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: December 29, 2021
- **SUBJECT:** Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

A mid-level area of high pressure located over Florida this morning will shift eastward during the next couple of days but reform over Florida by Saturday. The high-pressure area will block any frontal systems from affecting the District's weather through early this weekend while supporting above normal temperatures. From Wednesday through Saturday daytime maximum temperatures could rise to near-record or record levels, especially over interior sections of the District. Even though moisture levels will be increasing by Thursday, the strong stability of the atmosphere associated with the high will inhibit any organized areas of rains, except for isolated showers along and near the southeast coast. An upper-air disturbance moving out of the Great Plains late Saturday should cross the Mississippi River Valley on Sunday on its way to the eastern U.S. The vigorous upper-air impulse should introduce a cold front into north Florida on Sunday that will push through the northwestern half of the District Sunday night and move offshore the southeast coast of Florida on Monday morning. Ahead of the front on Sunday, very warm and dry conditions will prevail. A ribbon of moisture preceding the boundary, the 'lift' of the approaching frontal zone, and the forced ascent associated with favorable jet stream dynamics should cause a line of fastmoving, moderately heavy showers to sweep across the far northern part of the District Sunday evening. Although light to moderately heavy rains could occur north and west of Lake Okeechobee, the rains should generally diminish in intensity by the time they reach areas south and east of the Lake during the early morning hours on Monday. According to the latest model guidance, total rainfall on Sunday is unlikely to exceed a tenth of an inch, much less than the average for a frontal passage this time of year. Cooler weather with breezy north-northeasterly winds is then likely on Monday next week. There is a lower chance that some rains could occur along and near the east coast following the frontal passage, however, most model solutions favor a complete drying before noontime on Monday.

Kissimmee

Flow at S-65A has been reduced to minimum discharge (~300 cfs) and water depth on the Kissimmee River floodplain is declining. Mean depth decreased to 0.25 feet as of December 26, 2021. The concentration of dissolved oxygen in the Kissimmee River has remained well above the region of concern, with an average of 7.5 mg/L for the week ending on December 26, 2021.

Lake Okeechobee

Lake Okeechobee stage was 15.63 feet NGVD on December 26, 2021 and it was 0.38 feet lower than a month ago (**Figure LO-1**). Lake stage is currently 0.13 feet above the ecological envelope (**Figure LO-2**). Average daily inflows (excluding rainfall) decreased from the previous week, going from 764 cfs to 610 cfs. Average daily outflows (excluding evapotranspiration) increased from the previous week, going from 1,650 cfs to 1,992 cfs. Recent satellite imagery (December 25, 2021) showed low to medium bloom potential along the southern and western shorelines (**Figure LO-6**).

Estuaries

Total inflow to the St. Lucie Estuary averaged approximately 670 cfs over the past week with no flow coming from Lake Okeechobee. Mean surface salinities increased 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 2,190 cfs over the past week with 1,450 cfs coming from the Lake. Mean surface salinities remained the same at S-79, increased at Cape Coral, and decreased at the remaining sites 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, Shell Point and Sanibel.

Stormwater Treatment Areas

For the week ending Sunday, December 26, 2021, 1,300 ac-feet of 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 62,500 ac-feet. The total amount of inflows to the STAs in WY2022 is approximately 950,000 ac-feet. Most STA cells are at or near target stage, except STA-5/6 cells that are starting to dry 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, and STA-2 Flow-way 2 is offline for construction activities. Operational restrictions are in place in STA-1W Western, Eastern, and Northern Flow-ways 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. This week, if 2008 LORS recommends Lake releases to the WCAs and conditions allow, releases will be sent to STA-2.

Everglades

Rates of stage change across the Everglades went from mostly fair the previous week to fair and poor last week with elevated recessions in WCA-2A and northeastern and central WCA-3A. Depths are low in northern WCA-3A and stages are below the median in the central and southern regions of that conservation area. Florida Bay salinities increased again over the last week and stages fell in Taylor Slough. Salinities in both the central and eastern regions remain near the 75th percentile and conditions are less than ideal to tolerate a drier than average dry season.

Supporting Information

Kissimmee Basin

Upper Kissimmee

On December 26, 2021, lake stages were 58.0 feet NGVD (at schedule) in East Lake Toho, 54.8 feet NGVD (0.2 feet below schedule) in Lake Toho, and 50.2 feet NGVD (2.3 feet below schedule) in Lakes Kissimmee-Cypress-Hatchineha (KCH) (**Table KB-1**, **Figures KB-1-3**).

Lower Kissimmee

Discharges to the Kissimmee River on December 26, 2021 were 390 cfs at S-65 and 310 cfs at S-65A; discharges from the Kissimmee River were 370 cfs at S-65D and 370 cfs at S-65E (**Table KB-2**). Headwater stages were 46.3 feet NGVD at S-65A and 26.4 feet NGVD at S-65D on December 26, 2021. With lower water temperatures, little rainfall, and reduced discharge at S-65A, the concentration of dissolved oxygen has remained well above the region of concern, with an average of 7.5 mg/L for the week ending on December 26, 2021 (**Table KB-2**, **Figure KB-4**). Flow at S-65A has been reduced to minimum discharge (~300 cfs) and water depth on the Kissimmee River floodplain is declining. Mean depth decreased to 0.25 feet as of December 26, 2021 (**Figure KB-5**).

Water Management Recommendations

Managed stage recessions for snail kite nesting season are currently planned to begin in Lakes Toho and East Toho on January 15, 2022. In preparation, stage is being reduced in Lake Toho to 54.5 ft by January 14, 2022; this operation was started on December 17. Continue to maintain at least 300 cfs at S-65A and follow the IS-14-50 discharge plan (**Figure KB-6**) for S-65 and S-65A for the remainder of dry season.

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	7-Day Average	Lake Stage	Schedule Type ^b	Schedule Stage (feet NGVD)	Departure from Regulation (feet)	
-		Site	Discharge (cfs)	(feet NGVD) ^a			12/26/21	12/19/21
Lakes Hart and Mary Jane	S-62	LKMJ	88	61.0	R	61.0	0.0	-0.1
Lakes Myrtle, Preston and Joel	S-57	S-57	38	61.7	R	61.7	0.0	0.0
Alligator Chain	S-60	ALLI	100	64.0	R	64.0	0.0	0.0
Lake Gentry	S-63	LKGT	130	61.5	R	61.5	0.0	0.0
East Lake Toho	S-59	TOHOE	290	58.0	R	58.0	0.0	0.0
Lake Toho	S-61	TOHOW S-61	750	54.8	R	55.0	-0.2	-0.1
Lakes Kissimmee, Cypress and Hatchineha	S-65	KUB011 LKIS5B	370	50.2	R	52.5	-2.3	-2.5

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	Average for Previous Seven Day Periods			ods
		12/26/21	12/26/21	12/19/21	12/12/21	12/5/21
Discharge	S-65	390	370	370	360	350
Discharge	S-65A ^a	310	310	310	310	310
Headwater Stage (feet NGVD)	S-65A	46.3	46.3	46.3	46.3	46.3
Discharge	S-65D ^b	370	380	410	470	540
Headwater Stage (feet NGVD)	S-65D ^c	26.4	26.4	26.5	26.7	26.8
Discharge (cfs)	S-65E ^d	370	380	400	420	530
Discharge (cfs)	S-67	0	0	0	0	0
Dissolved Oxygen (mg/L) ^e	Phase I, II/III river channel	7.9	7.5	7.5	7.6	7.3
Mean depth (feet) ^f	Phase I floodplain	0.25	0.26	0.26	0.29	0.32

a. Combined discharge from main and auxiliary structures.

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

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

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

e. Dissolved oxygen is the average of values from sondes KRBN, PC62, PC33, PD62R and PD42R.

f. 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 two 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.



Figure KB-6. IS-14-50 Discharge Plan for S65/S65A with discharge rate of change limits (revised 1/14/19).

Lake Okeechobee

Lake Okeechobee stage was 15.63 feet NGVD on December 26, 2021, with water levels 0.38 feet lower than a month ago (**Figure LO-1**). Lake stage was approximately 0.13 feet above the ecological envelope (**Figure LO-2**). Lake stage remained in the Low sub-band (**Figure LO-3**). According to NEXRAD, 0.15 inches of rain fell directly on the Lake last week.

Average daily inflows (excluding rainfall) decreased from the previous week, going from 764 cfs to 610 cfs. Average daily outflows (excluding evapotranspiration) increased from the previous week, going from 1,650 cfs to 1,990 cfs. Highest inflows came from the Kissimmee River through the S-65E structure (383 cfs). The second highest inflow (121 cfs) was via the C41A canal through the S-84 / 84X structures. Backflow through the S-271 structure from the L-8 canal decreased by 109 cfs since the previous week, and it was 12 cfs. There was an outflow of 1,550 cfs to the west via S-77, 447 cfs to the south via the S-350s, and no flow to the east via the S-308 structure. **Figures LO-4 and LO-5** show the combined average daily inflows and outflows for the Lake over the past eight weeks, and average inflows and outflows last week, respectively. These data are provisional and are subject to change.

The most recent satellite image (December 25, 2021) from the NOAA cyanobacteria monitoring product derived from EUMETSAT's Sentinel 3 OLCI sensor showed low to medium bloom potential along the southern and western shorelines (**Figure LO-6**).

The latest water quality survey on December 6 - 13, 2021 revealed that phytoplankton biomass was highest in the southwestern areas of the Lake. Blooms (chl a > 40 μ g/L) were recorded at 3 sites (or 9%), which is 1 less than in the November sampling event. The highest biomass (47.9 μ g/L) was recorded at L007 in the southern part of the Lake. Except for POLESOUT along the northwestern shoreline, all sites sampled for toxins had concentrations below detectable limits (**Table LO-2** and **Figure LO-7**).



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



Figure LO-2. The prior seven years of 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) or from the C-44 canal through the S-308 are included as inflows. Conversely, flows from Lake Okeechobee into the L-8 or C-44 canals are included with outflows. Inflows are shown as positive values; outflows are negative. Outflows through the S-77 (Caloosahatchee) and S-308 (C-44 Canal) structures are based on downstream gauges to include flows to lock openings for navigation.



Figure LO-5. Inflows into Lake Okeechobee from Indian Prairie basins, Taylor Creek/Nubbin Slough, Kissimmee River and Fisheating Creek, and outflows to the west via S-77, to the east via S-308, to the south via S-351, S-352, S-354, and to southeast via S-271 (formerly Culvert 10A) for the week of December 20 - 26, 2021.



Figure LO-6. Cyanobacteria bloom potential on December 25, 2021 based on NOAA's harmful algal bloom monitoring system. Gray color indicates cloud cover.

Table LO-2. Provisional results of chlorophyll *a* and toxin concentrations and cyanobacteria taxa from sampling trips on December 6 - 13, 2021. Color coding generally follows the legend in **Figure LO-7**.

Station	CHLa (ug/L)	TOXIN (ug/L)	ΤΑΧΑ	Station	CHLa (ug/L)	TOXIN (ug/L)	ΤΑΧΑ	
FEBIN	18			L001	9.3			
FEBOUT	28.7			L004	29.4			
KISSR0.0	17.3	BDL	mixed	L006	34.1			
L005	31.7	BDL	Microcys	L007	47.9			
LZ2	20.3	BDL	mixed	L008	11.9			
KBARSE	32.8			LZ30	39.9	BDL	Cylindro	
RITTAE2	20.9	BDL	mixed	LZ40	7.9			
PELBAY3	25.8			CLV10A	9.9	BDL	mixed	
POLE3S	45.3			NCENTER	23.1			
LZ25A	22.7							
PALMOUT	41.0	BDL	Microcys	S308C	4.7	BDL	mixed	
PALMOUT1	34.9			S77	7.5	BDL	mixed	
PALMOUT2	21.1			> SFWMD con:	siders >40 µ	ug/L Chlorop	ohyll a (Chla)	
PALMOUT3	20.7			an algal bloo	m Dotoctoble	limit of 0 7) F	
POLESOUT	17.3	0.3	mixed	ND – No Dor	ninant taxa	Elimit of 0.2	.ο μg/ L	
POLESOUT1	17.2			P – Pending				
POLESOUT2	14.1			 NS – Not Sampled Station bold font – crew observed possible BGA Chlorophyll <i>a</i> analyzed by SFWMD Toxin and Taxa analyzed by FDEP: Microcys = Microcystic: Cylindro = Cylindrospermonsic: 				
POLESOUT3	17.3							
EASTSHORE	18.0							
NES135	7.8			Planktol = Pl	anktolyngb	ya; Dolicho	=	
NES191	7.3			Dolichospermum				



Figure LO-7. Expanded monitoring network and provisional results from water quality samples collected December 6 - 13, 2021 overlaid onto the December 12, 2021 image from NOAA's harmful algal bloom monitoring system.

Estuaries

St. Lucie Estuary

Over the past week, mean total inflow to the St. Lucie Estuary was approximately 670 cfs (**Figures ES-1** and **ES-2**) and the previous 30-day mean inflow was approximately 640 cfs. For comparison, the historical provisional mean inflows from the contributing areas are shown in **Figure ES-2**.

Over the past week, salinities increased at all sites in 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 18.4. 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 2,190 cfs (**Figures ES-5** and **ES-6**) and the previous 30-day mean inflow was approximately 2,160 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 S-79, increased at Cape Coral, 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, Shell Point, and Sanibel (**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 steady releases at 2,000 cfs with estimated tidal basin inflows of 74 cfs. Model results from all scenarios predict daily salinity to be 1.0 or lower and the 30-day moving average surface salinity to be 0.4 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 December 22, 2021, that *Karenia brevis*, the Florida red tide dinoflagellate, was observed at background to very low concentrations in and offshore of Lee County. On the east coast, red tide was

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

observed at background concentrations in one sample collected from Palm Beach County but was not detected in any samples from St. Lucie or Martin counties.

Water Management Recommendations

Lake stage is in the Low Sub-Band. Tributary conditions are near normal. 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)	12.3 (12.0)	16.1 (14.2)	NA ^a
US1 Bridge	16.9 (15.6)	19.9 (17.4)	10.0 - 26.0
A1A Bridge	25.0 (24.9)	28.1 (27.6)	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)	0.2 (0.2)	0.2 (0.2)	NA ^a
Val I-75	0.3 (0.4)	0.5 (0.6)	$0.0 - 5.0^{\ b}$
Fort Myers Yacht Basin	3.3 (3.9)	5.3 (5.6)	NA ^a
Cape Coral	10.3 (9.7)	12.3 (11.9)	10.0 - 30.0
Shell Point	22.1 (22.8)	24.6 (24.8)	10.0 - 30.0
Sanibel	28.7 (30.1)	29.8 (30.5)	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 a	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
А	0	74	1.0	0.4
В	450	74	0.4	0.3
С	800	74	0.3	0.3
D	1000	74	0.3	0.3
Е	1500	74	0.3	0.3
F	2000	74	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 and vegetation in these cells is stressed and highly stressed. The 365-day phosphorus loading rates (PLRs) are high for the Eastern and Central Flow-ways (**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 or near target stage. Vegetation in the flow-ways is stressed and highly stressed. The 365-day PLRs for the Northern, Western, and Eastern Flow-ways are below 1.0 g/m²/year (**Figure S-2**).

STA-2: STA-2 Flow-way 2 is offline for construction activities. Operational restrictions are in place in STA-2 Flow-ways 3 and 4 for vegetation management activities. Online treatment cells are at or near 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 1, 4 and 5 are below 1.0 g/m²/year. The 365-day PLR for Flow-way 3 is high (**Figure S-3**).

STA-3/4: STA-3/4 Eastern Flow-way is offline for vegetation rehabilitation/drawdown. Most online treatment cells are at or near 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 the Central and Western Flow-ways are below 1.0 g/m²/year (**Figure S-4**).

STA-5/6: All Flow-ways are online. Most treatment cells are below target stage. All treatment cells have highly stressed vegetation conditions except Flow-ways 7 and 8 which are healthy. The 365-day PLRs for flow-ways 1, 6, 7, and 8 are below 1.0 g/m²/year. The 365-day PLRs for flow-ways 4 and 5 are high. (**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 – 12/20/2021 through 12/26/2021



STA-3/4 Flow-Way Status				As of 12/26/2021	STA-3/4 Flow & Phosphorus Concentration			
				Stage Based: Relative to Target Stage (TS)		7 day	28 day	265 day
Flow-	Vegetation	Joading Rate	Online /	Deep Water Level (> 2.8' above TS)		7-uay	20-uay	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	26	32	363,704
				0.2' – 1.5' above TS	Lake Inflow, ac-ft	0	N/A	39,600
Eastern Offline, vegetation management drawdown as of 3/1/2021		Target Stage (TS +/- 0.2')	Total Outflow, ac-ft	65	906	320,769		
Central	\leftarrow	۹	Online	Low Water Level (<0.2' below TS)	Inflow Conc., ppb	31	35	65
contrai	/	1.0	U.I.I.U	Depth / Area Based: Percent of Area Dry	Outflow Conc. nph			
		۹		0-25% Dry 50-75% Dry	Outnow conc., ppb	18	18	15
Western		1.0	Online	25-50% Dry 75-100% Dry	Includes Preliminary Da	ita		

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 – 12/20/2021 through 12/26/2021





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: The 1-8C stage fell in parallel with the Zone A1 regulation line last week. The average on Sunday was 0.27 feet above. WCA-2A: Stage at 2A-17 fell faster than the slope of the Zone A regulation line last week; the average on Sunday was 1.26 feet higher than that line. WCA-3A: Over the last week the Three Gauge Average stages continued to fall away from the stable Zone A regulation line; average stage was 0.42 feet below (compared to 0.31 feet the previous week) that line on Sunday. WCA-3A: Stage at gauge 62 (Northwest corner) continues to fall faster than the slope of the falling Upper Schedule, the average on Sunday was 0.75 feet below the regulation line. (**Figures EV-1** through **EV-4**).

Water Depths

The SFWDAT tool indicates that water depths in the WCAs remain the lowest in northeastern WCA-3A, where there is now potential for water below the soil surface. The spatial extent of depths more than 4.0' around the upper reaches of the L-67s is minimal. North to South hydrologic connectivity is diminishing within all the sloughs in Everglades National Park and areas significantly below ground in western ENP and southern BCNP continue to increase in spatial extent. (**Figure EV-5**). Comparing current WDAT water depths to the depth one month ago, stages are decreasing in most areas, northern ENP is the exception. Looking back one year, most of the EPA is significantly lower in depth, with only WCA-1 and northeastern ENP close to the same depth as last year (**Figure EV-6**). Comparing depths over the past 20 years, most of WCA-3A is now at or below the 50th percentile while southern WCA-2A, WCA-1 and northeastern ENP remain well above. Portions of western ENP/southeastern BCNP have fallen below the 20th percentile. (**Figure EV-7**).

Taylor Slough and Florida Bay

Next to no rain fell over Taylor Slough and Florida Bay over the week ending Sunday, 12/26, which allowed stages to decrease an average of 0.03 feet which is slower than last week's decrease of 0.09 feet (Figure EV-8 and Figure EV-9). The Slough average is 5 inches above its historical average for this time of year while the northern parts of the Slough are 9 inches above its historical average from before the modifications to levies and structures in Upper Taylor Slough. Compared to this time last year after Tropical Storm Eta, stages now are still 5 inches lower suggesting less water available to buffer downstream conditions. Given the expectation of a drier than average dry season, maintaining water deliveries to the area would help to slow the recession in the slough so water movements south can be expedited when the wet season starts.

Salinities in Florida Bay averaged an increase of 0.3 over the week ending 12/26, with individual station changes ranging from -1.8 to +3.0 (Figure EV-8). The largest changes were increases in the northeastern shoreline area. Both the eastern and central Bay averages remain near their respective 75th percentiles (Figure EV-10), while the western Bay is within 1 of its median salinity for this time of year (31). Conditions are not ideal for enduring a drier than average dry season. Bay-wide salinity is averaging 2.5 higher than the historical average while there is less water in the upstream Slough compared to last year.

Water Management Recommendations

Conserving water in the northern basins, then allowing that water to move downstream as we transition into the dry season maximizes the ecological benefit of freshwater on the landscape. Flows into northern WCA-3A that assist recession rates in that sub-basin then move downstream have an ecological benefit. Continued freshwater to the Taylor Slough area, enough that maintains stage will help expedite deliveries to the south when the wet season begins. Individual regional recommendations can be found in **Table EV-2**.

Everglades Region	Rainfall (inches)	Stage change (feet)
WCA-1	0.01	-0.06
WCA-2A	0.02	-0.15
WCA-2B	0.03	-0.11
WCA-3A	0.12	-0.11
WCA-3B	0.14	ERROR
ENP	0.10	-0.02

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

* sensor not reporting (other two gauges report -0.02)



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



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



Figure EV-3. WCA-3A stage hydrographs (three-gauge average, 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 median 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.

SFWMD Everglades Ecological Recommendations, December 28, 2021 (red is new)						
Area	Weekly change	Recommendation	Reasons			
WCA-1	Stage decreased by 0.06'	Conserve water in this basin letting the water move south when conditions allow.	Protect within basin and downstream habitat and wildlife. Anticipated La Nina dry season.			
WCA-2A	Stage decreased by 0.15'	Conserve water in this basin letting the water move south when conditions allow, with northern WCA-3A as the priority for receiving discharge. Keeping a recession rate less than 0.10 feet per week has an ecological benefit.	Protect within basin and downstream habitat and wildlife. Protect wading bird foraging conditions in WCA-3A North.			
WCA-2B	Stage decreased by 0.11'	Conserve water in this basin, maintain a minimum input to maintain stage while moving water south when conditions allow.	Protect within basin and downstream habitat and wildlife. Depths in excess of 4.0 feet.			
WCA-3A NE	Stage decreased by 0.14'	Conserve water in this basin letting the water move south when conditions allow. Keeping a recession rate less than 0.10 feet per week has an ecological benefit.	Protect within basin peat soils and downstream habitat and wildlife.			
WCA-3A NW	Stage decreased by 0.10'	Conserve water in this basin letting the water move south when conditions allow. Keeping a recession rate less than 0.10 feet per week has an ecological benefit.				
Central WCA-3A S	Stage decreased by 0.11'	Conserve water in this basin letting the water move south when conditions allow. Keeping a recession rate less than 0.10 feet per week has an	Protect within basin and downstream habitat and wildlife.			
Southern WCA-3A S	Stage decreased by 0.09'	ecological benefit.				
WCA-3B	Stage decreased by 0.02'	Conserve water in this basin letting the water move south when conditions allow.	Protect within basin and downstream habitat and wildlife.			
ENP-SRS	Stage decreased by 0.02 feet	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 -0.00' to -0.06'	Move water southward as possible.	When available, provide freshwater buffer for downstream conditions.			
FB- Salinity	Salinity changes ranged -1.8 to +3.0	Move water southward as possible.	When available, provide freshwater to maintain low salinity buffer and promote water movement.			

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