

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

M E M O R A N D U M

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

FROM: SFWMD Staff Environmental Advisory Team

DATE: October 14, 2020

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

While cooler temperatures are not in the cards for the District with this week's front, a mid-level trough is forecast to push into the District behind the front bringing much drier air southward over the District. The dry air will limit the potential for shower activity over the northern half of the District Wednesday and Thursday. Moisture blowing in from the northeast, as well as moisture across the Florida Straits, is forecast to keep scattered shower activity south and along the east coast Wednesday. The moisture in the Florida Straits is then forecast to creep back north allowing an increase in showers and a few thunderstorms mainly south and east Thursday and then mainly over the interior and east Friday. Another cold front is forecast to move into the area Friday night and Saturday. This boundary is currently forecast to stall near south Florida so expect drier conditions to return north with shower activity persisting south and east Saturday and Sunday. Breezy northeast winds are forecast to enhance tidal levels along the east coast Wednesday, and there is the potential for breezy northeast and east winds again Saturday through early the following week. Total rainfall is forecast to be near the historical average during the first 7-day period (Week 1) and then near the historical average again during the second 7-day period (Week 2).

Kissimmee

Tuesday morning stages were 57.4 feet NGVD (at schedule) in East Lake Toho, 54.5 feet NGVD (0.1 feet above schedule) in Toho, and 52.3 feet NGVD (0.4 feet above schedule) in Kissimmee-Cypress-Hatchineha; headwater stages were 46.3 feet NGVD at S-65A and 27.8 feet NGVD at S-65D. Tuesday morning discharges were 990 cfs at S-65, 1,190 cfs at S-65A, 4,100 cfs at S-65D and 4,640 cfs at S-65E. Dissolved oxygen concentration in the Kissimmee River averaged 1.3 mg/L for the week through Sunday. Kissimmee River mean floodplain depth on Sunday was 2.16 feet. Beginning Monday 10/12, the recommendation is to reduce flow at S-65A to minimum discharge (300 +/- 50 cfs) at up to 150 cfs/day as needed to retain stage in Lakes Kissimmee-Cypress-Hatchineha.

Lake Okeechobee

Lake Okeechobee stage was 16.18 feet NGVD on October 12, 2020, 0.32 feet higher than the previous week and 1.37 feet higher than the previous month. This week the Lake rose into the Intermediate 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. Stage has been above or near the top of the envelope since August 1, 2020 and is currently 0.73 feet above. Ascension rates have exceeded the recommended rate (<0.5 foot per 2 weeks) many times since mid-May and lake stage has risen over 5 feet during that time. Cyanobacterial bloom risk potential is high in central and northern portions of the Lake. Water quality sampling on October 5-7, 2020 found four stations with Microcystin toxin levels >8 µg/L. Chlorophyll-a results are pending.

Estuaries

Total inflow to the St. Lucie Estuary averaged 3,636 cfs with no flow coming from Lake Okeechobee. The seven-day average salinities decreased throughout the estuary over the past week. Salinity at the US1 Bridge is in the poor range (0-5) for adult eastern oysters.

Total inflow to the Caloosahatchee Estuary averaged 4,086 cfs over the past week with no flow coming from the Lake. Seven-day average salinity remained almost fresh at Ft. Myers and upstream but increased in the lower 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 Sanibel, and in the poor range at Cape Coral (0-5).

Lake stage is in the Intermediate sub-band of 2008 LORS. Tributary hydrological conditions are very wet. The LORS 2008 Release Guidance suggests up to 4,000 cfs release at S-77 to the Caloosahatchee Estuary and up to 1,800 cfs release at S-80 to the St. Lucie Estuary.

Stormwater Treatment Areas

Over the past week, 13,800 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 49,900 ac-feet. The total amount of inflows to the STAs in WY2021 is approximately 961,000 ac-feet. Most STA cells are near or 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-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, if 2008 LORS recommends Lake releases to the WCAs and conditions allow, releases will be sent to STA-2 or the A-1 FEB/STA-3/4.

Everglades

Less rainfall was experienced across the Everglades last week than the week prior, and stage changes in WCA-3A were generally within the preferred ecological range. WCA-1 stage was above schedule late last week. WCA-3A remains above schedule but generally trending parallel with regulation. WCA-2A stages are now receding towards the falling regulation schedule. Stages decreased on average in Taylor Slough but remain above average for this time of year. Salinities decreased on average across Florida Bay and the nearshore this week, however the western nearshore salinities remain above average for this time of year. Salinities in the TR mangrove zone to the east remained near fresh as discharge rates from the creeks in that area were the highest so far this water year.

Supporting Information

KISSIMMEE BASIN

Rainfall

The Upper Kissimmee Basin received 0.46 inches of rainfall in the past week and the Lower Basin received 1.19 inches (SFWMD Daily Rainfall Report 10/11/2020).

Upper Kissimmee

Table 1 lists stage and discharge for several Kissimmee Chain of Lakes (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: 10/13/2020

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)						
							10/11/20	10/4/20	9/27/20	9/20/20	9/13/20	9/6/20	8/30/20
Lakes Hart and Mary Jane	S-62	21	LKMJ	60.4	R	60.3	0.1	0.0	0.1	0.4	0.0	0.0	0.0
Lakes Myrtle, Preston, and Joel	S-57	6	S-57	61.5	R	61.3	0.2	0.1	0.0	0.1	0.0	0.0	0.0
Alligator Chain	S-60	6	ALLI	63.4	R	63.5	-0.1	0.0	0.0	0.0	0.2	0.1	0.0
Lake Gentry	S-63	7	LKGT	61.2	R	61.2	0.0	-0.1	0.1	0.2	0.2	0.1	0.1
East Lake Toho	S-59	246	TOHOE	57.3	R	57.3	0.0	0.2	0.3	0.5	0.3	-0.3	-0.7
Lake Toho	S-61	689	TOHOW, S-61	54.4	R	54.3	0.1	0.2	0.2	0.1	0.1	0.1	-0.1
Lakes Kissimmee, Cypress, and Hatchineha	S-65	1,265	KUB011, LKIS5B	52.3	R	51.8	0.5	0.6	0.4	0.5	0.4	0.3	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

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** shows 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: 10/13/2020

Metric	Location	1-Day Average		Average for the Preceding 7-Days ¹							
		10/11/2020	10/11/20	10/4/20	9/27/20	9/20/20	9/13/20	9/6/20	8/30/20	8/23/20	8/16/20
Discharge (cfs)	S-65	1,116	1,265	1,725	2,890	3,143	2,193	2,631	3,273	2,506	1,611
Discharge (cfs)	S-65A ²	1,448	1,916	2,248	3,578	3,855	2,700	3,176	4,247	3,173	1,990
Discharge (cfs)	S-65D ²	4,339	4,848	4,692	5,198	3,738	3,512	4,262	3,420	3,067	4,360
Headwater Stage (feet NGVD)	S-65D ²	27.72	27.68	27.75	27.73	27.77	27.63	27.74	27.75	27.59	27.57
Discharge (cfs)	S-65E ²	4,620	5,287	5,081	4,994	3,919	3,578	4,317	3,444	3,079	4,484
Discharge (cfs)	S-67	0	0	0	0	0	0	0	0	0	0
DO (mg/L) ³	Phases I & II/III river channel	1.3	1.3	1.2	1.2	1.1	0.9	0.7	1.1	1.0	0.4
Mean depth (feet) ⁴	Phase I floodplain	2.16	2.29	2.41	2.70	2.31	2.06	2.42	2.27	1.76	2.06

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.

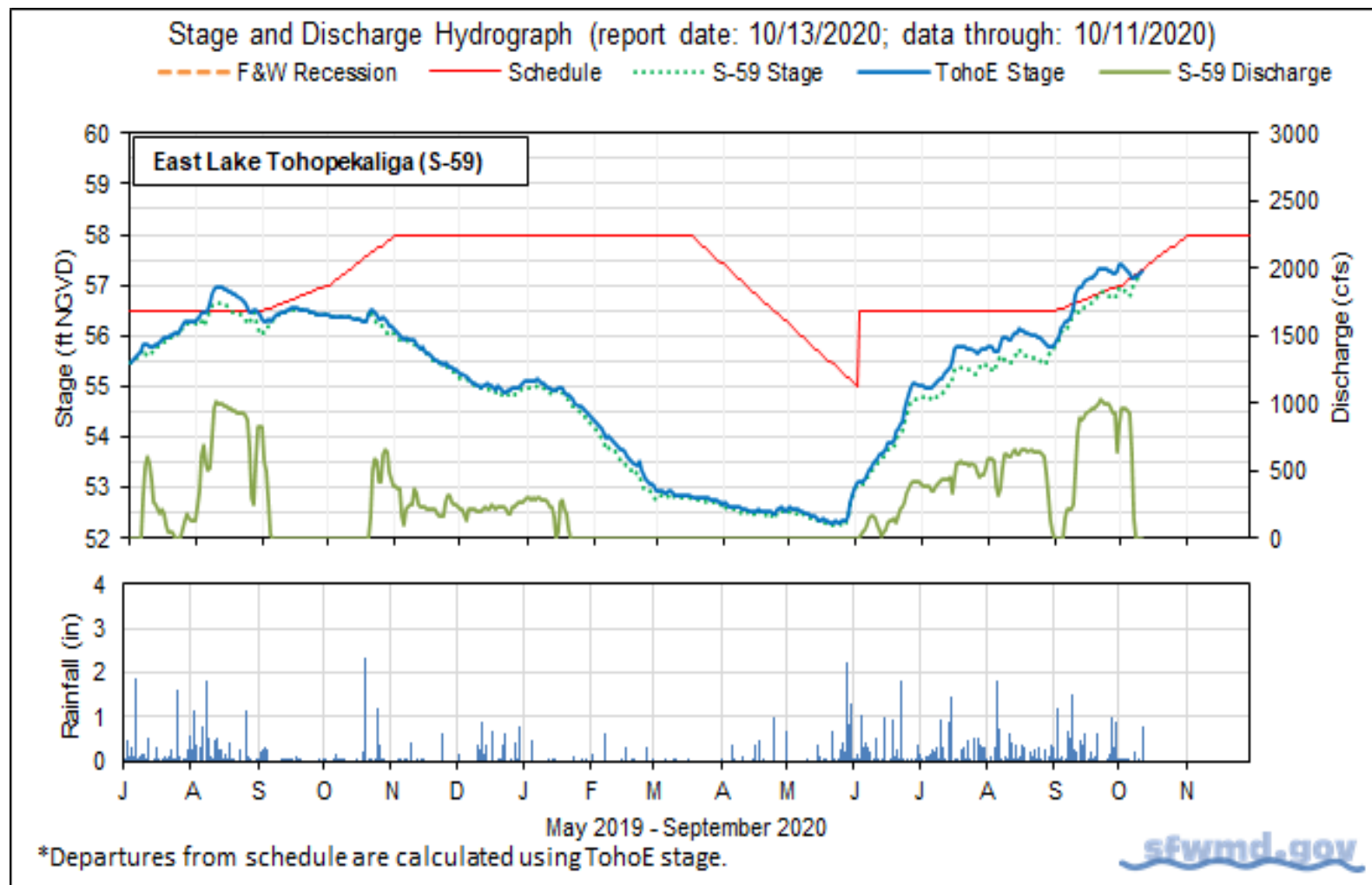


Figure 1. East Lake Toho regulation schedule, stage, discharge and rainfall.

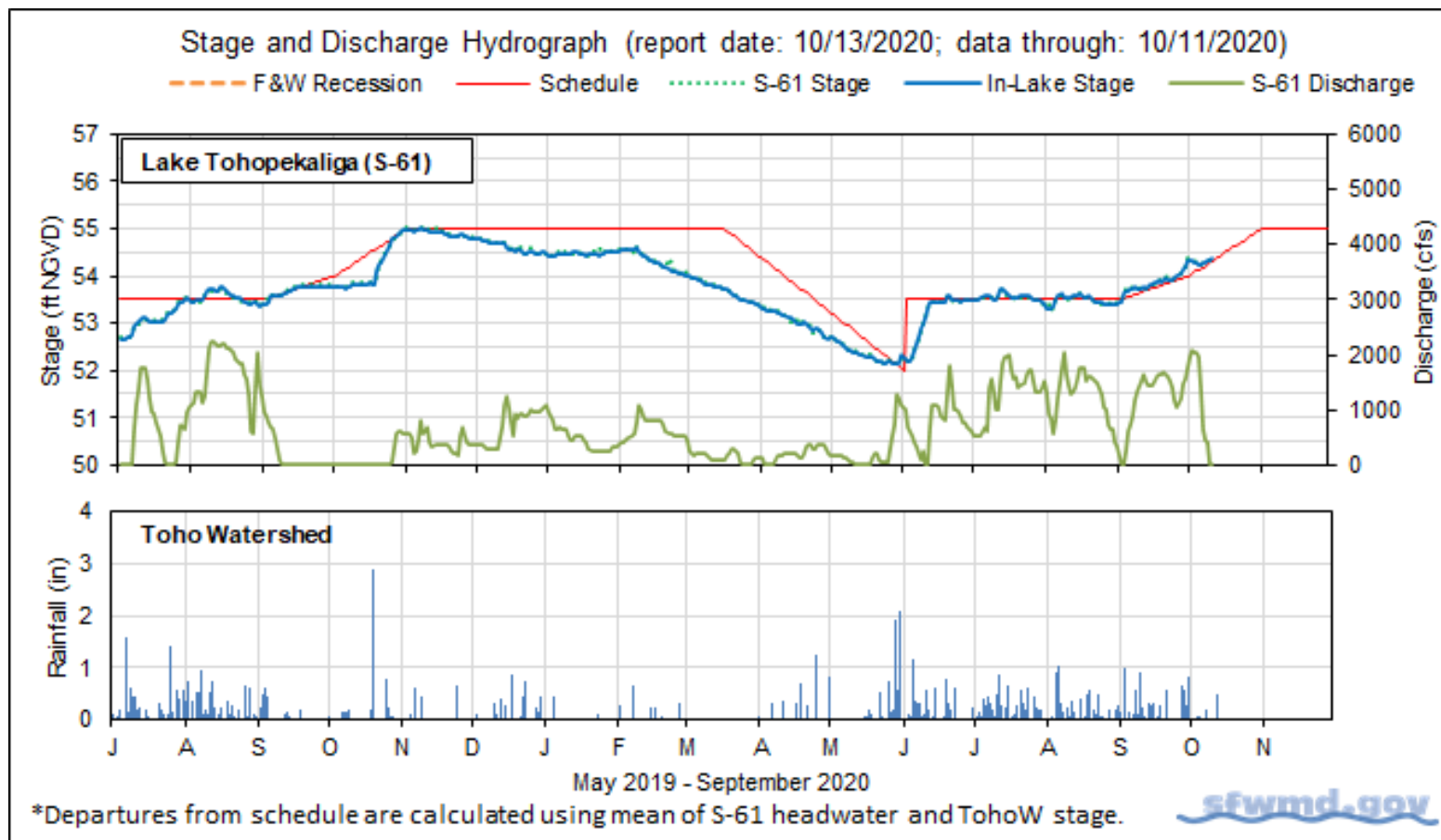


Figure 2. Lake Toho regulation schedule, stage, discharge and rainfall.

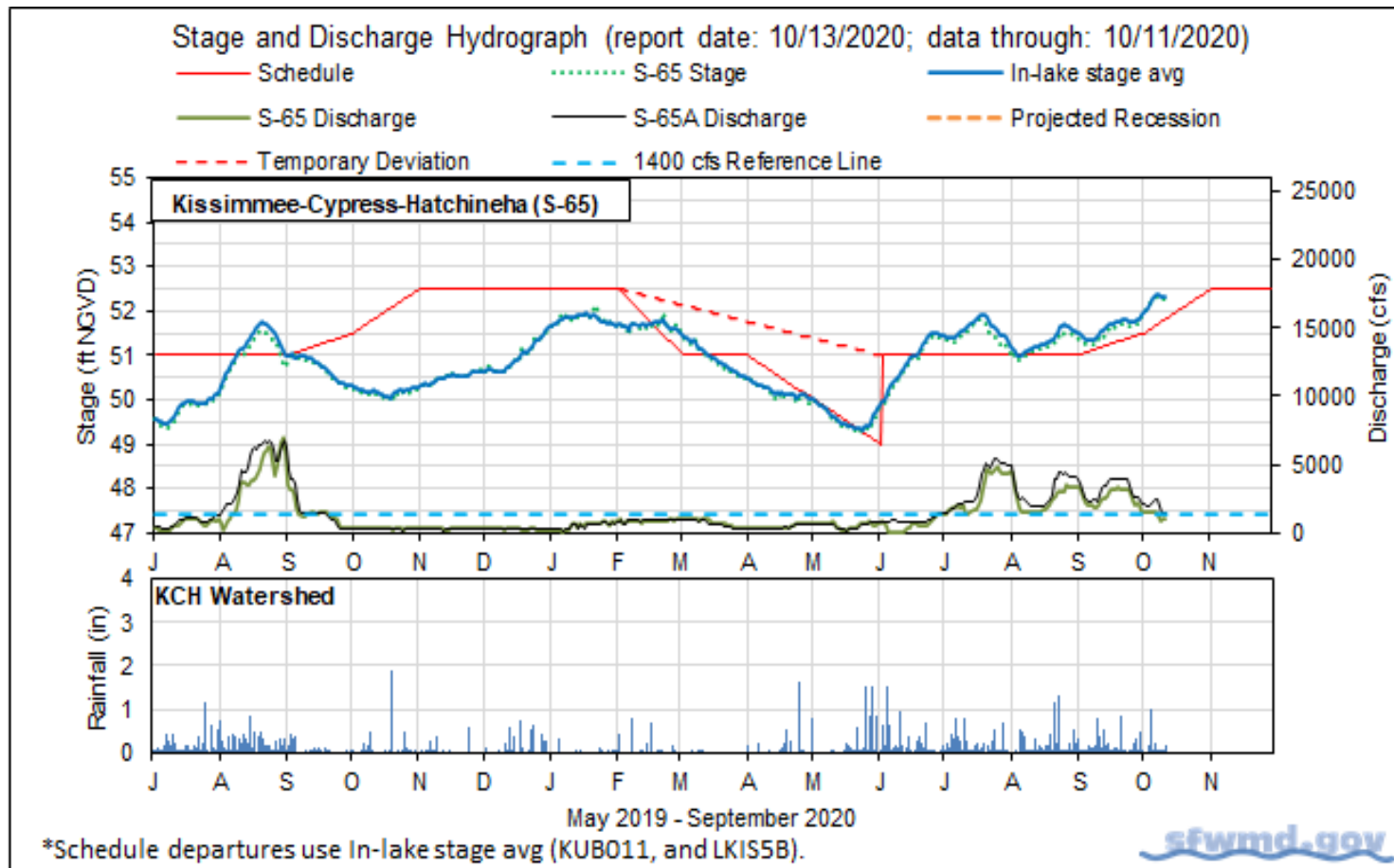


Figure 3. Lakes Kissimmee, Cypress and Hatchineha regulation schedule, stage, discharge and rainfall.

Kissimmee River Phase I Restoration Area Water Depth Maps

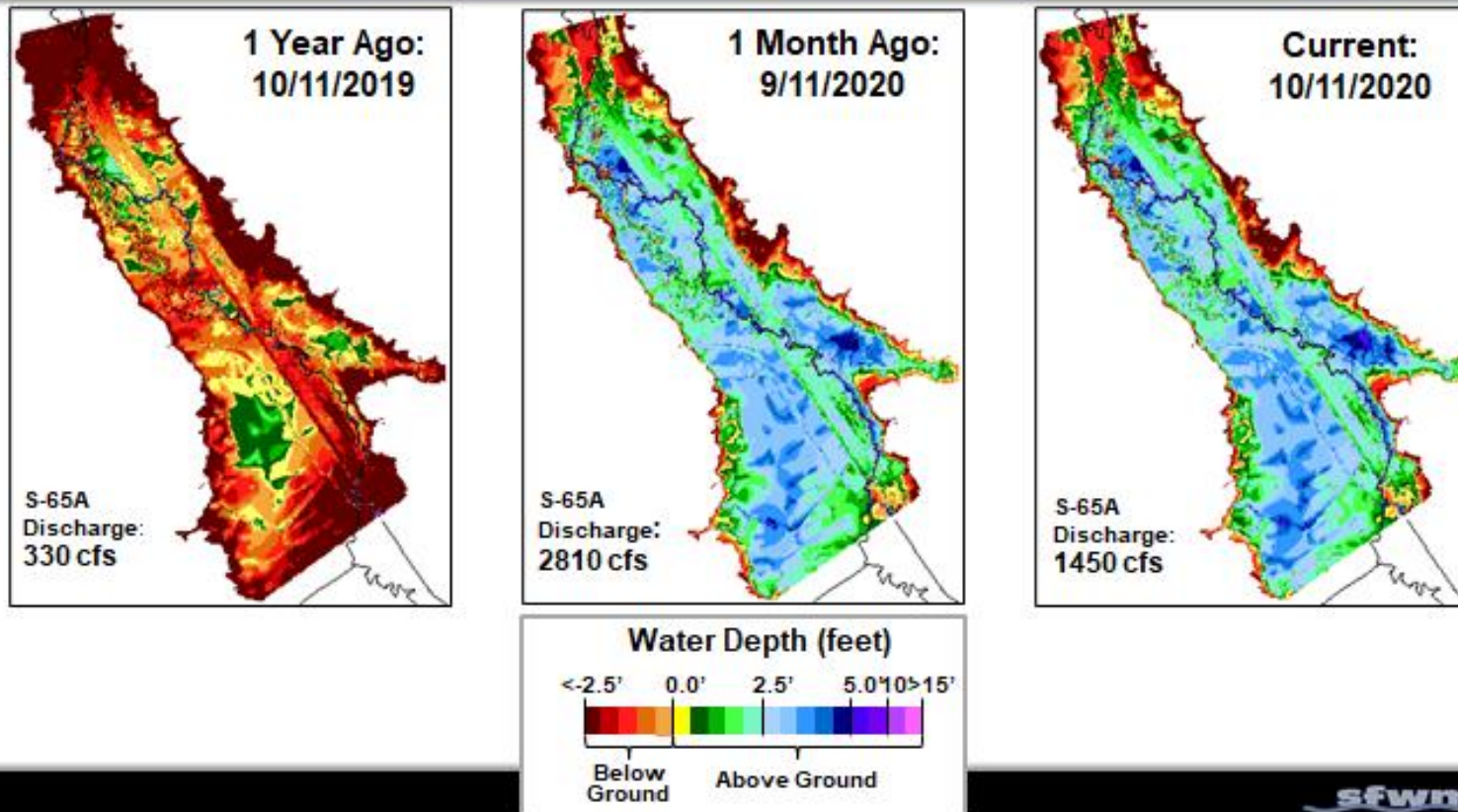
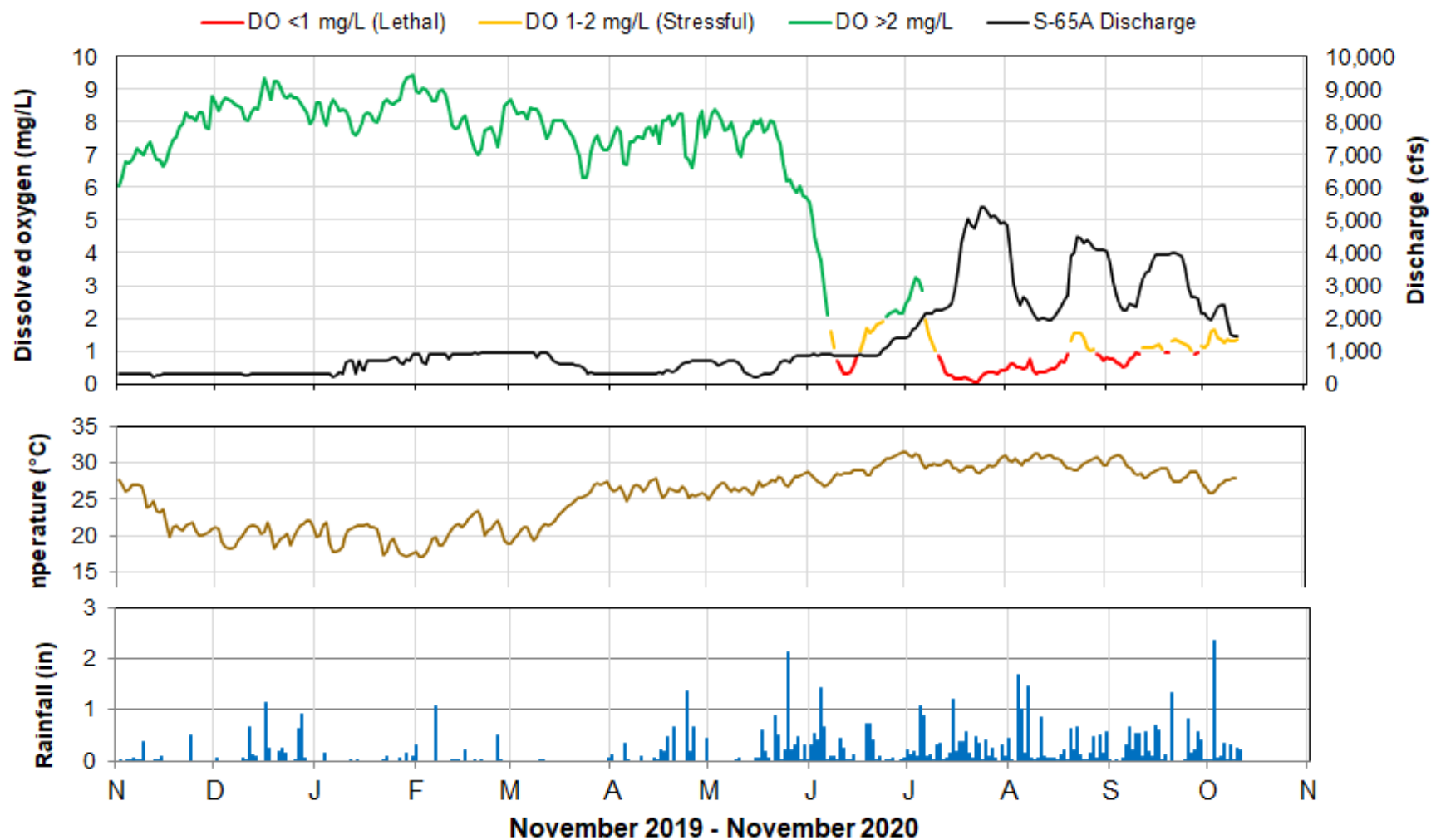


Figure 4. Phase I area floodplain water depths (from left to right) one year ago, one month ago and current. Color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to January 16, 2012.



Dissolved oxygen (DO) and temperature are mean daily values averaged for PC62, KRBN, PC33, PD62R and PD42R with an average of 3 stations reporting this week. Rainfall values are daily totals for Kissimmee River (Pool BCD) AHED watershed.

Report Date: 10/13/2020; data are through: 10/11/2020

sfwmd.gov

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.

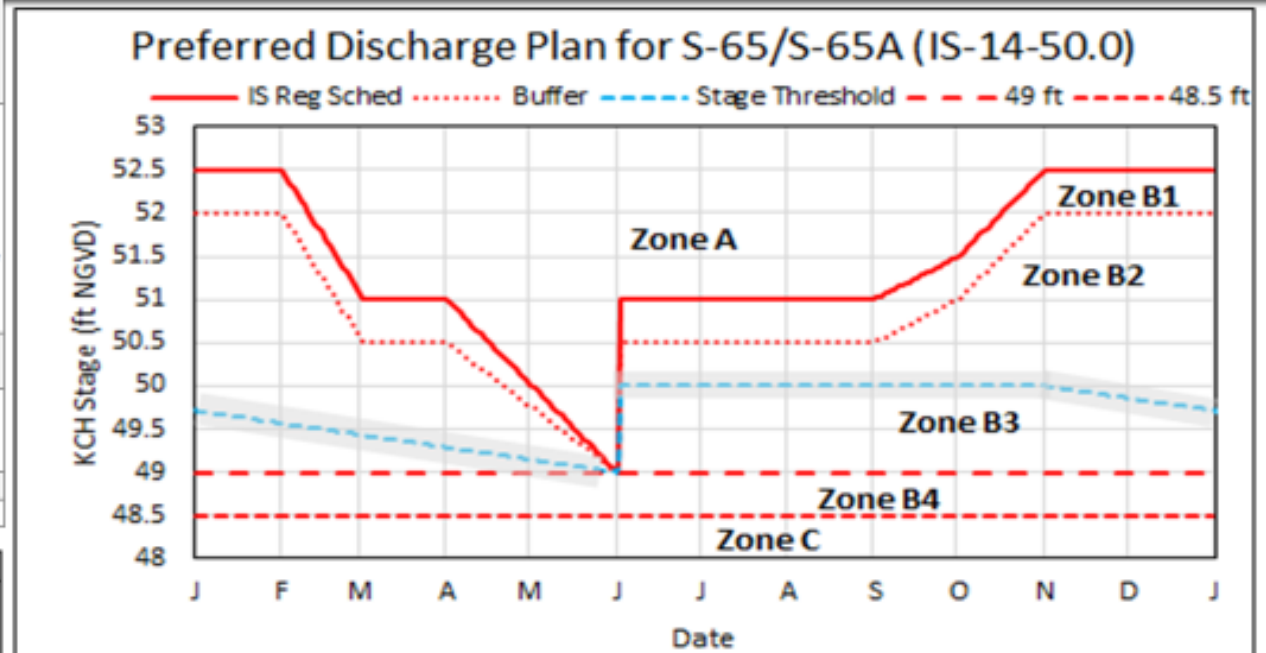
*Changes in discharge should not exceed limits in inset table below.

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.

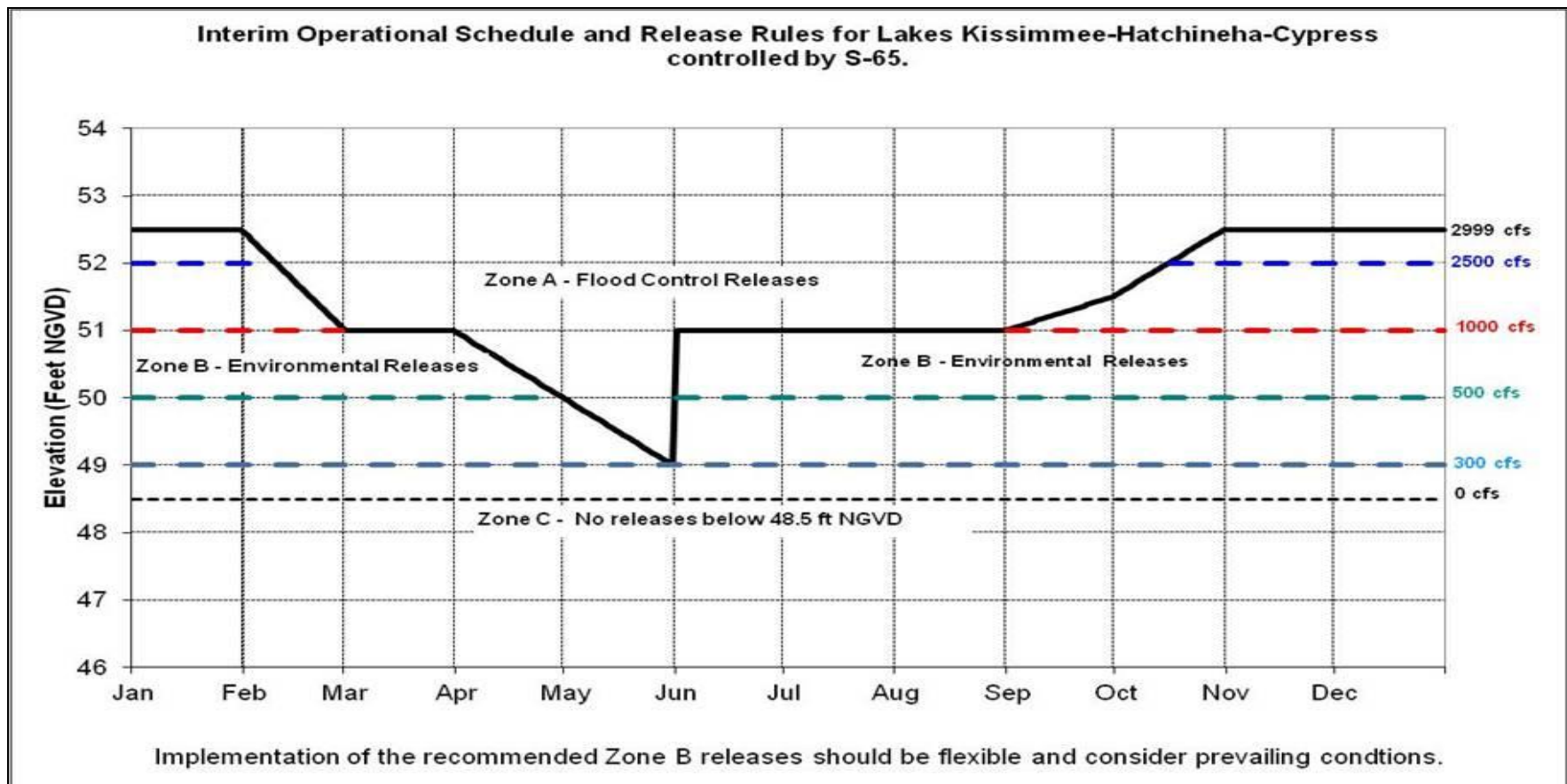


Figure 7. Interim operations schedule for S-65 (solid black line). The discharge schedule shown to the right has not been used in recent years.

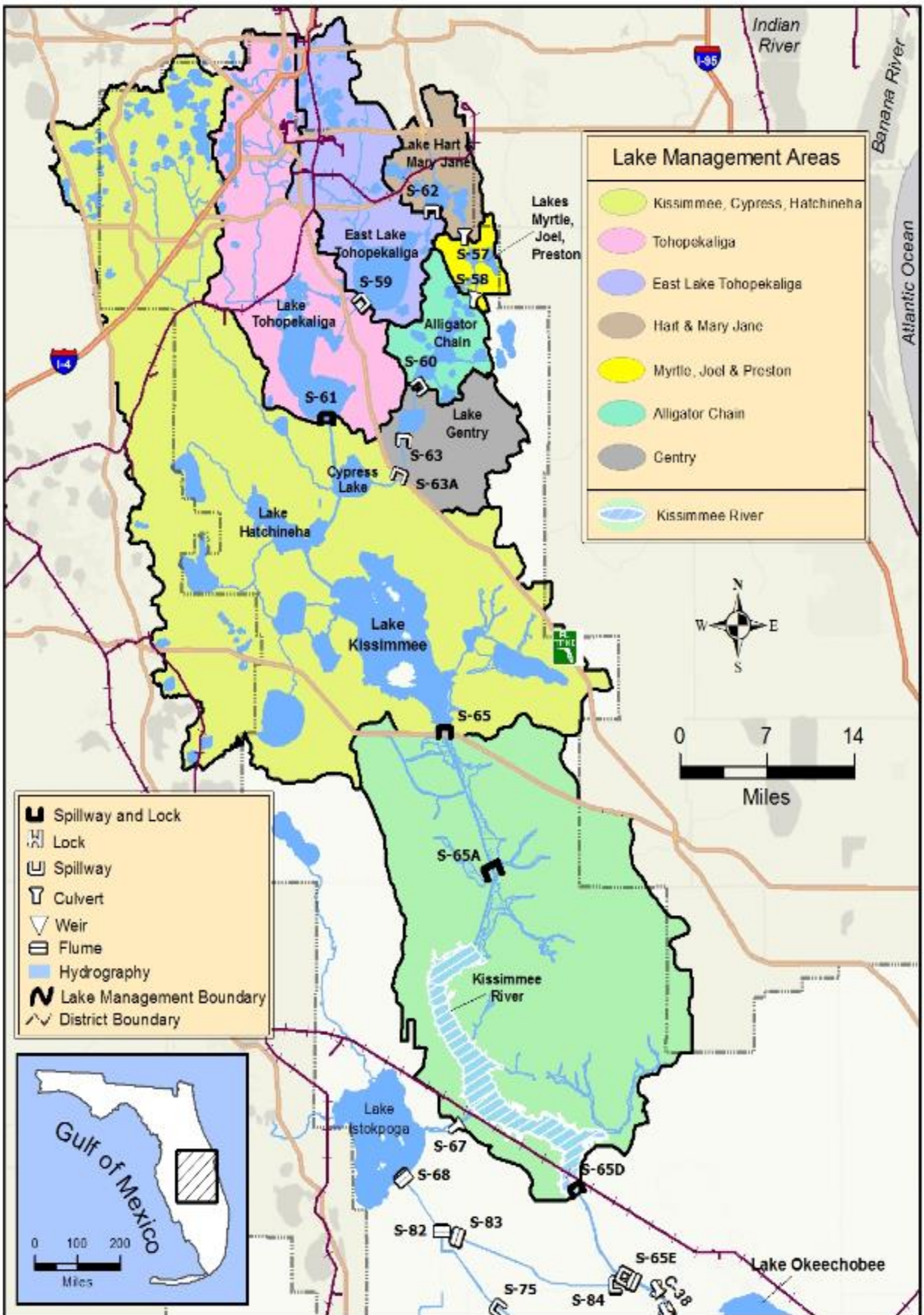


Figure 8. The Kissimmee Basin.

LAKE OKEECHOBEE

Lake Okeechobee stage is 16.18 feet NGVD, 1.32 feet higher than a month ago, and 2.68 feet higher than one year ago (Figure 1). Lake stages rose into the lower portion of the preferred ecological envelope on June 2, 2020 (Figure 2) but have been above the envelope since the end of July and are currently 0.73 above the envelope. Lake stage moved into the Beneficial Use sub-band on March 4, 2020, into the Base Flow sub-band in mid-July, and this week it entered the Intermediate sub-band (Figure 3). Lake stage reached a low of 10.99 feet on May 17 and has risen over 5 feet higher in less than 5 months. According to RAINДАР, 1.04 inches of rain fell directly over the Lake through the past week, while much of the watershed received between 0.5 and 1.5 inches (Figure 4).

The average daily inflows (minus rainfall) remain very high, but decreased slightly from the previous week, from 11,046 cfs to 10,457 cfs. Outflows (minus evapotranspiration) remained low, at 865 cfs. Most of the inflows came from the Kissimmee River (5,076 cfs through S-65E & S-65EX1), but there were substantial inflows from the C-41a canal (S-84 & S-84X, 1,633 cfs), Fisheating Creek (1,233 cfs) and the C-40 and C-41 canals (S-71 & S-72, 1,119 cfs). Inflows from the C-59 canal via the S-191 structure decreased from 995 cfs to 660 cfs. Outflows were all south through the S-350 structures and were similar to the past week at 865 cfs. 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 first October sampling occurred on the 5th to 7th (Figure 6). Cyanotoxins were detected at 12 of the 31 stations sampled, and four of these stations had Microcystin levels higher than 8 µg/L (the EPA recommendation for recreational waters), ranging from 13 to 53 µg/L. Chlorophyll-a results are pending.

The most recent satellite image (October 12, 2020) from NOAA's cyanobacteria monitoring product derived from EUMETSAT's Sentinel 3 OLCI sensor data suggested a high cyanobacteria bloom risk in the central and northern regions of the Lake, potentially due to reduced wind and rain activity over the past week. (Figure 7).

Water Management Summary

Lake Okeechobee stage was 16.18 feet NGVD on October 12, 2020, 0.32 feet higher than the previous week and 1.37 feet higher than the previous month. This week the Lake rose into the Intermediate 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. Stage has been above or near the top of the envelope since August 1, 2020 and is currently 0.73 feet above the envelope. Ascension rates have exceeded the recommended rate (<0.5 foot per 2 weeks) many times since mid-May and lake stage has risen over 5 feet during that time. Cyanobacterial bloom risk potential is high in central and northern portions of the Lake. Water quality sampling on October 5-7, 2020 found four stations with Microcystin toxin levels >8 µg/L. Chlorophyll-a results are pending.

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	5176	5076	1.9
S-71 & S-72	895	1119	0.4
S-84 & S-84X	2226	1633	0.6
Fisheating Creek	912	1233	0.5
S-154	162	191	0.1
S-191	995	660	0.2
S-133 P	258	133	0.1
S-127 P	33	48	0.0
S-129 P	45	42	0.0
S-131 P	63	42	0.0
S-135 P	224	226	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	57	53	0.0
Rainfall	4428	2762	1.0
Total	15474	13219	5.0

OUTFLOWS	Previous week Avg Daily CFS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)
S-77	0	0	0.0
S-308	0	0	0.0
S-351	467	189	0.1
S-352	308	325	0.1
S-354	25	351	0.1
L-8 Outflow			
ET	1801	2466	0.9
Total	2600	3331	1.3

Provisional Data

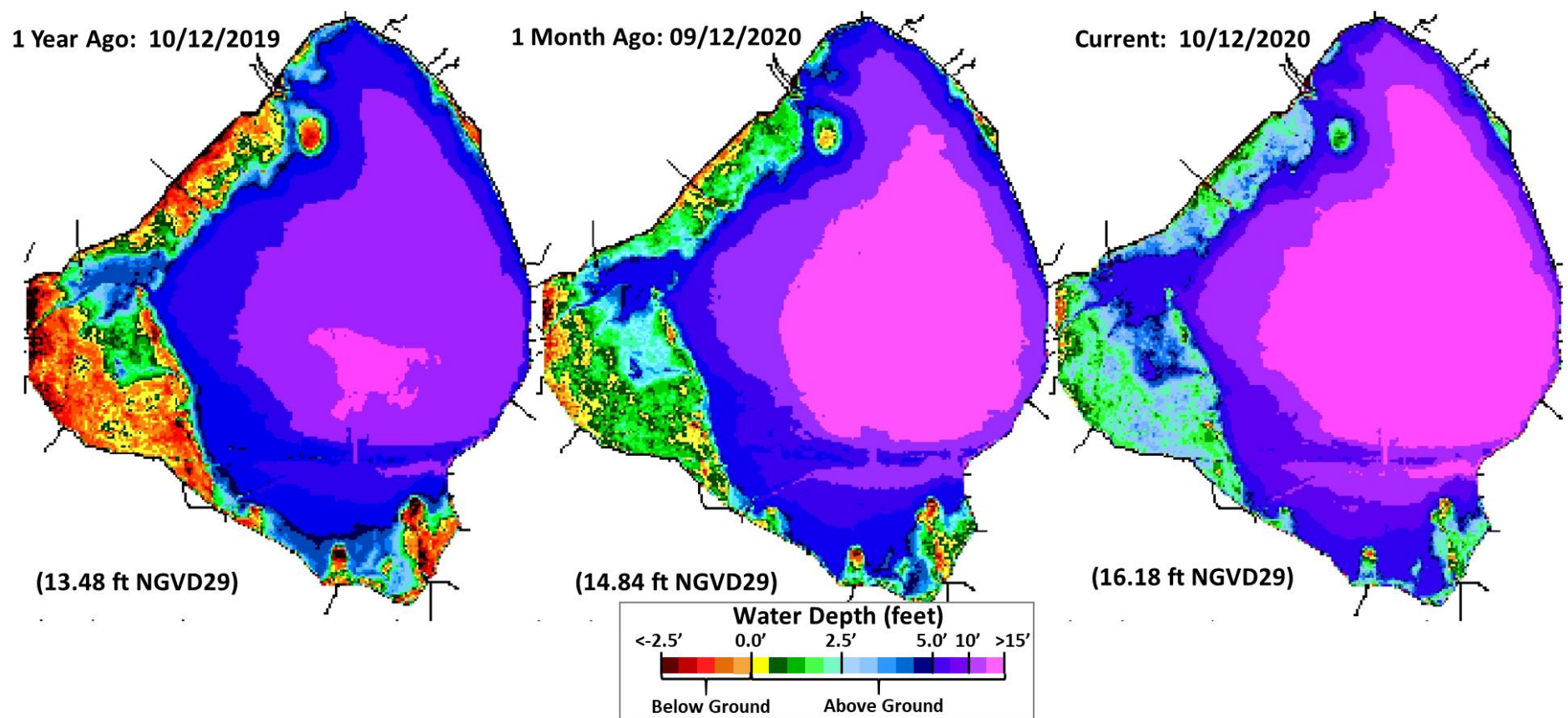


Figure 1. Water depth estimates on Lake Okeechobee based on the South Florida Water Depth Assessment Tool.

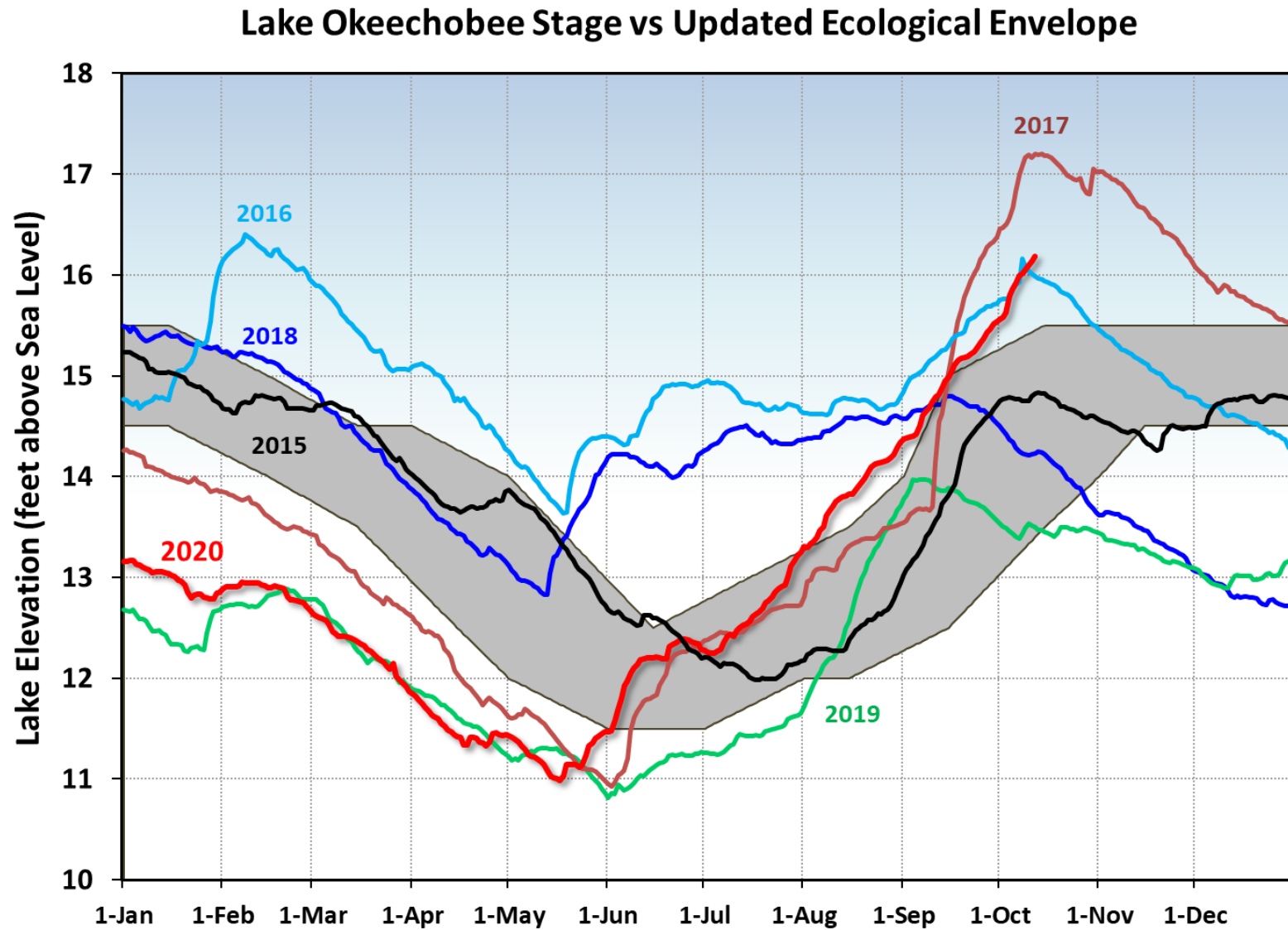


Figure 2. Select annual stage hydrographs for Lake Okeechobee in comparison to the updated Ecological Envelope.

Lake Okeechobee Water Level History and Projected Stages

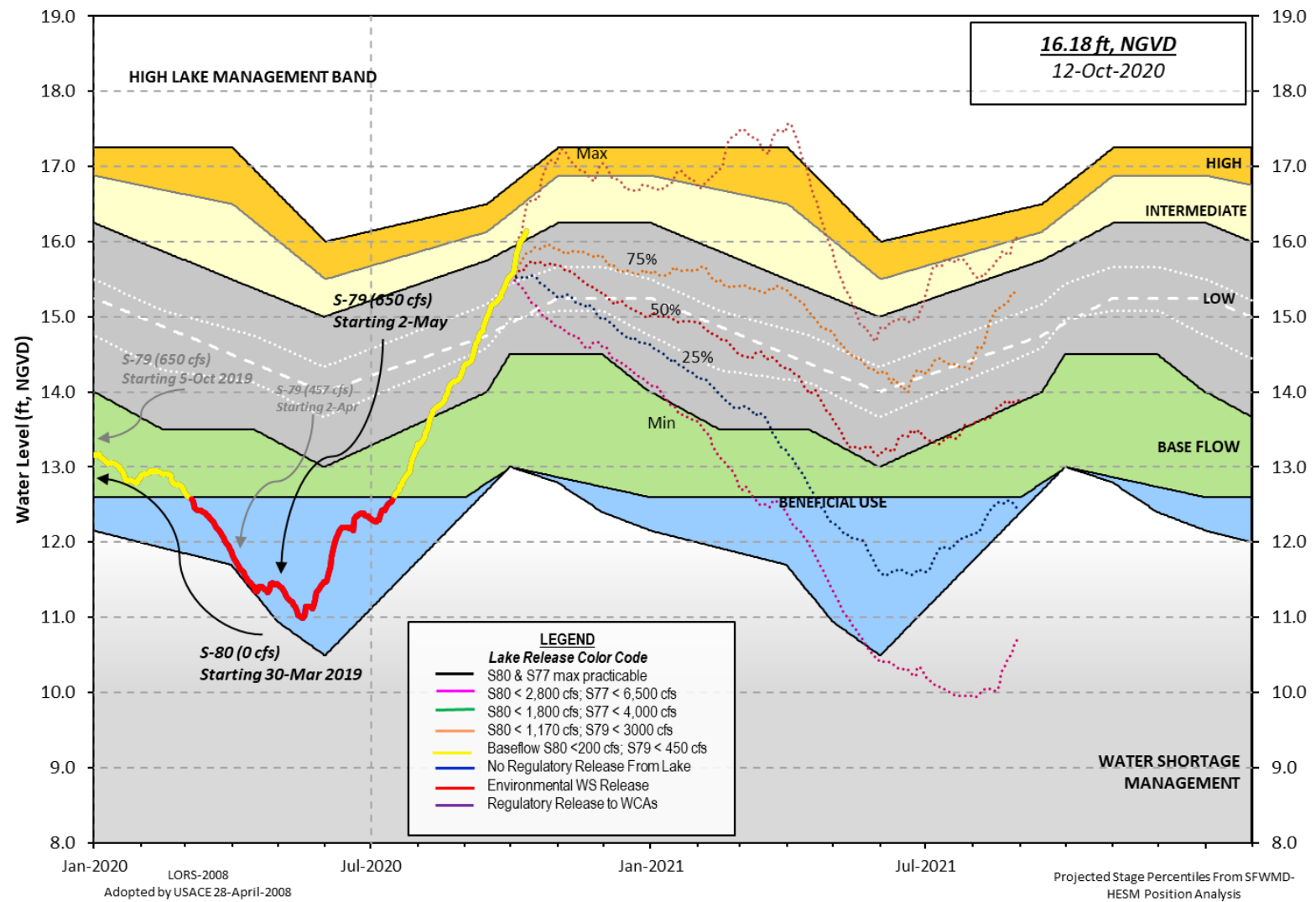


Figure 3. Recent Lake Okeechobee stage and releases, with projected stages based on a dynamic position analysis.

SFWMD PROVISIONAL RAINDAR 7-DAY BASIN RAINFALL ESTIMATES
FROM: 0700 EST, 10/06/2020 THROUGH: 0700 EST, 10/13/2020

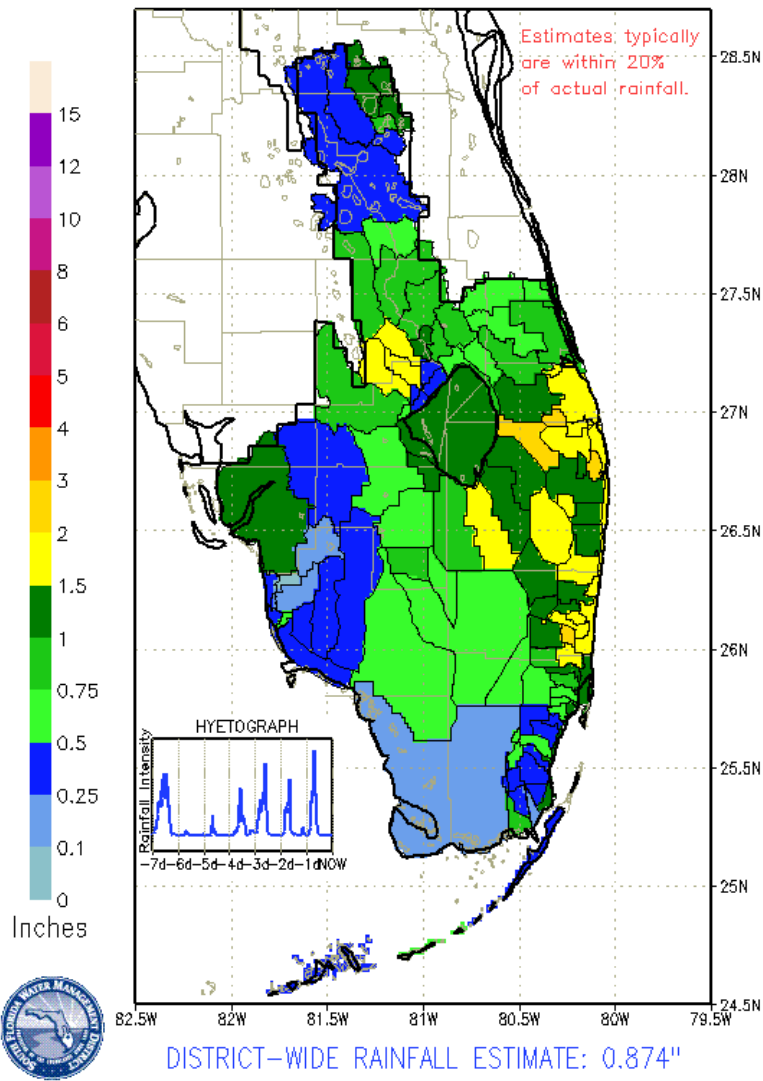


Figure 4. 7-Day rainfall estimates by RAINDAR.

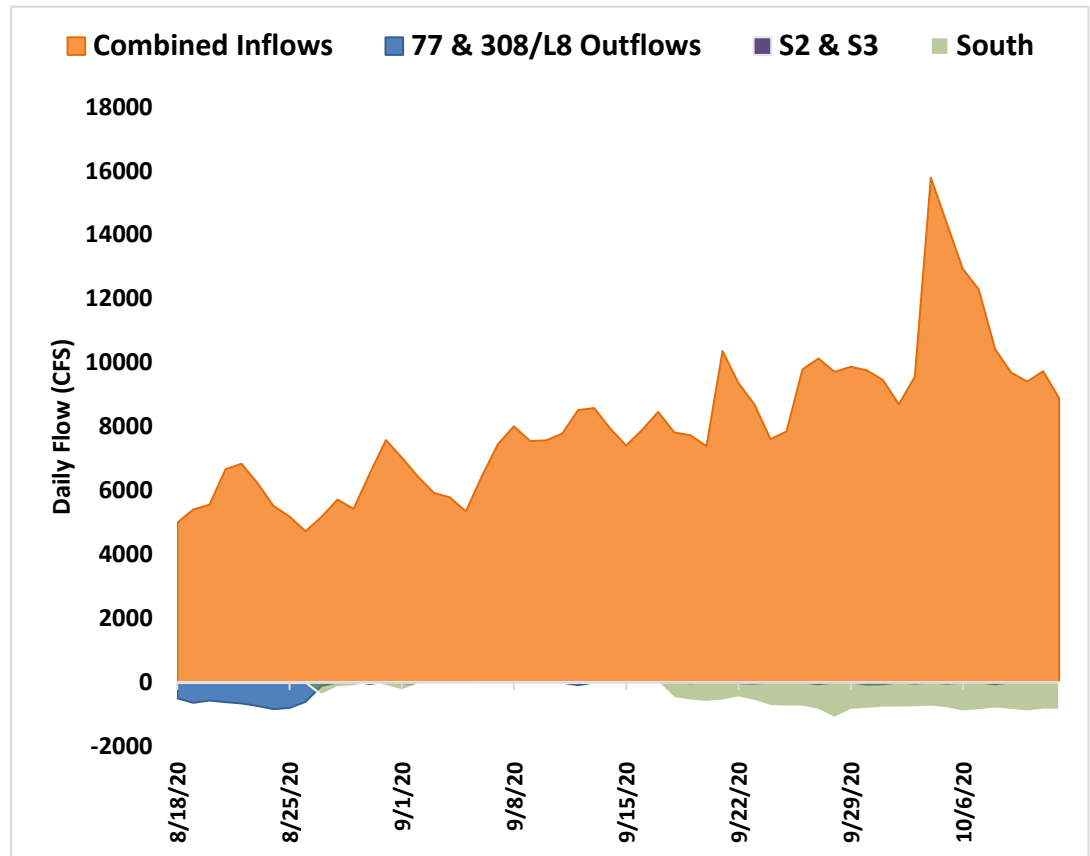


Figure 5. Major inflows (orange) and outflows (blue) of Lake Okeechobee, including the S-350 structures designated as South (green). The L-8 Canal flows through Culvert 10A are included as outflows when positive, and as inflows when backflowing into the Lake. All inflows and outflows are shown as positive 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: October 5-7, 2020

Station	CHL _a (ug/L)	TOXIN (ug/L)	TAXA
FEBIN	P	BDL	mixed
FEBOUT	P	BDL	NS
KISSR0.0	P	BDL	mixed
L005	P	BDL	<i>Planktol</i>
LZ2	P	BDL	mixed
KBARSE	P	5.5	<i>Microcys</i>
RITTA2	P	BDL	mixed
PELBAY3	P	BDL	mixed
POLE3S	P	BDL	mixed
LZ25A	P	BDL	mixed
PALMOUT	P	0.3	mixed
PALMOUT1	P	1.2	<i>Microcys</i>
PALMOUT2	P	3.2	<i>Microcys</i>
PALMOUT3	P	5.3	<i>Microcys</i>
POLESOUT	P	BDL	mixed
POLESOUT1	P	1.1	<i>Microcys</i>
POLESOUT2	P	13.0	<i>Microcys</i>
POLESOUT3	P	16.0	<i>Microcys</i>
EASTSHORE	P	BDL	mixed
NES135	P	BDL	mixed
NES191	P	BDL	mixed

Station	CHL _a (ug/L)	TOXIN (ug/L)	TAXA
L001	P	BDL	<i>Microcys</i>
L004	P	BDL	mixed
L006	P	BDL	mixed
L007	P	0.3	mixed
L008	P	43.0	<i>Microcys</i>
LZ30	P	6.0	mixed
LZ40	P	53.0	<i>Microcys</i>
CLV10A	P	BDL	mixed
NCENTER	P	BDL	mixed

S308C	P	BDL	mixed
S77	P	BDL	mixed

- SFWMD considers >40 µg/L Chlorophyll *a* (Chl_a) 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*

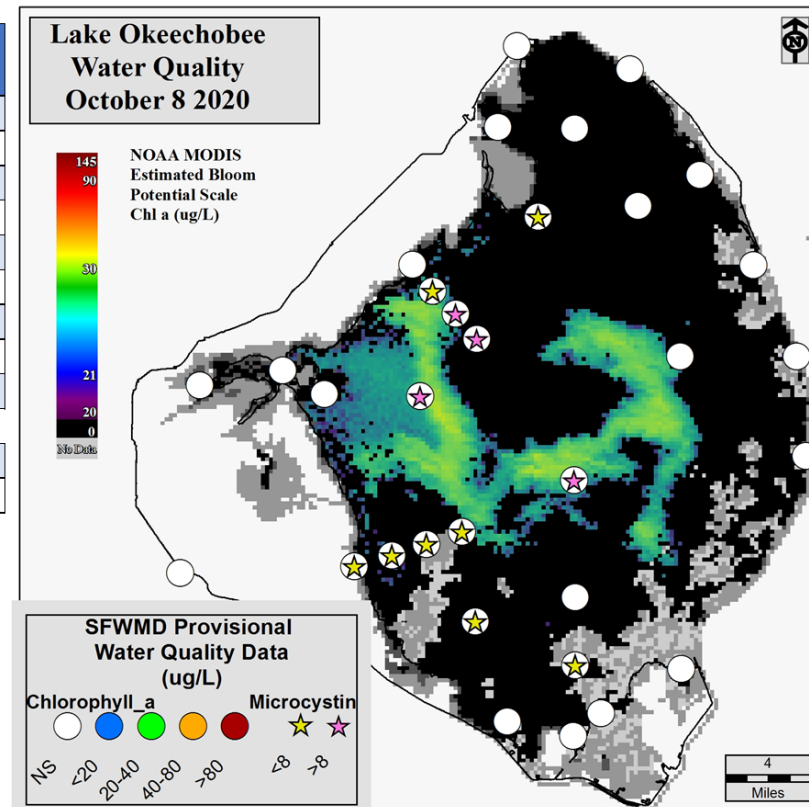


Figure 6. Provisional results from the expanded monitoring sampling trips on October 5-7, 2020

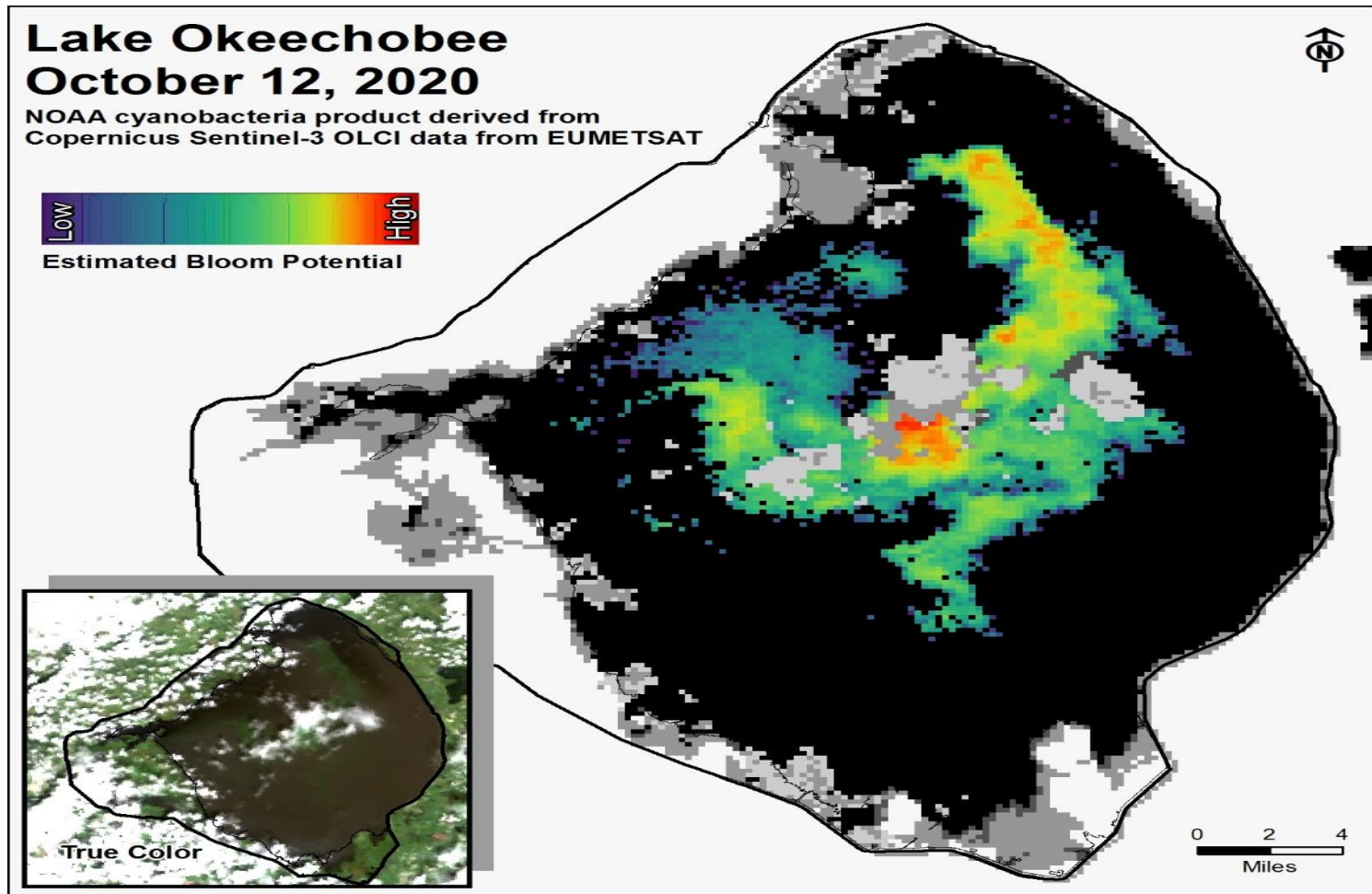


Figure 7. Potential for cyanobacterial blooms on Lake Okeechobee on October 12, 2020, based on NOAA's harmful algal bloom monitoring system. Gray color indicates cloud cover.

ESTUARIES

St. Lucie Estuary:

Last week total inflow to the St. Lucie Estuary averaged approximately 3,636 cfs (Figures 1 and 2) and last month inflow averaged about 2,965 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	1072
S-80	576
S-308	0
S-49 on C-24	704
S-97 on C-23	595
Gordy Rd. structure on Ten Mile Creek	689

Over the past week, 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 1.6. 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)	0.2 (2.2)	0.3 (5.4)	NA ¹
US1 Bridge	1.0 (5.3)	2.3 (7.4)	10.0-26.0
A1A Bridge	5.4 (11.9)	17.2 (18.8)	NA ¹

¹Envelope not applicable

Caloosahatchee Estuary:

Last week total inflow to the Caloosahatchee Estuary averaged approximately 4,086 cfs (Figures 5 and 6) and last month inflow averaged about 5,483 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	0
S-78	815
S-79	2,604
Tidal Basin Inflow	1,482

Over the past week in the estuary, salinity remained the same to Ft. Myers Yacht Basin and increased downstream (Table 4, Figures 7 & 8). The seven-day average salinity values are within the poor range for adult eastern oysters at Cape Coral and in the good 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 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)	0.2 (0.2)	0.2 (0.2)	NA ¹
Val I75	0.2 (0.2)	0.2 (0.2)	0.0-5.0 ²
Ft. Myers Yacht Basin	0.2 (0.2)	0.3 (0.2)	NA
Cape Coral	3.3 (2.3)	6.0 (2.7)	10.0-30.0
Shell Point	18.1 (14.0)	21.8 (16.7)	10.0-30.0
Sanibel	27.9 (24.0)	29.2 (25.5)	10.0-30.0

¹Envelope not applicable and 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 to be 0.3 or lower 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 600 cfs. The 30-day moving average surface salinity at Val I-75 is forecast to be 0.3 or lower (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	600	0.3	0.3
B	300	600	0.3	0.3
C	450	600	0.3	0.3
D	650	600	0.3	0.3
E	800	600	0.3	0.3

Red tide

The Florida Fish and Wildlife Research Institute reported on October 9, 2020, that *Karenia brevis*, the Florida red tide dinoflagellate, was not observed in samples collected from or offshore of Lee, Palm Beach, St. Lucie, Martin, Broward or Miami-Dade counties.

Water Management Recommendations

Lake stage is in the Intermediate sub-band. Tributary conditions are very wet. The LORS 2008 release guidance suggests up to 4,000 cfs release at S-77 to the Caloosahatchee Estuary and up to 1,800 cfs release at S-80 to the St. Lucie Estuary.

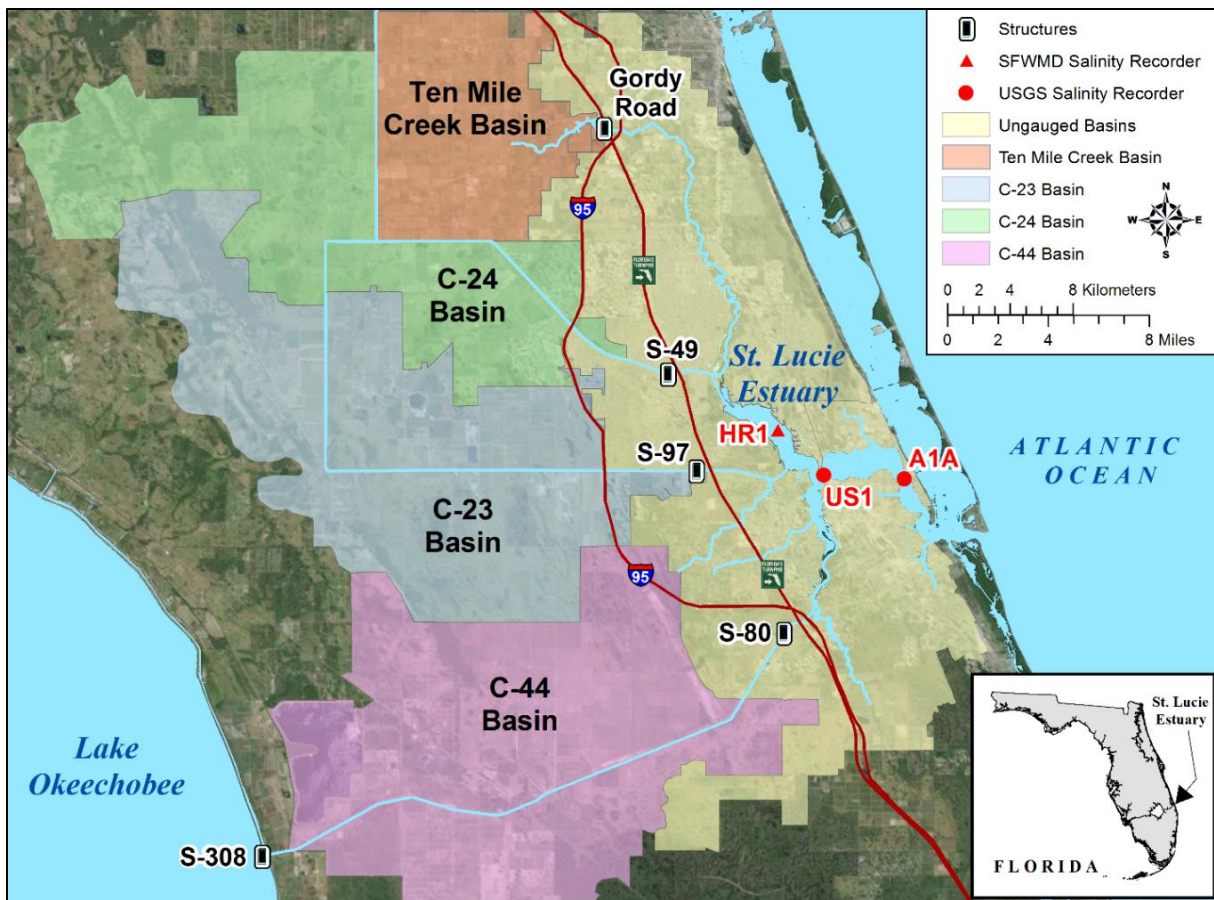


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

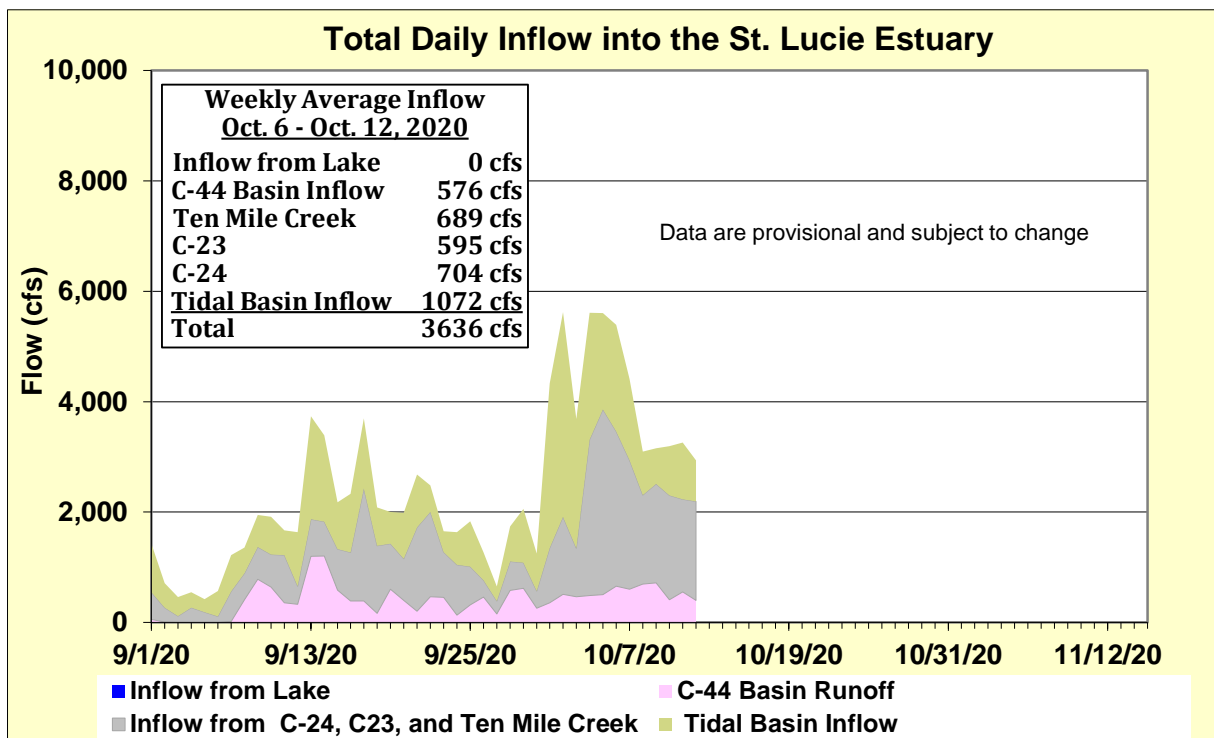


Figure 2. Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basin into the St. Lucie Estuary.

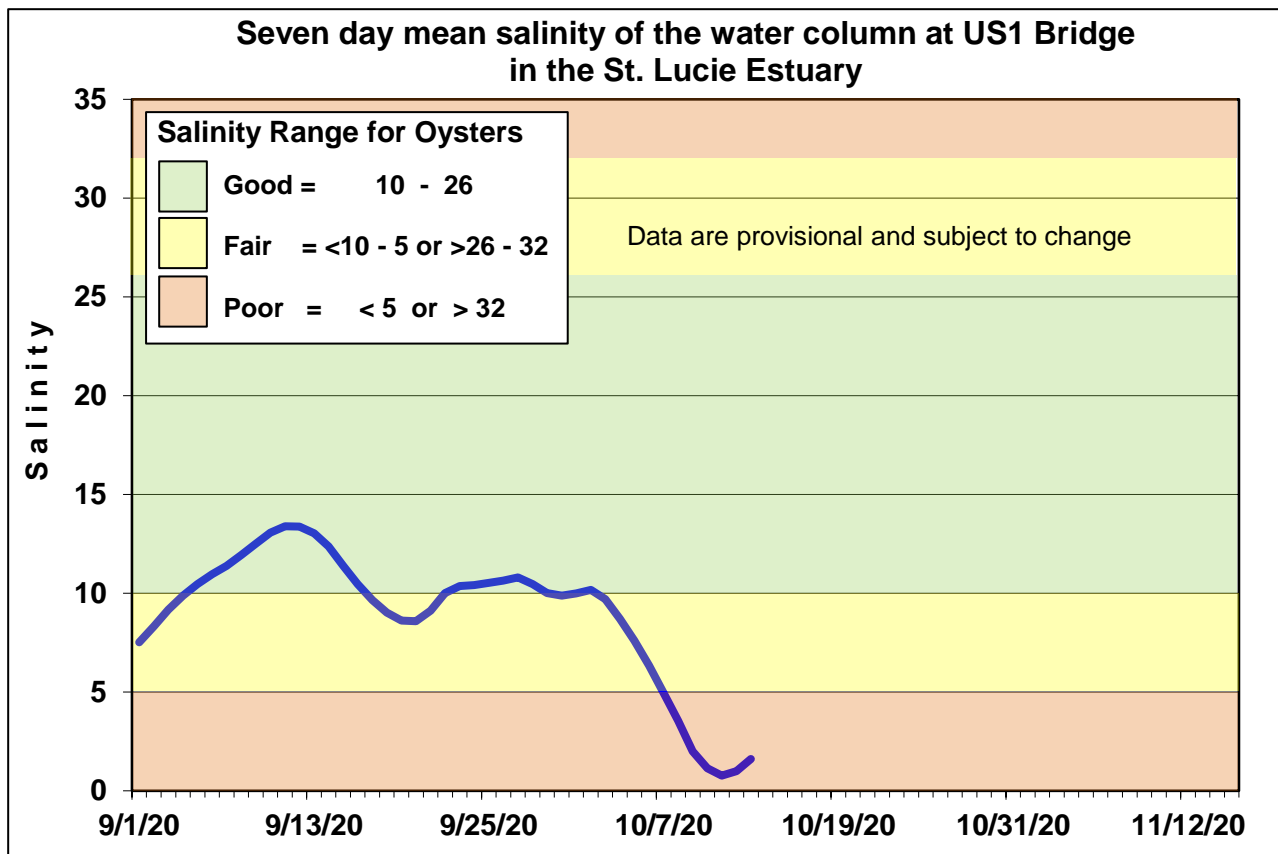


Figure 3. Seven-day mean salinity of the water column at the US1 Bridge.

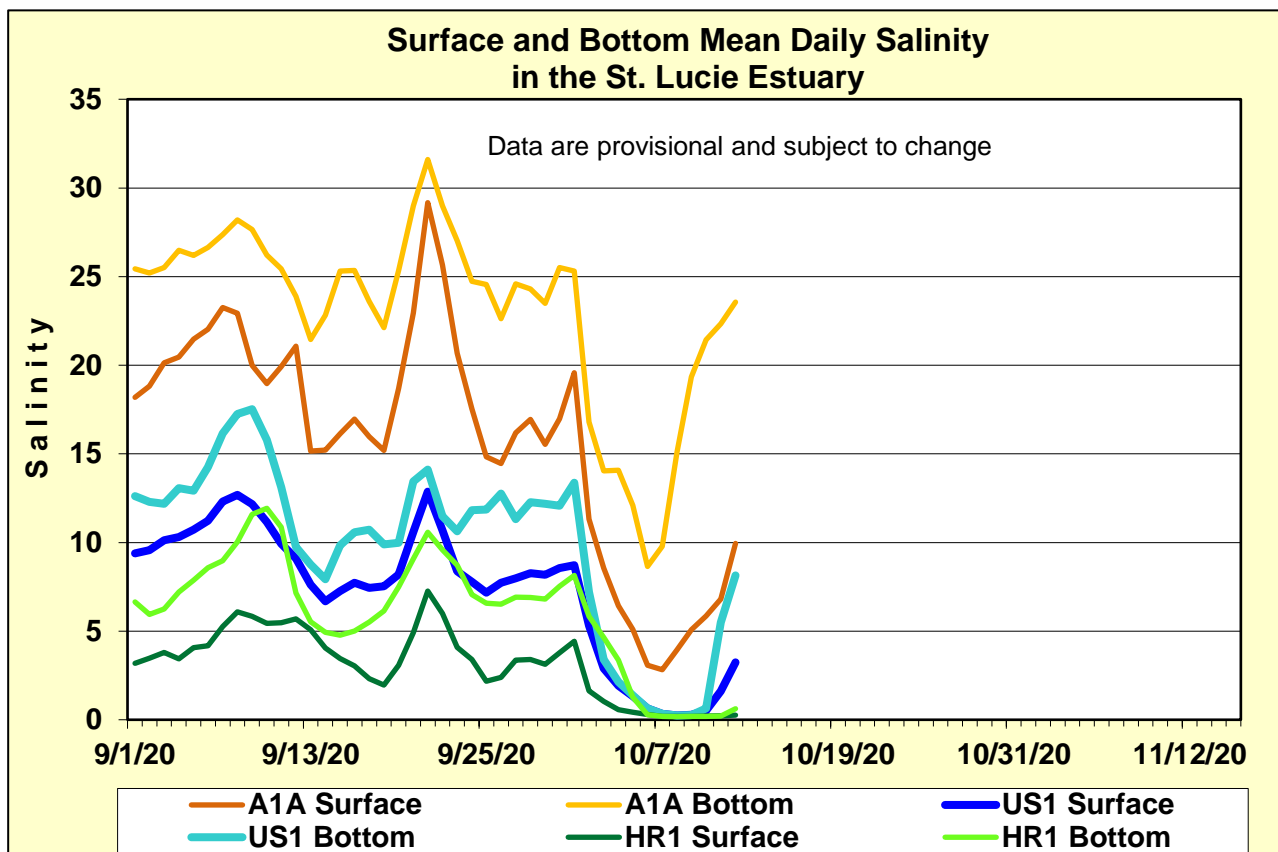


Figure 4. Daily mean salinity at the A1A, US1, and HR1 stations.

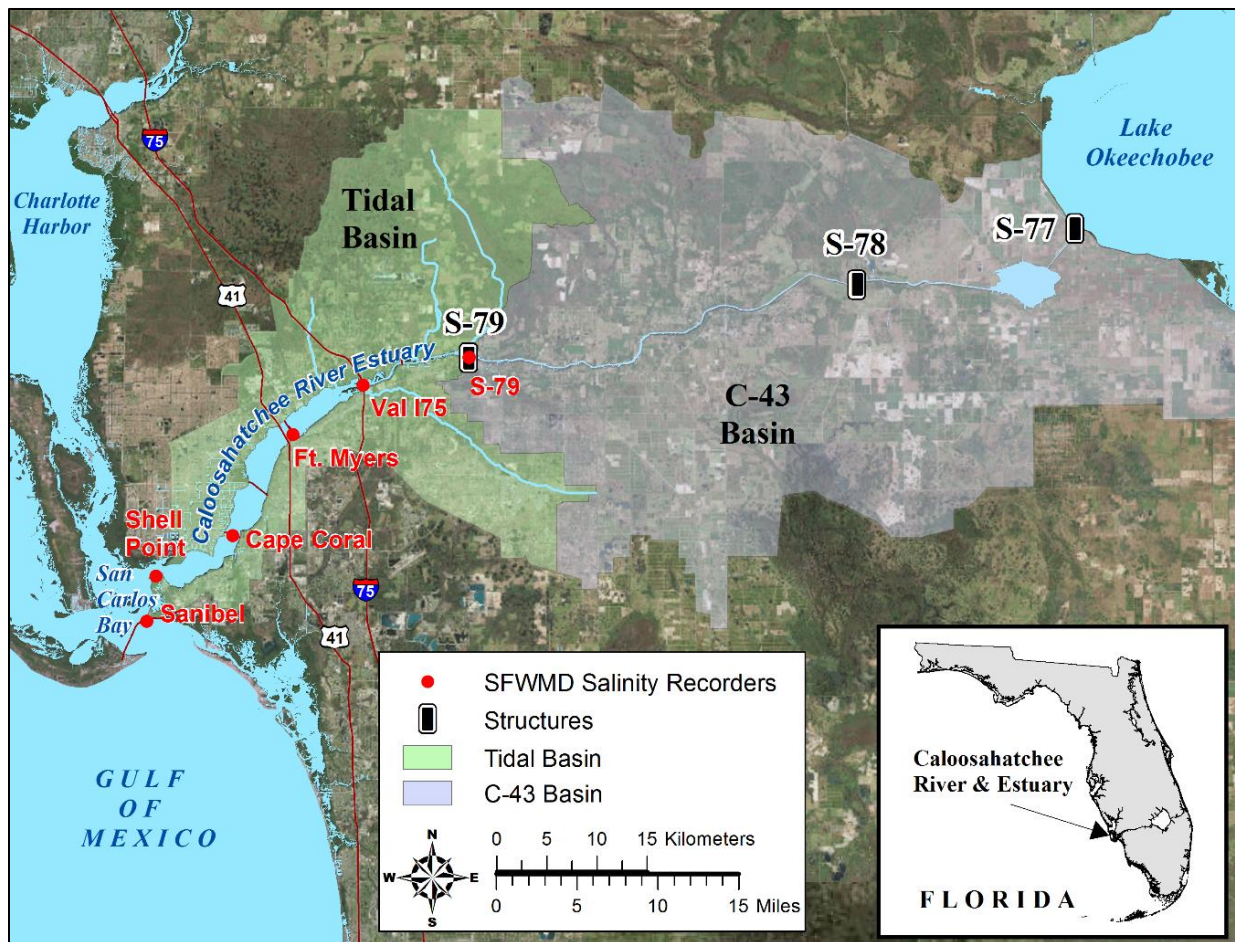


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

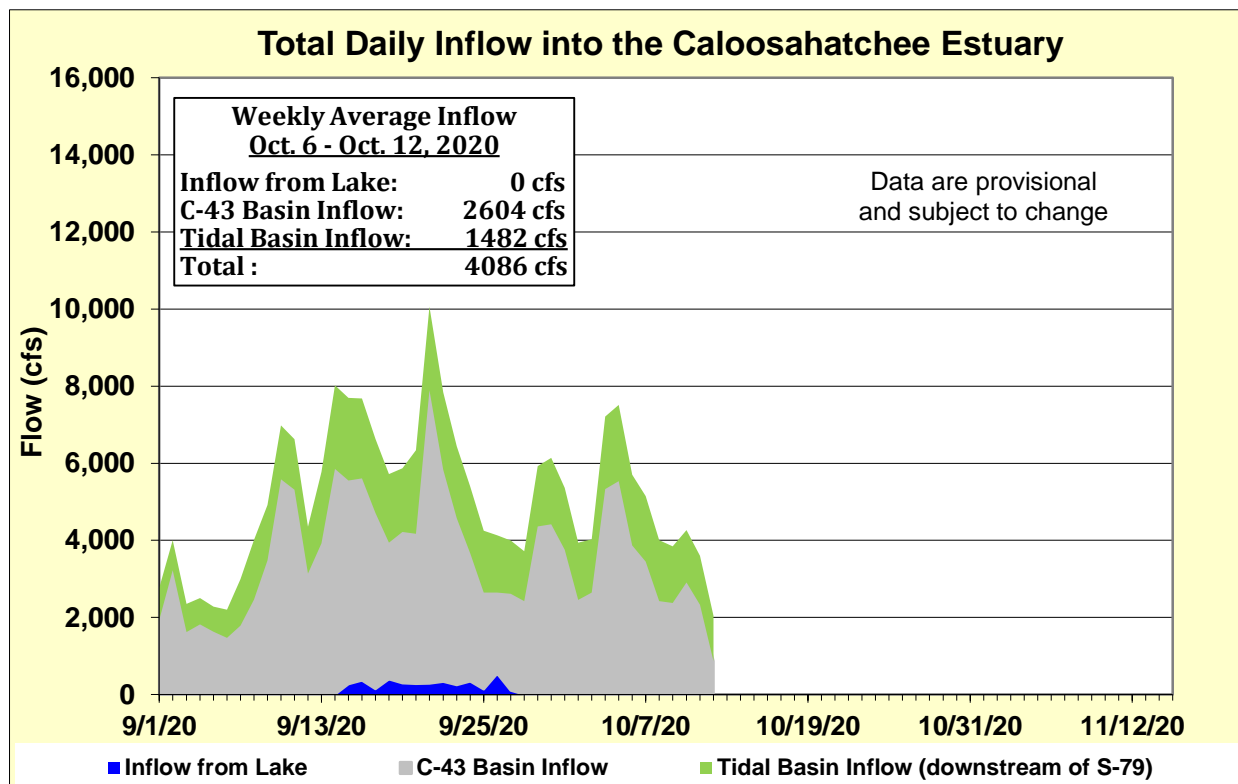


Figure 6. Total daily inflows from Lake Okeechobee, runoff from the C-43 basin

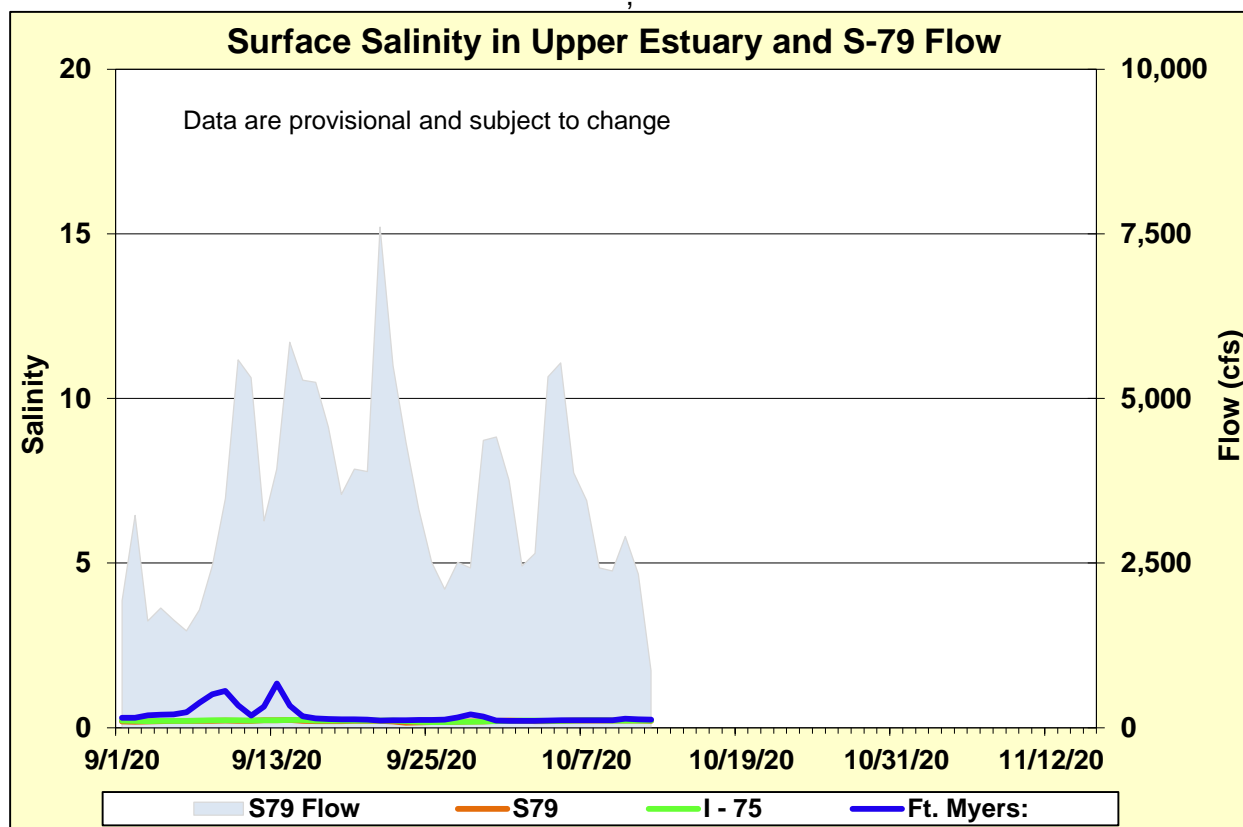


Figure 7. Daily mean flows at S-79 and salinity at upper estuary monitoring stations.

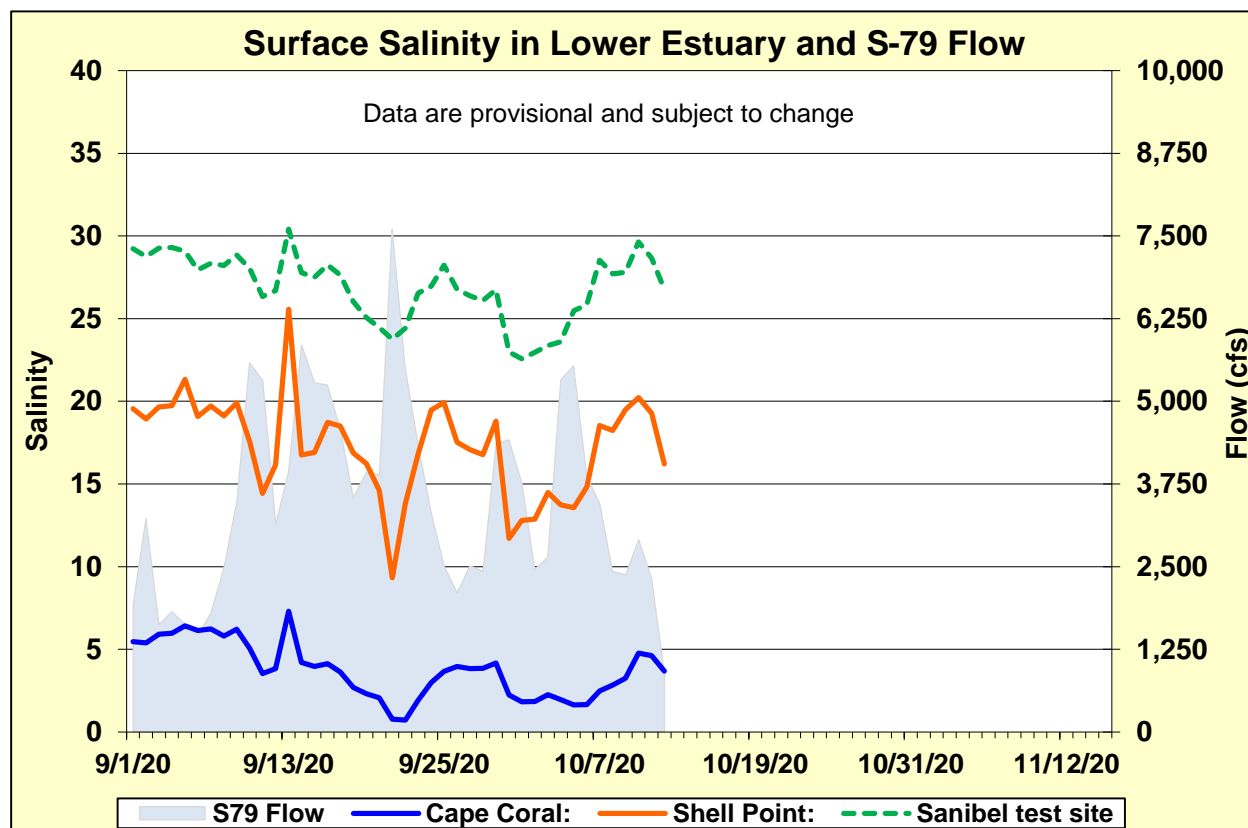


Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.

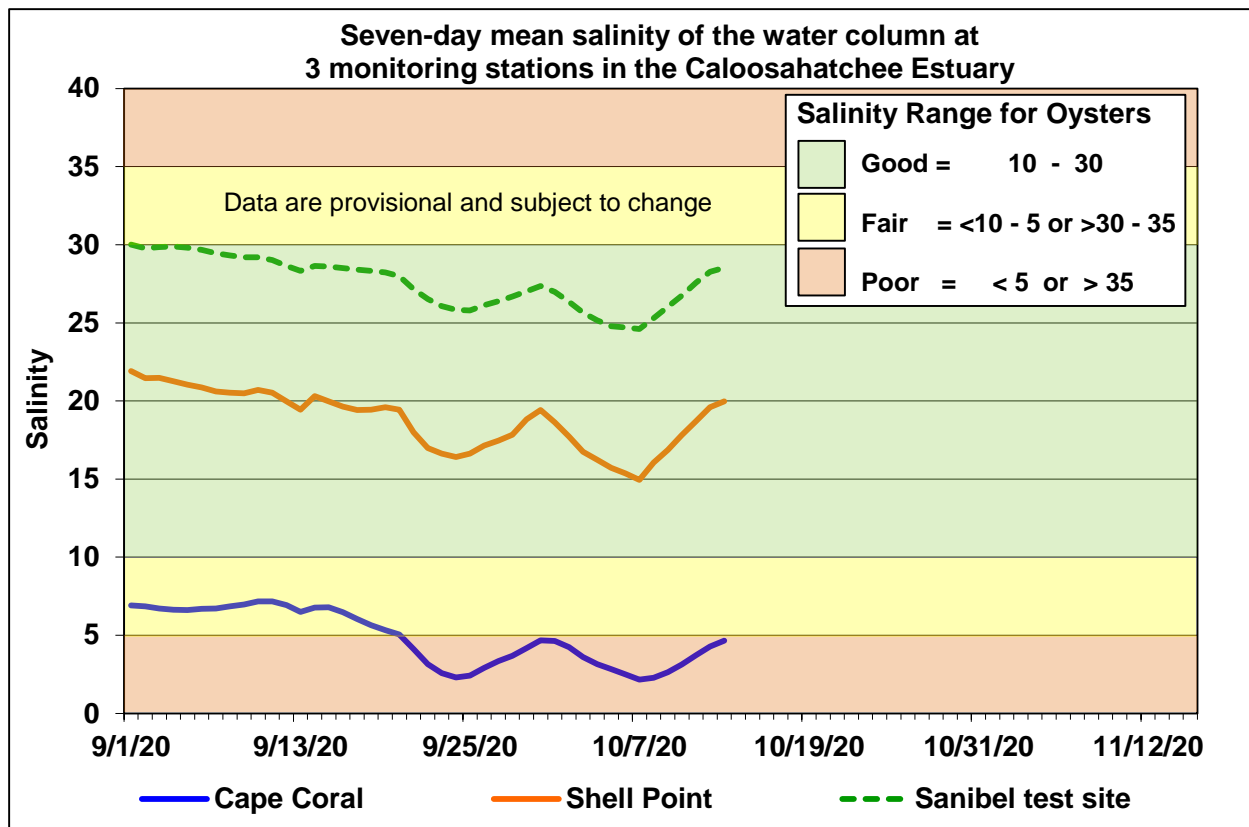


Figure 9. Seven-day mean salinity at Cape Coral, Shell Point, and Sanibel monitoring stations.

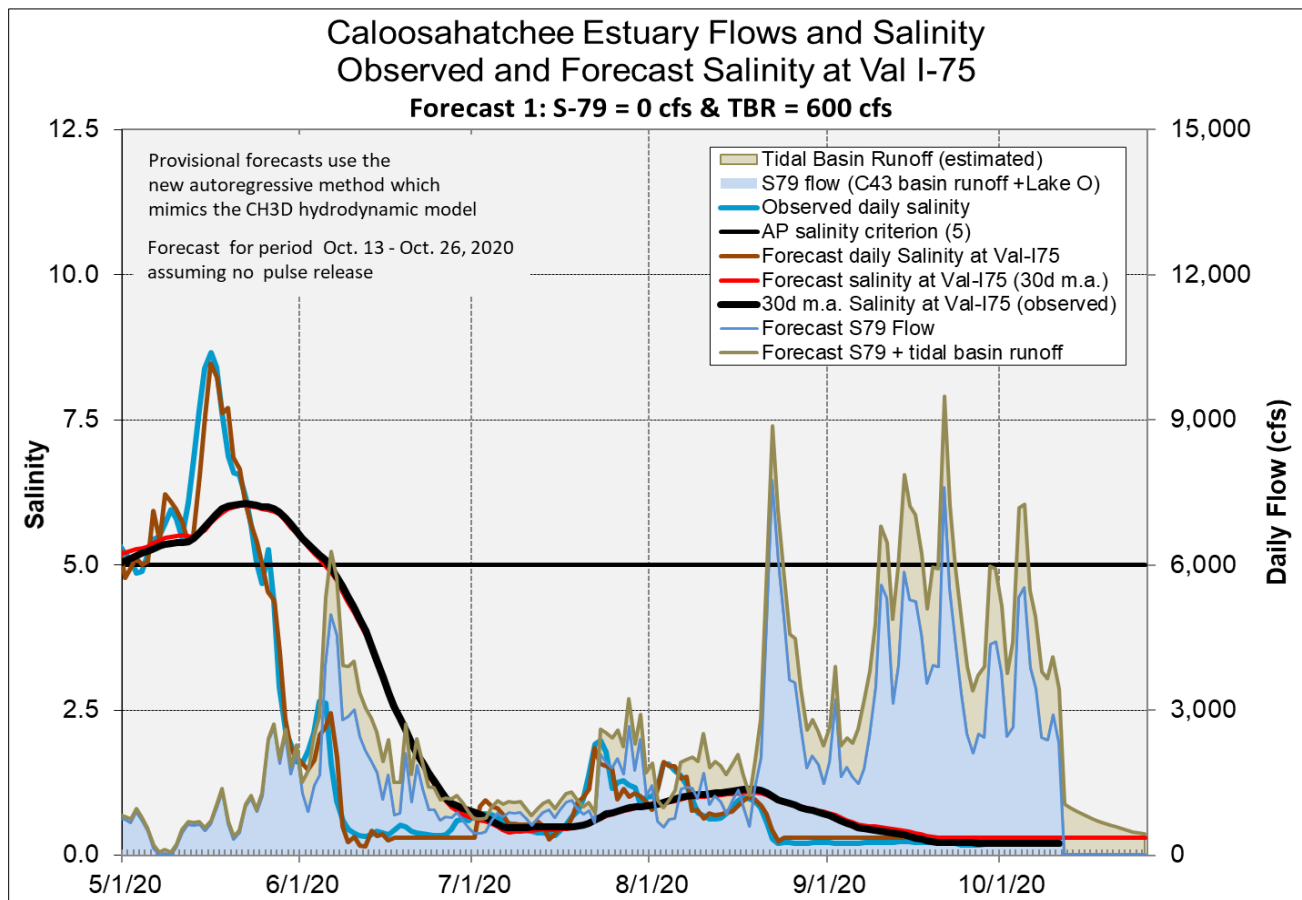
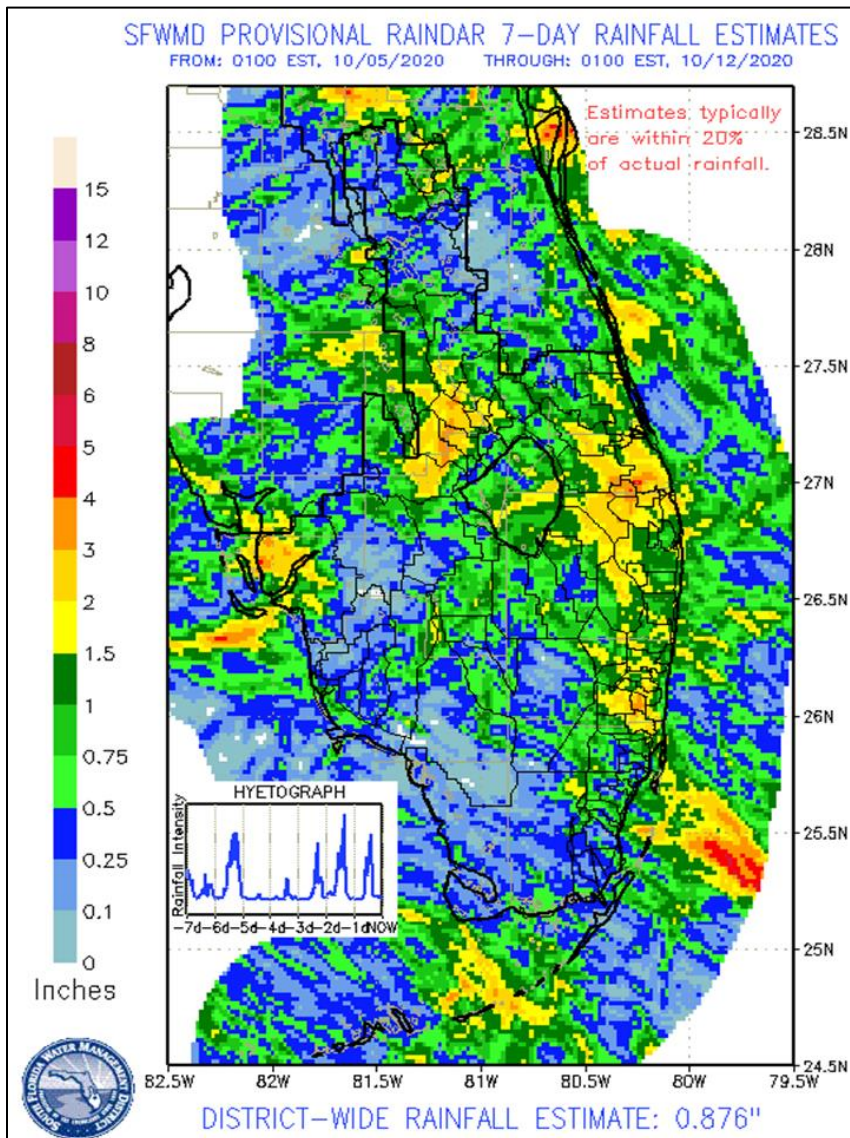


Figure 10. Forecasted Val I-75 surface salinity assuming no pulse release at S-79.

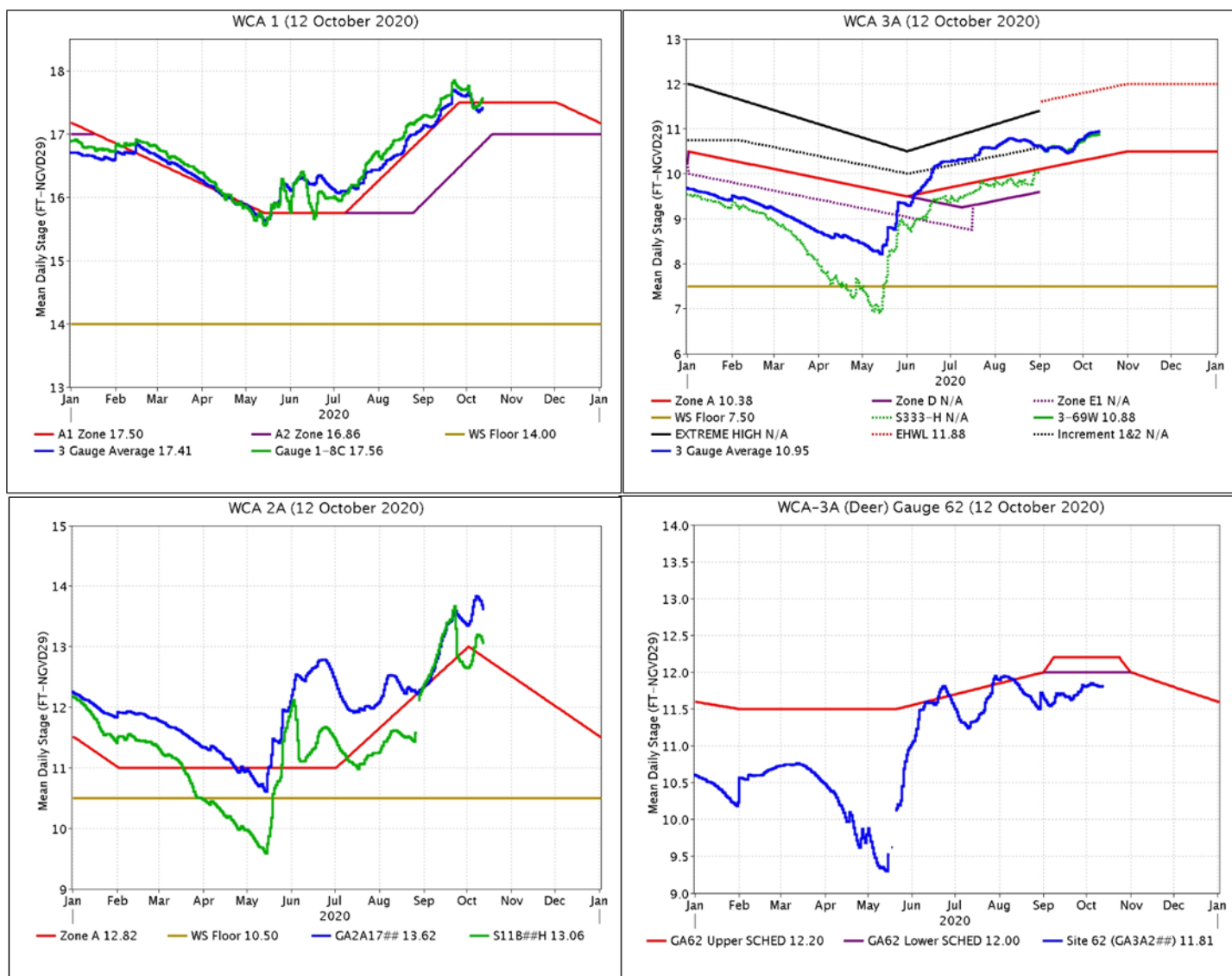
EVERGLADES

The highest rainfall totals fell in the northern Everglades last week, and lowest in WCA-3A and ENP. At the gauges monitored for this report stages decreased 0.06 feet on average, with WCA-1 experiencing a drop in stage and WCA-3A a slight increase. Evaporation was estimated at 0.98 inches last week, and the Tamiami Trail Flow Formula (TTFF) calls for maximum releases from WCA-3A.



Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	1.39	-0.19
WCA-2A	1.10	+0.18
WCA-2B	1.30	-0.08
WCA-3A	0.45	+0.04
WCA-3B	0.73	-0.07
ENP	0.32	-0.15

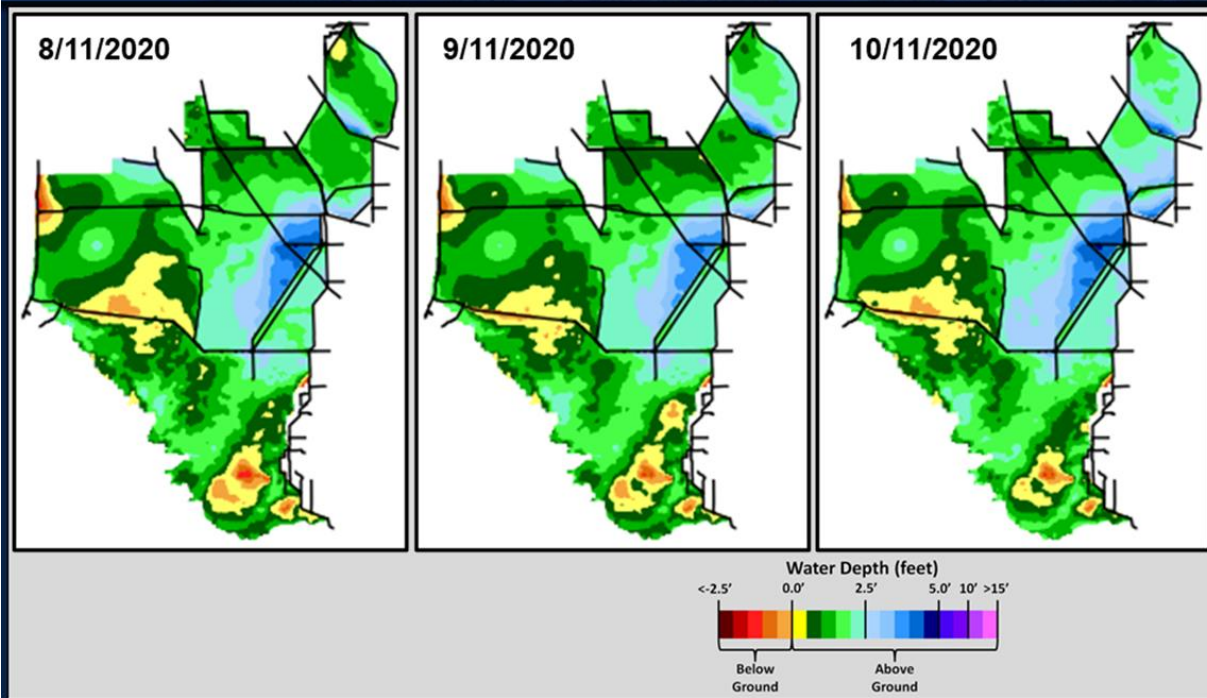
Regulation Schedules: WCA-1: Stage at the 1-8C Gauge returned to above schedule last week, now 0.06 feet above the stable Zone A1 regulation line last week. WCA-2A: Stages at Gauge 2-17 reversed direction last week and trends towards the falling regulation schedule, currently 0.80 feet above. WCA-3A: The Three-Gauge Average stages are above and following parallel to the rising Zone A regulation line and is currently 0.57 feet above the line. WCA-3A: Stage at Gauge 62 (Northwest corner) is currently 0.19 feet below the stable Lower Schedule and 0.39 feet below the Upper Schedule.



Water Depths: The WDAT tool for spatial interpolation of depth monthly snapshots over the last two months indicate current depths greater than 4.0 feet in WCA-3A South around the upper reaches of the L-67 canal. Ponding depths (>2.5 feet) are being reached in significant portions of both southern WCA-1 and across southern WCA-2A. Over the last month, stage changes were generally deeper and moderate across most the Everglades system. WCA-2A is the exception, which was significantly deeper in the southern half of the basin. Over the past year, the stage difference patterns are similar, but more significant. Generally, water is deeper across the entire system, and southern WCA-2A is 1.5 foot higher in stage compared to a year ago.



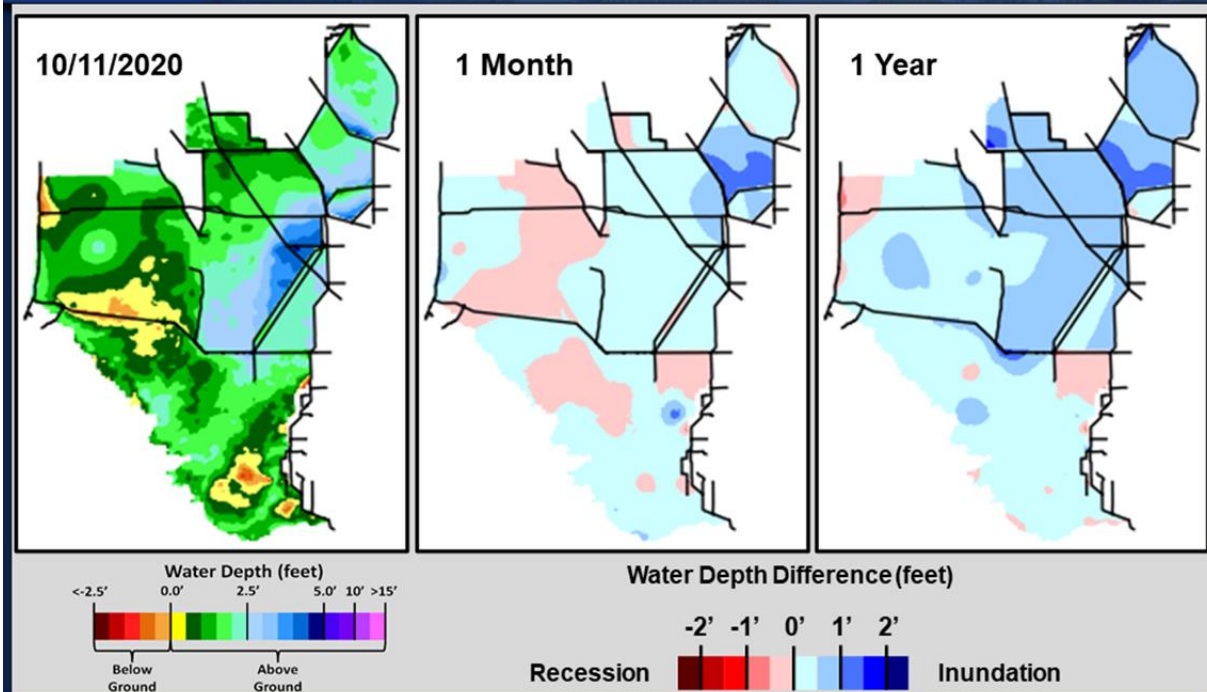
SFWDAT Water Depth Monthly Snapshots



South Florida Water Depth Assessment Tool (SFWDAT)



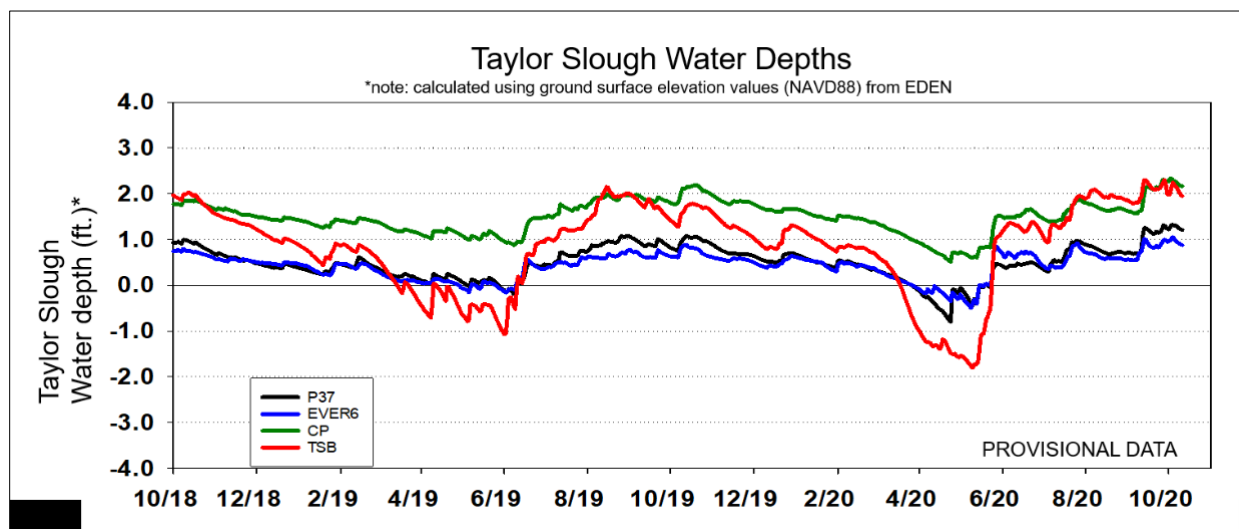
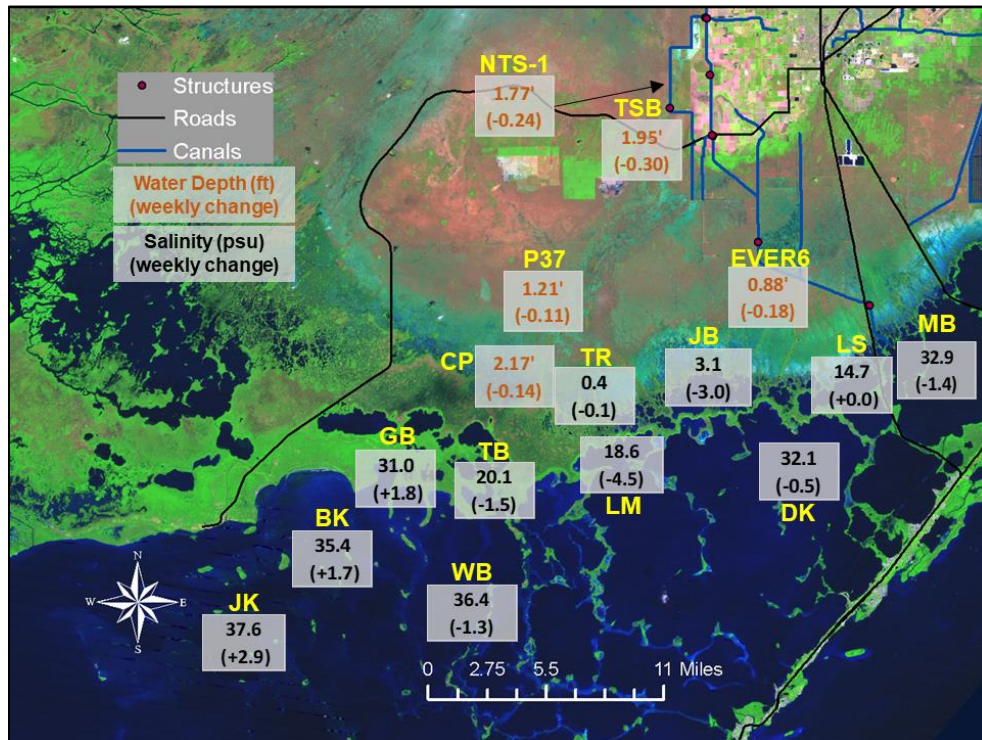
SFWDAT Everglades Difference Maps (Present – Past)



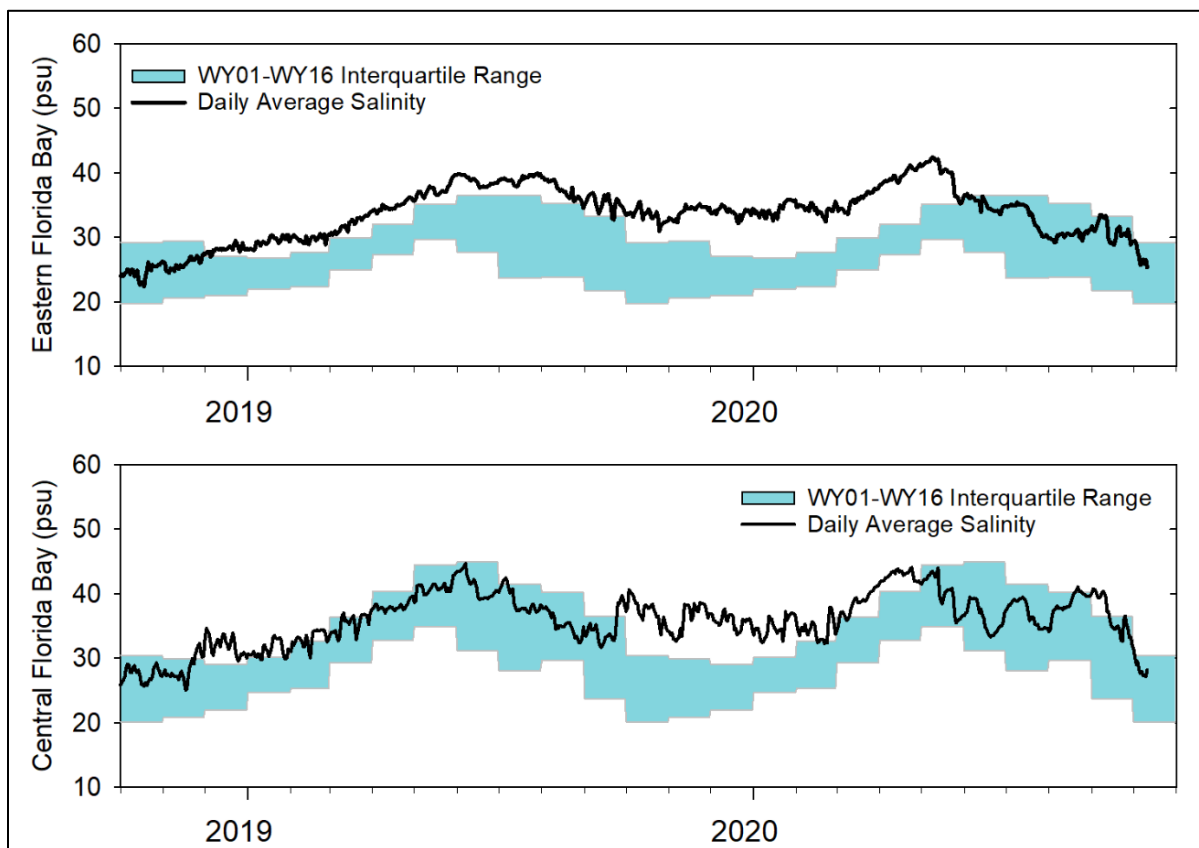
South Florida Water Depth Assessment Tool (SFWDAT)

Tree island inundation in WCA-3A, WCA-3B and ENP: 371 Tree Islands of known elevation are within WCA-3A, -3B, and Everglades National Park's Shark Slough. Current preliminary estimates using WDAT indicate that 53% or 196 of the tree islands are currently inundated, the same as the week prior. Initial island inundation began 5/24/20, and the longest duration of continuous inundation is 133 days. Inundation for more than 90 days has the potential for ecological harm. Inundation for more than 120 days will cause ecological harm (currently 7% of islands).

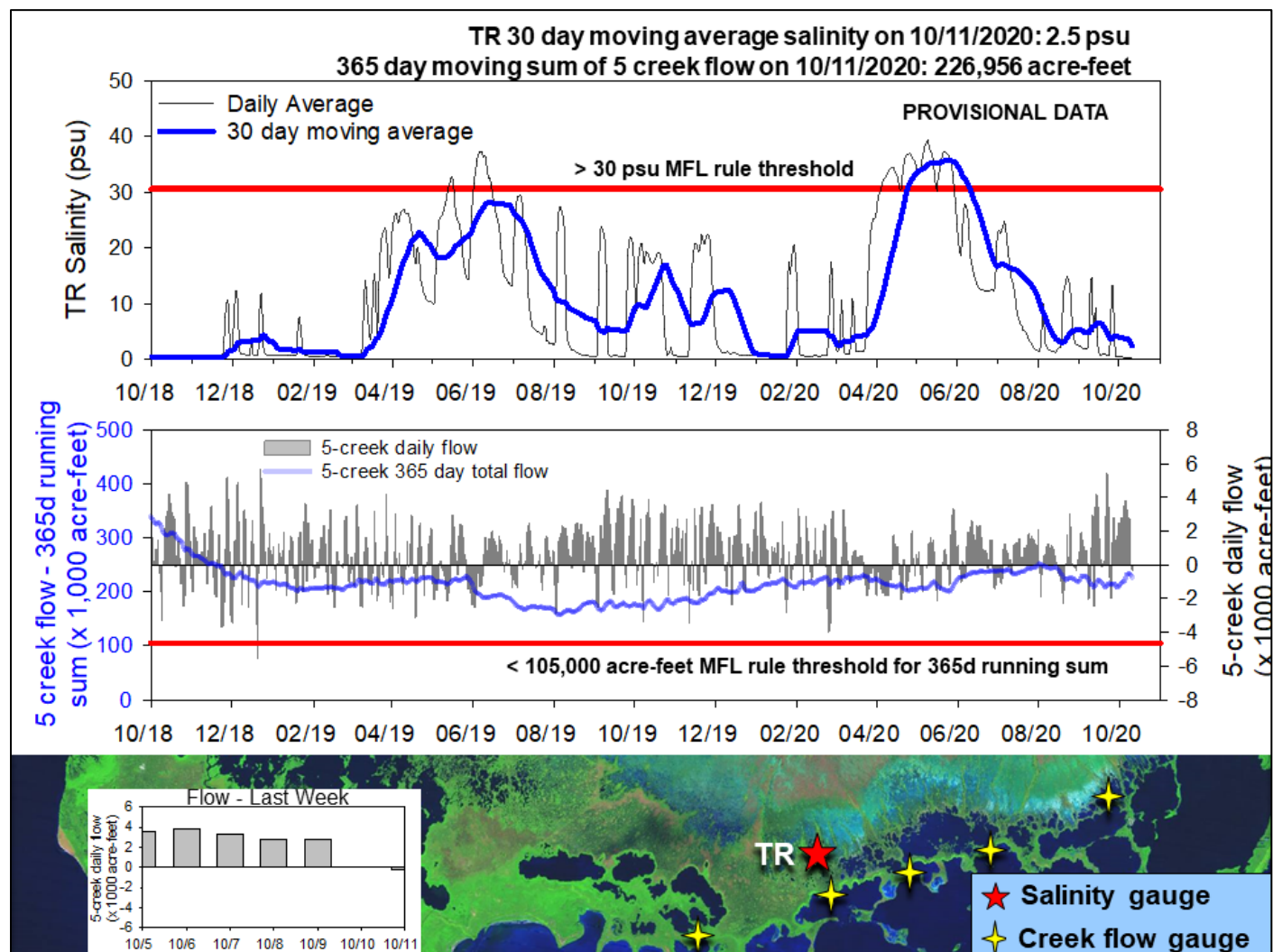
Taylor Slough Water Levels: An average of 0.6 inches of rain fell over Taylor Slough and Florida Bay this past week, and stages increased 0.2 feet on average. Northern Taylor Slough is 6 inches higher than the historical average (pre-Florida Bay Initiative), while the slough as a whole is now 4 inches higher than the historical average.



Florida Bay Salinities: Salinities in Florida Bay averaged a 0.5 decrease over the week with individual station changes ranging from -4.5 to +2.9. Nearshore salinity decreased 1.4 to end at 23 (now only 1.5 higher than the historical average) as we move into the part of the year expected to have the lowest salinities. The northeastern and central nearshore areas are near the desired salinities for this time of year, while the western nearshore salinity is still at least 6 higher than preferred.



Florida Bay MFL: The salinity at the TR station in the mangrove zone (tracked for the Florida Bay MFL) stayed at the near-fresh condition of 0.4 this past week. The 30-day moving average decreased 1.3 to end at 2.5. Weekly flow from the 5 creeks identified by yellow stars on the map totaled +16,000 acre-feet with positive flows until the weekend. This is the highest weekly volume of flow thus far in WY2021. The 365-day moving sum of flow from the five creeks (tracked as part of the Florida Bay MFL criteria) ended at 226,956 acre-feet this week, which is a 7,000 acre-feet increase from last week. That is between the historical median (249,091 acre-feet) and the 25th percentile (192,885 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. Current climatic predictions for low rainfall amounts in the upcoming dry season makes this a particularly important time of year for conserving water. Holding the water north in the system, during the historic peak creates conditions could provide ecological benefit to the Everglades in the next season and beyond. Moderating rapid increases in stage to within the preferred ecological rate of less than 0.25 feet per week or 0.50 feet per two weeks has ecological benefit. High stages in southern WCA-2A are negatively impacting the ecology there. Water management that lessens the stress of high water at the southern end but retains an adequate volume of water in that basin to prevent over drying in the north during the dry season would have ecological benefit especially given the climate predictions for dry weather. Peak stages in October in northern WCA-3A (11.5 feet NGVD 29 at gauge 3-63) 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 numbers as well as provide surface water that can protect it from terrestrial predators during the nesting season. Inflows or the conservation of water within this area has ecological benefit for peat soil conservation and wading bird foraging and nesting success. Ponding along the L-67 canal/levee system has increased, and inundation of the tree islands in that region and east into central WCA-3A South has now persisted for more than 120 days, which creates ecological harm in regions containing sensitive islands. Managing inflows/outflows within that region that decreases ponding in both spatial extent and the amount of time the region is inundated has benefit to the ecology of tree islands. 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 but require more freshwater to continue to decrease salinities in all areas of the 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, October 13th, 2020 (red is new)			
Area	Weekly change	Recommendation	Reasons
WCA-1	Stage decreased by 0.19'	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.	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.	Protect upstream/downstream habitat and wildlife. Apple snail reproduction is hindered by rapidly increasing stage.
WCA-3A NE	Stage increased by 0.12'	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 decreased by 0.05'	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 0.06'	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, and tree island ecology is diminished by flooding
Southern WCA-3A S	Stage increased by 0.02'		
WCA-3B	Stage decreased by 0.07'	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 0.15'	Make discharges to the Park according to COP protocol	Protect upstream/downstream habitat and wildlife. Apple snail reproduction is hindered by rapidly increasing stage.
Taylor Slough	Stage changes ranged from -0.11' to -0.30'	Move water southward as possible	When available, provide freshwater buffer for downstream conditions.
FB- Salinity	Salinity changes ranged -4.5 to +2.9 psu	Move water southward as possible	When available, provide freshwater to maintain low salinity buffer and promote water movement.