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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: December 22, 2021

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

Mostly dry conditions are forecast to spread across the area Wednesday and persist through the holiday weekend. Some spotty very light showers are forecast to move onshore along the east coast as winds switch to the east Friday. In the extended outlook, some limited shower activity is forecast to return from the southeast beginning Monday, but rainfall amounts should remain localized much of next week. There is the potential for a cold front to bring some light to moderate rainfall by the end of next weekend. Total rainfall is forecast to be below the historical average during both the first 7-day period (Week 1) as well as the second 7-day period (Week 2).

Kissimmee

Flow at S-65A has been reduced to minimum discharge (~300 cfs), and water depth on the Kissimmee River floodplain is declining. Mean depth decreased to 0.25 feet as of December 19, 2021. The concentration of dissolved oxygen in the Kissimmee River has remained well above the region of concern, with an average of 7.8 mg/L for the week ending on December 19, 2021.

Lake Okeechobee

Lake Okeechobee stage was 15.73 feet NGVD on December 19, 2021, and it was 0.29 feet lower than a month ago (**Figure LO-1**). Lake stage is currently 0.23 feet above the ecological envelope (**Figure LO-2**). Average daily inflows (excluding rainfall) increased from the previous week, going from 646 cfs to 764 cfs. Average daily outflows (excluding evapotranspiration) decreased from the previous week, going from 2,180 cfs to 1,650 cfs. Recent satellite imagery (December 17, 2021) showed low to medium bloom potential along the southern and western shorelines (**Figure LO-6**).

Estuaries

Total inflow to the St. Lucie Estuary averaged approximately 864 cfs over the past week with no flow coming from Lake Okeechobee. Mean surface salinities increased at the HR1 and A1A Bridge sites and decreased at the US1 Bridge site over the past week. Salinity at the US1 Bridge was in the good range (10-26) for adult eastern oysters.

Total inflow to the Caloosahatchee Estuary averaged 2,106 cfs over the past week with 1,394 cfs coming from the Lake. Mean surface salinities remained the same at S-79, Val I-75, and Shell Point, decreased at Cape Coral, and increased at Ft. Myers and Sanibel over the past week. Salinities were in the good range (0-10) for tape grass at Val I-75 and Ft. Myers. Salinities were also in the good range (10-30) for adult eastern oysters at Shell Point and Cape Coral, and in the fair range at Sanibel.

Stormwater Treatment Areas

For the week ending Sunday, December 19, 2021, no Lake Okeechobee water was delivered to the FEBs/STAs. The total amount of Lake releases sent to the FEBs/STAs in WY2022 (since May 1, 2021) is approximately 61,100 ac-feet. The total amount of inflows to the STAs in WY2022 is approximately 947,000 ac-feet. Most STA cells are at or near target stage. STA-1E Western Flow-way is offline for the Restoration Strategies project to fill and grade Cells 5 and 7, STA-3/4 Eastern Flow-way is offline for vegetation rehabilitation/drawdown, and STA-2 Flow-way 2 is offline for construction activities. Operational restrictions are in place in STA-1W Western, Eastern, and Northern Flow-ways for construction activities. Operational restrictions are in effect in STA-1E Central Flow-way and STA-2 Flow-ways 3 and 4 for vegetation management activities. This week, there is no capacity for Lake releases in the STAs.

Everglades

Rates of stage change were generally characterized as fair across the Everglades. Recessions in WCA-3A were near the maximum within the fair range. Florida Bay salinities increased over the last week, and stages fell in Taylor Slough. Salinities in both the central and western regions approach the 75th percentile once again, and conditions remain less than ideal to tolerate a drier than average dry season.

Supporting Information

Kissimmee Basin

Upper Kissimmee

On December 19, 2021, lake stages were 58.0 feet NGVD (at schedule) in East Lake Toho, 54.9 feet NGVD (0.1 feet below schedule) in Lake Toho, and 50.0 feet NGVD (2.5 feet below schedule) in Lakes Kissimmee-Cypress-Hatchineha (KCH) (**Table KB-1, Figures KB-1-3**).

Lower Kissimmee

Discharges to the Kissimmee River on December 19, 2021 were 360 cubic feet per second (cfs) at S-65 and 310 cfs at S-65A; discharges from the Kissimmee River were 400 cfs at S-65D and 410 cfs at S-65E (**Table KB-2**). Headwater stages were 46.3 feet NGVD at S-65A and 26.4 feet NGVD at S-65D on December 19, 2021. With lower water temperatures, little rainfall, and reduced discharge at S-65A, the concentration of dissolved oxygen has remained well above the region of concern, with an average of 7.8 mg/L for the week ending on December 19, 2021 (**Table KB-2, Figure KB-4**). Flow at S-65A has been reduced to minimum discharge (~300 cfs), and water depth on the Kissimmee River floodplain is declining. Mean depth decreased to 0.25 feet as of December 19, 2021 (**Figure KB-5**).

Water Management Recommendations

Managed stage recessions for snail kite nesting season are currently planned to begin in Lakes Toho and East Toho on January 15, 2022. In preparation, stage is being reduced in Lake Toho to 54.5 ft by January 14, 2022 (this operation was started on December 17). Continue to maintain at least 300 cfs at S-65A, and follow the IS-14-50 discharge plan (**Figure KB-6**) for S-65 and S-65A for the remainder of dry season.

Table KB-1. Average discharge for the preceding seven days and Sunday's average daily stage and departures from KCL flood regulation or temporary schedules. All data are provisional.

Water Body	Structure	Stage Monitoring Site	7-Day Average Discharge (cfs)	Lake Stage (feet NGVD) ^a	Schedule Type ^b	Schedule Stage (feet NGVD)	Departure from Regulation (feet)	
							12/19/21	12/12/21
Lakes Hart and Mary Jane	S-62	LKMJ	32	60.9	R	61.0	-0.1	0.0
Lakes Myrtle, Preston and Joel	S-57	S-57	15	61.8	R	61.8	0.0	-0.1
Alligator Chain	S-60	ALLI	0	64.0	R	64.0	0.0	0.0
Lake Gentry	S-63	LKGT	17	61.5	R	61.5	0.0	0.0
East Lake Toho	S-59	TOHOE	69	58.0	R	58.0	0.0	0.0
Lake Toho	S-61	TOHOW S-61	207	54.9	R	55.0	-0.1	0.0
Lakes Kissimmee, Cypress and Hatchineha	S-65	KUB011 LKIS5B	373	50.0	R	52.5	-2.5	-2.5

a. Names of in-lake monitoring sites and structures used to determine lake stage. If more than one site is listed, an average is reported.

b. A: projected recession line; R: USACE regulation schedule; S: temporary recession target line; T: temporary schedule; NA: not applicable or not available.

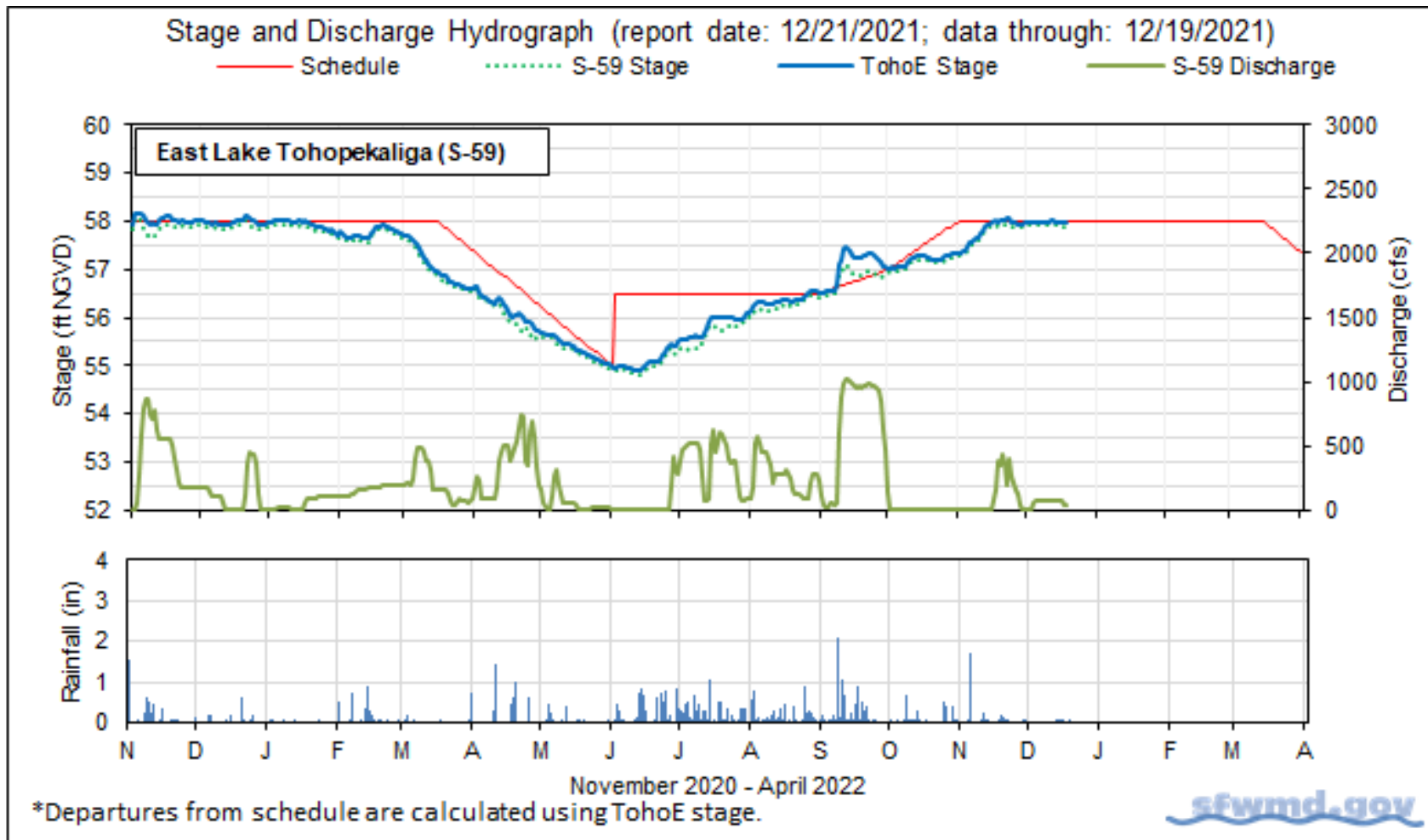


Figure KB-1. East Lake Toho regulation schedule, stage, discharge and rainfall.

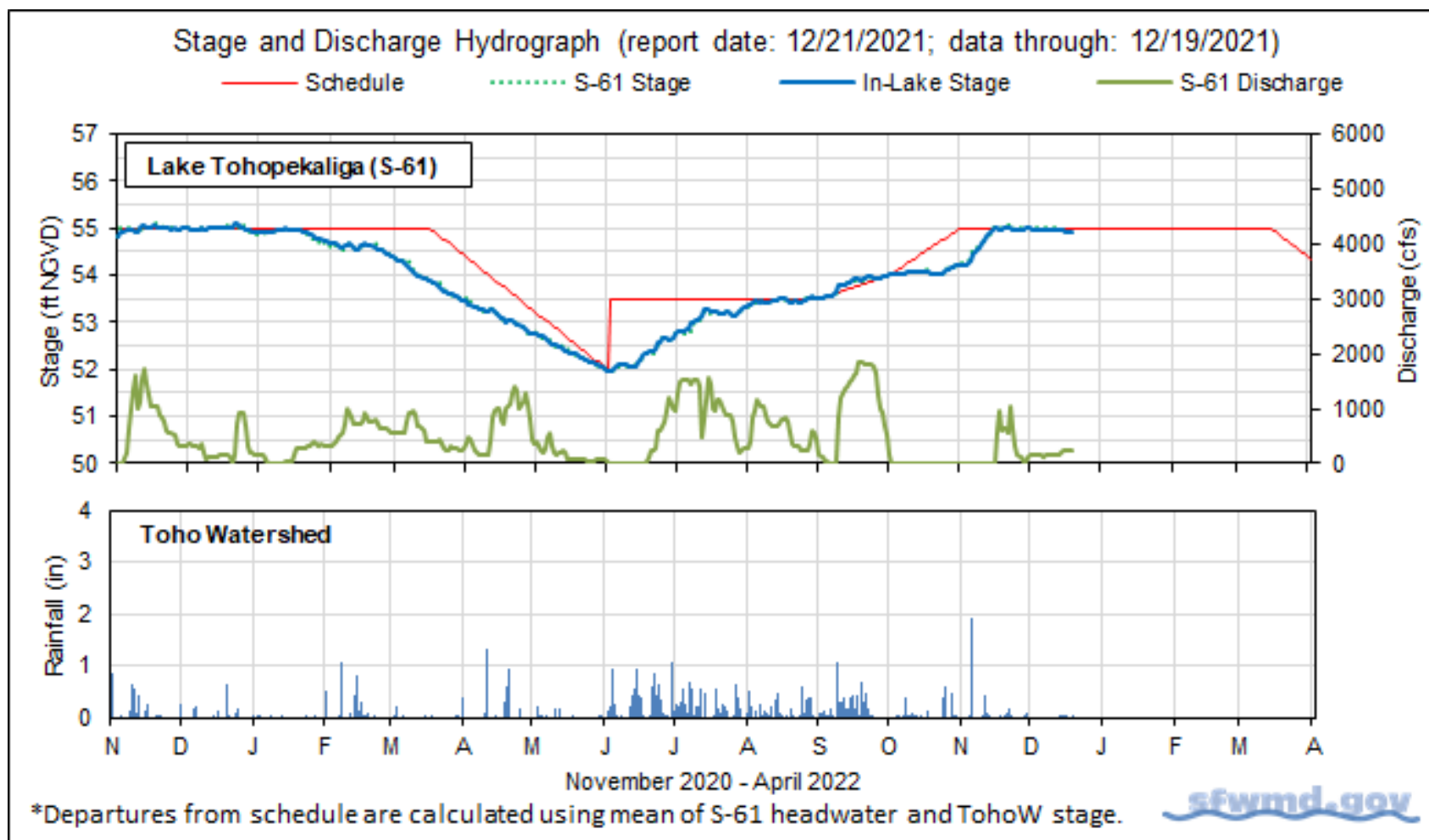


Figure KB-2. Lake Toho regulation schedule, stage, discharge and rainfall.

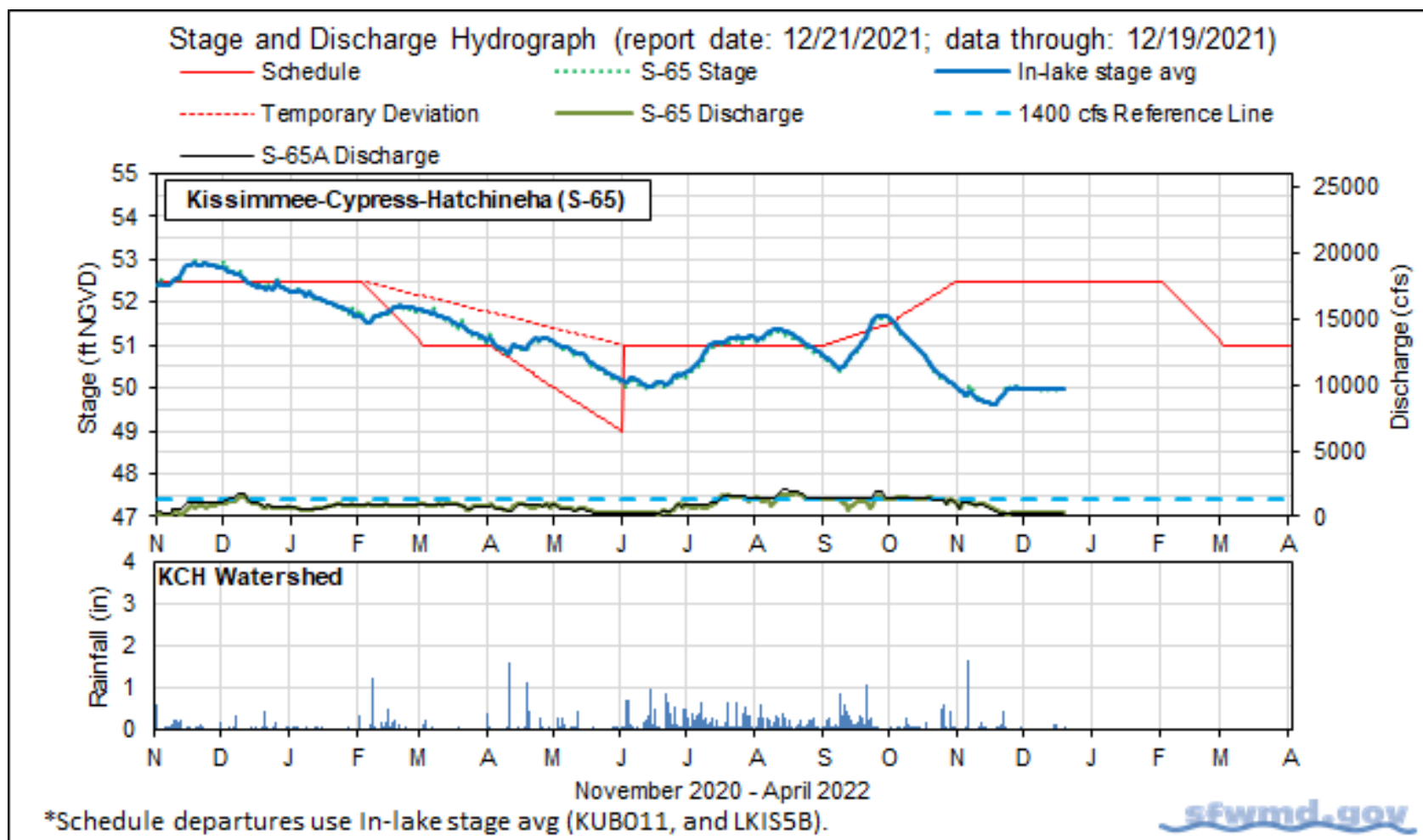


Figure KB-3. Lakes Kissimmee, Cypress and Hatchineha regulation schedule, stage, discharge and rainfall.

Table KB-2. One- and seven-day average discharge and stage at Lower Kissimmee basin structures, river channel dissolved oxygen concentrations and water depths in the Phase I area floodplain. All data are provisional.

Metric	Location	Daily Average	Average for Previous Seven Day Periods			
		12/19/21	12/19/21	12/12/21	12/5/21	11/28/21
Discharge	S-65	360	370	360	350	280
Discharge	S-65A ^a	310	310	310	310	310
Headwater Stage (feet NGVD)	S-65A	46.3	46.3	46.3	46.3	46.4
Discharge	S-65D ^b	400	410	470	540	630
Headwater Stage (feet NGVD)	S-65D ^c	26.4	26.5	26.7	26.8	27.0
Discharge (cfs)	S-65E ^d	410	400	420	530	590
Discharge (cfs)	S-67	0	0	0	0	0
Dissolved Oxygen (mg/L) ^e	Phase I, II/III river channel	7.7	7.8	7.7	7.4	6.9
Mean depth (feet) ^f	Phase I floodplain	0.25	0.26	0.29	0.32	0.39

a. Combined discharge from main and auxiliary structures.

b. Combined discharge from S-65D, S-65DX1 and S-65DX2.

c. Average stage from S-65D and S-65DX1.

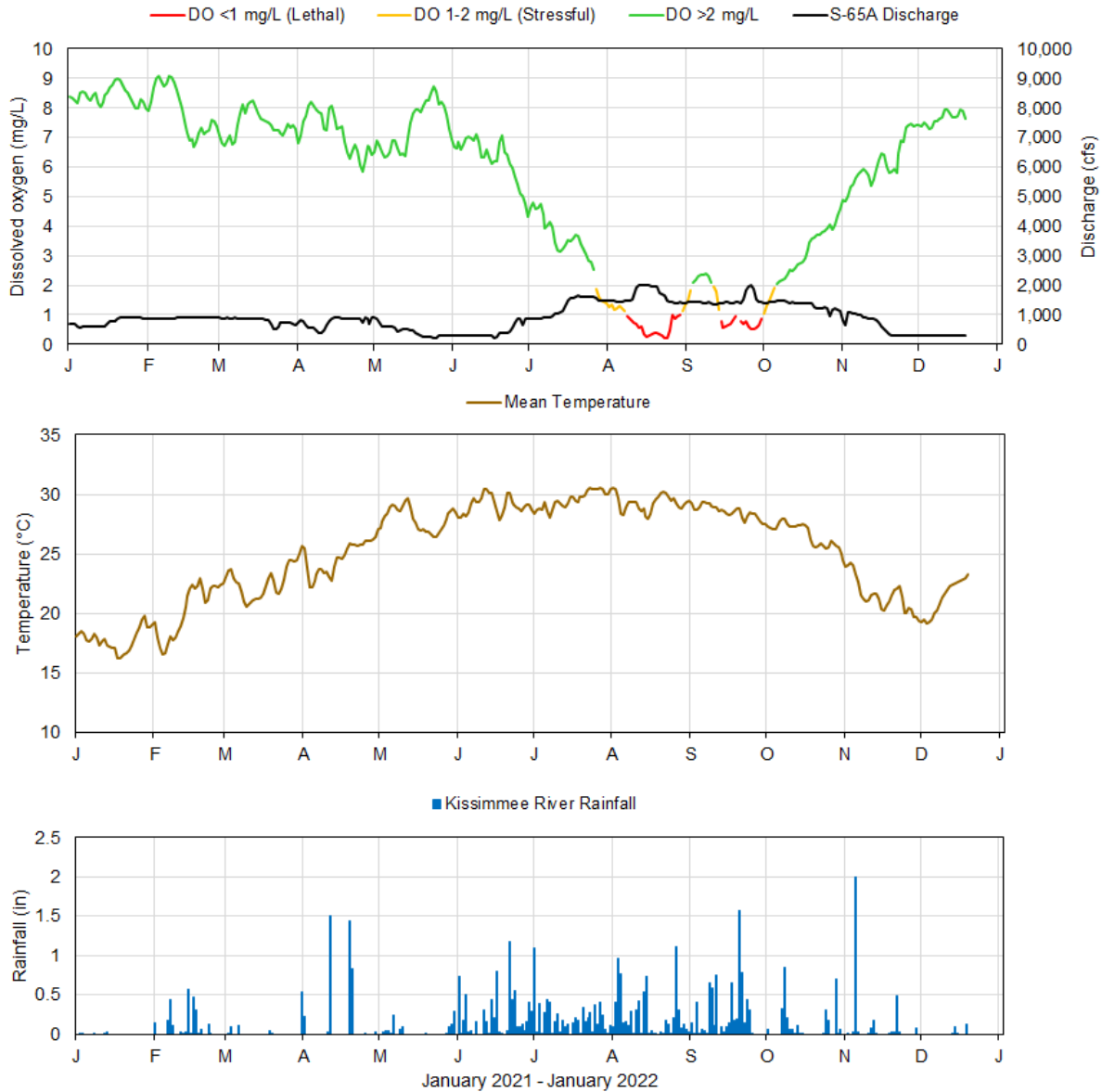
d. Combined discharge from S-65E and S-65EX1.

e. Dissolved oxygen is the average of values from sondes KRBN, PC62, PC33, PD62R and PD42R.

f. One-day spatial average obtained from the South Florida Water Depth Assessment Tool (SFWDAT).

Table KB-3. Discharge rate of change limits for S65/S-65A (revised 1/14/19).

Discharge (cfs)	Maximum Rate of Increase (cfs/day)	Maximum Rate of Decrease (cfs/day)
0-300	100	-50
301-650	150	-75
651-1,400	300	-150
1,401-3,000	600	-600
>3,000	1,000	-2,000



Report Date: 12/21/2021; data are through: 12/19/2021

sfwmd.gov

Figure KB-4. Restored Kissimmee river channel mean daily dissolved oxygen concentration (mg/L), S-65A discharge (cfs), temperature (°C) and rainfall (inches). Dissolved oxygen (DO) and temperature are mean daily values averaged for PC62, KRBN, PC33, PD62R, and PD42R with an average of two stations reporting this week. Rainfall values are daily totals for Kissimmee River (Pool BCD) AHED watershed.

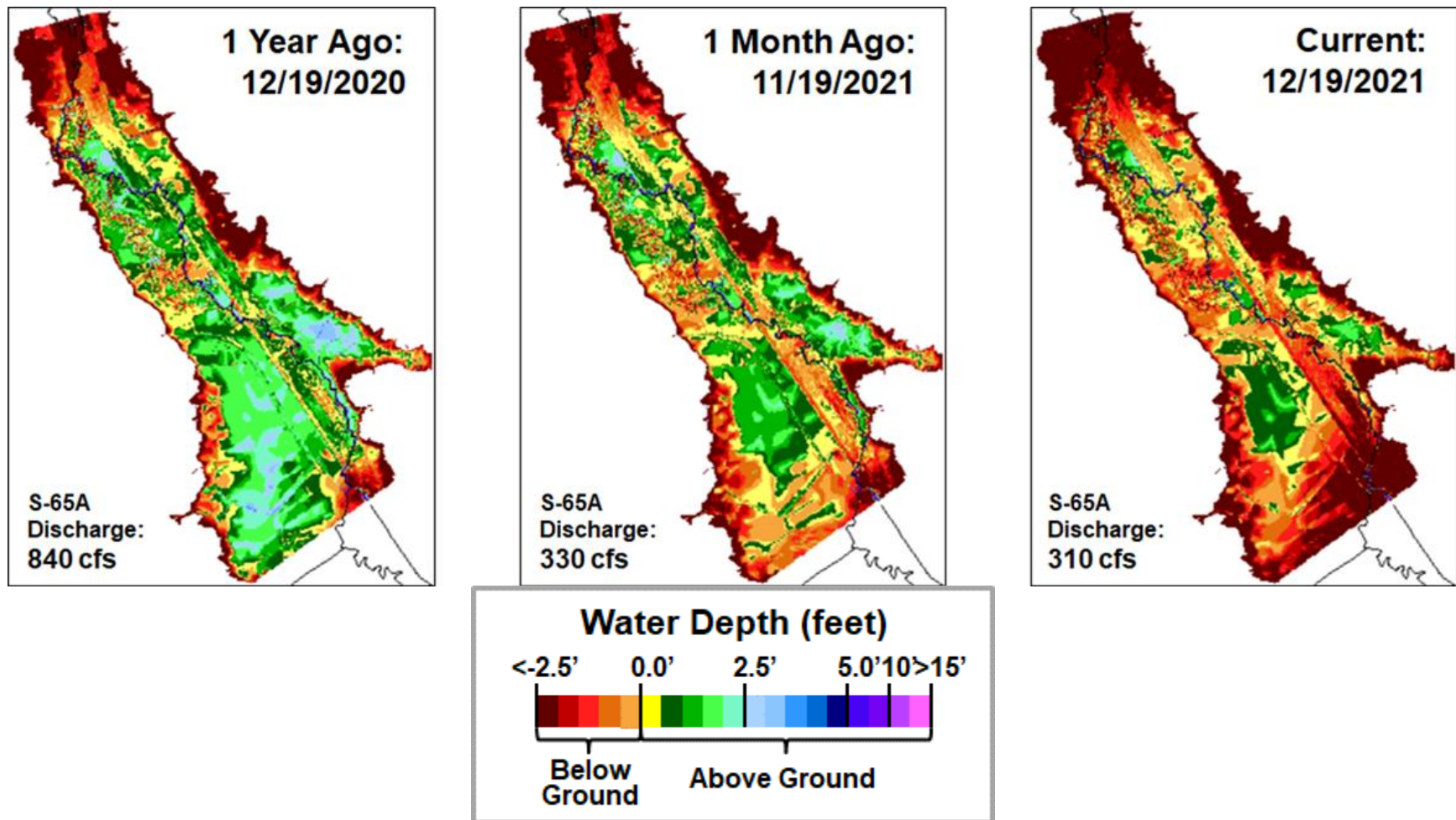


Figure KB-5. Phase I area Kissimmee River floodplain water depths (from left to right) one year ago, one month ago and current.

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Stage and Discharge Guidance for 2021-2022.

Zone	KCH Stage (ft NGVD)	S-65/S-65A Discharge*
A	Above regulation schedule line.	Flood control releases as needed with no limits on the rate of discharge change.
B1	In flood control buffer zone (0.5 ft below the schedule line).	Adjust S-65 discharge so that S-65A discharge is between 1400 cfs at the buffer zone line and 3000 cfs at the schedule line.
B2	Between the Flood Control Buffer zone and the 50.0 ft line.	Adjust S-65 discharge to maintain at least 1400 cfs at S-65A. Use ± 0.2 ft buffer (gray band) above and below the 50.0 ft line to decide when to begin ramping up to 1400 cfs or down to 300 cfs; do not continue reducing discharge if stage rises back to or above the threshold stage line.
B3	Between the 50.0 ft line and 49 ft.	Adjust S-65 discharge to maintain at least 300 cfs at S-65A.
B4	Between 48.5 ft to 49 ft.	Adjust S-65 discharge to maintain S-65A discharge between 0 cfs at 48.5 ft and 300 cfs at 49 ft.
C	Below 48.5 ft.	0 cfs.

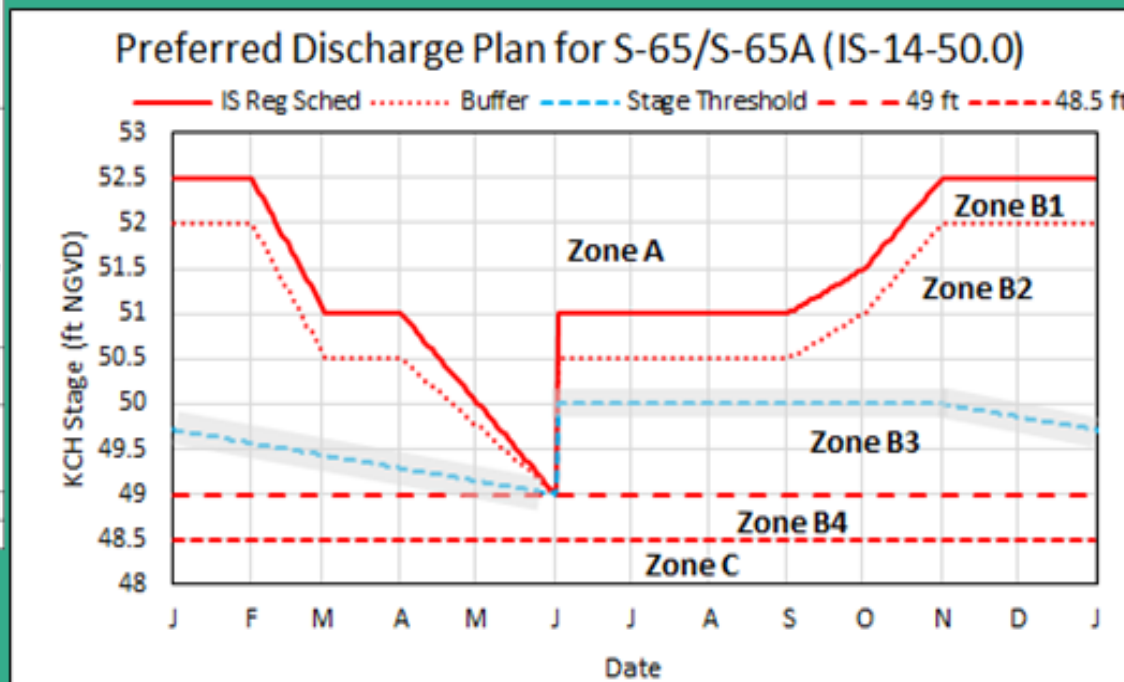
*Changes in discharge should not exceed limits in inset table below.

Table KB-3. Discharge Rate of Change Limits for S65/S65A (revised 1/14/19).

Q (cfs)	Maximum rate of INCREASE (cfs/day)	Maximum rate of DECREASE (cfs/day)
0-300	100	-50
301-650	150	-75
651-1400	300	-150
1401-3000	600	-600
>3000	1000	-2000

sfwmd.gov

2021-2022 Discharge Plan for S-65/S-65A



Other Considerations

- When possible, limit lake ascension rate in the Jun 1 - Aug 15 window to 0.25 ft per 7 days in Lakes Kissimmee, Cypress, Hatchineha (S-65), East Toho (S-59) and Toho (S-61).
- If outlook is for extreme dry conditions meet with KB staff to discuss modifications to this plan.

Slide Revised 6/1/2021

11

Figure KB-6. IS-14-50 Discharge Plan for S65/S65A with discharge rate of change limits (revised 1/14/19).

Lake Okeechobee

Lake Okeechobee stage was 15.73 feet NGVD on December 19, 2021, with water levels 0.29 feet lower than a month ago (**Figure LO-1**). Lake stage was approximately 0.23 feet above the ecological envelope (**Figure LO-2**). Lake stage remained in the Low sub-band (**Figure LO-3**). According to NEXRAD, 0.29 inches of rain fell directly on the Lake last week.

Average daily inflows (excluding rainfall) increased the previous week from 646 cfs to 764 cfs. Average daily outflows (excluding evapotranspiration) decreased the previous week from 2,180 cfs to 1,650 cfs. Highest inflows came from the Kissimmee River through the S-65E structure (399 cfs). The second highest inflow (129 cfs) was via the C41A canal through the S-84/84X structures. Backflow through the S-271 structure from the L-8 canal increased 97 cfs since the previous week to 121 cfs. There was an outflow of 1,398 cfs to the west via S-77, 234 cfs to the south via the S-350s, and 18 cfs to the east via the S-308 structure. **Figures LO-4 and LO-5** show the combined average daily inflows and outflows for the Lake over the past eight weeks, and average inflows and outflows last week, respectively. These data are provisional and are subject to change.

The most recent satellite image (December 17, 2021) from the NOAA cyanobacteria monitoring product derived from EUMETSAT's Sentinel 3 OLCI sensor showed low to medium bloom potential along the western and southwestern shorelines (**Figure LO-6**).

1 Month Ago:
11/19/2021

Current:
12/19/2021

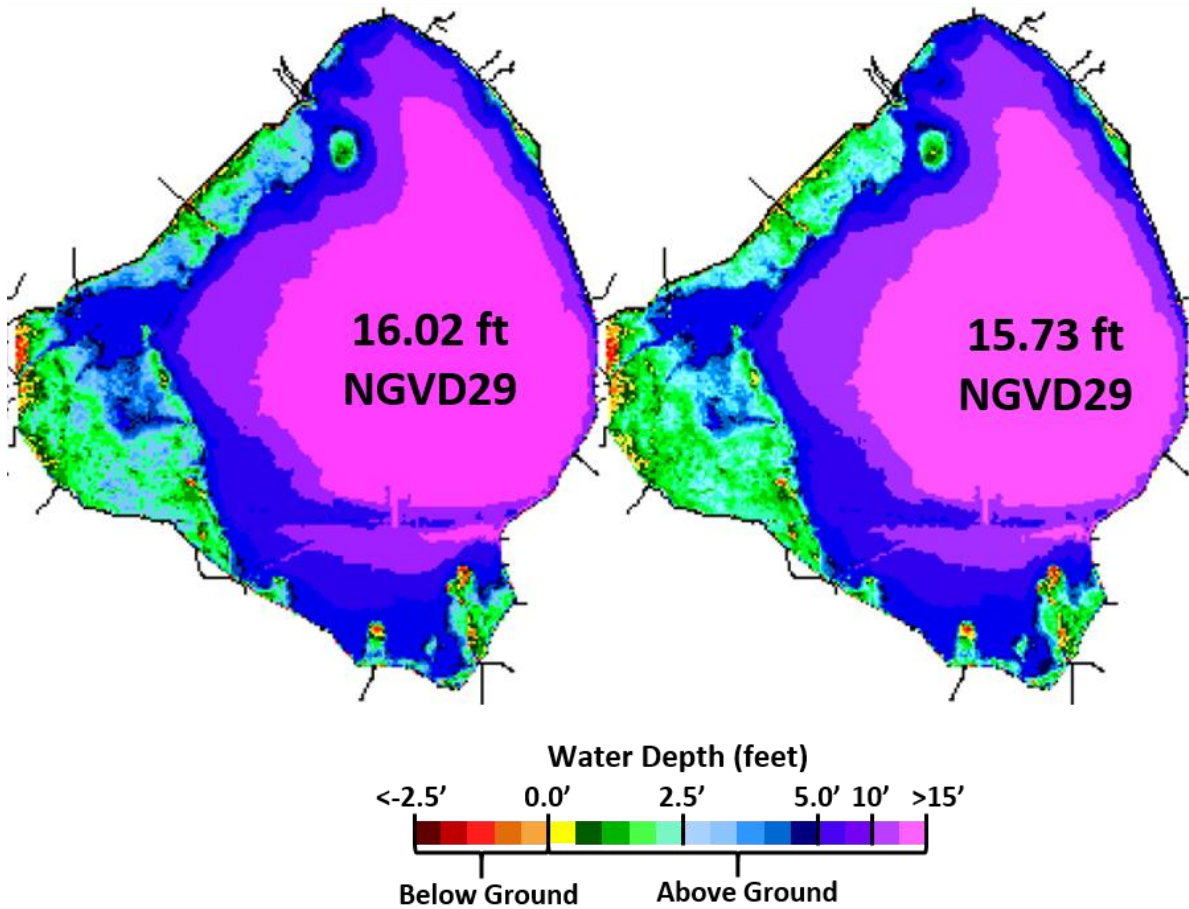


Figure LO-1. Lake Okeechobee water depth estimates based on South Florida Water Depth Assessment Tool (SFWDAT).

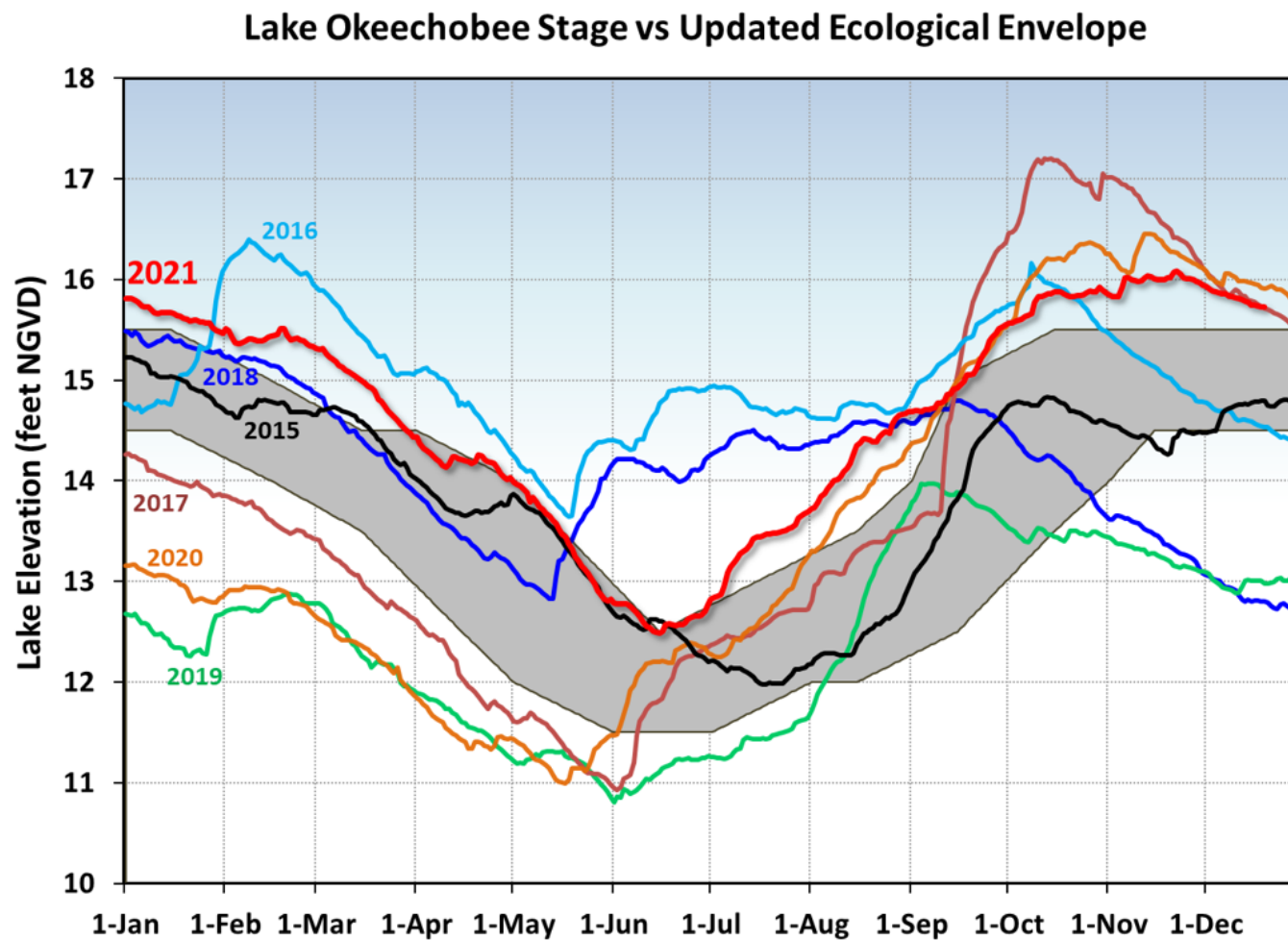


Figure LO-2. The prior seven years of annual stage hydrographs for Lake Okeechobee in comparison to the updated ecological envelope.

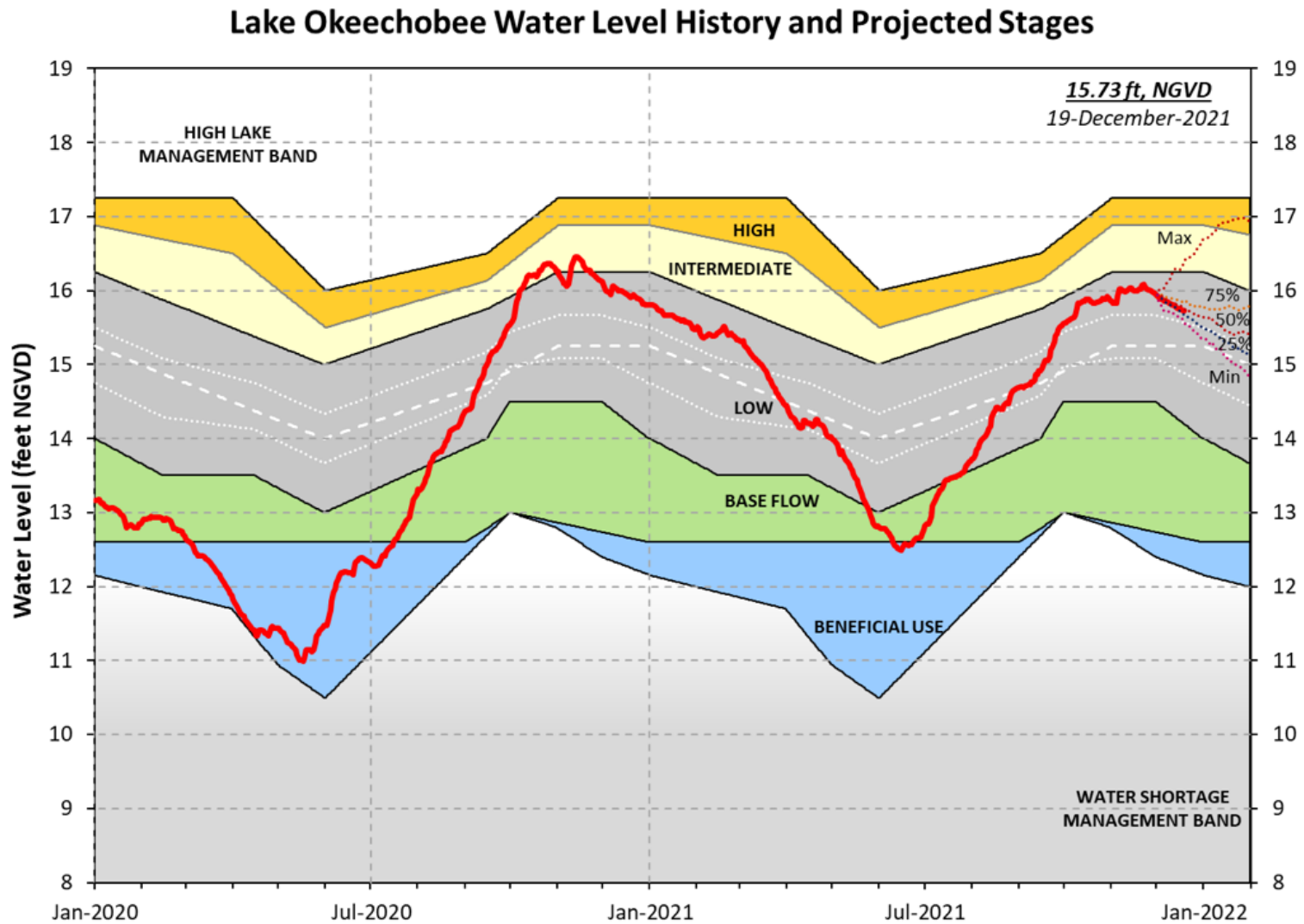


Figure LO-3. Recent Lake Okeechobee stages and releases, with projected stages based on a dynamic position analysis.

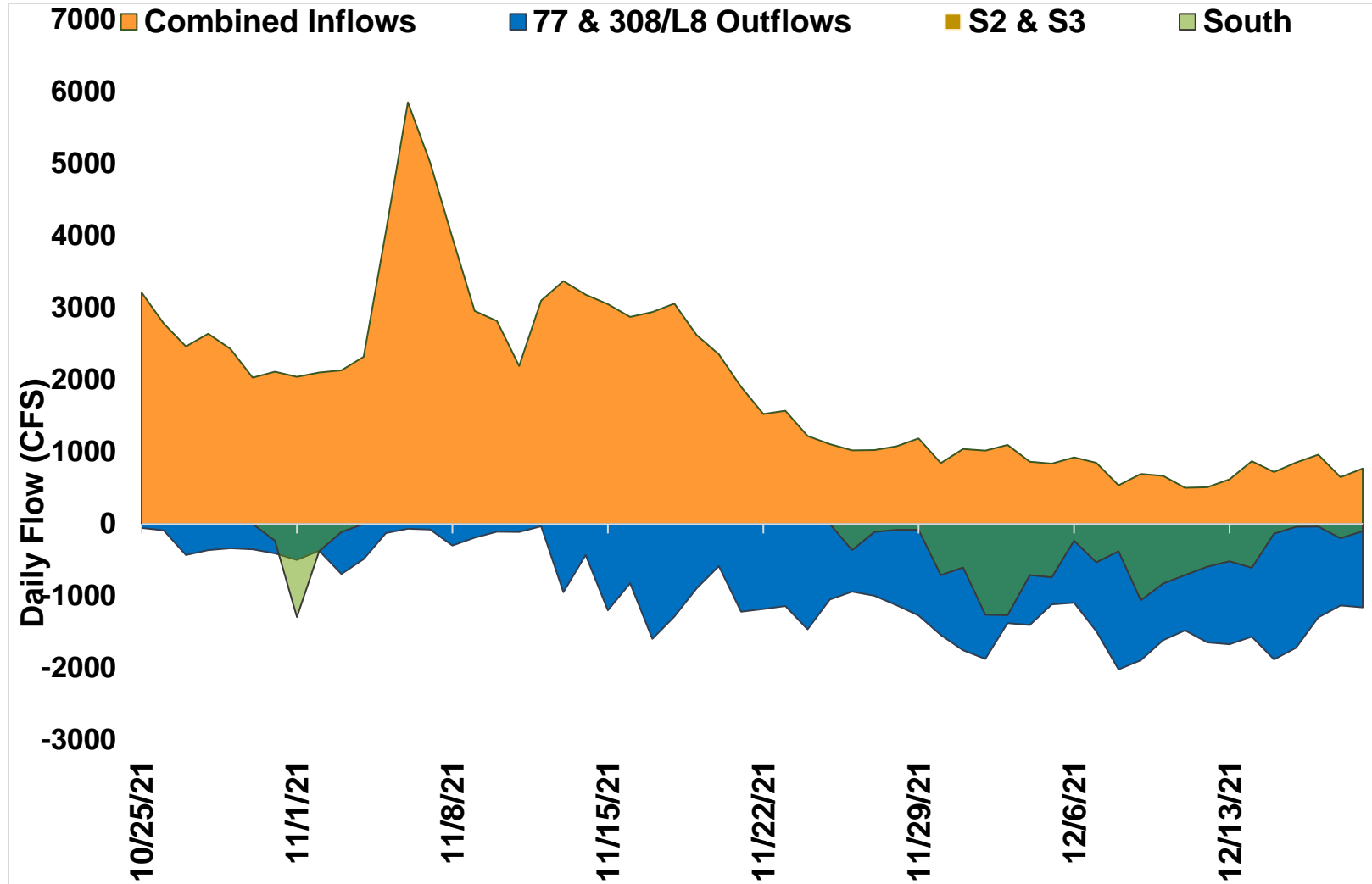


Figure LO-4. Major inflows (orange) to and outflows east and west (blue) from Lake Okeechobee. Outflows south are shown in green. Flows into Lake Okeechobee from the L-8 canal through S-271 (formerly Culvert 10A) or from the C-44 canal through the S-308 are included as inflows. Conversely, flows from Lake Okeechobee into the L-8 or C-44 canals are included with outflows. Inflows are shown as positive values; outflows are negative. Outflows through the S-77 (Caloosahatchee) and S-308 (C-44 Canal) structures are based on downstream gauges to include flows to lock openings for navigation.

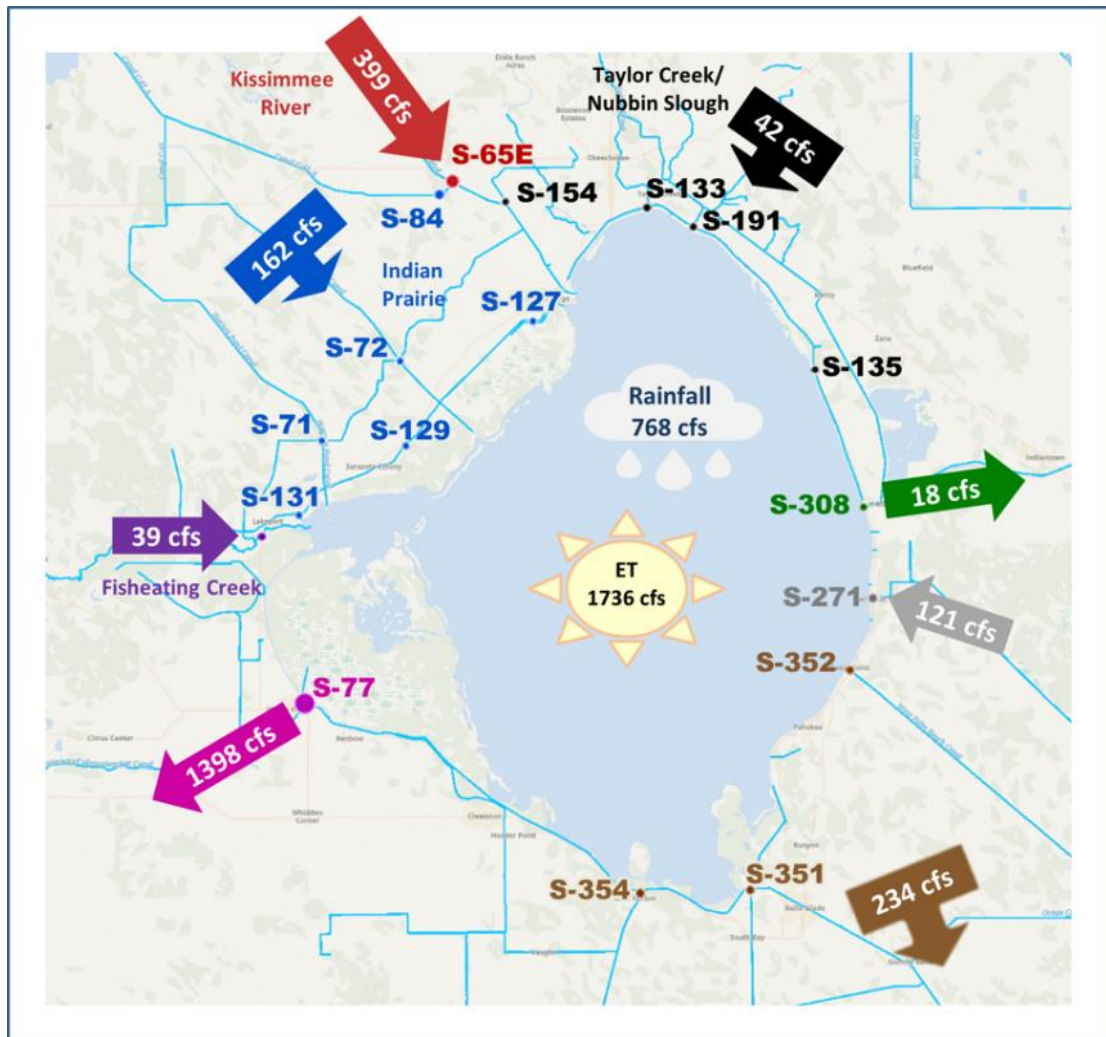


Figure LO-5. Inflows into Lake Okeechobee from Indian Prairie basins, Taylor Creek/Nubbin Slough, Kissimmee River and Fisheating Creek, and outflows to the west via S-77, to the east via S-308, to the south via S-351, S-352, S-354, and to southeast via S-271 (formerly Culvert 10A) for the week of December 13 - 19, 2021.

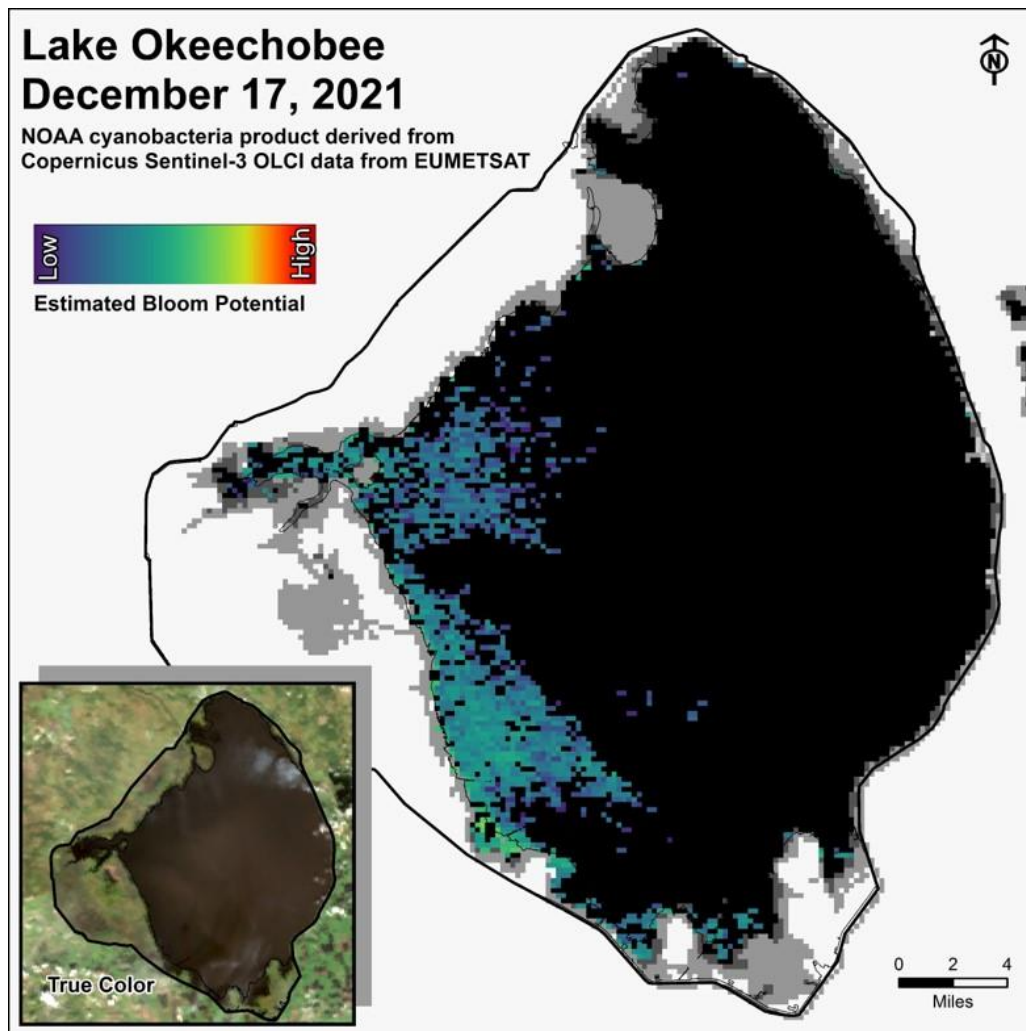


Figure LO-6. Cyanobacteria bloom potential on December 17, 2021 based on NOAA's harmful algal bloom monitoring system. Gray color indicates cloud cover.

Estuaries

St. Lucie Estuary

Over the past week, mean total inflow to the St. Lucie Estuary was 864 cfs (**Figures ES-1 and ES-2**), and the previous 30-day mean inflow was 1,099 cfs. For comparison, the historical provisional mean inflows from the contributing areas are shown in **Figure ES-2**.

Over the past week, surface salinities increased at the HR1 and A1A Bridge sites and decreased at the US1 Bridge site (**Table ES-1 and Figure ES-3**). The seven-day moving average of the surface and bottom salinities at the US1 Bridge was 16.5. Salinity conditions in the middle estuary were estimated to be within the good range for adult eastern oysters (**Figure ES-4**).

Caloosahatchee River Estuary

Over the past week, mean total inflow to the Caloosahatchee River Estuary was 2,106 cfs (**Figures ES-5 and ES-6**), and the previous 30-day mean inflow was 2,174 cfs. For comparison, the historical provisional mean inflows from the contributing areas are shown in **Figure ES-6**.

Over the past week, surface salinities remained the same at S-79, Val I-75, and Shell Point, decreased at Cape Coral, and increased at Ft. Myers and Sanibel (**Table ES-2 and Figures ES-7 and ES-8**). The seven-day mean surface salinities (**Table ES-2**) were in the good range (0-10) for tape grass at Val I-75 and at Ft. Myers. The seven-day mean surface salinity values were within the good range for adult eastern oysters at Cape Coral and Shell Point, and just within the fair range at Sanibel (**Figure ES-9**).

Surface salinity at Val I-75 was forecasted for the next two weeks using an autoregression model (Qiu and Wan, 2013¹) coupled with a linear reservoir model for the tidal basin. Model scenarios included pulse releases at S-79 ranging from 0 to 1500 cfs and steady releases at 2,000 cfs with estimated tidal basin inflows of 81 cfs. Model results from all scenarios predict daily salinity to be 1.3 or lower, and the 30-day moving average surface salinity to be 0.5 or lower at Val I-75 at the end of the two-week period (**Table ES-3 and Figure ES-10**). This keeps predicted salinities at Val I-75 within the LORS 2008 salinity range (0.0-5.0).

Red Tide

The Florida Fish and Wildlife Research Institute reported on December 17, 2021 that *Karenia brevis*, the Florida red tide dinoflagellate, was observed at background concentrations in Lee County. On the east coast, red tide was observed at background

¹ Qiu, C., and Y. Wan. 2013. Time series modeling and prediction of salinity in the Caloosahatchee River Estuary. *Water Resources Research* 49:5804-5816.

concentrations in one sample from Palm Beach County and was not observed in samples collected from Miami-Dade County.

Water Management Recommendations

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

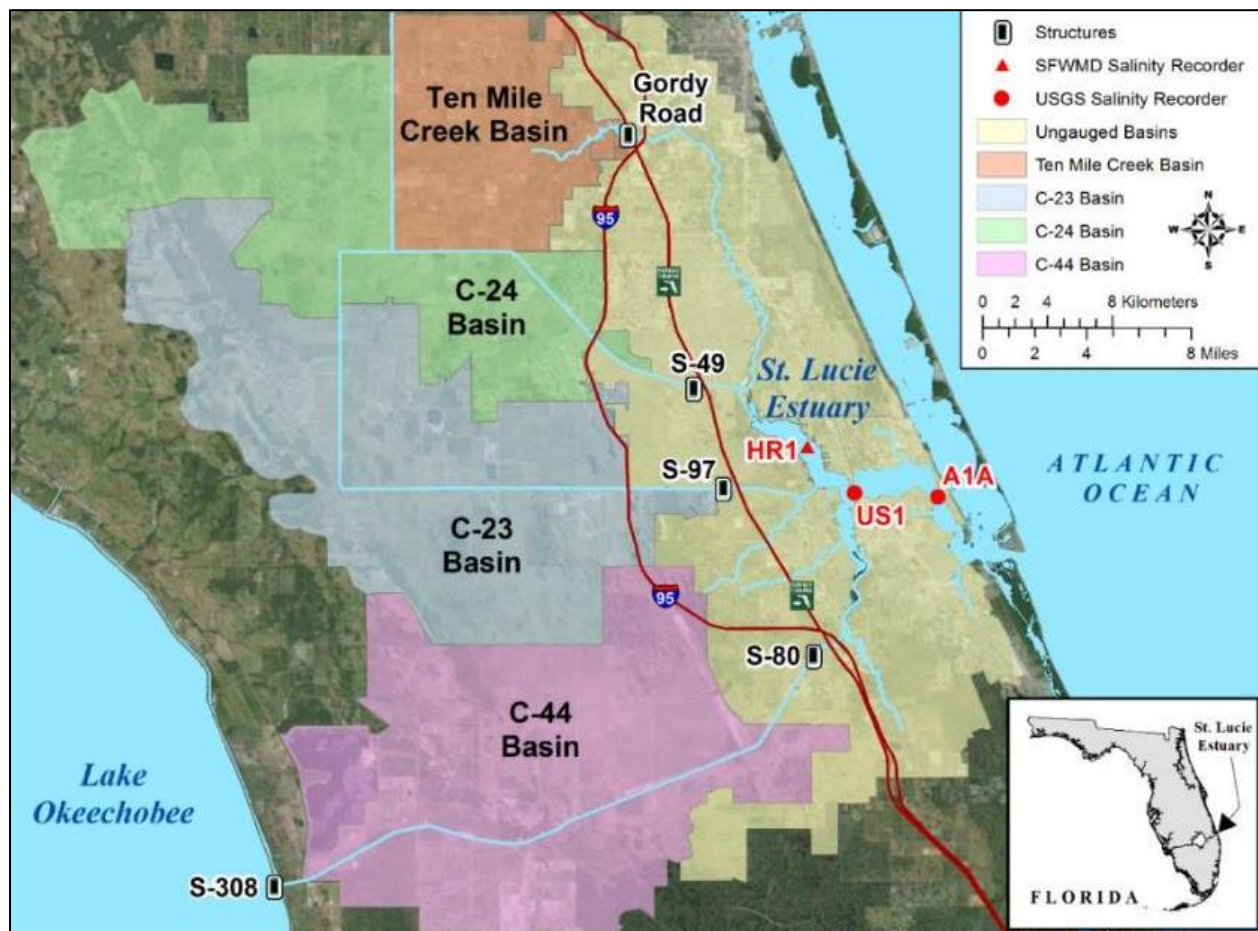


Figure ES-1. Basins, water control structures and salinity monitoring sites in the St. Lucie Estuary.

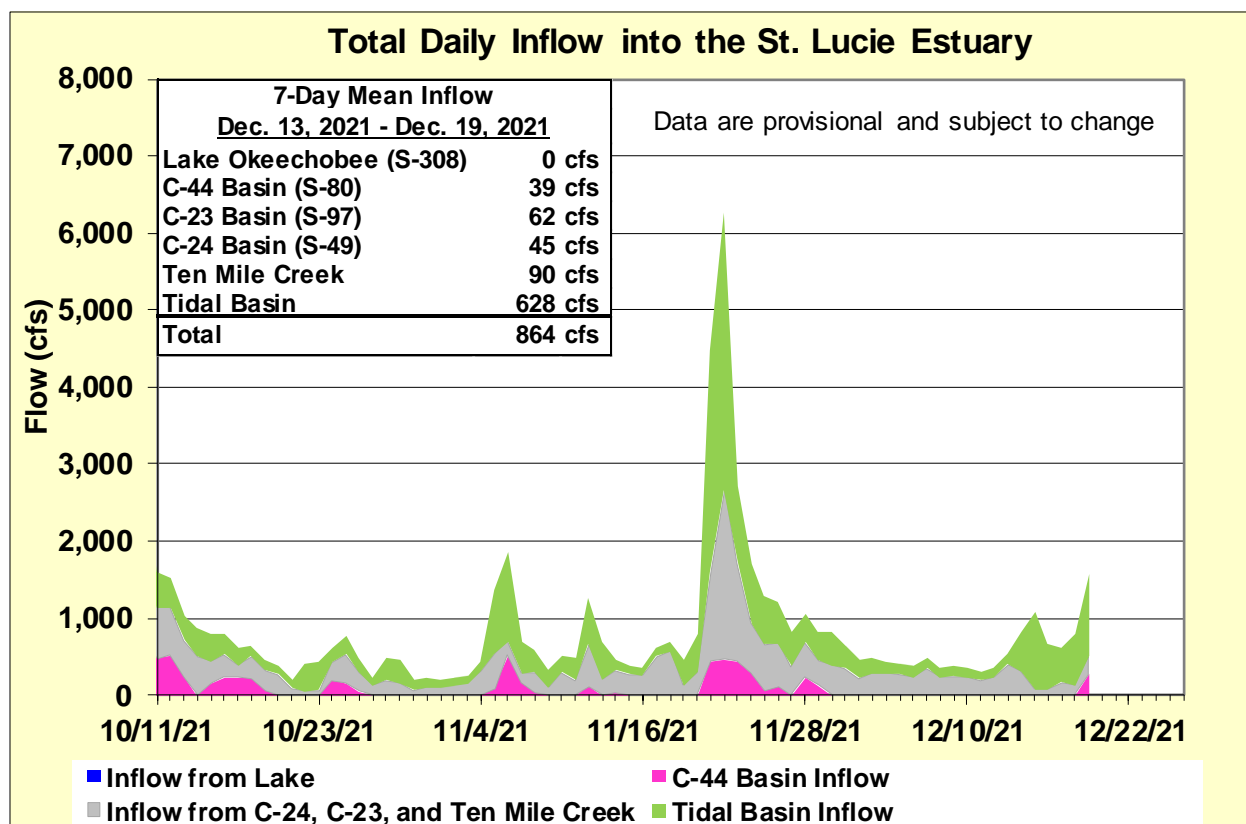


Figure ES-2. Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and Tidal Basins into the St. Lucie Estuary.

Table ES-1. Seven-day mean salinity at oyster monitoring sites in the St. Lucie Estuary. Current means are in bold font; previous week's means are in parentheses. The envelope reflects the preferred salinity range for adult eastern oysters (*Crassostrea virginica*) in the middle estuary. Data are provisional.

Sampling Site	Surface	Bottom	Envelope
HR1 (North Fork)	12.0 (10.8)	14.2 (15.0)	NA ^a
US1 Bridge	15.6 (16.1)	17.4 (18.4)	10.0 – 26.0
A1A Bridge	24.9 (24.0)	27.6 (27.3)	NA ^a

a. The envelope is not applicable.

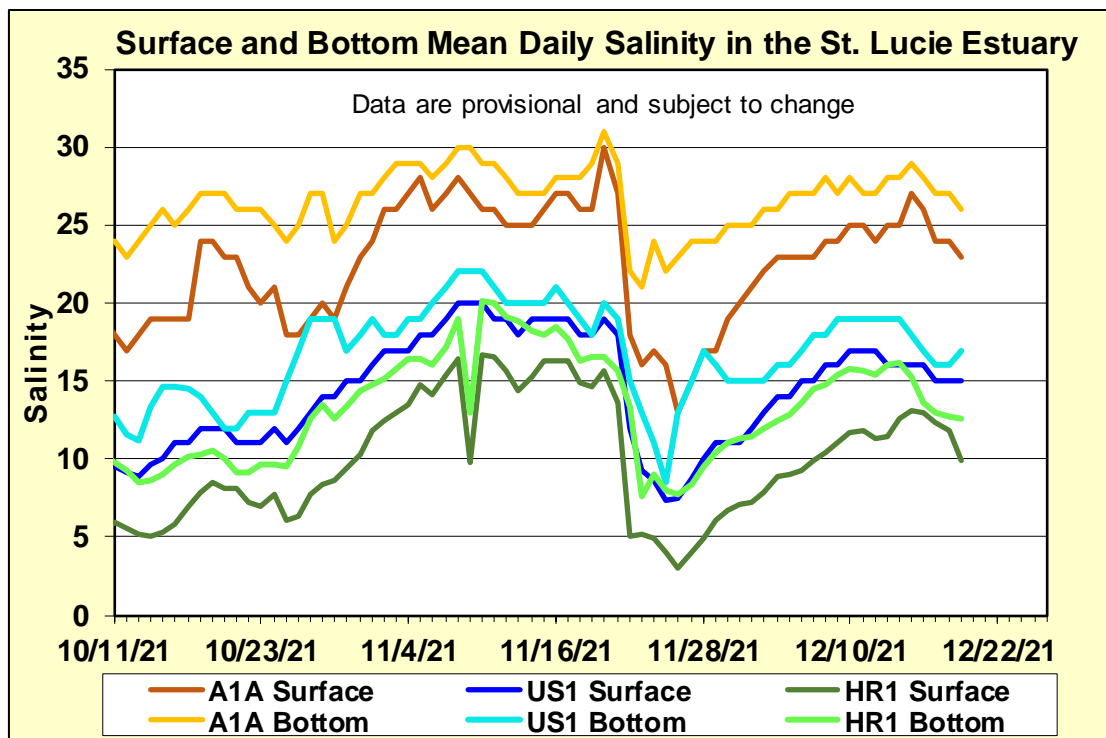


Figure ES-3. Mean daily salinity at the A1A, US1 and HR1 sites in the St. Lucie Estuary.

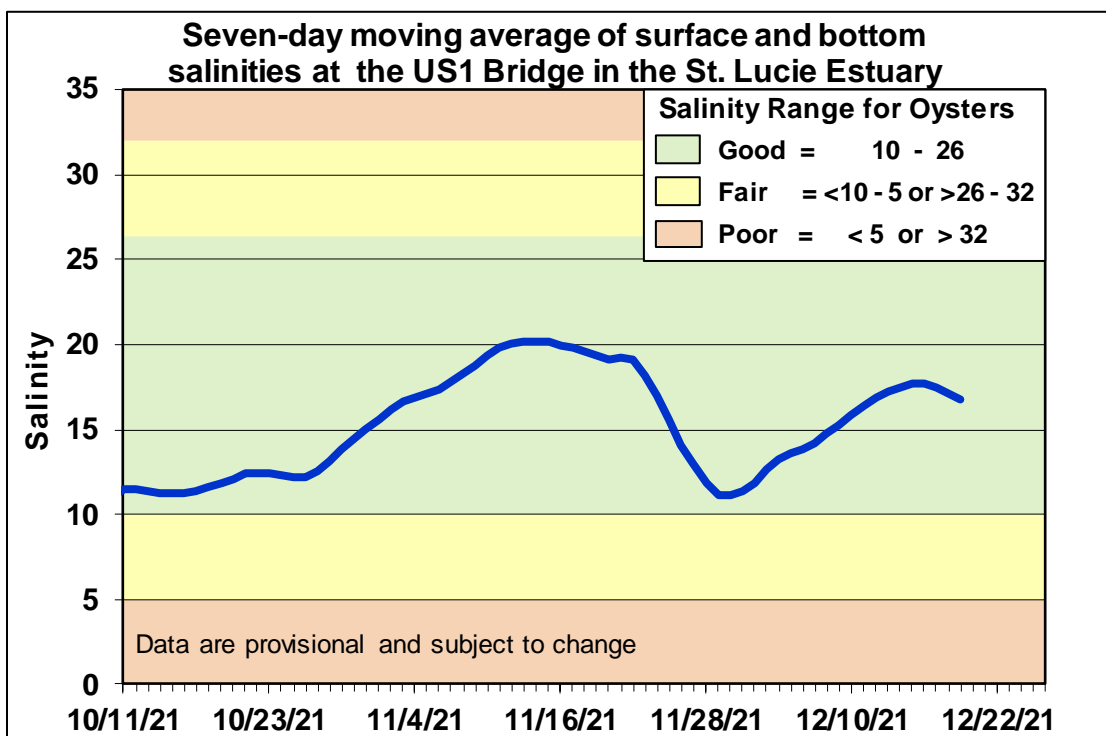


Figure ES-4. Seven-day moving average of the surface and bottom salinities at the US1 Bridge in the St. Lucie Estuary.

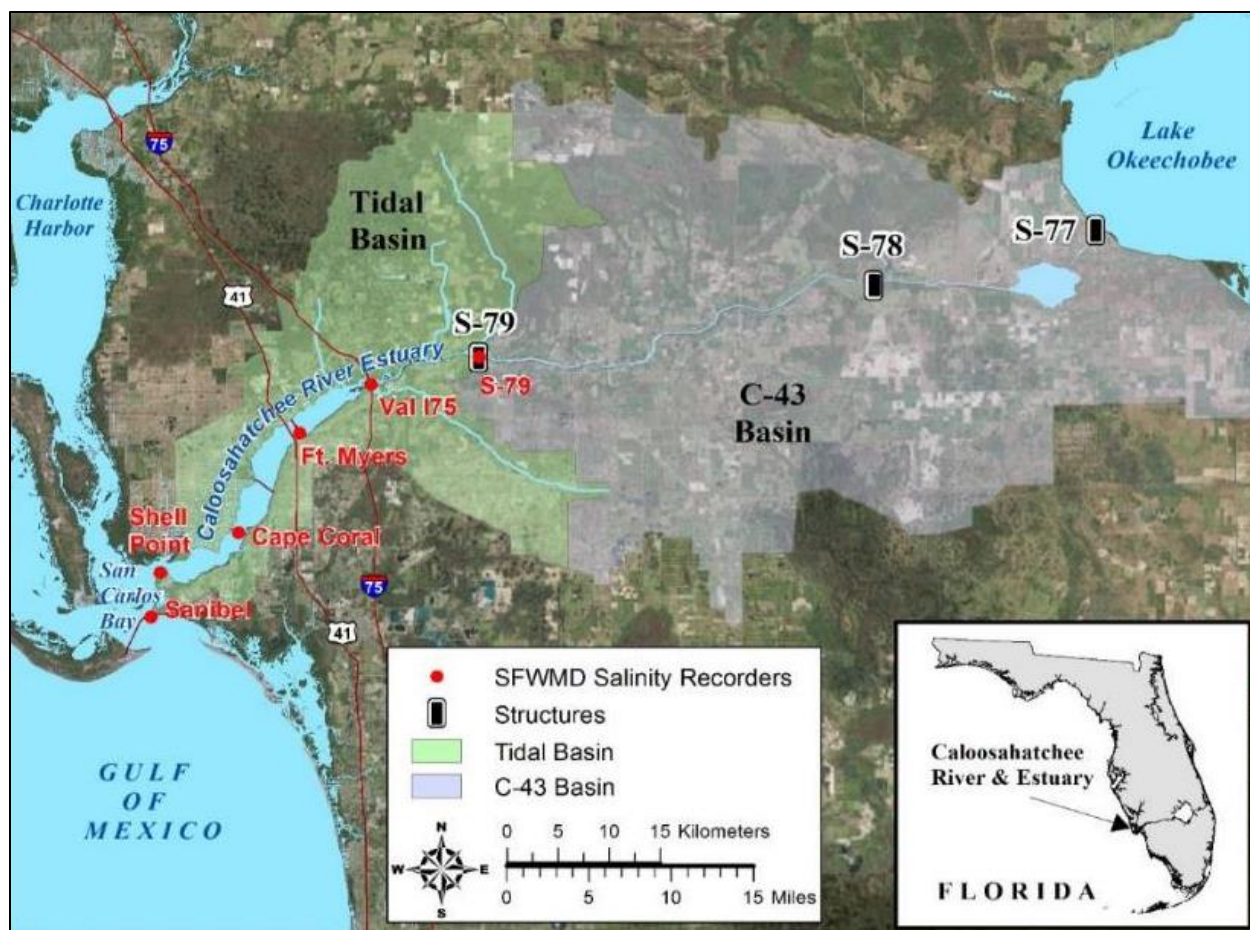


Figure ES-5. Basins, water control structures and salinity monitoring sites in the Caloosahatchee River Estuary.

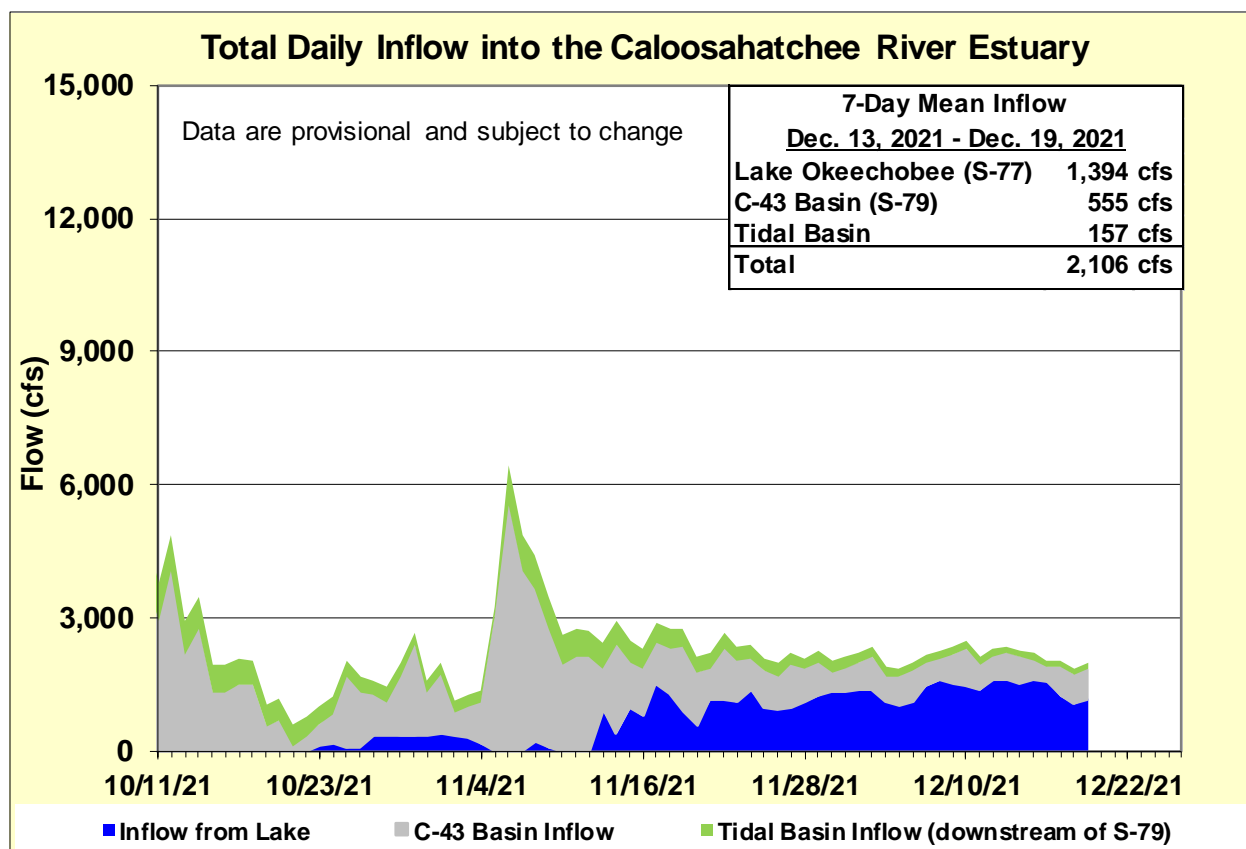


Figure ES-6. Total daily inflows from Lake Okeechobee, and runoff from the C-43 and Tidal basins into the Caloosahatchee River Estuary.

Table ES-2. Seven-day mean salinity at six monitoring sites in the Caloosahatchee River Estuary. Current means are in bold font; previous week's means are in parentheses. The envelope at I-75 is for the protection of tape grass in the upper estuary and the envelope in the lower estuary is the preferred salinity range for adult eastern oysters (*Crassostrea virginica*). Data are provisional.

Sampling Site	Surface	Bottom	Envelope
S-79 (Franklin Lock)	0.2 (0.2)	0.2 (0.2)	NA ^a
Val I-75	0.4 (0.4)	0.6 (0.4)	0.0 – 5.0 ^b
Fort Myers Yacht Basin	3.9 (3.8)	5.6 (5.6)	NA ^a
Cape Coral	9.7 (10.1)	11.9 (12.3)	10.0 – 30.0
Shell Point	22.8 (22.8)	24.8 (24.5)	10.0 – 30.0
Sanibel	30.1 (29.9)	30.5 (30.7)	10.0 – 30.0

a. The envelope is not applicable.

b. The envelope is based on the predicted 30-day mean for the next two weeks.

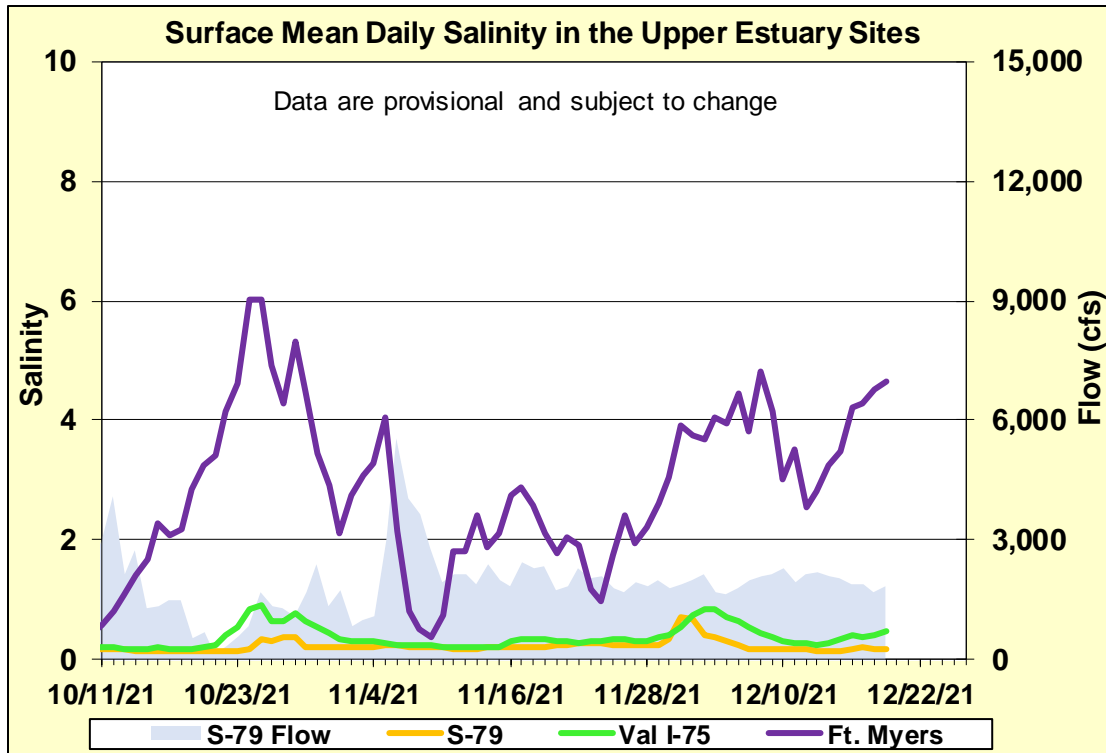


Figure ES-7. Mean daily salinity at upper Caloosahatchee River Estuary monitoring sites and mean daily flow at S-79.

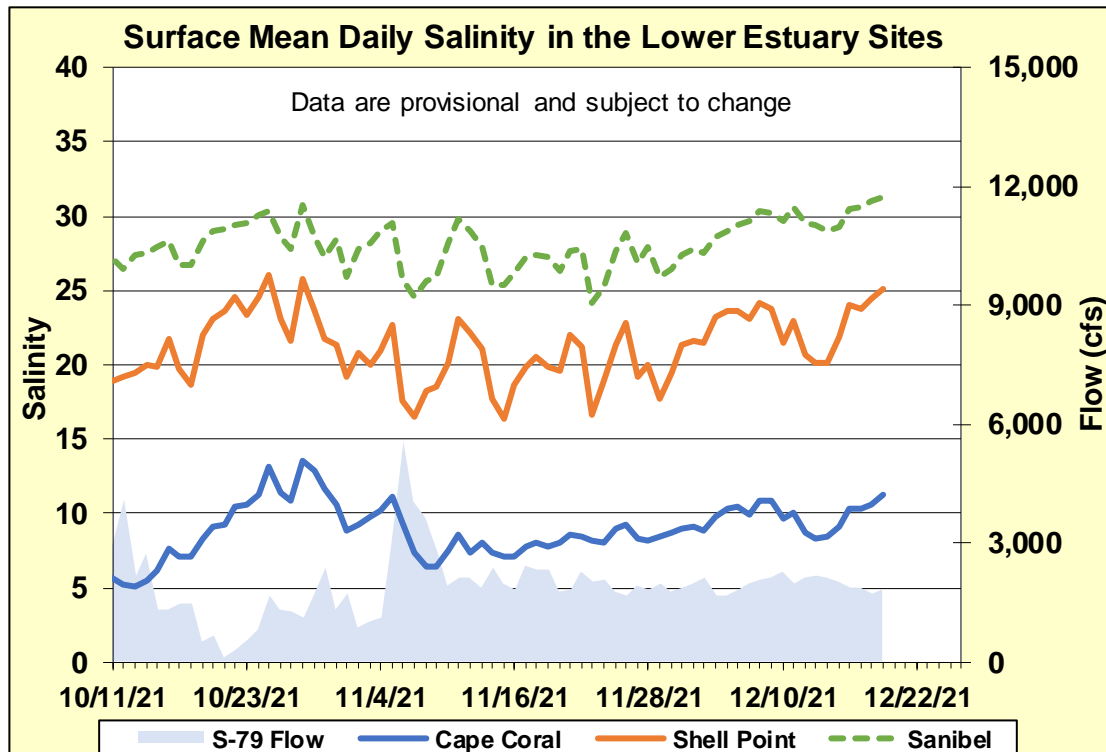


Figure ES-8. Mean daily surface salinity at lower Caloosahatchee River Estuary monitoring sites and mean daily flow at S-79.

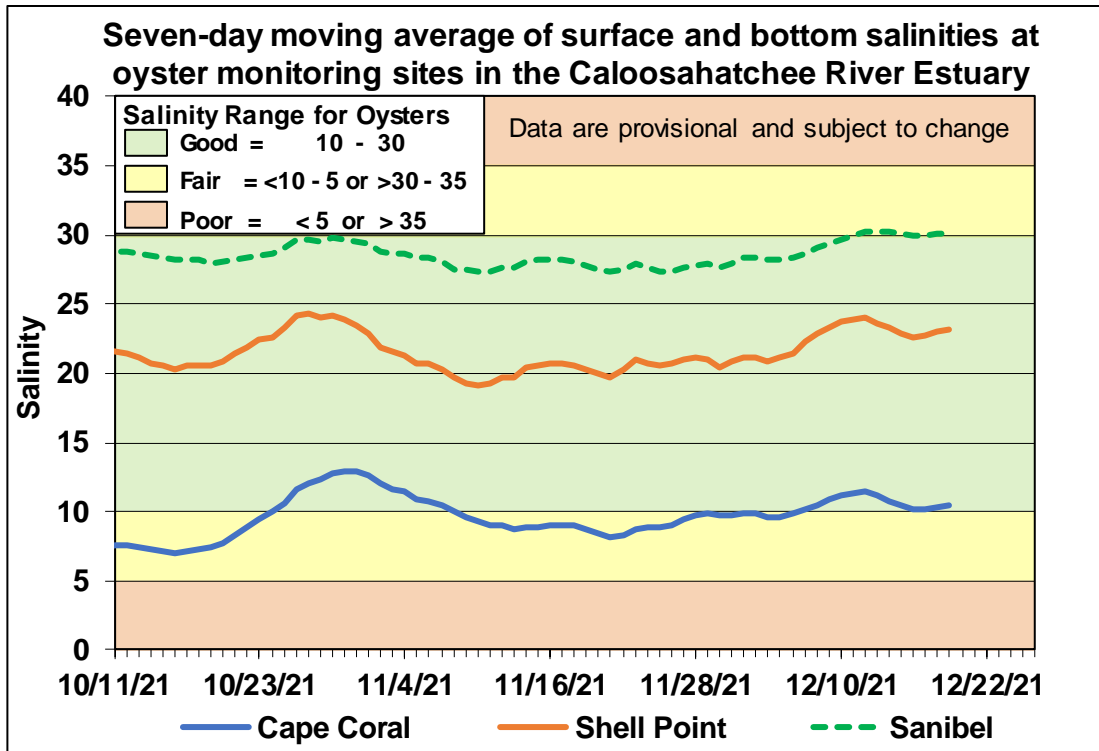


Figure ES-9. Seven-day moving average of surface and bottom salinities at Cape Coral, Shell Point and Sanibel monitoring sites in the Caloosahatchee River Estuary.

Table ES-3. Predicted salinity at Val I-75 in the Caloosahatchee River Estuary at the end of the forecast period for various S-79 flow release scenarios.

Scenario	Simulated S-79 Flow (cfs)	Tidal Basin Runoff (cfs)	Daily Salinity	30-Day Mean Salinity
A	0	81	1.3	0.5
B	450	81	0.5	0.4
C	800	81	0.3	0.4
D	1000	81	0.3	0.4
E	1500	81	0.3	0.4
F	2000	81	0.3	0.4

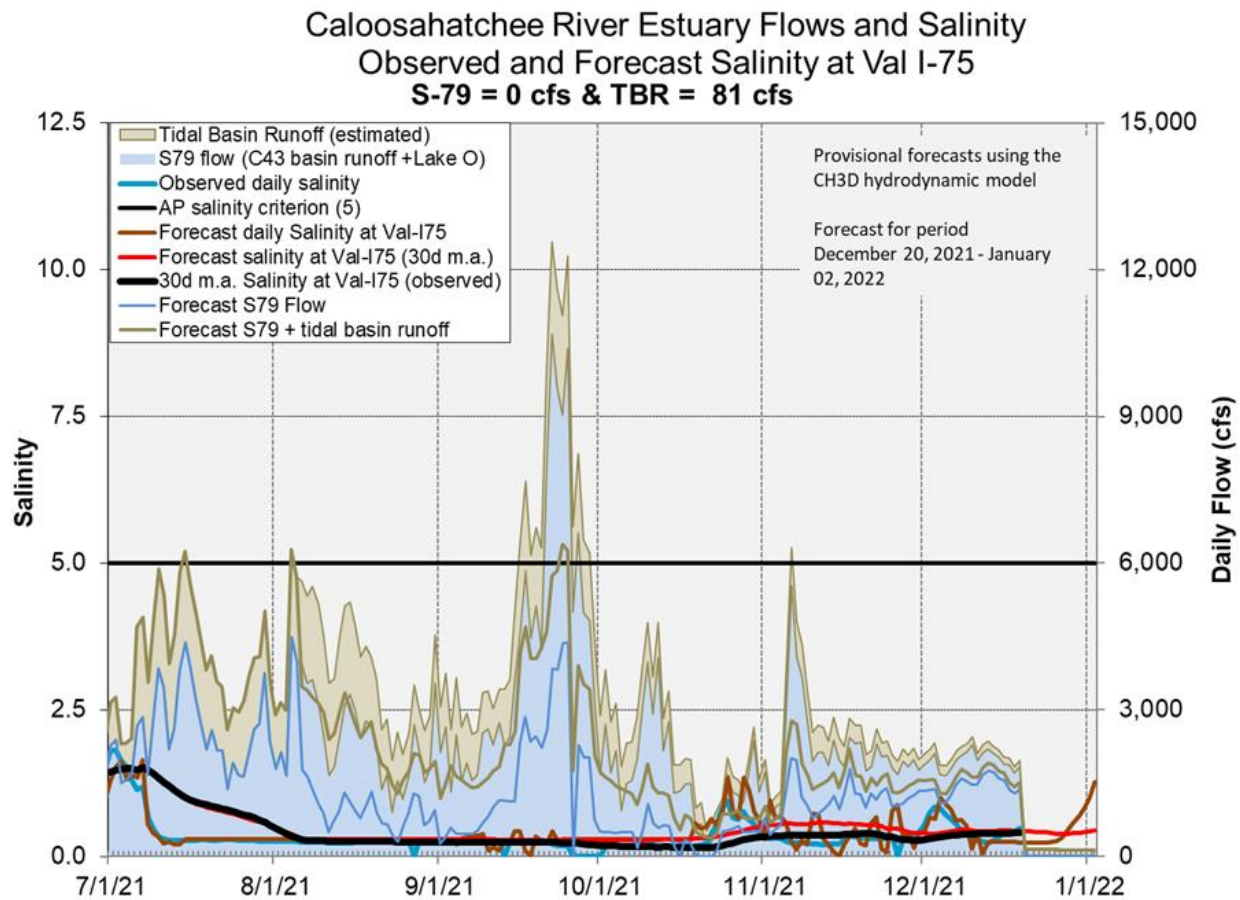


Figure ES-10. Forecasted Val I-75 site surface salinity assuming no pulse release at S-79.

Stormwater Treatment Areas

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 above target stage, and vegetation in these cells is stressed and highly stressed. The 365-day phosphorus loading rates (PLRs) are high for the Eastern and Central Flow-ways (**Figure S-1**).

STA-1W: Operational restrictions are in place in STA-1W Western, Eastern, and Northern Flow-ways due to construction activities. Most treatment cells are at or near target stage. Vegetation in the flow-ways is stressed and highly stressed. The 365-day PLRs for the Northern, Western, and Eastern Flow-ways are below 1.0 g/m²/year (**Figure S-2**).

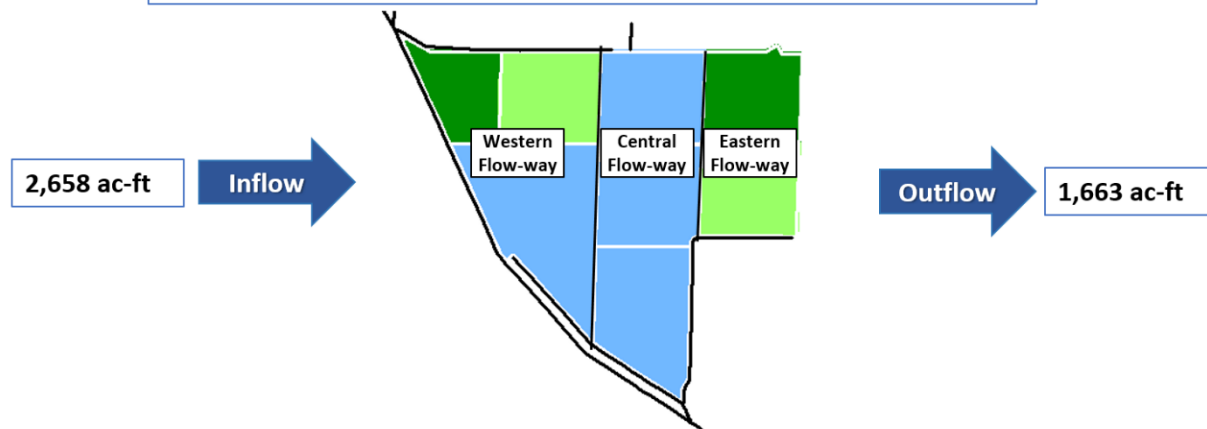
STA-2: STA-2 Flow-way 2 is offline for construction activities. Operational restrictions are in place in STA-2 Flow-ways 3 and 4 for vegetation management activities. Online treatment cells are at or near target stage. Vegetation in Flow-ways 1 and 3 is stressed, and in Flow-ways 2, 4 and 5 is highly stressed. The 365-day PLRs for Flow-ways 1, 4 and 5 are below 1.0 g/m²/year. The 365-day PLR for Flow-way 3 is high (**Figure S-3**).





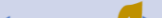

STA-3/4: STA-3/4 Eastern Flow-way is offline for vegetation rehabilitation/drawdown. Most online treatment cells are at or near target stage. Vegetation in the Eastern and Central Flow-ways is highly stressed and in the Western Flow-way is stressed. The 365-day PLRs for the Central and Western Flow-ways are below 1.0 g/m²/year (**Figure S-4**).










STA-5/6: All Flow-ways are online. Most treatment cells are near or below target stage. All treatment cells have highly stressed vegetation conditions except Flow-ways 7 and 8, which are healthy. The 365-day PLRs for flow-ways 1, 6, 7, and 8 are below 1.0 g/m²/year. The 365-day PLRs for flow-ways 4 and 5 are high. (**Figure S-5** and **S-6**).

For definitions on STA operational language see glossary following figures.

STA-1E Weekly Status Report – 12/13/2021 through 12/19/2021



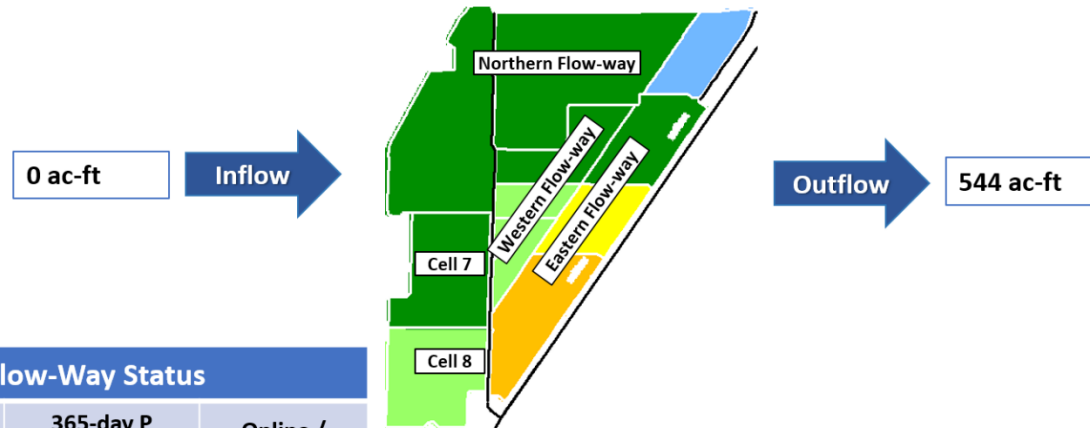
STA-1E Flow-Way Status			
Flow-Way	Vegetation Status <small>Healthy ----- Stressed</small> 	365-day P Loading Rate <small>(below 1.0 g P /m²/yr is optimal)</small> 	Online / Offline / Restrictions
Eastern			Online
Central			Vegetation Rehab
Western	Offline, construction activities starting 11/01/2019		

As of 12/19/2021			
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	2,658	5,738	177,993
--Lake Inflow, ac-ft	0	N/A	5,900
Total Outflow, ac-ft	1,663	5,070	148,565
Inflow Conc., ppb	47	59	123
Outflow Conc., ppb	34	25	23
Includes Preliminary Data			

Figure S-1. STA-1E Weekly Status Report

STA-1W Weekly Status Report – 12/13/2021 through 12/19/2021



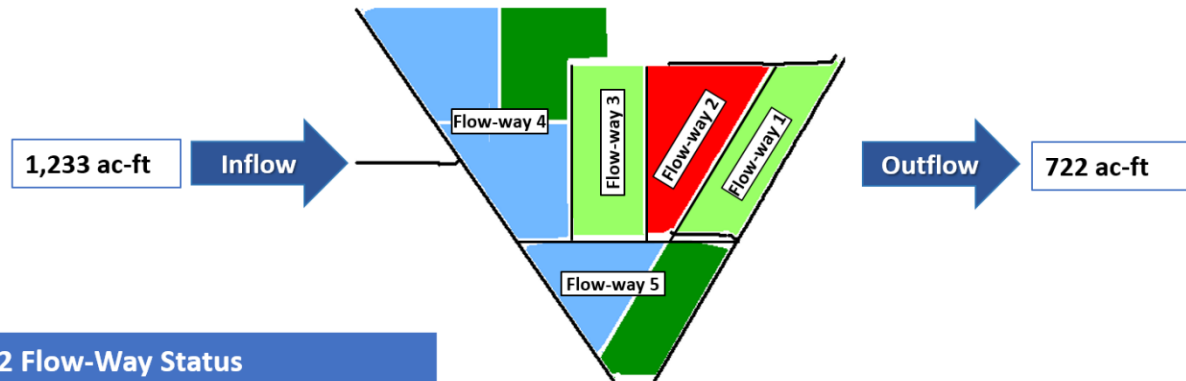
STA-1W Flow-Way Status			
Flow-Way	Vegetation Status Healthy --- Stressed	365-day P Loading Rate (below 1.0 g P /m ² /yr is optimal)	Online / Offline / Restrictions
Northern			Construction
Western			Construction
Eastern			Construction
Cell 7		N/A	Construction
Cell 8		N/A	Construction

As of 12/19/2021	
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-1W Flow & Phosphorus Concentration			
	7-day	28-day	365-day
Total Inflow, ac-ft	0	1,308	50,186
--Lake Inflow, ac-ft	0	N/A	4,100
Total Outflow, ac-ft	544	1,953	51,830
Inflow Conc., ppb	N/A	158	172
Outflow Conc., ppb	24	25	24
Includes Preliminary Data			

Figure S-2. STA-1W Weekly Status Report

STA-2 Weekly Status Report – 12/13/2021 through 12/19/2021



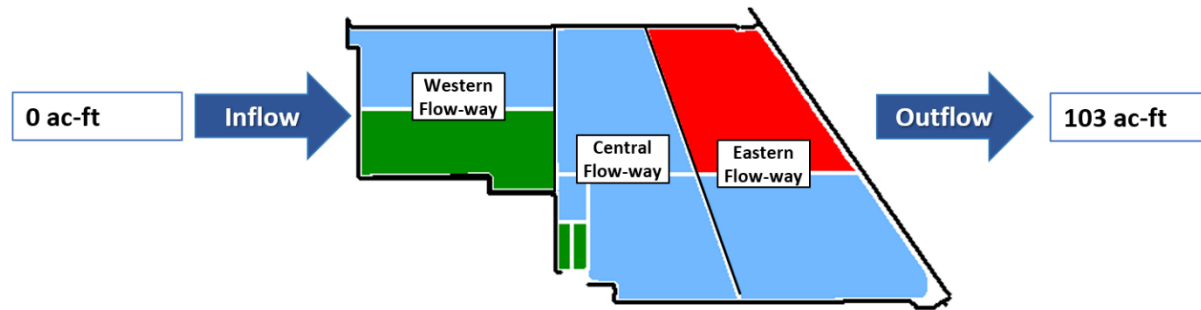
STA-2 Flow-Way Status			
Flow-Way	Vegetation Status Healthy ----- Stressed	365-day P Loading Rate (below 1.0 g P /m ² /yr is optimal)	Online / Offline / Restrictions
1			Online
2	Offline, construction activities as of 9/7/2021		
3			Vegetation Rehab
4			Vegetation Rehab
5			Online

As of 12/19/2021	
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-2 Flow & Phosphorus Concentration			
	7-day	28-day	365-day
Total Inflow, ac-ft	1,233	3,405	321,362
--Lake Inflow, ac-ft	0	N/A	64,900
Total Outflow, ac-ft	722	6,426	332,384
Inflow Conc., ppb	21	39	87
Outflow Conc., ppb	22	13	16
Includes Preliminary Data			

Figure S-3. STA-2 Weekly Status Report

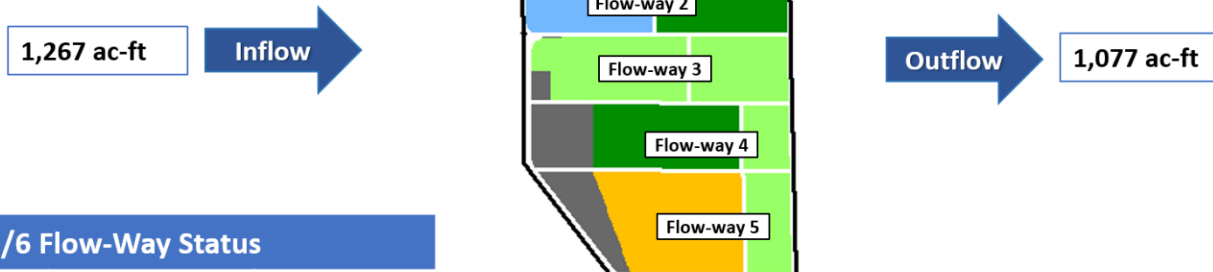
STA-3/4 Weekly Status Report – 12/13/2021 through 12/19/2021



STA-3/4 Flow-Way Status				As of 12/19/2021				STA-3/4 Flow & Phosphorus Concentration			
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)					7-day	28-day	365-day
Eastern	Offline, vegetation management drawdown as of 3/1/2021			Deep Water Level (> 2.8' above TS)				Total Inflow, ac-ft	0	6	364,544
Central			Online	High Water Level (1.5' – 2.8' above TS)				--Lake Inflow, ac-ft	0	N/A	38,600
Western			Online	0.2' – 1.5' above TS				Total Outflow, ac-ft	103	2,391	322,317
				Target Stage (TS +/- 0.2')				Inflow Conc., ppb	N/A	54	65
				Low Water Level (<0.2' below TS)				Outflow Conc., ppb	19	14	15
				Depth / Area Based: Percent of Area Dry				Includes Preliminary Data			
				0-25% Dry		50-75% Dry					
				25-50% Dry		75-100% Dry					

Figure S-4. STA-3/4 Weekly Status Report

STA-5/6 Weekly Status Report – 12/13/2021 through 12/19/2021



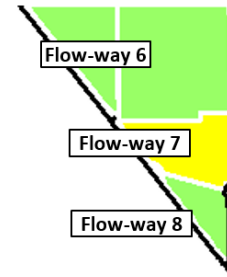
STA-5/6 Flow-Way Status			
Flow-Way	Vegetation Status Healthy ----- Stressed	365-day P Loading Rate (below 1.0 g P / m ² /yr is optimal)	Online / Offline / Restrictions
1			Online
2		N/A	Online
3		N/A	Online
4			Online
5			Online

As of 12/19/2021	
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-5/6 Flow & Phosphorus Concentration			
	7-day	28-day	365-day
Total Inflow, ac-ft	1,267	6,384	184,564
--Lake Inflow, ac-ft	0	N/A	9,000
Total Outflow, ac-ft	1,077	8,253	180,576
Inflow Conc., ppb	99	97	239
Outflow Conc., ppb	29	28	50
Includes Preliminary Data			

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

STA-5/6 Weekly Status Report – 12/13/2021 through 12/19/2021



STA-5/6 Flow-Way Status				As of 12/19/2021	
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)	
				<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>	
6	←-----→	1.0	Online		
7	←-----→	1.0	Online		
8	←-----→	1.0	Online		
				Depth / Area Based: Percent of Area Dry	
				0-25% Dry	50-75% Dry
				25-50% Dry	75-100% Dry

Figure S-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

Water Conservation Area Regulation Schedules

WCA-1: The 1-8C stage came up then stabilized last week. The average on Sunday was 0.25 feet above that falling line. WCA-2A: Stage at 2A-17 fell in parallel to the regulation line last week; the average on Sunday was 1.29 feet higher than the falling Zone A regulation line. WCA-3A: The Three Gauge Average stages continued to fall away from the stable Zone A regulation line last week; average stage was 0.31 feet below (compared to 0.21 feet last week) the Zone A line on Sunday. WCA-3A: Stage at gauge 62 (Northwest corner) continues to fall faster than the slope of the falling Upper Schedule, the average on Sunday was 0.70 feet below the regulation line. (**Figures EV-1 through EV-4**).

Water Depths

The SFWDAT tool indicates that water depths in the WCAs remain the lowest in northern WCA-3A, where a significant region now has the potential for water at the ground surface. The spatial extent of depths in excess of 4.0' around the upper reaches of the L-67s has diminished. North to South hydrologic connectivity is diminishing within all of the sloughs in Everglades National Park (ENP), and areas significantly below ground in western ENP and southern Big Cypress National Preserve (BCNP) have increased in spatial extent (**Figure EV-5**). Comparing current WDAT water depths to the depth one month ago, stages are decreasing in most areas. Looking back one year, all of the Everglades Protection Area (EPA) is significantly lower in depth, with only WCA-1 and northeastern ENP close to the same depth as last year. (**Figure EV-6**). Comparing depths over the past 20 years, most of the WCAs remains at or in the upper half of that historical range (northern WCA-2A and southwestern WCA-3A the exceptions). Portions of western ENP have fallen below the median, while southern WCA-2A, WCA-1, and northeastern ENP are above 80th percentile. (**Figure EV-7**).

Taylor Slough and Florida Bay

A spatially averaged 0.77 inches of rain fell over Taylor Slough and Florida Bay over the week ending Sunday, 12/19/21, which allowed stages to decrease 0.09 feet on average (**Figure EV-8 and Figure EV-9**). The Slough is 4 inches above its historical average for this time of year, while the northern parts of the Slough are 7 inches above its historical average from before the modifications to levies and structures in Upper Taylor Slough. Compared to this time last year after Tropical Storm Eta, stages now are 6 inches lower, suggesting less water availability to buffer downstream conditions. Given the expectation of a drier than average dry season, maintaining water deliveries to the area would help to slow the recession in the slough so water movements south can be expedited when the wet season starts.

Salinities in Florida Bay averaged an increase of 1 over the week ending 12/19/21, with individual station changes ranging from -2.0 to +8.7 (**Figure EV-8**). The largest change was the increase at the shallow Garfield Bight site where upstream flows persisted over the weekend. Both the central and western Bay averages increased over the week and approached their respective 75th percentiles (**Figure EV-10**). Conditions are not ideal for enduring a drier than average dry season. Bay-wide salinity is averaging 3 higher than the historical average, while the nearshore area is 4 higher than its historical average.

Water Management Recommendations

Conserving water in the northern basins, then allowing that water to move downstream as the dry season progresses, maximizes the ecological benefit of freshwater on the landscape. Flows into northern WCA-3A assist recession rates in that sub-basin then move downstream to have an ecological benefit. Continued freshwater to the Taylor Slough area that maintains stage will help expedite deliveries to the south when the wet season starts. Individual regional recommendations can be found in **Table EV-2**.

Table EV-2. Previous week's rainfall and water depth changes in Everglades regions.

Everglades Region	Rainfall (inches)	Stage change (feet)
WCA-1	1.47	+0.08
WCA-2A	0.32	-0.07
WCA-2B	0.55	-0.07
WCA-3A	0.14	-0.09
WCA-3B	0.30	-0.01
ENP	0.22	+0.01

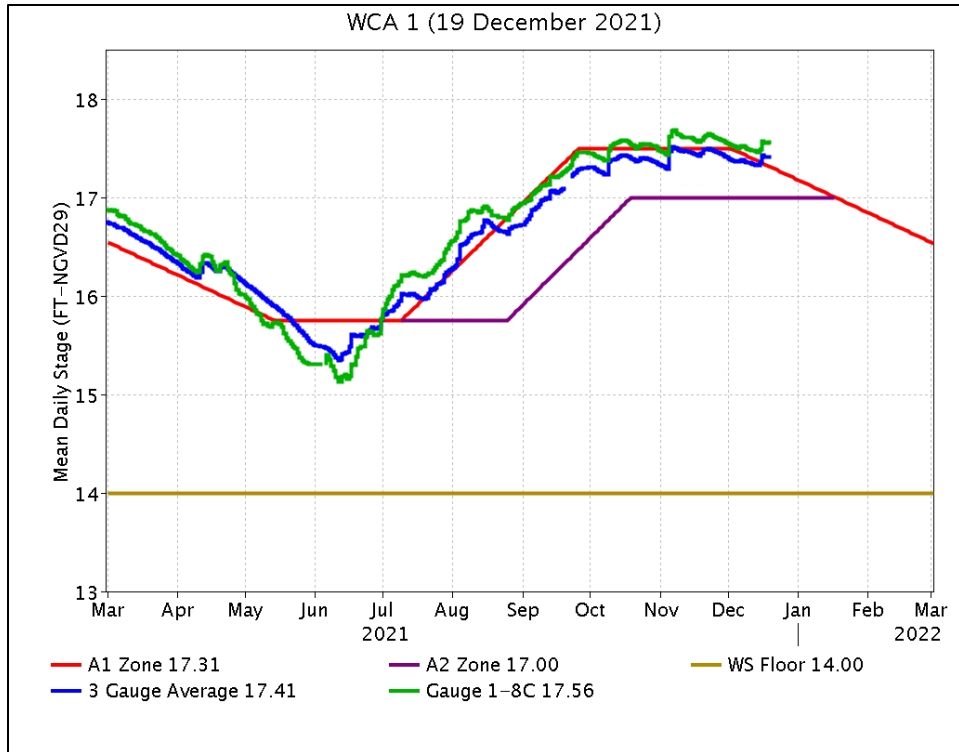


Figure EV-1. WCA-1 stage hydrographs and regulation schedule.

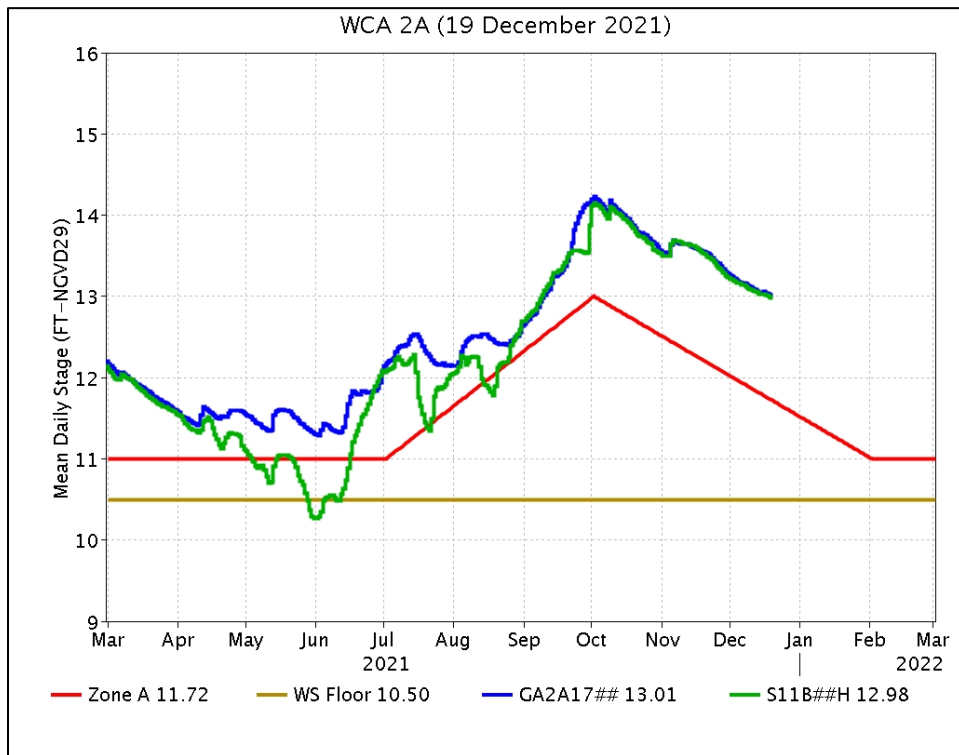


Figure EV-2. WCA-2A stage hydrographs and regulation schedule.

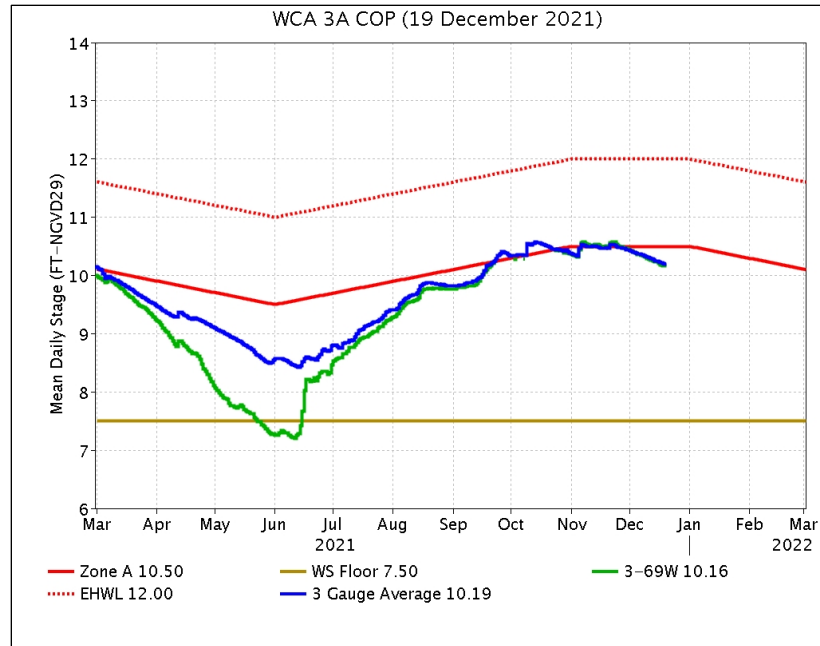


Figure EV-3. WCA-3A stage hydrographs (three-gauge average, S-333 headwater) and regulation schedule.

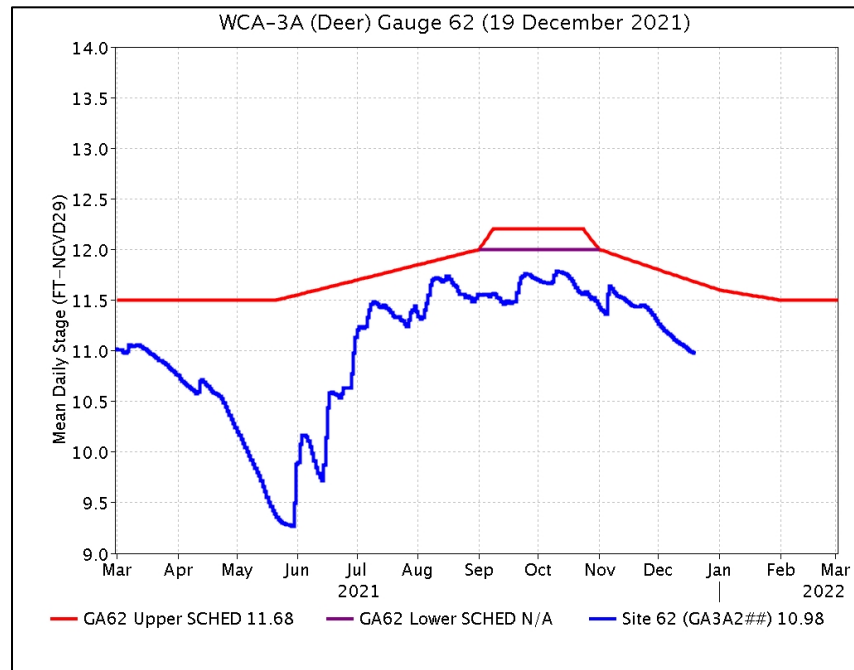


Figure EV-4. WCA-3A stage hydrograph (Deer gauge; Site 62) and CA62 regulation schedule.

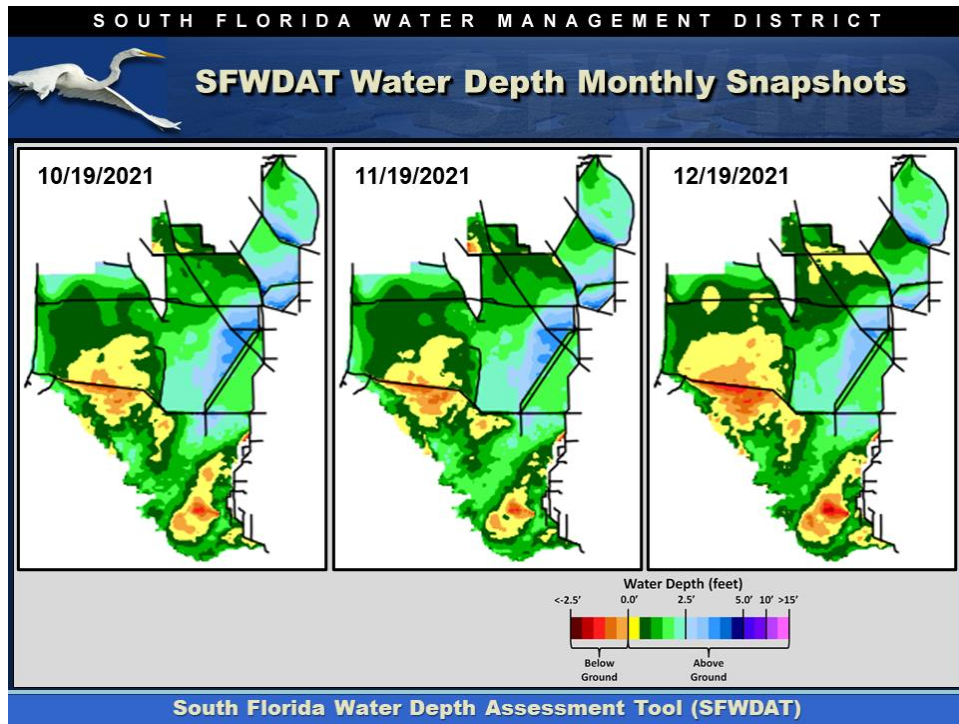


Figure EV-5. Everglades water depths from two months ago (left), one month ago (center) and present (right), based on SFWDAT.

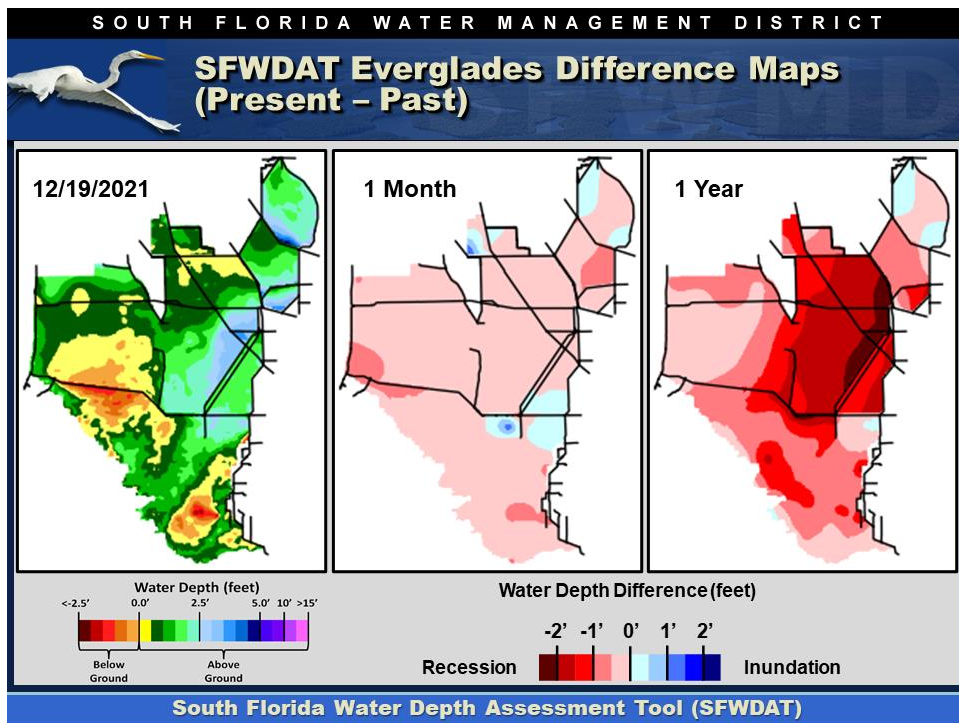


Figure EV-6. Present Everglades water depths (left) and water depth changes from one month (center) and one year (right) ago, based on SFWDAT.

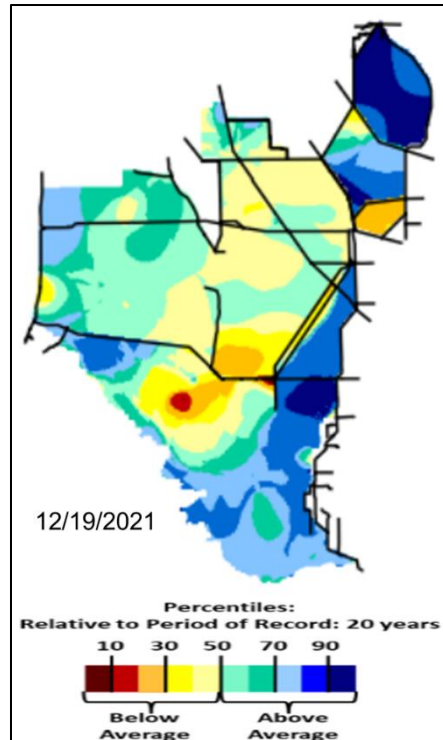


Figure EV-7. Present water depths compared to the day of year median over the previous 20 years.

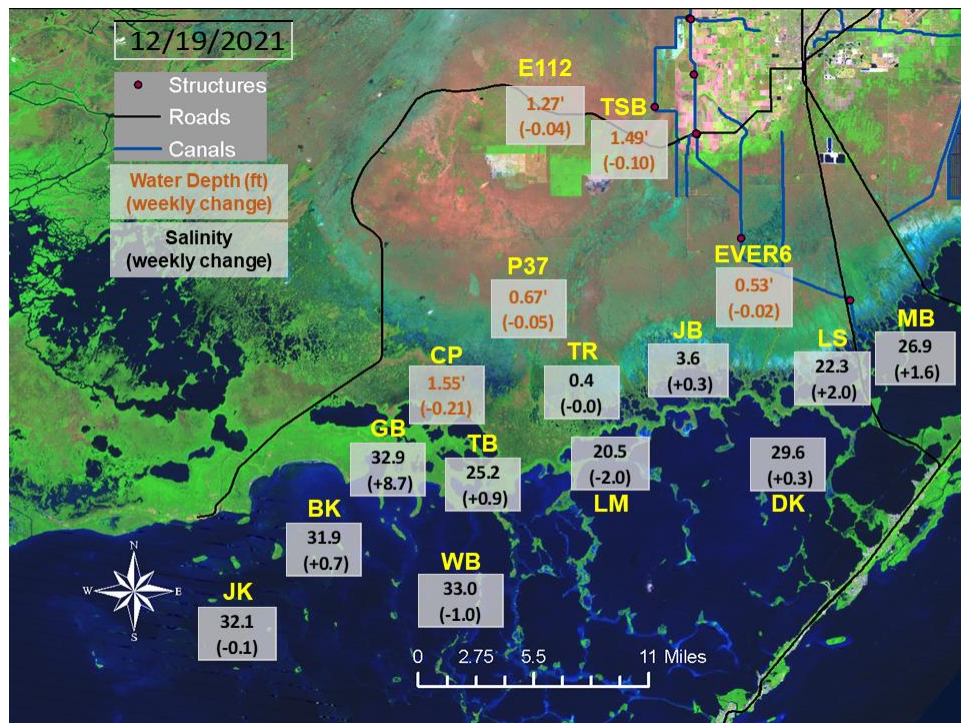


Figure EV-8. Taylor Slough water depths with changes since a week ago and Florida Bay salinities with changes since a week ago.

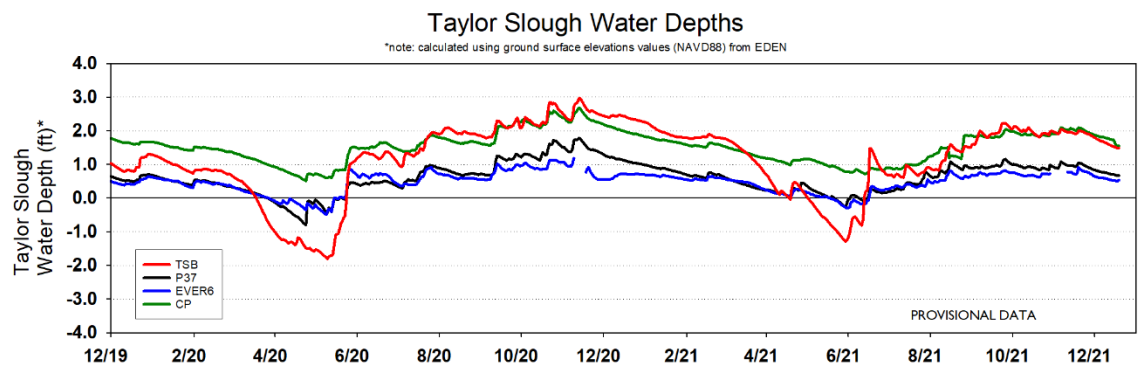


Figure EV-9. Taylor Slough water depth time series.

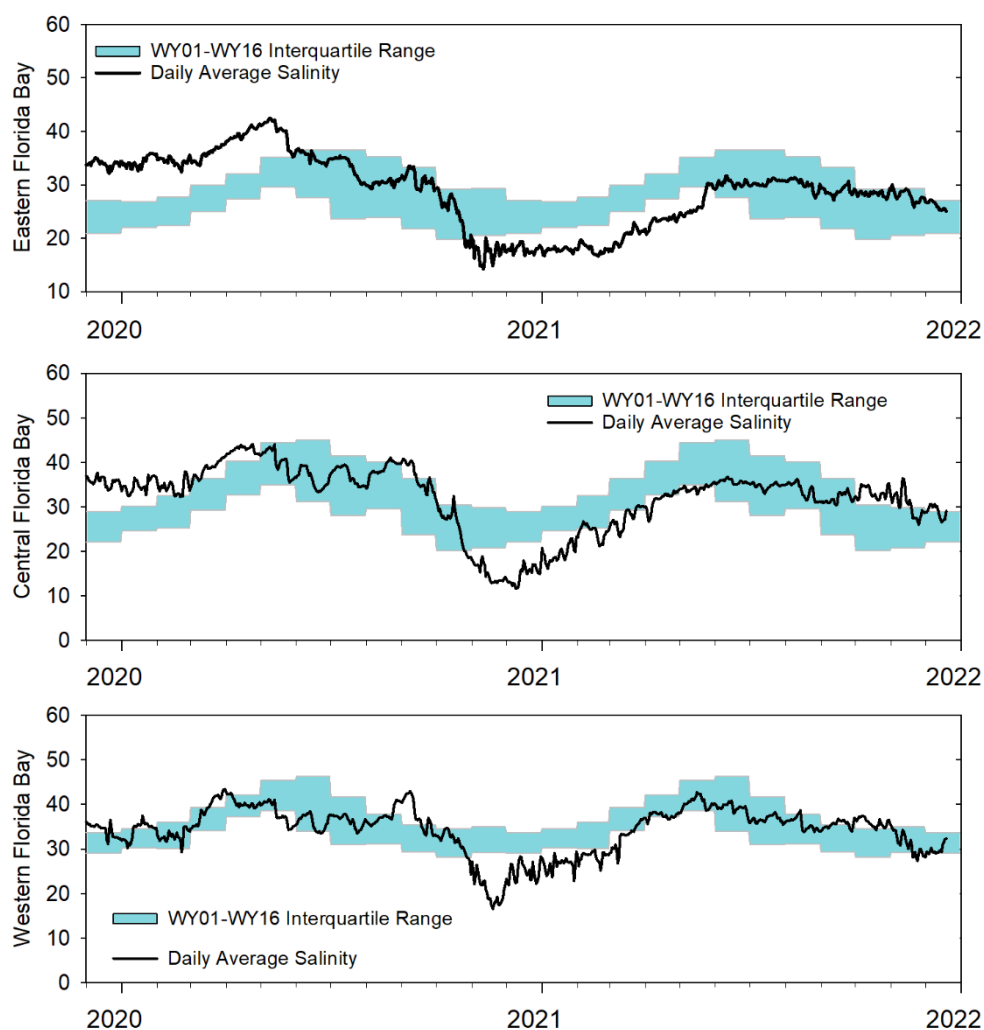


Figure EV-10. Eastern (top panel), Central (middle panel) and Western (bottom panel) Florida Bay daily average salinities with interquartile (25-75 percentile) ranges.

Table EV-2. Weekly water depth changes and water management recommendations

SFWMD Everglades Ecological Recommendations, December 7, 2021 (red is new)			
Area	Weekly change	Recommendation	Reasons
WCA-1	Stage increased by 0.08'	Conserve water in this basin letting the water move south when conditions allow.	Protect within basin and downstream habitat and wildlife. Anticipated La Nina dry season.
WCA-2A	Stage decreased by 0.07'	Conserve water in this basin letting the water move south when conditions allow, with northern WCA-3A as the priority for receiving discharge. Keeping a recession rate less than 0.10 feet per week has an ecological benefit.	Protect within basin and downstream habitat and wildlife. Protect wading bird foraging conditions in WCA-3A North.
WCA-2B	Stage decreased by 0.07'	Conserve water in this basin, maintain a minimum input to maintain stage while moving water south when conditions allow.	Protect within basin and downstream habitat and wildlife. Depths in excess of 4.0 feet.
WCA-3A NE	Stage decreased by 0.10'	Conserve water in this basin letting the water move south when conditions allow. Keeping a recession rate less than 0.10 feet per week has an ecological benefit.	Protect within basin peat soils and downstream habitat and wildlife.
WCA-3A NW	Stage decreased by 0.09'	Conserve water in this basin letting the water move south when conditions allow. Keeping a recession rate less than 0.10 feet per week has an ecological benefit.	
Central WCA-3A S	Stage decreased by 0.10'	Conserve water in this basin letting the water move south when conditions allow. Keeping a recession rate less than 0.10 feet per week has an ecological benefit.	Protect within basin and downstream habitat and wildlife.
Southern WCA-3A S	Stage decreased by 0.09'		
WCA-3B	Stage decreased by 0.01'	Conserve water in this basin letting the water move south when conditions allow.	Protect within basin and downstream habitat and wildlife.
ENP-SRS	Stage increased by 0.01 feet	Make discharges to the Park according to COP and TTFF protocol while considering upstream and downstream ecological conditions.	Protect within basin and upstream habitat and wildlife.
Taylor Slough	Stage changes ranged from -0.02' to -0.21'	Move water southward as possible.	When available, provide freshwater buffer for downstream conditions.
FB- Salinity	Salinity changes ranged -2.0 to +8.7	Move water southward as possible.	When available, provide freshwater to maintain low salinity buffer and promote water movement.