

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:** December 2, 2020

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

### **Summary**

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

A notably low atmospheric moisture and strongly stable atmosphere behind a very cool and dry air mass spreading across Florida means no rainfall will occur through Wednesday area wide. Temperatures are expected to gradually moderate by Thursday and Friday. Some moisture returns once the low-level winds veer easterly off of the Atlantic waters. A complex forecast scenario is emerging late this week, involving a pair of jet stream impulses moving out of the central Plains/Midwest and the southwestern United States. What ultimately occurs – a combined, stronger system or a relatively weaker and more progressive feature -- is critically important to the rainfall forecast for Friday and Saturday. A stronger, slower-moving system would produce a potentially significant rainfall across the District late Friday through Saturday afternoon while a weaker, fast-moving disturbance would produce considerably less and possibly little to no rainfall. The Friday and Saturday QPFs have been adjusted toward little significant rainfall in agreement with a trend in much of the guidance to favor a weaker and faster system. The large difference in model solutions makes the late-week rainfall forecast challenging and of lower-than-average confidence. Regardless of the exact outcome, a cold front will push through the District sometime during the day on Saturday, ahead of which there could be at least some shower activity. A frontal passage is likely by late-day Saturday, followed by what should be another cooler and markedly drier air mass that will likely result in no rainfall Sunday and Monday area wide.

#### **Kissimmee**

Tuesday morning stages were 58.1 feet NGVD (0.1 feet above schedule) in East Lake Toho, 55.0 feet NGVD (at schedule) in Lake Toho, and 52.9 feet NGVD (0.4 feet above schedule) in lakes Kissimmee-Cypress-Hatchineha; headwater stages were 46.4 feet NGVD at S-65A and 27.1 feet NGVD at S-65D. Tuesday morning discharges were 930 cfs at S-65, 1,130 cfs at S-65A, 1,500 cfs at S-65D and 1,580 cfs at S-65E. Dissolved oxygen concentration in the Kissimmee River averaged 5.3 mg/L for the week through Sunday. Kissimmee River mean floodplain depth on Sunday was 0.89 feet. Today's recommendation is to maintain at least minimum flow of 300 cfs +/- 50 cfs at S-65A.

#### **Lake Okeechobee**

Lake Okeechobee stage was 16.12 feet NGVD on December 1, 2020, 0.12 feet lower than the previous week and 0.14 feet lower than a month ago. The Lake is currently in the Low sub-band. Stage has been above or near the top of the ecological envelope since August 1, 2020 and is currently 0.62 feet above. Recent chlorophyll a and toxin results suggest little to no bloom activity on the Lake and satellite imagery suggests cyanobacterial bloom potential is low.

## **Estuaries**

Total inflow to the St. Lucie Estuary averaged more than 2,467 cfs with approximately 1,615 cfs coming from Lake Okeechobee. The seven-day average salinities increased 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 5,661 cfs over the past week with approximately 3,606 cfs coming from the Lake. Seven-day average salinities remained almost fresh (0.3 to 0.4) at the three most upstream sites (S-79, Val I75 and Ft. Myers Yacht Basin) and increased slightly 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 Low Sub-Band of 2008 LORS. Tributary hydrological conditions are normal. The LORS2008 Release Guidance suggests up to 450 cfs release at S-79 to the Caloosahatchee Estuary and up to 200 cfs release at S-80 to the St. Lucie Estuary.

## **Stormwater Treatment Areas**

Over the past week, no Lake Okeechobee water was delivered to the FEBs/STAs. The total amount of Lake releases sent to the FEBs/STAs in WY2021 (since May 1, 2020) is approximately 95,000 ac-feet. The total amount of inflows to the STAs in WY2021 is approximately 1,432,000 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, and STA-2 Flow-way 2 is offline for construction activities. Operational restrictions are in place in STA-1W Western, Eastern, and Northern Flow-ways due to discharge canal plug construction 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.

## **Everglades**

WCA-1 is at schedule and WCA-2A and 3A are well above schedule. At the gauges monitored for this report WCA-1 is around 0.6 feet, central WCA-2A is 1.3 foot, WCA-3A North is 2.0 feet and WCA-3A South around 1.8 feet above the mean stage at those locations for this time of year. Tens of thousands of Ibis were observed foraging in Big Cypress last week, thousands of Ibis in the marl prairie region and thousands of mixed species wading birds foraging along the coastal margins. In Florida Bay and Taylor Slough, rainfall and stages continued to decrease. Levels in the northern slough are still similar to post-Irma conditions. Salinities increased slightly on average across Florida Bay, but remain below average. Salinity at the TR station in the mangrove zone to the east remained near fresh as discharge rates from the creeks remain high and consistently positive.

## Supporting Information

### KESSIMMEE BASIN Rainfall

The Upper Kissimmee Basin received 0.01 inches of rainfall in the past week and the Lower Basin received 0.05 inches (SFWMD Daily Rainfall Report 11/29/2020).

### 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: 12/1/2020

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)						
							11/29/20	11/22/20	11/15/20	11/8/20	11/1/20	10/25/20	10/18/20
Lakes Hart and Mary Jane	S-62	118	LKMJ	61.0	R	61.0	0.0	0.1	0.1	-0.1	0.0	0.0	0.1
Lakes Myrtle, Preston, and Joel	S-57	35	S-57	62.0	R	62.0	0.0	0.1	0.0	-0.1	0.0	0.0	0.2
Alligator Chain	S-60	28	ALLI	64.1	R	64.0	0.1	0.1	0.1	-0.1	-0.3	-0.1	-0.1
Lake Gentry	S-63	56	LKGT	61.6	R	61.5	0.1	0.1	0.0	0.0	-0.1	-0.1	0.0
East Lake Toho	S-59	173	TOHOE	58.0	R	58.0	0.0	0.0	0.1	0.0	-0.1	0.0	-0.2
Lake Toho	S-61	432	TOHOW, S-61	55.0	R	55.0	0.0	0.0	0.0	-0.1	-0.2	-0.1	-0.1
Lakes Kissimmee, Cypress, and Hatchineha	S-65	842	KUB011, LKIS5B	52.8	R	52.5	0.3	0.4	0.4	0.0	-0.1	0.1	0.2

<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. **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: 12/1/2020**

Metric	Location	1-Day Average	Average for the Preceeding 7-Days <sup>1</sup>								
		11/29/2020	11/29/20	11/22/20	11/15/20	11/8/20	11/1/20	10/25/20	10/18/20	10/11/20	10/4/20
Discharge (cfs)	S-65	921	842	784	385	187	209	180	678	1,265	1,725
Discharge (cfs)	S-65A <sup>2</sup>	1,125	1,108	1,095	724	361	330	346	861	1,916	2,248
Discharge (cfs)	S-65D <sup>2</sup>	1,492	1,541	1,685	1,590	797	1,122	1,714	3,267	4,848	4,715
Headwater Stage (feet NGVD)	S-65D <sup>2</sup>	26.87	26.99	26.98	27.03	26.94	27.35	27.62	27.66	27.68	27.75
Discharge (cfs)	S-65E <sup>2</sup>	1,505	1,657	1,835	1,904	895	1,283	1,935	3,501	5,287	5,081
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	5.3	5.3	4.7	5.2	5.6	3.8	3.0	1.5	1.2	1.2
Mean depth (feet) <sup>4</sup>	Phase I floodplain	0.89	0.93	0.94	0.75	0.52	0.93	0.94	0.75	0.52	1.43

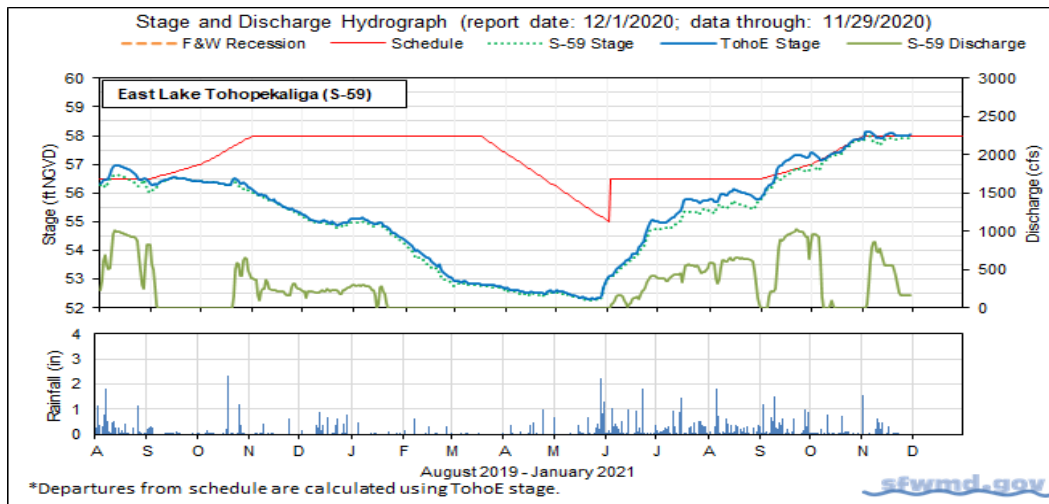
<sup>1</sup>Seven-day average of weighted daily means through Sunday midnight.

<sup>2</sup>S-65A discharge combines S-65A with auxillary 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.

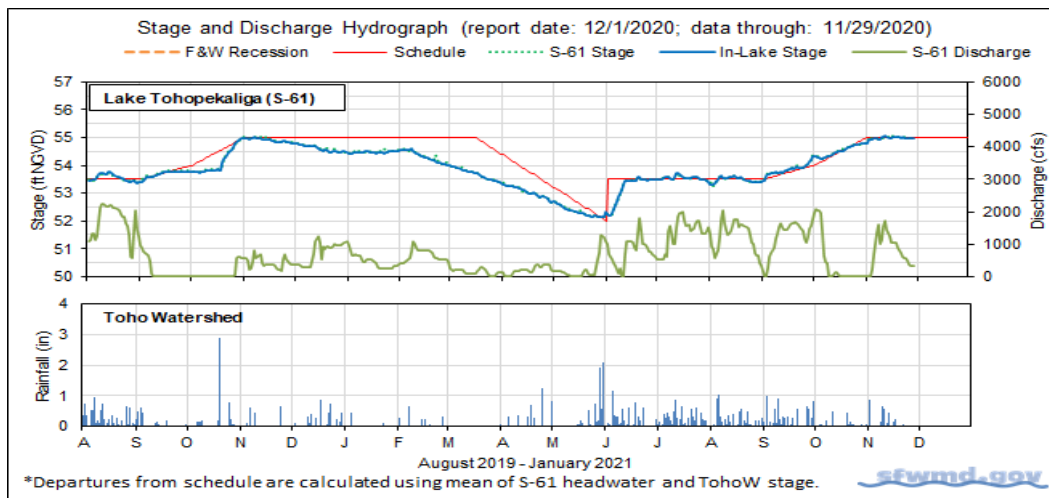
<sup>3</sup>DO is the average for sondes at KRBN, PC62, PC33, PD62R, and PD42R.

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

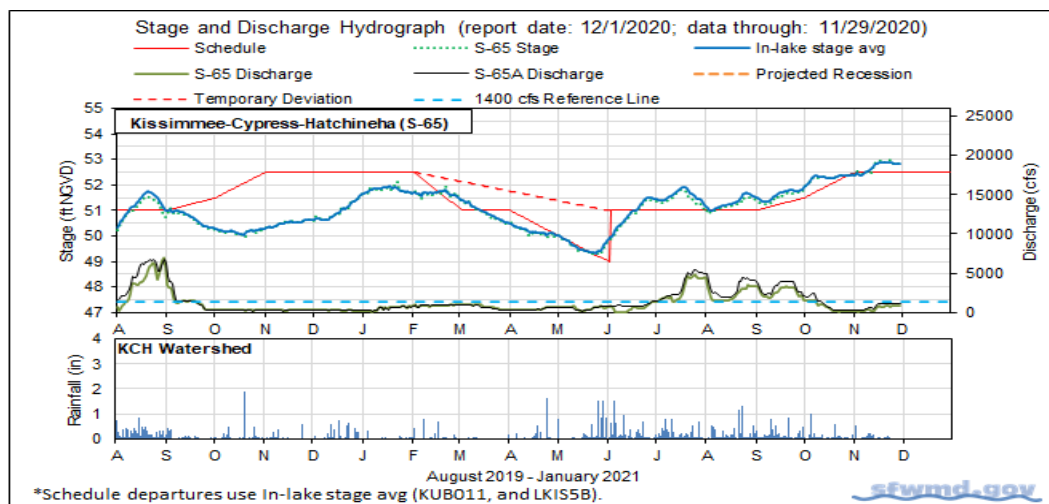
DATA ARE PROVISIONAL; N/A indicates that data were not available.



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

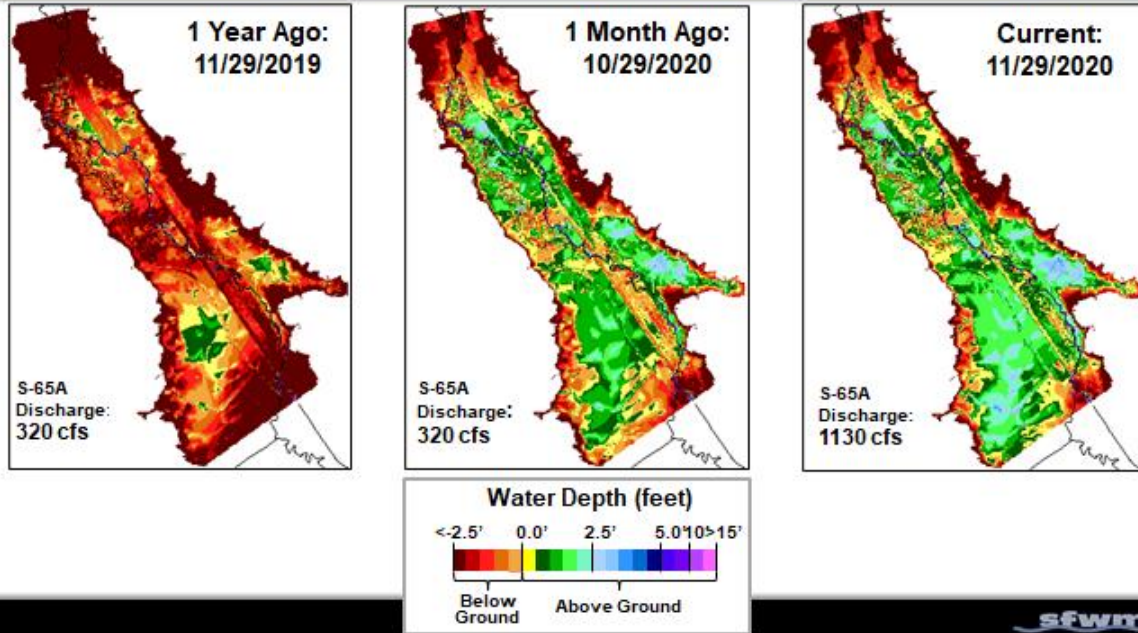


**Figure 2.** Lake Toho regulation schedule, stage, discharge and rainfall.

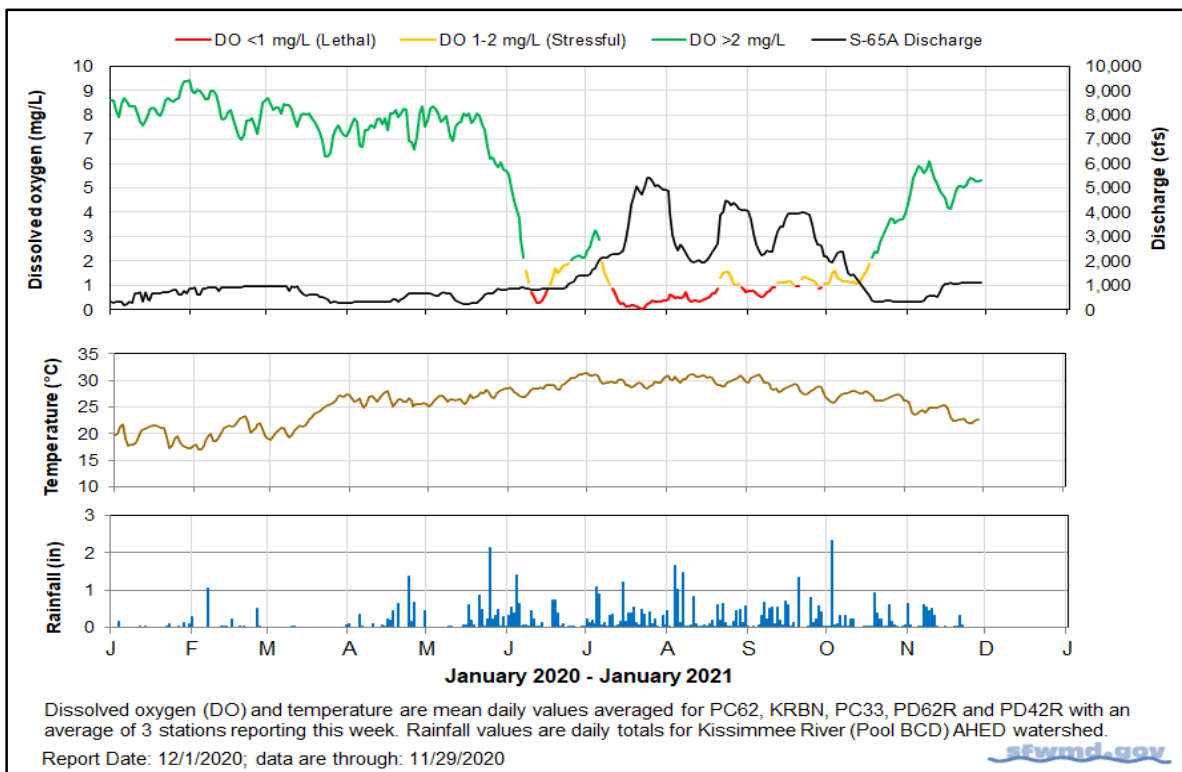


**Figure 3.** Lakes Kissimmee, Cypress and Hatchineha regulation schedule, stage, discharge and rainfall.

# Kissimmee River Phase I Restoration Area Water Depth Maps

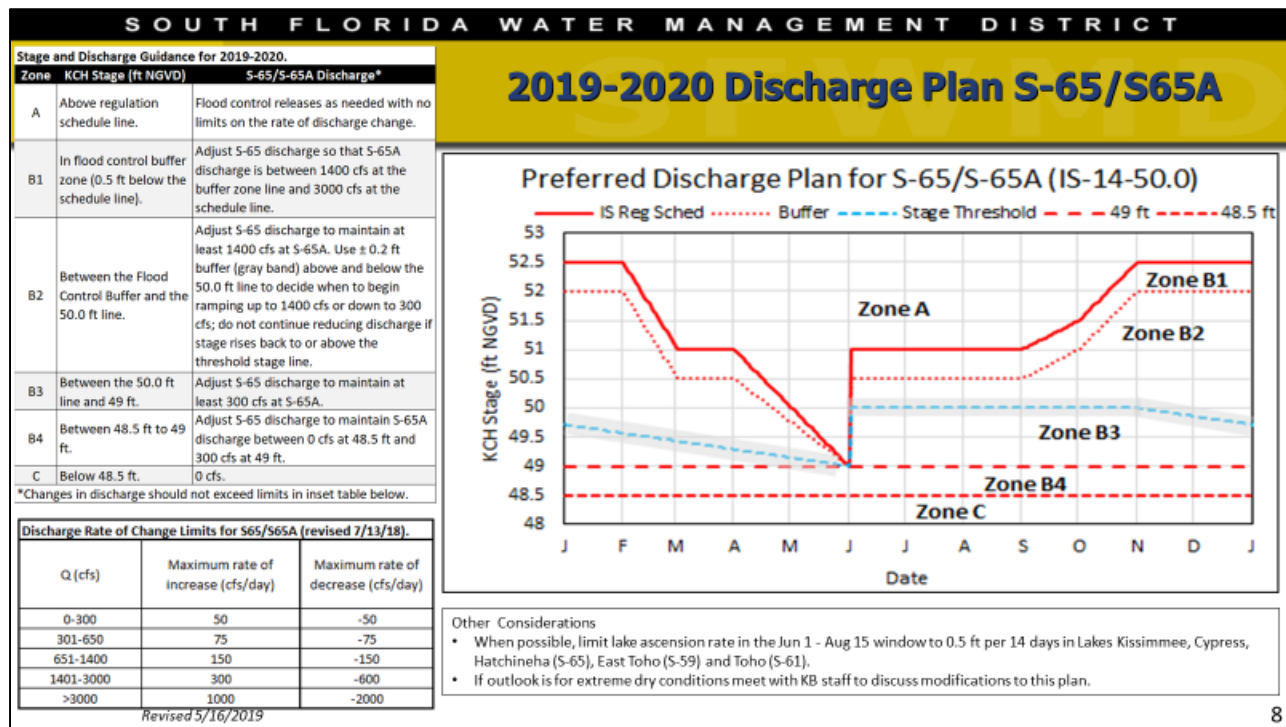


**Figure 4.** Phase I area floodplain water depths (from left to right) one year ago, one month ago and current. Color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to January 16, 2012.

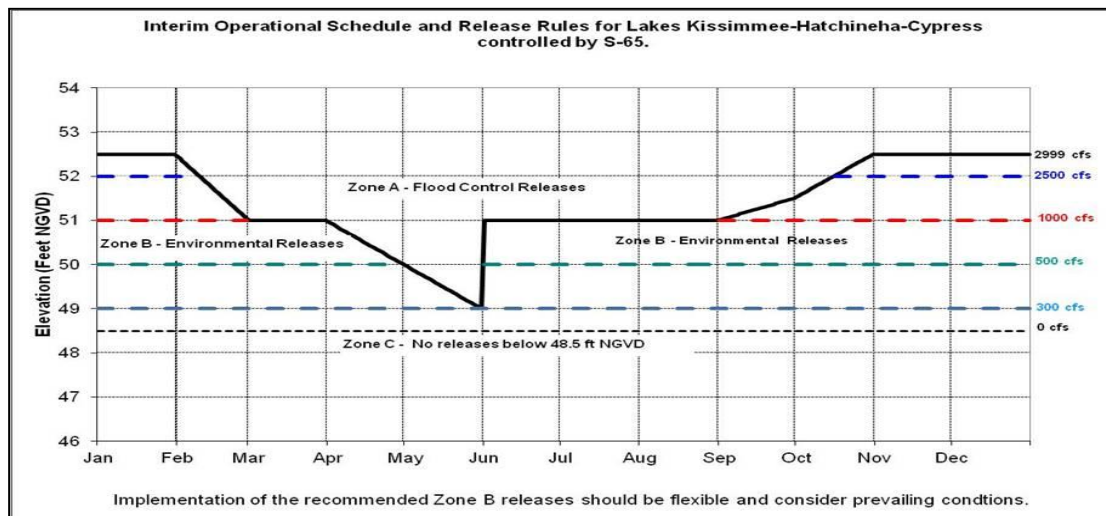


**Figure 5.** Restored Kissimmee river channel mean daily dissolved oxygen concentration (mg/L), S-65A discharge (cfs), temperature (°C) and rainfall (inches)





**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 16.12 feet NGVD, 0.14 feet lower than a month ago, and 3.02 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 0.62 feet above. Lake stage moved from the Beneficial Use sub-band in mid-July to the Intermediate sub-band in early October; a rise of over 3.5 feet in under three months (**Figure 3**). Lake stage reached a low of 10.99 feet on May 17 and a high of 16.45 feet on November 12 (post Tropical Storm Eta), a difference of 5.5 feet. Lake stage has declined since mid-November and is currently in the Low sub-band. According to RAINДАР, approximately 0.2 inches of rain fell directly on the Lake last week. Most of the watershed received less than 0.5 inches of rain except for the Lower Kissimmee Basin which received up to 1.0 inches (**Figure 4**).

Average daily inflows (excluding rainfall) were lower than the previous week, going from 3,567 cubic feet per second (cfs) to 3,009 cfs. Outflows (excluding evapotranspiration) decreased from 5,849 cfs to 5,615 cfs. Over half of the inflows came from the Kissimmee River (S-65E & S-65EX1), while most of the outflows were released west through S-77 (C-43/Caloosahatchee Canal) and east through S-308 (C-44/St Lucie Canal). Average inflows and outflows through water control structures surrounding the Lake for the previous two weeks (cfs) are shown in Table 1. The resultant Lake elevation change (ft) due to each structure's flow for the past week is also shown in Table 1. **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 is now on the non-bloom season schedule (November – April), occurring once monthly at approximately 30 stations for chlorophyll *a* and toxin analyses and at 8 stations for taxonomic identification. The November sampling occurred on the 17th and 18th but 13 chlorophyll *a* results are still pending (**Figure 6**). Of the seventeen sites completed, all had chlorophyll *a* levels below the bloom threshold of 40 µg/L, the highest value being 35.9 µg/L. All toxin samples have been completed and only three sites had toxin levels above detection but still well below the EPA recreational waters recommendation of 8 µg/L.

The most recent satellite image (November 29, 2020) from the NOAA cyanobacteria monitoring product derived from EUMETSAT's Sentinel 3 OLCI sensor data showed bloom potential continued to remain low on the Lake (**Figure 7**).

## **Water Management Summary**

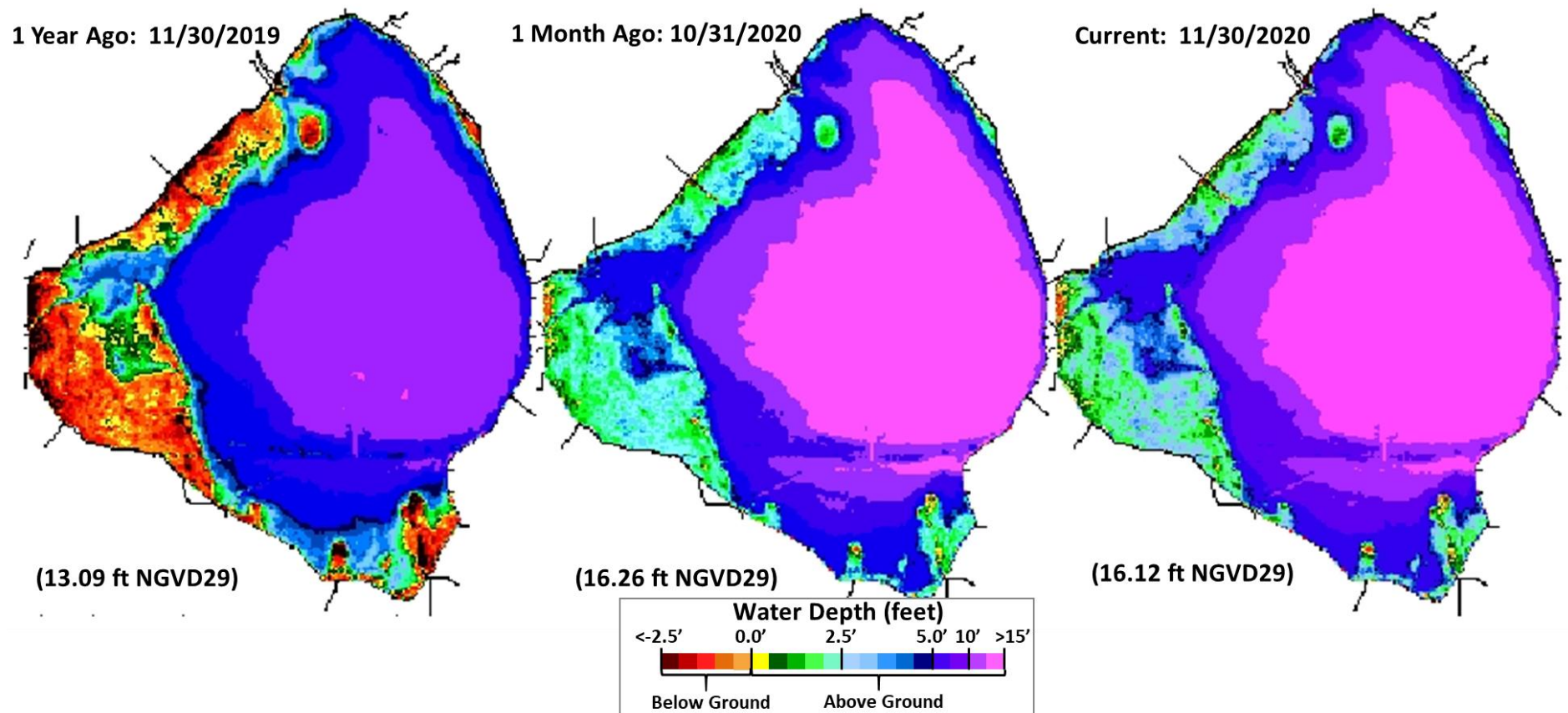
Lake Okeechobee stage was 16.12 feet NGVD on December 1, 2020, 0.12 feet lower than the previous week and 0.14 feet lower than the previous month. The Lake is currently in the Low sub-band. Stage has been above or near the top of the envelope since August 1, 2020 and is currently 0.62 feet above. Recent chlorophyll *a* and toxin results suggest little to no bloom activity on the Lake and satellite imagery suggests cyanobacterial bloom potential is low.

**Table 1.** Average daily inflows and outflows for the most recent two weeks and 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	1821	1615	0.6
S-71 & S-72	366	241	0.1
S-84 & S-84X	491	553	0.2
Fisheating Creek	332	260	0.1
S-154	99	56	0.0
S-191	150	58	0.0
S-133 P	86	66	0.0
S-127 P	40	23	0.0
S-129 P	26	12	0.0
S-131 P	9	5	0.0
S-135 P	144	114	0.0
S-2 P	0	0	0.0
S-3 P	0	0	0.0
S-4 P	0	0	0.0
L-8 Backflow	4	6	0.0
Rainfall	188	502	0.2
<b>Total</b>	<b>3755</b>	<b>3511</b>	<b>1.3</b>

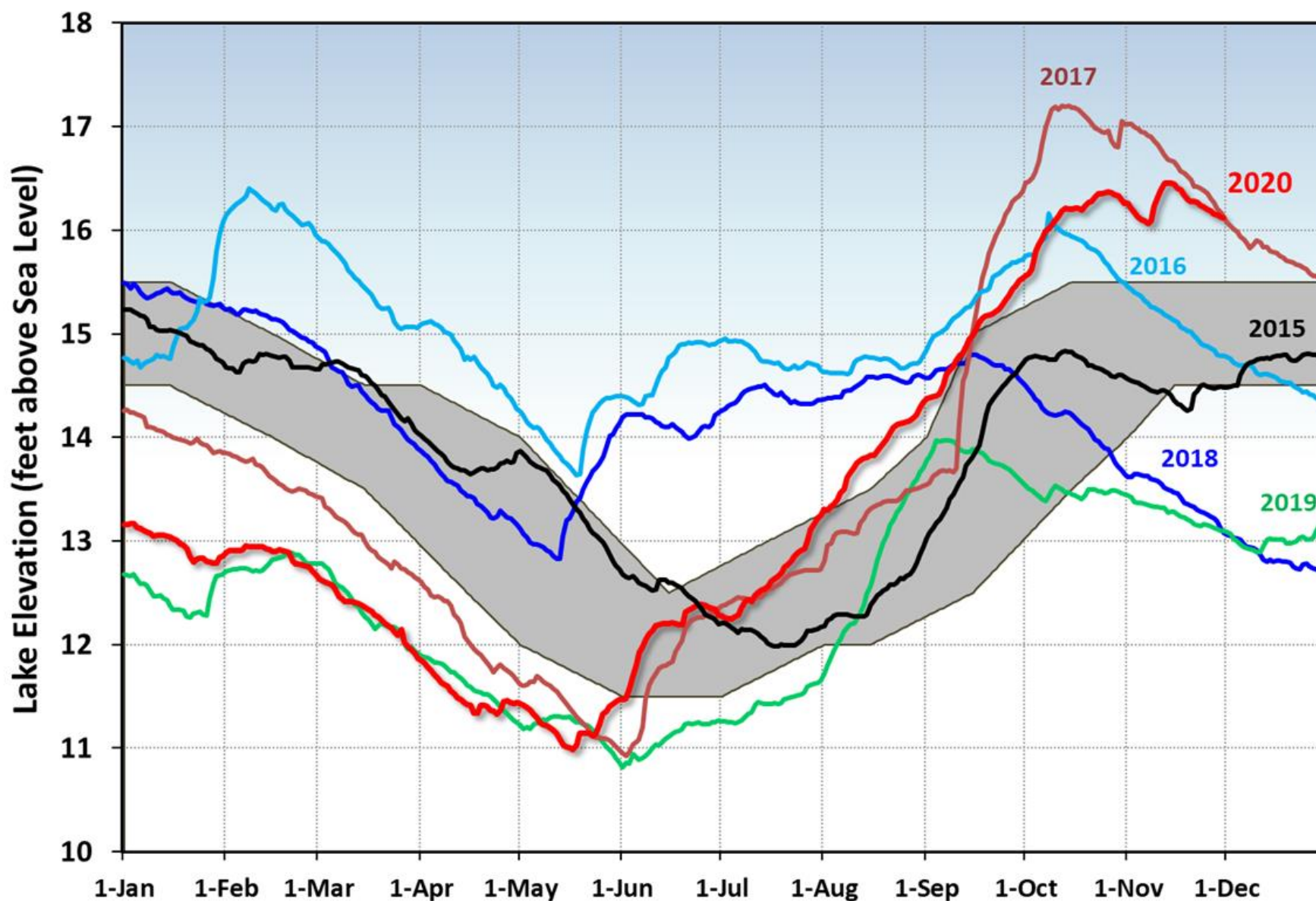
OUTFLOWS	Previous week Avg Daily CFS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)
S-77	4150	3968	1.5
S-308	1573	1615	0.6
S-351	108	0	0.0
S-352	18	33	0.0
S-354	0	0	0.0
L-8 Outflow			
ET	1559	1662	0.6
<b>Total</b>	<b>7408</b>	<b>7277</b>	<b>2.8</b>

Provisional Data



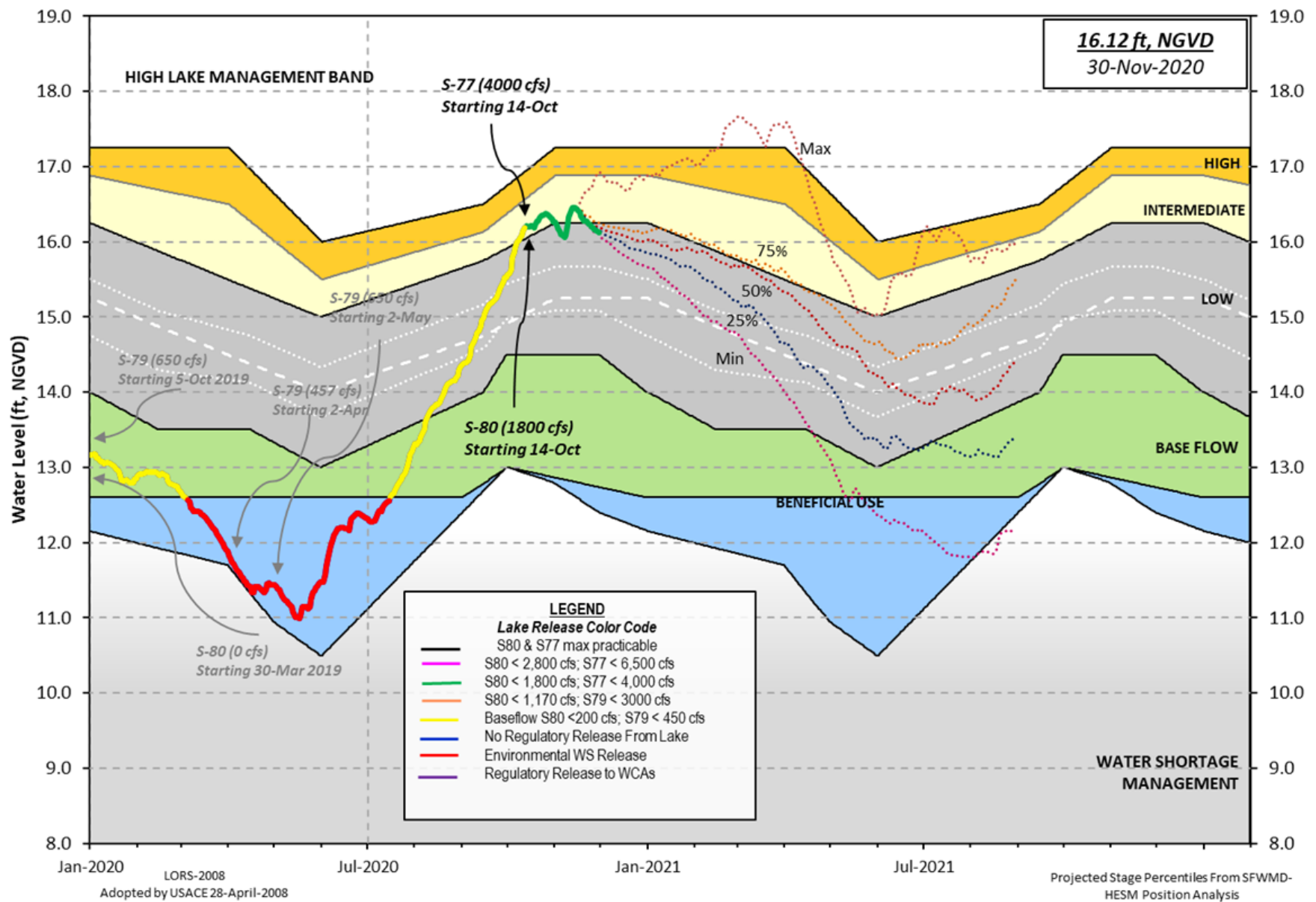
**Figure 1.** Water depth estimates on Lake Okeechobee based on the South Florida Water Depth Assessment Tool.

## 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: 0400 EST, 11/24/2020 THROUGH: 0400 EST, 12/01/2020

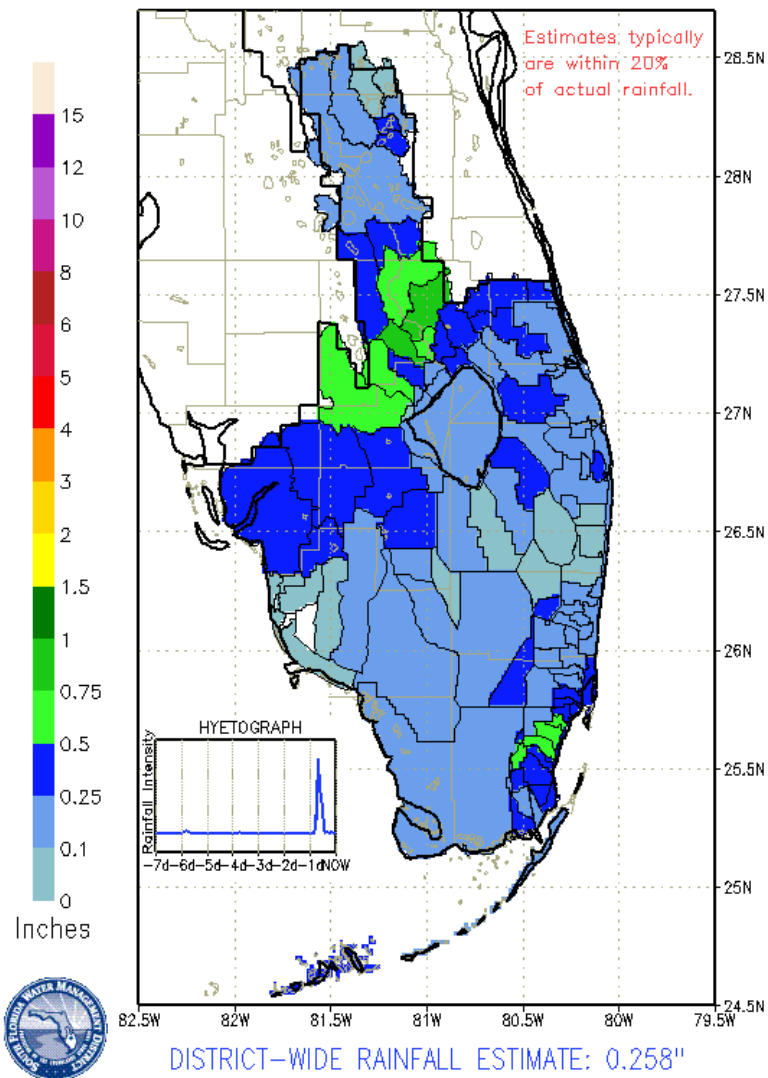


Figure 4. 7-Day rainfall estimates by RAINDAR.

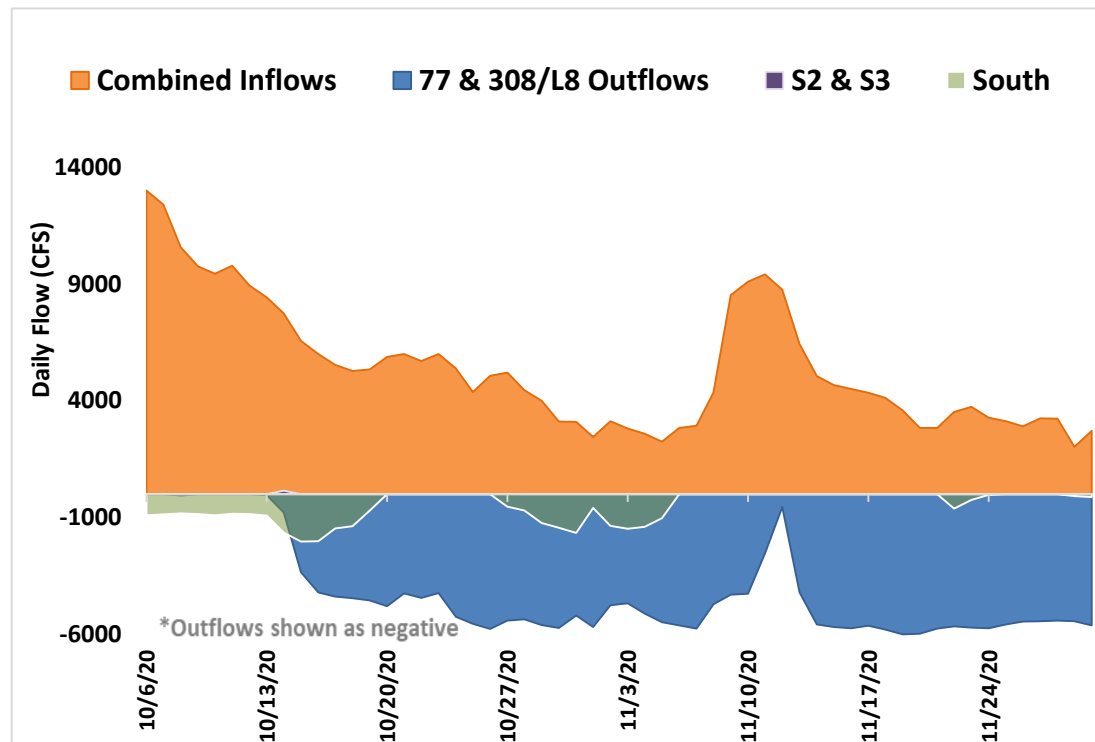


Figure 5. Major inflows (orange) and outflows (blue) of Lake Okeechobee, including the S-350 structures designated as South (green). The L-8 Canal flows through Culvert 10A are included as outflows when positive, and as inflows when backflowing into the Lake. All inflows and outflows are shown as positive 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: November 17-18, 2020

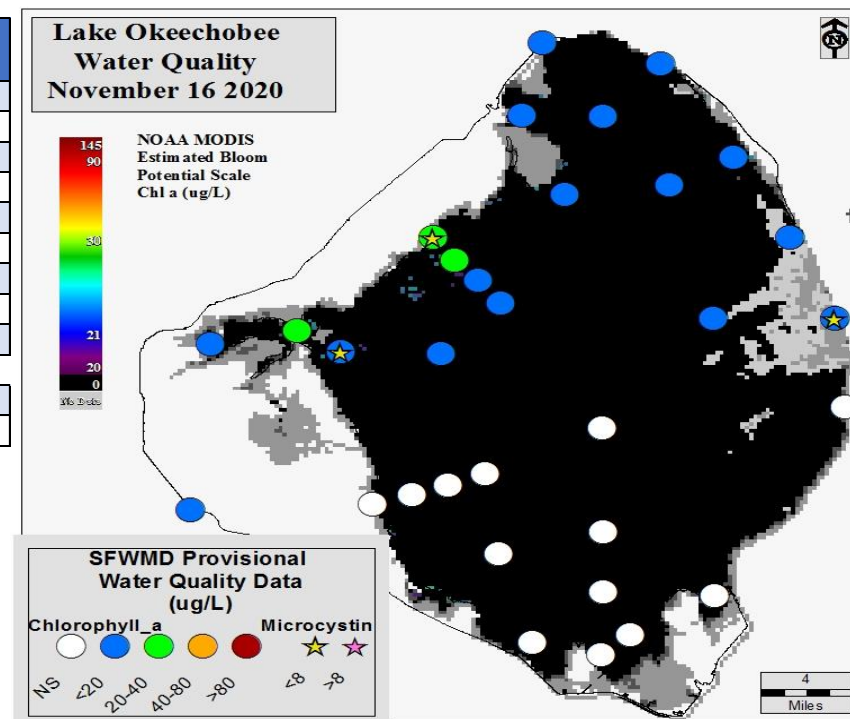
Station	CHL <sub>a</sub> (ug/L)	TOXIN (ug/L)	TAXA
FEBIN (11/2)	14.8		NS
FEBOU (11/2)	<b>36.0</b>		NS
KISSR0.0	9.2	BDL	mixed
L005	18.3	<b>0.5</b>	<i>Microcys</i>
LZ2	18.0	BDL	<i>Microcys</i>
KBARSE	9.5	BDL	NS
RITTAE2	P	BDL	mixed
PELBAY3	P	BDL	NS
POLE3S	P	BDL	NS
LZ25A	P	BDL	NS
PALMOUT	P	BDL	NS
PALMOUT1	P	BDL	NS
PALMOUT2	P	BDL	NS
PALMOUT3	P	BDL	NS
POLESOUT	<b>35.9</b>	<b>0.5</b>	<i>Microcys</i>
POLESOUT1	<b>21.5</b>	BDL	NS
POLESOUT2	14.1	BDL	NS
POLESOUT3	14.4	BDL	NS
EASTSHORE	4.6	BDL	NS
NES135	6.9	BDL	NS
NES191	2.8	BDL	NS

Station	CHL <sub>a</sub> (ug/L)	TOXIN (ug/L)	TAXA
L001	9.5	BDL	NS
L004	6.0	BDL	NS
L006	P	BDL	NS
L007	P	BDL	NS
L008	9.6	BDL	NS
LZ30	P	BDL	<i>Microcys</i>
LZ40	P	BDL	NS
CLV10A	P	BDL	NS
NCENTER	11.3	BDL	NS

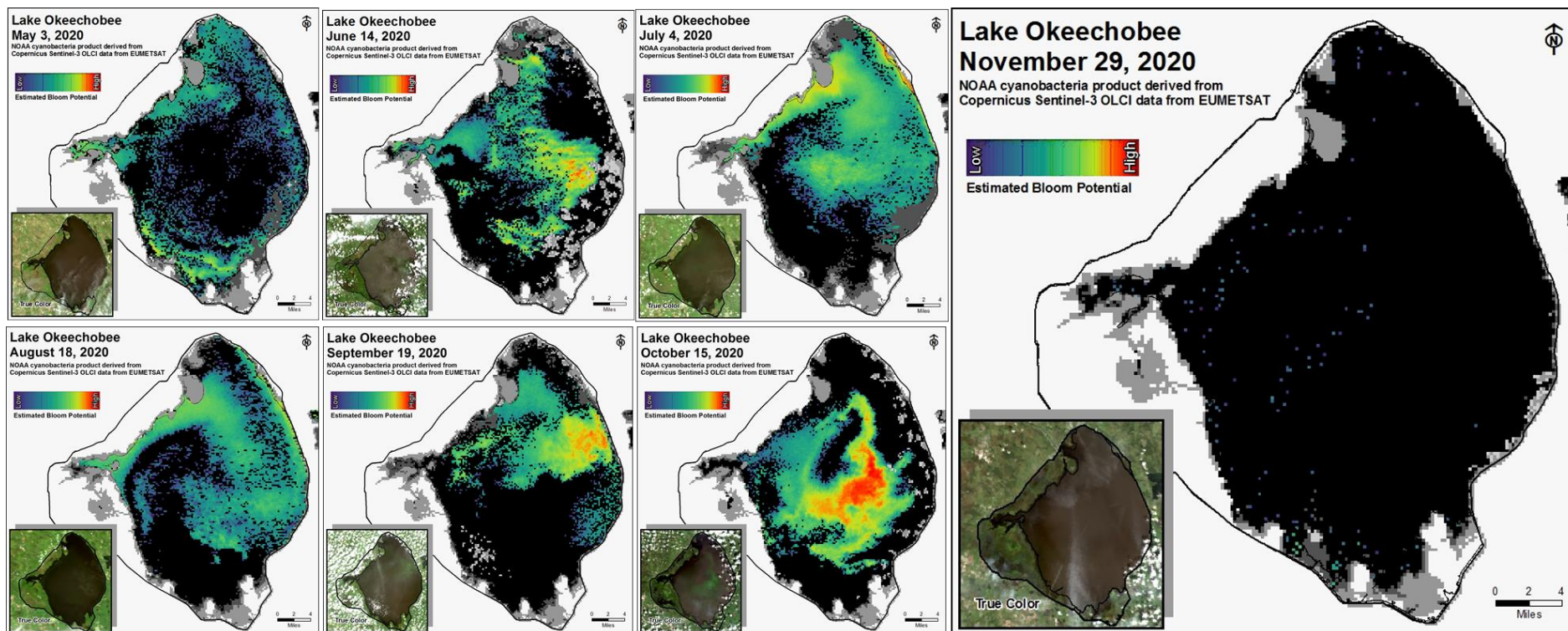
Sampled 11/16

S308C	3.3	<b>1.0</b>	<i>Microcys</i>
<b>S77</b>	3.9	BDL	<i>Microcys</i>

- 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 November 17 - 18, 2020.



**Figure 7.** Cyanobacteria bloom potential 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 2,467 cfs (Figures 1 and 2) and last month inflow averaged more than 4,763 cfs. Note these numbers do not include contributions from the 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).

<b>Location</b>	<b>Flow (cfs)</b>
Tidal Basin Inflow	149
S-80	1,949
S-308	1,615
S-49 on C-24	222
S-97 on C-23	147
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 2.9. 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.

<b>Sampling Site</b>	<b>Surface</b>	<b>Bottom</b>	<b>Envelope</b>
HR1 (North Fork)	<b>0.3</b> (0.2)	<b>0.4</b> (0.2)	NA <sup>1</sup>
US1 Bridge	<b>1.8</b> (0.5)	<b>4.0</b> (1.6)	10.0-26.0
A1A Bridge	<b>7.8</b> (7.1)	<b>18.0</b> (17.6)	NA <sup>1</sup>

<sup>1</sup>Envelope not applicable

### **Caloosahatchee Estuary:**

Last week total inflow to the Caloosahatchee Estuary averaged approximately 5,661 cfs (Figures 5 and 6) and last month inflow averaged about 7,468 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).

<b>Location</b>	<b>Flow (cfs)</b>
S-77	3,968
S-78	3,606
S-79	4,951
Tidal Basin Inflow	710

Over the past week in the estuary, salinity remained the same to Ft. Myers Yacht Basin and increased downstream (Table 4, Figures 7 & 8). The seven-day average salinity values are within the poor range for adult eastern oysters at Cape Coral and in the good range at Shell Point and at Sanibel (Figure 9). The seven-day average surface salinities (Table 4) are in the good range (0-10) for tape grass at Val I-75 and at Ft. Myers.

**Table 4.** Seven-day average salinity at six monitoring stations in the Caloosahatchee Estuary. Current average is in bold, previous average in parentheses. The envelope at Val I-75 is for the protection of tape grass in the upper estuary and the envelope in the lower estuary reflects the preferred salinity range for adult eastern oysters (*Crassostrea virginica*).

Sampling Site	Surface	Bottom	Envelope
S-79 (Franklin Lock)	<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>2.1</b> (1.3)	<b>3.0</b> (2.1)	10.0-30.0
Shell Point	<b>16.0</b> (12.3)	<b>18.7</b> (16.0)	10.0-30.0
Sanibel	<b>26.2</b> (22.9)	<b>27.9</b> (24.7)	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 350 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	350	0.3	0.3
B	300	350	0.3	0.3
C	450	350	0.3	0.3
D	650	350	0.3	0.3
E	800	350	0.3	0.3

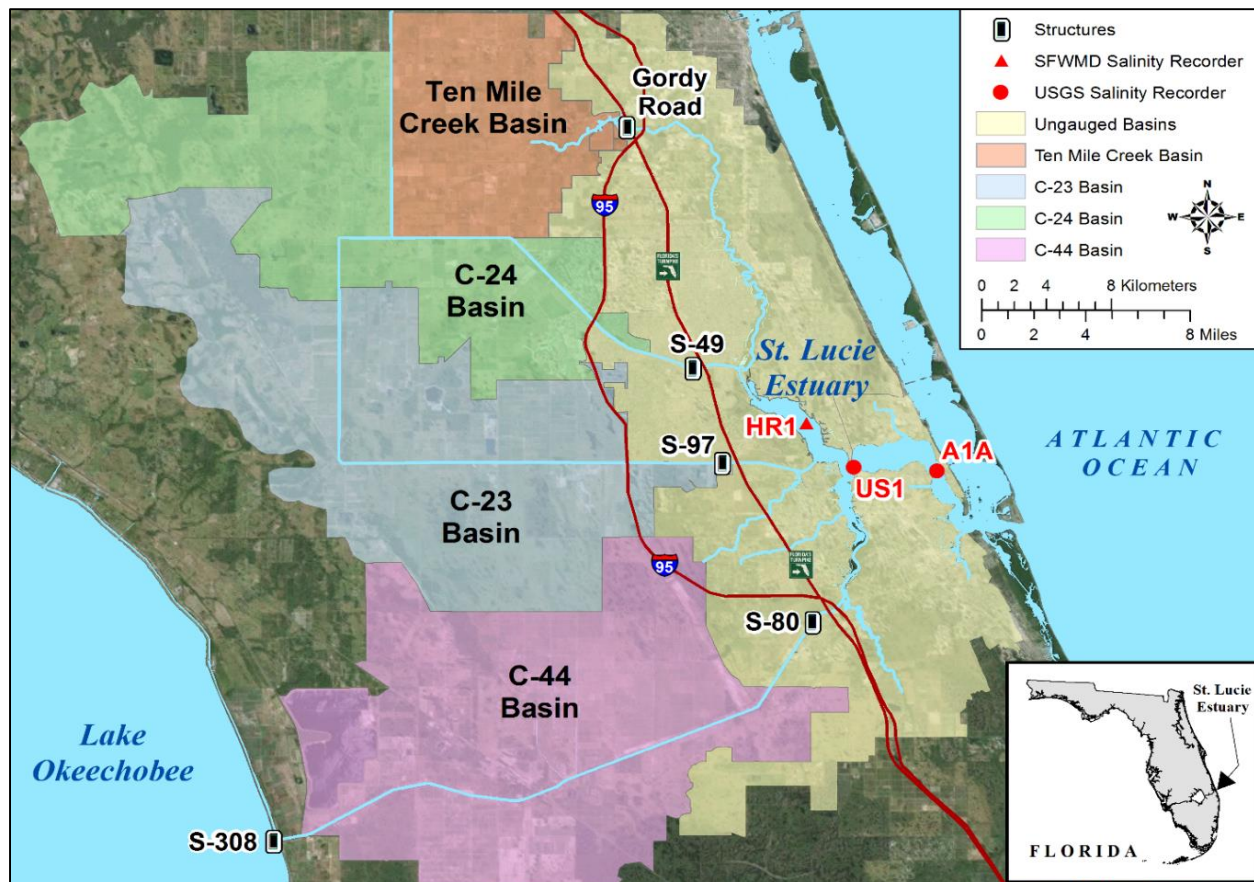
### Red tide

The Florida Fish and Wildlife Research Institute reported on November 25, 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 Miami-Dade or Broward counties).

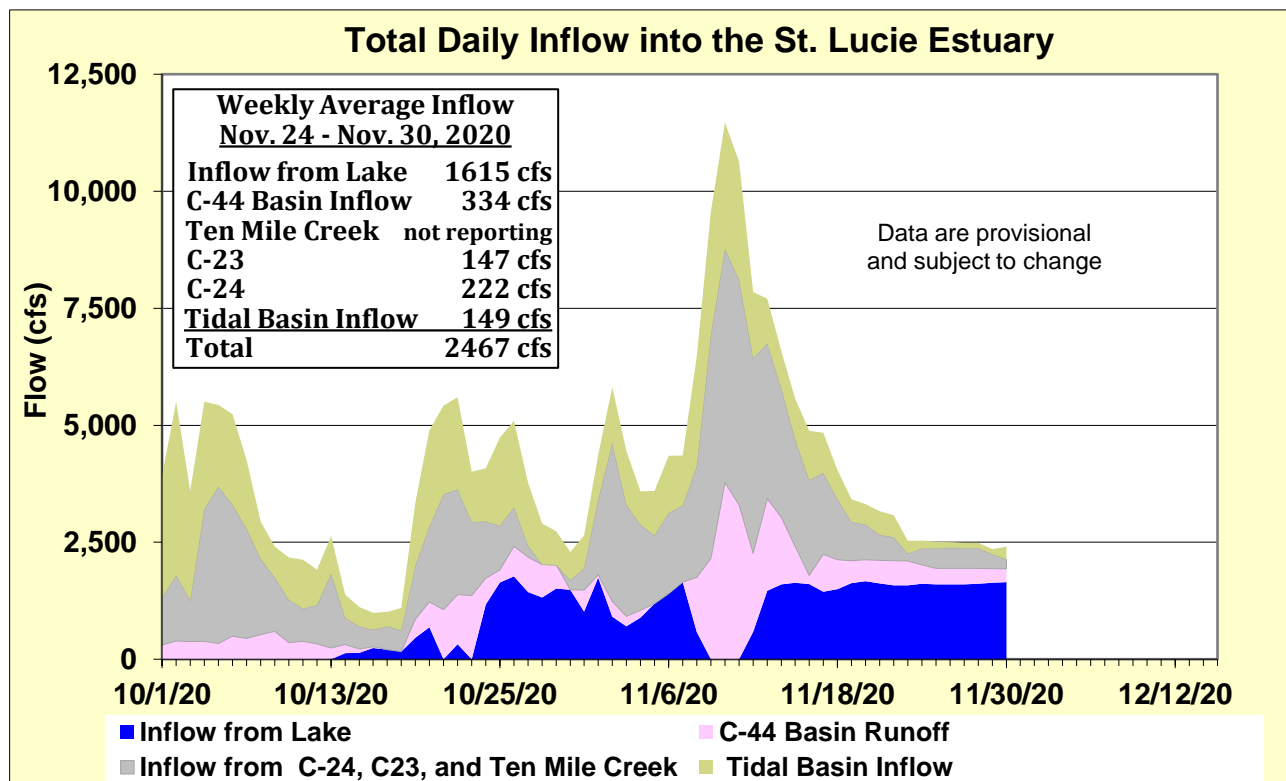
### Water Management Recommendations

Lake stage is in the Low Sub-Band. Tributary conditions are normal. The LORS2008 release guidance suggests up to 450 cfs release at S-79 to the Caloosahatchee Estuary and up to 200 cfs release at S-80 to the St. Lucie Estuary.





**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.

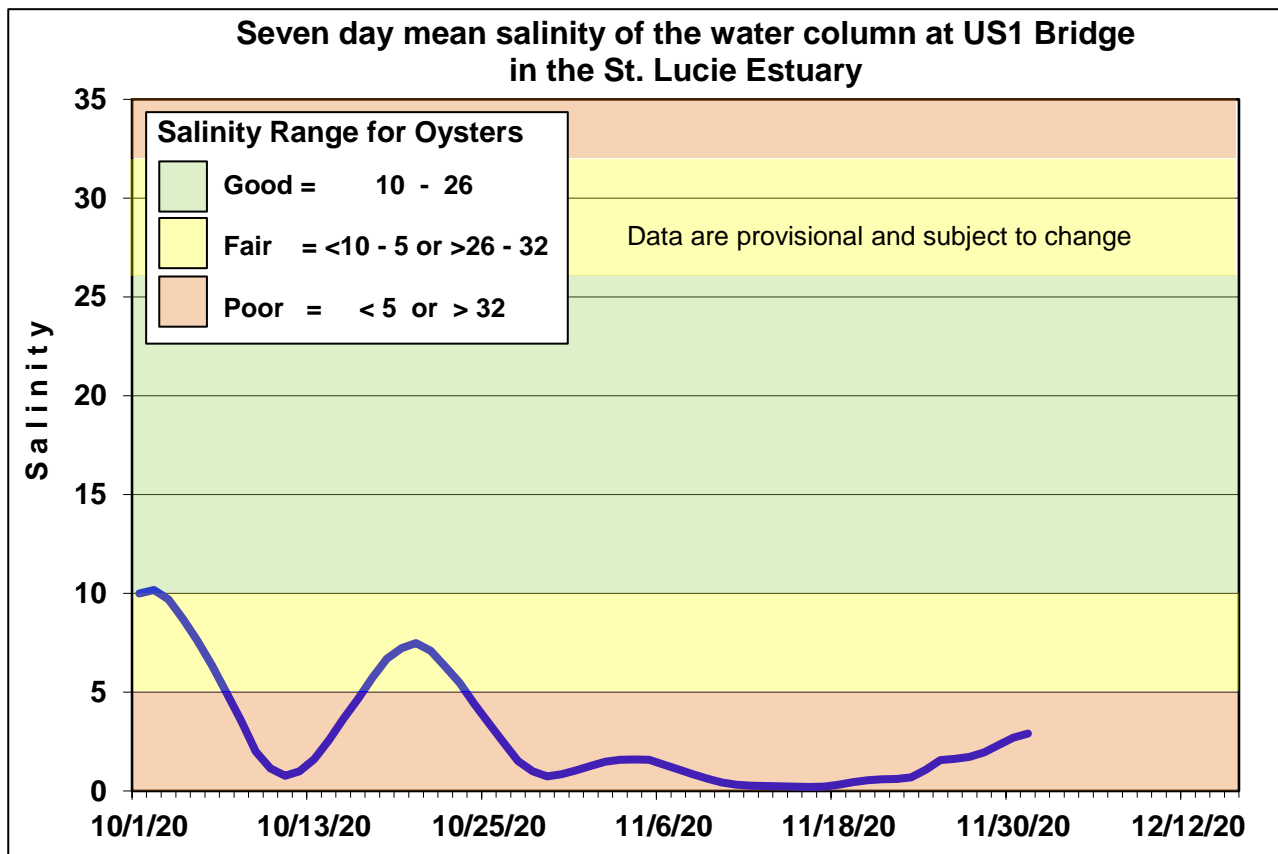


Figure 3. Seven-day mean salinity of the water column at the US1 Bridge.

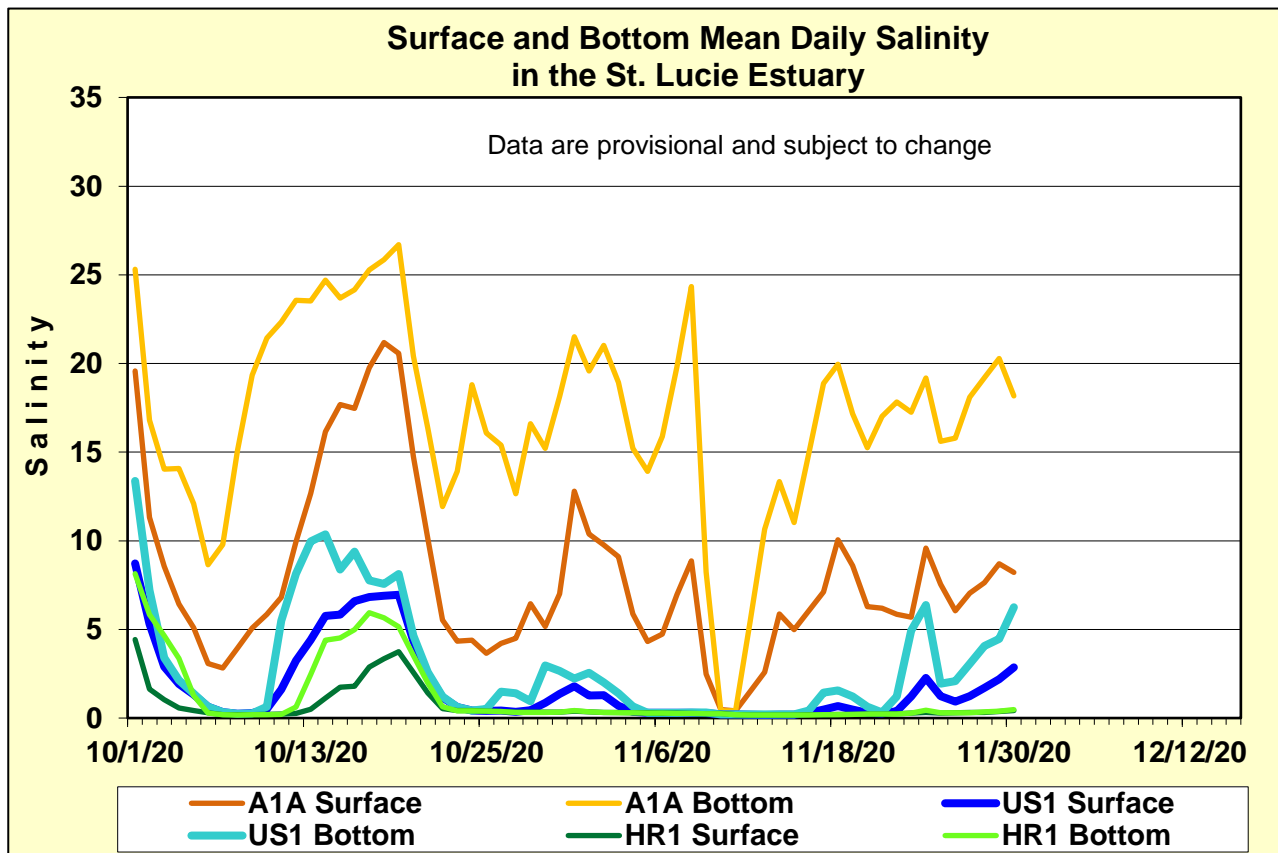
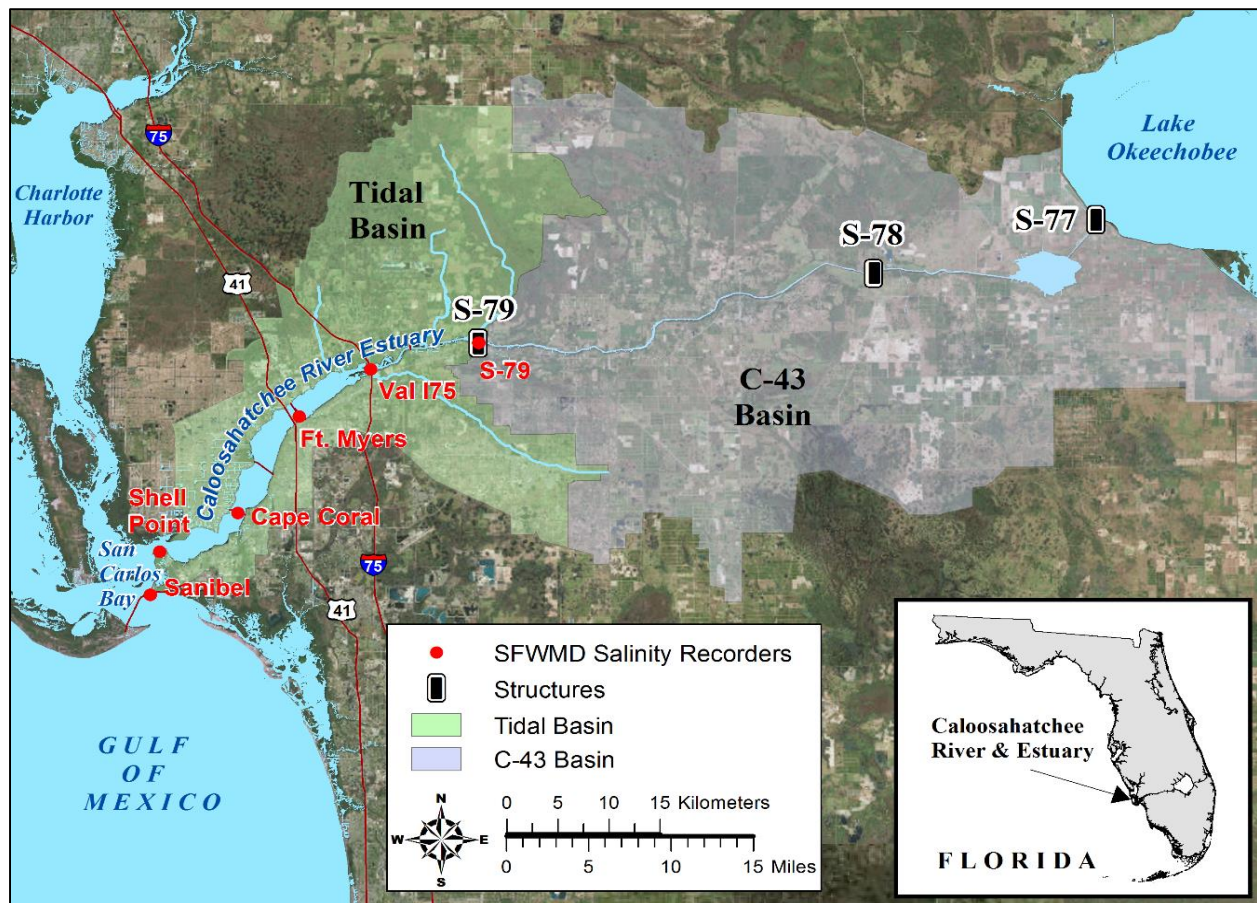
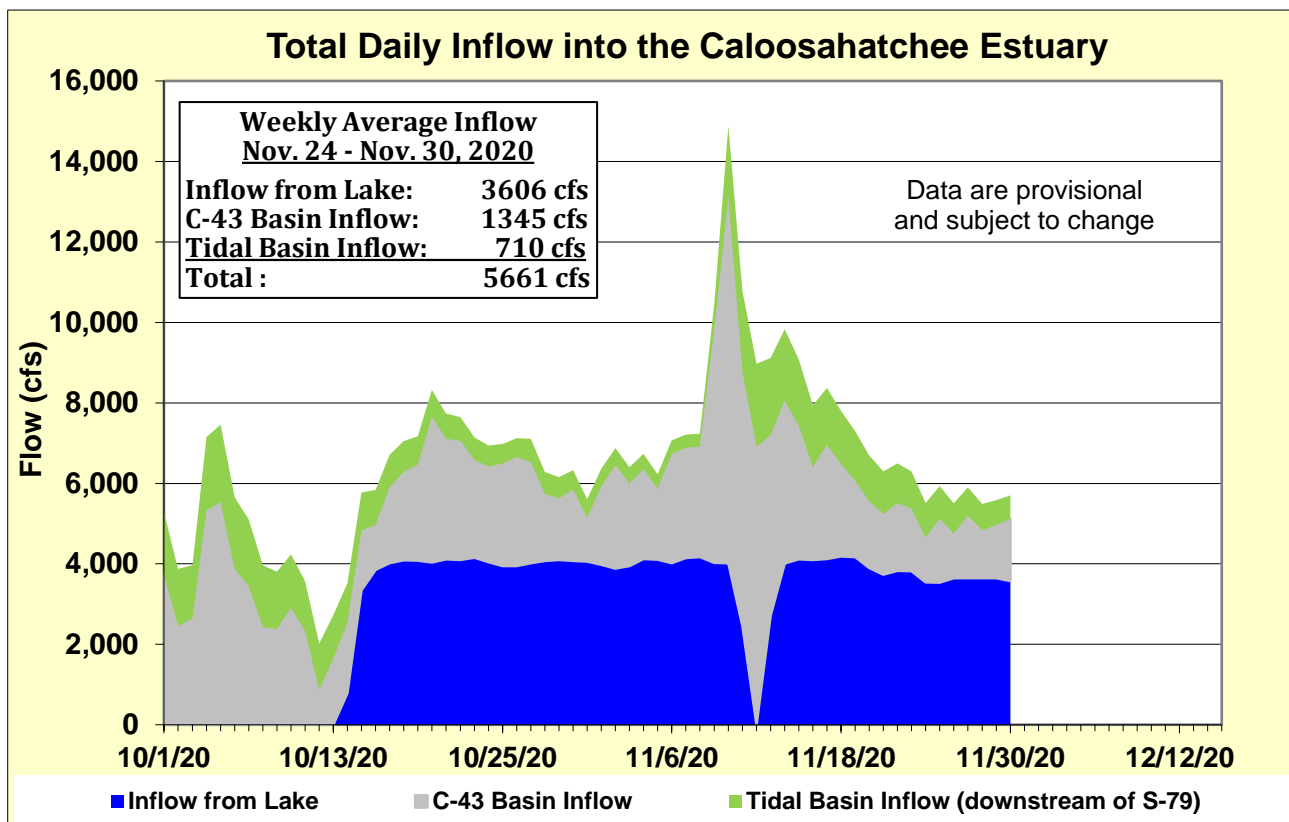


Figure 4. Daily mean salinity at the A1A, US1, and HR1 stations.



**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

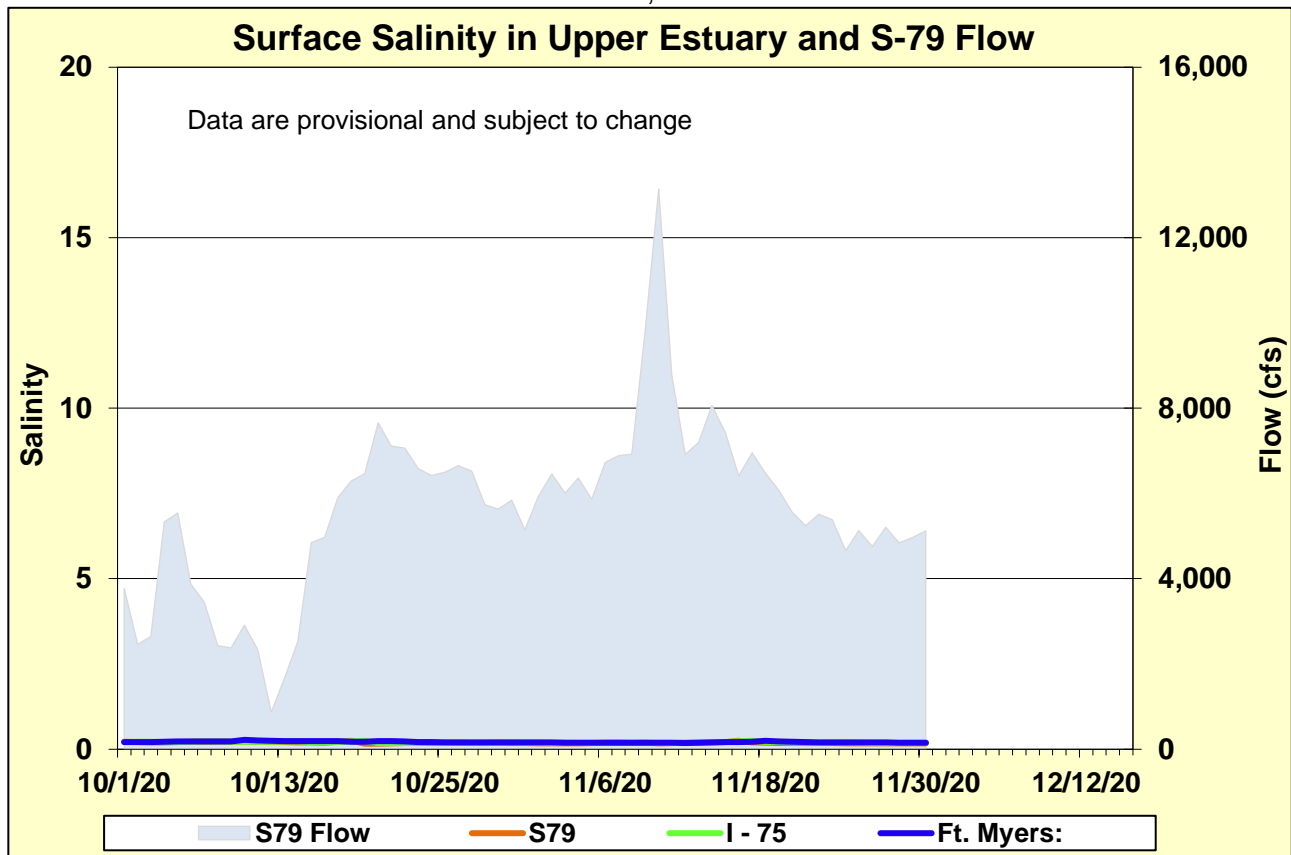


Figure 7. Daily mean flows at S-79 and salinity at upper estuary monitoring stations.

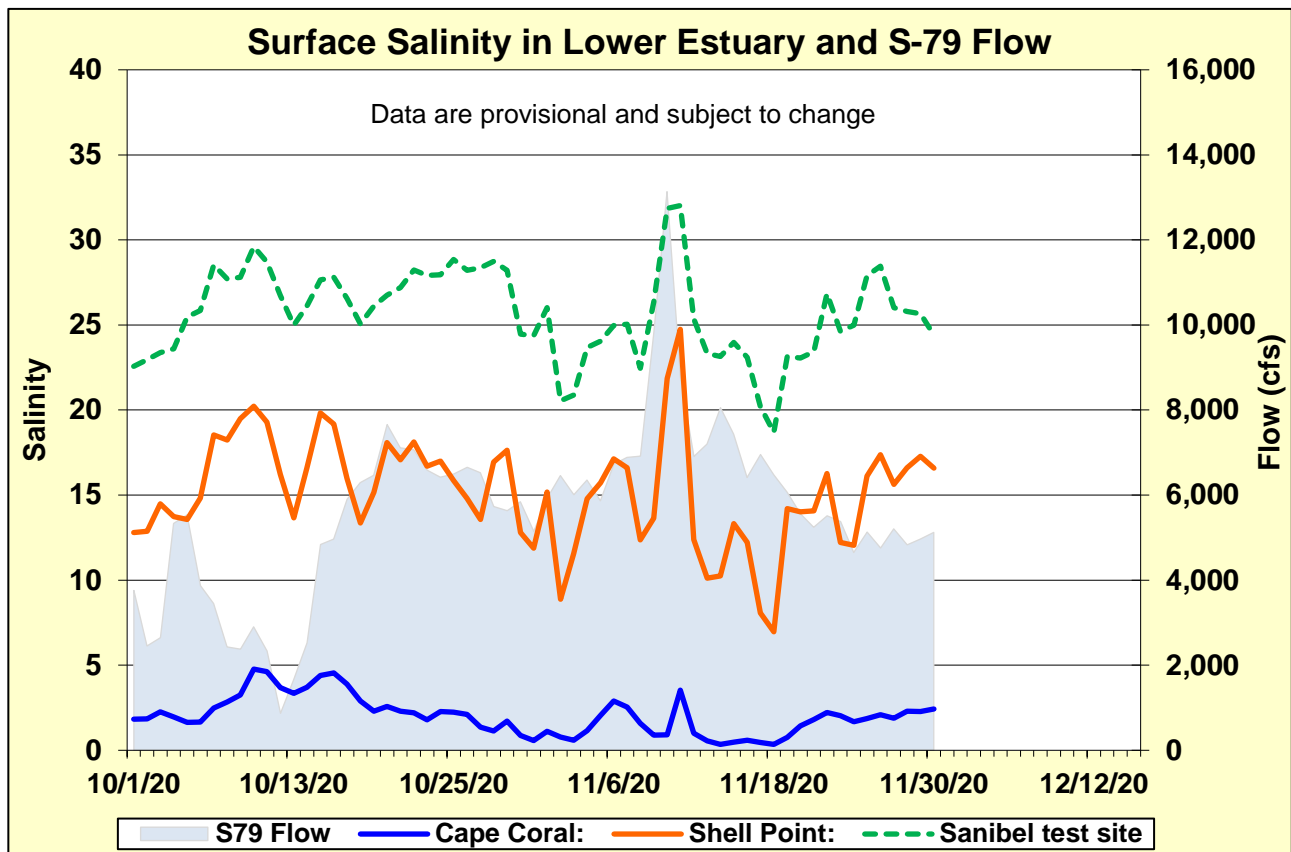
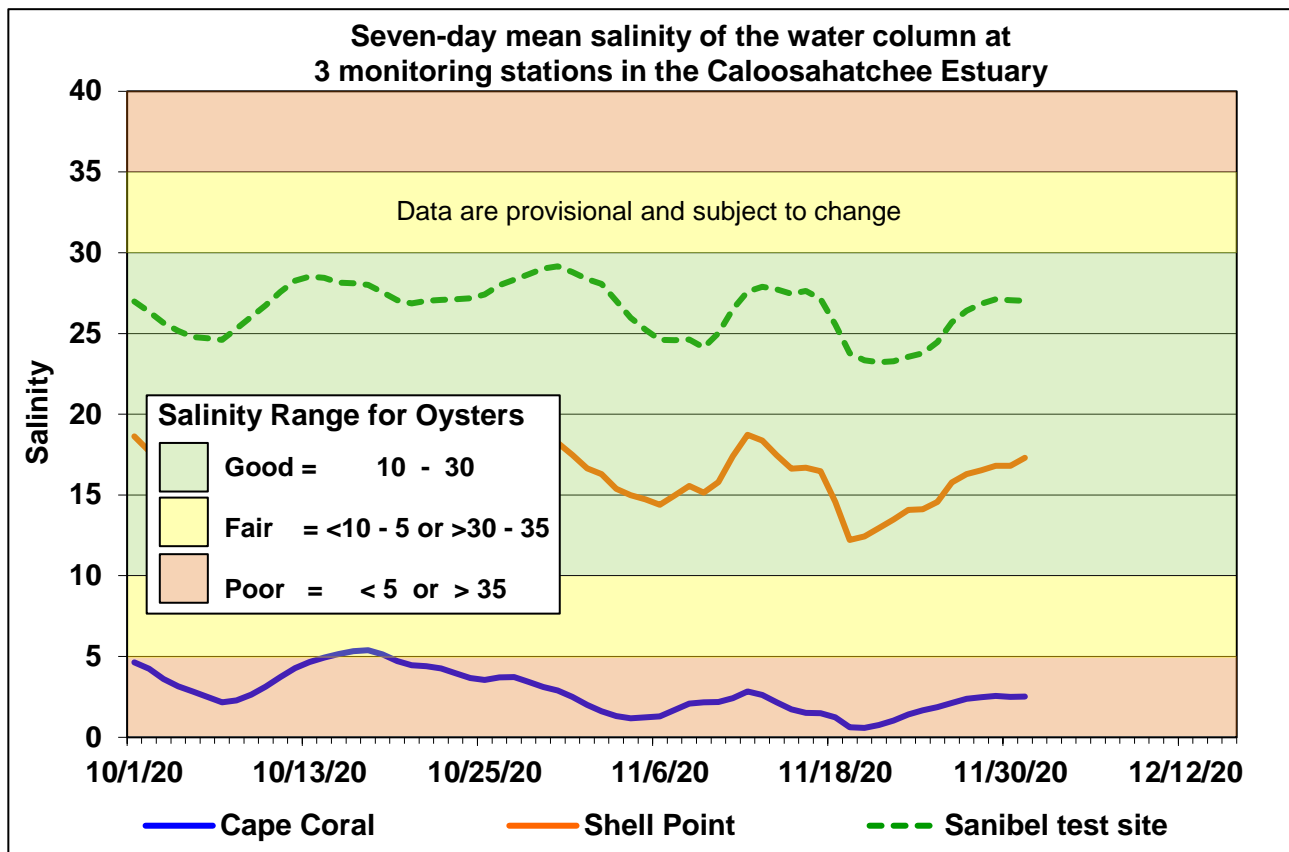
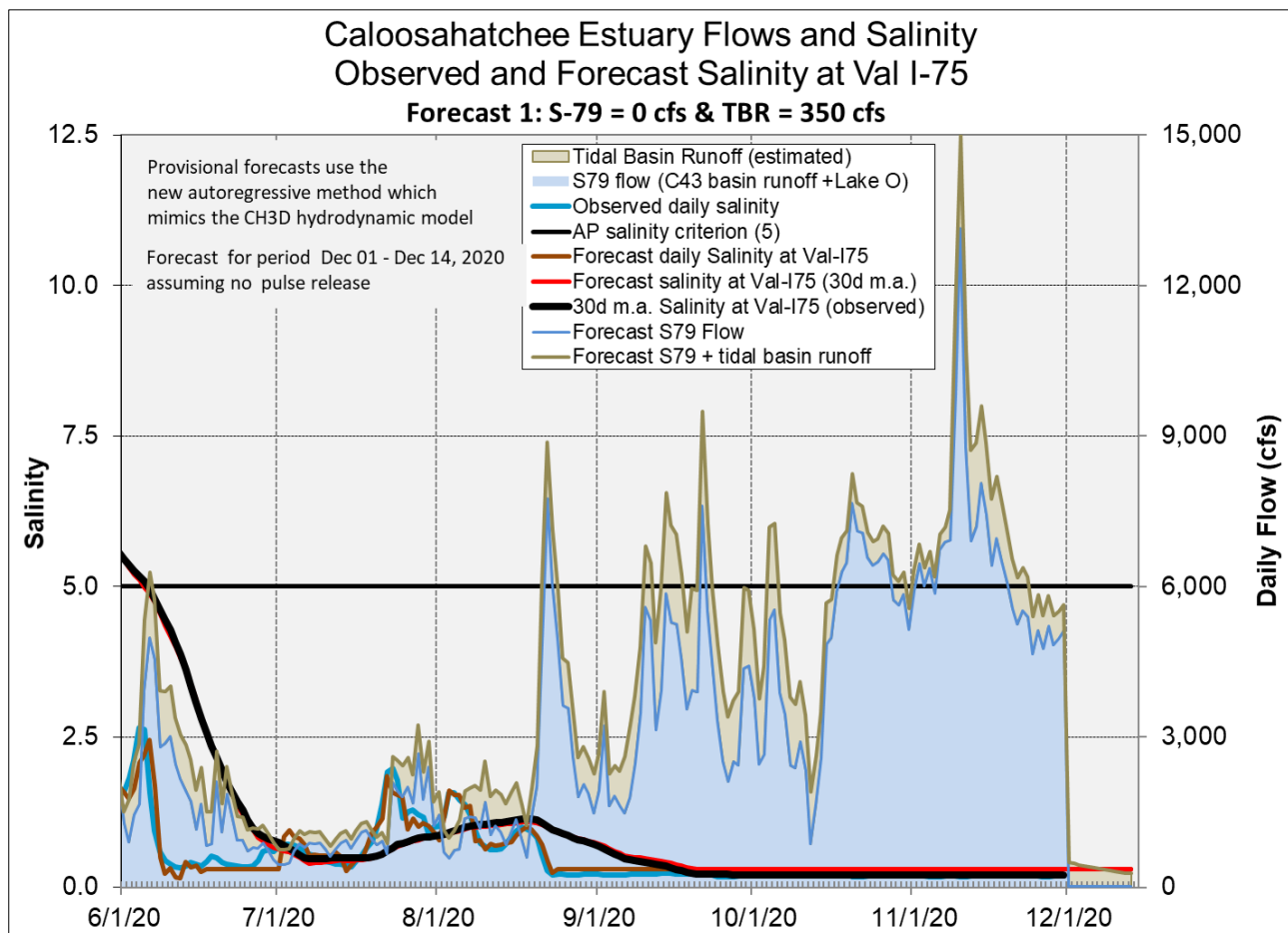


Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.





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



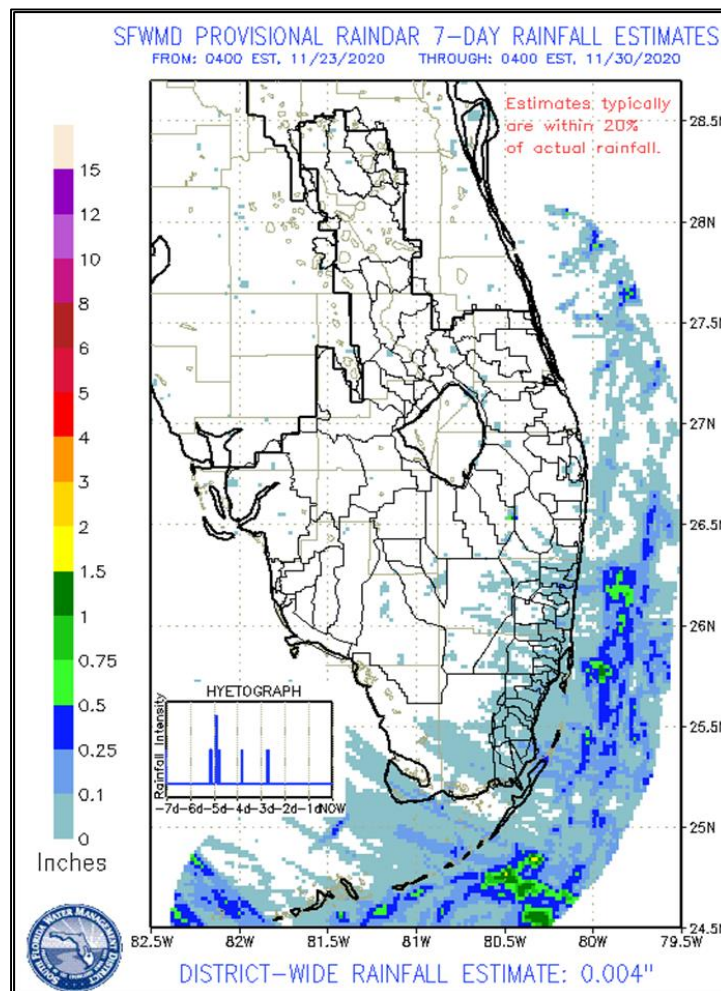
**Figure 10.** Forecasted Val I-75 surface salinity assuming no pulse release at S79.



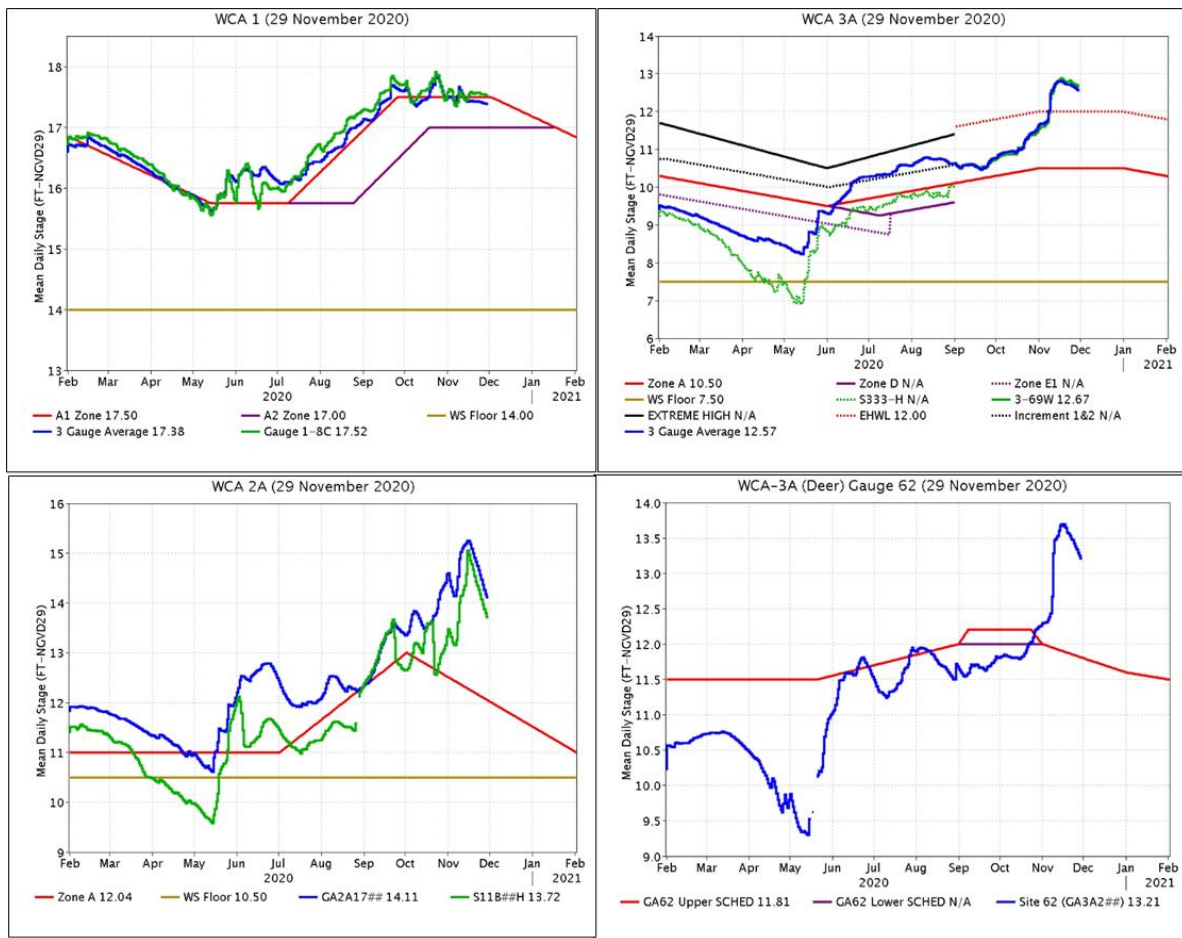
## EVERGLADES

Barely detectable amounts of rainfall fell in the southern end of the system, less to the north and west. At the gauges monitored for this report stages fell 0.16 feet on average. Evaporation was 0.76 inches last week, and the Tamiami trail flow formula (TTFF) continues to call for maximum releases from WCA-3A.

Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	<0.01	-0.05
WCA-2A	<0.01	-0.62
WCA-2B	<0.01	-0.18
WCA-3A	<0.01	-0.19
WCA-3B	0.01	-0.11
ENP	0.01	-0.07



Regulation Schedules: WCA-1: Stage at the 1-8C Gauge is generally trending along with schedule, currently 0.02 feet above the stable Zone A1 regulation line. WCA-2A: Stages at Gauge 2-17 continued to recede quickly towards the regulation line last week and is now 2.07 feet above the falling schedule. WCA-3A: The Three Gauge Average stages continued to recede towards the stable Zone A regulation line last week, currently 2.07 feet above it and 0.57 feet above the EHWL. WCA-3A: Stage at gauge 62 (Northwest corner) receded last week remaining above the falling Upper Schedule by 1.4 feet.

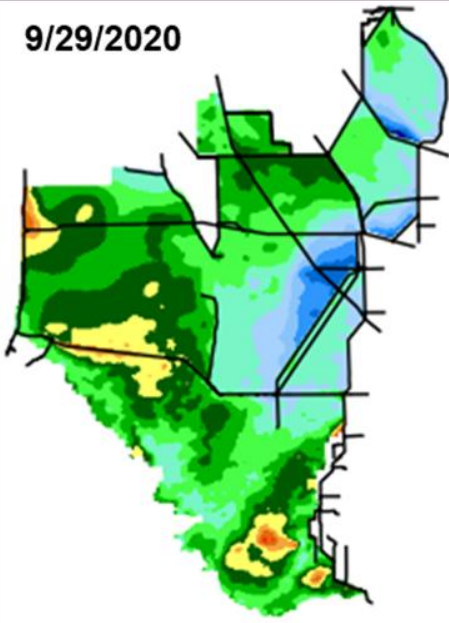


Water Depths: The WDAT tool for spatial interpolation of depth monthly snapshots over the last two months indicate current depths in excess of 5.0 feet in WCA-3A South around the upper reaches of the L-67 canal, southern WCA-2B and extreme southwestern WCA-2A. Ponding depths (>2.5 feet) are found across all of WCA-2A, the south side is much deeper and only the northwest corner of WCA-3A has the potential to be lower than 2.5 feet. Hydrologic connectivity is well established within the major sloughs in Everglades National Park (ENP) and the depths have increased west of the L-28S levee, though the potential remains for below ground stages in southern BCNP.

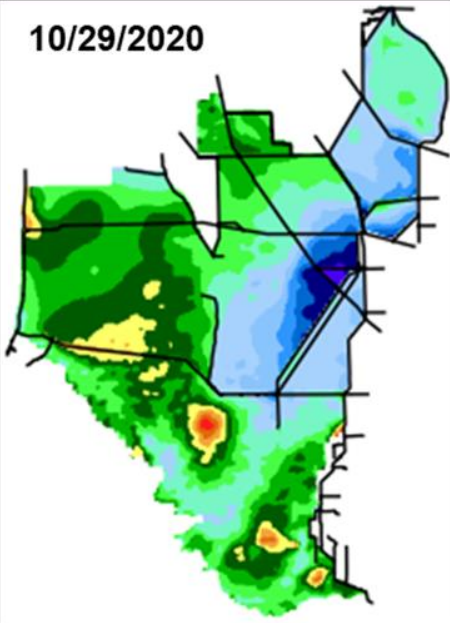


## SFWDAT Water Depth Monthly Snapshots

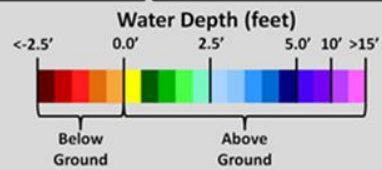
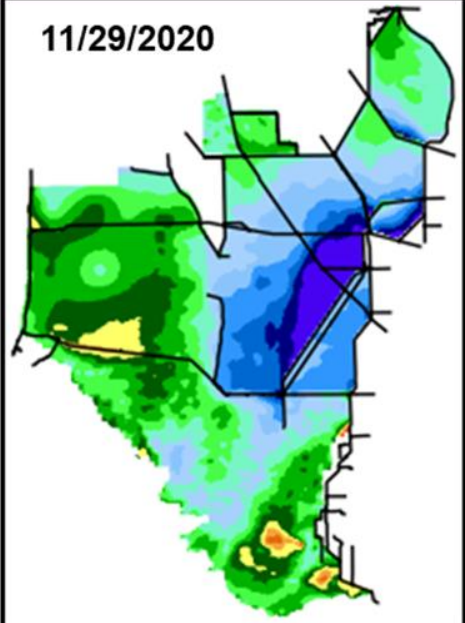
9/29/2020



10/29/2020



11/29/2020

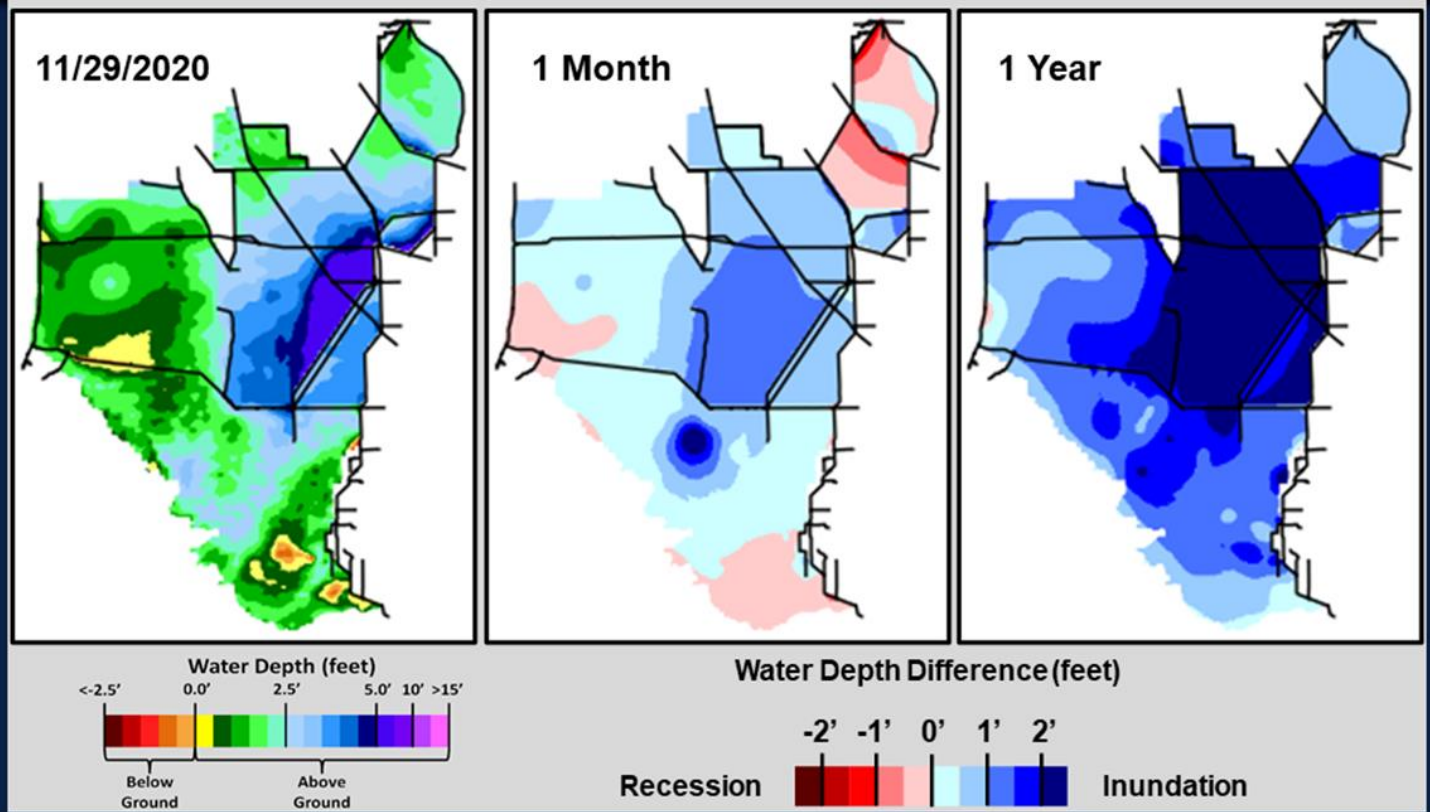


South Florida Water Depth Assessment Tool (SFWDAT)





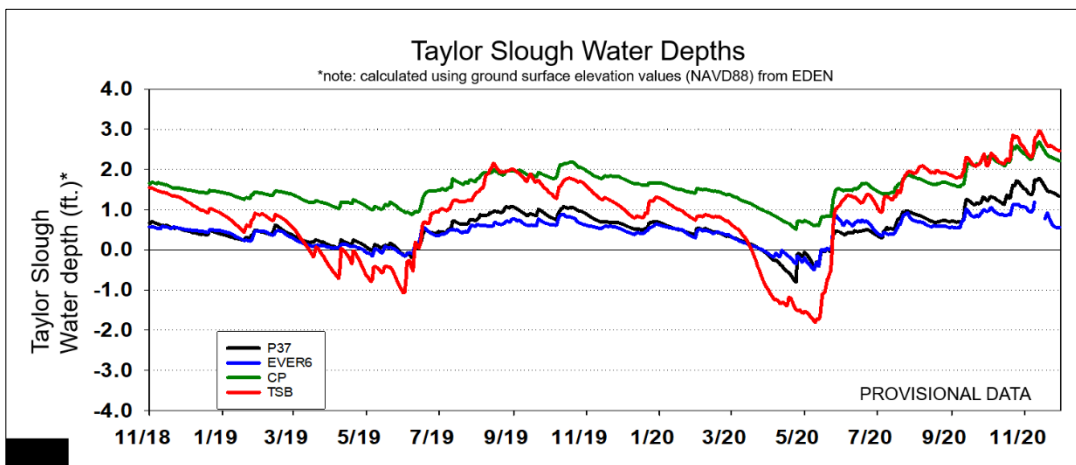
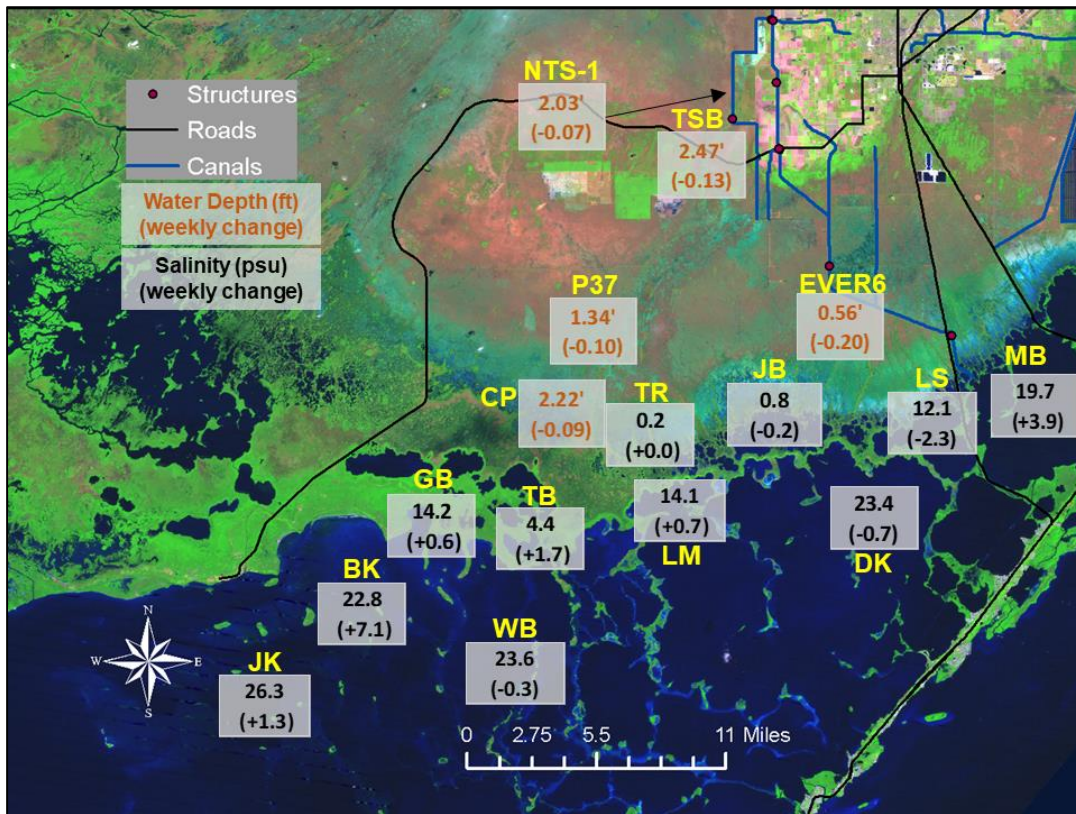
## SFWDAT Everglades Difference Maps (Present – Past)



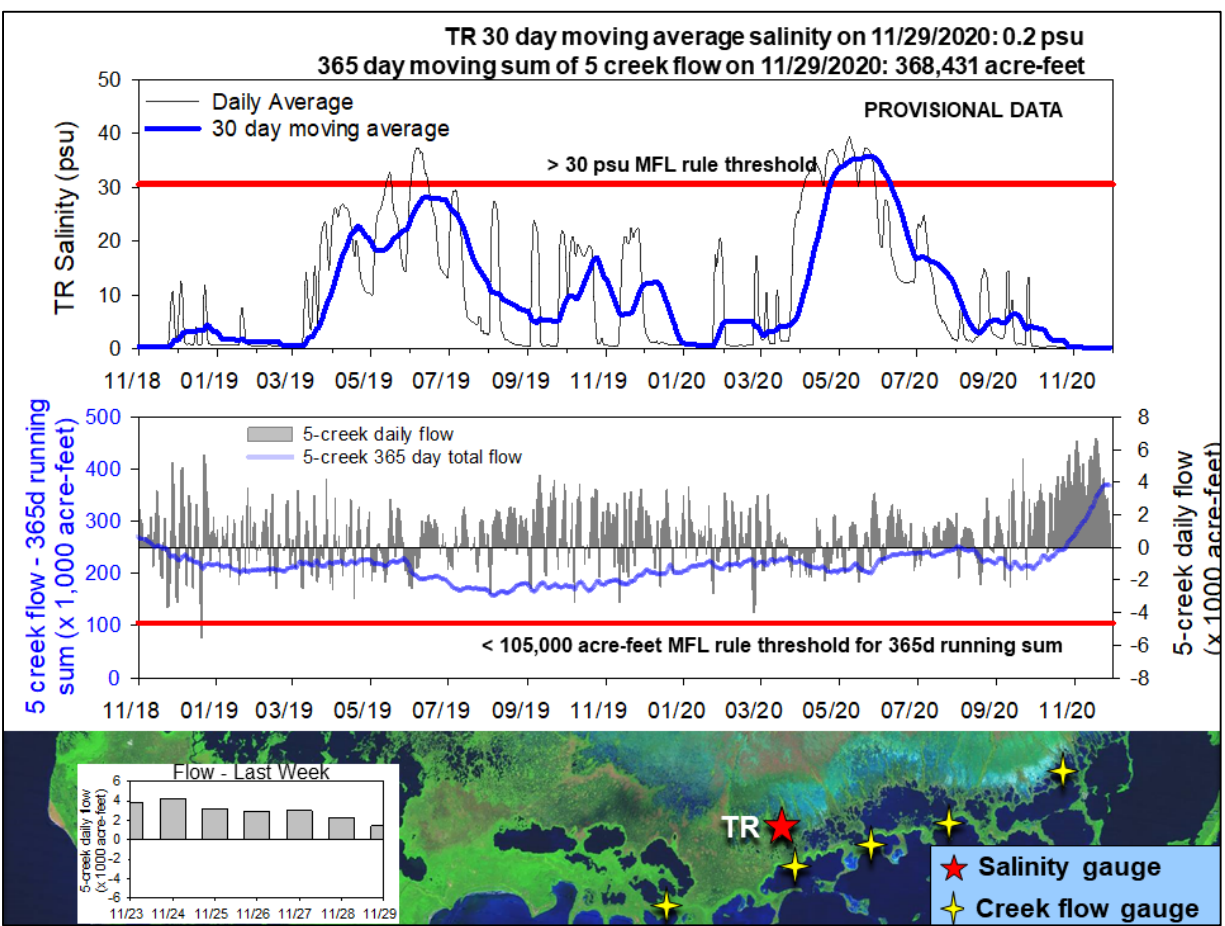
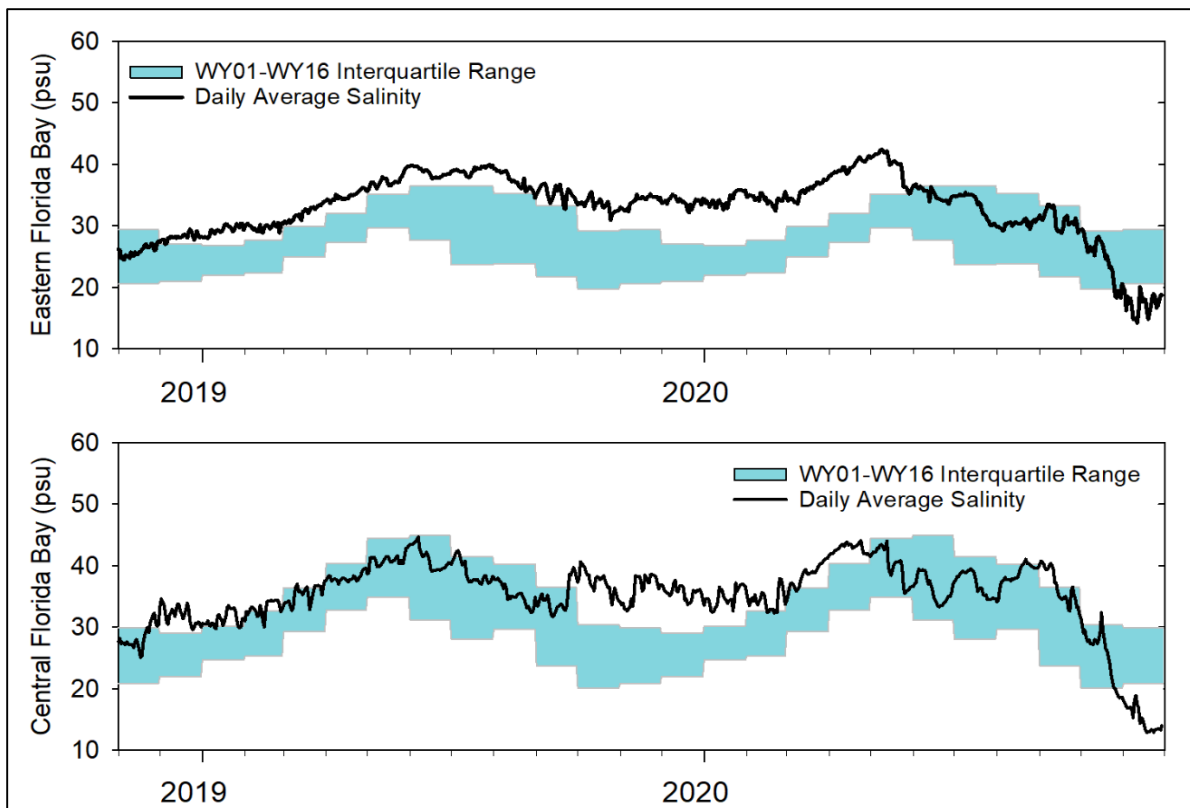
### South Florida Water Depth Assessment Tool (SFWDAT)

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 90% or 333 of the tree islands are currently inundated.

Taylor Slough Water Levels: An average of 0.14 inches of rain fell over Taylor Slough and Florida Bay this past week which allowed stages to decrease 0.12 feet on average over the week. The area is currently 10 inches above the historical average for this time of year.







Florida Bay Salinities: Salinities in Florida Bay averaged a 0.9 psu increase over the week as bay-wide salinities continue to stabilize after the recent large influx of freshwater. Average salinity for the Bay is 8 psu lower than the historical average for this time of year. Manatee Bay (MB) salinity is still depressed

due to the flows from S-197, but it has increased another 4 psu since last week to end near 20 psu, and flows through S-197 have been decreasing over the week (daily average of 1100 cfs on 11/23 to 700 cfs on 11/29).

Florida Bay MFL: The salinity at the TR station in the mangrove zone (tracked for the Florida Bay MFL) has continued to be near fresh (less than 0.3 psu) and the 30-day moving average is also low at 0.2 psu. Weekly flow from the 5 creeks identified by yellow stars on the map totaled almost 21,000 acre-feet with another full week of positive flow. Daily flows have been decreasing but consistent. The 365-day moving sum of flow from the five creeks (tracked as part of the Florida Bay MFL criteria) ended at 368,431 acre-feet this week which is a 7,000 acre-feet increase from last week. That is higher than the 75th percentile of historical data (313,052 acre-feet). This is a value not seen since October of 2018. Creek flows are provisional USGS data.

### **Water Management Recommendations**

At this early point in the dry season, maintaining the recession where possible in WCA-2A or WCA-3A even when faster than traditional ecological recommendations (i.e. between -.05 and -.09 feet per week) has ecological benefit as long as there is no downstream deleterious ecological impact. Moderating rapid changes in stage to less than plus or minus 0.25 feet per week or 0.50 feet per two weeks has ecological benefit. Extreme high-water conditions call for the utilization of any and all sources of discharge from WCA-2A and WCA-3A.

Tens of thousands of wading birds were observed feeding in the far southwest of the greater Everglades system. 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 needs to be maintained.

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, once conditions move closer to average.

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 hypersalinity 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, December 1st, 2020 (red is new)			
Area	Weekly change	Recommendation	Reasons
WCA-1	Stage decreased by 0.05'	Maintain marsh stage slightly above and parallel to the regulation schedule.	Protect within basin and downstream habitat and wildlife.
WCA-2A	Stage decreased by 0.62'	Maintain and moderate the recession rate to maintain marsh stage parallel to the falling regulation schedule.	Protect within basin and downstream habitat and wildlife from flooding stress.
WCA-2B	Stage decreased by 0.17'	Maintain and moderate the recession rate to lower marsh stage.	Protect within basin and downstream habitat and wildlife from flooding stress.
WCA-3A NE	Stage decreased by 0.24'	Maintain and moderate the recession rate to return marsh stage to more average conditions.	Protect within basin and downstream habitat and wildlife from flooding stress.
WCA-3A NW	Stage decreased by 0.29'	Maintain <b>and moderate</b> the recession rate to return marsh stage to more average conditions.	
Central WCA-3A S	Stage decreased by 0.14'	Maintain the recession rate to return marsh stage to more average conditions.	Protect within basin, upstream/downstream habitat and wildlife. Tree island ecology is diminished by flooding
Southern WCA-3A S	Stage increased by 0.10'		
WCA-3B	Stage decreased by 0.11'	Maintain the recession rate to lower marsh stage.	Protect within basin and downstream habitat and wildlife from flooding stress.
ENP-SRS	Stage decreased by 0.07'	Make discharges to the Park according to the current deviation with a return to COP protocol as soon as high water conditions are alleviated in the upstream WCAs	Protect within basin and upstream habitat and wildlife from flooding stress.
Taylor Slough	Stage changes ranged from -0.07' to -0.20'	Move water southward as possible	When available, provide freshwater buffer for downstream conditions.
FB- Salinity	Salinity changes ranged -2.3 to +7.1 psu	Move water southward as possible	When available, provide freshwater to maintain low salinity buffer and promote water movement.