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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: January 6, 2021

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

Dry, cool conditions will exist through Wednesday due to a frontal system. Once the high-pressure area shifts eastward on Thursday, the low-level winds will veer easterly and southerly by Thursday afternoon ahead of the next cold front. The change in the prevailing wind will cause temperatures to moderate, but dry conditions will persist through at least Thursday afternoon District wide. An offshore high moisture area could produce a marginal increase of rains over the Florida Keys and along or near the southeast coast Thursday evening, with a lower chance that the rains would be greater than currently forecast. Light rains preceding a front should overspread the northwestern half of the District overnight Thursday and quickly diminish in coverage by daybreak Friday while shifting southeastward. While some of the rains could initially arrive with moderate intensity over the far north, the median and favored solution shows less than a tenth of an inch over the area north and west of Lake Okeechobee. The cold front should push to just northwest of Lake Okeechobee at sunrise on Friday, to just southeast of the Lake by early afternoon and then offshore the southeast coast of Florida Friday evening. Little to no appreciable rain is forecast with the frontal passage on Friday. A chilly and dry weather pattern associated with building high pressure area well northwest of the area will prevail across the District this weekend, and there is good confidence of no rainfall area wide. Another cold front with a possible weak area of low pressure is forecast Monday next week. Before the frontal passage, a quick round of light to moderate rains could overspread the District. However, confidence is low regarding how much rain to expect since more than half of the model solutions currently indicate less-than-typical rainfall for a frontal passage this time of year while about a quarter show an average amount. Regardless, another dry and a continuation of cool weather are likely early next week, following the frontal passage.

Kissimmee

Tuesday morning stages were 58.0 feet NGVD (at schedule) in East Lake Toho, 54.9 feet NGVD (0.1 feet below schedule) in Toho, and 52.4 feet NGVD (0.1 feet below schedule) in Kissimmee-Cypress-Hatchineha; headwater stages were 46.5 feet NGVD at S-65A and 26.0 feet NGVD at S-65D. Tuesday morning discharges were 540 cfs at S-65, 600 cfs at S-65A, 840 cfs at S-65D and 1,120 cfs at S-65E. Dissolved oxygen concentration in the Kissimmee River averaged 8.2 mg/L for the week through Sunday. Kissimmee River mean floodplain depth on Sunday was 0.46 feet. Today's recommendation is to continue S-65/S-65A discharge at or below 800 cfs. The purpose is to allow for 2-3 weeks with flow below 800 cfs before construction in Pool D resumes in early January 2021.

Lake Okeechobee

Lake Okeechobee stage was 15.81 feet NGVD on January 3, 2020, 0.01 feet lower than last week and 0.17 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 preferred ecological envelope since August 1, 2020 and is currently 0.31 feet above. Recent satellite imagery and water quality results suggest little to no bloom activity on the Lake.

Estuaries

Total inflow to the St. Lucie Estuary averaged more than 746 cfs over the past week with approximately 552 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 fair range (5-10) for adult eastern oysters.

Total inflow to the Caloosahatchee Estuary averaged 1,445 cfs over the past week with approximately 585 cfs coming from the Lake. Seven-day average surface salinities remained almost fresh (0.2) at the two most upstream sites (S-79 and Val I75) and increased at the remaining sites in the estuary over the past week. Salinities are in the good range (0-10) for tape grass at Val I-75 and Ft. Myers. Salinities are in the good range (10-30) for adult eastern oysters at Shell Point and Sanibel, and in the fair 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 97,000 ac-feet. The total amount of inflows to the STAs in WY2021 is approximately 1,512,000 ac-feet. Most STA cells are near 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-ways 1, 3, 4 and 5, 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

For the third week in a row at all the gauges monitored for this report the WCA stages fell within the early dry season WY21 recession recommendations. Depths remain above average in Taylor Slough and salinities in Florida Bay remain below the historical average for this time of year. High concentrations of wading birds were noted along the southern coast, indicating good foraging conditions moving towards nesting season. If a near optimal recession continues many more wading birds are expected in high numbers within the central Everglades soon.

Supporting Information

KESSIMMEE BASIN

Rainfall

The Upper Kissimmee Basin received 0.05 inches of rainfall in the past week and the Lower Basin received 0.02 inches (SFWMD Daily Rainfall Report 01/04/2021).

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: 1/5/2021

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)						
							1/3/21	12/27/20	12/20/20	12/13/20	12/6/20	11/29/20	11/22/20
Lakes Hart and Mary Jane	S-62	30	LKMJ	61.0	R	61.0	0.0	-0.1	0.0	0.1	-0.1	0.0	0.1
Lakes Myrtle, Preston, and Joel	S-57	21	S-57	61.6	R	61.6	0.0	0.0	0.0	0.0	-0.1	0.0	0.1
Alligator Chain	S-60	0	ALLI	64.0	R	64.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Lake Gentry	S-63	8	LKGT	61.6	R	61.5	0.1	0.0	0.0	0.1	-0.1	0.1	0.1
East Lake Toho	S-59	0	TOHOE	58.0	R	58.0	0.0	-0.1	0.0	-0.1	0.0	0.0	0.0
Lake Toho	S-61	179	TOHOW, S-61	54.9	R	55.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0
Lakes Kissimmee, Cypress, and Hatchineha	S-65	676	KUB011, LKIS5B	52.4	R	52.5	-0.1	0.0	0.0	0.0	0.2	0.3	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: 1/5/2021

Metric	Location	1-Day Average		Average for the Preceding 7-Days ¹							
		1/3/2021	1/3/21	12/27/20	12/20/20	12/13/20	12/6/20	11/29/20	11/22/20	11/15/20	11/8/20
Discharge (cfs)	S-65	641	676	729	848	1,382	1,083	842	784	385	187
Discharge (cfs)	S-65A ²	678	733	809	974	1,566	1,275	1,108	1,095	724	361
Discharge (cfs)	S-65D ²	888	944	1,317	1,704	1,605	1,497	1,541	1,685	1,590	797
Headwater Stage (feet NGVD)	S-65D ²	25.73	25.80	25.73	26.08	26.40	26.82	26.99	26.98	27.03	26.94
Discharge (cfs)	S-65E ²	861	944	1,314	1,710	1,687	1,545	1,657	1,835	1,904	895
Discharge (cfs)	S-67	0	0	0	0	0	0	0	0	0	0
DO (mg/L) ³	Phases I & II/III river channel	8.4	8.6	7.5	6.4	7.2	6.0	5.3	4.7	5.2	5.6
Mean depth (feet) ⁴	Phase I floodplain	0.46	0.50	0.68	1.00	1.01	0.90	0.93	0.94	0.75	0.52

¹Seven-day average of weighted daily means through Sunday midnight.

²S-65A discharge combines S-65A with auxiliary structures; S-65D discharge combines discharge at S-65D, S-65DX1, and S-65DX2; S-65D stage averages stage at S-65D and S-65DX1; S-65E discharge combines S-65E and S-65EX1.

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

⁴1-day spatial average from South Florida Water Depth Assessment Tool (SFWDAT).

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

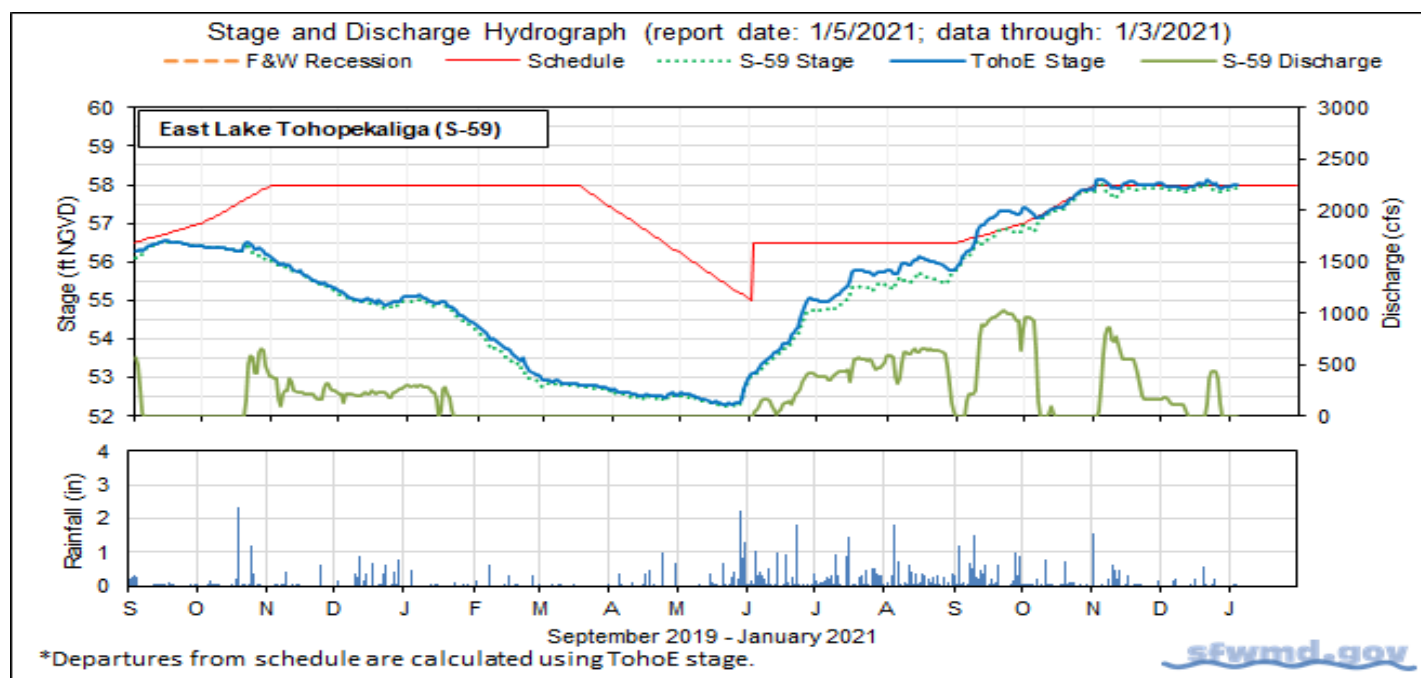


Figure 1. East Lake Toho regulation schedule, stage, discharge and rainfall.

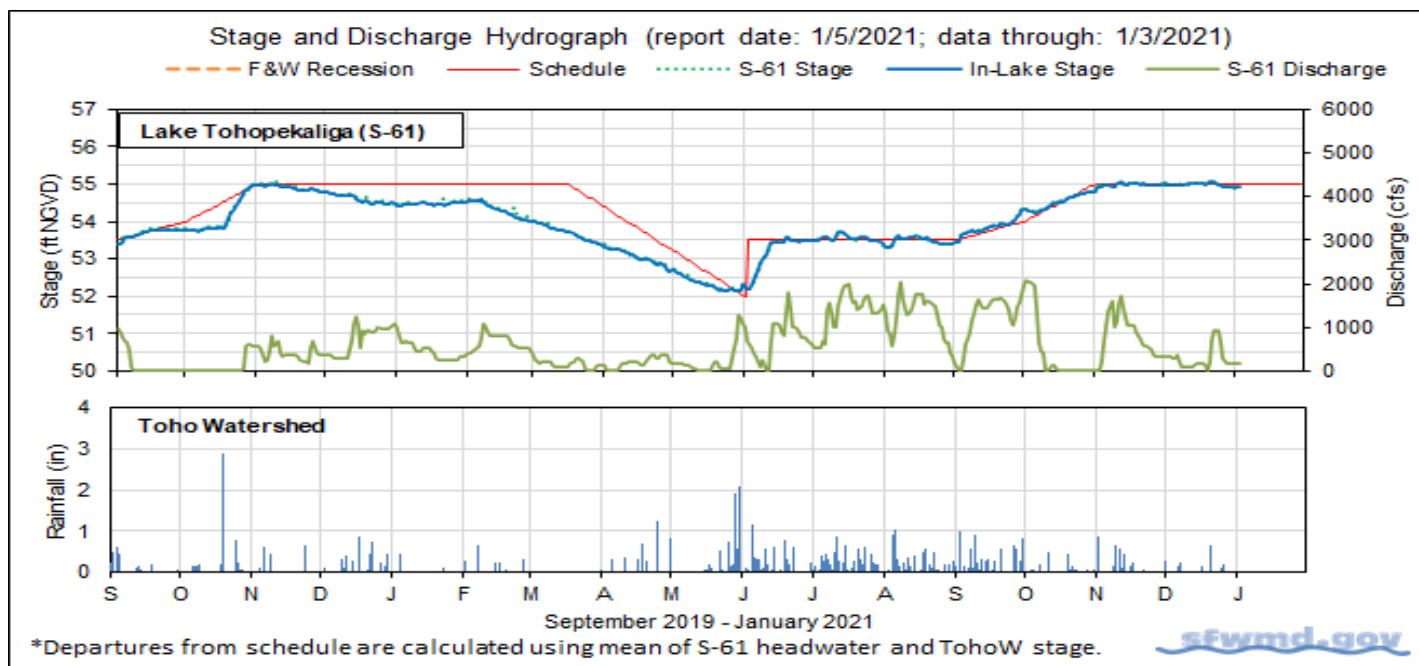


Figure 2. Lake Toho regulation schedule, stage, discharge and rainfall.

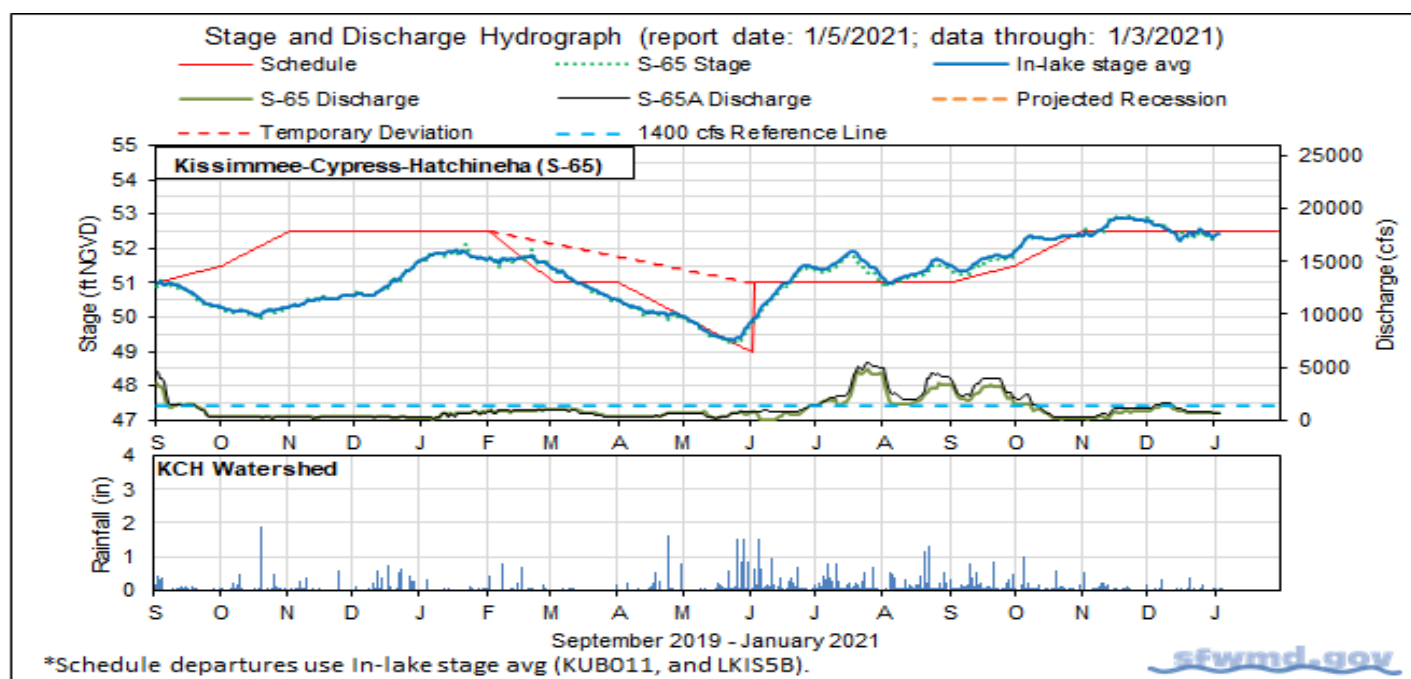


Figure 3. Lakes Kissimmee, Cypress and Hatchineha regulation schedule, stage, discharge and rainfall.

Kissimmee River Phase I Restoration Area Water Depth Maps

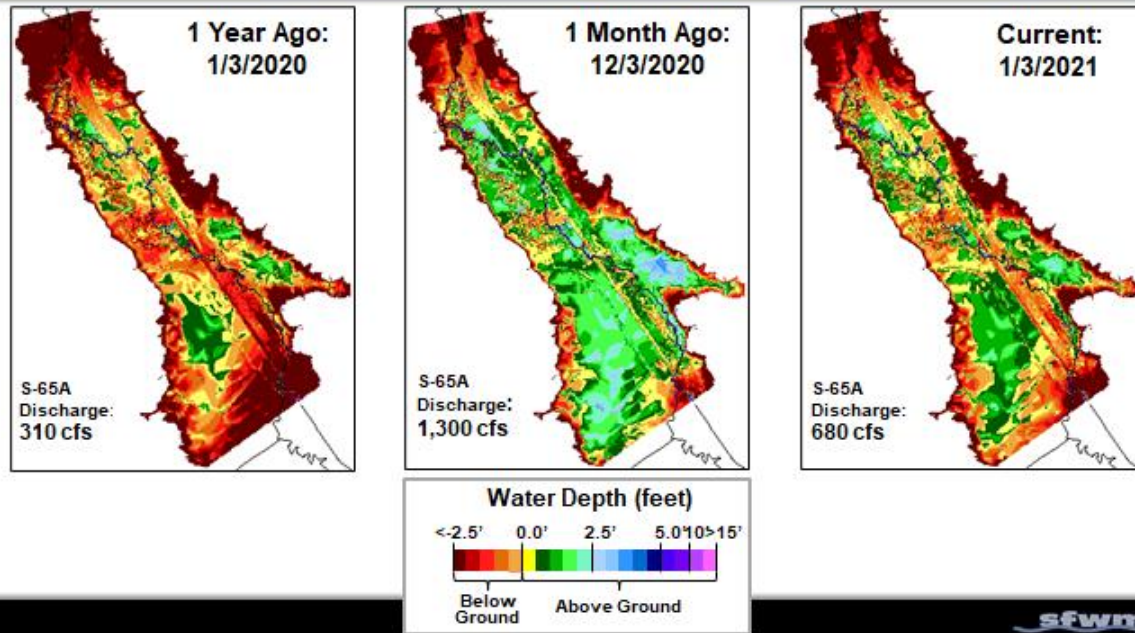
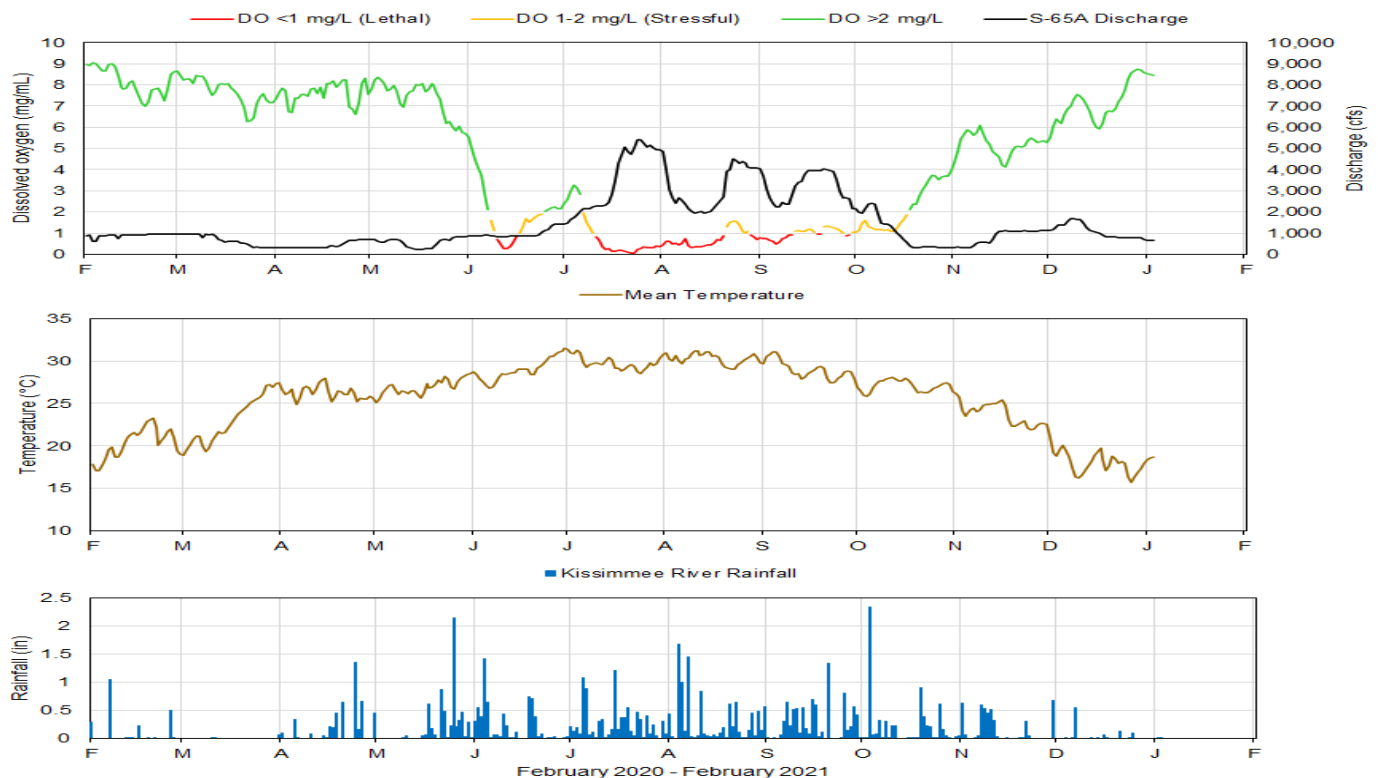


Figure 4. Phase I area floodplain water depths (from left to right) one year ago, one month ago and current. Color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to January 16, 2012.



Dissolved oxygen (DO) and temperature are mean daily values averaged for PC62, KRBN, PC33, PD62R and PD42R with an average of 3 stations reporting this week. Rainfall values are daily totals for Kissimmee River (Pool BCD) AHED watershed. Report Date: 1/5/2021; data are through: 1/3/2021

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

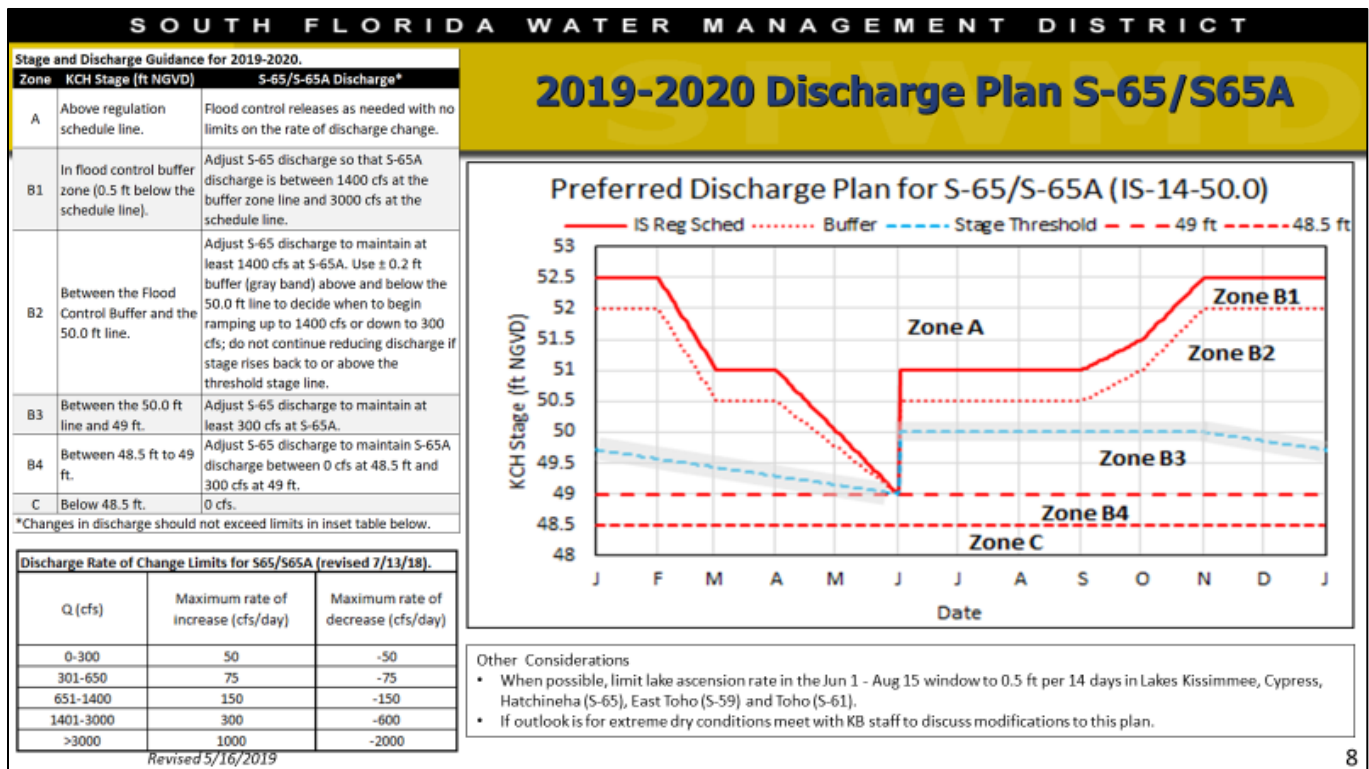


Figure 6. The 2019-2020 Discharge Plan for S-65/S-65A.

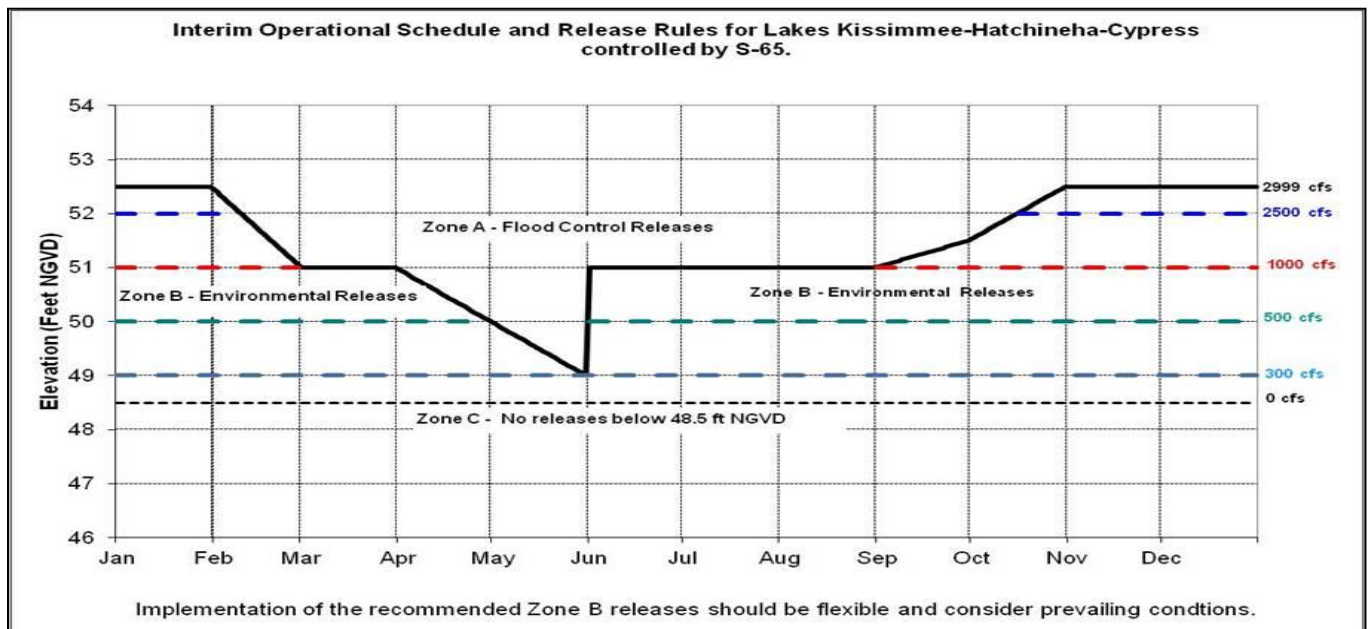


Figure 7. Interim operations schedule for S-65 (solid black line). The discharge schedule shown to the right has not been used in recent years.

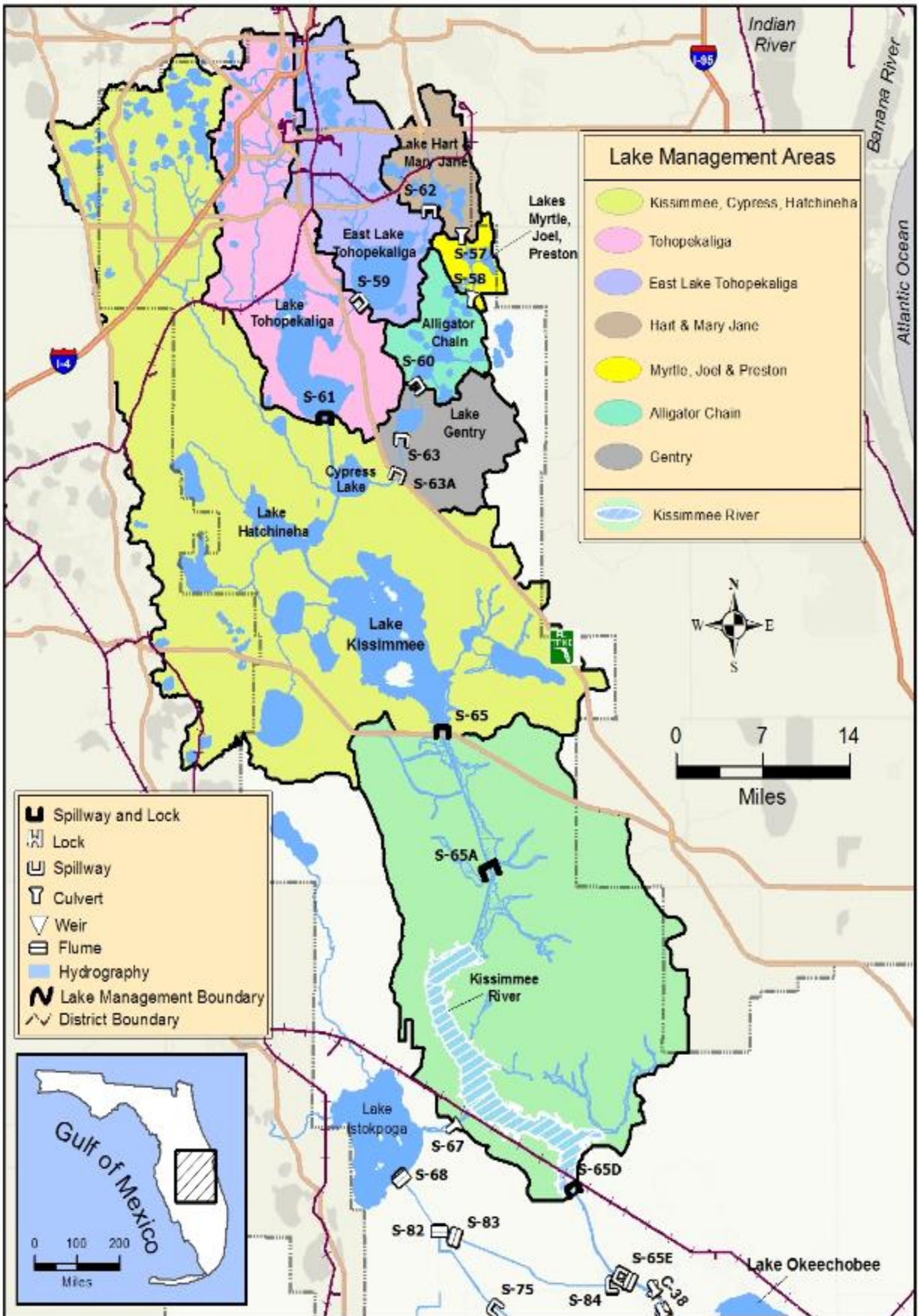


Figure 8. The Kissimmee Basin.

LAKE OKEECHOBEE

Lake Okeechobee stage is 15.81 feet NGVD, 0.17 feet lower than a month ago, and 2.64 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 August 1, 2020; currently 0.31 feet above. 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 (Figure 3). Lake stage has declined since mid-November and is currently in the Low sub-band. According to RAINДАР, no rain fell on the Lake, and most of the watershed received less than 0.1 inches.

Average daily inflows (excluding rainfall) were lower than the previous week, going from 2,264 cubic feet per second (cfs) to 1,537 cfs. Outflows (excluding evapotranspiration) also decreased from 3,191 cfs to 1,518 cfs. Most of the inflows came from the Kissimmee River (944 cfs through S-65E & S-65EX1) and the C-41a canal (154 cfs through S-84 & S-84X) combined. Releases to the west via S-77 decreased from 1,420 cfs to 620 cfs, and releases east via S-308 also decreased from 1,748 cfs to 693 cfs. 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 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 at 9 stations for taxonomic identification and toxin analyses. The December sampling occurred on the 15th and 16th, and four of the nine toxin samples had levels above detection but still well below the EPA recreational waters recommendation of 8 µg/L (Figure 6). Chlorophyll *a* samples at six stations had values >20 µg/L, and 17 additional stations had values >10 µg/L. Interestingly, the highest (37.2 µg/L) and lowest (3.7 µg/L) values occurred at two adjacent stations on the same transect in the southwest portion of the lake, PALMOUT3 and PALMOUT2, respectively.

The most recent satellite image (January 1, 2020) from the NOAA cyanobacteria monitoring product derived from EUMETSAT's Sentinel 3 OLCI sensor data showed continued low bloom potential on the Lake (Figure 7).

Water Management Summary

Lake Okeechobee stage was 15.81 feet NGVD on January 3, 2020, 0.01 feet lower than last week and 0.17 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 preferred ecological envelope since August 1, 2020 and is currently 0.31 feet above. Recent satellite imagery and water quality results suggest little to no bloom activity on the Lake.

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)	OUTFLOWS	Previous week Avg Daily CFS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)
S-65E & S-65EX1	1311	944	0.4	S-77	1420	620	0.2
S-71 & S-72	218	199	0.1	S-308	1748	693	0.3
S-84 & S-84X	466	154	0.1	S-351	6	94	0.0
Fisheating Creek	144	115	0.0	S-352	5	102	0.0
S-154	17	14	0.0	S-354	12	9	0.0
S-191	0	0	0.0	L-8 Outflow			
S-133 P	33	30	0.0	ET	1681	1403	0.5
S-127 P	20	12	0.0	Total	4872	2921	1.1
S-129 P	13	8	0.0				
S-131 P	6	4	0.0				
S-135 P	32	56	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	1	0.0				
Rainfall	322	0	0.0				
Total	2586	1537	0.6				

Provisional Data

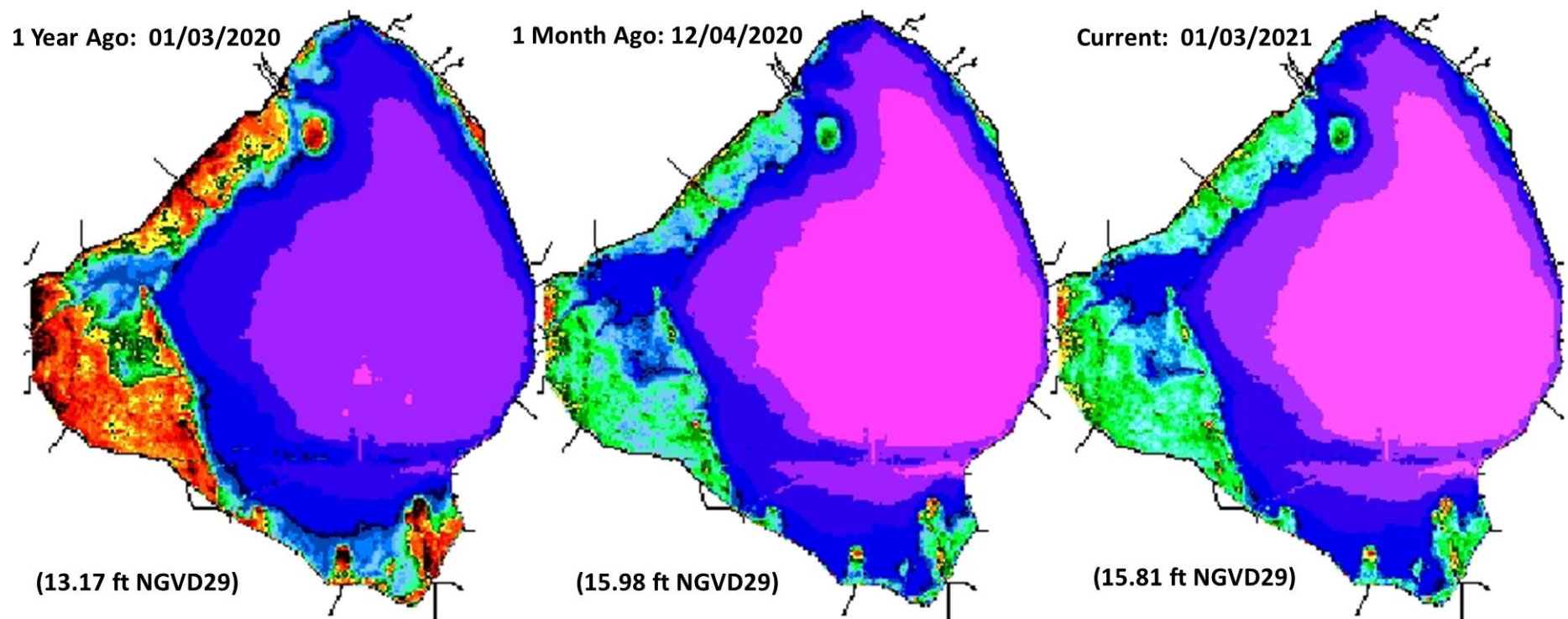


Figure 1. Water depth estimates on Lake Okeechobee based on the South Florida Water Depth Assessment Tool.

Lake Okeechobee Stage vs Updated Ecological Envelope

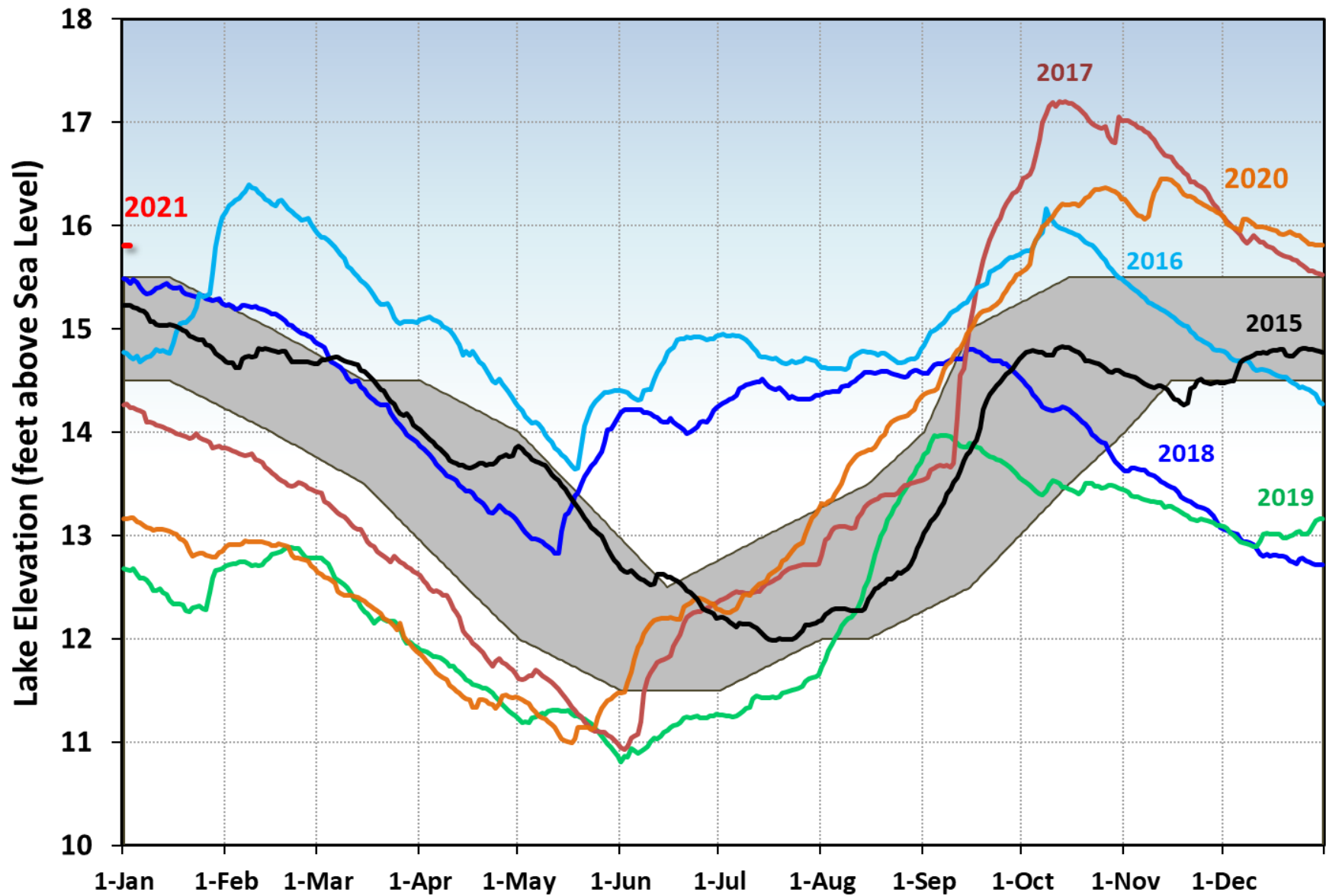


Figure 2. Select annual stage hydrographs for Lake Okeechobee in comparison to the updated Ecological Envelope.

Lake Okeechobee Water Level History and Projected Stages

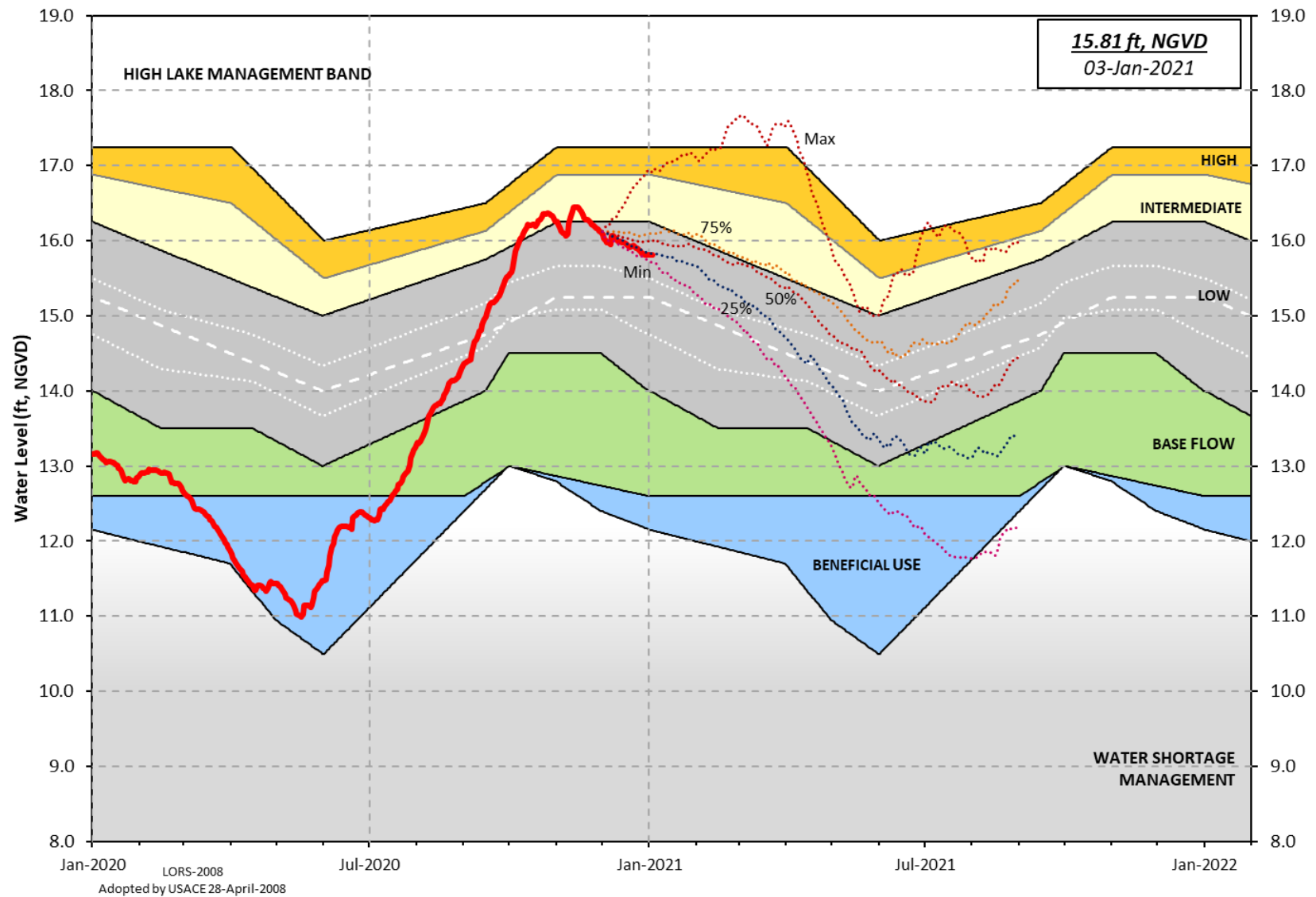


Figure 3. Recent Lake Okeechobee stages and releases, with projected stages based on a dynamic position analysis.

SFWMD PROVISIONAL RAINDAR 7-DAY BASIN RAINFALL ESTIMATES
FROM: 0400 EST, 12/28/2020 THROUGH: 0400 EST, 01/04/2021

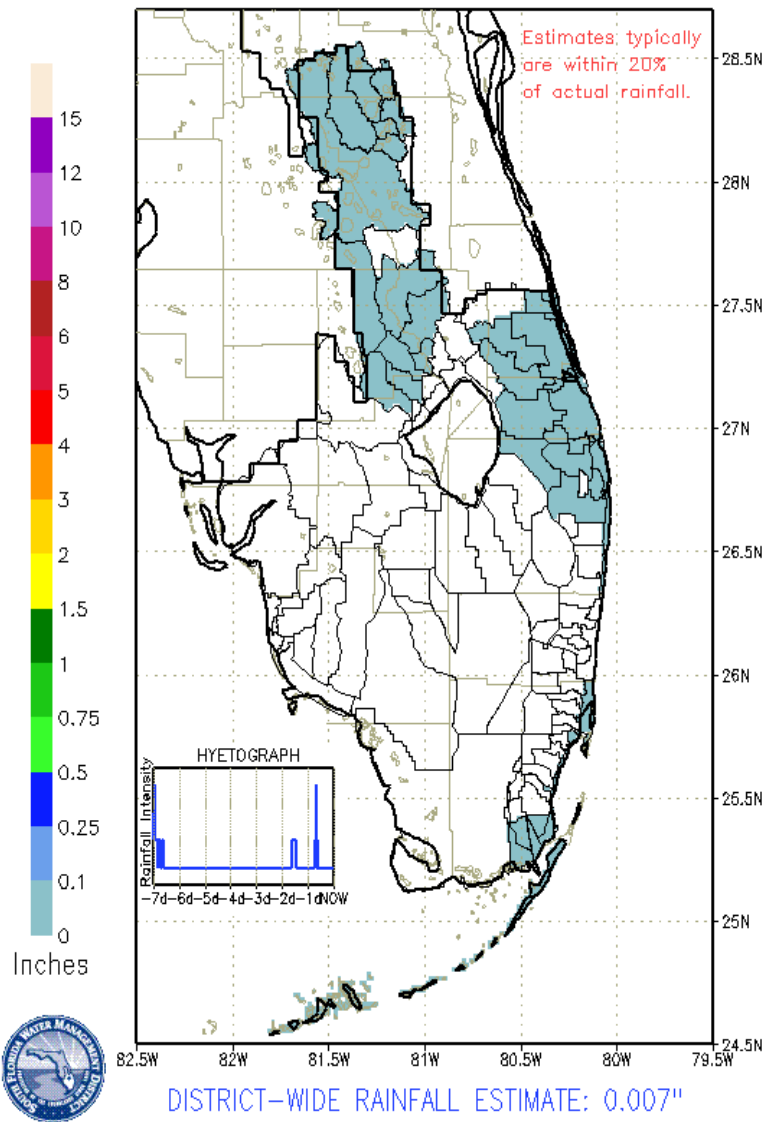


Figure 4. 7-Day rainfall estimates by RAINDAR.

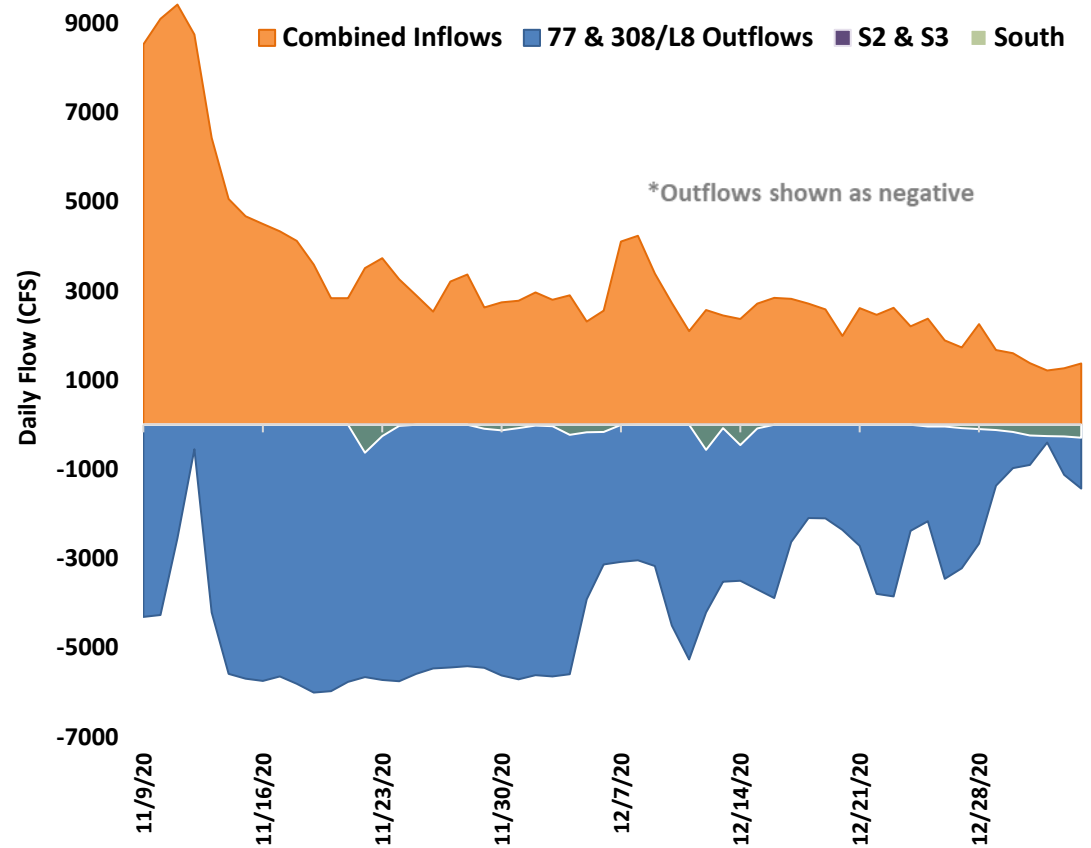


Figure 5. Major inflows (orange) and outflows (blue) of Lake Okeechobee, including the S-350 structures designated as South (green). The L-8 Canal flows through Culvert 10A are included as outflows when positive, and as inflows when backflowing into the Lake. All inflows and outflows are shown as positive 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: December 15-16, 2020

Station	CHL _a (ug/L)	TOXIN (ug/L)	TAXA
FEBIN _(12/7)	13.0		
FEBOUT _(12/7)	24.7		
KISSRO.0	12.7	0.3	<i>Micro/Micro</i>
L005	24.5	BDL	<i>Microcys</i>
LZ2	9.4	0.3	mixed
KBARSE	16.4		
RITAE2	7.5	0.4	<i>Microcys</i>
PELBAY3	13.5		
POLE3S	9.0		
LZ25A	10.4		
PALMOUT	16.8	0.6	<i>Microcys</i>
PALMOUT1	10.7		
PALMOUT2	3.7		
PALMOUT3	37.2		
POLESOUT	15.5	BDL	mixed
POLESOUT1	24.0		
POLESOUT2	11.0		
POLESOUT3	25.5		
EASTSHORE	16.3		
NES135	24.4		
NES191	14.8		

Station	CHL _a (ug/L)	TOXIN (ug/L)	TAXA
L001	10.8		
L004	16.9		
L006	4.7		
L007	7.0		
L008	19.9		
LZ30	11.3	BDL	mixed
LZ40	3.9		
CLV10A	10.8	BDL	mixed
NCENTER	14.4		

Sampled 12/14

S308C	4.5	BDL	mixed
S77	4.4		

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

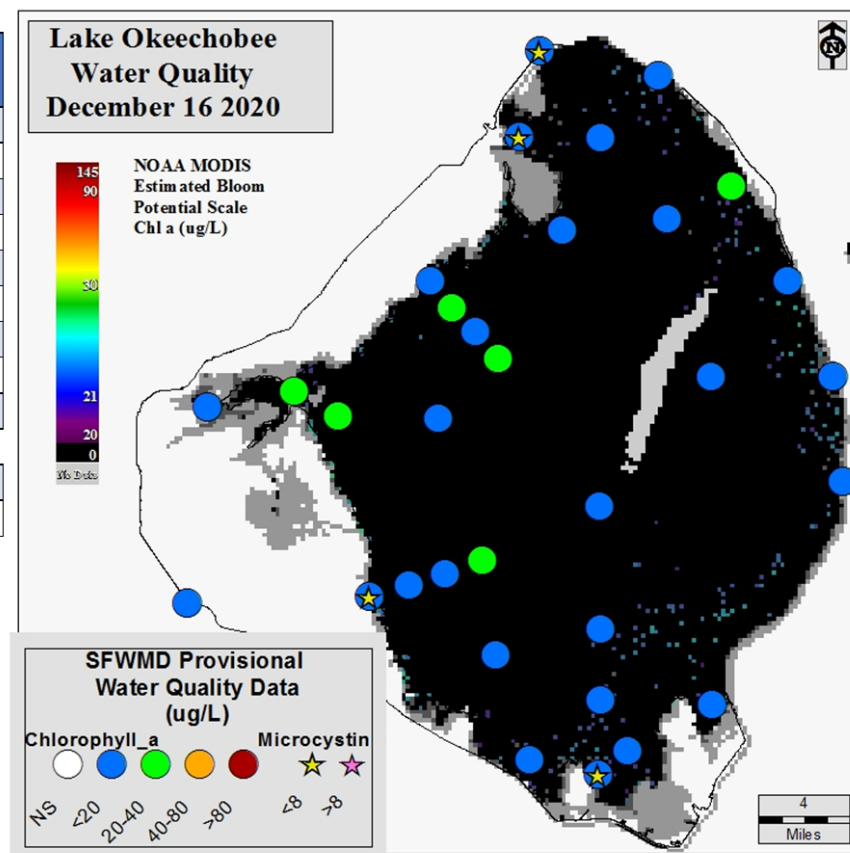


Figure 6. Provisional results from the expanded monitoring sampling trips on December 15 - 16, 2020.

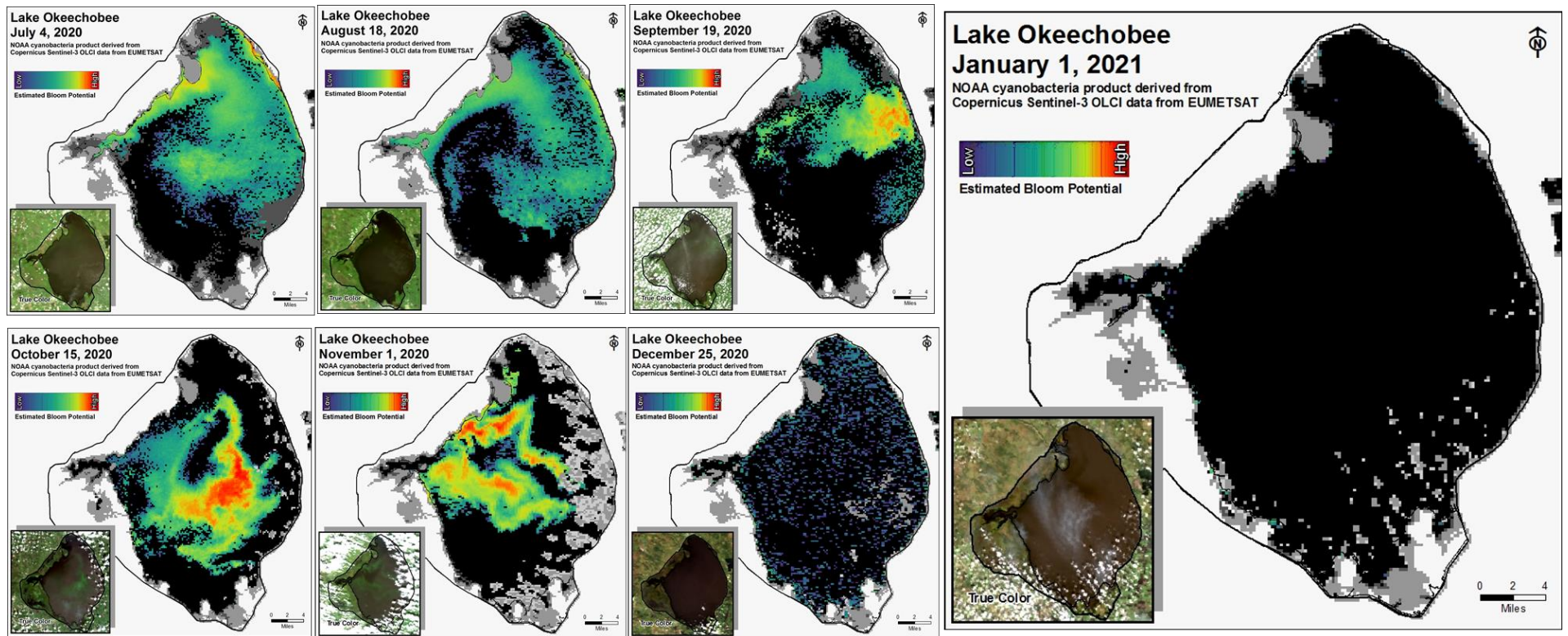


Figure 7. Cyanobacteria bloom potential based on NOAA's harmful algal bloom monitoring system. Gray color indicates cloud cover.

ESTUARIES

St. Lucie Estuary:

Last week total inflow to the St. Lucie Estuary averaged more than 746 cfs (Figures 1 and 2) and last month inflow averaged more than 1,198 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).

Location	Flow (cfs)
Tidal Basin Inflow	110
S-80	567
S-308	647
S-49 on C-24	42
S-97 on C-23	27
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 6.1. Salinity conditions in the middle estuary are estimated to be within the fair range for adult eastern oysters (Figure 3).

Table 2. Seven-day average salinity at three monitoring sites in the St. Lucie Estuary. Current average is in bold face type, previous average in parentheses. The envelope reflects the preferred salinity range for adult eastern oysters (*Crassostrea virginica*) in the middle estuary.

Sampling Site	Surface	Bottom	Envelope
HR1 (North Fork)	5.3 (7.0)	5.6 (8.9)	NA ¹
US1 Bridge	5.6 (8.7)	6.6 (13.1)	10.0-26.0
A1A Bridge	14.7 (15.3)	20.8 (21.6)	NA ¹

¹Envelope not applicable

Caloosahatchee Estuary:

Last week total inflow to the Caloosahatchee Estuary averaged approximately 1,445 cfs (Figures 5 and 6) and last month inflow averaged about 3,369 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	620
S-78	752
S-79	1282
Tidal Basin Inflow	162

Over the past week, salinity remained the same at the two most upstream sites and increased at the remaining sites in the estuary (Table 4, Figures 7 & 8). The seven-day average salinity values are within the fair 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	1.4 (0.2)	2.5 (0.2)	NA
Cape Coral	7.2 (4.0)	9.4 (5.6)	10.0-30.0
Shell Point	21.0 (17.1)	22.1 (19.3)	10.0-30.0
Sanibel	27.2 (25.5)	27.7 (26.1)	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 0.60 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 115 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	115	0.60	0.3
B	300	115	0.35	0.3
C	450	115	0.28	0.3
D	650	115	0.25	0.3
E	800	115	0.24	0.3

Red tide

The Florida Fish and Wildlife Research Institute reported on December 30, 2020, that *Karenia brevis*, the Florida red tide dinoflagellate, was observed at background to high concentrations in and offshore of Lee County, and medium to high concentrations in Collier County. Bloom concentrations were observed in 13 samples collected in Lee and Collier counties but were not observed in samples from Brevard or Palm Beach counties. No samples were analyzed this week from St. Lucie, Martin, Broward or Miami-Dade counties. Respiratory irritation and fish kills (suspected to be related to red tide) were also reported in Lee and Collier 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.

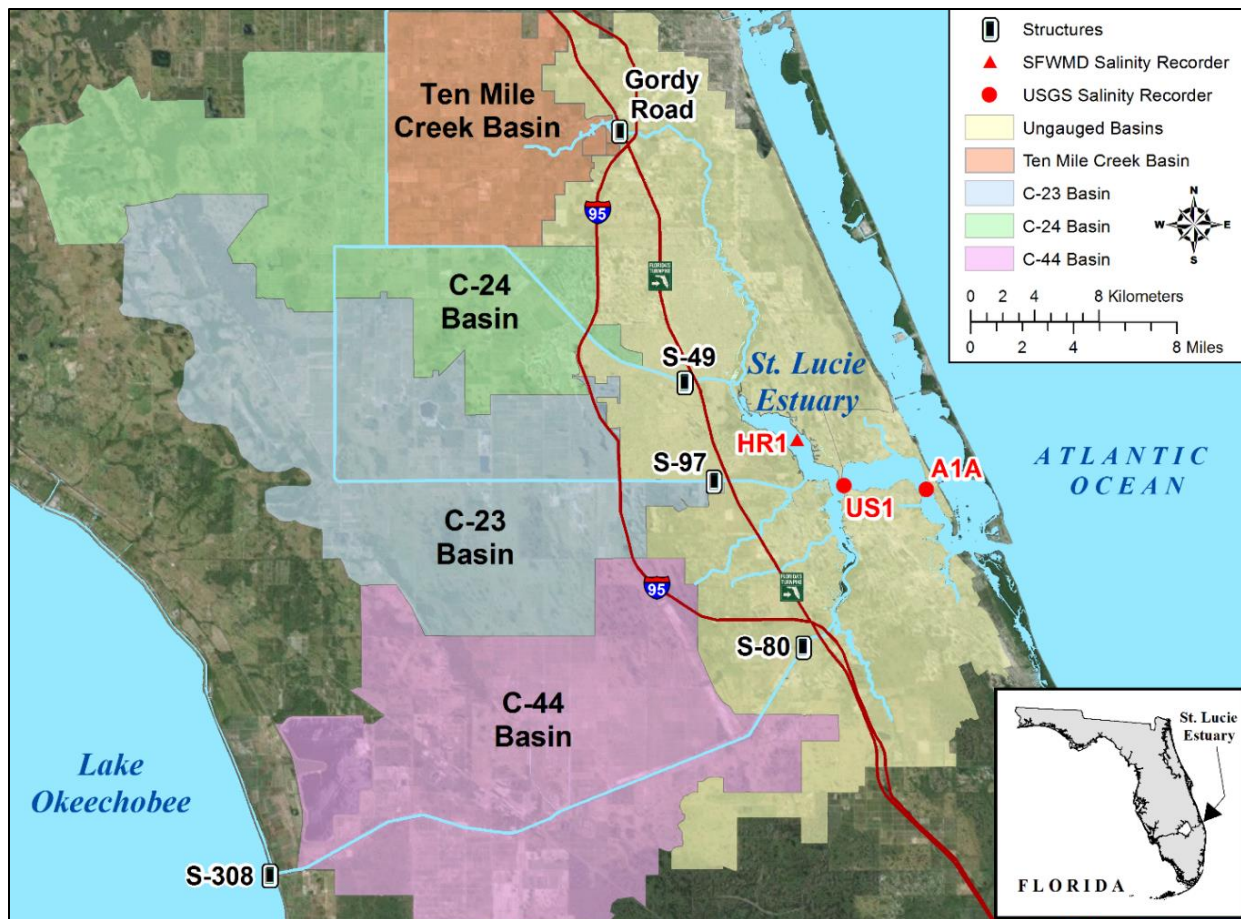


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

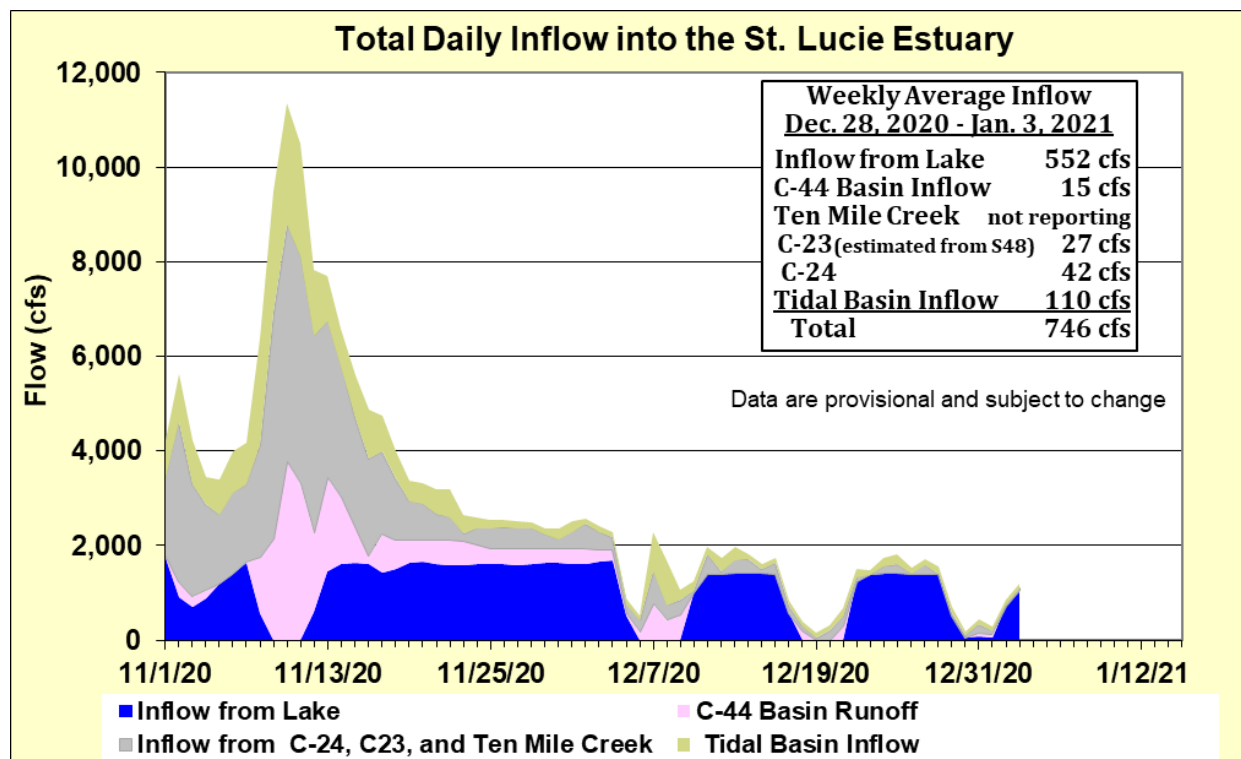


Figure 2. Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basin into the St. Lucie Estuary.

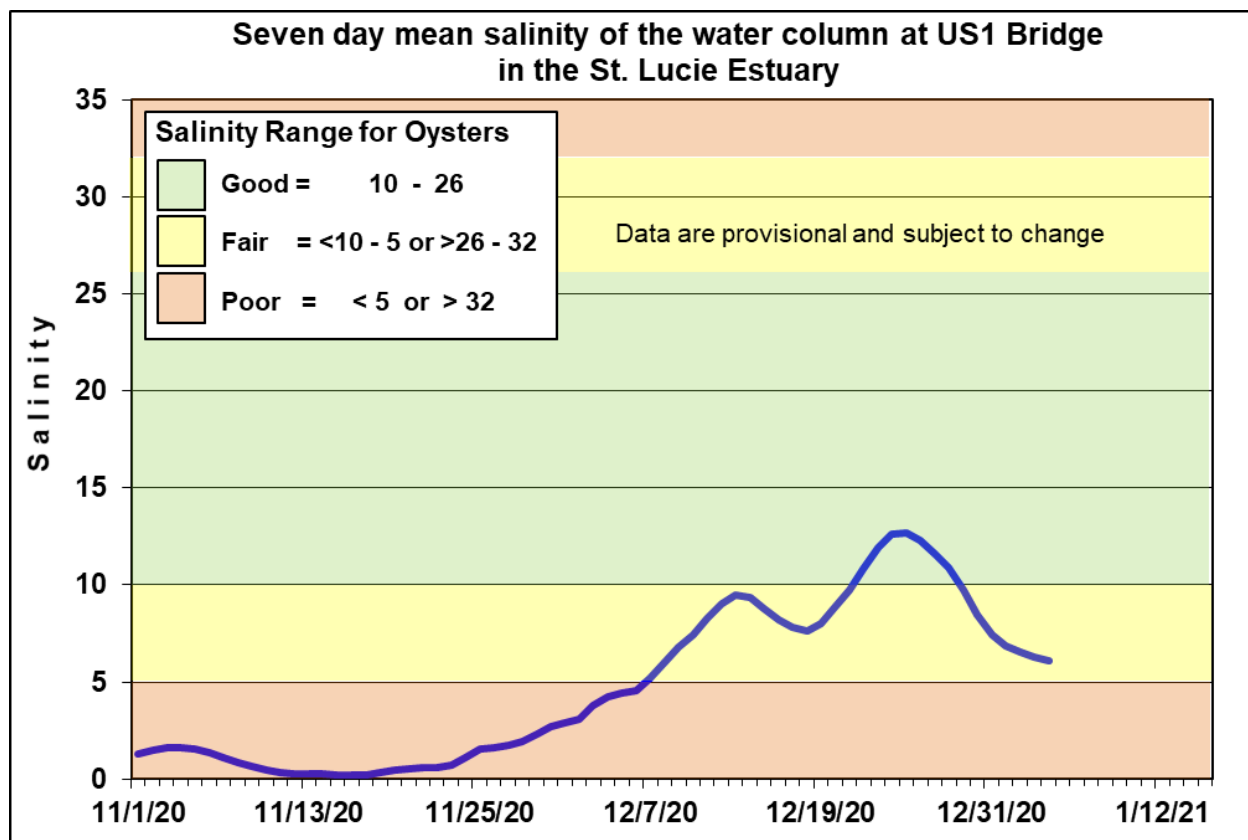


Figure 3. Seven-day mean salinity of the water column at the US1 Bridge.

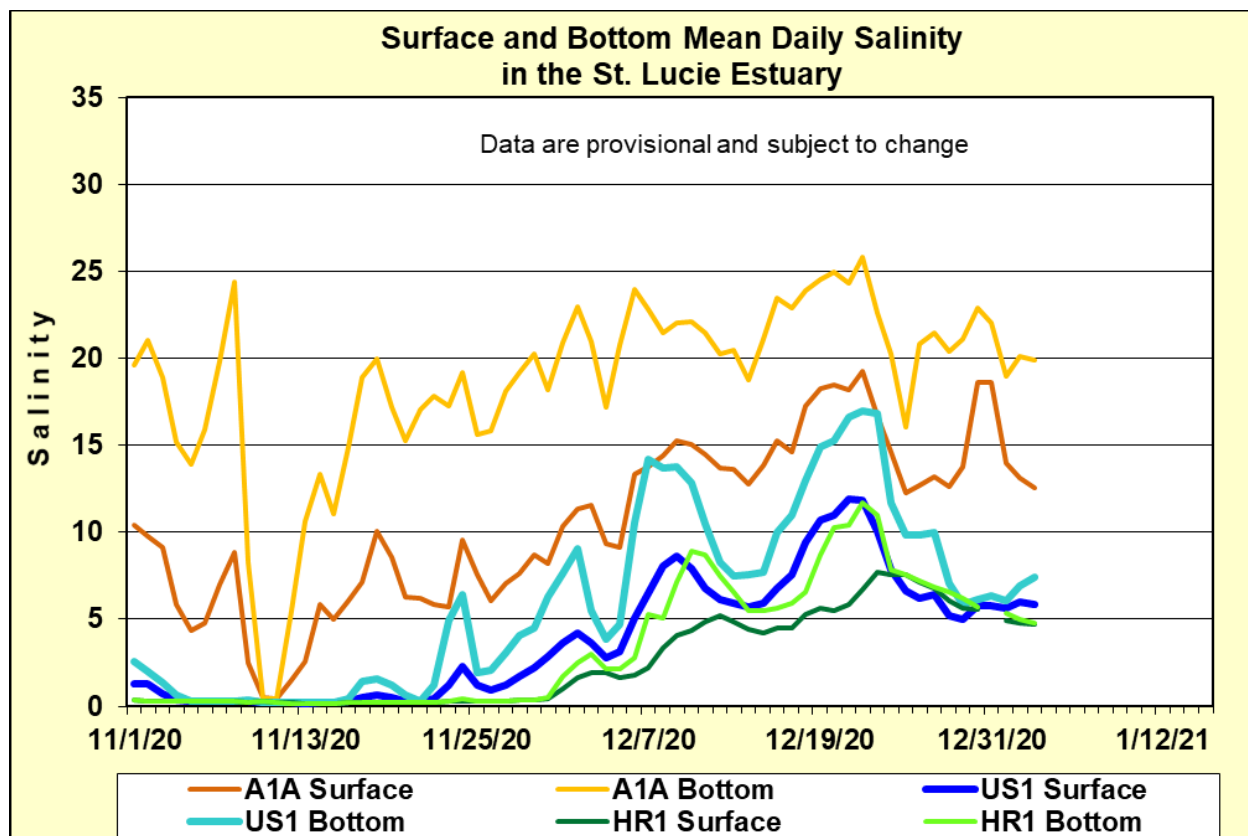


Figure 4. Daily mean salinity at the A1A, US1, and HR1 stations.

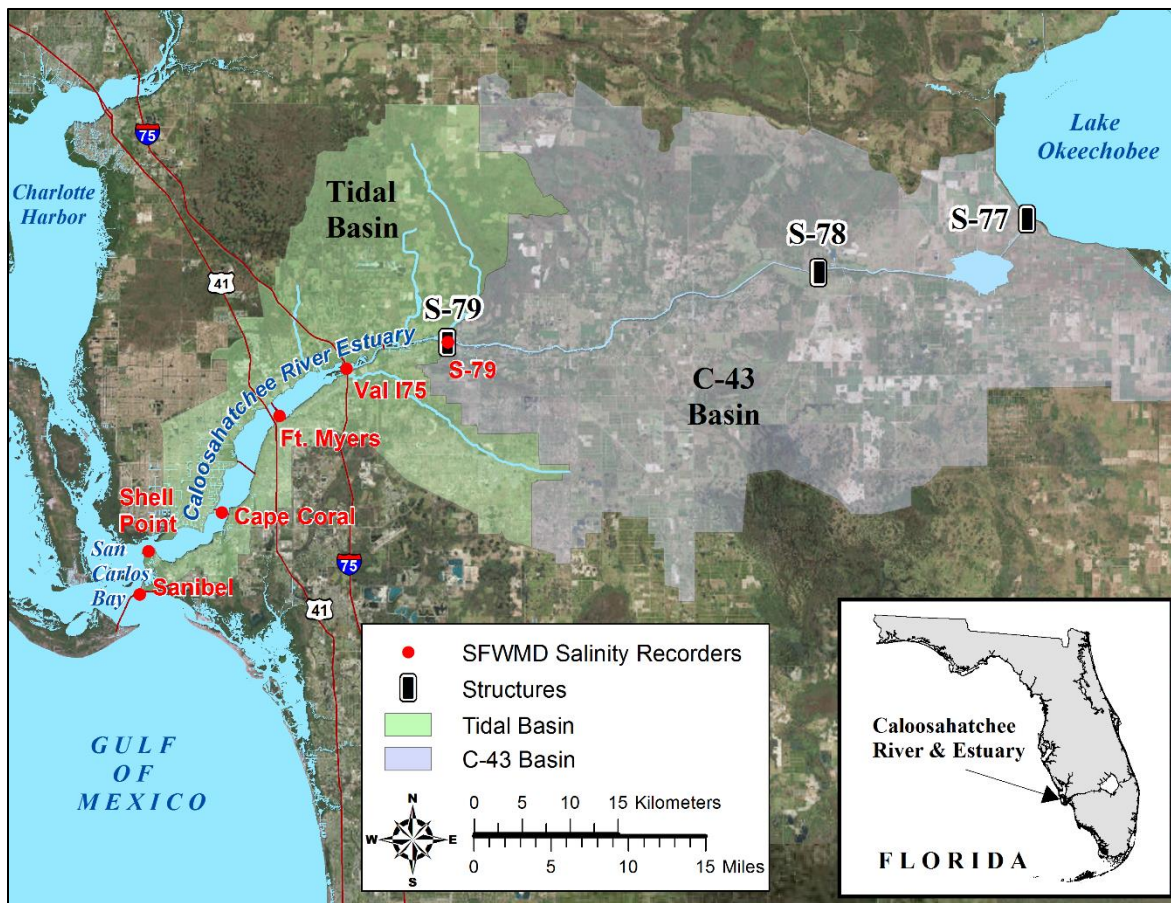


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

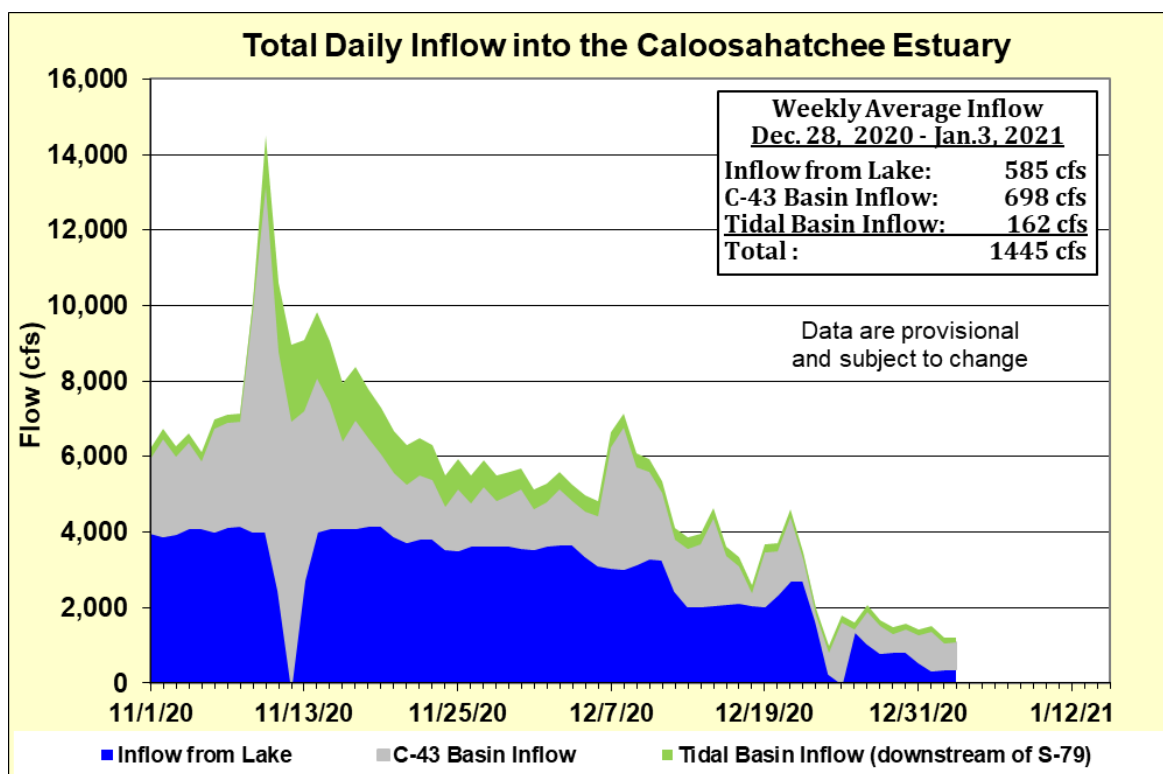


Figure 6. Total daily inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.

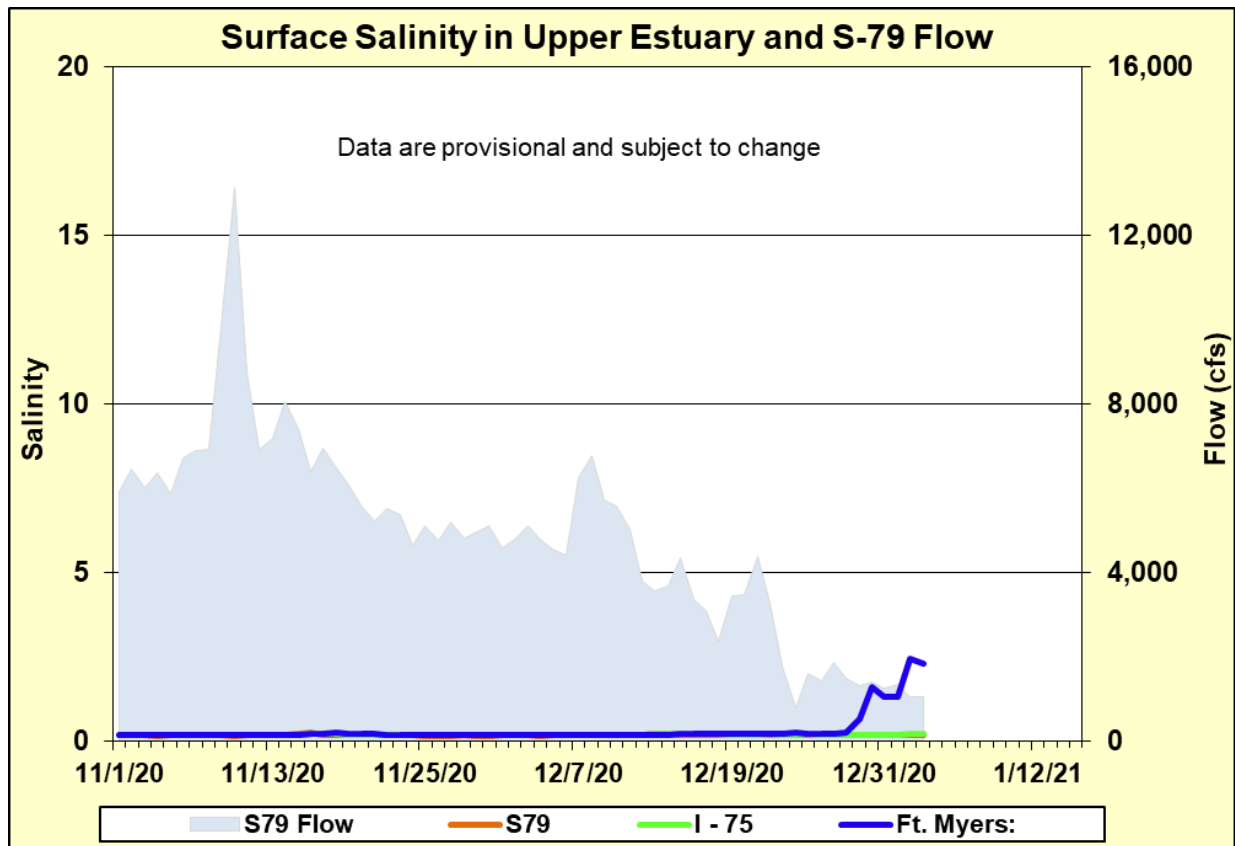


Figure 7. Daily mean flows at S-79 and salinity at upper estuary monitoring stations.

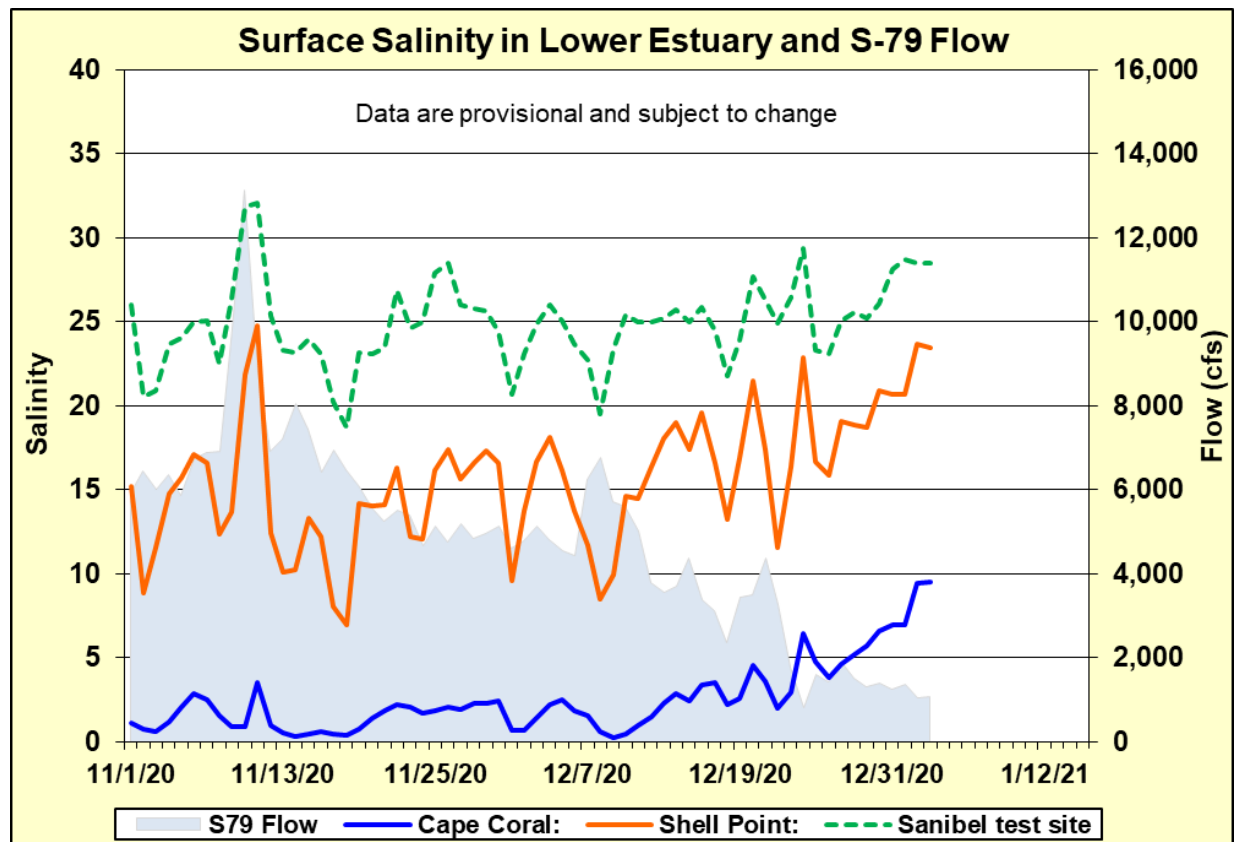


Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.

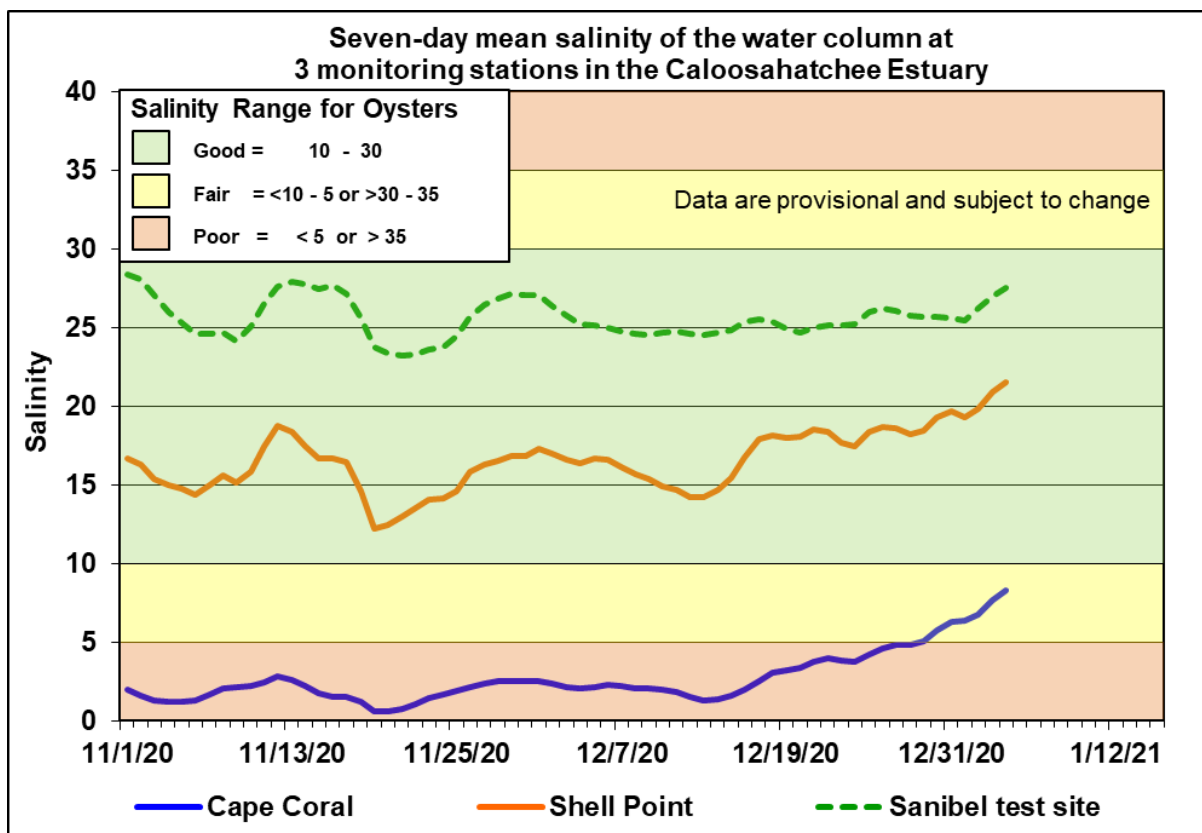


Figure 9. Seven-day mean salinity at Cape Coral, Shell Point, and Sanibel monitoring stations.

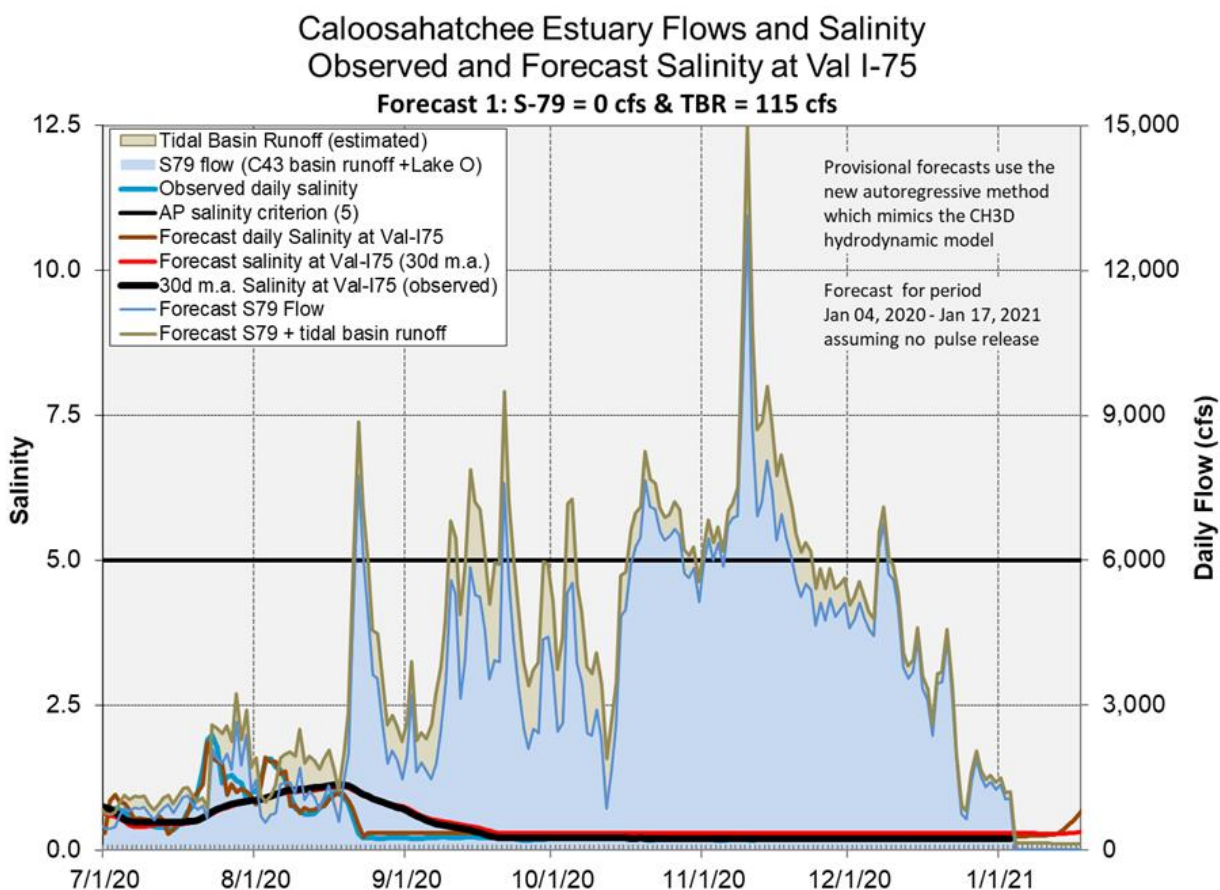
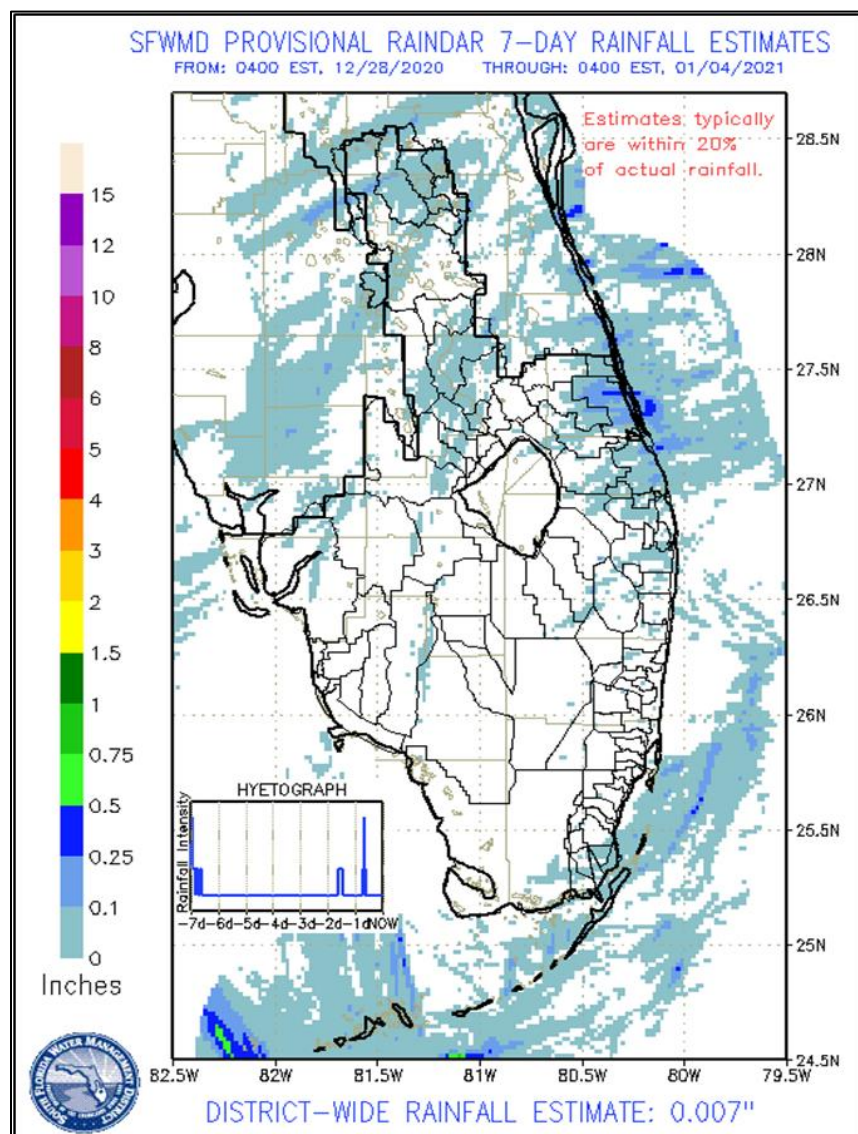


Figure 10. Forecasted Val I-75 surface salinity assuming no pulse release at S-79.

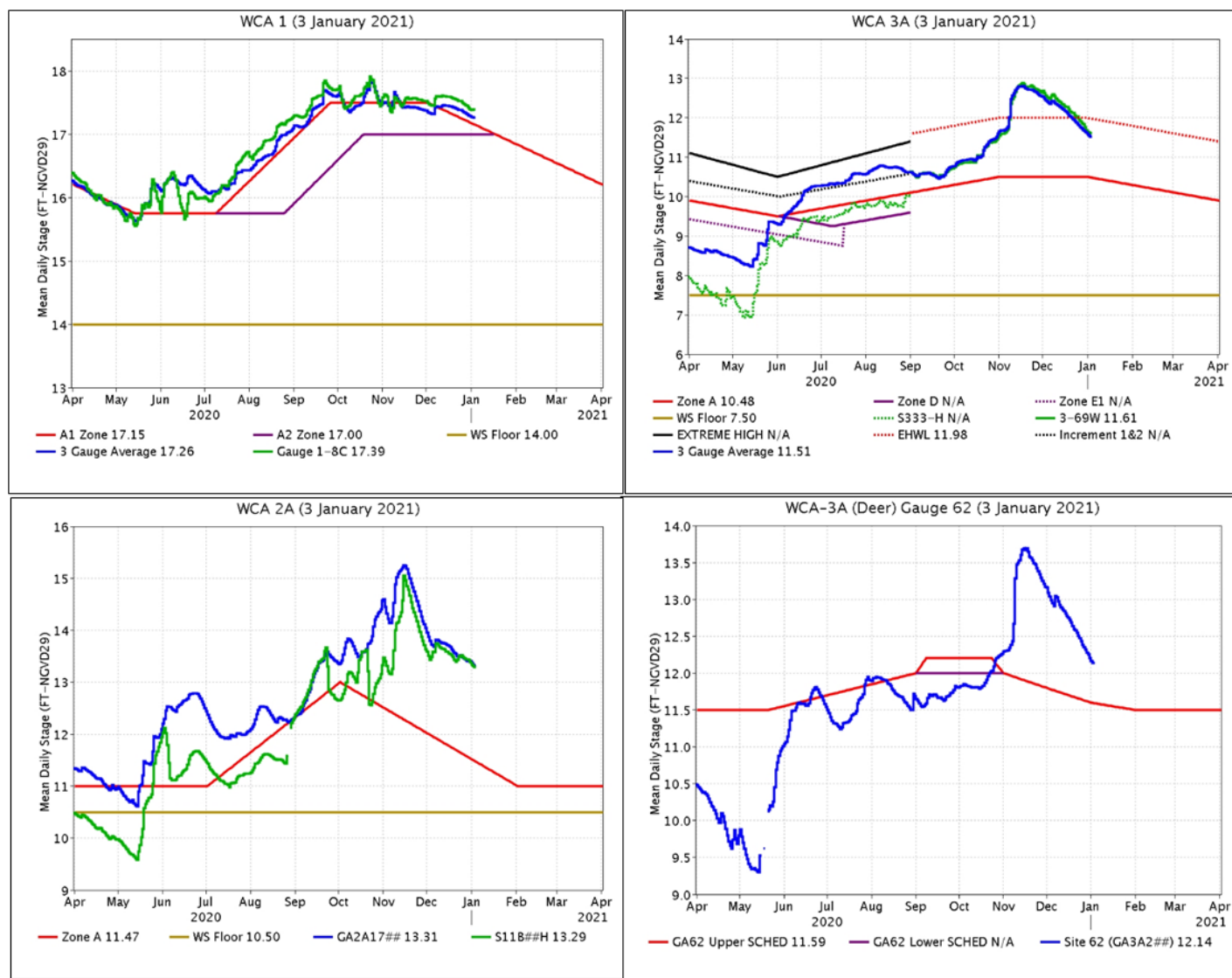
EVERGLADES

Essentially no rain fell across the Everglades last week. At the gauges monitored for this report, stages fell 0.16 feet on average last week. For the third consecutive week, stages fell the most in WCA-3A. Evaporation was 0.78 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	-0.08
WCA-2A	0.00	-0.14
WCA-2B	0.00	-0.14
WCA-3A	0.00	-0.24
WCA-3B	0.01	-0.14
ENP	<0.01	-0.08

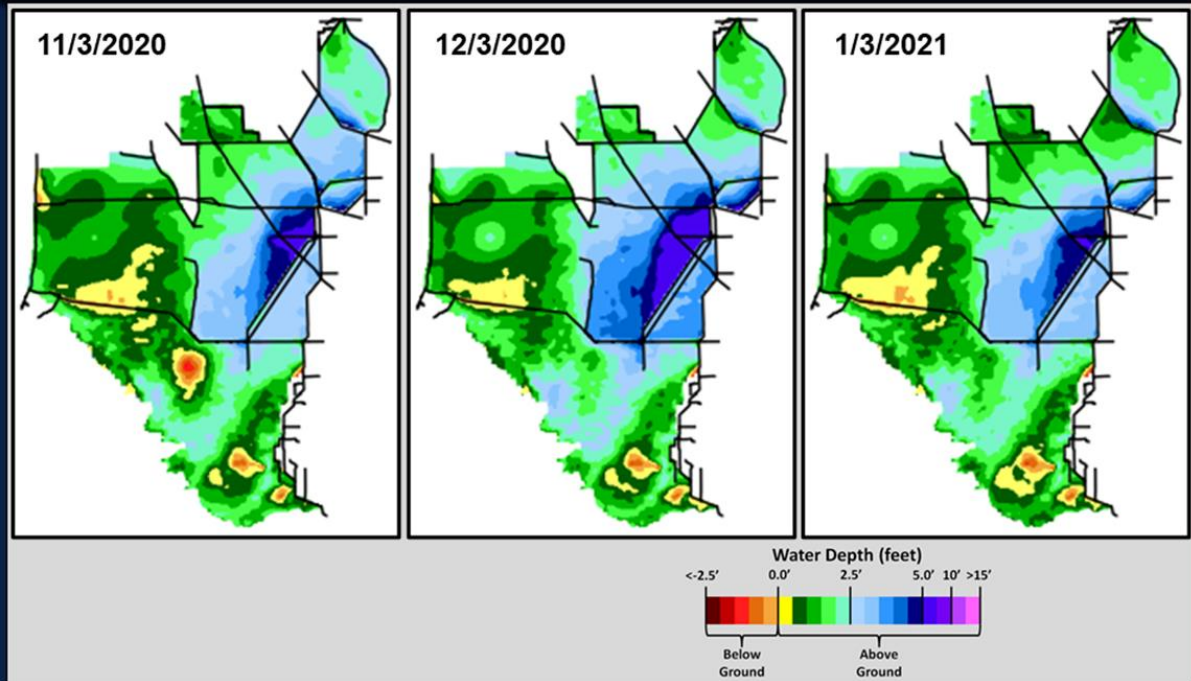
Regulation Schedules: WCA-1: Stage at the 1-8C Gauge is generally trending parallel with schedule, remaining 0.24 feet above the falling Zone A1 regulation line. WCA-2A: The recession in stage at Gauge 2-17 remained parallel to the regulation line last week at 1.84 feet above the falling schedule. WCA-3A: The Three Gauge Average stages continued to recede towards the falling Zone A regulation line last week, currently 1.03 feet above. WCA-3A: Stage at gauge 62 (Northwest corner) continues a sharp decline, now approaching the falling Upper Schedule, above by 0.55 feet.



Water Depths: The WDAT tool for spatial interpolation of depth monthly snapshots indicate that depths in excess of 5.0 feet in WCA-3A South around the upper reaches of the L-67 canal have now been restricted to within the C-11 EXT and C-123 canals. Flooding stress is becoming less ecologically detrimental as depths are retreating in the north of the WCAs. Extreme northern WCA-2A is drying down quickly with depths now potentially within 0.5 foot of soil surface. Northwestern WCA-3A is now within 1.0 feet of the soil surface. Comparing WDAT water levels from present, over the last month stages fell significantly across WCA-3A (up to -1.5 feet downstream of the S-11s) and northwestern WCA-2A. Looking back one year the stage difference patterns are strikingly different than one month ago. Compared to one year ago, the entire region is significantly deeper (with extreme northern WCA-2A the exception), more than 2.0 feet deeper downstream of the S-11s in WCA-3A, and more 1.0 feet in southern WCA-2A.



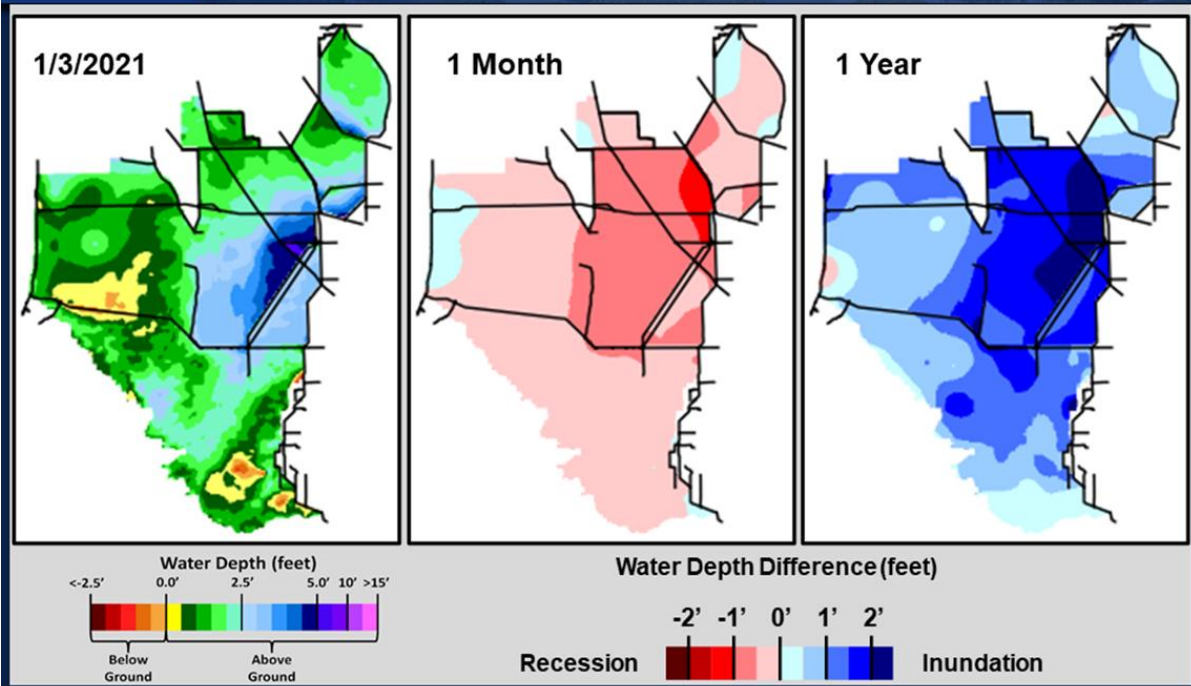
SFWDAT Water Depth Monthly Snapshots



South Florida Water Depth Assessment Tool (SFWDAT)



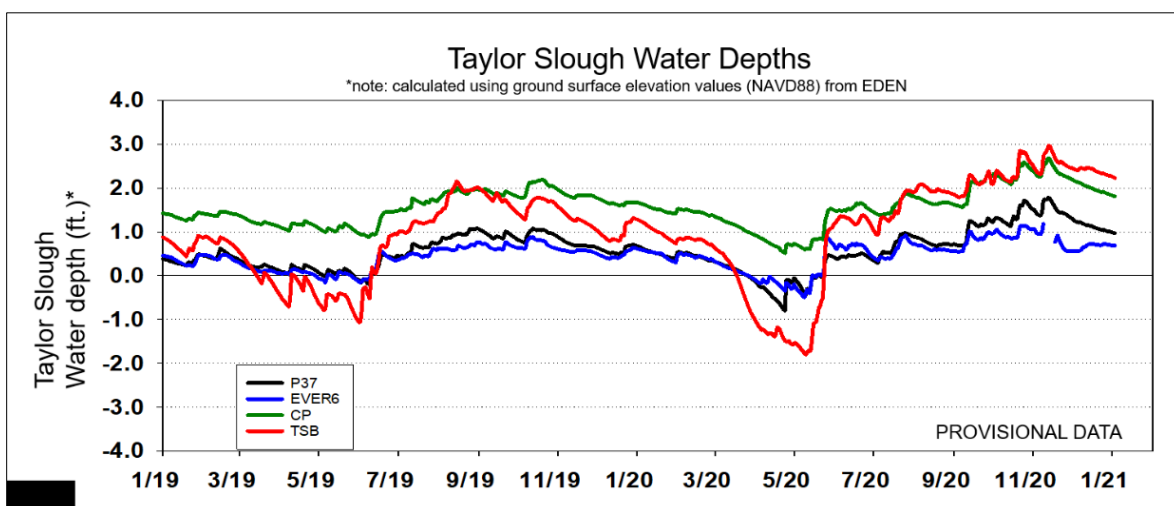
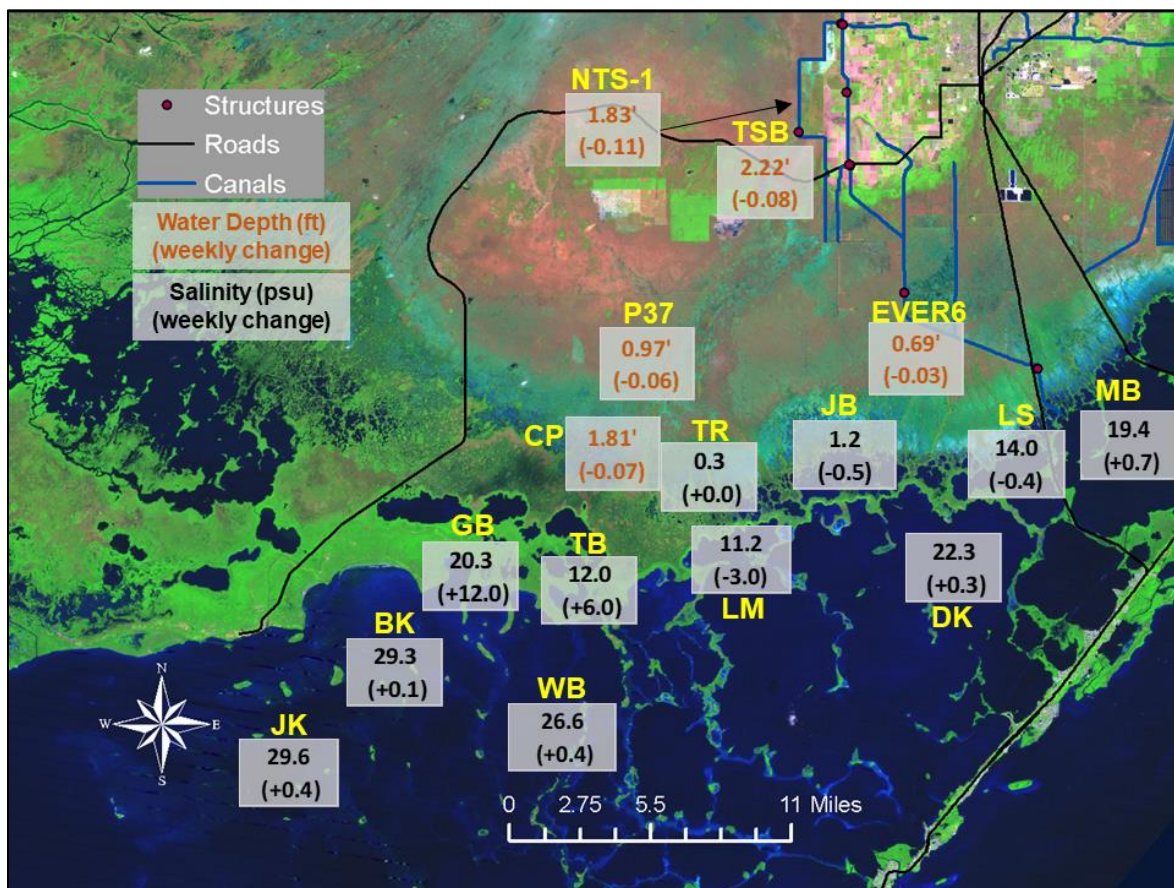
SFWDAT Everglades Difference Maps (Present – Past)



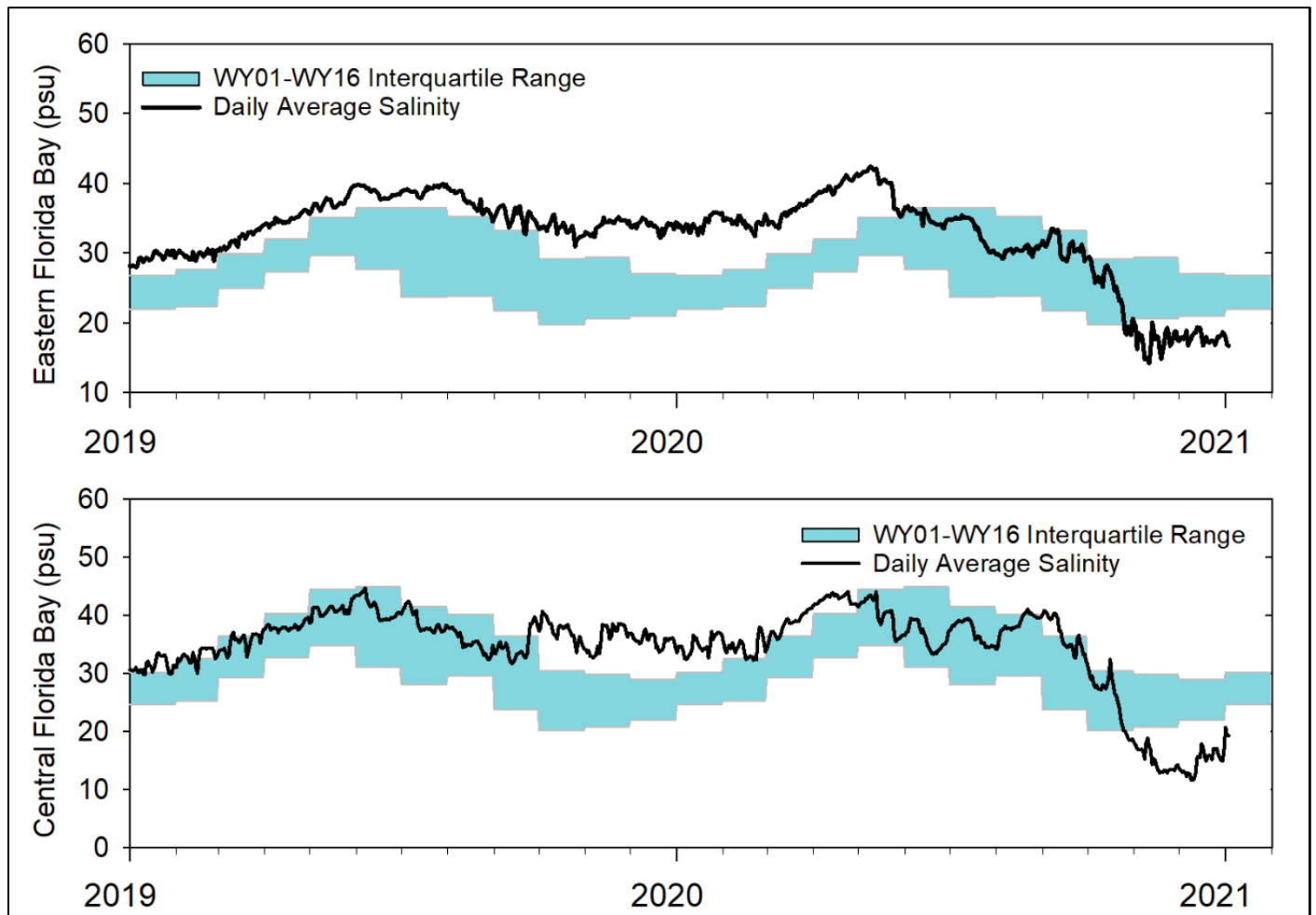
South Florida Water Depth Assessment Tool (SFWDAT)

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 74% or 275 of the tree islands are currently inundated (down from 80% the week prior), and 22% of those islands have been inundated for more than 120 days. Inundation for more than 120 days will cause ecological harm to sensitive islands.

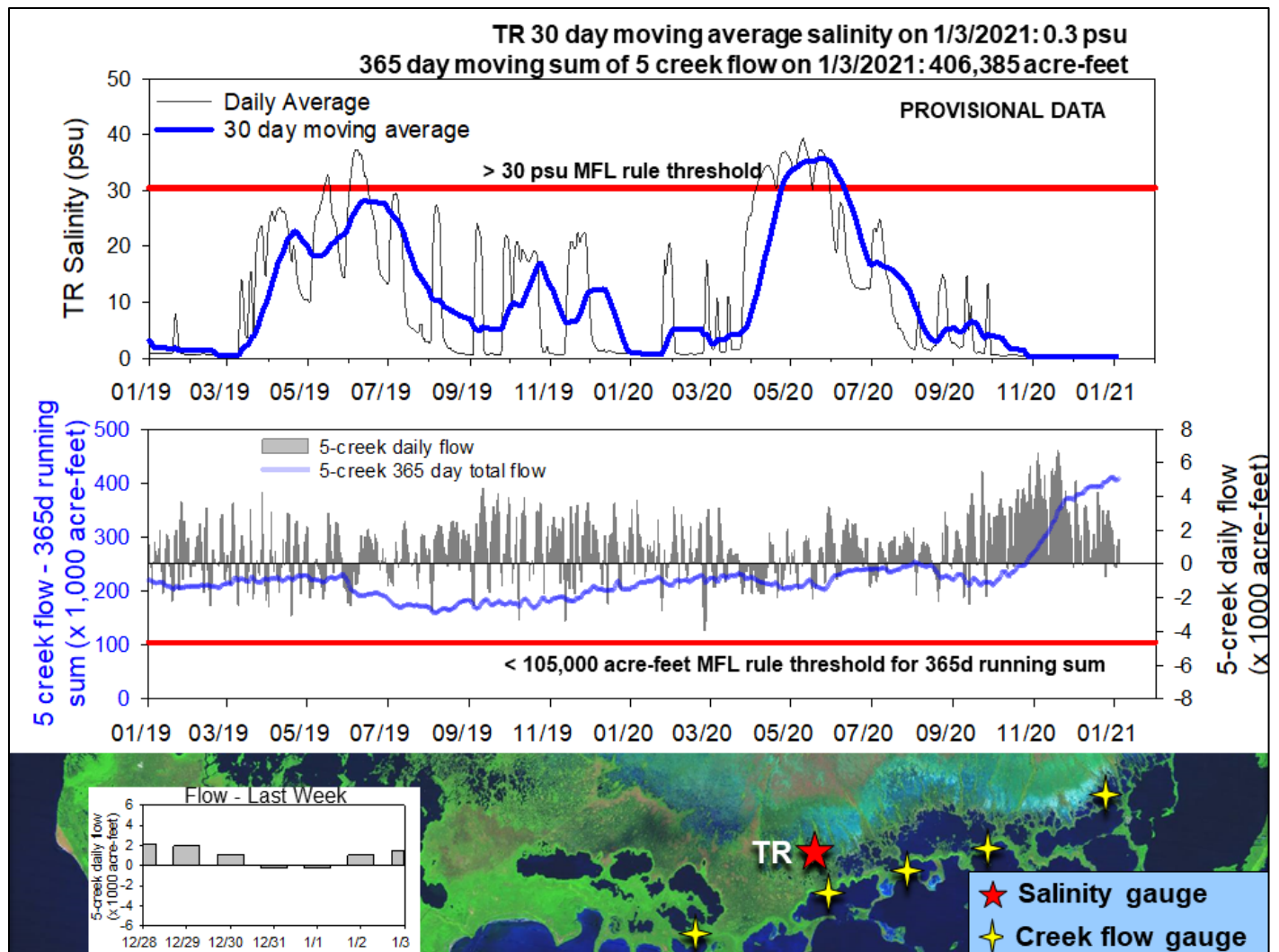
Taylor Slough Water Levels: Very little rain fell over Taylor Slough and Florida Bay this week with a maximum of 0.12 inches of rain recorded for the week in the eastern C-111 panhandle region. On average, Taylor Slough area stages decreased 0.07 feet last week (0.03 feet/week faster than last week). Taylor Slough is still averaging 10 inches higher than the historical average for this time of year, which is a good position to start 2021.



Florida Bay Salinities: Salinities in Florida Bay averaged a 1.7 increase over the week largely driven by the 12 psu weekly increase in the western nearshore area (GB) from saline water moving back into this area as freshwater flows decreased. Nearshore salinity is still 8 psu lower than its historical average.



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 has also remained low at 0.3 psu. Weekly flow from the 5 creeks identified by yellow stars on the map totaled just over 7,200 acre-feet (6,000 acre-feet less than last week). The 365-day moving sum of flow from the five creeks (tracked as part of the Florida Bay MFL criteria) ended at 406,385 acre-feet this week, which is only 70 acre-feet less than last week. That is higher than the 95th percentile of historical data (390,830 acre-feet). This is a value not seen since October of 2012. Creek flows are provisional USGS data.



Water Management Recommendations

Few wading birds were detected in the central Everglades, where stages are high and causing diminishing stress to terrestrial wildlife. Very high numbers of wading birds were noted along the southern coast three weeks ago, and conditions are indicative of a good nesting season to come. As water levels continue to recede, large numbers of ibis are expected to descend on the WCAs.

Recession rates near the high end of the recommended range of 0.05 to 0.09 feet per week have ecological benefit where depths are not in excess of 2.5 feet in WCA-1, WCA-2 and WCA-3A North. Any changes in inflows to WCA-2A should be offset by a reduction in outflows to tide to conserve water in the system and provide water south as conditions dry down.

The current inundation pattern and duration is forcing many animals to flee to the surrounding levees and others to delay breeding activities in portions of WCA-3A. At this point in the dry season, maintaining the recession where possible in WCA-3A South and Central even when faster than traditional (but less than 0.25 feet per week) ecological recession rate recommendations has ecological benefit as long as there is no downstream deleterious ecological impact.

Ponding along the L-67 canal/levee system has peaked and is now residing. However, inundation of the tree islands in that region and east into central WCA-3A South has now persisted for more than 200 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 status of tree islands in WCA-3A as a whole, the last two years of low flooding stress created a resilience to flooding stress for a single wet season. If these high stages should persist long into the dry season, ecological harm to tree islands is likely, but given the low precipitation predictions for the upcoming dry season, this persistence seems unlikely as long as the District continues to maximize flows south and is 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. This 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, January 5th, 2021 (red is new)			
Area	Weekly change	Recommendation	Reasons
WCA-1	Stage decreased by 0.08'	Maintain marsh stage slightly above and parallel to the regulation schedule.	Protect within basin and downstream habitat and wildlife.
WCA-2A	Stage decreased by 0.14'	Moderate the recession rate to near -.05 to -.09 feet per week and maintain marsh stage above and parallel to the falling regulation schedule.	Protect within basin and downstream habitat and wildlife from flooding stress.
WCA-2B	Stage decreased by 0.14'	Maintain a 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 the recession rate until marsh stage returns to more average conditions.	Protect within basin and downstream habitat and wildlife from flooding stress.
WCA-3A NW	Stage decreased by 0.21'	Maintain the recession rate until marsh stage returns to more average conditions.	
Central WCA-3A S	Stage decreased by 0.25'	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 decreased by 0.25'		
WCA-3B	Stage decreased by 0.14'	Maintain the recession rate to lower marsh stage.	Protect within basin and downstream habitat and wildlife from flooding stress. Tree island ecology is diminished by flooding
ENP-SRS	Stage decreased by 0.08'	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 -0.03' to -0.11'	Move water southward as possible	When available, provide freshwater buffer for downstream conditions.
FB- Salinity	Salinity changes ranged -3.0 to +12.0 psu	Move water southward as possible	When available, provide freshwater to maintain low salinity buffer and promote water movement.