

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

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: July 3, 2018

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

A deep-layered area of low pressure northeast of the northern Bahamas this morning is moving westward toward northern Florida. Some increase in moisture ahead of the low has eroded yesterday's dry mid-level air across the District, resulting in isolated showers and thunderstorms affecting the east coast this morning. A further increase in moisture in association with the low, along with an already very unstable atmosphere south of Lake Okeechobee, should result in scattered showers and thunderstorms developing by early this afternoon along the east coast sea breeze over the eastern interior. A deep layer of stronger northeasterly winds blowing across the District should cause the storms to move quickly farther inland and begin to concentrate from the southern and western interior to the west coast, where they will produce locally heavy rainfall through early evening. The rains should be less concentrated but perhaps a bit greater than yesterday over the central and western Kissimmee valley later in the afternoon once the east and west coast sea breezes interact. Despite the potential for heavy rains over the southwest today, District rainfall is still most likely to be at least somewhat below average (daily normal is ~0.28 inches). On Wednesday the low should move over north-central Florida and into the eastern Gulf of Mexico, where it will serve as a focusing mechanism for enhanced rainfall over the District. The deterministic QPF is about a third of an inch tomorrow, but it would not be surprising to see this number be higher since the probabilistic guidance suggests a 25% chance of rainfall of 0.4 - 0.5 inches. The forecast is rather uncertain on Thursday and Friday as the low pushes westward and away from the District, but with a mid- to upper-level trough forecast to form near the northern Bahamas and cross north Florida Friday and Saturday, the rains from Thursday through Saturday could turn out to be near to above normal. By Sunday, a significant drying trend is anticipated, with indications that District rainfall would be below to well below normal into early next week.

Kissimmee

Tuesday morning stages were 56.0 feet NGVD (0.5 feet below schedule) in East Lake Toho, 53.1 feet NGVD (0.4 feet below schedule) in Toho, and 50.8 feet NGVD (0.2 feet below schedule) in Kissimmee-Cypress-Hatchineha; headwater stages were 46.5 feet NGVD at S-65A and 26.8 feet NGVD at S-65D. Tuesday morning discharges were: 706 cfs at S-65, 669 cfs at S-65A, and 1,762 cfs at S-65E. Dissolved oxygen concentration in the Kissimmee River averaged 3.2 mg/L for the week. Kissimmee River mean floodplain depth on Sunday was 0.47 feet. In the last week, changes in rainfall necessitated two recommendations: 1) continue the reduction of discharge at S-65/S-65A as slowly as feasible to prevent stage decline in Kissimmee-Cypress-Hatchineha (6/28/2018) and 2) increase discharge at S-65/S-65A as slowly as feasible to slow stage ascension in Kissimmee-Cypress-Hatchineha (6/30/2018).

Lake Okeechobee

Lake Okeechobee stage is 14.28 feet NGVD having increased 0.18 feet over the past week and 0.06 feet over the past month. The Lake was below 13.0 feet NGVD for just 10 days this dry season and likely rose too quickly for many recovering submerged aquatic vegetation (SAV) communities to stay in optimal light conditions. The seasonal low for the 2018 growing season of 12.83 feet NGVD was the third highest since 2011, and the third time in six years that stage did not reach the bottom of the preferred stage envelope (12.5 – 15.5 feet NGVD). Due to record rainfall in May, the SAV coverage on the Lake will likely remain at minimal levels throughout the growing season and well into next year, prolonging impacts from high stages in 2016 and Hurricane Irma in 2017. Cyanobacteria blooms have increased rapidly since mid- to late-June, with NOAA's satellite monitoring product suggesting the majority of the Lake potentially has a visible bloom on the surface. Conditions will likely remain favorable for blooms throughout the summer, particularly during stretches of fewer storms and low winds.

Estuaries

Total inflow to the St. Lucie Estuary averaged 3,352 cfs over the past week with 876 cfs coming from Lake Okeechobee. Surface salinity decreased throughout the estuary. The seven-day average salinity at the US1 Bridge is in the fair range for adult eastern oysters. Total inflow to the Caloosahatchee Estuary averaged 4,600 cfs over the past week with 584 cfs coming from the Lake. Salinity increased downstream of Ft. Myers Yacht Basin. The 30-day moving average surface salinity is 0.2 at Val I-75 and 0.3 at Ft. Myers. Salinity conditions between Val I-75 and Ft. Myers are good for tape grass. Salinity conditions are in the poor range for adult eastern oysters at Cape Coral. 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 received approximately 1,600 acre-feet of Lake releases. The total amount of Lake releases sent to the STAs/FEBs in WY2019 (since May 1, 2018) is approximately 23,400 acre-feet. Most STA cells are at or above target depths. Operational restrictions are in place for vegetation rehabilitation in STA-1E and STA-2, and for construction related activities in STA-1W. The nests of Migratory Bird Treaty Act and Endangered Species Act protected species have been observed in STA-1E. This week, if 2008 LORS recommends Lake releases to the WCAs and the conditions allow, releases will be sent to the A-1 FEB/STA-3/4 and STA-2.

Everglades

Marsh stages within the water conservation areas (WCAs) are still above the regulation schedule with only WCA-2A having decreased this past week. Stage increases have stayed within the recommended weekly ascension rate of less than 0.25 feet per week. Keeping depths below 2.5 feet at gauge 65 in WCA-3A is important to moderate the stress to tree islands caused by flooding when durations last longer than 60-90 days. Depths reached 2.5 feet on June 13 (5 days earlier than last year). The depth on Sunday at that location was 2.86 feet, an increase of 0.16 feet over the last week. In Taylor Slough, stages increased on average by 0.13 feet and remained 5 to 7 inches above the historical averages. Salinities decreased an average of 1.4 psu in Florida Bay compared to last week and are 2 to 16 psu below the historical averages.

Supporting Information

KISSIMMEE BASIN

Kissimmee Basin Rainfall

The Upper Kissimmee Basin received 3.02 inches of rainfall in the past week and the Lower Basin received 1.45 inches (SFWMD Daily Rainfall Report 7/2/2018).

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: 7/3/2018

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)						
							7/1/18	6/24/18	6/17/18	6/10/18	6/3/18	5/27/18	5/20/18
Lakes Hart and Mary Jane	S-62	109	LKMJ	60.2	R	60.0	0.2	0.0	0.0	0.0	0.0	-0.1	0.0
Lakes Myrtle, Preston, and Joel	S-57	42	S-57	61.0	R	61.0	0.0	0.0	0.0	-0.4	-0.7	0.0	0.0
Alligator Chain	S-60	142	ALLI	63.4	R	63.2	0.2	0.0	-0.1	-0.6	-1.0	0.0	0.0
Lake Gentry	S-63	194	LKGT	61.1	R	61.0	0.1	-0.5	-0.6	-1.0	-1.3	0.1	0.2
East Lake Toho	S-59	207	TOHOE	56.0	R	56.5	-0.5	-0.9	-1.0	-1.2	-1.4	-0.2	-0.1
Lake Toho	S-61	918	TOHOW, S-61	53.1	R	53.5	-0.4	-0.9	-0.9	-1.2	-1.4	-0.1	-0.2
Lakes Kissimmee, Cypress, and Hatchineha	S-65	514	KUB011, LKIS5B	50.6	R	51.0	-0.4	-0.9	-0.9	-0.9	-1.1	0.4	0.1

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: 7/3/2018

		1-Day Average		Average for the Preceding 7-Days ¹								
Metric	Location	7/1/2018	7/1/18	6/24/18	6/17/18	6/10/18	6/3/18	5/27/18	5/20/18	5/13/18	5/6/18	4/29/18
Discharge (cfs)	S-65	549	514	834	1,110	915	1,092	1,271	854	381	338	354
Discharge (cfs)	S-65A ²	487	466	801	1,224	1,043	1,139	1,142	700	272	245	248
Discharge (cfs)	S-65D ²	1,549	1,608	2,094	2,062	1,925	1,869	1,495	781	323	304	341
Headwater Stage (feet NGVD)	S-65D ²	26.93	26.79	26.79	26.82	26.86	27.00	26.08	25.72	25.83	25.89	25.81
Discharge (cfs)	S-65E ²	1,606	1,834	2,347	2,261	2,107	2,082	1,623	824	290	263	304
Discharge (cfs)	S-67	300	298	277	273	278	282	298	332	71	0	0
DO (mg/L) ³	Phase I river channel	3.4	3.2	2.0	1.4	1.7	3.4	4.8	5.7	7.5	7.9	7.1
Mean depth (feet) ⁴	Phase I floodplain	0.47	0.46	0.75	0.84	0.76	0.66	0.47	0.17	0.06	0.06	0.06

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

²S-65A discharge combines S-65A with auxiliary structures; S-65D discharge combines discharge at S-65D, S-65DX1, and S-65DX2; S-65D stage averages stage at S-65D and S-65DX1; S-65E discharge combines S-65E and S-65EX1.

³DO is the average for sondes at 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)

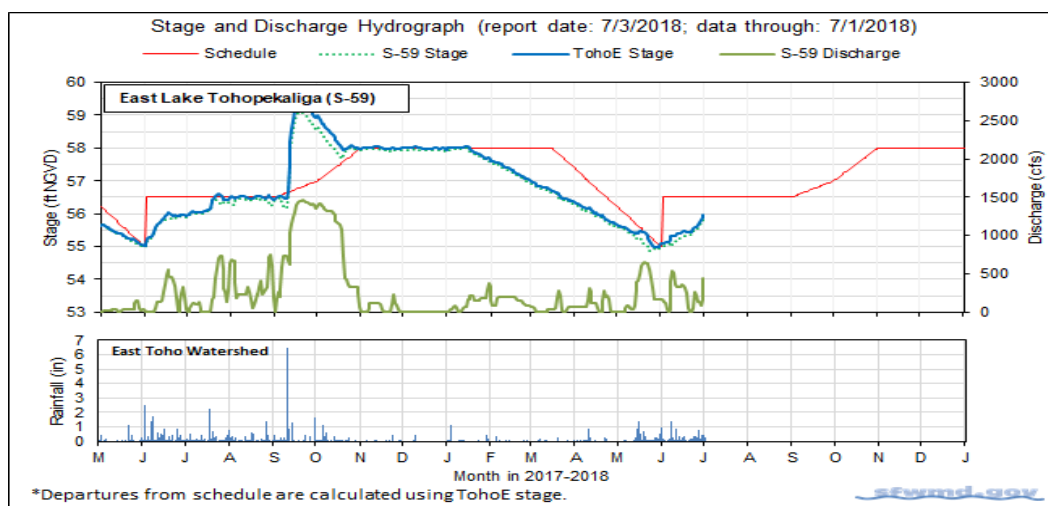


Figure 1.

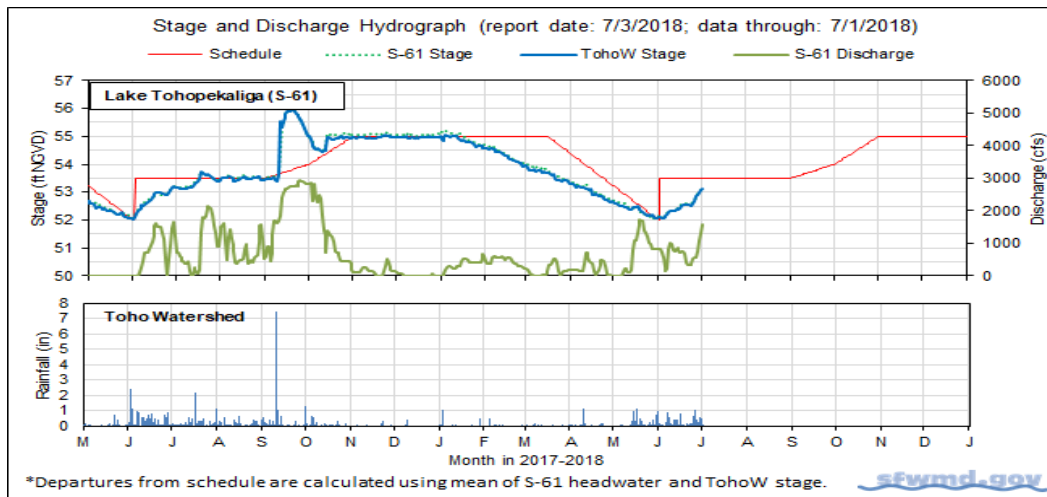


Figure 2.

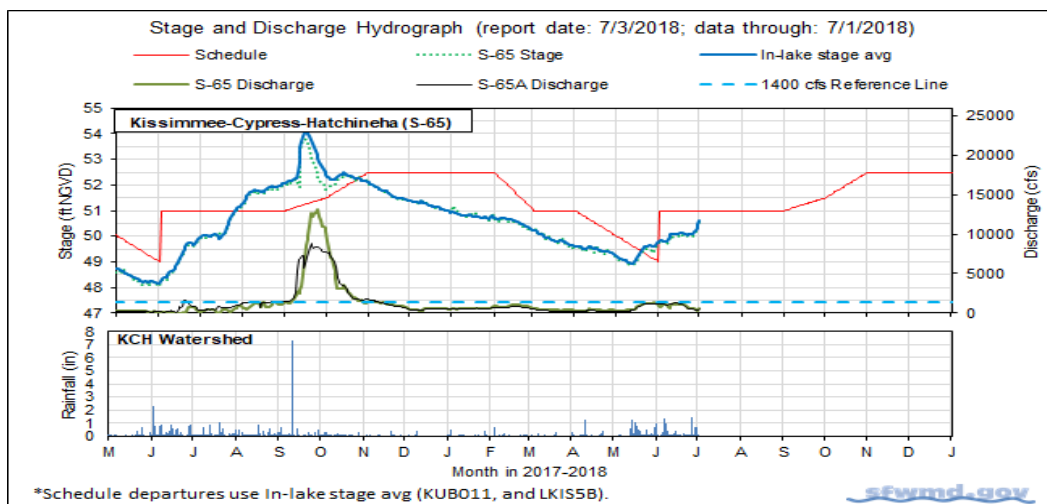


Figure 3.

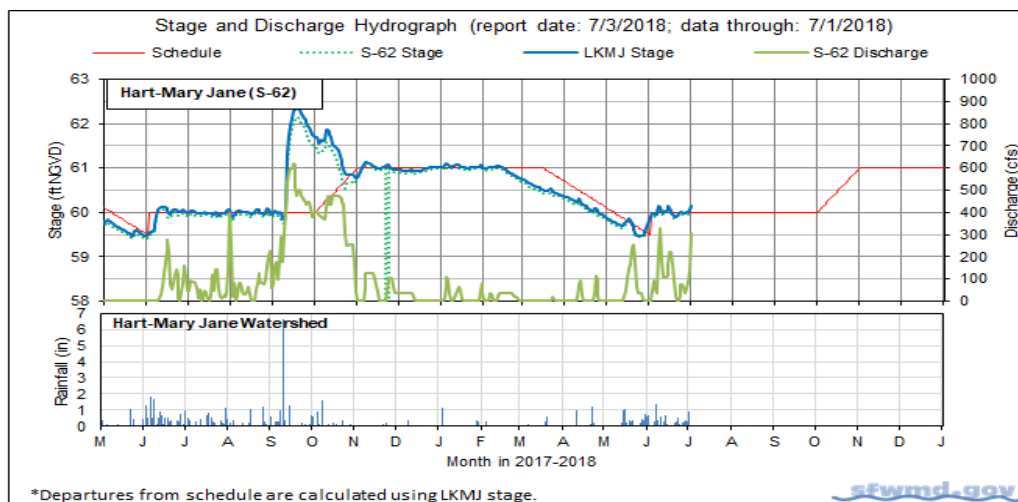


Figure 4.

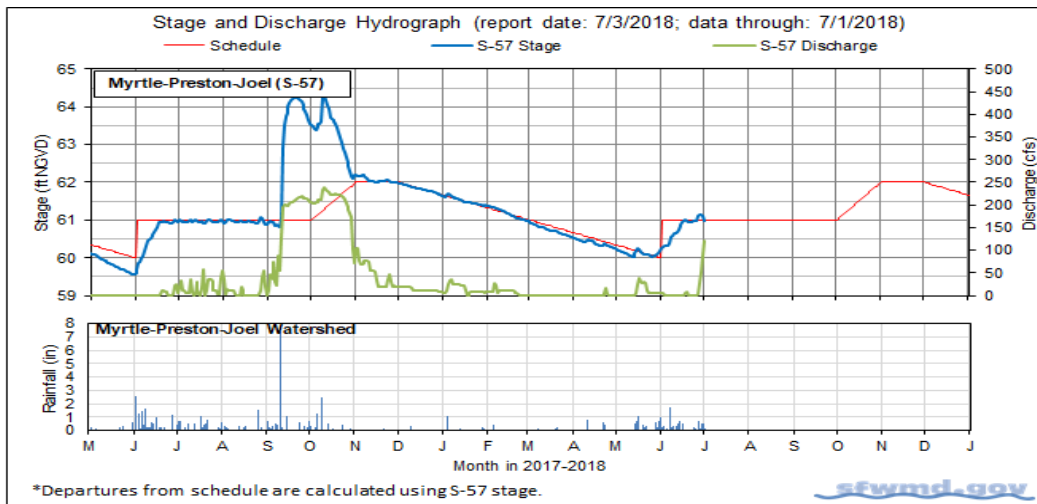


Figure 5.

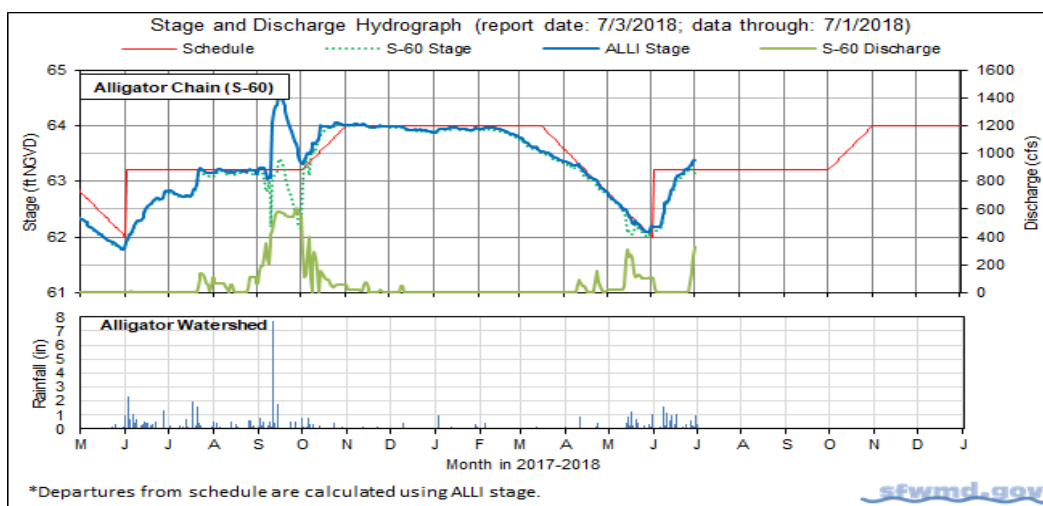


Figure 6.

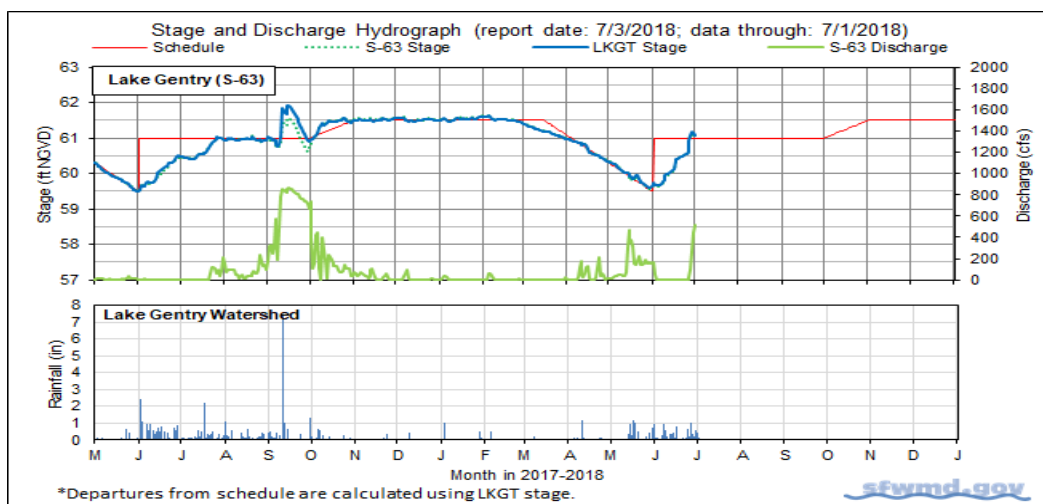


Figure 7.

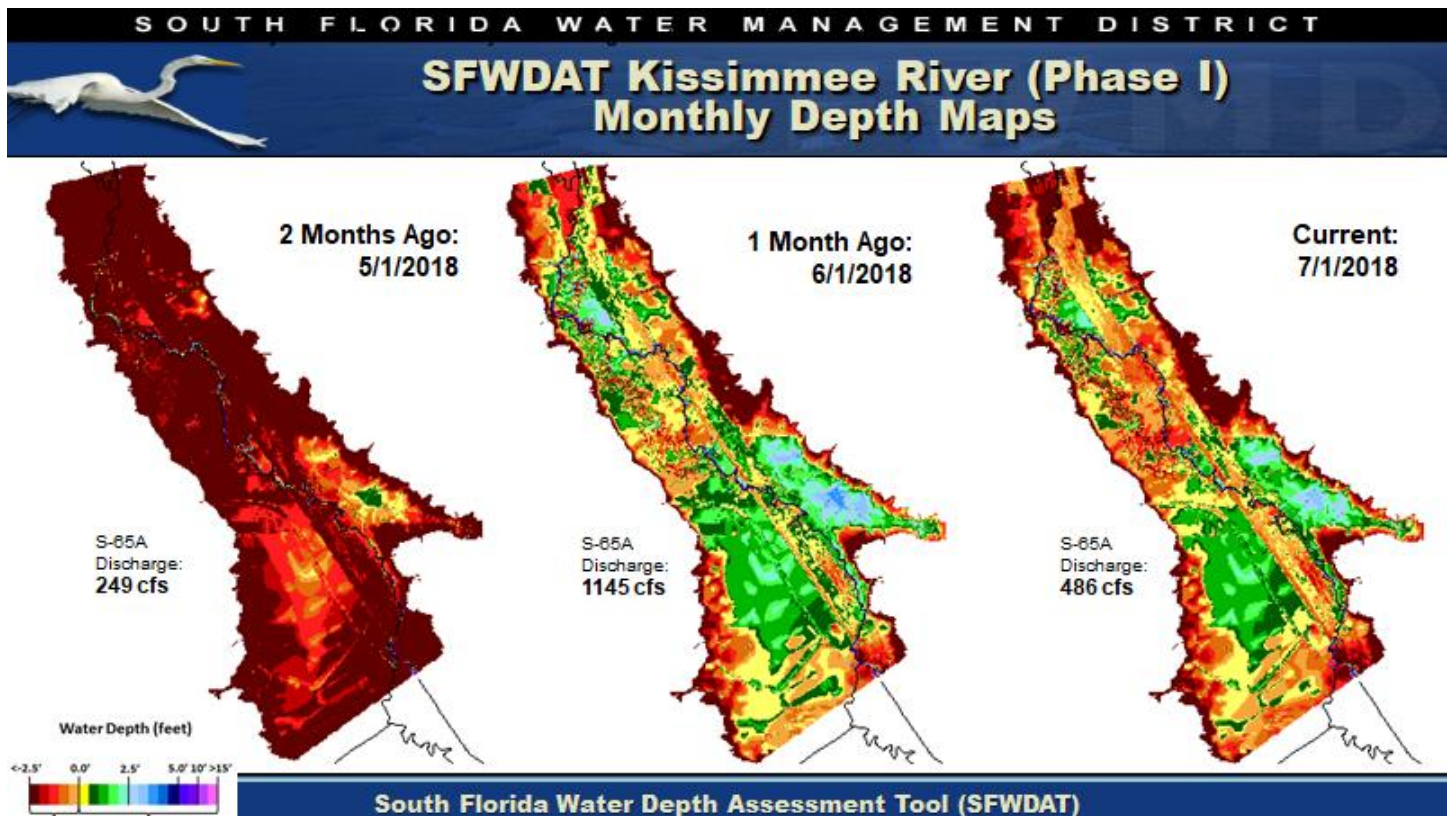


Figure 8. Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to January 16, 2012.

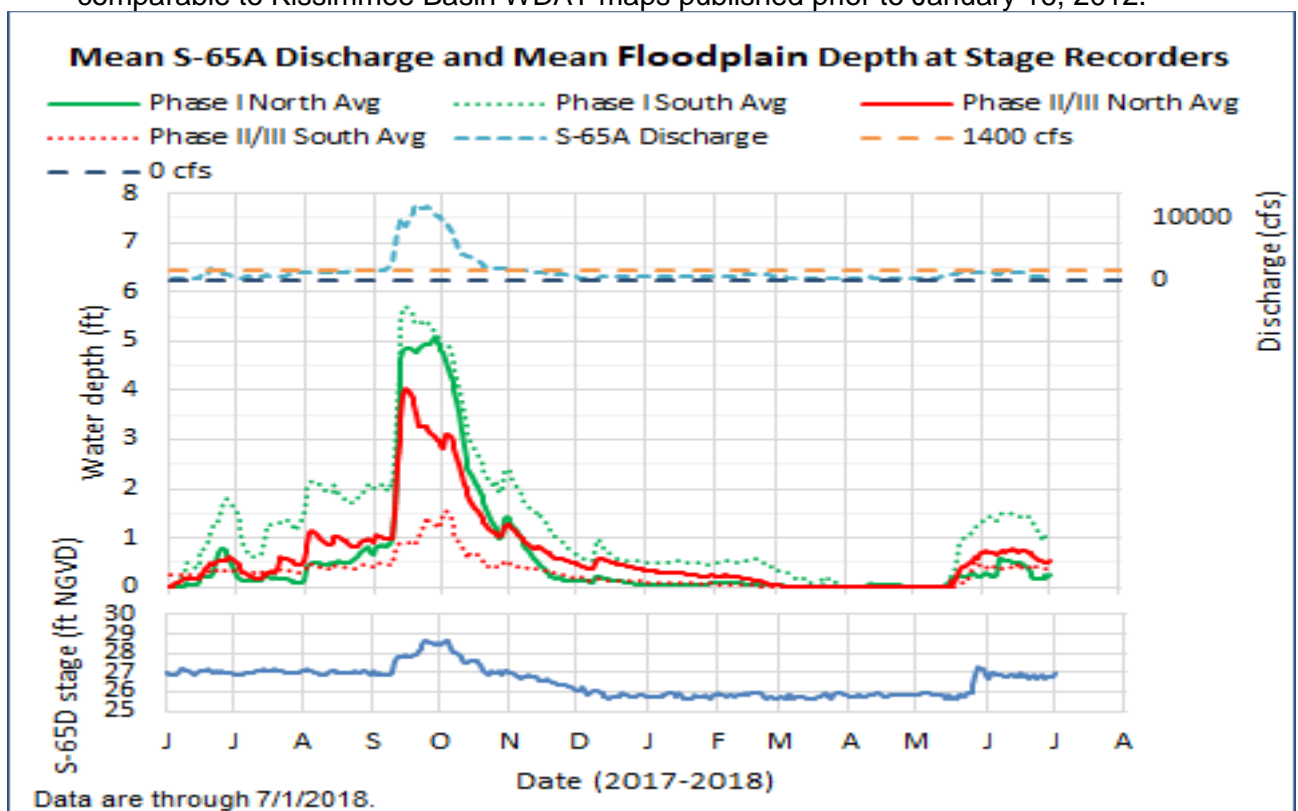
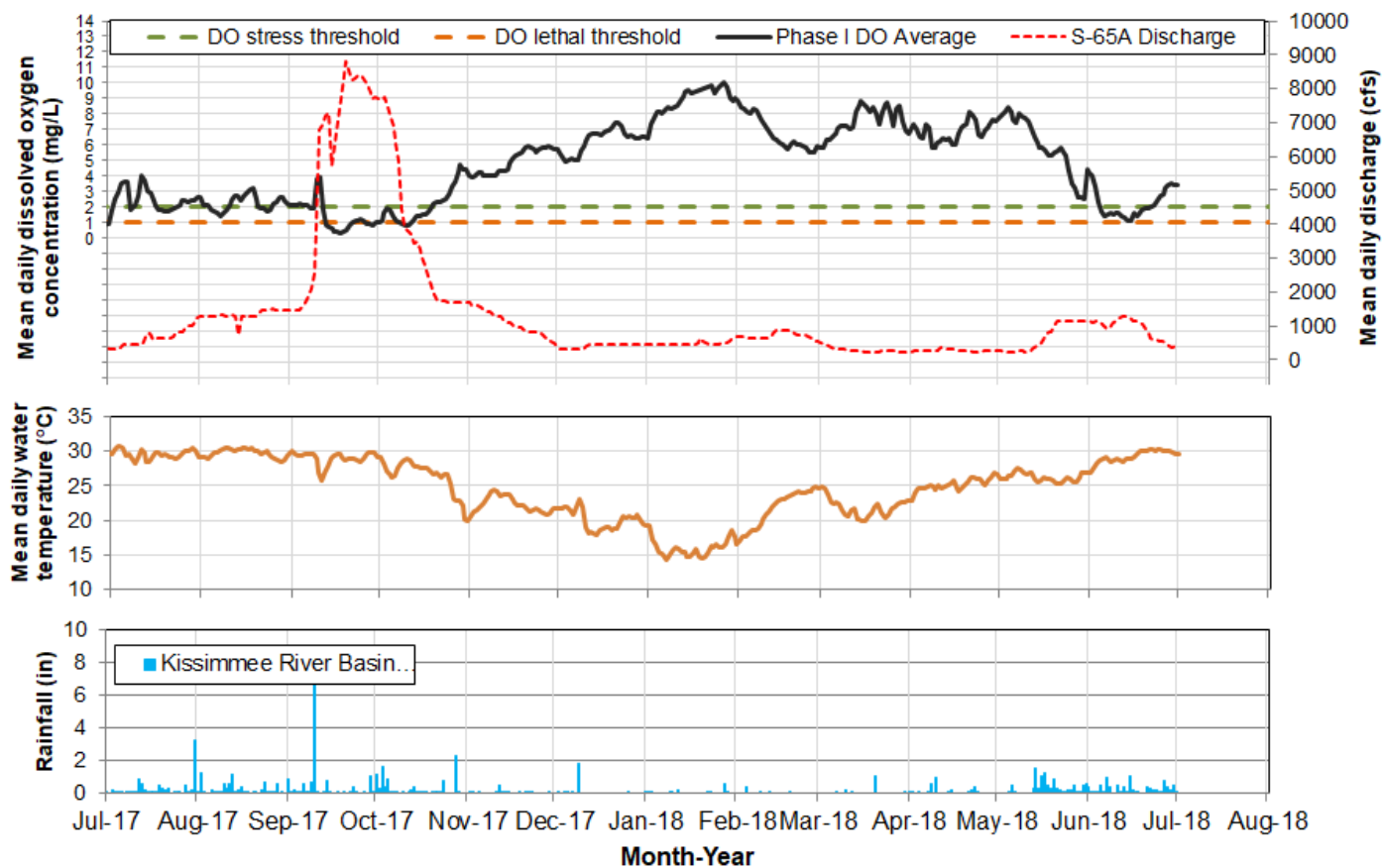


Figure 9. Mean water depth at stage recorders in the northern Phase I, southern Phase I, northern Phase II/III, and southern Phase II/III areas in relation to the S-65A discharge and S-65D headwater stage.



Report Date: 7/3/2018; data are through: 7/1/2018.

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

Water Management Recommendations

Kissimmee Basin Adaptive Recommendations and Operational Actions

Recommendation Date	Recommendation	Purpose	Outcome	Source	Report Date
6/30/2018	Increase S-65/S-65A discharge as slowly as feasible	Slow stage ascension in Kissimmee-Cypress-Hatchineha	Implemented	KB Ops/SFWMD Water Mgt	7/3/2018
6/28/2018	Continue to reduce discharge at S-65/S-65A as slowly as feasible.	Prevent stage decline in Kissimmee-Cypress-Hatchineha.	Implemented	KB Ops/SFWMD Water Mgt	7/3/2018
6/21/2018	Reduce discharge at S-65/S-65A as slowly as feasible.	Prevent stage decline in Kissimmee-Cypress-Hatchineha.	Implemented	KB Ops/SFWMD Water Mgt	6/26/2018
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
5/29/2018	Begin implementation of the 2018 Wet Season Discharge Plan for S-65/S-65A on June 1 (see figure).	Provide variable flow from S-65/S-65A to balance Kissimmee River and Headwaters Lakes objectives including Kissimmee River floodplain inundation, moderated rates of change in discharge, and constrained rate of stage rise in the lakes.	Planned	KB Ops/SFWMD Water Mgt/FWC/FWS	5/29/2018
5/22/2018	Hold Kissimmee-Cypress-Hatchineha at current stage of approximately 49.5 ft until June 1.	(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/SFWMD Water Mgt	5/29/2018
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	5/22/2018
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	5/22/2018
5/8/2018	No new recommendations.		N/A		5/8/2018
5/1/2018	No new recommendations.		N/A		5/1/2018
4/24/2018	No new recommendations.		N/A		4/24/2018
4/17/2018	No new recommendations.		N/A		4/17/2018
4/10/2018	No new recommendations.		N/A		4/10/2018
4/3/2018	No new recommendations.		N/A		4/3/2018
3/27/2018	No new recommendations.		N/A		3/27/2018
3/20/2018	No new recommendations.		N/A		3/20/2018
3/13/2018	No new recommendations.		N/A		3/13/2018
3/6/2018	No new recommendations.		N/A		3/6/2018
2/27/2018	No new recommendations.		N/A		2/27/2018
2/20/2018	No new recommendations.		N/A		2/20/2018
2/13/2018	No new recommendations.		N/A		2/13/2018
2/6/2018	No new recommendations.		N/A		2/6/2018
1/30/2018	No new recommendations.		N/A		1/30/2018
1/23/2018	No new recommendations.		N/A		1/23/2018
1/16/2018	No new recommendations.		N/A		1/16/2018
1/9/2018	No new recommendations.		N/A		1/9/2018
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
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
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	12/19/2017
12/12/2017	No new recommendations.		N/A		12/12/2017

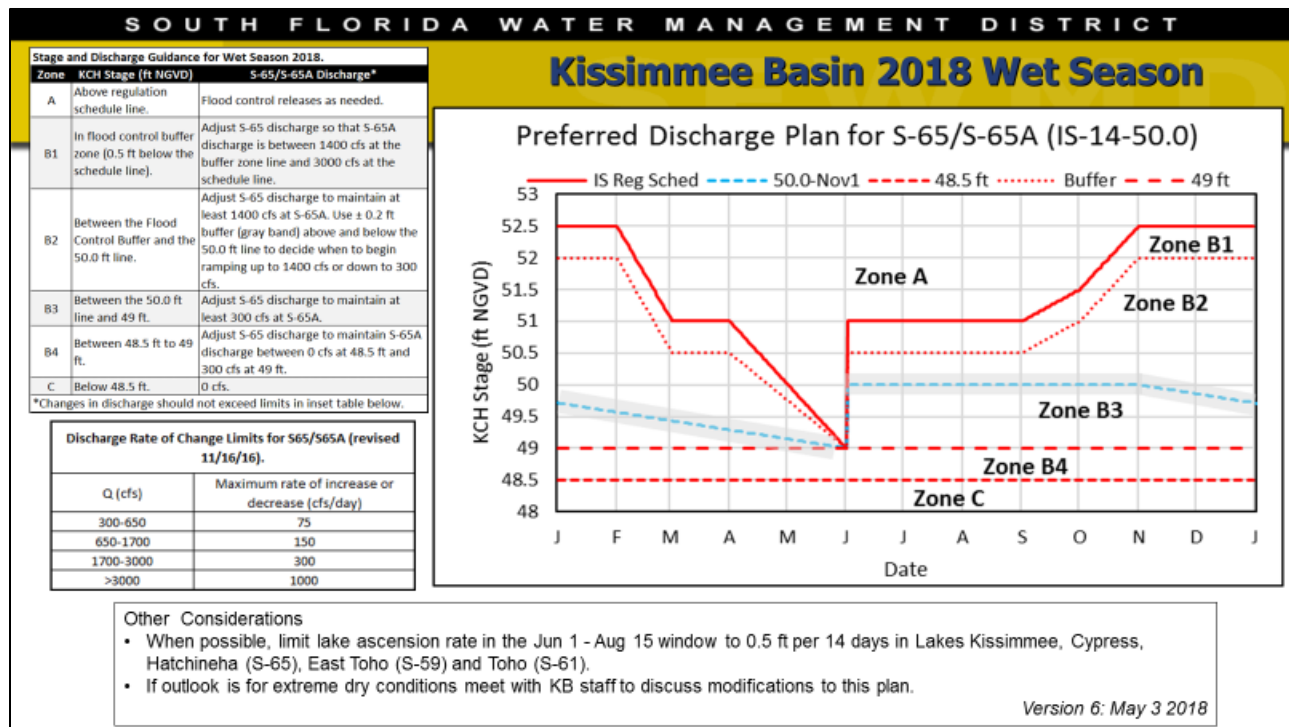


Figure 11. The 2018 Wet Season Discharge Plan for S-65/S-65A.

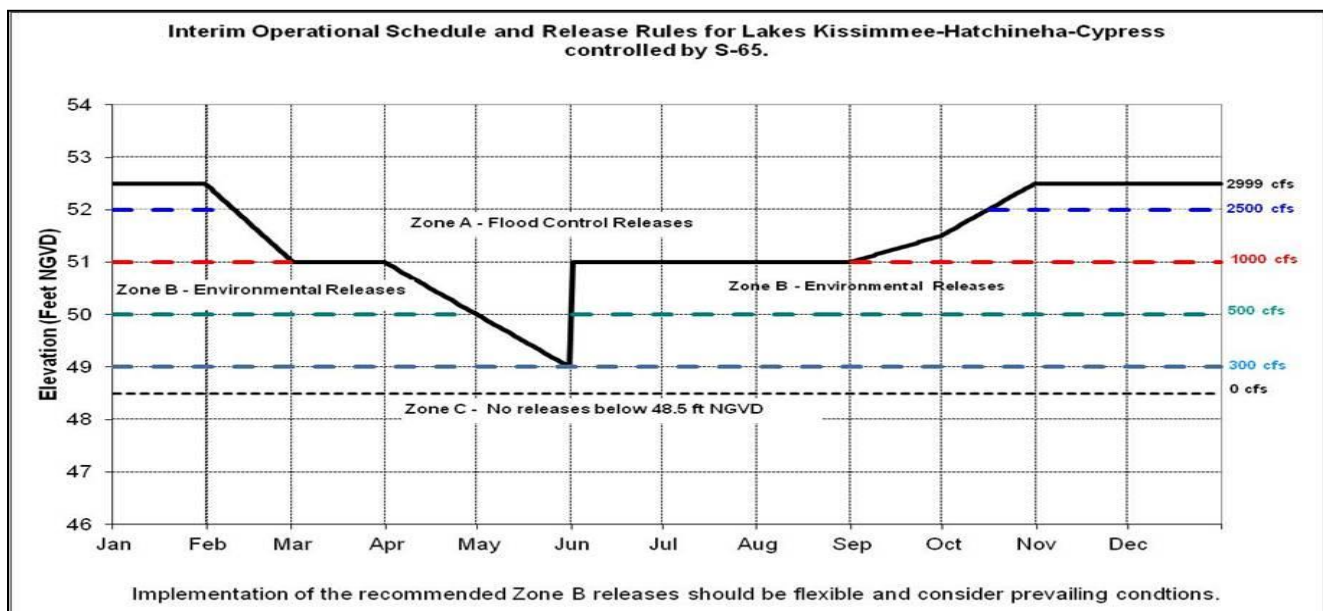


Figure 12. Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years.



Figure 13. The Kissimmee Basin.

LAKE OKEECHOBEE

According to the USACE web site, Lake Okeechobee stage is at 14.28 feet NGVD for the period ending at midnight on July 2, 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 0.08 feet higher than it was a month ago and 1.88 feet higher than a year ago (Figure 1). The Lake is now in the Low sub-band (Figure 2). According to RAINДАР, 1.51 inches of rain fell over the Lake during the week June 26, 2018 – July 2, 2018. Much of the northern and western watersheds received similar rainfall, between 0.75 – 3 inches (Figure 3).

Average daily inflows to the Lake increased slightly from the previous week, going from 4,924 cfs to 5,271 cfs. The largest inflow was from the Istokpoga and Indian Prairie basins, with a combined 2,366 average daily cfs through the S-84 and S-71 & S-72 structures, which was an increase from 1,643 cfs the previous week. The Kissimmee River, flowing through the S-65E structures had the second highest inflows, which decreased from an average of 2,347 cfs the previous week to 1,763 cfs this past week. There was essentially no inflow or outflow through Culvert 10A from the L-8 Canal this past week (Table 1). There have been no back-pumping operations from the S-2 or S-3 pumps during the wet season thus far.

Total outflows decreased substantially from the previous week, from 5,460 average daily cfs to 1,673 cfs. Discharges via the S-77 and S-308 structures decreased from 2,809 cfs and 1,154 cfs, respectively, to an average of 584 cfs and 876 cfs, respectively. Outflows to the south through the S-350 structures also decreased, from 1,478 average daily cfs the previous week to just 215 cfs this past week. The corrected average daily evapotranspiration value for the week based on the L006 weather platform solar radiation was similar to the previous week at 0.16 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 using the cyanobacteria monitoring product derived from NOAA's OLCI satellite sensor showed the potential for a cyanobacteria bloom rapidly increased over the past three weeks and currently extends over most of the open water portion of the Lake (Figure 5).

Nesting activity by the endangered Everglade snail kite (*Rostrhamus sociabilis plumbeus*) increased from the previous month, with 46 new nests found in the last survey, bringing the current total of active nests to 53 (Figure 6). All nesting activity was located in the Moonshine Bay area that has undergone intensive management efforts since 2015, leading to substantial snail kite and wading bird activity there since.

Water Management Recommendations

Lake Okeechobee stage is 14.28 feet NGVD having increased 0.18 feet over the past week and 0.06 feet over the past month. The Lake was below 13.0 feet NGVD for just 10 days this dry season and likely rose too quickly for many recovering SAV communities to stay in optimal light conditions. The seasonal low for the 2018 growing season of 12.83 feet NGVD was the third highest since 2011, and the third time in six years that stage did not reach the bottom of the preferred stage envelope (12.5 – 15.5 feet NGVD). Avoiding a seventh consecutive water year with stages greater than 15.5 feet NGVD would be beneficial to the struggling nearshore SAV communities. Given the lack of substantial low-water levels this dry season, the SAV coverage on the Lake will likely remain at minimal levels throughout the growing season and well into next year, prolonging impacts from high stages in 2016 and Hurricane Irma in 2017.

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)	OUTFLOWS	Previous Week Avg Daily cfs	Avg Daily Outflow cfs	Equivalent Depth Week Total (in)
S65E & S65EX1	2347	1763	0.7	S77	2809	584	0.2
S71 & 72	575	829	0.3	S308	1154	876	0.4
S84 & 84X	1068	1537	0.6	S351	318	0	0.0
Fisheating Creek	467	478	0.2	S352	341	201	0.1
S154	78	81	0.0	S354	819	14	0.0
S191	210	311	0.1	L8 Outflow	19	0	0.0
S133 P	152	191	0.1	ET	3472	3445	1.4
S127 P	17	33	0.0	Total	8932	5118	2.1
S129 P	5	6	0.0				
S131 P	4	3	0.0				
S135 P	0	37	0.0				
S2 P	0	0	0.0				
S3 P	0	0	0.0				
S4 P	0	0	0.0				
L8 Backflow	0	2	0.0				
Rainfall	3139	4169	1.5				
Total	8063	9441	3.7				

PROVISIONAL DATA

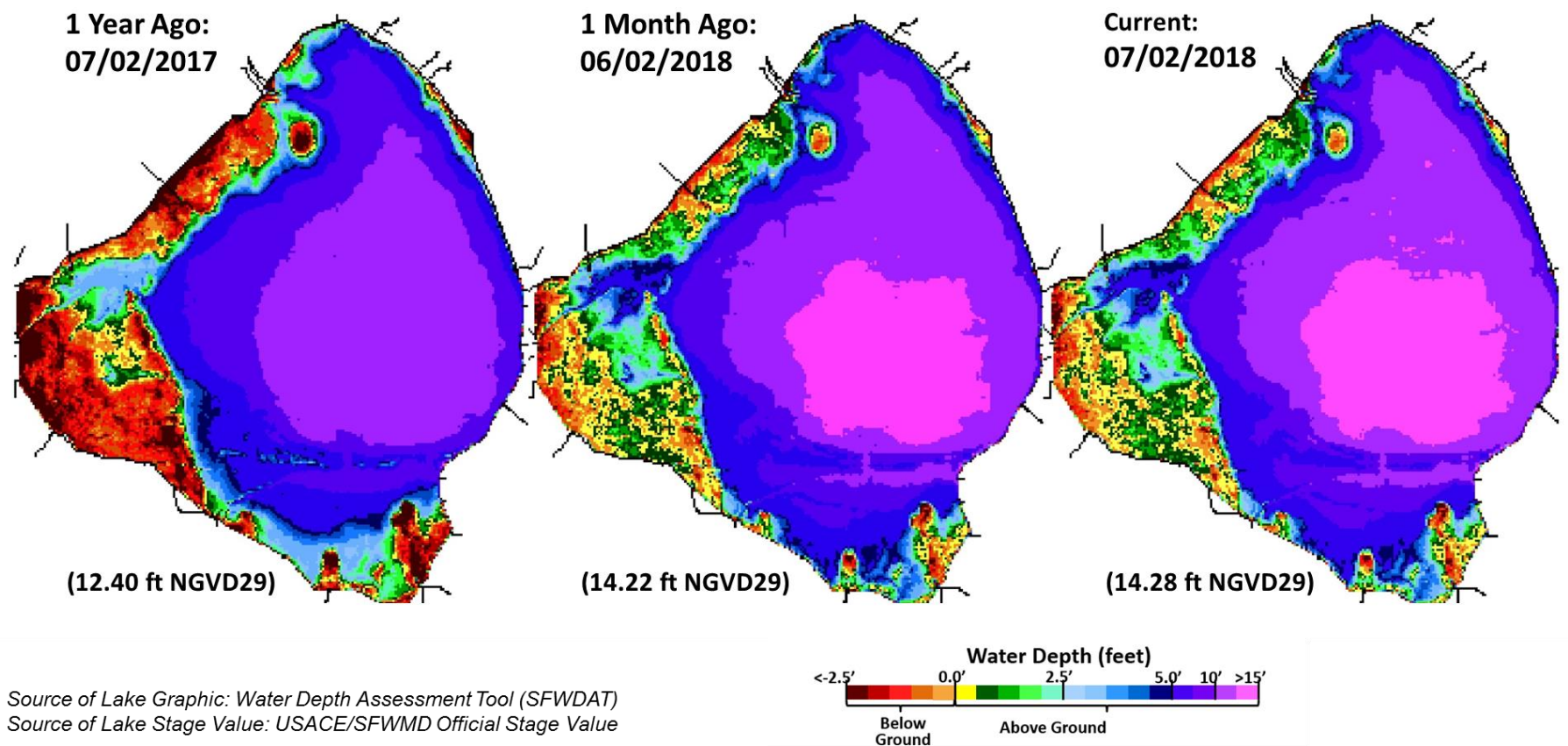
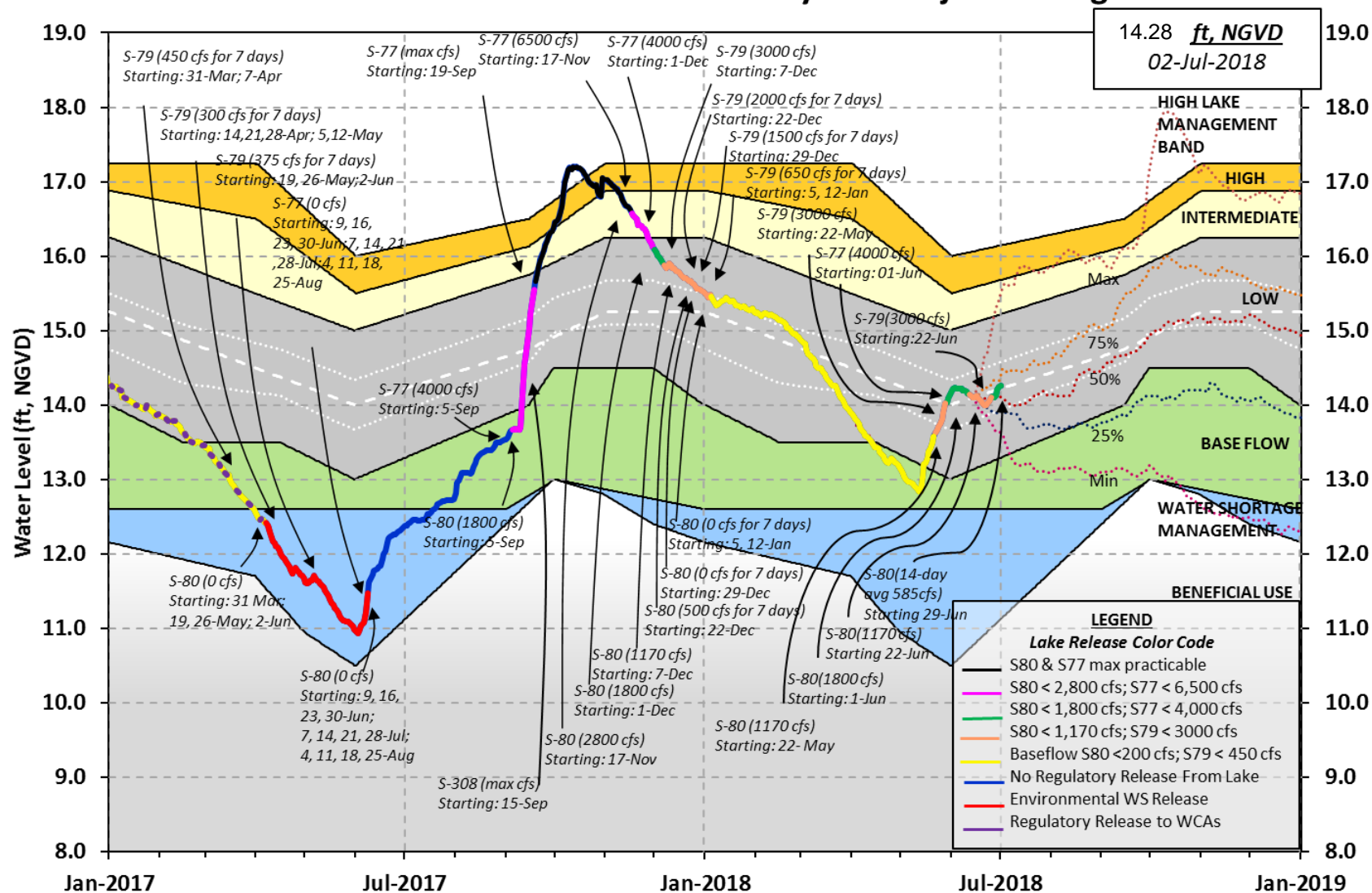


Figure 1. Water depth estimates on Lake Okeechobee based on the South Florida Water Depth Assessment Tool.

Lake Okeechobee Water Level History and Projected Stages



LORS-2008
Adopted by USACE 28-April-2008

Projected Stage Percentiles From
SFWMD-HESM Position Analysis

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

SFWMD PROVISIONAL RAINFALL 7-DAY BASIN RAINFALL ESTIMATES
FROM: 0830 EST, 06/26/2018 THROUGH: 0830 EST, 07/03/2018

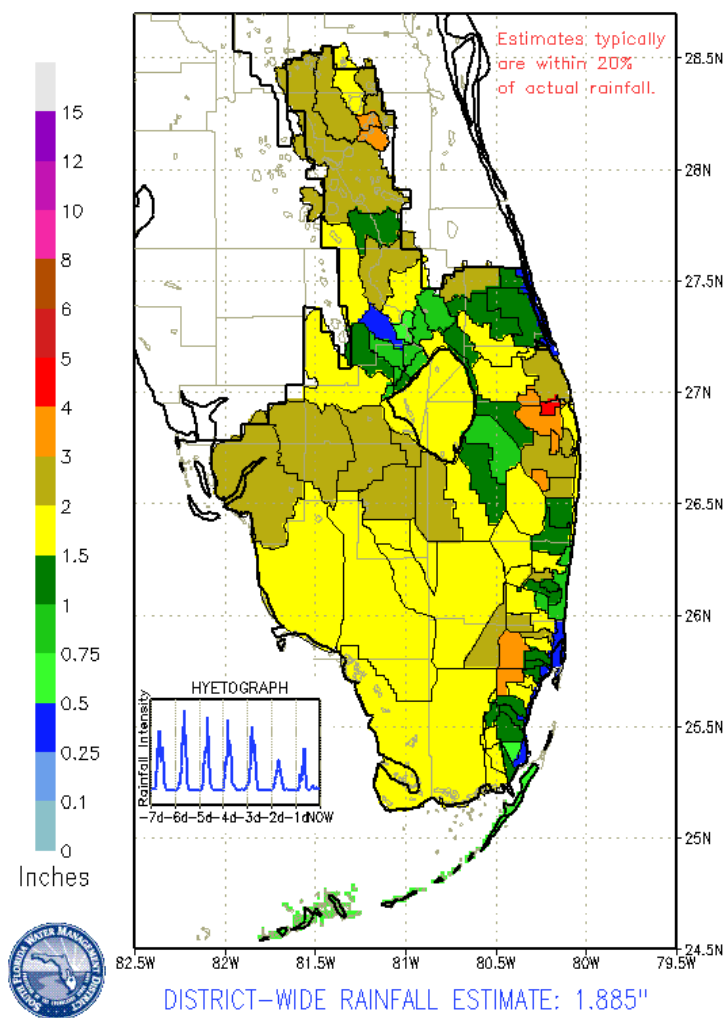


Figure 3. Rainfall estimates by basin.

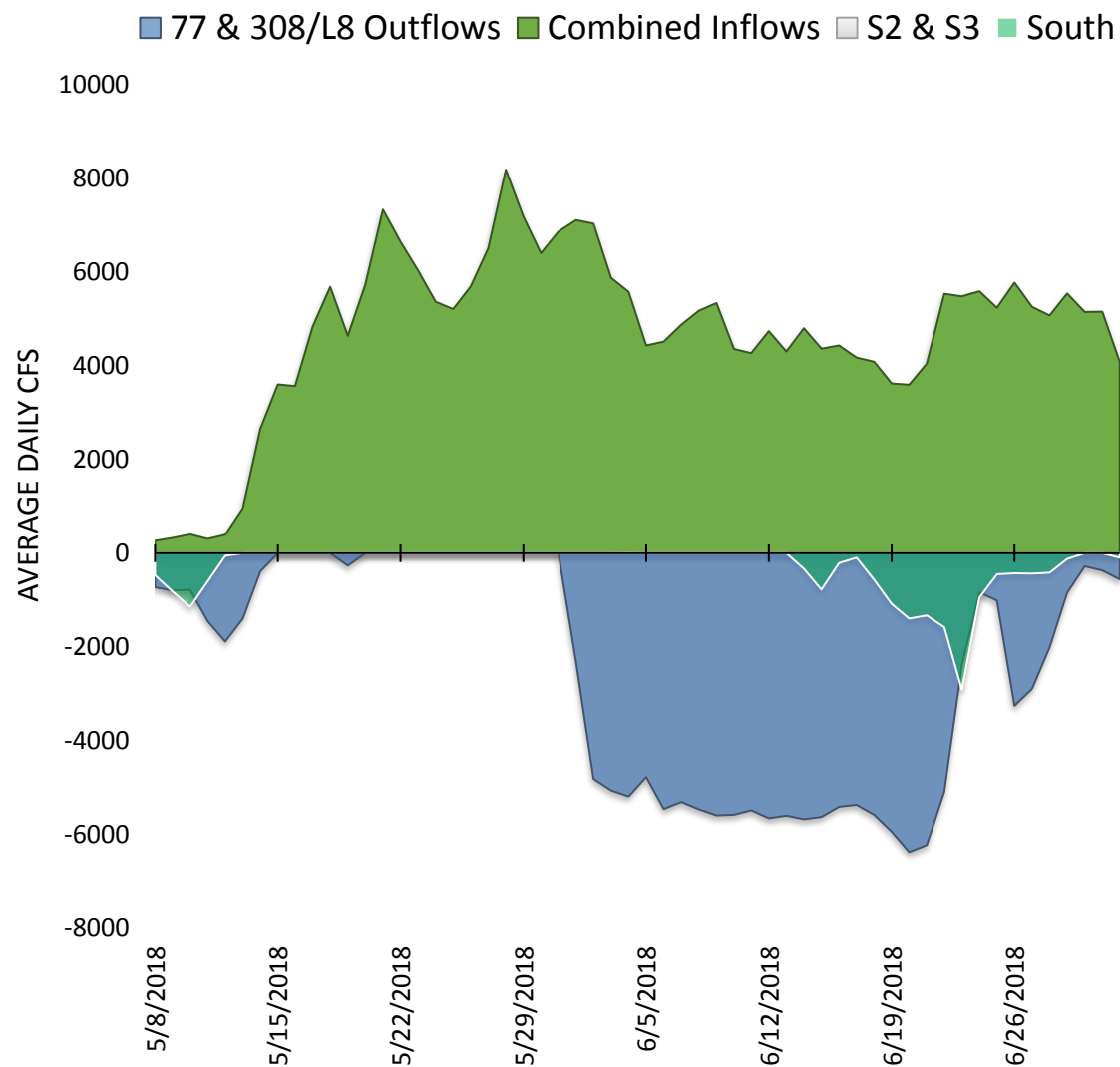


Figure 4. Major inflows and outflows of Lake Okeechobee, including the S-350 structures designated as South. The L-8 Canal flows through Culvert 10A are included as outflows when positive, and as inflows when backflowing into the Lake. Inflows and outflows are shown as positive and negative, respectively, for visual purposes.

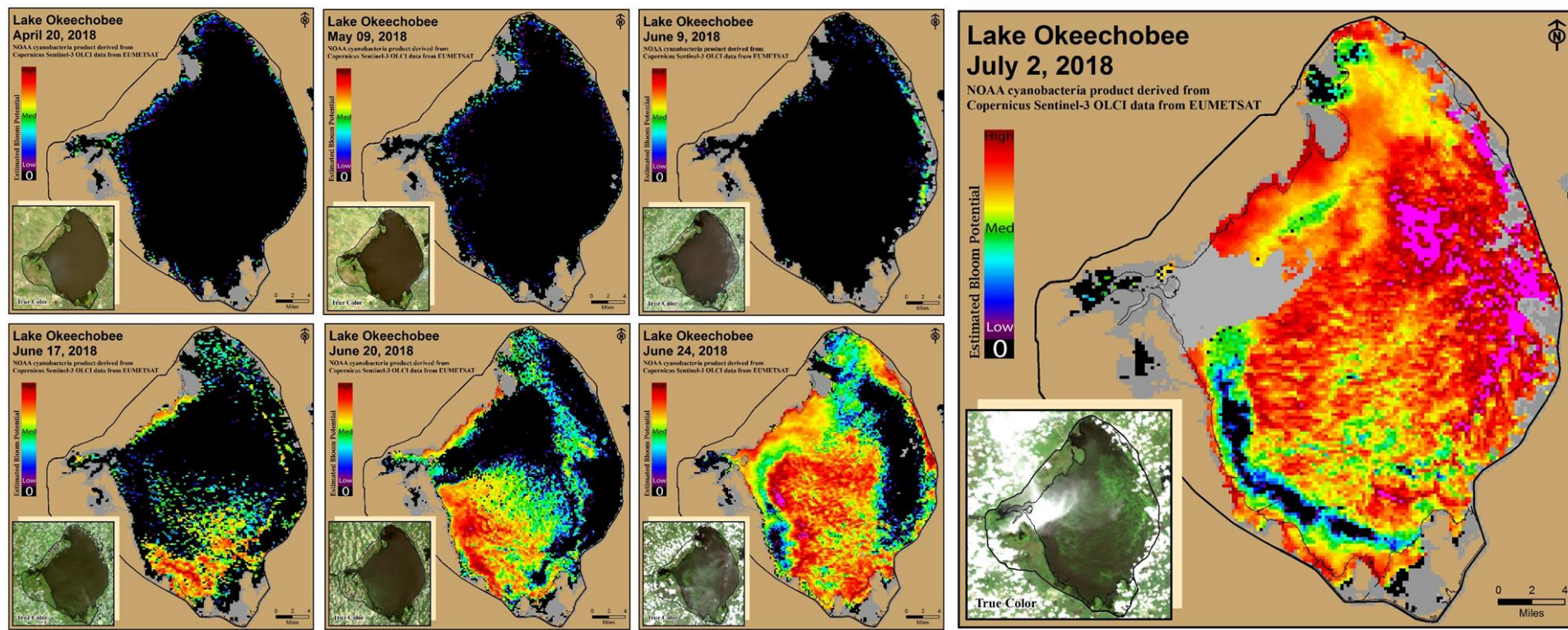


Figure 5. Potential for cyanobacterial blooms on Lake Okeechobee based on NOAA's harmful algal bloom monitoring system derived from Copernicus Sentinel-3 OLCI data from EUMETSAT. Gray indicates cloud cover. All data are experimental and unvalidated at this point in product development.



Figure 6. Snail kite nest locations and status for the 2018 breeding season, through June.

ESTUARIES

St. Lucie Estuary:

Last week total inflow to the St. Lucie Estuary averaged about 3,352 cfs (Figures 1 and 2) and last month inflow averaged about 3,510 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 are provisional).

Location	Flow (cfs)
Tidal Basin Inflow	569
S-80	1,301
S-308	876
S-49 on C-24	80
S-97 on C-23	429
Gordy Rd. structure on Ten Mile Creek	973

Over the past week, surface 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 7.6. Salinity conditions in the middle estuary are within the fair 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)	NR ² (NR)	NR (NR)	NA ¹
US1 Bridge	2.1 (2.6)	13.0 (5.9)	10.0-26.0
A1A Bridge	8.1 (9.5)	19.0 (19.3)	NA ¹

¹Envelope not applicable and ²Not Reporting.

Caloosahatchee Estuary:

Last week total inflow to the Caloosahatchee Estuary averaged about 4,600 cfs (Figures 5 and 6) and last month inflow averaged about 6,935 cfs. Last week's provisional averaged inflows from the structures are shown in Table 3.

Table 3. Weekly average inflows (data is provisional).

Location	Flow (cfs)
S-77	584
S-78	1,683
S-79	3,654
Tidal Basin Inflow	946

Over the past week in the estuary, salinity increased downstream of Ft. Myers Yacht Basin (Table 4, Figures 7 & 8). The seven-day average salinity values are in the poor range for adult eastern oysters at Cape Coral (Figure 9) and were not available at Shell Point and Sanibel. The 30-day moving average surface salinity is 0.2 at Val I-75 and 0.3 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	Envelope
S-79 (Franklin Lock)	0.2 (0.2)	0.2 (0.2)	NA ¹
Val I75	0.2 (0.2)	0.2 (0.2)	0.0-5.0 ²
Ft. Myers Yacht Basin	0.2 (0.2)	0.2 (0.2)	NA
Cape Coral	2.1 (0.5)	3.2 (0.6)	10.0-30.0
Shell Point	15.6 (NR ³)	14.7 (NR)	10.0-30.0
Sanibel	NR (NR)	NR (NR)	10.0-30.0

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

The Florida Fish and Wildlife Research Institute reported on June 29, 2018, that *Karenia brevis*, the Florida red tide dinoflagellate, was observed at background to high concentrations in 22 samples collected from or offshore of Lee County. Fish kills and respiratory irritation were reported in Lee County over the past week.

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 4,000 cfs at S-77 and up to 1,800 cfs at S-80. Given the current estuarine conditions, there are no ecological benefits associated with freshwater releases from Lake Okeechobee.

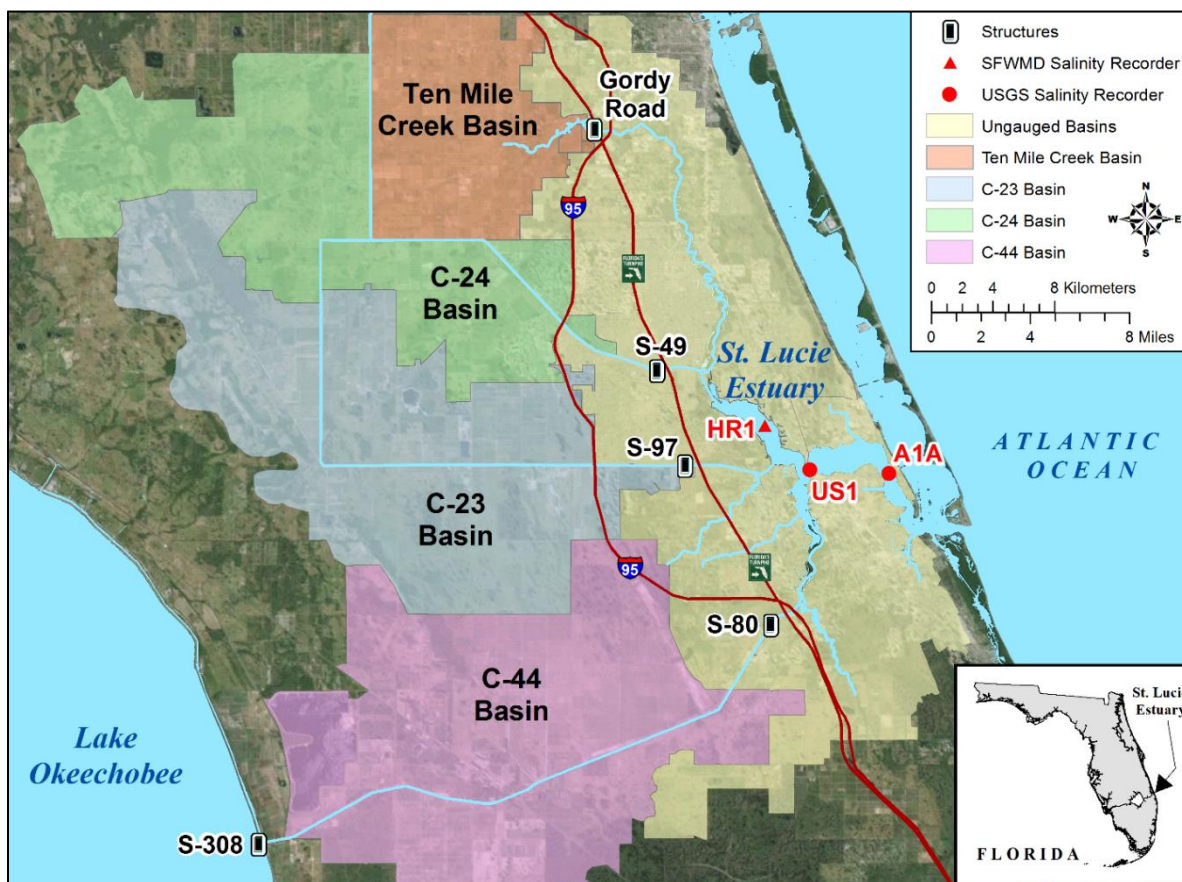


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

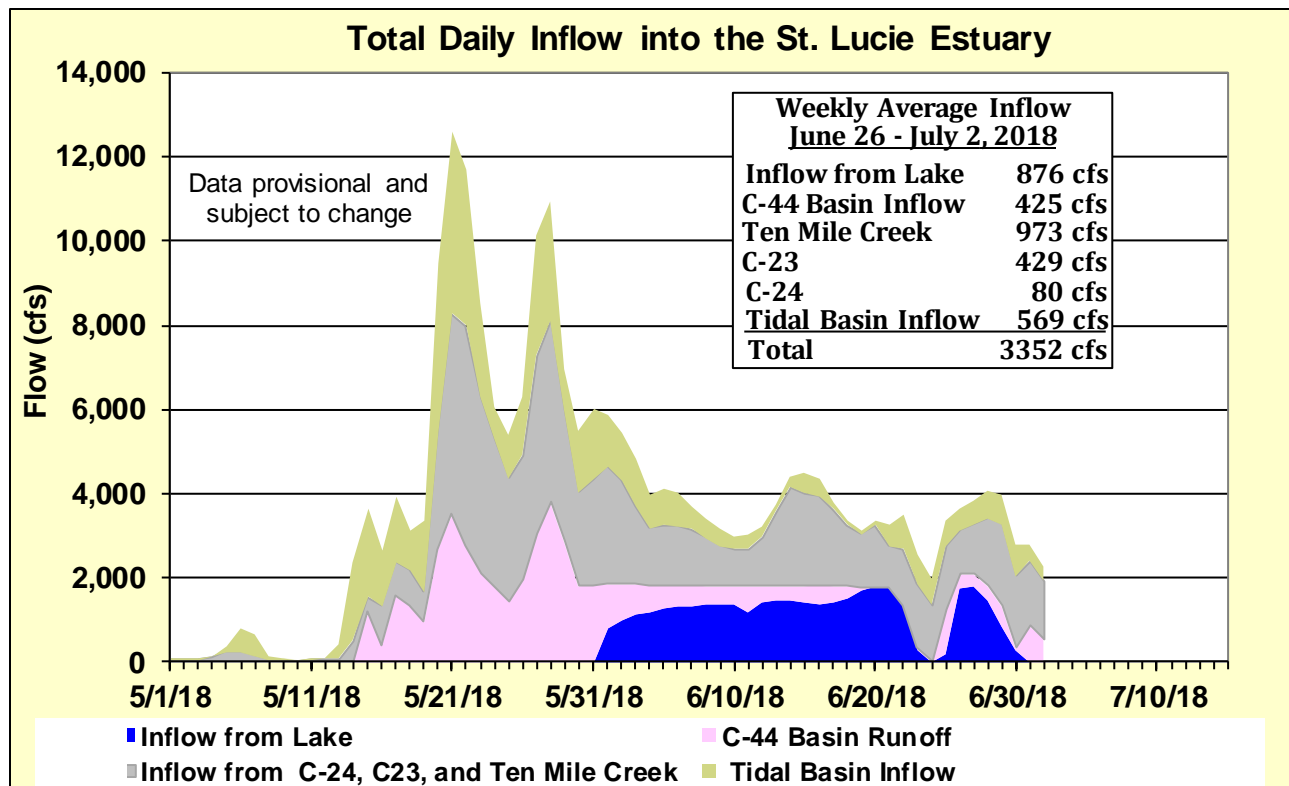


Figure 2. Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basins into the St. Lucie Estuary.

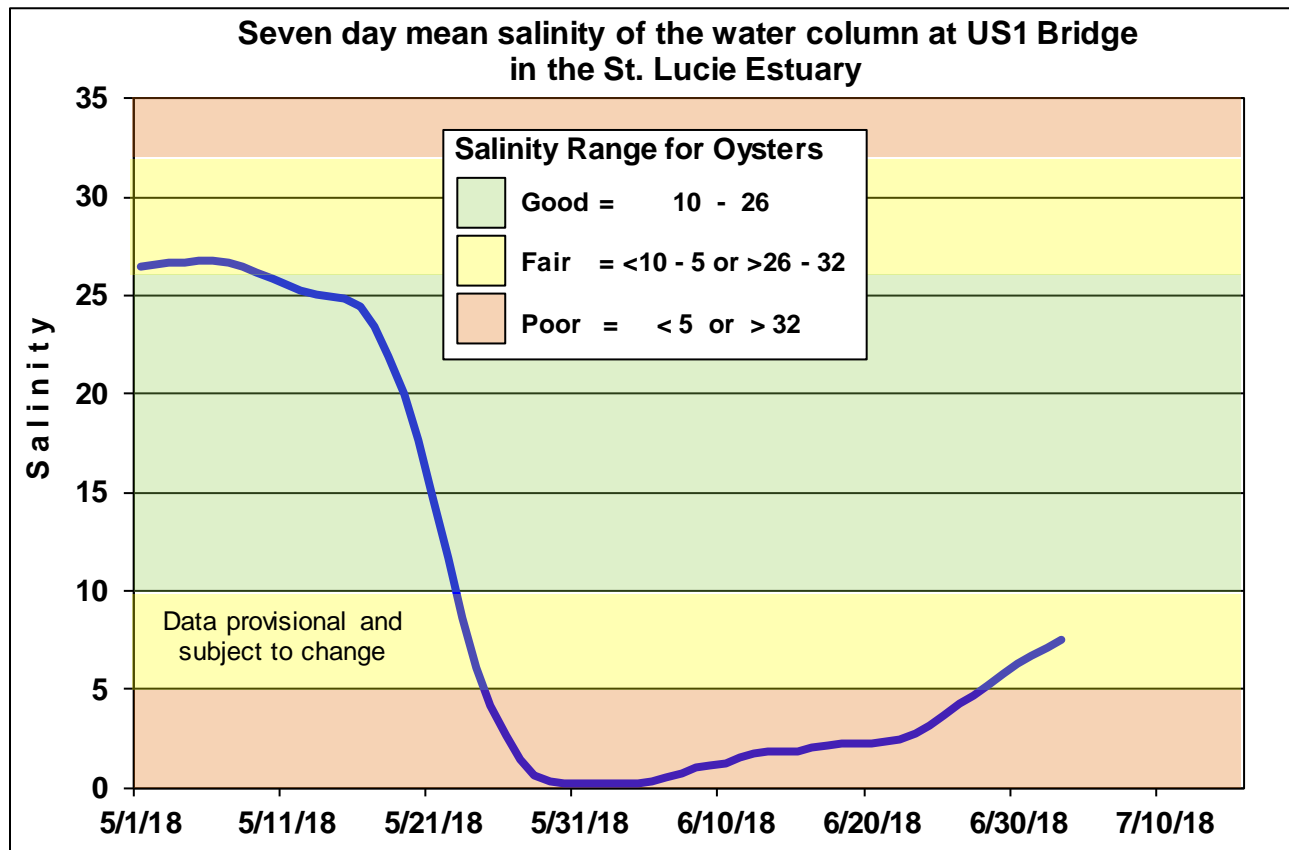


Figure 3. Seven-day mean salinity of the water column at the US1 Bridge.

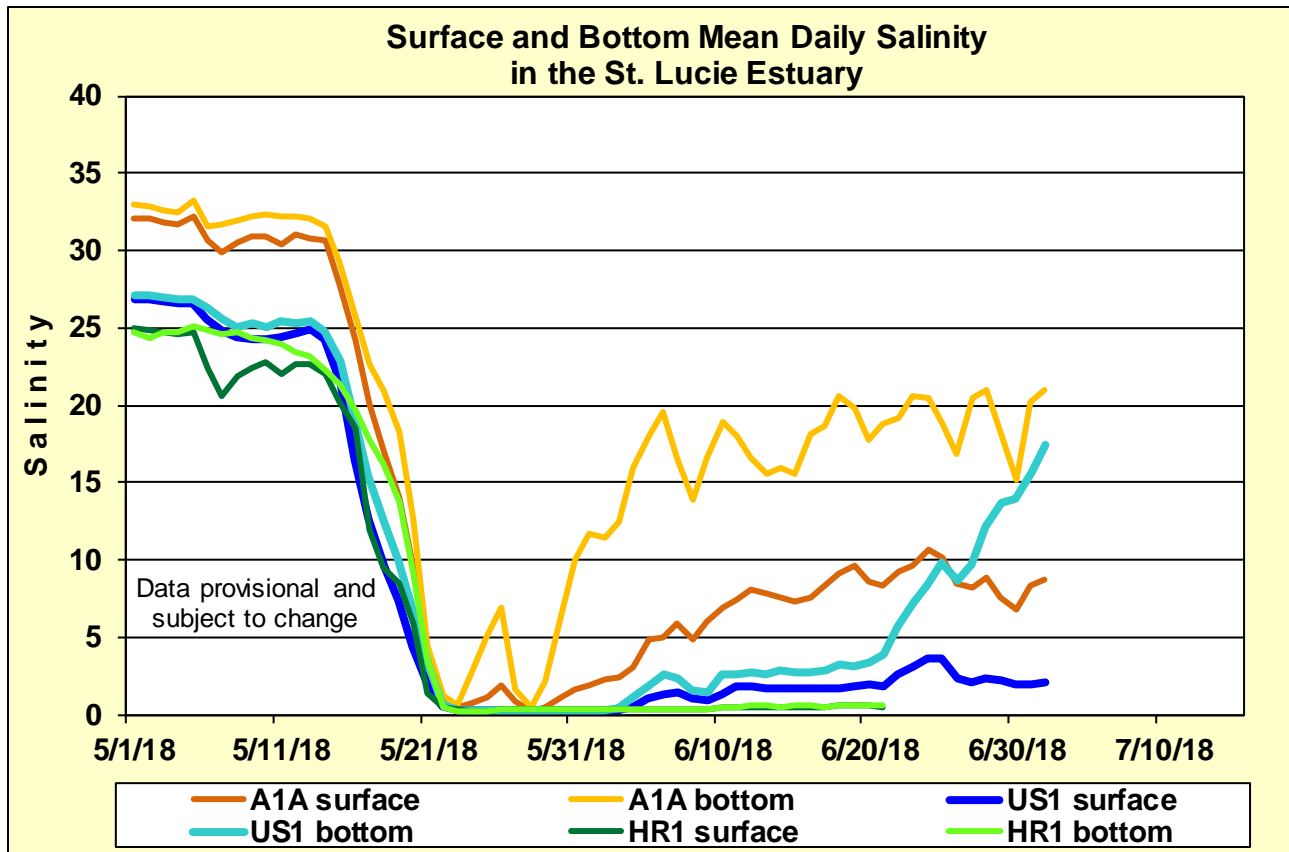


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

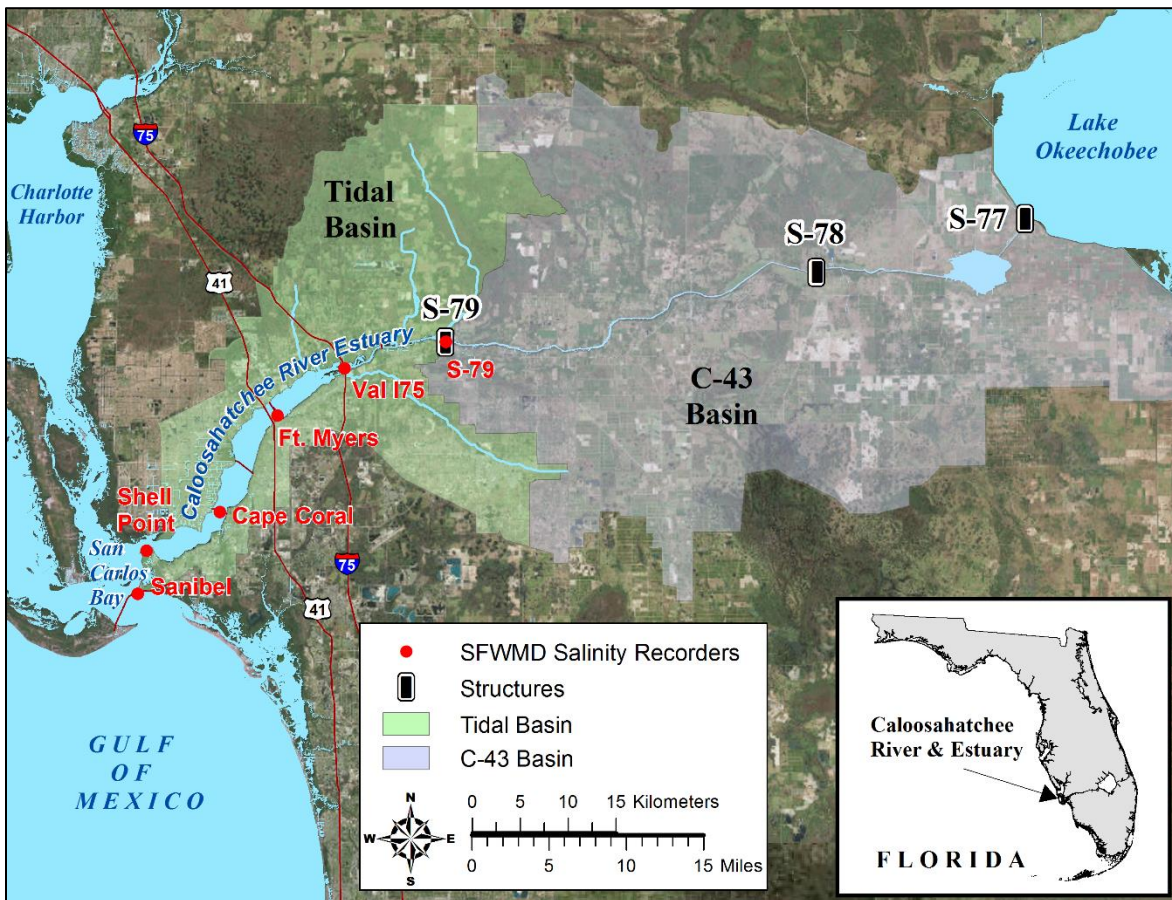


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

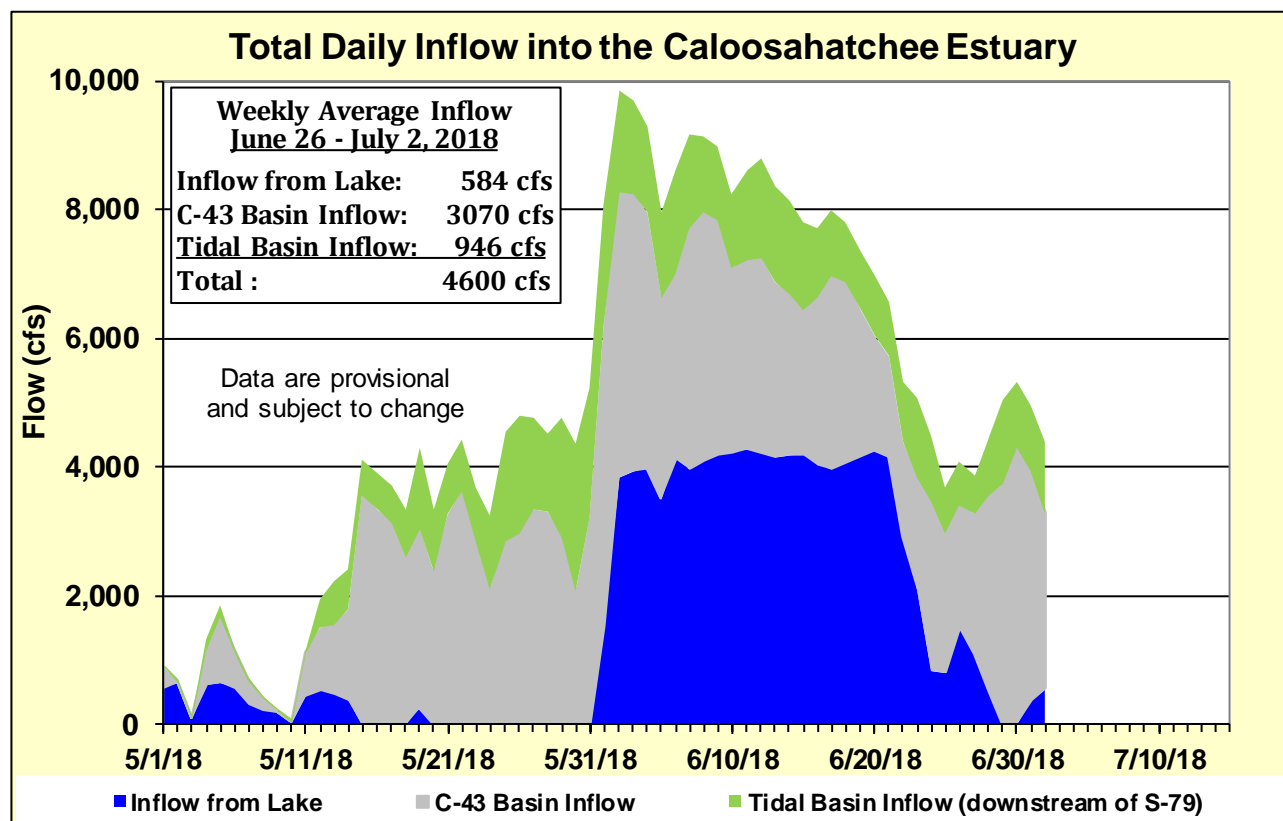


Figure 6. Total daily inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.

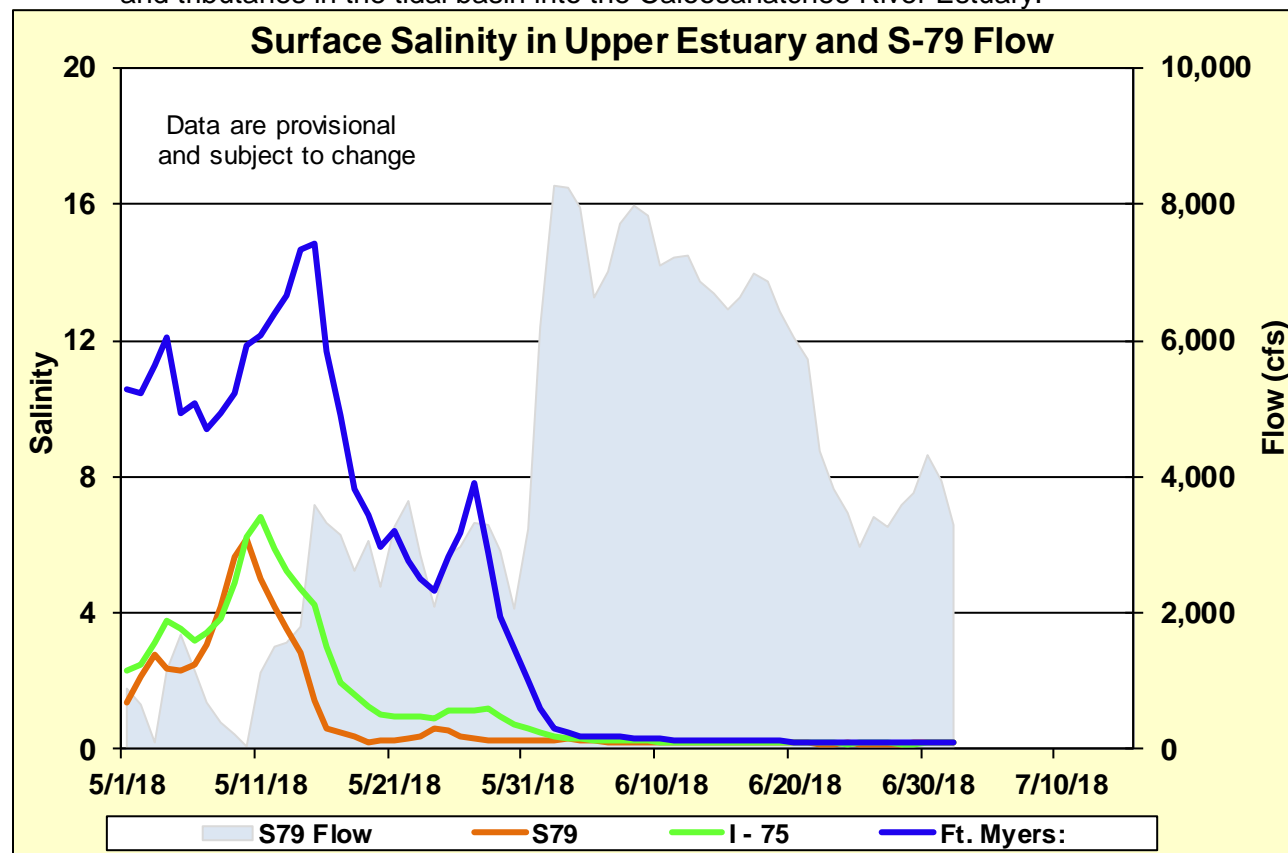


Figure 7. Daily mean flows at S-79 and salinity at upper estuary monitoring stations.

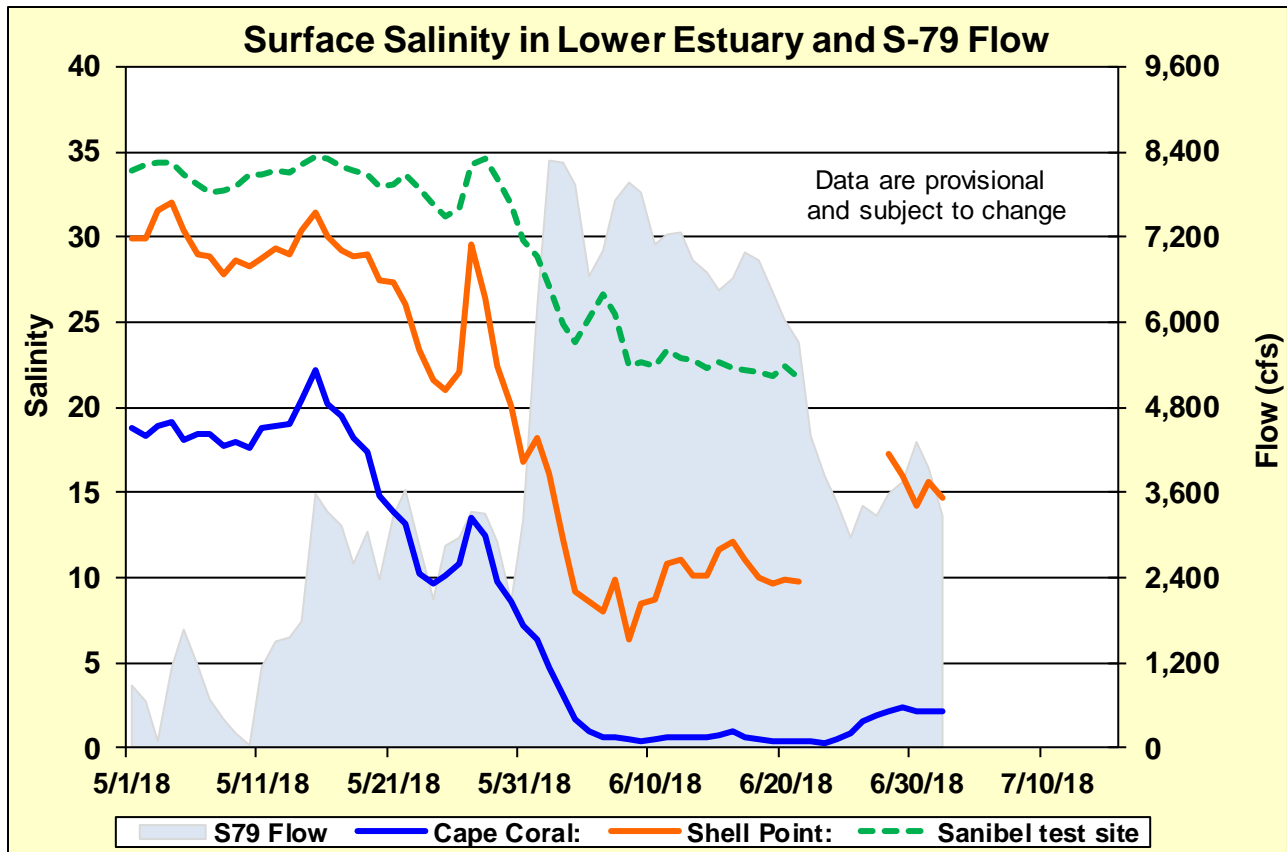


Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.

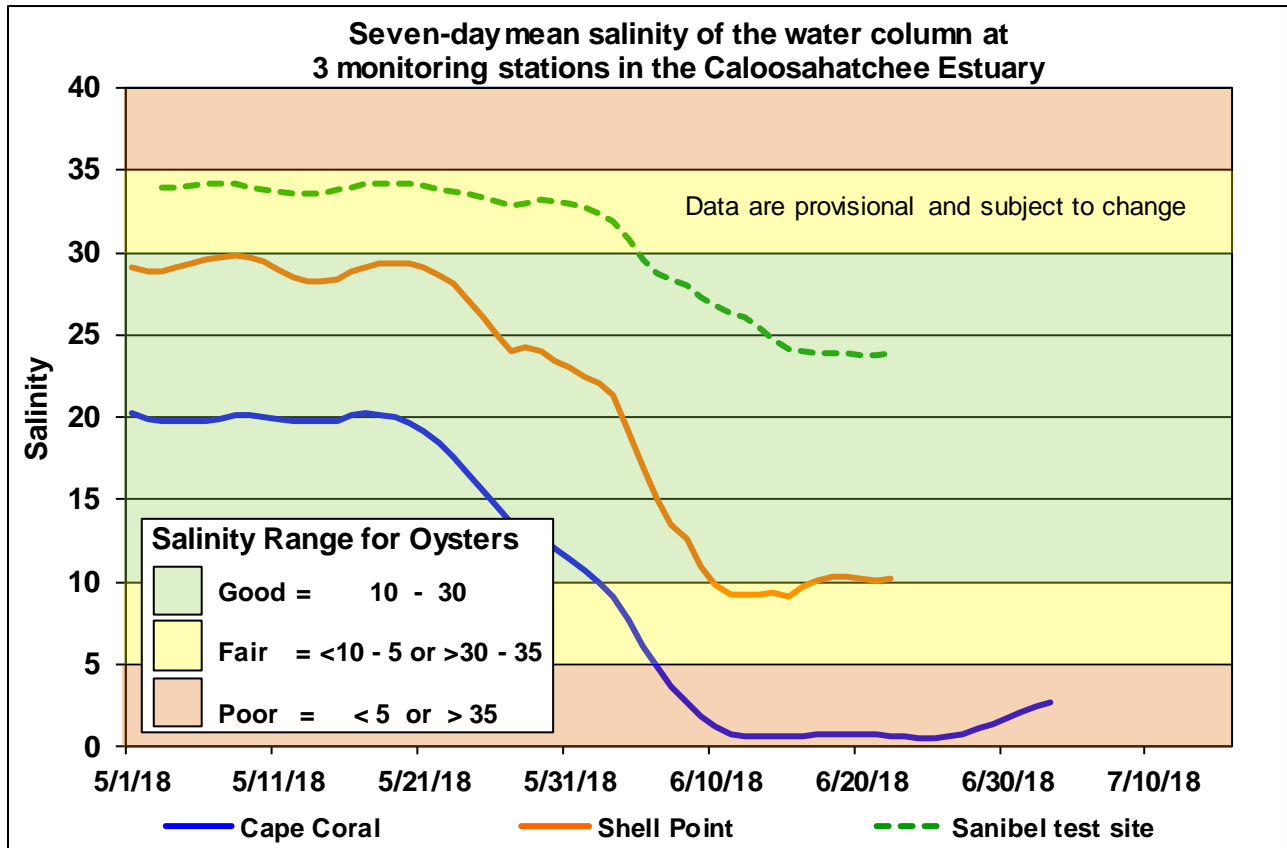
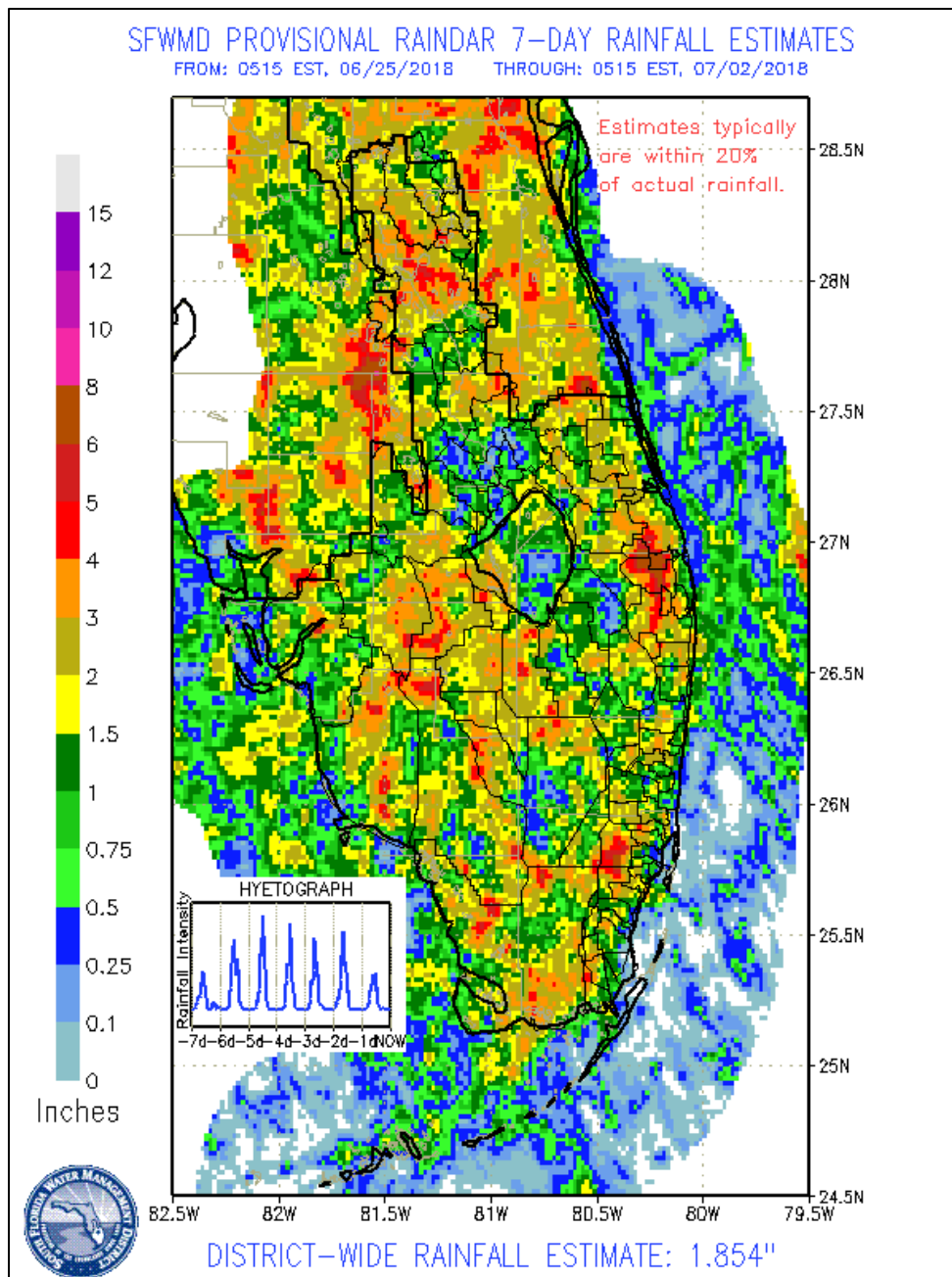


Figure 9. Seven-day mean salinity at Cape Coral, Shell Point, and Sanibel monitoring stations.

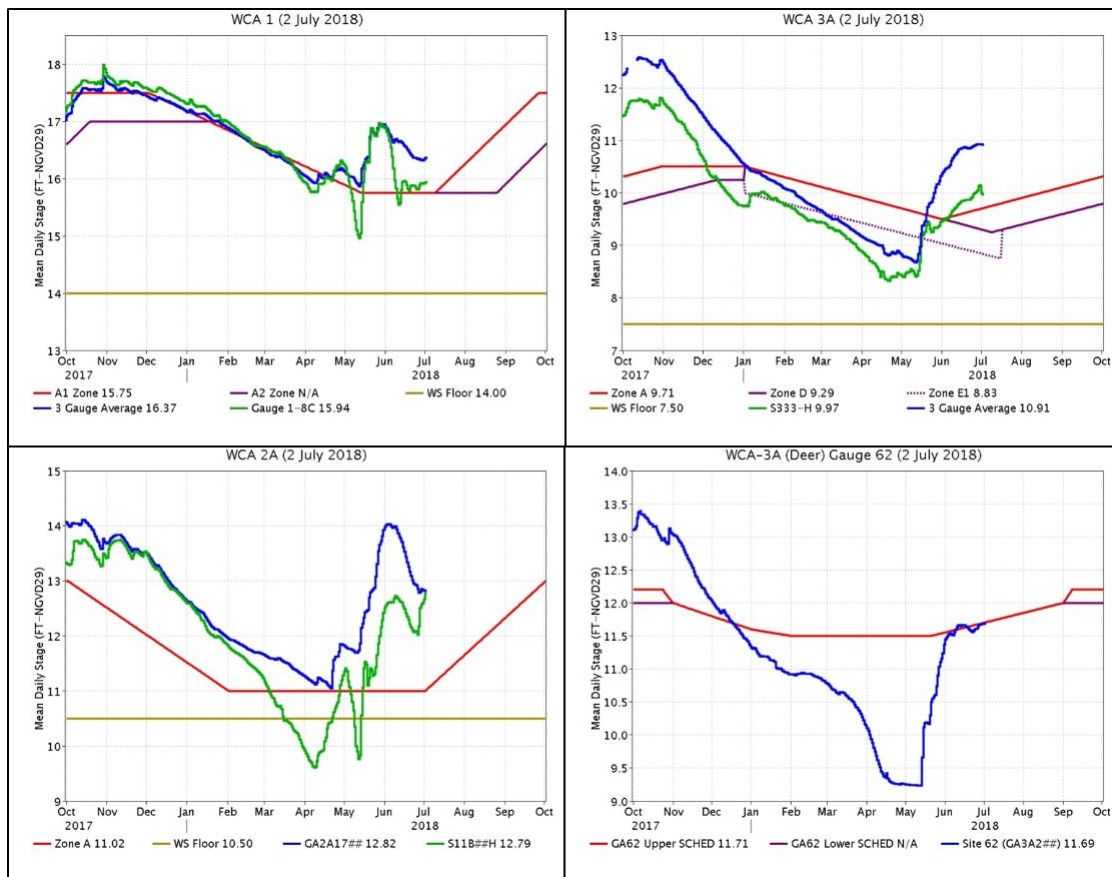
EVERGLADES

At the gauges monitored for this report, stages in WCA-2A fell 0.14 feet last week while the remainder of the Everglades basins rose an average of 0.07 feet. Individual gauge changes within the WCAs ranged from -0.14 feet (WCA-2A) to +0.19 feet (WCA-3B). Pan evaporation was estimated at 1.76 inches.

Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	1.55	+0.02
WCA-2A	1.34	-0.14
WCA-2B	1.71	+0.11
WCA-3A	1.68	+0.03
WCA-3B	1.65	+0.10
ENP	2.02	+0.11



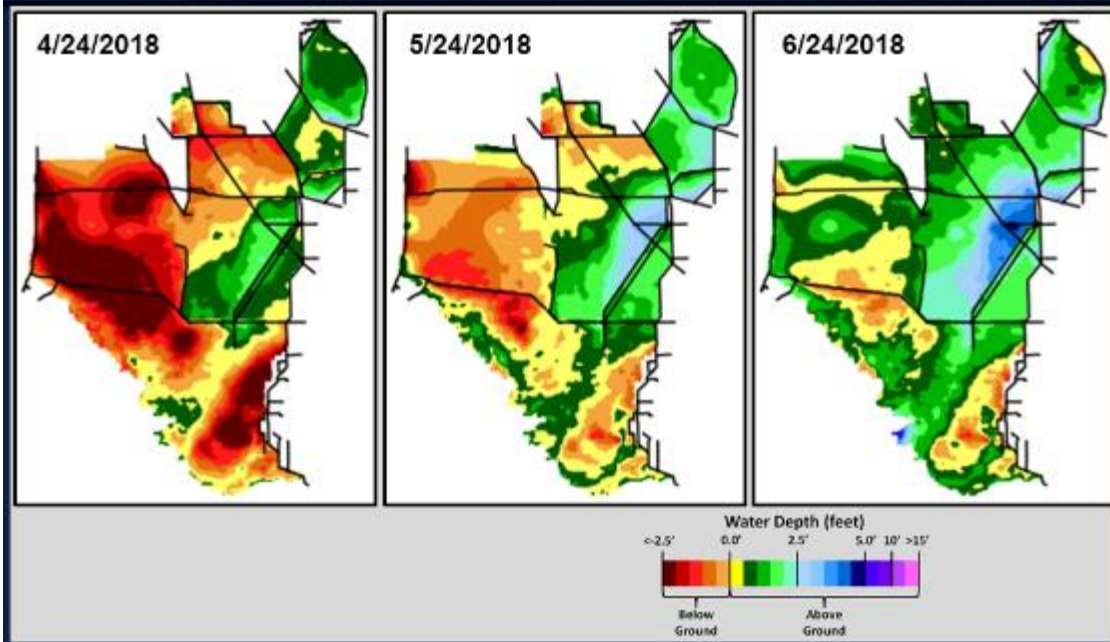
Regulation Schedules: WCA-1 three-gauge average stage is 0.62 feet above Zone A1 with a slight uptick at the end the week. Stage at gauge 1-8C is 0.19 above schedule. WCA-2A marsh stage is 1.80 feet above Zone A and moving toward schedule. S-11B headwater stage is 1.77 above schedule. WCA-3A three-gauge average stage is now 1.20 feet above Zone A. WCA-3A stage at gauge 62 (northwest corner) is following the upper schedule at only 0.03 feet below.



Water Depths and Changes: The WDAT tool for spatial interpolation of depth monthly snapshots indicates a rapidly hydrating WCA-3A, ponding along the northern reaches of the L-67 in southern WCA-3A and somewhat drier conditions in northeast WCA-1. Comparing current WDAT water depths to depths from last week, depths decreased across portions of WCA-1 and WCA-2A. WCA-3A is considerably wetter now than it was a month ago, significantly so in the eastern half of northern WCA-3A. Looking back one year ago, WCA-3A is drier while WCA-3B is wetter. WCA-2A is significantly drier than it was a week ago, a month ago, and a year ago.



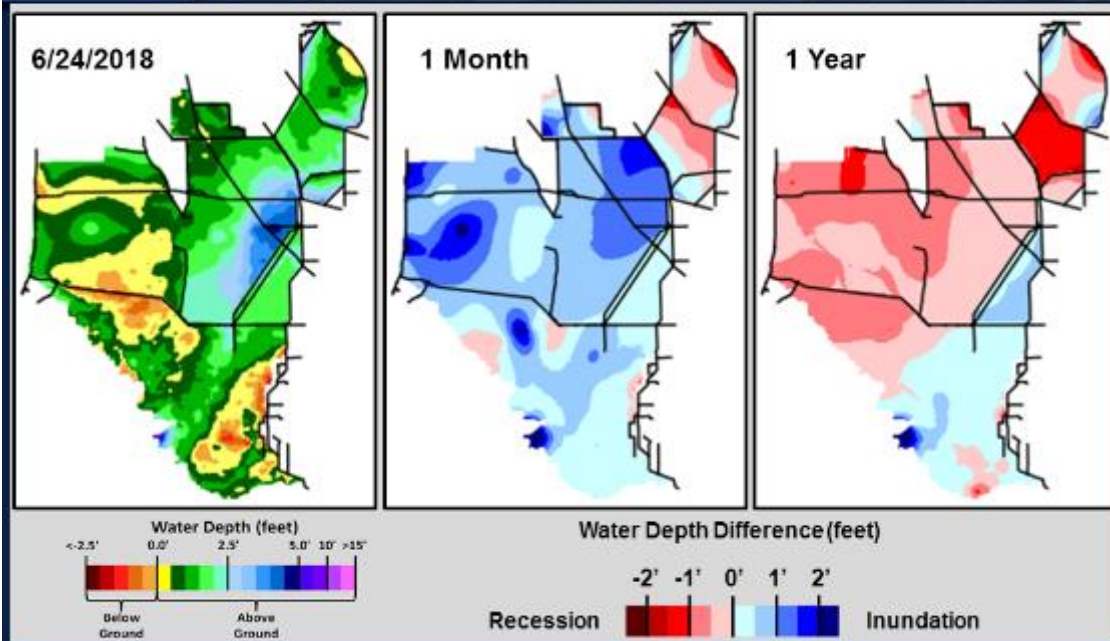
SFWDAT Water Depth Monthly Snapshots



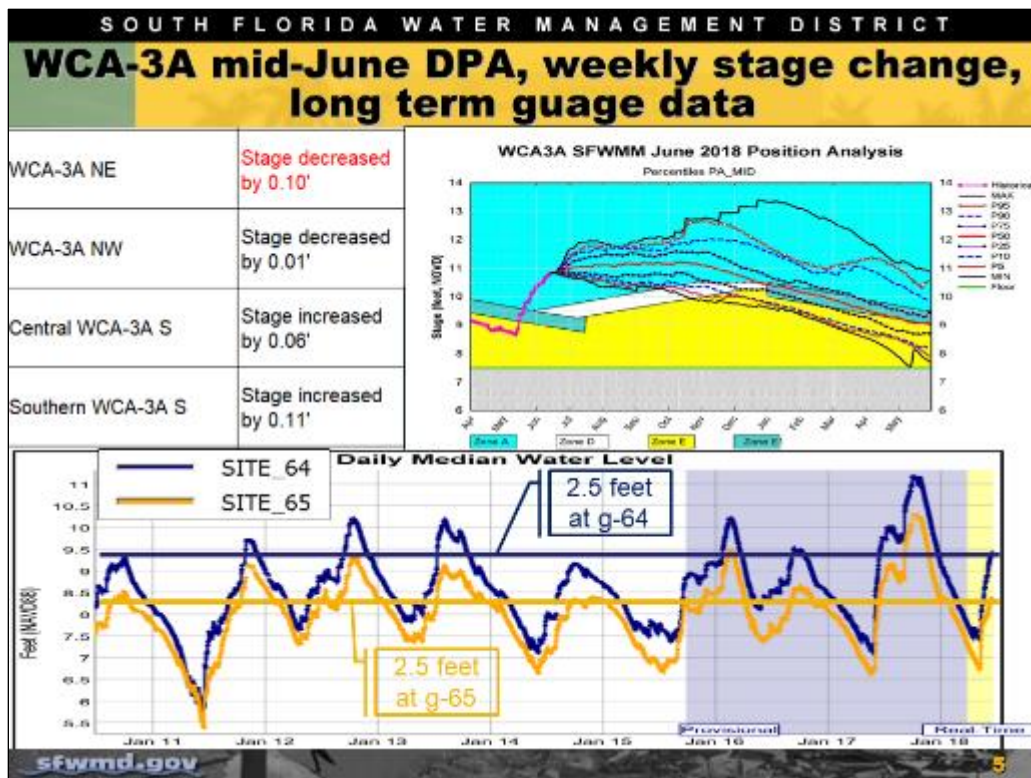
South Florida Water Depth Assessment Tool (SFWDAT)



SFWDAT Everglades Difference Maps (Present – Past)

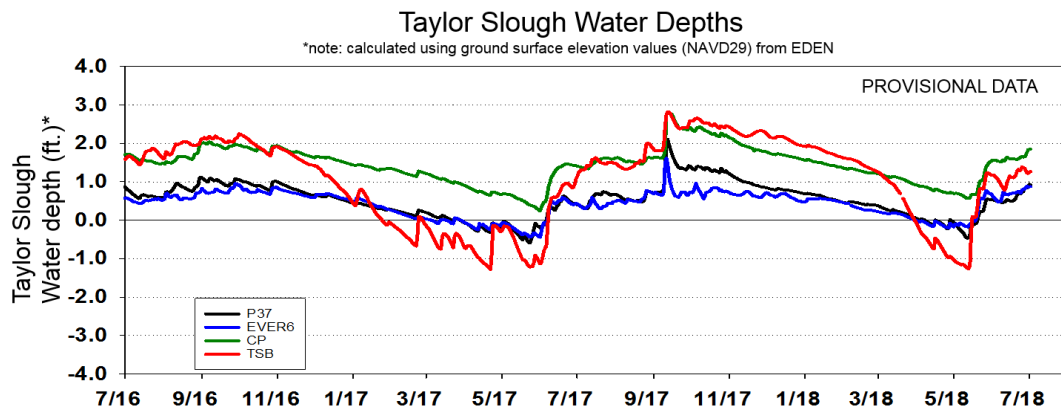
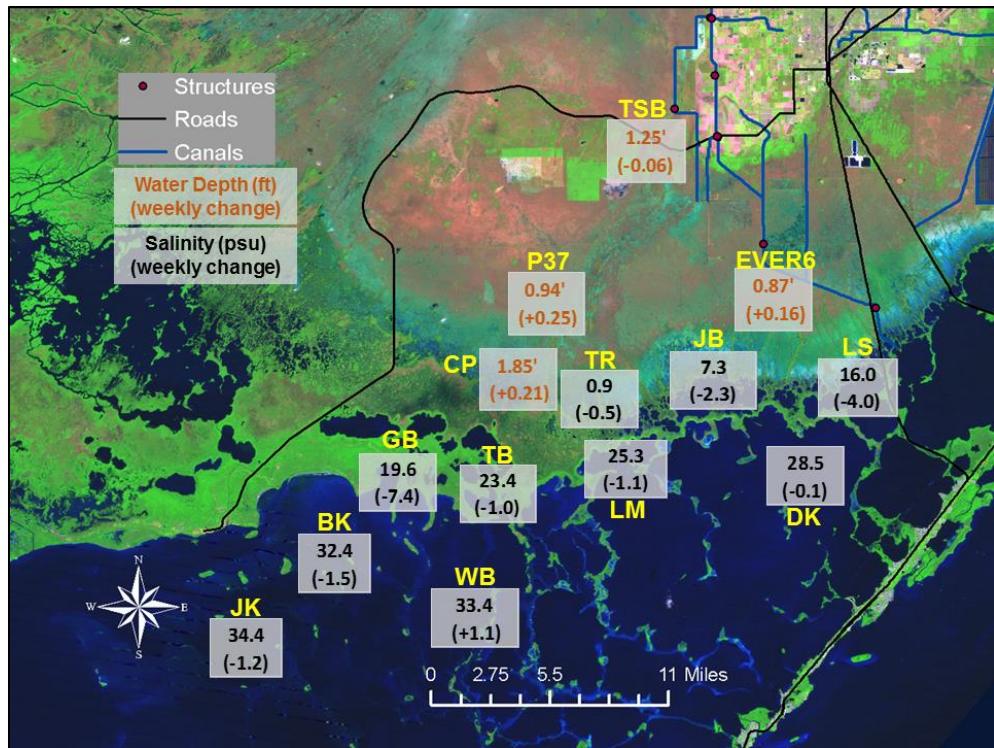


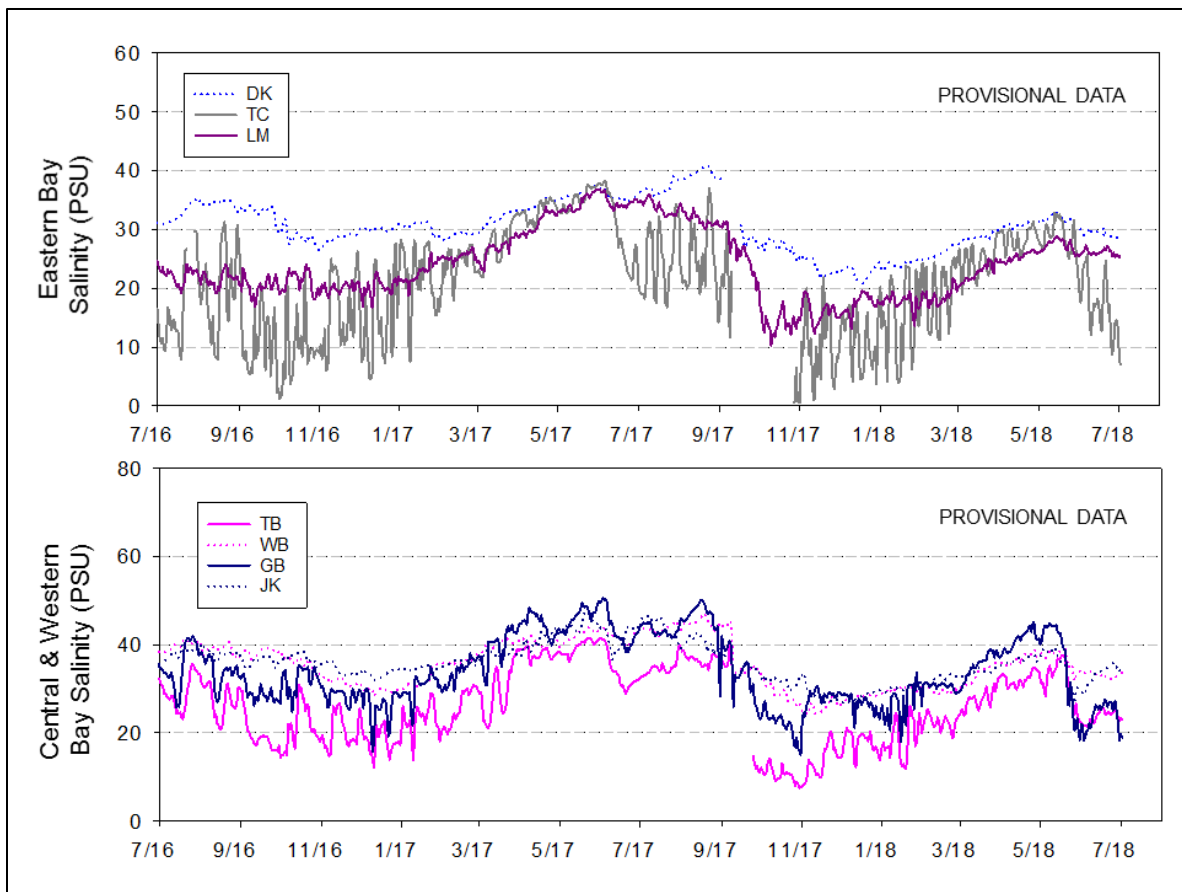
South Florida Water Depth Assessment Tool (SFWDAT)



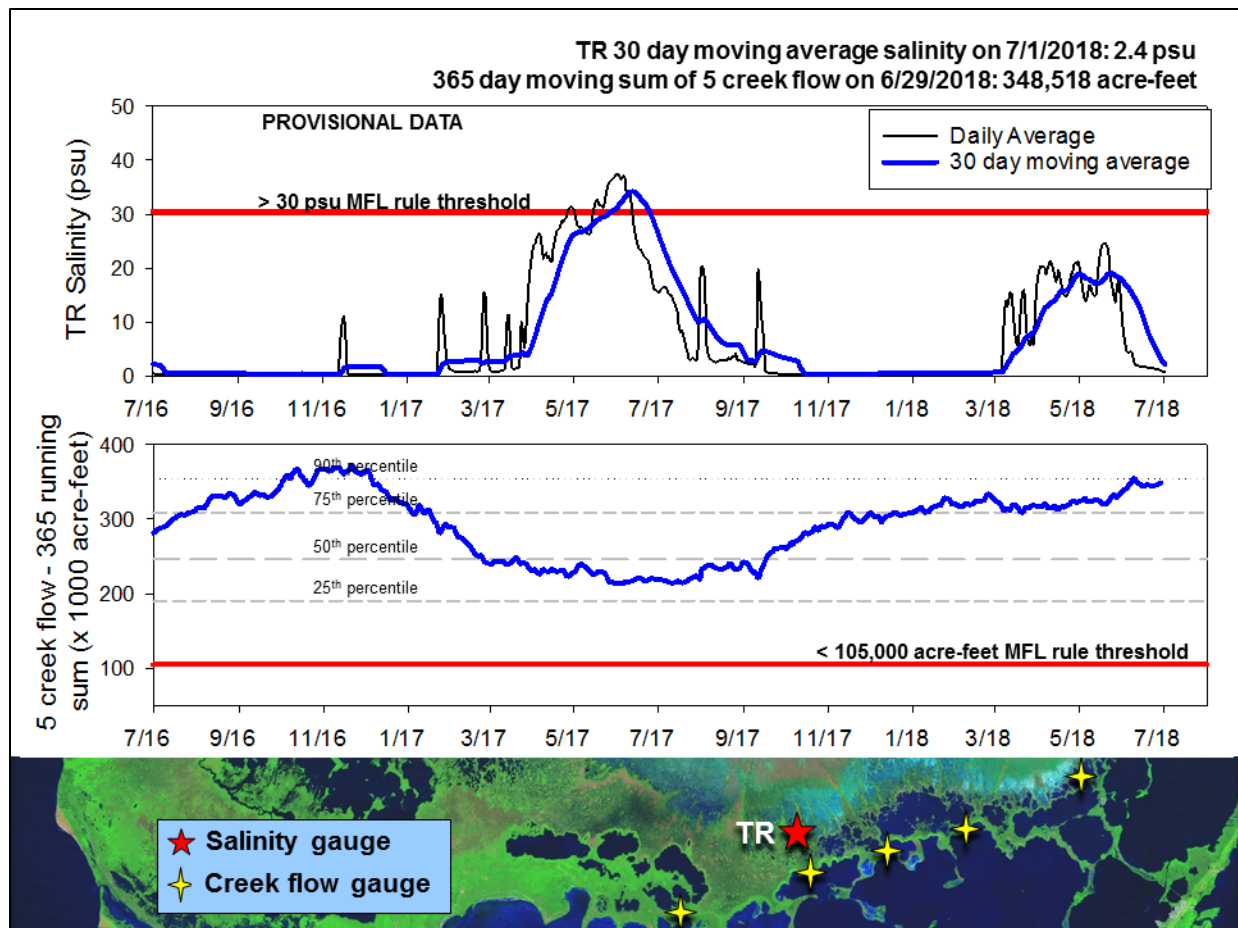
Taylor Slough Water Levels: An average of 2.4 inches of rain fell on Taylor Slough and Florida Bay with over 4 inches falling over the western nearshore area and southwest Taylor Slough. Stage changes this week ranged from -0.06 feet to $+0.25$ feet and averaged $+0.13$ feet. Water depths are still 5 to 7 inches above the historical averages.

Florida Bay Salinities: Salinities decreased 1.4 psu on average across Florida Bay, with individual station changes ranging from -7.4 psu to $+1.1$ psu. The greatest decreases corresponded with the highest rainfall. Salinities ranged from 7 psu in the northeast to 34 psu in the western bay. This range is 2 to 16 psu below the historical averages.





Florida Bay MFL: Mangrove zone daily average salinity decreased 0.5 psu to end at 0.9 psu this week. The 30-day moving average decreased 3.2 psu this week to end at 2.4 psu. The weekly cumulative flow from the five creeks denoted by yellow stars on the map averaged just over 1,000 acre-feet per day for most of last week. A sensor malfunction at the middle creek prevents calculation of the five-creek total beyond June 29, 2018. The 365-day moving sum of flow from the five creeks increased 3,000 acre-feet over the 5 days where data were available to end at 348,518 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

Inflows to northernmost WCA-3A create the least ecological stress when compared to flows to southern WCA-3A or WCA-2A. 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. Ascension rates are now critical for apple snail reproduction in the Everglades. The current recommended stage ascension rate is less than 0.25 feet per week (or 0.5 feet per 2 weeks). Due to elevated levels of phosphorus in the S-332D detention area and the Frog Pond detention area, a recommendation is being made to limit the increase in depths within the L-31W to no more than 3 inches per day over the course of 3 to 4 weeks when S-332D, S-328, and/or G-737 are opened. More specific recommendations appear in the summary table below. The red text represents new or modified information or recommendations.

SFWMD Everglades Ecological Recommendations, July 3rd, 2018 (red is new)			
Area	Weekly change	Recommendation	Reasons
WCA-1	Stage increased by 0.02'	Maintain depths at regulation schedule.	Protect upstream/downstream habitat and wildlife.
WCA-2A	Stage decreased by 0.14'	Maintain depths at or above regulation schedule.	Protect upstream/downstream habitat and wildlife.
WCA-2B	Stage increased by 0.11'	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 decreased by 0.17'	Maintain depths at regulation schedule.	Protect habitat including peat soil development and wildlife.
WCA-3A NW	Stage increased by 0.07'	Maintain depths at regulation schedule.	
Central WCA-3A S	Stage increased by 0.07'	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 habitat and wildlife.
Southern WCA-3A S	Stage increased by 0.16'		
WCA-3B	Stage increases ranged from 0.01' to 0.19'	Maintain depths at or above 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.
ENP-SRS	Stage increased by 0.11'	Make discharges to the Park according to the 2012 WCP rainfall plan.	Protect upstream/downstream habitat and wildlife.
Taylor Slough	Stage changes ranged from -0.06' to +0.25'	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 -7.4 to +1.1 psu.	Move water southward as possible	When available, provide freshwater to maintain low salinity buffer and promote water movement.