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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 25, 2021

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

A solid amount of moisture remains in the atmosphere over the District but building mid-level high pressure is bringing drier air and some Saharan dust in from the east. This drier mid-level layer can be seen in the hazy skies over the area. Therefore, thunderstorm development will be suppressed until daytime heating can overcome the dry layer creating scattered activity focused over the interior and north. This dry layer in the atmosphere is forecast to persist and produce well-below average shower coverage. An upper level low currently located east of the Bahamas is forecast to move across Florida Thursday morning and then into the northeastern Gulf of Mexico. Wind flow around this low should pull some moisture northward over the District producing scattered showers east Wednesday night and then kick start daily thunderstorm coverage closer to seasonal levels Thursday through the weekend. Steering winds should focus afternoon thunderstorm activity over the interior and west each day. The combination of the upper low and a tropical wave moving across the area should also produce some scattered shower activity east Thursday and Friday mornings. Total rainfall is forecast to be below the historical average during the first seven-day period (Week 1) and then on the drier side of the historical average during the second seven-day period (Week 2).

Kissimmee

Flow at S-65A continues to be too low for complete inundation of the Kissimmee River floodplain, but mean floodplain depth increased to 1.11 feet on August 22, 2021. Dissolved oxygen concentration in the Kissimmee River continued to decline to an average of 0.3 mg/L for the week, with the last eight days below the 1.0 mg/L threshold considered potentially lethal for sportfish.

Lake Okeechobee

Lake Okeechobee stage was 14.39 feet NGVD on August 22, 2021, 0.89 feet higher than a month ago, and 0.29 feet higher than one year ago (**Figure LO-1**). Lake stages were above the ecological envelope from August 1, 2020 to March 30, 2021, and near or within the upper threshold of the envelope until late June 2021. Lake stages have increased recently due to increased precipitation and inflows over the last several weeks and have

been above the ecological envelope since early-July, now approximately 1 foot above (**Figure LO-2**). Lake stage remained in the Low flow sub-band last week (**Figure LO-3**). According to NEXRAD, only 0.28 inches of rain fell directly on the Lake last week.

Estuaries

Total inflow to the St. Lucie Estuary averaged approximately 1,300 cfs over the past week with no flow coming from Lake Okeechobee. Mean surface salinities decreased at all sites in the estuary over the past week. Salinity at the US1 Bridge was in the fair range (10-26) for adult eastern oysters.

Total inflow to the Caloosahatchee Estuary averaged 3,960 cfs over the past week with no flow coming from the Lake. Mean surface salinities remained the same at Val I-75, decreased at Ft. Myers and Sanibel, and increased at the remaining sites in the estuary over the past week. Salinities were in the good range (0-10) for tape grass at Val I-75 and Ft. Myers. Salinities were also in the good range (10-30) for adult eastern oysters at Shell Point and Sanibel, and in the poor range at Cape Coral.

Stormwater Treatment Areas

For the week ending Sunday, August 22, 2021, no Lake Okeechobee water was delivered to the FEBs/STAs. The total amount of Lake releases sent to the FEBs/STAs in WY2022 (since May 1, 2021) is approximately 61,000 acre-feet. The total amount of inflows to the STAs in WY2022 is approximately 493,000 acre-feet. Most STA cells are near or above target stage. STA-1E Western Flow-way is offline for the Restoration Strategies project to fill and grade Cells 5 and 7, and STA-3/4 Eastern Flow-way is offline for vegetation rehabilitation/drawdown. Operational restrictions are in place in STA-1W Western, Eastern, and Northern Flow-ways, and STA-2 Flow-way 2 for construction activities. Operational restrictions are in effect in STA-1E Central Flow-way and STA-2 Flow-ways 3 and 4 for vegetation management activities. Operational restrictions are also in effect in STA-5/6 Flow-ways 2 and 3 following the Restoration Strategies project to grade non-effective treatment areas. This week, if 2008 LORS recommends Lake releases to the WCAs and conditions allow, releases will be sent to STA-2.

Everglades

Rehydration rates were poor across the Everglades Protection Area as all basins decreased in stage responding to below average precipitation. Depth conditions in WCA-3A remain below average across most of that basin. In Florida Bay salinities fell last week but remain above average, and stages decreased on average in Taylor Slough. Overall conditions remain stable in the Southern systems but now is the normal time of year where the lowest salinities are expected but have been slow to decrease.

SUPPORTING INFORMATION

Kissimmee Basin

Upper Kissimmee

On August 22, 2021, lake stages were 56.4 feet NGVD (0.1 feet below schedule) in East Lake Toho, 53.5 feet NGVD (at schedule) in Lake Toho, and 51.1 feet NGVD (0.1 feet above schedule) in lakes Kissimmee-Cypress-Hatchineha (KCH) (**Table KB-1, Figures KB-1-3**).

Lower Kissimmee

Discharges to the Kissimmee River on August 22, 2021 were 1,650 cfs at S-65 and 1,710 cfs at S-65A; discharges from the Kissimmee River were 2,030 cfs at S-65D and 2,160 cfs at S-65E (**Table KB-2**). Headwater stages were 46.2 feet NGVD at S-65A and 28.5 feet NGVD at S-65D on August 22, 2021. The concentration of dissolved oxygen in the Kissimmee River continued to decline, with the average for the week ending on August 22, 2021 decreasing to 0.3 mg/L; the last eight days were below the 1.0 mg/L threshold considered potentially lethal for sportfish (**Table KB-2, Figure KB-4**). Discharge at S-65/S-65A is being managed to attempt to limit further decline of dissolved oxygen in the Kissimmee River, but the outcome is dependent on rainfall. Flow at S-65A remains too low for complete inundation of the Kissimmee River floodplain, but mean floodplain depth increased to 1.11 feet on August 22, 2021 (**Figure KB-5**).

Water Management Recommendations

With stage in KCH now declining, we are in the process of reducing discharge at S-65/S-65A back to 1,400 cfs.

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

| Water Body | Structure | Stage Monitoring Site | 7-Day Average Discharge (cfs) | Lake Stage (feet NGVD) ^a | Schedule Type ^b | Schedule Stage (feet NGVD) | Departure from Regulation (feet) | |
|---|-----------|-----------------------|-------------------------------|-------------------------------------|----------------------------|----------------------------|----------------------------------|---------|
| | | | | | | | 8/22/21 | 8/15/21 |
| Lakes Hart and Mary Jane | S-62 | LKMJ | 82 | 59.9 | R | 60.0 | -0.1 | 0.0 |
| Lakes Myrtle, Preston and Joel | S-57 | S-57 | 14 | 61.0 | R | 61.0 | 0.0 | 0.0 |
| Alligator Chain | S-60 | ALLI | 0 | 63.2 | R | 63.2 | 0.0 | 0.0 |
| Lake Gentry | S-63 | LKGT | 2 | 61.0 | R | 61.0 | 0.0 | -0.1 |
| East Lake Toho | S-59 | TOHOE | 223 | 56.4 | R | 56.5 | -0.1 | -0.1 |
| Lake Toho | S-61 | TOHOW S-61 | 570 | 53.5 | R | 53.5 | 0.0 | 0.0 |
| Lakes Kissimmee, Cypress and Hatchineha | S-65 | KUB011 LKIS5B | 1,702 | 51.1 | R | 51.0 | 0.1 | 0.3 |

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

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

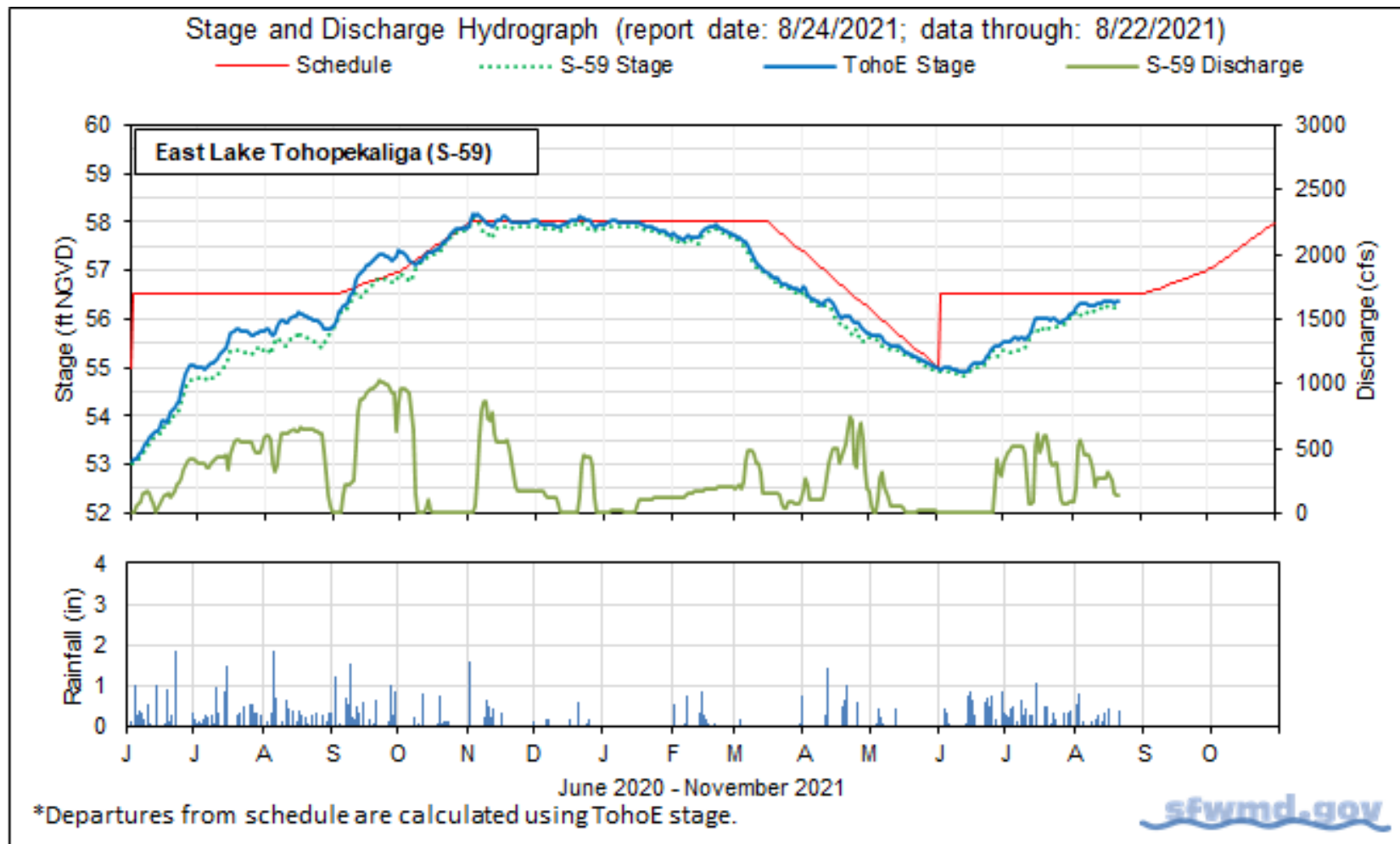


Figure KB-1. East Lake Toho regulation schedule, stage, discharge and rainfall.

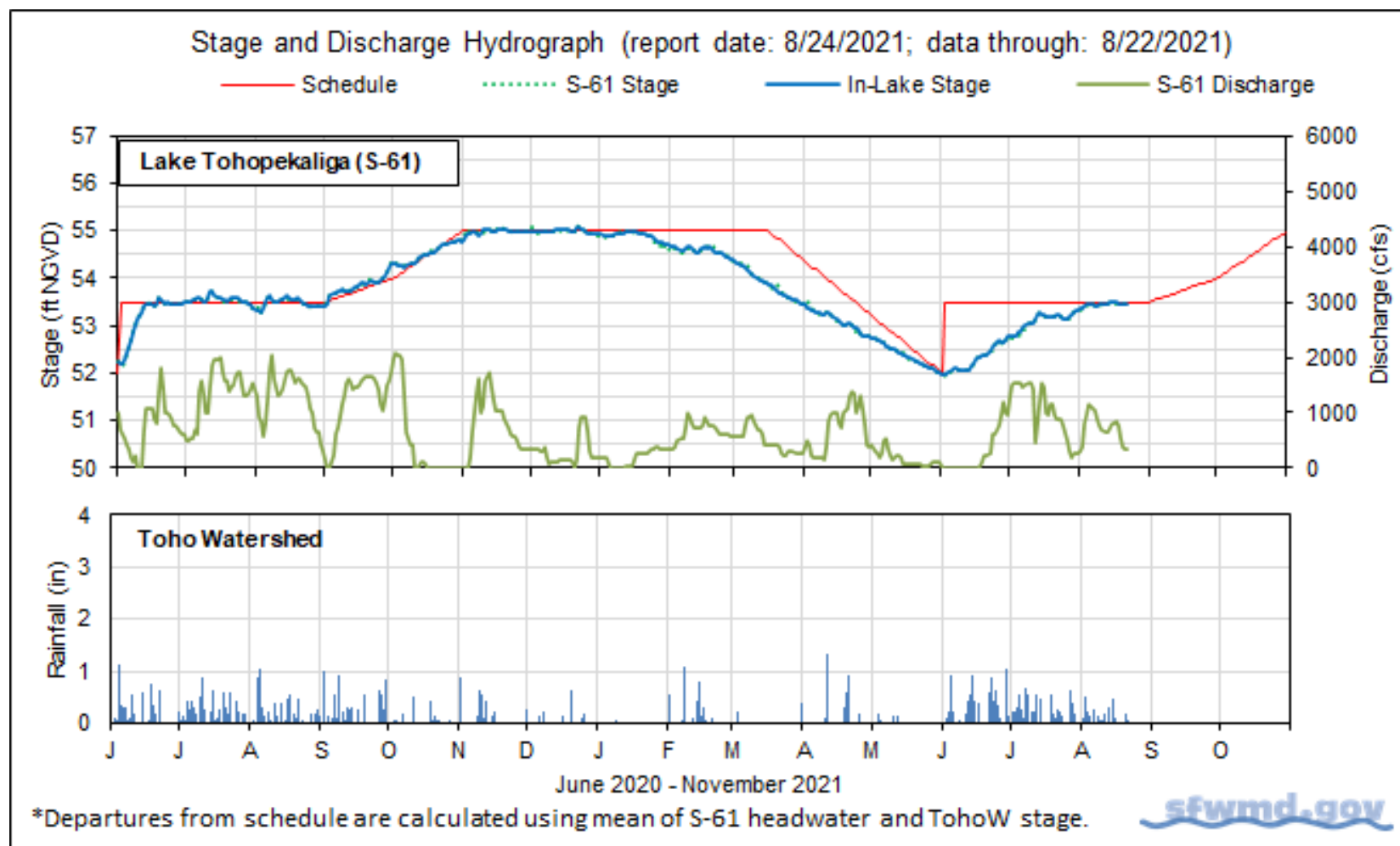


Figure KB-2. Lake Toho regulation schedule, stage, discharge and rainfall.

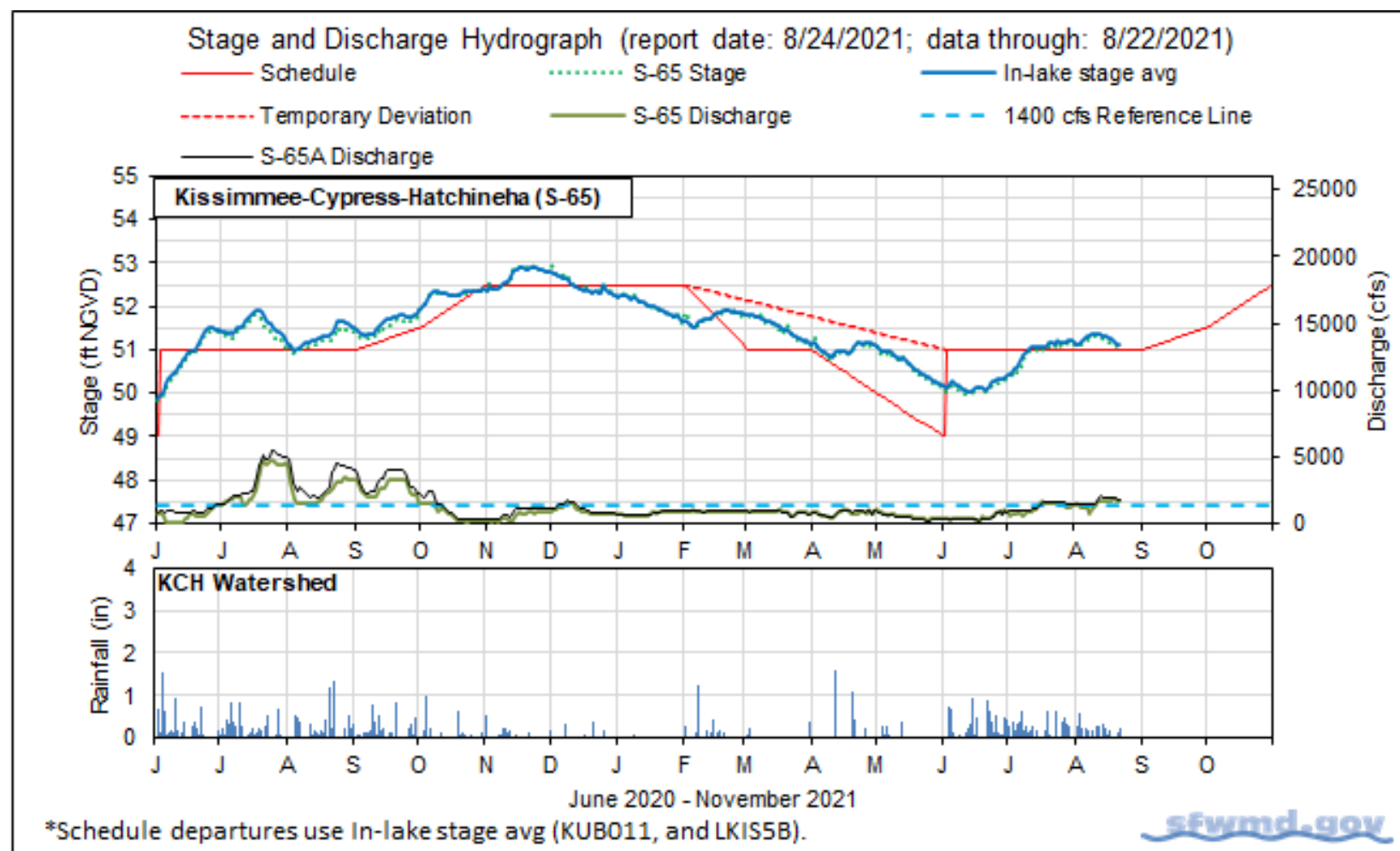


Figure KB-3. Lakes Kissimmee, Cypress and Hatchineha regulation schedule, stage, discharge and rainfall.

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

| Metric | Location | Daily Average 8/22/21 | Average for Previous Seven Day Periods | | | |
|--------------------------------------|-------------------------------|--------------------------|--|---------|--------|--------|
| | | | 8/22/21 | 8/15/21 | 8/8/21 | 8/1/21 |
| Discharge | S-65 | 1,650 | 1,700 | 1,470 | 1,210 | 1,360 |
| Discharge | S-65A ^a | 1,710 | 1,900 | 1,790 | 1,460 | 1,500 |
| Headwater Stage (feet NGVD) | S-65A | 46.2 | 46.3 | 46.5 | 46.4 | 46.4 |
| Discharge | S-65D ^b | 2,030 | 2,040 | 1,890 | 1,600 | 1,380 |
| Headwater Stage (feet NGVD) | S-65D ^c | 28.5 | 28.5 | 28.5 | 27.7 | 27.6 |
| Discharge (cfs) | S-65E ^d | 2,160 | 2,260 | 2,200 | 1,790 | 1,590 |
| Discharge (cfs) | S-67 | 0 | 0 | 0 | 0 | 0 |
| Dissolved Oxygen (mg/L) ^e | Phase I, II/III river channel | 0.3 | 0.3 | 0.7 | 1.2 | 1.7 |
| Mean depth (feet) ^f | Phase I floodplain | 1.11 | 1.13 | 0.93 | 0.84 | 0.68 |

a. Combined discharge from main and auxiliary structures.

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

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

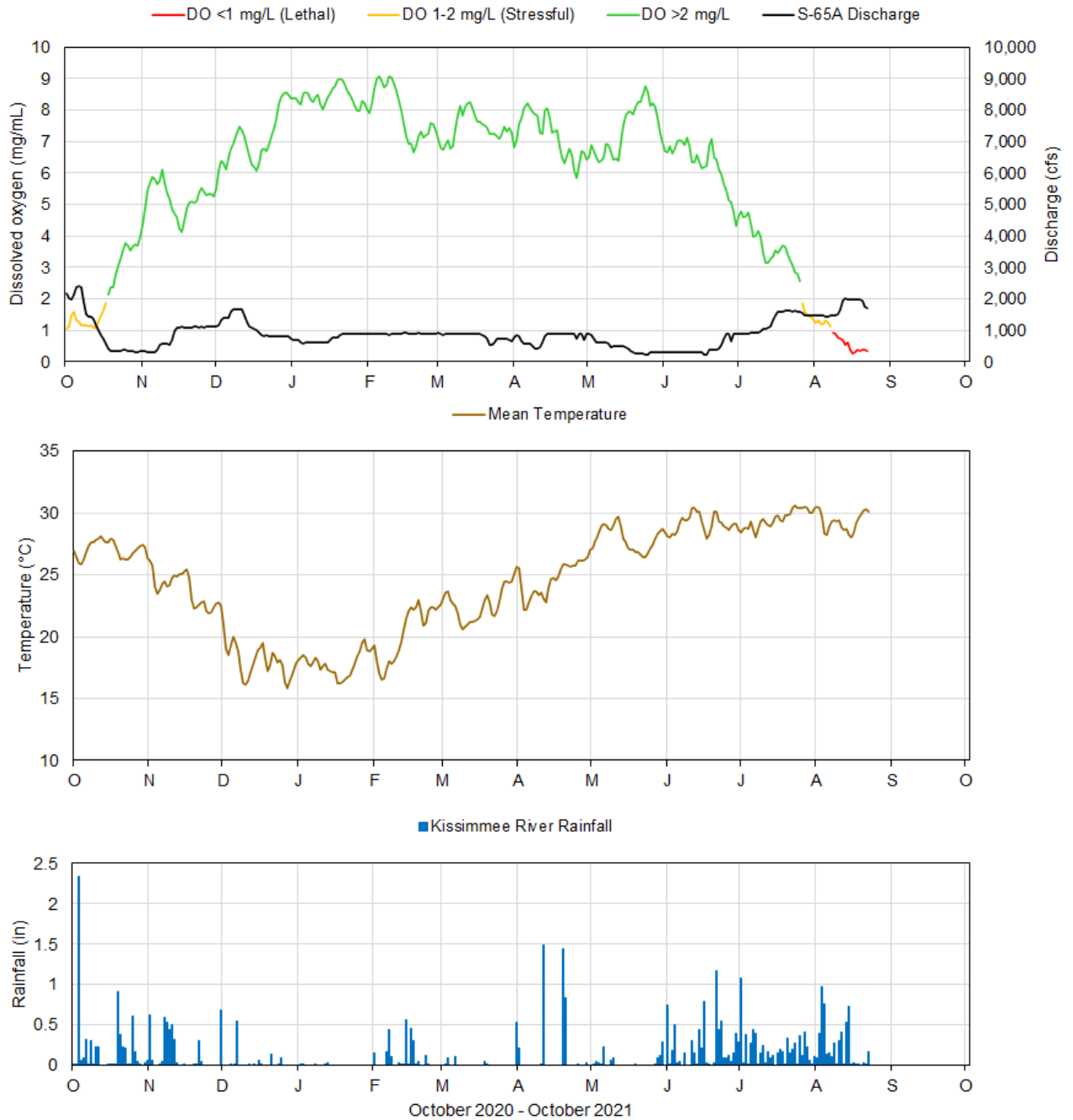
d. Combined discharge from S-65E and S-65EX1.

e. Dissolved oxygen is the average of values from sondes KRBN, PC62, PC63, PD62R and PD42R.

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

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

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



Report Date: 8/24/2021; data are through: 8/22/2021



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

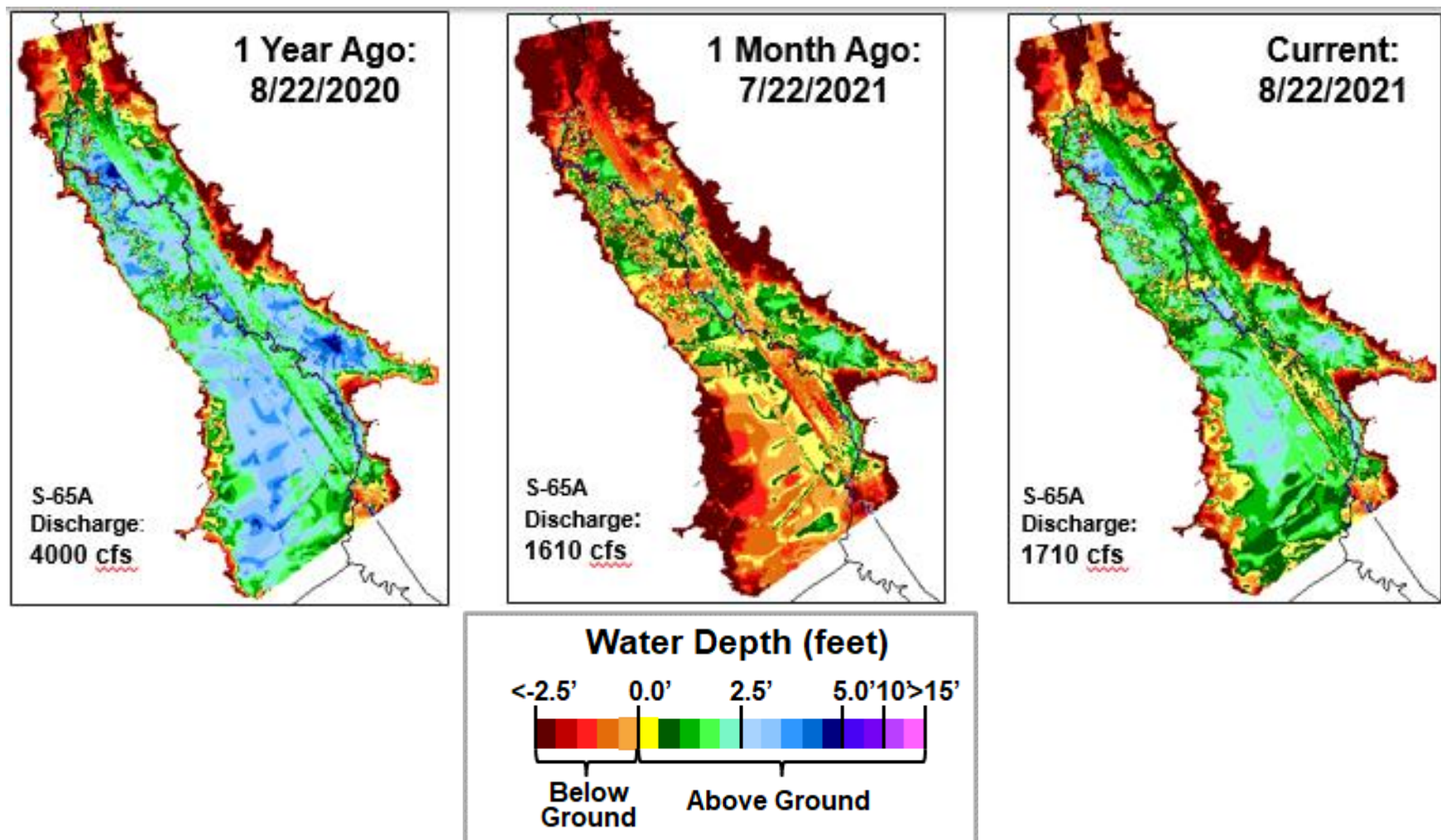


Figure KB-5. Phase I area Kissimmee River floodplain water depths (from left to right) one year ago, one month ago and current.

Lake Okeechobee

Lake Okeechobee stage was 14.39 feet NGVD on August 22, 2021, 0.89 feet higher than a month ago, and 0.29 feet higher than one year ago (**Figure LO-1**). Lake stages were above the ecological envelope from August 1, 2020 to March 30, 2021, and near or within the upper threshold of the envelope until late June 2021. Lake stages have increased recently due to increased precipitation and inflows over the last several weeks and have been above the ecological envelope since early-July, now approximately 1 foot above (**Figure LO-2**). Lake stage remained in the Low flow sub-band last week (**Figure LO-3**). According to NEXRAD, only 0.28 inches of rain fell directly on the Lake last week.

Average daily inflows (excluding rainfall) decreased from the previous week, going from 6,390 cubic feet per second (cfs) to 4,840 cfs. Average daily outflows (excluding evapotranspiration) increased from previous week, going from 15 cfs to 53 cfs. Most of the inflows (~89% of the total) came from the Kissimmee River (2,260 cfs through S-65E & S-65EX1), Fisheating Creek (865 cfs), C-40 & C-41 canals [625 cfs through S-72 & S-72J] and Lake Istokpoga basin C-41A canal [530 cfs through S-84 & S-84X]. There was no outflow to the west via S-77 or east via S-308 structures. There was a small outflow via the S-271 (42 cfs) structure into the L-8 canal and via S-352 (11 cfs) into the West Palm Beach Canal. There was no outflow south via the S-351 and S-354 structures. Average inflows and outflows through water control structures surrounding the Lake for the previous two weeks (cfs) are shown in Table LO-1, as is the resultant Lake elevation change in inches (in) due to each structure's flow for the past week. **Figure LO-4** shows the combined average daily cfs for inflows and outflows for the Lake over the past eight weeks. These data are provisional and are subject to change.

The most recent satellite image (August 21, 2021) from the NOAA cyanobacteria monitoring product derived from EUMETSAT's Sentinel 3 OLCI sensor data showed medium to high bloom potential in the western and central parts of the Lake, and low in the south-central region (**Figure LO-5**).

The latest water quality survey results from August 2-4, 2021 revealed that total phytoplankton biomass (chlorophyll *a* is a proxy for total phytoplankton biomass) was highest in the northeastern, southern and southwestern parts of the Lake. Bloom conditions (chl *a* > 40 µg/L) were recorded at 9 sites (or 29%). The highest biomass (140 µg/L) was recorded at LZ25A in the SE part of the Lake. The number of sites with bloom conditions decreased by 3% since late July (**Table LO-2** and **Figure LO-6**).

Table LO-1. Weekly Lake Okeechobee inflows and outflows (cfs) and as change in elevation (in).
Provisional data.

| INFLOWS | Previous week Avg Daily (cfs) | Avg Daily Flow (cfs) | Equivalent Depth Week Total (in) | OUTFLOWS | Previous week Avg Daily (cfs) | Avg Daily Flow (cfs) | Equivalent Depth Week Total (in) |
|------------------|-------------------------------|----------------------|----------------------------------|--------------|-------------------------------|----------------------|----------------------------------|
| S-65E & S-65EX1 | 2201 | 2256 | 0.9 | S-77 | 15 | 0 | 0.0 |
| S-71 & S-72 | 1063 | 625 | 0.3 | *S-308 | -24 | 0 | 0.0 |
| S-84 & S-84X | 1356 | 534 | 0.2 | S-351 | 0 | 0 | 0.0 |
| Fisheating Creek | 855 | 865 | 0.4 | S-352 | 0 | 11 | 0.0 |
| S-154 | 117 | 131 | 0.1 | S-354 | 0 | 0 | 0.0 |
| S-191 | 99 | 18 | 0.0 | *L-8 (S-271) | -102 | 42 | 0.0 |
| S-133 P | 89 | 34 | 0.0 | ET | 1877 | 2579 | 1.0 |
| S-127 P | 117 | 97 | 0.0 | Total | 1893 | 2632 | 1.1 |
| S-129 P | 49 | 31 | 0.0 | | | | |
| S-131 P | 31 | 11 | 0.0 | | | | |
| S-135 P | 280 | 232 | 0.1 | | | | |
| S-2 P | 0 | 0 | 0.0 | | | | |
| S-3 P | 0 | 0 | 0.0 | | | | |
| S-4 P | 3 | 0 | 0.0 | | | | |
| *Backflow | 126 | 0 | 0.0 | | | | |
| Rainfall | 6891 | 755 | 0.3 | | | | |
| Total | 13278 | 5589 | 2.3 | | | | |

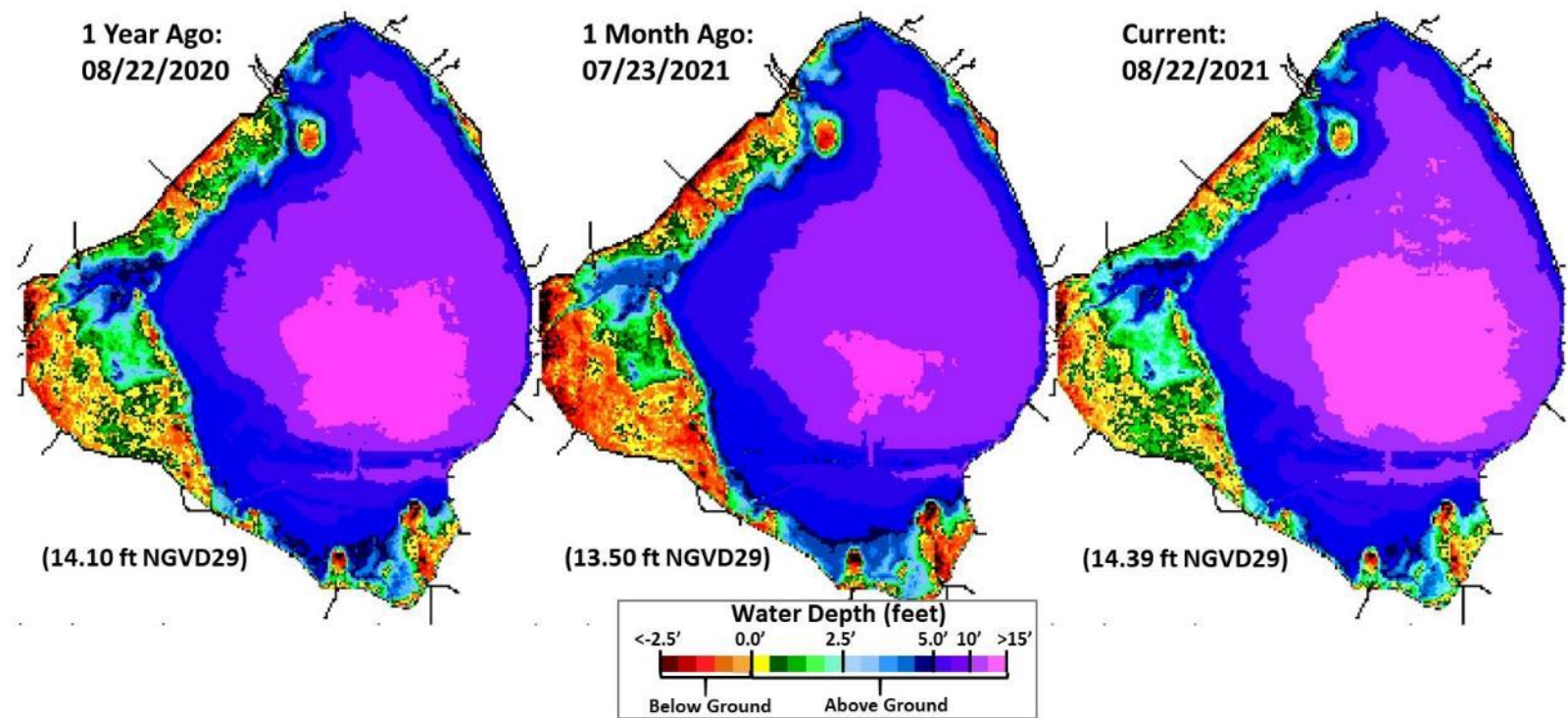


Figure LO-1. Lake Okeechobee water depth estimates based on South Florida Water Depth Assessment Tool (SFWDAT).

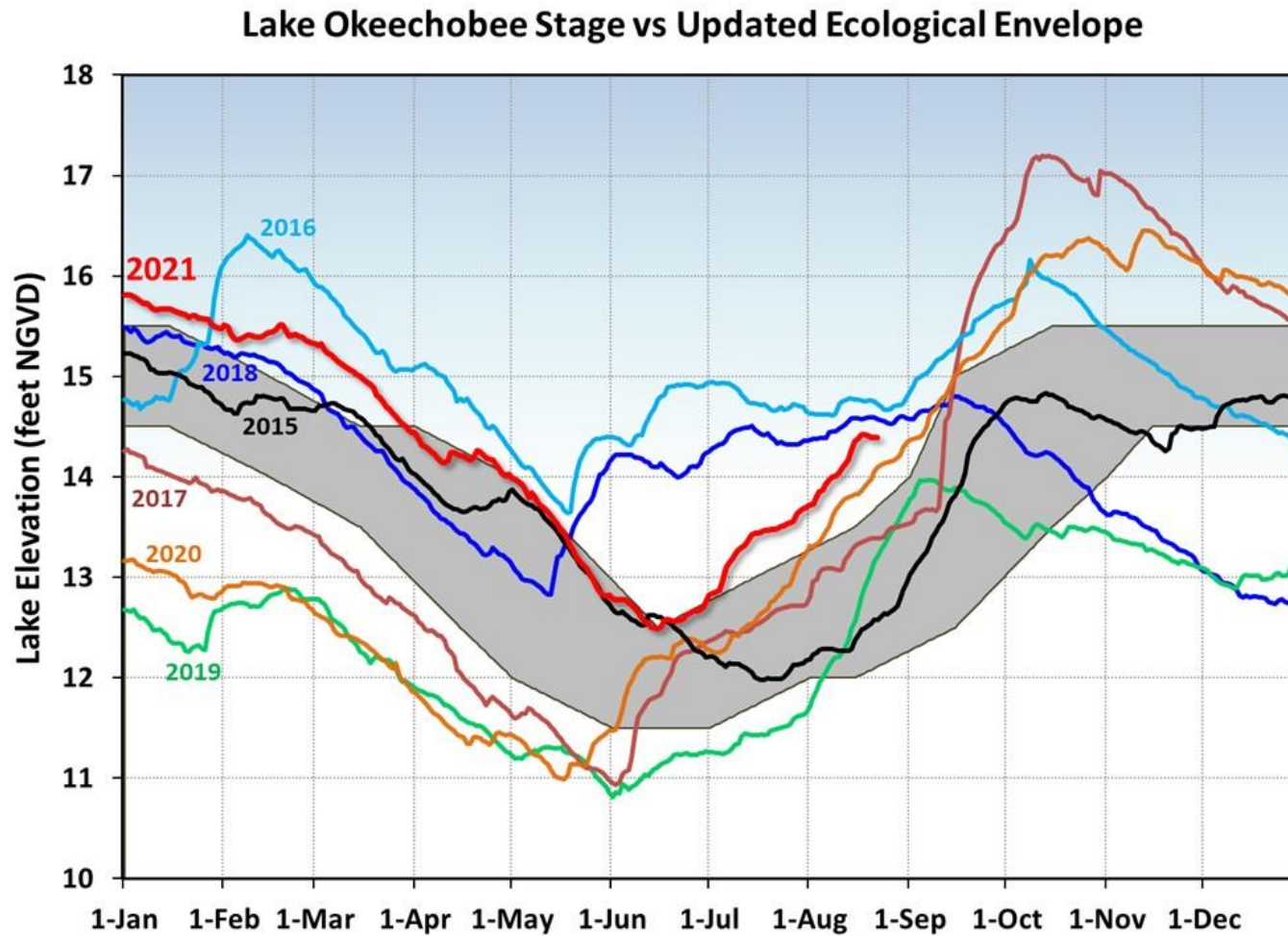


Figure LO-2. Select annual stage hydrographs for Lake Okeechobee in comparison to the updated ecological envelope.

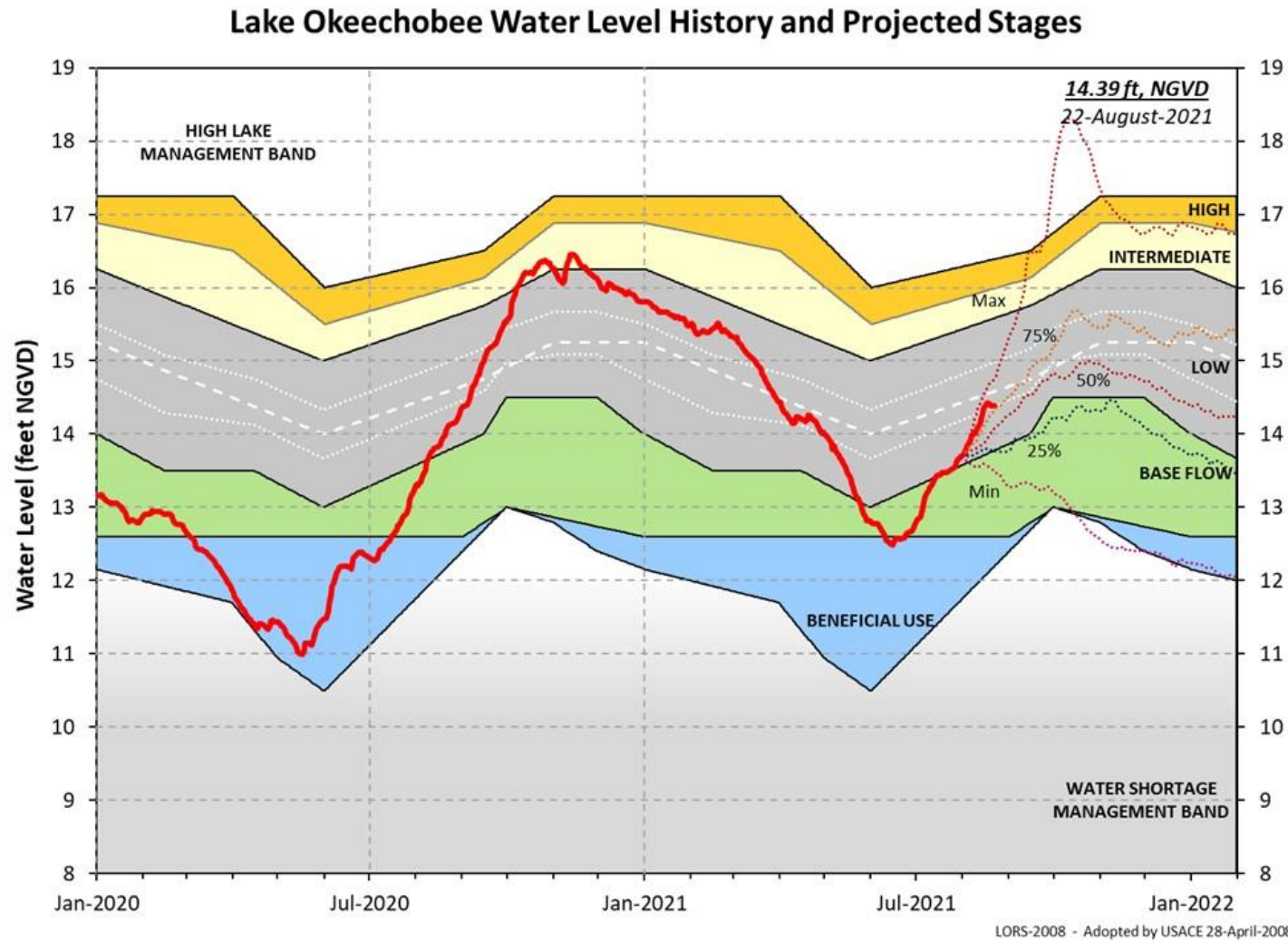


Figure LO-3. Recent Lake Okeechobee stages and releases, with projected stages based on a dynamic position analysis.

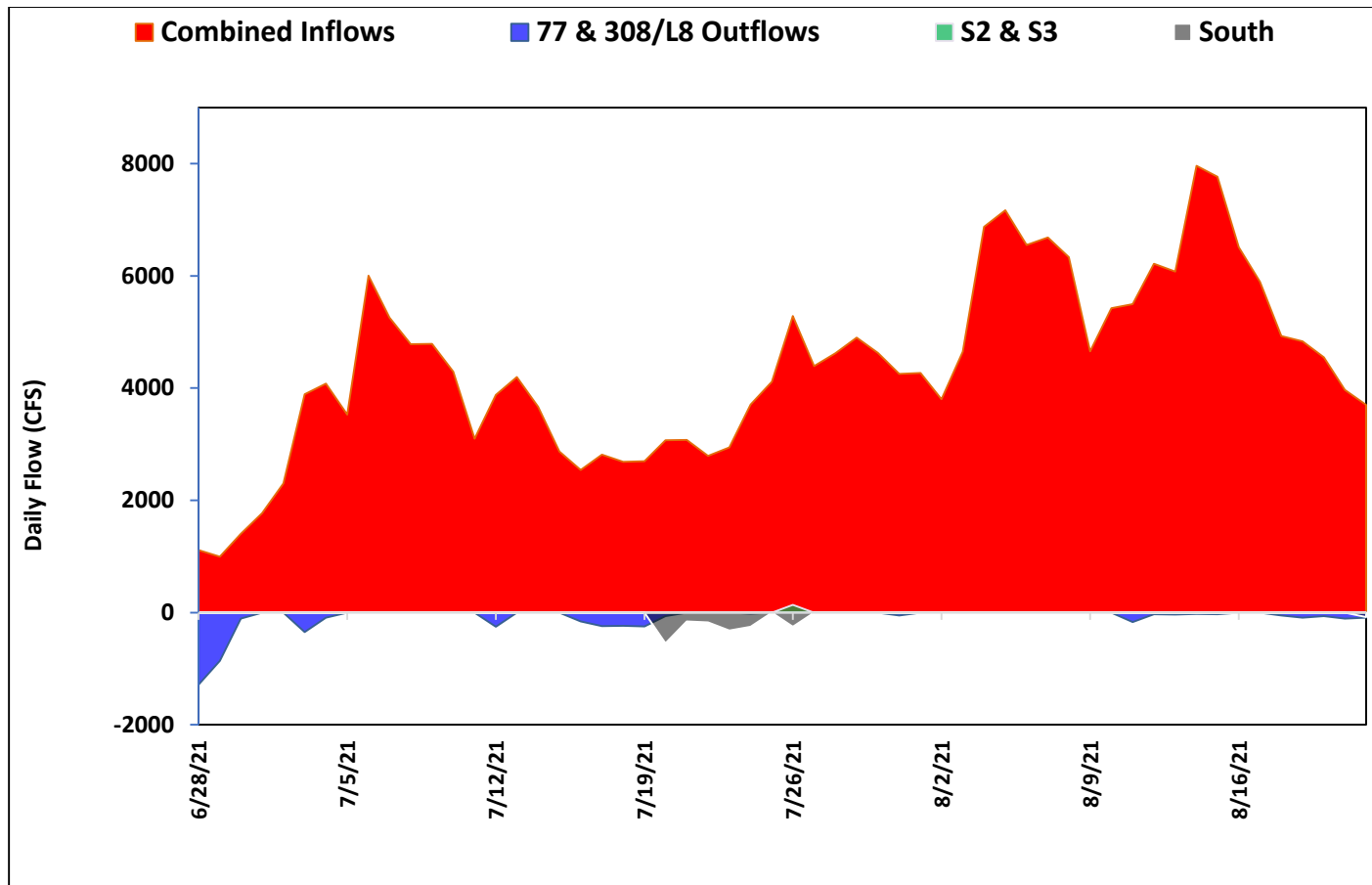


Figure LO-4. Major inflows (red) to and outflows east and west (blue) from Lake Okeechobee. Outflows south are shown in green. Flows into Lake Okeechobee from the L-8 canal through S-271 (formerly Culvert 10A) or from the C-44 canal through the S-308 are included as inflows. Conversely, flows from Lake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

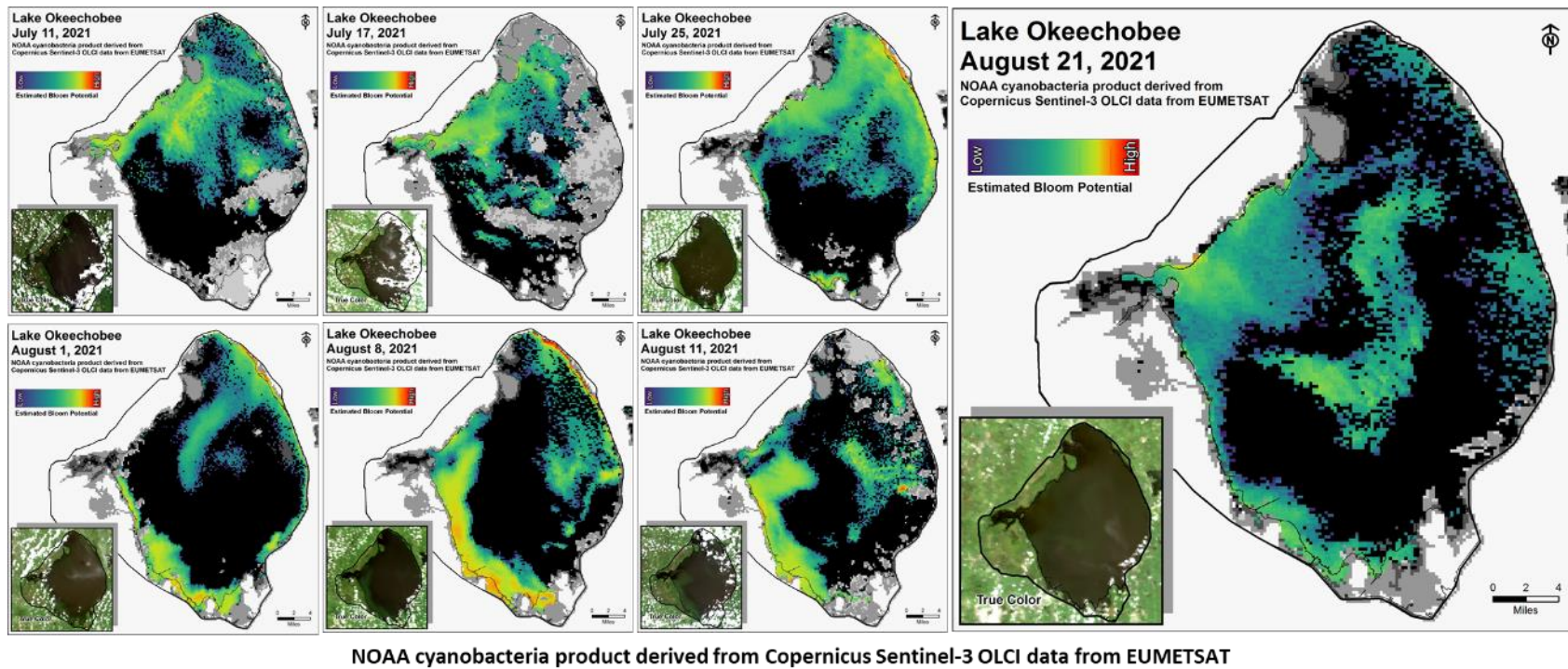


Figure LO-5. Cyanobacteria bloom potential based on NOAA’s harmful algal bloom monitoring system. Gray color indicates cloud cover.

Table LO-2. Provisional results of chlorophyll *a* concentrations and cyanobacteria taxa from sampling trips on August 2-4, 2021. Color coding generally follows the legend in **Figure LO-6**.

Collection Date: August 2-4, 2021

| Station | CHLa (ug/L) | TOXIN (ug/L) | TAXA |
|------------------|--------------|--------------|-----------------|
| FEBIN | 3.3 | BDL | <i>mixed</i> |
| FEBOUT | 19.0 | 0.3 | <i>Microcys</i> |
| KISSR0.0 | 28.0 | BDL | <i>mixed</i> |
| L005 | 13.8 | BDL | <i>mixed</i> |
| LZ2 | 50.5 | BDL | <i>mixed</i> |
| KBARSE | 25.0 | BDL | <i>Microcys</i> |
| RITTAE2 | 114.0 | BDL | <i>mixed</i> |
| PELBAY3 | 24.4 | BDL | <i>Microcys</i> |
| POLE3S | 137.0 | BDL | <i>Dolichos</i> |
| LZ25A | 140.0 | BDL | <i>mixed</i> |
| PALMOUT | 69.1 | BDL | <i>mixed</i> |
| PALMOUT1 | 86.9 | BDL | <i>Microcys</i> |
| PALMOUT2 | 6.5 | BDL | <i>mixed</i> |
| PALMOUT3 | 4.1 | BDL | <i>Microcys</i> |
| POLESOUT | 20.6 | BDL | <i>Microcys</i> |
| POLESOUT1 | 10.6 | BDL | NS |
| POLESOUT2 | 19.5 | BDL | <i>mixed</i> |
| POLESOUT3 | 13.7 | BDL | <i>Microcys</i> |
| EASTSHORE | 28.9 | 2.0 | <i>Microcys</i> |
| NES135 | 42.0 | 13.0 | <i>Microcys</i> |
| NES191 | 48.8 | 2.2 | <i>Microcys</i> |

| Station | CHLa (ug/L) | TOXIN (ug/L) | TAXA |
|----------------|-------------|--------------|-----------------|
| L001 | 36.1 | BDL | <i>mixed</i> |
| L004 | 15.9 | 1.1 | <i>Microcys</i> |
| L006 | 3.6 | BDL | <i>mixed</i> |
| L007 | 26.0 | BDL | <i>mixed</i> |
| L008 | 8.2 | BDL | <i>mixed</i> |
| LZ30 | 3.6 | BDL | <i>mixed</i> |
| LZ40 | 8.9 | BDL | <i>Microcys</i> |
| CLV10A | 18.0 | 0.4 | <i>Microcys</i> |
| NCENTER | 44.5 | BDL | <i>Microcys</i> |

| | | | |
|-------|---|------------|-----------------|
| S308C | P | 0.6 | <i>Microcys</i> |
| S77 | P | BDL | <i>mixed</i> |

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

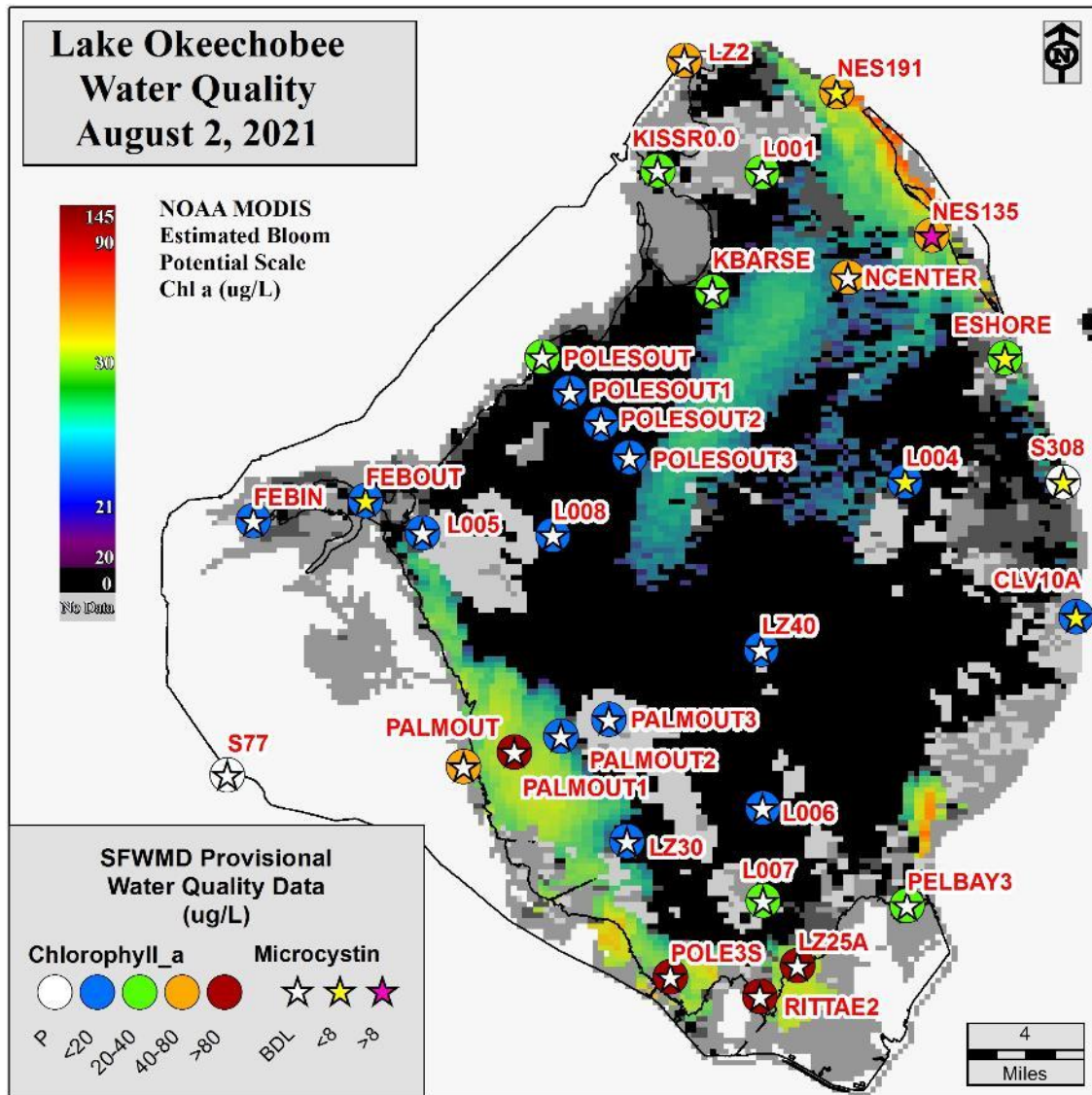


Figure LO-6. Expanded monitoring network and provisional results from samples collected August 2-4, 2021

Estuaries

St. Lucie Estuary

Over the past week, mean total inflow to the St. Lucie Estuary was approximately 1,300 cfs (**Figures ES-1 and ES-2**) and the previous 30-day mean inflow was approximately 1,710 cfs. For comparison, the historical provisional mean inflows from the contributing areas are shown in **Figure ES-2**.

Over the past week, surface salinities decreased at all sites throughout 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 6.9. Salinity conditions in the middle estuary were estimated to be within the fair range for adult eastern oysters (**Figure ES-4**).

Caloosahatchee River Estuary

Over the past week, mean total inflow to the Caloosahatchee River Estuary was approximately 3,960 cfs (**Figures ES-5 and ES-6**) and the previous 30-day mean inflow was approximately 4,270 cfs. For comparison, the historical provisional mean inflows from the contributing areas are shown in **Figure ES-6**.

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

Surface salinity at Val I-75 was forecasted for the next two weeks, using an autoregression model (Qiu and Wan, 2013¹) coupled with a linear reservoir model for the tidal basin. Model scenarios included pulse releases at S-79 ranging from 0 to 1500 cfs and a steady release at 2,000 cfs with estimated tidal basin inflows of 707 cfs. Model results from all scenarios predict daily salinity to be 0.8 or lower and the 30-day moving average surface salinity to be 0.3 at Val I-75 at the end of the two-week period (**Table ES-3 and Figure ES-10**). This keeps predicted salinities at Val I-75 within the LORS 2008 salinity range (0.0-5.0).

Red Tide

The Florida Fish and Wildlife Research Institute reported on August 20, 2021, that *Karenia brevis*, the Florida red tide dinoflagellate, was observed at medium to high concentrations in or offshore of Charlotte County, and background to medium

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

concentrations in or offshore of Lee County. 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 Very Wet. The LORS2008 release guidance suggests up to 450 cfs release at S-79 to the Caloosahatchee River Estuary and up to 200 cfs release at S-80 to the St. Lucie Estuary.

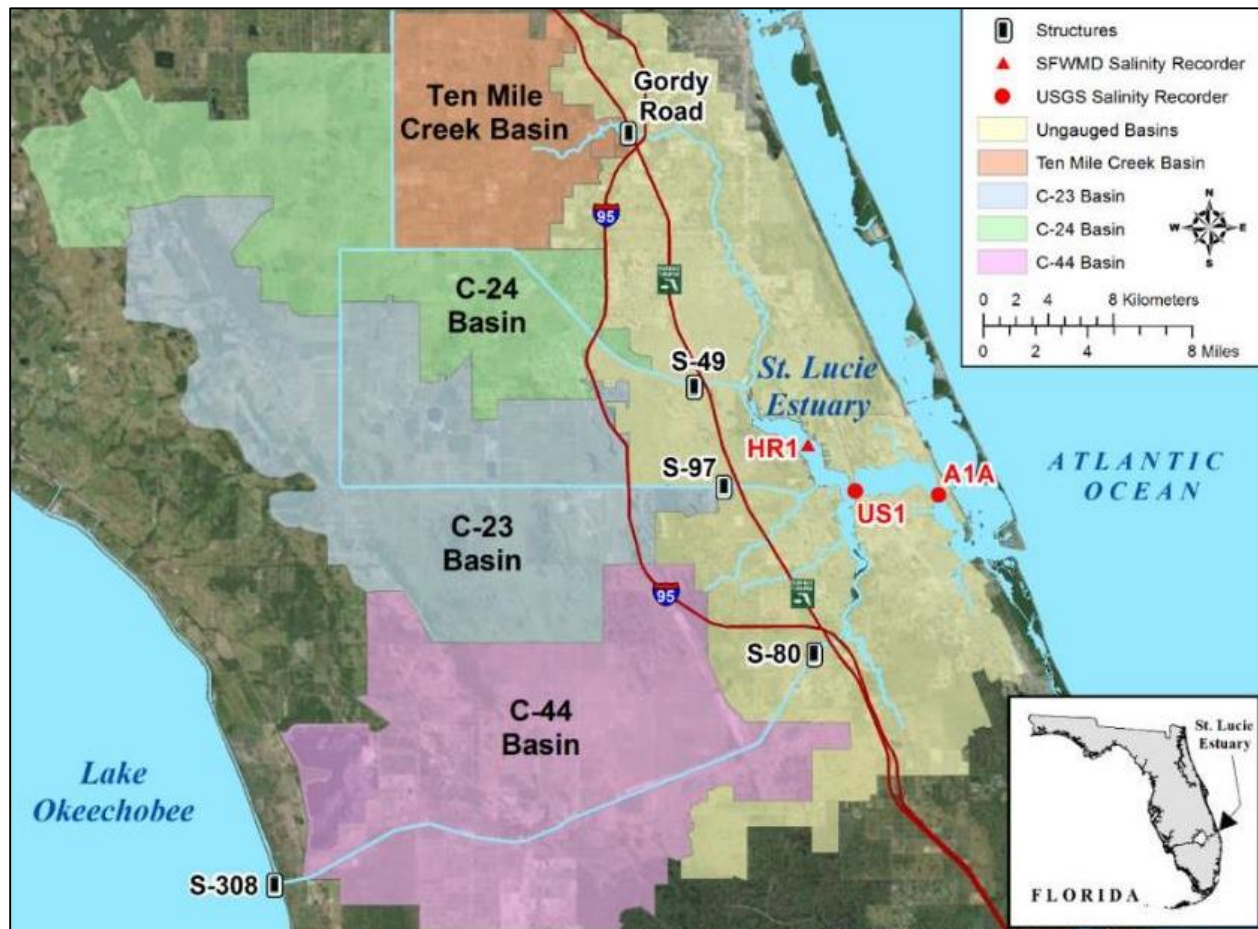


Figure ES-1. Basins, water control structures and salinity monitoring sites in the St. Lucie Estuary.

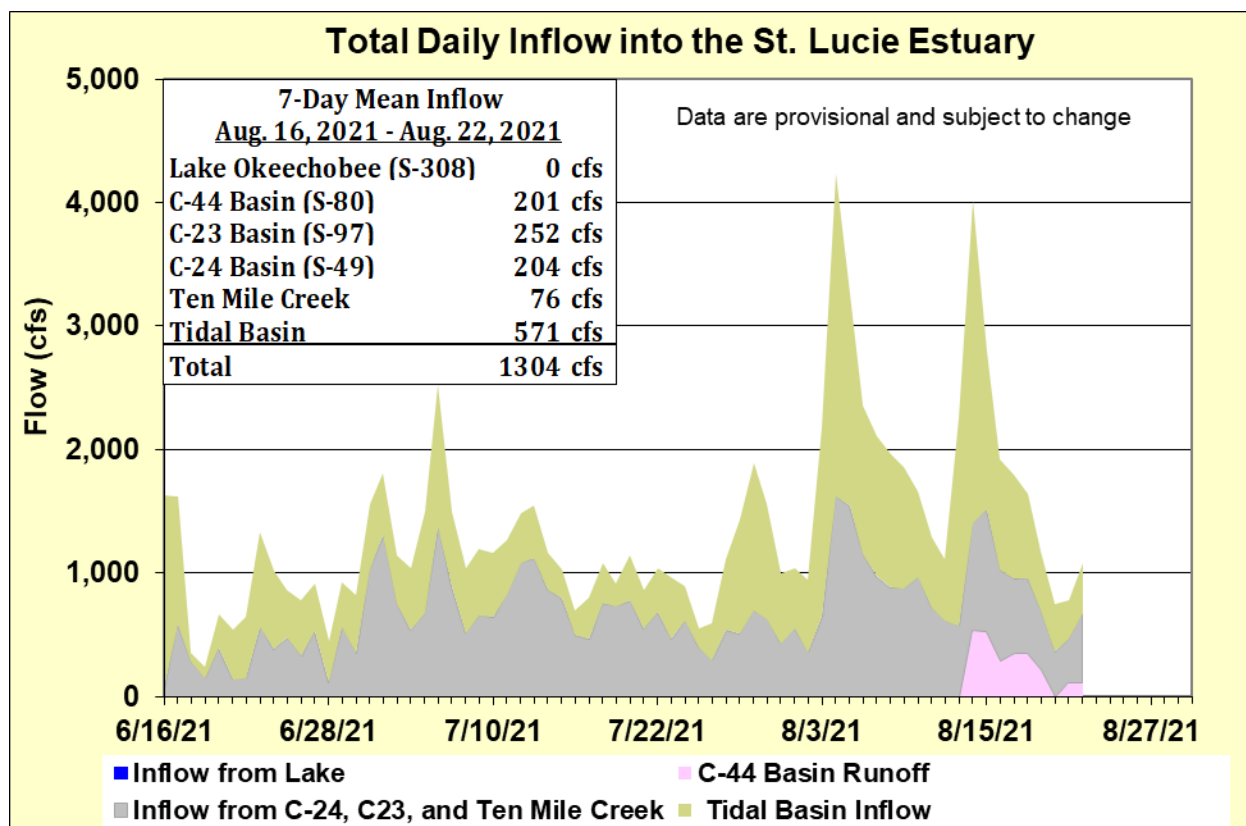


Figure ES-2. Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and Tidal Basins into the St. Lucie Estuary.

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

| Sampling Site | Surface | Bottom | Envelope |
|------------------|--------------------|--------------------|-----------------|
| HR1 (North Fork) | 1.3 (2.1) | 2.7 (5.2) | NA ^a |
| US1 Bridge | 5.9 (7.5) | 8.0 (8.7) | 10.0 – 26.0 |
| A1A Bridge | 15.1 (17.3) | 22.3 (22.3) | NA ^a |

a. The envelope is not applicable.

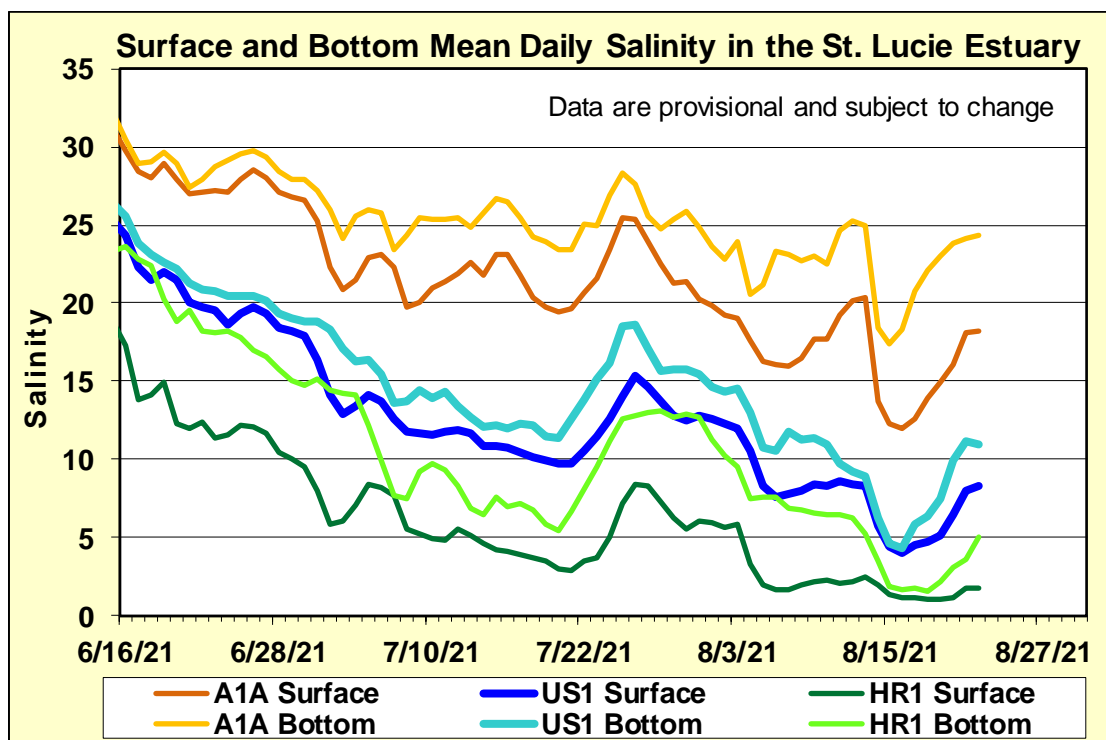


Figure ES-3. Mean daily salinity at the A1A, US1 and HR1 sites in the St. Lucie Estuary.

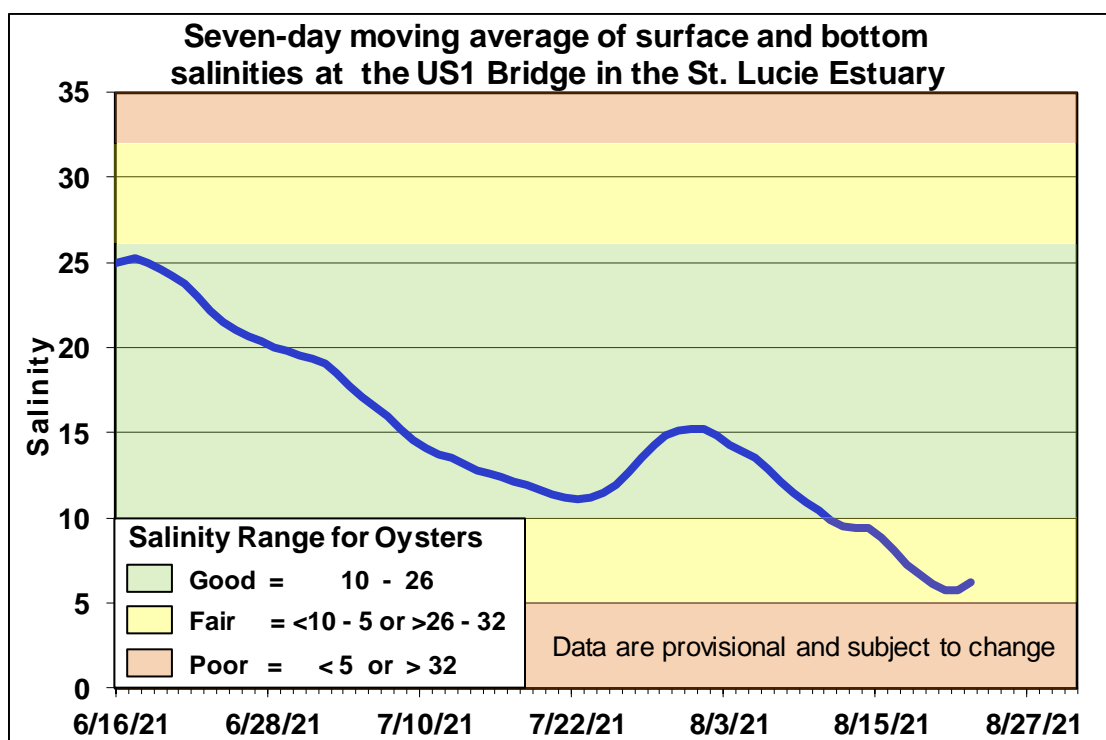


Figure ES-4. Seven-day moving average of the surface and bottom salinities at the US1 Bridge in the St. Lucie Estuary.

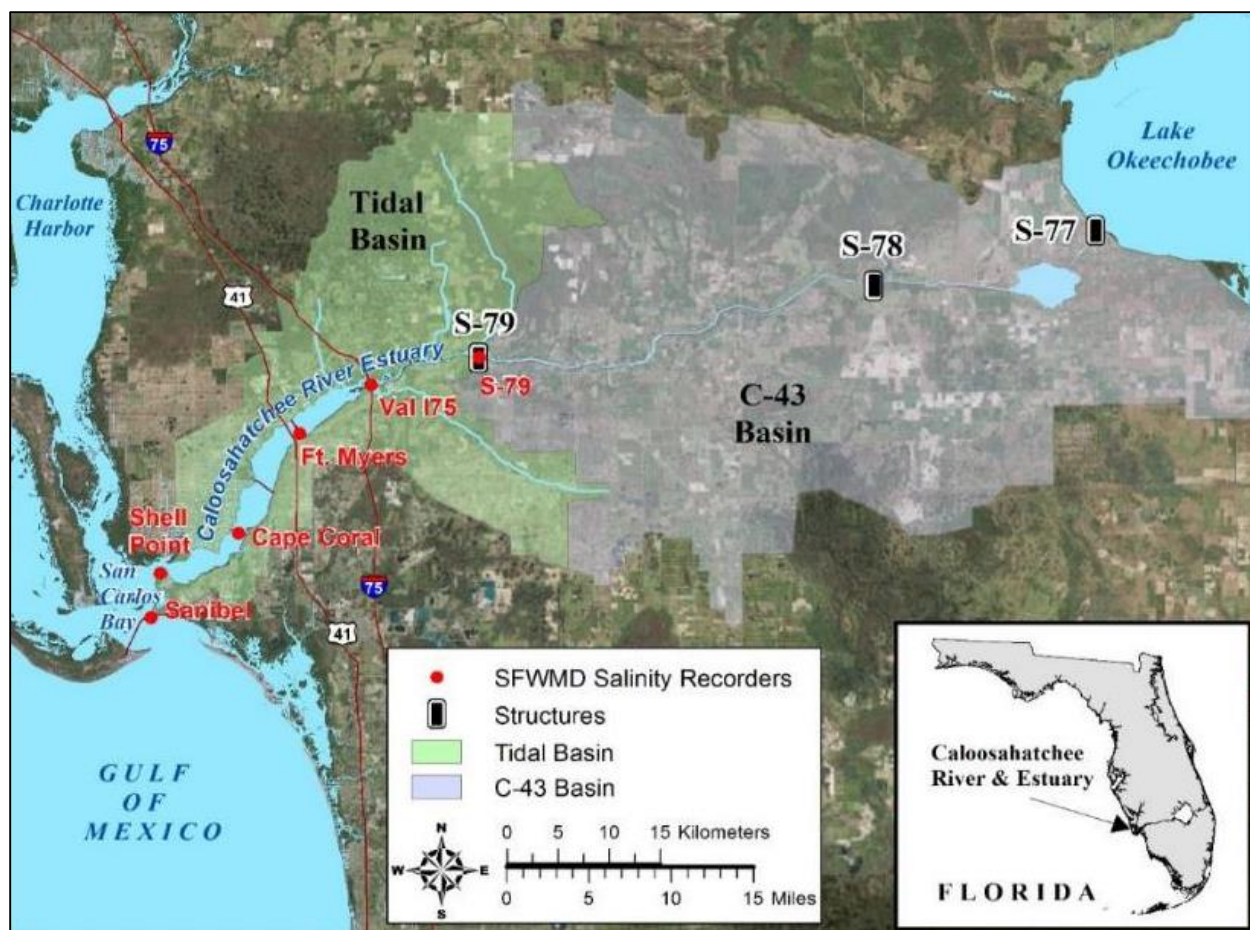


Figure ES-5. Basins, water control structures and salinity monitoring sites in the Caloosahatchee River Estuary.

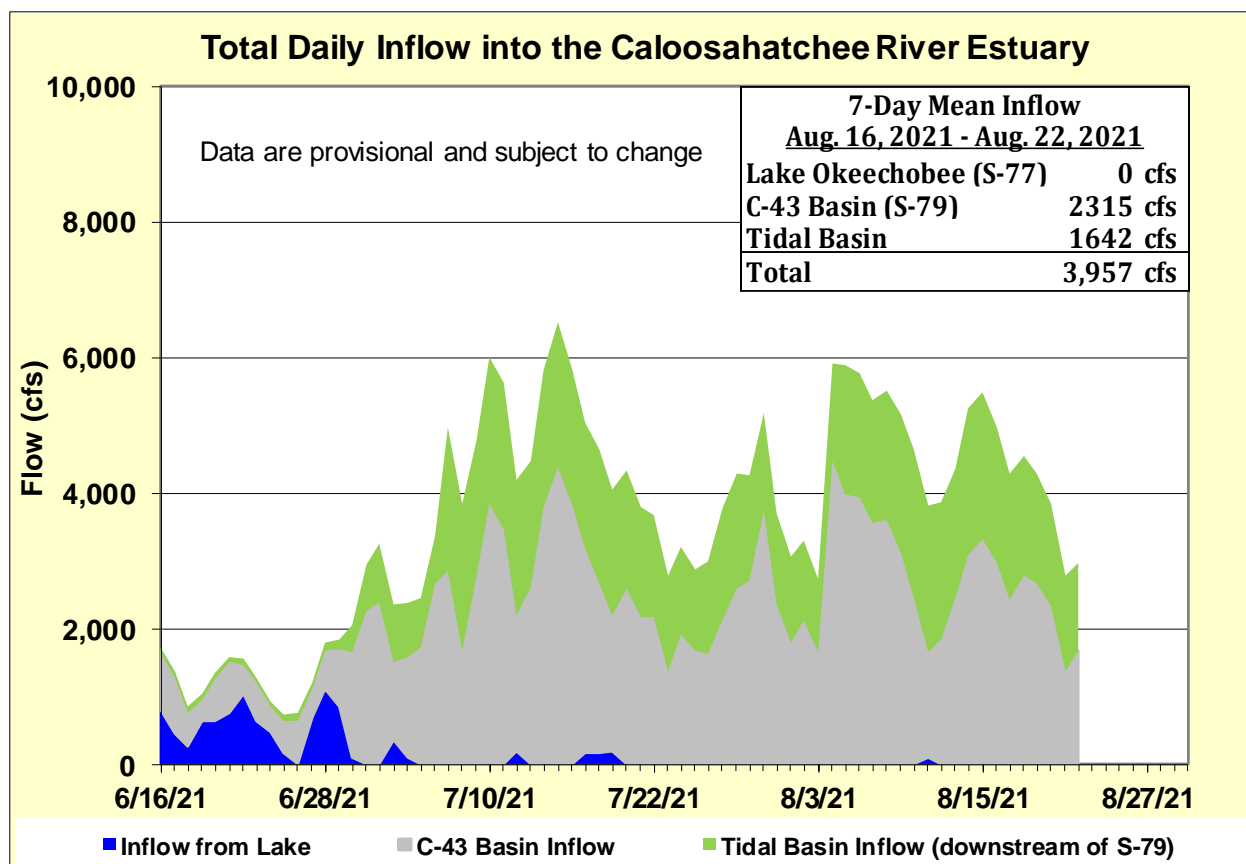


Figure ES-6. Total daily inflows from Lake Okeechobee, and runoff from the C-43 and Tidal basins into the Caloosahatchee River Estuary.

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

| Sampling Site | Surface | Bottom | Envelope |
|------------------------|--------------------|--------------------|------------------------|
| S-79 (Franklin Lock) | 0.3 (0.2) | 0.3 (0.2) | NA ^a |
| Val I-75 | 0.2 (0.2) | 0.2 (0.2) | 0.0 – 5.0 ^b |
| Fort Myers Yacht Basin | 0.2 (0.3) | 0.3 (0.4) | NA ^a |
| Cape Coral | 3.4 (2.1) | 4.9 (3.1) | 10.0 – 30.0 |
| Shell Point | 17.7 (14.9) | 20.6 (17.2) | 10.0 – 30.0 |
| Sanibel | 20.2 (23.8) | 22.7 (26.2) | 10.0 – 30.0 |

a. The envelope is not applicable.

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

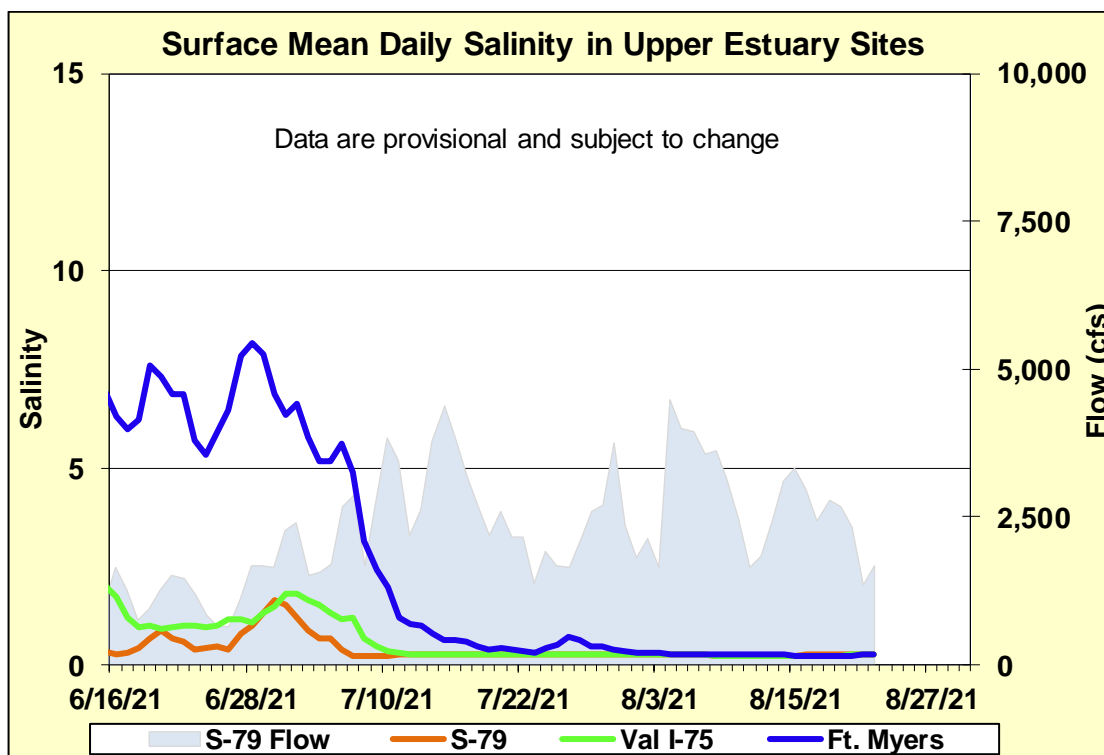


Figure ES-7. Mean daily salinity at upper Caloosahatchee River Estuary monitoring sites and mean daily flow at S-79.

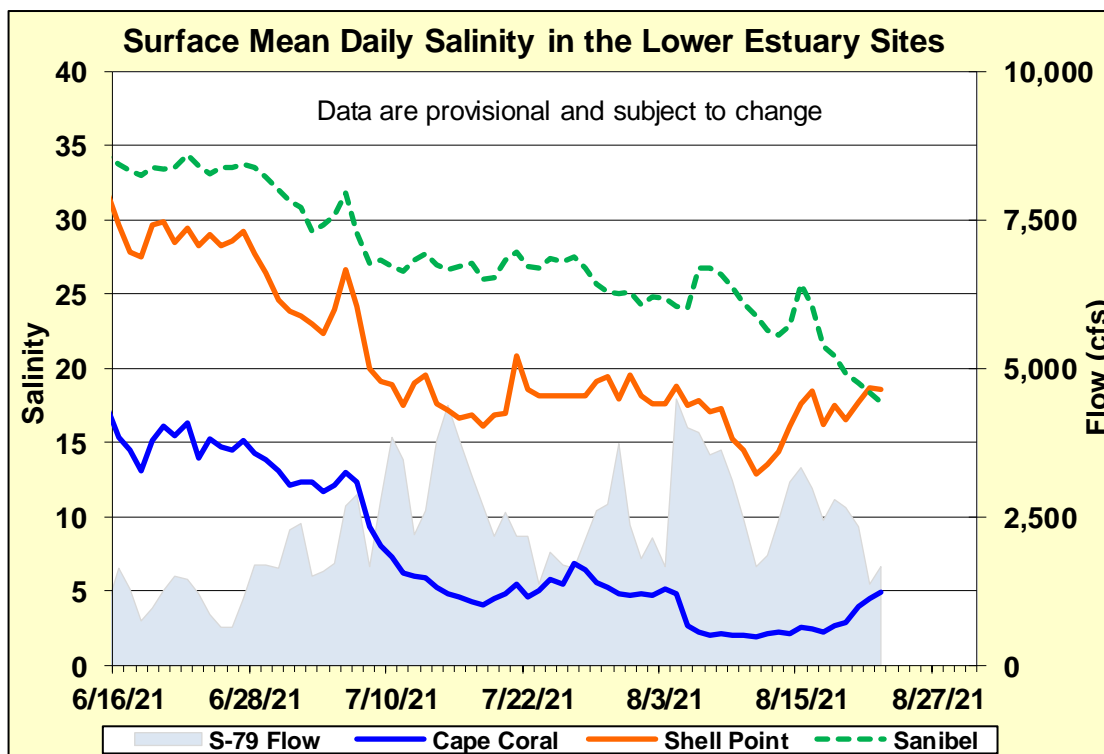


Figure ES-8. Mean daily surface salinity at lower Caloosahatchee River Estuary monitoring sites and mean daily flow at S-79.

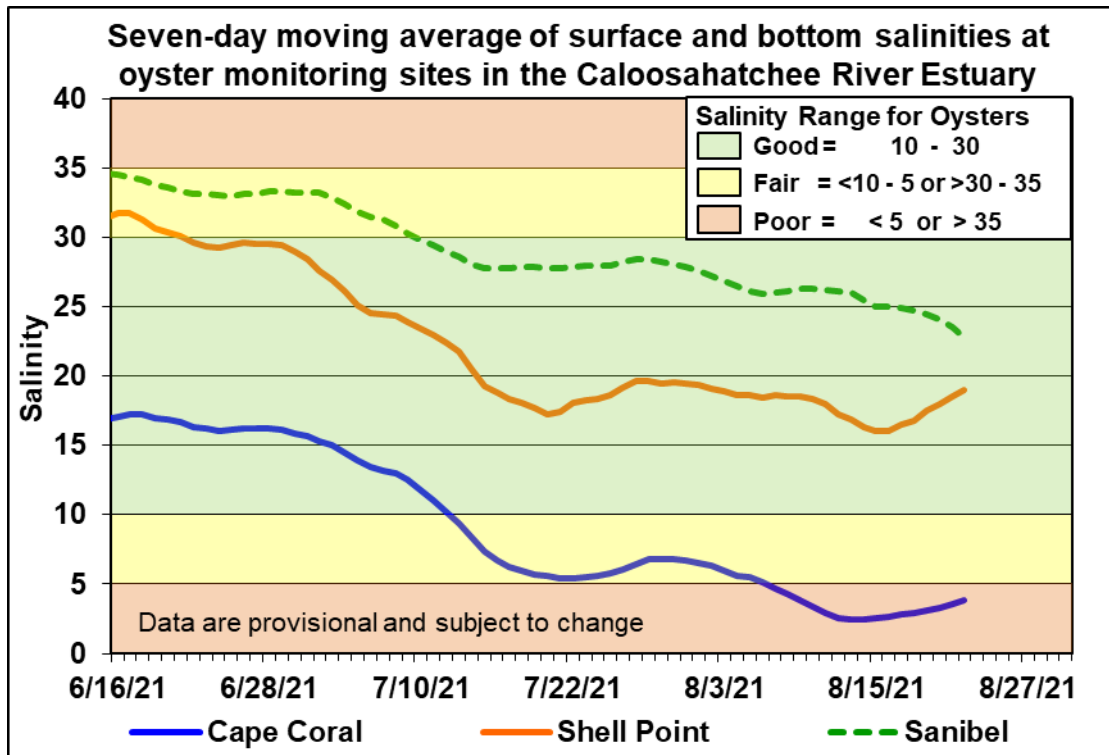


Figure ES-9. Seven-day moving average of surface and bottom salinities at Cape Coral, Shell Point and Sanibel monitoring sites in the Caloosahatchee River Estuary.

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

| Scenario | Simulated S-79 Flow (cfs) | Tidal Basin Runoff (cfs) | Daily Salinity | 30-Day Mean Salinity |
|----------|---------------------------|--------------------------|----------------|----------------------|
| A | 0 | 707 | 0.8 | 0.3 |
| B | 450 | 707 | 0.4 | 0.3 |
| C | 800 | 707 | 0.3 | 0.3 |
| D | 1000 | 707 | 0.3 | 0.3 |
| E | 1500 | 707 | 0.3 | 0.3 |
| F | 2000 | 707 | 0.3 | 0.3 |

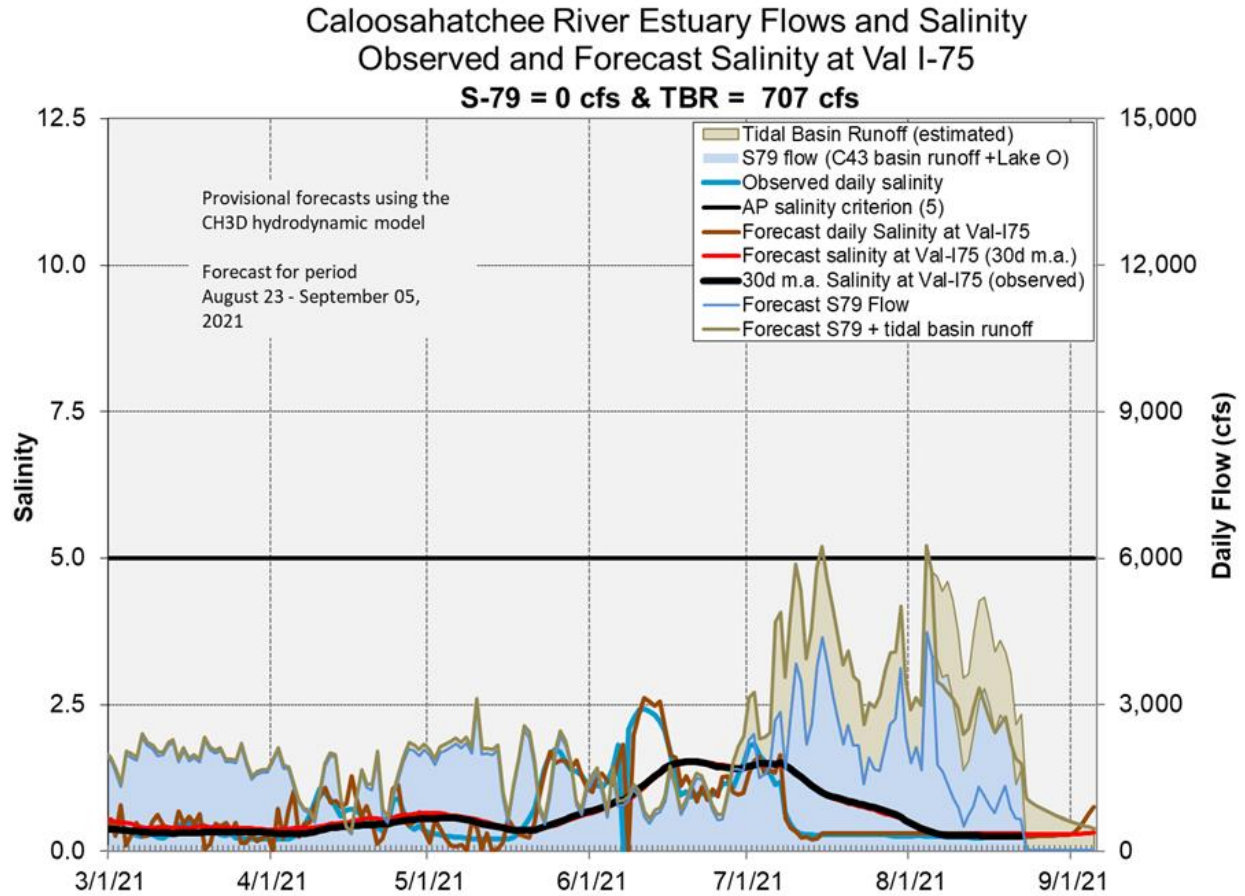


Figure ES-10. Forecasted Val I-75 site surface salinity assuming no pulse release at S-79.

Stormwater Treatment Areas

STA-1E: STA-1E Western Flow-way is offline for the Restoration Strategies project to fill and grade Cells 5 and 7. Operational restrictions are in place in STA-1E Central Flow-way for vegetation management activities. Online treatment cells are at or above target stage, vegetation in these cells is stressed and highly stressed and the 365-day phosphorus loading rates (PLR) for these flow-ways are very high (**Figure S-1**).

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

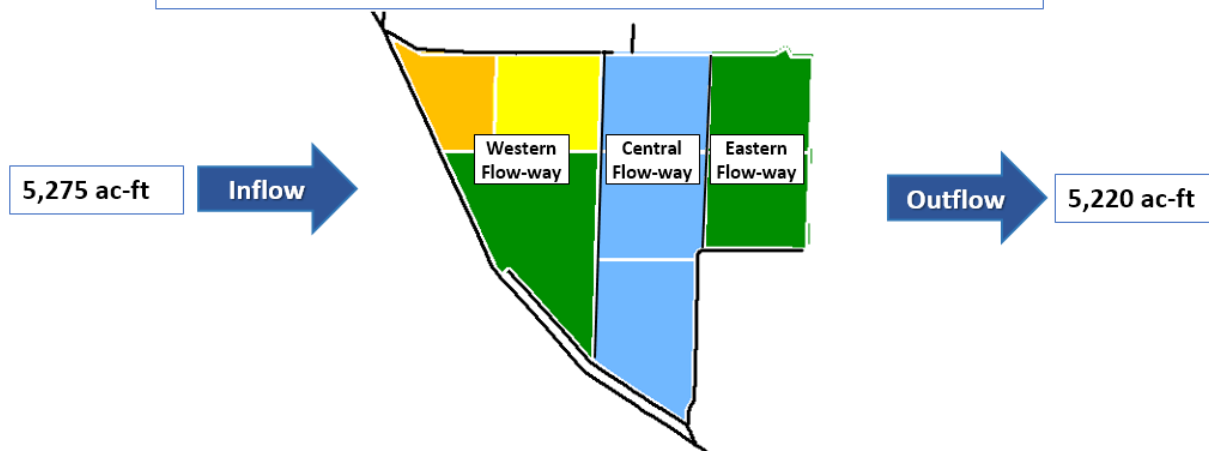
STA-2: Operational restrictions are in place in STA-2 Flow-ways 3 and 4 for vegetation management activities and in Flow-way 2 for construction activities. Most treatment cells are at or above target stage. Vegetation in Flow-ways 1 and 3 is stressed, and in Flow-ways 2, 4 and 5 is highly stressed. The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

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

STA-5/6: Operational restrictions are in place in STA-5/6 Flow-ways 2 and 3 following the Restoration Strategies project to grade non-effective treatment areas. Most treatment cells are at or above target stage. The 365-day PLRs for most flow-ways are above 1.0 g/m²/year. All treatment cells have highly stressed vegetation conditions except Flow-ways 7 and 8 which are healthy (**Figure S-5** and **S-6**).

For definitions on STA operational language see glossary following figures.

STA-1E Weekly Status Report – 8/16/2021 through 8/22/2021





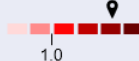

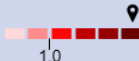
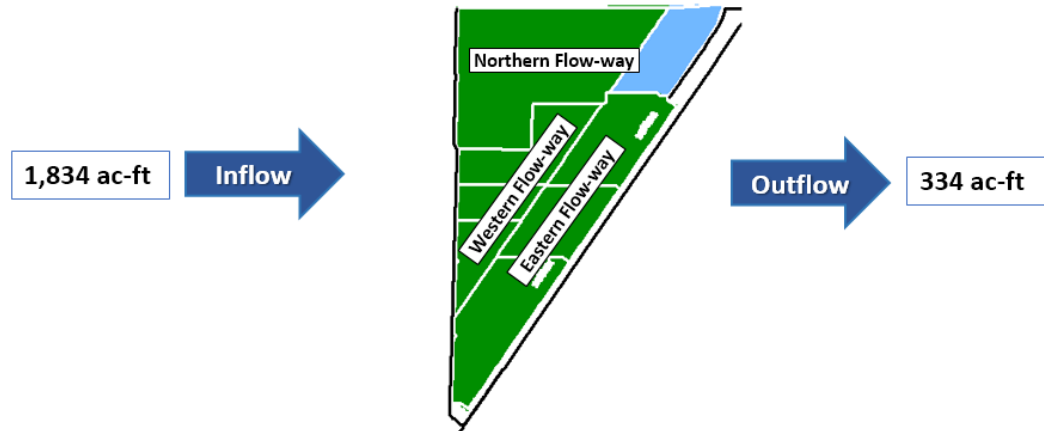
| STA-1E Flow-Way Status | | | | As of 8/22/2021 | | | | STA-1E Flow & Phosphorus Concentration | | | |
|------------------------|---|---|---------------------------------|--|--|--|--|--|-------|--------|---------|
| Flow-Way | Vegetation Status <small>Healthy ----- Stressed</small>  | 365-day P Loading Rate <small>(below 1.0 g P /m²/yr is optimal)</small> | Online / Offline / Restrictions | Stage Based: Relative to Target Stage (TS) | | | | | 7-day | 28-day | 365-day |
| | | | | <div><div></div> Deep Water Level (> 2.8' above TS)</div> <div><div></div> High Water Level (1.5' – 2.8' above TS)</div> <div><div></div> 0.2' – 1.5' above TS</div> <div><div></div> Target Stage (TS +/- 0.2')</div> <div><div></div> Low Water Level (<0.2' below TS)</div> | | | | | | | |
| Eastern |  |  | Online | Depth / Area Based: Percent of Area Dry | | | | Total Inflow, ac-ft | 5,275 | 36,633 | 281,487 |
| Central |  |  | Vegetation Rehab | <div><div></div> 0-25% Dry</div> <div><div></div> 25-50% Dry</div> | <div><div></div> 50-75% Dry</div> <div><div></div> 75-100% Dry</div> | | | --Lake Inflow, ac-ft | 0 | N/A | 26,200 |
| Western | Offline, construction activities starting 11/01/2019 | | | | | | | Total Outflow, ac-ft | 5,220 | 32,554 | 240,810 |
| | | | | | | | | Inflow Conc., ppb | 78 | 92 | 140 |
| | | | | | | | | Outflow Conc., ppb | 18 | 17 | 42 |
| | | | | | | | | Includes Preliminary Data | | | |

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

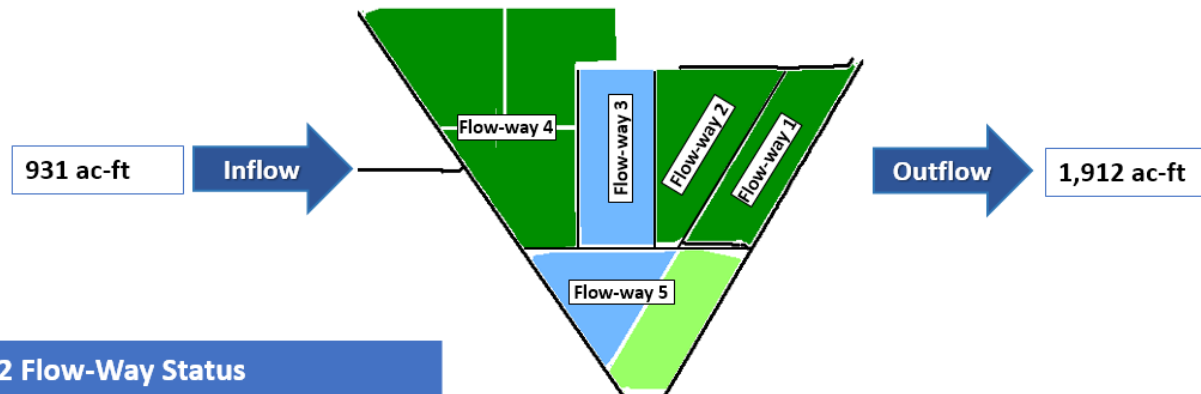
STA-1W Weekly Status Report – 8/16/2021 through 8/22/2021



| STA-1W Flow-Way Status | | | | STA-1W Flow & Phosphorus Concentration | | | |
|------------------------|---|--|---------------------------------|--|-------------|---------|--|
| Flow-Way | Vegetation Status Healthy --- Stressed | 365-day P Loading Rate (below 1.0 g P /m ² /yr is optimal) | Online / Offline / Restrictions | As of 8/22/2021 | | | |
| | | | | Stage Based: Relative to Target Stage (TS) | | | |
| | | | | Deep Water Level (> 2.8' above TS) | | | |
| | | | | High Water Level (1.5' – 2.8' above TS) | | | |
| | | | | 0.2' – 1.5' above TS | | | |
| | | | | Target Stage (TS +/- 0.2') | | | |
| | | | | Low Water Level (<0.2' below TS) | | | |
| | | | | Depth / Area Based: Percent of Area Dry | | | |
| | | | | 0-25% Dry | 50-75% Dry | | |
| | | | | 25-50% Dry | 75-100% Dry | | |
| Northern | ← → | 1.0 | Construction | | | | |
| Western | ← → | 1.0 | Construction | | | | |
| Eastern | ← → | 1.0 | Construction | | | | |
| | | | | 7-day | 28-day | 365-day | |
| Total Inflow, ac-ft | | | | 1,834 | 14,280 | 121,737 | |
| --Lake Inflow, ac-ft | | | | 0 | N/A | 7,700 | |
| Total Outflow, ac-ft | | | | 334 | 18,088 | 136,557 | |
| Inflow Conc., ppb | | | | 163 | 160 | 249 | |
| Outflow Conc., ppb | | | | 30 | 21 | 40 | |
| | | | | Includes Preliminary Data | | | |

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

STA-2 Weekly Status Report – 8/16/2021 through 8/22/2021



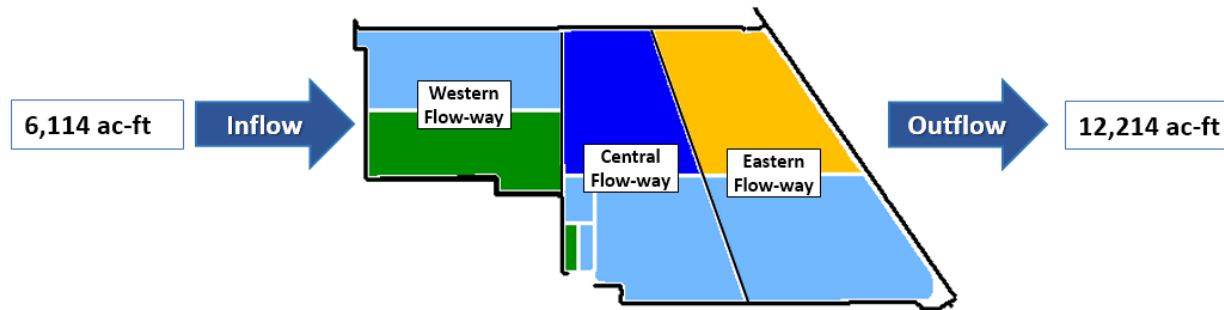
| STA-2 Flow-Way Status | | | |
|-----------------------|---|--|---------------------------------|
| Flow-Way | Vegetation Status Healthy ----- Stressed | 365-day P Loading Rate (below 1.0 g P /m ² /yr is optimal) | Online / Offline / Restrictions |
| 1 | | | Online |
| 2 | | | Construction |
| 3 | |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

| As of 8/22/2021 | |
|--|---|
| Stage Based: Relative to Target Stage (TS) | |
| | Deep Water Level (> 2.8' above TS) |
| | High Water Level (1.5' – 2.8' above TS) |
| | 0.2' – 1.5' above TS |
| | Target Stage (TS +/- 0.2') |
| | Low Water Level (<0.2' below TS) |
| Depth / Area Based: Percent of Area Dry | |
| | 0-25% Dry |
| | 25-50% Dry |
| | 50-75% Dry |
| | 75-100% Dry |

| STA-2 Flow & Phosphorus Concentration | | | |
|---------------------------------------|-------|--------|---------|
| | 7-day | 28-day | 365-day |
| Total Inflow, ac-ft | 931 | 33,779 | 414,321 |
| --Lake Inflow, ac-ft | 0 | N/A | 90,800 |
| Total Outflow, ac-ft | 1,912 | 44,995 | 465,787 |
| Inflow Conc., ppb | 71 | 100 | 93 |
| Outflow Conc., ppb | 15 | 16 | 20 |
| Includes Preliminary Data | | | |

Figure S-3. STA-2 Weekly Status Report

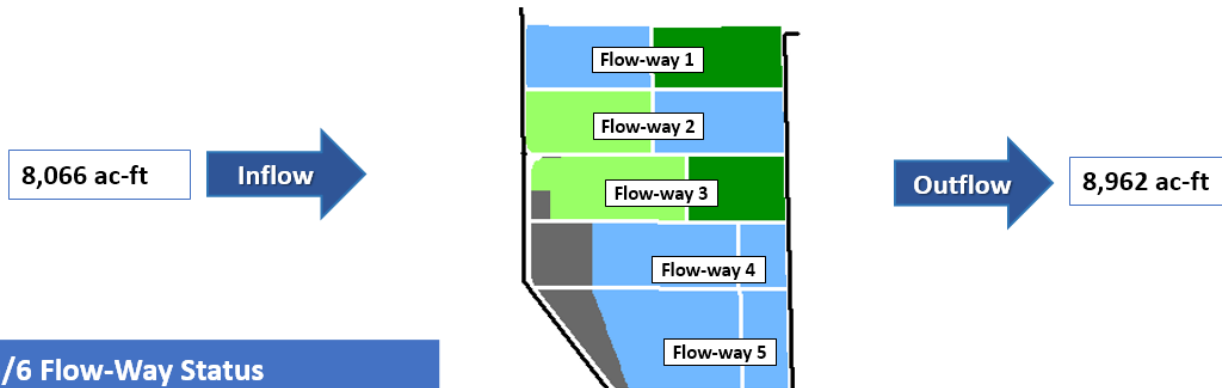
STA-3/4 Weekly Status Report – 8/16/2021 through 8/22/2021



| STA-3/4 Flow-Way Status | | | | STA-3/4 Flow & Phosphorus Concentration | | | |
|-------------------------|--|--|---------------------------------|--|-------------|--|--|
| Flow-Way | Vegetation Status Healthy ----- Stressed ←-----→ | 365-day P Loading Rate (below 1.0 g P /m ² /yr is optimal) | Online / Offline / Restrictions | As of 8/22/2021 | | | |
| | | | | Stage Based: Relative to Target Stage (TS) | | | |
| Eastern | Offline, vegetation management drawdown as of 3/1/2021 | | | Deep Water Level (> 2.8' above TS) High Water Level (1.5' – 2.8' above TS) 0.2' – 1.5' above TS Target Stage (TS +/- 0.2') Low Water Level (<0.2' below TS) | | | |
| | | | | Depth / Area Based: Percent of Area Dry | | | |
| Central | ←-----→ | 1.0 | Online | 0-25% Dry | 50-75% Dry | | |
| Western | ←-----→ | 1.0 | Online | 25-50% Dry | 75-100% Dry | | |
| | | | | 7-day 28-day 365-day Total Inflow, ac-ft 6,114 75,393 540,729 --Lake Inflow, ac-ft 0 N/A 61,200 Total Outflow, ac-ft 12,214 69,619 502,121 Inflow Conc., ppb 67 65 64 Outflow Conc., ppb 12 15 14 Includes Preliminary Data | | | |

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

STA-5/6 Weekly Status Report – 8/16/2021 through 8/22/2021



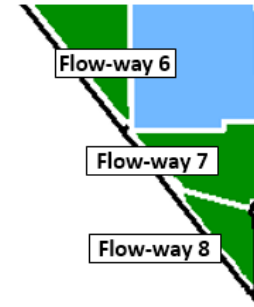
| STA-5/6 Flow-Way Status | | | |
|-------------------------|--|---|---------------------------------|
| Flow-Way | Vegetation Status Healthy ----- Stressed ←-----→ | 365-day P Loading Rate (below 1.0 g P / m ² /yr is optimal) | Online / Offline / Restrictions |
| 1 | ←-----→ | | Online |
| 2 | ←-----→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

| As of 8/22/2021 | |
|--|---|
| Stage Based: Relative to Target Stage (TS) | |
| | Deep Water Level (> 2.8' above TS) |
| | High Water Level (1.5' – 2.8' above TS) |
| | 0.2' – 1.5' above TS |
| | Target Stage (TS +/- 0.2') |
| | Low Water Level (<0.2' below TS) |
| Depth / Area Based: Percent of Area Dry | |
| | 0-25% Dry |
| | 25-50% Dry |
| | 50-75% Dry |
| | 75-100% Dry |

| STA-5/6 Flow & Phosphorus Concentration | | | |
|---|-------|--------|---------|
| | 7-day | 28-day | 365-day |
| Total Inflow, ac-ft | 8,066 | 36,015 | 145,420 |
| --Lake Inflow, ac-ft | 0 | N/A | 9,000 |
| Total Outflow, ac-ft | 8,962 | 36,298 | 162,022 |
| Inflow Conc., ppb | 326 | 306 | 294 |
| Outflow Conc., ppb | 69 | 52 | 72 |
| Includes Preliminary Data | | | |

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

STA-5/6 Weekly Status Report – 8/16/2021 through 8/22/2021
















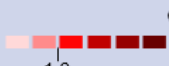


| STA-5/6 Flow-Way Status | | | | As of 8/22/2021 | |
|-------------------------|--|---|---------------------------------|--|---|
| Flow-Way | Vegetation Status Healthy ----- Stressed  | 365-day P Loading Rate (below 1.0 g P /m²/yr is optimal) | Online / Offline / Restrictions | Stage Based: Relative to Target Stage (TS) | |
| | | | |  Deep Water Level (> 2.8' above TS) |  High Water Level (1.5' – 2.8' above TS) |
| | | | |  0.2' – 1.5' above TS |  Target Stage (TS +/- 0.2') |
| | | | |  Low Water Level (<0.2' below TS) | |
| | | | | Depth / Area Based: Percent of Area Dry | |
| | | | |  0-25% Dry |  50-75% Dry |
| | | | |  25-50% Dry |  75-100% Dry |
| 6 |  |  | Online | | |
| 7 |  |  | Online | | |
| 8 |  |  | Online | | |

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

Basic Concepts and Definitions for STA Weekly Status Report

- **Inflow:** Sum of flow volume at all inflow structures to an STA.
- **Lake Inflow:** Portion of the STA total inflow volume that originates from Lake Okeechobee.
- **Outflow:** Sum of flow volume at outflow structures from an STA.
- **Total Phosphorus (TP):** Total mass of phosphorus in all its forms; including particulate, dissolved, etc.
- **Inflow Concentration:** TP concentration is the mass of TP in micrograms per liter of water, $\mu\text{g/L}$ or ppb. Inflow concentration refers to the flow-weighted mean TP from all inflow structures over a period of time.
- **Outflow Concentration:** The flow-weighted mean TP from all outflow structures over a period of time. The outflow concentration represents the reduction of inflow TP achieved by STA treatment of the inflow water.
- **WQBEL:** The STA outflow concentration that is required upon completion of the Restoration Strategies projects by December 2025. The outflow concentration shall not exceed 13 ppb as an annual flow weighted mean in more than 3 out of 5 water years on a rolling basis and shall not exceed 19 ppb as an annual flow weighted in any water year.
- **Flow-Way (FW):** One or more treatment cells connected in series. Cells typically have emergent aquatic vegetation (EAV) in the front portion of the flow-way followed by a mix of EAV and submerged aquatic vegetation (SAV)
- **Vegetation Status:** Healthy means the vegetation condition is good and will allow the STA to perform as designed. Stressed means the vegetation is showing signs of poor health, such as browning or areas of vegetation die-off, or the cell contains undesirable vegetation such as floating exotic vegetation requiring treatment. The TP reduction capability of the STA is affected when the vegetation condition is poor.
- **Phosphorus Loading Rate (PLR):** Mass of inflow TP in grams, divided by total treatment area of STA in square meters, per year. In general, a 365-day value of less than 1.0 is needed for an STA to perform optimally. A PLR of 2.0 is considered very high and a PLR of 3.0 is considered extremely high. The TP reduction capability of the STA is affected when the PLR is high, very high and extremely high.
- **Online:** Online status means the FW can receive and treat inflow.
- **Online with Restriction:** The FW can receive and treat inflow, but the amount of flow or water level may be limited temporarily. For example, a vegetation rehabilitation effort may require reduced flows through an area while the new plants are establishing, or nesting by protected species may require a certain water level not to be exceeded.
- **Offline:** The FW is unable to receive and treat inflow due to repairs, construction, or other prohibitive reasons.
- **Depth:** Difference between the average surface water level in a cell and the average ground elevation in that cell. Target depths, or depths between flow events, are between 1.25 ft to 1.5 ft. As depth approaches or drops below zero, an increasing percentage of the cell is considered dry and STA conditions deteriorate. An increase in depth above target depth is expected with increasing flow. However, as depth increases much above the target depth and is sustained over a period of time, it can be detrimental to vegetation health and overall STA treatment performance.
- **Note:** The data provided in this summary report were developed using a combination of provisional and quality-assured flow and water quality data. In some cases, best professional judgment was used to estimate missing data and revise questionable data. Values provided are not considered final but are appropriate for use in STA operational decision-making.

Everglades

Water Conservation Area Regulation Schedules

WCA-1: Stage at the 1-8C Gauge dropped towards schedule last week but remains above the Zone A1 regulation line. Stage on Sunday was 0.05 feet above. WCA-2A: Stage at 2A-17 fell last week, average on Sunday was 0.28 feet higher than the Zone A regulation line. WCA-3A: The Three Gauge Average ceased to trend upwards faster than the slope of the Zone A regulation line last week. Stage ended the week at 0.18 feet below the Zone A line the same as the week prior. WCA-3A: Stage at gauge 62 (Northwest corner) decreased last week. The Sunday average was 0.40 feet below the Upper Schedule. (Figures EV-1 through EV-4).

Water Depths

The WDAT tool indicates that water levels rose significantly across the EPA over the last two months. Northeastern WCA-3A is recovering but still drier than the surrounding regions and drier than last week. While downstream of S-11 and S-9 depths have exceeded 2.5 feet. North to South hydrologic connectivity rebounded in concert with the recent water movement, as sloughs within Everglades National Park (ENP) fill. Portions of eastern ENP remain dry or have water levels just at the ground surface. (Figure EV-5). Over the last month, stages generally increased, most significantly in northern Big Cypress National Preserve (BCNP). Compared to a year ago, WCA-3A is significantly drier, especially in the east along the L-67 canals. Most of ENP remains drier than a year ago, some regions significantly so. (Figure EV-6). Compared to the 20-year average water depths, much of the Everglades remains dryer than average with significant exceptions in northeastern ENP and WCA-1, While closer to average this week large areas of WCA-3A in the southwest, western ENP and northcentral BCNP remain below average. (Figure EV-7).

Taylor Slough and Florida Bay

An average of only 0.07 inches of rain fell over Taylor Slough (TS) and Florida Bay over the week ending Sunday (8/22). Stage decreased by an average of 0.08 feet over the week and westward water movement has slowed again (Figure EV-7 and Figure EV-8). The individual stations range from 4 inches below (CP in southwestern Taylor Slough) to 4 inches above (P37 in central Taylor Slough) the historical averages for this time of year. Taylor Slough is averaging 0.5 inches higher than the historical average. The latest phosphorus measurement at S-328 on 8/10 was 14 µg/L but the area is drying out again as water movements slow. The phosphorus threshold of 8 µg/L should be met before beginning water movements towards Everglades National Park.

Salinities in Florida Bay averaged a 1.4 decrease for the week ending 8/22, but individual stations had weekly changes ranging from -5.7 to +2.0 (Figure EV-7). The coastal mangrove zone is quickly reaching the near-fresh condition that is typical for the late wet season. Freshwater deliveries will still be needed to continue to freshen the nearshore area. Average condition within Florida Bay is now 2 psu higher than the historical average for this time of year. Salinities had decreased with the large rains of the previous week, but they are increasing again (Figure EV-9).

Water Management Recommendations

Ascension rates that do not exceed 0.25 feet per week or 0.50 feet per two weeks are considered ecologically healthy. Flows into northeastern WCA-3A continue to have an ecological benefit. In TS the areas near the S-328 continue to have elevated levels of phosphorus but should fall below 8 ppb soon. These structures should not be opened until the phosphorus levels return to below that threshold at that structure. Individual regional recommendations can be found in **Table EV-2**.

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

| Everglades Region | Rainfall (inches) | Stage change (feet) |
|-------------------|-------------------|---------------------|
| WCA-1 | 0.10 | -0.12 |
| WCA-2A | 0.29 | -0.09 |
| WCA-2B | 0.13 | -0.15 |
| WCA-3A | 0.32 | -0.03 |
| WCA-3B | 0.13 | -0.04 |
| ENP | 0.35 | -0.14 |

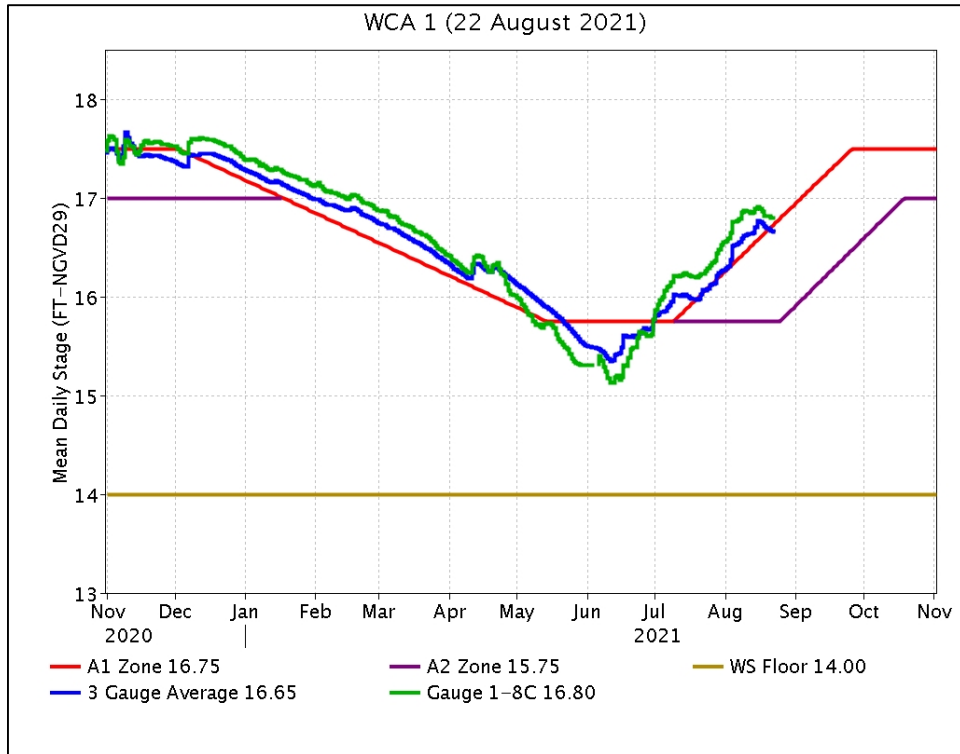


Figure EV-1. WCA-1 stage hydrographs and regulation schedule.

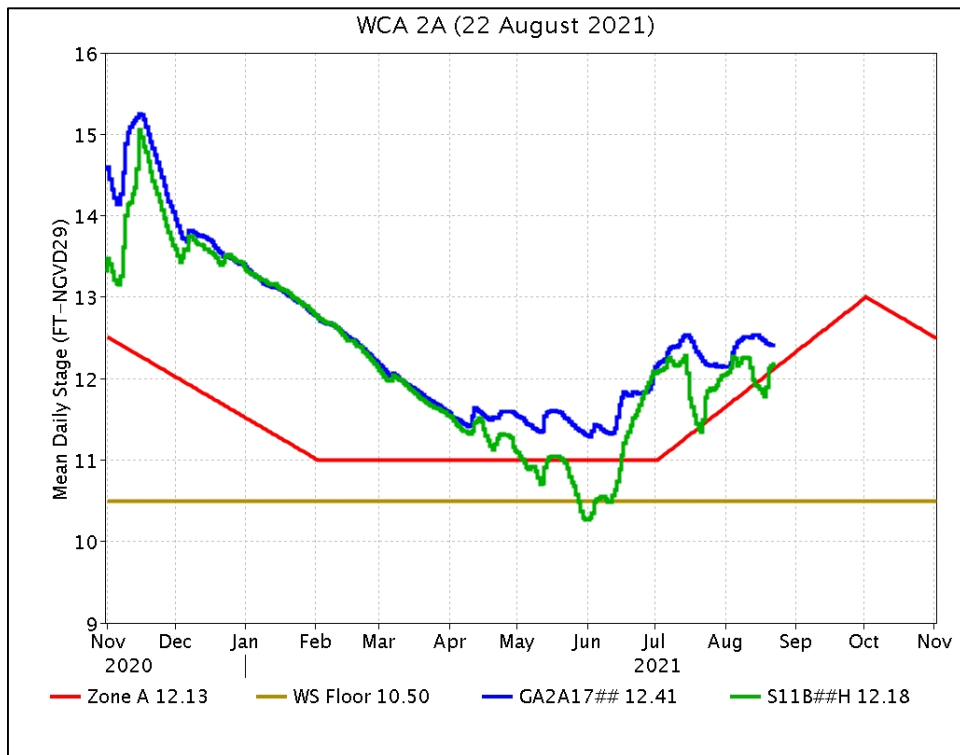


Figure EV-2. WCA-2A stage hydrographs and regulation schedule.

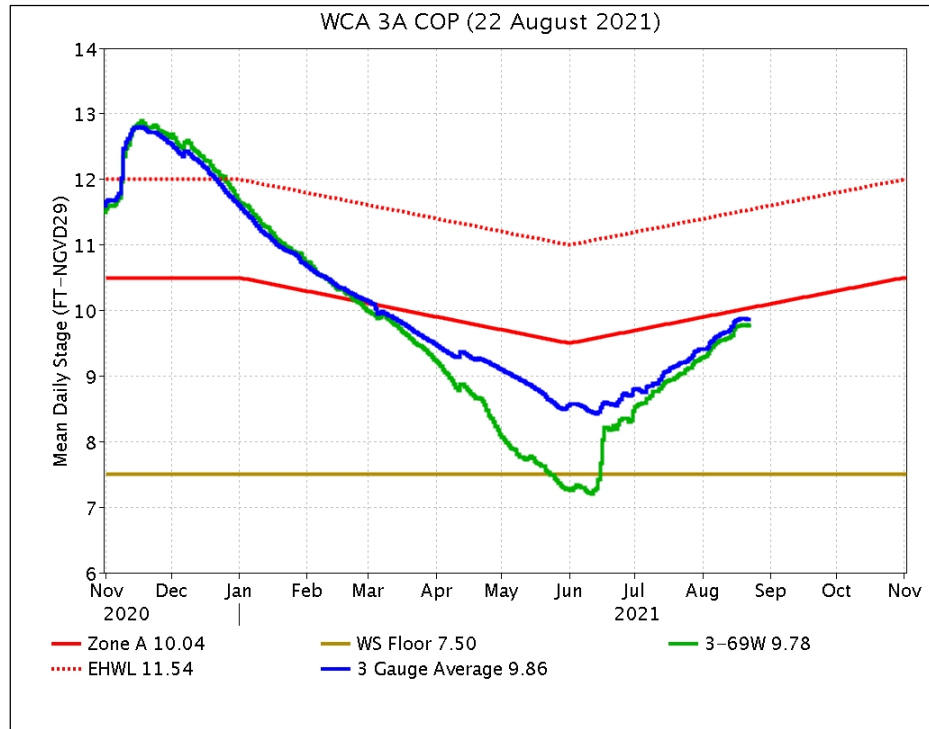


Figure EV-3. WCA-3A stage hydrographs (three-gauge average, S-333 headwater) and regulation schedule.

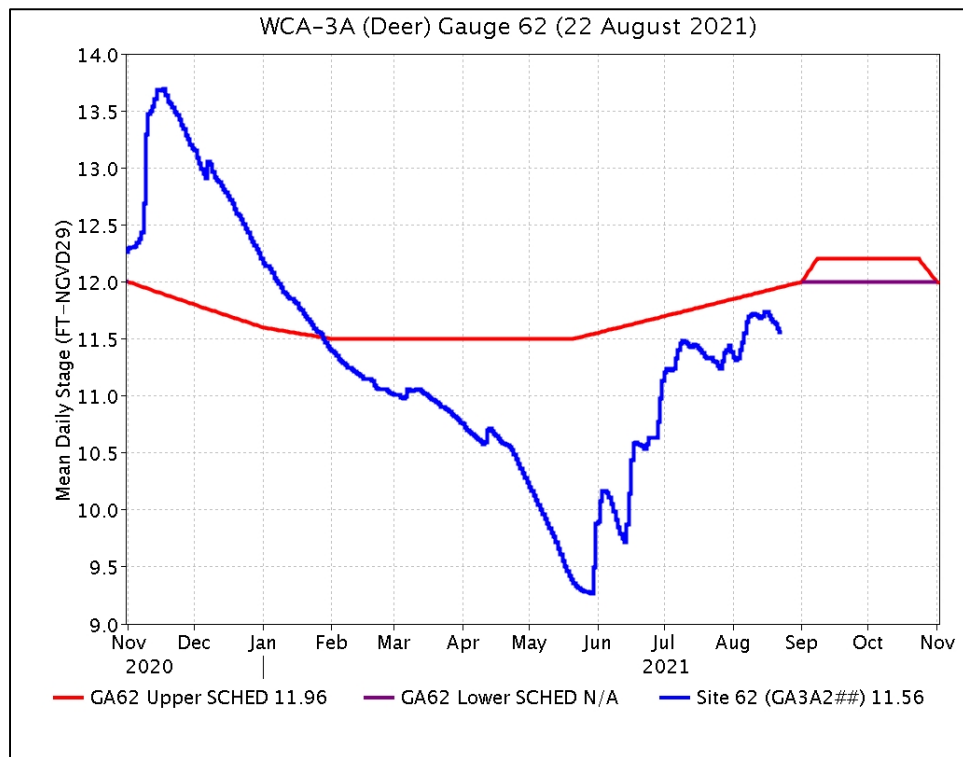


Figure EV-4. WCA-3A stage hydrograph (Deer gauge; Site 62) and CA62 regulation schedule.

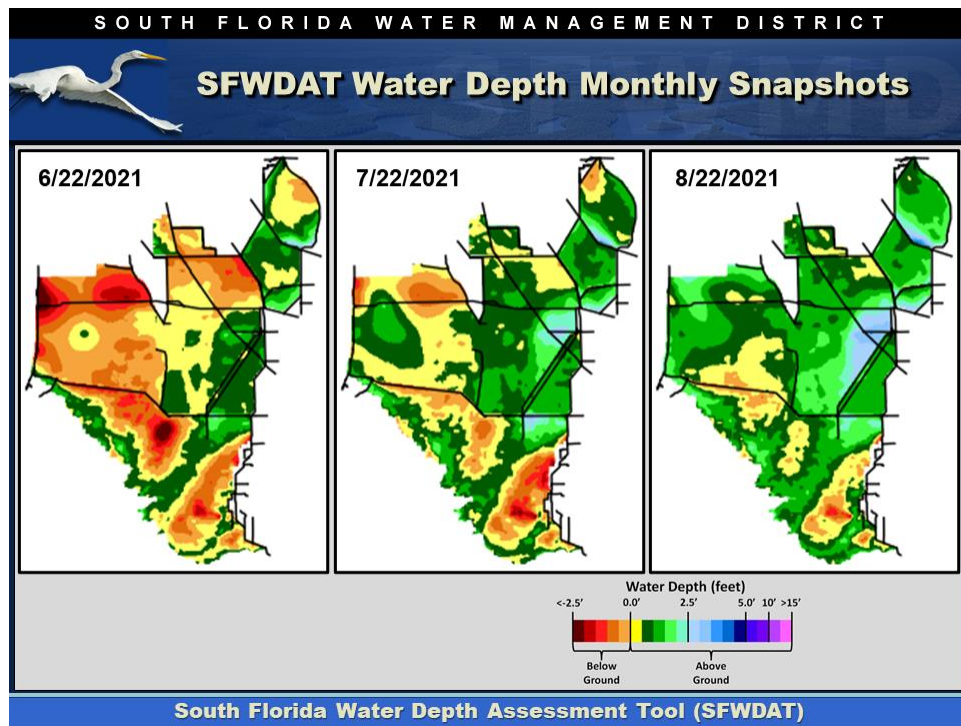


Figure EV-5. Everglades water depths from two months ago (left), one month ago (center) and present (right), based on SFWDAT.

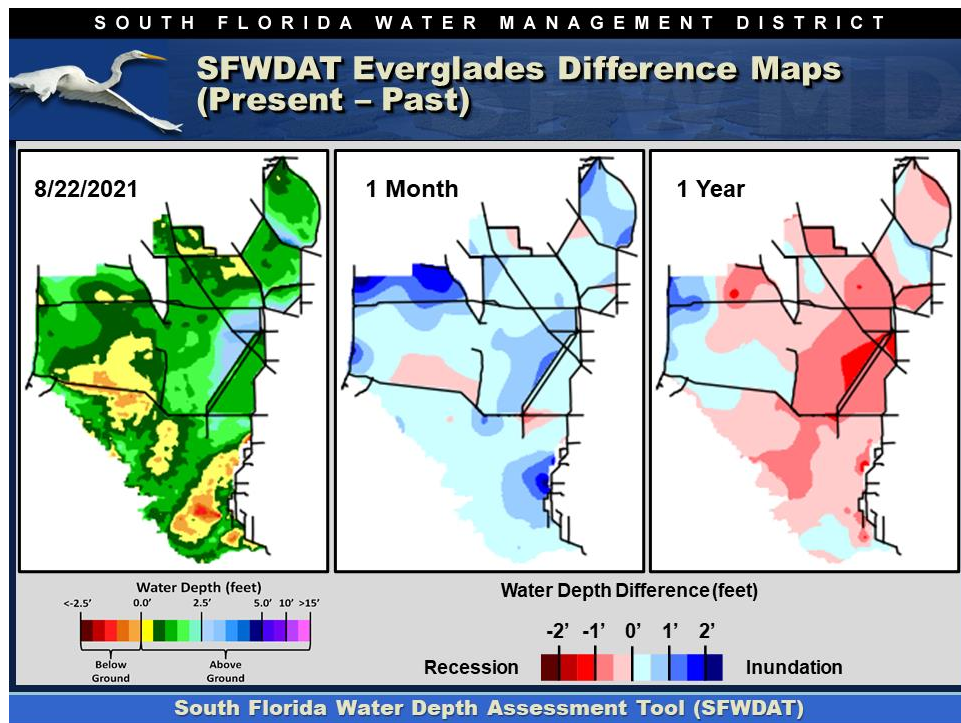


Figure EV-6. Present Everglades water depths (left) and water depth changes from one month (center) and one year (right) ago, based on SFWDAT.

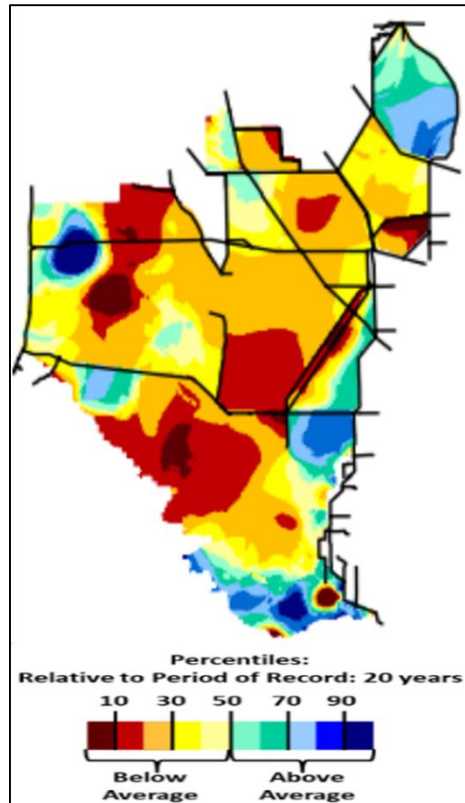


Figure EV-7. Present water depths compared to the day of year average over the previous 20 years.

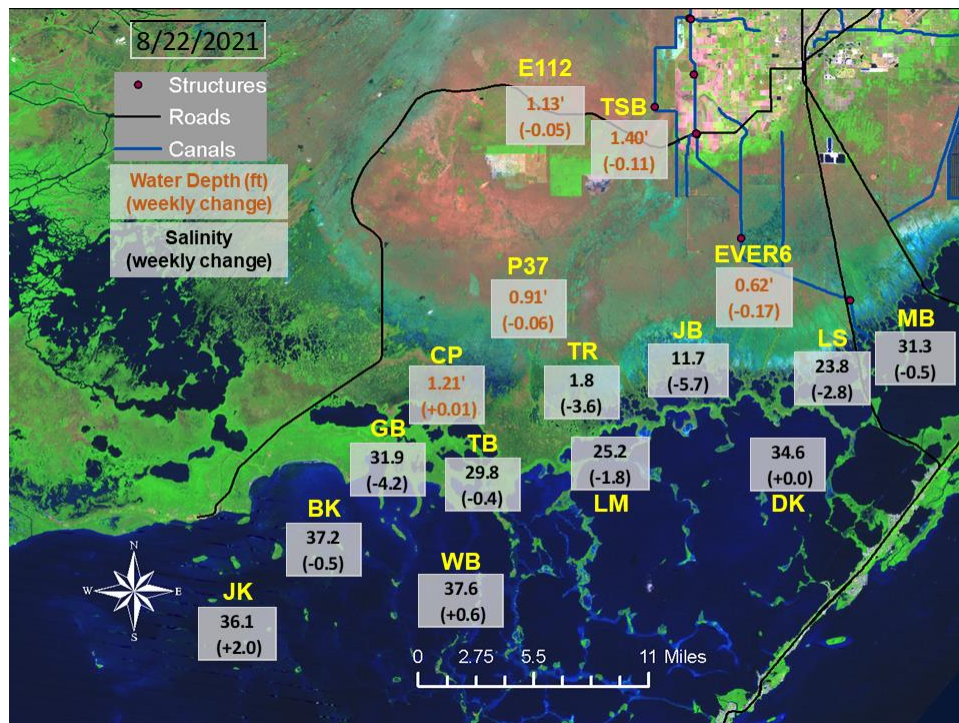


Figure EV-8. Taylor Slough water depths with changes since a week ago and Florida Bay salinities with changes since a week ago.

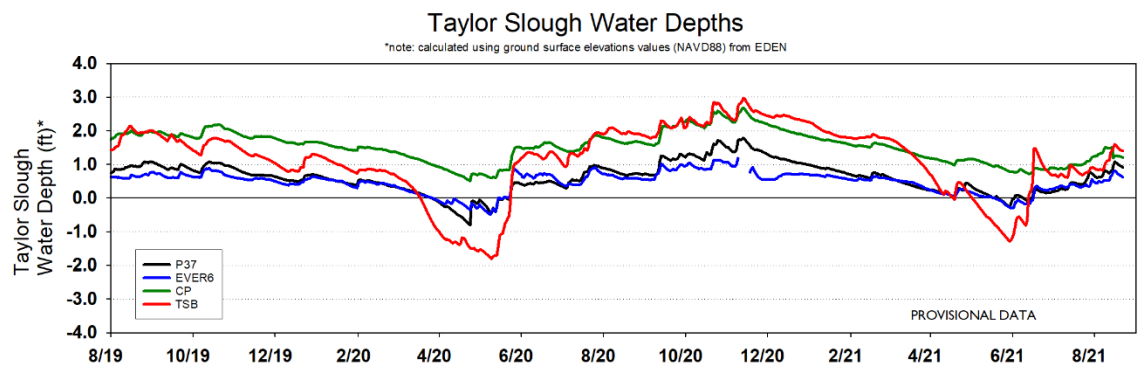


Figure EV-9. Taylor Slough water depth time series.

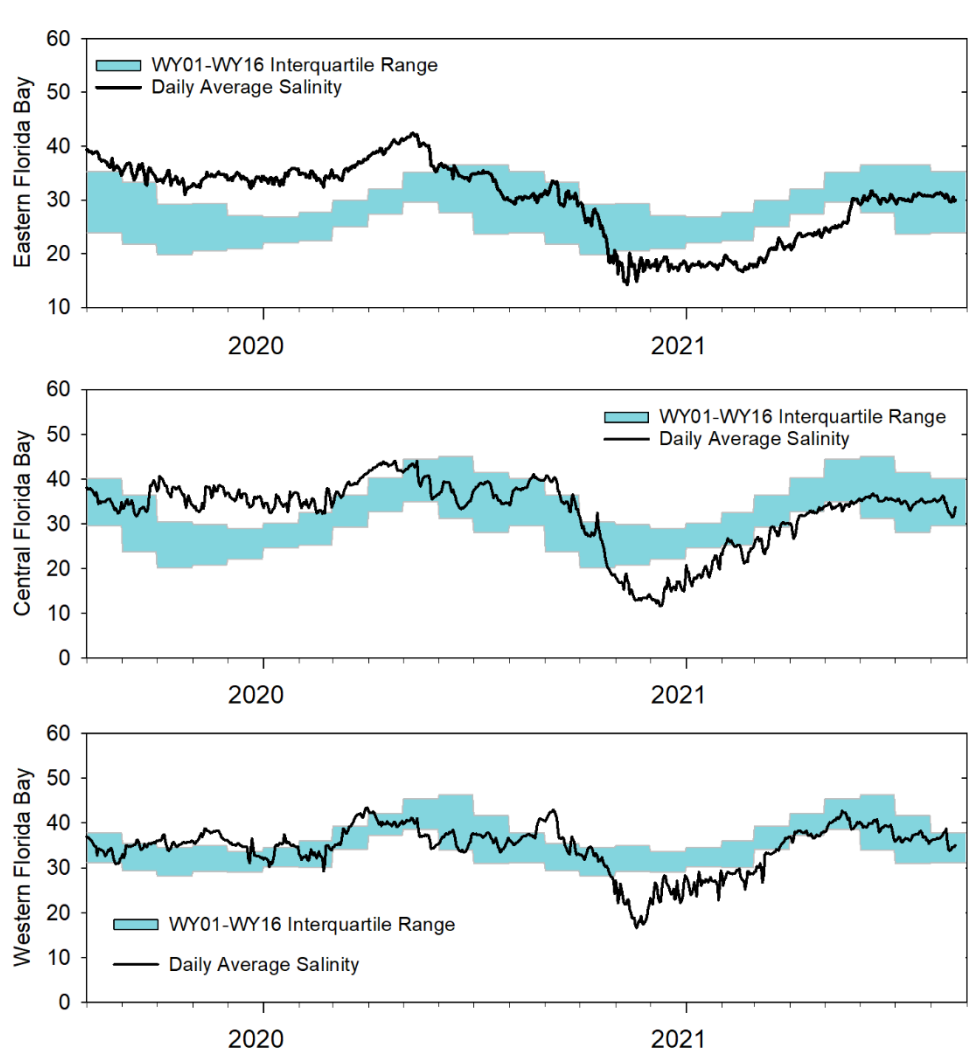


Figure EV-10. Eastern (top panel), Central (middle panel) and Western (bottom panel) Florida Bay daily average salinities with interquartile (25-75 percentile) ranges.

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

| SFWMD Everglades Ecological Recommendations, August 24th, 2021 (red is new) | | | |
|--|--|---|--|
| Area | Weekly change | Recommendation | Reasons |
| WCA-1 | Stage decreased by 0.12' | Maintain ascension rates of less than 0.25 feet per week or 0.50 feet per two weeks. | Protect within basin and downstream habitat and wildlife. |
| WCA-2A | Stage decreased by 0.09' | Maintain ascension rates of less than 0.25 feet per week or 0.50 feet per two weeks. | Protect within basin and downstream habitat and wildlife. |
| WCA-2B | Stage decreased by 0.15' | Maintain ascension rates of less than 0.25 feet per week or 0.50 feet per two weeks | Protect within basin and downstream habitat and wildlife. |
| WCA-3A NE | Stage decreased by 0.04' | Moderate ascension rates to less than 0.50 feet per two weeks. | Protect within basin and downstream habitat and wildlife. |
| WCA-3A NW | Stage decreased by 0.18 | Maintain ascension rates of less than 0.25 feet per week or 0.50 feet per two weeks. | |
| Central WCA-3A S | Stage increased by 0.07' | Maintain ascension rates of less than 0.25 feet per week or 0.50 feet per two weeks. | Protect within basin and downstream habitat and wildlife. |
| Southern WCA-3A S | Stage increased by 0.02' | | |
| WCA-3B | Stage decreased by 0.04' | Maintain ascension rates of less than 0.25 feet per week or 0.50 feet per two weeks. | Protect within basin and downstream habitat and wildlife. |
| ENP-SRS | Stage decreased by 0.14' | Make discharges to the Park according to COP and TTFF protocol while considering upstream and downstream ecological conditions. | Protect within basin and upstream habitat and wildlife. |
| Taylor Slough | Stage changes ranged from -0.17' to +0.01' | Move water southward as possible. | When available, provide freshwater buffer for downstream conditions. |
| FB- Salinity | Salinity changes ranged -5.7 to +2.0 | Move water southward as possible. | When available, provide freshwater to maintain low salinity buffer and promote water movement. |