Disclaimer: Information contained in the report addresses environmental conditions only and is not the official South Florida Water Management District operations recommendation or decision.

## MEMORANDUM

- **TO:** John Mitnik, Assistant Executive Director, Executive Office Staff
- **FROM:** SFWMD Staff Environmental Advisory Team
- **DATE:** June 30, 2021
- **SUBJECT:** Weekly Environmental Conditions for Systems Operations

#### Summary

#### Weather Conditions and Forecast

A weak tropical wave extending from the northwestern Caribbean Sea to the Florida Straits will move slowly westward, reaching the western Gulf of Mexico by Thursday. On Wednesday, western District areas will have enhanced risk of significant rainfall. An upperair trough is forecast to shift eastward on Thursday, favoring heavy rains in the interior of the District, particularly around and south/west of Lake Okeechobee. Steering winds veering to a south-southwesterly direction on Friday will favor enhanced rains with the heaviest rains over the interior and east. Through Friday, total rainfall above the daily climatological average is expected with significant rainfall over the western regions. On Saturday, a weak concentration of Saharan Dust and its accompanying Saharan Air Layer will overspread the Gulf of Mexico and Florida. The dust and its suppressing influence on rainfall will cause a much-reduced coverage of rain on Saturday and cause the total rainfall to fall well under the daily climatological average. Steering winds from the southwest on Saturday will favor any rains to break out over the interior and the east during the afternoon. A piece of a strong tropical wave moving through the Caribbean Sea this weekend may break off and divert northward probably east of the Lake this weekend. Meanwhile, the large-scale trough in the east is still forecast to be present in a weakened state. This will result in a return to an active pattern of rains on Sunday and Monday, with rains around and south of Lake Okeechobee on Sunday and north of Lake Okeechobee on Monday. A lack of agreement in the model guidance on the timing and evolution of these features makes forecast confidence lower-than-average after Saturday. For the week ending next Tuesday morning, total District rainfall is likely to be above normal, with the largest departures from normal probably over the interior and the west.

#### Kissimmee

Flow at S-65A continues to be too low for extensive inundation of the Kissimmee River floodplain, and mean floodplain depth remains at 0.09 feet on June 27. Dissolved oxygen concentration in the Kissimmee River averaged 5.9 mg/L for the week, well above the 2.0 mg/L threshold considered harmful to sportfish.

#### Lake Okeechobee

Lake Okeechobee stage was 12.66 feet NGVD on June 27, 2021, 0.2 feet lower than a month ago, and 0.3 feet higher than one year ago (**Figure LO-1**). Lake stages were above the ecological envelope from August 1, 2020 to March 30, 2021, but are currently following along the upper threshold of the envelope (**Figure LO-2**). The Lake has been within the envelope around a third of the time since January 1, 2021. Lake stage has increased slightly over the past two weeks (**Figure LO-3**). According to NEXRAD, 2.09 inches of rain fell directly on the Lake last week.

## Estuaries

Total inflow to the St. Lucie Estuary averaged approximately 853 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 good range (10-26) for adult eastern oysters.

Total inflow to the Caloosahatchee Estuary averaged 1,152 cfs over the past week with approximately 535 cfs coming from the Lake. Mean surface salinities remained the same at S-79 and decreased 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 Cape Coral and Shell Point, and in the fair range at Sanibel.

## **Stormwater Treatment Areas**

For the week ending Sunday, June 27, 2021, no Lake Okeechobee water was delivered to the FEBs/STAs. The total Lake releases sent to the FEBs/STAs in WY2022 (since May 1, 2021) is approximately 53,000 ac-feet. The total inflows to the STAs in WY2022 is approximately 134,000 ac-feet. Most STA cells are near target stage, with the exception of cells in STA-5/6 that are drying out. STA-1E Western Flow-way is offline for the Restoration Strategies project to fill and grade Cells 5 and 7. STA-3/4 Eastern Flow-way is offline for vegetation rehabilitation/drawdown. 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 in effect in STA-5/6 Flow-ways 2 and 3 for the Restoration Strategies project to grade non-effective treatment areas. Nests of Migratory Bird Treaty Act (MBTA) protected species were observed in STA-1W. This week, if 2008 LORS recommends Lake releases to the WCAs and conditions allow, releases will be sent to STA-2.

#### **Everglades**

Record wading bird nesting activity has largely come to completion across the system. A large proportion of White Ibis and Wood Storks have successfully fledged, potentially making this an even more productive year than the record 2018 season. Conditions remain good within the Cape Sable Seaside Sparrow habitat in ENP. Dry conditions persist in northeastern WCA-3A, and a wildfire is ongoing in Rotenberger WMA. In Florida Bay, salinities generally increased, and stages fell in Taylor Slough, but overall conditions remain good in the Southern systems.

## **Supporting Information**

## **Kissimmee Basin**

## Upper Kissimmee

On June 27, 2021, lake stages were 55.5 feet NGVD (1.4 feet below schedule) in East Lake Toho, 52.7 feet NGVD (1.1 feet below schedule) in Lake Toho, and 50.3 feet NGVD (0.9 feet below schedule) in Lakes Kissimmee-Cypress-Hatchineha (KCH) (**Table KB-1**, **Figures KB-1-3**).

#### Lower Kissimmee

Kissimmee River (headwater) stages were 46.2 feet NGVD at S-65A and 25.9 feet NGVD at S-65D on June 27, 2021, while discharges were 920 cubic feet per second (cfs) at S-65, 880 cfs at S-65A, 690 cfs at S-65D and 650 cfs at S-65E (**Table KB-2**). Dissolved oxygen concentration in the Kissimmee River declined slightly with the increases in discharge but averaged 5.9 mg/L for the week ending on June 27, 2021, still well above the 2.0 mg/L threshold considered harmful to sportfish (**Figure KB-4**). Flow at S-65A remains too low for extensive inundation of the Kissimmee River floodplain, and mean floodplain depth remains at 0.09 feet on June 27 (**Figure KB-5**).

## Water Management Recommendations

Hold stage in KCH flat or receding by increasing S-65 discharge without exceeding the USACE discharge limit of 900 cfs at S-65A. The objective is to protect recently completed construction in the Lower Basin by slowly increasing flow at S-65A over the next few weeks as possible, rather than allowing stage in KCH to rise. Continue to use the following limits: Follow the USACE request to hold S-65A discharge below 800-900 cfs to facilitate construction for the Kissimmee River Restoration Project. Follow the recommended S-65A discharge rate of change limits (Table KB-3) when adjustments in discharge are made. Limit ascension (stage rise) rates to 0.5 ft/14 days in East Lake Toho, Toho and KCH to the extent possible while maintaining the discharge rate of change limits. If lake stage begins to decline, attempt to limit the recession rate to a maximum of 0.18 ft/week.

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

Water Body	Structure	Stage Monitoring Site Discharge (cfs) (feet NGVD) <sup>a</sup> Type		Schedule Type <sup>b</sup>	Schedule Stage (feet NGV D)	Departure from Regulation (feet)		
			J J. ( ,	(,		· · · ·	6/27/21	6/20/21
Lakes Hart and Mary Jane	S-62	LKMJ	11	60.1	R	60.0	0.1	-0.4
Lakes Myrtle, Preston and Joel	S-57	S-57	0	60.4	R	61.0	-0.6	-1.0
Alligator Chain	S-60	ALLI	0	62.5	R	63.2	-0.7	-1.0
Lake Gentry	S-63	LKGT	0	60.0	R	61.0	-1.0	-1.3
East Lake Toho	S-59	TOHOE	29	55.5	R	56.5	-1.0	-1.4
Lake Toho	S-61	TOHOW S-61	588	52.7	R	53.5	-0.8	-1.1
Lakes Kissimmee, Cypress and Hatchineha	S-65	KUB011 LKIS5B	617	50.3	R	51.0	-0.7	-0.9

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	Daily Average for Previous Seven Day Period verage			ods
		6/27/21	6/27/21	6/20/21	6/13/21	6/6/21
Discharge	S-65	920	620	350	340	350
Discharge	S-65A <sup>a</sup>	880	600	300	300	300
Headwater Stage (feet NGVD)	S-65A	46.2	46.2	46.4	46.5	46.4
Discharge	S-65D <sup>b</sup>	690	480	270	270	310
Headwater Stage (feet NGVD)	S-65D <sup>c</sup>	25.9	25.8	25.8	25.7	25.7
Discharge (cfs)	S-65E <sup>d</sup>	650	470	250	250	300
Discharge (cfs)	S-67	0	0	0	0	0
Dissolved Oxygen (mg/L) <sup>e</sup>	Phase I, II/III river channel	5.1	5.9	6.3	6.7	6.6
Mean depth (feet) <sup>f</sup>	Phase I floodplain	0.09	0.08	0.07	0.07	0.07

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).

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

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



**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 12.66 feet NGVD on June 27, 2021, 0.2 feet lower than a month ago, and 0.3 feet higher than one year ago (**Figure LO-1**). Lake stages were above the ecological envelope from August 1, 2020 to March 30, 2021, but are currently following along the upper threshold of the envelope (**Figure LO-2**). The Lake has been within the envelope around a third of the time since January 1, 2021. Lake stage declined slowly from mid-November 2020 through mid-February 2021, before recession rates increased and stage declined over 2.5 feet between March the start of June. Lake stage has increased slightly over the past two weeks. (**Figure LO-3**). According to NEXRAD, 2.09 inches of rain fell directly on the Lake last week.

Average daily inflows (excluding rainfall) increased from the previous week, going from 270 cfs to 627 cfs. Outflows (excluding evapotranspiration) decreased, going from 941 cfs to 669 cfs. The majority of the inflow came from the Kissimmee River (472 cfs through S-65E & S-65EX1). Releases to the west via S-77 decreased from 809 cfs to 669 cfs and releases east via S-308 decreased from 27 cfs to 0 cfs. Releases south through the S-350 structures decreased from 66 cfs to 0 cfs. 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 (June 26, 2021) from the NOAA cyanobacteria monitoring product derived from EUMETSAT's Sentinel 3 OLCI sensor data showed medium to high bloom potential in central parts of the Lake. Overall, the bloom potential increased on the Lake from the previous week (**Figure LO-5**).

Water quality sampling is now on the bloom season schedule (May – October), occurring twice monthly at 32 stations for chlorophyll *a*, taxonomic identification, and toxin analyses. Most recent sampling occurred on June 21-23, 2021. A total of 18 sites (or 56%) had communities dominated by *Microcystis aeruginosa*, and 12 sites (or 38%) had mixed communities or communities dominated by *Cylindrospermopsis raciborskii* (**Table LO-2** and **Figure LO-6**). The percentage of samples dominated by *Microcystis aeruginosa* decreased since late May (91% in late May vs. 56% in late July). A total of 22 sites (or 71%) had microcystin concentration below EPA recommended human health recreational standard (8  $\mu$ g/L), and 12 (or 39%) had toxin concentration below detection limits. The highest toxin concentration (130  $\mu$ g/L) was recorded at S-308C in eastern part of the Lake increased since early June, and remained below detection level in southern part of the Lake.

#### Water Management Summary

Lake Okeechobee stage was 12.66 feet NGVD on June 27, 2021, 0.2 feet lower than a month ago, and 0.3 feet higher than one year ago (**Figure LO-1**). Lake stages were above the ecological envelope from August 1, 2020 to March 30, 2021 but are currently following along the upper threshold of the envelope (**Figure LO-2**). The Lake has been within the envelope around a third of the time since January 1, 2021. Recent satellite imagery (June 20, 2021) shows a medium to high bloom potential in central parts of the Lake.

Inflow s	Previous Week's Average Daily Flow (cfs)	This Week's Average Daily Flow (cfs)	Equivalent Depth Week Total (in)	Outflows	Previous Week's Average Daily Flow (cfs)	This Week's Average Daily Flow (cfs)	Equivalent Depth Week Total (in)
S-65E & S-65EX1	248	472	0.2	S-77	809	669	0.3
S-71 & S-72	4	36	0.0	S-308	27	0	0.0
S-84 & S-84X	2	11	0.0	S-351	22	0	0.0
Fisheating Creek	6	7	0.0	S-352	14	0	0.0
S-154	0	12	0.0	S-354	30	0	0.0
S-191	0	0	0.0	L-8 Outflow	39		
S-133 P	0	31	0.0	Evapotranspiration	1750	1939	0.9
S-127 P	0	0	0.0	Totals	2691	2608	1.2
S-129 P	0	9	0.0		-		
S-131 P	9	29	0.0				
S-135 P	0	0	0.0				
S-2 P	0	0	0.0				
S-3 P	0	0	0.0				
S-4 P	0	0	0.0				
L-8 Backflow		20	0.0				
Rainfall	5607	5599	2.5				
Totals	5877	6226	2.8				

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



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



Lake Okeechobee Stage vs Updated Ecological Envelope

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



Lake Okeechobee Water Level History and Projected Stages

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



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

Station	Chl a (µg/L)	Toxin (µg/L)	Таха	Station	Chl <i>a</i> (µg/L)	Toxin (µg/L)	Таха
FEBIN	NS	NS	NS	L001	Р	7.8	Microcys
FEBOUT	NS	NS	NS	L004	Р	5.9	Microcys
KISSR0.0	Р	BDL	mixed	L006	Р	BDL	mixed
L005	Р	BDL	mixed	L007	Р	BDL	Microcys
LZ2	Р	0.8	mixed	L008	Р	1.8	Microcys
KBARSE	Р	31.0	Microcys	LZ30	Р	BDL	Microcys
RITTAE2	Р	BDL	mixed	LZ40	Р	11.0	Microcys
PELBAY3	Р	BDL	Microcys	CLV10A	Р	BDL	mixed
POLE3S	Р	BDL	mixed	NCENTER	Р	4.4	Microcys
LZ25A	Р	BDL	mixed	Outflow Structures (sampled May 3)			
PALMOUT	Р	BDL	mixed	S308C	Р	130.0	Microcys
PALMOUT1	Р	BDL	mixed	S77	Р	BDL	Cylindro
PALMOUT2	Р	4.7	Microcys	<ul> <li>SFWMD consi</li> </ul>	iders > 40 μ	g/L chloropl	nyll a (Chla) an
PALMOUT3	Р	8	Microcys	algal bloom. • BDL: below de	etectable limit	of 0.25 µg/	L
POLESOUT	Р	0.5	Cylindro	<ul> <li>ND: no domina</li> <li>P: pending</li> </ul>	int taxa		
POLESOUT1	Р	6.9	Microcys	<ul> <li>NS: not sample</li> <li>Bold font: crev</li> </ul>	ed v observed p	ossible blue	-green algae
POLESOUT2	Р	0.3	Microcys	<ul> <li>Chla analyzed</li> <li>Toxin and taxa</li> </ul>	by SFWMD analyzed by	FDEP	
POLESOUT3	Р	6.3	Microcys	Cylindro:	Cylindrosper	mopsis	
EASTSHORE	Р	81.0	Microcys	Planktal: I Dolicho: L	Planktalyngb Dolichospern	ya num	
NES135	Р	21.0	Microcys	Microcys:	Microcystis		
NES191	Р	31.0	Microcys				

**Table LO-2.** Provisional results of chlorophyll *a* concentrations and cyanobacteria taxa from sampling trips on June 21-23, 2021.



NOAA cyanobacteria product derived from Copernicus Sentinel-3 OLCI data from EUMETSAT

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



Figure LO-6. Expanded monitoring network and provisional results from samples collected June 21-23, 2021

## Estuaries

#### St. Lucie Estuary

Over the past week, mean total inflow to the St. Lucie Estuary was approximately 853 cfs (**Figures ES-1** and **ES-2**) and the previous 30-day mean inflow was approximately 544 cfs. For comparison, the historical provisional mean inflows from the contributing areas are shown in **Figure ES-2**.

Over the past week, salinities decreased at all sites within the estuary (**Table ES-1** and **Figure ES-3**). The seven-day moving average of the surface and bottom salinities at the US1 Bridge was 20.0. Salinity conditions in the middle estuary were estimated to be within the good range for adult eastern oysters (**Figure ES-4**).

#### Caloosahatchee River Estuary

Over the past week, mean total inflow to the Caloosahatchee River Estuary was approximately 1,152 cfs (**Figures ES-5** and **ES-6**) and the previous 30-day mean inflow was approximately 1,157 cfs. For comparison, the historical provisional mean inflows from the contributing areas are shown in **Figure ES-6**.

Over the past week, surface salinities remained the same at S-79 and decreased 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 Cape Coral and Shell Point, and in the fair range at Sanibel (**Figure ES-9**).

Surface salinity at Val I-75 was forecasted for the next two weeks, using an autoregression model (Qiu and Wan, 2013<sup>1</sup>) coupled with a linear reservoir model for the tidal basin. Model scenarios included pulse releases at S-79 ranging from 0 to 1500 cfs and steady releases at 2,000 cfs with estimated tidal basin inflows of 470 cfs. Model results from all scenarios predict daily salinity to be 5.2 or lower and the 30-day moving average surface salinity to be 2.1 or lower at Val I-75 at the end of the two-week period (**Table ES-3** and **Figure ES-10**). This keeps predicted salinities at Val I-75 within the LORS 2008 salinity range (0.0-5.0).

#### Red Tide

The Florida Fish and Wildlife Research Institute reported on June 25, 2021, that *Karenia brevis*, the Florida red tide dinoflagellate, was observed at background to low concentrations in Lee County, and very low concentrations in Collier County. On the east coast, red tide was not observed in samples from St. Lucie or Martin counties.

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

#### Water Management Recommendations

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



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



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

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

Sampling Site	Surface	Bottom	Envelope
HR1 (Nork Fork)	<b>11.9</b> (15.7)	<b>17.9</b> (22.0)	NA <sup>a</sup>
US1 Bridge	<b>19.5</b> (23.1)	<b>20.6</b> (24.3)	10.0 – 26.0
A1A Bridge	<b>27.6</b> (29.4)	<b>28.8</b> (30.2)	NA <sup>a</sup>

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)	<b>0.5</b> (0.5)	<b>0.5</b> (0.5)	NA a
Val I-75	<b>1.0</b> (1.4)	<b>1.4</b> (1.9)	0.0 - 5.0 <sup>b</sup>
Fort Myers Yacht Basin	<b>6.4</b> (6.9)	<b>8.3</b> (7.8)	NA a
Cape Coral	<b>15.0</b> (15.7)	<b>17.4</b> (17.7)	10.0 - 30.0
Shell Point	<b>28.7</b> (29.8)	<b>30.3</b> (30.4)	10.0 - 30.0
Sanibel	<b>33.6</b> (33.7)	<b>32.9</b> (33.0)	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 theforecast period for various S-79 flow release scenarios.

Scenario	Simulated S-79 Flow (cfs)	Tidal Basin Runoff (cfs)	Daily Salinity	30-Day Mean Salinity
А	0	470	5.2	2.1
В	450	470	2.9	2.3
С	800	470	1.7	1.8
D	1000	470	1.3	1.5
E	1500	470	0.5	1.4
F	2000	470	0.3	1.2



**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 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. The Northern Flow-way contains nests of Migratory Bird Treaty Act protected species. Most treatment cells are at near target stage. Vegetation in all flow-ways is highly stressed. The 365-day PLRs for all 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, 2 and 3 is stressed, and in Flow-ways 4 and 5 is highly stressed. The 365-day PLRs for the flow-ways are at or below 1.0 g/m<sup>2</sup>/year except Flow-way 1 which is high and Flow-way 2 which 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 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/m<sup>2</sup>/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. Several treatment cells are at or near target stage while some cells are drying out. The 365-day PLRs for most flow-ways are near 1.0 g/m<sup>2</sup>/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.



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



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



Figure S-3. STA-2 Weekly Status Report

## STA-3/4 Weekly Status Report – 6/21/2021 through 6/27/2021



STA-3/4 Flow-Way Status				As of 6/27/2021	STA-3/4 Flow & Phosphorus Concentration			
				Stage Based: Relative to Target Stage (TS)		7 day	29 day	26E day
Flow-	Vegetation	Joading Rate	Online /	Deep Water Level (> 2.8' above TS)		7-uay	20-udy	505-uay
Way	Status Healthy Stressed	(below 1.0 g P /m²/yr is optimal)	Restrictions	High Water Level (1.5' – 2.8' above TS)	Total Inflow, ac-ft	28,902	46,220	521,773
Eastern Offline, vegetation management drawdown as of 3/1/2021				0.2' – 1.5' above TS	Lake Inflow, ac-ft	0	N/A	61,800
			n as of 3/1/2021	Target Stage (TS +/- 0.2')	Total Outflow, ac-ft	17,922	33,996	479,119
Central	←>	<b>°</b>	Online	Low Water Level (<0.2' below TS)	Inflow Conc., ppb	40	55	54
	~	1.0			Outflow Conc., ppb	10	10	12
Western	$\longleftrightarrow \blacksquare \longrightarrow$	1.0	Online	25-50% Dry 75-100% Dry	Includes Preliminary Da	ata	15	12

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



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

# STA-5/6 Weekly Status Report – 6/21/2021 through 6/27/2021





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, μg/L or ppb. Inflow concentration refers to the flowweighted 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 365day 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 continued trending upwards last week. On Sunday stage was below the flat Zone A1 regulation line by 0.15 feet. WCA-2A: Stage at S11B-HW continued trending upwards last week, 0.89 feet above the flat regulation line on Sunday. WCA-3A: The Three Gauge Average is trending slightly towards the Zone A regulation. On Sunday stage was 0.96 feet below the rising Zone A line. WCA-3A: Stage at gauge 62 (Northwest corner) continues trending upwards but stabilized last week. The average on Sunday was 1.05 feet below the rising Upper Schedule. (Figures EV-1 through EV-4).

## Water Depths

The WDAT tool for spatial interpolation of water depth monthly snapshots indicate that WCA-3A North is recovering water depths above soil surface but remains below ground in the northeast. North to South hydrologic connectivity strengthens in Shark River Slough (SRS) in Everglades National Park (ENP) and Taylor Slough. Big Cypress National Preserve (BCNP) recovers, as water nears the soil surface across most of that area. (**Figure EV-5**). Over the last month stages rose significantly in BCNP and in Taylor Slough within ENP. The Everglades are significantly drier than one year ago, with southern BCNP the lone exception, as wet season rains had begun rehydration earlier last year. Conditions continue moving closer to average across the system, with eastern WCA-3A South and northern BCNP remaining below average. (**Figure EV-6**).

## Wading Birds

Record nesting nears the end, and the provisional estimate of total nests in the Everglades in 2021 is approximately 81,000 nests. Foraging flocks, including juveniles, remains in the southern portions of the WCA-3A and along the coast of Cape Sable and western Florida Bay. It is likely that, given the low mortality noted and optimal foraging conditions throughout most of the nesting season, 2021 will surpass 2018 in the production of fledgling wading birds.

## Taylor Slough and Florida Bay

An average of 0.62 inches of rain fell over Taylor Slough and Florida Bay over the week ending Sunday (6/27) with the largest volume over central and western Florida Bay. Stage decreased by an average of 0.17 feet over the week with the largest decrease in the northern area (**Figure EV-7 & Figure EV-8**). Depths are now averaging 2 inches lower than the historical average for this time of year. Phosphorus levels at the westernmost structures (S-328 and G-737) are still elevated but lower than before with the maximum at 14  $\mu$ g/L as of 6/22/21. The phosphorus levels will decrease at these structures as the area rehydrates. In previous years, it took about 3 weeks after westward water movements began for the phosphorus levels to reach the 8  $\mu$ g/L threshold.

Salinities in Florida Bay averaged a 0.5 increase for the week ending 6/27, but individual stations had weekly changes ranging from -0.7 to +2.0 (**Figure EV-7**). The local rainfall

was able to limit the salinity increases from evaporation with the hot temperatures, but freshwater deliveries will be needed to freshen the nearshore area. The nearshore area salinity is 4 higher than the historical average for this time of year, while the rest of the bay salinity is 2 higher (**Figure EV-9**).

Florida Bay MFL: Salinity at the Taylor River (TR) station in the mangrove zone (tracked for the Florida Bay MFL) decreased from 16 to 14 over the week ending 6/27, but the 30-day moving average increased 2.2 over the week to end at 17.9 (**Figure EV-10**). Weekly flow from the 5 creeks monitored for the Florida Bay MFL totaled about 600 acre-feet with small flows peaking in both directions throughout the week (see inset on **Figure EV-10**). The 365-day moving sum of flow from the 5 creeks (tracked as part of the Florida Bay MFL criteria) decreased 5,000 acre-feet over the week to end at 388,033 acre-feet on Sunday, 6/27/21. The 365-day cumulative flows are now below the 95th percentile of historical data (390,830 acre-feet) but still above the 90th percentile (359,403 acre-feet). Creek flows are provisional USGS data.

#### Water Management Recommendations

Accession rates that do not exceed 0.25 feet per week or 0.50 feet per two weeks are considered ecologically healthy. Flows into northern WCA-3A, with a focus on the northeastern region downstream of S -150 would have an ecological benefit. Rehydration of northern Taylor Slough has begun, and the most western structures (S-328 and G-737) continue to have phosphorus levels above 8 ppb. These structures should not be opened until the phosphorus levels return to below that criteria at these locations.

Everglades Region	Rainfall (inches)	Stage change (feet)
WCA-1	1.13	+0.05
WCA-2A	0.90	+0.01
WCA-2B	1.88	+0.09
WCA-3B	1.18	+0.11
ENP	1.64	+0.02

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



**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. Taylor Slough water depths with changes since a week ago and Florida Bay salinities with changes since a week ago.



Figure EV-8. Taylor Slough water depth time series.



Figure EV-9. Eastern (top panel), Central (middle panel) and Western (bottom panel) Florida Bay daily average salinities with interquartile (25-75 percentile) ranges.



**Figure EV-10.** Top panel: Taylor River 30-day moving average salinity (blue), daily average salinity (gray) with salinity threshold; middle panel: Five-creek total flow for past 365 days (blue), daily flow (gray) with 365-day flow threshold; bottom panel: map of monitoring locations for the five creeks.

SFWMD Everglades Ecological Recommendations, June 29th, 2021 (red is new)						
Area	Weekly change	Recommendation	Reasons			
WCA-1	Stage increased by 0.05'	Maintain ascension rates betw een 0.01 and 0.25 feet per w eek.	Protect within basin and downstream habitat and wildlife. Protect wading bird foraging.			
WCA-2A	Stage increased by 0.01'	Maintain ascension rate to betw een 0.01 and 0.25 feet per w eek	Protect within basin and downstream habitat and wildlife.			
WCA-2B	Stage increased by 0.09'	Maintain ascension rate to betw een 0.01 and 0.25 feet per w eek	Protect within basin wading bird foraging.			
WCA-3A NE	Stage increased by 0.18'	Maintain ascension rates betw een 0.01 and 0.25 feet per w eek	Protect within basin habitat and wildlife. Inflows and rehydration preserve peat soils and prevents wildfire.			
WCA-3A NW	Stage increased by 0.08	Maintain ascension rate to betw een 0.01 and 0.25 feet per w eek				
Central WCA-3A S	Stage decreased by 0.05'	Moderate ascension rate to betw een 0.01 and 0.10 feet per w eek	Protect within basin wading bird foraging.			
Southern WCA-3A S	Stage increased by 0.23'					
WCA-3B	Stage increased by 0.02'	Maintain ascension rates betw een 0.01 and 0.25 feet per w eek	Protect within basin and downstream habitat and wildlife.			
ENP-SRS	Stage increased by 0.08'	Make discharges to the Park according to COP and TTFF protocol while considering upstream and downstream ecological conditions.	Protect within basin and upstream habitat and wildlife.			
Taylor Slough	Stage changes ranged from -0.02' to -0.49'	Move water southward as possible.	When available, provide freshwater buffer for downstream conditions.			
FB- Salinity	Salinity changes ranged -0.7 to +2.0	Move water southward as possible.	When available, provide freshwater to maintain low salinity buffer and promote water movement.			

**Table EV-11.** Weekly water depth changes and water management recommendations