

Disclaimer: Information contained in the report addresses environmental conditions only and is not the official South Florida Water Management District operations recommendation or decision.

M E M O R A N D U M

TO: John Mitnik, Assistant Executive Director, Executive Office Staff

FROM: SFWMD Staff Environmental Advisory Team

DATE: April 21, 2021

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

A frontal boundary will move from the Kissimmee Valley to the southern end of the District by Wednesday night producing moderate to heavy rainfall focused southeast of Lake Okeechobee mainly during the day Wednesday. The stalled boundary will keep some scattered shower activity near the southern end of the District Thursday before lifting back north Friday producing light to moderate shower activity mainly during the day Friday. Daytime heating will generate some scattered afternoon shower activity focused over the interior Saturday. The front is forecast to return south through the District Sunday bringing light to moderate showers and a few thunderstorms beginning over northern areas pre-dawn Sunday and then shifting southward through the area during the day Sunday. Drier conditions will most likely spread over the area Monday and Tuesday. Total rainfall is forecast to be well above the historical average during the first 7-day period (Week 1). Total rainfall is then forecast to be below the historical average during the second 7-day period (Week 2).

Kissimmee

With the forecast for heavy rainfall this week, attempts to minimize stage reversals in Lakes East Toho and Toho, while not allowing stage to rise too quickly in Kissimmee Cypress Hatchineha (KCH), would be preferable. Discharges at S-65A should continue to follow the USACE request to not exceed 800-900 cfs so that construction on the Kissimmee River Restoration Project can continue. As the rain ends, returning to the pre-event recession rates of 0.17 feet/week in East Lake Toho and Toho should be attempted, allowing them to reach their regulated low stage on June 1. Depending on rainfall, allowing stage to recede in KCH up to (but not exceeding) a recession rate of 0.18 feet/week by reducing S-65 discharge would be preferred.

Lake Okeechobee

Lake Okeechobee stage was 14.17 feet NGVD on April 18, 2021, 0.01 feet higher than last week and 0.72 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 but reentered the envelope on March 30, 2021. Latest water quality surveys (April 6-7, 2021) found detectable cyanotoxins and *Microcystis* dominant cyanobacteria taxa at six of the nine sites sampled. Chlorophyll *a* results for 8 of the 30 sites sampled indicate bloom conditions (50.0 µg/L) at one southwest shoreline site. The April 15, 2021 wading bird survey counted approximately 6,880 birds across ten flocks foraging within the Lake. Recent satellite imagery suggests there is minimal algal bloom activity on the Lake.

Estuaries

Total inflow to the St. Lucie Estuary averaged 648 cfs over the past week with no flow coming from Lake Okeechobee. The seven-day average surface salinities decreased at HR1 and A1A Bridge sites but remained the same at the US1 bridge site. Salinity at the US1 Bridge is in the good range (10-26) for adult eastern oysters. Total inflow to the Caloosahatchee Estuary averaged 1,260 cfs over the past week with 590 cfs coming from the Lake. Seven-day average surface salinities decreased at S-79 and increased at the remaining sites in the estuary. Salinities are in the good range (0-10) for tape grass at Val I-75 and Ft. Myers. Salinities are in the good range (10-30) for adult eastern oysters at Cape Coral and Shell Point, and in the fair range at Sanibel. Based on current conditions and seasonal outlooks, the LORS2008 Release Guidance suggests up to 3000 cfs release at S-79 to the Caloosahatchee Estuary and up to 1170 cfs release at S-80 to the St. Lucie Estuary.

Stormwater Treatment Areas

Over the past week, approximately 8,600 ac-ft of Lake Okeechobee water was delivered to the FEBs/STAs. The total amount of Lake releases sent to the FEBs/STAs in WY2021 (since May 1, 2020) is approximately 149,500 ac-feet, while the total inflows is approximately 1,619,000 ac-feet. Most STA cells are near target stage, except for EAV 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. 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 in effect in STA-5/6 Flow-ways 2 and 3 following the Restoration Strategies project to grade non-effective treatment areas. This week, if 2008 LORS recommends Lake releases to the WCAs and conditions allow, releases will be sent to STA-2 and STA-3/4.

Everglades

Despite rainfall, dry conditions continue in WCA-2A and WCA-3A North. Maintaining moderate recession rates in those basins when possible is desired. Wading birds were feeding in large flocks in Lostman's Slough, WCA-2A, and western Shark River Slough. With recent reversals, wading bird foraging is likely to shift to WCAs -1, -2B and -3A South. Excessive drying in WCA-2A and WCA-3A North could incur other ecological costs for aquatic wildlife as well as increased risk of peat oxidation and fire. Florida Bay remains positioned well to minimize any hypersaline conditions before the wet season.

Supporting Information

KISSIMMEE BASIN

Kissimmee Basin

Upper Kissimmee

Lake stages on April 18, 2021 were 56.0 feet NGVD (0.6 feet below schedule) in East Lake Toho, 53.0 feet NGVD (0.6 feet below schedule) in Lake Toho, and 51.4 feet NGVD (1.0 feet above schedule) in Kissimmee-Cypress-Hatchineha (KCH) (Table KB-1, Figures KB-1-3). Lake stages declined in lakes East Toho and Toho from the week before but stayed relatively steady in KCH due to discharge limitations at S-65 and efforts to reduce stage reversals in lakes East Toho and Toho to accommodate snail kite nesting.

Lower Kissimmee

Kissimmee River (headwater) stages were 46.0 feet NGVD at S-65A and 25.9 feet NGVD at S-65D on April 18, 2021, while discharges were 680 cubic feet per second (cfs) at S-65, 880 cfs at S-65A, 860 cfs at S-65D and 960 cfs at S-65E (Table KB-2). Dissolved oxygen concentration in the Kissimmee River averaged 7.8 mg/L for the week through Sunday, well above the 2.0 mg/L threshold considered harmful to sportfish (Figure KB-4). Kissimmee River mean floodplain depth on Sunday was 0.18 feet, down from 0.04 feet the week before (Figure KB-5).

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)	
							4/18/21	4/11/21
Lakes Hart and Mary Jane	S-62	LKMJ	55	60.1	R	60.4	-0.3	-0.2
Lakes Myrtle, Preston and Joel	S-57	S-57	0	60.5	R	60.5	0.0	-0.1
Alligator Chain	S-60	ALLI	96	63.3	R	63.1	0.2	0.1
Lake Gentry	S-63	LKGT	108	60.8	R	60.6	0.2	0.0
East Lake Toho	S-59	TOHOE	453	56.0	R	56.7	-0.7	-0.6
Lake Toho	S-61	TOHOW S-61	908	53.0	R	53.7	-0.7	-0.7
Lakes Kissimmee, Cypress and Hatchineha	S-65	KUB011 LKIS5B	929	50.9	R	50.4	0.5	0.2

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

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

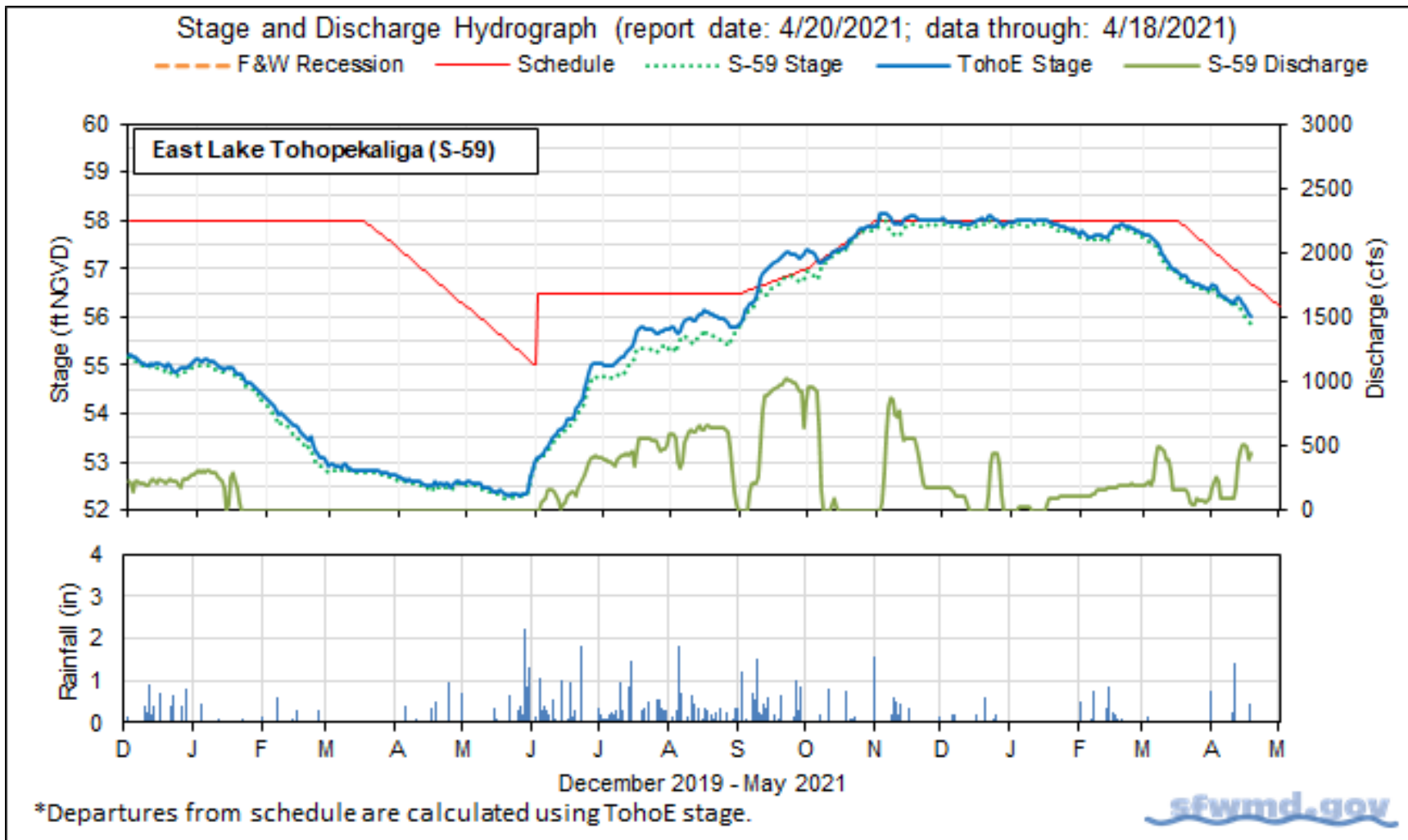


Figure KB-1. East Lake Toho regulation schedule, stage, discharge and rainfall.

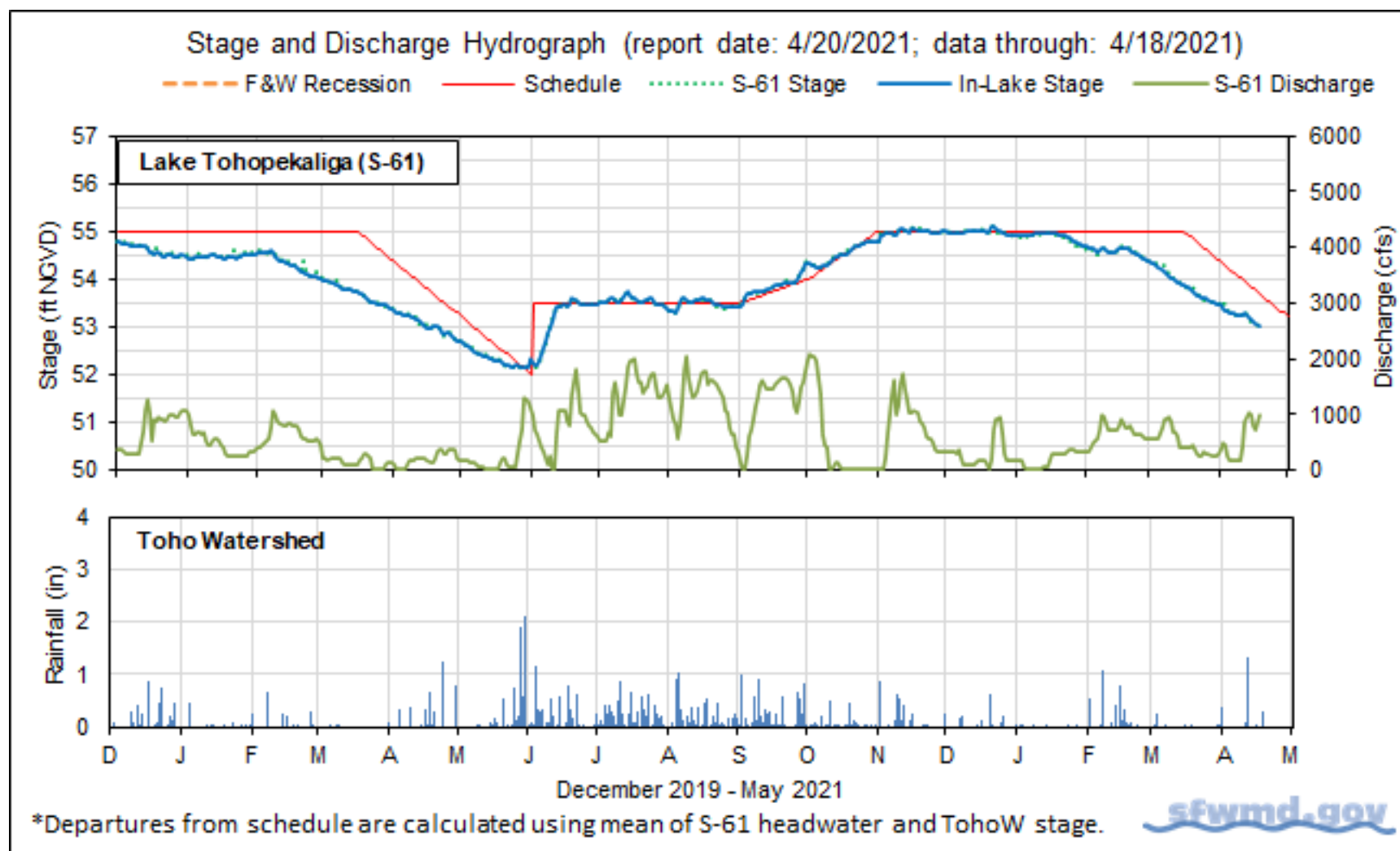


Figure KB-2. Lake Toho regulation schedule, stage, discharge and rainfall.

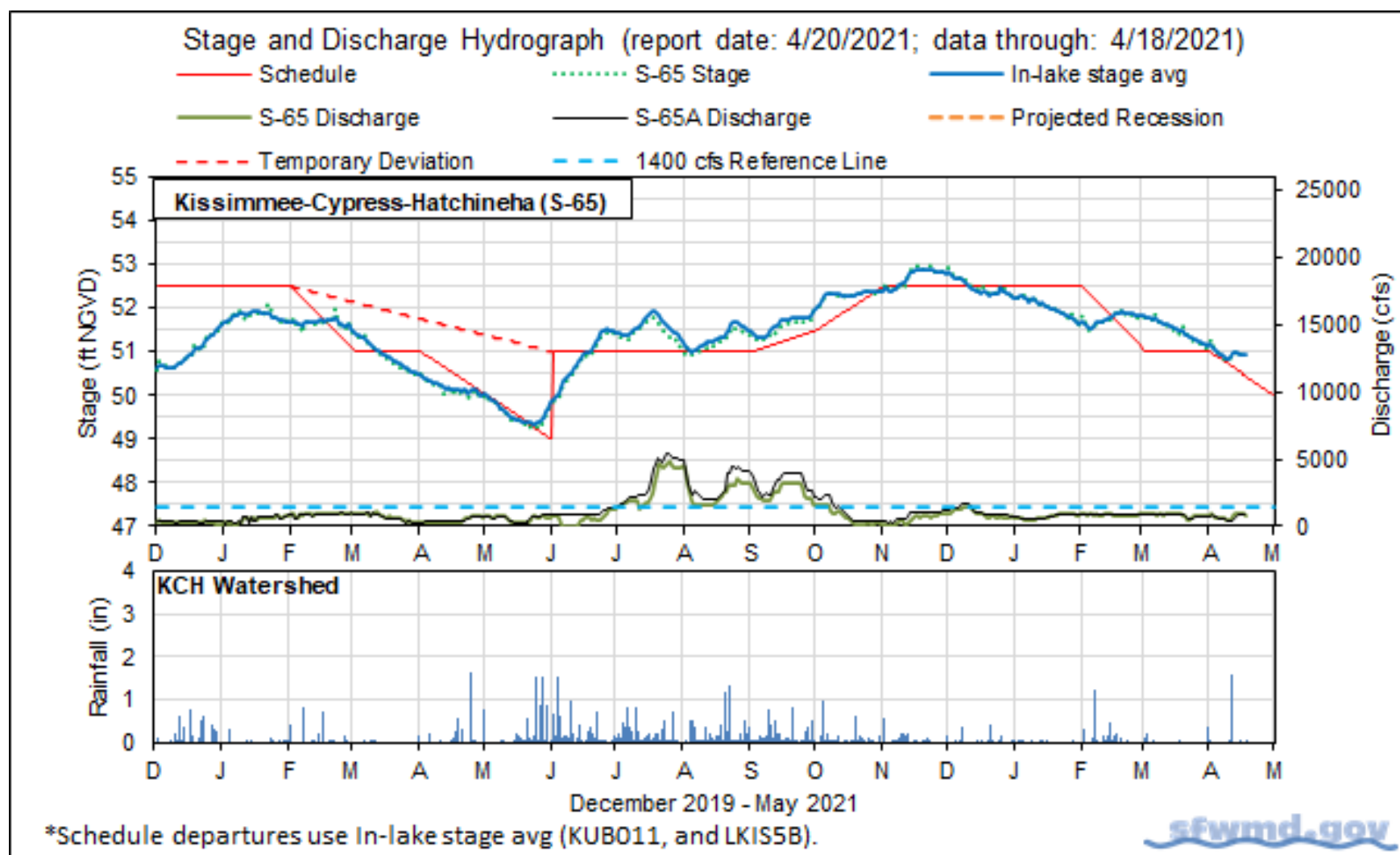


Figure KB-3. Lakes Kissimmee, Cypress and Hatchineha regulation schedule, stage, discharge and rainfall.

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

Metric	Location	Average	Average for Previous Seven Day Periods			
		4/18/21	4/18/21	4/11/21	4/4/21	3/28/21
Discharge	S-65	843	929	531	805	736
Discharge	S-65A ^a	888	842	492	729	652
Discharge	S-65D ^b	845	707	636	755	724
Headwater Stage (feet NGVD)	S-65D ^c	25.93	25.85	25.77	25.76	25.83
Discharge (cfs)	S-65E ^d	780	697	635	792	702
Discharge (cfs)	S-67	0	0	0	0	0
Dissolved Oxygen (mg/L) ^e	Phase I, II/III river channel	7.7	7.8	7.9	7.3	7.2
Mean depth (feet) ^f	Phase I floodplain	0.18	0.22	0.13	0.17	0.22

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).

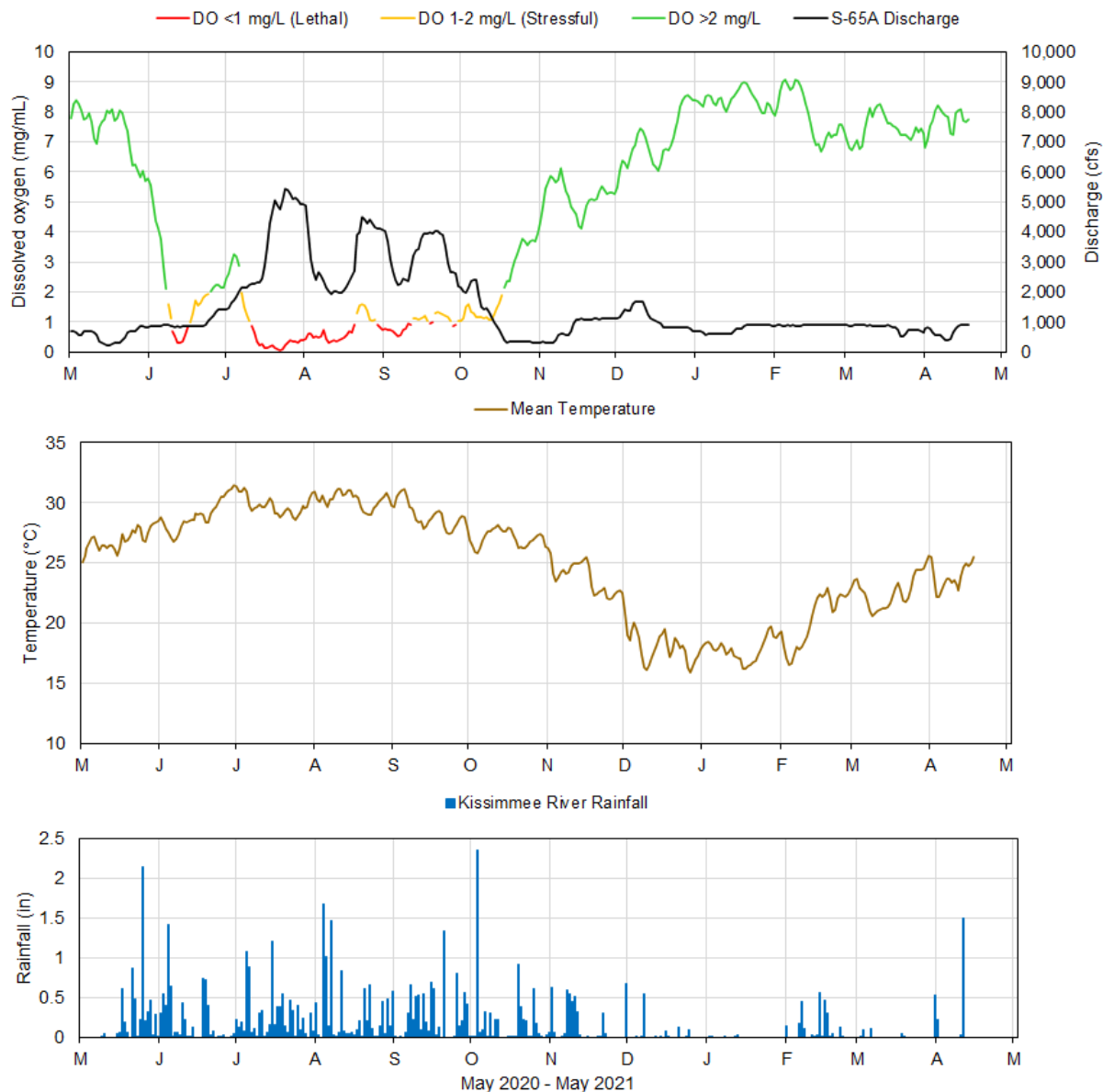


Figure KB-4. Restored Kissimmee river channel mean daily dissolved oxygen concentration (mg/L), S-65A discharge (cfs), temperature (°C) and rainfall (inches). Dissolved oxygen (DO) and temperature are mean daily values averaged for PC62, KRBN, PC33, PD62R, and PD42R with an average of four stations reporting this week. Rainfall values are daily totals for Kissimmee River (Pool BCD) AHED watershed.

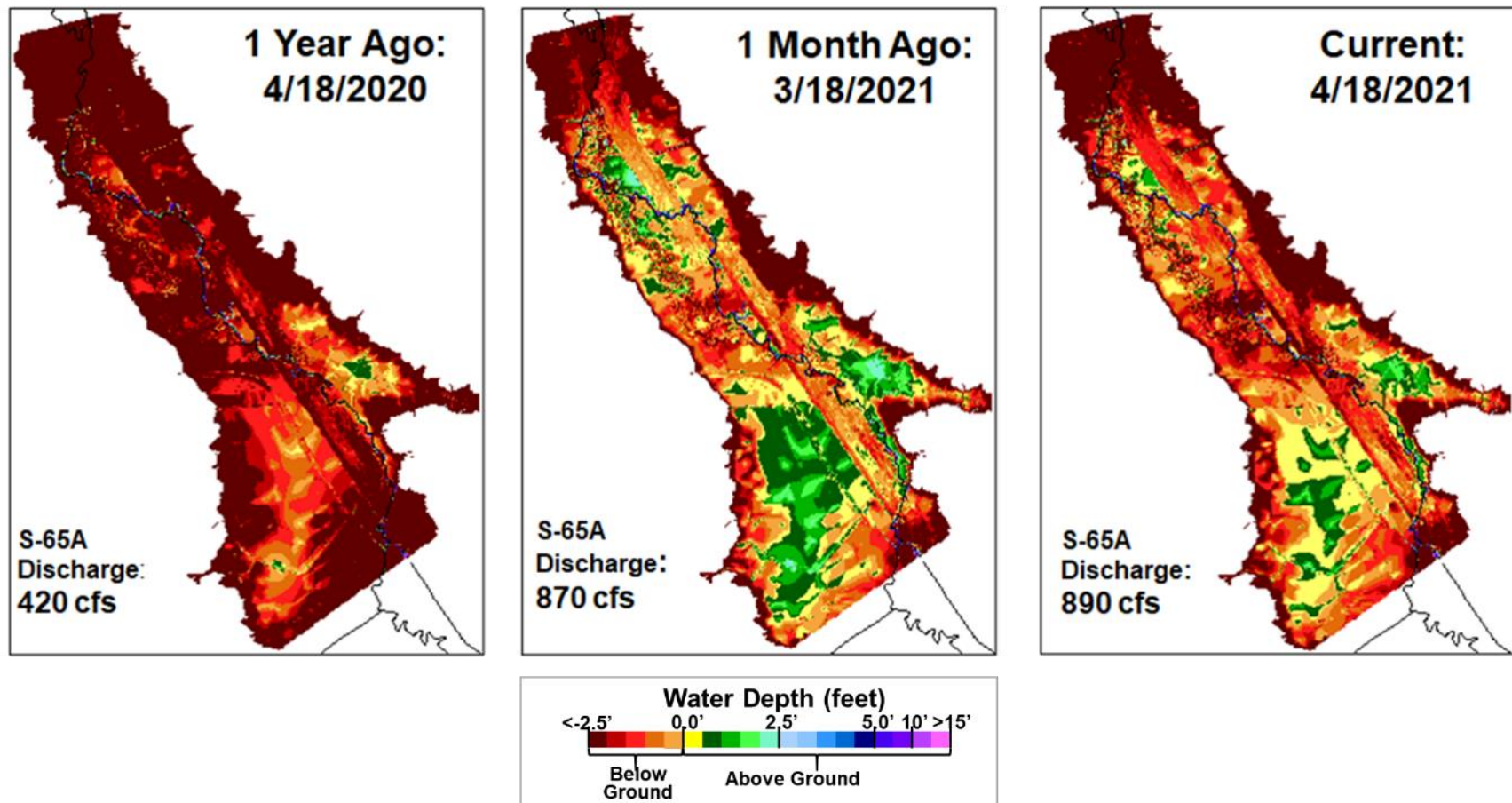


Figure KB-5. Phase I area Kissimmee River floodplain water depths (from left to right) one year ago, one month ago and current.

LAKE OKEECHOBEE

Lake Okeechobee

Lake Okeechobee stage was 14.17 feet NGVD on April 18, 2021, 0.72 feet lower than a month ago, and 2.76 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 reached a low of 10.99 feet on May 17, 2020 and a high of 16.45 feet on November 12, 2020 (post Tropical Storm Eta), a difference of 5.5 feet (Figure LO-3). Lake stage declined slowly from mid-November through mid-February, but recession rates have been high over the past several weeks. Lake stage reentered the envelope on March 30, 2021 and is in the Low sub-band. According to NEXRAD, 0.22 inches of rain fell directly on the Lake over the past week.

Average daily inflows (excluding rainfall) increased from the previous week, going from 676 cfs to 859 cfs. Outflows (excluding evapotranspiration) decreased, going from 3,202 cfs to 1,597 cfs. Over 81% of the inflows came from the Kissimmee River (698 cfs through S-65E & S-65EX1). Releases to the west via S-77 decreased from 1,089 cfs the prior week to 720 cfs, and releases east via S-308 went from 183 cfs to a passive inflow of 35 cfs. Releases south through the S-350 structures decreased, going from 1,589 cfs to 861 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.

On April 15, 2021, approximately 6,880 wading birds were observed in ten flocks around Lake Okeechobee (Figure LO-5). Over nine surveys from December to April, an average of over 5,800 wading birds were observed foraging in 2021, compared to an average of less than 3,500 over five surveys from the same period in 2020 (Figure LO-6). The number of birds nesting on the Lake also continues to be high, suggesting this could be a productive nesting year for wading birds on Lake Okeechobee.

Water quality sampling is now on the non-bloom season schedule (November – April), occurring once monthly at 32 stations for chlorophyll *a*, and at 9 stations for taxonomic identification and toxin analyses (Figure LO-7). Most of the April sampling occurred on the 6th and 7th. Chlorophyll *a* results for 8 of the 30 sites sampled indicate bloom conditions (50.0 µg/L) at one southwest shoreline site (PALMOUT). Six of the samples from the nine algal ID stations had detectable levels of cyanotoxins (but well below 8 µg/L) and the algal community was dominated by the cyanobacteria *Microcystis* (Table LO-2).

The most recent satellite image (April 18, 2021) from the NOAA cyanobacteria monitoring product derived from EUMETSAT's Sentinel 3 OLCI sensor data showed continued low bloom potential on the Lake (Figure LO-8).

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	635	698	0.3	S-77	1089	720	0.3
S-71 & S-72	1	35	0.0	S-308	183	-35	0.0
S-84 & S-84X	0	0	0.0	S-351	740	435	0.2
Fisheating Creek	22	12	0.0	S-352	618	295	0.1
S-154	0	0	0.0	S-354	231	132	0.1
S-191	0	49	0.0	L-8 Outflow	342	50	0.0
S-133 P	11	1	0.0	Evapotranspiration	2940	3012	1.2
S-127 P	0	1	0.0	Totals	6142	4609	1.9
S-129 P	0	1	0.0				
S-131 P	7	10	0.0				
S-135 P	0	52	0.0				
S-2 P	0	0	0.0				
S-3 P	0	0	0.0				
S-4 P	0	0	0.0				
L-8 Backflow							
Rainfall	3644	594	0.2				
Totals	4320	1452	0.6				

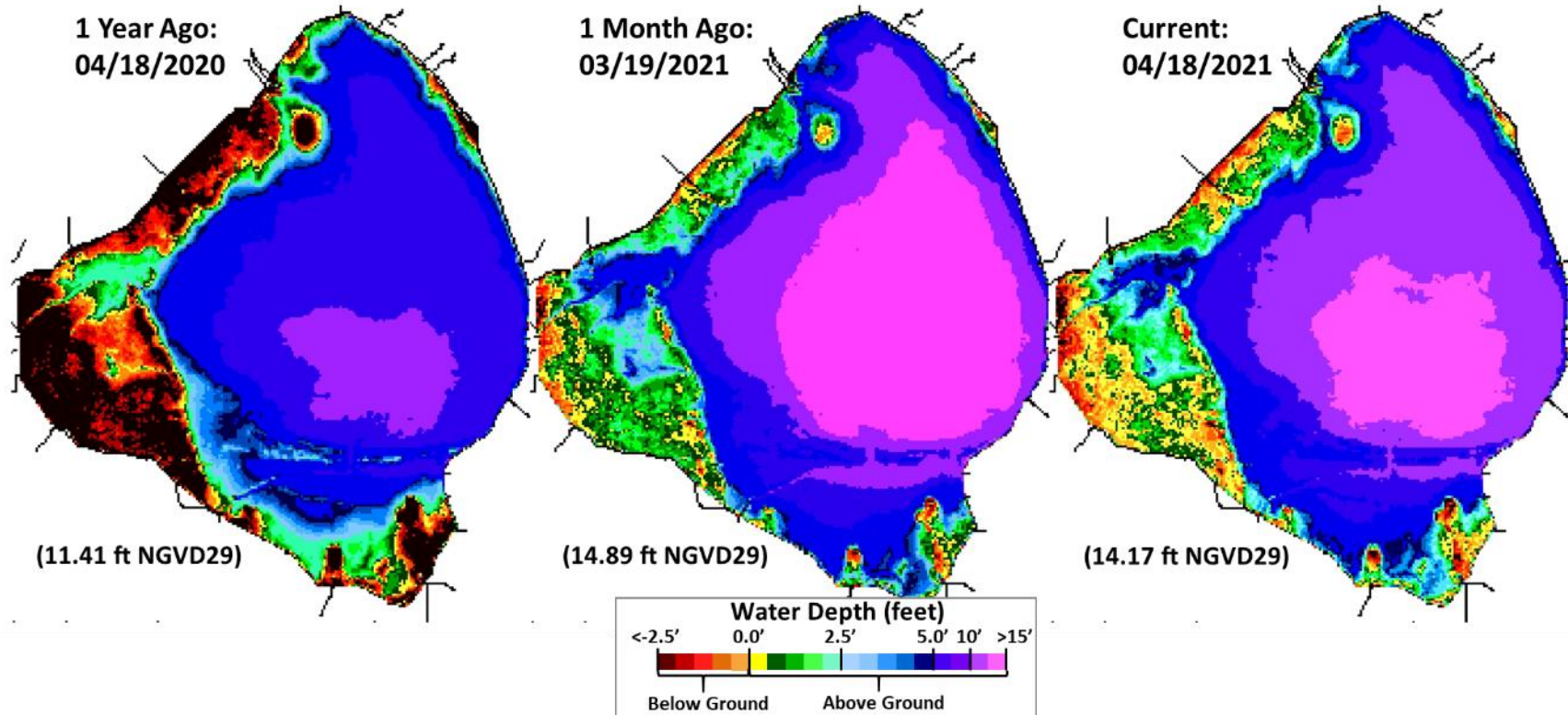


Figure LO-1. Lake Okeechobee water depth estimates based on South Florida Water Depth Assessment Tool (SFWDAT).

Lake Okeechobee Stage vs Updated Ecological Envelope

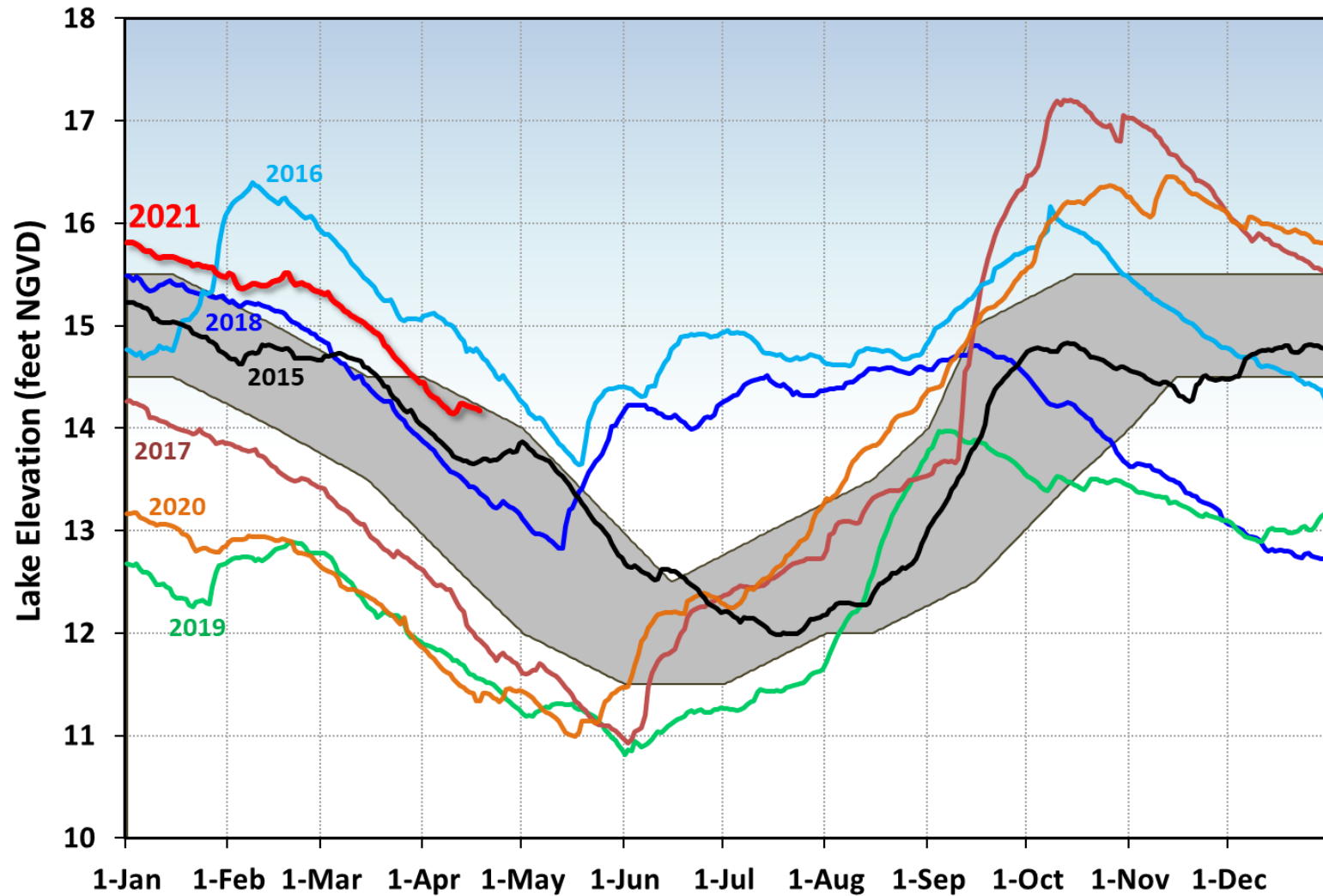
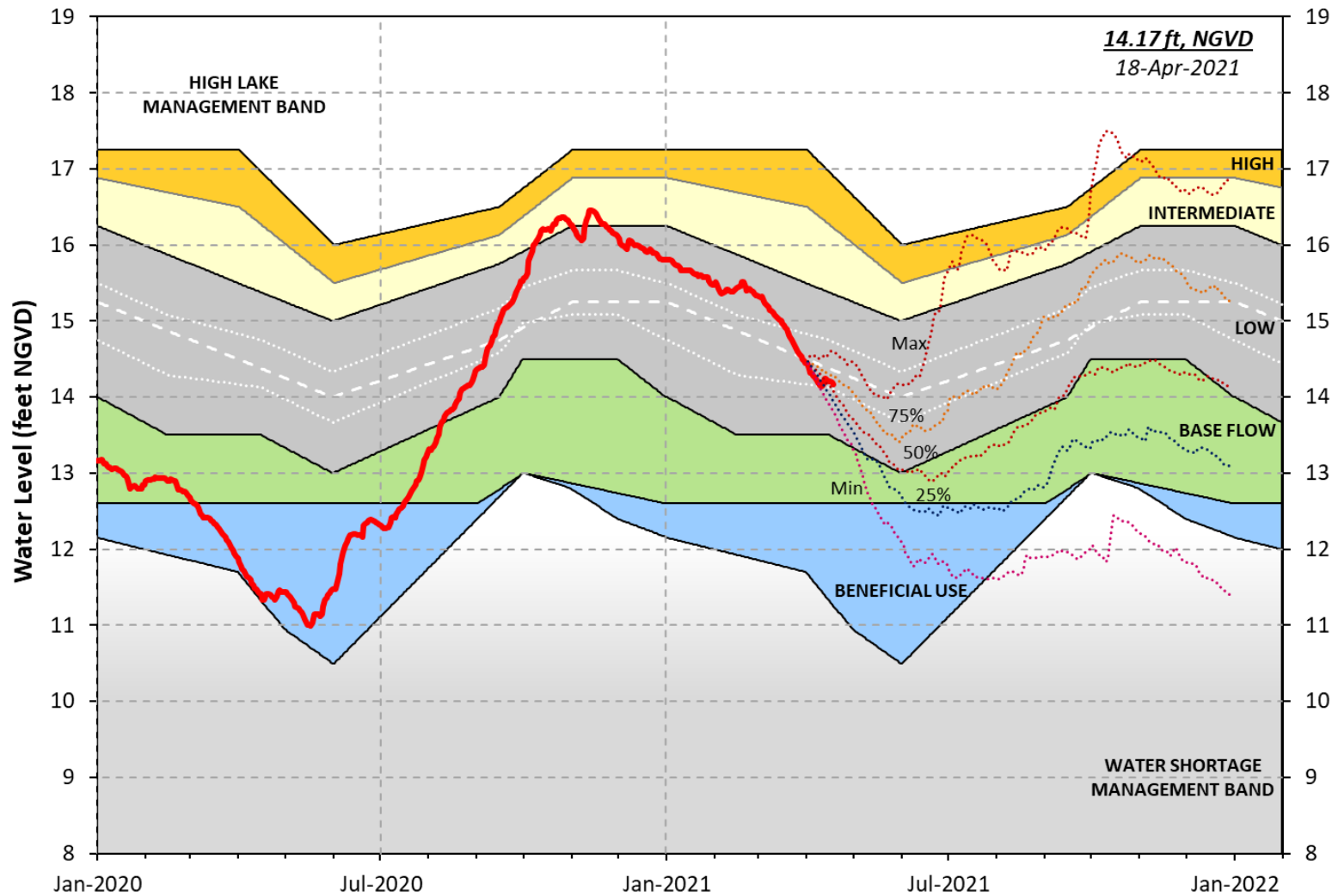


Figure LO-2. Select annual stage hydrographs for Lake Okeechobee in comparison to the updated ecological envelope.

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.

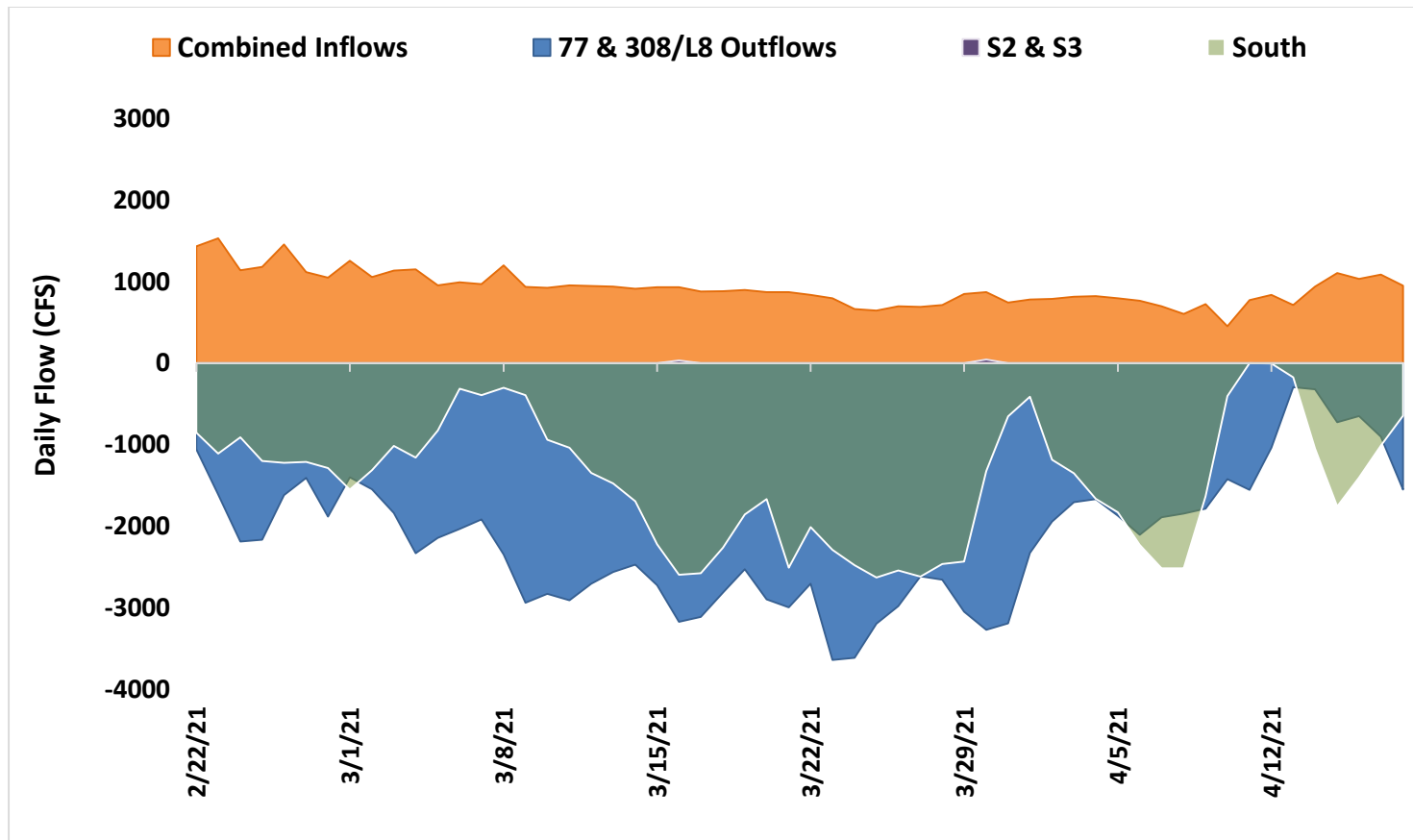


Figure LO-4. Major inflows (orange) to and outflows east and west (blue) from Lake Okeechobee. Outflows south are shown in green. Flows into Lake Okeechobee from the L-8 canal through S-271 (formerly Culvert 10A) are included as inflows. Conversely, flows from Lake Okeechobee into the L-8 Canal are included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

Wading Bird Foraging Locations April 15, 2021

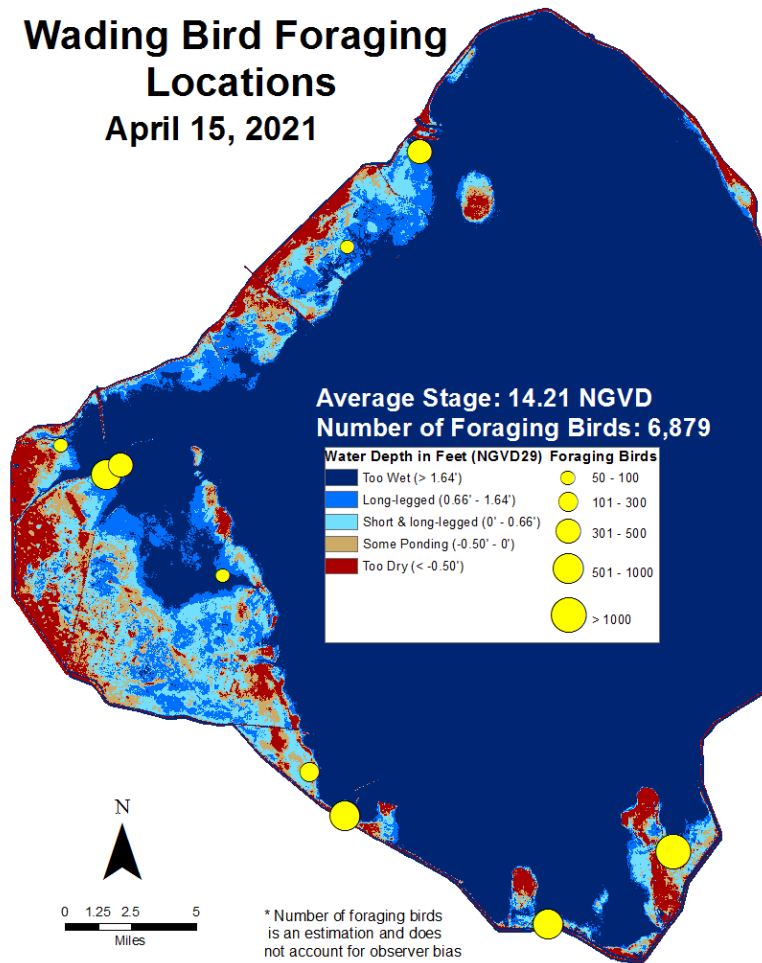


Figure LO-5. Wading bird foraging locations and abundance during April 15, 2021 survey of Lake Okeechobee.

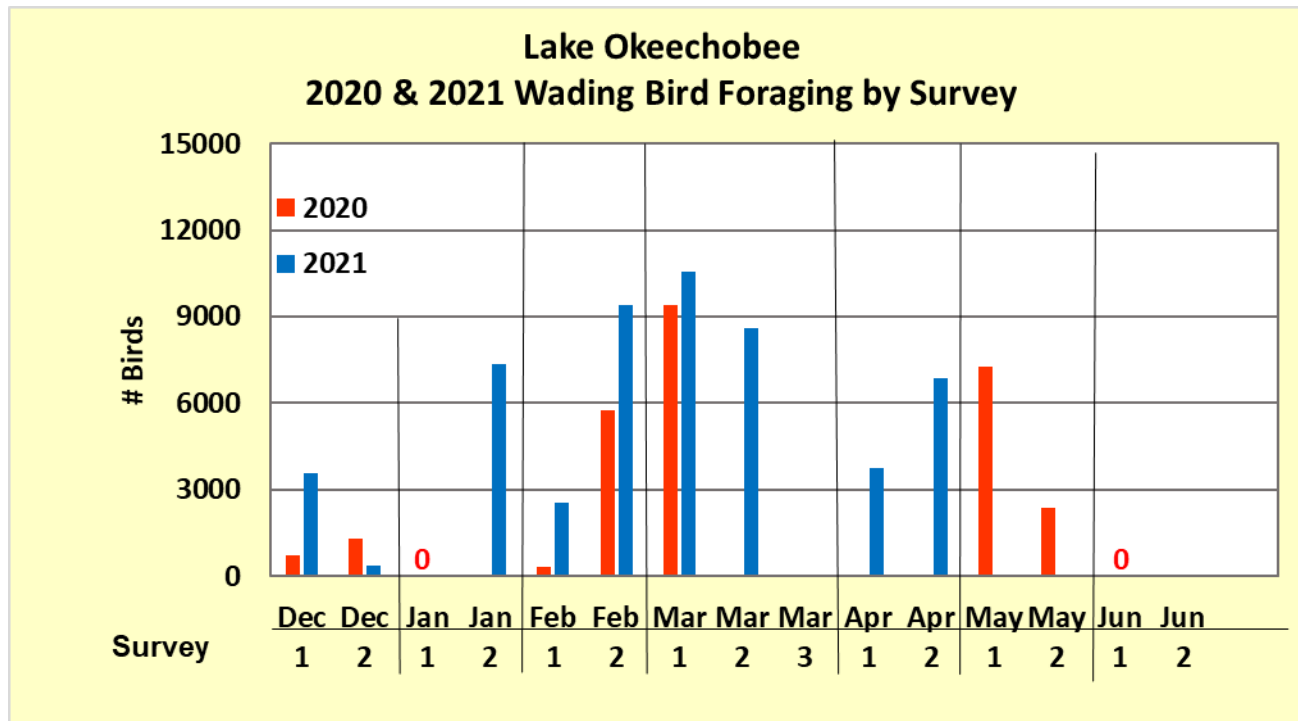


Figure LO-6. Foraging wading bird abundance by survey during the 2020 (red bars) and 2021 (blue bars) breeding seasons on Lake Okeechobee.

Table LO-2. Provisional results of chlorophyll *a* concentrations and cyanobacteria taxa from sampling trips on April 6-7, 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			L001	P		
FEBOUT	NS			L004	P		
KISSR0.0	P	0.4	<i>Microcys</i>	L006	P		
L005	P	0.8	<i>Microcys</i>	L007	P		
LZ2	P	0.5	<i>Microcys</i>	L008	P		
KBARSE	P	BDL	<i>NS</i>	LZ30	P	1.1	<i>Microcys</i>
RITTAE2	4.8	BDL	<i>mixed</i>	LZ40	P		
PELBAY3	4.0			CLV10A	P	BDL	<i>mixed</i>
POLE3S	8.3			NCENTER	P		
LZ25A	18.4			Outflow Structures			
PALMOUT	50.0	1.1	<i>Microcys</i>	S308C	P	0.3	<i>mixed</i>
PALMOUT1	8.5			S77	P	0.5	<i>Microcys</i>
PALMOUT2	6.4			<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	6.1						
POLESOUT	P	0.6	<i>Microcys</i>				
POLESOUT1	P						
POLESOUT2	P						
POLESOUT3	P						
EASTSHORE	P						
NES135	P						

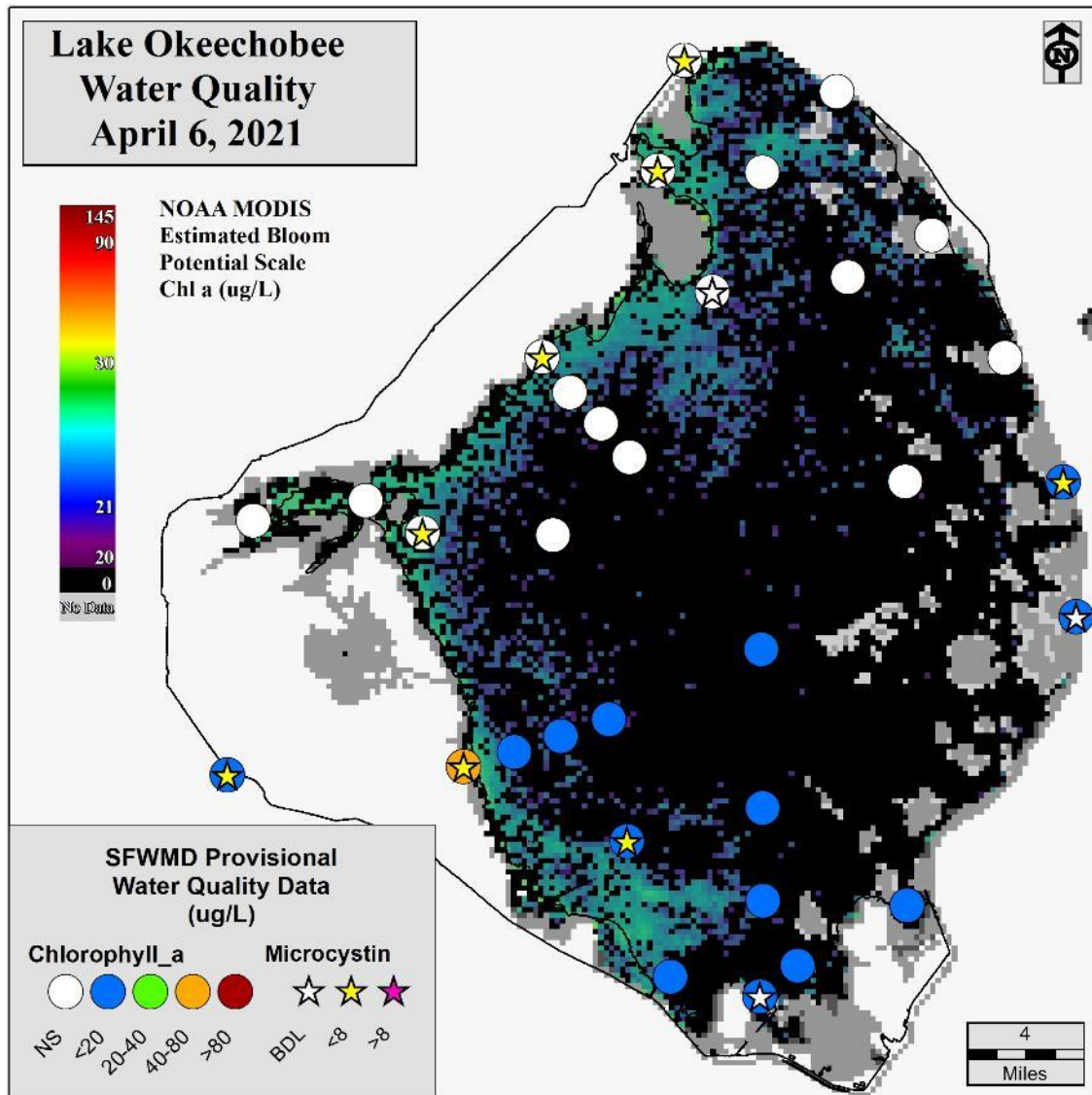


Figure LO-7. Expanded monitoring network and provisional results from samples collected April 6-7, 2021.

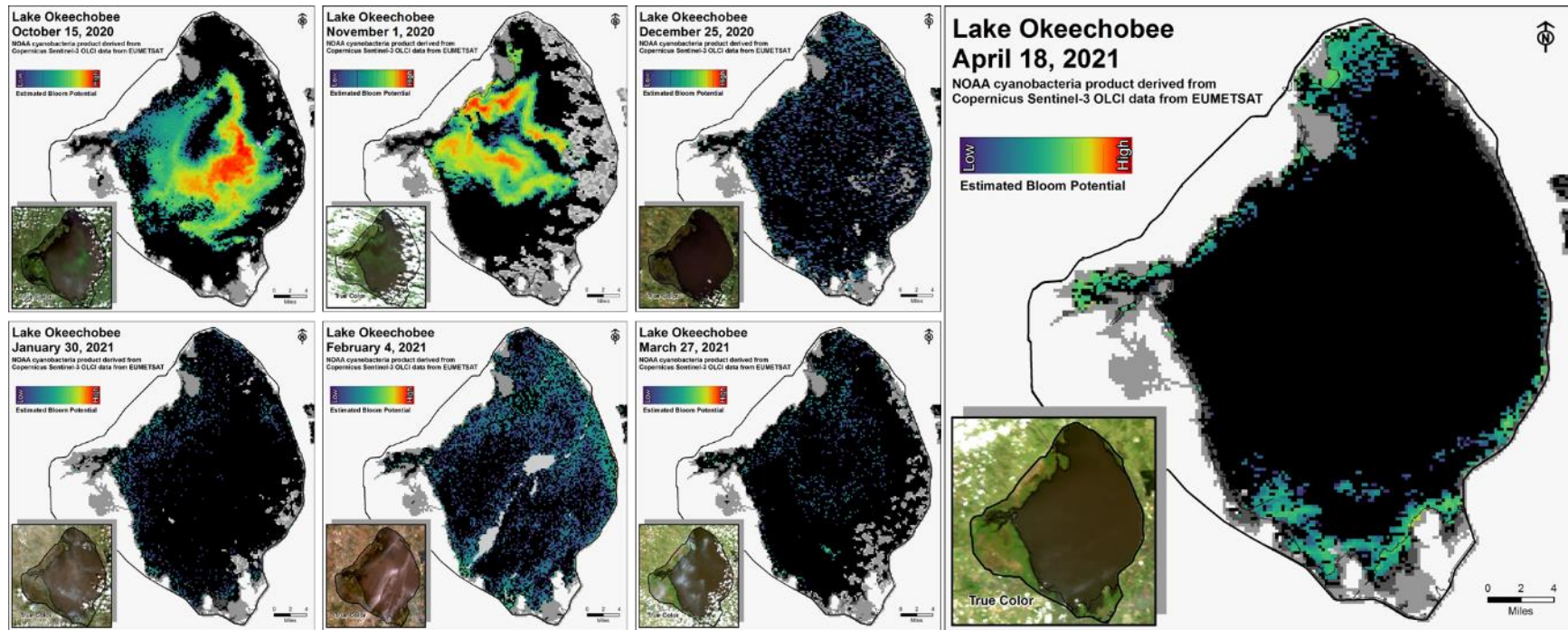


Figure LO-8. Cyanobacteria bloom potential based on NOAA's harmful algal bloom monitoring system. Gray color indicates cloud cover.

ESTUARIES

St. Lucie Estuary:

Last week total inflow to the St. Lucie Estuary averaged approximately 648 cfs (Figures ES-1 and ES-2) and the previous 30-day inflow averaged about 618 cfs. Last week's provisional averaged inflows from the tidal basin and the structures are shown in Table ES-1.

Table ES-1. Weekly average inflows (data are provisional). Note: flows for S-97 were estimated using S-48.

Location	Flow (cfs)
S-308	-35
S-80	239
S-97 on C-23	17
S-49 on C-24	14
Gordy Road structure on Ten Mile Creek	126
Tidal Basin Inflow	252

Over the past week, surface salinity decreased at the HR1 and A1A Bridge sites but remained the same at the US1 bridge site (Table ES-2, Figures ES-3 and ES-4). The seven-day moving average of the water column (an average of the surface and bottom salinity) at the US1 Bridge was 17.1. Salinity conditions in the middle estuary are estimated to be within the good range for adult eastern oysters (Figure ES-4).

Table ES-2. Seven-day average salinities at three monitoring sites in the St. Lucie Estuary. Current averages are in bold font, previous week's averages are in parentheses. The envelope reflects the preferred salinity range for adult eastern oysters (*Crassostrea virginica*) in the middle estuary.

Sampling Site	Surface	Bottom	Envelope
HR1 (North Fork)	11.3 (12.5)	14.8 (13.5)	NA ¹
US1 Bridge	15.6 (15.6)	18.6 (17.9)	10.0-26.0
A1A Bridge	23.1 (24.1)	27.2 (27.6)	NA ¹

¹Envelope not applicable

Caloosahatchee Estuary:

Last week total inflow to the Caloosahatchee Estuary averaged approximately 1,260 cfs (Figures ES-5 and ES-6) and the previous 30-day inflow averaged about 1,558 cfs. Last week's provisional averaged inflows from the structures and the tidal basin are shown in Table ES-3.

Table ES-3. Weekly average inflows from Lake Okeechobee and to the Caloosahatchee River and Estuary.
Data are provisional.

Location	Flow (cfs)
S-77	720
S-78	754
S-79	1203
Tidal Basin Inflow	58

Over the past week, surface salinities decreased at S-79 and increased at the remaining sites in the estuary (Table ES-4, Figures ES-7 and ES-8). The seven-day average 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). The seven-day average surface salinities (Table ES-4) are in the good range (0-10) for tape grass at Val I-75 and at Ft. Myers.

Table ES-4. Seven-day average salinities at six monitoring sites in the Caloosahatchee Estuary. Current averages are in bold font; previous week's averages are in parentheses. The envelope at Val I-75 is for the protection of tape grass in the upper estuary and the envelope in the lower estuary reflects the preferred salinity range for adult eastern oysters (*Crassostrea virginica*).

Sampling Site	Surface	Bottom	Envelope
S-79 (Franklin Lock)	0.3 (0.6)	0.3 (0.7)	NA ¹
Val I-75	0.7 (0.6)	0.8 (1.3)	0.0-0.5 ²
Ft. Myers Yacht Basin	3.0 (2.9)	3.5 (4.0)	NA ¹
Cape Coral	13.9 (13.3)	15.3 (16.0)	10.0-30.0
Shell Point	27.6 (26.9)	28.6 (27.7)	10.0-30.0
Sanibel	30.7 (30.3)	32.3 (31.8)	10.0-30.0

¹Envelope not applicable and ²Envelope is based on a 2-week forecast 30-day average

Forecast of surface salinity (Table ES-5 and Figure ES-10) at Val I-75 for the next two weeks using the autoregression model (Qiu and Wan, 2013) coupled with a linear reservoir model for the tidal basin predicts daily salinity to be 2.5 or lower at the end of the two week period for pulse release at S-79 ranging from 0 to 1500 cfs. Tidal Basin inflows are estimated to be 65 cfs. The 30-day moving average surface salinity at Val I-75 is forecast to be 0.8 or lower (Table ES-5). The current salinity conditions at Val I-75 are within the envelope of salinity (0.0-5.0) for this site (Table ES-4).

Table ES-5. Predicted salinity at Val I-75 at the end of the forecast period for various S-79 flow release scenarios.

Scenario	Q79 (cfs)	TB Runoff (cfs)	Daily Salinity	30-Day Mean
A	0	65	2.5	0.8
B	450	65	1.5	0.6
C	800	65	0.8	0.5
D	1000	65	0.5	0.4
E	1500	65	0.3	0.4

Red tide

The Florida Fish and Wildlife Research Institute reported on April 16, 2021, that *Karenia brevis*, the Florida red tide dinoflagellate, was observed at background to very low concentrations in and offshore of Lee County and background to medium concentrations in Collier County. On the east coast, no samples were collected from counties within the District.

Water Management Recommendations

Lake stage is in the Low Sub-Band. Tributary conditions are normal. The seasonal outlook is wet and multi-seasonal outlook is wet. The LORS2008 release guidance suggests up to 3000 cfs release at S-79 to the Caloosahatchee Estuary and up to 1170 cfs release at S-80 to the St. Lucie Estuary.

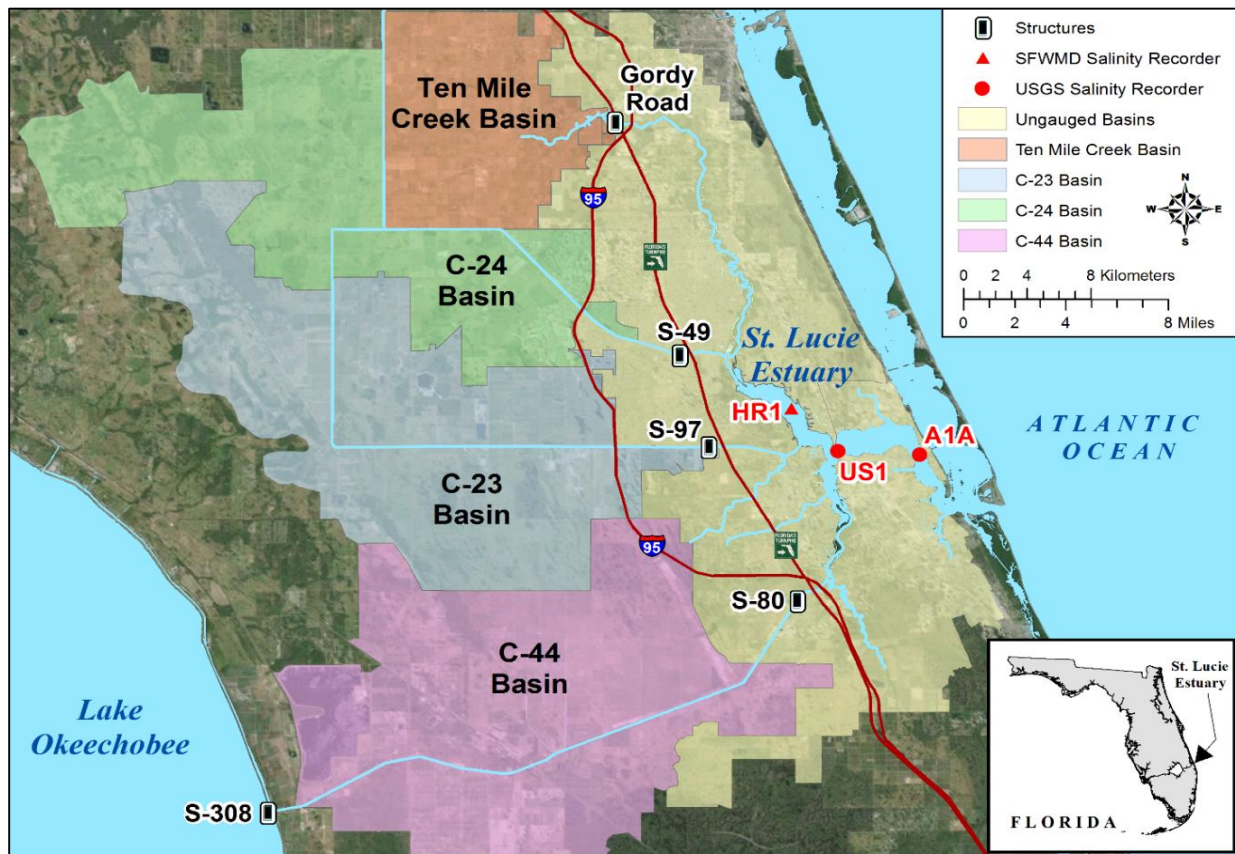


Figure ES-1. Basins, water control structures, and salinity monitoring sites in the St. Lucie Estuary.

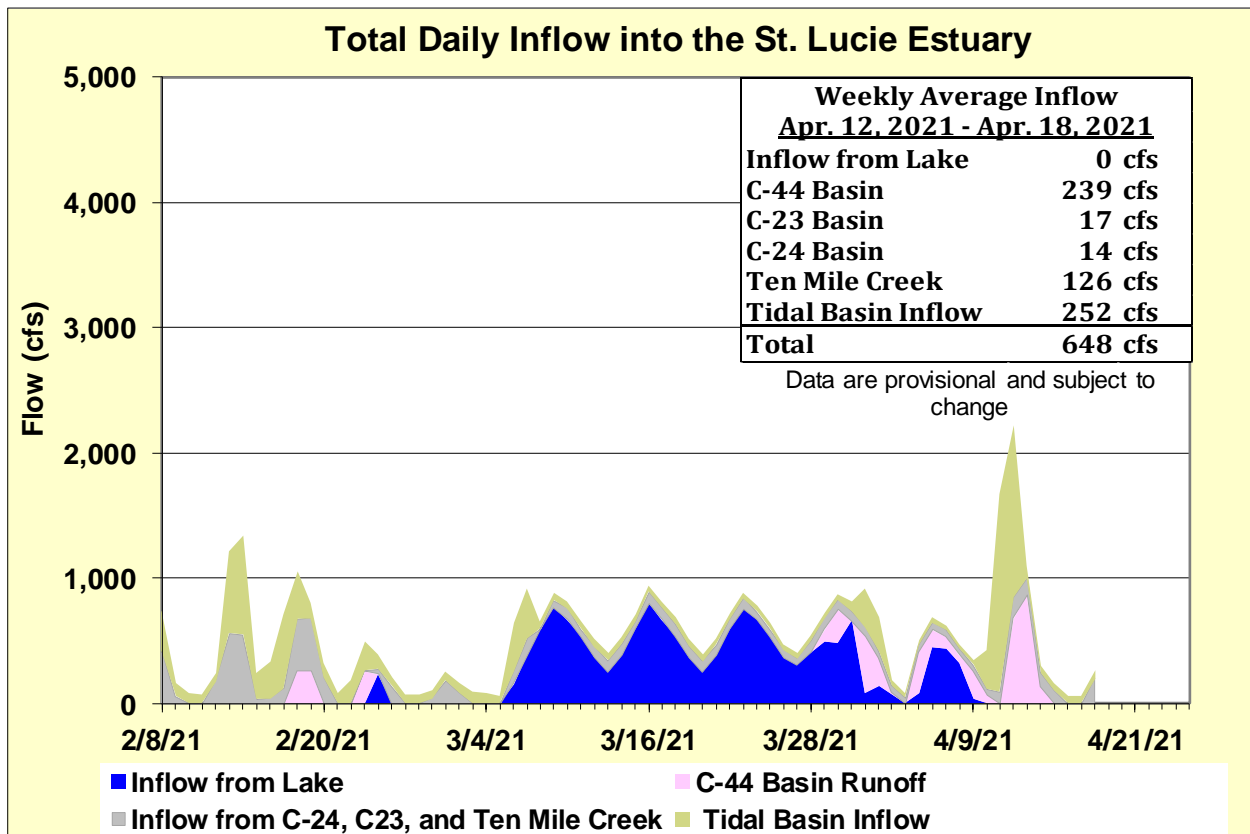


Figure ES-2. Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basins into the St. Lucie Estuary. Note: C-23 Basin inflows were estimated using S-48.

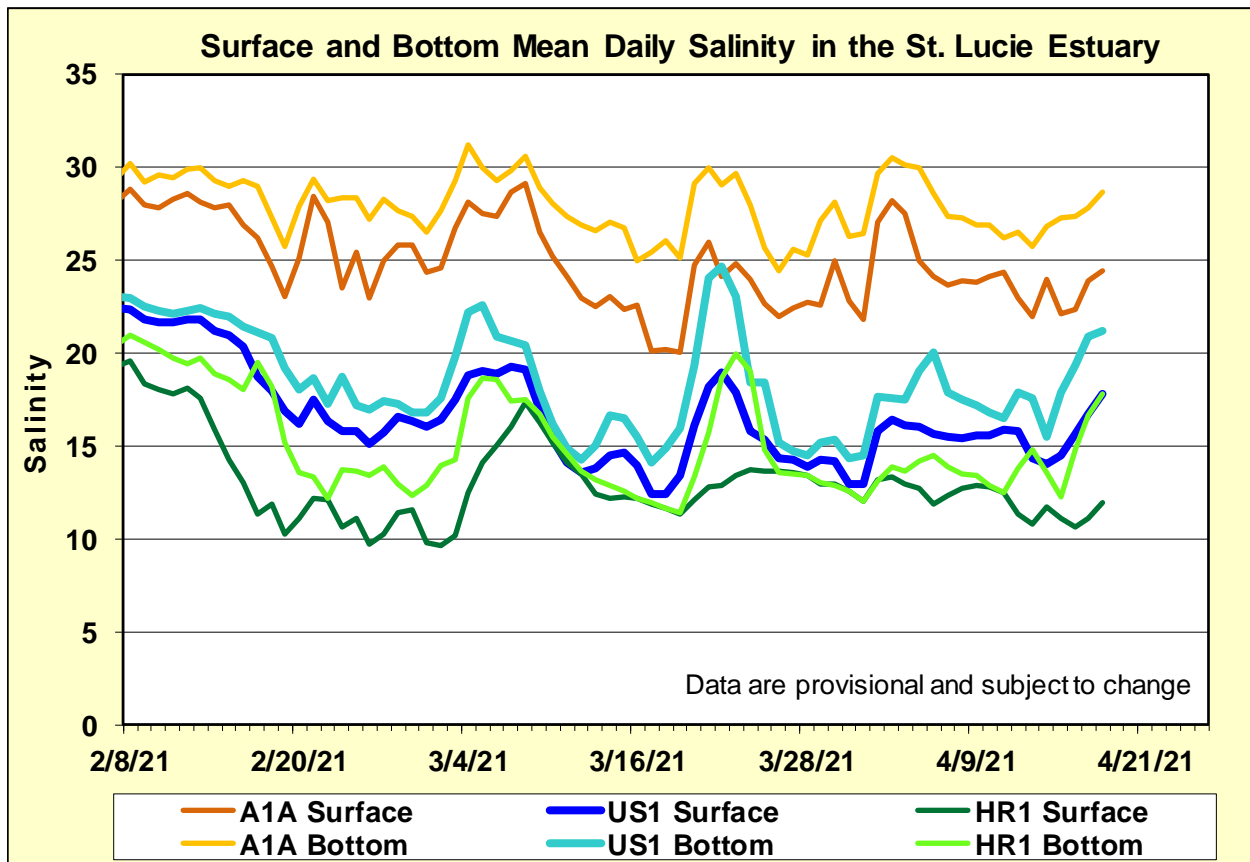


Figure ES-3. Daily mean salinity at the A1A, US1, and HR1 sites.

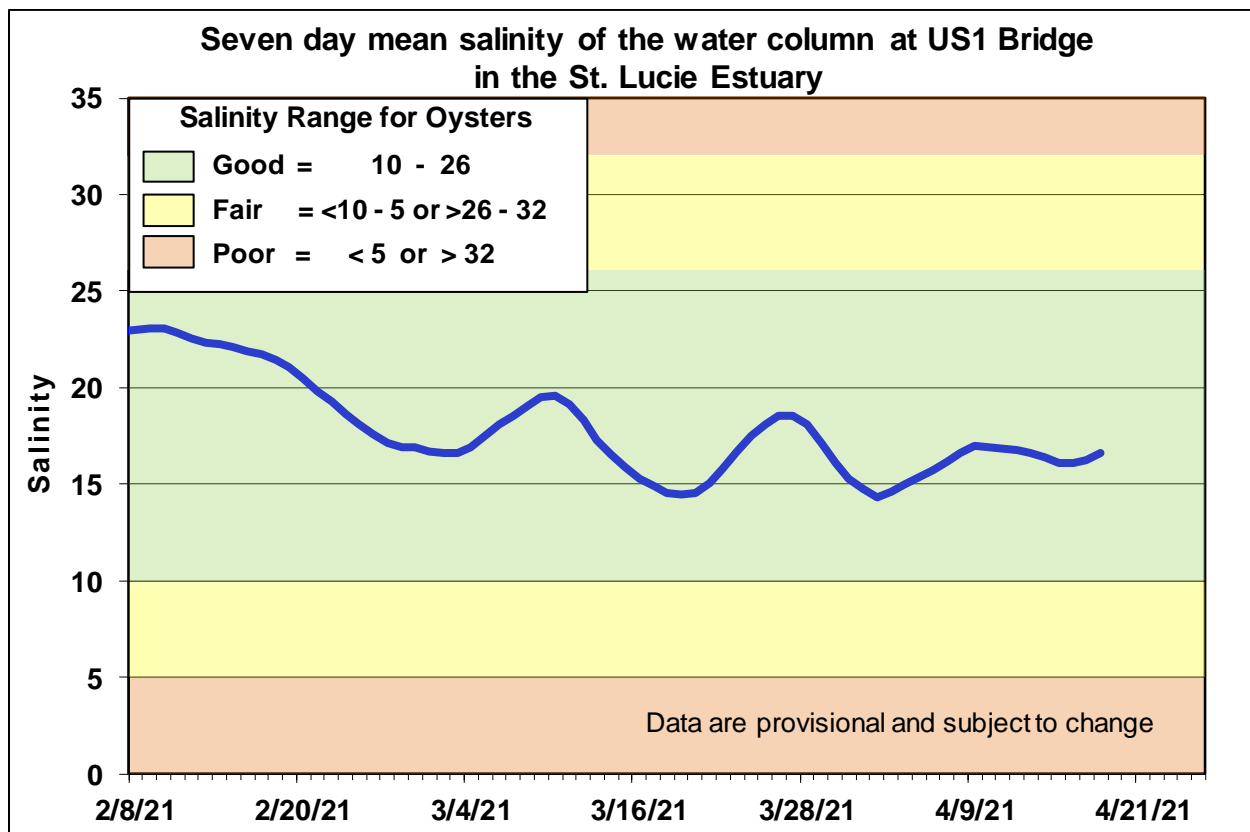


Figure ES-4. Seven-day mean salinity of the water column at the US1 Bridge.

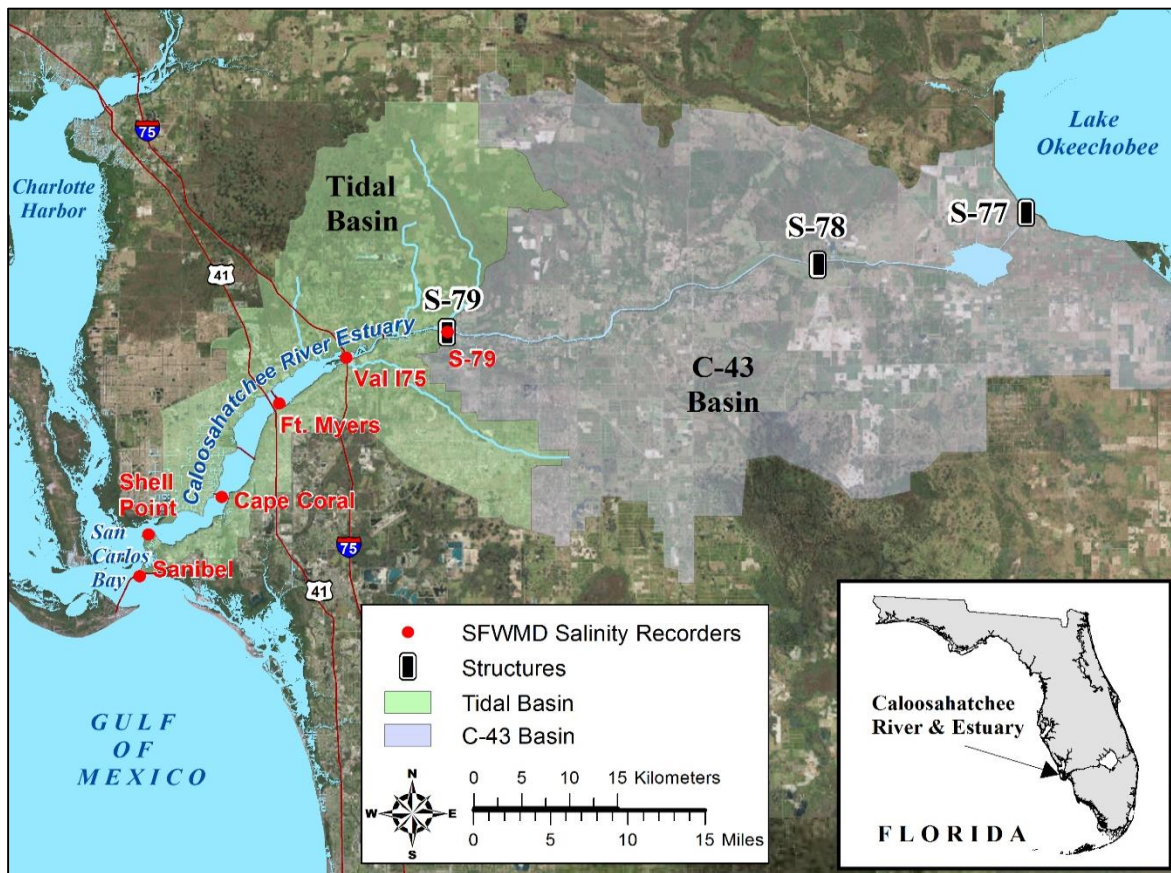


Figure ES-5. Basins, water control structures, and salinity monitoring sites in the Caloosahatchee Estuary.

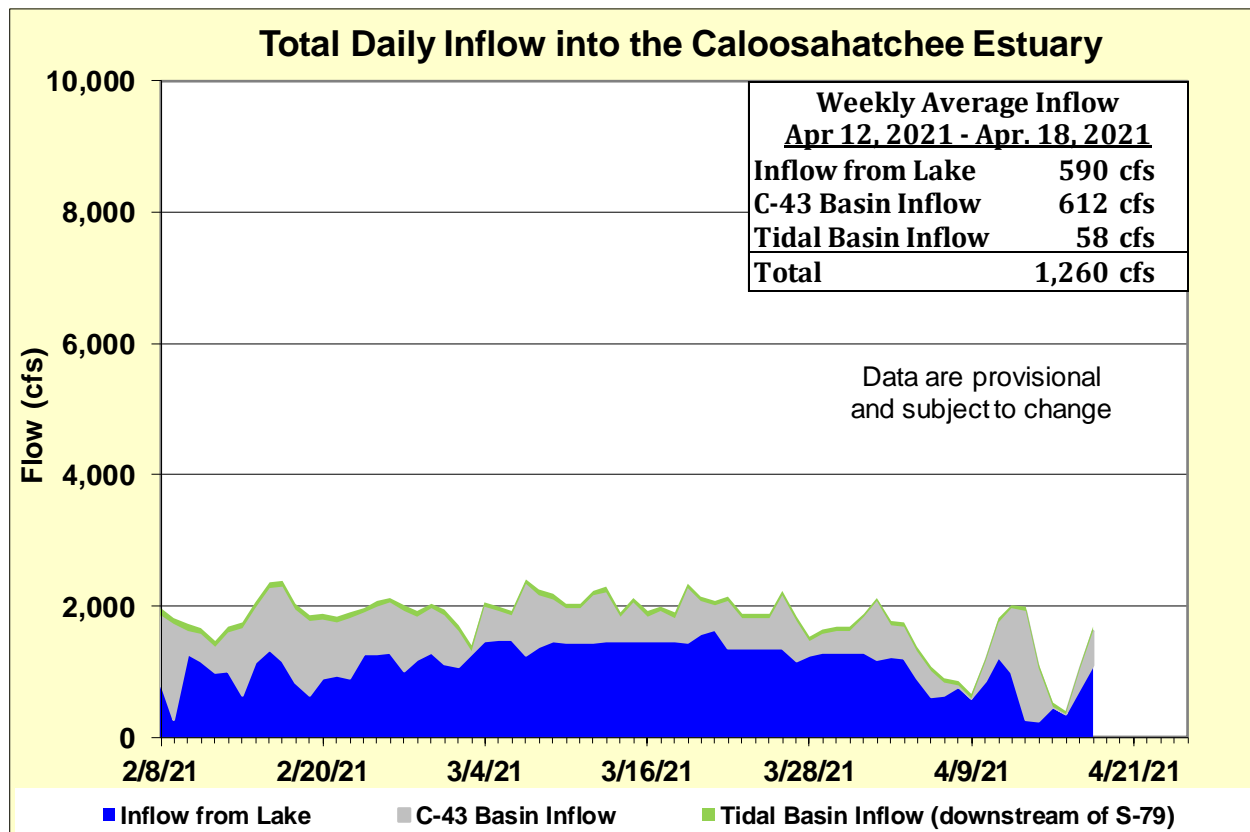


Figure ES-6. Total daily inflows from Lake Okeechobee, and runoff from the C-43 and Tidal basins into the Caloosahatchee Estuary.

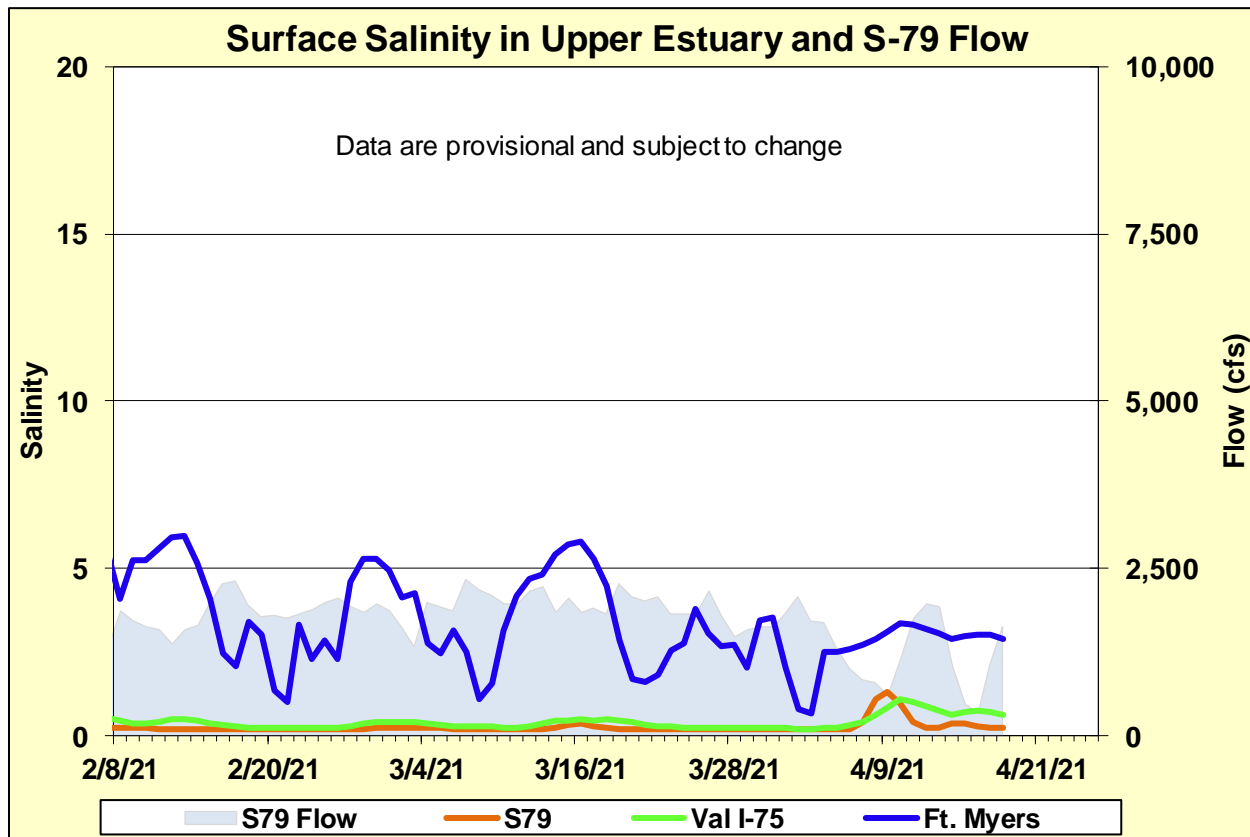


Figure ES-7. Daily mean flows at S-79 and salinity at upper estuary monitoring sites.

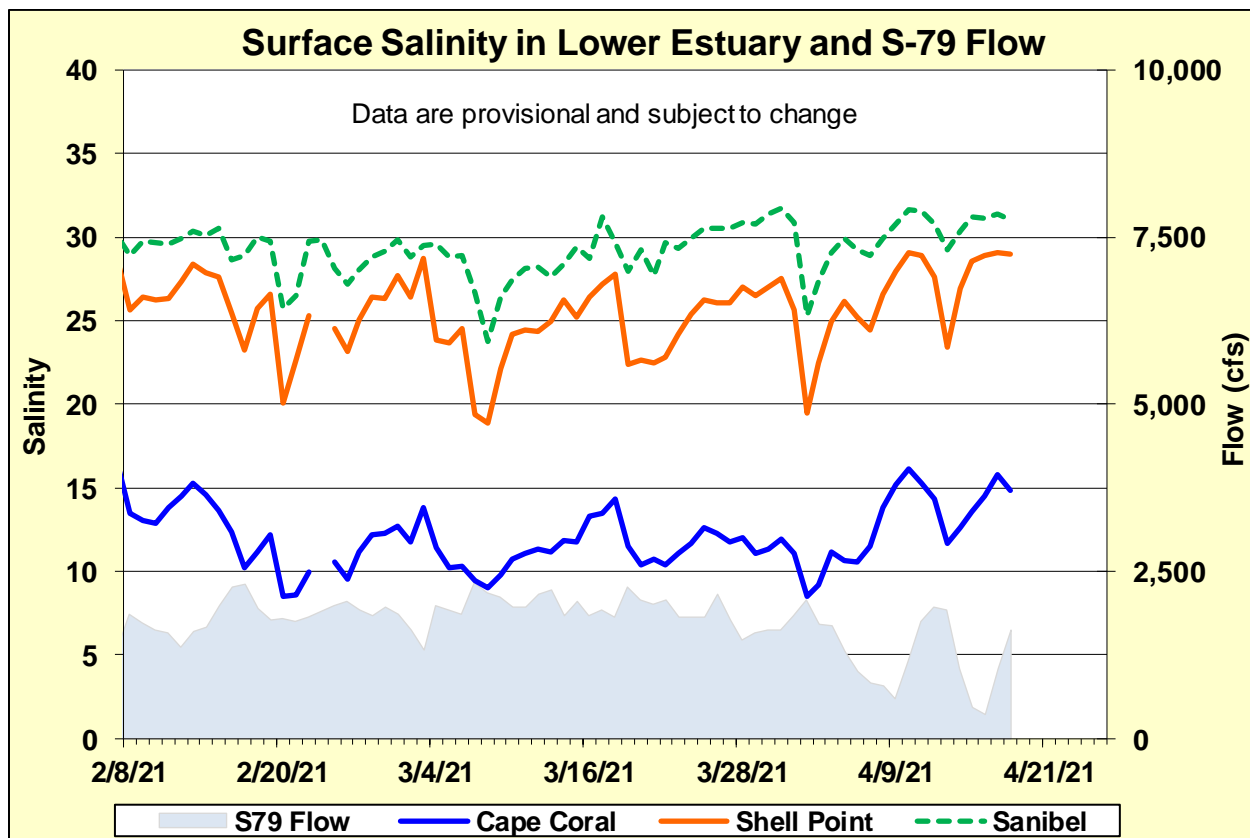


Figure ES-8. Daily mean flows at S-79 and salinity at lower estuary sites.

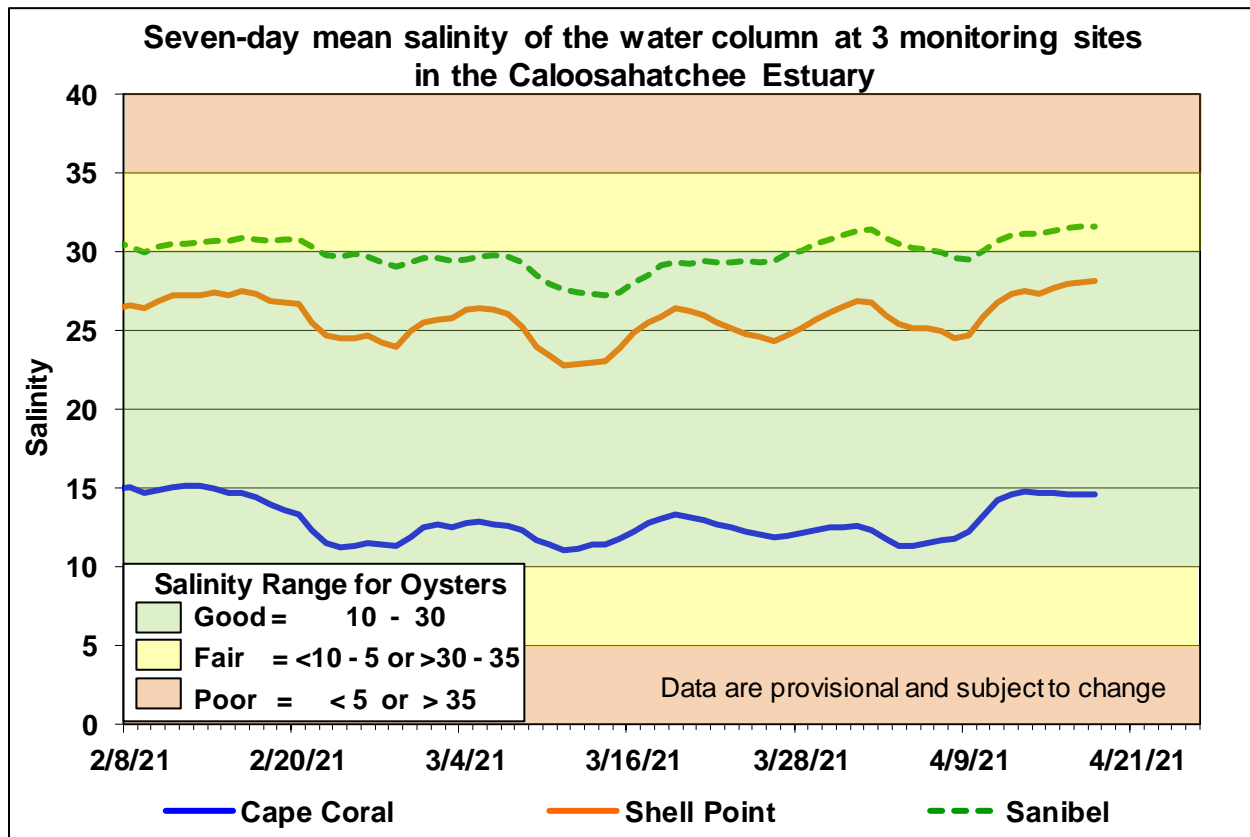


Figure ES-9. Seven-day mean salinity at Cape Coral, Shell Point, and Sanibel monitoring sites.

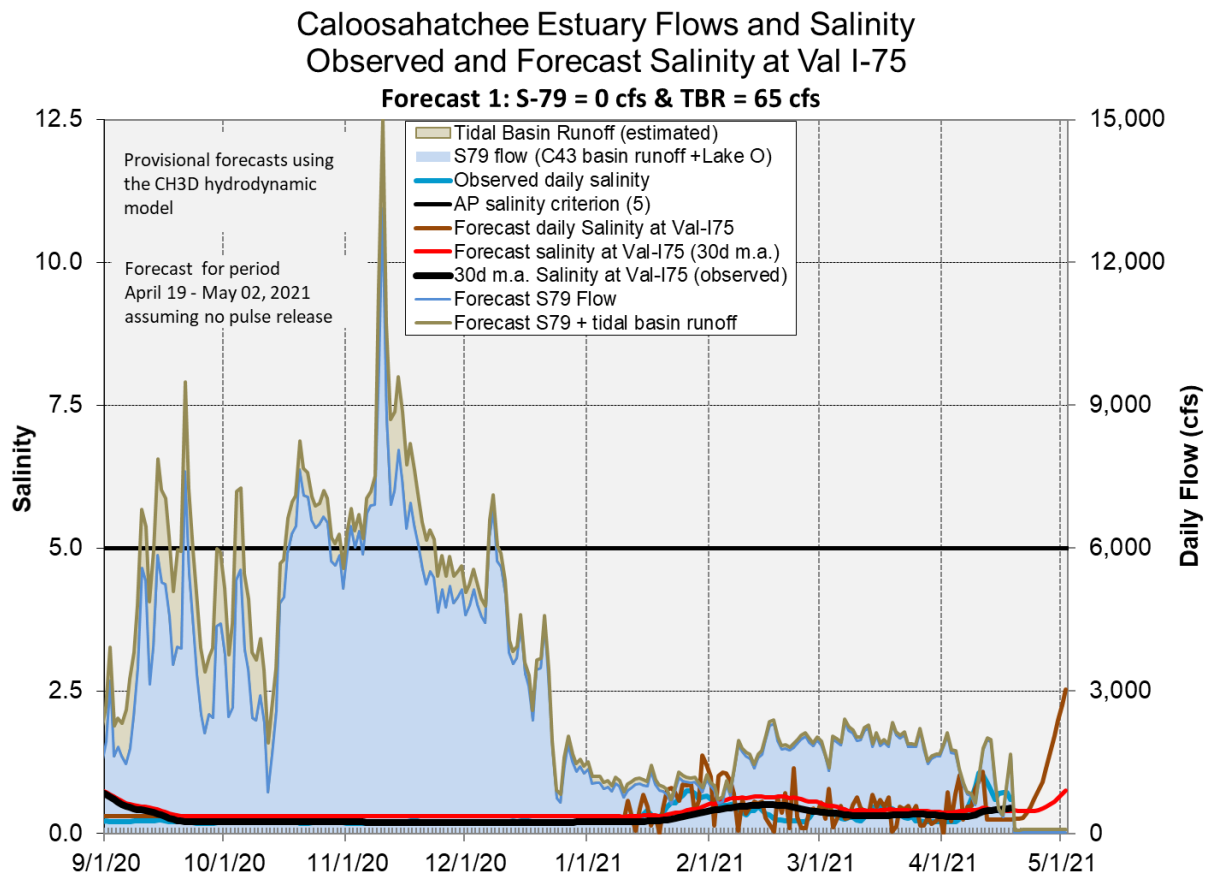


Figure ES-10. Forecasted surface salinity Val I-75 site assuming no pulse release at S-79.

Stormwater Treatment Areas

Over the past week, approximately 8,600 ac-ft of Lake Okeechobee water was delivered to the FEBs/STAs. The total amount of Lake releases sent to the FEBs/STAs in WY2021 (since May 1, 2020) is approximately 149,500 ac-feet. The total amount of inflows to the STAs in WY2021 is approximately 1,619,000 ac-feet. 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. For definitions on STA operational language see glossary following figures.

STA-1E: STA-1E Western Flow-way is offline for the Restoration Strategies project to fill and grade Cells 5 and 7. Operational restrictions are in place in STA-1E Central Flow-way for vegetation management activities. Online treatment cells are at or near target stage, vegetation in these cells is highly stressed and the 365-day phosphorus loading rates (PLR) for these flow-ways are extremely high (Figure S-1).

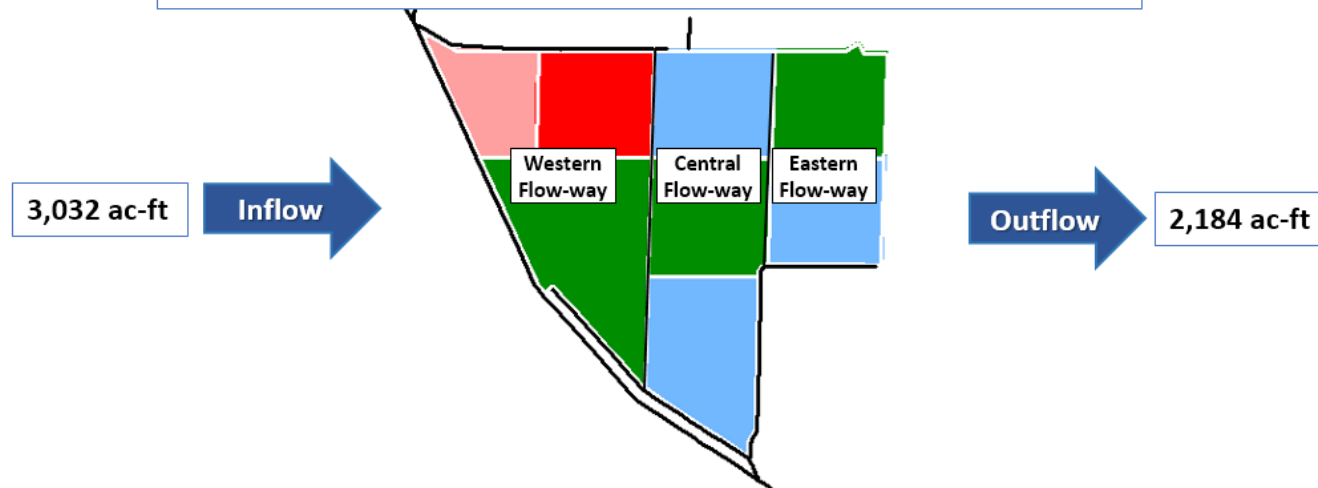
STA-1W: Operational restrictions are in place in STA-1W Western, Eastern, and Northern Flow-ways due to construction activities. All treatment cells are at or below target stage. Vegetation in all flow-ways is highly stressed and the 365-day PLRs for all flow-ways are high to very high (Figure S-2).









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. Treatment cells are at or near target stage. Vegetation in Flow-way 1 is healthy, in Flow-ways 2 and 3 is stressed, and in Flow-ways 4 and 5 is highly stressed. The 365-day PLRs for all flow-ways are about 1.0 g/m²/year except 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 near 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 starting to dry 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).

STA-1E Weekly Status Report – 4/12/2021 through 4/18/2021



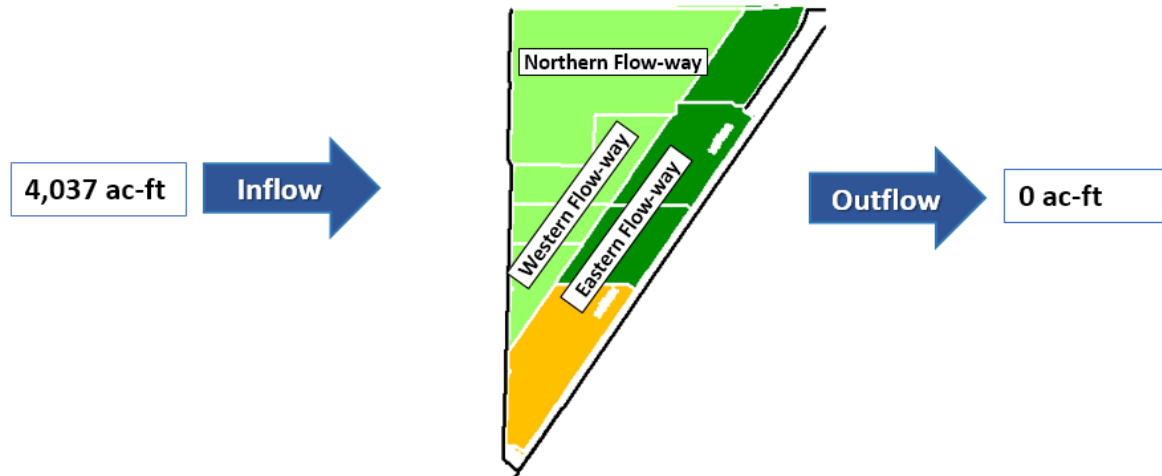
STA-1E Flow-Way Status			
Flow-Way	Vegetation Status <small>Healthy ----- Stressed</small> 	365-day P Loading Rate <small>(below 1.0 g P /m²/yr. is optimal)</small> 	Online / Offline / Restrictions
Eastern	 		Online
Central	 		Vegetation Rehab
Western	Offline, construction activities starting 11/01/2019		

As of 4/18/2021	
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	3,032	5,686	320,739
--Lake Inflow, ac-ft	200	N/A	24,700
Total Outflow, ac-ft	2,184	4,401	280,779
Inflow Conc., ppb	165	161	137
Outflow Conc., ppb	33	36	37
Includes Preliminary Data			

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

STA-1W Weekly Status Report – 4/12/2021 through 4/18/2021



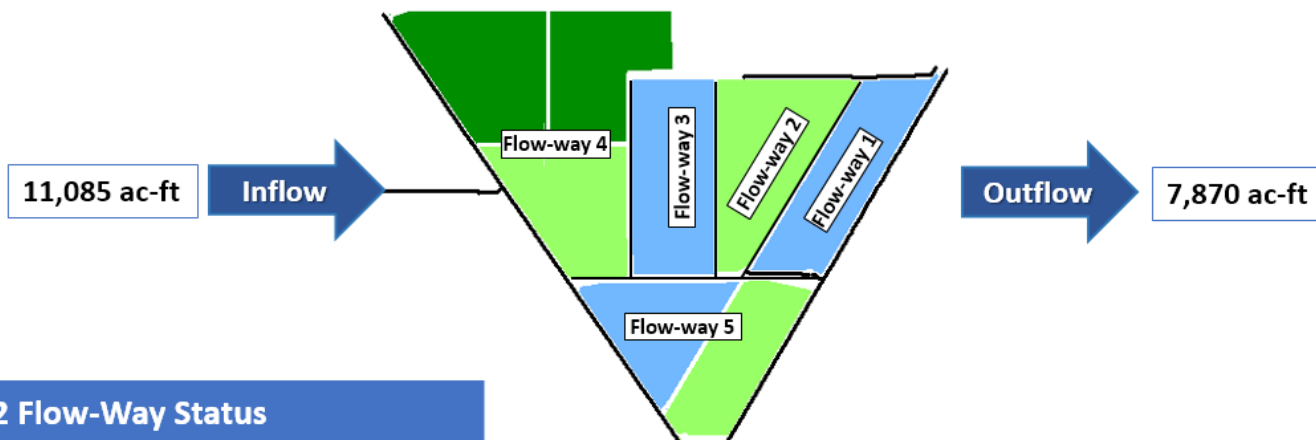
STA-1W Flow-Way Status			
Flow-Way	Vegetation Status Healthy --- Stressed	365-day P Loading Rate (below 1.0 g P /m ² /yr is optimal)	Online / Offline / Restrictions
Northern			Construction
Western			Construction
Eastern			Construction

As of 4/18/2021			
Stage Based: Relative to Target Stage (TS)			
Deep Water Level (> 2.8' above TS)			
High Water Level (1.5' – 2.8' above TS)			
0.2' – 1.5' above TS			
Target Stage (TS +/- 0.2')			
Low Water Level (<0.2' below TS)			
Depth / Area Based: Percent of Area Dry			
0-25% Dry		50-75% Dry	
25-50% Dry		75-100% Dry	

STA-1W Flow & Phosphorus Concentration			
	7-day	28-day	365-day
Total Inflow, ac-ft	4,037	5,466	194,699
--Lake Inflow, ac-ft	1,900	N/A	8,600
Total Outflow, ac-ft	0	0	216,679
Inflow Conc., ppb	133	137	251
Outflow Conc., ppb	N/A	N/A	38
Includes Preliminary Data			

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

STA-2 Weekly Status Report – 4/12/2021 through 4/18/2021



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 4/18/2021

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

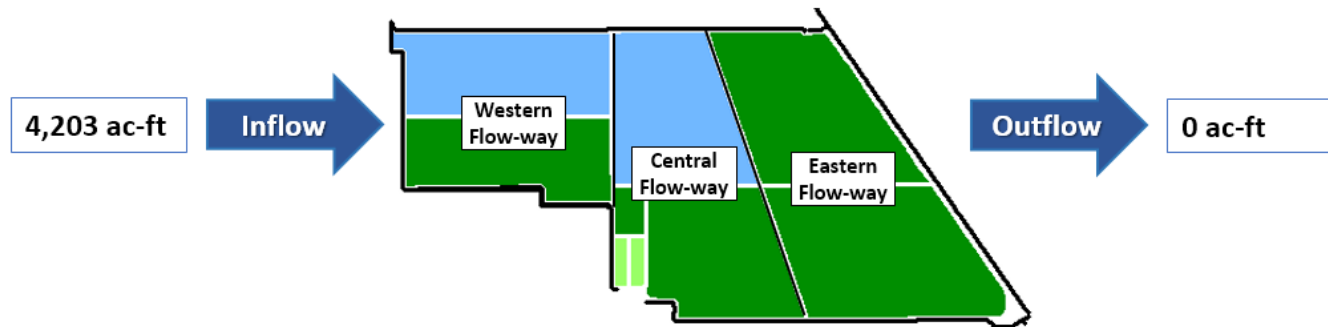
- 0-25% Dry
- 25-50% Dry
- 50-75% Dry
- 75-100% Dry

STA-2 Flow & Phosphorus Concentration

	7-day	28-day	365-day
Total Inflow, ac-ft	11,085	29,103	428,804
--Lake Inflow, ac-ft	3,800	N/A	67,600
Total Outflow, ac-ft	7,870	24,421	493,343
Inflow Conc., ppb	57	62	102
Outflow Conc., ppb	19	17	21
Includes Preliminary Data			

Figure S-3. STA-2 Weekly Status Report

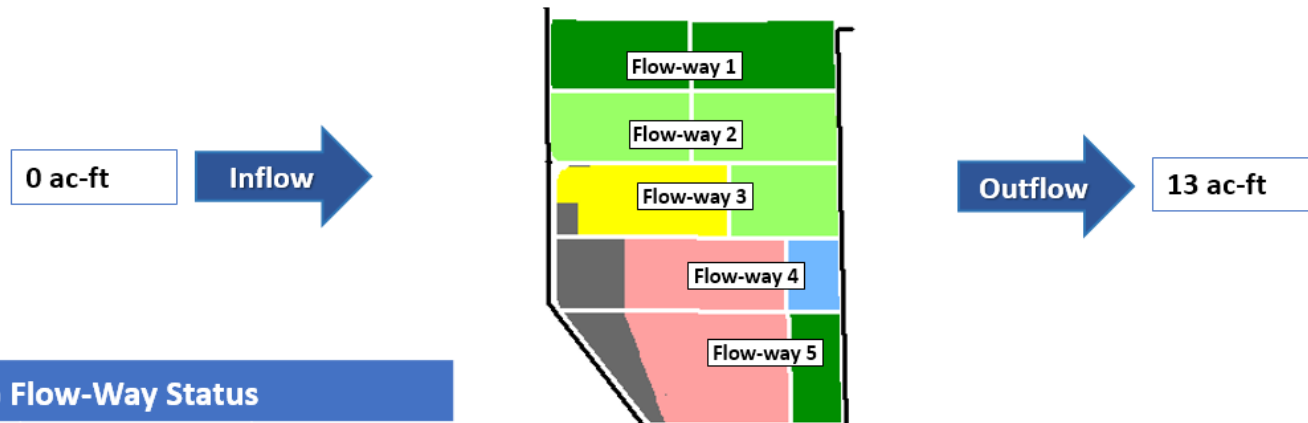
STA-3/4 Weekly Status Report – 4/12/2021 through 4/18/2021



STA-3/4 Flow-Way Status				As of 4/18/2021		STA-3/4 Flow & Phosphorus Concentration			
Flow-Way	Vegetation Status <div>Healthy ----- Stressed</div>	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	<div></div>	<div></div>	Offline, vegetation management drawdown as of 3/1/2021	<div></div> Deep Water Level (> 2.8' above TS)		Total Inflow, ac-ft	4,203	4,203	559,008
				<div></div> High Water Level (1.5' – 2.8' above TS)		--Lake Inflow, ac-ft	2,500	N/A	40,300
Central	<div></div>	<div></div>	Online	<div></div> 0.2' – 1.5' above TS		Total Outflow, ac-ft	0	8	540,769
				<div></div> Target Stage (TS +/- 0.2')		Inflow Conc., ppb	31	31	57
Western	<div></div>	<div></div>	Vegetation Rehab	<div></div> Low Water Level (<0.2' below TS)		Outflow Conc., ppb	N/A	8	12
				Depth / Area Based: Percent of Area Dry		Includes Preliminary Data			
				<div></div> 0-25% Dry	<div></div> 50-75% Dry				
				<div></div> 25-50% Dry	<div></div> 75-100% Dry				

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

STA-5/6 Weekly Status Report – 4/12/2021 through 4/18/2021



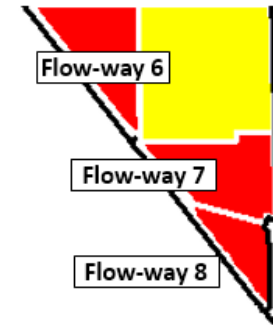
STA-5/6 Flow-Way Status			
Flow-Way	Vegetation Status Healthy ----- Stressed ←-----→	365-day P Loading Rate (below 1.0 g P /m ² /yr is optimal)	Online / Offline / Restrictions
1	←-----→	1.0	Online
2	←-----→	N/A	Post-construction
3	←-----→	N/A	Post-construction
4	←-----→	1.0	Online
5	←-----→	1.0	Online

As of 4/18/2021	
Stage Based: Relative to Target Stage (TS)	
Deep Water Level (> 2.8' above TS)	
High Water Level (1.5' – 2.8' above TS)	
0.2' – 1.5' above TS	
Target Stage (TS +/- 0.2')	
Low Water Level (<0.2' below TS)	
Depth / Area Based: Percent of Area Dry	
0-25% Dry	50-75% Dry
25-50% Dry	75-100% Dry

STA-5/6 Flow & Phosphorus Concentration			
	7-day	28-day	365-day
Total Inflow, ac-ft	0	0	130,126
--Lake Inflow, ac-ft	N/A	N/A	N/A
Total Outflow, ac-ft	13	69	152,531
Inflow Conc., ppb	N/A	N/A	281
Outflow Conc., ppb	78	67	79
Includes Preliminary Data			

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

STA-5/6 Weekly Status Report – 4/12/2021 through 4/18/2021








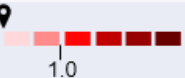
STA-5/6 Flow-Way Status				As of 4/18/2021
Flow-Way	Vegetation Status Healthy ----- Stressed ←-----→	365-day P Loading Rate (below 1.0 g P /m ² /yr is optimal)	Online / Offline / Restrictions	Stage Based: Relative to Target Stage (TS)
6	←-----→ 		Online	<div> <div>Deep Water Level (> 2.8' above TS)</div> <div>High Water Level (1.5' – 2.8' above TS)</div> <div>0.2' – 1.5' above TS</div> <div>Target Stage (TS +/- 0.2')</div> <div>Low Water Level (<0.2' below TS)</div> </div>
7	←-----→ 		Online	<div> <div>Depth / Area Based: Percent of Area Dry</div> <div> <div>0-25% Dry</div> <div>25-50% Dry</div> <div>50-75% Dry</div> <div>75-100% Dry</div> </div> </div>
8	←-----→ 		Online	

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

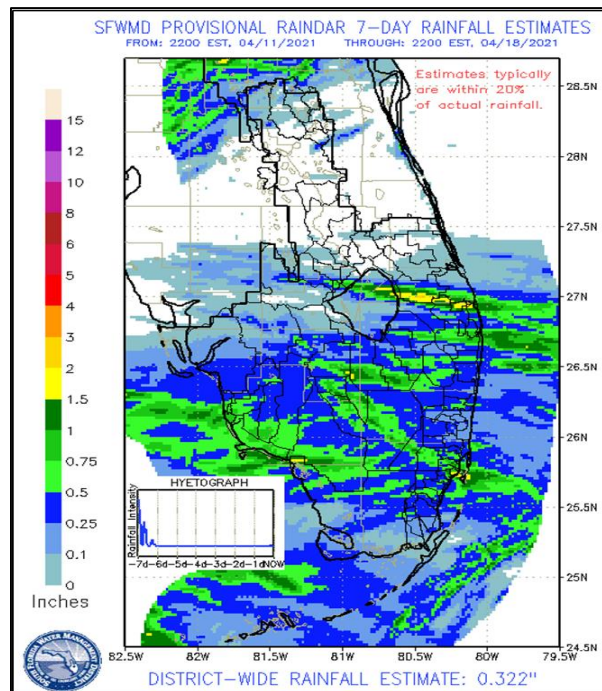
Basic Concepts and Definitions for STA Weekly Status Report

- **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.

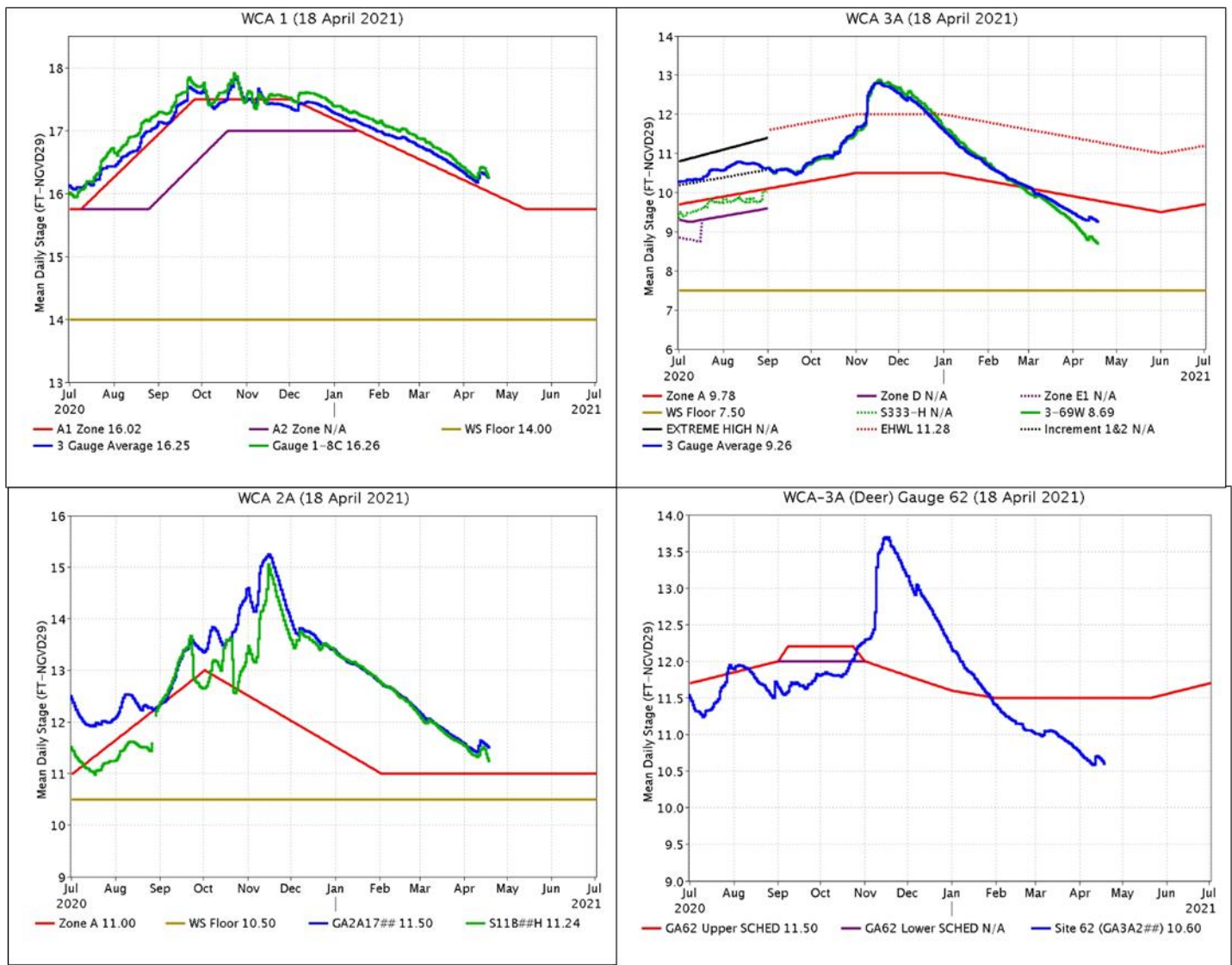
EVERGLADES

Widespread rain fell over the Everglades last week, about one-third the amount of the week prior. At the gauges monitored for this report, stages fell 0.10 feet on average last week, a large increase from the week prior. Evaporation was 1.33 inches last week. The Tamiami Trail Flow Formula (TTFF) -Target Flow from WCA-3A to ENP this week is 1058 cfs a reduction of 26 cfs from the previous week.

Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	0.46	-0.08
WCA-2A	0.48	-0.15
WCA-2B	0.31	-0.15
WCA-3A	0.54	-0.10
WCA-3B	0.52	-0.09
ENP	0.33	-0.06



Regulation Schedules: WCA-1: Stage at the 1-8C Gauge reversed and now returns to follow just above schedule at 0.24 feet above the falling Zone A1 regulation line. WCA-2A: The recession in stage at S11B-HW continues now only 0.24 feet above the stable regulation line. WCA-3A: The Three Gauge Average stages continue to drop steadily below and trending away from the falling Zone A regulation line and is currently 0.52 feet below. WCA-3A: Stage at gauge 62 (Northwest corner) continues to decline. The average on Sunday was 0.90 feet below the stable Upper Schedule.

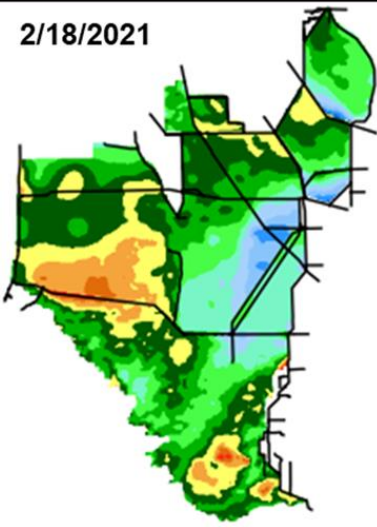


The WDAT tool for spatial interpolation of depth monthly snapshots indicate that northern WCA-3A is drying down, with areas containing depths significantly below the soil surface expanding. WCA-2A has now drawn down across a majority of that basin. North-South hydrologic connectivity remains established within Shark River Slough (SRS) in Everglades National Park (ENP) as conditions dry down to the west and east. The southern half Big Cypress National Preserve has dried down to up to 2.5 foot below soil surface. Comparing WDAT water levels from present, over the last month stages fell significantly across northwestern and southeastern WCA-3A along the L-67 levees, and parts of WCA-1 and WCA-2B. Looking back one year the stage difference patterns are different than one month ago with WCA-3A and northern WCA-2A significantly wetter. Compared to one year ago the eastern boundary of Everglades National Park is significantly wetter than a year ago.

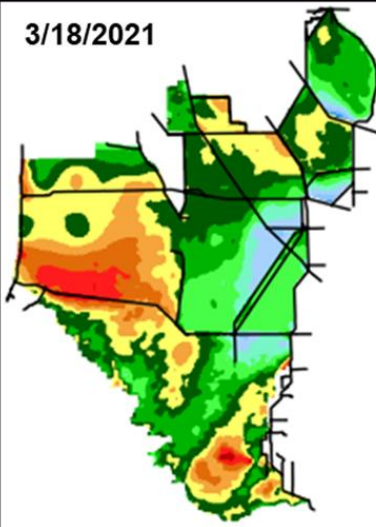


SFWDAT Water Depth Monthly Snapshots

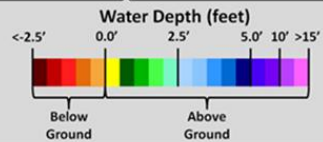
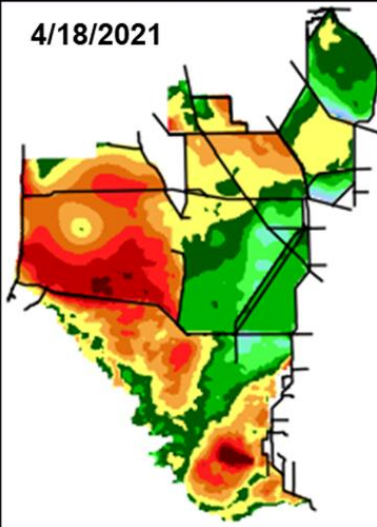
2/18/2021



3/18/2021



4/18/2021

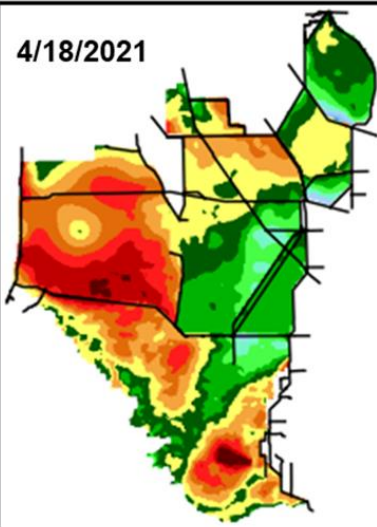


South Florida Water Depth Assessment Tool (SFWDAT)

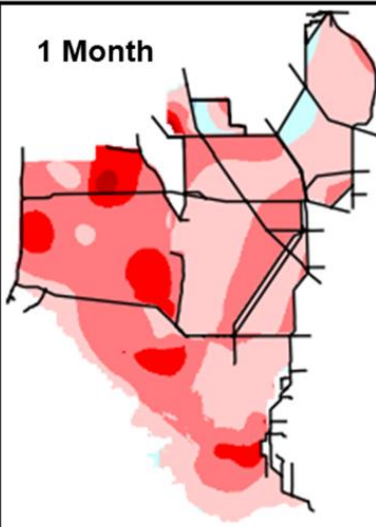


SFWDAT Everglades Difference Maps (Present – Past)

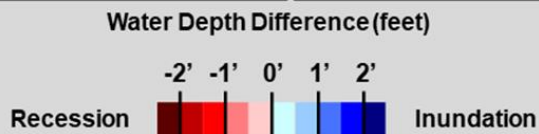
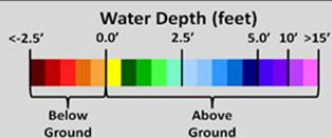
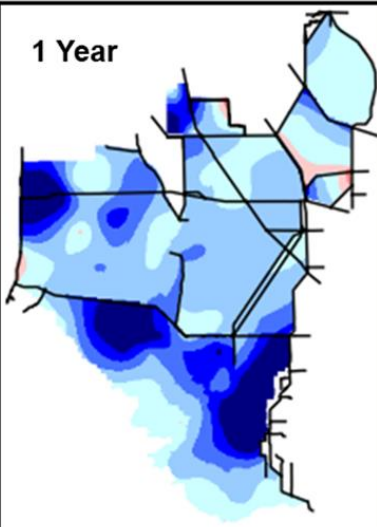
4/18/2021



1 Month



1 Year

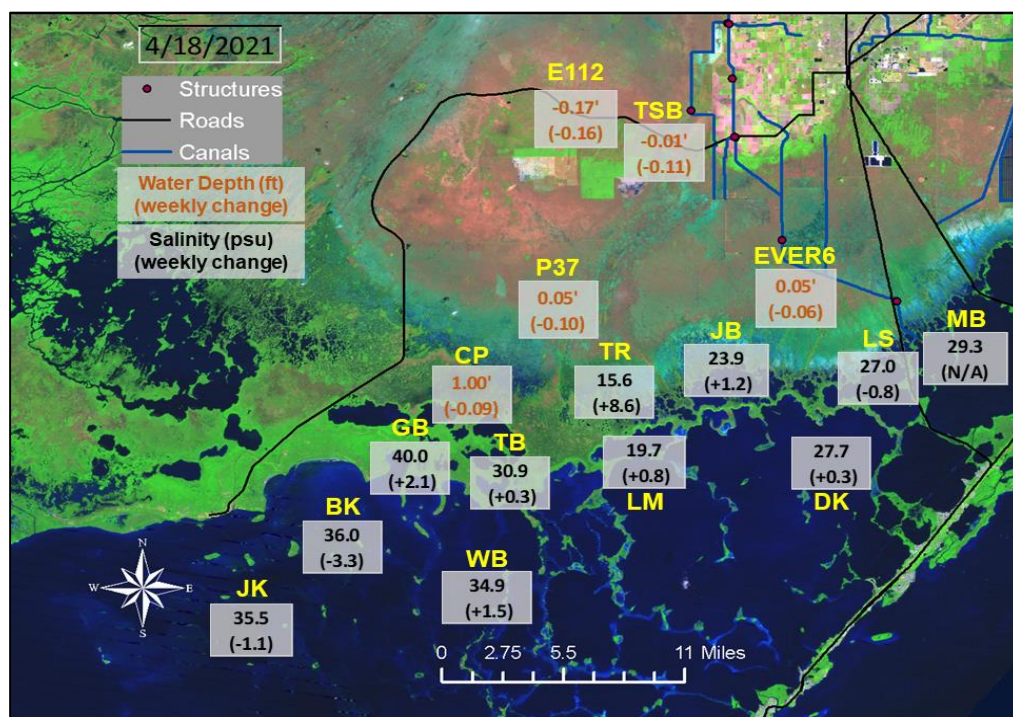


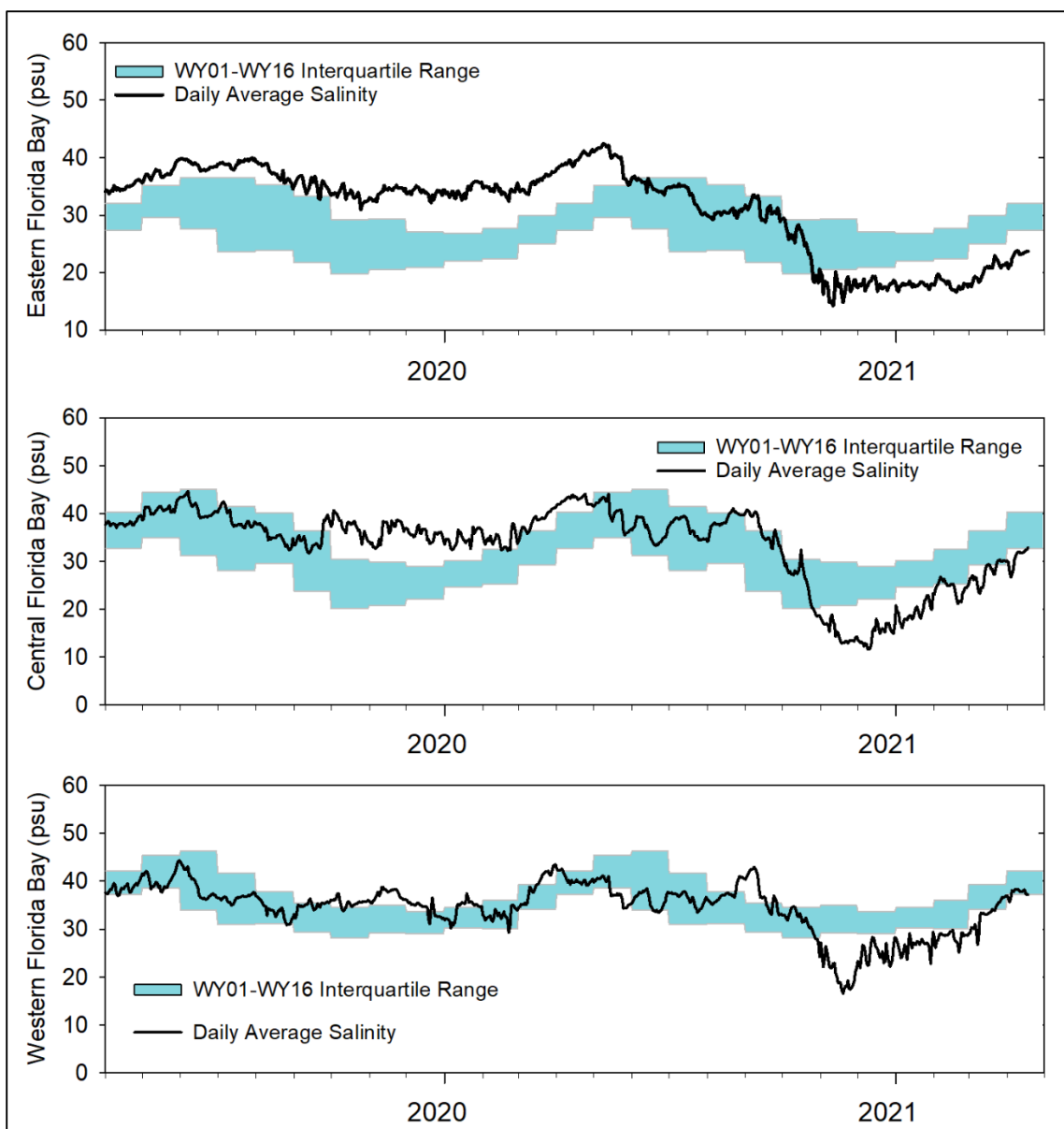
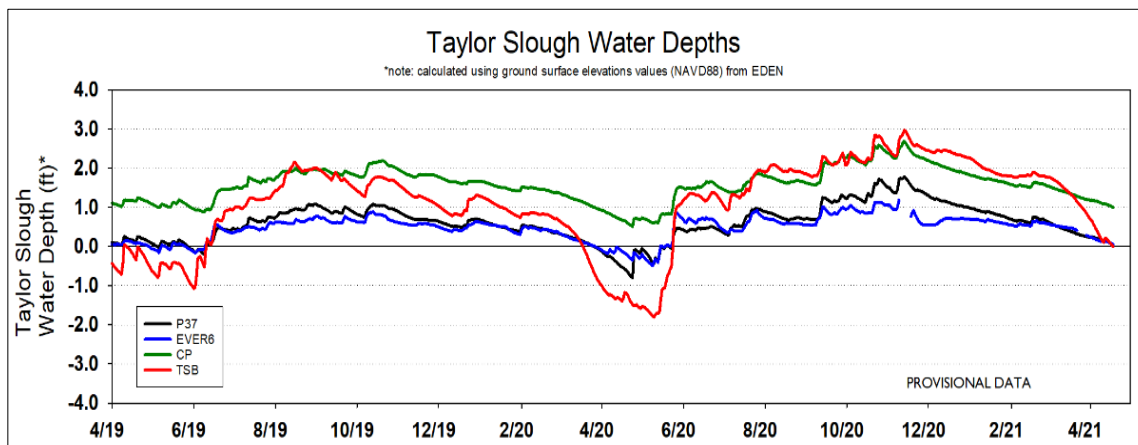
South Florida Water Depth Assessment Tool (SFWDAT)

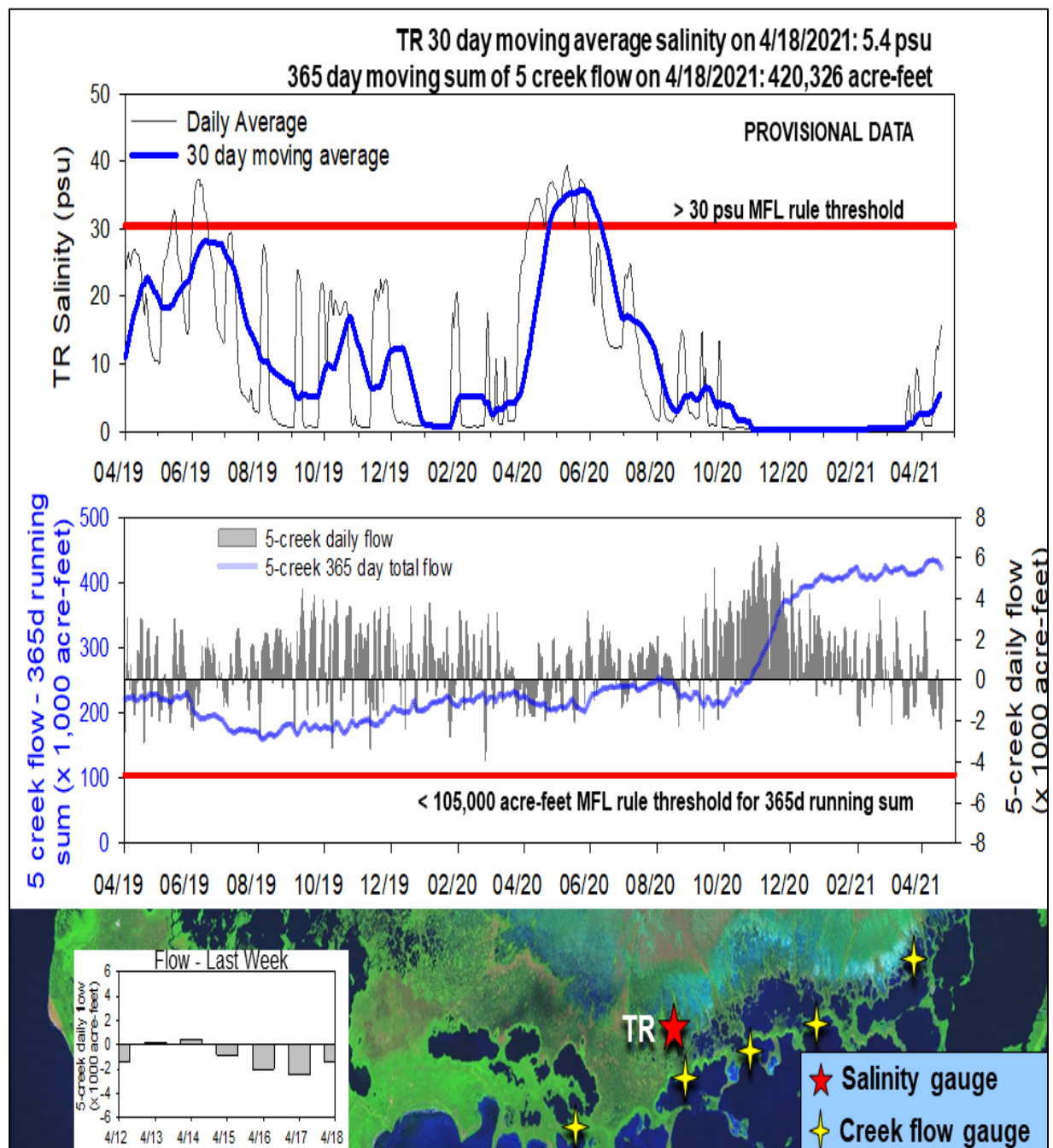
Tree island inundation in WCA-3A, WCA-3B and ENP: 371 Tree Islands of known elevation within WCA-3A, -3B, and Everglades National Park's Shark Slough. Current preliminary estimates using WDAT indicate that 3% or 11 of the tree islands are currently inundated (down from 4% the week prior), and all of those islands have been inundated for more than 120 days. Inundation for more than 120 days will cause ecological harm to sensitive islands.

Wading bird foraging/nesting: Large numbers of birds continue to forage and nest (now more than 60,000 White Ibis nests) throughout the Greater Everglades. There are few feeding birds in WCA-3A South and numbers have declined considerably in WCA-3A North as the open areas in the north are now too dry for foraging. Of concern, the continued rapid drying rates and now relatively dry conditions in WCAs -2A and -3A North, which are unlikely to support sustained foraging. The focus of wading bird foraging is likely to shift to WCAs -1, -2B and -3AS as these areas continue to dry over the next few weeks.

Taylor Slough Water Levels: About 0.12 inches of rain fell over Taylor Slough and Florida Bay last week, but the rains from the previous Sunday helped to slow the recession for this week. The Slough averaged a 0.09 feet decrease on average over the week (less than half of the previous week). Highest recession rates continued to be in the northern parts of the slough as expected for this time of year. Taylor Slough is still averaging 5 inches higher than the historical average for this time of year.







Florida Bay Salinities: Salinities in Florida Bay averaged next to no change over the week. Net-negative flows at the shoreline over the week caused increases in salinity again in that area. The station with the highest weekly decrease in salinity (BK) also received the most rainfall this week. Bay-wide salinity is still lower than the historical average for this time of year. The Bay is positioned very well to minimize hypersalinity before the rainy season begins even though the shallow Garfield Bight (GB) area is already at a salinity of 40.

Florida Bay MFL: The TR station in the mangrove zone (tracked for the Florida Bay MFL) was rising very rapidly over the week with the negative flows and ended the week at a salinity of 16. The 30-day moving average salinity increased 2.4 as a result to end at 5.4. Weekly flow from the 5 creeks identified by yellow stars on the map totaled about -7,400 ac-feet which 600 ac-feet more going upstream than last week. The 365-day moving sum of flow from the five creeks (tracked as part of the Florida Bay MFL criteria) ended at 420,326 ac-feet this week, which is an 11,000 ac-feet decrease from last week.

Conditions are still higher than the 95th percentile of historical data (390,830 ac-feet). Creek flows are provisional USGS data.

Water Management Recommendations

Slowing the recession rates in all regions to 0.05 to 0.07 feet per week would have ecological benefit, particularly in central WCA-2A and WCA-3A North. Excessive drying in WCA-2A and WCA-3A North could incur other ecological costs for aquatic wildlife (into next season) as well as increased risk of peat oxidation and fire risk.

As more water makes its way south into WCA-3A North, evenly distributing inflows mimicking sheet flow across the northern perimeter of WCA-3A and conserving water in WCA-2A has ecological benefit.

Inflows that prolong the drying down of northern Taylor Slough have within and downstream ecological benefit.

More specific recommendations appear in the summary table below. The red text represents new or modified information or recommendations.

SFWMD Everglades Ecological Recommendations, April 20th, 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.	Protect within basin and downstream habitat and wildlife. Maintaining optimal recession rates prepares the habitat for conducive wading bird foraging.
WCA-2A	Stage decreased by 0.15'	Maintain marsh stage slightly above and parallel to the regulation schedule.	Protect within basin and downstream habitat and wildlife.
WCA-2B	Stage decreased by 0.15'	Moderate the recession rate to near -.05 to -.07 feet per week.	Protect (expected) within basin wildlife and downstream habitat and wildlife from flooding stress.
WCA-3A NE	Stage decreased by 0.13'	Moderate the recession rate to near -.05 to -.07 feet per week.	Protect within basin and downstream habitat and wildlife. Optimal recession rates preserves peat soils and extends the time that foraging is optimal on the landscape.
WCA-3A NW	Stage decreased by 0.08'	Moderate the recession rate to near -.05 to -.07 feet per week.	
Central WCA-3A S	Stage decreased by 0.08'	Moderate the recession rate to near -.05 to -.07 feet per week.	Protect within basin and downstream habitat and wildlife. Moderating the recession preserves peat soils and extends the time that foraging is optimal on the landscape.
Southern WCA-3A S	Stage decreased by 0.10'		
WCA-3B	Stage decreased by 0.09'	Moderate the recession rate to near -.05 to -.07 feet per week.	Protect within basin and downstream habitat and wildlife from flooding stress. Tree island ecology is diminished by flooding
ENP-SRS	Stage decreased by 0.06'	Make discharges to the Park according to COP and TTF 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 -0.06' to -0.11'	Move water southward as possible.	When available, provide freshwater buffer for downstream conditions.
FB- Salinity	Salinity changes ranged -3.3 to +2.1 psu	Move water southward as possible.	When available, provide freshwater to maintain low salinity buffer and promote water movement.