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 21, 2020

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

A stalled frontal zone remains across south Florida and strong east winds are bringing a steady supply of low level moisture to the area while an upper level trough over the area continues to bring favorable upper level flow. With the stalled boundary, plentiful moisture, and favorable wind flow remaining in place over the District, a pattern of enhanced shower activity should persist with heaviest activity focused south and east. A low pressure system is forecast to develop near the northern end of Yucatan peninsula interact with the frontal boundary as it lifts northward to the south central Gulf of Mexico by Thursday. Expect the deep moisture currently over the District to shift westward to the eastern Gulf of Mexico as the low develops which should result in a decrease in shower coverage over the District Thursday and Friday. The low will most likely weaken as it is lifted further northward ahead of an upper level trough moving across the Gulf of Mexico Friday. As the upper level trough moves across the peninsula of Florida Saturday, it is forecast to pick up some moisture from the Caribbean and help generate showers and thunderstorms over the District Saturday and Sunday mainly over the interior and east. Strong east winds are forecast to enhance already seasonal high tidal levels along the east coast and continue to enhance tides Tuesday through Friday. Total rainfall is forecast to be above to well-above the historical average during the first 7-day period (Week 1) and then near the historical average north and west and near the historical average east during the second 7-day period (Week 2).

Kissimmee

Tuesday morning stages were 57.6 feet NGVD (at schedule) in East Lake Toho, 54.6 feet NGVD (at schedule) in Toho, and 52.3 feet NGVD (0.2 feet above schedule) in Kissimmee-Cypress-Hatchineha; headwater stages were 46.5 feet NGVD at S-65A and 27.7 feet NGVD at S-65D. Tuesday morning discharges were 0 cfs at S-65, 330 cfs at S-65A, 2,150 cfs at S-65D and 2,320 cfs at S-65E. Dissolved oxygen concentration in the Kissimmee River averaged 1.5 mg/L for the week through Sunday. River mean floodplain depth on Sunday was 1.32 feet. Today's recommendation is Maintain minimum flow of 300 cfs +/- 50 cfs at S-65A.

Lake Okeechobee

Lake Okeechobee stage was 16.23 feet NGVD on October 19, 2020, 0.05 feet higher than the previous week and 1.06 feet higher than the previous month. The Lake rose into the Intermediate sub-band on October 7, 2020 and remained there this week. Lake stage moved into the ecological envelope (which varies seasonally from 12.0 – 15.0 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 rose over 5 feet during that time, but with the initiation of Lake releases the ascension rate declined by 0.27 feet from the previous week.

Cyanobacterial bloom risk potential is high in the central portion of the Lake. Water quality sampling on October 5 - 7, 2020 showed four stations having Microcystin toxin levels >8 μg/L. Half of the Chlorophyll-a results are still pending.

Estuaries

Total inflow to the St. Lucie Estuary averaged more than 1,495 cfs with approximately 190 cfs coming from Lake Okeechobee. Note the number does not include contribution from Gordy Road Structure due to missing data. The seven-day average salinities increased throughout the estuary over the past week. Salinity at the US1 Bridge is in the fair range (5-10) for adult eastern oysters.

Total inflow to the Caloosahatchee Estuary averaged 5,572 cfs over the past week with approximately 2,883 cfs coming from the Lake. Seven-day average salinity remained almost fresh at Ft. Myers and upstream and decreased 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 (10-30) for adult eastern oysters at Shell Point and Sanibel, and in the poor range (0-5) at Cape Coral.

Lake stage is in the Intermediate sub-band of 2008 LORS. Tributary hydrological conditions are very wet. The LORS2008 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, 22,100 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 71,900 ac-feet. The total amount of inflows to the STAs in WY2021 is approximately 999,000 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

Above average precipitation fell across the Everglades last week meaning the WCAs remain above schedule. WCA-1 stage is above schedule and nears high water metric. WCA-3A remains above schedule but generally trends parallel with regulation. WCA-2A stages continue receding towards the falling regulation schedule. Rainfall in the south was focused on central Taylor Slough and stages remain above average for this time of year. Salinities decreased on average across Florida bay and remained stable in the nearshore this week. Salinities in the TR mangrove zone to the east remained near fresh as discharge rates from the creeks in that area remained high.

Supporting Information

KISSIMMEE BASIN
Rainfall

The Upper Kissimmee Basin received 0.12 inches of rainfall in the past week and the Lower Basin received 0.04 inches (SFWMD Daily Rainfall Report 10/19/2020).

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: 10/20/2020

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)						
							10/18/20	10/11/20	10/4/20	9/27/20	9/20/20	9/13/20	9/6/20
Lakes Hart and Mary Jane	S-62	20	LKMJ	60.7	R	60.6	**0.1**	0.1	0.0	0.1	0.4	0.0	0.0
Lakes Myrtle, Preston, and Joel	S-57	5	S-57	61.8	R	61.6	**0.2**	0.2	0.1	0.0	0.1	0.0	0.0
Alligator Chain	S-60	0	ALLI	63.5	R	63.6	**-0.1**	-0.1	0.0	0.0	0.0	0.2	0.1
Lake Gentry	S-63	0	LKGT	61.3	R	61.3	**0.0**	0.0	-0.1	0.1	0.2	0.2	0.1
East Lake Toho	S-59	23	TOHOE	57.4	R	57.6	**-0.2**	0.0	0.2	0.3	0.5	0.3	-0.3
Lake Toho	S-61	53	TOHOW, S-61	54.5	R	54.6	**-0.1**	0.1	0.2	0.2	0.1	0.1	0.1
Lakes Kissimmee, Cypress, and Hatchineha	S-65	678	KUB011, LKIS5B	52.3	R	52.1	**0.2**	0.5	0.6	0.4	0.5	0.4	0.3

[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: **10/20/2020**

Metric	Location	1-Day Average	Average for the Preceeding 7-Days[1]								
		10/18/2020	10/18/20	10/11/20	10/4/20	9/27/20	9/20/20	9/13/20	9/6/20	8/30/20	8/23/20
Discharge (cfs)	S-65	261	**678**	1,265	1,725	2,890	3,143	2,193	2,631	3,273	2,506
Discharge (cfs)	S-65A[2]	399	**861**	1,916	2,248	3,578	3,855	2,700	3,176	4,247	3,173
Discharge (cfs)	S-65D[2]	2,401	**3,267**	4,848	4,715	5,198	3,738	3,512	4,262	3,420	3,067
Headwater Stage (feet NGVD)	S-65D[2]	27.56	**27.66**	27.68	27.75	27.73	27.77	27.63	27.74	27.75	27.59
Discharge (cfs)	S-65E[2]	2,672	**3,501**	5,287	5,081	4,994	3,919	3,578	4,317	3,444	3,079
Discharge (cfs)	S-67	0	**0**	0	0	0	0	0	0	0	0
DO (mg/L)[3]	Phases I & II/III river channel	2.1	**1.5**	1.2	1.2	1.2	1.1	0.9	0.7	1.1	1.0
Mean depth (feet)[4]	Phase I floodplain	1.32	**1.66**	2.28	2.41	2.70	2.31	2.06	2.42	2.27	1.76

[1]Seven-day average of weighted daily means through Sunday midnight.
[2]S-65A discharge combines S-65A with auxillary strucutures; 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.
[3]DO is the average for sondes at KRBN, PC62, PC33, PD62R, and PD42R.
[4]1-day spatial average from South Florida Water Depth Assessment Tool (SFWDAT).
DATA ARE PROVISIONAL; N/A indicates that data were not available.

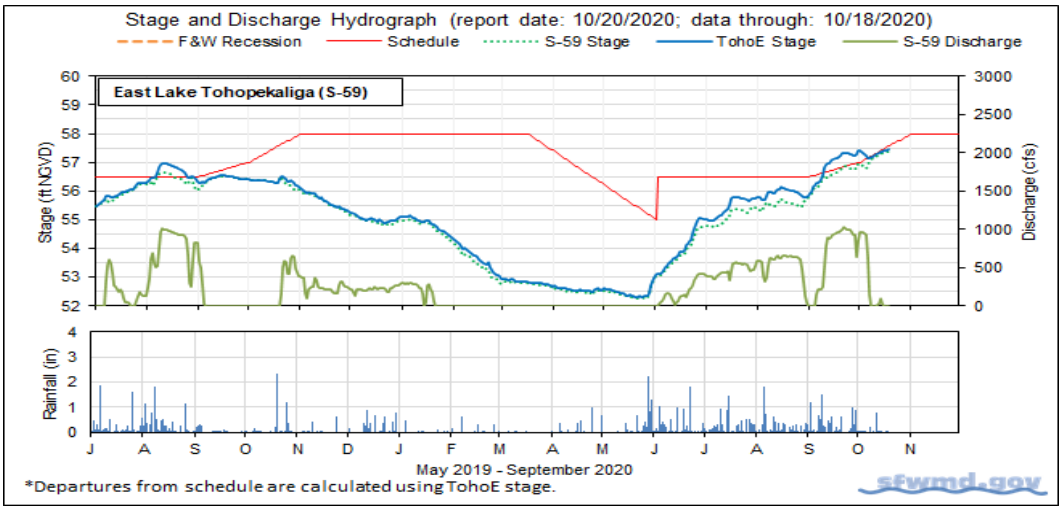


Figure 1. East Lake Toho regulation schedule, stage, discharge and rainfall.

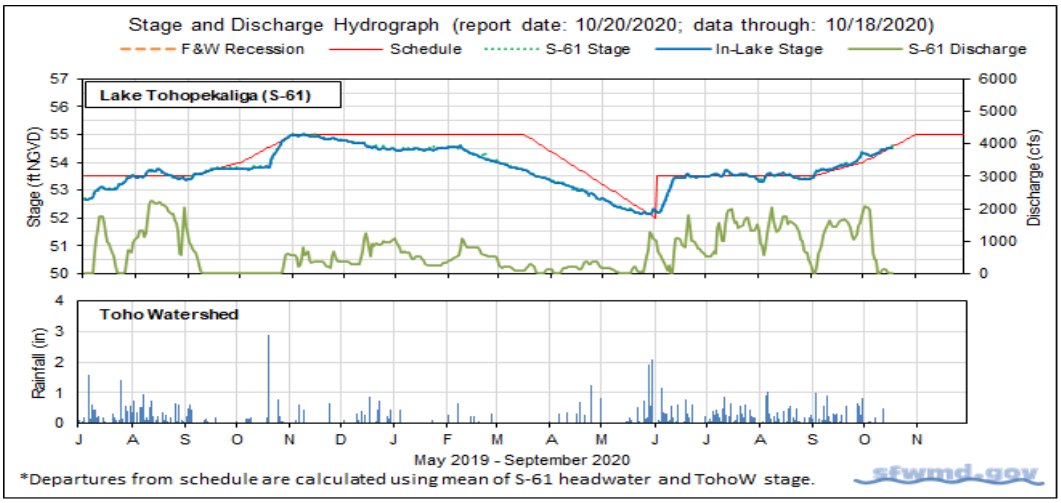


Figure 2. Lake Toho regulation schedule, stage, discharge and rainfall.

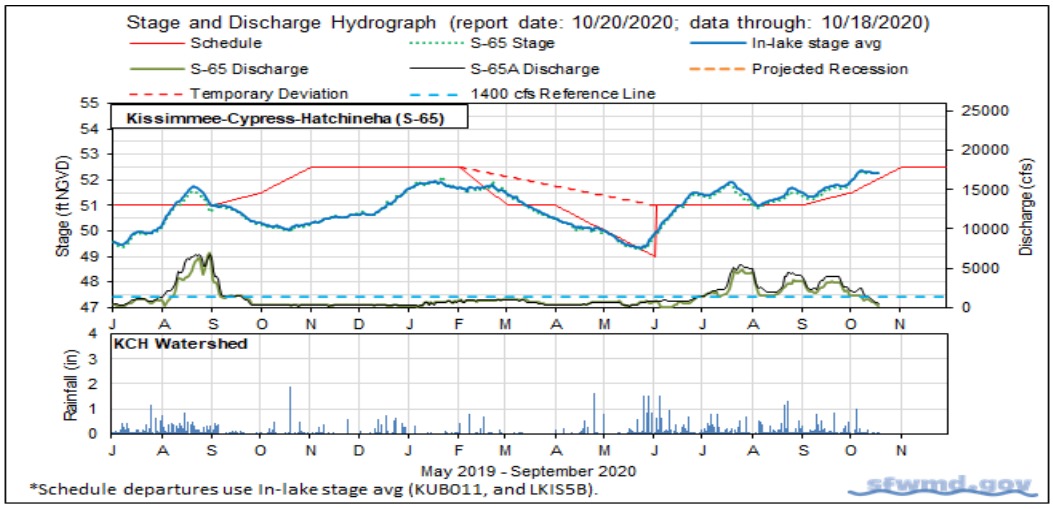


Figure 3. Lakes Kissimmee, Cypress and Hatchineha regulation schedule, stage, discharge and rainfall.

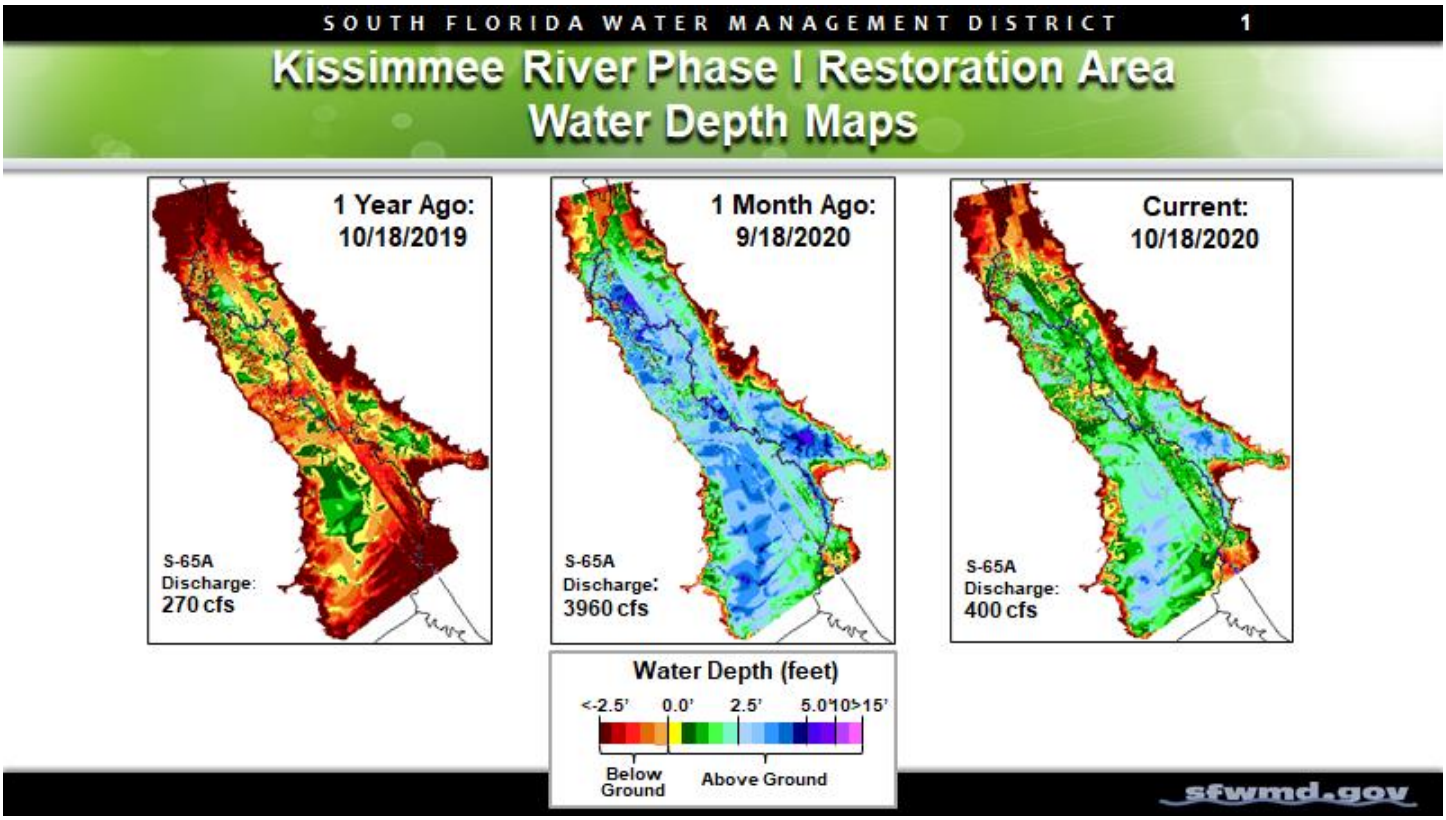


Figure 4. Phase I area floodplain water depths (from left to right) one year ago, one month ago and current. Color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to January 16, 2012.

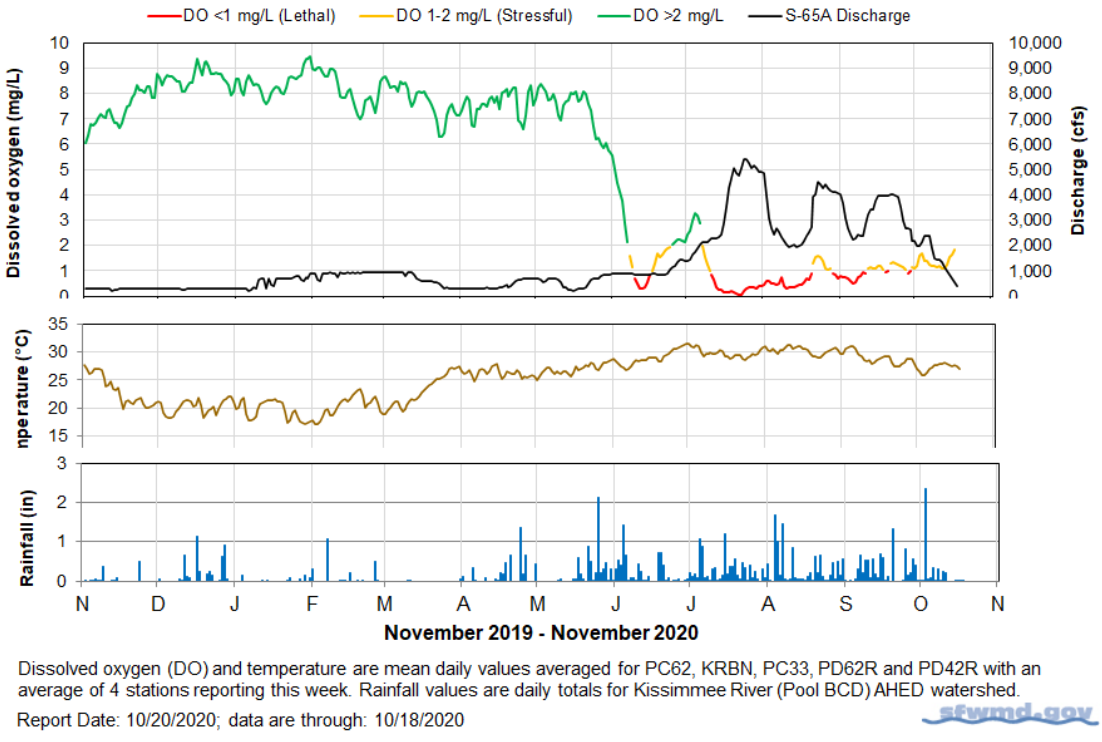


Figure 5. Restored Kissimmee river channel mean daily dissolved oxygen concentration (mg/L), S-65A discharge (cfs), temperature (°C) and rainfall (inches)

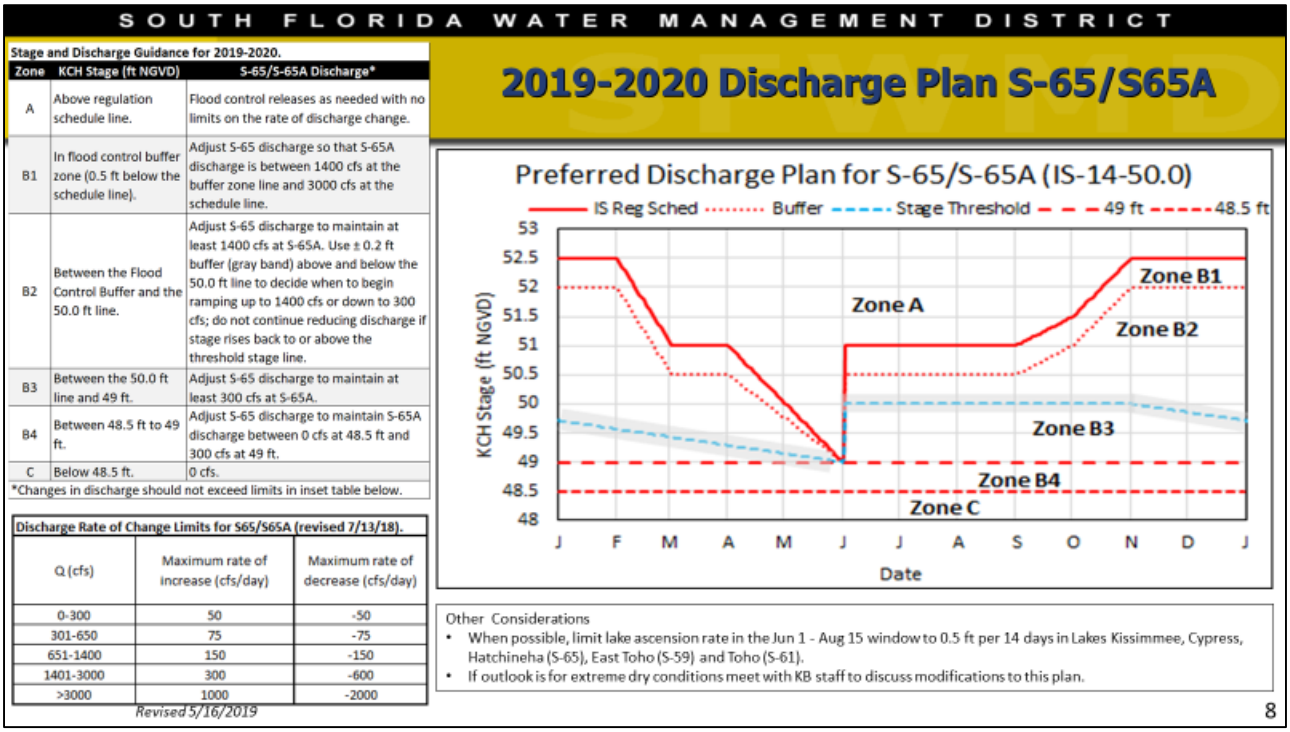


Figure 6. The 2019-2020 Discharge Plan for S-65/S-65A.

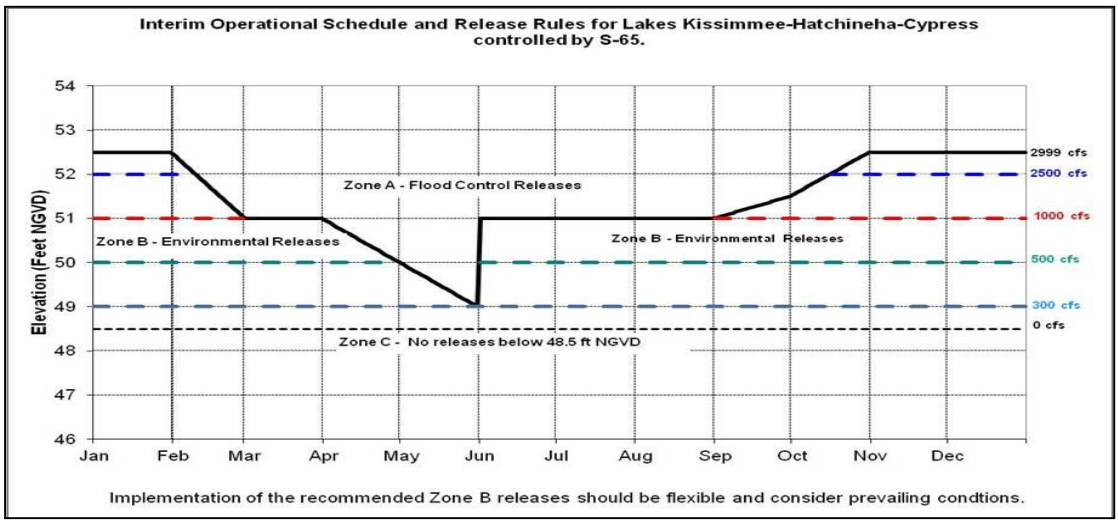


Figure 7. Interim operations schedule for S-65 (solid black line). The discharge schedule shown to the right has not been used in recent years.

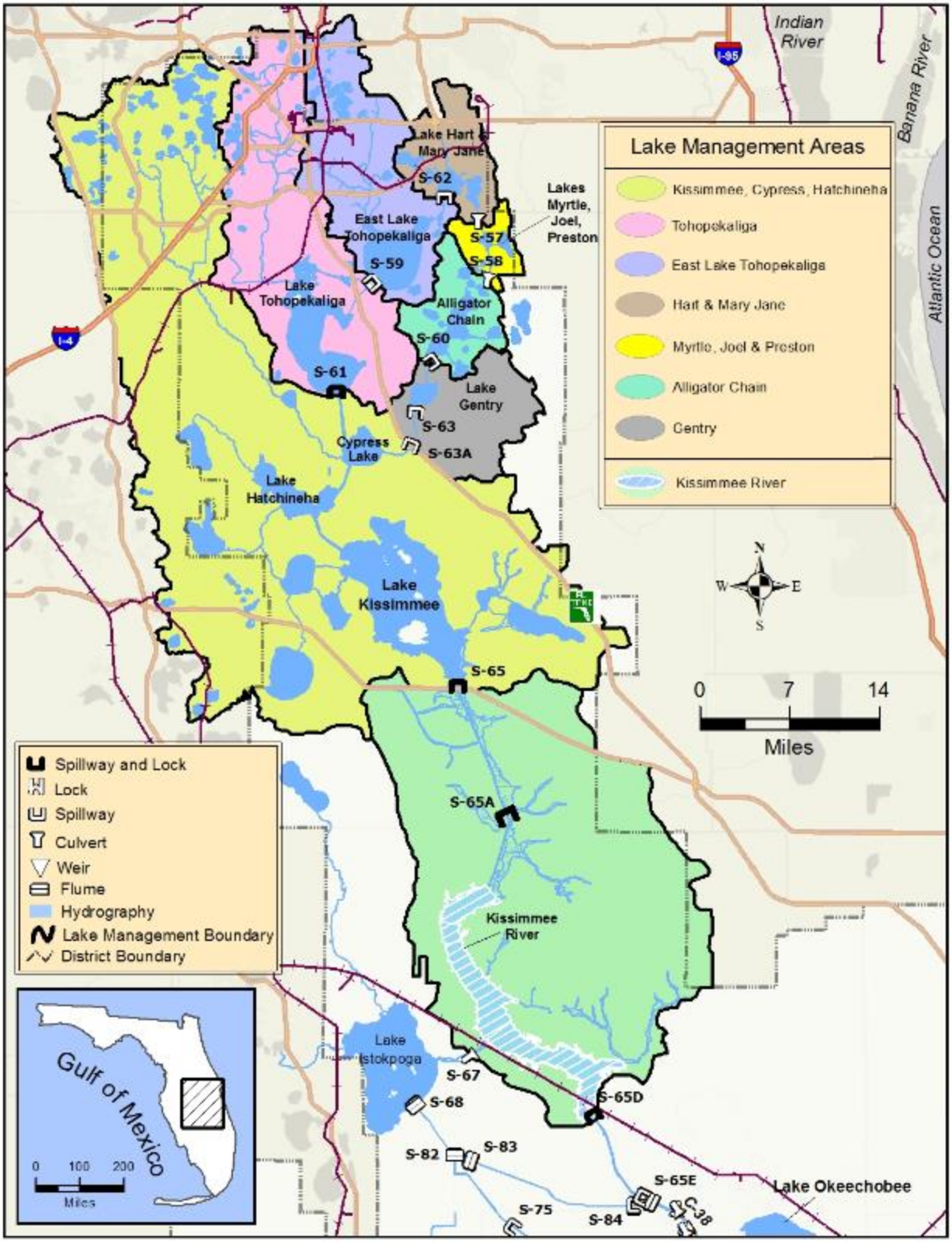


Figure 8. The Kissimmee Basin.

LAKE OKEECHOBEE

Lake Okeechobee stage is 16.23 feet NGVD, 1.06 feet higher than a month ago, and 2.79 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. Lake stage moved into the Beneficial Use sub-band on March 4, 2020, into the Base Flow sub-band in mid-July, and into the Intermediate sub-band last week (Figure 3). Lake stage reached a low of 10.99 feet on May 17, 2020 and rose over 5 feet higher in less than 5 months, but with the initiation of Lake releases this week the ascension rate declined by 0.27 feet from the previous week. According to RAINDAR, 1.57 inches of rain fell directly over the Lake through the past week, with much of the southern watershed receiving up to 4 inches and northern areas receiving between 0.25 and 1.5 inches (Figure 4).

The average daily inflows (minus rainfall) remain very high, but decreased slightly from the previous week, from 10,457 cfs to 6,330 cfs. Outflows (minus evapotranspiration) increased from 865 cfs to 4,359 cfs. Most of the inflows came from the Kissimmee River (3,216 cfs through S-65E & S-65EX1), but there were substantial inflows from Fisheating Creek (1,078), the C-41A canal (S-84 & S-84X, 984 cfs), and the C-40 and C-41 canals (S-71 & S-72, 525 cfs). Inflows from the C-59 canal via the S-191 structure decreased from 660 cfs to 65 cfs and inflows from the S-154 structure also decreased from 210 cfs to 127 cfs. Pumps contributed a combined 313 cfs of inflow, a decrease of 178 cfs from the previous week. Releases to the west via S-77 and east via S-308 were initiated this week with outflows of 2,904 cfs and 203 cfs, respectively. Outflows south through the S-350 structures increased from 865 cfs to 1,445 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. Half of the Chlorophyll-a results are pending.

The most recent satellite image (October 15, 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 region of the Lake. (Figure 7).

Water Management Summary

Lake Okeechobee stage was 16.23 feet NGVD on October 19, 2020, 0.05 feet higher than the previous week and 1.06 feet higher than the previous month. The Lake rose into the Intermediate sub-band on October 7, 2020 and remained there this week. Lake stage moved into the ecological envelope (which varies seasonally from 12.0 – 15.0 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 rose over 5 feet during that time, but with the initiation of Lake releases the ascension rate declined by 0.27 feet from the previous week. Cyanobacterial bloom risk potential is high in the central portion of the Lake. Water quality sampling on October 5 - 7, 2020 showed four stations having Microcystin toxin levels >8 μg/L. Half of the Chlorophyll-a results are still 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	5076	3216	1.2
S-71 & S-72	1119	525	0.2
S-84 & S-84X	1617	984	0.4
Fisheating Creek	1233	1078	0.4
S-154	210	127	0.0
S-191	660	65	0.0
S-133 P	133	65	0.0
S-127 P	48	22	0.0
S-129 P	42	15	0.0
S-131 P	42	10	0.0
S-135 P	226	180	0.1
S-2 P	0	21	0.0
S-3 P	0	0	0.0
S-4 P	0	0	0.0
L-8 Backflow	53	22	0.0
Rainfall	2750	4142	1.6
Total	**13210**	**10472**	**4.0**

OUTFLOWS	Previous week Avg Daily CFS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)
S-77	0	2904	1.1
S-308	0	203	0.1
S-351	189	257	0.1
S-352	325	697	0.3
S-354	351	501	0.2
L-8 Outflow			
ET	1831	1949	0.7
Total	**2695**	**6511**	**2.5**

Provisional Data

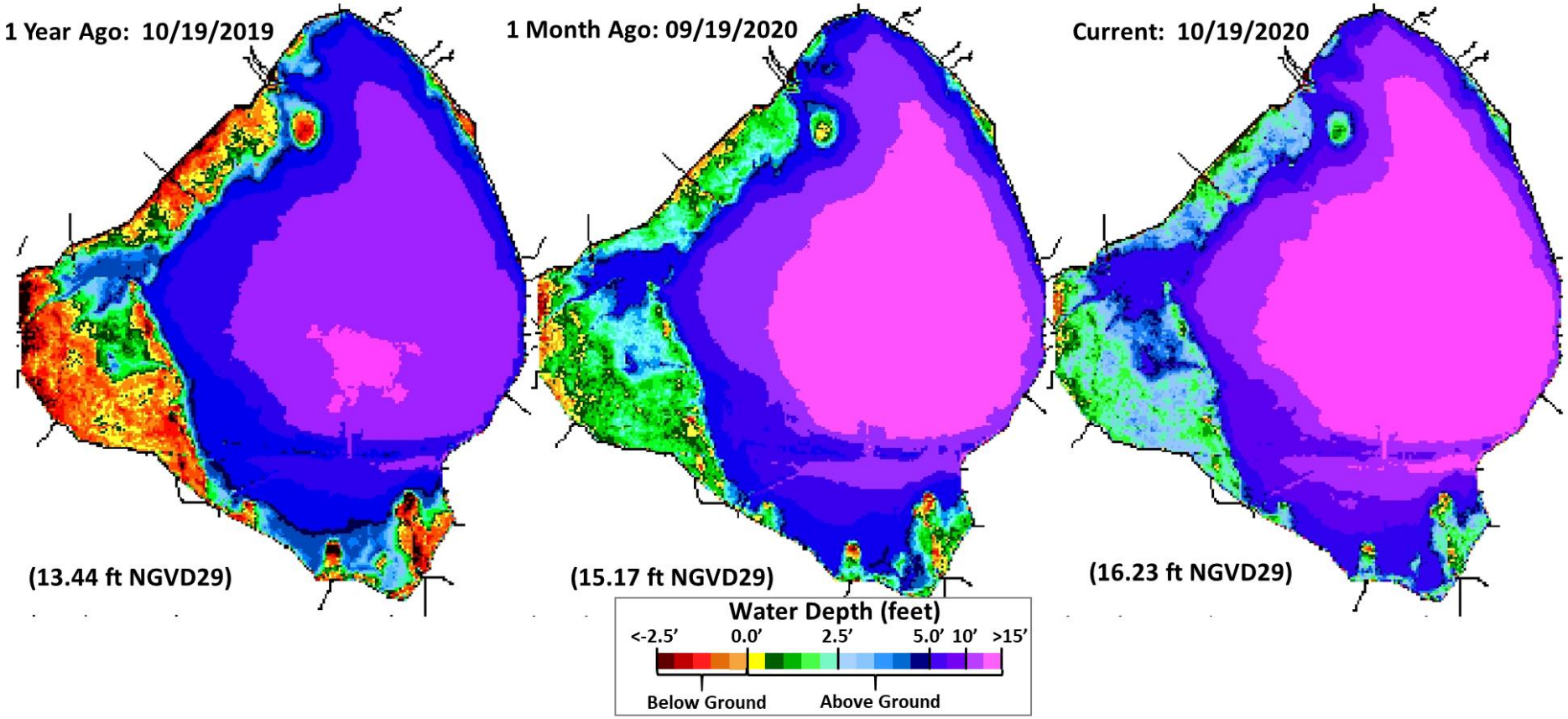


Figure 1. Water depth estimates on Lake Okeechobee based on the South Florida Water Depth Assessment Tool.

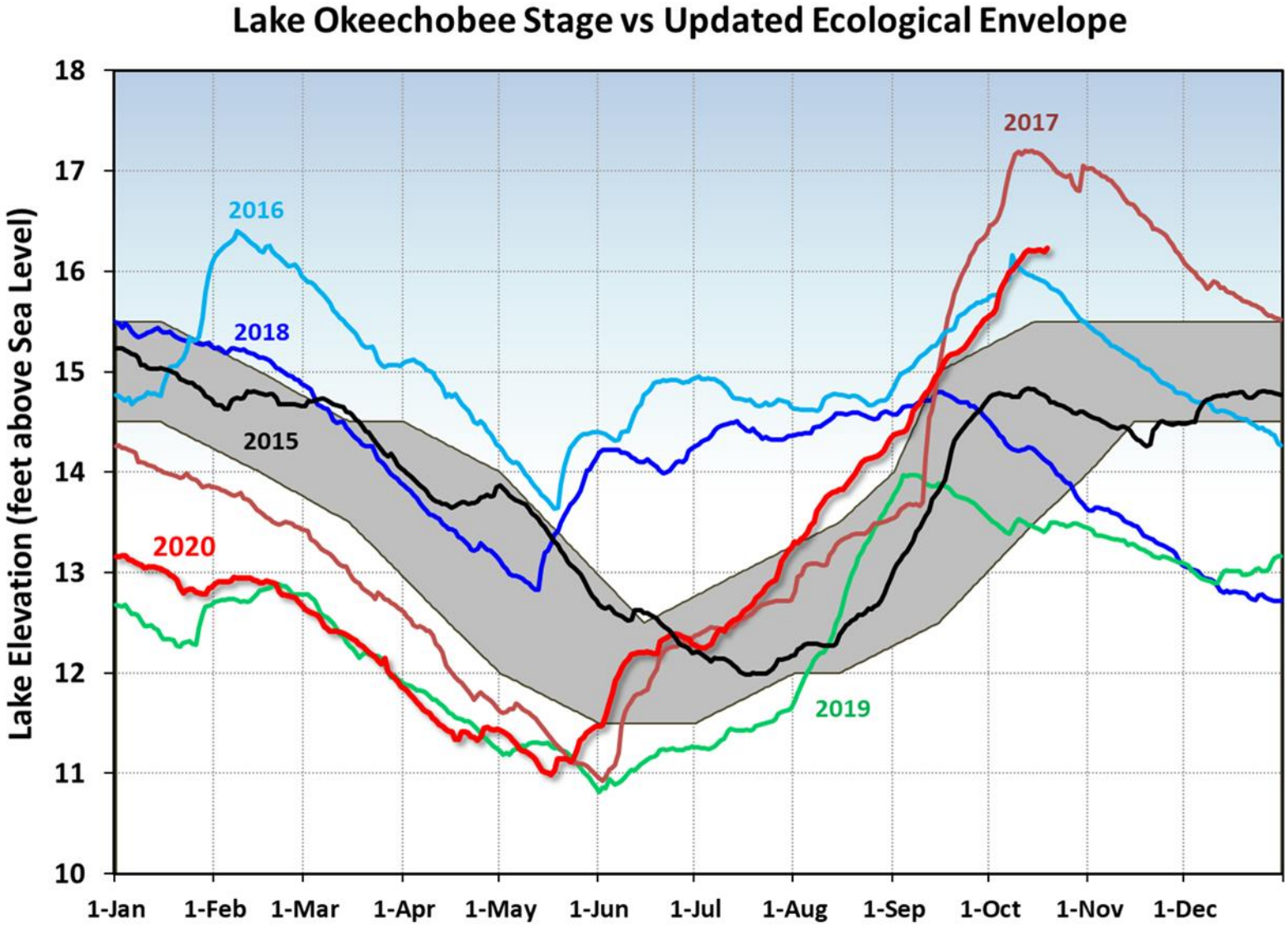


Figure 2. Select annual stage hydrographs for Lake Okeechobee in comparison to the updated Ecological Envelope.

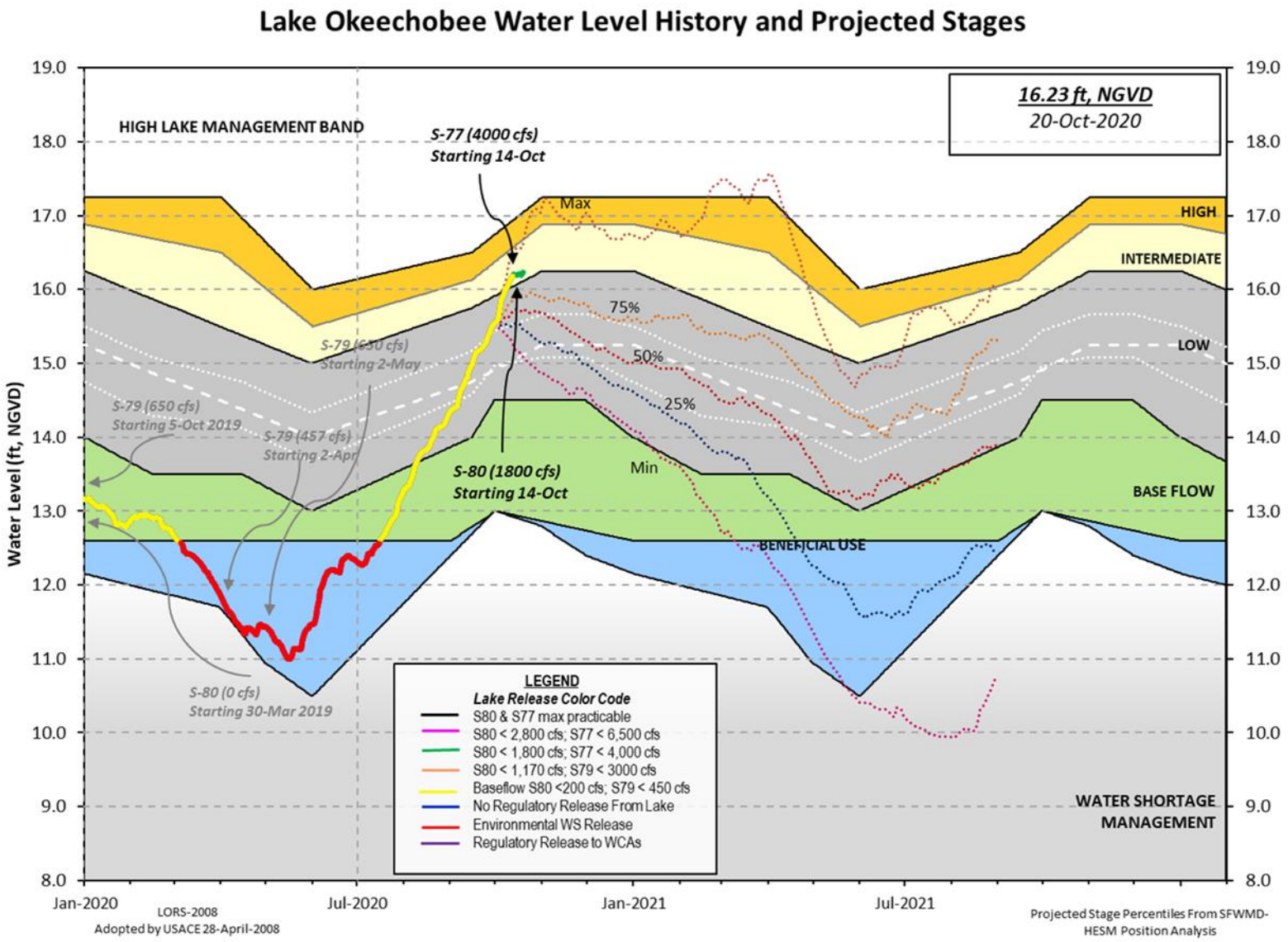


Figure 3. Recent Lake Okeechobee stage and releases, with projected stages based on a dynamic position analysis.

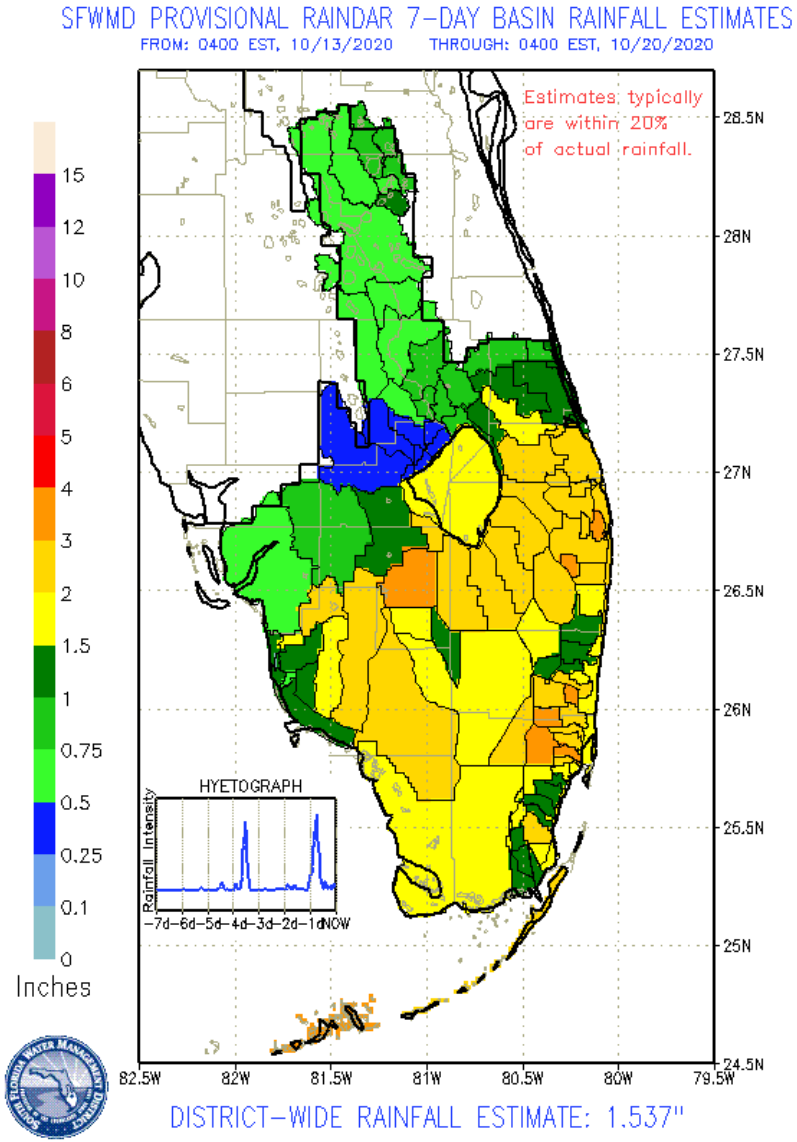


Figure 4. 7-Day rainfall estimates by RAINDAR.

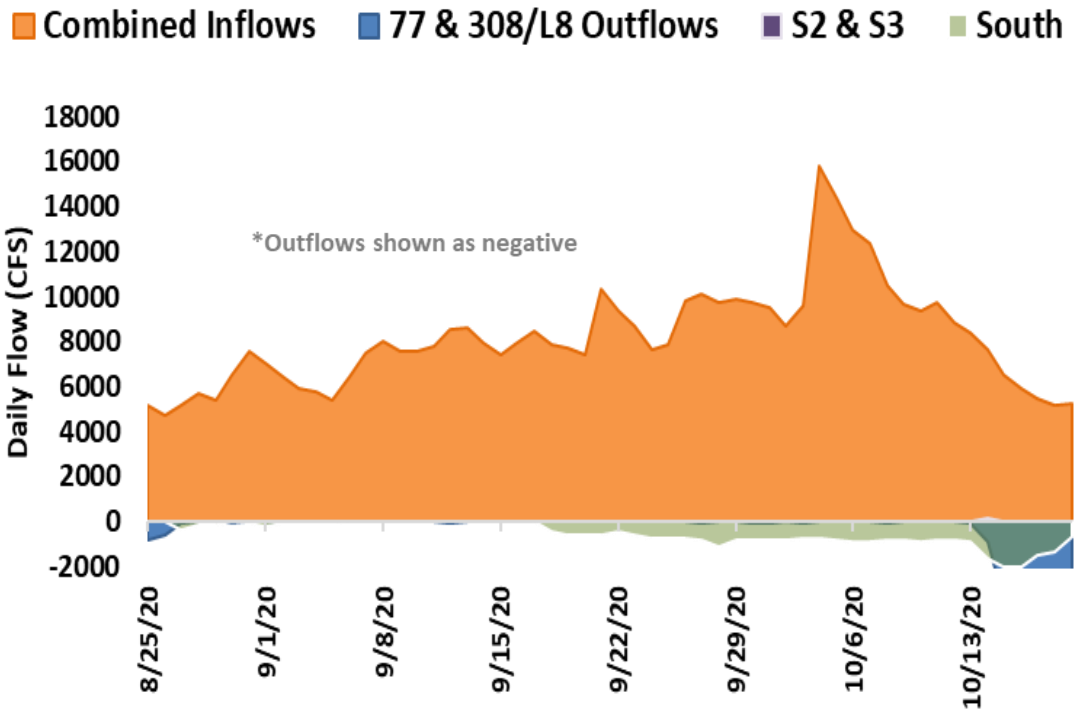


Figure 5. Major inflows (orange) and outflows (blue) of Lake Okeechobee, including the S-350 structures designated as South (green). The L-8 Canal flows through Culvert 10A are included as outflows when positive, and as inflows when backflowing into the Lake. All inflows and outflows are shown as positive 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	2.9	BDL	mixed
FEBOUT			NS
KISSR0.0	14.9	BDL	mixed
L005	**71.8**	BDL	*Planktol*
LZ2	**27.4**	BDL	mixed
KBARSE	**26.3**	**5.5**	*Microcys*
RITTAE2	P	BDL	mixed
PELBAY3	P	BDL	mixed
POLE3S	P	BDL	mixed
LZ25A	P	BDL	mixed
PALMOUT	P	**0.3**	mixed
PALMOUT1	P	**1.2**	*Microcys*
PALMOUT2	P	**3.2**	*Microcys*
PALMOUT3	P	**5.3**	*Microcys*
POLESOUT	**42.4**	BDL	mixed
POLESOUT1	**22.0**	**1.1**	*Microcys*
POLESOUT2	**36.4**	**13.0**	*Microcys*
POLESOUT3	**23.5**	**16.0**	*Microcys*
EASTSHORE	3.6	BDL	mixed
NES135	10.6	BDL	mixed
NES191	2.4	BDL	mixed

Station	CHL*a* (ug/L)	TOXIN (ug/L)	TAXA
L001	17.5	BDL	*Microcys*
L004	8.7	BDL	mixed
L006	P	BDL	mixed
L007	P	**0.3**	mixed
L008	**54.1**	**43.0**	*Microcys*
LZ30	P	**6.0**	mixed
LZ40	P	**53.0**	*Microcys*
CLV10A	P	BDL	mixed
NCENTER	7.9	BDL	mixed

S308C	4.2	BDL	mixed
S77	9.4	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

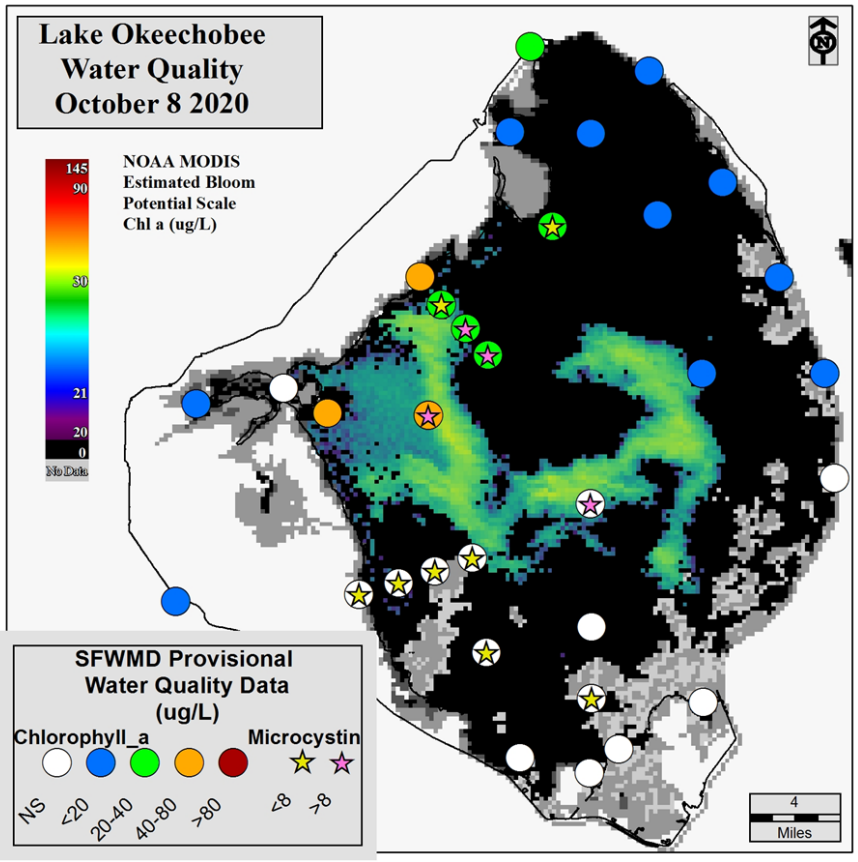


Figure 6. Provisional results from the expanded monitoring sampling trips on October 5 - 7, 2020

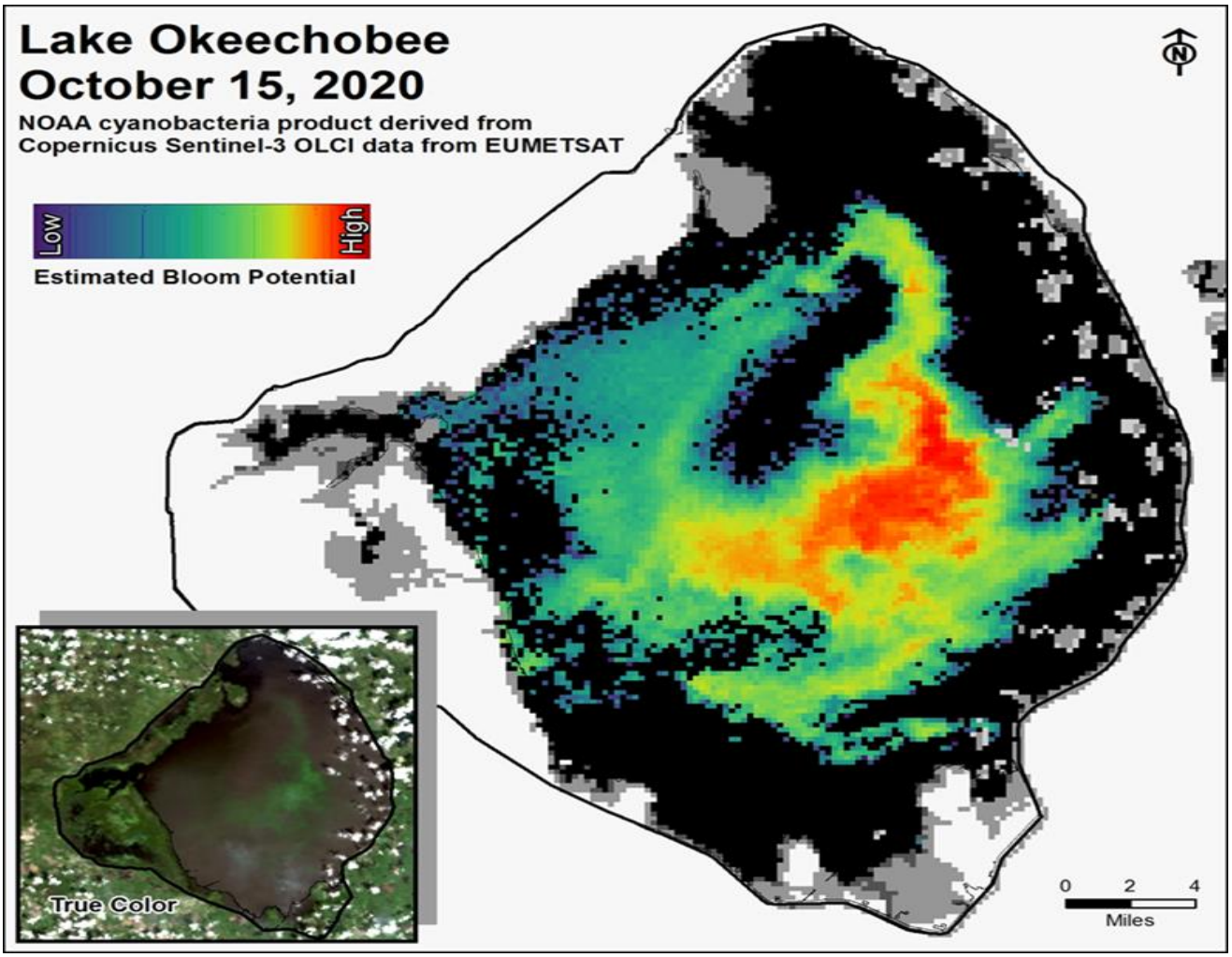


Figure 7. Potential for cyanobacterial blooms on Lake Okeechobee on October 15, 2020, based on NOAA's harmful algal bloom monitoring system. Gray color indicates cloud cover.

ESTUARIES

St. Lucie Estuary:

Last week total inflow to the St. Lucie Estuary averaged more than 1,495 cfs (Figures 1 and 2) and last month inflow averaged more than 2,696 cfs. Note these numbers do not include contribution from Gordy Road Structure due to missing data. Last week's provisional averaged inflows from the tidal basin and the structures are shown in Table 1. (Note: Recorder at Gordy Road structure was not reporting flow over the past week)

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

Location	Flow (cfs)
Tidal Basin Inflow	594
S-80	340
S-308	240
S-49 on C-24	297
S-97 on C-23	264
Gordy Rd. structure on Ten Mile Creek	Not reporting

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 7.5. 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)	**2.2** (0.2)	**4.7** (0.3)	NA[1]
US1 Bridge	**6.2** (1.0)	**8.8** (2.3)	10.0-26.0
A1A Bridge	**17.9** (5.4)	**24.9** (17.2)	NA[1]

[1]Envelope not applicable

Caloosahatchee Estuary:

Last week total inflow to the Caloosahatchee Estuary averaged approximately 5,572 cfs (Figures 5 and 6) and last month inflow averaged about 5,253 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	2,904
S-78	3,131
S-79	4,672
Tidal Basin Inflow	900

Over the past week in the estuary, salinity remained the same to Cape Coral and decreased 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)	**0.2** (0.3)	NA
Cape Coral	**3.6** (3.3)	**5.3** (6.0)	10.0-30.0
Shell Point	**16.3** (18.1)	**18.8** (21.8)	10.0-30.0
Sanibel	**26.3** (27.9)	**27.4** (29.2)	10.0-30.0

[1]Envelope not applicable and [2]Envelope 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 400 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	400	0.3	0.3
B	300	400	0.3	0.3
C	450	400	0.3	0.3
D	650	400	0.3	0.3
E	800	400	0.3	0.3

Red tide

The Florida Fish and Wildlife Research Institute reported on October 16, 2020, that *Karenia brevis,* the Florida red tide dinoflagellate, was not observed in samples collected from or offshore of 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 Intermediate sub-band. Tributary conditions are very wet. The LORS2008 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.

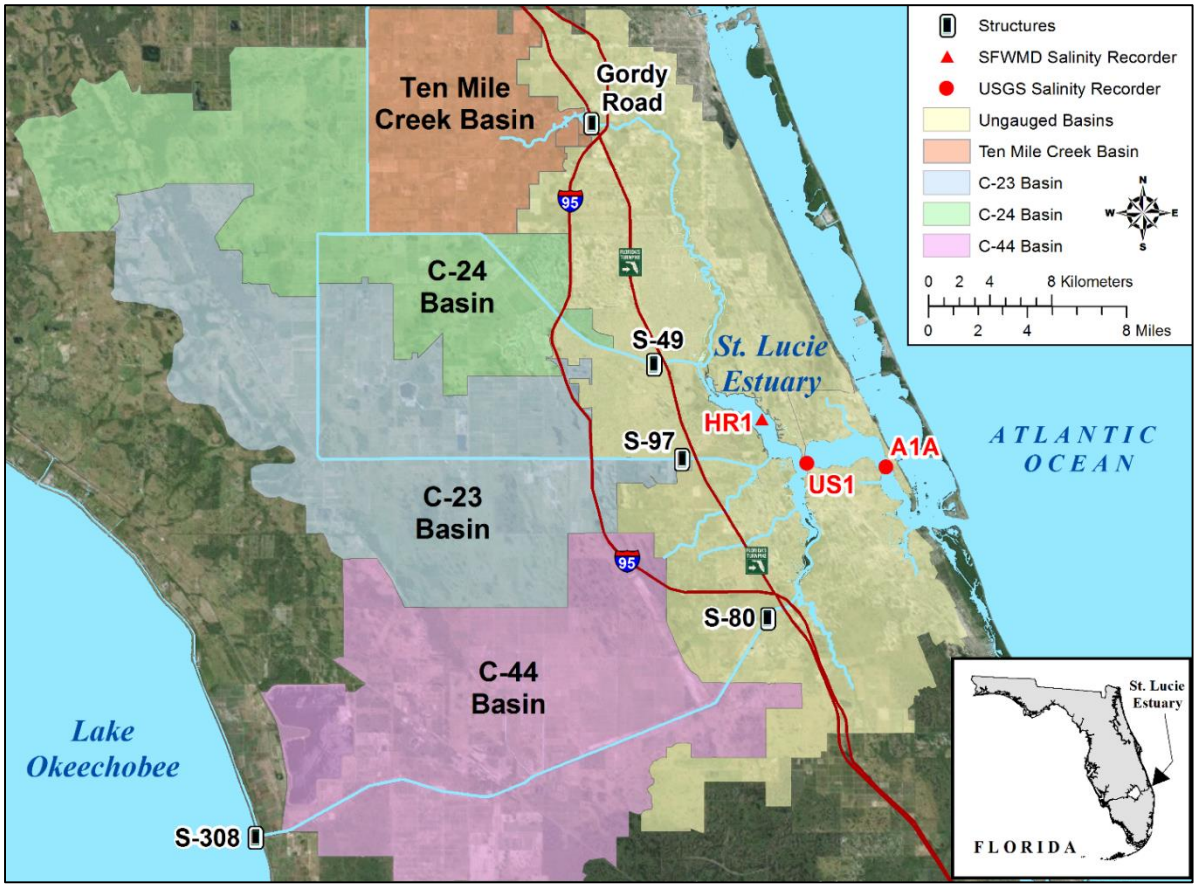


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

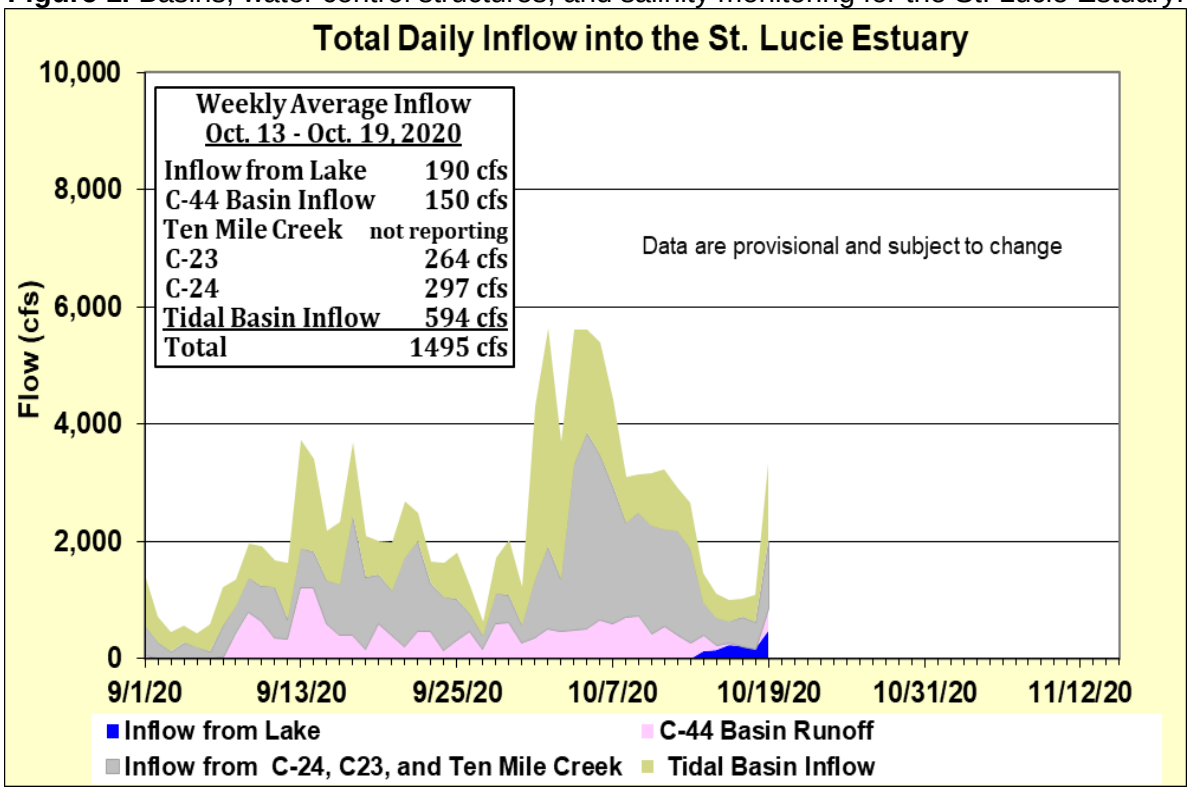


Figure 2. Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basin into the St. Lucie Estuary.

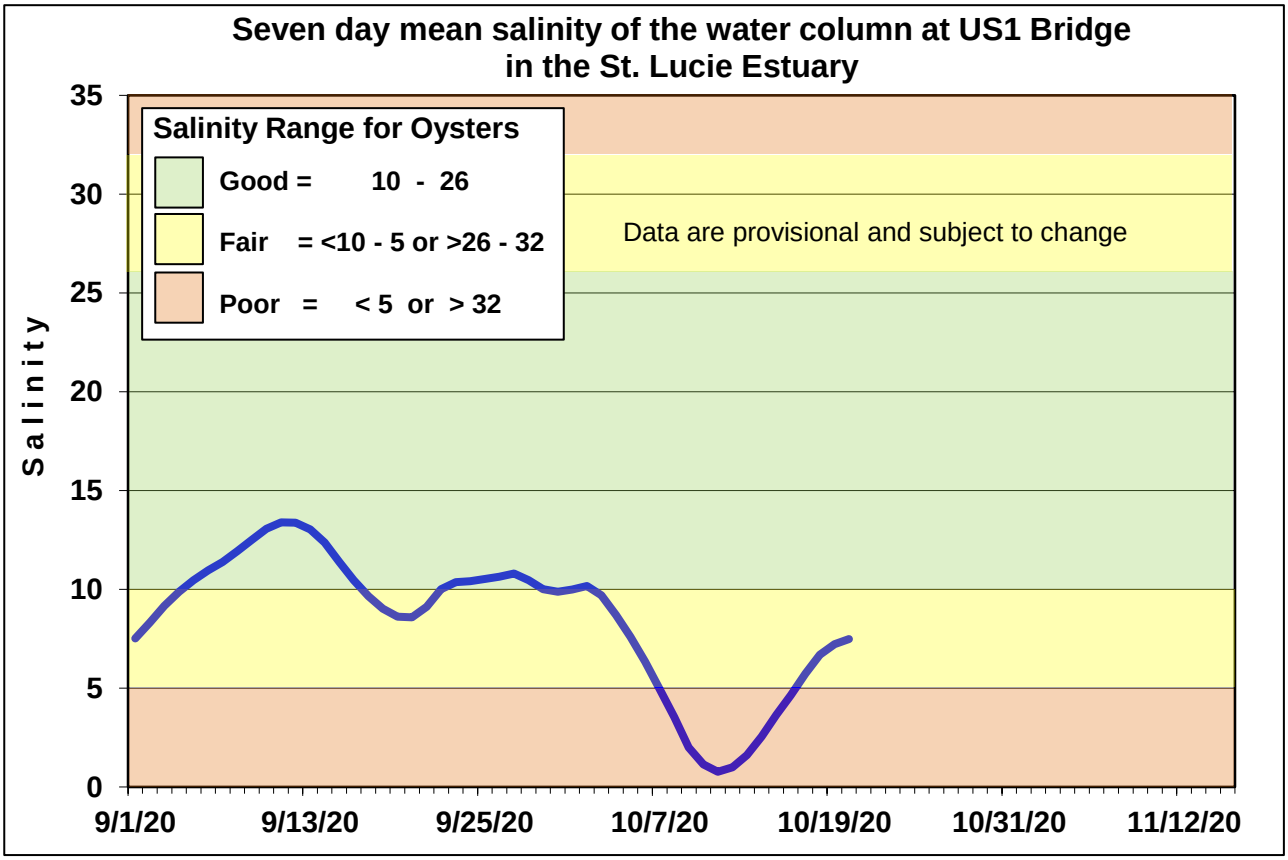


Figure 3. Seven-day mean salinity of the water column at the US1 Bridge.

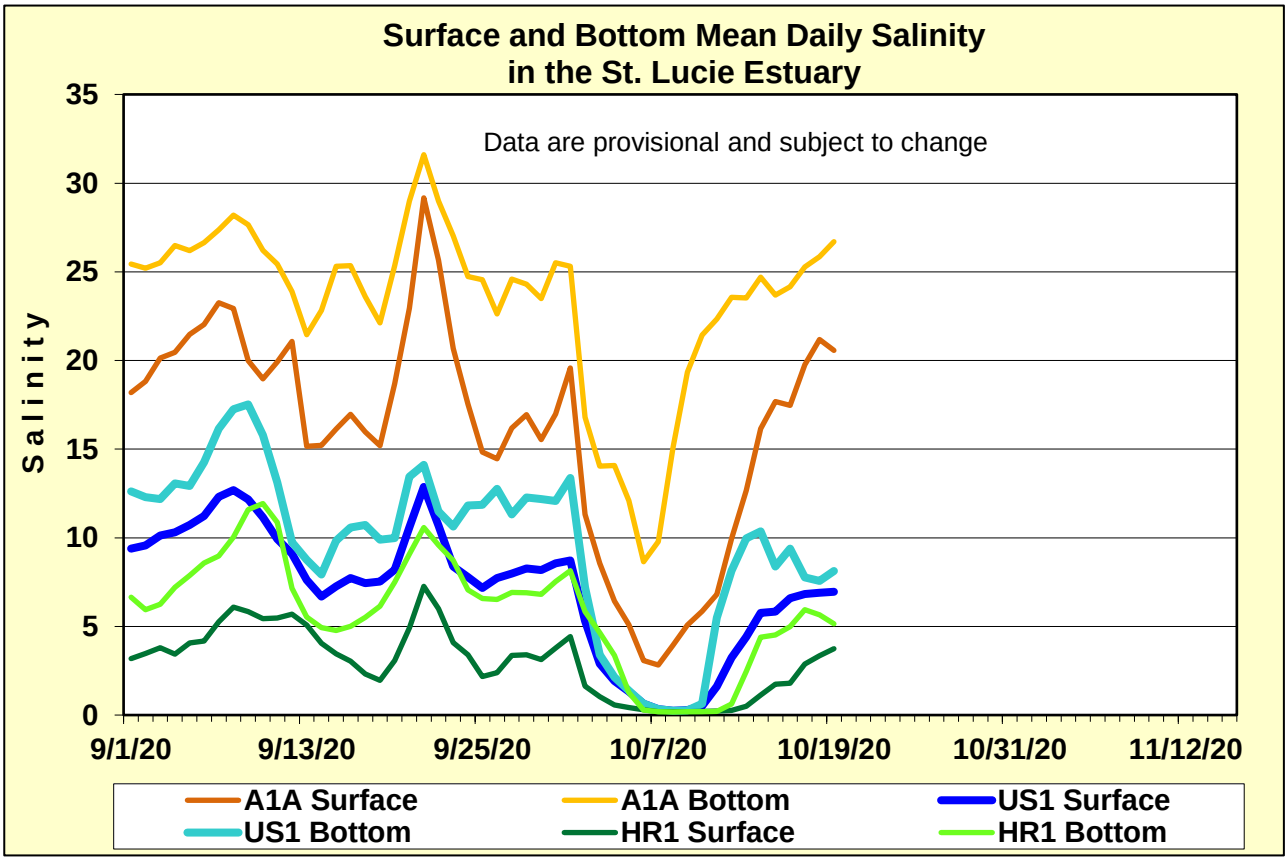


Figure 4. Daily mean salinity at the A1A, US1, and HR1 stations.

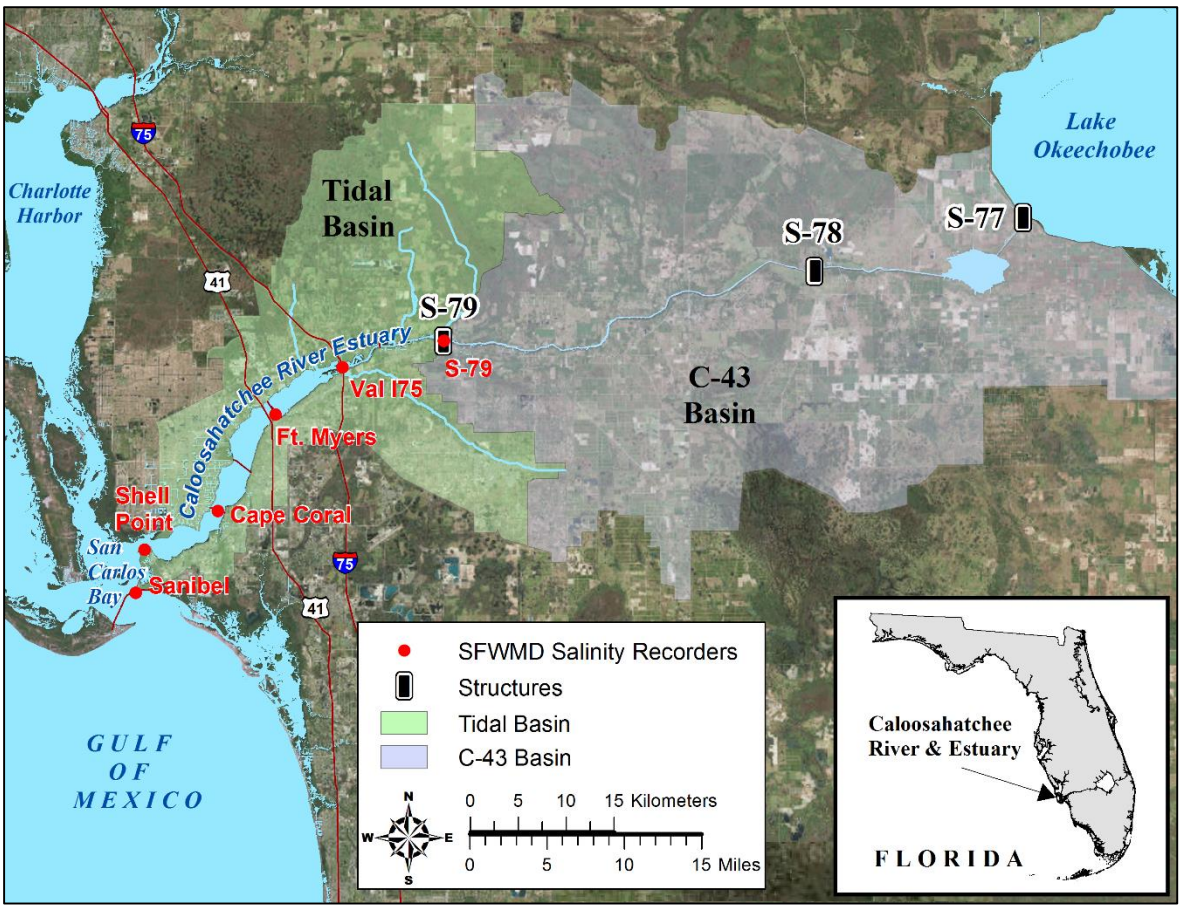


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

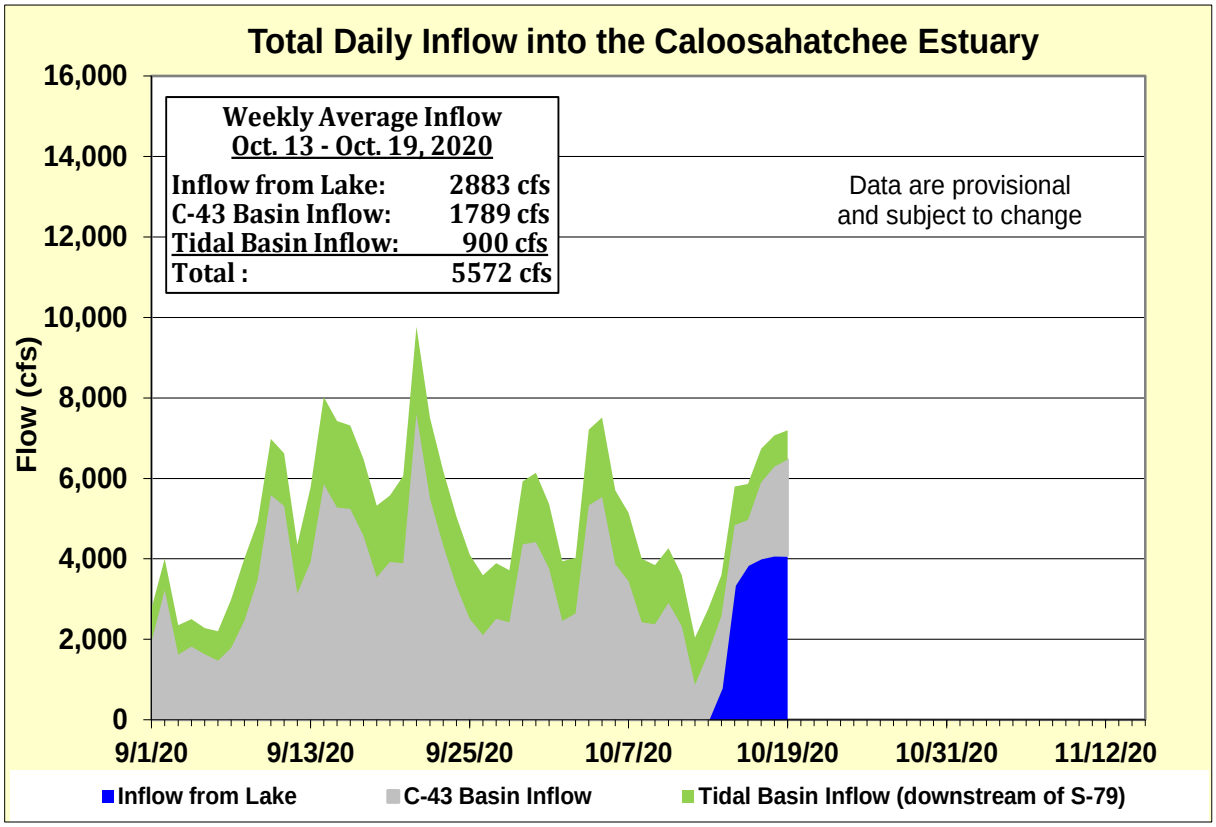


Figure 6. Total daily inflows from Lake Okeechobee, runoff from the C-43 basin

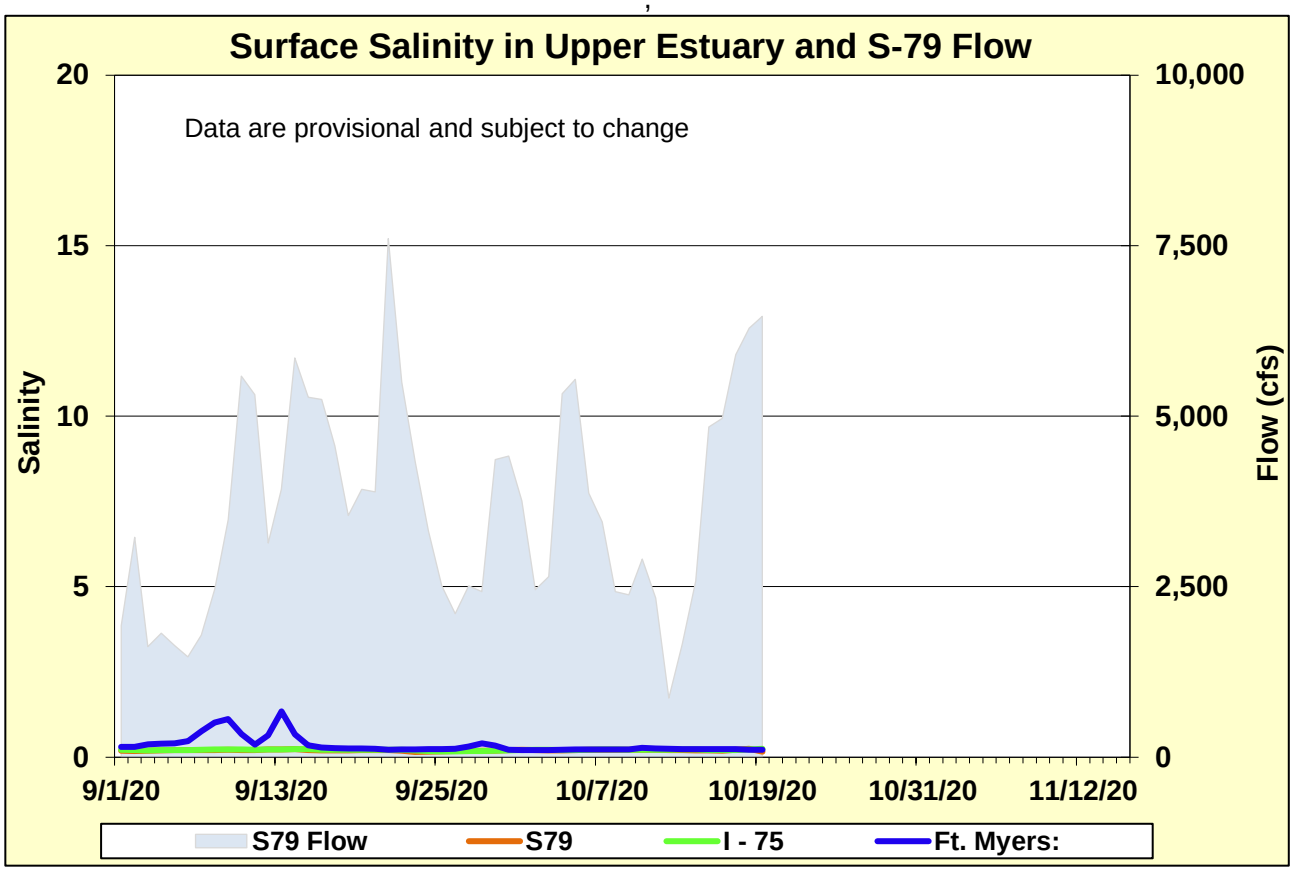


Figure 7. Daily mean flows at S-79 and salinity at upper estuary monitoring stations.

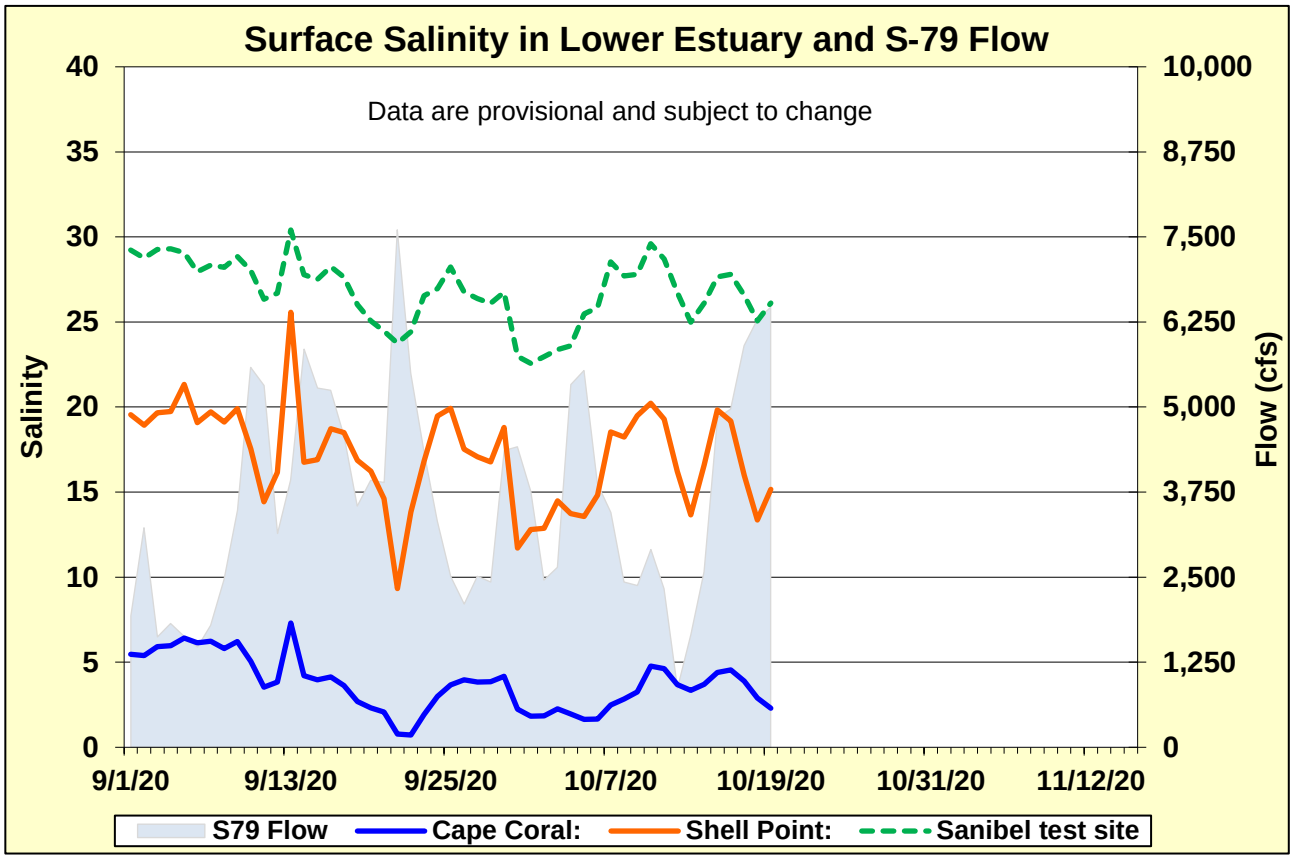


Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.

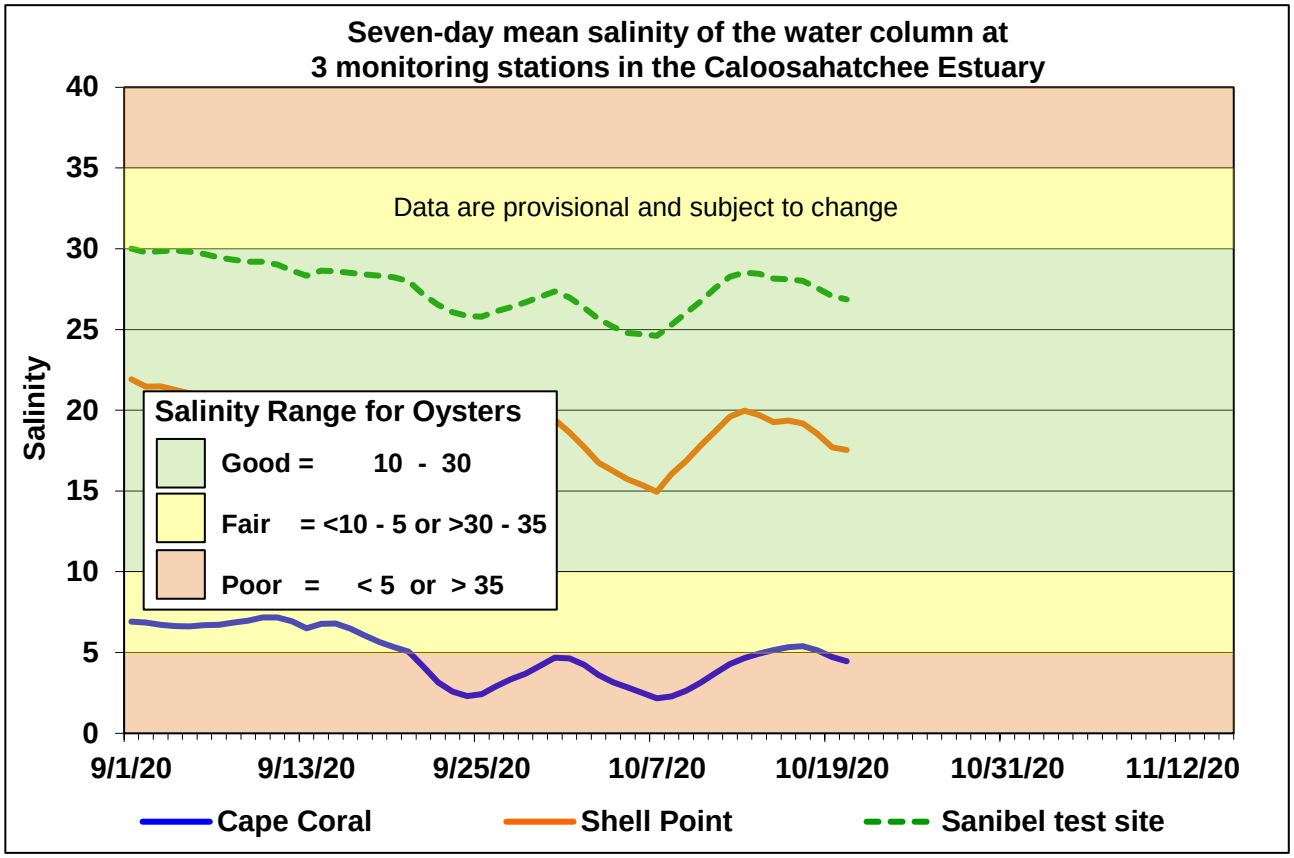


Figure 9. Seven-day mean salinity at Cape Coral, Shell Point, and Sanibel monitoring stations.

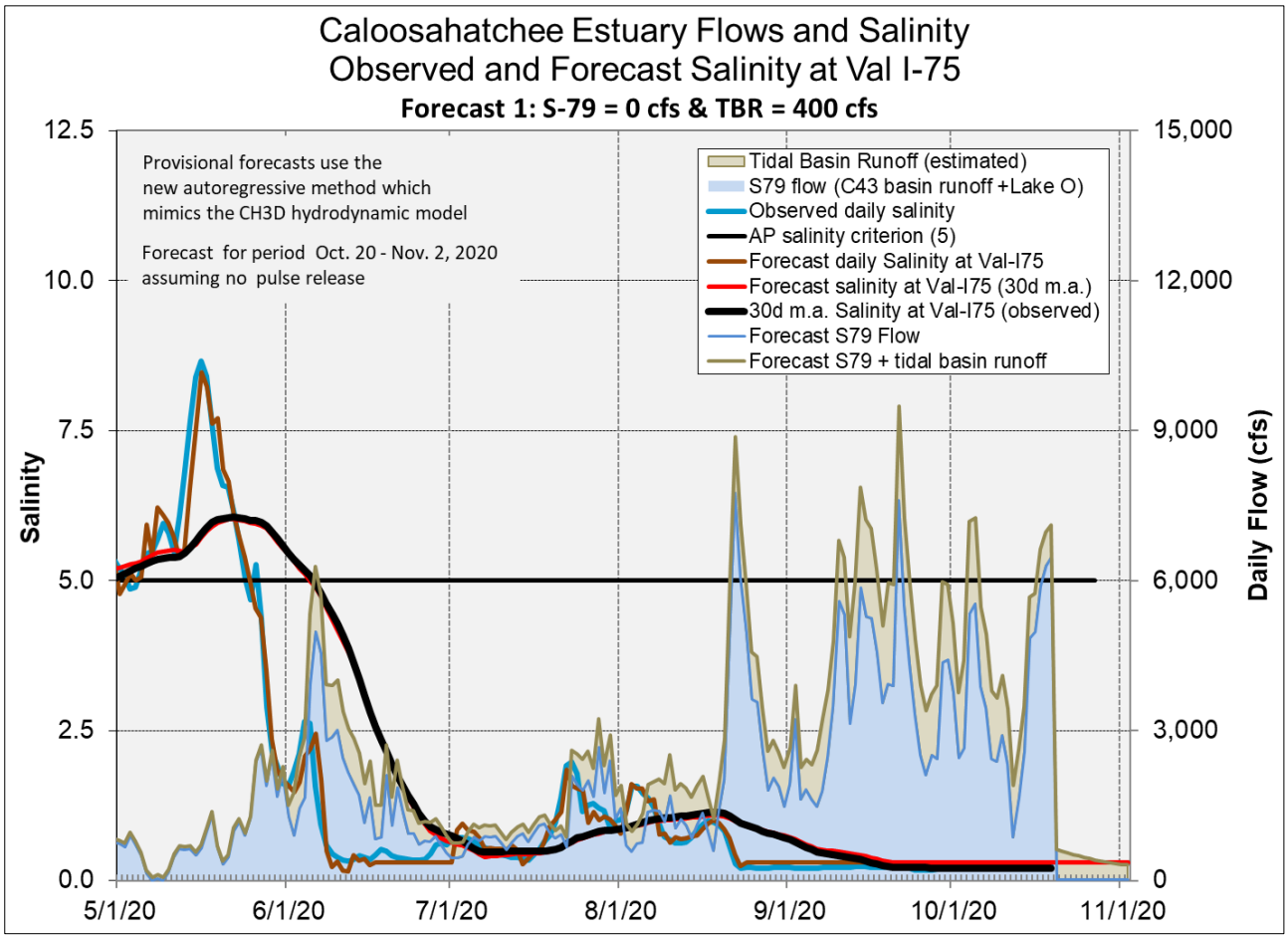


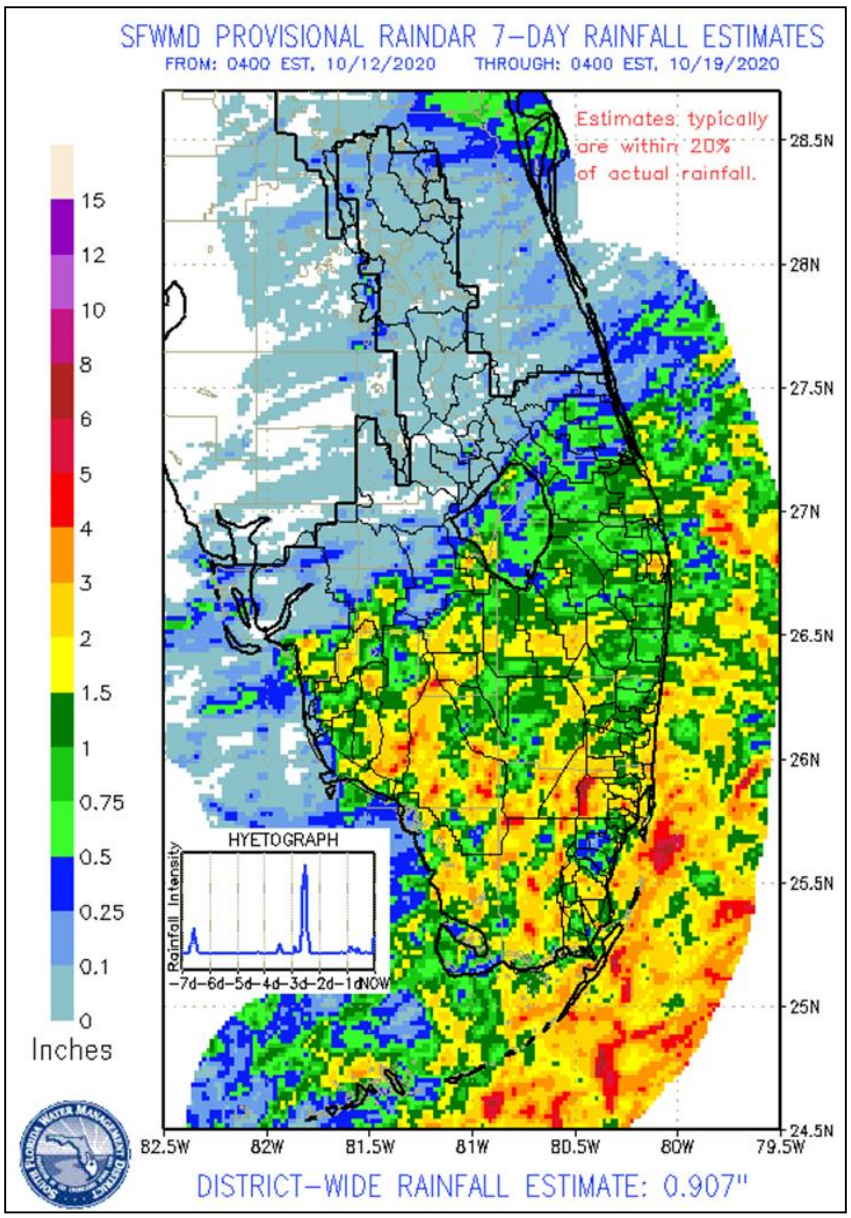
Figure 10. Forecasted Val I-75 surface salinity assuming no pulse release at S79.

EVERGLADES

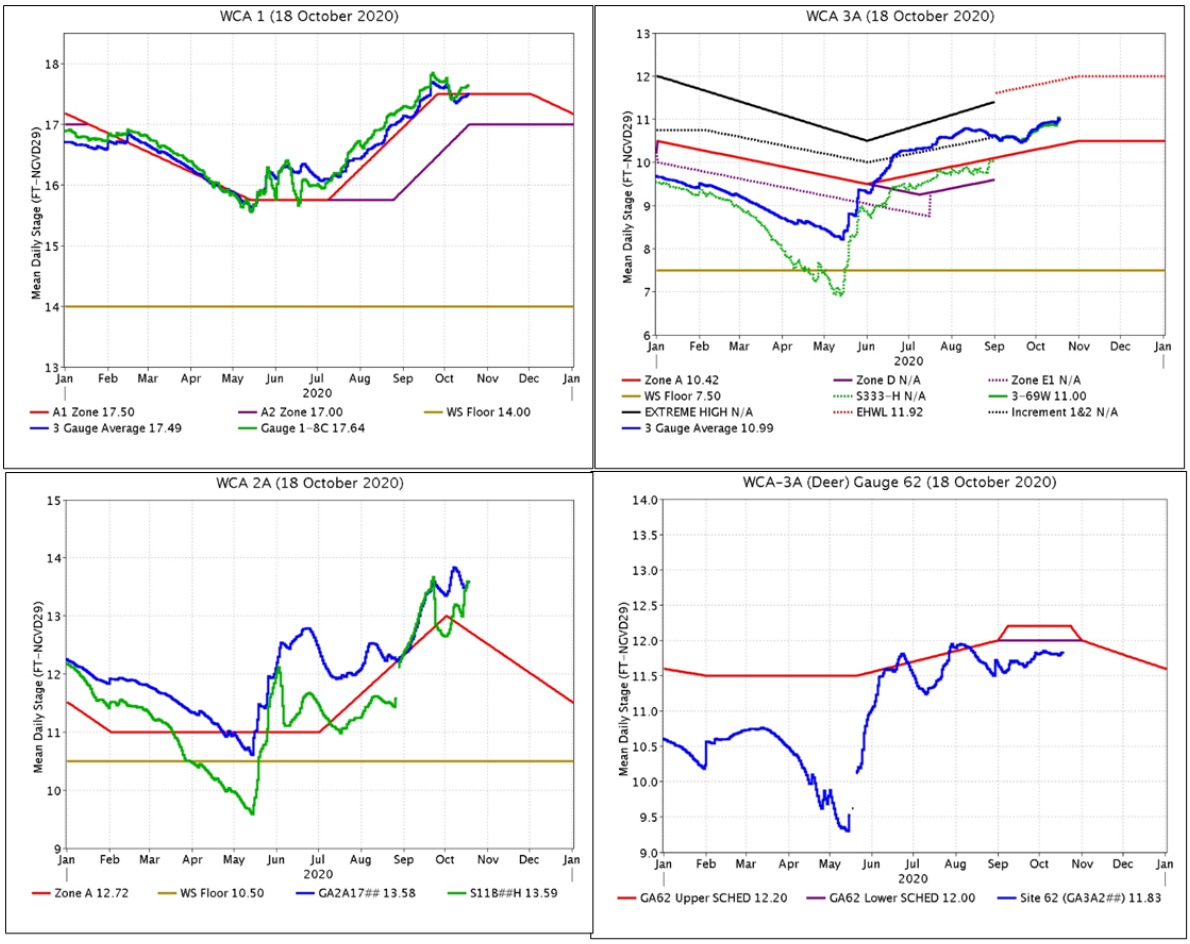
Consistent above average rainfall fell across the Everglades last week, highest in WCA-3B. At the gauges monitored for this report stages increased 0.07 feet on average, with only WCA-2A and 2B

experiencing a drop in stage. Evaporation was estimated at 0.91 inches last week, and the TTFF continues to call for maximum releases from WCA-3A.

Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	1.22	+0.11
WCA-2A	1.51	−0.08
WCA-2B	1.26	−0.04
WCA-3A	1.53	+0.03
WCA-3B	2.57	+0.13
ENP	1.71	+0.26

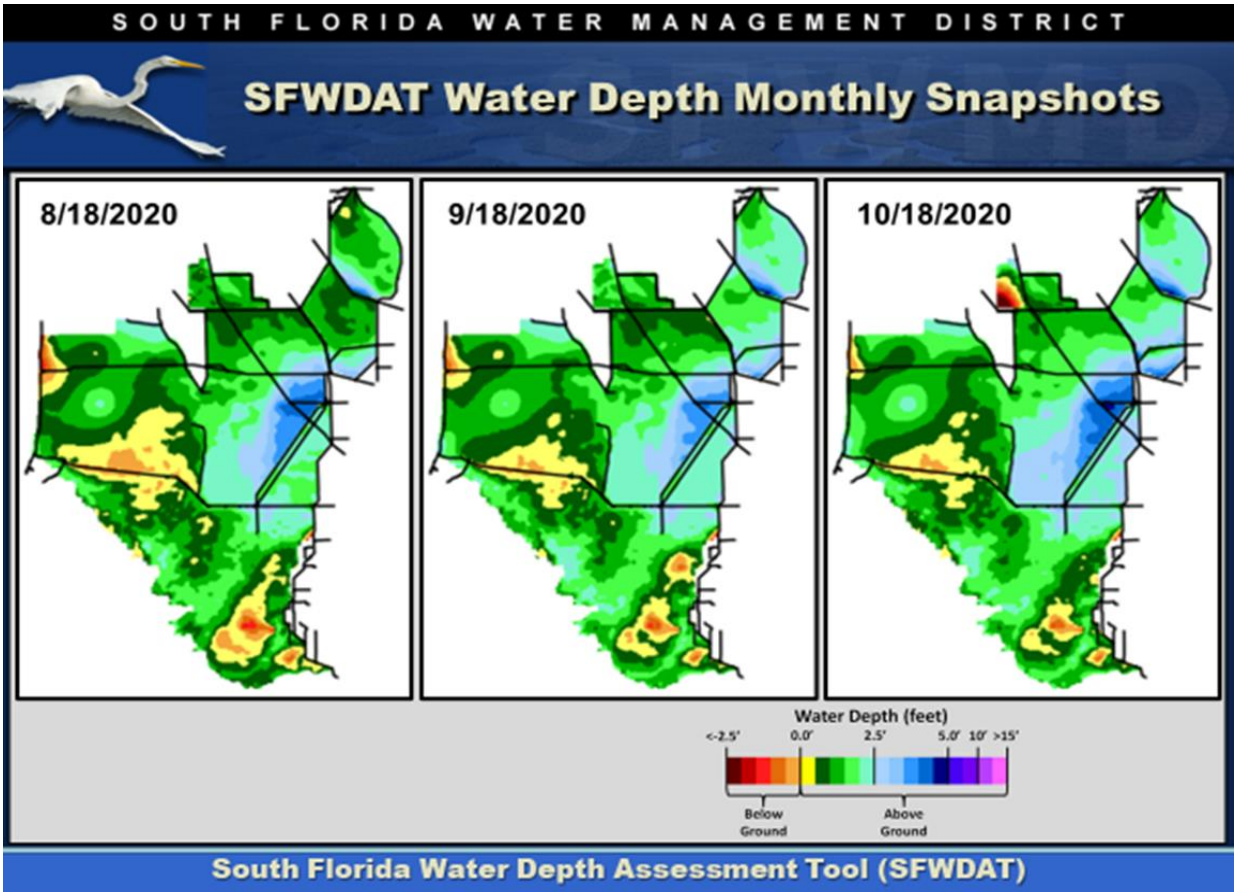


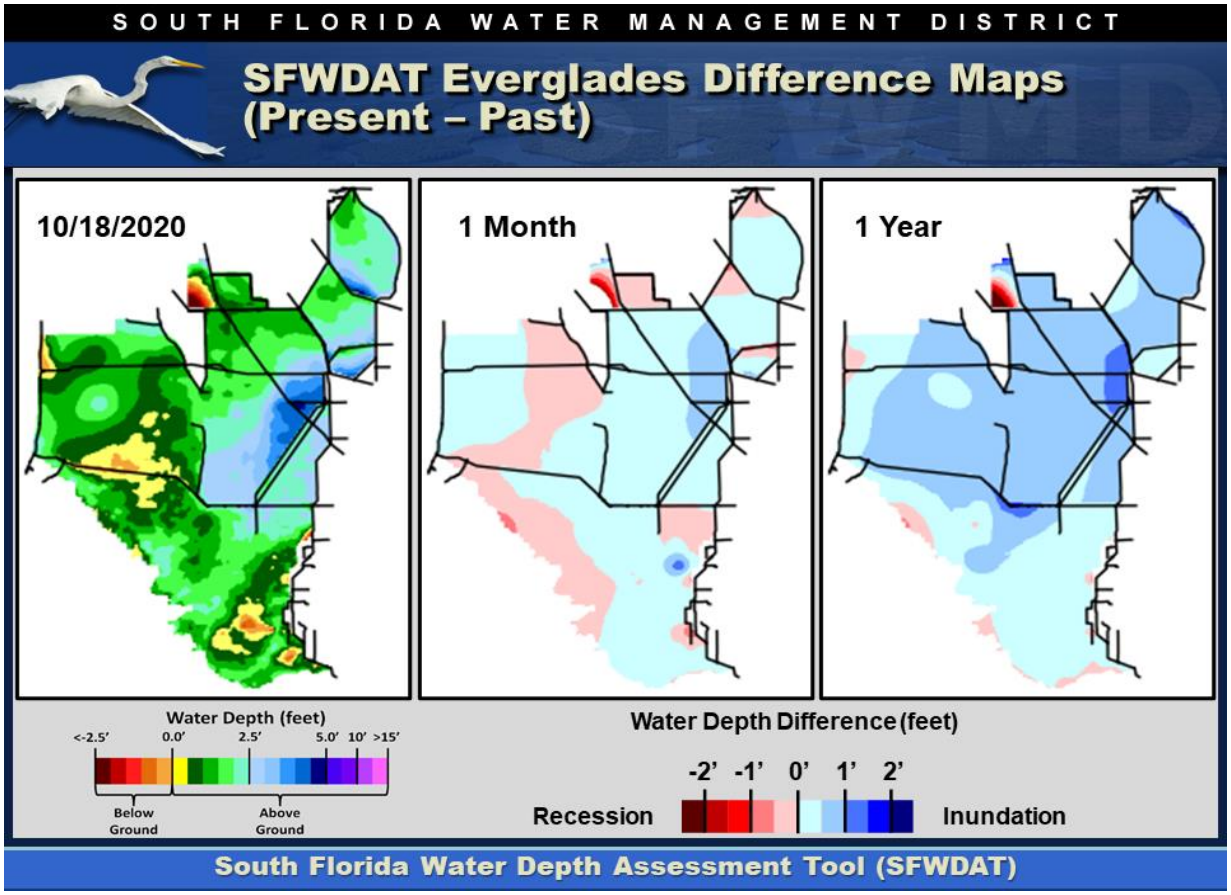
Regulation Schedules: WCA-1: Stage at the 1-8C Gauge remains above schedule last week, now 0.14 feet above the stable Zone A1 regulation line. WCA-2A: Stages at Gauge 2-17 stabilized last week but remains above the falling regulation schedule, currently 0.86 feet above. WCA-3A: The Three Gauge Average stages are above and following parallel to the rising Zone A regulation line last week, currently 0.57 feet above nearly the same as the week prior. WCA-3A: Stage at gauge 62 (Northwest corner) is currently 0.17 feet below the stable Lower Schedule and 0.37 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 in excess of 4.5 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. Hydrologic connectivity is well established within the Major Sloughs in Everglades National Park (ENP). Comparing WDAT water levels from present, over the last month stage changes were generally deeper and moderate across most the Everglades system. WCA-3A is the exception significantly deeper downstream of the S-11s and south to the upper reaches of the L-67 canal. Looking back one year the stage difference patterns are similar, but more significant. Generally deeper across the entire system, significantly deeper downstream of the S-11s and south to the upper reaches of the L-67 canal.

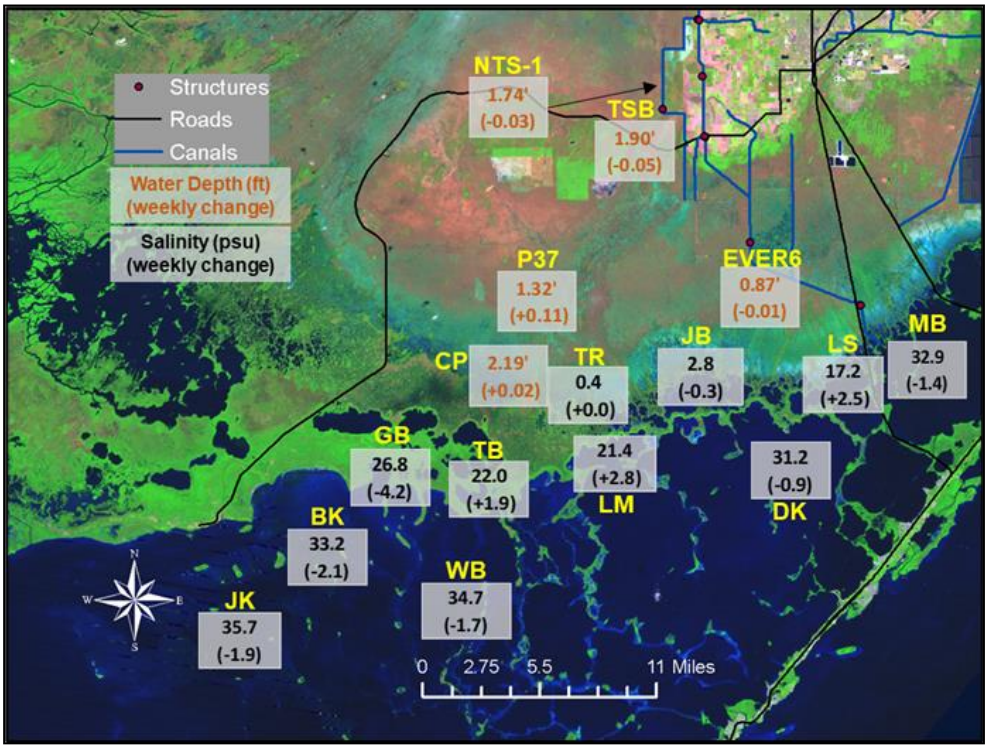
** sensor recalibration in Rotenberger is causing erroneous output.

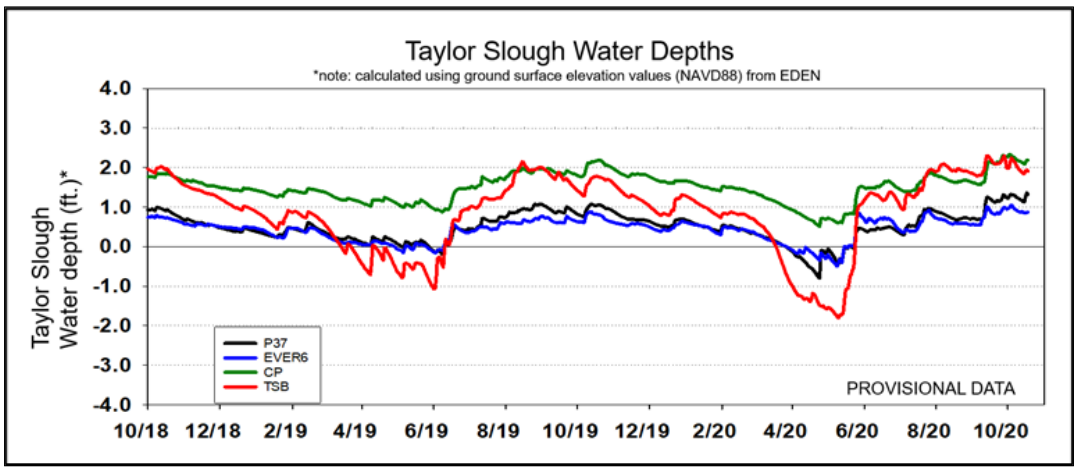

SOUTH FLORIDA WATER MANAGEMENT DISTRICT
SFWDAT Water Depth Monthly Snapshots
8/18/2020
9/18/2020
10/18/2020
Water Depth (feet)
<-2.5'
0.0'
2.5'
5.0'
10'
>15'
Below Ground
Above Ground
South Florida Water Depth Assessment Tool (SFWDAT)

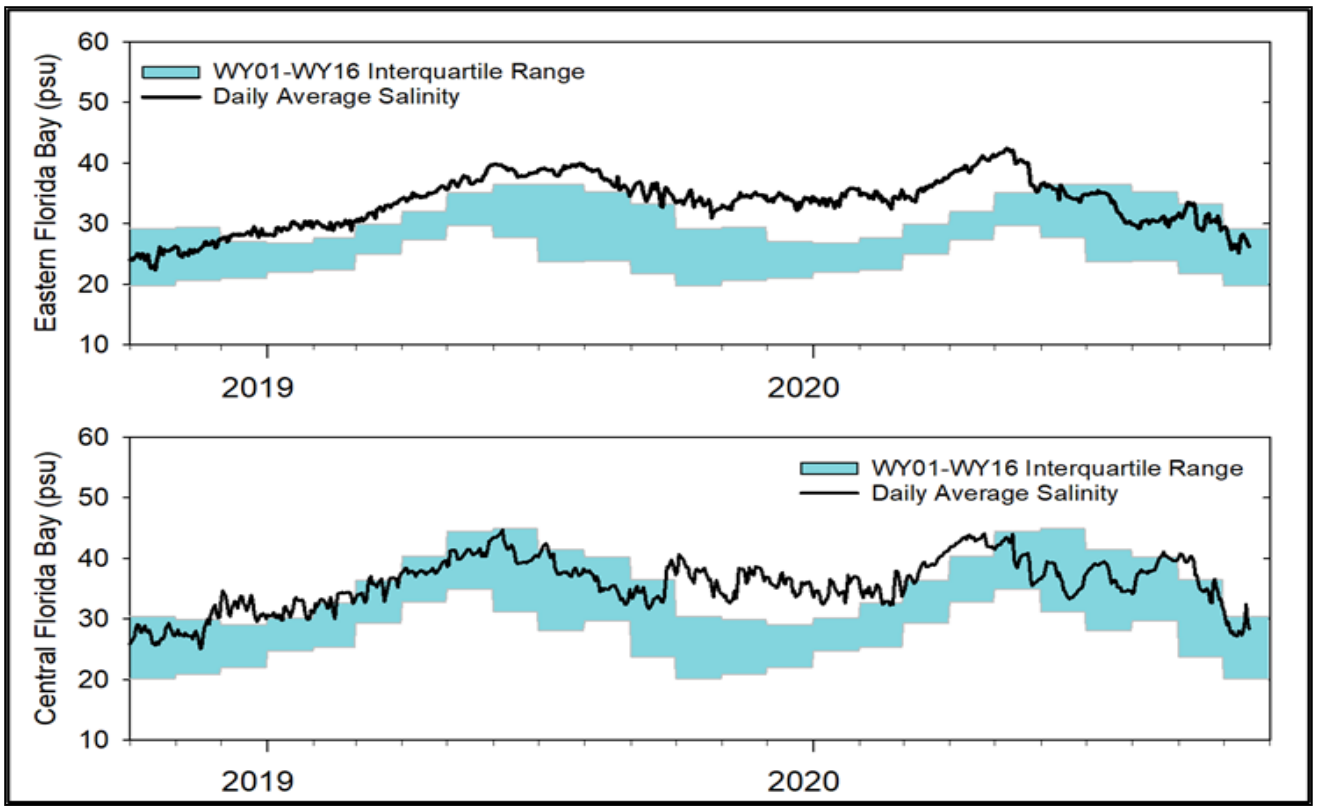

SOUTH FLORIDA WATER MANAGEMENT DISTRICT
SFWDAT Everglades Difference Maps
(Present – Past)
10/18/2020
1 Month
1 Year
Water Depth (feet)
<-2.5'
0.0'
2.5'
5.0'
10'
>15'
Below Ground
Above Ground
Water Depth Difference (feet)
-2'
-1'
0'
1'
2'
Recession
Inundation
South Florida Water Depth Assessment Tool (SFWDAT)

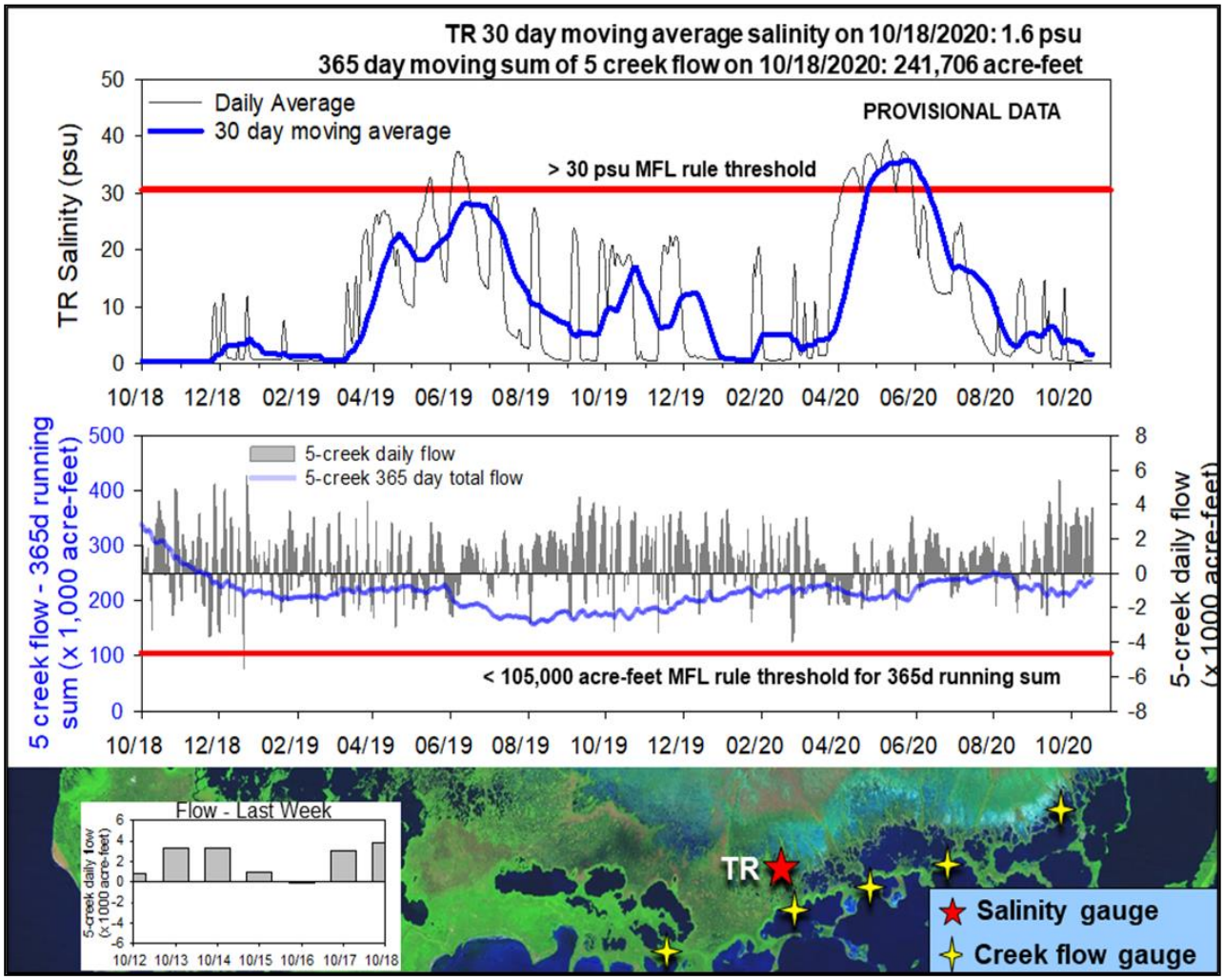
Tree island inundation in WCA-3A, WCA-3B and ENP: 371 Tree Islands of known elevation within WCA-3A, -3B, and Everglades National Park's Shark Slough. Current preliminary estimates using WDAT indicate that 56% or 207 of the tree islands are currently inundated, the same as the week prior. Initial islands inundated beginning May 24, 2020, longest duration of continuous inundation is 140 days. Inundation for more than 90 days has the potential for ecological harm. Inundation for more than 120 days will cause ecological harm (currently 10% of islands).

Taylor Slough Water Levels: An average of 1.8 inches of rain fell over Taylor Slough and Florida Bay this past week, and stages increased 0.01 feet on average. Central Taylor Slough received the most rain this week (4 inches) and had the largest weekly increase (0.11 feet). Taylor Slough remains 4 inches higher than the historical average.






Eastern Florida Bay (psu)
WY01-WY16 Interquartile Range
Daily Average Salinity
60
50
40
30
20
10
2019
2020
Central Florida Bay (psu)
WY01-WY16 Interquartile Range
Daily Average Salinity
60
50
40
30
20
10
2019
2020


TR 30 day moving average salinity on 10/18/2020: 1.6 psu
365 day moving sum of 5 creek flow on 10/18/2020: 241,706 acre-feet
TR Salinity (psu)
Daily Average
30 day moving average
PROVISIONAL DATA
> 30 psu MFL rule threshold
50
40
30
20
10
0
10/18 12/18 02/19 04/19 06/19 08/19 10/19 12/19 02/20 04/20 06/20 08/20 10/20
5 creek flow - 365d running sum (x 1,000 acre-feet)
5-creek daily flow
5-creek 365 day total flow
< 105,000 acre-feet MFL rule threshold for 365d running sum
5-creek daily flow (x 1000 acre-feet)
500
400
300
200
100
0
8
6
4
2
0
-2
-4
-6
-8
10/18 12/18 02/19 04/19 06/19 08/19 10/19 12/19 02/20 04/20 06/20 08/20 10/20
Flow - Last Week
5-creek daily flow (x 1000 acre-feet)
6
4
2
0
-2
-4
-6
10/12 10/13 10/14 10/15 10/16 10/17 10/18
TR
Salinity gauge
Creek flow gauge

Florida Bay Salinities: Salinities in Florida Bay averaged a 0.4 psu decrease over the week with individual station changes ranging from −4.2 to +2.8 psu. Nearshore salinity stayed at an average of 23 psu with slight increases in the east and decreases in the west. Average salinity in Florida Bay is now only 2 psu higher than average. This is the closest to the historical average that it has been since May. The uptick in central Bay salinity was a temporary jump to 28 psu at TB in the central nearshore area.

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 psu this past week. The 30-day moving average decreased 0.9 psu to end at 1.6 psu. Weekly flow from the 5 creeks identified by yellow stars on the map totaled +15,000 acre-feet with positive flows for 6 of the 7 days last week. The 365-day moving sum of flow from the five creeks (tracked as part of the Florida Bay MFL criteria) ended at 241,706 acre-feet this week which is 15,000 acre-feet increase from last week. That is approaching the historical median (249,091 acre-feet). Creek flows are provisional USGS data.

Water Management Recommendations

When water is discharged to tide its potential to benefit the ecology of the Everglades is lost. Conserving water in the WCAs and sending it southward has ecological benefit. 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 20th, 2020 (red is new)			
Area	Weekly change	Recommendation	Reasons
WCA-1	Stage increased by 0.11'	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-2A	Stage decreased by 0.08'	Moderating the recession rate to maintain marsh stage parellel and above the falling regulation schedule.	Protect upstream/downstream habitat and wildlife. Conserving water in this basin has ecological benefit into the dry season.
WCA-2B	Stage decreased by 0.04'	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 0.03'	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 0.12'	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 and tree island ecology is dimineshed by flooding
Southern WCA-3A S	Stage increased by 0.03'		
WCA-3B	Stage increased by 0.11'	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 increased by 0.26'	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 −0.04' to +0.11'	Move water southward as possible	When available, provide freshwater buffer for downstream conditions.
FB- Salinity	Salinity changes ranged −4.2 to +2.8 psu	Move water southward as possible	When available, provide freshwater to maintain low salinity buffer and promote water movement.