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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 8, 2020

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

Potential for development of some moderate/heavy showers east Thursday night and Friday. A cold front is forecast to move through the District tonight and Wednesday, but a lack of moisture will limit the rainfall potential so just some scattered light rain and showers are forecast for today and Wednesday. The frontal boundary is expected to push into the northern portion of the District this evening and then to south Florida by Wednesday morning before continuing southward into the Florida Straits where it will stall Wednesday night. The frontal boundary is then forecast to lift back north on Thursday and Friday. This slow-moving boundary creates the potential for the development of some moderate to heavy shower activity mainly east Thursday night through Friday night as moisture returns from the east. The next cold front is forecast to stall across north Florida Sunday and then return north. Daytime heating is forecast to generate some scattered to widely scattered showers and a couple of thunderstorms mainly over the interior of the District Saturday, Sunday, and Monday. Beyond that, the current forecast calls for deepening high pressure over the area which would typically inhibit the progression of any cold fronts further south than central Florida. Therefore, the Week 2 forecast is for near-average rainfall over central Florida and below-average rainfall over south Florida.

Kissimmee

Tuesday morning stages were 55.1 feet NGVD (2.9 feet below schedule) in East Lake Toho, 54.5 feet NGVD (0.5 feet below schedule) in Toho, and 51.8 feet NGVD (0.7 feet below schedule) in Kissimmee-Cypress-Hatchineha; headwater stages were 46.3 feet NGVD at S-65A and 25.6 feet NGVD at S-65D. Tuesday morning discharges were 101 cfs at S-65, N/A cfs at S-65A, 463 cfs at S-65D and 218 cfs at S-65E. Dissolved oxygen concentration in the Kissimmee River averaged 9.0 mg/L for the week through Sunday. Kissimmee River mean floodplain depth on Sunday was 0.24 feet. This week's recommendation is to continue 250 cfs discharge at S65-A and maintain minimum flow to the Kissimmee River.

Lake Okeechobee

Lake Okeechobee stage was 13.12 feet NGVD on January 6, 2020, down 0.04 feet from the previous week but still up 0.19 feet from the previous month. The Lake has been in the Base Flow sub-band since September 11, 2019, after spending nearly five months in the Beneficial Use sub-band over the summer of 2019. Water levels moved below the ecological envelope (which varies seasonally from 12.5 – 15.5 feet NGVD +/- 0.5 feet) on October 15, 2019 and are currently 1.38 feet below the bottom of the envelope. Low lake stages benefit recovering SAV communities, but also stress higher elevation marshes; areas with elevations greater than approximately 14 feet NGVD have now been dry since late October of 2018, well over a year. Low stages throughout 2019 also likely limited prey production in the marsh and is likely to impact wading bird use of the Lake in the 2020 breeding season. The latest

estimate of cyanobacteria bloom potential (January 1, 2020) shows that estimated bloom potential is at low- to no-risk, with areas of higher potential in the south having waned over the past few weeks.

Estuaries

Total inflow to the St. Lucie Estuary averaged 1420 cfs over the past week with no flow coming from Lake Okeechobee. Salinities decreased throughout the estuary. Salinity at the US1 Bridge is in the fair range for adult eastern oysters.

Total inflow to the Caloosahatchee Estuary averaged 767 cfs over the past week with 522 cfs coming from the Lake. Salinity was stable in the upper estuary but decreased slightly in the lower estuary over the past week. Salinities are in the good range at Val I-75 and Ft. Myers for Tape Grass. Salinities are in the good range for adult eastern oysters at Cape Coral and Shell Point and in the fair range at Sanibel.

Lake stage is in the Base Flow sub-band of 2008 LORS. Tributary hydrological conditions are normal. The 2008 LORS release guidance suggests up to 450 cfs at S-79 and up to 200 cfs at S-80.

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 WY2020 (since May 1, 2019) is approximately 70,000 acre-feet. The total amount of inflows to the STAs in WY2020 is approximately 833,000 acre-feet. Most STA cells are at or near target depths except STA-5/6 cells which are below target. STA-1E Western Flow-way is offline for West Distribution Cell levee repairs and 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, and STA-2 Flow-way 4 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 the conditions allow, releases will be sent to STA-2 or A-1 FEB/STA-3/4.

Everglades

Current stages in the WCAs remain low for this time of year and salinities are above average in Florida Bay. Conserving fresh water in the Everglades, distributing it to where depths are low (WCA-3A North) and allowing it to flow south has important ecological benefit. One example of this currently taking place is the routing of water from WCA-2A into NE WCA-3A via the S7 and S-150 structures. As wading bird nesting begins in the Everglades, ecological recommendations move towards moderating recession rates where and when possible. Generally, this time of year rates from -0.05 to -0.09 feet per week are desirable to optimize conditions for prey concentration and capture. However, given the below average stages in most of the Everglades currently it remains ecologically desirable to conserve as much water as possible. Very little rain fell in Taylor Slough and Florida Bay this past week and stages decreased throughout the area, but in the north reaches of the slough are above average. The rainfall at the end of December has helped to improve salinity conditions in Florida Bay, but the nearshore area remains higher than average.

Supporting Information

KISSIMMEE BASIN

Kissimmee Basin Rainfall

The Upper Kissimmee Basin received 0.42 inches of rainfall in the past week and the Lower Basin received 0.15 inches (SFWMD Daily Rainfall Report 1/6/2020).

Upper Kissimmee Basin

Stages and departures in the Kissimmee Chain of Lakes (KCOL) are shown in **Table 1**. KCOL stage hydrographs with respective regulation schedules and rainfall are shown in Figures 1-3.

Table 1. Average discharge (cfs) for the preceding seven days, one-day stage (feet NGVD), and departures from KCOL flood regulation (R) or temporary schedules (T, A, or S). Provisional, real-time data are from SFWMD.

Report Date: 1/7/2020

Water Body	Structure	7-day Average Discharge (cfs) ¹	Stage Monitoring Site ²	Lake Stage (feet)	Schedule Type ³	Schedule Stage (feet)	Daily Departure (feet)						
							1/5/20	12/29/19	12/22/19	12/15/19	12/8/19	12/1/19	11/24/19
Lakes Hart and Mary Jane	S-62	196	LKMJ	61.0	R	61.0	0.0	0.2	0.0	-0.2	-0.4	-0.4	-0.4
Lakes Myrtle, Preston, and Joel	S-57	48	S-57	61.7	R	61.6	0.1	0.1	0.0	-0.3	-0.5	-0.5	-0.5
Alligator Chain	S-60	0	ALLI	63.5	R	64.0	-0.5	-0.7	-0.9	-1.0	-1.1	-1.1	-1.0
Lake Gentry	S-63	0	LKGT	61.4	R	61.5	-0.1	-0.3	-0.6	-0.7	-0.7	-0.7	-0.7
East Lake Toho	S-59	297	TOHOE	55.2	R	58.0	-2.8	-2.9	-3.1	-3.0	-3.0	-2.8	-2.5
Lake Toho	S-61	843	TOHOW, S-61	54.5	R	55.0	-0.5	-0.5	-0.5	-0.4	-0.3	-0.2	-0.1
Lakes Kissimmee, Cypress, and Hatchineha	S-65	211	KUB011, LKIS5B	51.8	R	52.5	-0.7	-1.0	-1.4	-1.6	-1.8	-1.9	-1.9

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 Basin

Discharges at Lower Basin structures are shown in Table 2. SFWDAT depth maps for the Phase I restoration area are shown in Figure 8. Kissimmee River floodplain stages at selected stations are shown in Figure 9.

Table 2. One-day and seven-day averages of discharge at S-65x structures, of dissolved oxygen concentration in the Phase I area river channel, and water depth in the Phase I area floodplain. Data are provisional real-time data from SFWMD.

Report Date: 1/7/2020

Metric	Location	1-Day Average		Average for the Preceding 7-Days ¹							
		1/5/2020	1/5/20	12/29/19	12/22/19	12/15/19	12/8/19	12/1/19	11/24/19	11/17/19	11/10/19
Discharge (cfs)	S-65	203	211	283	317	347	359	358	356	323	335
Discharge (cfs)	S-65A ²	316	314	317	315	302	318	315	319	276	281
Discharge (cfs)	S-65D ²	469	553	454	408	344	346	347	330	290	338
Headwater Stage (feet NGVD)	S-65D ²	25.80	25.75	25.84	25.76	25.81	25.88	25.90	25.84	25.76	25.77
Discharge (cfs)	S-65E ²	313	502	441	386	342	307	330	345	244	208
Discharge (cfs)	S-67	0	0	0	0	0	0	0	0	0	0
DO (mg/L) ³	Phases I & II/III river channel	9.4	9.0	9.2	9.7	9.7	9.3	8.4	8.1	7.2	7.2
Mean depth (feet) ⁴	Phase I floodplain	0.24	0.26	0.23	0.16	0.11	0.11	0.14	0.13	0.15	0.17

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.

KCOL Hydrographs (through Sunday midnight)

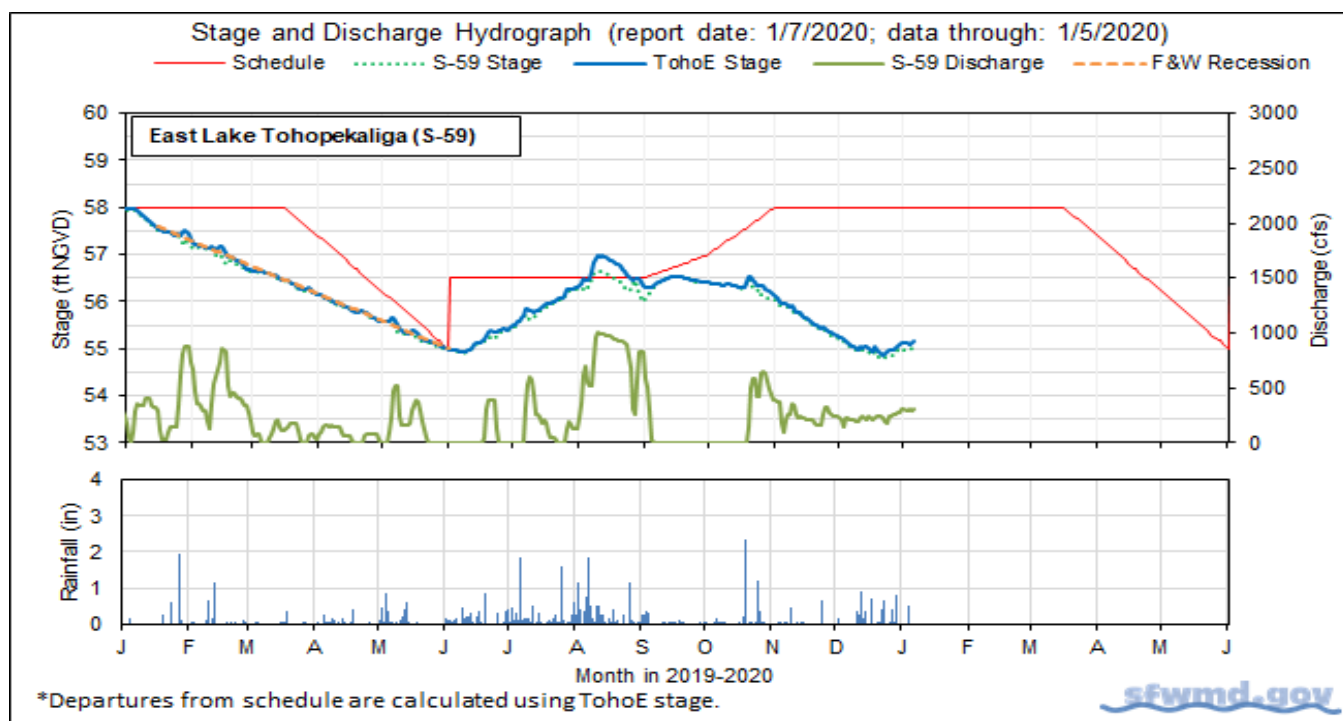


Figure 1.

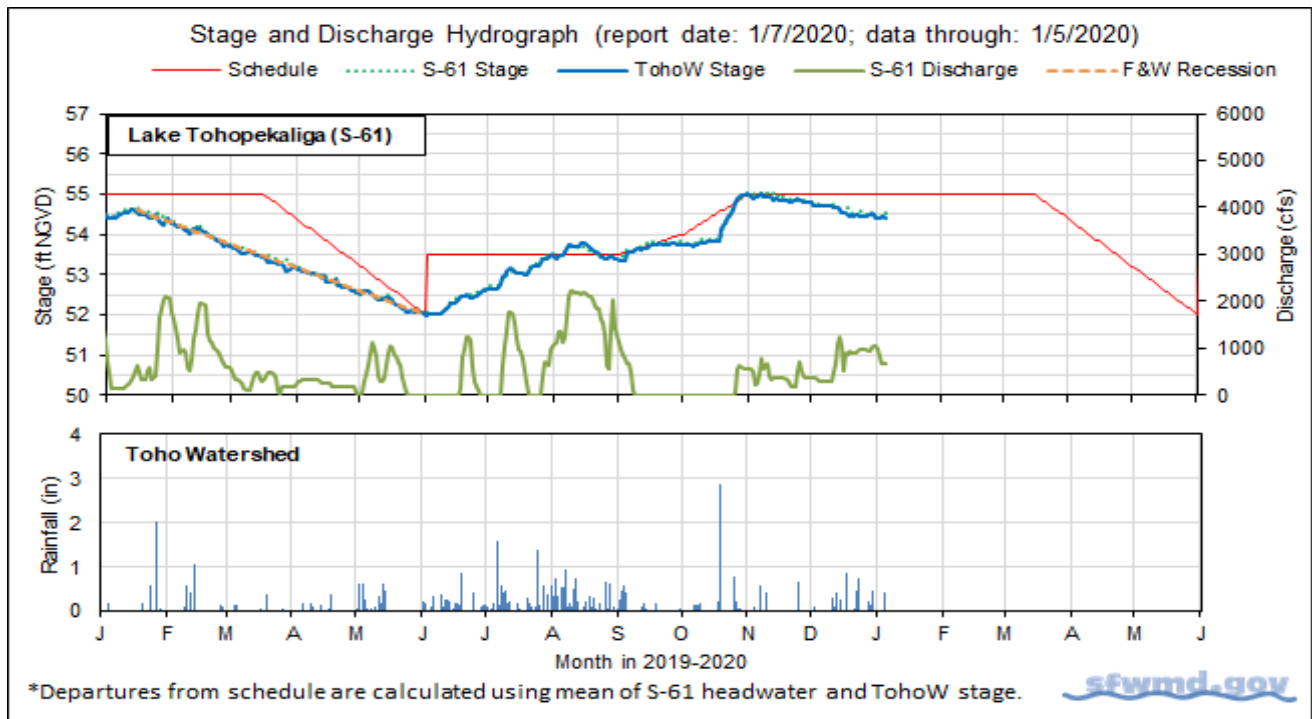


Figure 2.

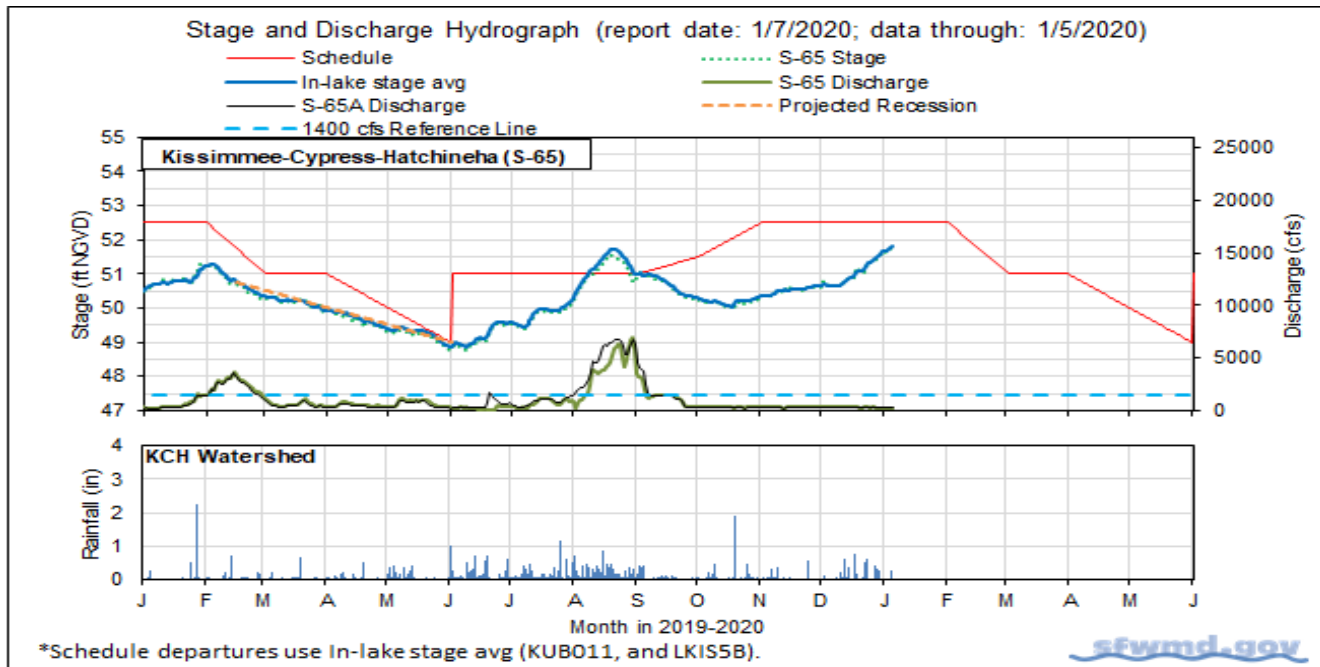


Figure 3.

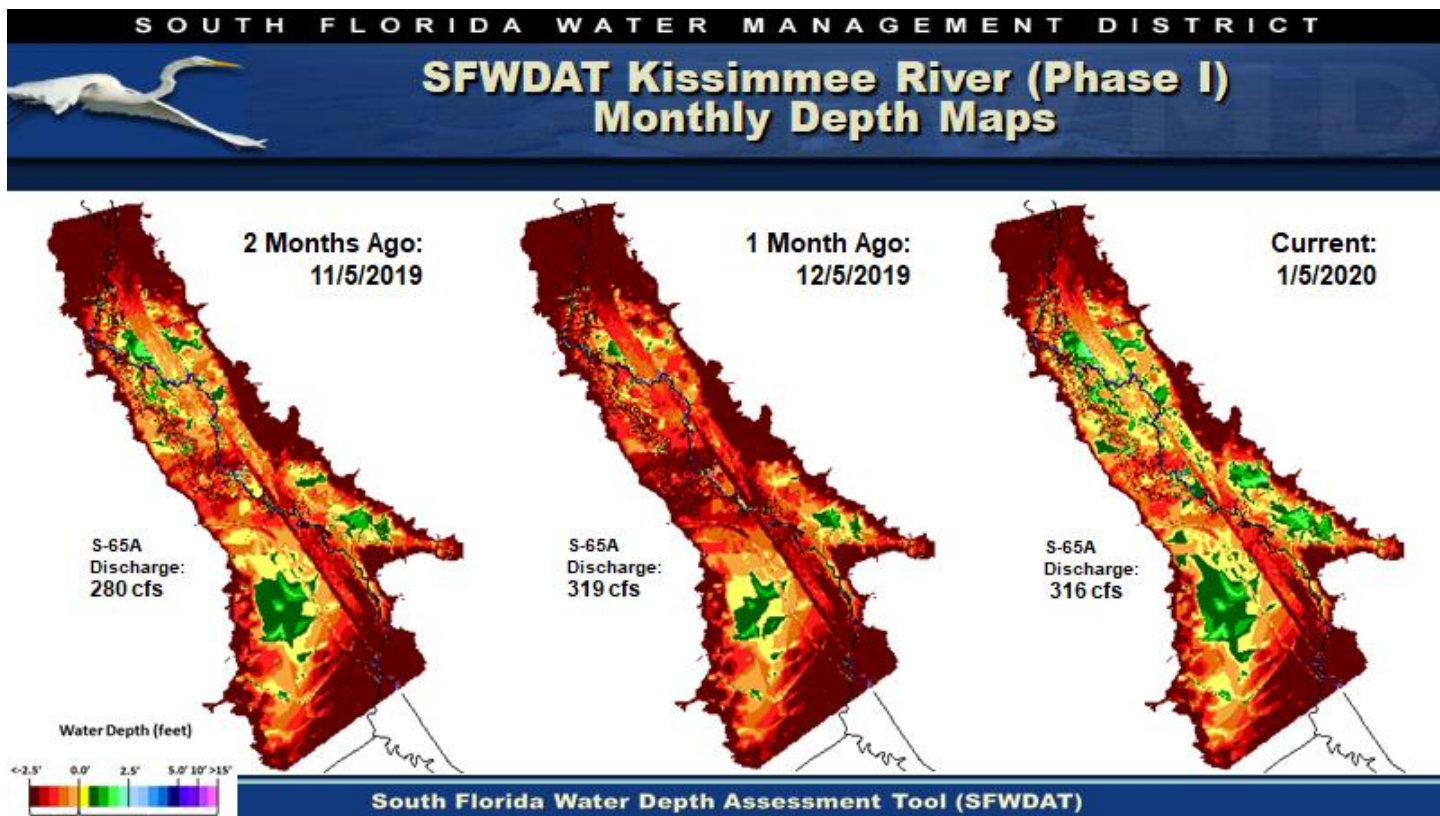
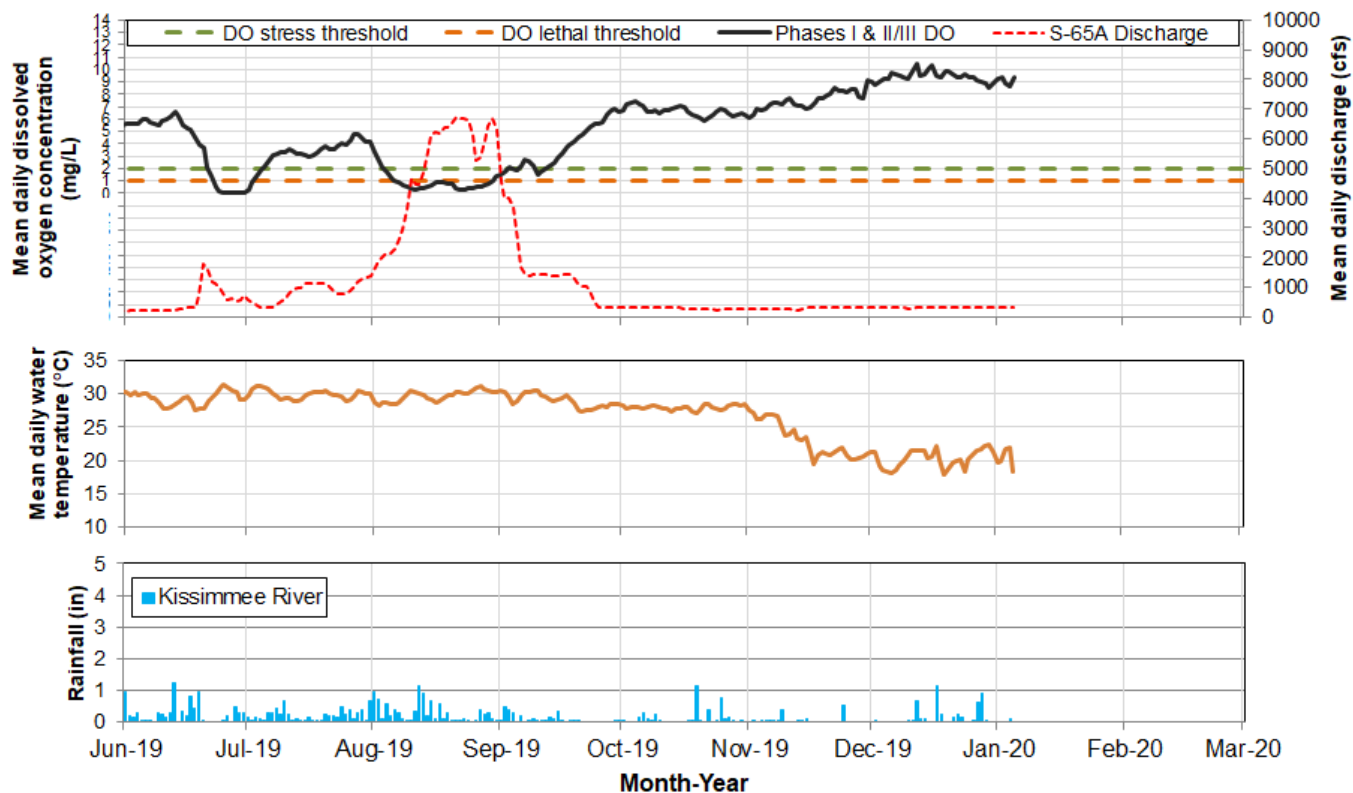


Figure 4. Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to January 16, 2012.



Report Date: 1/7/2020; data are through: 1/5/2020.

Figure 5. Mean daily dissolved oxygen, discharge, temperature and rainfall in the Phases I/II/III river channel.

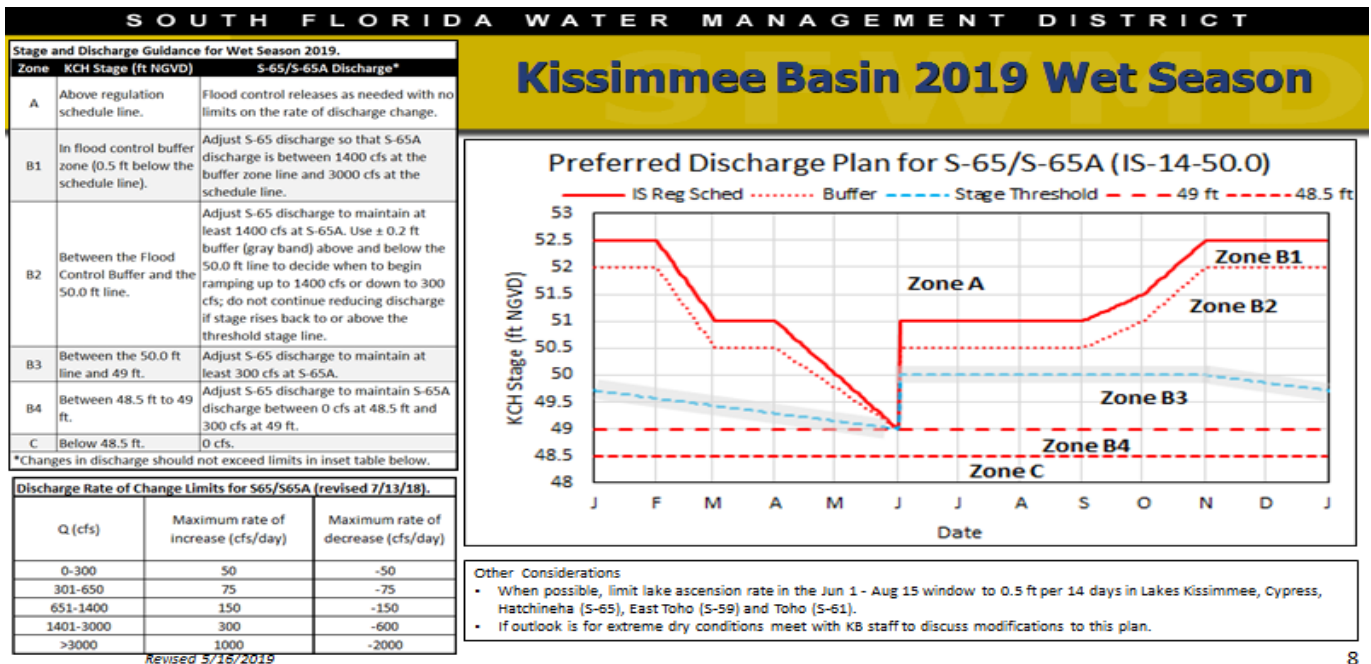


Figure 6. The 2019 Wet Season Discharge Plan for S-65/S-65A.

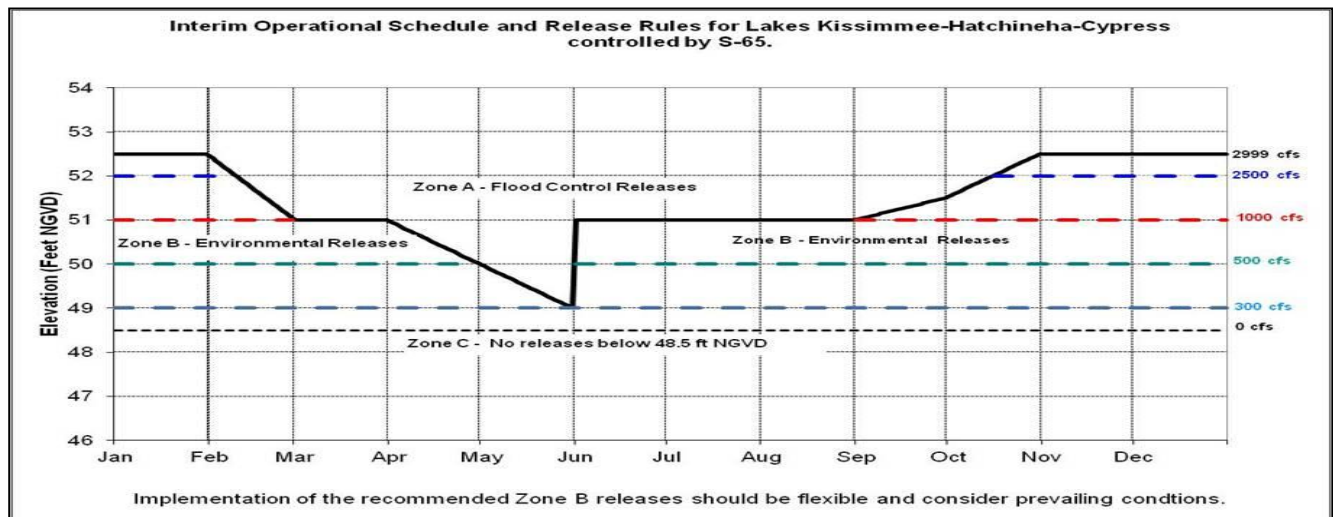


Figure 7. Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years.

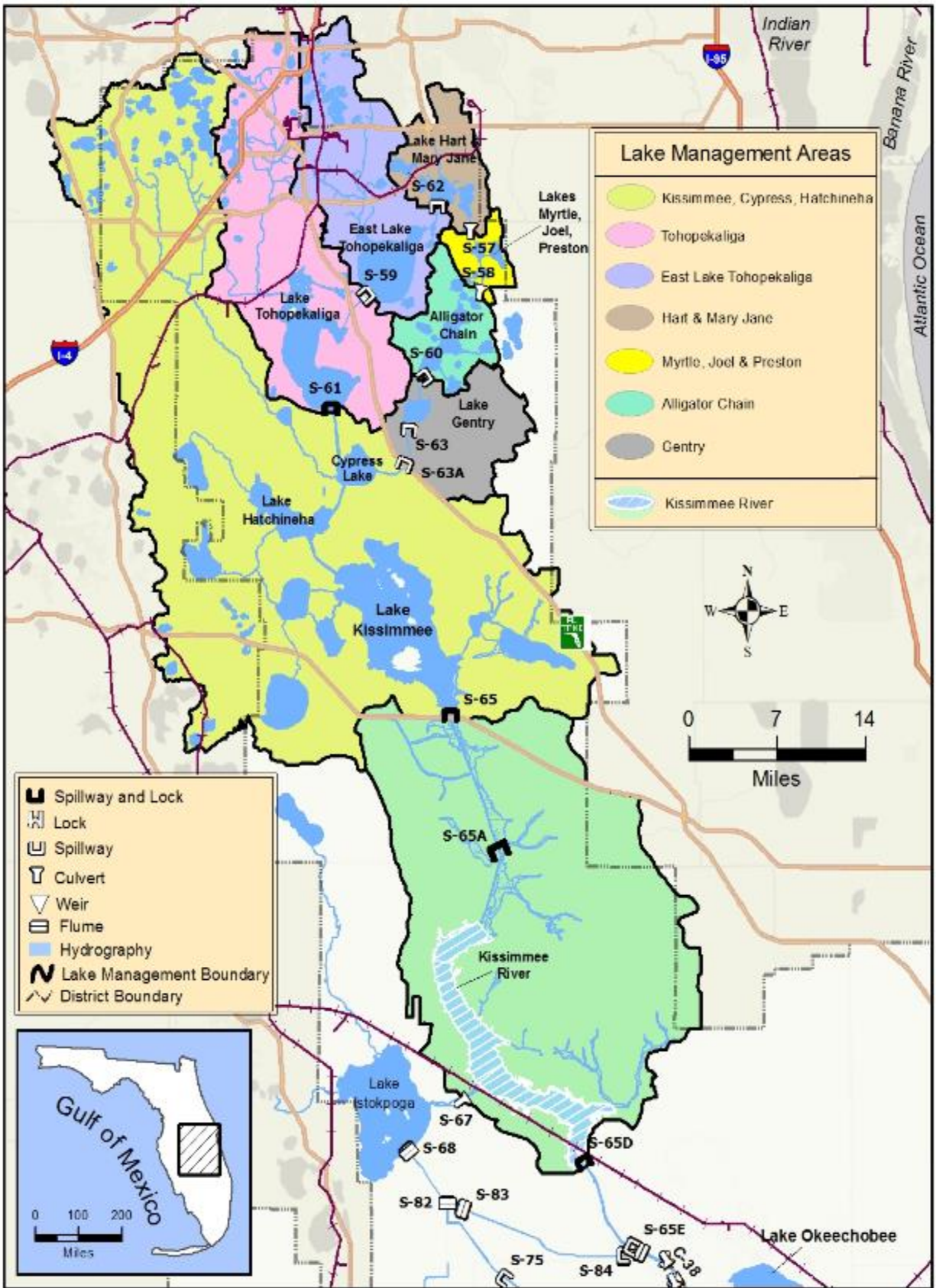


Figure 8. The Kissimmee Basin.

LAKE OKEECHOBEE

According to the USACE web site, Lake Okeechobee average daily lake stage was 13.12 feet NGVD on January 6, 2020, down 0.04 feet from the previous week but up 0.19 feet from the previous month. This value is based on the use of four interior lake stations (L001, L005, L006 and LZ40) and four perimeter stations (S-308, S-352, S-4 and S-133). The Lake is now 0.54 feet higher than a year ago (Figure 1) and is currently 1.38 feet below the preferred ecological envelope (Figure 2). Lake stages have been in the Base Flow sub-band since September 4, 2019 (Figure 3). According to RAINДАР, during the week of December 31, 2019 to January 06, 2020, 0.04 inches of rain fell directly over the Lake, with all but the very northern watershed receiving similar amounts of rain. The upper Kissimmee basin had the most rainfall of the watershed, with up to 0.42 inches of rain (Figure 4).

The average daily inflows (minus rainfall) to the Lake were similar to the previous week at 1,194 cfs, which does not include passive inflows from the S-308 structure. Most of the inflow came from the Kissimmee River (S-65E & S-65EX1) (523 cfs) and Lake Istokpoga (S-84 & S-84X) (389 cfs), while backflows through the S-308 also contributed 296 cfs. Passive inflows from the L-8 canal through Culvert 10A decreased from 102 cfs to 62 cfs this past week. Nubbin Slough also contributed 150 average daily cfs, up from 96 cfs the prior week. Fisheating Creek flows were minimal, at just 32 cfs (Table 1).

Outflow (minus evapotranspiration) increased from the previous week, going from just 65 cfs to 268 cfs, which includes backflows through S-308. Most of the outflows were west through the S-77, which increased from 271 cfs to 512 cfs. Flows south through the S-350 structures decreased from 204 cfs the previous week to just 51 cfs this past week; all of which occurred at the end of the week. The corrected average daily evapotranspiration value for the week based on the L006 and LZ40 weather platform solar radiation increased from 0.33 inches the previous week to 0.47 inches this past week.

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 samples collected on December 3rd – 4th, 2019 found elevated values of Chlorophyll a (Chla) in the southern portion of the Lake at LZ25A (30 µg/L), Palmout (33 µg/L), and L007 (35 µg/L), while POLE3S (48 µg/L) was the only station with Chla values >40 µg/L, a threshold which the District considers representative of bloom conditions (Figure 6). Microcystin was not found (detection limit of 0.20 µg/L) at any station.

The most recent three-month averages (October – December) for select water quality samples were compared to the same months over the past five years (2013 – 2019) (Table 2). All the 2019 nearshore zone averages were similar to recent average values, while several parameters in the pelagic zone were elevated. The DIN, TN, TP, and turbidity were all substantially higher than recent averages, with the latter three having the second highest averages of the period; only those affected by Hurricane Irma in 2017 were higher. The turbidity and TP values were elevated primarily due to high December values, which resulted from passing cold fronts that caused turbidity at one pelagic station to reach 214 NTU. The elevated turbidity and associated TP in the pelagic may be indicative of continued sediment disruption from Hurricane Irma or may be related to lower lake stages that can increase the depth at which wave disturbance can reach sediments.

The most recent available satellite imagery (January 1, 2020) using NOAA's cyanobacteria monitoring product derived from EUMETSAT's Sentinel 3 OLCI sensor data showed that bloom potential is low

lake-wide, having decreased in potential in the southwestern portion of the lake since mid-December (Figure 7).

Water Management Recommendations

Lake Okeechobee stage was 13.01 feet NGVD on December 16, 2019, up 0.10 feet from the previous week and down 0.25 feet from the previous month. The Lake moved up into the Low sub-band on September 4, 2019 then moved back down into the Base Flow sub-band on September 11, 2019 where it has remained since. Water levels moved below the ecological envelope (which varies seasonally from 12.5 – 15.5 feet NGVD +/- 0.5 feet) on October 15, 2019 and are currently 1.49 feet below the bottom of the envelope. Low lake stages continue to benefit recovering SAV communities, but also stress higher elevation marshes; areas with elevations greater than approximately 14 feet NGVD have now been dry since late October of last year. Low stages throughout 2019 also likely limited prey production in the marsh and is likely to impact wading bird use of the lake in the 2020 breeding season. The latest estimate of cyanobacteria bloom potential (December 16, 2019) shows that estimated bloom potential is at low- to no-risk.

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)	OUTFLOWS	Previous week Avg Daily CFS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)
S-65E & S-65EX1	468	523	0.2	S-77	271	512	0.2
S-71 & S-72	72	24	0.0	S-308	-409	-296	-0.1
S-84 & S-84X	312	389	0.2	S-351	84	12	0.0
Fisheating Creek	22	32	0.0	S-352	80	20	0.0
S-154	0	0	0.0	S-354	40	19	0.0
S-191	96	150	0.1	L-8 Outflow			
S-133 P	0	0	0.0	ET	720	1069	0.5
S-127 P	0	0	0.0	Total	785	1337	0.6
S-129 P	16	13	0.0				
S-131 P	12	3	0.0				
S-135 P	26	0	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	102	62	0.0				
Rainfall	1982	90	0.0				
Total	3108	1285	0.6				

Provisional Data

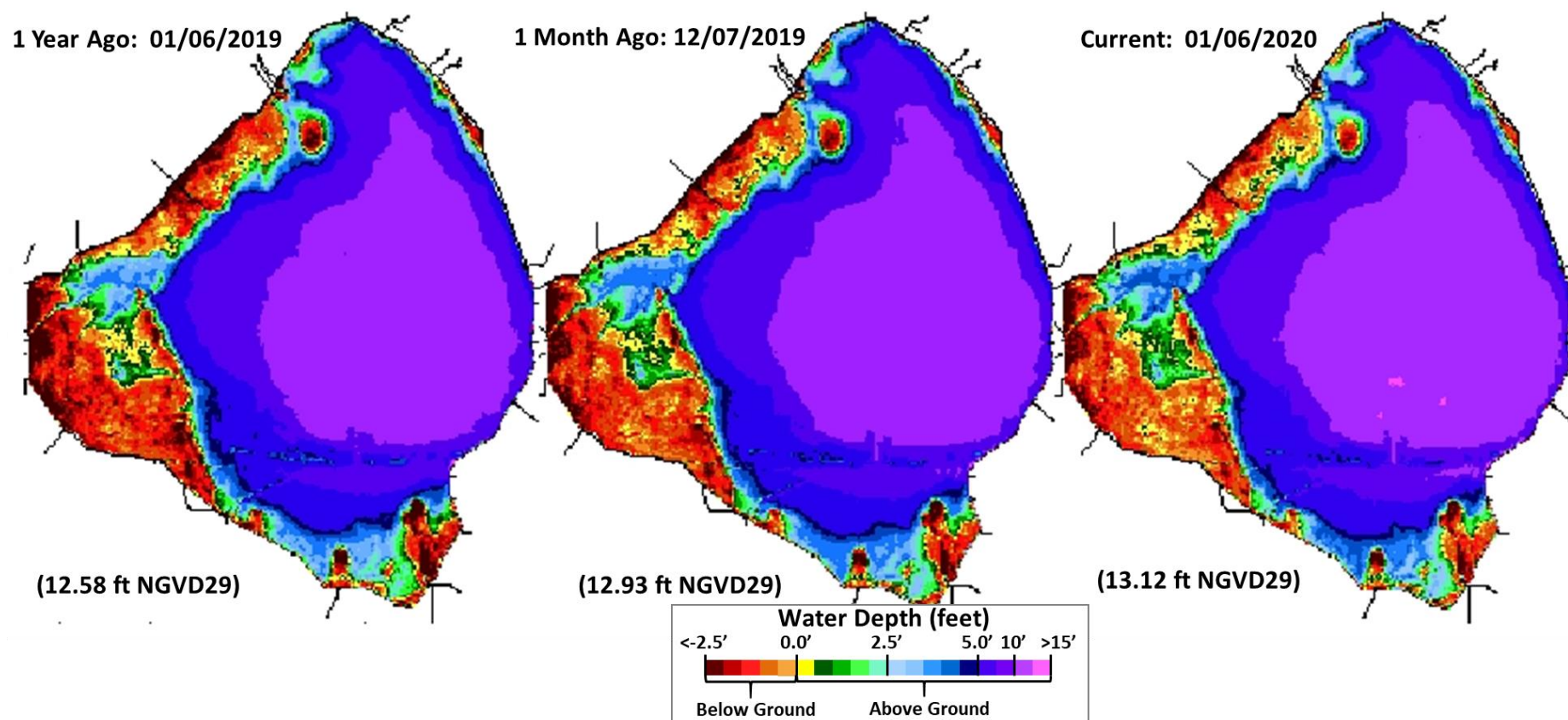


Figure 1. Water depth estimates on Lake Okeechobee based on the South Florida Water Depth Assessment Tool.

Lake Okeechobee Stage vs Ecological Envelope

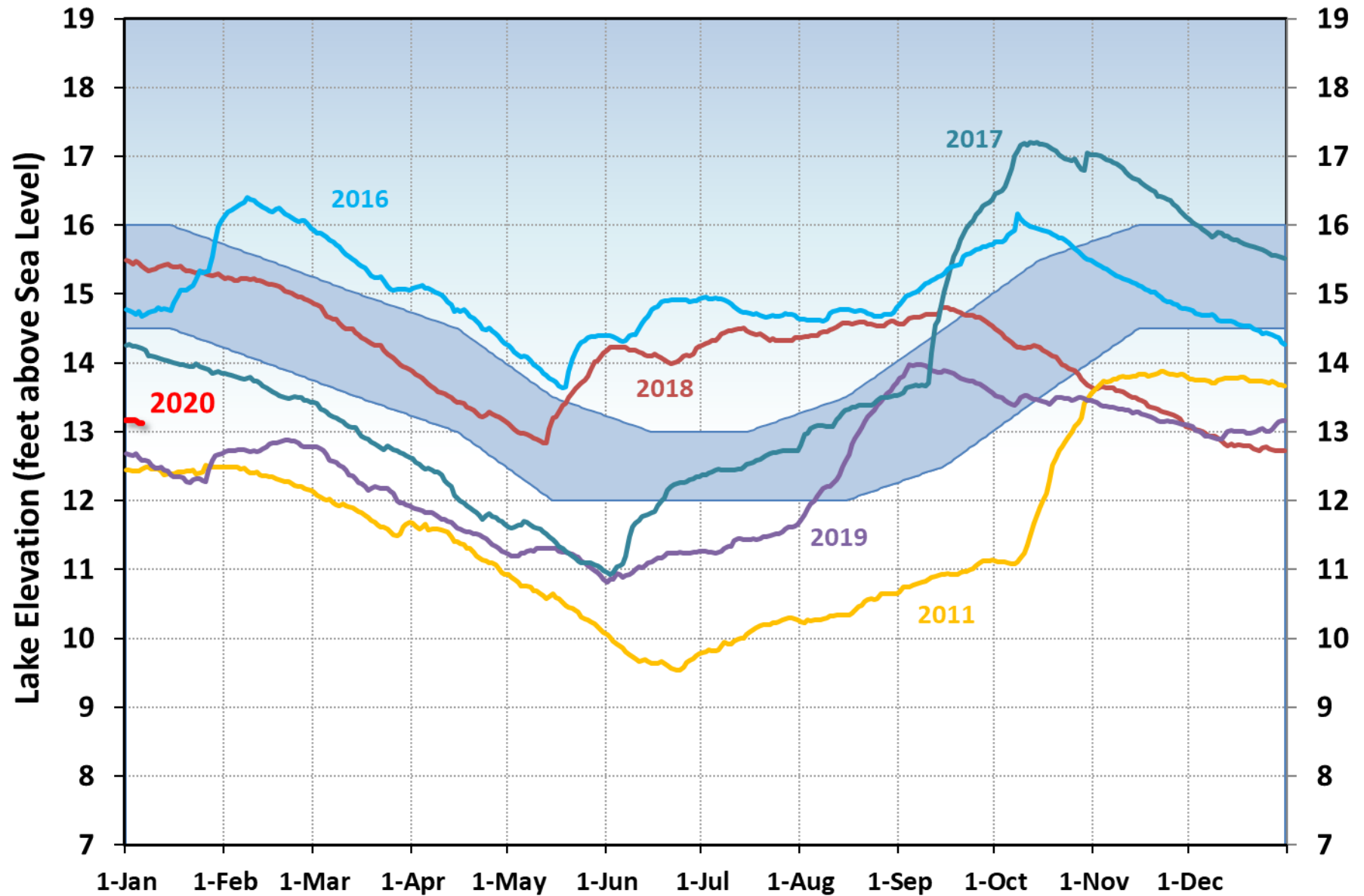
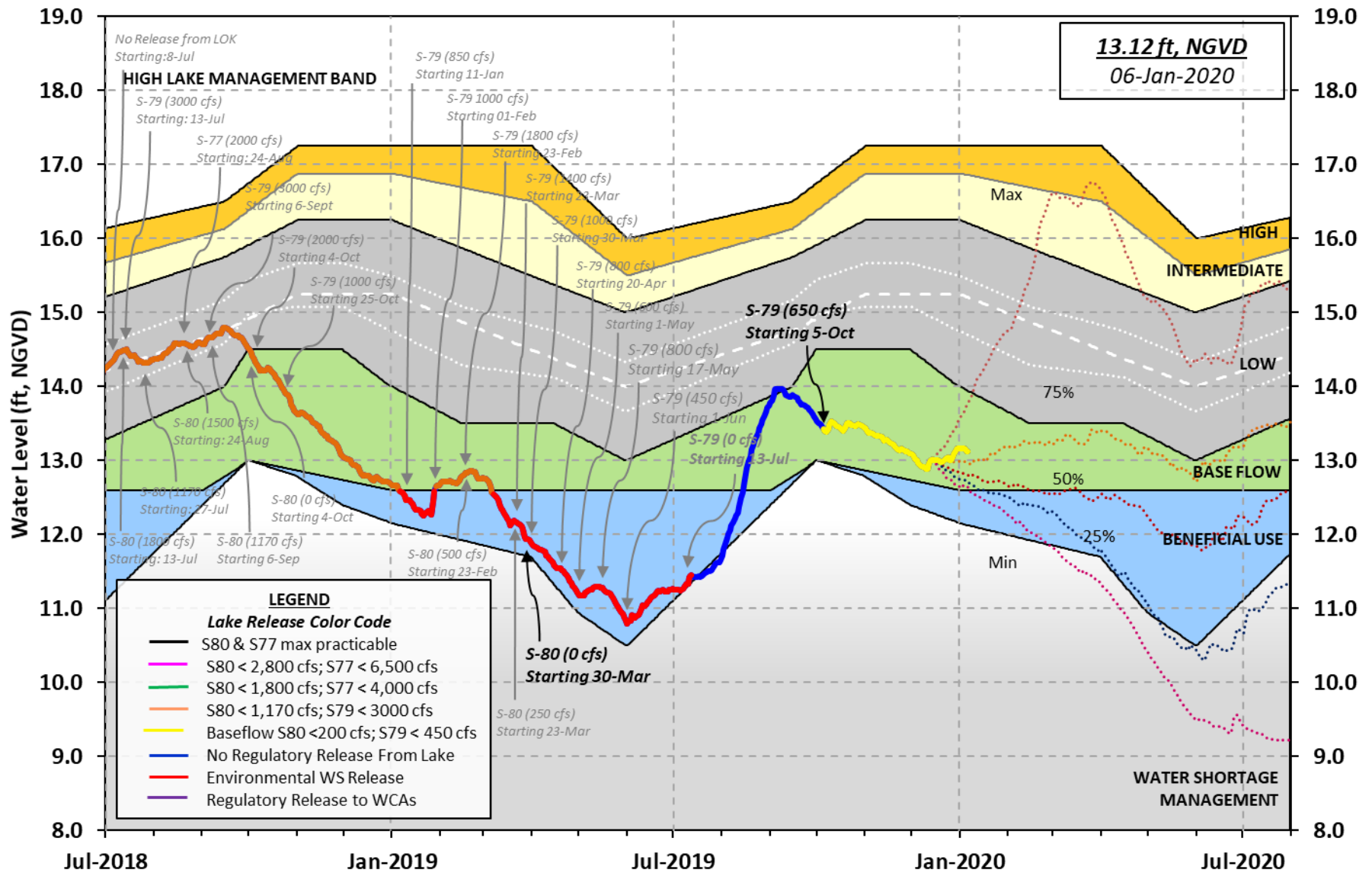


Figure 2. Select annual stage hydrographs for Lake Okeechobee in comparison to the draft Ecological Envelope.

Lake Okeechobee Water Level History and Projected Stages



LORS-2008
Adopted by USACE 28-April-2008

Projected Stage Percentiles From
SFWMD-HESM Position Analysis

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

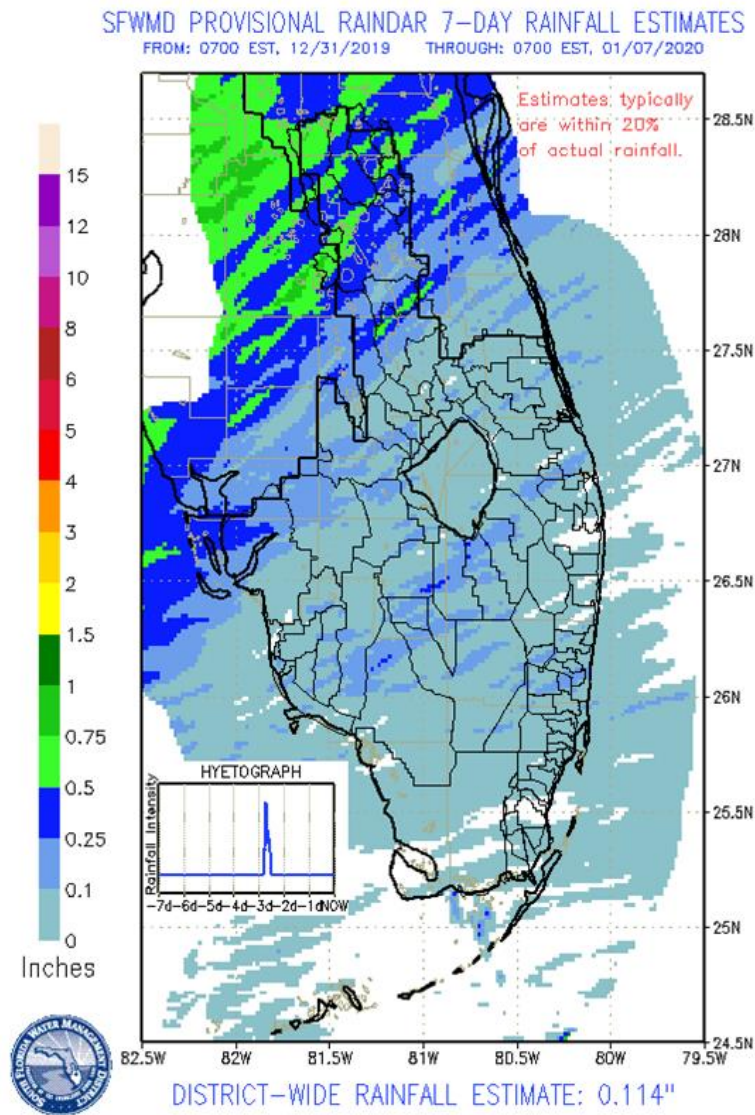


Figure 4. Rainfall estimates by basin.

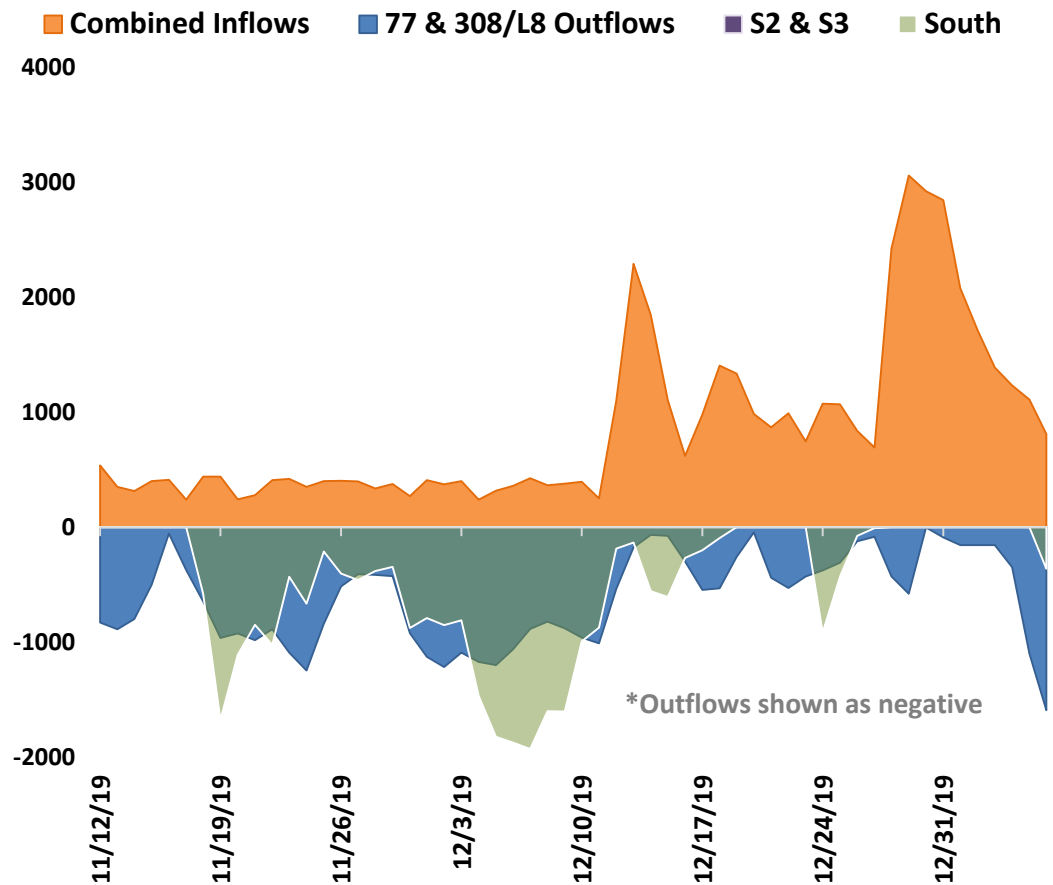


Figure 5. Major inflows (orange) and outflows (blue) of Lake Okeechobee, including the S-350 structures designated as South (green). The L-8 Canal flows through Culvert 10A are included as outflows when positive, and as inflows when backflowing into the Lake. All inflows and outflows are shown as positive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



December 2019		
Site	Chlorophyll <i>a</i> (µg/L)	Microcystin (µg/L)
Nearshore Stations		
KISSR0.0	14.3	BDL
L005	13.2	BDL
LZ2	11.6	BDL
LZ25A	29.5	
PALMOUT	33.4	
PELBAY3	3.7	
POLE3S	47.5	
POLESOUT	12.9	BDL
RITTAE2	16.9	
Pelagic Stations		
L001	14.2	
L004	6.3	
L006	6.0	
L007	34.5	
L008	6.3	
LZ30	5.0	BDL
LZ40	8.9	
CLV10A	9.1	BDL

Figure 6. Chlorophyll *a* (µg/L) and microcystin (µg/L) values for nearshore and pelagic stations for December 3rd and 4th, 2019. SFWMD classifies an algal bloom as having Chla values >40 µg/L. Microcystin values <0.20 µg/L are below the detection limit (BDL).

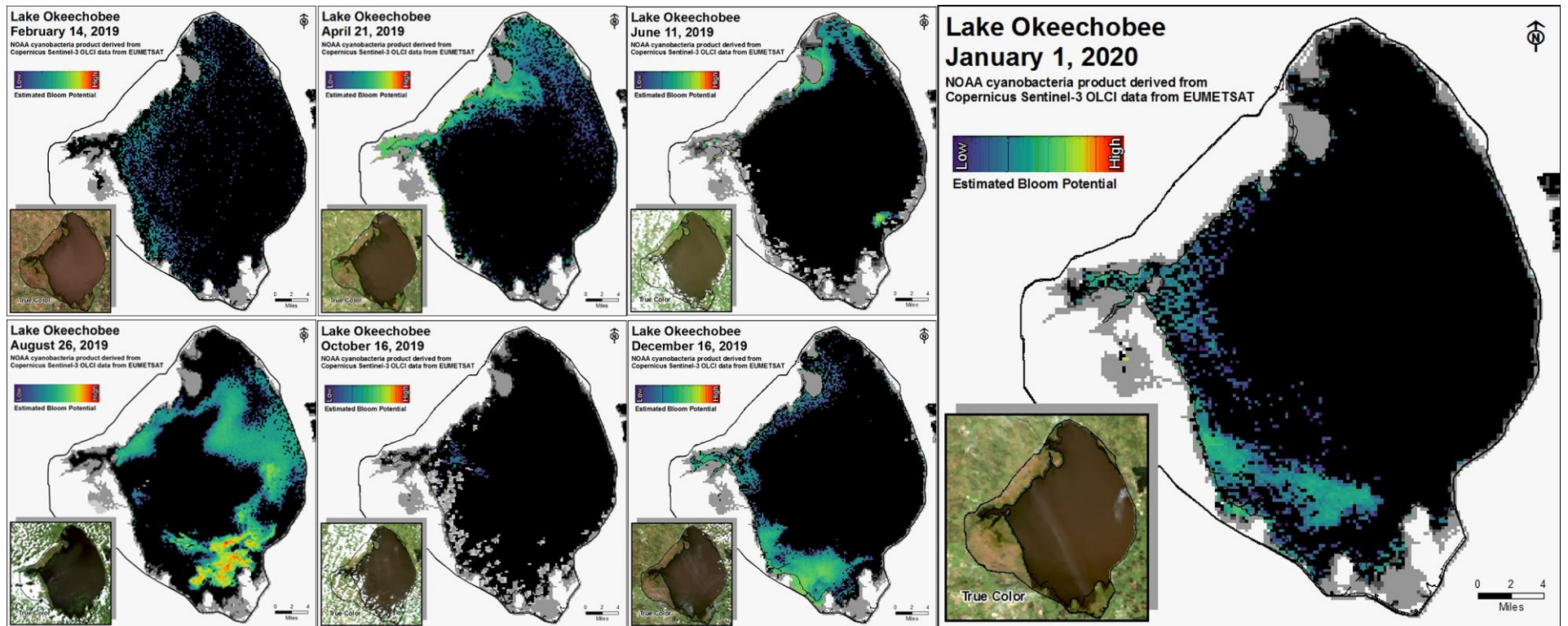


Figure 7. Potential for cyanobacterial blooms on Lake Okeechobee in 2019, based on NOAA's harmful algal bloom monitoring system derived from Copernicus Sentinel-3 OLCI data from EUMETSAT. Gray indicates cloud cover.

Table 2. Recent three-month averages (October – December) for select water quality parameters averaged across nearshore (n=9) and pelagic (n=8) monitoring stations, compared across the previous six years (2013 – 2019). Measured parameters are Chlorophyll a (Chla), Dissolved Inorganic Nitrogen (NH4 and NOx), Total Nitrogen (TN), Soluble Reactive Phosphorus (SRP = OPO4), Total Phosphorus (TP), and turbidity. Data are provisional.

Location	Year	Avg Chla (ug/L)	Avg DIN (mg/L)	Avg TN (mg/L)	Avg SRP (ug/L)	Avg TP (ug/L)	Avg Turbidity (NTU)
Nearshore	2013	34.1	0.145	1.3	0.021	0.076	8.6
	2014	29.8	0.144	1.25	0.023	0.082	10.5
	2015	21.8	0.272	1.21	0.023	0.075	11.5
	2016	22.7	0.182	1.26	0.037	0.102	14.0
	2017	10.7	0.415	1.59	0.094	0.178	29.3
	2018	32.6	0.046	1.40	0.012	0.087	12.4
	2019	21.6	0.132	1.39	0.026	0.097	14.8
Pelagic	2013	18.3	0.153	1.26	0.043	0.119	29.4
	2014	13.4	0.198	1.26	0.042	0.127	36.3
	2015	15.9	0.167	1.22	0.034	0.105	27.5
	2016	13.4	0.358	1.38	0.041	0.136	42.0
	2017	5.5	0.485	1.64	0.070	0.184	60.4
	2018	20.2	0.113	1.23	0.044	0.126	24.4
	2019	12.4	0.289	1.62	0.049	0.173	56.8

ESTUARIES

St. Lucie Estuary:

Last week total inflow to the St. Lucie Estuary averaged approximately 1,421 cfs (Figures 1 and 2) and last month inflow averaged about 1,568 cfs. Last week's provisional averaged inflows from the tidal basin and the structures are shown in Table 1.

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

Location	Flow (cfs)
Tidal Basin Inflow	423
S-80	0
S-308	-362
S-49 on C-24	372
S-97 on C-23	494
Gordy Rd. structure on Ten Mile Creek	132

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 7.8. Salinity conditions in the middle estuary are estimated to be within the fair range for adult eastern oysters (Figure 3).

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

Sampling Site	Surface	Bottom	Envelope
HR1 (North Fork)	2.9 (7.7)	5.2 (12.1)	NA ¹
US1 Bridge	6.3 (12.4)	10.0 (13.4)	10.0-26.0
A1A Bridge	13.0 (21.6)	21.9 (25.2)	NA ¹

¹Envelope not applicable

Caloosahatchee Estuary:

Last week total inflow to the Caloosahatchee Estuary averaged approximately 909 cfs (Figures 5 and 6) and last month inflow averaged about 956 cfs. Last week's provisional averaged inflows from the structures are shown in Table 3.

Table 3. Weekly average inflows (data is provisional).

Location	Flow (cfs)
S-77	512
S-78	557
S-79	766
Tidal Basin Inflow	143

Over the past week, salinity remained about the same throughout the estuary (Table 4, Figures 7 & 8). The seven-day average salinity values are within the good range for adult eastern oysters at Cape Coral and at Shell Point and in the fair range at Sanibel (Figure 9). The seven-day average surface salinities (Table 4) are in the good range 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 reflects the preferred salinity range for associated sampling sites.

Sampling Site	Surface	Bottom	Envelope
S-79 (Franklin Lock)	3.3 (3.3)	3.3 (3.3)	NA ¹
Val I75	4.0 (3.5)	5.4 (5.2)	0.0-5.0 ²
Ft. Myers Yacht Basin	9.1 (10.1)	10.7 (12.0)	NA
Cape Coral	16.4 (17.2)	17.7 (18.8)	10.0-30.0
Shell Point	26.1 (27.1)	26.3 (27.1)	10.0-30.0
Sanibel	29.7 (29.7)	30.8 (30.4)	10.0-30.0

¹Envelope not applicable and ²Envelope is based on a 2-week forecast 30-day average (see Table 5 below).

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 ranging from 3.9 to 7.0 at the end of the next two weeks for pulse release at S-79 ranging from 0 to 800 cfs and Tidal Basin inflows of 120 cfs. The 30-day moving average surface salinity at Val I-75 is forecast to be between 3.5 and 4.7 within two weeks (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	120	7.0	4.7
B	300	120	6.5	4.5
C	450	120	5.5	4.1
D	650	120	4.0	3.6
E	800	120	3.9	3.5

Red tide

The Florida Fish and Wildlife Research Institute reported on January 3, 2020, that *Karenia brevis*, the Florida red tide dinoflagellate, was not observed in samples collected from Lee County. *Karenia brevis* was not observed in samples collected from Palm Beach or Broward counties (no samples were analyzed this week from St. Lucie, Martin, or Miami-Dade counties).

Water Management Recommendations

Lake stage is in the Base Flow sub-band. Tributary conditions are normal. The 30-day moving average of surface salinity at Val I-75 is not predicted to exceed 5 over the next two weeks. SFWMD's Lake Okeechobee Adaptive Protocol's Release Guidance suggests up to 450 cfs @ S-79 and S-77 baseflow release to supplement as needed.

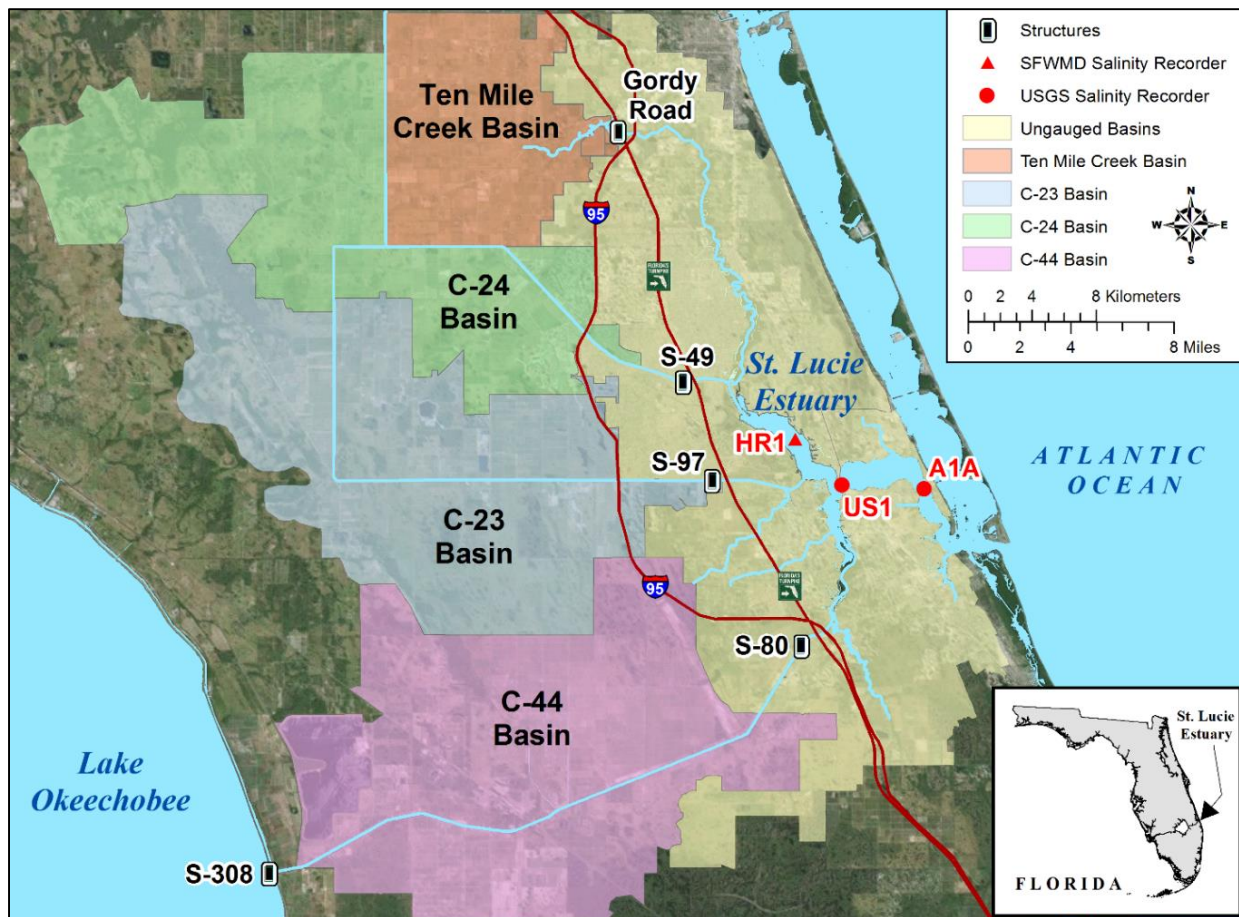


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

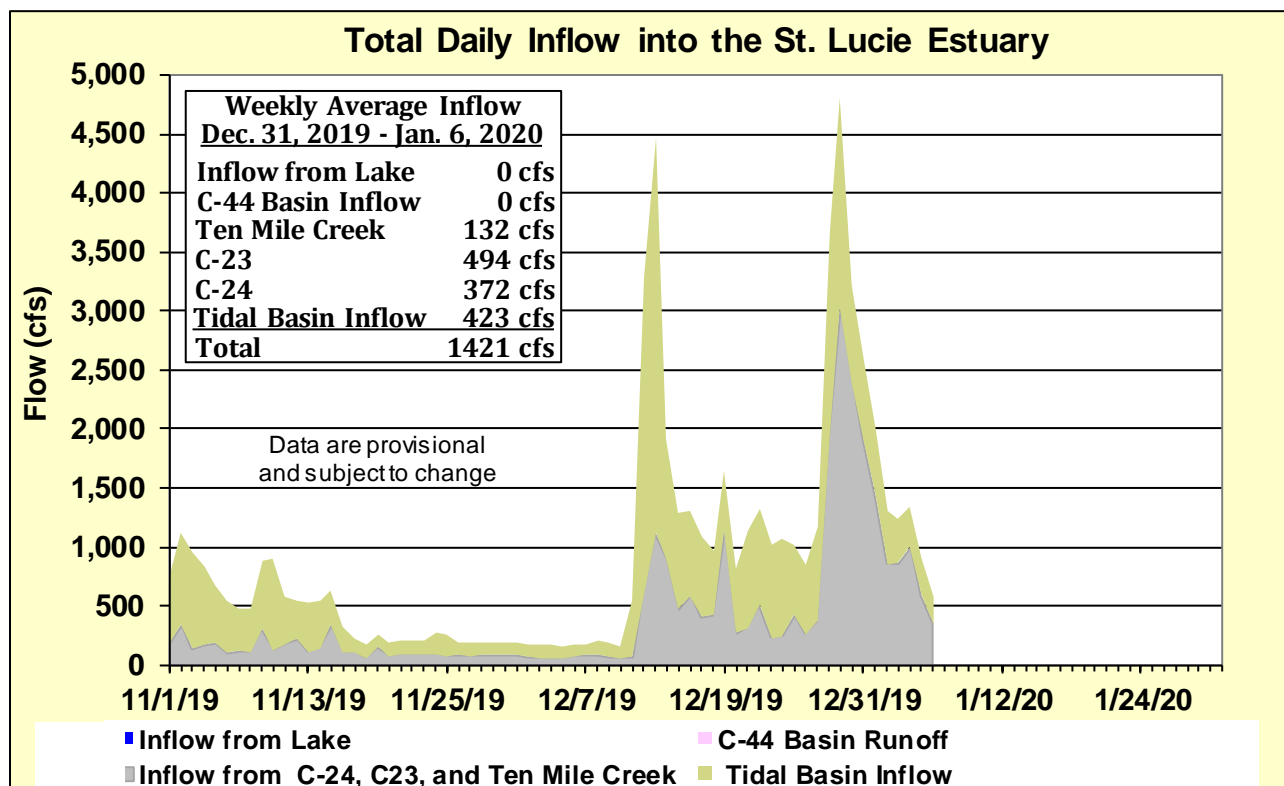


Figure 2. Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basin into the St. Lucie Estuary.

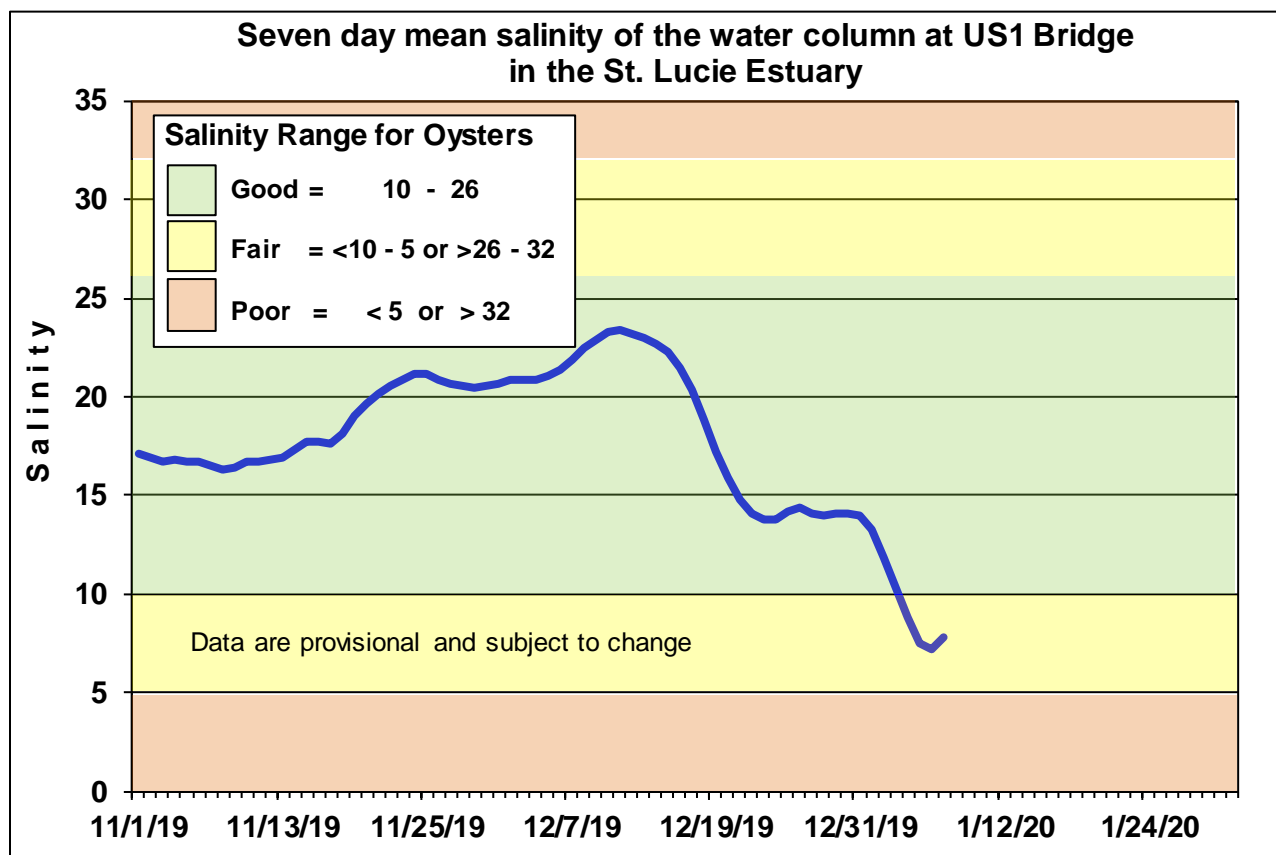


Figure 3. Seven-day mean salinity of the water column at the US1 Bridge.

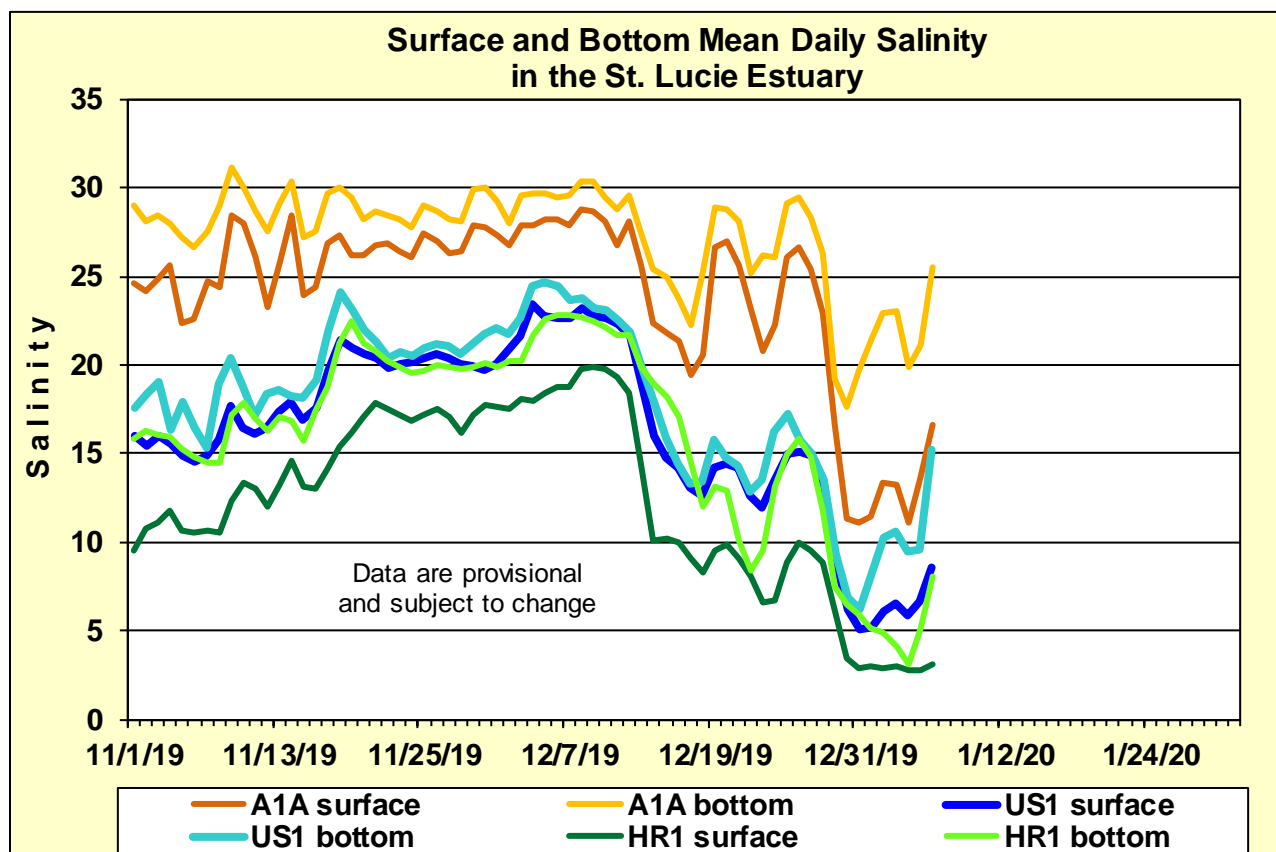


Figure 4. Daily mean salinity at the A1A, US1, and HR1 stations.

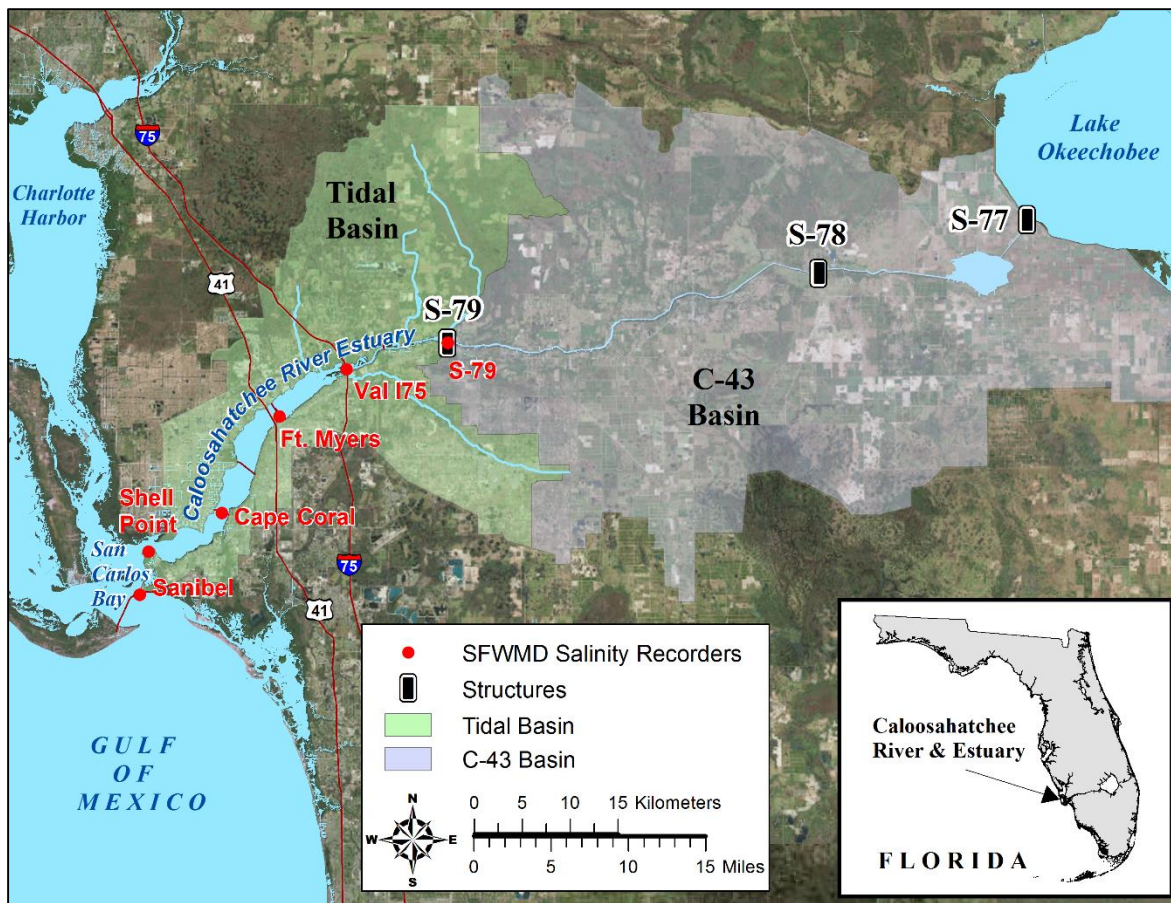


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

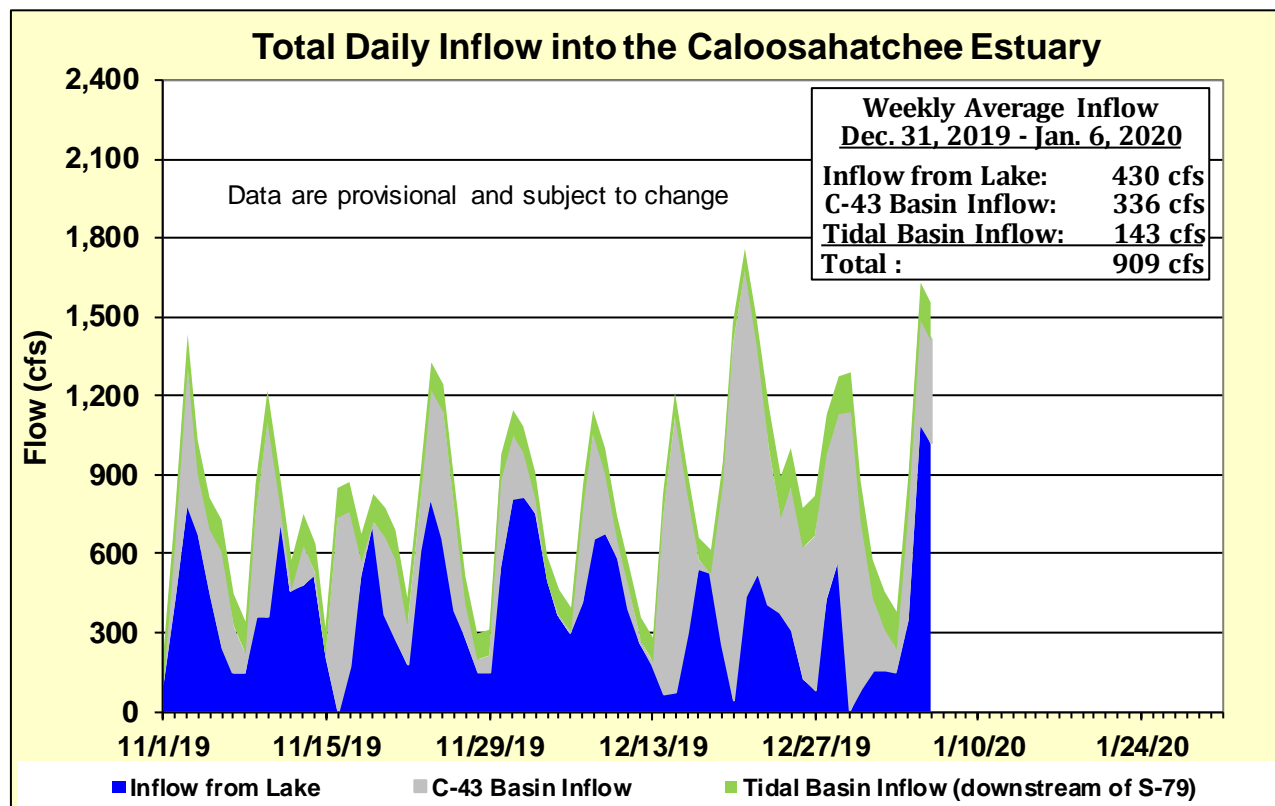


Figure 6. Total daily inflows from Lake Okeechobee, runoff from the C-43 basin

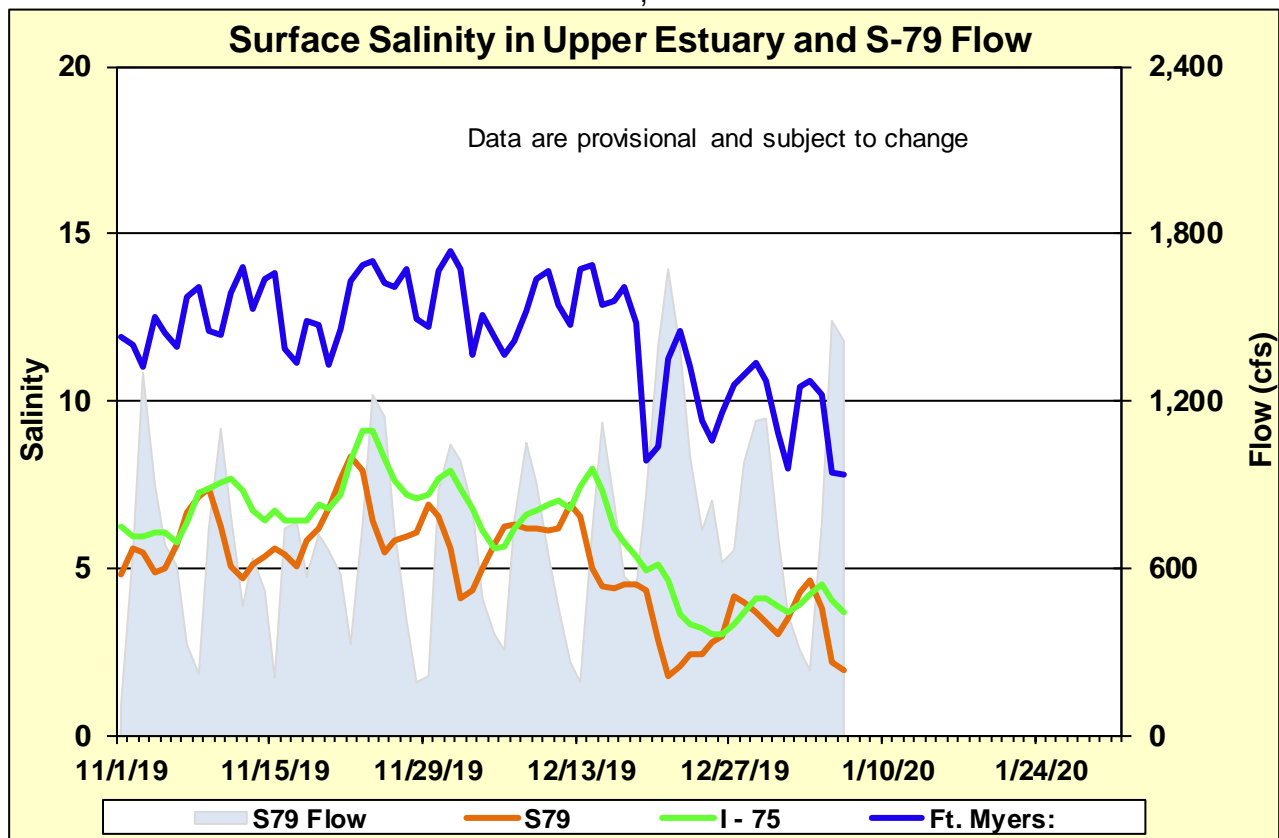


Figure 7. Daily mean flows at S-79 and salinity at upper estuary monitoring stations.

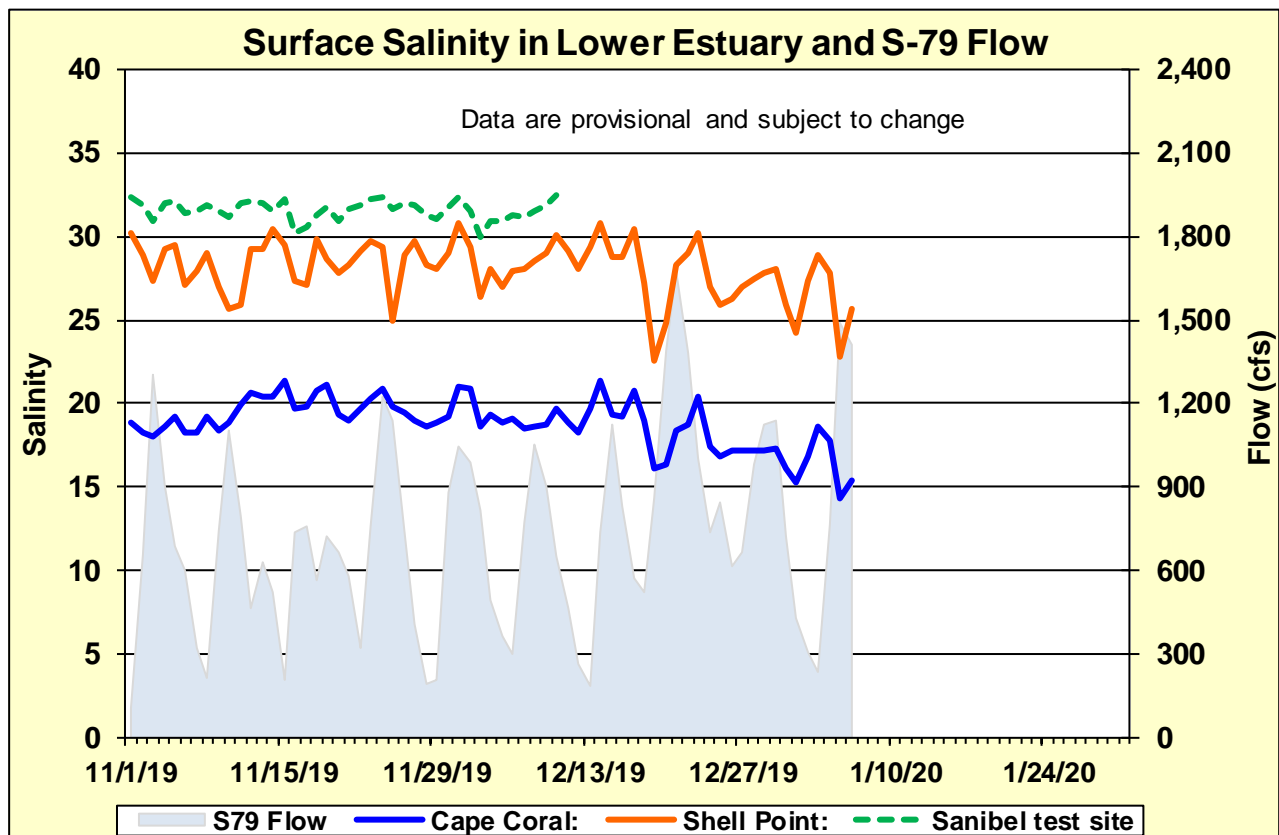


Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.

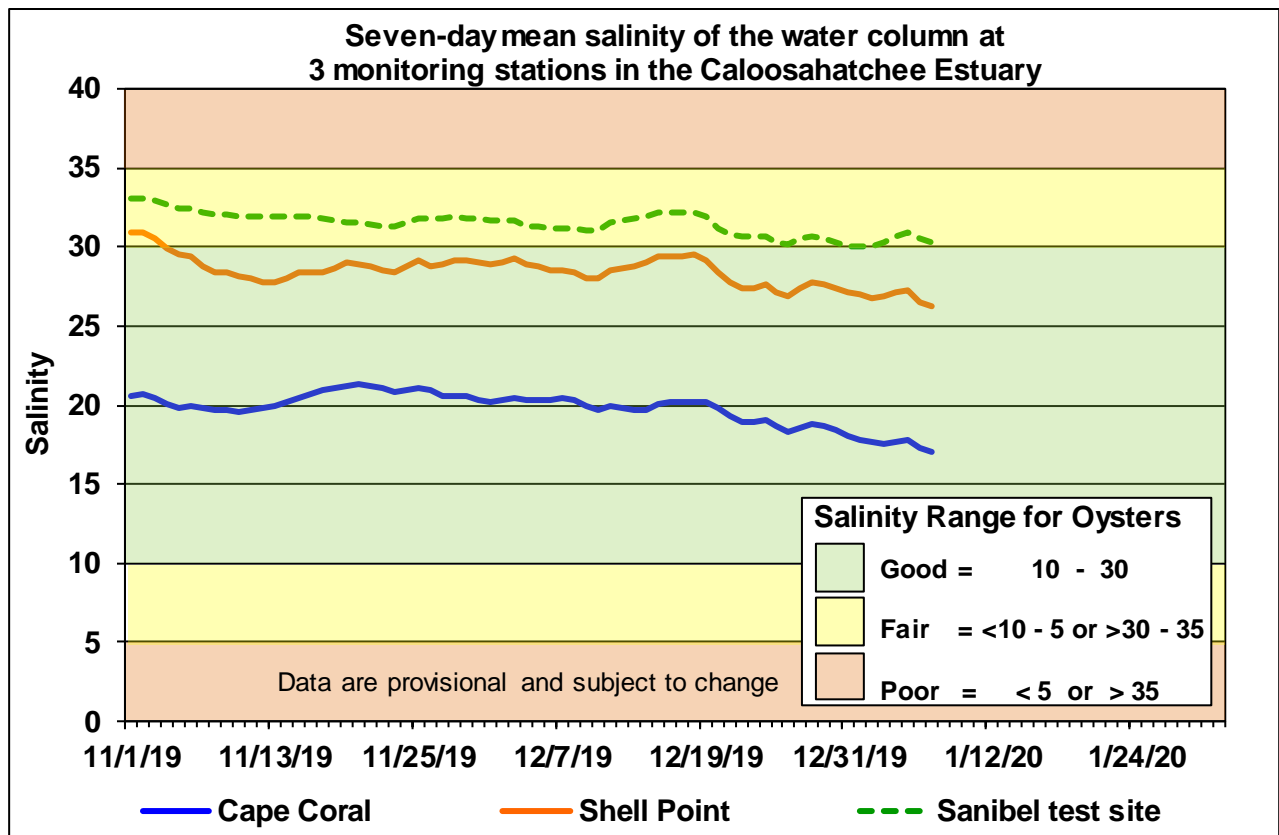


Figure 9. Seven-day mean salinity at Cape Coral, Shell Point, and Sanibel monitoring stations.

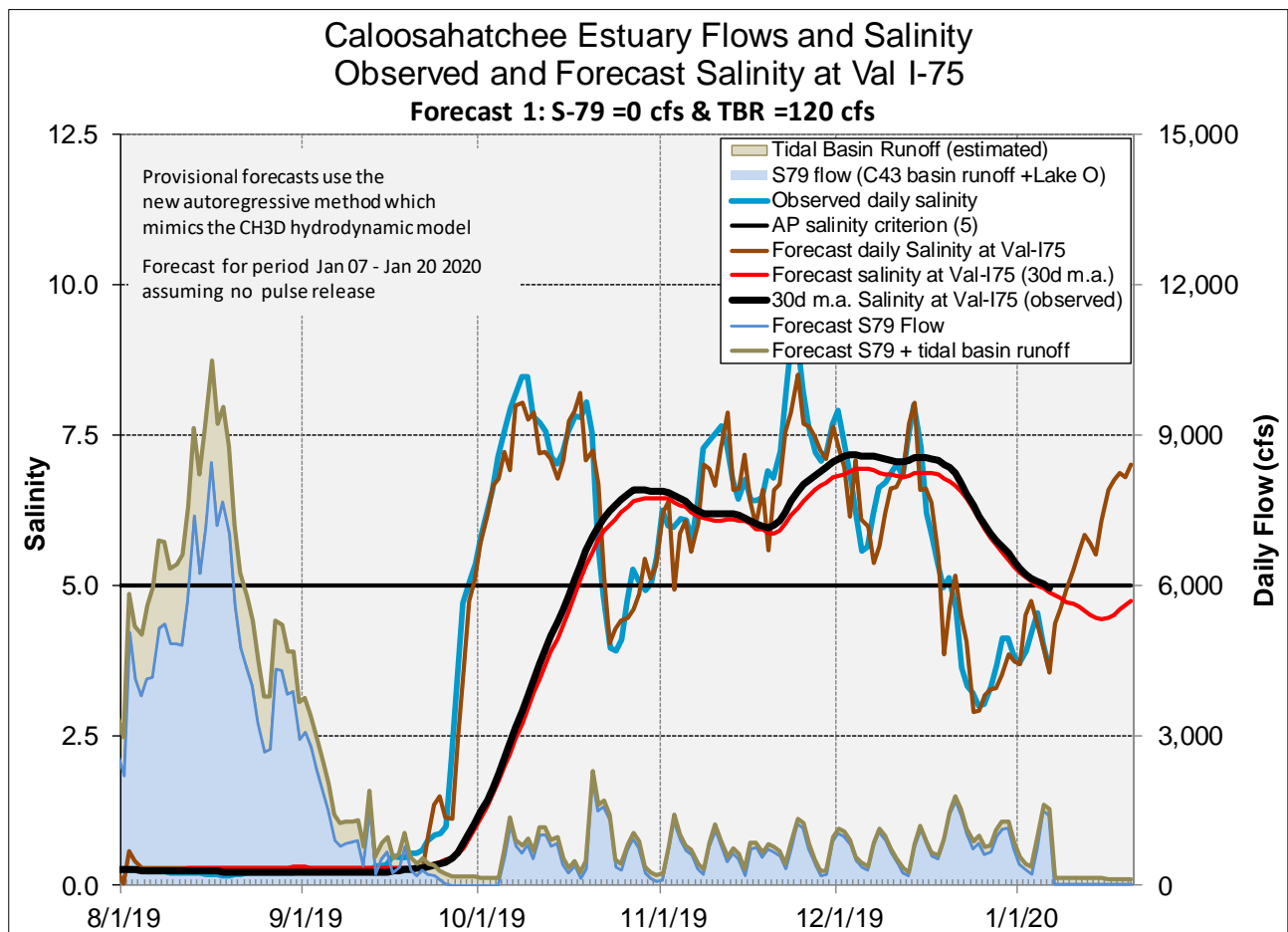
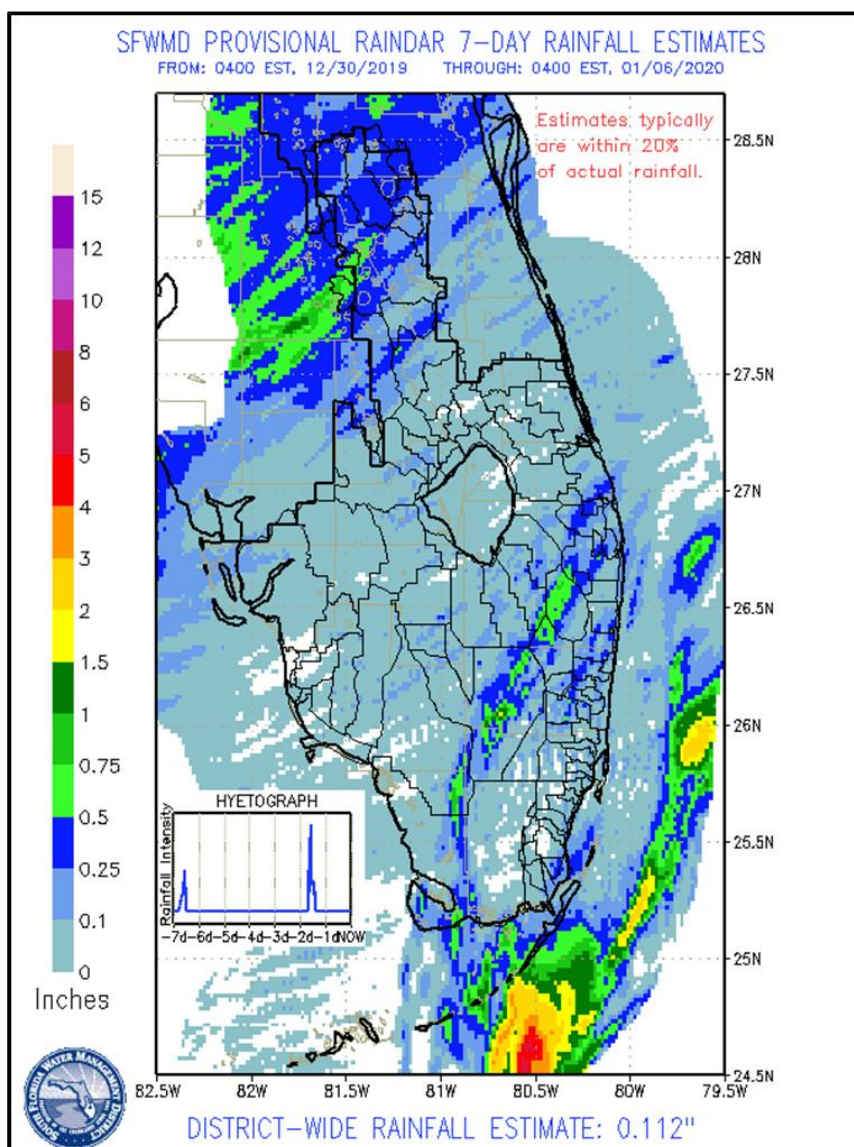


Figure 10. Forecasted Val I-75 surface salinity assuming no pulse release at S-79.

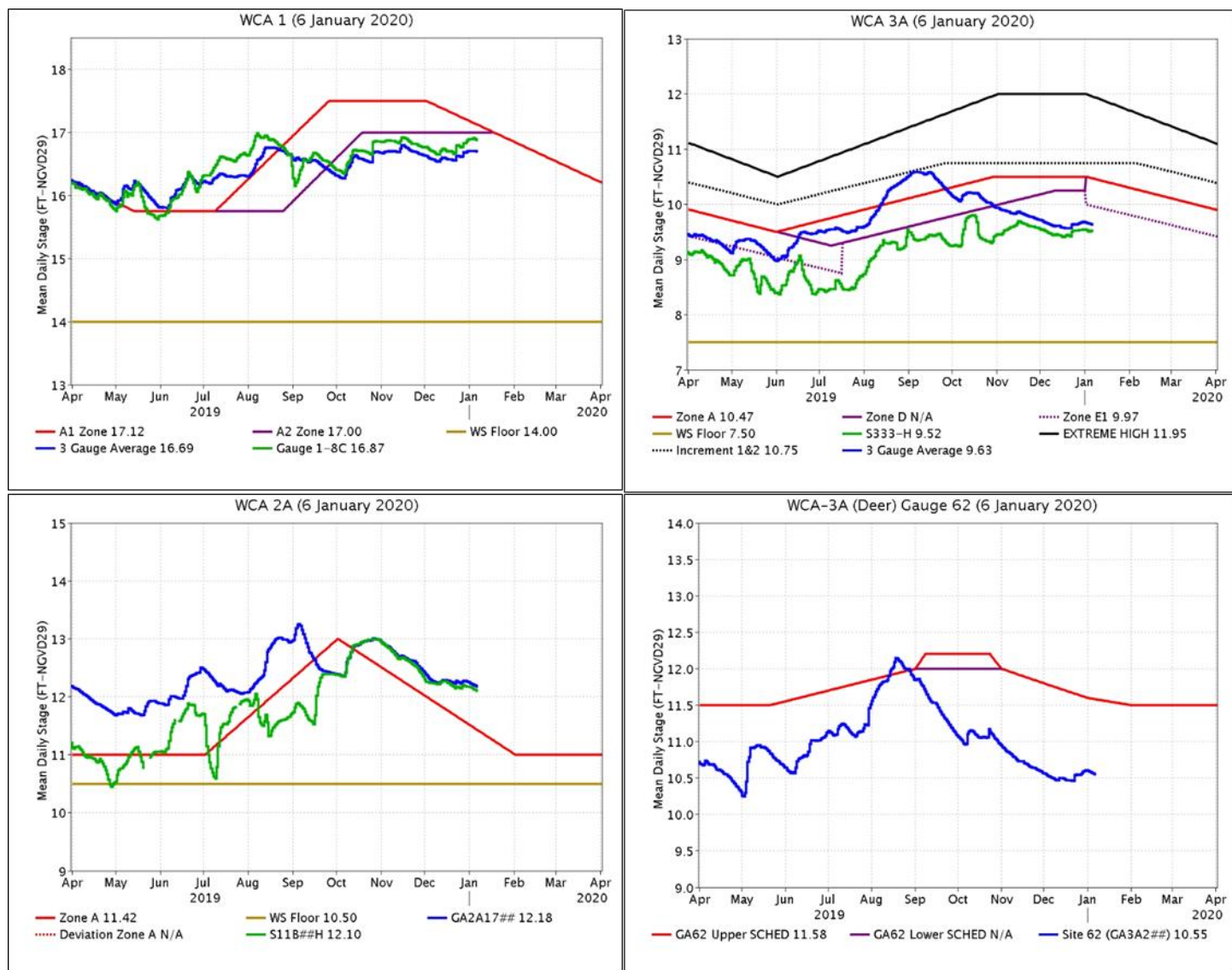
EVERGLADES

Limited precipitation fell in the WCAs last week. Stages rose slightly in WCA-1 and fell in the other basins. Pan evaporation was estimated at 0.95 inches. At the gauges monitored for this report stages fell on average 0.05 feet last week.

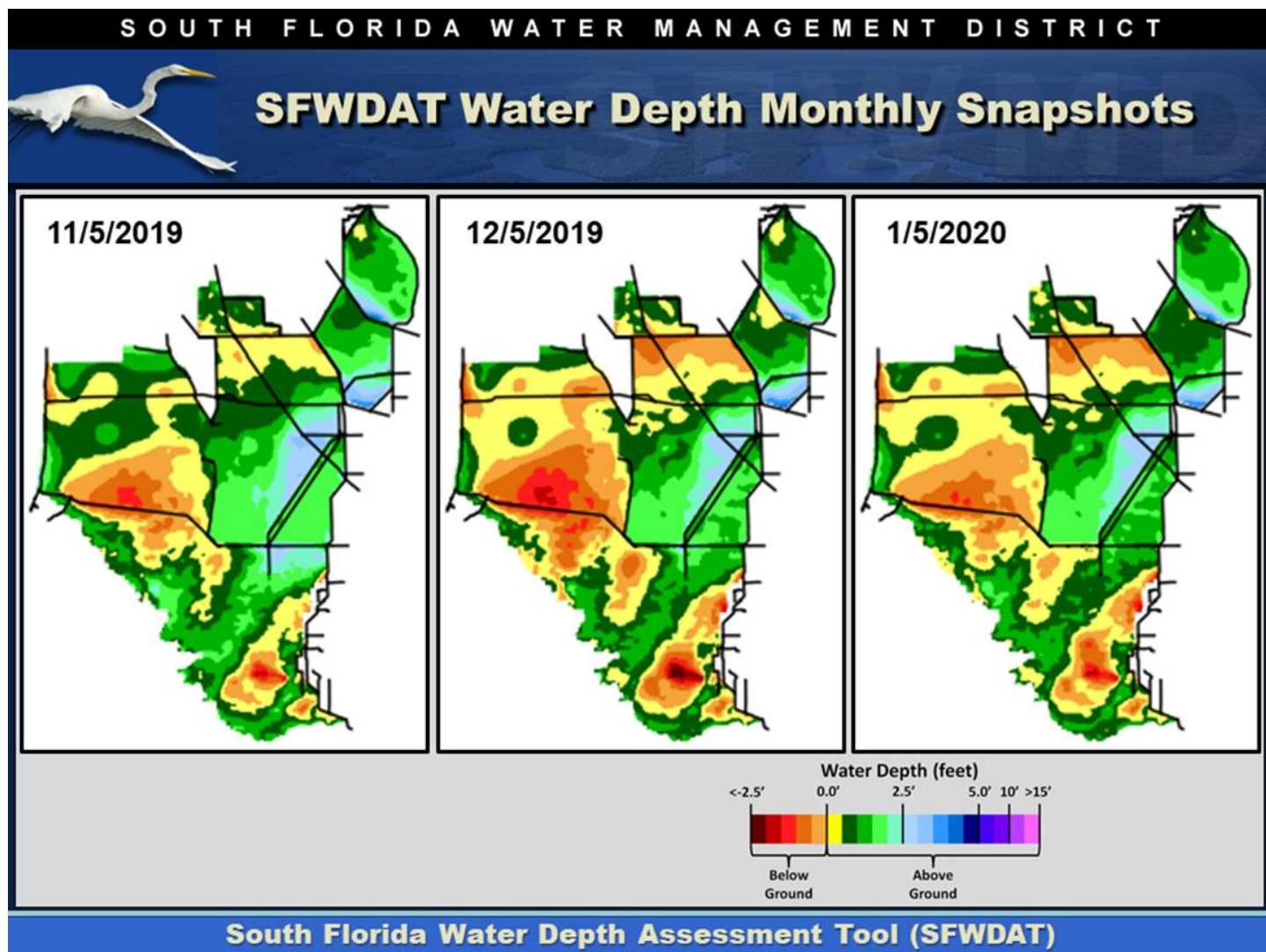
Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	0.34	+0.02
WCA-2A	0.26	-0.08
WCA-2B	0.11	-0.12
WCA-3A	0.23	-0.03
WCA-3B	0.06	-0.06
ENP	0.10	-0.10



Regulation Schedules: WCA-1: The three-gauge average and stages at the 1-8C gauge continue to trend upwards toward the Zone A2 reg line this week, currently at 0.31 feet and 0.13 feet respectively below the stable regulation line. WCA-2A: Stages at Gauge 2A-17 continue to trend away from the Zone A regulation line now 0.76 above the falling reg line. WCA-3A: The three-gauge average stage paralleled the falling Zone E1 regulation line last week, currently 0.34 feet below that line. WCA-3A at gauge 62 (northwest corner): Stage dropped 0.02 last week and generally trends downward away from the falling upper schedule, currently 1.03 feet below.

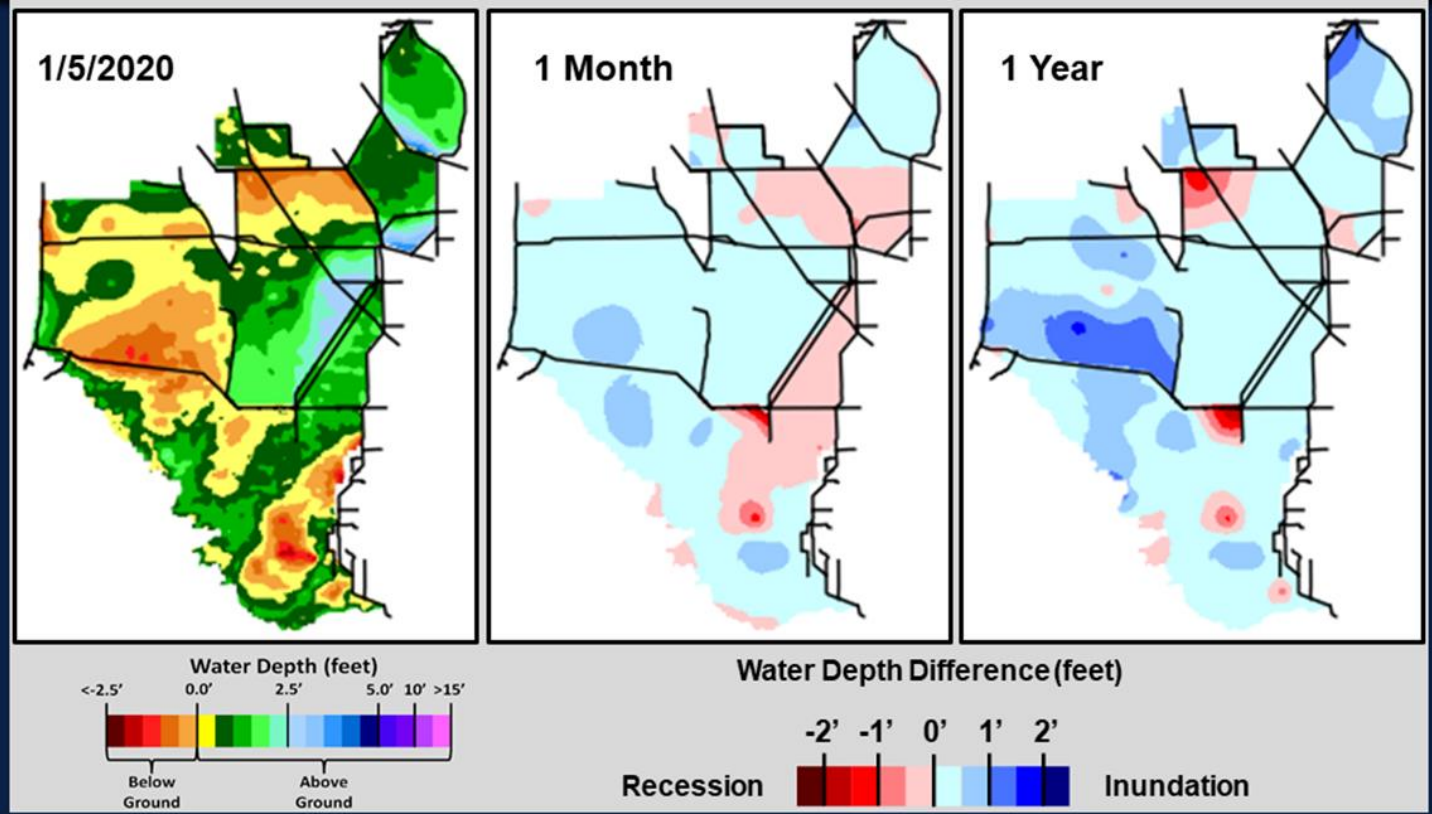


Water Depths: The WDAT tool for spatial interpolation of depth monthly snapshots indicate depths at or below ground across a majority of WCA-3A North, and depths along the northern perimeter. Depths remain near 4 feet across parts of WCA-2B and extreme southern WCA-1. Hydrologic connectivity was strengthened over the last month in Lostman's, Shark River and Taylor Slough. Comparing WDAT water levels from present, water depths changes over the last month are mixed, with WCA-1 slightly wetter and WCA-2A and northeastern WCA-3A drier. Looking back one year the stage differences are also mixed, but the changes are greater than last month's depth changes. The northwest corner of WCA-3A is significantly drier and the rest of the basin slightly wetter. WCA-1 is wetter especially in the northern region.



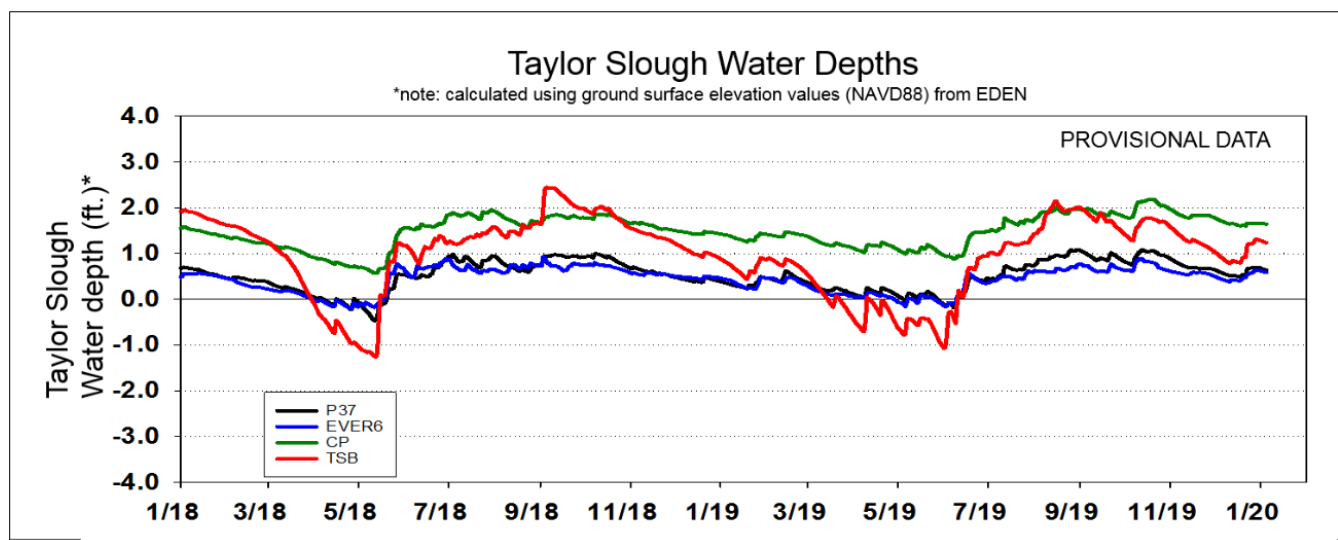


SFWDAT Everglades Difference Maps (Present – Past)

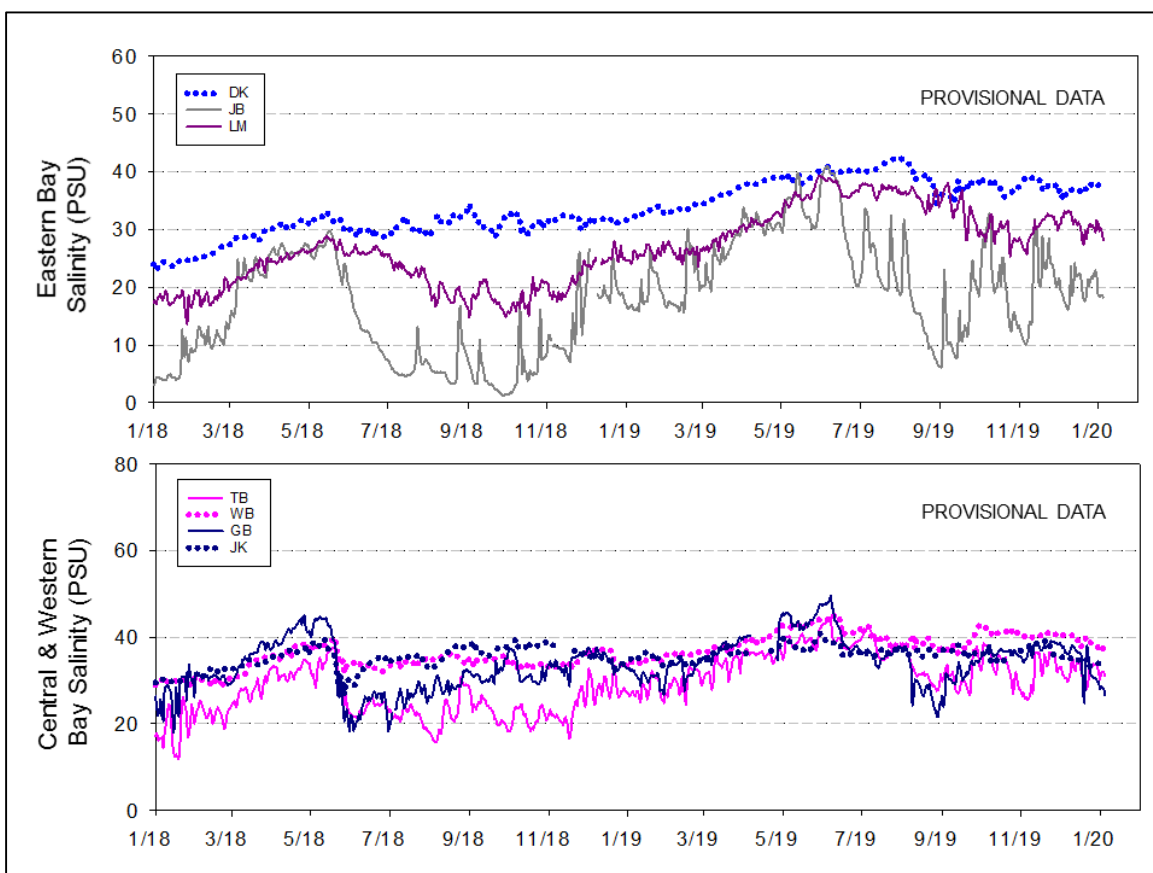
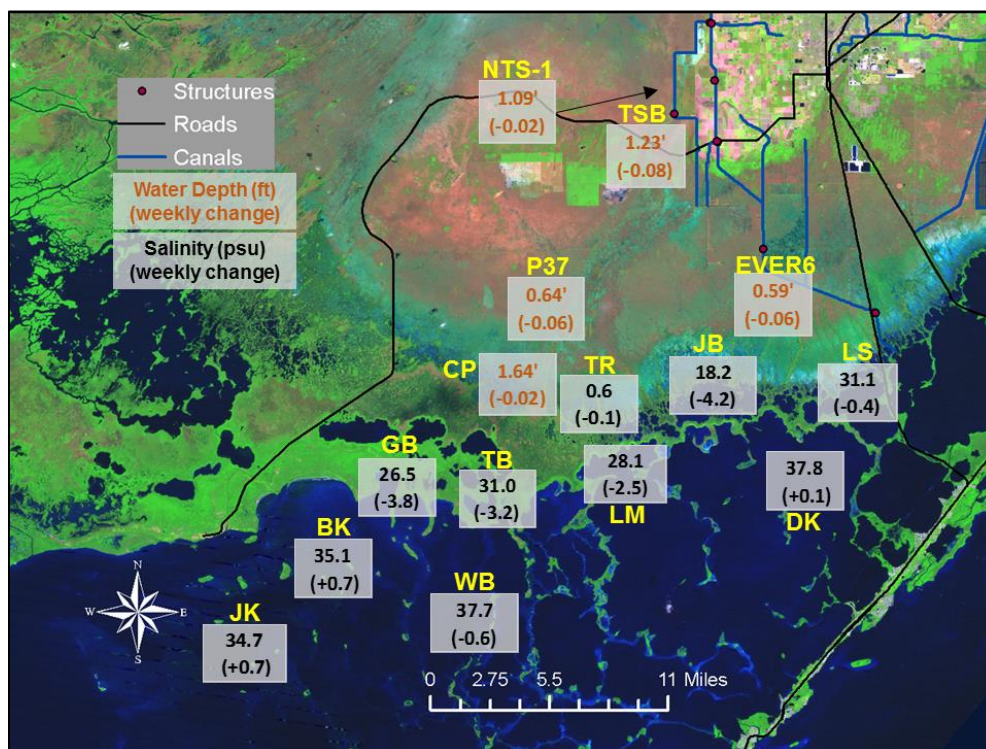


South Florida Water Depth Assessment Tool (SFWDAT)

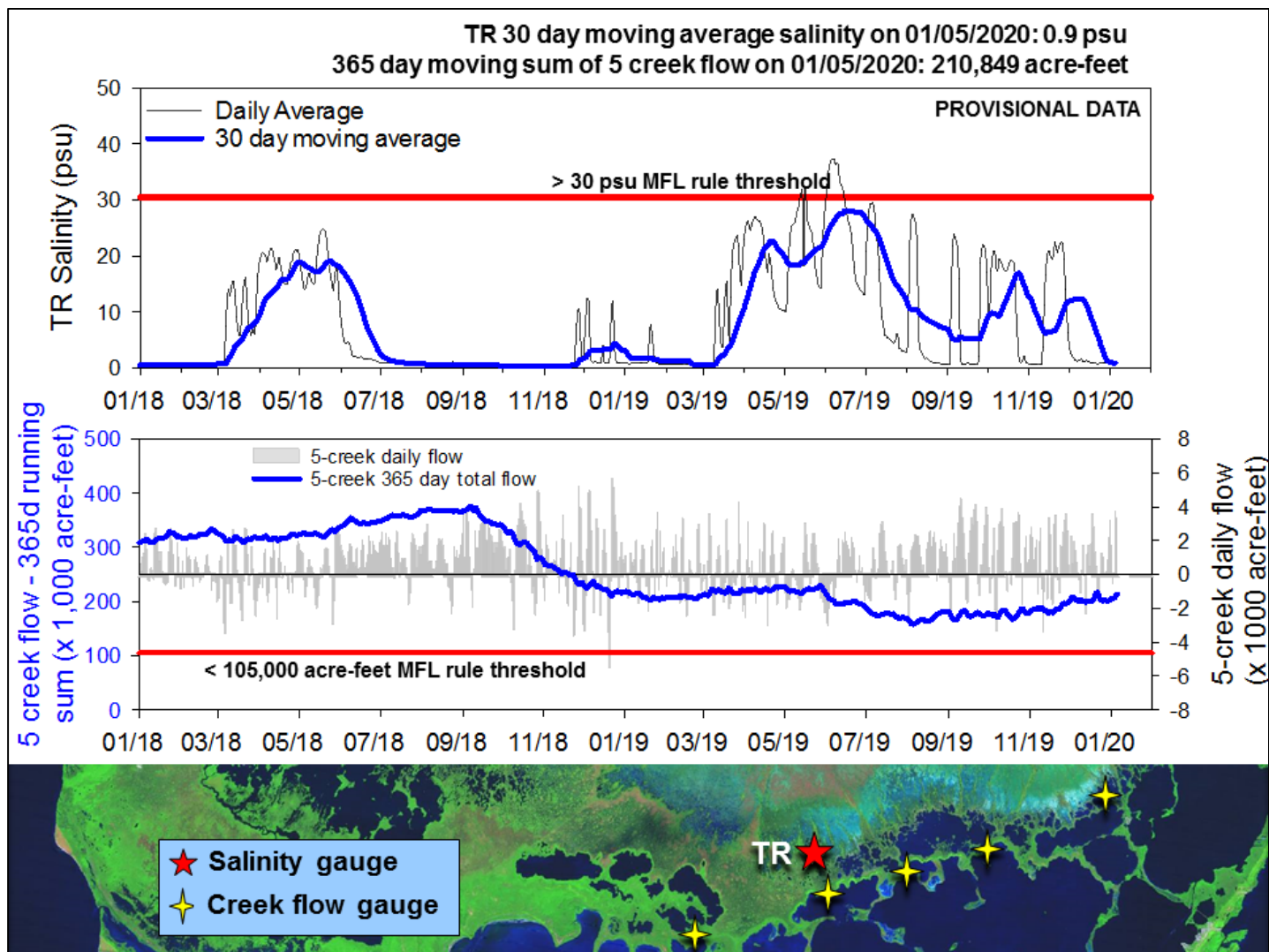
Taylor Slough Water Levels: An average of 0.12 inches of rain fell over Taylor Slough and Florida Bay this last week with stages decreasing an average of 0.05 feet. Upper Taylor Slough (west of S-332D impoundment) is about 11 inches higher than its historical average while the rest of Taylor Slough is about 7 inches higher than the historical average. Over the last 30 days the Upper Taylor Slough area has risen 0.22 feet due largely to rainfall effects.



Florida Bay Salinities: Average salinity in Florida Bay decreased 2 psu to end at 31 psu this past week (6 psu above average). The rainfall at the end of December has helped to improve salinity conditions in Florida Bay, but the nearshore area is still 8 psu higher than average. The small amounts of daily rain and cooler water temperatures have helped to keep salinities from rising quickly, but the central and eastern nearshore embayments, typically less than 25 psu at the end of the wet season/ beginning of the dry season, have yet to reach that low.



Florida Bay MFL: Salinity at the TR station in the mangrove zone (tracked for the Florida Bay MFL) has been staying near fresh (<1 psu). The 30-day moving average ended at 0.9 psu (0.8 psu lower than last week). Weekly flow from the 5 creeks identified by yellow stars on the map totaled about 11,000 acre-feet last week with positive flows through the entire week. This is likely a result of the previous week's rainfall. The 365-day moving sum of flow from the five creeks (tracked as part of the Florida Bay MFL criteria) increased 8,000 acre-feet this week to end at 210,849 acre-feet, between the 25th percentile (192,885 acre-feet) and the median (249,091 acre-feet). Creek flow are provisional USGS data.



Water Management Recommendations

Current stages in the WCAs are low for this time of year and salinities are high in Florida Bay. Conserving water within the WCAs and moving low nutrient water south has many ecological benefits. Maintaining saturated soils in over-drained portions of the Everglades conserves peat and lowers the risk of muck fires. Flows towards Taylor Slough and Florida Bay freshen salinity conditions within the nearshore areas of Florida Bay and decrease the currently stressful conditions for seagrasses and fauna as nearshore salinities remain elevated. More specific recommendations appear in the summary table below. The red text represents new or modified information or recommendations.

SFWMD Everglades Ecological Recommendations, January 7th, 2020 (red is new)			
Area	Weekly change	Recommendation	Reasons
WCA-1	Stage increased by 0.02'	Conserving water in this basin has ecological benefit as current water depths are below seasonal averages.	Protect tree islands, upstream/downstream habitat and wildlife.
WCA-2A	Stage decreased by 0.08'	Conserving water in this basin has ecological benefit as current water depths are below seasonal averages.	Protect tree islands, upstream/downstream habitat and wildlife.
WCA-2B	Stage decreased by 0.12'	Conserving water in this basin has benefit as current water depths are below seasonal averages.	Protect within basin habitat and wildlife.
WCA-3A NE	Stage decreased by 0.02'	Conserving water in this basin has ecological benefit as current water depths are below seasonal averages. Inflows to this region continue to have ecological benefit.	Protect stage conditions conducive to wading bird foraging and peat soil conservation.
WCA-3A NW	Stage decreased by 0.02'	Conserving water in this basin has ecological benefit as current water depths are below seasonal averages.	
Central WCA-3A S	Stage decreased by 0.04'	Conserving water in this basin has ecological benefit as current water depths are below seasonal averages.	Protect upstream/downstream habitat and wildlife.
Southern WCA-3A S	Stage decreased by 0.05'		
WCA-3B	Stage decreased by 0.06'	Conserving water in this basin has benefit as current water depths are below seasonal averages.	Protect tree islands, upstream/downstream habitat and wildlife.
ENP-SRS	Stage decreased by 0.10'	Make discharges to the Park according to the 2012 WCP rainfall plan.	Protect upstream/downstream habitat and wildlife.
Taylor Slough	Stage changes ranged from -0.02' to -0.08'	Move water southward as possible	When available, provide freshwater buffer for downstream conditions.
FB- Salinity	Salinity changes ranged -4.2 to +0.7 psu	Move water southward as possible	When available, provide freshwater to maintain low salinity buffer and promote water movement.