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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 7, 2021

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

Tropical Storm (TS) Elsa is expected to move northward just off the southwest coast of the District. Widespread areas of heavy rainfall will move over the southern half of the District with heaviest activity focused west. The areas of heavy rain will then spread over the northern portion of the District. Rains should decrease southeast but intermittent bands of heavy rain will continue to affect western and northern areas. As TS Elsa exits to the northeast across north Florida Wednesday, outer rain bands will bring some locally heavy thunderstorm activity mainly over the northern two-thirds of the District. Tropical storm conditions are forecast to affect the western portion of the District. Behind TS Elsa, daytime heating should then help generate daily thunderstorm activity Thursday through Saturday. An upper level low moving in from the east is forecast to initially suppress shower development Sunday and then enhance shower development, particularly south, Monday. Total rainfall is forecast to be above the historical average during the first 7-day period (Week 1) and then below the historical average during the second 7-day period.

Kissimmee

Flow at S-65A continues to be too low for extensive inundation of the Kissimmee River floodplain, and mean floodplain depth remains at 0.14 feet on July 4. Dissolved oxygen concentration in the Kissimmee River continued its recent decline to an average of 4.9 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 12.87 feet NGVD on July 4, 2021, 0.09 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, but have been near or within the upper threshold of the envelope (**Figure LO-2**), spending about a third of the time in the envelope since January 1, 2021. Recent satellite imagery (June 20, 2021) shows a medium to high bloom potential in central parts of the Lake.

Estuaries

Total inflow to the St. Lucie Estuary averaged approximately 1281 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 2,471 cfs over the past week with approximately 199 cfs coming from the Lake. Mean surface salinities increased at S-79 and Val I-75 and decreased at the remaining sites in the estuary over the past week. Salinities were in the good range (0-10) for tape grass at Val I-75 and Ft. Myers. Salinities were also in the good range (10-30) for adult eastern oysters at Cape Coral and Shell Point, and in the fair range at Sanibel.

Stormwater Treatment Areas

For the week ending Sunday, July 4, 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 184,000 ac-feet. Most STA cells are near or above target stage, with the exception of several cells in STA-5/6 that are drying out. 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, there is no capacity for Lake releases in the STAs.

Everglades

WCA-1: Stage at the 1-8C Gauge continued trending upwards last week and stage is currently above the Zone A1 regulation line by 0.25 feet. WCA-2A: Stage at S11B-HW continued trending upwards last week and is 1.04 feet above regulation. In WCA-3A, the three gauge average is approximating the slope of the Zone A regulation line and is 0.97 feet below Zone A line. Using preliminary estimates, 2021 looks to be the second largest nesting effort in the Everglades since the 1940s with greater than 80,000 total nests (**Figure EV-7**). Good post-fledging conditions are expected to support increased survival of the high number of fledglings which could possibly rival the production of birds from the 2018 breeding season even with fewer nests.

Supporting Information

Kissimmee Basin

Upper Kissimmee

On July 4, 2021, lake stages were 55.6 feet NGVD (0.9 feet below schedule) in East Lake Toho, 52.8 feet NGVD (0.7 feet below schedule) in Lake Toho, and 50.6 feet NGVD (0.4 feet below schedule) in Lakes Kissimmee-Cypress-Hatchineha (KCH) (**Table KB-1, Figures KB-1-3**).

Lower Kissimmee

Kissimmee River (headwater) stages were 46.1 feet NGVD at S-65A and 26.8 feet NGVD at S-65D on July 4, 2021, while discharges were 660 cfs at S-65, 890 cfs at S-65A, 920 cfs at S-65D and 1,010 cfs at S-65E (**Table KB-2**). Dissolved oxygen concentration in the Kissimmee River declined slightly with the increases in discharge but averaged 4.9 mg/L for the week ending on July 4, 2021, still well above the 2.0 mg/L threshold considered harmful to sportfish (**Figure KB-4**). Flow at S-65A remains too low for extensive inundation of the Kissimmee River floodplain, and mean floodplain depth remains at 0.14 feet on July 4, 2021 (**Figure KB-5**).

Water Management Recommendations

Hold stage in KCH flat or receding by increasing S-65 discharge without exceeding the USACE discharge limit of 900 cfs at S-65A. The objective is to protect recently completed construction in the Lower Basin by slowly increasing flow at S-65A over the next few weeks as possible, rather than allowing stage in KCH to rise. Continue to use the following recommendations: follow the USACE request to hold S-65A discharge below 800-900 cfs to protect recently-completed construction for the Kissimmee River Restoration Project; follow the recommended S-65A discharge rate of change limits (Table KB-3) when adjustments in discharge are made; limit ascension (stage rise) rates to 0.5 ft/14 days in East Lake Toho, Toho and KCH to the extent possible while maintaining the discharge rate of change limits; if lake stage begins to decline, attempt to limit the recession rate to a maximum of 0.18 ft/week.

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) ^a	Schedule Type ^b	Schedule Stage (feet NGVD)	Departure from Regulation (feet)	
							7/4/21	6/27/21
Lakes Hart and Mary Jane	S-62	LKMJ	172	60.0	R	60.0	0.0	0.1
Lakes Myrtle, Preston and Joel	S-57	S-57	2	60.8	R	61.0	-0.2	-0.6
Alligator Chain	S-60	ALLI	0	62.8	R	63.2	-0.4	-0.7
Lake Gentry	S-63	LKGT	0	60.3	R	61.0	-0.7	-1.0
East Lake Toho	S-59	TOHOE	411	55.6	R	56.5	-0.9	-1.0
Lake Toho	S-61	TOHOW S-61	1,284	52.8	R	53.5	-0.7	-0.8
Lakes Kissimmee, Cypress and Hatchineha	S-65	KUB011 LKIS5B	768	50.6	R	51.0	-0.4	-0.7

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

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

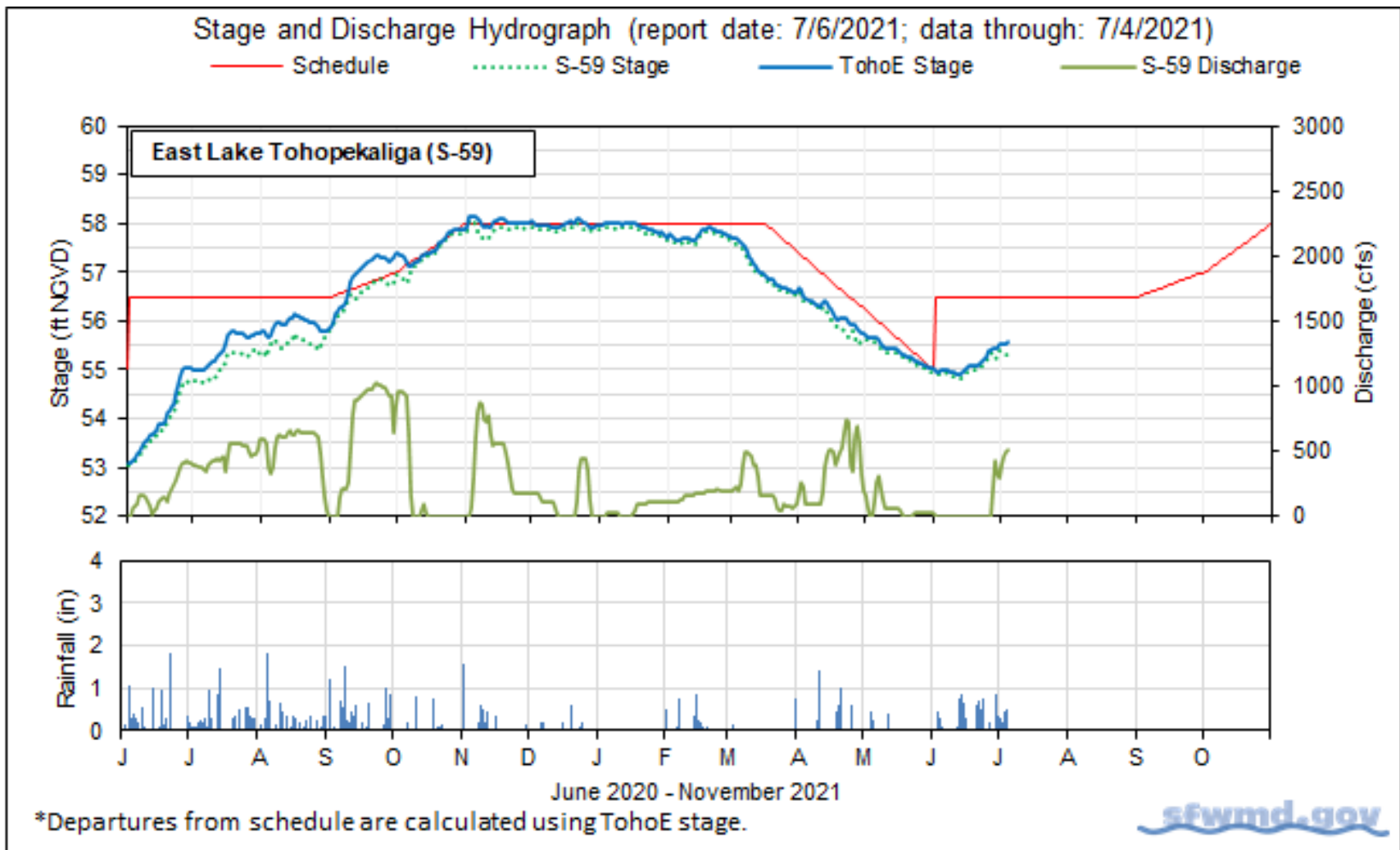


Figure KB-1. East Lake Toho regulation schedule, stage, discharge and rainfall.

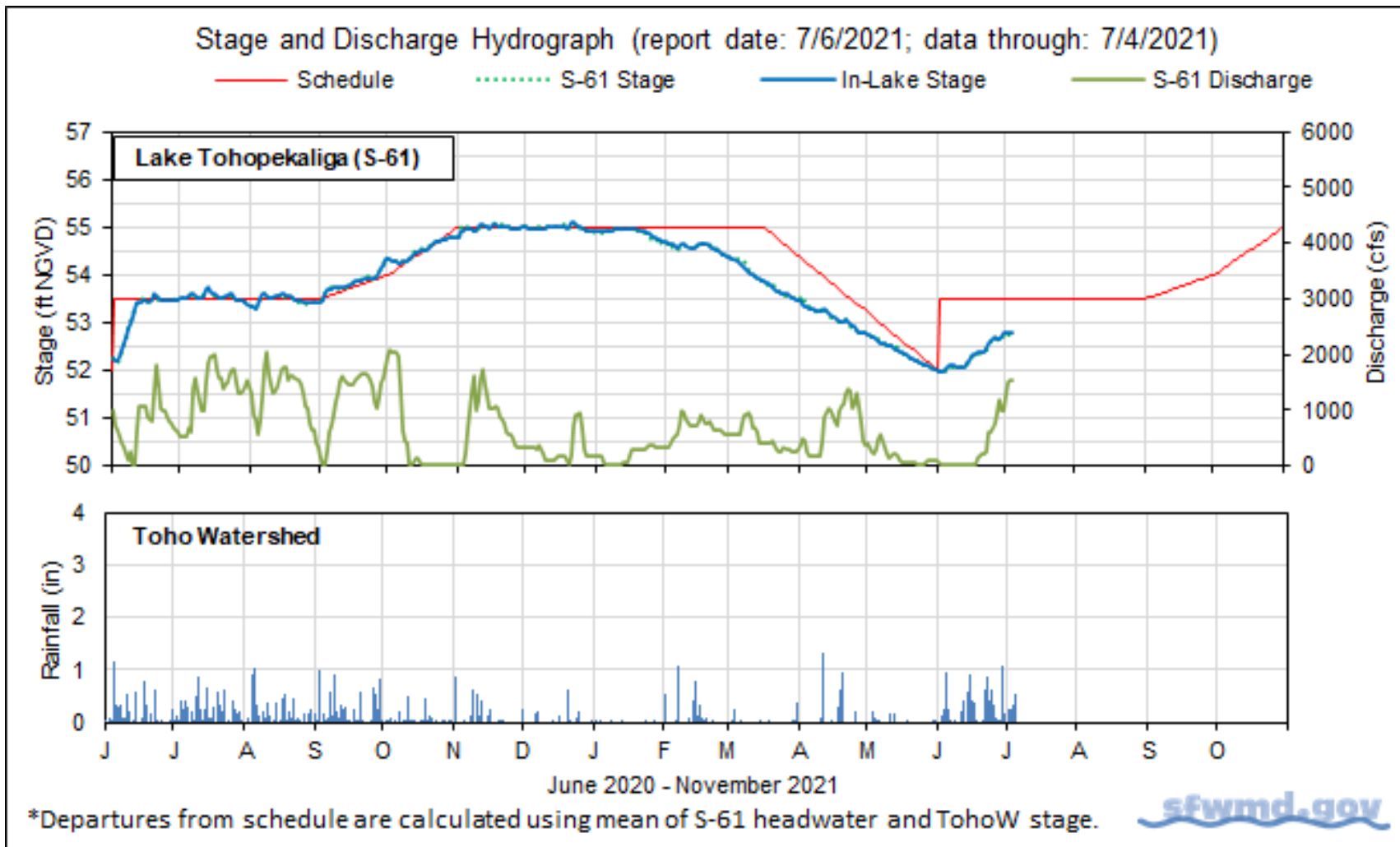


Figure KB-2. Lake Toho regulation schedule, stage, discharge and rainfall.

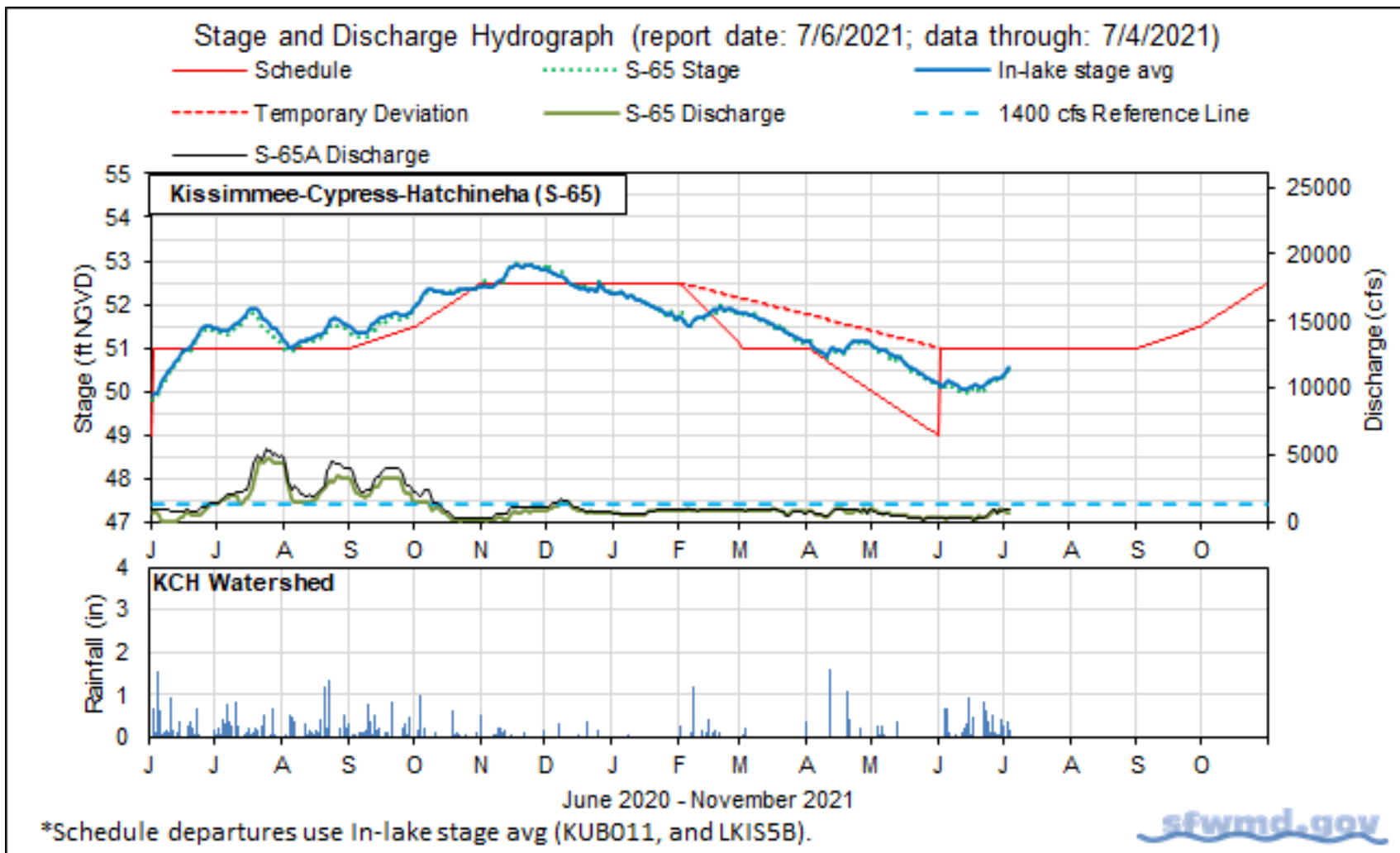


Figure KB-3. Lakes Kissimmee, Cypress and Hatchineha regulation schedule, stage, discharge and rainfall.

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

Metric	Location	Daily Average	Average for Previous Seven Day Periods			
		7/4/21	7/4/21	6/27/21	6/20/21	6/13/21
Discharge	S-65	660	770	620	350	340
Discharge	S-65A ^a	890	850	600	300	300
Headwater Stage (feet NGVD)	S-65A	46.1	46.2	46.2	46.4	46.5
Discharge	S-65D ^b	920	840	480	270	270
Headwater Stage (feet NGVD)	S-65D ^c	26.8	26.3	25.8	25.8	25.7
Discharge (cfs)	S-65E ^d	1,010	880	470	250	250
Discharge (cfs)	S-67	0	0	0	0	0
Dissolved Oxygen (mg/L) ^e	Phase I, IV/III river channel	4.9	4.9	5.9	6.3	6.7
Mean depth (feet) ^f	Phase I floodplain	0.14	0.11	0.08	0.07	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.

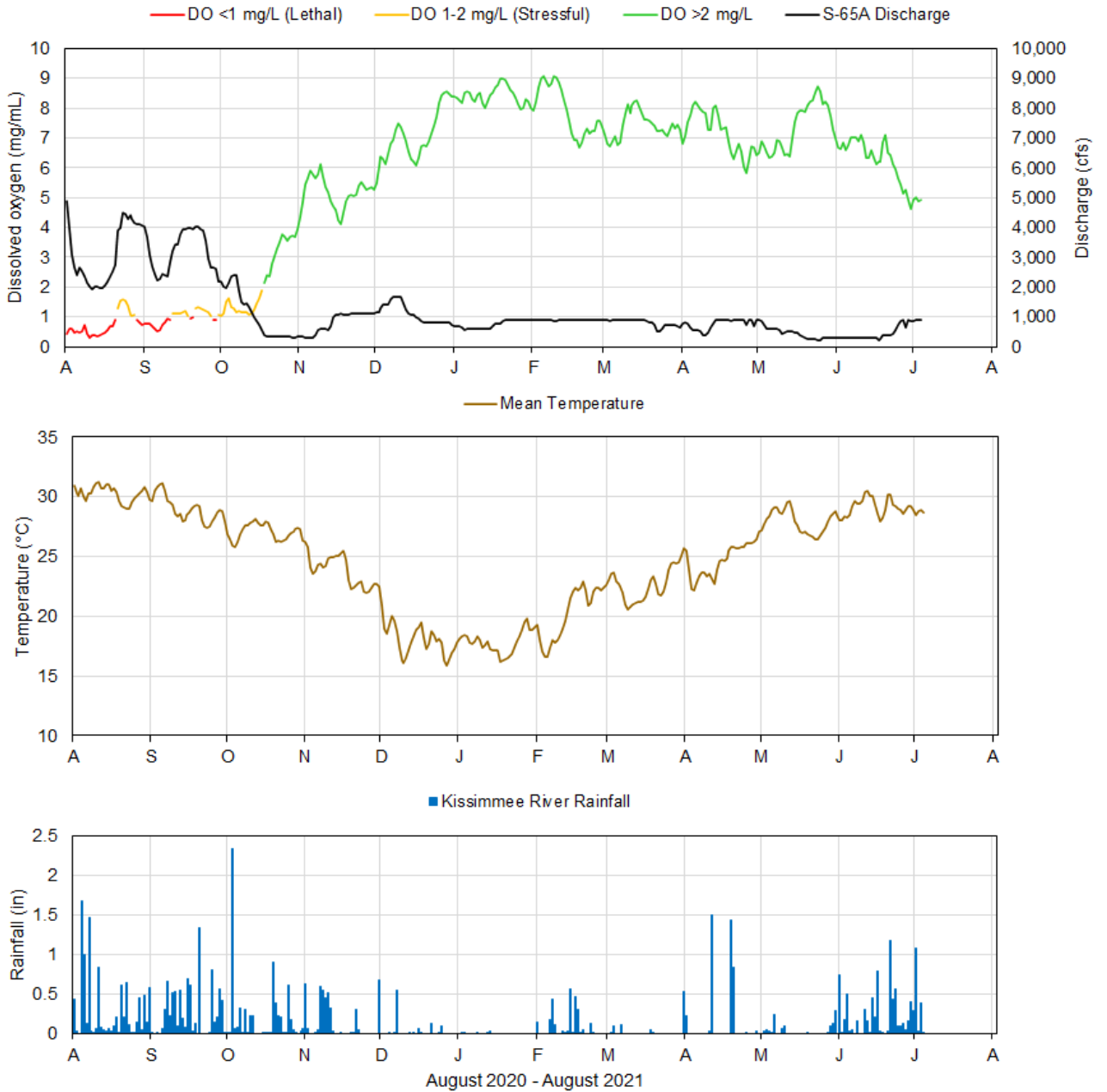
d. Combined discharge from S-65E and S-65EX1.

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: 7/6/2021; data are through: 7/4/2021



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.

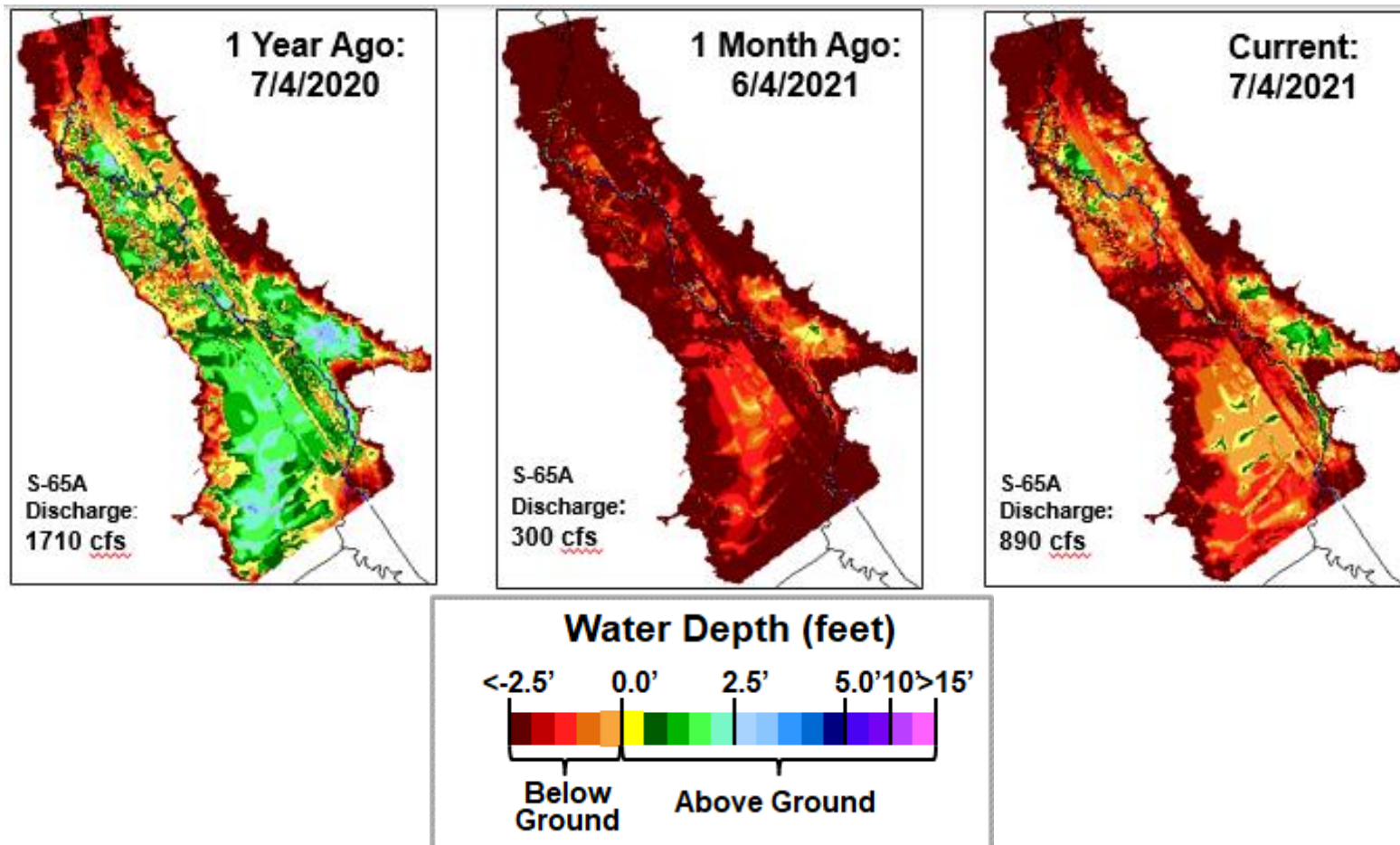


Figure KB-5. Phase I area Kissimmee River floodplain water depths (from left to right) one year ago, one month ago and current.

Lake Okeechobee

Lake Okeechobee stage was 12.87 feet NGVD on July 4, 2021, 0.09 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, but have been near or within the upper threshold of the envelope (**Figure LO-2**), spending about a third of the time in the envelope since January 1, 2021. Lake stage declined slowly from mid-November, 2020 through mid-February, 2021, before recession rates increased and stage declined over 2.5 feet between March the start of June. Lake stage has increased slightly over the past two weeks with the onset of the rainy season (**Figure LO-3**). According to NEXRAD, 2.65 inches of rain fell directly on the Lake last week.

Average daily inflows (excluding rainfall) increased from the previous week, going from 627 cubic feet per second (cfs) to 1,900 cfs. Outflows (excluding evapotranspiration) decreased, going from 669 cfs to 92 cfs. The majority of the inflow came from the Kissimmee River (880 cfs through S-65E & S-65EX1). Releases to the west via S-77 decreased from 669 cfs to 380 cfs and water is flowed back from the C-44 canal into the Lake (backflow) via S-308 at the average rate of 289 cfs over the past week. 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 4, 2021) from the NOAA cyanobacteria monitoring product derived from EUMETSAT's Sentinel 3 OLCI sensor data showed medium to high bloom potential in central parts of the Lake. Overall, the bloom potential increased on the Lake from the previous week (**Figure LO-5**).

The latest survey on June 21-23, 2021 revealed that phytoplankton biomass was highest in the northern and northeastern parts of the Lake. The number of samples with bloom conditions (chlorophyll a > 40 µg/L) increased by approximately 10% since early June. The highest biomass (97.2 µg/L) was recorded at NES191 in the northeast part of the Lake. The same region also experienced the highest toxin concentration levels (**Table LO-2** and **Figure LO-6**).

Water Management Summary

Lake Okeechobee stage was 12.87 feet NGVD on July 4, 2021, 0.09 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, but have been near or within the upper threshold of the envelope (**Figure LO-2**), spending about a third of the time in the envelope since January 1, 2021. Recent satellite imagery (June 20, 2021) shows a medium to high bloom potential in central parts 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	472	880	0.4	S-77	669	380	0.2
S-71 & S-72	36	154	0.1	S-308	0	-289	-0.1
S-84 & S-84X	11	550	0.2	S-351	0	0	0.0
Fisheating Creek	7	13	0.0	S-352	0	0	0.0
S-154	12	46	0.0	S-354	0	0	0.0
S-191	0	33	0.0	L-8 Outflow			
S-133 P	31	40	0.0	Evapotranspiration	1937	2207	1.0
S-127 P	0	12	0.0	Totals	2605	2299	1.0
S-129 P	9	13	0.0				
S-131 P	29	20	0.0				
S-135 P	0	115	0.1				
S-2 P	0	0	0.0				
S-3 P	0	0	0.0				
S-4 P	16	0	0.0				
L-8 Backflow	20	25	0.0				
Rainfall	5599	7114	3.1				
Totals	6242	9014	4.0				

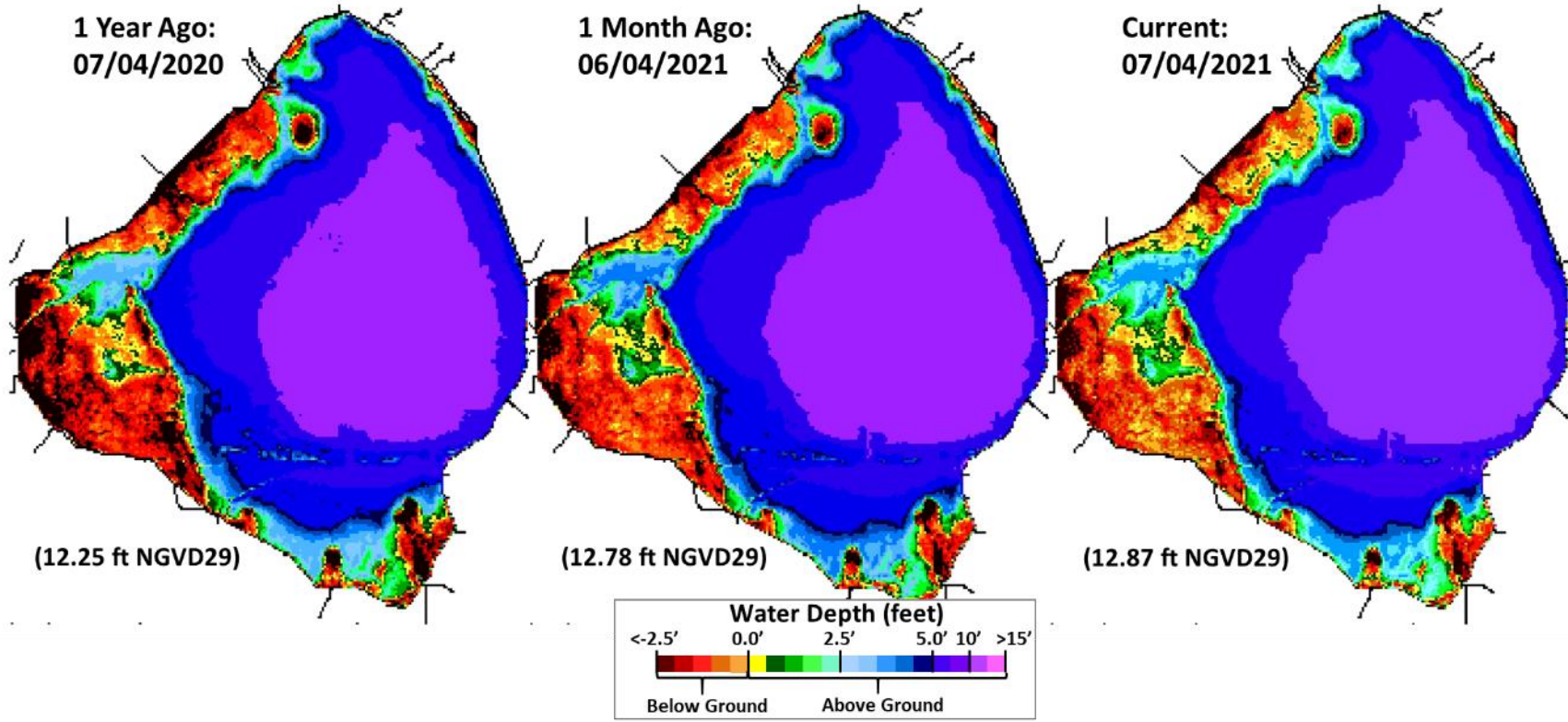


Figure LO-1. Lake Okeechobee water depth estimates based on South Florida Water Depth Assessment Tool (SFWDAT).

Lake Okeechobee Stage vs Updated Ecological Envelope

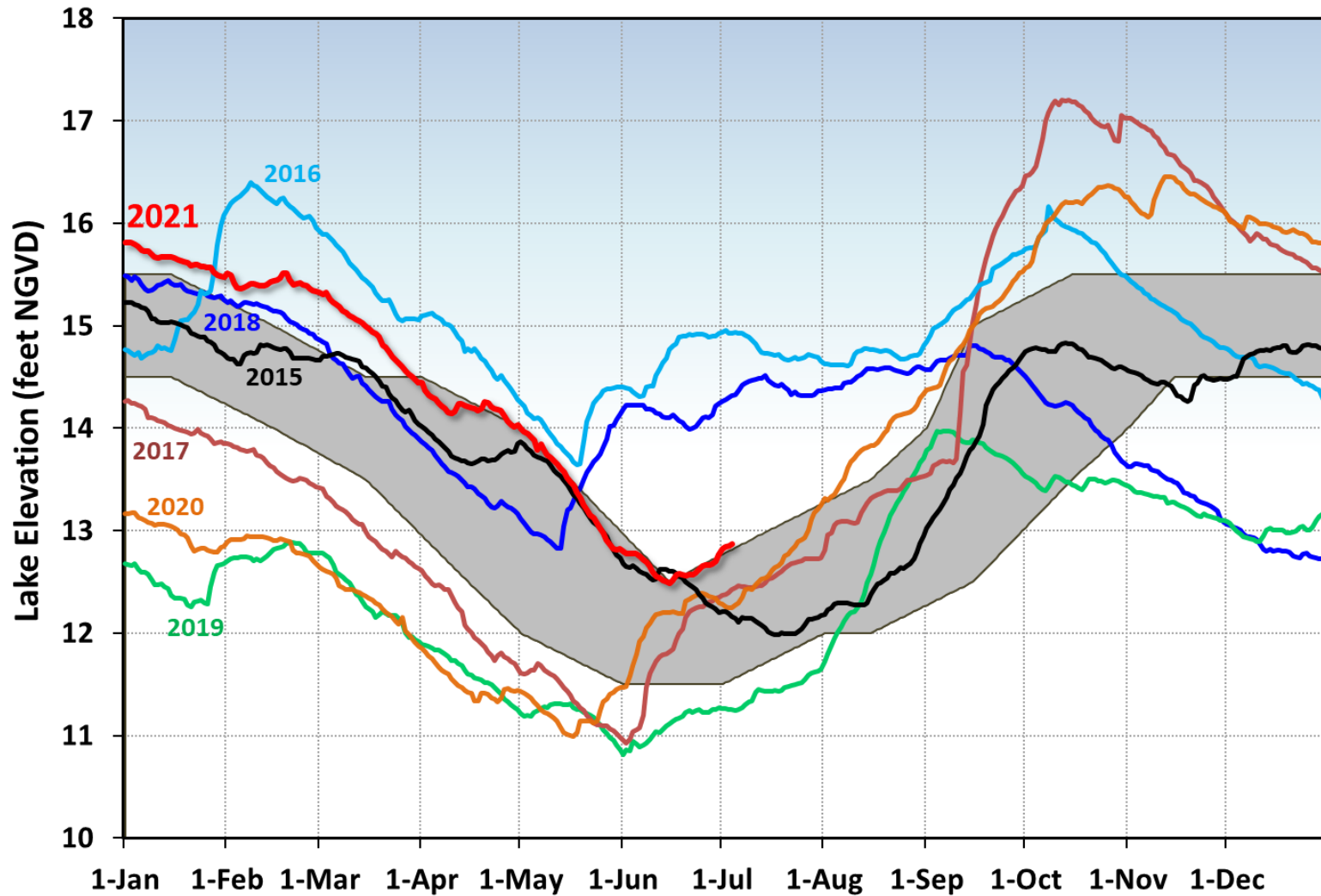
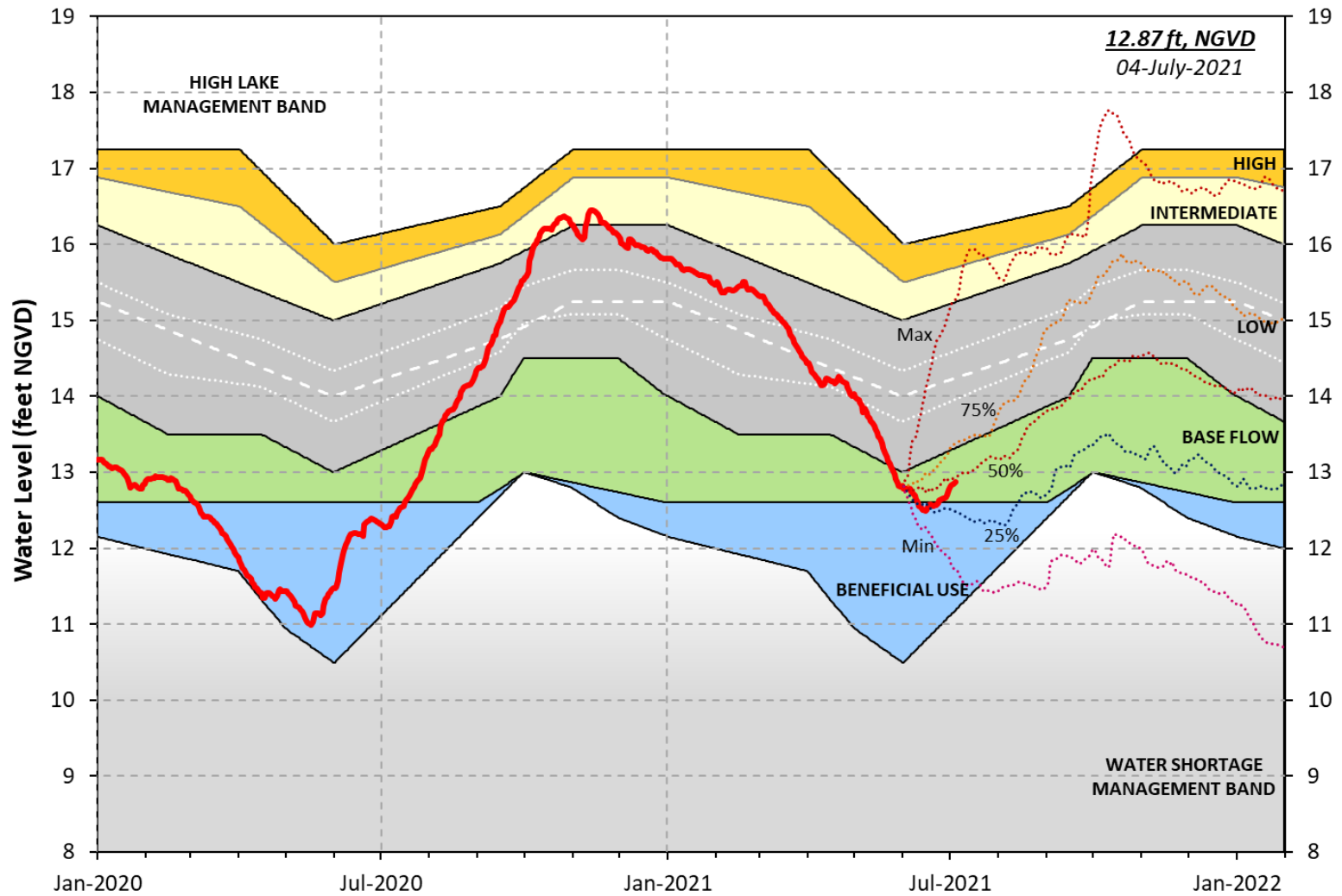


Figure LO-2. Select annual stage hydrographs for Lake Okeechobee in comparison to the updated ecological envelope.

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.

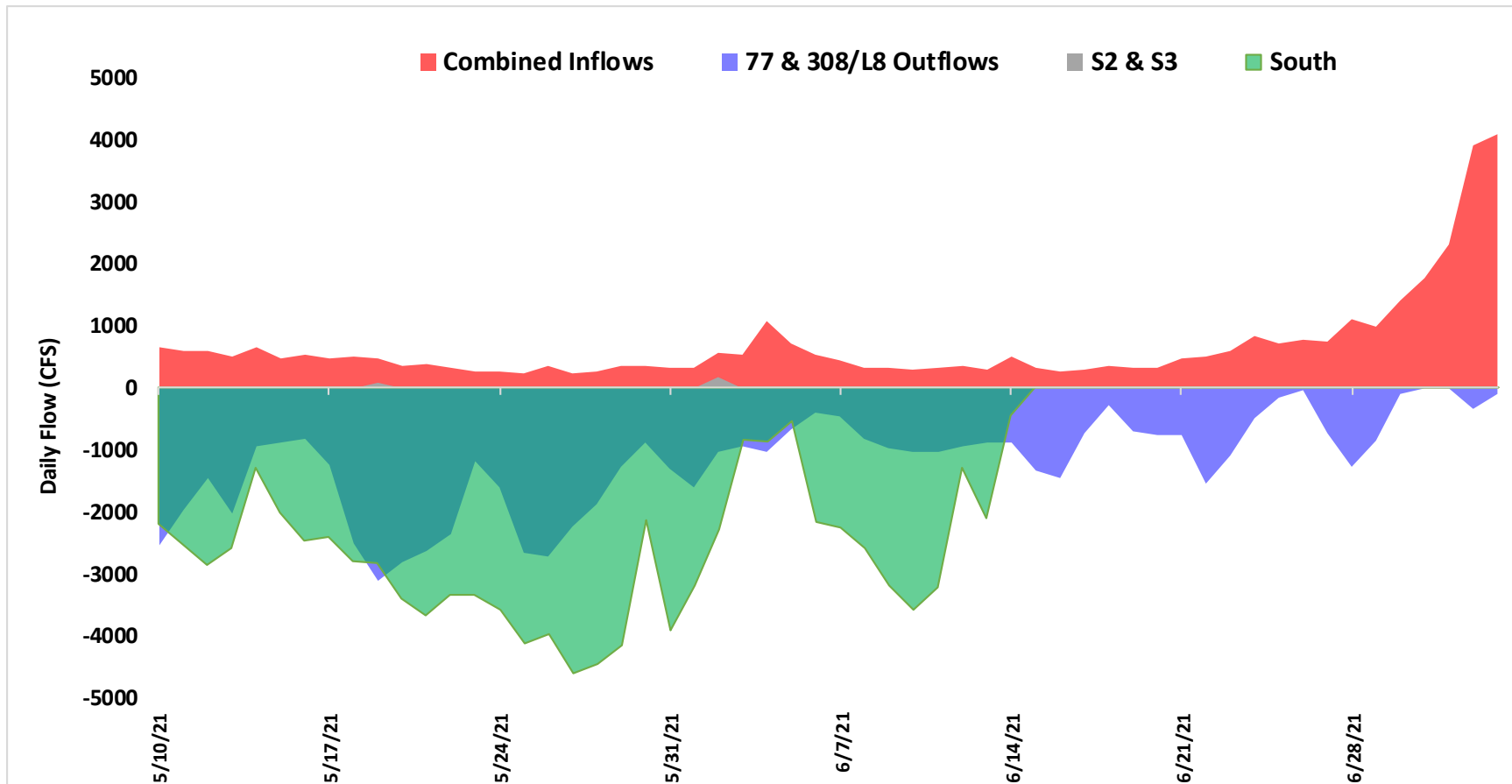


Figure LO-4. Major inflows (red) to and outflows east and west (blue) from Lake Okeechobee. Outflows south are shown in green. Flows into Lake Okeechobee from the L-8 canal through S-271 (formerly Culvert 10A) are included as inflows. Conversely, flows from Lake Okeechobee into the L-8 Canal are included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

Table LO-2. Provisional results of chlorophyll *a* concentrations and cyanobacteria taxa from sampling trips on June 21-23, 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	L001	40.3	7.8	<i>Microcys</i>
FEBOUT	NS	NS	NS	L004	17.5	5.9	<i>Microcys</i>
KISSR0.0	49.0	BDL	mixed	L006	6.1	BDL	mixed
L005	24.8	BDL	mixed	L007	3.9	BDL	<i>Microcys</i>
LZ2	39.7	0.8	mixed	L008	14.3	1.8	<i>Microcys</i>
KBARSE	64.2	31.0	<i>Microcys</i>	LZ30	8.2	BDL	<i>Microcys</i>
RITTAE2	6.3	BDL	mixed	LZ40	54.0	11.0	<i>Microcys</i>
PELBAY3	7.0	BDL	<i>Microcys</i>	CLV10A	13.3	BDL	mixed
POLE3S	8.3	BDL	mixed	NCENTER	39.0	4.4	<i>Microcys</i>
LZ25A	6.8	BDL	mixed	Outflow Structures (sampled June 21-23)			
PALMOUT	14.2	BDL	mixed	S308C	P	130.0	<i>Microcys</i>
PALMOUT1	4.8	BDL	mixed	S77	P	BDL	<i>Cylindro</i>
PALMOUT2	10.3	4.7	<i>Microcys</i>	<ul style="list-style-type: none"> • SFWMD considers > 40 µg/L chlorophyll <i>a</i> (Chl<i>a</i>) an algal bloom. • BDL: below detectable limit of 0.25 µg/L • ND: no dominant taxa • P: pending • NS: not sampled • Bold font: crew observed possible blue-green algae • Chl <i>a</i> analyzed by SFWMD • Toxin and taxa analyzed by FDEP <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	9.2	8	<i>Microcys</i>				
POLESOUT	54.3	0.5	<i>Cylindro</i>				
POLESOUT1	32.6	6.9	<i>Microcys</i>				
POLESOUT2	15.4	0.3	<i>Microcys</i>				
POLESOUT3	13.9	6.3	<i>Microcys</i>				
EASTSHORE	88.2	81.0	<i>Microcys</i>				
NES135	47.2	21.0	<i>Microcys</i>				
NES191	97.2	31.0	<i>Microcys</i>				

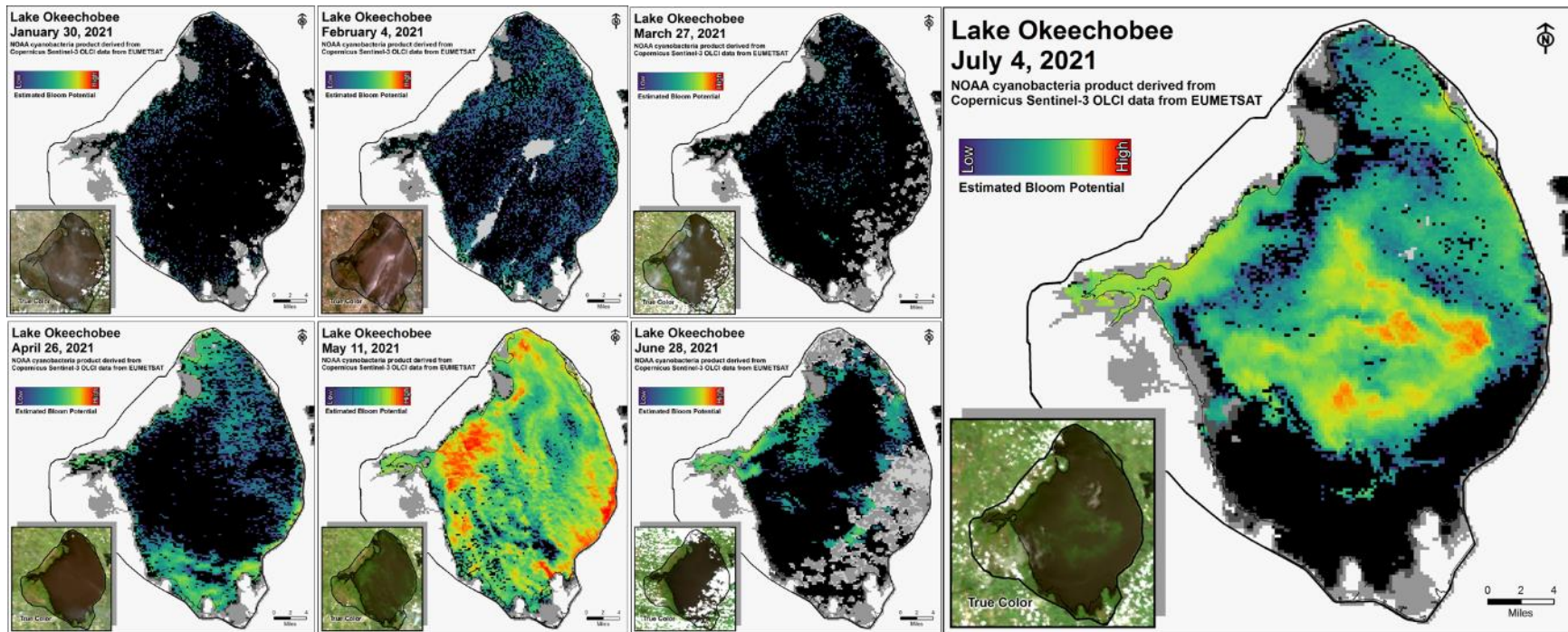


Figure LO-5. Cyanobacteria bloom potential based on NOAA's harmful algal bloom monitoring system. Gray color indicates cloud cover.

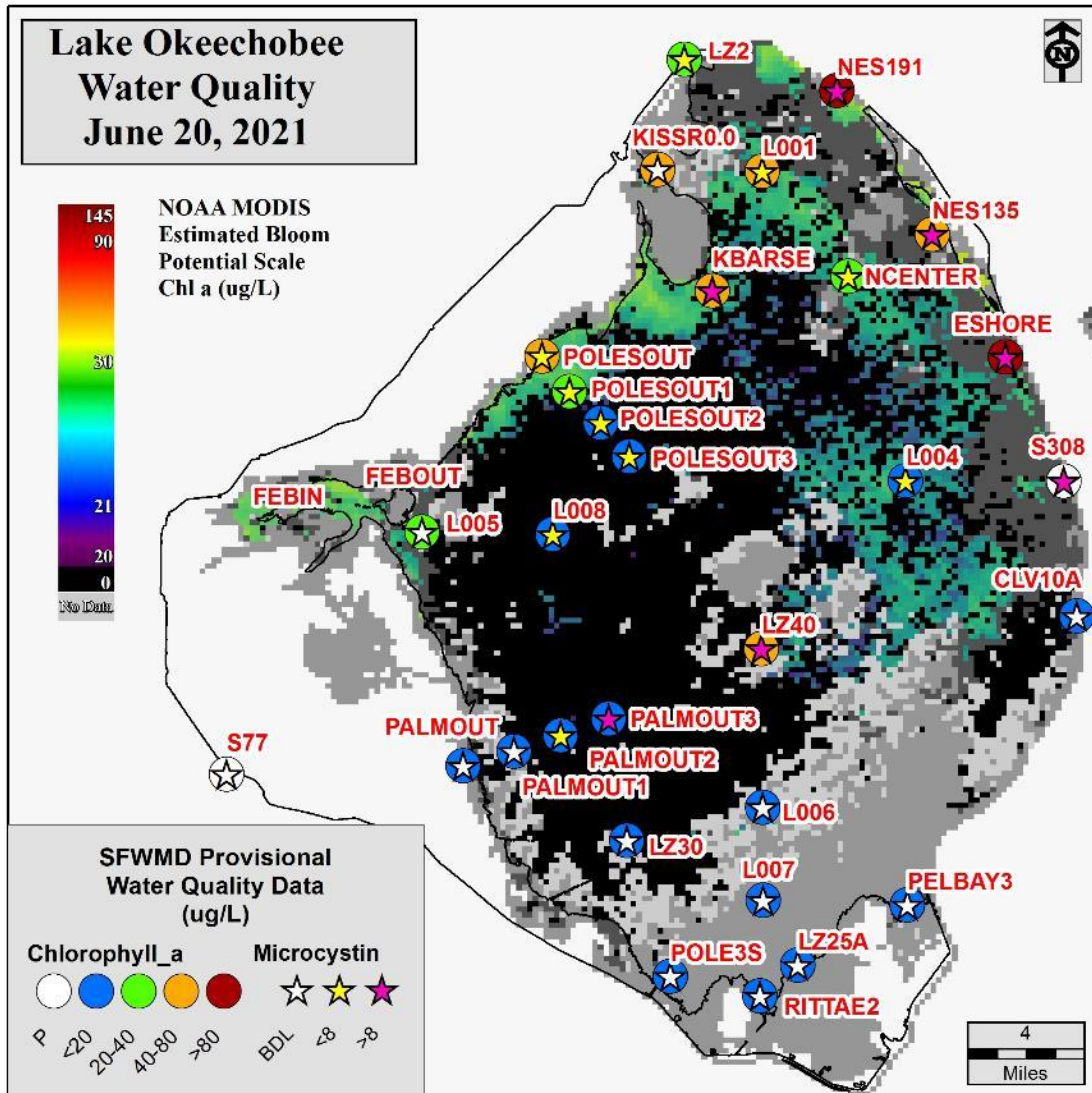


Figure LO-6. Expanded monitoring network and provisional results from samples collected June 21-23, 2021

Estuaries

St. Lucie Estuary

Over the past week, mean total inflow to the St. Lucie Estuary was approximately 1281 cfs (**Figures ES-1 and ES-2**) and the previous 30-day mean inflow was approximately 749 cfs. For comparison, the historical provisional mean inflows from the contributing areas are shown in **Figure ES-2**.

Over the past week, mean salinity 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 16.6. Salinity conditions in the middle estuary were estimated to be within the good range for adult eastern oysters (**Figure ES-4**).

Caloosahatchee River Estuary

Over the past week, mean total inflow to the Caloosahatchee River Estuary was approximately 2,471 cfs (**Figures ES-5 and ES-6**) and the previous 30-day mean inflow was approximately 1,451 cfs. For comparison, the historical provisional mean inflows from the contributing areas are shown in **Figure ES-6**.

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

Surface salinity at Val I-75 was forecasted for the next two weeks, using an autoregression model (Qiu and Wan, 2013¹) 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 1470 cfs. Model results from all scenarios predict daily salinity to be 3.2 or lower and the 30-day moving average surface salinity to be 1.6 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 2, 2021, that *Karenia brevis*, the Florida red tide dinoflagellate, was observed at low concentrations in Charlotte County and background concentrations in Lee County. On the east coast, red tide was

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

observed in background concentrations in Palm Beach County, and in very low concentrations in Broward and Miami-Dade counties.

Water Management Recommendations

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

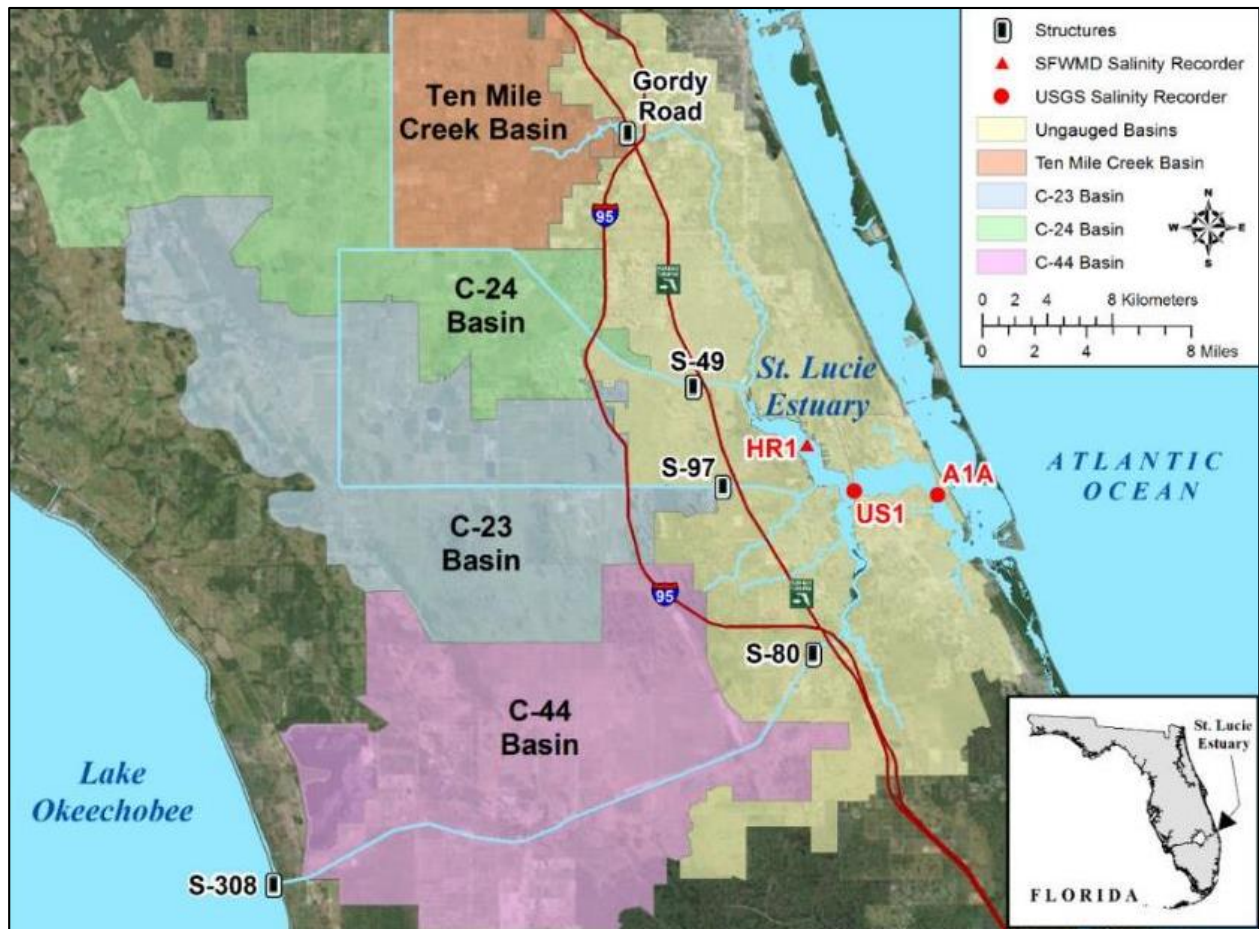


Figure ES-1. Basins, water control structures and salinity monitoring sites in the St. Lucie Estuary.

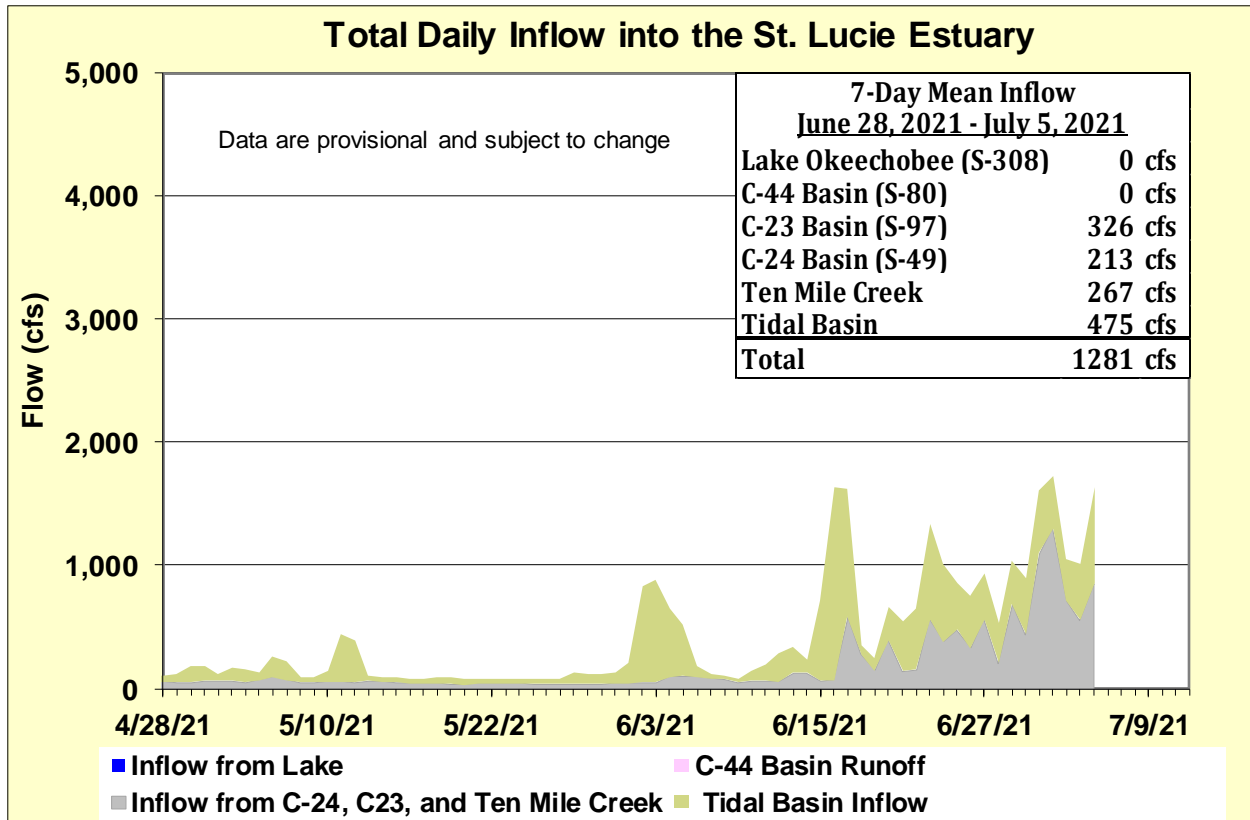


Figure ES-2. Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and Tidal Basins into the St. Lucie Estuary.

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

Sampling Site	Surface	Bottom	Envelope
HR1 (Nork Fork)	7.9 (11.7)	14.3 (17.4)	NA ^a
US1 Bridge	15.3 (19.2)	17.8 (20.3)	10.0 – 26.0
A1A Bridge	23.7 (27.6)	26.4 (29.0)	NA ^a

a. The envelope is not applicable.

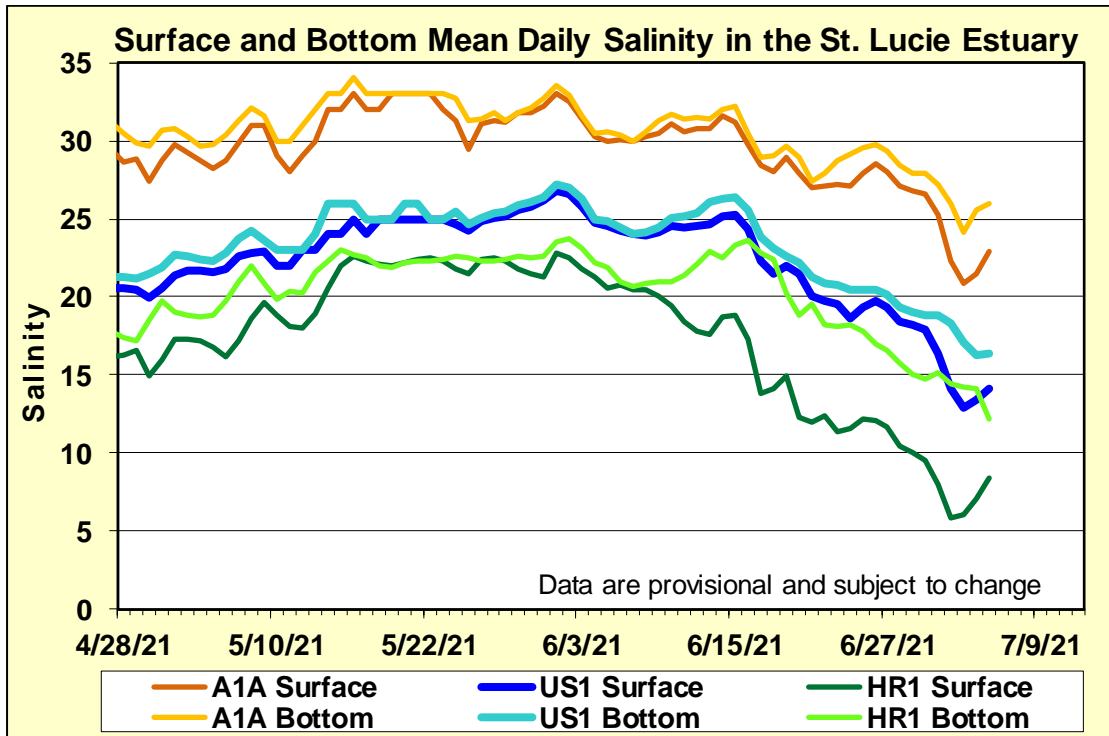


Figure ES-3. Mean daily salinity at the A1A, US1 and HR1 sites in the St. Lucie Estuary.

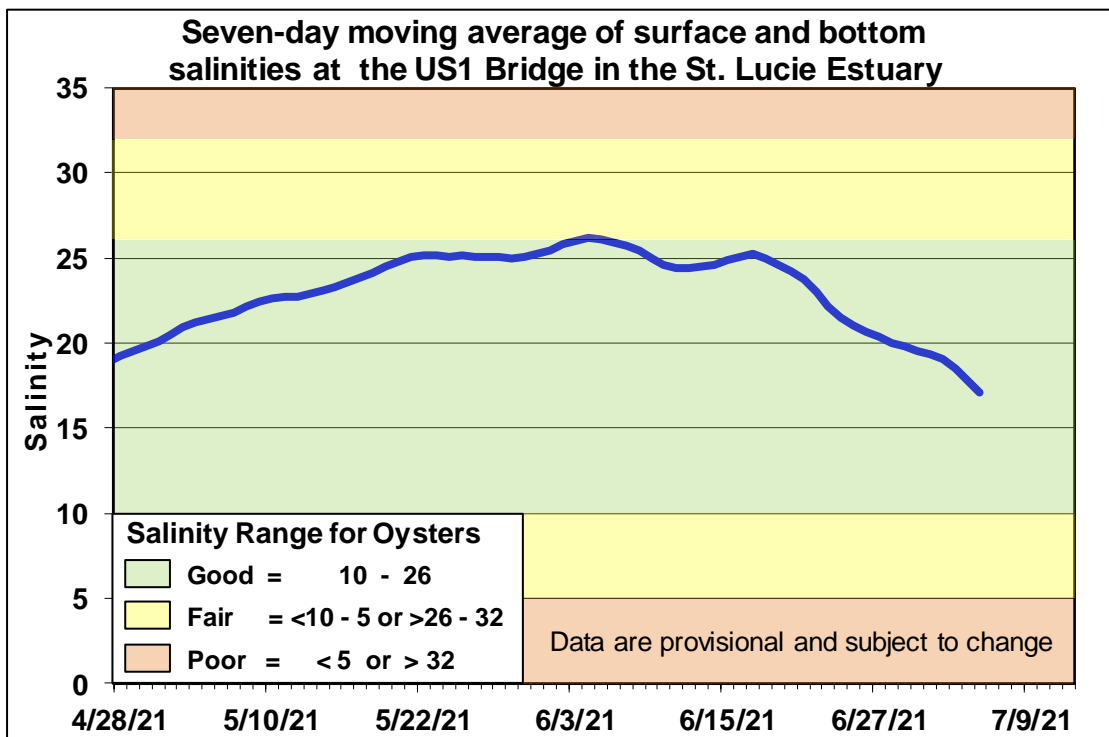


Figure ES-4. Seven-day moving average of the surface and bottom salinities at the US1 Bridge in the St. Lucie Estuary.

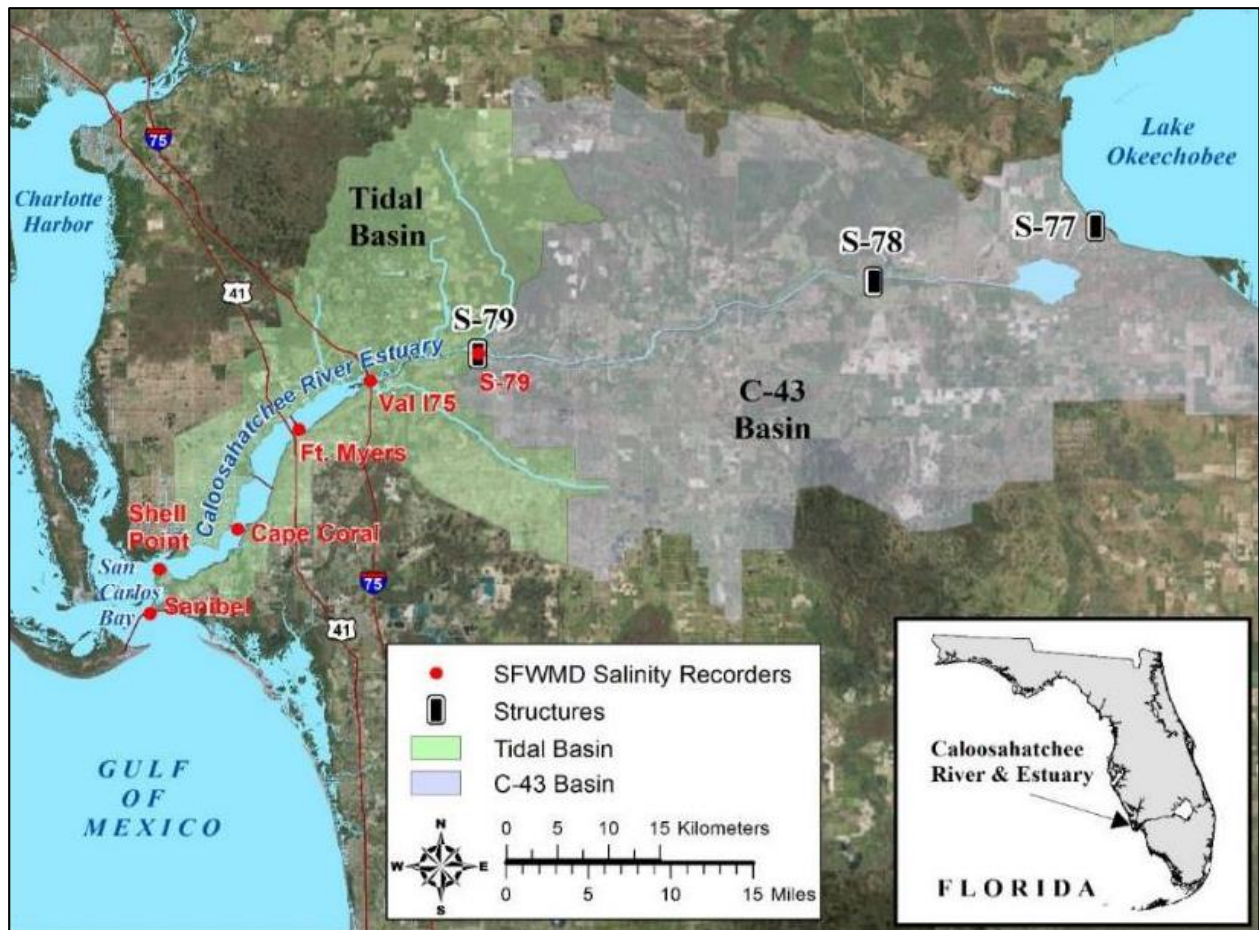


Figure ES-5. Basins, water control structures and salinity monitoring sites in the Caloosahatchee River Estuary.

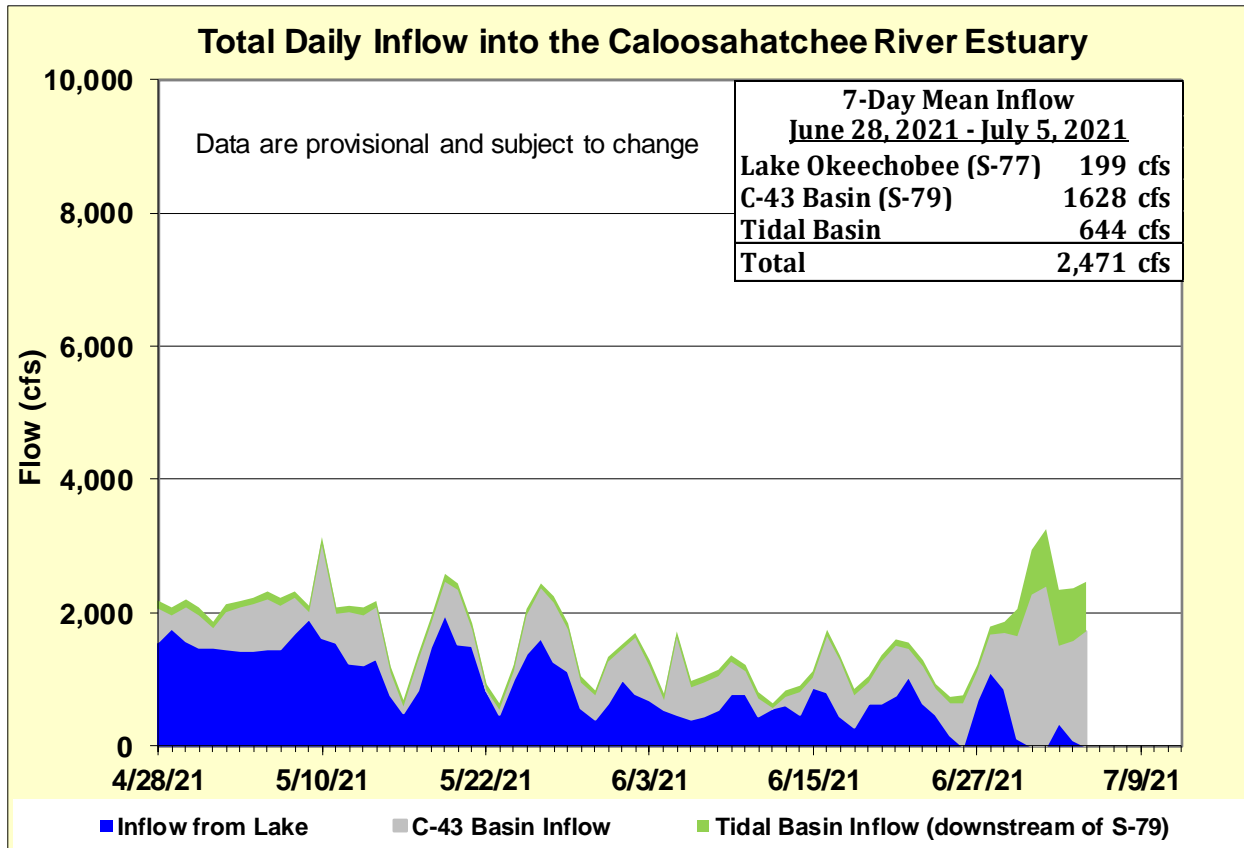


Figure ES-6. Total daily inflows from Lake Okeechobee, and runoff from the C-43 and Tidal basins into the Caloosahatchee River Estuary.

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)	1.1 (0.6)	1.1 (0.6)	NA ^a
Val I-75	1.6 (1.0)	2.3 (1.6)	0.0 – 5.0 ^b
Fort Myers Yacht Basin	6.3 (6.6)	10.9 (8.8)	NA ^a
Cape Coral	12.5 (14.9)	14.3 (17.4)	10.0 – 30.0
Shell Point	24.0 (28.6)	25.0 (30.2)	10.0 – 30.0
Sanibel	30.9 (33.6)	32.0 (33.0)	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.

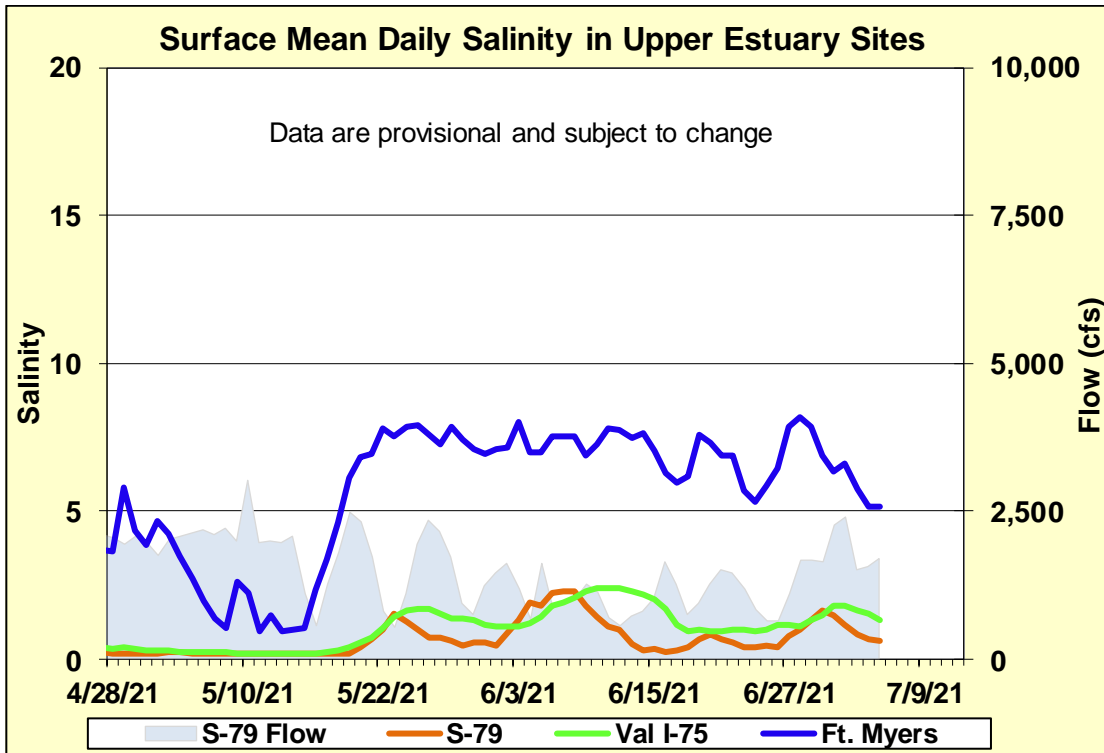


Figure ES-7. Mean daily salinity at upper Caloosahatchee River Estuary monitoring sites and mean daily flow at S-79.

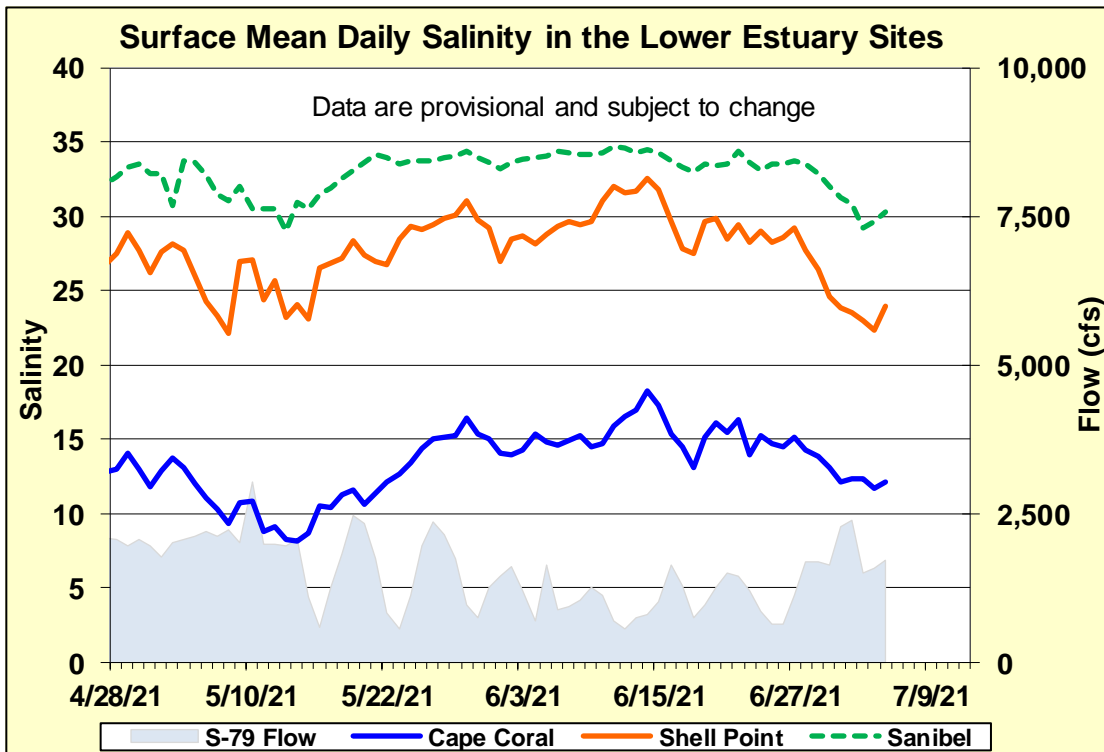


Figure ES-8. Mean daily surface salinity at lower Caloosahatchee River Estuary monitoring sites and mean daily flow at S-79.

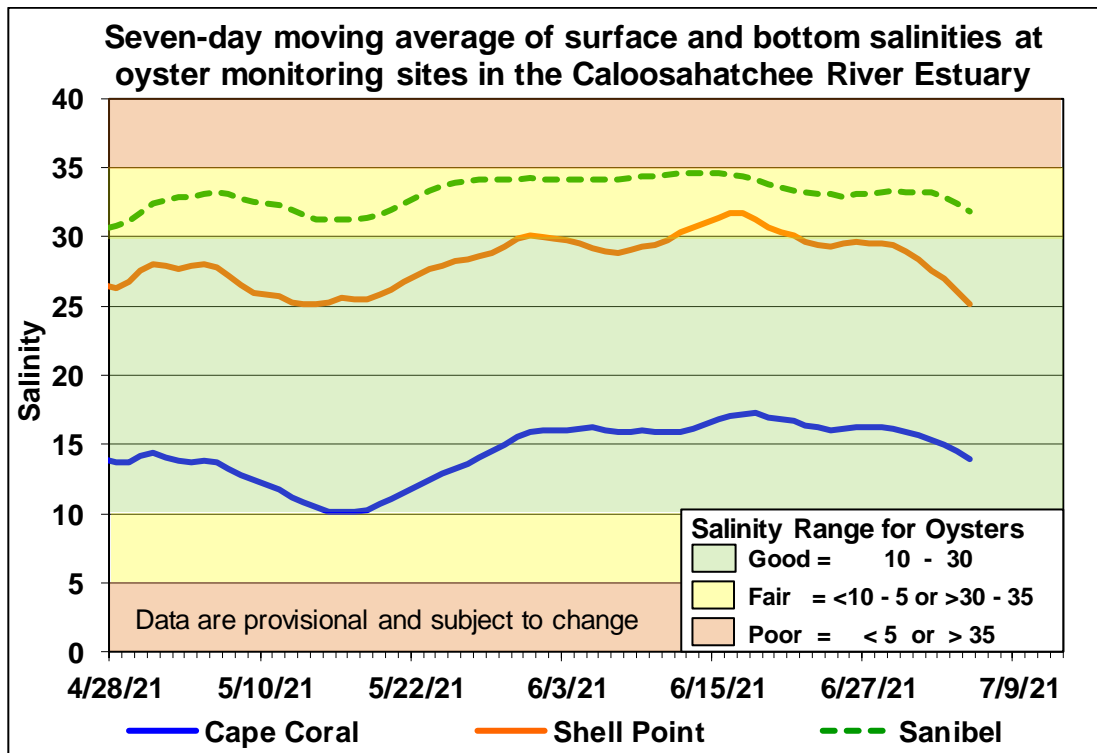


Figure ES-9. Seven-day moving average of surface and bottom salinities at Cape Coral, Shell Point and Sanibel monitoring sites in the Caloosahatchee River Estuary.

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	1470	3.2	1.6
B	450	1470	1.6	1.3
C	1000	1470	0.6	1.0
D	1500	1470	0.3	0.8
E	2000	1470	0.3	0.8
F	3000	1470	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 above target stage. Vegetation in the flow-ways is stressed and highly stressed. The 365-day PLRs for all flow-ways are high (**Figure S-2**).

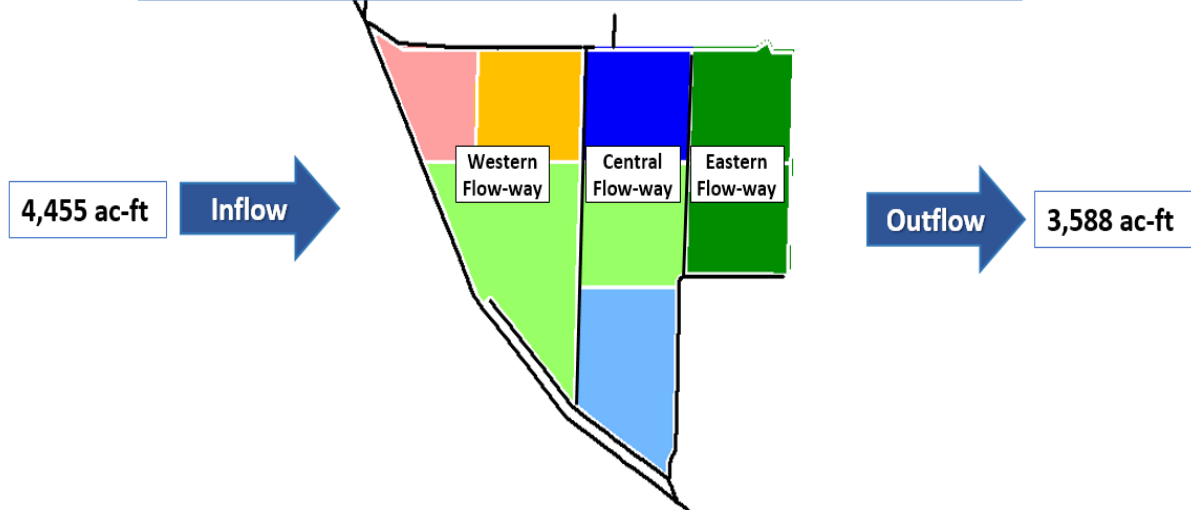
STA-2: Operational restrictions are in place in STA-2 Flow-ways 3 and 4 for vegetation management activities and in Flow-way 2 for construction activities. Most treatment cells are at or above target stage. Vegetation in Flow-ways 1, 2 and 3 is stressed, and in Flow-ways 4 and 5 is highly stressed. The 365-day PLRs for the flow-ways are at or below 1.0 g/m²/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/m²/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/m²/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.

STA-1E Weekly Status Report – 6/28/2021 through 7/4/2021



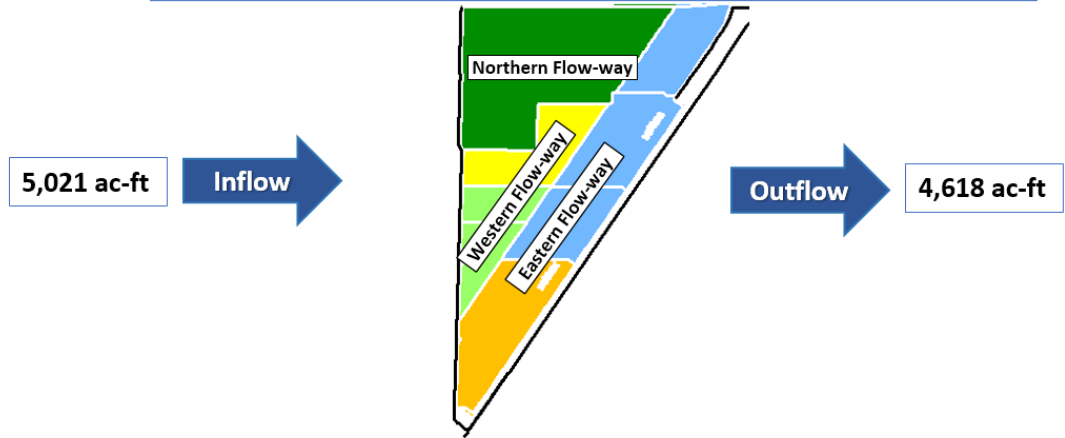
STA-1E Flow-Way Status			
Flow-Way	Vegetation Status Healthy ----- Stressed ←-----→	365-day P Loading Rate (below 1.0 g P /m ² /yr is optimal)	Online / Offline / Restrictions
Eastern	←-----→		Online
Central	←-----→		Vegetation Rehab
Western	Offline, construction activities starting 11/01/2019		

As of 7/5/2021	
Stage Based: Relative to Target Stage (TS)	
	Deep Water Level (> 2.8' above TS)
	High Water Level (1.5' – 2.8' above TS)
	0.2' – 1.5' above TS
	Target Stage (TS +/- 0.2')
	Low Water Level (<0.2' below TS)
Depth / Area Based: Percent of Area Dry	
	0-25% Dry
	25-50% Dry
	50-75% Dry
	75-100% Dry

STA-1E Flow & Phosphorus Concentration			
	7-day	28-day	365-day
Total Inflow, ac-ft	4,455	12,121	297,716
--Lake Inflow, ac-ft	0	N/A	26,000
Total Outflow, ac-ft	3,588	9,358	255,010
Inflow Conc., ppb	83	104	137
Outflow Conc., ppb	16	20	40
Includes Preliminary Data			

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

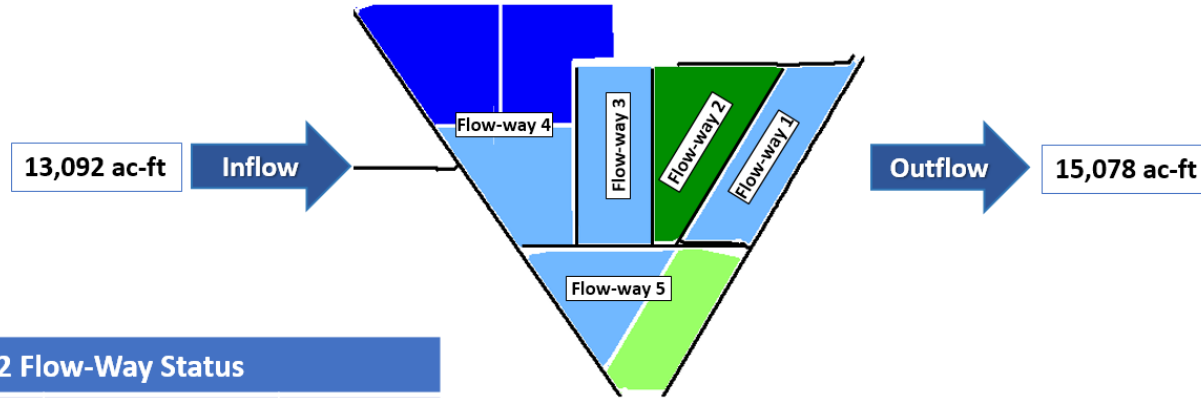
STA-1W Weekly Status Report – 6/28/2021 through 7/4/2021



STA-1W Flow-Way Status				As of 7/5/2021		STA-1W Flow & Phosphorus Concentration			
Flow-Way	Vegetation Status Healthy --- Stressed	365-day P Loading Rate (below 1.0 g P /m ² /yr is optimal)	Online / Offline / Restrictions	Stage Based: Relative to Target Stage (TS)			7-day	28-day	365-day
				<ul style="list-style-type: none"> 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					
				<ul style="list-style-type: none"> 0-25% Dry 25-50% Dry 50-75% Dry 75-100% Dry 					
Northern	← →		Construction			Total Inflow, ac-ft	5,021	9,460	143,171
Western	← →		Construction			--Lake Inflow, ac-ft	0	N/A	8,200
Eastern	← →		Construction			Total Outflow, ac-ft	4,618	4,618	150,842
						Inflow Conc., ppb	191	195	245
						Outflow Conc., ppb	27	27	40
						Includes Preliminary Data			

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

STA-2 Weekly Status Report – 6/28/2021 through 7/4/2021



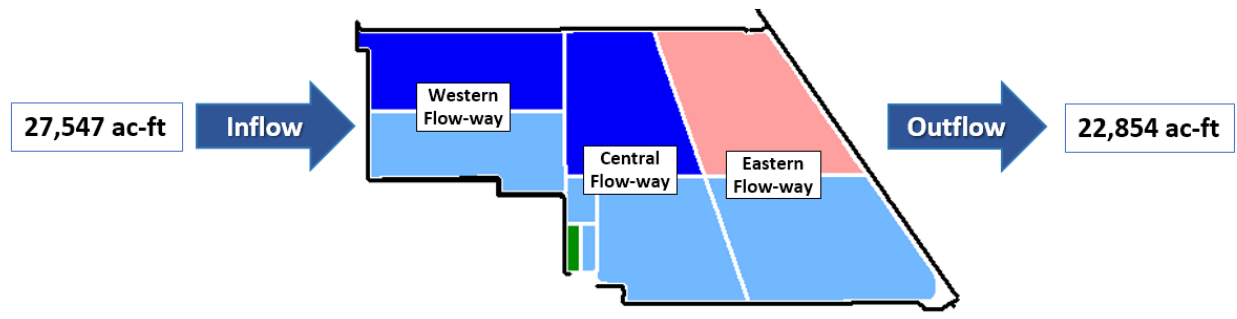
STA-2 Flow-Way Status			
Flow-Way	Vegetation Status Healthy ----- Stressed	365-day P Loading Rate (below 1.0 g P /m ² /yr is optimal)	Online / Offline / Restrictions
1	← →	1.0	Online
2	← →	1.0	Construction
3	← →	1.0	Vegetation Rehab
4	← →	1.0	Vegetation Rehab
5	← →	1.0	Online

As of 7/5/2021	
Stage Based: Relative to Target Stage (TS)	
	Deep Water Level (> 2.8' above TS)
	High Water Level (1.5' – 2.8' above TS)
	0.2' – 1.5' above TS
	Target Stage (TS +/- 0.2')
	Low Water Level (<0.2' below TS)
Depth / Area Based: Percent of Area Dry	
	0-25% Dry
	25-50% Dry
	50-75% Dry
	75-100% Dry

STA-2 Flow & Phosphorus Concentration			
	7-day	28-day	365-day
Total Inflow, ac-ft	13,092	41,760	421,646
--Lake Inflow, ac-ft	0	N/A	90,500
Total Outflow, ac-ft	15,078	43,636	458,140
Inflow Conc., ppb	75	88	93
Outflow Conc., ppb	15	16	21
Includes Preliminary Data			

Figure S-3. STA-2 Weekly Status Report

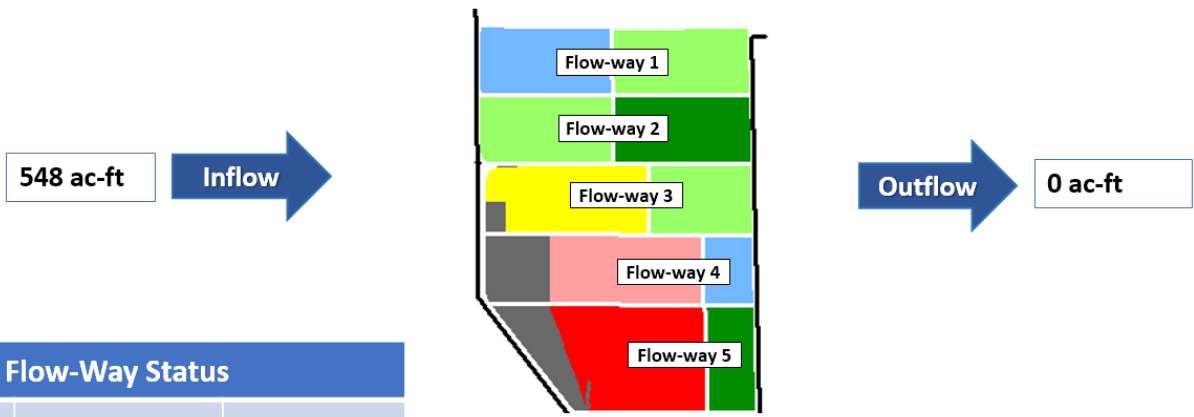
STA-3/4 Weekly Status Report – 6/28/2021 through 7/4/2021



STA-3/4 Flow-Way Status				As of 7/5/2021		STA-3/4 Flow & Phosphorus Concentration				
Flow-Way	Vegetation Status Healthy ----- Stressed	365-day P Loading Rate (below 1.0 g P /m ² /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			<div style="display: flex; flex-direction: column; gap: 5px;"> <div style="background-color: #4a4a8a; width: 15px; height: 10px;"></div> Deep Water Level (> 2.8' above TS) <div style="background-color: #0000ff; width: 15px; height: 10px;"></div> High Water Level (1.5' – 2.8' above TS) <div style="background-color: #add8e6; width: 15px; height: 10px;"></div> 0.2' – 1.5' above TS <div style="background-color: #008000; width: 15px; height: 10px;"></div> Target Stage (TS +/- 0.2') <div style="background-color: #90ee90; width: 15px; height: 10px;"></div> Low Water Level (<0.2' below TS) </div>						
Central	← →		Online	Depth / Area Based: Percent of Area Dry						
Western	← →		Online	<div style="display: flex; flex-wrap: wrap; gap: 5px;"> <div style="background-color: #ffff00; width: 15px; height: 10px;"></div> 0-25% Dry <div style="background-color: #ff69b4; width: 15px; height: 10px;"></div> 50-75% Dry <div style="background-color: #ffa500; width: 15px; height: 10px;"></div> 25-50% Dry <div style="background-color: #ff0000; width: 15px; height: 10px;"></div> 75-100% Dry </div>						
						Total Inflow, ac-ft	27,547	70,240	545,449	
						--Lake Inflow, ac-ft	0	N/A	61,800	
						Total Outflow, ac-ft	22,854	52,810	493,268	
						Inflow Conc., ppb	41	47	54	
						Outflow Conc., ppb	14	17	13	
						Includes Preliminary Data				

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

STA-5/6 Weekly Status Report – 6/28/2021 through 7/4/2021



STA-5/6 Flow-Way Status

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

As of 7/5/2021

Stage Based: Relative to Target Stage (TS)

- Deep Water Level (> 2.8' above TS)
- High Water Level (1.5' – 2.8' above TS)
- 0.2' – 1.5' above TS
- Target Stage (TS +/- 0.2')
- Low Water Level (<0.2' below TS)

Depth / Area Based: Percent of Area Dry

- 0-25% Dry
- 25-50% Dry
- 50-75% Dry
- 75-100% Dry

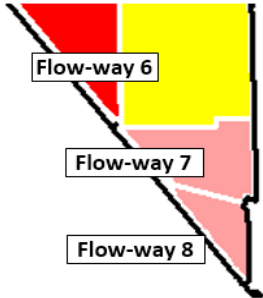
STA-5/6 Flow & Phosphorus Concentration

	7-day	28-day	365-day
Total Inflow, ac-ft	549	689	115,999
--Lake Inflow, ac-ft	N/A	N/A	N/A
Total Outflow, ac-ft	0	8	145,044
Inflow Conc., ppb	167	177	276
Outflow Conc., ppb	N/A	22	74

Includes Preliminary Data

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

STA-5/6 Weekly Status Report – 6/28/2021 through 7/4/2021



STA-5/6 Flow-Way Status				As of 7/5/2021	
Flow-Way	Vegetation Status Healthy ----- Stressed ←-----→	365-day P Loading Rate (below 1.0 g P /m ² /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)
6	←-----→	 1.0	Online	0.2' – 1.5' above TS	Target Stage (TS +/- 0.2')
7	←-----→	 1.0	Online	Low Water Level (<0.2' below TS)	Depth / Area Based: Percent of Area Dry
8	←-----→	 1.0	Online	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 continued trending upwards last week (**Figure EV-1**). On Sunday (7/4), stage was above the flat Zone A1 regulation line by 0.25 feet. WCA-2A: Stage at S11B-HW continued trending upwards last week (**Figure EV-2**). It is 1.04 feet above the now increasing regulation line on Sunday. WCA-3A: The three gauge average is approximating the slope of the Zone A regulation line despite the daily fluctuations (**Figure EV-3**). On Sunday, stage was still 0.97 feet below the rising Zone A line. WCA-3A: Stage at gauge 62 (Northwest corner) increased rapidly last week (**Figure EV-4**). The average on Sunday was 0.50 feet below the rising Upper Schedule.

Water Depths

The WDAT tool for spatial interpolation of water depth monthly snapshots indicates that water depths are rising across the Everglades Protection Area. Northeastern WCA-3A is still dry and in need of water as the wet season continues. WCA-2A stages increased faster than recommended this week (**Table EV-1**). North to South hydrologic connectivity strengthens in Shark River Slough (SRS) and Taylor Slough within Everglades National Park (ENP). Big Cypress National Preserve (BCNP) recovers, as stages are nearing the soil surface across most of that area (**Figure EV-5**). Comparing WDAT water levels from present to last month, stages increased the most in BCNP and in Taylor Slough within ENP. The Everglades are significantly drier than one year ago, especially in eastern WCA-3A, with southern BCNP the lone exception. Conditions continue moving closer to average across the system, with eastern WCA-3A South, northern BCNP, and Lostman's Slough in ENP remaining below average (**Figure EV-6**).

Wading Birds

Using preliminary estimates, 2021 looks to be the second largest nesting effort in the Everglades since the 1940s with greater than 80,000 total nests (**Figure EV-7**). Good post-fledging conditions are expected to support increased survival of the high number of fledglings which could possibly rival the production of birds from the 2018 breeding season even with fewer nests.

Taylor Slough and Florida Bay

An average of 1.74 inches of rain fell over Taylor Slough and Florida Bay over the week ending Sunday (7/4) with the largest volume over western Florida Bay. Stage decreased by an average of only 0.01 feet over the week as the decreases in the north were balanced out by increases in the south (**Figure EV-8 & Figure EV-9**). Depths are still averaging 2 inches lower than the historical average for this time of year. Phosphorus levels at the westernmost structures (S-328 and G-737) are still elevated but lower than before with the maximum at 28 µg/L as of 6/29. The phosphorus levels will decrease at these structures as the area rehydrates. In previous years, it took about 3 weeks after westward water movements began for the phosphorus levels to reach the 8 µg/L threshold. Tropical storm Elsa could temporarily elevate phosphorus levels if sediments near the structures gets stirred up.

Salinities in Florida Bay averaged a 1.5 decrease for the week ending 7/4, but individual stations had weekly changes ranging from -3.5 to +0.6 (**Figure EV-8**). The only station to increase in salinity was Whipray Basin (WB on **Figure EV-8**), and locally heavy rainfall helped to decrease the salinity in the westernmost stations (**Figure EV-10**). Freshwater deliveries will still be needed to freshen the nearshore area, but the predicted forecast for the area looks likely to deliver some much needed rain to help conditions along.

Florida Bay MFL: The TR station in the mangrove zone (tracked for the Florida Bay MFL) peaked near 18 before decreasing to 13 over the week ending 7/4, and the 30-day moving average finally decreased 0.5 to end at 17.4 (**Figure EV-11**). Weekly flow from the 5 creeks monitored for the Florida Bay MFL totaled about 3,400 acre-feet with small positive flows persisting for 6 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) increased 9,000 acre-feet over the week to end at 397,039 acre-feet on Sunday, 6/27. The 365-day cumulative flows are once again above the 95th percentile of historical data (390,830 acre-feet). Creek flows are provisional USGS data.

Water Management Recommendations

Accretion 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	1.13	+0.05
WCA-2A	0.90	+0.01
WCA-2B	1.88	+0.09
WCA-3B	1.18	+0.11
ENP	1.64	+0.02



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



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

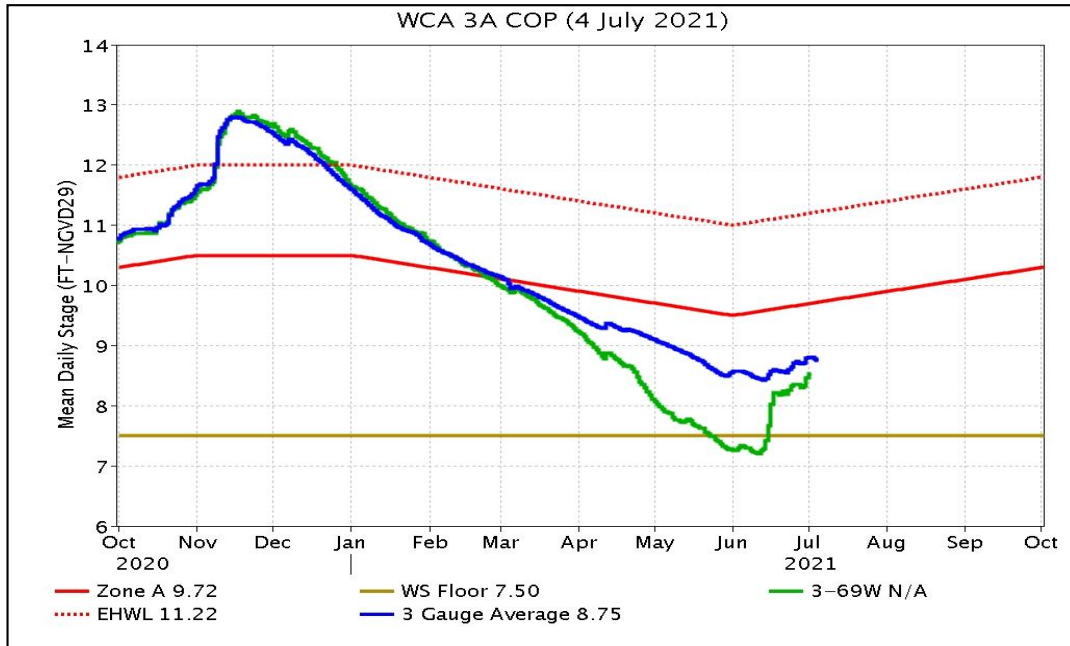


Figure EV-3. WCA-3A stage hydrographs (three-gauge average, S-333 headwater) and regulation schedule.

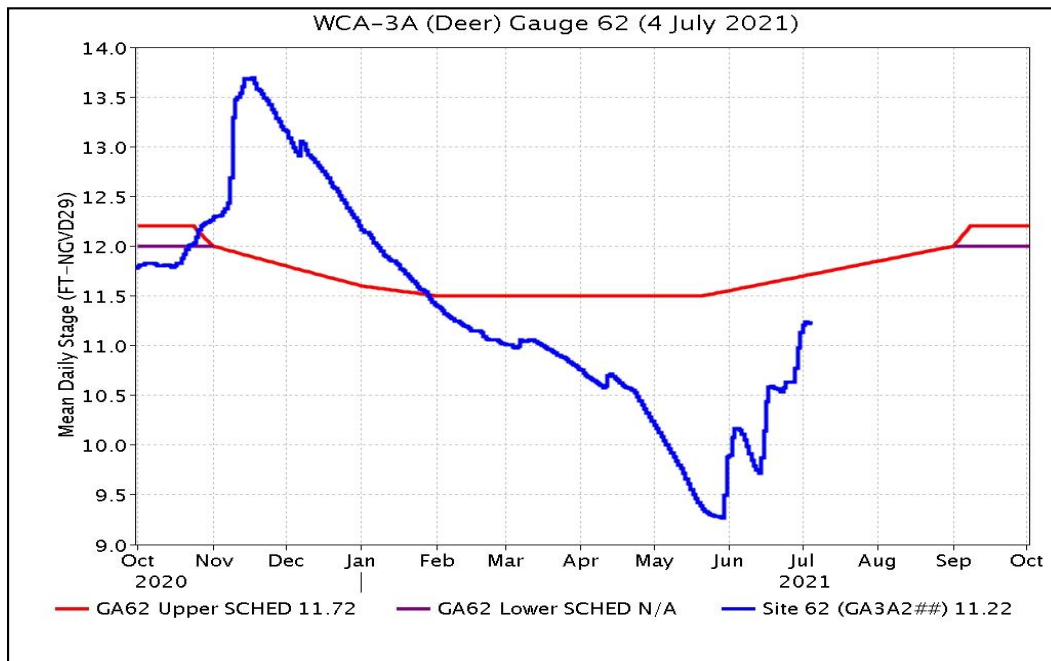


Figure EV-4. WCA-3A stage hydrograph (Deer gauge; Site 62) and CA62 regulation schedule.

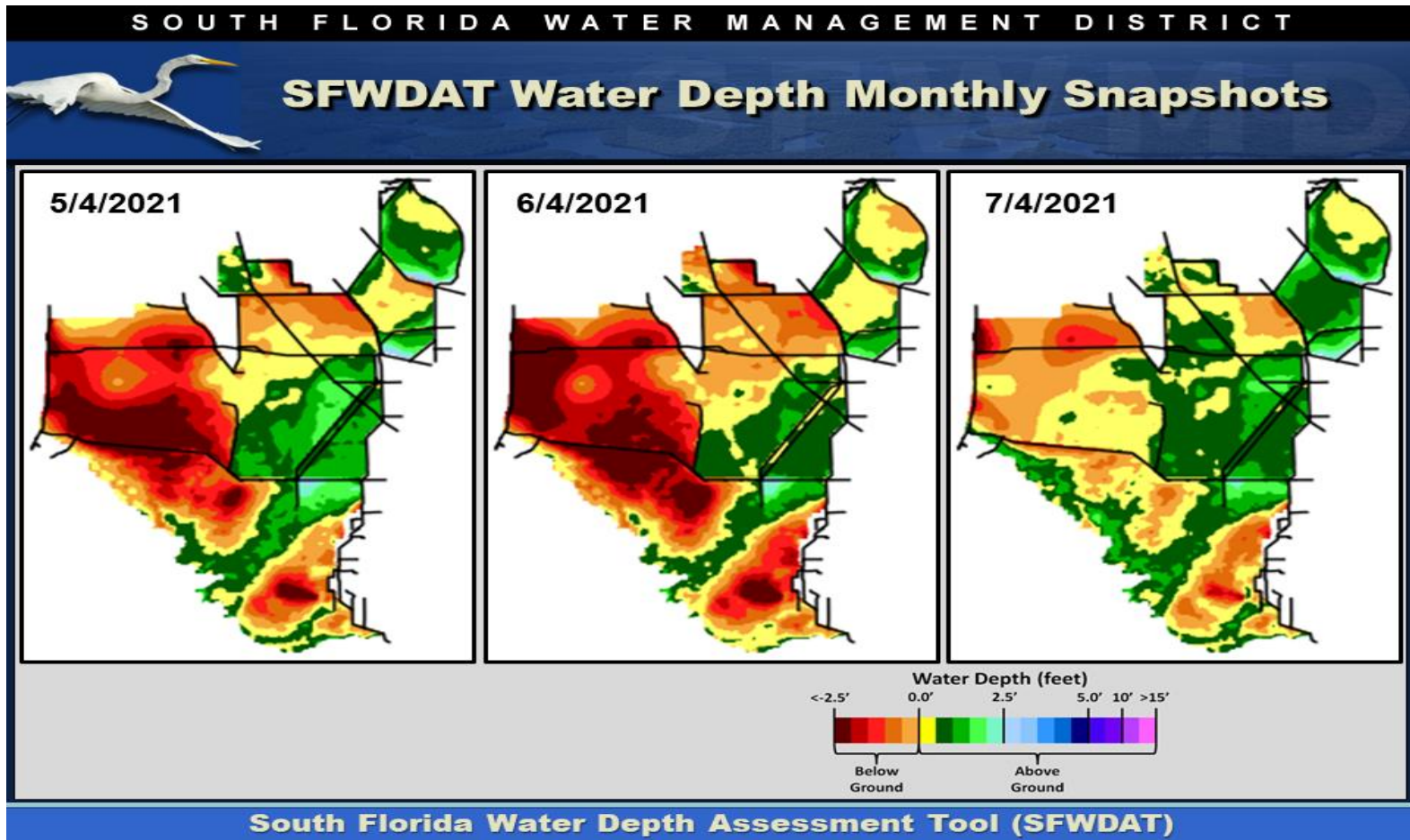


Figure EV-5. Everglades water depths from two months ago (left), one month ago (center) and present (right), based on SFWDAT.

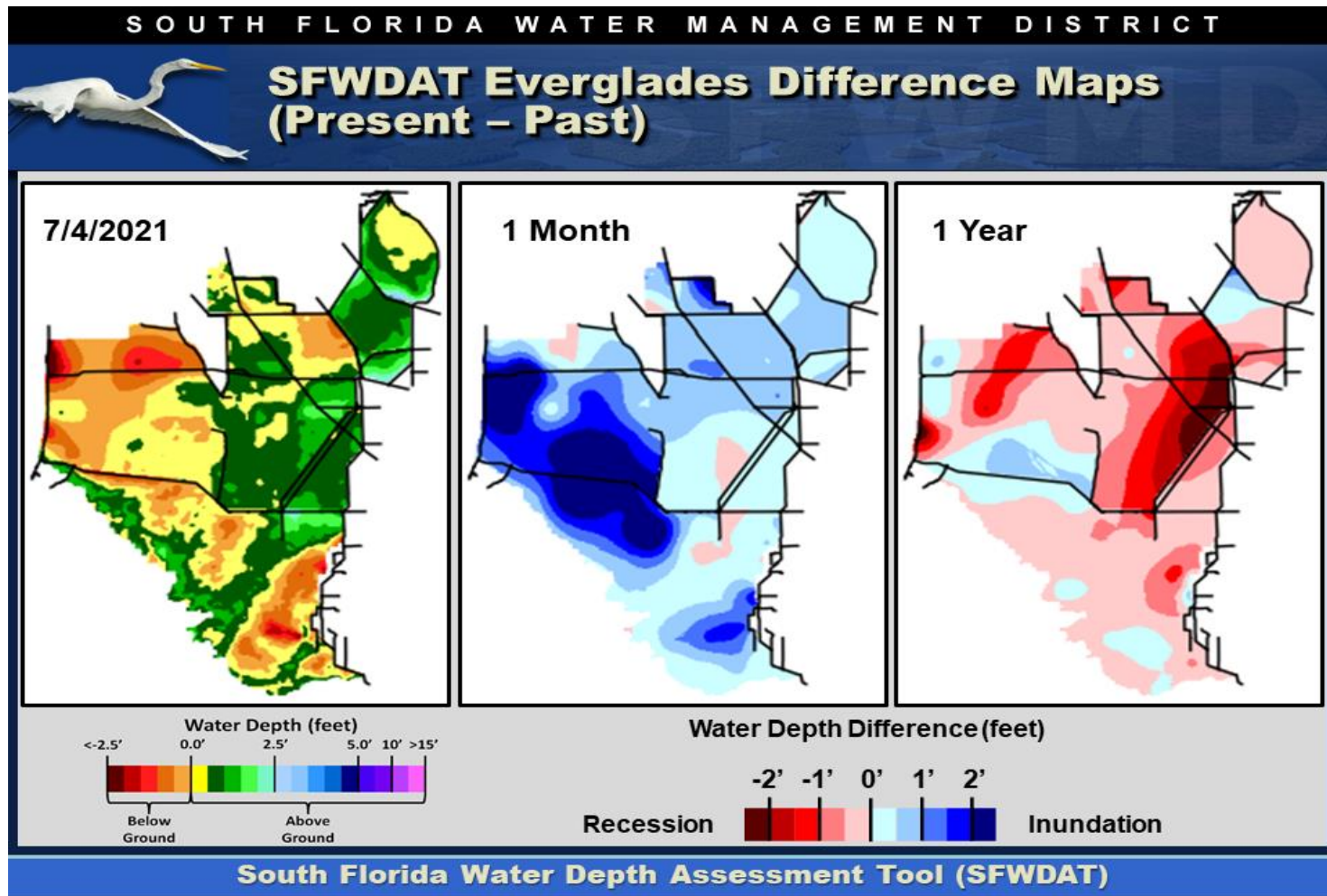


Figure EV-6. Present Everglades water depths (left) and water depth changes from one month (center) and one year (right) ago, based on SFWDAT.

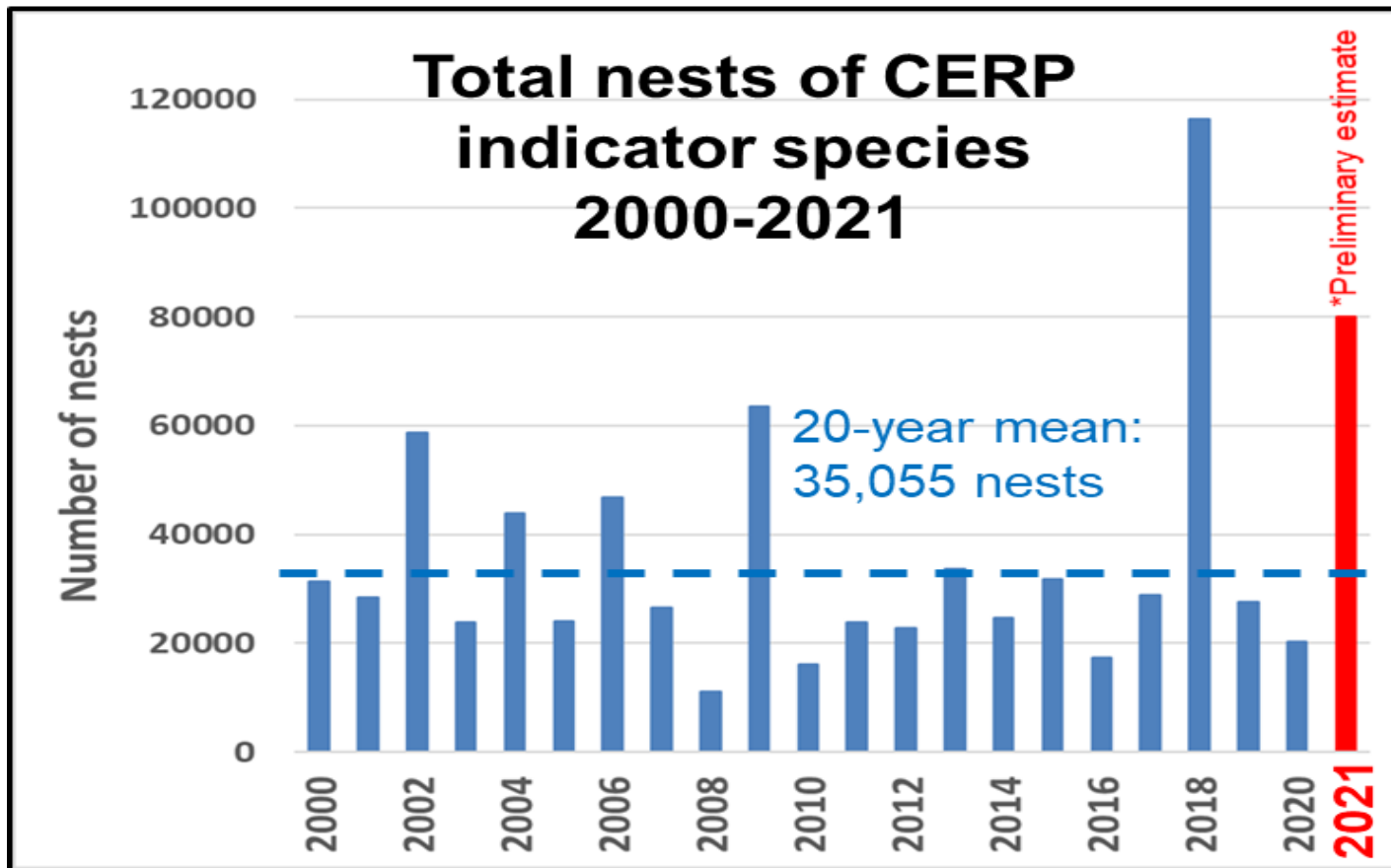


Figure EV-7. Nest numbers within the Everglades Protection Area since 2000.

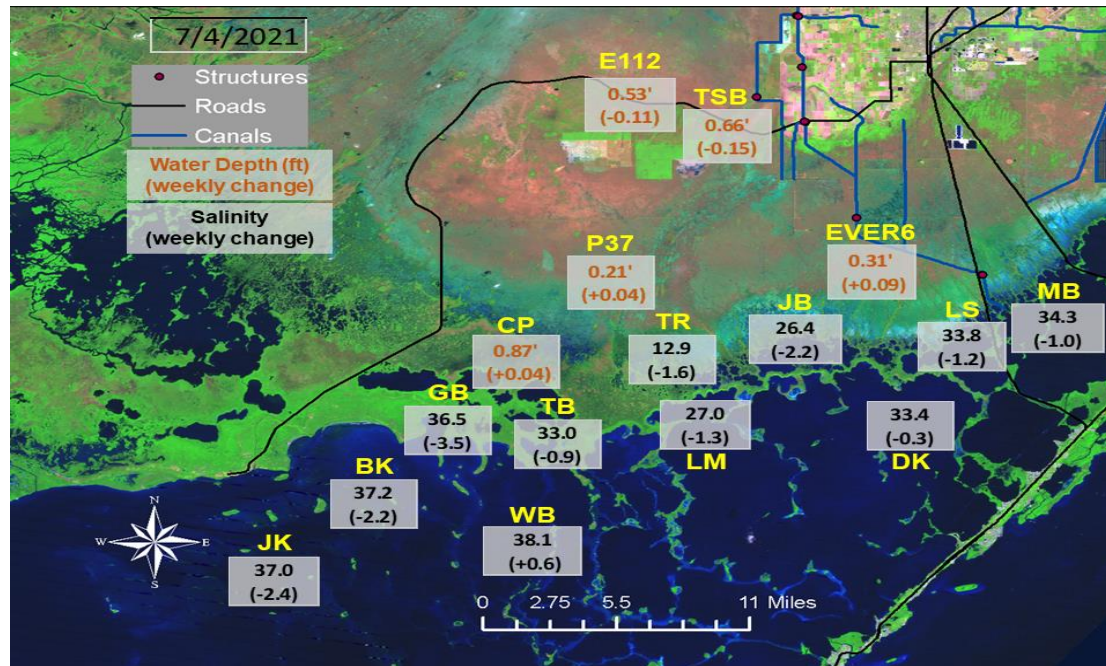


Figure EV-8. Taylor Slough water depths with changes since a week ago and Florida Bay salinities with changes since a week ago.

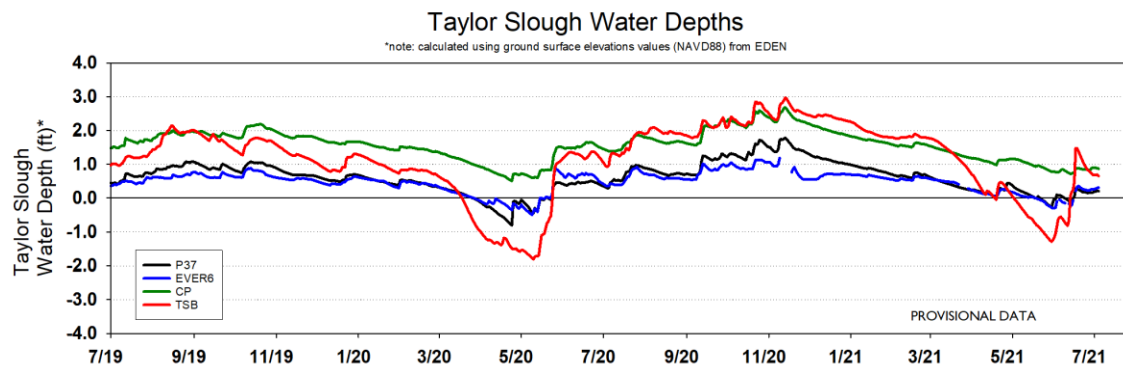


Figure EV-9. Taylor Slough water depth time series.

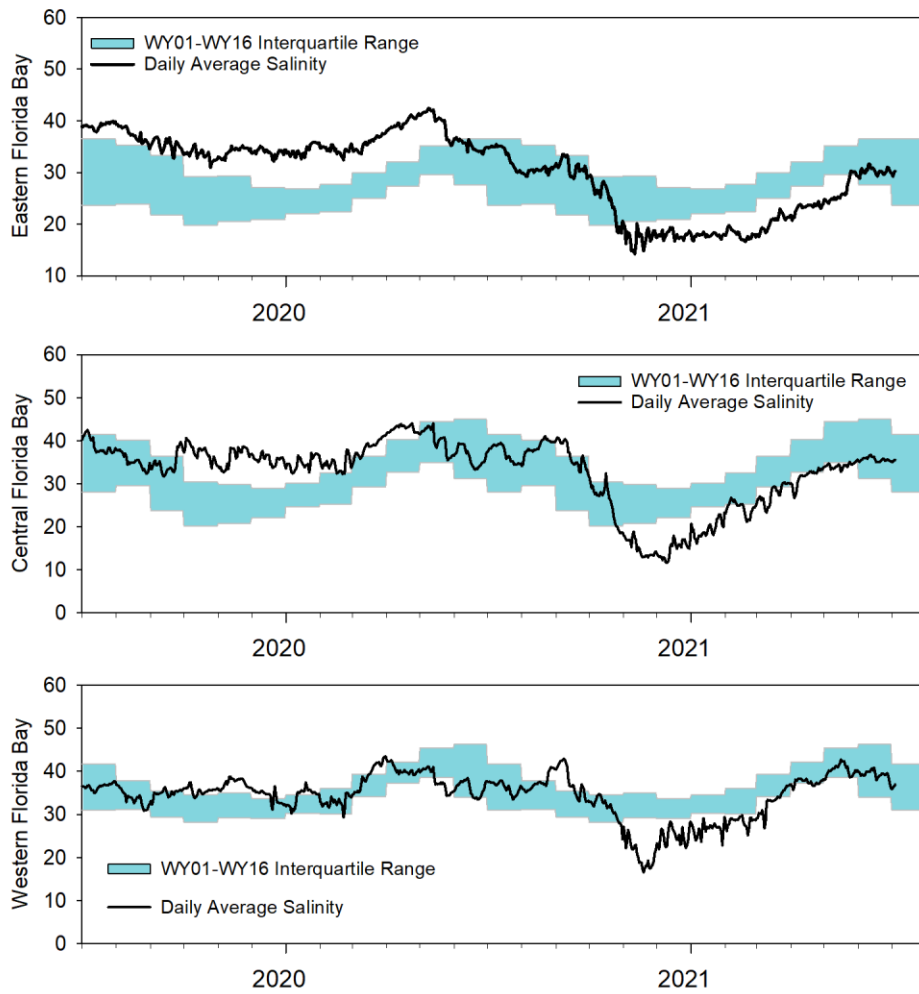


Figure EV-10. Eastern (top panel), Central (middle panel) and Western (bottom panel) Florida Bay daily average salinities with interquartile (25-75 percentile) ranges.

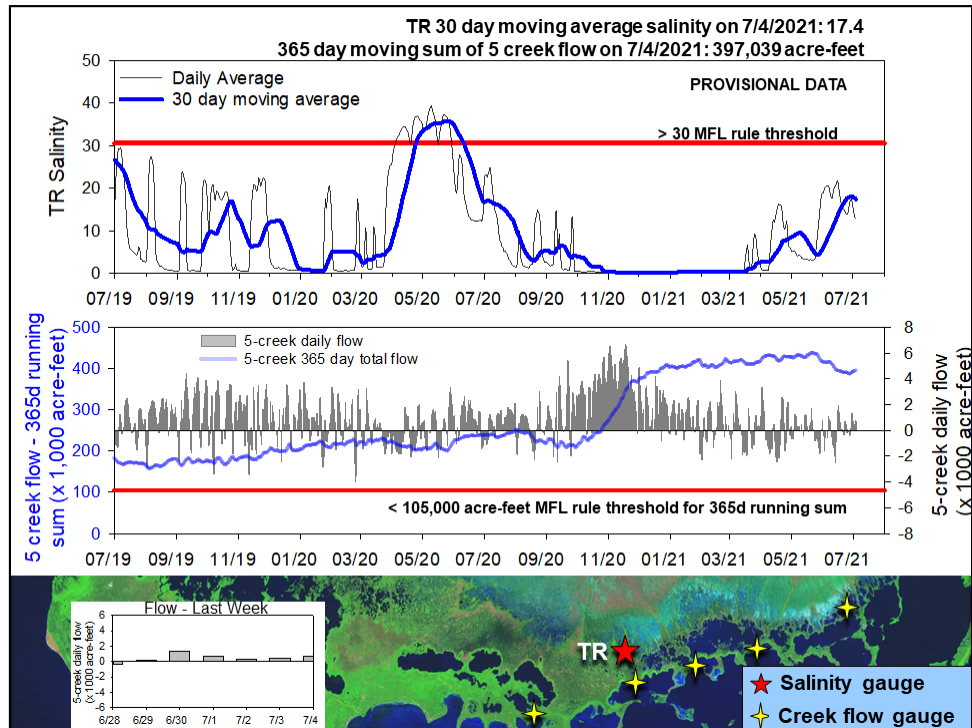


Figure EV-11. Top panel: Taylor River 30-day moving average salinity (blue), daily average salinity (gray) with salinity threshold; middle panel: Five-creek total flow for past 365 days (blue), daily flow (gray) with 365-day flow threshold; bottom panel: map of monitoring locations for the five creeks.

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

SFWMD Everglades Ecological Recommendations, July 6th, 2021 (red is new)			
Area	Weekly change	Recommendation	Reasons
WCA-1	Stage increased by 0.18'	Maintain ascension rates between 0.01 and 0.25 feet per week.	Protect within basin and downstream habitat and wildlife. Protect wading bird foraging.
WCA-2A	Stage increased by 0.37'	Maintain ascension rate to between 0.01 and 0.25 feet per week	Protect within basin and downstream habitat and wildlife.
WCA-2B	Stage increased by 0.27'	Maintain ascension rate to between 0.01 and 0.25 feet per week	Protect within basin wading bird foraging.
WCA-3A NE	Stage increased by 0.06'	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.
WCA-3A NW	Stage increased by 0.57'	Maintain ascension rate to between 0.01 and 0.25 feet per week	
Central WCA-3A S	Stage increased by 0.06'	Moderate ascension rate to between 0.01 and 0.10 feet per week	Protect within basin wading bird foraging.
Southern WCA-3A S	Stage decreased by 0.02'		
WCA-3B	Stage increased by 0.07'	Maintain ascension rates between 0.01 and 0.25 feet per week	Protect within basin and downstream habitat and wildlife.
ENP-SRS	Stage increased by 0.21'	Make discharges to the Park according to COP and TTFP protocol while considering upstream and downstream ecological conditions.	Protect within basin and upstream habitat and wildlife.
Taylor Slough	Stage changes ranged -0.15' to +0.09'	Move water southward as possible.	When available, provide freshwater buffer for downstream conditions.
FB- Salinity	Salinity changes ranged -3.5 to +0.6	Move water southward as possible.	When available, provide freshwater to maintain low salinity buffer and promote water movement.