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, Chief, Operations, Engineering and Construction Bureau Paul Linton, Chief, Operations Section
- **FROM:** SFWMD Staff Environmental Advisory Team
- **DATE:** October 23, 2018
- SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

A band of enhanced moisture associated with a diffuse cold front over the Florida Straits extends northward through the southern portion of the District this morning. The enhanced moisture should help to generate isolated light rains this afternoon, generally south of a southern Palm Beach-extreme southern Collier County line and especially farther south and east over Miami-Dade and Monroe counties where the moisture is the greatest. However, the lack of any instability means that thunderstorms are not likely, which should keep localized rainfall accumulations less than about half an inch. Isolated light showers are also possible from the Space Coast through portions of the upper Kissimmee valley in a region of relatively greater moisture. Overall, the total District rainfall is again predicted to be well below average, which should extend the streak of days with much below normal District rainfall to eleven. A rebound in moisture should occur on Wednesday ahead of the next cold front that is forecast to stall over north Florida, to the north of the District. The increase of moisture should cause some minor enhancement of shower activity over the eastern half of the District, with the greatest activity generally closer to the east coast. Low pressure over the Gulf of Mexico should strengthen and shift northeastward into the southeastern United States by Friday, bringing heavy rains from the northern Gulf coast through the eastern United States today through early this weekend. Even though the axis of heaviest rains associated with the low should remain north of the District, some enhancement of District rainfall is expected from Thursday through Saturday. However, total rainfall on these days is expected to be no better than about average (daily normal is 0.10"). The cold front over north Florida late this week should sweep southward through the District late on Saturday and move off the southeast coast by early Sunday, ushering in very dry and stable air. No rainfall is forecast from Sunday through the middle part of next week in the wake of the front, and possibly a second, stronger front that would pass early next week. For the week ending next Tuesday morning, the deterministic quantitative precipitation forecast (QPF) is 0.23" or about 30% of normal while the probabilistic model data indicates only a one in five shots of seeing normal precipitation (0.72") [the 5th, 25th, 50th, and 75th percentiles are the following: 0.15", 0.28". 0.44", and 0.66", respectively]. The weekly deficit of rains should cause the October rainfall deficit to widen further, with total October rainfall projected to be close to 40% of normal [around the 10th percentile]. Additionally, the June-October rainfall is expected to be around 7.75" below normal, which essentially offsets the record-breaking rains to start off the wet season (May rainfall was 7.64" above normal).

Kissimmee

Tuesday morning stages were 57.1 feet NGVD (0.6 feet below schedule) in East Lake Toho, 54.4 feet NGVD (0.3 feet below schedule) in Toho, and 50.0 feet NGVD (2.2 feet below schedule) in Kissimmee-Cypress-Hatchineha; headwater stages were 46.5 feet NGVD at S-65A and 27.8 feet NGVD at S-65D. Tuesday morning discharges were 432 cfs at S-65, 331 cfs at S-65A, and 1,520 cfs at S-65E. Dissolved oxygen concentration in the Kissimmee River averaged 4.6 mg/L for the week. Kissimmee River mean

floodplain depth on Sunday was 0.56 feet. Recommendations: 10/22/2018-Reduce S-65/S-65A discharge to approximately 300 cfs (minimum discharge) in one step of approximately 1100 cfs today. Purpose is to reduce rate of stage decline in lakes Kissimmee-Cypress-Hatchineha.

Lake Okeechobee

Lake Okeechobee stage is 13.98 feet NGVD, falling 0.24 feet from the previous week and 0.71 feet over the past 30 days. Lake stages remain the lowest they have been for this time of year since 2011 and are now within 0.25 feet of the bottom of the preferred ecological envelope, which varies seasonally from 12.5 – 15.5 feet NGVD. However, given potential for heavy rainfall associated with El Niño conditions this winter and the poor condition of SAV and EAV in the nearshore zone, these lower lake stages are ideal for vegetation recovery. Cyanobacterial bloom potential increased in the southern region based on the latest NOAA image (October 21), suggesting the presence of algal blooms from south of Fisheating Bay to the southern islands in a narrow band along the edge of the marsh.

Estuaries

Total inflow to the St. Lucie Estuary averaged 196 cfs over the past week with 0 cfs coming from Lake Okeechobee. Surface salinity increased throughout the estuary. The seven-day average salinity at the US1 Bridge is in the good range for adult eastern oysters. Total inflow to the Caloosahatchee Estuary averaged 1,610 cfs over the past week with 975 cfs coming from the Lake. Surface salinity increased to downstream of Ft. Myers Yacht Basin and slightly decreased at and downstream of Cape Coral. The 30-day moving average surface salinity is 0.6 at Val I-75 and 2.1 at Ft. Myers. Salinity conditions between Val I-75 and Ft. Myers are good for tape grass. Salinity conditions are in the good range for adult eastern oysters at Cape Coral and Shell Point. Given the current estuarine conditions, there are no ecological benefits associated with freshwater releases from Lake Okeechobee.

Stormwater Treatment Areas

Over the past week, the STAs received approximately 27,300 acre-feet of inflows (which includes approximately 26,900 acre-feet of Lake releases). The total amount of inflows to the STAs in WY2019 (since May 1, 2018) is approximately 1,103,000 acre-feet, which includes approximately 270,000 acre-feet of Lake releases. Most STA cells are at or above target depths. Operational restrictions are in place for construction related activities in STA-1W (all flow-ways) and maintenance activities in STA-2 Flow-way 2. STA-5/6 Flow-ways 2 and 3 are offline for initiation of a Restoration Strategies project to grade non-effective treatment areas. This week, if 2008 LORS recommends Lake releases to the WCAs and the conditions allow, releases will be sent to the STA-1E, A-1 FEB/STA-3/4 and STA-2.

Everglades

Over the last week water depths declined on average across the Everglades and at a slightly higher rate than the previous weeks. Conditions within the Everglades are stable but drying as stages drop below or significantly below the regulation lines in the WCAs and near the lower quartile of their historical averages for this time of year. WCA-3A North and northern WCA-1 continue to dry out as indicated by the WDAT model output. The average water depth at the gauges located in WCA-3A North fell at a similar rate as last week but the gauges in WCA-3A South fell more sharply this week. Near average precipitation fell on Taylor Slough and Florida Bay, and depths within the slough remain above average for this time of year. Salinities in Florida Bay decreased on average this past week, but conditions at the western stations remain higher than their historic averages for this time of year.

Supporting Information

KISSIMMEE BASIN

Kissimmee Basin Rainfall

The Upper Kissimmee Basin received 0.11 inches of rainfall in the past week and the Lower Basin received 0.02 inches (SFWMD Daily Rainfall Report 10/22/2018).

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 1-7.

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.

neport Bater 10/20/2010													
		7-day				Schedule			Daily D	Departure	(feet)		
Water Body	Structure	Average Discharge (cfs) ¹	Stage Monitoring Site ²	Lake Stage (feet)	Schedule Type ³	Stage (feet)	10/21/18	10/14/18	10/7/18	9/30/18	9/23/18	9/16/18	9/9/18
Lakes Hart and Mary Jane	S-62	0	LKMJ	60.0	R	60.7	-0.7	-0.3	-0.2	0.0	0.1	0.0	0.1
Lakes Myrtle, Preston, and Joel	S-57	0	S-57	61.3	R	61.7	-0.4	-0.1	0.0	0.1	0.0	0.0	0.2
Alligator Chain	S-60	0	ALLI	63.3	R	63.7	-0.4	-0.2	-0.1	0.0	0.0	0.1	0.1
Lake Gentry	S-63	0	LKGT	61.4	R	61.3	0.1	0.1	0.1	0.1	0.1	0.0	0.1
East Lake Toho	S-59	0	TOHOE	57.1	R	57.7	-0.6	-0.3	-0.1	0.1	0.1	0.0	0.1
Lake Toho	S-61	0	TOHOW, S-61	54.4	R	54.7	-0.3	0.0	0.0	0.2	0.1	0.1	0.1
Lakes Kissimmee, Cypress, and Hatchineha	S-65	1,592	KUB011, LKIS5B	50.1	R	52.2	-2.1	-1.4	-0.9	-0.4	-0.1	0.1	0.2

Report Date: 10/23/2018

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

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

³T = temporary schedule, R = USACE flood control schedule, S = temporary snail kite schedule, A = projected ascension line, 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 8. Kissimmee River floodplain stages at selected stations are shown in Figure 9.

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:	10/23/2018											
		1-Day Average			Avera	ge for the Pro	eceeding 7-I	Days ¹				
Metric	Location	10/21/2018	10/21/18	10/14/18	10/7/18	9/30/18	9/23/18	9/16/18	9/9/18	9/2/18	8/26/18	8/19/18
Discharge (cfs)	S-65	1,565	1,592	1,559	1,542	1,485	1,560	1,544	3,538	3,088	1,806	3,282
Discharge (cfs)	S-65A ²	1,370	1,394	1,382	1,391	1,416	1,532	1,634	3,808	3,315	1,765	3,443
Discharge (cfs)	S-65D ²	1,458	1,461	1,521	1,646	1,982	2,221	3,351	4,313	2,699	3,077	4,254
Headwater Stage (feet NGVD)	S-65D ²	27.84	27.78	27.89	27.81	27.81	27.75	27.67	27.86	27.88	27.70	27.00
Discharge (cfs)	S-65E ²	1,529	1,535	1,598	1,684	2,062	2,296	3,458	4,259	2,902	3,219	3,860
Discharge (cfs)	S-67	0	0	0	67	310	288	215	176	190	187	169
DO (mg/L) ³	Phase I river channel	4.5	4.6	4.7	4.3	3.3	2.8	2.5	2.9	2.7	2.5	2.8
Mean depth (feet) ⁴	Phase I floodplain	0.56	0.57	0.60	0.64	0.75	0.80	1.12	1.79	1.24	1.16	1.76

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

²S-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.

 ^{3}DO is the average for sondes at PC62 and PC33.

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 5.







Figure 7.



Figure 8. 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 9. Mean water depth at stage recorders in the northern Phase I, southern Phase I, northern Phase II/III, and southern Phase II/III areas in relation to the S-65A discharge and S-65D headwater stage.





Water Management Recommendations

Kissimmee Basin Adaptive Recommendations and Operational Actions	

Recommendation Date	Recommendation	Purpose	Outcome	Source	Report Date
Dute	Reduce S-65/S-65A discharge to approximately				
10/22/2018	300 cfs (minimum discharge) in one step of	Reduce rate of stage decline in lakes Kissimmee- Cypress-Hatchineha	Implemented	SFWMD Water Mgt/KB Ops	10/23/2018
10/10/2010	approximately 1100 cts today.		N1/A		10/16/2010
10/16/2018	No new recommendations.		N/A		10/16/2018
10/9/2018	No new recommendations.		N/A		10/9/2018
10/2/2018	No new recommendations.		N/A		10/2/2018
9/25/2018	No new recommendations		N/A		9/25/2016
9/10/2010	No new recommendations		N/A		9/10/2010
9/11/2018	No new recommendations		N/A		9/11/2018
9/4/2018	No new recommendations.		N/A		9/4/2010
8/20/2010	No new recommendations.		N/A		8/21/2018
8/11/2018	No new recommendations		N/A		8/21/2018
8/7/2018	No new recommendations.		N/A		8/7/2018
7/22/2018	Increase discharge from 1400 cfs to 3000 cfs, then		N/A	SEW/MD Water Mat/KB	6/7/2018
7/24/2018	3200 cfs and 3500 cfs.	For flood control in Lake Kissimmee.	Implemented	Ops	7/31/2018
	Follow Revised (X2) 2018 Wet Season Discharge	To the extent possible, maintain sufficient discharge to keep areas under snail kites nests in			
7/19/2018	Plan to the extent possible, including 50 foot stage	Pool D hydrated until nests fledge, while avoiding	N/A	KB Ops	7/24/2018
	threshold and 0.5 foot flood control buffer.	large increases in discharge that might flood the			
		nests.			
	Maintain at least 1400 cfs at S-65A while Lake	To the extent possible, maintain sufficient			
7/13/2018	Kissimmee stage is above 50 feet. (See revised	discharge to keep areas under snail nest kites in	N/A	KB Ops	7/17/2018
	2018 discharge plan).	Pool D hydrated until nests fledge.			
	Reduce S-65/S-65A discharge by 600 cfs/day until	Reach 1400 cfs faster to help stabilize Lake		SEW/MD Water Mot/KB	
7/13/2018	1400 cfs is reached. (See revised 2018 discharge	Kissimmoo stago	Implemented		7/17/2018
	plan, below).	Кознинсе заде.		003	
7/9/2018	Increase S-65/S-65A discharge by 300 cfs if needed.	Stablize Lake Kissimmee stage.	N/A	SFWMD Water Mgt/KB Ops	7/10/2018
7/8/2018	Increase S-65/S-65A discharge by 900 cfs today in 3 increments of 300 cfs each.	Stablize Lake Kissimmee stage.	Implemented	KB Ops	7/10/2018
7/5/2010	Increase S-65/S-65A discharge by 300 cfs/day				7402000
7/5/2018	(double the prescribed rate of increase) Thursday	Stablize Lake Kissimmee stage.	Implemented	SEWMD Water Mgt	//10/2018
	through Sunday .				
7/2/2018	Increase S-65/S-65A discharge by 150 cfs/day	Stablize Lake Kissimmee stage.	Implemented	SFWMD Water Mgt/KB	7/10/2018
	(double the prescribed rate of increase).			Ups	
6/30/2018	Increase S-65/S-65A discharge as slowly as	Slow stage ascencsion in Kissimmee-Cypress-	Implemented	KB Ops/SFWMD Water	7/3/2018
		Hatchinena		Mgt	
6/28/2018	Continue to reduce discharge at S-65/S-65A as	Prevent stage decline in Kissimmee-Cypress-	Implemented	KB Ops/SFWMD Water	7/3/2018
	slowly as feasible.	Hatchineha.		Mgt	
6/21/2018	Reduce discharge at S-65/S-65A as slowly as	Prevent stage decline in Kissimmee-Cypress-	Implemented	KB Ops/SFWMD Water	6/26/2018
	Teasible.	Hatchinena.		Mgt	
6/15/2018	Reduce S-65A discharge by 150-300 cfs over the weekend.	Slow or stop DO decline in Kissimmee River.	Implemented	KB Ops	6/19/2018
6/12/2018	No new recommendations.		N/A		6/12/2018
6/5/2018	No new recommendations.		N/A		6/5/2018
		Provide variable flow from S-65/S-65A to balance			
	Regin implementation of the 2018 Wet Season	Kissimmee River and Headwaters Lakes			
5/29/2018	Discharge Plan for S-65/S-65A on June 1 (see	objectives including Kissimmee River floodplain	Planned	KB Ops/SFWMD Water	5/29/2018
5,25,2010	figure).	inundation, moderated rates of change in	nameu	Mgt/FWC/FWS	5/25/2010
	11501 c/.	discharge, and constrained rate of stage rise in			
		the lakes.			
	Hold Kissimmee-Cypress-Hatchingha at current	(a) Reduce impacts of rising water on DO in the		KB Ops/SEW/MD Water	
5/22/2018	stage of annroximately 49.5 ft until lune 1	Kissimmee River; and (b) limit stage reversal in	Implemented	Mat	5/29/2018
		KCH to <1 foot to protect snail kite nests.		INIEL	



Figure 11. The 2018 Wet Season Discharge Plan for S-65/S-65A.



Figure 12. Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years.



LAKE OKEECHOBEE

According to the USACE web site, Lake Okeechobee stage is at 13.98 feet NGVD for the period ending at midnight on October 22, 2018. This value is based on the use of four interior lake stations (L001, L005, L006 and LZ40) and four perimeter stations (S-308, S-352, S-4 and S-133). The Lake is now 0.71 feet lower than it was a month ago and 2.99 feet lower than a year ago when runoff from Hurricane Irma caused extreme high lake stages (Figure 1). The Lake is now in the Base-Flow sub-band (Figure 2). According to RAINDAR, 0.01 inches of rain fell over the Lake during the week October 16, 2018 – October 22, 2018. Most of the watershed received similar or slightly more rainfall, between 0 and 0.25 inches of rain (Figure 3).

Average daily inflows to the Lake decreased again from the previous week, going from 1,672 cfs to 1,576 cfs. The decrease in inflows was mostly from the Kissimmee River via the S-65E structures, going from 1,588 cfs the previous week to 1,529 cfs this past week (Table 1). Inflows also decreased by 23 cfs from Fisheating Creek and by 15 cfs from the northern pumps.

Total outflows increased from the previous week, going from 3,122 average daily cfs the previous week to 4,784 cfs this past week. The increases in outflows were primarily in discharges west via the S-77 structure and south through the S-350 structures. Discharges via the S-77 increased from 1,103 cfs the previous week to 1,526 average daily cfs this past week, while outflows south through the S-350 structures went from 2,000 cfs the previous week to 3,105 cfs this past week. S-308 discharges remained at zero except for releases of 238 and 257 cfs on October 18th and 19th, respectively. Outflow from the L-8 at Canal Point increased from 19 cfs last week to 143 cfs this past week. The corrected average daily evapotranspiration value for the week based on the L006 weather platform solar radiation was similar to last week at 0.13 inches.

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 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 imagery (October 21) using the cyanobacteria monitoring product derived from NOAA's analysis of EUMETSAT's OLCI satellite sensor showed high potential for a bloom in the south and southwest end of the Lake in a narrow band along the outer edge of the marsh from just south of Fisheating Bay down to the southern islands (Figure 5).

Water Management Recommendations

Lake Okeechobee stage is 13.98 feet NGVD, falling 0.24 feet from the previous week and 0.71 feet over the past 30 days. Lake stages remain the lowest they have been for this time of year since 2011 and are now within 0.25 feet of the bottom of the preferred ecological envelope, which varies seasonally from 12.5 – 15.5 feet NGVD. However, given potential for heavy rainfall associated with El Niño conditions this winter and the poor condition of SAV and EAV in the nearshore zone, these lower lake stages are ideal. Recovery of vegetation in the nearshore zone from Hurricane Irma impacts and 2016 El Niño-associated rainfall will require lake stages in the lower portion of the ecological envelope or lower for extended periods, so efforts to prepare for such an event will help speed the rebound of this important community.

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 Inflow cfs	Equivalent Depth Week Total (in)
S65E & S65EX1	1588	1529	0.6
S71 & 72	0	0	0.0
S84 & 84X	0	0	0.0
Fisheating Creek	68	45	0.0
S154	0	0	0.0
S191	0	0	0.0
S133 P	10	0	0.0
S127 P	0	0	0.0
S129 P	3	0	0.0
S131 P	2	0	0.0
S135 P	0	0	0.0
S2 P	0	0	0.0
S3 P	0	0	0.0
S4 P	0	0	0.0
L8 Backflow	0	0	0.0
Rainfall	2860	0	0.0
Total	4532	1574	0.7

OUTFLOWS	Previous Week Avg Daily cfs	Avg Daily Outflow cfs	Equivalent Depth Week Total (in)
S77	1103	1526	0.6
S308	0	71	0.0
S351	964	1282	0.5
S352	98	396	0.2
S354	938	1427	0.6
L8 Outflow	19	143	0.1
ET	2315	2148	0.9
Total	5437	6993	2.9

PROVISIONAL DATA



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



Lake Okeechobee Water Level History and Projected Stages

Figure 2. Recent Lake Okeechobee stage and releases, with projected stages based on a dynamic position analysis.



Figure 3. Rainfall estimates by basin.

Figure 4. Major inflows and outflows of Lake Okeechobee, including the S-350 structures designated as South. 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.



Figure 5. Potential for cyanobacterial blooms on Lake Okeechobee based on NOAA's harmful algal bloom monitoring system derived from Copernicus Sentinel-3 OLCI data from EUMETSAT. Gray indicates cloud cover. All data are experimental and unvalidated at this point in product development.

ESTUARIES

St. Lucie Estuary:

Last week total inflow to the St. Lucie Estuary averaged about 196 cfs (Figures 1 and 2) and last month inflow averaged about 796 cfs. Last week's provisional averaged inflows from the tidal basin and the structures are shown in Table 1.

Table 1. Weekly average innows (data are provisional)				
Location	Flow (cfs)			
Tidal Basin Inflow	110			
S-80	0			
S-308	71			
S-49 on C-24	0			
S-97 on C-23	0			
Gordy Rd. structure on Ten Mile Creek	86			

Table 1. Weekly average inflows (data are provisional).

Over the past week, salinity increased throughout the estuary (Table 2, Figures 3 and 4). The sevenday moving average salinity of the water column (an average of the surface and bottom salinity) at the US1 Bridge is 15.2. Salinity conditions in the middle estuary are within the good 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
HR1 (North Fork)	8.7 (4.7)	12.8 (9.1)
US1 Bridge	14.4 (11.7)	16.0 (12.5)
A1A Bridge	24.9 (21.3)	28.7 (26.3)

¹Envelope not applicable and ²Not Reporting.

Caloosahatchee Estuary:

Last week total inflow to the Caloosahatchee Estuary averaged about 1,610 cfs (Figures 5 and 6) and last month inflow averaged about 2,767 cfs. Last week's provisional averaged inflows from the structures are shown in Table 3.

Table J. Weekiy average millows	$\int \left(uata + 3 p \left(0 \right) \right) \left(uata + 3 p \left(0 \right) \right) \left(1 \right) $
Location	Flow (cfs)
S-77	1,445
S-78	985
S-79	1,344
Tidal Basin Inflow	266

Table 3.	Weekly	average inflows	(data is	provisional).
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Over the past week, surface salinity increased to downstream of Ft. Myers Yacht Basin and slightly decreased at and downstream of Cape Coral (Table 4, Figures 7 & 8). The seven-day average salinity values are estimated to be within the good range for adult eastern oysters at Cape Coral and at Shell Point (Figure 9). Salinity values were not available at Sanibel. The 30-day moving average surface salinity is 0.6 at Val I-75 and 2.1 at Ft. Myers. Salinity conditions between Val I-75 and Ft. Myers are good for tape grass.

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

Sampling Site	Surface	Bottom
S-79 (Franklin Lock)	1.3 (0.2)	1.3 (0.2)
Val I75	1.5 (0.4)	3.1 (0.9)
Ft. Myers Yacht Basin	5.1 (2.4)	9.6 (4.5)
Cape Coral	8.9 (9.2)	14.5 (13.5)
Shell Point	21.7 (22.2)	21.5 (NR)
Sanibel	NR ³ (NR)	NR (NR)

¹Envelope not applicable, ²Envelope is based on a 30-day average, and ³Not Reporting.

Forecast of surface salinity (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 1.3 to 3.8 at the end of the next two weeks for pulse release at S-79 ranging from 0 to 650 cfs and Tidal Basin inflows 250 cfs.

Red tide

The Florida Fish and Wildlife Research Institute reported on October 19, 2018, that *Karenia brevis*, the Florida red tide dinoflagellate, was observed at very low concentrations in two samples collected from or offshore of Lee County. Respiratory irritation was reported in Lee County over the past week. *Karenia brevis*, the Florida red tide dinoflagellate, was observed at background to medium concentrations in 15 samples collected from or offshore of St. Lucie County, background to low concentrations in 14 samples collected from Martin County, background to low concentrations in 29 samples collected from or offshore of Broward County, and background to very low concentrations in five samples collected from or offshore of Miami-Dade County. Fish kills were reported in St. Lucie County and in one location each in Martin and Palm Beach counties.

Water Management Recommendations

Lake stage is in the Baseflow sub-band of 2008 LORS. Tributary hydrological conditions are normal. The 2008 LORS recommends up to 450 cfs at S-79 and up to 200 cfs at S-80. Given the current estuarine conditions, there are no ecological benefits associated with freshwater releases from Lake Okeechobee.



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 basins 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 estimated 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, and tributaries in the tidal basin into the Caloosahatchee River Estuary.



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

At the gauge locations monitored for this report, stages within the Everglades fell 0.08 feet on average over the last week. The most extreme individual gauge changes within the WCAs ranged from +0.08 feet (WCA-2B) to -0.17 feet (WCA-3A central). Pan evaporation was estimated at 1.40 inches this week.

Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	0.16	-0.05
WCA-2A	0.10	-0.10
WCA-2B	0.04	+0.07
WCA-3A	0.03	-0.16
WCA-3B	0.09	-0.11
ENP	0.19	-0.04



Regulation Schedules: WCA-1 three-gauge average stage is 1.0 feet below Zone A1, and 0.50 feet below the Zone A2 regulation line. WCA-2A marsh stage is 0.75 feet below Dev. Zone A. S-11B Headwater stage is 0.73 feet below the Deviation, and 0.45 above the Zone A regulation line. WCA-3A three-gauge average stage is 0.72 feet below Increment 1&2, and 0.42 feet below the Zone A regulation line. WCA-3A stage at gauge 62 (northwest corner) is 1.35 feet below the upper schedule and continues to fall away from the regulation line.



Water Depths and Changes: The WDAT tool for spatial interpolation of depth monthly snapshots indicate drying conditions, the spatial extent of ponded depths along the L-67 and in WCA-3A South has contracted compared with last month and the ponding depth has decreased. Regions with depths down to 0.0 feet expanded greatly over the last month in WCA-3A North, and slightly in northern WCA-1. WDAT difference output indicates that water level changes across most of South Florida are drier than they were one month ago. Ecologically important regions across WCA-3A are significantly shallower, with as much as a -1.0 foot change in depth. In the "1 Year" inset we see the comparison between current depth conditions and post Hurricane Irma's (9/10/17) impact on water depths.





Taylor Slough Water Levels: An average of 0.5 inches of rain fell on Taylor Slough and Florida Bay this past week. Stages decreased an average of 0.07 feet last week. Water depths averaged 1.18 feet across Taylor Slough which is 1.2 inches higher than the historical averages for this time of year.

Florida Bay Salinities: Salinities decreased on average 0.2 psu this past week (individual gauge changes were less than 5 psu) and range from 5 psu in the northeast to 38 psu in the west. Conditions in western Florida Bay are 3 to 5 psu higher than their historical averages for this time of year which is undesirable this late in the wet season.







Florida Bay MFL: Mangrove zone daily average salinity stayed at 0.4 psu this past week, and the 30day moving average is also 0.4 psu. The weekly cumulative flow from the five creeks denoted by yellow stars on the map totaled about 13,000 acre-feet for the last week which is 2,000 acre-feet greater than the average for this time of year. The 365-day moving sum of flow from the five creeks has been dropping rapidly with an additional decrease of 6,000 acre-feet over the last week to end at 294,476 acre-feet (still greater than the long-term average of 257,628 acre-feet and above the median). Creek flow is provisional data from the USGS and is highly variable.



Water Management Recommendations

Water management that protects peat soils (especially in WCA-3A North) as the dry season approaches has increased ecological benefit over high water concerns at this point. The Deer Gauge (3-62) is now 1.35 feet below the lower schedule and trends unfavorably away from the regulation line. Wading bird flocks containing large numbers of juveniles were noted feeding in northeast WCA-3A North on 10/22/18. The continued hydration of WCA-3A North serves both the conservation of peat soils and is providing suitable foraging depths for wading bird feeding. Any water not available to protect the peat soils in WCA-3A North, would be ecologically beneficial to Holeyland and Rotenburger WMA as those basins are now in Zone C. According to the WDAT modeling, depths in the northern portion of WCA-1 at and near ground level have expanded significantly over the last month. This historically dry area would continue to benefit from hydration as the 3-gauge average stage is now 0.52 feet below the Zone A2 regulation line but has remained steady over the last several weeks. Incremental change in the rate of structure flows (i.e., when changing flow rates from 0 cfs to 1,000 cfs, make 500 cfs adjustment per week) to the WCAs is more ecologically sensitive than abrupt rate changes. More specific recommendations appear in the summary table below. The red text represents new or modified information or recommendations.

SFWMD Everglades Ecological Recommendations, October 23rd, 2018 (red is new)			
Area	Weekly change	Recommendation	Reasons
WCA-1	Stage decreased by 0.05'	Maintain depths at regulation schedule.	Protect upstream/downstream habitat and wildlife.
WCA-2A	Stage decreased by 0.10'	Maintain depths at temporary regulation schedule.	Protect upstream/downstream habitat and wildlife.
WCA-2B	Stage increased by 0.07'	Maintain depths at temporary regulation schedule. Manage for a rate of ascension less than +0.25' per week, or less than +0.5 per 2 weeks.	Protect upstream/downstream habitat and wildlife.
WCA-3A NE	Stage decreased by 0.16'	Maintain depths at regulation schedule.	Protect habitat including <u>peat soil</u> development, tree islands and wildlife.
WCA-3A NW	Stage decreased by 0.15'	Maintain depths at regulation schedule.	
Central WCA-3A S	Stage decreased by 0.17'	Maintain depths at regulation schedule.	Protect habitat including peat soil development, <u>tree islands</u> and wildlife.
Southern WCA-3A S	Stage decreased by 0.15'		
WCA-3B	Stage decreased by 0.11'	Maintain depths at temporary regulation schedule.	Protect upstream/downstream habitat and wildlife.
ENP-SRS	Stage decreased by 0.04'	Make discharges to the Park according to the 2012 WCP rainfall plan.	Protect upstream/downstream habitat and wildlife.
Taylor Slough	Stage changes ranged from -0.15' to -0.03'	Move water southward as possible	When available, provide freshwater buffer for downstream conditions.
FB- Salinity	Salinity changes ranged -3.8 to +4.4 psu	Move water southward as possible	When available, provide freshwater to maintain low salinity buffer and promote water movement.