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M E M O R A N D U M

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

FROM: SFWMD Staff Environmental Advisory Team

DATE: August 5, 2020

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

Active thunderstorm days are expected today through Thursday. Tropical Storm Isaias will move through the northeastern US today, but a trailing trough extends across central Florida, and it will help generate an active thunderstorm day across the District today. A deepening trough over the eastern US is digging into the Gulf of Mexico, and it is expected to shift to the eastern Gulf Wednesday and Thursday. This trough is forecast to pull moisture northward from a tropical wave passing to the south of the District and help thunderstorms develop near the south and southeastern coasts tonight and then over the District during the days Wednesday and Thursday. The trough should then lift out of the area Friday and upper level high pressure is forecast to build over the area, so expect moisture and daily thunderstorm coverage to decrease Friday and Saturday. A developing upper level low in the northeast Gulf of Mexico has the potential to increase daily thunderstorm coverage a bit Sunday. Rainfall is forecast to be near the historical average for the first 7-day period (Week 1) as well as the second 7-day period (Week 2).

Kissimmee

Tuesday morning stages were 55.7 feet NGVD (0.8 feet below schedule) in East Lake Toho, 53.3 feet NGVD (0.2 feet above schedule) in Toho, and 51.0 feet NGVD (at schedule) in Kissimmee-Cypress-Hatchineha; headwater stages were 46.2 feet NGVD at S-65A and 27.5 feet NGVD at S-65D. Tuesday morning discharges were 2,180 cfs at S-65, 2,870 cfs at S-65A, 5,160 cfs at S-65D and 5,250 cfs at S-65E. Dissolved oxygen concentration in the Kissimmee River averaged 0.4 mg/L for the week through Sunday, well below the critical threshold of 1 mg/L. Kissimmee River mean floodplain depth on Sunday was 2.9 feet. Today's recommendation is to continue to manage S-65 / S65A discharge to reduce stage rise in lakes Kissimmee, Cypress and Hatchineha while considering effects on dissolved oxygen in the Kissimmee River. The wet season recommendation is to 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 foot per 30 days from June 1- August 15. To the extent possible, attempt to control the ascension rate in lakes Toho, Kissimmee, Cypress and Hatchineha to less than 0.5 feet per 14 days during the same June 1 – August 15 timeframe.

Lake Okeechobee

Lake Okeechobee stage was 13.33 feet NGVD on August 3, 2020, 0.32 feet higher than the previous week and 1.08 feet higher than the previous month. The Lake is in the Base Flow sub-band. Lake stage moved into the ecological envelope (which varies seasonally from 12 – 15 feet NGVD +/- 0.5 feet) on June 2, 2020, after being up to 1.5 feet below since October 15, 2019 but is now hovering around the top of envelope. Ascension rates were high in early June, slowed and remained stable through the beginning of July, providing submerged plant communities an opportunity to catch up with rising stages

but have been increasing over the past three weeks. The cyanobacteria bloom risk potential increased from last week, especially in the central and southwestern areas of the Lake. Tropical Storm Isaias had little to no direct impacts on the Lake.

Estuaries

Total inflow to the St. Lucie Estuary averaged 2,415 cfs over the past week with no flow coming from Lake Okeechobee. The seven-day average salinities decreased in the estuary over the past week. Salinity at the US1 Bridge is in the fair range for adult eastern oysters.

Total inflow to the Caloosahatchee Estuary averaged 2,082 cfs over the past week with no flow coming from the Lake. The seven-day average salinity decreased in 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 (10-30) for adult eastern oysters at Cape Coral and Shell Point and in the fair range at Sanibel.

Lake stage is in the Base Flow sub-band of 2008 LORS. Tributary hydrological conditions are very wet. The LORS2008 Release Guidance suggests up to 450 cfs release at S-79 to the Caloosahatchee Estuary and up to 200 cfs release at S-80 to the St. Lucie 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 11,100 ac-feet. The total amount of inflows to the STAs in WY2021 is approximately 518,000 ac-feet. Most STA cells are near or above target stage, while the EAV cells of STA-3/4 are considerably above target stage. 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-ways 3 and 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

All the WCAs are above regulation but depths are increasing at an ecologically favorable rate and following the rising trend of the schedules. Stages at the “Deer Gauge” in northwestern WCA-3A are above the Upper Schedule, and the two-gauge average in WCA-3A North is 0.04 feet below the FFWC closure stage. 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. All of the Everglades fell below the maximum ascension rates over the past two weeks. Florida Bay and Taylor Slough received below average rainfall, and stages decreased on average in the slough. In Florida Bay, nearshore salinity fell while bay sites increased. Daily average salinity in the mangrove zone continued to decrease last week, and flows from the creeks remained mostly positive for the week.

Supporting Information

KISSIMMEE BASIN

Rainfall

The Upper Kissimmee Basin received 1.26 inches of rainfall in the past week and the Lower Basin received 1.28 inches (SFWMD Daily Rainfall Report 08/02/2020).

Upper Kissimmee

Table 1 lists stage and discharge for several KCL water bodies using data from lake outfall structures. KCL stage hydrographs, with respective regulation schedules and rainfall, are shown in **Figures 1-3**.

Table 1. Average discharge (cfs) for the preceding seven days, stage (feet NGVD), and departures from KCL flood regulation (R) or temporary schedules (T, A, or S); provisional, real-time data are from SFWMD.

Report Date: 8/4/2020

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)						
							8/2/20	7/26/20	7/19/20	7/12/20	7/5/20	6/28/20	6/21/20
Lakes Hart and Mary Jane	S-62	201	LKMJ	59.8	R	60.0	-0.2	0.0	0.0	0.2	0.2	0.0	0.2
Lakes Myrtle, Preston, and Joel	S-57	33	S-57	60.8	R	61.0	-0.2	0.0	0.0	0.1	-0.2	-0.1	-0.2
Alligator Chain	S-60	136	ALLI	63.1	R	63.2	-0.1	0.0	0.0	-0.2	-0.6	-0.5	-0.4
Lake Gentry	S-63	206	LKGT	60.8	R	61.0	-0.2	0.1	0.1	0.1	-0.2	-0.2	-0.3
East Lake Toho	S-59	527	TOHOE	55.8	R	56.5	-0.7	-0.8	-0.7	-1.2	-1.5	-1.4	-2.2
Lake Toho	S-61	1,304	TOHOW, S-61	53.3	R	53.5	-0.2	0.0	0.0	0.2	0.1	0.0	0.0
Lakes Kissimmee, Cypress, and Hatchineha	S-65	4,215	KUB011, LKIS5B	51.1	R	51.0	0.1	0.5	0.9	0.7	0.4	0.5	0.2

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

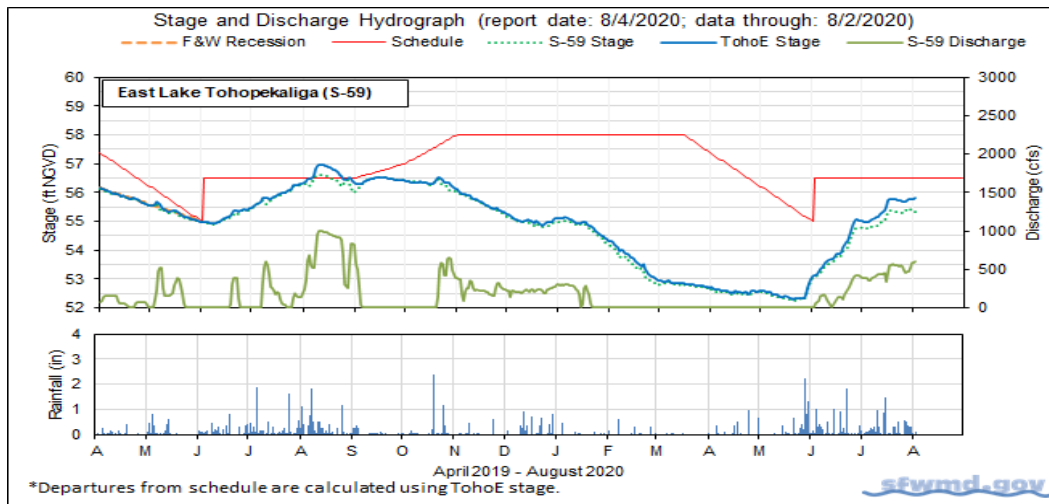


Figure 1. East Lake Toho regulation schedule, stage, discharge and rainfall.

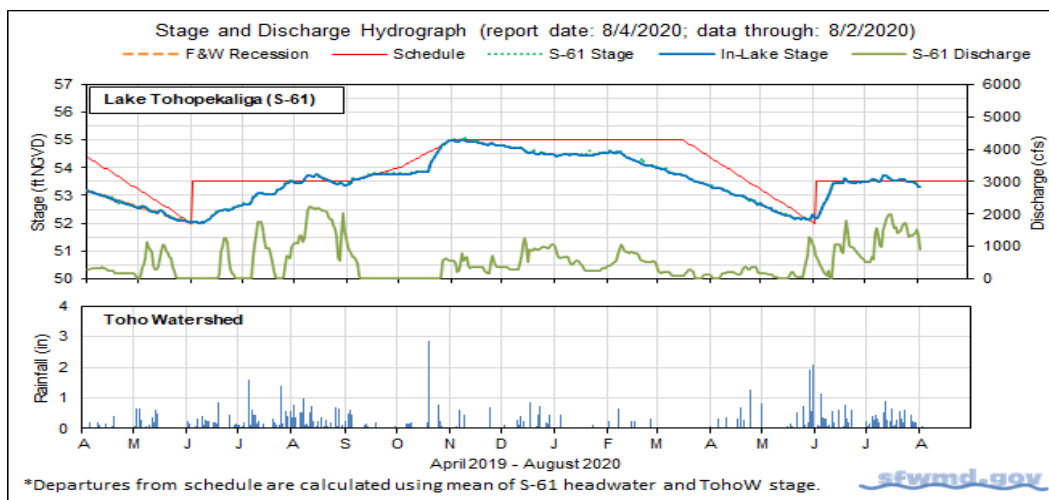


Figure 2. Lake Toho regulation schedule, stage, discharge and rainfall.

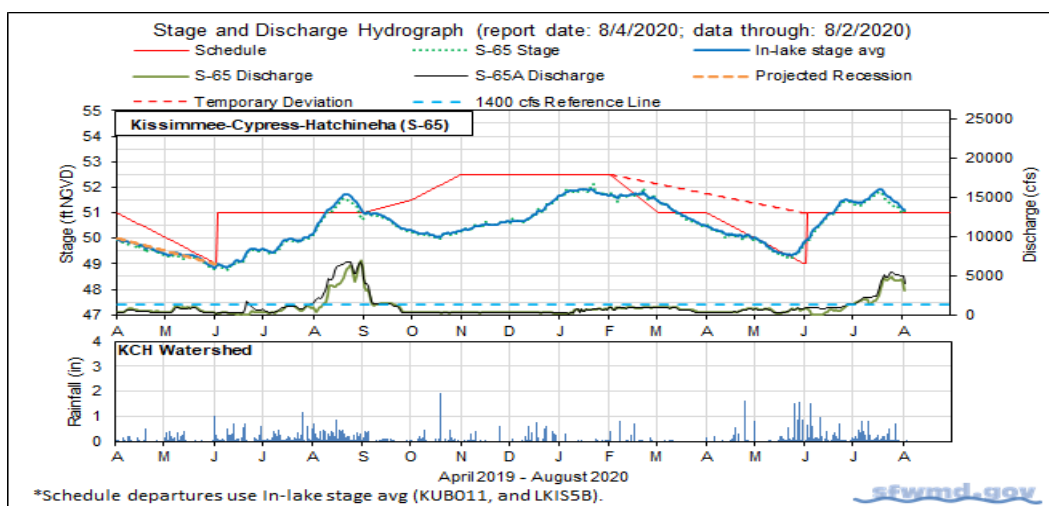


Figure 3. Lakes Kissimmee, Cypress and Hatchineha regulation schedule, stage, discharge and rainfall.

Lower Kissimmee

Discharges at lower basin structures are shown in **Table 2**. **Figure 4** compares floodplain inundation depths from one year and one month ago with current inundation depths in the Phase I restored area of the Kissimmee River. **Figure 5** is dissolved oxygen concentration along with S-65A discharge, water temperature, and rainfall. **Figures 6-8** are included for reference. **Figure 6** is the current guide for operation of S-65 and S-65A, called the “Preferred Discharge Plan IS-14-50.0”. This is developed collaboratively each year between ecologists and SFWMD water managers based on prevailing ecological and hydrologic conditions. A preferred discharge plan and the interim regulation schedule (**Figure 7**) will be used until the Headwaters Lakes Revitalization regulation schedule is implemented. **Figure 8** is a map of the Kissimmee Basin showing Central and Southern Florida (C&SF) flood control project structures and color-coded watersheds.

Table 2. One- and seven-day average discharge at lower basin structures, dissolved oxygen concentration in phases I and II/III area river channel, and depth in the Phase I area floodplain using provisional, real-time data from SFWMD.

Report Date: 8/4/2020

Metric	Location	1-Day Average	Average for the Preceding 7-Days ¹								
		8/2/2020	8/2/20	7/26/20	7/19/20	7/12/20	7/5/20	6/28/20	6/21/20	6/14/20	6/7/20
Discharge (cfs)	S-65	3,175	4,215	4,623	2,396	1,779	1,527	873	581	80	427
Discharge (cfs)	S-65A ²	3,980	4,851	5,111	3,202	2,174	1,559	1,127	864	854	884
Discharge (cfs)	S-65D ²	5,345	5,538	3,846	2,383	1,602	1,314	1,453	1,641	1,988	1,485
Headwater Stage (feet NGVD)	S-65D ²	27.75	27.75	26.99	26.02	25.81	25.76	25.72	25.74	25.72	25.78
Discharge (cfs)	S-65E ²	5,313	5,462	3,671	2,229	1,574	1,240	1,402	1,549	1,868	1,552
Discharge (cfs)	S-67	0	0	0	0	0	0	0	0	0	0
DO (mg/L) ³	Phases I & II/III river channel	0.8	0.4	0.2	0.2	1.4	2.7	2.0	1.2	0.7	4.0
Mean depth (feet) ⁴	Phase I floodplain	2.93	3.01	2.64	1.63	1.13	0.73	0.71	0.78	0.90	0.56

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.

Kissimmee River Phase I Restoration Area Water Depth Maps

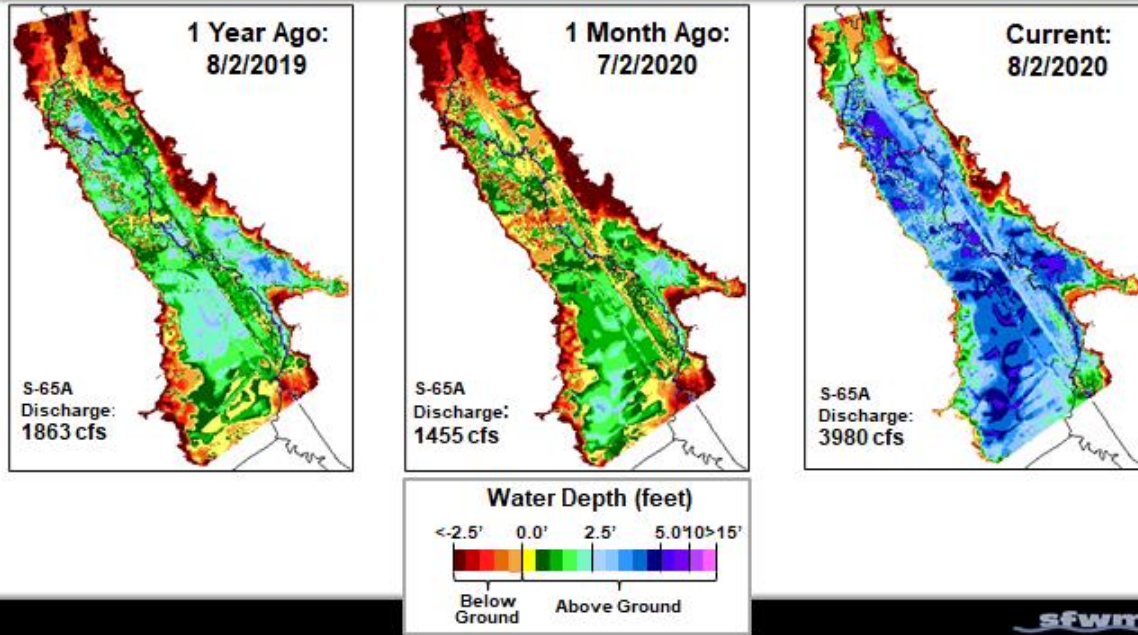
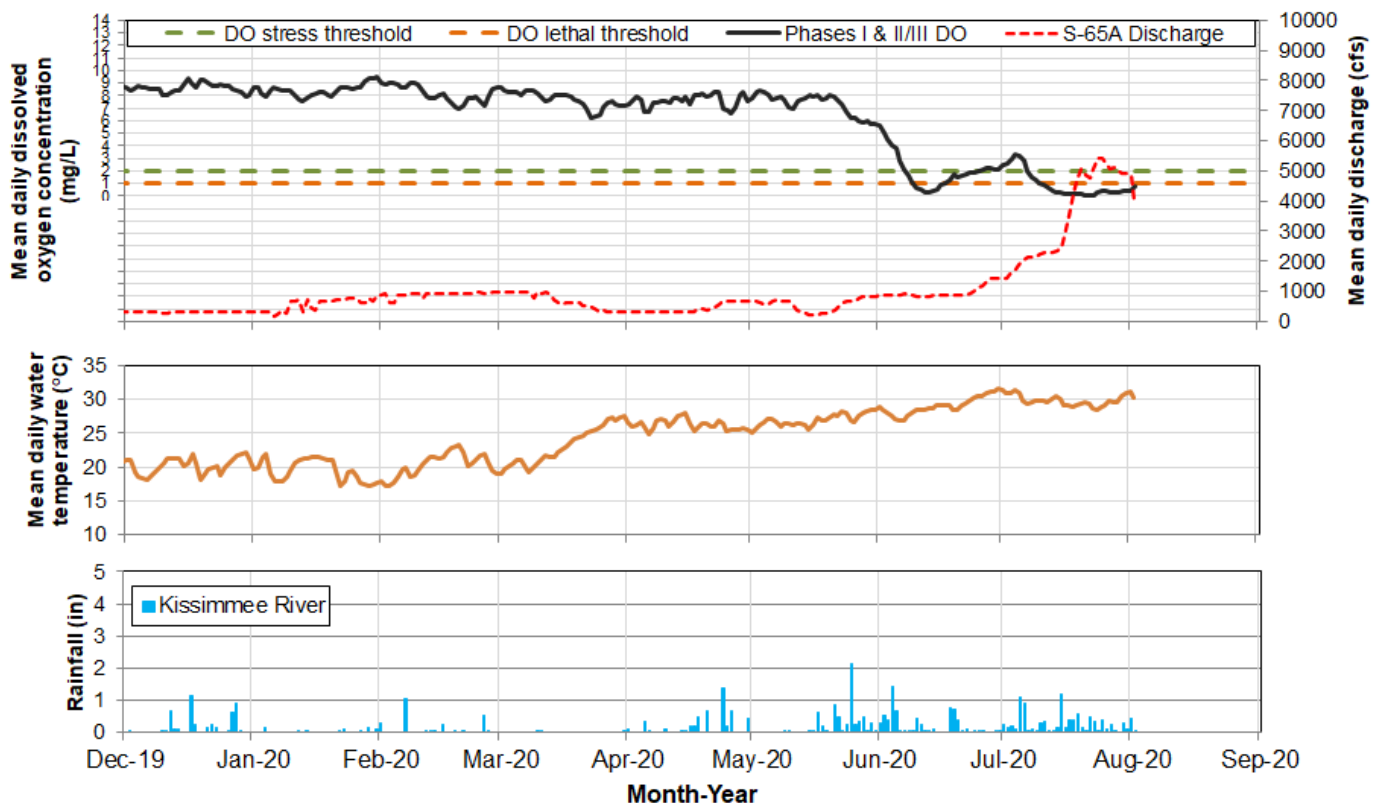


Figure 4. Phase I area floodplain water depths (from left to right) one year ago, one month ago and current. Color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to January 16, 2012.



Report Date: 8/4/2020; data are through: 8/2/2020.

Figure 5. Restored Kissimmee river channel mean daily dissolved oxygen concentration (mg/L), S-65A discharge (cfs), temperature (°C) and rainfall (inches)

Stage and Discharge Guidance for 2019-2020.

Zone	KCH Stage (ft NGVD)	S-65/S-65A Discharge*
A	Above regulation schedule line.	Flood control releases as needed with no limits on the rate of discharge change.
B1	In flood control buffer zone (0.5 ft below the schedule line).	Adjust S-65 discharge so that S-65A discharge is between 1400 cfs at the buffer zone line and 3000 cfs at the schedule line.
B2	Between the Flood Control Buffer and the 50.0 ft line.	Adjust S-65 discharge to maintain at least 1400 cfs at S-65A. Use ± 0.2 ft buffer (gray band) above and below the 50.0 ft line to decide when to begin ramping up to 1400 cfs or down to 300 cfs; do not continue reducing discharge if stage rises back to or above the threshold stage line.
B3	Between the 50.0 ft line and 49 ft.	Adjust S-65 discharge to maintain at least 300 cfs at S-65A.
B4	Between 48.5 ft to 49 ft.	Adjust S-65 discharge to maintain S-65A discharge between 0 cfs at 48.5 ft and 300 cfs at 49 ft.
C	Below 48.5 ft.	0 cfs.

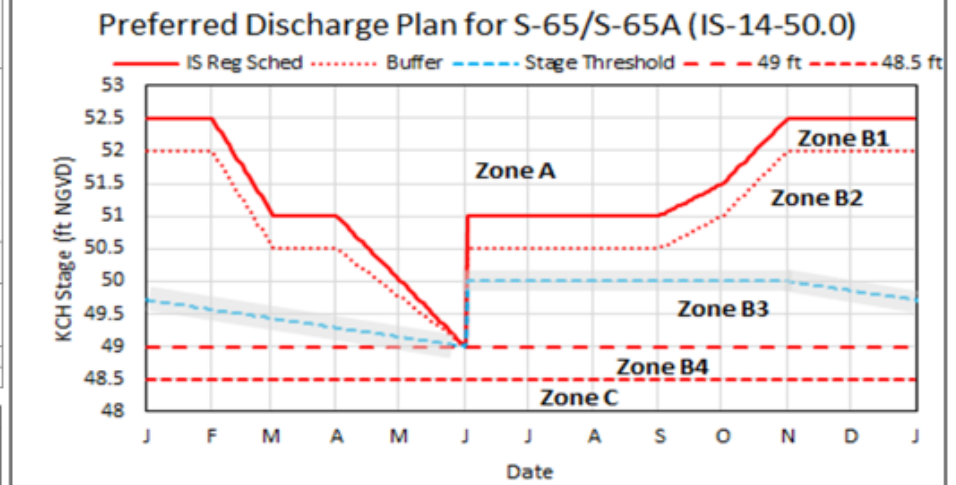
*Changes in discharge should not exceed limits in inset table below.

Discharge Rate of Change Limits for S65/S65A (revised 7/13/18).

Q (cfs)	Maximum rate of increase (cfs/day)	Maximum rate of decrease (cfs/day)
0-300	50	-50
301-650	75	-75
651-1400	150	-150
1401-3000	300	-600
>3000	1000	-2000

Revised 5/16/2019

2019-2020 Discharge Plan S-65/S65A



Other Considerations

- When possible, limit lake ascension rate in the Jun 1 - Aug 15 window to 0.5 ft per 14 days in Lakes Kissimmee, Cypress, Hatchineha (S-65), East Toho (S-59) and Toho (S-61).
- If outlook is for extreme dry conditions meet with KB staff to discuss modifications to this plan.

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

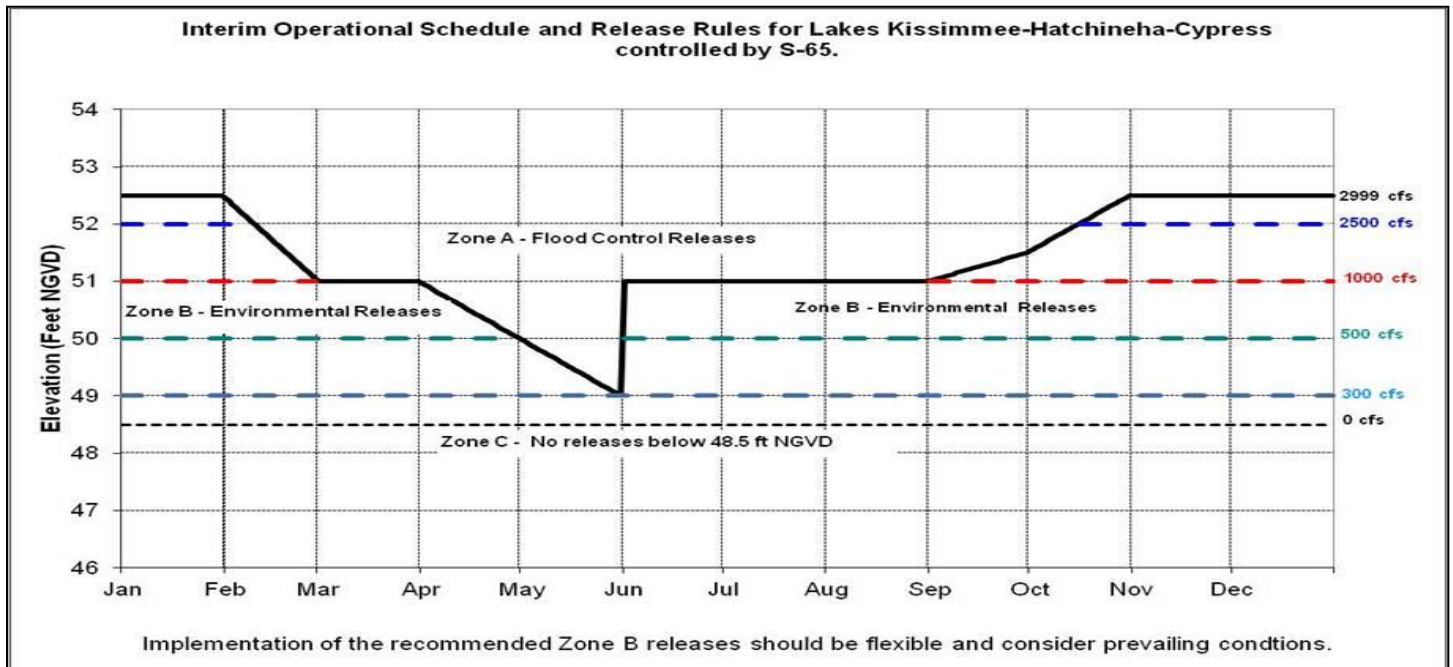


Figure 7. Interim operations schedule for S-65 (solid black line). The discharge schedule shown to the right has not been used in recent years.

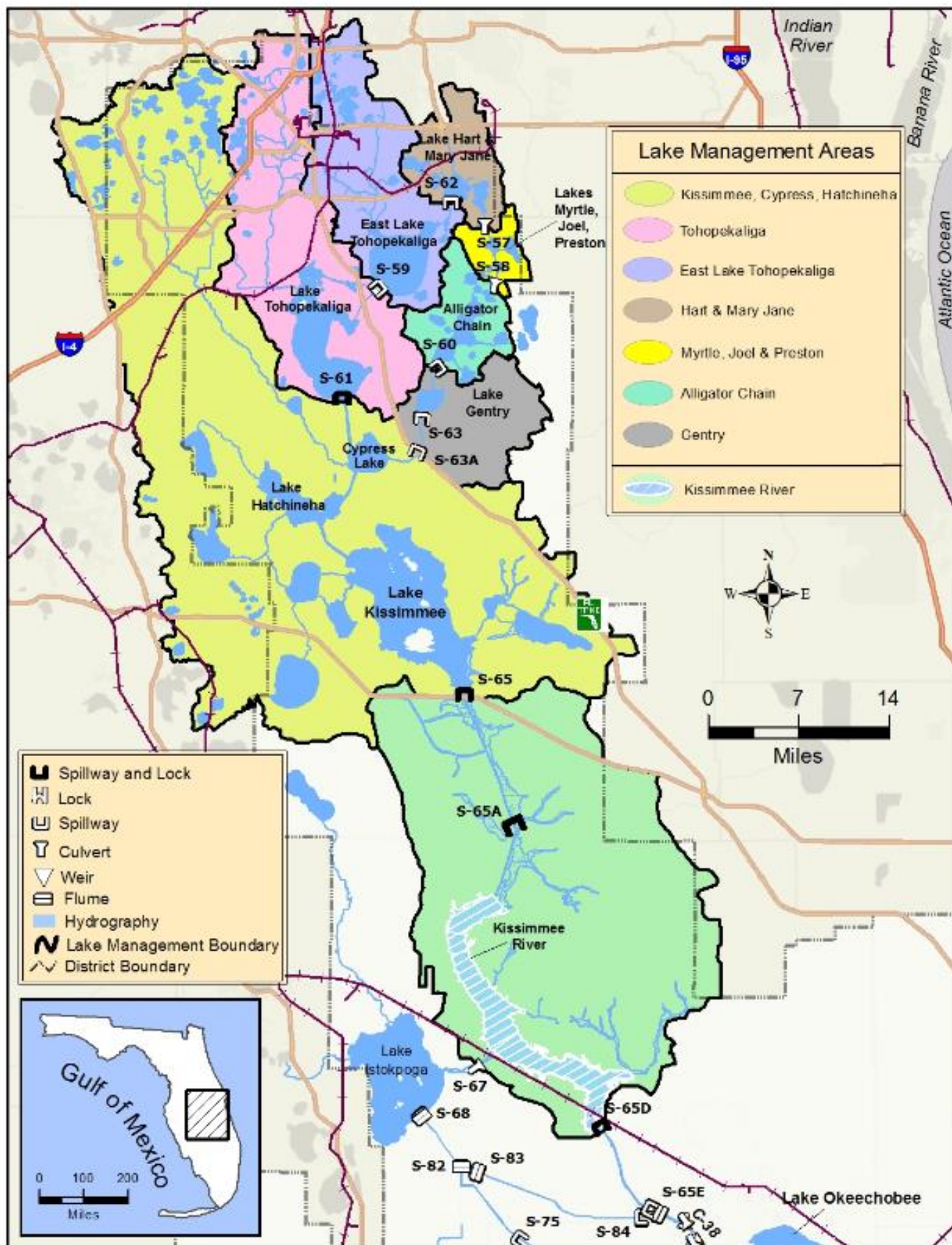


Figure 8. The Kissimmee Basin.

LAKE OKEECHOBEE

Lake Okeechobee stage is 13.33 feet NGVD, 1.08 feet higher than a month ago and 1.45 feet higher than one year ago (Figure 1). The Lake has been within the preferred ecological envelope since June 2, 2020 (Figure 2), but stage is currently near around the top of the envelope. Lake stage moved into the Beneficial Use sub-band on March 4, 2020 and is now in the Base Flow sub-band (Figure 3). Lake stage reached a low of 10.99 on May 17, rose rapidly for a month, levelled out for the remainder of June, and has been rising between 0.22 and 0.32 feet per week over the past three weeks. According to RAINДАР, 0.55 inches of rain fell directly over the Lake during the past week (Figure 4). The majority of the watershed received similar amounts of rainfall with the exception of the lower Kissimmee Basin and the area immediately west of the Lake, which received less rainfall, and an area along the southeast coast, which received up to 4 inches of rain. The district-wide average was approximately 0.87 inches.

The average daily inflows (minus rainfall) increased from 6,293 cfs to 8,784 cfs, while the outflows (minus evapotranspiration) decreased from 71 cfs to 0 cfs. Most of the inflows came from the Kissimmee River (5,440 cfs through S-65E & S-65EX1), while 1,707 cfs came from the C-41a canal (through S-84 & S-84X), 268 cfs from Fisheating Creek, around 443 cfs from S-71 and S-72, and 309 cfs came from the remaining northern structures and northern pump stations. An additional 183 cfs and 433 cfs came from passive inflow from the east through S-308 and the L-8 Canal via Culvert 10A, respectively. There were no outflows, as operations were preparing for Tropical Storm Isaias. 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. The second July sampling occurred on the 21st and 22nd, and eight sites had a chlorophyll a value greater than 40 µg/L, one of which was greater than 100 µg/L (Figure 6). Despite the high chl-a values, cyano-toxin values were relatively low. Three of thirty sites (10%) had microcystin levels above the EPA recreational waters recommendation of 8 µg/L; L007 at 12.0 µg/L, LZ40 at 18.0 µg/L, and a high of 29.0 µg/L at L006 a site in the southern region of the lake. Nineteen more sites had microcystin detected (detection limit of 0.25 µg/L or greater), ranging from 0.3 – 7.6 µg/L.

Satellite images from the month of July, using NOAA's cyanobacteria monitoring product derived from EUMETSAT's Sentinel 3 OLCI sensor data suggested a decrease in cyanobacteria bloom risk potential during mid to late July but an intensification in the most recent image (Figure 7).

Water Management Summary

Lake Okeechobee stage was 13.33 feet NGVD on August 3, 2020, 0.32 feet higher than the previous week and 1.08 feet higher than the previous month. The Lake is in the Base Flow sub-band. Lake stage moved into the ecological envelope (which varies seasonally from 12 – 15 feet NGVD +/- 0.5 feet) on June 2, 2020, after being up to 1.5 feet below since October 15, 2019. It is now near the top of envelope. Ascension rates were high in early June, slowed and remained stable through the beginning of July, providing submerged plant communities an opportunity to catch up with rising stages, but have been increasing over the past couple of weeks. The cyanobacteria bloom risk potential increased from last week, especially in the central and southwestern areas of the Lake. Tropical Storm Isaias had little to no direct impacts on the Lake.

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	4047	5440	2.4
S-71 & S-72	367	443	0.2
S-84 & S-84X	1160	1707	0.7
Fisheating Creek	204	268	0.1
S-154	22	31	0.0
S-191	56	115	0.1
S-133 P	33	11	0.0
S-127 P	2	5	0.0
S-129 P	11	16	0.0
S-131 P	19	13	0.0
S-135 P	81	118	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	64	433	0.2
Rainfall	4947	1258	0.6
Total	11012	9859	4.3

OUTFLOWS	Previous week Avg Daily CFS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)
S-77	71	0	0.0
S-308	-226	-183	-0.1
S-351	0	0	0.0
S-352	0	0	0.0
S-354	0	0	0.0
L-8 Outflow			
ET	1717	2559	1.1
Total	1561	2376	1.0

Provisional Data

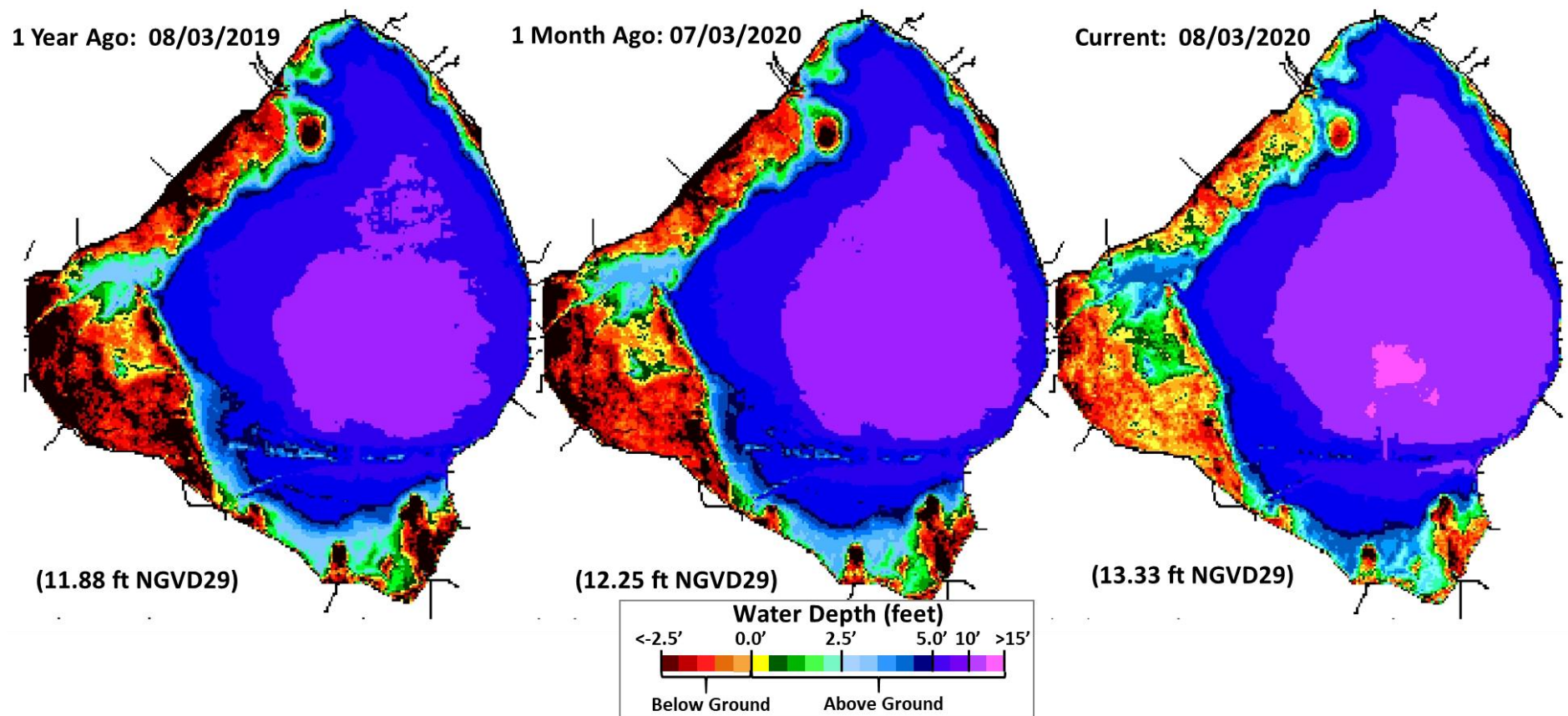


Figure 1. Water depth estimates on Lake Okeechobee based on the South Florida Water Depth Assessment Tool.

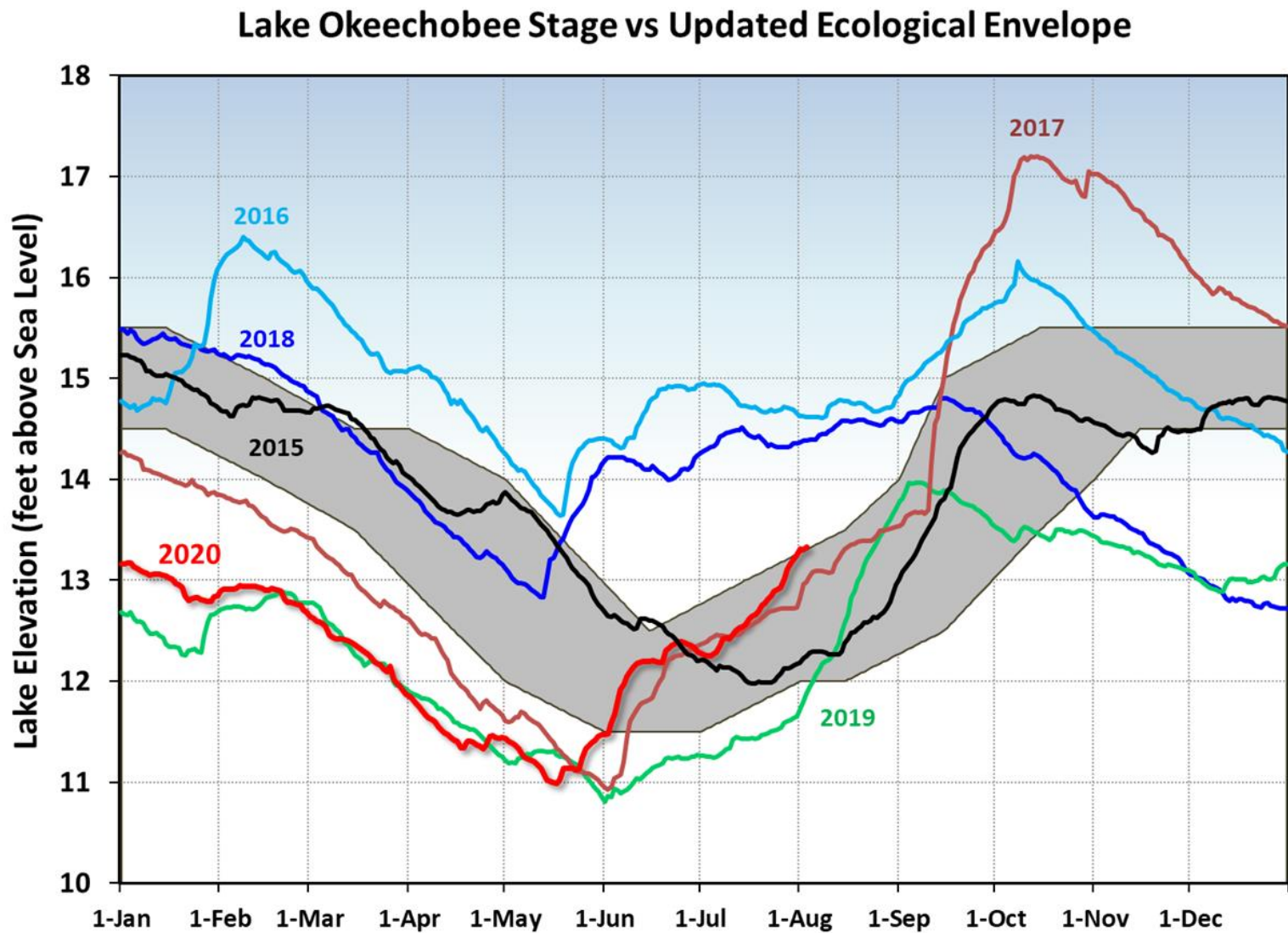


Figure 2. Select annual stage hydrographs for Lake Okeechobee in comparison to the updated Ecological Envelope.

Lake Okeechobee Water Level History and Projected Stages

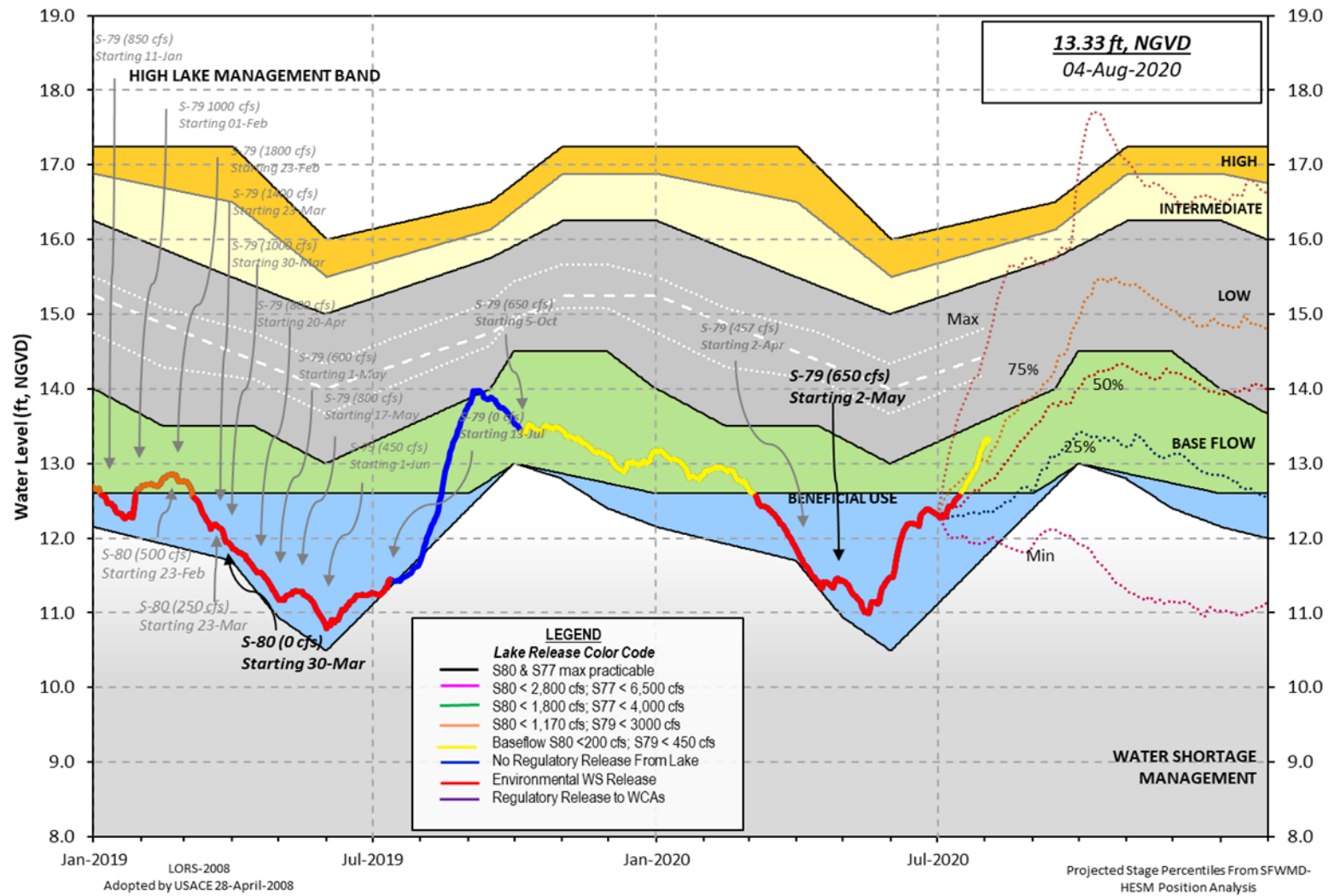


Figure 3. Recent Lake Okeechobee stage and releases, with projected stages based on a dynamic position analysis.

SFWMD PROVISIONAL RAINDAR 7-DAY BASIN RAINFALL ESTIMATES
FROM: 0400 EST, 07/28/2020 THROUGH: 0400 EST, 08/04/2020

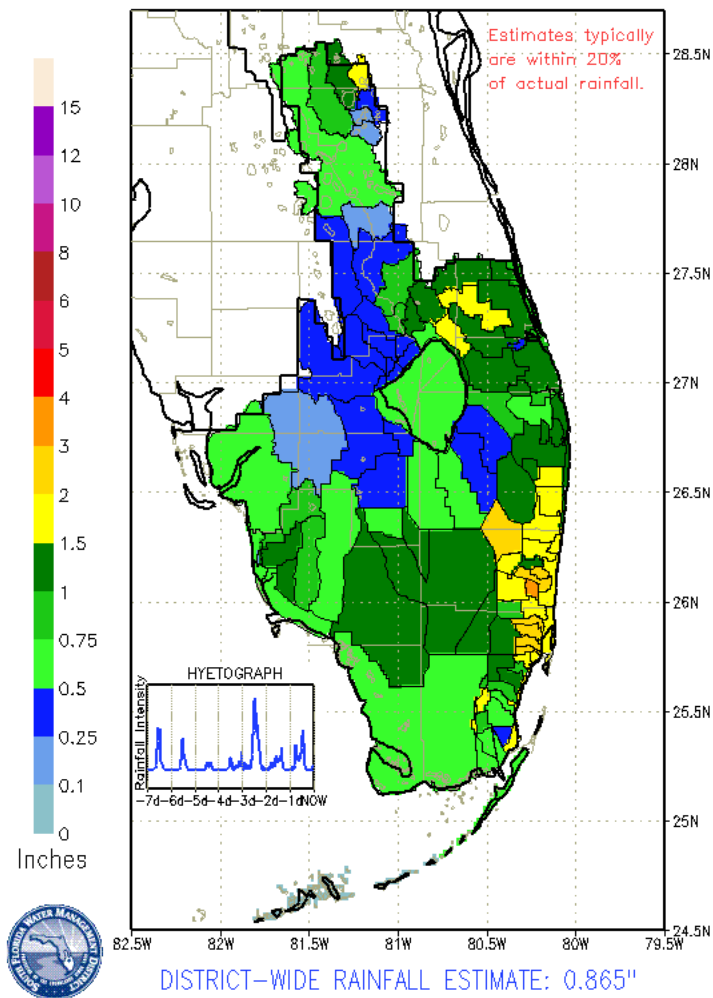


Figure 4. 7-Day rainfall estimates by RAINDAR.

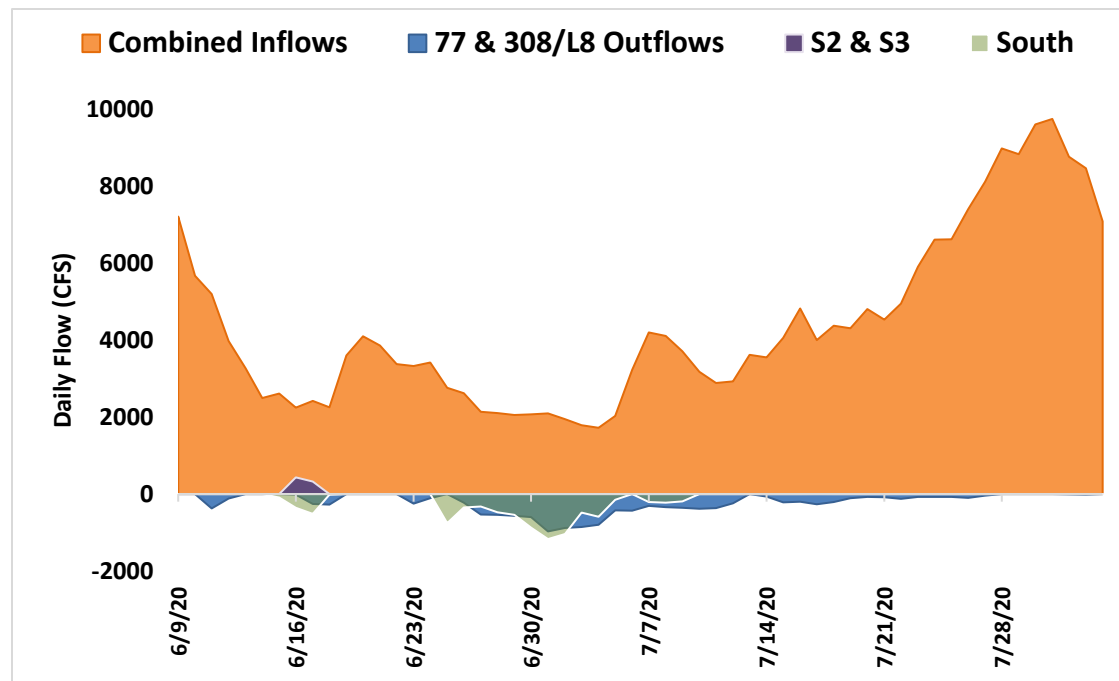


Figure 5. Major inflows (orange) and outflows (blue) of Lake Okeechobee, including the S-350 structures designated as South (green). The L-8 Canal flows through Culvert 10A are included as outflows when positive, and as inflows when backflowing into the Lake. All inflows and outflows are shown as positive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

Collection Date July 21 –22, 2020

Station	CHLa (ug/L)	TOXIN (ug/L)	TAXA
FEBIN			NS
FEBOUT			NS
KISSR0.0	17.5	BDL	<i>Microcys</i>
L005	42.1	BDL	<i>mixed</i>
LZ2	34.5	0.3	<i>mixed</i>
KBARSE	52.8	0.3	<i>Cylindro</i>
RITAE2	8.0	BDL	<i>Planktol</i>
PELBAY3	8.0	0.5	<i>Microcys</i>
POLE3S	11.2	BDL	<i>mixed</i>
LZ25A	16.8	1.0	<i>Microcys</i>
PALMOUT	6.8	1.1	<i>mixed</i>
PALMOUT1	17.1	BDL	<i>mixed</i>
PALMOUT2	13.0	0.5	<i>Microcys</i>
PALMOUT3	12.5	4.7	<i>Microcys</i>
POLESOUT	75.5	0.3	<i>Cylindro</i>
POLESOUT1	121.0	0.3	<i>Cylindro</i>
POLESOUT2	41.3	0.7	<i>Microcys</i>
POLESOUT3	19.2	4.6	<i>Microcys</i>
EASTSHORE	47.6	0.3	<i>mixed</i>
NES135	72.2	0.4	<i>Microcys</i>
NES191	29.2	BDL	<i>mixed</i>

Station	CHLa (ug/L)	TOXIN (ug/L)	TAXA
L001	36.2	0.4	<i>Microcys</i>
L004	15.4	0.6	<i>Microcys</i>
L006	12.0	29.0	<i>Microcys</i>
L007	18.3	12.0	<i>Microcys</i>
L008	16.0	0.5	<i>Microcys</i>
LZ30	20.5	7.6	<i>Microcys</i>
LZ40	22.1	18.0	<i>Microcys</i>
CLV10A	19.0	2.4	<i>Microcys</i>
NCENTER	71.6	0.3	<i>Microcys</i>

Samples collected July 27

S308C	P	BDL	<i>mixed</i>
S77	P	BDL	<i>Microcys</i>

- SFWMD considers >40 µg/L 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*

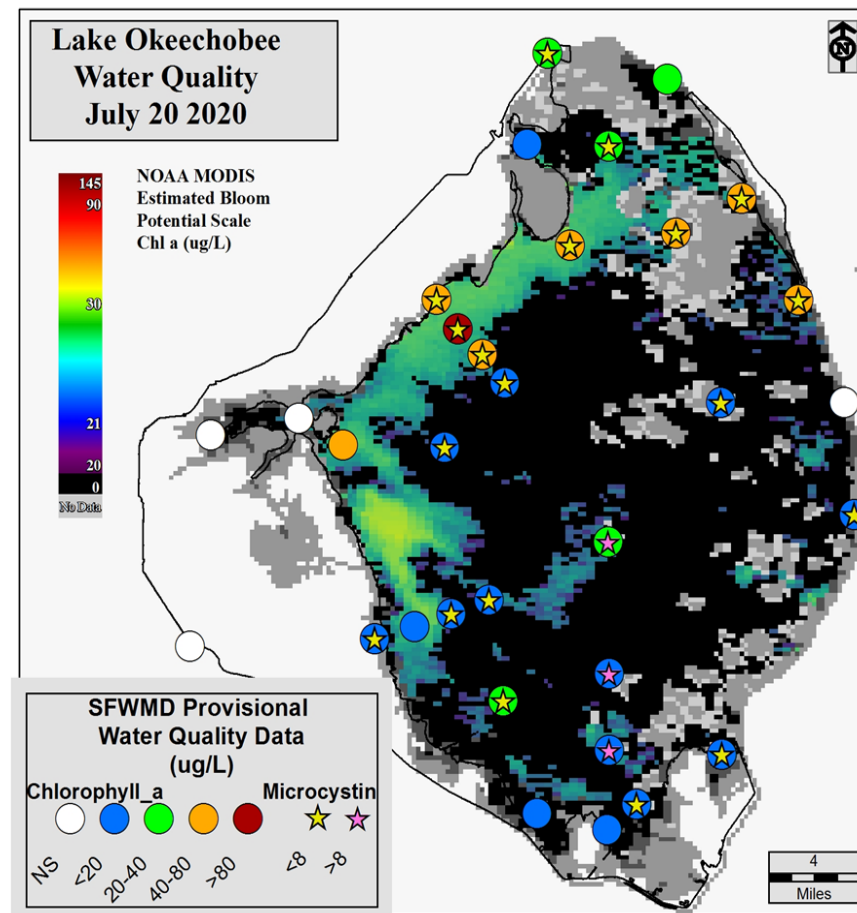


Figure 6. Provisional results from the expanded monitoring sampling trips on July 21 - 22, 2020.

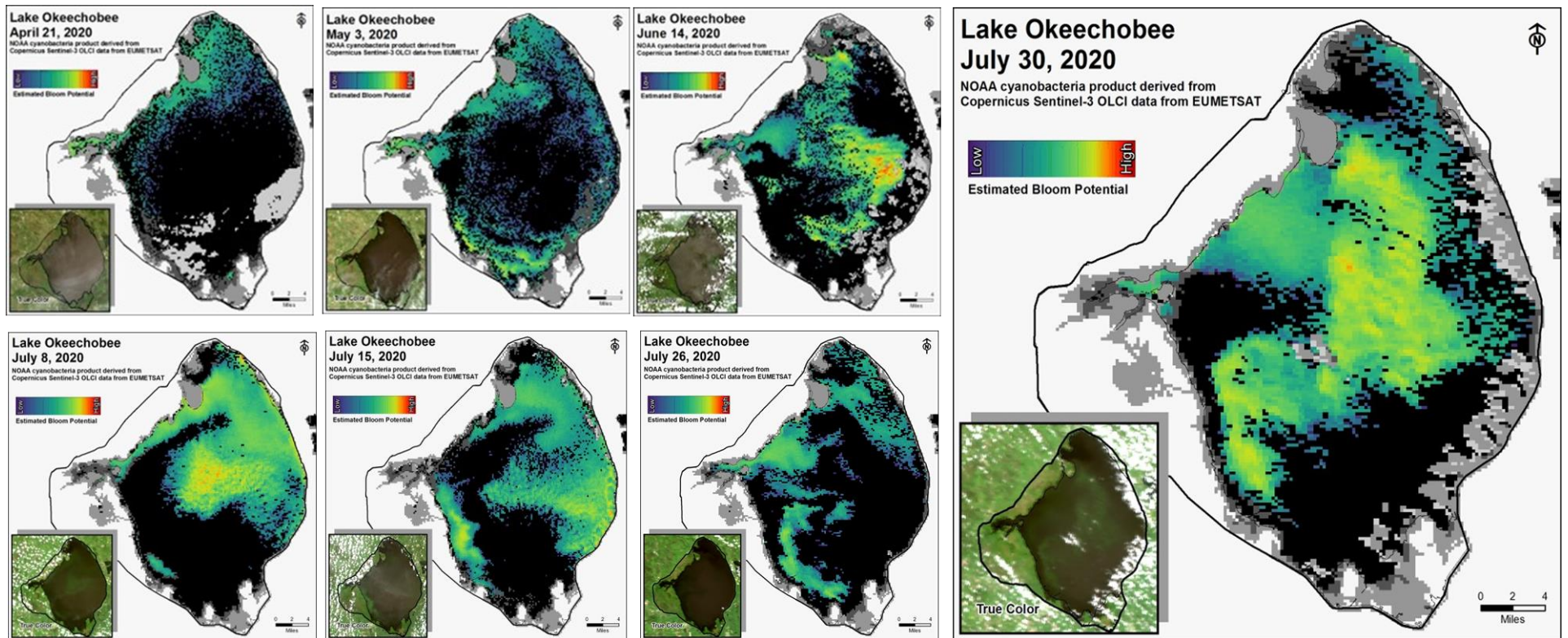


Figure 7. Potential for cyanobacterial blooms on Lake Okeechobee during 2020, based on NOAA's harmful algal bloom monitoring system. Gray color indicates cloud cover.

ESTUARIES

St. Lucie Estuary:

Last week total inflow to the St. Lucie Estuary averaged approximately 2,415 cfs (Figures 1 and 2) and last month inflow averaged about 1,859 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	729
S-80	108
S-308	-183
S-49 on C-24	399
S-97 on C-23	522
Gordy Rd. structure on Ten Mile Creek	657

Over the past week, surface salinity decreased 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 5.9. Salinity conditions in the middle estuary are estimated to be within the fair 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)	1.0 (1.9)	1.6 (2.6)	NA ¹
US1 Bridge	5.1 (6.3)	7.1 (6.9)	10.0-26.0
A1A Bridge	15.3 (16.8)	21.9 (22.6)	NA ¹

¹Envelope not applicable

Caloosahatchee Estuary:

Last week total inflow to the Caloosahatchee Estuary averaged approximately 2,082 cfs (Figures 5 and 6) and last month inflow averaged about 1,543 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	0
S-78	608
S-79	1537
Tidal Basin Inflow	545

Over the past week, salinities 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 Cape Coral and at Shell Point and in the fair range 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)	1.0 (1.3)	1.0 (1.3)	NA ¹
Val I75	1.1 (1.5)	1.7 (2.4)	0.0-5.0 ²
Ft. Myers Yacht Basin	5.5 (7.8)	7.3 (9.8)	NA
Cape Coral	11.9 (13.7)	14.7 (15.8)	10.0-30.0
Shell Point	24.6 (26.5)	25.7 (27.4)	10.0-30.0
Sanibel	30.9 (32.1)	31.5 (32.5)	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 2.0 to 4.9 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 315 cfs. The 30-day moving average surface salinity at Val I-75 is forecast to be between 1.3 and 2.2 (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	315	4.9	2.2
B	300	315	3.5	1.8
C	450	315	3.1	1.6
D	650	315	2.5	1.4
E	800	315	2.0	1.3

Red tide

The Florida Fish and Wildlife Research Institute reported on July 31, 2020, that *Karenia brevis*, the Florida red tide dinoflagellate, was not observed in samples collected from Lee County (no samples were analyzed this week from St. Lucie, Martin, Palm Beach, Broward, or Miami-Dade counties).

Water Management Recommendations

Lake stage is in the Base Flow sub-band. Tributary conditions are very wet. The LORS 2008 release guidance suggest up to 450 cfs release at S-79 to the Caloosahatchee Estuary and up to 200 cfs release at S-80 to the St. Lucie Estuary.

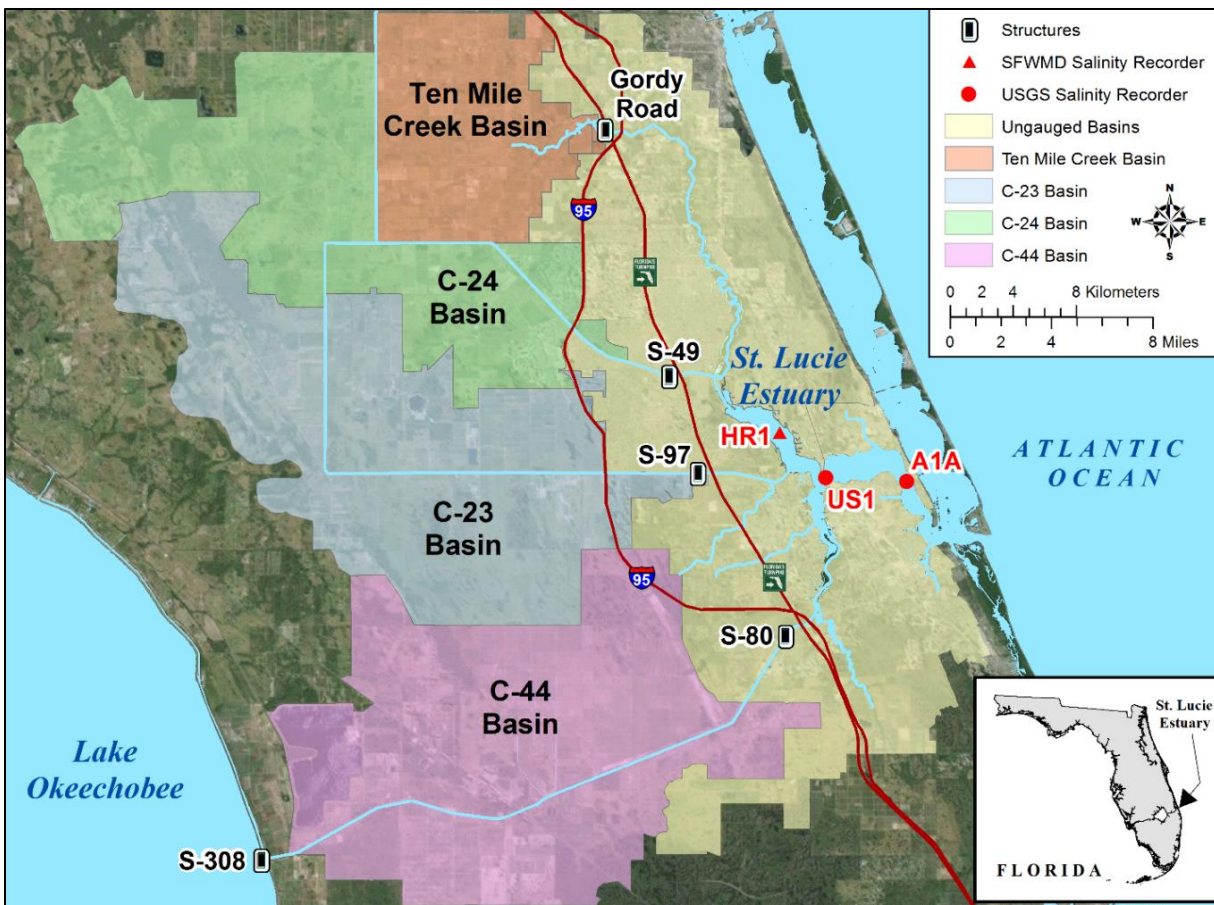


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

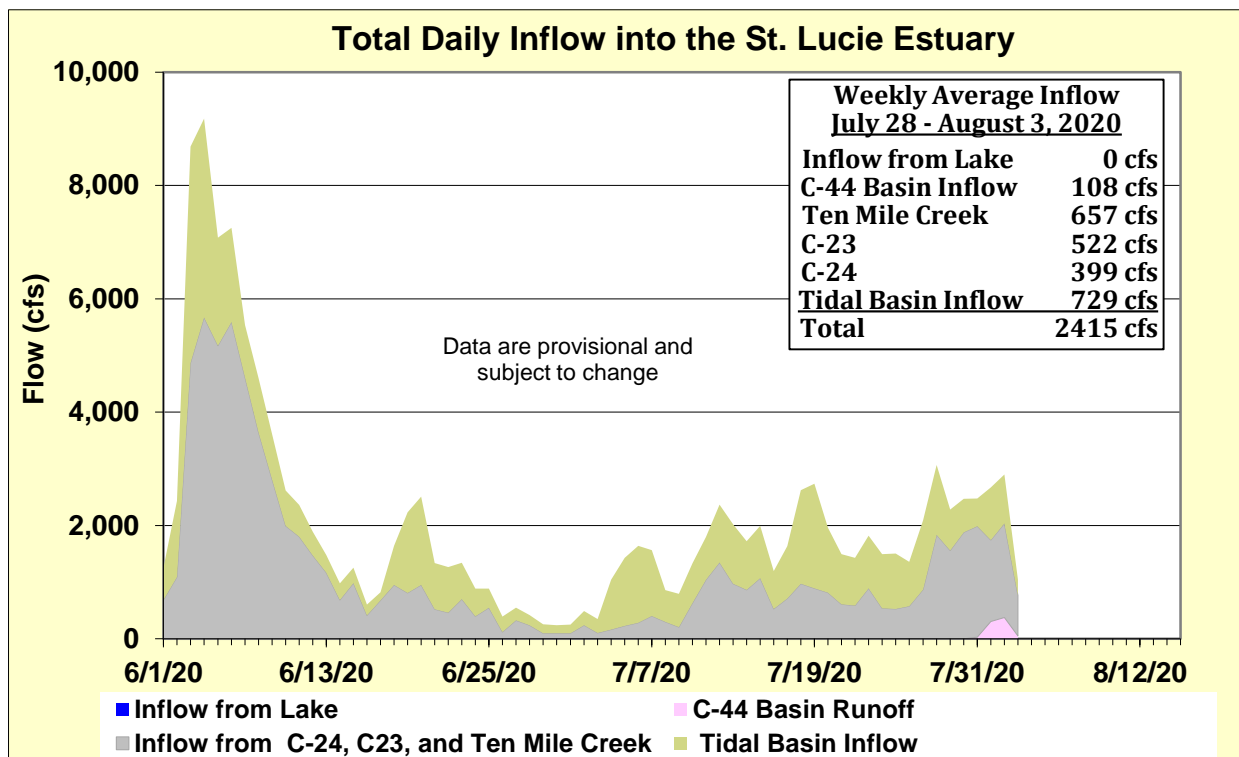


Figure 2. Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basin into the St. Lucie Estuary.

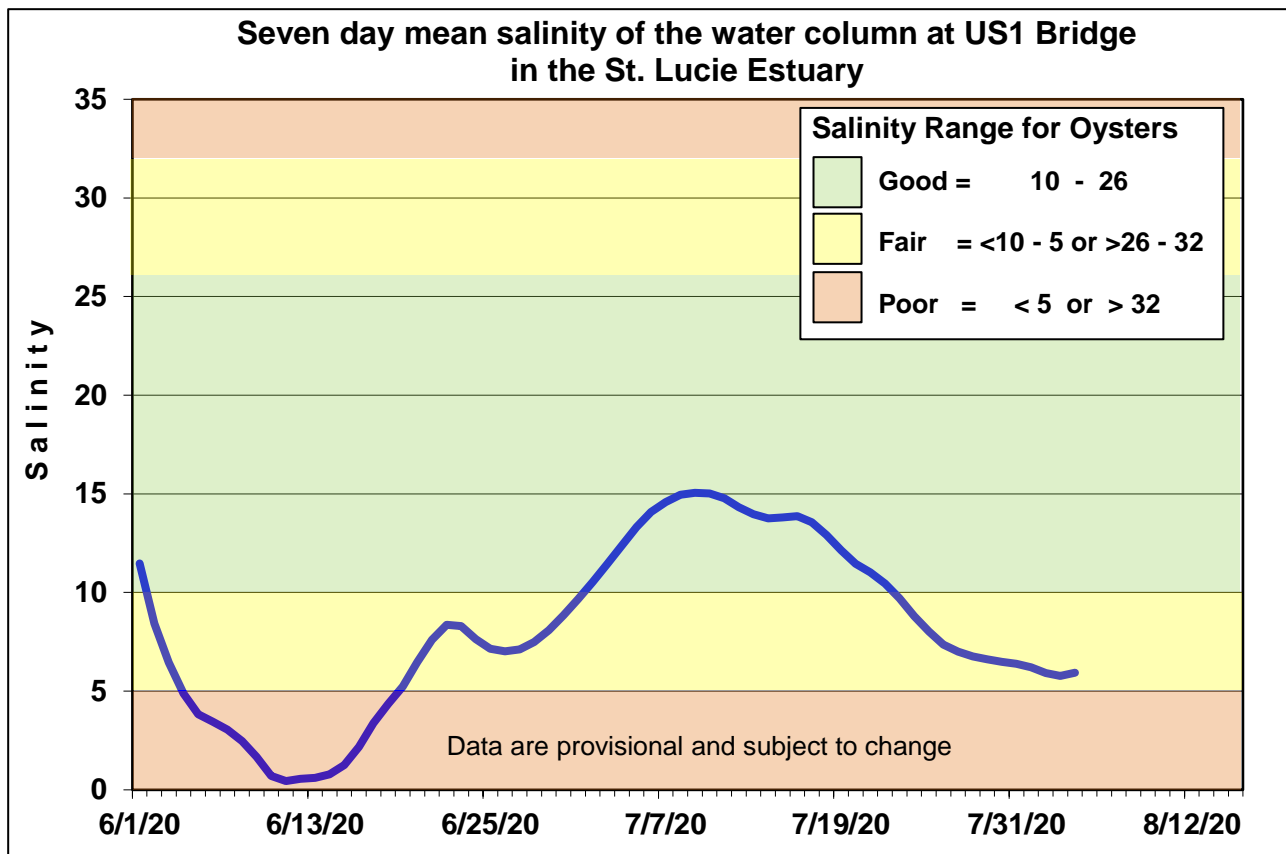


Figure 3. Seven-day mean salinity of the water column at the US1 Bridge.

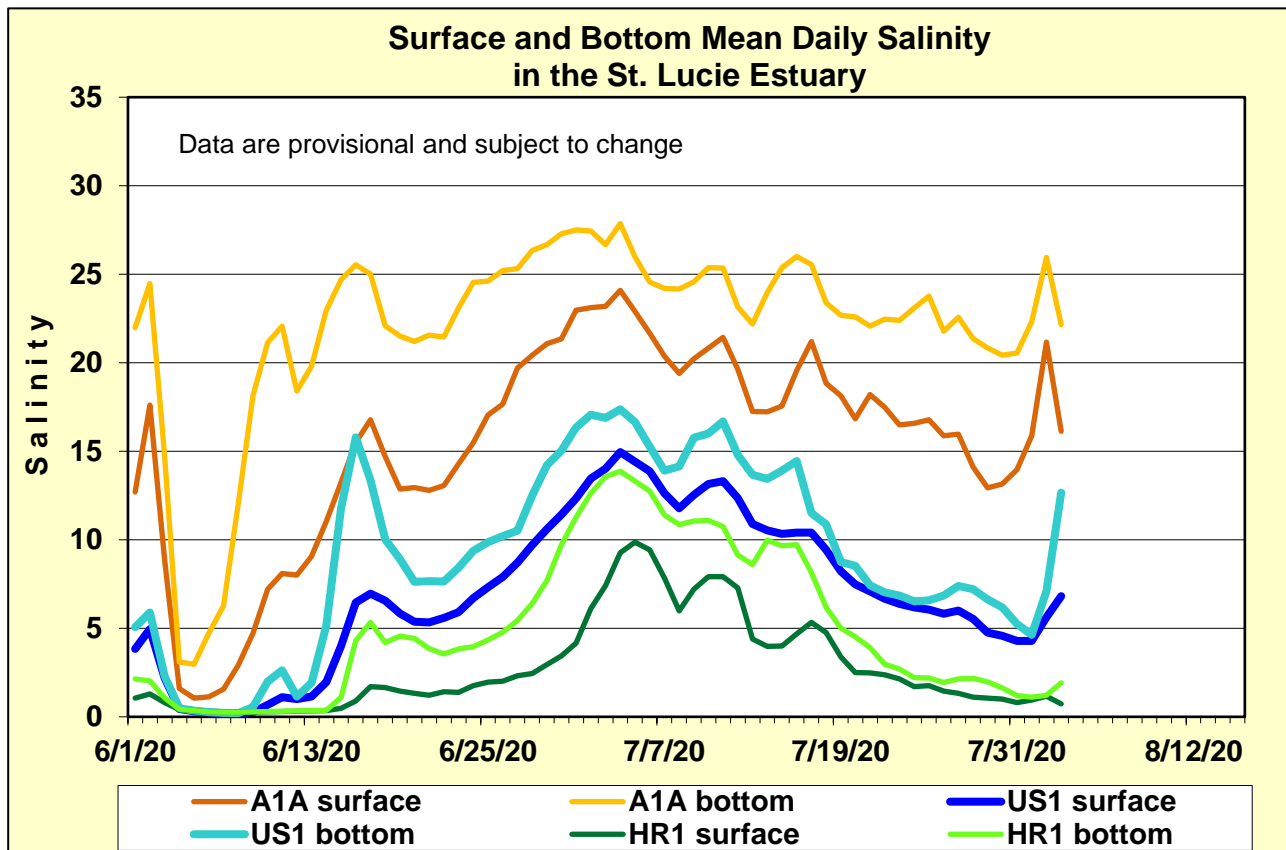


Figure 4. Daily mean salinity at the A1A, US1, and HR1 stations.

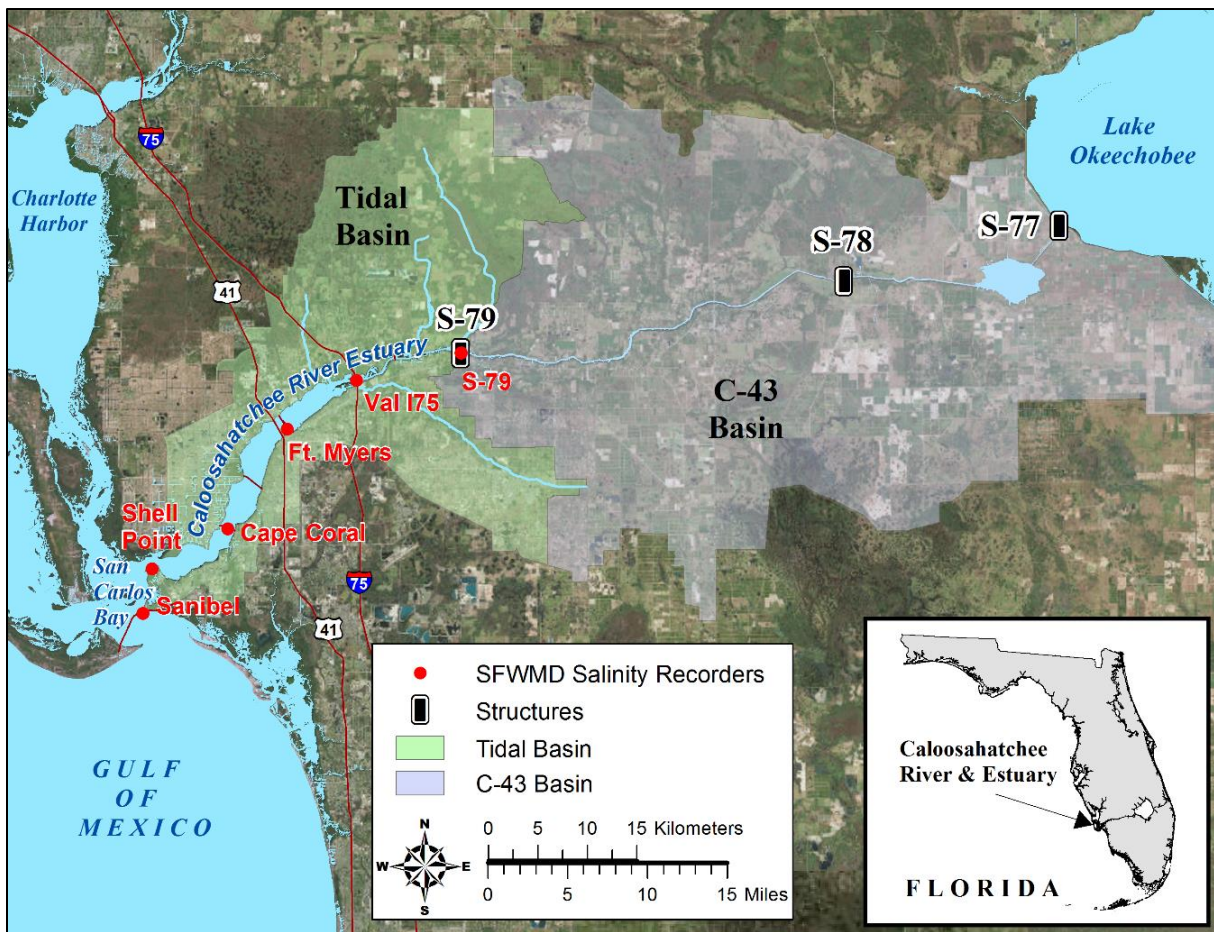


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

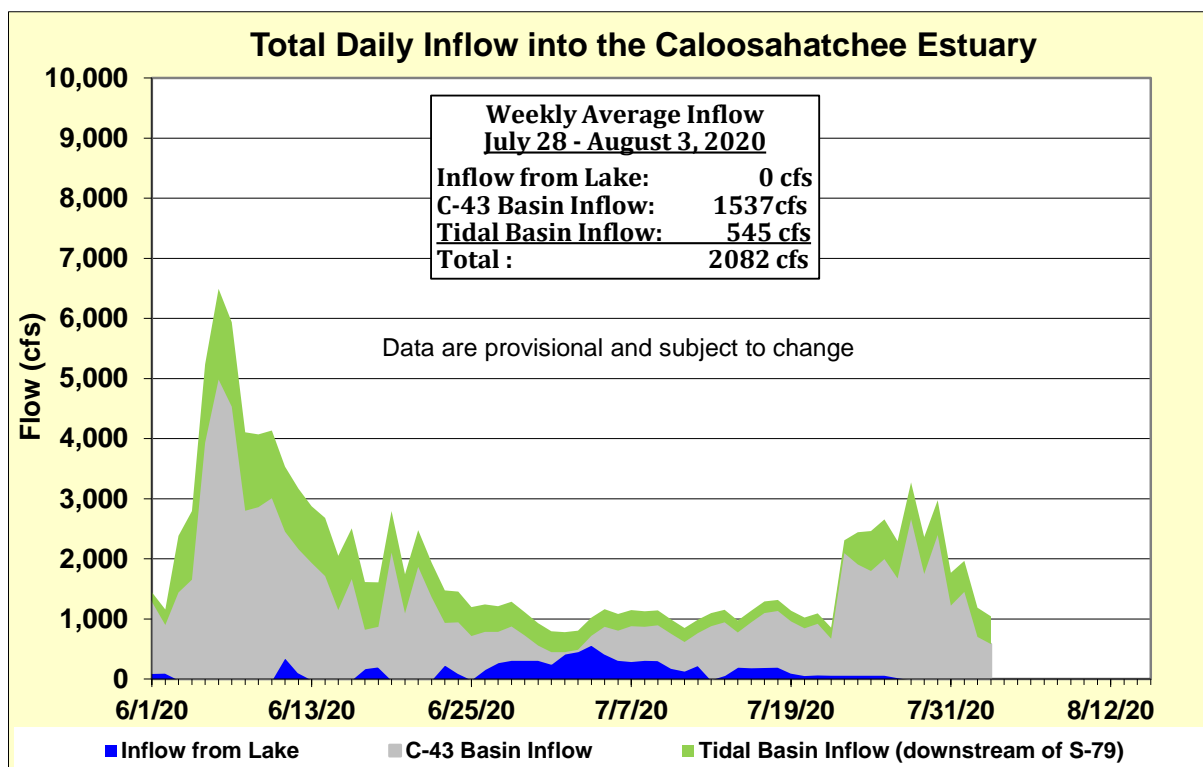


Figure 6. Total daily inflows from Lake Okeechobee, runoff from the C-43 basin

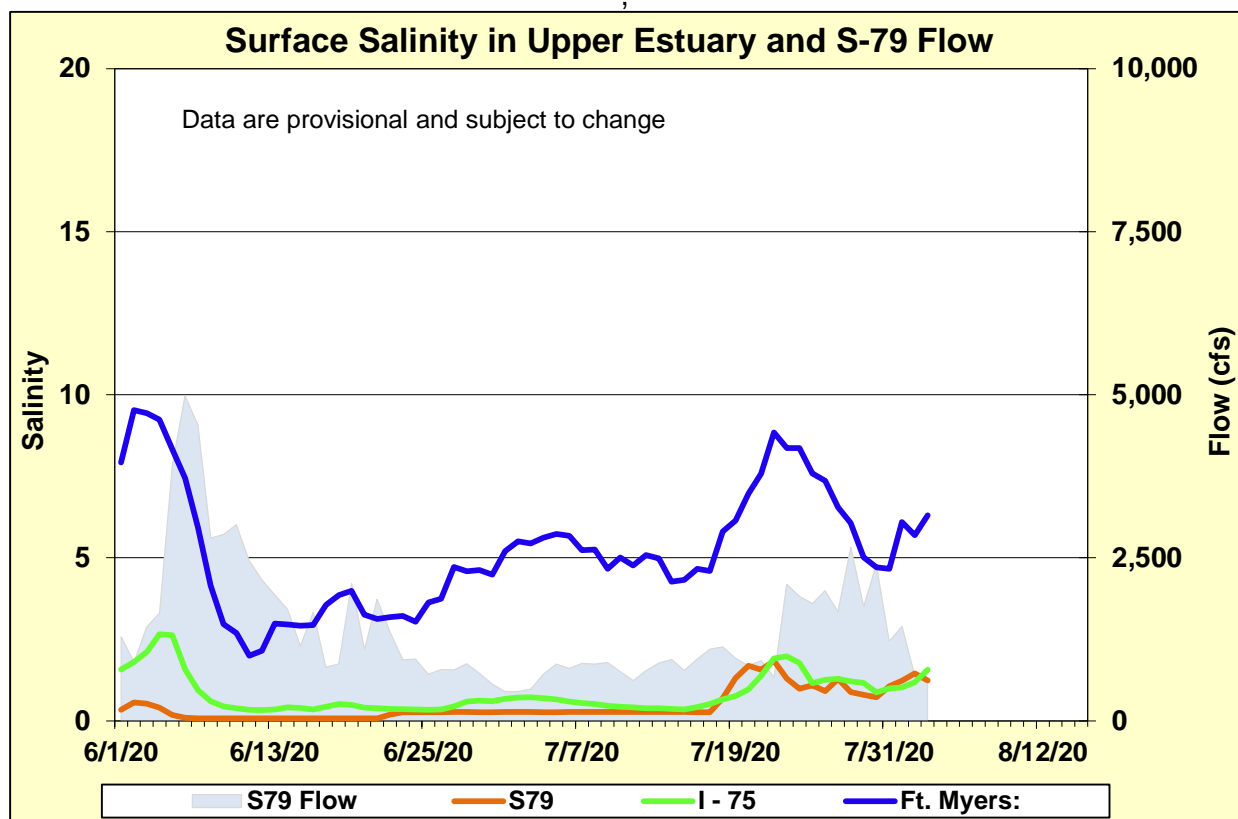


Figure 7. Daily mean flows at S-79 and salinity at upper estuary monitoring stations.

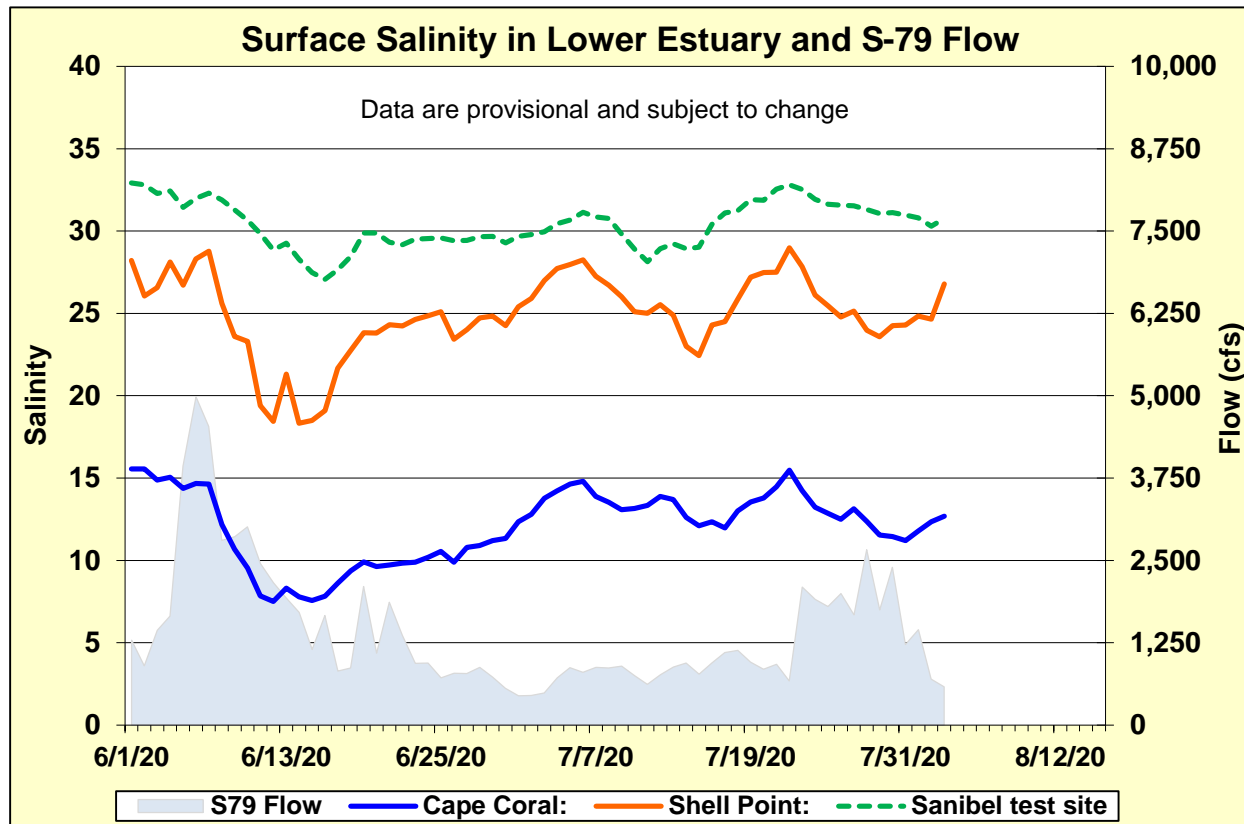


Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.

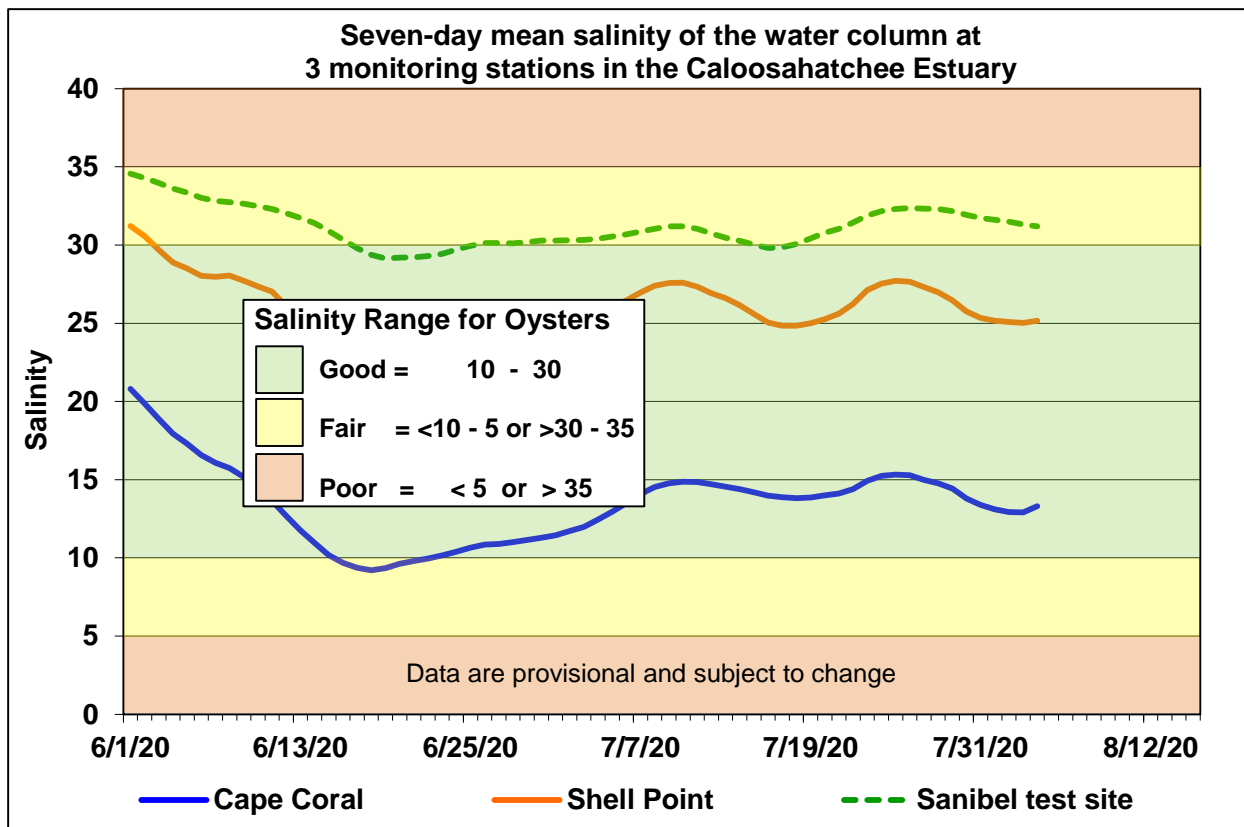


Figure 9. Seven-day mean salinity at Cape Coral, Shell Point, and Sanibel monitoring stations.

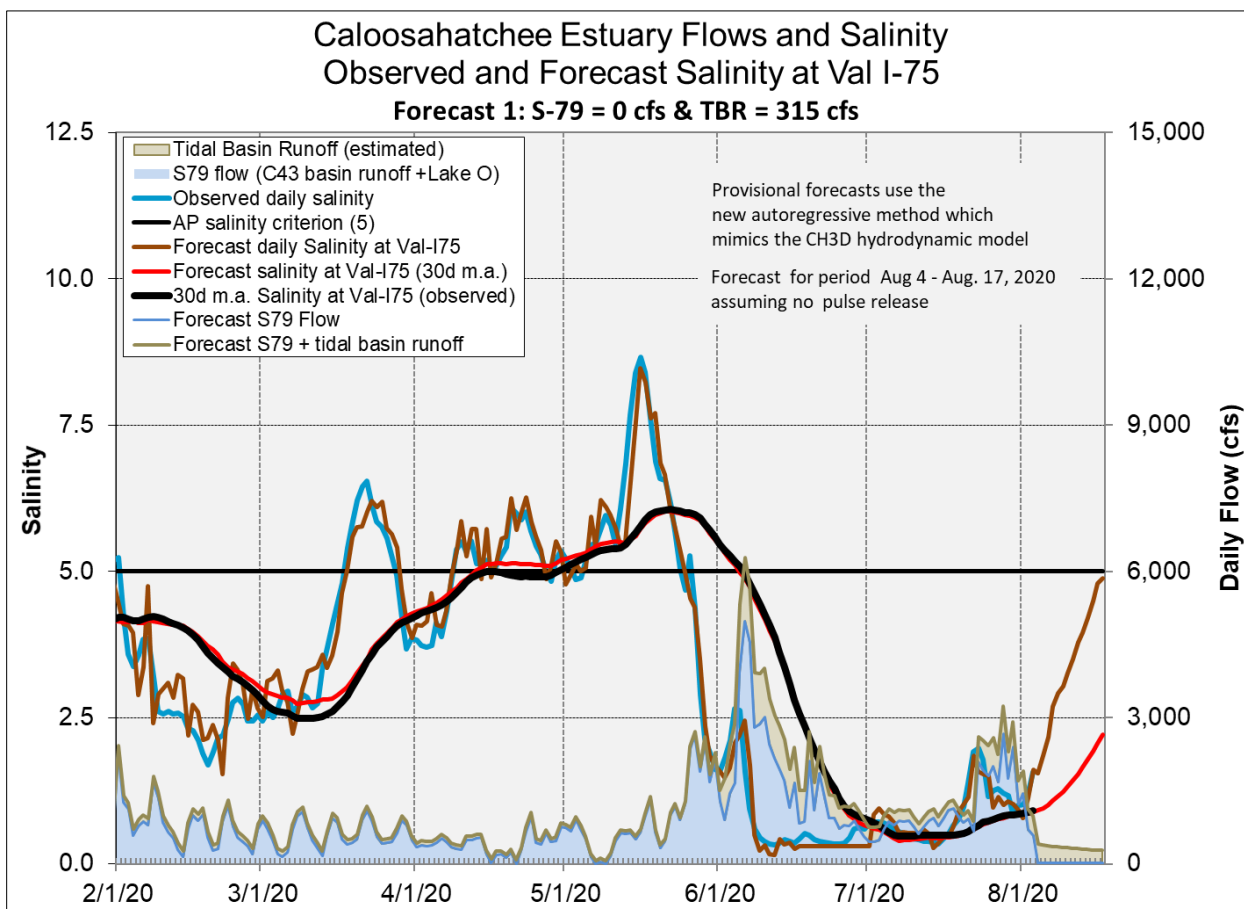
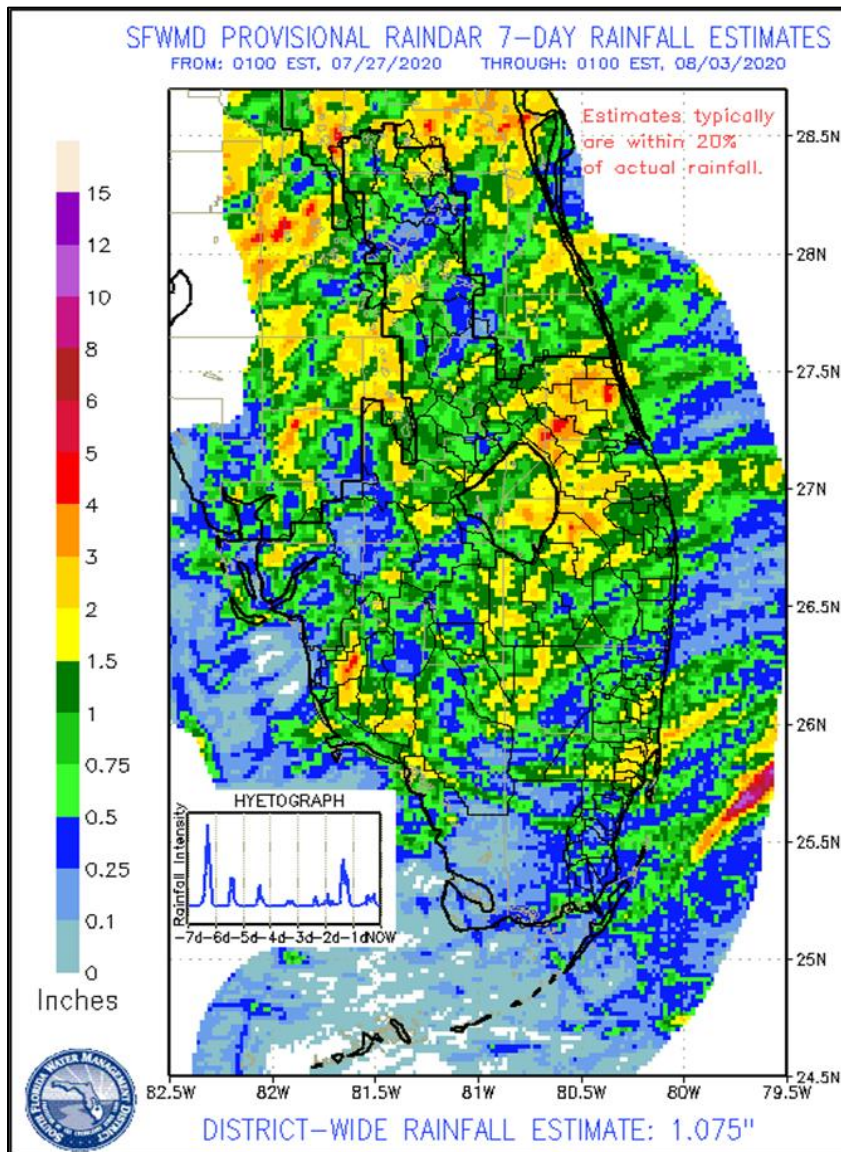


Figure 10. Forecasted Val I-75 surface salinity assuming no pulse release at S-79.

EVERGLADES

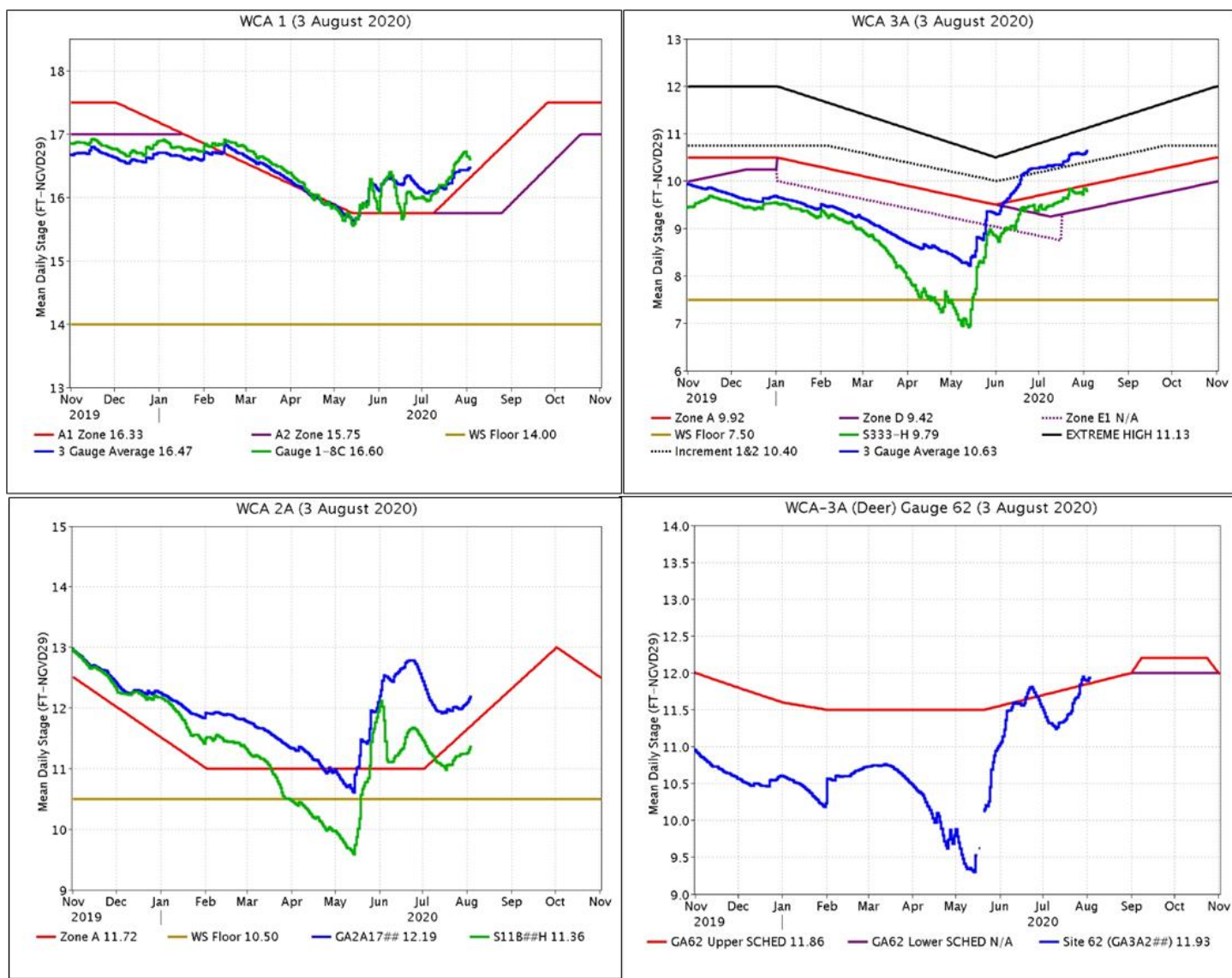
Below average rainfall was consistently recorded across the WCAs last week, NW WCA-3A received the most. At the gauges monitored for this report stages were unchanged on average with a maximum increase of 0.18 feet in central WCA-2A. WCA-3A rose an estimated 0.04 feet*. Evaporation was estimated at 1.66 inches last week higher than the week prior.

* gauge malfunction from 7/30 to 8/3 required estimation



Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	0.78	+0.03
WCA-2A	0.84	+0.18
WCA-2B	0.62	-0.06
WCA-3A	0.97	ERROR
WCA-3B	0.85	-0.02
ENP	0.35	-0.11

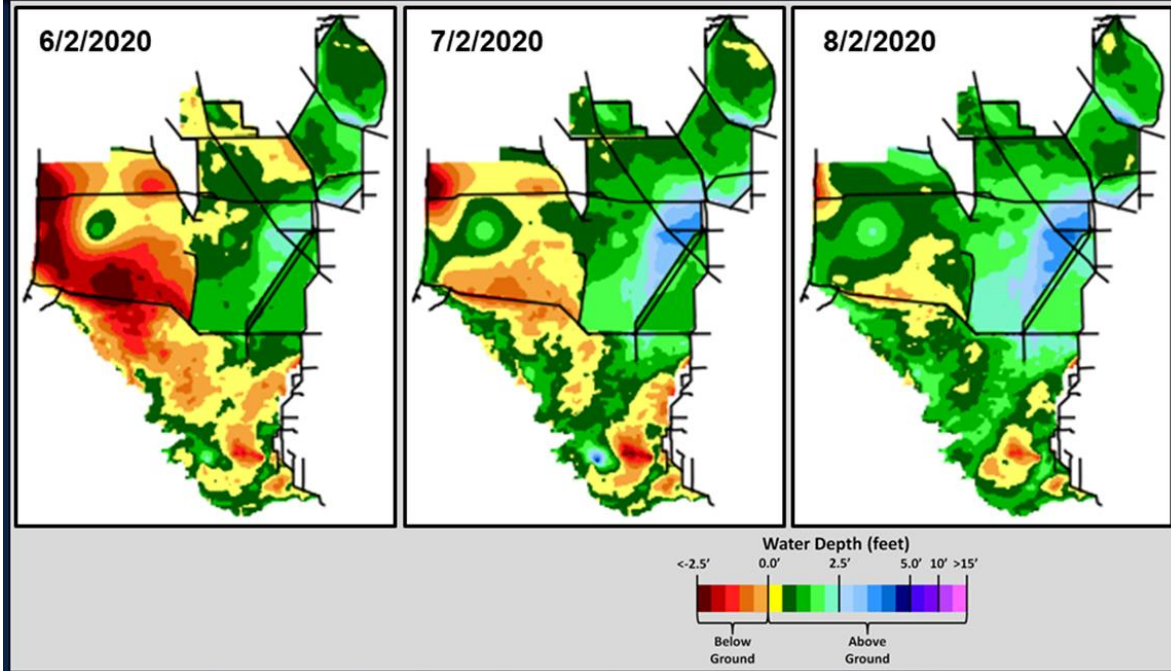
Regulation Schedules: WCA-1: Stage at the 1-8C Gauge trended down to the rising Zone A1 regulation line last week, currently 0.27 feet above, and the 3-Gauge average is 0.14 feet above. WCA-2A: Stage at Gauge 2-17 trends slightly upwards last week and is now 0.47 feet above. WCA-3A: The Three Gauge Average trends slightly upwards, currently 0.23 feet above the Increment 1&2 line, and 0.71 feet above the Zone A regulation line. WCA-3A: Stage at gauge 62 (Northwest corner) remained above the rising Upper Schedule last week, now 0.07 feet above.



Water Depths: The WDAT tool for spatial interpolation of depth monthly snapshots indicate depths in WCA-3A North are currently at 1.0 feet or higher across that sub-basin. Depths in WCA-3A South are increasing more than 3.5 feet along the upper reaches of the L-67 canal, and the spatial extent is expanding westward along the southern boundary. WCA-2A depths are lowest in the southeast and deepest along the northwestern boundary. Stages in WCA-1 remain deepest along the southwestern perimeter with the potential for shallow depths in the north. Hydrologic connectivity is strengthening within the major sloughs in Everglades National Park. Over the last month, stages rose across most of WCA-3A, most significantly along the western border. WCA-2A is significantly drier, most dramatically in the southeast. Differences in WCA-1 are mixed, deeper along the northeast, shallower along the northwest boundaries. Looking back one year, the stage difference patterns are very similar. WCA-3A depths along the L-67 A and downstream of the S-11S are significantly deeper. The WDAT model indicates wetter conditions in the western basins compared to a month ago but not a year ago.



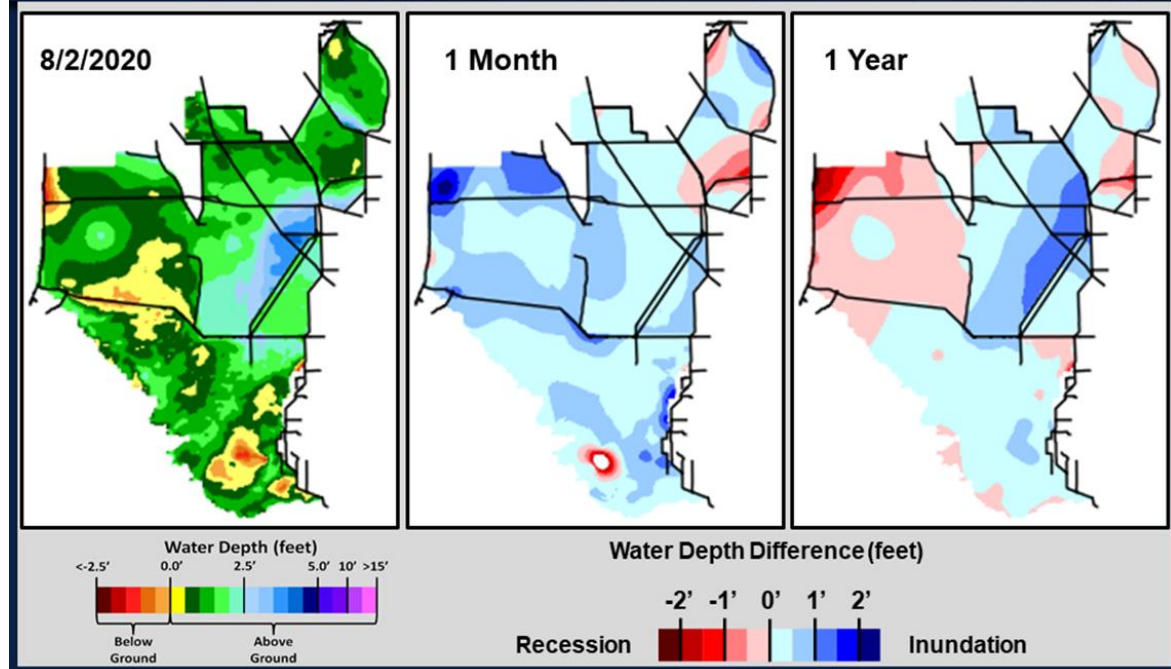
SFWDAT Water Depth Monthly Snapshots



South Florida Water Depth Assessment Tool (SFWDAT)

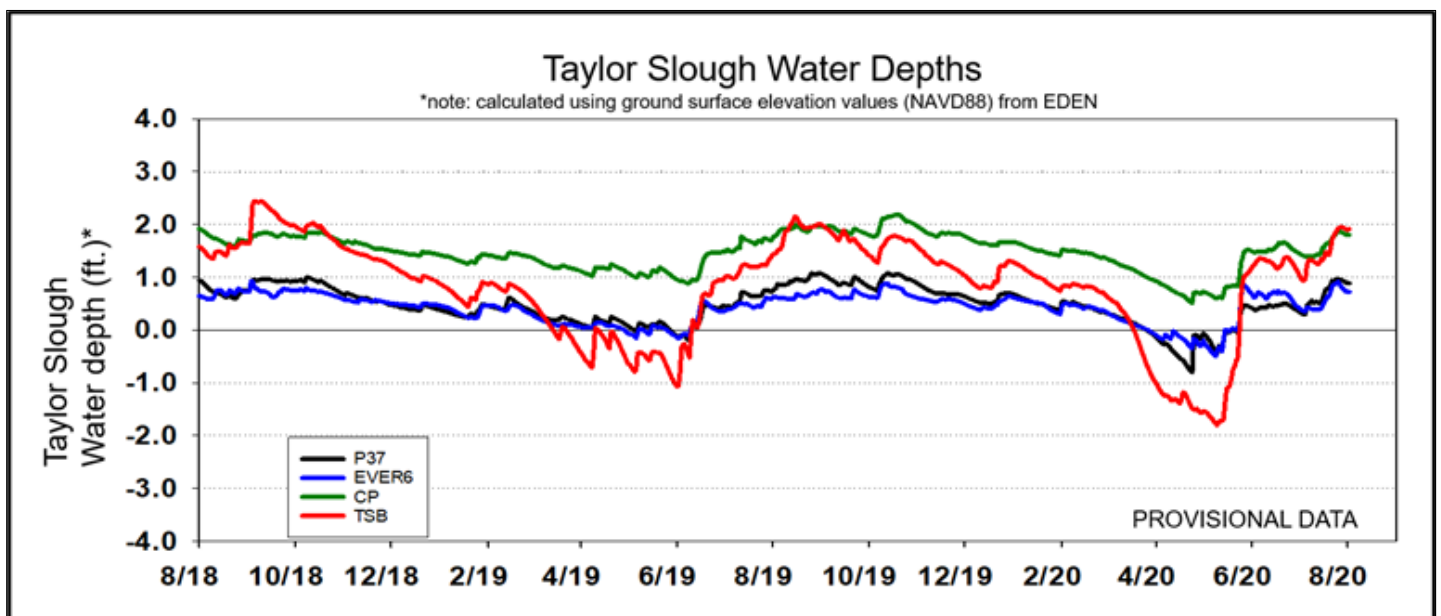
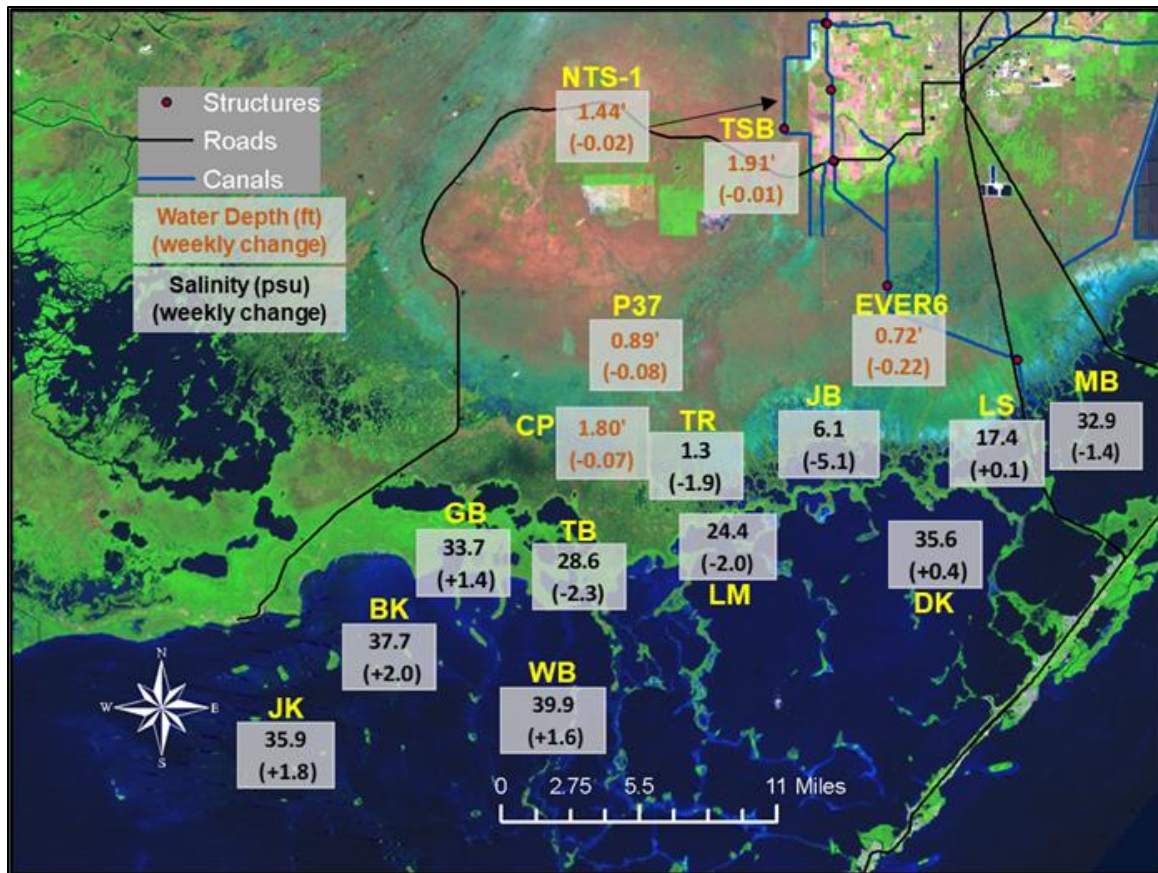


SFWDAT Everglades Difference Maps (Present – Past)

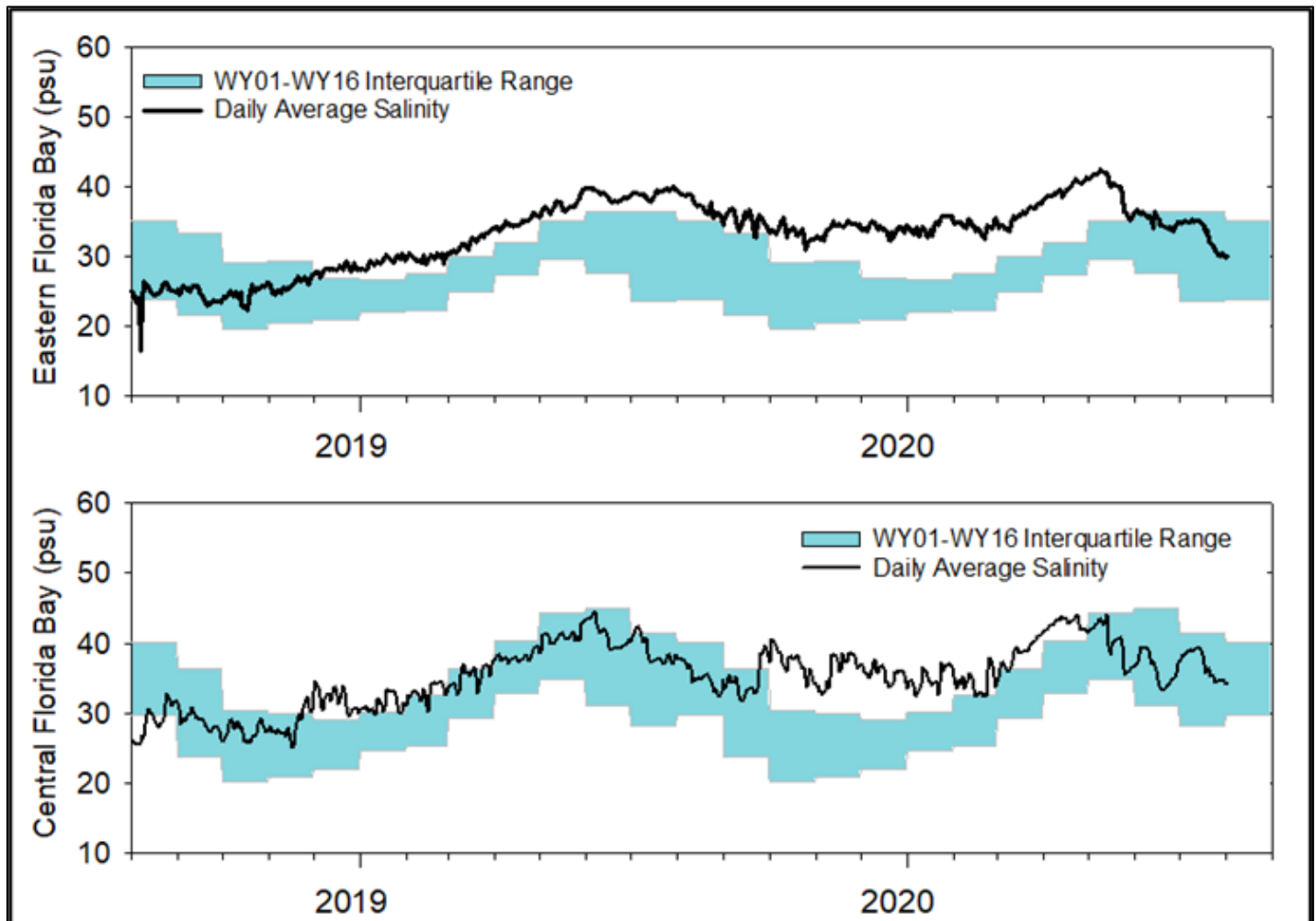


South Florida Water Depth Assessment Tool (SFWDAT)

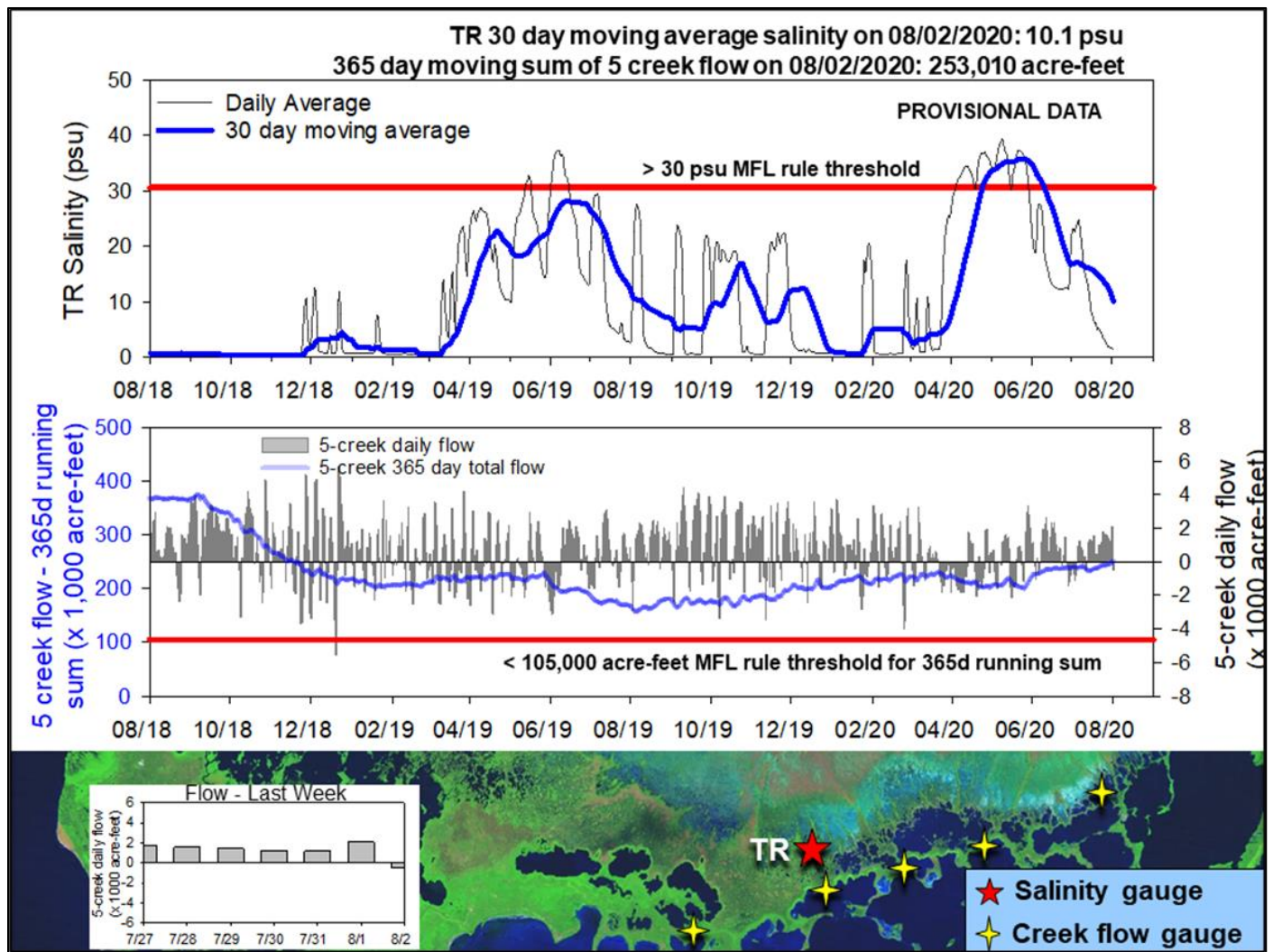
Taylor Slough Water Levels: Rainfall over Taylor Slough and Florida Bay this past week averaged only half an inch, and stages decreased 0.08 feet on average. The tropical system seemed to have dried out the southernmost areas of the state. All stations experienced a decrease of at least 0.01 feet, but average water depth is still 1.4 feet.



Florida Bay Salinities: Average salinity in Florida Bay decreased 0.3 psu (an order of magnitude less than last week). Nearshore salinities averaged a weekly decrease of 1.6 psu while bay sites averaged an increase of 1.4 psu. All stations are within 4 psu of their historical average with an average divergence of 0.25 psu above the historical average. The largest divergence is 3.7 psu higher than historical average in eastern Florida Bay.



Florida Bay MFL: Salinity at the TR station in the mangrove zone (tracked for the Florida Bay MFL) decreased from 3 psu to end the week at 1 psu. The 30-day moving average decreased 3.4 psu to end at 10.1 psu. Weekly flow from the 5 creeks identified by yellow stars on the map totaled just over 8,700 acre-feet with positive flows persisting through Saturday. The 365-day moving sum of flow from the five creeks (tracked as part of the Florida Bay MFL criteria) increased 9,000 acre-feet this week to end at 253,010 acre-feet which is just above the median (249,091 acre-feet) and mean (250,857 acre-feet). Creek flows are provisional USGS data.



Water Management Recommendations

Conserving water in the WCAs and sending it southward has ecological benefit. Peak stages in northern WCA-3A provide improved conditions to support next season's wading bird nesting success at the Alley north colony by providing conditions for an increase in prey base as well as provide surface water that can protect it from terrestrial predators during the nesting season. Ponding along the L-67 canal/levee system has increased and inundation of the tree islands in that region has now persisted for more than 60 days. Moderating inflows into that region decreases ponding in both spatial extent and limits the amount of time the region is inundated, this has benefit to the ecology of tree islands in that region. 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 the nearshore/off shore gradient returns. However, more freshwater is required to continue the decrease in salinities in both the nearshore and the eastern bay towards a more ecologically preferred condition. More specific recommendations appear in the summary table below. The red text represents new or modified information or recommendations.

SFWMD Everglades Ecological Recommendations, August 4th, 2020 (red is new)

Area	Weekly change	Recommendation	Reasons
WCA-1	Stage increased by 0.03'	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 0.18'	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 0.06'	Moderating the ascension rate to less than 0.25 feet per week or 0.50 feet per two weeks.	Protect upstream/downstream habitat and wildlife. Apple snail reproduction is hindered by rapidly increasing stage.
WCA-3A NE	Stage increased by 0.06' ??	Moderating the ascension rate to less than 0.25 feet per week or 0.50 feet per two weeks. Conserving water in this region has ecological benefit.	Protect upstream/downstream habitat and wildlife. Apple snail reproduction is hindered by rapidly increasing stage.
WCA-3A NW	Stage increased by 0.09'	Moderating the ascension rate to less than 0.25 feet per week or 0.50 feet per two weeks.	
Central WCA-3A S	Stage increased by 0.03'	Moderating the ascension rate to less than 0.25 feet per week or 0.50 feet per two weeks.	Protect upstream/downstream habitat and wildlife. Apple snail reproduction is hindered by rapidly increasing stage, and tree island ecology is diminished by flooding
Southern WCA-3A S	Stage decreased by 0.03'		
WCA-3B	Stage decreased by 0.02'	Moderating the ascension rate to less than 0.25 feet per week or 0.50 feet per two weeks.	Protect upstream/downstream habitat and wildlife. Apple snail reproduction is hindered by rapidly increasing stage.
ENP-SRS	Stage decreased by 0.11'	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 -0.01' to -0.22'	Move water southward as possible	When available, provide freshwater buffer for downstream conditions.
FB- Salinity	Salinity changes ranged -5.1 to +2.0 psu	Move water southward as possible	When available, provide freshwater to maintain low salinity buffer and promote water movement.