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MEMORANDUM

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

FROM: SFWMD Staff Environmental Advisory Team

DATE: May 13, 2020

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

A cold front extending from the central Bahamas to the northwestern Caribbean Sea this morning should remain nearly stationary through Wednesday. Meanwhile, strong high pressure located over the eastern United States will build southward into Florida from the Mid-Atlantic by Wednesday. An unusually dry and stable air mass associated with the high-pressure area should ensure dry conditions District-wide through at least Wednesday afternoon or evening. A strengthening pressure gradient between the high to the north and relative low pressure to the south will also favor breezy east winds by later today that should increase further on Wednesday and Thursday as the gradient tightens. The increase of winds, low relative humidity (especially over the interior and west), and the high May sun angle will likely result in rather high evapotranspiration rates during the next day or so. An upper-level impulse traveling from west to east across the Gulf of Mexico late Wednesday will cause the front well south of the area and considerable moisture and instability accompanying it to retreat to the Florida Straits on Thursday. The moisture surge will fuel increasing rains that should spread into the Florida Keys and southeastern part of the District by late Thursday or Thursday night but with a rather uncertain timing. The upper-air disturbance is forecast to spawn a low pressure system along the front somewhere between the Florida Straits and the western/central Bahamas on Friday or Saturday that would gradually lift north-northeastward to northeastward over the weekend while possibly developing into a subtropical cyclone. The incipient low, very favorable moisture/instability and weak jet dynamics associated with the upper-air disturbance nearing Florida from the west could result in a large increase and widespread coverage of rains across the District by Friday that would begin to diminish on or by Saturday as the low pulls away. However, the Friday/Saturday forecasts are unusually uncertain since it is critically dependent on the exact point of origin, evolution/timing and track of the wave of low-pressure area, which are all not well known at the present time. Drier continental air wrapping around the low will probably filter southward into Florida by Sunday, which would help to greatly reduce rainfall across the District. Despite the moisture decrease on the large-scale, there should still be enough low-level moisture and instability around peak heating each day to generate at least some rains over the southern and western parts of the District during the afternoon to early evening. The weather pattern and large-scale environment depicted by the model guidance this weekend and/or next week could help to start the wet season, which on average would begin around this time, with the main hindrance likely to be the influence of the departing low pressure area over the Bahamas.

Kissimmee

Tuesday morning stages were 52.4 feet NGVD (3.4 feet below schedule) in East Lake Toho, 52.4 feet NGVD (0.4 feet below schedule) in Toho, and 49.6 feet NGVD (0.1 feet below schedule) in Kissimmee-Cypress-Hatchineha; headwater stages were 46.4 feet NGVD at S-65A and 25.7 feet NGVD at S-65D. Tuesday morning discharges were 528 cfs at S-65, 430 cfs at S-65A, 692 cfs at S-65D and 477 cfs at S-65E. Dissolved oxygen concentration in the Kissimmee River averaged 8.1 mg/L for the week through

Sunday. Kissimmee River mean floodplain depth on Sunday was 0.08 feet. **Today's recommendations:** Continue the snail kite recession on Lake Tohopekaliga to reach low pool (52 feet) on June 1st. Reduce discharge at S-65 to slow the stage recession rate in Lakes Kissimmee-Cypress-Hatchineha to be less than 0.8 ft/30 days.

Lake Okeechobee

Lake Okeechobee stage was 11.17 feet NGVD on May 11, 2020, down 0.20 feet from the previous week, and 0.32 feet from the previous month. The Lake entered the Beneficial Use sub-band on March 4, 2020 and is now 0.38 feet above the Water Shortage sub-band. Lake stage moved below the ecological envelope (which varies seasonally from 12 – 15 feet NGVD +/- 0.5 feet) on October 15, 2019 and is currently 0.67 feet below the bottom of the envelope. Low water levels (lake stages below the ecological envelope) will continue to benefit recovering submerged and emergent marsh vegetation at low elevations but will reduce aquatic habitat for fish and wildlife in the marshes. Wading bird and snail kite nesting efforts are likely to be lower for the second consecutive year on the Lake due to low lake stages during the breeding season.

Estuaries

Total inflow to the St. Lucie Estuary averaged 442 cfs over the past week with no flow coming from Lake Okeechobee. The seven-day average salinities increased throughout the estuary over the past week. Salinity at the US1 Bridge is in the good range for adult eastern oysters.

Total inflow to the Caloosahatchee Estuary averaged 256 cfs over the past week with 130 cfs coming from the Lake. The seven-day average salinity increased in the estuary over the past week except at S-79 where it decreased slightly. Salinities are in the good range (0-10) for tape grass at Val I-75 and in the fair range (10-15) at Ft. Myers. Salinities are in the good range for adult eastern oysters at Cape Coral and in the fair range at Shell Point and Sanibel.

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

Stormwater Treatment Areas

Over the past week, 2,100 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 3,800 ac-feet. The total amount of inflows to the STAs in WY2021 is approximately 7,600 ac-feet. Most STA cells are at or near target stage, except STA-5/6 cells that continue to dry out. 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 1, STA-2 Flow-way 2, 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. Nests of Migratory Bird Treaty Act (MBTA) protected species have been observed in STA-1E and STA-1W. This week, there is no capacity for Lake releases in the STAs.

Everglades

The recession rates across all of the WCAs exceeded the optimal range of -0.09 feet per week last week. Slowing those recession rates when possible has ecological benefit because it could maintain water levels above ground longer into the nesting effort. The core of the wading bird nesting effort in the Everglades is taking place in WCA-1, protecting foraging conditions there by moderating reversals could have great ecological benefit by prolonging the nesting effort in that region. Current stages in WCA-3A remain well below average (Site 62 in the northwest and Site 64 in the central are both near 0.90 feet below and Site 63 in the northeast is 0.74 feet below, and stages are below ground at those

gauge locations) for this time of year. Conserving fresh water in the Everglades, distributing it to where depths are low (WCA-3A NE and WCA-3A NW), then allowing it to flow south has important ecological benefit. Near average rain fell over Taylor Slough and Florida Bay last week, however stage decreased and remain well below the historical average in northern Taylor slough and nearly two feet below ground. Salinities at the TR station in the mangrove zone are in the upper three percent of historical values. Florida Bay average salinity remains 5 psu above average for this time of year, and continued increases are expected without heavy rainfall.

Supporting Information

KISSIMMEE BASIN

Kissimmee Basin Rainfall

The Upper Kissimmee Basin received 0.01 inches of rainfall in the past week and the Lower Basin received 0.01 inches (SFWMD Daily Rainfall Report 5/10/2020).

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: 5/12/2020

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)						
							5/10/20	5/3/20	4/26/20	4/19/20	4/12/20	4/5/20	3/29/20
Lakes Hart and Mary Jane	S-62	0	LKMJ	59.7	R	59.9	-0.2	-0.2	-0.2	-0.2	-0.3	-0.4	-0.4
Lakes Myrtle, Preston, and Joel	S-57	0	S-57	60.2	R	60.2	0.0	0.0	0.1	0.0	-0.1	0.0	0.0
Alligator Chain	S-60	42	ALLI	62.5	R	62.6	-0.1	0.0	0.1	-0.2	-0.4	-0.5	-0.6
Lake Gentry	S-63	67	LKGT	60.1	R	60.1	0.0	0.0	0.1	0.1	0.1	0.0	-0.1
East Lake Toho	S-59	0	TOHOE	52.5	R	55.9	-3.4	-3.5	-3.8	-4.1	-4.5	-4.6	-4.8
Lake Toho	S-61	110	TOHOW, S-61	52.4	R	52.9	-0.5	-0.5	-0.6	-0.7	-0.9	-0.9	-1.1
Lakes Kissimmee, Cypress, and Hatchineha	S-65	738	KUB011, LKISSB	49.6	R	49.7	-0.1	-0.1	-0.1	-0.3	-0.4	-0.5	-0.5

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 8. Kissimmee River floodplain stages at selected stations are shown in Figure 9.

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: 5/12/2020

Metric	Location	1-Day Average		Average for the Preceding 7-Days ¹							
		5/10/2020	5/10/20	5/3/20	4/26/20	4/19/20	4/12/20	4/5/20	3/29/20	3/22/20	3/15/20
Discharge (cfs)	S-65	805	738	760	611	372	365	357	448	690	920
Discharge (cfs)	S-65A ²	670	656	679	550	353	323	310	350	592	837
Discharge (cfs)	S-65D ²	770	667	722	485	317	308	302	476	699	940
Headwater Stage (feet NGVD)	S-65D ²	25.73	25.81	25.84	25.84	25.83	25.75	25.78	25.71	25.75	25.85
Discharge (cfs)	S-65E ²	799	617	677	435	282	283	262	433	653	864
Discharge (cfs)	S-67	0	0	0	0	0	0	0	0	0	0
DO (mg/L) ³	Phases I & II/III river channel	7.6	8.1	7.9	7.5	7.9	7.4	7.4	6.9	7.6	8.0
Mean depth (feet) ⁴	Phase I floodplain	0.08	0.09	0.14	0.10	0.06	0.07	0.07	0.08	0.11	0.20

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)

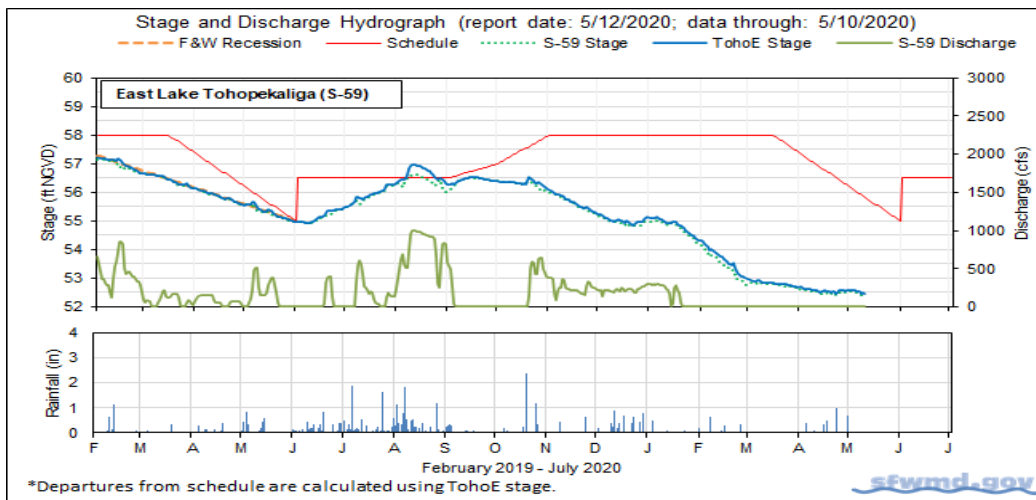


Figure 1.

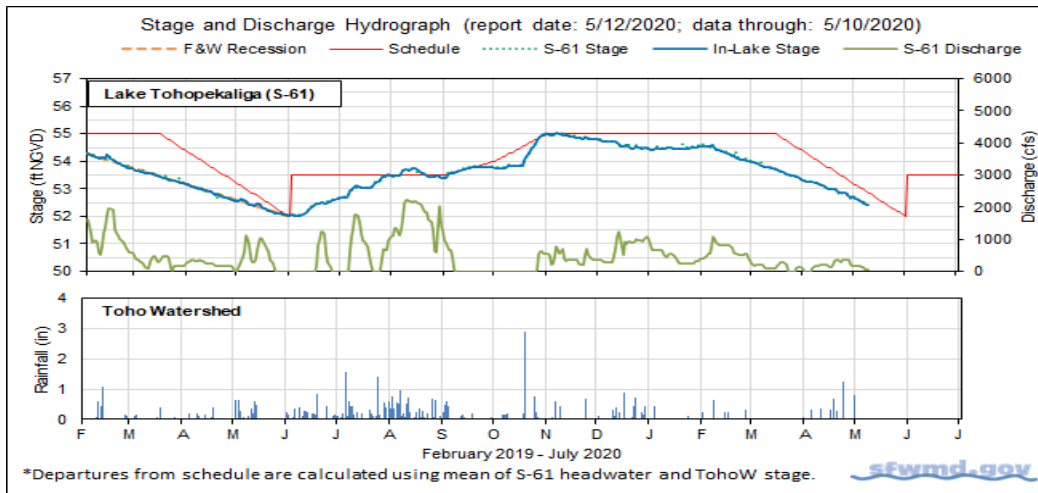


Figure 2.

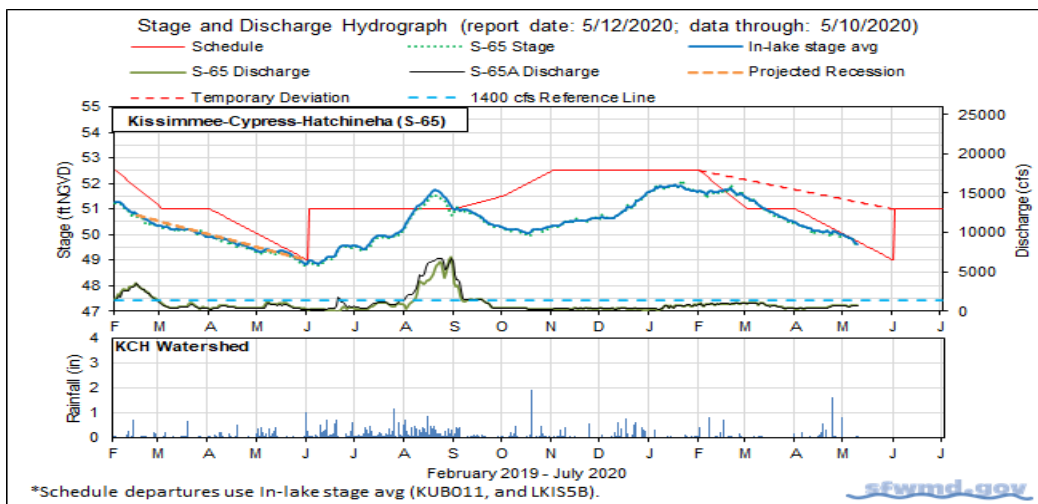


Figure 3.



SFWDAT Kissimmee River (Phase I) Monthly Depth Maps

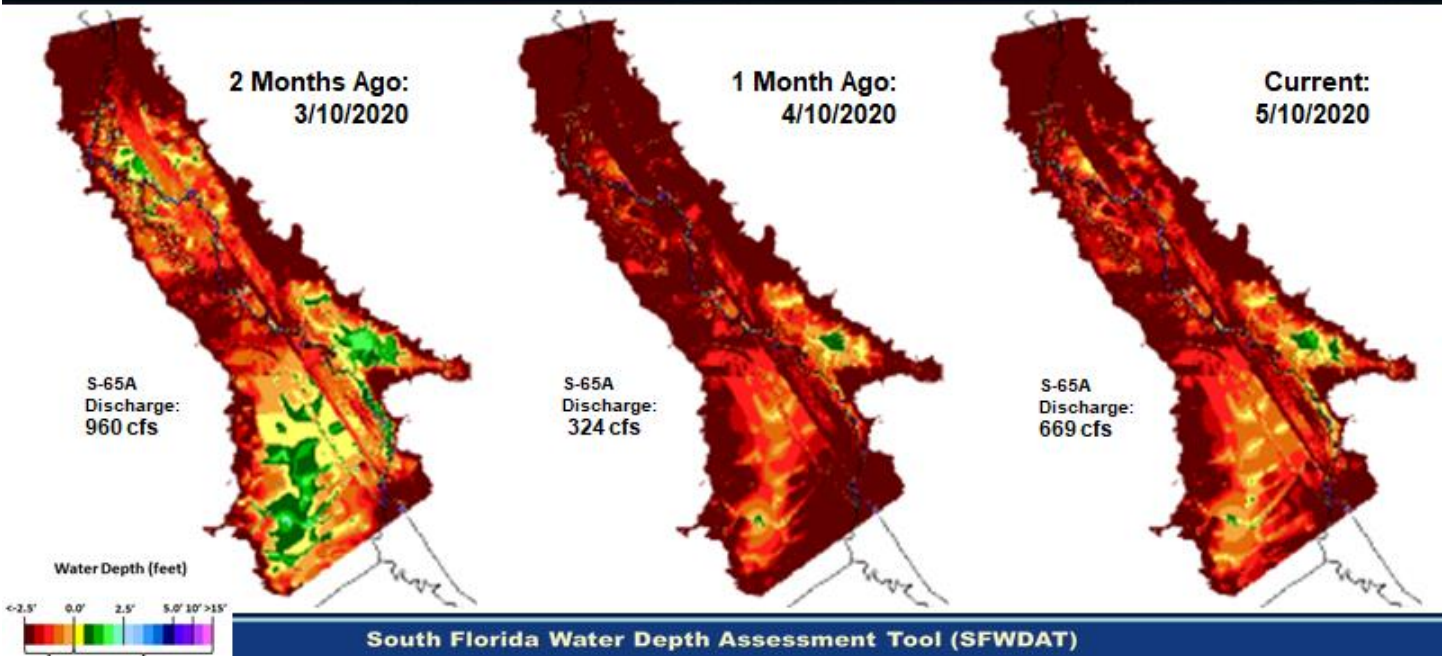
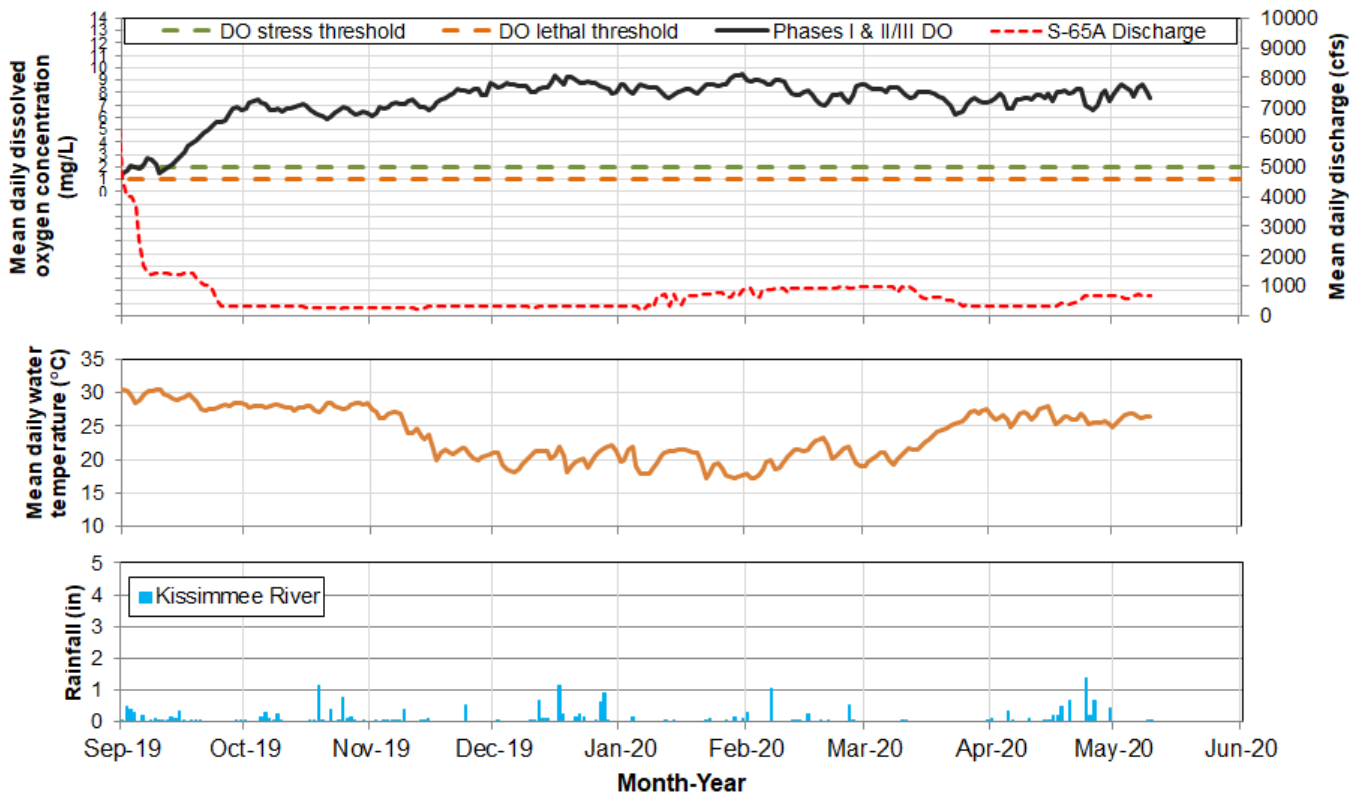


Figure 4. Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to January 16, 2012.



Report Date: 5/12/2020; data are through: 5/10/2020.

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

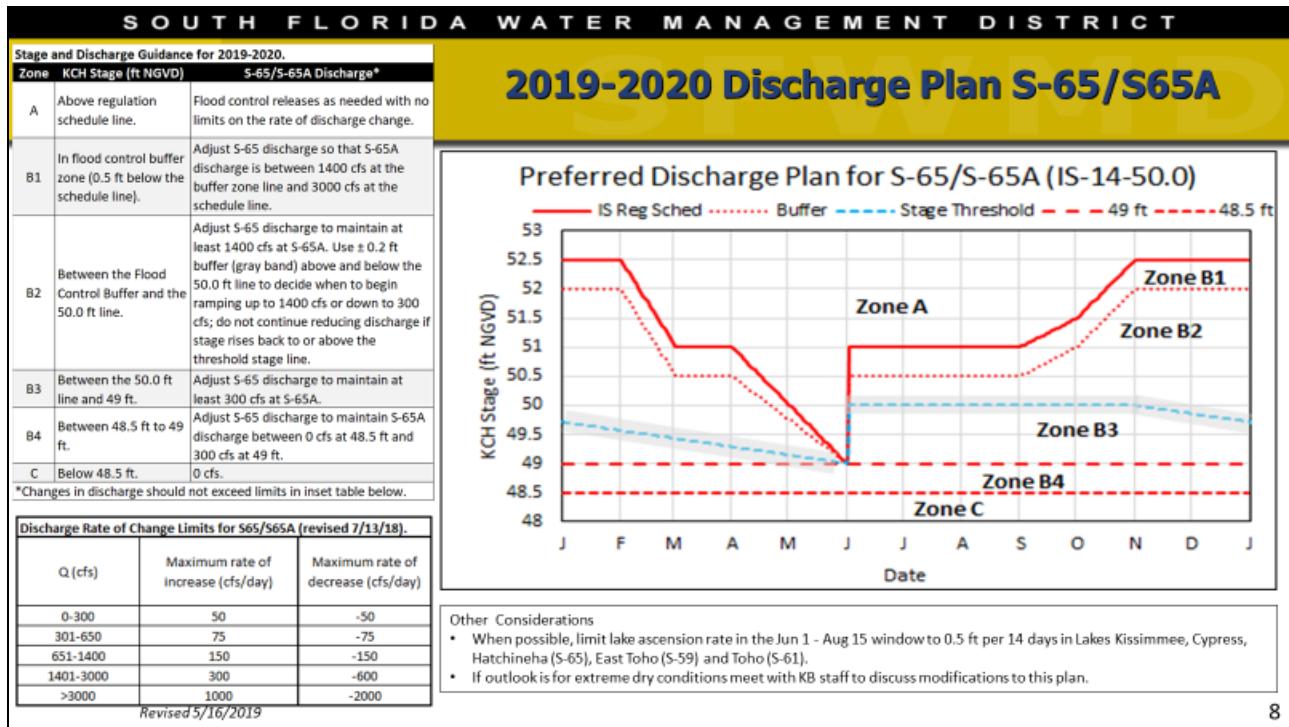


Figure 6. The 2019-2020 Discharge Plan for S-65/S-65A.

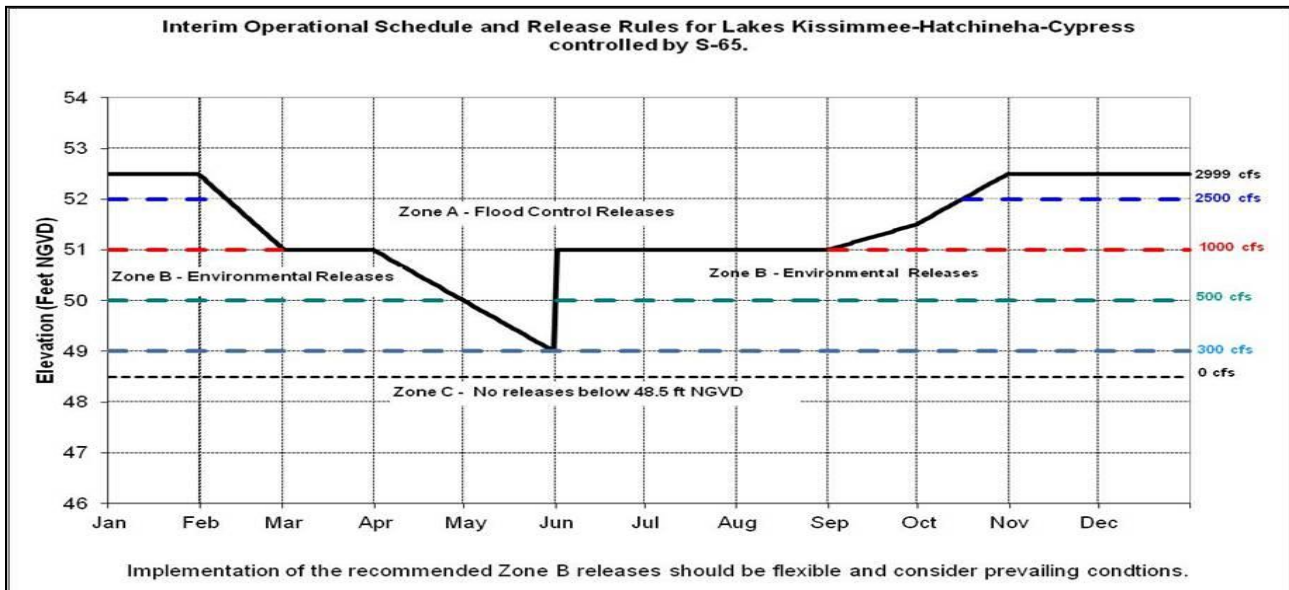


Figure 7. Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years.

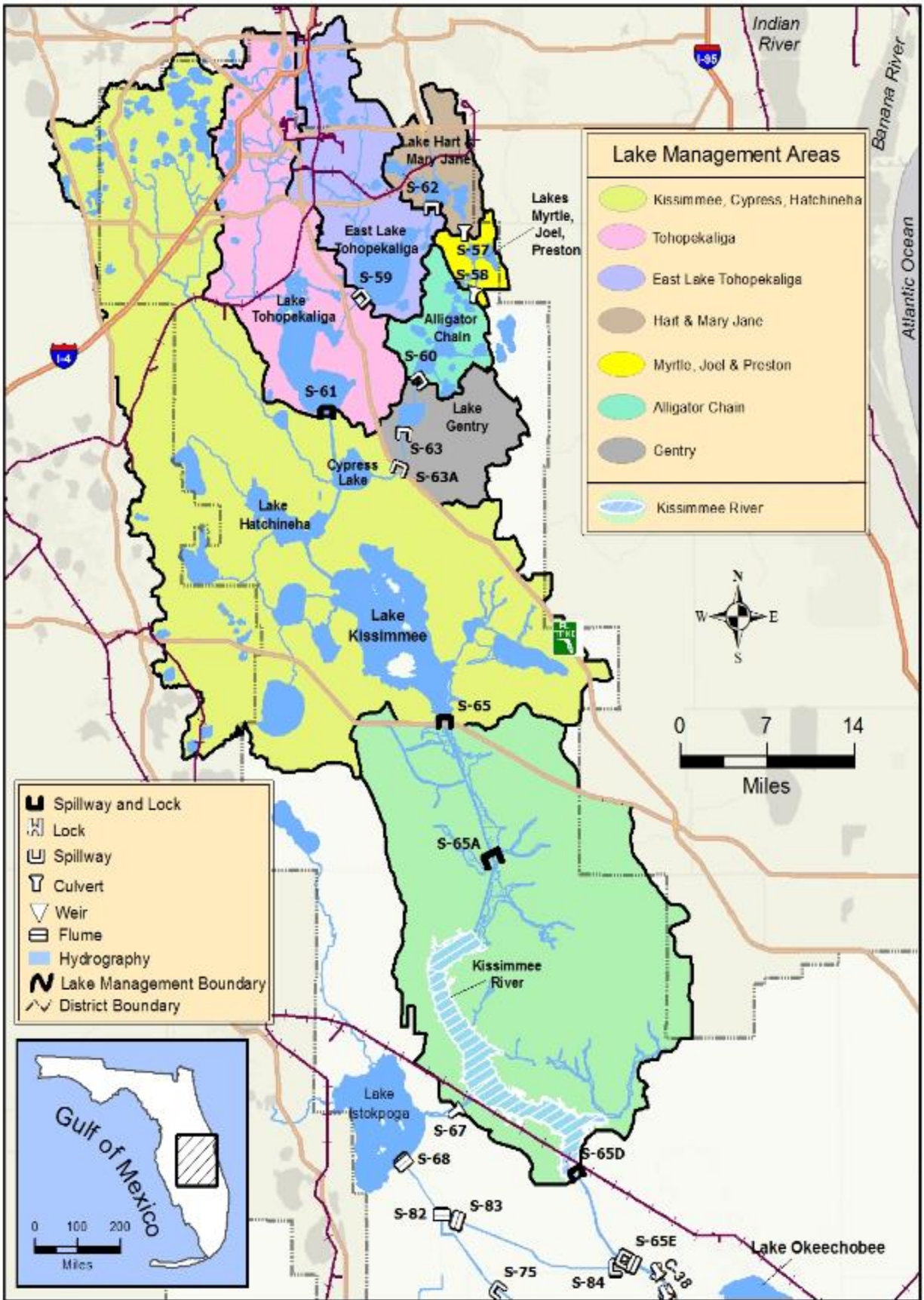


Figure 8. The Kissimmee Basin.

LAKE OKEECHOBEE

Lake Okeechobee stage is 11.17 feet NGVD, 0.32 feet lower than a month ago and 0.12 feet lower than one year ago (Figure 1). The Lake is currently 0.67 feet below 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 had been quickly declining since late-February 2020 but rain events in mid-April resulted in a relatively stable stage for several weeks. According to RAINДАР, 0.16 inches of rain fell directly over the Lake during the past week (Figure 4). Most of the northern watershed received similar or less amounts, between 0 - 0.5 inches of rain.

The average daily inflows (minus rainfall) decreased over the past week, going from 865 cfs to 657 cfs, and average daily outflows (minus evapotranspiration) increased, from 1,267 cfs the previous week to 1,773 cfs. Most of the inflow (615 cfs) came from the Kissimmee River (S-65E & S-65EX1). Outflows of 530 cfs were released to the west through the S-77 (C-43/Caloosahatchee Canal) while 1,184 cfs went south through the S-350 structures. 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.

The most recent survey of foraging wading birds was conducted on May 7 (Figure 6). There were approximately 7,300 wading birds seen foraging around Lake Okeechobee, which was very similar to this time last year and down roughly 2,000 from an early March survey. Snail kite nest surveys were also conducted in late April, finding no nests thus far this breeding season. Lake stage has been below 14 feet since October 2018 leaving many areas of the marsh continuously dry for two wading bird/snail kite breeding seasons in a row, so conditions on the lake are likely unfavorable for nesting at this time.

Water quality sampling occurs twice-monthly at 30 stations from May – October as part of expanded monitoring efforts to track and study Harmful Algal Blooms on the Lake. Results from early May sampling were reported on Florida's Department of Environmental Protection Algal Bloom Monitoring website, for all sites where blooms were observed by the sampling crew (8 of 30 stations) (Figure 7). *Microcystis aeruginosa* was the dominant taxa in 7 of 8 of those stations, while no dominant taxa were defined at 1 of those 8 stations (L008). Microcystin toxin was detected at 7 of the 8 stations as well, ranging from barely detectable (0.53 µg/L) to a high of 35.0 µg/L at the station LZ30.

Satellite bloom monitoring (using NOAA's cyanobacteria monitoring product derived from EUMETSAT's Sentinel 3 OLCI sensor) from the same time period appeared to suggest elevated levels of cyanobacteria at most of the 8 stations where blooms were observed, but also showed higher bloom potential along the western shore, which was not observed by field crews (Figure 8). This phenomenon was also observed last summer. Efforts are underway to understand the discrepancy between field observations, water quality samples, and the satellite monitoring product in these areas; e.g. whether other taxa are blooming in those areas that are less likely to form visible surface mats like *Microcystis*, or whether the densities are being overestimated by the satellite monitoring product.

Water Management Summary

Lake Okeechobee stage was 11.17 feet NGVD on May 11, 2020, down 0.20 feet from the previous week, and 0.32 feet from the previous month. The Lake entered the Beneficial Use sub-band on March 4, 2020 and is now 0.38 feet above the Water Shortage sub-band. Lake stage moved below the ecological envelope (which varies seasonally from 12 – 15 feet NGVD +/- 0.5 feet) on October 15, 2019 and is currently 0.67 feet below the bottom of the envelope. Low water levels (lake stages below the ecological envelope) will continue to benefit recovering submerged and emergent marsh vegetation at low elevations but will reduce aquatic habitat for fish and wildlife in the marshes. Wading bird and snail kite nesting efforts are likely to be lower for the second consecutive year on the Lake due to low lake stages during the breeding season.

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	671	615	0.3
S-71 & S-72	0	0	0.0
S-84 & S-84X	185	38	0.0
Fisheating Creek	4	5	0.0
S-154	0	0	0.0
S-191	0	0	0.0
S-133 P	0	0	0.0
S-127 P	0	0	0.0
S-129 P	0	0	0.0
S-131 P	0	0	0.0
S-135 P	0	0	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	5		
Rainfall	766	321	0.2
Total	1631	978	0.5

OUTFLOWS	Previous week Avg Daily CFS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)
S-77	493	530	0.3
S-308	-15	25	0.0
S-351	407	557	0.3
S-352	94	297	0.1
S-354	287	330	0.2
L-8 Outflow		33	0.0
ET	2583	2652	1.3
Total	3850	4425	2.2

Provisional Data

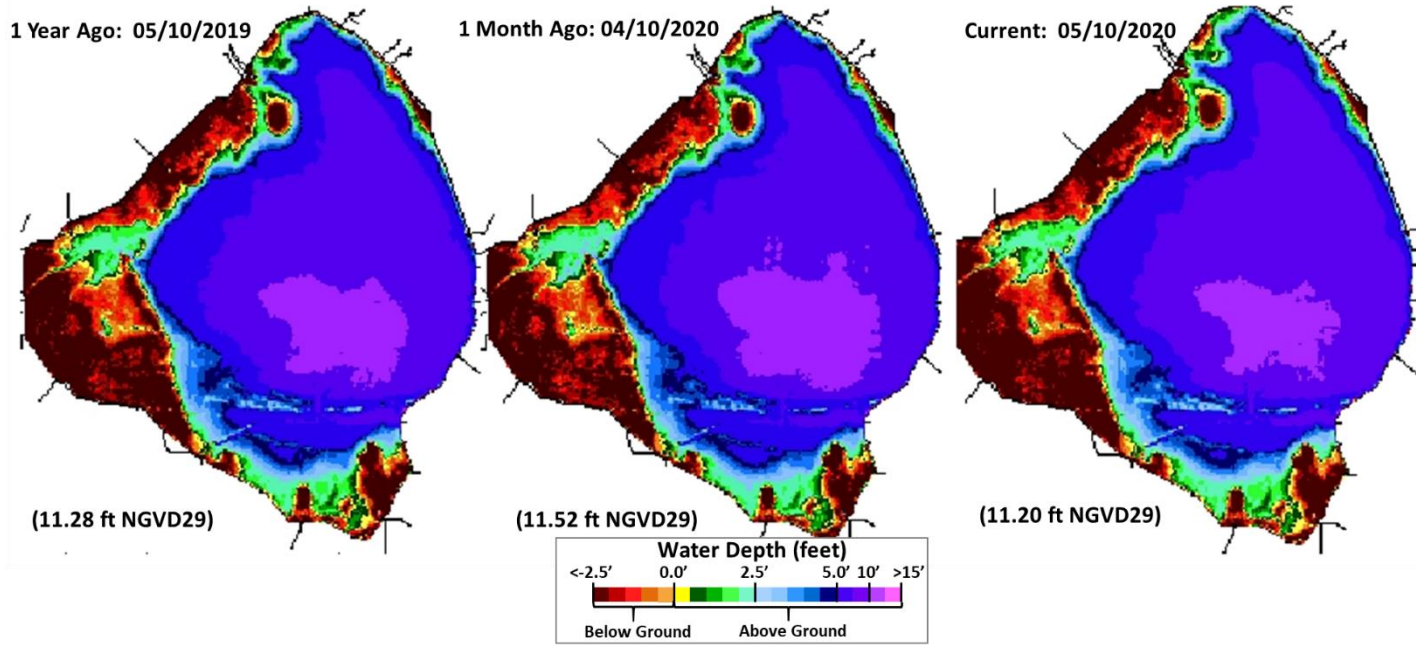


Figure 1. Water depth estimates on Lake Okeechobee based on the South Florida Water Depth Assessment Tool.

Lake Okeechobee Stage vs Updated Ecological Envelope

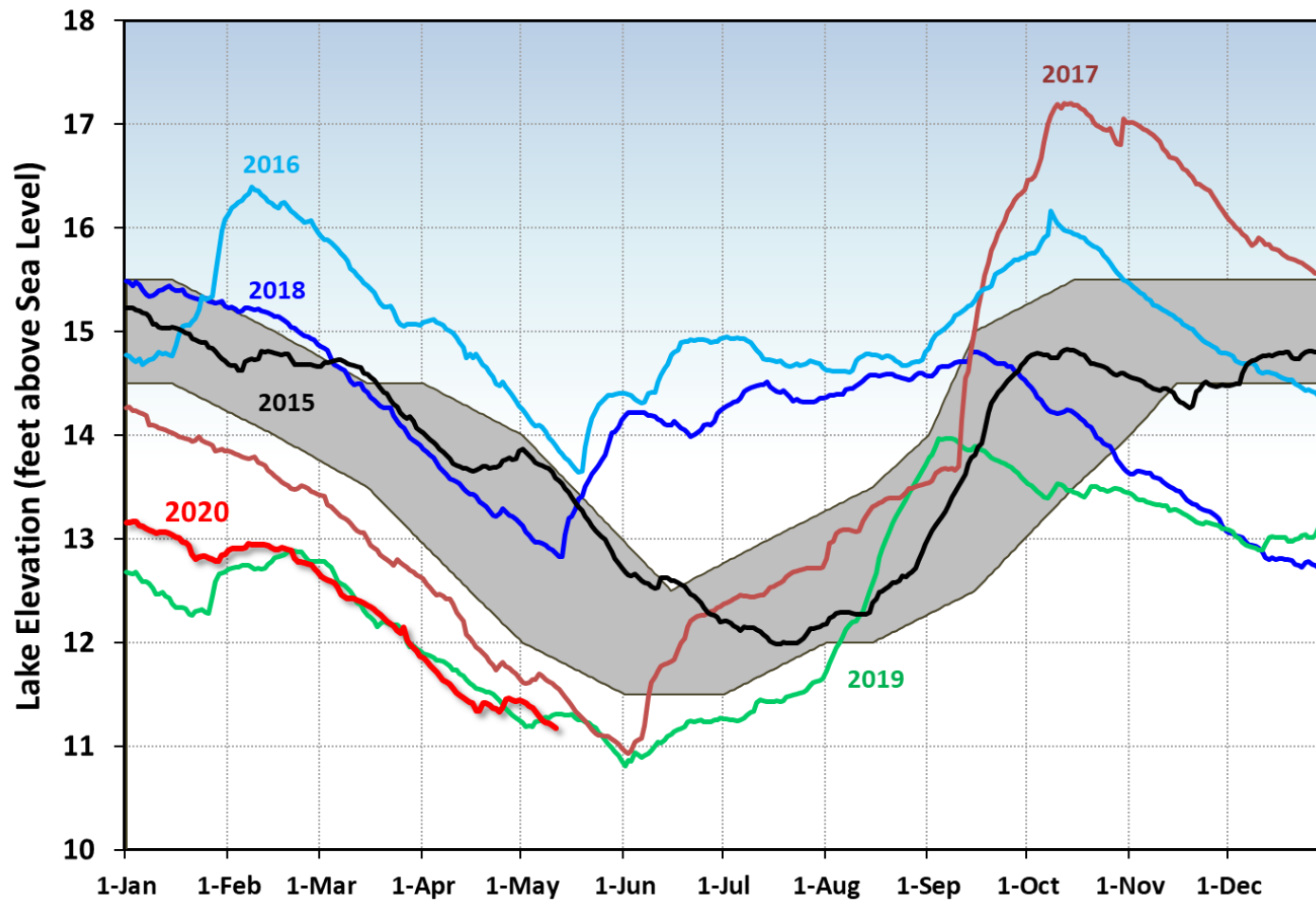


Figure 2. Select annual stage hydrographs for Lake Okeechobee in comparison to the updated Ecological Envelope.

Lake Okeechobee Water Level History and Projected Stages

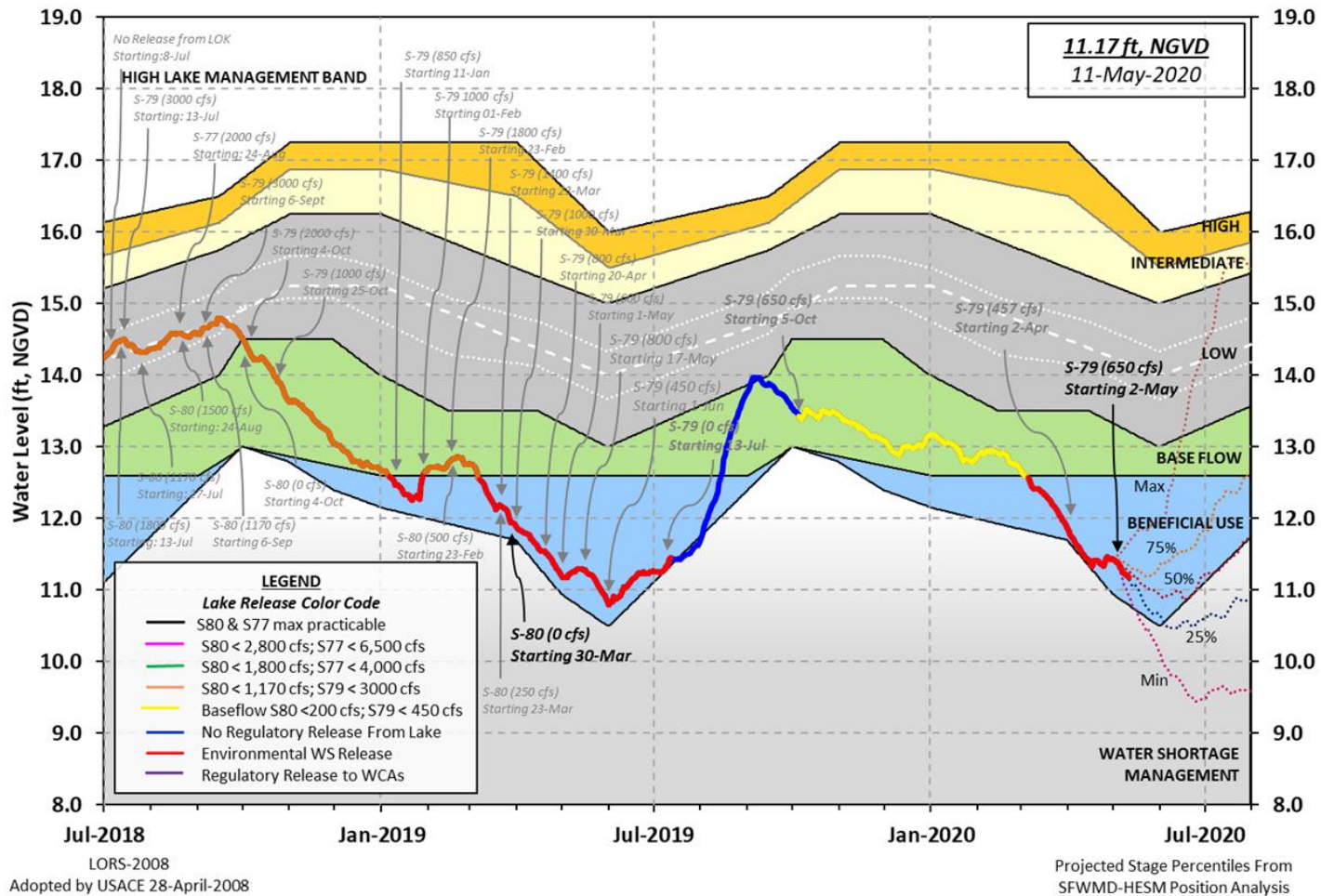


Figure 3. Recent Lake Okeechobee stage and releases, with projected stages based on a dynamic position analysis.

SFWMD PROVISIONAL RAINDAR 7-DAY RAINFALL ESTIMATES

FROM: 0415 EST, 05/05/2020 THROUGH: 0415 EST, 05/12/2020

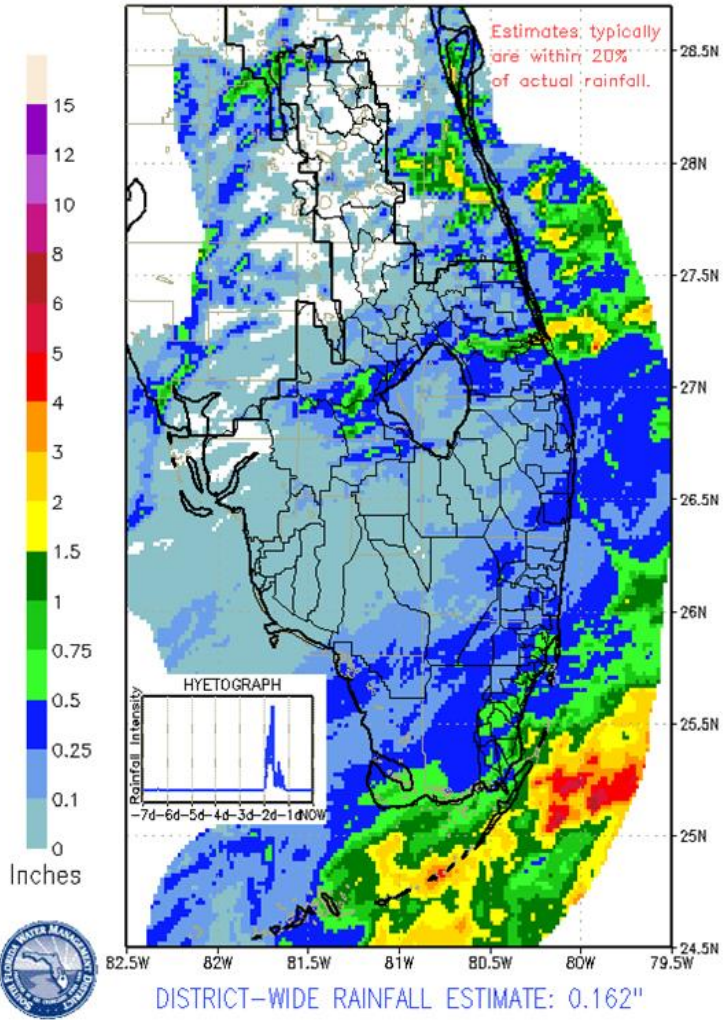


Figure 4. 7-Day rainfall estimates by RAINDAR.

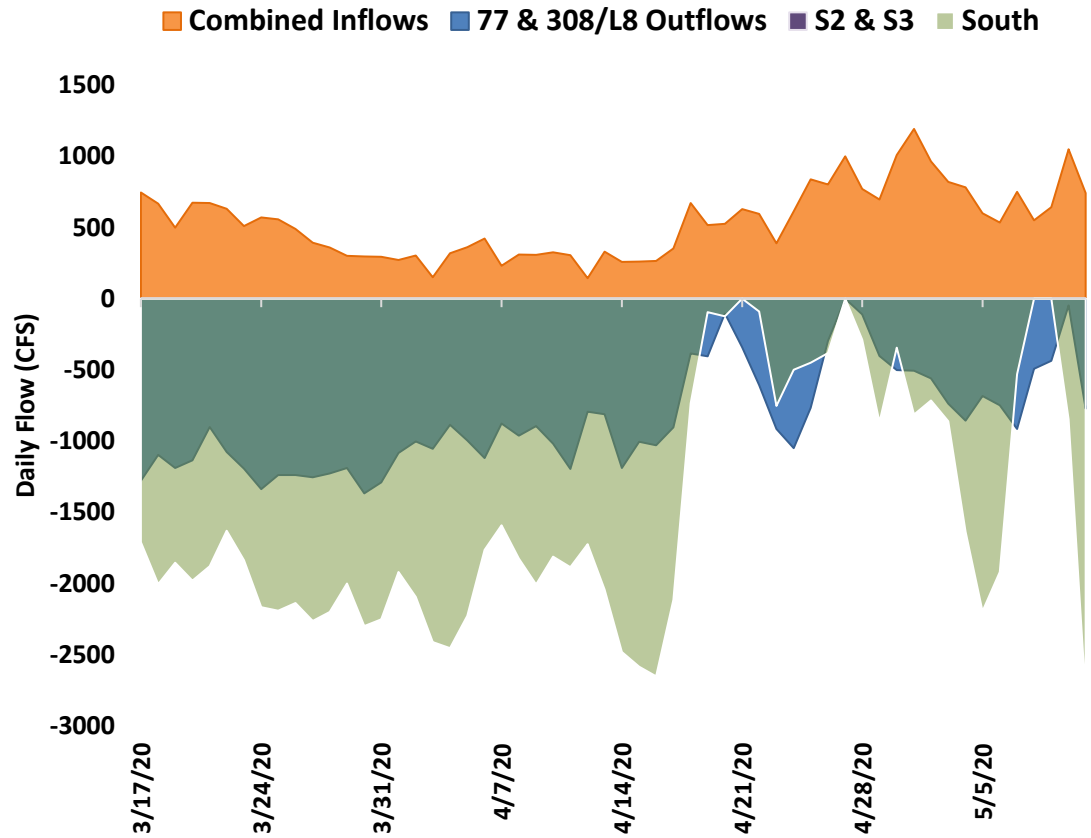


Figure 5. Major inflows (orange) and outflows (blue) of Lake Okeechobee, including the S-350 structures designated as South (green). The L-8 Canal flows through Culvert 10A are included as outflows when positive, and as inflows when backflowing into the Lake. All inflows and outflows are shown as positive 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.

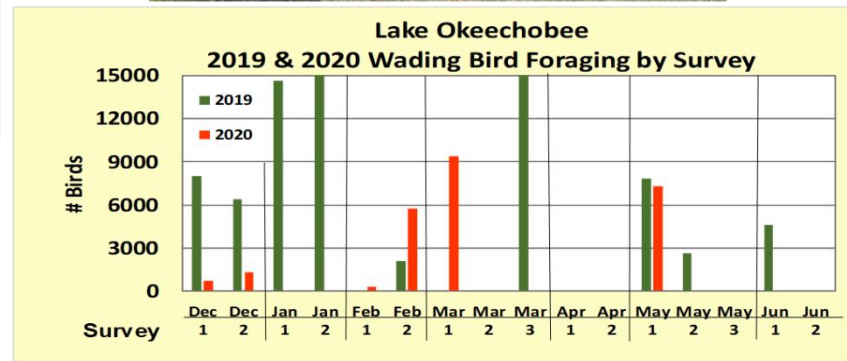
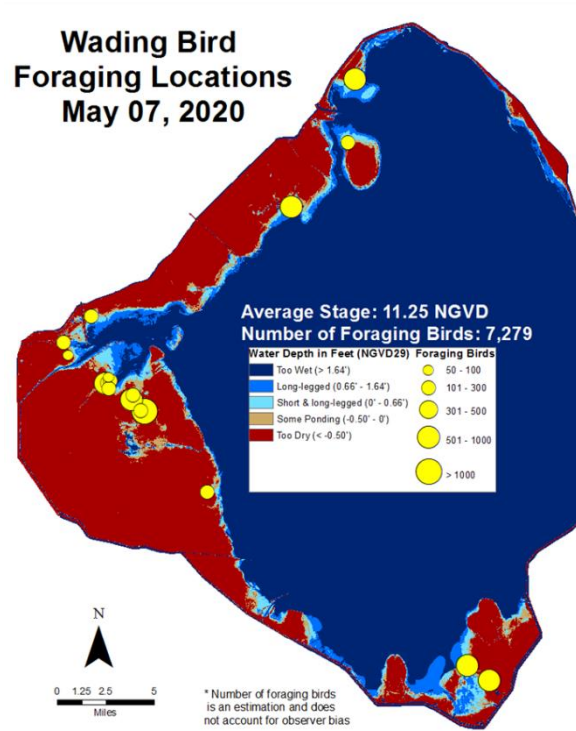


Figure 6. Results of wading bird survey flight from May 7, 2020, and comparison to previous surveys.

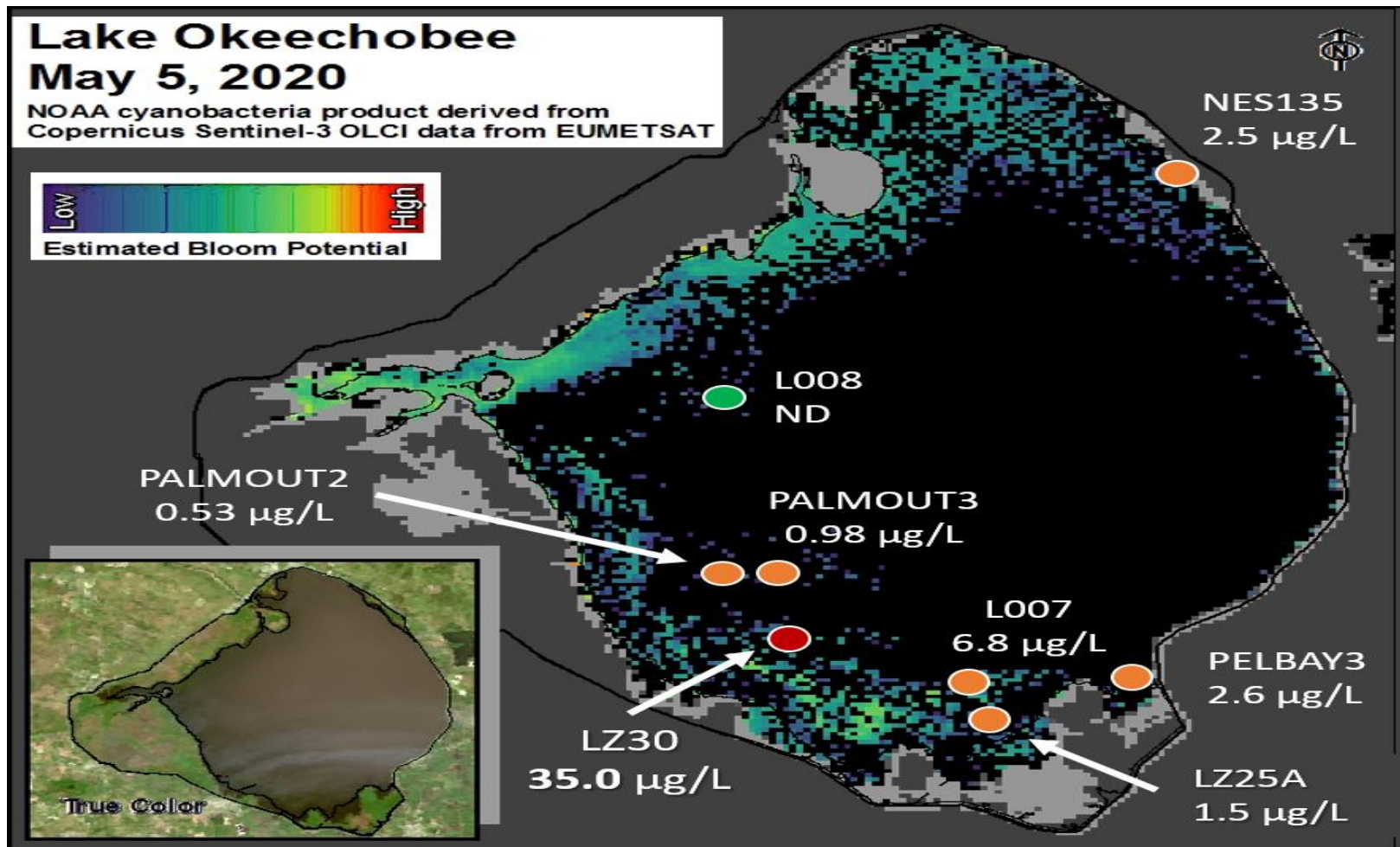


Figure 7. The potential for cyanobacterial blooms on Lake Okeechobee (based on images from NOAA's cyanobacteria product [derived from EUMETSAT's Copernicus Sentinel-3 OLCI data]) are represented by pixel colors on the black lake background. Colored circles represent algae sample locations from early May where sampling crews observed algal blooms. Station names and Microcystin concentration are denoted in white text next each station. ND means no toxin was detected (detection limit = 0.20 $\mu\text{g/L}$). Light gray color indicates cloud cover or areas too shallow to classify.

ESTUARIES

St. Lucie Estuary:

Last week total inflow to the St. Lucie Estuary averaged approximately 442 cfs (Figures 1 and 2) and last month inflow averaged about 915 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	369
S-80	0
S-308	25
S-49 on C-24	0
S-97 on C-23	0
Gordy Rd. structure on Ten Mile Creek	73

Over the past week, salinity increased throughout the estuary (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 23.9. Salinity conditions in the middle estuary are estimated to be within the good 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)	19.7 (18.5)	22.4 (20.7)	NA ¹
US1 Bridge	23.6 (22.1)	24.4 (23.0)	10.0-26.0
A1A Bridge	30.4 (29.0)	31.3 (30.2)	NA ¹

¹Envelope not applicable

Caloosahatchee Estuary:

Last week total inflow to the Caloosahatchee Estuary averaged approximately 256 cfs (Figures 5 and 6) and last month inflow averaged about 470 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	530
S-78	231
S-79	189
Tidal Basin Inflow	67

Over the past week in the estuary, surface salinity slightly decreased at S79 and remained about the same downstream (Table 4, Figures 7 & 8). The seven-day average salinity values are within the good range for adult eastern oysters at Cape Coral and in the fair range at Shell Point 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 in the fair range (10-15) 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)	2.0 (3.4)	1.7 (2.2)	NA ¹
Val I75	5.6 (5.1)	6.3 (6.1)	0.0-5.0 ²
Ft. Myers Yacht Basin	13.5 (12.5)	15.3 (16.0)	NA
Cape Coral	21.4 (21.5)	23.5 (23.2)	10.0-30.0
Shell Point	31.9 (~31)	32.0 (31.6)	10.0-30.0
Sanibel	34.1 (33.2)	34.6 (34.0)	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 4.9 to 8.1 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 55 cfs. The 30-day moving average surface salinity at Val I-75 is forecast to be between 4.9 and 6.2 (Table 5). The current salinity conditions at Val I-75 are outside of 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	55	8.1	6.2
B	300	55	7.1	5.7
C	450	55	6.6	5.5
D	650	55	5.0	5.1
E	800	55	4.9	4.9

Red tide

The Florida Fish and Wildlife Research Institute reported on May 8, 2020, that *Karenia brevis*, the Florida red tide dinoflagellate, was not observed from or offshore of Lee County or Palm Beach counties (no samples were analyzed this week from St. Lucie, Martin, or Miami-Dade counties).

Water Management Recommendations

Lake stage is in the Beneficial Use Flow sub-band. Tributary conditions are dry. The South Florida Water Management District's Lake Okeechobee Adaptive Protocol's Release Guidance suggests no release from the lake to the Caloosahatchee Estuary.

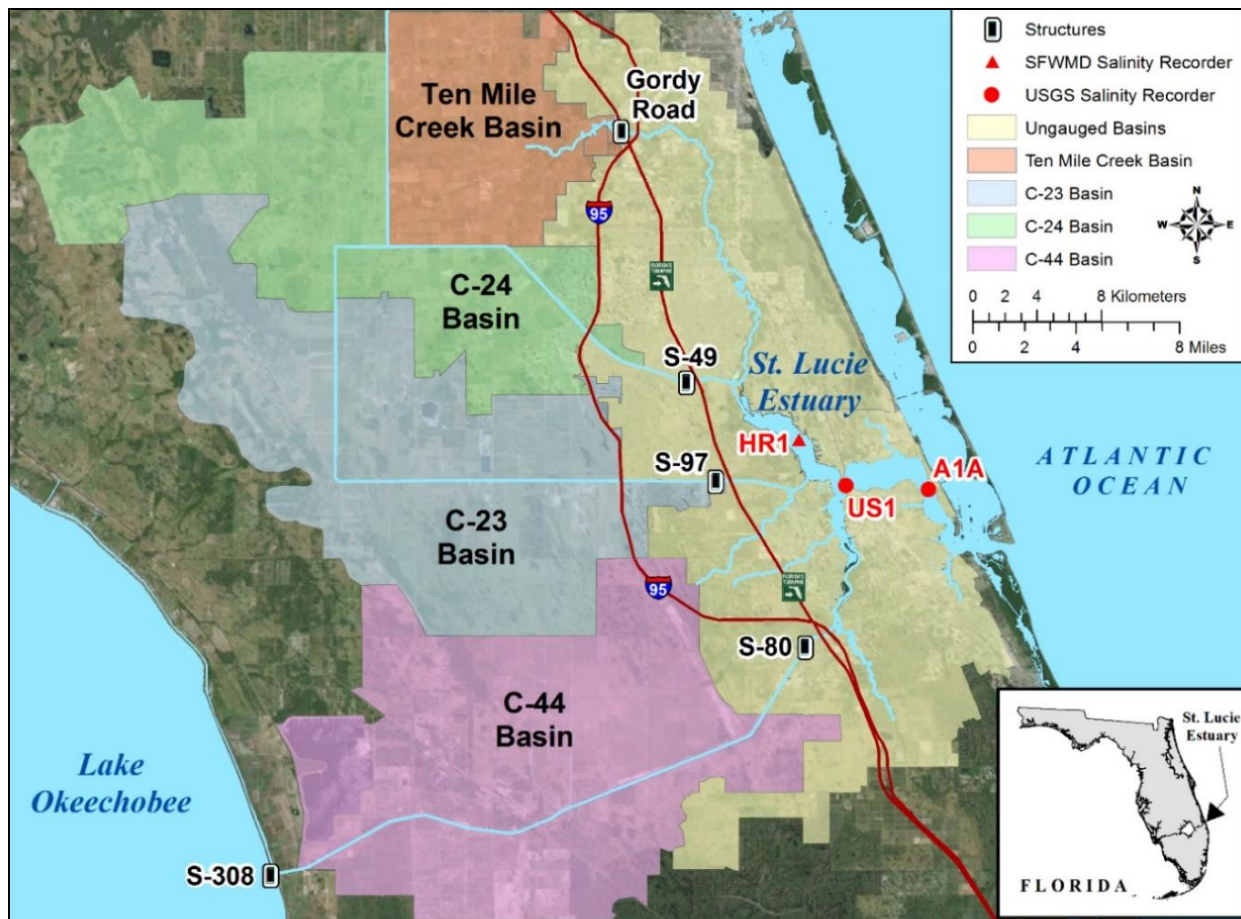


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

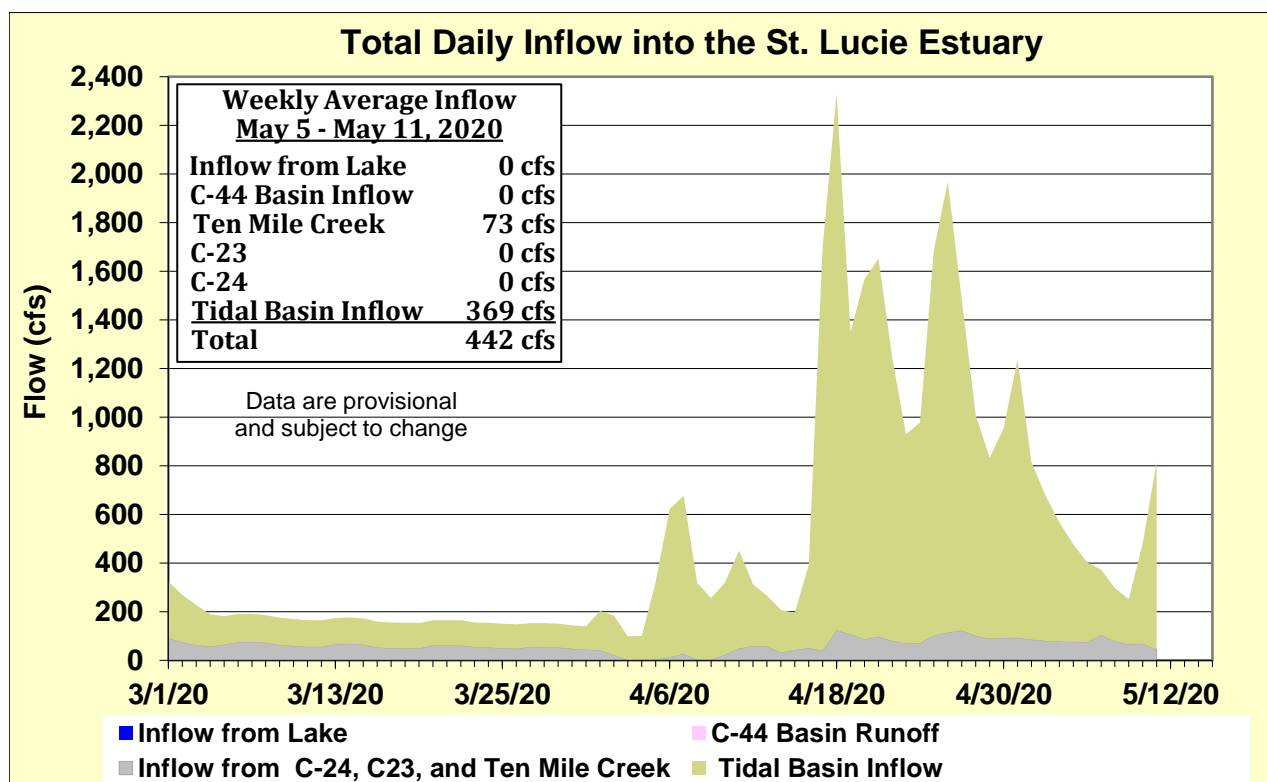


Figure 2. Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basin into the St. Lucie Estuary.

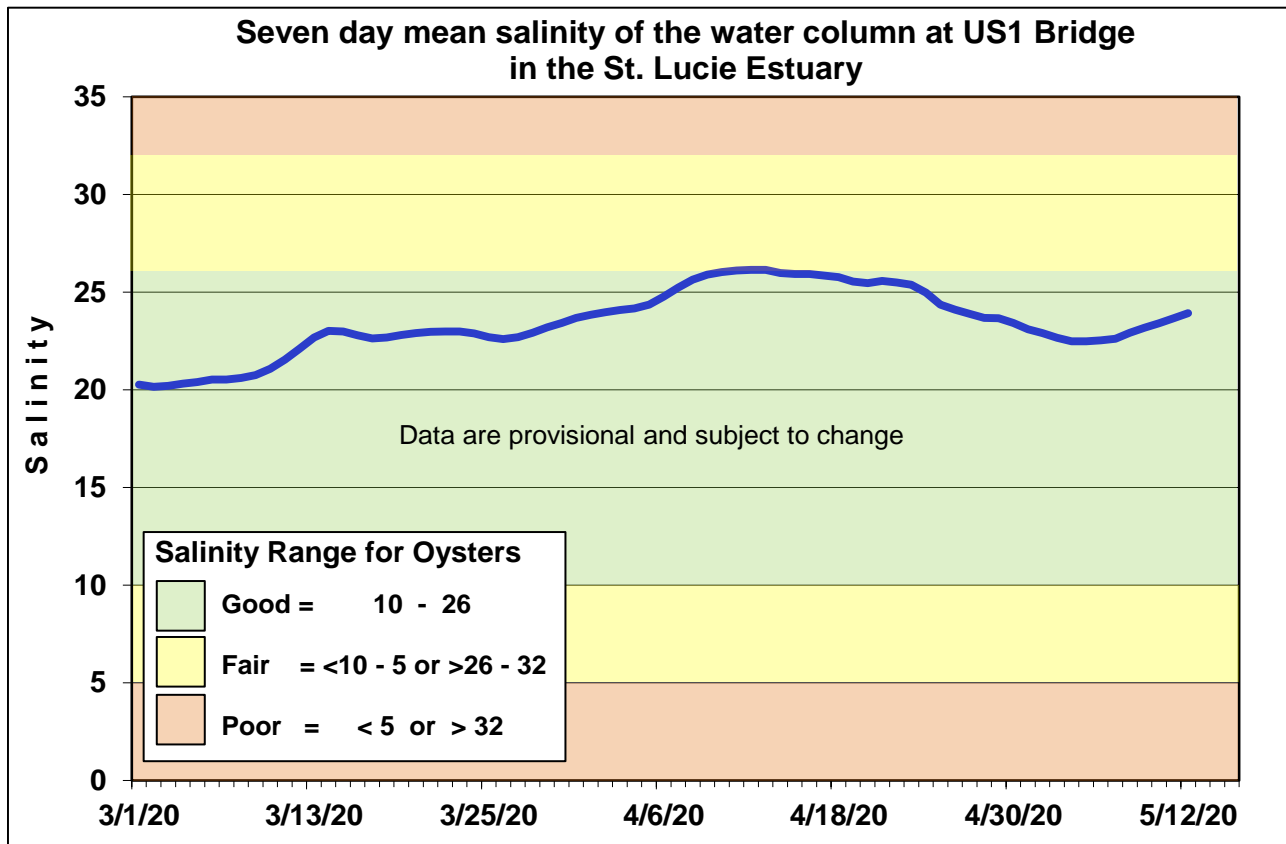


Figure 3. Seven-day mean salinity of the water column at the US1 Bridge.

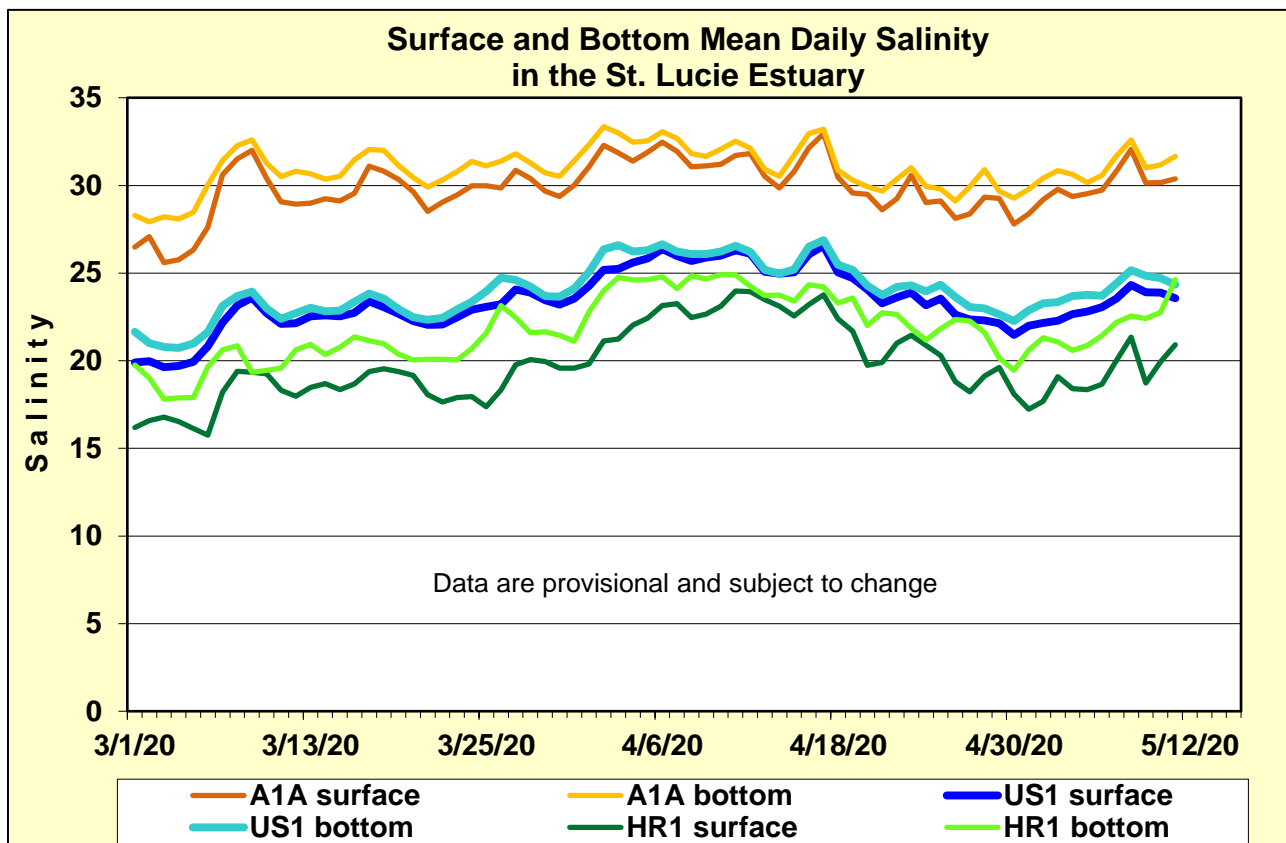


Figure 4. Daily mean salinity at the A1A, US1, and HR1 stations.

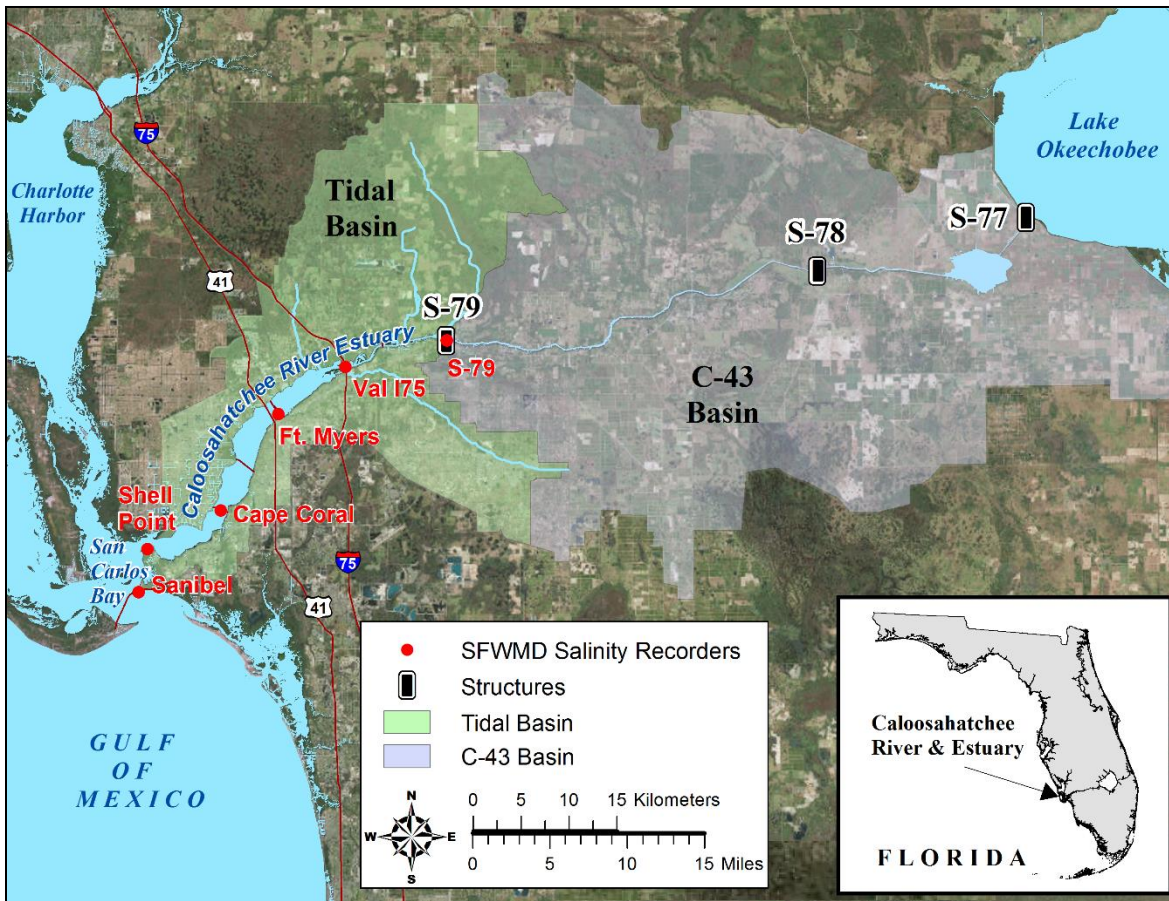


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

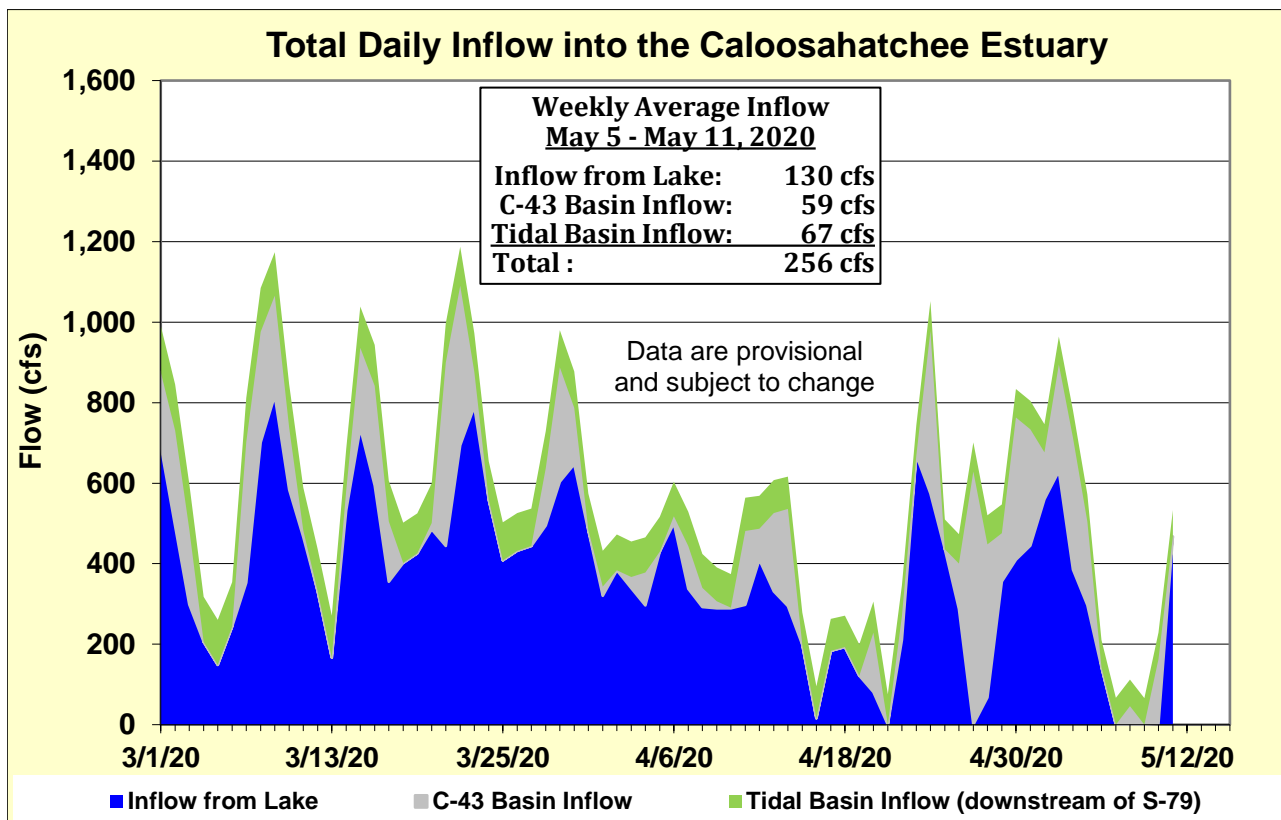


Figure 6. Total daily inflows from Lake Okeechobee, runoff from the C-43 basin

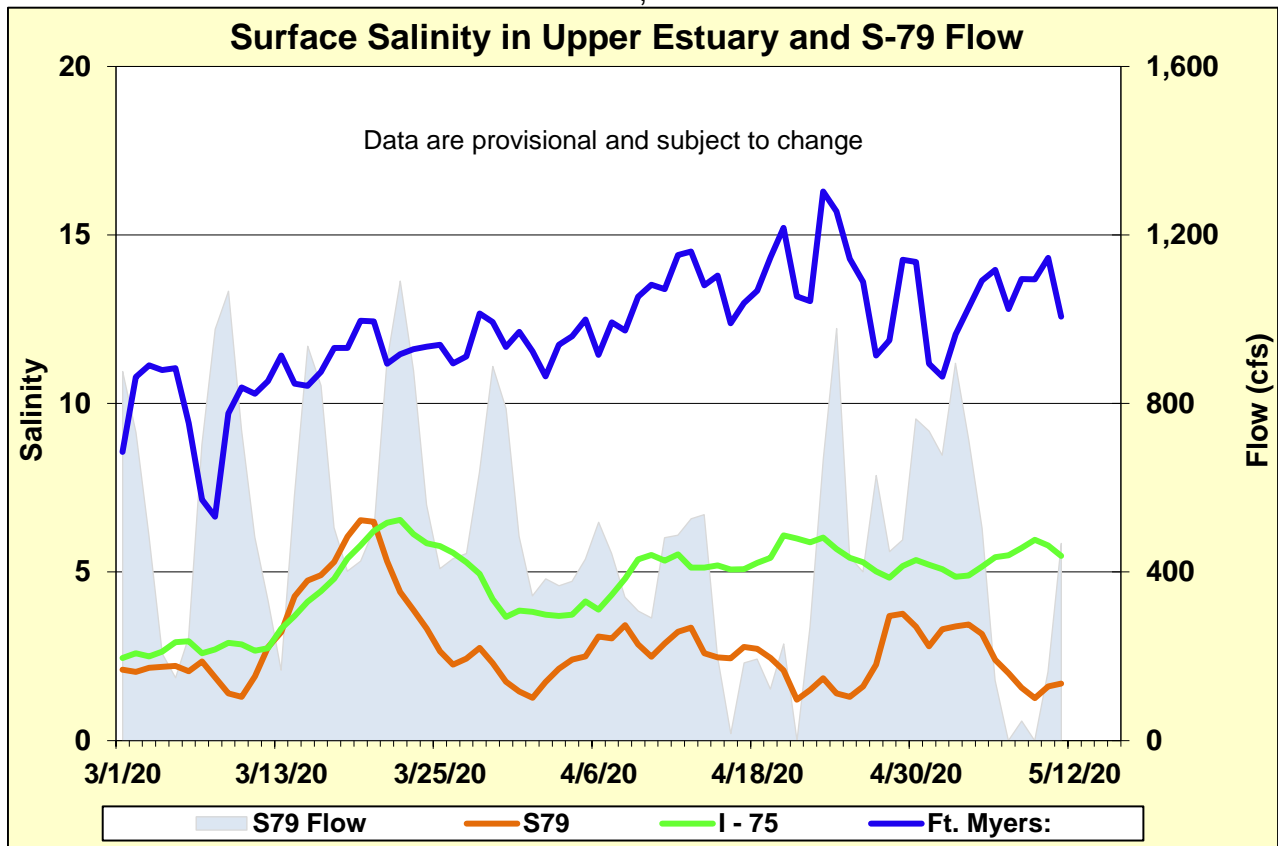


Figure 7. Daily mean flows at S-79 and salinity at upper estuary monitoring stations.

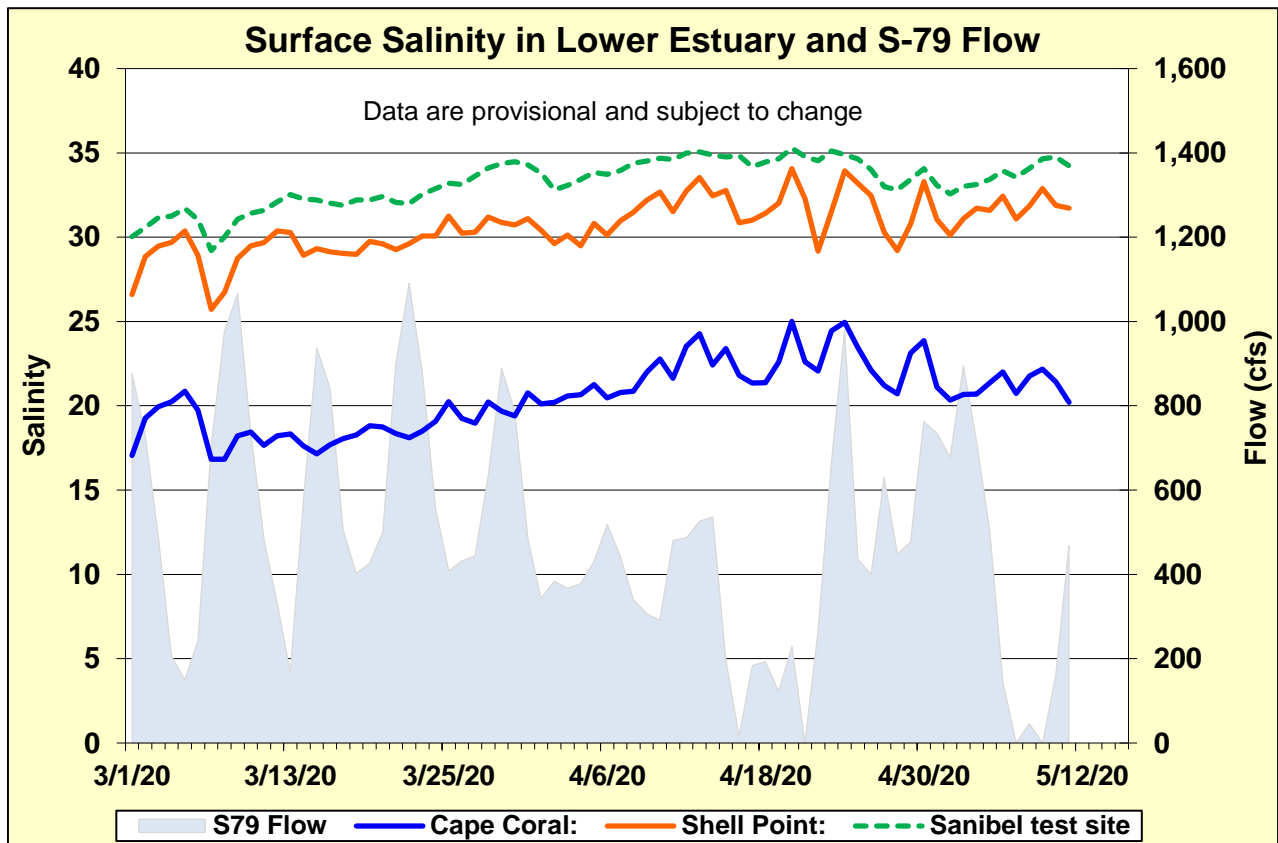


Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.

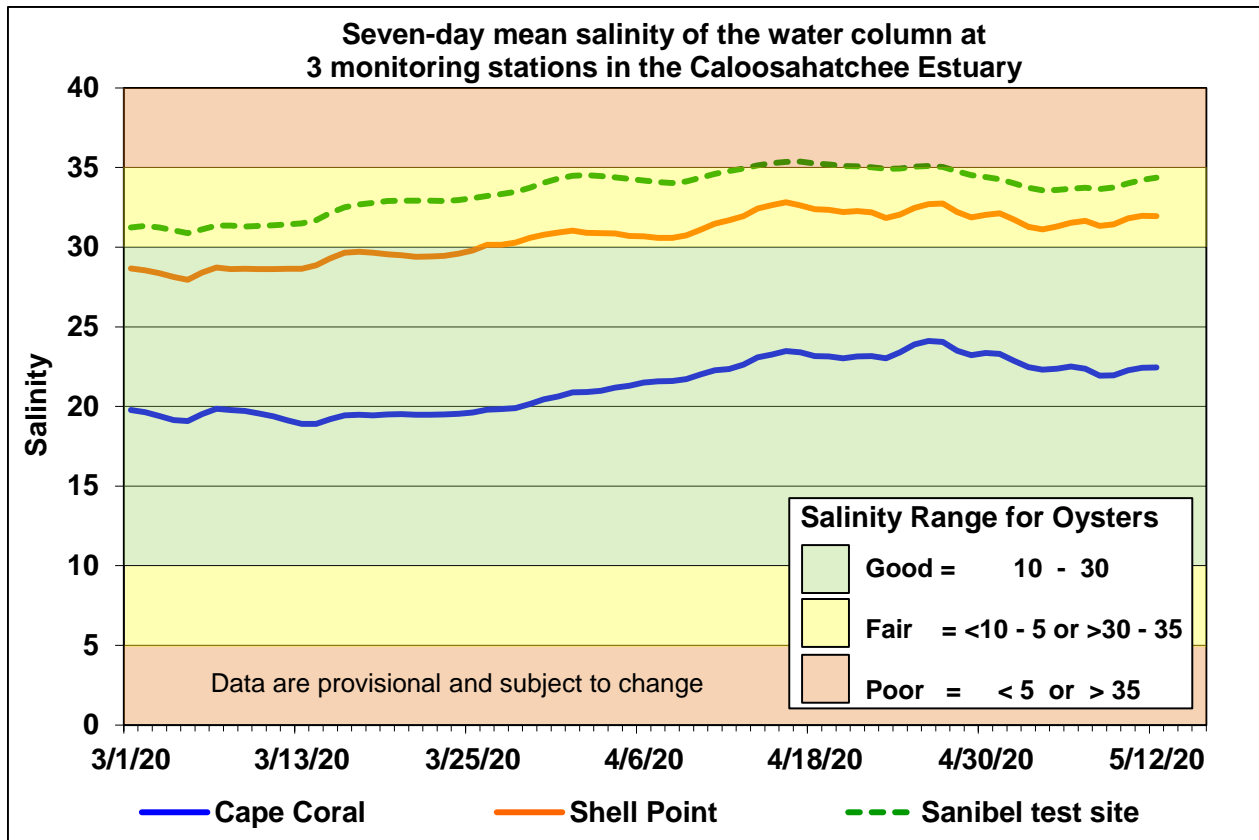


Figure 9. Seven-day mean salinity at Cape Coral, Shell Point, and Sanibel monitoring stations.

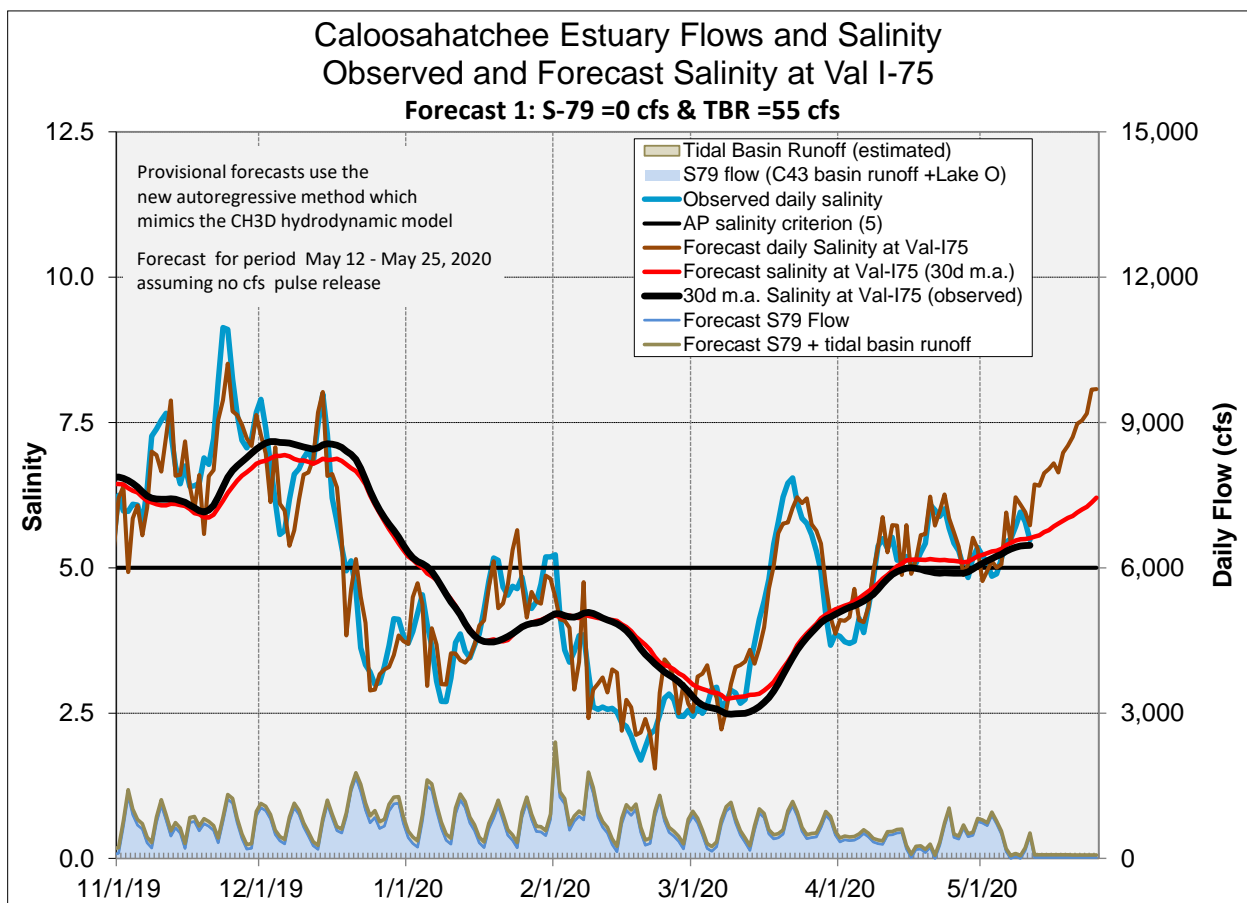

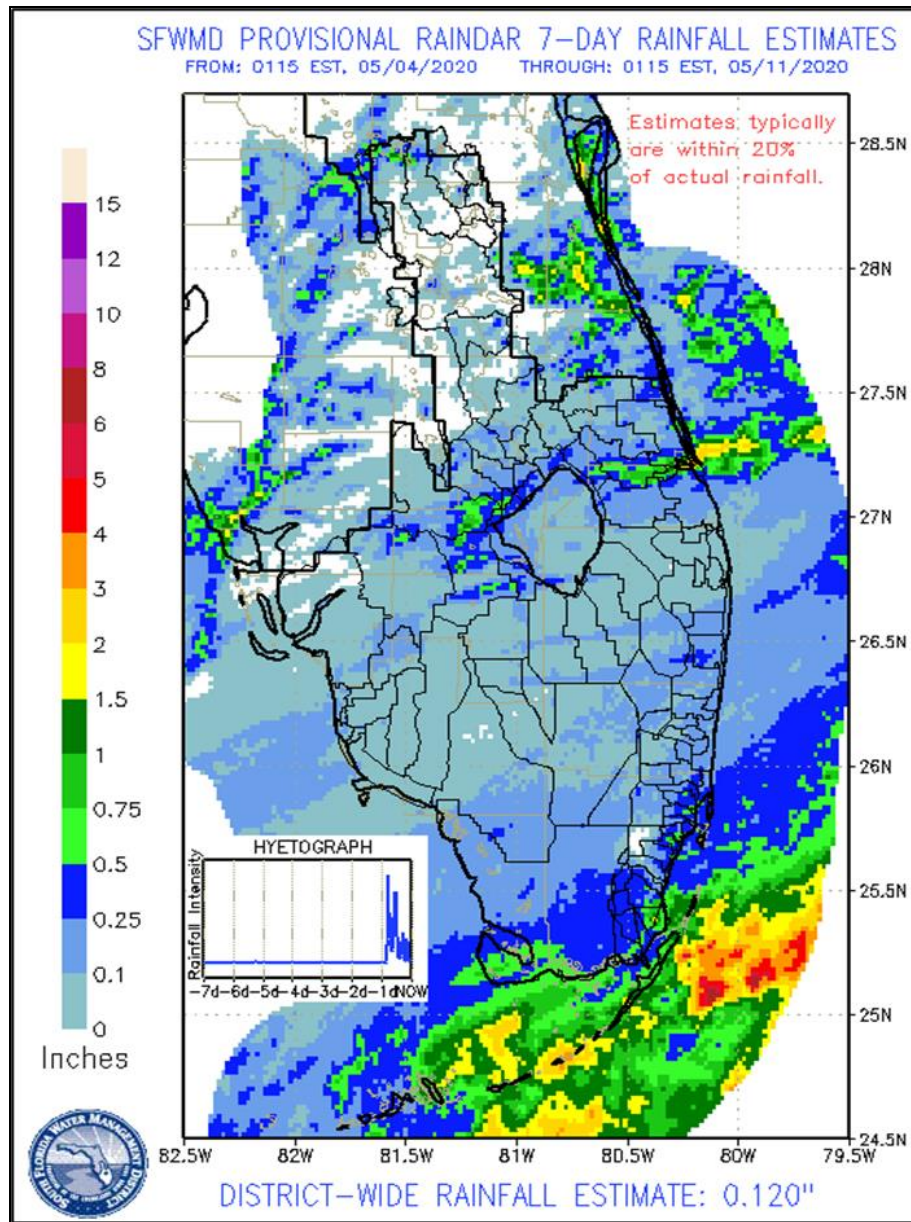


Figure 10. Forecasted Val I-75 surface salinity assuming no pulse release at S-79.

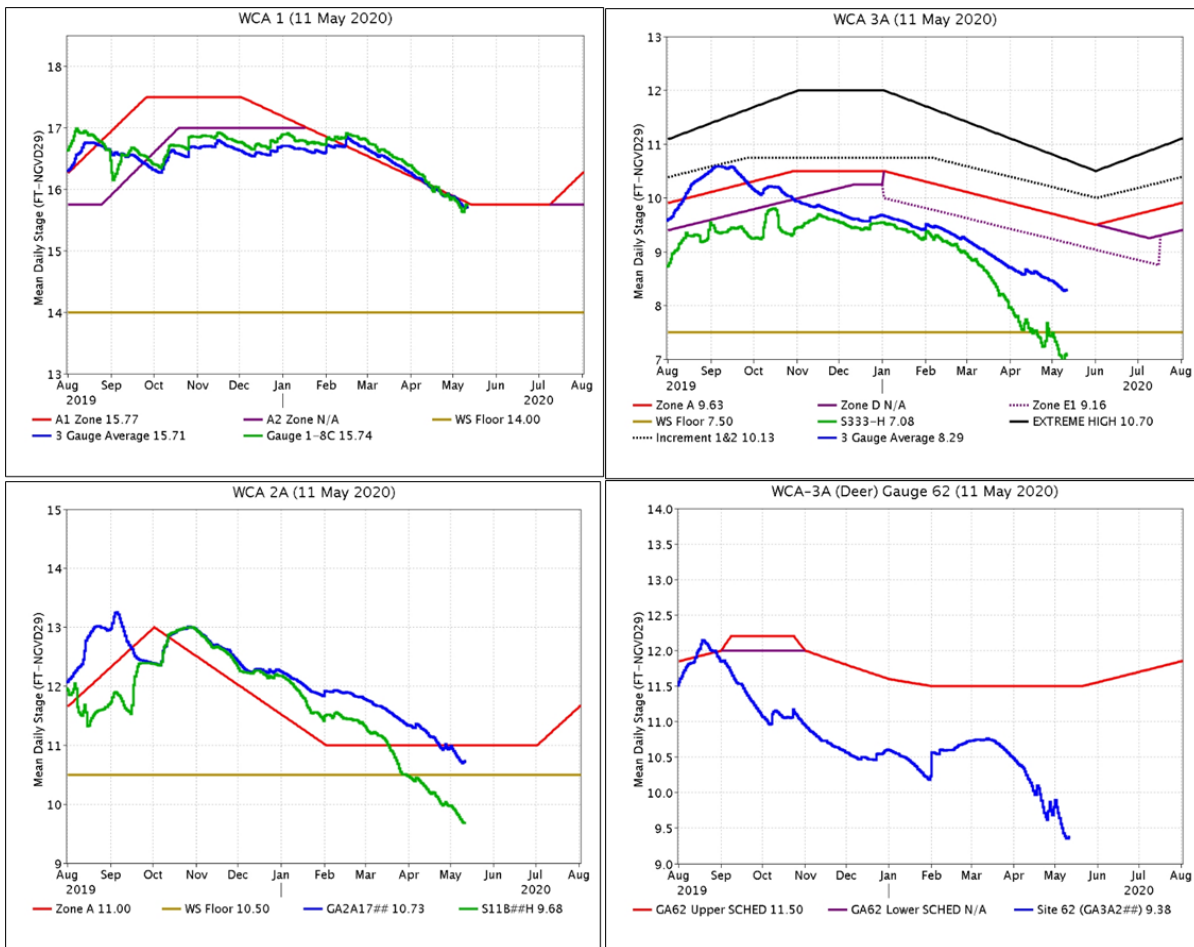
EVERGLADES

Below average rainfall was recorded across the Everglades last week, with WCA-3A receiving the least. At the gauges monitored for this report stages fell on average 0.15 feet last week almost equal to the week prior and changes ranged from -0.36 to -0.03. Evaporation was estimated at 2.17 inches last week a significant increase from the week prior.

Everglades Region	Rainfall (Inches)	Stage Change (feet)	
WCA-1	0.13	-0.11	
WCA-2A	0.13	-0.13	
WCA-2B	0.12	-0.23	
WCA-3A	0.09	-0.15	
WCA-3B	0.13	-0.18	
ENP	0.29	-0.03	



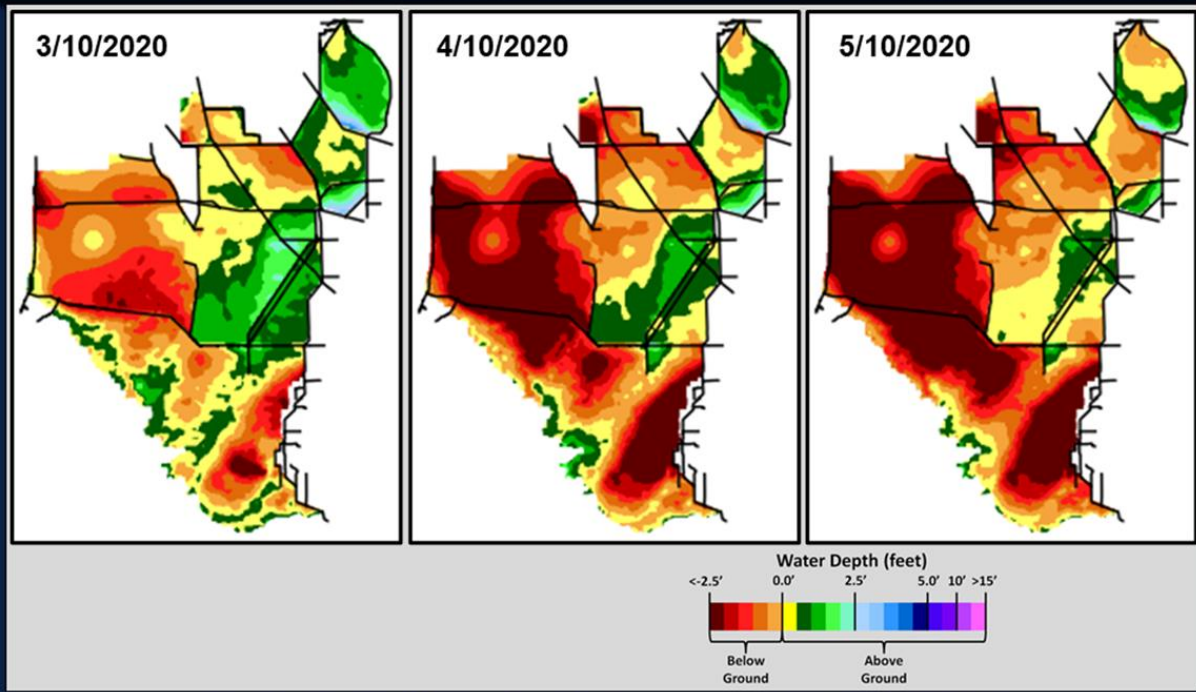
Regulation Schedules: WCA-1: Stage at the 1-8C Gauge continues to trend parallel to the falling regulation line last week, remaining 0.03 feet below the Zone A1 line. WCA-2A: Stage at Gauge S11-B remained below the water supply floor of the regulation schedule last week and trends downward, currently 0.82 feet below. WCA-3A: The Three Gauge Average stage trends away from regulation last week, still well below the falling Zone E1 regulation line, presently 0.87 feet below. S333-Hw is 0.42' below the water supply floor. WCA-3A at gauge 62 (Northwest corner): Stage fell last week and remains below the Upper Schedule at 2.12 feet below the stable regulation line.



Water Depths: The WDAT tool for spatial interpolation of depth monthly snapshots indicate depths significantly below ground across WCA-3A North, and up to 1.5 feet below in the extreme northeast (for more than 2 months) and up to 2.5 feet below in the northwest regions (much drier than two months ago). Much of WCA3A-South is now also at or near ground surface in stage. Most of WCA-2A has dried down to ground surface, with the northern area of cattail expansion along the L39 and south now significantly below ground. WCA-1 depths remain stable and drawing down from north to south. All the sloughs in ENP have all dried down to ground surface or near. Comparing WDAT water levels from present, over the last month there was a significant recession in portions of all the WCAs, the fastest drop taking place in northwestern WCA-3A, northeastern WCA-1 and southeastern WCA-2A. Looking back one year the stage difference patterns are more dramatic. The entirety of WCA-3A and 2A are significantly lower in stage. WCA-2A is most dramatically lower in stage in the northeastern regions of that basin and WCA-3A in the northwest. WCA-1 stages are significantly lower than they were a year ago, particularly in the north. The WDAT model indicates a much drier condition in the western basins compared to a month and a year ago.



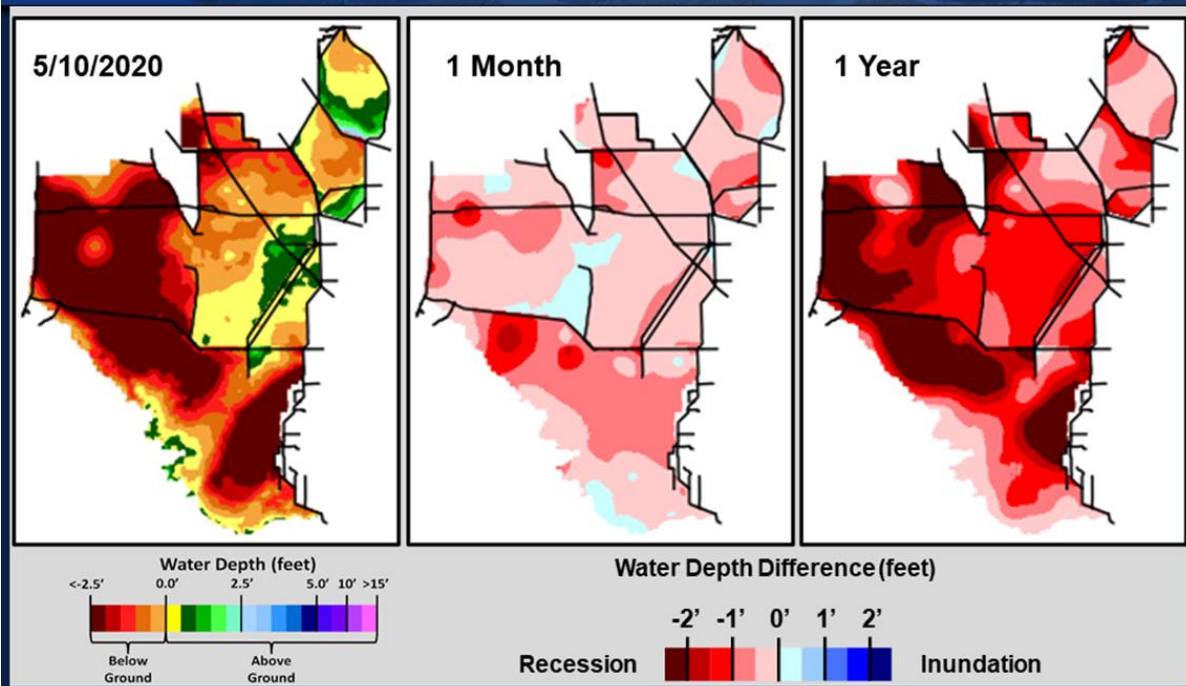
SFWDAT Water Depth Monthly Snapshots



South Florida Water Depth Assessment Tool (SFWDAT)

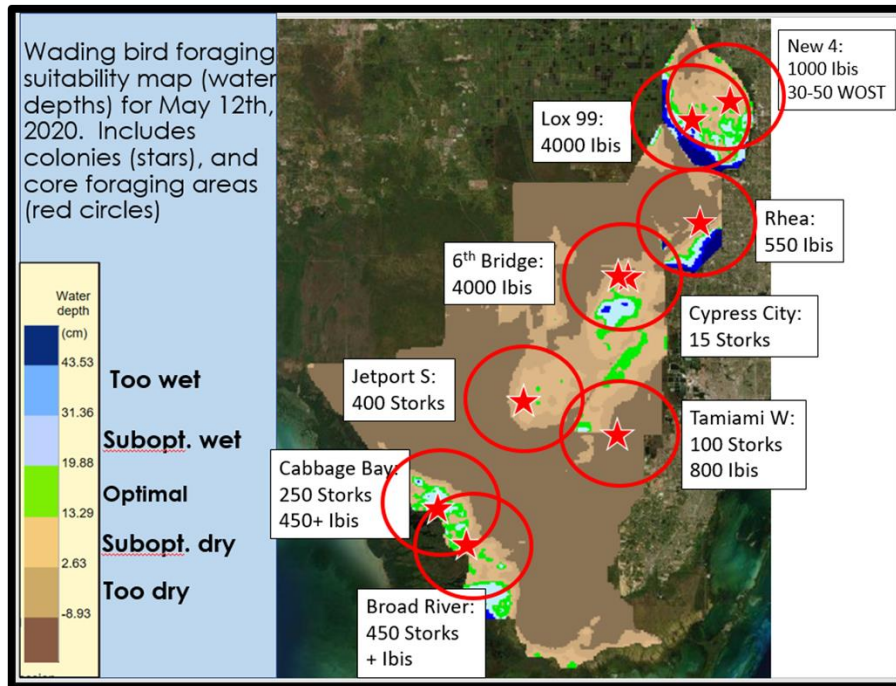


SFWDAT Everglades Difference Maps (Present - Past)

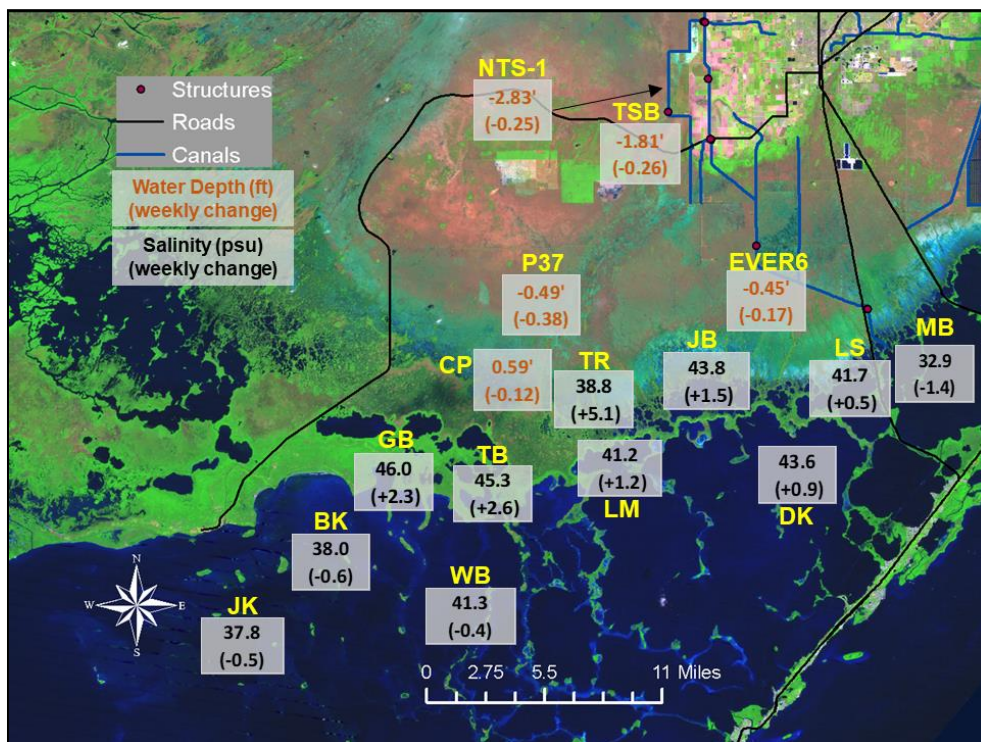


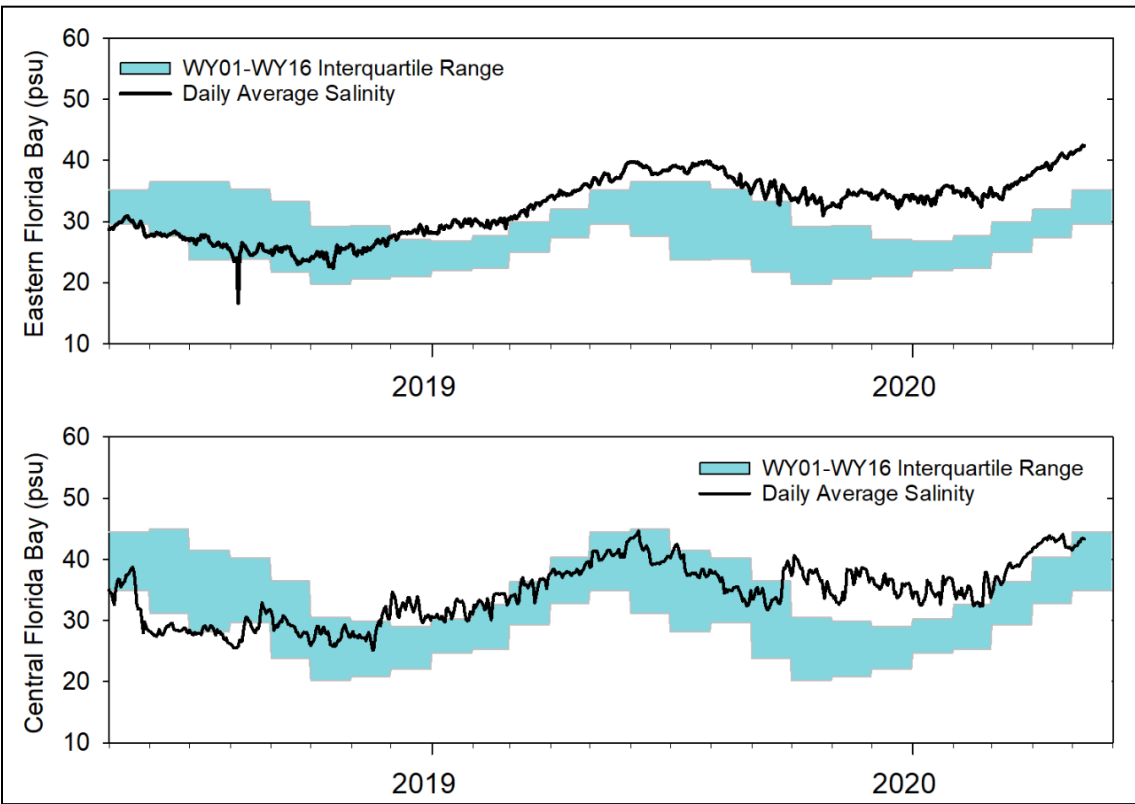
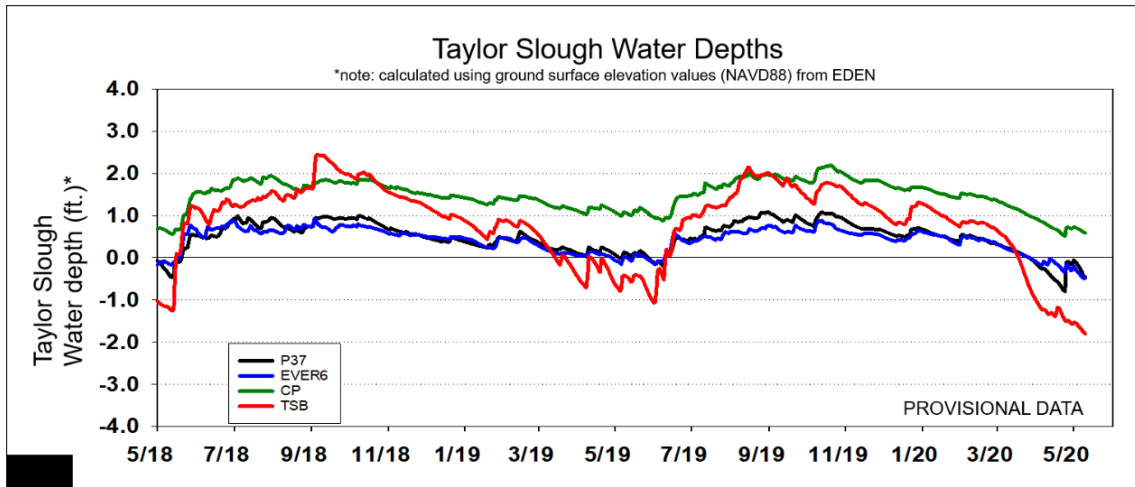
South Florida Water Depth Assessment Tool (SFWDAT)

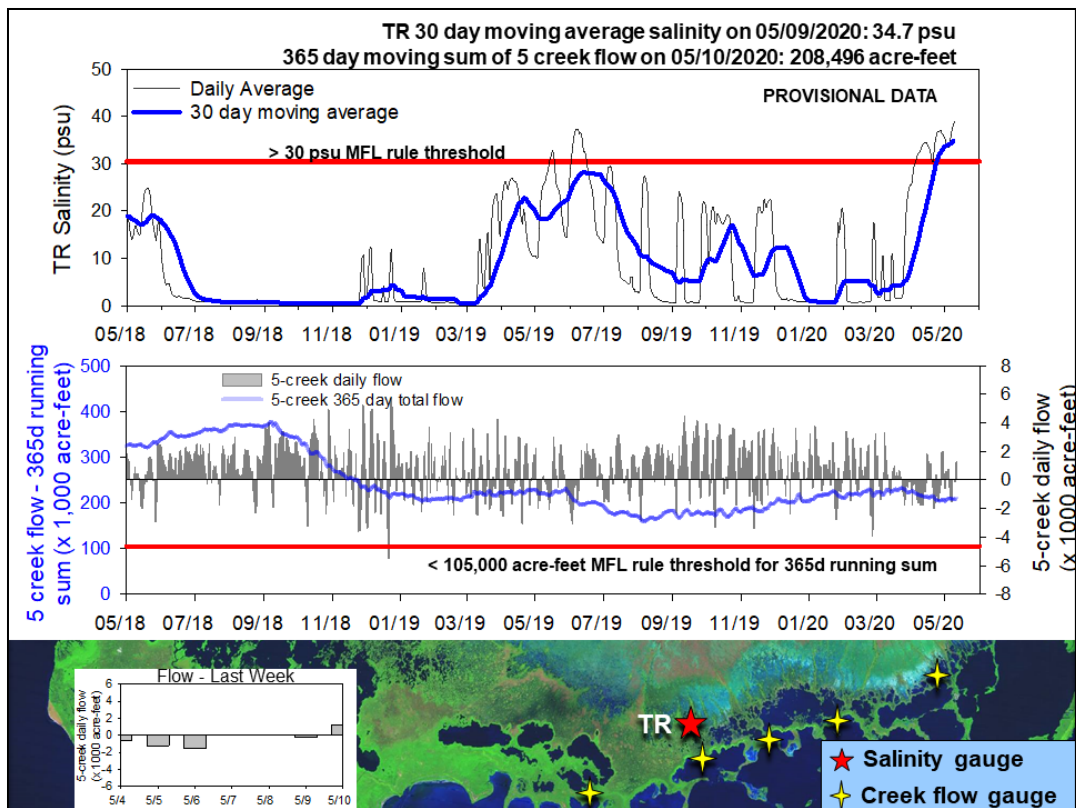
Wildlife: Wading birds HSI and core foraging areas, May 12



Taylor Slough Water Levels: An average of 0.54 inches of rain fell over Taylor Slough and Florida Bay on Sunday while stage decreased an average of 0.24 feet over the past week. Northernmost Taylor Slough is 17 inches below the historical average, and the water depth is more than 2 feet below ground. In order to get flows to Florida Bay this wet season, water deliveries will have to first fill these areas (the sponge effect).







Florida Bay Salinities: Average salinity in Florida Bay increased 0.8 psu this week. Florida Bay average salinity is still 5 psu higher than the historical average for this time of year. Central Florida Bay salinities had decreased slightly and are beneath the 75th percentile now because historical May salinities have a wider range. Continued increases are expected without heavy rainfall in the near future.

Florida Bay MFL: Salinity at the TR station in the mangrove zone (tracked for the Florida Bay MFL) increased from 34 psu to 39 over the last week. This is in the upper 3 percent of historical values. The 30-day moving average increased 0.9 psu to end at 34.7 psu. Weekly flow from the 5 creeks identified by yellow stars on the map totaled about -2,400 acre-feet last week with positive flows only on Sunday. The 365-day moving sum of flow from the five creeks (tracked as part of the Florida Bay MFL criteria) increased 170 acre-feet this week to end at 208,496 acre-feet, between the 25th percentile (192,885 acre-feet) and the median (249,091 acre-feet). Creek flow are provisional USGS data.

Water Management Recommendations

Discharges into historically over drained northern WCA-3A have the potential to maintain saturated soils and protect these over-drained portions of the Everglades. The ecological benefits include conserving peat and lowering the risk of muck fires especially as depths near the seasonal low in regions with muck fire potential. While the moderation of recession rates in any part of WCA-3A North are beneficial, available water sent through the S-150 into Northeastern WCA-3A would have greater ecological value than the same amount of water discharged in Northwestern 3A. This is due in part to the greater potential for muck fire in the northeastern region versus the northwestern regions of that basin. Water management undertaken to minimize a reversal (trying to keep the rise in stage less than .2 feet per week) that would negatively impact the core wading bird foraging areas in WCA-3A South and WCA-1 would have ecological benefit. 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, May 12th, 2020 (red is new)

Area	Weekly change	Recommendation	Reasons
WCA-1	Stage decreased by 0.11'	Moderating the recession rate and conserving water in this basin has ecological benefit.	Protect downstream habitat and wildlife. Provide wading bird foraging opportunities as wading bird nesting continues in this basin.
WCA-2A	Stage decreased by 0.13'	Moderating the recession rate and conserving water in this basin has ecological benefit.	Protect upstream/downstream habitat and wildlife. Provide wading bird foraging opportunities as wading bird nesting continues in this basin.
WCA-2B	Stage decreased by 0.23'	Moderating the recession rate and conserving water in this basin has ecological benefit.	Protect upstream/downstream habitat and wildlife. Provide wading bird foraging opportunities as wading bird nesting continues nearby this basin.
WCA-3A NE	Stage decreased by 0.03'	Conserving water and slowing the recession in this basin has ecological benefit as current water depths are well below seasonal averages. Inflows to this region have ecological benefit.	Protect and conserve peat soils, prevent muck fires.
WCA-3A NW	Stage decreased by 0.28'	Conserving water and slowing the recession in this basin has ecological benefit as current water depths. Inflows to this region have ecological benefit.	
Central WCA-3A S	Stage decreased by 0.15'	Conserving water and slowing the recession in this region has ecological benefit as current water depths are below seasonal averages. Inflows to this region have great ecological benefit.	Protect upstream/downstream habitat and wildlife. Protect wading bird foraging as nesting continues.
Southern WCA-3A S	Stage decreased by 0.12'		
WCA-3B	Stage decreased by 0.18'	Conserving water in this basin has benefit.	Protect tree islands, upstream/downstream habitat and wildlife.
ENP-SRS	Stage decreased 0.03'	Make discharges to the Park according to the 2012 WCP rainfall plan	Protect upstream/downstream habitat and wildlife.
Taylor Slough	Stage changes ranged from -0.38' to -0.12'	Move water southward as possible	When available, provide freshwater buffer for downstream conditions.
FB- Salinity	Salinity changes ranged -0.6 to +2.6 psu	Move water southward as possible	When available, provide freshwater to maintain low salinity buffer and promote water movement.