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 10, 2020

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

Strong upper-level convergence and sinking air (subsidence) across Florida, to the west of a deep trough of low pressure over the Atlantic Ocean, favor below normal total District rainfall today (daily climatological average is 0.29 inches). However, good moisture and instability profiles across the District, particularly north of Lake Okeechobee, suggest that afternoon showers and thunderstorms will form over parts of the interior and the west but probably later in the day once a strong 'cap' (or stable layer aloft) is broken after sufficient daytime heating occurs. Given the good instability, it would not be surprising to see localized areas of heavy rainfall over the far west and Kissimmee Valley, with some of the rains possibly extending into the evening in some cases. The late start to today's rains and east-southeasterly steering winds pushing the 'east coast sea breeze' well inland by afternoon should mean that most or all of the southeast would remain rain-free today. North of Lake Okeechobee where large-scale conditions are more conducive for rain, unusual west-northwesterly or northwesterly winds aloft will help to steer rains forming over the Kissimmee Valley southeastward, possibly toward the Treasure or upper east coasts. On Wednesday, the remains of a cold front pushing outward from a large cyclone over the central Atlantic are expected to spread across the Bahamas and Florida. A good supply of moisture and instability ahead of this feature and enhanced convergence along it should result in a substantial increase of rain chances and coverage of rain but especially over the interior and the west during the afternoon due to northeasterly steering winds. Localized areas of significant rainfall are possible. Much drier air rotating around the large circulation of the central Atlantic cyclone will overspread Florida from the northeast on Thursday and linger across the area while slowly beginning to moisten again by Friday. The sharp reduction in moisture favors below normal rainfall both Thursday and Friday, although the continuation of northeasterly steering winds would still favor afternoon rains from the western interior to the west coast, at least on Thursday. A tropical wave over the southwestern Caribbean Sea on Friday is forecast to move through the northwestern Caribbean and Central America over the weekend before entering the southern Gulf of Mexico by early the following week. A deep layer of moisture and instability associated with the wave are likely to be drawn northward across Cuba, Florida, and the Bahamas, ahead of a strong upper-level trough of low pressure digging from the eastern United States into the Gulf of Mexico. This weather pattern would favor greatly enhanced rains across these areas with a heightened potential of heavy rainfall occurring each day through early the following week and could result in an extended significant District rain event. A minority of model solutions show the northern end of the wave fracturing and moving over or near Florida, similar to what occurred Memorial Day of this year and prior to the development of "Bertha," but in an environment of strong wind shear that would likely prevent tropical cyclone formation. Nevertheless, it should be noted that a somewhat more organized system could further enhance the potential for heavy rains during this time, and future model runs will have to be monitored carefully to determine whether this scenario has a better chance of occurring.

<u>Kissimmee</u>

Tuesday morning stages were 53.5 feet NGVD (3.0 feet below schedule) in East Lake Toho, 52.9 feet NGVD (0.6 feet below schedule) in Toho, and 50.5 feet NGVD (0.5 feet below schedule) in Kissimmee-Cypress-Hatchineha; headwater stages were 47.5 feet NGVD at S-65A and 25.7 feet NGVD at S-65D. Tuesday morning discharges were 0 cfs at S-65, 883 cfs at S-65A, 2,263 cfs at S-65D and 2,144 cfs at S-65E. Dissolved oxygen concentration in the Kissimmee River averaged 4.6 mg/L for the week through Sunday. Kissimmee River mean floodplain depth on Sunday was 0.79 feet. This week's recommendations: Reduce flow at S-61 to slow the rate of stage rise in Lakes Kissimmee-Cypress-Hatchineha. To the extent possible, increase flow through S-59 to slow the rate of stage rise in East Lake Toho. 2020 Wet Season Recommendations for Kissimmee Basin: Continue to use the IS-14-50 discharge plan through the 2020 Wet Season. The discharge rate of change limits for S-65/S-65A may be adjusted for individual events after consultation with Kissimmee River Restoration Evaluation Program (KRREP) staff. To the extent possible, attempt to control the ascension rate in East Lake Toho to be less than 1.0 feet per 30 days during the June 1- August 15 window. To the extent possible, attempt to control the ascension rate in Lakes Toho and Kissimmee-Cypress-Hatchineha to be less than 0.5 feet per 14 days during the June 1-August 15 window.

Lake Okeechobee

Lake Okeechobee stage was 12.05 feet NGVD on June 8, 2020, up 0.58 feet from the previous week, and 0.83 feet from the previous month. The Lake entered the Beneficial Use sub-band on March 4, 2020 and is now 1.4 feet above the Water Shortage sub-band. Lake stage finally moved back into the ecological envelope (which varies seasonally from 12.0 – 15.0 feet NGVD +/- 0.5 feet), which it had been below since October 15, 2019. While water levels remain relatively low, the current ascension rate (over 1 foot in 3 weeks) is a concern for the recovering submerged and emergent marsh vegetation at low elevations. High district-wide rainfall and rapid Lake stage reversals also reduced wading bird foraging, while nesting efforts were already low for the second consecutive year on the Lake due to low lake stages during the breeding season.

Estuaries

Total inflow to the St. Lucie Estuary averaged 6,279 cfs over the past week with no flow coming from Lake Okeechobee. The seven-day average salinities decreased significantly in the estuary over the past week. Salinity at the US1 Bridge fell into the poor range (0-5) for adult eastern oysters. Total inflow to the Caloosahatchee Estuary averaged 4,015 cfs over the past week with only 15 cfs (estimated) coming from the Lake. The seven-day average salinity decreased throughout the estuary over the past week. Salinities are in the good range (0-10) for tape grass at Val I-75 and Ft. Myers. Salinities are in the good range for adult eastern oysters at Cape Coral and Shell Point and in the fair range at Sanibel. Lake stage is in the Beneficial Use sub-band of 2008 LORS. Tributary hydrological conditions are very wet. The SFWMD's Lake Okeechobee Adaptive Protocol's Release Guidance suggests no S-77 release to the Caloosahatchee Estuary.

Stormwater Treatment Areas

Over the past week, no Lake Okeechobee water was delivered to the FEBs/STAs. The total amount of Lake releases sent to the FEBs/STAs in WY2021 (since May 1, 2020) is approximately 9,500 ac-feet. The total amount of inflows to the STAs in WY2021 is approximately 169,000 ac-feet. Most STA cells are well above target stage, except STA-5/6 cells that are slightly below target. STA-1E Western Flowway is offline for the Restoration Strategies project to fill and grade Cells 5 and 7. Operational restrictions are in place in STA-1W Northern Flow-way related to STA-1W Expansion #1 startup activities, in STA-1E Central Flow-way, STA-2 Flow-way 3, STA-2 Flow-way 4, STA-3/4 Eastern, Central, and Western Flow-ways for vegetation management activities, and in STA-5/6 Flow-ways 2 and 3 following the Restoration Strategies project to grade non-effective treatment areas. This week, there is no capacity for Lake releases in the STAs.

Everglades

Ascension rates impact apple snail reproduction and the current ecologically preferred rate in the Everglades is 0.05–0.15 feet per week, with a maximum of 0.25 per week or 0.5 per two weeks. WCA-1 is now well above schedule, WCA-2A fell to just above schedule last week and WCA-3A moved above regulation schedule. Heavy rainfall last week meant a continued stage reversal occurred across the Everglades negatively impacting wading bird nesting especially Wood Storks whose nesting numbers have declined 70 percent. The core of wading bird nesting in the Everglades remains in WCA-1, however the white ibis there are not foraging within the system and water management to create a recession most likely has little ecological benefit. White ibis and small herons are continuing to nest successfully in the WCAs. Moderate rains fell over Taylor Slough and Florida Bay last week and stages increased. Phosphorus levels near the western structures have decreased. Florida Bay average salinities increased and remain within the middle 50% of historical values. The 30-day moving average salinity at the TR station in the mangrove zone but remains over 30 psu.

Supporting Information

KISSIMMEE BASIN

Kissimmee Basin Rainfall

The Upper Kissimmee Basin received 3.89 inches of rainfall in the past week and the Lower Basin received 3.70 inches (SFWMD Daily Rainfall Report 6/8/2020).

Upper Kissimmee Basin

Stages and departures in the Kissimmee Chain of Lakes (KCOL) are shown in **Table 1**. KCOL stage hydrographs with respective regulation schedules and rainfall are shown in Figures 1-3.

Table 1. Average discharge (cfs) for the preceding seven days, one-day stage (feet NGVD), and departures from KCOL flood regulation (R) or temporary schedules (T, A, or S). Provisional, real-time data are from SFWMD.

		7-day				Schedule			Daily	Departure	e (feet)	_	_
Water Body	Structure	Average Discharge (cfs) ¹	Stage Monitoring Site ²	Lake Stage (feet)	Schedule Type ³	Stage (feet)	6/7/20	5/31/20	5/24/20	5/17/20	5/10/20	5/3/20	4/26/20
Lakes Hart and Mary Jane	S-62	9	LKMJ	59.8	R	60.0	-0.2	0.1	-0.1	-0.2	-0.2	-0.2	-0.2
Lakes Myrtle, Preston, and Joel	S-57	1	S-57	60.6	R	61.0	-0.4	0.0	-0.1	-0.1	0.0	0.0	0.1
Alligator Chain	S-60	14	ALLI	62.3	R	63.2	-0.9	0.1	0.0	0.0	-0.1	0.0	0.1
Lake Gentry	S-63	23	LKGT	60.0	R	61.0	-1.0	0.2	-0.1	0.1	0.0	0.0	0.1
East Lake Toho	S-59	76	TOHOE	53.4	R	56.5	-3.1	-2.0	-3.0	-3.2	-3.4	-3.5	-3.8
Lake Toho	S-61	544	TOHOW, S-61	52.7	R	53.5	-0.8	0.3	-0.1	-0.3	-0.5	-0.5	-0.6
Lakes Kissimmee, Cypress, and Hatchineha	S-65	427	KUB011, LKIS5B	50.4	R	51.0	-0.6	0.8	0.0	-0.1	-0.1	-0.1	-0.1

Report Date: 6/9/2020

¹Seven-day average of weighted daily means through midnight.

² Names of in-lake monitoring sites and structures used to determine lake stage; if more than one site is listed, an average is reported.

³ A = projected ascension line, R = USACE regulation schedule, S = temporary recession target line, T = temporary schedule, N/A= not applicable or data not available.

DATA ARE PROVISIONAL

Lower Kissimmee Basin

Discharges at Lower Basin structures are shown in Table 2. SFWDAT depth maps for the Phase I restoration area are shown in Figure 4. Mean daily dissolved oxygen concentrations, discharge, temperature, and rainfall are shown in Figure 5. The 2019-2020 Discharge Plan for S-65/S-65A, the interim regulation schedule for S-65, and a map of the Kissimmee Basin are shown respectively in Figures 6-8.

Table 2. One-day and seven-day averages of discharge at S-65x structures, of dissolved oxygen concentration in the Phase I area river channel, and water depth in the Phase I area floodplain. Data are provisional real-time data from SFWMD.

Report Date:	6/9/2020										
Matria	Location	1-Day Average			Avera	ge for the Pre	eceeding 7-I	Days ¹			
wethe	Location	6/7/2020	6/7/20	5/31/20 5/24/20 5/17/20 5/10/20 5/3/20			5/3/20	4/26/20 4/19/20 4/12/20			
Discharge (cfs)	S-65	0	427	695	496	353	738	760	611	372	365
Discharge (cfs)	S-65A ²	903	884	788	438	313	656	679	550	353	323
Discharge (cfs)	S-65D ²	2,189	1,485	903	325	441	667	722	485	317	308
Headwater Stage (feet NGVD)	S-65D ²	25.84	25.78	25.76	25.84	25.61	25.81	25.84	25.84	25.83	25.75
Discharge (cfs)	S-65E ²	2,193	1,552	926	312	411	617	677	435	282	283
Discharge (cfs)	S-67	0	0	0	0	0	0	0	0	0	0
DO (mg/L) ³	Phases I & II/III river channel	2.6	4.6	6.4	8.0	8.0	8.0	7.9	7.5	7.9	7.4
Mean depth (feet) ⁴	Phase I floodplain	0.79	0.54	0.28	0.08	0.07	0.09	0.14	0.10	0.06	0.07

¹Seven-day average of weighted daily means through Sunday midnight. ⁴S-65A discharge combines S-65A with auxillary strucutures; S-65D discharge combines discharge at S-65D, S-65DX1, and S-65DX2; S-65D stage averages stage at S-65D and S-65DX1; S-65E discharge combines S-65E and S-65EX1.

³DO is the average for sondes at KRBN, PC62, PC33, PD62R, and PD42R.

⁴1-day spatial average from South Florida Water Depth Assessment Tool (SFWDAT).

DATA ARE PROVISIONAL; N/A indicates that data were not available.

KCOL Hydrographs (through Sunday midnight)



Figure 1.



Figure 2.



Figure 3.



Figure 4. Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to January 16, 2012.





Figure 5. Mean daily dissolved oxygen, discharge, temperature and rainfall in the Phases I/II/III river channel.



Figure 6. The 2019-2020 Discharge Plan for S-65/S-65A.



Figure 7. Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years.



Figure 8. The Kissimmee Basin.

LAKE OKEECHOBEE

Lake Okeechobee stage is 12.05 feet NGVD, 0.83 feet higher than a month ago and 1.14 feet higher than one year ago (Figure 1). The Lake is now back within the preferred ecological envelope (Figure 2). Lake stage moved into the Base Flow sub-band on September 11, 2019 and entered the Beneficial Use sub-band on March 4, 2020 (Figure 3). Lake stage had been declining since late-February 2020 until the start of the wet season in mid-May, reaching a low of 10.99 feet NGVD on May 17. In the 22 days since then, the Lake has risen over 1 foot, at an average rate of more than half an inch per day. According to RAINDAR, 3.27 inches of rain fell directly over the Lake during the past week (Figure 4). Portions of the upper Kissimmee Basin received over 4 inches of rainfall, all but the southern watersheds received at least 2-3 inches of rainfall. The district wide average was 3.8 inches.

The average daily inflows (minus rainfall) increased considerably from 3,958 cfs to 9,775 cfs, while the outflows (minus evapotranspiration) remained close to zero. Uncharacteristically, much of the inflow (3,990 cfs) came from the C-44 canal, through S-308, which is predominantly an outflow from the Lake. High inflows were also received from the C-41A canal (1,755 cfs through S-84 & S-84X) and the Kissimmee River (1,743 cfs through S-65E & S-65EX1), while the remaining inflow sources provided approximately 1,600 cfs between them. There was effectively zero outflow from the Lake. Total lake inflows and outflows for the past week are detailed in Table 1, as well as the approximate change in lake stage from each major structure's total flows over the period. Figure 5 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.

A wading bird survey flight was conducted on June 5, 2020, with zero birds seen foraging within the Lake (Figure 6). A likely explanation for this is the multi-week reversal in lake levels causing a redistribution of prey to the rewetted areas, making foraging on the lake less efficient. Additionally, the heavy rain has continued to open up foraging opportunities outside of the lake.

Water quality sampling occurs twice-monthly at 30 stations from May – October as part of expanded monitoring efforts to track and study Harmful Algal Blooms on the Lake. Figure 7 shows results from the late May (18-21) sampling. Chlorophyll-*a* values were elevated (>20 μ g/L) at 11 of 16 stations in nearshore areas (5 stations were not sampled), and 4 of those sites had bloom conditions (>40 μ g/L). However, none of these bloom sites had measured toxin levels above 1 μ g/L, and the highest toxin value (5.57 1 μ g/L) was found at Pelbay3, which had a Chlorophyll-*a* value less than 8 μ g/L. In contrast, only 2 of 9 stations in the pelagic areas had elevated Chlorophyll-*a* values, and none had bloom conditions. But 5 of 9 stations had detectable levels of toxin, 2 of which were higher than 8 μ g/L, the recommended safe level for recreational waters.

Due to the persistent heavy cloud cover, there is no current satellite imagery from NOAA's cyanobacteria monitoring EUMETSAT's Sentinel 3 OLCI sensor.

Water Management Summary

Lake Okeechobee stage was 12.05 feet NGVD on June 8, 2020, up 0.58 feet from the previous week, and 0.83 feet from the previous month. The Lake entered the Beneficial Use sub-band on March 4, 2020 and is now 1.4 feet above the Water Shortage sub-band. Lake stage finally moved back into the ecological envelope (which varies seasonally from 12.0 – 15.0 feet NGVD +/- 0.5 feet), which it had been below since October 15, 2019. While water levels remain relatively low, the current ascension rate (over 1 foot in 3 weeks) is a concern for the recovering submerged and emergent marsh vegetation at low elevations. High district-wide rainfall and rapid Lake stage reversals also reduced wading bird foraging, while nesting efforts were already low for the second consecutive year on the Lake due to low lake stages during the breeding season.

Table 1. Average daily inflows and outflows and the approximate depth equivalents on Lake Okeechobee for various structures.

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	932	1743	0.8	S-77	7	16	0.0	
S-71 & S-72	571	656	0.3	S-308	-438	-3990	-1.9	
S-84 & S-84X	1887	1755	0.8	S-351	0	0	0.0	
Fisheating Creek	28	59	0.0	S-352	0	0	0.0	
	20	55	0.0	S-354	0	0	0.0	
S-154	0	49	0.0	L-8 Outflow				
S-191	0	862	0.4	ET	2591	1382	0.6	
S-133 P	0	112	0.1	Total	2160	-2592	-1.2	
S-127 P	0	27	0.0					
S-129 P	25	28	0.0					
S-131 P	59	51	0.0					
S-135 P	0	177	0.1					
S-2 P	0	0	0.0					
S-3 P	0	0	0.0		Provis	ional Data		
S-4 P	0	0	0.0					
L-8 Backflow	20	267	0.1					
Rainfall	2348	6980	3.3					
Total	5868	12766	6.0					



Figure 1. Water depth estimates on Lake Okeechobee based on the South Florida Water Depth Assessment Tool.



Lake Okeechobee Stage vs Updated Ecological Envelope

Figure 2. Select annual stage hydrographs for Lake Okeechobee in comparison to the updated Ecological Envelope.



Lake Okeechobee Water Level History and Projected Stages

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



Figure 4. 7-Day rainfall estimates by RAINDAR.



Figure 5. Major inflows (orange) and outflows (blue) of Lake Okeechobee, including the S-350 structures designated as South (green). The L-8 Canal flows through Culvert 10A are included as outflows when positive, and as inflows when backflowing into the Lake. All inflows and outflows are shown as positive and negative, respectively, for visual purposes. Outflows through the S-77 and S-308 structures are shown based on their downstream gauges to account for lock openings for navigation.



Figure 6. Results of June 5, 2020 wading bird survey flight, and comparison to previous surveys.



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Figure 7. Water quality parameters at nearshore (n=21) and pelagic (n=9) stations for May 18-21, 2020. All data are provisional.

ESTUARIES

St. Lucie Estuary:

Last week total inflow to the St. Lucie Estuary averaged approximately 6,379 cfs (Figures 1 and 2) and last month inflow averaged about 2,609 cfs. Last week's provisional averaged inflows from the tidal basin and the structures are shown in Table 1.

Location	Flow (cfs)
Tidal Basin Inflow	2017
S-80	0
S-308	-3191
S-49 on C-24	1618
S-97 on C-23	2192
Gordy Rd. structure on Ten Mile Creek	552

Table 1. Weekly average inflows (data are provisional)).
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Over the past week, salinity decreased throughout the estuary (Table 2, Figures 3 and 4). The sevenday moving average of the water column (an average of the surface and bottom salinity) at the US1 Bridge is 1.7. Salinity conditions in the middle estuary are estimated to be within the poor range for adult eastern oysters (Figure 3).

Table 2. Seven-day average salinity at three monitoring sites in the St. Lucie Estuary. Current average is in bold face type, previous average in parentheses. The envelope reflects the preferred salinity range for adult eastern oysters (*Crassostrea virginica*) in the middle estuary.

Sampling Site	Surface	Bottom	Envelope
HR1 (North Fork)	0.5 (3.0)	0.7 (7.2)	NA ¹
US1 Bridge	1.2 (6.7)	1.4 (7.8)	10.0-26.0
A1A Bridge	5.0 (13.3)	9.8 (18.7)	NA ¹

¹Envelope not applicable

Caloosahatchee Estuary:

Last week total inflow to the Caloosahatchee Estuary averaged approximately 4,015 cfs (Figures 5 and 6) and last month inflow averaged about 1,871 cfs. Last week's provisional averaged inflows from the structures and the tidal basin are shown in Table 3.

Location	Flow (cfs)
S-77	16
S-78	1520
S-79	2891
Tidal Basin Inflow	1124

Table 3. Weekly average inflows (c	data is provisional).
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Over the past week, salinity decreased throughout the estuary (Table 4, Figures 7 & 8). The seven-day average salinity values are within the good range for adult eastern oysters at Cape Coral and at Shell Point and in the fair range at Sanibel (Figure 9). The seven-day average surface salinities (Table 4) are in the good range (0-10) for tape grass at Val I-75 and at Ft. Myers.

Table 4. Seven-day average salinity at six monitoring stations in the Caloosahatchee Estuary. Current average is in bold, previous average in parentheses. The envelope at Val I-75 is for the protection of tape grass in the upper estuary and the envelope in the lower estuary reflects the preferred salinity range for adult eastern oysters (*Crassostrea virginica*).

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Sampling Site	Surface	Bottom	Envelope
S-79 (Franklin Lock)	0.3 (0.3)	0.5 (0.7)	NA ¹
Val I75	1.8 (2.8)	2.4 (3.6)	0.0-5.0 ²
Ft. Myers Yacht Basin	7.7 (10.0)	8.7 (13.4)	NA
Cape Coral	14.5 (19.0)	15.8 (20.8)	10.0-30.0
Shell Point	27.2 (30.3)	28.3 (30.8)	10.0-30.0
Sanibel	32.2 (34.1)	33.1 (34.5)	10.0-30.0

¹Envelope not applicable, ²Envelope is based on a 2-week forecast 30-day average.

Forecast of surface salinity (Table 5 and Figure 10) at Val I-75 for the next two weeks using the autoregression model (Qiu and Wan, 2013) coupled with a linear reservoir model for the tidal basin predicts daily salinity ranging from 0.8 to 2.5 at the end of the two week period for pulse release at S-79 ranging from 0 to 800 cfs and estimated Tidal Basin inflows of 800 cfs. The 30-day moving average surface salinity at Val I-75 is forecast to be between 1.7 and 2.1 (Table 5). The current salinity conditions at Val I-75 are within the envelope of salinity 0.0-5.0 for this site (Table 4).

Scenario	Q79	TB runoff	Daily	30 day
	(cfs)	(cfs)	salinity	Mean
A	0	800	2.5	2.1
В	300	800	1.6	1.9
С	450	800	1.3	1.8
D	650	800	1.0	1.7
E	800	800	0.8	1.7

 Table 5. Predicted salinity at Val I-75 at the end of forecast period

Red tide

The Florida Fish and Wildlife Research Institute reported on June 5, 2020, that *Karenia brevis*, the Florida red tide dinoflagellate, was not observed in samples collected from Lee or Broward counties (no samples were analyzed this week from St. Lucie, Martin, Palm Beach, or Miami-Dade counties).

Water Management Recommendations

Lake stage is in the Beneficial Use Flow sub-band. Tributary conditions are very wet. The South Florida Water Management District's Lake Okeechobee Adaptive Protocol's Release Guidance suggests no S-77 to the Caloosahatchee Estuary.



Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.



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



Figure 3. Seven-day mean salinity of the water column at the US1 Bridge.



Figure 4. Daily mean salinity at the A1A, US1, and HR1 stations.



Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.



Figure 6. Total daily inflows from Lake Okeechobee, runoff from the C-43 basin



Figure 7. Daily mean flows at S-79 and salinity at upper estuary monitoring stations.



Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.



Figure 9. Seven-day mean salinity at Cape Coral, Shell Point, and Sanibel monitoring stations.





EVERGLADES

Well above average rainfall was recorded across the Everglades last week, with Everglades National Park (ENP) receiving the least. At the gauges monitored for this report stages rose on average 0.20 feet last week with a maximum rate of change of +0.54 feet in WCA-3A NE. Evaporation was estimated at 1.76 inches last week a slight decrease from the week prior.

Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	2.74	+0.17
WCA-2A	2.54	+0.33
WCA-2B	2.79	+0.16
WCA-3A	2.98	+0.31
WCA-3B	1.39	+0.02
ENP	1.09	+0.38



Regulation Schedules: WCA-1: Falling the week before, stage at the 1-8C Gauge rose quickly last week, currently 0.63 feet above the Zone A1 regulation line and 0.08 feet above the 3 Gauge average. WCA-2A: Stage at Gauge S11-B ascending the week prior, fell to near the Zone A regulation line last week, now 0.11 feet above. WCA-3A: The Three Gauge Average rose to just above the Zone A regulation line last week, presently 0.04 feet above the regulation line. WCA-3A at gauge 62 (Northwest corner): Stage continued to rise quickly last week nearing the Upper Schedule at 0.10 feet below the rising target line.



Water Depths: The WDAT tool for spatial interpolation of depth monthly snapshots indicate depths in WCA-3A North are approaching 1.0 feet across that entire sub-basin except in the northeast corner and along the Miami canal. Depths in WCA-3A South are building, in excess of 2.5 feet along the upper reaches of the L-67 canal. WCA-2A depths are highest along the northern and eastern perimeter, lowest upstream of the S-11s. Depths in WCA-1 have risen across that basin and remain lowest along the southern and southeastern perimeters. Shark River Slough and Lostman's Slough in ENP are ascending to ground surface or near and hydrologic connectivity has returned to Taylor River. Comparing WDAT water depths from present, over the last month depths increased significantly across the WCAs most prominently in northwestern WCA-3, the upper reach of the L-67 canal and northeastern WCA-2A. Looking back one year, the depth difference patterns are less striking, with mixed conditions in the WCAs. Northeast WCA-3A is significantly wetter than it was a year ago. The WDAT model indicates wetter conditions in the western basins and the panhandle of ENP compared to a month ago but less so a year ago.







Taylor Slough Water Levels: An average of 0.74 inches of rain fell over Taylor Slough and Florida Bay this past week and stages increased an average of 0.03 feet (driven by TSB in northern Taylor Slough that was the only station to increase this week). Operations of the S-332s slowed this week with the lower rainfall which is decreasing the head pressure to Taylor Slough.









Florida Bay Salinities: Average salinity in Florida Bay increased 0.5 psu with the largest increases occurring in the central and western nearshore areas. The salinities in the Bay are still within the middle 50% of historical values for this time of year, but the nearshore areas are still elevated. More rain and water deliveries are needed to fuel freshwater flows towards Florida Bay to decrease those salinities.

Florida Bay MFL: Salinity at the TR station in the mangrove zone (tracked for the Florida Bay MFL) decreased from 28 psu to 18 before returning to 28 psu to end the week. The 30-day moving average decreased 2.9 psu to end at 32.2 psu. Weekly flow from the 5 creeks identified by yellow stars on the map totaled only 400 acre-feet last week with flows changing direction every day. Only the 2 easternmost creeks had positive flow, but the quantities were greater than the negative flows to the west on alternate days. The 365-day moving sum of flow from the five creeks (tracked as part of the Florida Bay MFL criteria) increased 10,000 acre-feet this week to end at 229,842 acre-feet, between the 25th percentile (192,885 acre-feet) and the median (249,091 acre-feet). Creek flow are provisional USGS data.

Water Management Recommendations

When water is discharged to tide its potential to benefit the ecology of the Everglades is lost. Conserving water in the WCAs and sending it southward has ecological benefit. Balancing inflows to the west and east along the northern perimeter of WCA-3A North has ecological benefit. Phosphorus levels at the western structures (S-328 and G-737) near the Taylor Slough headwaters were 13 µg/L last week a decrease from the week before that sufficiently lessens the impact of nutrients should those structures need to be utilized. Flows towards Taylor Slough and Florida Bay freshen salinity conditions within the nearshore areas of Florida Bay and decrease the currently stressful conditions for seagrasses and fauna as nearshore salinities remain elevated, decreasing the estuarine gradient within the bay. More specific recommendations appear in the summary table below. The red text represents new or modified information or recommendations.

SFWMD Everglades Ecological Recommendations, June 2nd, 2020 (red is new)							
Area	Weekly change	Recommendation	Reasons				
WCA-1	Stage increased by 0.04'	Moderating the ascension rate to less than 0.25 feet per week or 0.50 feet per two weeks is ecologically beneficial. A recession rate in this basin has ecological benefit.	Protect downstream habitat and wildlife. Provide in basin wading bird foraging opportunities as wading bird nesting continues in this basin.				
WCA-2A	Stage increased by 0.61'	Moderating the ascension rate to less than 0.25 feet per week or 0.50 feet per two weeks and conserving water in this basin has ecological benefit.	Protect upstream/downstream habitat and wildlife. Apple snail reproduction is hindered by rapidly increasing stage.				
WCA-2B	Stage increased by 0.32'	Moderating the ascension rate to less than 0.25 feet per week or 0.50 feet per two weeks and conserving water in this basin has ecological benefit.	Protect upstream/downstream habitat and wildlife. Apple snail reproduction is hindered by rapidly increasing stage.				
WCA-3A NE	Stage increased by 0.34'	Moderating the ascension rate to less than 0.25 feet per week or 0.50 feet per two weeks and conserving water in this basin has ecological benefit.	Protect upstream/downstream habitat and wildlife. Apple snail				
WCA-3A NW	Stage increased by 0.67'	Moderating the ascension rate to less than 0.25 feet per week or 0.50 feet per two weeks and conserving water in this basin has ecological benefit.	reproduction is hindered by rapidly increasing stage.				
Central WCA-3A S	Stage remained unchanged	Moderating the ascension rate to less than 0.25 feet per week or 0.50 feet per two weeks and conserving water in	Protect upstream/downstream habitat and wildlife. Protect wading bird				
Southern WCA-3A S	Stage increased by 0.54'	this basin has ecological benefit. A recession rate in this basin has ecological benefit	foraging as nesting continues.				
WCA-3B	Stage increased by 0.39'	Moderating the ascension rate to less than 0.25 feet per week or 0.50 feet per two weeks and conserving water in this basin has ecological benefit.	Protect upstream/downstream habitat and wildlife. Apple snail reproduction is hindered by rapidly increasing stage.				
ENP-SRS	Stage increased by 0.54'	Make discharges to the Park according to the 2012 WCP rainfall plan	Protect upstream/downstream habitat and wildlife. Apple snail reproduction is hindered by rapidly increasing stage.				
Taylor Slough	Stage changes ranged from +0.31' to +1.21'	Move water southward as possible	When available, provide freshwater buffer for downstream conditions.				
FB- Salinity	Salinity changes ranged -13.8 to +0.7 psu	Move water southward as possible	When available, provide freshwater to maintain low salinity buffer and promote water movement.				