

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:** July 28, 2021

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

### **Summary**

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

On Wednesday, moisture pooling over Florida will favor a good or widespread coverage of rain. A southwesterly to westerly steering wind flow will direct the heavier rains from the central interior to the east coast, where locally heavy rainfall is possible during the afternoon. A third to half of an inch of large areal average rainfall is possible in the east. While total rainfall is forecast to decrease on Thursday, areas north and west of Lake Okeechobee are still likely to see enhanced rains. Late this week a sharper reduction of total rainfall and rain coverage is expected, with Saturday appearing to be the least rainy day. The coverage of rain is forecast to be widely scattered and low intensity due to much drier mid-level air arriving from the north. Early next week a deep mid- to upper-level trough is forecast to develop over the eastern U.S., with a cold front likely pushing unusually far south into the southeastern U.S. Ahead of the front, a rainier weather pattern is likely to develop across the northwestern half of the District. For the week ending next Tuesday morning, total rainfall is likely to be at least normal and could be somewhat above the long-term mean.

#### **Kissimmee**

Flow at S-65A continues to be too low for extensive inundation of the Kissimmee River floodplain, but mean floodplain depth increased to 0.48 feet on July 25. Dissolved oxygen concentration in the Kissimmee River continued to decline to an average of 3.1 mg/L for the week but is still above the 2.0 mg/L threshold considered harmful to sportfish.

#### **Lake Okeechobee**

Lake Okeechobee stage was 13.53 feet NGVD on July 25, 2021, 0.88 feet higher than a month ago, and 0.62 feet higher than one year ago. 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. Recent satellite imagery from July 25, 2021 shows a medium to high bloom potential in the Northern and Northeastern parts of the Lake.

## **Estuaries**

Total inflow to the St. Lucie Estuary averaged approximately 912 cfs over the past week, with no flow coming from Lake Okeechobee. Mean surface salinities decreased at the HR1 and A1A sites and increased slightly at the US1 Bridge site 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 3,534 cfs over the past week with 28 cfs coming from Lake Okeechobee. Mean salinities remained the same at S-79 and Val I-75, decreased at Ft. Myers, 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. For adult eastern oysters, salinities were also in the good range (10-30) at Shell Point and Sanibel and in the fair range at Cape Coral.

## **Stormwater Treatment Areas**

For the week ending Sunday, July 25, 2021, 1,400 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 54,400 ac-feet. The total amount of inflows to the STAs in WY2022 is approximately 296,000 ac-feet. Most STA cells are at 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 of concern in WCA-2A and WCA-North last week. Depth conditions are below average across most of WCA-3A, well below along the northern perimeter. In Florida Bay, salinities are generally stable with some wind driven changes last week, and stages decreased 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 July 25, 2021, lake stages were 56.0 feet NGVD (0.5 feet below schedule) in East Lake Toho, 53.2 feet NGVD (0.3 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***

Kissimmee River (headwater) stages were 46.3 feet NGVD at S-65A and 27.5 feet NGVD at S-65D on July 25, 2021, while discharges were 1,550 cfs at S-65, 1,600 cfs at S-65A, 1,250 cfs at S-65D, and 1,340 cfs at S-65E (**Table KB-2**). The decline in dissolved oxygen concentration in the Kissimmee River continued for the week ending on July 25, 2021, with an average for the week of 3.1 mg/L (**Table KB-2, Figure KB-4**). Discharge at S-65/S-65A is being managed to attempt to avoid further decline of DO 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 0.48 feet on July 25, 2021 (**Figure KB-5**).

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

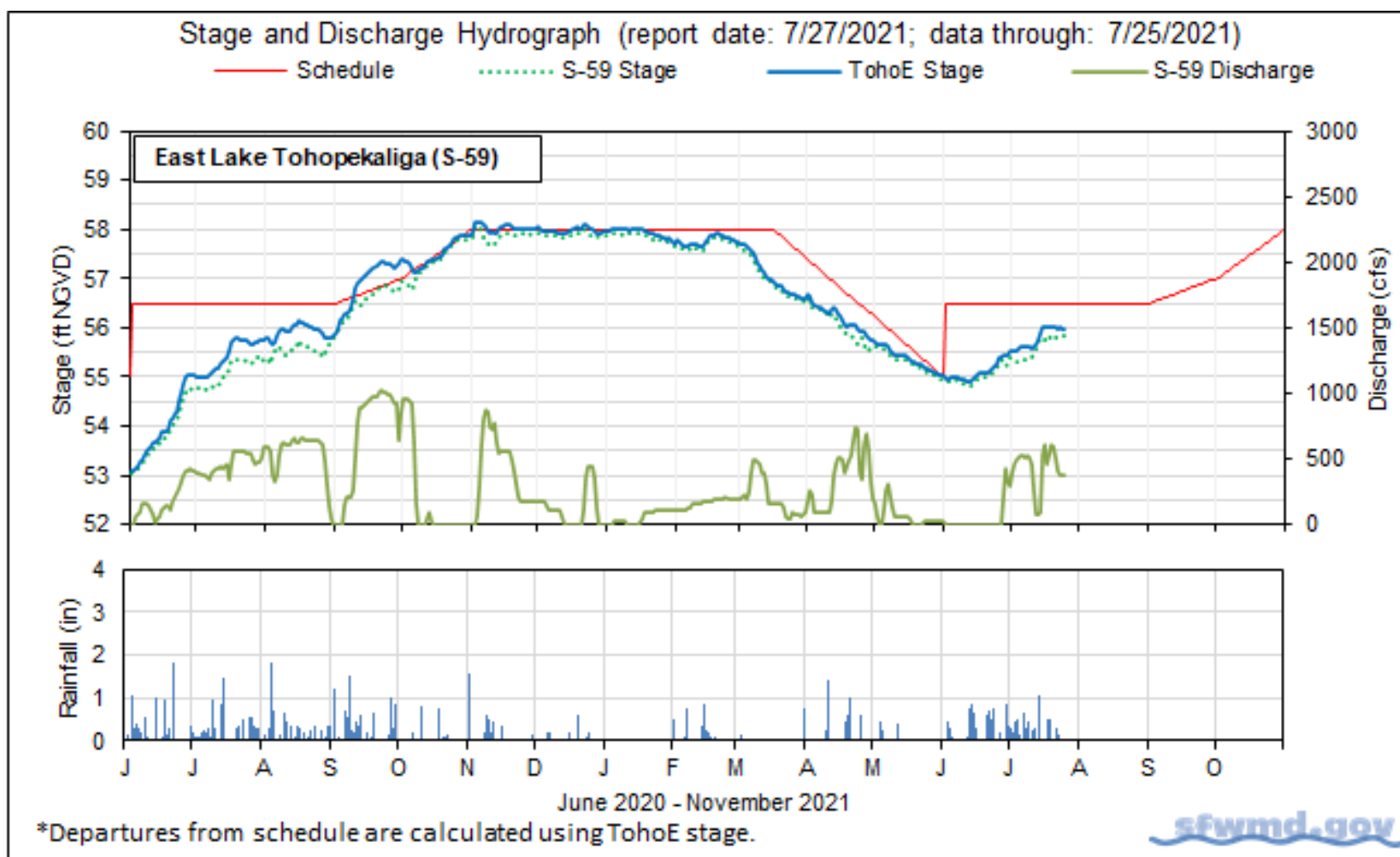
Due to the recent trend of dissolved oxygen decline in the Kissimmee River, efforts continue to make recommendations several times per week to adaptively manage flow at S-65 and S-65A. The current objective is to continue to maintain flow above bankfull (>1,400 cfs) without causing a persistent dissolved oxygen decline, while avoiding excessive stage rise in KCH. A reduction in S-65/S-65A flow may be needed today or in coming days. 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.

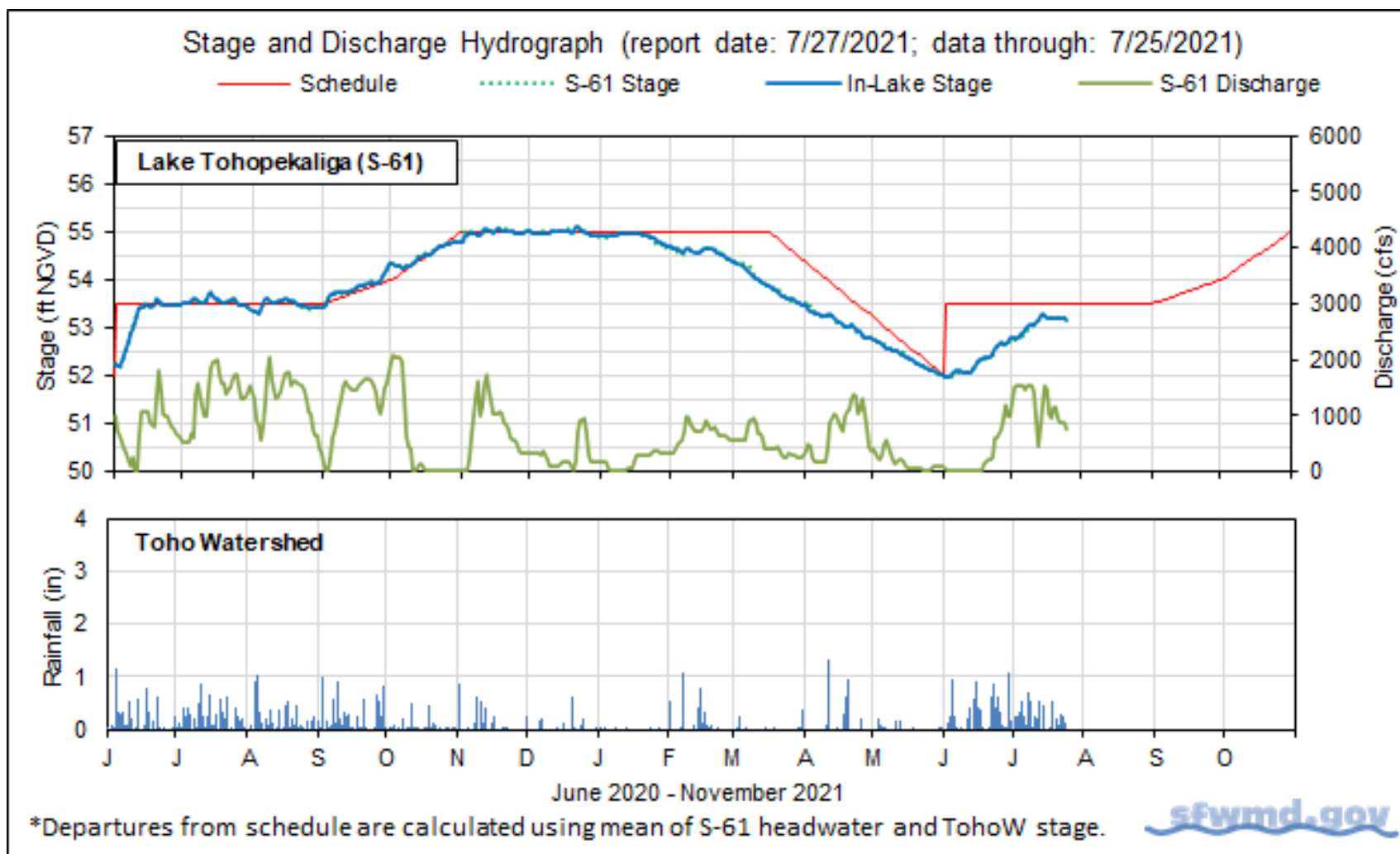
Water Body	Structure	Stage Monitoring Site	7-Day Average Discharge (cfs)	Lake Stage (feet NGVD) <sup>a</sup>	Schedule Type <sup>b</sup>	Schedule Stage (feet NGVD)	Departure from Regulation (feet)	
							7/25/21	7/18/21
Lakes Hart and Mary Jane	S-62	LKMJ	186	59.9	R	60.0	-0.1	0.0
Lakes Myrtle, Preston and Joel	S-57	S-57	38	60.9	R	61.0	-0.1	-0.1
Alligator Chain	S-60	ALLI	103	63.1	R	63.2	-0.1	0.0
Lake Gentry	S-63	LKGT	132	60.9	R	61.0	-0.1	0.0
East Lake Toho	S-59	TOHOE	462	56.0	R	56.5	-0.5	-0.5
Lake Toho	S-61	TOHOW S-61	955	53.2	R	53.5	-0.3	-0.3
Lakes Kissimmee, Cypress and Hatchineha	S-65	KUB011 LKIS5B	1,544	51.2	R	51.0	0.2	0.1

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.

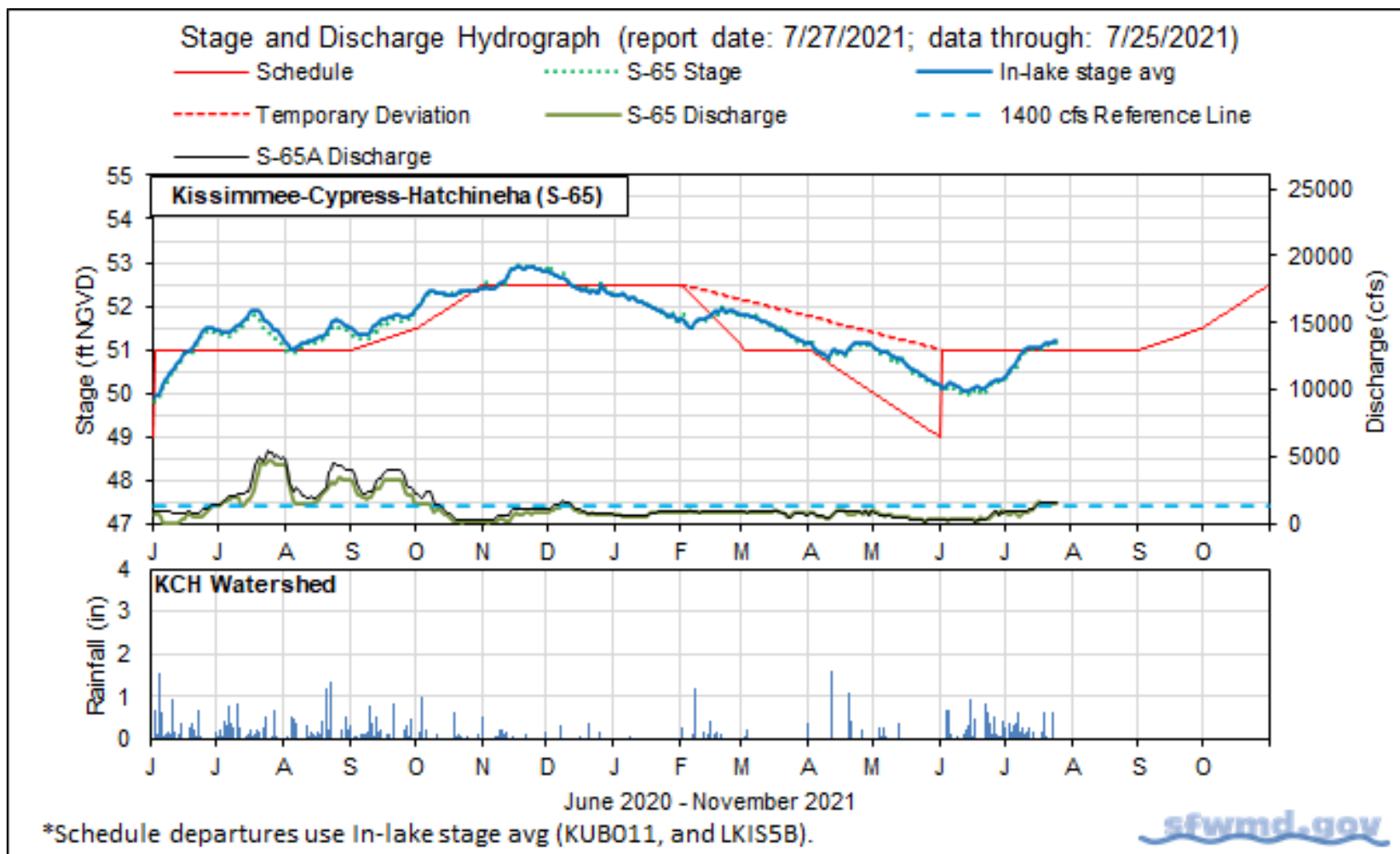
b. A: projected recession line; R: USACE regulation schedule; S: temporary recession target line; T: temporary schedule; NA: not applicable or not available.



**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 7/25/21	Average for Previous Seven Day Periods			
			7/25/21	7/18/21	7/11/21	7/4/21
Discharge	S-65	1,550	1,540	1,270	760	770
Discharge	S-65A <sup>a</sup>	1,600	1,610	1,320	940	850
Headwater Stage (feet NGVD)	S-65A	46.3	46.3	46.2	46.2	46.2
Discharge	S-65D <sup>b</sup>	1,250	1,240	1,120	970	840
Headwater Stage (feet NGVD)	S-65D <sup>c</sup>	27.5	27.5	27.5	27.4	26.3
Discharge (cfs)	S-65E <sup>d</sup>	1,340	1,360	1,200	1,070	880
Discharge (cfs)	S-67	0	0	0	0	0
Dissolved Oxygen (mg/L) <sup>e</sup>	Phase I, II/III river channel	2.5	3.1	3.4	4.1	4.7
Mean depth (feet) <sup>f</sup>	Phase I floodplain	0.48	0.38	0.20	0.19	0.11

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.

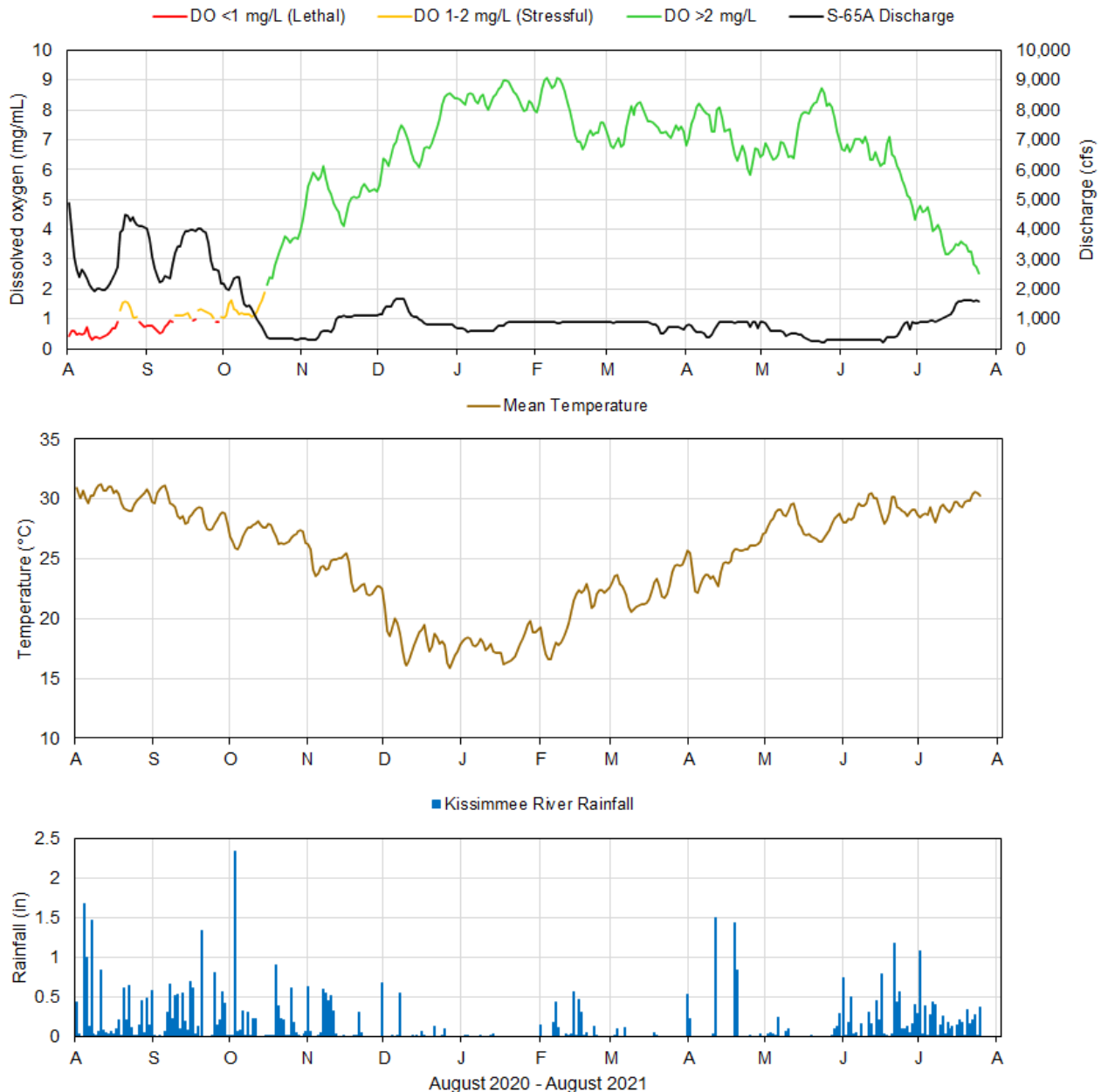
e. Dissolved oxygen is the average of values from sondes KRBN, PC62, PC63, PD62R and PD42R.

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

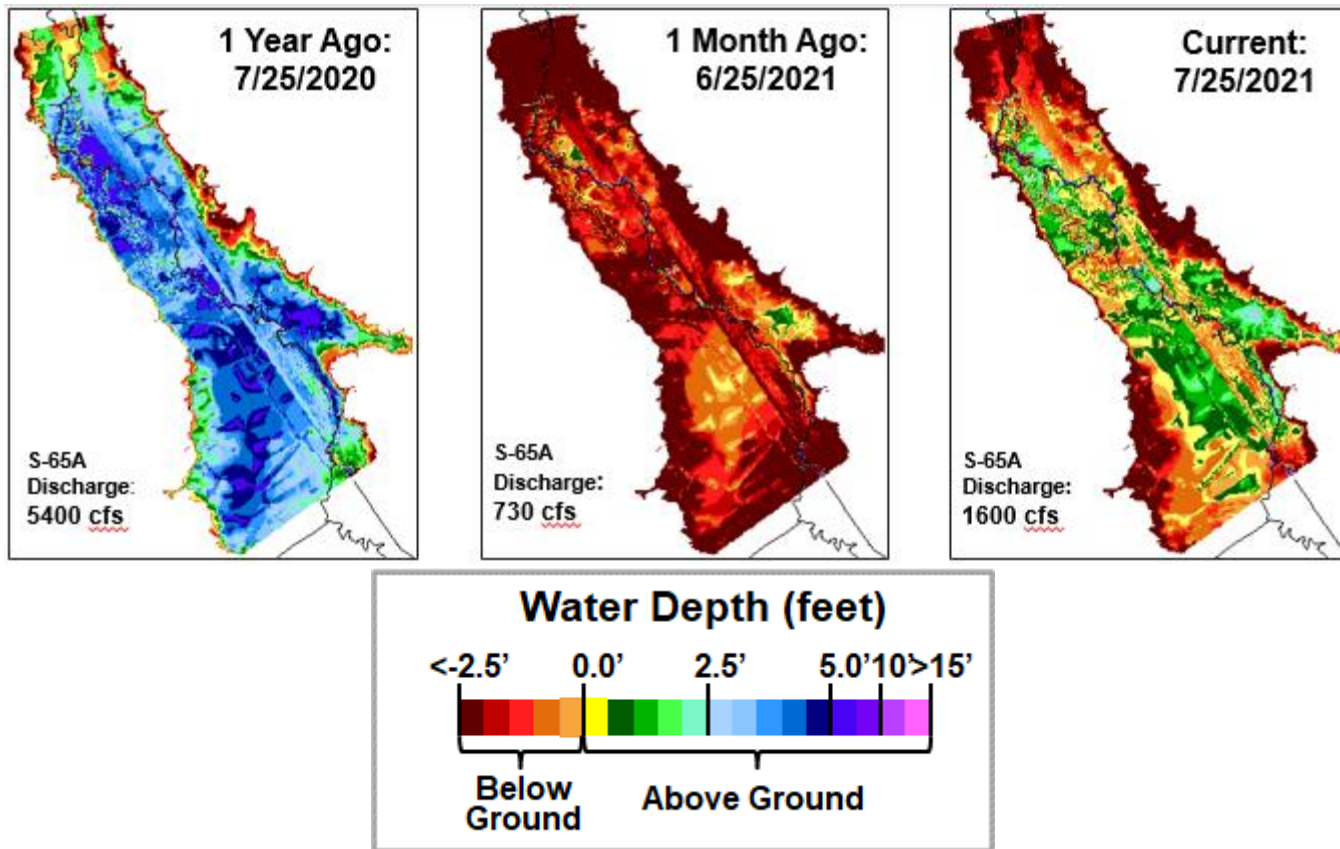




Report Date: 7/27/2021; data are through: 7/25/2021

[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 13.53 feet NGVD on July 25, 2021, 0.88 feet higher than a month ago, and 0.62 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 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, 1.05 inches of rain fell directly on the Lake last week.

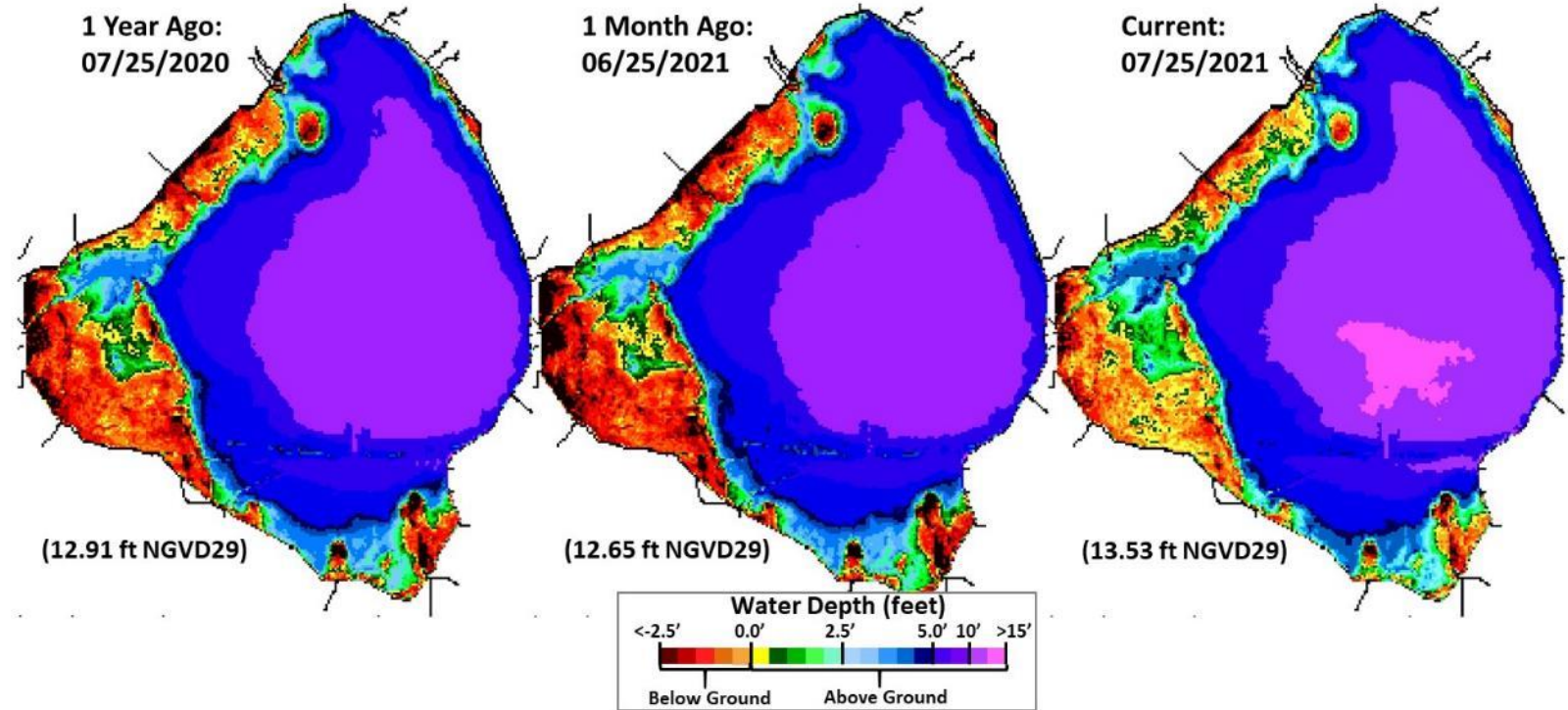
Average daily inflows (excluding rainfall) increased from the previous week, going from 2,953 cubic feet per second (cfs) to 3,119 cfs. Outflows (excluding evapotranspiration) increased, going from 107 cfs to 236 cfs. Most of the inflows (~67% of the total) came from the Kissimmee River (1,356 cfs through S-65E & S-65EX1), S-84 and S-84X structures (679 cfs), and Fisheating Creek (415 cfs). Water flowed back from the C-44 canal (via S-308 structure) and L-8 Canal (via S-271) into the Lake at average rates of 27 cfs and 9 cfs, respectively over the past week. Releases to the west via S-77 decreased from 75 cfs to 28 cfs, and releases south through the S-350 structures increased from 0 cfs to 207 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 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 (July 25, 2021) from the NOAA cyanobacteria monitoring product derived from EUMETSAT's Sentinel 3 OLCI sensor data showed increased medium to high bloom potential in the northern and northeastern parts of the Lake from the previous week but remains low in most parts of the southern part of the Lake (**Figure LO-5**).

The latest water quality survey results from July 19-21, 2021 revealed that a total of 30 sites (or 94%) had mixed communities or communities dominated by *Microcystis aeruginosa*. At 2 sites (or 6%), communities were dominated by either *Cylindrospermopsis raciborskii* or co-dominated by *C. raciborskii* and *M. aeruginosa* (**Table LO-2** and **Figure LO-6**). Percentage of sites dominated by *M. aeruginosa* decreased by 3% since early-July and by 7% since late-June. A total of 30 sites (or 94%) had microcystin concentration below EPA recommended human health recreational standard (8 µg/L). The highest toxin concentration (13 µg/L) was recorded at KBARSE in northern part of the Lake. Overall, toxin concentration decreased by 17% since late-June (**Table LO-2** and **Figure LO-6**).

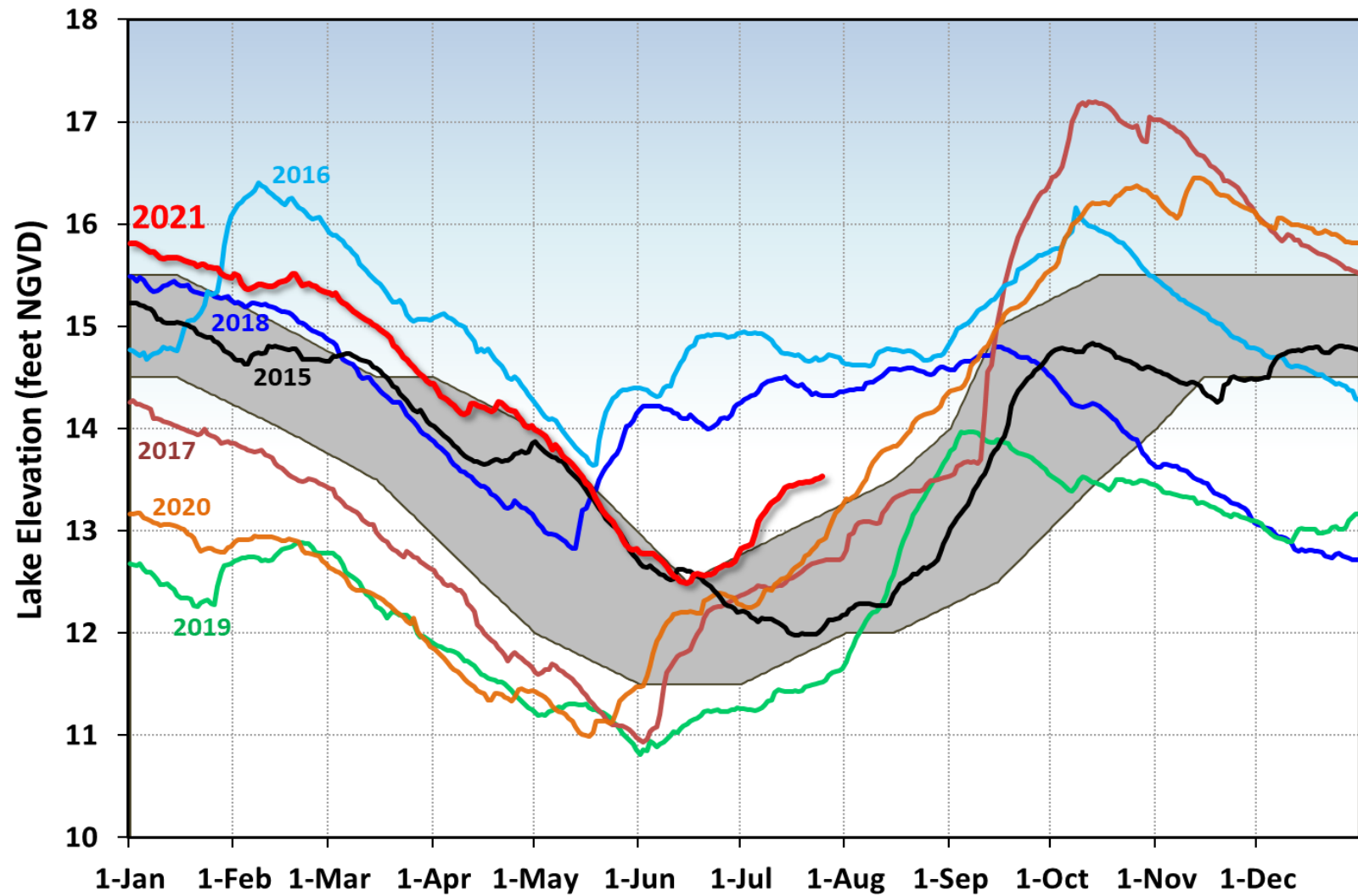
**Table LO-1.** Weekly Lake Okeechobee inflows and outflows (cfs) and as change in elevation (in). All data are provisional.

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	1198	1356	0.6	S-77	75	28	0
S-71 & S-72	328	326	0.1	S-308	-245	-27	0
S-84 & S-84X	623	679	0.3	S-351	0	87	0
Fisheating Creek	166	415	0.2	S-352	0	120	0.1
S-154	71	44	0	S-354	0	0	0
S-191	178	0	0	L-8 Outflow	32		
S-133 P	107	59	0	ET	2666	3172	1.3
S-127 P	54	48	0	<b>Total</b>	<b>2528</b>	<b>3381</b>	<b>1.4</b>
S-129 P	22	4	0				
S-131 P	25	15	0				
S-135 P	182	163	0.1				
S-2 P	0	0	0				
S-3 P	0	0	0				
S-4 P	0	0	0				
L-8 Backflow		9	0				
Rainfall	3274	2812	1.2				
<b>Total</b>	<b>6227</b>	<b>5930</b>	<b>2.5</b>				



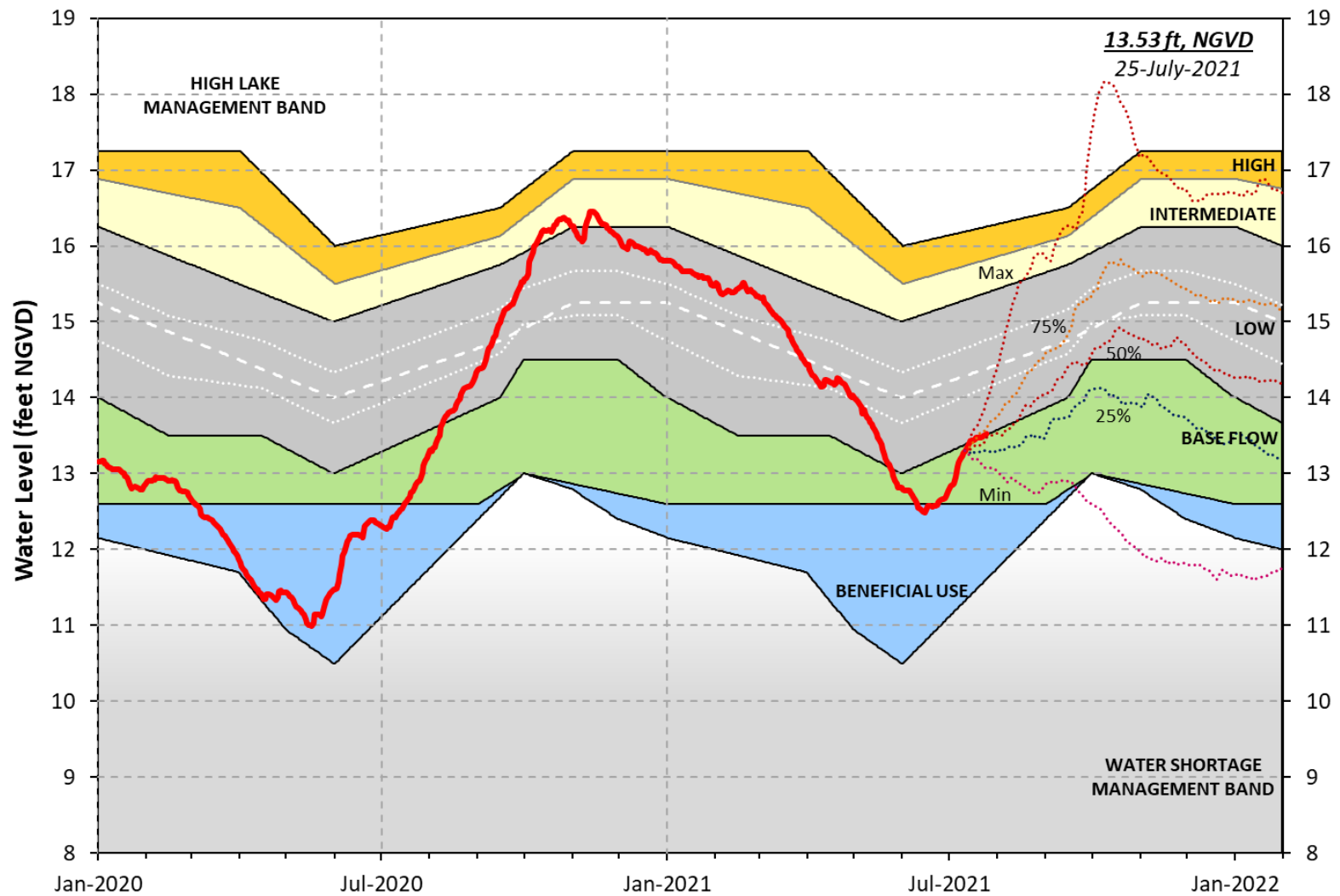
**Figure LO-1.** Lake Okeechobee water depth estimates based on South Florida Water Depth Assessment Tool (SFWDAT).

## Lake Okeechobee Stage vs Updated Ecological Envelope



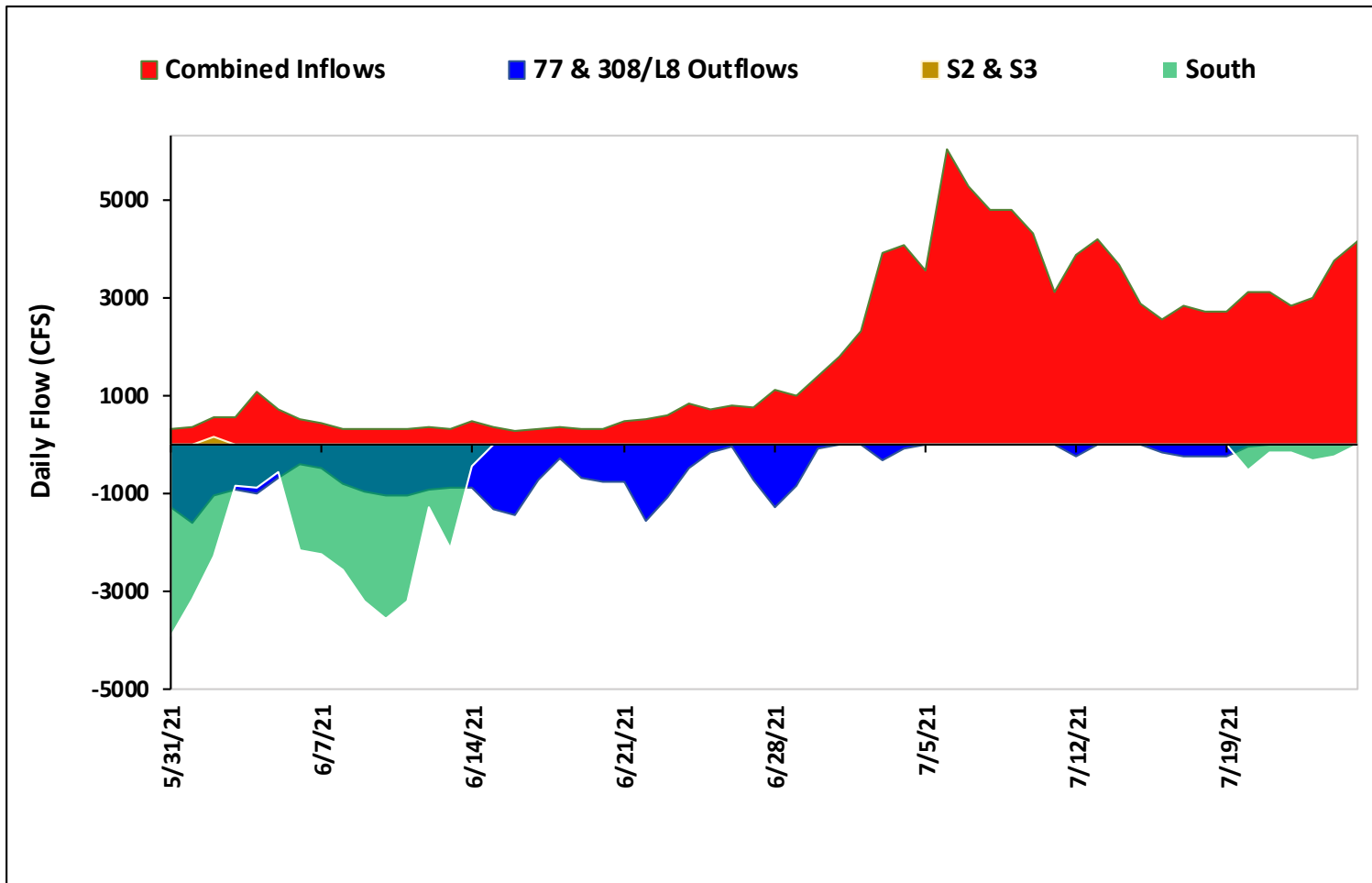
**Figure LO-2.** Select annual stage hydrographs for Lake Okeechobee in comparison to the updated ecological envelope.

## Lake Okeechobee Water Level History and Projected Stages



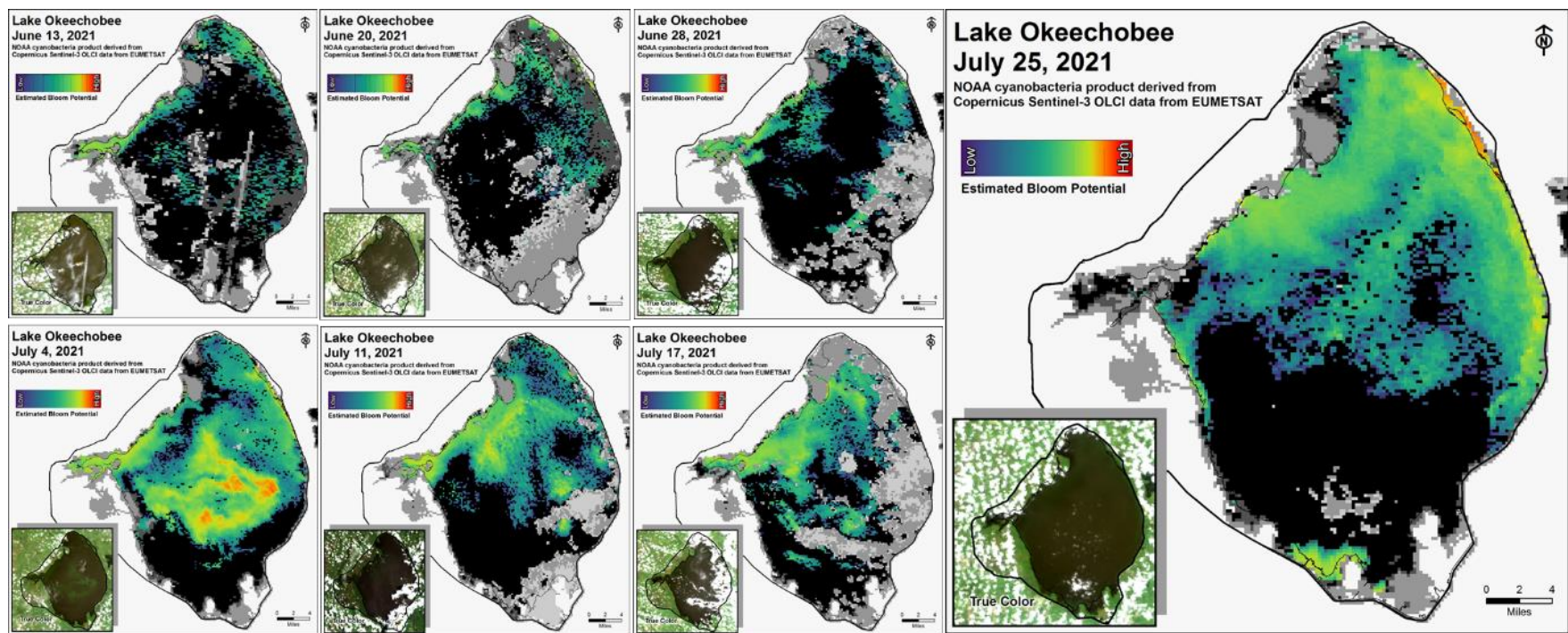
LORS-2008 - Adopted by USACE 28-April-2008

**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.





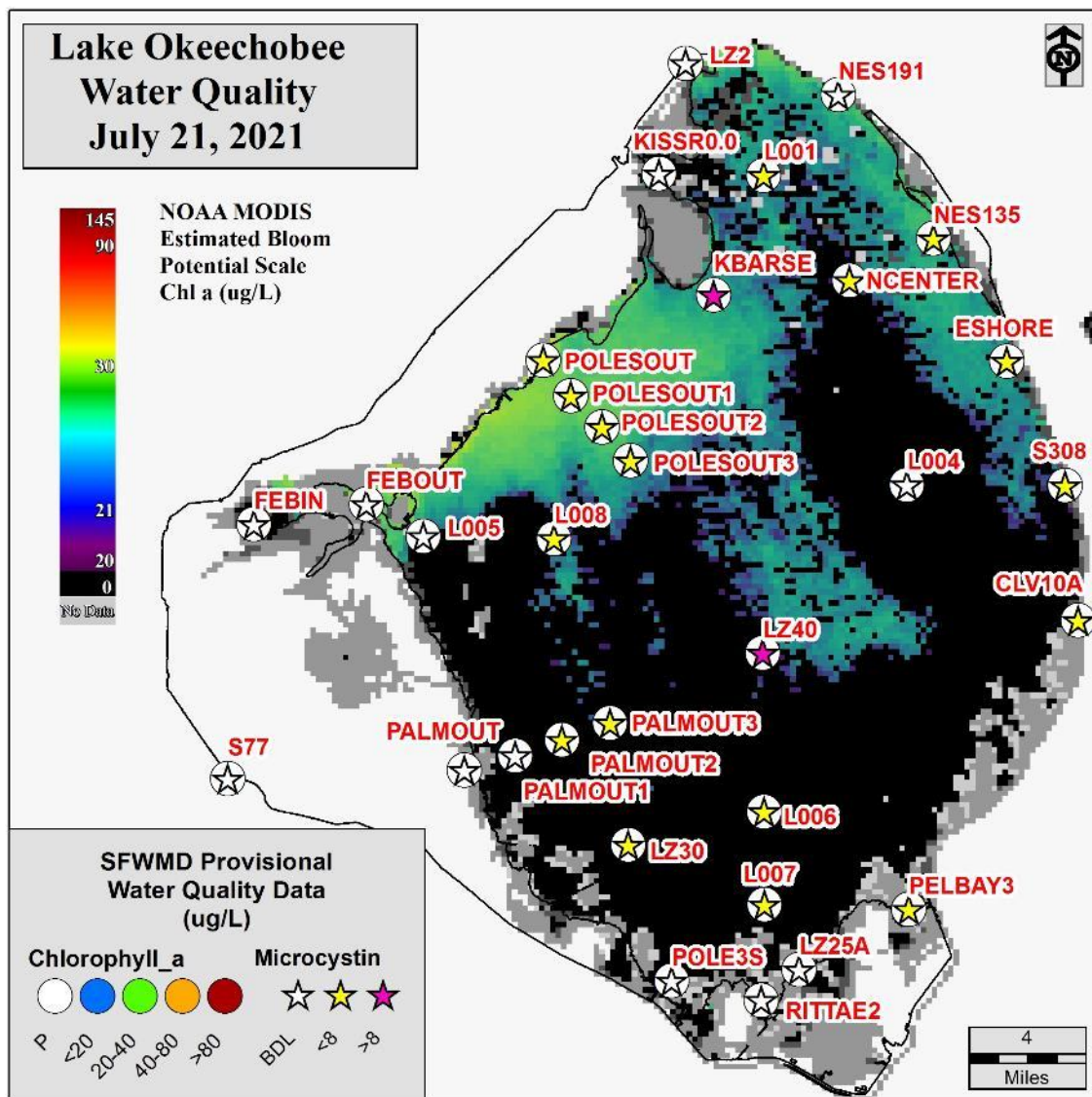
NOAA cyanobacteria product derived from Copernicus Sentinel-3 OLCI data from EUMETSAT

**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.

Station	CHLa (ug/L)	TOXIN (ug/L)	TAXA	Station	CHLa (ug/L)	TOXIN (ug/L)	TAXA
FEBIN	P	BDL	<i>Cylindro</i>	L001	P	6.7	<i>Microcys</i>
FEBOUT	P	BDL	<i>mixed</i>	L004	P	BDL	<i>mixed</i>
KISSR0.0	P	BDL	<i>mixed</i>	L006	P	0.5	<i>mixed</i>
L005	P	BDL	<i>mixed</i>	L007	P	0.3	<i>Microcys</i>
LZ2	P	BDL	<i>mixed</i>	L008	P	3.3	<i>Microcys</i>
KBARSE	P	13.0	<i>Microcys</i>	LZ30	P	1.7	<i>Microcys</i>
RITTAE2	P	BDL	<i>mixed</i>	LZ40	P	9.7	<i>Microcys</i>
PELBAY3	P	0.3	<i>Microcys</i>	CLV10A	P	0.3	<i>mixed</i>
POLE3S	P	BDL	<i>mixed</i>	NCENTER	P	5.0	<i>Microcys</i>
LZ25A	P	BDL	<i>Microcys</i>				
PALMOUT	P	BDL	<i>mixed</i>	S-308C	P	0.3	<i>mixed</i>
PALMOUT1	P	BDL	<i>mixed</i>	S-77	P	BDL	<i>mixed</i>
PALMOUT2	P	1.8	<i>Microcys</i>				
PALMOUT3	P	5	<i>Microcys</i>				
POLESOUT	P	0.3	<i>Micro/Cylin</i>				
POLESOUT1	P	0.5	<i>Microcys</i>				
POLESOUT2	P	0.5	<i>Microcys</i>				
POLESOUT3	P	6.7	<i>Microcys</i>				
EASTSHORE	P	0.4	<i>mixed</i>				
NES135	P	0.3	<i>mixed</i>				
NES191	P	BDL	<i>Microcys</i>				

P = pending  
 BDL = below detection level



**Figure LO-6.** Expanded monitoring network and provisional results from samples collected July 19-21, 2021.

## Estuaries

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

Over the past week, mean total inflow to the St. Lucie Estuary was approximately 912 cfs (**Figures ES-1 and ES-2**) and the previous 30-day mean inflow was approximately 1,126 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 the HR1 and A1A sites and increased slightly at the US1 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 12.7. Salinity conditions in the middle estuary were estimated to be within the good range for adult eastern oysters (**Figure ES-4**).

### ***Caloosahatchee River Estuary***

Over the past week, mean total inflow to the Caloosahatchee River Estuary was approximately 3,534 cfs (**Figures ES-5 and ES-6**) and the previous 30-day mean inflow was approximately 3,698 cfs. For comparison, the historical provisional mean inflows from the contributing areas are shown in **Figure ES-6**.

Over the past week, salinities remained the same at S-79 and Val I-75, decreased at Ft. Myers, and increased at the remaining sites in the estuary (**Table ES-2; Figures ES-7 and ES-8**). The seven-day mean surface salinities (**Table ES-2**) were in the good range (0-10) for tape grass at Val I-75 and at Ft. Myers. The seven-day mean surface salinity values were within the good range for adult eastern oysters at Shell Point and Sanibel, and in the fair range at Cape Coral (**Figure ES-9**).

Surface salinity at Val I-75 was forecasted for the next two weeks, using an autoregression model (Qiu and Wan, 2013<sup>1</sup>) coupled with a linear reservoir model for the tidal basin. Model scenarios included pulse releases at S-79 ranging from 0 to 1500 cfs and a steady release at 2,000 cfs with estimated tidal basin inflows of 859 cfs. Model results from all scenarios predict daily salinity to be 0.8 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 23, 2021, that *Karenia brevis*, the Florida red tide dinoflagellate, was observed at background to very low concentrations in Charlotte County, and background to low concentrations in Lee County. On the east coast, red tide was not observed in samples taken from St. Lucie, Martin, Palm Beach or Miami-Dade counties.

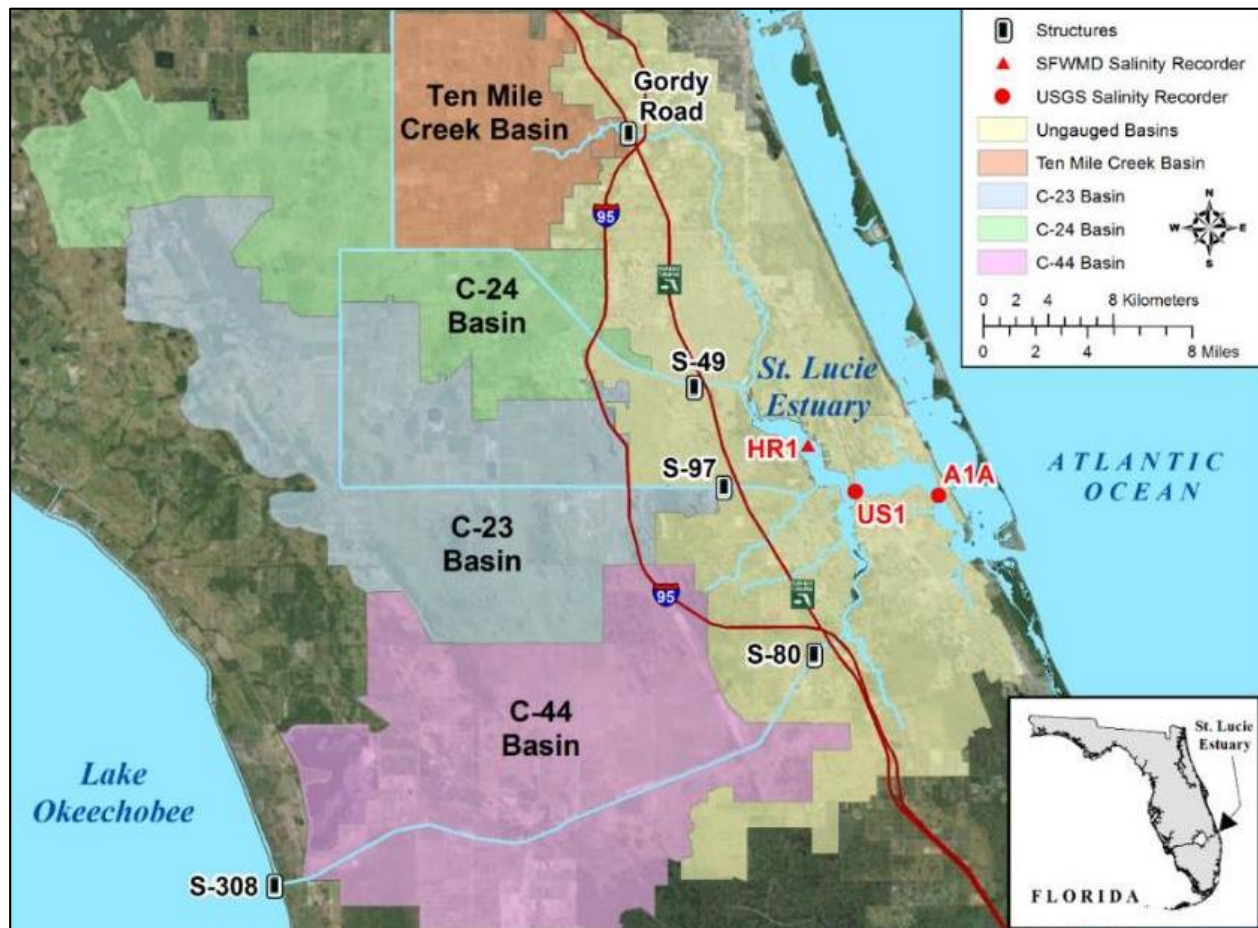
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<sup>1</sup> Qui, C., and Y. Wan. 2013. Time series modeling and prediction of salinity in the Caloosahatchee River Estuary. *Water Resources Research* 49:5804-5816.

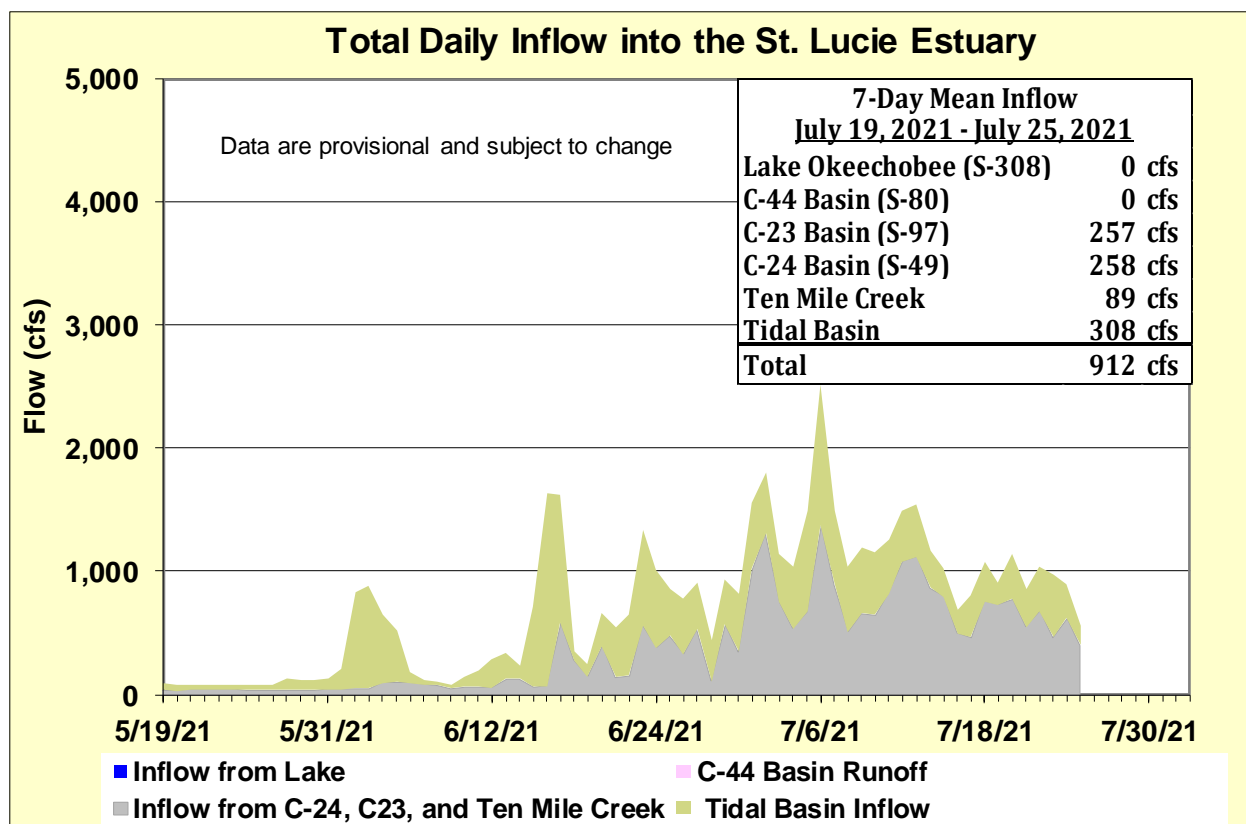


### **Water Management Recommendations**

Lake stage is in the Low Sub-Band. Tributary conditions are Wet. The LORS2008 release guidance suggests up to 3,000 cfs release at S-79 to the Caloosahatchee River Estuary and up to 1170 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.

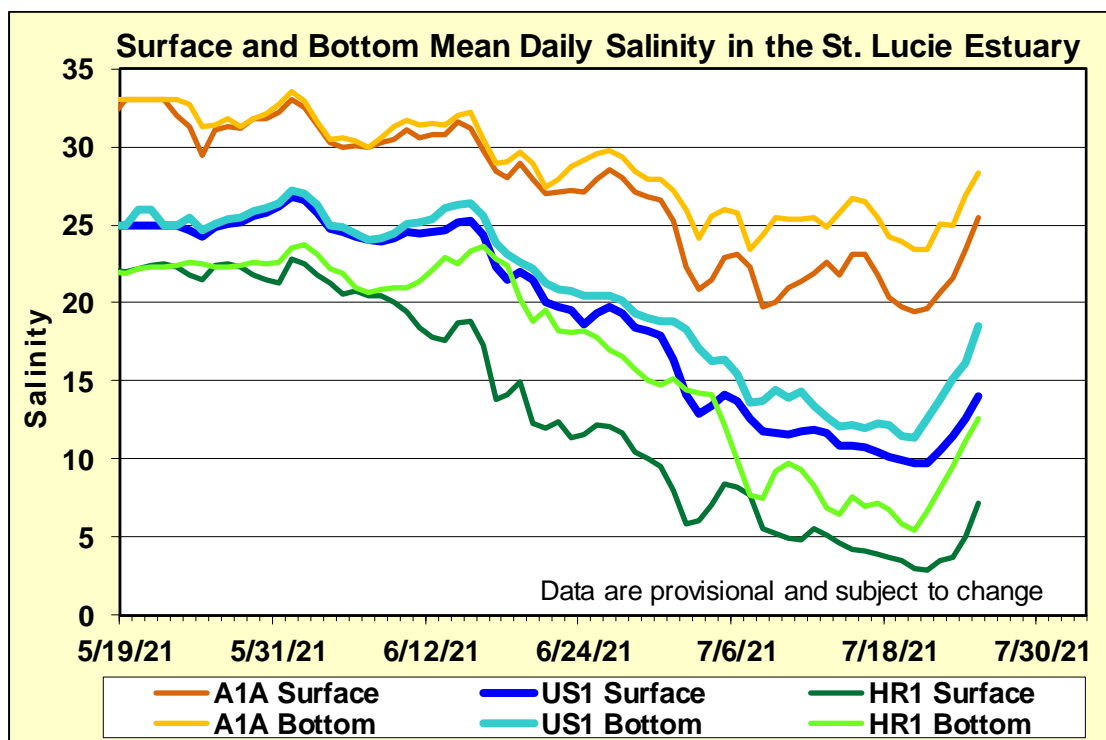


**Figure ES-2.** Total daily inflows from Lake Okeechobee and runoff from the C -44, C-23, C-24, Ten Mile Creek, and Tidal Basins into the St. Lucie Estuary.

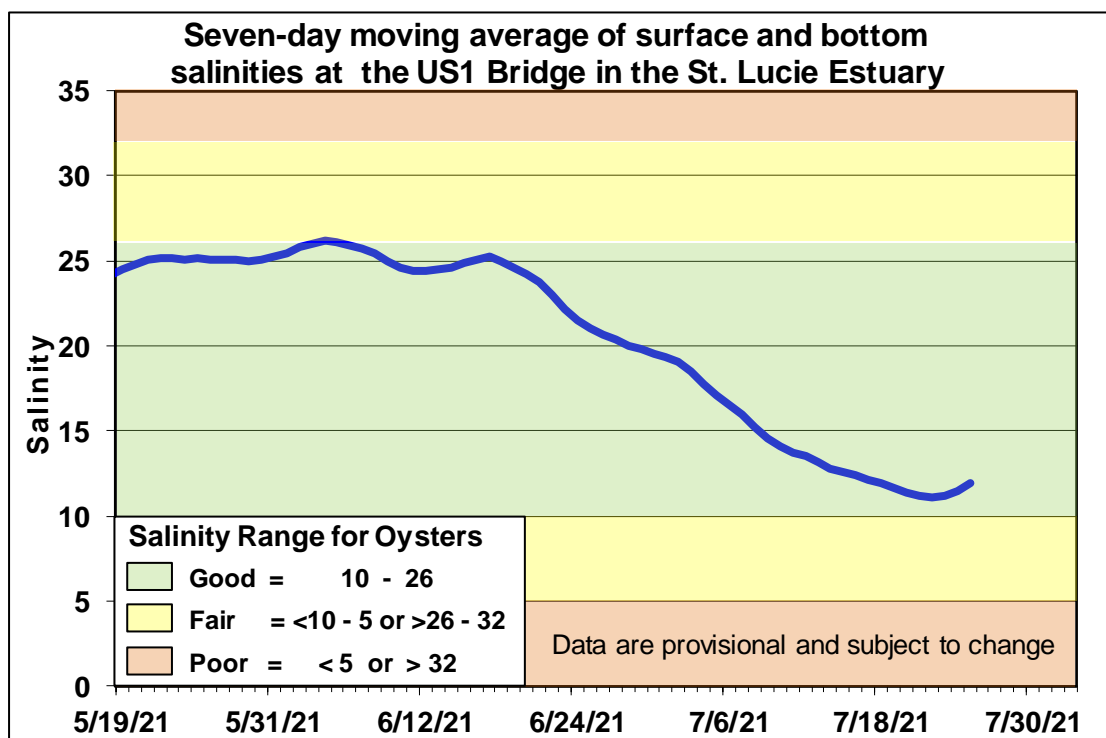
**Table ES-1.** Seven-day mean salinity at oyster monitoring sites in the St. Lucie Estuary. Current means are in bold font; previous week's means are in parentheses. The envelope reflects the preferred salinity range for adult eastern oysters (*Crassostrea virginica*) in the middle estuary. Data are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

Sampling Site	Surface	Bottom	Envelope
HR1 (Nork Fork)	<b>4.1</b> (4.4)	<b>8.5</b> (7.2)	NA <sup>a</sup>
US1 Bridge	<b>11.2</b> (11.0)	<b>14.1</b> (12.4)	10.0 – 26.0
A1A Bridge	<b>21.4</b> (22.1)	<b>25.2</b> (25.6)	NA <sup>a</sup>

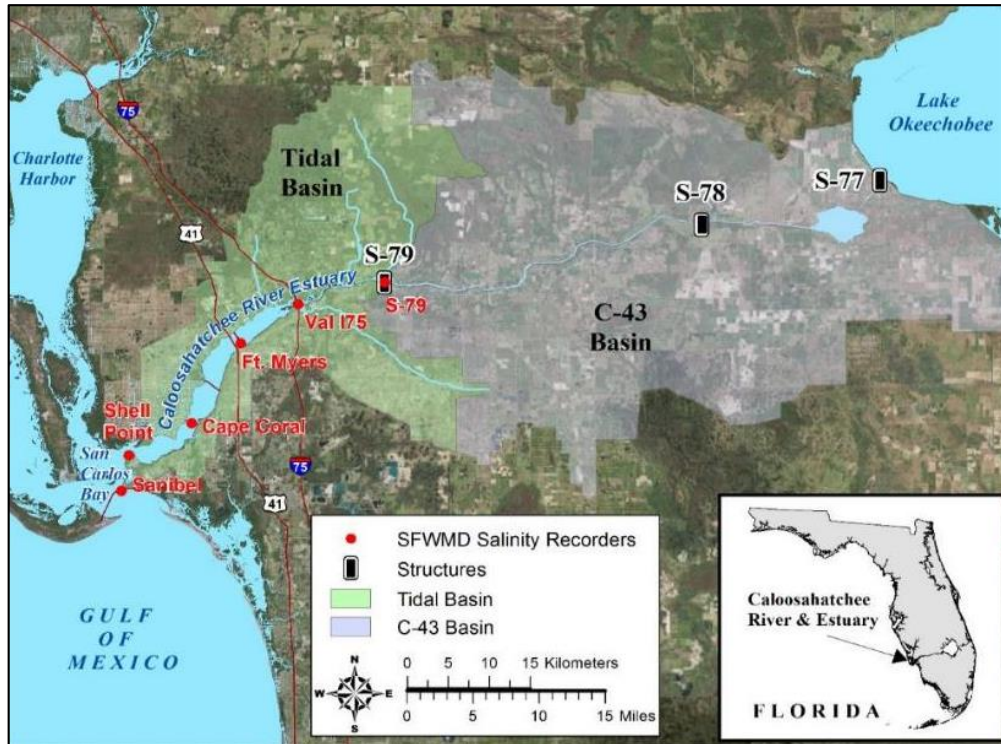
a. The envelope is not applicable.



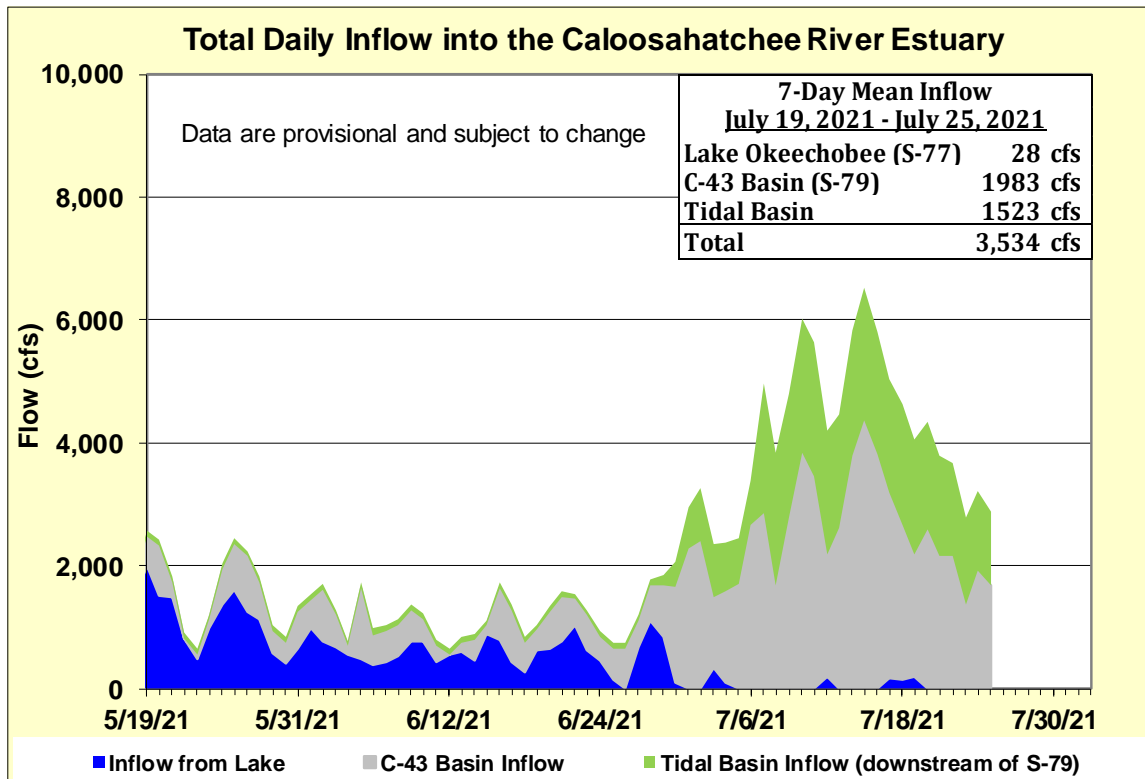
**Figure ES-3.** Mean daily salinity at the A1A, US1 and HR1 sites in the St. Lucie Estuary.



**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.

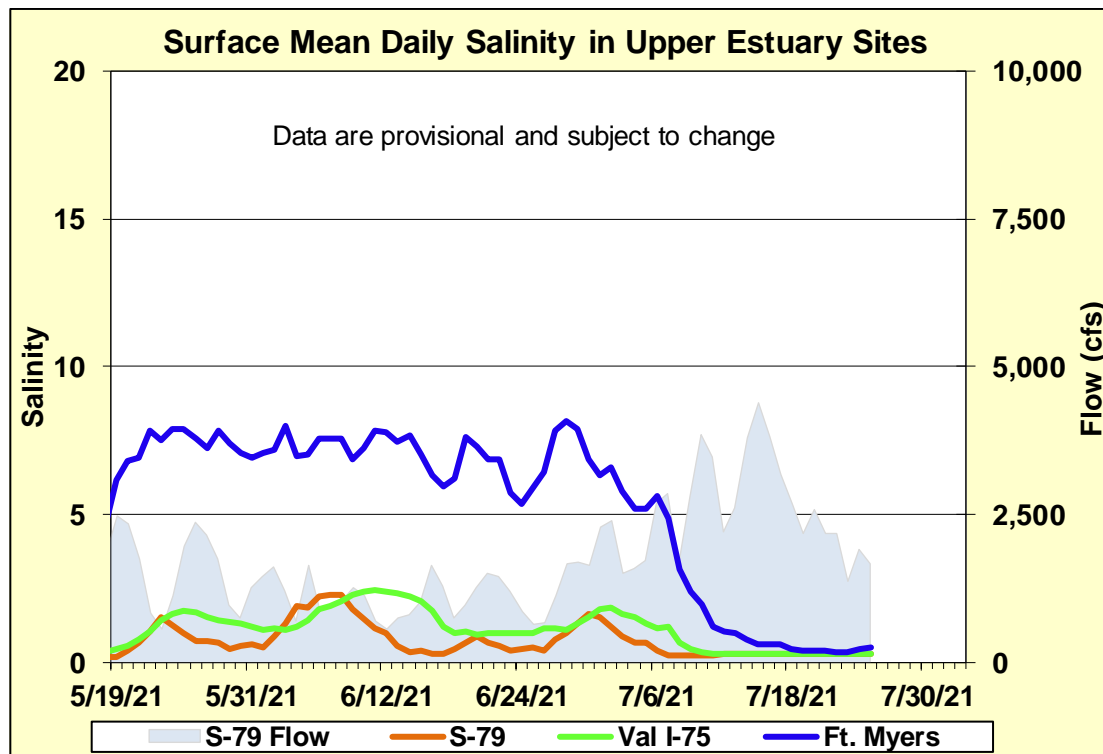


**Table ES-2.** Seven-day mean salinity at six monitoring sites in the Caloosahatchee River Estuary. Current means are in bold font; previous week's means are in parentheses. The envelope at I-75 is for the protection of tape grass in the upper estuary and the envelope in the lower estuary is the preferred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

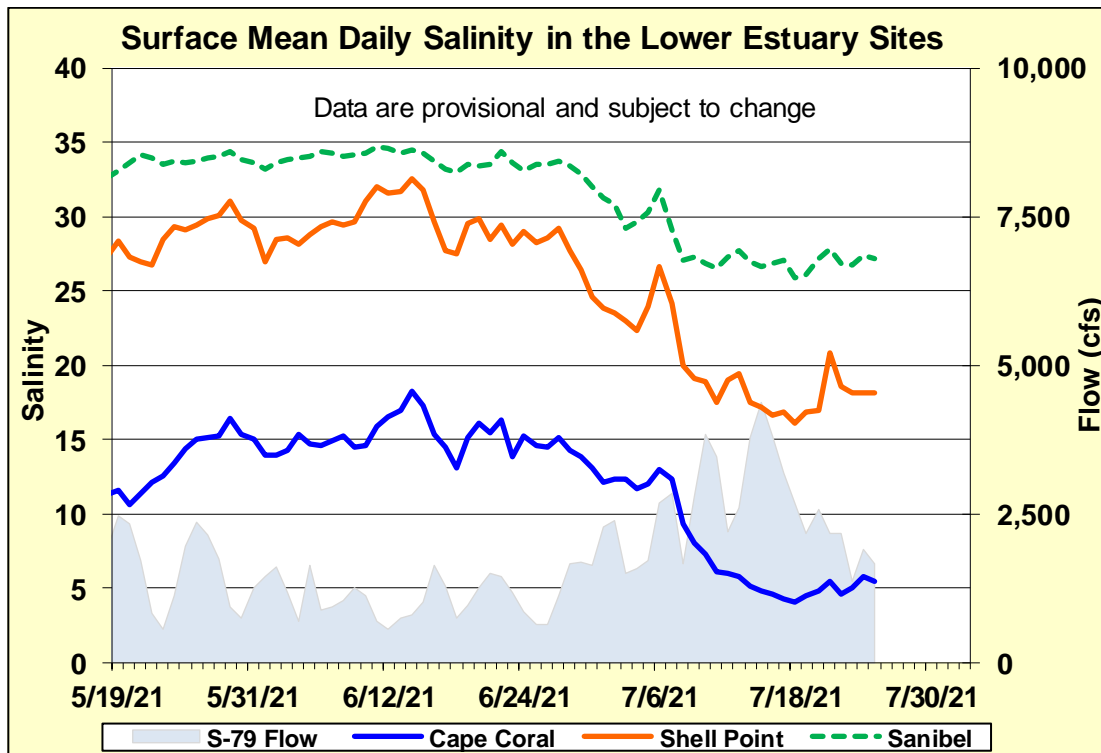
Sampling Site	Surface	Bottom	Envelope
S-79 (Franklin Lock)	<b>0.3</b> (0.3)	<b>0.3</b> (0.3)	NA <sup>a</sup>
Val I-75	<b>0.3</b> (0.3)	<b>0.3</b> (0.3)	0.0 – 5.0 <sup>b</sup>
Fort Myers Yacht Basin	<b>0.4</b> (0.7)	<b>3.5</b> (4.9)	NA <sup>a</sup>
Cape Coral	<b>5.1</b> (5.0)	<b>7.0</b> (6.5)	10.0 – 30.0
Shell Point	<b>18.2</b> (17.5)	<b>20.2</b> (17.8)	10.0 – 30.0
Sanibel	<b>27.1</b> (27.0)	<b>29.3</b> (28.7)	10.0 – 30.0

a. The envelope is not applicable.

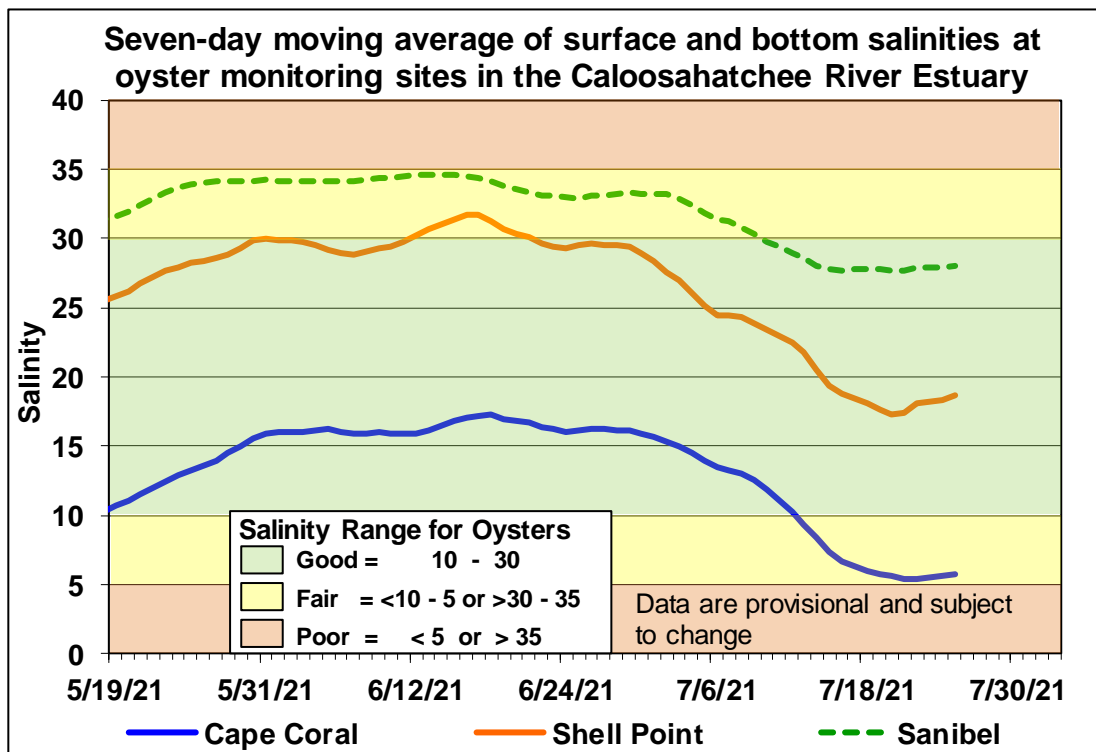
b. The envelope is based on the predicted 30-day mean for the next two weeks.



**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	859	0.8	0.3
B	450	859	0.4	0.3
C	800	859	0.3	0.3
D	1000	859	0.3	0.3
E	1500	859	0.3	0.3
F	2000	859	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 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 to extremely high (**Figure S-1**).

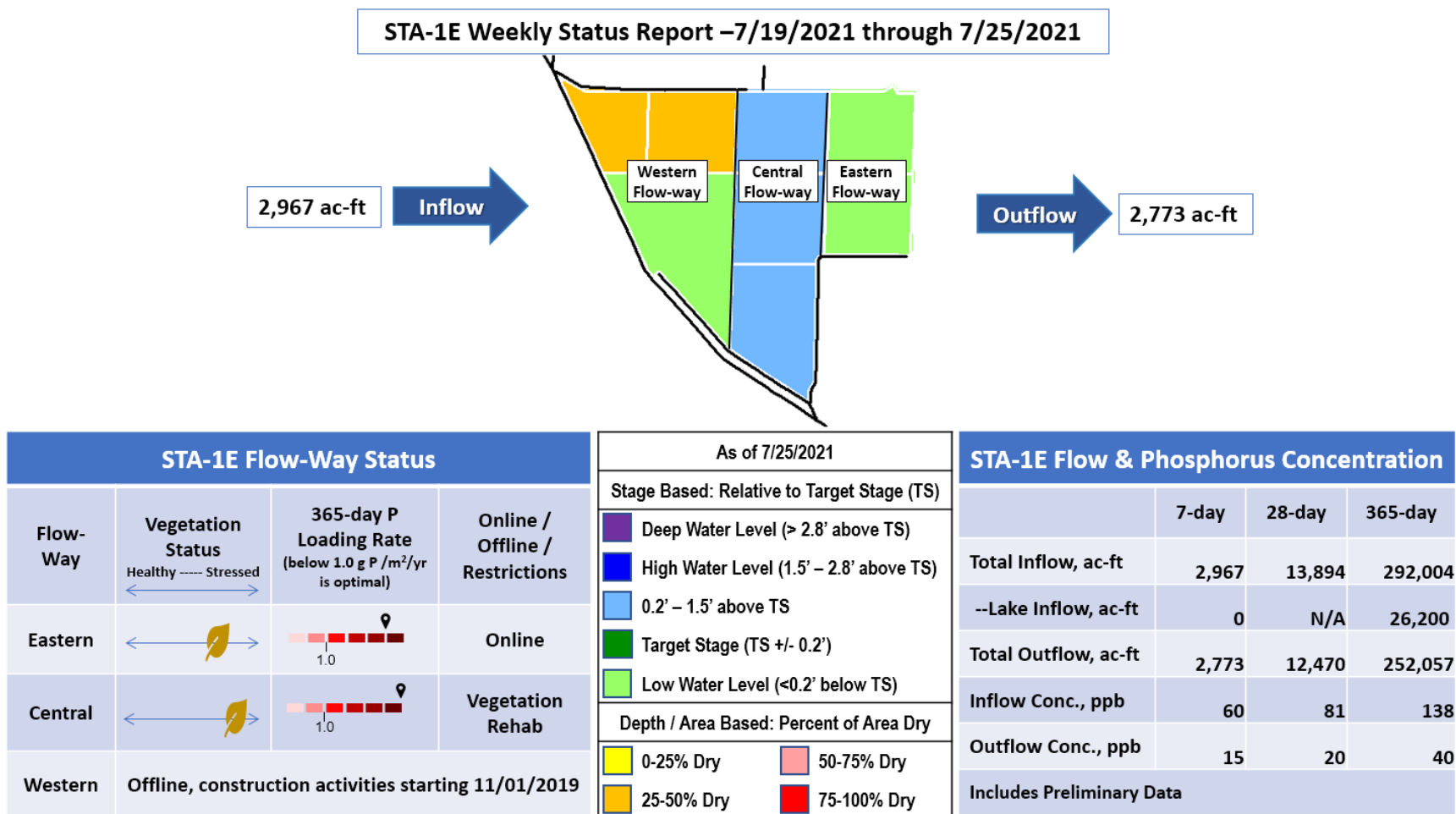
**STA-1W:** Operational restrictions are in place in STA-1W Western, Eastern, and Northern Flow-ways due to construction activities. Most treatment cells are at or near target stage. Vegetation in the flow-ways is stressed and highly stressed. The 365-day PLRs for all flow-ways are high (**Figure S-2**).

**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 4 and 5 are below 1.0 g/m<sup>2</sup>/year and for Flow-ways 1 and 3 are high; the 365-day PLR 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**).

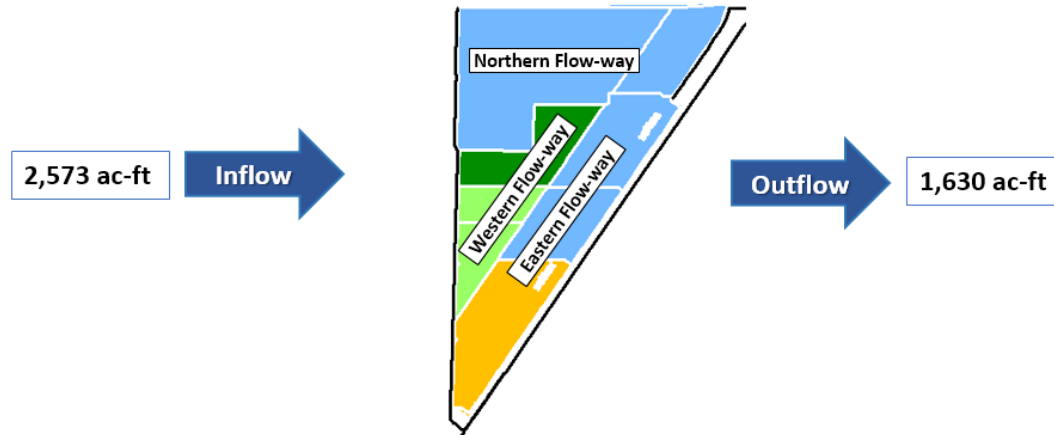
**STA-5/6:** Operational restrictions are in place in STA-5/6 Flow-ways 2 and 3 following the Restoration Strategies project to grade non-effective treatment areas. Most treatment cells are at or above target stage. The 365-day PLRs for most flow-ways are near 1.0 g/m<sup>2</sup>/year. All treatment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



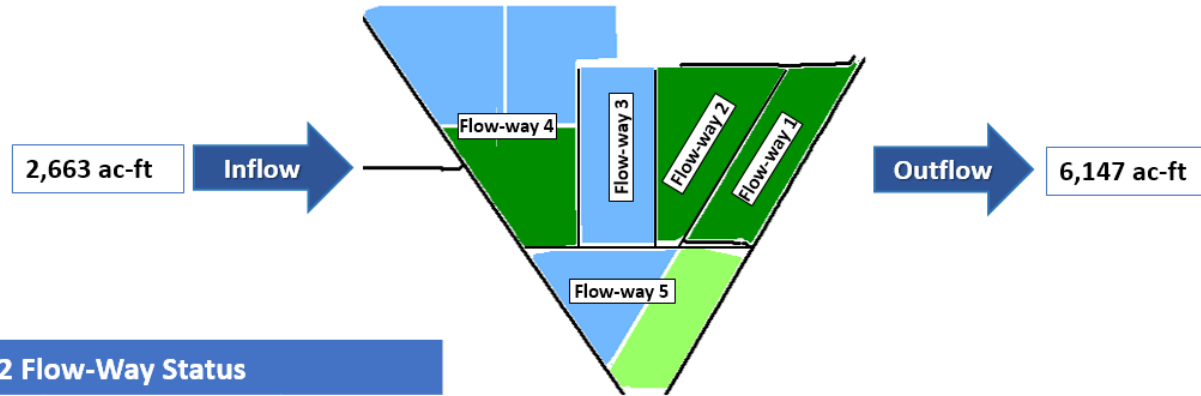
**Figure S-1.** STA-1E Weekly Status Report

STA-1W Weekly Status Report – 7/19/2021 through 7/25/2021



STA-1W Flow-Way Status				As of 7/25/2021				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
Northern			Construction		Deep Water Level (> 2.8' above TS)			Total Inflow, ac-ft	2,573	14,524	138,477
					High Water Level (1.5' – 2.8' above TS)						
Western			Construction		0.2' – 1.5' above TS			--Lake Inflow, ac-ft	900	N/A	7,700
					Target Stage (TS +/- 0.2')						
Eastern			Construction		Low Water Level (<0.2' below TS)			Total Outflow, ac-ft	1,630	15,143	153,034
				Depth / Area Based: Percent of Area Dry							
					0-25% Dry			Inflow Conc., ppb	270	206	251
					25-50% Dry						
					50-75% Dry			Outflow Conc., ppb	17	26	40
					75-100% Dry						
Includes Preliminary Data											

# STA-2 Weekly Status Report – 7/19/2021 through 7/25/2021



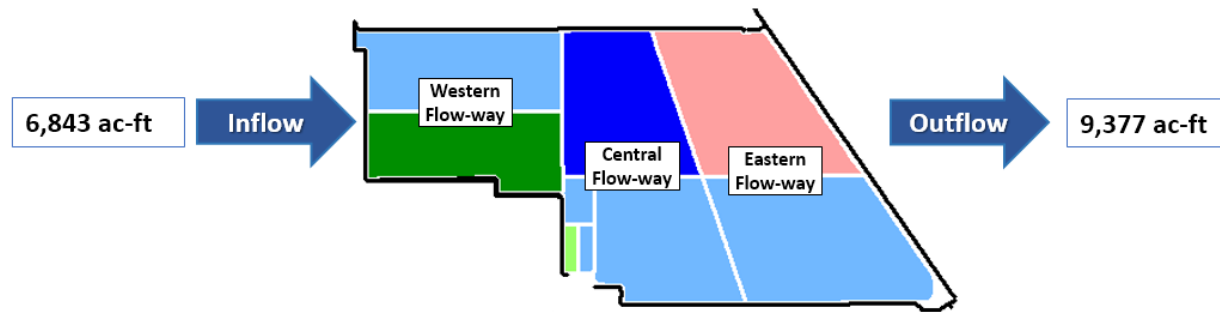
STA-2 Flow-Way Status			
Flow-Way	Vegetation Status Healthy ----- Stressed	365-day P Loading Rate (below 1.0 g P / m <sup>2</sup> /yr is optimal)	Online / Offline / Restrictions
1	←  →	1.0	Online
2	←  →	1.0	Construction
3	←  →	1.0	Vegetation Rehab
4	←  →	1.0	Vegetation Rehab
5	←  →	1.0	Online

As of 7/25/2021	
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	2,663	39,979	415,994
--Lake Inflow, ac-ft	500	N/A	90,800
Total Outflow, ac-ft	6,147	50,403	464,064
Inflow Conc., ppb	48	93	93
Outflow Conc., ppb	14	14	20
Includes Preliminary Data			

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

STA-3/4 Weekly Status Report – 7/19/2021 through 7/25/2021

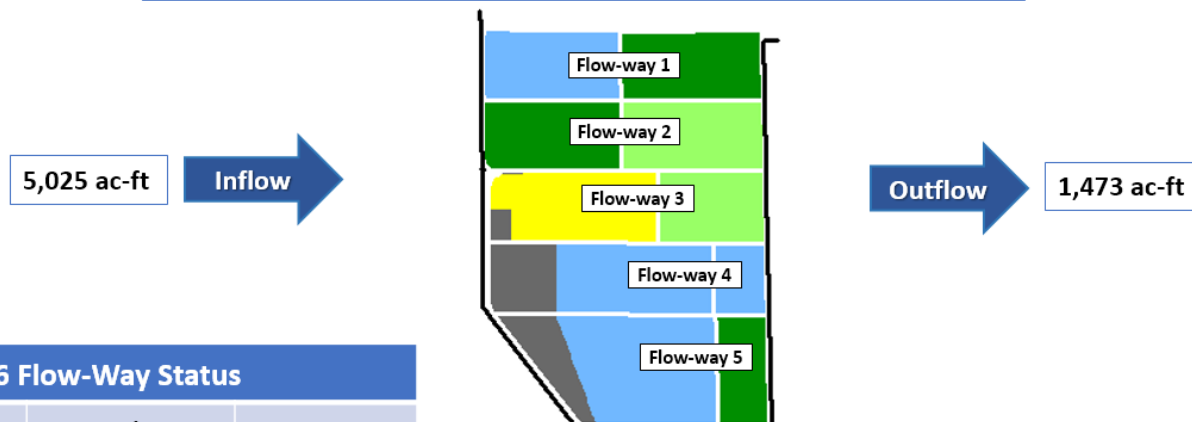


STA-3/4 Flow-Way Status				As of 7/25/2021				STA-3/4 Flow & Phosphorus Concentration			
Flow-Way	Vegetation Status Healthy ----- Stressed ←-----→	365-day P Loading Rate (below 1.0 g P / m <sup>2</sup> /yr is optimal)	Online / Offline / Restrictions	Stage Based: Relative to Target Stage (TS)					7-day	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	6,843	80,013	540,965
Central	←-----→	1.0	Online	High Water Level (1.5' – 2.8' above TS)				--Lake Inflow, ac-ft	0	N/A	61,400
Western	←-----→	1.0	Online	0.2' – 1.5' above TS				Total Outflow, ac-ft	9,377	76,408	510,197
				Target Stage (TS +/- 0.2')				Inflow Conc., ppb	39	63	58
				Low Water Level (<0.2' below TS)				Outflow Conc., ppb	13	17	13
				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 – 7/19/2021 through 7/25/2021



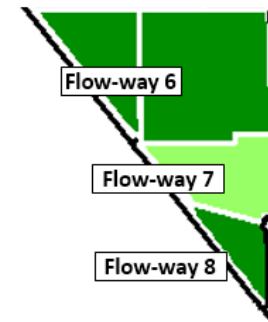
STA-5/6 Flow-Way Status			
Flow-Way	Vegetation Status Healthy ----- Stressed	365-day P Loading Rate (below 1.0 g P / m <sup>2</sup> /yr is optimal)	Online / Offline / Restrictions
1			Online
2		N/A	Post-construction
3		N/A	Post-construction
4			Online
5			Online

As of 7/25/2021	
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	5,025	13,562	120,655
--Lake Inflow, ac-ft	N/A	N/A	N/A
Total Outflow, ac-ft	1,473	2,470	139,975
Inflow Conc., ppb	223	200	277
Outflow Conc., ppb	19	23	74
Includes Preliminary Data			

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

## STA-5/6 Weekly Status Report – 7/19/2021 through 7/25/2021



STA-5/6 Flow-Way Status				As of 7/25/2021	
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)	
				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

**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 very close to schedule last week. Stage on Sunday was below the rising Zone A1 regulation line by 0.01 feet. WCA-2A: Stage at 2A-17 continued trending downwards last week falling to 0.64 feet above the rising regulation line. 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 0.62 feet below the rising Zone A line. WCA-3A: Stage change at gauge 62 (Northwest corner) began to fall last week. The Sunday average was 0.56 feet below the upwards sloping Upper Schedule (**Figures EV-1 – EV-4**).

### ***Water Depths***

The WDAT tool indicates that water levels continue to rise across the Everglades Protection Area. Northeastern WCA-3A is recovering but still drier than the surrounding regions and in need of water as the wet season continues. While 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, much of ENP and Big Cypress National Preserve (BCNP) are either still dry or have water levels just at the ground surface (**Figure EV-5**). Over the last month stages increased in most places. The largest increases occurred on the far western side of the Everglades Protection Area, and downstream of the S-11s in WCA-3A. Compared to a year ago, WCA-3 is significantly drier than one year ago, 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 both upstream in WCA-3A and downstream is below average (**Figure EV-7**).

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

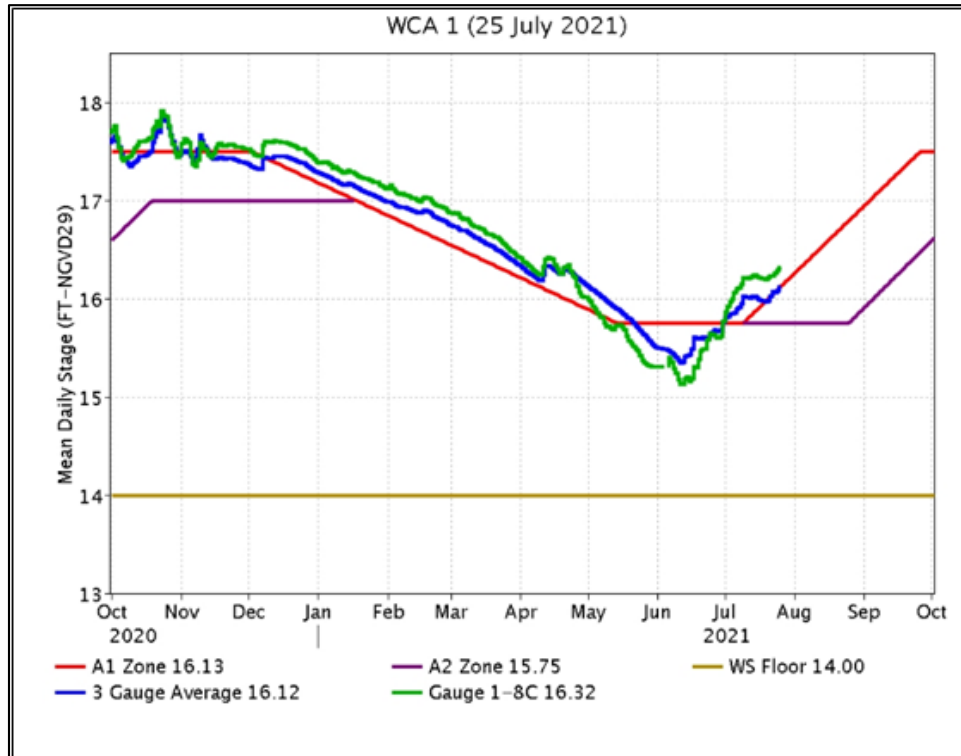
An average of 1.4 inches of rain fell over Taylor Slough and Florida Bay over the week ending Sunday (July 25, 2021) with the largest volumes over the central and western nearshore Florida Bay area. Stage decreased by an average of 0.13 feet over the week as rainfall was not able to offset evaporation. Depths are averaging 2 inches lower than the historical average for this time of year again (**Figure EV-8 & Figure EV-9**). Depths are averaging 0.6 inches higher than the historical average for this time of year now due to the rapid increase. Phosphorus levels at S-328 were not available for last week but it is assumed to still be high. The phosphorus level should be less than 8 µg/L threshold before water movements towards Everglades National Park from that structure begin. Water levels in the South Dade area are not high enough to sustain westward water movements towards the Park. Salinities in Florida Bay averaged an increase of 1 for the week ending July 25, but individual stations had weekly changes ranging from -0.9 to +8.1 (**Figure EV-8**). The effects of wind-driven upstream flows can be seen in the increased salinity in the northeastern coastal areas (TR and JB). Salinities are 3 higher than the historical average (**Figure EV-9**), but freshwater deliveries will still be needed to freshen the nearshore area and prevent late season salinity increases (**Figure EV-10**).

**Water Management Recommendations**

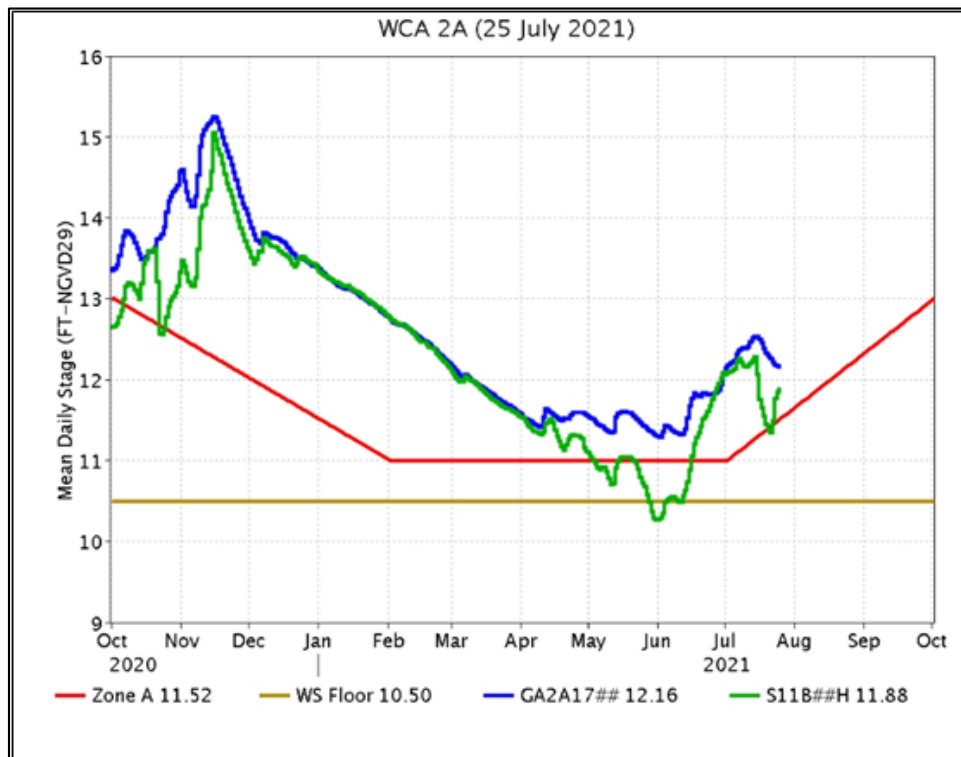
Ascension rates that do not exceed 0.25 feet per week or 0.50 feet per two weeks are considered ecologically healthy. Flows into northern WCA-3A, with a focus on the northeastern region downstream of S -150 would have an ecological benefit. Rehydration of northern Taylor Slough has begun and the most western structures (S-328 and G-737) continue to have phosphorus levels above 8 ppb. 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.

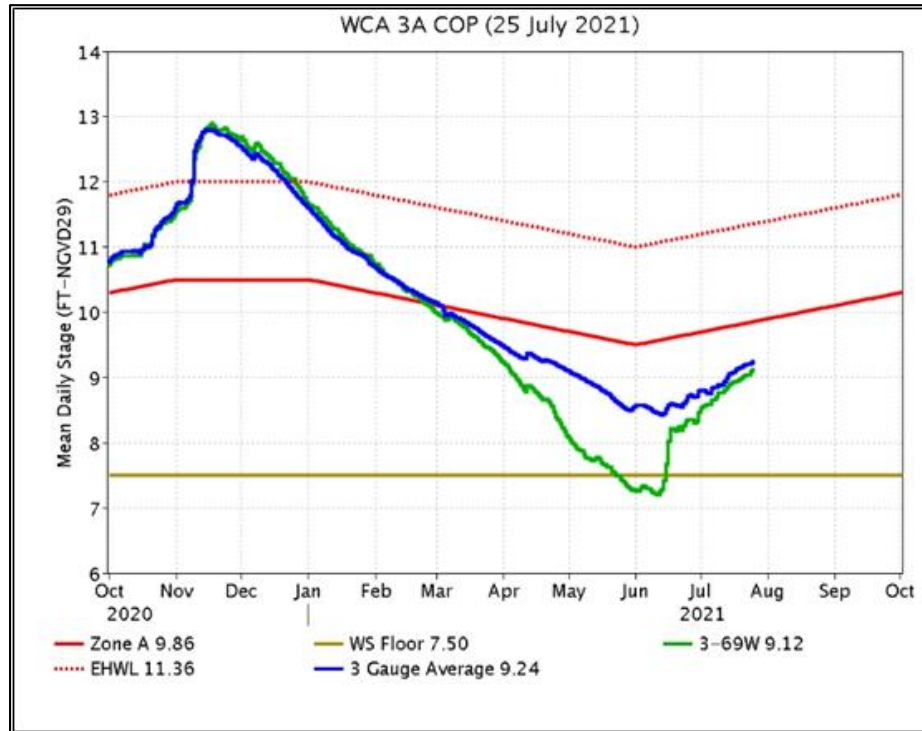
Everglades Region	Rainfall (inches)	Stage change (feet)
WCA-1	1.35	+0.16
WCA-2A	1.06	-0.22
WCA-2B	1.95	+0.00
WCA-3A	1.47	+0.05
WCA-3B	1.59	+0.03
ENP	1.43	+0.04



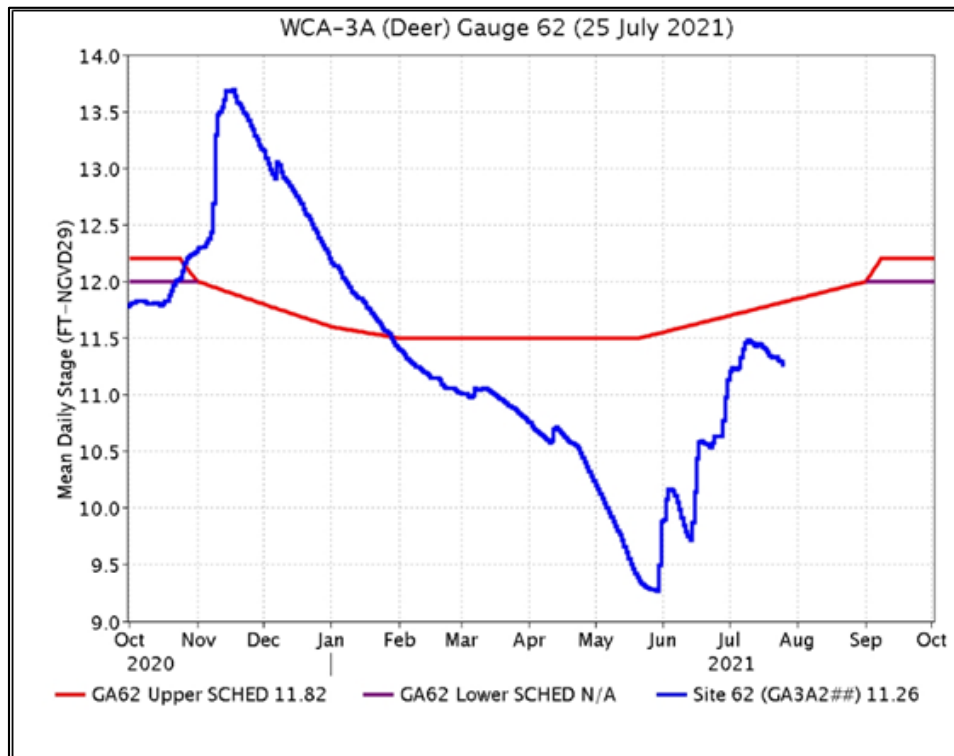
**Figure EV-1.** WCA-1 stage hydrographs and regulation schedule.



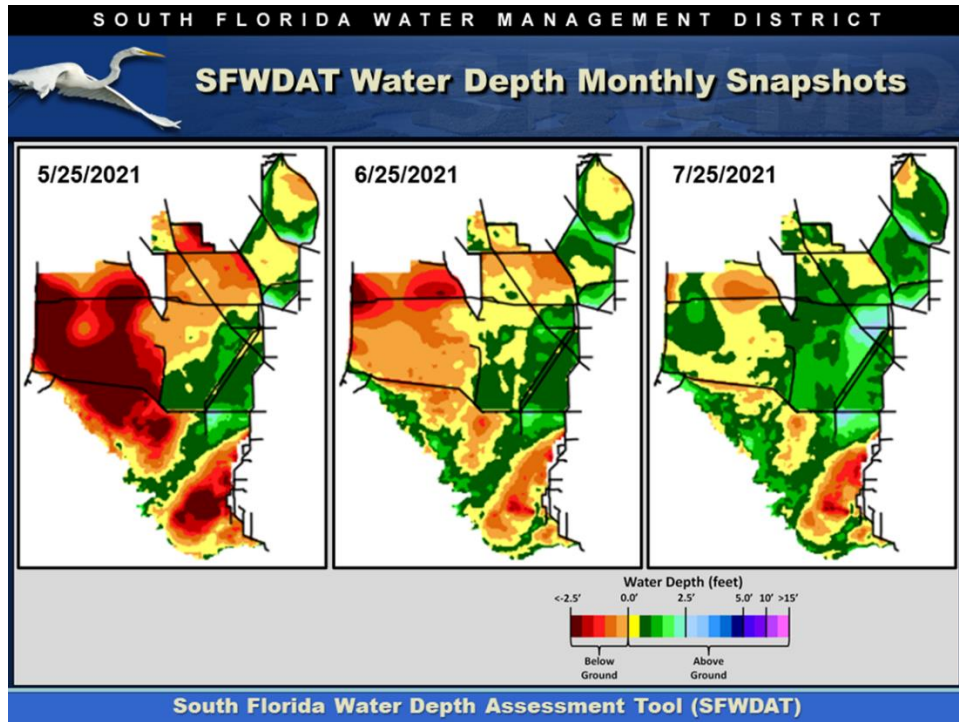
**Figure EV-2.** WCA-2A stage hydrographs and regulation schedule.



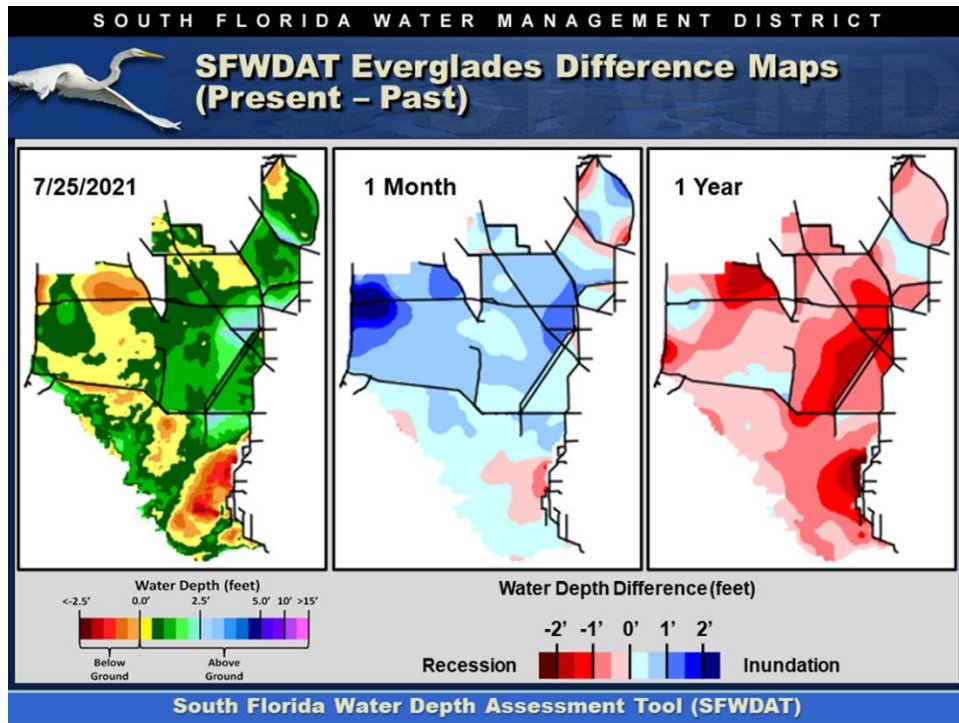
**Figure EV-3.** WCA-3A stage hydrographs (three-gauge average, S-333 headwater) and regulation schedule.



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

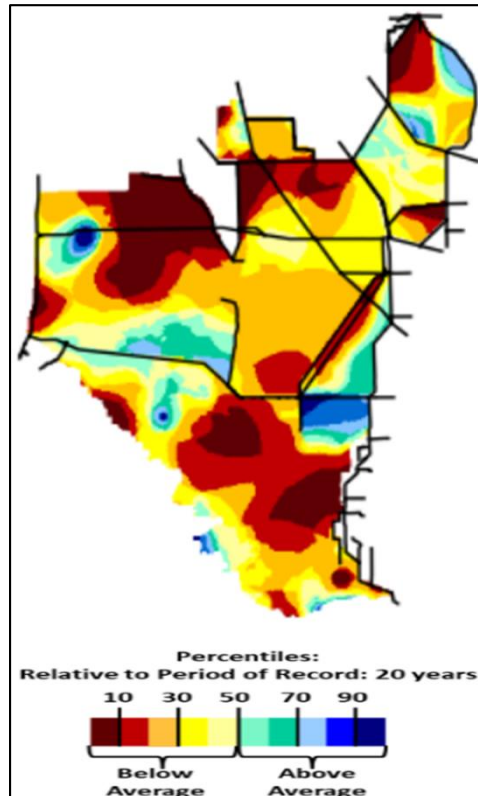


**Figure EV-5.** Everglades water depths from two months ago (left), one month ago (center) and present (right), based on SFWDAT.

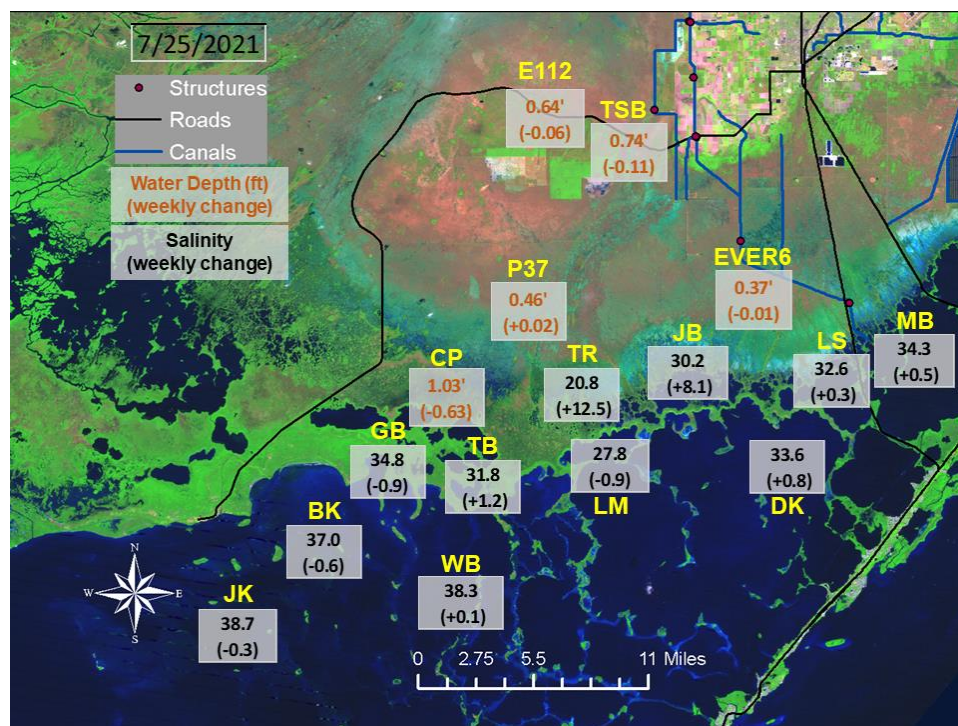


**Figure EV-6.** Present Everglades water depths (left) and water depth changes from one month (center) and one year (right) ago, based on SFWDAT.

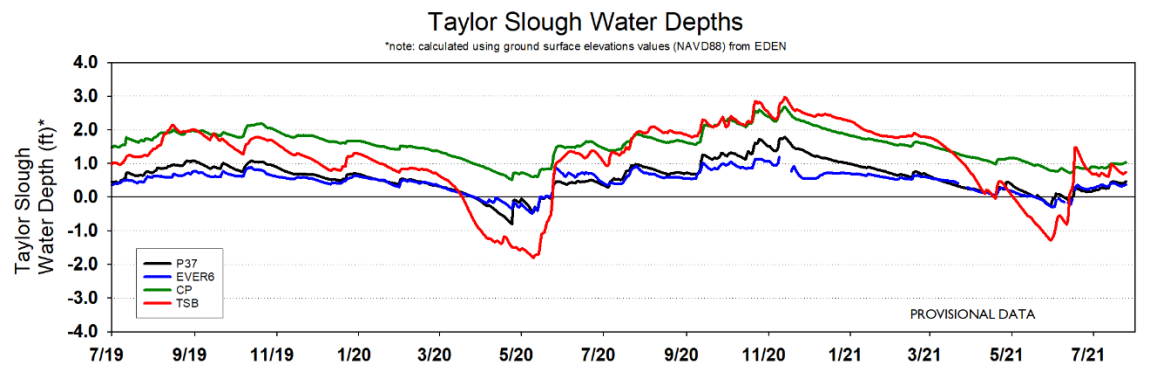




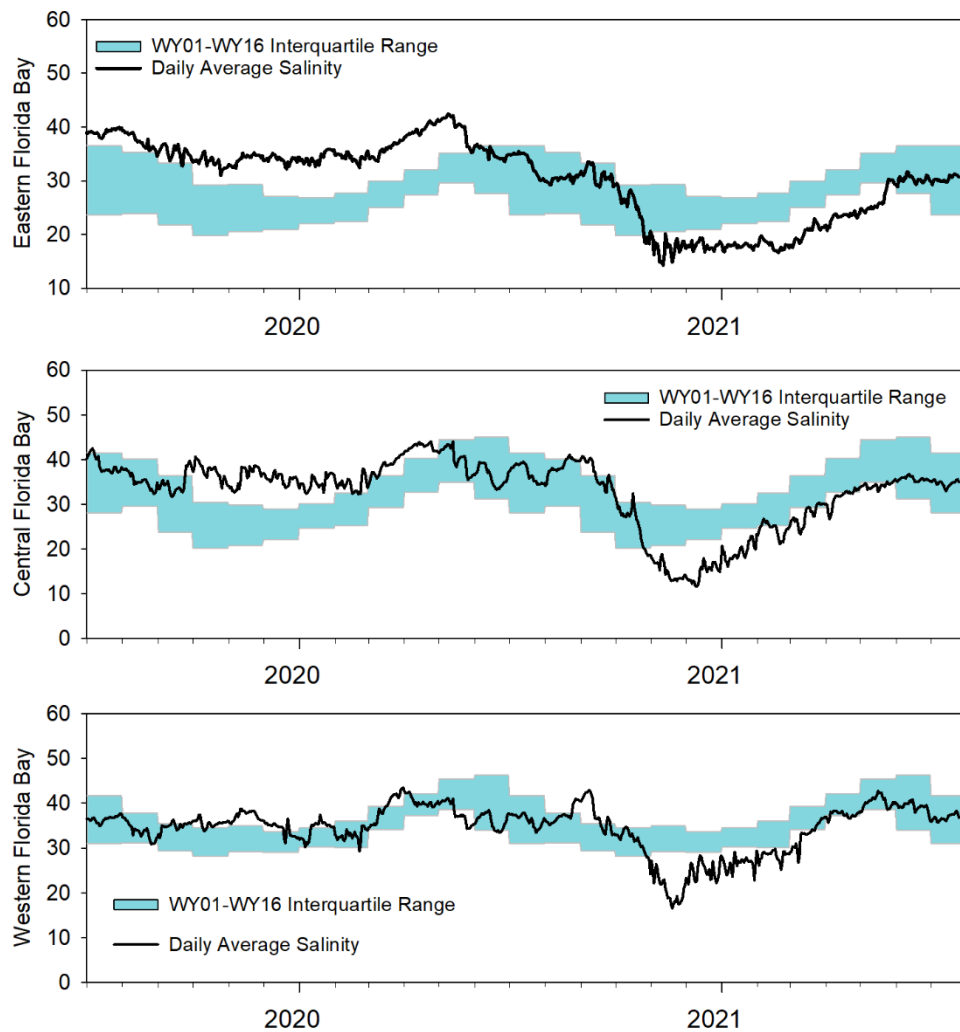
**Figure EV-7.** Present water depths compared to the day of year average over the previous 20 years .



**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

<b>SFWMD Everglades Ecological Recommendations, July 20th, 2021 (red is new)</b>			
<b>Area</b>	<b>Weekly change</b>	<b>Recommendation</b>	<b>Reasons</b>
<b>WCA-1</b>	Stage increased by 0.16'	Maintain ascension rates between 0.01 and 0.25 feet per week.	Protect within basin and downstream habitat and wildlife.
<b>WCA-2A</b>	Stage decreased by 0.22'	Allow for an ascension rate to between 0.01 and 0.25 feet per week	Protect within basin and downstream habitat and wildlife.
<b>WCA-2B</b>	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.
<b>WCA-3A NE</b>	Stage increased by 0.22'	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.
<b>WCA-3A NW</b>	Stage decreased by 0.12	Allow for an ascension rate to between 0.01 and 0.25 feet per week	
<b>Central WCA-3A S</b>	Stage increased by 0.02'	Maintain the ascension rate to between 0.01 and 0.25 feet per week	Protect within basin and downstream habitat and wildlife.
<b>Southern WCA-3A S</b>	Stage increased by 0.08'		
<b>WCA-3B</b>	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.
<b>ENP-SRS</b>	Stage increased by 0.04'	Make discharges to the Park according to COP and TTFF protocol while considering upstream and downstream ecological conditions.	Protect within basin and upstream habitat and wildlife.
<b>Taylor Slough</b>	Stage changes ranged from -0.63' to +0.02'	Move water southward as possible.	When available, provide freshwater buffer for downstream conditions.
<b>FB- Salinity</b>	Salinity changes ranged -0.9 to +8.1	Move water southward as possible.	When available, provide freshwater to maintain low salinity buffer and promote water movement.