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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: October 28, 2020

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

The large envelope of deep moisture accompanying Tropical Storm Zeta that helped to enhance the District's rainfall this past weekend is forecast to gradually pull away from the area as Zeta moves into the south-central Gulf of Mexico. A strengthening mid-level ridge of high-pressure northeast of Florida and an associated pronounced warming in the mid-levels of the atmosphere will help to create a more stable atmosphere while moisture availability is lower. This should result in a decrease of total rainfall to well under the daily climatological average, with the relatively dry conditions likely extending through Thursday even after the mid-level ridges shifts to the east. Light shower activity could occur area wide on Wednesday and Thursday, but overall rainfall accumulations should be minimal in most cases. On Friday, a cold front is forecast to move through the District, which should increase shower activity area wide but mainly in the east. After the frontal passage on Saturday, a moist low-level onshore wind and the cooler air mass behind the front moving over warm Gulf Stream waters favor enhanced shower and some thunderstorm activity over the southeastern part of the District with an uncertain inland penetration. The heaviest rains, some of which could produce localized, significant rainfall, are likely to occur along or near the east coast. The forecast is of much lower confidence by Sunday due to the large spread in the model guidance (model differences) regarding a digging upper-level trough over the southeastern United States. However, a much larger increase of rain seems possible that would extend over the entire District or a large part of it, with most model guidance showing more rains in the east than the west.

Kissimmee

Tuesday morning stages were 57.9 feet NGVD (0.1 feet above schedule) in East Lake Toho, 54.8 feet NGVD (at schedule) in Toho, and 52.4 feet NGVD (0.1 feet above schedule) in Kissimmee-Cypress-Hatchineha; headwater stages were 46.5 feet NGVD at S-65A and 27.6 feet NGVD at S-65D. Tuesday morning discharges were 140 cfs at S-65, 340 cfs at S-65A, 1,160 cfs at S-65D and 1,360 cfs at S-65E. Dissolved oxygen concentration in the Kissimmee River averaged 3.0 mg/L for the week through Sunday. Kissimmee River mean floodplain depth on Sunday was 0.74 feet. Today's recommendation is to maintain a minimum flow of 300 cfs +/- 50 cfs at S-65A.

Lake Okeechobee

Lake Okeechobee stage was 16.37 feet NGVD on October 26, 2020, 0.14 feet higher than the previous week and 1.0 feet higher than the previous month. The Lake rose into the Intermediate sub-band on October 7, 2020 and has remained there since. 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 0.87 feet above. Ascension rates have exceeded the recommended rate (<0.5 foot per 2 weeks) many times since mid-May and lake stage rose about 5.5 feet during that time. Water quality

sampling on October 21 - 22, 2020 showed five stations had microcystin toxin levels $>8 \mu\text{g/L}$, and satellite imagery showed bloom potential remains elevated in the central portion of the lake.

Estuaries

Total inflow to the St. Lucie Estuary averaged 6,232 cfs with approximately 798 cfs 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 7,425 cfs over the past week with approximately 4,049 cfs coming from the Lake. Seven-day average salinities remained almost fresh (0.2) at the three most upstream sites (S-79, Val I75 and Ft. Myers Yacht Basin) over the past week. At the lower estuary sites, seven-day average salinities decreased at Cape Coral and increased at Shell Point and Sanibel 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 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, 1,400 acre-feet 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 73,600 acre-feet. The total amount of inflows to the STAs in WY2021 is approximately 1,115,000 acre-feet. Most STA cells are 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 the 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

Well above average precipitation fell across the Everglades last week, particularly in WCA-1. At the gauges monitored for this report WCA-1 is around 0.75 feet, central WCA-2A is around 1.0 foot and WCA-3A is about 0.5 feet above the mean stage for this time of year. All of the WCAs are above schedule and generally trending away from their respective regulation stages. Heavy rainfall over Taylor Slough and FB this week and stages in the slough rose on average nearly 0.5 feet. Salinities decreased on average across Florida Bay and are now below the historical average. Salinities in the TR mangrove zone to the east remained near fresh as discharge rates from the creeks in that area once again were the highest for the year.

Supporting Information

KESSIMMEE BASIN

Rainfall

The Upper Kissimmee Basin received 1.09 inches of rainfall in the past week and the Lower Basin received 1.41 inches (SFWMD Daily Rainfall Report 10/25/2020).

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: 10/27/2020

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)						
							10/25/20	10/18/20	10/11/20	10/4/20	9/27/20	9/20/20	9/13/20
Lakes Hart and Mary Jane	S-62	97	LKMJ	60.8	R	60.8	0.0	0.1	0.1	0.0	0.1	0.4	0.0
Lakes Myrtle, Preston, and Joel	S-57	39	S-57	61.8	R	61.8	0.0	0.2	0.2	0.1	0.0	0.1	0.0
Alligator Chain	S-60	0	ALLI	63.7	R	63.8	-0.1	-0.1	-0.1	0.0	0.0	0.0	0.2
Lake Gentry	S-63	28	LKGT	61.3	R	61.4	-0.1	0.0	0.0	-0.1	0.1	0.2	0.2
East Lake Toho	S-59	0	TOHOE	57.8	R	57.8	0.0	-0.2	0.0	0.2	0.3	0.5	0.3
Lake Toho	S-61	0	TOHOW, S-61	54.7	R	54.8	-0.1	-0.1	0.1	0.2	0.2	0.1	0.1
Lakes Kissimmee, Cypress, and Hatchineha	S-65	180	KUB011, LKIS5B	52.4	R	52.3	0.1	0.2	0.5	0.6	0.4	0.5	0.4

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: 10/27/2020

Metric	Location	1-Day Average	Average for the Preceding 7-Days ¹								
		10/25/2020	10/25/20	10/18/20	10/11/20	10/4/20	9/27/20	9/20/20	9/13/20	9/6/20	8/30/20
Discharge (cfs)	S-65	282	180	678	1,265	1,725	2,890	3,143	2,193	2,631	3,273
Discharge (cfs)	S-65A ²	363	346	861	1,916	2,248	3,578	3,855	2,700	3,176	4,247
Discharge (cfs)	S-65D ²	1,346	1,714	3,267	4,848	4,715	5,198	3,738	3,512	4,262	3,420
Headwater Stage (feet NGVD)	S-65D ²	27.63	27.62	27.66	27.68	27.75	27.73	27.77	27.63	27.74	27.75
Discharge (cfs)	S-65E ²	1,598	1,935	3,501	5,287	5,081	4,994	3,919	3,578	4,317	3,444
Discharge (cfs)	S-67	0	0	0	0	0	0	0	0	0	0
DO (mg/L) ³	Phases I & II/III river channel	3.8	3.0	1.5	1.2	1.2	1.2	1.1	0.9	0.7	1.1
Mean depth (feet) ⁴	Phase I floodplain	0.74	0.91	1.66	2.28	2.41	2.70	2.31	2.06	2.42	2.27

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.

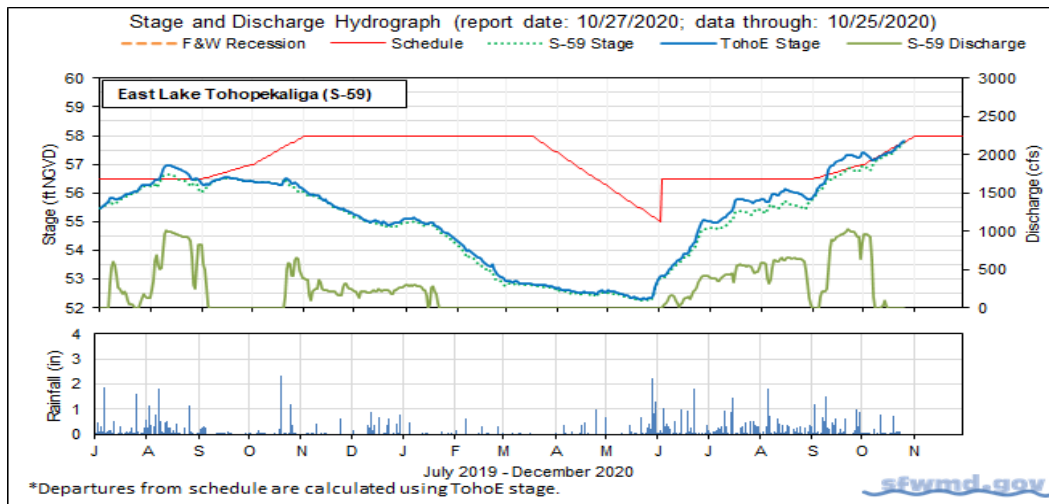


Figure 1. East Lake Toho regulation schedule, stage, discharge and rainfall.

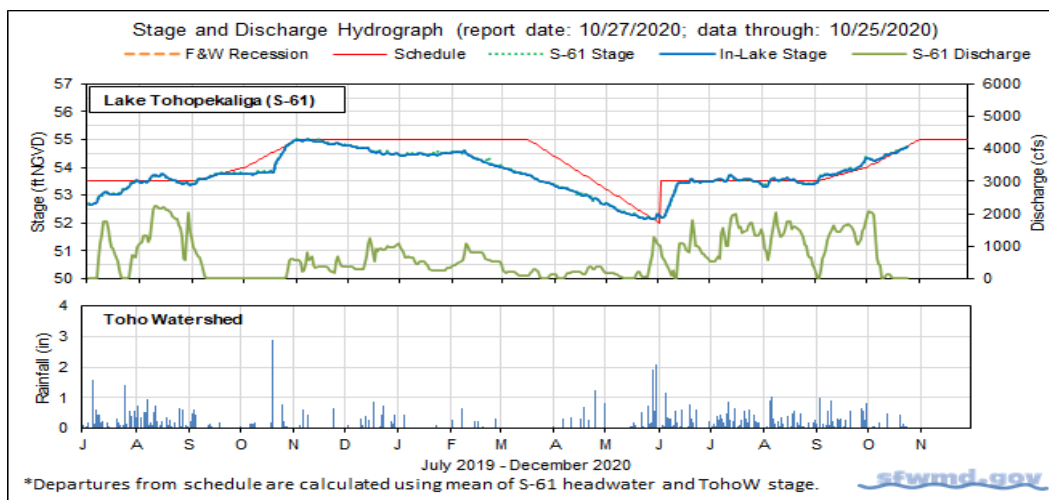


Figure 2. Lake Toho regulation schedule, stage, discharge and rainfall.

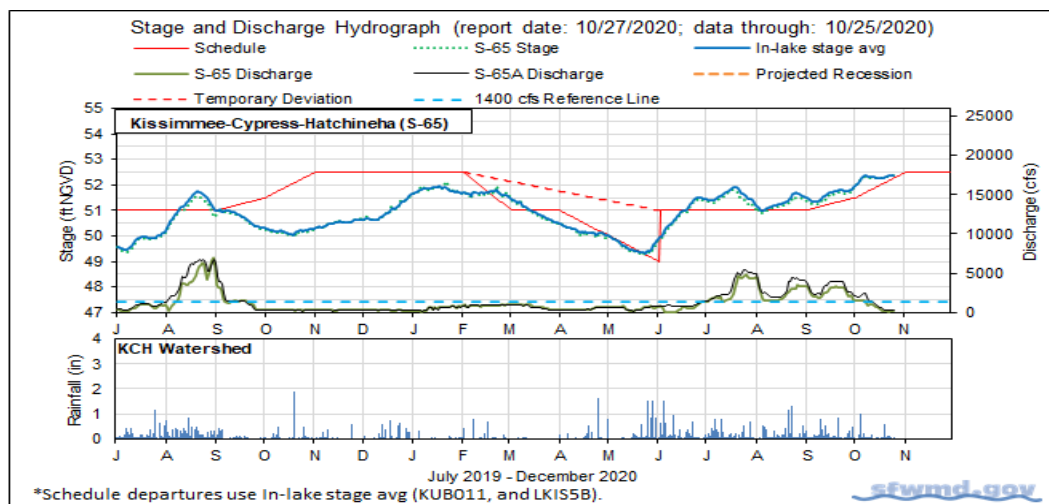


Figure 3. Lakes Kissimmee, Cypress and Hatchineha regulation schedule, stage, discharge and rainfall.

Kissimmee River Phase I Restoration Area Water Depth Maps

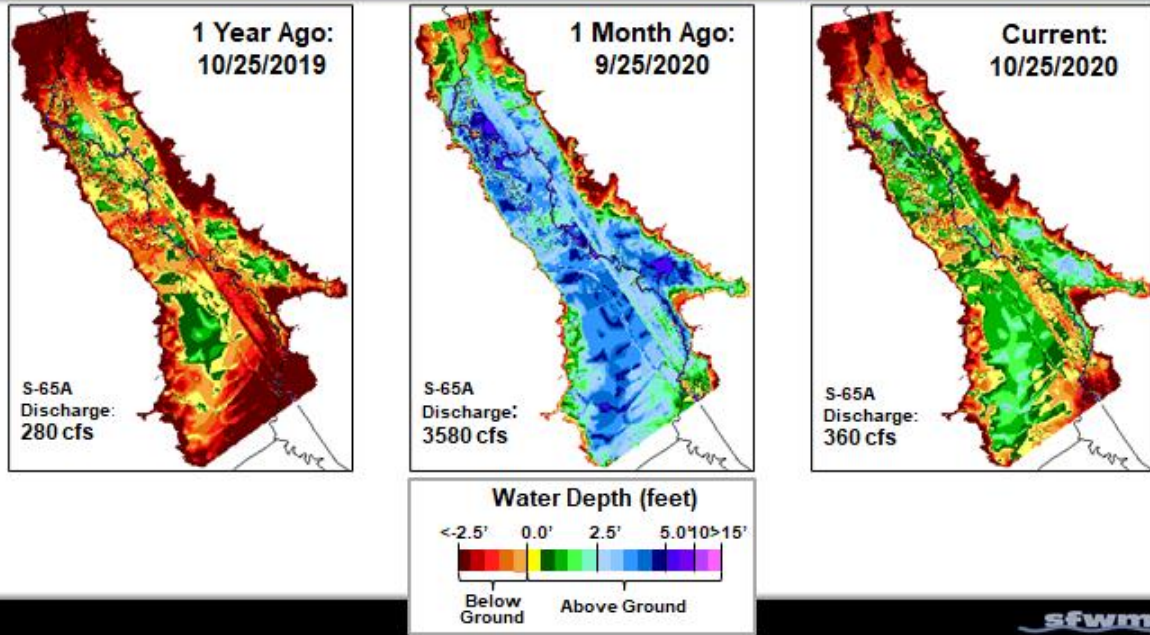


Figure 4. Phase I area floodplain water depths (from left to right) one year ago, one month ago and current. Color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to January 16, 2012.

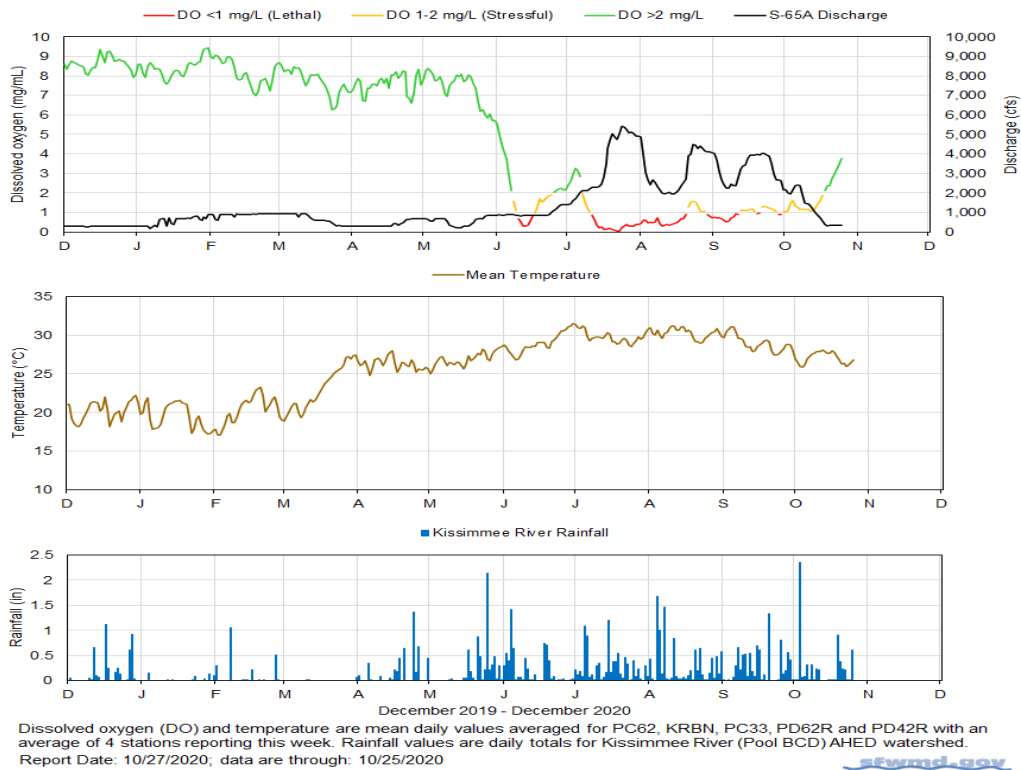


Figure 5. Restored Kissimmee river channel mean daily dissolved oxygen concentration (mg/L), S-65A discharge (cfs), temperature (°C) and rainfall (inches)

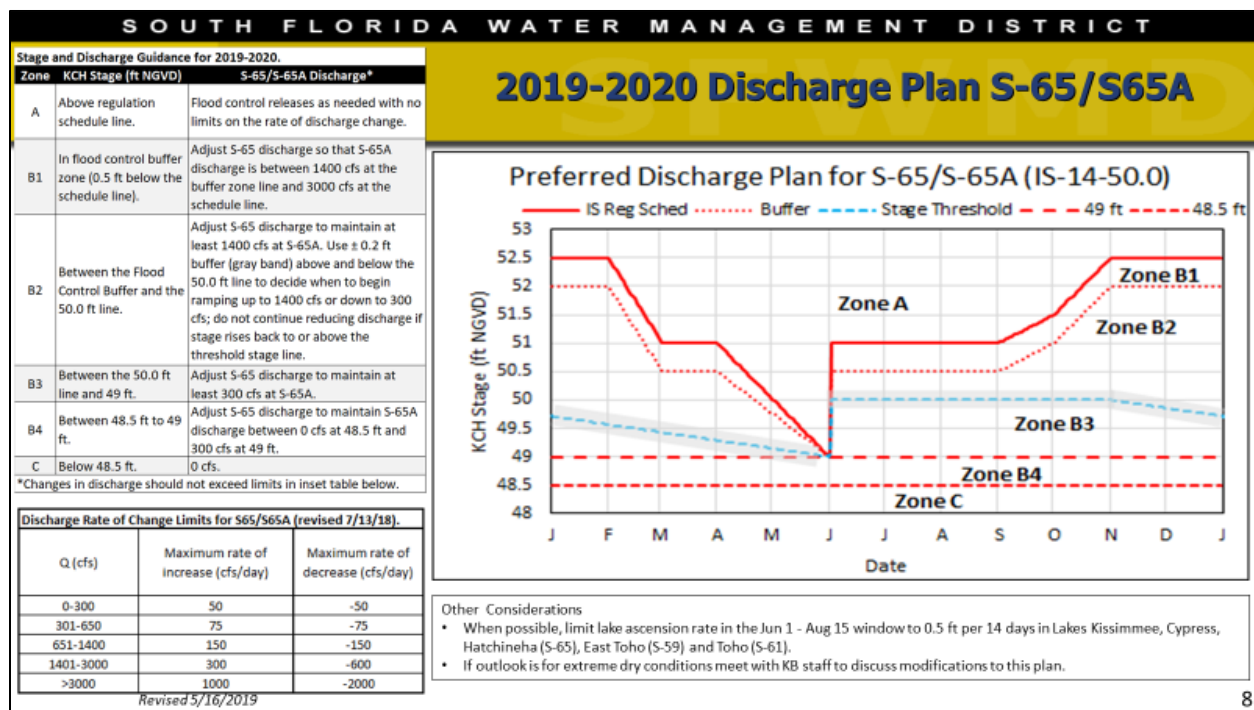


Figure 6. The 2019-2020 Discharge Plan for S-65/S-65A.

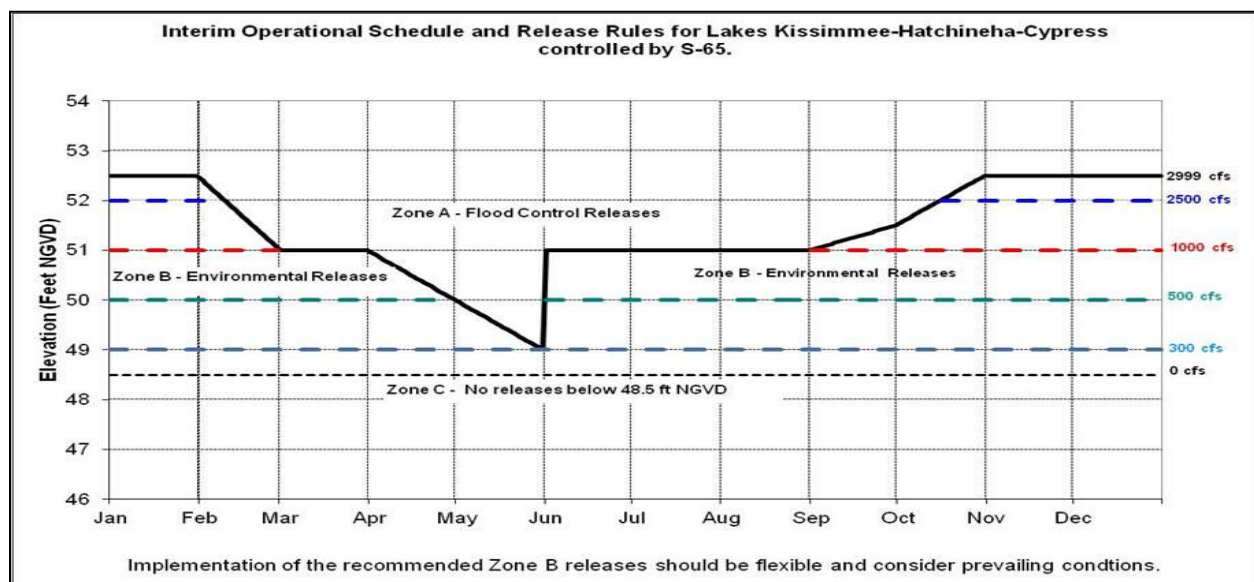


Figure 7. Interim operations schedule for S-65 (solid black line). The discharge schedule shown to the right has not been used in recent years.

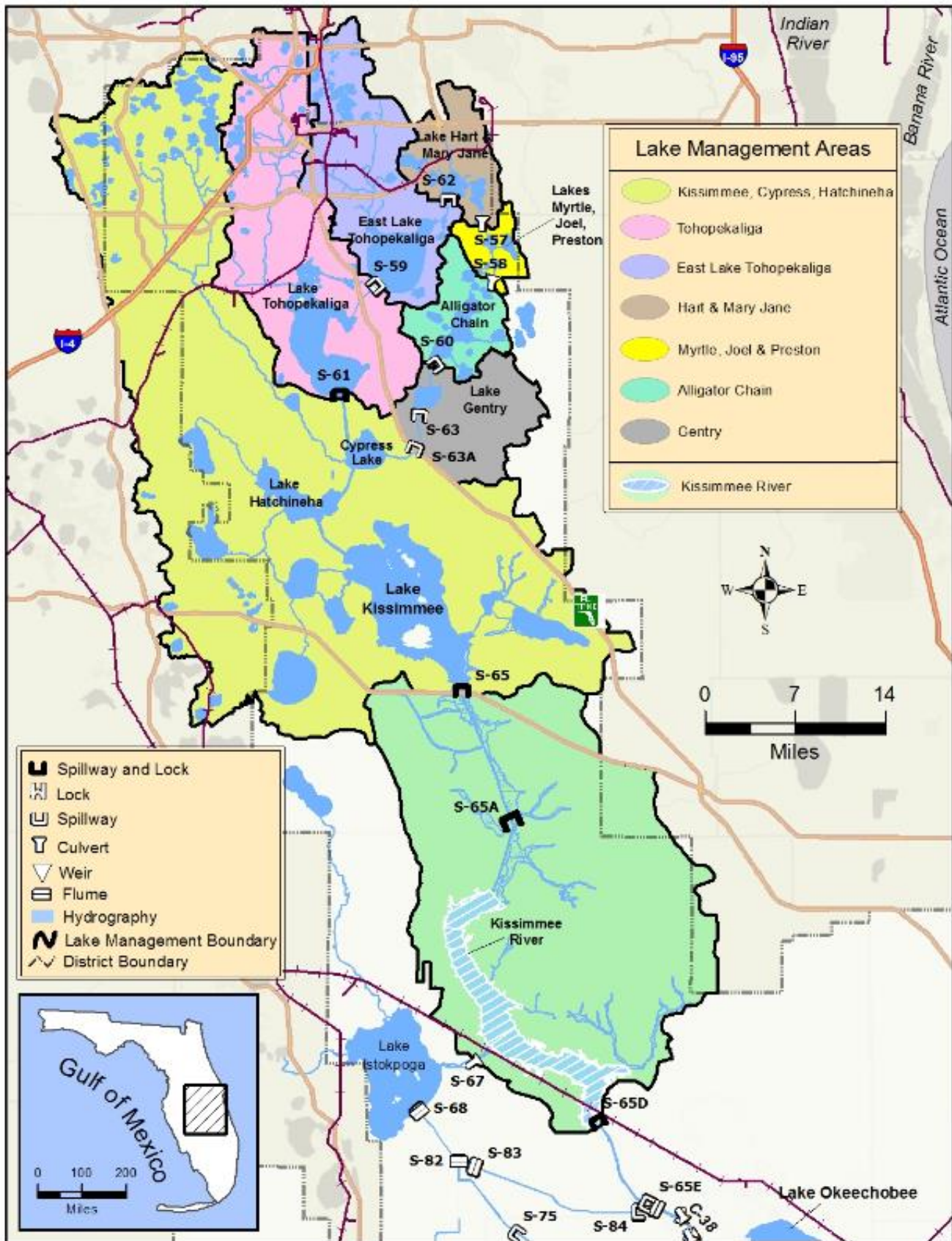


Figure 8. The Kissimmee Basin.

LAKE OKEECHOBEE

Lake Okeechobee stage is 16.37 feet NGVD, 1.00 feet higher than a month ago, and 2.90 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; currently 0.87 feet 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 on October 7 (**Figure 3**). Lake stage reached a low of 10.99 feet on May 17 and has risen nearly 5.5 feet since, but the ascension rate has slowed after the initiation of Lake releases over the past two weeks. According to RAINДАР, 1.63 inches of rain fell directly over the Lake through the past week, with much of the northern watershed receiving less, between 0.25 and 1.5 inches (**Figure 4**).

The average daily inflows (minus rainfall) remain high but decreased from the previous week, going from 6,397 cfs to 5,309 cfs. Outflows (minus evapotranspiration) increased slightly, from 4,590 cfs to 4,847 cfs. Most of the inflows came from the Kissimmee River (1,793 cfs through S-65E & S-65EX1), but there were substantial inflows from the C-41a canal (1,203 cfs through S-84 & S-84X), Fisheating Creek (611 cfs), and the C-40 and C-41 canals (568 cfs through S-71 & S-72). Inflows from the C-59 canal via the S-191 structure increased from 65 cfs to 200 cfs and inflows from the S-154 structure were similar to the prior week at 110 cfs. Pumps contributed a combined 443 cfs of inflow, an increase of 151 cfs from the previous week. Releases to the west via S-77 increased from 2,904 cfs the prior week to 4,049 cfs this past week, while releases east via S-308 increased from 233 cfs to 798 cfs. Outflows south through the S-350 structures decreased from 1,453 cfs to zero. 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. Eleven stations had Chlorophyll-a values > 20 µg/L and five had values >40 µg/L (considered a bloom by the District), ranging from 42.4 to 87.6 µg/L.

Samples were also collected on October 21-22, with 10 of 32 stations having detectable levels of microcystin (>0.25 µg/L) and five of these stations had microcystin levels higher than 8 µg/L, ranging from 8.1 to 16 µg/L (**Figure 7**). Chlorophyll-a results are pending.

The most recent satellite image (October 26, 2020) from NOAA's cyanobacteria monitoring product derived from EUMETSAT's Sentinel 3 OLCI sensor data suggested a continued elevated cyanobacteria bloom risk in the central region of the Lake (**Figure 8**), though reduced from the levels apparent in the October 15 imagery.

Water Management Summary

Lake Okeechobee stage was 16.37 feet NGVD on October 26, 2020, 0.14 feet higher than the previous week and 1.0 feet higher than the previous month. The Lake rose into the Intermediate sub-band on October 7, 2020 and has remained there since. 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 0.87 feet above. Ascension rates have exceeded the recommended rate (<0.5 foot per 2 weeks) many times since mid-May and lake stage rose about 5.5 feet during that time. Water quality

sampling on October 21 - 22, 2020 showed five stations had microcystin toxin levels >8 µg/L, and satellite imagery showed bloom potential remains elevated in the central portion of 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	3216	1793	0.7
S-71 & S-72	525	568	0.2
S-84 & S-84X	965	1203	0.5
Fisheating Creek	1163	611	0.2
S-154	127	110	0.0
S-191	65	200	0.1
S-133 P	65	103	0.0
S-127 P	22	27	0.0
S-129 P	15	25	0.0
S-131 P	10	12	0.0
S-135 P	180	276	0.1
S-2 P	21	0	0.0
S-3 P	0	0	0.0
S-4 P	0	145	0.1
L-8 Backflow	23	237	0.1
Rainfall	4154	4319	1.6
Total	10551	9628	3.6

OUTFLOWS	Previous week Avg Daily CFS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)
S-77	2904	4049	1.5
S-308	233	798	0.3
S-351	256	0	0.0
S-352	696	0	0.0
S-354	501	0	0.0
L-8 Outflow			
ET	1949	1257	0.5
Total	6538	6104	2.3

Provisional Data

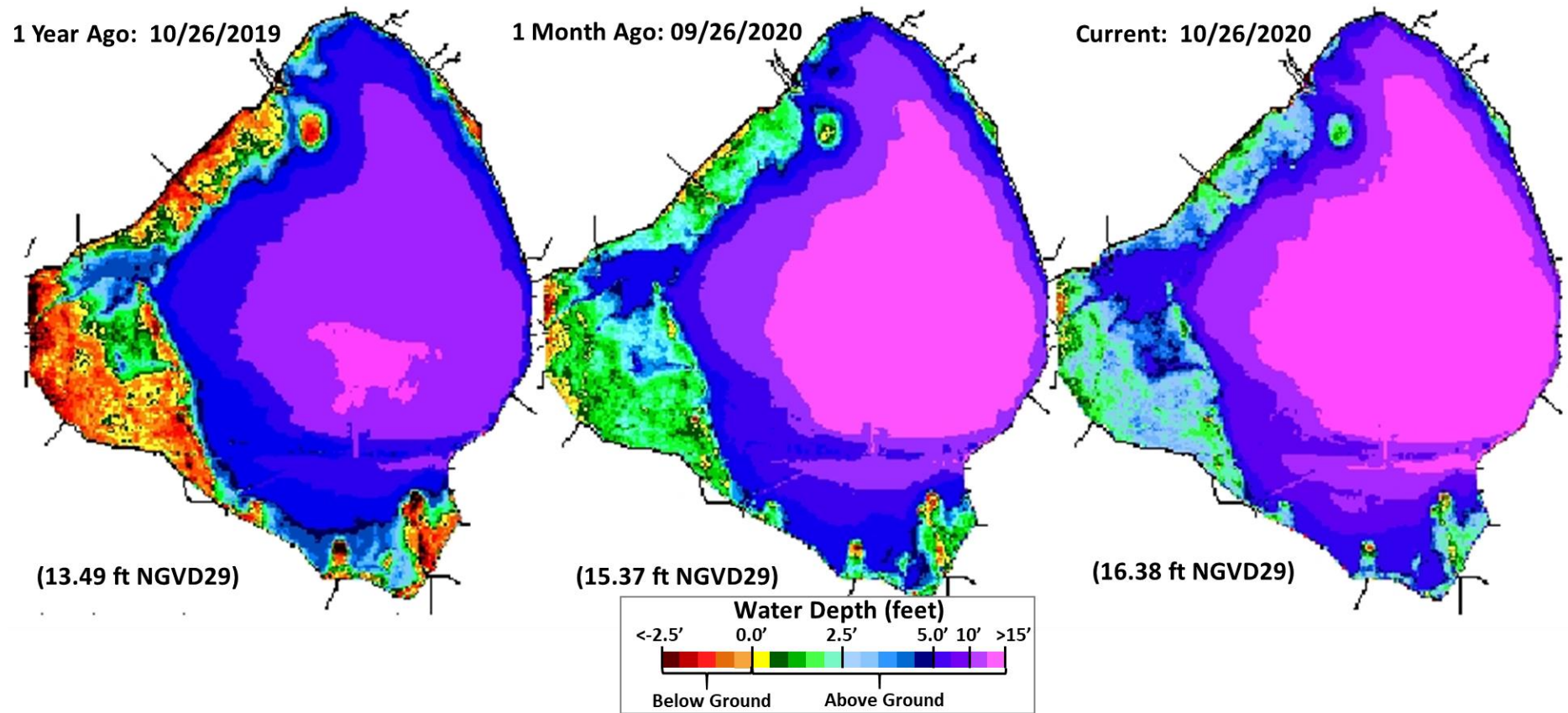


Figure 1. Water depth estimates on Lake Okeechobee based on the South Florida Water Depth Assessment Tool.

Lake Okeechobee Stage vs Updated Ecological Envelope

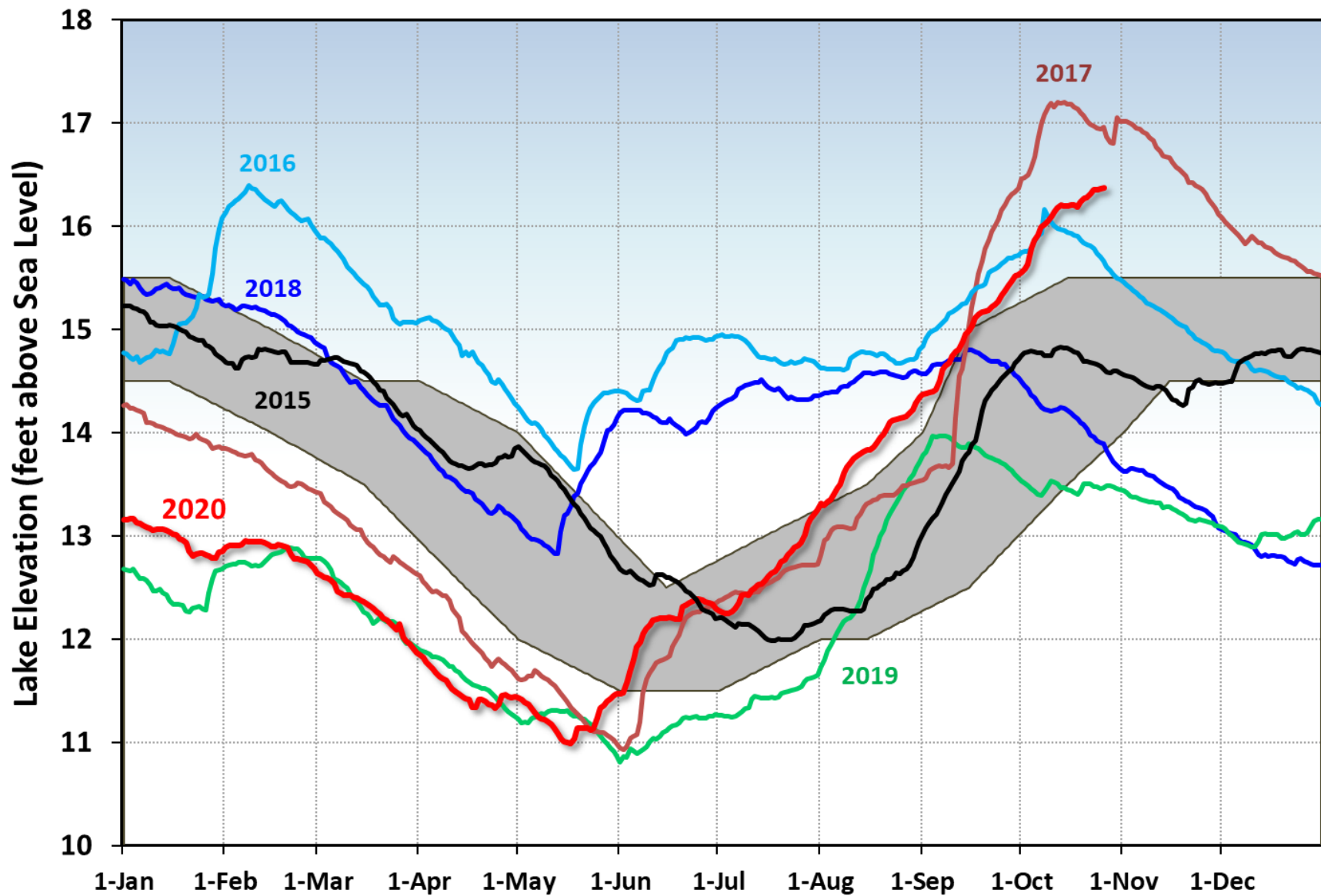


Figure 2. Select annual stage hydrographs for Lake Okeechobee in comparison to the updated Ecological Envelope.

Lake Okeechobee Water Level History and Projected Stages

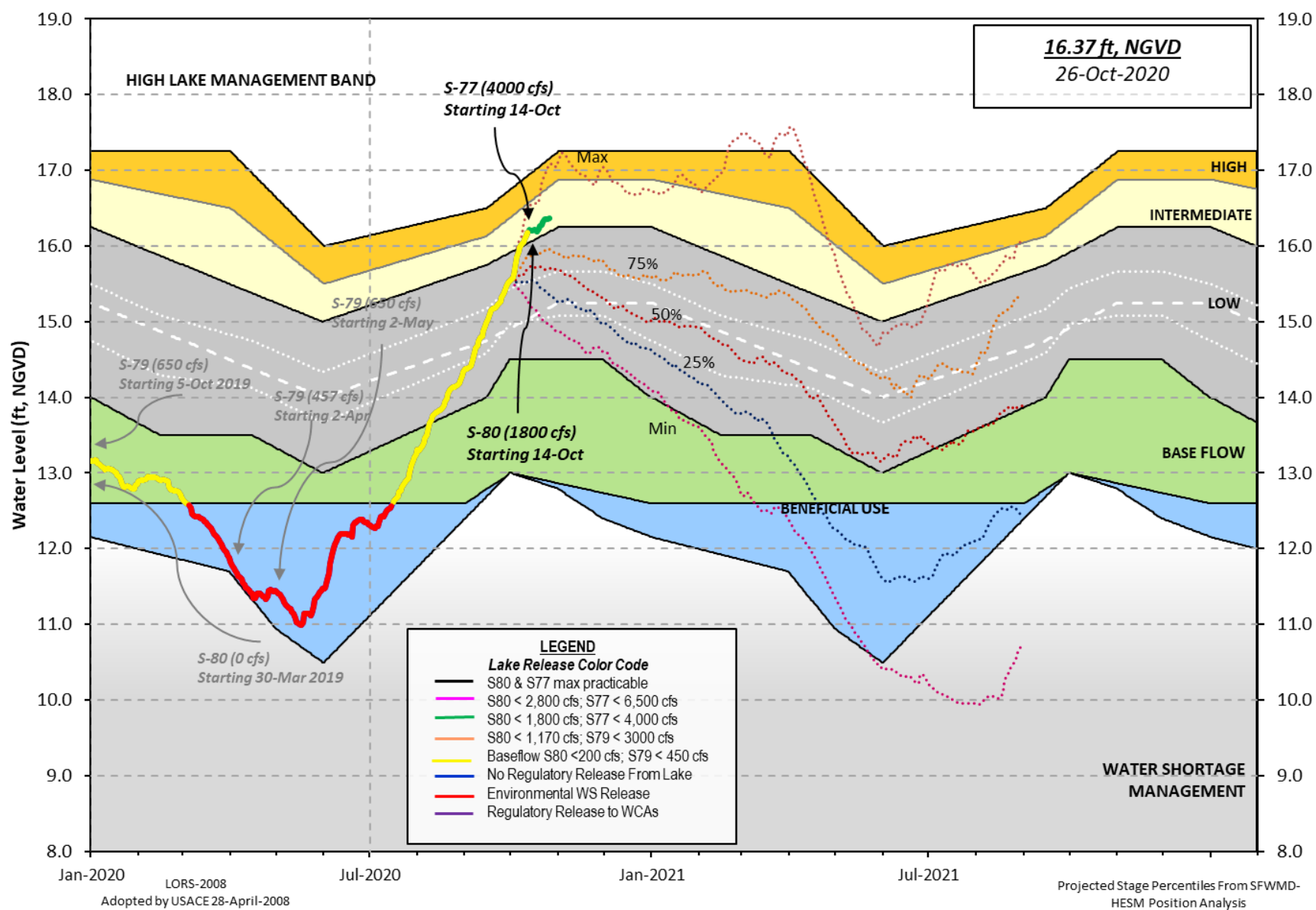


Figure 3. Recent Lake Okeechobee stage and releases, with projected stages based on a dynamic position analysis.

SFWMD PROVISIONAL RAINDAR 7-DAY BASIN RAINFALL ESTIMATES

FROM: 1000 EST, 10/20/2020 THROUGH: 1000 EST, 10/27/2020

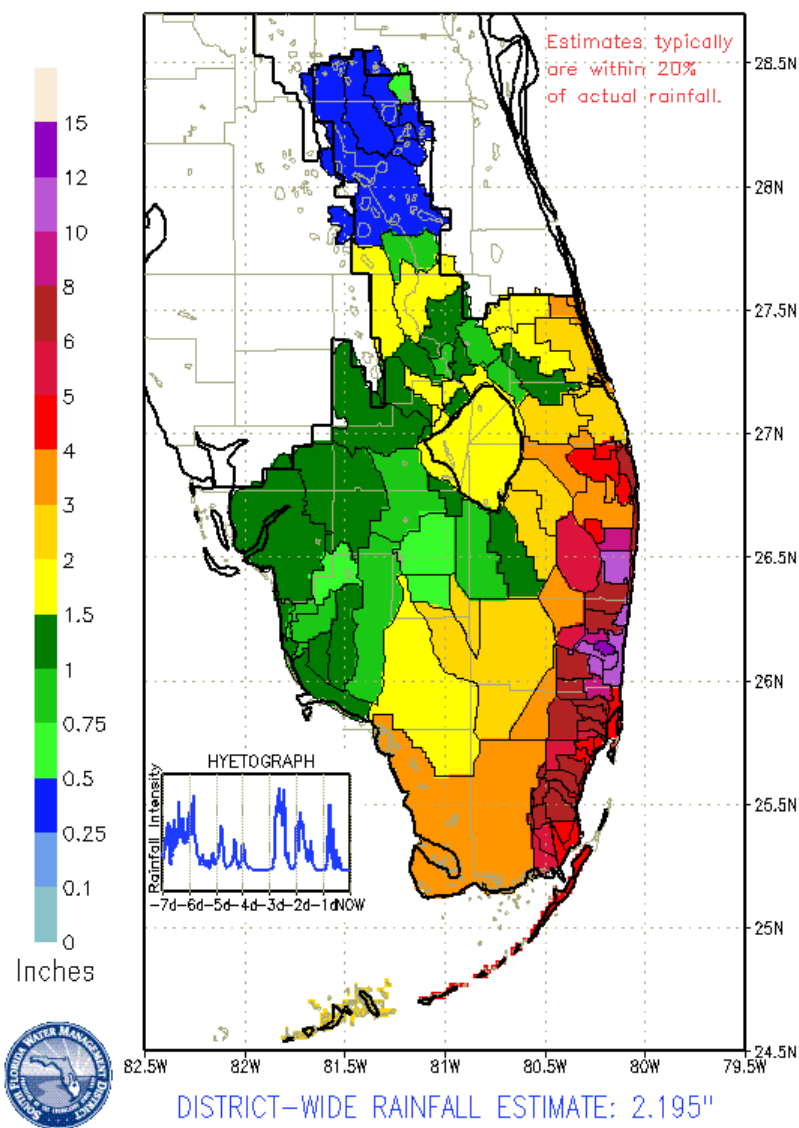


Figure 4. 7-Day rainfall estimates by RAINDAR.

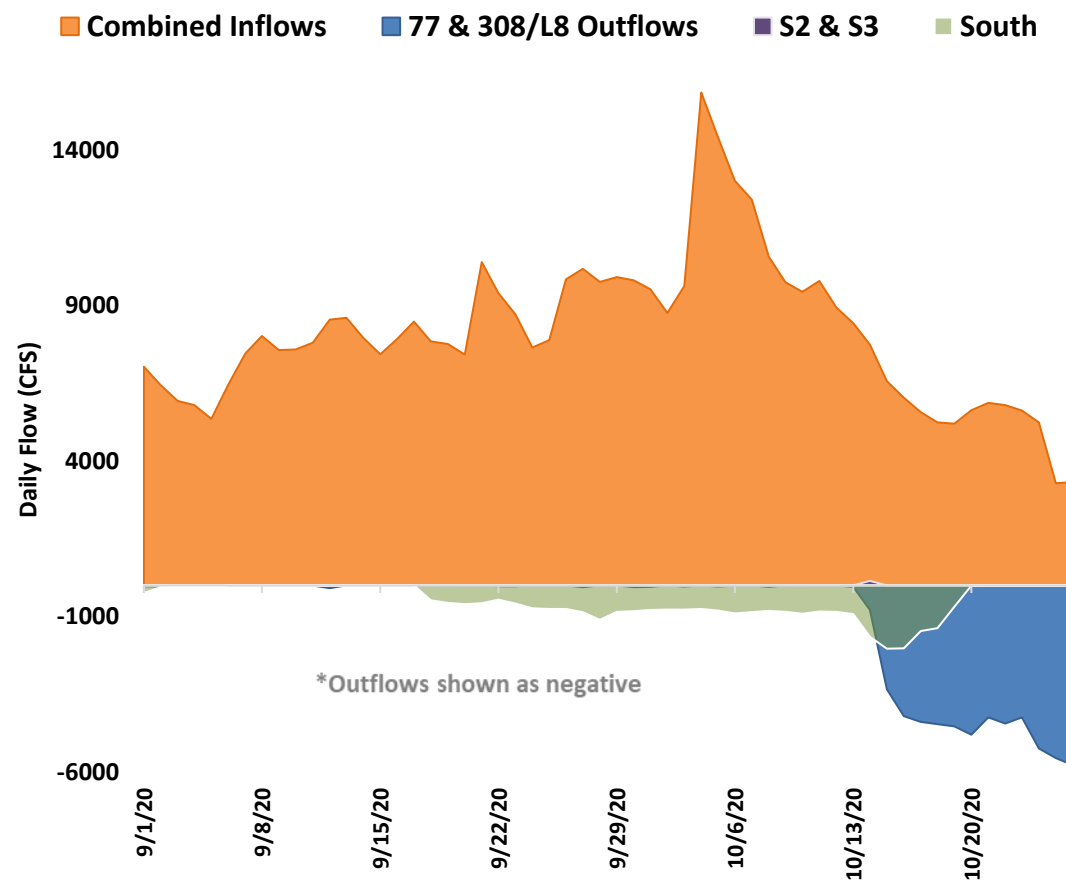


Figure 5. Major inflows (orange) and outflows (blue) of Lake Okeechobee, including the S-350 structures designated as South (green). The L-8 Canal flows through Culvert 10A are included as outflows when positive, and as inflows when backflowing into the Lake. All inflows and outflows are shown as positive 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	CHLa (ug/L)	TOXIN (ug/L)	TAXA
FEBIN	2.9	BDL	mixed
FEBOUT	P	BDL	NS
KISSR0.0	14.9	BDL	mixed
L005	71.8	BDL	<i>Planktol</i>
LZ2	27.4	BDL	mixed
KBARSE	26.3	5.5	<i>Microcys</i>
RITTAE2	12.6	BDL	mixed
PELBAY3	3.5	BDL	mixed
POLE3S	6.7	BDL	mixed
LZ25A	4.5	BDL	mixed
PALMOUT	21.1	0.3	mixed
PALMOUT1	14.2	1.2	<i>Microcys</i>
PALMOUT2	53.3	3.2	<i>Microcys</i>
PALMOUT3	16.0	5.3	<i>Microcys</i>
POLESOUT	42.4	BDL	mixed
POLESOUT1	22.0	1.1	<i>Microcys</i>
POLESOUT2	36.4	13.0	<i>Microcys</i>
POLESOUT3	23.5	16.0	<i>Microcys</i>
EASTSHORE	3.6	BDL	mixed
NES135	10.6	BDL	mixed
NES191	2.4	BDL	mixed

Station	CHLa (ug/L)	TOXIN (ug/L)	TAXA
L001	17.5	BDL	<i>Microcys</i>
L004	8.7	BDL	mixed
L006	4.6	BDL	mixed
L007	4.3	0.3	mixed
L008	54.1	43.0	<i>Microcys</i>
LZ30	6.5	6.0	mixed
LZ40	87.6	53	<i>Microcys</i>
CLV10A	2.7	BDL	mixed
NCENTER	7.9	BDL	mixed

Sampled 10/5

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*
Dolicha = *Dolichospermum*

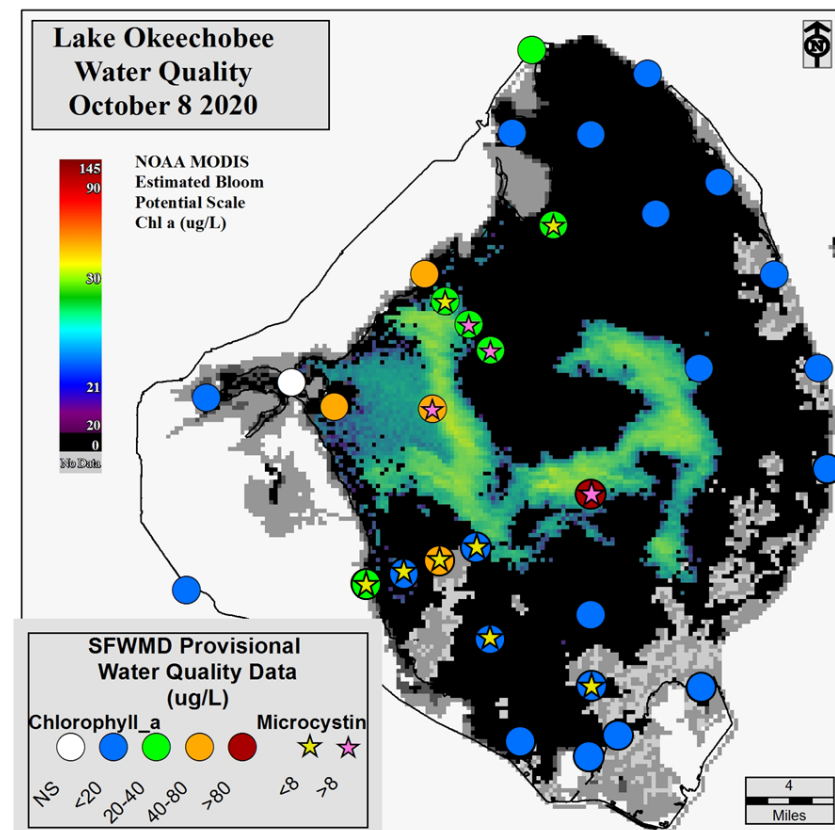


Figure 6. Provisional results from the expanded monitoring sampling trips on October 5 - 7, 2020.

Collection Date: October 21-22, 2020

Station	CHLa (ug/L)	TOXIN (ug/L)	TAXA
FEBIN	P	BDL	NS
FEBOUT	P	BDL	NS
KISSRO.0	P	BDL	<i>Micro/Micro</i>
L005	P	BDL	<i>Plank/Cylin</i>
LZ2	P	BDL	mixed
KBARSE	P	BDL	<i>Microcys</i>
RITTAE2	P	BDL	mixed
PELBAY3	P	BDL	mixed
POLE3S	P	BDL	mixed
LZ25A	P	BDL	mixed
PALMOUT	P	BDL	NS
PALMOUT1	P	10.0	<i>Microcys</i>
PALMOUT2	P	13.0	<i>Microcys</i>
PALMOUT3	P	13.0	<i>Microcys</i>
POLESOUT	P	BDL	<i>Microcys</i>
POLESOUT1	P	0.6	<i>Microcys</i>
POLESOUT2	P	BDL	<i>Microcys</i>
POLESOUT3	P	5.0	<i>Microcys</i>
EASTSHORE	P	BDL	mixed
NES135	P	BDL	mixed
NES191	P	BDL	mixed

Station	CHLa (ug/L)	TOXIN (ug/L)	TAXA
L001	P	BDL	mixed
L004	P	BDL	mixed
L006	P	16.0	<i>Microcys</i>
L007	P	1.0	<i>Microcys</i>
L008	P	2.3	<i>Microcys</i>
LZ30	P	8.1	<i>Microcys</i>
LZ40	P	0.3	<i>Microcys</i>
CLV10A	P	BDL	NS
NCENTER	P	BDL	mixed

Sampled 10/19

S308C	P	BDL	mixed
S77	P	BDL	mixed

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

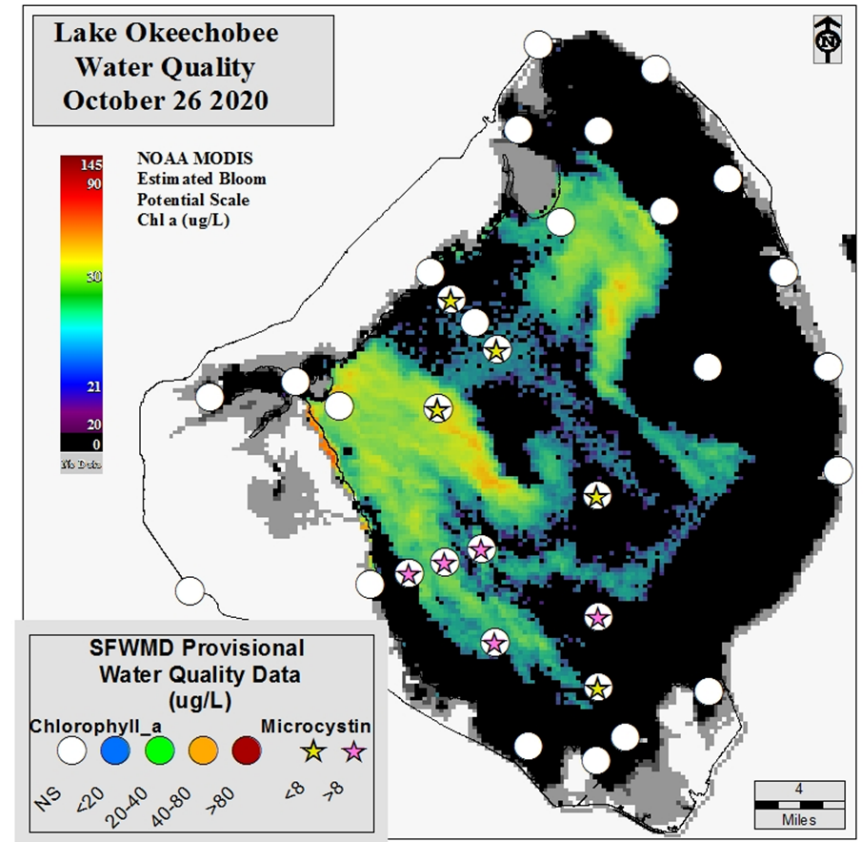


Figure 7. Provisional results from the expanded monitoring sampling trips on October 21 - 22, 2020.

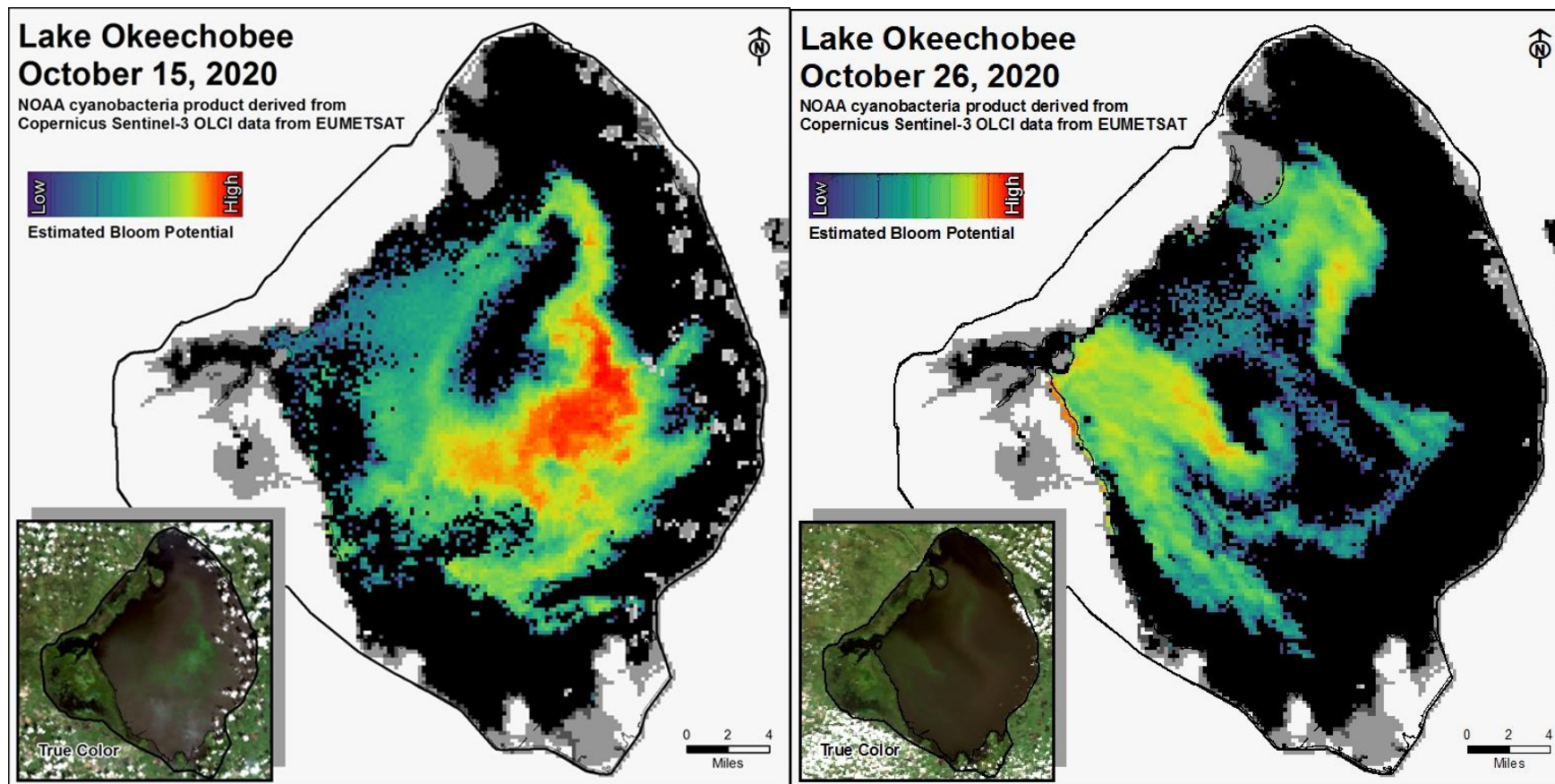


Figure 8. Potential for cyanobacterial blooms on Lake Okeechobee on October 15, 2020 and October 26, 2020, based on NOAA's harmful algal bloom monitoring system. Gray color indicates cloud cover.

ESTUARIES

St. Lucie Estuary:

Last week total inflow to the St. Lucie Estuary averaged more than 4,835 cfs (Figures 1 and 2) and last month inflow averaged more than 3,152 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 removed due to bridge construction)

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

Location	Flow (cfs)
Tidal Basin Inflow	1696
S-80	1582
S-308	798
S-49 on C-24	756
S-97 on C-23	801
Gordy Rd. structure on Ten Mile Creek	Not reporting

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 2.5. 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)	0.9 (2.2)	1.1 (4.7)	NA ¹
US1 Bridge	1.4 (6.2)	1.6 (8.8)	10.0-26.0
A1A Bridge	6.7 (17.9)	16.1 (24.9)	NA ¹

¹Envelope not applicable

Caloosahatchee Estuary:

Last week total inflow to the Caloosahatchee Estuary averaged approximately 7,425 cfs (Figures 5 and 6) and last month inflow averaged about 5,577 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	4,049
S-78	5,082
S-79	6,854
Tidal Basin Inflow	571

Over the past week in the estuary, salinity remained the same to Ft. Myers Yacht Basin, decreased at Cape Coral Bridge 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)	0.2 (0.2)	NA
Cape Coral	2.2 (3.6)	5.2 (5.3)	10.0-30.0
Shell Point	16.8 (16.3)	21.2 (18.8)	10.0-30.0
Sanibel	27.9 (26.3)	28.8 (27.4)	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 320 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	320	0.3	0.3
B	300	320	0.3	0.3
C	450	320	0.3	0.3
D	650	320	0.3	0.3
E	800	320	0.3	0.3

Red tide

The Florida Fish and Wildlife Research Institute reported on October 23, 2020, that *Karenia brevis*, the Florida red tide dinoflagellate, was not observed in samples collected from Lee, St. Lucie, Martin, or Palm Beach counties (no samples were analyzed this week from 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.

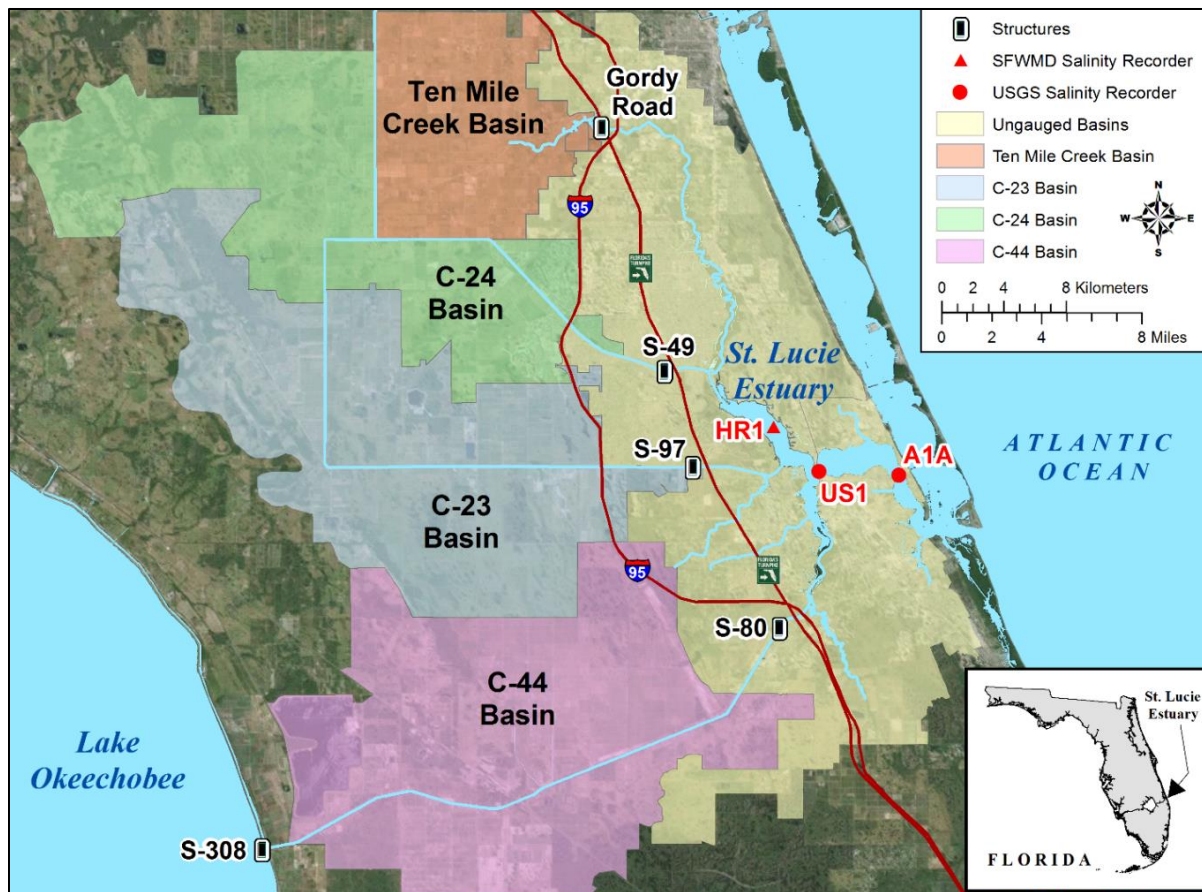


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

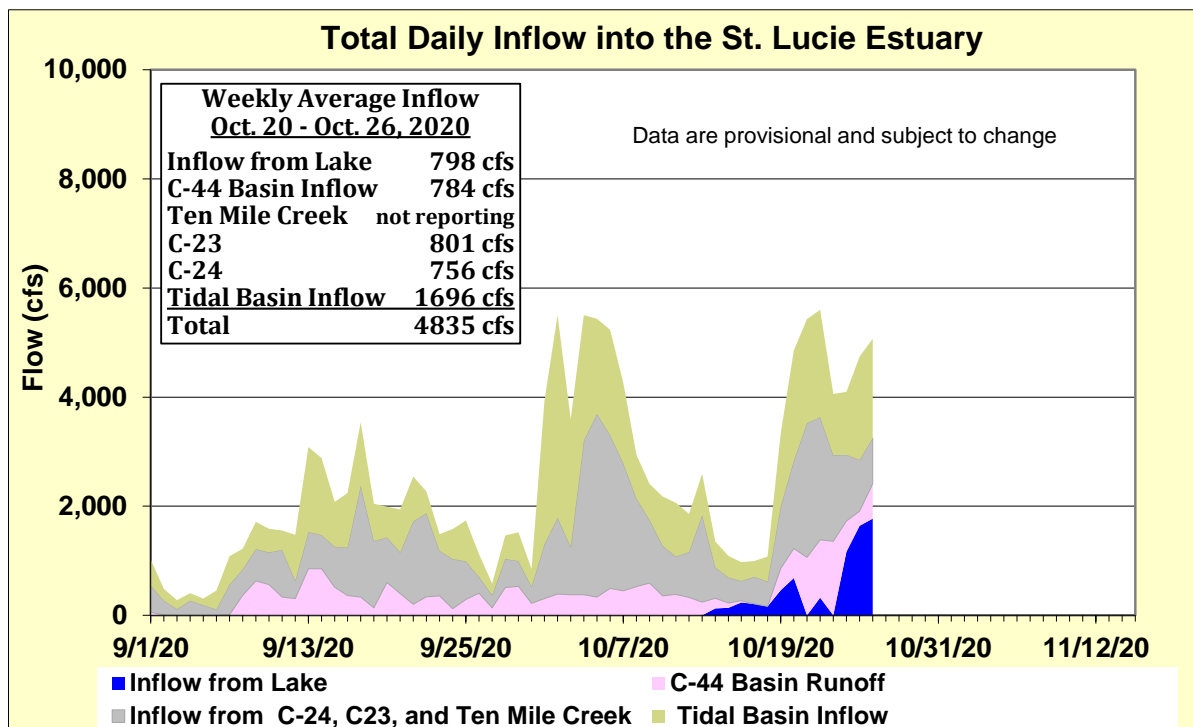


Figure 2. Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basin into the St. Lucie Estuary.

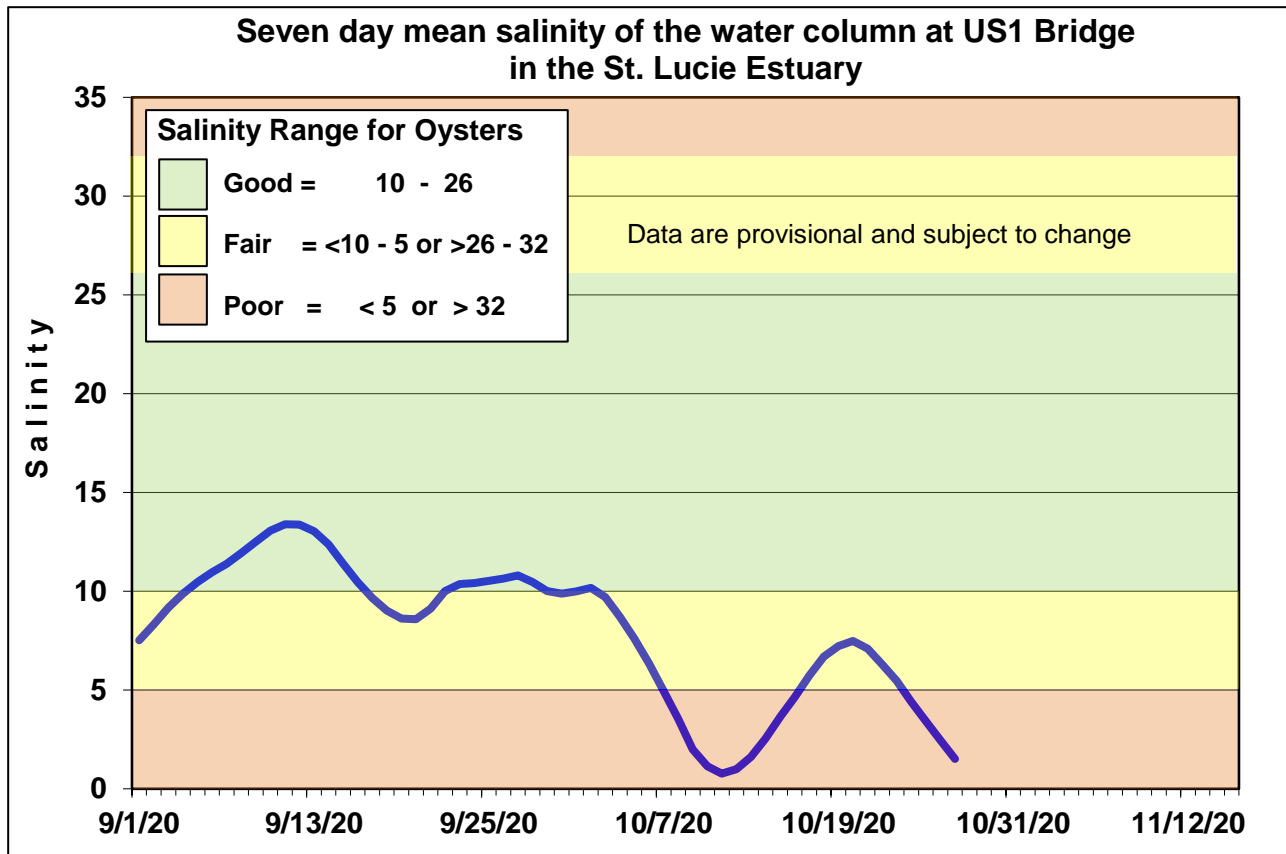


Figure 3. Seven-day mean salinity of the water column at the US1 Bridge.

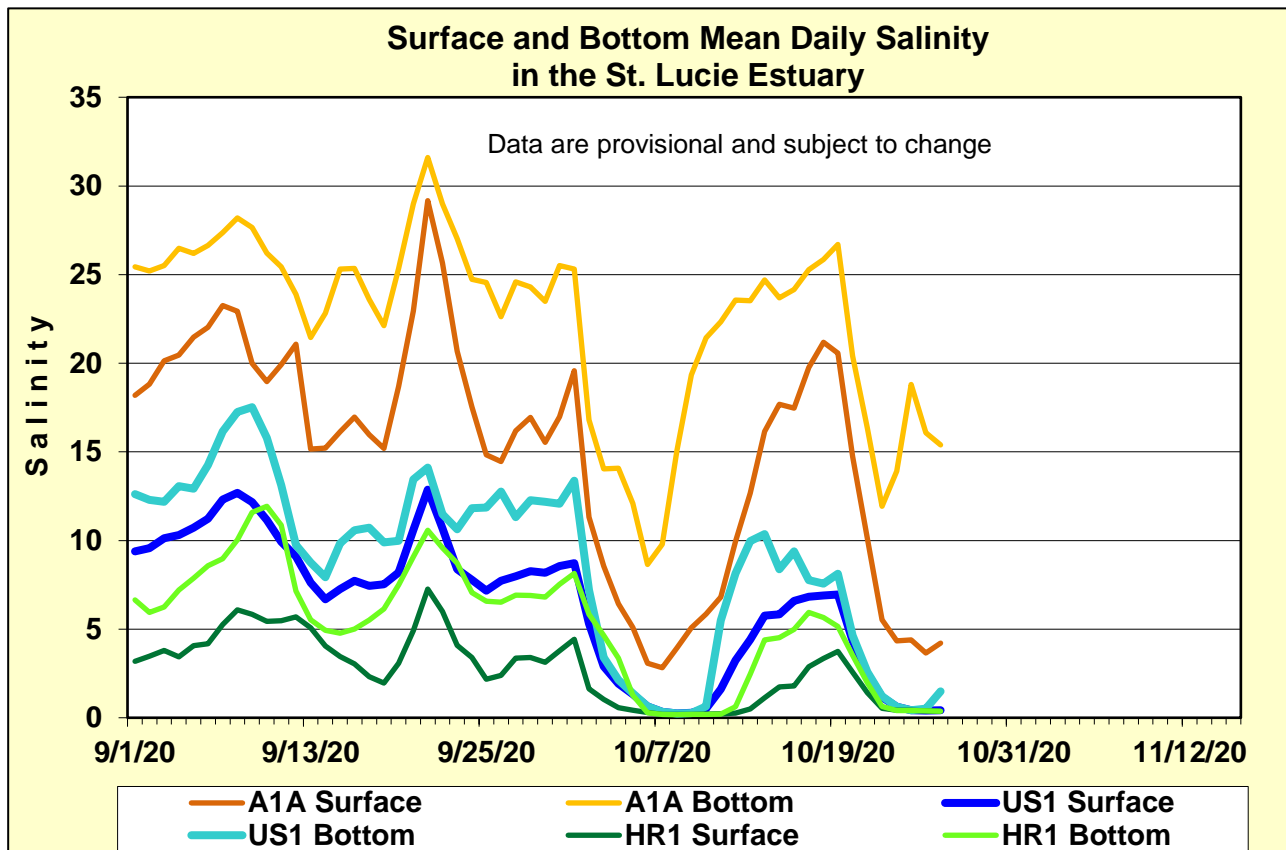


Figure 4. Daily mean salinity at the A1A, US1, and HR1 stations.

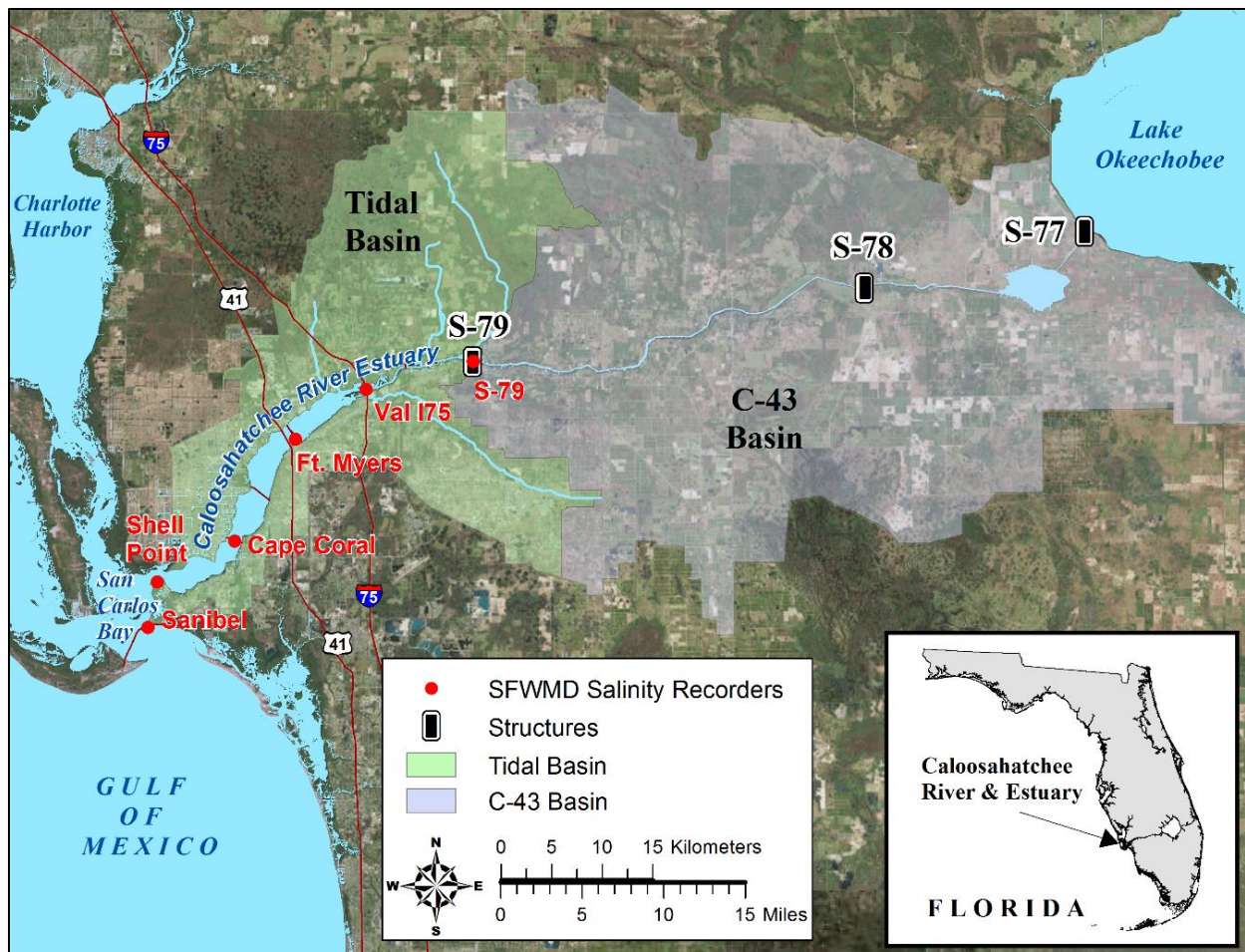


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

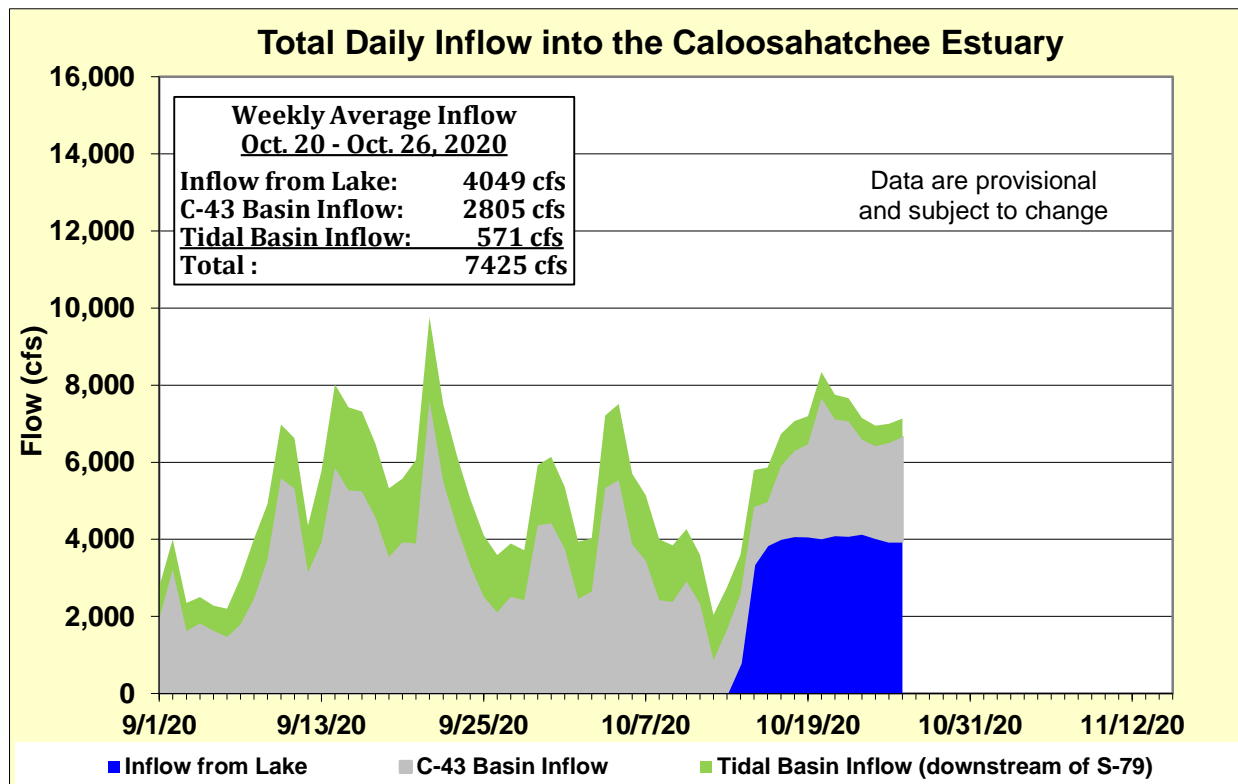


Figure 6. Total daily inflows from Lake Okeechobee, runoff from the C-43 basin

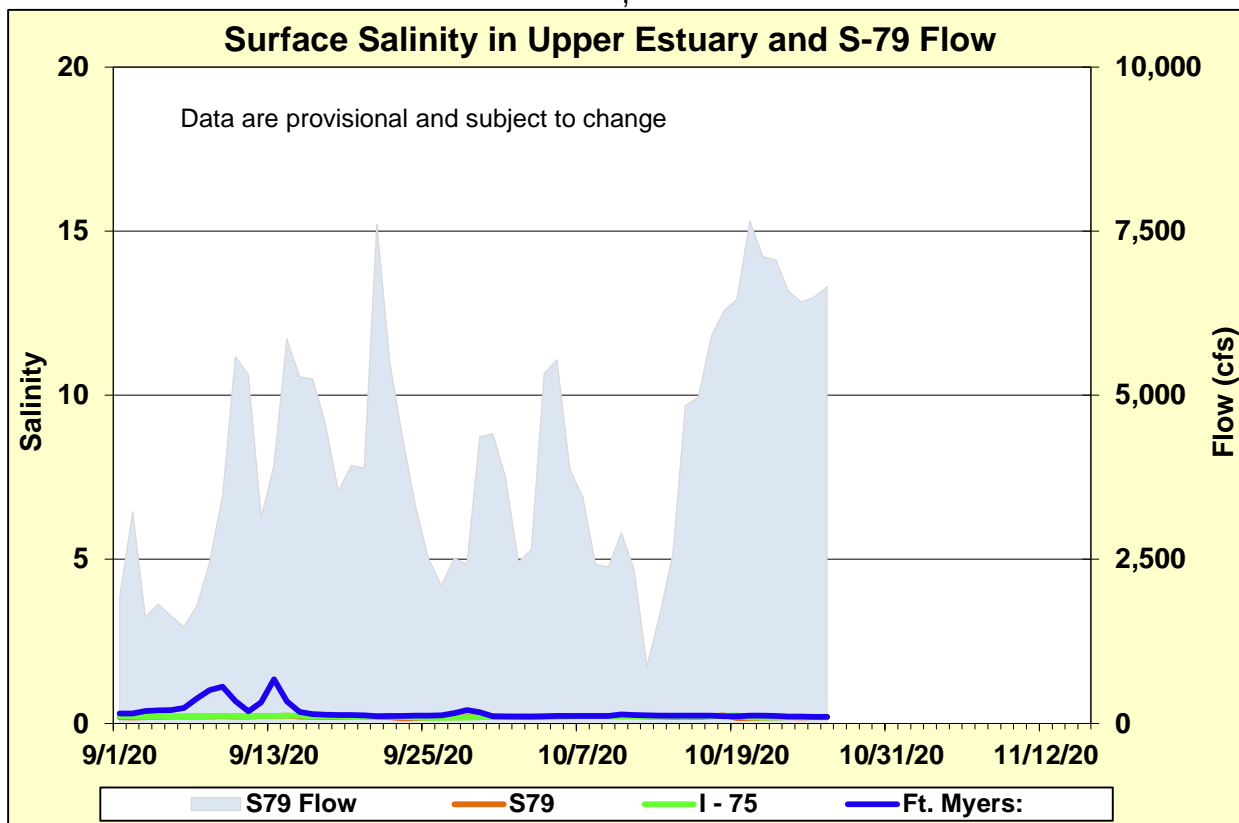


Figure 7. Daily mean flows at S-79 and salinity at upper estuary monitoring stations.

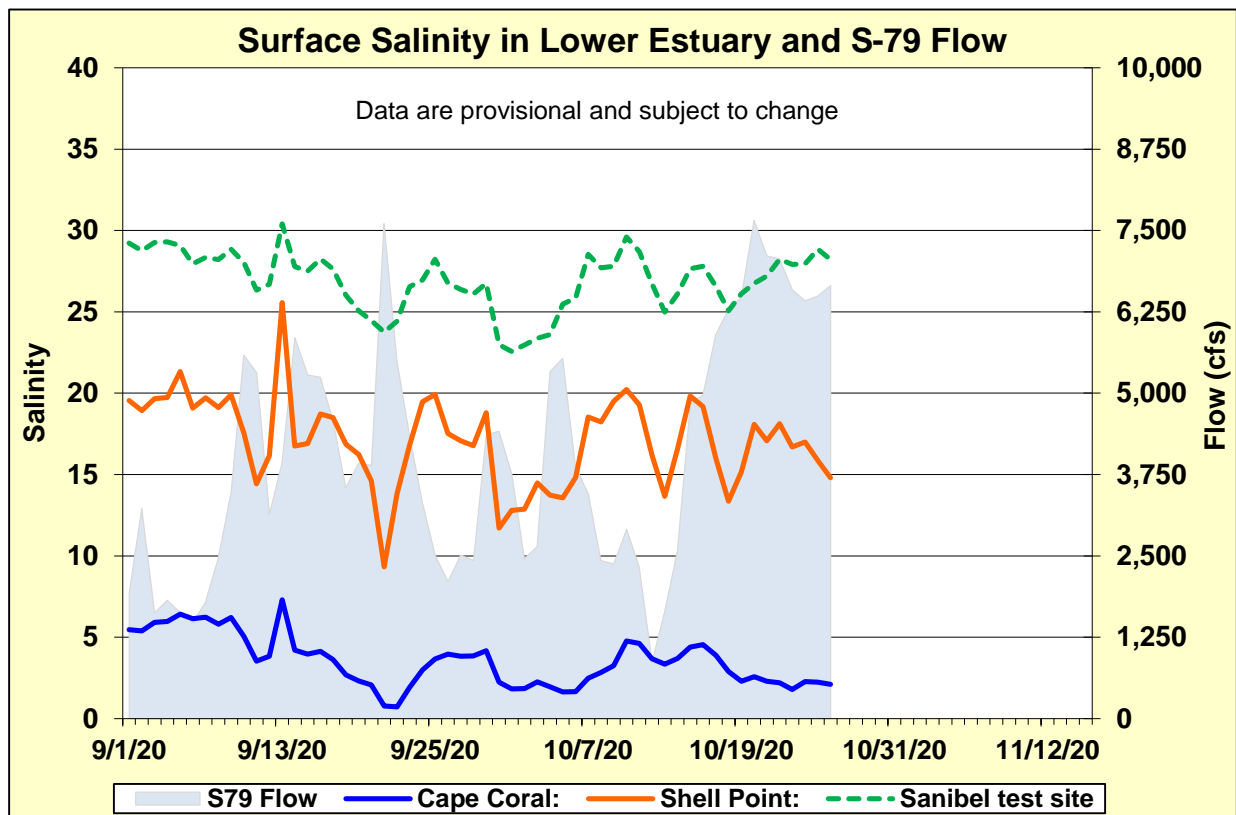


Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.

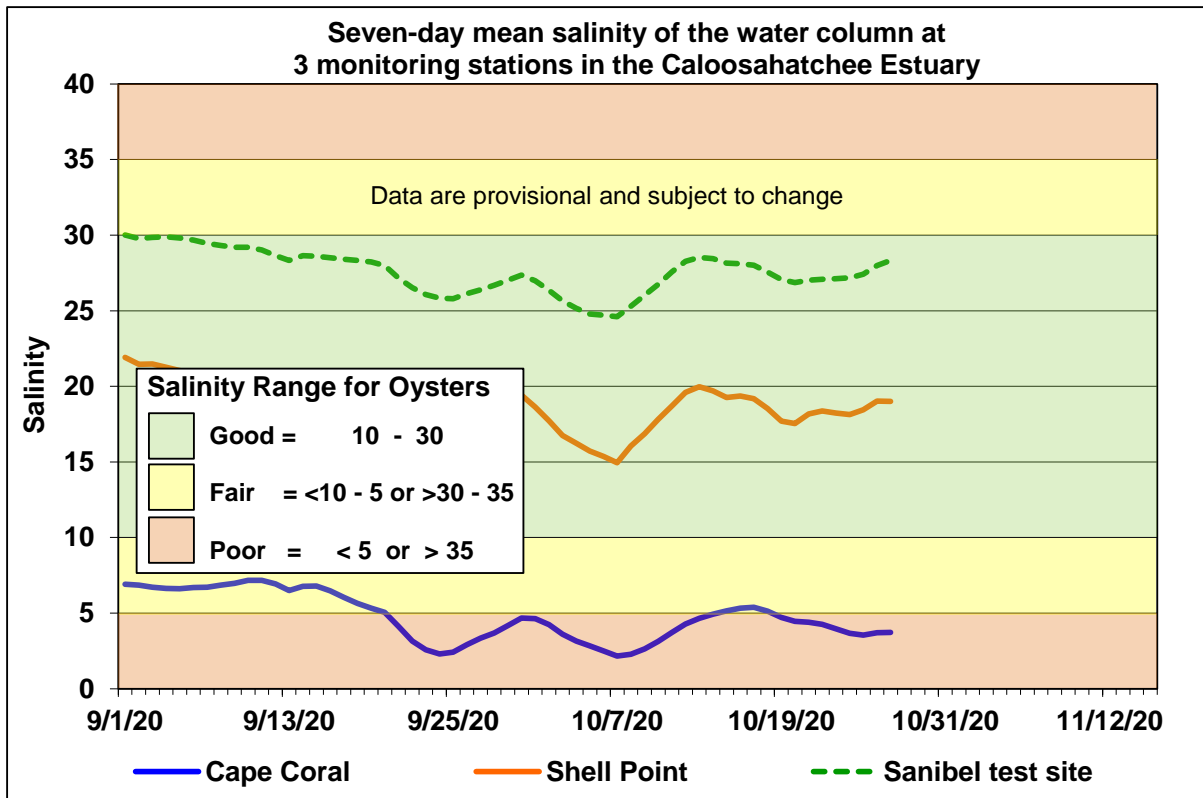


Figure 9. Seven-day mean salinity at Cape Coral, Shell Point, and Sanibel monitoring stations.

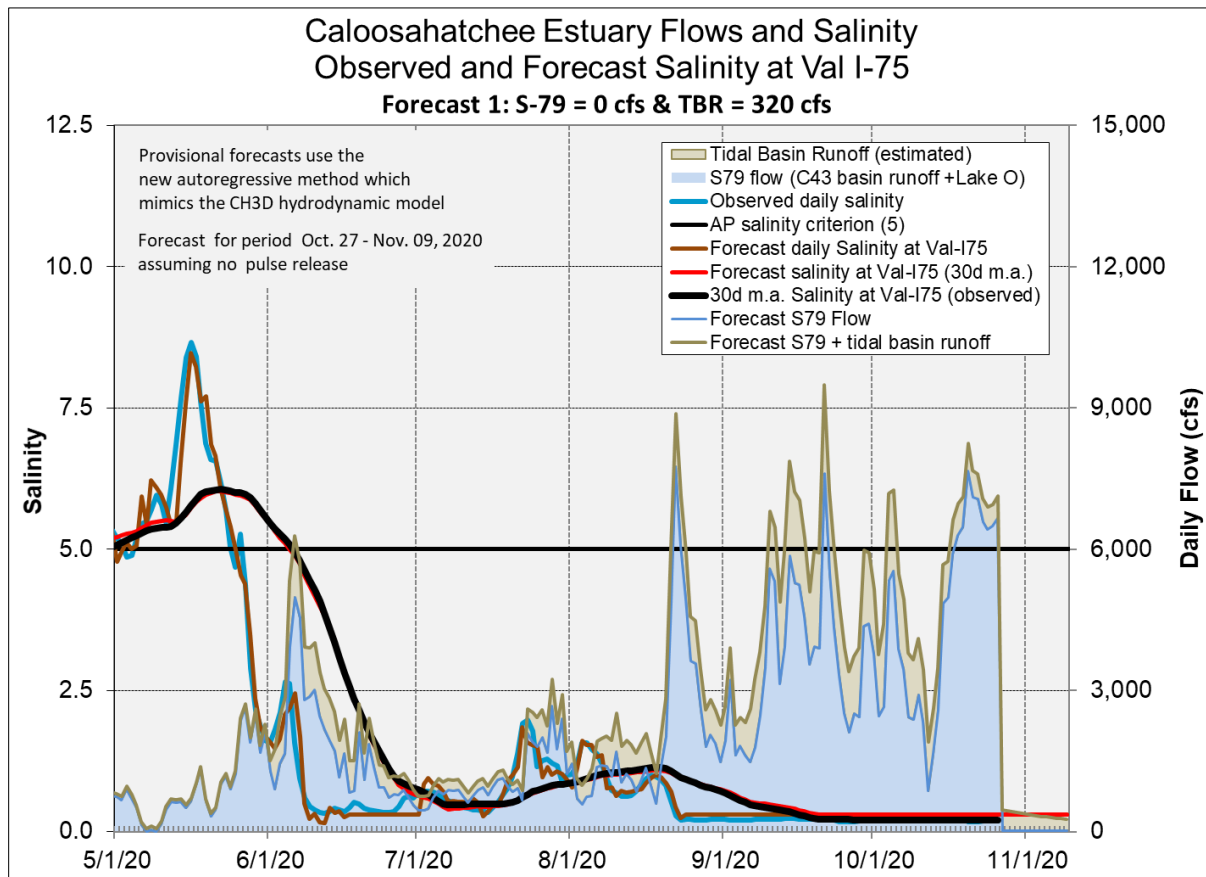
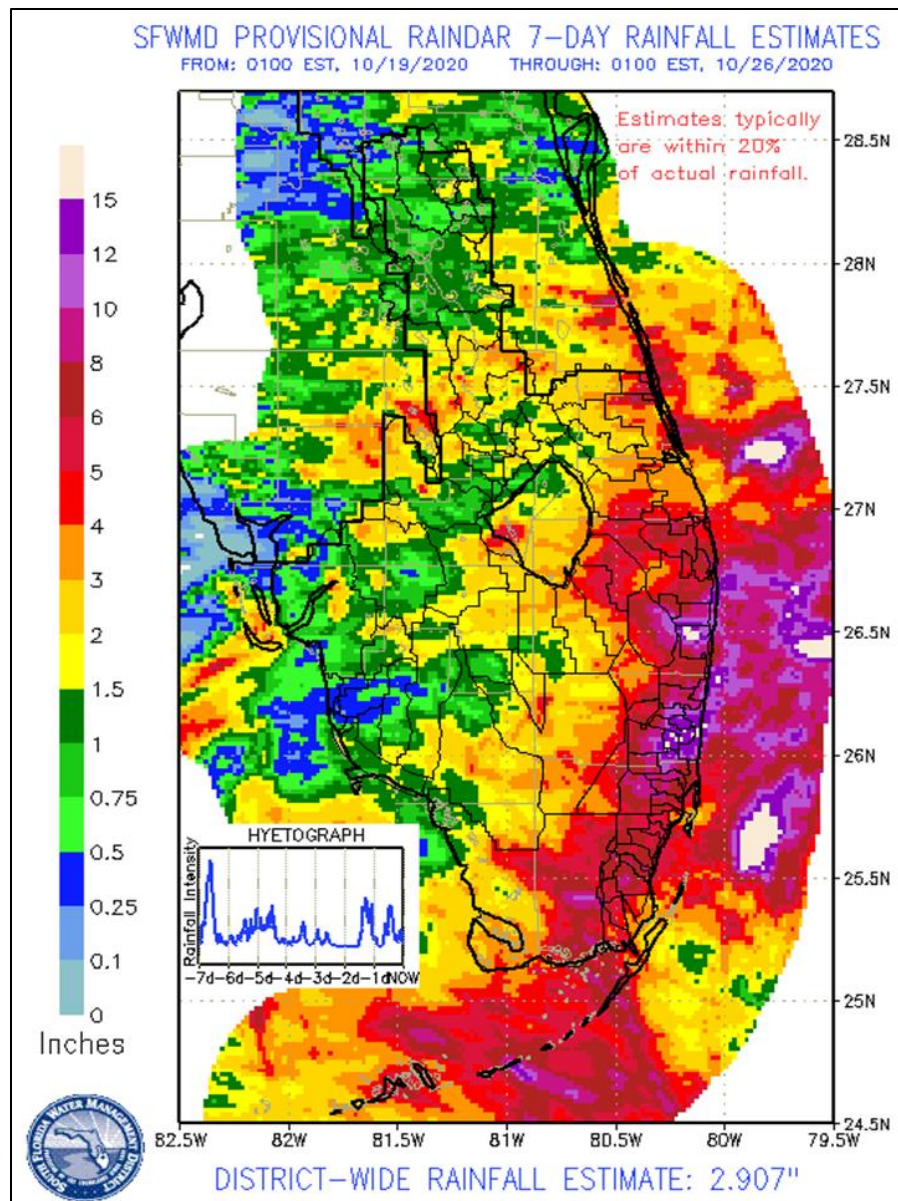


Figure 10. Forecasted Val I-75 surface salinity assuming no pulse release at S-79.

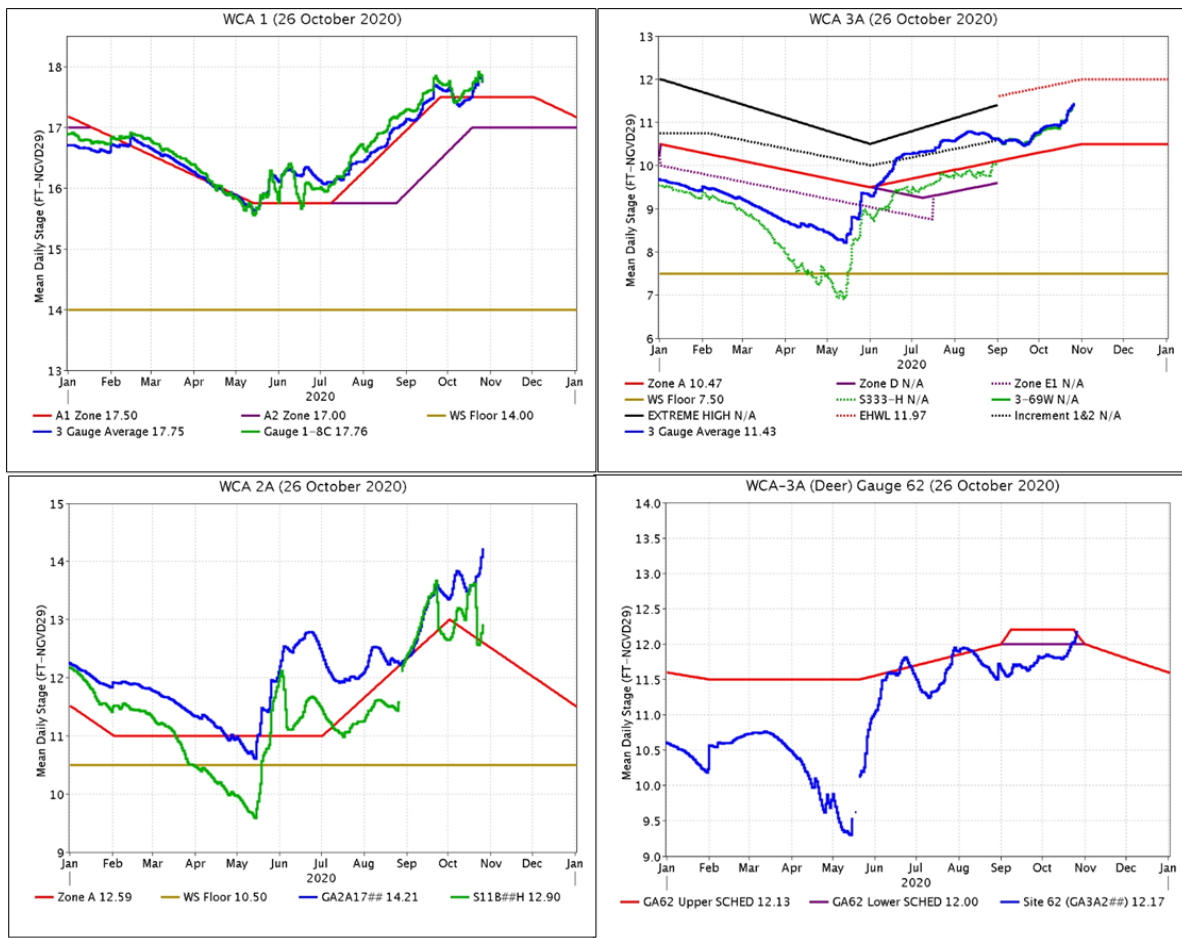
EVERGLADES

Well above average rainfall fell across the Everglades last week, highest in WCA-1. At the gauges monitored for this report stages increased 0.39 feet on average, with south central WCA-2A experiencing the largest increase. Evaporation dropped to 0.67 inches last week, and the Tamiami Trail Flow Formula continues to call for maximum releases from WCA-3A.

Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	6.82	+0.29
WCA-2A	4.17	+0.61
WCA-2B	5.78	+0.40
WCA-3A	2.91	+0.41
WCA-3B	4.70	+0.42
ENP	4.22	+0.26

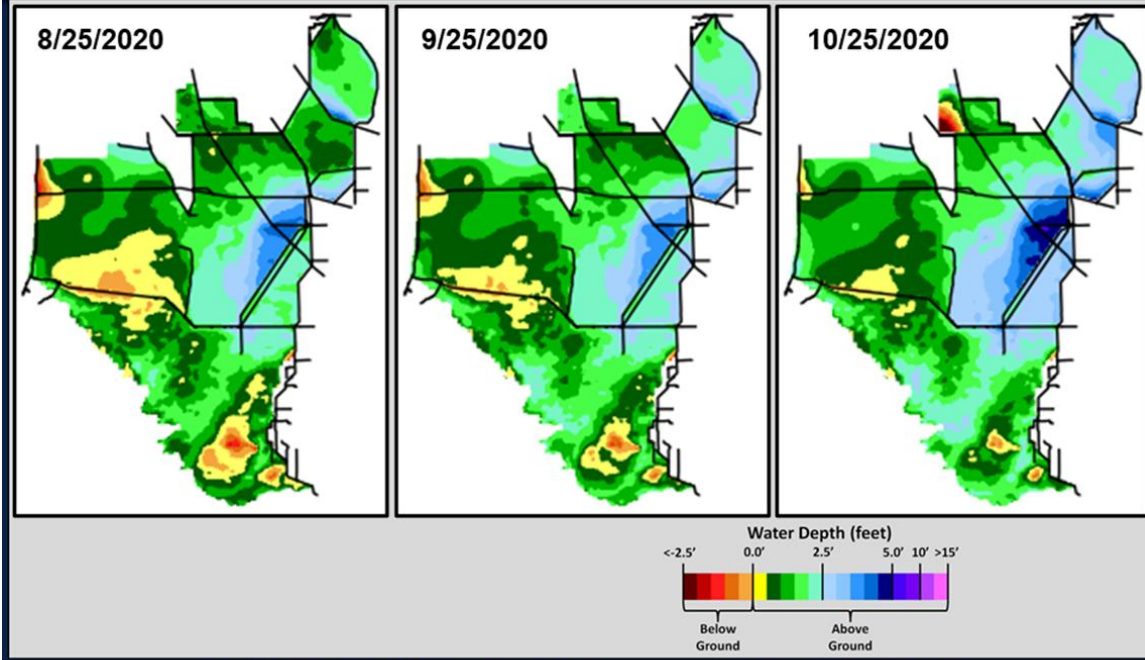


Regulation Schedules: WCA-1: Stage at the 1-8C Gauge ascended quickly last week trending upwards, now 0.76 feet above the stable Zone A1 regulation line. WCA-2A: Stages at Gauge 2-17 once again climbed quickly away from the regulation line last week and is now 1.62 feet above the falling schedule. WCA-3A: The Three Gauge Average stages trended up and away from the rising Zone A regulation line last week, currently 0.96 feet above. WCA-3A: Stage at gauge 62 (Northwest corner) rose steadily last week and is currently 0.04 feet above the falling Upper Schedule.

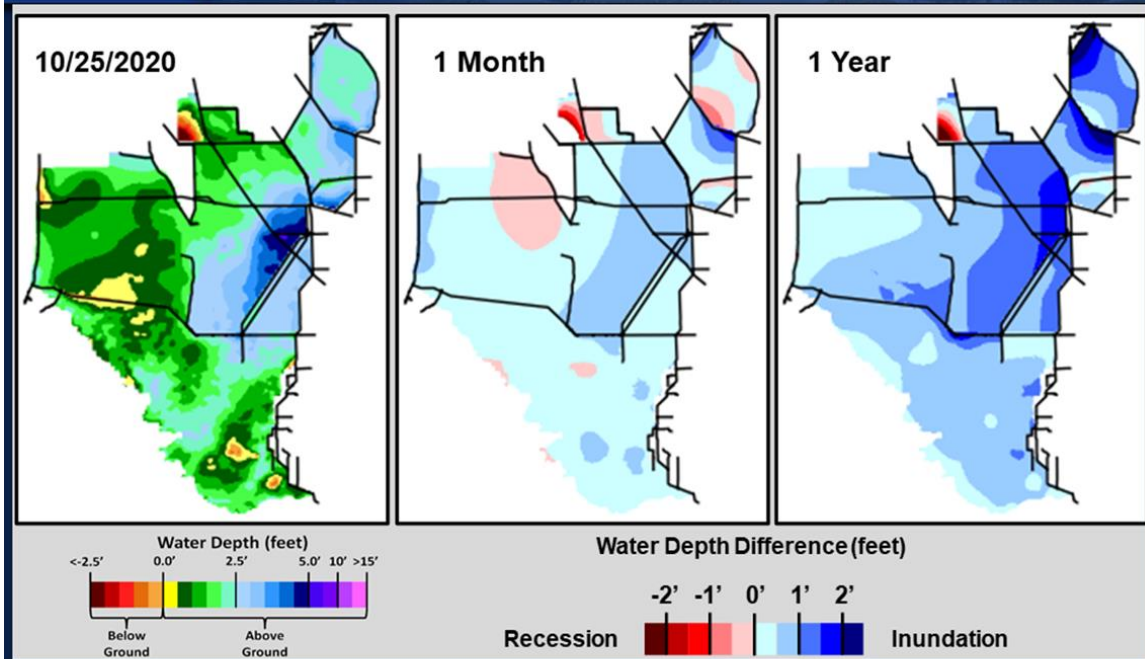


Water Depths: The WDAT tool for spatial interpolation of depth monthly snapshots over the last two months indicate current depths up to 5.0 feet in WCA-3A South around the upper reaches of the L-67 canal. Ponding depths (>2.5 feet) are found in significant portions of WCA-1 and eastern WCA-2A is even deeper. Hydrologic connectivity is well established within the major sloughs in ENP and the western basins are wetter. Comparing WDAT water levels from present, over the last month stage changes were generally deeper and in eastern WCA-3A and northern WCA-2A the change is significant and look to represent differences brought about by water moving between basins. Looking back one year the stage difference patterns are similar, but more significant. Deeper across the entire system, significantly deeper downstream of the S-11s and south to the upper reaches of the L-67 canal. Along the northern perimeters of WCA-2A and WCA-1 the difference is greater than 2.0 feet.

** sensor recalibration in Rotenberger is causing erroneous output.

**SFWDAT Water Depth Monthly Snapshots**

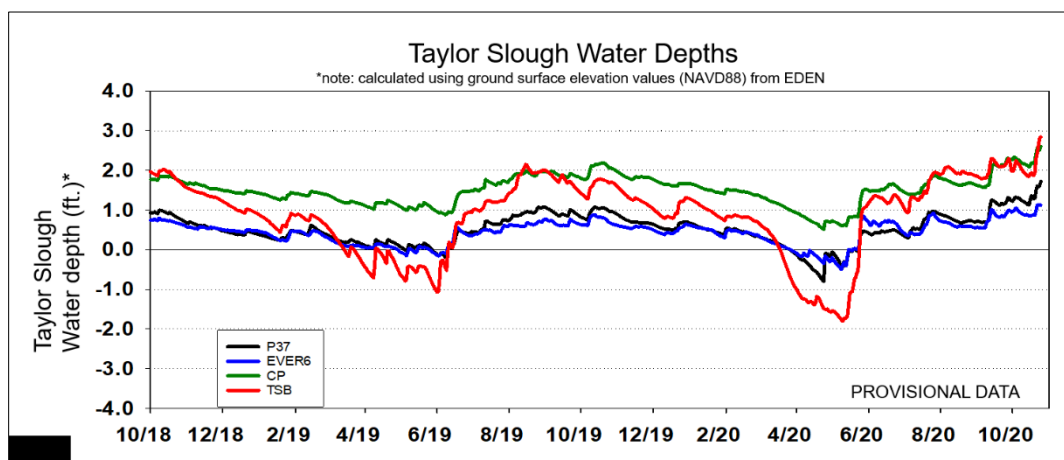
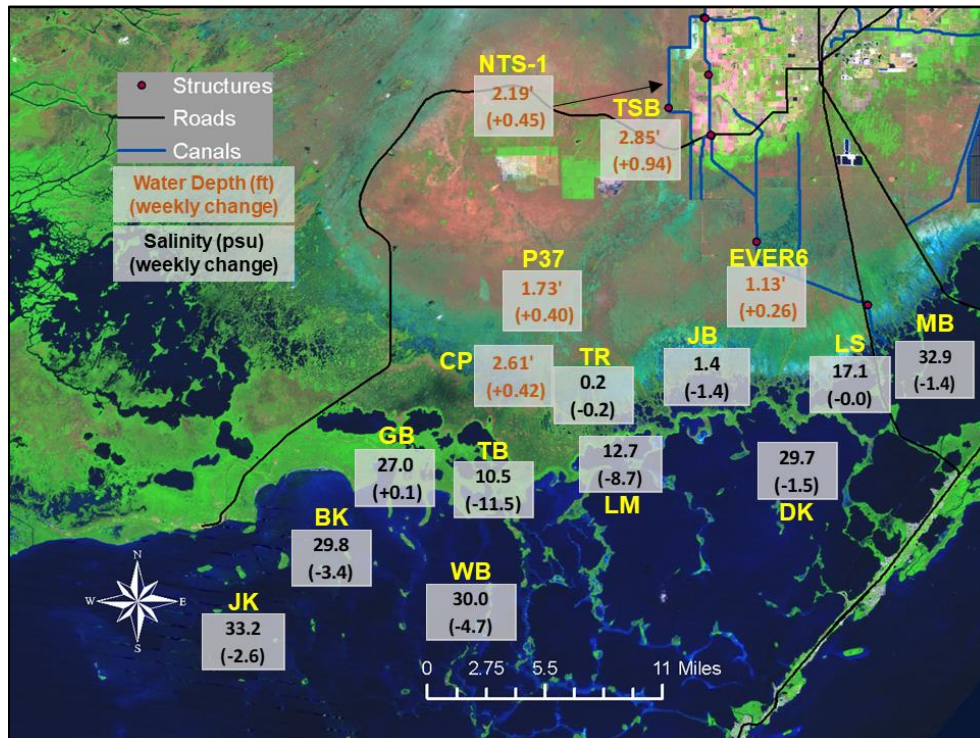
South Florida Water Depth Assessment Tool (SFWDAT)

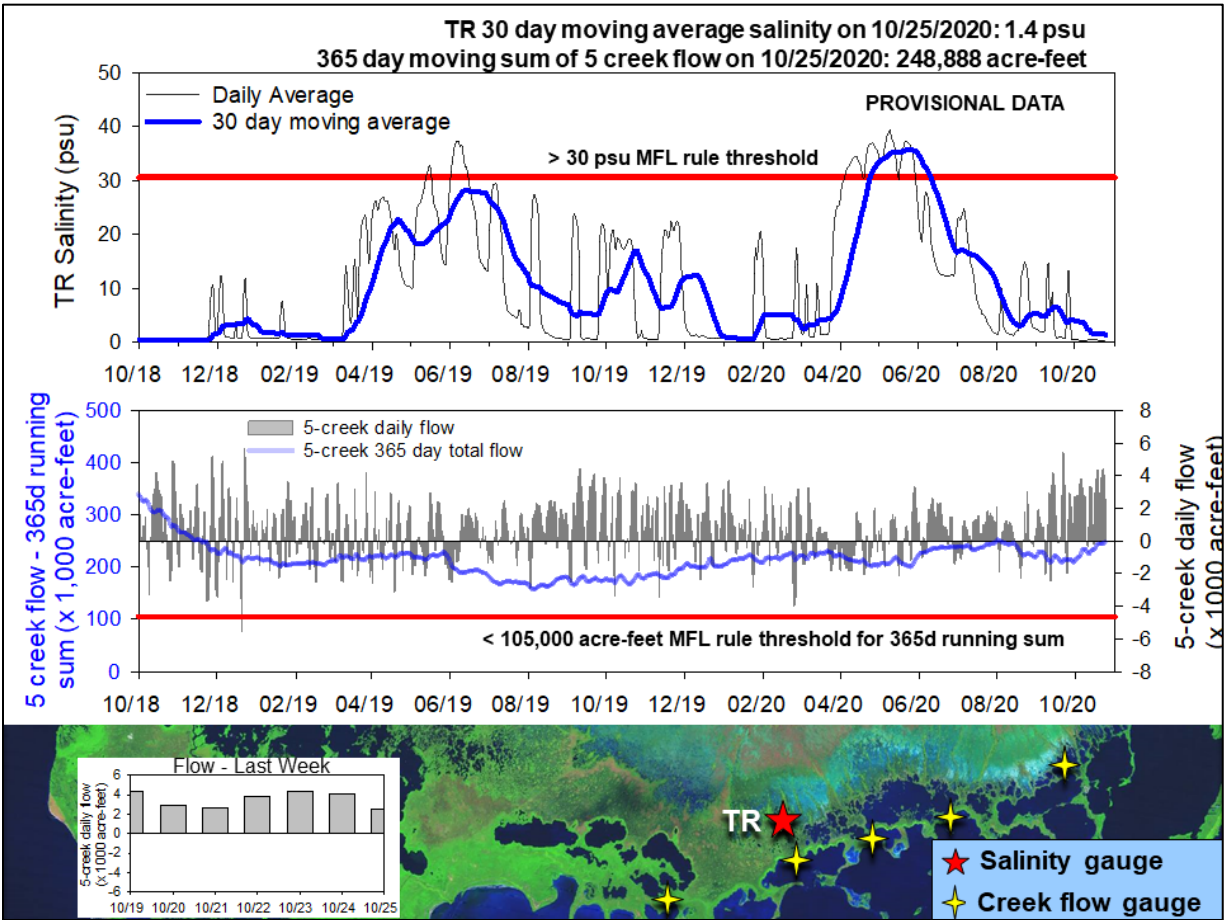
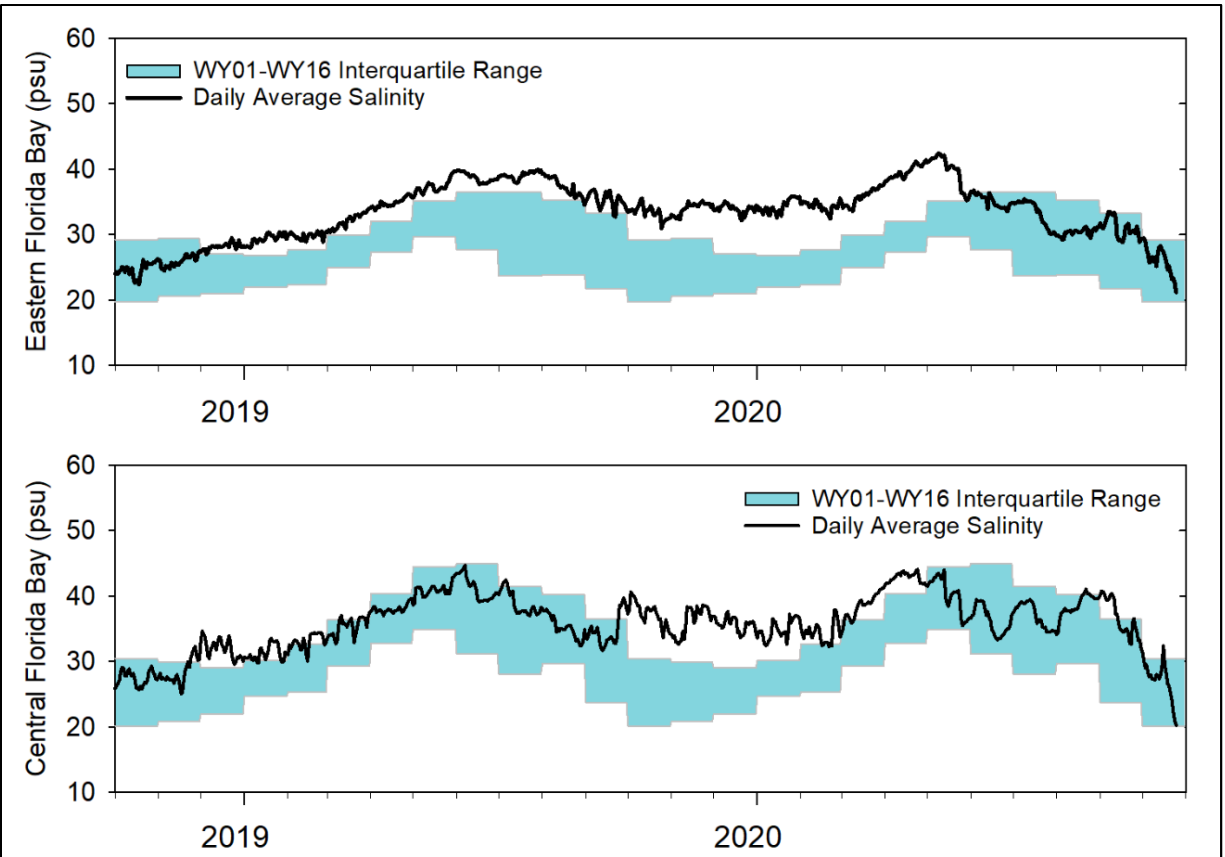
**SFWDAT Everglades Difference Maps
(Present – Past)**

South Florida Water Depth Assessment Tool (SFWDAT)

Tree island inundation in WCA-3A, WCA-3B and ENP: 371 Tree Islands of known elevation within WCA-3A, -3B, and Everglades National Park's Shark Slough. Current preliminary estimates using WDAT indicate that 63% or 234 of the tree islands are currently inundated, up from 56% the week prior. Initial islands inundated beginning 5/24/20, longest duration of continuous inundation is 147 days. Inundation for more than 90 days has the potential for ecological harm. Inundation for more than 120 days will cause ecological harm to sensitive islands (currently 15% of islands).

Taylor Slough Water Levels: An average of 6.8 inches of rain fell over Taylor Slough and Florida Bay this past week, and stages increased 0.49 feet on average. Northern Taylor Slough received the most rain this week (11 inches) and had the largest weekly increase (0.94 feet). Taylor Slough is now 11 inches higher than the historical average.





Florida Bay Salinities: Salinities in Florida Bay averaged a 4 psu decrease over the week with individual stations decreasing up to 11.5 psu. Nearshore salinity decreased by almost 7 psu over the week with average salinity ending at 17 psu. Average salinity in Florida Bay is now 1.5 psu below the historical average. The rapid decrease in salinity this week has brought average salinity in the Eastern and Central areas near the 25th percentile of the historical data.

Florida Bay MFL: The salinity at the TR station in the mangrove zone (tracked for the Florida Bay MFL) remains near-fresh this week (now at 0.2 psu). The 30-day moving average decreased 0.2 psu to end at 1.4 psu. Weekly flow from the 5 creeks identified by yellow stars on the map totaled almost +25,000 acre-feet (new highest weekly flow for the year) with another full week of positive flows. The 365-day moving sum of flow from the five creeks (tracked as part of the Florida Bay MFL criteria) ended at 248,888 acre-feet this week which is a 7,000 acre-feet increase from last week. That is only 200 acre-feet less than 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. 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. When considering the ecology of tree islands in WCA-3A as a whole, the last two years of low flooding stress create a resilience to flooding stress for a single wet season. If these high stages persist long into the dry season, ecological harm is likely, but given the low precipitation predictions for the upcoming dry season this persistence seems unlikely and why at this time SFWMD Everglades ecologists are recommending a careful conservation of water in WCA-3A. Continued flows towards Taylor Slough and Florida Bay maintain hydration in the marshes and lower salinity conditions within the nearshore areas of Florida Bay and will provide a freshwater buffer against the drier than average dry season that is expected which would delay the start of the salinity increases that occur within the dry season and possibly prevent the occurrence of extreme hyper-salinity towards the end of the dry season. 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 parallel 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 tree island ecology is diminished 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.