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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: May 19, 2021

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

Limited moisture remains over the District with plentiful moisture along a frontal boundary across Cuba. Moisture associated with the front is expected to increase shower activity near the southern end of the District Tuesday through Friday. The focus of heavy rainfall is currently forecast to remain across the Florida Keys with light to moderate rainfall totals affecting the eastern and southern portions of the District Tuesday through Thursday. Sinking air associated with a strengthening upper level high pressure will bring in drier conditions from the northeast during the day Friday with mostly dry conditions expected to persist into early next week. During the first 7-day period (Week 1), total rainfall is forecast to be below the historical average. While some daily shower and thunderstorm activity may return later in the second 7-day period (Week 2), it is not likely that rainfall totals will keep pace with the historical average, so total rainfall is forecast to be below average.

Kissimmee

With minor departures, stages in East Lake Toho and Toho are following their target recession lines, which are projected to bring lake stages to their regulation lows on June 1 at a rate of approximately 0.17 feet/week. Kissimmee-Cypress-Hatchineha receded at an average rate of 0.19 feet/week over the past week. Flow at S-65A continues to be too low for extensive inundation of the Kissimmee River floodplain, and mean floodplain depth decreased to 0.10 feet on May 16, down from 0.14 feet the week before. Dissolved oxygen concentration in the Kissimmee River averaged 7.2 mg/L for the week, well above the 2.0 mg/L threshold considered harmful to sportfish.

Lake Okeechobee

Lake Okeechobee stage was 13.47 feet NGVD on May 16, 2021, 0.27 feet lower than last week and 0.73 feet lower than a month ago. The Lake is currently in the Low Sub-band. Stage had been above or near the top of the preferred ecological envelope since August 1, 2020, reentered the envelope on March 30, 2021, and is currently following along the upper threshold. The Lake has been within the envelope only ~20% of the time

since January 1, 2021. Recent satellite imagery (May 15, 2021) shows a decrease in the central pelagic region but remains elevated along the shoreline.

Estuaries

Total inflow to the St. Lucie Estuary averaged approximately 194 cfs over the past week with no flow coming from Lake Okeechobee. Mean salinities increased at all sites within 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 1,921 cfs over the past week with approximately 1,170 cfs coming from the Lake. Mean salinities remained the same 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, May 16, 2021, approximately 9,700 ac-ft of Lake Okeechobee water was delivered to the FEBs/STAs. The total amount of Lake releases sent to the FEBs/STAs in WY2022 (since May 1, 2021) is approximately 20,000 ac-feet. The total amount of inflows to the STAs in WY2022 is approximately 23,000 ac-feet. Most STA cells are near 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, STA-2 Flow-ways 3 and 4, and STA-3/4 Western Flow-way 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. Nests of Migratory Bird Treaty Act (MBTA) protected species have been observed in STA-1W. This week, if 2008 LORS recommends Lake releases to the WCAs and conditions allow, releases will be sent to STA-2 and STA-3/4.

Everglades

The current estimated number of 65,000 wading bird nests is the second highest seen since the 1940s. Foraging conditions in WCA-1 and WCA-3A South and southern Everglades National Park (ENP) near all the major colonies are currently excellent, and there is enough water to allow for a recession throughout the rest of the season without the habitat becoming overly dry. The likely only constraint to nesting success will be the timing of the start of the wet season and the first major reversal. Very dry conditions continue dominate in WCA-3A North, with a public closure likely coming this week. Salinities in Florida Bay and Taylor Slough are gradually increasing, but the Bay remains well positioned to minimize hypersalinity before the wet season.

Supporting Information

Kissimmee Basin

Upper Kissimmee

Lake stages on May 16, 2021 were 55.3 feet NGVD (0.3 feet below schedule) in East Lake Toho, 52.4 feet NGVD (0.2 feet below schedule) in Lake Toho, and 50.7 feet NGVD (1.2 feet above schedule) in Lakes Kissimmee-Cypress-Hatchineha (KCH) (**Table KB-1, Figures KB-1-3**). With minor departures, stages in East Lake Toho and Toho are following their target recession lines, which are projected to bring lake stages to their regulation lows on June 1 at a rate of approximately 0.17 feet/week. Kissimmee-Cypress-Hatchineha receded at an average rate of 0.19 feet/week over the past week.

Lower Kissimmee

Kissimmee River (headwater) stages were 46.27 feet NGVD at S-65A and 25.65 feet NGVD at S-65D on May 16, 2021, while discharges were 541 cfs at S-65, 456 cfs at S-65A, 512 cfs at S-65D and 521 cfs at S-65E (**Table KB-2**). Dissolved oxygen concentration in the Kissimmee River averaged 7.2 mg/L for the week ending May 16, 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 decreased to 0.10 feet on May 16, down from 0.14 feet the week before (**Figure KB-5**).

Water Management Recommendations

In Lakes East Toho and Toho, continue to reduce stage along their target recession lines (recession rates of 0.17 feet/week) to reach their regulation schedule low stages on June 1. Continue to follow the USACE request to hold S-65A discharge below 800-900 cfs to facilitate construction for the Kissimmee River Restoration Project. Allow stage to recede in Kissimmee-Cypress-Hatchineha while not exceeding 0.18 feet/week.

Table KB-1. Average discharge for the preceding seven days, 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)	
							5/16/21	5/9/21
Lakes Hart and Mary Jane	S-62	LKMJ	19	59.7	R	59.8	-0.1	-0.2
Lakes Myrtle, Preston and Joel	S-57	S-57	6	60.2	R	60.2	0.0	-0.1
Alligator Chain	S-60	ALLI	36	62.4	R	62.4	0.0	0.0
Lake Gentry	S-63	LKGT	51	59.9	R	59.9	0.0	0.0
East Lake Toho	S-59	TOHOE	59	55.3	R	55.6	-0.3	-0.4
Lake Toho	S-61	TOHOW S-61	160	52.4	R	52.6	-0.2	-0.4
Lakes Kissimmee, Cypress and Hatchineha	S-65	KUB011 LKIS5B	570	50.7	R	49.5	1.2	1.1

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

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

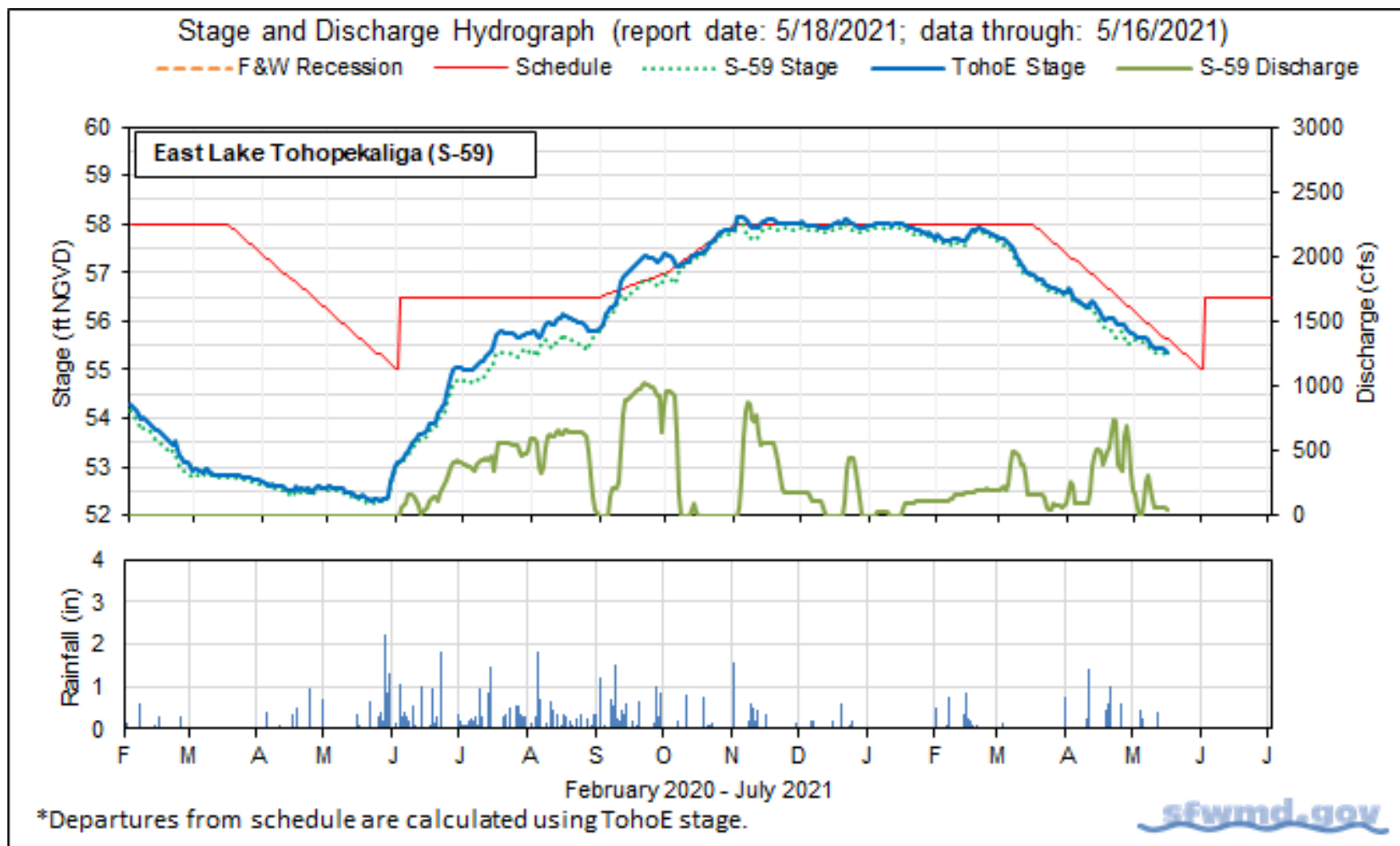


Figure KB-1. East Lake Toho regulation schedule, stage, discharge and rainfall.

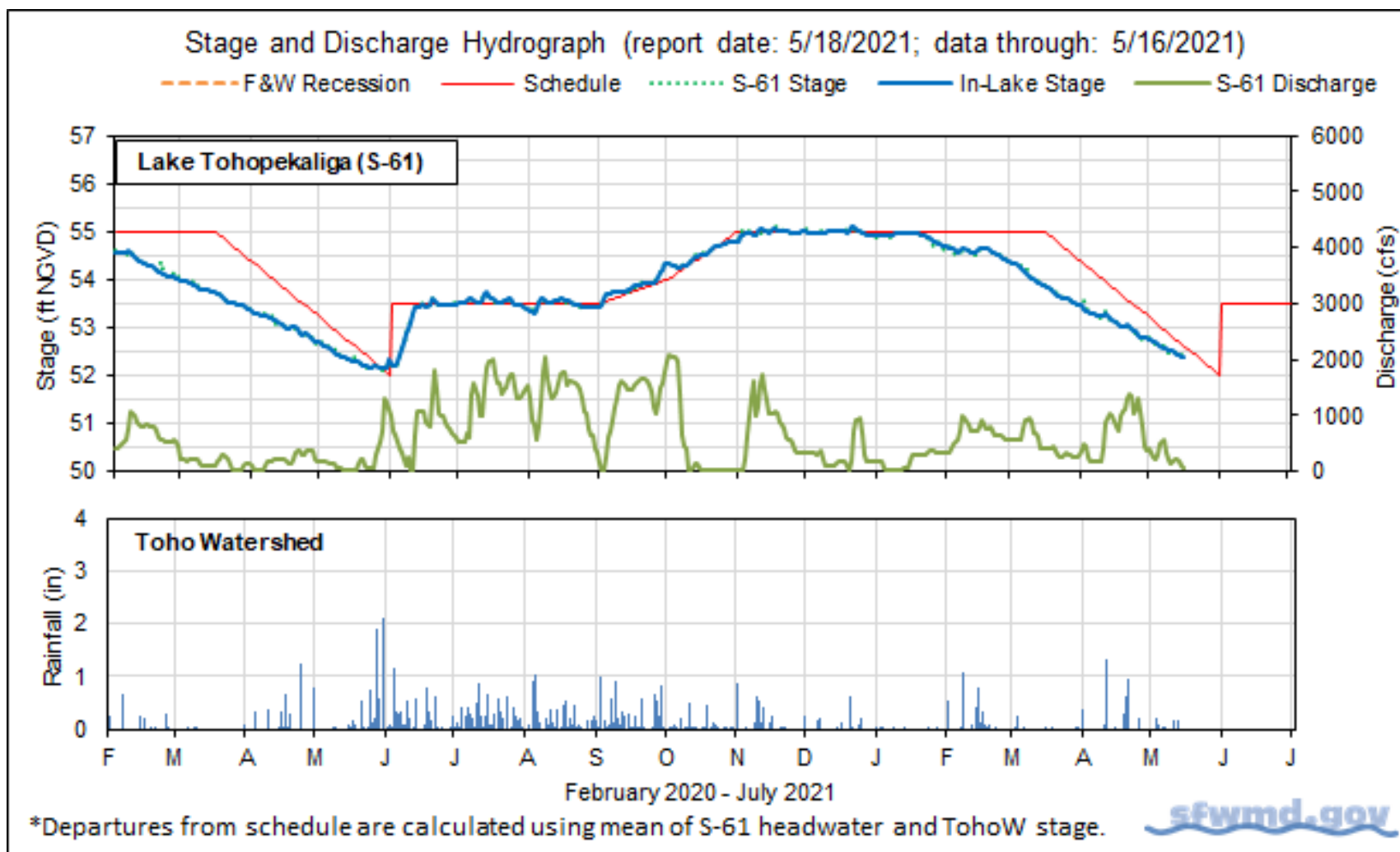


Figure KB-2. Lake Toho regulation schedule, stage, discharge and rainfall.

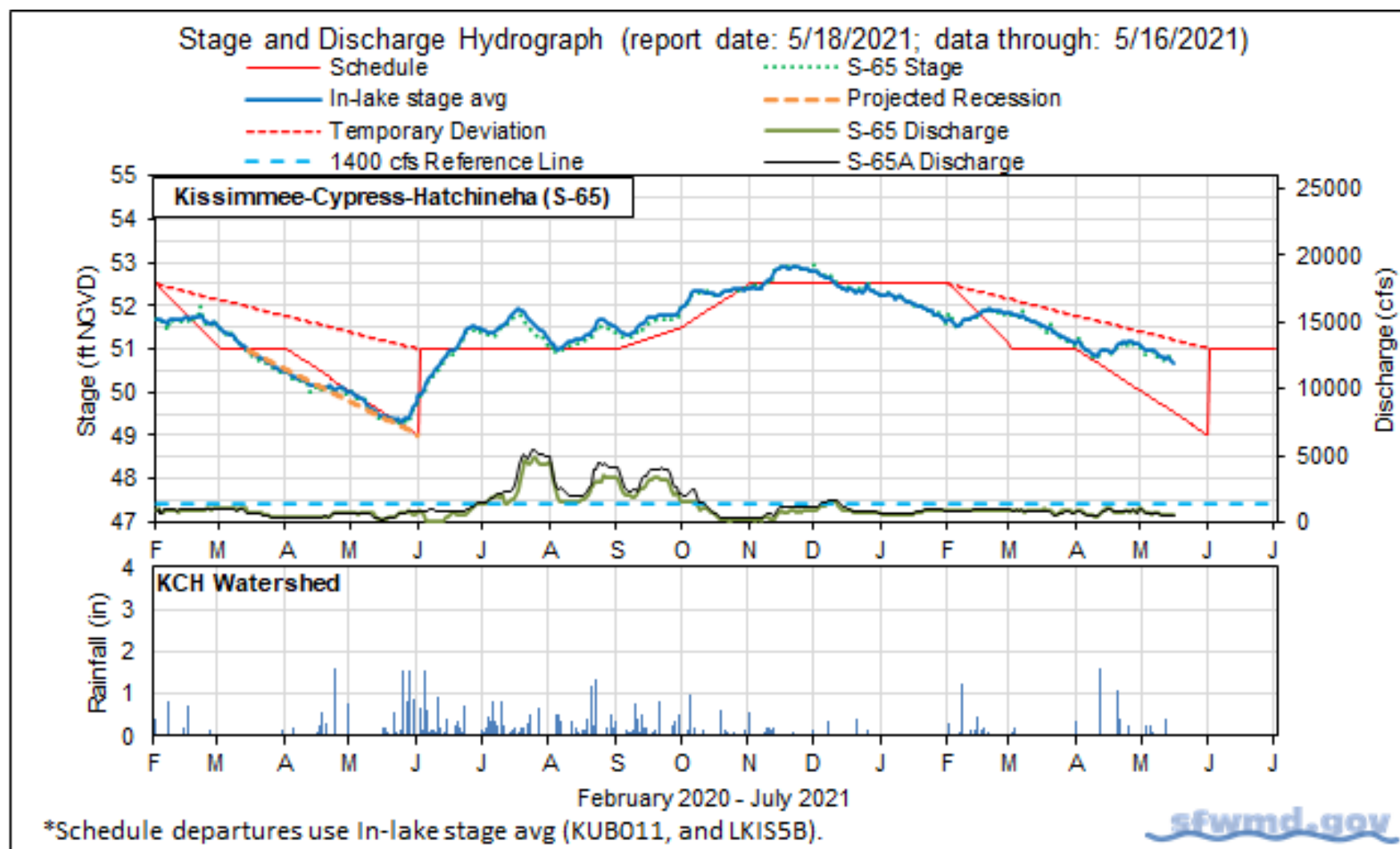


Figure KB-3. Lakes Kissimmee, Cypress and Hatchineha regulation schedule, stage, discharge and rainfall.

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

Metric	Location	Daily Average 5/16/21	Average for Previous Seven Day Periods			
			5/16/21	5/9/21	5/2/21	4/25/21
Discharge	S-65	541	570	692	902	757
Discharge	S-65A ^a	456	483	613	836	881
Discharge	S-65D ^b	512	549	771	941	968
Headwater Stage (feet NGVD)	S-65D ^c	25.65	25.73	25.74	25.85	25.86
Discharge (cfs)	S-65E ^d	521	531	756	857	957
Discharge (cfs)	S-67	0	0	0	0	0
Dissolved Oxygen (mg/L) ^e	Phase I, II/III river channel	8.1	7.2	6.6	6.5	6.5
Mean depth (feet) ^f	Phase I floodplain	0.10	0.10	0.14	0.19	0.29

a. Combined discharge from main and auxiliary structures.

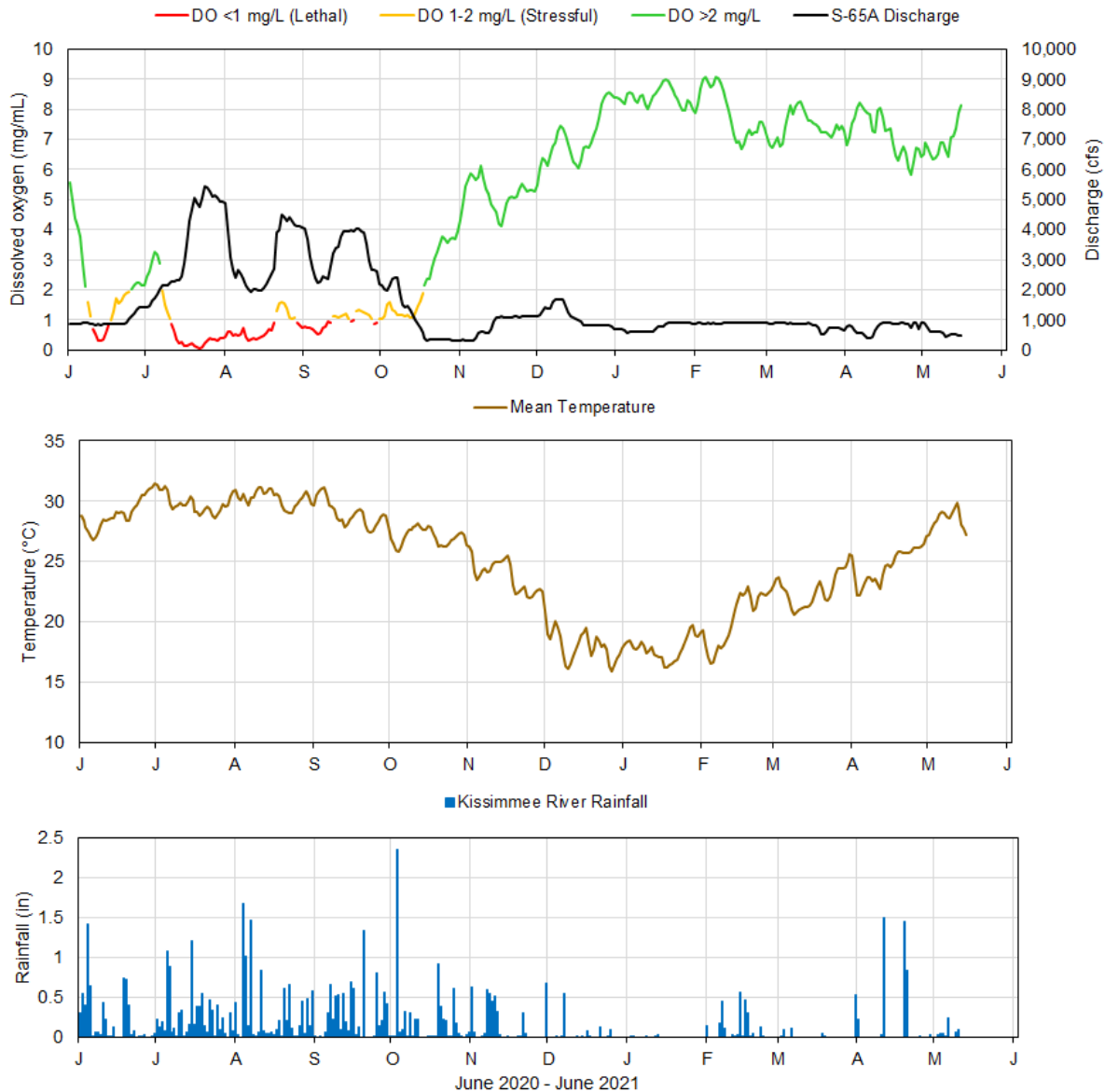
b. Combined discharge from S-65D, S-65DX1 and S-65DX2.

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).



Dissolved oxygen (DO) and temperature are mean daily values averaged for PC62, KRBN, PC33, PD62R and PD42R with an average of 3 stations reporting this week. Rainfall values are daily totals for Kissimmee River (Pool BCD) AHED watershed.
Report Date: 5/18/2021; data are through: 5/16/2021

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.

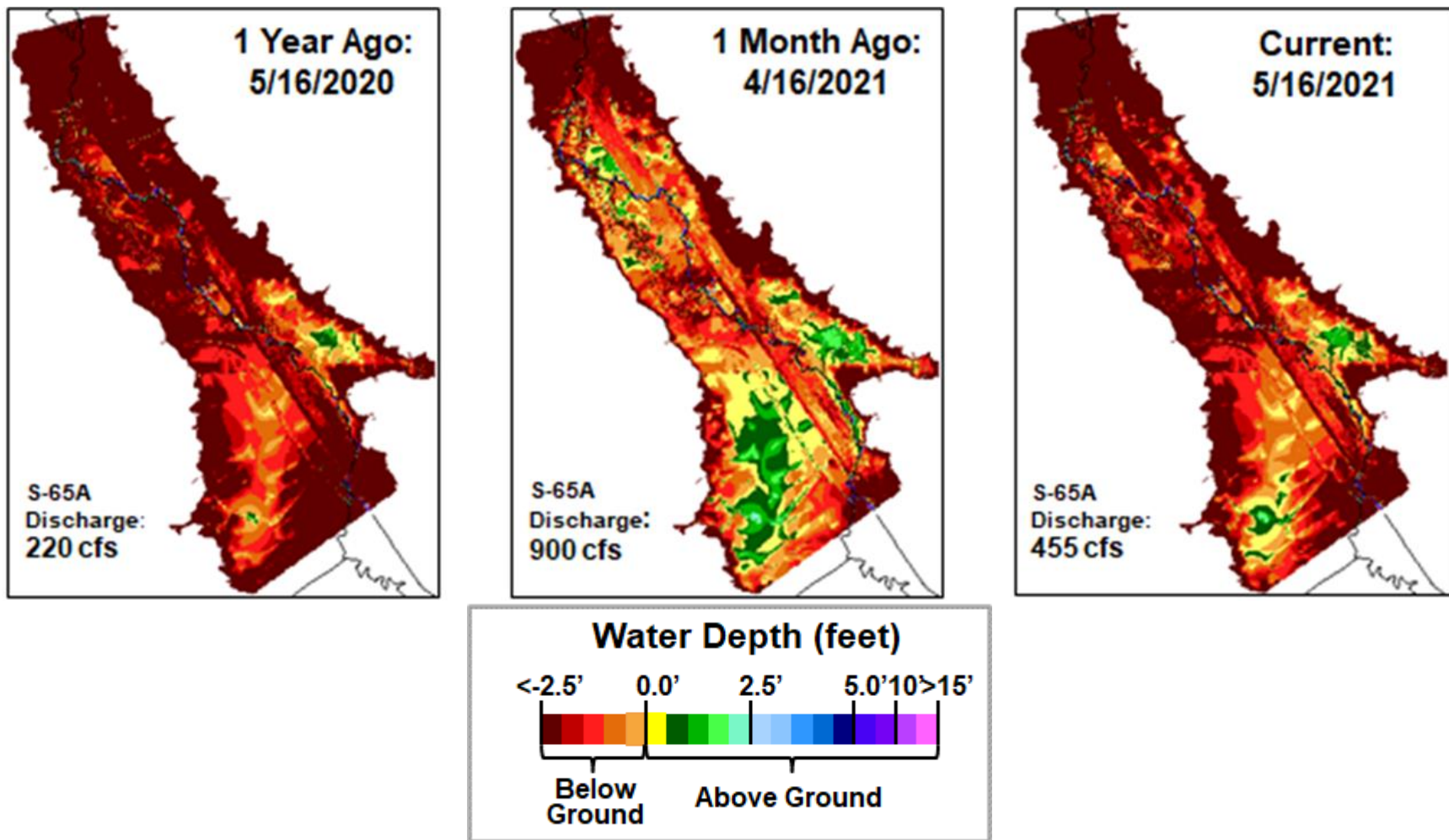


Figure KB-5. Phase I area Kissimmee River floodplain water depths (from left to right) one year ago, one month ago and current.

Lake Okeechobee

Lake Okeechobee stage was 13.47 feet NGVD on May 16, 2021, 0.73 feet lower than a month ago, and 2.46 feet higher than one year ago (**Figure LO-1**). Lake stages rose into the lower portion of the preferred ecological envelope on June 2, 2020 (**Figure LO-2**) and had been above the envelope since August 1, 2020. Lake stage reentered the envelope on March 30, 2021, and is currently following along the upper threshold. The Lake has been within the envelope only ~20% of the time since January 1, 2021. Lake stage reached a low of 10.99 feet on May 17 and a high of 16.45 feet on November 12 (post Tropical Storm Eta), a difference of 5.5 feet (**Figure LO-3**). Lake stage declined slowly from mid-November through mid-February, then recession rates increased until early April. Lake stage has seen a steady decline for the past several weeks. According to NEXRAD, 0.24 inches of rain fell directly on the Lake last week.

Average daily inflows (excluding rainfall) decreased from the previous week, going from 882 cubic feet per second (cfs) to 556 cfs. Outflows (excluding evapotranspiration) increased, going from 4,363 cfs to 4,416 cfs. The majority of the inflow came from the Kissimmee River (531 cfs through S-65E & S-65EX1). Releases to the west via S-77 decreased from 2,038 cfs to 2,010 cfs, and releases east via S-308 slightly decreased, going from 126 cfs to 120 cfs. Releases south through the S-350 structures increased from 2,124 cfs to 2,286 cfs. Average inflows and outflows through water control structures surrounding the Lake for the previous two weeks (cfs) are shown in **Table LO-1**. The resultant Lake elevation change in inches (in) due to each structure's flow for the past week is also shown in **Table LO-1**. **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.

Water quality sampling is now on the bloom season schedule (May – October), occurring twice monthly at 32 stations for chlorophyll *a*, taxonomic identification, and toxin analyses (**Figure LO-5**). Most of the sampling for early May occurred on the 4th and 5th. Chlorophyll *a* (Chla) results from the 32 sites sampled indicated bloom conditions (>40.0 µg/L) at ten locations around the lake, primarily along the shorelines, with several values near and over 100 µg/L on the eastern shore. The cyanotoxin microcystin was detected at all 30 stations where it was analyzed, with nine stations having values >8 µg/L, the limit recommended by the EPA for recreational exposure. Those values ranged from 9.1 µg/L to a high of 440 µg/L off the western shore, though Chla values were just less than 40 µg/L at that station. The highest Chla value occurred on the eastern shore (116.0 µg/L) with a corresponding toxin value of 16.0 µg/L. The algal community at all but three sites was dominated by the cyanobacteria *Microcystis* (**Table LO-2**).

The most recent satellite image (May 15, 2021) from the NOAA cyanobacteria monitoring product derived from EUMETSAT's Sentinel 3 OLCI sensor data showed a decrease in the central pelagic region but remains elevated along the shoreline (**Figure LO-6**).

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

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	755	531	0.2	S-77	2038	2010	0.9
S-71 & S-72	0	0	0.0	S-308	126	120	0.1
S-84 & S-84X	76	0	0.0	S-351	875	937	0.4
Fisheating Creek	28	18	0.0	S-352	514	360	0.2
S-154	0	0	0.0	S-354	735	989	0.4
S-191	0	0	0.0	L-8 Outflow	75	1	0.0
S-133 P	0	0	0.0	Evapotranspiration	3170	2909	1.2
S-127 P	0	0	0.0	Totals	7533	7323	3.1
S-129 P	0	0	0.0				
S-131 P	3	7	0.0				
S-135 P	0	0	0.0				
S-2 P	0	22	0.0				
S-3 P	0	0	0.0				
S-4 P	0	0	0.0				
L-8 Backflow							
Rainfall	1509	642	0.3				
Totals	2397	1197	0.5				

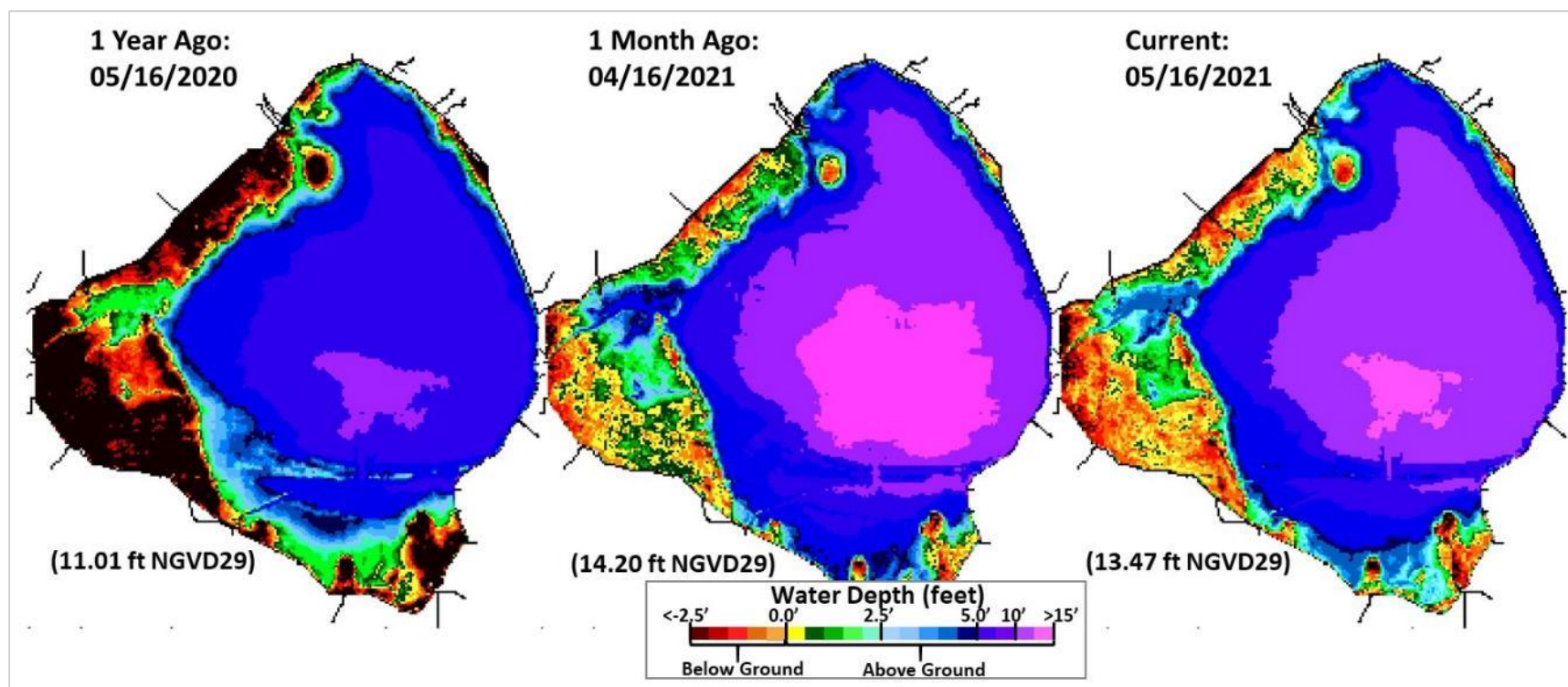


Figure LO-1. Lake Okeechobee water depth estimates based on South Florida Water Depth Assessment Tool (SFWDAT).

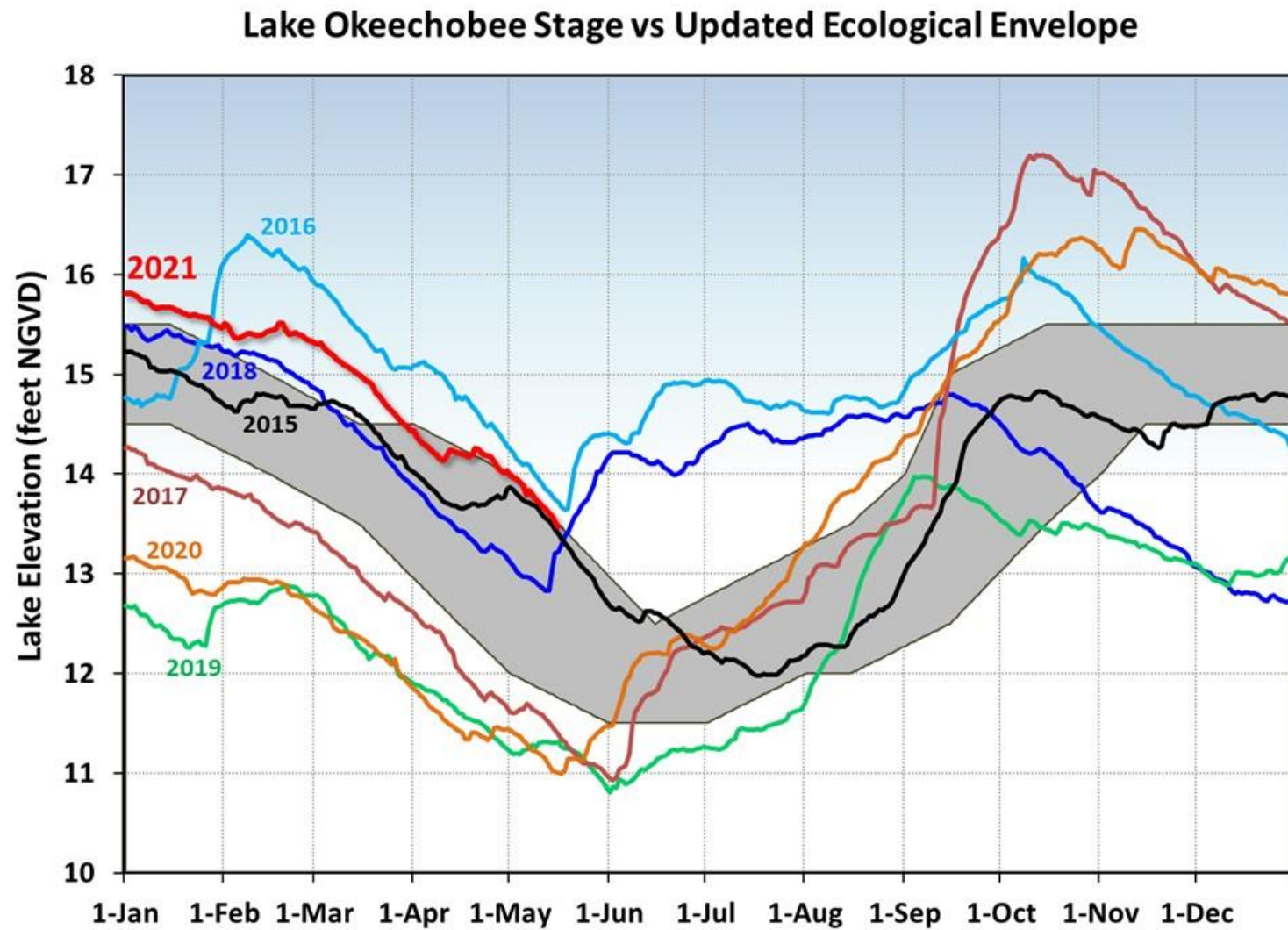
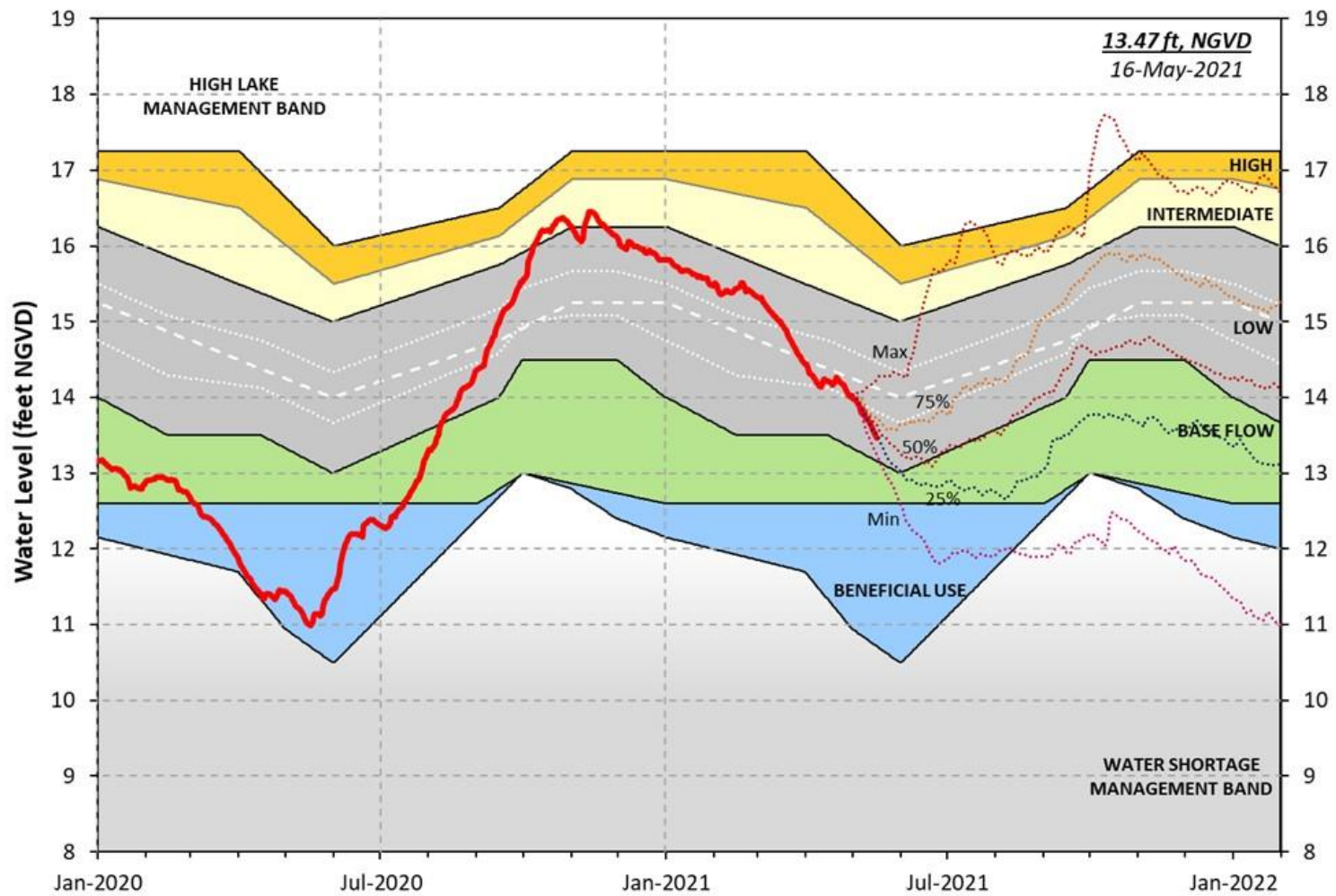


Figure LO-2. Select annual stage hydrographs for Lake Okeechobee in comparison to the updated ecological envelope.

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.

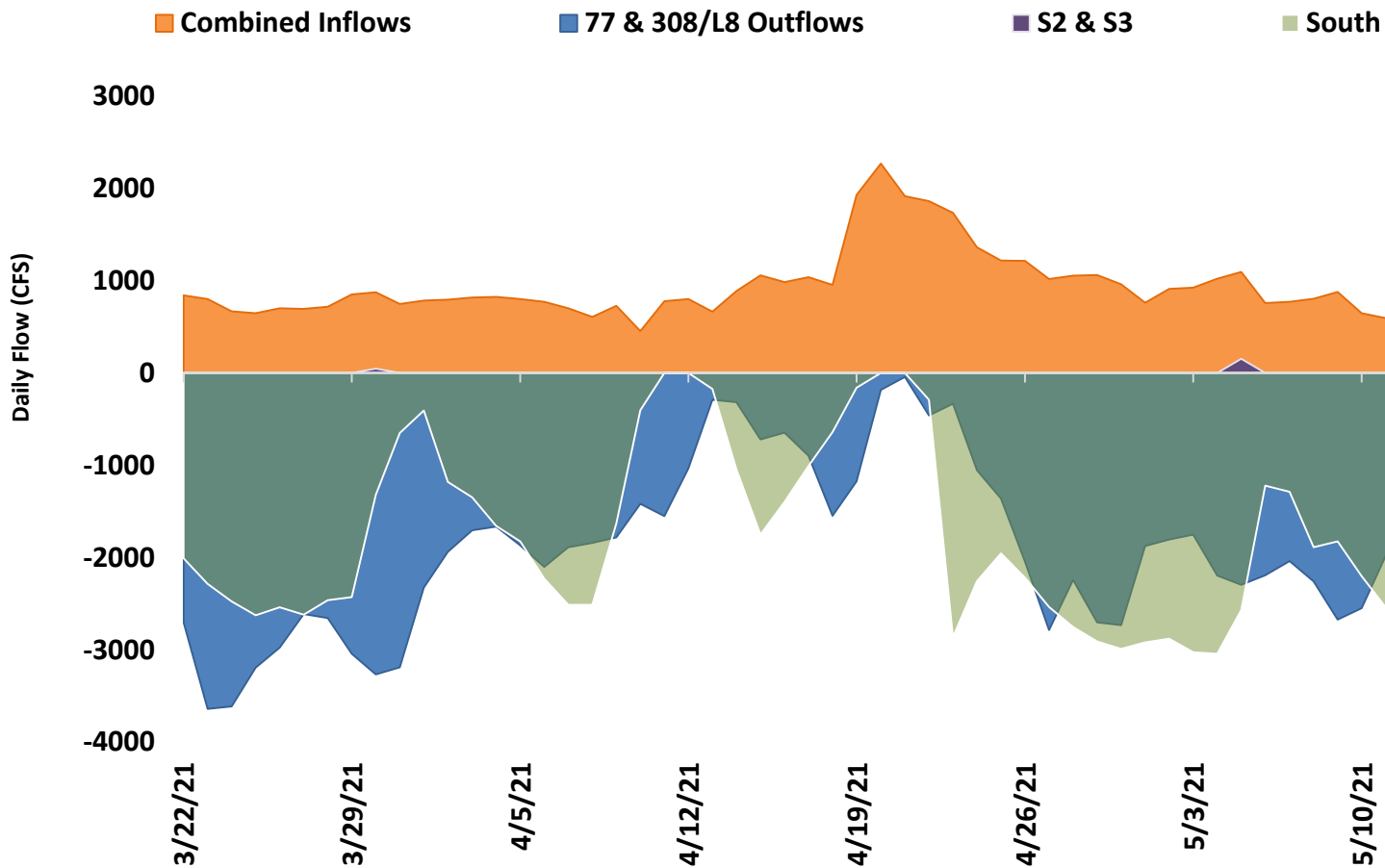


Figure LO-4. Major inflows (orange) to and outflows east and west (blue) from Lake Okeechobee. Outflows south are shown in green. Flows into Lake Okeechobee from the L-8 canal through S-271 (formerly Culvert 10A) are included as inflows. Conversely, flows from Lake Okeechobee into the L-8 Canal are included 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 May 4-5, 2021.

Station	Chl <i>a</i> (µg/L)	Toxin (µg/L)	Taxa	Station	Chl <i>a</i> (µg/L)	Toxin (µg/L)	Taxa
FEBIN	77.3			L001	27.3	0.7	<i>Microcys</i>
FEBOUT	44.3			L004	22.8	6.0	<i>Microcys</i>
KISSR0.0	33.6	0.3	mixed	L006	6.2	6.6	<i>Microcys</i>
L005	23.1	3.8	<i>Microcys</i>	L007	5.9	1.0	<i>Microcys</i>
LZ2	87.7	0.3	mixed	L008	12.9	17.0	<i>Microcys</i>
KBARSE	69.9	0.5	<i>Microcys</i>	LZ30	8.2	1.1	<i>Microcys</i>
RITTAE2	15.8	9.1	<i>Microcys</i>	LZ40	10.7	1.6	<i>Microcys</i>
PELBAY3	3.8	1.0	<i>Microcys</i>	CLV10A	104.0	57.0	<i>Microcys</i>
POLE3S	9.6	2.2	<i>Microcys</i>	NCENTER	26.7	3.3	<i>Microcys</i>
LZ25A	7.3	0.7	<i>Microcys</i>	Outflow Structures (sampled May 3)			
PALMOUT	23.5	7.0	<i>Microcys</i>	S308C	116.0	16.0	<i>Microcys</i>
PALMOUT1	14.0	47.0	<i>Microcys</i>	S77	9.8	0.5	<i>Microcys</i>
PALMOUT2	8.3	53.0	<i>Microcys</i>	<ul style="list-style-type: none"> • SFWMD considers > 40 µg/L chlorophyll <i>a</i> (Chla) 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 • Chla 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	36.5	440.0	<i>Microcys</i>				
POLESOUT	44.5	1.6	<i>Coelasph</i>				
POLESOUT1	20.3	3.8	<i>Microcys</i>				
POLESOUT2	25.8	7.3	<i>Microcys</i>				
POLESOUT3	18.0	7.8	<i>Microcys</i>				
EASTSHORE	92.2	84.0	<i>Microcys</i>				
NES135	76.1	5.8	<i>Microcys</i>				
NES191	58.5	1.3	<i>Microcys</i>				

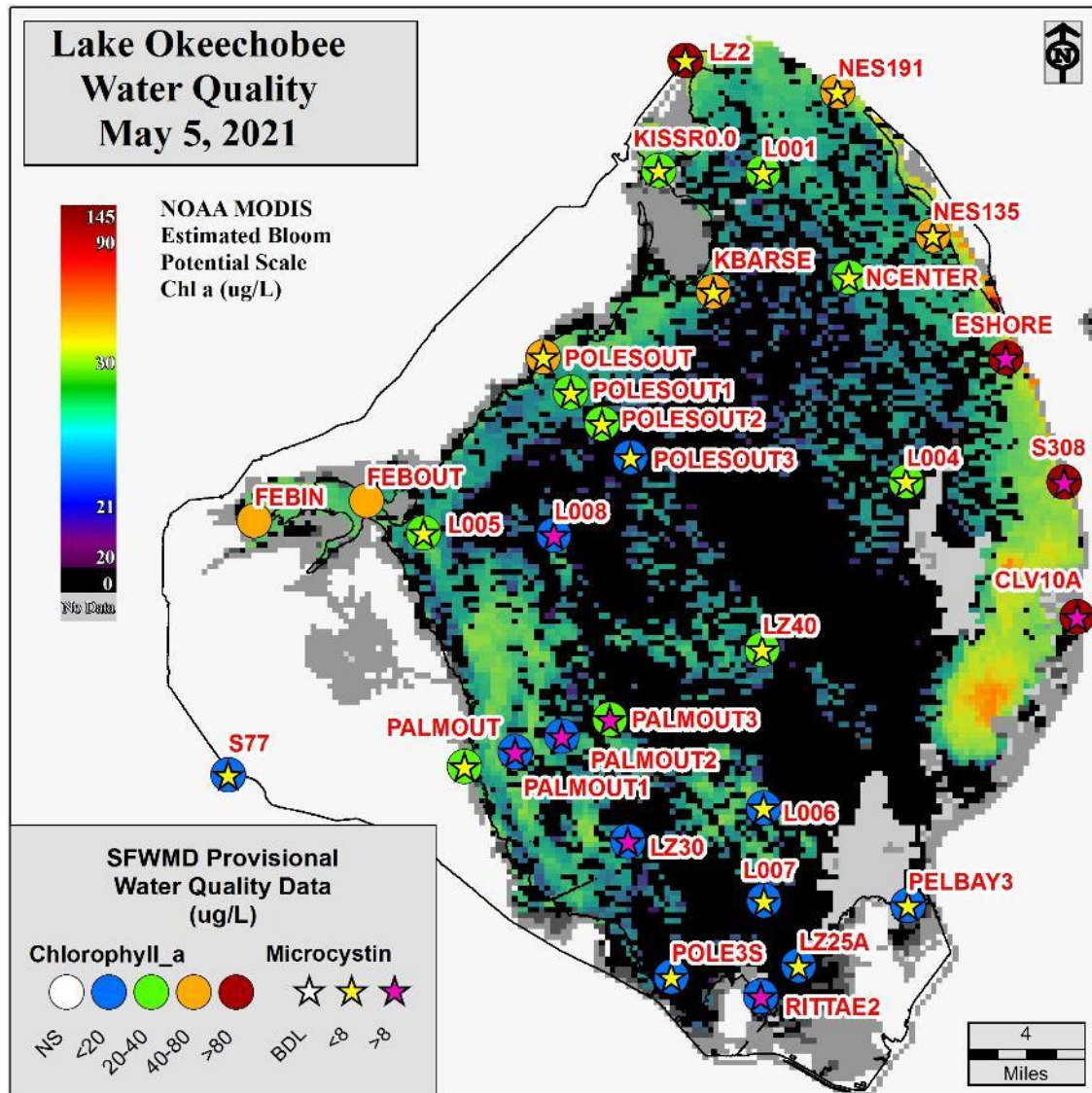


Figure LO-5. Expanded monitoring network and provisional results from samples collected May 4-5, 2021.

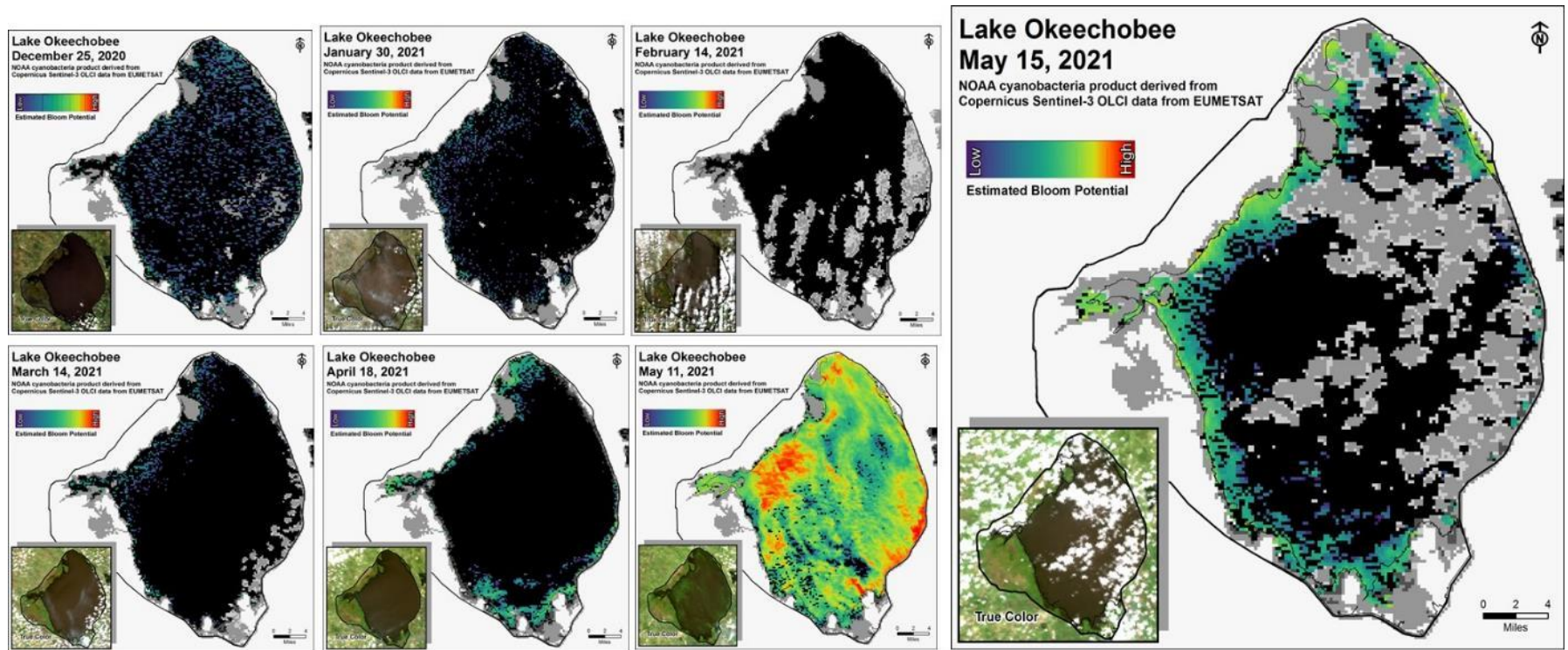


Figure LO-6. Cyanobacteria bloom potential based on NOAA's harmful algal bloom monitoring system. Gray color indicates cloud cover.

Estuaries

St. Lucie Estuary

Over the past week, mean total inflow to the St. Lucie Estuary was approximately 194 cfs (**Figures ES-1 and ES-2**) and the previous 30-day mean inflow was approximately 228 cfs. For comparison, the historical provisional mean inflows from the contributing areas are shown in **Figure ES-2**.

Over the past week, mean salinity increased at all sites within the estuary (**Table ES-1 and Figure ES-3**). The seven-day moving average of the surface and bottom salinities at the US1 Bridge was 23.9. 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 1,921 cfs (**Figures ES-5 and ES-6**) and the previous 30-day mean inflow was approximately 1,844 cfs. For comparison, the historical provisional mean inflows from the contributing areas are shown in **Figure ES-6**.

Over the past week, salinities remained the same at S-79 and Val I-75 and decreased at the remaining sites in the estuary (**Table ES-2; Figures ES-7 and ES-8**). The seven-day mean surface salinities (**Table ES-2**) were in the good range (0-10) for tape grass at Val I-75 and at Ft. Myers. The seven-day mean surface salinity values were within the good range for adult eastern oysters at 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 103 cfs.

Model results from all scenarios predict daily salinity to be 4.7 or lower and the 30-day moving average surface salinity to be 1.4 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 May 14, 2021, that *Karenia brevis*, the Florida red tide dinoflagellate, was observed at background to high concentrations in Lee County, very low to high concentrations in Collier County, and background to low concentrations in Monroe County. On the east coast, red tide was not observed in samples from Palm Beach or Miami-Dade counties.

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.

Water Management Recommendations

Lake stage is in the Low Sub-Band. Tributary conditions are normal. The LORS2008 release guidance suggests up to 3,000 cfs release at S-79 to the Caloosahatchee River Estuary and up to 1,170 cfs release at S-80 to the St. Lucie Estuary.

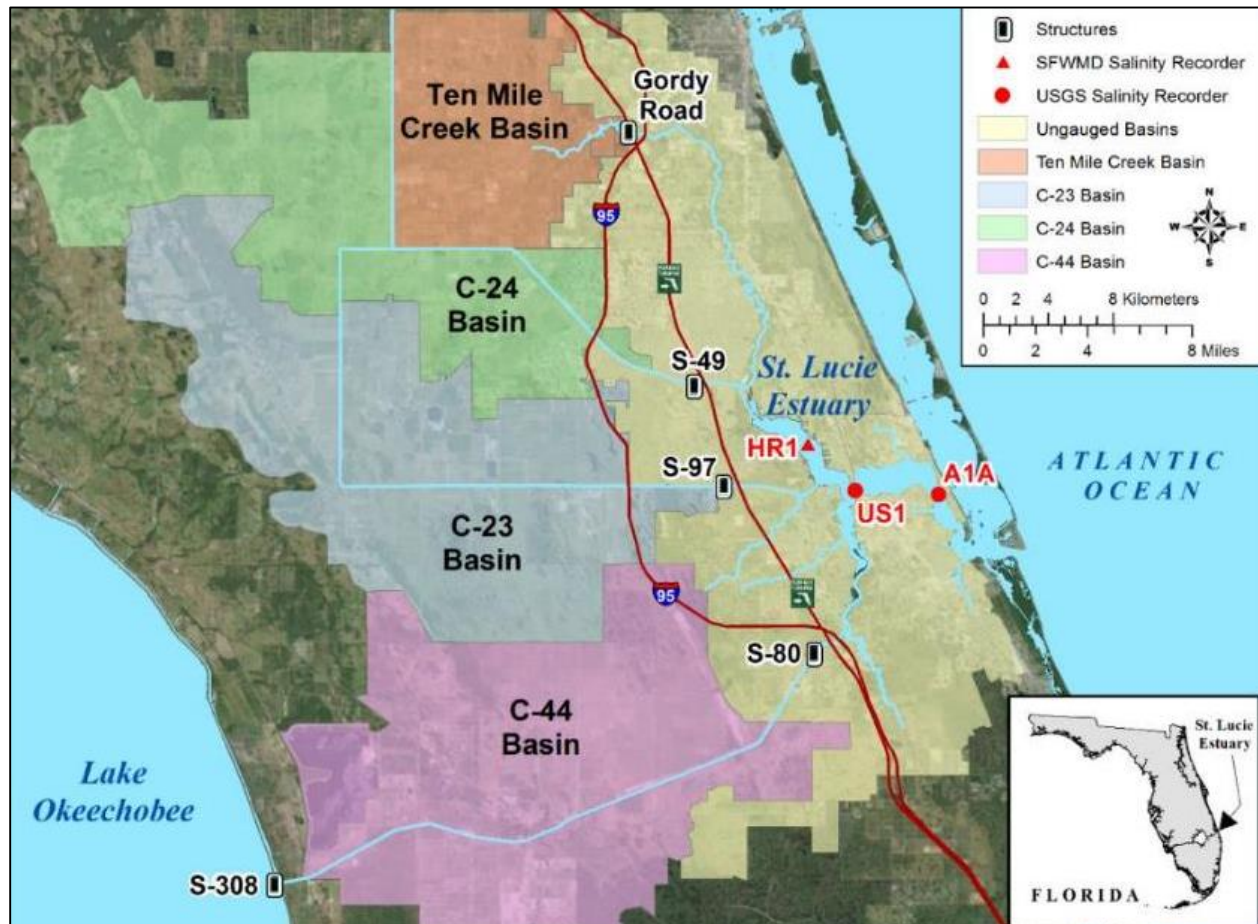


Figure ES-1. Basins, water control structures and salinity monitoring sites in the St. Lucie Estuary.

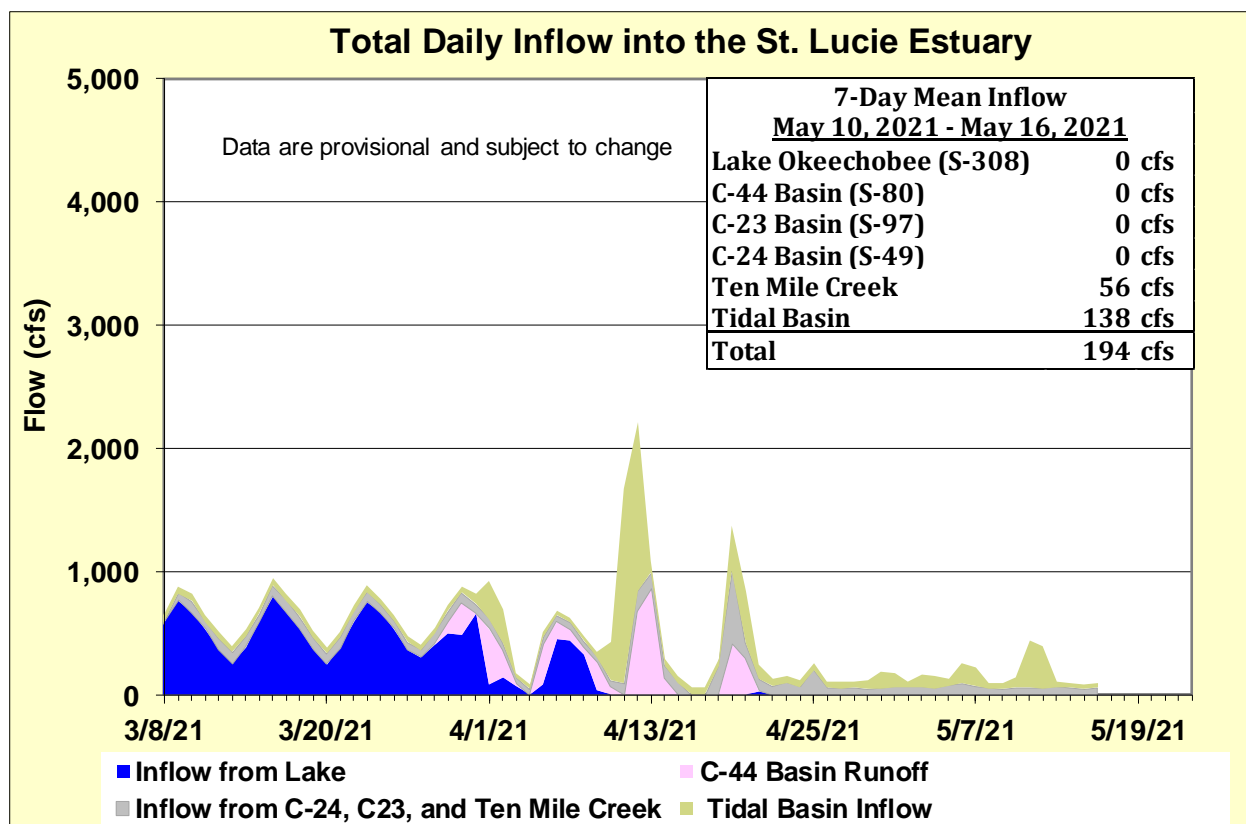


Figure ES-2. Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and Tidal Basins into the St. Lucie Estuary.

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)	17.8 (17.6)	21.4 (20.0)	NA ^a
US1 Bridge	23.3 (22.2)	24.4 (23.1)	10.0 – 26.0
A1A Bridge	30.4 (29.5)	31.9 (30.7)	NA ^a

a. The envelope is not applicable.

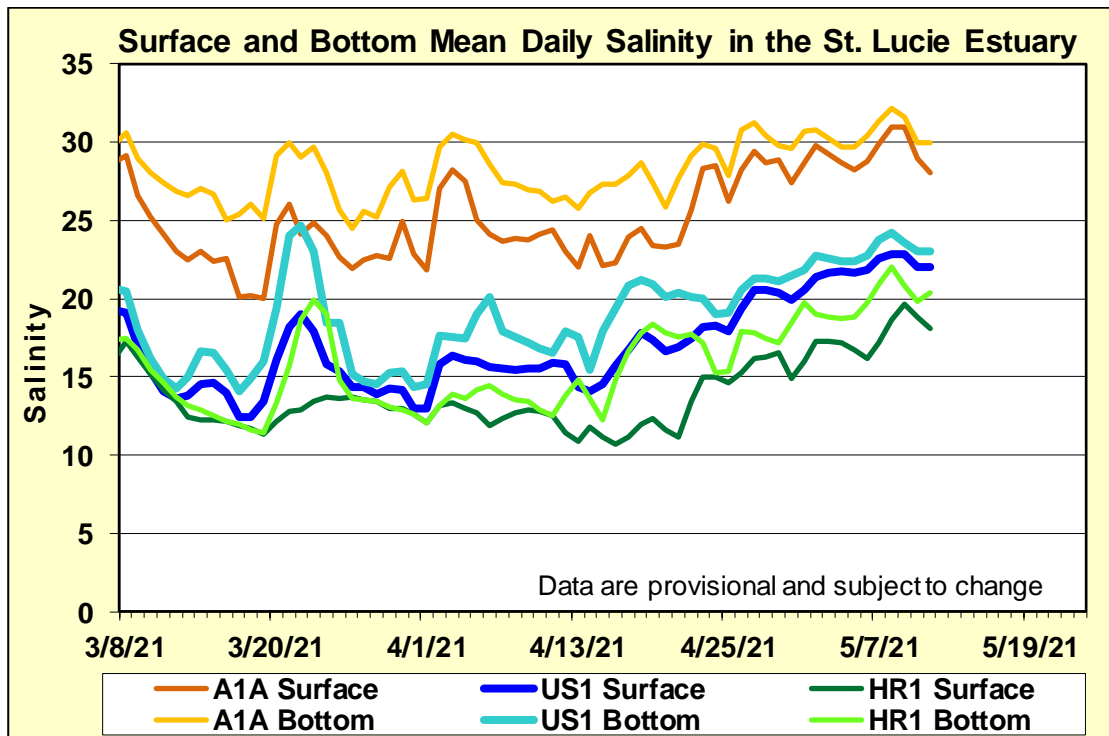


Figure ES-3. Mean daily salinity at the A1A, US1 and HR1 sites in the St. Lucie Estuary.

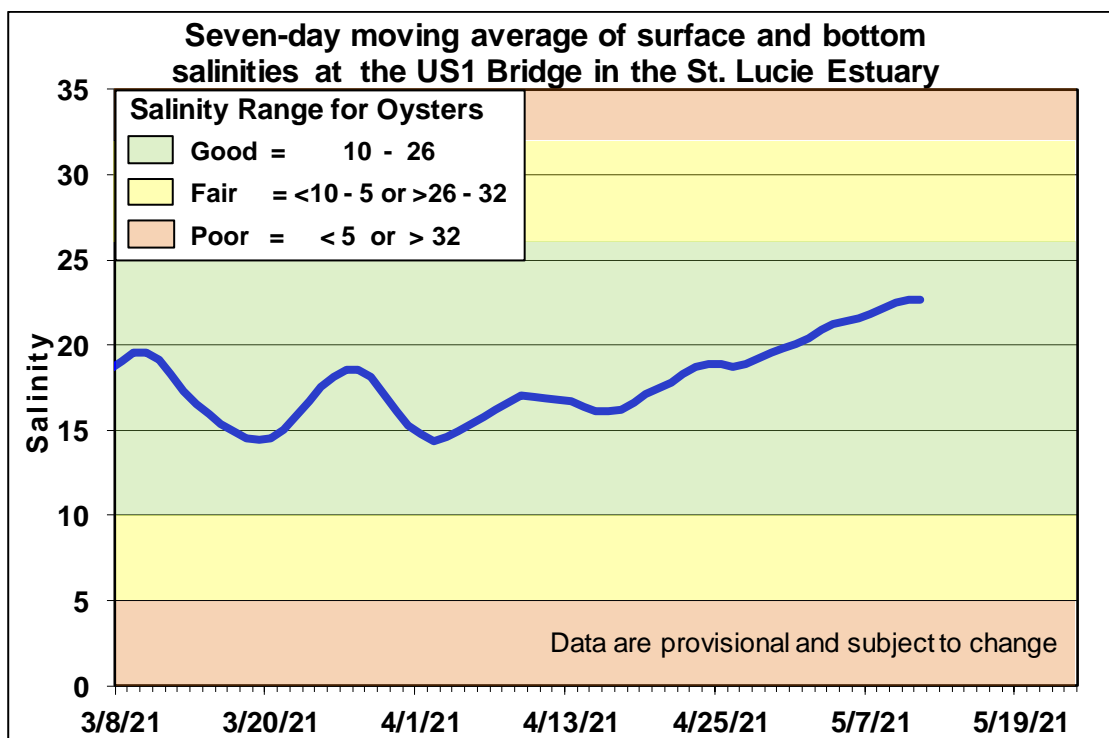


Figure ES-4. Seven-day moving average of the surface and bottom salinities at the US1 Bridge in the St. Lucie Estuary.

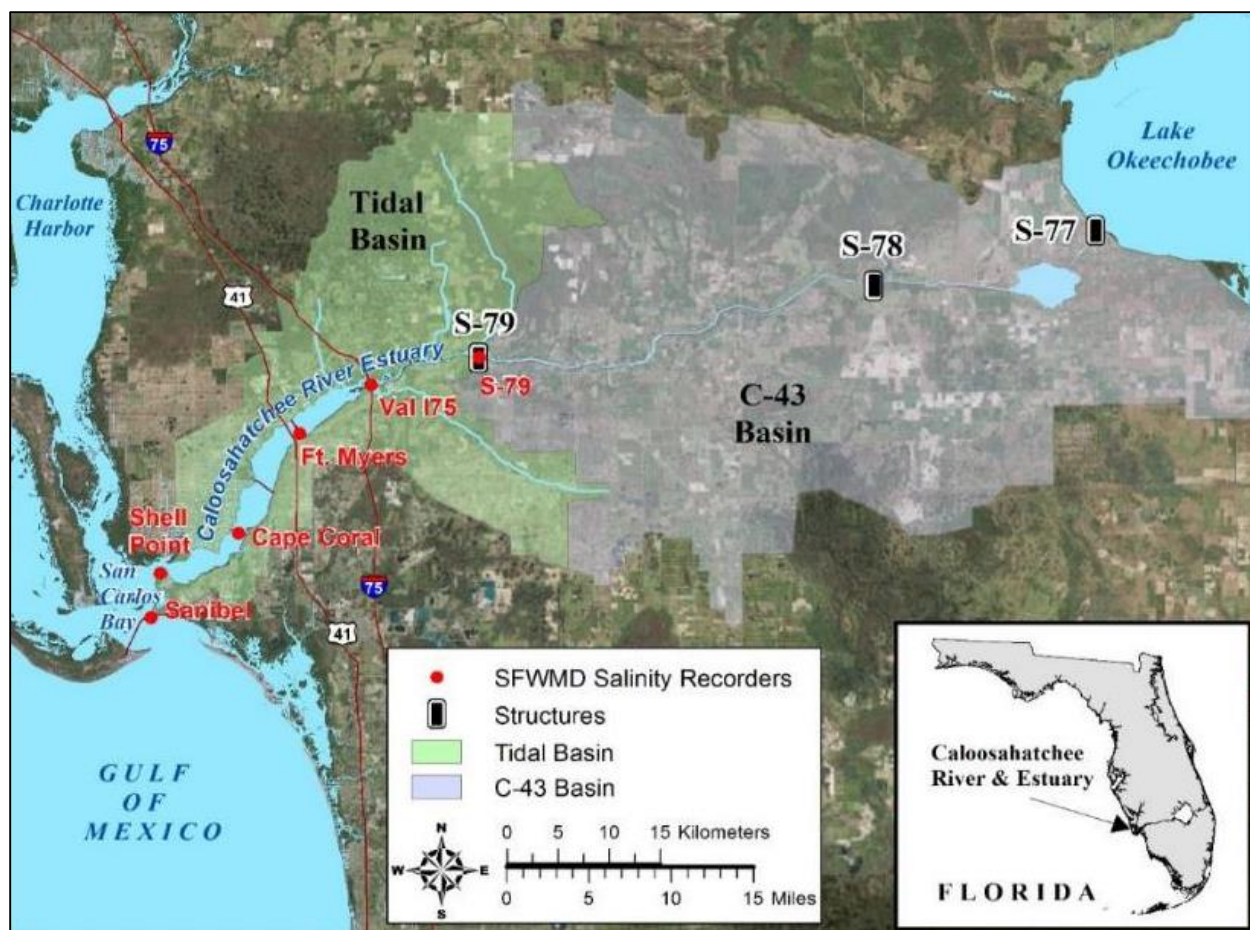


Figure ES-5. Basins, water control structures and salinity monitoring sites in the Caloosahatchee River Estuary.

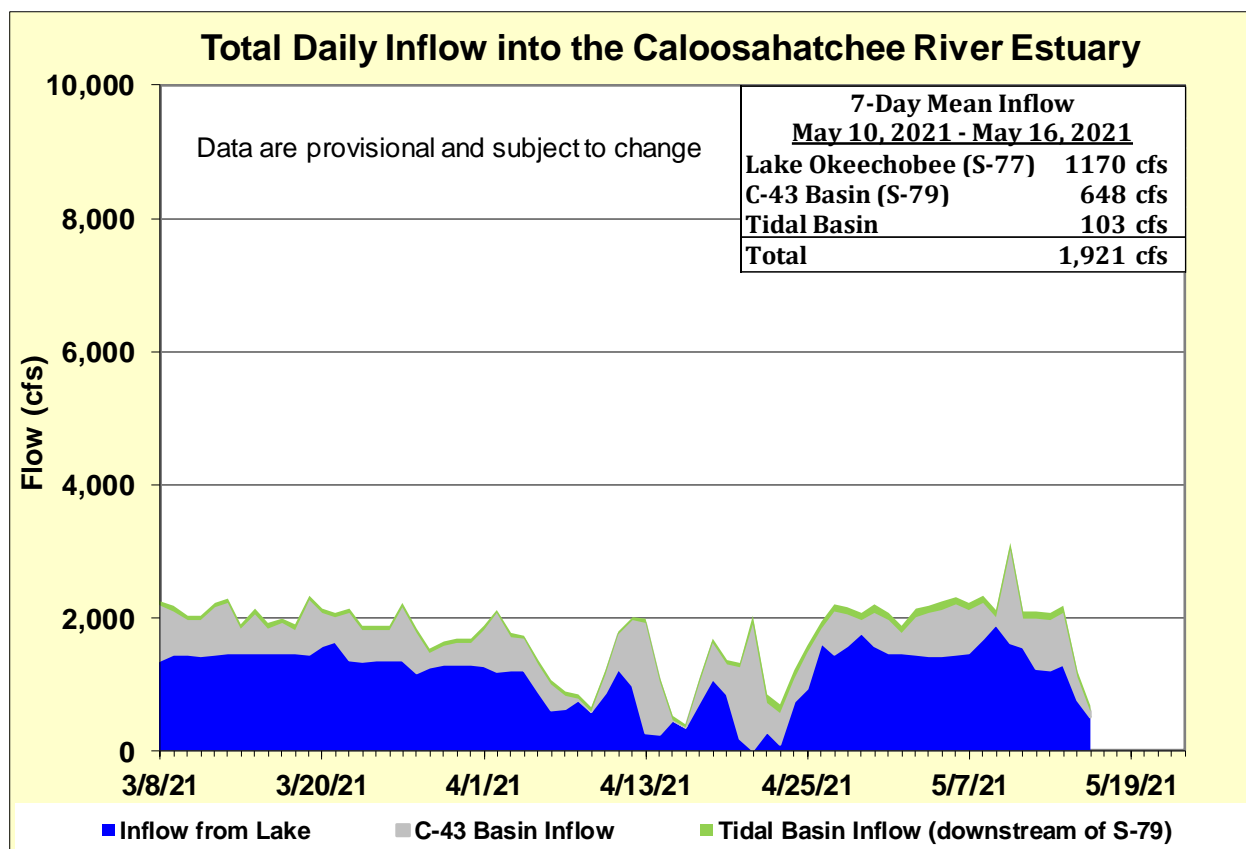


Figure ES-6. Total daily inflows from Lake Okeechobee, and runoff from the C-43 and Tidal basins into the Caloosahatchee River Estuary.

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)	0.2 (0.2)	0.2 (0.2)	NA ^a
Val I-75	0.2 (0.2)	0.2 (0.2)	0.0 – 5.0 ^b
Fort Myers Yacht Basin	1.4 (2.5)	2.3 (3.6)	NA ^a
Cape Coral	9.2 (11.5)	11.0 (12.7)	10.0 – 30.0
Shell Point	24.8 (25.5)	26.1 (26.2)	10.0 – 30.0
Sanibel	30.5 (32.2)	32.0 (32.6)	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.

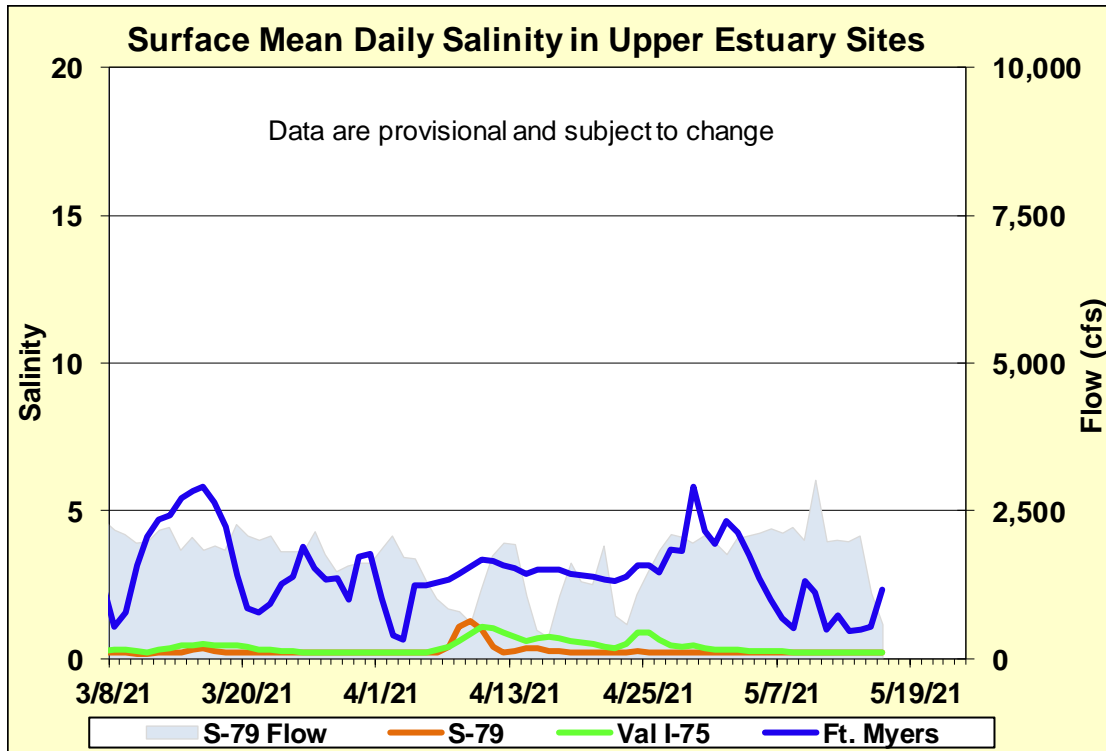


Figure ES-7. Mean daily salinity at upper Caloosahatchee River Estuary monitoring sites and mean daily flow at S-79.

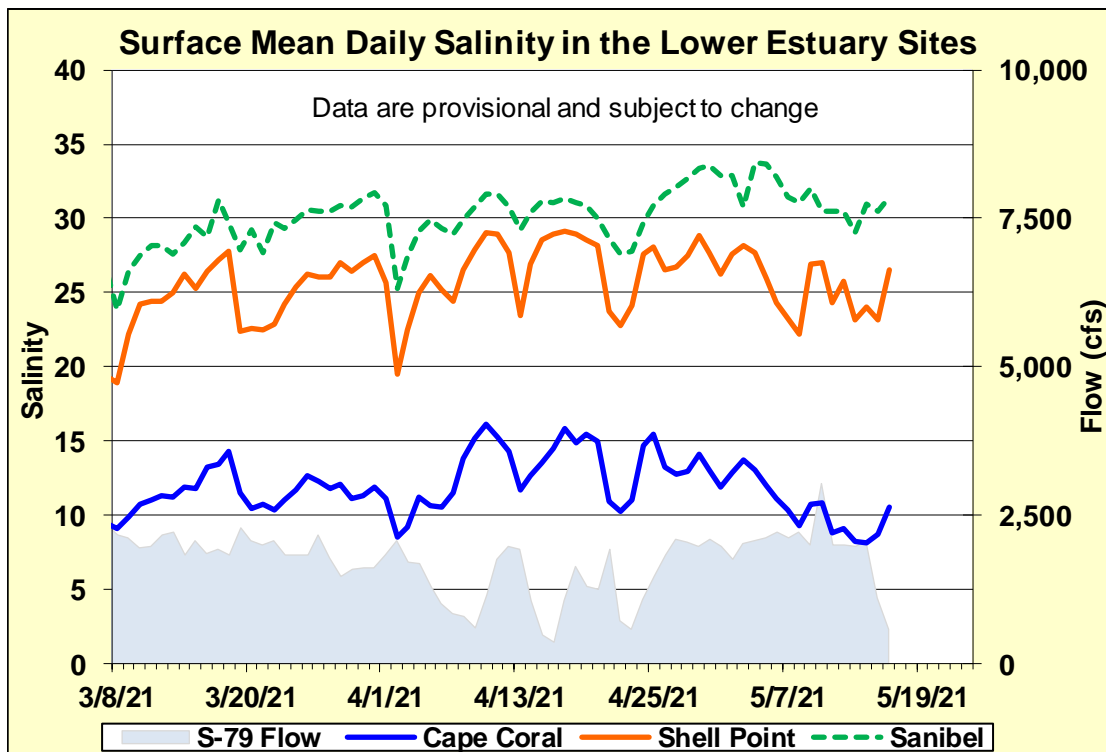


Figure ES-8. Mean daily surface salinity at lower Caloosahatchee River Estuary monitoring sites and mean daily flow at S-79.

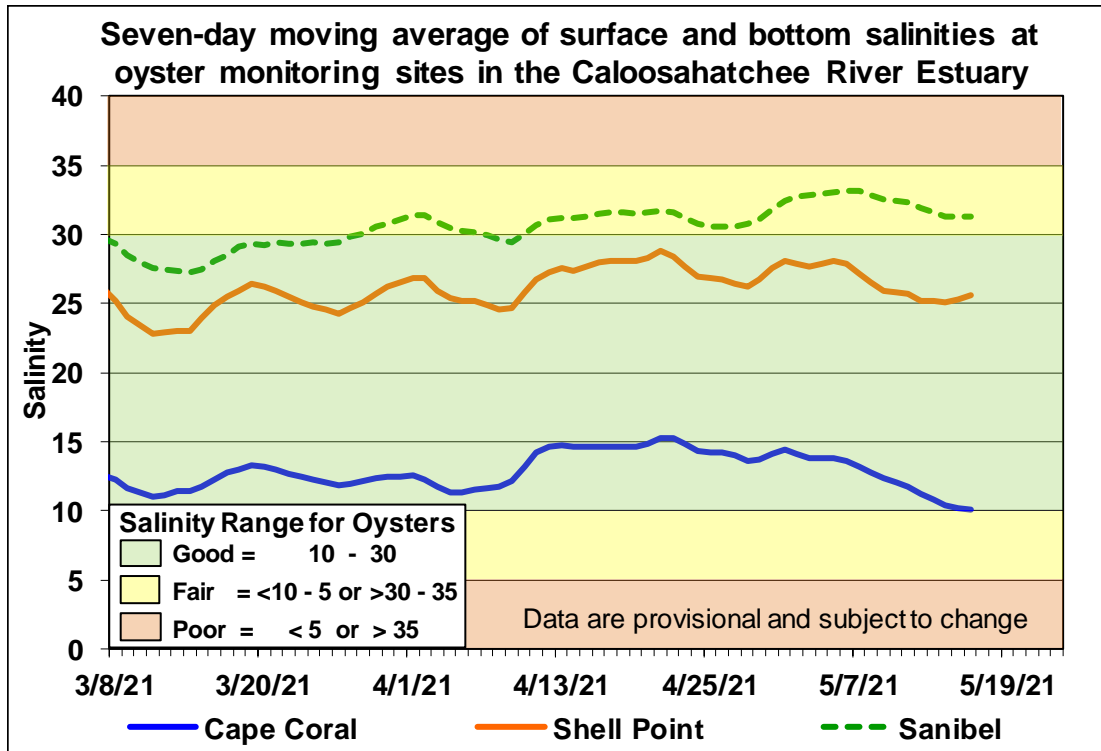


Figure ES-9. Seven-day moving average of surface and bottom salinities at Cape Coral, Shell Point and Sanibel monitoring sites in the Caloosahatchee River Estuary.

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	103	4.7	1.4
B	450	103	2.5	1.0
C	1000	103	1.1	0.6
D	1500	103	0.4	0.4
E	2000	103	0.3	0.4
F	3000	103	0.3	0.3

Caloosahatchee River Estuary Flows and Salinity Observed and Forecast Salinity at Val I-75

S-79 = 0 cfs & TBR = 103 cfs

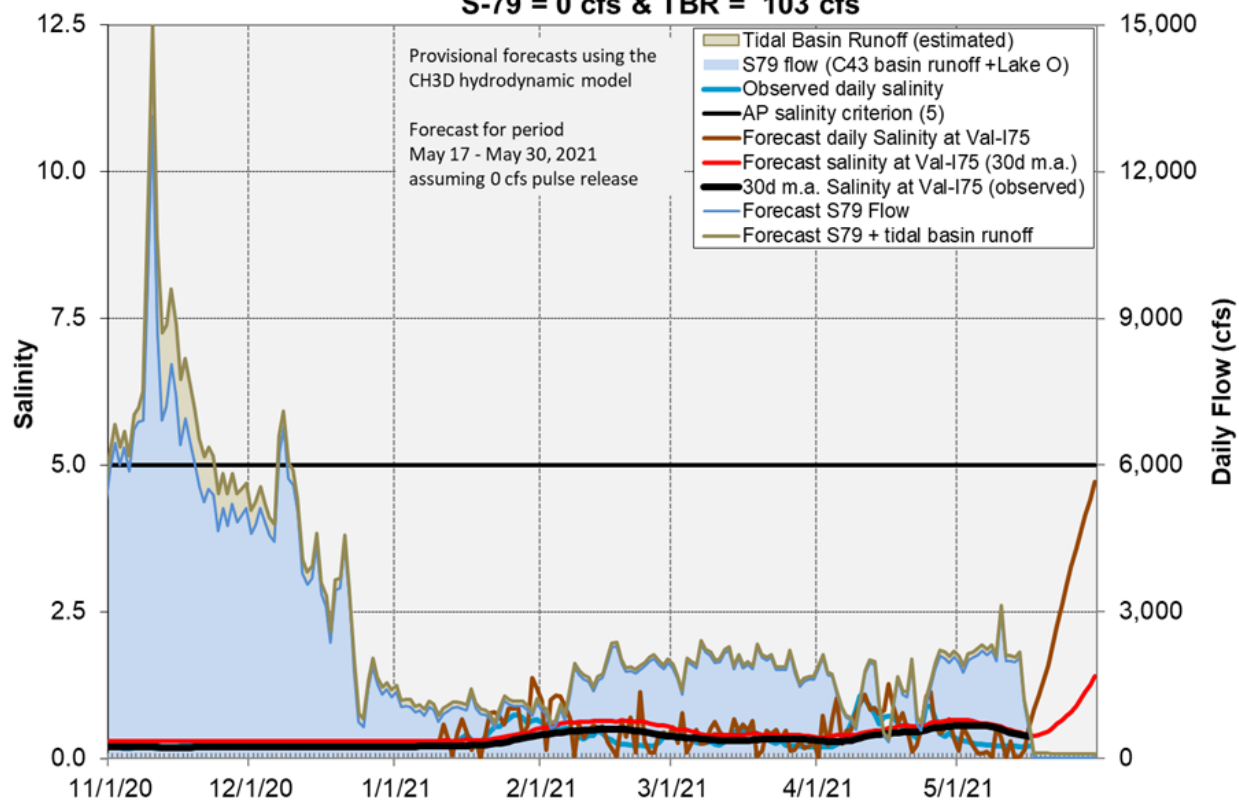


Figure ES-10. Forecasted Val I-75 site surface salinity assuming no pulse release at S-79.

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 highly stressed and the 365-day phosphorus loading rates (PLR) for these flow-ways are 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. The Northern and Western Flow-ways and Cell 8 contain nests of Migratory Bird Treaty Act protected species. Treatment cells are at or near target stage. Vegetation in all flow-ways is highly stressed. The 365-day PLRs for all flow-ways are high to very high (**Figure S-2**).

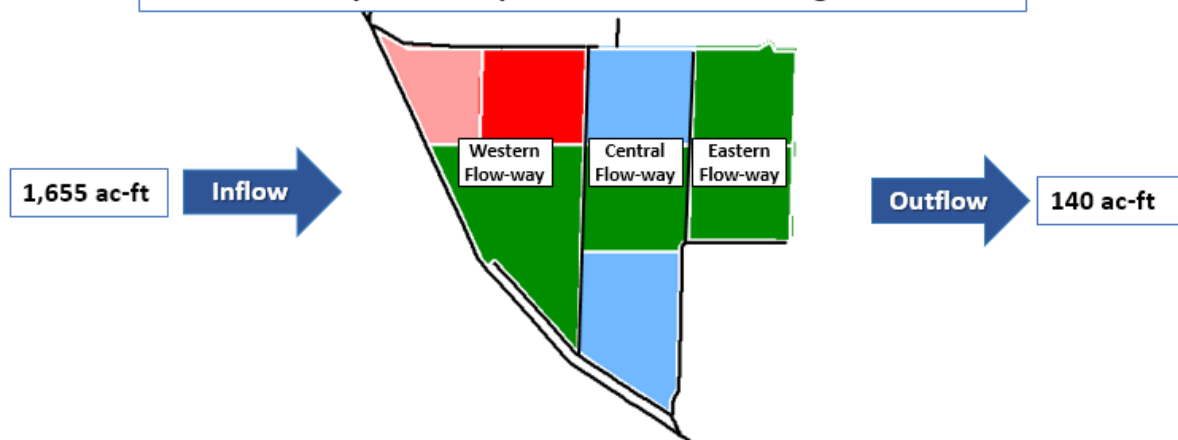
STA-2: Operational restrictions are in place in STA-2 Flow-ways 3 and 4 for vegetation management activities and in Flow-way 2 for construction activities. Most treatment cells are at or above target stage. Vegetation in Flow-ways 1, 2 and 3 is stressed, and in Flow-ways 4 and 5 is highly stressed. The 365-day PLRs for the flow-ways are at or below 1.0 g/m²/year except Flow-way 1 which is 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. Operational restrictions are in place in STA-3/4 Western Flow-way for vegetation management activities. Online treatment cells are at or above target stage. Vegetation in the Eastern and Central Flow-ways is highly stressed and in the Western Flow-way is stressed. The 365-day PLRs for all flow-ways are below 1.0 g/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. Some treatment cells are at or near target stage while several 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.

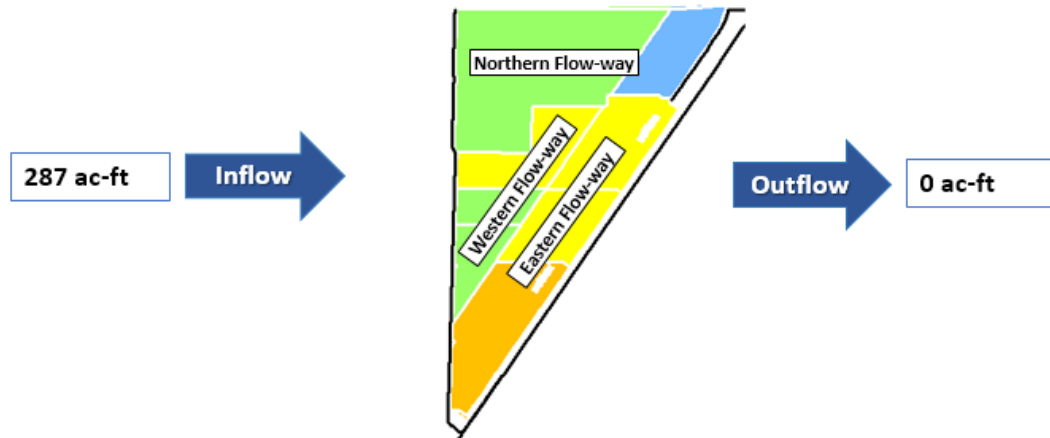
STA-1E Weekly Status Report – 5/10/2021 through 5/16/2021



STA-1E Flow-Way Status				As of 5/16/2021				STA-1E Flow & Phosphorus Concentration			
Flow-Way	Vegetation Status <small>Healthy ----- Stressed</small>	365-day P Loading Rate <small>(below 1.0 g P /m²/yr is optimal)</small>	Online / Offline / Restrictions	Stage Based: Relative to Target Stage (TS)					7-day	28-day	365-day
Eastern			Online	Deep Water Level (> 2.8' above TS)				Total Inflow, ac-ft	1,655	5,997	323,181
				High Water Level (1.5' – 2.8' above TS)							
				0.2' – 1.5' above TS							
Central			Vegetation Rehab	Target Stage (TS +/- 0.2')				Total Outflow, ac-ft	140	3,942	282,601
				Low Water Level (<0.2' below TS)							
				Depth / Area Based: Percent of Area Dry							
Western	Offline, construction activities starting 11/01/2019			0-25% Dry				Inflow Conc., ppb	112	156	138
				25-50% Dry							
				75-100% Dry							
				50-75% Dry				Outflow Conc., ppb	46	48	37
				75-100% Dry							
Includes Preliminary Data											

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

STA-1W Weekly Status Report – 5/10/2021 through 5/16/2021



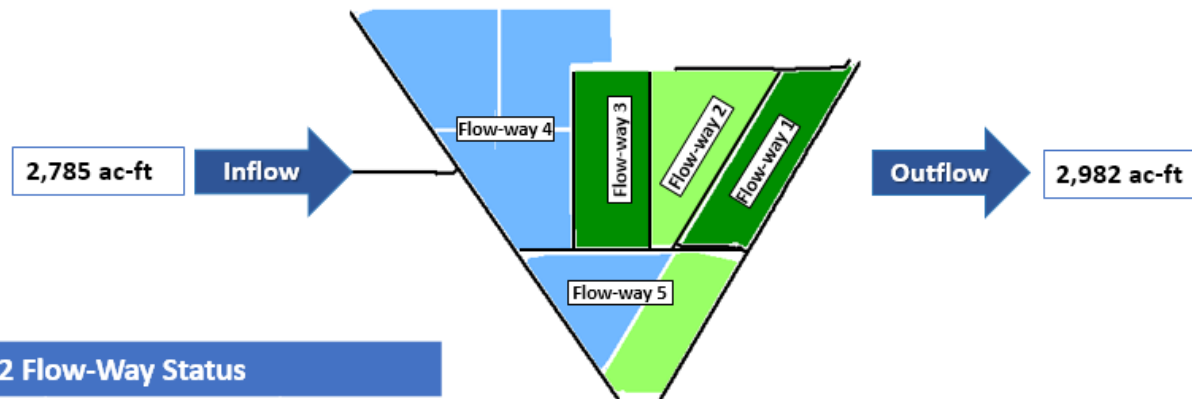
STA-1W Flow-Way Status			
Flow-Way	Vegetation Status <small>Healthy --- Stressed</small>	365-day P Loading Rate <small>(below 1.0 g P /m²/yr is optimal)</small>	Online / Offline / Restrictions
Northern			Construction / Avian Nesting
Western			Construction / Avian Nesting
Eastern			Construction

As of 5/16/2021	
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-1W Flow & Phosphorus Concentration			
	7-day	28-day	365-day
Total Inflow, ac-ft	287	287	191,889
--Lake Inflow, ac-ft	200	N/A	8,400
Total Outflow, ac-ft	0	0	214,462
Inflow Conc., ppb	120	120	253
Outflow Conc., ppb	N/A	N/A	38
Includes Preliminary Data			

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

STA-2 Weekly Status Report – 5/10/2021 through 5/16/2021



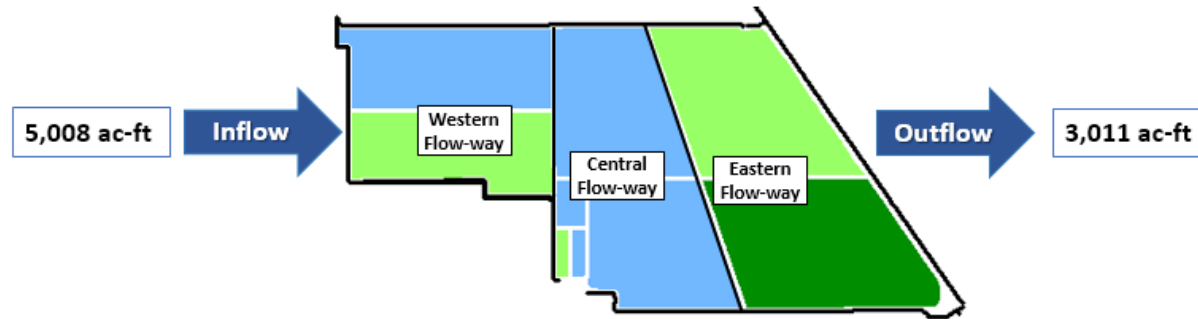
STA-2 Flow-Way Status			
Flow-Way	Vegetation Status Healthy ----- Stressed	365-day P Loading Rate (below 1.0 g P /m ² /yr is optimal)	Online / Offline / Restrictions
1			Online
2			Construction
3			Vegetation Rehab
4			Vegetation Rehab
5			Online

As of 5/16/2021	
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	3,976	20,527	450,452
--Lake Inflow, ac-ft	3,600	N/A	79,400
Total Outflow, ac-ft	2,982	15,123	508,638
Inflow Conc., ppb	55	74	100
Outflow Conc., ppb	15	17	21
Includes Preliminary Data			

Figure S-3. STA-2 Weekly Status Report

STA-3/4 Weekly Status Report – 5/10/2021 through 5/16/2021







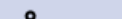




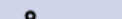

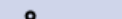




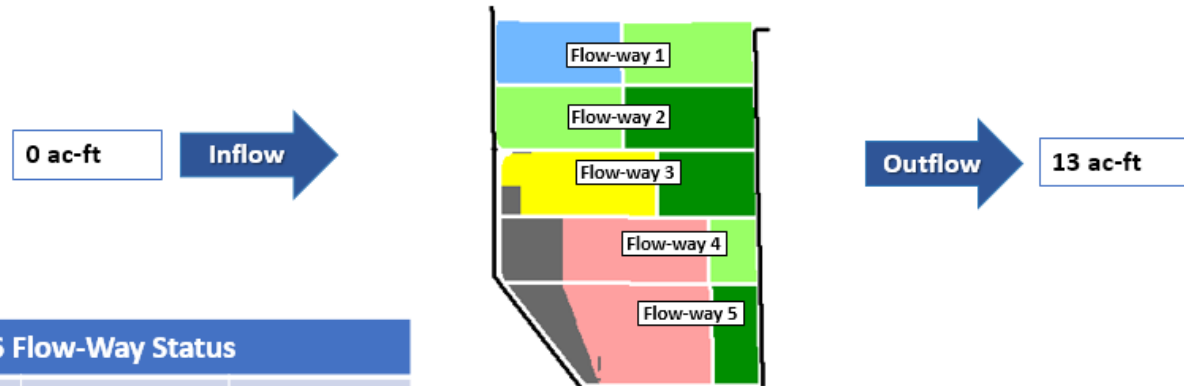
STA-3/4 Flow-Way Status				As of 5/16/2021		STA-3/4 Flow & Phosphorus Concentration			
Flow-Way	Vegetation Status <small>Healthy ----- Stressed</small> 	365-day P Loading Rate <small>(below 1.0 g P / m²/yr is optimal)</small>	Online / Offline / Restrictions	Stage Based: Relative to Target Stage (TS)			7-day	28-day	365-day
				 Deep Water Level (> 2.8' above TS)	 High Water Level (1.5' – 2.8' above TS)				
Eastern			Offline, vegetation management drawdown as of 3/1/2021	 0.2' – 1.5' above TS	 Target Stage (TS +/- 0.2')				
				 Low Water Level (<0.2' below TS)					
Central			Online	Depth / Area Based: Percent of Area Dry					
Western			Vegetation Rehab	 0-25% Dry	 50-75% Dry				
				 25-50% Dry	 75-100% Dry				
						Includes Preliminary Data			

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

STA-5/6 Weekly Status Report – 5/10/2021 through 5/16/2021



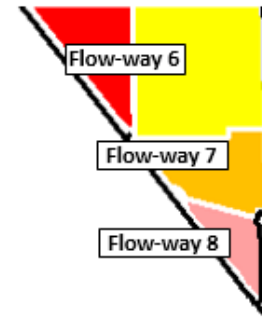
STA-5/6 Flow-Way Status			
Flow-Way	Vegetation Status Healthy ----- Stressed	365-day P Loading Rate (below 1.0 g P /m ² /yr is optimal)	Online / Offline / Restrictions
1	← →		Online
2	← →	N/A	Post-construction
3	← →	N/A	Post-construction
4	← →		Online
5	← →		Online

As of 5/16/2021	
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	0	9	130,135
--Lake Inflow, ac-ft	N/A	N/A	N/A
Total Outflow, ac-ft	13	13	152,541
Inflow Conc., ppb	N/A	107	281
Outflow Conc., ppb	25	25	79
Includes Preliminary Data			

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

STA-5/6 Weekly Status Report – 5/10/2021 through 5/16/2021



STA-5/6 Flow-Way Status				As of 5/16/2021	
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)	
6	←-----→	1.0	Online	High Water Level (1.5' – 2.8' above TS)	
7	←-----→	1.0	Online	0.2' – 1.5' above TS	
8	←-----→	1.0	Online	Target Stage (TS +/- 0.2')	
				Low Water Level (<0.2' below TS)	
				Depth / Area Based: Percent of Area Dry	
				0-25% Dry	50-75% Dry
				25-50% Dry	75-100% Dry

Figure S-6. STA-5/6 Weekly Status Report (Flow-ways 6 – 8)

Basic Concepts and Definitions for STA Weekly Status Report

- **Inflow:** Sum of flow volume at all inflow structures to an STA.
- **Lake Inflow:** Portion of the STA total inflow volume that originates from Lake Okeechobee.
- **Outflow:** Sum of flow volume at outflow structures from an STA.
- **Total Phosphorus (TP):** Total mass of phosphorus in all its forms; including particulate, dissolved, etc.
- **Inflow Concentration:** TP concentration is the mass of TP in micrograms per liter of water, $\mu\text{g/L}$ or ppb. Inflow concentration refers to the flow-weighted mean TP from all inflow structures over a period of time.
- **Outflow Concentration:** The flow-weighted mean TP from all outflow structures over a period of time. The outflow concentration represents the reduction of inflow TP achieved by STA treatment of the inflow water.
- **WQBEL:** The STA outflow concentration that is required upon completion of the Restoration Strategies projects by December 2025. The outflow concentration shall not exceed 13 ppb as an annual flow weighted mean in more than 3 out of 5 water years on a rolling basis and shall not exceed 19 ppb as an annual flow weighted in any water year.
- **Flow-Way (FW):** One or more treatment cells connected in series. Cells typically have emergent aquatic vegetation (EAV) in the front portion of the flow-way followed by a mix of EAV and submerged aquatic vegetation (SAV)
- **Vegetation Status:** Healthy means the vegetation condition is good and will allow the STA to perform as designed. Stressed means the vegetation is showing signs of poor health, such as browning or areas of vegetation die-off, or the cell contains undesirable vegetation such as floating exotic vegetation requiring treatment. The TP reduction capability of the STA is affected when the vegetation condition is poor.
- **Phosphorus Loading Rate (PLR):** Mass of inflow TP in grams, divided by total treatment area of STA in square meters, per year. In general, a 365-day value of less than 1.0 is needed for an STA to perform optimally. A PLR of 2.0 is considered very high and a PLR of 3.0 is considered extremely high. The TP reduction capability of the STA is affected when the PLR is high, very high and extremely high.
- **Online:** Online status means the FW can receive and treat inflow.
- **Online with Restriction:** The FW can receive and treat inflow, but the amount of flow or water level may be limited temporarily. For example, a vegetation rehabilitation effort may require reduced flows through an area while the new plants are establishing, or nesting by protected species may require a certain water level not to be exceeded.
- **Offline:** The FW is unable to receive and treat inflow due to repairs, construction, or other prohibitive reasons.
- **Depth:** Difference between the average surface water level in a cell and the average ground elevation in that cell. Target depths, or depths between flow events, are between 1.25 ft to 1.5 ft. As depth approaches or drops below zero, an increasing percentage of the cell is considered dry and STA conditions deteriorate. An increase in depth above target depth is expected with increasing flow. However, as depth increases much above the target depth and is sustained over a period of time, it can be detrimental to vegetation health and overall STA treatment performance.
- **Note:** The data provided in this summary report were developed using a combination of provisional and quality-assured flow and water quality data. In some cases, best professional judgment was used to estimate missing data and revise questionable data. Values provided are not considered final but are appropriate for use in STA operational decision-making.

Everglades

Water Conservation Area Regulation Schedules

WCA-1: Stage at the 1-8C Gauge remained generally paralleling schedule last week with a rise late in the week. On Sunday stage was below the flat Zone A1 regulation line by 0.04 feet. WCA-2A: Stage at S11B-HW ascended to the regulation line last week, 0.04 feet above on Sunday. WCA-3A: The Three Gauge Average continue to fall away from the Zone A regulation line last week. On Sunday, stage was 0.79 feet below the falling Zone A line. WCA-3A: Stage at gauge 62 (Northwest corner) continues a sharp decline away from the schedule line. The average on Sunday was 1.94 feet below the stable Upper Schedule. (**Figures EV-1 through EV-4**).

Water Depths

The WDAT tool for spatial interpolation of water depth monthly snapshots indicate that WCA-3A North is getting very dry, much of northwestern sub-basin has water depths significantly below ground. North to South hydrologic connectivity remains well maintained in Shark River Slough in ENP as conditions dry down in the Taylor Slough area. (**Figure EV-5**). Comparing WDAT water levels from present, over the last month stages fell significantly in WCA-1 and WCA-3A along the upper reaches of the L-67 levees. Looking back one year conditions are more comparable than anytime over this dry season. Significant differences are only detected in the north of WCA-2A and along the eastern boundary of ENP (**Figure EV-6**).

Tree Islands

One (0.2%) of the 371 tree Islands of known elevation within WCA-3A, WCA-3B, and ENP Shark Slough are currently inundated (down from 0.5% the week prior).

Wading Birds

Nesting continues to build and foraging conditions near all the major colonies are currently excellent, despite dry conditions at the Alley North colony the birds there have moved south of I-75 into WCA-3A South where tens of thousands of birds are currently feeding. The likely only constraint to nesting success will be the timing of the start of the wet season and the first major reversal. In ENP older juvenile Wood Storks and Roseate Spoonbills are now beginning to leave their nests for the nearby marshes. The provisional estimate of total nests in the Everglades in 2021 is approximately 81,000 nests, which is more than double the 10-year average and since the 1940's is second only in magnitude to the record-breaking nesting effort of 2018.

Taylor Slough and Florida Bay

About 0.39 inches of patchy rain fell over Taylor Slough and Florida Bay for the week ending Sunday (5/16). The Slough averaged a decrease of 0.13 feet over the week (**Figure EV-7**). All areas experienced a decrease over the past week with the northern part of the Slough experiencing the greatest loss of water elevation as is typical for this time of year (**Figure EV-8**). Depths continue to be about 5 inches higher than the historical average for this time of year overall, but the northern areas of the slough are only an inch above the historical average now. The drier that the Slough gets, the longer it will take to

rehydrate the marsh to facilitate transference of freshwater to Florida Bay once the wet season starts.

Salinities in Florida Bay increased by almost 1 over the week ending Sunday (5/16) and are maintaining a lower than average condition for this time of year. Bay-wide salinity is still 3 lower than the historical average for this time of year while the eastern and central Bay are 6 lower (**Figure EV-9**). The western Bay areas have risen above standard seawater and are averaging 40 or above. The Bay is positioned very well to minimize hypersalinity extremes and duration before the rainy season begins.

The TR station in the mangrove zone (tracked for the Florida Bay MFL) decreased from 4 to 3 by Sunday (May 16, 2021) (**Figure EV-10**). The 30-day moving average decreased 1.5 from the previous week to end at 8.0. Weekly flow from the 5 creeks monitored for the Florida Bay MFL totaled about +2,900 acre-feet with small positive flows persisting the last half of the week (see inset on **Figure EV-10**). The 365-day moving sum of flow from the five creeks (tracked as part of the Florida Bay MFL criteria) ended at 430,193 acre-feet on Sunday, 5/16, which is a 3,000 acre-feet decrease from last week. The 365-day cumulative flows remain higher than the 95th percentile of historical data (390,830 acre-feet). Creek flows are provisional USGS data.

Water Management Recommendations

Moderating reversals in WCA-1 and WCA-3A South for the duration of the wading bird nesting season will prevent potential large-scale nestling mortality. Flows into northern WCA-3A, with a particular focus on the northeastern region downstream of S -150 have a great ecological benefit at this time in the dry season. Maintaining the current recession rates in WCA-3A South will continue to provide good foraging conditions for wading birds nesting in the colonies within that basin as the drying front moves from the northwest to the southeast, concentrating prey. Maintaining a moderate recession in WCA-2B may prove important to wading birds over the next few weeks as they remain foraging in that basin last week. Inflows that delay the drying down of northern Taylor Slough have within and downstream ecological benefit.

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

Everglades Region	Rainfall (inches)	Stage (feet)	change
WCA-1	1.05	-0.08	
WCA-2A	1.99	+0.24	
WCA-2B	1.99	+0.02	
WCA-3B	0.41	-0.17	
ENP	0.91	-0.04	

WCA 1 (16 May 2021)



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

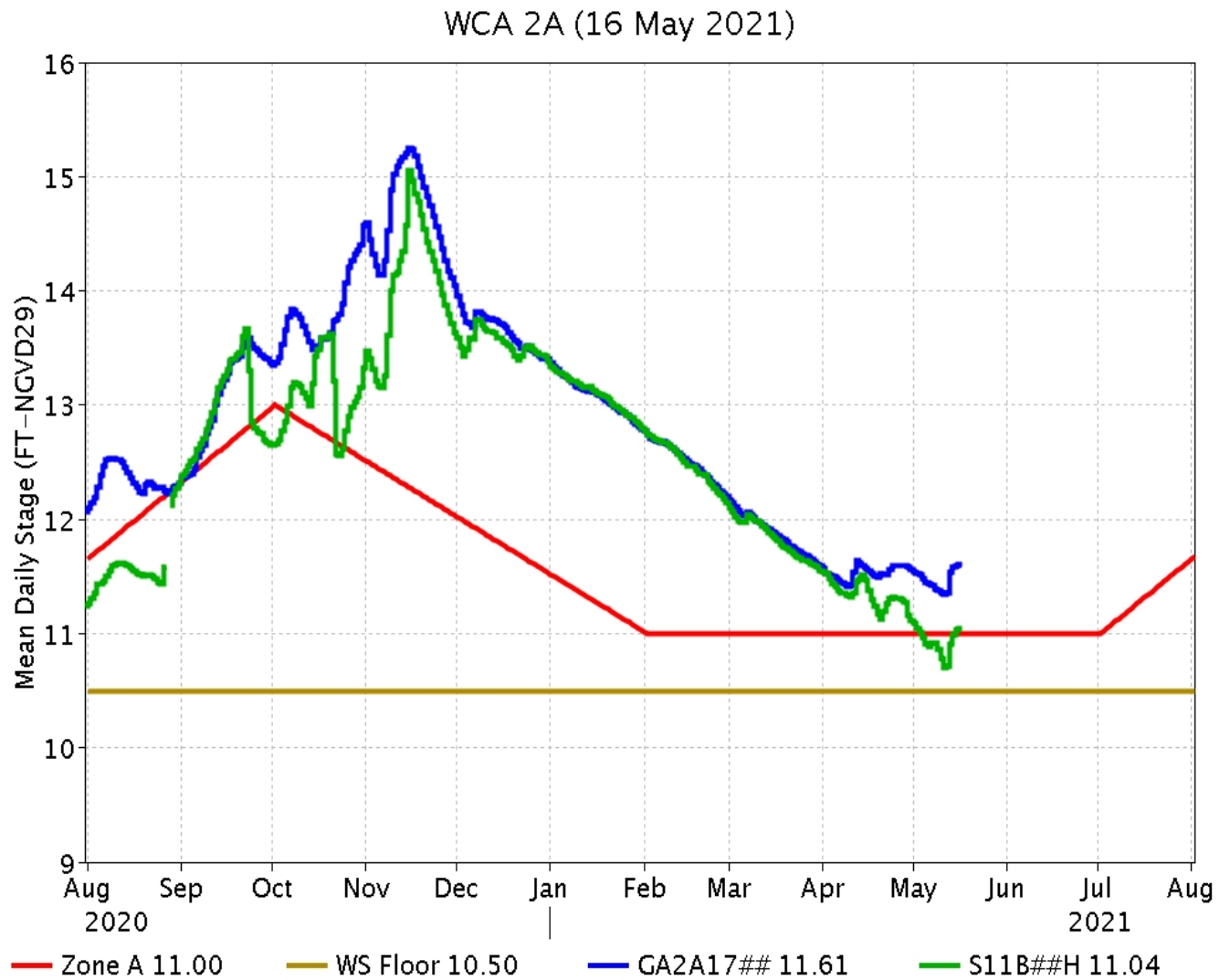


Figure EV-2. WCA-2A stage hydrographs and regulation schedule.

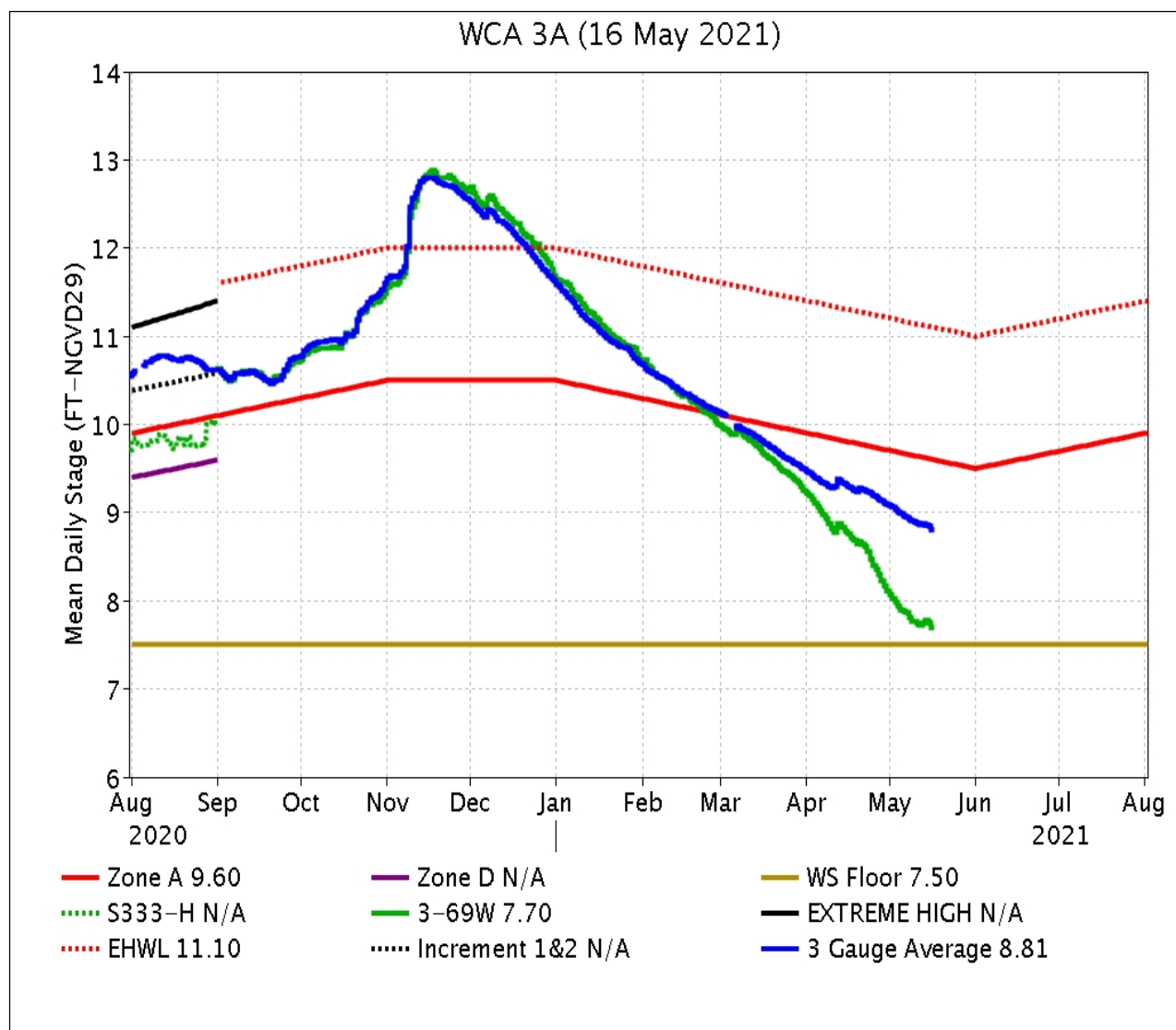


Figure EV-3. WCA-3A stage hydrographs (three-gauge average, S-333 headwater) and regulation schedule.

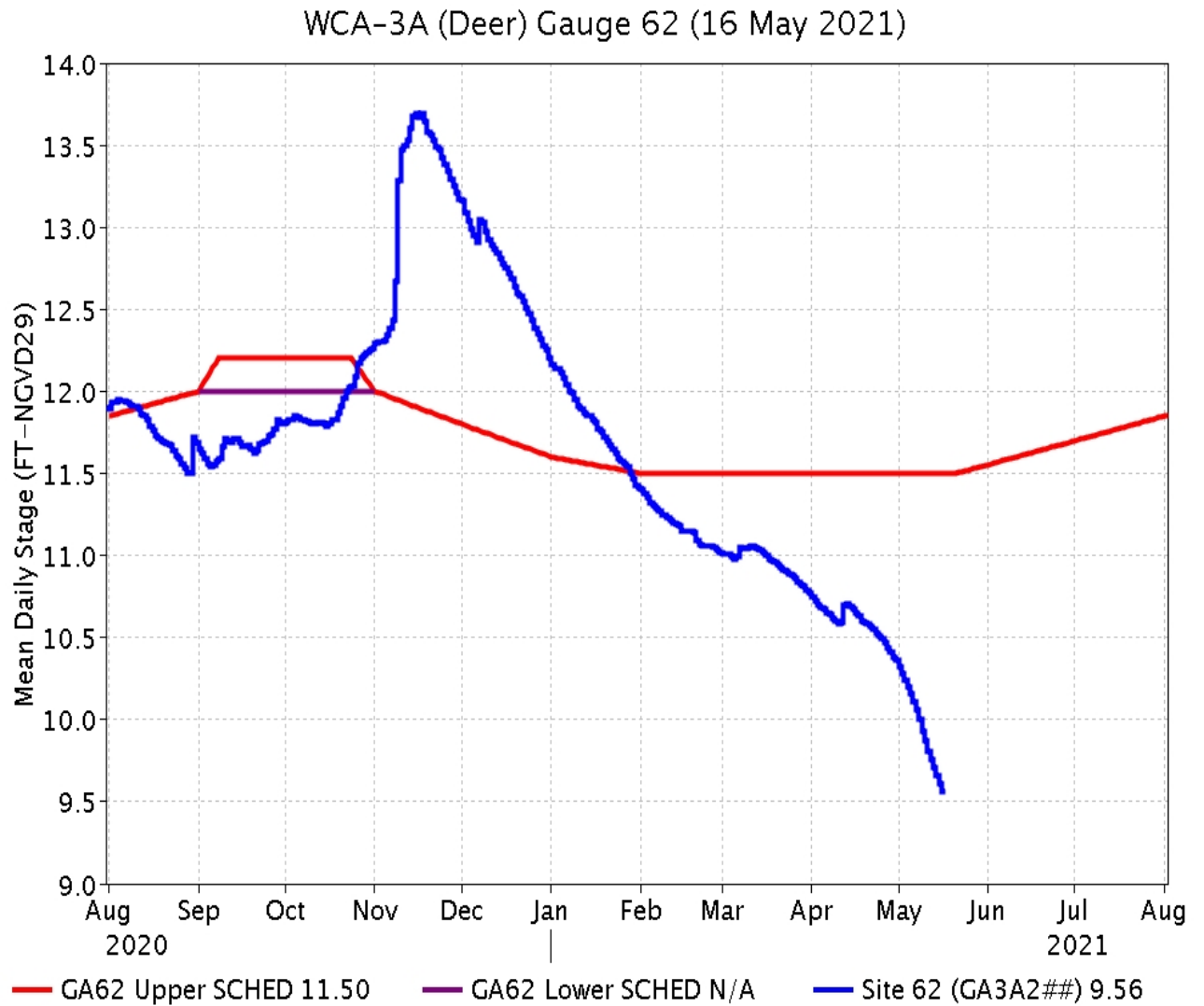


Figure EV-4. WCA-3A stage hydrograph (Deer gauge; Site 62) and CA62 regulation schedule.

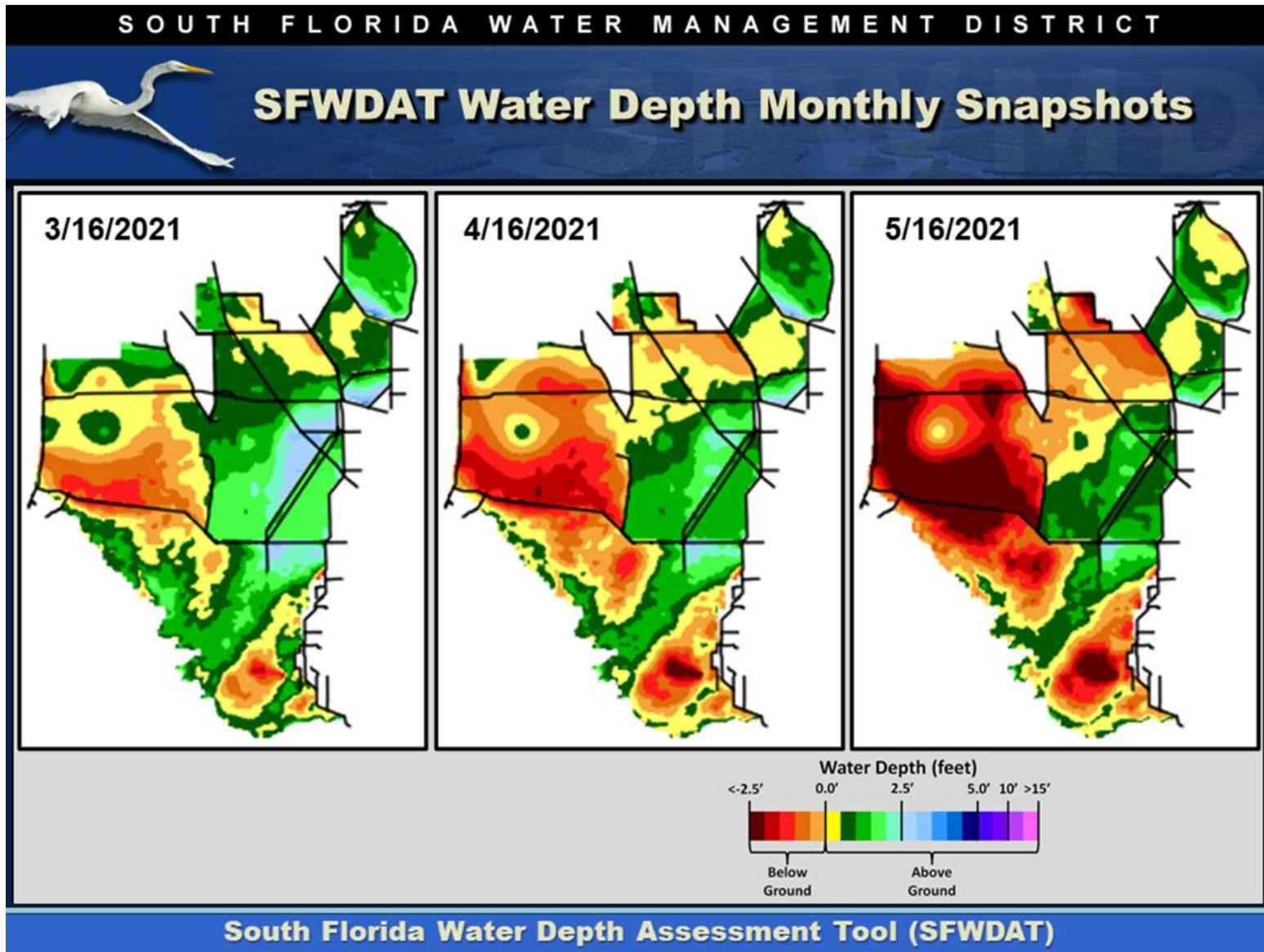


Figure EV-5. Everglades water depths from two months ago (left), one month ago (center) and present (right), based on SFWDAT.

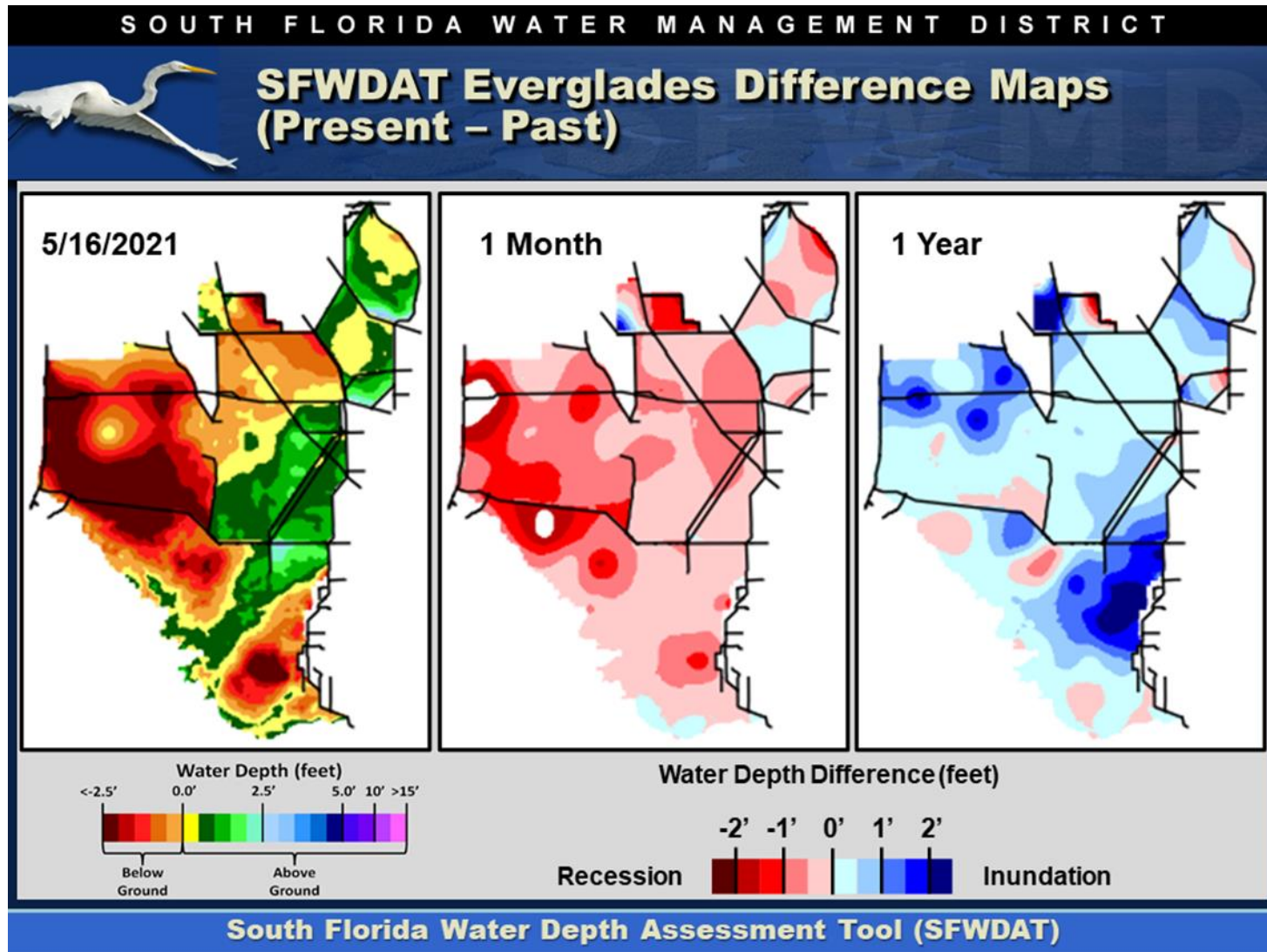


Figure EV-6. Present Everglades water depths (left) and water depth changes from one month (center) and one year (right) ago, based on SFWDAT.

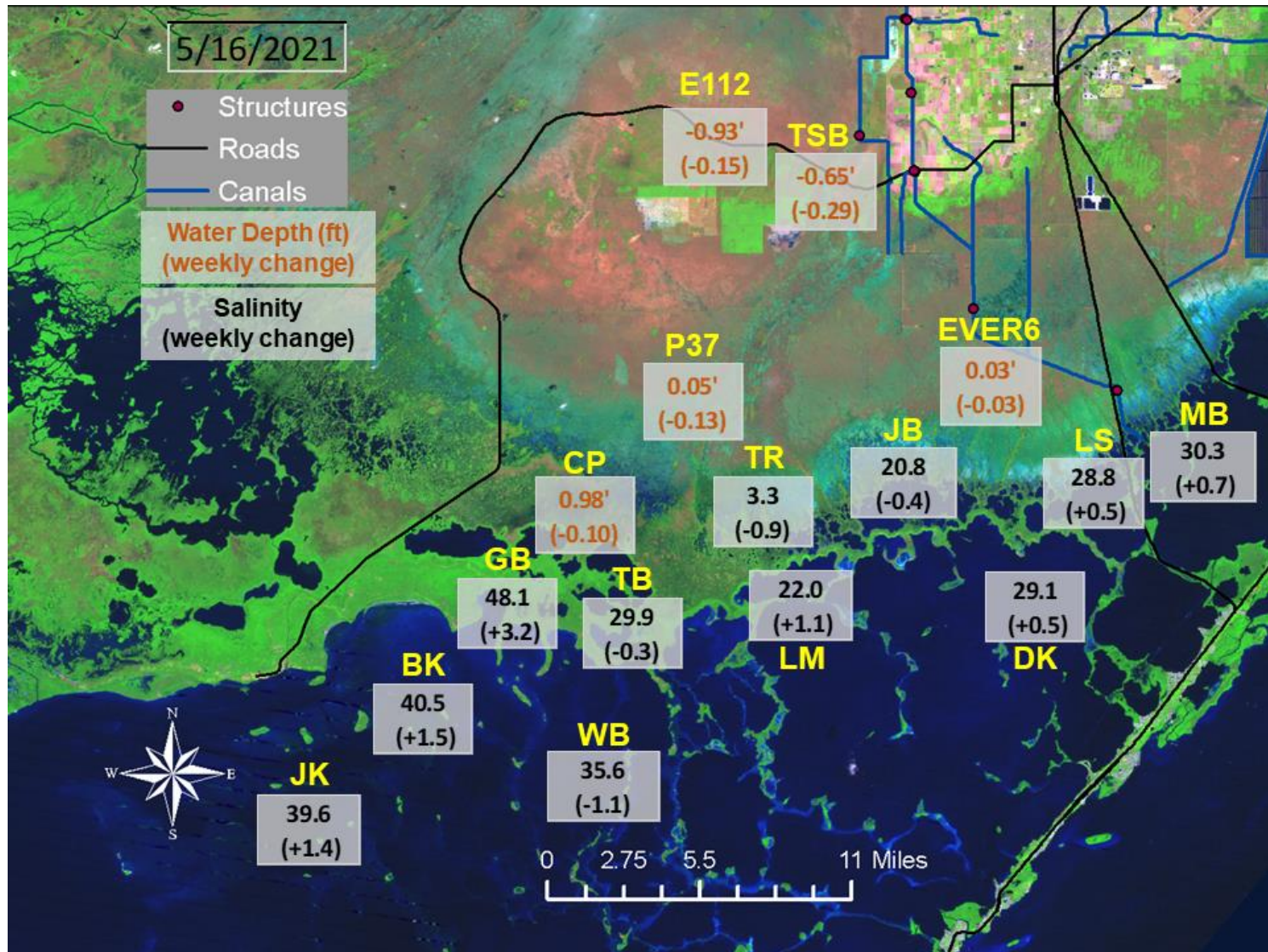


Figure EV-7. Taylor Slough water depths with changes since a week ago and Florida Bay salinities with changes since a week ago.

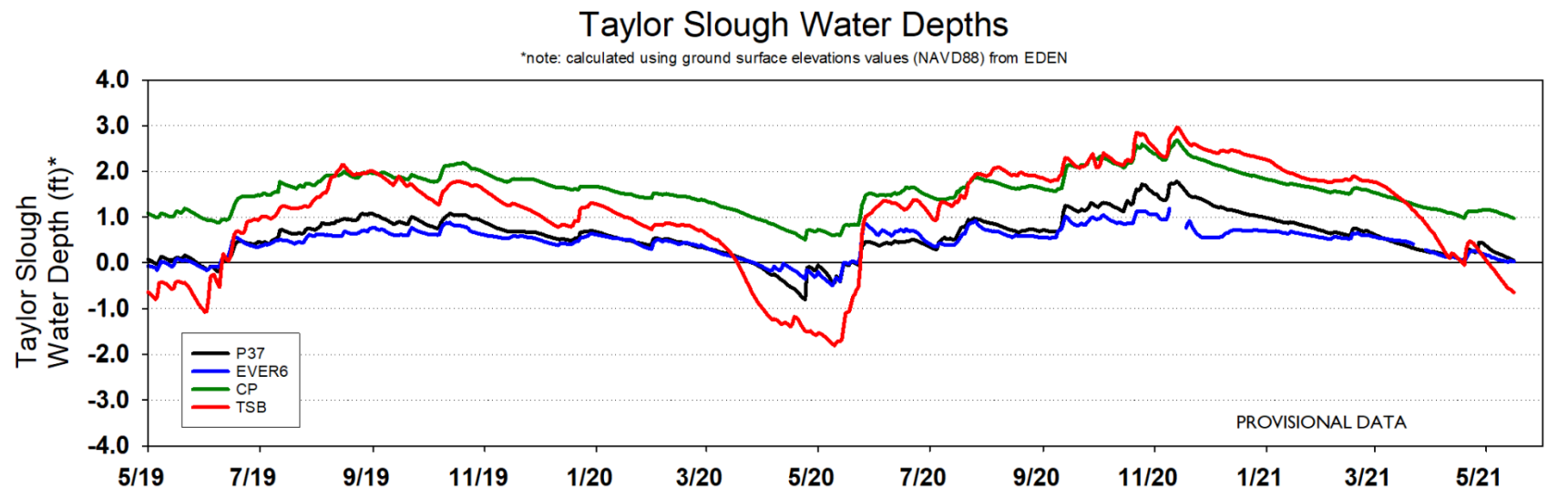


Figure EV-8. Taylor Slough water depth time series.

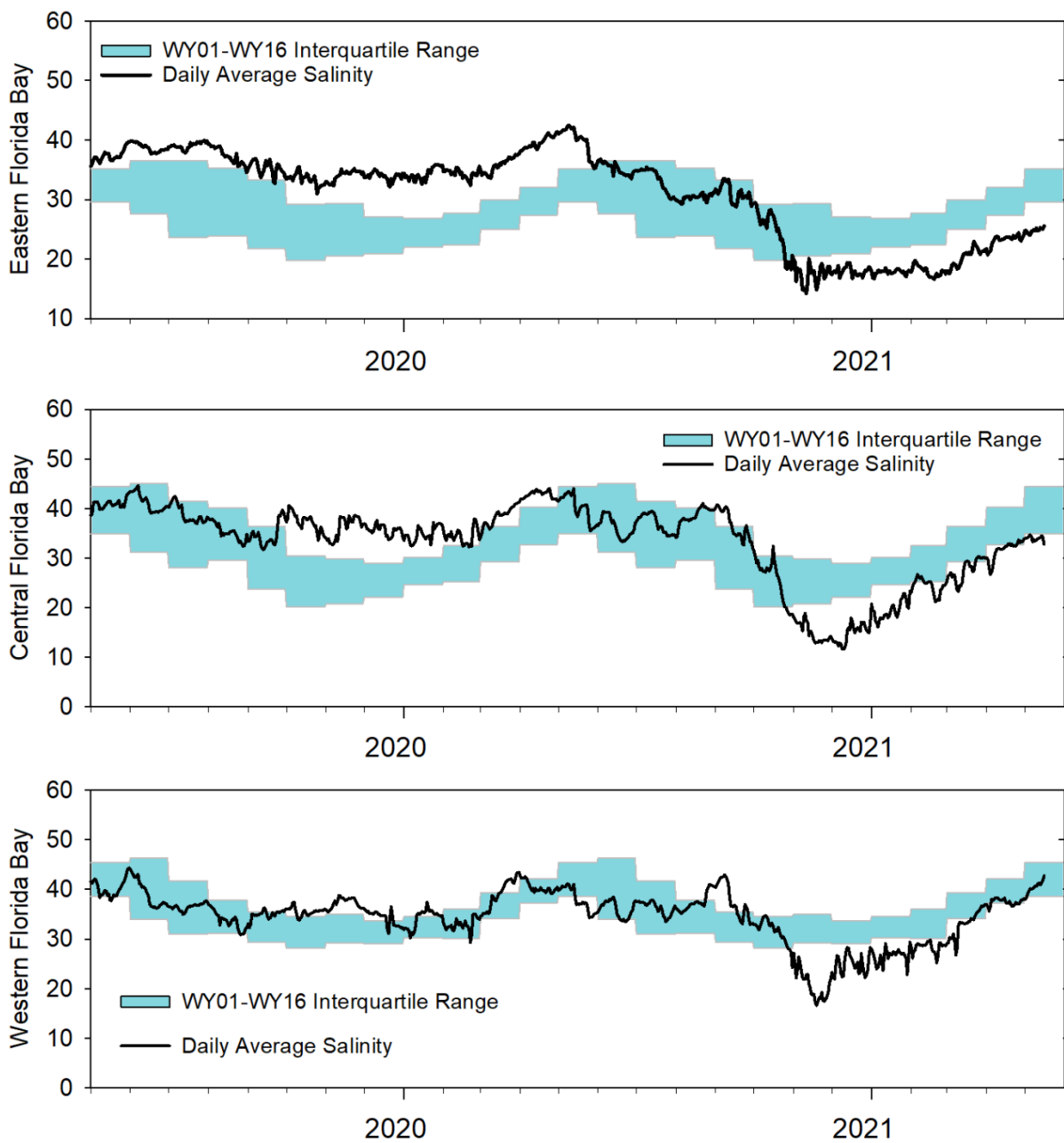


Figure EV-9. Eastern (top panel), Central (middle panel) and Western (bottom panel) Florida Bay daily average salinities with interquartile (25-75 percentile) ranges.

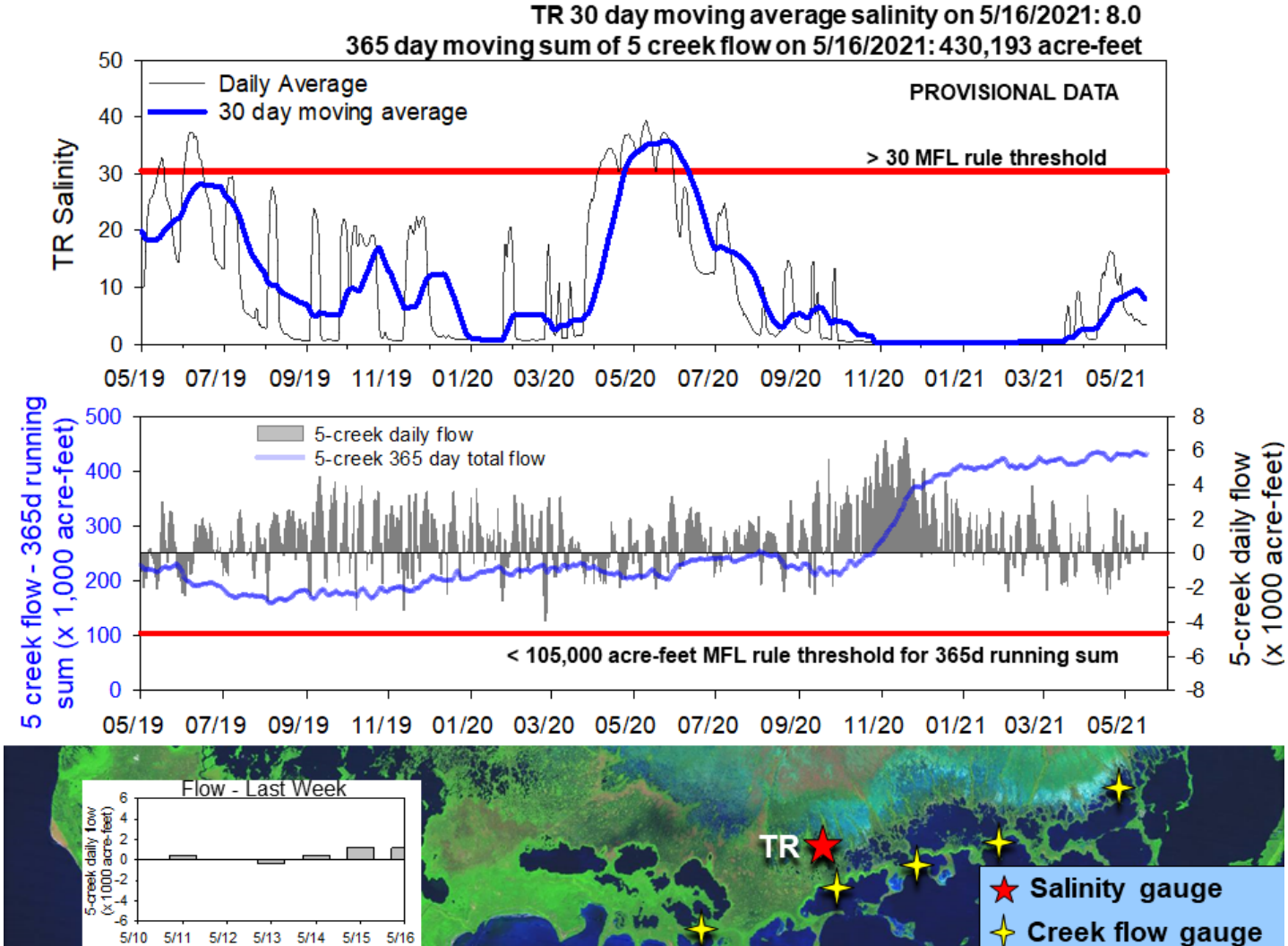


Figure EV-10. Top panel: Taylor River 30-day moving average salinity (blue), daily average salinity (gray) with salinity threshold; middle panel: Five-creek total flow for past 365 days (blue), daily flow (gray) with 365-day flow threshold; bottom panel: map of monitoring locations for the five creeks.

Table EV-11. Weekly water depth changes and water management recommendations

SFWMD Everglades Ecological Recommendations, May 18th, 2021 (red is new)			
Area	Weekly change	Recommendation	Reasons
WCA-1	Stage decreased by 0.08'	Maintain marsh stage slightly above and parallel to the regulation schedule. Moderate any reversal as possible.	Protect within basin and downstream habitat and wildlife. Protect wading bird foraging.
WCA-2A	Stage increased by 0.24'	Maintain marsh stage 0.5 feet above and parallel to the regulation schedule.	Protect within basin and downstream habitat and wildlife.
WCA-2B	Stage increased by 0.02'	Initiate a recession rate at near 0.05 to 0.07 feet per week.	Protect within basin wading bird foraging.
WCA-3A NE	Stage decreased by 0.08'	Moderate the recession rate to near 0.05 to 0.07 feet per week.	Protect within basin habitat and wildlife. Inflows and optimal recession rates preserve peat soils.
WCA-3A NW	Stage decreased by 0.37'	Moderate the recession rate to near 0.05 to 0.07 feet per week.	
Central WCA-3A S	Stage decreased by 0.13'	Maintain the recession rate at near .10 feet per week.	Protect within basin wading bird foraging.
Southern WCA-3A S	Stage decreased by 0.10'		
WCA-3B	Stage decreased by 0.04'	Maintain the recession rate at near .05 to .07 feet per week.	Protect within basin habitat and wildlife.
ENP-SRS	Stage decreased by 0.15'	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 from flooding stress.
Taylor Slough	Stage changes ranged from -0.03' to -0.29'	Move water southward as possible.	When available, provide freshwater buffer for downstream conditions.
FB- Salinity	Salinity changes ranged -1.1 to +3.2	Move water southward as possible.	When available, provide freshwater to maintain low salinity buffer and promote water movement.