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M E M O R A N D U M

TO: John Mitnik, Chief, Operations, Engineering and Construction Bureau
Paul Linton, Chief, Operations Section

FROM: SFWMD Staff Environmental Advisory Team

DATE: May 22, 2018

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

Less rain is expected today and Wednesday, but it is expected to be very wet again Thursday through Sunday. Southeasterly winds will shift showers and thunderstorms, currently over the northeastern portion of the District, west and north this afternoon. We can expect a more typical sea breeze pattern on Wednesday with scattered afternoon showers and thunderstorms focused over the interior and west. A developing area of low pressure currently over the northwestern Caribbean is forecast to move slowly northward through the central Gulf of Mexico Thursday through Saturday. This system has the potential to be classified as a tropical or sub-tropical cyclone later this week, but it is expected to remain well west of the District. However, deep tropical moisture associated with the system will move across the District which will combine with favorable upper level wind flow to produce areas of heavy rain each day Thursday through Sunday with District-wide rainfall averaging around 2.5 inches over the 4-day period. Daytime heating will then produce daily thunderstorm activity Monday through Wednesday. Beyond that, a period of below average rainfall is forecast to begin next Thursday.

Kissimmee

Tuesday morning stages were 55.4 feet NGVD (at schedule) in East Lake Toho, 52.2 feet NGVD (0.2 feet below schedule) in Toho, and 49.6 feet NGVD (0.3 feet above schedule) in Kissimmee-Cypress-Hatchineha; headwater stages were 46.3 feet NGVD at S-65A and 25.8 feet NGVD at S-65D. Mean recession rates for the last seven days were -0.03 feet per week (negative denotes reversal due to rising stage) and 0.11 feet per week in East Lake Toho and Toho, respectively (preferred recession range is 0.15-0.2 feet per week); the recession in Kissimmee-Cypress-Hatchineha has likely ended due to recent rainfall; Kissimmee-Cypress-Hatchineha reached a low stage of 48.92 feet NGVD on 5/13/2018. Tuesday morning discharges were: 1,309 cfs at S-65, 1,151 cfs at S-65A, and 1,644 cfs at S-65E. Dissolved oxygen concentration in the Kissimmee River averaged 5.7 mg/L for the week. Kissimmee River mean floodplain depth on Sunday was 0.30 feet. Recommendations for this week are to increase discharge gradually in response to rainfall to (a) reduce impacts of rising water on dissolved oxygen in the Kissimmee River, and (b) limit stage reversal in Kissimmee-Cypress-Hatchineha to less than 1.0 feet to protect snail kite nests.

Lake Okeechobee

Lake Okeechobee stage is 13.57 feet NGVD, having increased 0.53 feet over the past week and 0.34 feet over the last month. There was considerable rainfall over the last 8 days, bringing the first substantial stage reversal since late October 2017. The Lake was below 13 feet for just 10 days and is likely rising too fast for many recovering SAV communities to stay in optimal light conditions. The seasonal low stage for the 2018 growing season may have been reached on May 12 – May 13, which was 12.83 feet NGVD. Given the high stages and turbidity throughout the fall and winter, lower water

levels for substantial periods of time would have benefitted plant communities in deeper areas. Given the current stages and predicted above-average rainfall over the next few months, the SAV coverage on the Lake will likely remain at minimal levels throughout the summer as a result of Hurricane Irma impacts. Additionally, most of the wading bird foraging activity and new nesting activity will likely diminish as stage reversals will disperse prey and reduce the quality of available foraging habitats.

Estuaries

Total inflow to the St. Lucie Estuary averaged 5,424 cfs over the past week with no flow coming from Lake Okeechobee. Salinity decreased throughout the estuary. The seven-day average salinity at the US1 Bridge is in the good range for adult eastern oysters. The highest weekly ranges of chlorophyll *a* were 3.42 – 11.02 µg/L in the North Fork. Total inflow to the Caloosahatchee Estuary averaged 3,853 cfs over the past week with 38 cfs coming from the Lake. Salinity decreased near Shell Point and increased downstream. The 30-day moving average surface salinity is 3.4 at Val I-75 and 10.6 at Ft. Myers. The 30-day moving average salinity at Val I-75 is forecast to be 2.4 in two weeks with no flow through S-79. 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 at Shell Point. Chlorophyll *a* concentrations over the last week were relatively low to medium near Beautiful Island (4.60 – 10.73 µg/L), Ft. Myers (1.50 – 58.53 µg/L), and Shell Point (0.96 – 14.36 µg/L). Dissolved oxygen levels at Beautiful Island were 3.84 – 5.54 mg/L, Ft. Myers 2.87 – 8.88 mg/L and at Shell Point 5.83 – 7.79 mg/L. 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/FEBs did not receive Lake releases. The total amount of Lake releases sent to the STAs/FEBs in WY2019 (since May 1, 2018) is approximately 3,800 acre-feet. Most STA cells are above target depths, except many of the STA-5/6 cells which have dried out. Operational restrictions are in place for vegetation rehabilitation in STA-1E, STA-2 and STA-3/4. The nests of Migratory Bird Treaty Act (MBTA) protected species have been observed in STA-5/6. Due to recent basin runoff, it is recommended that no Lake Releases be sent to the STAs/FEBs this week.

Everglades

There was no wading bird foraging detected within the WCAs this week. Foraging conditions in the WCAs have most likely come to an end with the onset of the rainy season. However, birds were observed in Shark River Slough in Everglades National Park and model results indicate suitable foraging conditions remain in this area. Keeping water depths and rates of change within the suitable range for wading bird foraging in Shark River Slough has ecological benefit for the remaining birds nesting in the southern end of the Everglades. Inflows to Rotenberger Wildlife Management Area no longer generate substantial ecological benefit. As of the last survey, that area contains 31 active snail kite nests. During the May 8, 2018 survey, 38 snail kites were observed in WCA-3A. Stage ascension rates are now critical for apple snail reproduction in the Everglades. The current recommended rehydration rate is 0.25 feet or less per week (or 0.5 feet per 2 weeks). Inflows via the S-332D structure continue to have ecological benefit as long as water depths are below ground surface; standing surface water should be avoided. The Taylor Slough bridge location has been rehydrated over the last week, and water depths within Taylor Slough are 3 to 11 inches above the historical average. Salinity changes in Florida Bay ranged from -5.7 to +1.7 psu and are below the historical average for this time of year. Both the daily and 30-day moving average mangrove zone salinity increased compared to last week.

Supporting Information

KESSIMMEE BASIN

Kissimmee Basin Rainfall

The Upper Kissimmee Basin received 5.06 inches of rainfall in the past week and the Lower Basin received 5.30 inches (SFWMD Daily Rainfall Report 5/21/2018).

Upper Kissimmee Basin

Stages and departures in the Kissimmee Chain of Lakes (KCOL) are shown in **Table 1**.

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.
Report Date: 5/22/2018

Water Body	Structure	7-day Average Discharge (cfs) ¹	Stage Monitoring Site ²	Lake Stage (feet)	Schedule Type ³	Schedule Stage (feet)	Daily Departure (feet)						
							5/20/18	5/13/18	5/6/18	4/29/18	4/22/18	4/15/18	4/8/18
Lakes Hart and Mary Jane	S-62	103	LKMJ	59.7	R	59.7	0.0	-0.2	-0.2	-0.2	-0.2	-0.2	-0.3
Lakes Myrtle, Preston, and Joel	S-57	18	S-57	60.1	R	60.1	0.0	-0.2	-0.1	-0.1	0.0	0.0	-0.2
Alligator Chain	S-60	218	ALLI	62.3	R	62.3	0.0	0.0	0.0	-0.1	0.1	0.0	-0.1
Lake Gentry	S-63	293	LKGT	60.0	R	59.8	0.2	0.0	0.0	0.0	0.0	0.1	0.0
East Lake Toho	S-59	418	TOHOE	55.4	R	55.5	-0.1	-0.3	-0.4	-0.6	-0.7	-0.8	-0.9
Lake Toho	S-61	1,106	TOHOW, S-61	52.3	R	52.5	-0.2	-0.3	-0.4	-0.6	-0.7	-0.7	-0.9
Lakes Kissimmee, Cypress, and Hatchineha	S-65	771	KUB011, LKIS5B	49.5	R	49.4	0.1	-0.7	-0.8	-0.8	-0.9	-1.0	-1.3

¹ Seven-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 T = 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: 5/22/2018

Metric	Location	1-Day Average		Average for the Preceding 7-Days ¹								
		5/20/2018	5/20/18	5/13/18	5/6/18	4/29/18	4/22/18	4/15/18	4/8/18	4/1/18	3/25/18	3/18/18
Discharge (cfs)	S-65	1,075	771	357	343	348	392	406	340	376	361	400
Discharge (cfs)	S-65A	981	614	252	248	246	270	313	257	246	245	258
Discharge (cfs)	S-65D ²	981	781	323	304	341	362	384	301	324	329	343
Stage (feet NGVD)	S-65D ²	25.80	25.72	25.83	25.89	25.81	25.77	25.86	25.77	25.86	25.80	25.66
Discharge (cfs)	S-65E ²	981	824	290	263	304	318	355	297	325	348	317
Discharge (cfs)	S-67	324	332	71	0	0	0	1	0	0	0	0
DO (mg/L) ³	Phase I river channel	5.5	5.7	7.5	7.9	7.1	7.2	6.2	6.8	7.5	8.2	8.3
Mean depth (feet) ⁴	Phase I floodplain	0.30	0.17	0.06	0.06	0.06	0.07	0.07	0.06	0.07	0.09	0.07

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

² 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.

⁴ 1-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)

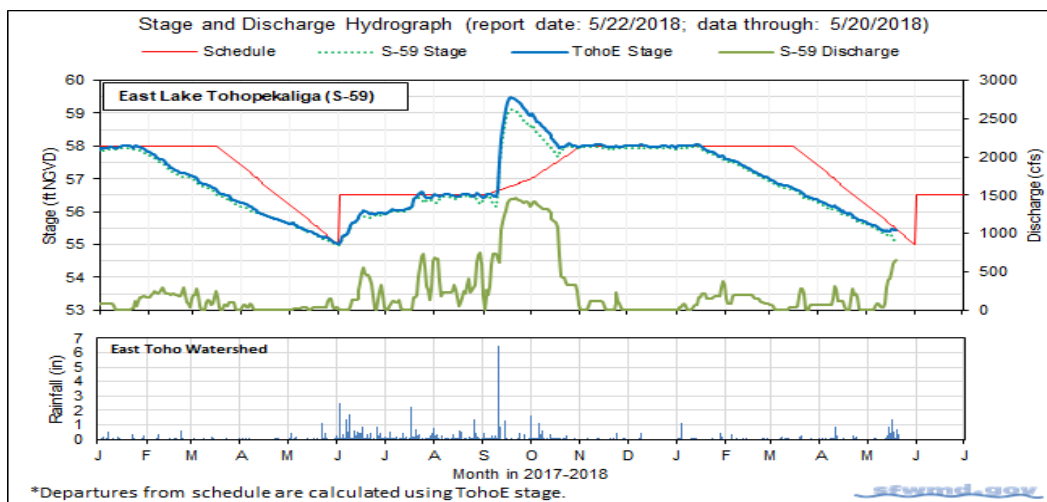


Figure 1.

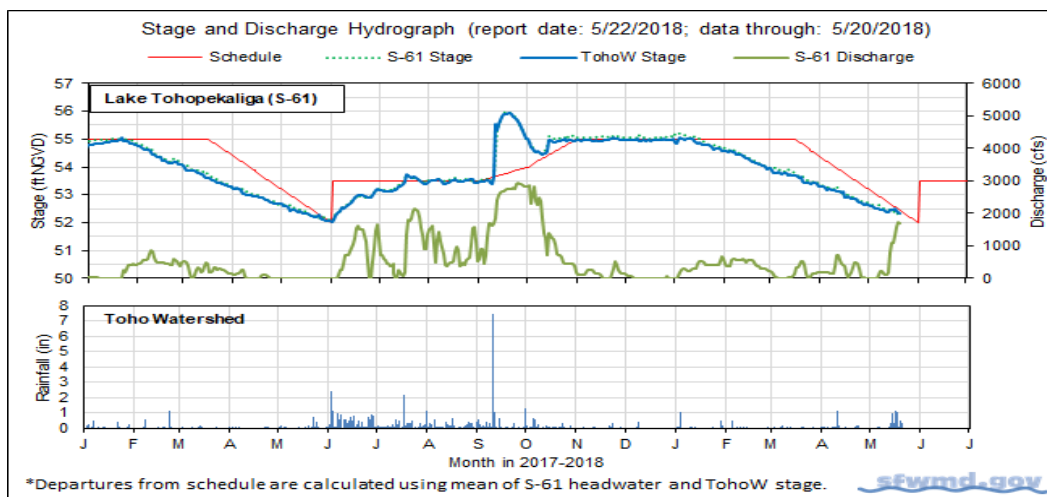


Figure 2.

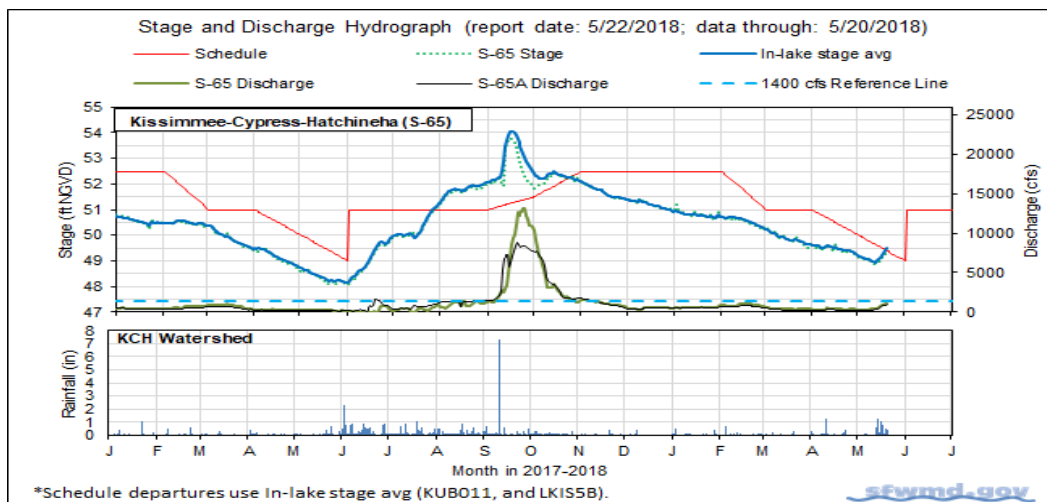


Figure 3.

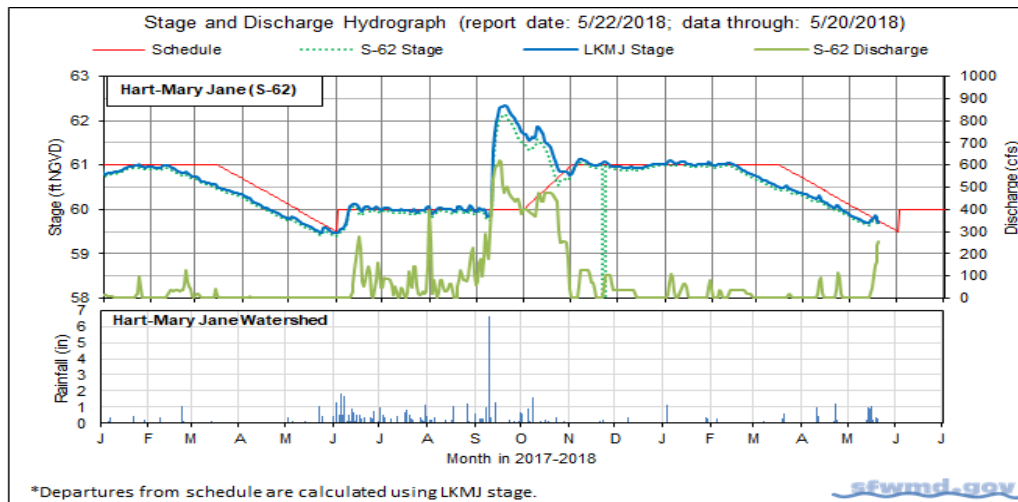


Figure 4.

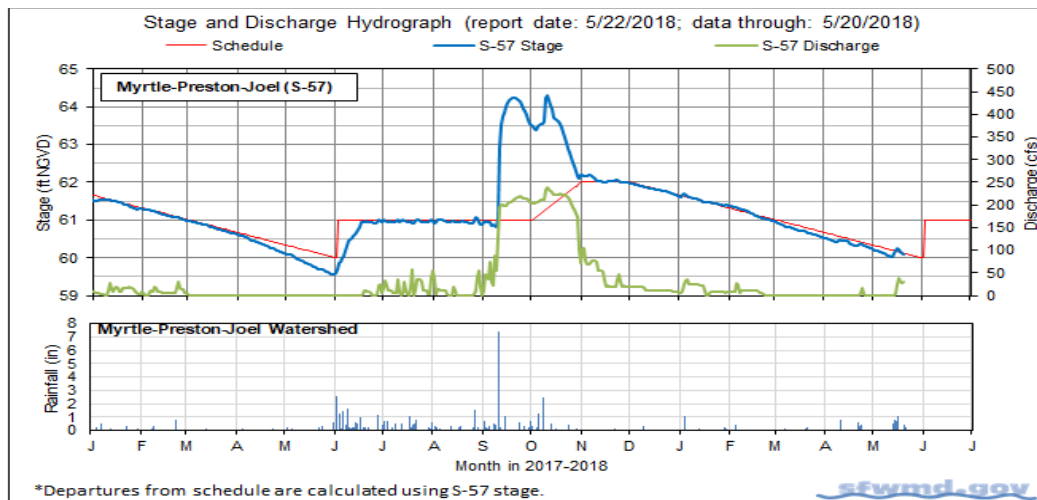


Figure 5.

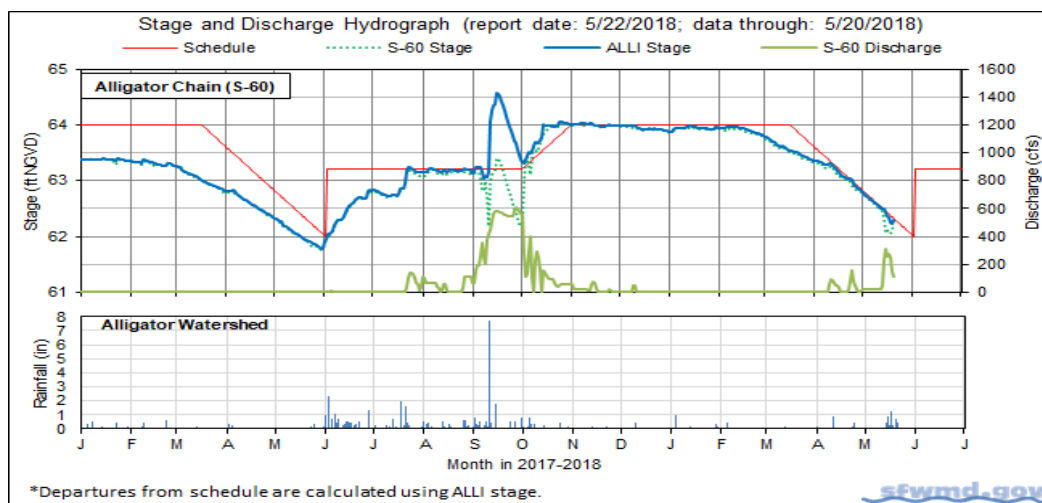


Figure 6.

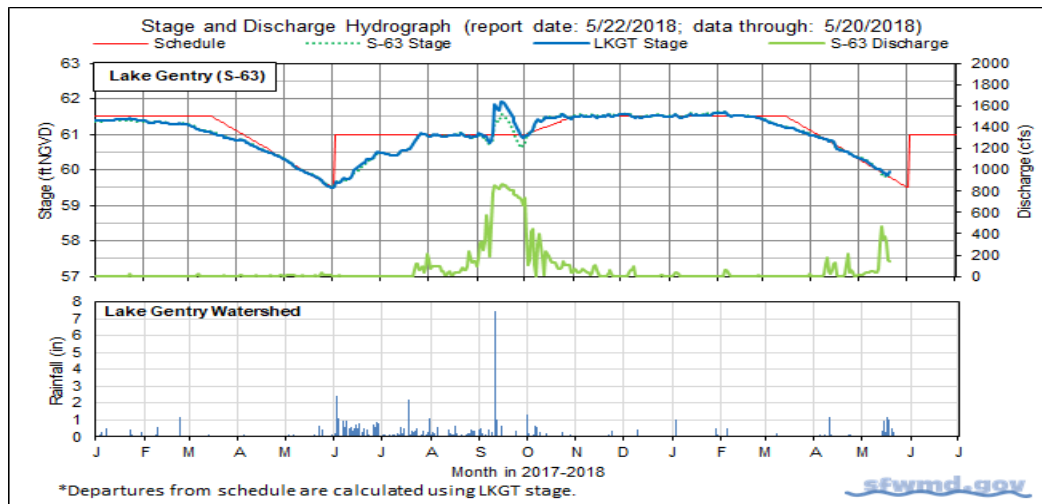


Figure 7.

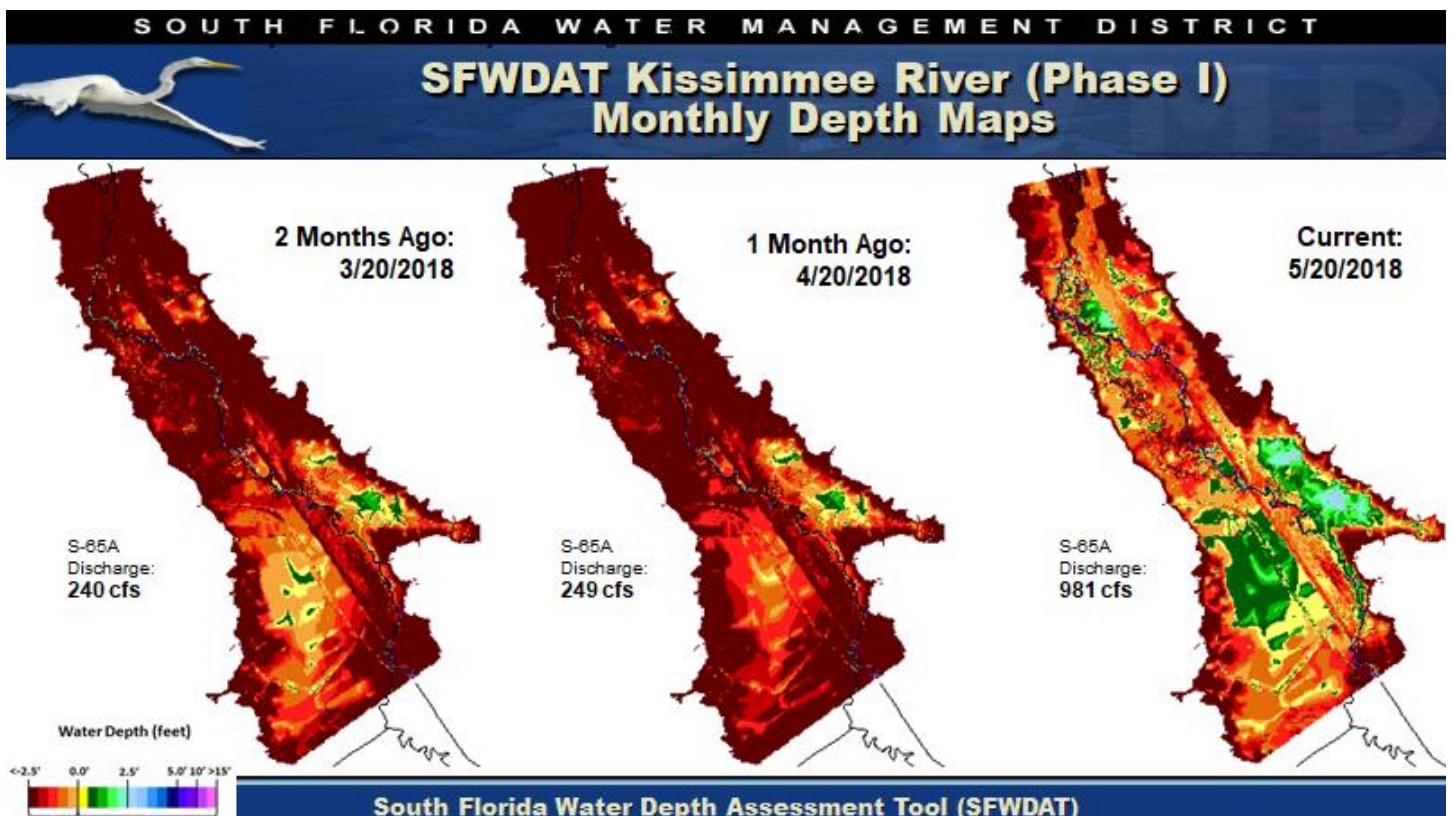


Figure 8. Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to January 16, 2012.

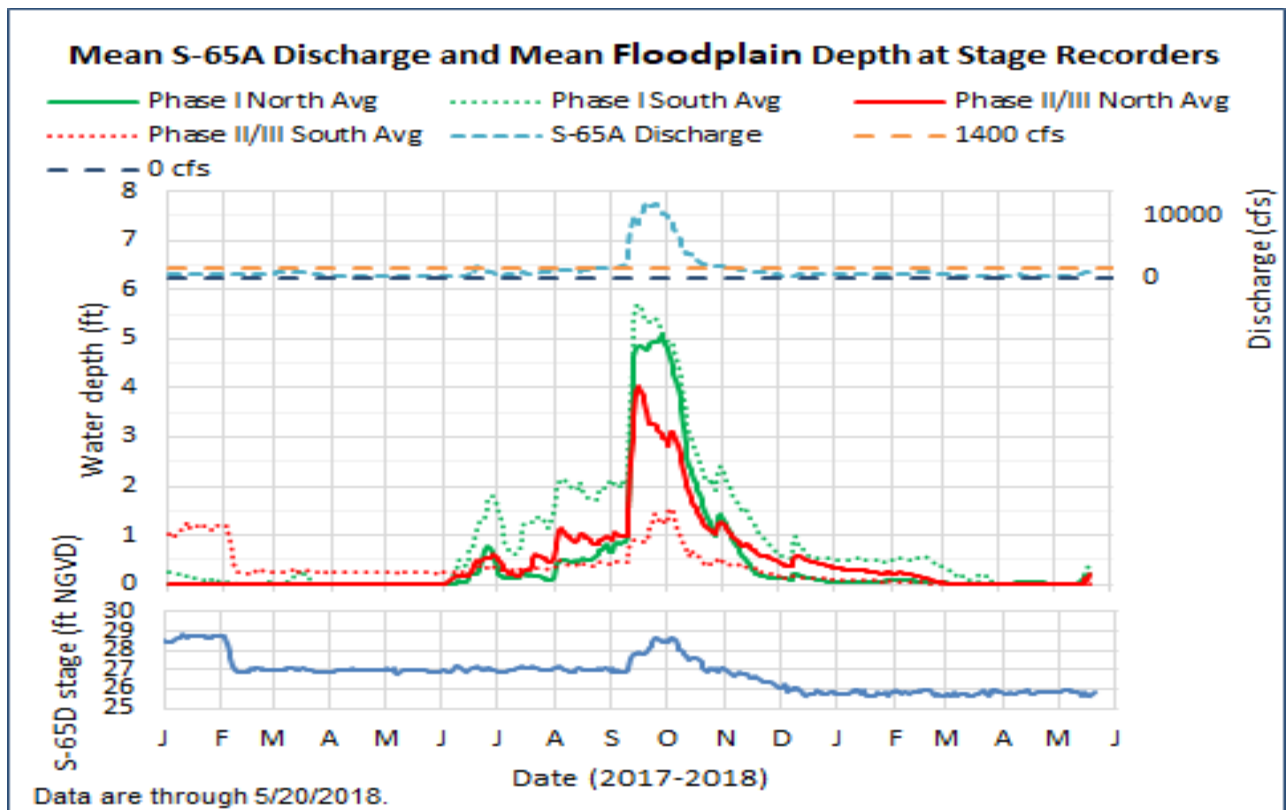
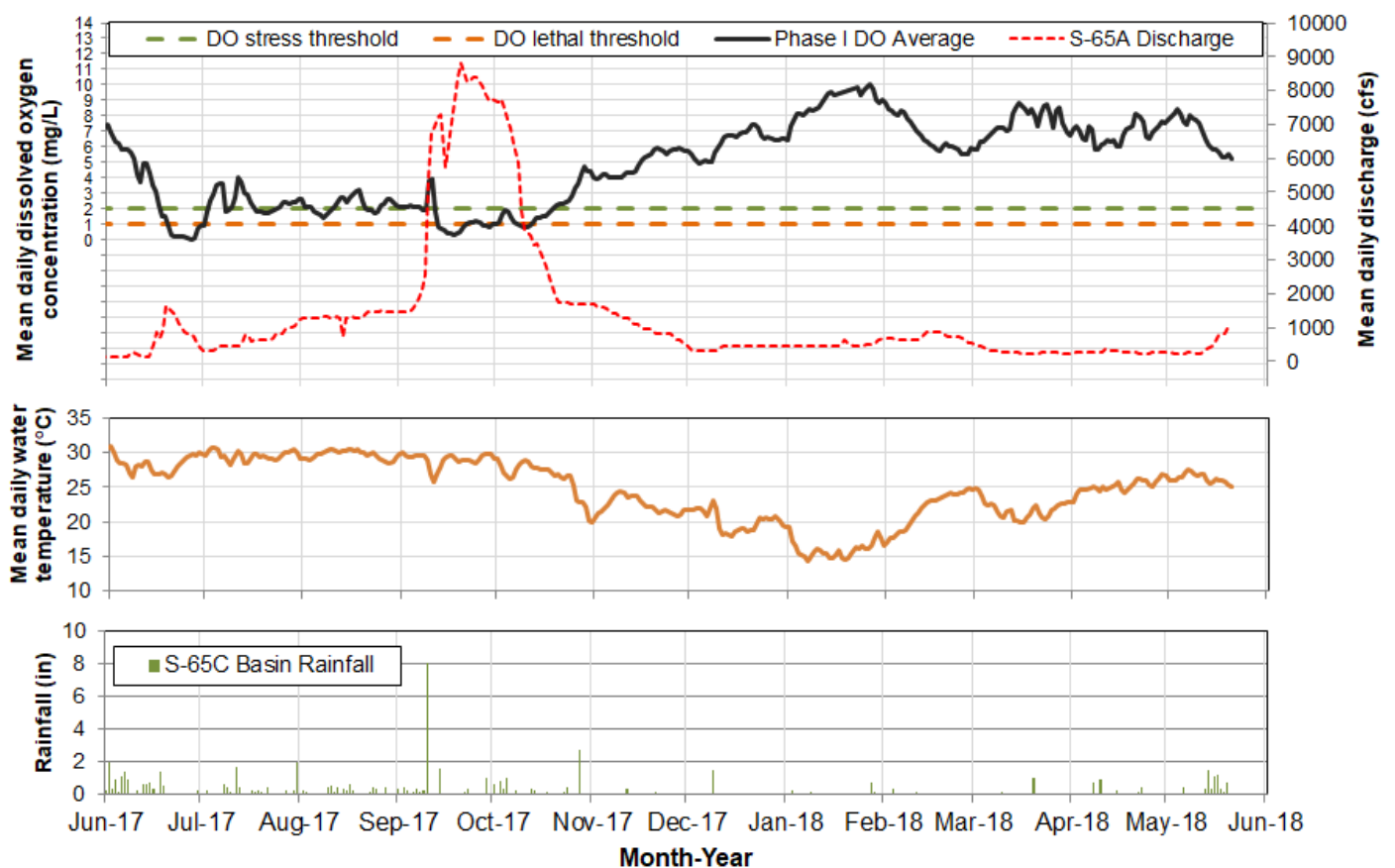


Figure 9. Mean water depth at stage recorders in the northern Phase I, southern Phase I, northern Phase II/III, and southern Phase II/III areas in relation to the S-65A discharge and S-65D headwater stage.



Report Date: 5/22/2018; data are through: 5/20/2018.

Figure 10. Mean daily dissolved oxygen, discharge, temperature and rainfall in the Phase I river channel.

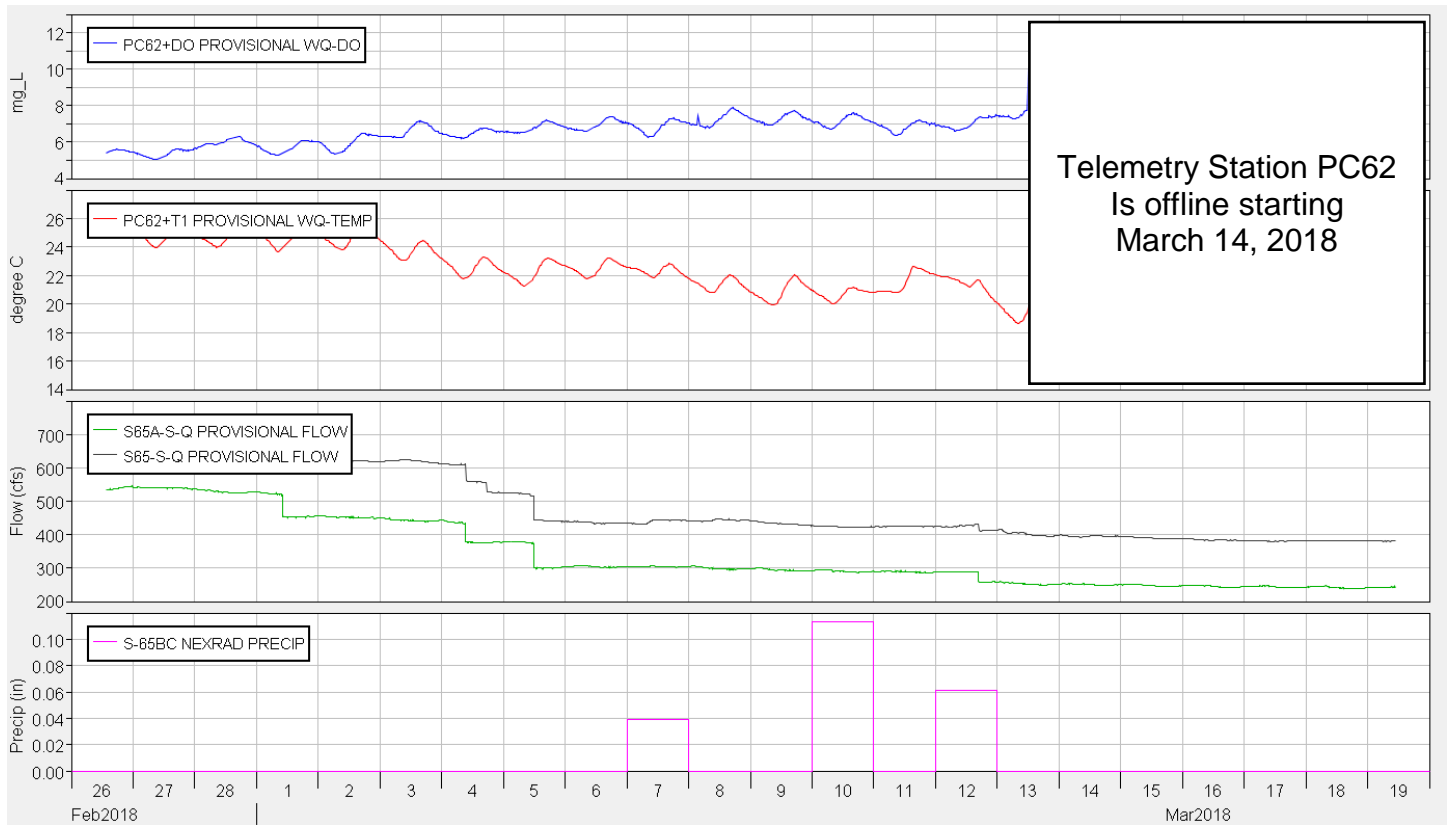


Figure 11. Phase I river channel dissolved oxygen and water temperature (measured at 15-minute intervals) and Pool BC daily rainfall.

Water Management Recommendations

Kissimmee Basin Adaptive Recommendations and Operational Actions

Date	Recommendation	Purpose	Outcome	Source
5/18/2018-5/20/2018	Increase discharge gradually in response to rainfall in consultation with KB staff.	(a) Reduce impacts of rising water on DO in the Kissimmee River; and (b) limit stage reversal in KCH to <1 foot to protect snail kite nests.	Implemented	KB Ops
5/15/2018	Adjust S-65/S-65A discharge over the next few days to avoid additional stage rise in Kissimmee-Cypress-Hatchineha. Make any needed discharge changes gradually in consultation with Kissimmee Basin staff to reduce potential effects on Kissimmee River dissolved oxygen.	Protect Lake Kissimmee snail kite nests from rising water if there is additional rainfall.	N/A	KB Ops
5/8/2018	No new recommendations.		N/A	
5/1/2018	No new recommendations.		N/A	
4/24/2018	No new recommendations.		N/A	
4/17/2018	No new recommendations.		N/A	
4/10/2018	No new recommendations.		N/A	
4/3/2018	No new recommendations.		N/A	
3/27/2018	No new recommendations.		N/A	
3/20/2018	No new recommendations.		N/A	
3/13/2018	No new recommendations.		N/A	
3/6/2018	No new recommendations.		N/A	
2/27/2018	No new recommendations.		N/A	
2/20/2018	No new recommendations.		N/A	
2/13/2018	No new recommendations.		N/A	
2/6/2018	No new recommendations.		N/A	
1/30/2018	No new recommendations.		N/A	
1/23/2018	No new recommendations.		N/A	
1/16/2018	No new recommendations.		N/A	
1/9/2018	No new recommendations.		N/A	
12/19/2017	Begin discharge of 400 cfs from S67 into Istokpoga Canal.	Increase navigability by scouring channel and reducing sandbar at canal mouth.	Implemented	KB Ops/SFWMD Water Mgt
12/19/2017	Begin a stage recession on January 1 in Lakes Kissimmee-Cypress-Hatchineha starting at stage on January 1 to reach low pool on May 31. Recession rate not to exceed 0.2 ft/week as possible. Subject to SFWMD planned operations hierarchy.	Achieve fish and wildlife benefits by slowing lake stage recession rates relative to the regulation schedule recession rates.	-	KB Ops/SFWMD Water Mgt
12/19/2017	Begin stage recessions on January 15 in Lakes East Toho and Toho starting at stage on January 15, to reach low pools on May 31. Recession rate not to exceed 0.2 ft/week if possible. Subject to SFWMD planned operations hierarchy.	Achieve fish and wildlife benefits by slowing lake stage recession rates relative to the regulation schedule recession rates.	-	KB Ops/SFWMD Water Mgt
12/12/2017	No new recommendations.		N/A	
12/5/2017	No new recommendations.		N/A	
11/28/2017	No new recommendations.		N/A	
11/21/2017	No new recommendations.		N/A	
11/13/2017	No new recommendations.		N/A	
11/1/2017	No new recommendations.		N/A	
10/24/2017	No new recommendations.		N/A	
10/17/2017	No new recommendations.		N/A	
10/10/2017	No new recommendations.		N/A	
10/3/2017	No new recommendations.		N/A	
9/25/2017	No new recommendations.		N/A	
9/19/2017	No new recommendations.		N/A	
9/5/2017	No new recommendations.		N/A	
8/29/2017	No new recommendations.		N/A	
8/22/2017	No new recommendations.		N/A	
8/15/2017	No new recommendations.		N/A	

S-65/S-65A Limits on Rate of Change in Discharge

Q (cfs)	Maximum rate of increase or decrease (cfs/day)
300-650	75
650-1700	150
1700-3000	300
>3000	1000

Figure 12. Limits on rate of discharge change at S-65/S-65A starting with the 2016-2017 Dry Season.
Revised 11/16/16

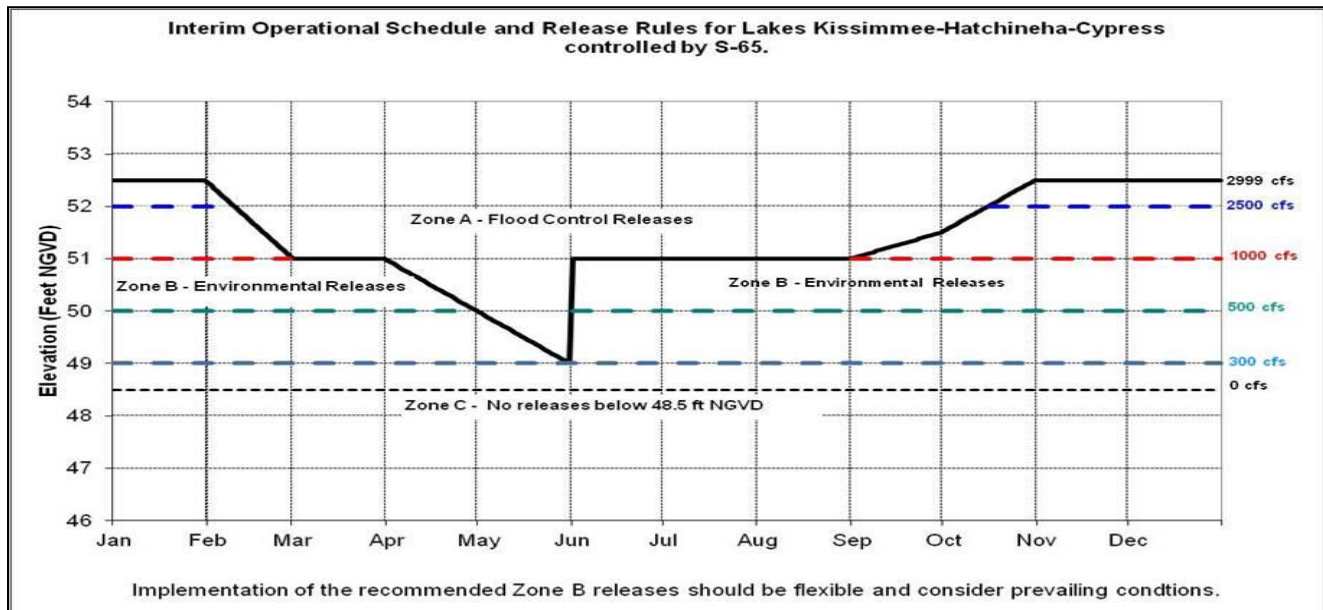


Figure 13. Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years.



Figure 14. The Kissimmee Basin.

LAKE OKEECHOBEE

According to the USACE web site, Lake Okeechobee stage is at 13.57 feet NGVD for the period ending at midnight on May 21, 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 0.34 feet higher than it was a month ago and 2.41 feet higher than a year ago (Figure 1). The Lake is now in the Low Flow sub-band and is rising quickly (Figure 2). According to RAINDAR, 2.6 inches of rain fell over the Lake during the week May 15, 2018 – May 21, 2018. Several areas on the northern shore received similar or more rainfall, between 2.0 – 4.0 inches, while much of the Kissimmee Basin received more, between 4.0 – 5.0 inches (Figure 3).

Average daily inflows to the Lake were substantially higher than the previous week, going from 720 cfs to 5,060 cfs. The largest inflow was from the S-84 structures, at 1,724 cfs, followed by Kissimmee River discharges through the S-65E structures, at 939 cfs. The L-8 canal via Culvert 10A also reversed flow into the Lake, averaging 714 daily cfs of inflow (Table 1).

Average daily outflows for the Lake decreased from the previous week, going from 1,070 cfs to 38 cfs. The only discharges were from the S-77 structure on May 19, at 263 cfs. The corrected average daily evapotranspiration value for the week based on the L006 weather platform solar radiation data fell to 0.10 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.

Based on the Lake Okeechobee wading bird habitat suitability index, there was an increase of approximately 7,600 acres in habitats with suitable foraging depths for long-legged wading birds from the previous week, with 35,388 acres of suitable depth on May 21. There was also a similar increase of roughly 6,000 acres of suitable foraging depths for short or long-legged wading birds, with 18,572 acres this past week (Figure 5). However, substantial reversals are likely to disperse prey and dramatically reduce the quality of available foraging habitat on the Lake.

Turbidity (ntu), a measure of water clarity, rose slightly in May after declining substantially from February through April from a near record high in January (Figure 6). The average turbidity from pelagic stations nearly doubled from April, going from 44 ntu to 80 in early May. However, this was still a decline from values of 97 – 99 ntu in January and February. Nearshore values followed a similar trend but with less range, going from 27 ntu to 39 ntu from April to May.

Total phosphorus (mg/L) levels also followed a similar pattern, declining from a January high through April, but then slightly increasing again in May. The pelagic average went from 0.184 mg/L to 0.231 mg/L from April to May, while the nearshore went from 0.163 mg/L in April to 0.178 mg/L in May (Figure 6).

Water Management Recommendations

Lake Okeechobee stage is 13.57 feet NGVD having increased 0.53 feet over the past week and 0.34 feet over the last month. There was considerable rainfall over the last 8 days, bringing the first substantial stage reversal since late October 2017. The Lake was below 13.0 feet NGVD for just 10 days and is likely rising too fast for many recovering SAV communities to stay in optimal light conditions. The seasonal low for the 2018 growing season may have been reached on May 12 – May 13, which was 12.83 feet NGVD. Given the high stages and turbidity throughout the fall and winter, lower water levels for substantial periods of time would have benefitted plant communities in deeper areas. Given

the current stages and predicted above-average rainfall over the next few months, the SAV coverage on the Lake throughout the summer will likely remain at minimal levels following Hurricane Irma impacts. Additionally, most of the wading bird foraging activity and new nesting activity will likely diminish as stage reversals will disperse prey and reduce the quality of available foraging habitats. Efforts to reduce Lake stage through the peak of the summer growing season to benefit recovering vegetation in the nearshore may help to reduce algal blooms and will improve the overall ecological conditions on the Lake.

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)
S65E & S65EX1	331	939	0.4	S77	364	38	0.0
S71 & 72	65	693	0.3	S308	219	0	0.0
S84 & 84X	168	1724	0.7	S351	181	0	0.0
Fisheating Creek	4	11	0.0	S352	39	0	0.0
S154	25	117	0.0	S354	223	0	0.0
S191	52	399	0.2	L8 Outflow	46	0	-0.3
S133 P	74	218	0.1	ET	3114	1984	0.8
S127 P	0	34	0.0	Total	4184	2022	0.6
S129 P	0	24	0.0				
S131 P	0	20	0.0				
S135 P	0	113	0.0				
S2 P	0	0	0.0				
S3 P	0	0	0.0				
S4 P	0	54	0.0				
L8 Backflow	0	714	0.0				
Rainfall	10031	7248	2.6				
Total	10751	12308	4.5				

PROVISIONAL DATA

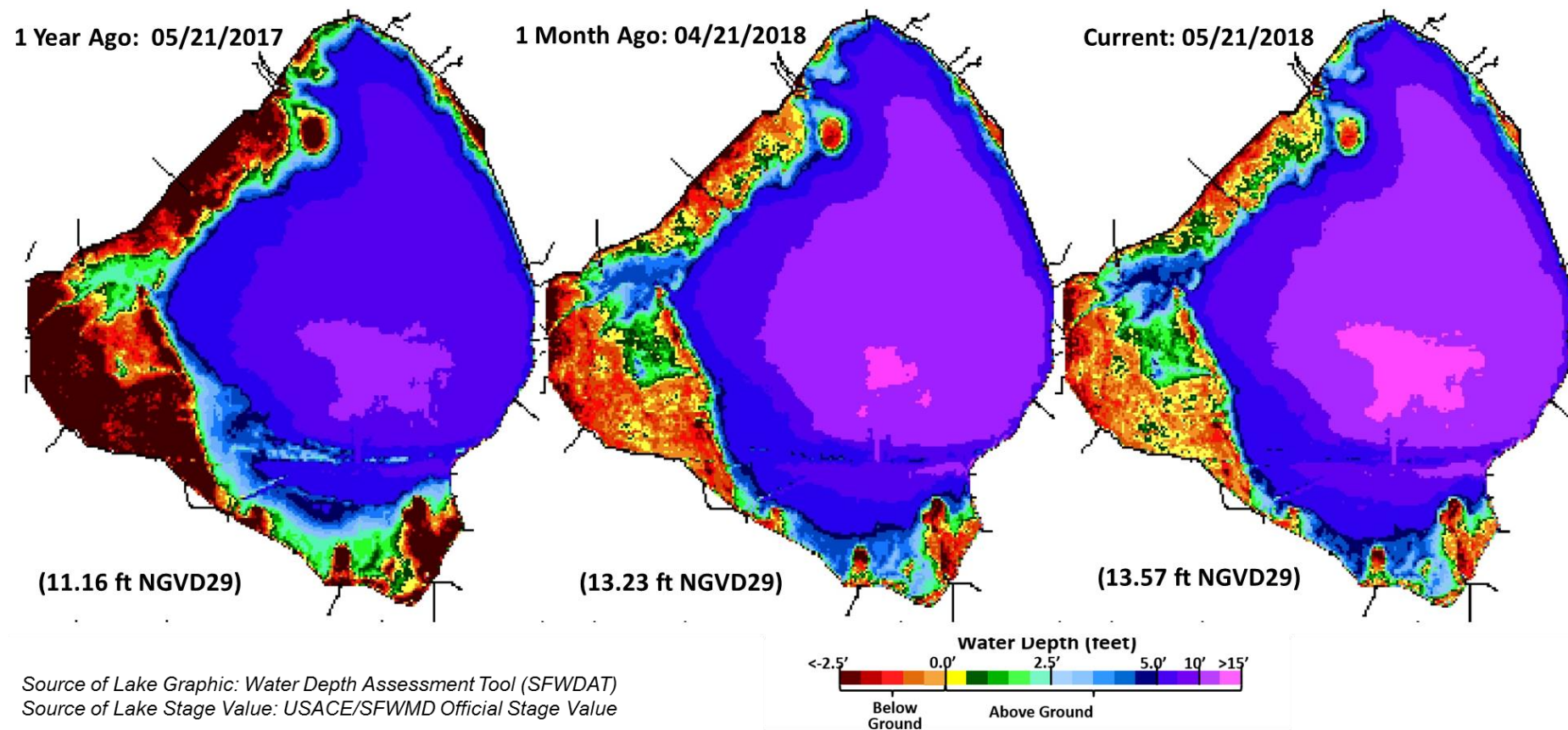


Figure 1. Water depth estimates on Lake Okeechobee based on the South Florida Water Depth Assessment Tool.

Lake Okeechobee Water Level History and Projected Stages

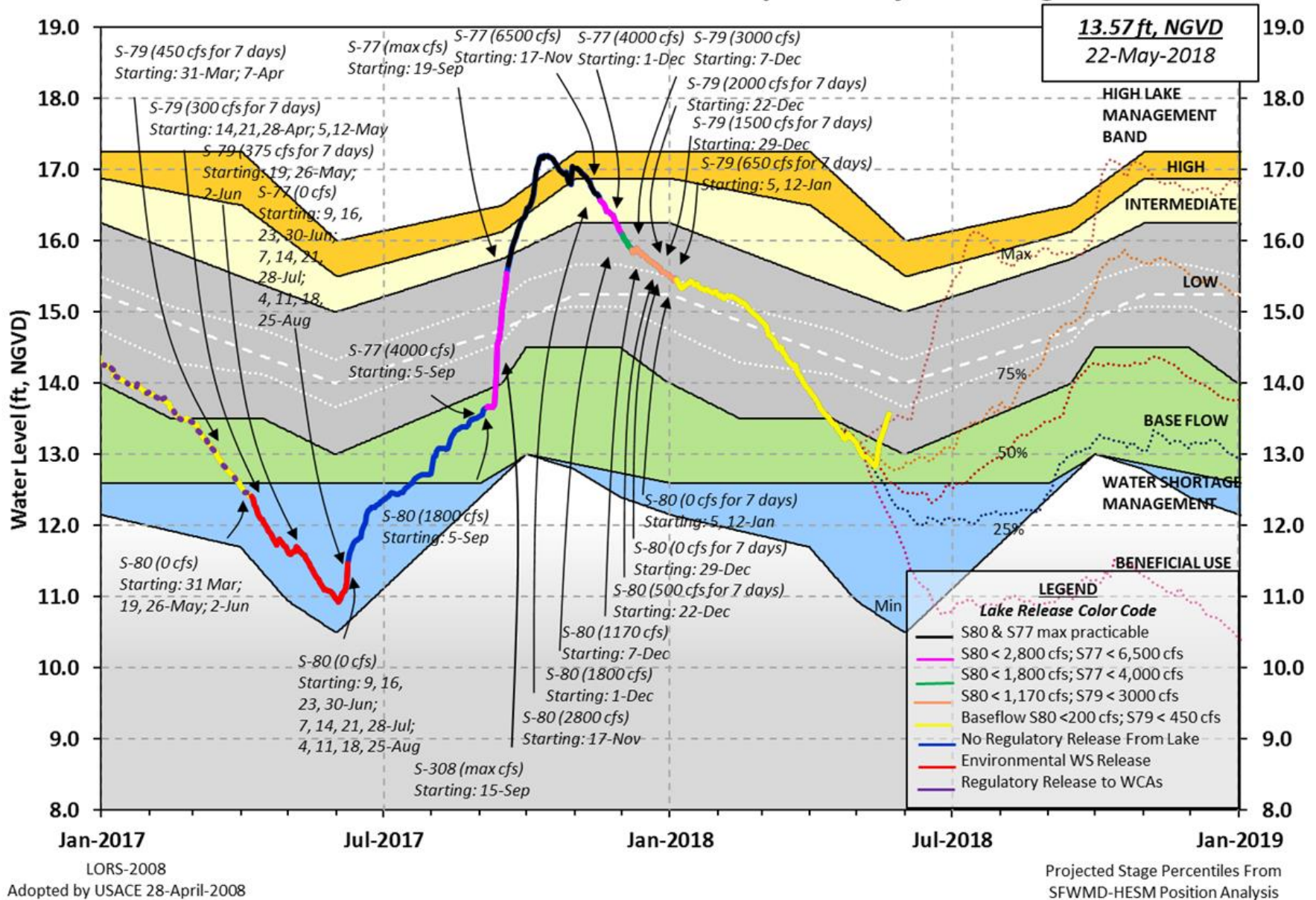


Figure 2. Recent Lake Okeechobee stage and releases, with projected stages based on a dynamic position analysis.

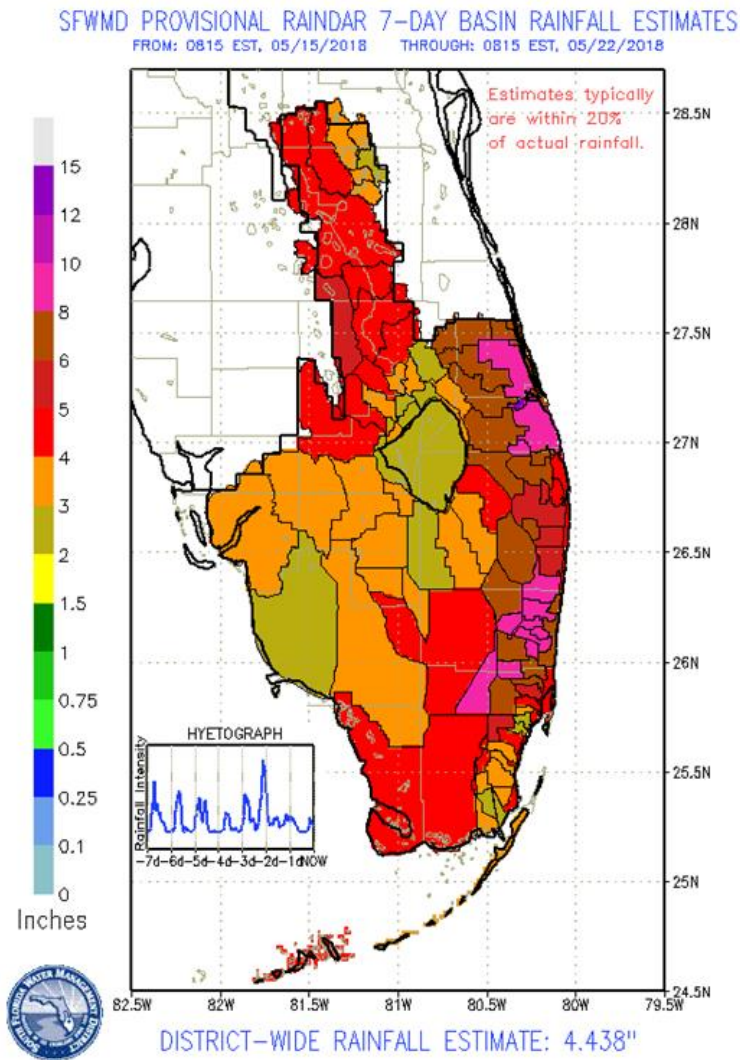
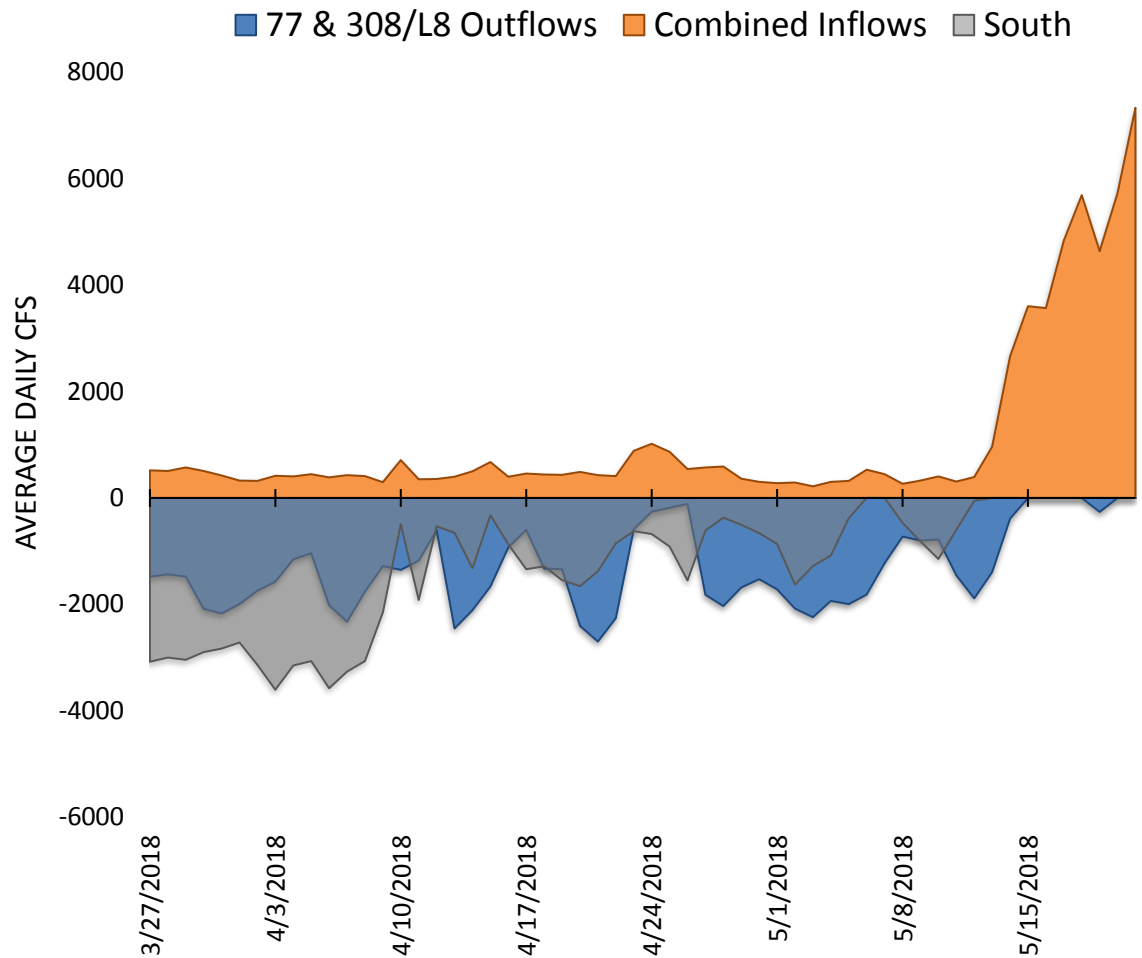


Figure 3. Rainfall estimates by basin.



PROVISIONAL DATA

Figure 4. Major inflows and outflows of Lake Okeechobee, including the S350 structures designated as South. The L8 canal flows through culvert 10A are included as outflows when positive, and as inflows when backflowing into the lake. Inflows and outflows are shown as positive and negative, respectively, for visual

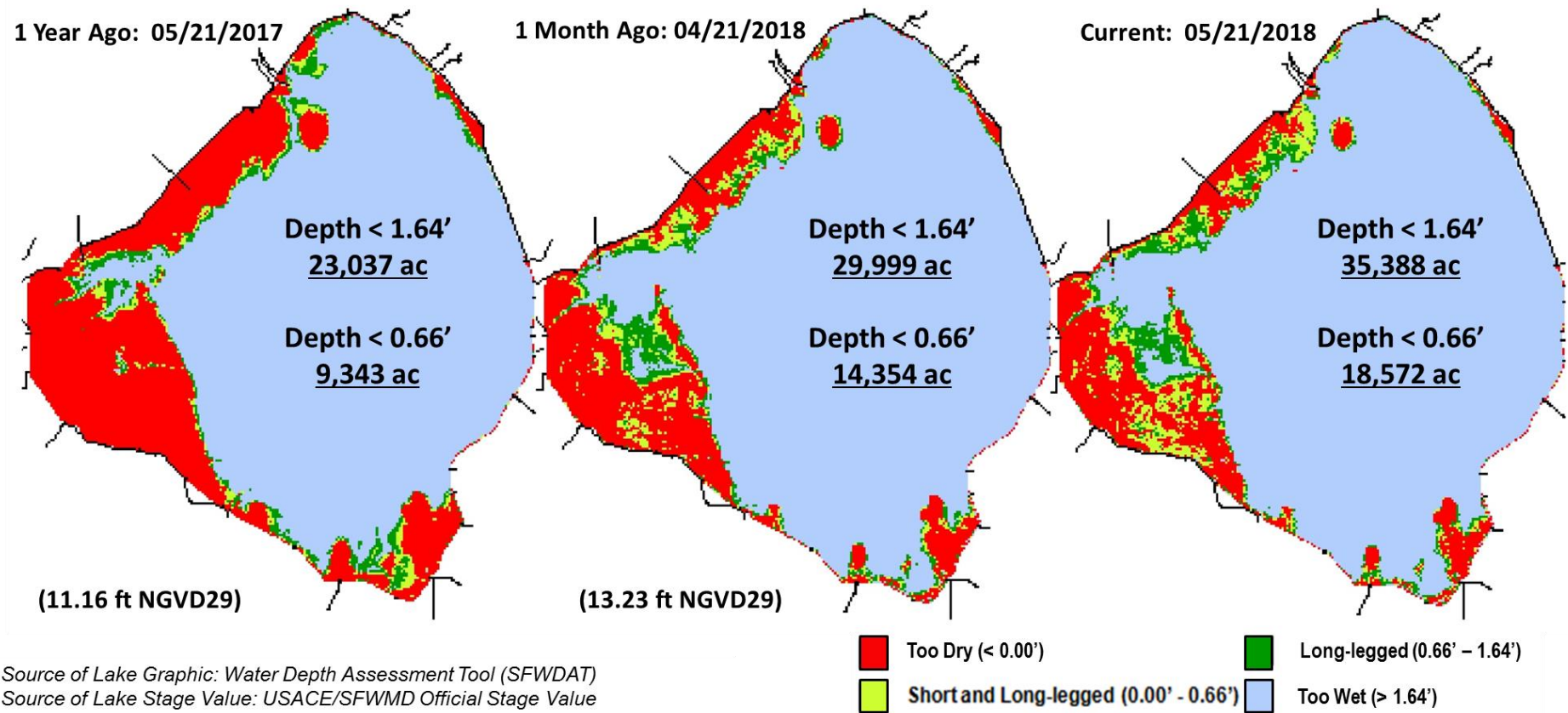
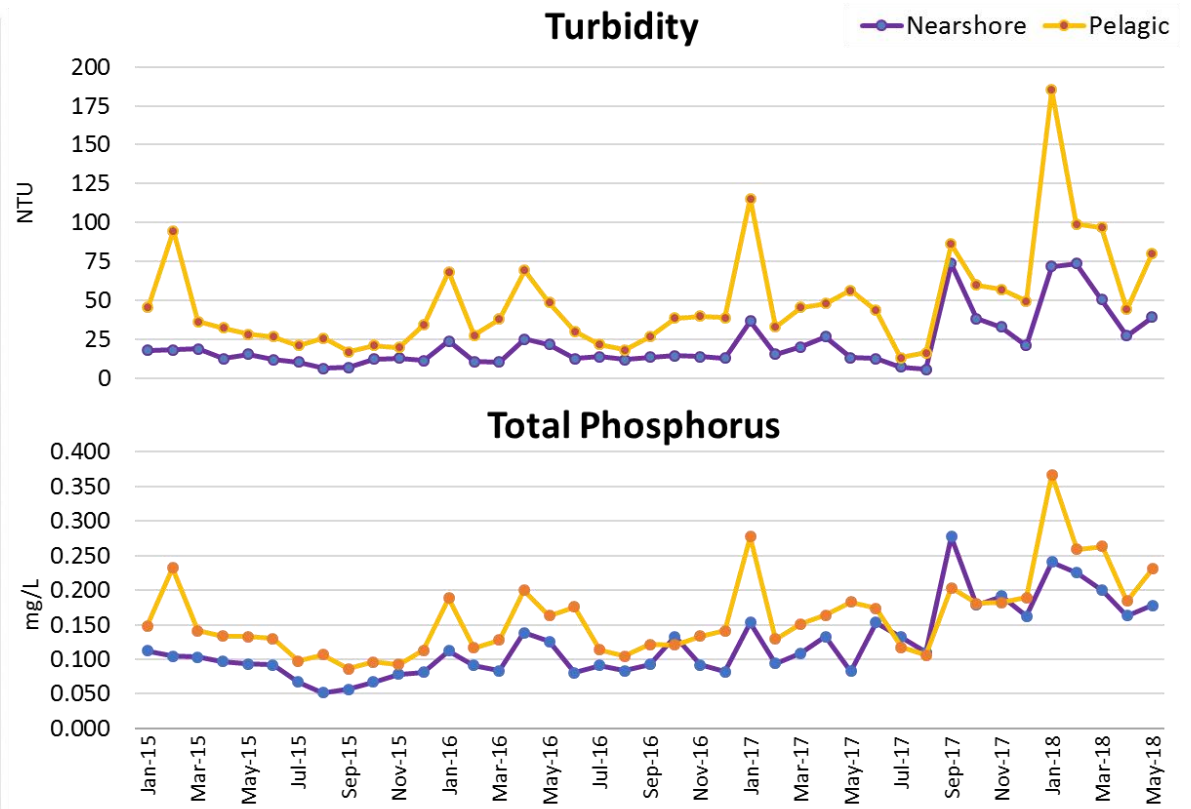
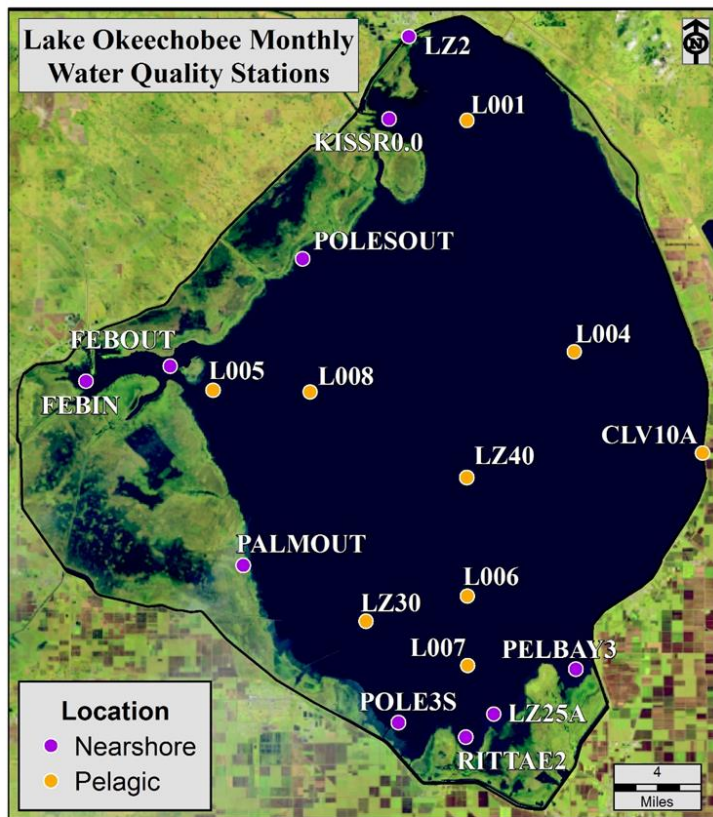


Figure 5. Wading bird habitat suitability index for Lake Okeechobee based on the South Florida Water Depth Assessment Tool.



NOTE: Fisheating Bay samples not included in Nearshore

Figure 6. Turbidity (ntu) and Total Phosphorus (mg/L) values from mid-January 2015 through mid-May 2018 for nearshore (purple) and pelagic (yellow) zones. Fisheating Bay stations were not included due to sporadic sampling across the period of record.

ESTUARIES

St. Lucie Estuary:

Last week total inflow to the St. Lucie Estuary averaged about 5,424 cfs (Figures 1 and 2) and last month inflow averaged about 1,584 cfs. Last week's provisional averaged inflows from the tidal basin and the structures are shown in Table 1.

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

Location	Flow (cfs)
Tidal Basin Inflow	2267
S-80	1572
S-308	0
S-49 on C-24	754
S-97 on C-23	521
Gordy Rd. structure on Ten Mile Creek	310

Over the past week, salinity decreased throughout the estuary (Table 2, Figures 3 and 4). The seven-day moving average salinity of the water column (an average of the surface and bottom salinity) at the US1 Bridge is estimated to be 11.3. 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	Envelope
HR1 (North Fork)	10.8 (22.3)	14.5 (23.7)	NA ¹
US1 Bridge	NR (NR)	12.9 (25.3)	10.0-26.0
A1A Bridge	16.6 (30.8)	19.1 (32.1)	NA ¹

¹Envelope not applicable, NR=not reporting

Continuous monitoring of water quality is conducted at five Land/Ocean Biogeochemical Observatory (LOBO) stations located in the St. Lucie Estuary and maintained by Florida Atlantic University/Harbor Branch Oceanographic Institute (FAU-HBOI). Data are summarized in Table 3 and station location map is shown in Figure 5.

Table 3. Weekly ranges of instrument depth, chlorophyll *a* (a measure of algal biomass) and dissolved oxygen concentrations at five FAU-HBOI LOBO stations located in the St. Lucie Estuary.

Location	Depth (m)	Chlorophyll <i>a</i> (µg/l)	Average DO (mg/l)	Minimum DO (mg/l)	Maximum DO (mg/l)
SF2	2.77	5.45 - 6.84	9.76	8.03	11.50
SF	1.57	3.16 - 7.55	5.75	4.34	7.01
NF	1.89	3.42 - 11.02	6.16	4.65	8.64
ME	1.69	3.42 - 8.85	5.99	5.23	6.81
IRL-SLE	3.43	0.51 - 6.17	6.24	5.77	7.13

NOAA satellite imagery to indicate cyanobacteria bloom potential in the St. Lucie Estuary was unavailable this week due to cloud coverage.

Caloosahatchee Estuary:

Last week total inflow into the Caloosahatchee Estuary averaged about 3,853 cfs (Figures 6 and 7) and last month inflow averaged about 1,704 cfs. Last week's provisional averaged inflows from the structures are shown in Table 4.

Table 4. Weekly average inflows (data is provisional).

Location	Flow (cfs)
S-77	38
S-78	1771
S-79	3053
Tidal Basin Inflow	800

Over the past week in the estuary, salinity decreased to Shell Point and increased downstream (Table 5, Figures 8 & 9). The seven-day average salinity values are in the good range for adult eastern oysters at Cape Coral and at Shell Point (Figure 10). Salinity data were not available at Sanibel. The 30-day moving average surface salinity is 3.4 at Val I-75 and 10.6 at Ft. Myers. With no flow through S-79, daily salinity at Val I-75 is forecast in two weeks to be 1.8, and the 30-day moving average is forecast to be 2.4 (Figure 11). Salinity conditions between Val I-75 and Ft. Myers are good for tape grass.

Table 5. 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	Envelope
S-79 (Franklin Lock)	0.5 (4.5)	0.6 (4.8)	NA ¹
*Val I75	1.8 (5.4)	3.6 (9.2)	0.0-5.0 ²
Ft. Myers Yacht Basin	9.0 (12.2)	12.1 (16.4)	NA
Cape Coral	18.0 (18.7)	18.8 (20.9)	10.0-30.0
Shell Point	29.1 (28.9)	28.2 (27.8)	10.0-30.0
Sanibel	NR ³ (NR)	NR (NR)	10.0-30.0

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

*Val I75 is temporarily unavailable (salinity values are estimated using models developed for this site).

Monitoring data collected by the River, Estuary and Coastal Observing Network of Sanibel-Captiva Conservation Foundation using continuous sensors are summarized in Table 6 as concentration ranges of chlorophyll *a* and dissolved oxygen at Beautiful Island, Ft. Myers, and Shell Point in the Caloosahatchee Estuary.

Table 6. Weekly ranges of chlorophyll *a* (a measure of algal biomass) and dissolved oxygen concentrations at three monitoring stations maintained by the Sanibel-Captiva Conservation Foundation.

Parameter Name	RECON Monitoring Stations		
	Beautiful Island	Ft. Myers	Shell Point
Chlorophyll <i>a</i> (µg/l)	4.60 – 10.73	1.50 – 58.53	0.96 – 14.36
Dissolved Oxygen (mg/l)	3.84 – 5.54	2.87 – 8.88	5.83 – 7.79

The Florida Fish and Wildlife Research Institute reported on May 18, 2018, that *Karenia brevis*, the *Florida red tide dinoflagellate*, was observed at background to medium concentrations in 8 samples collected from Lee County. Fish kills and respiratory irritation were reported in Lee County over the past week.

NOAA satellite imagery to indicate cyanobacteria bloom potential in the Caloosahatchee Estuary was unavailable this week due to cloud coverage.

Water Management Recommendations

Lake stage is in the Low sub-band of 2008 LORS. Tributary hydrological conditions are very wet. The 2008 LORS recommends up to 3,000 cfs at S-79 and up to 1,170 cfs at S-80. Given the current estuarine conditions, there are no ecological benefits associated with freshwater releases from Lake Okeechobee.

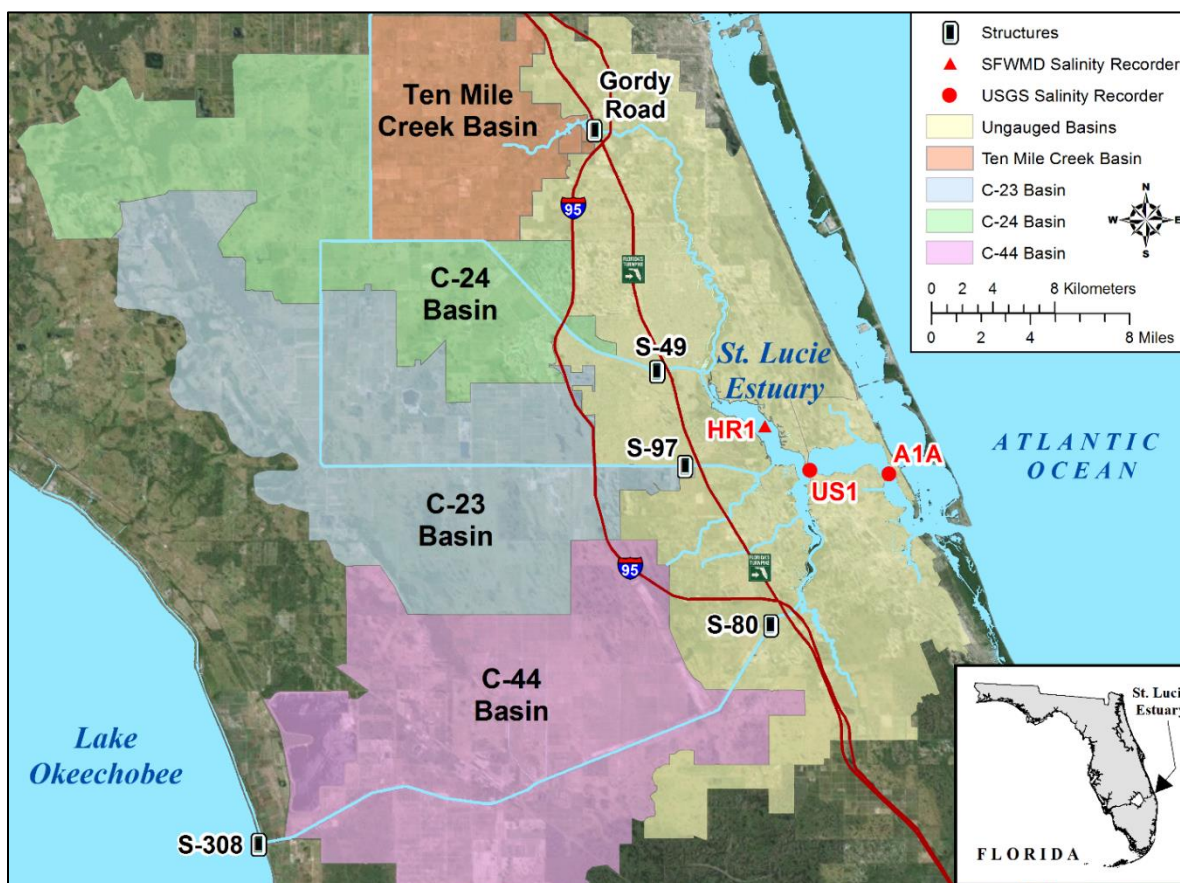


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

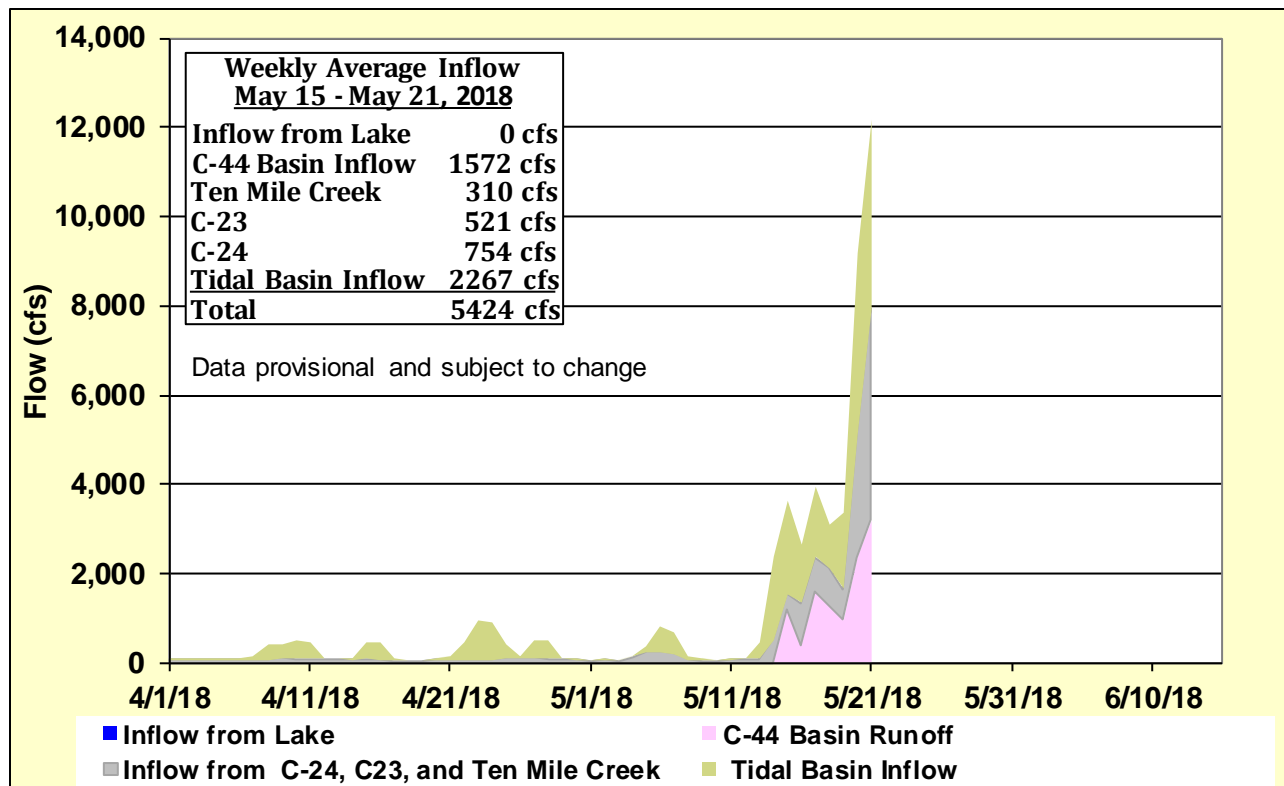


Figure 2. Estimated surface freshwater inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basins into the St. Lucie Estuary.

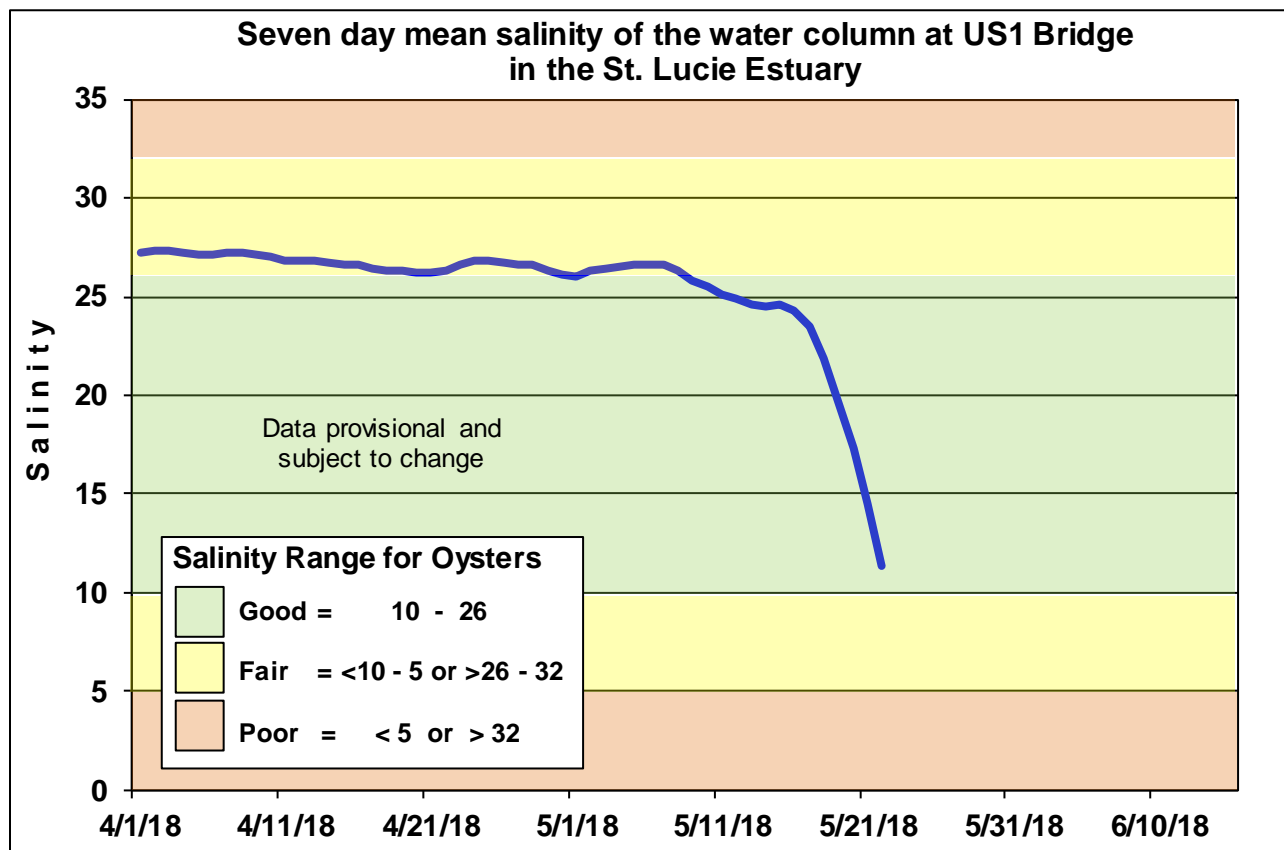


Figure 3. Seven-day mean salinity of the water column at the US1 Bridge.

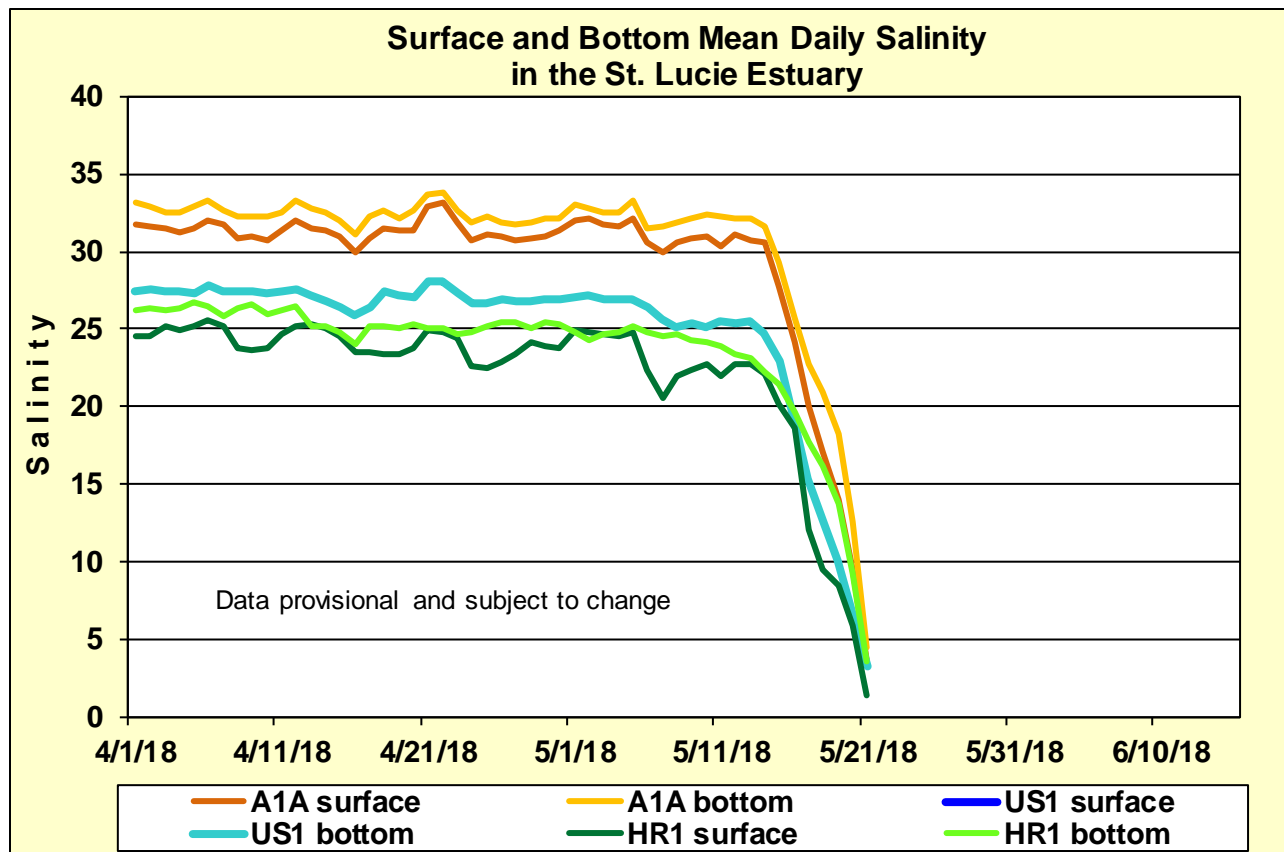


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

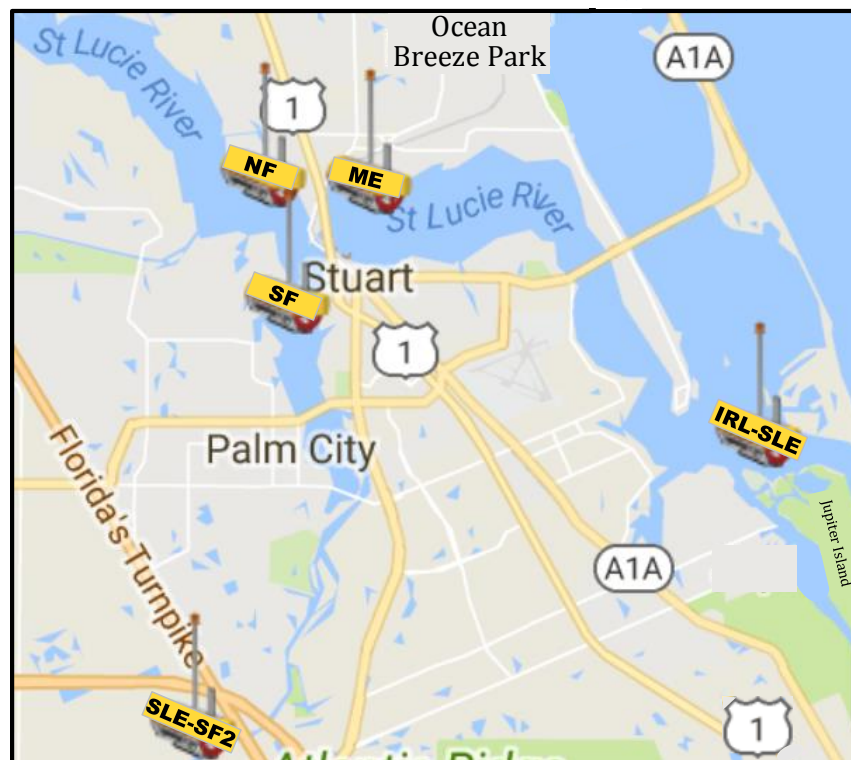


Figure 5. Location of FAU-HBOI LOBO water quality stations in the St. Lucie Estuary.

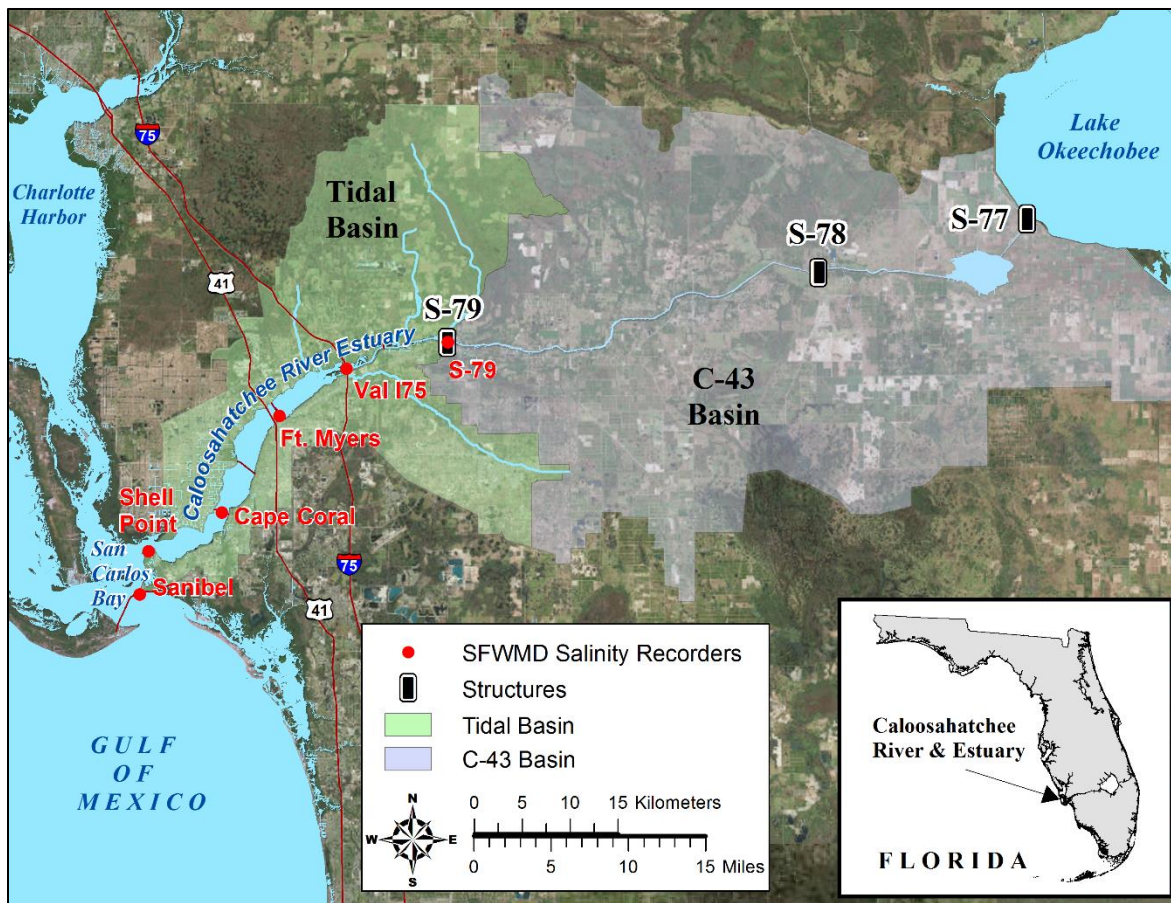


Figure 6. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

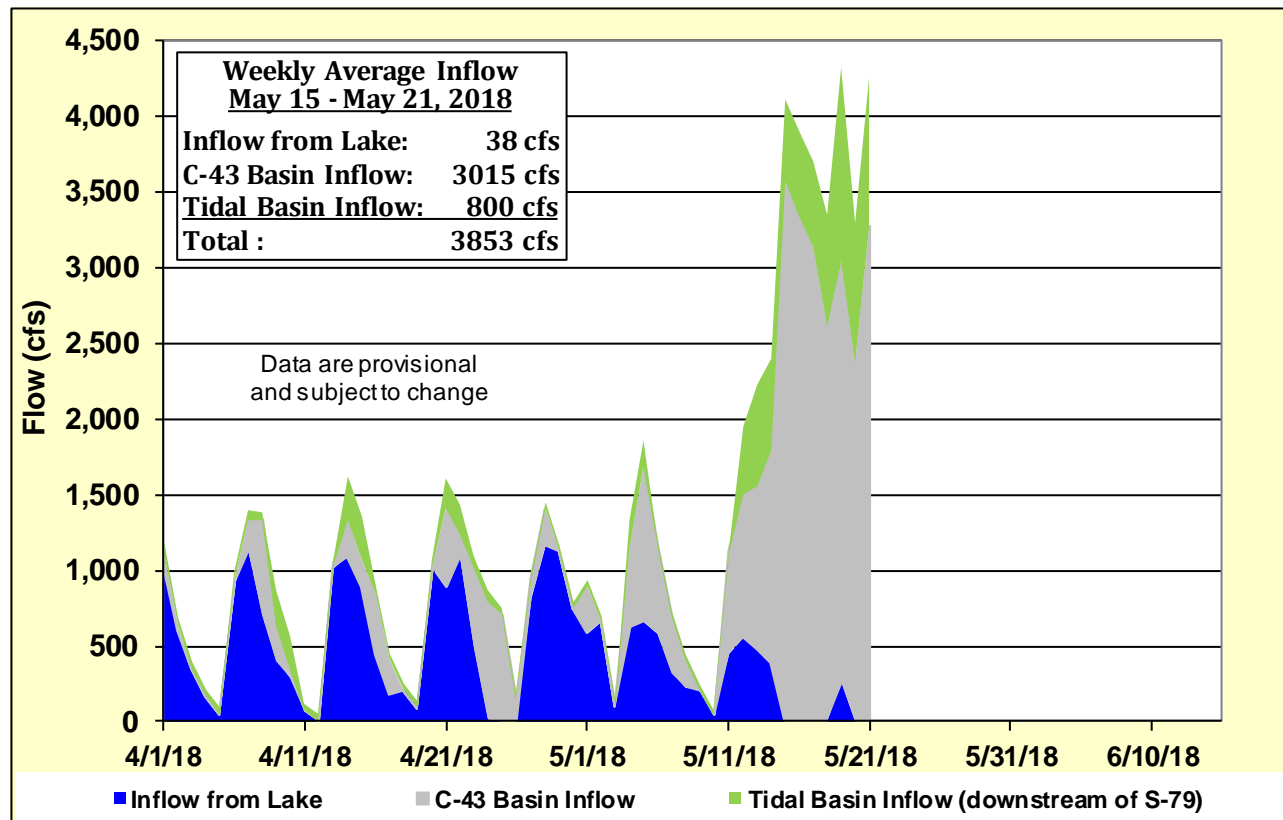


Figure 7. Freshwater inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.

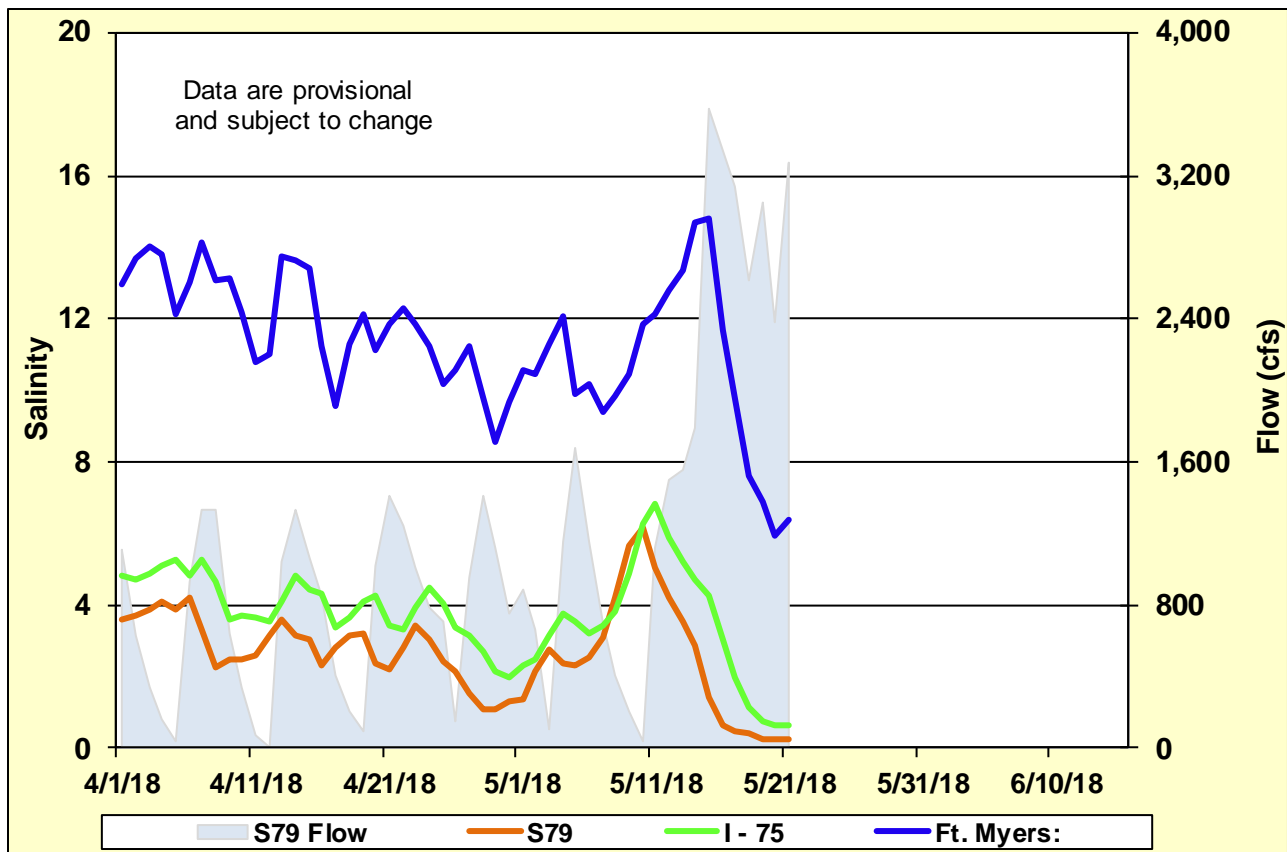


Figure 8. Daily mean flows at S-79 and salinity at upper estuary monitoring stations.

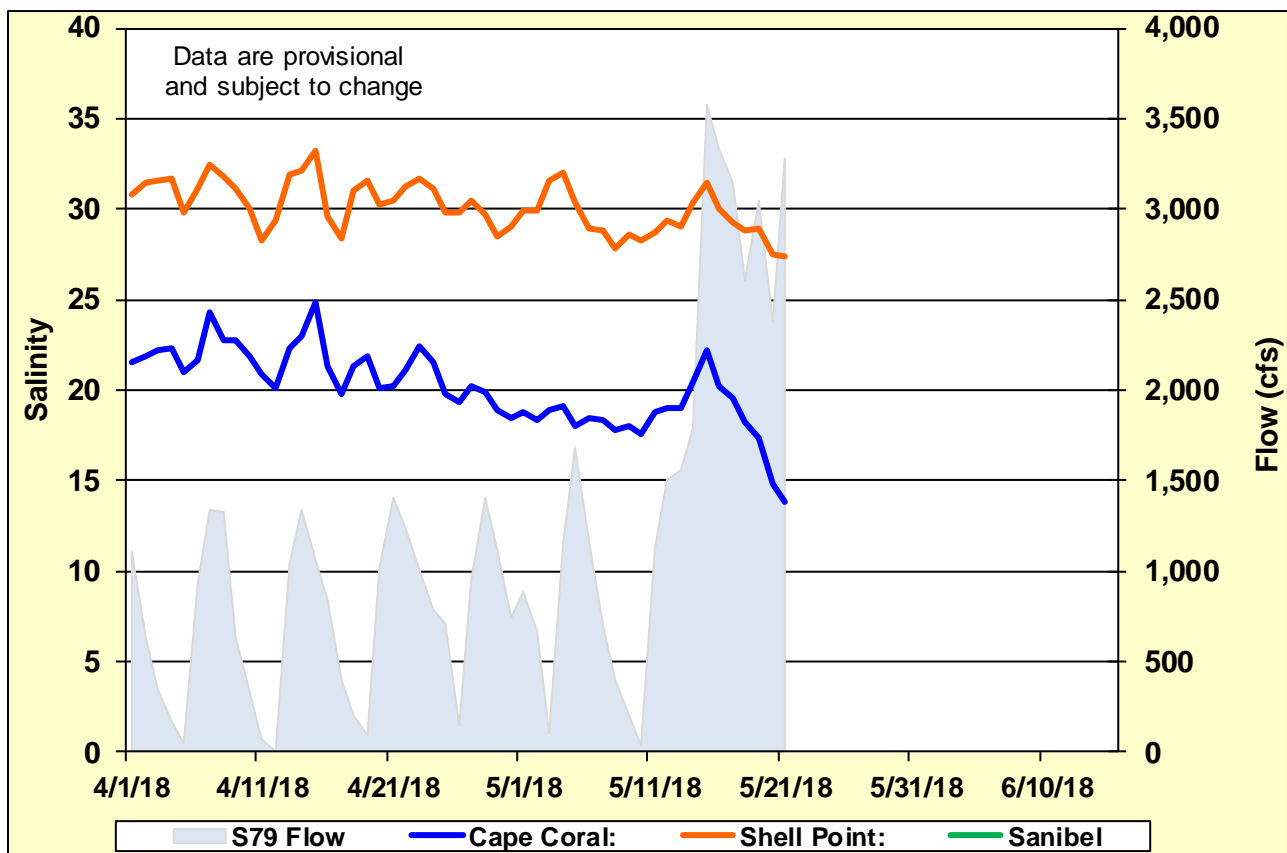


Figure 9. Daily mean flows at S-79 and salinity at lower estuary stations.

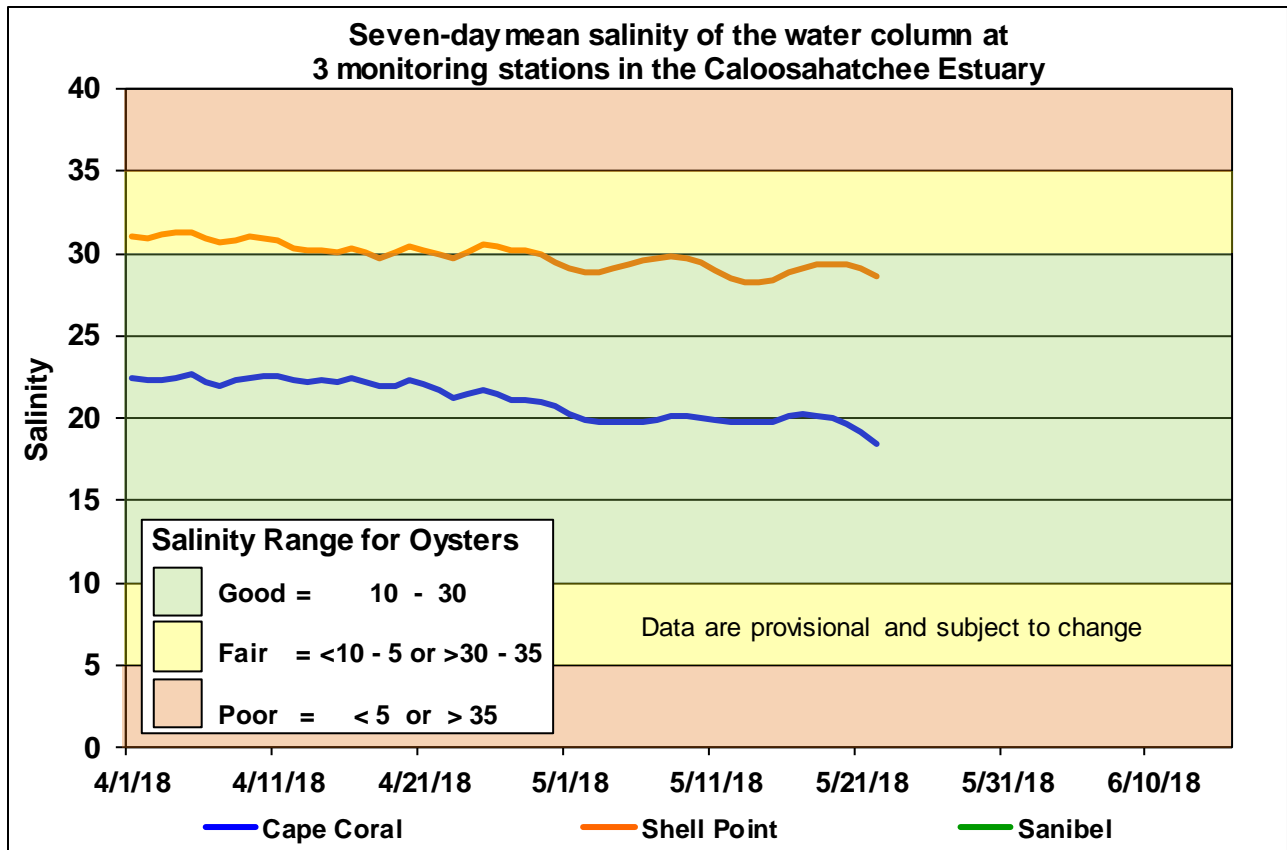


Figure 10. Seven-day mean salinity at Cape Coral Bridge, Shell Point, and Sanibel Bridge monitoring stations.

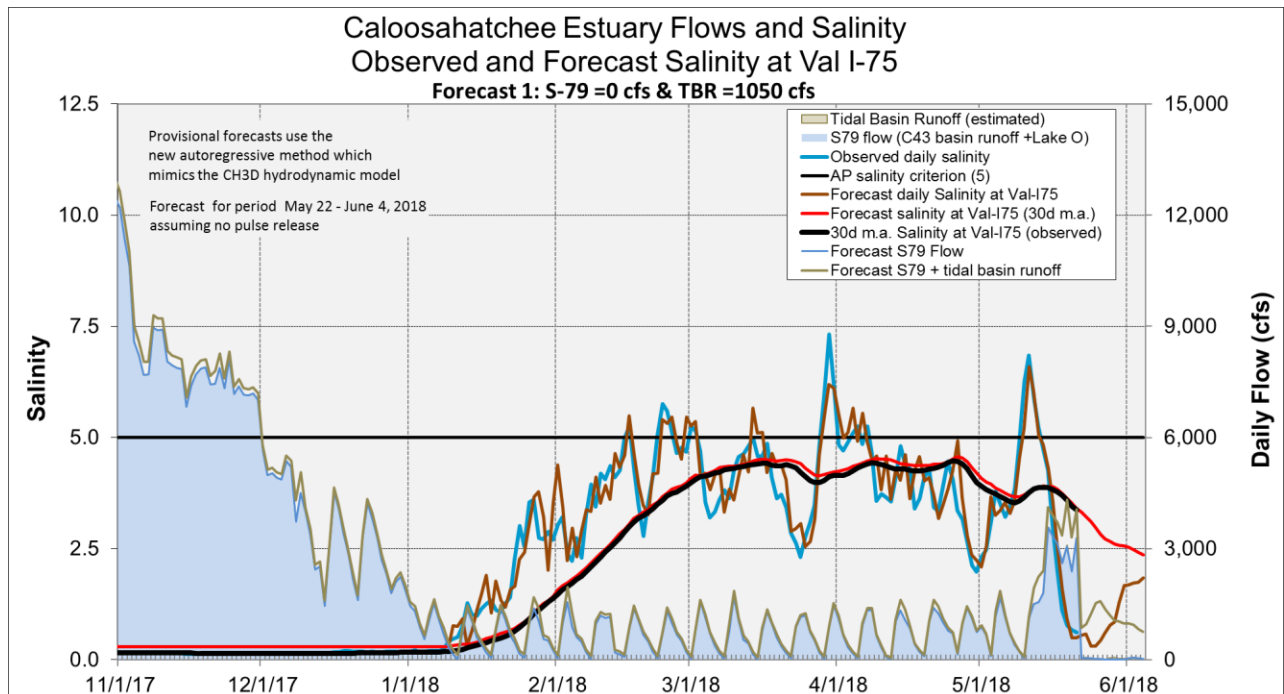
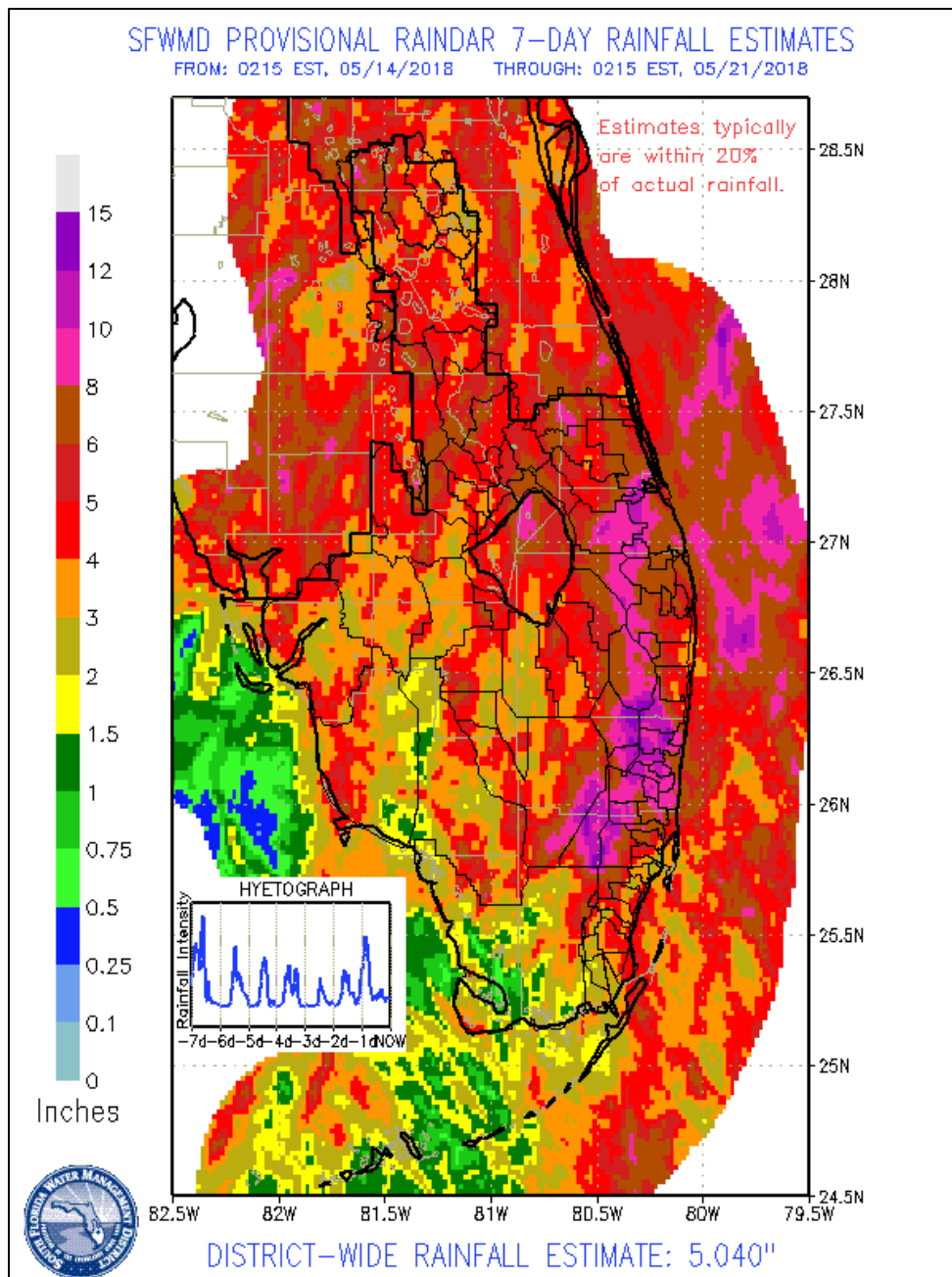


Figure 11. 14-day salinity forecast at Val I-75 assuming no releases at S-79.

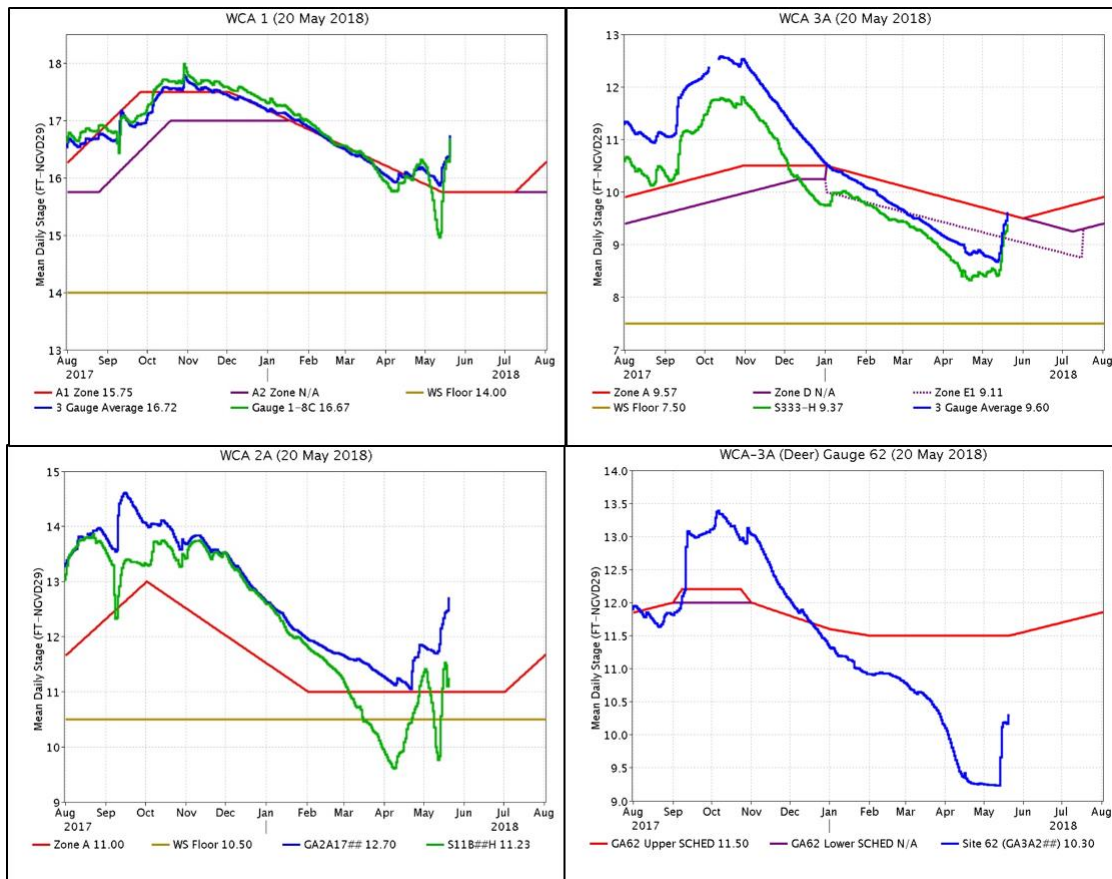
EVERGLADES

At the gauges monitored for this report, water depths across Everglades rose an average of 0.83 feet last week. Individual gauge changes within the WCAs ranged from +1.19 feet (NW WCA-3A) to +0.63 feet (WCA-3B). Pan evaporation was estimated at 1.7 inches, a decrease from last week.

Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	8.33	+0.77
WCA-2A	8.57	+0.77
WCA-2B	9.51	+0.95
WCA-3A	5.27	+0.97
WCA-3B	9.40	+0.71
ENP	2.58	+0.69



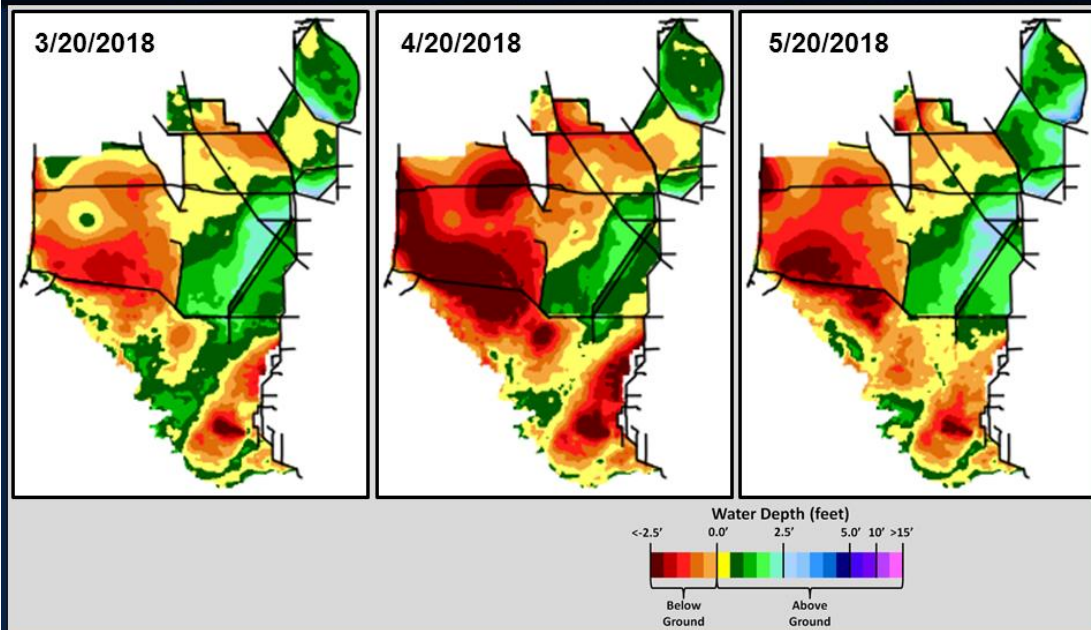
Regulation Schedules: WCA-1 three-gauge average is now 0.97 feet above Zone A1, while the canal stage is 0.92 feet above (+1.6-foot change from last week). WCA-2A canal stage continues with its recent abrupt changes with gauge S11B stage now 0.23 feet above Zone A and the marsh gauge 1.70 above Zone A. WCA-3A three-gauge average stage is 0.03 feet above Zone A. WCA-3A at gauge 62 (northwest corner) stage is 1.2 feet below the upper schedule.



Water Depths and Changes: The WDAT tool for spatial interpolation of depth monthly snapshots indicates rapidly rehydrating conditions across Everglades. Dry conditions (optimal foraging) never really occurred in WCA-1 this nesting season. Northern WCA-3A water depths are now above ground surface. Comparing WDAT water levels from present, last week water levels dropped within Shark River Slough in Everglades National Park and increased most dramatically in northwestern WCA-3A. The Everglades is considerably wetter than it was last year at this time.



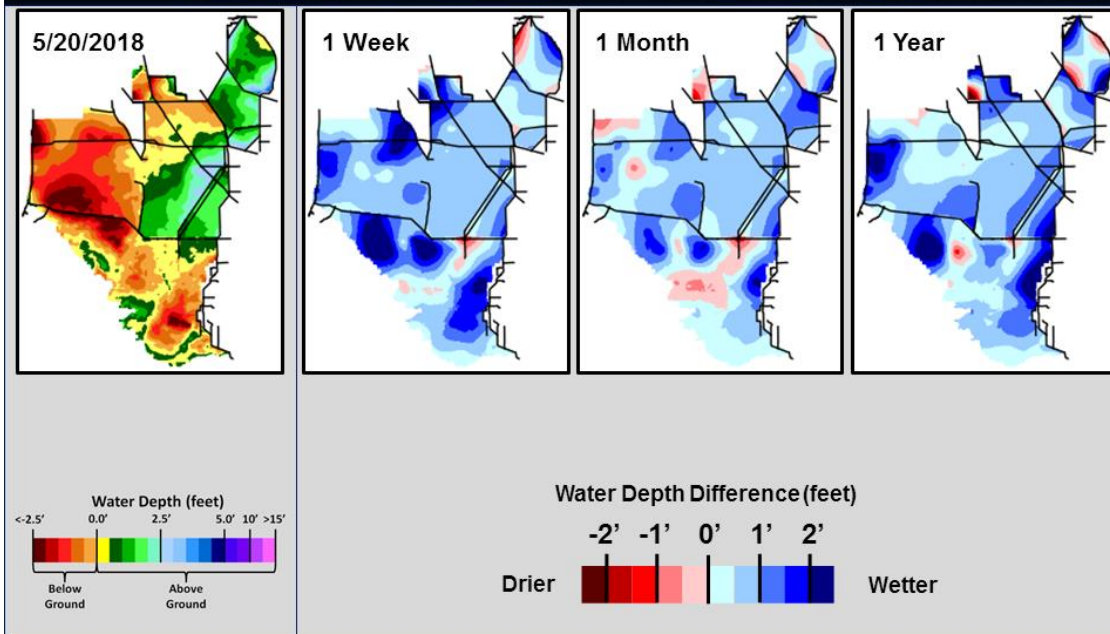
SFWDAT Water Depth Monthly Snapshots



South Florida Water Depth Assessment Tool (SFWDAT)



SFWDAT Everglades Difference Maps (Present – Past)



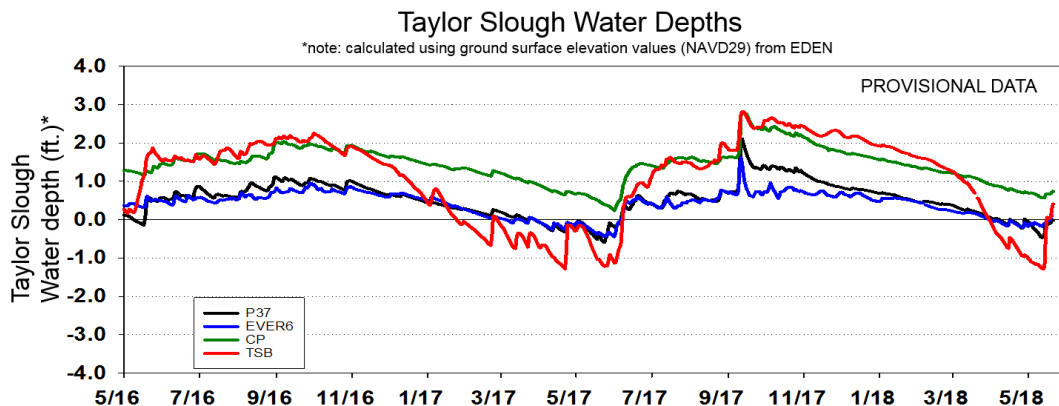
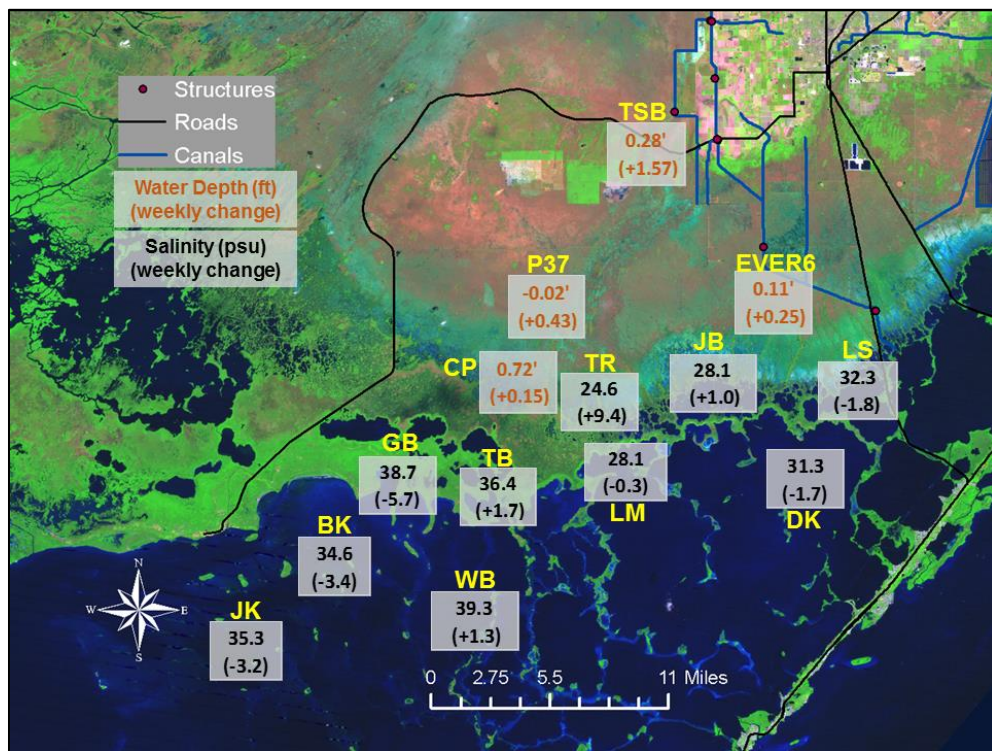
South Florida Water Depth Assessment Tool (SFWDAT)

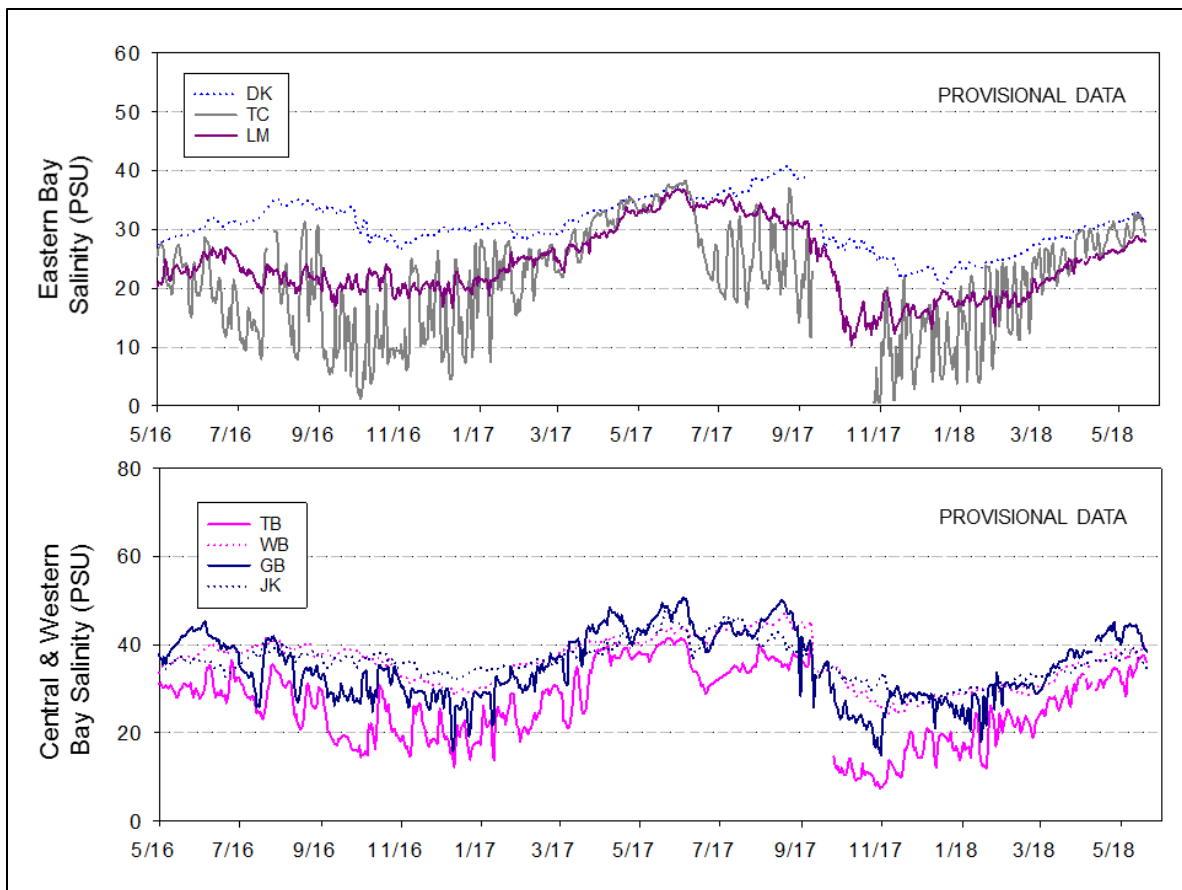
SFWMD wading bird flight (5/21/2018):

- No foraging observed in WCAs.
- However, fledglings of all species at colonies and overall numbers are down.
- Decrease in wading birds at colonies due to juvenile independence and another likely factor is mortality as a result of recent large, rain-driven reversals.

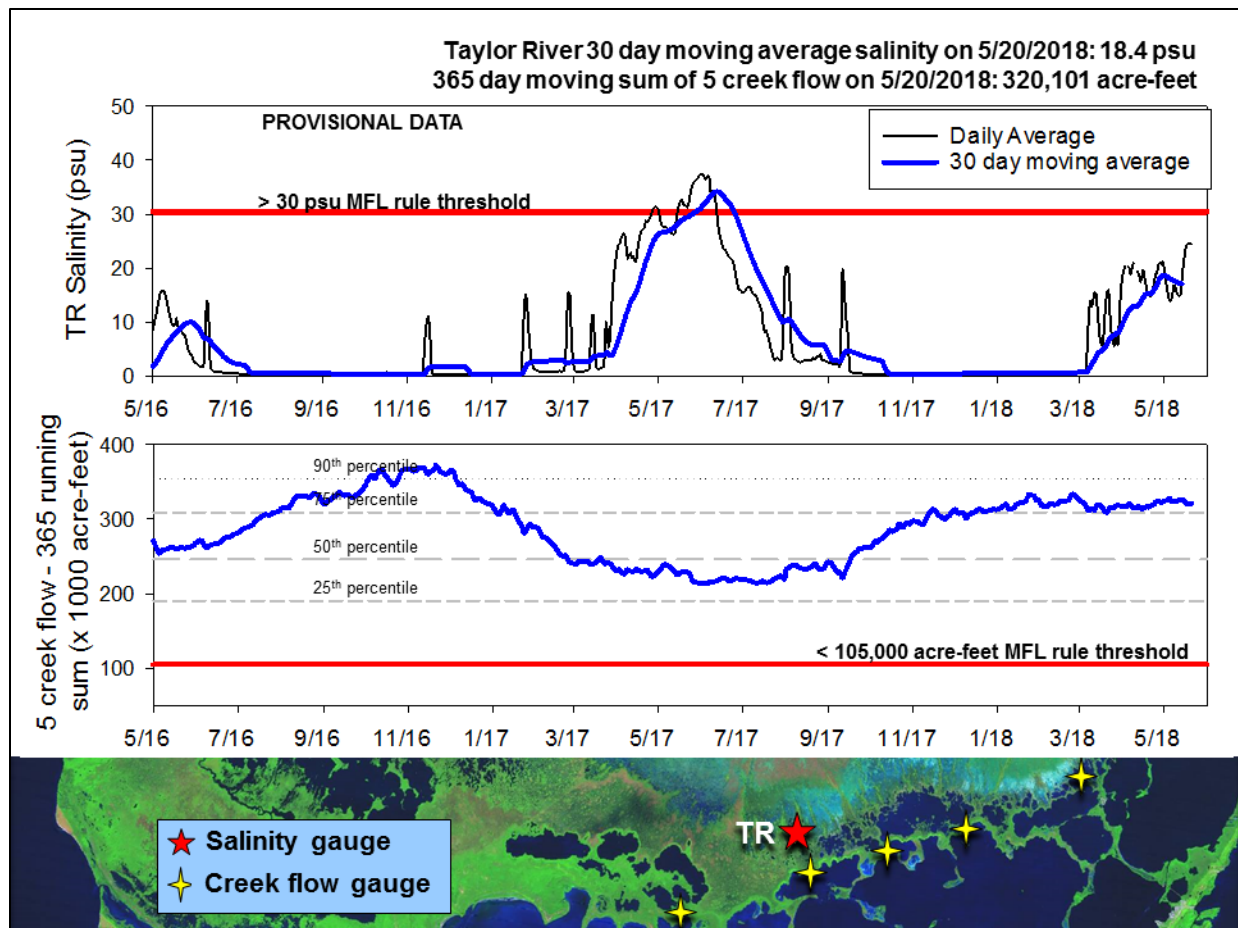
Taylor Slough Water Levels: An average of 2.7 inches of rain fell on Taylor Slough and Florida Bay with a maximum of 5.1 inches falling over northern Taylor Slough. Stage changes this week ranged from +0.15 feet to +1.57 feet. Water depths range from -0.02 feet to +0.72 feet and are 3 to 11 inches above the historical averages. The Taylor Slough bridge location in northern Taylor Slough has rehydrated over the last week.

Florida Bay Salinities: Salinity changes in Florida Bay ranged from -5.7 psu to +1.7 psu. Salinities ranged from 28 psu in the northeast to 39 psu in the central bay. This range is 1 to 7 psu below the historical averages.





Florida Bay MFL: Mangrove zone daily average salinity rose 9 psu this past week to end at 25 psu. The 30-day moving average increased 1.3 psu ending at 18.4 psu. The weekly cumulative flow from the five creeks denoted by yellow stars on the map totaled -4,900 acre-feet for the last week as bay water was pushed upstream for most of the week. The 365-day moving sum of flow from the five creeks decreased 6,800 acre-feet over the last week to end at 320,101 acre-feet (still greater than the long-term average of 257,628 acre-feet). Creek flow is provisional data from the USGS and is highly variable.



Water Management Recommendations

Keeping depths in Shark River Slough within the suitable range for wading bird foraging has ecological benefit for the remaining wading birds nesting in the southern end of the Everglades. Inflows to Rotenberger Wildlife Management Area no longer generate substantial ecological benefit. Ascension rates are now critical for apple snail reproduction in the Everglades. The current recommended rehydration rate is 0.25 feet or less per week (or 0.5 feet per 2 weeks). Inflows via the S-332D structure continue to have ecological benefit as long as water depths are below ground surface; standing surface water should be avoided. Due to elevated levels of phosphorus upstream of S-332, a recommendation is being made to limit the increase in water depths within the L-31W to no more than 3 inches per day over the course of 3 to 4 weeks. More specific recommendations appear in the summary table below. The red text represents new or modified information or recommendations.

SFWMD Everglades Ecological Recommendations, May 22nd, 2018 (red is new)

Area	Weekly change	Recommendation	Reasons
WCA-1	Stage increased by 0.77'	Maintain depths at 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-2A	Stage increased by 0.77'	Maintain depths at 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-2B	Stage increased by 0.95'	Maintain depths at 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 increased by 1.03'	Maintain depths at 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 NW	Stage increased by 1.19'	Maintain depths at regulation schedule. Manage for a rate of ascension less than +0.25' per week, or less than +0.5 per 2 weeks.	
Central WCA-3A S	Stage increased by 0.67'	Maintain depths at regulation schedule.	Protect downstream wading bird foraging conditions.
Southern WCA-3A S	Stages decreased by 0.97'		
WCA-3B	Stages increased by 0.71'	Maintain depths at regulation schedule.	Protect upstream/downstream habitat and wildlife.
ENP-SRS	Stage increased by 0.69'	Make discharges to the Park according to the 2012 WCP rainfall plan.	Protect last remaining habitat suitable for wading bird foraging this nesting season.
Taylor Slough	Stage changes ranged from +0.15' to +1.57'	Move water southward as possible. Limit increases in the L-31W to less than 3 inches per day for 3-4 weeks to allow for reductions in phosphorus concentrations.	When available, provide freshwater buffer for downstream conditions. Decrease potential for high phosphorus input to ENP.
FB- Salinity	Salinity changes ranged -5.7 to +1.7 psu.	Move water southward as possible	When available, provide freshwater to maintain low salinity buffer and promote water movement.