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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: August 9, 2023

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

Southwesterly steering winds with increased moisture should favor area-averaged rainfall from the central interior through the northeastern part of the SFWMD on Wednesday. On Thursday, a Saharan Air Layer (SAL) is predicted to reach the southern half of the SFWMD, greatly curbing rainfall in the south while potentially causing a good coverage of rain north of Lake Okeechobee. The SAL should overspread the SFWMD on Friday and have a greater inhibiting effect on rainfall. Enhanced moisture from a pair of tropical waves should engulf Florida late this week/early next week, resulting in increased rainfall relative to earlier in the week. A rainfall maximum is depicted in the weekend's QPFs, initially southeast of Lake Okeechobee from rains later Saturday/Saturday night and then from the southern interior through the west coast early next week. Less area-averaged rainfall is predicted over the far northern part of the SFWMD. For the week ending next Tuesday morning, total SFWMD rainfall is likely to be below to much below normal.

Kissimmee

Releases were made from East Lake Toho and Lake Toho as needed to slow the rate of stage rise. Weekly average discharge on August 6, 2023, was 330 cfs and 500 cfs at S-65 and S-65A. Mean weekly water depth on the Kissimmee River floodplain was 0.31 feet over the week ending August 6, 2023. The weekly average concentration of dissolved oxygen in the Kissimmee River decreased from 4.5 mg/L last week to 4.3 mg/L for the week ending August 6, 2023, which is above both the potentially lethal level and the level that is physiologically stressful for largemouth bass and other sensitive species.

Lake Okeechobee

Lake Okeechobee stage was 15.30 feet NGVD on August 06, 2023, which was 0.19 feet higher than the previous week and 0.53 feet higher than a month ago. Average daily inflows (excluding rainfall) increased from 3,112 cfs the previous week to 5,939 cfs. Average daily outflows (excluding evapotranspiration) decreased from 551 cfs the previous week to 181 cfs. The cyanobacteria index level decreased lake-wide since the previous week but remained high along the northeastern shoreline according to the

August 06, 2023, NOAA cyanobacterial index map. Routine phytoplankton monitoring on July 24 - 26, revealed that chlorophyll *a* concentrations were above the Lake bloom threshold (> 40 µg/L) at 10 out of the 32 sites, with the highest concentration (77.2 µg/L) recorded at the S-308 site. Concentration of microcystins toxins exceeded the EPA recommended recreational waters criterion (8 µg/L) at 5 sites, with the highest concentration recorded at the L004 site (21 µg/L). Phytoplankton communities at 28 sites were either dominated by *Microcystis aeruginosa* or co-dominated by *M. aeruginosa* and *Planktolyngbya limnetica*, while the remaining 4 sites had mixed communities.

Estuaries

Total inflow to the St. Lucie Estuary averaged 3,052 cfs over the past week with no flow coming from Lake Okeechobee. Mean salinities decreased at all three sites within the estuary over the past week. Salinity in the middle estuary was in the optimal range (10-25) for adult eastern oysters.

Total inflow to the Caloosahatchee Estuary averaged 3,872 cfs over the past week with 12 cfs coming from Lake Okeechobee. Mean surface salinities remained the same at S-79 and Val I-75 and increased in lower estuary over the past week. Salinities were in the optimal range (0-10) for tape grass in the upper estuary. Salinities were in the optimal range for adult eastern oysters at Shell Point (10-25), in the upper stressed range at Sanibel (>25) and in the lower stressed range at Cape Coral (5-10).

Stormwater Treatment Areas

For the week ending August 6, 2023, no Lake Okeechobee water was delivered to the FEBs/STAs. The total amount of Lake releases sent to the FEBs/STAs in WY2024 (since May 1, 2023) is approximately 2,000 ac-feet. The total amount of inflows to the STAs in WY2024 is approximately 516,000 ac-feet. Most STA cells are above target stage. STA-1E Western Flow-way and STA-2 Flow-way 2 are offline for post-construction vegetation grow in, and STA-3/4 Eastern Flow-way is offline for vegetation rehabilitation/drawdown. Operational restrictions are in effect in STA-1W Northern Flow-way and STA-2 Flow-way 4 for vegetation management activities, and in STA-2 Flow-way 3 for canal plug refurbishments. This week, if 2008 LORS recommends Lake releases to the WCAs and conditions allow, releases will be sent to STA-2.

Everglades

Most regions of the WCAs experienced a good stage change rate last week. Depths are above average for this time of year across most of the WCAs, with the notable exception of northwestern WCA-3A. Stages increased across Taylor Slough and remain well above historical average. Average salinity increased last week across most sites in Florida Bay, but conditions remain fresher than average for this time of year. Florida Bay water temperatures continue to be above 90F in some areas, so is being closely monitored.

Biscayne Bay

Total inflow to Biscayne Bay averaged 1,156 cfs, and the previous 30-day mean inflow averaged 1,027 cfs. The seven-day mean salinity was 25.6 at BBCW8 and 24.2 at BBCW10, both within the ideal salinity range for estuarine organisms in this region (salinity less than 35). Data provided by Biscayne National Park.

Supporting Information

Kissimmee Basin

Upper Kissimmee

On August 6, 2023, mean daily lake stages were 56.1 feet NGVD (0.4 feet below schedule) in East Lake Toho, 53.3 feet NGVD (0.2 feet below schedule) in Lake Toho, and 49.9 feet NGVD (1.1 feet below schedule) in Lakes Kissimmee-Cypress-Hatchineha (KCH) (**Table KB-1, Figures KB-1-3**).

Lower Kissimmee

For the week ending August 6, 2023, mean weekly discharge was 330 cfs and 500 cfs at S-65 and S-65A, respectively. Mean weekly discharge from the Kissimmee River was 1,400 cfs at S-65D and 1,600 cfs at S-65E (**Table KB-2**). Mean weekly headwater stages were 46.4 feet NGVD at S-65A and 27.8 feet NGVD at S-65D on August 6, 2023. Mean weekly river channel stage decreased by 0.3 feet to 35.8 ft NGVD over the week ending on August 6, 2023 (**Figure KB-4**). Mean weekly water depth on the Kissimmee River floodplain was at 0.31 feet over the week ending August 6, 2023 (**Table KB-2, Figure KB-5**). The weekly average concentration of dissolved oxygen in the Kissimmee River decreased from 4.5 mg/L the previous week to 4.3 mg/L for the week ending August 6, 2023 (**Table KB-2, Figure KB-6**).

Water Management Recommendations

Follow the IS-14-50 discharge plan for S-65/S-65A, including limiting lake stage ascension rates to 0.25 ft/week to the extent possible in East Lake Toho, Lake Toho and KCH. Maintain at least minimum flow (250-300 cfs) at S-65A. Maintain current headwater stage at S-65D for the time being.

Table KB-1. Average discharge for the preceding seven days, Sunday’s average daily stage and Sunday’s average daily departure from KCOL flood regulation lines or temporary schedules. All data are provisional.

Water Body	Structure	Stage Monitoring Site	Weekly (7-Day) Average Discharge (cfs)	Sunday Lake Stage (feet NGVD) ^a	Schedule Type ^b	Sunday Schedule Stage (feet NGVD)	Sunday Departure from Regulation (feet)	
							8/6/23	7/30/23
Lakes Hart and Mary Jane	S-62	LKMJ	37	59.8	R	60.0	-0.2	-0.2
Lakes Myrtle, Preston and Joel	S-57	S-57	0	60.4	R	61.0	-0.6	-0.7
Alligator Chain	S-60	ALLI	0	62.8	R	63.2	-0.4	-0.5
Lake Gentry	S-63	LKGT	0	60.4	R	61.0	-0.6	-0.9
East Lake Toho	S-59	TOHOE	0	56.1	R	56.5	-0.4	-0.6
Lake Toho	S-61	TOHOW S-61	150	53.3	R	53.5	-0.2	-0.4
Lakes Kissimmee, Cypress and Hatchineha	S-65	KUB011 LKIS5B	330	49.9	R	51.0	-1.1	-1.1

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.

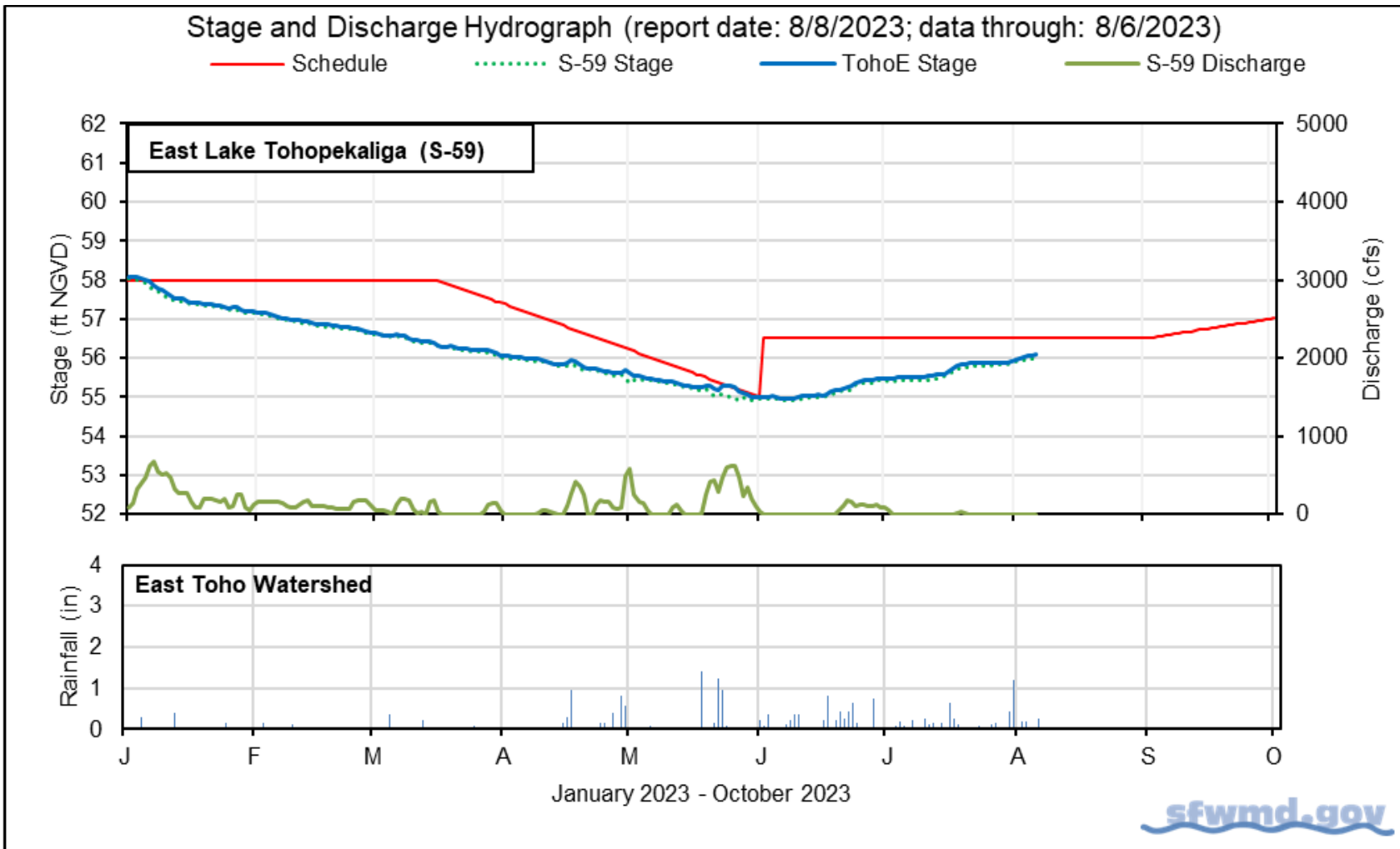


Figure KB-1. East Lake Toho regulation schedule, stage, discharge, and rainfall.

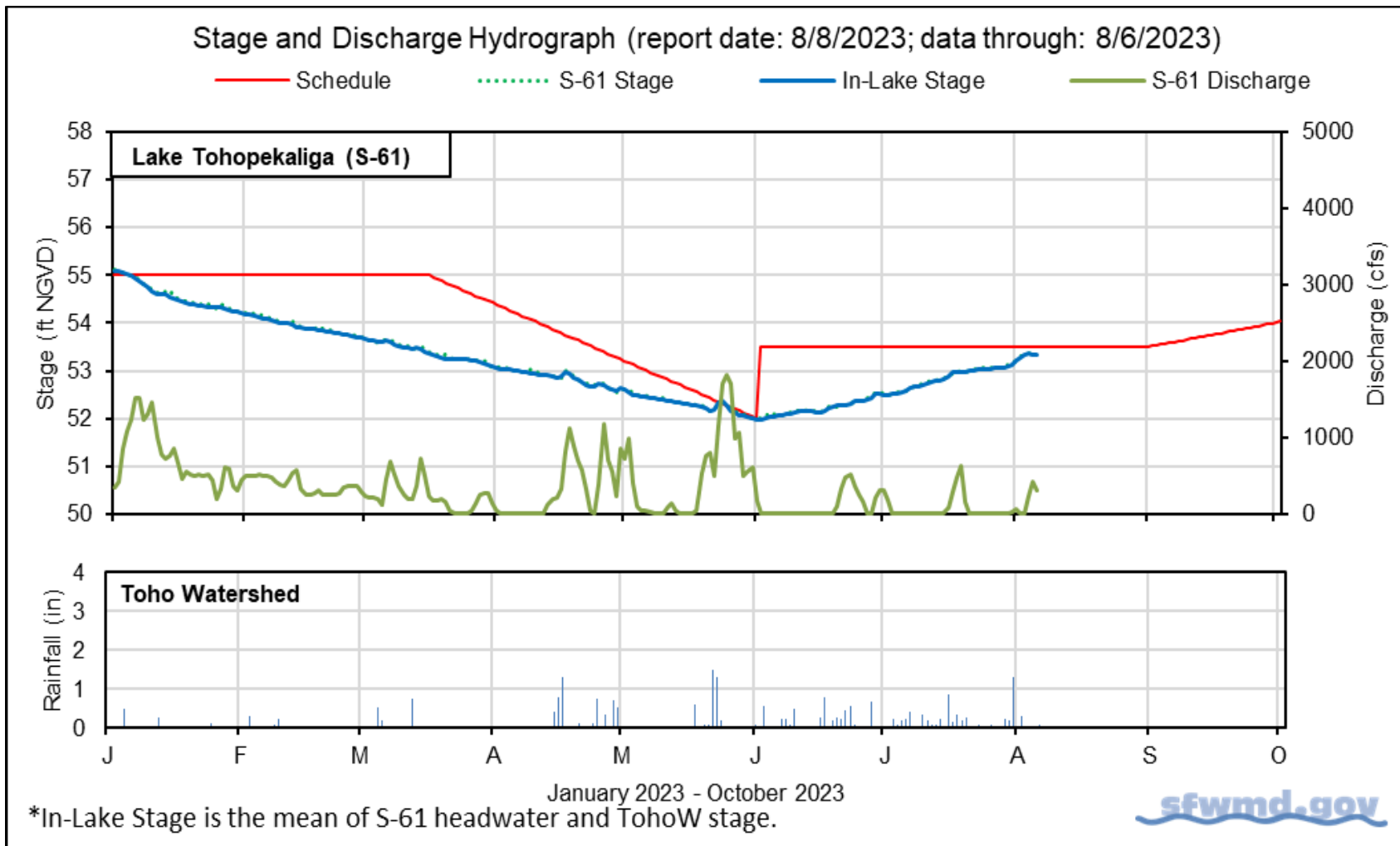


Figure KB-2. Lake Toho regulation schedule, stage, discharge, and rainfall.

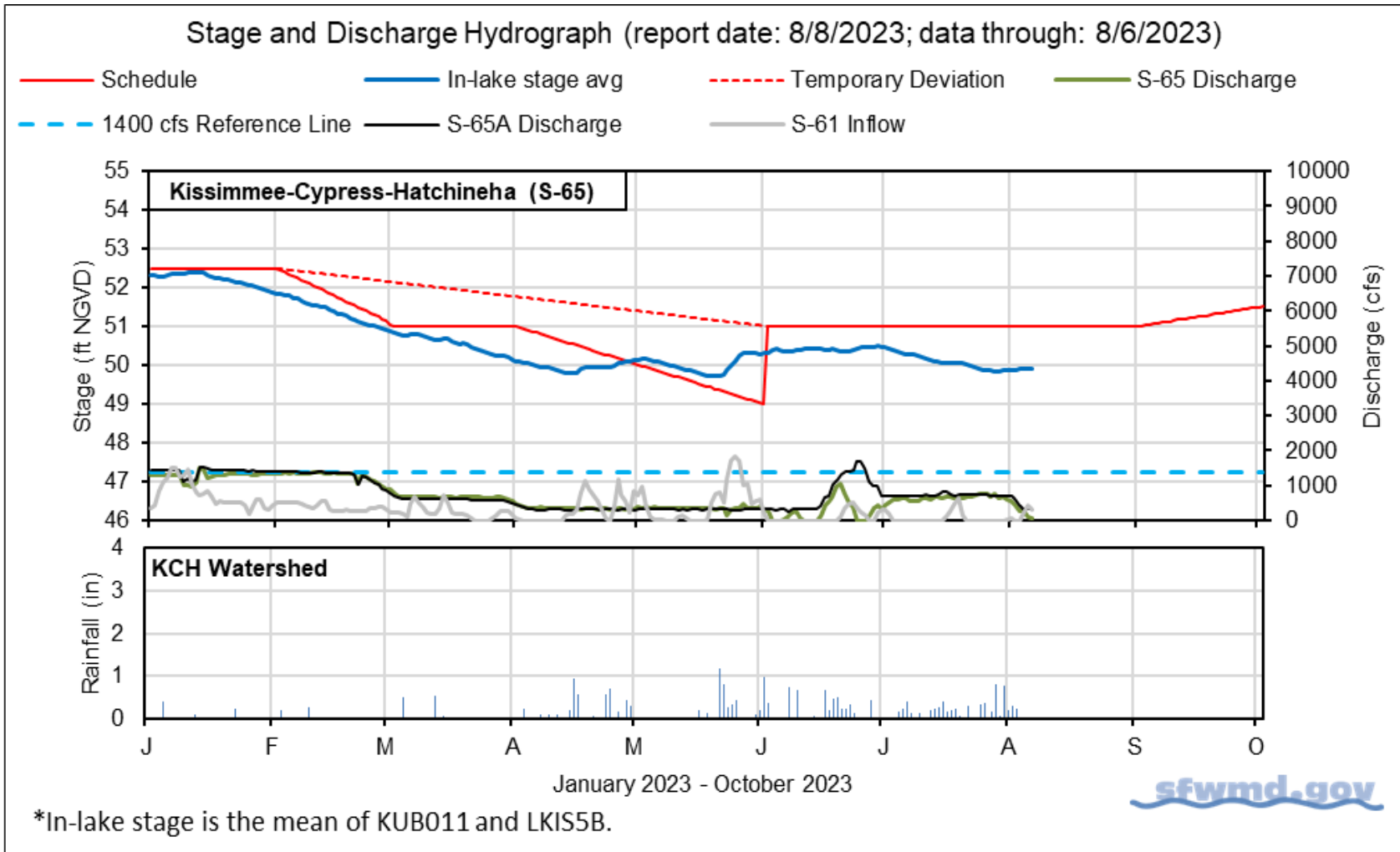


Figure KB-3. Lakes Kissimmee, Cypress and Hatchineha regulation schedule, stage, discharge, and rainfall.

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	Sunday Daily Average	Weekly Average for Previous Seven Day Periods			
		8/6/23	8/6/23	7/30/23	7/23/23	7/16/23
Discharge	S-65	84	330	720	670	650
Discharge	S-65A ^a	320	500	720	730	760
Headwater Stage (feet NGVD)	S-65A	46.5	46.4	46.4	46.3	46.3
Discharge	S-65D ^b	1,800	1,400	1,200	1,600	1,900
Headwater Stage (feet NGVD)	S-65D ^c	27.8	27.8	27.8	27.9	27.8
Discharge (cfs)	S-65E ^d	2,100	1,600	1,300	1,900	2,000
Discharge (cfs)	S-67	0	0	0	0	0
Dissolved Oxygen (mg/L) ^e	Phase I, II/III river channel	3.8	4.3	4.5	3.2	1.8
River channel mean stage ^f	Phase I river channel	35.3	35.8	36.1	36.6	37.2
Mean depth (feet) ^g	Phase I floodplain	0.33	0.31	0.31	0.36	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. Mean of five river channel stations (PC62, KRDR02, KRBN, PC33, PC11) in the Phase I area.

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

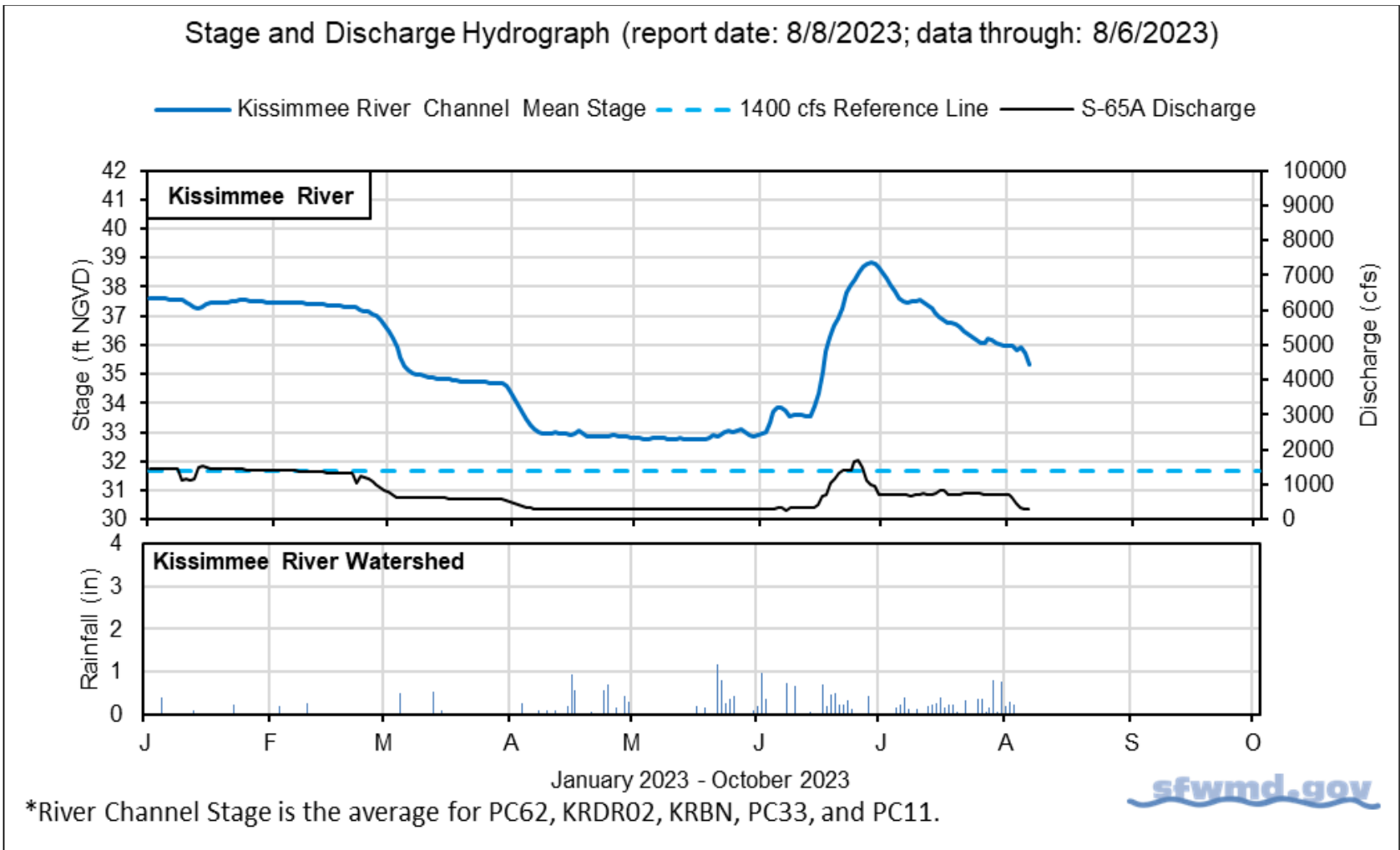


Figure KB-4. Kissimmee River stage, discharge, and rainfall.

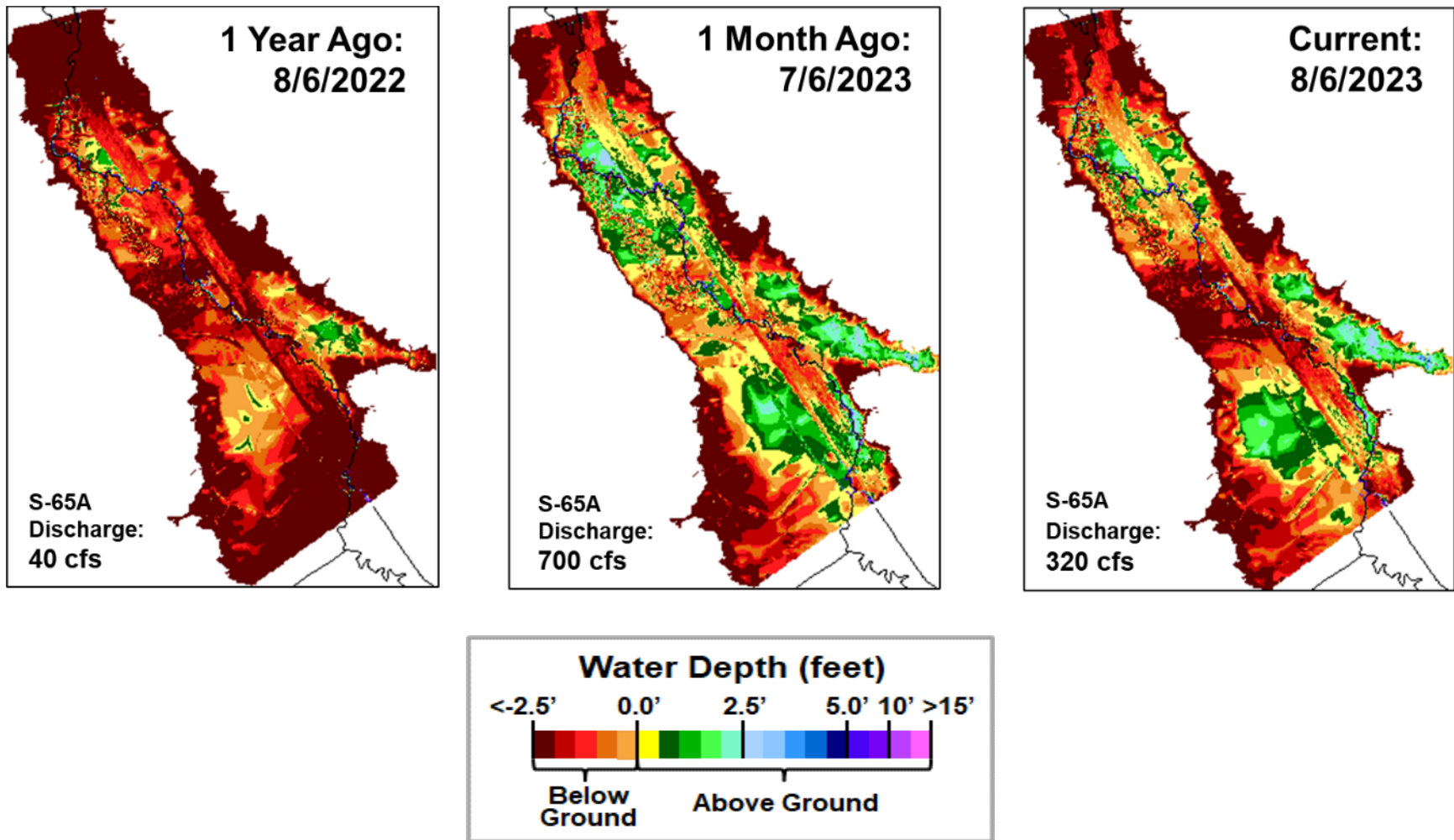
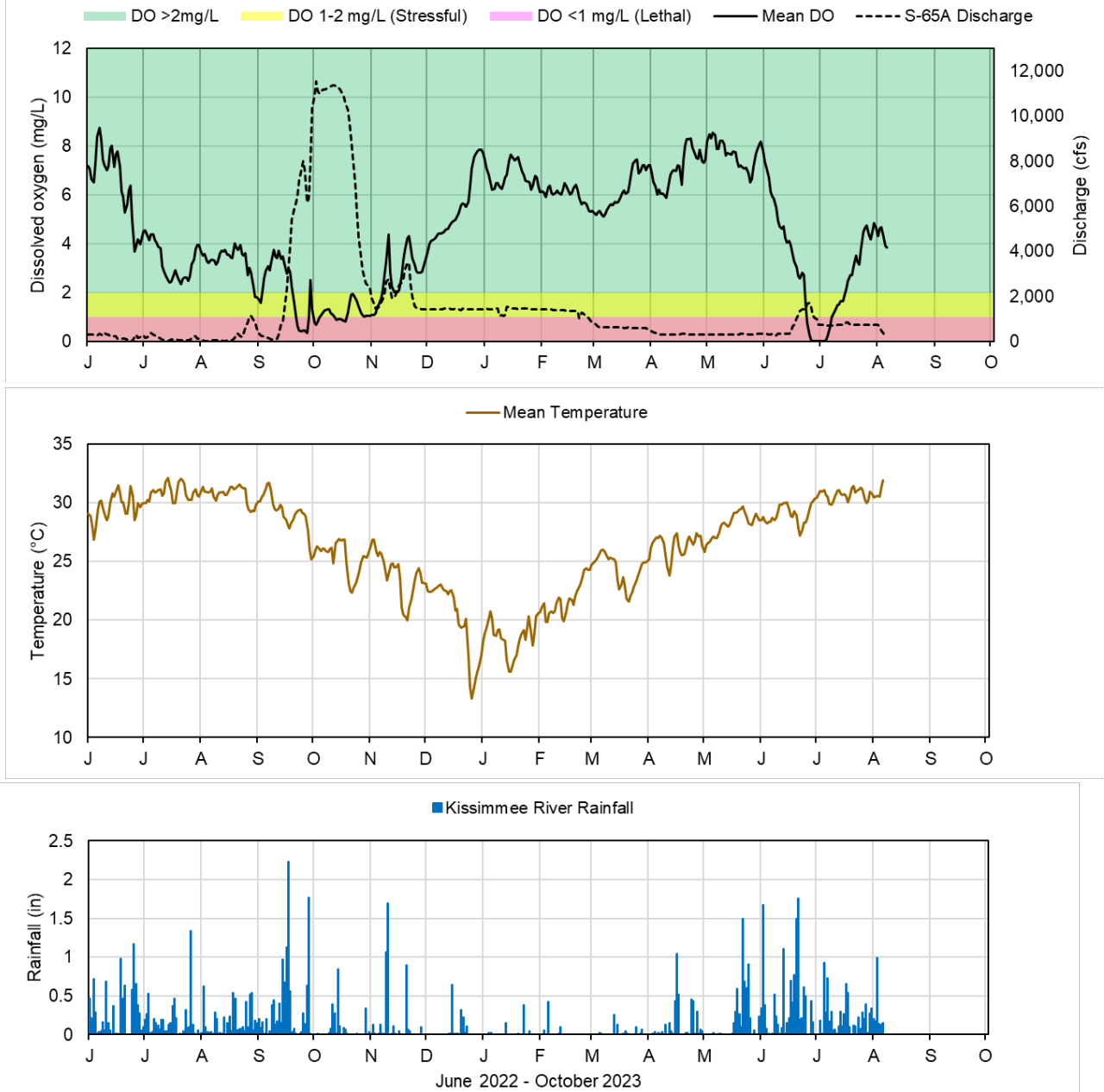


Figure KB-5. Phase I area Kissimmee River floodplain water depths (from left to right) one year ago, one month ago, and current.



Report Date: 8/8/2023; data are through: 8/6/2023



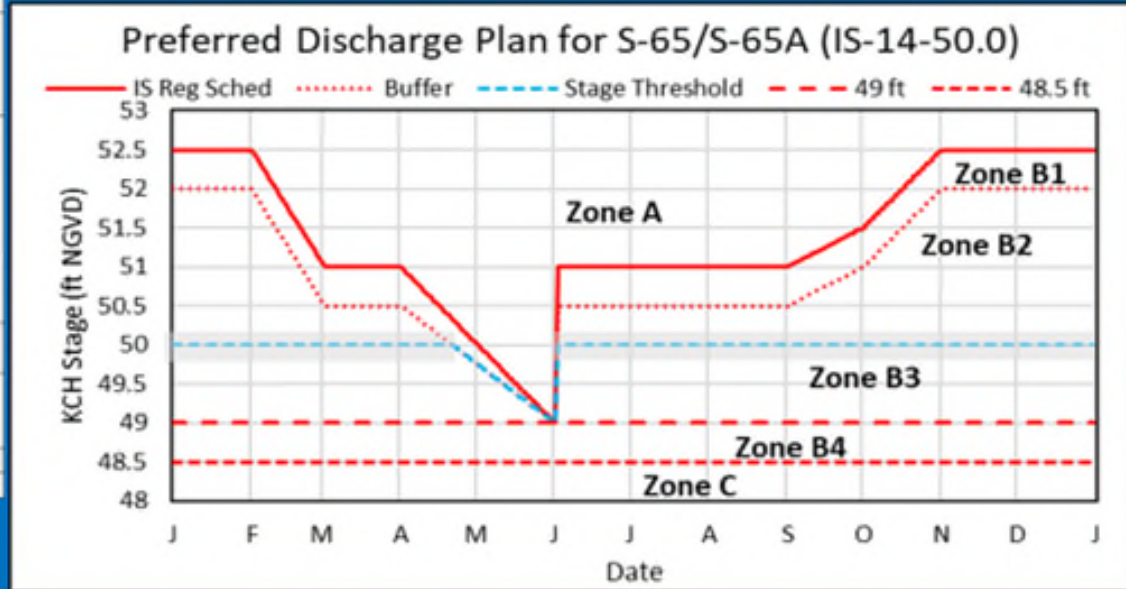
Figure KB-6. Restored Kissimmee river channel mean daily dissolved oxygen concentration (mg/L), S-65A discharge (cfs), temperature (°C), and rainfall (inches). Dissolved oxygen (DO) and temperature are mean daily values averaged for PC62, KRDR02, KRBN, PC33, PC11, PD62R, and PD42R with an average of five stations reporting this week. Rainfall values are daily totals for Kissimmee River (Pool BCD) AHED watershed.

Stage and Discharge Guidance for 2021-2023.		
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

2021-2023 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 1/3/2022

Figure KB-7. IS-14-50 Discharge Plan for S65/S65A with discharge rate of change limits (revised 1/14/19).

Lake Okeechobee

Lake Okeechobee stage was 15.30 feet NGVD on August 06, 2023, which was 0.19 feet higher than the previous week and 0.53 feet higher than a month ago (**Figure LO-1**). Lake stage remained in the Low sub-band (**Figure LO-2**) and was 1.95 feet above the upper limit of the ecological envelope (**Figure LO-3**). According to NEXRAD, 1.22 inches of rain fell directly on the Lake last week.

Average daily inflows (excluding rainfall) increased from 3,112 cfs the previous week to 5,939 cfs. The highest average single structure inflow came from the C-38 Canal via the S-65E/EX1 structure (1,613 cfs). Average daily outflows (excluding evapotranspiration) decreased from 551 cfs the previous week to 181 cfs. The highest average single structure outflow was recorded at the S-308 structure into the C-44 Canal (124 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 cyanobacteria index level decreased lake-wide since the previous week but remained high along the northeastern shoreline according to the August 06, 2023, satellite image from NOAA's Harmful Algal Bloom Monitoring System (**Figure LO-6**). Routine phytoplankton monitoring on July 24 - 26, revealed that chlorophyll *a* concentrations were above the Lake bloom threshold (> 40 µg/L) at 10 out of the 32 sites, with the highest concentration (77.2 µg/L) recorded at the S-308 site. Concentration of microcystins toxins exceeded the EPA recommended recreational waters criterion (8 µg/L) at 5 sites and were above the method's detection limit at 29 out of 32 sites. The highest concentration of microcystins was recorded at the L004 site (21 µg/L). Phytoplankton communities at 28 sites were either dominated by *Microcystis aeruginosa* or co-dominated by *M. aeruginosa* and *Planktolyngbya limnetica*, while the remaining 4 sites had mixed communities (**Figure LO-7**). All data presented in this report are provisional and are subject to change.

**1 Month Ago:
07/07/2023**

**Current:
08/06/2023**

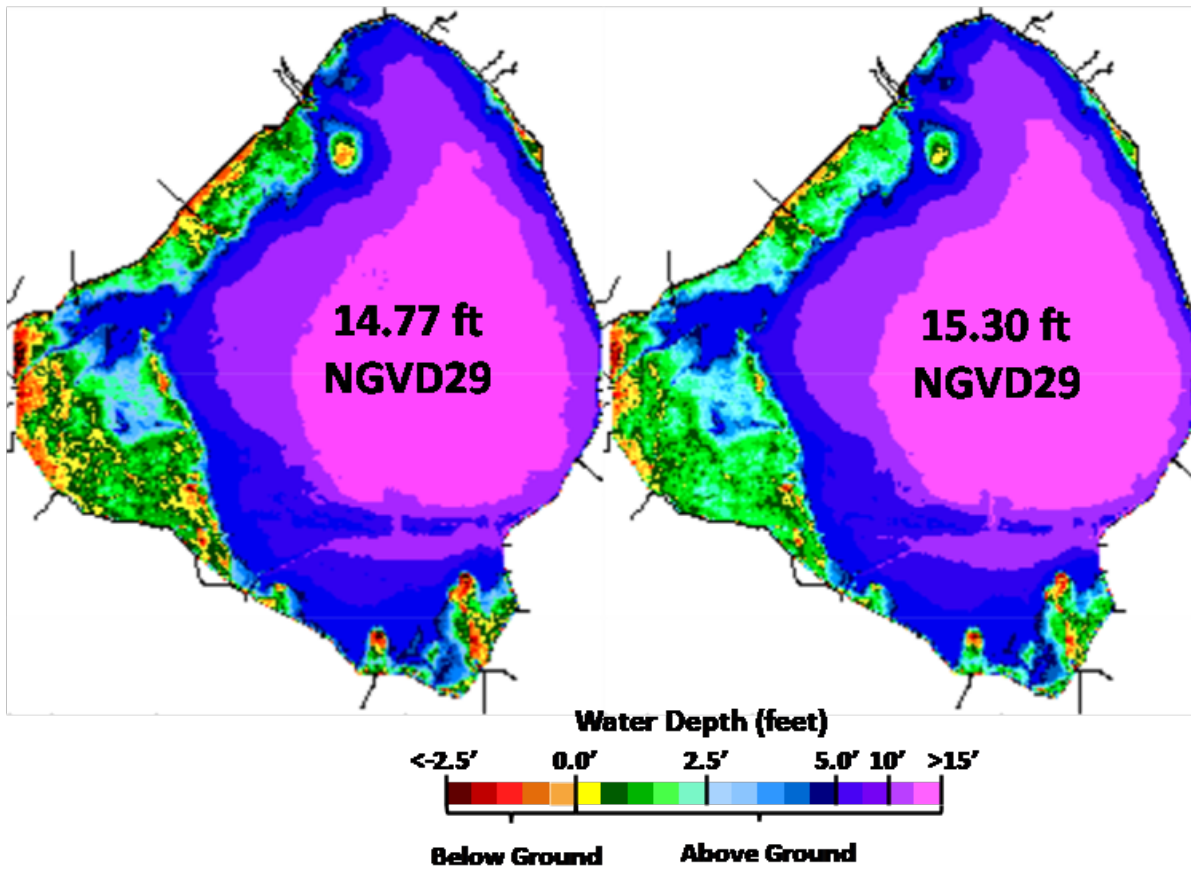


Figure LO-1. Lake Okeechobee water depth estimates based on South Florida Water Depth Assessment Tool (SFWDAT).

Lake Okeechobee Water Level History and Projected Stages

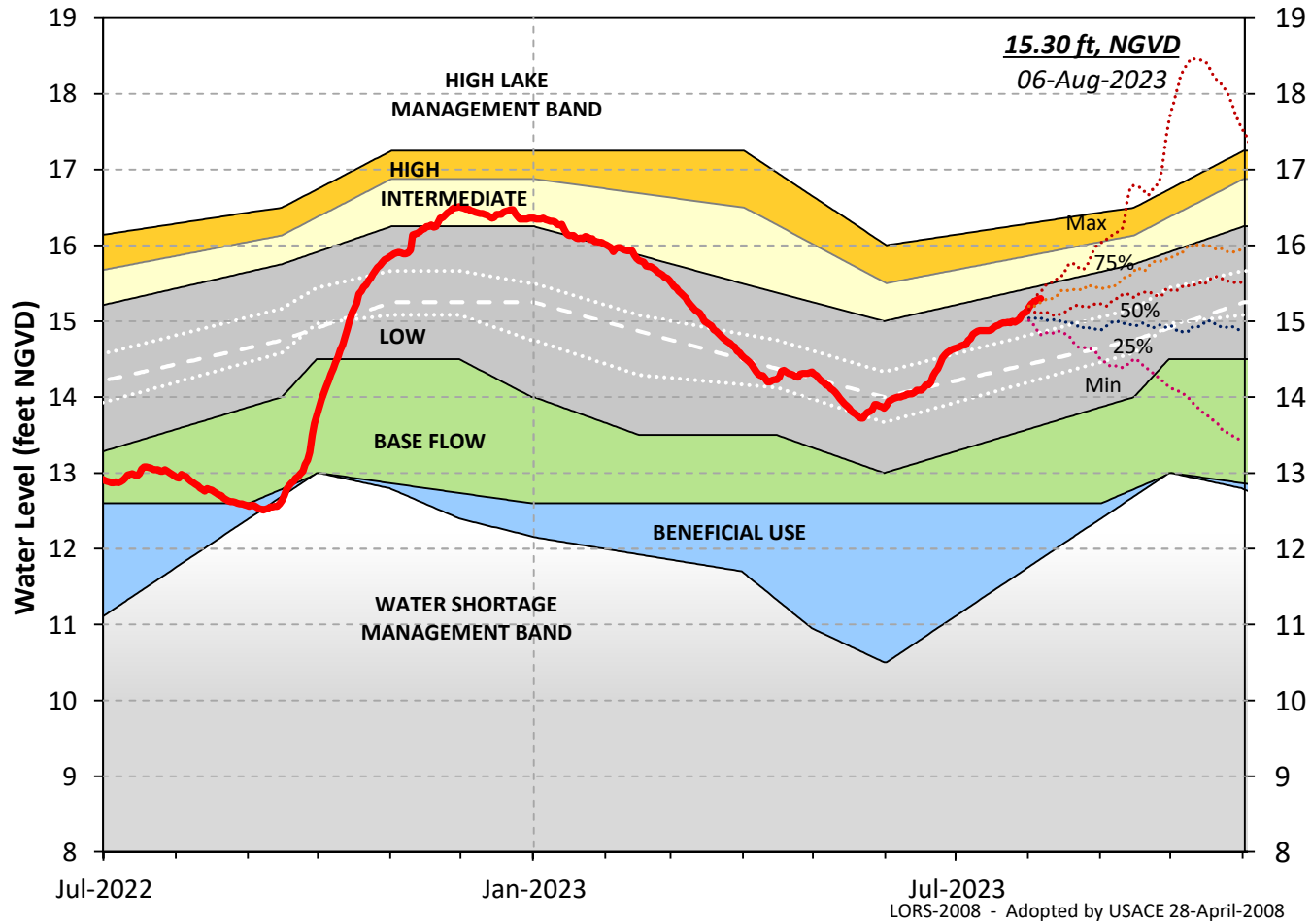


Figure LO-2. Recent Lake Okeechobee stages with projected stages based on a dynamic position analysis.

Lake Okeechobee Stage vs Ecological Envelope

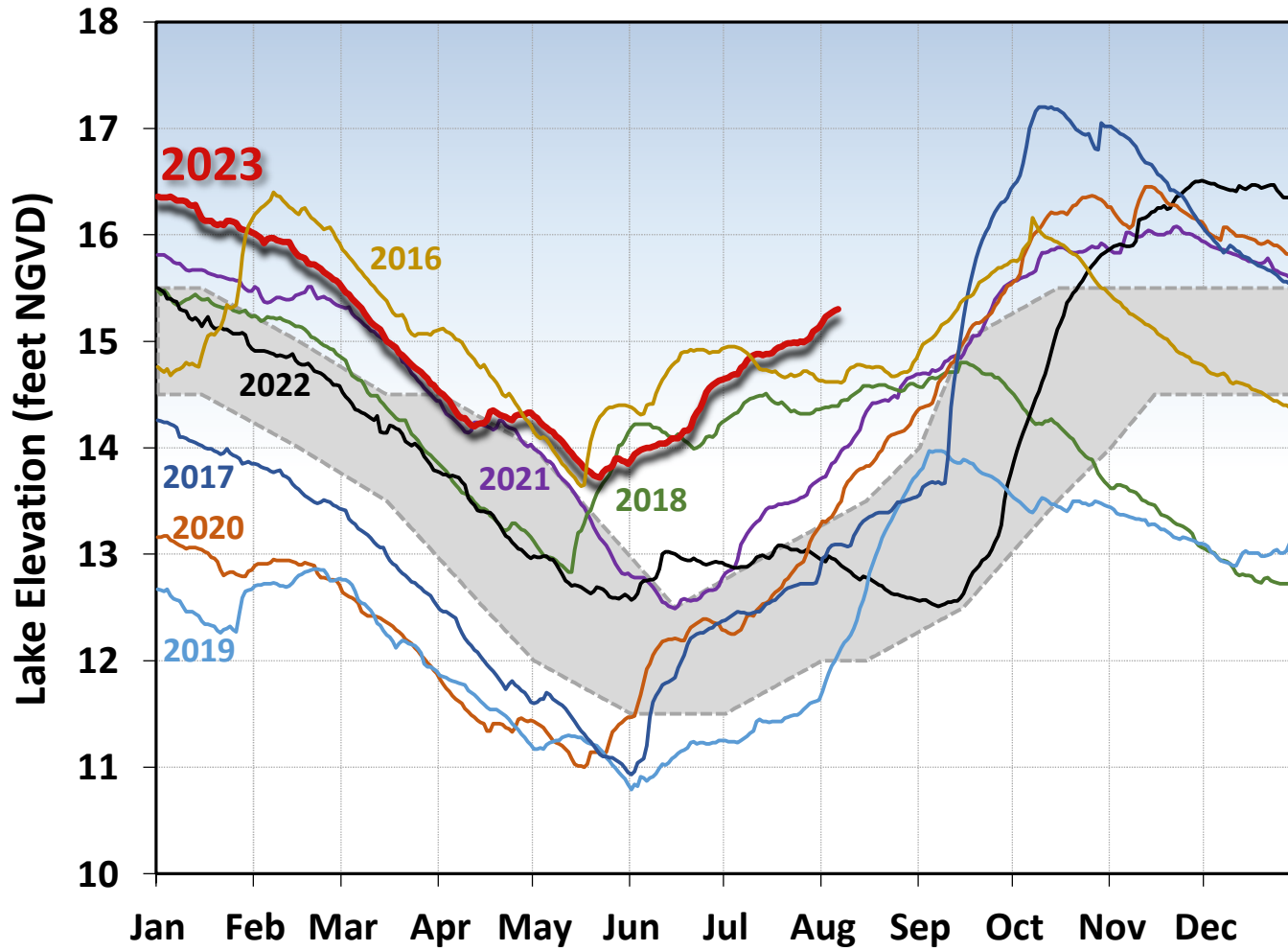


Figure LO-3. The prior seven years of annual stage hydrographs for Lake Okeechobee in comparison to the ecological envelope.

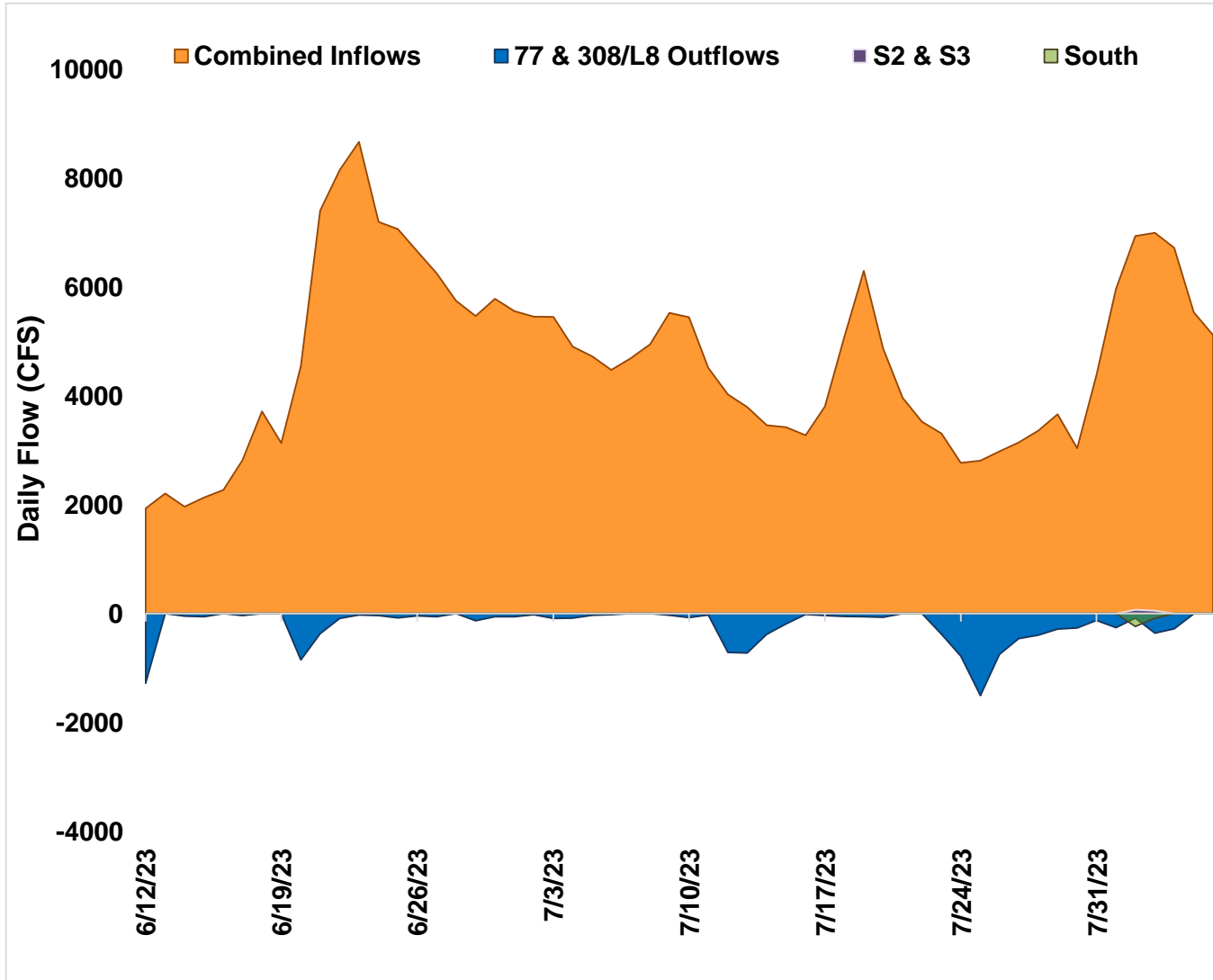


Figure LO-4. Major inflows (orange) to and outflows east and west (blue) from Lake Okeechobee. Outflows south are shown in green. Flows into Lake Okeechobee from the L-8 canal through S-271 (formerly Culvert 10A) or from the C-44 canal through the S-308 are included as inflows. Conversely, flows from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

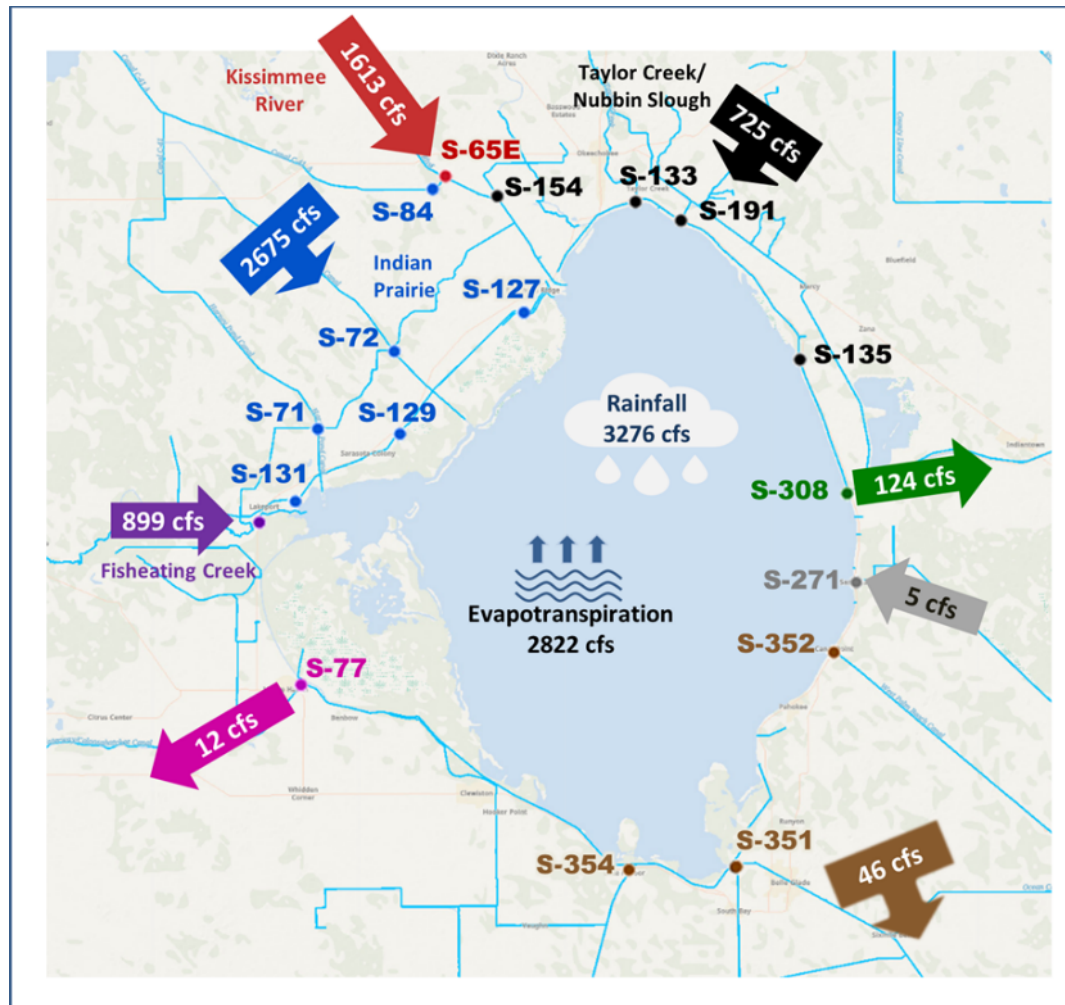


Figure LO-5. Inflows into Lake Okeechobee from Indian Prairie basins, Taylor Creek/Nubbin Slough, Kissimmee River and Fisheating Creek, and outflows to the west via S-77, to the east via S-308, to the south via S-351, S-352, S-354, and to southeast via S-271 (formerly Culvert 10A) for the week of July 31 – August 06, 2023.

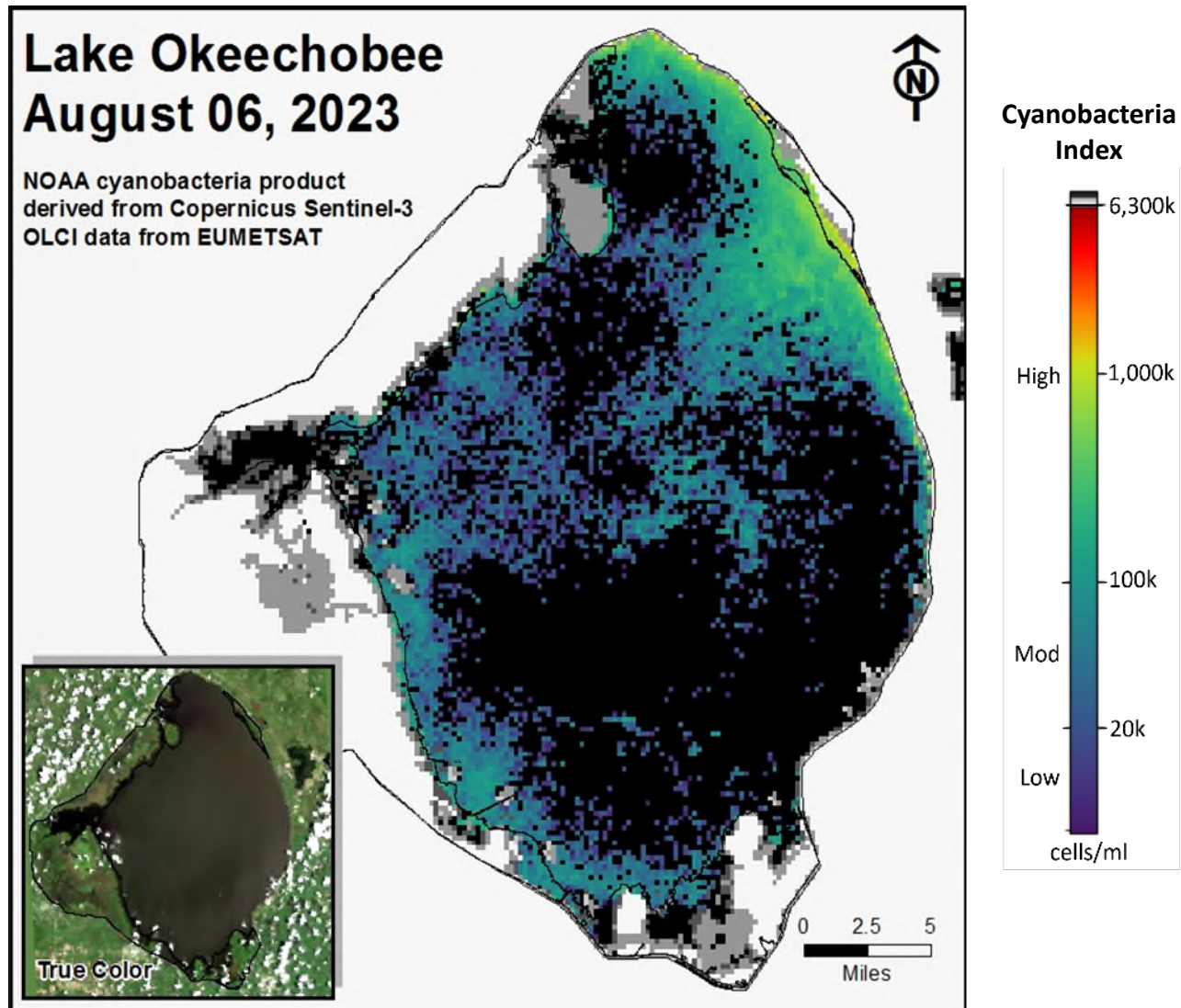


Figure LO-6. Cyanobacteria bloom index level on August 06, 2023, based on NOAA’s harmful algal bloom monitoring system. Gray color indicates cloud cover.

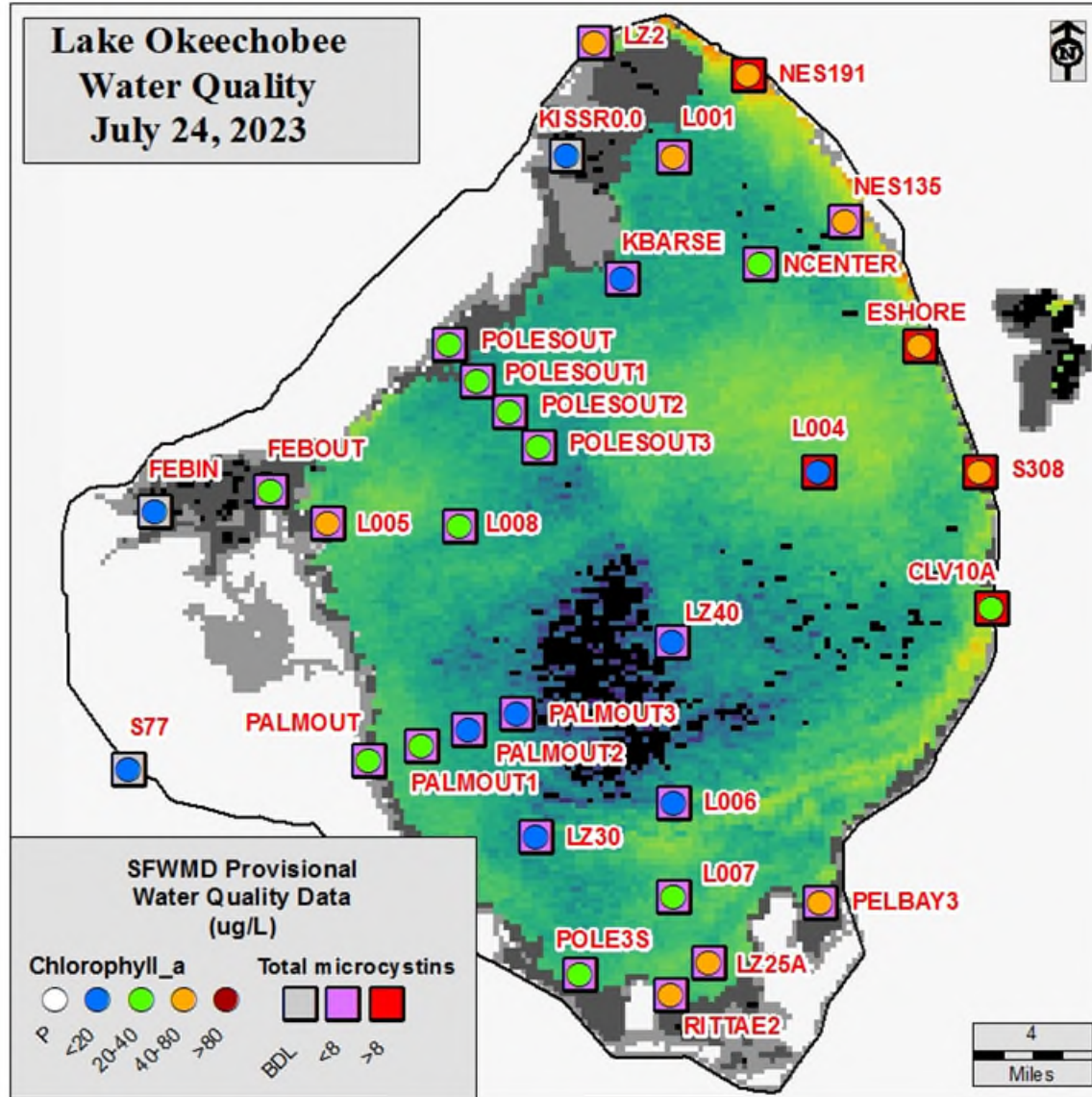


Figure LO-7. Total microcystins ($\mu\text{g/L}$) and chlorophyll *a* ($\mu\text{g/L}$) data from July 24 - 26, 2023. Sampling locations are overlaid on the July 24, 2023, image from NOAA's harmful algal bloom monitoring system. Gray color indicates cloud cover.

Estuaries

St. Lucie Estuary

Over the past week, mean total inflow to the St. Lucie Estuary was 3,052 cfs (**Figures ES-1 and ES-2**), and the previous 30-day mean inflow was 1,637 cfs. For comparison, the historical provisional inflows from the contributing areas are shown in **Figure ES-2**.

Over the past week, salinities decreased 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 10.7. Salinity conditions in the middle estuary were estimated to be within the optimal range for adult eastern oysters (**Figure ES-4**). The mean larval oyster recruitment rate reported by the Fish and Wildlife Research Institute (FWRI) was 0.2 spat/shell for July, a slight decrease from June's recruitment rate (**Figure ES-5**).

Caloosahatchee River Estuary

Over the past week, mean total inflow to the Caloosahatchee River Estuary was 3,872 cfs (**Figures ES-6 and ES-7**), and the previous 30-day mean inflow was 3,344 cfs. For comparison, the historical provisional mean inflows from the contributing areas are shown in **Figure ES-7**.

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-8 and ES-9**). The seven-day mean salinities (**Table ES-2**) were in the optimal range (0-10) for tape grass in the upper estuary. The seven-day mean salinity values were within the optimal range for adult eastern oysters at Shell Point and in the stressed range at Cape Coral and Sanibel (**Figure ES-10**). The mean larval oyster recruitment rate reported by the FWRI was 7.3 spat/shell at Iona Cove and 10.1 spat/shell at Bird Island for July, which was a large increase from recruitment rates recorded in June (**Figures ES-11 and ES-12**).

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 1,500 cfs, and a steady release at 2,000 cfs with estimated tidal basin inflows of 465 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-13**). This keeps predicted salinities in the upper estuary within the optimal salinity range (0-10) for tape grass.

Red Tide

The FWRI reported on August 4, 2023, that *Karenia brevis*, the Florida red tide dinoflagellate, was not observed in any samples collected within the District region.

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

Water Management Recommendations

Lake stage is in the Low Sub-Band. Tributary conditions are wet. The LORS2008 release guidance suggests up to 3,000 cfs release at S-79 to the Caloosahatchee River Estuary and up to 1,170 cfs release at S-80 to the St. Lucie Estuary.

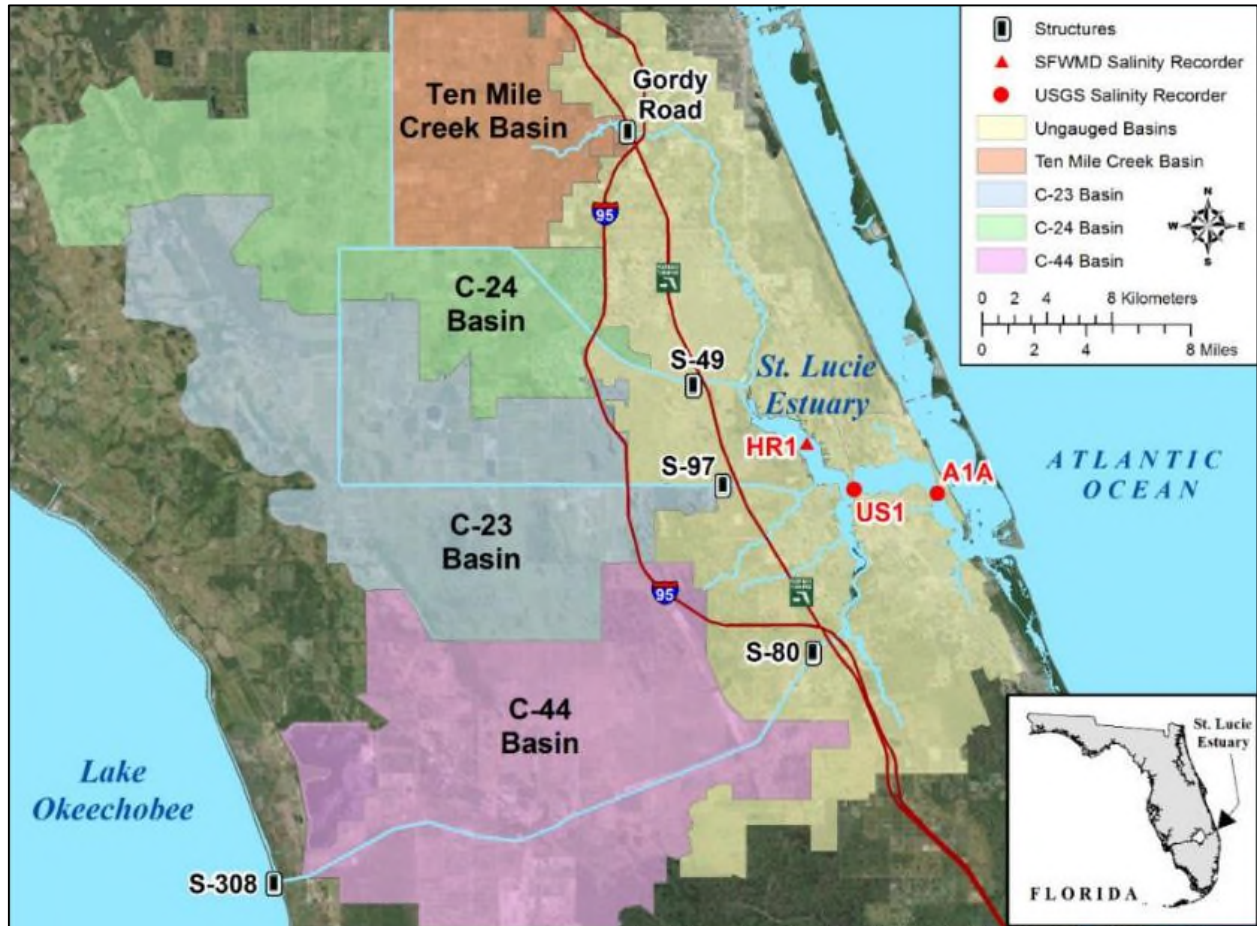


Figure ES-1. Basins, water control structures and salinity monitoring sites in the St. Lucie Estuary.

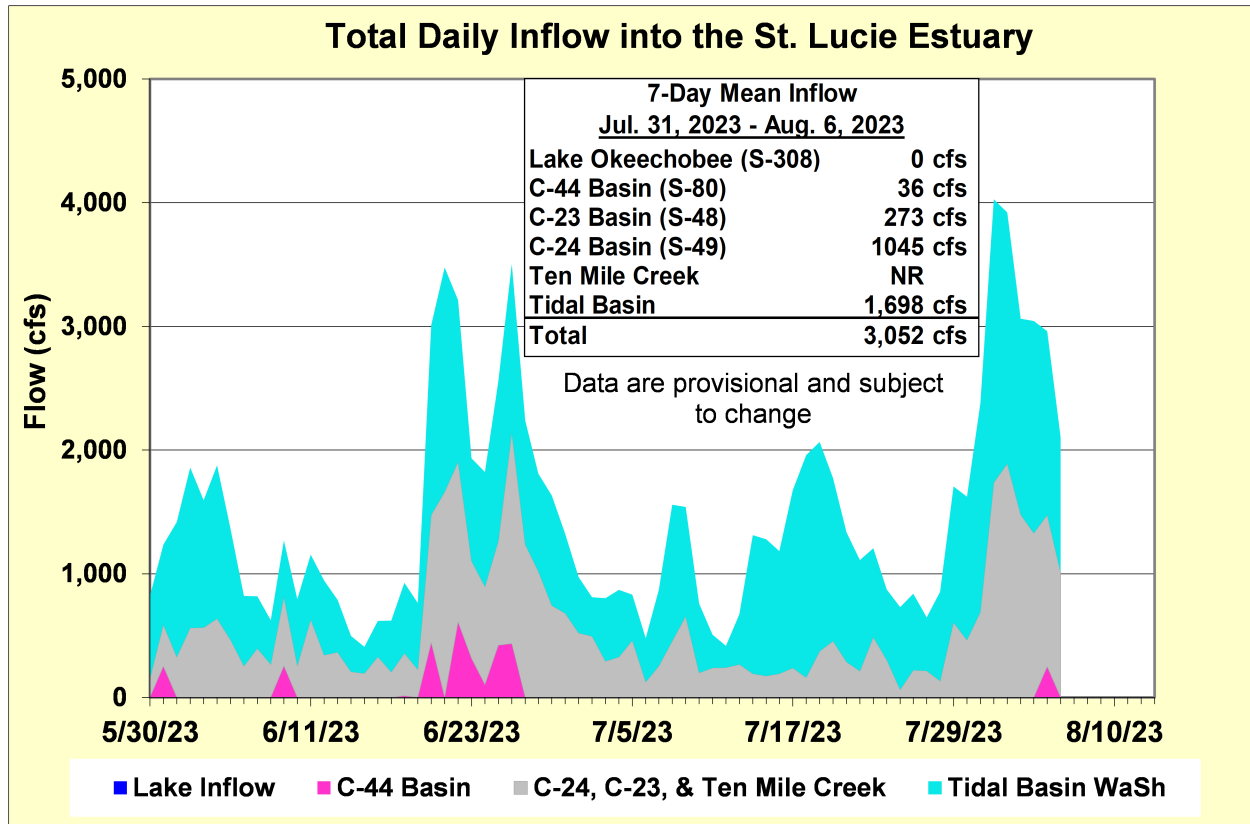


Figure ES-2. Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and Tidal Basins into the St. Lucie Estuary.

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 optimum salinity range for adult eastern oysters (*Crassostrea virginica*) in the estuary. Data are provisional.

Sampling Site	Surface	Bottom	Optimum Envelope
HR1 (North Fork)	3.5 (8.1)	10.4 (14.0)	10.0 – 25.0
US1 Bridge	10.0 (14.0)	11.5 (16.9)	10.0 – 25.0
A1A Bridge	18.7 (22.3)	23.9 (27.0)	10.0 – 25.0

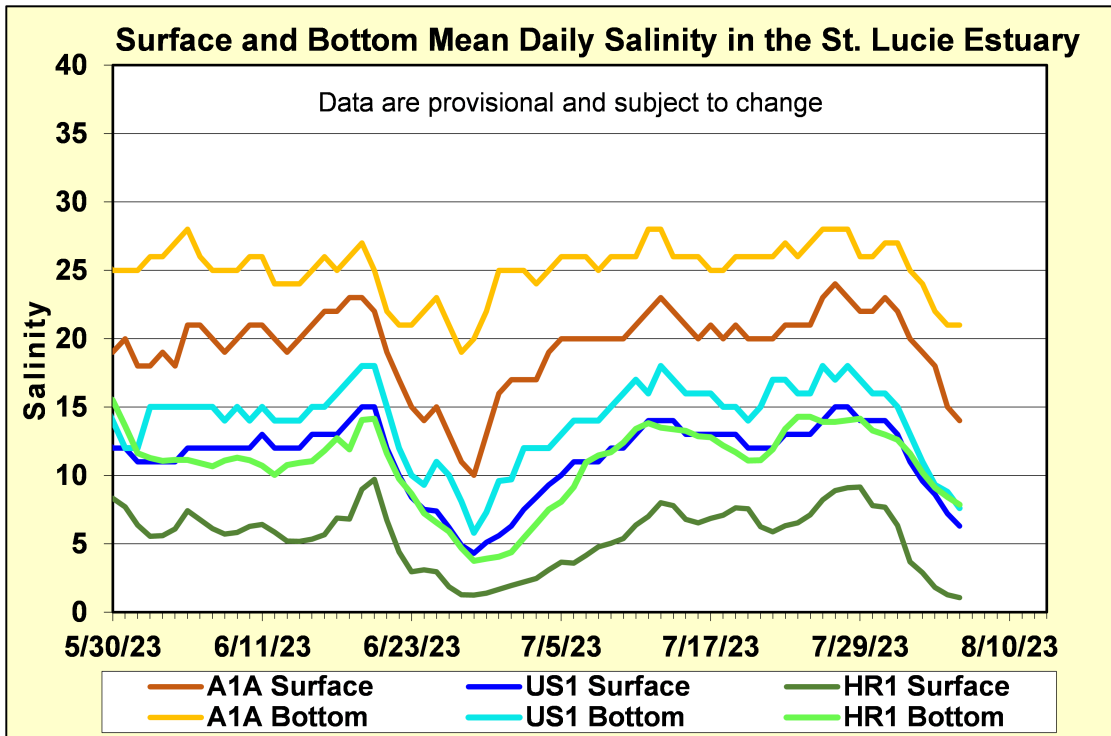


Figure ES-3. Mean daily salinity at the A1A, US1 and HR1 sites in the St. Lucie Estuary.

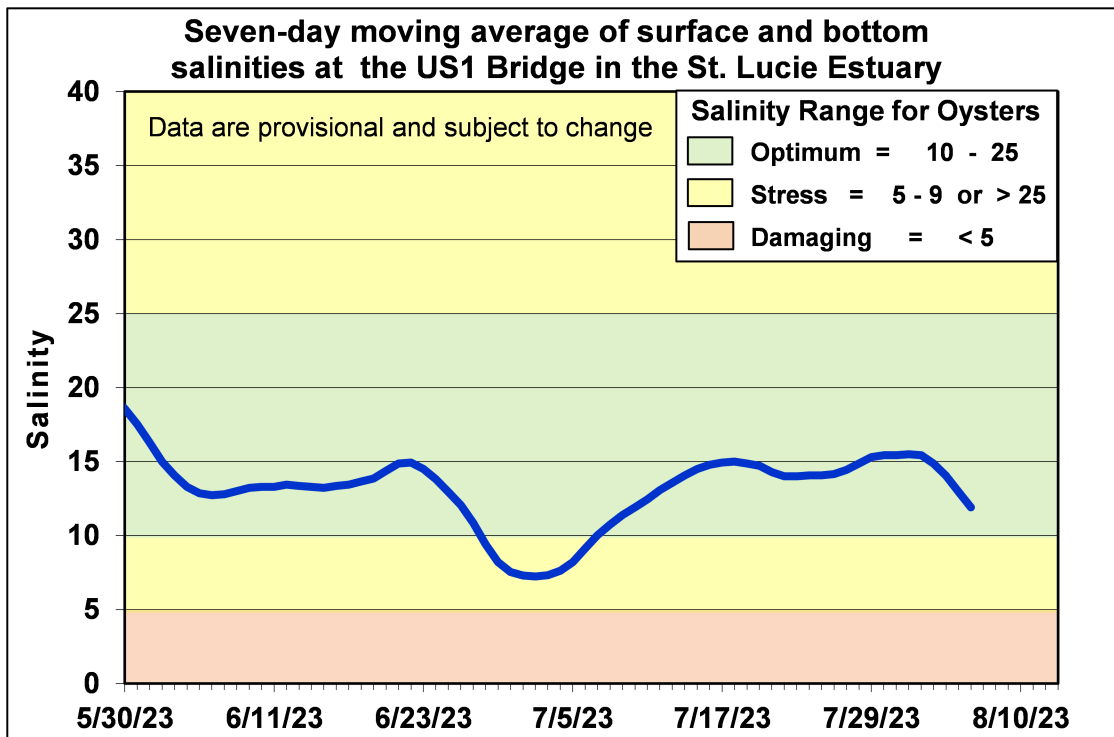


Figure ES-4. Seven-day moving average of the surface and bottom salinities at the US1 Bridge in the St. Lucie Estuary.

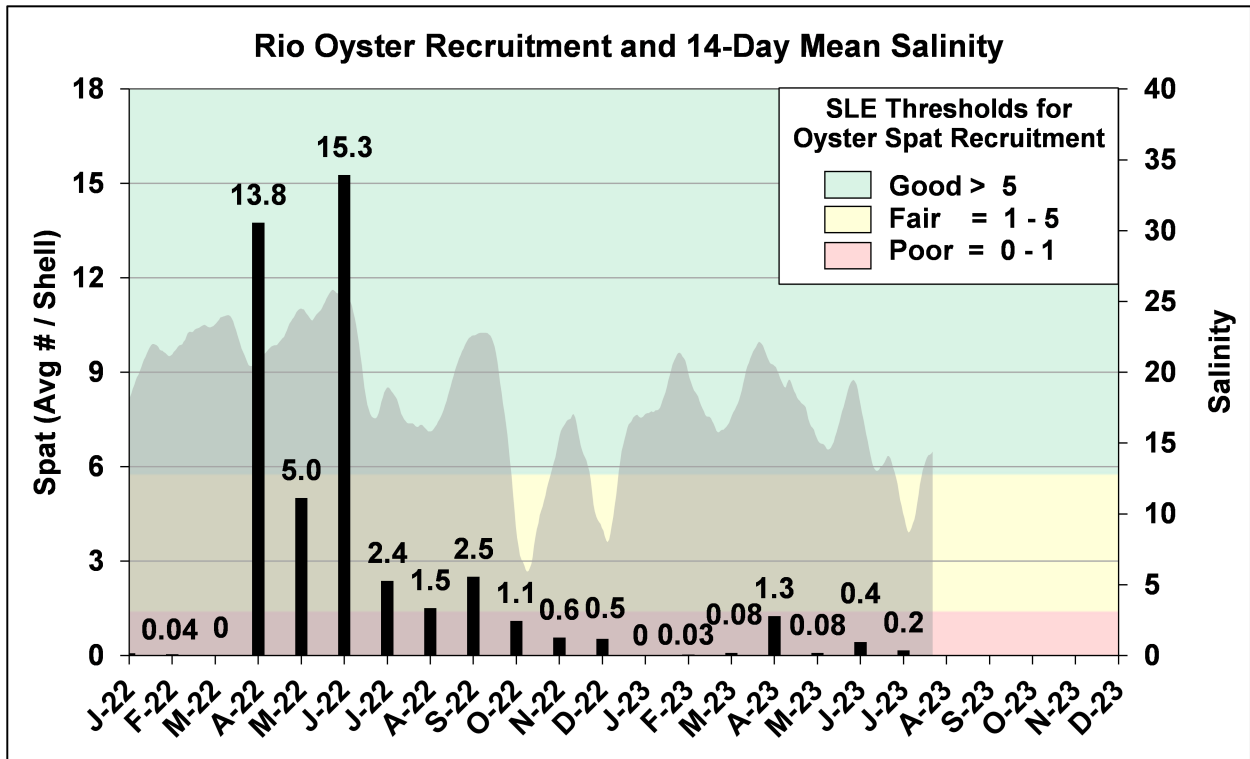


Figure ES-5. Mean oyster recruitment at the Rio oyster monitoring station and 14-day mean salinity at US1 Bridge.

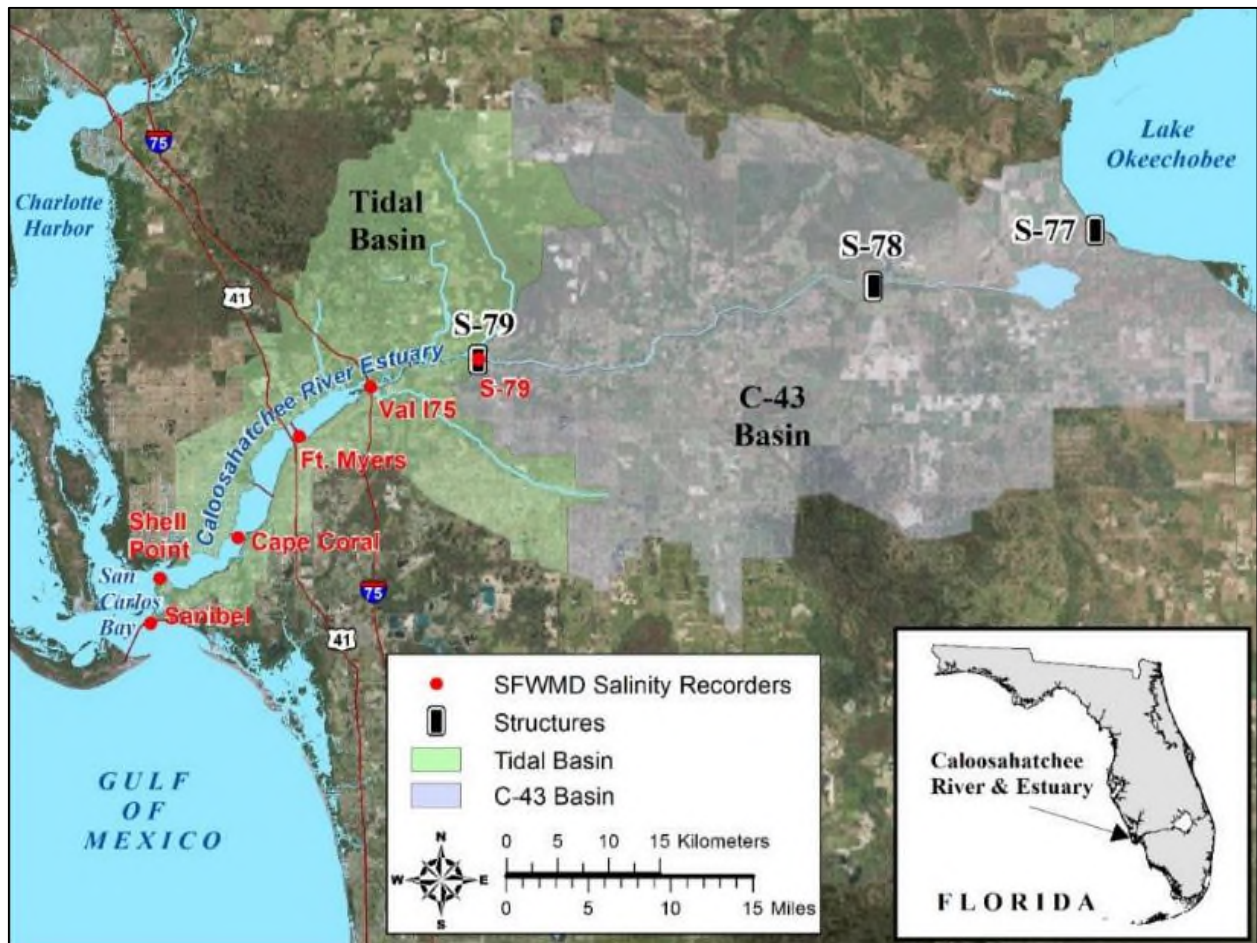


Figure ES-6. Basins, water control structures and salinity monitoring sites in the Caloosahatchee River Estuary.

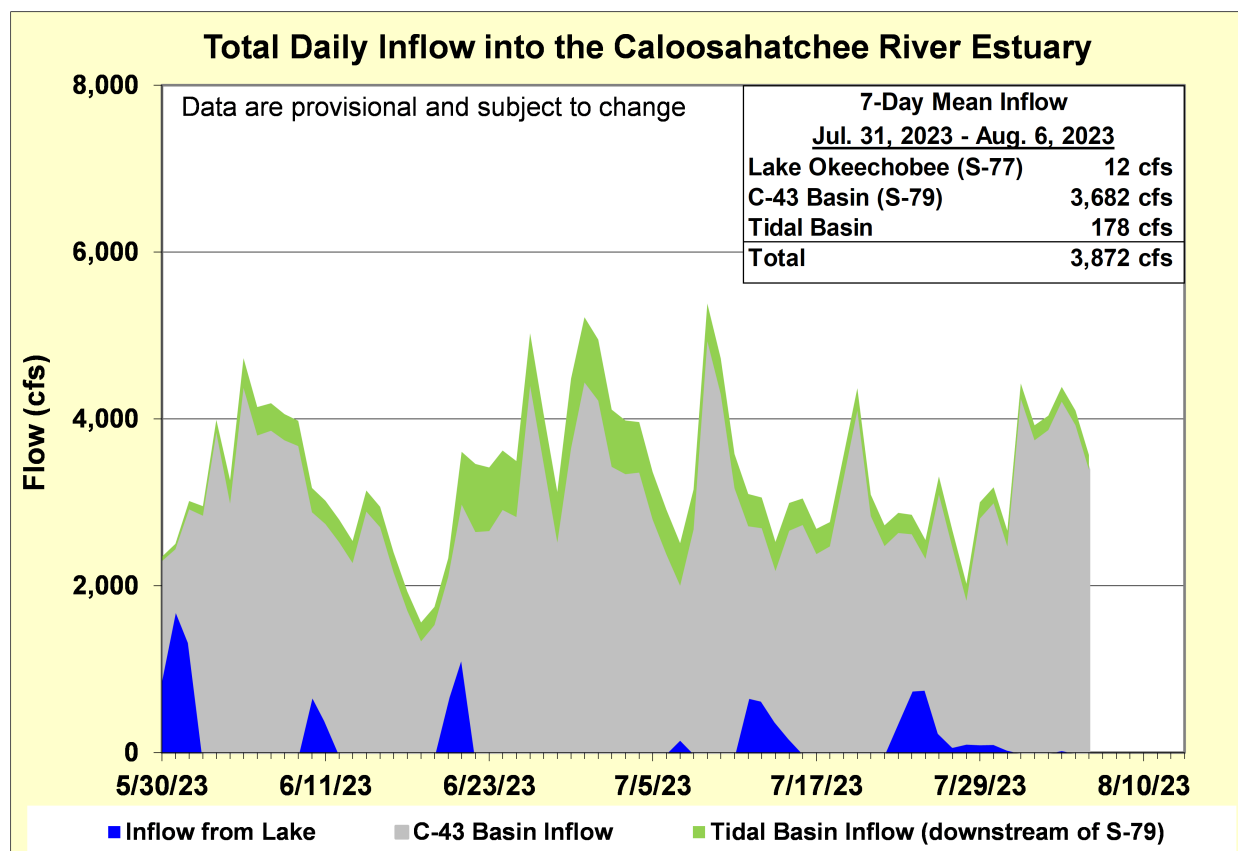


Figure ES-7. Total daily inflows from Lake Okeechobee, and runoff from the C-43 and Tidal basins into the Caloosahatchee River Estuary.

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 in the upper estuary sites is for the protection of tape grass and the envelope in the lower estuary is the optimum salinity range for adult eastern oysters (*Crassostrea virginica*). Data are provisional.

Sampling Site	Surface	Bottom	Optimum Envelope
S-79 (Franklin Lock)	0.2 (0.2)	0.2 (0.2)	0.0 – 10.0
Val I-75	0.2 (0.2)	0.2 (0.2)	0.0 – 10.0
Fort Myers Yacht Basin	0.4 (0.3)	0.4 (0.3)	0.0 – 10.0
Cape Coral	5.9 (4.6)	7.0 (6.7)	10.0 – 25.0
Shell Point	23.0 (19.9)	24.4 (23.2)	10.0 – 25.0
Sanibel	30.1 (28.8)	30.1 (30.3)	10.0 – 25.0

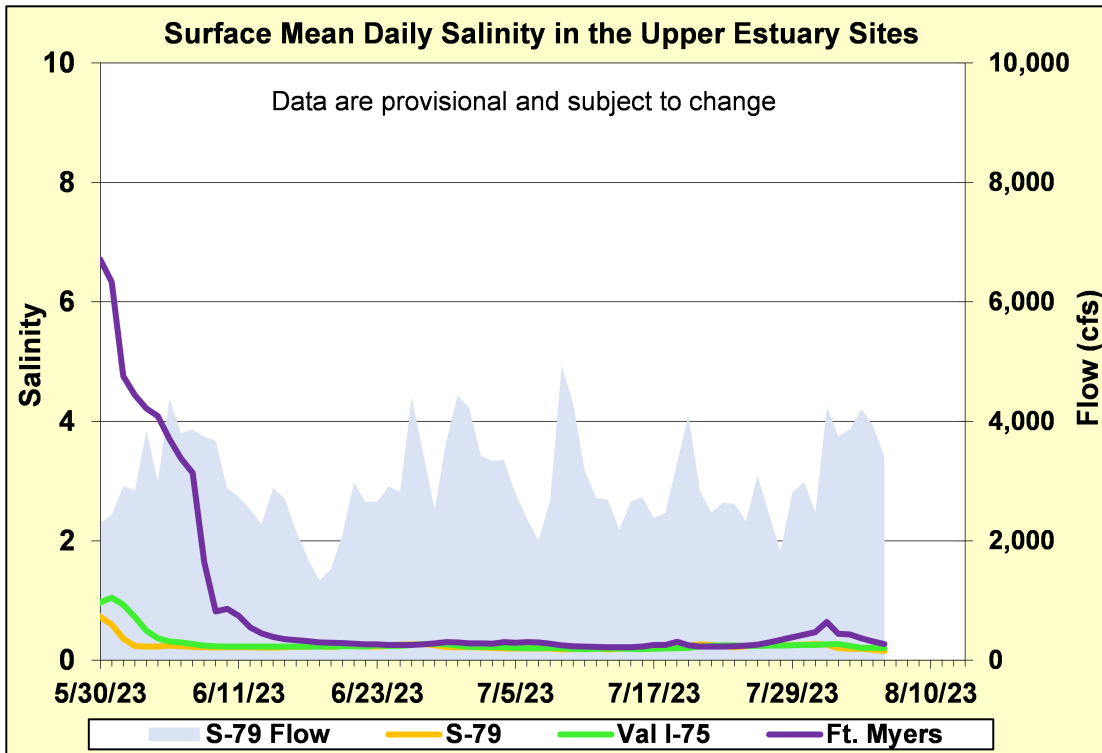


Figure ES-8. Mean daily salinity at upper Caloosahatchee River Estuary monitoring sites and mean daily flow at S-79.

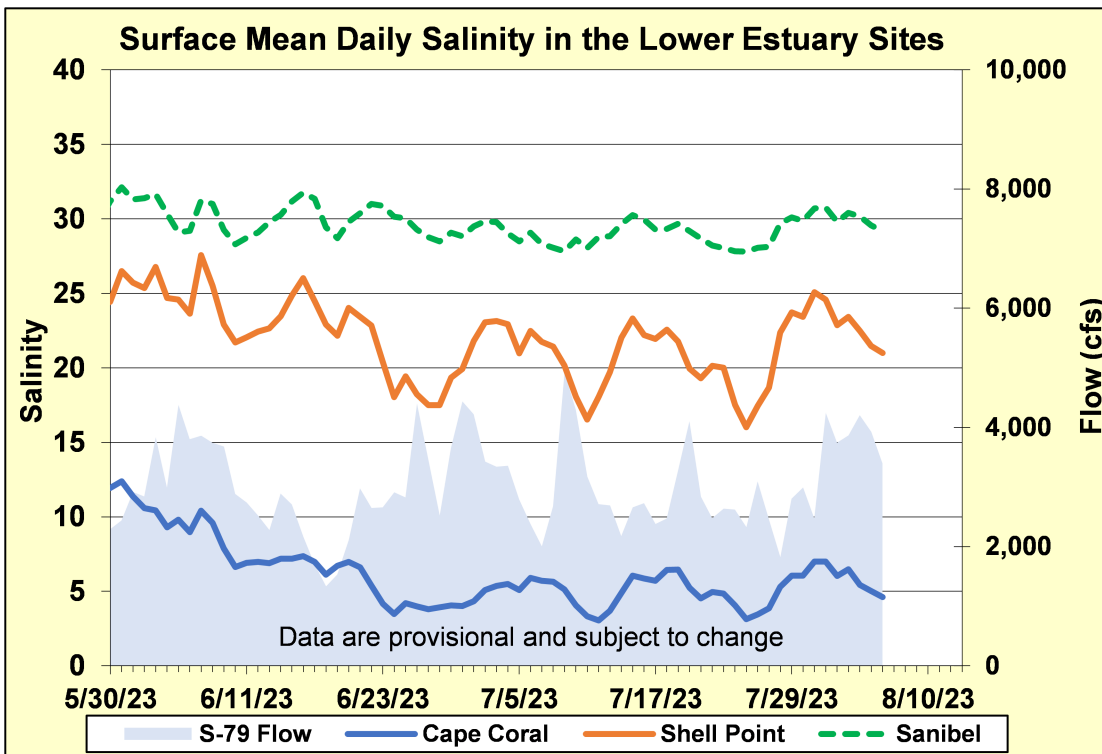


Figure ES-9. Mean daily surface salinity at lower Caloosahatchee River Estuary monitoring sites and mean daily flow at S-79.

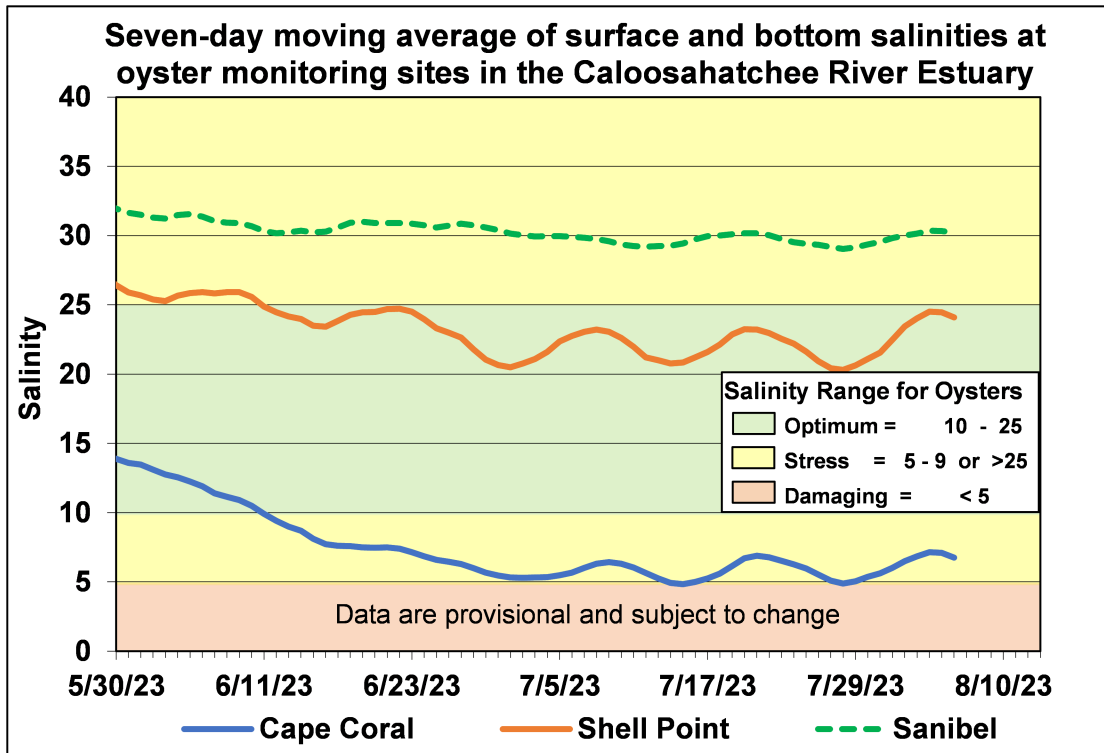


Figure ES-10. Seven-day moving average of surface and bottom salinities at Cape Coral, Shell Point and Sanibel monitoring sites in the Caloosahatchee River Estuary.

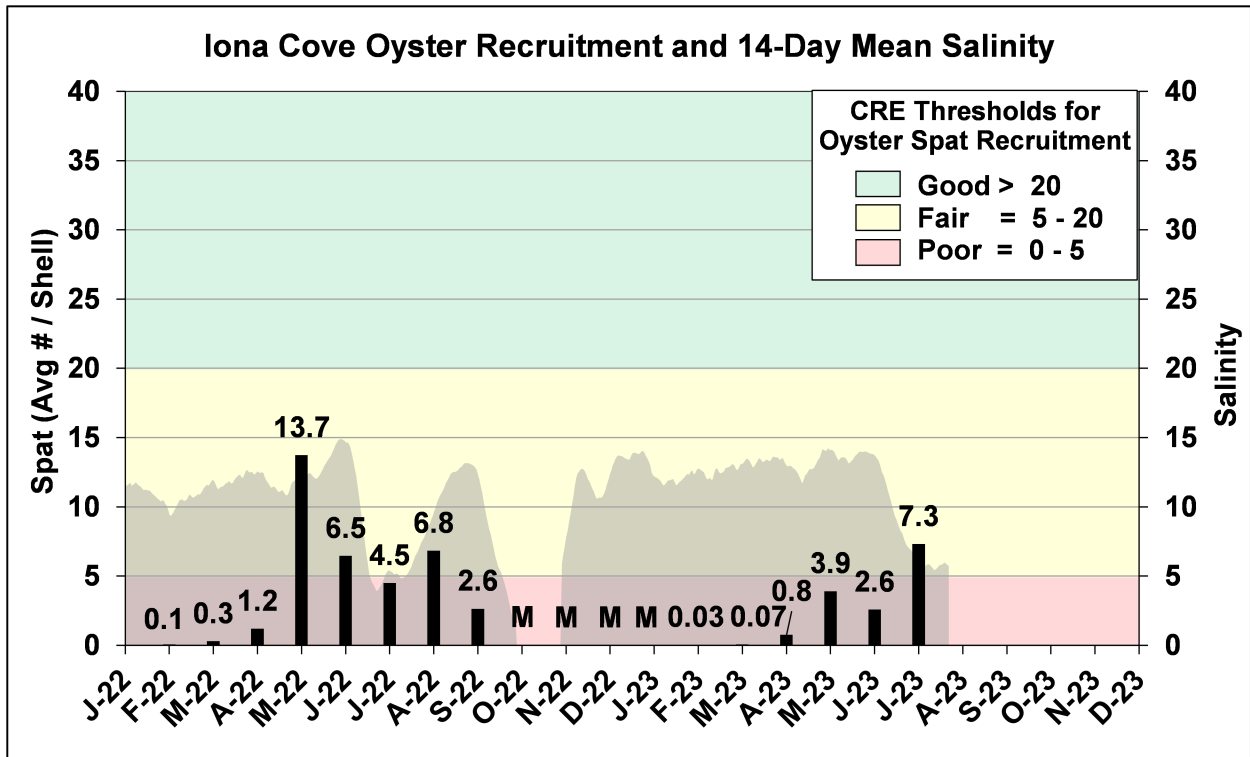


Figure ES-11. Mean oyster recruitment at the Iona Cove oyster monitoring station and 14-day mean salinity at Cape Coral.

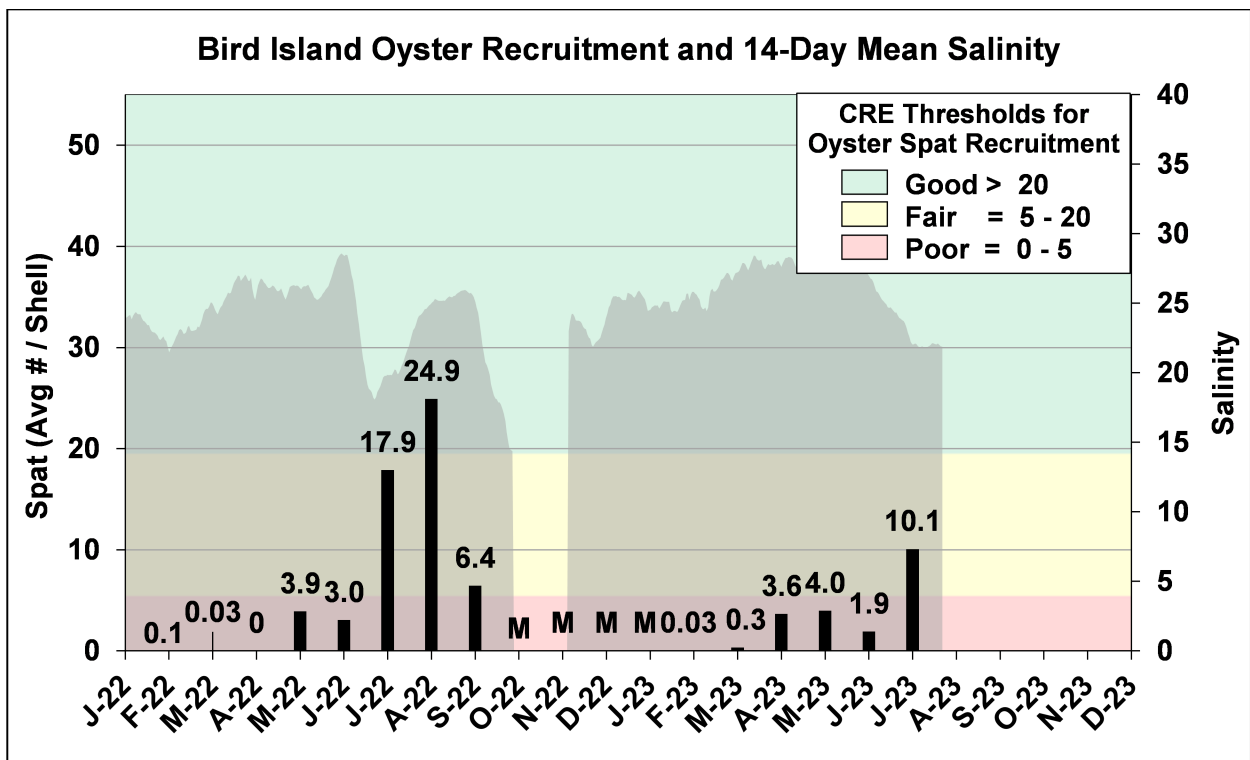


Figure ES-12. Mean oyster recruitment at the Bird Island oyster monitoring station and 14-day mean salinity at Shell Point.

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	465	0.5	0.3
B	450	465	0.3	0.3
C	750	465	0.3	0.3
D	1,000	465	0.3	0.3
E	1,500	465	0.3	0.3
F	2,000	465	0.3	0.3

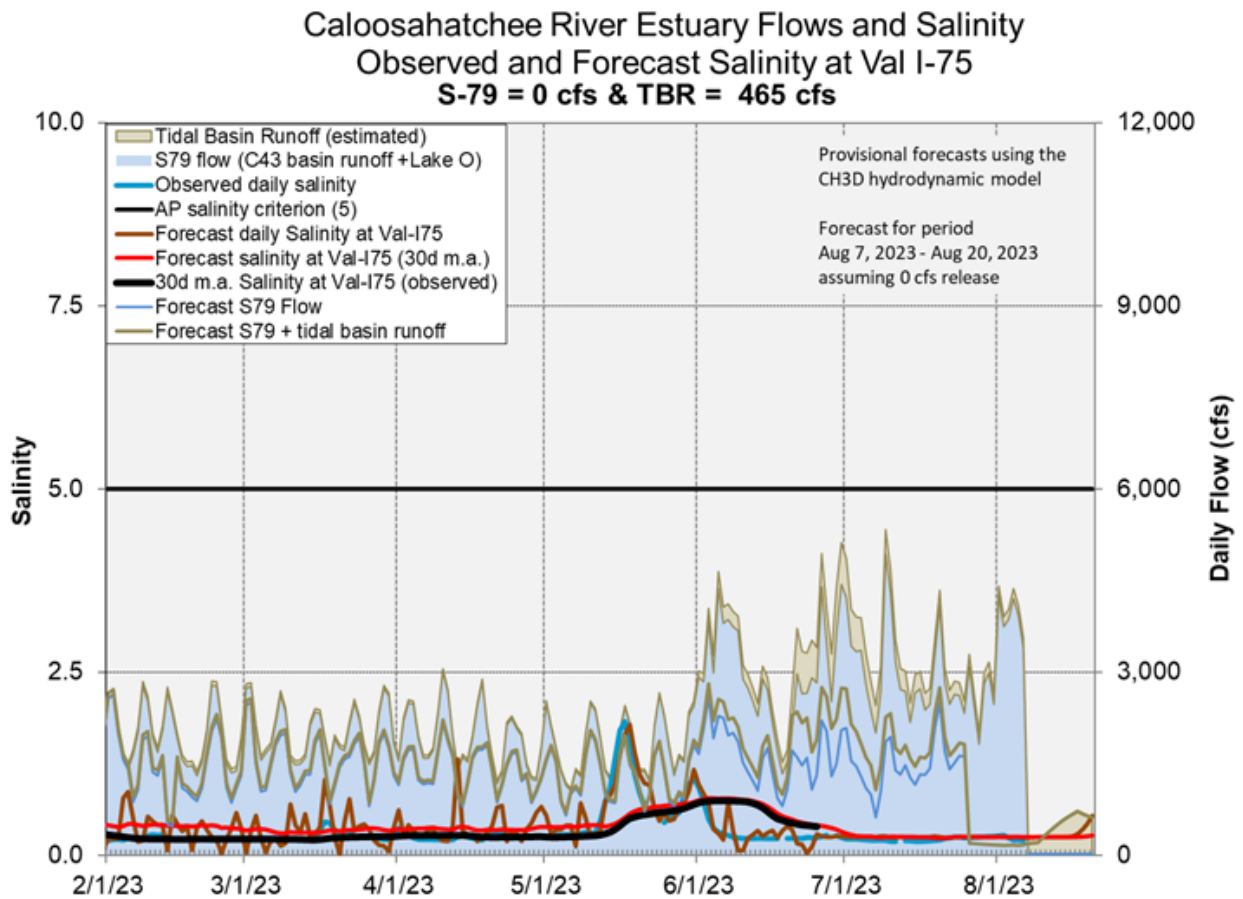


Figure ES-13. Forecasted Val I-75 site surface salinity assuming no pulse release at S-79.

Stormwater Treatment Areas

STA-1E: STA-1E Western Flow-way is offline for post-construction vegetation grow in. Online treatment cells are at or above target stage. Vegetation in the flow-ways is stressed and highly stressed. The 365-day phosphorus loading rate (PLRs) for the Central Flow-way and Eastern Flow-ways are high (**Figure S-1**).

STA-1W: An operational restriction is in place in STA-1W Northern Flow-way for vegetation management activities. Treatment cells are above target stage. Vegetation in the flow-ways is stressed and highly stressed. The 365-day PLRs for the Eastern, Western, and Northern Flow-ways are high (**Figure S-1**).

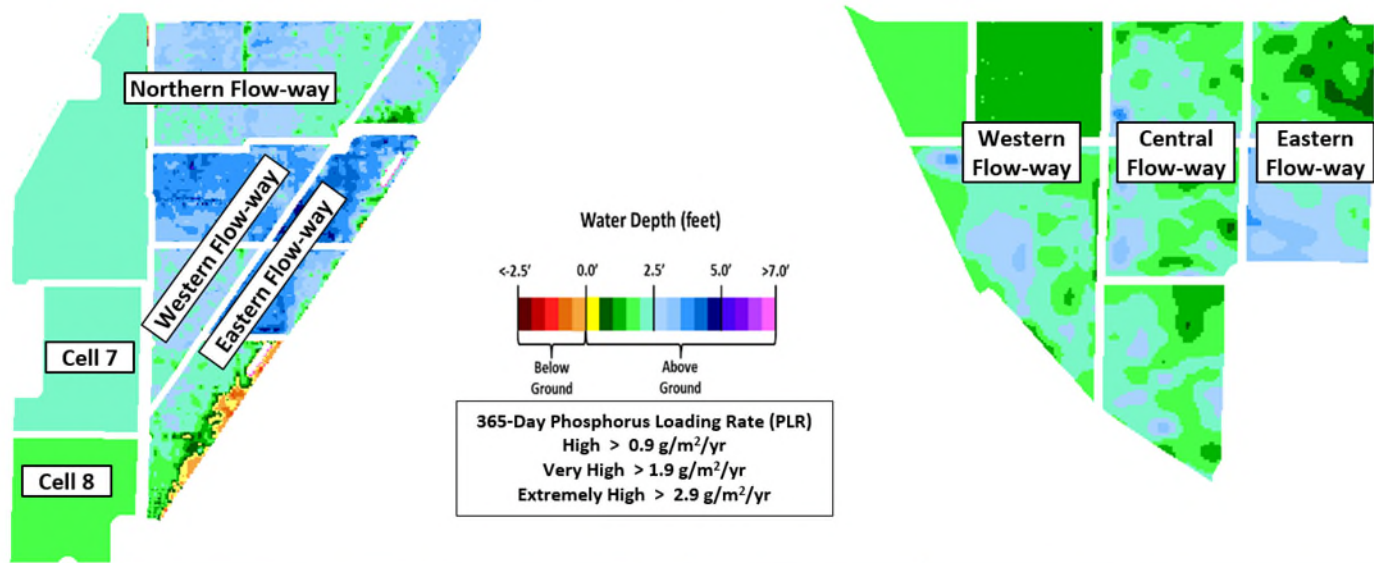
STA-2: STA-2 Flow-way 2 is offline for post-construction vegetation grow in. Operational restrictions are in place in STA-2 Flow-way 3 for canal plug refurbishments, and in Flow-way 4 for vegetation management activities. Most online treatment cells are above target stage. Vegetation in Flow-ways 1 and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

STA-3/4: STA-3/4 Eastern Flow-way is offline for vegetation rehabilitation. Online treatment cells are above target stage. Vegetation in the Central Flow-way 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-2**).

STA-5/6: All flow-ways in STA-5/6 are online. Most treatment cells are at or above target stage. All treatment cells have highly stressed or stressed vegetation conditions except Flow-ways 7 which is healthy. The 365-day PLRs for most flow-ways are at or below 1.0 g/m²/year, except Flow-way 3, 4, and 5 which are high (**Figure S-3**).

For definitions on STA operational language see glossary following figures.

Eastern Flow Path Weekly Status Report – 7/31/2023 through 8/6/2023

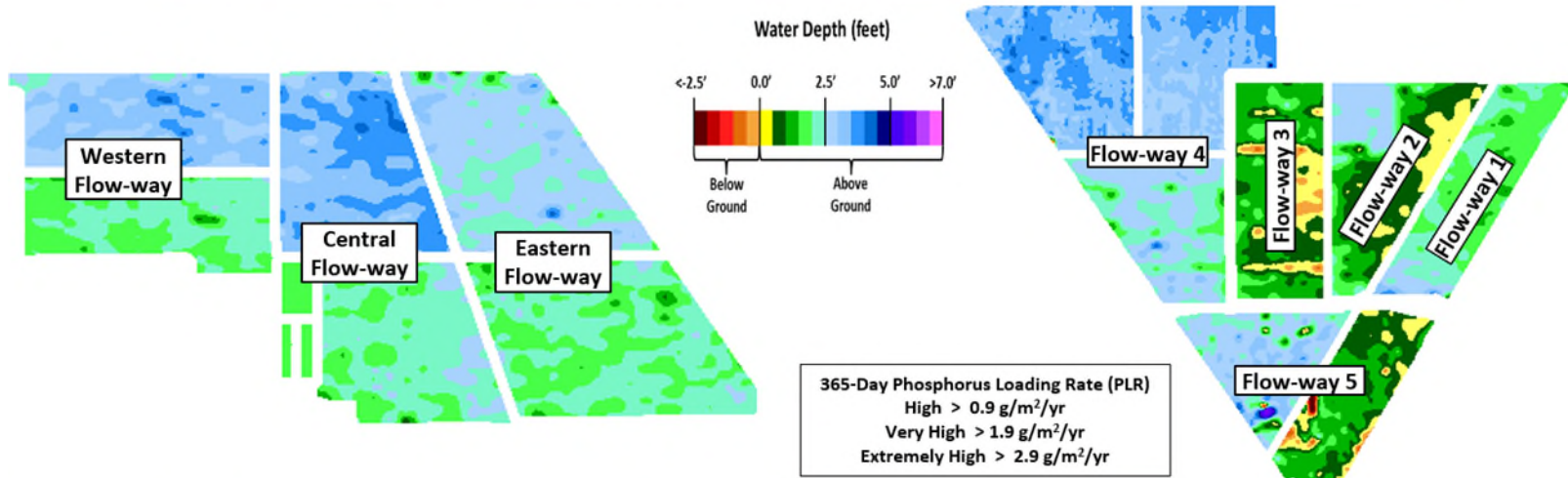


STA-1W	Flow-way Status
Western	<ul style="list-style-type: none"> • High 365-day PLR • Highly stressed vegetation conditions
Eastern	<ul style="list-style-type: none"> • High 365-day PLR • Highly stressed vegetation conditions
Northern	<ul style="list-style-type: none"> • High 365-day PLR • Highly stressed vegetation conditions • Planting emergent vegetation
Cell 7	<ul style="list-style-type: none"> • Stressed vegetation conditions
Cell 8	<ul style="list-style-type: none"> • Construction activities

STA-1E	Flow-way Status
Western	<ul style="list-style-type: none"> • Offline for post-construction vegetation grow-in
Central	<ul style="list-style-type: none"> • Highly stressed vegetation conditions
Eastern	<ul style="list-style-type: none"> • High 365-day PLR • Stressed vegetation conditions

Figure S-1. Eastern Flow Path Weekly Status Report

Central Flow Path Weekly Status Report – 7/31/2023 through 8/6/2023



STA-3/4	Flow-way Status
Western	<ul style="list-style-type: none"> Stressed vegetation conditions Nuisance vegetation control within inflow canal
Central	<ul style="list-style-type: none"> Highly stressed vegetation conditions Removal of floating tussocks Nuisance vegetation control within inflow canal
Eastern	<ul style="list-style-type: none"> Offline for post-drawdown vegetation establishment Nuisance vegetation control within inflow canal

STA-2	Flow-way Status
Flow-way 1	<ul style="list-style-type: none"> High 365-day PLR Stressed vegetation conditions
Flow-way 2	<ul style="list-style-type: none"> Offline for post-construction vegetation grow-in
Flow-way 3	<ul style="list-style-type: none"> Refurbishments project - plug construction Stressed vegetation conditions
Flow-way 4	<ul style="list-style-type: none"> Planting emergent vegetation Nuisance vegetation control Highly stressed vegetation conditions
Flow-way 5	<ul style="list-style-type: none"> Highly stressed vegetation conditions

Figure S-2. Central Flow Path Weekly Status Report

Western Flow Path Weekly Status Report – 7/31/2023 through 8/6/2023

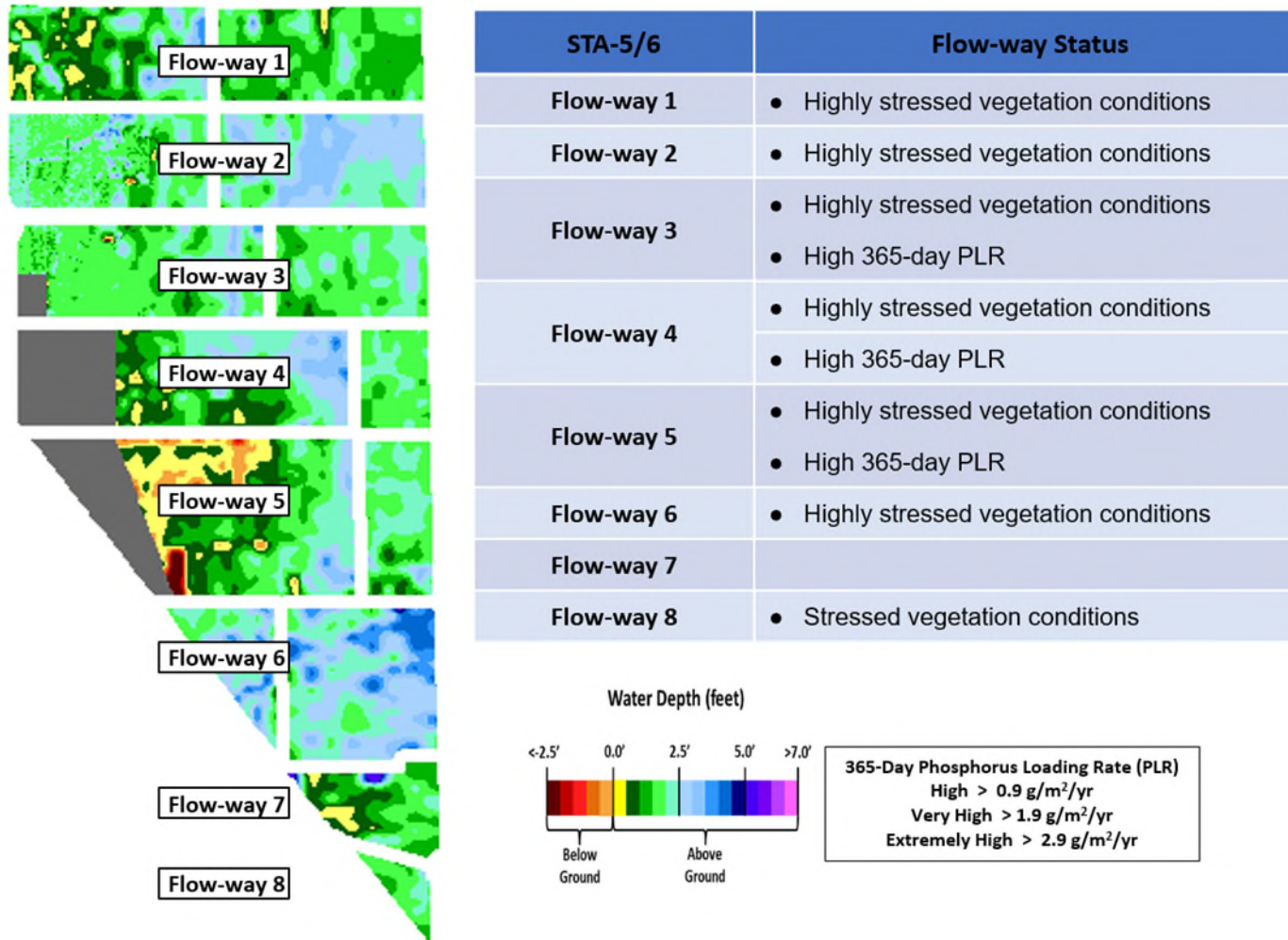


Figure S-3. Western Flow Path Weekly Status Report

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: Last week stage within the refuge increased significantly in both the canal and the marsh. The 1-8C average on Sunday was 0.24 feet above the rising Zone A1 regulation line. WCA-2A: Stage at the 2-17 decreased slightly over the last week. The average on Sunday was 1.08 feet above the rising regulation line. WCA-3A: The 3-Gauge average increased over the last week. The average stage on Sunday was 0.80 feet above the rising regulation line and 0.70 feet below the Extreme High-Water Line (EHWL). WCA-3A North: Gauge 62 (NW corner) rose then steadied remaining below the rising line of the Upper Schedule on Sunday by 0.08 feet. See figures **EV-1** through **EV-4**.

Water Depths

The SFWDAT tool illustrates water depths continuing to build in all Everglades Protection Area (EPA) basins, with only a small region in southern Big Cypress National Preserve (BCNP) and western Everglades National Park (ENP) with the potential for stages below ground. Ponded conditions are lessening in eastern WCA-2A yet the upper reaches of the L-67s in WCA-3A and within 3B are deeper. Hydrologic connectivity has been maintained in ENP and is building in the western sloughs.

Comparing current WDAT water depths to one month ago conditions within the central EPA and WCA-1 are slightly deeper, while WCA-2A and western BCNP are slightly drier. Looking back a year ago, conditions are significantly wetter in western WCA-3A and northern WCA-2A (**Figure EV-5** and **Figure EV-6**).

Comparing current conditions to the 20-year average on August 6th, well above average depths conditions continue across most of the EPA, with only portions of BCNP and northwestern WCA-3A below the 50th percentile. Conditions remain above the 90th percentile in WCA-3B and western ENP (**Figure EV-7**).

Taylor Slough and Florida Bay

Total weekly rainfall averaged 0.9 inches in Taylor Slough and Florida Bay over the past week (Monday-Sunday) based on the 17 gauges used for this report. Total weekly rainfall ranged from 0.1 inches at Little Madeira (LM) in the eastern nearshore region to 3.7 inches at P37 in the southern slough. All stages increased across Taylor Slough, with an average increase of 0.10 feet. Stage changes ranged from +0.02 feet at EVER6 and EPSW, both in the southeastern slough, to +0.23 feet at Taylor Slough Bridge (TSB) in the northern slough (**Figure EV-8** and **Figure EV-9**). Taylor Slough water levels are above the historical average for this time of year by 6.6 inches compared to before the Florida Bay initiative (starting in 2017), an increase of 0.6 inches from last week.

Average Florida Bay salinity was 29.0, 1.7 higher than the previous week. Salinity increased across most sites, and changes ranged from a decrease of 0.8 at Johnson Key (JK) in the western region to an increase of 6.0 at Joe Bay (JB) in the eastern nearshore region (**Figure EV-8**). Salinities remain within the interquartile range (IQR) for the Eastern and Central regions of the bay, and Western salinities are at the 75th percentile (**Figure**

EV-10). Florida Bay salinity remains below its historical average for this time of year by 0.6, an increase of 0.2 relative to last week.

Water Management Recommendations

Individual regional recommendations and the reasoning for each can be found in **Table EV-2 below**. In general, keeping the entire system hydrated and flowing at all times maintains biodiversity and productivity. However, operations that elevate the ascension rates above 0.18 feet per week, as they did this past week, have detrimental ecological impacts on sensitive regions of the EPA, especially where Apple Snail eggs are found. Avoiding extreme shifts in hydrologic trends and depths is protective of the ecology of the WCAs. However, the ecology of Northwestern WCA-3A would benefit from an increase in water depths because there is the potential for below ground stages and peat oxidation, which is inconsistent with this being the wet season. As conditions remain above the 90th percentile in NE Shark River Slough, continuing strong positive Taylor Slough creek flows to avoid salinity swings in the nearshore areas is ecologically beneficial.

Table EV-2. Previous week’s rainfall and water depth changes in Everglades basins.

Everglades Region	Rainfall (inches)	Stage change (feet)
WCA-1	3.42	+0.22
WCA-2A	3.13	-0.06
WCA-2B	5.30	+0.45
WCA-3A	2.57	+0.19
WCA-3B	1.84	+0.10
ENP	1.75	-0.02

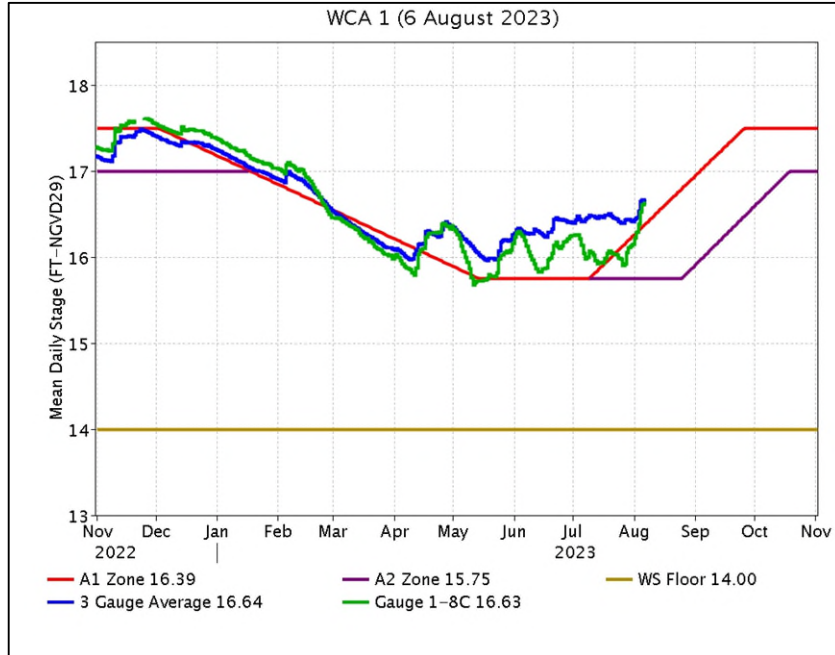


Figure EV-1. WCA-1 stage hydrographs and regulation schedule.

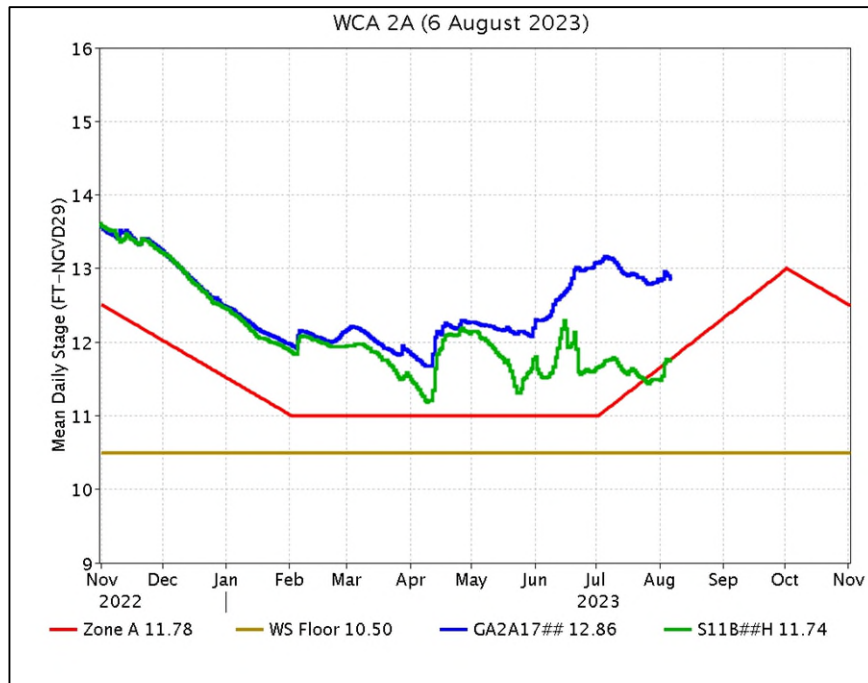


Figure EV-2. WCA-2A stage hydrographs and regulation schedule.

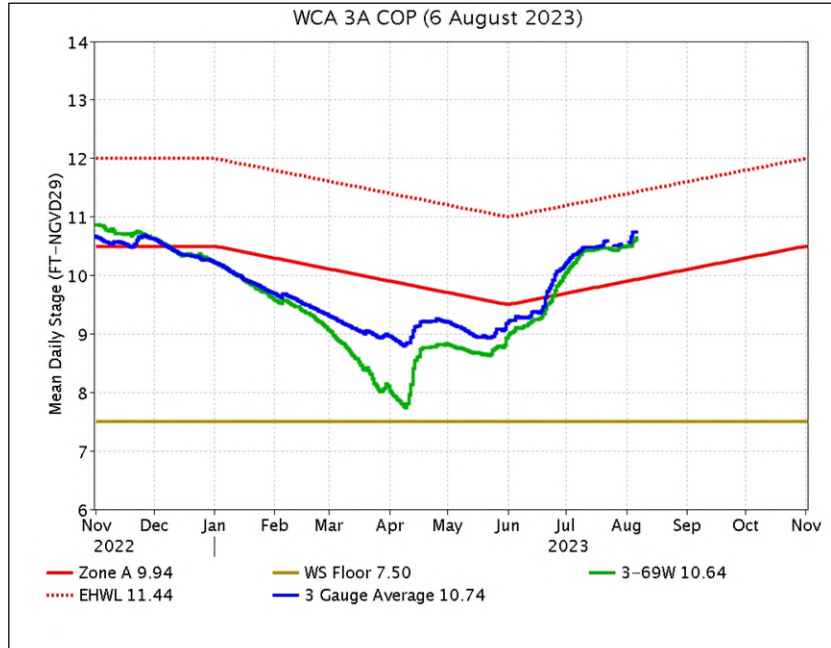


Figure EV-3. WCA-3A stage hydrographs (three-gauge average, 3-69W) and regulation schedule.

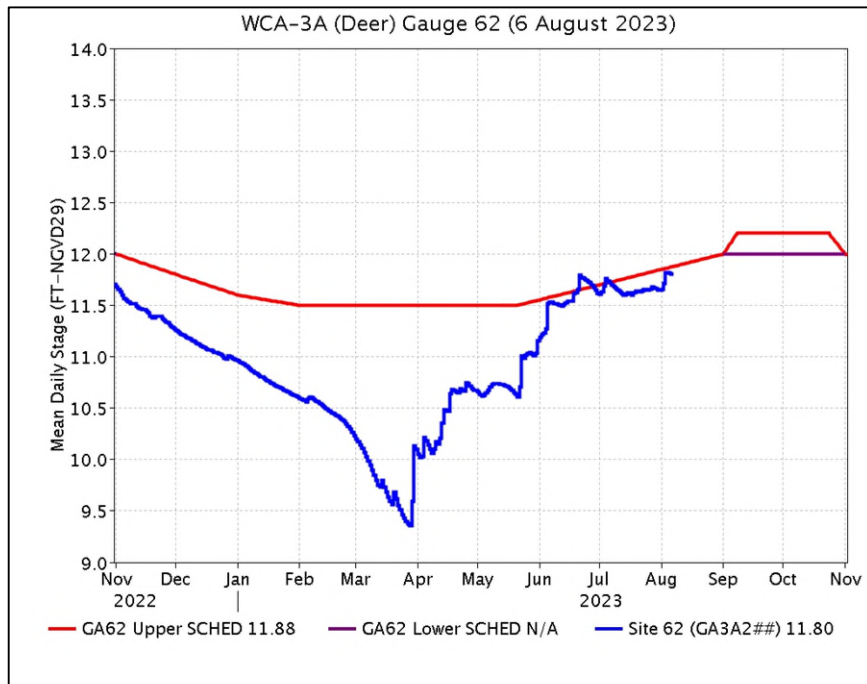


Figure EV-4. WCA-3A stage hydrograph (Deer gauge; Site 62) and CA62 regulation schedule.

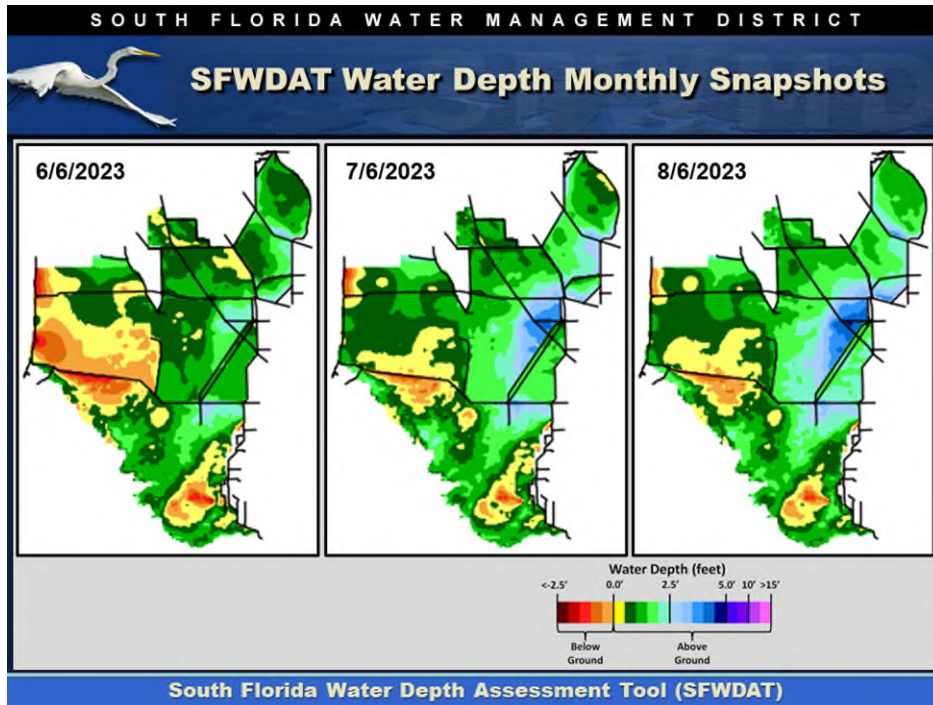


Figure EV-5. Everglades water depths from two months ago (left), one month ago (center) and present (right), based on SFWDAT.

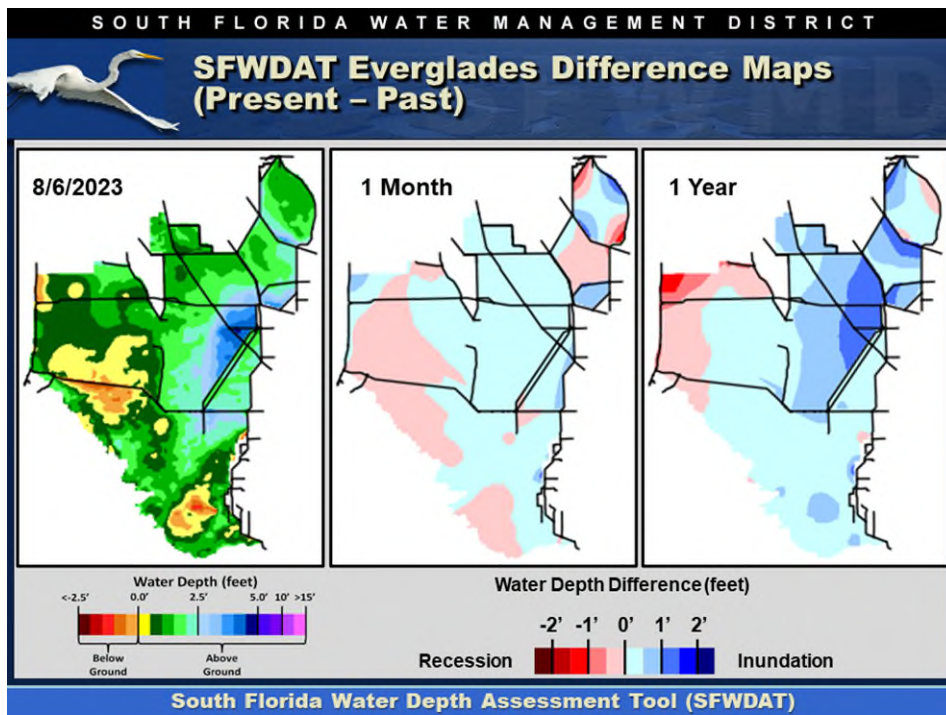


Figure EV-6. Present Everglades water depths (left) and water depth changes from one month (center) and one year (right) ago, based on SFWDAT.

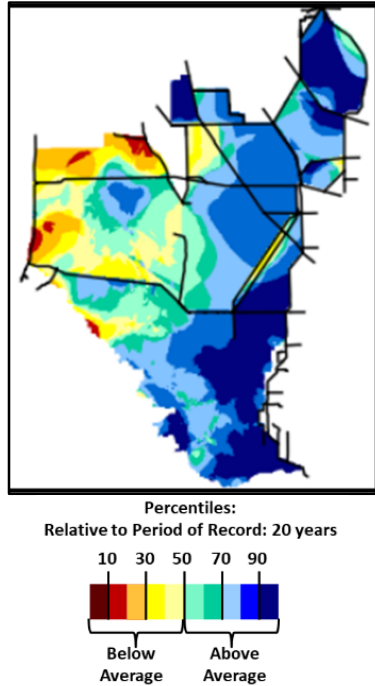


Figure EV-7. Present water depths (8/6/2023) compared to the day of year average over the previous 20 years.

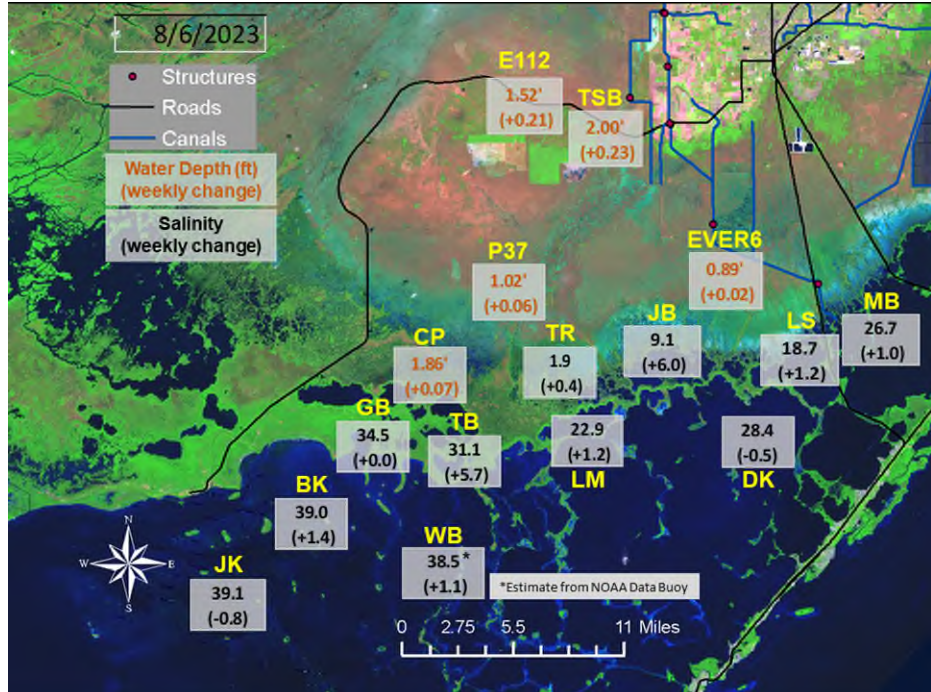


Figure EV-8. Taylor Slough water depths with changes since a week ago and Florida Bay salinities with changes since a week ago.

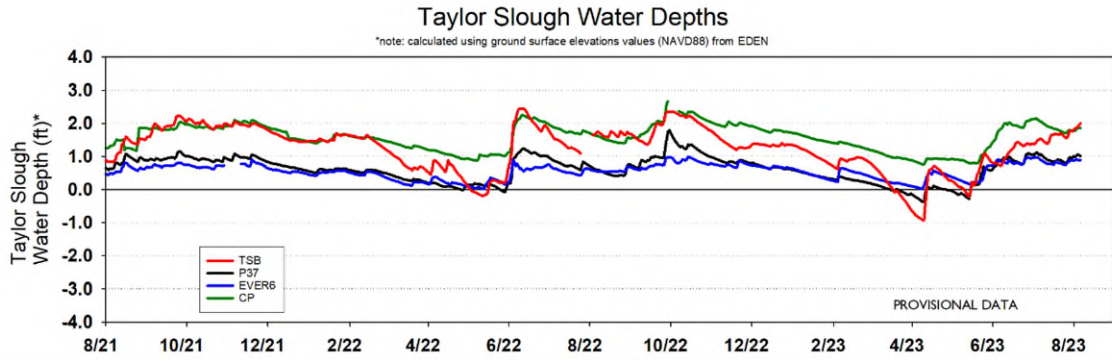


Figure EV-9. Taylor Slough water depth time series.

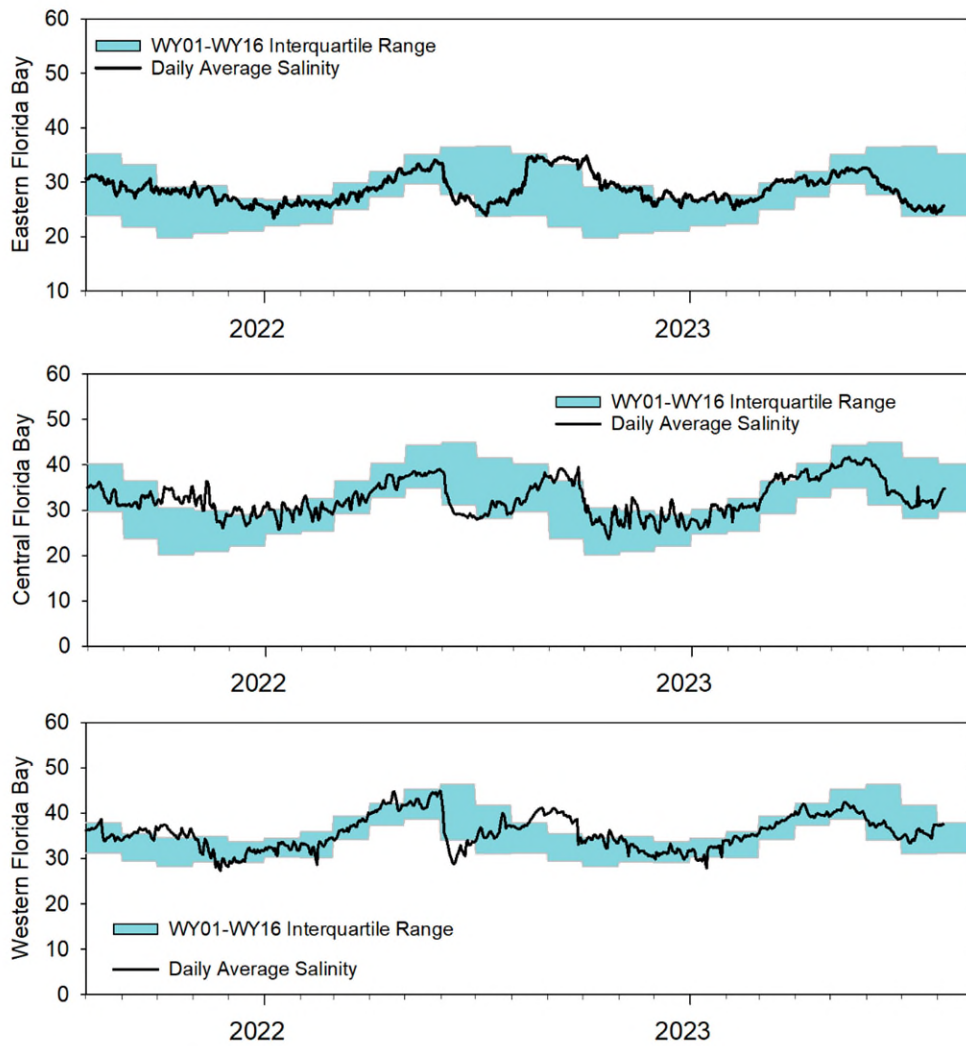


Figure EV-10. Eastern (top panel), Central (middle panel) and Western (bottom panel) Florida Bay daily average salinities with interquartile (25-75 percentile) ranges.

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

SFWMD Everglades Ecological Recommendations, August 8, 2023 (red is new)			
	Weekly change	Recommendation	Reasons
WCA-1	Stage increased by 0.22'	Ascension rate of less than +0.14' per week.	Protect within basin and downstream habitat and wildlife (apple snail reproduction).
WCA-2A	Stage decreased by 0.06	Minimal ascension rate. Move water from this basin to tide as necessary.	Protect within basin and downstream habitat and wildlife (apple snail reproduction).
WCA-2B	Stage increased by 0.45'	Minimal ascension rate.	Last week's ascension rate was elevated. Protect within basin and downstream habitat and wildlife (apple snail reproduction).
WCA-3A NE	Stage increased by 0.30'	Ascension rate of less than +0.18' per week.	Protect within basin and downstream habitat (peat soils) and wildlife (fish/crayfish reproduction).
WCA-3A NW	Stage increased by 0.15'	Ascension rate of less than +0.18' per week.	
Central WCA-3A S	Stage increased by 0.21'	Ascension rate of less than +0.15' per week.	Protect within basin and downstream habitat and wildlife (apple snail reproduction).
Southern WCA-3A S	Stage increased by 0.11'		
WCA-3B	Stage increased by 0.10'	Ascension rate of less than +0.18' per week.	Protect within basin and downstream habitat and wildlife (apple snail reproduction).
ENP-SRS	Stage decreased by 0.02'	Make discharges to ENP according to COP and TFFF protocol while adaptively considering upstream and downstream ecological conditions.	Protect within basin and upstream habitat and wildlife (apple snail reproduction).
Taylor Slough	Stage changes ranged from +0.02' to +0.23'	Move water southward as possible.	When available, provide freshwater to promote water movement.
FB- Salinity	Salinity changes ranged from -0.8 to +6.0	Move water southward as possible.	When available, provide freshwater to promote water movement.

Biscayne Bay

As shown in **Figure BB-1**, mean total inflow to Biscayne Bay was 1,156 cfs, and the previous 30-day mean inflow was 1,027 cfs. The seven-day mean salinity was 25.6 at BBCW8 and 24.2 at BBCW10, both within the ideal salinity range for estuarine organisms in this region (salinity less than 35). Data were provided by Biscayne National Park.

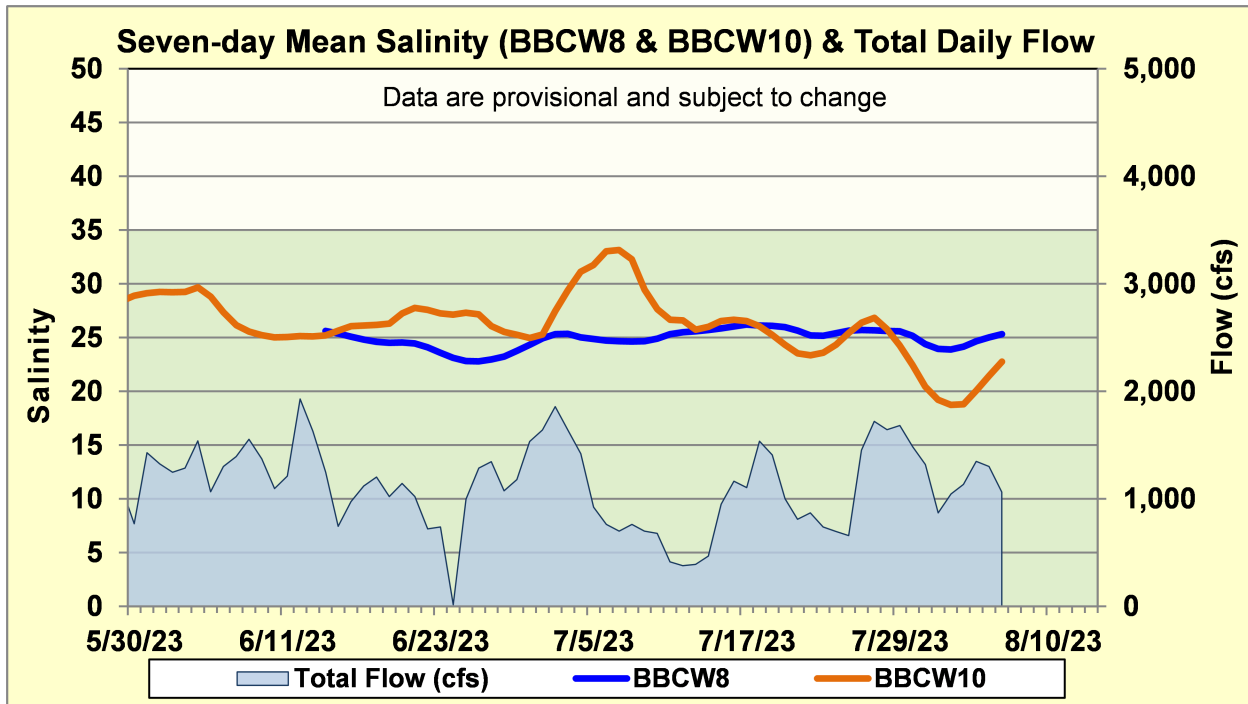


Figure BB-1. Seven-day mean salinity at BBCW8 and BBCW10 and total daily flow in Biscayne Bay. Total daily flow was calculated using flow from structures S20G, S20F, S21, S21A, S123, and S700P.