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: February 24, 2021

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

A cold front is forecast to push through south Florida Tuesday morning before stalling near the Florida Keys Tuesday evening. The front is expected to generate some light to moderate showers as it pushes through the southern end of the District Tuesday morning and early afternoon before activity pushes offshore by late afternoon. The stalled front boundary is forecast to lift back north bringing moderate to locally heavy rains to the southeastern portion of the District Wednesday and then moderate rains to the northeastern portion of the District Thursday. The boundary could continue to produce some light showers mainly north as it continues lifting northward through central Florida Friday. Building high pressure is then forecast to bring drier conditions with just some widely scattered light showers mainly east Saturday and Sunday. During the first 7-day period (Week 1), total rainfall is forecast to be below the historical average west and north while the frontal boundary is forecast to bring near average rains with pockets of above average rains over eastern areas. Rains below the historical average are forecast for the second 7-day period (Week 2).

Kissimmee

Tuesday morning stages were 57.9 feet NGVD (0.1 feet below schedule) in East Lake Toho, 54.5 feet NGVD (0.5 feet below schedule) in Toho, and 51.9 feet NGVD (0.5 feet above schedule) in Kissimmee-Cypress-Hatchineha; headwater stages were 46.3 feet NGVD at S-65A and 25.9 feet NGVD at S-65D. Tuesday morning discharges were 820 cfs at S-65, 890 cfs at S-65A, 1,160 cfs at S-65D, and 1,140 cfs at S-65E. Dissolved oxygen concentration in the Kissimmee River averaged 7.2 mg/L for the week through Sunday. Kissimmee River mean floodplain depth on Sunday was 0.6 feet. Today's recommendation is to continue to follow the USACE request to keep S-65A discharge below 800-900 cfs to facilitate construction in the Lower Kissimmee Basin. Continue current lake operations until conditions in Kissimmee-Cypress-Hatchineha, Toho, and East Lake Toho have been re-evaluated.

Lake Okeechobee

Lake Okeechobee stage was 15.40 feet NGVD on February 21, 2021, 0.03 feet lower than last week and 0.20 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 0.51 feet above. Approximately 9,400 wading birds were observed foraging on the Lake last week, and Great Blue Herons and Great Egrets have initiated nesting activities. Their nesting was observed at three known colonies, one of which has not seen active nesting over the past five years because it is typically only used when Lake levels are unusually high during the nesting seasons. Recent satellite imagery suggests there is little to no algal bloom activity on the Lake.

Estuaries

Total inflow to the St. Lucie Estuary averaged more than 736 cfs over the past week with no flow coming from Lake Okeechobee. The seven-day average surface salinities decreased throughout the estuary over the past week. Salinity at the US1 Bridge is in the good range (10-26) for adult eastern oysters. Total inflow to the Caloosahatchee Estuary averaged 2,058 cfs over the past week with approximately 993 cfs coming from the Lake. Seven-day average salinities remained the same at S-79 and decreased 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 Cape Coral and Shell Point but have increased enough to exceed optimal and move into the fair range at Sanibel. 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, approximately 2,100 ac-feet of Lake Okeechobee water was delivered to the FEBs/STAs. The total amount of Lake releases sent to the FEBs/STAs in WY2021 (since May 1, 2020) is approximately 101,400 ac-feet. The total amount of inflows to the STAs in WY2021 is approximately 1,547,000 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. Operational restrictions are in place in STA-1W Western, Eastern, and Northern Flow-ways, and STA-2 Flow-ways 2 and 3 for construction activities, in STA-1E Central Flow-way, STA-2 Flow-ways 3, 4 and 5, STA-3/4 Eastern, Central, and Western Flow-ways for vegetation management activities, in STA-3/4 Eastern Flow-way for drawdown preparation 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

Nearly all the gauges monitored for this report the WCA weekly stage changes fell within the “fair” dry season WY21 ecological recession characterizations. Wading birds continue to forage along the southern coast but their numbers there are dwindling as flocks build in the western marl prairies, eastern Big Cypress National Reserve and central WCA-3A North. Conditions continue to suggest a very productive upcoming wading bird nesting season. Depths remain above average in Taylor Slough and salinities in Florida Bay remain below the historical average for this time of year, continued good positioning for early 2021 as salinities gradually increase.

Supporting Information

KISSIMMEE BASIN

Kissimmee Basin Rainfall

The Upper Kissimmee Basin received 0.63 inches of rainfall in the past week and the Lower Basin received 0.69 inches (SFWMD Daily Rainfall Report 02/22/2021).

Upper Kissimmee Basin

Table 1 lists stage and discharge for several Kissimmee Chain of Lakes (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: 2/23/2021

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)						
							2/21/21	2/14/21	2/7/21	1/31/21	1/24/21	1/17/21	1/10/21
Lakes Hart and Mary Jane	S-62	169	LKMJ	60.8	R	61.0	**-0.2**	0.0	0.0	0.0	0.0	0.0	0.0
Lakes Myrtle, Preston, and Joel	S-57	63	S-57	61.1	R	61.1	**0.0**	0.1	0.1	0.0	0.1	0.0	-0.1
Alligator Chain	S-60	168	ALLI	64.0	R	64.0	**0.0**	0.1	0.1	-0.1	-0.1	0.0	0.0
Lake Gentry	S-63	205	LKGT	61.4	R	61.5	**-0.1**	0.0	0.1	0.0	0.0	0.0	0.0
East Lake Toho	S-59	#DIV/0!	TOHOE	57.9	R	58.0	**-0.1**	-0.2	-0.3	-0.3	-0.1	0.0	0.0
Lake Toho	S-61	798	TOHOW, S-61	54.6	R	55.0	**-0.4**	-0.4	-0.4	-0.3	-0.1	0.0	0.0
Lakes Kissimmee, Cypress, and Hatchineha	S-65	835	KUB011, LKIS5B	51.9	R	51.5	**0.4**	0.0	-0.6	-0.8	-0.6	-0.5	-0.3

[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: **2/23/2021**

Metric	Location	1-Day Average	Average for the Preceeding 7-Days[1]								
		2/21/2021	2/21/21	2/14/21	2/7/21	1/31/21	1/24/21	1/17/21	1/10/21	1/3/21	12/27/20
Discharge (cfs)	S-65	812	**835**	880	894	894	869	644	540	676	729
Discharge (cfs)	S-65A[2]	905	**901**	887	882	892	856	641	600	733	809
Discharge (cfs)	S-65D[2]	1,042	**1,038**	946	934	914	838	701	770	944	1,317
Headwater Stage (feet NGVD)	S-65D[2]	25.72	**25.80**	25.87	25.79	25.83	25.79	25.87	25.85	25.80	25.73
Discharge (cfs)	S-65E[2]	1,068	**1,049**	942	940	873	849	719	808	944	1,314
Discharge (cfs)	S-67	0	**0**	0	0	0	0	0	0	0	0
DO (mg/L)[3]	Phases I & II/III river channel	7.5	**7.2**	8.7	8.7	8.1	8.8	8.3	8.4	8.4	7.5
Mean depth (feet)[4]	Phase I floodplain	0.59	**0.59**	0.41	0.38	0.38	0.36	0.33	0.40	0.50	0.68

[1]Seven-day average of weighted daily means through Sunday midnight.
[2]S-65A discharge combines S-65A with auxillary strucutures; 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.
[3]DO is the average for sondes at KRBN, PC62, PC33, PD62R, and PD42R.
[4]1-day spatial average from South Florida Water Depth Assessment Tool (SFWDAT).
DATA ARE PROVISIONAL; N/A indicates that data were not available.

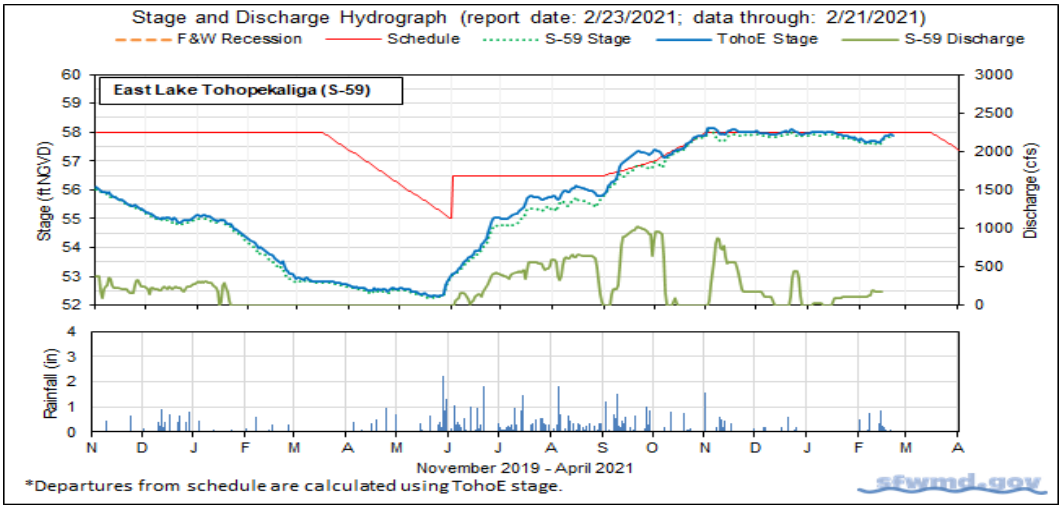


Figure 1. East Lake Toho regulation schedule, stage, discharge, and rainfall.

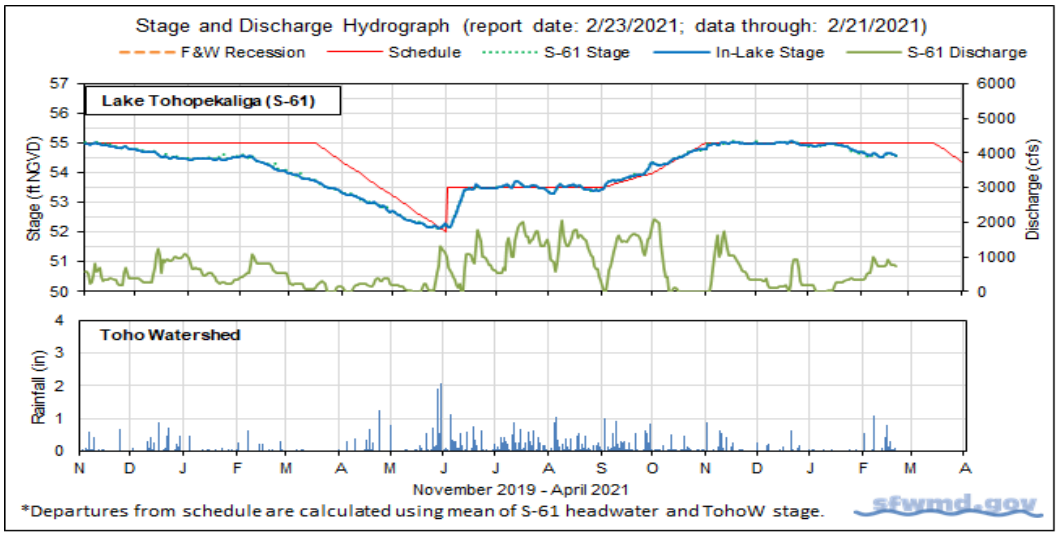


Figure 2. Lake Toho regulation schedule, stage, discharge, and rainfall.

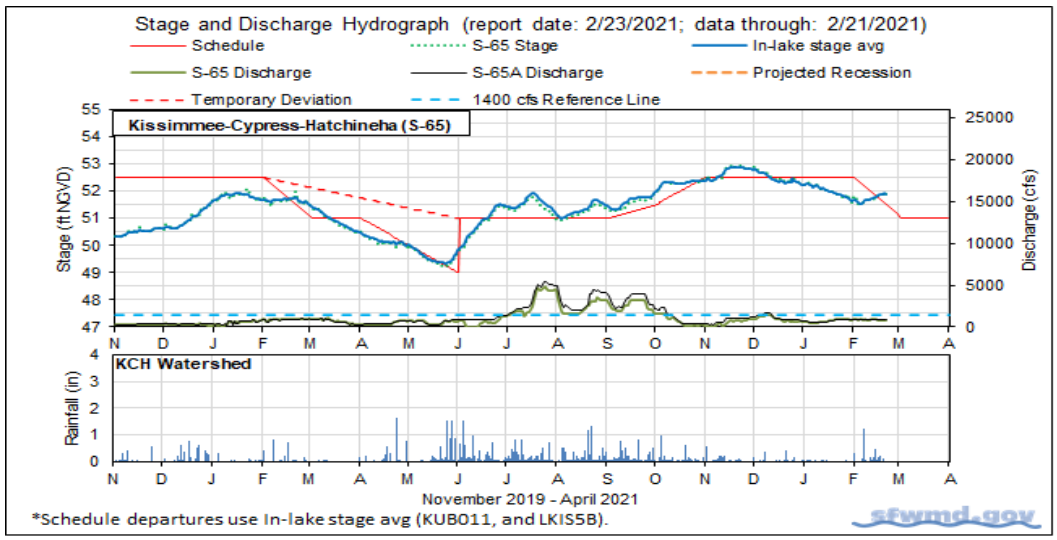


Figure 3. Lakes Kissimmee, Cypress and Hatchineha regulation schedule, stage, discharge, and rainfall.

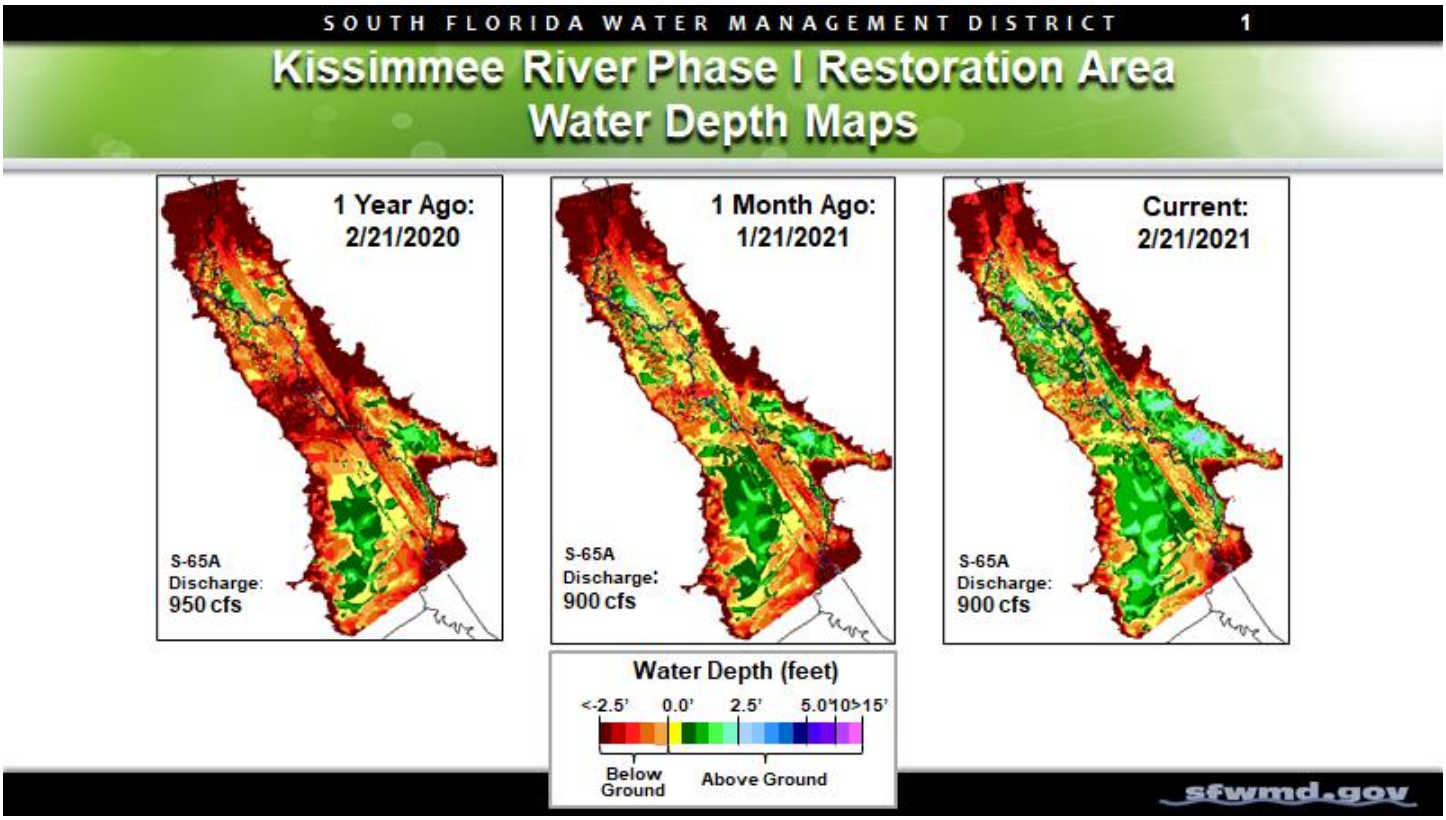


Figure 4. Phase I area floodplain water depths (from left to right) one year ago, one month ago, and current. Color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to January 16, 2012.

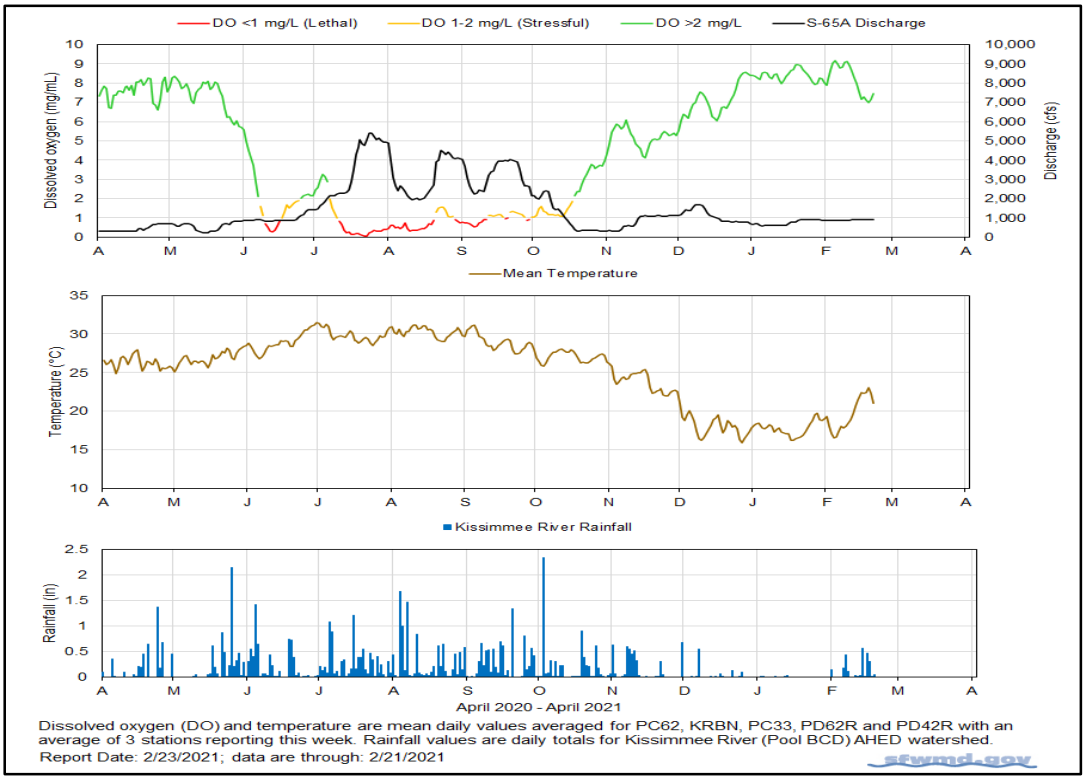


Figure 5. Restored Kissimmee River channel mean daily dissolved oxygen concentration (mg/L), S-65A discharge (cfs), temperature (°C) and rainfall (inches).

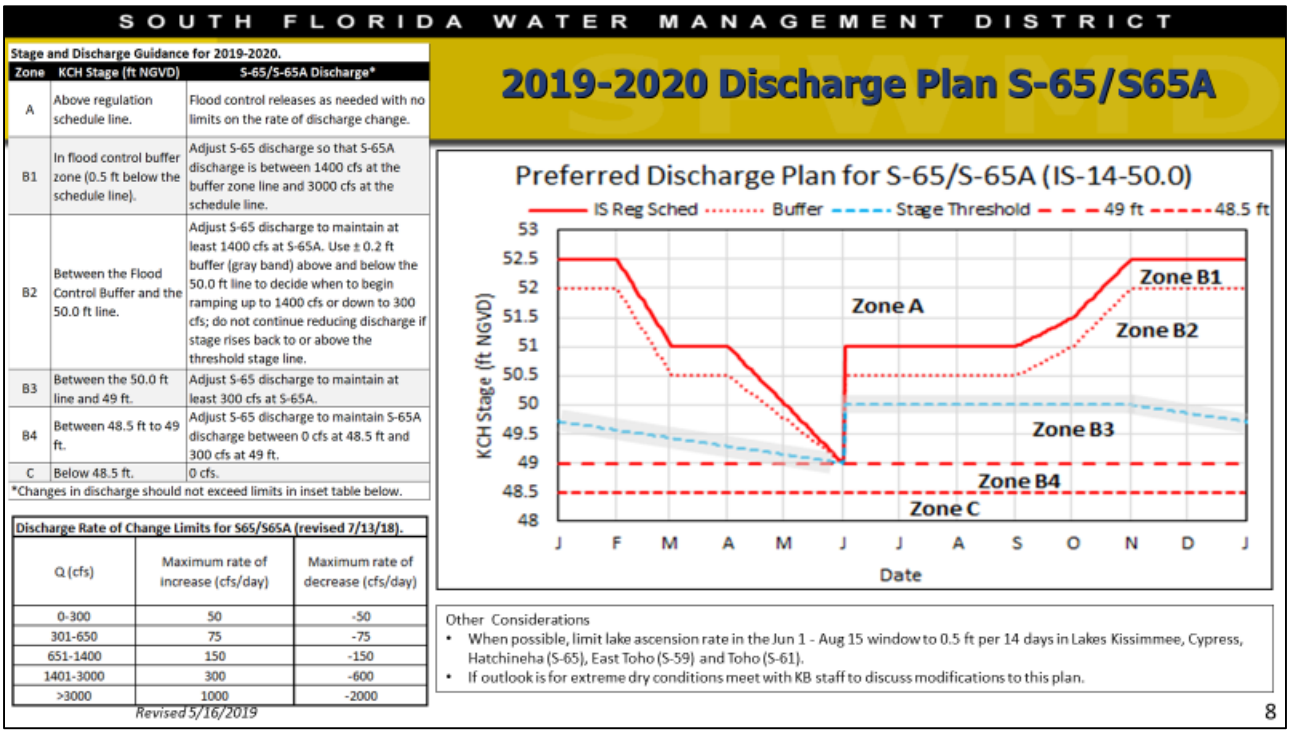


Figure 6. The 2019-2020 Discharge Plan for S-65/S-65A.

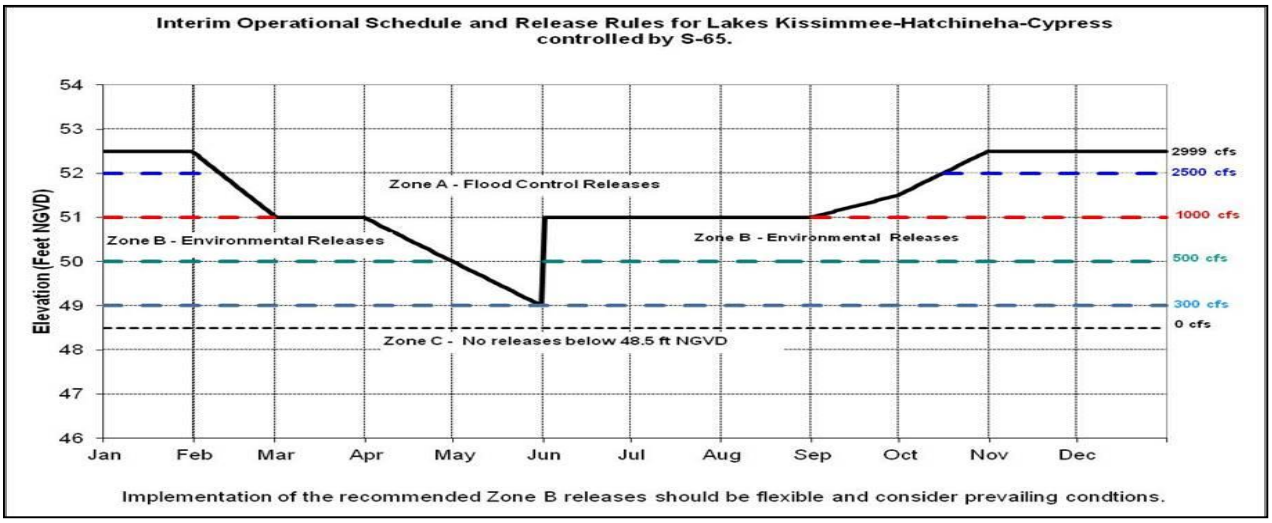


Figure 7. Interim operations schedule for S-65 (solid black line). The discharge schedule shown to the right has not been used in recent years.

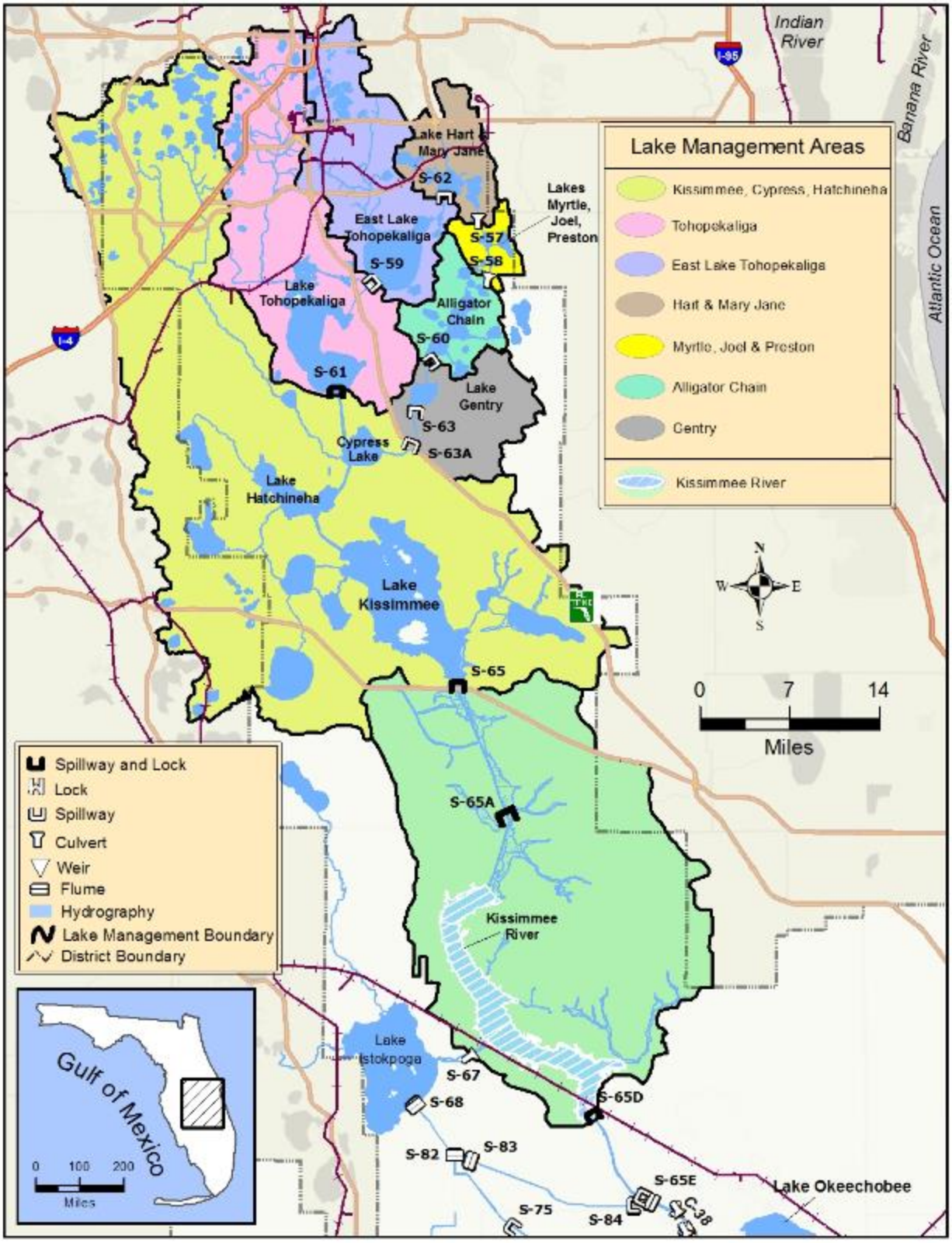


Figure 8. The Kissimmee Basin.

LAKE OKEECHOBEE

Lake Okeechobee stage was 15.40 feet NGVD on February 21, 2021, 0.20 feet lower than a month ago, and 2.58 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 0.51 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 slowly since mid-November and is currently in the Low sub-band. According to NEXRAD, 0.79 inches of rain fell directly on the Lake while the northern watershed received up to 1.5 inches. Most of the southern watershed received less than 0.5 inches with the exception of the lower east coast which received up to 3 inches (Figure 4).

Average daily inflows (excluding rainfall) increased from the previous week going from 1,236 cubic feet per second (cfs) to 2,370 cfs. Outflows (excluding evapotranspiration) increased from 1,237 cfs to 1,566 cfs. Most of the inflows came from the Kissimmee River (1,050 cfs through S-65E & S-65EX1). Releases to the west via S-77 were similar, going from 983 cfs the prior week to 993 cfs, while releases east via S-308 decreased to 0 cfs. Releases south through the S-350 structures increased from approximately 186 cfs to 474 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 in inches (in) 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.

The fifth wading bird survey of the 2021 breeding season (conducted February 18, 2021) reported over 9,400 foraging wading birds on the Lake, compared to about 2,530 on February 4th, 7,400 on the January 21st survey, about 350 on December 17th, and 3,500 on December 3rd (Figure 6). The first five surveys of this year have averaged roughly 3,630 wading birds per survey, compared to about 1,600 per survey over the same period last year when lake stage was over 2.5 feet lower and most of the marsh was dry (Figure 2). Suitable foraging habitat is currently limited due to deep water levels throughout the marsh, especially for the short-legged wading birds. Higher lake stages throughout the summer and fall of 2020 followed two years of low winter stages; the combination of which has likely sparked prey production in the marsh and lead to more wading bird foraging activity than would be expected at 15.5 – 16.0 feet in lake stage this time of year. If Lake stages continue to decline and stay near the top of the ecological envelope throughout the spring, there should be good foraging and nesting conditions for wading birds on the Lake this breeding season.

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 February sampling occurred on the 9th and 10th. Three samples had detectable levels of cyanotoxins but well below the 8 ug/L threshold, and algal communities were described as mixed at five sites and *Microcystis* dominant at four sites (Figure 7). Results for chlorophyll-*a* showed one site on the northern shore above the bloom threshold of 40 µg/L and six sites between 20 µg/L and 40 µg/L.

The most recent satellite image (February 20, 2021) from the NOAA cyanobacteria monitoring product derived from EUMETSAT's Sentinel 3 OLCI sensor data showed continued low bloom potential on the Lake (Figure 8).

Water Management Summary

Lake Okeechobee stage was 15.40 feet NGVD on February 21, 2021, 0.03 feet lower than last week and 0.20 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 0.51

feet above. Approximately 9,400 wading birds were observed foraging on the Lake last week and Great Blue Herons and Great Egrets have initiated nesting activities. Their nesting was observed at three known colonies, one of which has not seen active nesting over the past five years because it is typically only used when Lake levels are unusually high during the nesting seasons. Recent satellite imagery suggests there is little to no algal 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)
S-65E & S-65EX1	942	1050	0.4
S-71 & S-72	16	193	0.1
S-84 & S-84X	143	785	0.3
Fisheating Creek	32	33	0.0
S-154	0	7	0.0
S-191	0	3	0.0
S-133 P	54	56	0.0
S-127 P	17	18	0.0
S-129 P	10	12	0.0
S-131 P	8	9	0.0
S-135 P	16	205	0.1
S-2 P	0	0	0.0
S-3 P	0	0	0.0
S-4 P	0	0	0.0
L-8 Backflow			
Rainfall	1931	2114	0.8
Total	**3167**	**4483**	**1.7**

OUTFLOWS	Previous week Avg Daily CFS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)
S-77	983	993	0.4
S-308	41	0	0.0
S-351	118	158	0.1
S-352	0	34	0.0
S-354	68	282	0.1
L-8 Outflow	27	100	0.0
ET	1886	1645	0.6
Total	**3122**	**3212**	**1.2**

Provisional Data

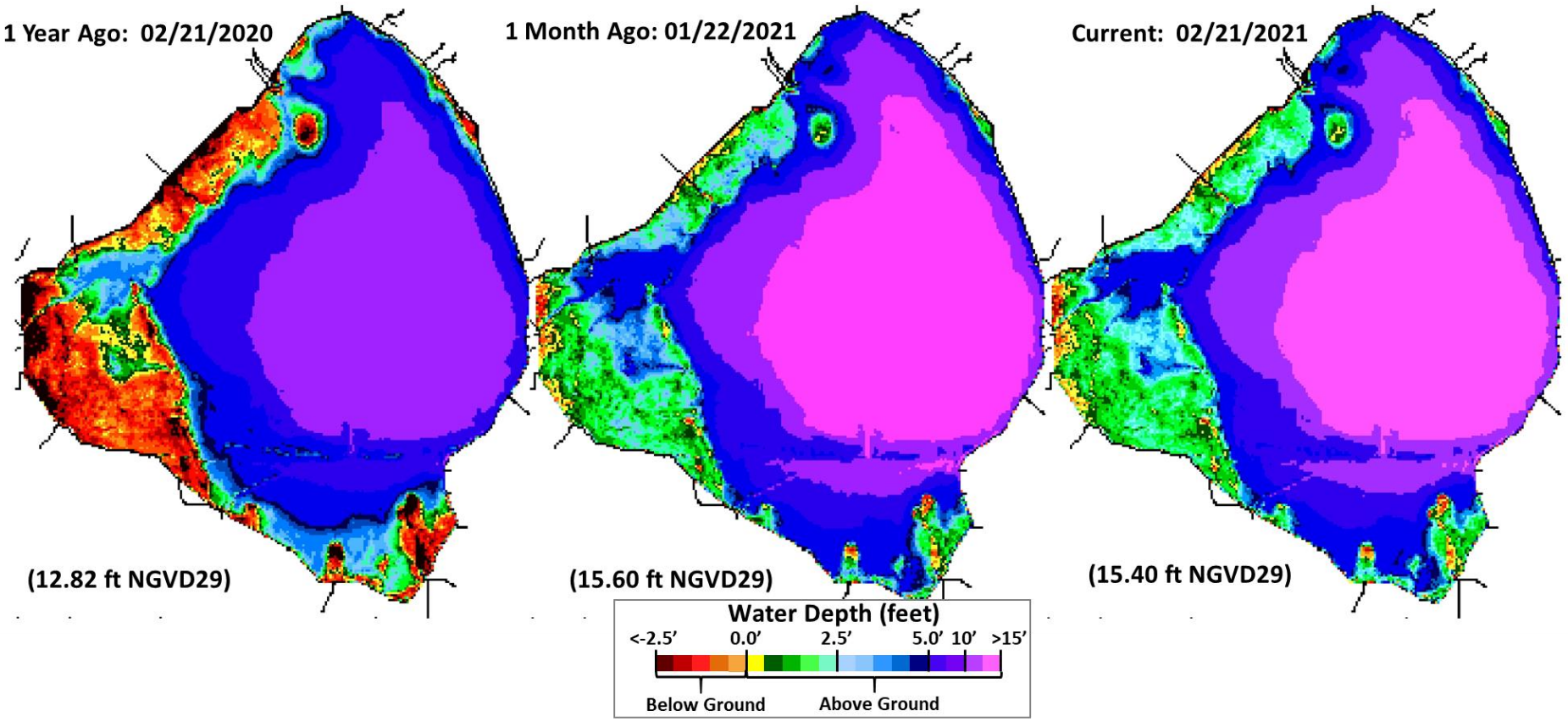


Figure 1. Water depth estimates on Lake Okeechobee based on the South Florida Water Depth Assessment Tool.

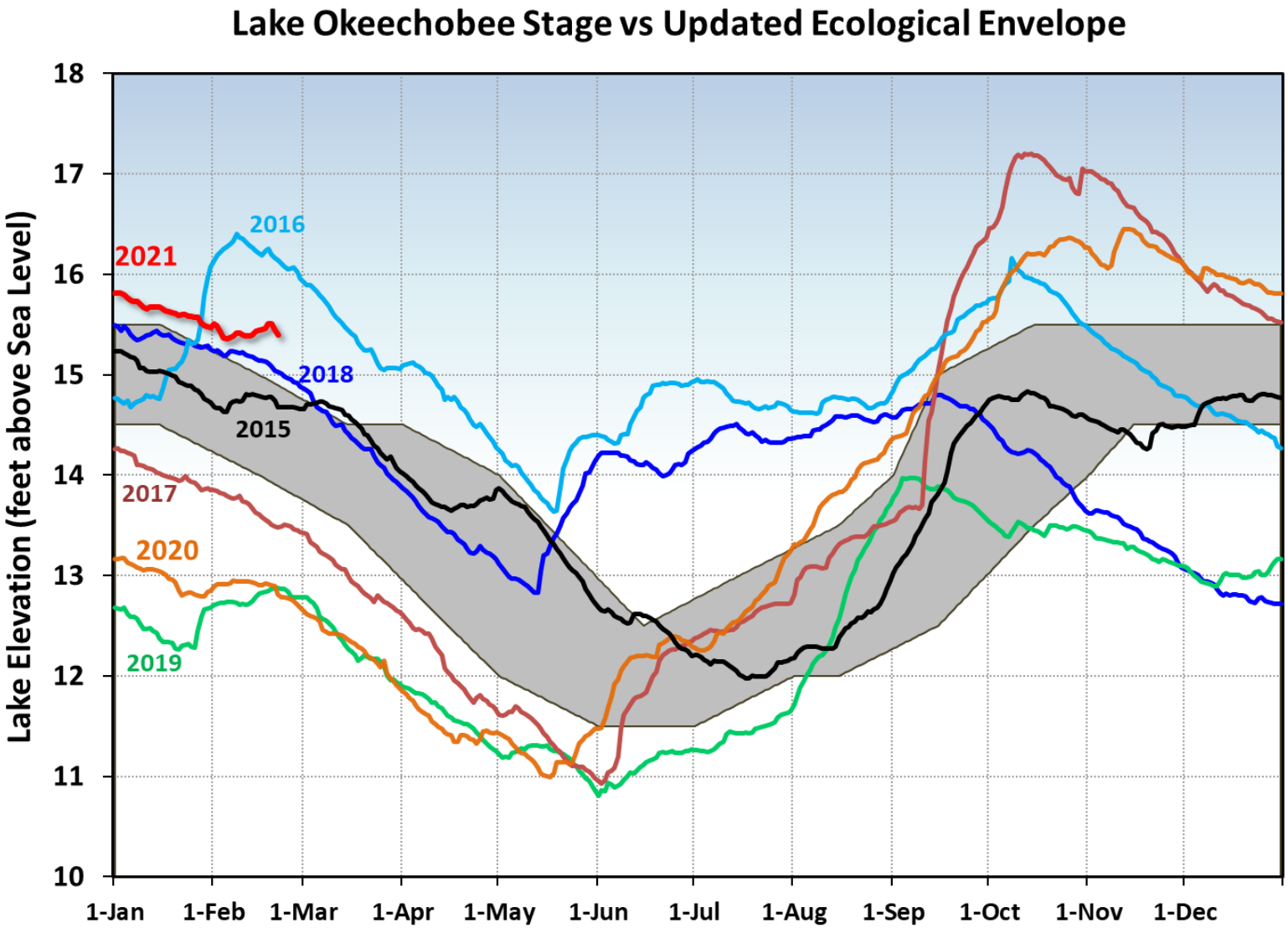


Figure 2. Select annual stage hydrographs for Lake Okeechobee in comparison to the updated Ecological Envelope.

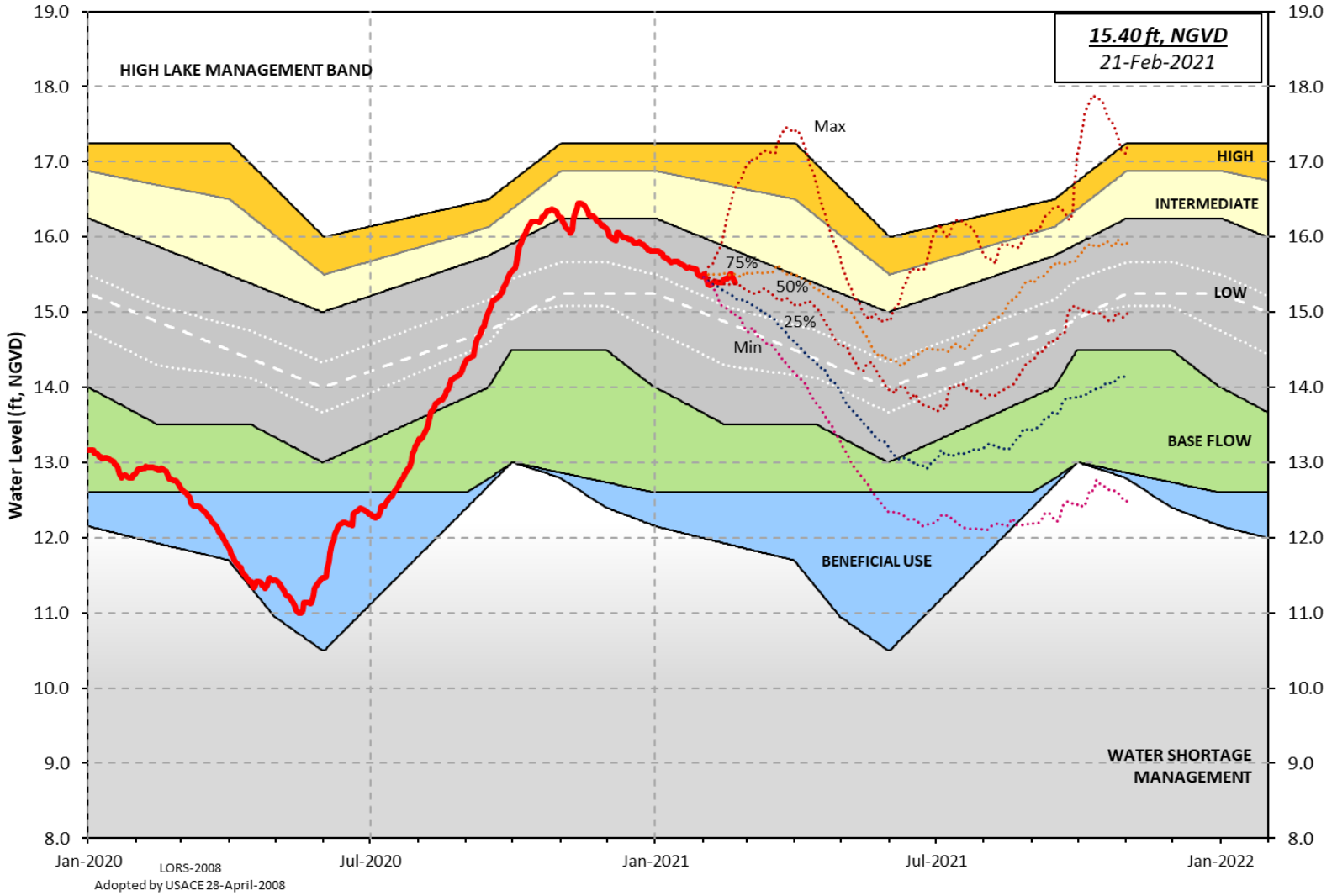


Figure 3. Recent Lake Okeechobee stages and releases, with projected stages based on a dynamic position analysis.

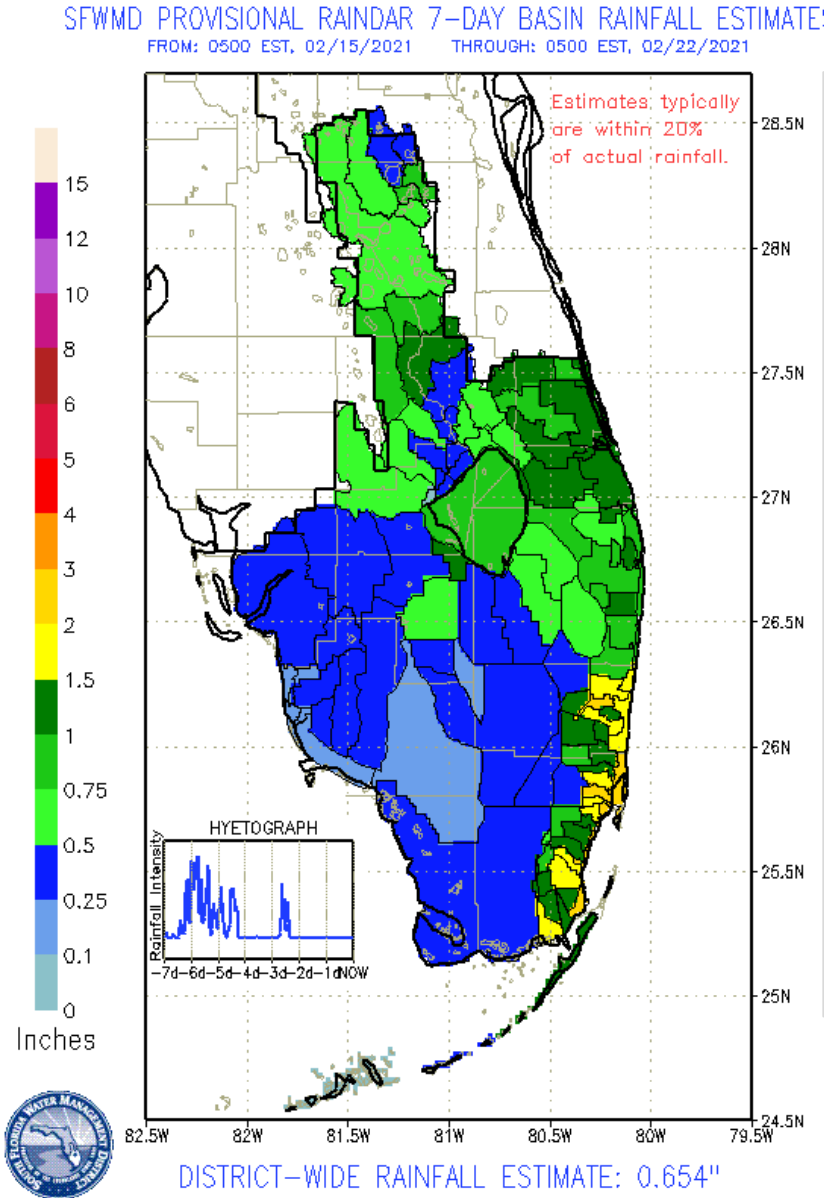


Figure 4. 7-Day rainfall estimates by RAINDAR.

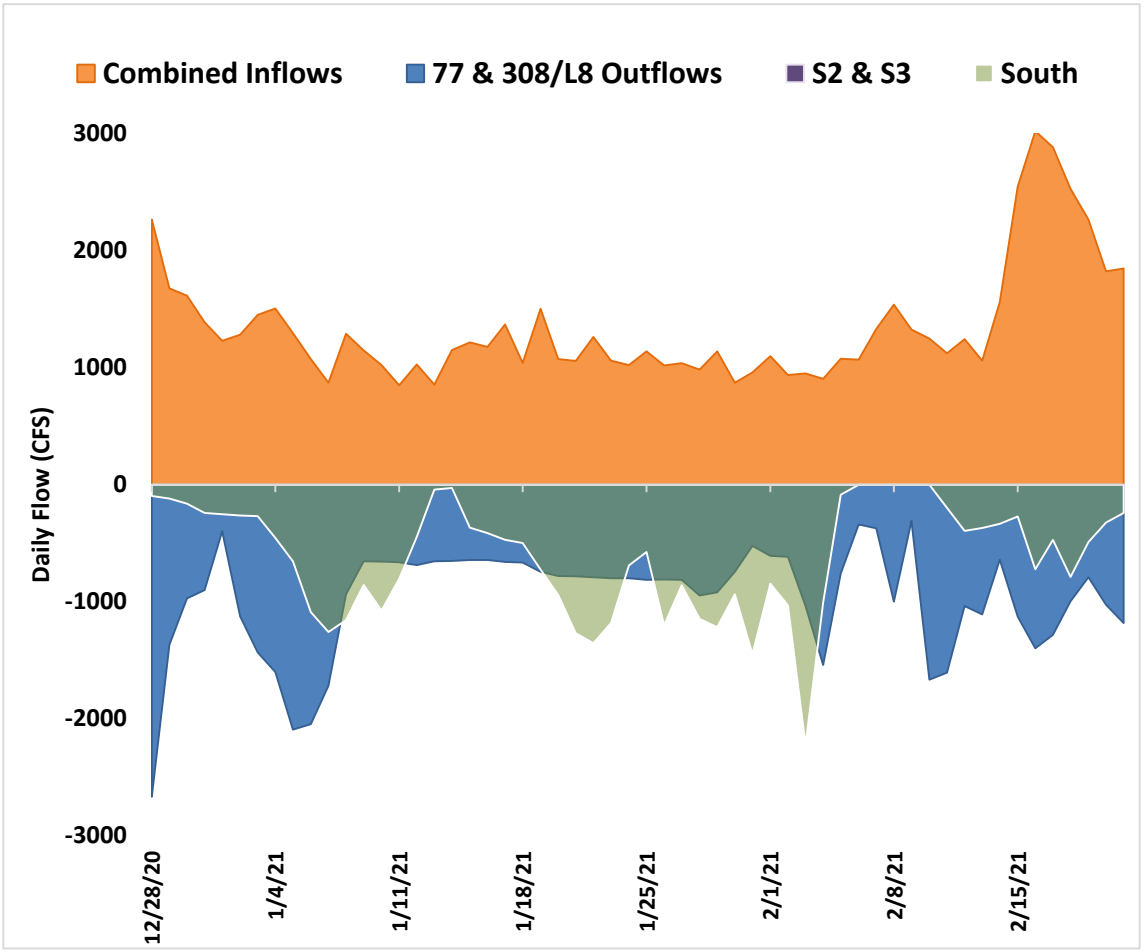
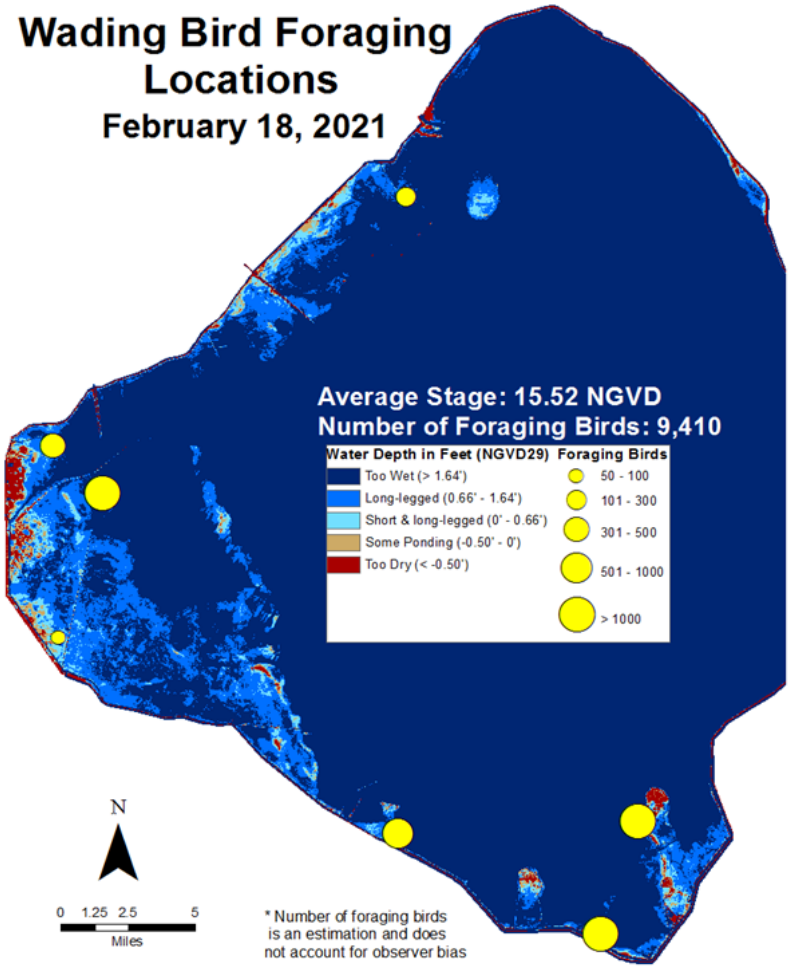


Figure 5. Major inflows (orange) and outflows (blue) of Lake Okeechobee, including the S-350 structures designated as South (green). The L-8 Canal flows through Culvert 10A are included as outflows when positive, and as inflows when backflowing into the Lake. All inflows and outflows are shown as positive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



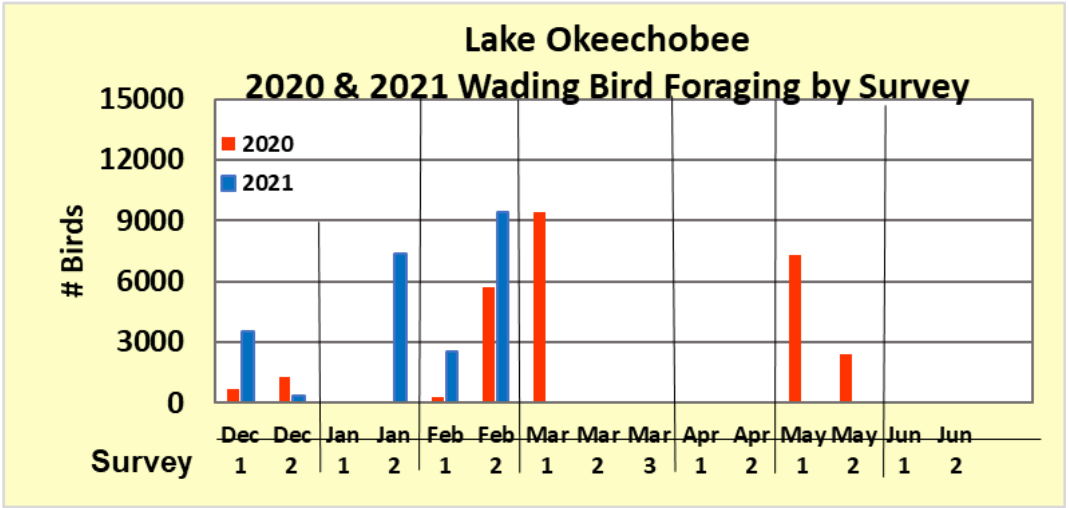


Figure 6. Locations of foraging flocks of wading birds observed during a monitoring flight on February 18, 2021 are shown in yellow, with circle sizes representing the size of the flocks. Previous survey totals from last year's breeding season are compared in the bar graph.

Collection Date: February 9-10, 2021

Station	CHL*a* (ug/L)	TOXIN (ug/L)	TAXA
FEBIN (2/1)	12.4		
FEBOUT (2/1)	14.0		
KISSR0.0	**36.9**	**0.3**	mixed
L005	15.0	BDL	mixed
LZ2	11.4	BDL	mixed
KBARSE	**42.6**		
RITTAE2	12.3	**0.8**	*Microcys*
PELBAY3	10.7		
POLE3S	8.9		
LZ25A	8.2		
PALMOUT	**23.0**	**0.8**	*Microcys*
PALMOUT1	12.3		
PALMOUT2	17.3		
PALMOUT3	**22.8**		
POLESOUT	**34.8**	BDL	mixed
POLESOUT1	9.0		
POLESOUT2	8.0		
POLESOUT3	5.5		
EASTSHORE	7.7		
NES135	8.7		
NES191	15.8		

Station	CHL*a* (ug/L)	TOXIN (ug/L)	TAXA
L001	13.1		
L004	17.4		
L006	4.5		
L007	9.5		
L008	9.2		
LZ30	19.6	BDL	*Microcys*
LZ40	4.1		
CLV10A	**32.3**	BDL	*Microcys*
NCENTER	16.2		

Sampled 2/8

S308C	**27.3**	BDL	mixed
S77	6.5		

- 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

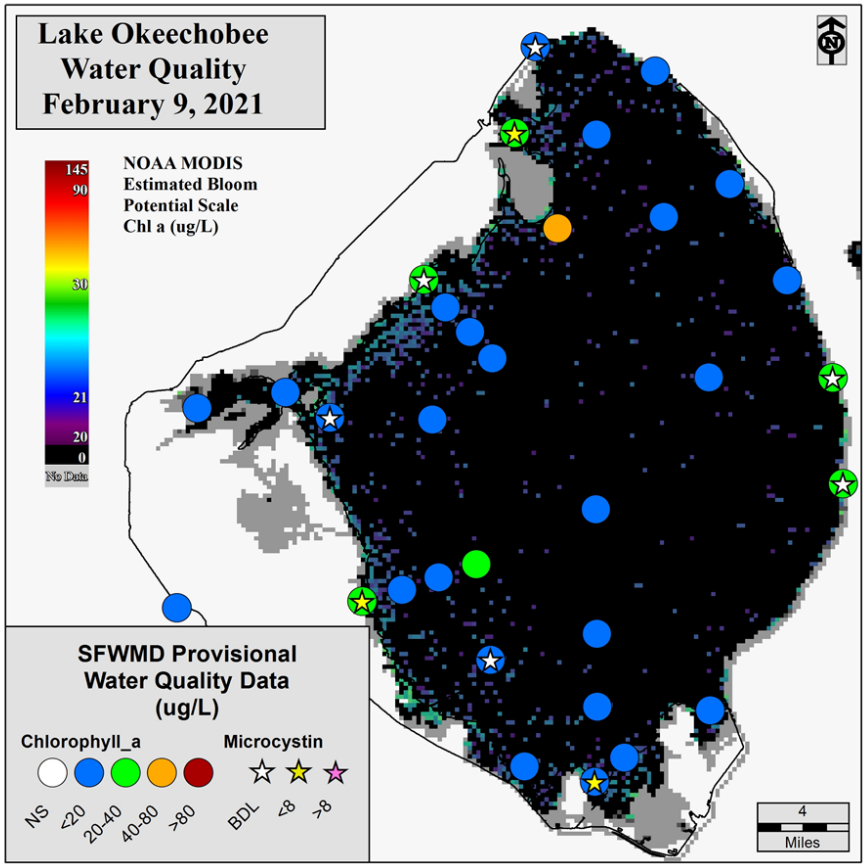


Figure 7. Provisional results from the expanded monitoring sampling trips February 9 - 10, 2021.

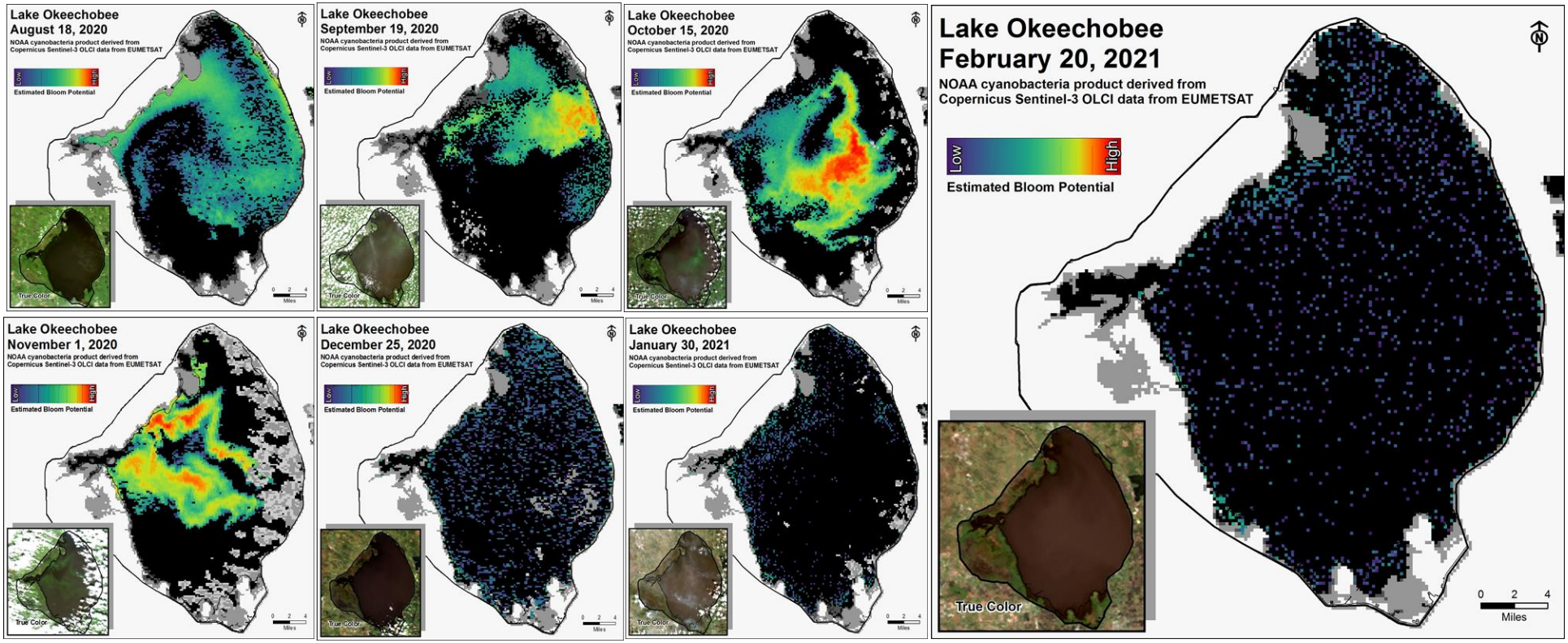


Figure 8. Cyanobacteria bloom potential based on NOAA's harmful algal bloom monitoring system. Gray color indicates cloud cover.

ESTUARIES

St. Lucie Estuary:

Last week total inflow to the St. Lucie Estuary averaged approximately 736 cfs (Figures 1 and 2) and the previous 30-day inflow averaged about 452 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.

Table 1. Weekly average inflows (data are provisional). Note: flows for S-97 were estimated using S-48 and the Gordy Road structure was removed due to bridge construction.

Location	Flow (cfs)
S-308	0
S-80	304
S-97 on C-23	92
S-49 on C-24	84
Gordy Rd. structure on Ten Mile Creek	Not reporting
Tidal Basin Inflow	256

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 was 19.3. Salinity conditions in the middle estuary are estimated to be within the good range for adult eastern oysters (Figure 4).

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)	**12.0** (17.9)	**16.6** (19.9)	NA[1]
US1 Bridge	**18.4** (21.8)	**20.2** (22.4)	10.0-26.0
A1A Bridge	**26.1** (28.2)	**28.2** (29.6)	NA[1]

[1]Envelope not applicable

Caloosahatchee Estuary:

Last week total inflow to the Caloosahatchee Estuary averaged approximately 2,058 cfs (Figures 5 and 6) and the previous 30-day inflow averaged about 1,462 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	993
S-78	1325
S-79	1971
Tidal Basin Inflow	87

Over the past week, salinity remained the same at S-79 and decreased at the remaining sites in the estuary (Table 4, Figures 7 & 8). The seven-day average surface salinity values were within the good range for adult eastern oysters at Cape Coral and Shell Point but have increased enough at Sanibel to exceed optimal and move into the fair range (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	**0.3** (0.4)	**0.3** (0.6)	0.0-5.0[2]
Ft. Myers Yacht Basin	**2.5** (5.3)	**3.3** (7.3)	NA
Cape Coral	**10.9** (14.0)	**12.0** (15.4)	10.0-30.0
Shell Point	**24.5** (26.9)	**25.0** (27.6)	10.0-30.0
Sanibel	**28.6** (29.8)	**31.0** (31.6)	10.0-30.0

[1]Envelope not applicable and [2]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 1.6 or lower at the end of the two week period for pulse release at S-79 ranging from 0 to 1,500 cfs and steady release at S-79 of 2,000 cfs. Tidal Basin inflows are estimated to be 75 cfs. The 30-day moving average surface salinity at Val I-75 is forecast to be 0.6 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	75	1.6	0.6
B	300	75	0.9	0.5
C	450	75	0.6	0.4
D	650	75	0.4	0.4
E	800	75	0.3	0.4
F	1000	75	0.3	0.4
G	1500	75	0.2	0.4
H	2000	75	0.2	0.4

Red tide

The Florida Fish and Wildlife Research Institute reported on February 19, 2021, that *Karenia brevis*, the Florida red tide dinoflagellate, was observed at background to medium concentrations in and offshore of Lee County, and very low to low concentrations in Collier County. On the east coast, red tide was not observed in samples from Brevard or Miami-Dade 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.

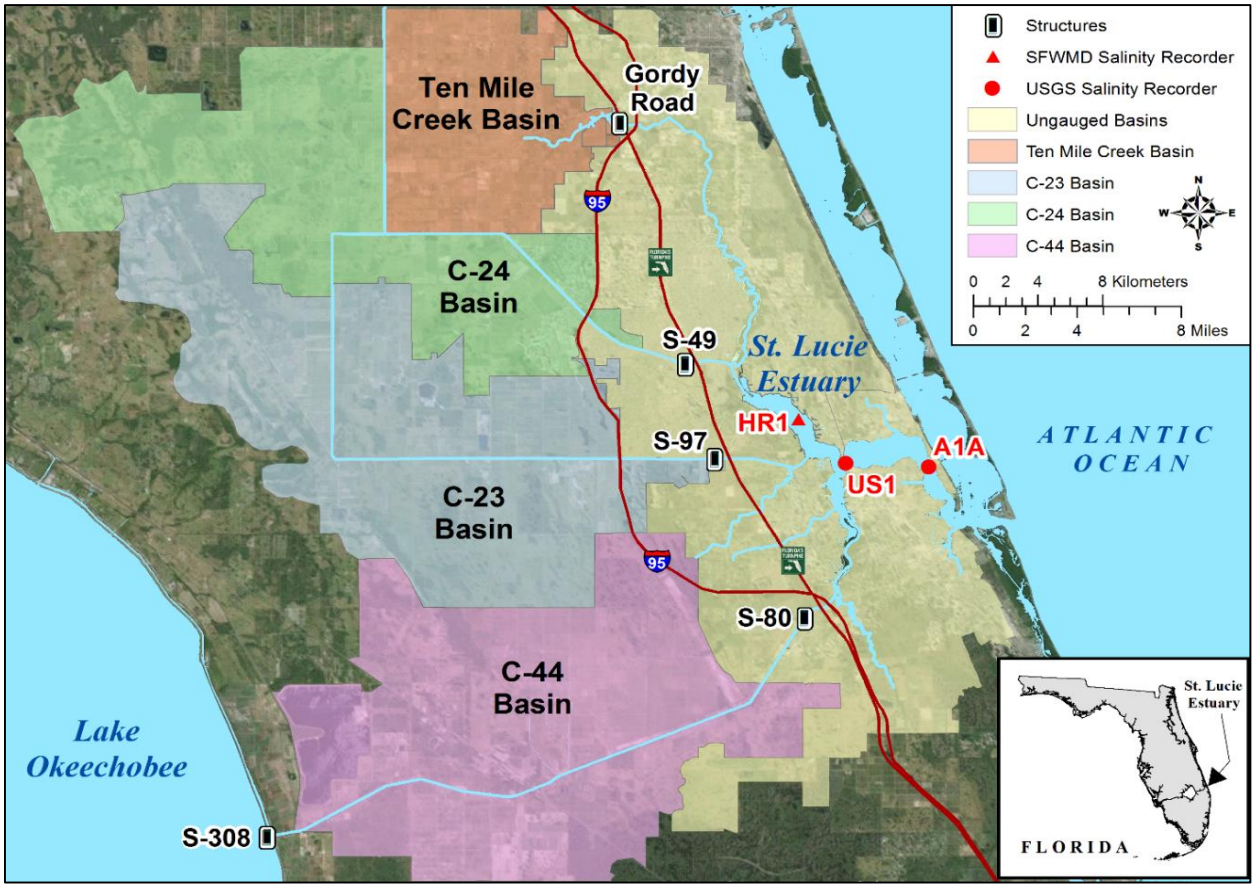


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

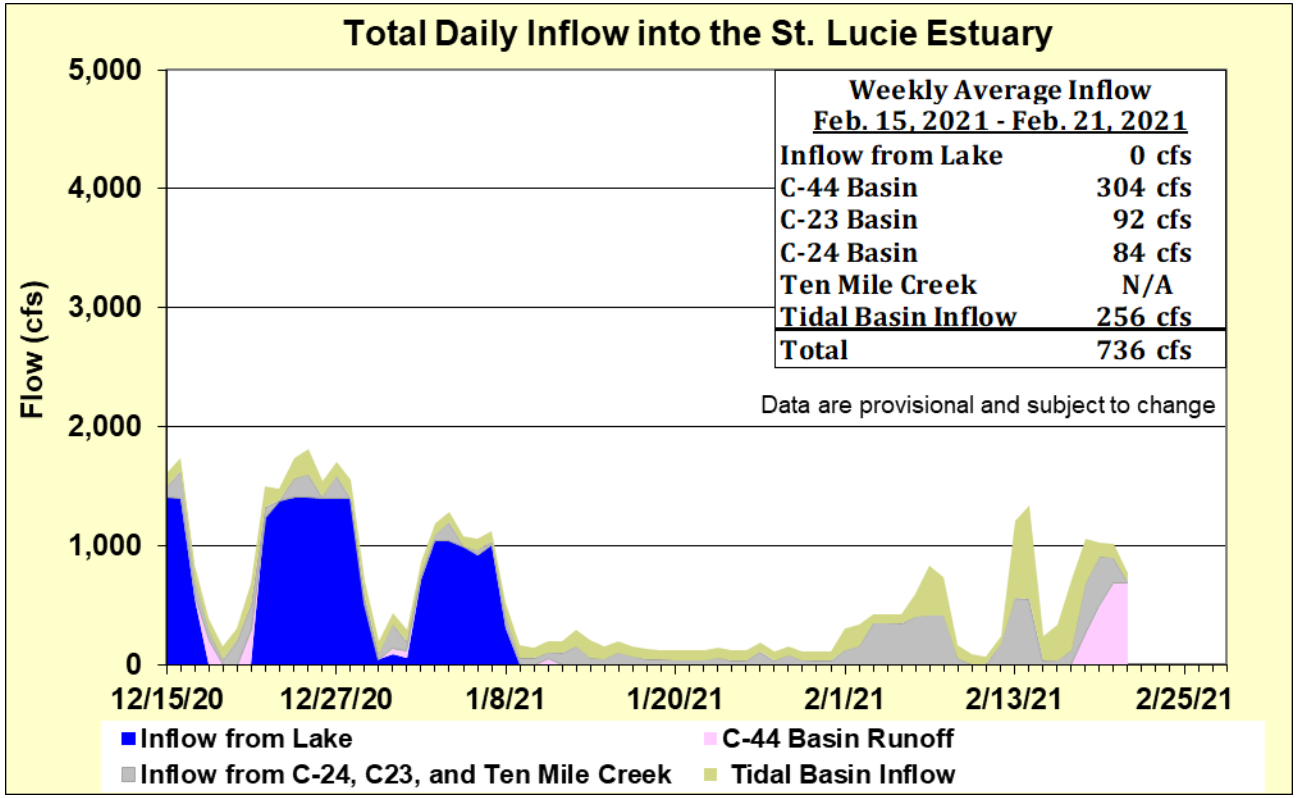


Figure 2. Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basin into the St. Lucie Estuary. Note: C-23 Basin inflows were estimated using S-48 and the Ten Mile Creek Basin inflows are not being calculated at this time.

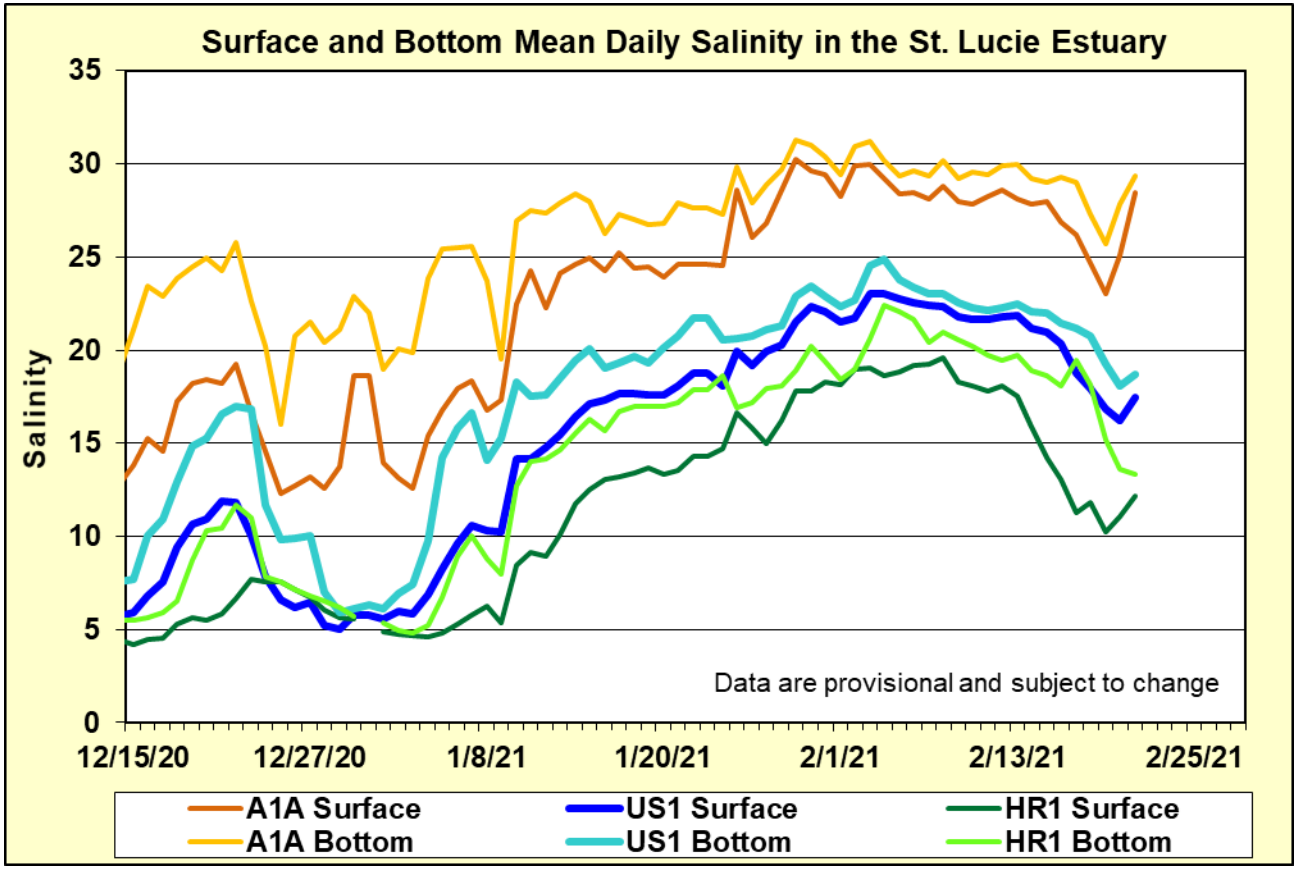


Figure 3. Daily mean salinity at the A1A, US1, and HR1 stations.

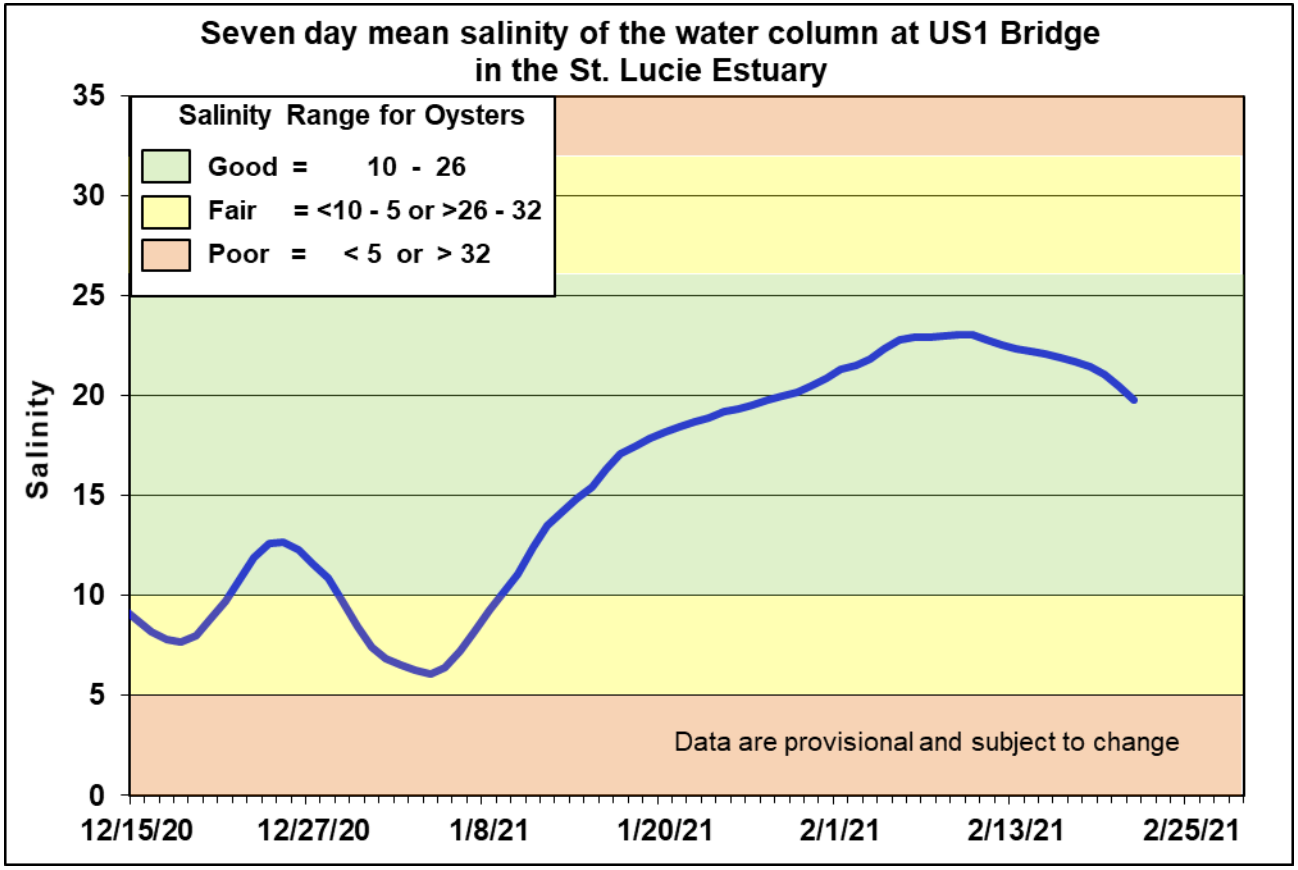


Figure 4. Seven-day mean salinity of the water column at the US1 Bridge.

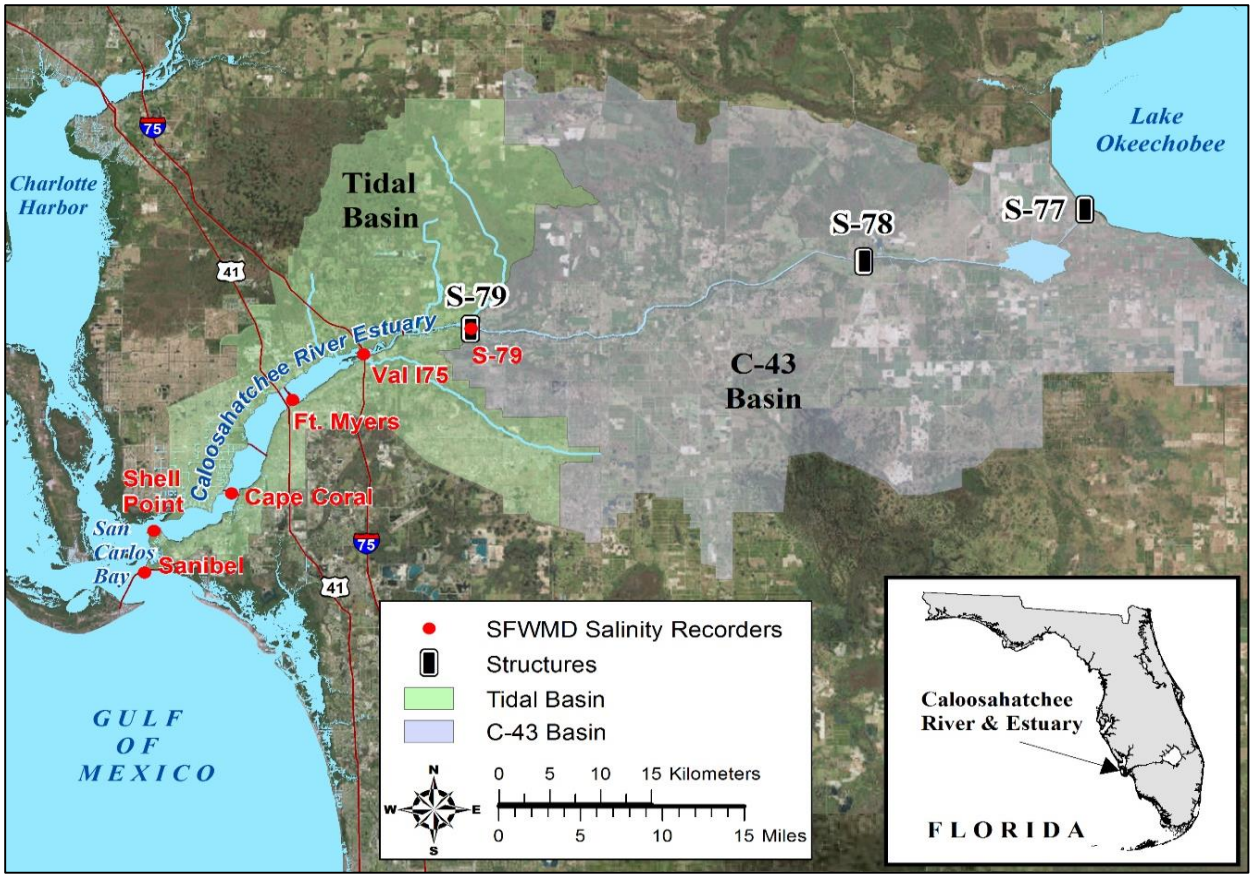


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

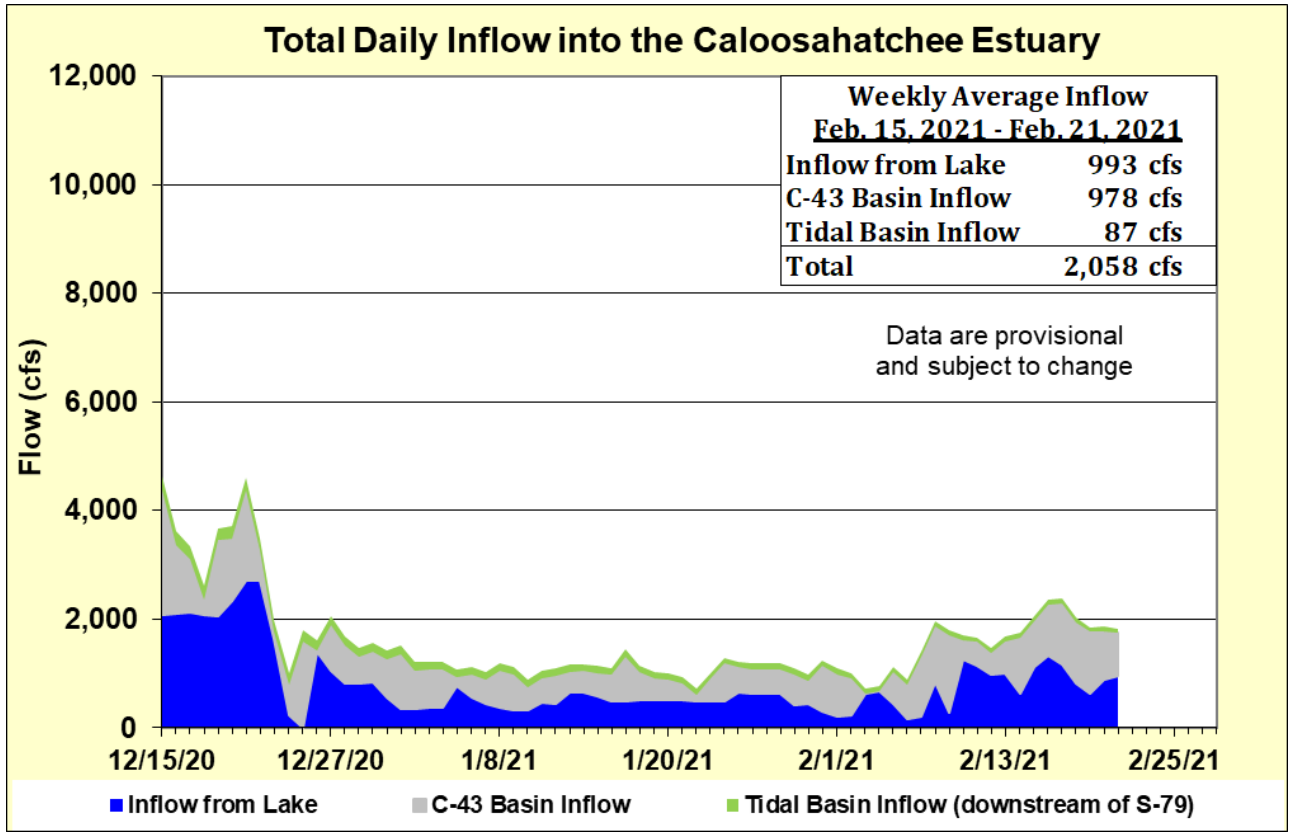


Figure 6. Total daily inflows from Lake Okeechobee, runoff from the C-43 basin and tributaries in the tidal basin into the Caloosahatchee River Estuary.

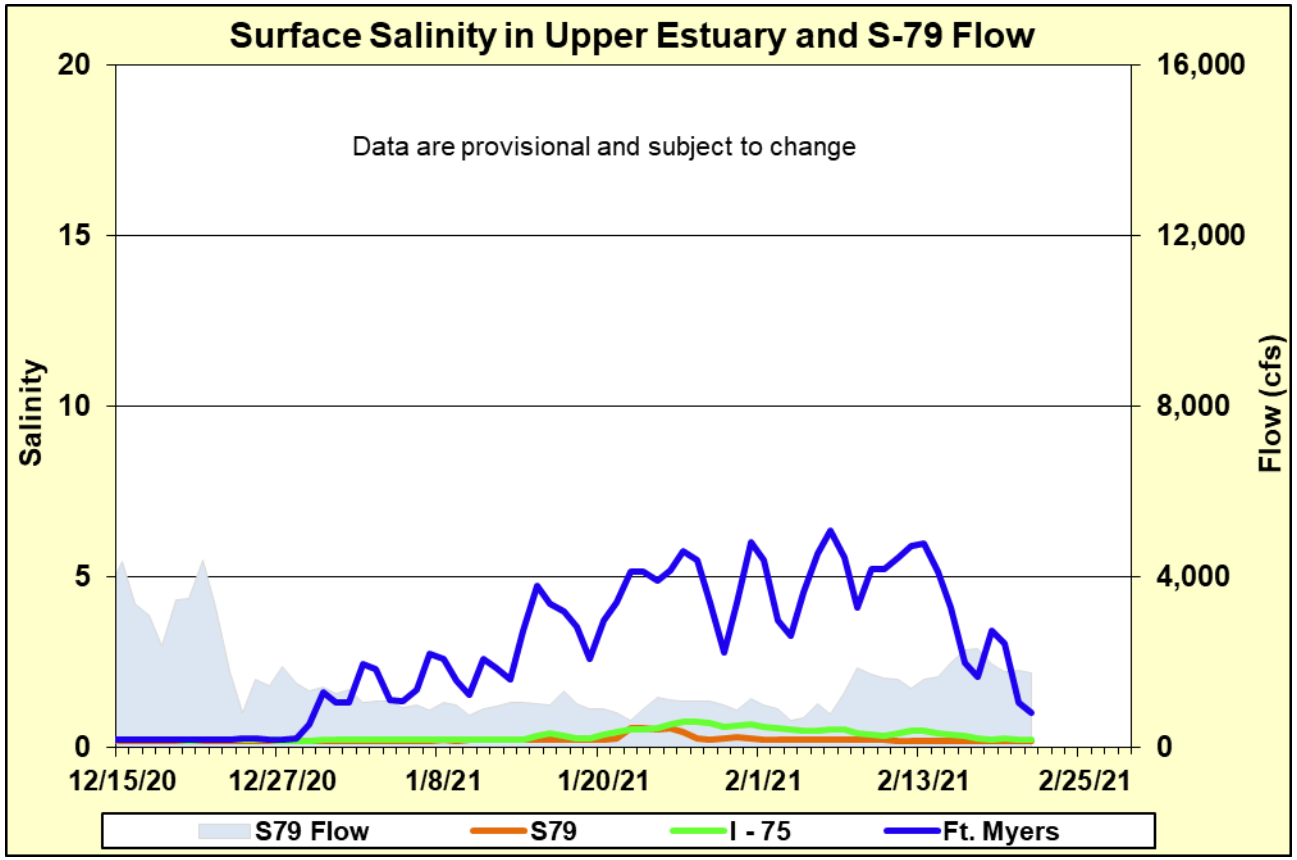


Figure 7. Daily mean flows at S-79 and salinity at upper estuary monitoring stations.

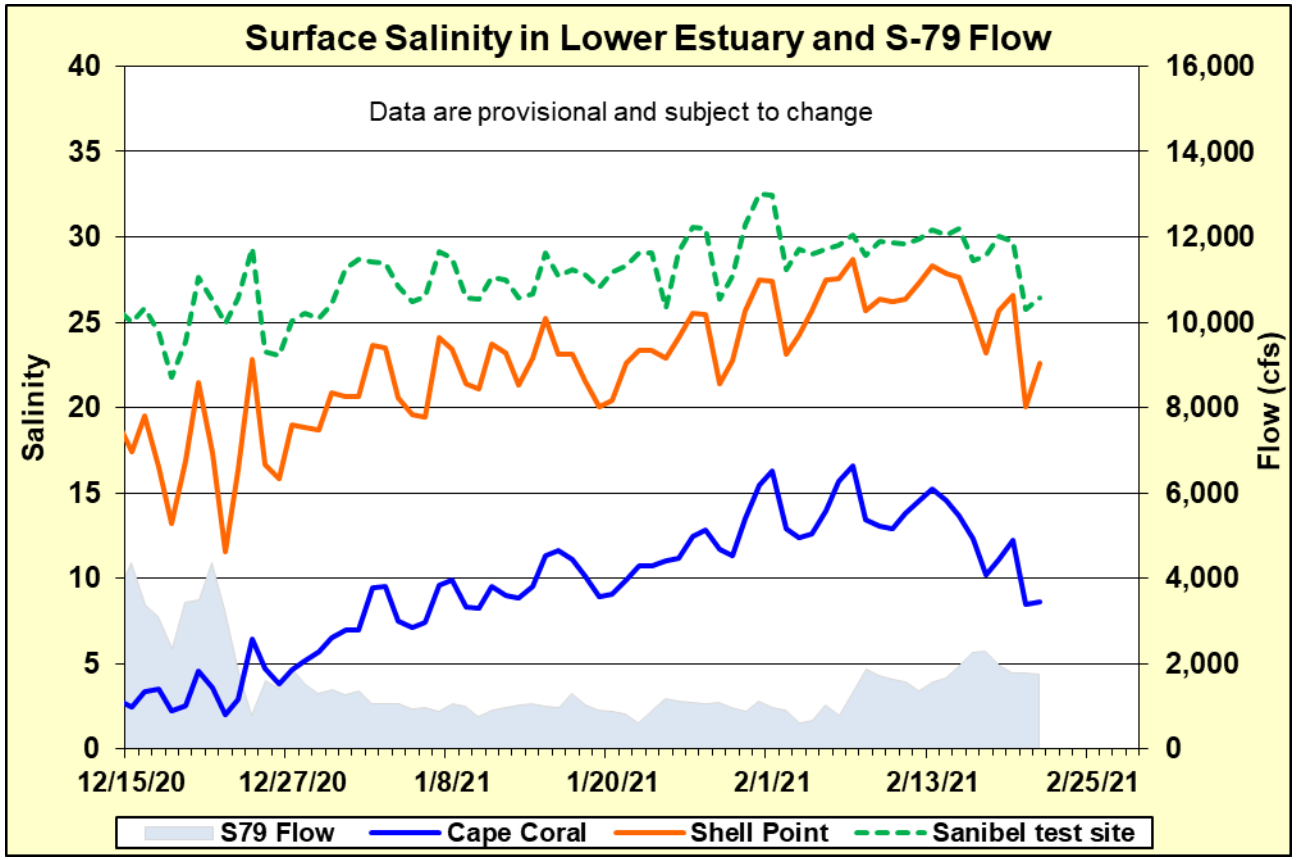


Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.

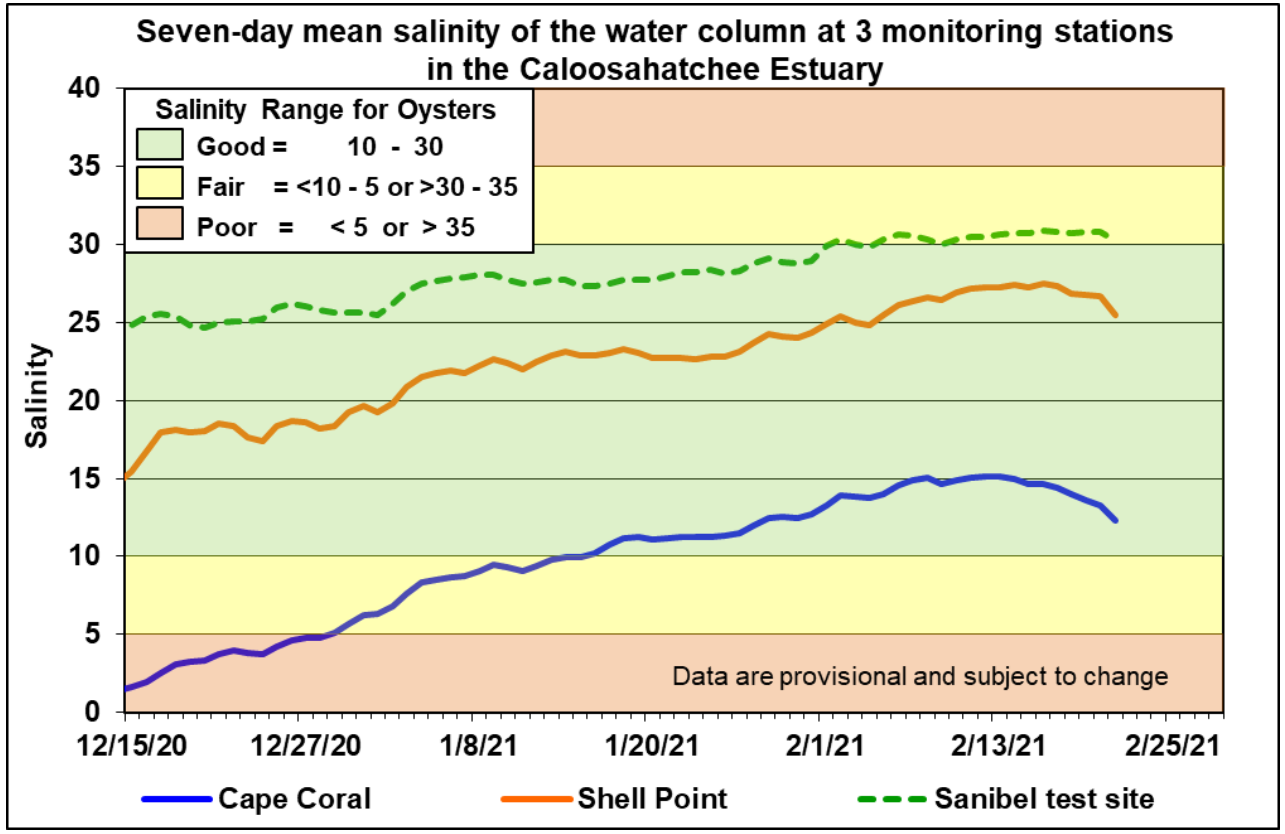


Figure 9. Seven-day mean salinity at Cape Coral, Shell Point, and Sanibel monitoring stations.

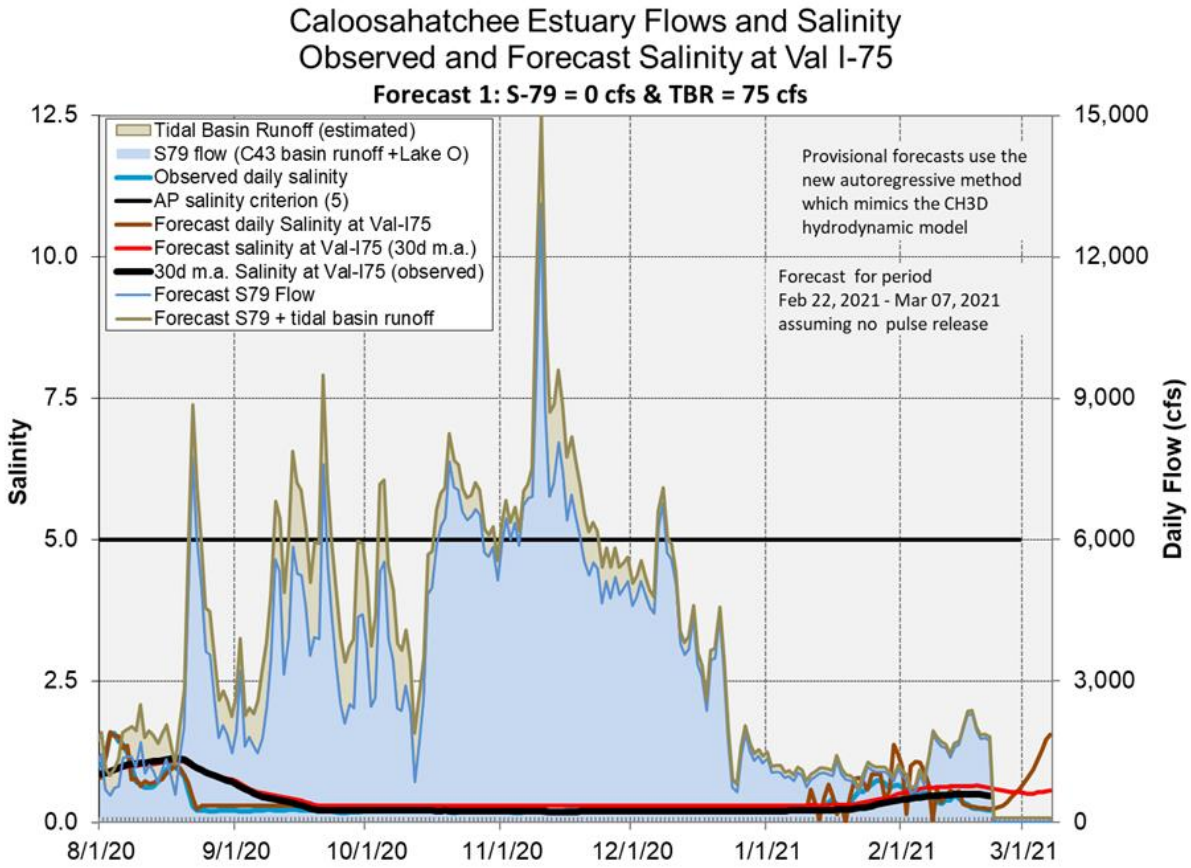


Figure 10. Forecasted Val I-75 surface salinity assuming no pulse release at S79.

Stormwater Treatment Areas

Over the past week, approximately 2,100 ac-ft of Lake Okeechobee water was delivered to the FEBs/STAs. The total amount of Lake releases sent to the FEBs/STAs in WY2021 (since May 1, 2020) is approximately 101,400 ac-feet. The total amount of inflows to the STAs in WY2021 is approximately 1,547,000 ac-feet. This week, if 2008 LORS recommends Lake releases to the WCAs and conditions allow, releases will be sent to STA-2. For definitions on STA operational language see glossary following figures.

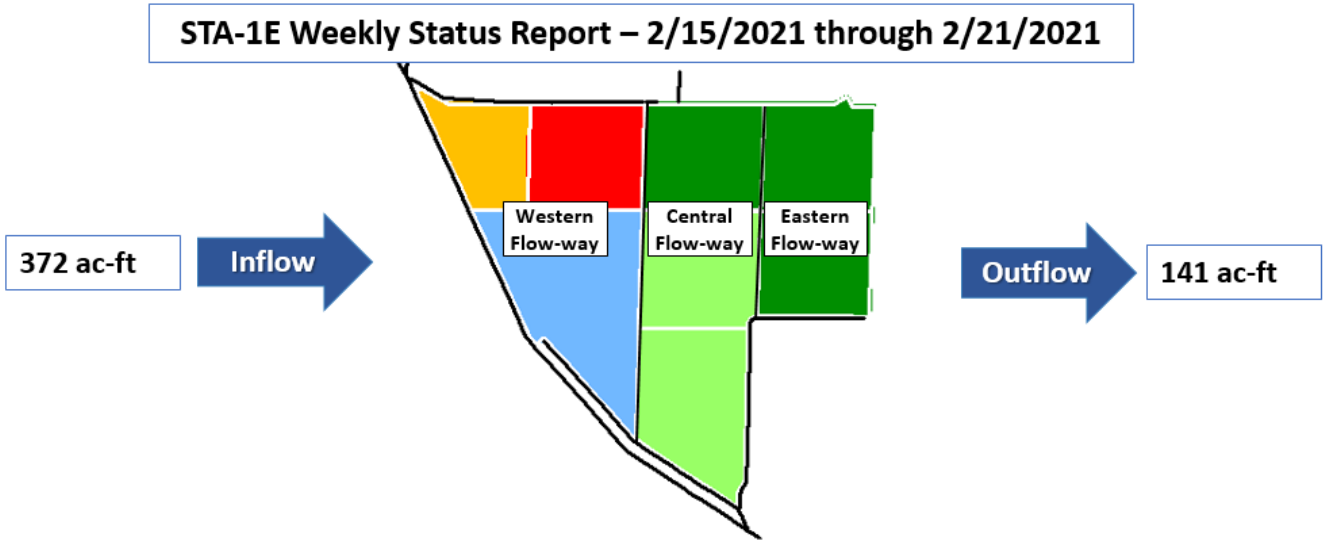
STA-1E: STA-1E Western Flow-way is offline for the Restoration Strategies project to fill and grade Cells 5 and 7. Operational restrictions are in place in STA-1E Central Flow-way for vegetation management activities. Online treatment cells are at or near target stage, vegetation in these cells is highly stressed and the 365-day phosphorus loading rates (PLR) for these flow-ways are extremely high (Figure 1).

STA-1W: Operational restrictions are in place in STA-1W Western, Eastern, and Northern Flow-ways due to construction activities. Treatment cells are at or near target stage except the Eastern Flow-way downstream cells which are below target stage. Vegetation in all flow-ways is highly stressed and the 365-day PLRs for all flow-ways are high to very high (Figure 2).

STA-2: Operational restrictions are in place in STA-2 Flow-ways 3, 4 and 5 for vegetation management activities and in Flow-ways 2 and 3 for construction activities. Treatment cells are at or near target stage except Flow-way 2 which is below target stage. Vegetation in Flow-way 1 is healthy, in Flow-ways 2 and 3 is stressed, and in Flow-ways 4 and 5 is highly stressed. The 365-day PLRs for all flow-ways are at or below 1.0 g/m^2/year (Figure 3).

STA-3/4: Operational restrictions are in place in STA-3/4 Eastern, Central, and Western Flow-ways for vegetation management activities and in the Eastern Flow-way also for drawdown preparation activities. Most treatment cells are above target stage. Vegetation in the Eastern and Central Flow-ways is highly stressed and in the Western Flow-way is stressed. The 365-day PLRs for all flow-ways are below 1.0 g/m^2/year (Figure 4).

STA-5/6: Operational restrictions are in place in STA-5/6 Flow-ways 2 and 3 following the Restoration Strategies project to grade non-effective treatment areas. Most treatment cells are at or near target stage except the Flow-way 4, 5, and 6 upstream cells which are below target stage. The 365-day PLRs for most flow-ways are near 1.0 g/m^2/year. All treatment cells have highly stressed vegetation conditions except Flow-ways 7 and 8 which are healthy (Figure 5 and 6).



STA-1E Flow-Way Status			
Flow-Way	Vegetation Status Healthy ----- Stressed	365-day P Loading Rate (below 1.0 g P /m²/yr is optimal)	Online / Offline / Restrictions
Eastern	⟷	1.0	Online
Central	⟷	1.0	Vegetation Rehab
Western	Offline, construction activities starting 11/01/2019		

As of 2/21/2021	
Stage Based: Relative to Target Stage (TS)	
Deep Water Level (> 2.8' above TS)	
High Water Level (1.5' – 2.8' above TS)	
0.2' – 1.5' above TS	
Target Stage (TS +/- 0.2')	
Low Water Level (<0.2' below TS)	
Depth / Area Based: Percent of Area Dry	
0-25% Dry	50-75% Dry
25-50% Dry	75-100% Dry

STA-1E Flow & Phosphorus Concentration			
	7-day	28-day	365-day
Total Inflow, ac-ft	372	3,400	318,698
--Lake Inflow, ac-ft	0	N/A	21,900
Total Outflow, ac-ft	141	1,192	277,134
Inflow Conc., ppb	94	84	136
Outflow Conc., ppb	38	37	37
Includes Preliminary Data			

Figure 1. STA-1E Weekly Status Report

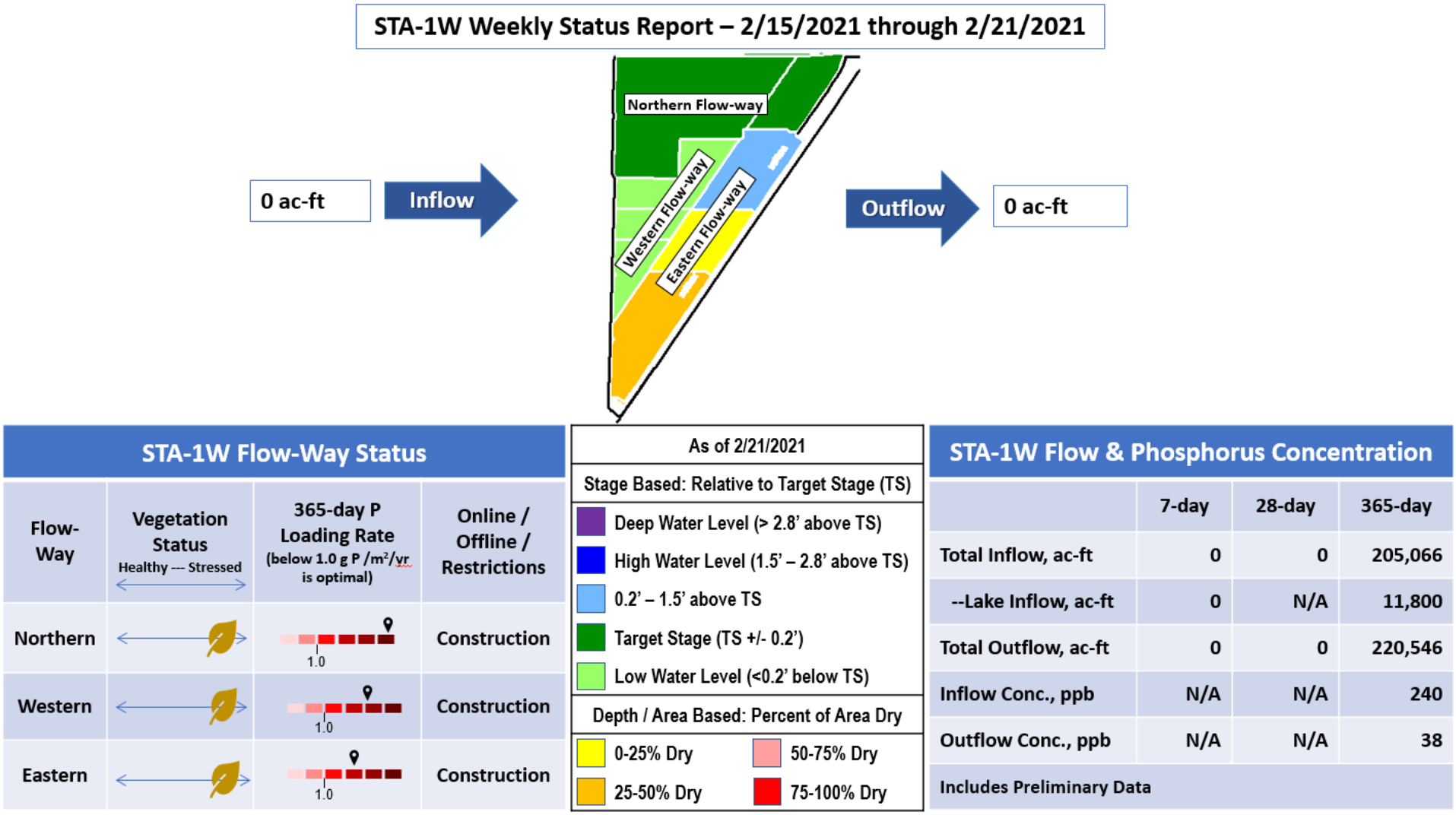
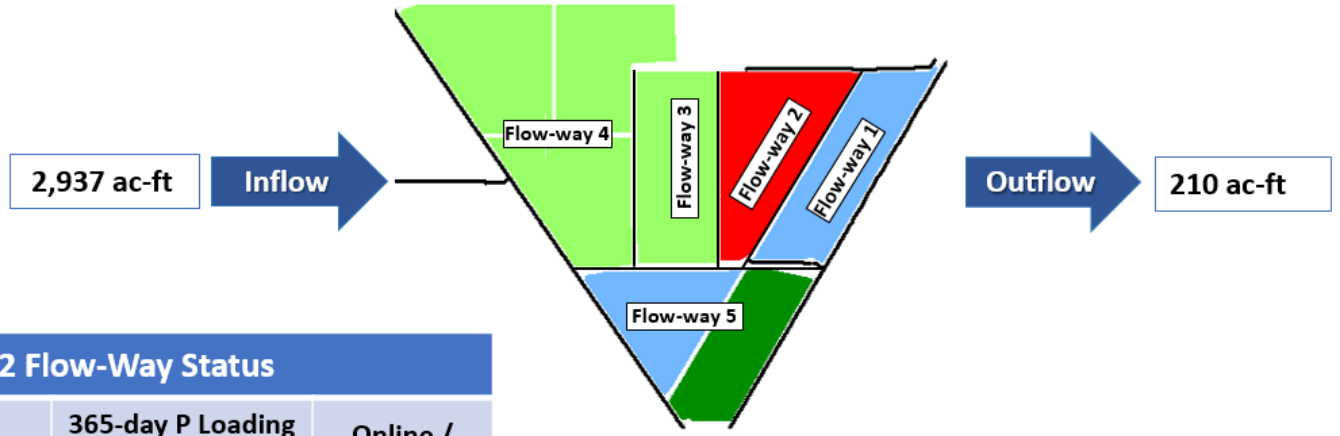


Figure 2. STA-1W Weekly Status Report

STA-2 Weekly Status Report – 2/15/2021 through 2/21/2021



STA-2 Flow-Way Status

Flow-Way	Vegetation Status (Healthy ------ Stressed)	365-day P Loading Rate (below 1.0 g P /m²/yr is optimal)	Online / Offline / Restrictions
1		1.0	Online
2		1.0	Construction
3		1.0	Construction & Vegetation Rehab
4		1.0	Vegetation Rehab
5		1.0	Vegetation Rehab

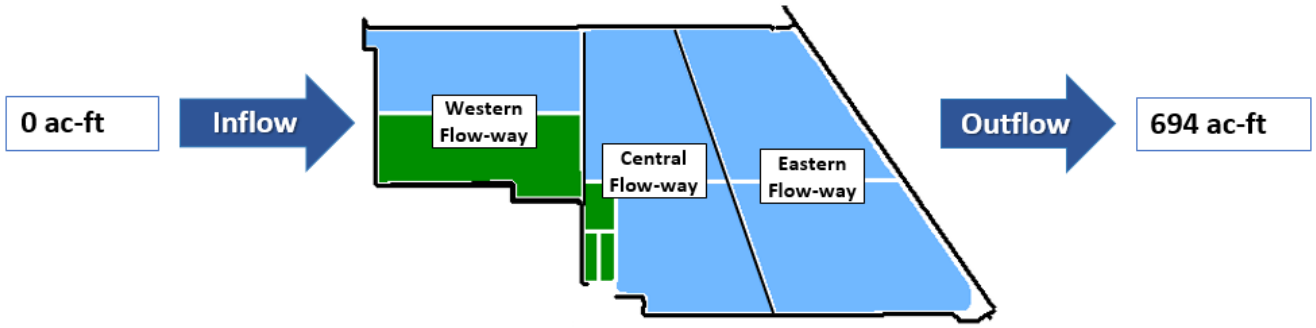
As of 2/21/2021	
Stage Based: Relative to Target Stage (TS)	
Deep Water Level (> 2.8' above TS)	
High Water Level (1.5' – 2.8' above TS)	
0.2' – 1.5' above TS	
Target Stage (TS +/- 0.2')	
Low Water Level (<0.2' below TS)	
Depth / Area Based: Percent of Area Dry	
0-25% Dry	50-75% Dry
25-50% Dry	75-100% Dry

STA-2 Flow & Phosphorus Concentration

	7-day	28-day	365-day
Total Inflow, ac-ft	2,937	4,657	390,160
--Lake Inflow, ac-ft	1,900	N/A	41,300
Total Outflow, ac-ft	210	767	463,819
Inflow Conc., ppb	29	32	107
Outflow Conc., ppb	16	16	21
Includes Preliminary Data			

Figure 3. STA-2 Weekly Status Report

STA-3/4 Weekly Status Report – 2/15/2021 through 2/21/2021



STA-3/4 Flow-Way Status

Flow-Way	Vegetation Status (Healthy ------ Stressed)	365-day P Loading Rate (below 1.0 g P /m²/yr is optimal)	Online / Offline / Restrictions
Eastern		1.0	Vegetation Rehab
Central		1.0	Vegetation Rehab
Western		1.0	Vegetation Rehab

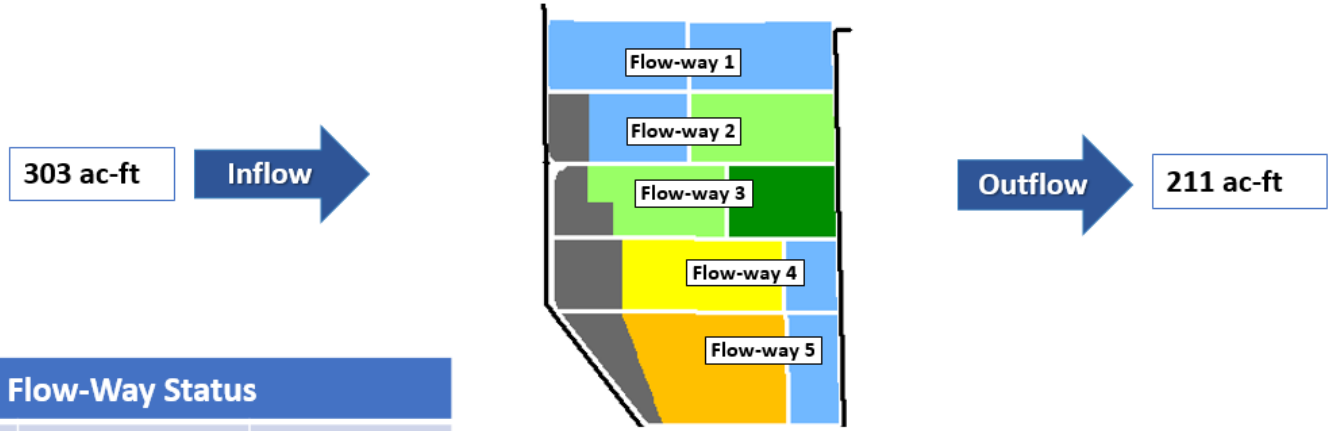
As of 2/21/2021	
Stage Based: Relative to Target Stage (TS)	
Deep Water Level (> 2.8' above TS)	
High Water Level (1.5' – 2.8' above TS)	
0.2' – 1.5' above TS	
Target Stage (TS +/- 0.2')	
Low Water Level (<0.2' below TS)	
Depth / Area Based: Percent of Area Dry	
0-25% Dry	50-75% Dry
25-50% Dry	75-100% Dry

STA-3/4 Flow & Phosphorus Concentration

	7-day	28-day	365-day
Total Inflow, ac-ft	0	1,572	599,374
--Lake Inflow, ac-ft	0	N/A	60,900
Total Outflow, ac-ft	694	1,552	574,061
Inflow Conc., ppb	N/A	22	58
Outflow Conc., ppb	24	20	12
Includes Preliminary Data			

Figure 4. STA-3/4 Weekly Status Report

STA-5/6 Weekly Status Report – 2/15/2021 through 2/21/2021



STA-5/6 Flow-Way Status

Flow-Way	Vegetation Status (Healthy ------ Stressed)	365-day P Loading Rate (below 1.0 g P /m²/yr is optimal)	Online / Offline / Restrictions
1		1.0	Online
2		N/A	Post-construction
3		N/A	Post-construction
4		1.0	Online
5		1.0	Online

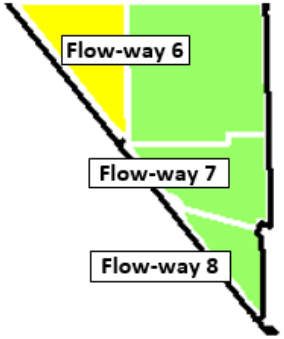
As of 2/21/2020	
Stage Based: Relative to Target Stage (TS)	
Deep Water Level (> 2.8' above TS)	
High Water Level (1.5' – 2.8' above TS)	
0.2' – 1.5' above TS	
Target Stage (TS +/- 0.2')	
Low Water Level (<0.2' below TS)	
Depth / Area Based: Percent of Area Dry	
0-25% Dry	50-75% Dry
25-50% Dry	75-100% Dry

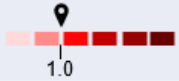
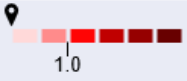
STA-5/6 Flow & Phosphorus Concentration

	7-day	28-day	365-day
Total Inflow, ac-ft	303	1,604	130,129
--Lake Inflow, ac-ft	N/A	N/A	N/A
Total Outflow, ac-ft	211	478	152,746
Inflow Conc., ppb	115	97	281
Outflow Conc., ppb	17	21	79
Includes Preliminary Data			

Figure 5. STA-5/6 Weekly Status Report (Flow-ways 1 – 5)

STA-5/6 Weekly Status Report – 2/15/2021 through 2/21/2021



STA-5/6 Flow-Way Status			
Flow-Way	Vegetation Status Healthy ------ Stressed	365-day P Loading Rate (below 1.0 g P /m²/yr is optimal)	Online / Offline / Restrictions
6			Online
7			Online
8			Online

As of 2/21/2021	
Stage Based: Relative to Target Stage (TS)	
Deep Water Level (> 2.8' above TS)	
High Water Level (1.5' – 2.8' above TS)	
0.2' – 1.5' above TS	
Target Stage (TS +/- 0.2')	
Low Water Level (<0.2' below TS)	
Depth / Area Based: Percent of Area Dry	
0-25% Dry	50-75% Dry
25-50% Dry	75-100% Dry

Figure 6. STA-5/6 Weekly Status Report (Flow-ways 6 – 8)

Basic Concepts and Definitions for STA Weekly Status Report

- **Inflow**: Sum of flow volume at all inflow structures to an STA.
- **Lake Inflow**: Portion of the STA total inflow volume that originates from Lake Okeechobee.
- **Outflow**: Sum of flow volume at outflow structures from an STA.
- **Total Phosphorus** (TP): Total mass of phosphorus in all its forms; including particulate, dissolved, etc.
- **Inflow Concentration**: TP concentration is the mass of TP in micrograms per liter of water, µg/L or ppb. Inflow concentration refers to the flow-weighted mean TP from all inflow structures over a period of time.
- **Outflow Concentration**: The flow-weighted mean TP from all outflow structures over a period of time. The outflow concentration represents the reduction of inflow TP achieved by STA treatment of the inflow water.
- **WQBEL**: The STA outflow concentration that is required upon completion of the Restoration Strategies projects by December 2025. The outflow concentration shall not exceed 13 ppb as an annual flow weighted mean in more than 3 out of 5 water years on a rolling basis and shall not exceed 19 ppb as an annual flow weighted in any water year.
- **Flow-Way** (FW): One or more treatment cells connected in series. Cells typically have emergent aquatic vegetation (EAV) in the front portion of the flow-way followed by a mix of EAV and submerged aquatic vegetation (SAV)
- **Vegetation Status**: Healthy means the vegetation condition is good and will allow the STA to perform as designed. Stressed means the vegetation is showing signs of poor health, such as browning or areas of vegetation die-off, or the cell contains undesirable vegetation such as floating exotic vegetation requiring treatment. The TP reduction capability of the STA is affected when the vegetation condition is poor.
- **Phosphorus Loading Rate** (PLR): Mass of inflow TP in grams, divided by total treatment area of STA in square meters, per year. In general, a 365-day value of less than 1.0 is needed for an STA to perform optimally. A PLR of 2.0 is considered very high and a PLR of 3.0 is considered extremely high. The TP reduction capability of the STA is affected when the PLR is high, very high and extremely high.
- **Online**: Online status means the FW can receive and treat inflow.
- **Online with Restriction**: The FW can receive and treat inflow, but the amount of flow or water level may be limited temporarily. For example, a vegetation rehabilitation effort may require reduced flows through an area while the new plants are establishing, or nesting by protected species may require a certain water level not to be exceeded.
- **Offline**: The FW is unable to receive and treat inflow due to repairs, construction, or other prohibitive reasons.
- **Depth**: Difference between the average surface water level in a cell and the average ground elevation in that cell. Target depths, or depths between flow events, are between 1.25 ft to 1.5 ft. As depth approaches or drops below zero, an increasing percentage of the cell is considered dry and STA conditions deteriorate. An increase in depth above target depth is expected with increasing flow. However, as depth increases much above the target depth and is sustained over a period of time, it can be detrimental to vegetation health and overall STA treatment performance.
- **Note**: The data provided in this summary report were developed using a combination of provisional and quality-assured flow and water quality data. In some cases, best professional judgment was used to estimate missing data and revise questionable data. Values provided are not considered final but are appropriate for use in STA operational decision-making.

EVERGLADES

The water conservation areas (WCAs) received more than 0.33 inches of rainfall last week, more to the east. At the gauges monitored for this report stages fell 0.08 feet on average last week, nearly the same as the week prior. Evaporation was 0.94 inches last week, a 0.10 inch increase from the previous week (Figure 1).

Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	0.69	−0.03
WCA-2A	0.48	−0.16
WCA-2B	1.22	−0.05
WCA-3A	0.36	−0.11
WCA-3B	0.48	−0.11
ENP	0.48	+0.04

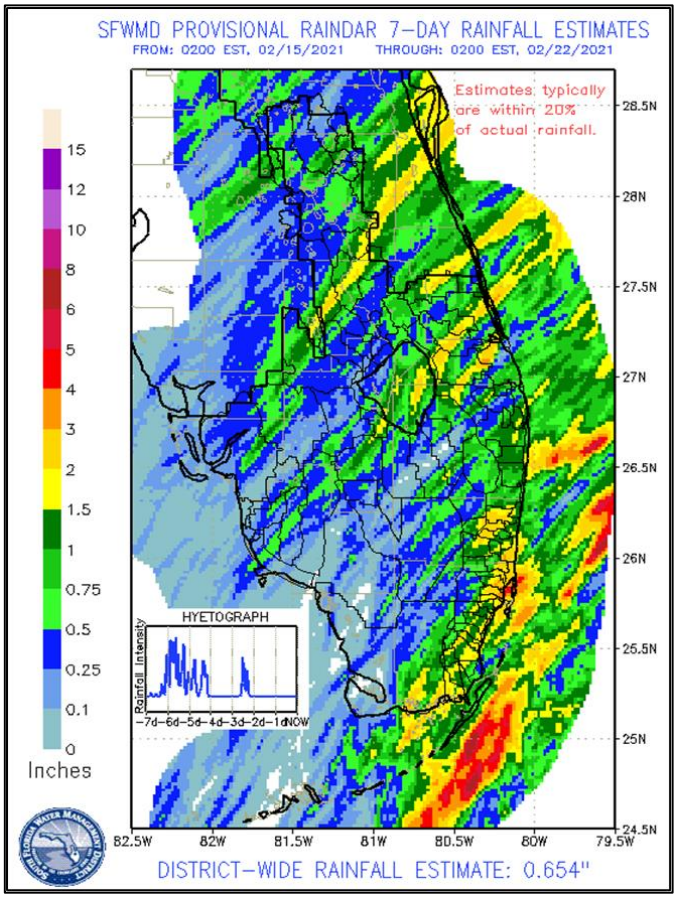


Figure 1. Rainfall across the Everglades region over the last week.

Regulation Schedules: WCA-1: Stage at the 1-8C Gauge continues to follow just above and parallel with schedule, now 0.35 feet above the falling Zone A1 regulation line. WCA-2A: The recession in stage at S11B-HW continues a steady recession to the flat regulation line, currently 1.38 feet above. WCA-3A: The Three Gauge Average stages continue a steady recession towards the falling Zone A regulation line last week, currently just 0.10 feet above. WCA-3A: Stage at gauge 62 (Northwest corner) continued a steady decline last week, the average on Sunday was 0.43 feet below the stable Upper Schedule (Figure 2).

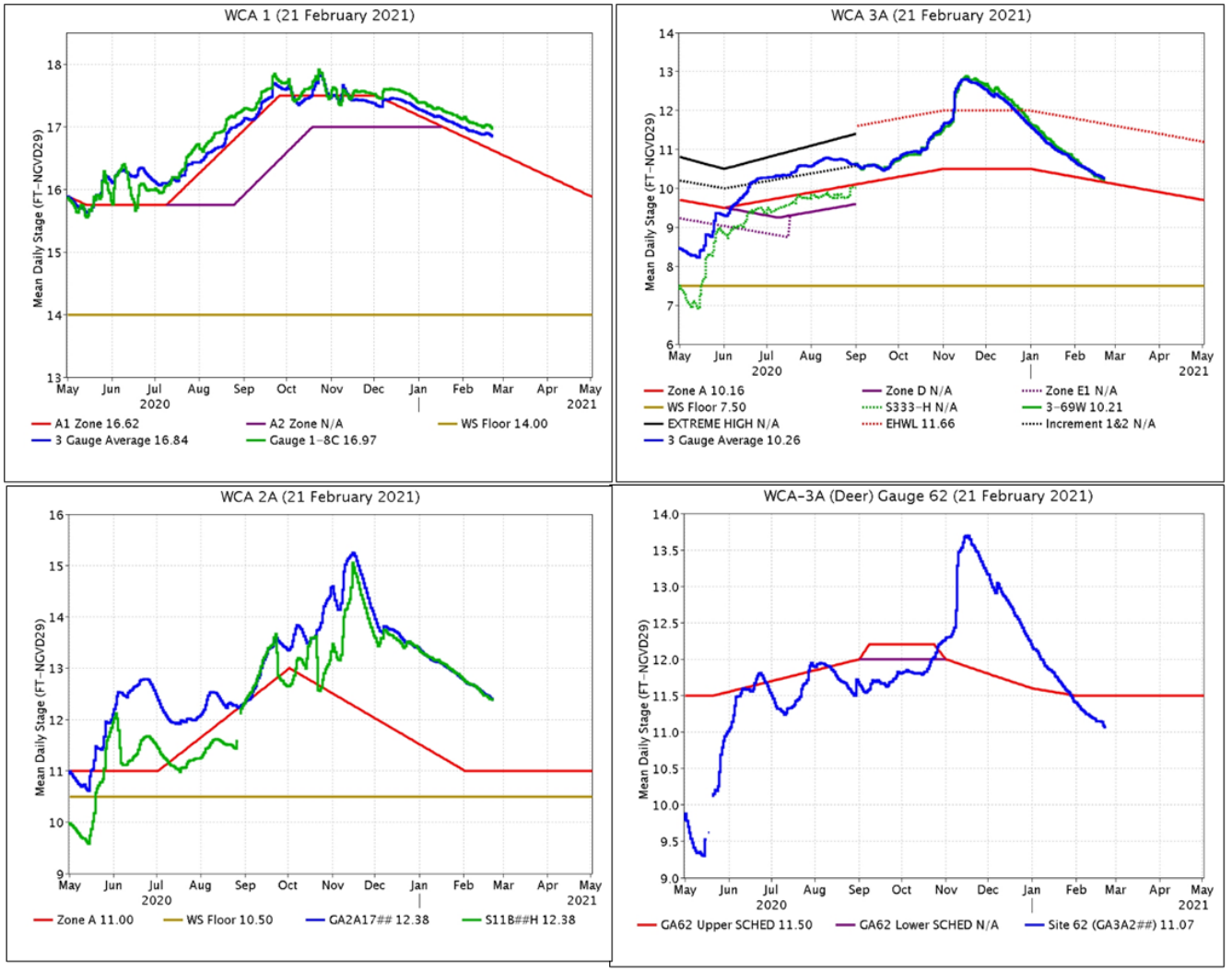
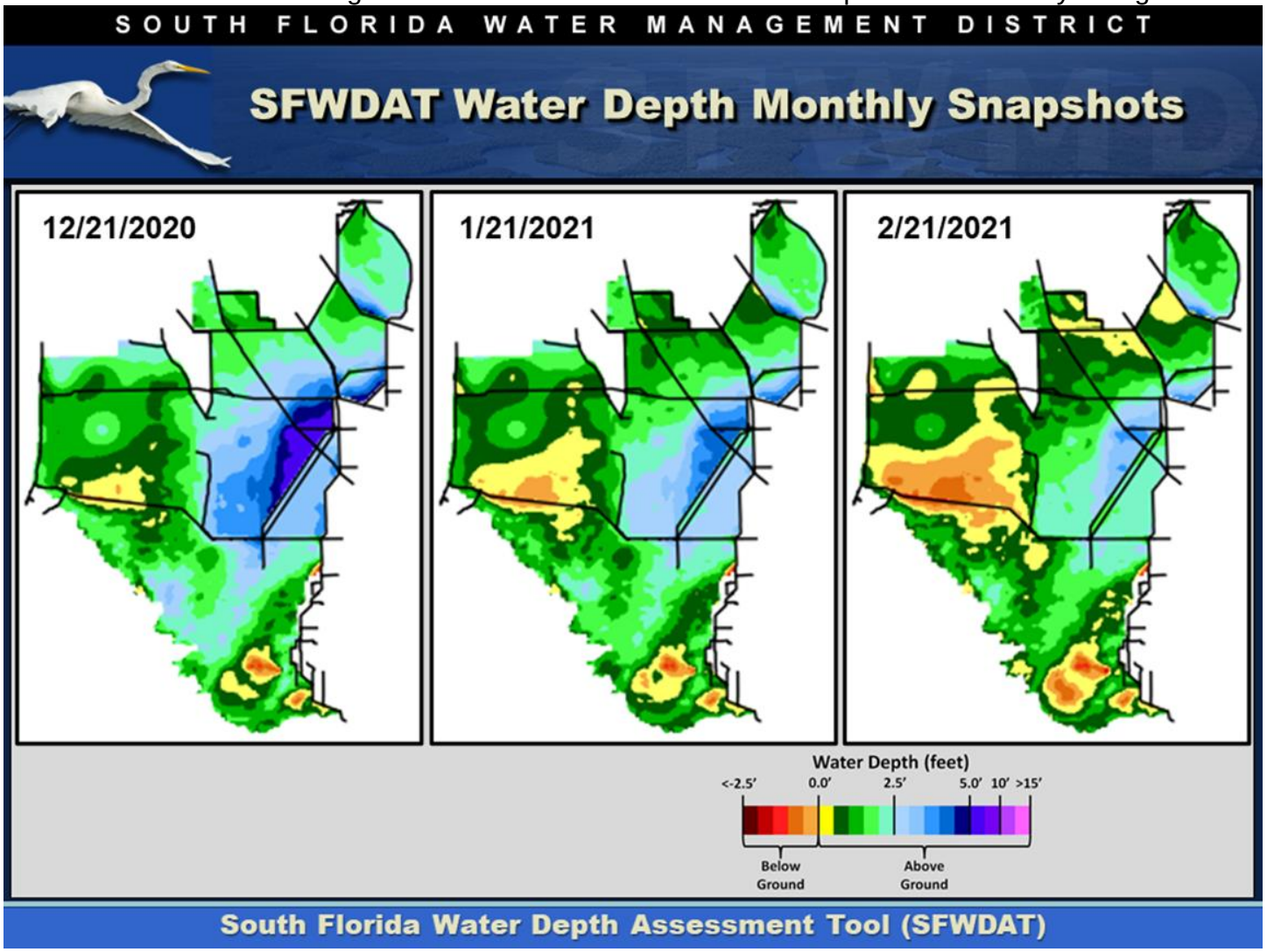
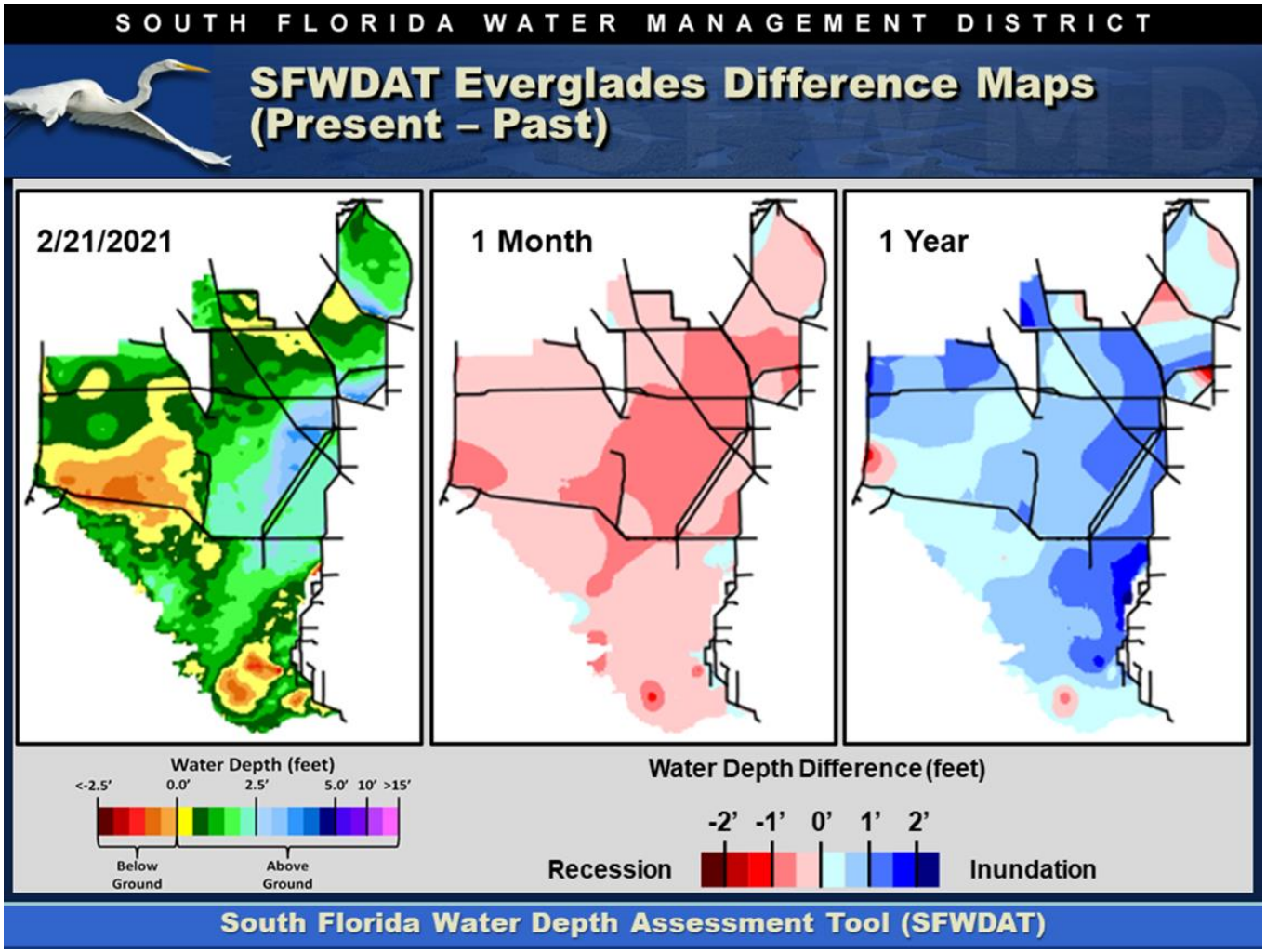


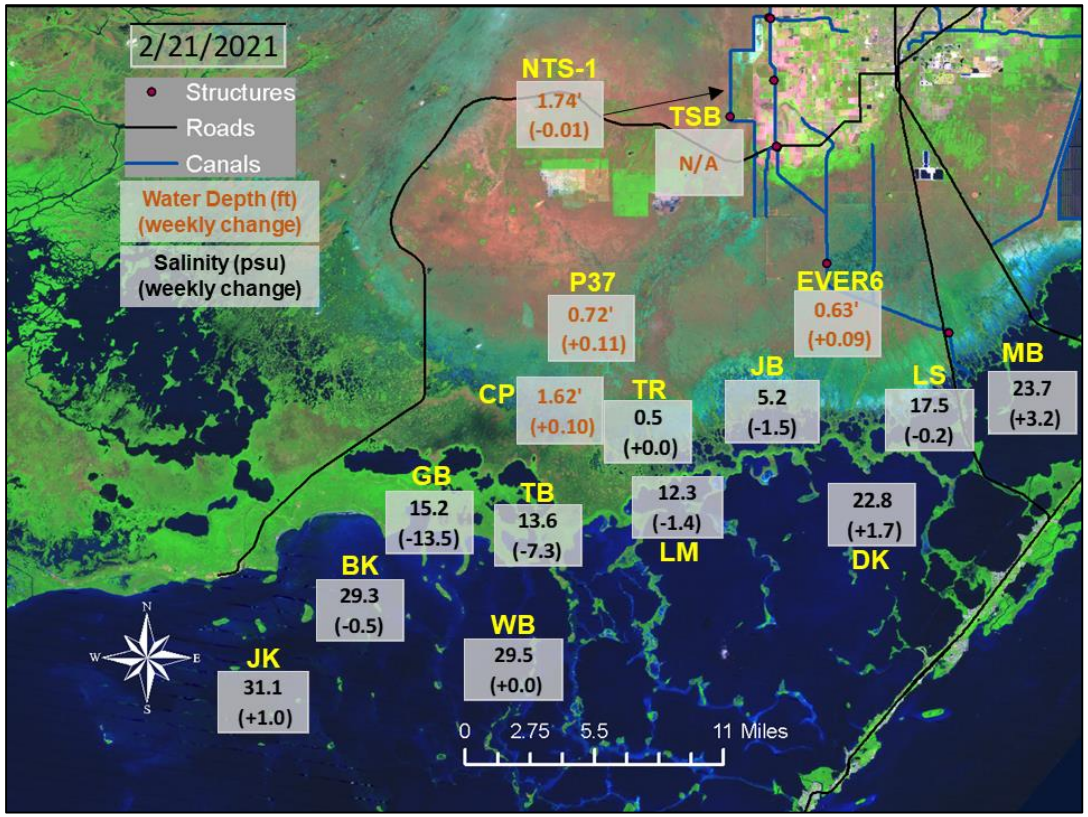
Figure 2. Water levels compared to their regulation schedules across the Water Conservation Areas.

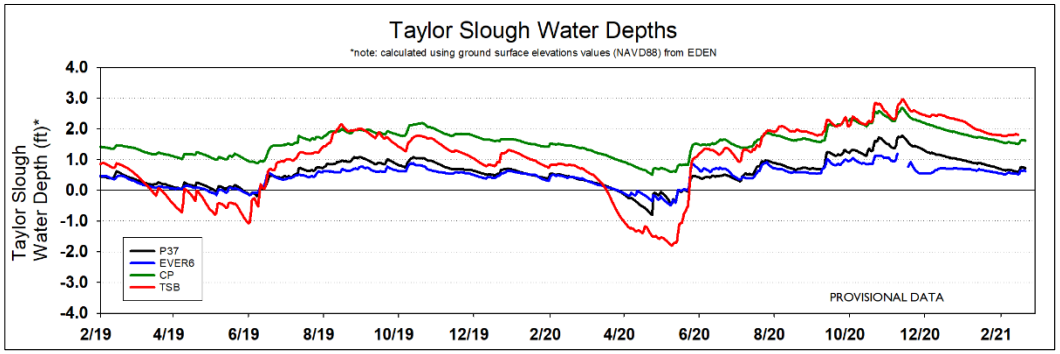
Water: The WDAT tool for spatial interpolation of depth monthly snapshots indicate that WCA-3A is drying down quickly in the north with depths potentially at the soil surface along northern perimeter and in the northeast. Northern WCA-2A is also drying down to soil surface. Hydrologic connectivity remains established within Shark River Slough (SRS) and Taylor slough in Everglades National Park (ENP) as conditions begin to dry down in Lostman's Slough and the western marl prairie. Large portions of southern and southwestern Big Cypress National Preserve (BCNP) are drying down to below soil surface. Comparing WDAT water levels from present, over the last month stages fell significantly across WCA-3A and southern WCA-2A. Looking back one year the stage difference patterns are strikingly different than one month ago, with most of the system wetter. Compared to one year ago WCA-3A is deeper than it was a year ago, most significantly on eastern side. Northern WCA-2A is trending shallower and the southern end is deeper than it was a year ago.

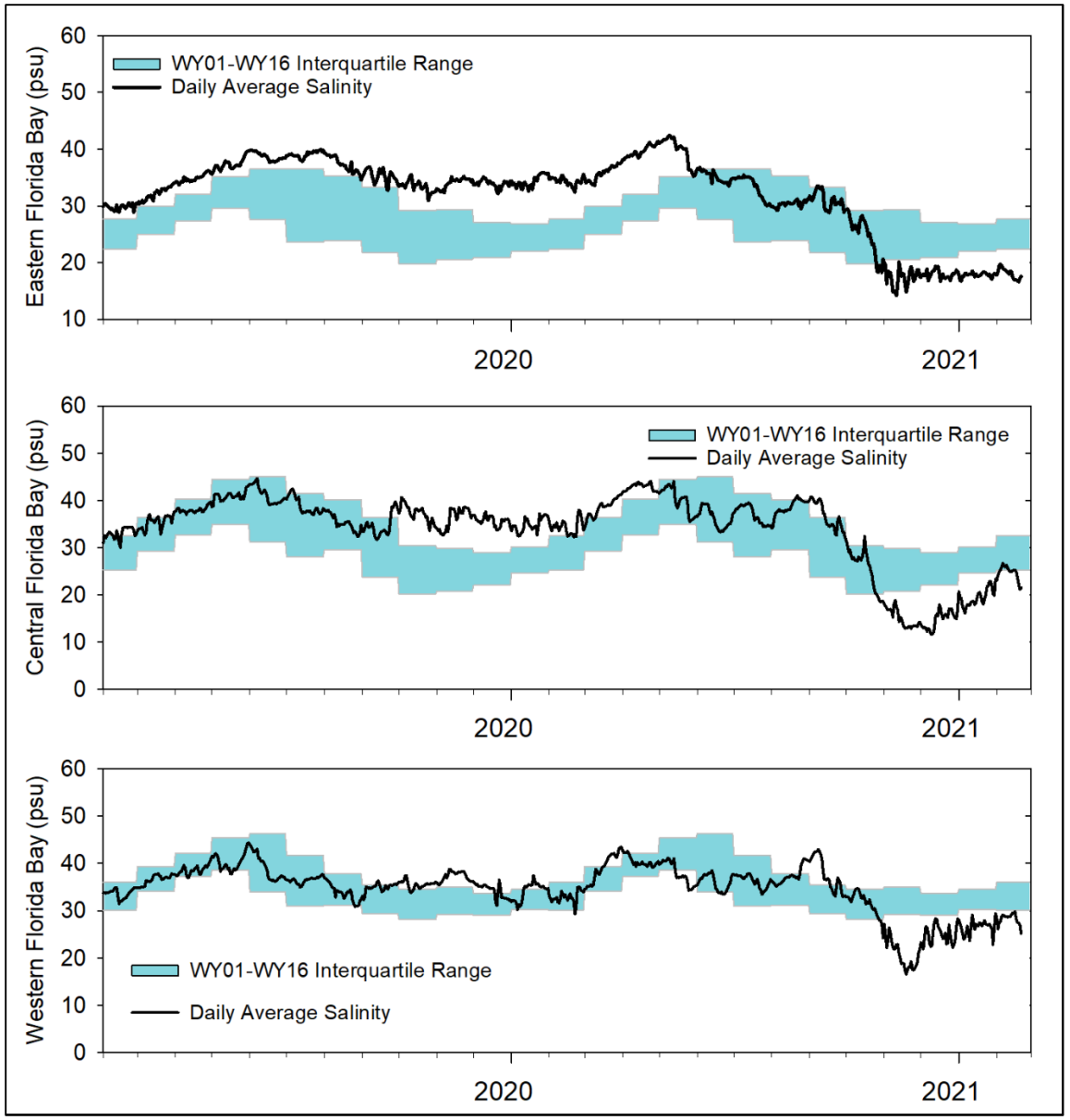


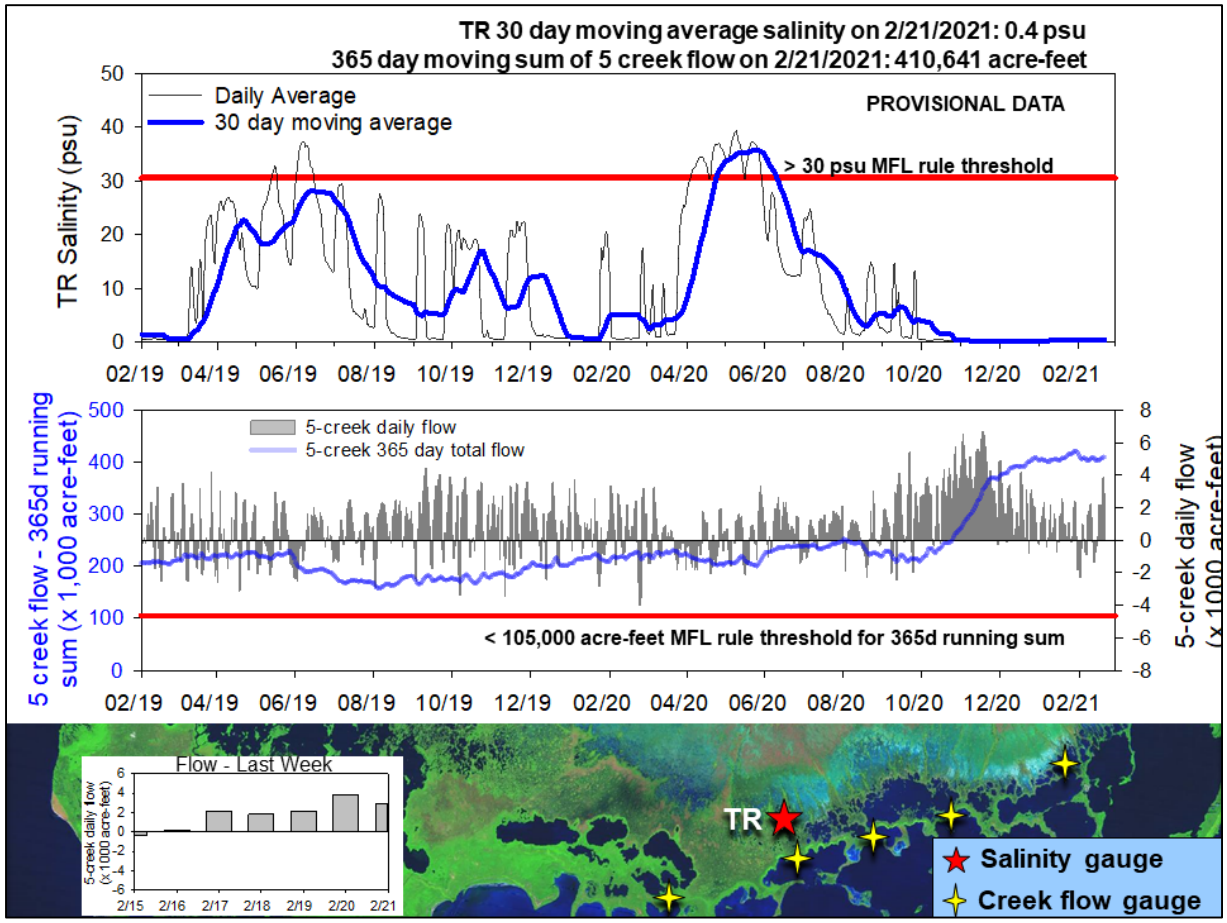


Tree island inundation in WCA-3A, WCA-3B and Everglades National Park (ENP): 371 Tree Islands of known elevation within WCA-3A, -3B, and Everglades National Park's Shark Slough. Current preliminary estimates using WDAT indicate that 32% or 119 of the tree islands are currently inundated (down from 37% the week prior), and all 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: An average of 1.86 inches of rain fell over Taylor Slough and Florida Bay this week, and water levels in Taylor Slough increased by 0.07 feet on average over the week. Taylor Slough Bridge (TSB) gauge had some errors starting on the February 16, 2021 so no data was available for most of the week. The increases in the lower part of the slough can be accounted for with local rainfall over the week as all stations within the region received at least an inch of rain. Taylor Slough is averaging 13 inches higher than the historical average for this time of year, and the northern portion of the slough is 25 inches higher than the average for this time of year. Conditions are wetter than a year ago.


2/21/2021
Structures
Roads
Canals
Water Depth (ft)
(weekly change)
Salinity (psu)
(weekly change)
NTS-1
1.74'
(-0.01)
TSB
N/A
P37
0.72'
(+0.11)
EVER6
0.63'
(+0.09)
CP
1.62'
(+0.10)
TR
0.5
(+0.0)
JB
5.2
(-1.5)
LS
17.5
(-0.2)
MB
23.7
(+3.2)
GB
15.2
(-13.5)
TB
13.6
(-7.3)
12.3
(-1.4)
LM
22.8
(+1.7)
DK
BK
29.3
(-0.5)
WB
29.5
(+0.0)
JK
31.1
(+1.0)
N
W
E
S
0
2.75
5.5
11 Miles


Taylor Slough Water Depths
*note: calculated using ground surface elevations values (NAVD88) from EDEN
Taylor Slough Water Depth (ft)*
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
-3.0
-4.0
P37
EVER6
CP
TSB
PROVISIONAL DATA
2/19
4/19
6/19
8/19
10/19
12/19
2/20
4/20
6/20
8/20
10/20
12/20
2/21


Eastern Florida Bay (psu)
60
50
40
30
20
10
WY01-WY16 Interquartile Range
Daily Average Salinity
2020
2021
Central Florida Bay (psu)
60
50
40
30
20
10
0
WY01-WY16 Interquartile Range
Daily Average Salinity
2020
2021
Western Florida Bay (psu)
60
50
40
30
20
10
0
WY01-WY16 Interquartile Range
Daily Average Salinity
2020
2021



Florida Bay Salinities: Salinities in Florida Bay averaged a 2.4 psu decrease over the week with individual station changes ranging from -13.5 psu in the western shoreline to +1.7 psu in the eastern Bay. Bay-wide salinity is 8 psu lower than the historical average for this time of year. All stations are at least 2 psu lower than their historical averages. The extremely shallow Garfield Bight (GB) station in the western nearshore had the largest decrease in salinity and the second highest rainfall total for the week (2.57 inches). Garfield Bight went from being 1 psu above average last week to 17 psu below average this week. As a result, the nearshore area is now 11 psu below the historical average for this time of year (was 4 psu below last week).

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 (<0.5 psu) but is very slowly rising as is normal for this time of year. The 30-day moving average has also remained low at 0.4 psu. Weekly flow from the 5 creeks identified by yellow stars on the map totaled nearly 13,000 acre-feet which is an increase 0f 8,000 acre-feet from last week. Strong positive flows persisted for the latter two-thirds of the week. The 365-day moving sum of flow from the five creeks (tracked as part of the Florida Bay MFL criteria) ended at 410,641 acre-feet this week which is 6,000 acre-feet more than last week. Conditions are still higher than the 95th percentile of historical data (390,830 acre-feet). Creek flows are provisional USGS data.

Water Management Recommendations

Slowing the recession rates in all regions to 0.05 to 0.07 feet per week would have ecological benefit, particularly in WCA-3A North and WCA-2A. Slower recession rates in the northern Everglades extends the time that wading bird foraging conditions remain optimal, conserves water and protects peat soils later in the dry season.

Reversals in northeastern Shark River Slough are not ecologically detrimental at this point in the season as wading bird foraging can remain favorable along the fringes of the slough. 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.

Sporadic or short-term discharges from the S-152 have the potential to limit the Decomp Physical Model (DPM) Science's team interpretation of flow effects on marsh and canal ecological processes. Care should be made to protect the certainty provided by that physical model and the science being conducted at that location.

More specific recommendations appear in the summary table below. The red text represents new or modified information or recommendations.

SFWMD Everglades Ecological Recommendations, February 23rd, 2021 (red is new)			
Area	Weekly change	Recommendation	Reasons
WCA-1	Stage decreased by 0.03'	Maintain marsh stage slightly above and parellel to the regulation schedule.	Protect within basin and downstream habitat and wildlife. Maintaining optimal recession rates prepares the habitat for conducive wading bird foraging.
WCA-2A	Stage decreased by 0.16'	Maintain the recession rate near -.05 to -.07 feet per week and maintain marsh stage above the regulation schedule targeting 11.6' NGVD.	Protect within basin and downstream habitat and wildlife. Maintaining optimal recession rates prepares the habitat for conducive wading bird foraging.
WCA-2B	Stage decreased by 0.05'	Maintain the recession rate to near -.05 to -.07 feet per week.	Protect within basin and downstream habitat and wildlife from flooding stress.
WCA-3A NE	Stage decreased by 0.13'	Moderate the recession rate to near -.05 to -.07 feet per week.	Protect within basin and downstream habitat and wildlife. Moderating the recession preserves peat soils and extends the time that foraging is optimal on the landscape.
WCA-3A NW	Stage decreased by 0.10'	Moderate the recession rate to near -.05 to -.07 feet per week.	
Central WCA-3A S	Stage decreased by 0.14'	Moderate the recession rate to near -.05 to -.07 feet per week.	Protect within basin and downstream habitat and wildlife. Moderating the recession preserves peat soils and extends the time that foraging is optimal on the landscape.
Southern WCA-3A S	Stage decreased by 0.08'		
WCA-3B	Stage decreased by 0.11'	Moderate the recession rate to near -.05 to -.07 feet per week.	Protect within basin and downstream habitat and wildlife from flooding stress. Tree island ecology is diminished by flooding
ENP-SRS	Stage increased by 0.04'	Make discharges to the Park according to COP and TTFF protocol.	Protect within basin and upstream habitat and wildlife from flooding stress.
Taylor Slough	Stage changes ranged from −0.01' to +0.11'	Move water southward as possible.	When available, provide freshwater buffer for downstream conditions.
FB- Salinity	Salinity changes ranged −13.5 to +1.7 psu	Move water southward as possible.	When available, provide freshwater to maintain low salinity buffer and promote water movement.