

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:** November 4, 2020

**SUBJECT:** Weekly Environmental Conditions for Systems Operations

### **Summary**

#### **Weather Conditions and Forecast**

As moisture begins to creep back north, some light showers should return to the east coast by Wednesday evening with scattered moderate to locally heavy shower activity returning south and east Thursday. Hurricane Eta is making landfall over Nicaragua, and the surface circulation should degenerate over the mountainous terrain of Nicaragua and Honduras. However, the remnants of Eta are forecast to help develop a tropical cyclone over the northwestern Caribbean by Saturday. As this low meanders around the northwestern Caribbean this weekend, it should interact with the frontal boundary to our south and lift it back north over the District where breezy east winds should bring a steady supply of moisture to the District. This scenario creates the potential for areas of heavy rainfall to develop over the District particularly south and east Friday, Saturday, and Sunday. The total rainfall and location of heaviest rains this weekend are very uncertain as it is heavily dependent upon the evolution of the tropical cyclone in the northwestern Caribbean. The tropical cyclone may lift northward during the early and middle part of next week, so the current quantitative precipitation forecast (QPF) keeps rains over the District Monday through the middle part of next week. Strong northeast to east winds are forecast to enhance tidal levels along the east coast through Thursday with breezy to strong east winds continuing to enhance tides Friday through Monday. Total rainfall is forecast to be above to well-above the historical average during the first 7-day period (Week 1) and then above the historical average during the second 7-day period (Week 2).

#### **Kissimmee**

Tuesday morning stages were 58.1 feet NGVD (0.1 feet above schedule) in East Lake Toho, 54.9 feet NGVD (0.1 below schedule) in Toho, and 52.4 feet NGVD (0.1 feet below schedule) in Kissimmee-Cypress-Hatchineha; headwater stages were 46.6 feet NGVD at S-65A and 27.0 feet NGVD at S-65D. Tuesday morning discharges were 190 cfs at S-65, 310 cfs at S-65A, 620 cfs at S-65D and 800 cfs at S-65E. Dissolved oxygen concentration in the Kissimmee River averaged 3.9 mg/L for the week through Sunday. Kissimmee River mean floodplain depth on Sunday was 0.59 feet. Today's recommendation is to maintain minimum flow of 300 cfs +/- 50 cfs at S-65A.

#### **Lake Okeechobee**

Lake Okeechobee stage was 16.26 feet NGVD on November 2, 2020, 0.11 feet lower than the previous week and 0.63 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 0.76 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 but recent releases have resulted in a stage decline over the past week. 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 and northwest portions of the lake.

### **Estuaries**

Total inflow to the St. Lucie Estuary averaged more than 3,475 cfs with approximately 1,346 cfs coming from Lake Okeechobee. The seven-day average surface salinities decreased at the North Fork and US1 Bridge and increased at the A1A Bridge 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 6,389 cfs over the past week with approximately 4,027 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) and decreased at Cape Coral, 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, 11,400 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 84,900 ac-feet. The total amount of inflows to the STAs in WY2021 is approximately 1,178,000 ac-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 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 WCAs last week, particularly in WCA-2A. At the gauges monitored for this report, WCA-1 is around 0.60 feet, central WCA-2A is around 1.4 feet and WCA-3A is about 0.75 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. Close to average rainfall fell over Taylor Slough and Florida Bay last week and stages fell but remain above average. The effects of last week's rain are still being felt throughout the area this week. Salinities decreased 3 psu on average across Florida Bay and remain below the historical average. Salinities in the TR mangrove zone to the east remained near fresh as discharge rates from the creeks remain high. Conditions are in a good position to start the dry season.

## Supporting Information

### KISSIMMEE BASIN

#### Rainfall

The Upper Kissimmee Basin received 1.09 inches of rainfall in the past week and the Lower Basin received 0.69 inches (SFWMD Daily Rainfall Report 11/2/2020).

#### 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: 11/3/2020**

Water Body	Structure	7-day Average Discharge (cfs) <sup>1</sup>	Stage Monitoring Site <sup>2</sup>	Lake Stage (feet)	Schedule Type <sup>3</sup>	Schedule Stage (feet)	Daily Departure (feet)						
							11/1/20	10/25/20	10/18/20	10/11/20	10/4/20	9/27/20	9/20/20
Lakes Hart and Mary Jane	S-62	4	LKMJ	61.0	R	61.0	0.0	0.0	0.1	0.1	0.0	0.1	0.4
Lakes Myrtle, Preston, and Joel	S-57	0	S-57	62.0	R	62.0	0.0	0.0	0.2	0.2	0.1	0.0	0.1
Alligator Chain	S-60	0	ALLI	63.7	R	64.0	-0.3	-0.1	-0.1	-0.1	0.0	0.0	0.0
Lake Gentry	S-63	0	LKGT	61.4	R	61.5	-0.1	-0.1	0.0	0.0	-0.1	0.1	0.2
East Lake Toho	S-59	0	TOHOE	57.9	R	58.0	-0.1	0.0	-0.2	0.0	0.2	0.3	0.5
Lake Toho	S-61	0	TOHOW, S-61	54.8	R	55.0	-0.2	-0.1	-0.1	0.1	0.2	0.2	0.1
Lakes Kissimmee, Cypress, and Hatchineha	S-65	209	KUB011, LKIS5B	52.4	R	52.5	-0.1	0.1	0.2	0.5	0.6	0.4	0.5

<sup>1</sup> Seven-day average of weighted daily means through midnight.

<sup>2</sup> Names of in-lake monitoring sites and structures used to determine lake stage; if more than one site is listed, an average is reported.

<sup>3</sup> 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. **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: 11/3/2020

Metric	Location	1-Day Average		Average for the Preceding 7-Days <sup>1</sup>							
		11/1/2020	11/1/20	10/25/20	10/18/20	10/11/20	10/4/20	9/27/20	9/20/20	9/13/20	9/6/20
Discharge (cfs)	S-65	189	209	180	678	1,265	1,725	2,890	3,143	2,193	2,631
Discharge (cfs)	S-65A <sup>2</sup>	325	330	346	861	1,916	2,248	3,578	3,855	2,700	3,176
Discharge (cfs)	S-65D <sup>2</sup>	873	1,122	1,714	3,267	4,848	4,715	5,198	3,738	3,512	4,262
Headwater Stage (feet NGVD)	S-65D <sup>2</sup>	27.08	27.35	27.62	27.66	27.68	27.75	27.73	27.77	27.63	27.74
Discharge (cfs)	S-65E <sup>2</sup>	889	1,283	1,935	3,501	5,287	5,081	4,994	3,919	3,578	4,317
Discharge (cfs)	S-67	0	0	0	0	0	0	0	0	0	0
DO (mg/L) <sup>3</sup>	Phases I & II/III river channel	4.4	3.9	3.0	1.5	1.2	1.2	1.2	1.1	0.9	0.7
Mean depth (feet) <sup>4</sup>	Phase I floodplain	0.59	0.67	0.90	1.66	2.28	2.41	2.70	2.31	2.06	2.42

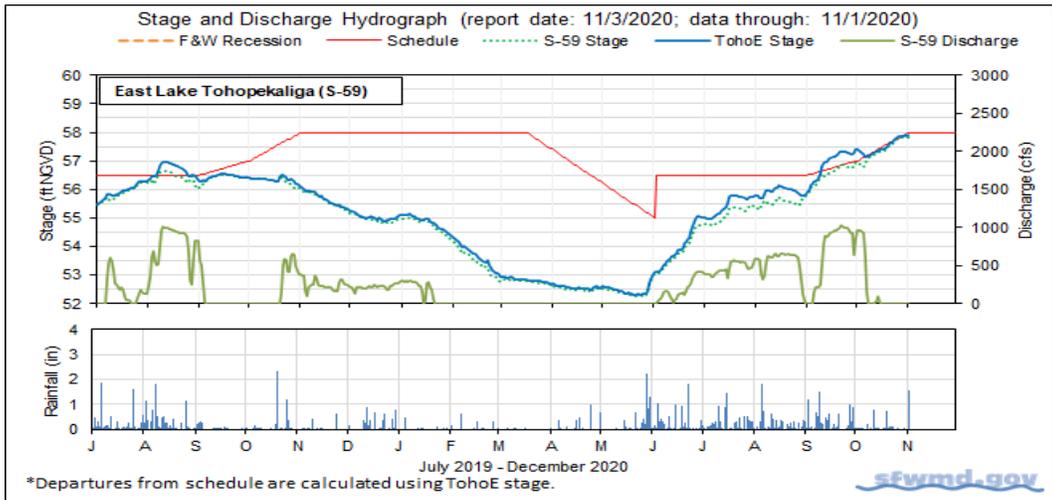
<sup>1</sup>Seven-day average of weighted daily means through Sunday midnight.

<sup>2</sup>S-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.

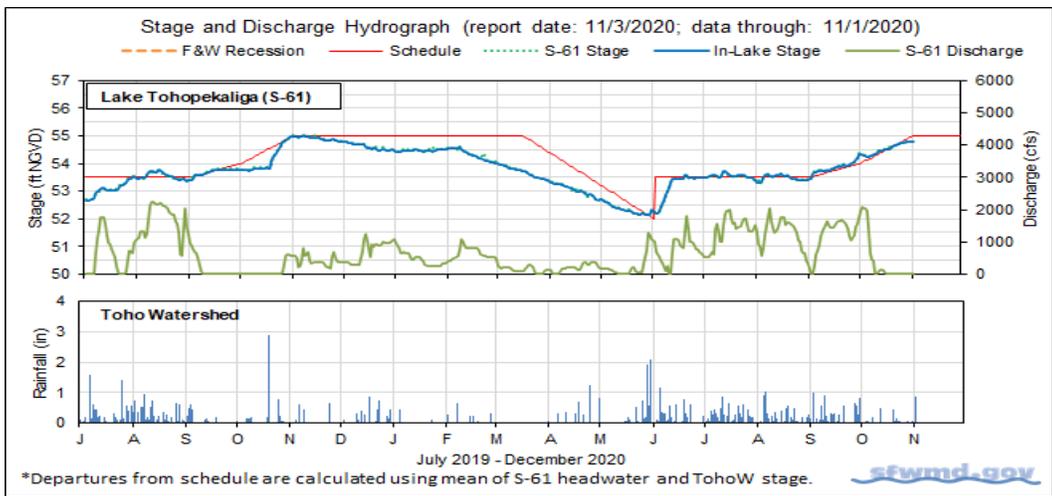
<sup>3</sup>DO is the average for sondes at KRBN, PC62, PC33, PD62R, and PD42R.

<sup>4</sup>1-day spatial average from South Florida Water Depth Assessment Tool (SFWDAT).

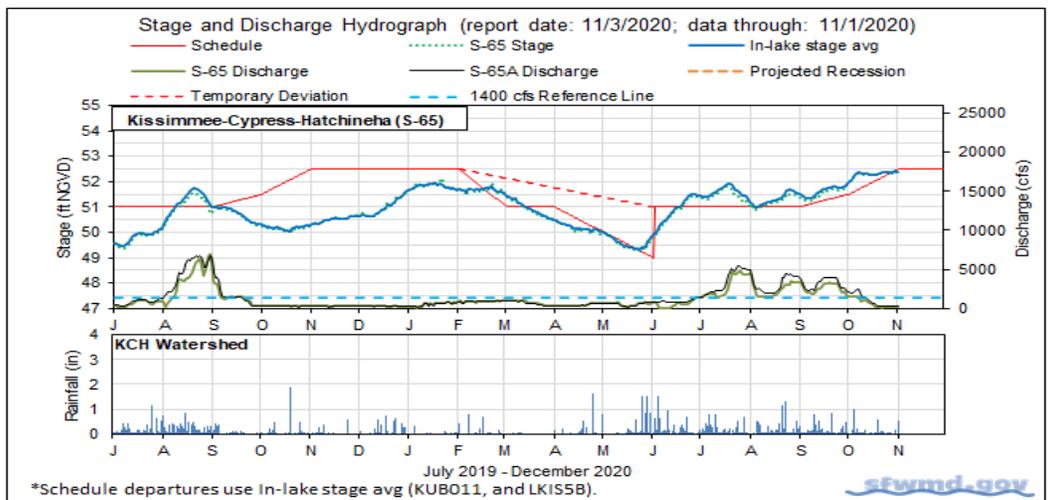
DATA ARE PROVISIONAL; N/A indicates that data were not available.



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

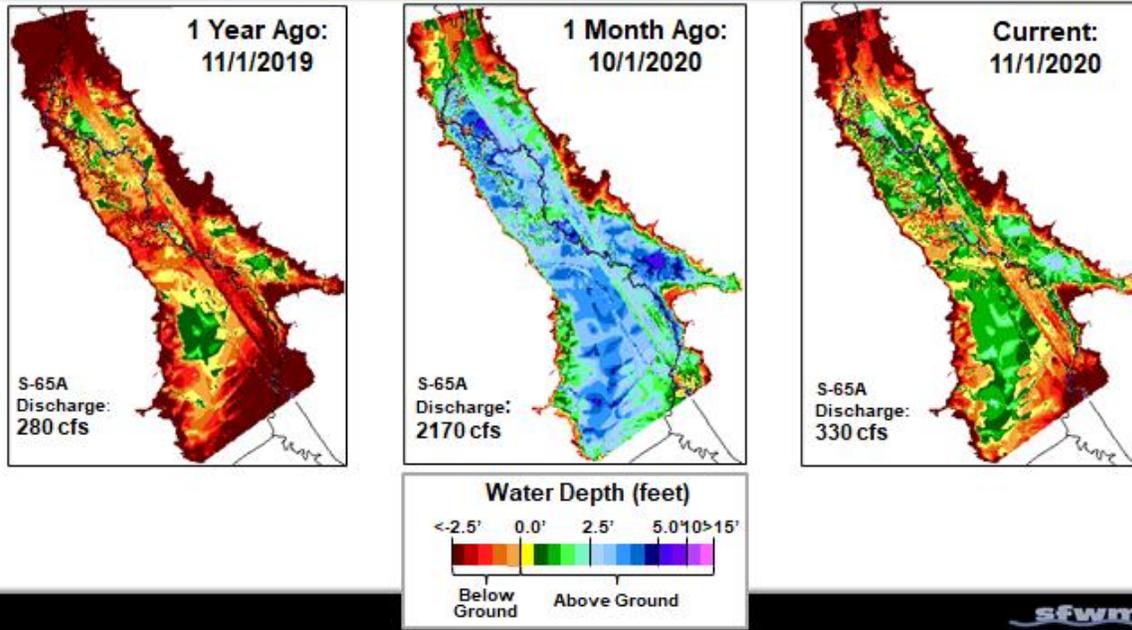


**Figure 2.** Lake Toho regulation schedule, stage, discharge and rainfall.

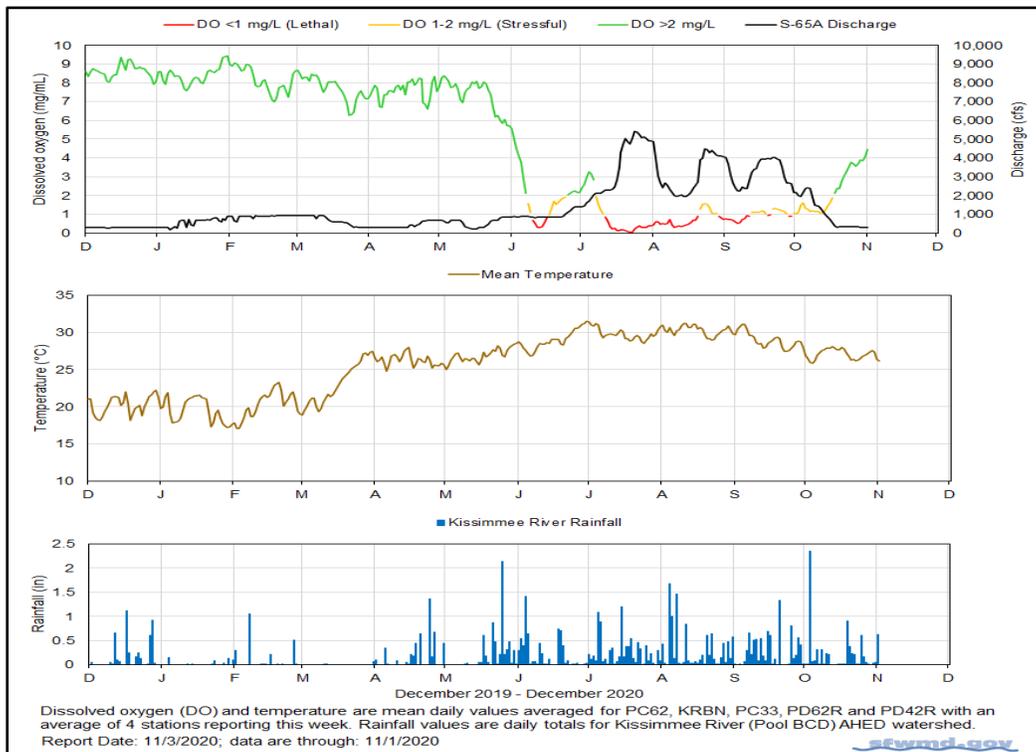


**Figure 3.** Lakes Kissimmee, Cypress and Hatchineha regulation schedule, stage, discharge and rainfall.

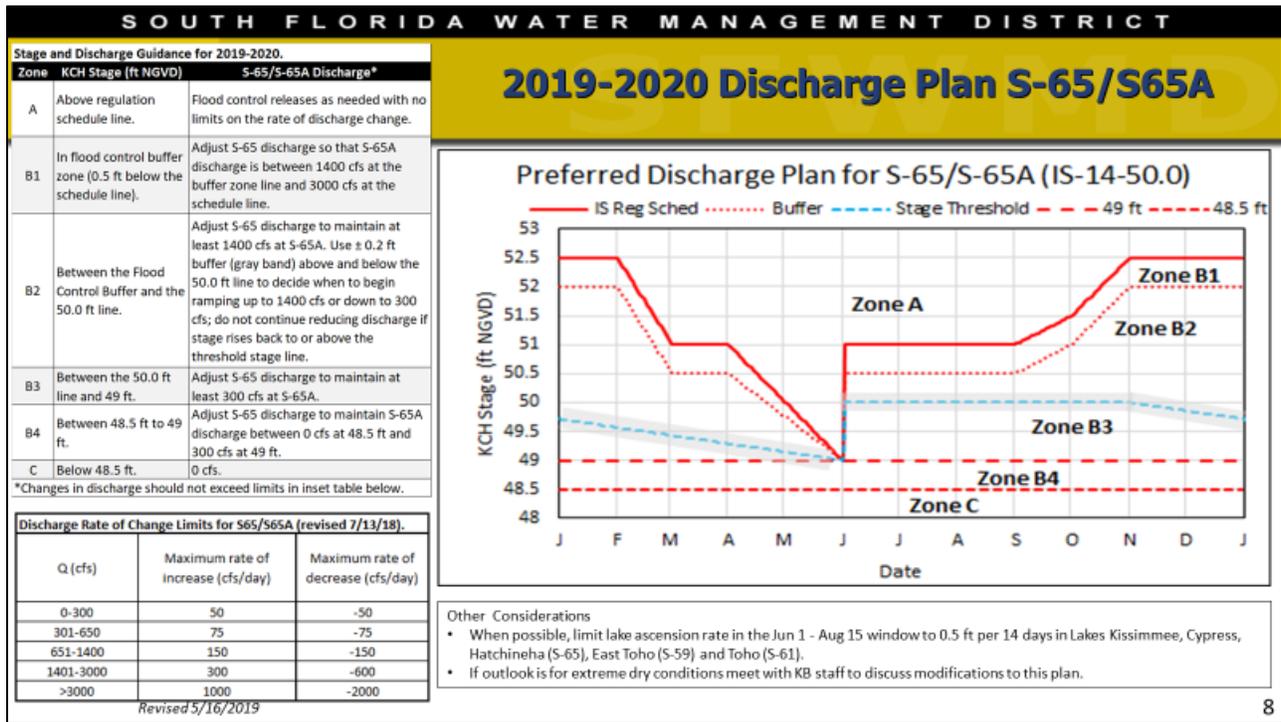
# Kissimmee River Phase I Restoration Area Water Depth Maps



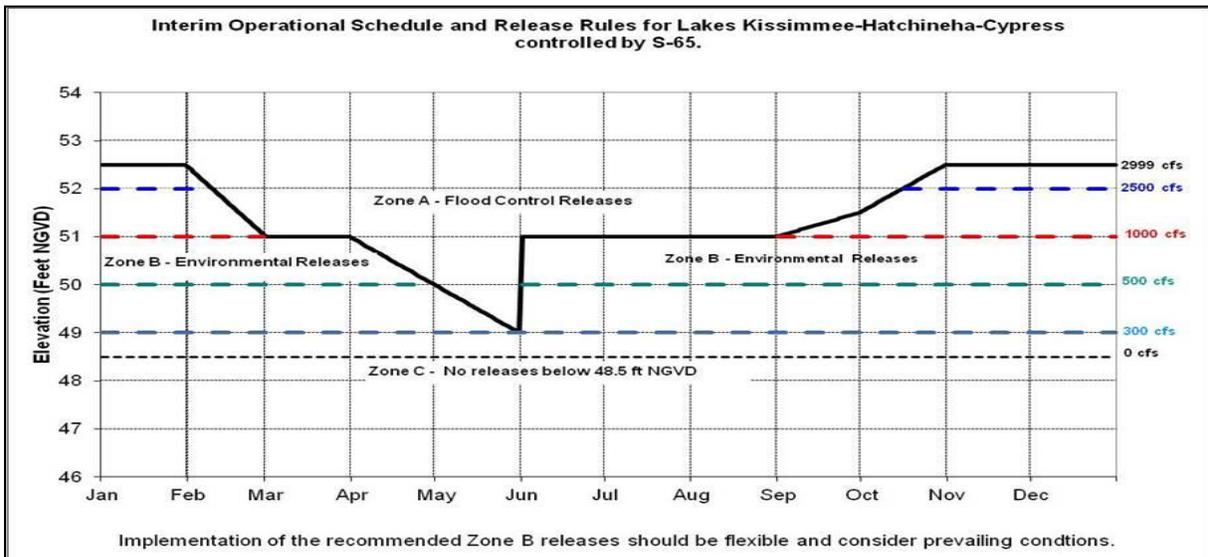
**Figure 4.** Phase I area floodplain water depths (from left to right) one year ago, one month ago and current. Color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to January 16, 2012.



**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.

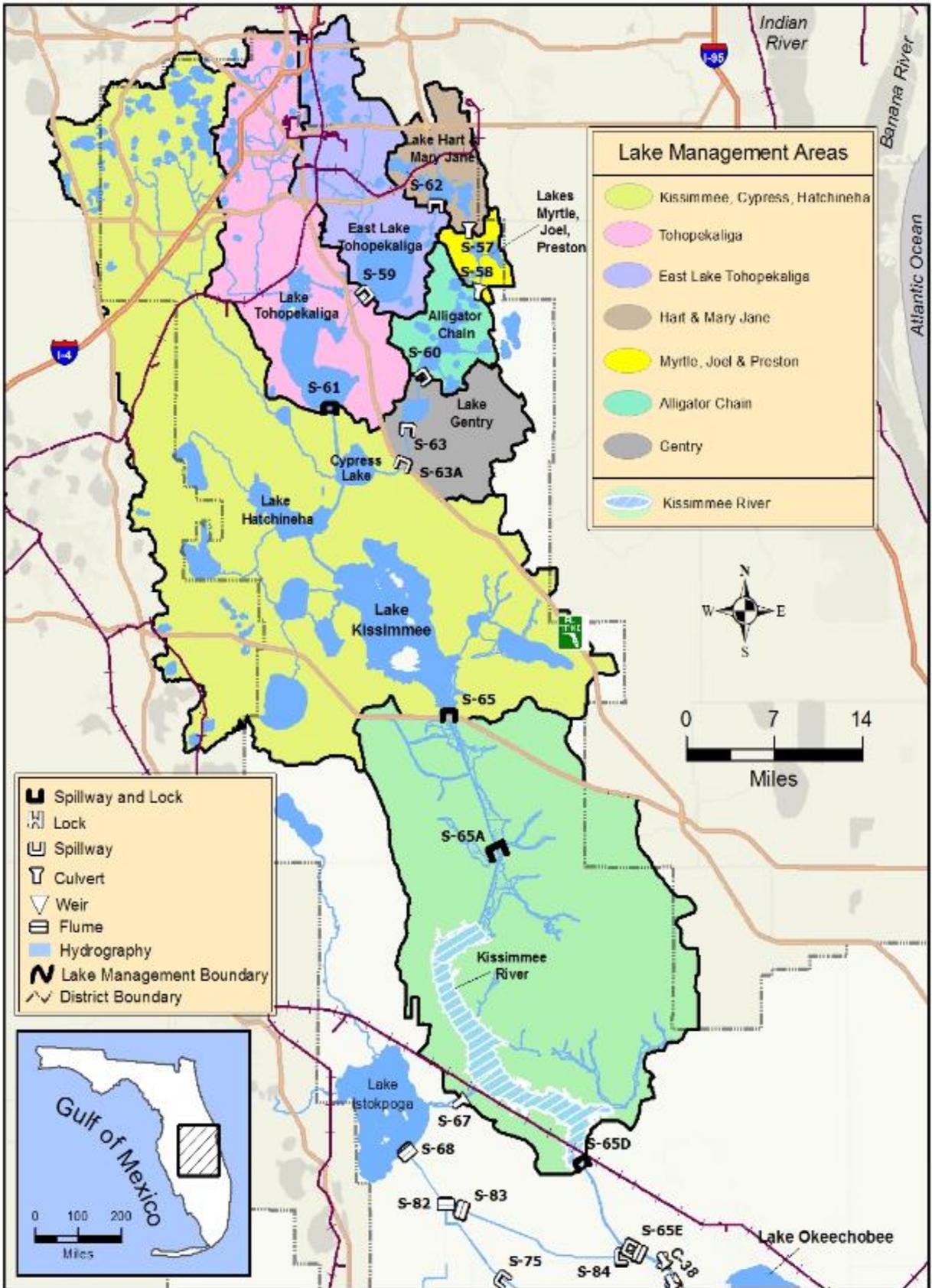


Figure 8. The Kissimmee Basin.

## **LAKE OKEECHOBEE**

Lake Okeechobee stage is 16.26 feet NGVD, 0.63 feet higher than a month ago, and 2.85 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 0.76 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 NGVD on May 17 and has risen nearly 5.5 feet since, but releases over the past two weeks have resulted in a stage decline. According to RAINДАР, 0.60 inches of rain fell directly over the Lake through the past week, with the rest of the watershed receiving varied amounts, as low as 0.25 inches and up to 6.0 inches (Figure 4).

The average daily inflows (minus rainfall) remain high but decreased from the previous week, going from 5,489 cfs to 3,527 cfs. Outflows (minus evapotranspiration) increased from 4,847 cfs to 6,472 cfs. Most of the inflows came from the Kissimmee River (1,256 cfs through S-65E & S-65EX1), but there were substantial inflows from the C-41a canal (864 cfs through S-84 & S-84X), Fisheating Creek (390 cfs), and the C-40 and C-41 canals (431 cfs through S-71 & S-72). Inflows from the C-59 canal via the S-191 structure decreased from 201 cfs to 78 cfs and inflows from the S-154 structure were similar to the prior week at 97 cfs. Pumps contributed a combined 315 cfs of inflow, a decrease of 128 cfs from the previous week. Releases to the west via S-77 were similar to the prior week at 4,041 cfs this past week, while releases east via S-308 increased from 798 cfs to 1,357 cfs. Outflows south through the S-350 structures increased from 0 cfs to 1,075 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 second October sampling occurred on the 21<sup>st</sup> and 22<sup>nd</sup> (Figure 6). Cyanotoxins were detected at 10 of the 32 stations sampled, and five of these stations had microcystin levels higher than 8 µg/L (the EPA recommendation for recreational waters), ranging from 8.1 to 16 µg/L. Chlorophyll-a results are pending.

The most recent satellite image (November 1, 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 and northwest regions of the Lake (Figure 7). Staff reported bloom conditions along the northwest shore and at the L005 weather platform on the west side of the Lake on October 29, 2020 which agrees with the November 1<sup>st</sup> imagery.

## **Water Management Summary**

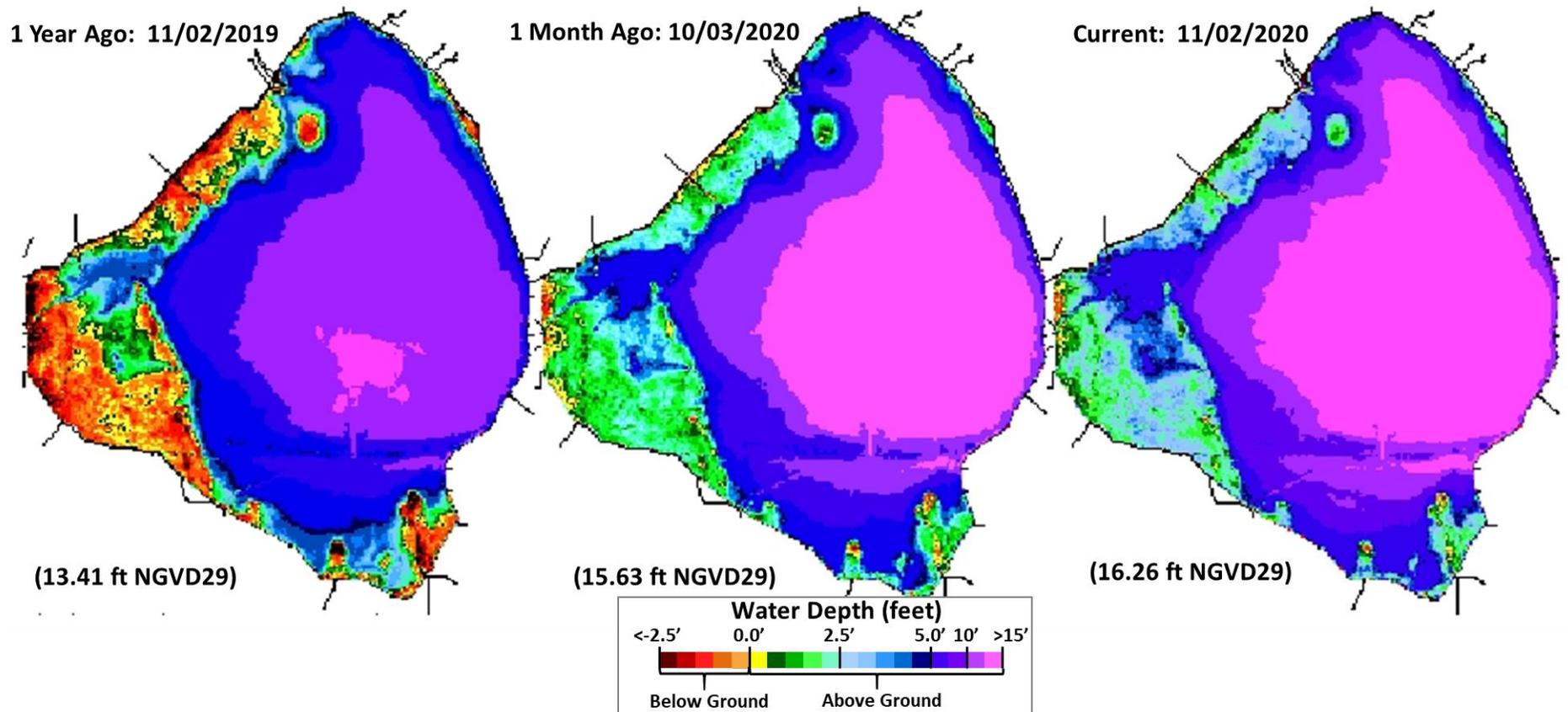
Lake Okeechobee stage was 16.26 feet NGVD on November 2, 2020, 0.11 feet lower than the previous week and 0.63 feet higher than the previous month. The Lake rose into the Intermediate sub-band on October 7, 2020 and has remained there since. Lake stage moved into the ecological envelope (which varies 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 0.76 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 but recent releases have resulted in a stage decline over the past week. 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 and northwest portions 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	1793	1256	0.5
S-71 & S-72	568	431	0.2
S-84 & S-84X	1383	864	0.3
Fisheating Creek	611	390	0.1
S-154	110	97	0.0
S-191	201	78	0.0
S-133 P	103	83	0.0
S-127 P	27	22	0.0
S-129 P	25	21	0.0
S-131 P	12	7	0.0
S-135 P	276	181	0.1
S-2 P	0	0	0.0
S-3 P	0	1	0.0
S-4 P	145	0	0.0
L-8 Backflow	237	96	0.0
Rainfall	4377	1622	0.6
<b>Total</b>	<b>9866</b>	<b>5149</b>	<b>2.0</b>

OUTFLOWS	Previous week Avg Daily CFS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)
S-77	4049	4041	1.5
S-308	798	1357	0.5
S-351	0	188	0.1
S-352	0	460	0.2
S-354	0	427	0.2
L-8 Outflow			
ET	1256	1967	0.7
<b>Total</b>	<b>6103</b>	<b>8439</b>	<b>3.2</b>

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

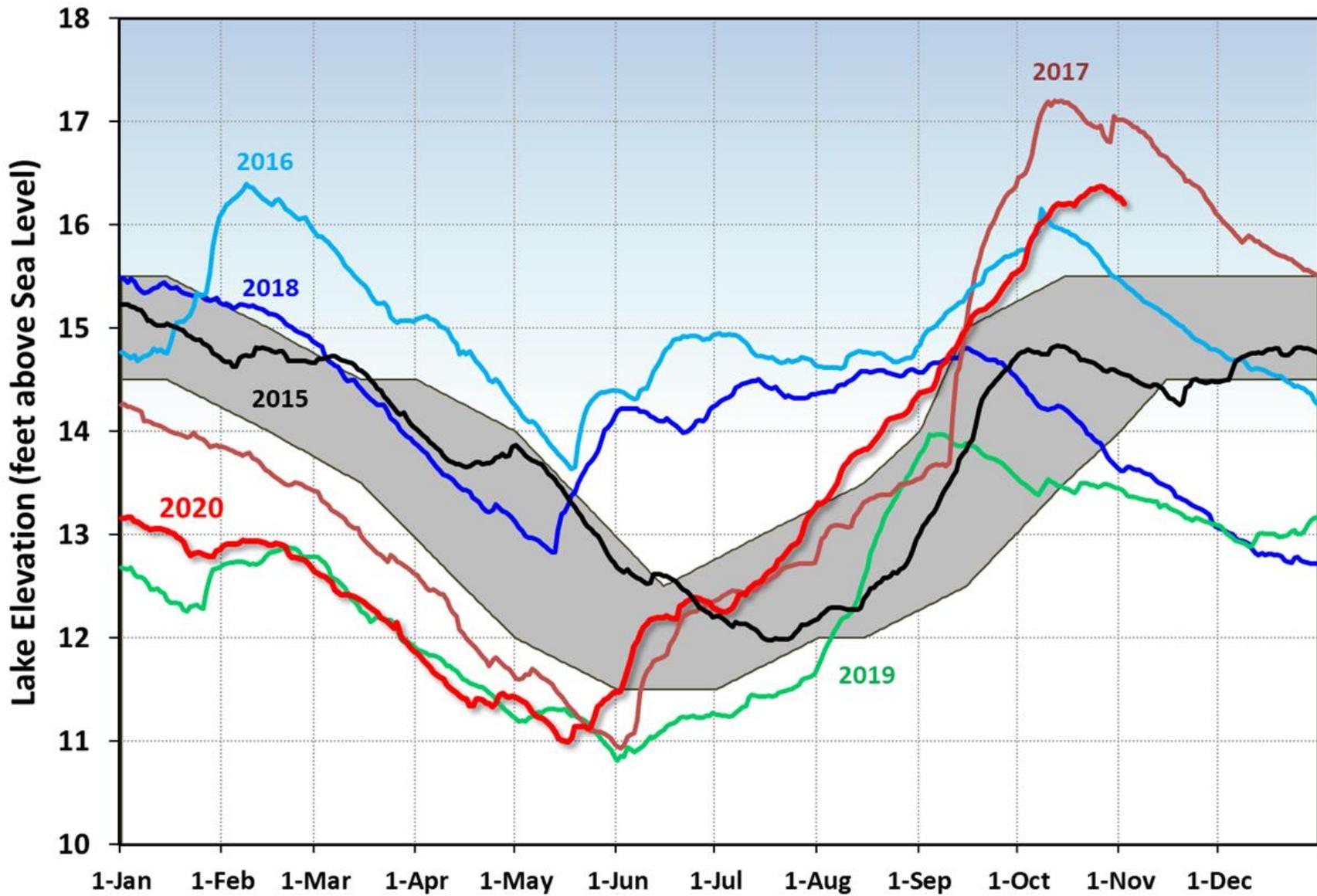


Figure 2. Select annual stage hydrographs for Lake Okeechobee in comparison to the updated Ecological Envelope.

# Lake Okeechobee Water Level History and Projected Stages

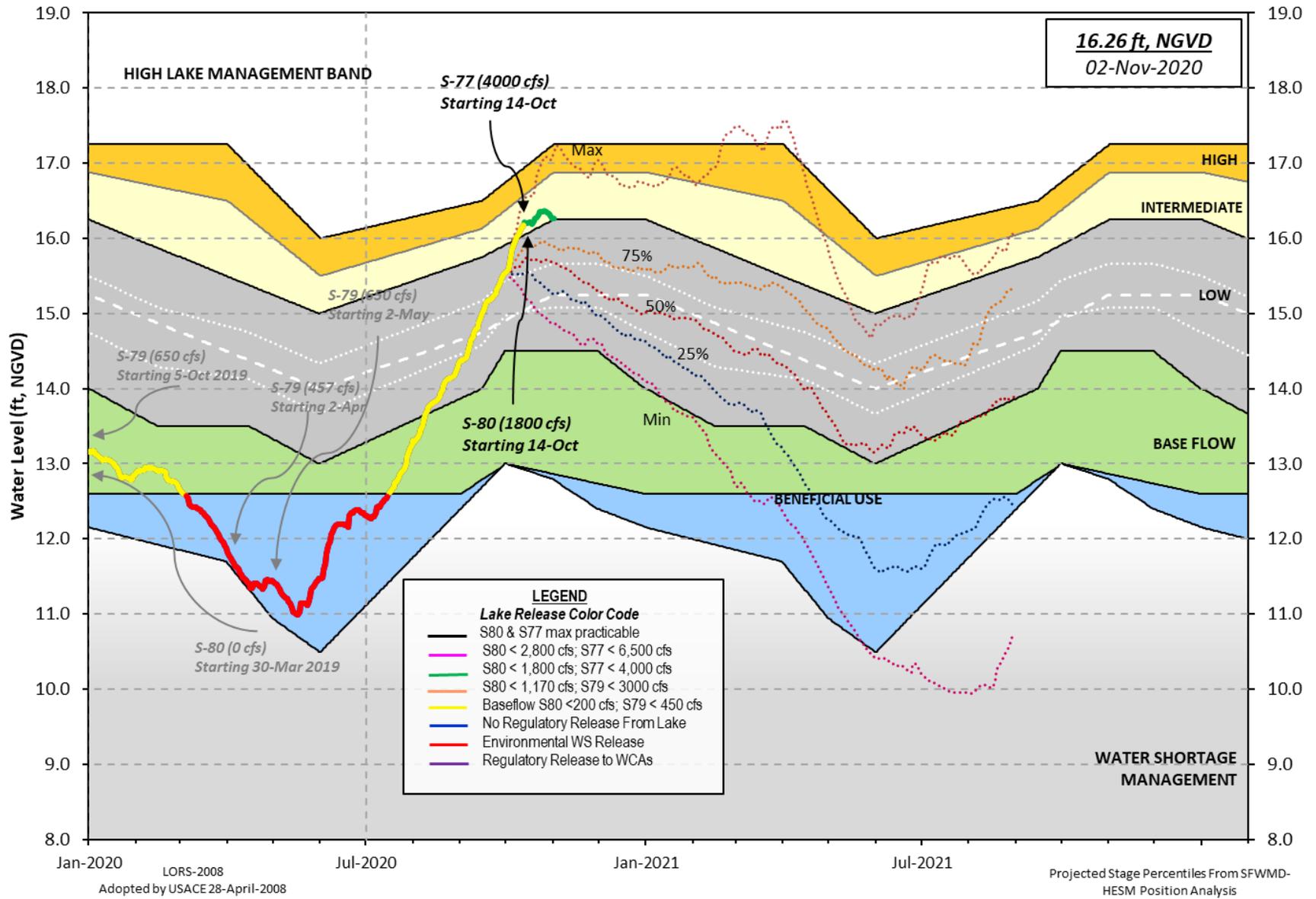


Figure 3. Recent Lake Okeechobee stage and releases, with projected stages based on a dynamic position analysis.

SFWMD PROVISIONAL RAINDAR 7-DAY BASIN RAINFALL ESTIMATES

FROM: 0500 EST, 10/27/2020 THROUGH: 0500 EST, 11/03/2020

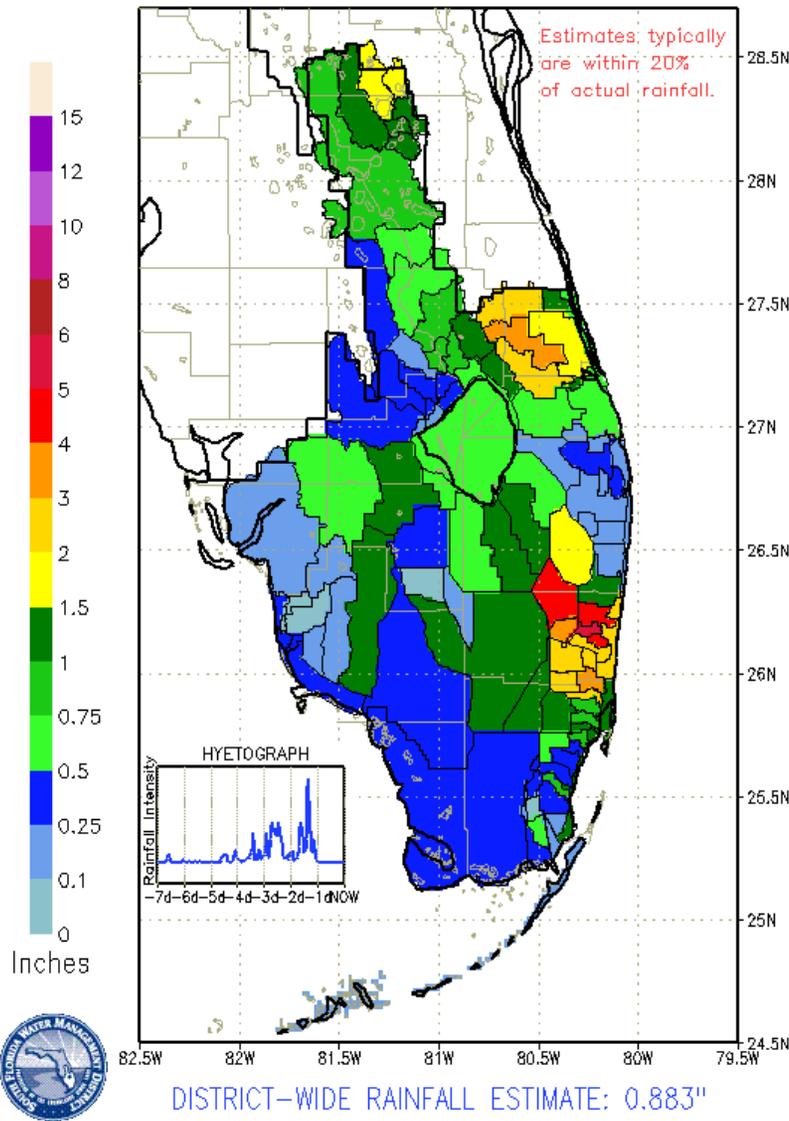


Figure 4. 7-Day rainfall estimates by RAINDAR.

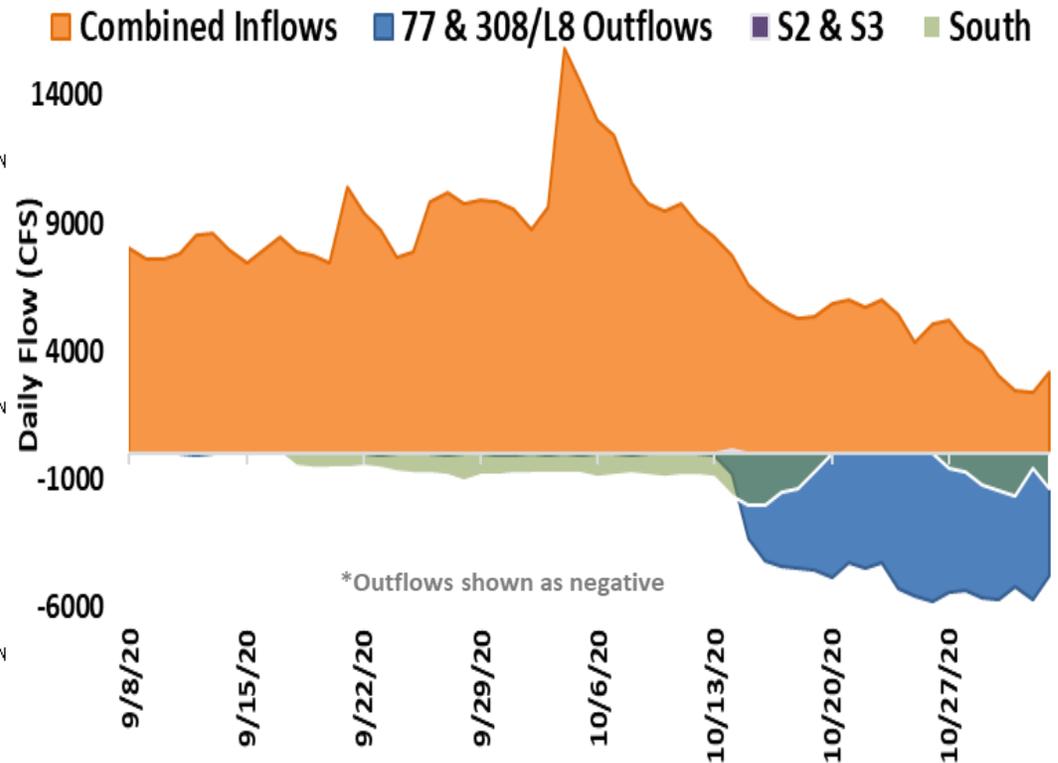


Figure 5. Major inflows (orange) and outflows (blue) of Lake Okeechobee, including the S-350 structures designated as South (green). The L-8 Canal flows through Culvert 10A are included as outflows when positive, and as inflows when backflowing into the Lake. All inflows and outflows are shown as positive 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 21-22, 2020

Station	CHL <sub>a</sub> (ug/L)	TOXIN (ug/L)	TAXA
FEBIN	P	BDL	NS
FEBOUT	P	BDL	NS
KISSR0.0	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
<b>PALMOUT1</b>	P	<b>10.0</b>	<i>Microcys</i>
<b>PALMOUT2</b>	P	<b>13.0</b>	<i>Microcys</i>
<b>PALMOUT3</b>	P	<b>13.0</b>	<i>Microcys</i>
POLESOUT	P	BDL	<i>Microcys</i>
POLESOUT1	P	<b>0.6</b>	<i>Microcys</i>
POLESOUT2	P	BDL	<i>Microcys</i>
<b>POLESOUT3</b>	P	<b>5.0</b>	<i>Microcys</i>
EASTSHORE	P	BDL	mixed
NES135	P	BDL	mixed
NES191	P	BDL	mixed

Station	CHL <sub>a</sub> (ug/L)	TOXIN (ug/L)	TAXA
L001	P	BDL	mixed
L004	P	BDL	mixed
<b>L006</b>	P	<b>16.0</b>	<i>Microcys</i>
L007	P	<b>1.0</b>	<i>Microcys</i>
<b>L008</b>	P	<b>2.3</b>	<i>Microcys</i>
<b>LZ30</b>	P	<b>8.1</b>	<i>Microcys</i>
<b>LZ40</b>	P	<b>0.3</b>	<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* (Chl<sub>a</sub>) 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*

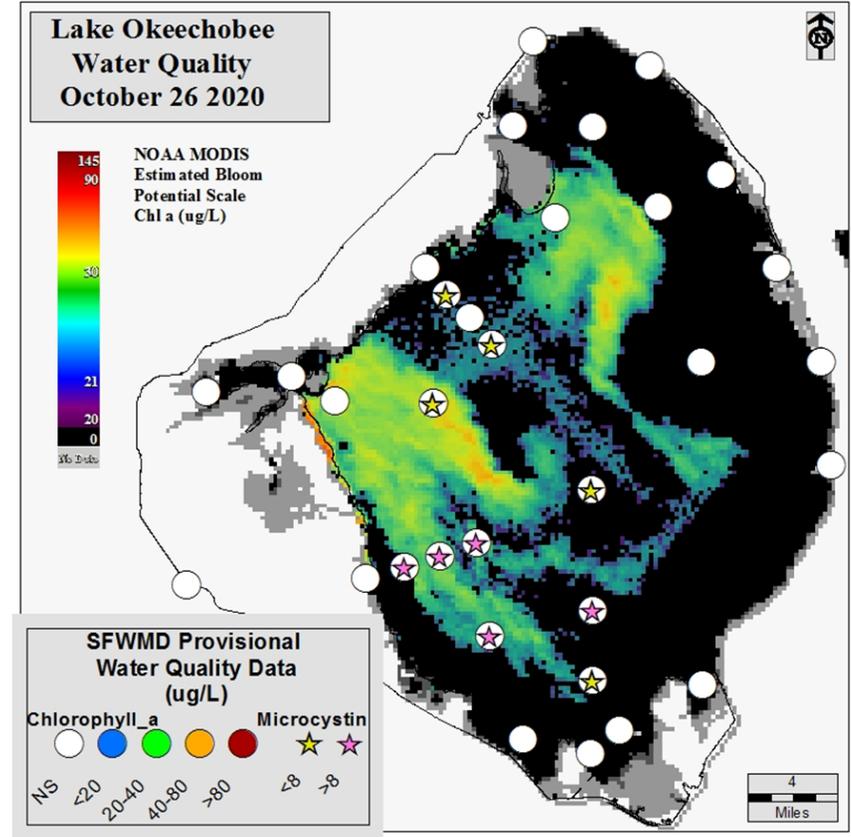
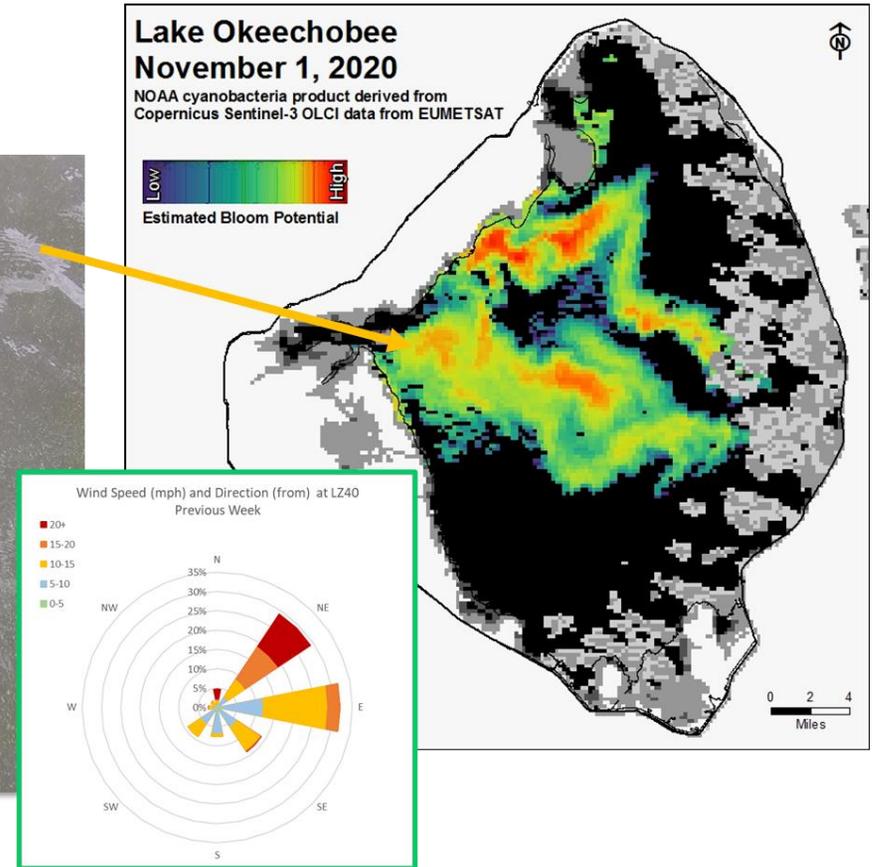
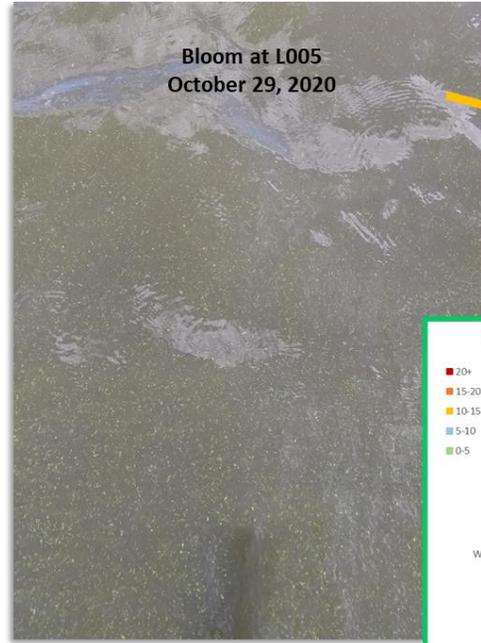
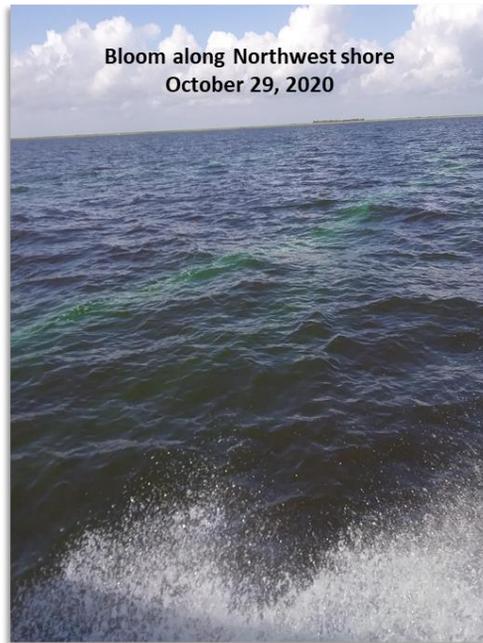


Figure 6. Provisional results from the expanded monitoring sampling trips on October 21 - 22, 2020.

# Algal Bloom on Lake Okeechobee on October 29, 2020



**Figure 7.** Algal bloom on Lake Okeechobee on October 29, 2020 and cyanobacteria bloom potential image on November 1, 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 3,475 cfs (Figures 1 and 2) and last month inflow averaged more than 3,390 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	885
S-80	1745
S-308	1357
S-49 on C-24	429
S-97 on C-23	416
Gordy Rd. structure on Ten Mile Creek	Not reporting

Over the past week, surface salinity in the estuary decreased in the North Fork and at the US1 Bridge but increased at the downstream A1A bridge (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)	<b>0.3</b> (0.9)	<b>0.3</b> (1.1)	NA <sup>1</sup>
US1 Bridge	<b>1.1</b> (1.4)	<b>2.1</b> (1.6)	10.0-26.0
A1A Bridge	<b>8.0</b> (6.7)	<b>17.8</b> (16.1)	NA <sup>1</sup>

<sup>1</sup>Envelope not applicable

### Caloosahatchee Estuary:

Last week total inflow to the Caloosahatchee Estuary averaged approximately 6,389 cfs (Figures 5 and 6) and last month inflow averaged about 5,947 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	4,041
S-78	4,458
S-79	5,893
Tidal Basin Inflow	496

Over the past week in the estuary, salinity remained the same to Ft. Myers Yacht Basin 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)	<b>0.2</b> (0.2)	<b>0.2</b> (0.2)	NA <sup>1</sup>
Val I75	<b>0.2</b> (0.2)	<b>0.2</b> (0.2)	0.0-5.0 <sup>2</sup>
Ft. Myers Yacht Basin	<b>0.2</b> (0.2)	<b>0.2</b> (0.2)	NA
Cape Coral	<b>1.1</b> (2.2)	<b>1.5</b> (5.2)	10.0-30.0
Shell Point	<b>13.8</b> (16.8)	<b>16.9</b> (21.2)	10.0-30.0
Sanibel	<b>25.8</b> (27.9)	<b>28.2</b> (28.8)	10.0-30.0

<sup>1</sup>Envelope not applicable and <sup>2</sup>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 270 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

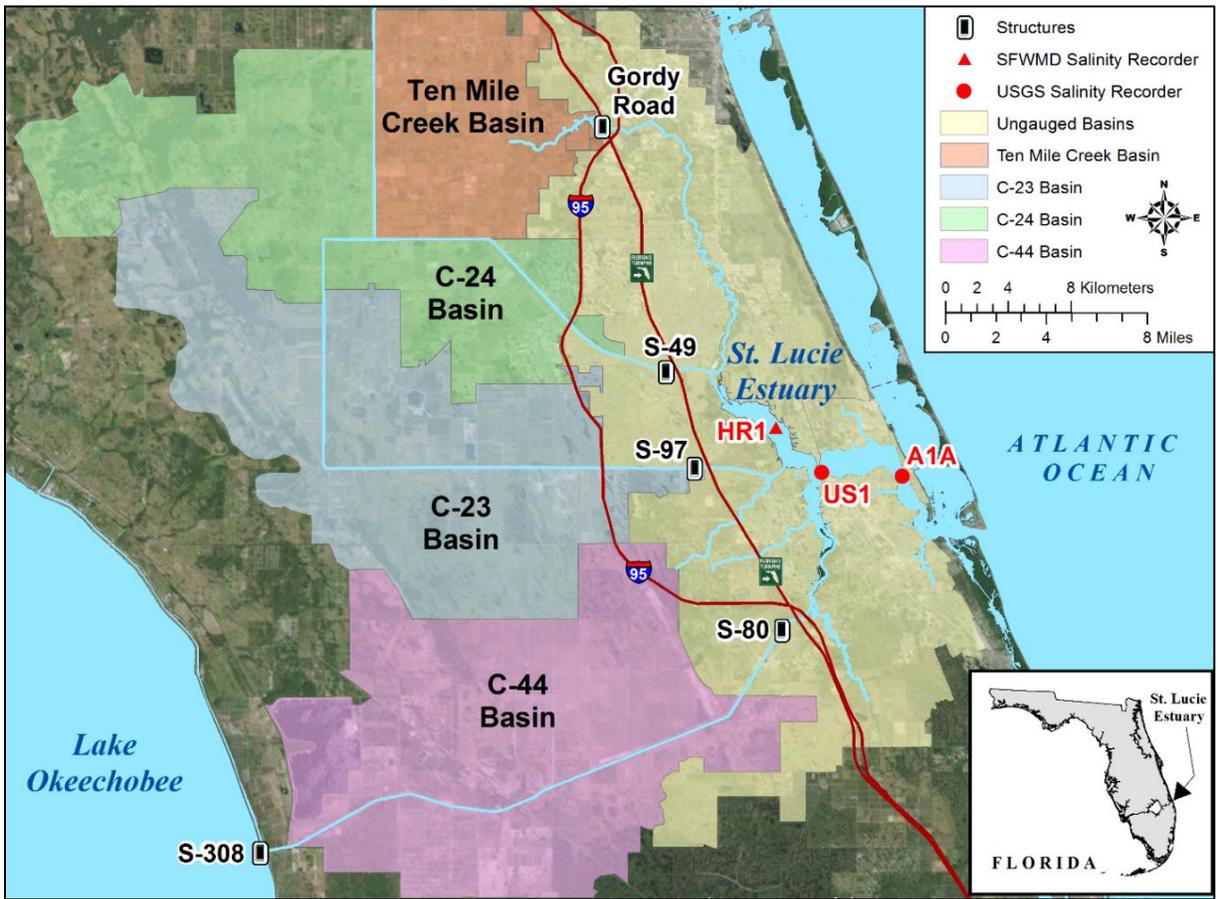
Scenario	Q79 (cfs)	TB runoff (cfs)	Daily salinity	30 day Mean
A	0	270	0.3	0.3
B	300	270	0.3	0.3
C	450	270	0.3	0.3
D	650	270	0.3	0.3
E	800	270	0.3	0.3

### Red tide

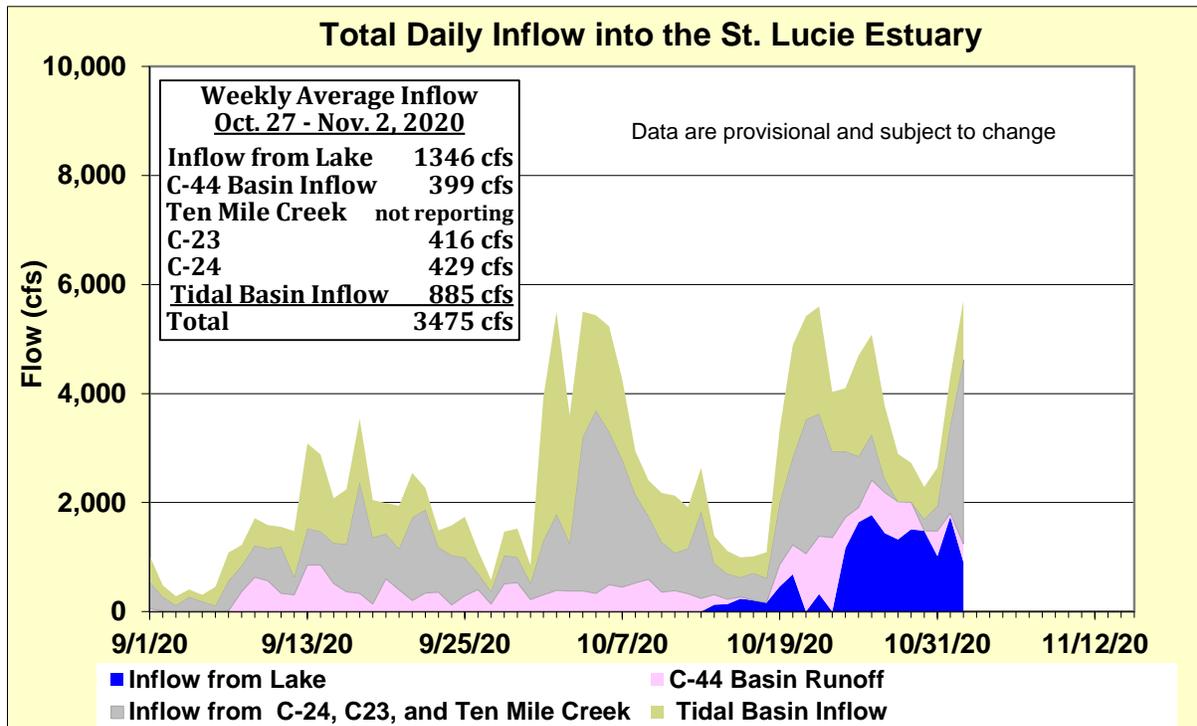
The Florida Fish and Wildlife Research Institute reported on October 30, 2020, that *Karenia brevis*, the Florida red tide dinoflagellate, was observed in background concentrations in one sample collected from Lee County and was not observed in samples collected from Palm Beach County (no samples were analyzed this week from 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.

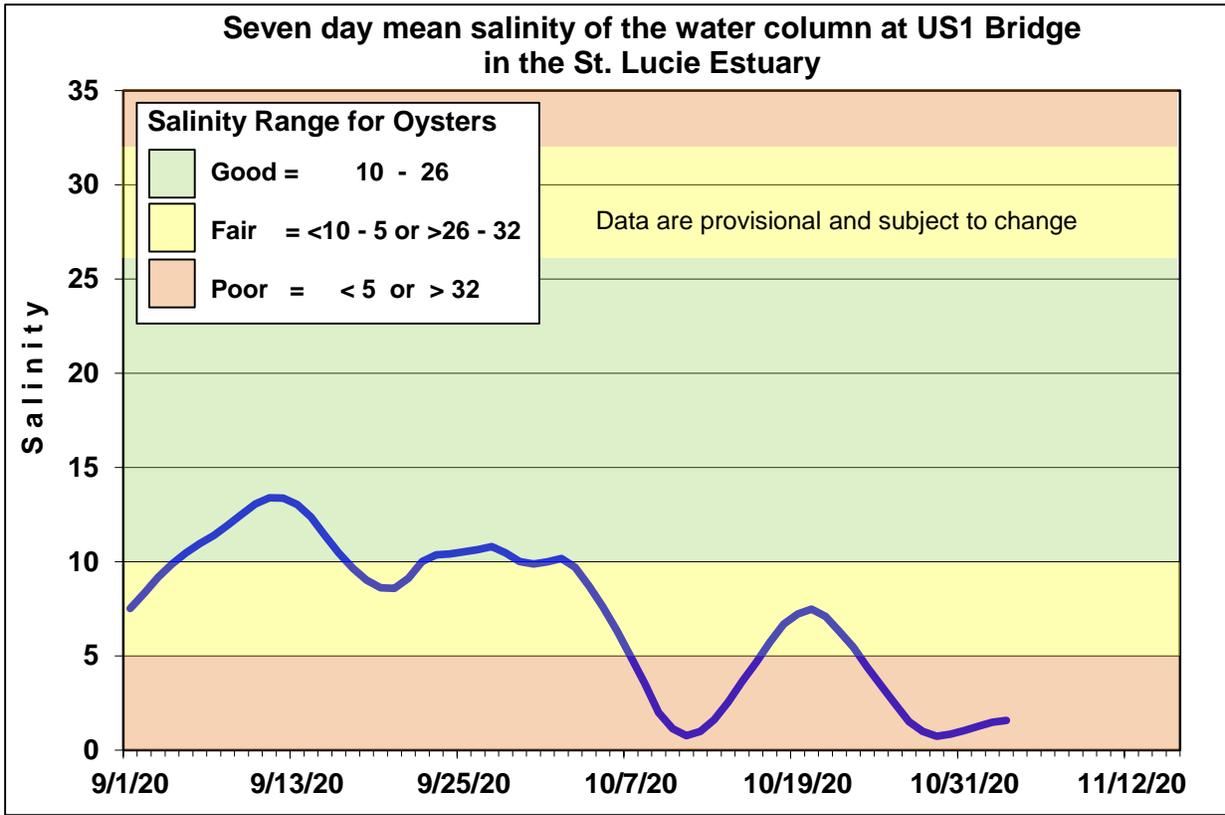


Figure 3. Seven-day mean salinity of the water column at the US1 Bridge.

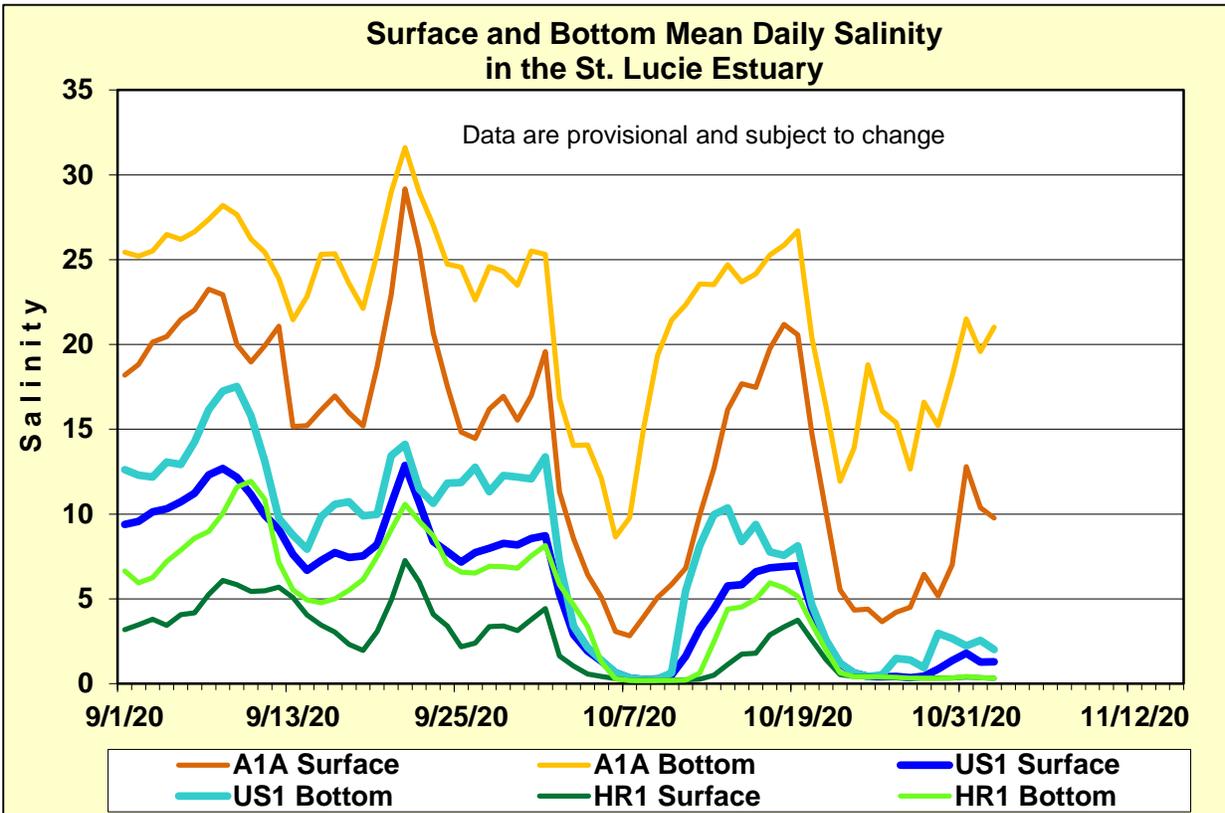


Figure 4. Daily mean salinity at the A1A, US1, and HR1 stations.

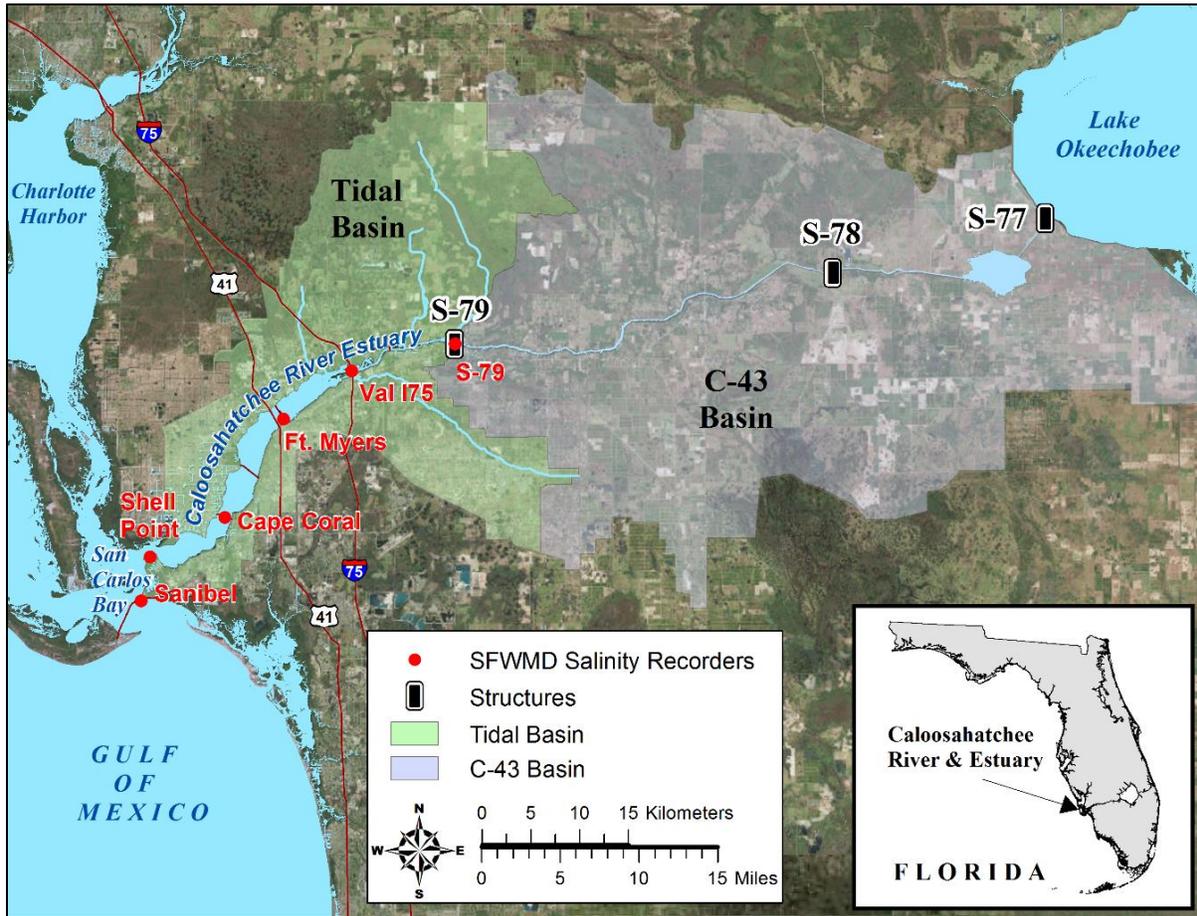


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

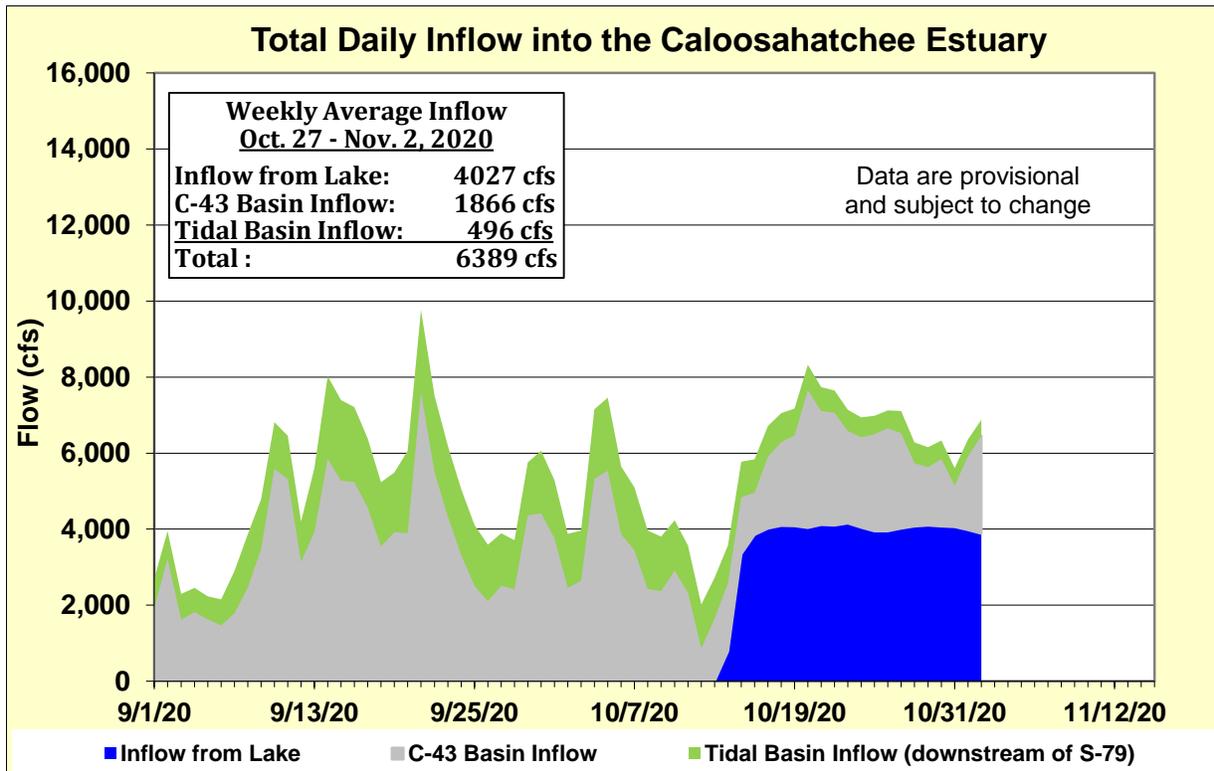


Figure 6. Total daily inflows from Lake Okeechobee, runoff from the C-43 basin

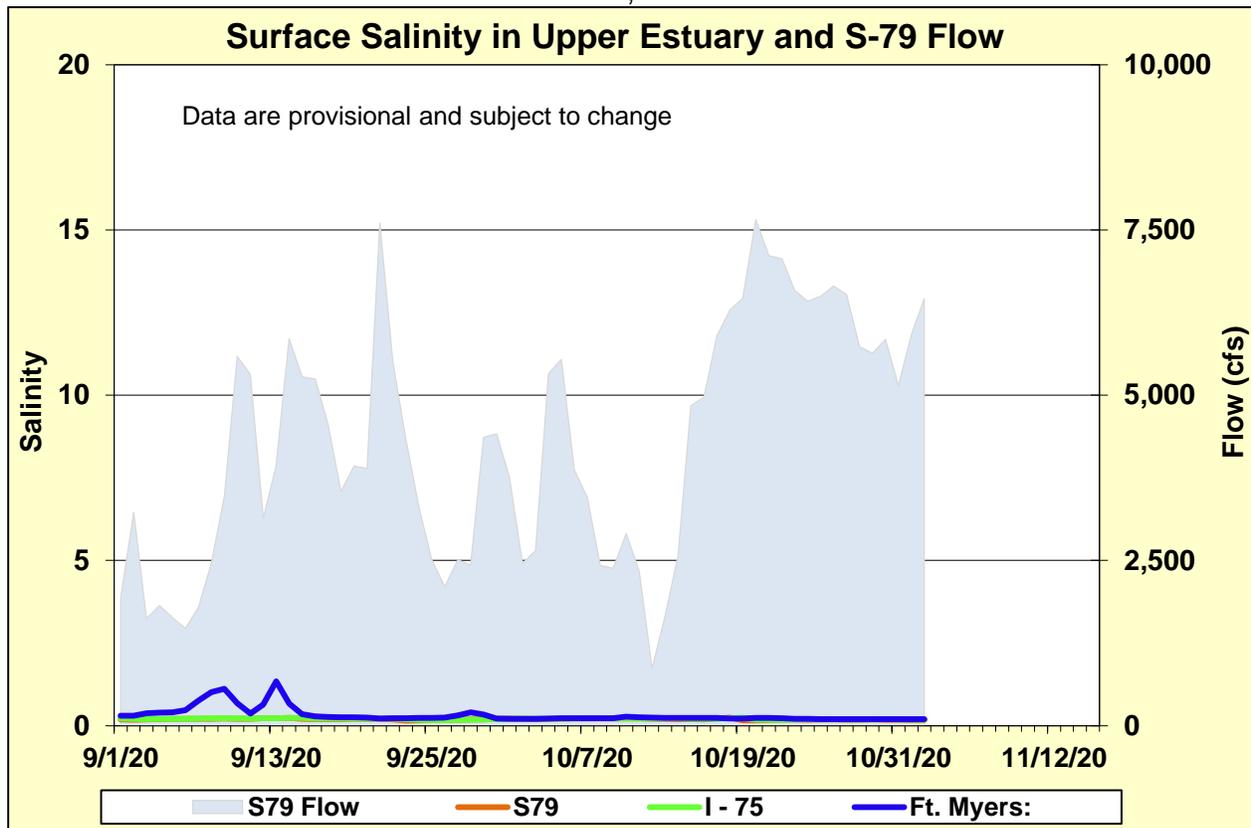


Figure 7. Daily mean flows at S-79 and salinity at upper estuary monitoring stations.

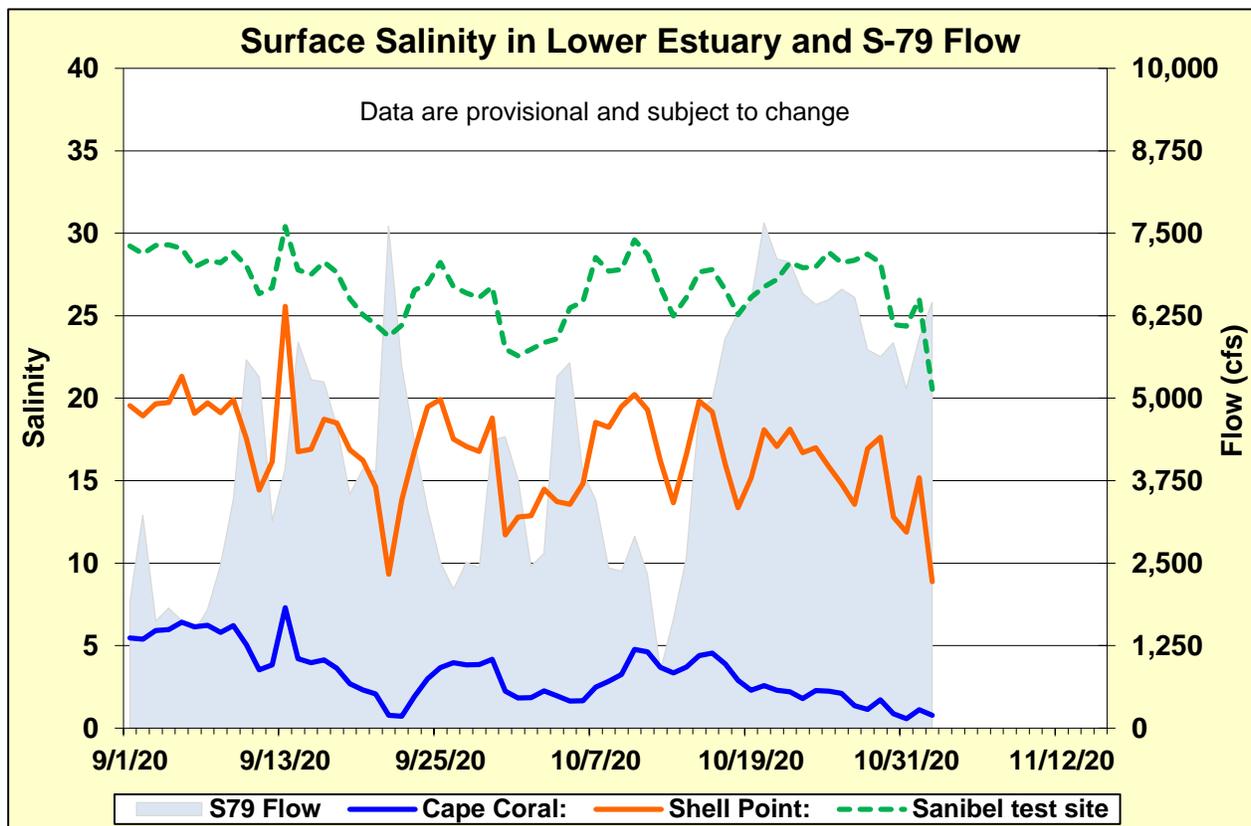
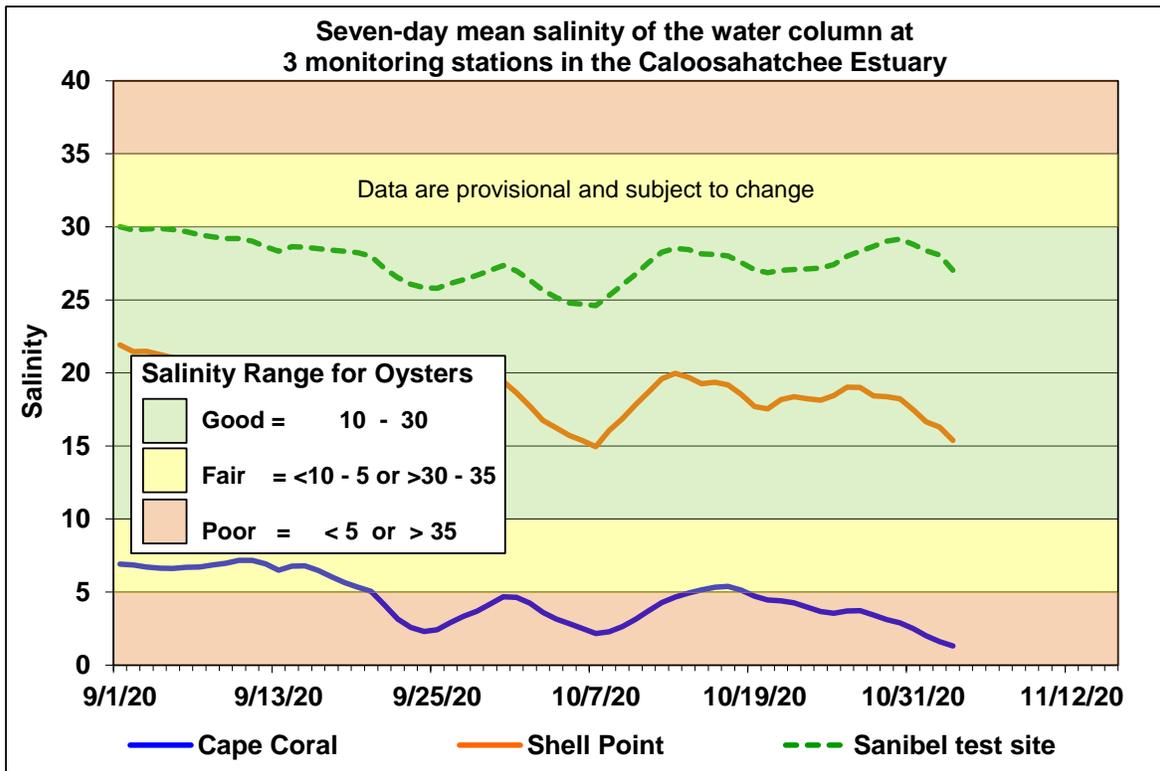
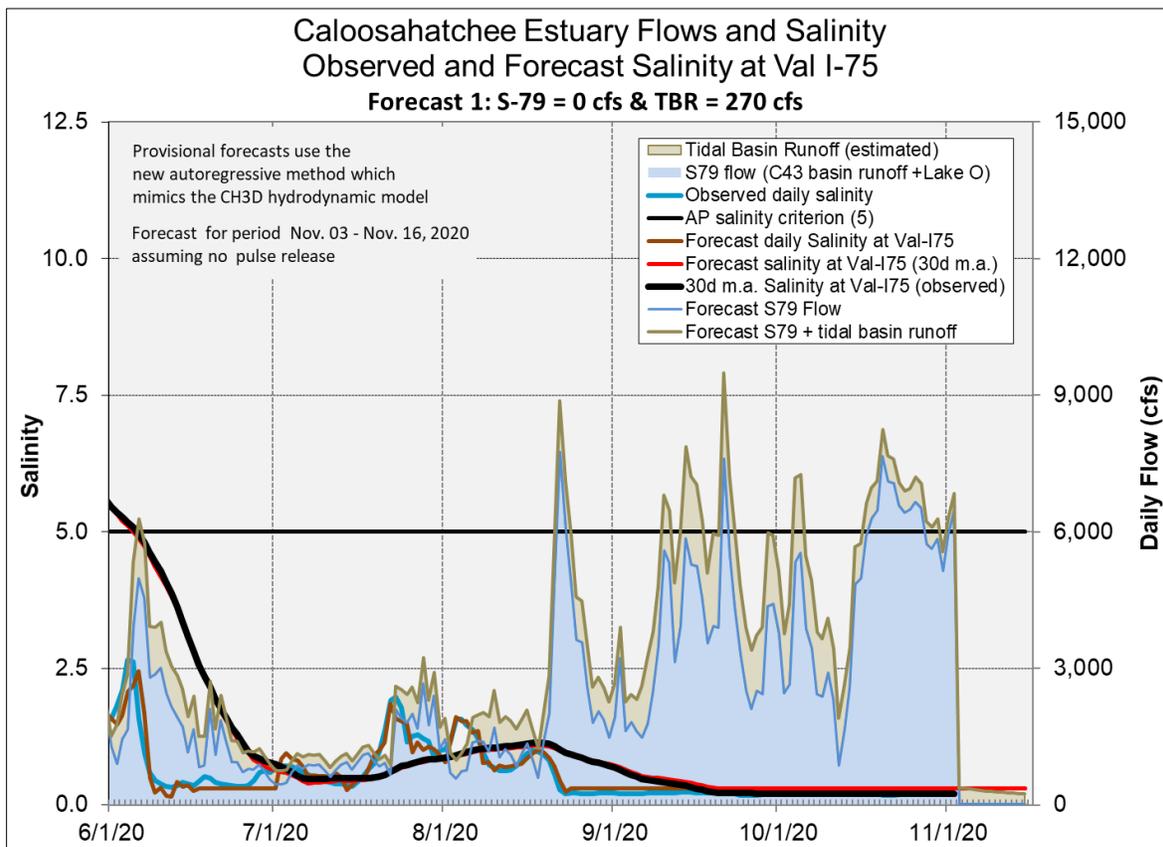


Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.



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

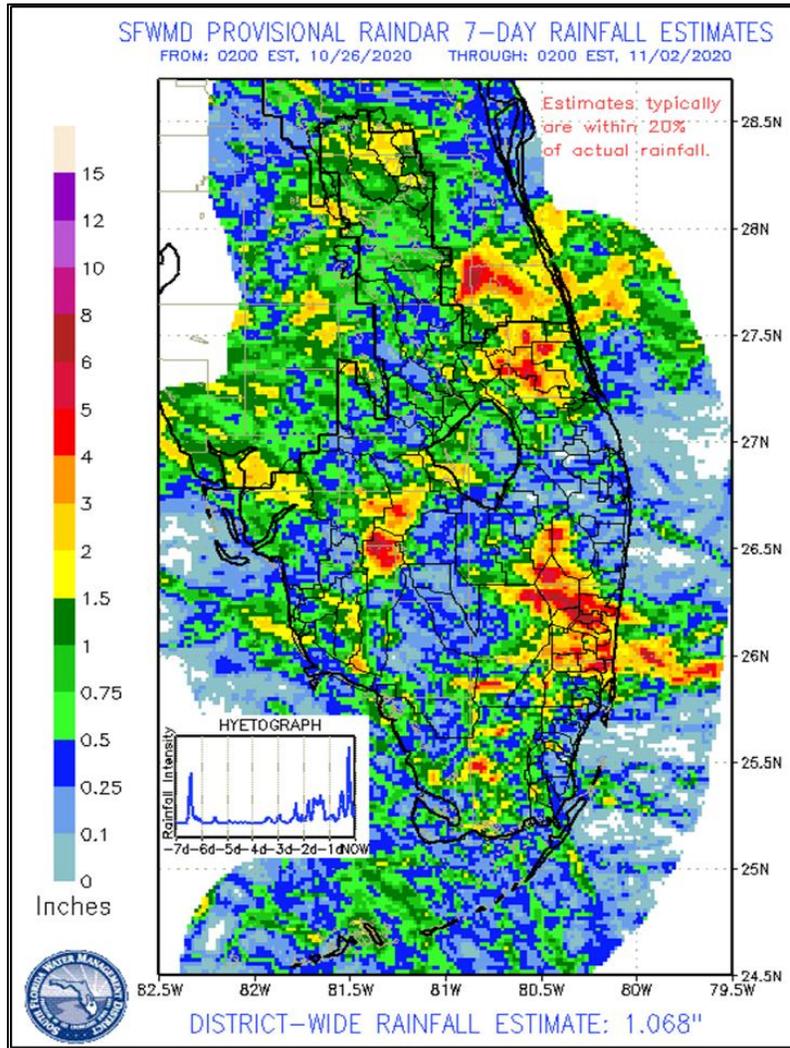


**Figure 10.** Forecasted Val I-75 surface salinity assuming no pulse release at S-79.

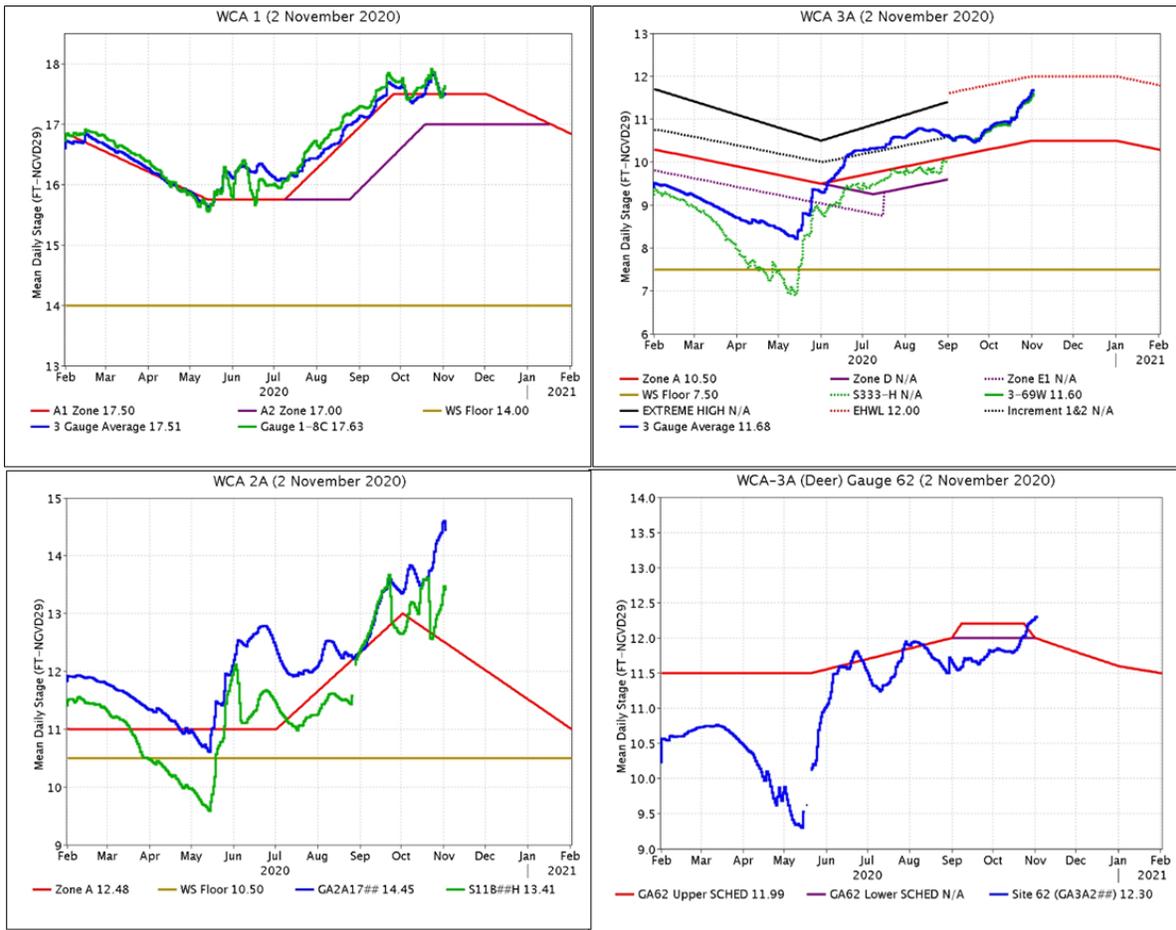
## **EVERGLADES**

Above average rainfall fell across the Everglades last week, but more variable compared to the week prior, and highest in WCA-2A and B. At the gauges monitored for this report, stages increased 0.06 feet on average, with both WCA-1 and ENP experiencing a drop. Evaporation was 0.83 inches last week, and the TTFF continues to call for maximum releases from WCA-3A.

<b>Everglades Region</b>	<b>Rainfall (Inches)</b>	<b>Stage Change (feet)</b>
WCA-1	1.79	-0.28
WCA-2A	4.21	+0.35
WCA-2B	3.80	+0.24
WCA-3A	1.13	+0.24
WCA-3B	1.35	+0.01
ENP	0.87	-0.14



Regulation Schedules: WCA-1: Stage at the 1-8C Gauge descended quickly to regulation line last week now trending slightly upwards, currently 0.13 feet above the stable Zone A1 regulation line. WCA-2A: Stage at Gauge 2-17 continued to climb quickly away from the regulation line last week then trended downward late in the week and is now 1.97 feet above the falling schedule. WCA-3A: The Three Gauge Average stages continued to trend up and away from the stable Zone A regulation line last week, currently 1.18 feet above. WCA-3A: Stage at gauge 62 (Northwest corner) again rose steadily last week and is currently 0.31 feet above the falling Upper Schedule.

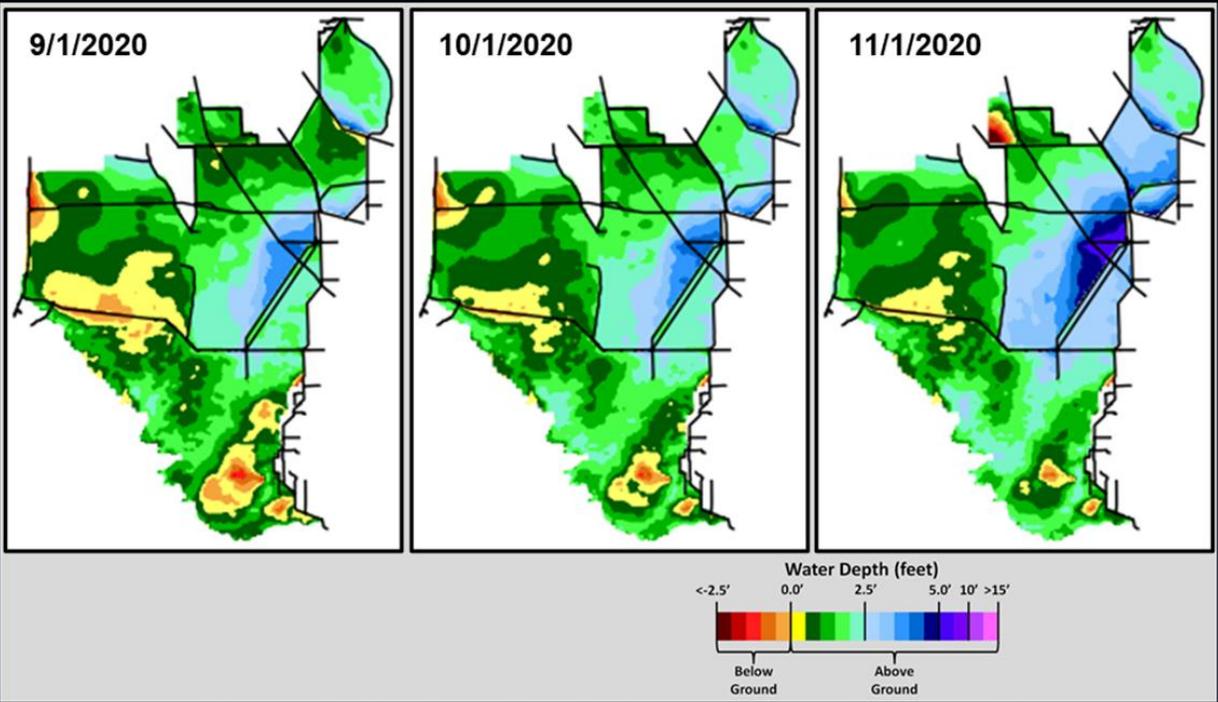


Water Depths: The WDAT tool for spatial interpolation of depth monthly snapshots over the last two months indicate current depths in excess of 5.0 feet in WCA-3A South around the upper reaches of the L-67 canal. Ponding depths (>2.5 feet) are found across all of WCA-2A, with the south even deeper. Hydrologic connectivity is well established within the major sloughs in ENP and the depths have increased west of the L-28S levee. Comparing WDAT water levels from present, over the last month depth changes are significantly greater across most of the system; in excess of 1.0 feet in eastern WCA-3A and southern WCA-2A. Looking back one year the depth difference patterns are similar, but more significant. Conditions are deeper across the entire system, more than 2.0 deeper downstream of the S-11s and south to the upper reaches of the L-67 canal. WCA-2A is up to 2.0 feet deeper.

\*\* sensor recalibration in Rotenberger is causing erroneous output.



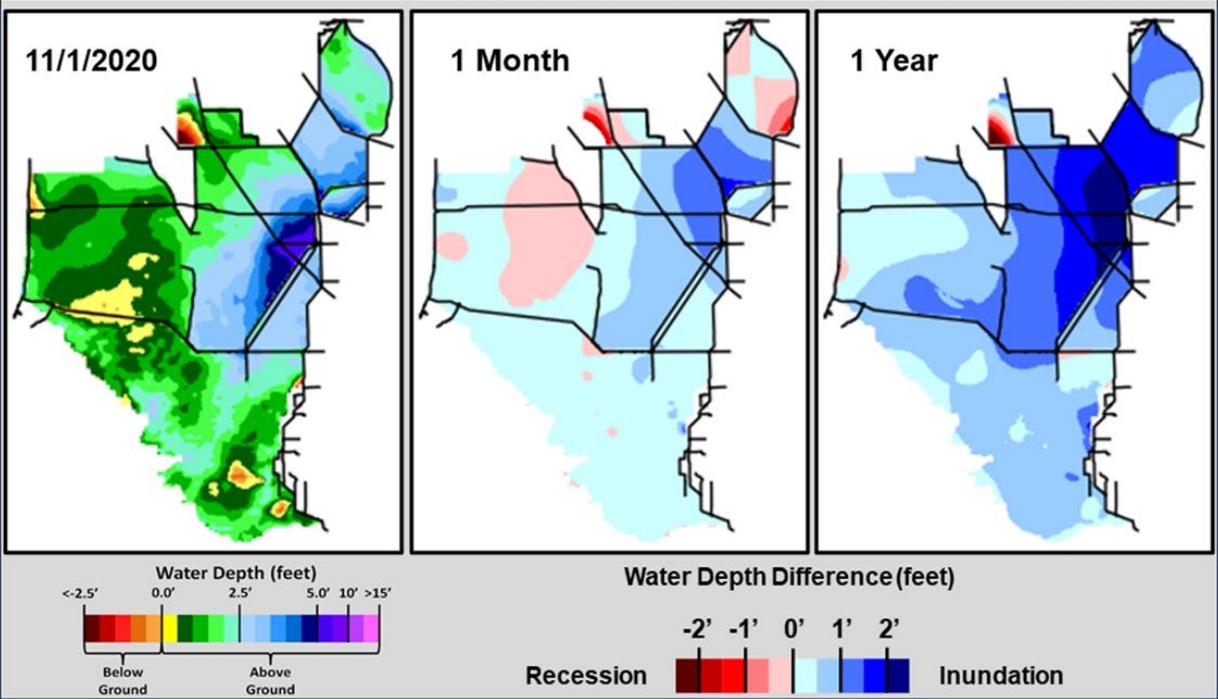
### SFWDAT Water Depth Monthly Snapshots



South Florida Water Depth Assessment Tool (SFWDAT)



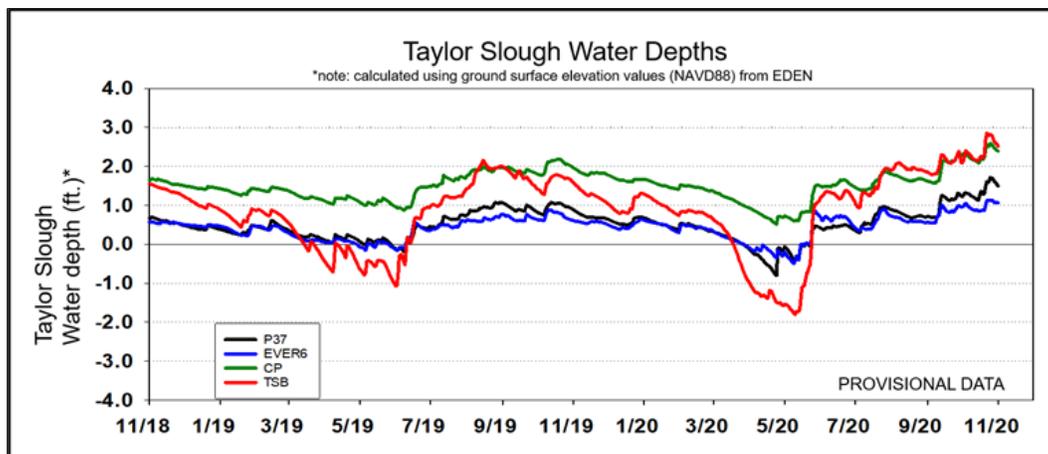
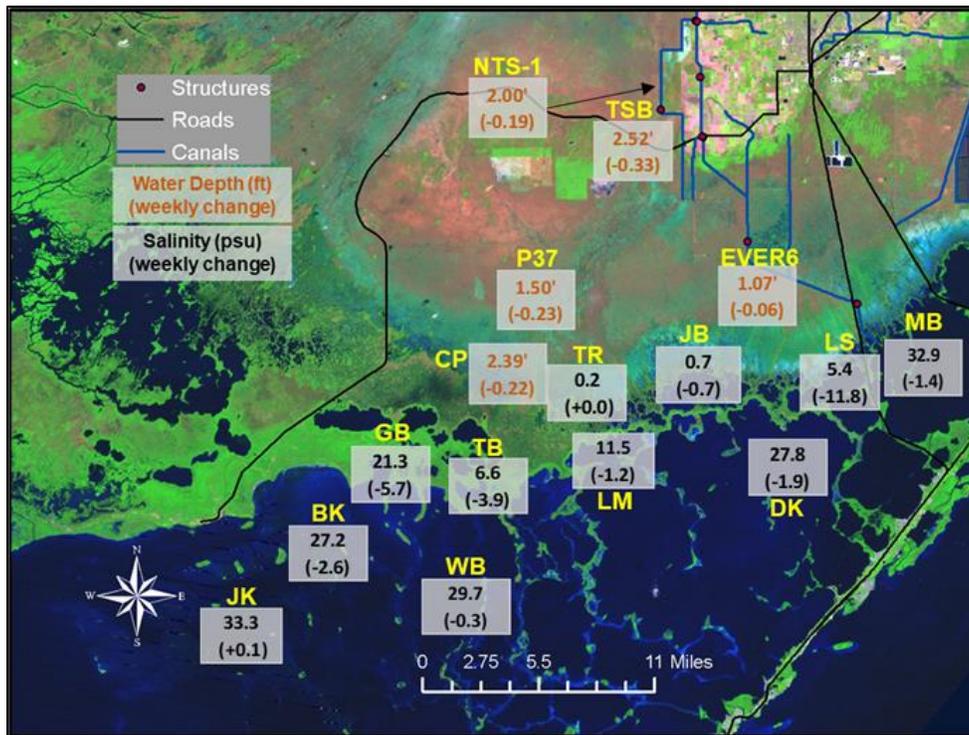
### SFWDAT Everglades Difference Maps (Present - Past)

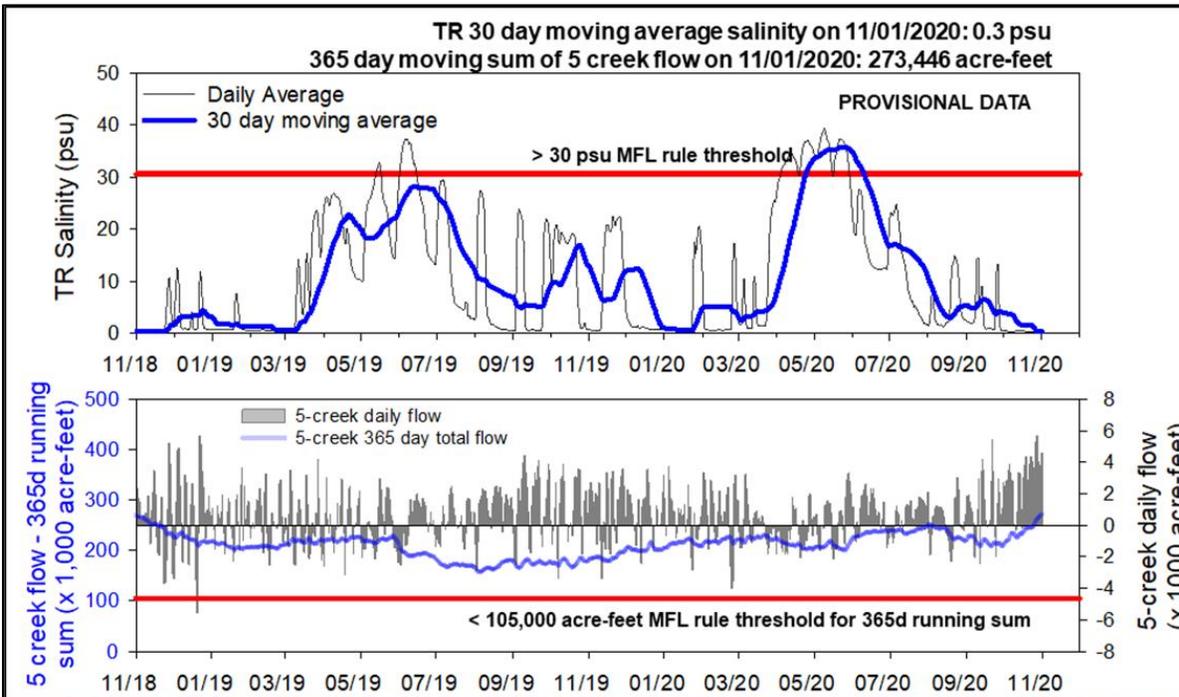
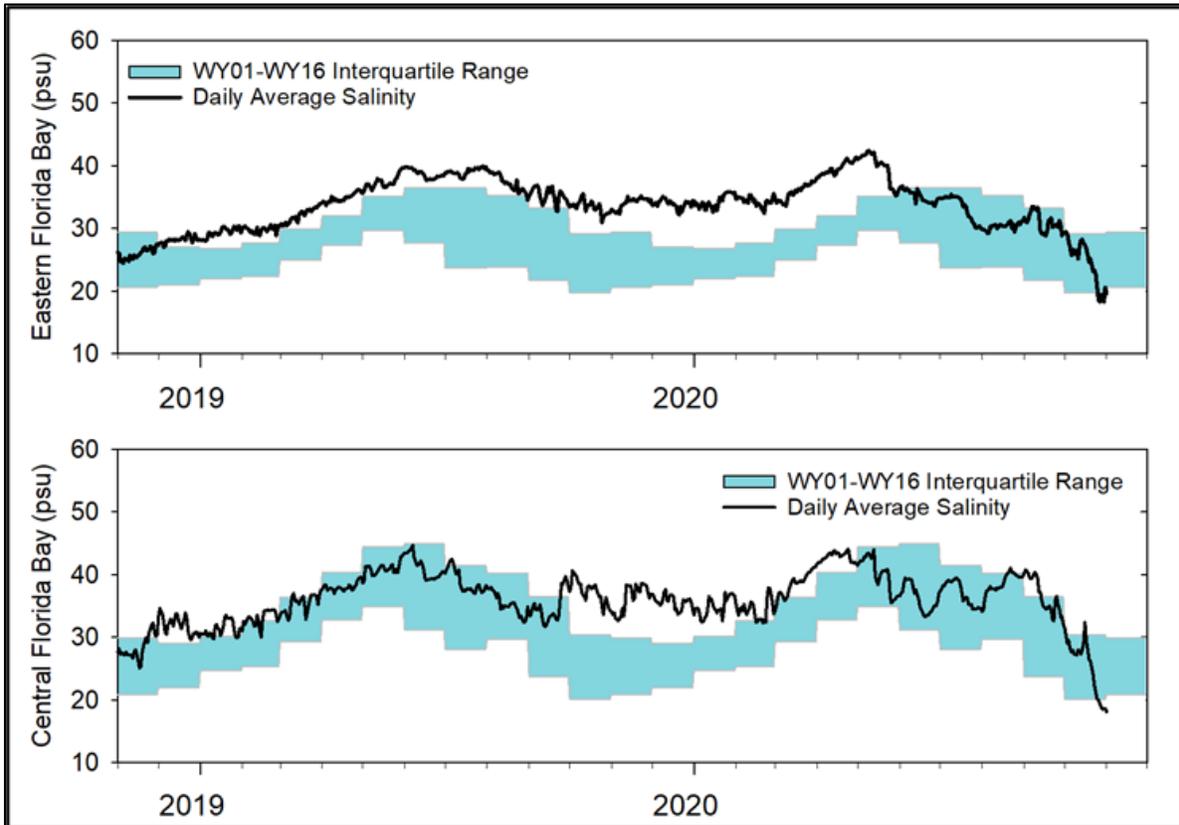


South Florida Water Depth Assessment Tool (SFWDAT)

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 68% or 251 of the tree islands are currently inundated, up from 63% the week prior. Initial islands were inundated beginning 5/24/20; longest duration of continuous inundation is 152 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 (remains 15% of islands).

Taylor Slough Water Levels: An average of 0.62 inches of rain fell over Taylor Slough and Florida Bay this past week, and stages decreased 0.21 feet on average with every station used for this report showing a weekly decrease. The largest individual station changed in the past week (-0.33 feet) was in northern Taylor Slough (TSB). Taylor Slough is 10 inches higher than the historical average for this time of year.





Florida Bay Salinities: Salinities in Florida Bay averaged a 3 psu decrease over the week with individual stations decreasing up to 11.8 psu. Average salinity in Florida Bay is now 5 psu below the historical average. The average salinity in both the east and the central regions is within the lowest quartile of the historical distribution this week. This is good positioning to start the dry season.

Florida Bay MFL: The salinity at the TR station in the mangrove zone (tracked for the Florida Bay MFL) has remained near fresh for more than 30 days now so the 30-day moving average decreased 1.1 psu over the last week to end at 0.3 psu. Weekly flow from the 5 creeks identified by yellow stars on the map totaled about +30,000 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 273,446 acre-feet this week which is 25,000 acre-feet increase from last week. That is higher than the historical median (249,091 acre-feet) and is a value not seen in the last 2 years. 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. October's peak stages in northern WCA-3A suggest success for next season's wading bird nesting at the Alley north colony by providing adequate surface water that can protect it from terrestrial predators during the nesting season. In order to optimize foraging conditions for wading birds, a recession would ideally begin by mid-November. The conservation of water within this area has ecological benefit for peat soil conservation. 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 were to 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.

**SFWM Everglades Ecological Recommendations, November 3rd, 2020 (red is new)**

Area	Weekly change	Recommendation	Reasons
WCA-1	Stage decreased by 0.28'	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.
WCA-2A	Stage increased by 0.35'	Moderating the recession rate to maintain marsh stage parallel and above the falling regulation schedule.	Protect upstream/downstream habitat and wildlife.
WCA-2B	Stage increased by 0.24'	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.
WCA-3A NE	Stage increased by 0.45'	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.
WCA-3A NW	Stage increased by 0.17'	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 0.19'	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. Tree island ecology is diminished by flooding
Southern WCA-3A S	Stage increased by 0.15'		
WCA-3B	Stage increased by 0.01'	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.
ENP-SRS	Stage decreased by 0.14'	Make discharges to the Park according to COP protocol	Protect upstream/downstream habitat and wildlife.
Taylor Slough	Stage changes ranged from -0.06' to -0.33'	Move water southward as possible	When available, provide freshwater buffer for downstream conditions.
FB- Salinity	Salinity changes ranged -11.8 to +0.1 psu	Move water southward as possible	When available, provide freshwater to maintain low salinity buffer and promote water movement.