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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: March 17, 2021

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

A strong atmospheric stability associated with a high-pressure system and the absence of any organized triggering mechanism mean that dry conditions will persist through mid-week. Southeasterly to southerly low-levels winds will veer more southerly by Wednesday, which will help to transport warm air northward across the District. The hot daytime temperatures, lack of much cloud cover, an occasional breeze, and the increasing March sun angle also imply greater-than-normal evapotranspiration rates, which after six consecutive days of no measurable rainfall, would likely result in water supply needs further increasing. The high pressure over the Gulf of Mexico and Florida will weaken and shift eastward by Friday. This change to the weather pattern will allow a cold front to push through the Gulf of Mexico and Florida Panhandle Thursday morning, north Florida late Thursday and arrive over the northwestern part of the District overnight. Preceding the front, breezy southerly to southwesterly winds will favor hot temperatures Thursday afternoon but likely little rainfall, except for a few showers possible in the southeast. Then a line of light to moderately heavy showers should push into the northwestern half of the District beginning late Thursday or overnight. The rains will shift southeastward Friday morning but over a diminishing area by Friday afternoon, followed by cooler temperatures and a drying over all areas by Friday evening. The model guidance has consistently been forecasting no more than about a tenth of an inch of total rainfall in association with the late-week frontal system. The 90th percentile for an individual basin from the late Thursday to Friday rains is about a quarter of an inch. The drier conditions immediately behind the front should last through early Saturday but could be interrupted by a low-pressure system. A surge of moisture from the east this weekend, in combination with the slow passage of a secondary cold front, could cause an increase in rains, particularly in the east. The increasing rains, with some potentially locally heavy, would also occur as a strong surface high builds southward behind the secondary front over the eastern U.S., resulting in abnormally windy conditions across the District and possible gale-force conditions along or near the east coast. Some of the rains could extend farther inland on Sunday, but the forecast is uncertain. The potential exists for over half an inch of rainfall in or near the east coast this weekend, although the degree of model differences is still rather high and thus forecast confidence is low. Regardless of the exact amount that occurs, the weekend rains could hang on in a lighter form Monday morning and afternoon in the east before diminishing altogether, but with very windy east-northeasterly to northeasterly winds and cool temperatures would likely continue throughout the day.

Kissimmee

Tuesday morning stages were 57.0 feet NGVD (1.0 feet below schedule) in East Lake Toho, 53.9 feet NGVD (1.1 feet below schedule) in Toho, and 51.7 feet NGVD (0.7 feet above 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 930 cfs at S-65, 880 cfs at S-65A, 910 cfs at S-65D and 920 cfs at S-65E. Dissolved oxygen concentration in the Kissimmee River averaged 9.5 mg/L for the week through Sunday. River mean floodplain depth on Sunday was 0.39 feet. Today's recommendation is to maintain

slow stage recessions of ~0.18 feet/week in East Lake Toho and Lake Toho through June 1. Continue to follow the USACE request to keep S-65A discharge below 800-900 cfs to facilitate construction for the Kissimmee River Restoration Project.

Lake Okeechobee

Lake Okeechobee stage was 15.02 feet NGVD on March 14, 2021, 0.16 feet lower than last week and 0.37 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 0.50 feet above. Recent Snail Kite surveys found 35 total nests around the Lake; 32 active, 1 successful with nestlings and 2 failed. 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 569 cfs over the past week with 510 cfs coming from Lake Okeechobee. The seven-day average salinities increased at HR1 and decreased at the remaining sites in 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 2,130 cfs over the past week with approximately 1,443 cfs coming from the Lake. Seven-day average surface salinities remained similar at S-79 and Val I-75, increased at Ft. Myers, 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 also in the good range (10-30) for adult eastern oysters at Cape Coral, Shell Point, and 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 4,600 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 115,900 ac-feet. The total amount of inflows to the STAs in WY2021 is approximately 1,566,000 ac-feet. Most STA cells are near target stage, with the exception of several EAV cells in STA-5/6 that are starting to dry out. STA-1E Western Flow-way is offline for the Restoration Strategies project to fill and grade Cells 5 and 7, and STA-3/4 Eastern Flow-way is offline for vegetation rehabilitation/drawdown. Operational restrictions are in place in STA-1W Western, Eastern, and Northern Flow-ways, and STA-2 Flow-way 2 for construction activities, in STA-1E Central Flow-way, STA-2 Flow-ways 3 and 4, STA-3/4 Central and Western Flow-ways for vegetation management activities, and in STA-5/6 Flow-ways 2 and 3 following the Restoration Strategies project to grade non-effective treatment areas. This week, if 2008 LORS recommends Lake releases to the WCAs and conditions allow, releases will be sent to STA-2.

Everglades

Conditions remain indicative of a productive wading bird nesting season. Birds are feeding in large flocks in the western marl prairies and the northern marshes of the WCAs. Numbers of nesting birds continue to increase at colonies within Everglades National Park and WCA-3A. However, Wood Stork numbers are less than hoped, but it is early in the season. The ecology of the coast/bay continues to benefit from the freshwater flow. As volumes decrease, a slow recession has ecological benefit.

Supporting Information

KISSIMMEE BASIN

Rainfall

The Upper Kissimmee Basin received 0.00 inches of rainfall in the past week, and the Lower Basin received 0.00 inches (SFWMD Daily Rainfall Report 3/15/2021).

Upper Kissimmee

Table 1 lists stage and discharge for several KCL water bodies using data from lake outfall structures. KCL stage hydrographs with respective regulation schedules and rainfall are shown in **Figures 1-3**.

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

Report Date: 3/16/2021

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)						
							3/14/21	3/7/21	2/28/21	2/21/21	2/14/21	2/7/21	1/31/21
Lakes Hart and Mary Jane	S-62	18	LKMJ	60.5	R	61.0	-0.5	-0.3	-0.2	-0.2	0.0	0.0	0.0
Lakes Myrtle, Preston, and Joel	S-57	8	S-57	60.8	R	60.9	-0.1	0.0	0.1	0.0	0.1	0.1	0.0
Alligator Chain	S-60	0	ALLI	63.9	R	64.0	-0.1	0.0	0.0	0.0	0.1	0.1	-0.1
Lake Gentry	S-63	0	LKGT	61.4	R	61.5	-0.1	0.0	-0.1	-0.1	0.0	0.1	0.0
East Lake Toho	S-59	381	TOHOE	57.0	R	58.0	-1.0	-0.5	-0.3	-0.1	-0.2	-0.3	-0.3
Lake Toho	S-61	729	TOHOW, S-61	53.9	R	55.0	-1.1	-0.8	-0.6	-0.4	-0.4	-0.4	-0.3
Lakes Kissimmee, Cypress, and Hatchineha	S-65	906	KUB011, LKIS5B	51.6	R	51.0	0.6	0.8	0.7	0.4	0.0	-0.6	-0.8

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: 3/16/2021

Metric	Location	1-Day Average	Average for the Preceding 7-Days ¹								
		3/14/2021	3/14/21	3/7/21	2/28/21	2/21/21	2/14/21	2/7/21	1/31/21	1/24/21	1/17/21
Discharge (cfs)	S-65	930	906	903	856	835	880	894	894	869	644
Discharge (cfs)	S-65A ²	881	883	888	897	901	887	882	892	856	641
Discharge (cfs)	S-65D ²	915	926	961	1,012	1,038	946	934	914	838	701
Headwater Stage (feet NGVD)	S-65D ²	25.63	25.76	25.80	25.80	25.80	25.87	25.79	25.83	25.79	25.87
Discharge (cfs)	S-65E ²	895	906	949	1,015	1,049	942	940	873	849	719
Discharge (cfs)	S-67	0	0	0	0	0	0	0	0	0	0
DO (mg/L) ³	Phases I & II/III river channel	8.5	9.5	8.9	7.3	7.0	8.7	8.7	8.1	8.8	8.3
Mean depth (feet) ⁴	Phase I floodplain	0.39	0.41	0.46	0.53	0.59	0.41	0.38	0.38	0.36	0.33

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

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

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

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

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

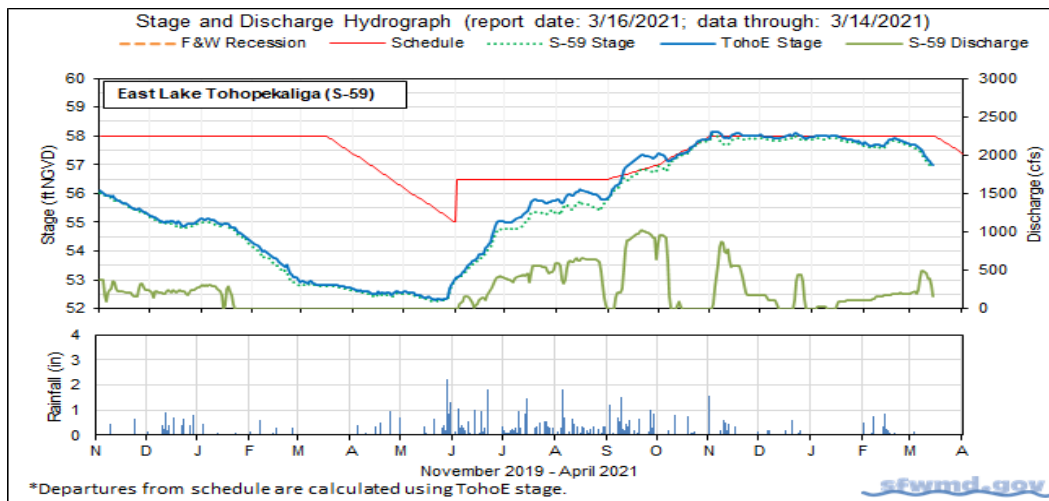


Figure 1. East Lake Toho regulation schedule, stage, discharge and rainfall.

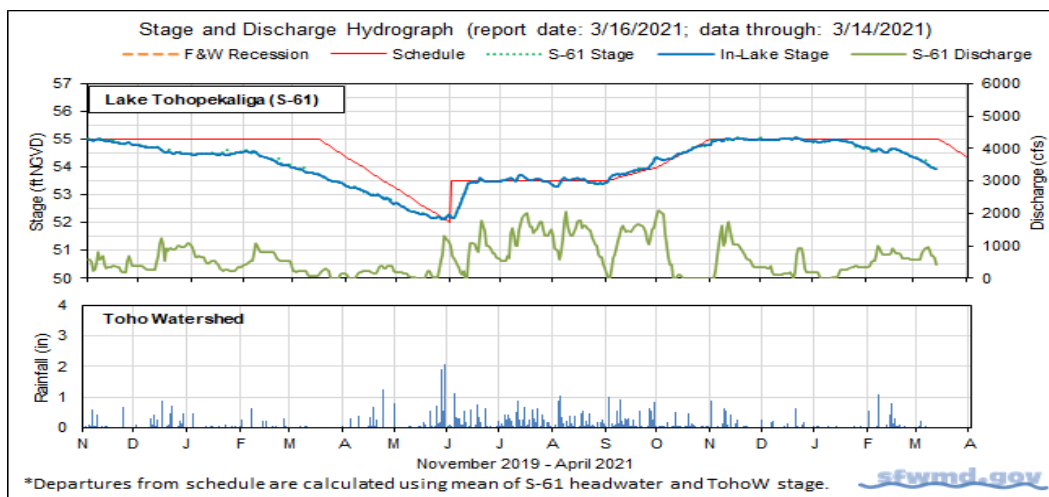


Figure 2. Lake Toho regulation schedule, stage, discharge and rainfall.

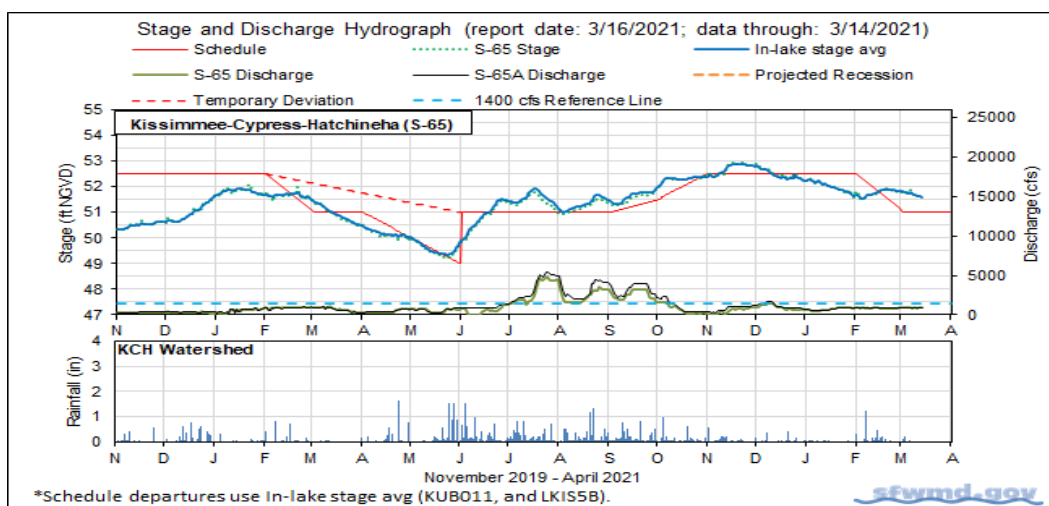


Figure 3. Lakes Kissimmee, Cypress and Hatchineha regulation schedule, stage, discharge and rainfall.

Kissimmee River Phase I Restoration Area Water Depth Maps

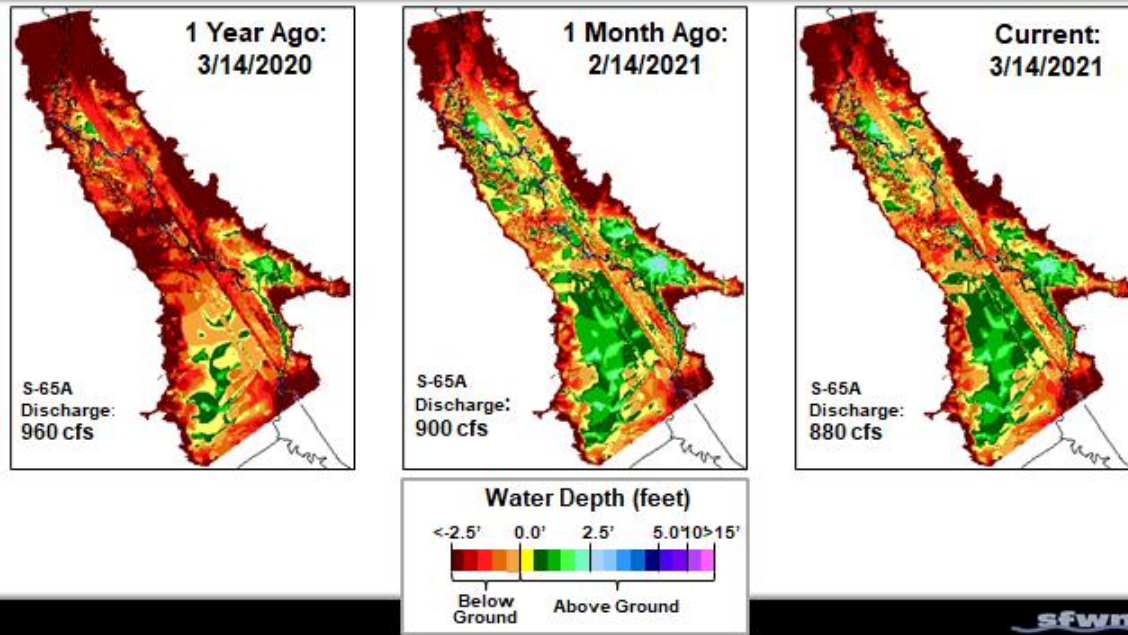


Figure 4. Phase I area floodplain water depths (from left to right) one year ago, one month ago and current. Color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to January 16, 2012.

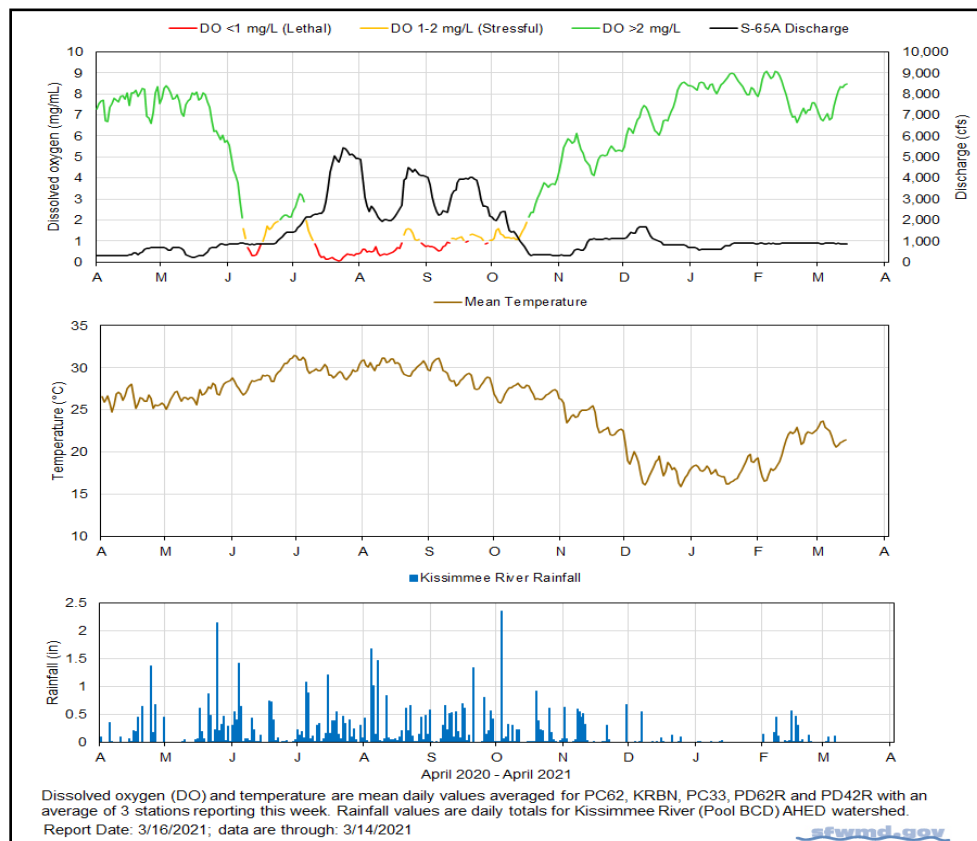


Figure 5. Restored Kissimmee river channel mean daily dissolved oxygen concentration (mg/L), S-65A discharge (cfs), temperature (°C) and rainfall (inches)

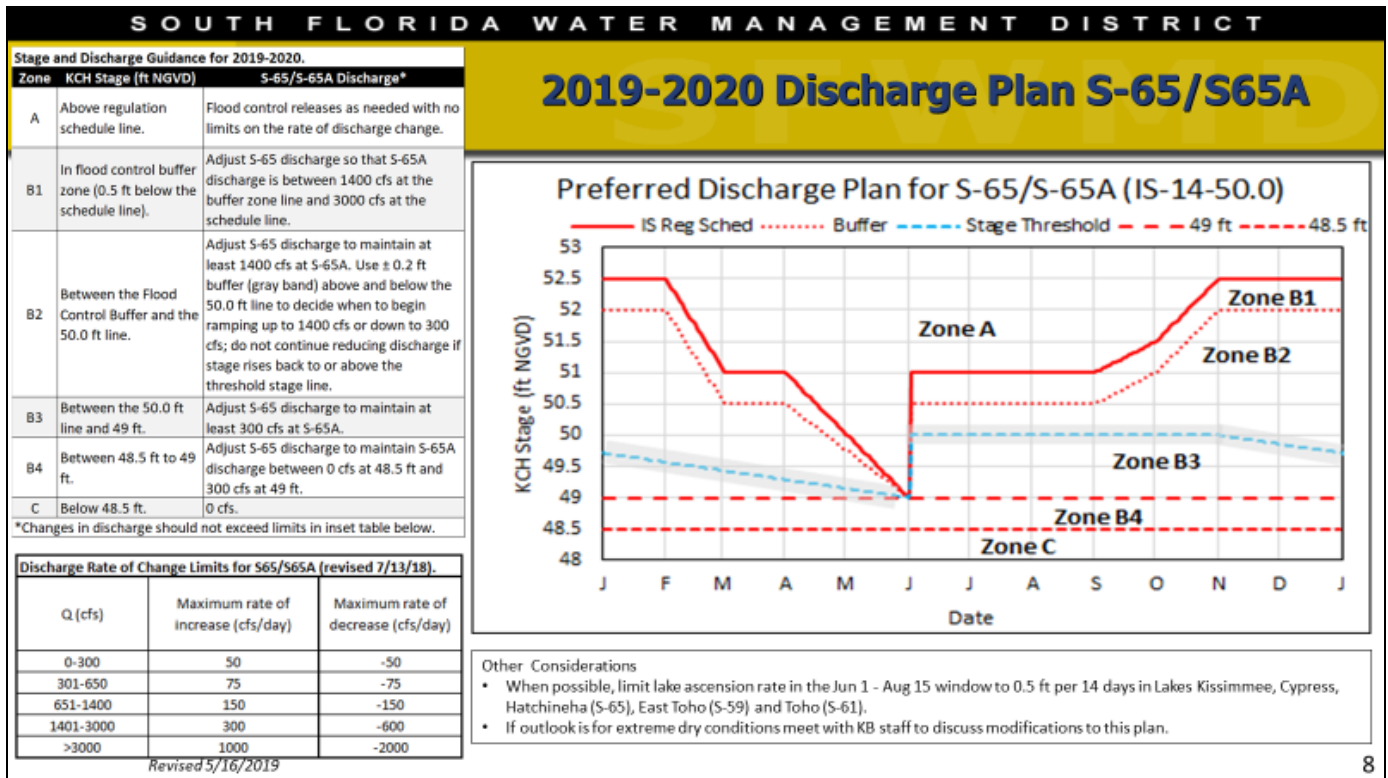


Figure 6. The 2019-2020 Discharge Plan for S-65/S-65A.

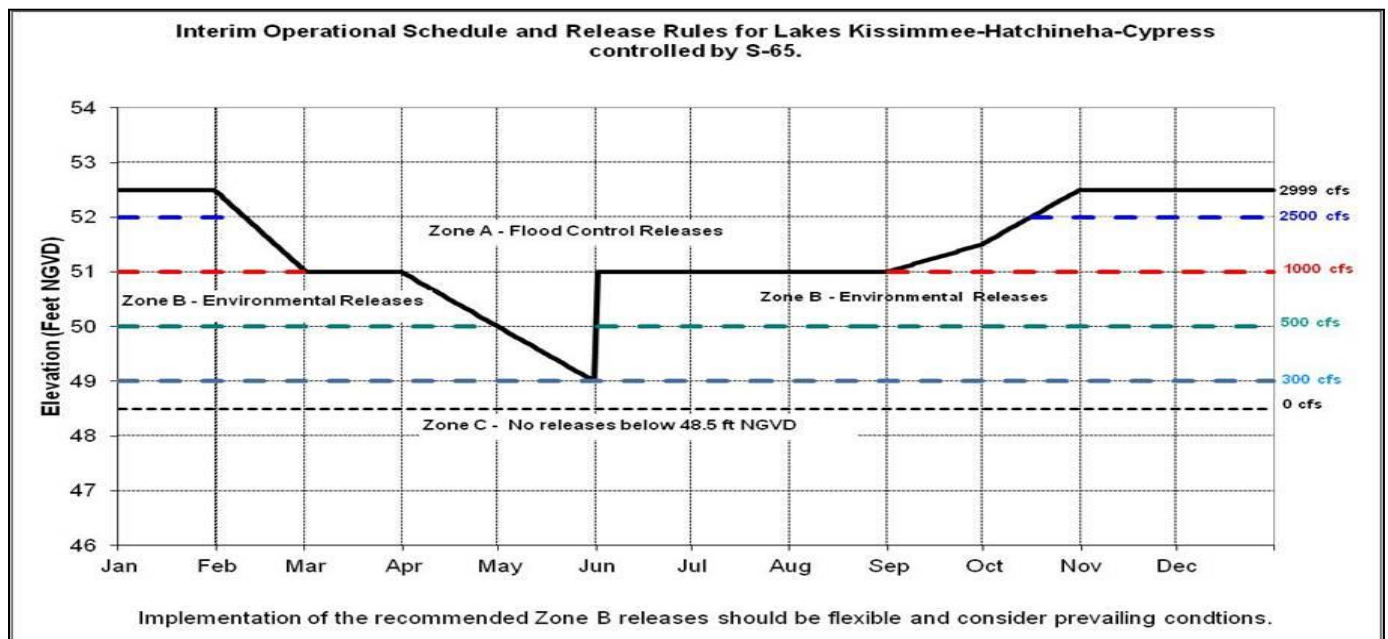


Figure 7. Interim operations schedule for S-65 (solid black line). The discharge schedule shown to the right has not been used in recent years.

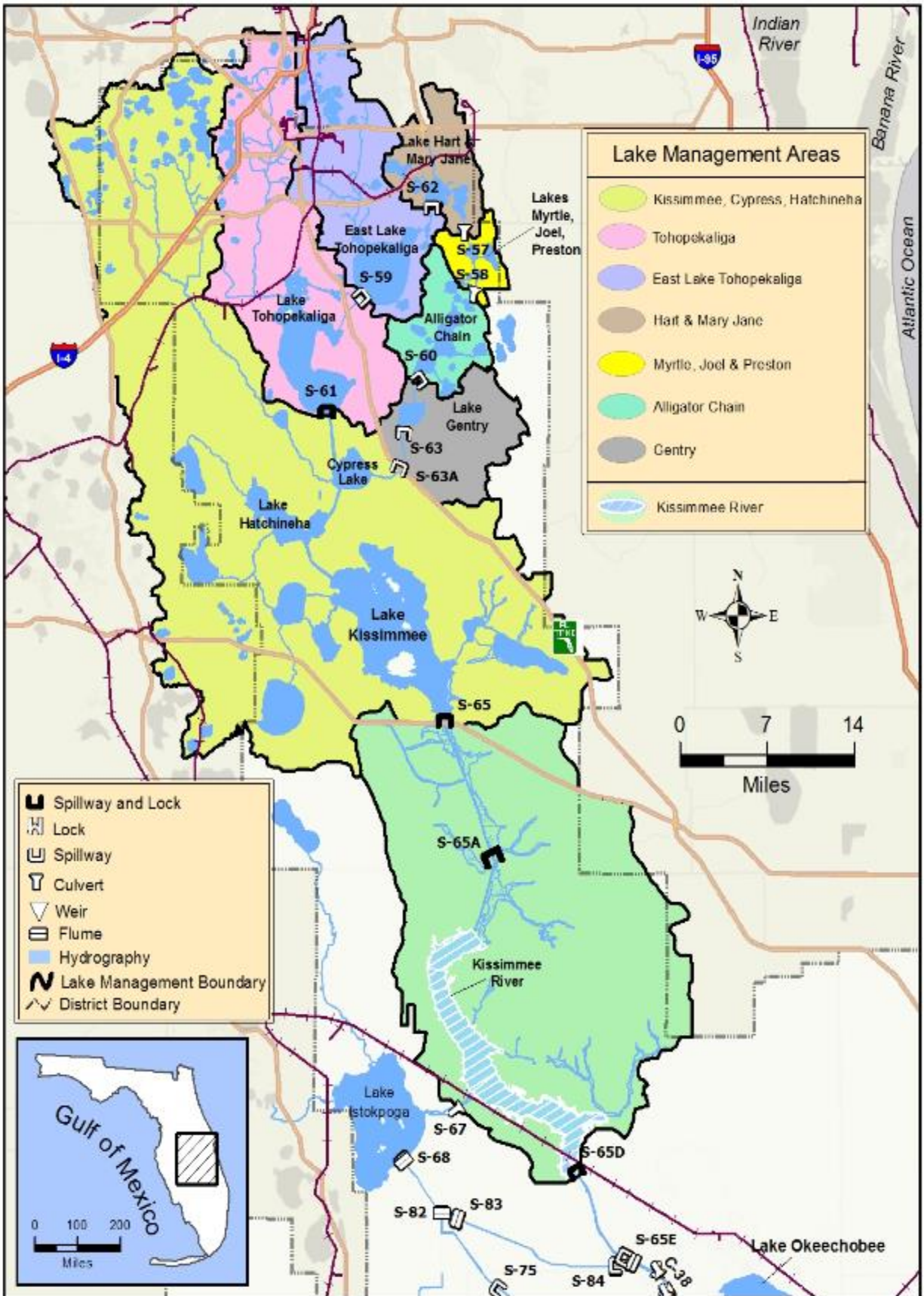


Figure 8. The Kissimmee Basin.

LAKE OKEECHOBEE

Lake Okeechobee stage was 15.02 feet NGVD on March 14, 2021, 0.37 feet lower than a month ago, and 2.64 feet higher than one year ago (Figure 1). Lake stages rose into the lower portion of the preferred ecological envelope on June 2, 2020 (Figure 2) but have been above the envelope since August 1, 2020; currently 0.50 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, no rain fell directly on the Lake and much of the District saw less than 0.5 inches (Figure 4).

Average daily inflows (excluding rainfall) were similar to the previous week, dropping from 1,069 cfs to 989 cfs. Outflows (excluding evapotranspiration) increased from 2,863 cfs to 3,615 cfs. Most of the inflows came from the Kissimmee River (906 cfs through S-65E & S-65EX1). Releases to the west via S-77 increased slightly from 1,545 cfs the prior week to 1,720 cfs, and releases east via S-308 increased from 178 cfs to 623 cfs. Releases south through the S-350 structures increased slightly, going from 937 cfs to 1,026 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.

There are now 32 active Snail Kite nests on Lake Okeechobee for a total of 35 nest thus far (Figure 6). These results are encouraging, and if water levels in the marsh continue to be optimal with a slow and steady recession, this could be an above average year for nesting productivity. Crews will be surveying the northern areas later this month.

The most recent satellite image (March 14, 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 7).

Water Management Summary

Lake Okeechobee stage was 15.02 feet NGVD on March 14, 2021, 0.16 feet lower than last week and 0.37 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 0.50 feet above. Recent Snail Kite surveys found 35 total nests around the Lake; 32 active, 1 successful with nestlings and 2 failed. 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)	OUTFLOWS	Previous week Avg Daily CFS	Avg Daily Flow cfs	Equivalent Depth Week Total (in)
S-65E & S-65EX1	949	906	0.4	S-77	1545	1720	0.7
S-71 & S-72	0	0	0.0	S-308	178	623	0.2
S-84 & S-84X	17	2	0.0	S-351	488	632	0.2
Fisheating Creek	41	45	0.0	S-352	135	277	0.1
S-154	0	0	0.0	S-354	314	117	0.0
S-191		0	0.0	L-8 Outflow	204	245	0.1
S-133 P	30	16	0.0	ET	2122	2383	0.9
S-127 P	12	5	0.0	Total	4985	5998	2.4
S-129 P	4	0	0.0				
S-131 P	3	3	0.0				
S-135 P	13	12	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							
Rainfall	1815	0	0.0				
Total	2884	989	0.4				

Provisional Data

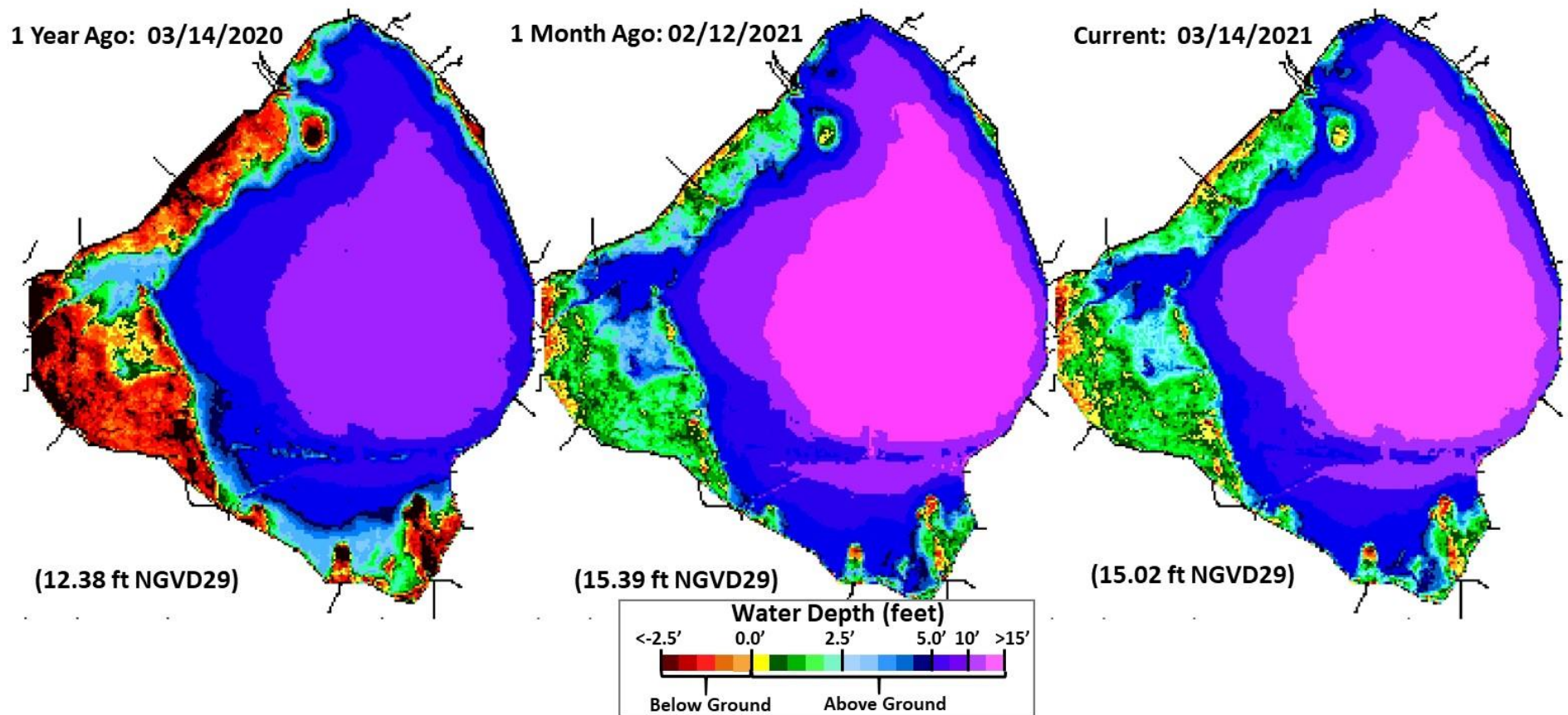


Figure 1. Water depth estimates on Lake Okeechobee based on the South Florida Water Depth Assessment Tool.

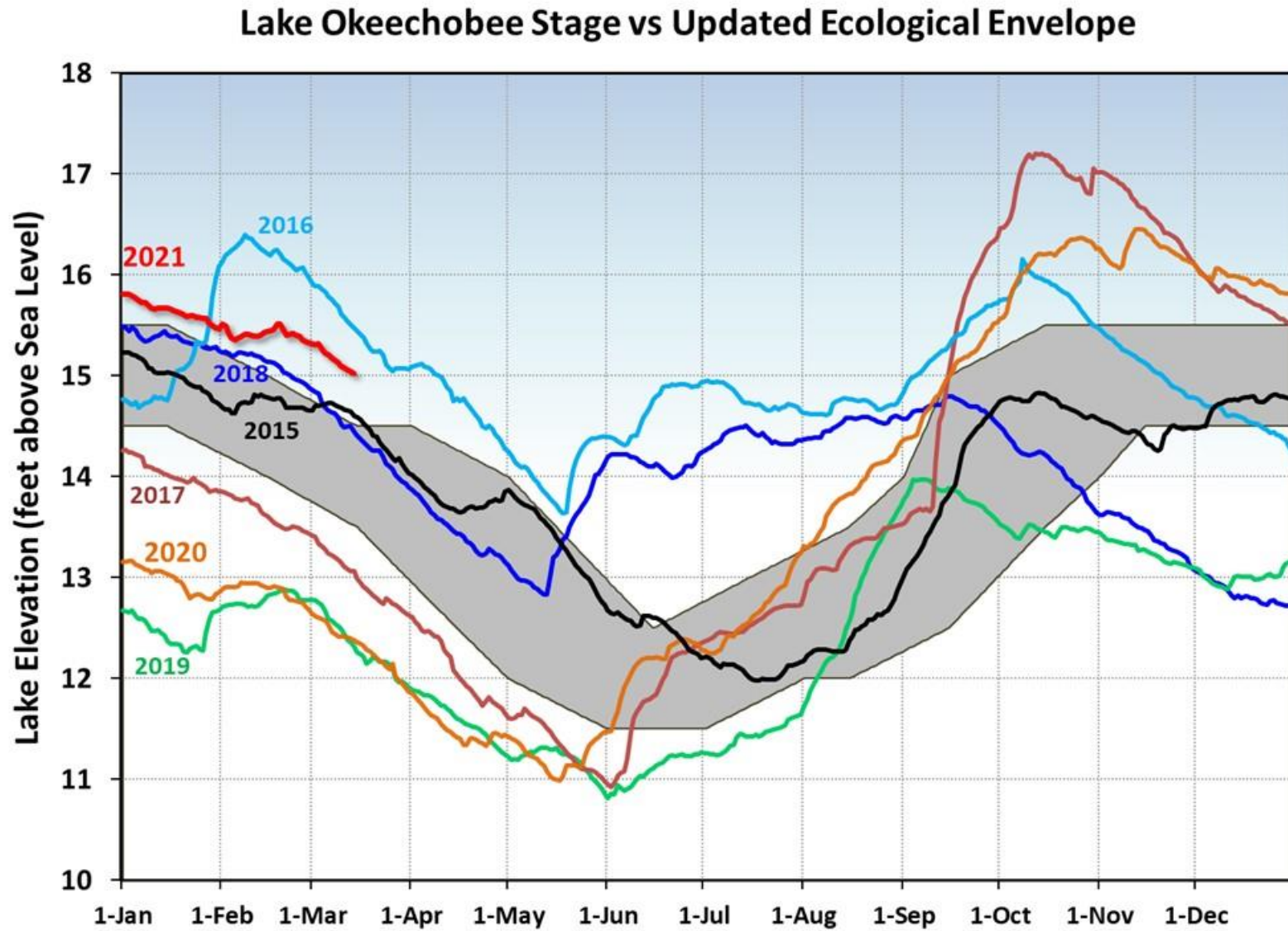


Figure 2. Select annual stage hydrographs for Lake Okeechobee in comparison to the updated Ecological Envelope.

Lake Okeechobee Water Level History and Projected Stages

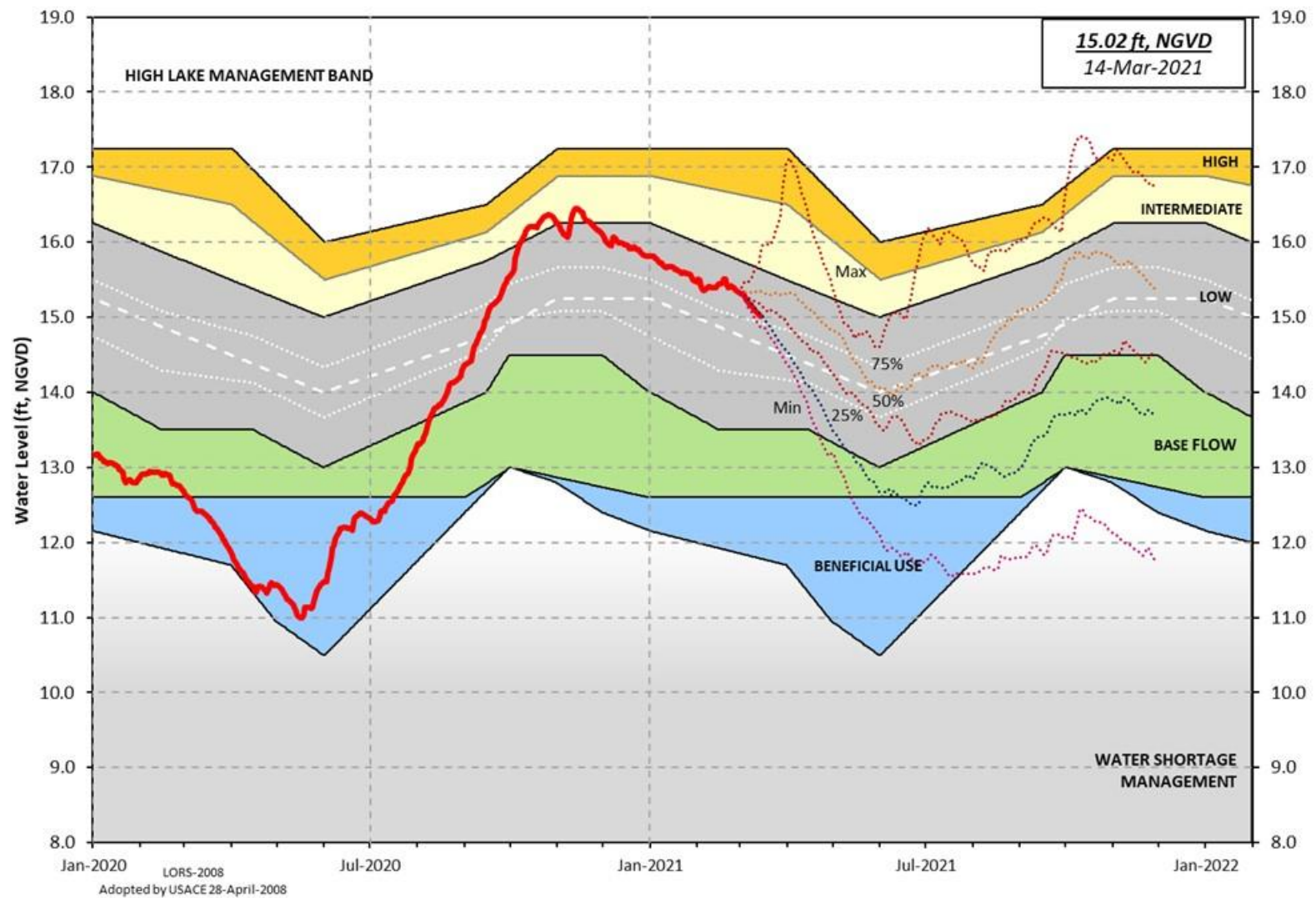


Figure 3. Recent Lake Okeechobee stages and releases, with projected stages based on a dynamic position analysis.

SFWMD PROVISIONAL RAINDAR 7-DAY BASIN RAINFALL ESTIMATES

FROM: 0400 EST, 03/08/2021 THROUGH: 0400 EST, 03/15/2021

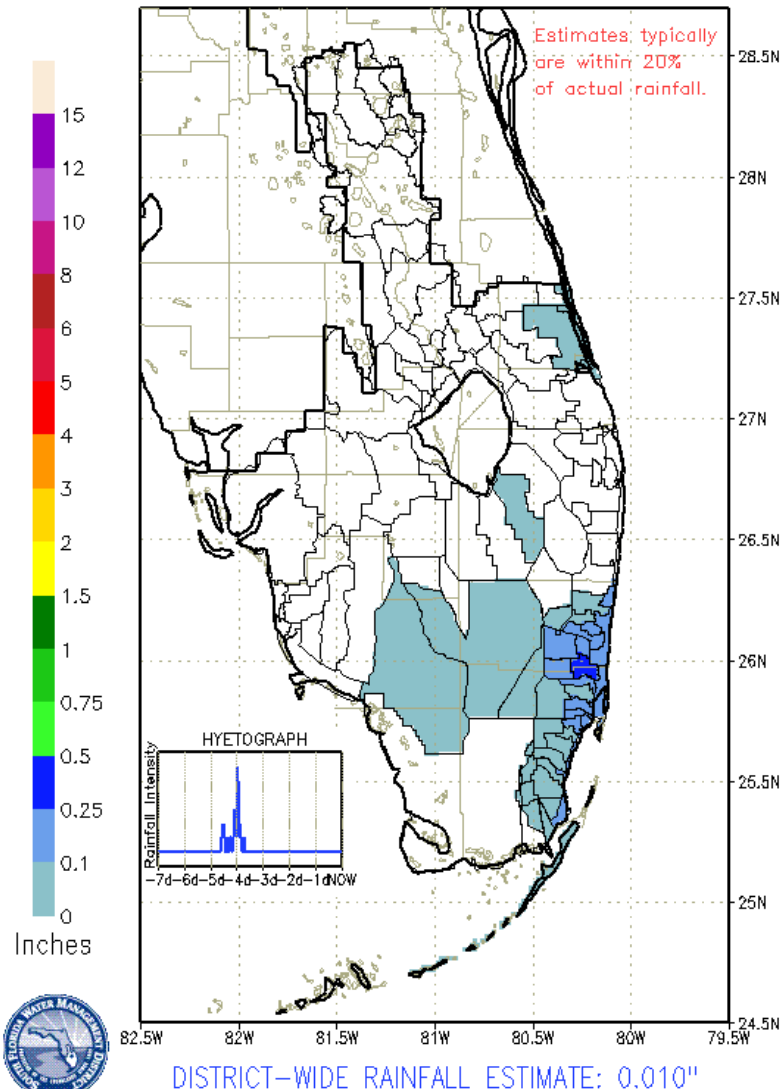


Figure 4. 7-Day rainfall estimates by RAINDAR.

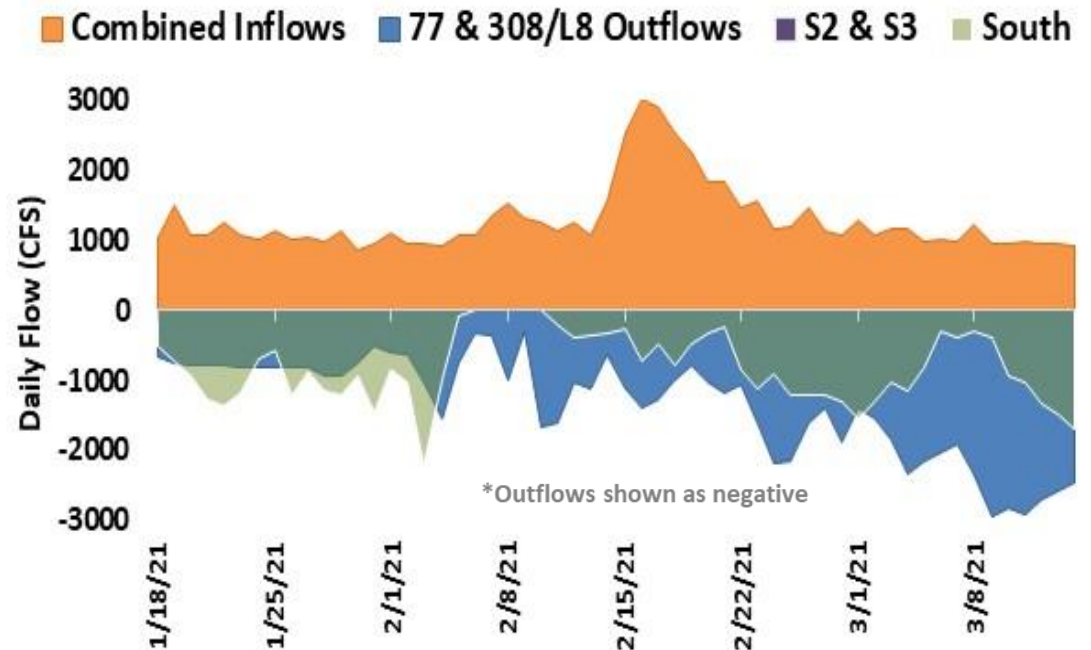


Figure 5. Major inflows (orange) and outflows (blue) of Lake Okeechobee, including the S-350 structures designated as South (green). The L-8 Canal flows through Culvert 10A are included as outflows when positive, and as inflows when backflowing into the Lake. All inflows and outflows are shown as positive and negative, respectively, for visual purposes. Outflows through the S-77 and S-308 structures are shown based on their downstream gauges to account for lock openings for navigation.

35 nests on Lake Okeechobee

- 32 active
- 1 successful
- 2 failed

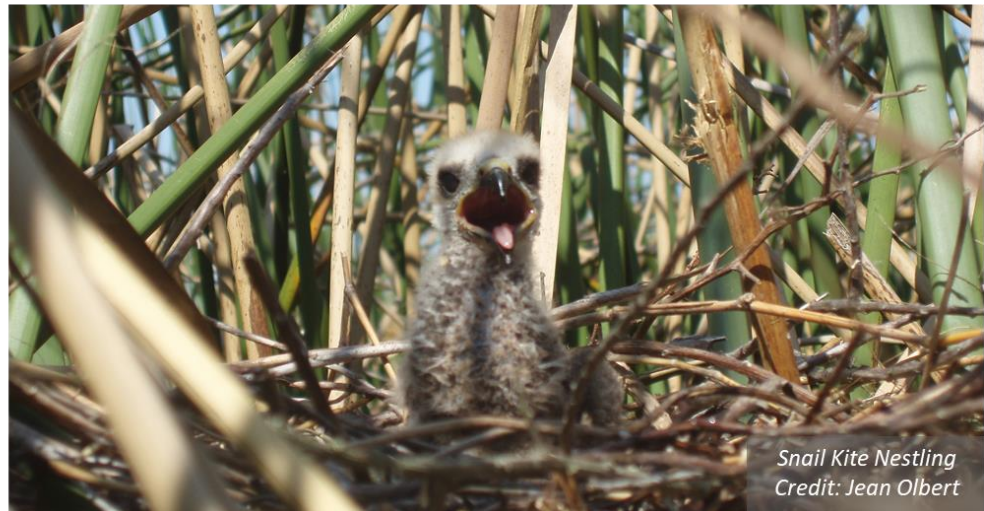
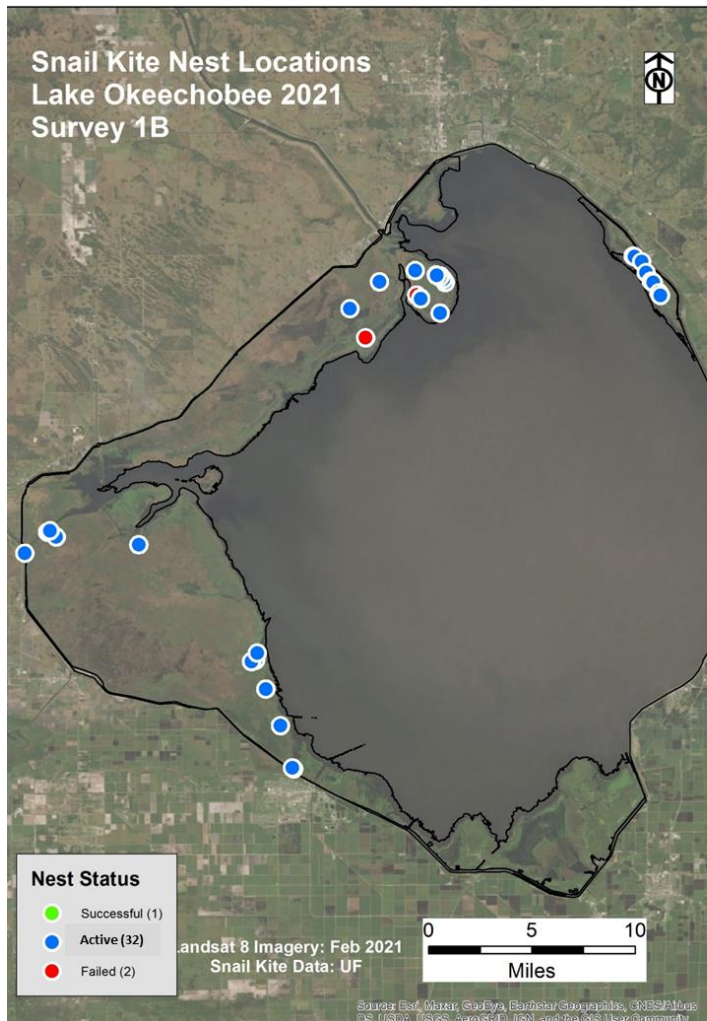


Figure 6. Current abundance of Snail Kite nests in Lake Okeechobee

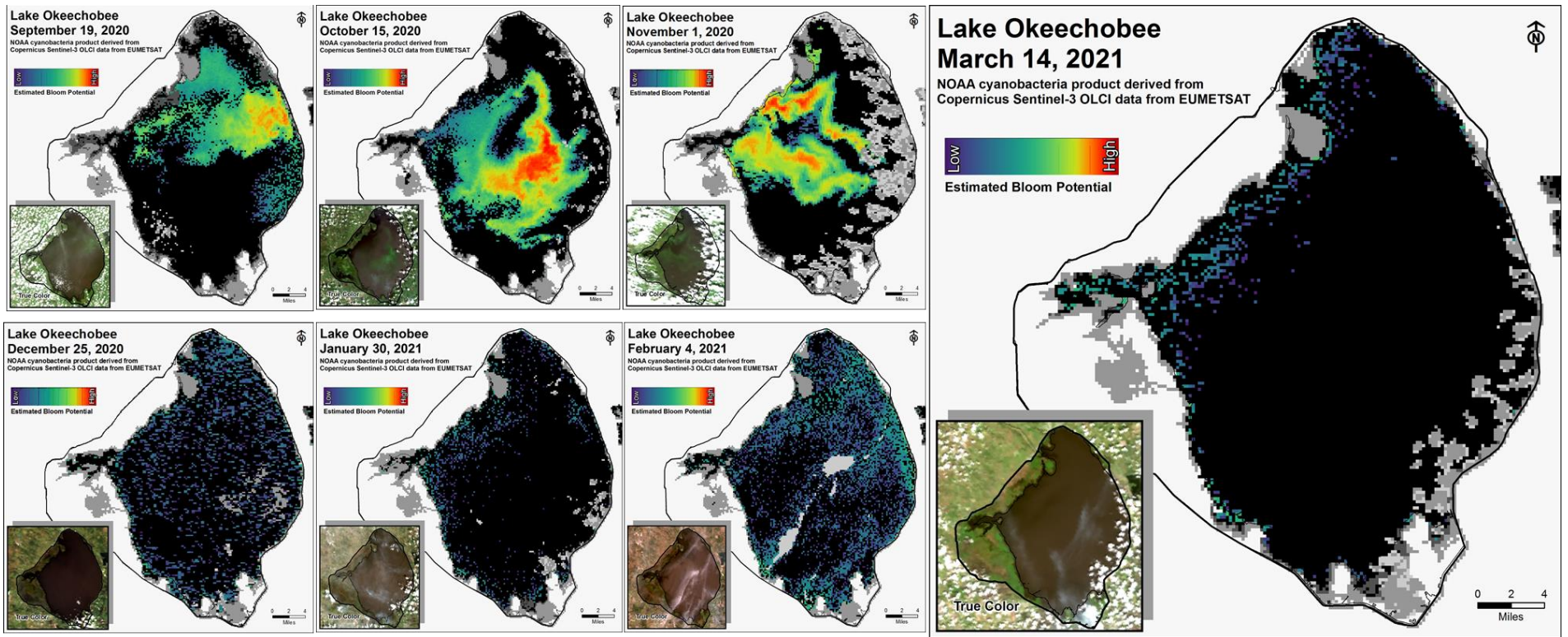


Figure 7. Cyanobacteria bloom potential based on NOAA's harmful algal bloom monitoring system. Gray color indicates cloud cover.

ESTUARIES

St. Lucie Estuary:

Last week total inflow to the St. Lucie Estuary averaged approximately 569 cfs (**Figures 1 and 2**) and the previous 30-day inflow averaged about 460 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	623
S-80	510
S-97 on C-23	1
S-49 on C-24	0
Gordy Rd. structure on Ten Mile Creek	Not reporting
Tidal Basin Inflow	58

Over the past week, surface salinity increased at HR1 and decreased at the remaining sites in 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 15.9. 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)	14.4 (12.5)	14.9 (16.2)	NA ¹
US1 Bridge	15.3 (18.0)	16.5 (20.1)	10.0-26.0
A1A Bridge	24.8 (26.8)	27.9 (29.1)	NA ¹

¹Envelope not applicable

Caloosahatchee Estuary:

Last week total inflow to the Caloosahatchee Estuary averaged approximately 2,130 cfs (**Figures 5 and 6**), and the previous 30-day inflow averaged about 2,006 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	1720
S-78	1458
S-79	2057
Tidal Basin Inflow	73

Over the past week, salinity remained the same at S-79 and similar at Val I75. Salinity increased at Ft. Myers and decreased at the remaining sites in the estuary (**Table 4, Figures 7 and 8**). The seven-day average surface salinity values were within the good range for adult eastern oysters at Cape Coral,

Shell Point, and Sanibel (**Figure 9**). The seven-day average surface salinities (**Table 4**) were 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 (0.3)	0.5 (0.4)	0.0-5.0 ²
Ft. Myers Yacht Basin	3.6 (3.5)	5.6 (4.7)	NA ¹
Cape Coral	10.7 (11.4)	12.8 (13.1)	10.0-30.0
Shell Point	23.6 (24.9)	24.2 (25.5)	10.0-30.0
Sanibel	27.1 (28.9)	27.8 (29.7)	10.0-30.0

¹Envelope not applicable and ²Envelope is based on a 2-week forecast 30-day average

Forecast of surface salinity (**Table 5** and **Figure 10**) at Val I-75 for the next two weeks using the autoregression model (Qiu and Wan, 2013) coupled with a linear reservoir model for the tidal basin predicts daily salinity to be 1.3 or lower at the end of the two week period for pulse release at S-79 ranging from 0 to 1500 cfs and steady release at S-79 of 2000 cfs. Tidal Basin inflows are estimated to be 60 cfs. The 30-day moving average surface salinity at Val I-75 is forecast to be 0.4 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	60	1.3	0.4
B	300	60	0.7	0.4
C	450	60	0.6	0.4
D	650	60	0.4	0.3
E	800	60	0.3	0.3
F	1000	60	0.3	0.3
G	1500	60	0.2	0.3
H	2000	60	0.2	0.3

Red tide

The Florida Fish and Wildlife Research Institute reported on March 12, 2021, that *Karenia brevis*, the Florida red tide dinoflagellate, was observed at background to medium concentrations in and offshore of Lee County and in Collier County. On the east coast, red tide was not observed in samples from Brevard, St. Lucie, Martin or Palm Beach 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.

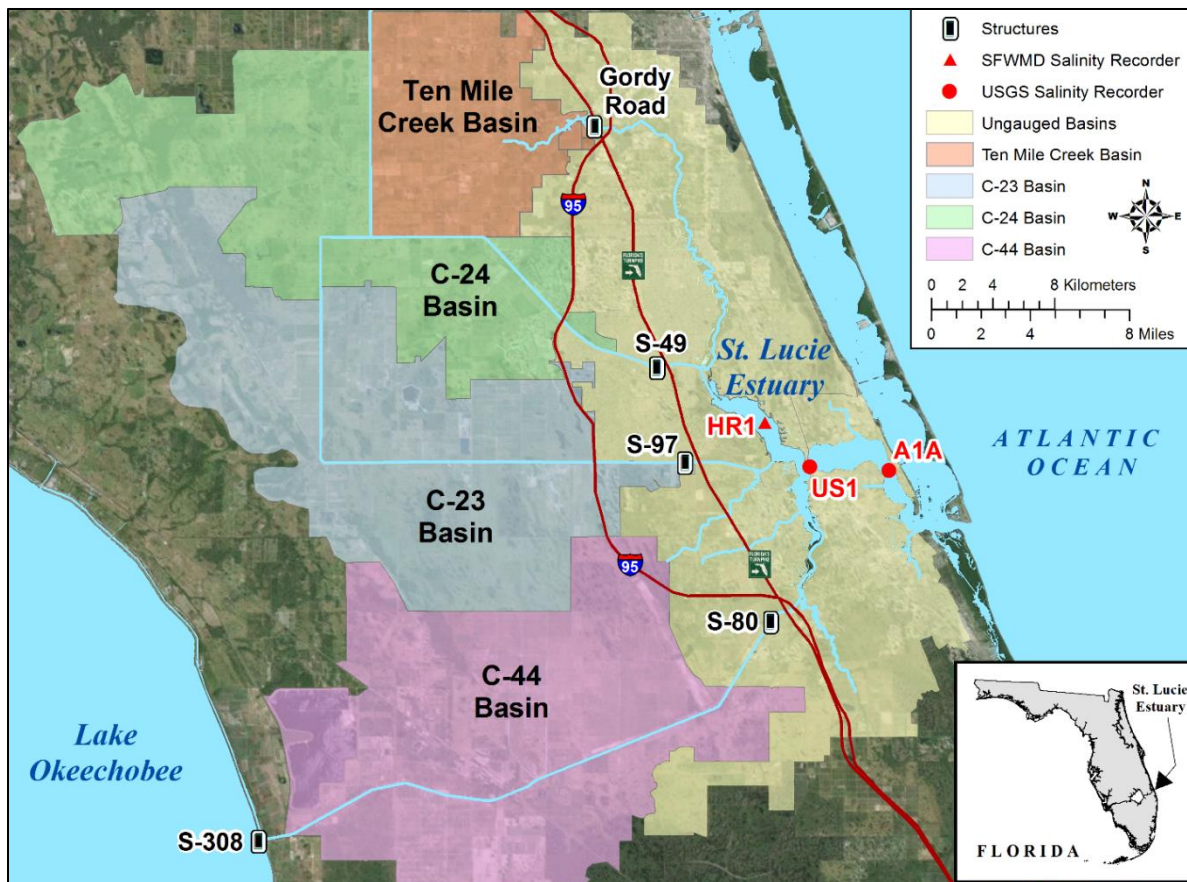


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

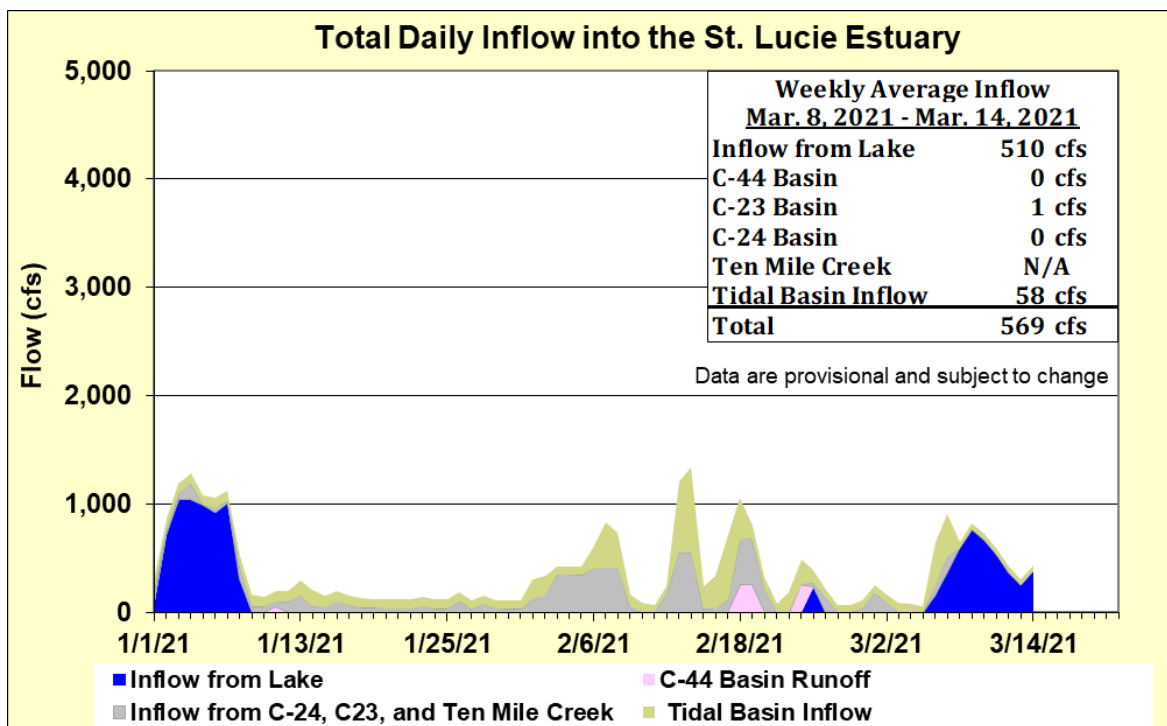


Figure 2. Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basin into the St. Lucie Estuary. Note: C-23 Basin inflows were estimated using S-48 and the Ten Mile Creek Basin inflows are not being calculated at this time.

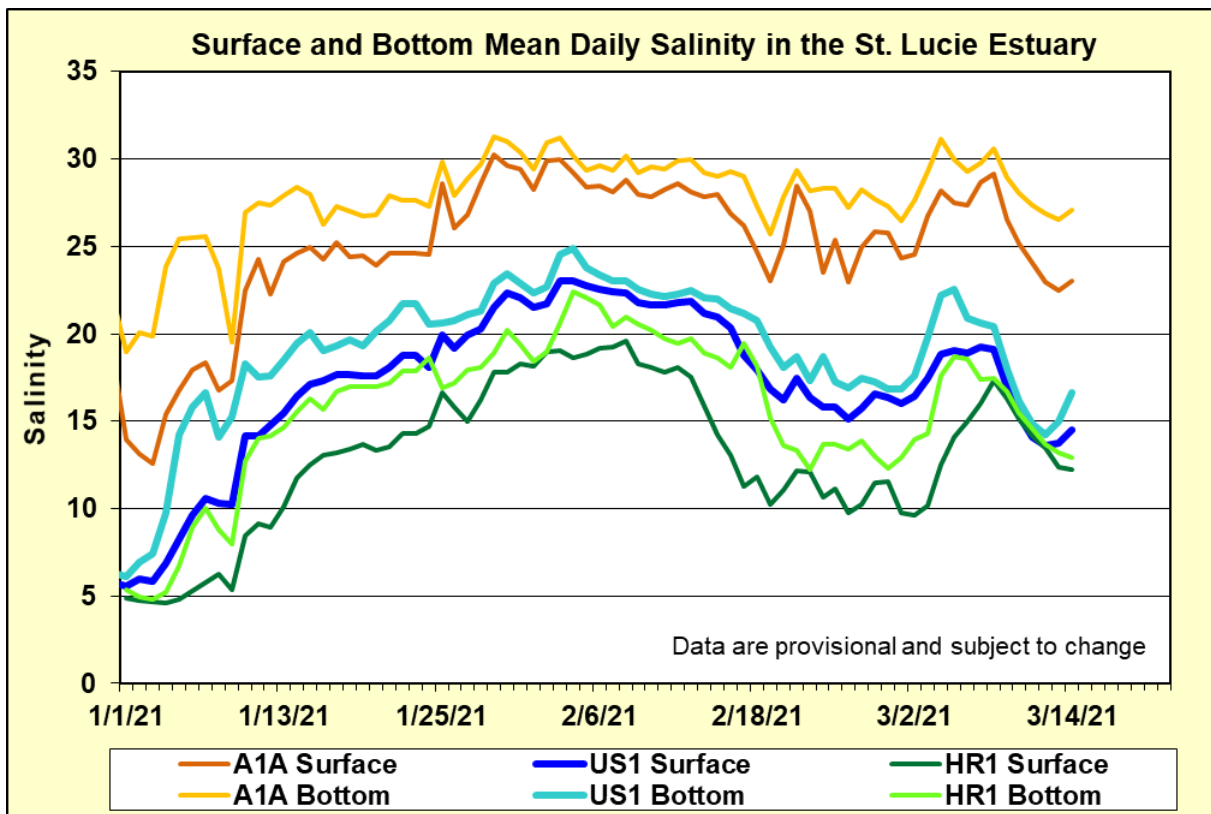


Figure 3. Daily mean salinity at the A1A, US1, and HR1 stations.

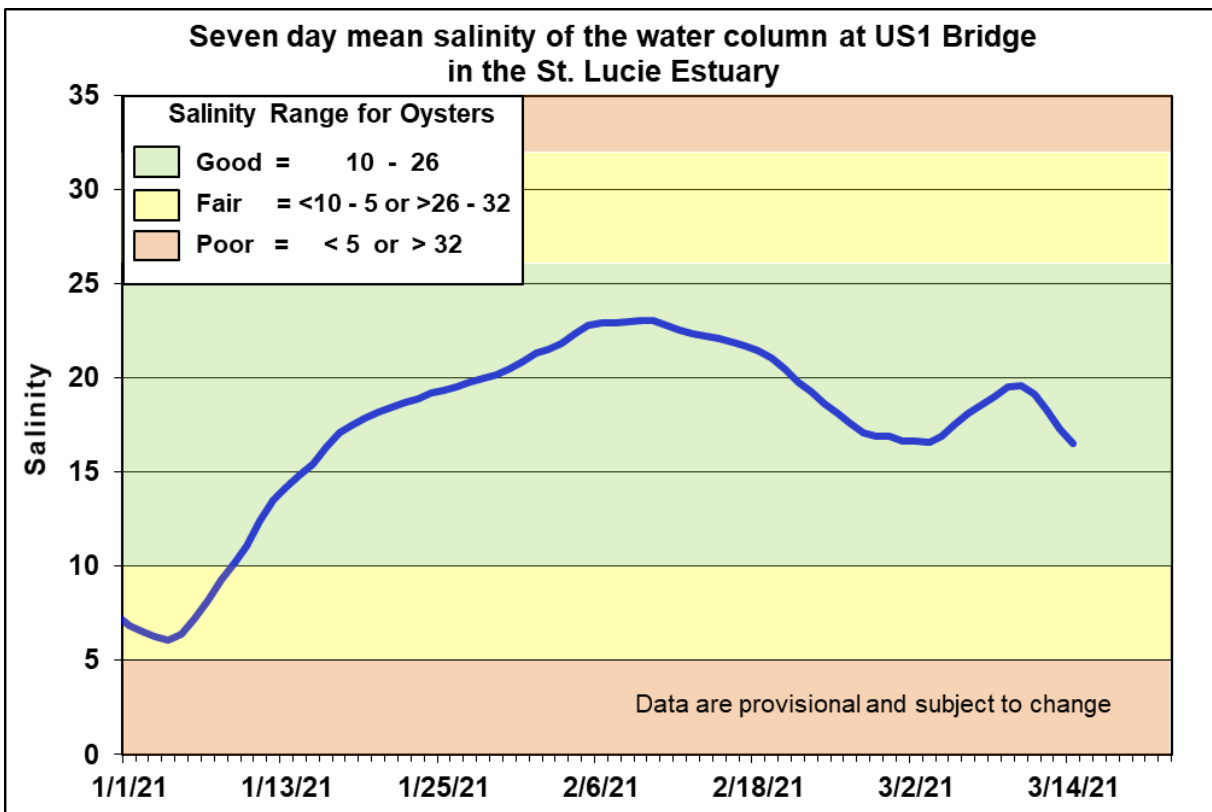


Figure 4. Seven-day mean salinity of the water column at the US1 Bridge.

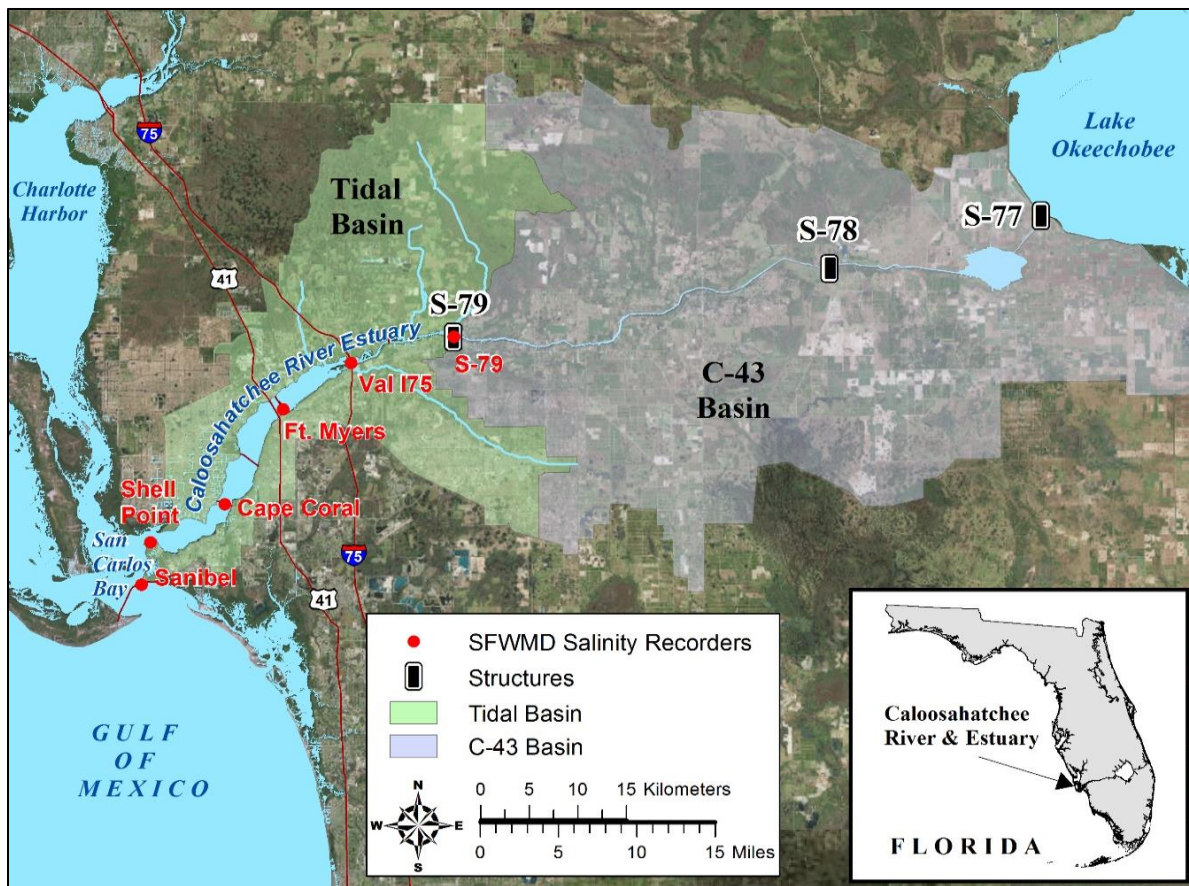


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

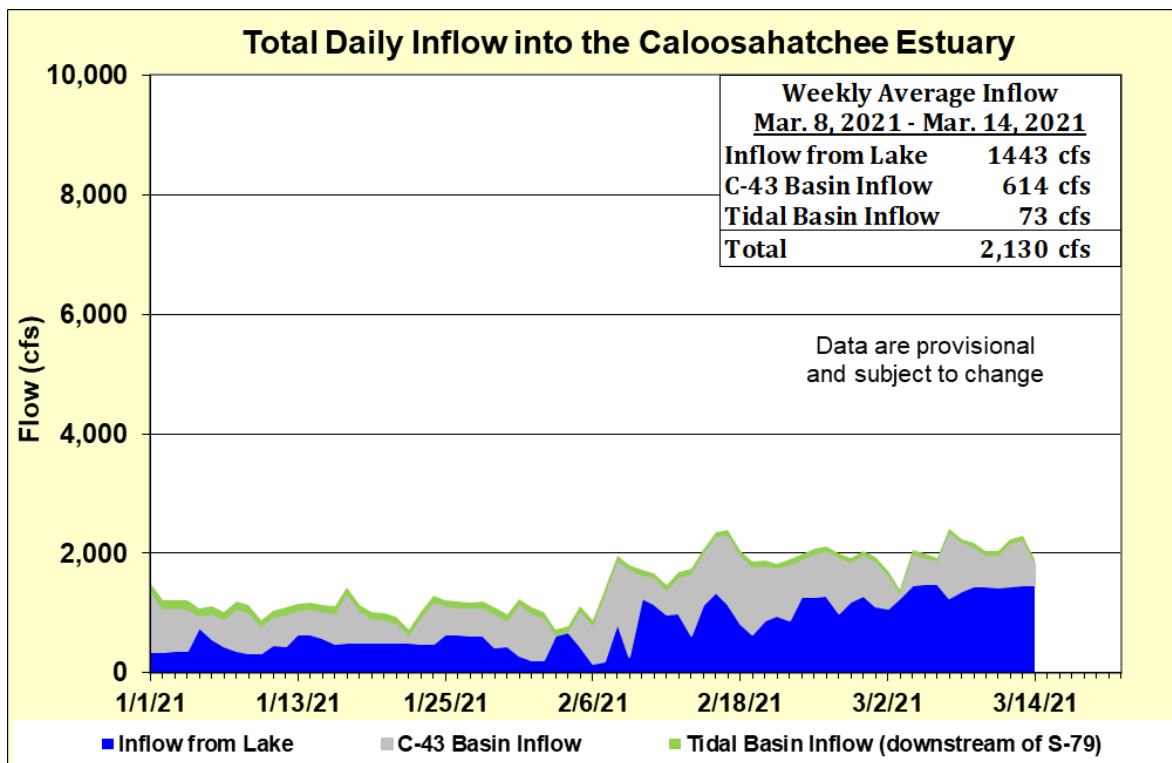


Figure 6. Total daily inflows from Lake Okeechobee, runoff from the C-43 basin and tributaries in the tidal basin into the Caloosahatchee River Estuary.

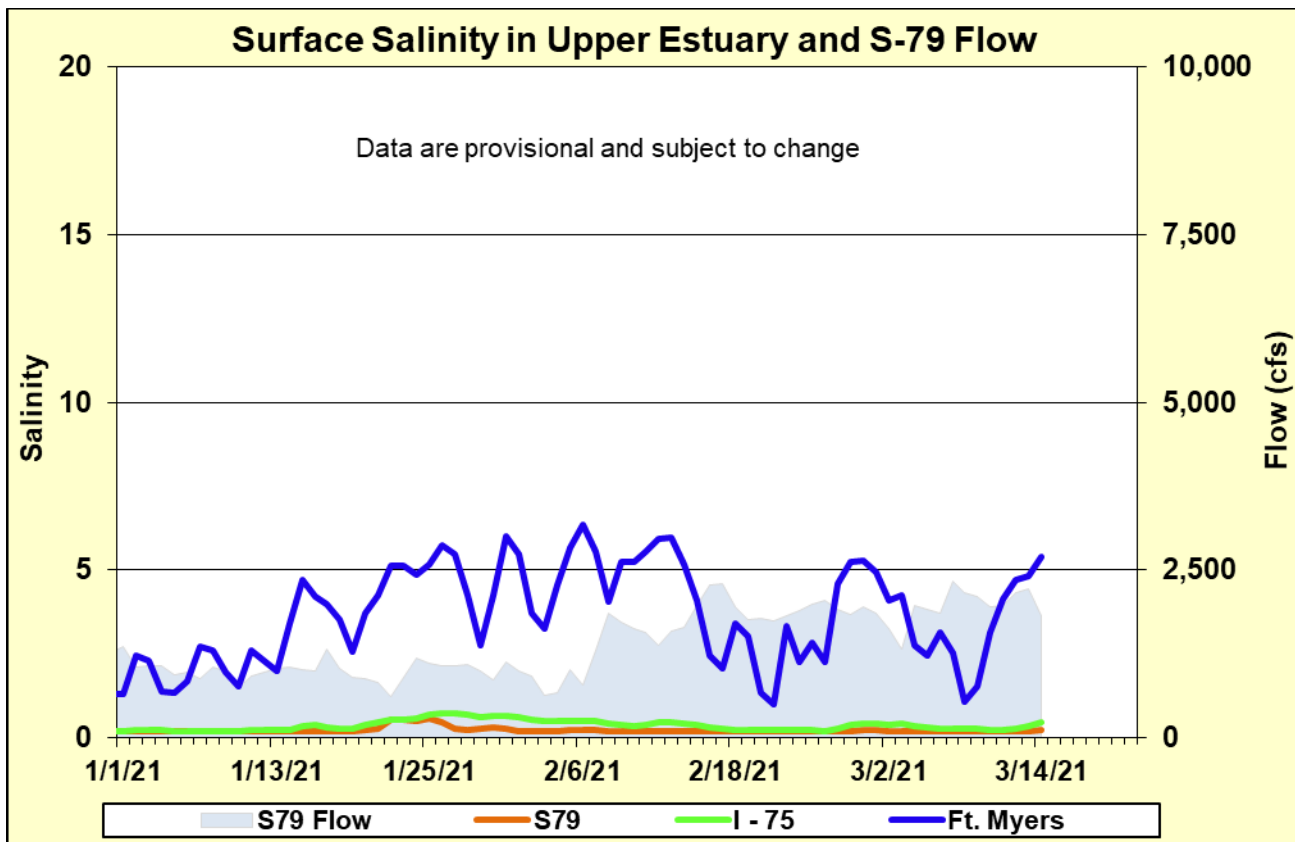


Figure 7. Daily mean flows at S-79 and salinity at upper estuary monitoring stations.

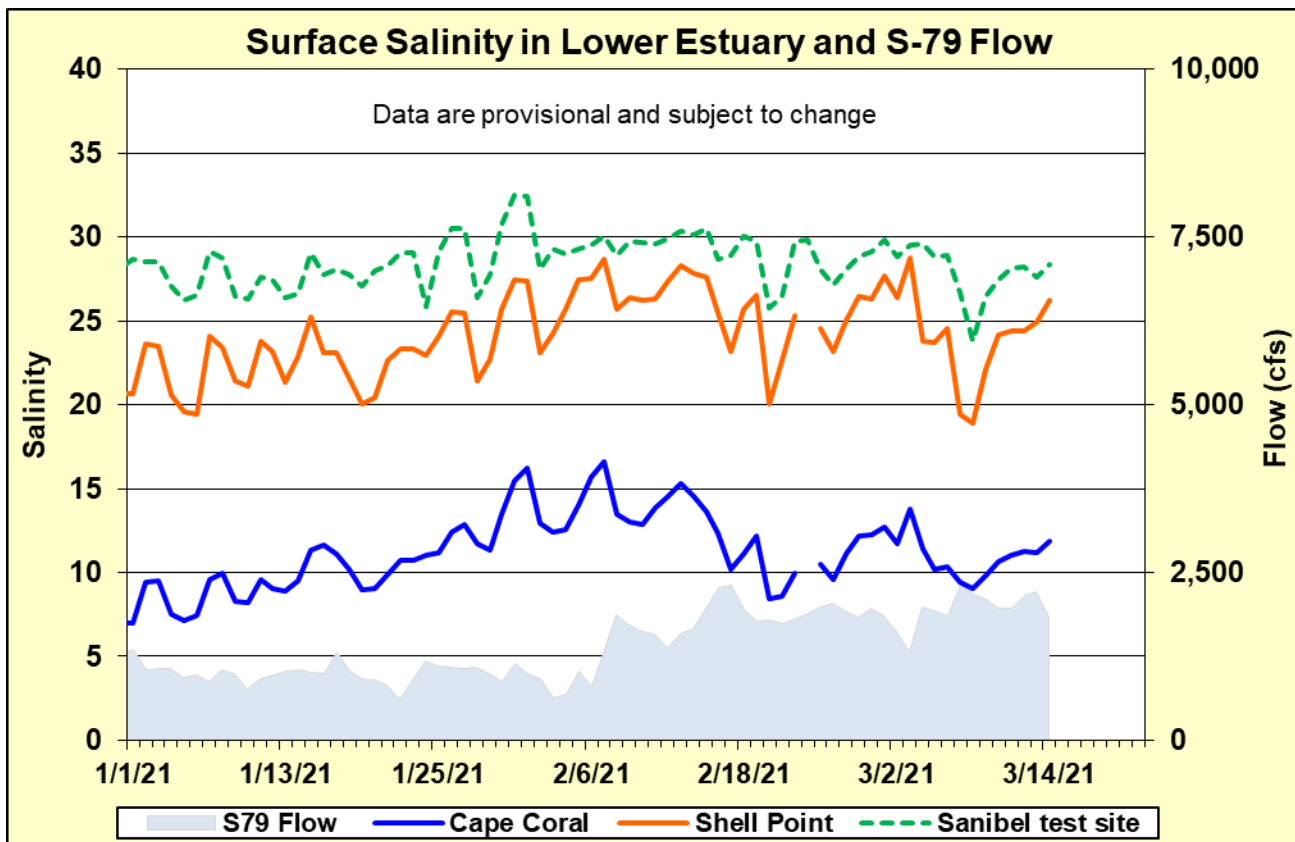


Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.

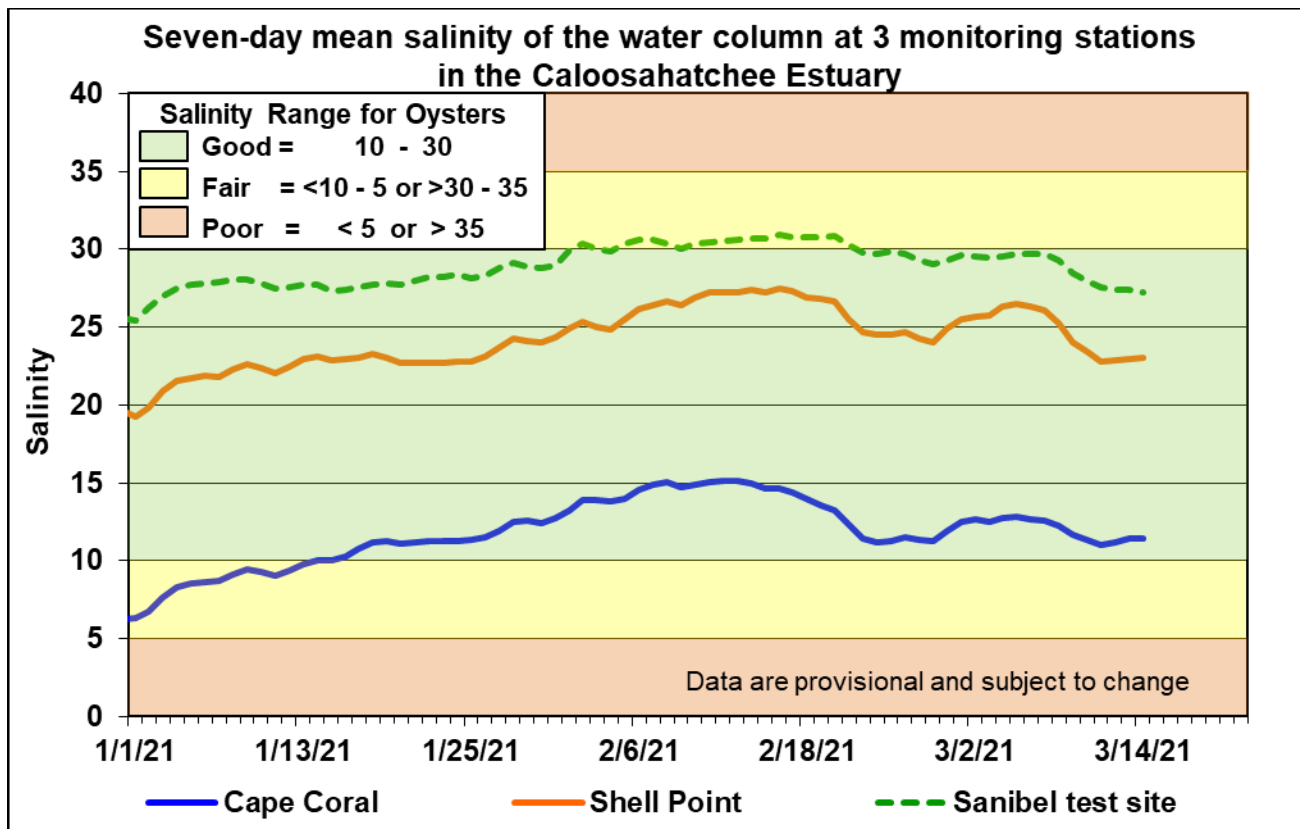


Figure 9. Seven-day mean salinity at Cape Coral, Shell Point, and Sanibel monitoring stations.

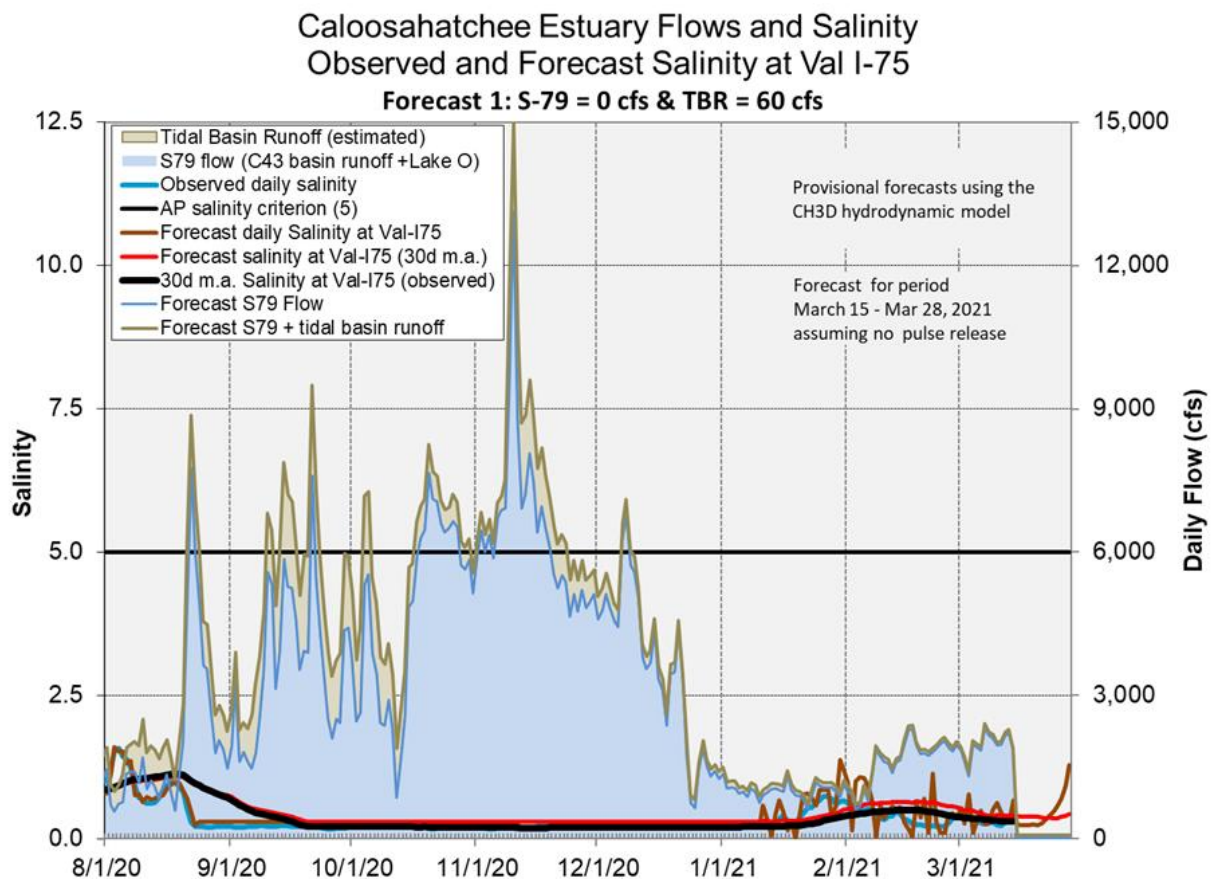


Figure 10. Forecasted Val I-75 surface salinity assuming no pulse release at S-79.

Stormwater Treatment Areas

Over the past week, approximately 4,600 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 115,900 ac-feet. The total amount of inflows to the STAs in WY2021 is approximately 1,566,000 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).

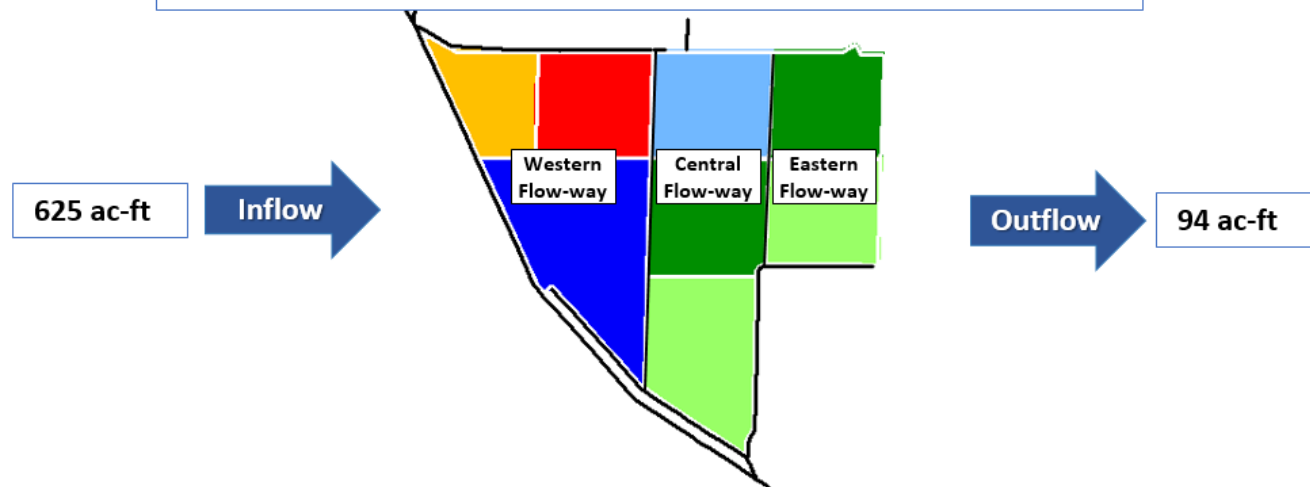
STA-1W: Operational restrictions are in place in STA-1W Western, Eastern, and Northern Flow-ways due to construction activities. Treatment cells are at or near target stage except the Eastern Flow-way downstream cells which are below target stage. Vegetation in all flow-ways is highly stressed, and the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


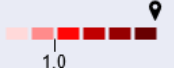



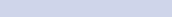


STA-2: Operational restrictions are in place in STA-2 Flow-ways 3 and 4 for vegetation management activities and in Flow-way 2 for construction activities. Treatment cells are at or near target stage except Flow-way 2 which is below target stage. Vegetation in Flow-way 1 is healthy, in Flow-ways 2 and 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/m²/year. (Figure 3).










STA-3/4: STA-3/4 Eastern Flow-way is offline for vegetation rehabilitation/drawdown. Operational restrictions are in place in STA-3/4 Central and Western Flow-ways for vegetation management activities. Most treatment cells are at 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/m²/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 and starting to dry out. The 365-day PLRs for most flow-ways are near 1.0 g/m²/year. All treatment cells have highly stressed vegetation conditions except Flow-ways 7 and 8 which are healthy (Figure 5 and 6).

STA-1E Weekly Status Report – 3/8/2021 through 3/14/2021

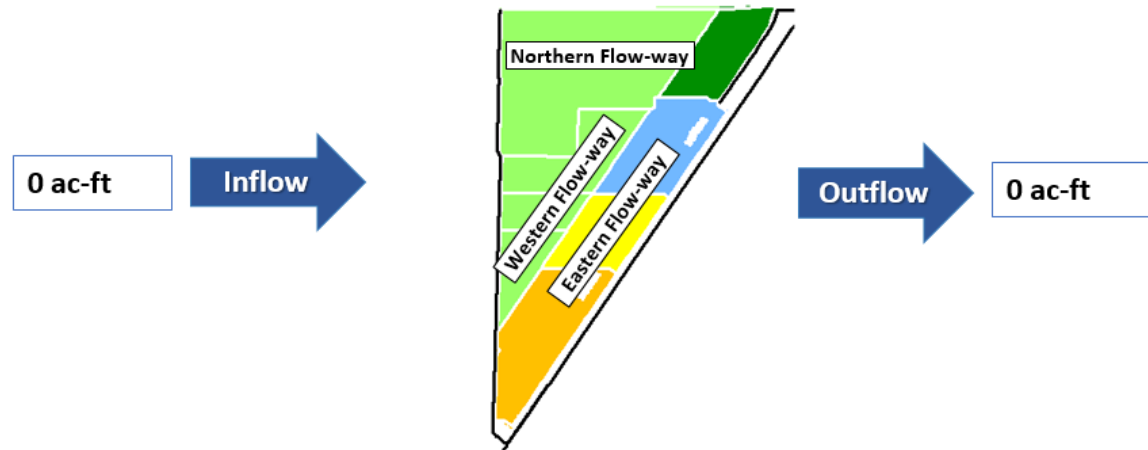


STA-1E Flow-Way Status			
Flow-Way	Vegetation Status <small>Healthy ----- Stressed</small> 	365-day P Loading Rate <small>(below 1.0 g P /m²/yr is optimal)</small> 	Online / Offline / Restrictions
Eastern	 		Online
Central	 		Vegetation Rehab
Western	Offline, construction activities starting 11/01/2019		

As of 3/14/2021	
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
	25-50% Dry
	50-75% Dry
	75-100% Dry

STA-1E Flow & Phosphorus Concentration			
	7-day	28-day	365-day
Total Inflow, ac-ft	625	2,116	317,730
--Lake Inflow, ac-ft	500	N/A	22,100
Total Outflow, ac-ft	94	518	276,941
Inflow Conc., ppb	134	98	136
Outflow Conc., ppb	31	35	37
Includes Preliminary Data			

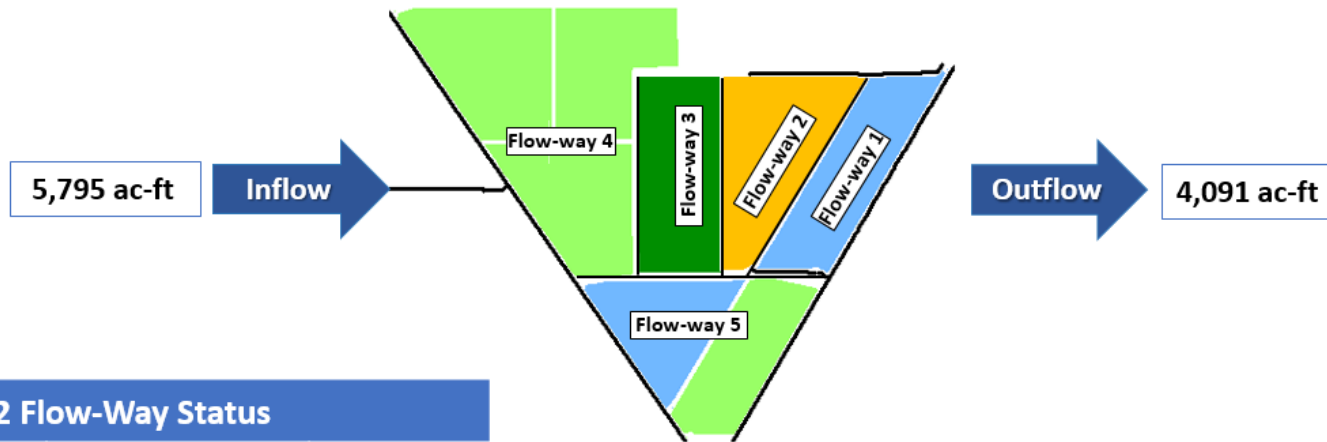
STA-1W Weekly Status Report – 3/8/2021 through 3/14/2021



STA-1W Flow-Way Status				STA-1W Flow & Phosphorus Concentration			
Flow-Way	Vegetation Status <small>Healthy — Stressed</small>	365-day P Loading Rate <small>(below 1.0 g P /m²/yr is optimal)</small>	Online / Offline / Restrictions	As of 3/14/2021			
				Stage Based: Relative to Target Stage (TS)			
Northern			Construction	Deep Water Level (> 2.8' above TS)	<div>7-day</div> <div>28-day</div> <div>365-day</div>		
				High Water Level (1.5' – 2.8' above TS)			
				0.2' – 1.5' above TS			
Western			Construction	Target Stage (TS +/- 0.2')	<div>Total Inflow, ac-ft</div> <div>--Lake Inflow, ac-ft</div> <div>Total Outflow, ac-ft</div>		
				Low Water Level (<0.2' below TS)			
				Depth / Area Based: Percent of Area Dry			
Eastern			Construction	0-25% Dry	<div>Inflow Conc., ppb</div> <div>Outflow Conc., ppb</div> <div>Includes Preliminary Data</div>		
				25-50% Dry			
				50-75% Dry			
				75-100% Dry			

Figure 2. STA-1W Weekly Status Report

STA-2 Weekly Status Report – 3/8/2021 through 3/14/2021



STA-2 Flow-Way Status

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

As of 3/14/2021

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

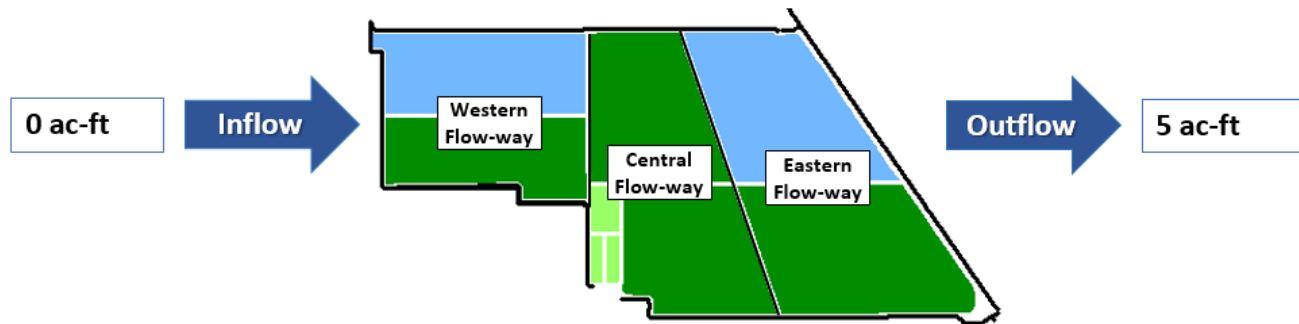
	0-25% Dry		50-75% Dry
	25-50% Dry		75-100% Dry

STA-2 Flow & Phosphorus Concentration

	7-day	28-day	365-day
Total Inflow, ac-ft	5,795	20,047	397,963
--Lake Inflow, ac-ft	4,000	N/A	45,200
Total Outflow, ac-ft	4,091	10,249	463,650
Inflow Conc., ppb	50	33	105
Outflow Conc., ppb	13	16	21
Includes Preliminary Data			

Figure 3. STA-2 Weekly Status Report

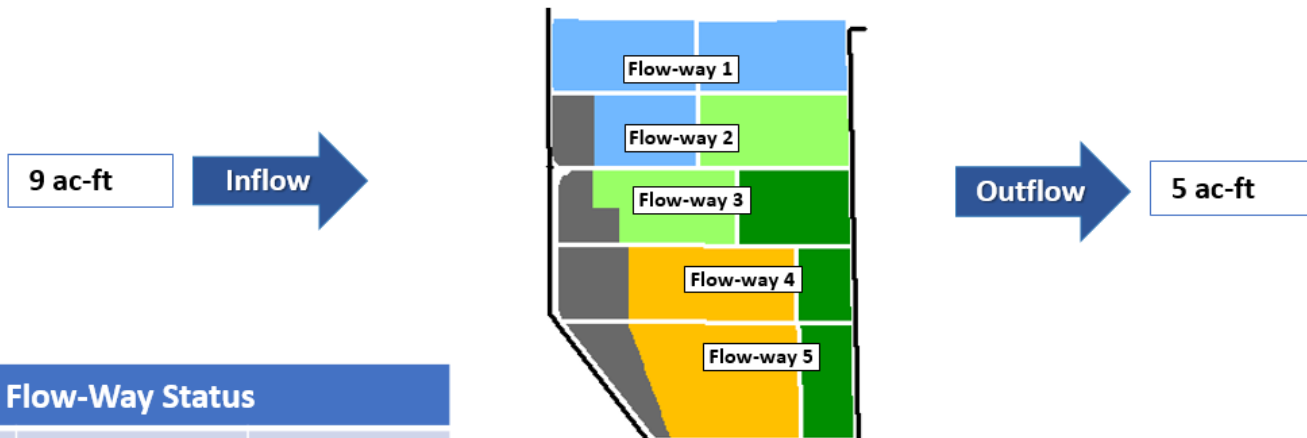
STA-3/4 Weekly Status Report – 3/8/2021 through 3/14/2021



STA-3/4 Flow-Way Status				As of 3/14/2021		STA-3/4 Flow & Phosphorus Concentration			
Flow-Way	Vegetation Status <div>Healthy ----- Stressed</div> <div>←-----→</div>	365-day P Loading Rate (below 1.0 g P /m ² /yr is optimal)	Online / Offline / Restrictions	Stage Based: Relative to Target Stage (TS)			7-day	28-day	365-day
Eastern	<div>Offline, vegetation management drawdown as of 3/1/2021</div>	<div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>1.0</div></div>		<div>Deep Water Level (> 2.8' above TS)</div>		Total Inflow, ac-ft	0	0	575,250
				<div>High Water Level (1.5' – 2.8' above TS)</div>		--Lake Inflow, ac-ft	0	N/A	47,400
				<div>0.2' – 1.5' above TS</div>		Total Outflow, ac-ft	5	1,090	550,765
				<div>Target Stage (TS +/- 0.2')</div>		Inflow Conc., ppb	N/A	N/A	58
Central	<div>←-----→<div>🍃</div></div>	<div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>1.0</div></div>	Vegetation Rehab	<div>Low Water Level (<0.2' below TS)</div>		Outflow Conc., ppb	8	25	12
Western	<div>←-----→<div>🍃</div></div>	<div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div><div>1.0</div></div>	Vegetation Rehab	Depth / Area Based: Percent of Area Dry		Includes Preliminary Data			
				<div>0-25% Dry</div>	<div>50-75% Dry</div>				
				<div>25-50% Dry</div>	<div>75-100% Dry</div>				

Figure 4. STA-3/4 Weekly Status Report

STA-5/6 Weekly Status Report – 3/8/2021 through 3/14/2021



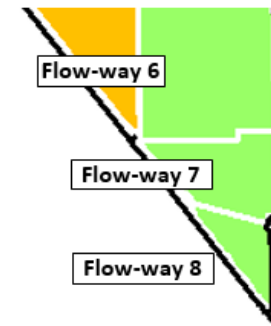
STA-5/6 Flow-Way Status			
Flow-Way	Vegetation Status Healthy ——— Stressed ←————→	365-day P Loading Rate (below 1.0 g P /m ² /yr is optimal)	Online / Offline / Restrictions
1	←————→	1.0	Online
2	←————→	N/A	Post-construction
3	←————→	N/A	Post-construction
4	←————→	1.0	Online
5	←————→	1.0	Online

As of 3/14/2021	
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-5/6 Flow & Phosphorus Concentration			
	7-day	28-day	365-day
Total Inflow, ac-ft	9	312	130,138
--Lake Inflow, ac-ft	N/A	N/A	N/A
Total Outflow, ac-ft	5	215	152,450
Inflow Conc., ppb	107	115	281
Outflow Conc., ppb	36	21	79
Includes Preliminary Data			

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

STA-5/6 Weekly Status Report – 3/8/2021 through 3/14/2021









STA-5/6 Flow-Way Status				As of 3/14/2021
Flow-Way	Vegetation Status Healthy ----- Stressed ←-----→	365-day P Loading Rate (below 1.0 g P / m ² /yr is optimal)	Online / Offline / Restrictions	Stage Based: Relative to Target Stage (TS)
6	←-----→ 		Online	<div> <div>Deep Water Level (> 2.8' above TS)</div> <div>High Water Level (1.5' – 2.8' above TS)</div> <div>0.2' – 1.5' above TS</div> <div>Target Stage (TS +/- 0.2')</div> <div>Low Water Level (<0.2' below TS)</div> </div>
7	←-----→ 		Online	Depth / Area Based: Percent of Area Dry
8	←-----→ 		Online	<div> <div>0-25% Dry</div> <div>25-50% Dry</div> <div>50-75% Dry</div> <div>75-100% Dry</div> </div>

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

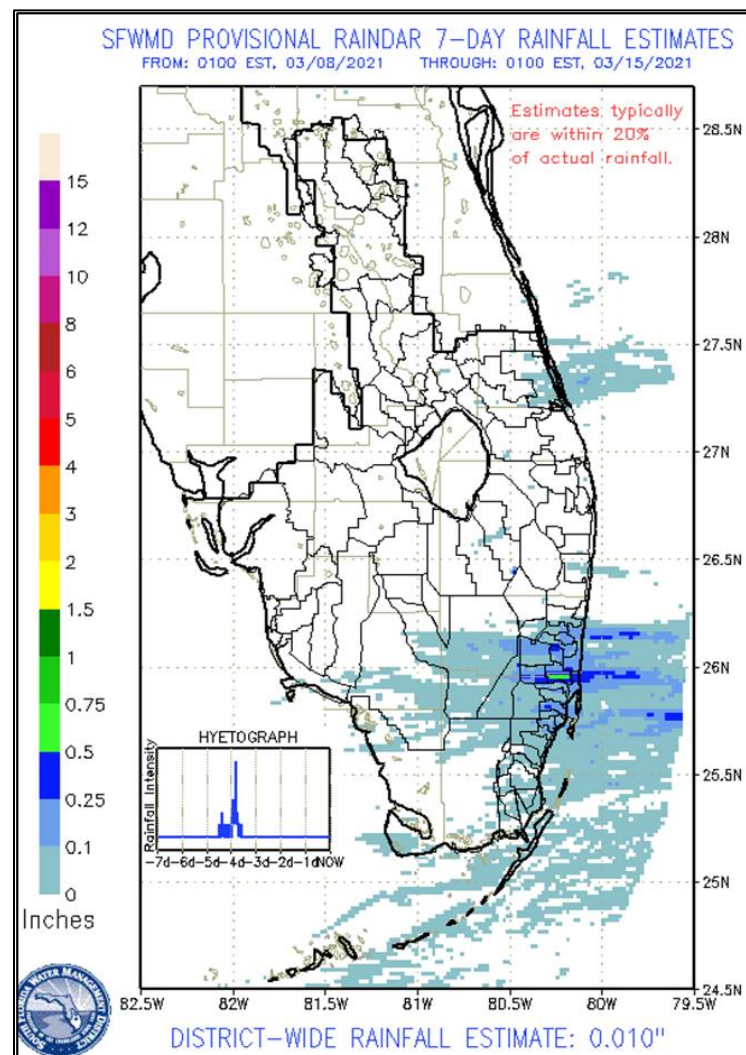
Basic Concepts and Definitions for STA Weekly Status Report

- **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, $\mu\text{g/L}$ 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.

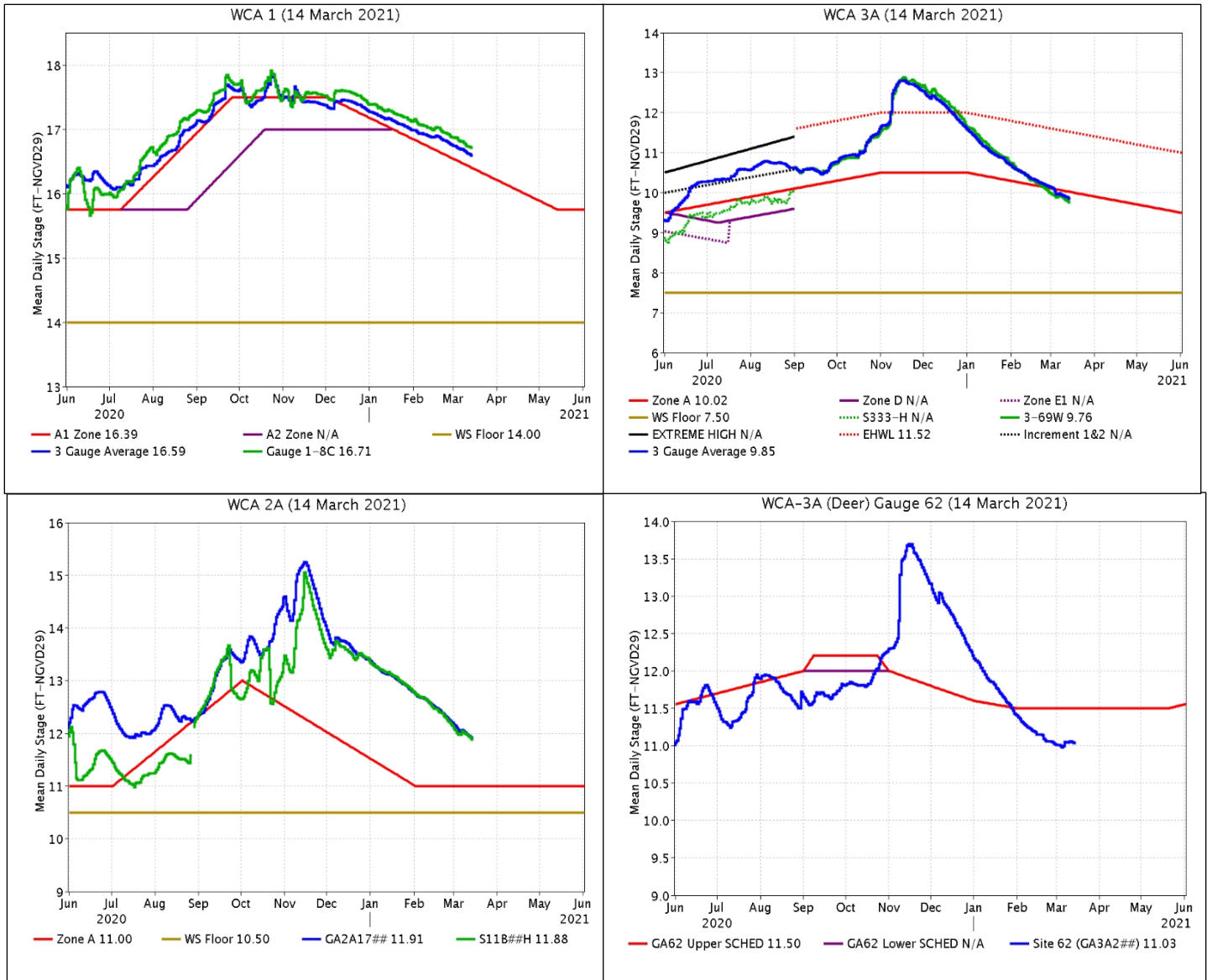
EVERGLADES

Very little rain fell within the WCAs and Everglades National Park, slightly more to the south. At the gauges monitored for this report, stages fell 0.12 feet on average last week, an increase from the week prior. Evaporation was 1.0 inches last week. The Tamiami Trail Flow Formula (TTFF) target flow from WCA-3A to ENP this week is 1550 cfs.

Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	0.00	-0.10
WCA-2A	0.00	-0.15
WCA-2B	0.01	-0.16
WCA-3A	0.02	-0.11
WCA-3B	0.06	-0.13
ENP	<0.01	-0.04



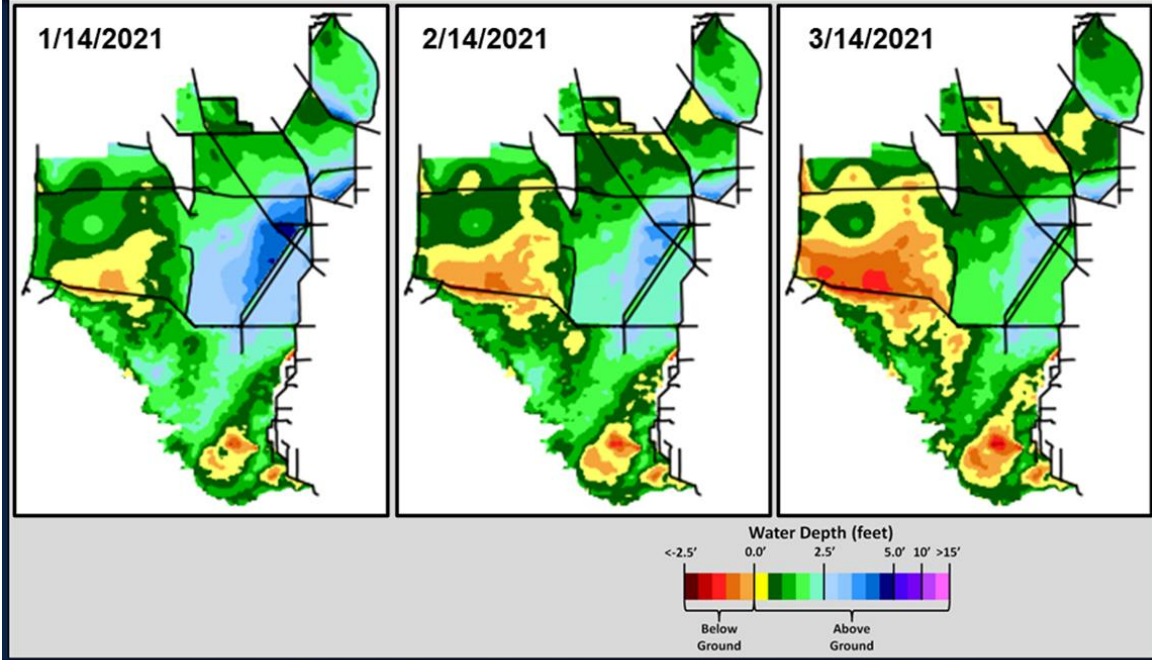
Regulation Schedules: WCA-1: Stage at the 1-8C Gauge continues to follow just above and parallel with the regulation schedule, now 0.32 feet above the falling Zone A1 regulation line. WCA-2A: The recession in stage at S11B-HW continues a steady decline, now 0.88 feet above the stable regulation line. WCA-3A: The Three Gauge Average stages remain beneath the falling Zone A regulation line and is currently 0.17 feet below. WCA-3A: Stage at gauge 62 (Northwest corner) remained steady over the week. The average on Sunday was 0.47 feet below the stable Upper Schedule.



The WDAT tool for spatial interpolation of depth monthly snapshots indicate that WCA-3A is drying down in the northeast with depths potentially at the soil surface downstream of S-150. North-South hydrologic connectivity remains established within Shark River Slough (SRS) and Taylor slough in the Everglades National Park (ENP) as conditions begin to dry down in Lostman's Slough and the western marl prairie. Large portions along Tamiami Trail in Big Cypress National Preserve are drying down to below soil surface. The WDAT tool for spatial interpolation of depth monthly snapshots indicate that WCA-3A is drying down in the northeast with depths potentially at the soil surface downstream of S-150.



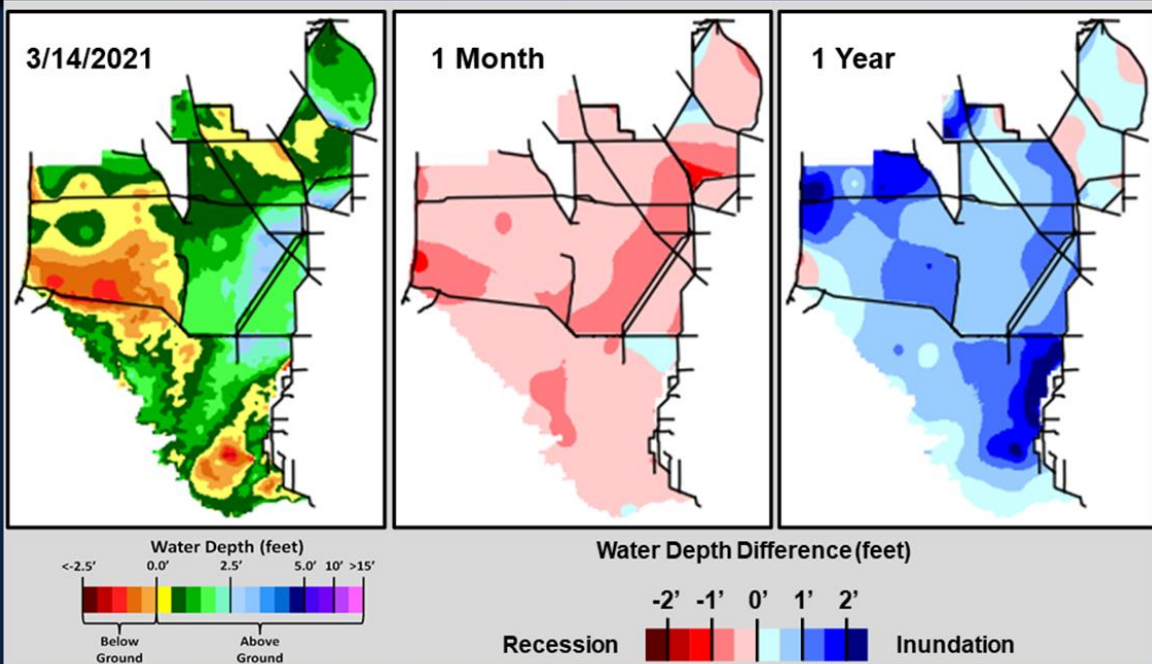
SFWDAT Water Depth Monthly Snapshots



South Florida Water Depth Assessment Tool (SFWDAT)



SFWDAT Everglades Difference Maps (Present – Past)

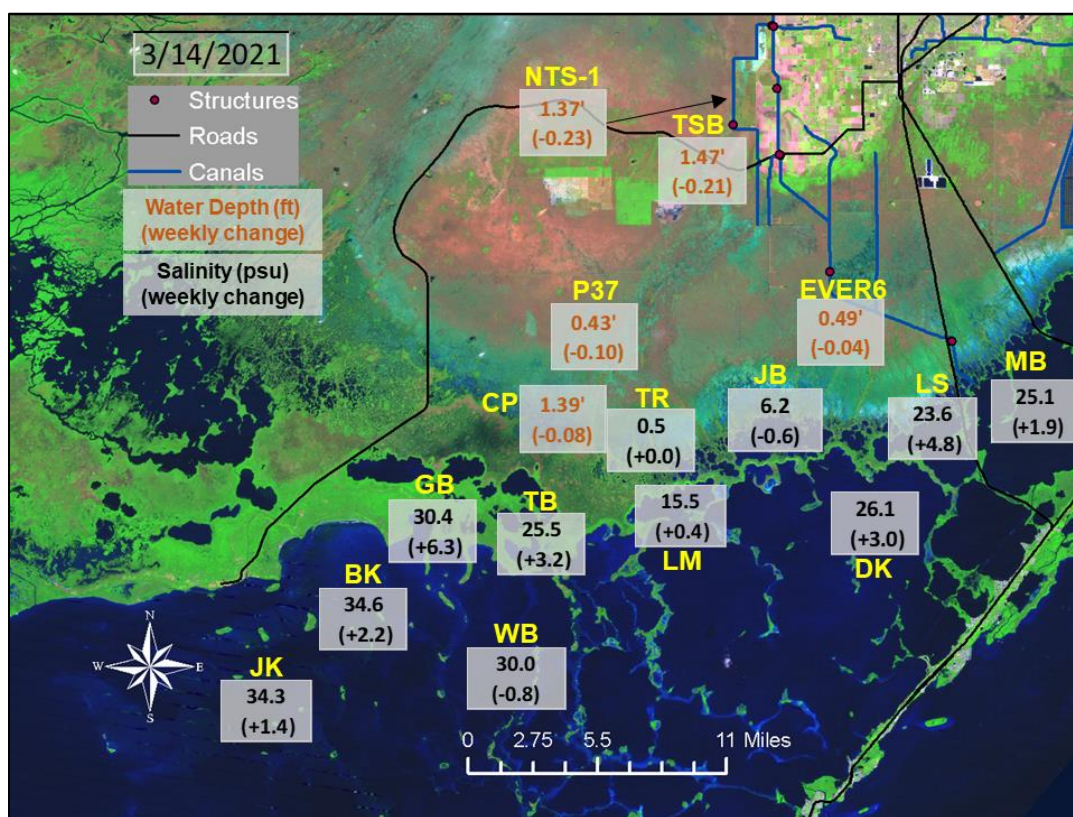


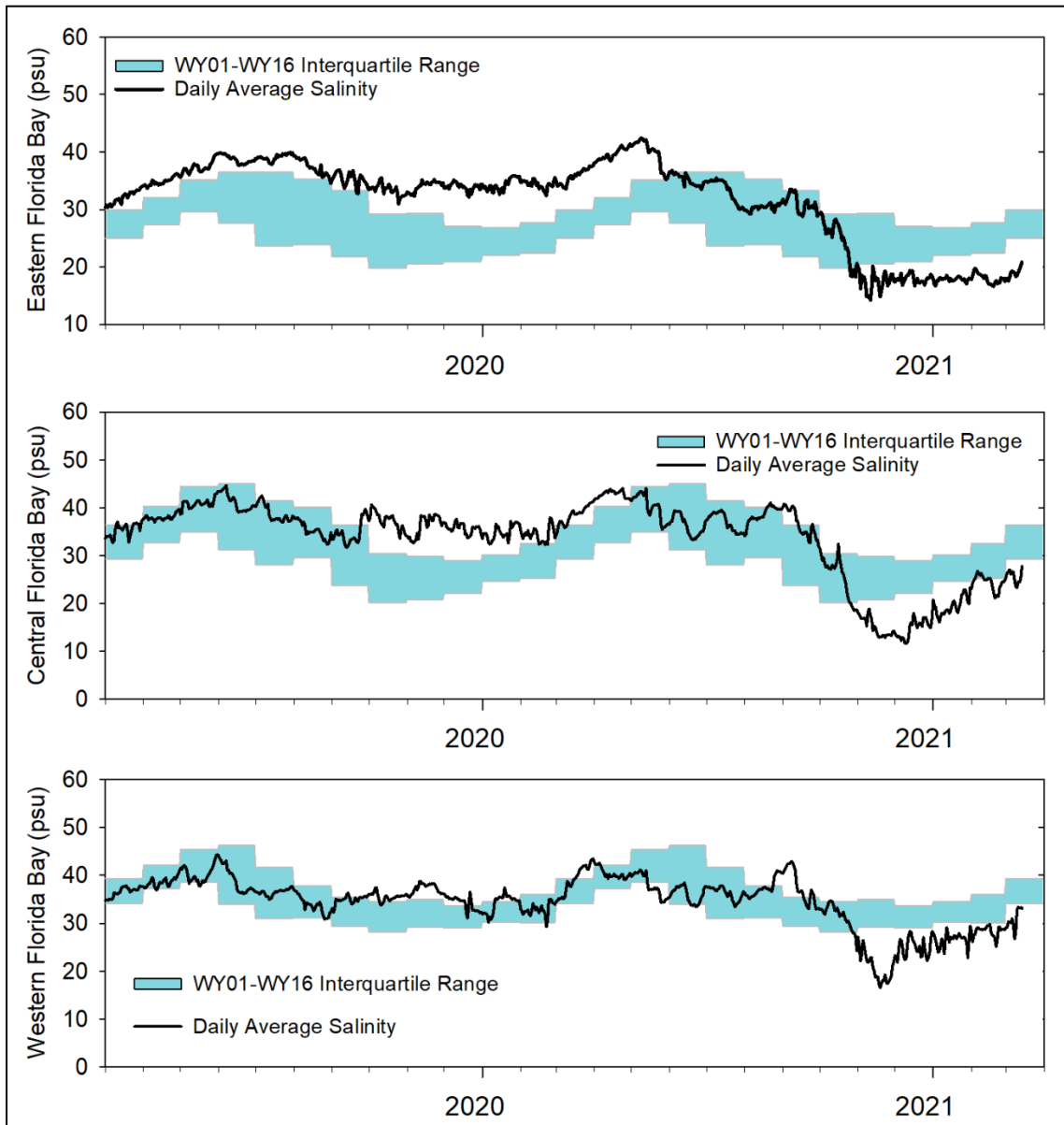
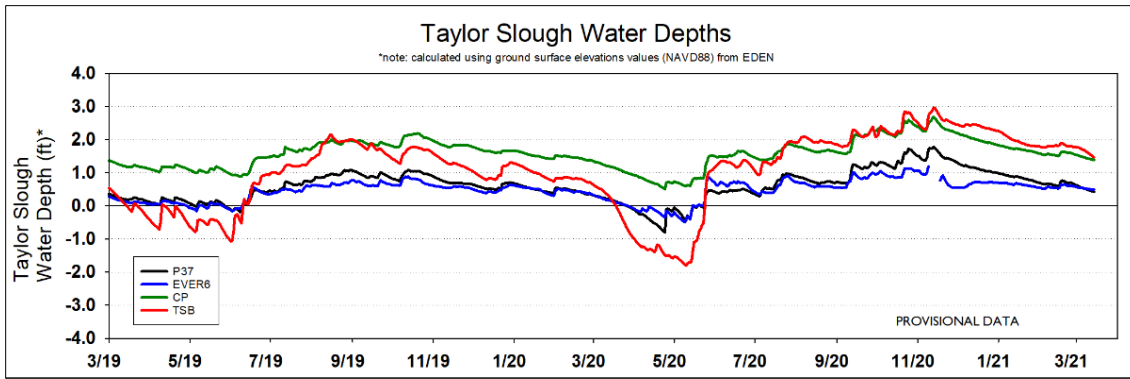
South Florida Water Depth Assessment Tool (SFWDAT)

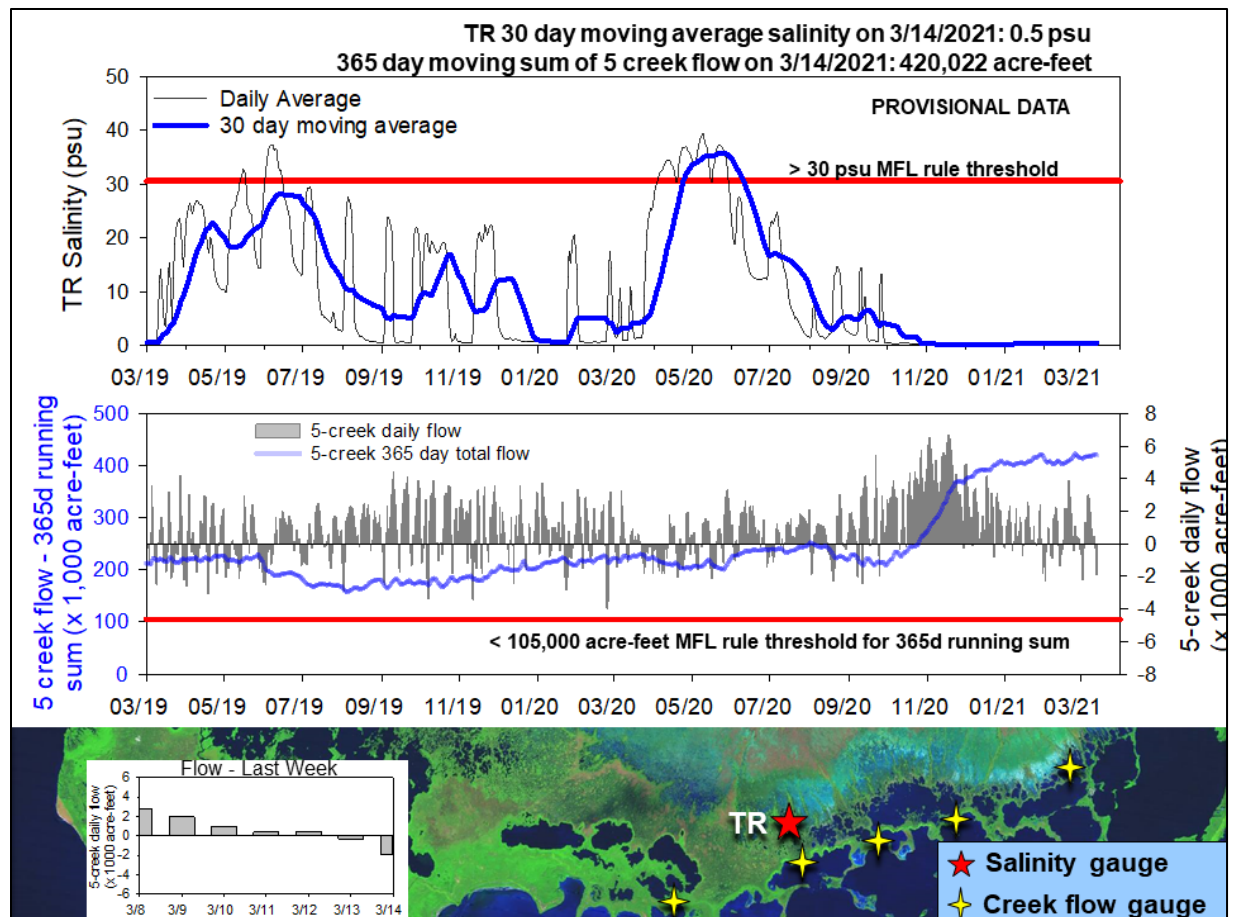
Tree island inundation in WCA-3A, WCA-3B and ENP: 371 Tree Islands of known elevation within WCA-3A, -3B, and ENP's Shark Slough. Current preliminary estimates using WDAT indicate that 19% or 71 of the tree islands are currently inundated (down from 22% the week prior), and all of those islands have been inundated for more than 120 days. Inundation for more than 120 days will cause ecological harm to sensitive islands.

Wading bird foraging/nesting: Large numbers of wading birds are foraging in the western marl prairies and the northern marshes of WCA-3A, with increasing numbers in WCA-1 and WCA-2. Nesting continues to increase at multiple colonies (Wood Storks, Roseate Spoonbills and Great Egrets). Very large aggregations of pre-breeding White Ibis (20,000 birds) are at the Alley North colony and now 5,000 to 10,000 are nesting there.

Taylor Slough Water Levels: Next to no rain fell over Taylor Slough and Florida Bay this week allowing Taylor Slough to decrease by 0.13 feet on average over the week. Highest recession rates were in the northern parts of the slough as expected for this time of year. Taylor Slough is still averaging 10 inches higher than the historical average for this time of year, and the northern portion of the slough is 24 inches higher than the average for this time of year. We are reaching the time of year when recession rates increase, especially in the northern part of the slough, but the northern part of the slough is also typically dry by now. For comparison, in 2018 (post-Hurricane Irma), northern Taylor Slough dried out by the end of March. At the current recession rate, the northern part of the slough will dry out in April.







Florida Bay Salinities: Salinities in Florida Bay averaged a 2.2 psu increase over the week with individual station changes ranging from -0.8 psu in the central Florida Bay to +6.3 psu in the shallow western shoreline. Bay-wide salinity is 3 psu lower than the historical average for this time of year. All stations are lower than their historical averages with Johnson Key Basin (JK) being the closest to its historical average at 0.3 psu lower. The nearshore area is 5 psu below the historical average for this time of year. Salinities across the Bay are still lower than seawater, but the northeast to southwest gradient is decreasing as the dry season progresses and inflows slow.

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 0.5 psu. Weekly flow from the 5 creeks identified by yellow stars on the map totaled about 4,400 acre-feet which is a 2,800 acre-feet increase from last week. Opposite of last week, flows began as positive, but negative flows returned in the latter half. The 365-day moving sum of flow from the five creeks (tracked as part of the Florida Bay MFL criteria) ended at 420,022 acre-feet this week which is a 2,400 acre-feet increase from 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-2A and WCA-3A North. For this upcoming week the ecology of the Everglades dictates a priority of WCA-2A foraging conditions over WCA-3A North for limited available inflows. Slowing the recession rate in that basin allows for a greater utilization of the available forage and less stranding or “wasting” of prey due to an elevated recession rate.

Distributing flows across the northern perimeter of WCA-3A and into that basin promotes sheet flow, prevents landscape scale peat loss and extends the window of time that wading bird foraging is optimal.

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 delays the start of the salinity increases that occur within the dry season and possibly prevent the occurrence of extreme hyper-salinity towards the end of the dry season. Delaying the start of salinity increases in Florida Bay has ecological benefit.

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

SFWMD Everglades Ecological Recommendations, March 16th, 2021 (red is new)			
Area	Weekly change	Recommendation	Reasons
WCA-1	Stage decreased by 0.10'	Maintain marsh stage slightly above and parallel 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 0.15'	Moderate the recession rate to near -.05 to -.07 feet per week and maintain marsh stage above the regulation schedule targeting 11.6' NGVD 29.	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 0.16'	Moderate 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 0.03'	Maintain the recession rate to near -.05 to -.07 feet per week.	
Central WCA-3A S	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. Moderating the recession preserves peat soils and extends the time that foraging is optimal on the landscape.
Southern WCA-3A S	Stage decreased by 0.13'		
WCA-3B	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 from flooding stress. Tree island ecology is diminished by flooding
ENP-SRS	Stage decreased by 0.04'	Make discharges to the Park according to COP and TTFP protocol.	Protect within basin and upstream habitat and wildlife from flooding stress.
Taylor Slough	Stage changes ranged from -0.04' to -0.23'	Move water southward as possible.	When available, provide freshwater buffer for downstream conditions.
FB- Salinity	Salinity changes ranged -0.8 to +6.3 psu	Move water southward as possible.	When available, provide freshwater to maintain low salinity buffer and promote water movement.