

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 14, 2021

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

### **Summary**

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

A tropical wave east of Florida will move west of the area on Wednesday. It is expected to produce numerous showers and thunderstorms and a widespread coverage of rain across the District Tuesday. Model guidance is showing a large maximum of rainfall in the east of greater than half of an inch with generous rains also extending through the southern interior. The very favorable large-scale conditions are expected to cause a high risk of localized, significant rainfall area wide and a *significant District rain event* (a total of a half of an inch of total rainfall or more), with some chance that excessive rainfall could occur along and near parts of the east coast that already observed considerable rains. On Wednesday, the wave should be well west of Florida, but a broad area of enhanced moisture is expected to hang back across the District continuing above-normal rains. An easterly steering wind will then turn the focus of the rains over the interior and western sections of the District during the afternoon. A batch of much drier air is forecast to overspread the District on Thursday with a substantial reduction in rain coverage, rain intensity, and total rainfall to well under the daily climatological average. Friday through Monday, a typical July weather pattern is forecast to prevail, characterized by a well-defined subtropical ridge of high pressure extending from the Atlantic westward through Florida and the Gulf of Mexico. The easterly wind regime will favor overnight and early-day rains in the east shifting to the interior and west later in the afternoon. For the Friday-through-Monday period, total rainfall each day is seen to be either at or below the daily climatological average.

#### **Kissimmee**

Flow at S-65A continues to be too low for extensive inundation of the Kissimmee River floodplain, but mean floodplain depth increased to 0.19 feet on July 11. Dissolved oxygen concentration in the Kissimmee River continued its recent decline to an average of 4.3 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 13.30 feet NGVD on July 11, 2021, 0.75 feet higher than a month ago, and 0.83 feet higher than one year ago (**Figure LO-1**). Lake stages were above the ecological envelope from August 1, 2020 to March 30, 2021, and near or within the upper threshold of the envelope until mid-June. Lake stages have been above the ecological envelope since early-July (**Figure LO-2**). Recent satellite imagery (July 11, 2021) shows a medium to high bloom potential in the NW part of the Lake.

## **Estuaries**

Total inflow to the St. Lucie Estuary averaged approximately 1,394 cfs over the past week with no flow coming from Lake Okeechobee. Mean salinities decreased 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 4,441 cfs over the past week with no flow coming from the Lake. Mean surface salinities decreased at all 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 Cape Coral and Shell Point, and Sanibel.

## **Stormwater Treatment Areas**

For the week ending Sunday, July 11, 2021, no Lake Okeechobee water was delivered to the FEBs/STAs. The total amount of Lake releases sent to the FEBs/STAs in WY2022 (since May 1, 2021) is approximately 53,000 ac-feet. The total amount of inflows to the STAs in WY2022 is approximately 227,800 ac-feet. Most STA cells are near 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**

The Everglades Protection Area is rehydrating after an extended dry season with the northern and eastern areas having deeper surface water at this time. Big Cypress National Preserve and Everglades National Park are both still drier than their historical averages for this time of year due to the delayed start of the wet season, but conditions are improving. Northeastern Water Conservation Area-3A has stages that have almost risen to ground surface but would still benefit from more rainfall or inflows. Florida Bay salinities have been stable for a few weeks, but freshwater through Taylor Slough will be needed soon to keep salinities from rising.

## **Supporting Information**

### **Kissimmee Basin**

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

On July 11, 2021, lake stages were 55.6 feet NGVD (0.9 feet below schedule) in East Lake Toho, 53.1 feet NGVD (0.4 feet below schedule) in Lake Toho, and 51.0 feet NGVD (at 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 27.6 feet NGVD at S-65D on July 11, 2021, while discharges were 900 cfs at S-65, 1,020 cfs at S-65A, 1,040 cfs at S-65D and 1,140 cfs at S-65E (**Table KB-2**). Dissolved oxygen concentration in the Kissimmee River has been declining with the increases in discharge and averaged 4.3 mg/L for the week ending on July 11, 2021, (**Figure KB-4**) and has continued to decline as of Monday. Discharge is being increased slowly to reduce the rate of stage rise in KCH while attempting to avert a DO crash in the Kissimmee River. Flow at S-65A remains too low for extensive inundation of the Kissimmee River floodplain, but mean floodplain depth increased to 0.19 feet on July 11, 2021 (**Figure KB-5**).

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

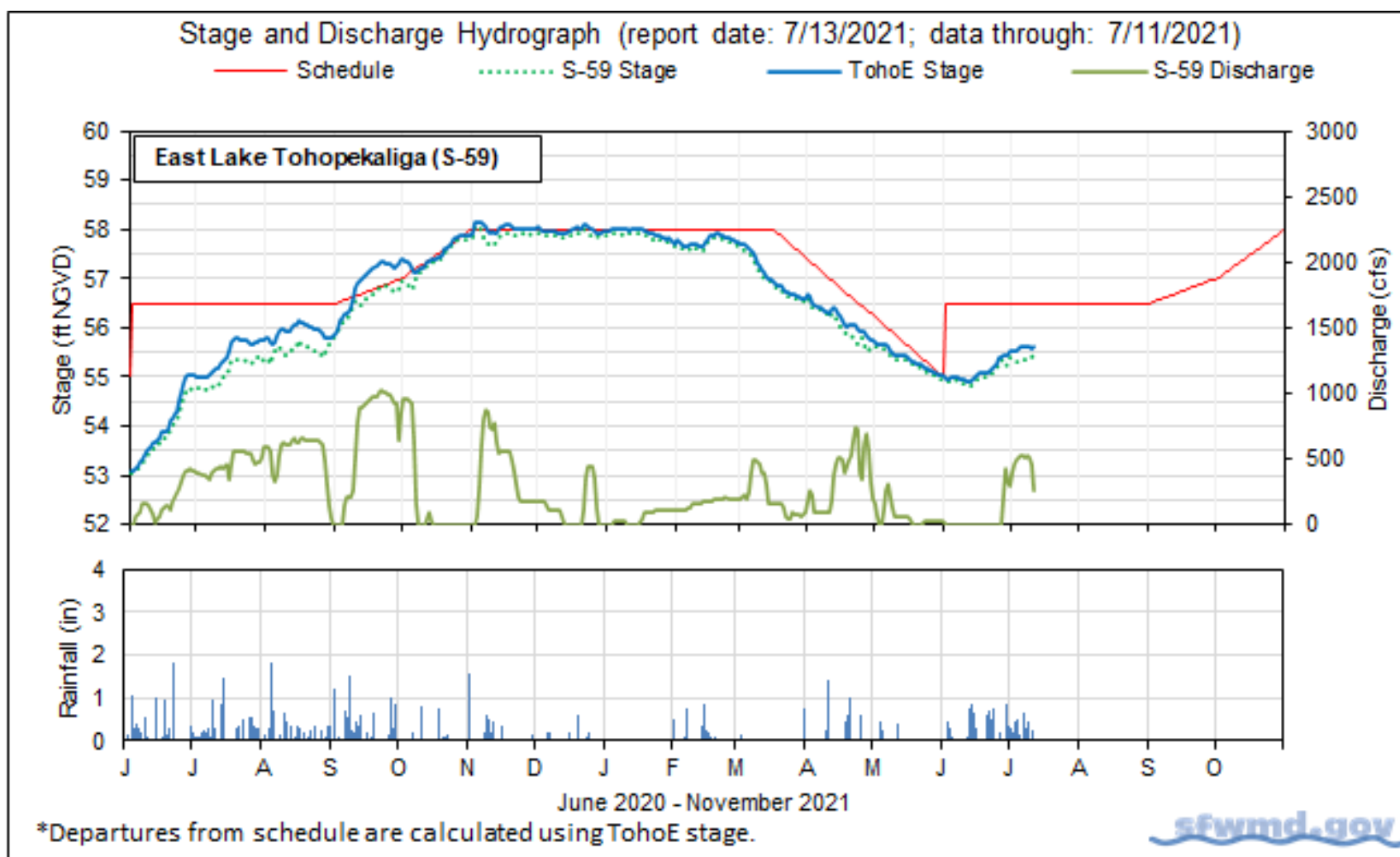
Due to declining dissolved oxygen (DO) in the Kissimmee River, we are making recommendations on a daily basis for increases in S-65 and S-65A flow. The objective is to raise flow slowly to bankfull discharge (1,400 cfs) to help reduce the rate of stage rise in KCH without causing DO declines that tend to persist throughout the wet season. We currently recommend small increases in 50 cfs increments every day or every other day. With increasing ascension rates in Lakes KCH, Toho, and East Toho we will also be balancing ascension rates among the lakes by modifying 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.

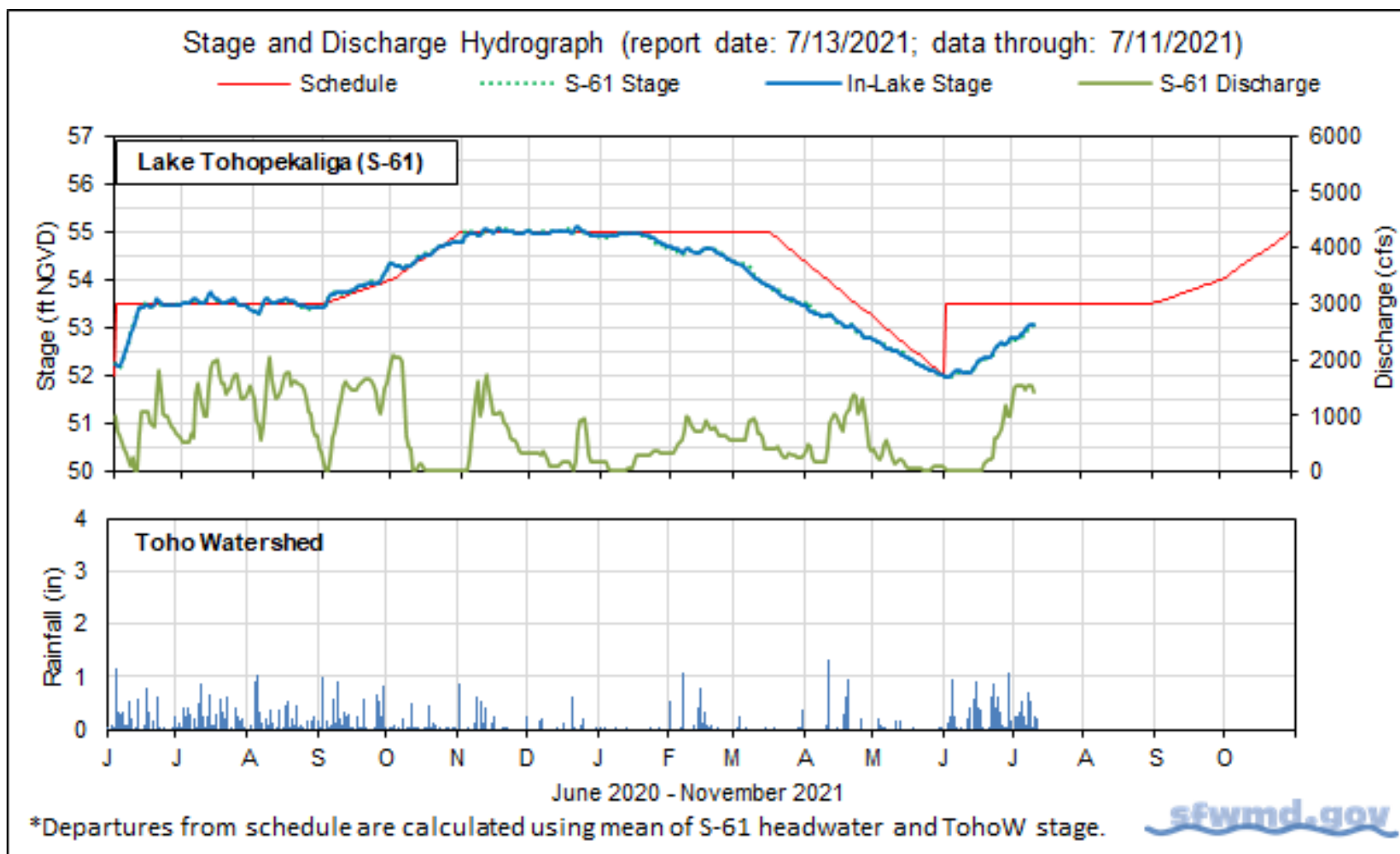
Water Body	Structure	Stage Monitoring Site	7-Day Average Discharge (cfs)	Lake Stage (feet NGVD) <sup>a</sup>	Schedule Type <sup>b</sup>	Schedule Stage (feet NGVD)	Departure from Regulation (feet)	
							7/11/21	7/4/21
Lakes Hart and Mary Jane	S-62	LKMJ	149	60.0	R	60.0	0.0	0.0
Lakes Myrtle, Preston and Joel	S-57	S-57	17	60.9	R	61.0	-0.1	-0.2
Alligator Chain	S-60	ALLI	0	63.1	R	63.2	-0.1	-0.4
Lake Gentry	S-63	LKGT	0	0.0	R	61.0	-61.0	-0.7
East Lake Toho	S-59	TOHOE	475	55.6	R	56.5	-0.9	-0.9
Lake Toho	S-61	TOHOW S-61	1,505	53.1	R	53.5	-0.4	-0.7
Lakes Kissimmee, Cypress and Hatchineha	S-65	KUB011 LKIS5B	756	51.0	R	51.0	0.0	-0.4

a. Names of in-lake monitoring sites and structures used to determine lake stage. If more than one site is listed, an average is reported.

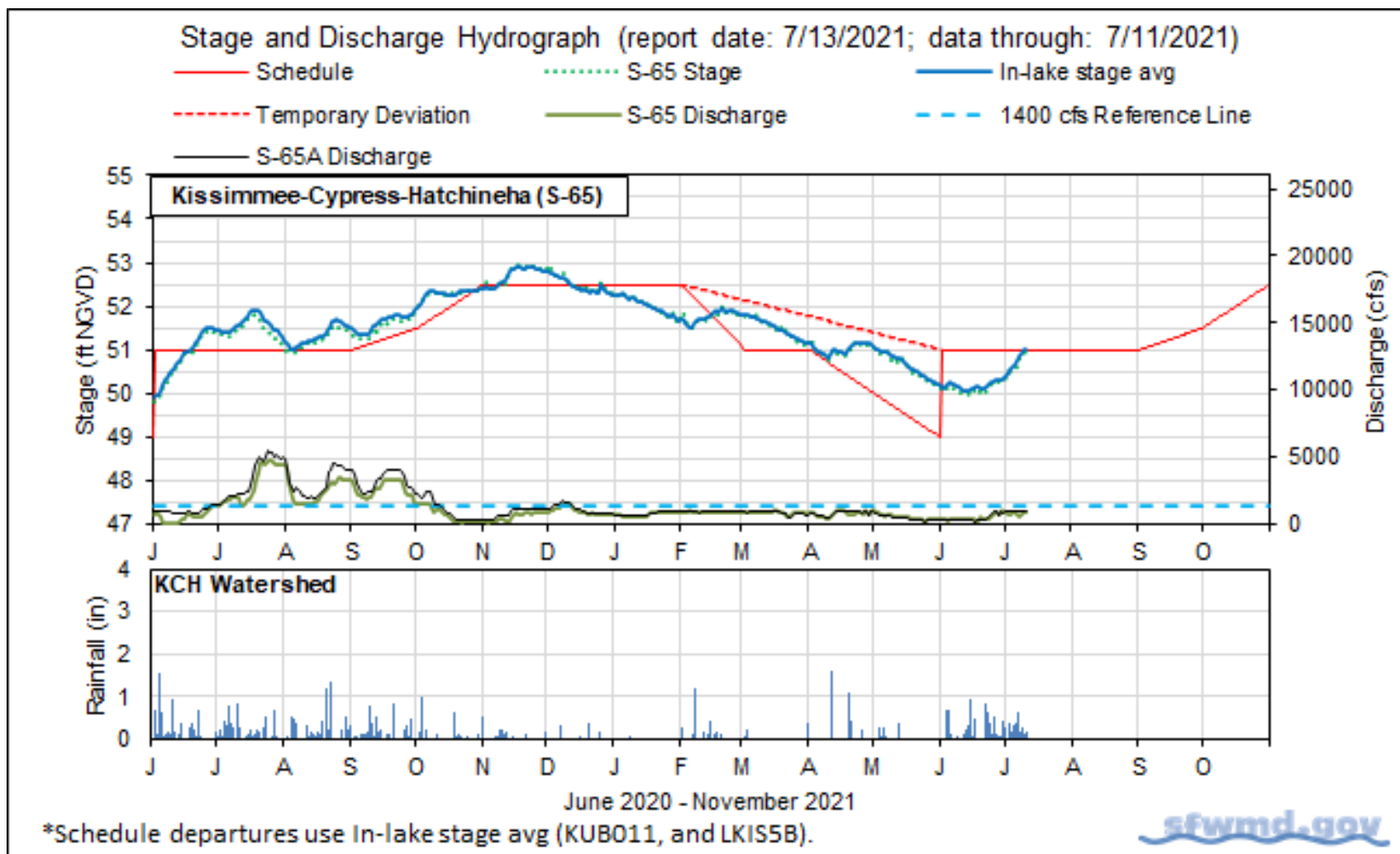
b. A: projected recession line; R: USACE regulation schedule; S: temporary recession target line; T: temporary schedule; NA: not applicable or not available.



**Figure KB-1.** East Lake Toho regulation schedule, stage, discharge and rainfall.



**Figure KB-2.** Lake Toho regulation schedule, stage, discharge and rainfall.



**Figure KB-3.** Lakes Kissimmee, Cypress and Hatchineha regulation schedule, stage, discharge and rainfall.

**Table KB-2.** One- and seven-day average discharge and stage at Lower Kissimmee basin structures, river channel dissolved oxygen concentrations and water depths in the Phase I area floodplain. All data are provisional.

Metric	Location	Daily Average 7/11/21	Average for Previous Seven Day Periods			
			7/11/21	7/4/21	6/27/21	6/20/21
Discharge	S-65	900	760	770	620	350
Discharge	S-65A <sup>a</sup>	1,020	940	850	600	300
Headwater Stage (feet NGVD)	S-65A	46.3	46.2	46.2	46.2	46.4
Discharge	S-65D <sup>b</sup>	1,040	970	840	480	270
Headwater Stage (feet NGVD)	S-65D <sup>c</sup>	27.6	27.4	26.3	25.8	25.8
Discharge (cfs)	S-65E <sup>d</sup>	1,140	1,070	880	470	250
Discharge (cfs)	S-67	0	0	0	0	0
Dissolved Oxygen (mg/L) <sup>e</sup>	Phase I, II/III river channel	3.8	4.3	4.7	5.9	6.3
Mean depth (feet) <sup>f</sup>	Phase I floodplain	0.19	0.20	0.11	0.08	0.07

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.

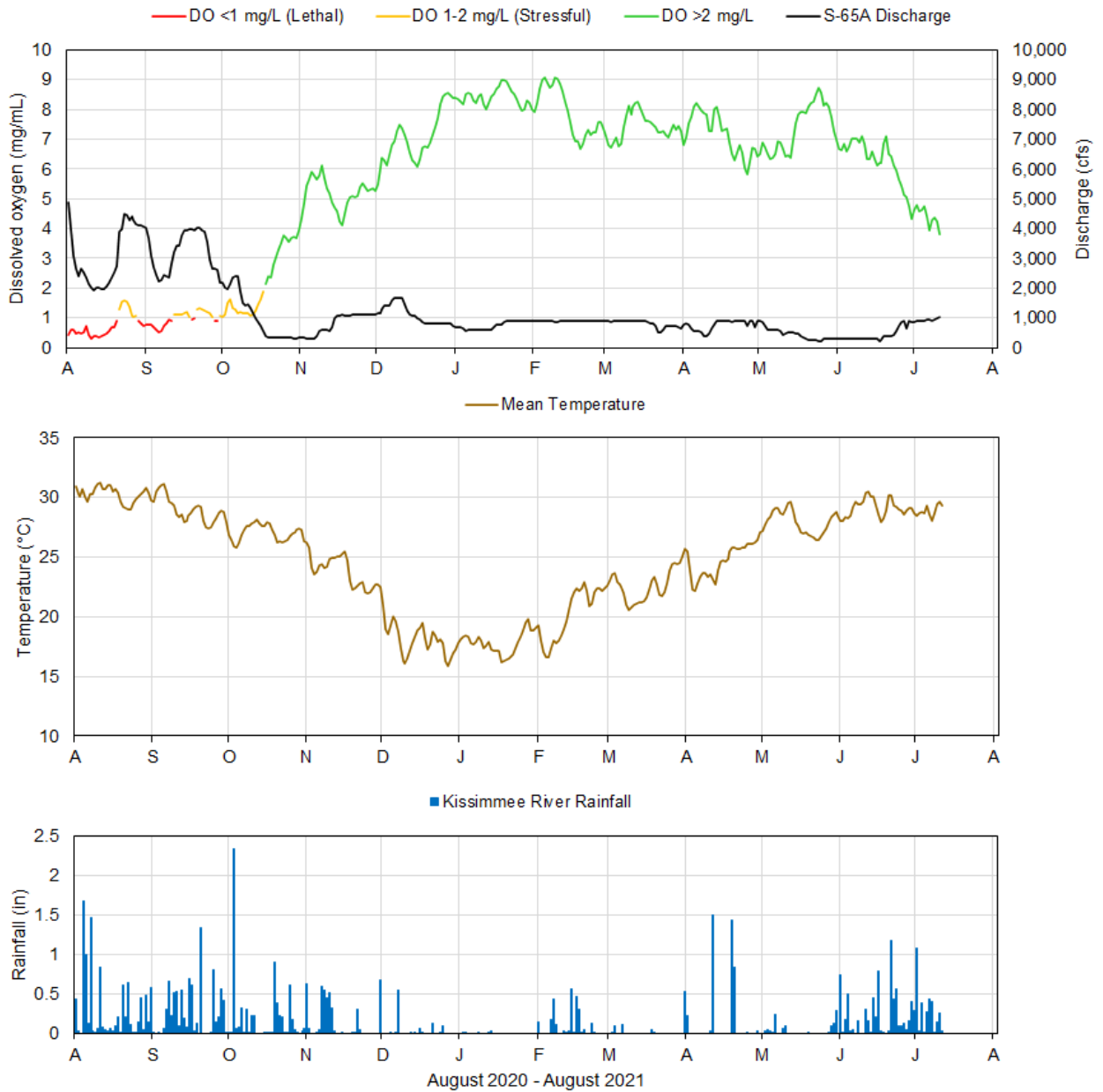
e. Dissolved oxygen is the average of values from sondes KRBN, PC62, PC63, PD62R and PD42R.

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

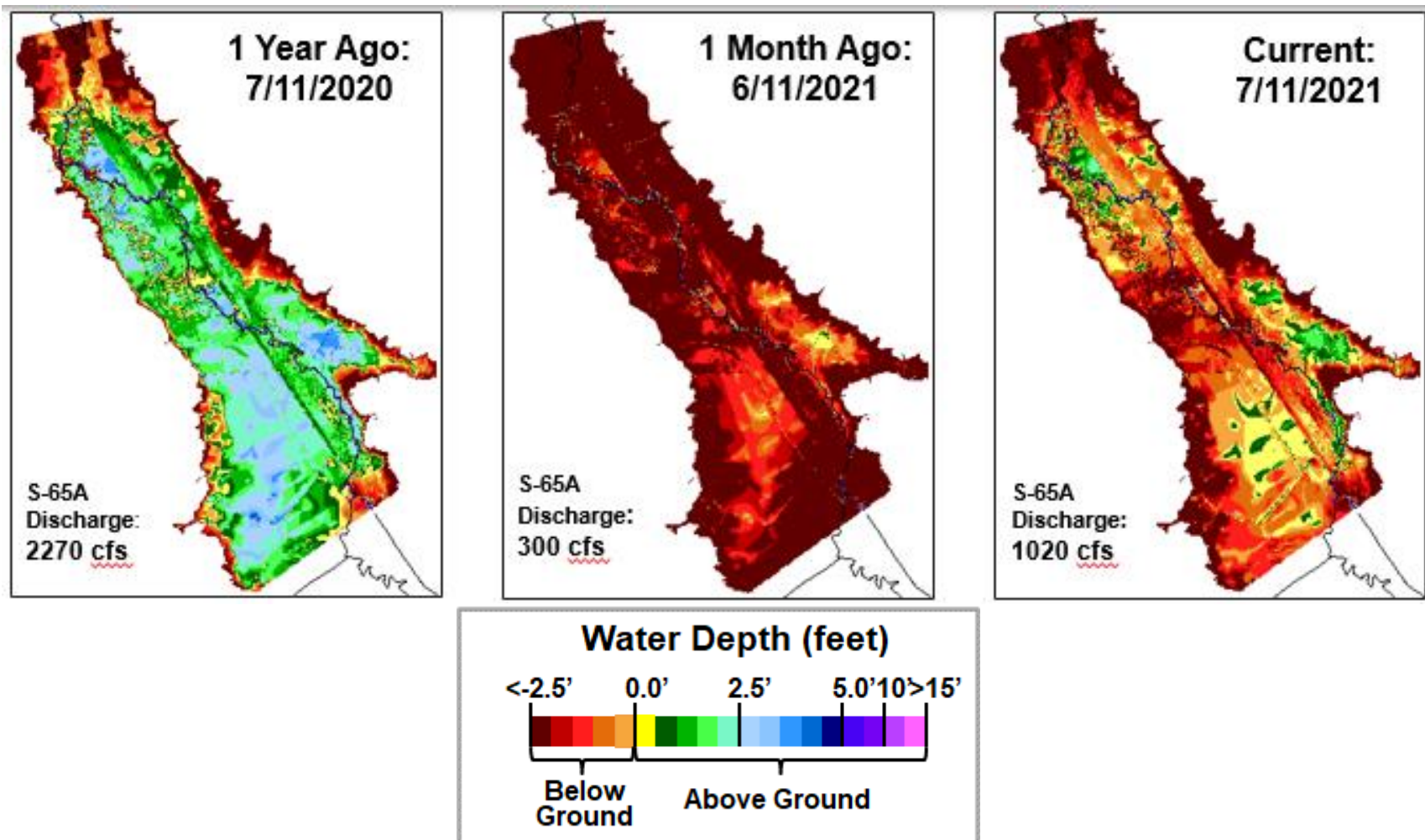




Report Date: 7/13/2021; data are through: 7/11/2021

[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 13.30 feet NGVD on July 11, 2021, 0.75 feet higher than a month ago, and 0.83 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 with the onset of the rainy season and have been above the ecological envelope since early-July (**Figure LO-2**). Lake stage remains within the base flow sub-band (**Figure LO-3**). According to NEXRAD, 3.42 inches of rain fell directly on the Lake last week.

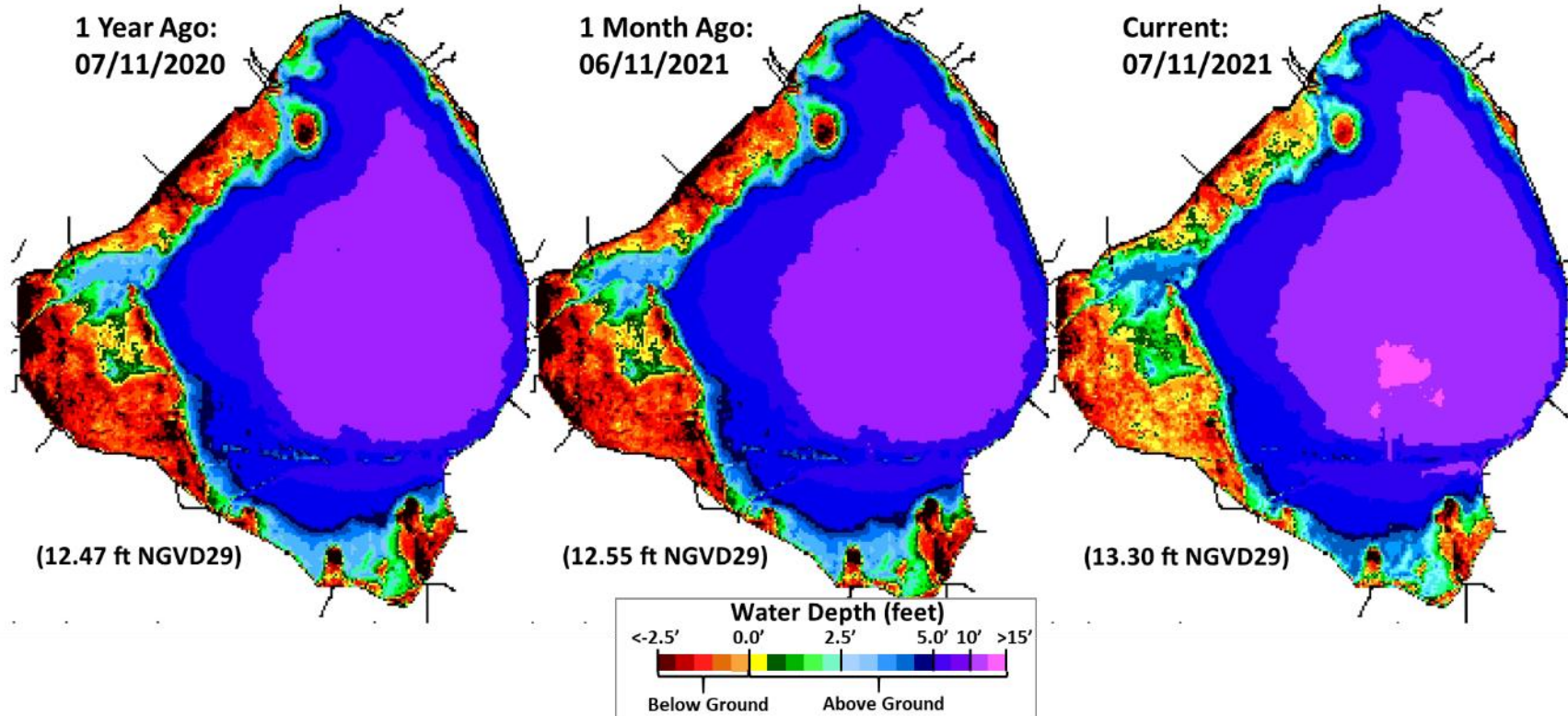
Average daily inflows (excluding rainfall) increased from the previous week, going from 1,900 cubic feet per second (cfs) to 4,275 cfs. Outflows (excluding evapotranspiration) decreased, going from 92 cfs to 0 cfs. The major inflows came from the Kissimmee River (1,069 cfs through S-65E & S-65EX1), the C-41A canal (1,245 cfs through S-84 & S-84X) and the C-40 and C-41 canals (783 cfs through S-71 & S-72). Water flowed back from the C-44 canal into the Lake (backflow) via S-308 at the average rate of 314 cfs over the past week. Releases to the west via S-77 decreased from 380 cfs to 0 cfs and there were no releases south through the S-350 structures last week. Average inflows and outflows through water control structures surrounding the Lake for the previous two weeks (cfs) are shown in **Table LO-1**, as is the resultant Lake elevation change in inches (in) due to each structure's flow for the past week. **Figure LO-4** shows the combined average daily cfs for inflows and outflows for the Lake over the past eight weeks. These data are provisional and are subject to change.

The most recent satellite image (July 11, 2021) from the NOAA cyanobacteria monitoring product derived from EUMETSAT's Sentinel 3 OLCI sensor data showed medium to high bloom potential in northwestern part of the Lake. Overall, the bloom potential decreased slightly on the Lake from the previous week, especially in the central part (**Figure LO-5**).

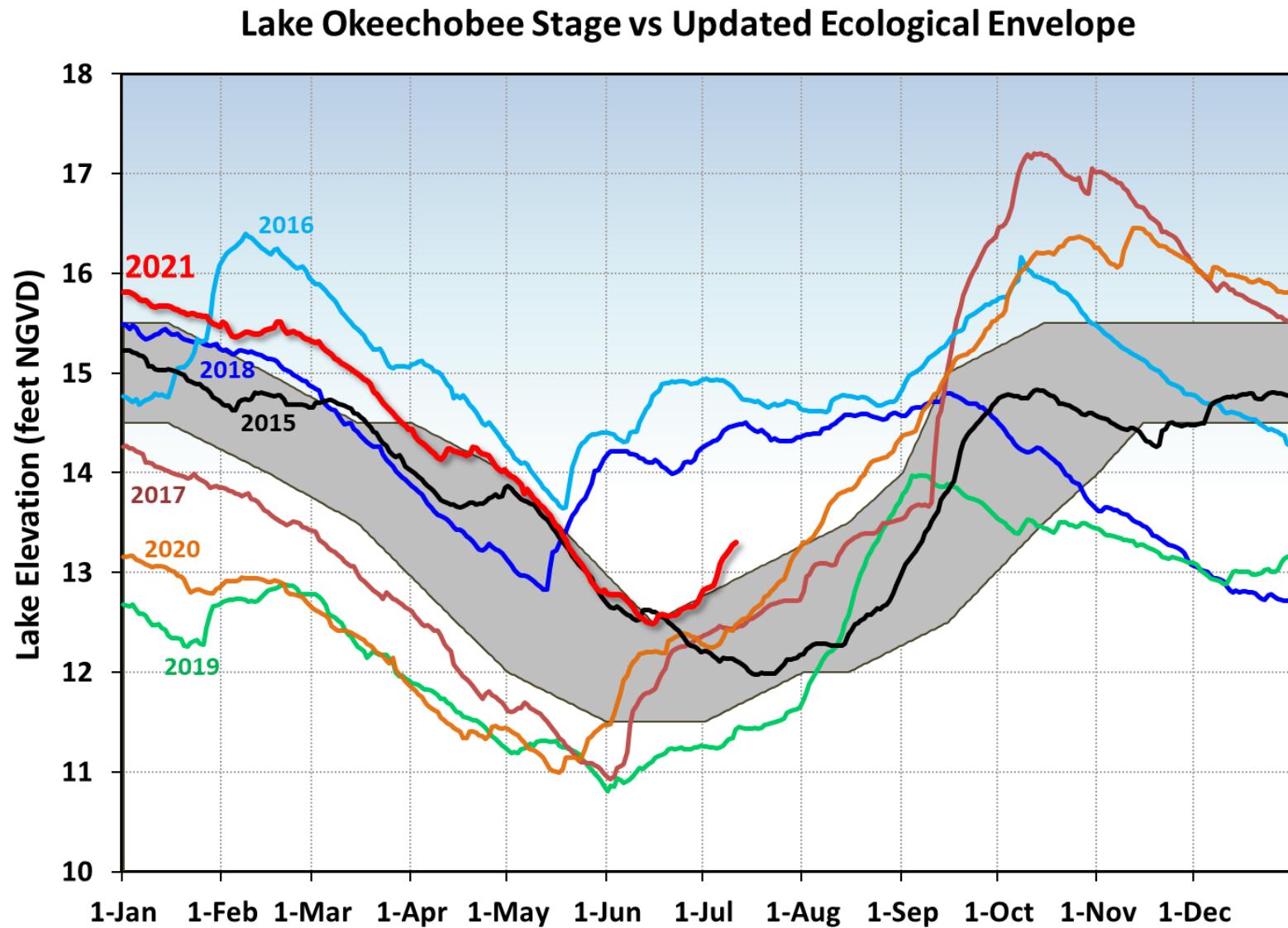
The latest survey on July 6 - 8, 2021 revealed that a total of 16 sites (or 50%) had communities dominated by *Microcystis aeruginosa* and 2 sites (or 6%) by *Cylindrospermopsis raciborskii*. The remaining sites had mixed communities or communities co-dominated by *M. aeruginosa* and *C. raciborskii* (10 (or 31%) and 2 (or 6%) sites, respectively). Percentage of sites dominated by *M. aeruginosa* decreased by 6% since late June. A total of 27 sites (or 85%) had microcystin concentration below the EPA recommended human health recreational standard (8 µg/L). The highest toxin concentration (37 µg/L) was recorded at POLESOUT3 in the NW part of the Lake. Overall, toxin concentration decreased since late June, especially in the NE part of the Lake (**Table LO-2** and **Figure LO-6**), and remained either below detection level or below the EPA threshold in southern part of the Lake.

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

Inflows	Previous Week's Average Daily Flow (cfs)	This Week's Average Daily Flow (cfs)	Equivalent Depth Week Total (in)	Outflows	Previous Week's Average Daily Flow (cfs)	This Week's Average Daily Flow (cfs)	Equivalent Depth Week Total (in)
S-65E & S-65EX1	880	1069	0.5	S-77	380	0	0.0
S-71 & S-72	154	783	0.3	S-308	-289	-314	-0.1
S-84 & S-84X	550	1245	0.5	S-351	0	0	0.0
Fisheating Creek	13	96	0.0	S-352	0	0	0.0
S-154	46	62	0.0	S-354	0	0	0.0
S-191	33	277	0.1	L-8 Outflow			
S-133 P	39	253	0.1	Evapotranspiration	2207	2227	1.0
S-127 P	12	91	0.0	<b>Totals</b>	<b>2299</b>	<b>1913</b>	<b>0.8</b>
S-129 P	13	52	0.0				
S-131 P	20	54	0.0				
S-135 P	116	240	0.1				
S-2 P	0	0	0.0				
S-3 P	0	0	0.0				
S-4 P	0	0	0.0				
L-8 Backflow	25	53	0.0				
Rainfall	7114	9179	3.9				
<b>Totals</b>	<b>9014</b>	<b>13454</b>	<b>5.8</b>				

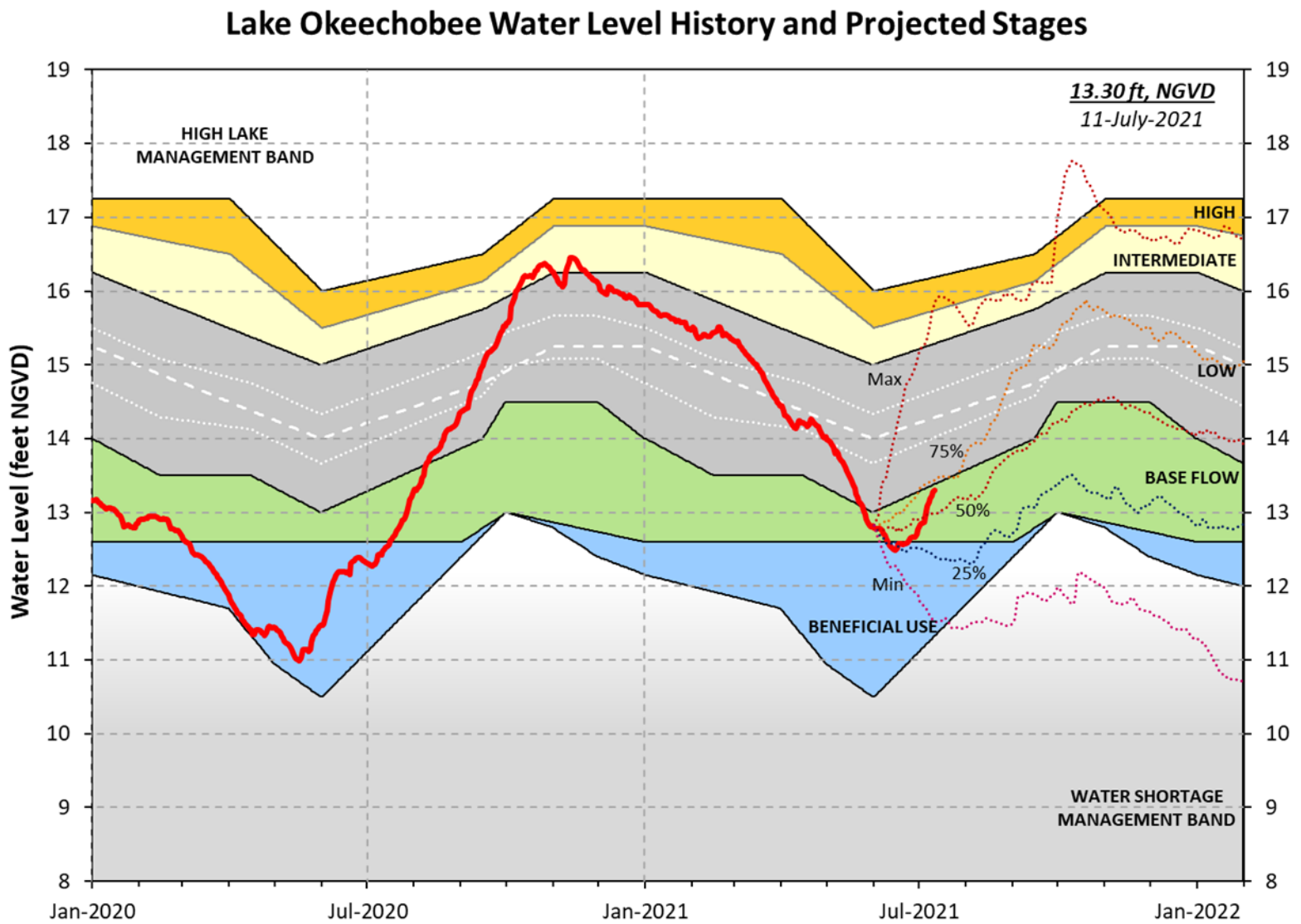


**Figure LO-1.** Lake Okeechobee water depth estimates based on South Florida Water Depth Assessment Tool (SFWDAT).

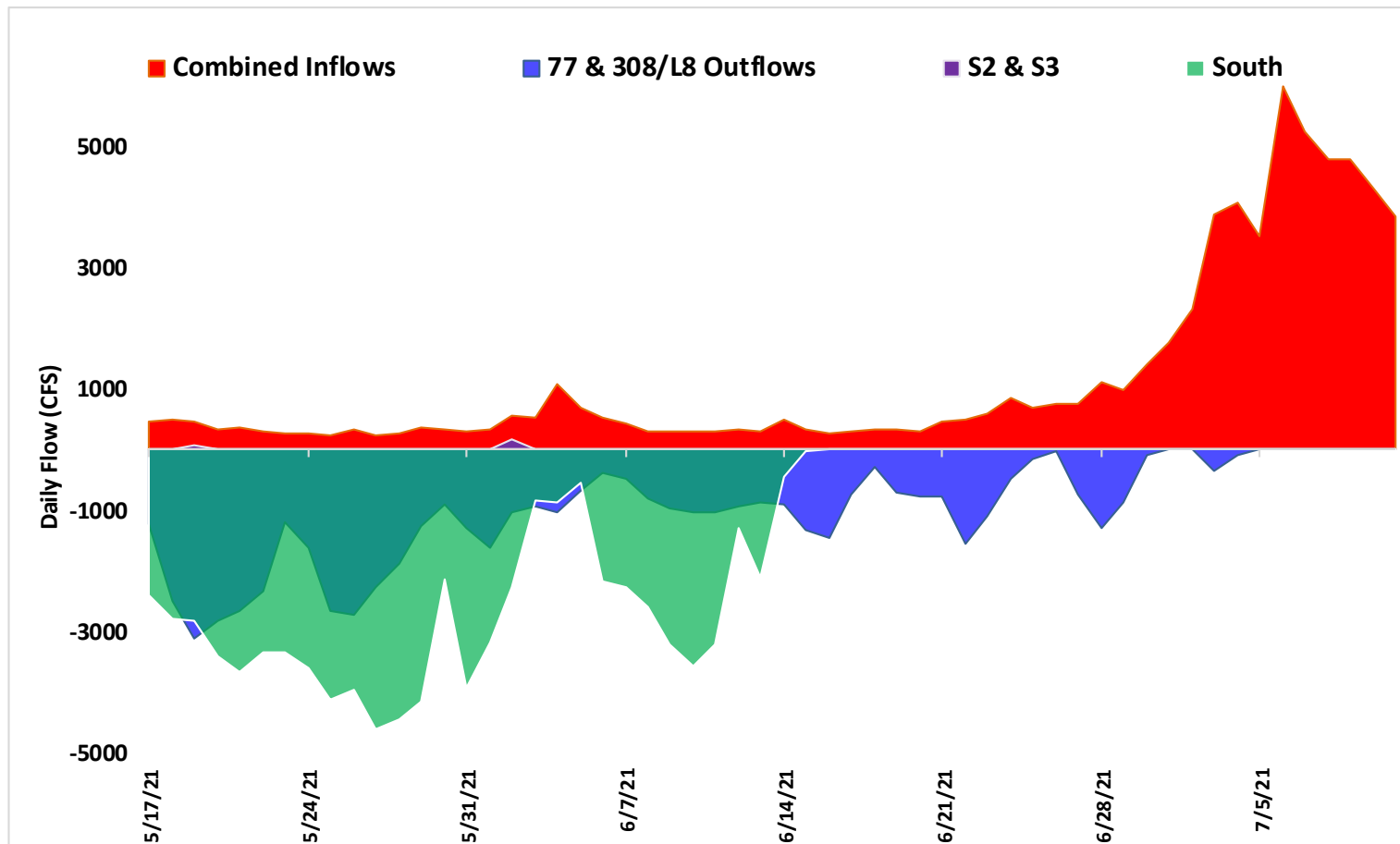


**Figure LO-2.** Select annual stage hydrographs for Lake Okeechobee in comparison to the updated ecological envelope.





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

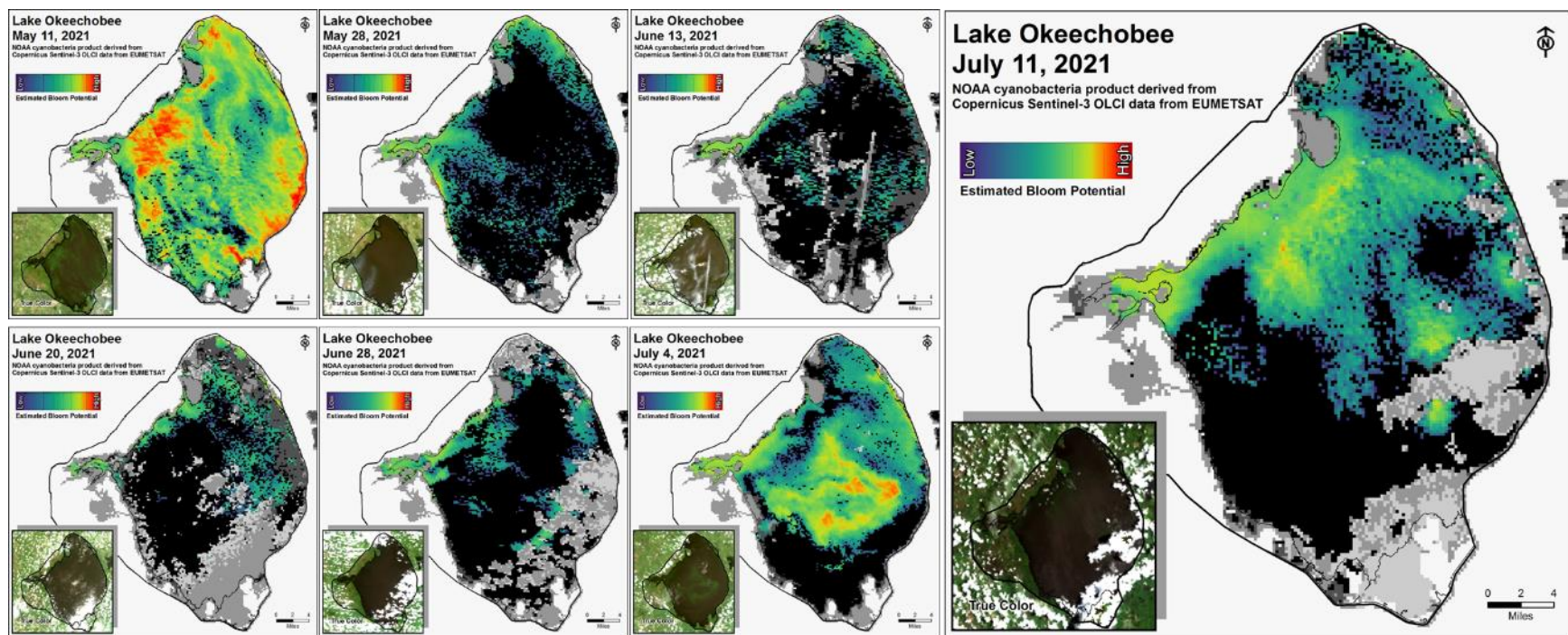


**Figure LO-4.** Major inflows (red) to and outflows east and west (blue) from Lake Okeechobee. Outflows south are shown in green. Flows into Lake Okeechobee from the L-8 canal through S-271 (formerly Culvert 10A) are included as inflows. Conversely, flows from Lake Okeechobee into the L-8 Canal are 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.

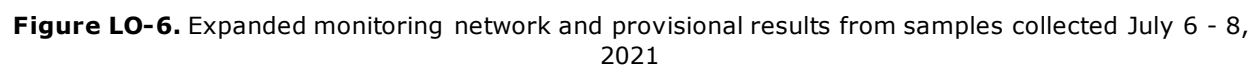


**Table LO-2.** Provisional results of chlorophyll *a* concentrations and cyanobacteria taxa from sampling trips on July 6 - 8, 2021.

Station	Chl <i>a</i> (µg/L)	Toxin (µg/L)	Taxa	Station	Chl <i>a</i> (µg/L)	Toxin (µg/L)	Taxa
FEBIN	NS	NS	NS	<b>L001</b>	P	1.7	<i>Microcys</i>
FEBOUT	NS	NS	NS	<b>L004</b>	P	0.7	<i>Microcys</i>
KISSR0.0	P	0.4	mixed	L006	P	0.3	<i>Microcys</i>
<b>L005</b>	P	0.5	mixed	L007	P	0.3	mixed
LZ2	P	BDL	mixed	<b>L008</b>	P	7.5	<i>Microcys</i>
<b>KBARSE</b>	P	0.7	<i>Micro/Cylin</i>	<b>LZ30</b>	P	0.8	<i>Microcys</i>
RITTAE2	P	BDL	mixed	<b>LZ40</b>	P	5.3	<i>Microcys</i>
PELBAY3	P	BDL	mixed	<b>CLV10A</b>	P	7.3	<i>Microcys</i>
POLE3S	P	BDL	mixed	<b>NCENTER</b>	P	0.8	<i>Microcys</i>
LZ25A	P	0.3	mixed	Outflow Structures			
PALMOUT	P	BDL	mixed	S308C	P	0.7	mixed
<b>PALMOUT1</b>	P	2.3	<i>Microcys</i>	<b>S77</b>	P	BDL	<i>Cylindro</i>
PALMOUT2	P	0.5	<i>Microcys</i>	<ul style="list-style-type: none"> <li>• SFWMD considers &gt; 40 µg/L chlorophyll <i>a</i> (Chla) an algal bloom.</li> <li>• BDL: below detectable limit of 0.25 µg/L</li> <li>• ND: no dominant taxa</li> <li>• P: pending</li> <li>• NS: not sampled</li> <li>• Bold font: crew observed possible blue-green algae</li> <li>• Chla analyzed by SFWMD</li> <li>• Toxin and taxa analyzed by FDEP</li> </ul> <p> <i>Cylindro</i>: <i>Cylindrospermopsis</i>  <i>Planktal</i>: <i>Planktalyngbya</i>  <i>Dolicho</i>: <i>Dolichospermum</i>  <i>Microcys</i>: <i>Microcystis</i> </p>			
PALMOUT3	P	2	<i>Microcys</i>				
POLESOUT	P	0.3	<i>Cylindro</i>				
<b>POLESOUT1</b>	P	2.5	<i>Micro/Cylin</i>				
<b>POLESOUT2</b>	P	12.0	<i>Microcys</i>				
<b>POLESOUT3</b>	P	37.0	<i>Microcys</i>				
<b>EASTSHORE</b>	P	5.2	<i>Microcys</i>				
<b>NES135</b>	P	21.0	<i>Microcys</i>				
NES191	P	0.4	<i>Microcys</i>				



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



## Estuaries

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

Over the past week, mean total inflow to the St. Lucie Estuary was approximately 1,394 cfs (**Figures ES-1 and ES-2**) and the previous 30-day mean inflow was approximately 979 cfs. For comparison, the historical provisional mean inflows from the contributing areas are shown in **Figure ES-2**.

Over the past week, salinities decreased at all sites 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 13.5. 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 4,441 cfs (**Figures ES-5 and ES-6**) and the previous 30-day mean inflow was approximately 2,188 cfs. For comparison, the historical provisional mean inflows from the contributing areas are shown in **Figure ES-6**.

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

Surface salinity at Val I-75 was forecasted for the next two weeks, using an autoregression model (Qiu and Wan, 2013<sup>1</sup>) coupled with a linear reservoir model for the tidal basin. Model scenarios included pulse releases at S-79 ranging from 0 to 1500 cfs and steady releases at 2,000 and 3,000 cfs with estimated tidal basin inflows of 1,571 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 0.8 or lower at Val I-75 at the end of the two-week period (**Table ES-3 and Figure ES-10**). This keeps predicted salinities at Val I-75 within the LORS 2008 salinity range (0.0-5.0).

### ***Red Tide***

The Florida Fish and Wildlife Research Institute reported on July 9, 2021, that *Karenia brevis*, the Florida red tide dinoflagellate, was observed at very low to low concentrations in Charlotte County, and low concentrations in Lee County. On the east coast, red tide was not observed in samples from St. Lucie, Martin, or Palm Beach counties.

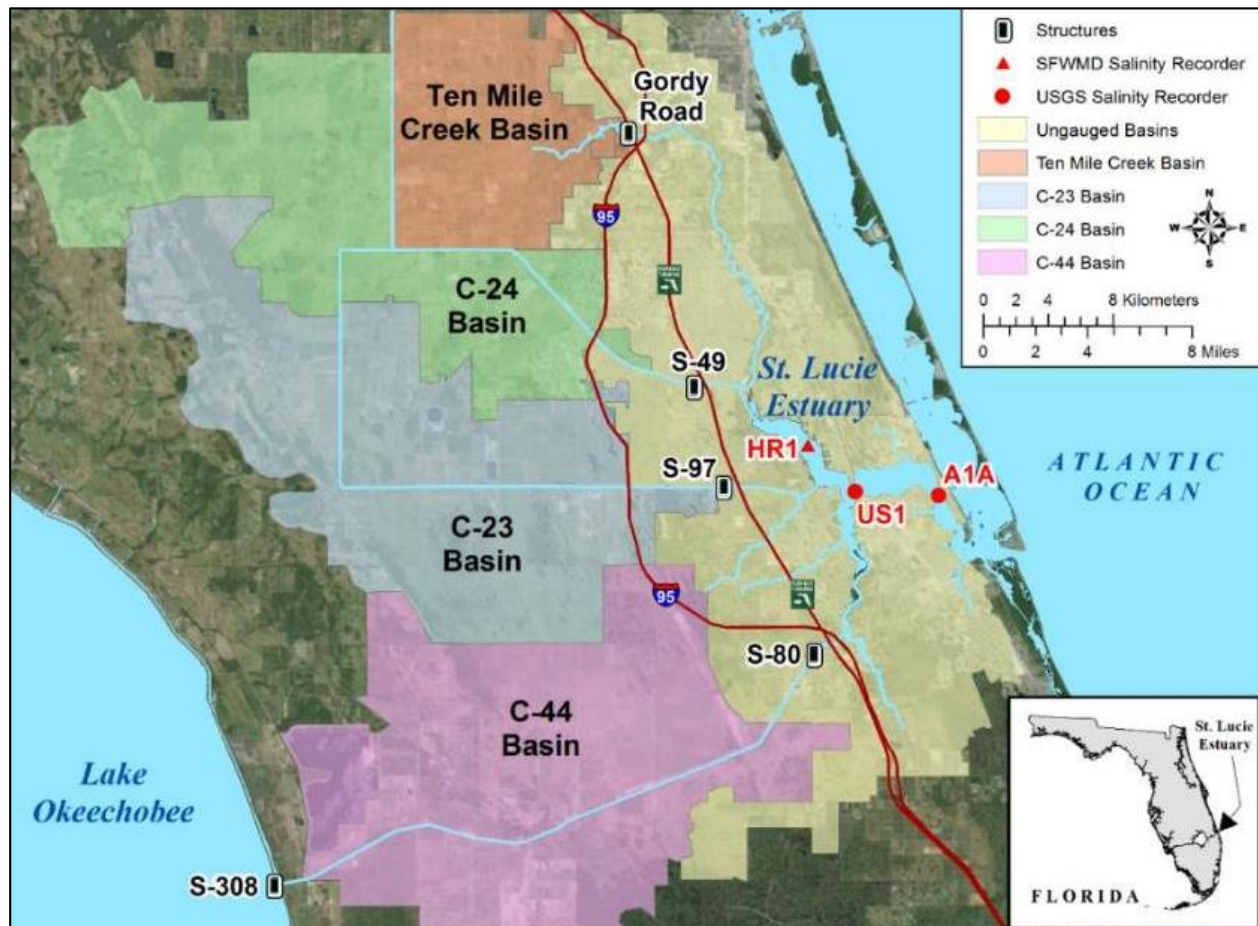
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<sup>1</sup> Qiu, C., and Y. Wan. 2013. Time series modeling and prediction of salinity in the Caloosahatchee River Estuary. *Water Resources Research* 49:5804-5816.

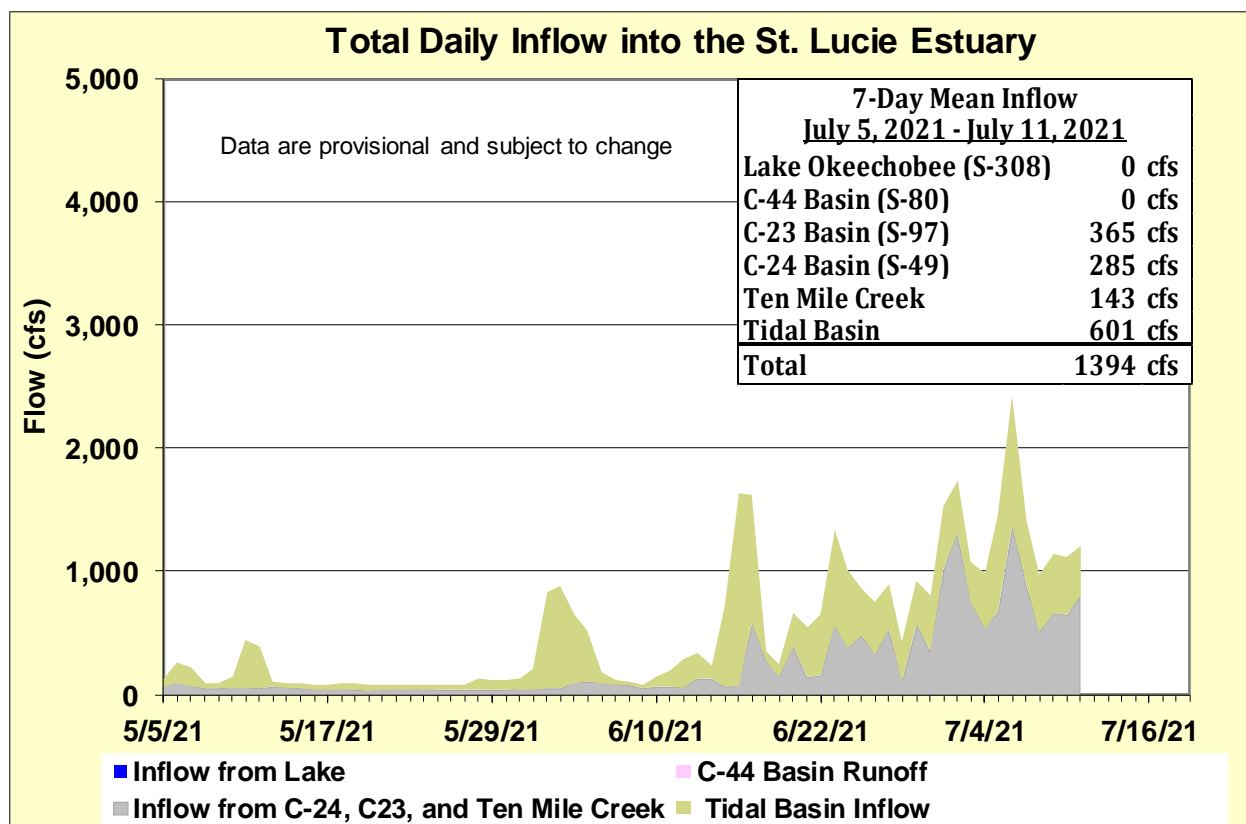


### **Water Management Recommendations**

Lake stage is in the Base Flow Sub-Band. Tributary conditions are Very Wet. The LORS2008 release guidance suggests up to 450 cfs release at S-79 to the Caloosahatchee River Estuary and up to 200 cfs release at S-80 to the St. Lucie Estuary.



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

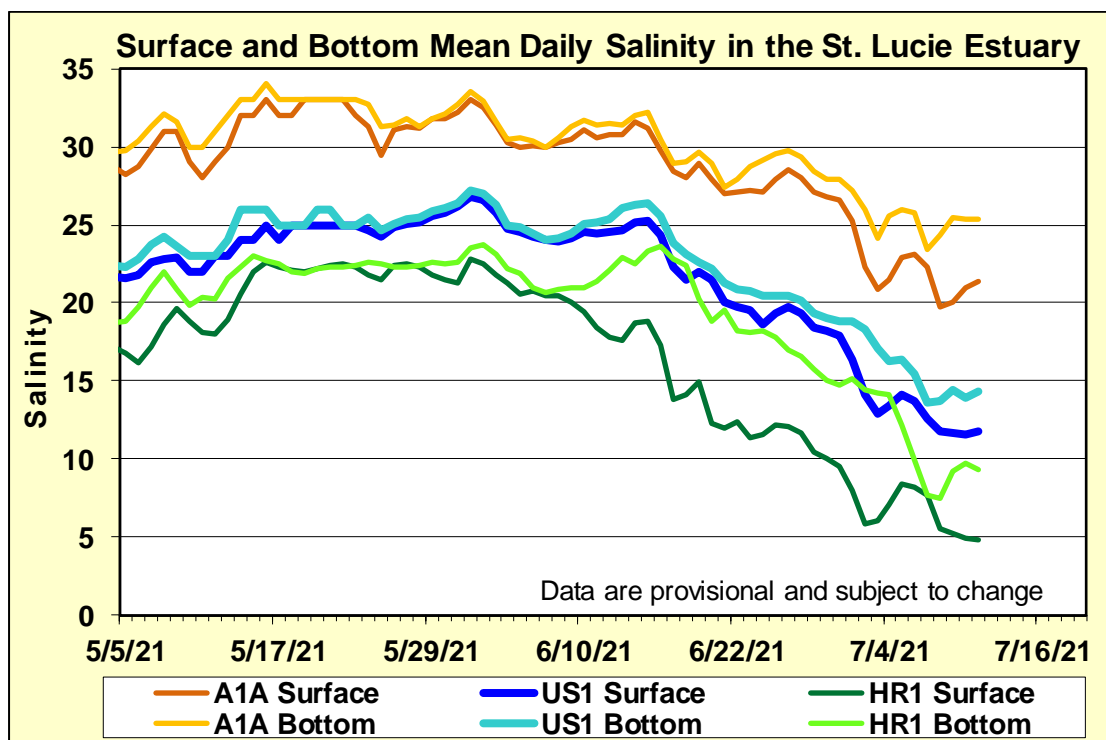


**Figure ES-2.** Total daily inflows from Lake Okeechobee and runoff from the C -44, C-23, C-24, Ten Mile Creek, and Tidal Basins into the St. Lucie Estuary.

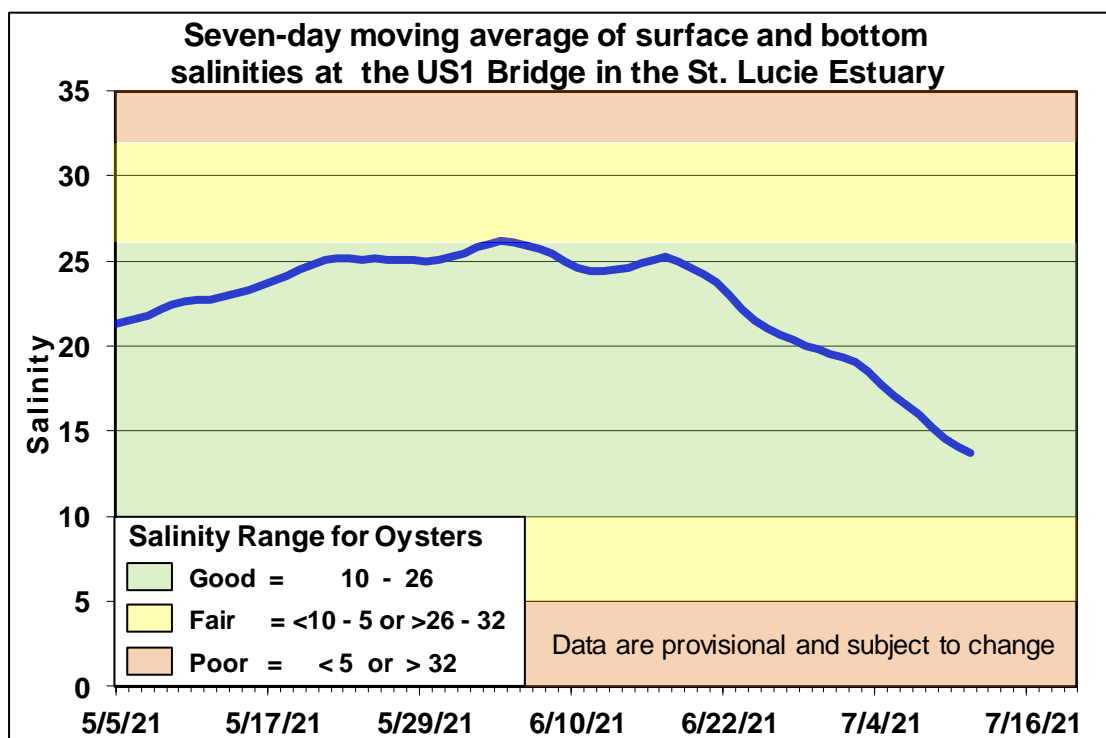
**Table ES-1.** Seven-day mean salinity at oyster monitoring sites in the St. Lucie Estuary. Current means are in bold font; previous week's means are in parentheses. The envelope reflects the preferred salinity range for adult eastern oysters (*Crassostrea virginica*) in the middle estuary. Data are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

Sampling Site	Surface	Bottom	Envelope
HR1 (Nork Fork)	<b>6.4</b> (8.1)	<b>9.4</b> (14.8)	NA <sup>a</sup>
US1 Bridge	<b>12.5</b> (15.9)	<b>14.5</b> (18.2)	10.0 – 26.0
A1A Bridge	<b>21.5</b> (24.3)	<b>25.1</b> (26.7)	NA <sup>a</sup>

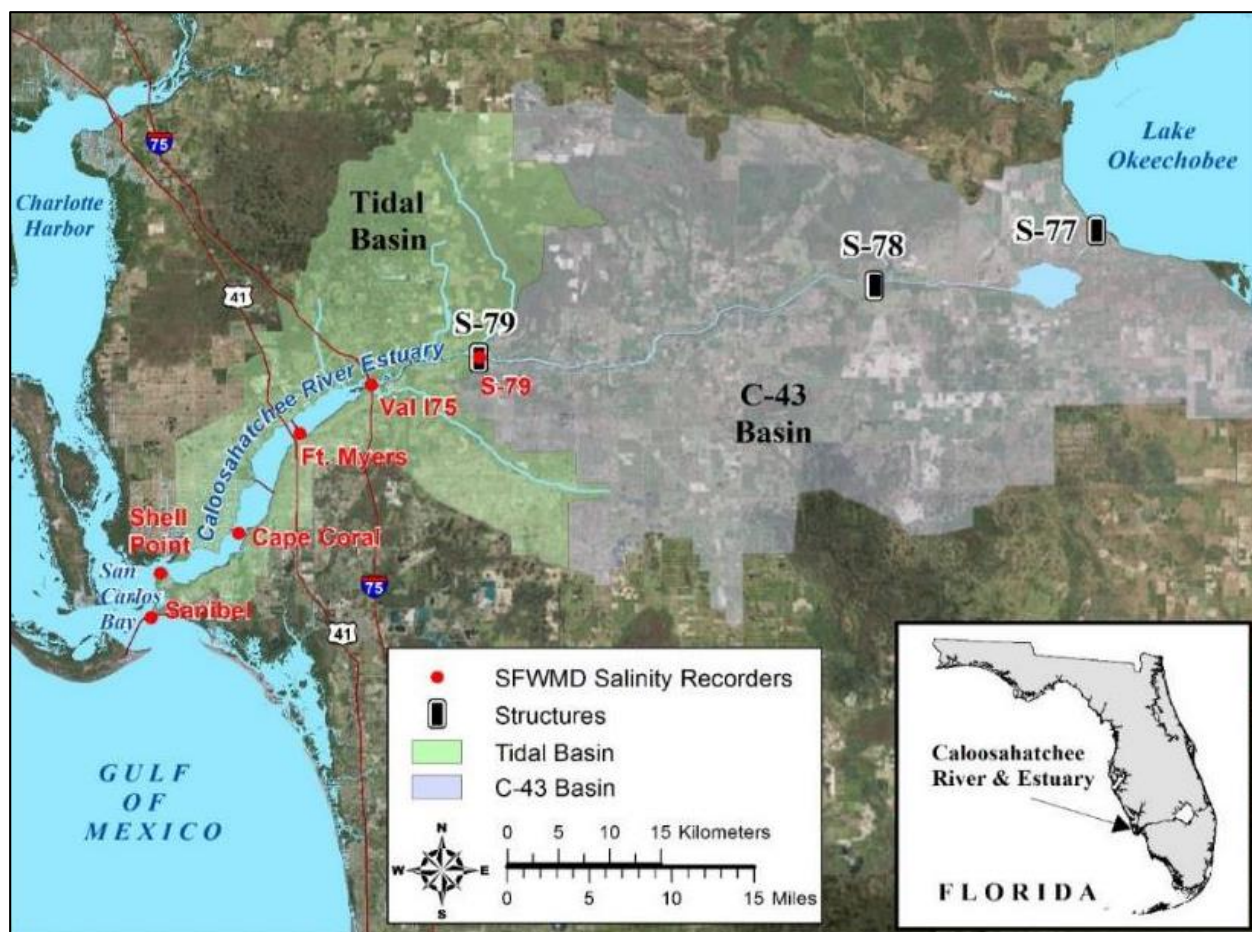
a. The envelope is not applicable.



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

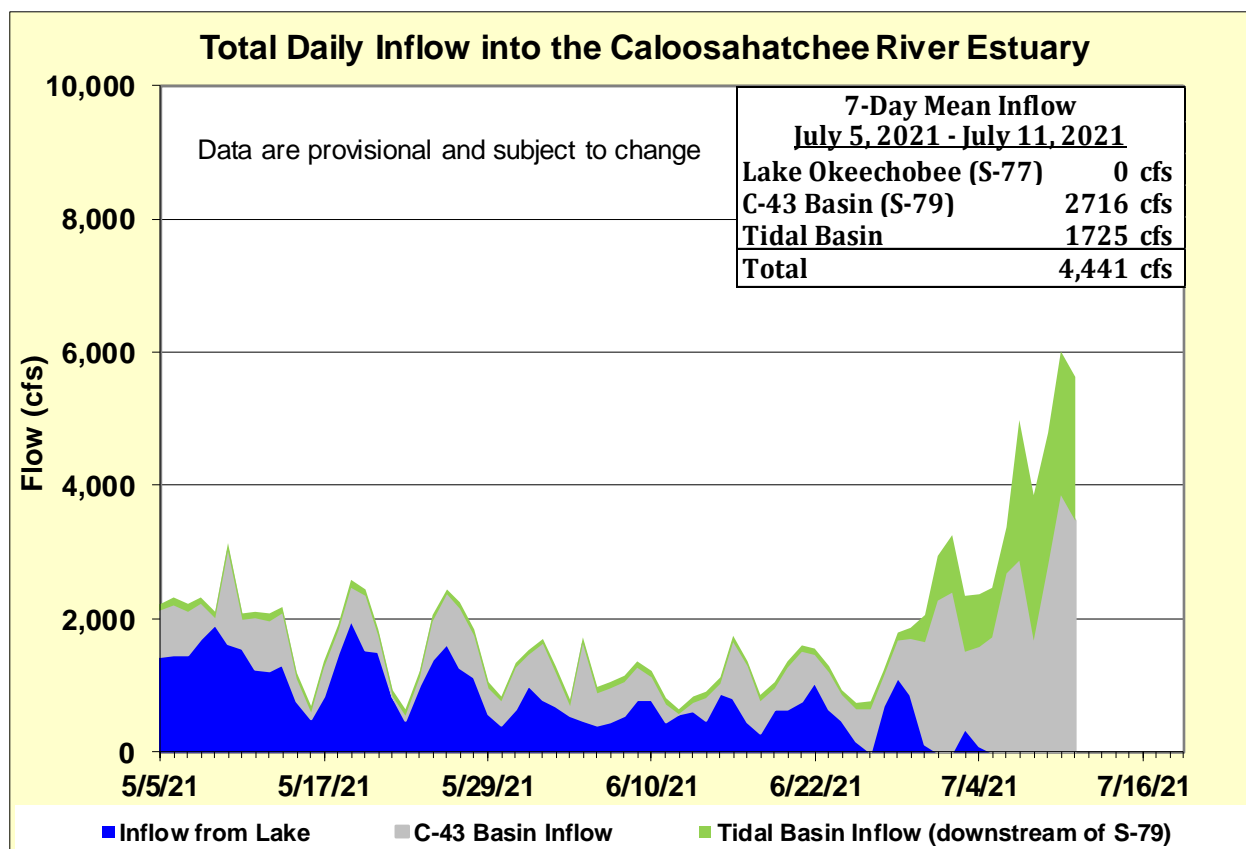


**Figure ES-4.** Seven-day moving average of the surface and bottom salinities at the US1 Bridge in the St. Lucie Estuary.



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





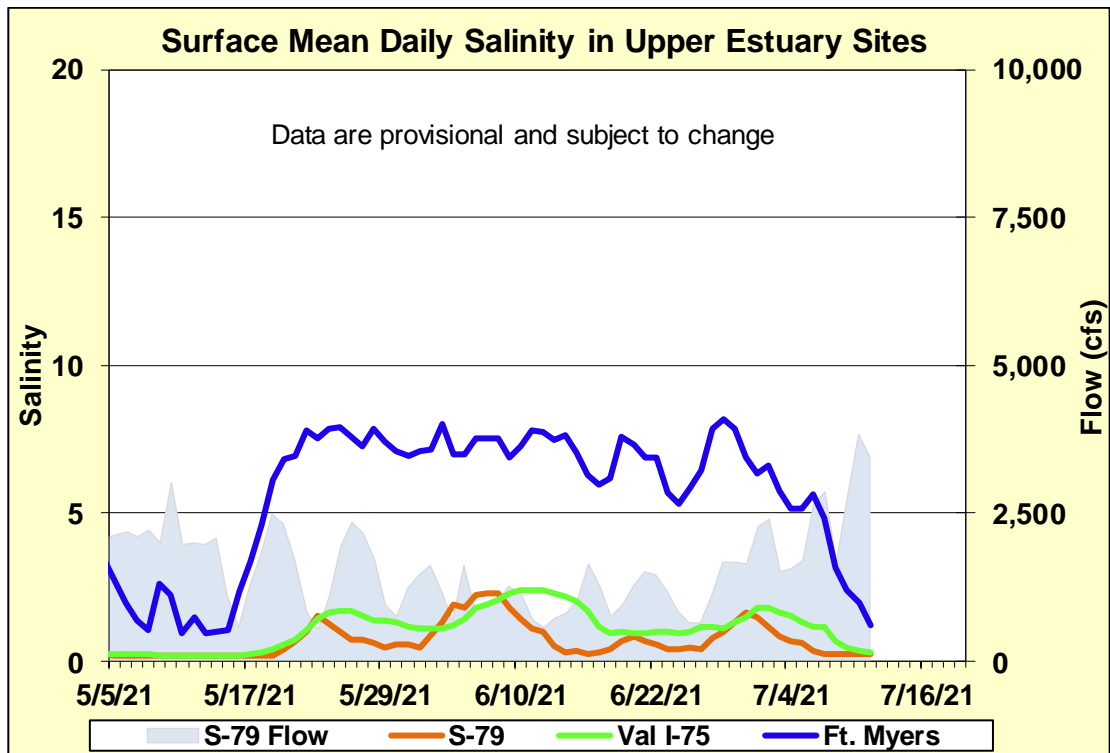
**Figure ES-6.** Total daily inflows from Lake Okeechobee, and runoff from the C-43 and Tidal basins into the Caloosahatchee River Estuary.

**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.

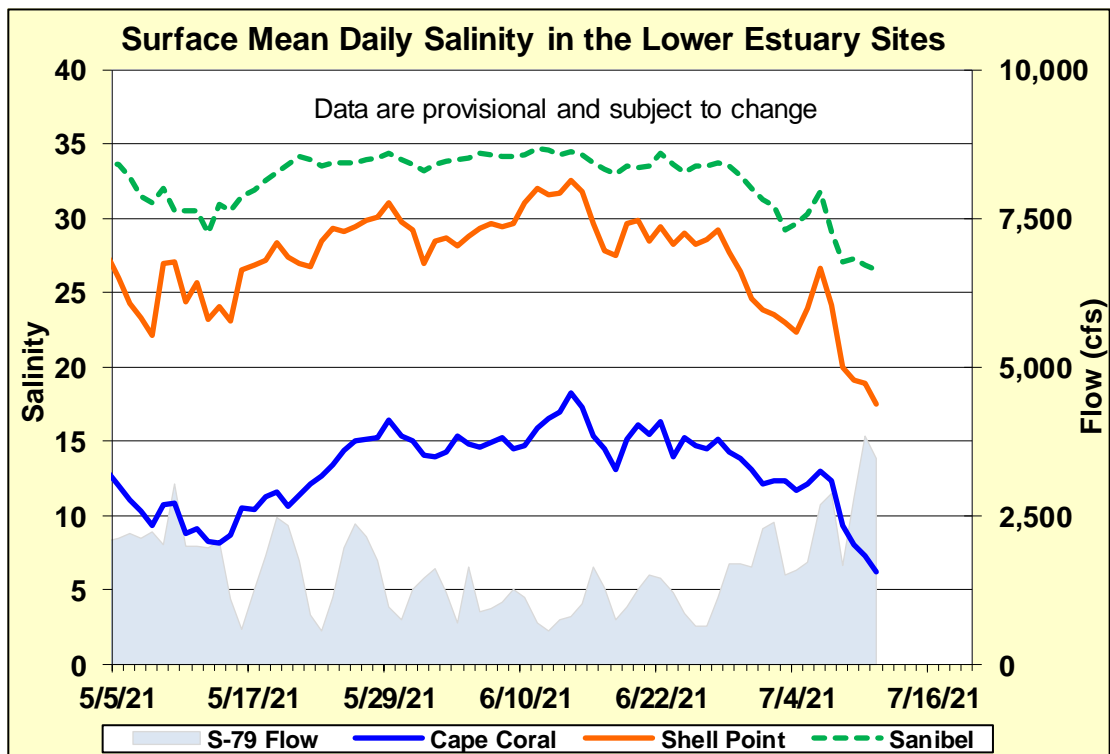
Sampling Site	Surface	Bottom	Envelope
S-79 (Franklin Lock)	<b>0.3</b> (1.2)	<b>0.3</b> (1.2)	NA <sup>a</sup>
Val I-75	<b>0.8</b> (1.5)	<b>0.9</b> (2.5)	0.0 – 5.0 <sup>b</sup>
Fort Myers Yacht Basin	<b>3.5</b> (6.7)	<b>8.3</b> (11.0)	NA <sup>a</sup>
Cape Coral	<b>9.8</b> (12.8)	<b>10.7</b> (14.9)	10.0 – 30.0
Shell Point	<b>21.5</b> (24.5)	<b>23.4</b> (25.7)	10.0 – 30.0
Sanibel	<b>28.4</b> (31.3)	<b>29.5</b> (32.4)	10.0 – 30.0

a. The envelope is not applicable.

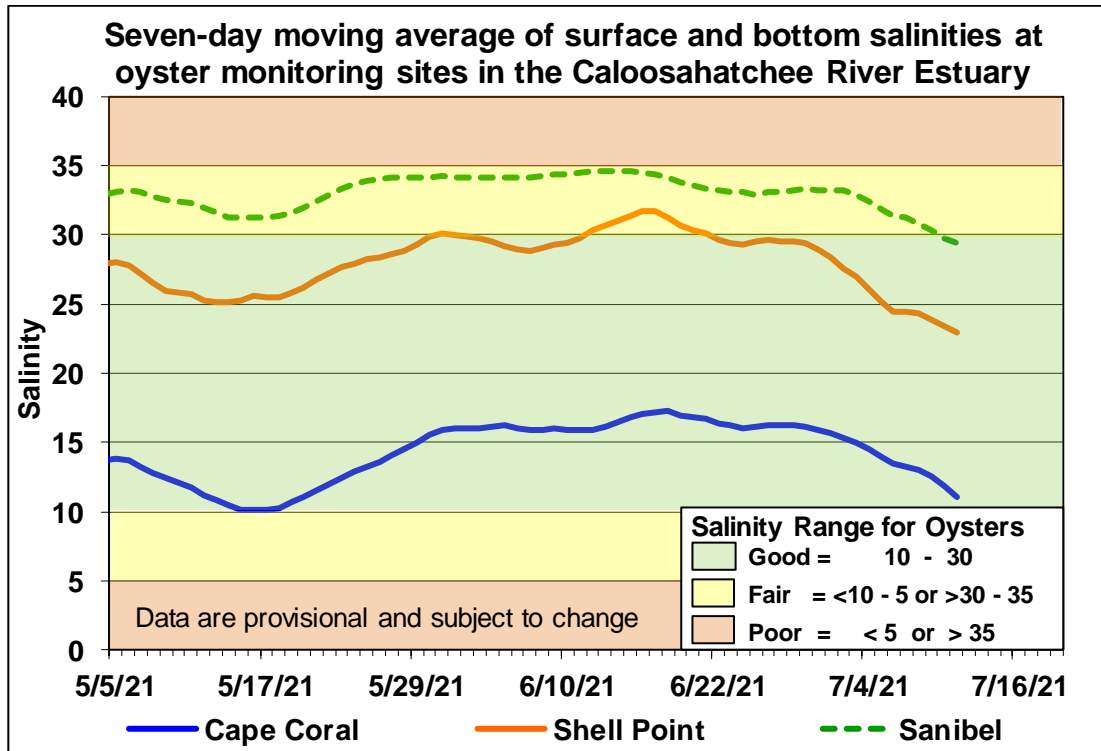
b. The envelope is based on the predicted 30-day mean for the next two weeks.



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



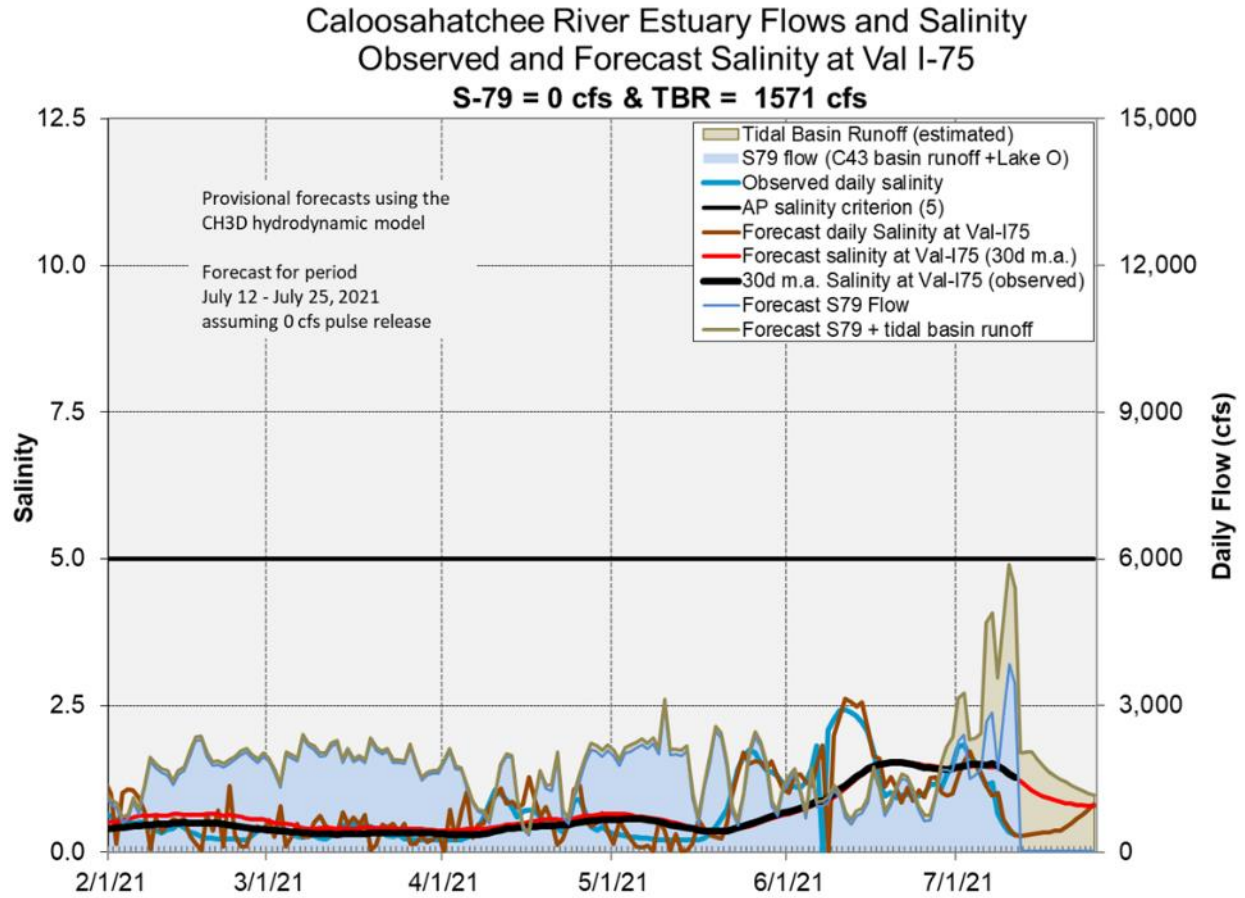
**Figure ES-8.** Mean daily surface salinity at lower Caloosahatchee River Estuary monitoring sites and mean daily flow at S-79.



**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	1571	0.8	0.8
B	450	1571	0.4	0.7
C	800	1571	0.3	0.7
D	1000	1571	0.3	0.7
E	1500	1571	0.3	0.7
F	2000	1571	0.3	0.7



**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**).

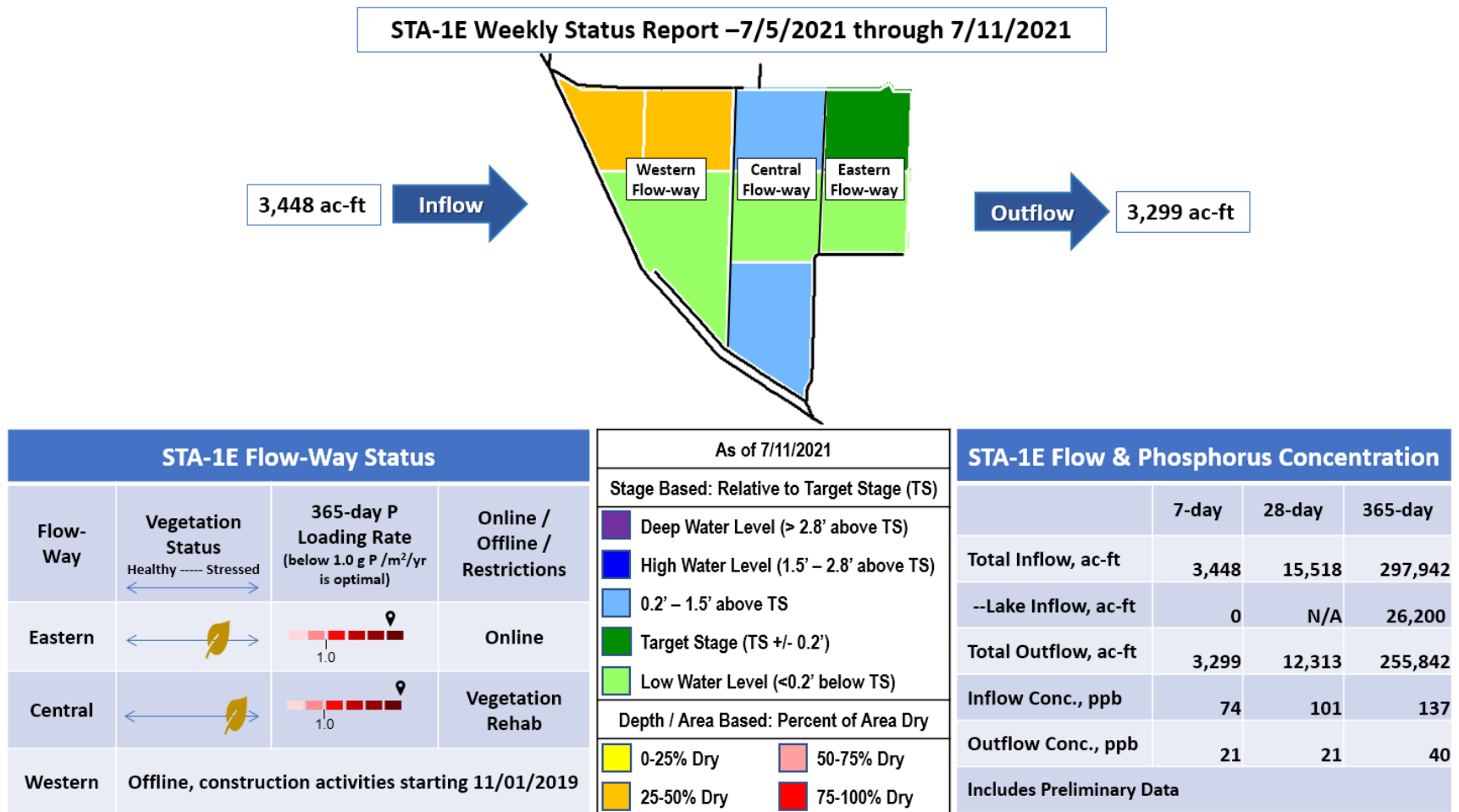
**STA-1W:** Operational restrictions are in place in STA-1W Western, Eastern, and Northern Flow-ways due to construction activities. Most treatment cells are at or near target stage. Vegetation in the flow-ways is stressed and highly stressed. The 365-day PLRs for all flow-ways are high (**Figure S-2**).

**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 the flow-ways are at or below 1.0 g/m<sup>2</sup>/year except Flow-ways 1 and 3 which are high and Flow-way 2 which 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**).

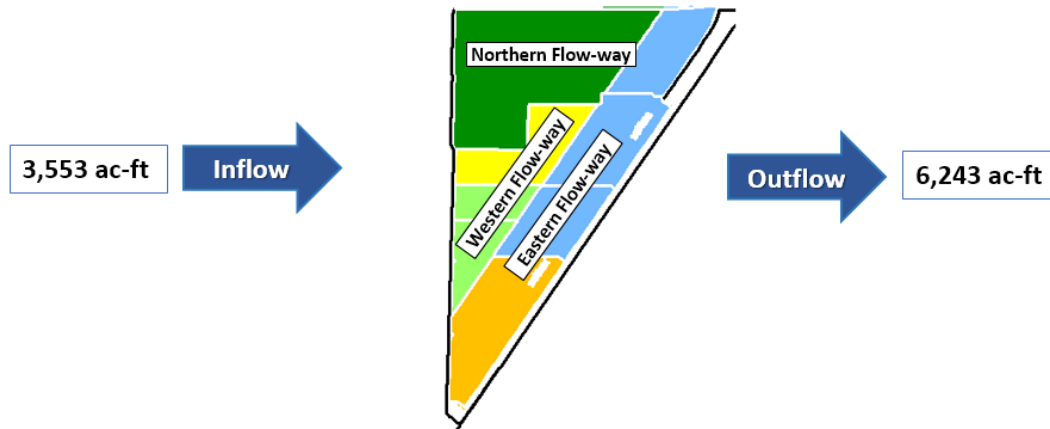
**STA-5/6:** Operational restrictions are in place in STA-5/6 Flow-ways 2 and 3 following the Restoration Strategies project to grade non-effective treatment areas. Several treatment cells are at or near target stage while some cells are drying out. The 365-day PLRs for most flow-ways are near 1.0 g/m<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 – 7/5/2021 through 7/11/2021













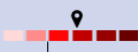







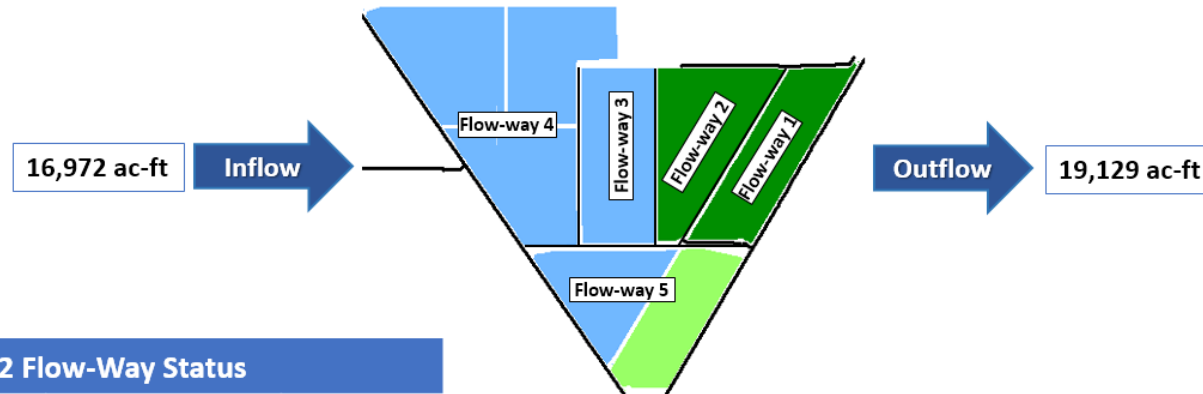
STA-1W Flow-Way Status				STA-1W Flow & Phosphorus Concentration						
Flow-Way	Vegetation Status <small>Healthy --- Stressed</small>	365-day P Loading Rate <small>(below 1.0 g P / m<sup>2</sup>/yr is optimal)</small>	Online / Offline / Restrictions	As of 7/11/2021						
				Stage Based: Relative to Target Stage (TS)						
Northern			Construction	 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')						
Western			Construction	 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		
Eastern			Construction	Includes Preliminary Data						
				Total Inflow, ac-ft						
				--Lake Inflow, ac-ft						
				Total Outflow, ac-ft						
Inflow Conc., ppb				Inflow Conc., ppb						
Outflow Conc., ppb				Outflow Conc., ppb						

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

### STA-2 Weekly Status Report – 7/5/2021 through 7/11/2021



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

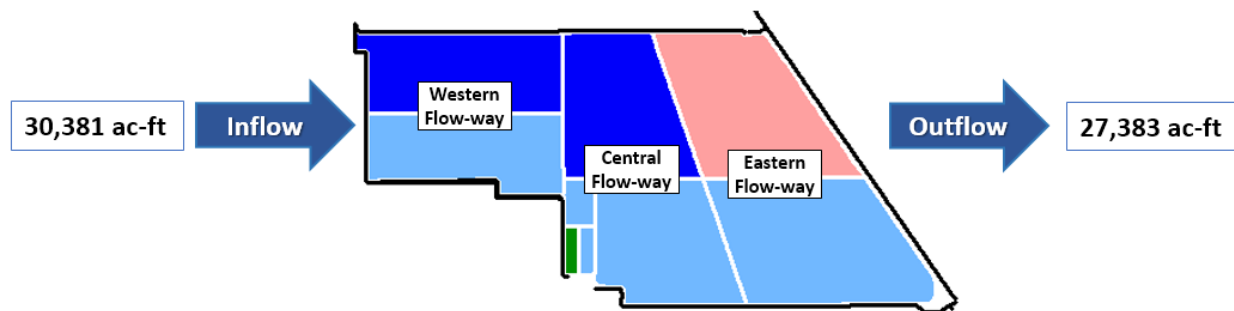
As of 7/11/2021	
Stage Based: Relative to Target Stage (TS)	
	Deep Water Level (> 2.8' above TS)
	High Water Level (1.5' – 2.8' above TS)
	0.2' – 1.5' above TS
	Target Stage (TS +/- 0.2')
	Low Water Level (<0.2' below TS)
Depth / Area Based: Percent of Area Dry	
	0-25% Dry
	25-50% Dry
	50-75% Dry
	75-100% Dry

STA-2 Flow & Phosphorus Concentration			
	7-day	28-day	365-day
Total Inflow, ac-ft	16,972	55,280	431,628
--Lake Inflow, ac-ft	0	N/A	90,300
Total Outflow, ac-ft	19,129	59,894	473,293
Inflow Conc., ppb	131	108	95
Outflow Conc., ppb	12	15	20
Includes Preliminary Data			

Figure S-3. STA-2 Weekly Status Report



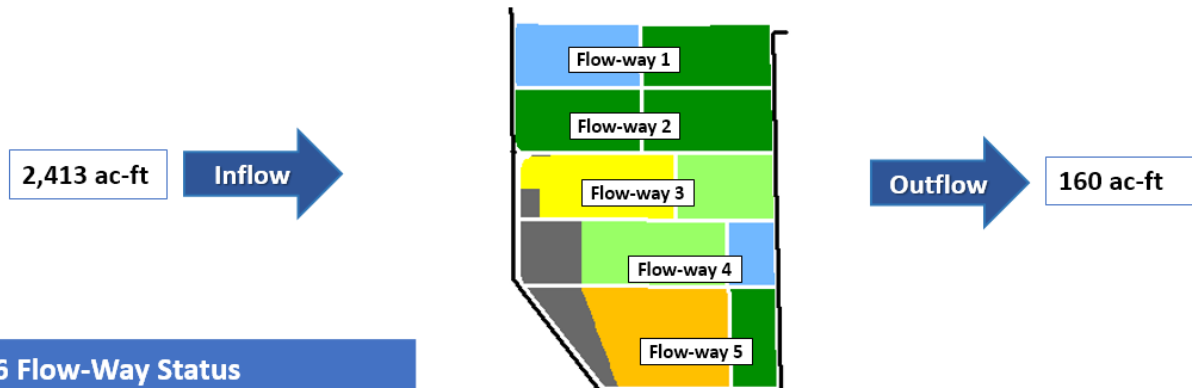
STA-3/4 Weekly Status Report – 7/5/2021 through 7/11/2021



STA-3/4 Flow-Way Status				As of 7/11/2021				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	30,381	94,938	571,614
Central			Online	High Water Level (1.5' – 2.8' above TS)				--Lake Inflow, ac-ft	0	N/A	61,400
Western			Online	0.2' – 1.5' above TS				Total Outflow, ac-ft	27,383	76,407	516,707
				Target Stage (TS +/- 0.2')				Inflow Conc., ppb	74	60	56
				Low Water Level (<0.2' below TS)				Outflow Conc., ppb	15	19	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 – 7/5/2021 through 7/11/2021



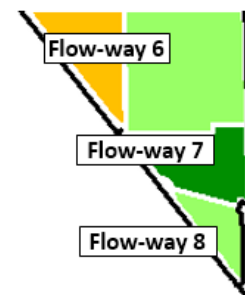
STA-5/6 Flow-Way Status			
Flow-Way	Vegetation Status Healthy ----- Stressed	365-day P Loading Rate (below 1.0 g P / m <sup>2</sup> /yr is optimal)	Online / Offline / Restrictions
1	← →		Online
2	← →	N/A	Post-construction
3	← →	N/A	Post-construction
4	← →		Online
5	← →		Online







As of 7/11/2021	
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	2,413	3,102	116,098
--Lake Inflow, ac-ft	N/A	N/A	N/A
Total Outflow, ac-ft	160	161	143,282
Inflow Conc., ppb	117	130	276
Outflow Conc., ppb	17	17	74
Includes Preliminary Data			

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

## STA-5/6 Weekly Status Report – 7/5/2021 through 7/11/2021



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
6	↔ 		Online
7	 ↔		Online
8	 ↔		Online

As of 7/11/2021	
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

**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 continued trending upwards last week (**Figure EV-1**). Stage on Monday (7/12) was above the now rising Zone A1 regulation line by 0.37 feet. WCA-2A: Stage at 2A-17 continued increasing last week (**Figure EV-2**) and ended the week at 1.22 feet above the rising leg of the regulation line. WCA-3A: The three-gauge average rose a little faster than the slope of the Zone A regulation line last week (**Figure EV-3**). Stage ended the week at 0.83 feet below the rising Zone A line. WCA-3A: Stage at gauge 62 (Northwest corner) increased rapidly again last week (**Figure EV-4**). The Monday (7/12) average was 0.32 feet below the rising Upper Schedule.

### ***Water Depths***

The WDAT indicates that water levels continue to rise across the Everglades Protection Area. Northeastern WCA-3A is still dry and in need of water as the wet season started late. North to South hydrologic connectivity is present in Shark River Slough (SRS) 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**). Comparing WDAT water levels from present to last month, stages increased in most places (**Figure EV-6**). The largest increases occurred on the western side of the Everglades Protection Area. Compared to a year ago, WCA-3 is significantly drier, especially in eastern WCA-3A. ENP also continues to be drier than a year ago, while WCA-2A is wetter. Compared to the 20-year average water depths, one notably wetter area is northeastern ENP near Tamiami Trail, which is due to modified operations and infrastructure improvements to increase flow (**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 (7/11) with the largest volume over western Florida Bay again. Stage increased by an average of 0.01 feet over the week with only small changes throughout the Slough (**Figure EV-8 & Figure EV-9**). Depths are averaging 2.5 inches lower than the historical average for this time of year with southwestern Taylor Slough (CP) being the furthest from average at 5 inches below. Total phosphorus levels at the westernmost structures (S-328 and G-737) rose slightly, with a maximum of 35 µg/L; well above the 8 µg/L threshold needed to begin moving water towards Everglades National Park.

Salinities in Florida Bay averaged a decrease of one for the week ending 7/11, but individual stations had weekly changes ranging from -3.1 to +0.4 (**Figure EV-8**). The only station to increase in salinity was Buoy Key (BK) despite the relatively high rainfall at this site last week (4 inches). Freshwater deliveries will still be needed to freshen the nearshore area, but conditions are staying near average out in the Bay (**Figure EV-10**).

Florida Bay MFL: The TR station in the mangrove zone (tracked for the Florida Bay MFL) peaked near 16 before decreasing to 13 over the week ending 7/11, and the 30-day moving average decreased 1.1 to end at 16.3 (**Figure EV-11**). Weekly flow from the 5 creeks monitored for the Florida Bay MFL totaled about 1,300 acre-feet with small positive

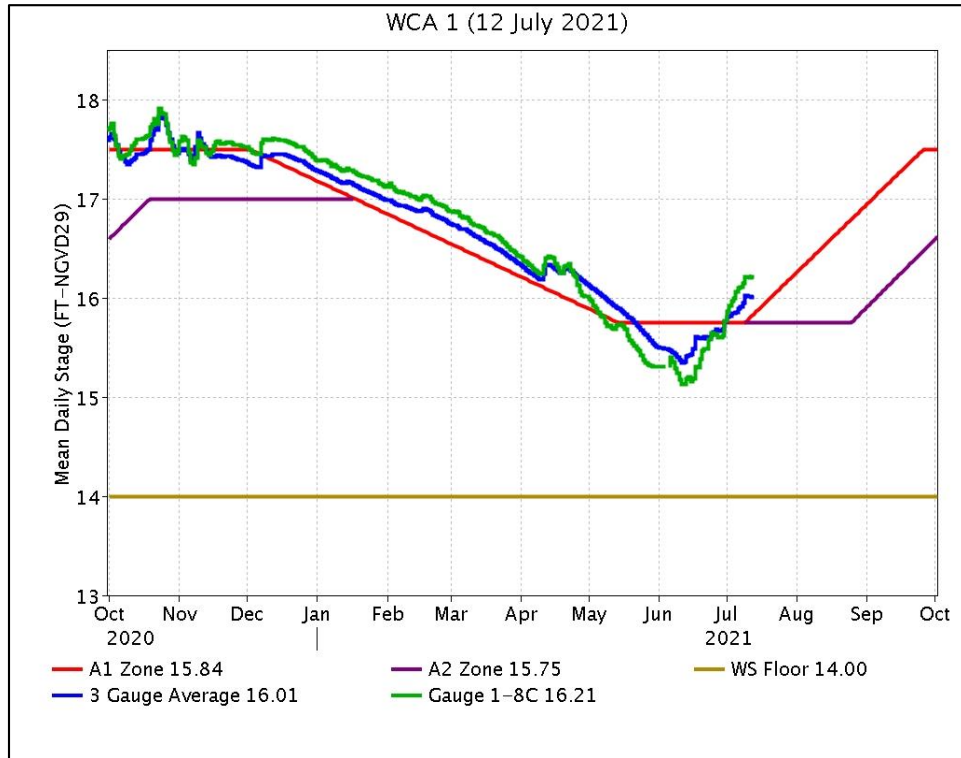
flows persisting for 5 of the 7 days last week (see inset on **Figure EV-11**). The 365-day moving sum of flow from the five creeks (tracked as part of the Florida Bay MFL criteria) decreased 2,000 acre-feet over the week to end at 395,042 acre-feet on Sunday, 7/11. The 365-day cumulative flow is hovering near the 95<sup>th</sup> percentile of historical data (390,830 acre-feet). Creek flows are provisional USGS data.

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

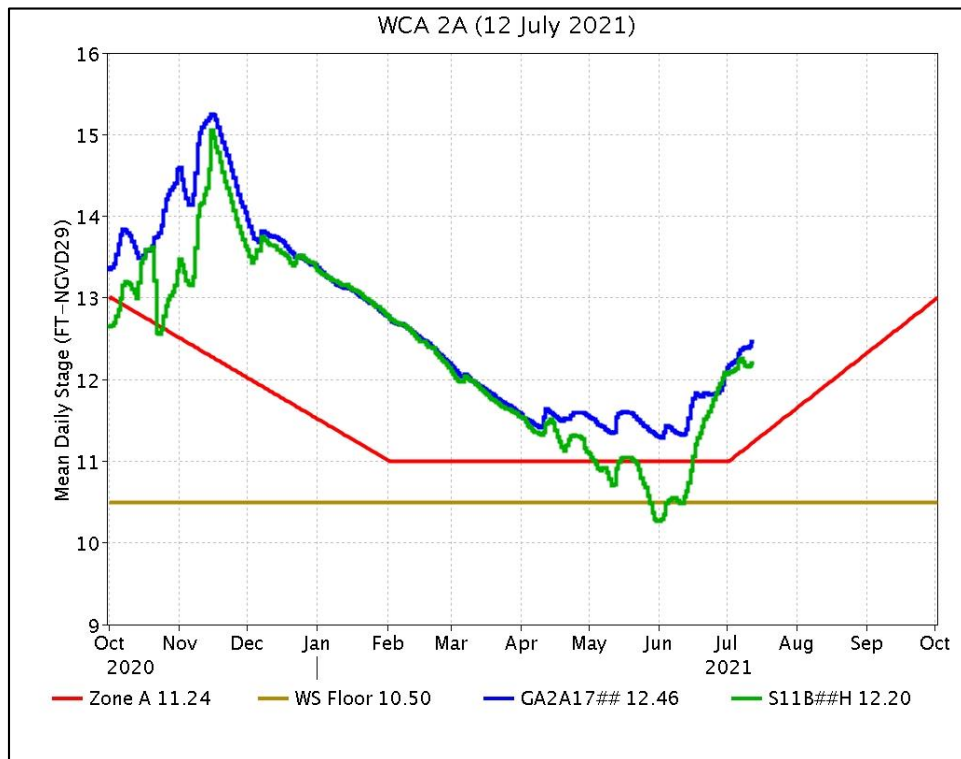
Ascension rates that do not exceed 0.25 feet per week or 0.50 feet per two weeks are considered ecologically healthy. Water deliveries into northern WCA-3A, with a focus on the northeastern region downstream of S-150 would be ecologically beneficial to the region. Rehydration of northern Taylor Slough has begun 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 8 µg/L 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.

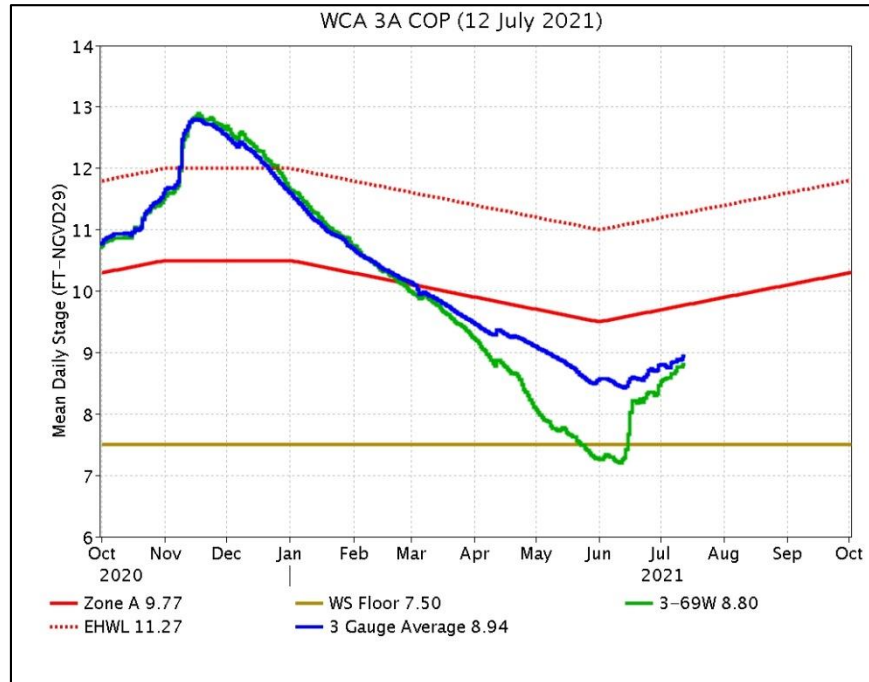
Everglades Region	Rainfall (inches)	Stage change (feet)
WCA-1	2.18	+0.16
WCA-2A	2.06	+0.21
WCA-2B	2.27	+0.09
WCA-3A	2.18	+0.17
WCA-3B	2.65	+0.15
ENP	1.39	+0.10



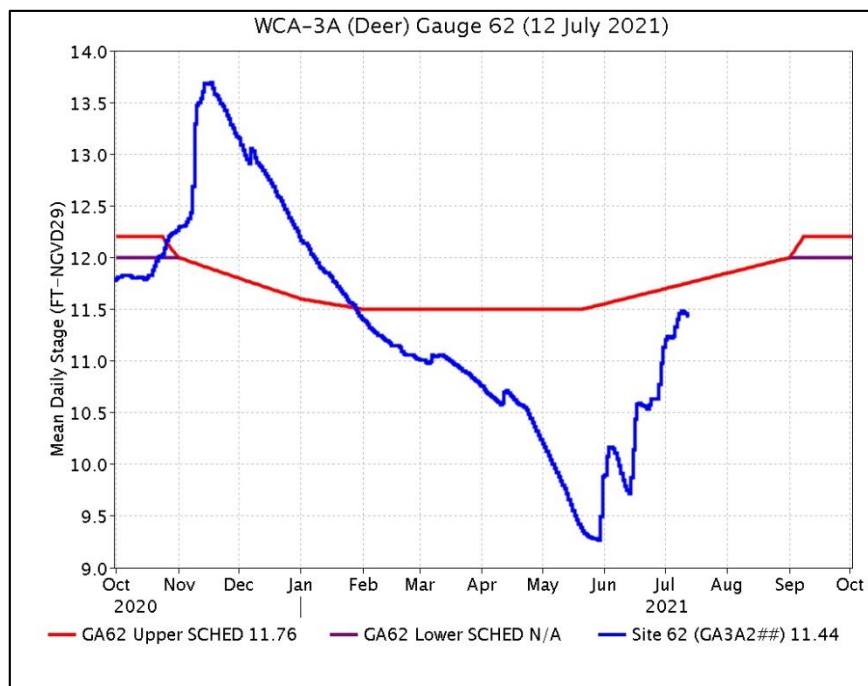
**Figure EV-1.** WCA-1 stage hydrographs and regulation schedule.



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

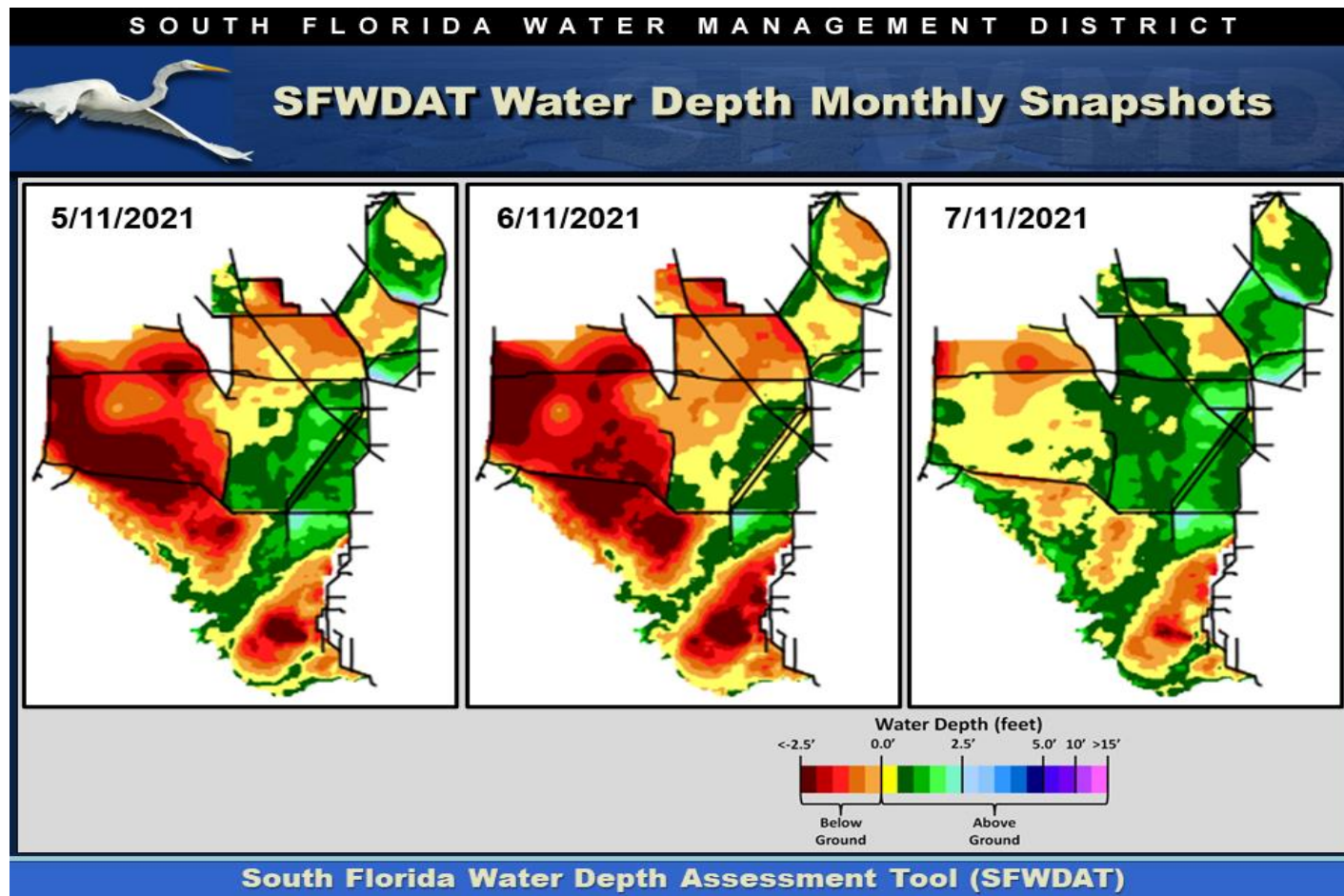


**Figure EV-3.** WCA-3A stage hydrographs (three-gauge average, S-333 headwater) and regulation schedule.

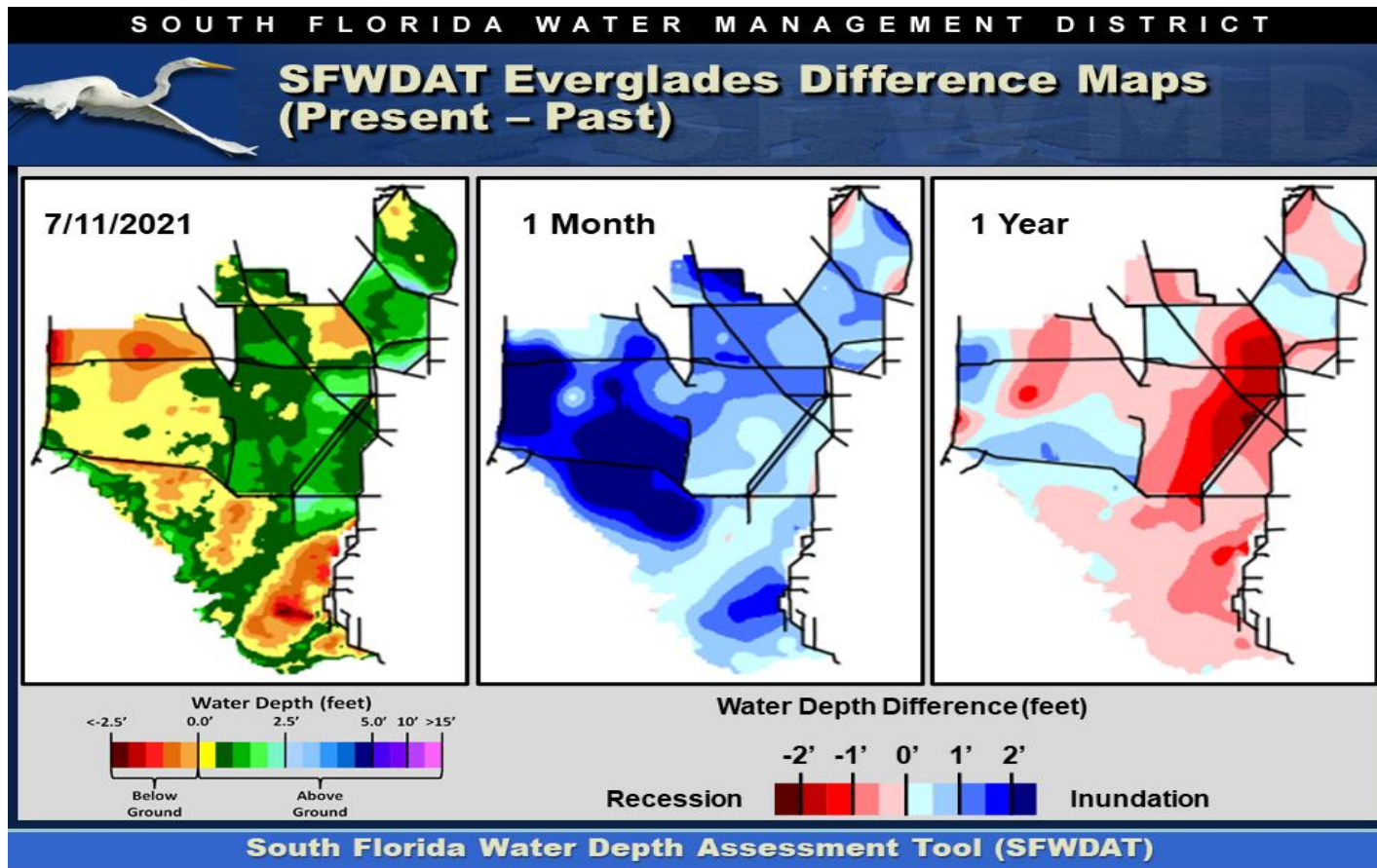


**Figure EV-4.** WCA-3A stage hydrograph (Deer gauge; Site 62) and GA62 regulation schedule.

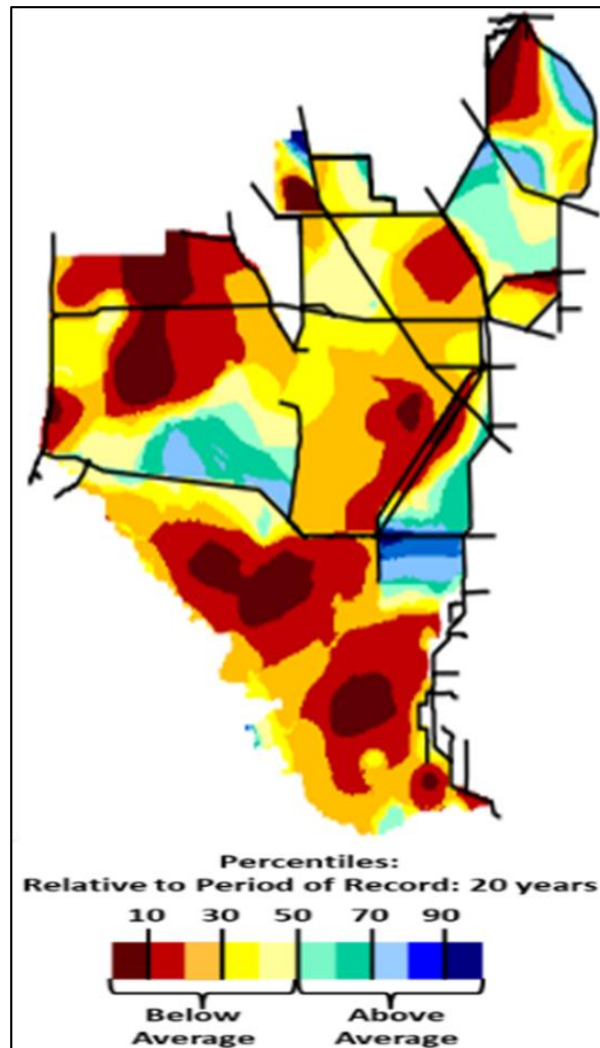




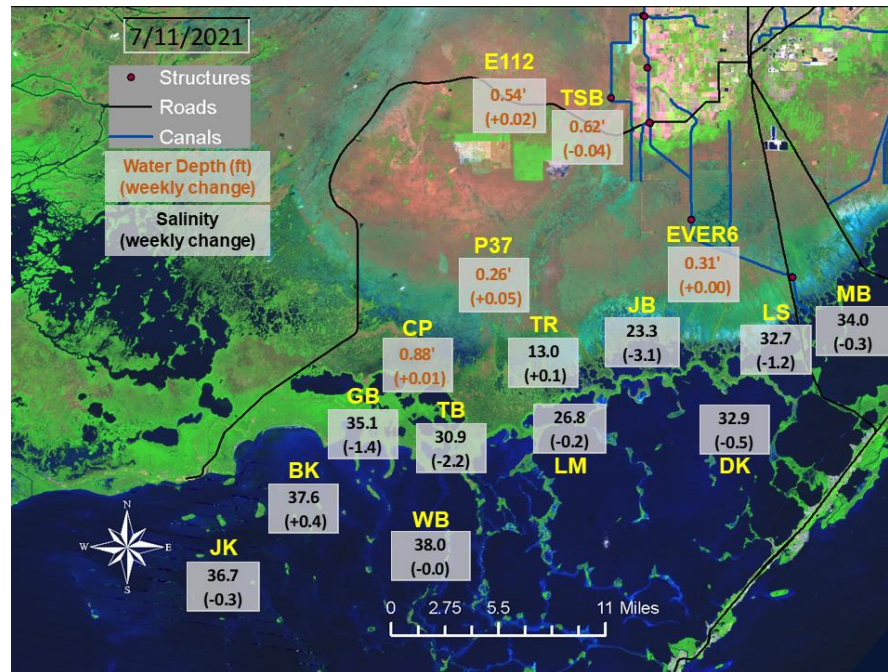
**Figure EV-5.** Everglades water depths from two months ago (left), one month ago (center) and present (right), based on SFWDAT.



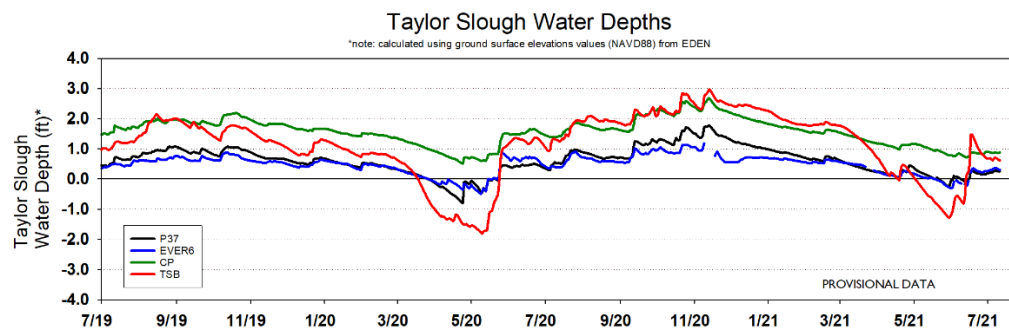
**Figure EV-6.** Present Everglades water depths (left) and water depth changes from one month (center) and one year (right) ago , based on SFWDAT.



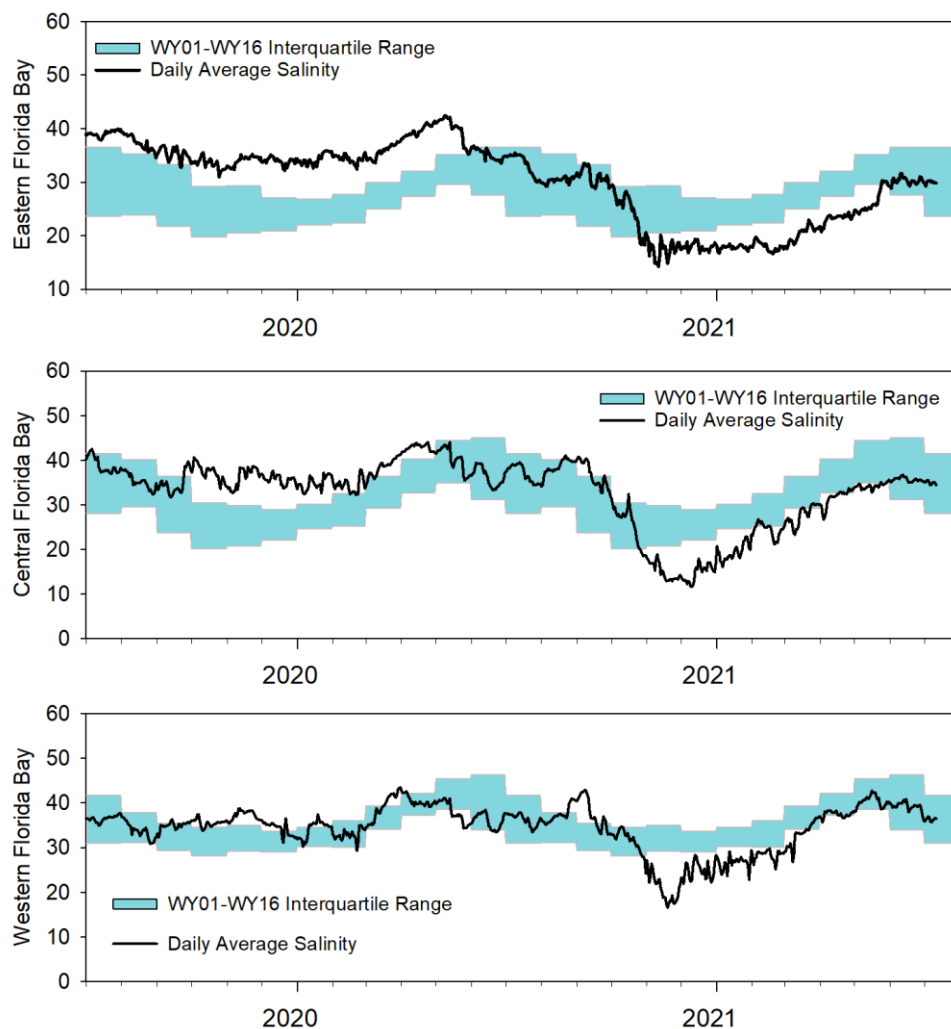
**Figure EV-7.** Present water depths compared to the day of year average over the previous 20 years.



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

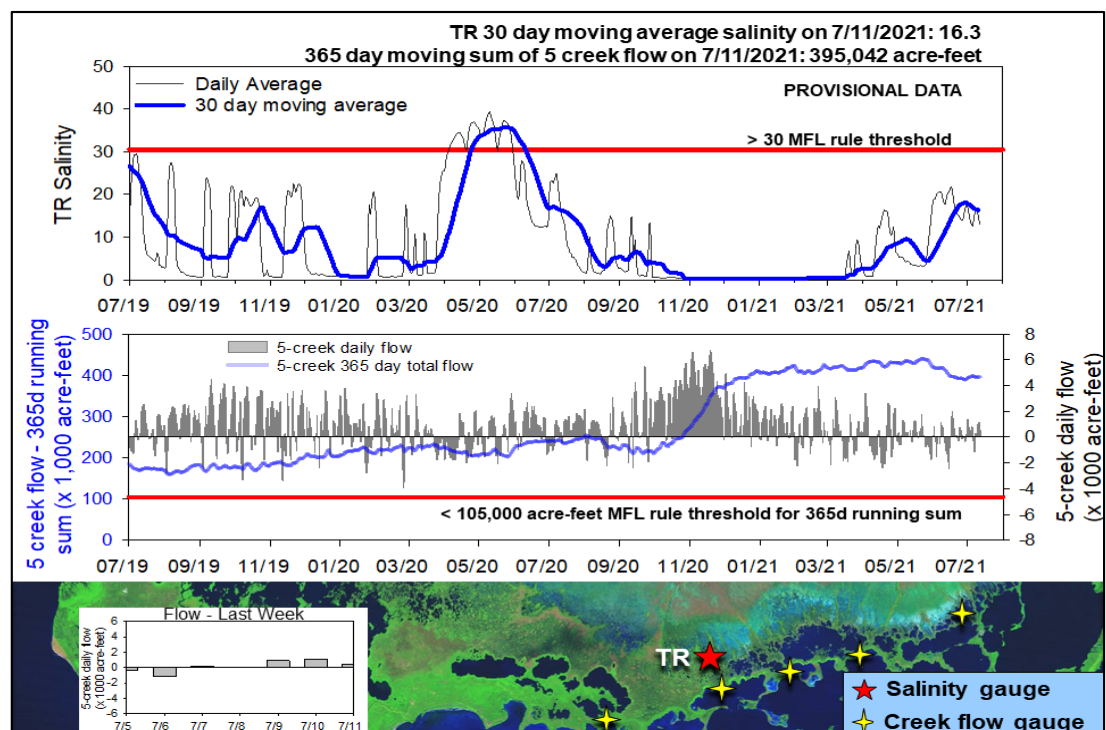


**Figure EV-9.** Taylor Slough water depth time series.



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





**Figure EV-11.** Top panel: Taylor River 30-day moving average salinity (blue), daily average salinity (gray) with salinity threshold; middle panel: Five-creek total flow for past 365 days (blue), daily flow (gray) with 365-day flow threshold; bottom panel: map of monitoring locations for the five creeks.

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

<b>SFWMD Everglades Ecological Recommendations, July 13th, 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. Protect wading bird foraging.
<b>WCA-2A</b>	Stage increased by 0.21'	Maintain 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 increased by 0.09'	Maintain ascension rate to between 0.01 and 0.25 feet per week	Protect within basin wading bird foraging.
<b>WCA-3A NE</b>	Stage increased by 0.09'	Maintain ascension rates between 0.01 and 0.25 feet per week	Protect within basin habitat and wildlife. Inflows and rehydration preserve peat soils and prevents wildfire.
<b>WCA-3A NW</b>	Stage increased by 0.23	Maintain ascension rate to between 0.01 and 0.25 feet per week	
<b>Central WCA-3A S</b>	Stage increased by 0.17'	Moderate ascension rate to between 0.01 and 0.10 feet per week	Protect within basin wading bird foraging.
<b>Southern WCA-3A S</b>	Stage increased by 0.21'		
<b>WCA-3B</b>	Stage increased by 0.15'	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 0.10'	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.
<b>Taylor Slough</b>	Stage changes ranged -0.04' to +0.05'	Move water southward as possible.	When available, provide freshwater buffer for downstream conditions.
<b>FB- Salinity</b>	Salinity changes ranged -3.1 to +0.4	Move water southward as possible.	When available, provide freshwater to maintain low salinity buffer and promote water movement.