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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: October 13, 2021

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

Early-day rains in the east and widely scattered interior and western rains during the afternoon on Wednesday are expected, but total daily rainfall probably will be below the daily climatological average. As an upper-level low begins to sink southward or southwestward, a moisture surge arriving Thursday morning should result in an enhancement of rains over the offshore waters through the east coast by early Thursday morning and around and south of Lake Okeechobee during the day that could produce widespread coverage of light to moderately heavy rains. Late in the week, when the upper-low sinks farther south into the northwestern Caribbean Sea, much drier, modified continental air with greater atmospheric stability will arrive from the north and northeast while the zone of greater moisture across the District on Thursday pushes southward to the Florida Straits. While this should greatly reduce rainfall across much of the District, rains will probably be enhanced across the Florida Keys, some of which could creep into the far southern part on Friday but to a lesser extent on Saturday as the drier continental air becomes more dominant. On Sunday, a quick-moving jet stream disturbance passing through the eastern U.S. will push a weak cold front into north Florida that should settle southward into central or southern Florida on Monday. With still-limited moisture on Sunday, only a small increase of rains is forecast in association with the front, with a focus in the east where onshore winds could fuel greater rains. When the frontal boundary sinks farther south on Monday, a greater increase of rains is predicted, some of which could be heavy and focus along and near the east coast while a drying occurs north and west of Lake Okeechobee well behind the front. For the week ending next Tuesday morning, total weekly District rainfall is likely to be below normal, with the greatest weekly rains south through southeast of Lake Okeechobee and with considerably less areal average rainfall north and northwest of the Lake.

Kissimmee

Flow at S-65A continues to be too low for complete inundation of the Kissimmee River floodplain, and mean floodplain water depth declined to 1.03 feet by October 10, 2021. The concentration of dissolved oxygen in the Kissimmee River has been improving, with the station average rising above 2.0 mg/L on October 10, 2021.

Lake Okeechobee

Lake Okeechobee stage was 15.83 feet NGVD on October 10, 2021, and it was 1.01 feet higher than a month ago. Lake stages have been above or at the very top of the ecological envelope for all of 2021 and is currently 0.4 feet above. There have been essentially no outflows from the Lake since late June 2021. Recent satellite imagery (October 10, 2021) showed low to medium bloom potential in the western and northeastern parts of the Lake.

Estuaries

Total inflow to the St. Lucie Estuary averaged approximately 1,230 cubic feet per second (cfs) over the past week with no flow coming from Lake Okeechobee. Mean salinities increased slightly at all sites within the estuary 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 3,119 cfs over the past week with no flow coming from the Lake. Mean salinities remained the same at S-79 and Val I-75 and increased at the remaining sites within the estuary 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 Sanibel and Shell Point and in the fair range at Cape Coral.

Stormwater Treatment Areas

For the week ending October 10, 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 61,000 ac-feet. The total amount of inflows to the STAs in WY2022 is approximately 807,000 ac-feet. Most STA cells are above 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. Operational restrictions are also in effect in STA-5/6 Flow-ways 2 and 3 following the Restoration Strategies project to grade non-effective treatment areas. This week, there is no capacity for Lake releases in the STAs.

Everglades

Rehydration rates were generally fair to good across the Everglades. Depths in WCA-3A North remain below the average for this time of year, and tree island model output indicate drier than average conditions. Stages decreased in Taylor Slough with a steady recession from north to south. In Florida Bay, salinities increased over the last week on average. Both central and western Florida Bay remain above the 75th percentile of the historical average salinity for this time of year, and the Bay as a whole remains marine and above average.

SUPPORTING INFORMATION

Kissimmee Basin

Upper Kissimmee

On October 10, 2021, lake stages were 57.2 feet NGVD (0.1 feet below schedule) in East Lake Toho, 54.1 feet NGVD (0.2 feet below schedule) in Lake Toho, and 51.1 feet NGVD (0.7 feet below schedule) in Lakes Kissimmee-Cypress-Hatchineha (KCH) (**Table KB-1, Figures KB-1-3**).

Lower Kissimmee

Discharges to the Kissimmee River on October 10, 2021 were 1,320 cfs at S-65 and 1,420 cfs at S-65A; discharges from the Kissimmee River were 1,790 cfs at S-65D and 1,950 cfs at S-65E (**Table KB-2**). Headwater stages were 46.5 feet NGVD at S-65A and 28.5 feet NGVD at S-65D on October 10, 2021. With lower water temperatures, little rainfall, and reduced discharge at S-65A, the concentration of dissolved oxygen in the Kissimmee River has been improving (**Table KB-2, Figure KB-4**), with the daily average above 2.0 mg/L on October 10. Flow at S-65A remains too low for complete inundation of the Kissimmee River floodplain, and mean floodplain depth decreased to 1.03 feet by October 10, 2021 (**Figure KB-5**).

Water Management Recommendations

Maintain at least 1,400 cfs at S65/S65A while stage in KCH is at or above 50 ft NGVD, per the IS-14-50 discharge plan (**Figure KB-6**).

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)	
							10/10/21	10/3/21
Lakes Hart and Mary Jane	S-62	LKMJ	84	60.3	R	60.3	0.0	0.0
Lakes Myrtle, Preston and Joel	S-57	S-57	67	61.3	R	61.3	0.0	0.0
Alligator Chain	S-60	ALLI	0	63.5	R	63.4	0.1	0.0
Lake Gentry	S-63	LKGT	0	61.3	R	61.2	0.1	0.1
East Lake Toho	S-59	TOHOE	0	57.2	R	57.3	-0.1	-0.1
Lake Toho	S-61	TOHOW S-61	0	54.1	R	54.3	-0.2	-0.1
Lakes Kissimmee, Cypress and Hatchineha	S-65	KUB011 LKIS5B	1,443	51.1	R	51.8	-0.7	-0.1

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.

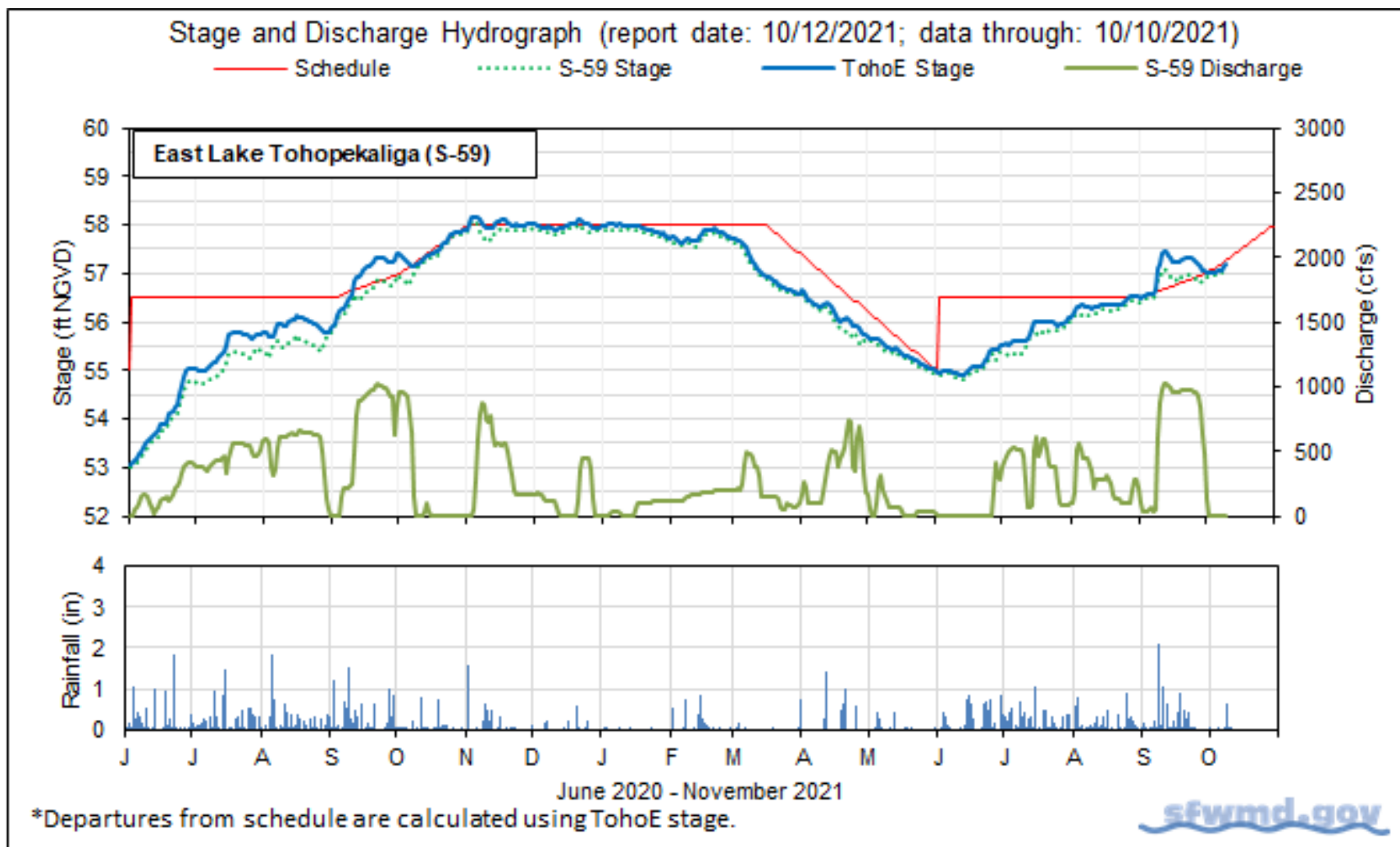


Figure KB-1. East Lake Toho regulation schedule, stage, discharge and rainfall.

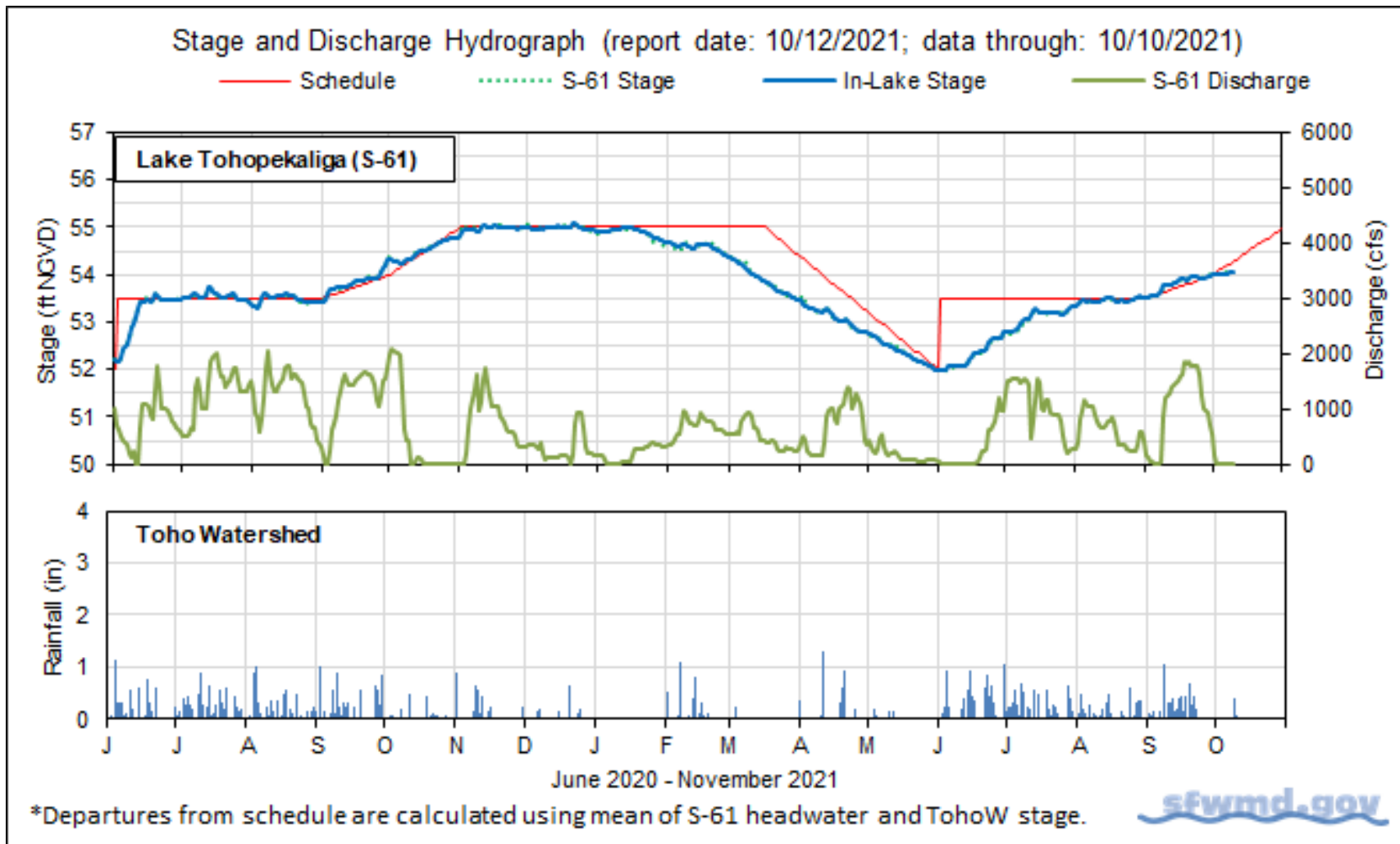


Figure KB-2. Lake Toho regulation schedule, stage, discharge and rainfall.

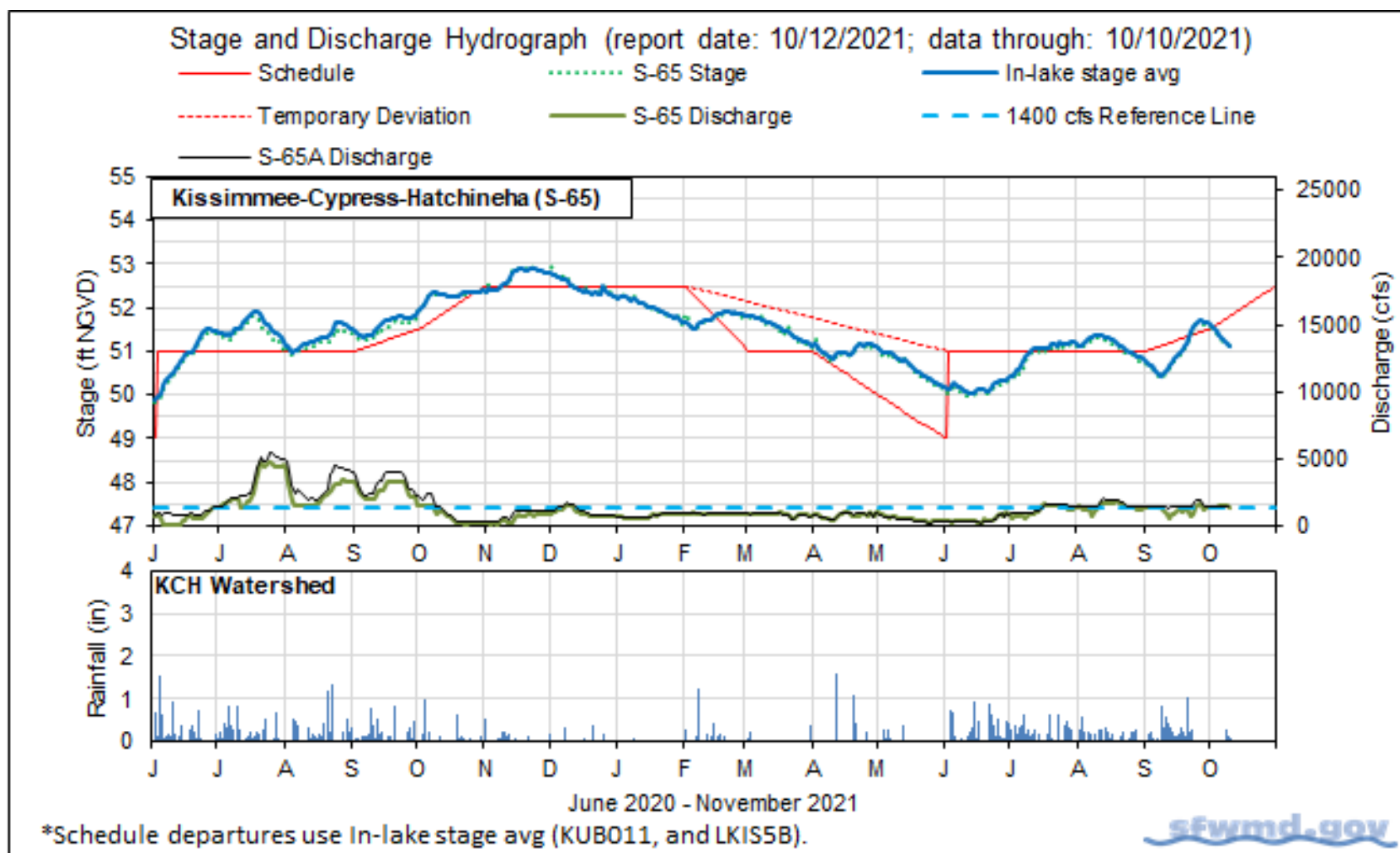


Figure KB-3. Lakes Kissimmee, Cypress and Hatchineha regulation schedule, stage, discharge and rainfall.

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			
		10/10/21	10/10/21	10/3/21	9/26/21	9/19/21
Discharge	S-65	1,320	1,440	1,340	1,170	1,020
Discharge	S-65A ^a	1,420	1,460	1,500	1,650	1,420
Headwater Stage (feet NGVD)	S-65A	46.5	46.4	46.2	46.4	46.3
Discharge	S-65D ^b	1,790	2,030	2,880	2,650	1,680
Headwater Stage (feet NGVD)	S-65D ^c	28.5	28.5	28.6	28.7	28.5
Discharge (cfs)	S-65E ^d	1,950	2,150	3,010	2,770	1,730
Discharge (cfs)	S-67	0	0	0	0	0
Dissolved Oxygen (mg/L) ^e	Phase I, II/III river channel	2.3	1.9	0.9	0.8	0.8
Mean depth (feet) ^f	Phase I floodplain	1.03	1.07	1.40	1.52	1.21

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.

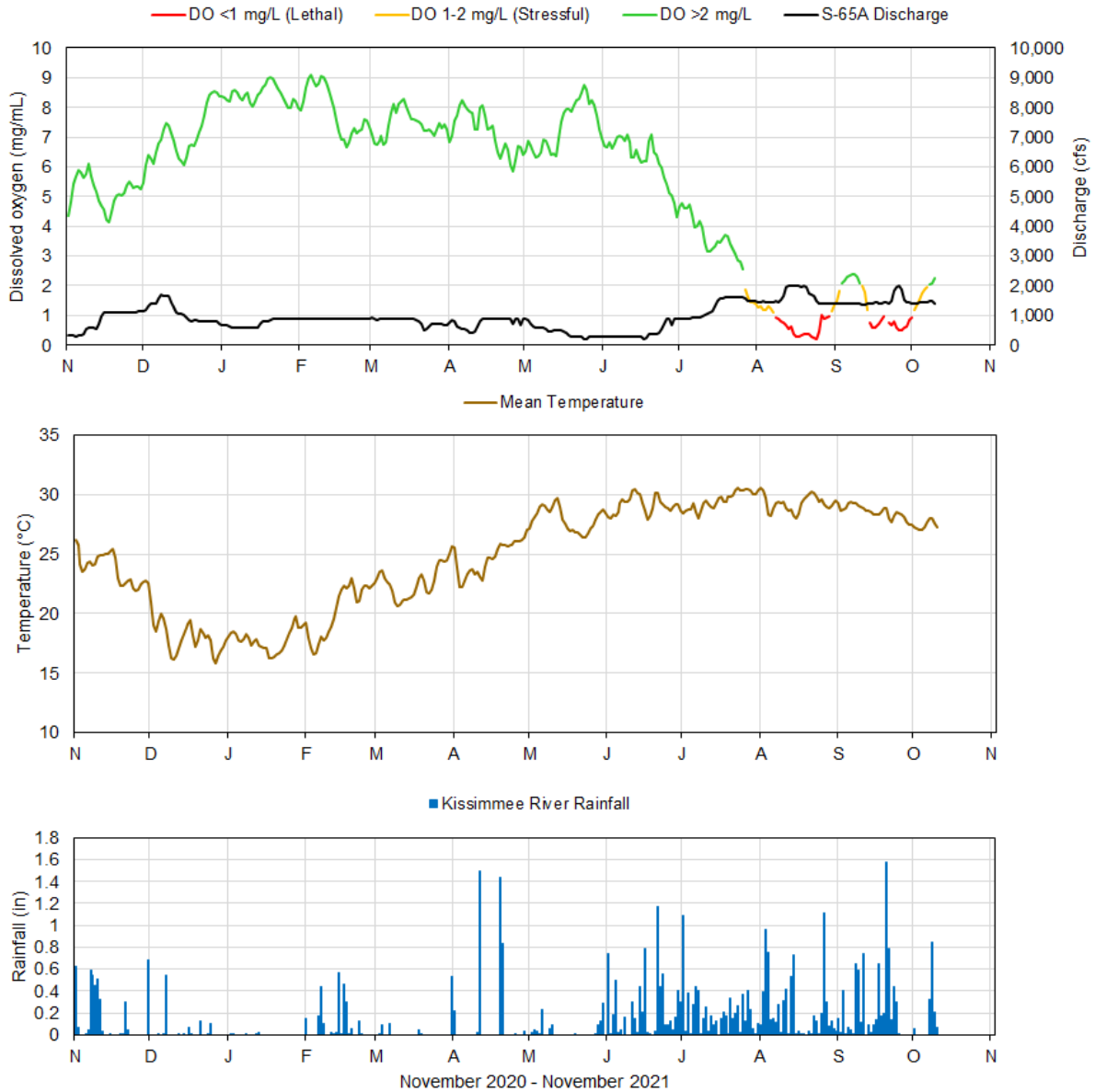
d. Combined discharge from S-65E and S-65EX1.

e. Dissolved oxygen is the average of values from sondes KRBN, PC62, PC63, 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: 10/12/2021; data are through: 10/10/2021



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 four stations reporting this week. Rainfall values are daily totals for Kissimmee River (Pool BCD) AHED watershed.

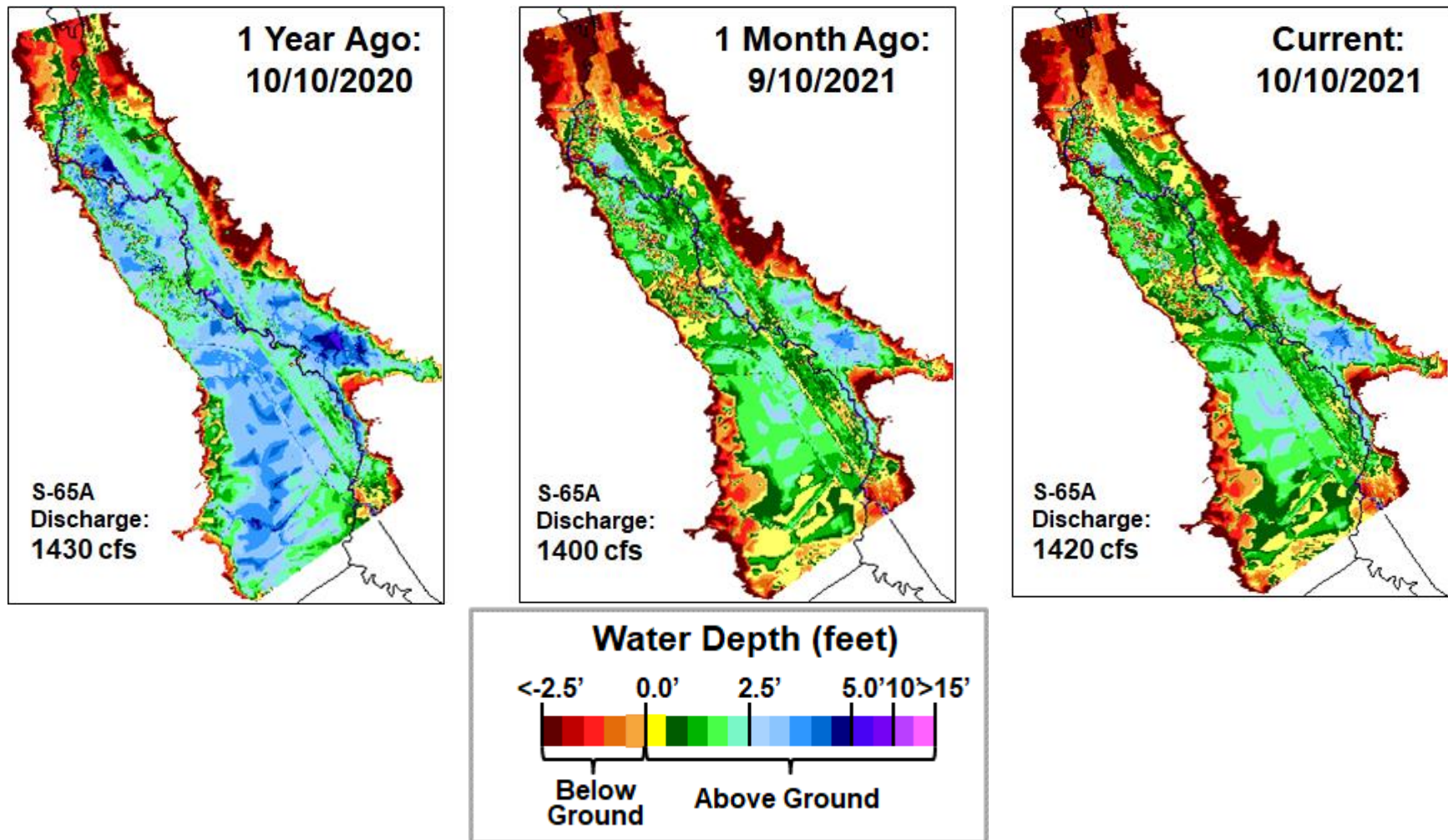


Figure KB-5. Phase I area Kissimmee River floodplain water depths (from left to right) one year ago, one month ago and current.

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 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.

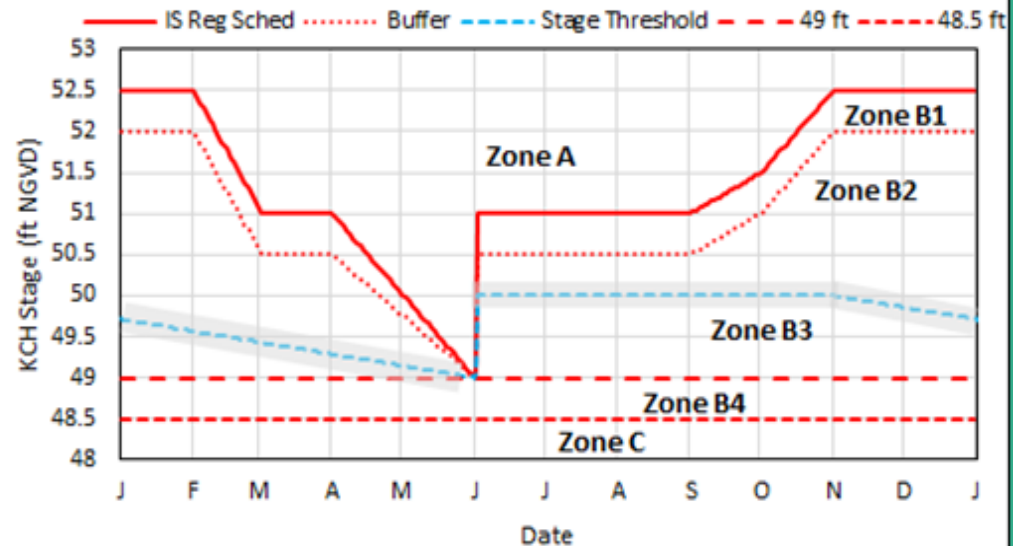
Table KB-3. Discharge Rate of Change Limits for S65/S65A (revised 1/14/19).

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

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

Preferred Discharge Plan for S-65/S-65A (IS-14-50.0)



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

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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 15.83 feet NGVD on October 10, 2021, and it was 1.01 feet higher than a month ago (**Figure LO-1**). Lake stage is currently 0.4 ft above the ecological envelope, having been either above or at the very top of the envelope for all of 2021 (**Figure LO-2**). Lake stage remained in the Low sub-band last week (**Figure LO-3**). According to NEXRAD, 1.85 inches of rain fell directly on the Lake last week.

Average daily inflows (excluding rainfall) decreased from the previous week, going from 7,708 cfs to 4,596 cfs. Average daily outflows (excluding evapotranspiration) remained at 0 cfs. There have been essentially no outflows from the Lake since late June 2021. Most of the inflows (2,153 cfs) came from the Kissimmee River through S-65E & S-65EX1 structures. The second and third highest inflows were received from the Indian Prairie basins (992 cfs) and Fisheating Creek (822 cfs), respectively. There was no outflow to the west via S-77, to the east via S-308, or to the south via S-351, S-352, and S-354 structures. There was backflow from the L-8 canal via the S-271 structure at the average daily rate of 107 cfs. **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 (October 10, 2021) from the NOAA cyanobacteria monitoring product derived from EUMETSAT's Sentinel 3 OLCI sensor data showed low to medium bloom potential in the western and northeastern parts of the Lake (**Figure LO-6**). The October 4-7, 2021 algal survey results revealed that approximately 34% of the samples had microcystin concentration above the detection limit ($> 0.25 \mu\text{g/L}$) and about 12% had above the EPA recommended threshold for recreational waters ($8 \mu\text{g/L}$). The maximum toxin concentration ($44 \mu\text{g/L}$) was recorded at PALMOUT2 in the southwestern part of the Lake. Approximately 62% of the samples had mixed algal communities, while the rest were dominated by *Microcystis aeruginosa*. The October 4-7, 2021 algal survey results are shown in **Table LO-1** and **Figure LO-7**.

Changes in Water Depth

1 Month Ago:
09/10/2021

Current:
10/10/2021

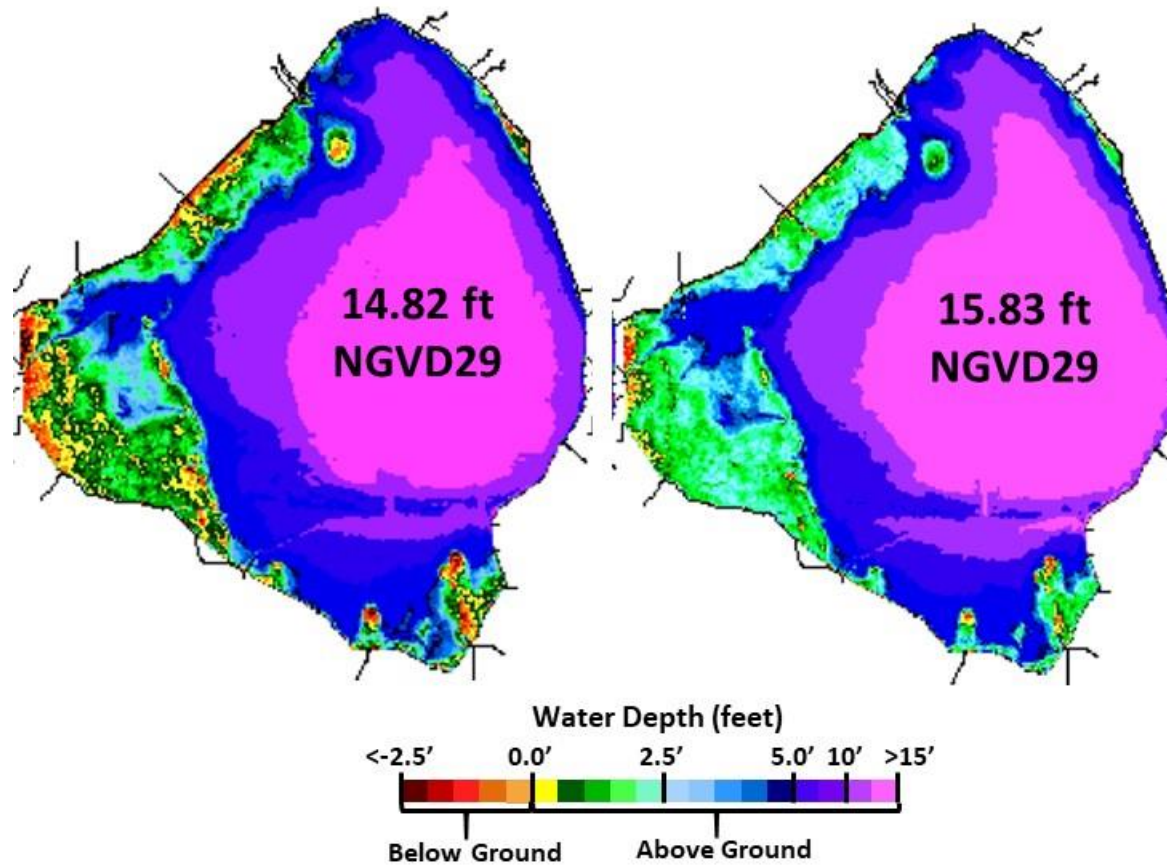


Figure LO-1. Lake Okeechobee water depth estimates based on South Florida Water Depth Assessment Tool (SFWDAT).

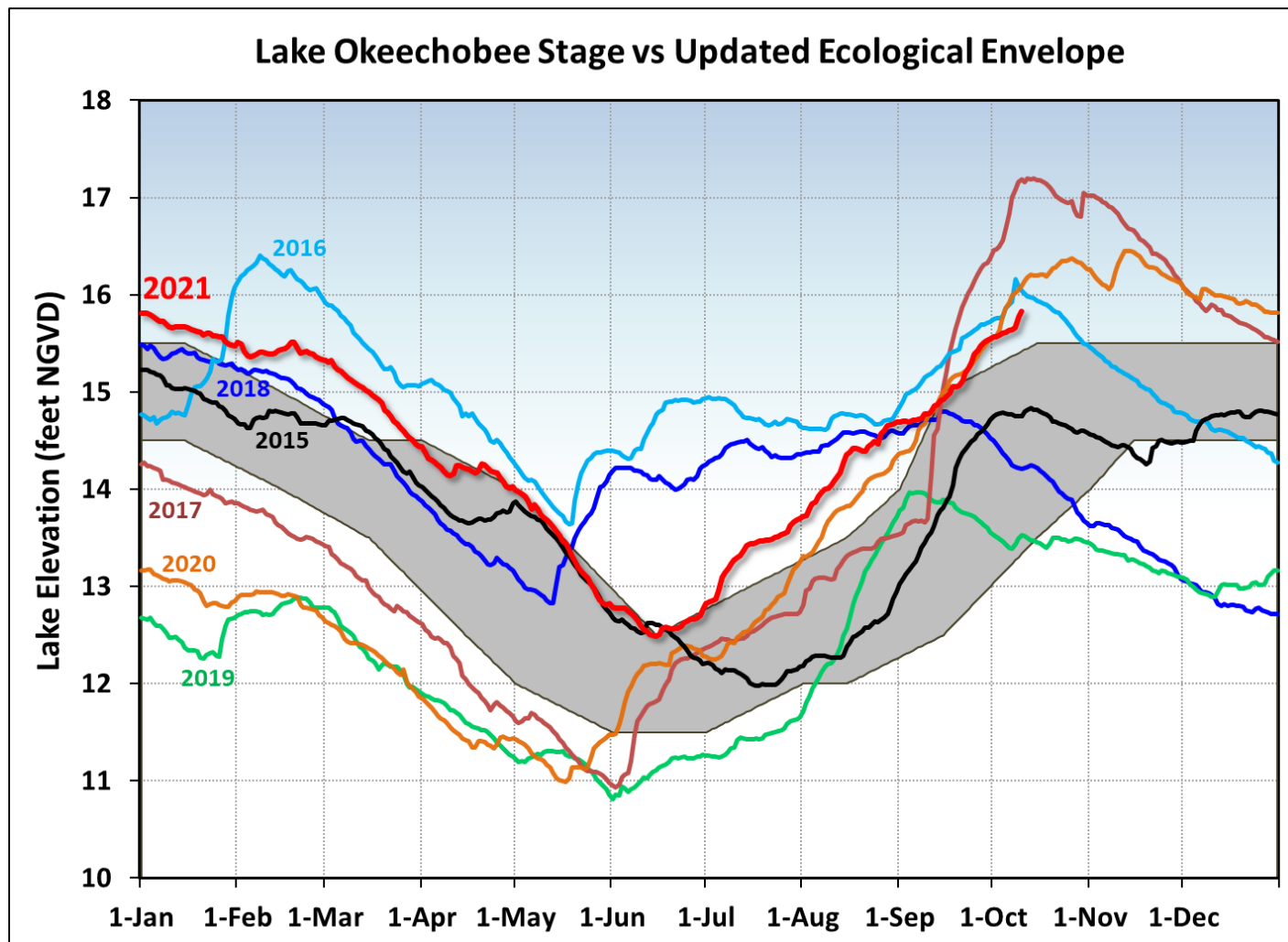


Figure LO-2. Select annual stage hydrographs for Lake Okeechobee in comparison to the updated ecological envelope.

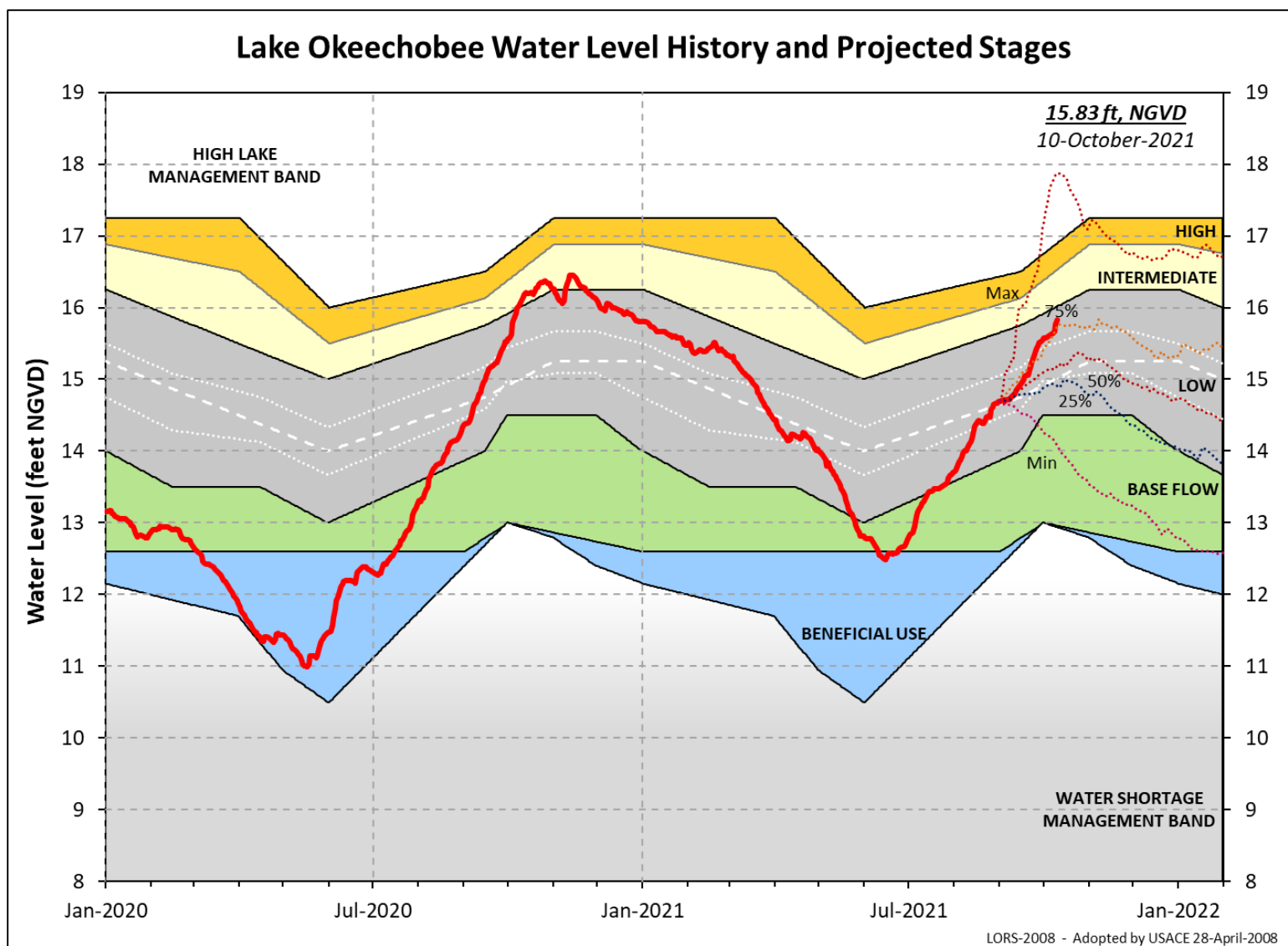


Figure LO-3. Recent Lake Okeechobee stages and releases, with projected stages based on a dynamic position analysis.

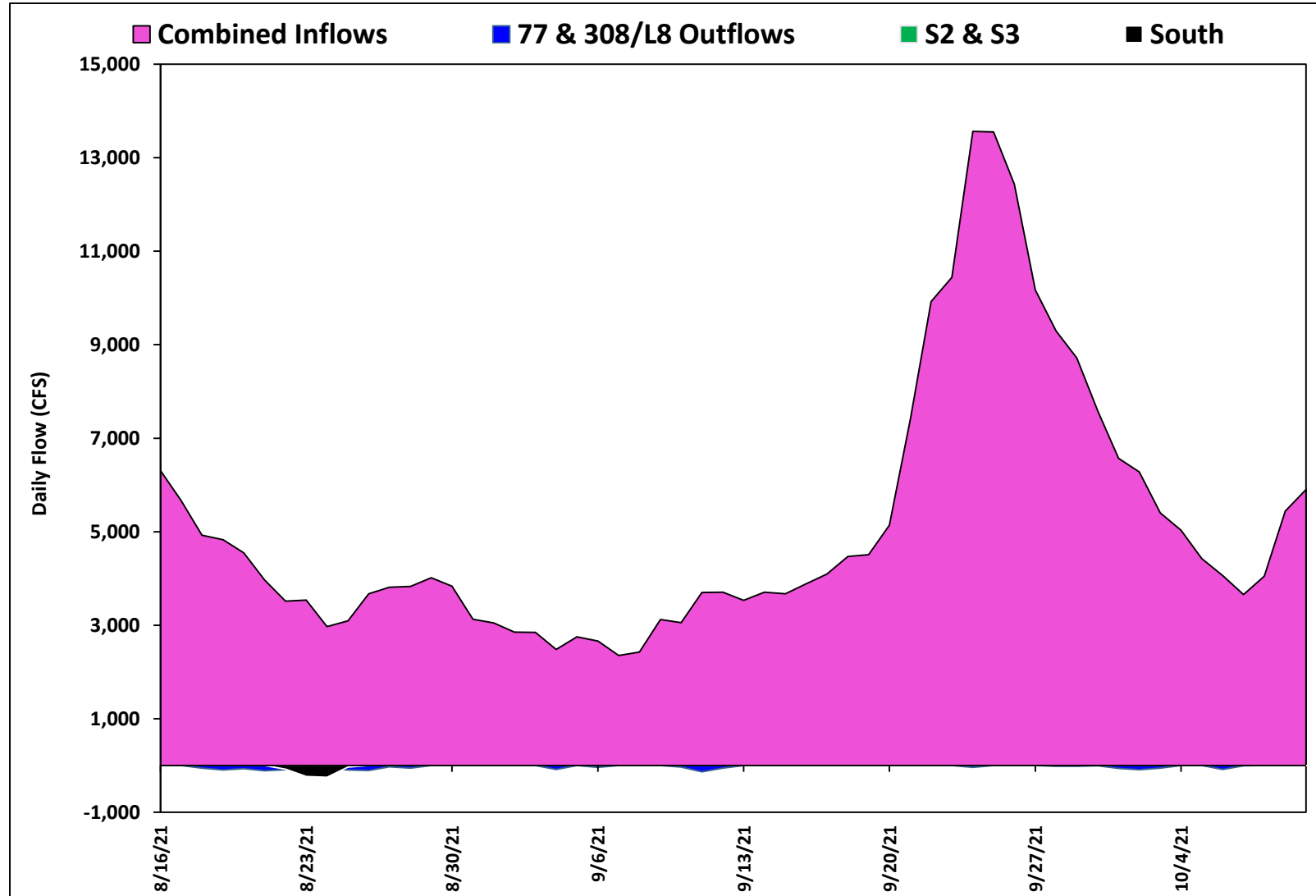


Figure LO-4. Major inflows (pink) to and outflows east and west (blue) from Lake Okeechobee. Outflows south are shown in black. Flows into Lake Okeechobee from the L-8 canal through S-271 (formerly Culvert 10A) or from the C-44 canal through the S-308 are included as inflows. Conversely, flows from Lake 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.

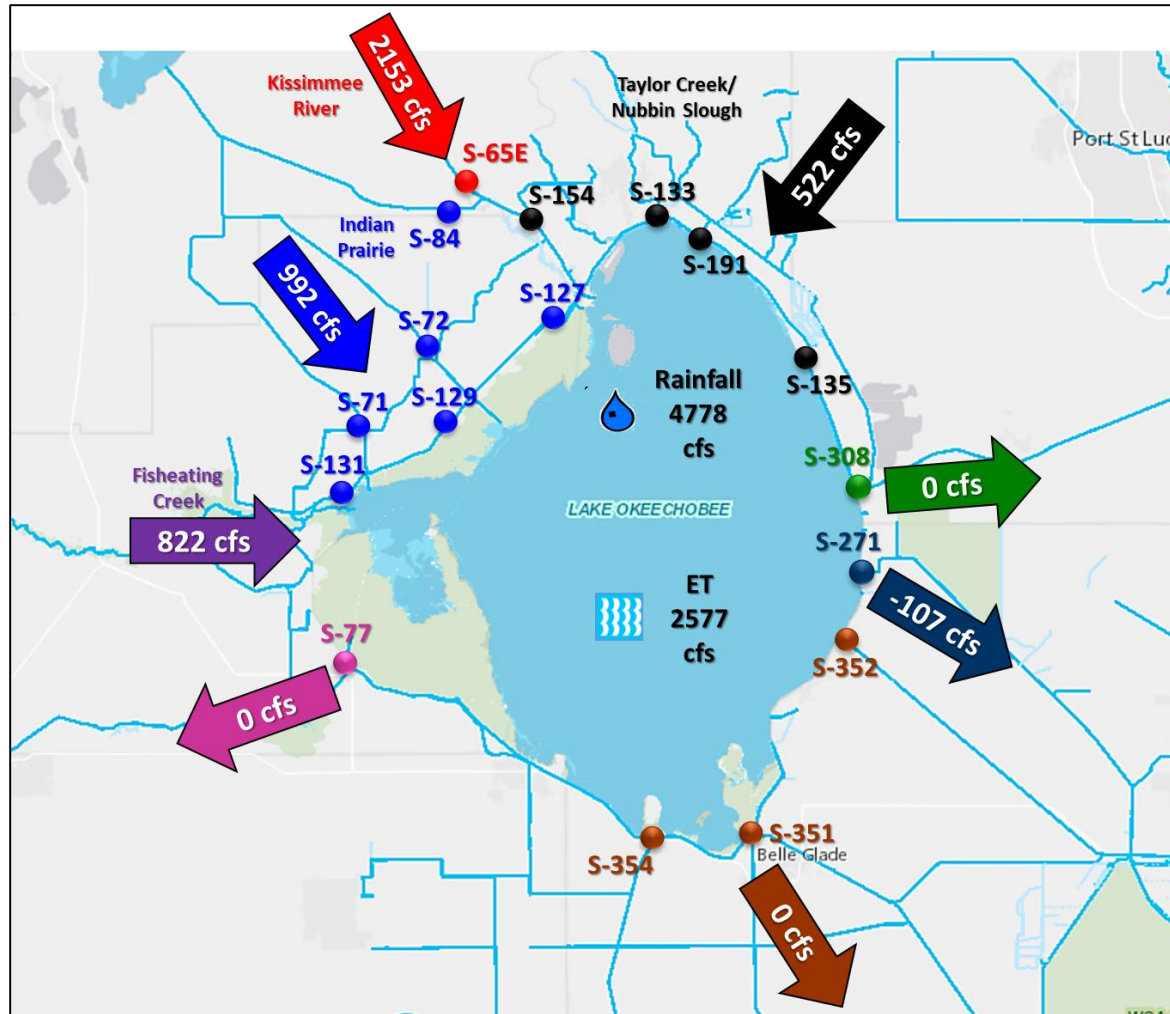


Figure LO-5. Inflows into Lake Okeechobee from Indian Prairie basins, Taylor Creek/Nubbin Slough, Kissimmee River and Fisheating Creek, and outflows to the west via S-77, to the east via S-308, to the south via S-351, S-352, S-354, and to SW via S-271 (formerly Culvert 10A).

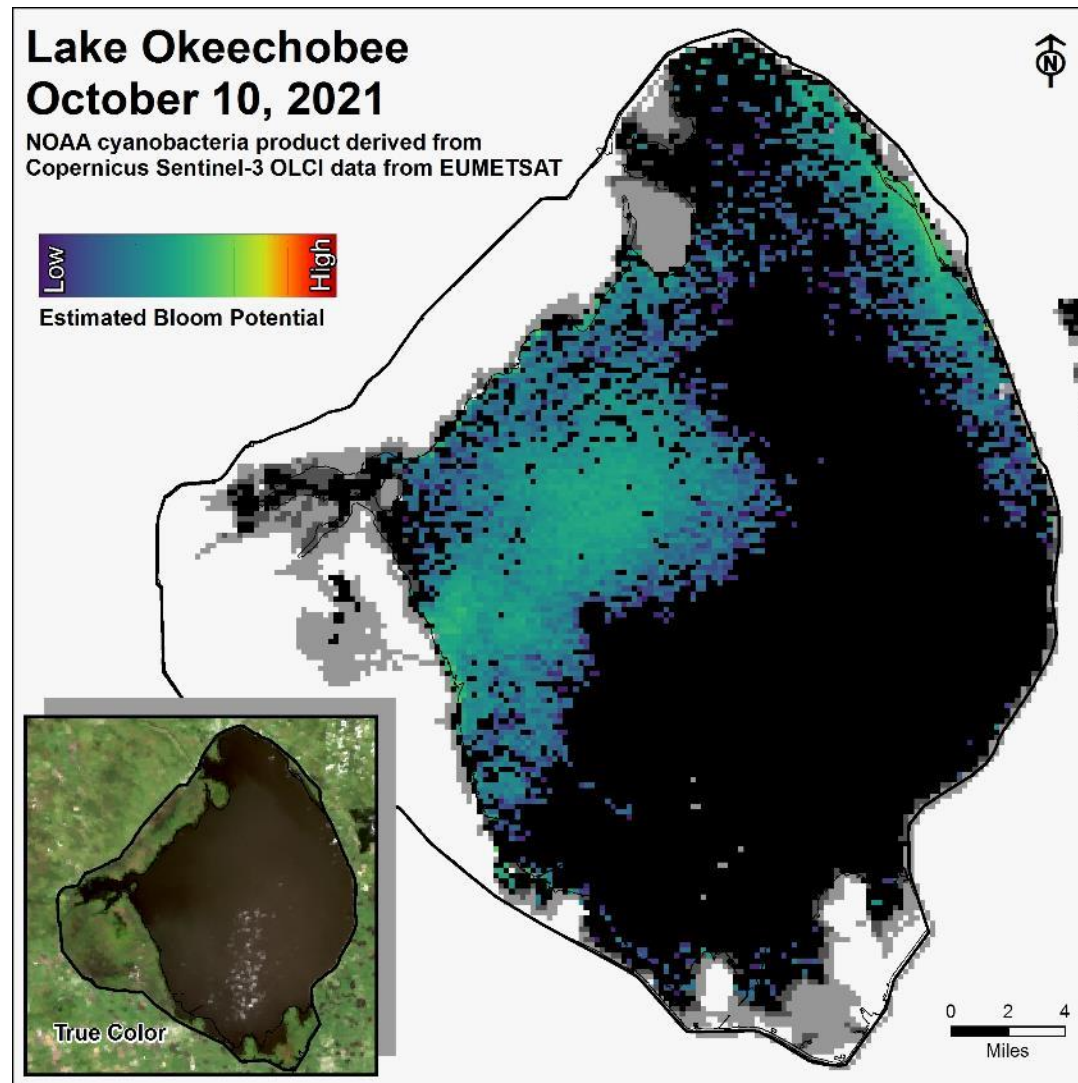


Figure LO-6. Cyanobacteria bloom potential on October 2nd, 2021 based on NOAA's harmful algal bloom monitoring system. Gray color indicates cloud cover.

Table LO-1. Provisional results of chlorophyll *a* concentrations and cyanobacteria taxa from sampling trips on October 4-7, 2021. Color coding generally follows the legend in **Figure LO-6**.

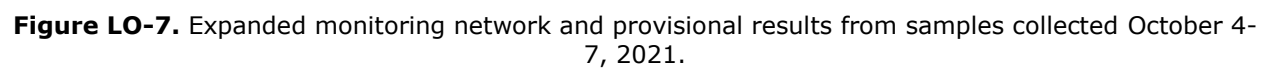
Collection Date: October 4-7, 2021

Station	CHLa (ug/L)	TOXIN (ug/L)	TAXA
FEBIN	P	BDL	<i>mixed</i>
FEBOUT	P	BDL	<i>mixed</i>
KISSR0.0	P	BDL	<i>mixed</i>
L005	P	BDL	<i>Microcys</i>
LZ2	P	BDL	<i>mixed</i>
KBARSE	P	BDL	<i>mixed</i>
RITTAE2	P	0.4	<i>Microcys</i>
PELBAY3	P	BDL	<i>Microcys</i>
POLE3S	P	1.1	<i>Microcys</i>
LZ25A	P	0.3	<i>Microcys</i>
PALMOUT	P	3.5	<i>Microcys</i>
PALMOUT1	P	14.0	<i>Microcys</i>
PALMOUT2	P	44.0	<i>Microcys</i>
PALMOUT3	P	27.0	<i>Microcys</i>
POLESOUT	P	BDL	<i>mixed</i>
POLESOUT1	P	BDL	<i>mixed</i>
POLESOUT2	P	BDL	<i>mixed</i>
POLESOUT3	P	BDL	<i>mixed</i>
EASTSHORE	P	BDL	<i>mixed</i>
NES135	P	BDL	<i>mixed</i>
NES191	P	BDL	<i>mixed</i>

Station	CHLa (ug/L)	TOXIN (ug/L)	TAXA
L001	P	BDL	<i>mixed</i>
L004	P	BDL	<i>mixed</i>
L006	P	1.5	<i>mixed</i>
L007	P	BDL	<i>Microcys</i>
L008	P	BDL	<i>mixed</i>
LZ30	P	15.0	<i>Microcys</i>
LZ40	P	2	<i>Microcys</i>
CLV10A	P	0.4	<i>mixed</i>
NCENTER	P	BDL	<i>mixed</i>

S308C	P	BDL	<i>mixed</i>
S77	P	BDL	<i>mixed</i>

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



Estuaries

St. Lucie Estuary

Over the past week, mean total inflow to the St. Lucie Estuary was 1,230 cfs (**Figures ES-1 and ES-2**), and the previous 30-day mean inflow was 1,857 cfs. For comparison, the historical provisional mean inflows from the contributing areas are shown in **Figure ES-2**.

Over the past week, salinities increased at all sites within the estuary (**Table ES-1 and Figure ES-3**). The seven-day moving average of the surface and bottom salinities at the US1 Bridge was 11.5. 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 3,119 cfs (**Figures ES-5 and ES-6**), and the previous 30-day mean inflow was 5,922 cfs. For comparison, the historical provisional mean inflows from the contributing areas are shown in **Figure ES-6**.

Over the past week, salinities remained the same at S-79 and Val I-75 and increased at the remaining sites in the estuary (**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 Shell Point and Sanibel and in the fair range at Cape Coral (**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 519 cfs. Model results from all scenarios predict daily salinity to be 0.5 or lower, and the 30-day moving average surface salinity to be 0.3 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 October 8, 2021, that *Karenia brevis*, the Florida red tide dinoflagellate, was observed at background to high concentrations in Charlotte County and background to very low concentrations in Lee

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.

County. On the east coast, red tide was not observed in samples from St. Lucie, Martin, or Broward counties.

Water Management Recommendations

Lake stage is in the Low Sub-Band. Tributary conditions are wet. 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.

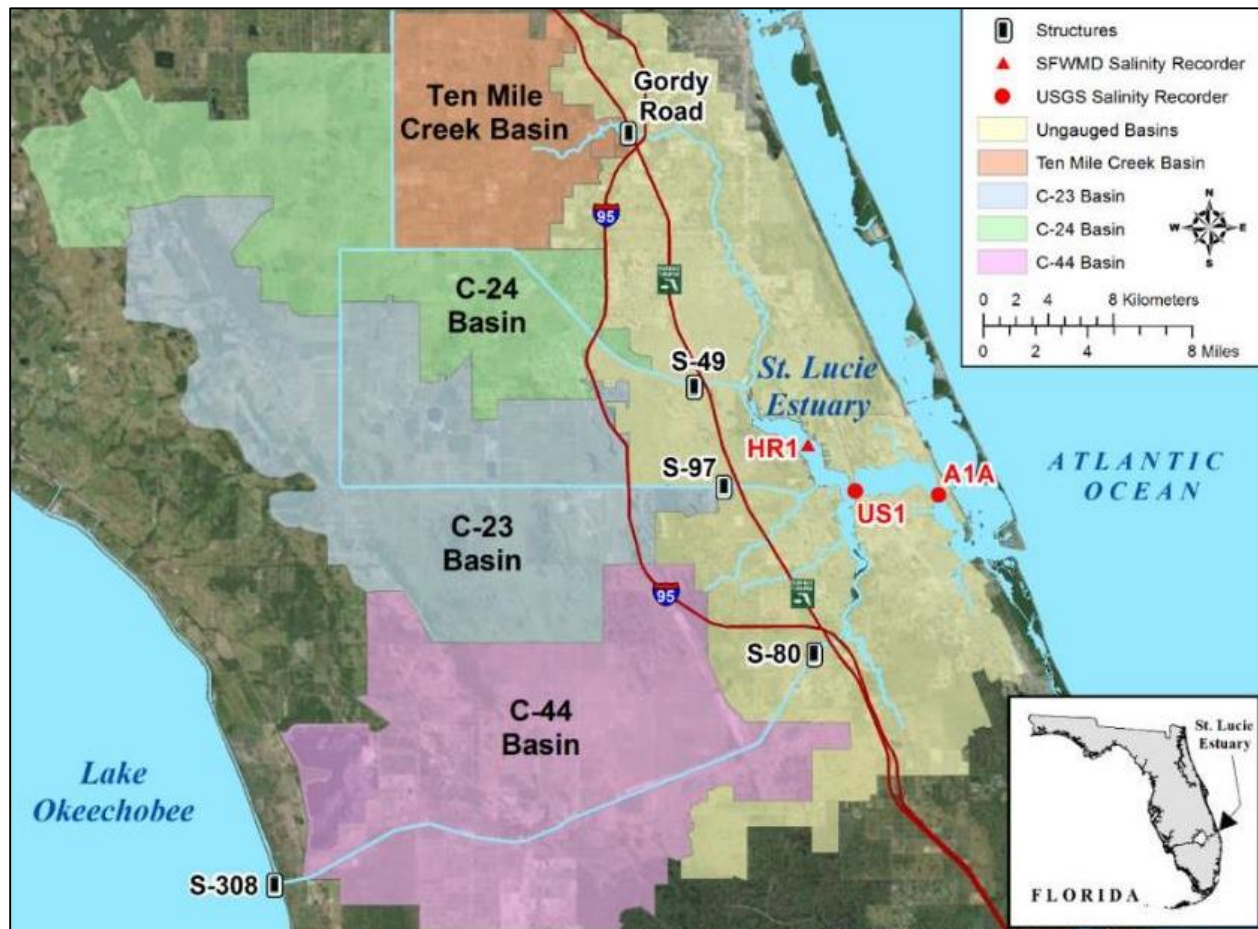


Figure ES-1. Basins, water control structures and salinity monitoring sites in the St. Lucie Estuary.

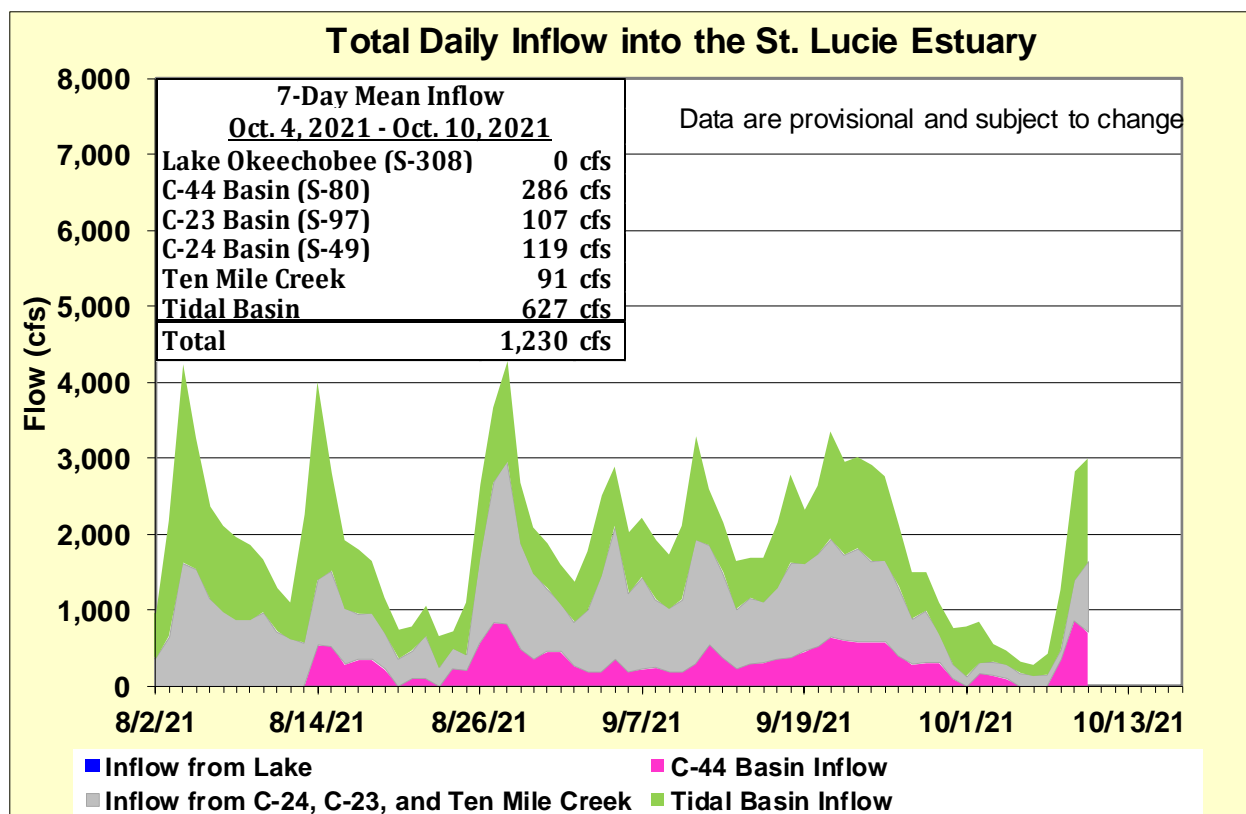


Figure ES-2. Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and Tidal Basins into the St. Lucie Estuary.

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)	4.5 (2.9)	8.5 (4.5)	NA ^a
US1 Bridge	10.3 (6.5)	12.8 (10.0)	10.0 – 26.0
A1A Bridge	20.3 (17.1)	25.3 (24.0)	NA ^a

a. The envelope is not applicable.

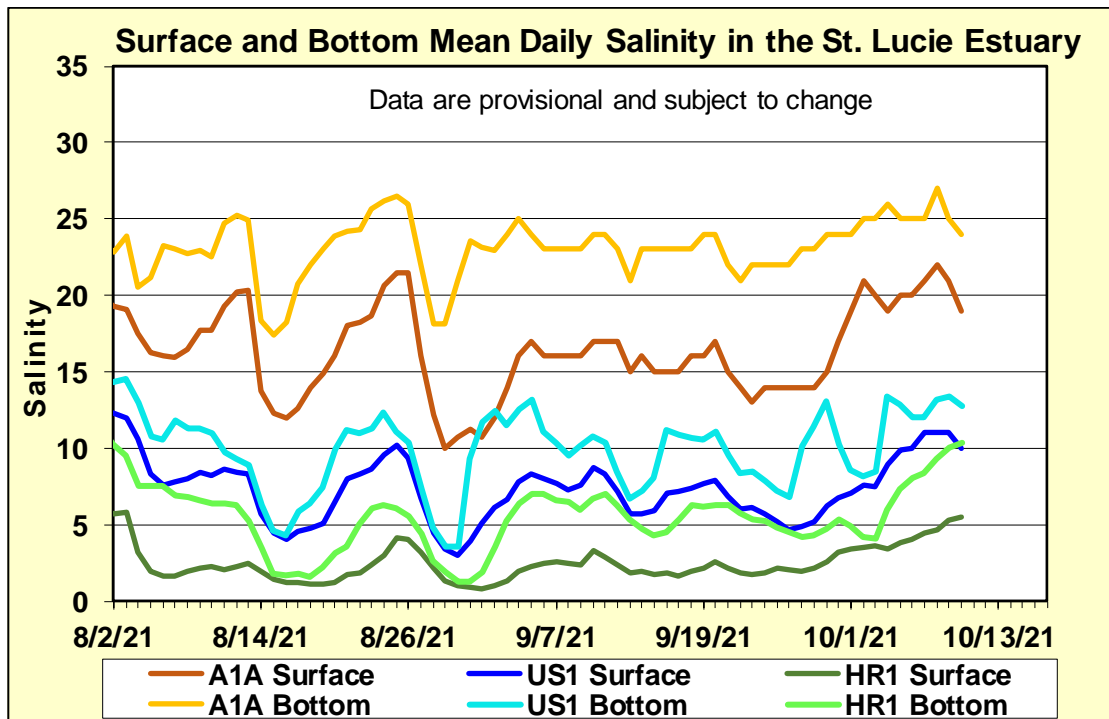


Figure ES-3. Mean daily salinity at the A1A, US1 and HR1 sites in the St. Lucie Estuary.

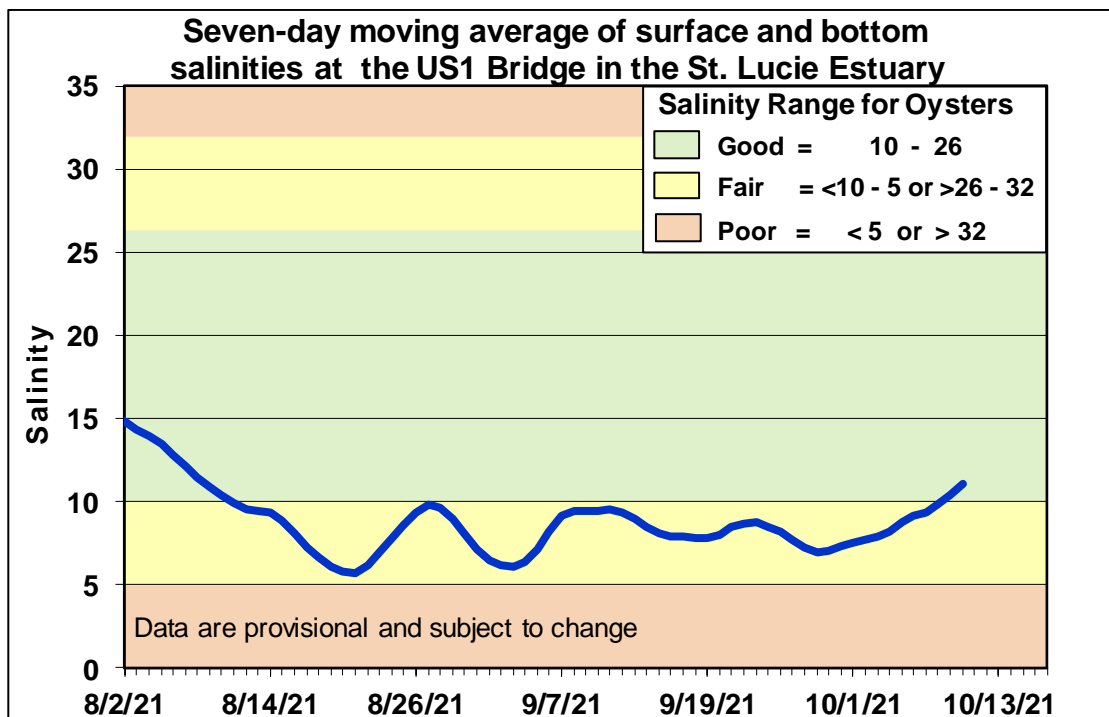


Figure ES-4. Seven-day moving average of the surface and bottom salinities at the US1 Bridge in the St. Lucie Estuary.

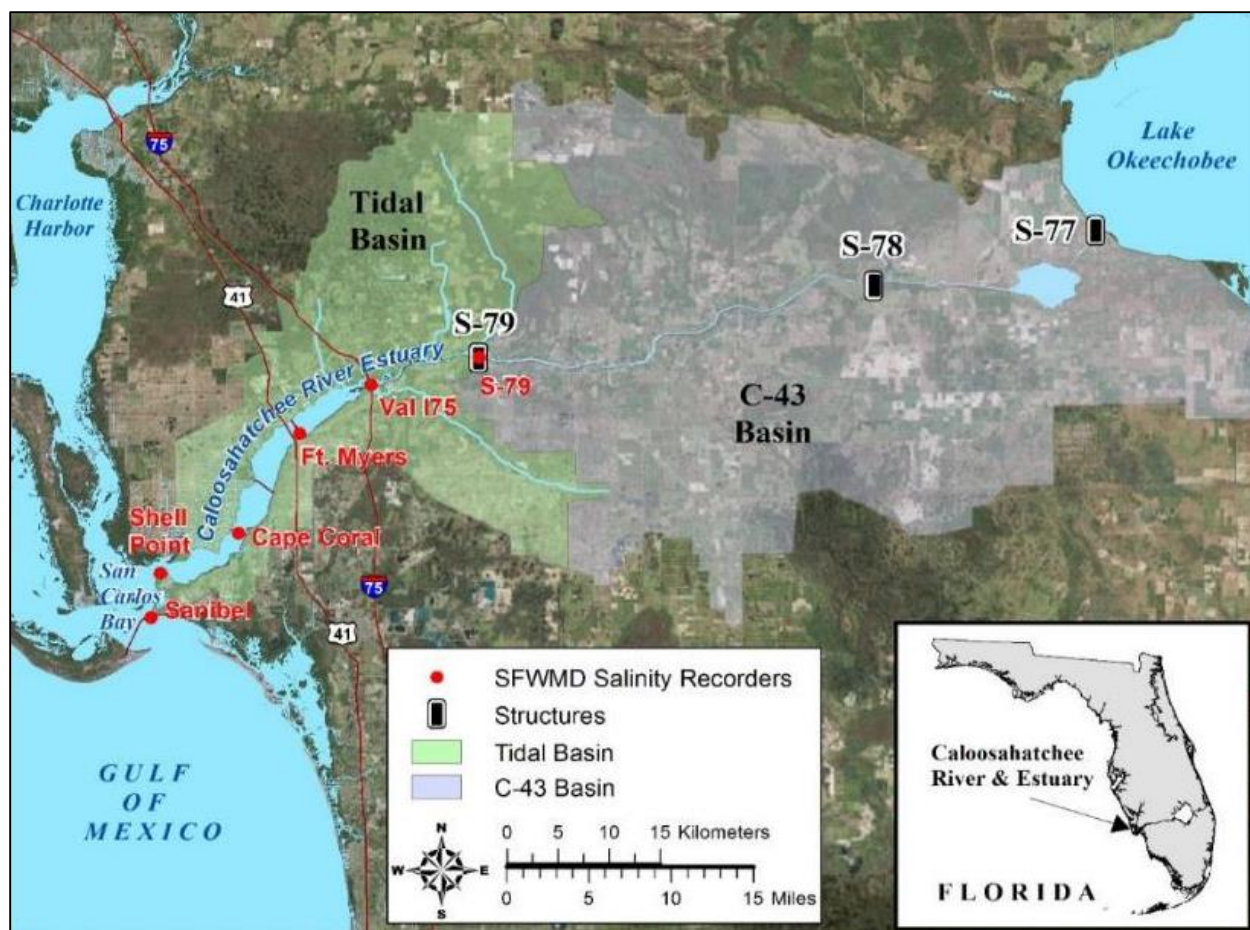


Figure ES-5. Basins, water control structures and salinity monitoring sites in the Caloosahatchee River Estuary.

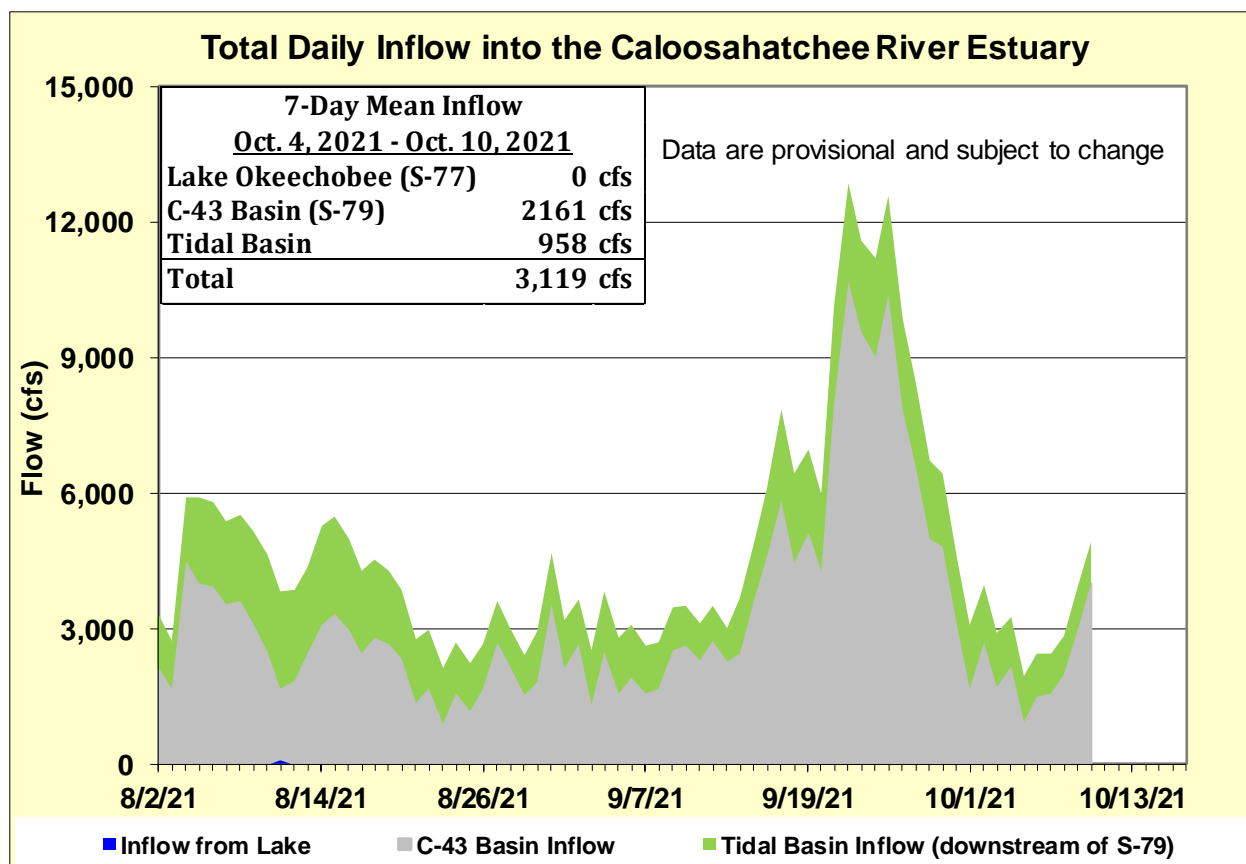


Figure ES-6. Total daily inflows from Lake Okeechobee, and runoff from the C-43 and Tidal basins into the Caloosahatchee River Estuary.

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	0.2 (0.2)	0.2 (0.2)	0.0 – 5.0 ^b
Fort Myers Yacht Basin	0.6 (0.2)	0.8 (0.2)	NA ^a
Cape Coral	6.6 (1.9)	8.5 (2.9)	10.0 – 30.0
Shell Point	21.1 (15.9)	22.0 (19.1)	10.0 – 30.0
Sanibel	27.9 (25.4)	29.8 (28.4)	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.

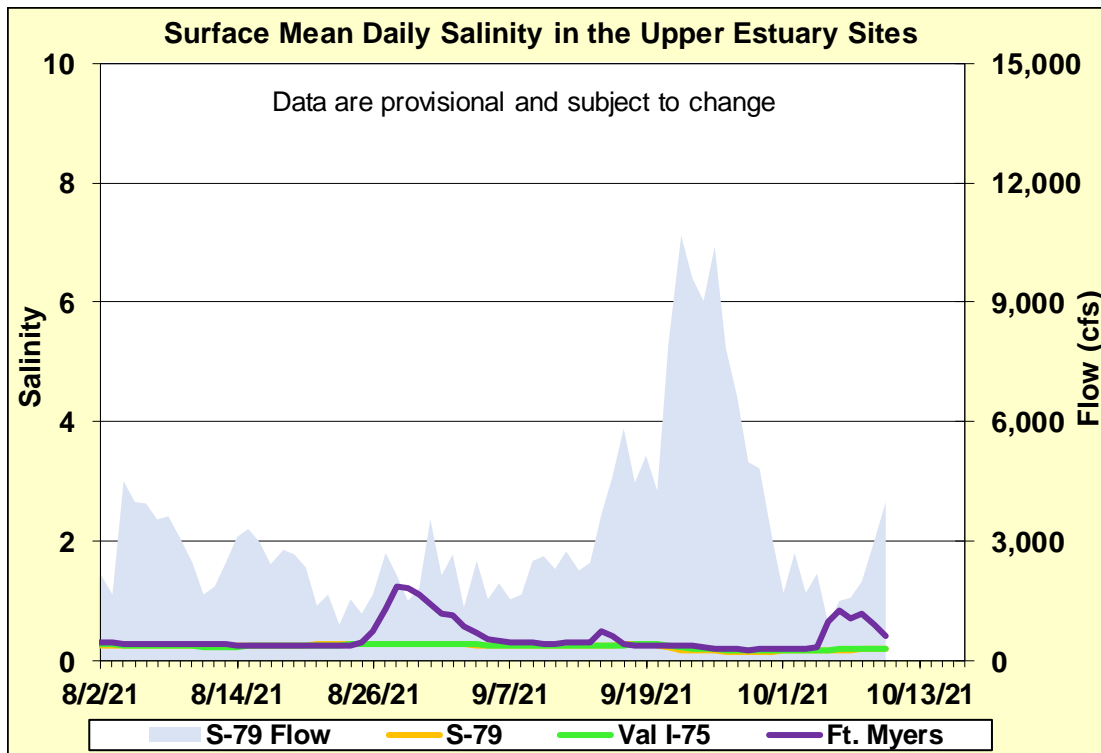


Figure ES-7. Mean daily salinity at upper Caloosahatchee River Estuary monitoring sites and mean daily flow at S-79.

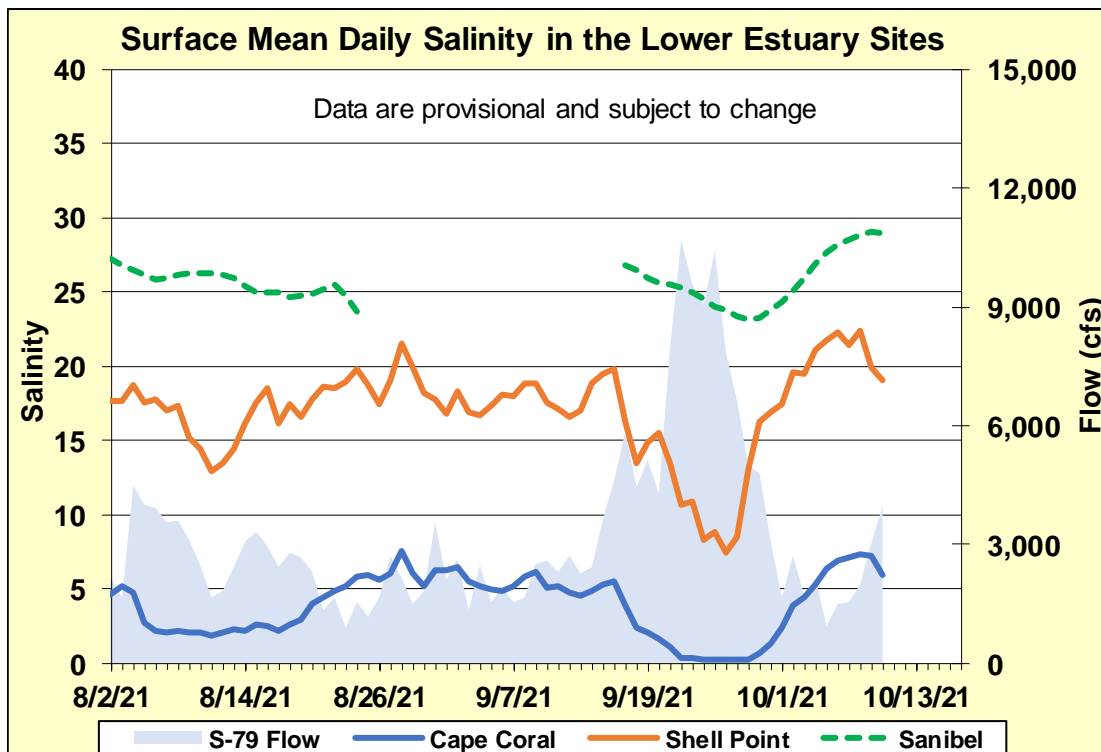


Figure ES-8. Mean daily surface salinity at lower Caloosahatchee River Estuary monitoring sites and mean daily flow at S-79.

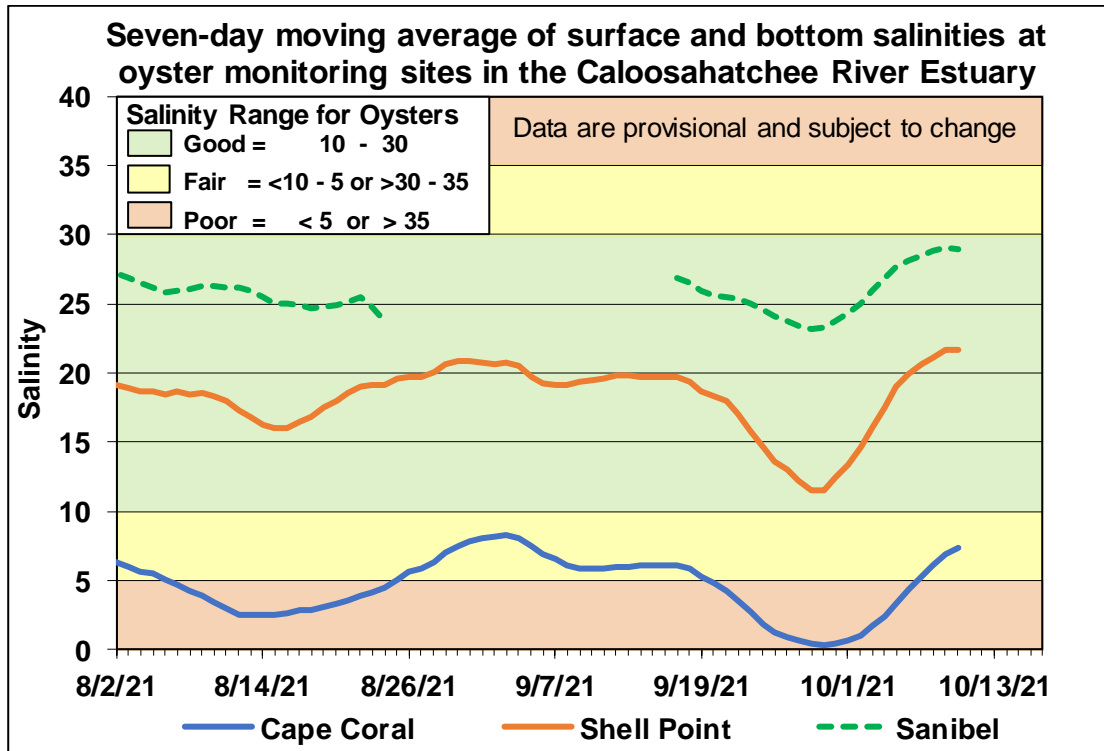


Figure ES-9. Seven-day moving average of surface and bottom salinities at Cape Coral, Shell Point and Sanibel monitoring sites in the Caloosahatchee River Estuary.

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	519	0.5	0.3
B	450	519	0.3	0.3
C	800	519	0.3	0.3
D	1,000	519	0.3	0.3
E	1,500	519	0.3	0.3
F	2,000	519	0.3	0.3

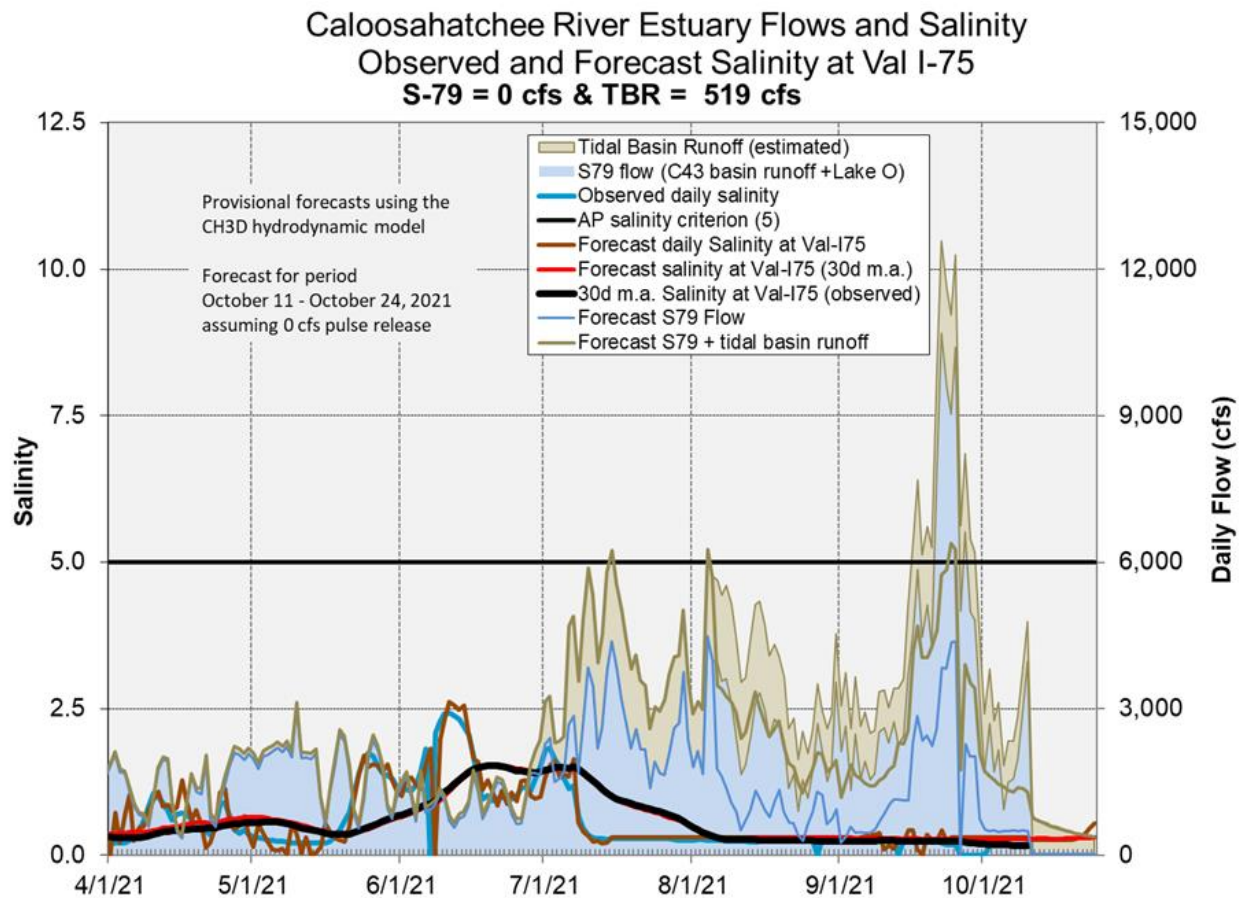


Figure ES-10. Forecasted Val I-75 site surface salinity assuming no pulse release at S-79.

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) for the Eastern and Central Flow-ways are very high (**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 above target stage. Vegetation in the flow-ways is stressed and highly stressed. The 365-day PLRs for the Northern and Western Flow-ways are below 1.0 g/m²/year. The 365-day PLR for the Eastern Flow-way is high (**Figure S-2**).

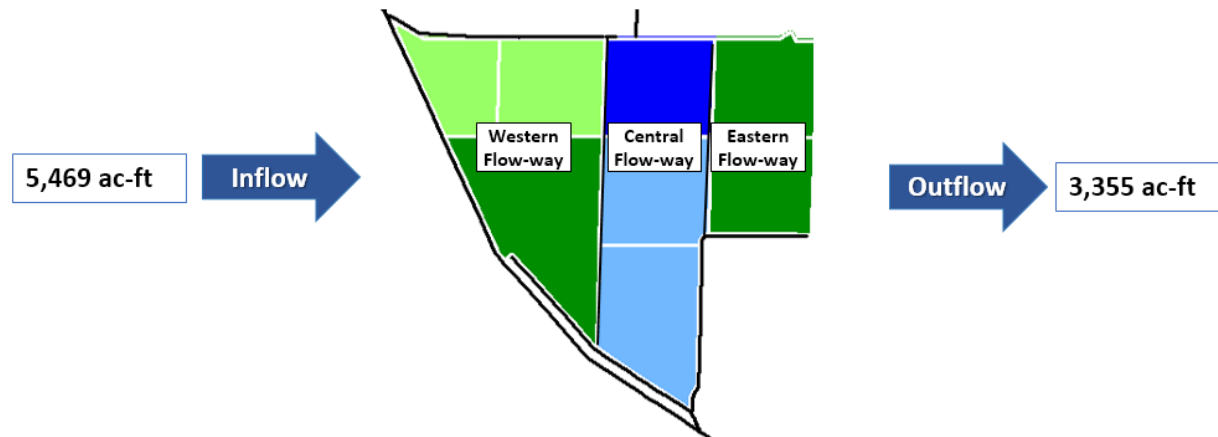
STA-2: STA-2 Flow-way 2 is offline for construction activities. Operational restrictions are in place in STA-2 Flow-ways 3 and 4 for vegetation management activities. Most treatment cells are above target stage. Vegetation in Flow-ways 1 and 3 is stressed, and in Flow-ways 2, 4, and 5 is highly stressed. 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**).





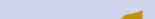

STA-3/4: STA-3/4 Eastern Flow-way is offline for vegetation rehabilitation/drawdown. Most online treatment cells are above target stage. Vegetation in the Eastern and Central Flow-ways is highly stressed and in the Western Flow-way is stressed. The 365-day PLR for the Western Flow-way is below 1.0 g/m²/year. The 365-day PLR for the Central Flow-way is high (**Figure S-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 above target stage. All treatment cells have highly stressed vegetation conditions except Flow-ways 7 and 8 which are healthy. The 365-day PLRs for most flow-ways are high (**Figure S-5** and **S-6**).

For definitions on STA operational language see glossary following figures.

STA-1E Weekly Status Report – 10/4/2021 through 10/10/2021



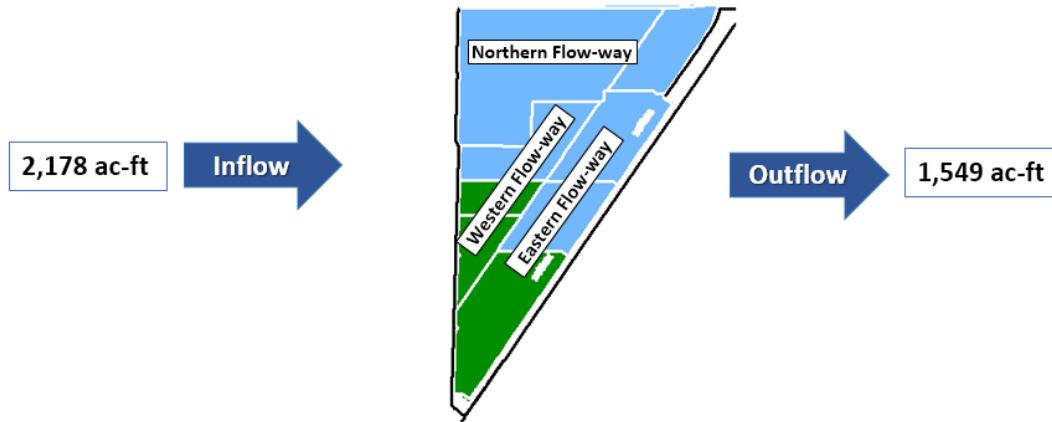
STA-1E Flow-Way Status			
Flow-Way	Vegetation Status Healthy ----- Stressed 	365-day P Loading Rate (below 1.0 g P /m²/yr is optimal) 	Online / Offline / Restrictions
Eastern			Online
Central			Vegetation Rehab
Western	Offline, construction activities starting 11/01/2019		

As of 10/10/2021	
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	5,469	36,574	263,682
--Lake Inflow, ac-ft	0	N/A	19,200
Total Outflow, ac-ft	3,355	32,347	224,099
Inflow Conc., ppb	50	145	136
Outflow Conc., ppb	19	24	41
Includes Preliminary Data			

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

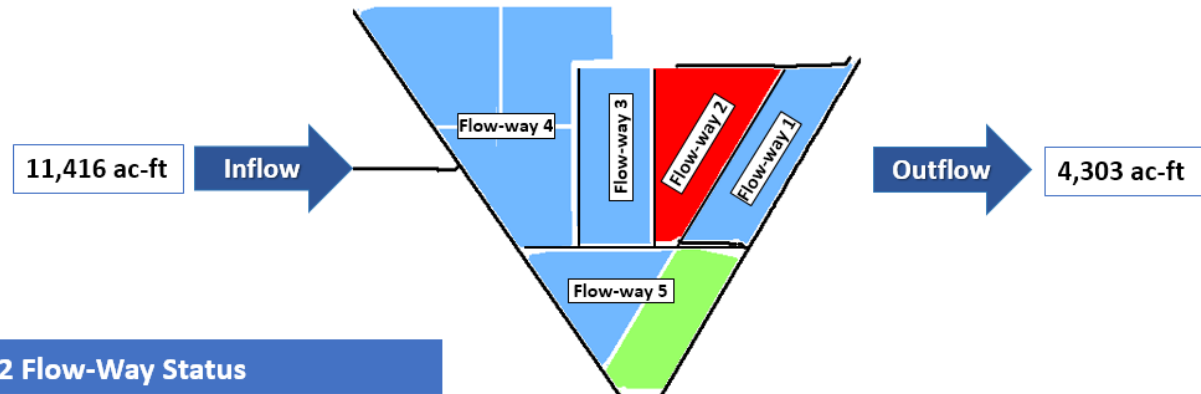
STA-1W Weekly Status Report – 10/4/2021 through 10/10/2021



STA-1W Flow-Way Status				As of 10/10/2021				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	Stage Based: Relative to Target Stage (TS)					7-day	28-day	365-day
				<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)							
				Depth / Area Based: Percent of Area Dry							
				<div></div> 0-25% Dry	<div></div> 50-75% Dry						
				<div></div> 25-50% Dry	<div></div> 75-100% Dry						
Northern	<div></div>	<div></div>	Construction								
Western	<div></div>	<div></div>	Construction								
Eastern	<div></div>	<div></div>	Construction								

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

STA-2 Weekly Status Report – 10/4/2021 through 10/10/2021



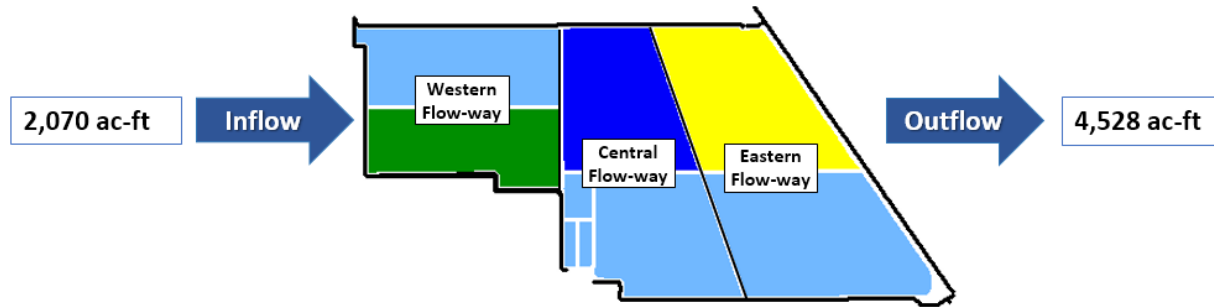
STA-2 Flow-Way Status			
Flow-Way	Vegetation Status Healthy ----- Stressed	365-day P Loading Rate (below 1.0 g P /m ² /yr is optimal)	Online / Offline / Restrictions
1			Online
2	Offline, construction activities as of 9/7/2021		
3			Vegetation Rehab
4			Vegetation Rehab
5			Online

As of 10/10/2021	
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	11,416	56,336	410,747
--Lake Inflow, ac-ft	0	N/A	73,200
Total Outflow, ac-ft	4,303	59,959	443,372
Inflow Conc., ppb	89	112	93
Outflow Conc., ppb	14	15	19
Includes Preliminary Data			

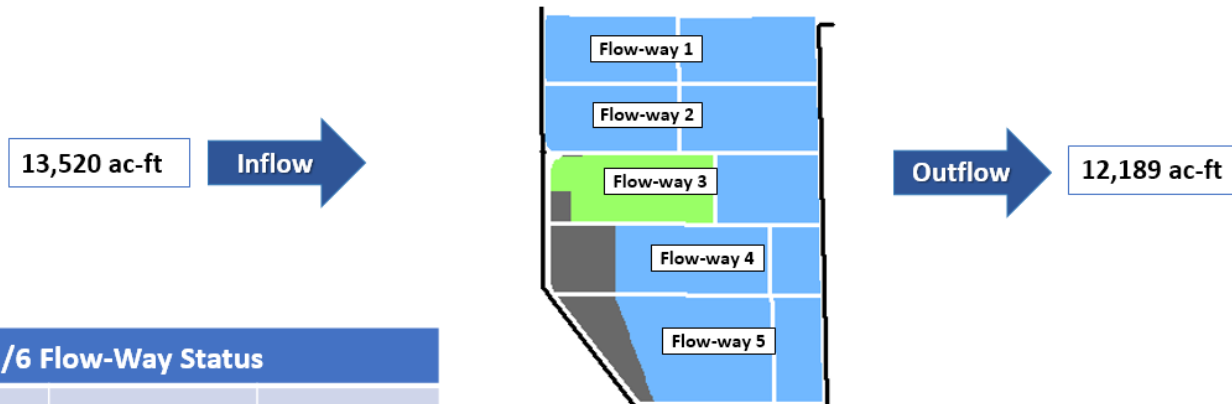
Figure S-3. STA-2 Weekly Status Report

STA-3/4 Weekly Status Report – 10/4/2021 through 10/10/2021



STA-3/4 Flow-Way Status				As of 10/10/2021				STA-3/4 Flow & Phosphorus Concentration			
Flow-Way	Vegetation Status <div>Healthy ----- Stressed</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>			Deep Water Level (> 2.8' above TS)				Total Inflow, ac-ft	2,070	77,148	540,044
				High Water Level (1.5' – 2.8' above TS)							
Central	<div></div>	<div></div>	Online	0.2' – 1.5' above TS				--Lake Inflow, ac-ft	0	N/A	53,900
				Target Stage (TS +/- 0.2')							
Western	<div></div>	<div></div>	Online	Low Water Level (<0.2' below TS)				Total Outflow, ac-ft	4,528	64,723	492,313
				Depth / Area Based: Percent of Area Dry				Inflow Conc., ppb	100	78	68
				0-25% Dry 50-75% Dry							
				25-50% Dry 75-100% Dry				Includes Preliminary Data			

STA-5/6 Weekly Status Report – 10/4/2021 through 10/10/2021



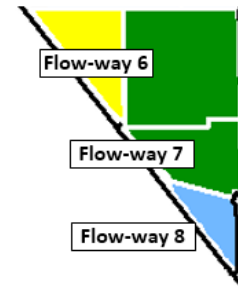
STA-5/6 Flow-Way Status			
Flow-Way	Vegetation Status Healthy ----- Stressed	365-day P Loading Rate (below 1.0 g P /m ² /yr is optimal)	Online / Offline / Restrictions
1	← →		Online
2	← →	N/A	Post-construction
3	← →	N/A	Post-construction
4	← →		Online
5	← →		Online

As of 10/10/2021	
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	13,520	62,841	212,262
--Lake Inflow, ac-ft	0	N/A	9,000
Total Outflow, ac-ft	12,189	57,117	216,512
Inflow Conc., ppb	223	279	295
Outflow Conc., ppb	56	67	74
Includes Preliminary Data			

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

STA-5/6 Weekly Status Report – 10/4/2021 through 10/10/2021









STA-5/6 Flow-Way Status				As of 10/10/2021	
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	←————→ 		Online		
7	←————→ 		Online		
8	←————→ 		Online		
				Depth / Area Based: Percent of Area Dry	
				<div>0-25% Dry</div> <div>25-50% Dry</div>	<div>50-75% Dry</div> <div>75-100% Dry</div>

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 Three-Gauge average stages rose late in the week to just below the Zone A1 regulation line last week, the average on Sunday was 0.12 feet below that line. WCA-2A: Stage at 2A-17 fell then rose again late in the week, the average on Sunday was 1.28 feet higher than the Zone A regulation line (nearly the same as the previous week). WCA-3A: The Three-Gauge Average stage rose quickly late in the week above the Zone A regulation line last week. Stage averaged 0.17 feet above the rising schedule line on Sunday. WCA-3A: Stage at Gauge 62 (Northwest corner) fell slowly then rose late last week. The average on Sunday was 0.42 feet below the flat Upper regulation line (**Figures EV-1 through EV-4**).

Water Depths

The Water Depth Assessment Tool (WDAT) indicates that water depths in the WCAs are lowest in northeastern WCA-3A. The ponded area within the upper reaches of the L-67s is expanding in spatial extent. Depths are between 1.5 – 2.0 feet across northern WCA-2A, and recently surveyed vegetation conditions within the marsh found little stress. North to south hydrologic connectivity is now increasing within all of the sloughs within Everglades National Park (ENP). (**Figure EV-5**). Comparing WDAT water levels from present over the last month, stages generally increased, most significantly in southern WCA-2A. Looking back one year ago, WCA-2A is wetter in the south, and Big Cypress National Park (BCNP) is wetter in the northwest. Eastern WCA-3A is significantly drier. (**Figure EV-6**). Compared to the 20-year median water depths, most of the central Everglades were near the median last week. The western sloughs in ENP are well below the median; while western BCNP, WCA-1, -2A, northeastern ENP are significantly above the median. (**Figure EV-7**).

Taylor Slough and Florida Bay

Rainfall keeps decreasing with last week seeing only an average of 0.41 inches of rain over Taylor Slough and Florida Bay for the week ending Sunday (10/10). Stage decreased an average of 0.08 feet over the week with all stations showing a decrease (**Figure EV-8**), and the largest decrease was in the northern area of the Slough. The entire Slough has been experiencing similar recession rates (**Figure EV-9**). The southern areas of the Slough are average, and the northern area is 5 inches above average, while the Slough as a whole is 1.8 inches above the historical average for this time of year. It should be noted that Northern Taylor Slough historical averages are from before the alterations to the system to facilitate water movement and that this area is expected to be higher than the historical average as a result of these modifications.

Salinities in Florida Bay increased by 1 on average for the week ending 10/10, but individual stations had weekly changes ranging from -1.0 to +6.0 (**Figure EV-8**). The largest weekly increase occurred in the central nearshore area (TB) returning that station to a near marine condition. Both the central and western areas remain above their respective 75th percentiles (**Figure EV-10**). More freshwater is still needed to push the

estuarine front out into the Bay before the dry season begins. Most of the Bay is still marine or higher and is 7 higher than the historical average for this time of year.

Water Management Recommendations

Ascension rates that do not exceed 0.25 feet per week or 0.50 feet per two weeks are considered ecologically healthy. Conserving water in the northern basins, then allowing that water to move downstream maximizes the ecological benefit of freshwater on the landscape. Flows into northeastern WCA-3A that move downstream continue to have an ecological benefit. Continued freshwater into Florida Bay will push the estuarine front further into the Bay helping to buffer possible dry season salinity conditions. 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	2.25	+0.10
WCA-2A	2.20	-0.07
WCA-2B	1.79	+0.40
WCA-3A	1.90	+0.16
WCA-3B	1.72	+0.11
ENP	1.12	+0.05

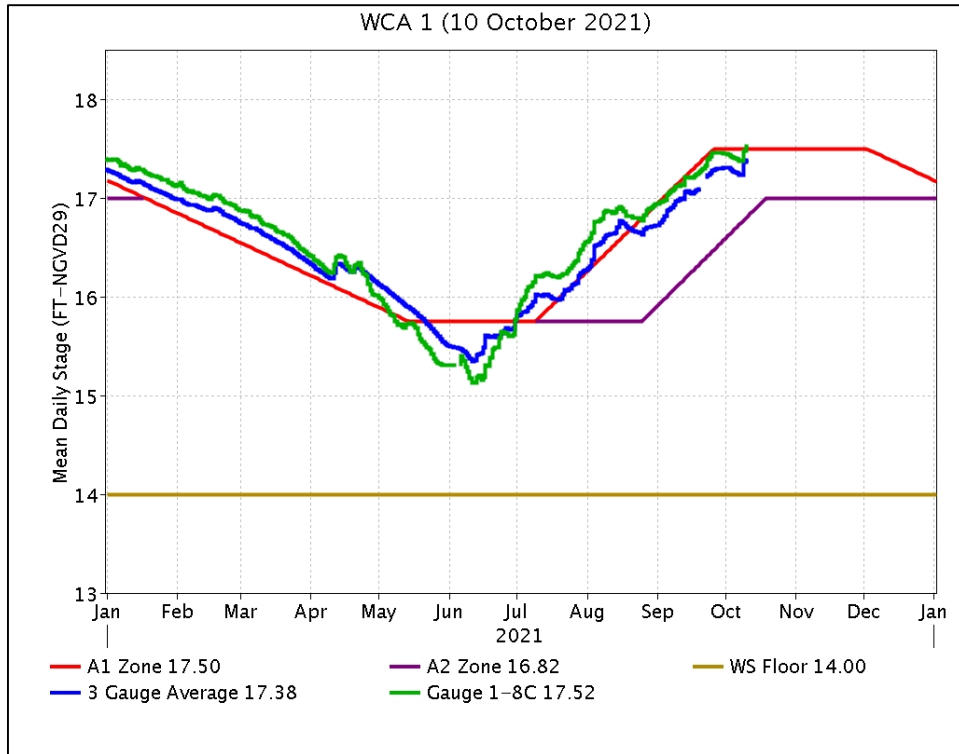


Figure EV-1. WCA-1 stage hydrographs and regulation schedule.

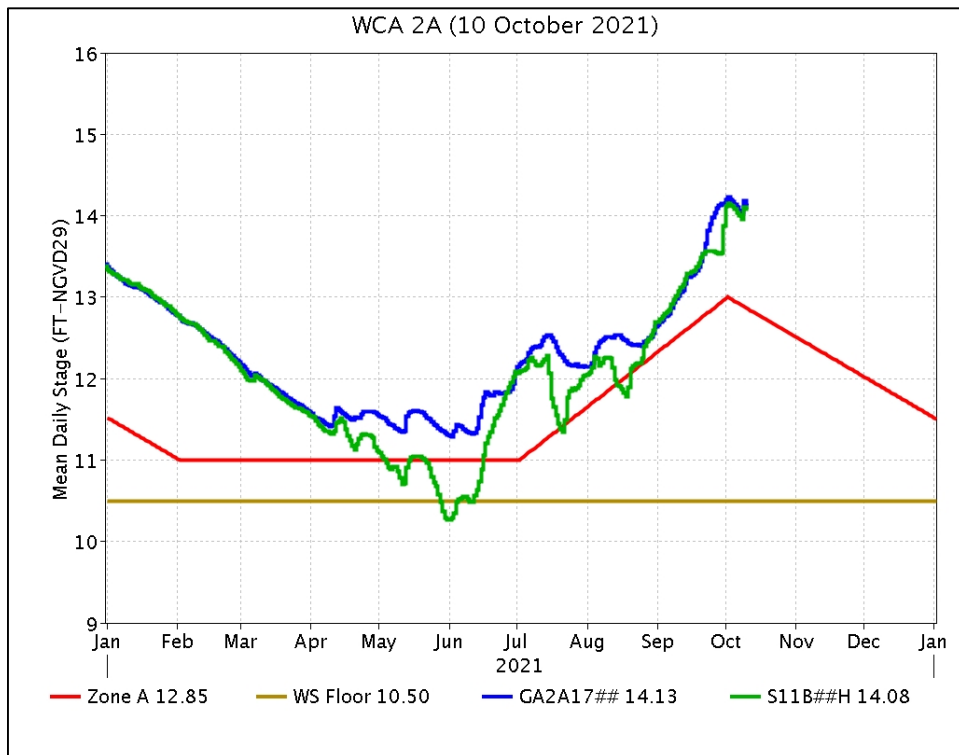


Figure EV-2. WCA-2A stage hydrographs and regulation schedule.

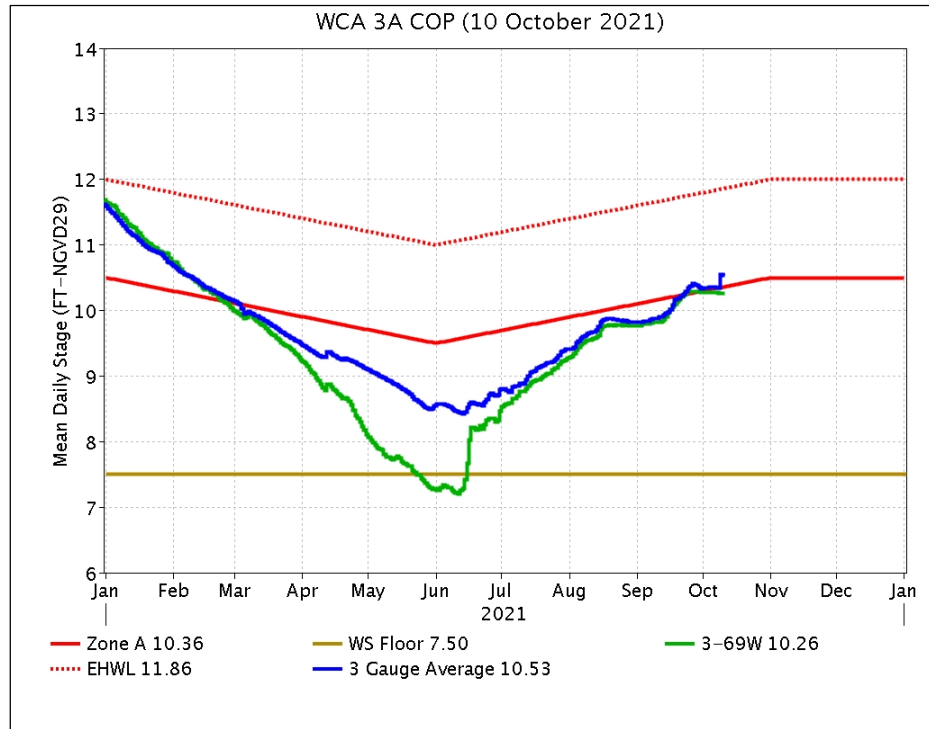


Figure EV-3. WCA-3A stage hydrographs (three-gauge average, S-333 headwater) and regulation schedule.

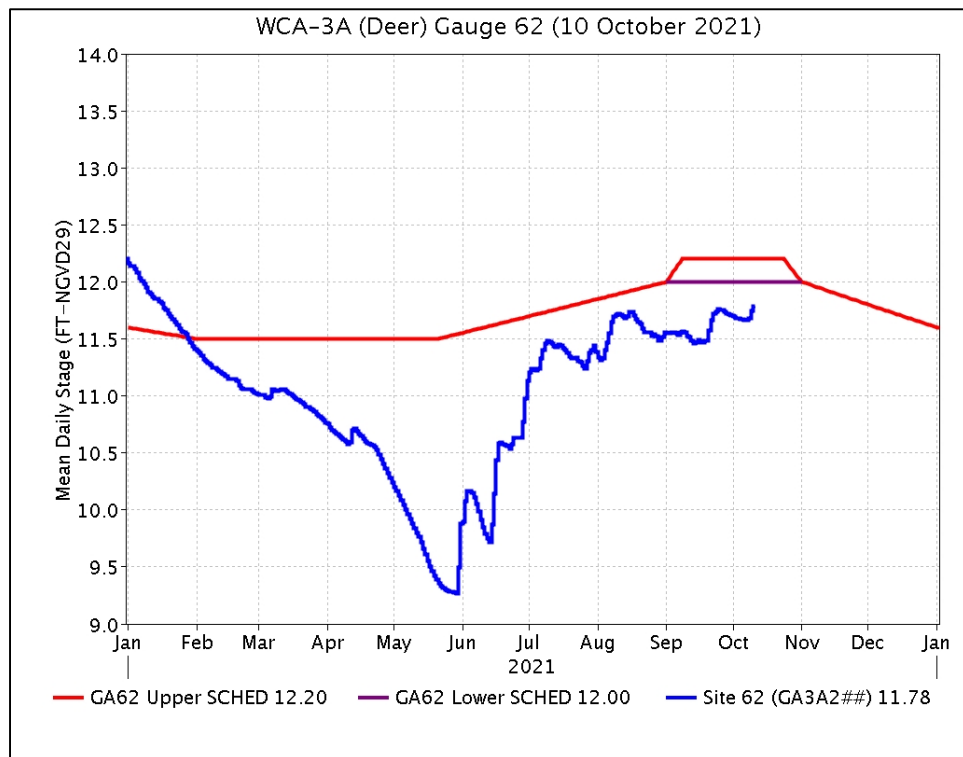


Figure EV-4. WCA-3A stage hydrograph (Deer gauge; Site 62) and CA62 regulation schedule.

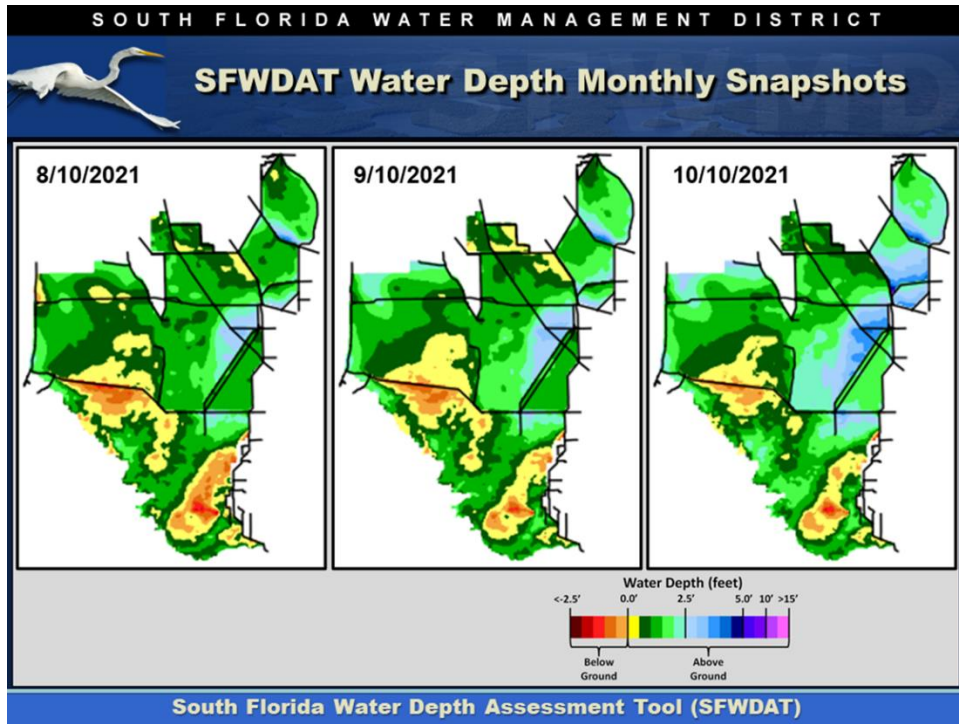


Figure EV-5. Everglades water depths from two months ago (left), one month ago (center) and present (right), based on SFWDAT.

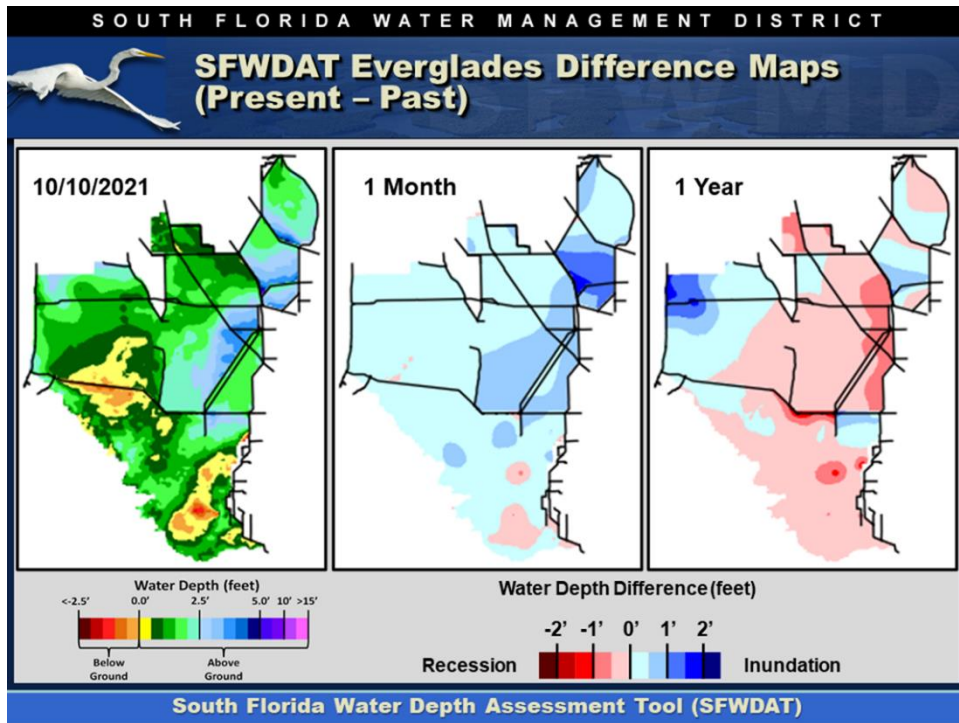


Figure EV-6. Present Everglades water depths (left) and water depth changes from one month (center) and one year (right) ago, based on SFWDAT.

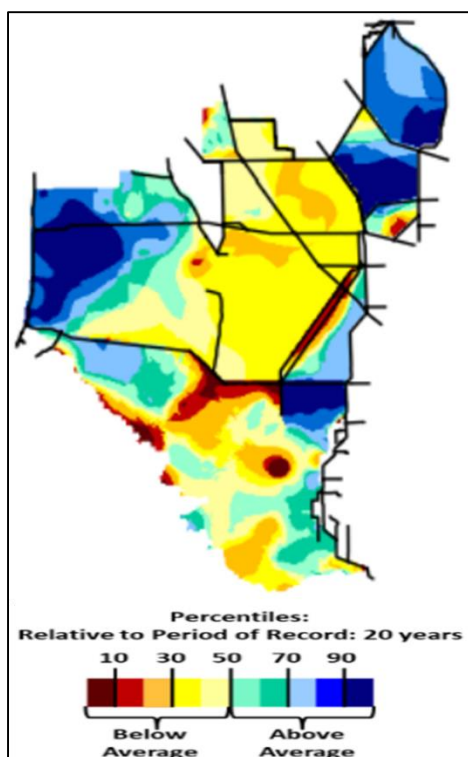


Figure EV-7. Present water depths compared to the day of year median over the previous 20 years.

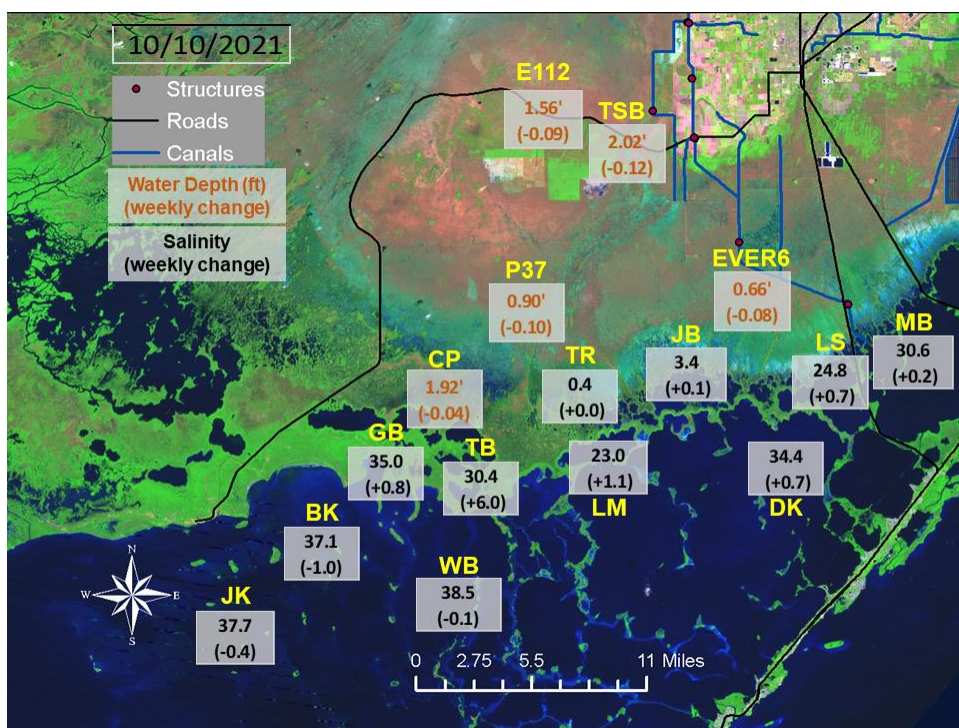


Figure EV-8. Taylor Slough water depths with changes since a week ago and Florida Bay salinities with changes since a week ago.

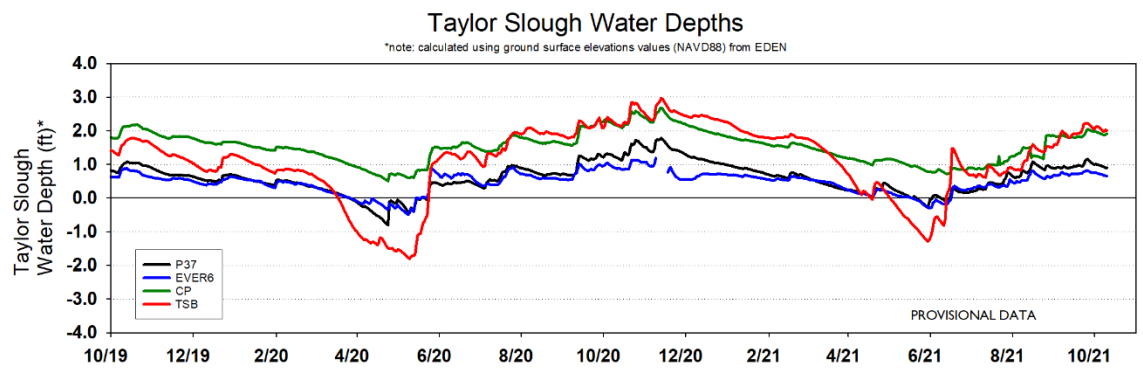


Figure EV-9. Taylor Slough water depth time series.

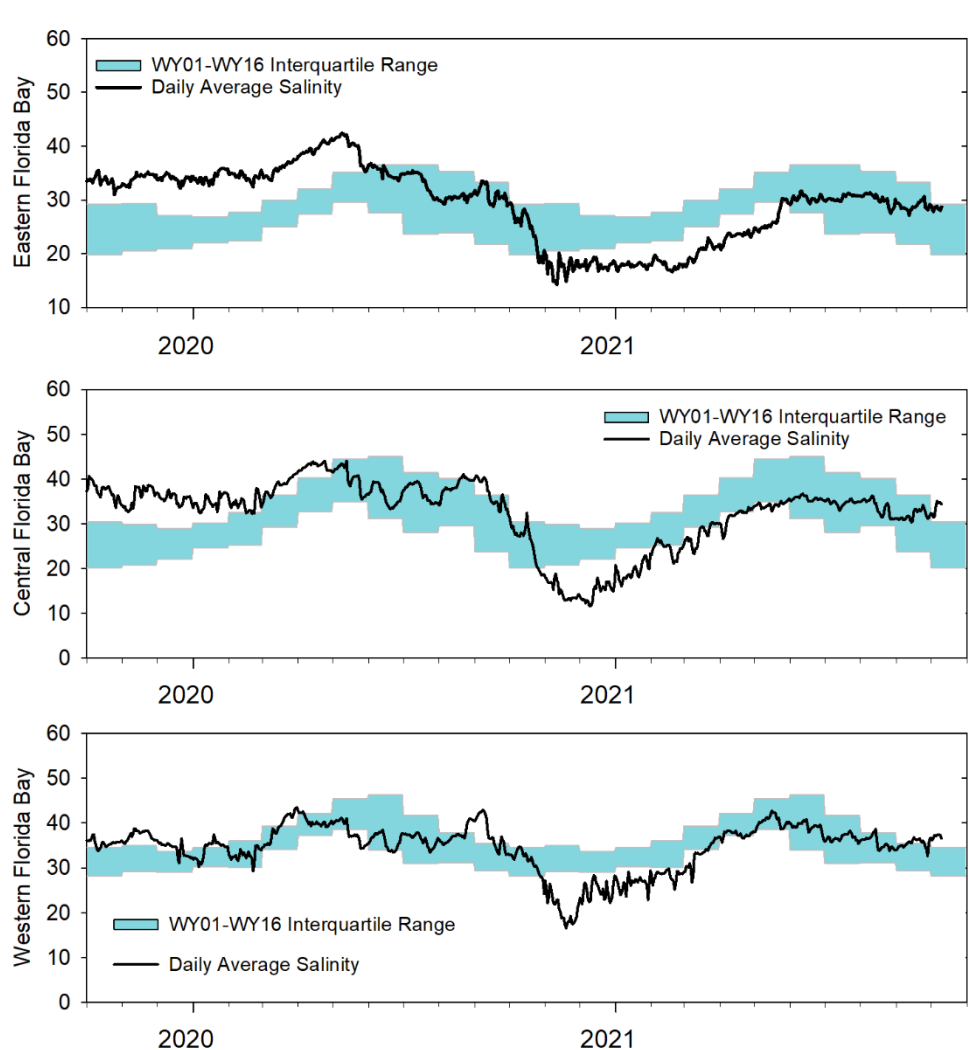


Figure EV-10. Eastern (top panel), Central (middle panel) and Western (bottom panel) Florida Bay daily average salinities with interquartile (25-75 percentile) ranges.

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

SFWMD Everglades Ecological Recommendations, October 12, 2021 (red is new)			
Area	Weekly change	Recommendation	Reasons
WCA-1	Stage increased by 0.10'	Maintain ascension rates of less than 0.25 feet per week or 0.50 feet per two weeks.	Protect within basin and downstream habitat and wildlife.
WCA-2A	Stage decreased by 0.07'	Initiate an ascension rate of less than 0.25 feet per week or 0.50 feet per two weeks, while moving water through the system.	Protect within basin and downstream habitat and wildlife.
WCA-2B	Stage increased by 0.40'	Maintain ascension rates of less than 0.50 feet per two weeks.	Protect within basin and downstream habitat and wildlife.
WCA-3A NE	Stage increased by 0.16'	Maintain an ascension rate of less than 0.25 feet per week or 0.50 feet per two weeks, while moving water through the system.	Protect within basin peat soils and downstream habitat and wildlife.
WCA-3A NW	Stage increased by 0.10'	Maintain an ascension rates of less than 0.25 feet per week or 0.50 feet per two weeks, while moving water through the system.	
Central WCA-3A S	Stage increased by 0.19'	Maintain an ascension rates of less than 0.25 feet per week or 0.50 feet per two weeks, while moving water through the system.	Protect within basin and downstream habitat and wildlife.
Southern WCA-3A S	Stage increased by 0.10'		
WCA-3B	Stage increased by 0.11'	Maintain an ascension rates of less than 0.25 feet per week or 0.50 feet per two weeks, while moving water through the system.	Protect within basin and downstream habitat and wildlife.
ENP-SRS	Stage increased by 0.05'	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 -0.04' to -0.12'	Move water southward as possible.	When available, provide freshwater buffer for downstream conditions.
FB- Salinity	Salinity changes ranged -1.0 to +6.0	Move water southward as possible.	When available, provide freshwater to maintain low salinity buffer and promote water movement.