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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: July 12, 2023

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

Drier conditions are prevalent in association with the Saharan Air Layer (SAL), which is introducing a haze across the sky. On Thursday, moisture will increase in association with a passing tropical wave, fueling a widespread coverage of showers and thunderstorms, some of which could be locally significant. Weak easterly steering currents will favor the development of slow-moving heavy showers and thunderstorms, mostly along the western interior on Thursday and Friday. A secondary tropical wave on Saturday will fuel more widespread shower and thunderstorm activity through this weekend, and possible on into next week from additional tropical waves. Near average rainfall is expected for the 7-day period ending next Tuesday morning.

Kissimmee

No releases were made from East Lake Toho and Lake Toho. Weekly average discharges on July 9, 2023 at S-65 and S-65A were 590 cfs and 700 cfs, respectively. Mean weekly water depth on the Kissimmee River floodplain decreased by 0.41 feet to 0.47 feet over the week ending July 9, 2023. The weekly average concentration of dissolved oxygen in the Kissimmee River increased from 0.0 mg/L last week to 0.9 mg/L for the week ending July 9, 2023, which is below both the levels that are potentially lethal and that are physiologically stressful for largemouth bass and other sensitive species. As of July 10, daily average DO in the Phase I area has recovered to 2.0 mg/L, while the daily average in the Phase II/III area is still below 1 mg/L.

Lake Okeechobee

Lake Okeechobee stage was 14.85 feet NGVD on July 9, 2023, which is 0.19 feet higher than the previous week and 0.83 feet higher than a month ago. Average daily inflows (excluding rainfall) decreased from the previous week, going from 5,889 cfs to 4,998 cfs. There were no outflows last week. The most recent satellite image (July 9, 2023) from NOAA's Harmful Algal Bloom Monitoring System showed the highest bloom index level in the northeastern nearshore and southern regions of the Lake. Routine phytoplankton monitoring on June 19 - 21, revealed that chlorophyll *a* concentration was above the Lake

bloom threshold ($> 40 \mu\text{g/L}$) at 17 out of the 32 sampling stations, with the highest concentration ($177 \mu\text{g/L}$) recorded at L004 in the central-east region of the Lake.

Estuaries

Total inflow to the St. Lucie Estuary averaged 972 cfs over the past week with no flow coming from Lake Okeechobee. Mean salinities increased at all sites 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 3,610 cfs over the past week with no flow coming from Lake Okeechobee. Mean surface salinities remained the same at S-79 and Ft. Myers, decreased at Val I-75 and Sanibel, and increased at Cape Coral and Shell Point 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 lower stressed range at Cape Coral (5-10), and in the upper stressed range at Sanibel (>25).

Stormwater Treatment Areas

For the week ending Sunday, July 9, 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 348,000 ac-feet. Most STA cells are above target stage. STA-1E Western Flow-way is offline for post-construction vegetation grow in, STA-3/4 Eastern Flow-way is offline for vegetation rehabilitation/drawdown, and STA-2 Flow-way 2 is offline for post-construction vegetation grow in. 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 “fair” or “good” rate of stage change last week with central WCA-3A the exception. Depths are above average for this time of year across most of the Everglades Protection Area. Total nesting effort was relatively low in the Everglades this year, with a preliminary estimate of 26,000 nesting, about 16,000 below the 10-year mean. Nesting success was also poor, with snowy egret’s the exception. Depths decreased on average in Taylor Slough last week but remain well above historical average. Average salinity fell again last week in Florida Bay and continues trending towards a fresher than average condition for this time of year.

Biscayne Bay

Total inflow to Biscayne Bay averaged 979 cfs and the previous 30-day mean inflow averaged 1,120 cfs. The seven-day mean salinity was 24.9 at BBCW8 and 27.6 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 July 9, 2023, mean daily lake stages were 55.5 feet NGVD (1.0 feet below schedule) in East Lake Toho, 52.7 feet NGVD (0.8 feet below schedule) in Lake Toho, and 50.2 feet NGVD (0.8 feet below schedule) in Lakes Kissimmee-Cypress-Hatchineha (KCH) (**Table KB-1, Figures KB-1-3**).

Lower Kissimmee

For the week ending July 9, 2023, mean weekly discharge was 590 cfs at S-65 and 700 cfs at S-65A. Mean weekly discharge from the Kissimmee River was 2,700 cfs at S-65D and 2,700 cfs at S-65E (**Table KB-2**). Mean weekly headwater stages were 46.3 feet NGVD at S-65A and 27.9 feet NGVD at S-65D on July 9, 2023. Mean weekly river channel stage decreased by 1.0 feet to 37.6 ft NGVD over the week ending on July 9, 2023 (**Figure KB-4**). Mean weekly water depth on the Kissimmee River floodplain decreased by 0.41 feet to 0.47 feet over the week ending July 9, 2023 (**Table KB-2, Figure KB-5**). The weekly average concentration of dissolved oxygen in the Kissimmee River increased from 0.0 mg/L the previous week to 0.9 mg/L for the week ending July 9, 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. Due to a dissolved oxygen crash in the Kissimmee River, suspend maximum flow reduction criteria temporarily if recommended by KRREP staff to help improve DO conditions.

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)	
							7/9/23	7/2/23
Lakes Hart and Mary Jane	S-62	LKMJ	0	60.0	R	60.0	0.0	0.0
Lakes Myrtle, Preston and Joel	S-57	S-57	0	60.2	R	61.0	-0.8	-1.0
Alligator Chain	S-60	ALLI	0	62.4	R	63.2	-0.8	-0.8
Lake Gentry	S-63	LKGT	0	60.0	R	61.0	-1.0	-1.0
East Lake Toho	S-59	TOHOE	0	55.5	R	56.5	-1.0	-1.0
Lake Toho	S-61	TOHOW S-61	0	52.7	R	53.5	-0.8	-1.0
Lakes Kissimmee, Cypress and Hatchineha	S-65	KUB011 LKIS5B	590	50.2	R	51.0	-0.8	-0.6

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.

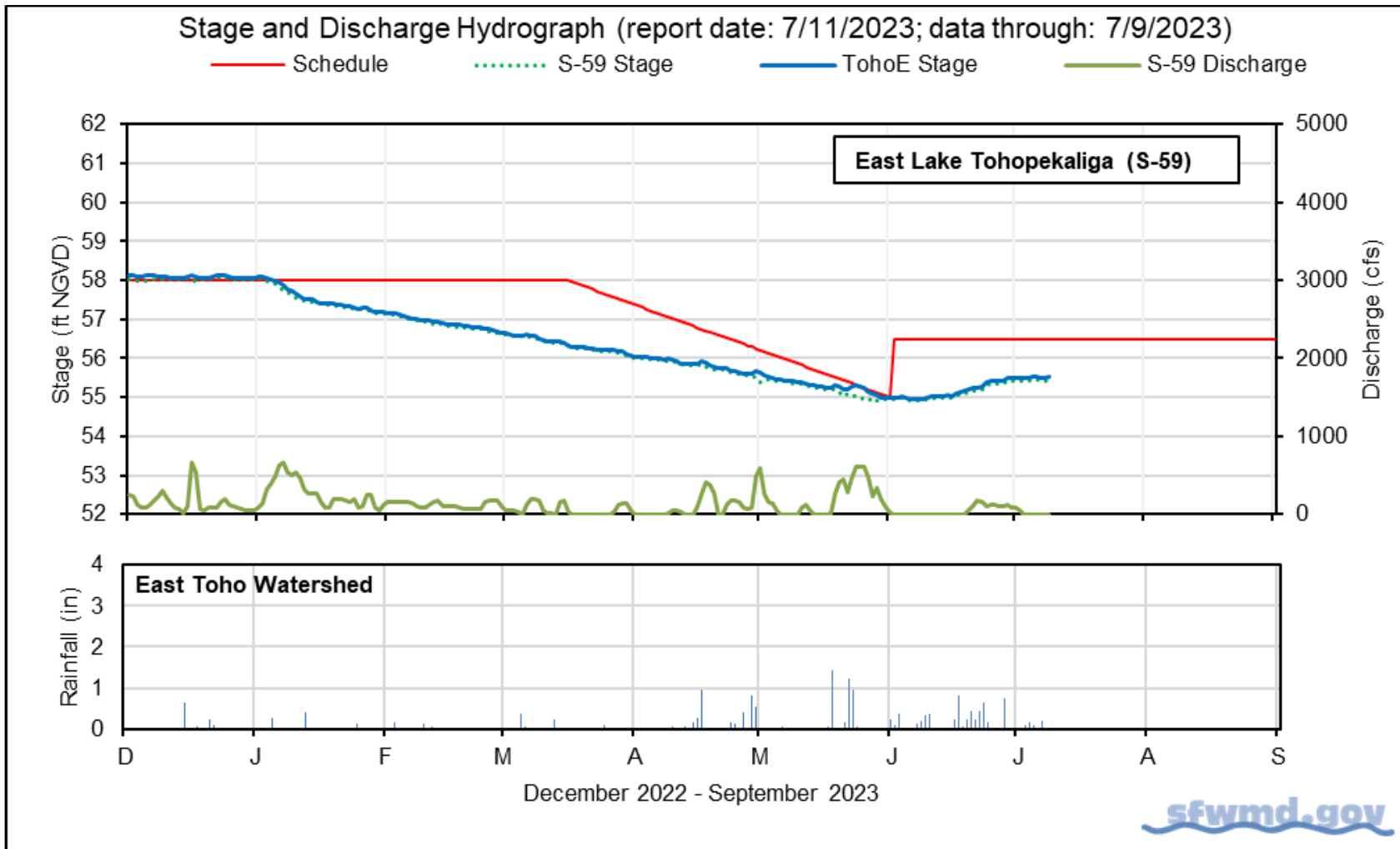


Figure KB-1. East Lake Toho regulation schedule, stage, discharge and rainfall.

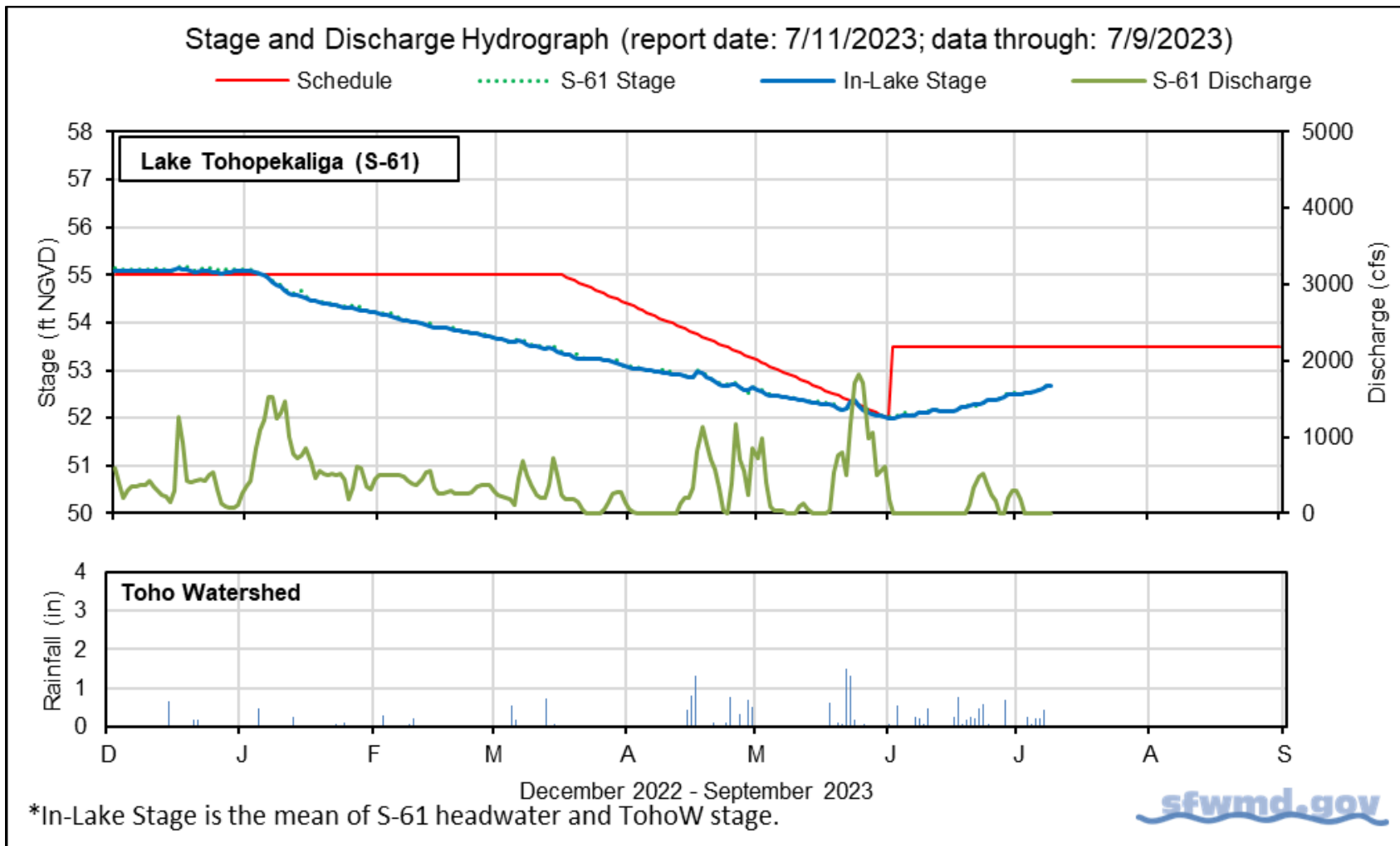


Figure KB-2. Lake Toho regulation schedule, stage, discharge and rainfall.

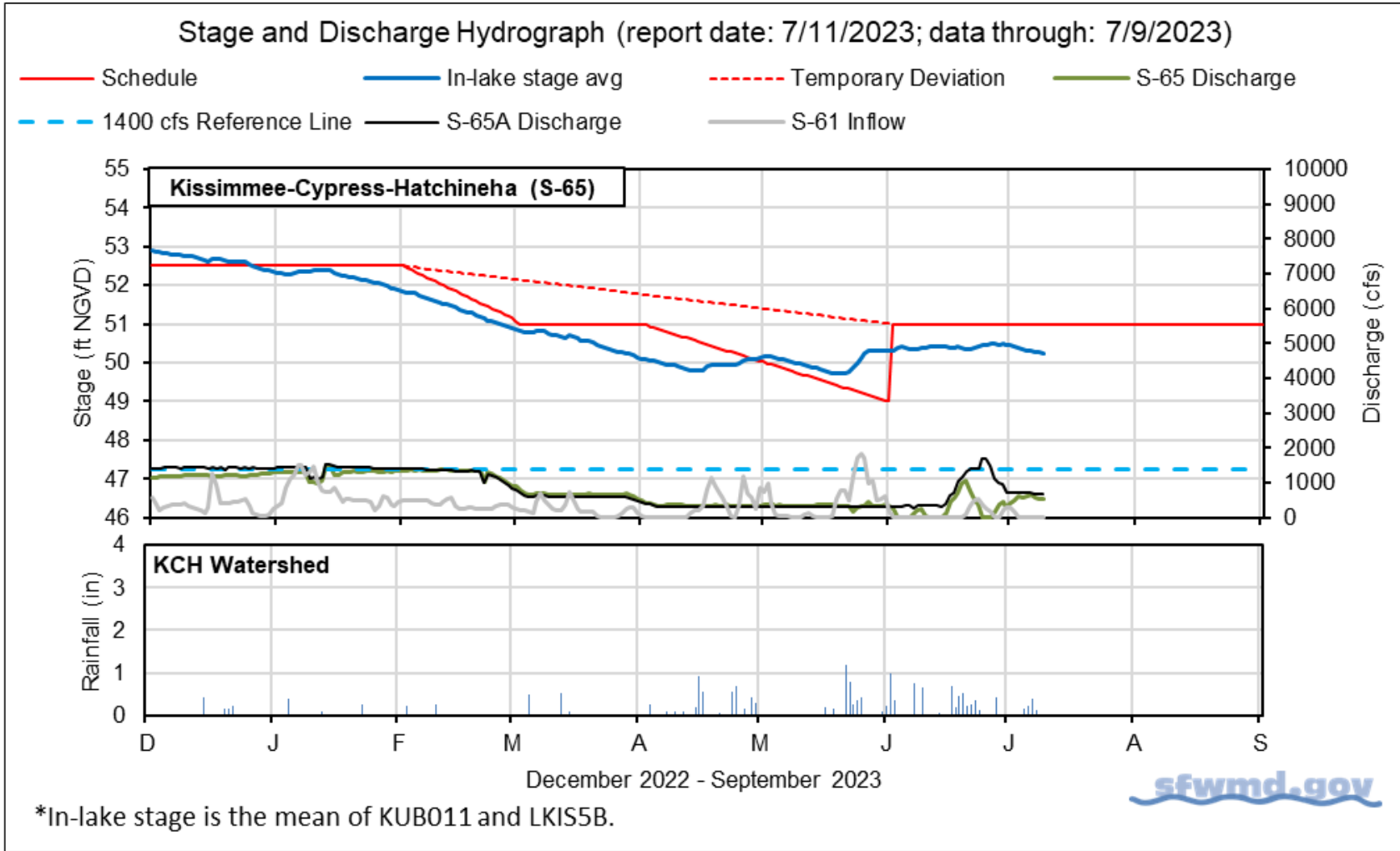


Figure KB-3. Lakes Kissimmee, Cypress and Hatchineha regulation schedule, stage, discharge and rainfall.

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			
		7/9/23	7/9/23	7/2/23	6/25/23	6/18/23
Discharge	S-65	540	590	310	530	260
Discharge	S-65A ^a	690	700	960	1,400	550
Headwater Stage (feet NGVD)	S-65A	46.3	46.3	46.4	46.6	46.4
Discharge	S-65D ^b	2,200	2,700	2,800	1,800	680
Headwater Stage (feet NGVD)	S-65D ^c	27.9	27.9	27.9	27.8	27.8
Discharge (cfs)	S-65E ^d	2,200	2,700	2,900	1,900	730
Discharge (cfs)	S-67	0	0	0	0	0
Dissolved Oxygen (mg/L) ^e	Phase I, II/III river channel	1.9	0.9	0.0	1.9	3.7
River channel mean stage ^f	Phase I river channel	37.5	37.6	38.6	37.6	34.6
Mean depth (feet) ^g	Phase I floodplain	0.38	0.47	0.88	0.43	0.12

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.

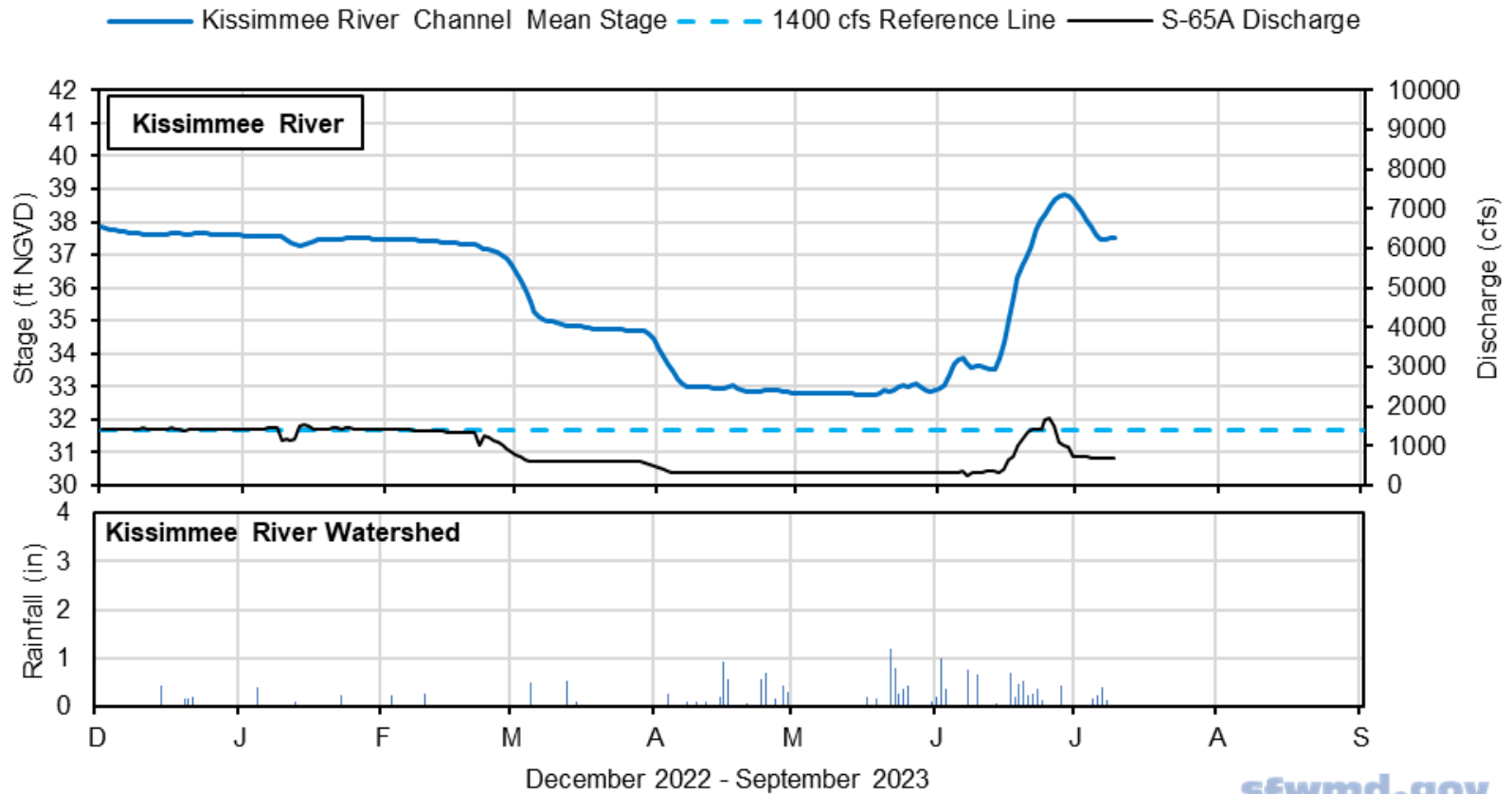
d. Combined discharge from S-65E and S-65EX1.

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).

Stage and Discharge Hydrograph (report date: 7/11/2023; data through: 7/9/2023)



*River Channel Stage is the average for PC62, KRDR02, KRBN, PC33, and PC11.



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

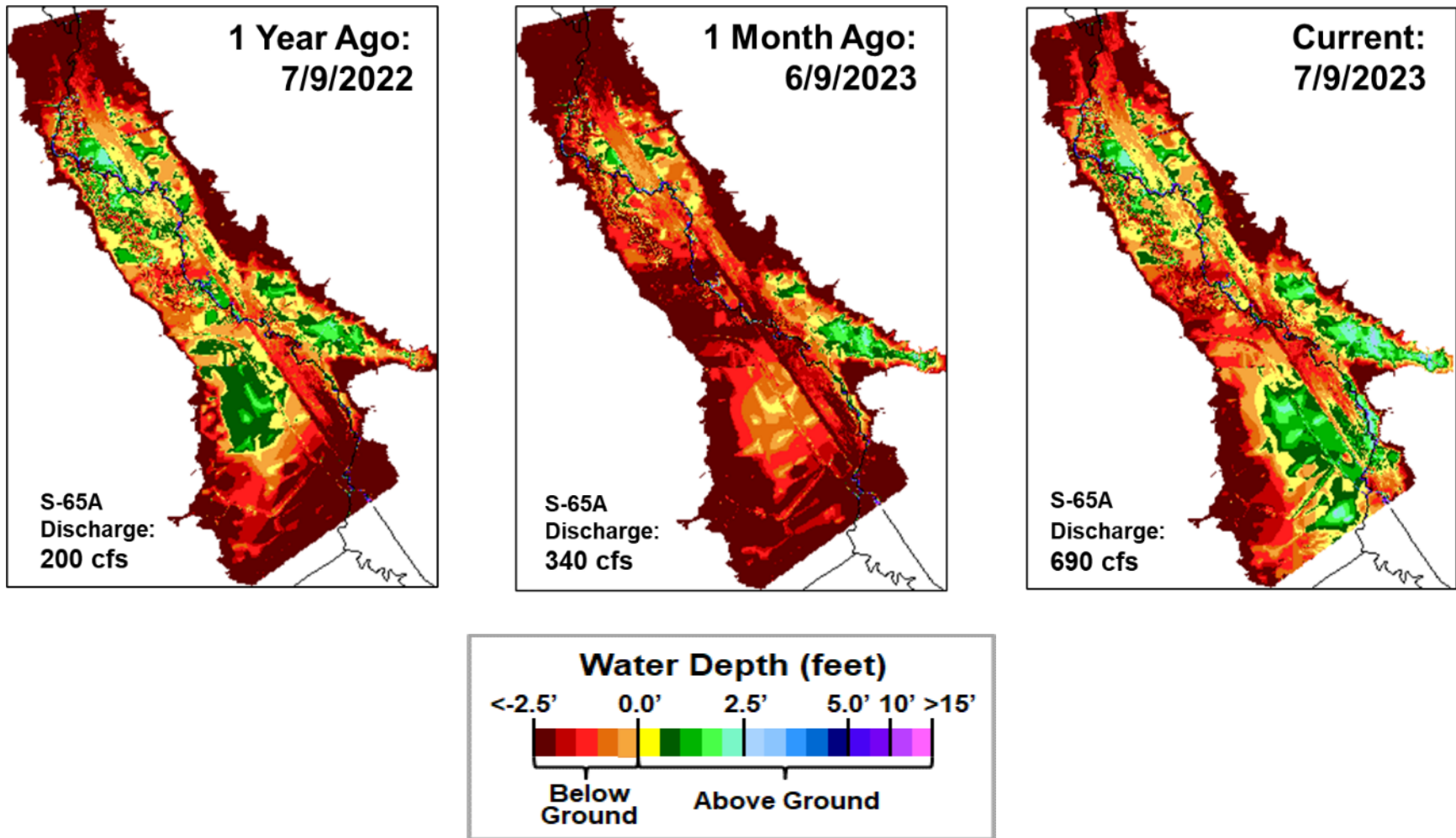
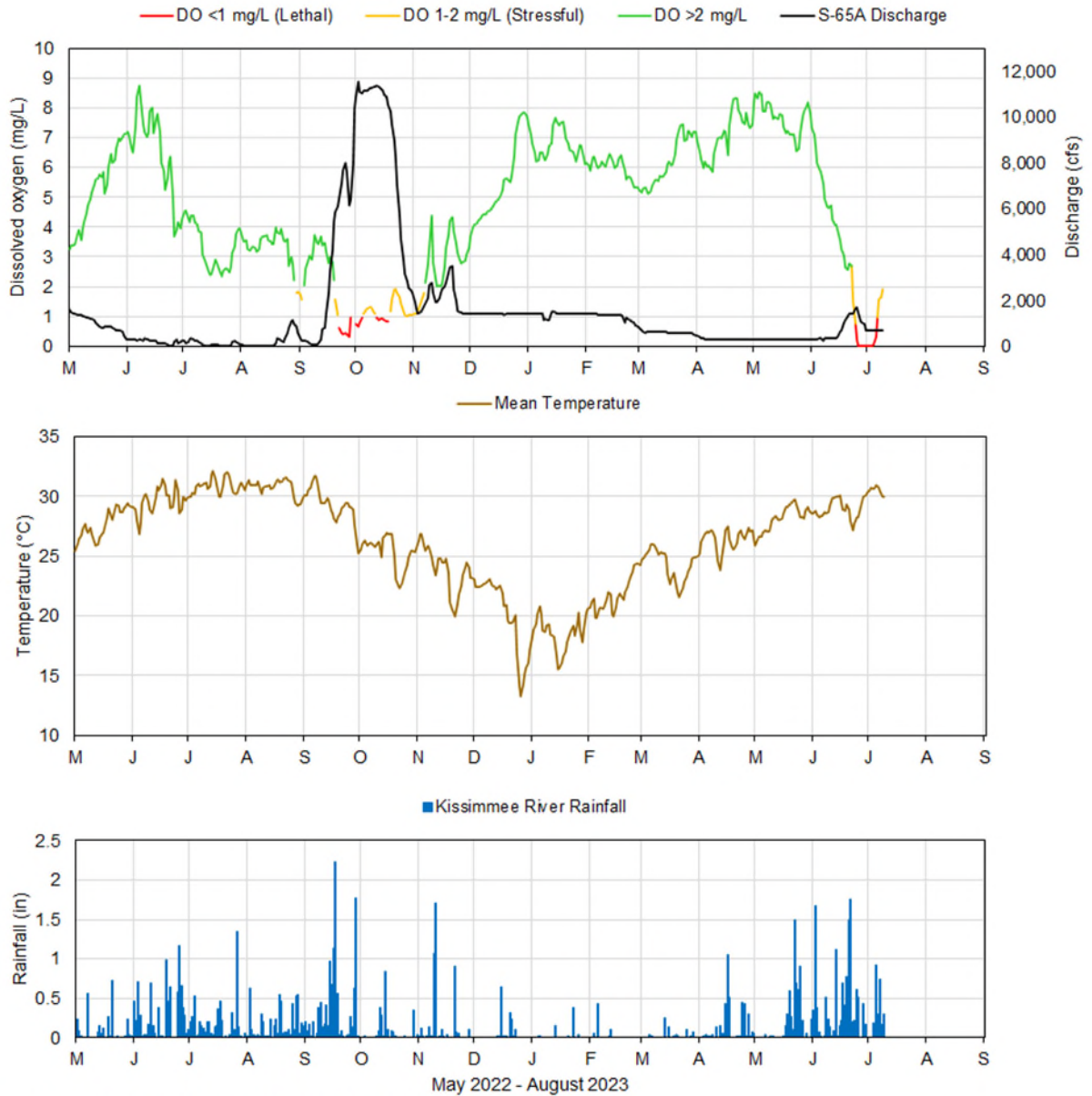


Figure KB-5. Phase I area Kissimmee River floodplain water depths (from left to right) one year ago, one month ago and current.



Report Date: 7/11/2023; data are through: 7/9/2023



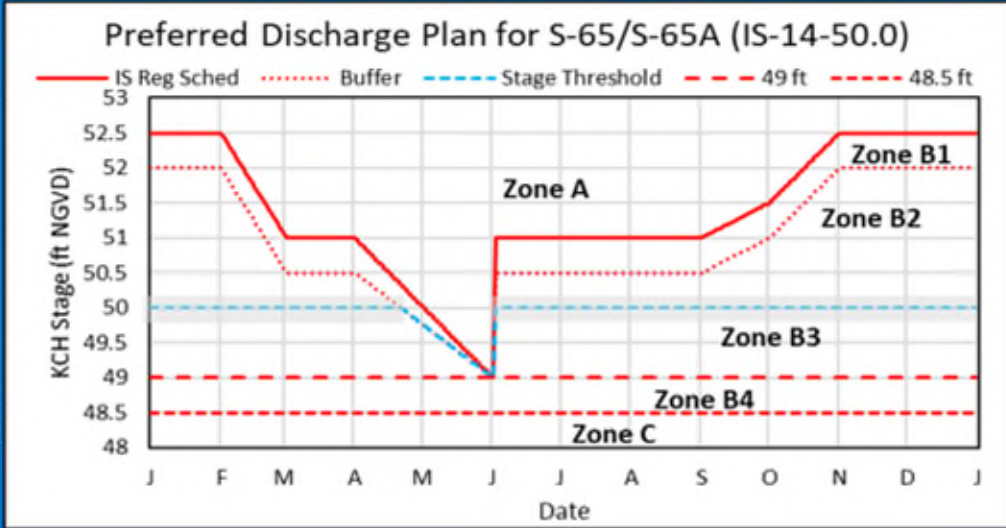
Figure KB-6. Restored Kissimmee river channel mean daily dissolved oxygen concentration (mg/L), S-65A discharge (cfs), temperature (°C) and rainfall (inches). Dissolved oxygen (DO) and temperature are mean daily values averaged for PC62, KRDR02, KRBN, PC33, PC11, PD62R, and PD42R with an average of four 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.

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 14.85 feet NGVD on July 9, 2023, which was 0.19 feet higher than the previous week and 0.83 feet higher than a month ago (**Figure LO-1**). Lake stage remained in the Low sub-band (**Figure LO-2**) and was 1.96 feet above the upper limit of the ecological envelope (**Figure LO-3**). According to NEXRAD, 2.12 inches of rain fell directly on the Lake last week.

Average daily inflows (excluding rainfall) decreased from the previous week, going from 5,889 cfs to 4,998 cfs. The highest average single structure inflow came from the S-65E/EX1 structure (2,734 cfs). There were no outflows last week. Backflows via the S-271 were at an average rate of 125 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.

Cyanobacteria bloom index level decreased in the east-central regions of the Lake and was highest in the northeastern nearshore and southern regions of the Lake according to the most recent satellite image (July 9, 2023) from NOAA's Harmful Algal Bloom Monitoring System (**Figure LO-6**).

Routine phytoplankton monitoring on June 19 - 21, revealed that chlorophyll *a* concentration was above the Lake bloom threshold ($> 40 \mu\text{g/L}$) at 17 out of the 32 sampling stations, with the highest concentration (177 $\mu\text{g/L}$) recorded at L004 in the central-east region of the Lake (**Figure LO-7**). Average inorganic nutrient concentrations further decreased since the early June survey on the Lake.

Changes in Water Depth

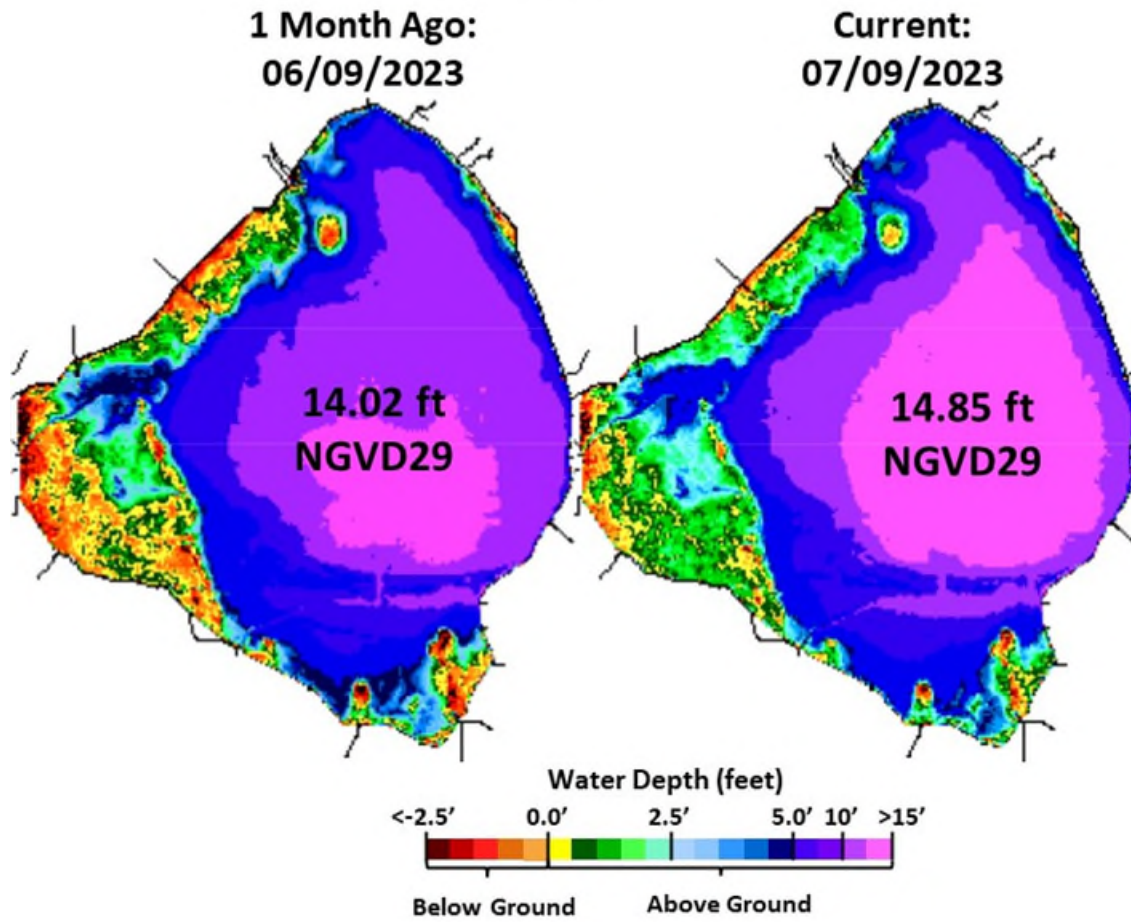


Figure LO-1. Lake Okeechobee water depth estimates based on South Florida Water Depth Assessment Tool (SFWDAT).

Lake Okeechobee Water Level History and Projected Stages

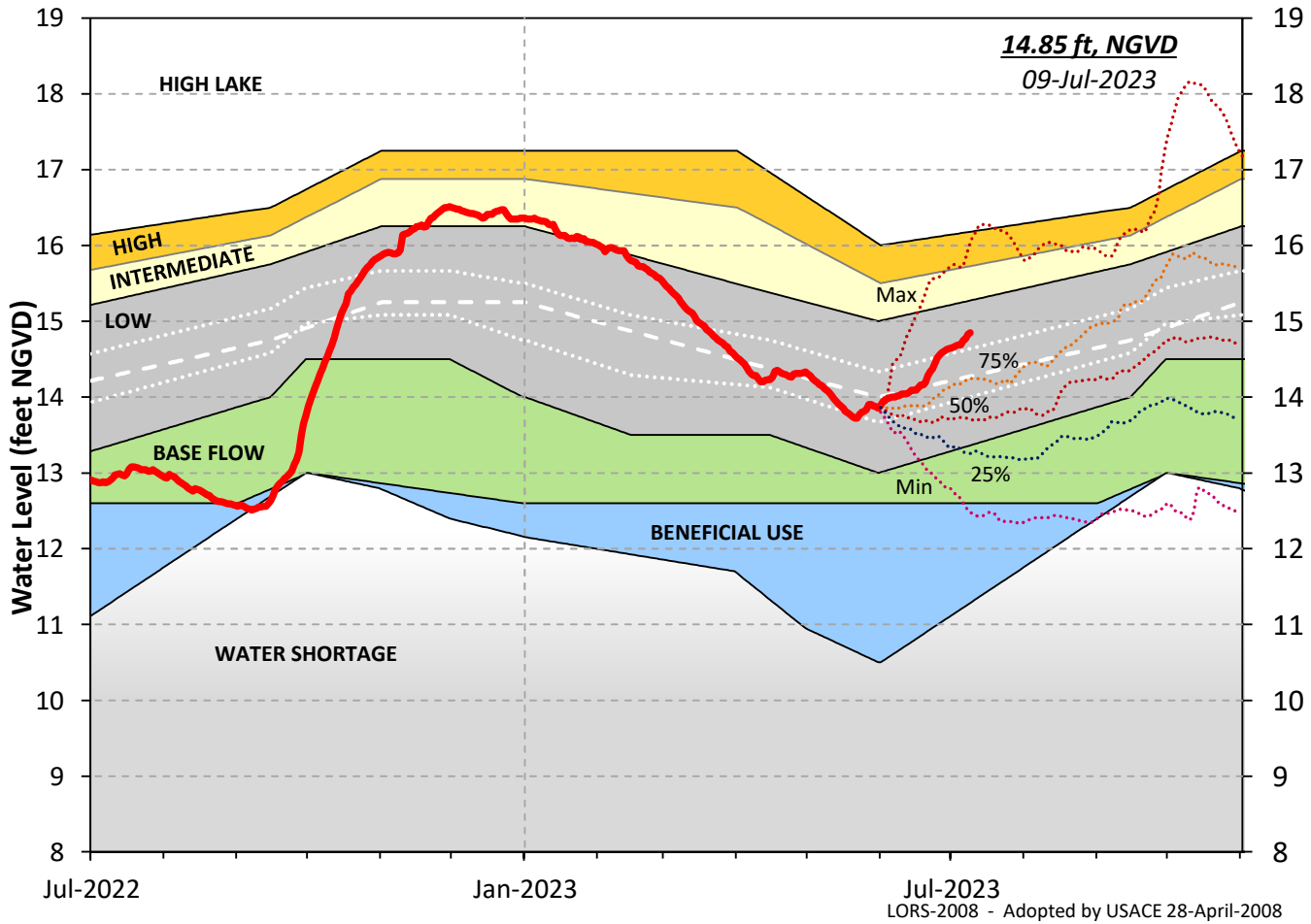


Figure LO-2. Recent Lake Okeechobee stages with projected stages based on a dynamic position analysis.

Lake Okeechobee Stage vs Ecological Envelope

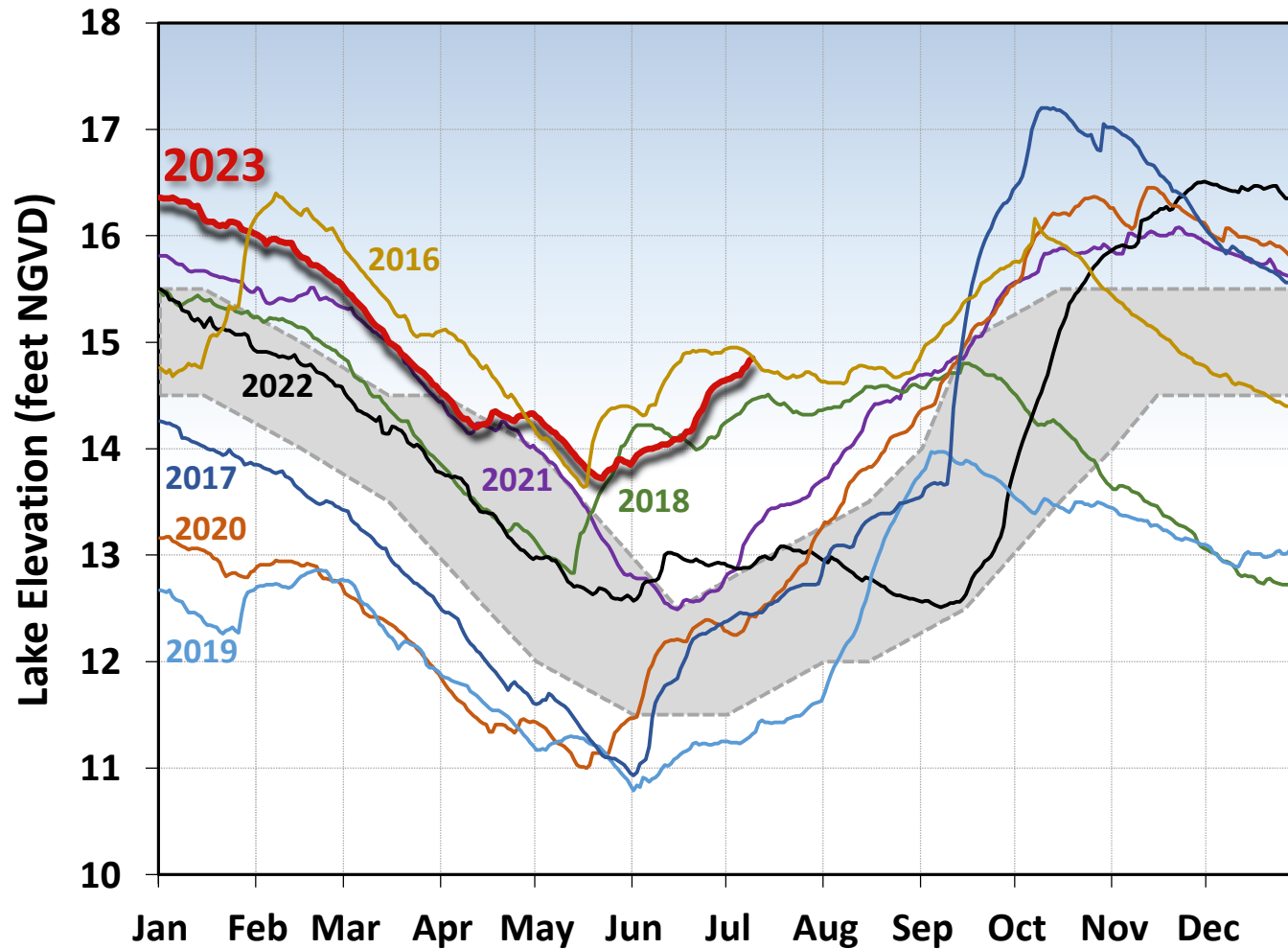


Figure LO-3. The prior seven years of annual stage hydrographs for Lake Okeechobee in comparison to the ecological envelope.

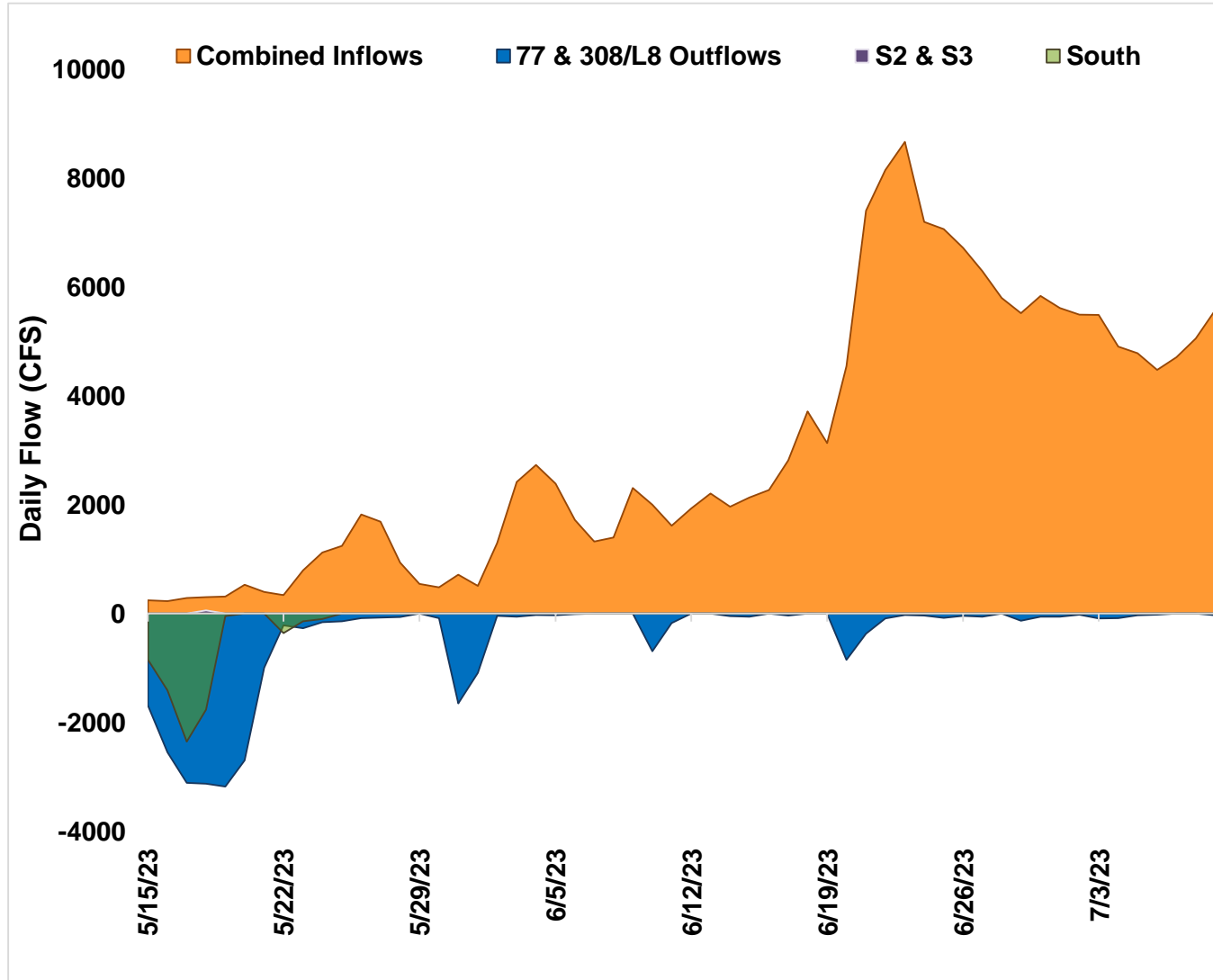


Figure LO-4. Major inflows (orange) to and outflows east and west (blue) from Lake Okeechobee. Outflows south are shown in green. Flows into Lake Okeechobee from the L-8 canal through S-271 (formerly Culvert 10A) or from the C-44 canal through the S-308 are included as inflows. Conversely, flows from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

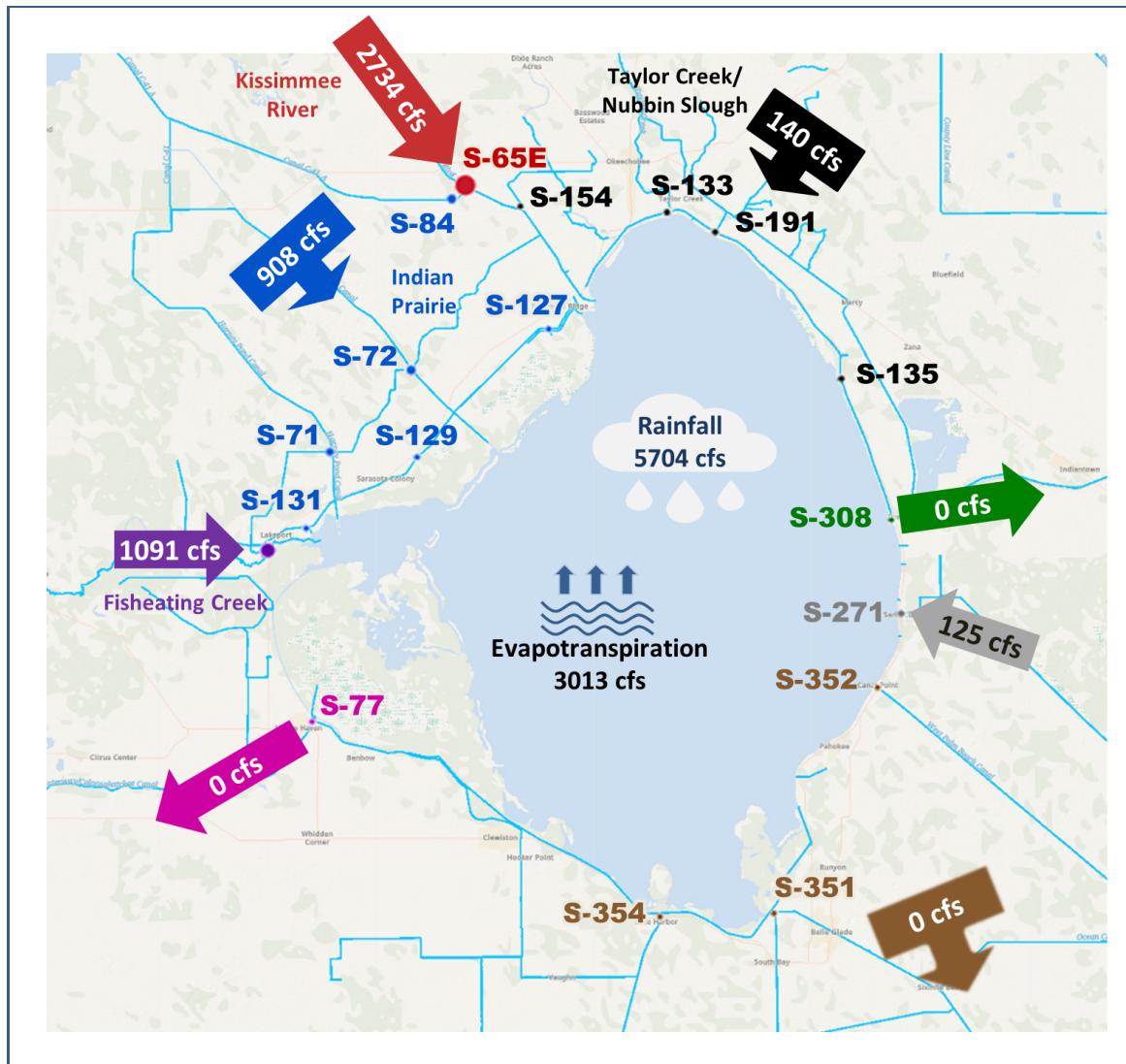


Figure LO-5. Inflows into Lake Okeechobee from Indian Prairie basins, Taylor Creek/Nubbin Slough, Kissimmee River and Fisheating Creek, and outflows to the west via S-77, to the east via S-308, to the south via S-351, S-352, S-354, and to southeast via S-271 (formerly Culvert 10A) for the week of July 03 - 09, 2023.

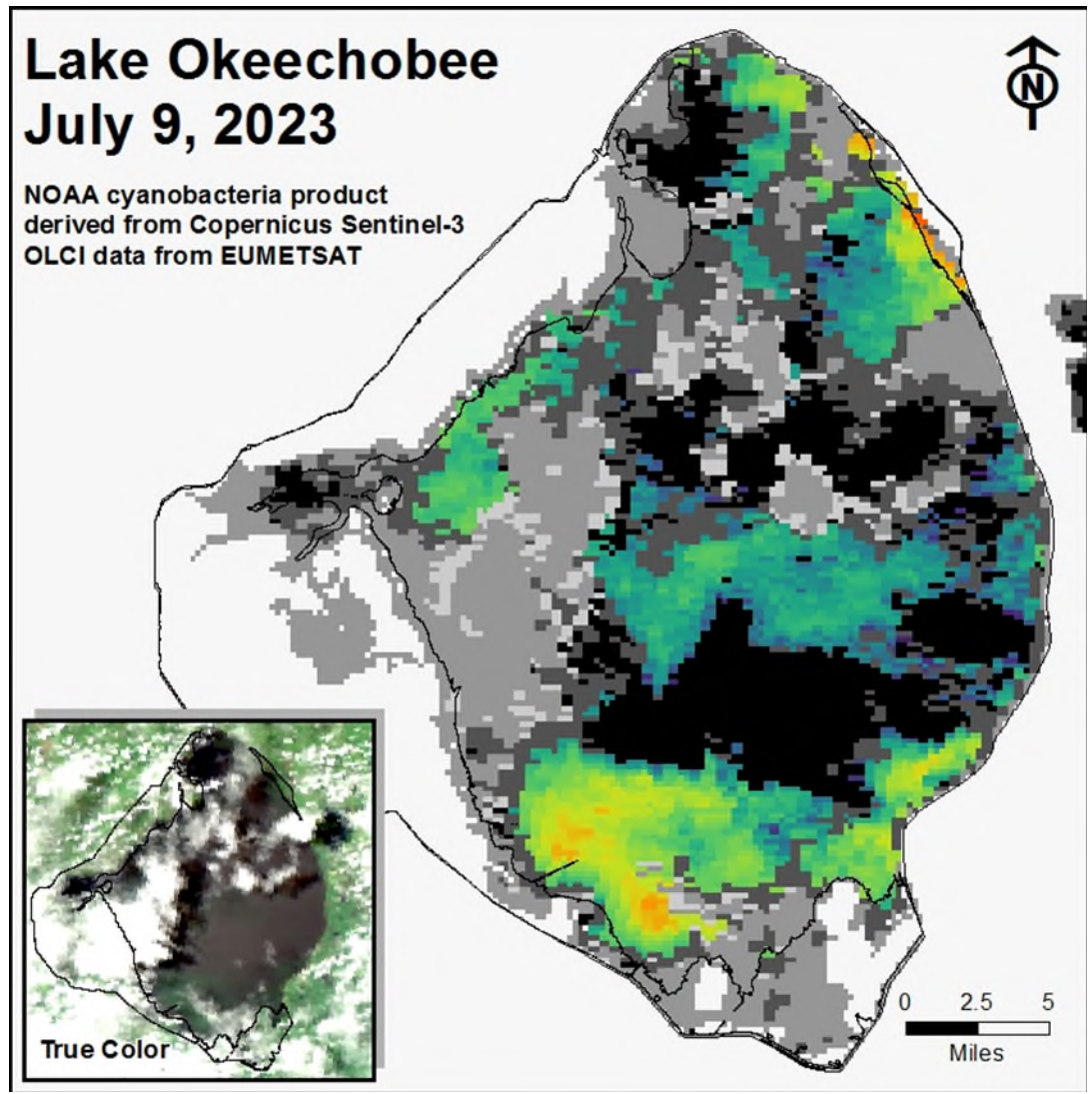


Figure LO-6. Cyanobacteria bloom index level on July 9, 2023, based on NOAA's harmful algal bloom monitoring system. Gray color indicates cloud cover.

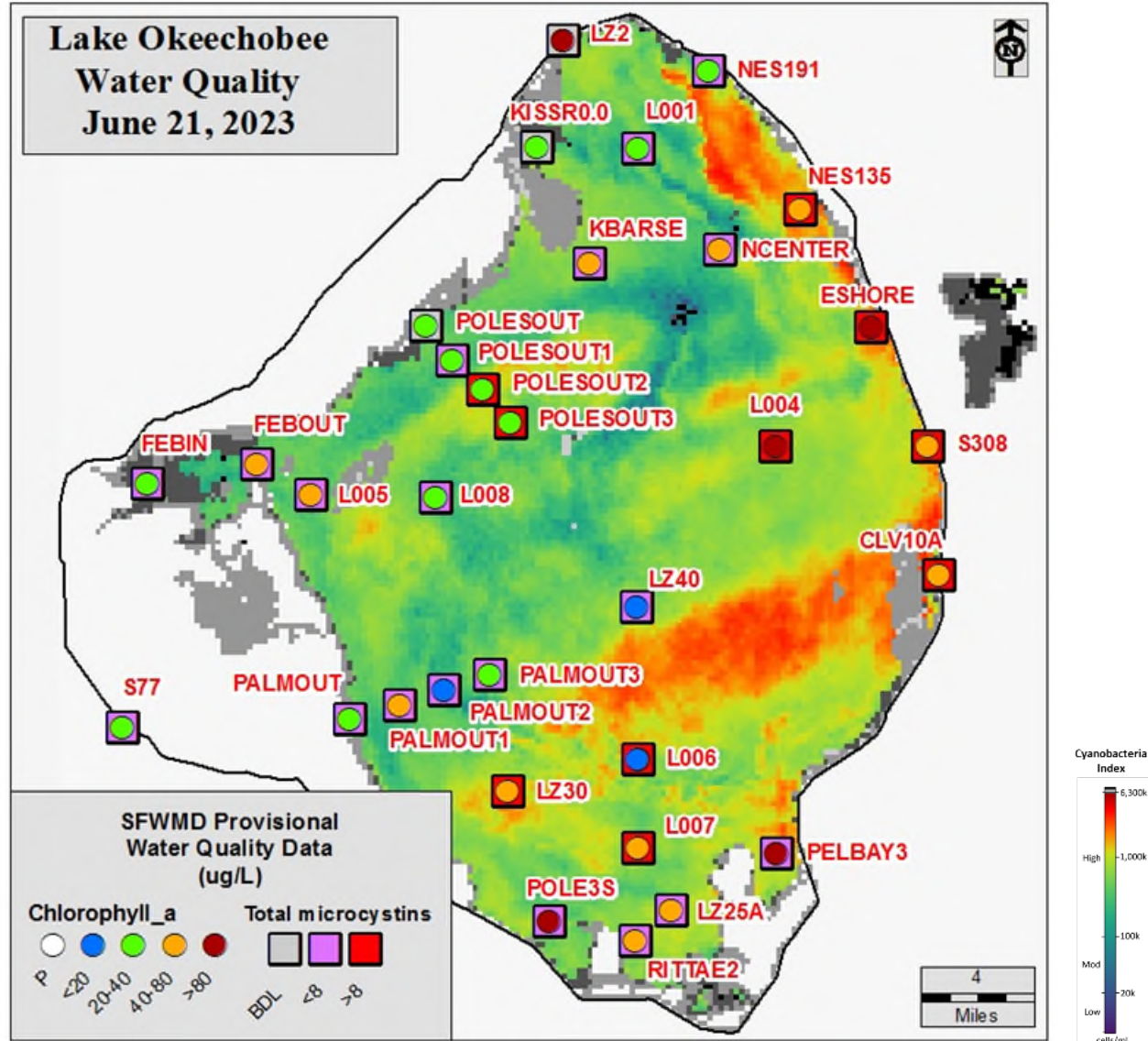


Figure LO-7. Total microcystins ($\mu\text{g/L}$) and chlorophyll *a* data from June 19 - 21, 2023. Sampling locations are overlaid on the June 21, 2023 image from NOAA's harmful algal bloom monitoring system. Gray color indicates cloud cover.

Estuaries

St. Lucie Estuary

Over the past week, mean total inflow to the St. Lucie Estuary was 972 cfs (**Figures ES-1 and ES-2**), and the previous 30-day mean inflow was 1,426 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 11.9. 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 0.4 spat/shell for June, which is an increase from the recruitment rate recorded in May (**Figure ES-5**). Mean oyster density decreased slightly to 532 live oysters/m² in June but remains within the good range for oyster density.

Caloosahatchee River Estuary

Over the past week, mean total inflow to the Caloosahatchee River Estuary was 3,610 cfs (**Figures ES-6 and ES-7**), and the previous 30-day mean inflow was 3,381 cfs. For comparison, the historical provisional mean inflows from the contributing areas are shown in **Figure ES-7**.

Over the past week, surface salinities remained the same at S-79 and Ft. Myers, decreased at Val I-75 and Sanibel, and increased at Cape Coral and Shell Point (**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 Fish and Wildlife Research Institute was 2.6 spat/shell at Iona Cove and 1.9 spat/shell at Bird Island for June, which was a slight decrease from the recruitment rates recorded in May (**Figures ES-11 and ES-12**). Mean oyster density was 133 live oysters/m² at Iona Cove and 233 live oysters/m² at Bird Island in June, which is lower than densities previously recorded in March. These decreased densities can most likely be attributed to mortality of newly settled spring spat associated with changes in salinity and increased predation rates.

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 287 cfs. Model results from all scenarios predict daily salinity to be 0.6 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**

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.

Figure ES-13). This keeps predicted salinities in the upper estuary within the optimal salinity range (0-10) for tape grass.

Red Tide

The Florida Fish and Wildlife Research Institute reported on July 7, 2023, that *Karenia brevis*, the Florida red tide dinoflagellate, was not observed in any samples collected within the District region. On the east coast, red tide was not observed in samples from Palm Beach County.

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.

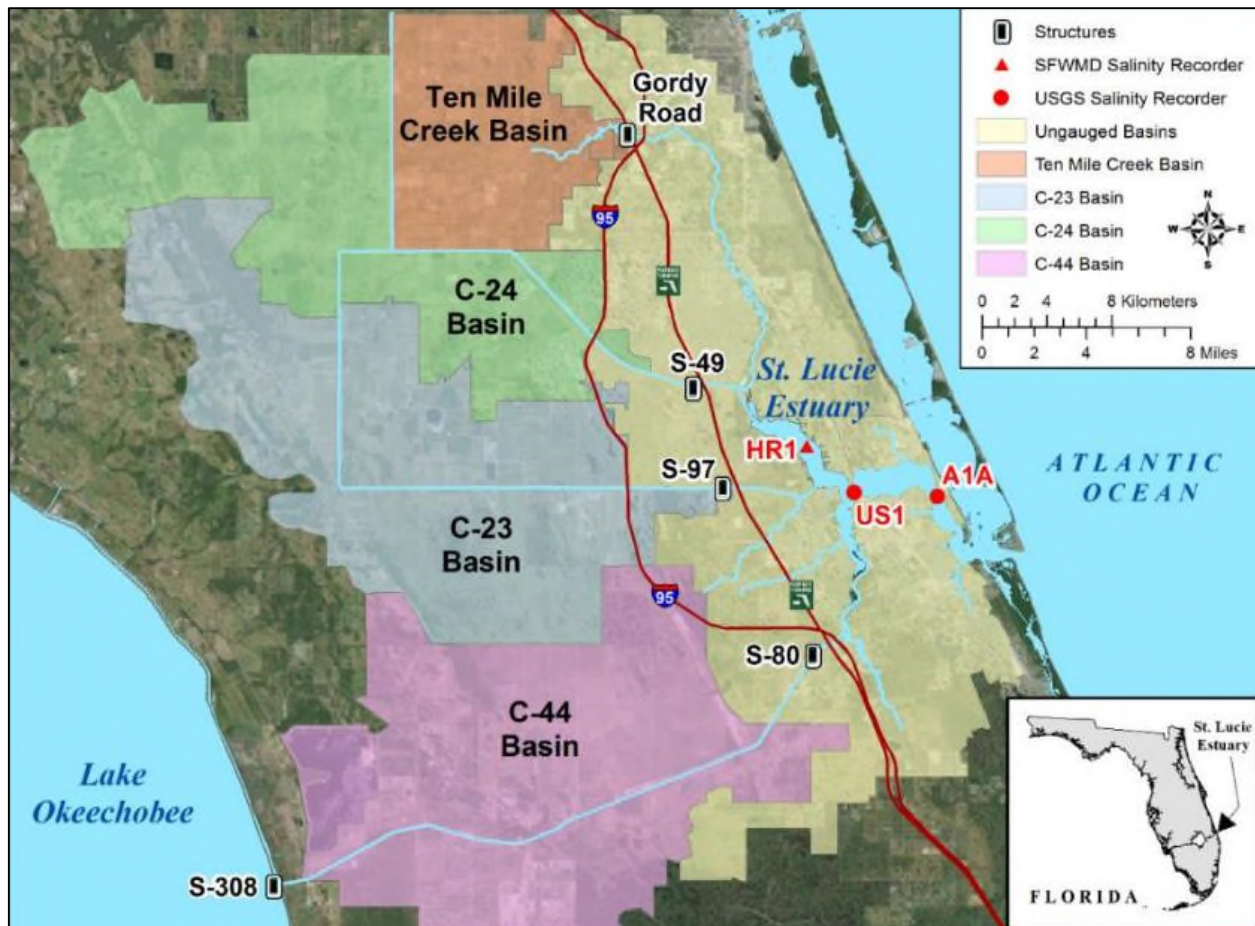


Figure ES-1. Basins, water control structures and salinity monitoring sites in the St. Lucie Estuary.

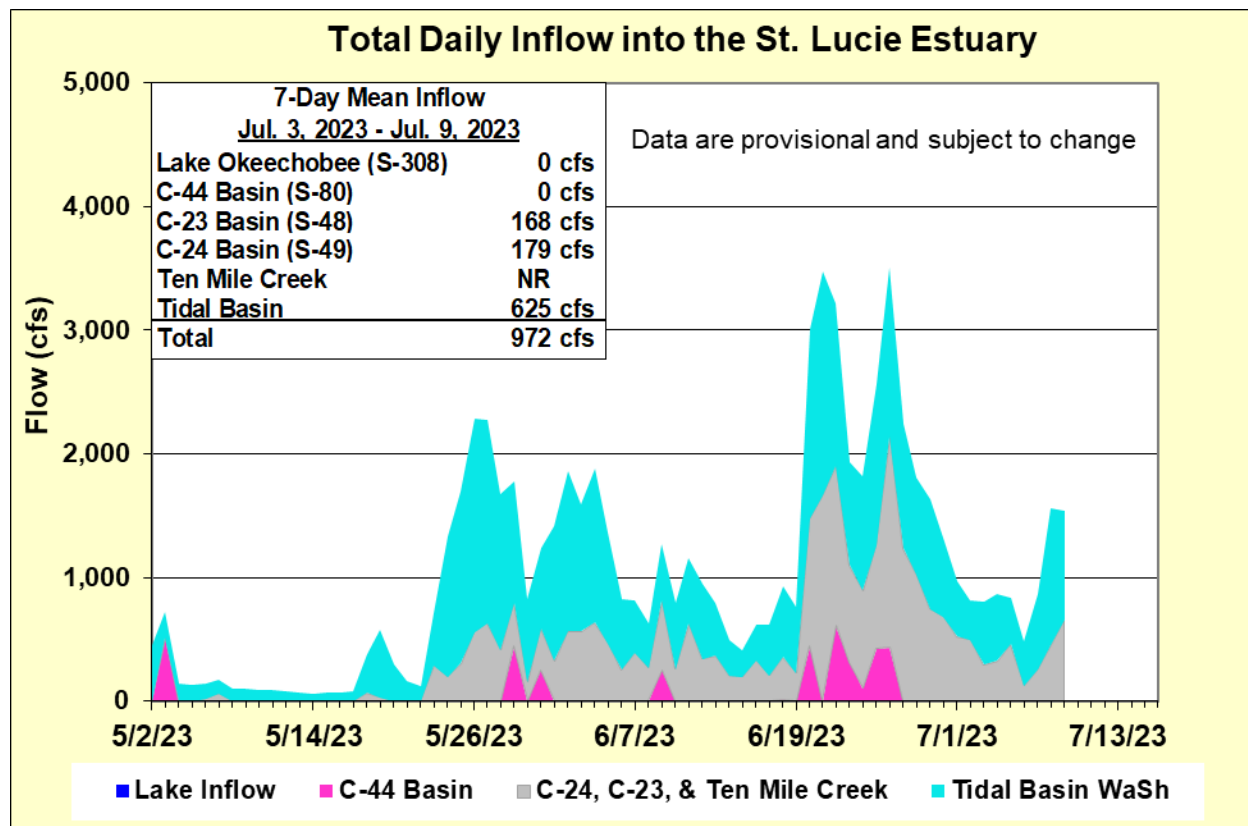


Figure ES-2. Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and Tidal Basins into the St. Lucie Estuary.

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)	3.8 (1.7)	9.3 (4.6)	10.0 – 25.0
US1 Bridge	10.4 (5.7)	13.4 (8.9)	10.0 – 25.0
A1A Bridge	19.4 (13.9)	25.4 (22.4)	10.0 – 25.0

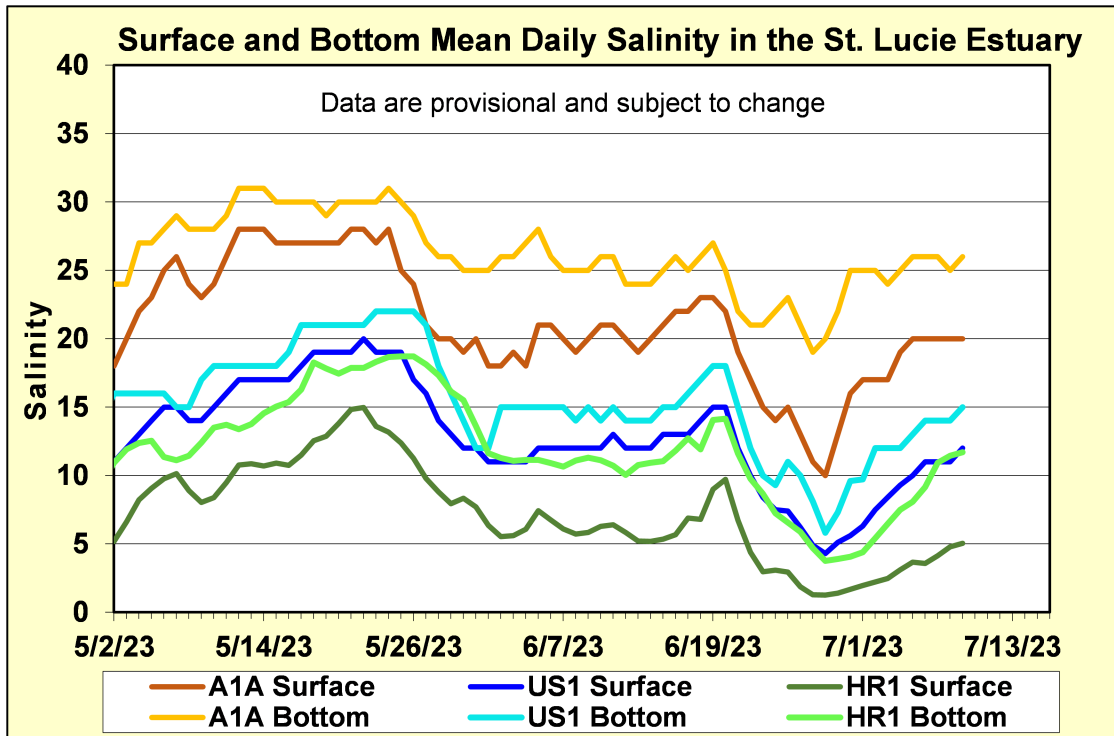


Figure ES-3. Mean daily salinity at the A1A, US1 and HR1 sites in the St. Lucie Estuary.

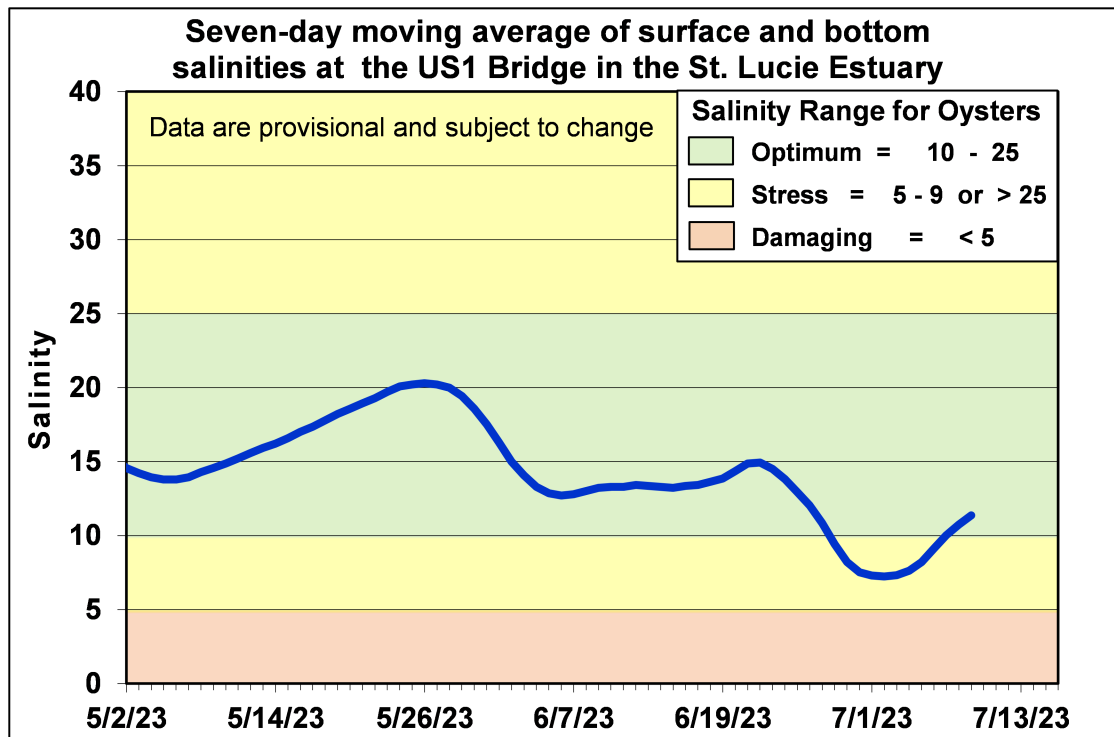


Figure ES-4. Seven-day moving average of the surface and bottom salinities at the US1 Bridge in the St. Lucie Estuary.

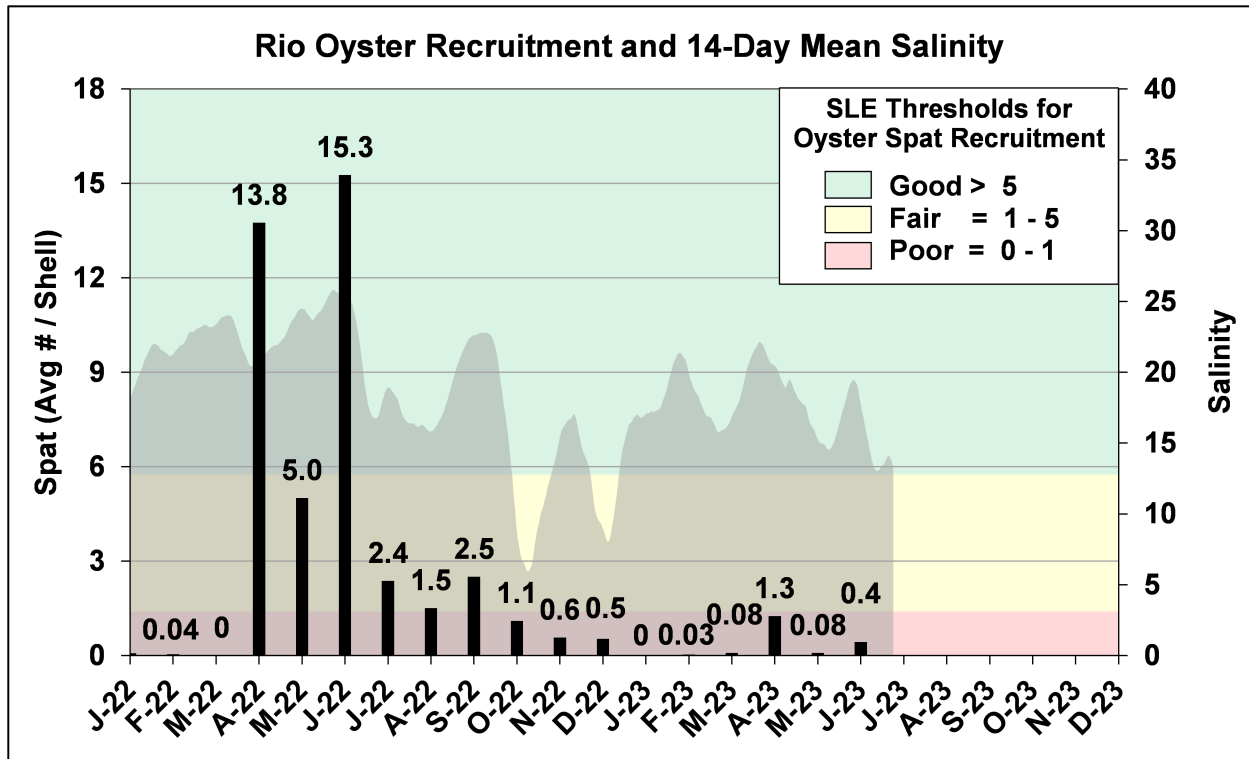


Figure ES-5. Mean oyster recruitment at the Rio oyster monitoring station and 14-day mean salinity at US1 Bridge.

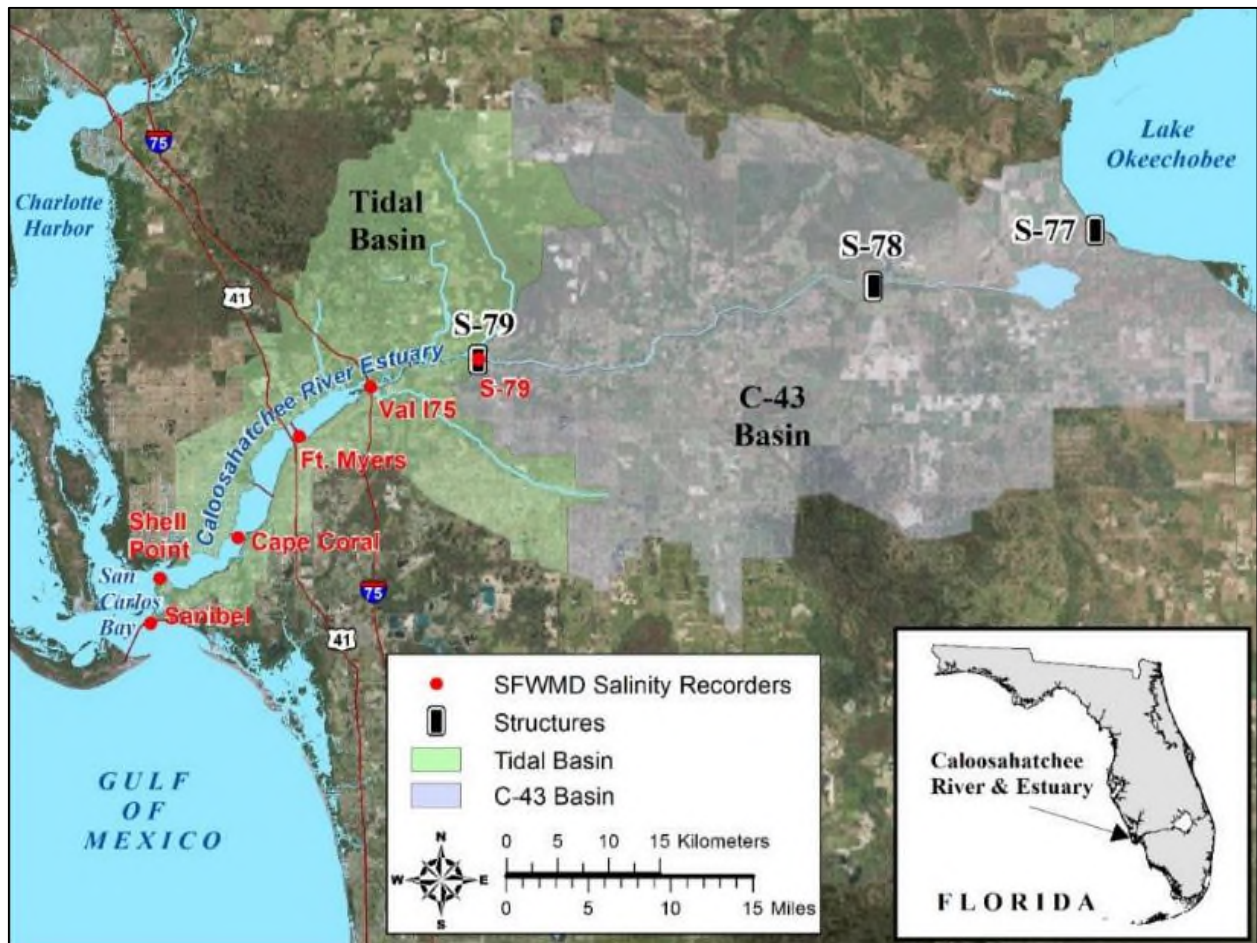


Figure ES-6. Basins, water control structures and salinity monitoring sites in the Caloosahatchee River Estuary.

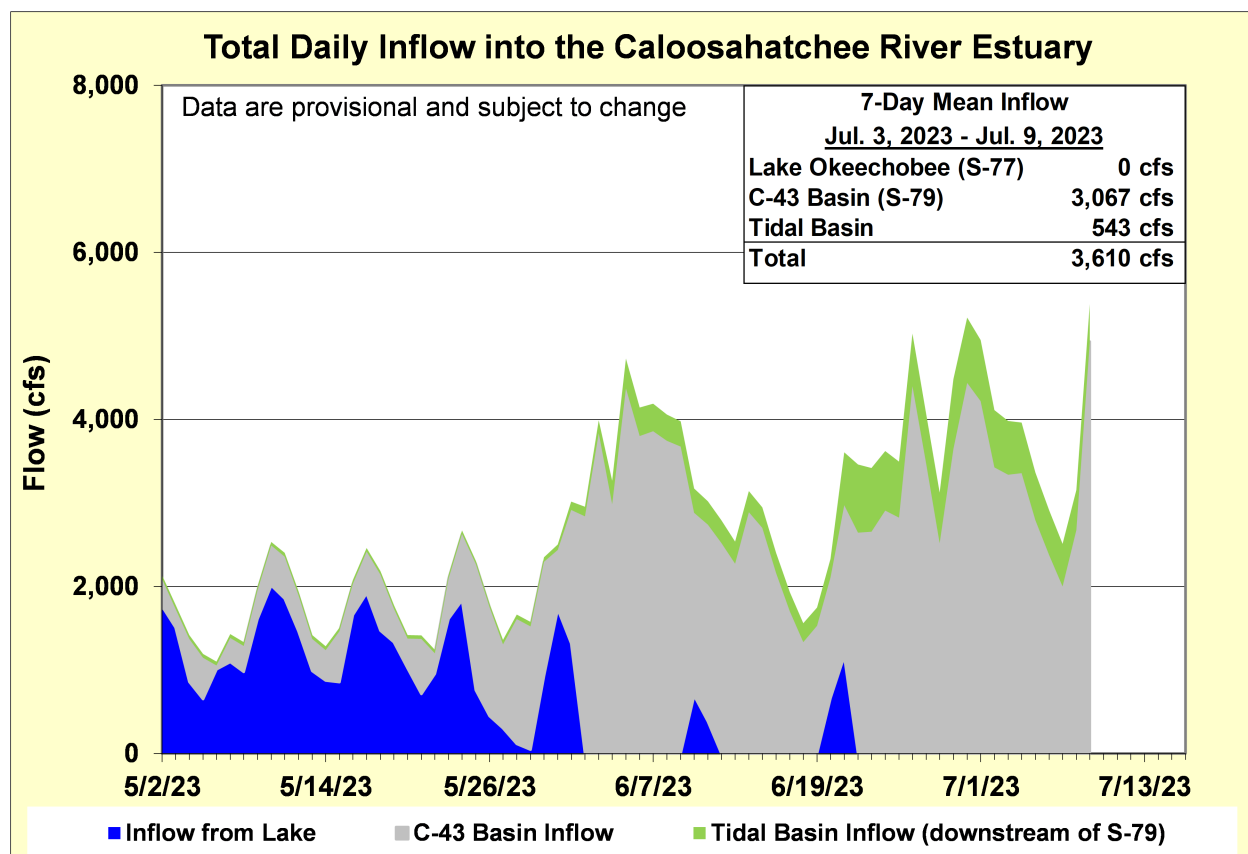


Figure ES-7. Total daily inflows from Lake Okeechobee, and runoff from the C-43 and Tidal basins into the Caloosahatchee River Estuary.

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 (0.3)	0.2 (0.2)	0.0 – 10.0
Fort Myers Yacht Basin	0.3 (0.3)	0.3 (0.3)	0.0 – 10.0
Cape Coral	5.5 (4.2)	7.2 (6.5)	10.0 – 25.0
Shell Point	21.2 (19.1)	22.7 (22.0)	10.0 – 25.0
Sanibel	28.7 (29.1)	30.1 (30.8)	10.0 – 25.0

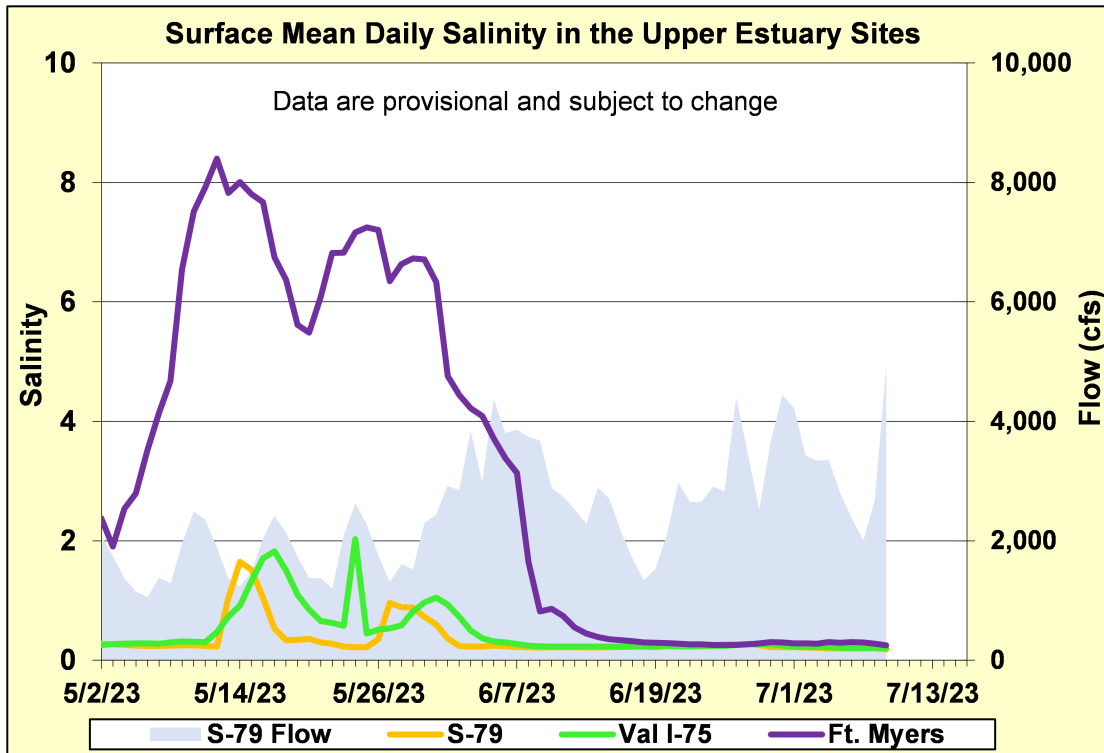


Figure ES-8. Mean daily salinity at upper Caloosahatchee River Estuary monitoring sites and mean daily flow at S-79.

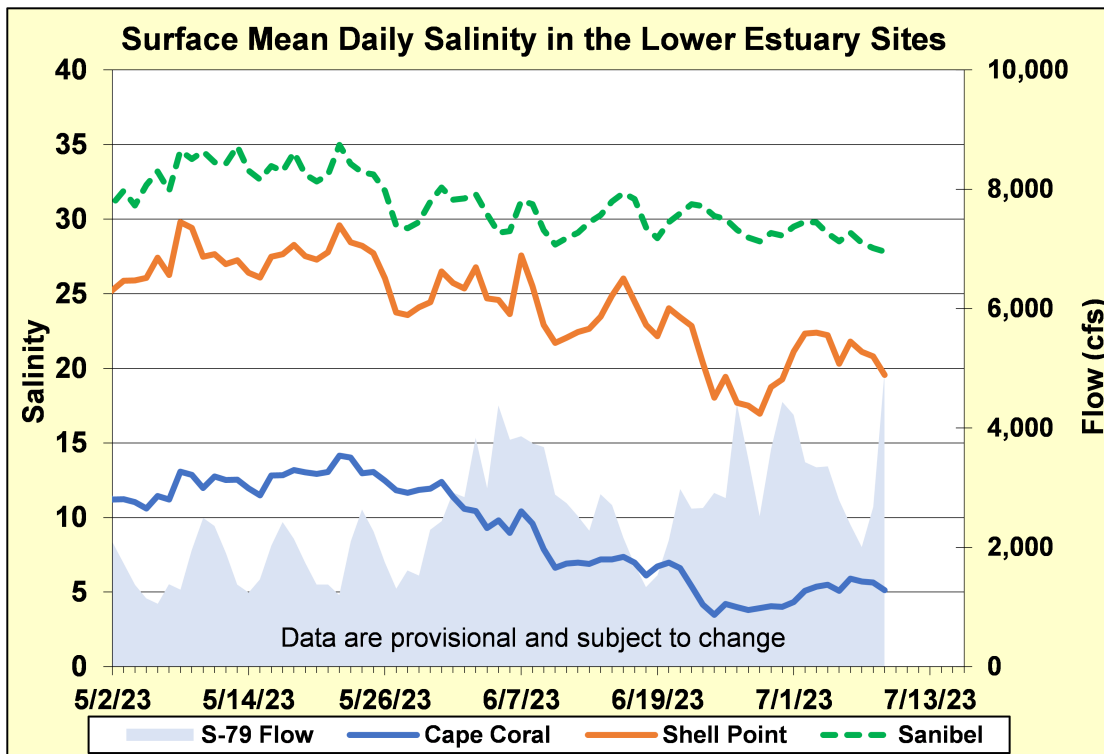


Figure ES-9. Mean daily surface salinity at lower Caloosahatchee River Estuary monitoring sites and mean daily flow at S-79.

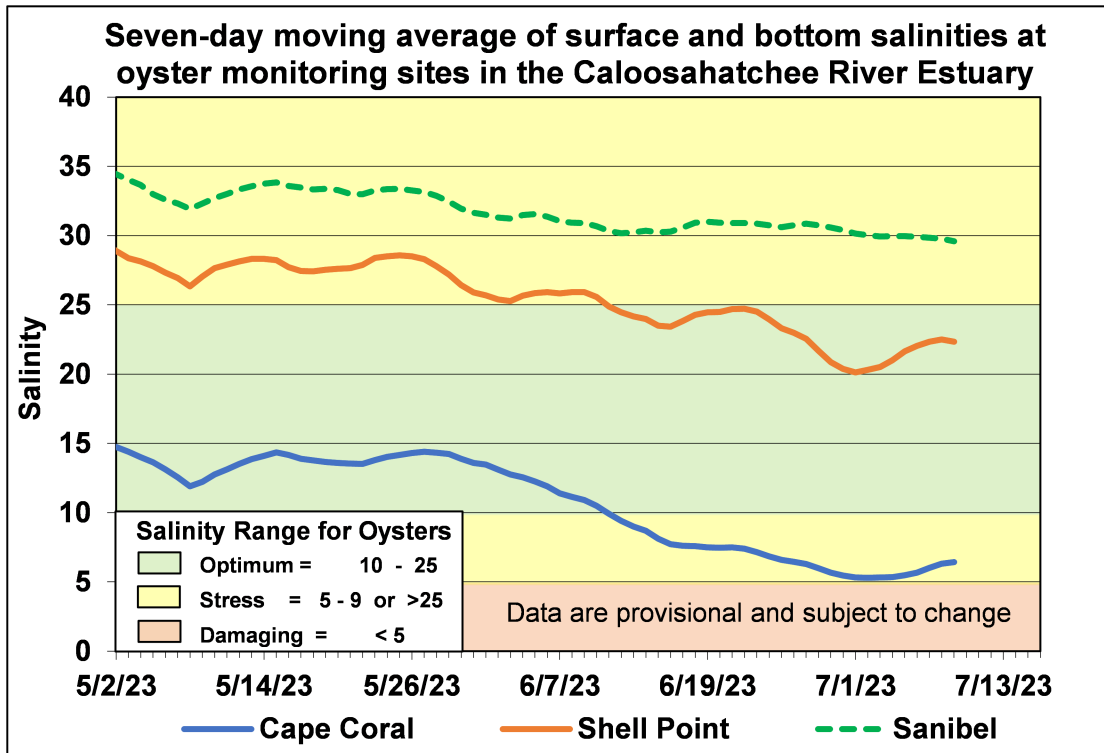


Figure ES-10. Seven-day moving average of surface and bottom salinities at Cape Coral, Shell Point and Sanibel monitoring sites in the Caloosahatchee River Estuary.

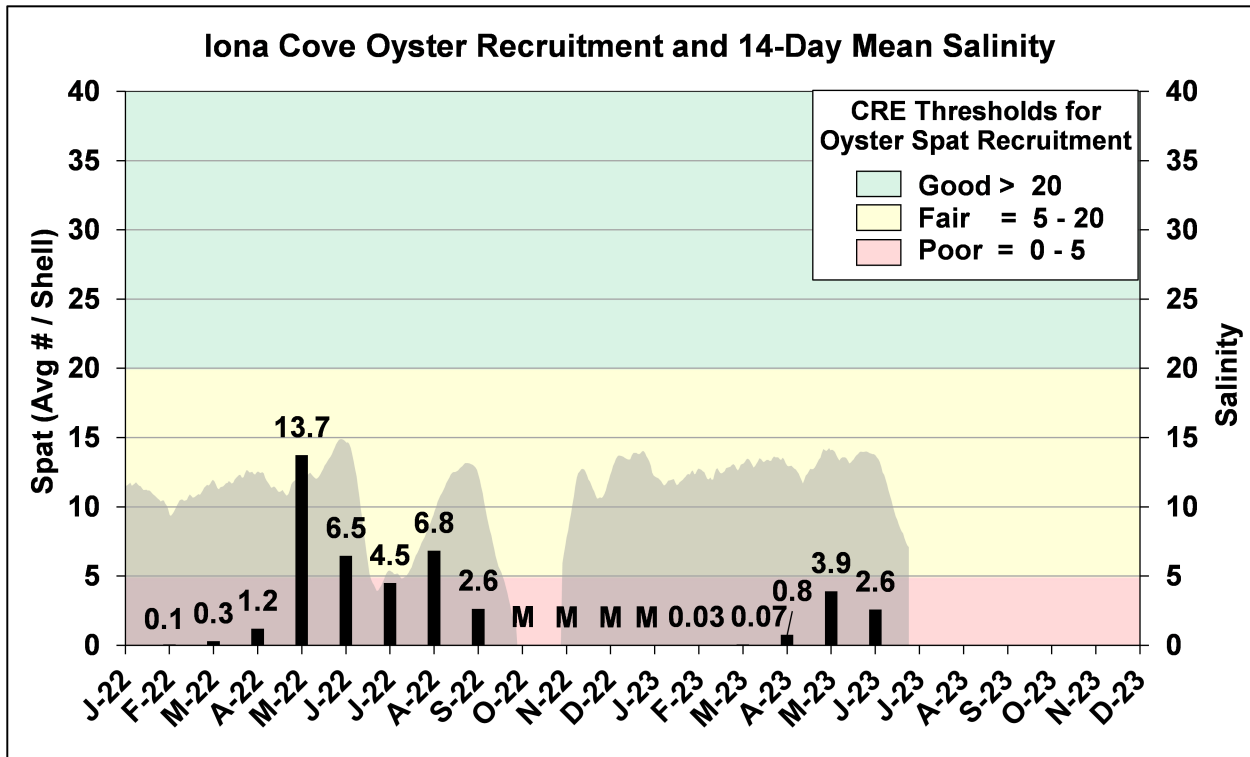


Figure ES-11. Mean oyster recruitment at the Iona Cove oyster monitoring station and 14-day mean salinity at Cape Coral.

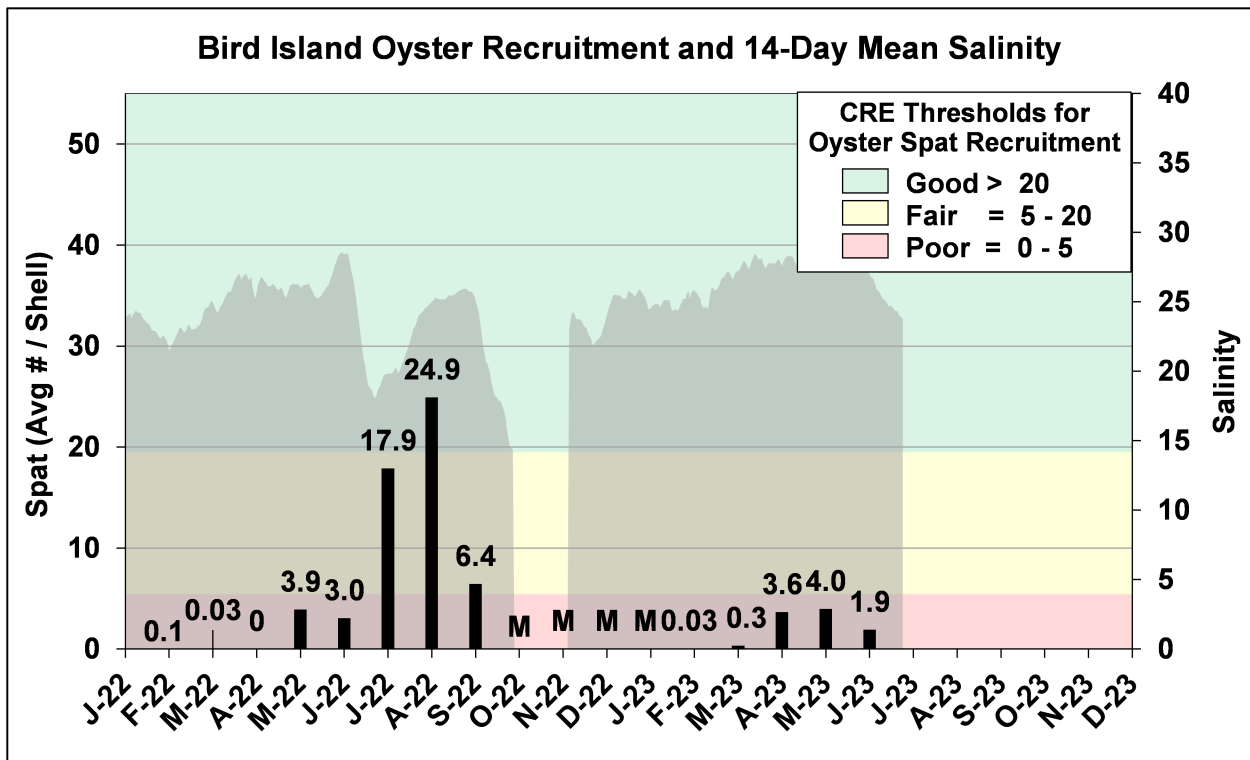


Figure ES-12. Mean oyster recruitment at the Bird Island oyster monitoring station and 14-day mean salinity at Shell Point.

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	287	0.6	0.3
B	450	287	0.3	0.3
C	750	287	0.3	0.2
D	1,000	287	0.3	0.2
E	1,500	287	0.3	0.2
F	2,000	287	0.3	0.2

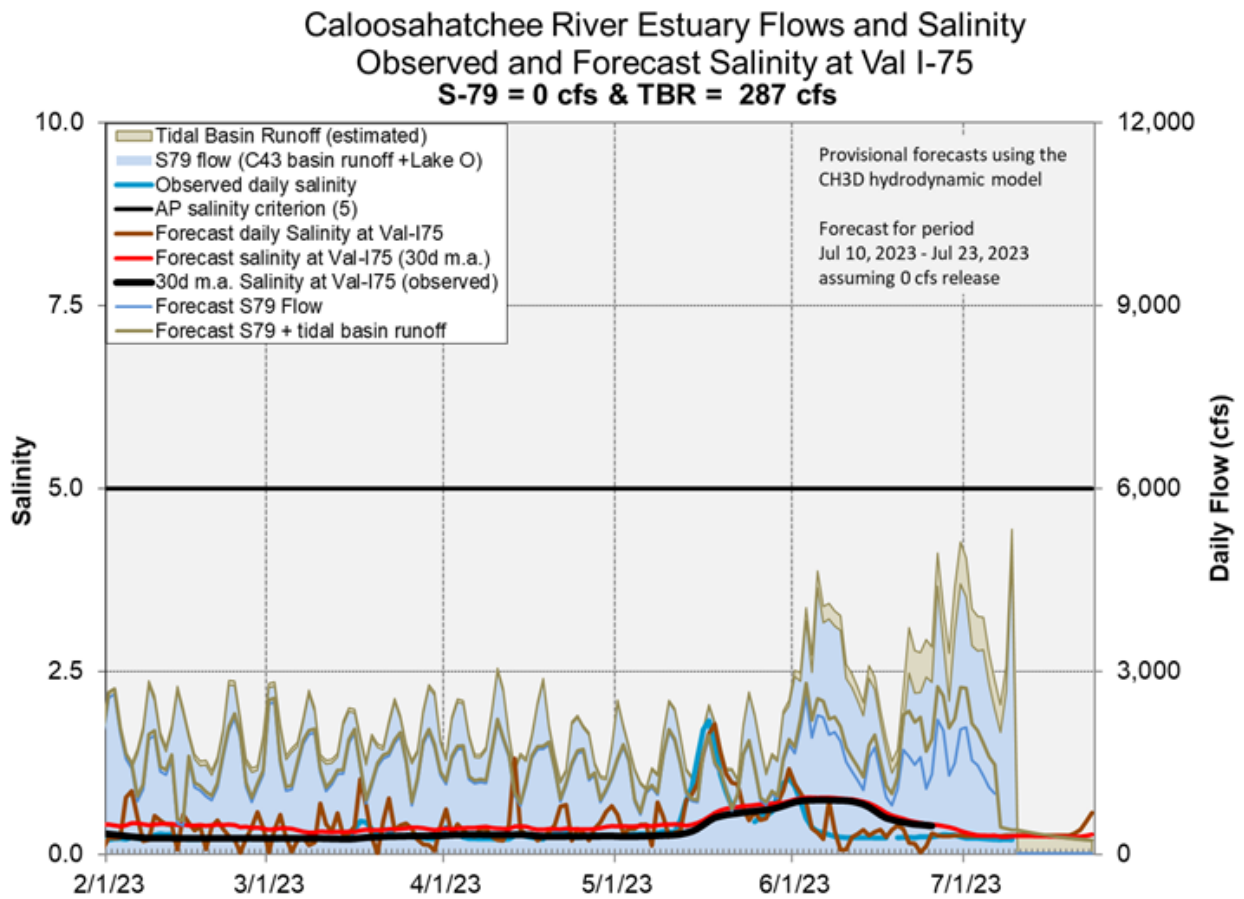


Figure ES-13. Forecasted Val I-75 site surface salinity assuming no pulse release at S-79.

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-ways is below 1.0 g/m²/year. The 365-day PLR for the Eastern Flow-way is 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**).

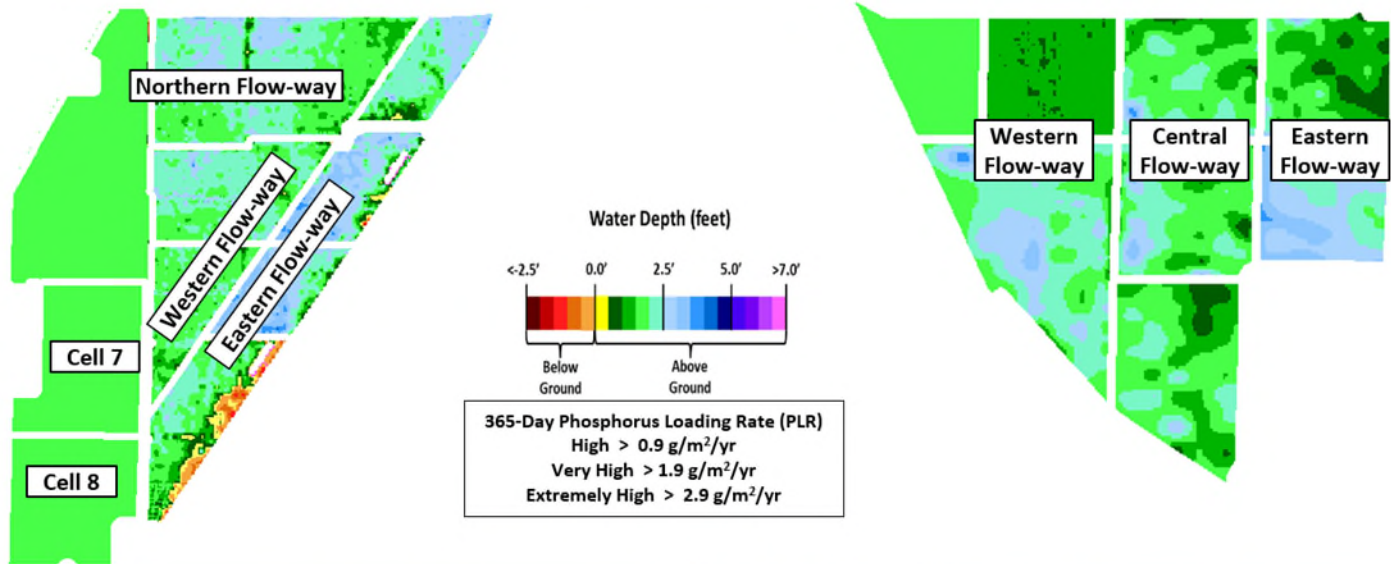
STA-2: STA-2 Flow-way 2 is offline for post-construction vegetation grow in. Operational restrictions are in place in STA-2 Flow-way 3 for canal plug refurbishments, and in Flow-way 4 for vegetation management activities. Most online treatment cells are above target stage. Vegetation in Flow-ways 1 and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

For definitions on STA operational language see glossary following figures.

Eastern Flow Path Weekly Status Report – 7/3/2023 through 7/9/2023

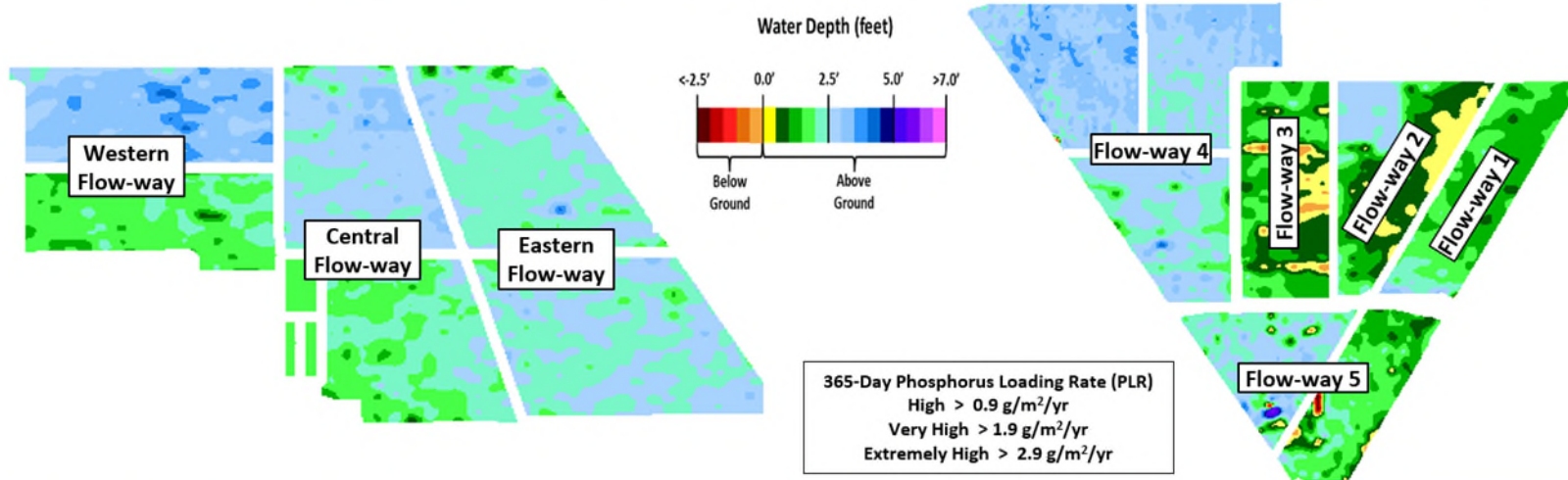


STA-1W	Flow-way Status
Western	<ul style="list-style-type: none"> • High 365-day PLR • Highly stressed vegetation conditions
Eastern	<ul style="list-style-type: none"> • High 365-day PLR • Highly stressed vegetation conditions
Northern	<ul style="list-style-type: none"> • High 365-day PLR • Highly stressed 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 – 7/3/2023 through 7/9/2023

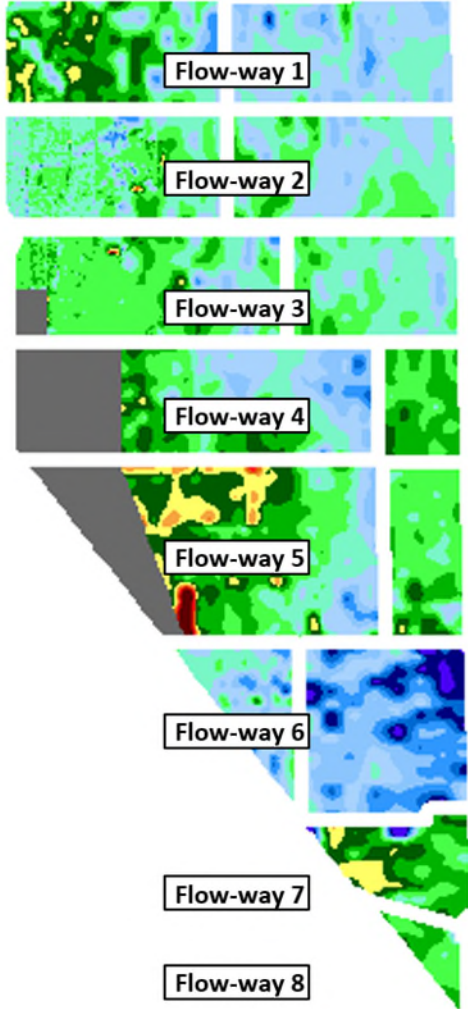


STA-3/4	Flow-way Status
Western	<ul style="list-style-type: none"> Stressed vegetation conditions FAV eradication within inflow canal
Central	<ul style="list-style-type: none"> Highly stressed vegetation conditions Removal of floating tussocks FAV eradication within inflow canal
Eastern	<ul style="list-style-type: none"> Offline for post-drawdown vegetation establishment FAV eradication 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"> High 365-day PLR Refurbishments project - plug construction Stressed vegetation conditions
Flow-way 4	<ul style="list-style-type: none"> Planting emergent vegetation FAV eradication 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 – 7/3/2023 through 7/9/2023



STA-5/6	Flow-way Status
Flow-way 1	<ul style="list-style-type: none"> Highly stressed vegetation conditions
Flow-way 2	<ul style="list-style-type: none"> Highly stressed vegetation conditions
Flow-way 3	<ul style="list-style-type: none"> Highly stressed vegetation conditions High 365-day PLR
Flow-way 4	<ul style="list-style-type: none"> Highly stressed vegetation conditions
Flow-way 5	<ul style="list-style-type: none"> Highly stressed vegetation conditions High 365-day PLR
Flow-way 6	<ul style="list-style-type: none"> Highly stressed vegetation conditions
Flow-way 7	
Flow-way 8	<ul style="list-style-type: none"> Stressed vegetation conditions

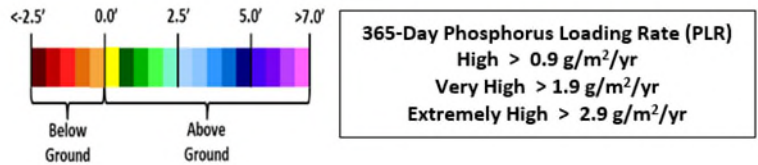


Figure S-3. Western Flow Path Weekly Status Report

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

Last week the EPA experienced daily rainfall with above average rains late in the week. WCA-1: Last week stage at the 1-8C fell then trended upwards. The average on Sunday was 0.30 feet above the now rising Zone A1 regulation line. WCA-2A: Stage remained steady at the 2A-17-gauge last week. The average on Sunday was 1.95 feet above the now rising regulation line. WCA-3A: The Three Gauge Average continued to rise steadily. The average stage was 0.72 feet above the rising regulation line on Sunday. WCA-3A North: Stage at gauge 62 (Northwest corner) fell below the Upper Schedule last week, the average on Sunday was 0.07 feet above that rising line. (**Figures EV-1 through EV-4**).

Water Depths

The SFWDAT tool illustrates the current stage has risen to near ground surface across most of the BCNP and completely across WCA-3A North. Central WCA-3A depths have risen significantly over the past two months with the potential for stage below ground now absent in that region. Ponded conditions remain in eastern WCA-2A and are even deeper in the upper reaches of the L-67s in WCA-3A Hydrologic connectivity strengthens in the western sloughs of ENP. Comparing current WDAT water depths to one month ago conditions within the EPA are wetter as a whole and significantly higher stage in eastern WCA-3A downstream of the S-11s. Looking back a year ago, conditions are similar; slightly wetter in WCAs only significantly drier in northwestern BCNP. (**Figure EV-5 and Figure EV-6**). Comparing current conditions to the 20-year average on July 9th: Depths are above average in WCAs -1 and -2A and are moving above average in southern WCA-3A. Conditions remain above average in northern WCA-3A and central BCNP; and well above average across ENP. (**Figure EV-7**).

Taylor Slough and Florida Bay

Total weekly rainfall averaged 1.6 inches in Taylor Slough and Florida Bay over the past week (Monday-Sunday) based on the 18 gauges used for this report. Total weekly rainfall ranged from 0.1 inches at Manatee Bay (MB) in the eastern nearshore region to 3.5 inches at Taylor River (TR) in the central region. Stage changes were variable across Taylor Slough, with an average decrease of -0.04 feet. Stage changes ranged from -0.14 feet at Craighead Pond (CP) in the southwestern slough to +0.10 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 +6.9 inches compared to before the Florida Bay initiative (starting in 2017), a decrease of -0.9 inches from last week.

Average Florida Bay salinity was 25.8, -0.8 lower than the previous week. Salinity continued to decrease at most sites and changes ranged from a decrease of -4.1 at Garfield Bight (GB) in the western nearshore region to an increase of +2.1 at Long Sound (LS) in the eastern nearshore region (**Figure EV-8**). Salinities remain within the IQR (~30th percentile) for the Eastern, Central and Western regions of the bay (**Figure EV-10**).

Florida Bay salinity is -3.7 below its historical average for this time of year, roughly the same relative to last week.

Water Management Recommendations

Keeping water within the system and flowing south has long term ecological benefits however operations that elevate the ascension rates above 0.18 feet per week have detrimental ecological impacts on sensitive regions of the EPA. Short term operations (i.e. water to tide) that alleviate high rates of stage change or abnormal depths can be protective of the ecology of the WCAs. The ecology of central WCA-3A would benefit from a moderation of the current ascension rate. The ecology of southern and eastern WCA-2A would benefit if depths could be maintained until stage reaches within .75' of regulation. As conditions remain at the 90th percentile in NESRS, when water is available flow through Taylor Slough has ecological benefit downstream. Individual regional recommendations can be found in **Table EV-2**.

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

Everglades Region	Rainfall (inches)	Stage change (feet)
WCA-1	1.57	-0.02
WCA-2A	1.30	+0.02
WCA-2B	1.95	+0.01
WCA-3A	1.67	+0.13
WCA-3B	1.78	+0.12
ENP	1.46	-0.02



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

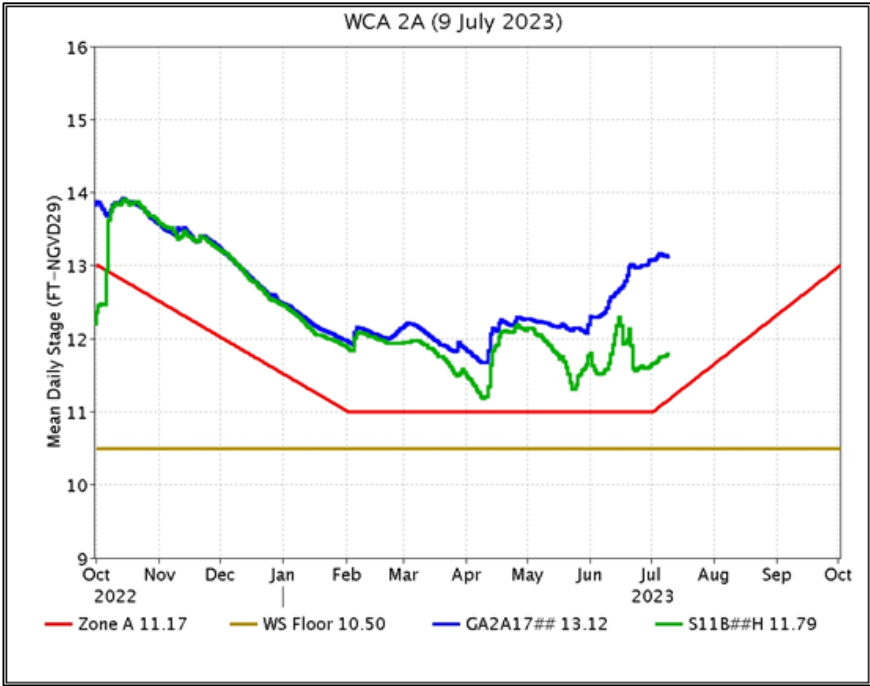


Figure EV-2. WCA-2A stage hydrographs and regulation schedule.

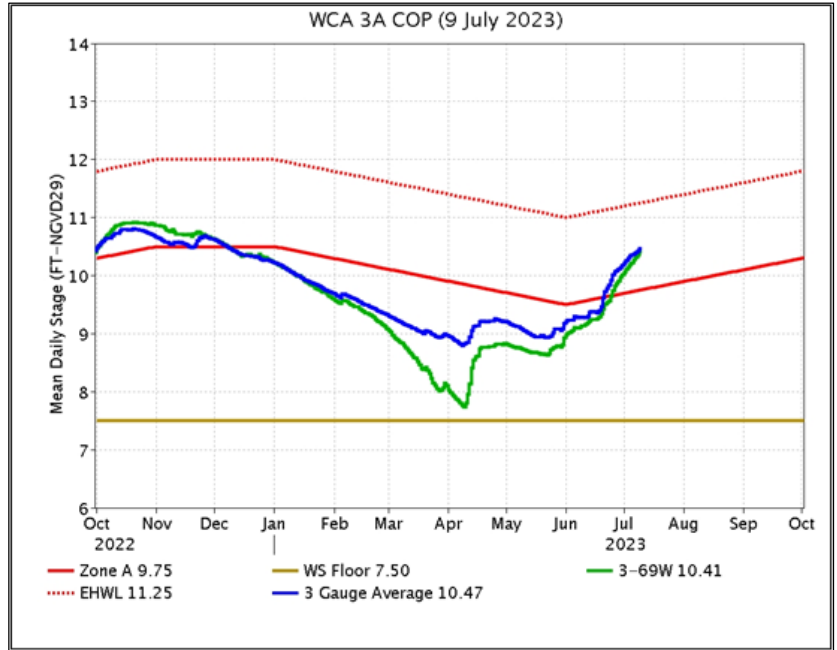


Figure EV-3. WCA-3A stage hydrographs (three-gauge average, 3-69W) and regulation schedule.

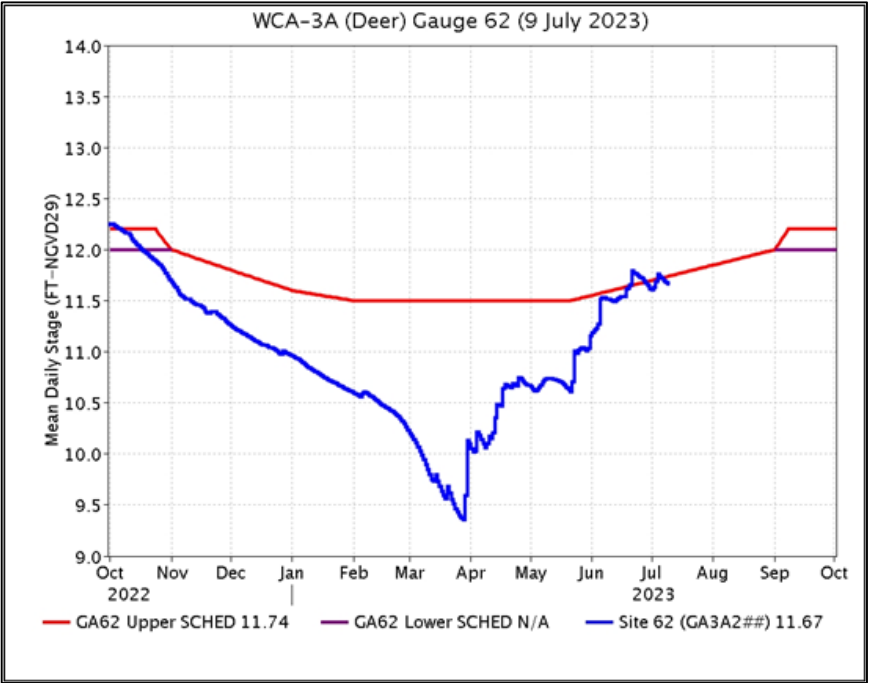


Figure EV-4. WCA-3A stage hydrograph (Deer gauge; Site 62) and CA62 regulation schedule.

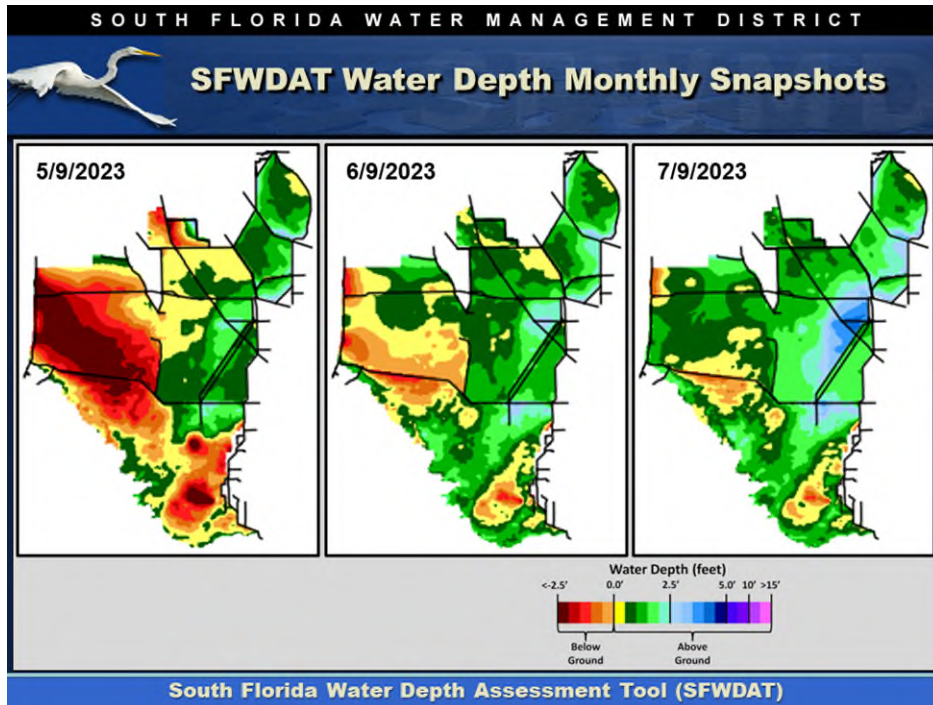


Figure EV-5. Everglades water depths from two months ago (left), one month ago (center) and present (right), based on SFWDAT.

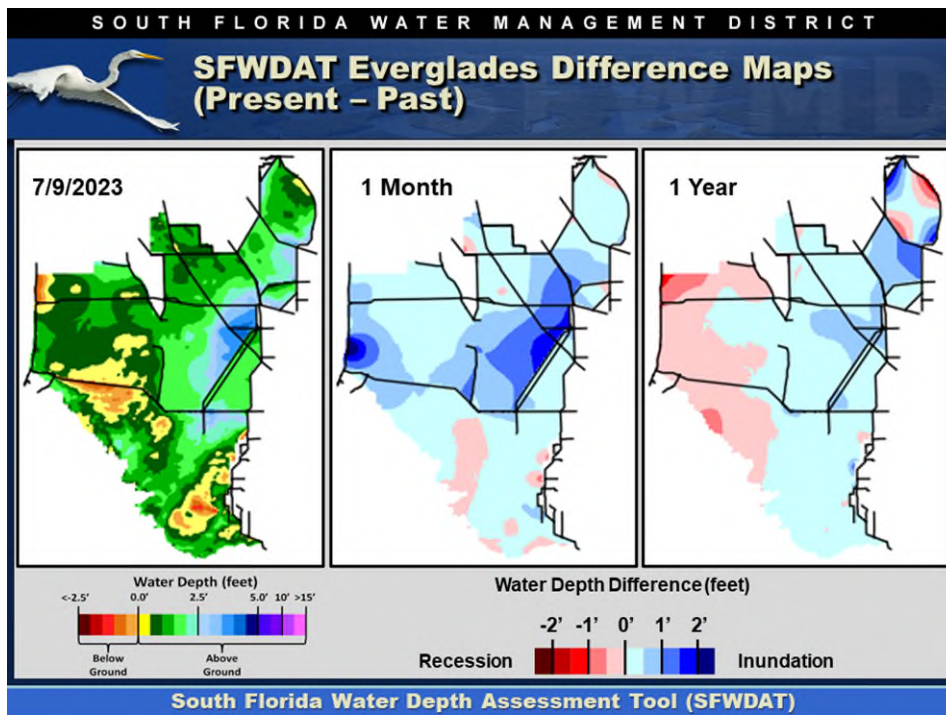


Figure EV-6. Present Everglades water depths (left) and water depth changes from one month (center) and one year (right) ago, based on SFWDAT.

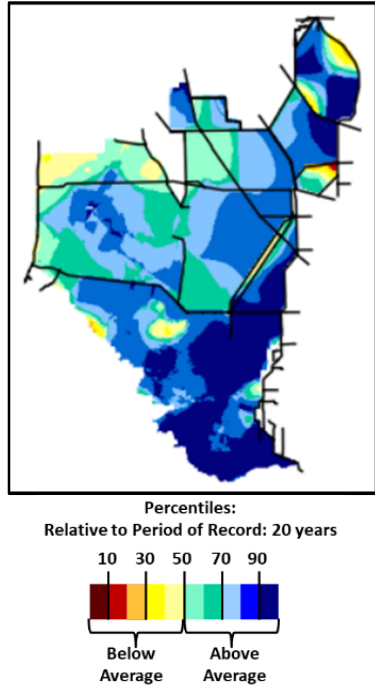


Figure EV-7. Present water depths (7/9/2023) compared to the day of year average over the previous 20 years.

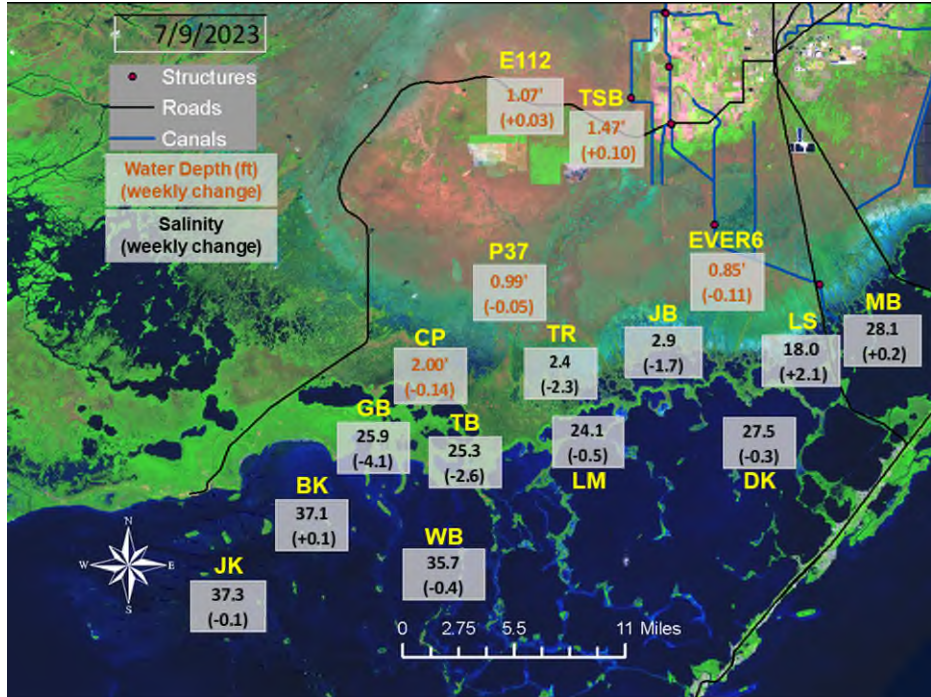


Figure EV-8. Taylor Slough water depths with changes since a week ago and Florida Bay salinities with changes since a week ago.

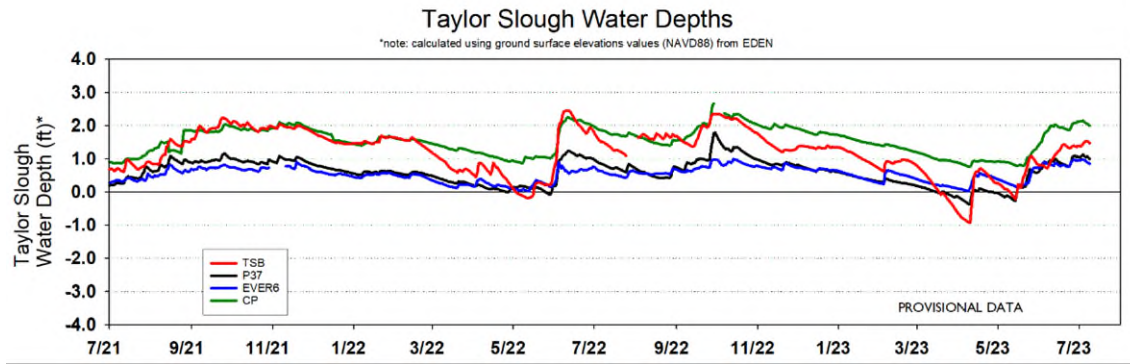


Figure EV-9. Taylor Slough water depth time series.

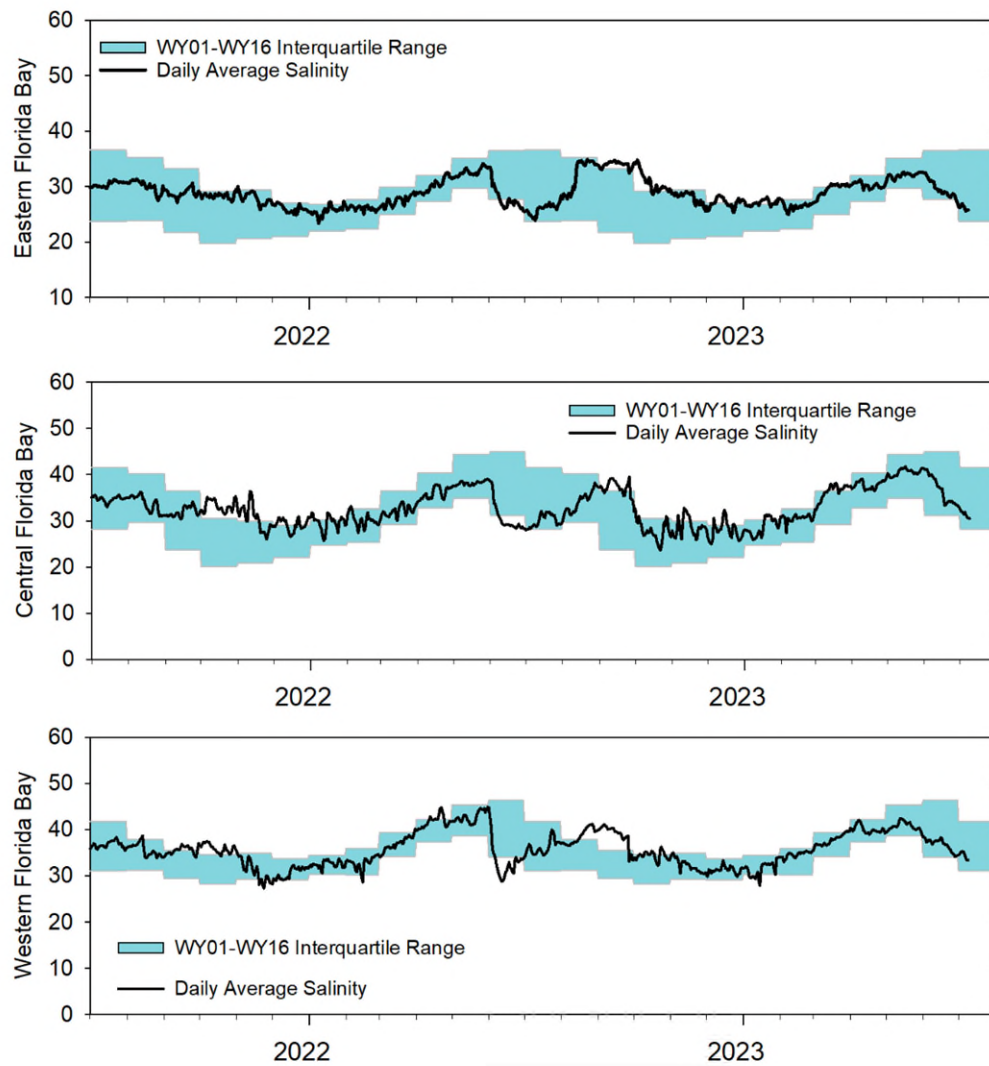


Figure EV-10. Eastern (top panel), Central (middle panel) and Western (bottom panel) Florida Bay daily average salinities with interquartile (25-75 percentile) ranges.

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

SFWMD Everglades Ecological Recommendations, July 11, 2023 (red is new)			
	Weekly change	Recommendation	Reasons
WCA-1	Stage decreased by 0.02'	Conserve water in this basin as possible. Ascension rate of less than +0.18' per week.	Protect within basin and downstream habitat and wildlife.
WCA-2A	Stage increased by 0.02'	Minimal ascension rate. Move water from this basin to tide as necessary.	Protect within basin and downstream habitat and wildlife.
WCA-2B	Stage increased by 0.01'	Conserve water in this basin as possible Ascension rate of less than +0.18' per week.	Protect within basin and downstream habitat and wildlife.
WCA-3A NE	Stage increased by 0.14'	Ascension rate of less than +0.18' per week.	Protect within basin and downstream habitat and wildlife.
WCA-3A NW	Stage decreased by 0.02'	Ascension rate of less than +0.18' per week.	
Central WCA-3A S	Stage increased by 0.19'	Ascension rate of less than +0.18' per week.	Protect within basin and downstream habitat and wildlife.
Southern WCA-3A S	Stage increased by 0.22'		
WCA-3B	Stage increased by 0.12'	Ascension rate of less than +0.18' per week.	Protect within basin and downstream habitat and wildlife.
ENP-SRS	Stage decreased by 0.02'	Make discharges to ENP according to COP and TTFP protocol while adaptively considering upstream and downstream ecological conditions.	Protect within basin and upstream habitat and wildlife.
Taylor Slough	Stage changes ranged from -0.06' to +0.11'	Move water southward as possible.	When available, provide freshwater buffer for downstream conditions.
FB- Salinity	Salinity changes ranged from -4.3 to +1.6	Move water southward as possible.	When available, provide freshwater to maintain low salinity buffer and promote water movement.

Biscayne Bay

As shown in **Figure BB-1**, mean total inflow to Biscayne Bay was 979 cfs, and the previous 30-day mean inflow was 1,120 cfs. The seven-day mean salinity was 24.9 at BBCW8 and 27.6 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.

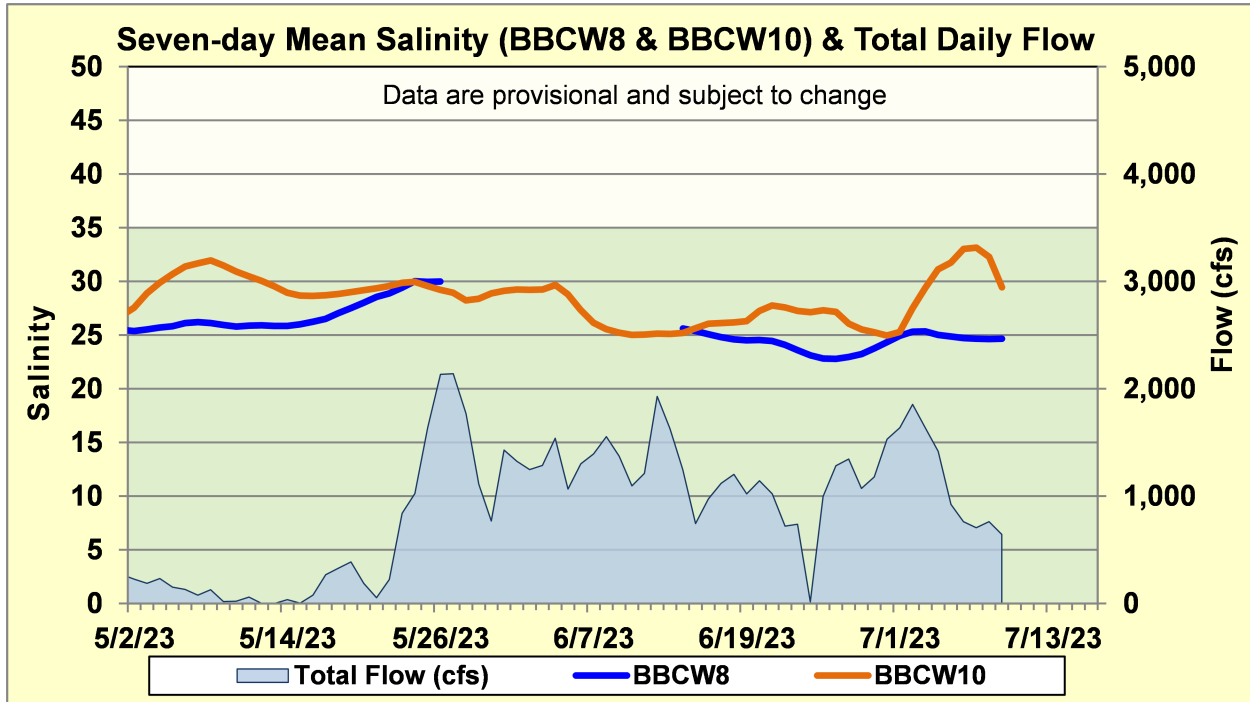


Figure BB-1. Seven-day mean salinity at BBCW8 and BBCW10 and total daily flow in Biscayne Bay. Total daily flow was calculated using flow from structures S20G, S20F, S21, S21A, S123, and S700P.