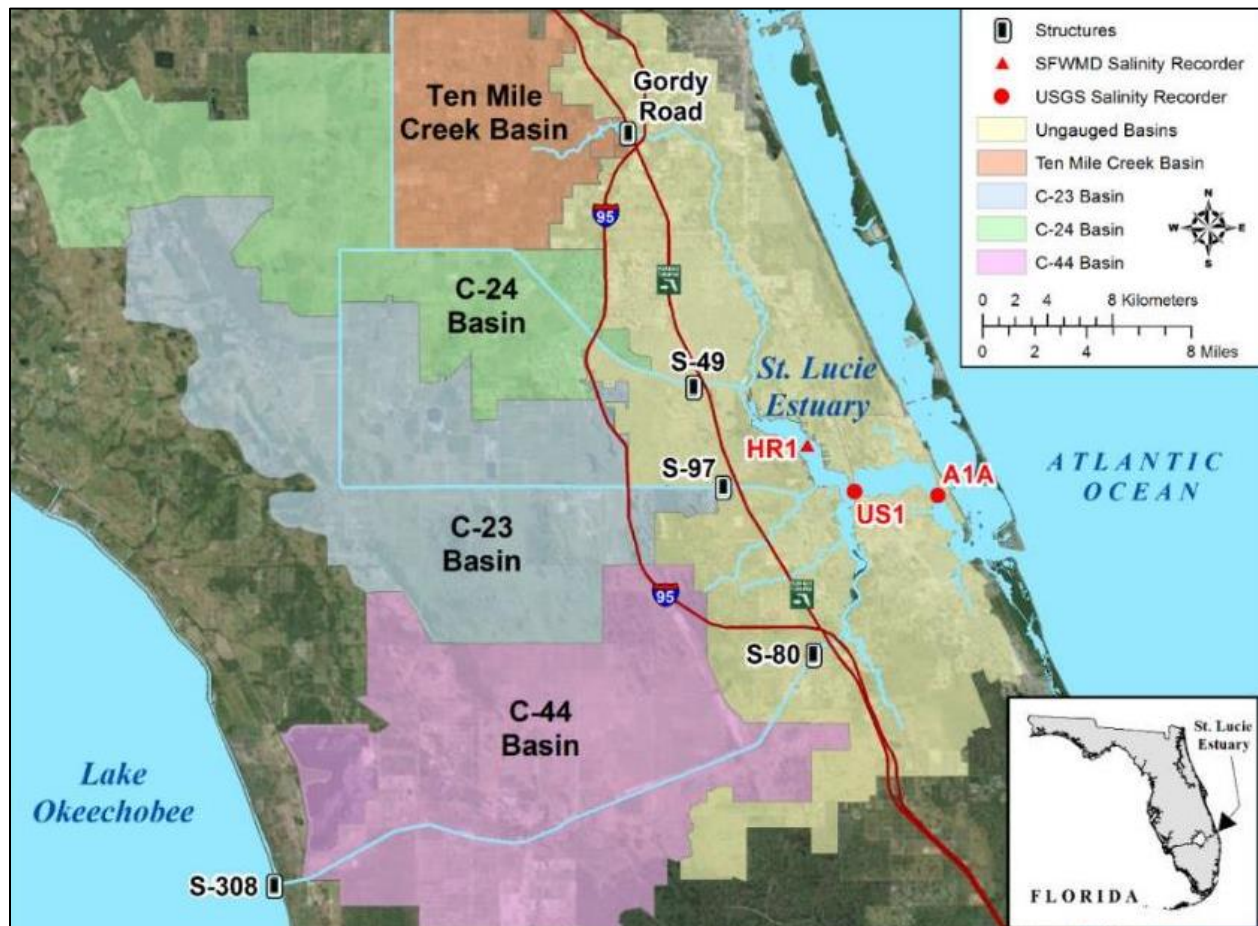
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<sup>1</sup> Qiu, C., and Y. Wan. 2013. Time series modeling and prediction of salinity in the Caloosahatchee River Estuary. *Water Resources Research* 49:5804-5816.

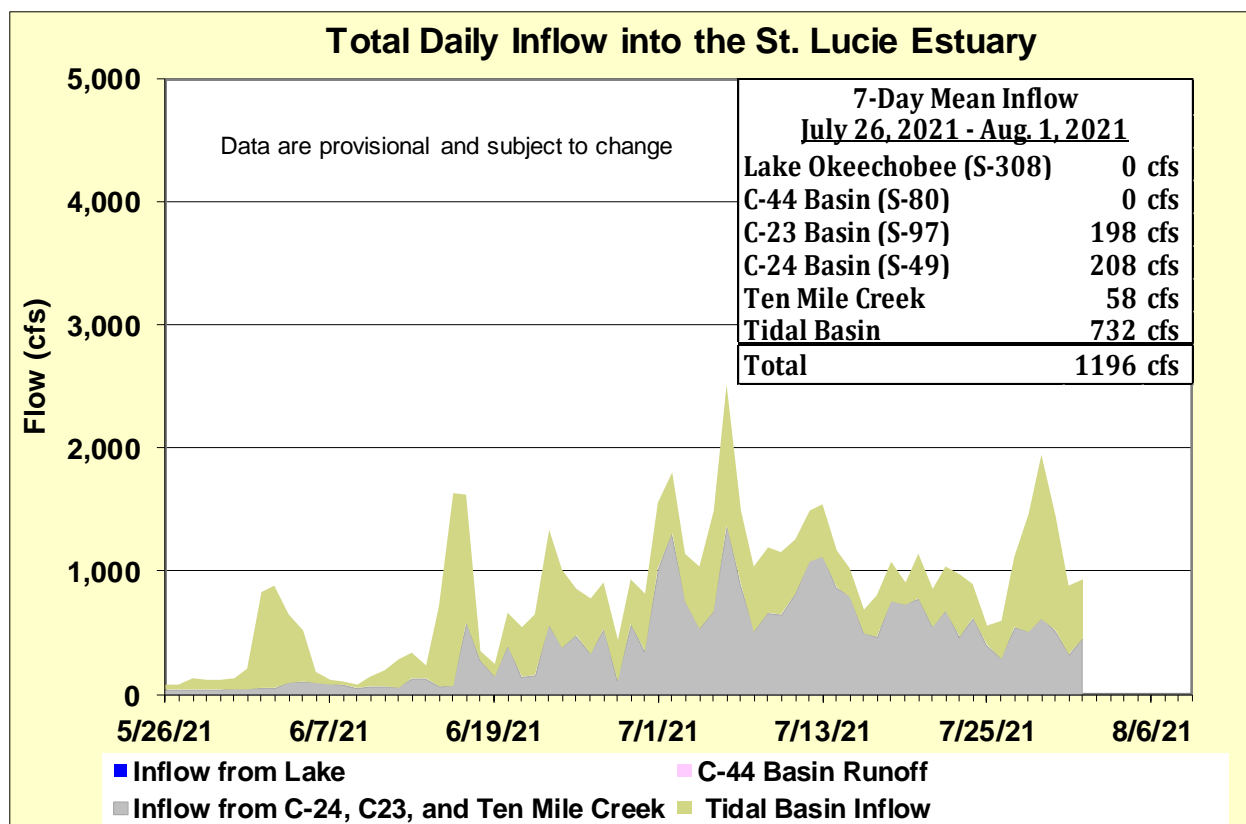


### **Water Management Recommendations**

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

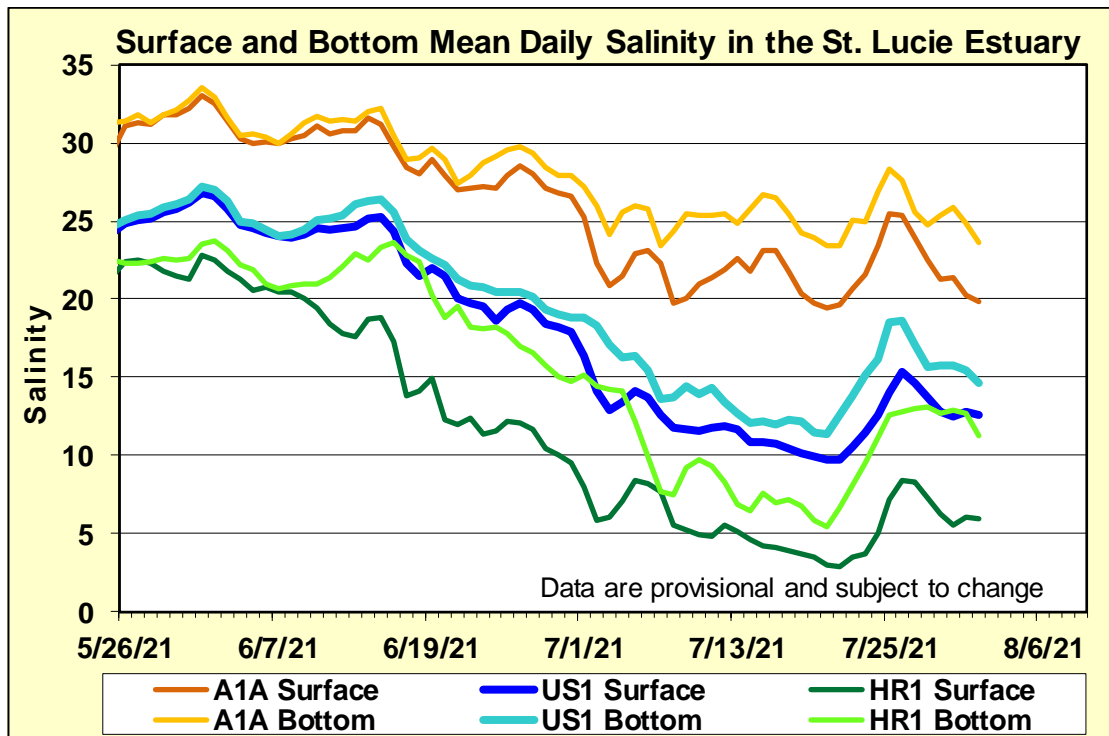


**Figure ES-2.** Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and Tidal Basins into the St. Lucie Estuary.

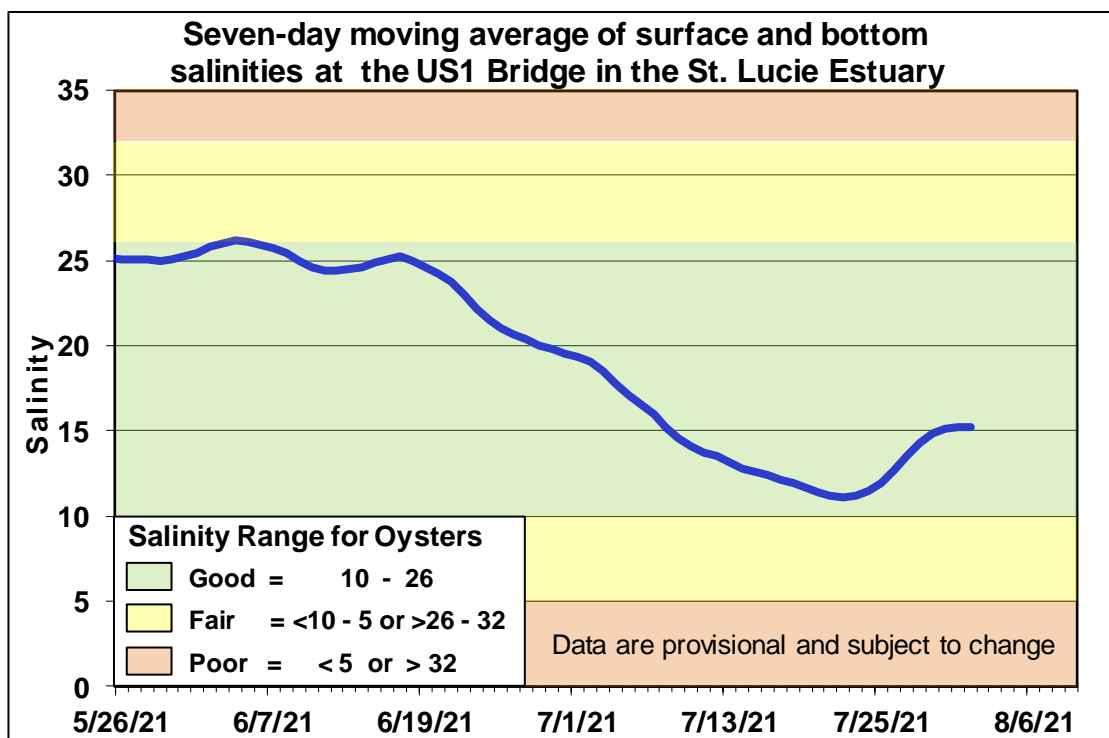
**Table ES-1.** Seven-day mean salinity at oyster monitoring sites in the St. Lucie Estuary. Current means are in bold font; previous week's means are in parentheses. The envelope reflects the preferred salinity range for adult eastern oysters (*Crassostrea virginica*) in the middle estuary. Data are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

Sampling Site	Surface	Bottom	Envelope
HR1 (Nork Fork)	<b>6.8</b> (4.1)	<b>12.6</b> (8.5)	NA <sup>a</sup>
US1 Bridge	<b>13.5</b> (11.2)	<b>16.1</b> (14.1)	10.0 – 26.0
A1A Bridge	<b>22.1</b> (21.4)	<b>25.4</b> (25.2)	NA <sup>a</sup>

a. The envelope is not applicable.

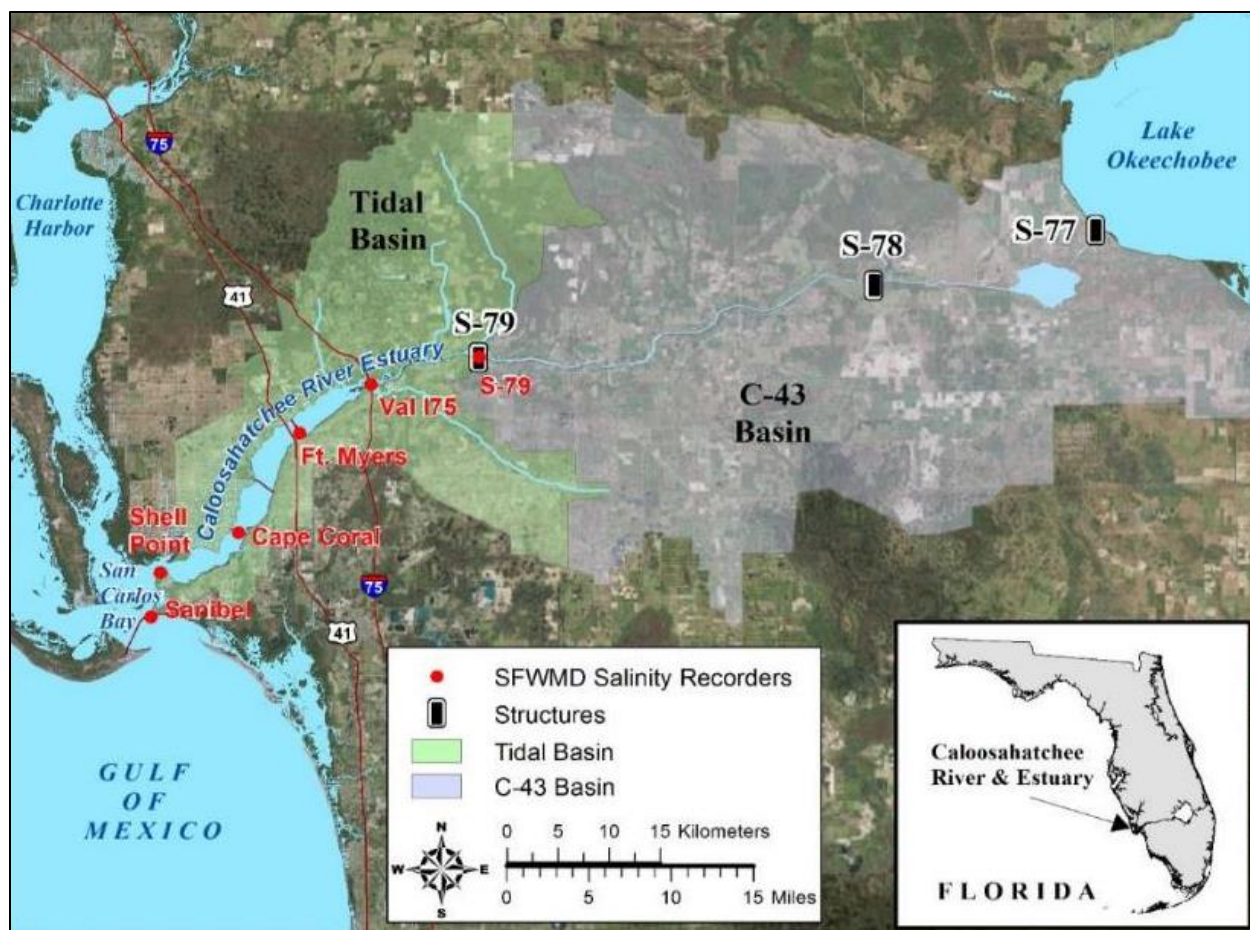


**Figure ES-3.** Mean daily salinity at the A1A, US1 and HR1 sites in the St. Lucie Estuary.

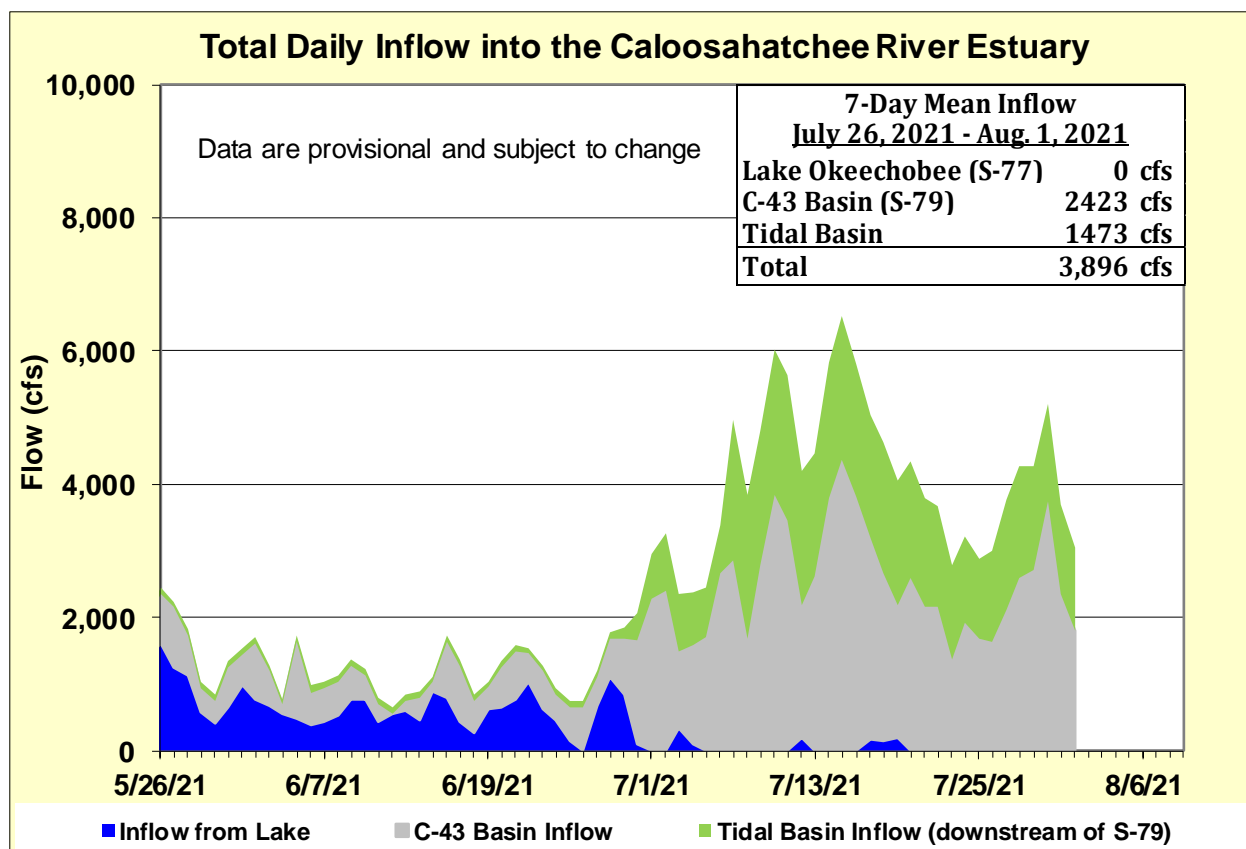


**Figure ES-4.** Seven-day moving average of the surface and bottom salinities at the US1 Bridge in the St. Lucie Estuary.





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



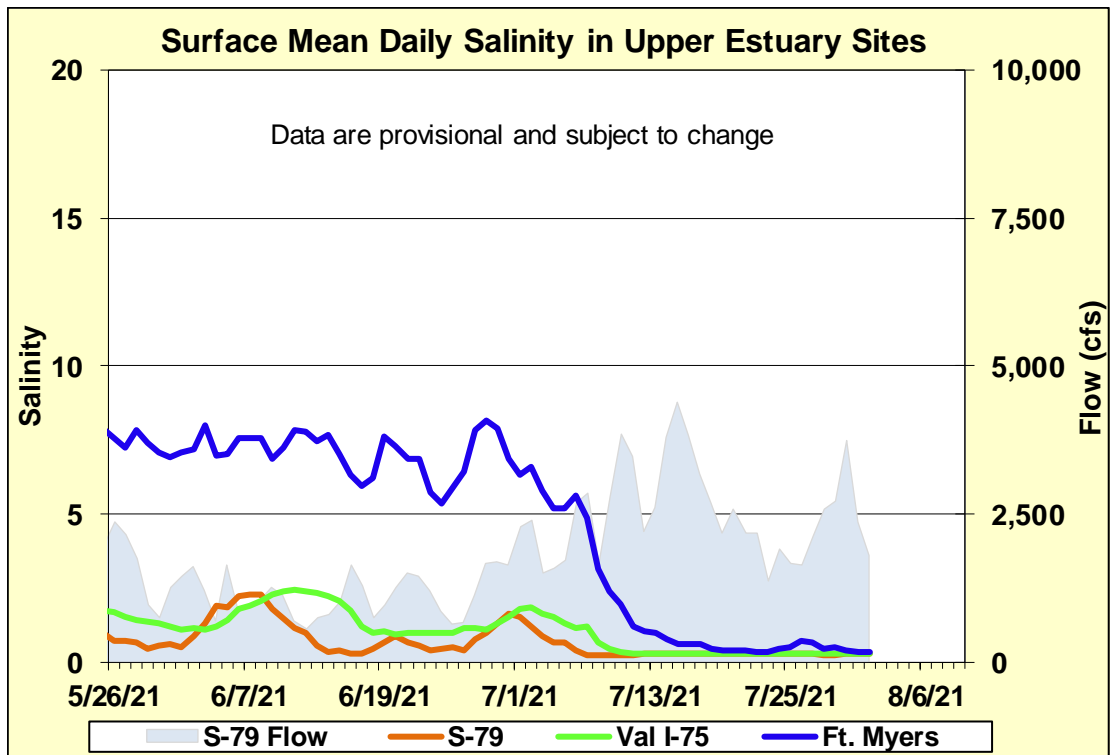
**Figure ES-6.** Total daily inflows from Lake Okeechobee, and runoff from the C-43 and Tidal basins into the Caloosahatchee River Estuary.

**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.

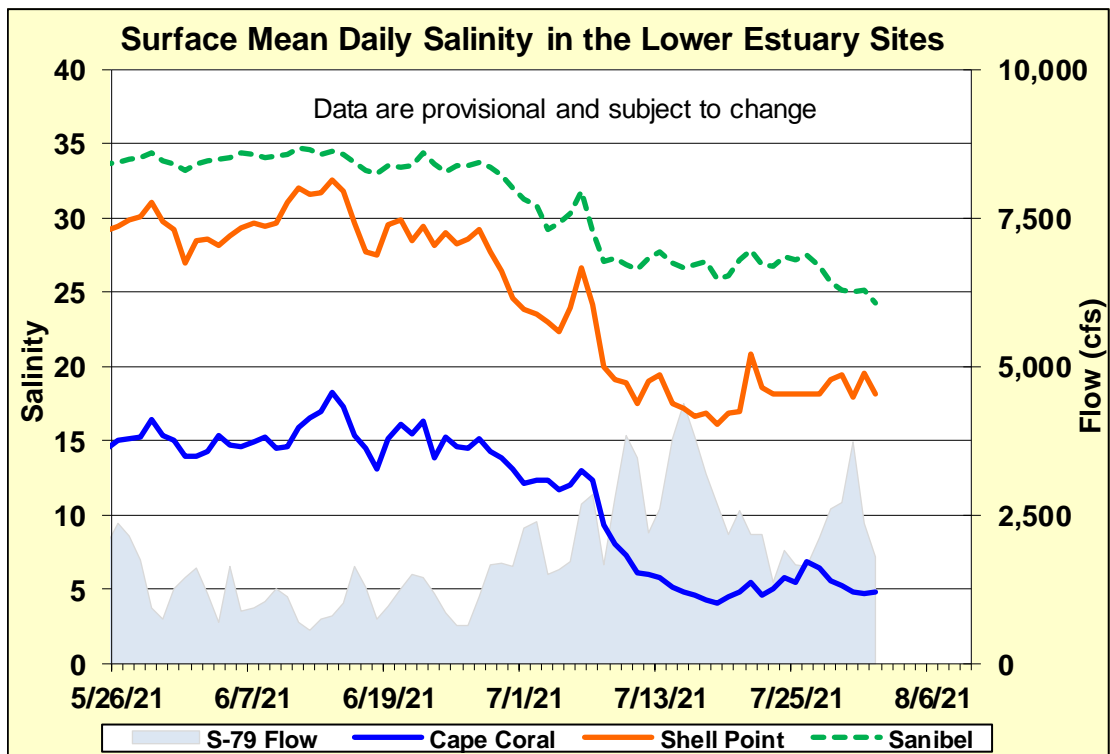
Sampling Site	Surface	Bottom	Envelope
S-79 (Franklin Lock)	<b>0.3</b> (0.3)	<b>0.3</b> (0.3)	NA <sup>a</sup>
Val I-75	<b>0.3</b> (0.3)	<b>0.3</b> (0.3)	0.0 – 5.0 <sup>b</sup>
Fort Myers Yacht Basin	<b>0.5</b> (0.4)	<b>1.3</b> (3.5)	NA <sup>a</sup>
Cape Coral	<b>5.5</b> (5.1)	<b>7.2</b> (7.0)	10.0 – 30.0
Shell Point	<b>18.7</b> (18.2)	<b>19.6</b> (20.2)	10.0 – 30.0
Sanibel	<b>25.7</b> (27.1)	<b>28.8</b> (29.3)	10.0 – 30.0

a. The envelope is not applicable.

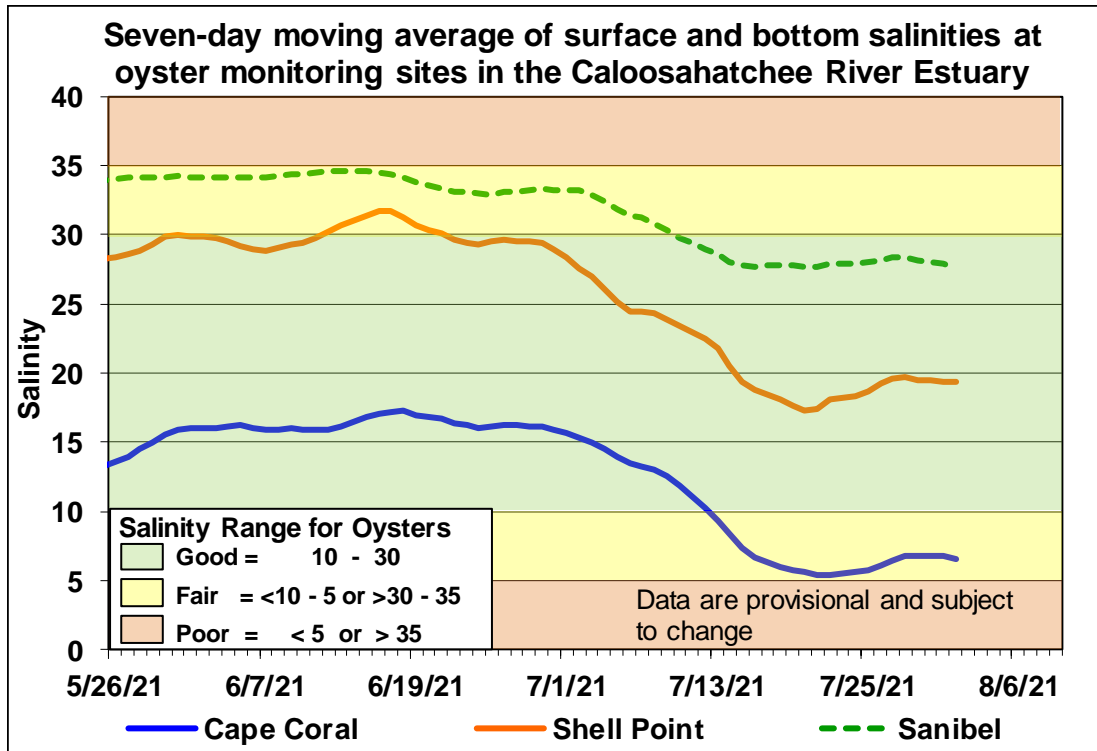
b. The envelope is based on the predicted 30-day mean for the next two weeks.



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



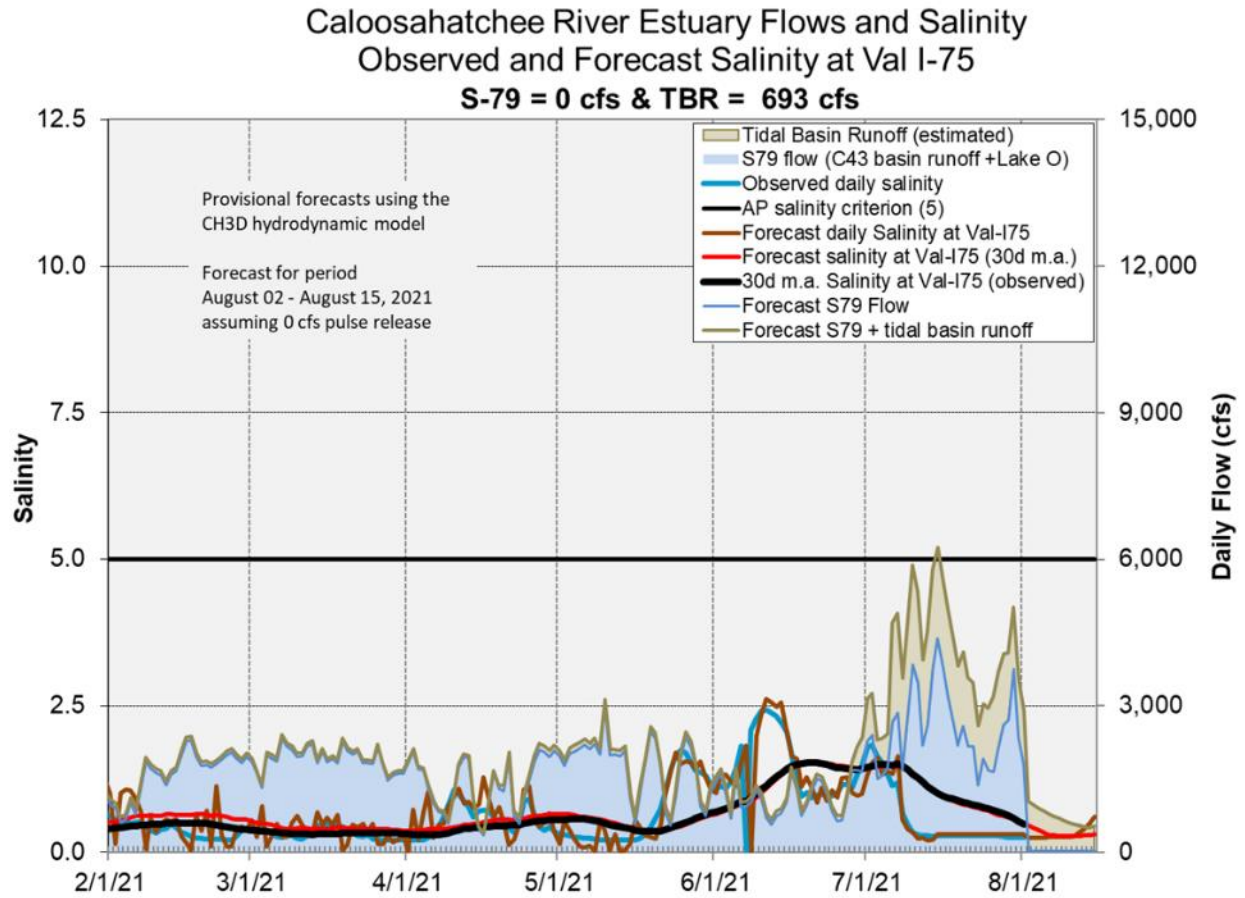
**Figure ES-8.** Mean daily surface salinity at lower Caloosahatchee River Estuary monitoring sites and mean daily flow at S-79.



**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	693	0.6	0.3
B	450	693	0.3	0.3
C	800	693	0.3	0.3
D	1000	693	0.3	0.3
E	1500	693	0.3	0.3
F	2000	693	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 at or near 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**).

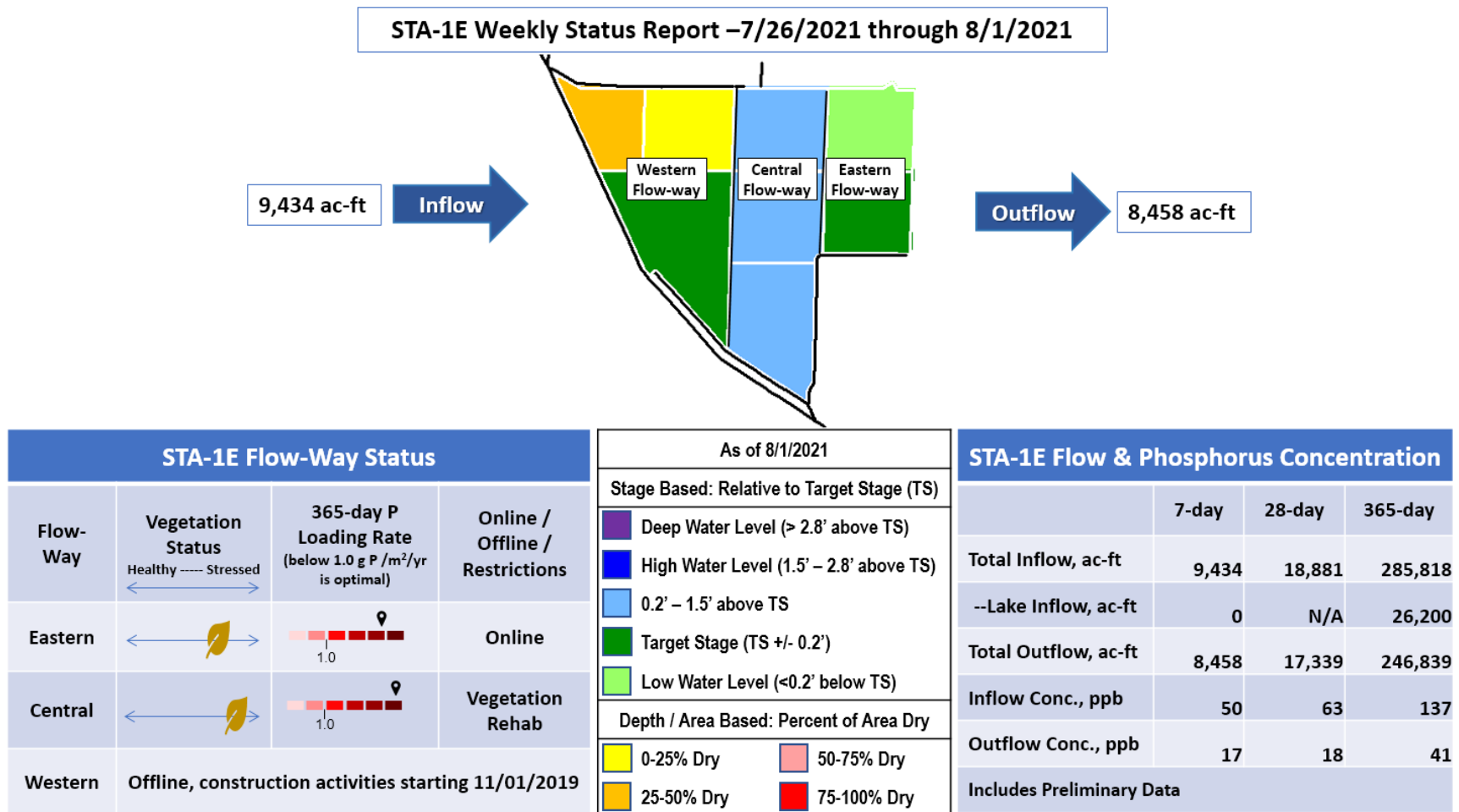
**STA-1W:** Operational restrictions are in place in STA-1W Western, Eastern, and Northern Flow-ways due to construction activities. Most treatment cells are at or above target stage. Vegetation in the flow-ways is stressed and highly stressed. The 365-day PLRs for all flow-ways are high (**Figure S-2**).

**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 3, 4, and 5 are below 1.0 g/m<sup>2</sup>/year. The 365-day PLR for Flow-way 1 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 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**).

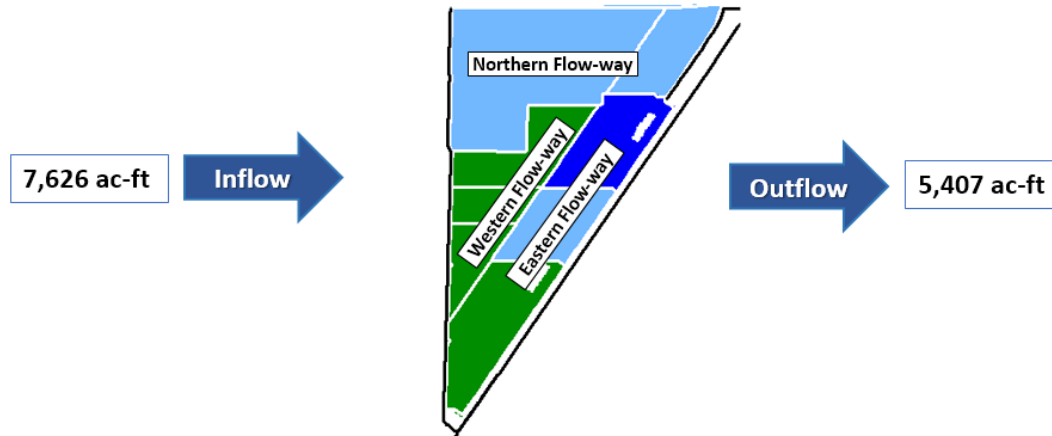
**STA-5/6:** Operational restrictions are in place in STA-5/6 Flow-ways 2 and 3 following the Restoration Strategies project to grade non-effective treatment areas. Most treatment cells are at or above target stage. The 365-day PLRs for most flow-ways are near 1.0 g/m<sup>2</sup>/year. All treatment 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 – 7/26/2021 through 8/1/2021

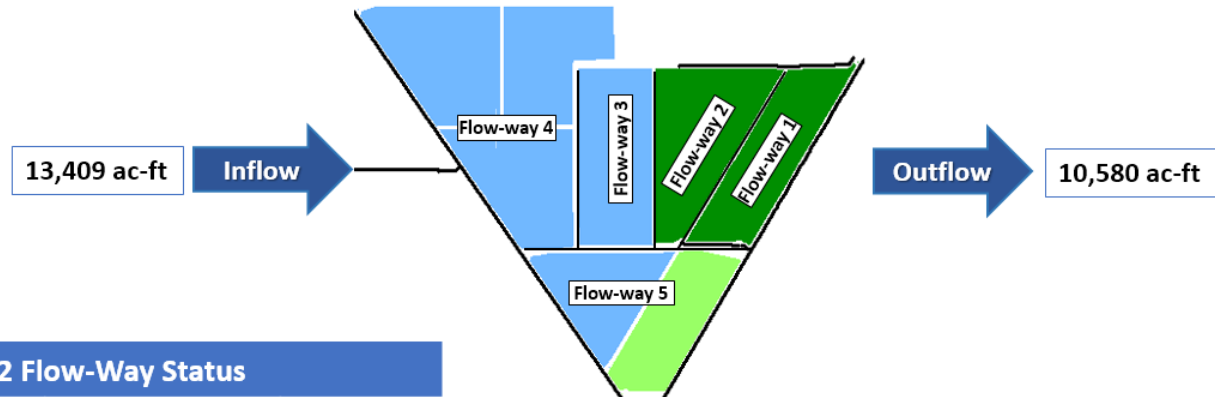


STA-1W Flow-Way Status				As of 8/1/2021				STA-1W Flow & Phosphorus Concentration			
Flow-Way	Vegetation Status Healthy --- Stressed	365-day P Loading Rate (below 1.0 g P /m <sup>2</sup> /yr is optimal)	Online / Offline / Restrictions	Stage Based: Relative to Target Stage (TS)					7-day	28-day	365-day
				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							
Northern	← Healthy →	1.0	Construction					Total Inflow, ac-ft	7,626	17,158	136,633
Western	← Healthy →	1.0	Construction					--Lake Inflow, ac-ft	0	N/A	7,700
Eastern	← Healthy →	1.0	Construction					Total Outflow, ac-ft	5,407	15,965	141,109
								Inflow Conc., ppb	137	166	247
								Outflow Conc., ppb	18	22	40
								Includes Preliminary Data			

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



# STA-2 Weekly Status Report – 7/26/2021 through 8/1/2021



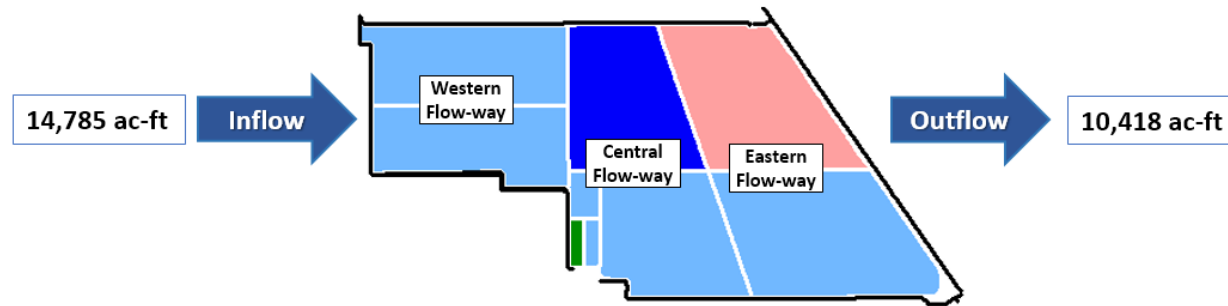
STA-2 Flow-Way Status			
Flow-Way	Vegetation Status Healthy ----- Stressed	365-day P Loading Rate (below 1.0 g P /m <sup>2</sup> /yr is optimal)	Online / Offline / Restrictions
1	←  →	1.0	Online
2	←  →	1.0	Construction
3	←  →	1.0	Vegetation Rehab
4	←  →	1.0	Vegetation Rehab
5	←  →	1.0	Online

As of 8/1/2021	
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-2 Flow & Phosphorus Concentration			
	7-day	28-day	365-day
Total Inflow, ac-ft	13,409	40,291	412,985
--Lake Inflow, ac-ft	0	N/A	90,800
Total Outflow, ac-ft	10,580	45,886	457,319
Inflow Conc., ppb	43	72	90
Outflow Conc., ppb	12	13	20
Includes Preliminary Data			

Figure S-3. STA-2 Weekly Status Report

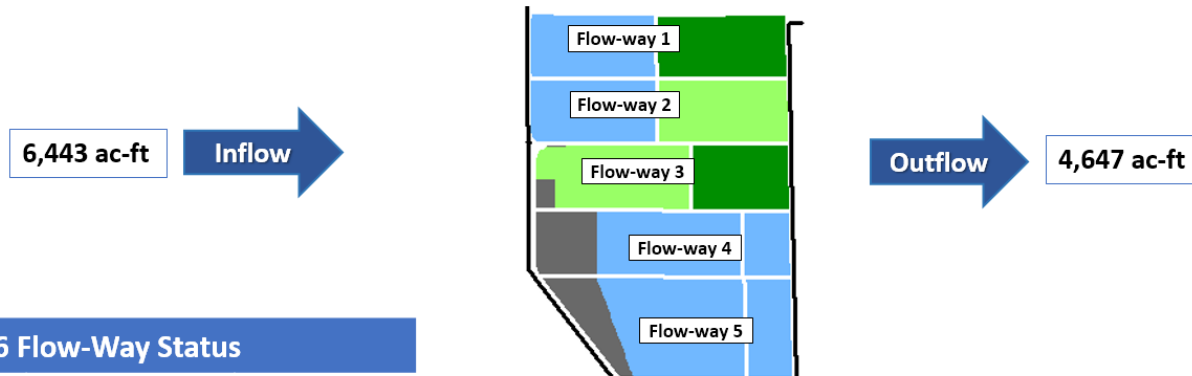
STA-3/4 Weekly Status Report – 7/26/2021 through 8/1/2021



STA-3/4 Flow-Way Status				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	As of 8/1/2021			
				Stage Based: Relative to Target Stage (TS)			
Eastern	Offline, vegetation management drawdown as of 3/1/2021			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			
Central			Online	0-25% Dry	50-75% Dry		
Western			Online	25-50% Dry	75-100% Dry		
				Includes Preliminary Data			
					7-day	28-day	365-day
Total Inflow, ac-ft					14,785	67,417	526,358
--Lake Inflow, ac-ft					200	N/A	61,600
Total Outflow, ac-ft					10,418	64,268	493,850
Inflow Conc., ppb					37	58	59
Outflow Conc., ppb					13	15	13

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

STA-5/6 Weekly Status Report – 7/26/2021 through 8/1/2021



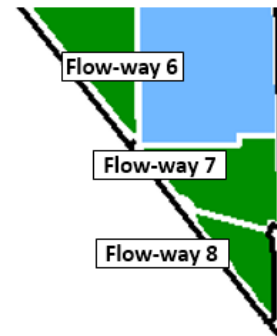
STA-5/6 Flow-Way Status			
Flow-Way	Vegetation Status Healthy ----- Stressed	365-day P Loading Rate (below 1.0 g P /m <sup>2</sup> /yr is optimal)	Online / Offline / Restrictions
1			Online
2		N/A	Post-construction
3		N/A	Post-construction
4			Online
5			Online
















As of 8/1/2021	
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	6,443	19,453	122,309
--Lake Inflow, ac-ft	0	N/A	9,000
Total Outflow, ac-ft	4,647	7,111	138,367
Inflow Conc., ppb	178	196	277
Outflow Conc., ppb	34	31	74
Includes Preliminary Data			

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

## STA-5/6 Weekly Status Report – 7/26/2021 through 8/1/2021



STA-5/6 Flow-Way Status				As of 8/1/2021
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> 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>
7	←-----→ 		Online	Depth / Area Based: Percent of Area Dry
8	←-----→ 		Online	<div> 0-25% Dry</div> <div> 25-50% Dry</div> <div> 50-75% Dry</div> <div> 75-100% Dry</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: Stage at the 1-8C Gauge trended closely to schedule last week. Stage on Sunday was 0.28 feet above the rising Zone A1 regulation line. WCA-2A: Stage at 2A-17 was stable last week, 0.48 feet above the rising regulation line on Sunday. WCA-3A: The Three Gauge Average continued to trend upwards faster than the slope of the Zone A regulation line last week. Stage ended the week at 0.50 feet below the rising Zone A line. WCA-3A: Stage change at gauge 62 (Northwest corner) went up and then down last week. The Sunday average was 0.52 feet below the rising Upper Schedule (**Figures EV-1 through EV-4**).

### ***Water Depths***

The WDAT tool indicates that water levels continue to rise across the Everglades Protection Area. Northeastern WCA-3A is recovering with surface water now present but still drier than the surrounding regions. Downstream in the upper reaches of the L-67, depths have exceeded 2.5 feet. North to South hydrologic connectivity is present within Everglades National Park (ENP), however portions of ENP and Big Cypress National Preserve (BCNP) remain dry or have water levels just at the ground surface (**Figure EV-5**). Over the last month stages generally increased in most places but not significantly (more than 0.5 feet). The largest increases occurred downstream of the S-11s in WCA-3A and in northwestern BCNP. Compared to a year ago, WCA-3 is significantly drier especially in the east. Eastern ENP continues to be drier than a year ago, while WCA-2A is wetter (**Figure EV-6**). Compared to the 20-year average water depths, northeastern ENP is currently much deeper than average, while upstream in northern WCA-3A, southern WCA-2A and downstream is below average (**Figure EV-7**).

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

An average of 1.24 inches of rain fell over Taylor Slough and Florida Bay over the week ending Sunday (8/1) with the largest volumes over the central Taylor Slough. Stage increased by an average of 0.15 feet over the week as a result of the rainfall (**Figure EV-7 & Figure EV-8**). Depths are within 3 inches of the historical average for this time of year at all sites. Phosphorus levels at S-328 were at 30 µg/L last week. The phosphorus level should be less than 8 µg/L threshold before water movements towards Everglades National Park from that structure begin. We are still waiting for water levels in the South Dade area to be high enough to sustain westward water movements towards the Park.

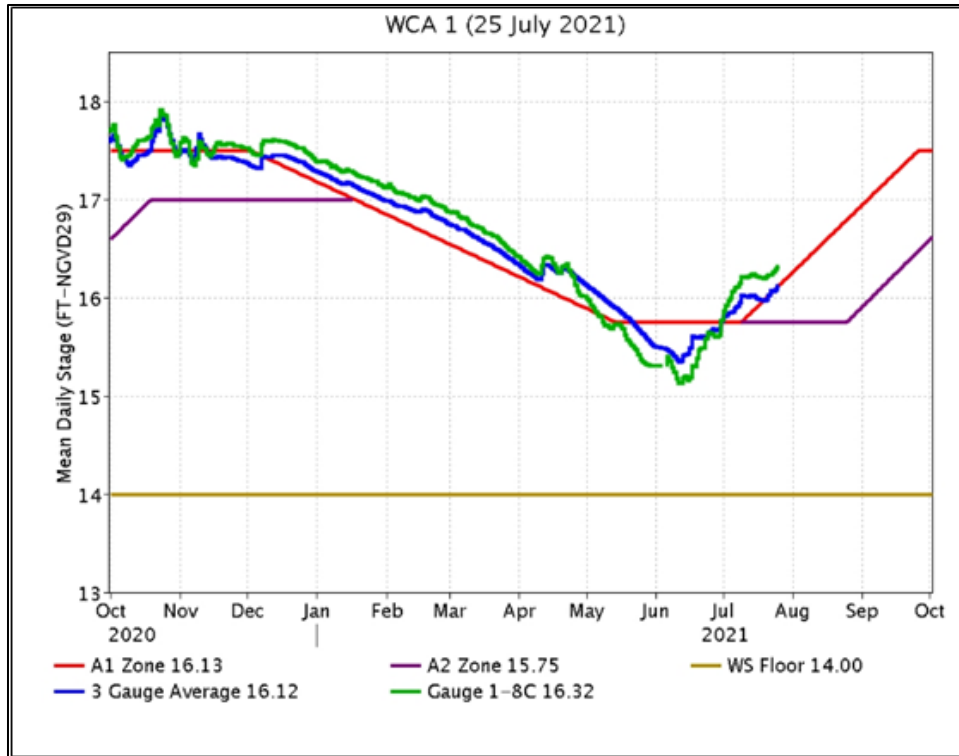
Salinities in Florida Bay averaged a decrease of 1 for the week ending 8/1, but individual stations had weekly changes ranging from -3.4 to +0.6 (**Figure EV-7**). The largest decreases are in the nearshore areas that had experienced the upstream flows last week. The decreases at these sites this week are small suggesting that there is not a lot of freshwater at the shoreline currently. Salinities are 2.5 higher than the historical average (**Figure EV-9**). Freshwater deliveries will still be needed to freshen the nearshore area. We are quickly reaching the time of year where the lowest salinities are expected, but salinities have not been decreasing (**Figure EV-10**).

### **Water Management Recommendations**

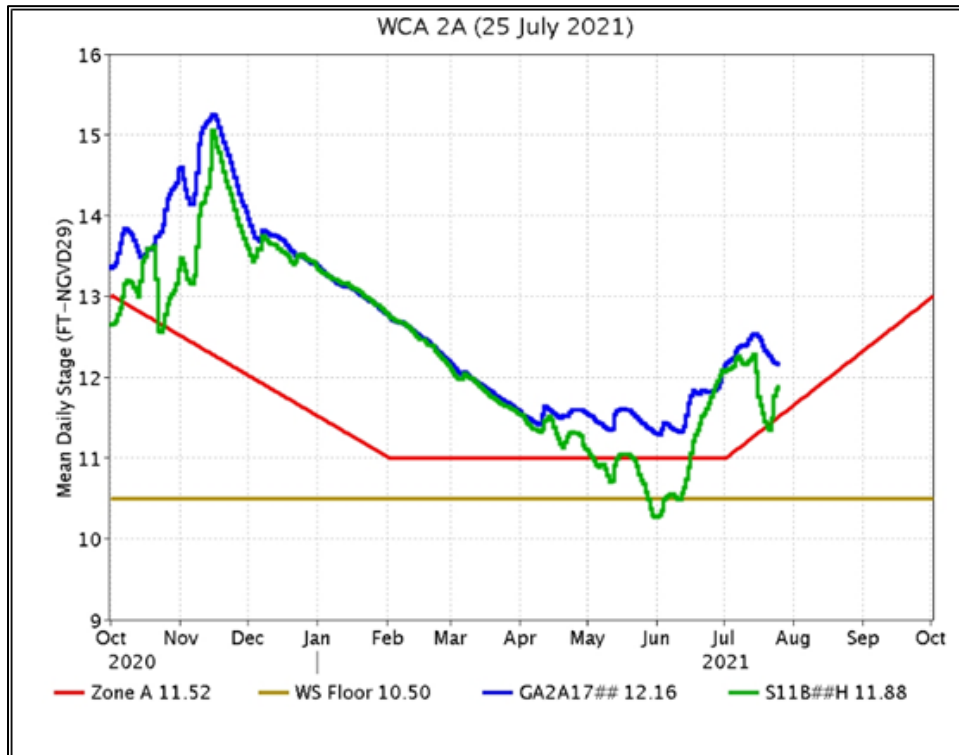
Ascension rates that do not exceed 0.25 feet per week or 0.50 feet per two weeks are considered ecologically healthy. An equal distribution of inflows across the northern perimeter of WCA-3A would have an ecological benefit. Rehydration of northern Taylor Slough has begun slowly, and the most western structures (S-328 and G-737) continue to have phosphorus levels above 8 µg/L. These structures should not be opened until the phosphorus levels return to below that criteria at these locations. 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	2.72	+0.14
WCA-2A	2.07	+0.00
WCA-2B	2.27	+0.14
WCA-3A	1.87	+0.14
WCA-3B	1.47	+0.03
ENP	1.16	+0.10

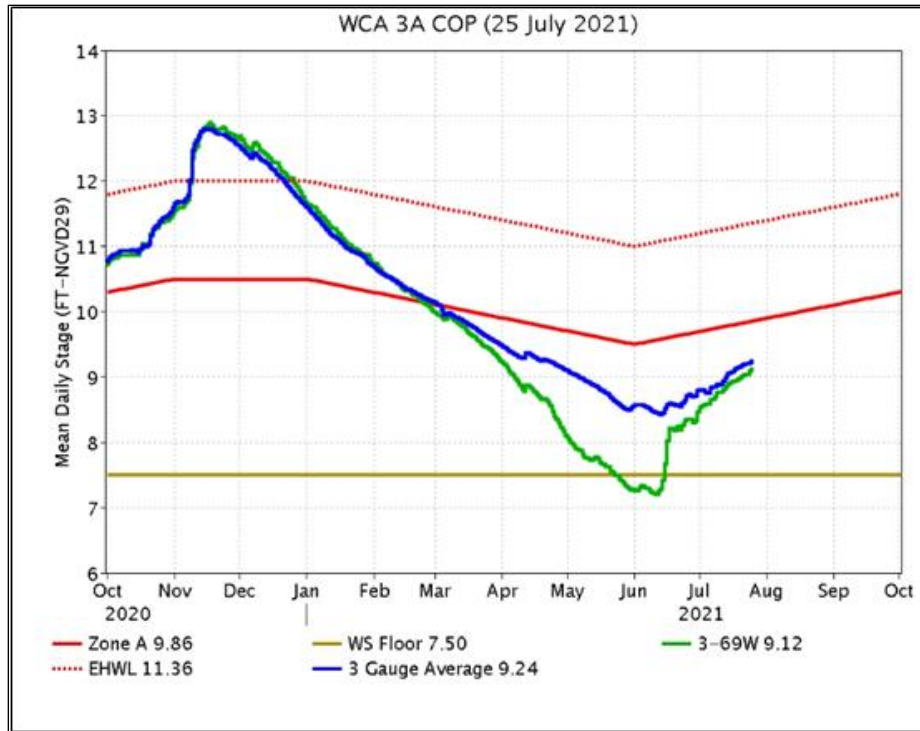


**Figure EV-1.** WCA-1 stage hydrographs and regulation schedule.

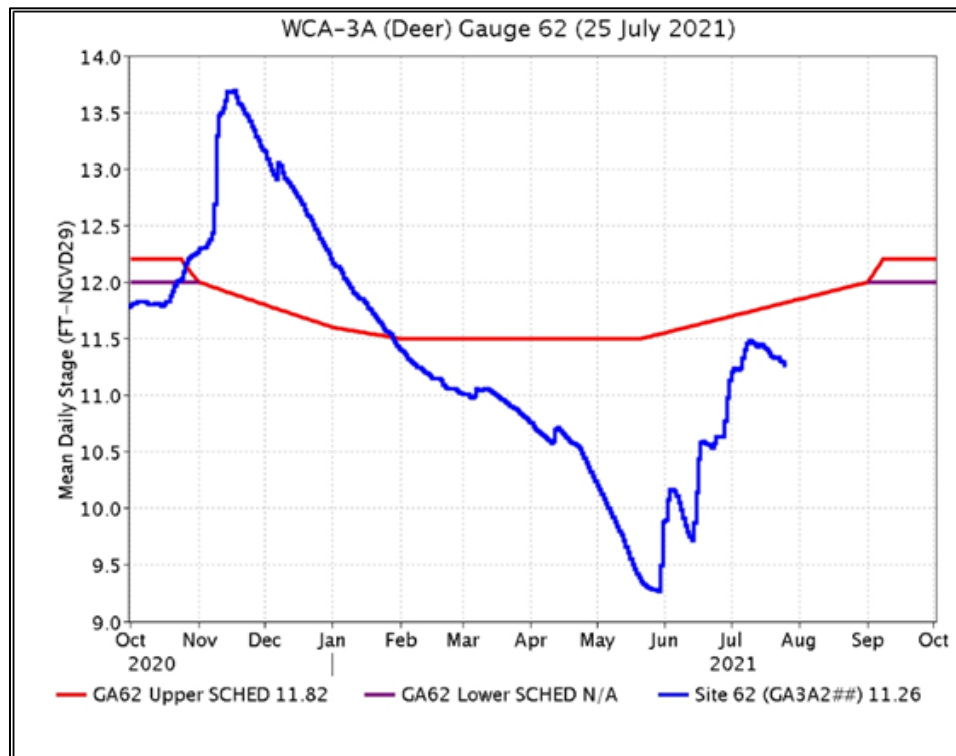


**Figure EV-2.** WCA-2A stage hydrographs and regulation schedule.

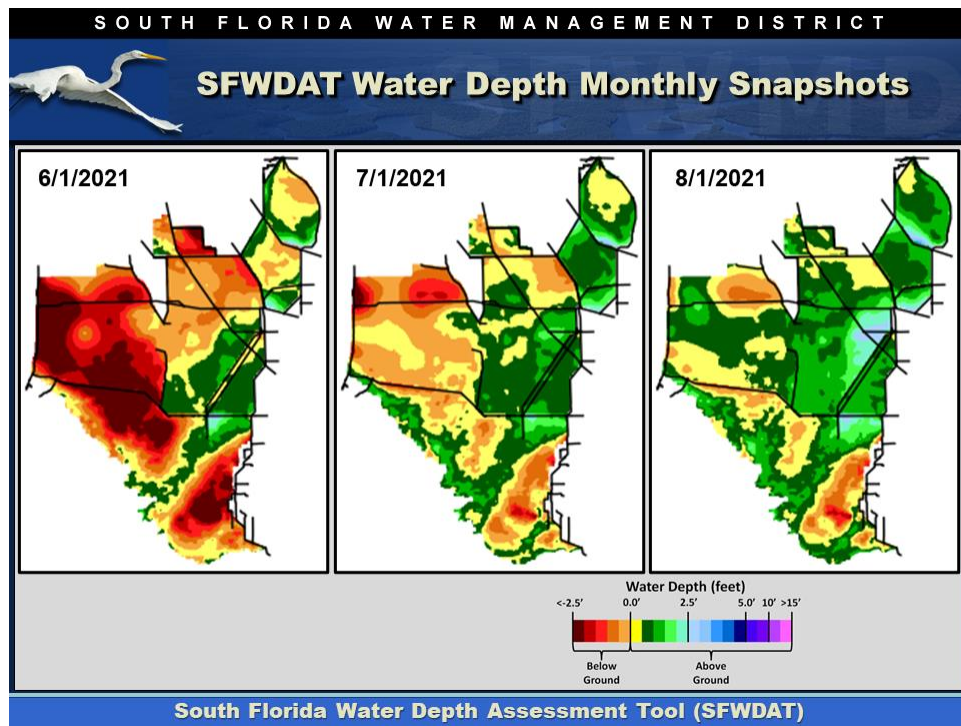




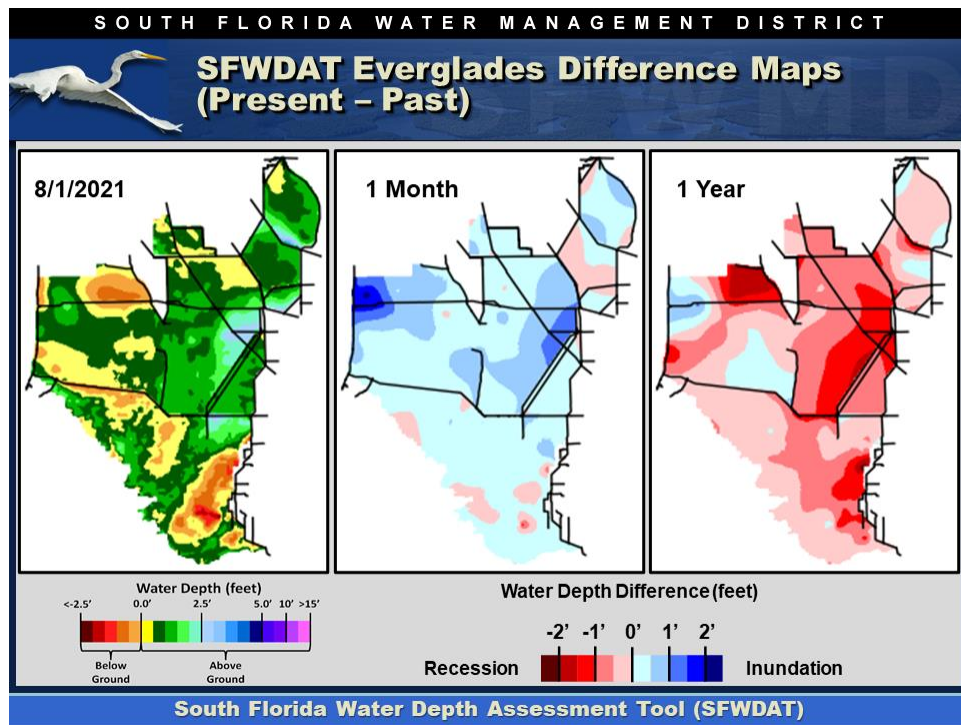
**Figure EV-3.** WCA-3A stage hydrographs (three-gauge average, S-333 headwater) and regulation schedule.



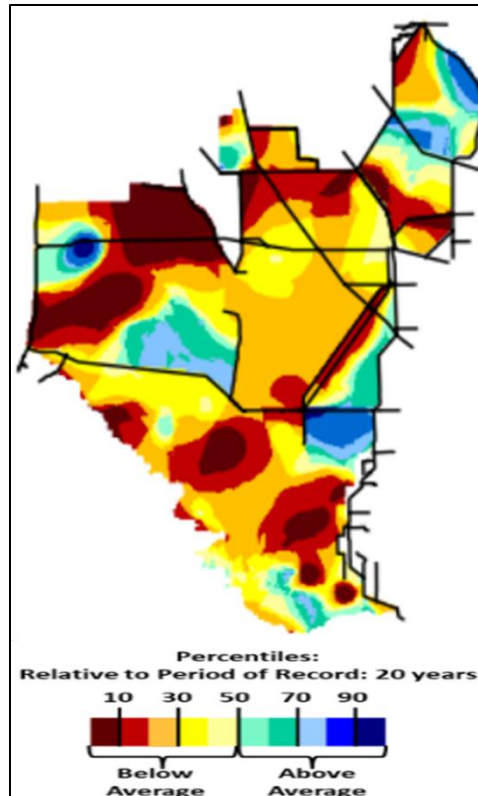
**Figure EV-4.** WCA-3A stage hydrograph (Deer gauge; Site 62) and CA62 regulation schedule.



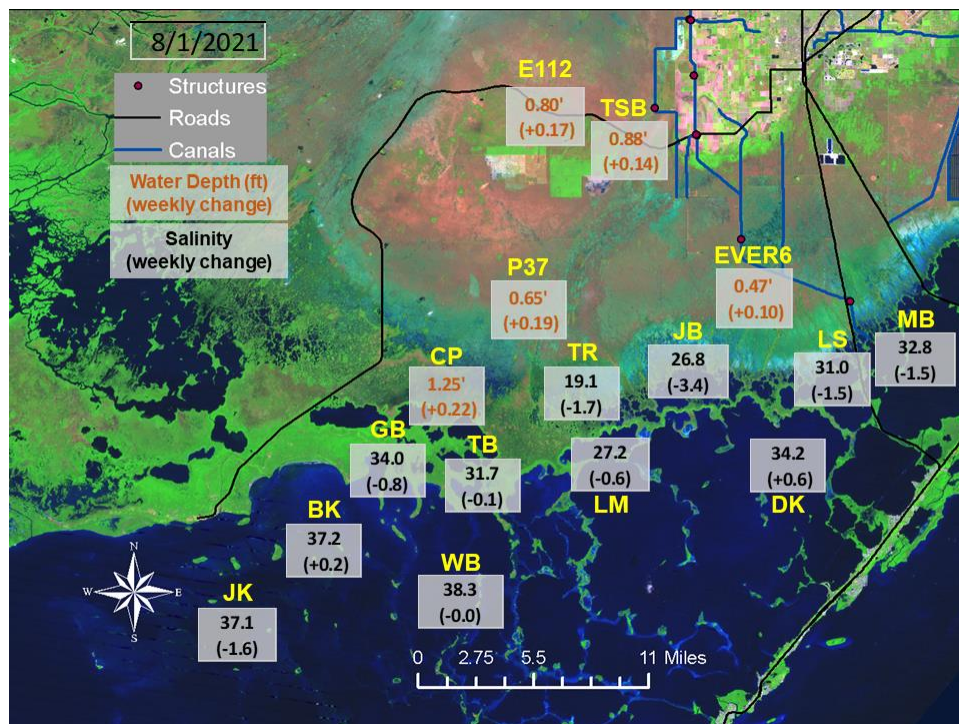
**Figure EV-5.** Everglades water depths from two months ago (left), one month ago (center) and present (right), based on SFWDAT.



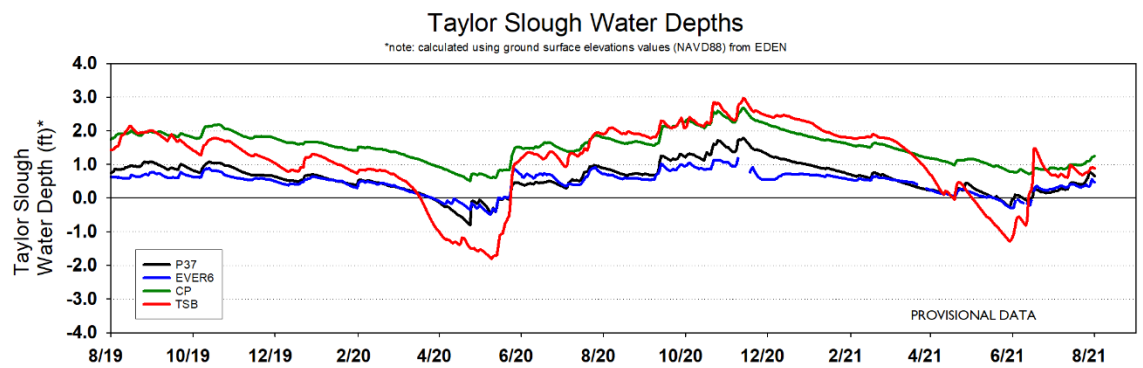
**Figure EV-6.** Present Everglades water depths (left) and water depth changes from one month (center) and one year (right) ago, based on SFWDAT.



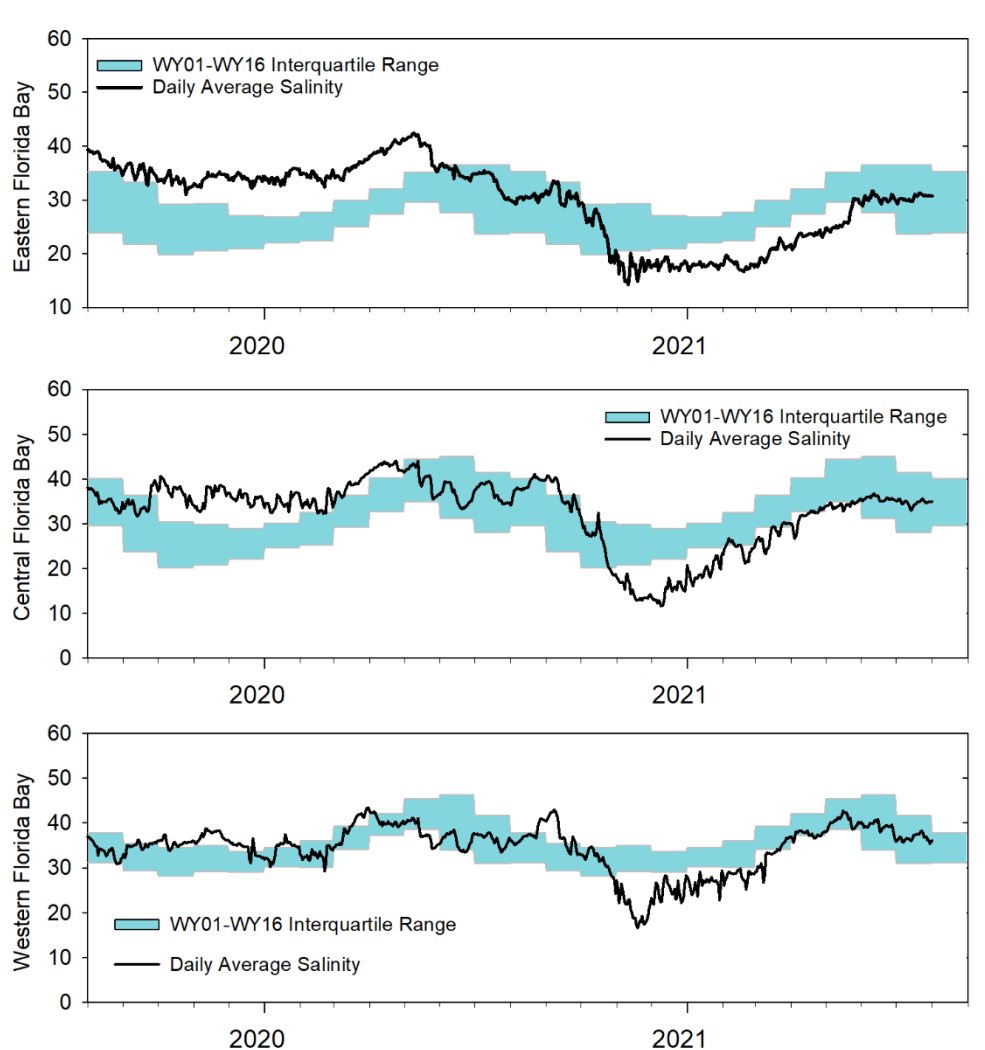
**Figure EV-7.** Present water depths compared to the day of year average over the previous 20 years.



**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, July 20th, 2021 (red is new)			
Area	Weekly change	Recommendation	Reasons
WCA-1	Stage increased by 0.14'	Maintain ascension rates between 0.01 and 0.25 feet per week.	Protect within basin and downstream habitat and wildlife.
WCA-2A	Stage remained unchanged	Allow for an ascension rate to between 0.01 and 0.25 feet per week	Protect within basin and downstream habitat and wildlife.
WCA-2B	Stage increased by 0.14'	Maintain an ascension rate to between 0.01 and 0.25 feet per week	Protect within basin and downstream habitat and wildlife.
WCA-3A NE	Stage increased by 0.06'	Maintain ascension rates between 0.01 and 0.25 feet per week now that surface water is present.	Protect within basin and downstream habitat and wildlife.
WCA-3A NW	Stage decreased by 0.07	Maintain an ascension rate to between 0.01 and 0.25 feet per week	
Central WCA-3A S	Stage increased by 0.29'	Moderate the ascension rate to less than .5 feet per two weeks	Protect within basin and downstream habitat and wildlife.
Southern WCA-3A S	Stage increased by 0.15'		
WCA-3B	Stage increased by 0.03'	Maintain ascension rates between 0.01 and 0.25 feet per week	Protect within basin and downstream habitat and wildlife.
ENP-SRS	Stage increased by 0.10'	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 +0.07' to +0.22'	Move water southward as possible.	When available, provide freshwater buffer for downstream conditions.
FB- Salinity	Salinity changes ranged -3.4 to +0.6	Move water southward as possible.	When available, provide freshwater to maintain low salinity buffer and promote water movement.