

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

MEMORANDUM

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

FROM: SFWMD Staff Environmental Advisory Team

DATE: June 17, 2020

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

Significantly drier over most of the District today; potential for areas of heavy rainfall Thursday and Friday. An upper level low over South Carolina has helped push a surface trough into south Florida and has brought dry air over central Florida and a good chunk of south Florida. This dry air should squelch most sea breeze shower activity over the District today, but enough moisture remains south to allow showers and a couple of thunderstorms to develop over the southern end of the peninsula mainly this afternoon. Energy spinning around the low will also generate some widely scattered shower activity across central Florida, but rainfall amounts will be light over this area. The upper level low is forecast to meander around near the Carolinas and Virginia through Saturday before it exits to the east. Moisture should begin to work its way back north a bit on Wednesday allowing thunderstorm activity to expand over the southern half of the District. An upper level trough extending from the Carolina / Virginia low to the eastern Gulf Mexico is forecast to bring widespread thunderstorm development to the District Thursday and Friday. This trough should slowly progress eastward this weekend and focus thunderstorm development over the interior and east Saturday and then over the southern interior and east Sunday. Rainfall over the coming 7-day period (Week 1) is forecast to be below the historical average over the northern half of the District and near to above the historical average south of Lake Okeechobee. A drier pattern is anticipated for the second 7-day period (Week 2) so below-average rainfall is forecast for Week 2.

Kissimmee

Tuesday morning stages were 53.9 feet NGVD (2.6 feet below schedule) in East Lake Toho, 53.5 feet NGVD (at schedule) in Toho, and 51.0 feet NGVD (at schedule) in Kissimmee-Cypress-Hatchineha; headwater stages were 47.2 feet NGVD at S-65A and 25.8 feet NGVD at S-65D. Tuesday morning discharges were 444 cfs at S-65, 850 cfs at S-65A, 1525 cfs at S-65D and 1275 cfs at S-65E. Dissolved oxygen concentration in the Kissimmee River averaged 0.7 mg/L for the week through Sunday. Kissimmee River mean floodplain depth on Sunday was 0.86 feet. This week's recommendation: to the extent possible, continue to adjust S-61 discharge to balance the rates of stage rise in Lakes Toho and KCH. 2020 Wet Season Recommendations for Kissimmee Basin: Continue to use the IS-14-50 discharge plan through the 2020 Wet Season. The discharge rate of change limits for S-65 / S-65A may be adjusted for individual events after consultation with Kissimmee River Restoration Evaluation Program staff. To the extent possible, attempt to control the ascension rate in East Lake Toho to be less than 1 ft / 30d during the June 1- August 15 window. To the extent possible, attempt to control the ascension rate in Lakes Toho and Kissimmee-Cypress-Hatchineha to be less than 0.5 ft / 14d during the June 1-August 15 window.

Lake Okeechobee

Lake Okeechobee stage was 12.20 feet NGVD on June 15, 2020, up 0.15 feet from the previous week, and 1.19 feet from the previous month. The Lake entered the Beneficial Use sub-band on March 4, 2020 and is now 0.4 feet below the Base Flow sub-band. Lake stage finally moved back into the ecological envelope (which varies seasonally from 12 – 15 feet NGVD +/- 0.5 feet), after being up to 1.5 feet below since October 15, 2019. While ascension rates were recently quite high (over 1 foot in 3 weeks), the rate of rise slowed over the past week, providing submerged plant communities an opportunity to catch up with rising stages. Large inflows have also increased cyanobacteria bloom potential, with central, western, and northern portions of the lake showing elevated Chlorophyll-a concentrations based on satellite imagery.

Estuaries

Total inflow to the St. Lucie Estuary averaged 2,009 cfs over the past week with no flow coming from Lake Okeechobee. The seven-day average salinities increased at A1A and US1 Bridge over the past week. Salinity at the US1 Bridge remains in the poor range (0-5) for adult eastern oysters.

Total inflow to the Caloosahatchee Estuary averaged 3,217 cfs over the past week with 71 cfs (estimated) coming from the Lake. The seven-day average salinity decreased throughout the estuary over the past week. Salinities are in the good range (0-10) for tape grass at Val I-75 and Ft. Myers. Salinities are in the good range for adult eastern oysters at Shell Point (10-30) and in the fair range at Cape Coral (5-10) and Sanibel.(30-35).

Water Management Recommendations

Lake stage is in the Beneficial Use sub-band of 2008 LORS. Tributary hydrological conditions are very wet. The SFWMD Lake Okeechobee Adaptive Protocol's Release Guidance suggests no S-77 releases to the Caloosahatchee Estuary.

Stormwater Treatment Areas

Over the past week, no 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 9,500 ac-feet. The total amount of inflows to the STAs in WY2021 is approximately 234,000 ac-feet. Most STA cells are above target stage, except STA-5/6 cells. 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-1W Northern Flow-way related to STA-1W Expansion #1 startup activities, in STA-1E Central Flow-way, STA-2 Flow-way 3, STA-2 Flow-way 4, STA-3/4 Eastern, Central, and Western Flow-ways for vegetation management activities, and in STA-5/6 Flow-ways 2 and 3 following the Restoration Strategies project to grade non-effective treatment areas. This week, there is no capacity for Lake releases in the STAs.

Everglades

Moderate rainfall last week meant a recession in WCA-1 and a moderate ascension in WCA-3A Central where white ibis continue to nest as well as in ENP. Wood Storks nesting numbers have declined 70 percent or more as the onset of the rainy season reduced forage to the point of abandonment across the WCAs and ENP. Ascension rates impact apple snail reproduction and the current ecologically preferred rate in the Everglades is 0.05–0.15 feet per week, with a maximum of 0.25 per week or 0.5 per two weeks. Those maximum rates of change were not exceeded in WCA-2A, WCA-3A South and ENP. WCA-1 fell to near schedule while WCA-2A ascended away from schedule last week and WCA-3A is above and trends slightly away from regulation schedule. Due to some data delivery difficulties, data since Friday 6/12 were not available for this report. Moderate rains fell over TS and FB last week and stages increased in the south and fell in the north. Florida Bay average salinities decreased with a rapid decrease in salinity is starting upstream and more water deliveries are needed to decrease salinity

at the shoreline. The 30-day moving average at the TR mangrove zone decreased to below the 30 psu threshold.

Supporting Information

KISSIMMEE BASIN

Kissimmee Basin Rainfall

The Upper Kissimmee Basin received 1.97 inches of rainfall in the past week and the Lower Basin received 0.73 inches (SFWMD Daily Rainfall Report 6/14/2020).

Upper Kissimmee Basin

Stages and departures in the Kissimmee Chain of Lakes (KCOL) are shown in **Table 1**. KCOL stage hydrographs with respective regulation schedules and rainfall are shown in Figures 1-3.

Table 1. Average discharge (cfs) for the preceding seven days, one-day stage (feet NGVD), and departures from KCOL flood regulation (R) or temporary schedules (T, A, or S). Provisional, real-time data are from SFWMD. **Report Date: 6/16/2020**

Water Body	Structure	7-day Average Discharge (cfs) ¹	Stage Monitoring Site ²	Lake Stage (feet)	Schedule Type ³	Schedule Stage (feet)	Daily Departure (feet)						
							6/14/20	6/7/20	5/31/20	5/24/20	5/17/20	5/10/20	5/3/20
Lakes Hart and Mary Jane	S-62	9	LKMJ	60.1	R	60.0	0.1	-0.2	0.1	-0.1	-0.2	-0.2	-0.2
Lakes Myrtle, Preston, and Joel	S-57	0	S-57	60.8	R	61.0	-0.2	-0.4	0.0	-0.1	-0.1	0.0	0.0
Alligator Chain	S-60	0	ALLI	62.7	R	63.2	-0.5	-0.9	0.1	0.0	0.0	-0.1	0.0
Lake Gentry	S-63	0	LKGT	60.4	R	61.0	-0.6	-1.0	0.2	-0.1	0.1	0.0	0.0
East Lake Toho	S-59	87	TOHOE	53.8	R	56.5	-2.7	-3.1	-2.0	-3.0	-3.2	-3.4	-3.5
Lake Toho	S-61	450	TOHOW, S-61	53.4	R	53.5	-0.1	-0.8	0.3	-0.1	-0.3	-0.5	-0.5
Lakes Kissimmee, Cypress, and Hatchineha	S-65	80	KUB011, LKIS5B	50.9	R	51.0	-0.1	-0.6	0.8	0.0	-0.1	-0.1	-0.1

¹ Seven-day average of weighted daily means through midnight.

² Names of in-lake monitoring sites and structures used to determine lake stage; if more than one site is listed, an average is reported.

³ A = projected ascension line, R = USACE regulation schedule, S = temporary recession target line, T = temporary schedule, N/A= not applicable or data not available. DATA ARE PROVISIONAL

Lower Kissimmee Basin

Discharges at Lower Basin structures are shown in Table 2. SFWDAT depth maps for the Phase I restoration area are shown in Figure 4. Mean daily dissolved oxygen concentrations, discharge, temperature, and rainfall are shown in Figure 5. The 2019-2020 Discharge Plan for S-65/S-65A, the interim regulation schedule for S-65, and a map of the Kissimmee Basin are shown respectively in Figures 6-8.

Table 2. One-day and seven-day averages of discharge at S-65x structures, of dissolved oxygen concentration in the Phase I area river channel, and water depth in the Phase I area floodplain. Data are provisional real-time data from SFWMD.

Report Date: 6/16/2020

Metric	Location	1-Day Average		Average for the Preceding 7-Days ¹							
		6/14/2020	6/14/20	6/7/20	5/31/20	5/24/20	5/17/20	5/10/20	5/3/20	4/26/20	4/19/20
Discharge (cfs)	S-65	424	80	427	695	496	353	738	760	611	372
Discharge (cfs)	S-65A ²	854	854	884	788	438	313	656	679	550	353
Discharge (cfs)	S-65D ²	1,726	1,988	1,485	903	325	441	667	722	485	317
Headwater Stage (feet NGVD)	S-65D ²	25.63	25.72	25.78	25.76	25.84	25.61	25.81	25.84	25.84	25.83
Discharge (cfs)	S-65E ²	1,573	1,868	1,552	926	312	411	617	677	435	282
Discharge (cfs)	S-67	0	0	0	0	0	0	0	0	0	0
DO (mg/L) ³	Phases I & II/III river channel	0.5	0.7	4.0	6.0	7.6	7.7	7.8	7.9	7.5	7.9
Mean depth (feet) ⁴	Phase I floodplain	0.86	0.90	0.56	0.28	0.08	0.07	0.09	0.14	0.10	0.06

¹Seven-day average of weighted daily means through Sunday midnight.

²S-65A discharge combines S-65A with auxiliary structures; S-65D discharge combines discharge at S-65D, S-65DX1, and S-65DX2; S-65D stage averages stage at S-65D and S-65DX1; S-65E discharge combines S-65E and S-65EX1.

³DO is the average for sondes at KRBN, PC62, PC33, PD62R, and PD42R.

⁴1-day spatial average from South Florida Water Depth Assessment Tool (SFWDAT).

DATA ARE PROVISIONAL; N/A indicates that data were not available.

KCOL Hydrographs (through Sunday midnight)

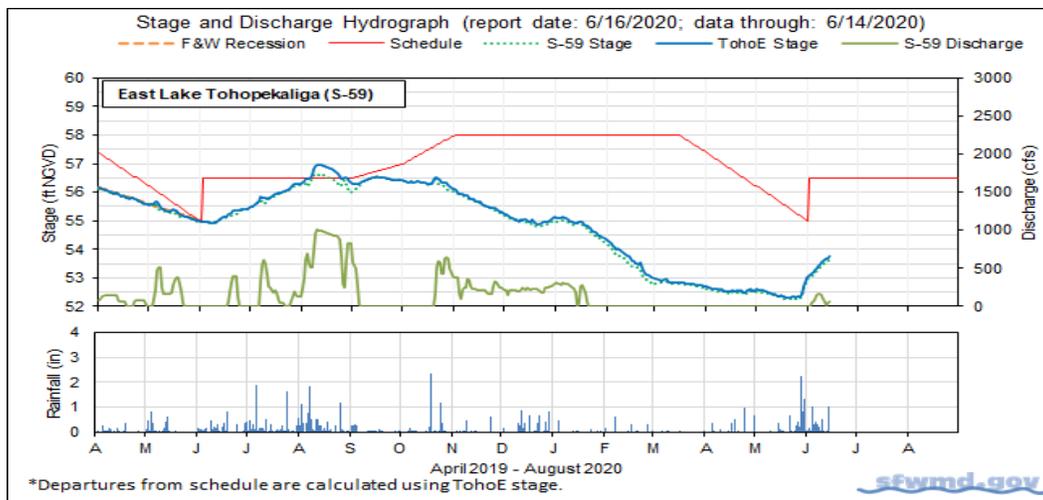


Figure 1.

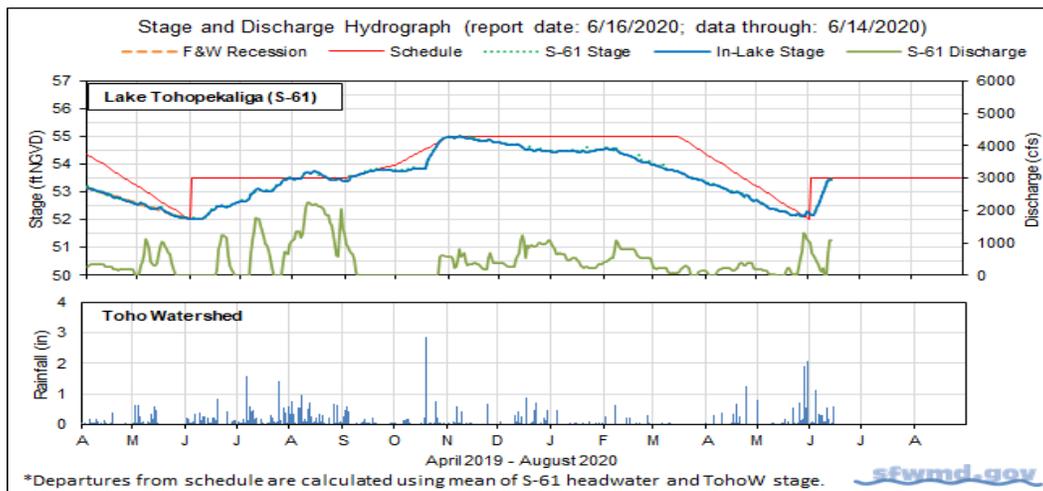


Figure 2.

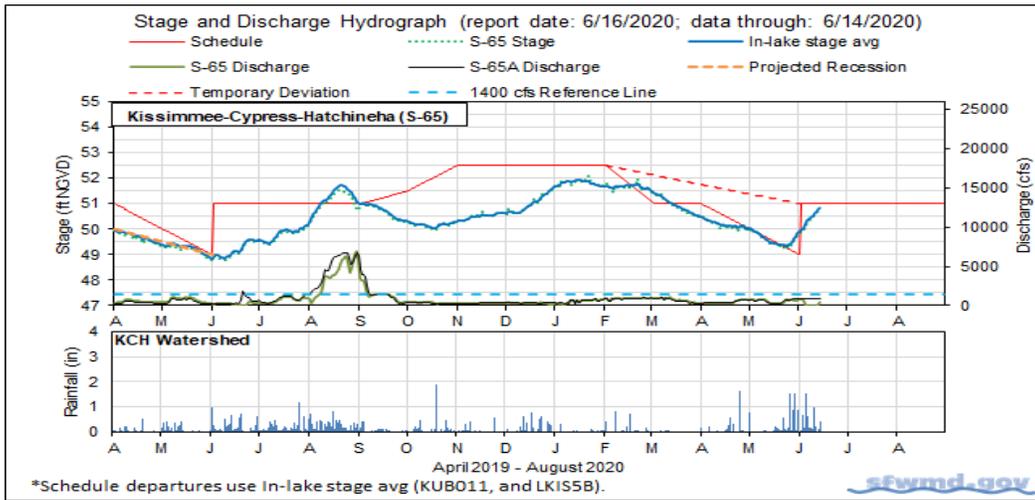


Figure 3.

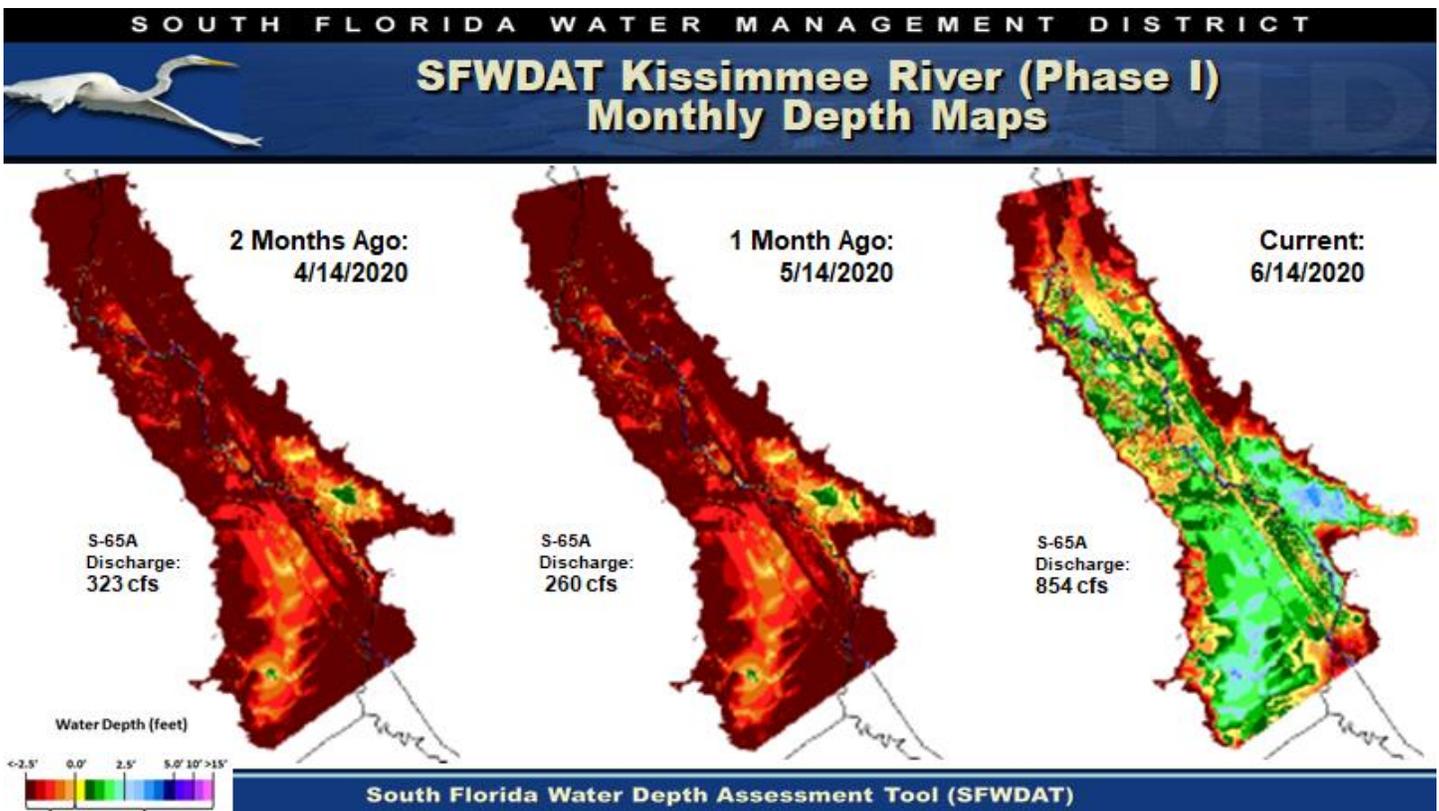
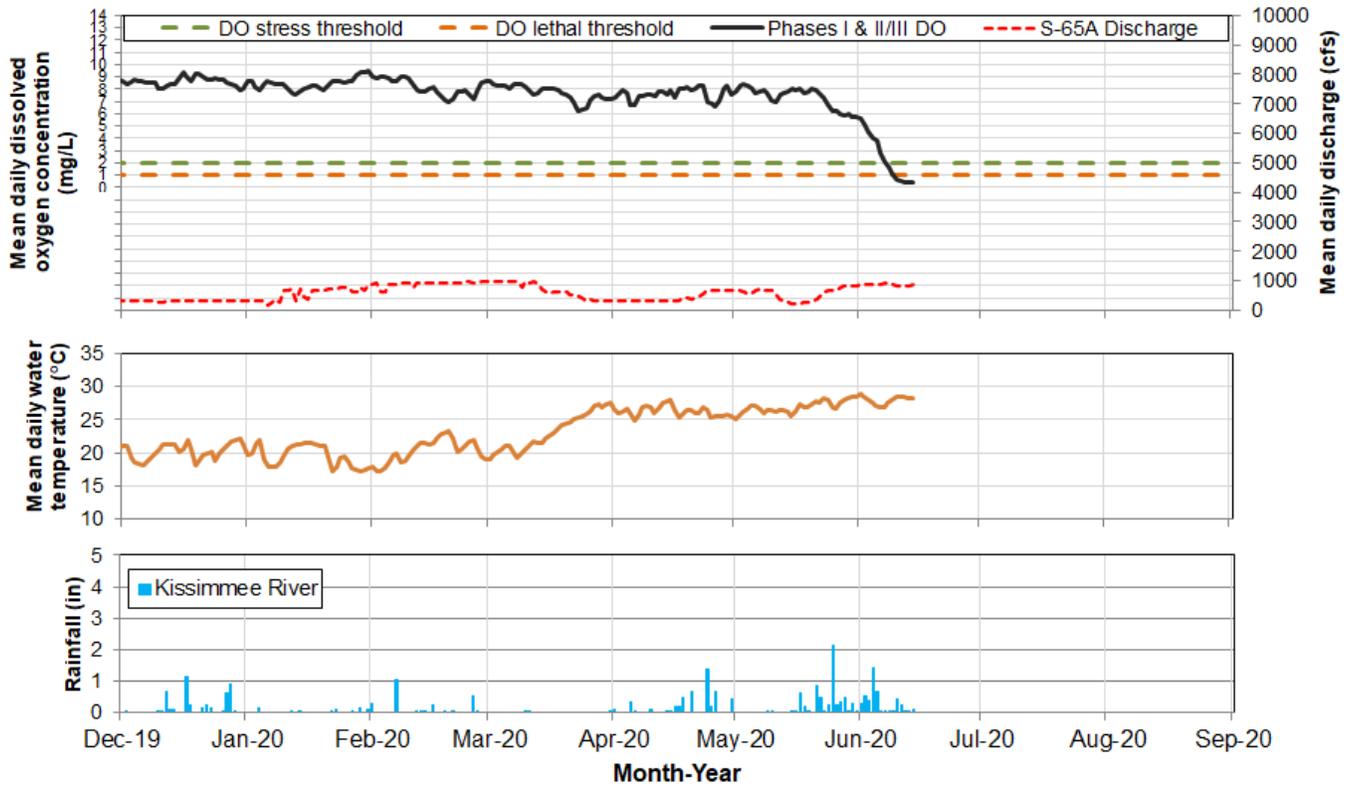


Figure 4. Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to January 16, 2012.



Report Date: 6/16/2020; data are through: 6/14/2020.

Figure 5. Mean daily dissolved oxygen, discharge, temperature and rainfall in the Phases I/II/III river channel.

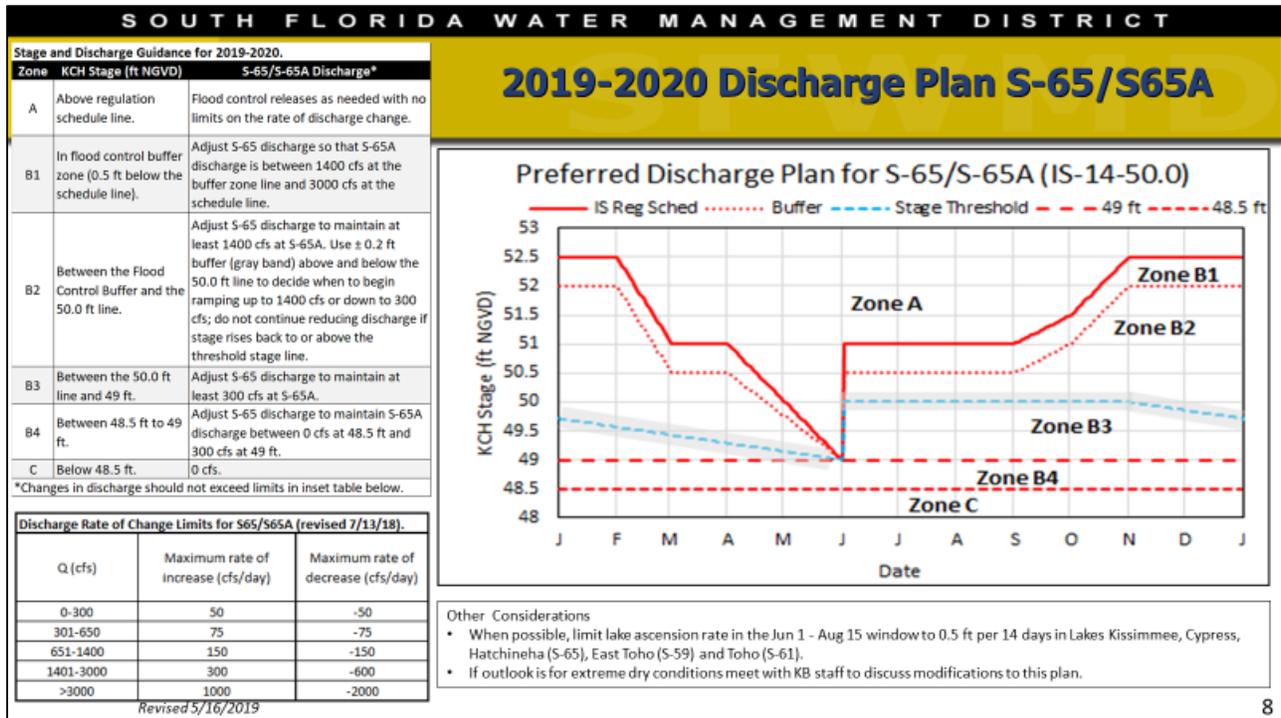


Figure 6. The 2019-2020 Discharge Plan for S-65/S-65A.

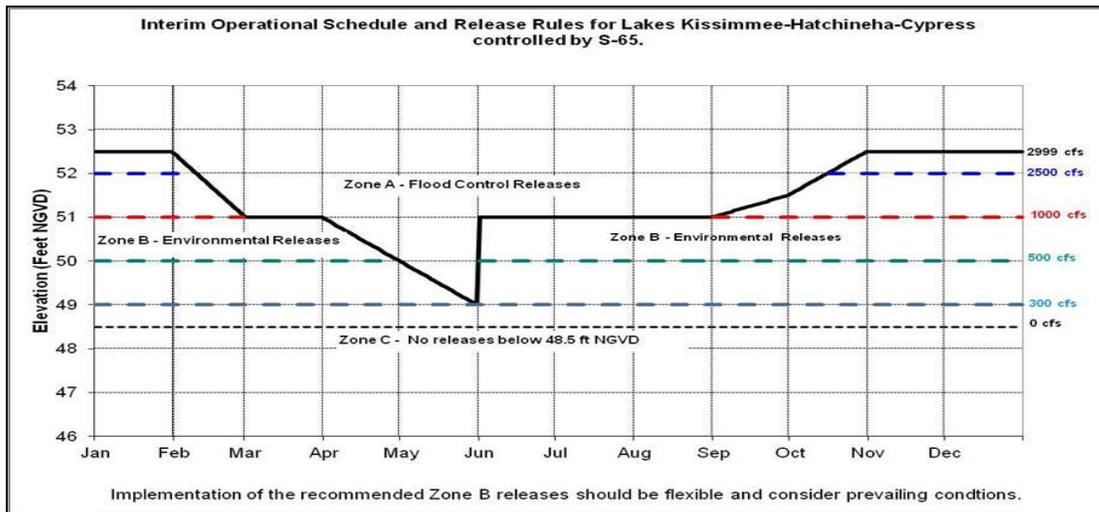


Figure 7. Interim operations schedule for S-65.

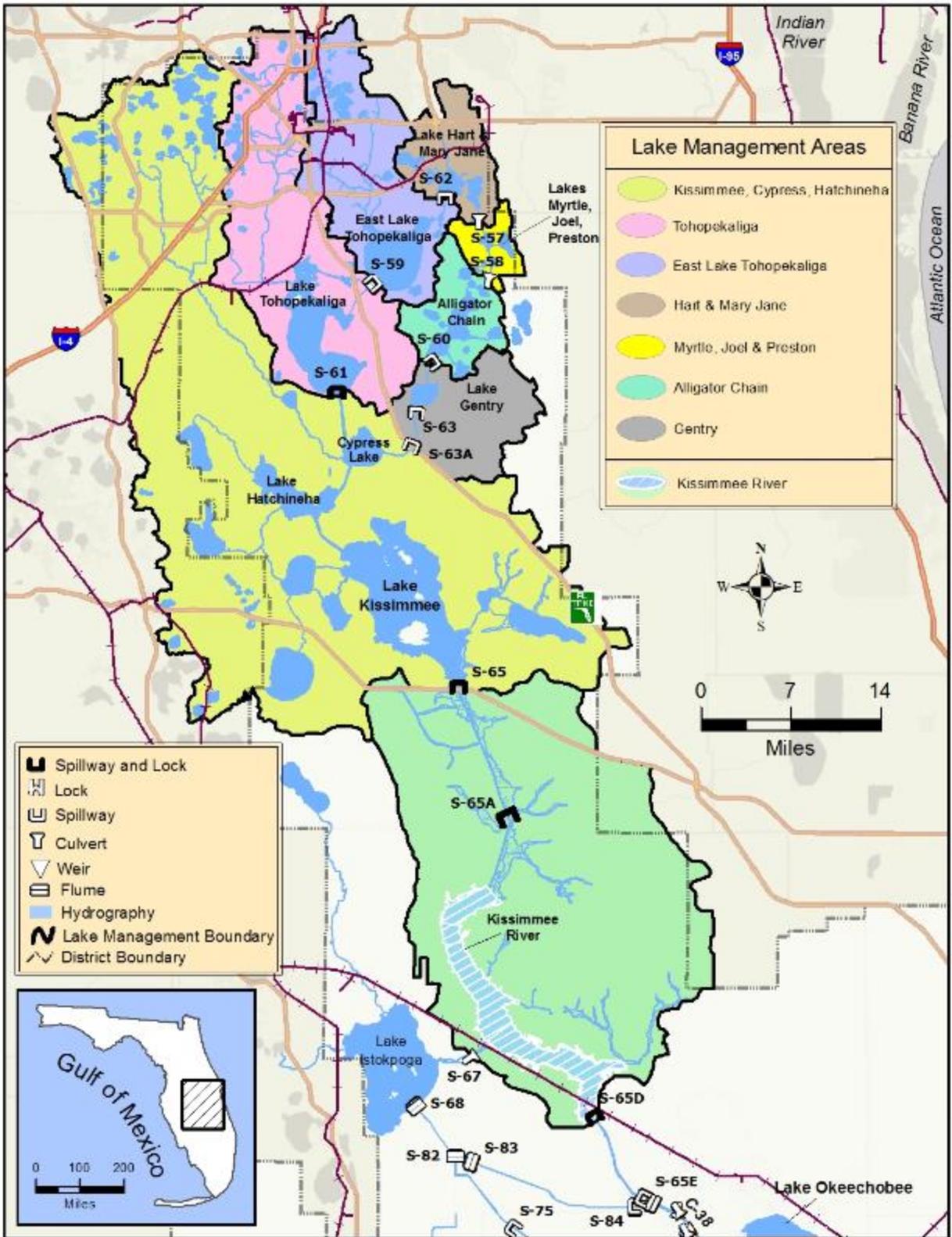


Figure 8. The Kissimmee Basin.

LAKE OKEECHOBEE

Lake Okeechobee stage is 12.20 feet NGVD, 1.19 feet higher than a month ago and 1.10 feet higher than one year ago (Figure 1). The Lake is now back within the preferred ecological envelope (Figure 2). Lake stage moved into the Base Flow sub-band on September 11, 2019 and entered the Beneficial Use sub-band on March 4, 2020 (Figure 3). Lake stage reached a low of 10.99 on May 17 before beginning a rapid rise over the past month. According to RAINДАР, 0.61 inches of rain fell directly over the Lake during the past week (Figure 4). Portions of the upper Kissimmee Basin received over 1.5 inches of rainfall, with most of the northern watersheds receiving between 0.25 and 1.0 inches.

The average daily inflows (minus rainfall) decreased considerably from 9,796 cfs to 4,990 cfs, while the outflows (minus evapotranspiration) remained minimal (96 cfs). Most of the inflows came from the Kissimmee River (1,766 through S-65E & S-65EX1), while 1,064 cfs came from the C-41a canal (through S-84 & S-84X). 1,133 cfs also came from the C-44 canal through S-308, which is predominantly an outflow from the Lake. Total lake inflows and outflows for the past week are detailed in Table 1, as well as the approximate change in lake stage from each major structure's total flows over the period. Figure 5 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 occurs twice-monthly at approximately 30 stations from May – October as part of expanded monitoring efforts to track and study Harmful Algal Blooms on the Lake. Figure 6 shows results from the early June (2-3) sampling. Chlorophyll-a (Chla) values were elevated (>20 µg/L) at 11 of 18 stations in nearshore areas (3 stations were not sampled); 8 of those sites had bloom conditions (>40 µg/L) and 7 had detectable levels of microcystin, ranging from 0.34 to 3.0 µg/L. In contrast, 5 of 9 stations in the pelagic areas had elevated Chlorophyll-a values, with only one having bloom conditions. However, 7 stations had detectable levels of microcystin, 2 of which at or above 8 µg/L (8 and 27 µg/L), the recommended safe level for recreational waters. Neither of the major outflow structures (S-77 and S-308) had toxins detected, though Chla concentrations were 54 µg/L at S-77.

Due to the persistent heavy cloud cover, there is only one current satellite imagery from NOAA's cyanobacteria monitoring EUMETSAT's Sentinel 3 OLCI sensor, and some of the lake remains obscured (Figure 7). However, a large area of elevated bloom potential was observed in the central portion of the lake, extending northward. Elevated potential along the western shoreline and in Fisheating Bay has been persistent and corroborated with elevated Chla values; but it appears the bloom is typically dominated by *Cylindrospermopsis* instead of *Microcystis*, does not have toxin associated with it, and sampling crews generally do not report visible blooms in the area. Thus far this bloom season, sampling crews generally only report visible algae in areas dominated by *Microcystis*.

Submerged aquatic vegetation (SAV) is monitored twice annually on transects around the shoreline of the lake, established on elevation gradients near and within the edge of the emergent marsh (Figure 8). Sampling conducted in the fall of 2019 and spring of 2020 showed continued peaks of biomass near 10 – 11 feet in elevation, and the vast majority of SAV occurring on the western shorelines (Figure 9). Fisheating Bay and the southern sites had little regrowth observed, even 2.5 years after Hurricane Irma decimated SAV communities in the lake. Some beds of SAV were observed in Fisheating Bay in between transects but was less prevalent than along the NW and SW shores.

Water Management Summary

Lake Okeechobee stage was 12.20 feet NGVD on June 15, 2020, up 0.15 feet from the previous week, and 1.19 feet from the previous month. The Lake entered the Beneficial Use sub-band on March 4, 2020 and is now 0.4 feet below the Base Flow sub-band. Lake stage finally moved back into the ecological envelope (which varies seasonally from 12 – 15 feet NGVD +/- 0.5 feet), after being up to 1.5 feet below since October 15, 2019. While ascension rates were recently quite high (over 1 foot in 3 weeks), the rate of rise slowed over the past week, providing submerged plant communities an

opportunity to catch up with rising stages. Large inflows have also increased cyanobacteria bloom potential, with central, western, and northern portions of the lake showing elevated Chlorophyll-a concentrations based on satellite imagery.

Table 1. Average daily inflows and outflows and the approximate depth equivalents on Lake Okeechobee for various structures.

INFLOWS	Previous week Avg Daily CFS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)
S-65E & S-65EX1	1743	1766	0.8
S-71 & S-72	659	221	0.1
S-84 & S-84X	1755	1064	0.5
Fisheating Creek	59	149	0.1
S-154	49	12	0.0
S-191	862	379	0.2
S-133 P	112	36	0.0
S-127 P	26	29	0.0
S-129 P	28	17	0.0
S-131 P	51	13	0.0
S-135 P	176	110	0.1
S-2 P	0	0	0.0
S-3 P	0	0	0.0
S-4 P	0	0	0.0
L-8 Backflow	267	157	0.1
Rainfall	6970	7031	3.3
Total	12757	10984	5.1

OUTFLOWS	Previous week Avg Daily CFS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)
S-77	16	82	0.0
S-308	-4025	-1133	-0.5
S-351	0	14	0.0
S-352	0	0	0.0
S-354	0	0	0.0
L-8 Outflow			
ET	1473	2929	1.4
Total	-2536	1892	0.9

Provisional Data

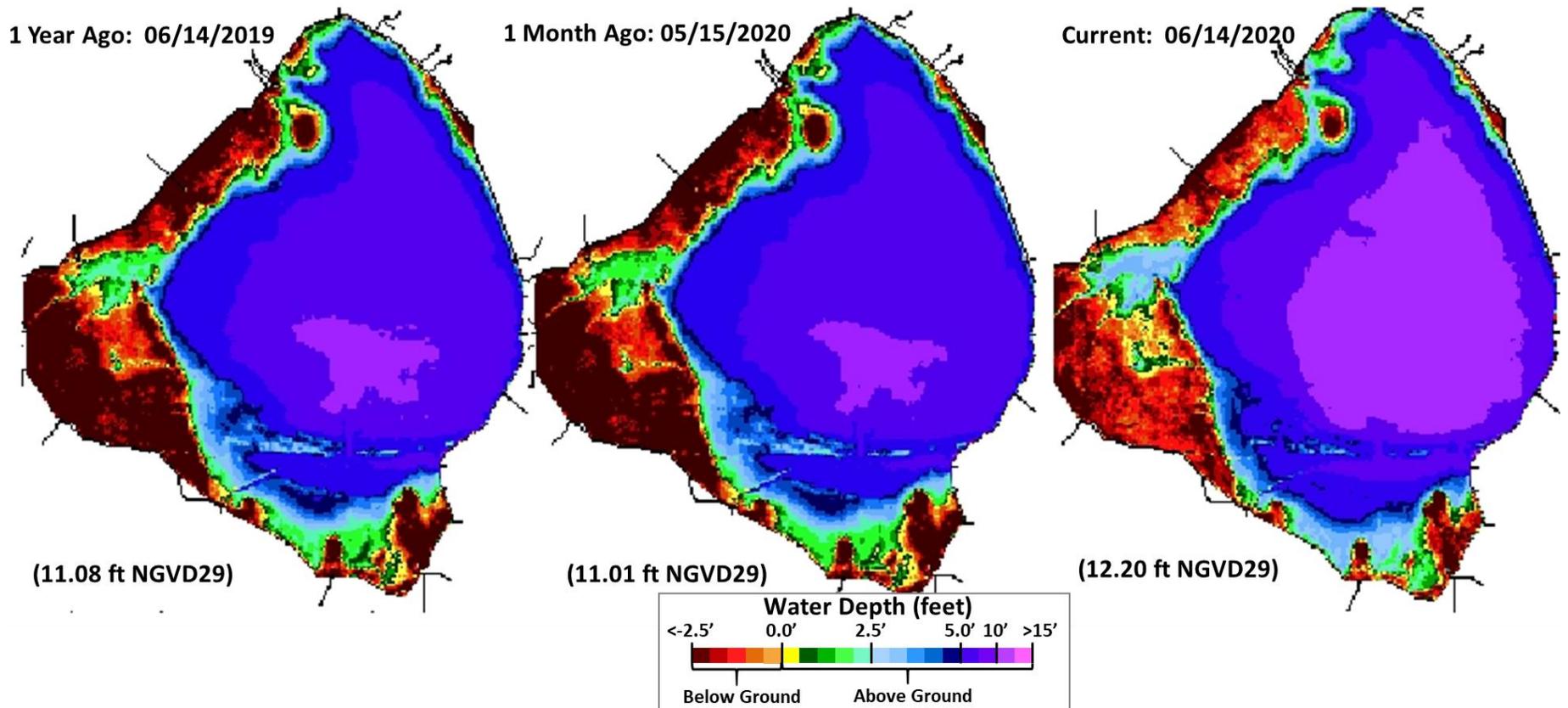


Figure 1. Water depth estimates on Lake Okeechobee based on the South Florida Water Depth Assessment Tool.

Lake Okeechobee Stage vs Updated Ecological Envelope

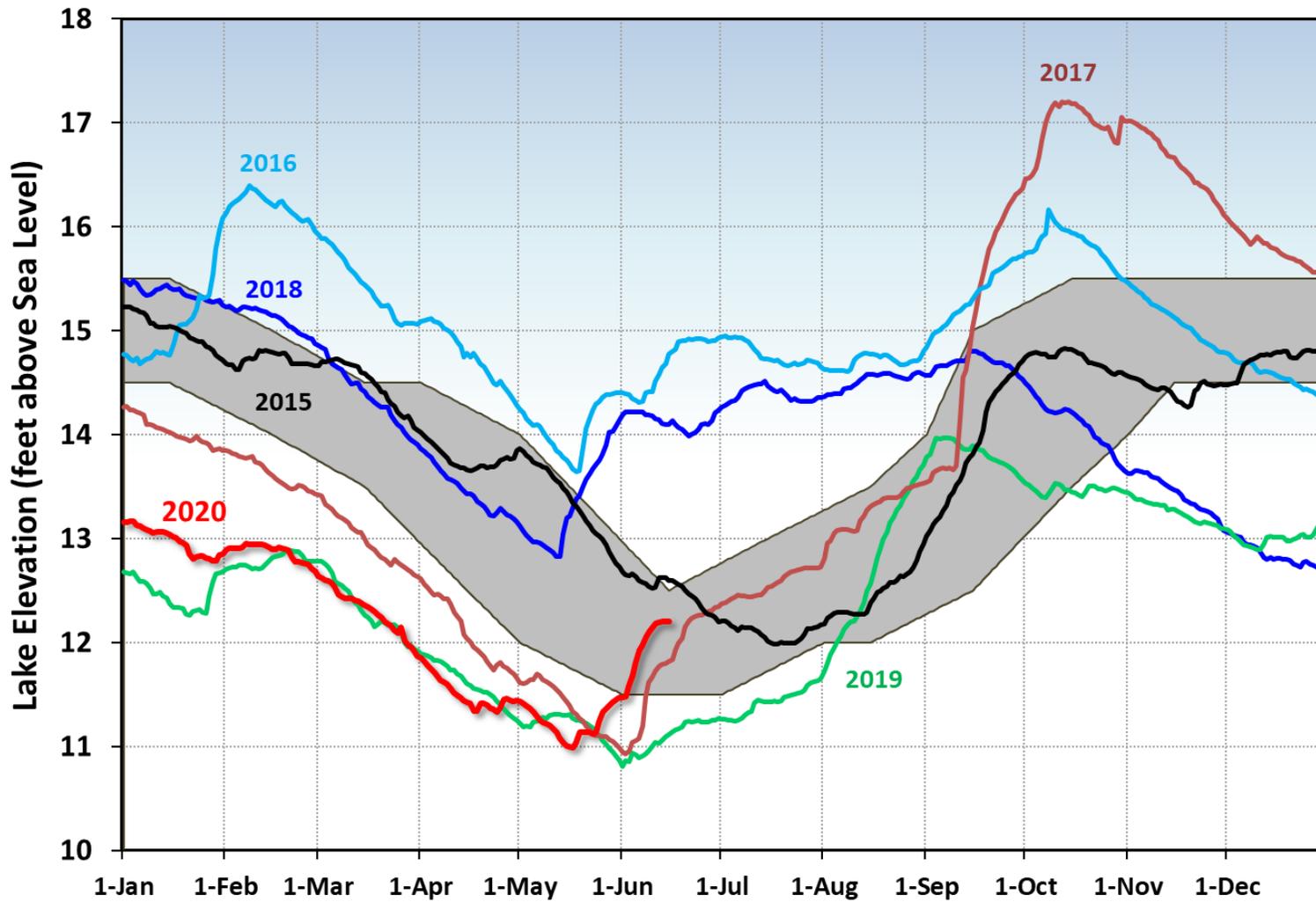
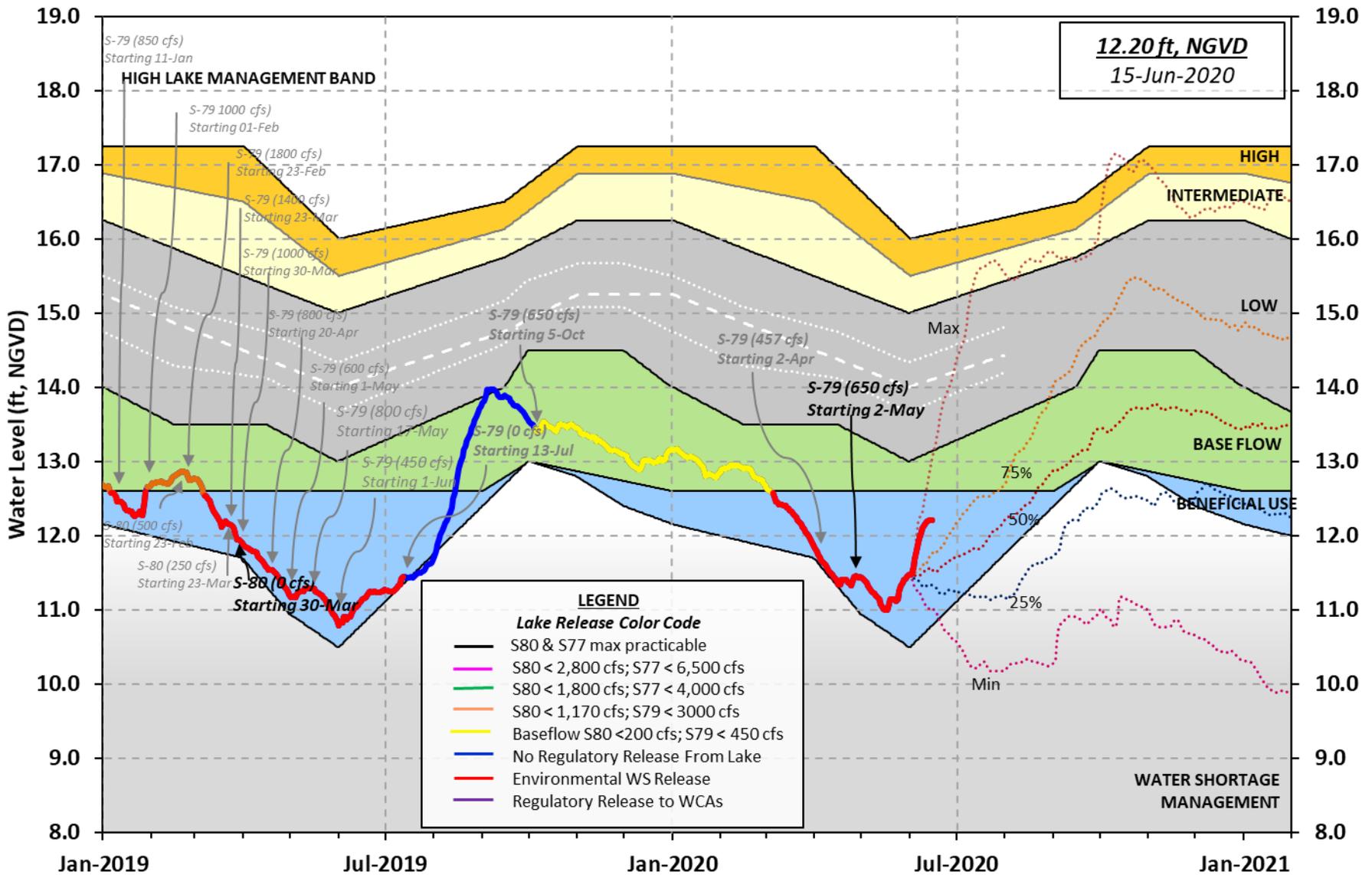


Figure 2. Select annual stage hydrographs for Lake Okeechobee in comparison to the updated Ecological Envelope.

Lake Okeechobee Water Level History and Projected Stages



LORS-2008
Adopted by USACE 28-April-2008

Projected Stage Percentiles From
SFWMD-HESM Position Analysis

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

SFWMD PROVISIONAL RAINDAR 7-DAY BASIN RAINFALL ESTIMATES

FROM: 1300 EST, 06/09/2020 THROUGH: 1300 EST, 06/16/2020

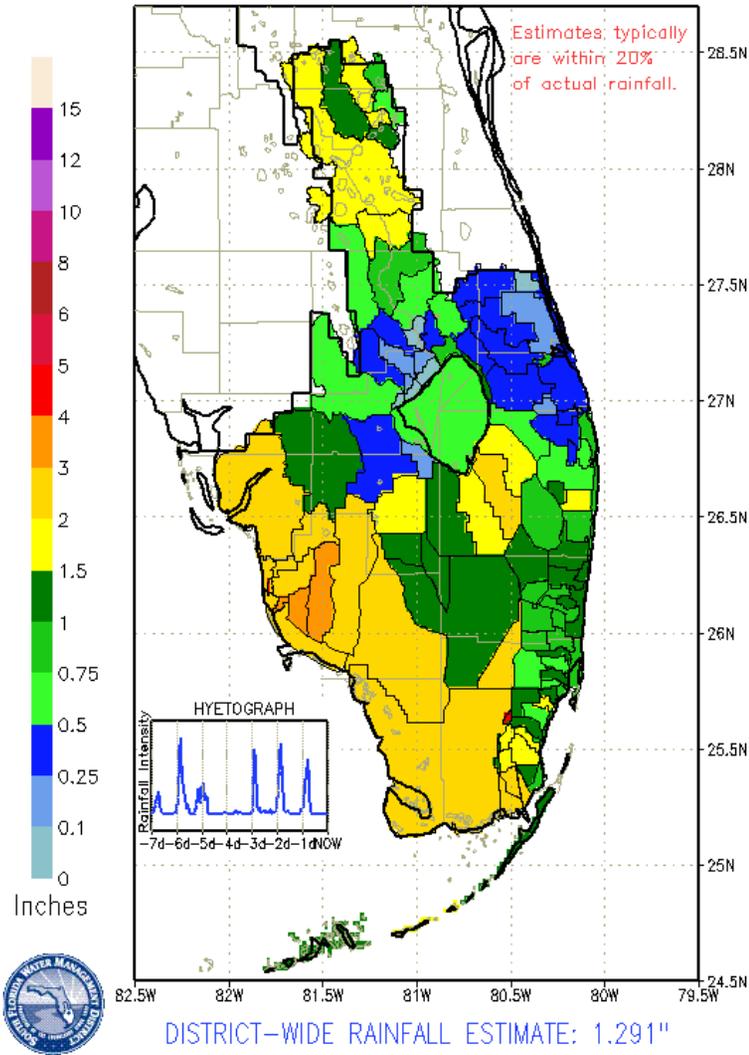


Figure 4. 7-Day rainfall estimates by RAINDAR.

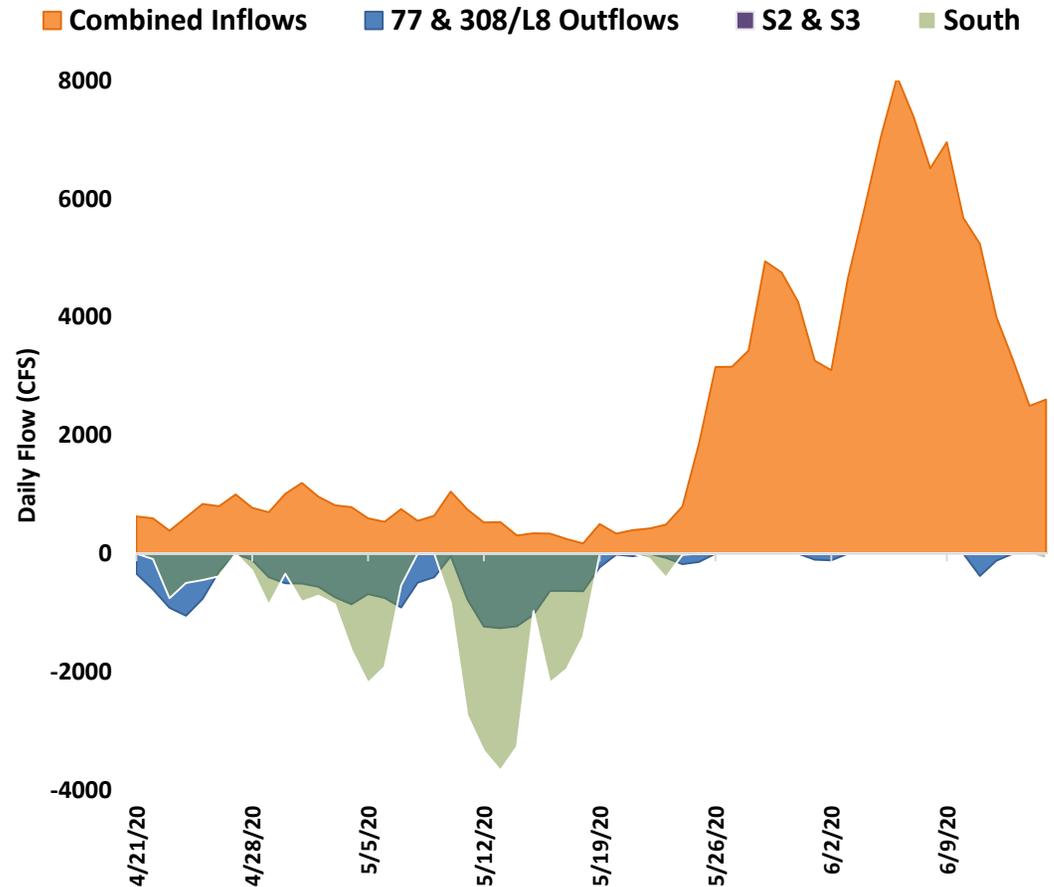


Figure 5. Major inflows (orange) and outflows (blue) of Lake Okeechobee, including the S-350 structures designated as South (green). The L-8 Canal flows through Culvert 10A are included as outflows when positive, and as inflows when backflowing into the Lake. All inflows and outflows are shown as positive and negative, respectively, for visual purposes. Outflows through the S-77 and S-308 structures are shown based on their downstream gauges to account for lock openings for navigation.

Samples collected on June 2- 3, 2020

NEARSHORE	CHLa (ug/L)	TOXIN (ug/L)	TAXA	PELAGIC	CHLa (ug/L)	TOXIN (ug/L)	TAXA
FEBIN	19.6	BDL	ND	L001	44.4	2.0	<i>Microcystis</i>
FEBOUT	65.5	BDL	ND	L004	17.8	4.4	<i>Microcystis</i>
KISSRO.0	47.6	BDL	<i>Cylindro</i>	L006	12.9	0.67	<i>Cylindro</i>
L005	74.0	BDL	<i>Cylin/Plank</i>	L007	10.4	BDL	ND
LZ2	32.4	BDL	ND	L008	25.0	BDL	<i>Microcystis</i>
KBARSE	20.5	0.34	<i>Microcystis</i>	LZ30	10.2	0.7	<i>Microcystis</i>
RITTAE2	NS	NS	NS	LZ40	38.3	8.0	<i>Microcystis</i>
PELBAY3	5.4	BDL	ND	CLV10A	36.0	27.0	<i>Microcystis</i>
POLE3S	NS	NS	NS	NCENTER	24.6	1.4	<i>Microcystis</i>
LZ25A	NS	NS	NS	S-308	9.7	BDL	ND
PALMOUT	8.2	BDL	ND	S-77	54.4	BDL	<i>Micro/Cylin</i>
PALMOUT1	12.8	BDL	ND				
PALMOUT2	10.6	2.3	<i>Microcystis</i>				
PALMOUT3	12.5	1.8	<i>Micro/Cylin</i>				
POLESOUT	46.5	BDL	<i>Cylindro</i>				
POLESOUT1	66.6	BDL	<i>Cylindro</i>				
POLESOUT2	49.3	0.36	<i>Micro/Cylin</i>				
POLESOUT3	40.4	1.3	<i>Microcystis</i>				
EASTSHORE	19.4	0.78	<i>Microcystis</i>				
NES135	49.4	3.0	<i>Microcystis</i>				
NES191	19.3	BDL	ND				

- SFWMD considers >40 µg/L Chlorophyll *a* (Chla) an algal bloom
 - BDL – Below Detectable Limit of 0.25 µg/L
 - ND – No Dominant taxa
 - P – Pending
 - NS – Not Sampled
 - Bold – crew observed possible BGA
 - Chlorophyll *a* analyzed by SFWMD
 - Toxin and Taxa analyzed by FDEP
- Cylindro* = *Cylindrospermopsis*
Planktol = *Planktolyngbya*
Dolicho = *Dolichospermum*

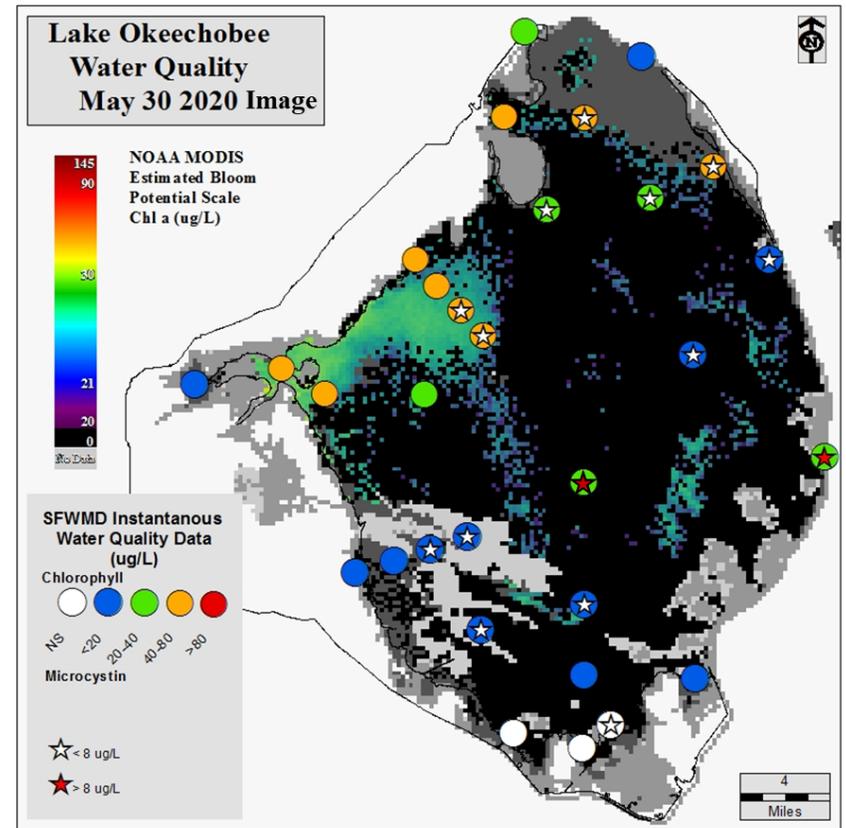
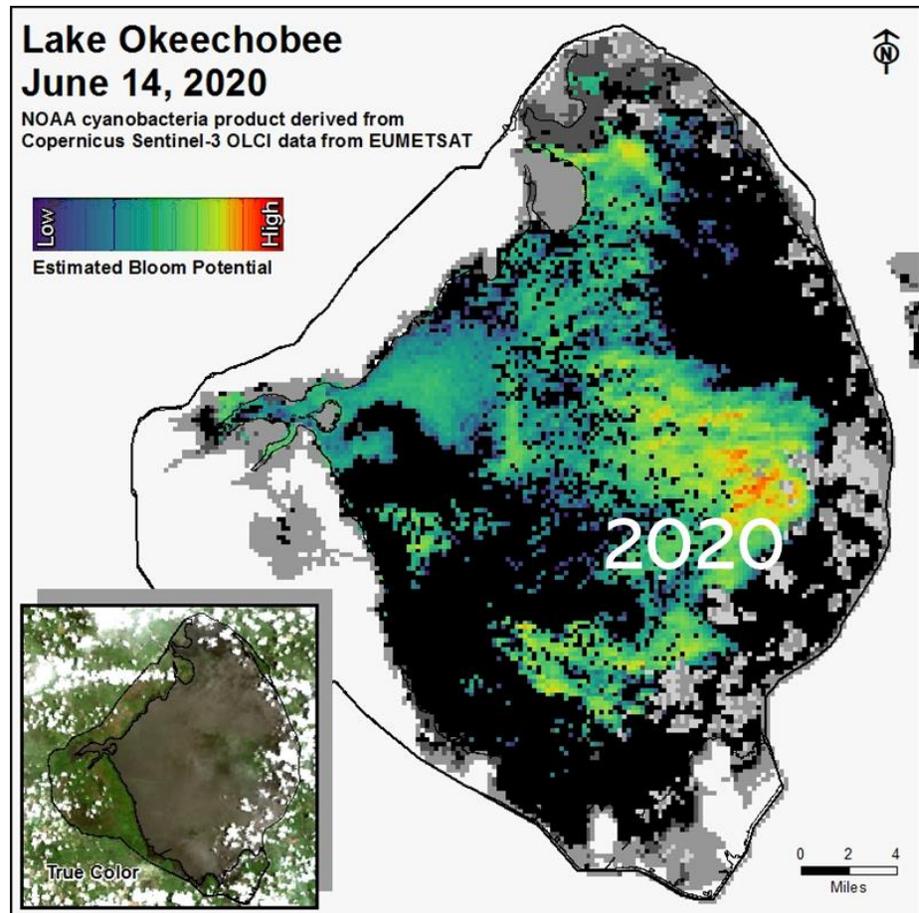
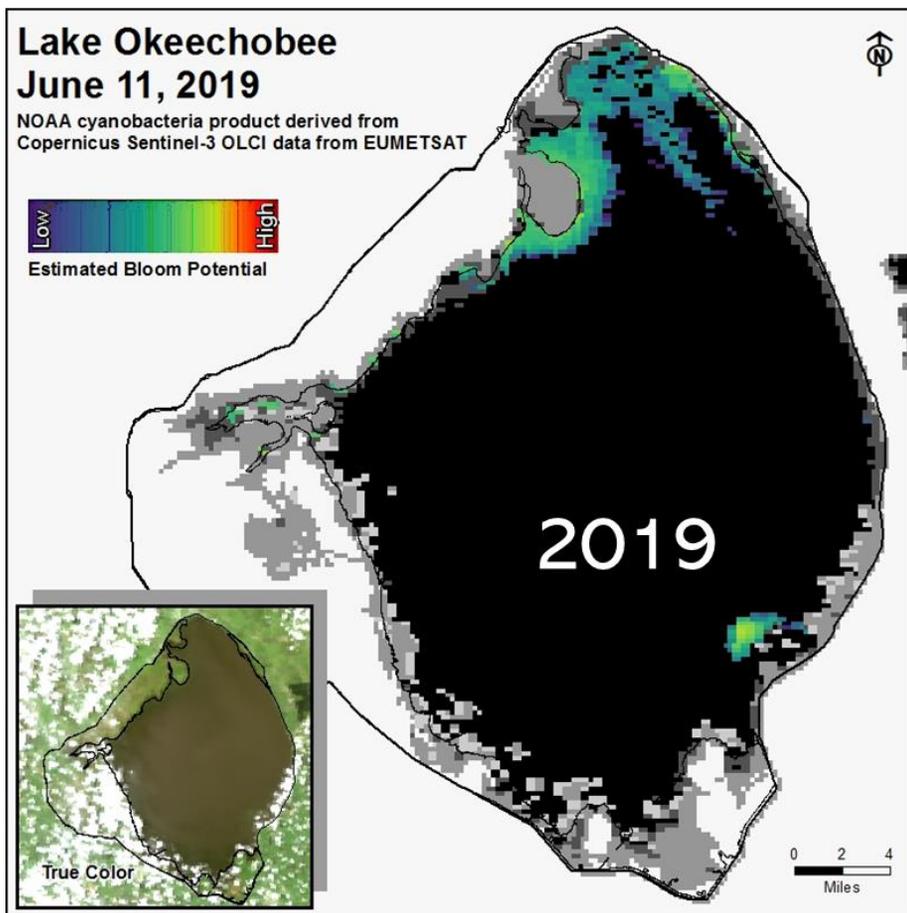


Figure 6. Water quality parameters at nearshore (n=21) and pelagic (n=9) stations for June 2-3, 2020.

All data are provisional.



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

Figure 7. Potential for cyanobacterial blooms on Lake Okeechobee in mid-June 2019 and 2020, based on NOAA's harmful algal bloom monitoring system. Gray color indicates cloud cover.

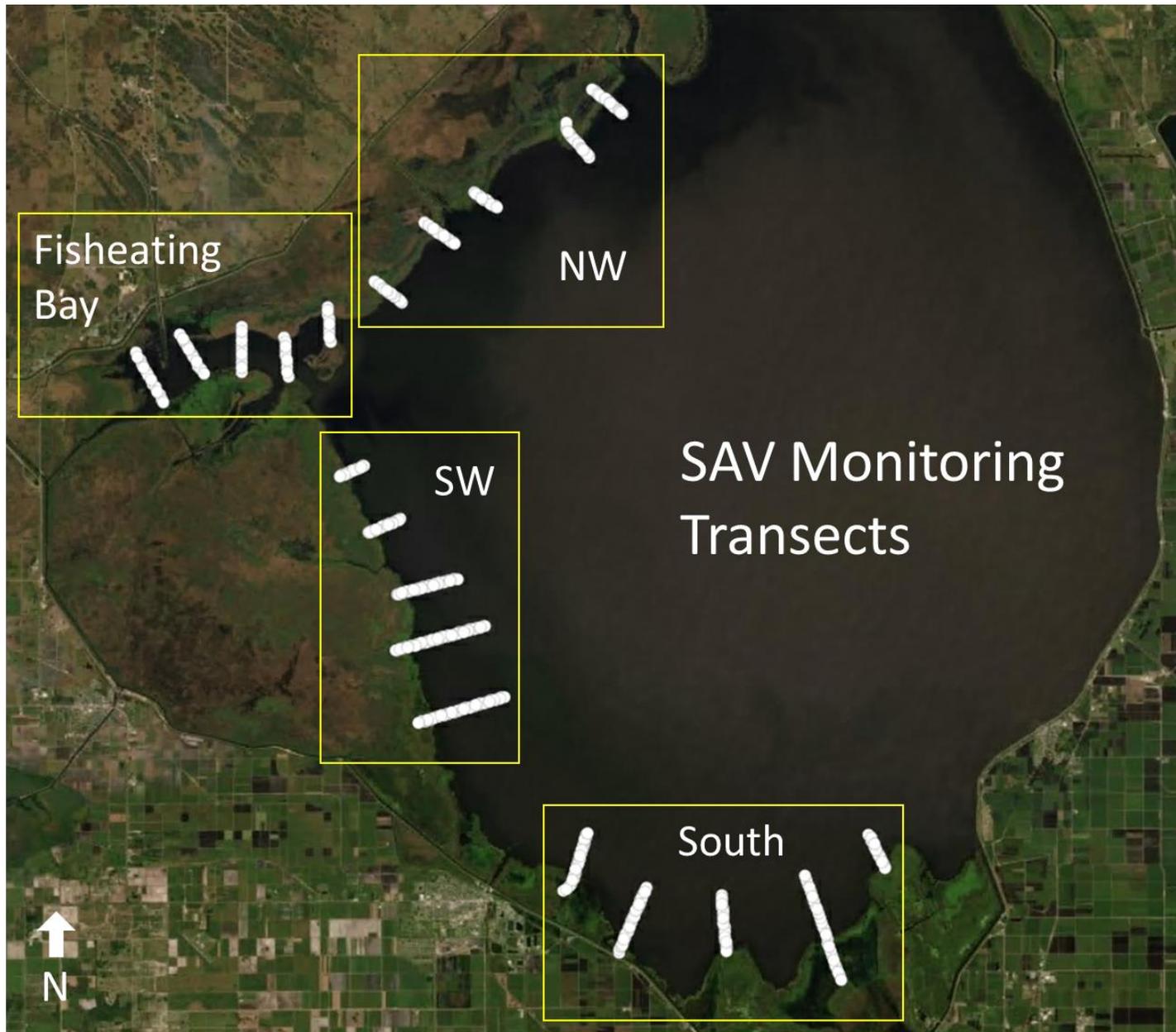


Figure 8. Location of SAV monitoring transects that are sampled in the spring and fall of each year since 2018 to document recovery following Hurricane Irma.

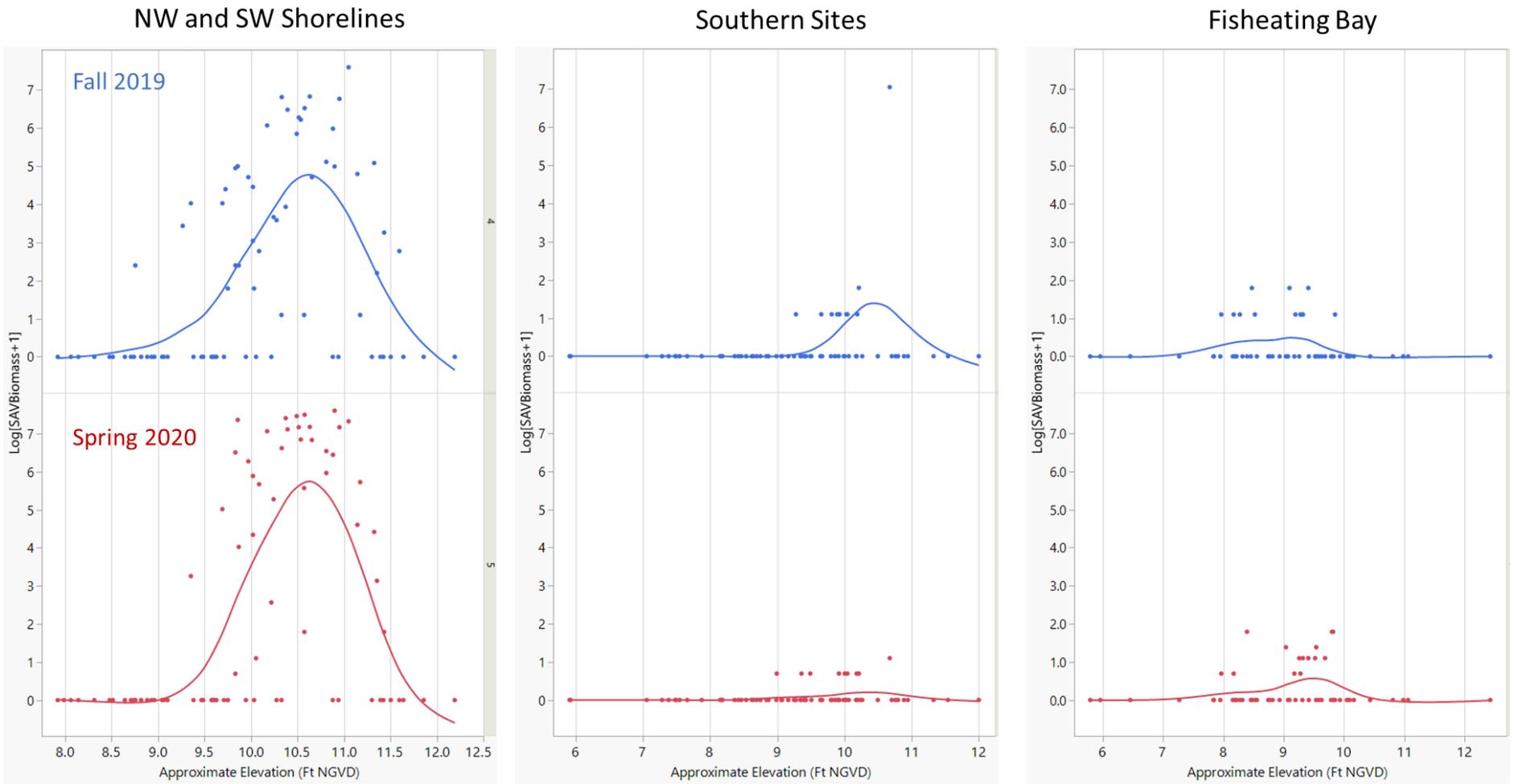


Figure 9. Biomass ($\log[x+1]$) of SAV along transects on the Lake, from the fall of 2019 and the spring of 2020. Each sample (dot) represents SAV biomass from 1 m².

ESTUARIES

St. Lucie Estuary:

Last week total inflow to the St. Lucie Estuary averaged approximately 2,009 cfs (Figures 1 and 2) and last month inflow averaged about 2,973 cfs. Last week's provisional averaged inflows from the tidal basin and the structures are shown in Table 1.

Table 1. Weekly average inflows (data are provisional).

Location	Flow (cfs)
Tidal Basin Inflow	468
S-80	0
S-308	-390
S-49 on C-24	635
S-97 on C-23	723
Gordy Rd. structure on Ten Mile Creek	183

Over the past week in the estuary, salinity decreased slightly at HR1 and increased at US1 Bridge and A1A Bridge (Table 2, Figures 3 and 4). The seven-day moving average of the water column (an average of the surface and bottom salinity) at the US1 Bridge is 2.2. Salinity conditions in the middle estuary are estimated to be within the poor range for adult eastern oysters (Figure 3).

Table 2. Seven-day average salinity at three monitoring sites in the St. Lucie Estuary. Current average is in bold face type, previous average 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)	0.3 (0.5)	0.4 (0.7)	NA ¹
US1 Bridge	1.4 (1.2)	3.6 (1.4)	10.0-26.0
A1A Bridge	8.8 (5.0)	21.0 (9.8)	NA ¹

¹Envelope not applicable

Caloosahatchee Estuary:

Last week total inflow to the Caloosahatchee Estuary averaged approximately 3,217 cfs (Figures 5 and 6) and last month inflow averaged about 2,483 cfs. Last week's provisional averaged inflows from the structures and the tidal basin are shown in Table 3.

Table 3. Weekly average inflows (data is provisional).

Location	Flow (cfs)
S-77	71
S-78	821
S-79	2182
Tidal Basin Inflow	1035

Over the past week, salinity decreased throughout the estuary (Table 4, Figures 7 & 8). The seven-day average salinity values are within the good range for adult eastern oysters at Shell Point and in the fair range at Cape Coral and at Sanibel (Figure 9). The seven-day average surface salinities (Table 4) are in the good range (0-10) for tape grass at Val I-75 and at Ft. Myers.

Table 4. Seven-day average salinity at six monitoring stations in the Caloosahatchee Estuary. Current average is in bold, previous average 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)	0.1 (0.3)	0.1 (0.5)	NA ¹
Val I75	0.4 (1.8)	0.4 (2.4)	0.0-5.0 ²
Ft. Myers Yacht Basin	2.7 (7.7)	3.9 (8.7)	NA
Cape Coral	8.5 (14.5)	10.9 (15.8)	10.0-30.0
Shell Point	20.4 (27.2)	23.7 (28.3)	10.0-30.0
Sanibel	29.4 (32.2)	31.3 (33.1)	10.0-30.0

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

Forecast of surface salinity (Table 5 and Figure 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 ranging from 0.4 to 3.4 at the end of the two-week period for pulse release at S-79 ranging from 0 to 800 cfs and estimated Tidal Basin inflows of 500 cfs. The 30-day moving average surface salinity at Val I-75 is forecast to be between 0.7 and 1.6 (Table 5). The current salinity conditions at Val I-75 are within the envelope of salinity 0.0-5.0 for this site (Table 4).

Table 5. Predicted salinity at Val I-75 at the end of forecast period

Scenario	Q79 (cfs)	TB runoff (cfs)	Daily salinity	30 day Mean
A	0	500	3.4	1.6
B	300	500	1.6	1.0
C	450	500	1.1	0.8
D	650	500	0.8	0.7
E	800	500	0.4	0.7

Red tide

The Florida Fish and Wildlife Research Institute reported on June 12, 2020, that *Karenia brevis*, the Florida red tide dinoflagellate, was not observed in samples collected from Lee or Palm Beach counties (no samples were analyzed this week from St. Lucie, Martin, Broward, or Miami-Dade counties).

Water Management Recommendations

Lake stage is in the Beneficial Use Flow sub-band. Tributary conditions are very wet. The South Florida Water Management District's Lake Okeechobee Adaptive Protocol's Release Guidance suggests noS-77 to the Caloosahatchee Estuary.

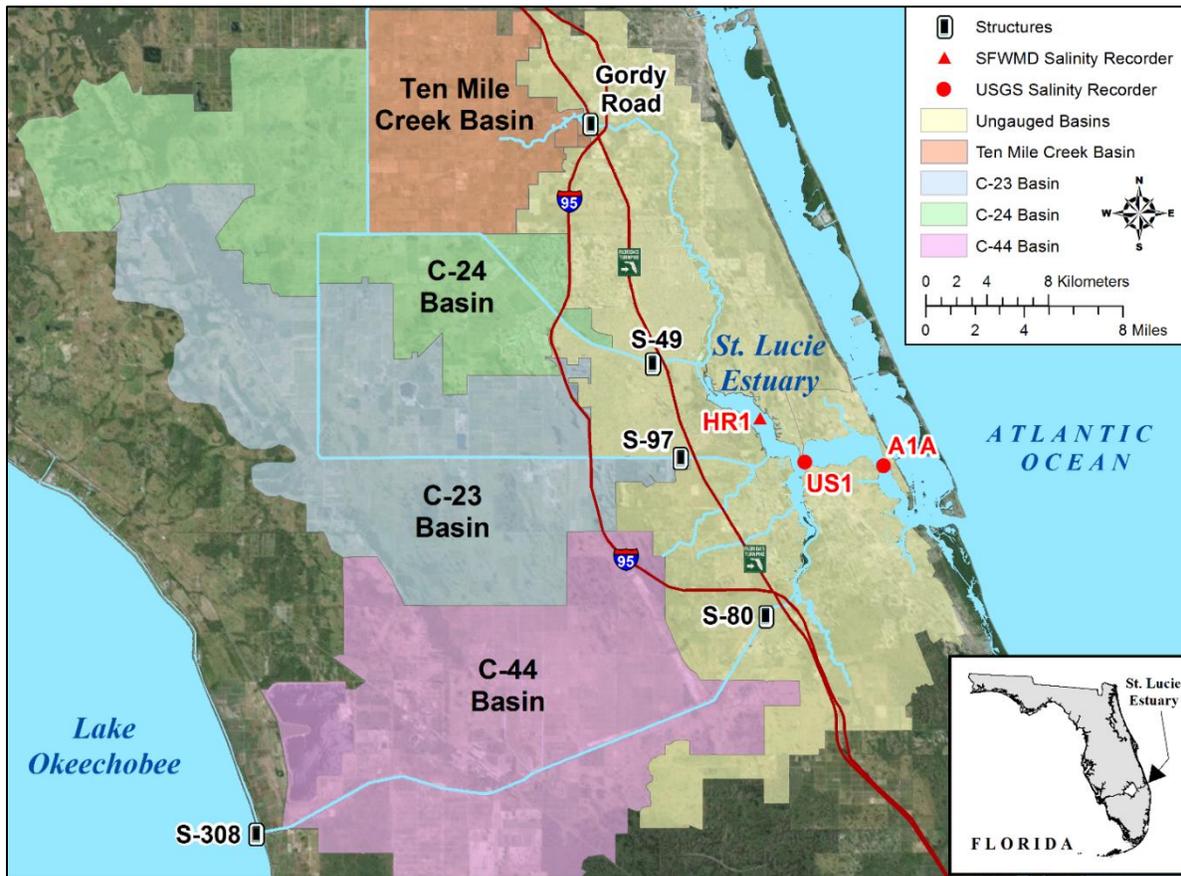


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

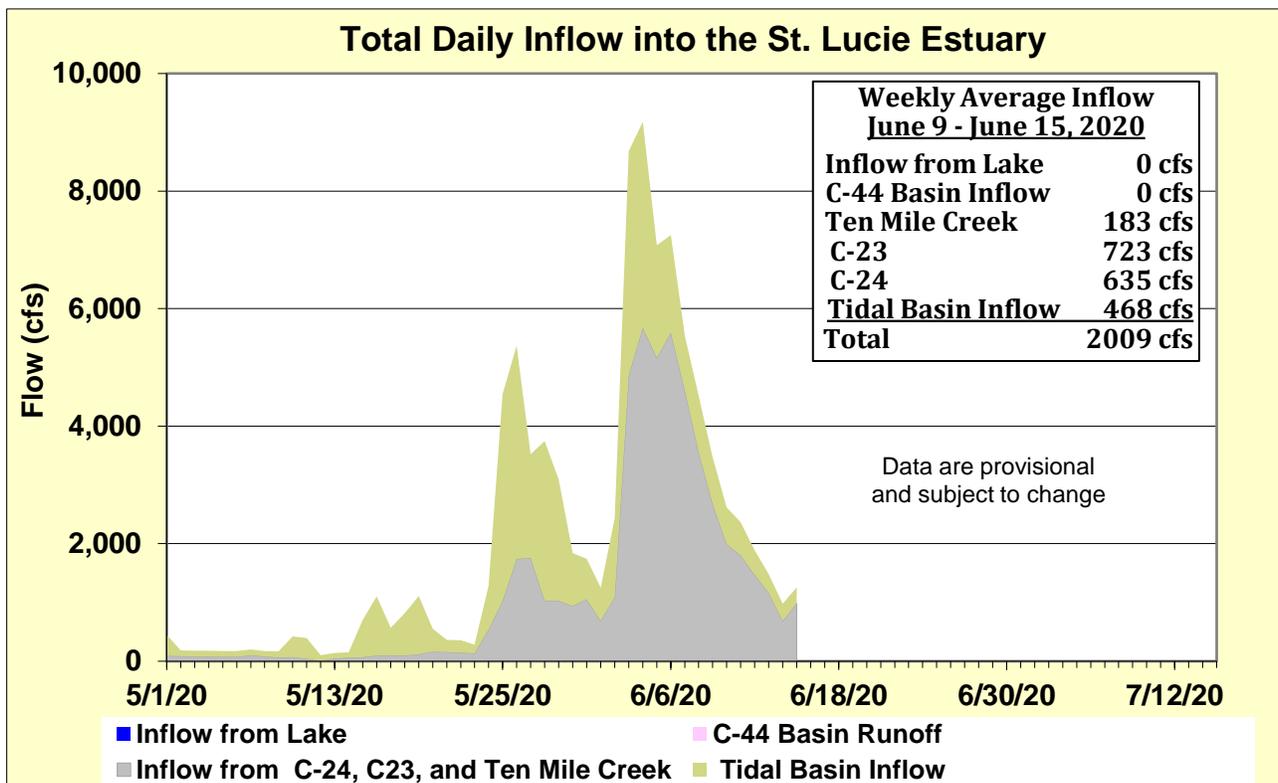


Figure 2. Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basin into the St. Lucie Estuary.

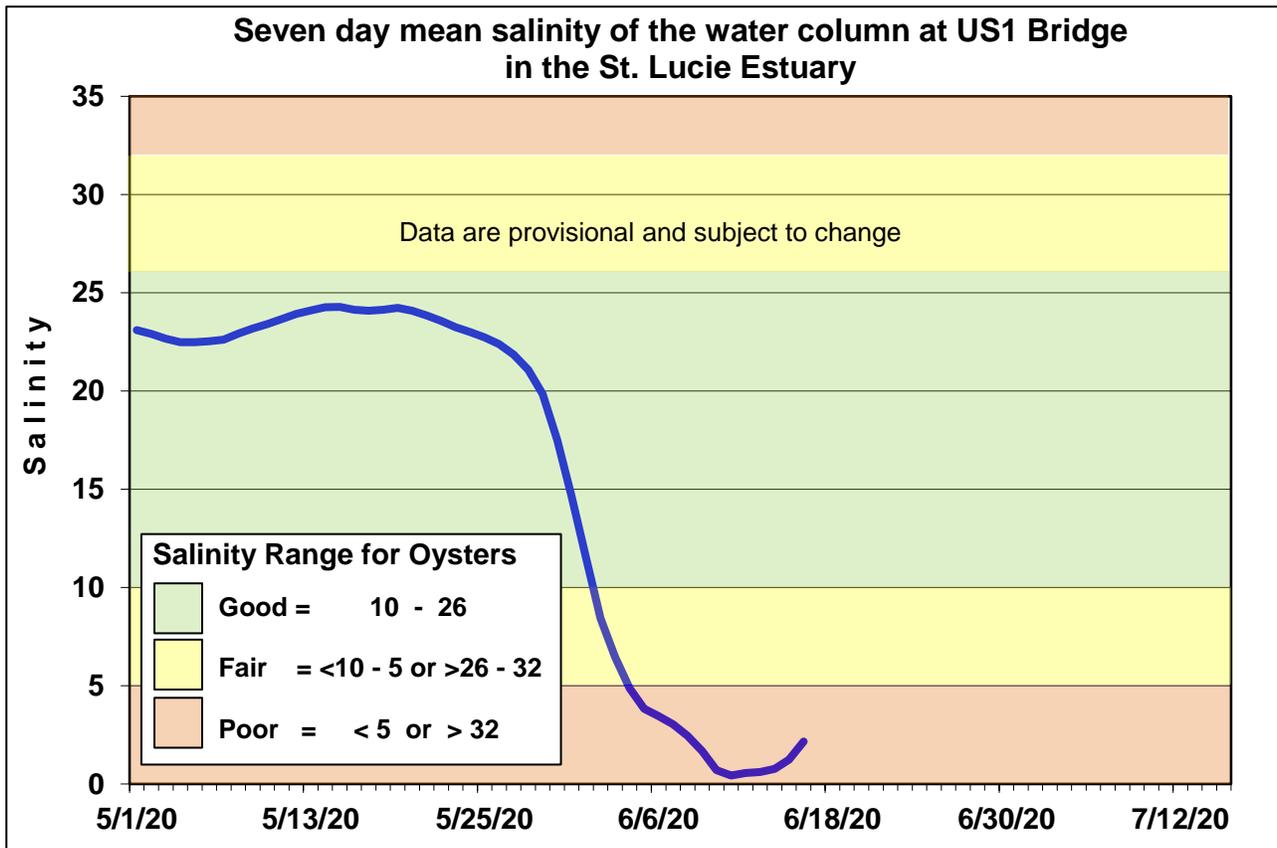


Figure 3. Seven-day mean salinity of the water column at the US1 Bridge.

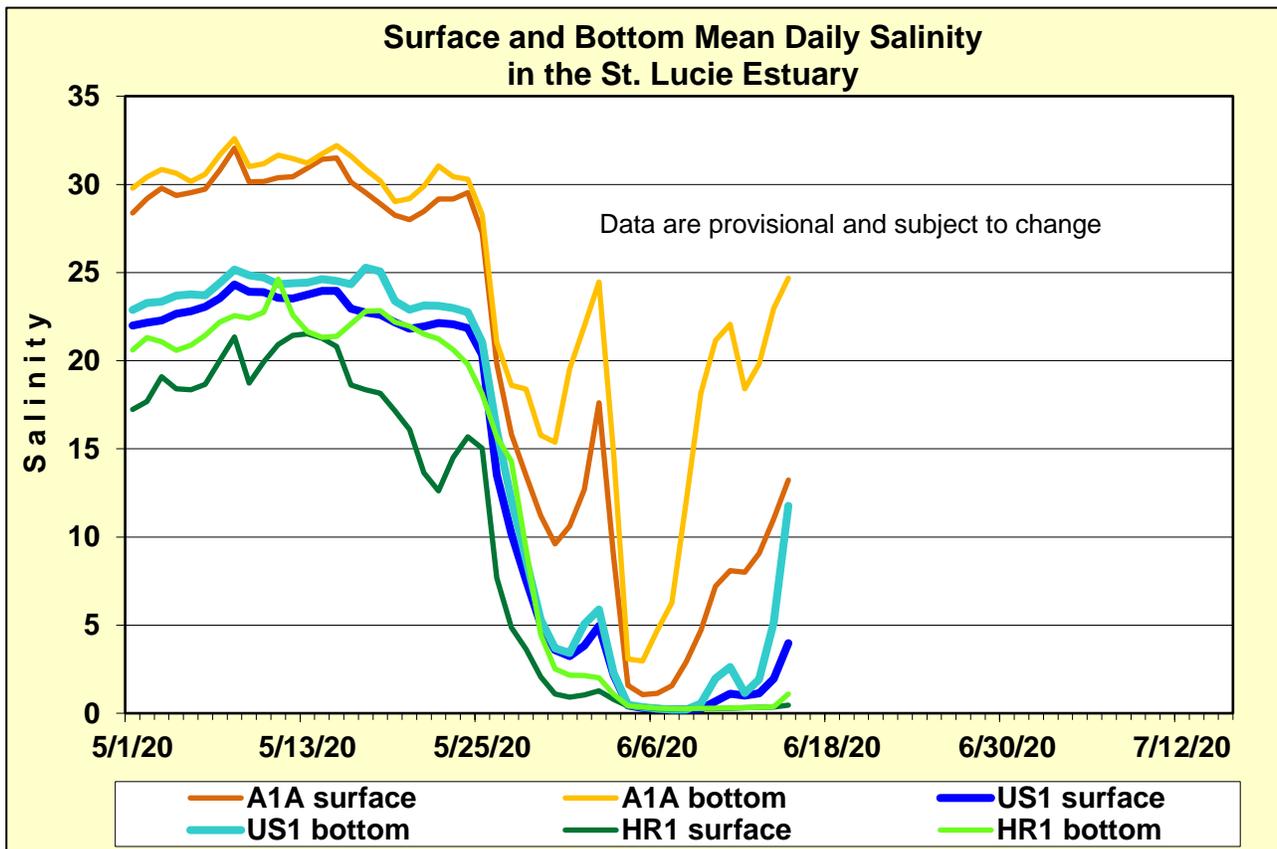


Figure 4. Daily mean salinity at the A1A, US1, and HR1 stations.

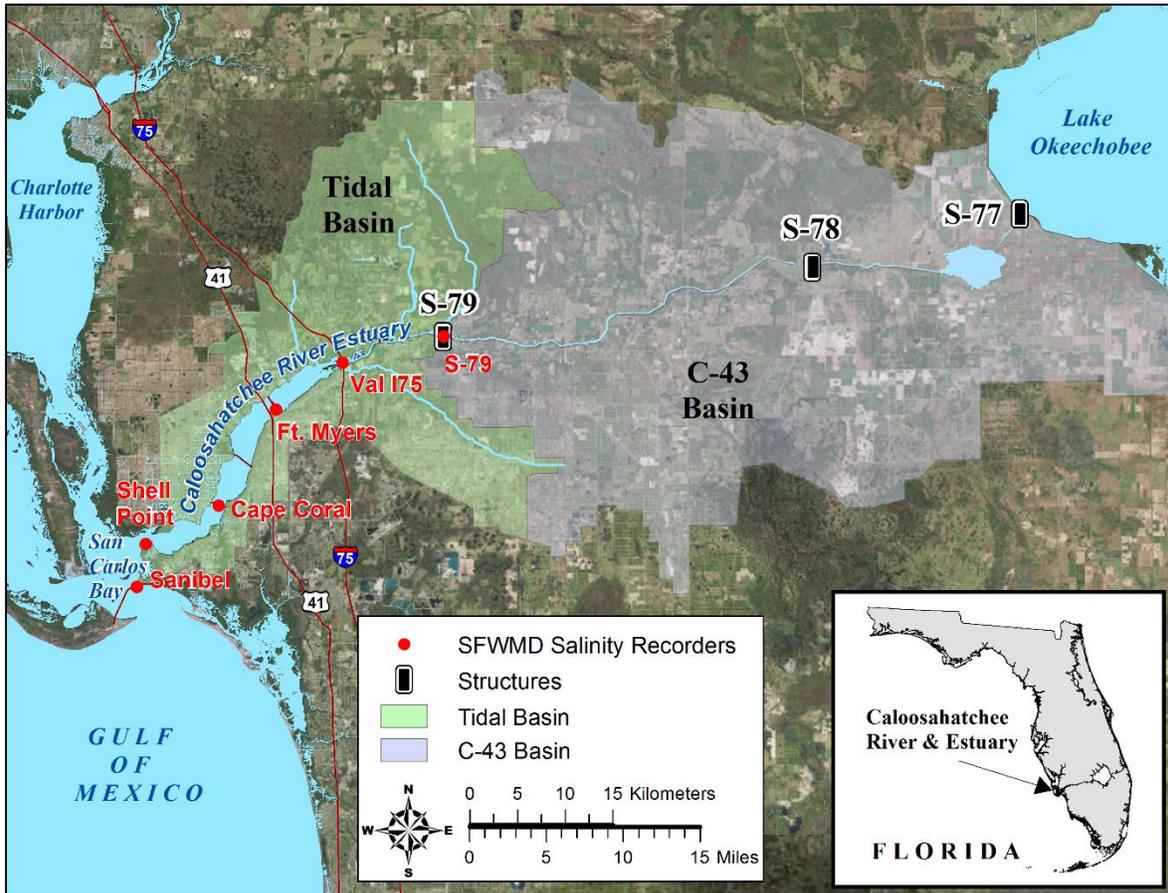


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

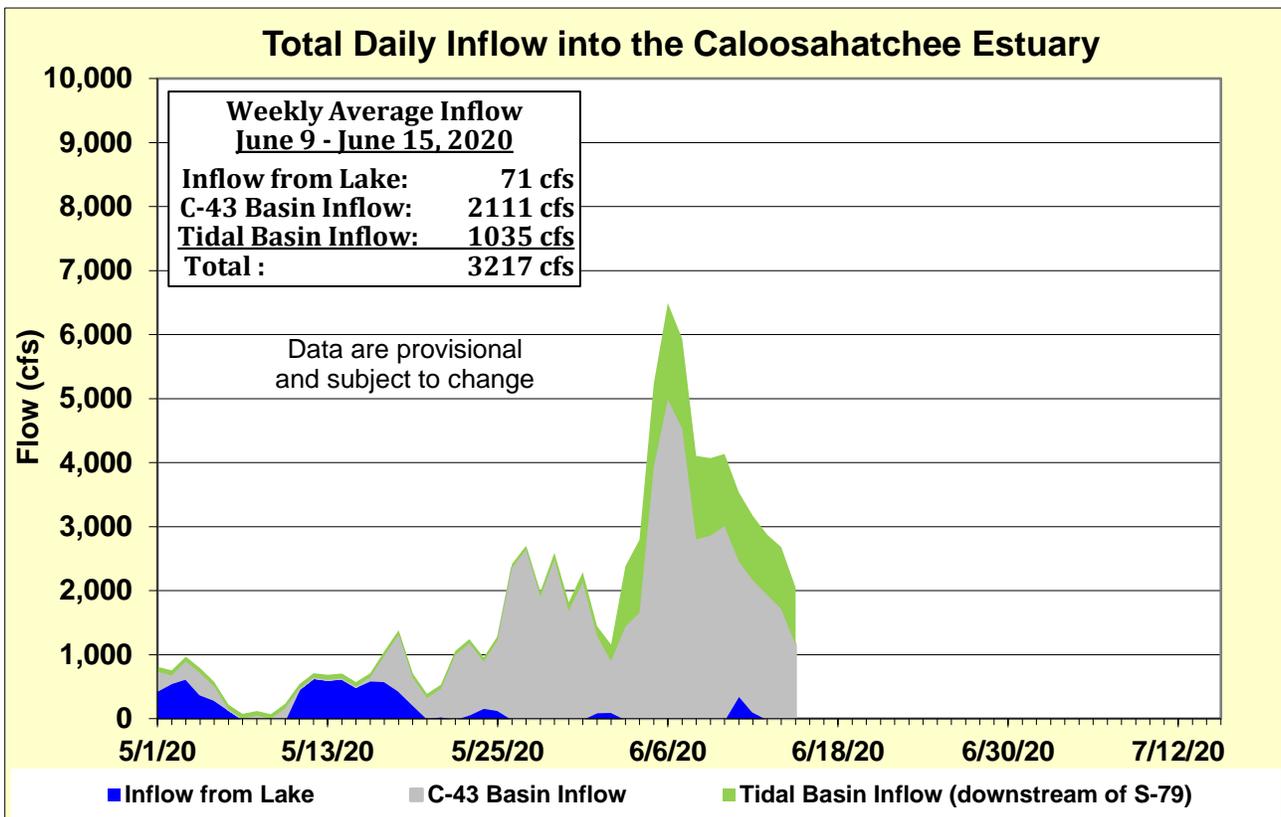


Figure 6. Total daily inflows from Lake Okeechobee, runoff from the C-43 basin

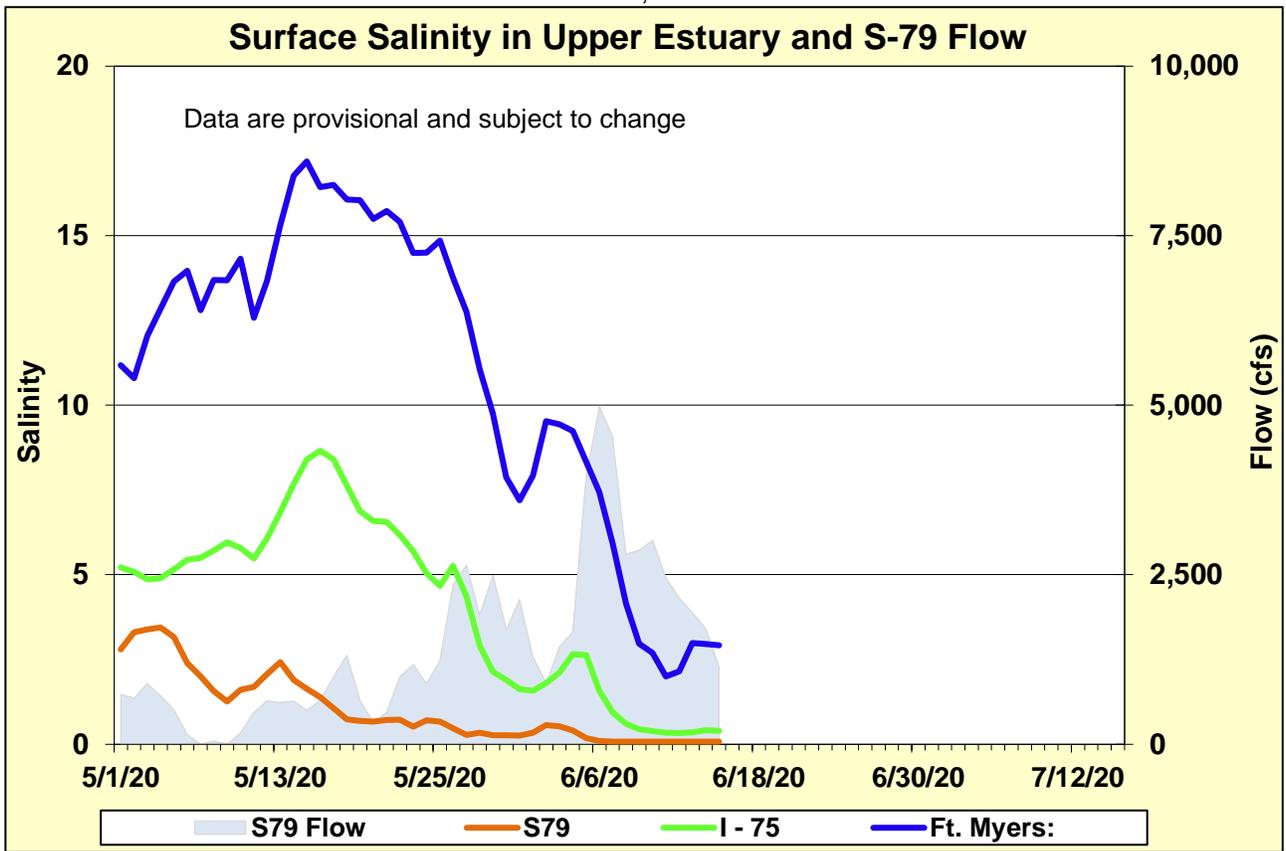


Figure 7. Daily mean flows at S-79 and salinity at upper estuary monitoring stations.

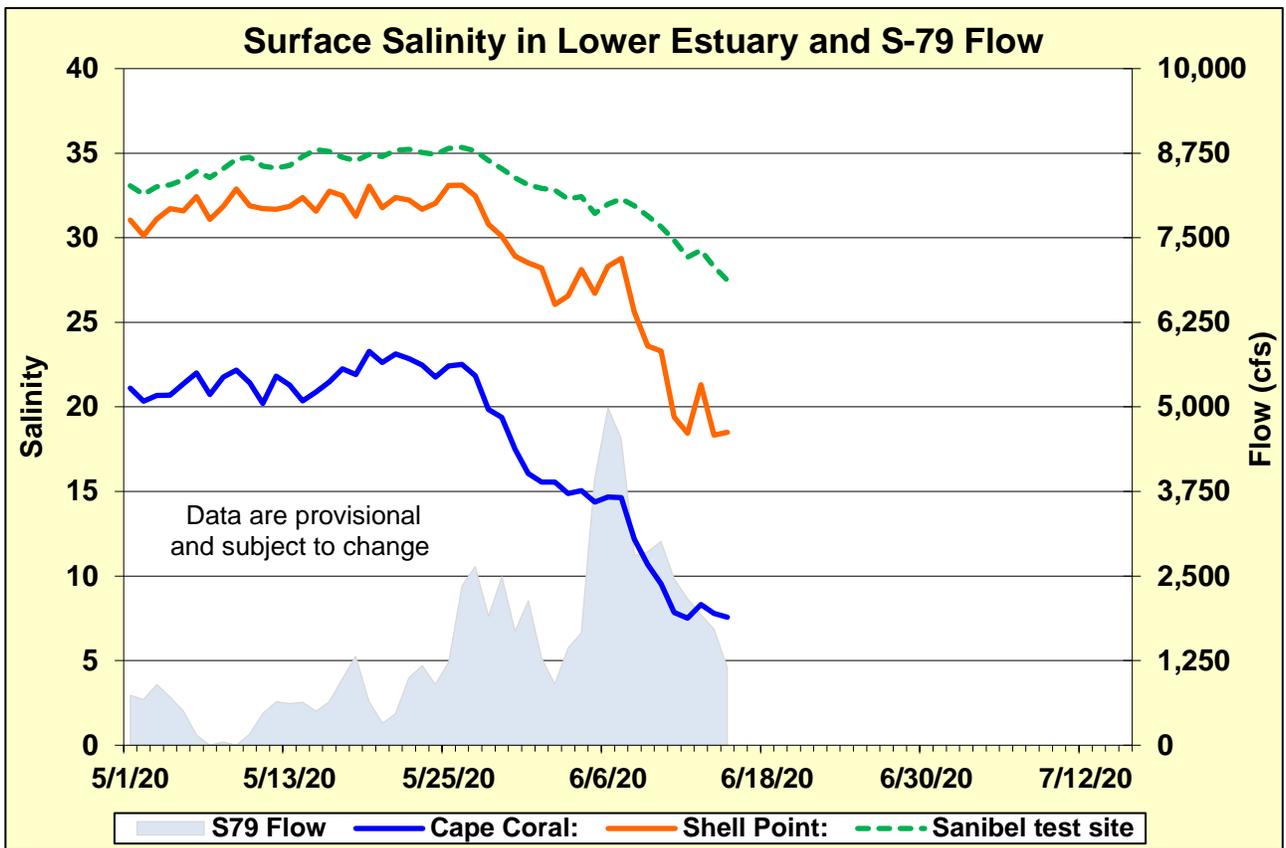


Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.

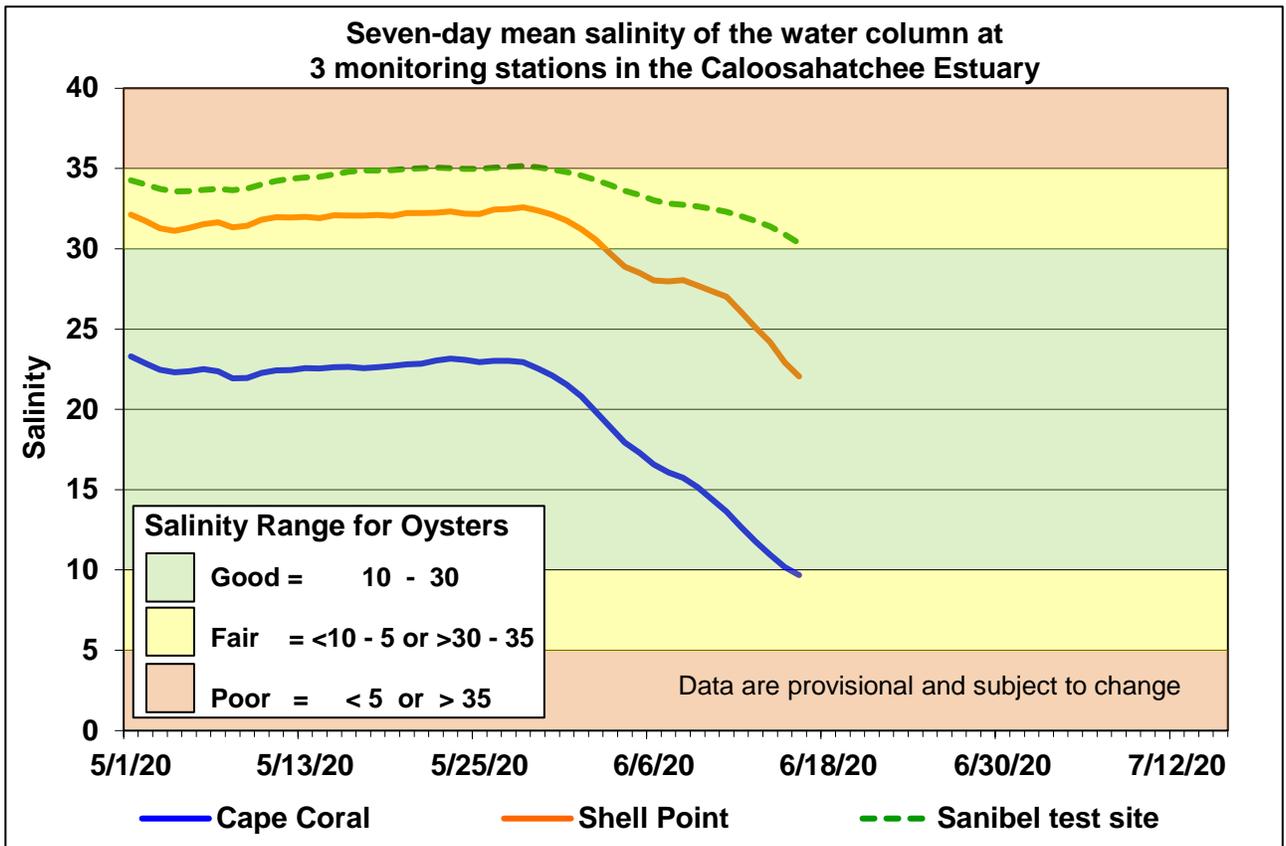


Figure 9. Seven-day mean salinity at Cape Coral, Shell Point, and Sanibel monitoring stations.

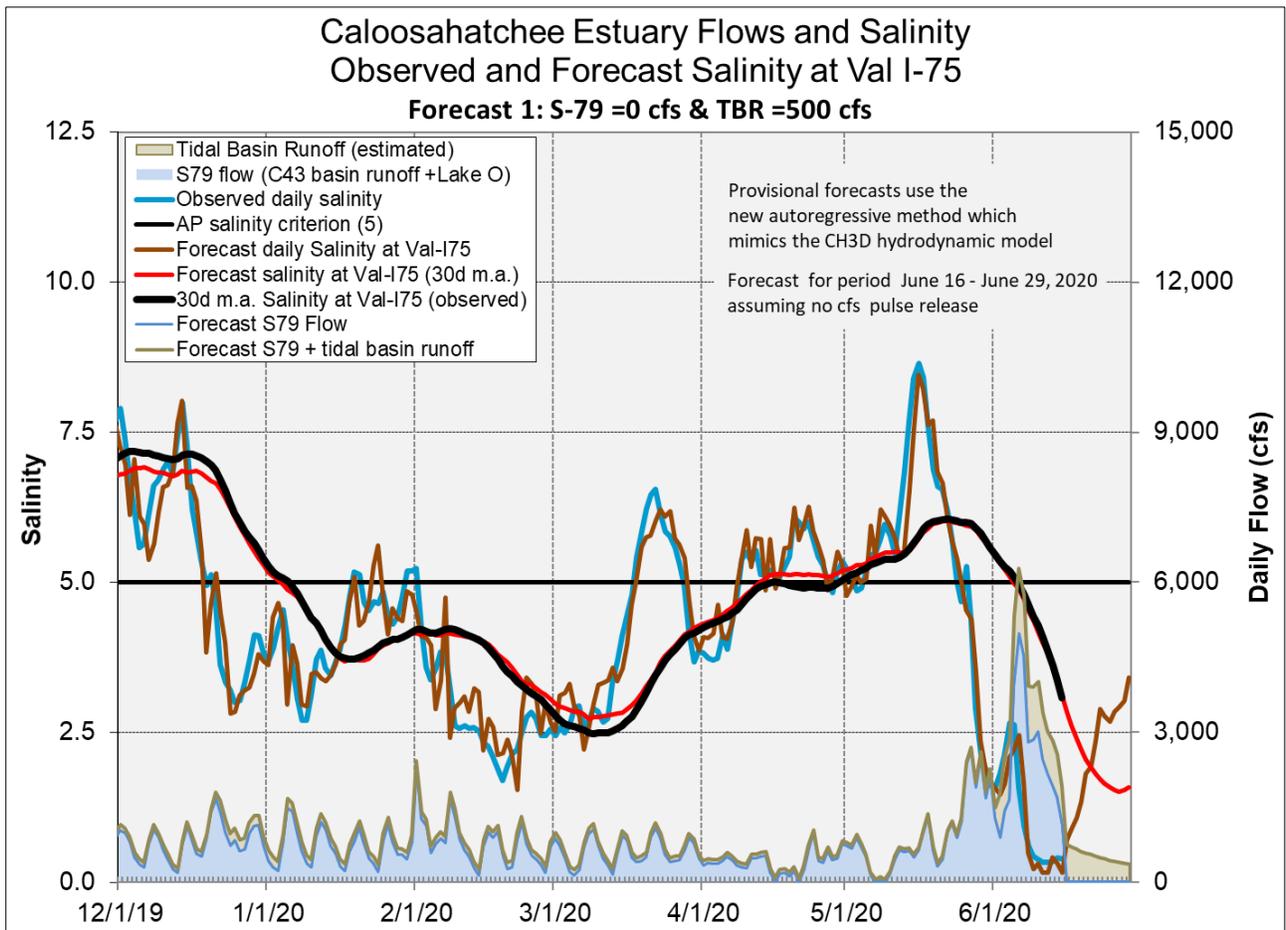
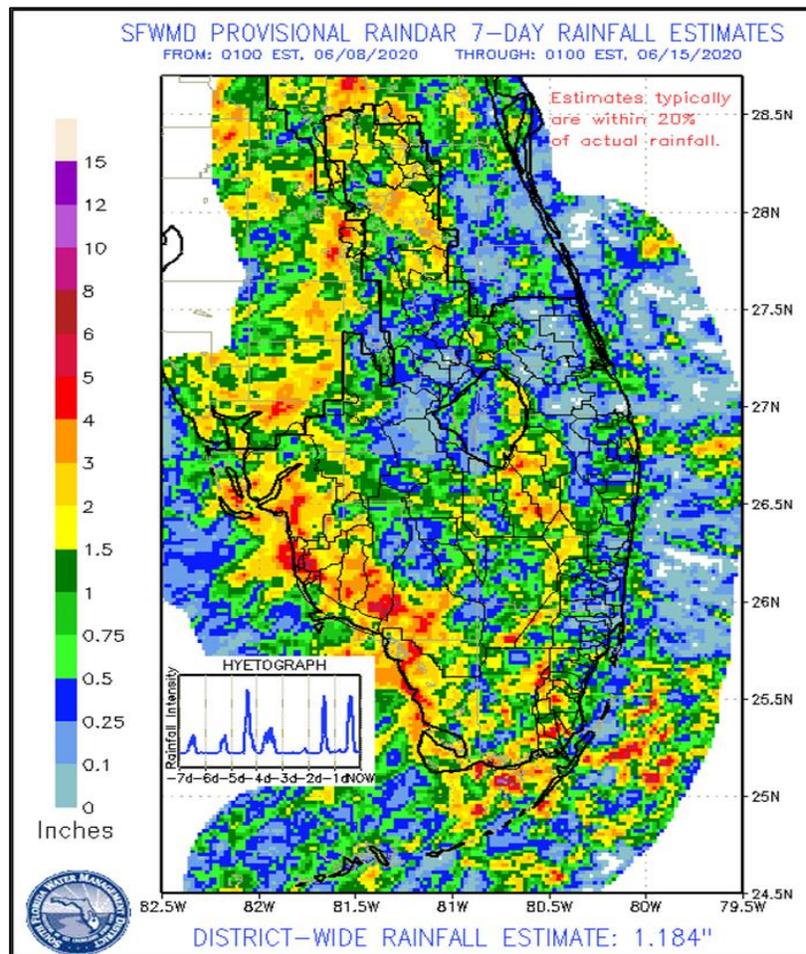


Figure 10. Forecasted Val I-75 surface salinity assuming no pulse release at S79.

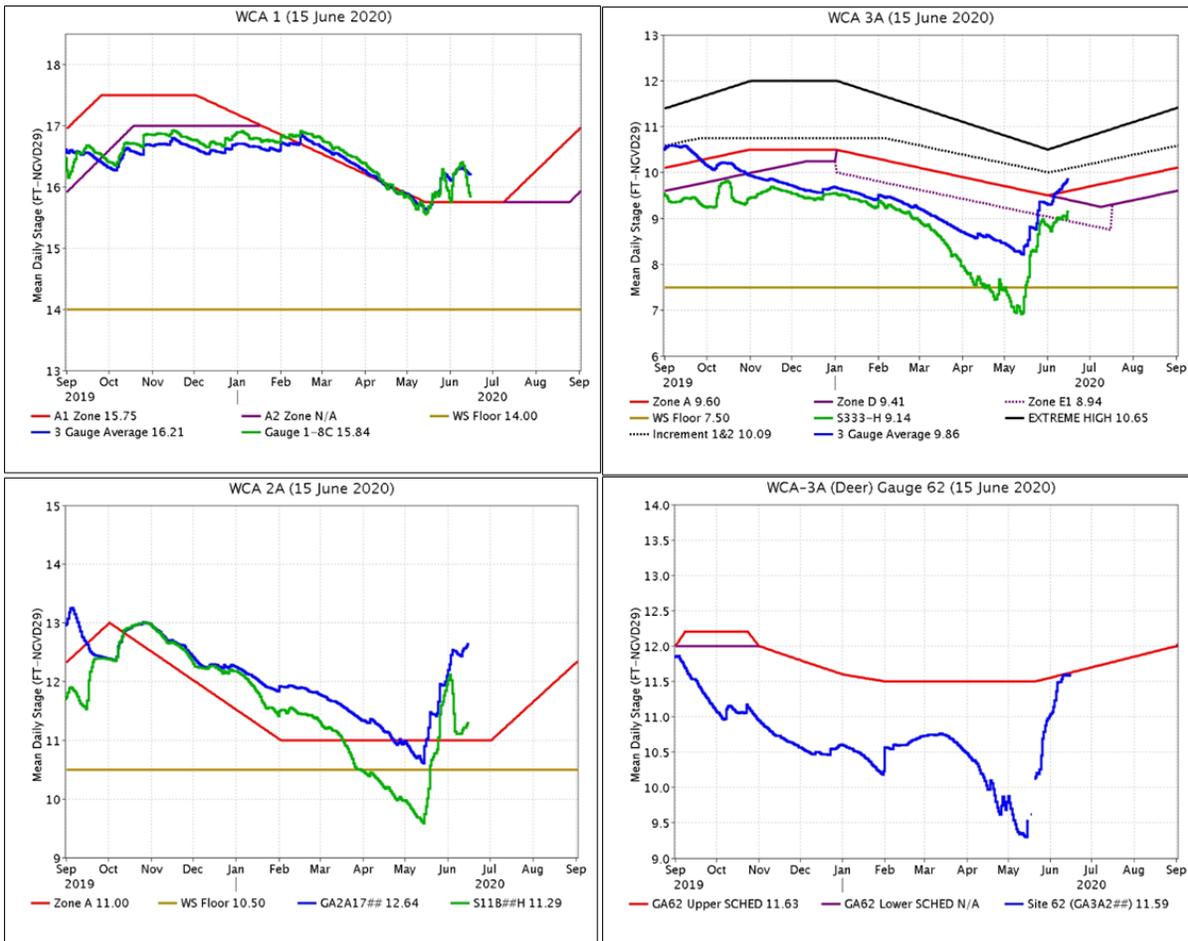
EVERGLADES

Near average rainfall was recorded across the Everglades last week, with ENP and WCA-2A receiving the most. At the gauges monitored for this report stages rose on average 0.05 feet last week with a maximum increase of +0.41 feet in WCA-3A NE again this week. Evaporation was estimated at 1.49 inches last week a decrease from the week prior.

Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	0.91	-0.08
WCA-2A	1.77	+0.16
WCA-2B	0.99	-0.08
WCA-3A	0.99	+0.24
WCA-3B	1.52	+0.00
ENP	1.77	+0.05



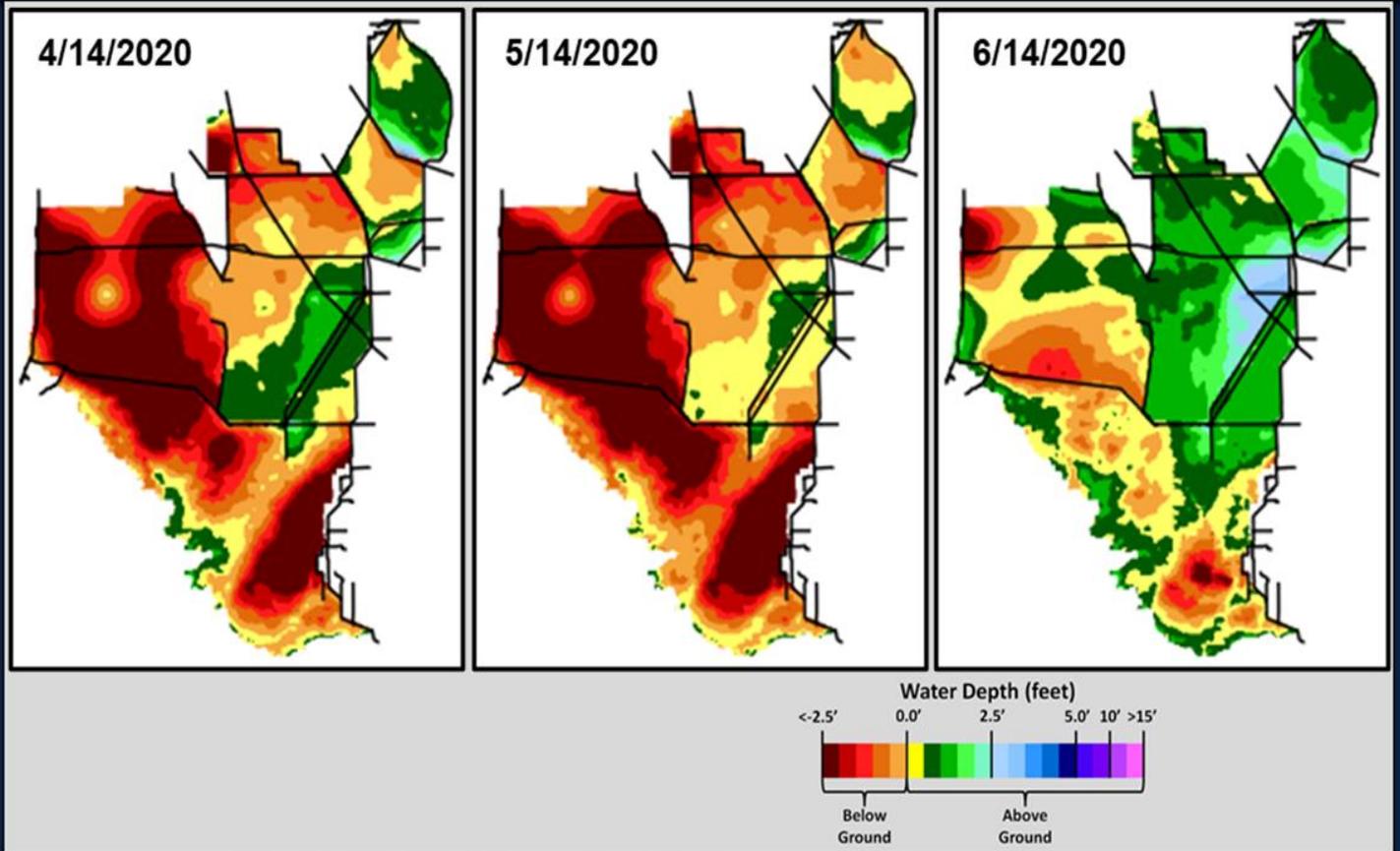
Regulation Schedules: WCA-1: Stage at the 1-8C Gauge fell sharply last week, currently 0.09 feet above the Zone A1 reg. line now below the 3 Gauge average. WCA-2A: Stage at Gauge S11-B began ascending again last week now 0.29 feet above the stable Zone A reg line and continues to rise. WCA-3A: The Three Gauge Average continued to rise away from the Zone A regulation line last week, presently 0.26 feet above that ascending regulation line. WCA-3A at gauge 62 (Northwest corner): Last week stage rose to the Upper Schedule now 0.04 feet below the rising target line.



Water Depths: The WDAT tool for spatial interpolation of depth monthly snapshots indicate depths in WCA-3A North are at 1.0 feet or higher across that entire sub-basin except in the northeast corner. Depths in WCA-3A South are building, in excess of 2.5 feet along the upper reaches of the L-67 canal. WCA-2A stages are highest along the northern perimeter, lowest upstream of the S-11s. Stages in WCA-1 have risen across that basin and are lowest in the northeast and deeper along the western perimeter and in the south. Shark River Slough, Taylor River and Lostman's Slough in ENP are ascending to ground surface or near and hydrologic connectivity is returning. Comparing WDAT water levels from present, over the last month stages rose significantly across the WCAs most prominent in northwestern WCA-3, the upper reach of the L-67 canal and northeastern WCA-2A. Looking back one year the stage difference patterns are less striking, with mixed conditions primarily wetter in northeastern WCA-3A and 2A. The WDAT model indicates wetter conditions in the western basins and ENP compared to a month ago but not a year ago.



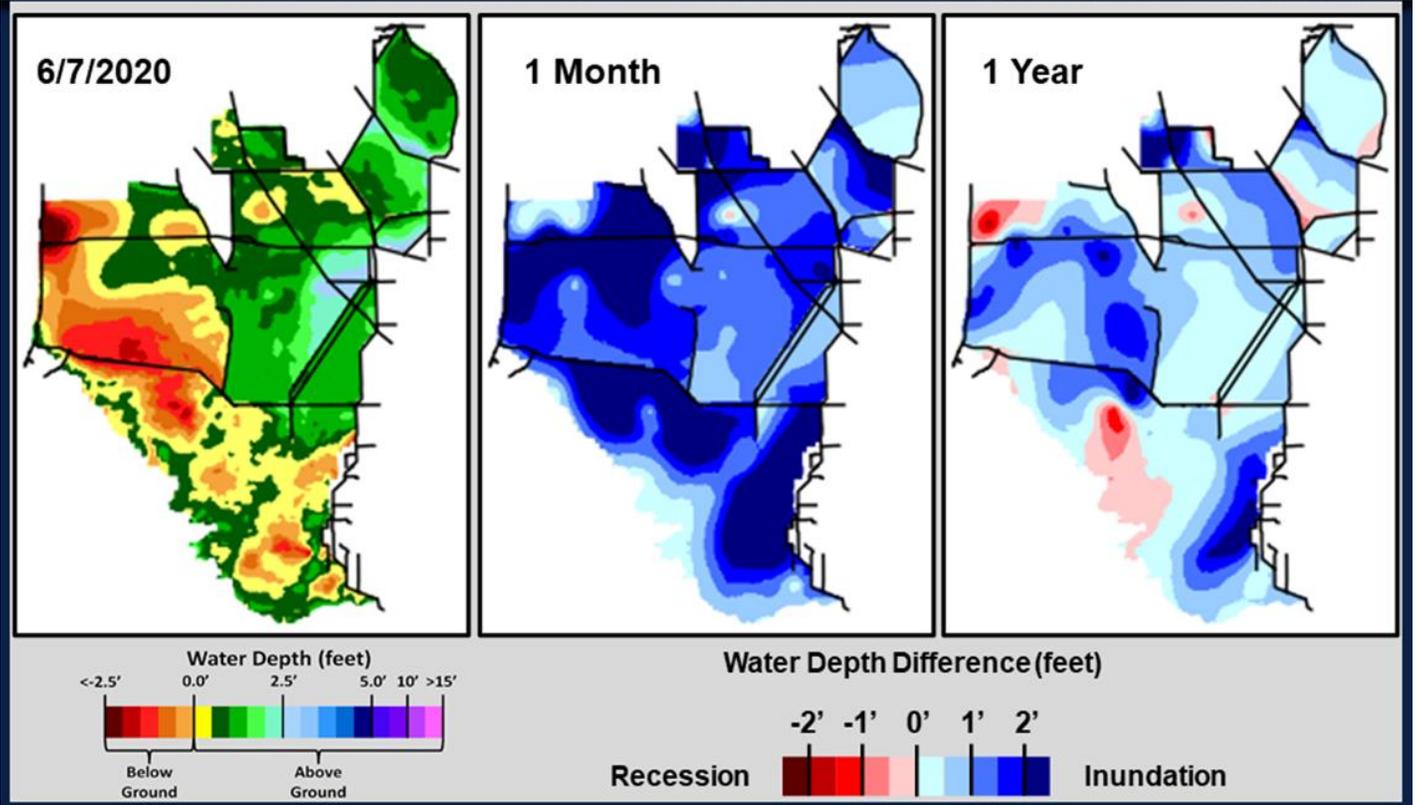
SFWDAT Water Depth Monthly Snapshots



South Florida Water Depth Assessment Tool (SFWDAT)

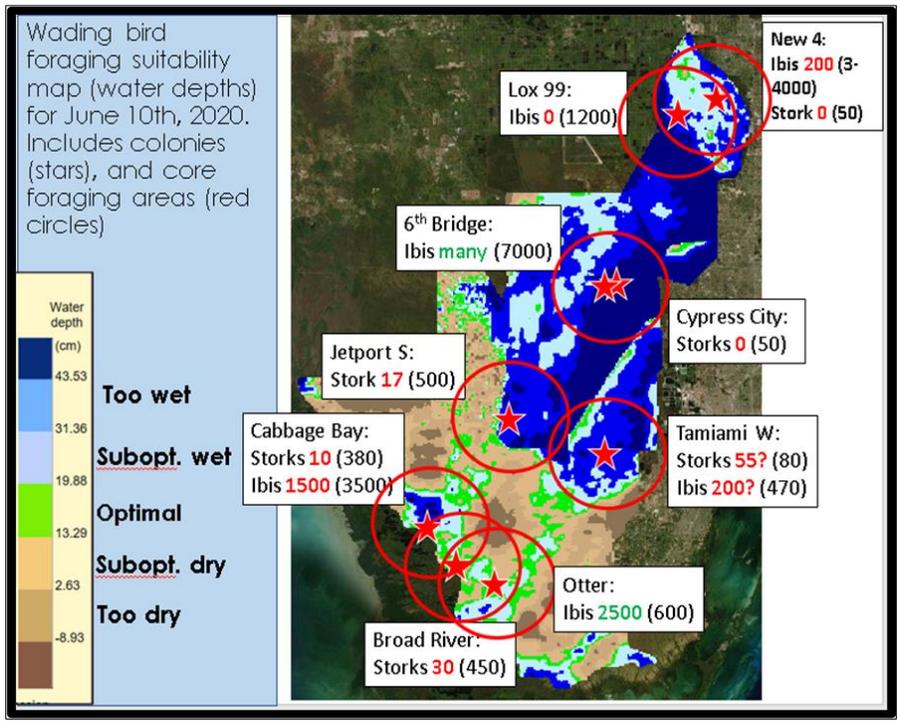


SFWDAT Everglades Difference Maps (Present - Past)

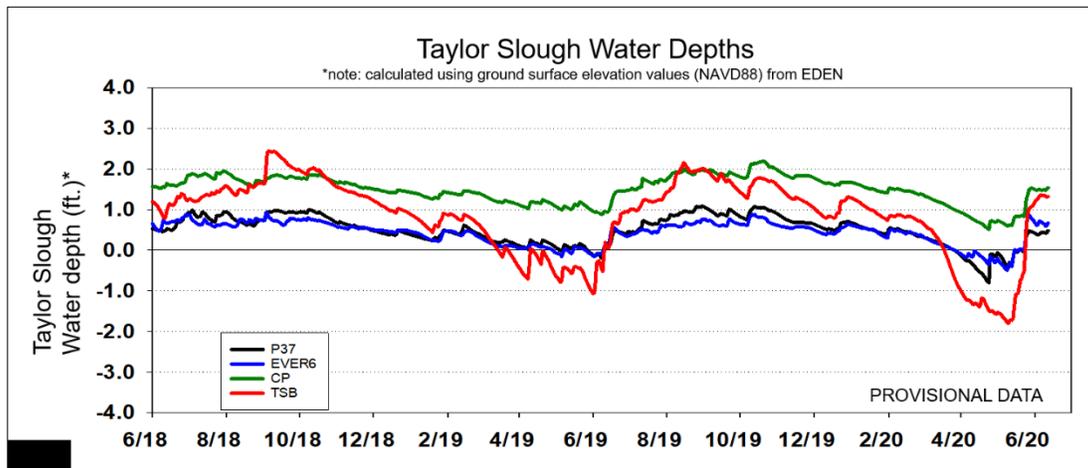
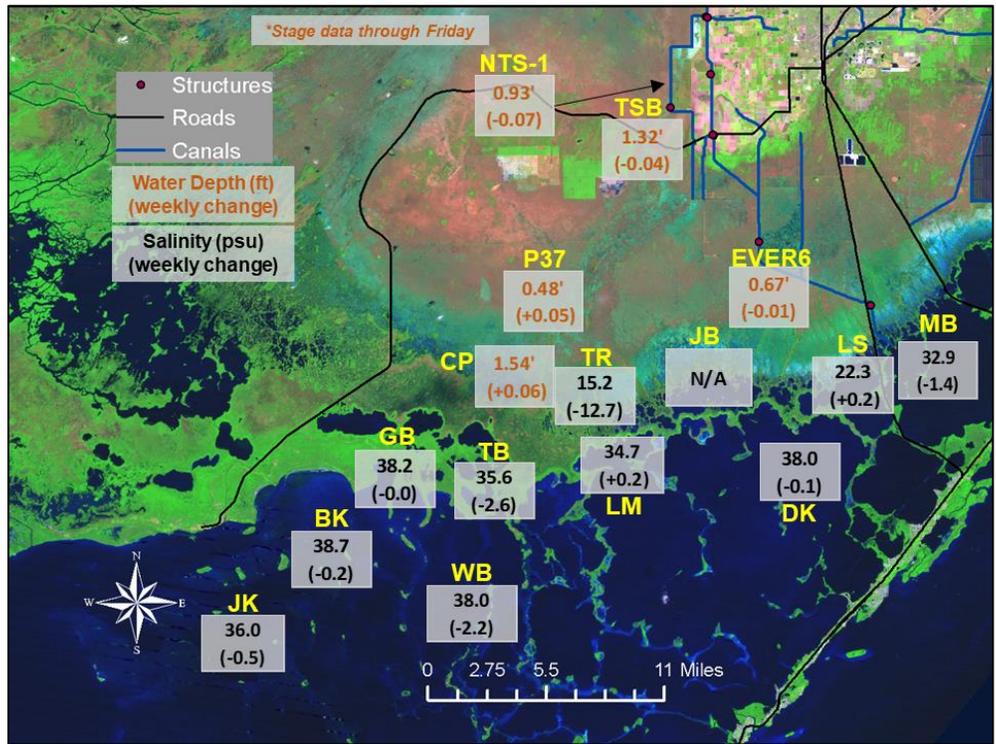


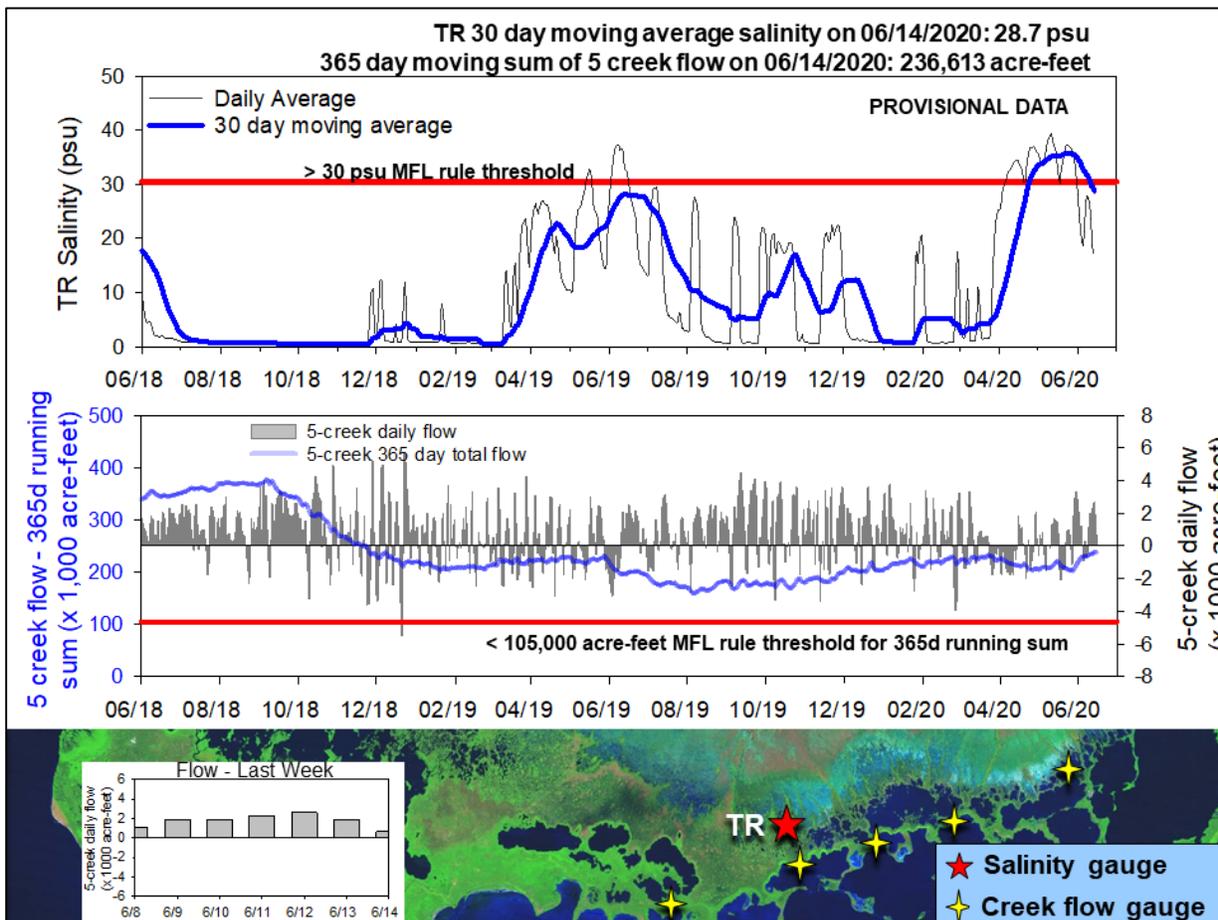
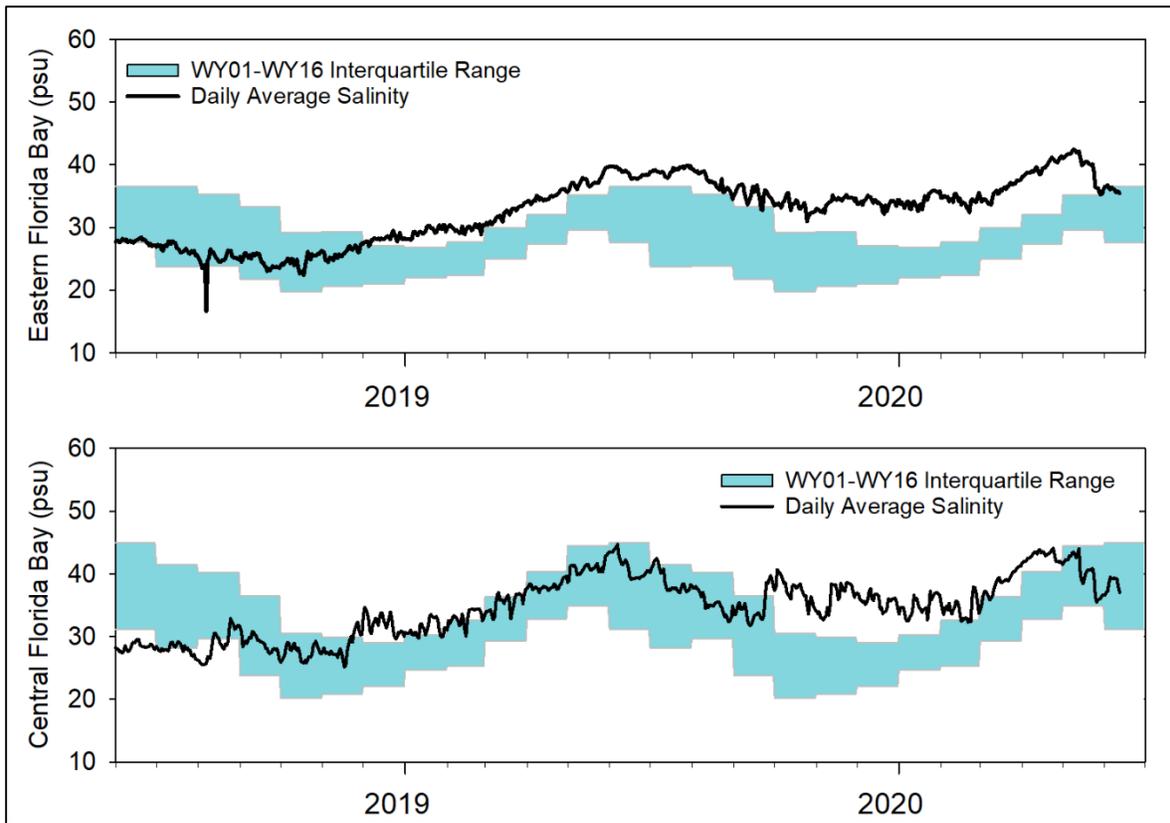
South Florida Water Depth Assessment Tool (SFWDAT)

Wildlife: Wading birds



Taylor Slough Water Levels: Data delivery issues from Everglades National Park occurred over the weekend so the most recent rain and stage data available were from 6/12. Over Monday through Friday last week, an average of 0.75 inches of rain fell over Taylor Slough and Florida Bay, and average stage remained the same. The increases in the south balanced out the decreases in the north.





Florida Bay Salinities: Average salinity in Florida Bay decreased 0.6 psu this week returning the area to the condition of the previous week (increased 0.5 psu last week). The rapid decrease in salinity is starting upstream (see TR), but it has not reached the shoreline yet. More rain and water deliveries are needed to fuel freshwater flows towards Florida Bay to decrease those salinities.

Florida Bay MFL: Salinity at the TR station in the mangrove zone (tracked for the Florida Bay MFL) decreased from 28 psu to 15 over the last week. The 30-day moving average decreased 3.5 psu to end at 28.7 psu. Weekly flow from the 5 creeks identified by yellow stars on the map totaled 12,000 acre-feet last week with positive flows the entire week at all 5 creeks. The 365-day moving sum of flow from the five creeks (tracked as part of the Florida Bay MFL criteria) increased 7,000 acre-feet this week to end at 236,613 acre-feet, between the 25th percentile (192,885 acre-feet) and the median (249,091 acre-feet). Creek flows are provisional USGS data.

Water Management Recommendations

When water is discharged to tide its potential to benefit the ecology of the Everglades is lost. Conserving water in the WCAs and sending it southward has ecological benefit. While continued inflows into WCA 3A are preferred, we recommend moderating ascension rates to the extent possible to benefit wildlife and avoid possible high-water impacts. Recommended ascension rates are the lower than the preferred max rate of 0.25 feet per week or 0.50 per two weeks. Peak stages later in the wet season provide improved conditions to support future wading bird and snail kite breeding success.

Flows towards Taylor Slough and Florida Bay freshen salinity conditions within the nearshore areas of Florida Bay and decrease the currently stressful conditions for seagrasses and fauna as nearshore salinities remain elevated, decreasing the estuarine gradient within the bay.

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

SFWMD Everglades Ecological Recommendations, June 16th, 2020 (red is new)

Area	Weekly change	Recommendation	Reasons
WCA-1	Stage decreased by 0.08'	Moderating the ascension rate to less than 0.25 feet per week or 0.50 feet per two weeks and conserving water in this basin has ecological benefit.	Protect upstream/downstream habitat and wildlife. Apple snail reproduction is hindered by rapidly increasing stage.
WCA-2A	Stage increased by 0.16'	Moderating the ascension rate to less than 0.25 feet per week or 0.50 feet per two weeks and conserving water in this basin has ecological benefit.	Protect upstream/downstream habitat and wildlife. Apple snail reproduction is hindered by rapidly increasing stage.
WCA-2B	Stage decreased by 0.08'	Moderating the ascension rate to less than 0.25 feet per week or 0.50 feet per two weeks and conserving water in this basin has ecological benefit.	Protect upstream/downstream habitat and wildlife. Apple snail reproduction is hindered by rapidly increasing stage.
WCA-3A NE	Stage increased by 0.41'	Moderating the ascension rate to less than 0.25 feet per week or 0.50 feet per two weeks and conserving water in this basin has ecological benefit.	Protect upstream/downstream habitat and wildlife. Apple snail reproduction is hindered by rapidly increasing stage.
WCA-3A NW	Stage increased by 0.10'	Moderating the ascension rate to less than 0.25 feet per week or 0.50 feet per two weeks and conserving water in this basin has ecological benefit.	
Central WCA-3A S	Stage increased by 0.14'	Moderating the ascension rate to less than 0.25 feet per week or 0.50 feet per two weeks and conserving water in this basin has ecological benefit. A recession rate in this basin has ecological benefit	Protect upstream/downstream habitat and wildlife. Apple snail reproduction is hindered by rapidly increasing stage.
Southern WCA-3A S	Stage increased by 0.31'		
WCA-3B	Stage remained unchanged	Moderating the ascension rate to less than 0.25 feet per week or 0.50 feet per two weeks and conserving water in this basin has ecological benefit.	Protect upstream/downstream habitat and wildlife. Apple snail reproduction is hindered by rapidly increasing stage.
ENP-SRS	Stage increased by 0.05'	Make discharges to the Park according to the 2012 WCP rainfall plan	Protect upstream/downstream habitat and wildlife. Apple snail reproduction is hindered by rapidly increasing stage.
Taylor Slough	Stage changes ranged from -0.07' to +0.06'	Move water southward as possible	When available, provide freshwater buffer for downstream conditions.
FB- Salinity	Salinity changes ranged -2.6 to +0.2 psu	Move water southward as possible	When available, provide freshwater to maintain low salinity buffer and promote water movement.