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: January 8, 2019

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

Limited rain prospects for the next 2 weeks. A cold front is forecast to move through the area Wednesday but with only some limited light showers due to a lack of moisture and a lack of upper level energy with the system. This front will reinforce the dry conditions over the area Thursday, but then northeast and east winds will bring some widely scattered light showers east Thursday night and Friday. As the old frontal boundary lifts northward into the District, scattered light showers are forecast to develop mainly east Saturday and Sunday. Shower activity is then expected to decrease Sunday night and Monday as another dry front slides through the area and continues the dry trend next week. A cold front late in the two-week period has the potential to bring some moderate rainfall to the District.

Kissimmee

Tuesday morning stages were 57.9 feet NGVD (0.1 feet below schedule) in East Lake Toho, 54.4 feet NGVD (0.6 feet below schedule) in Toho, and 50.6 feet NGVD (1.9 feet below schedule) in Kissimmee-Cypress-Hatchineha; headwater stages were 46.5 feet NGVD at S-65A and 25.9 feet NGVD at S-65D. Tuesday morning discharges were 300 cfs at S-65, 187 cfs at S-65A, and 208 cfs at S-65E. Dissolved oxygen concentration in the Kissimmee River averaged 5.6 mg/L for the week. Kissimmee River mean floodplain depth on Sunday was 0.09 feet. Recommendations: 1/4/2019- Discontinue 54-foot stage reduction target in Lake Toho because Lake Kissimmee stage has risen by 1.5 feet.

Lake Okeechobee

Lake Okeechobee stage is 12.57 feet NGVD, falling 0.12 feet from the previous week and 0.36 feet over the past 30 days. Lake stages are the lowest they have been for this time of year since 2010 and are now 1.93 feet below the bottom of the preferred ecological envelope, which varies seasonally from 12.5 – 15.5 feet NGVD. 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, but will reduce habitat for fish and wildlife in the near-term and encourage spread of invasive vegetation in the upper marsh. Approximately 6,400 wading birds were seen foraging on the lake at the end of December mostly in the western Moonshine Bay.

Estuaries

Total inflow to the St. Lucie Estuary averaged 119 cfs over the past week with 0 cfs coming from Lake Okeechobee. Surface salinity remained more or less the same throughout the estuary over the last week. 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 1,082 cfs over the past week with 762 cfs coming from the Lake. Over the past week in the estuary, salinity remained more or less the same throughout the estuary over the last week. The 30-day moving average surface salinity is 2.2 at Val I-75 and 7.6 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 to the upper estuary associated with freshwater releases from Lake Okeechobee, but some benefits may accrue to areas further downstream.

Stormwater Treatment Areas

Over the past week, the STAs received approximately 1,900 acre-feet of Lake releases. The total amount of inflows to the STAs in WY2019 (since May 1, 2018) is approximately 1,200,000 acre-feet, which includes approximately 337,000 acre-feet of Lake releases. Most STA cells are at or above target depths except the emergent aquatic vegetation cells in STA-5/6 which are drying out. STA-1W Northern Flow-way is offline for STA-1W Expansion project construction activities, and operational restrictions are in place for STA-1W Expansion project construction activities in STA-1W Eastern and Western Flow-ways. STA-5/6 Flow-ways 2 and 3 are offline for Restoration Strategies project to grade non-effective treatment areas. This week, if Lake releases are sent to the WCAs and conditions allow, releases will be sent to STA-1E and STA-2.

Everglades

Conditions within the WCAs remain as they have over the past several weeks, stable but unseasonably dry. Stages in northern WCA-3A and WCA-1 continue to decline below ground. Over the last week water depths declined on average across the Everglades at a rate slightly higher than the previous month. Stages remain below regulation in the WCAs with WCA-2A now also below its regulation line. Water management supporting the ecological need for hydration in northeast WCA-3A continues with discharge from S-150 continuing last week averaging around 250 cubic feet per second, providing water to northeastern WCA-3A. Stages continued to decline this week throughout Taylor Slough, however, are about 2.1 inches above average with the greatest divergence from average near water management components in the north and east. Some salinity data was unavailable from Florida Bay, where it was salinities averaged a 0.4 psu decrease and range from 17 psu to 35 psu.

Supporting Information

KISSIMMEE BASIN

Kissimmee Basin Rainfall

The Upper Kissimmee Basin received 0.23 inches of rainfall in the past week and the Lower Basin received 0.12 inches (SFWMD Daily Rainfall Report 1/7/2018).

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.

Report Date: 1/8/2019

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)						
							1/6/19	12/30/18	12/23/18	12/16/18	12/9/18	12/2/18	11/25/18
Lakes Hart and Mary Jane	S-62	42	LKMJ	61.0	R	61.0	**0.0**	0.0	-0.3	-0.9	-1.0	-1.1	-1.0
Lakes Myrtle, Preston, and Joel	S-57	0	S-57	61.6	R	61.6	**0.0**	-0.1	-0.3	-0.5	-0.7	-0.9	-0.9
Alligator Chain	S-60	0	ALLI	63.3	R	64.0	**-0.7**	-0.7	-0.7	-0.9	-1.0	-1.0	-1.0
Lake Gentry	S-63	2	LKGT	61.5	R	61.5	**0.0**	0.0	0.0	0.1	0.0	0.0	0.0
East Lake Toho	S-59	171	TOHOE	58.0	R	58.0	**0.0**	0.0	-0.1	-0.8	-1.0	-1.0	-1.0
Lake Toho	S-61	404	TOHOW, S-61	54.5	R	55.0	**-0.5**	-0.5	-0.1	-0.2	-0.2	-0.4	-0.4
Lakes Kissimmee, Cypress, and Hatchineha	S-65	273	KUB011, LKIS5B	50.7	R	52.5	**-1.8**	-2.0	-2.6	-3.1	-3.2	-3.1	-3.0

[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: **1/8/2019**

Metric	Location	1-Day Average	Average for the Preceeding 7-Days[1]									
		1/6/2019	1/6/19	12/30/18	12/23/18	12/16/18	12/9/18	12/2/18	11/25/18	11/18/18	11/11/18	11/4/18
Discharge (cfs)	S-65	266	**273**	277	253	301	330	337	346	349	336	350
Discharge (cfs)	S-65A[2]	183	**194**	201	182	180	252	232	254	256	252	288
Discharge (cfs)	S-65D[2]	236	**241**	242	238	253	298	276	315	321	360	404
Headwater Stage (feet NGVD)	S-65D[2]	25.81	**25.86**	25.88	25.73	25.80	25.84	25.82	26.20	26.66	27.15	27.62
Discharge (cfs)	S-65E[2]	221	**215**	218	266	242	292	302	335	317	370	405
Discharge (cfs)	S-67	0	**0**	0	0	0	0	0	0	0	0	0
DO (mg/L)[3]	Phase I river channel	5.4	**5.6**	6.1	6.2	5.4	5.1	5.9	5.5	5.7	5.2	5.3
Mean depth (feet)[4]	Phase I floodplain	0.09	**0.09**	0.11	0.12	0.10	0.10	0.12	0.10	0.12	0.16	0.21

[1]Seven-day average of weighted daily means through Sunday midnight.
[2]S-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.
[4]1-day spatial average from South Florida Water Depth Assessment Tool (SFWDAT).

KCOL Hydrographs (through Sunday midnight)

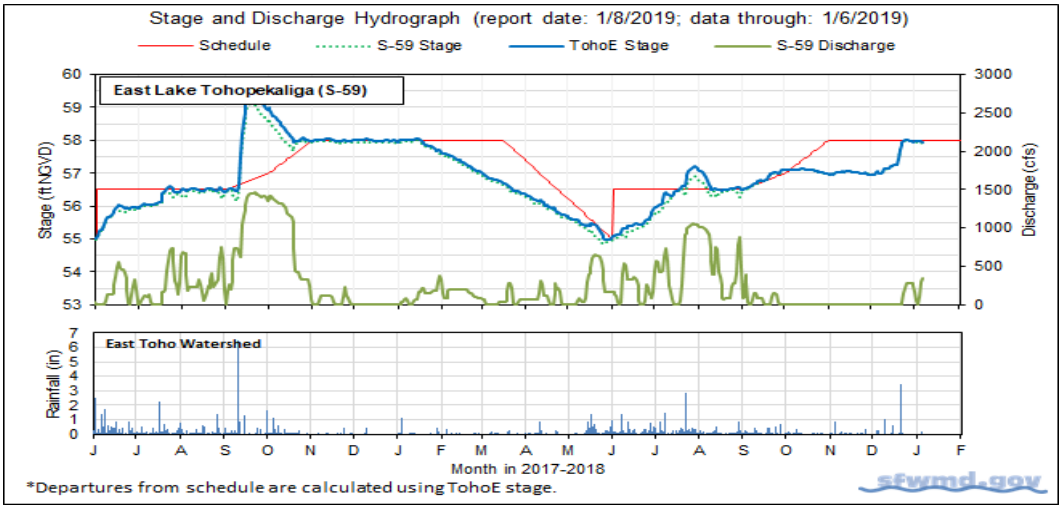


Figure 1.

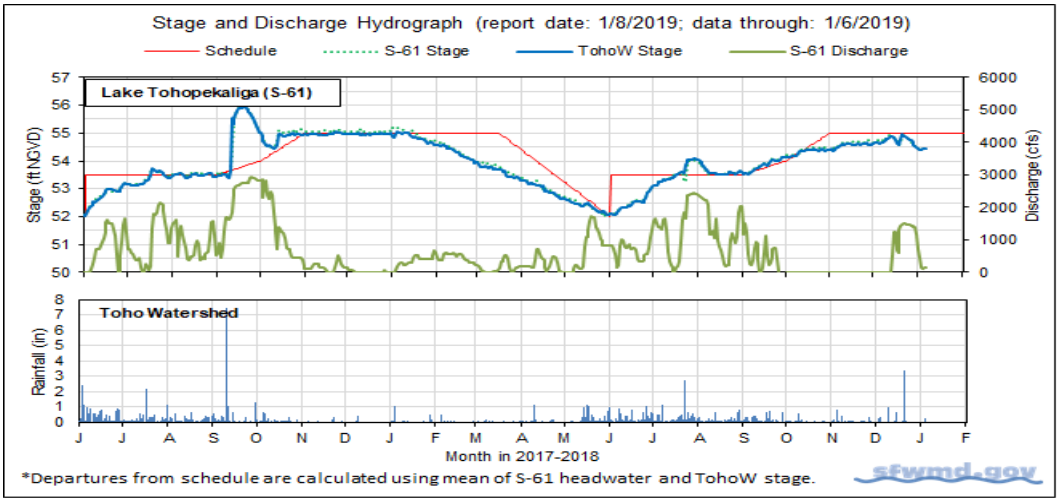


Figure 2.

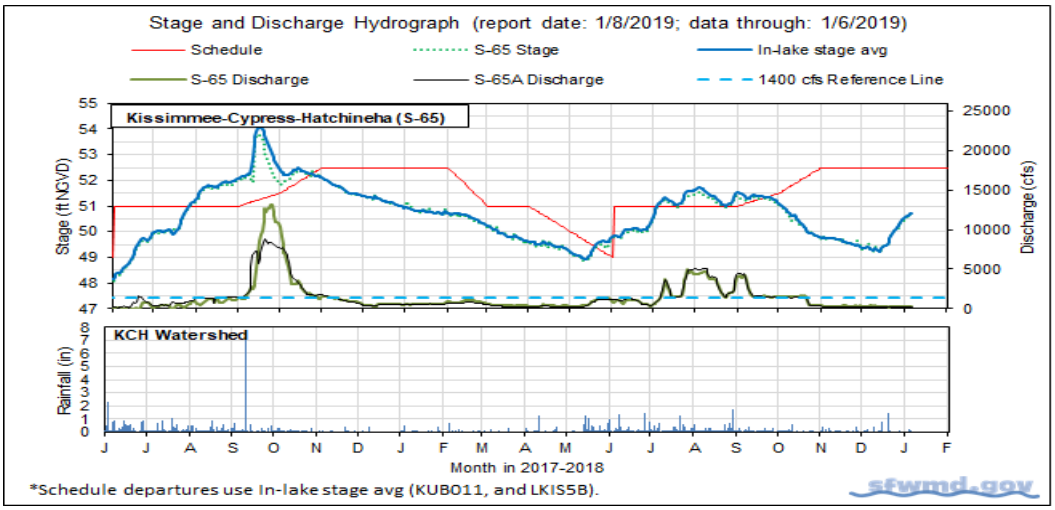


Figure 3.

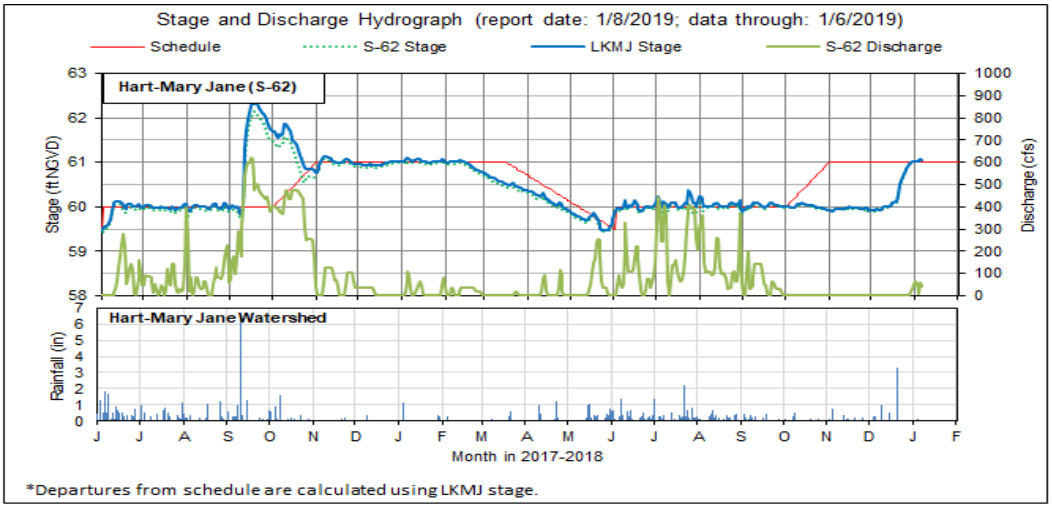


Figure 4.

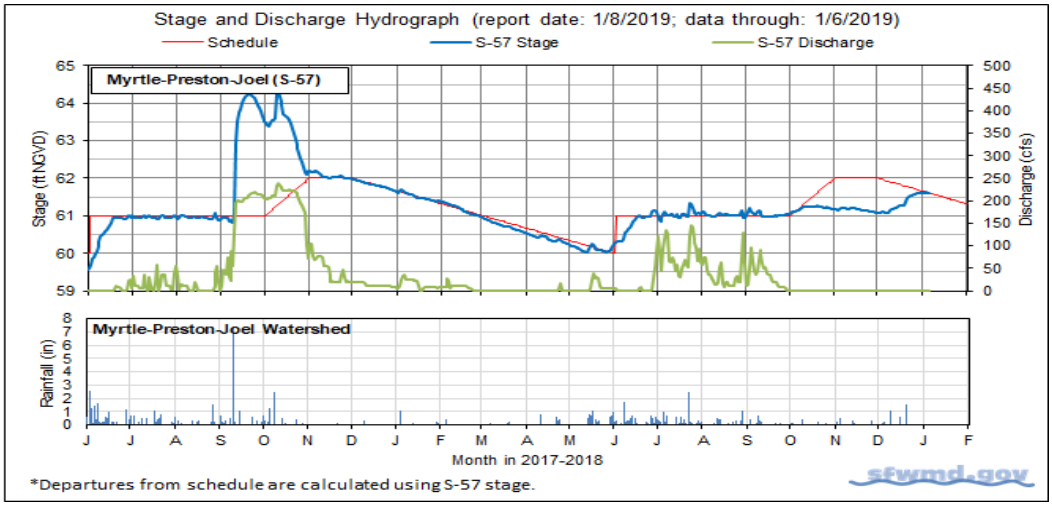


Figure 5.

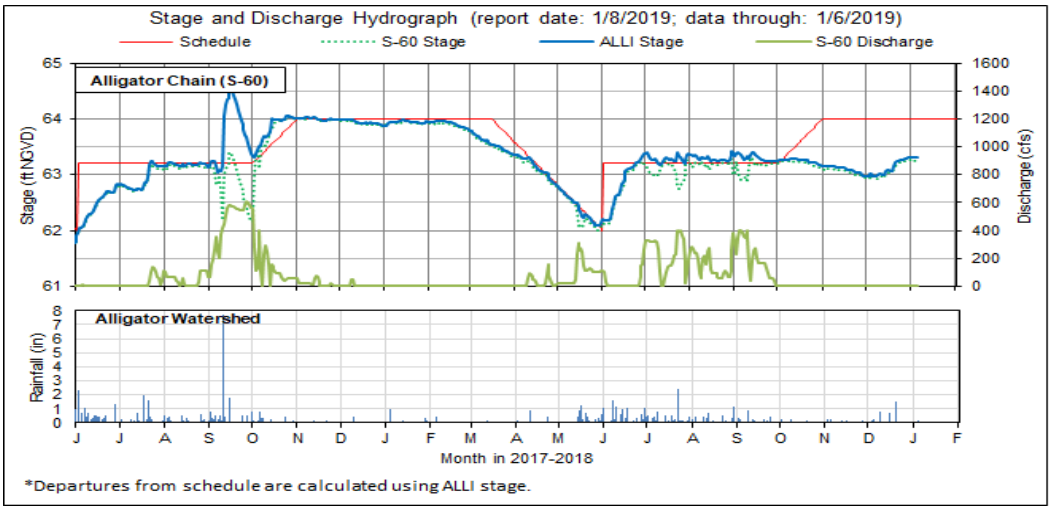


Figure 6.

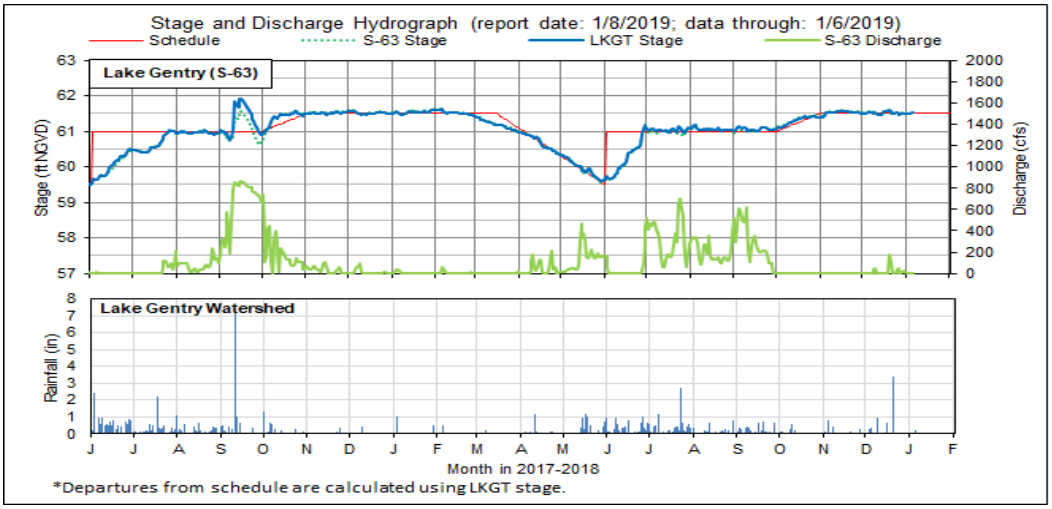


Figure 7.

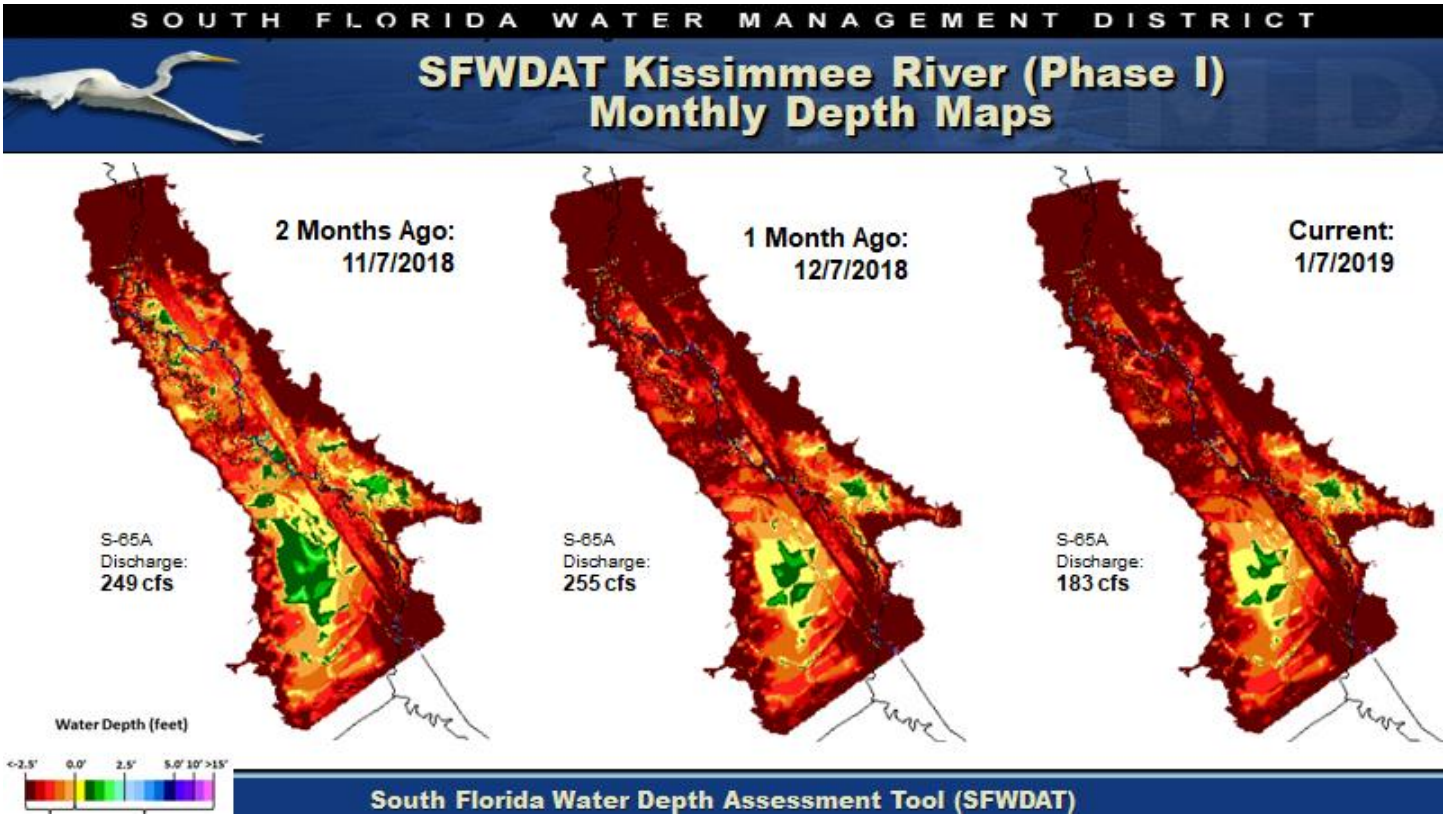


Figure 8. Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to January 16, 2012.

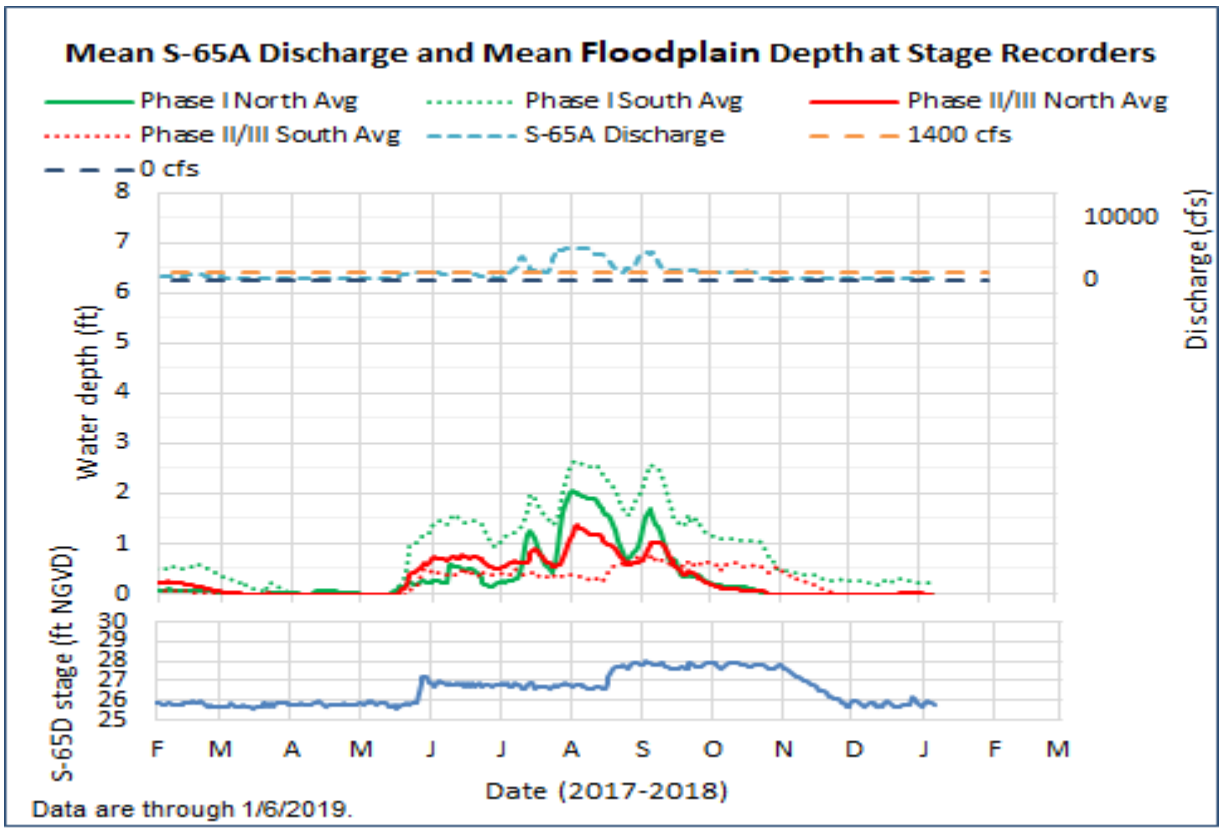


Figure 9. Mean water depth at stage recorders in the northern Phase I, southern Phase I, northern Phase II/III, and southern Phase II/III areas in relation to the S-65A discharge and S-65D headwater stage.

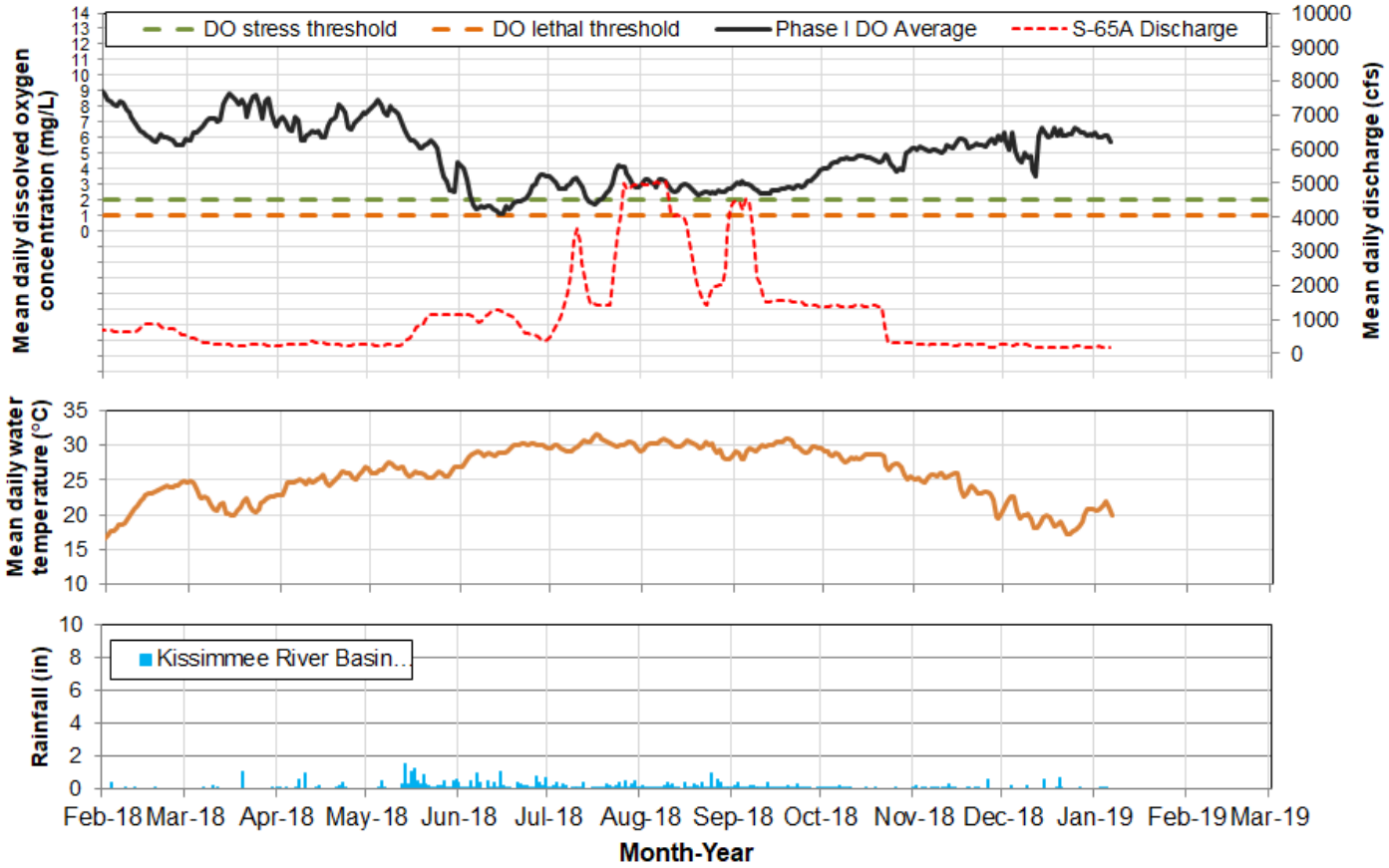


Figure 10. Mean daily dissolved oxygen, discharge, temperature and rainfall in the Phase I river channel.

Water Management Recommendations

Kissimmee Basin Adaptive Recommendations and Operational Actions

Recommendation Date	Recommendation	Purpose	Outcome	Source	Report Date
1/4/2019	Discontinue 54 foot stage reduction target in Lake Toho.	Lake Kissimmee has already risen by ~1.5 ft.	Implemented	SFWMD Water Mgt/KB Ops	1/8/2019
12/14/2018	Manage S-61 discharge to reduce stage in Lake Toho to 54 ft over the next 7-9 days.	Move water to KCH to reduce the rate of stage decline in KCH; reduce the head difference between S-61 headwater and tailwater.	N/A	SFWMD Water Mgt/KB Ops	12/18/2018
12/10/2018	Reduce S-65A discharge to 180 cfs.	Reduce rate of stage decline in lakes Kissimmee-Cypress-Hatchineha	N/A	SFWMD Water Mgt/KB Ops	12/11/2018
12/3/2018	No new recommendations.		N/A		12/4/2018
11/26/2018	No new recommendations.		N/A		11/27/2018
11/19/2018	No new recommendations.		N/A		11/20/2018
11/12/2018	No new recommendations.		N/A		11/13/2018
11/2/2018	Reduce S-65/S-65A discharge to approximately 250 cfs.	To conserve stage in Lake Kissimmee.	Implemented	SFWMD Water Mgt/KB Ops	11/6/2018
10/30/2018	No new recommendations.		N/A		10/30/2018
10/22/2018	Reduce S-65/S-65A discharge to approximately 300 cfs (minimum discharge) in one step of approximately 1100 cfs today.	Reduce rate of stage decline in lakes Kissimmee-Cypress-Hatchineha	Implemented	SFWMD Water Mgt/KB Ops	10/23/2018
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		9/25/2018
9/18/2018	No new recommendations.		N/A		9/18/2018
9/11/2018	No new recommendations.		N/A		9/11/2018
9/4/2018	No new recommendations.		N/A		9/4/2018
8/28/2018	No new recommendations.		N/A		8/28/2018
8/21/2018	No new recommendations.		N/A		8/21/2018
8/14/2018	No new recommendations.		N/A		8/14/2018
8/7/2018	No new recommendations.		N/A		8/7/2018
7/23/2018-7/24/2018	Increase discharge from 1400 cfs to 3000 cfs, then 3200 cfs and 3500 cfs.	For flood control in Lake Kissimmee.	Implemented	SFWMD Water Mgt/KB Ops	7/31/2018
7/19/2018	Follow Revised (X2) 2018 Wet Season Discharge Plan to the extent possible, including 50 foot stage threshold and 0.5 foot flood control buffer.	To the extent possible, maintain sufficient discharge to keep areas under snail kites nests in Pool D hydrated until nests fledge, while avoiding large increases in discharge that might flood the nests.	N/A	KB Ops	7/24/2018
7/13/2018	Maintain at least 1400 cfs at S-65A while Lake Kissimmee stage is above 50 feet. (See revised 2018 discharge plan).	To the extent possible, maintain sufficient discharge to keep areas under snail nest kites in Pool D hydrated until nests fledge.	N/A	KB Ops	7/17/2018
7/13/2018	Reduce S-65/S-65A discharge by 600 cfs/day until 1400 cfs is reached. (See revised 2018 discharge plan, below).	Reach 1400 cfs faster to help stabilize Lake Kissimmee stage.	Implemented	SFWMD Water Mgt/KB Ops	7/17/2018
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
7/5/2018	Increase S-65/S-65A discharge by 300 cfs/day (double the prescribed rate of increase) Thursday through Sunday .	Stablize Lake Kissimmee stage.	Implemented	SFWMD Water Mgt	7/10/2018
7/2/2018	Increase S-65/S-65A discharge by 150 cfs/day (double the prescribed rate of increase).	Stablize Lake Kissimmee stage.	Implemented	SFWMD Water Mgt/KB Ops	7/10/2018
6/30/2018	Increase S-65/S-65A discharge as slowly as feasible	Slow stage ascencsion 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

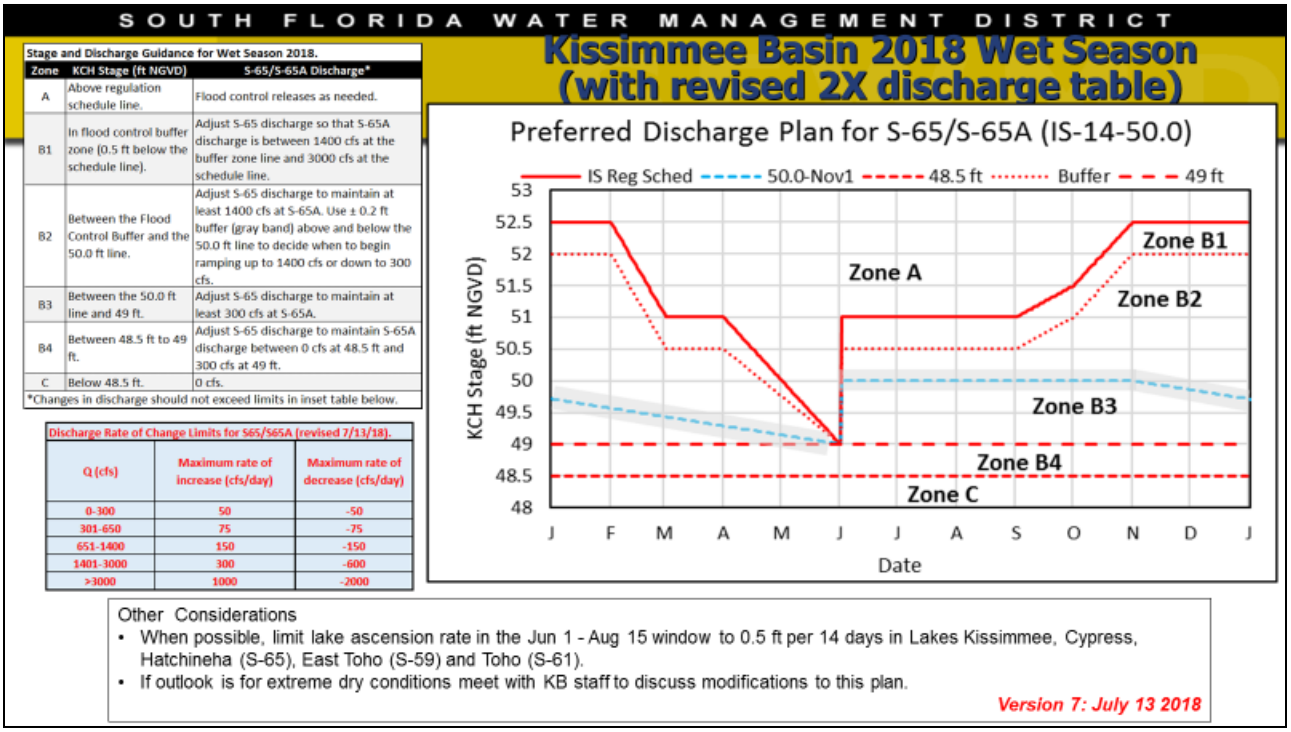


Figure 11. The 2018 Wet Season Discharge Plan for S-65/S-65A.

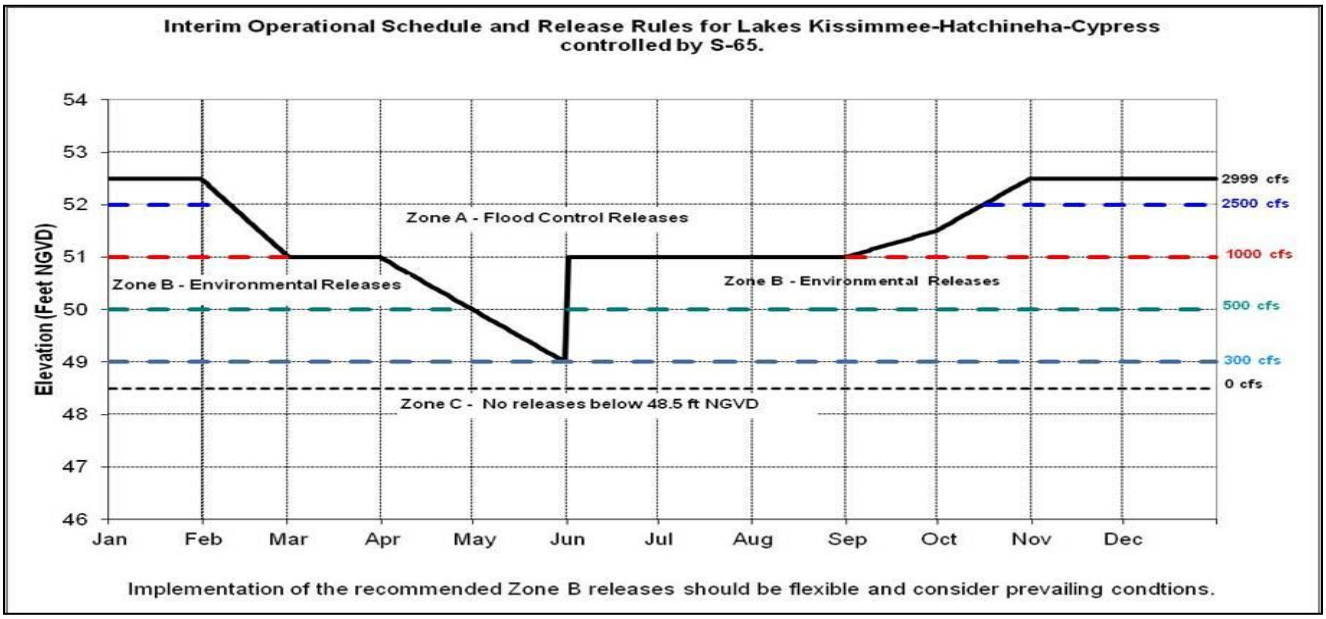


Figure 12. Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years.

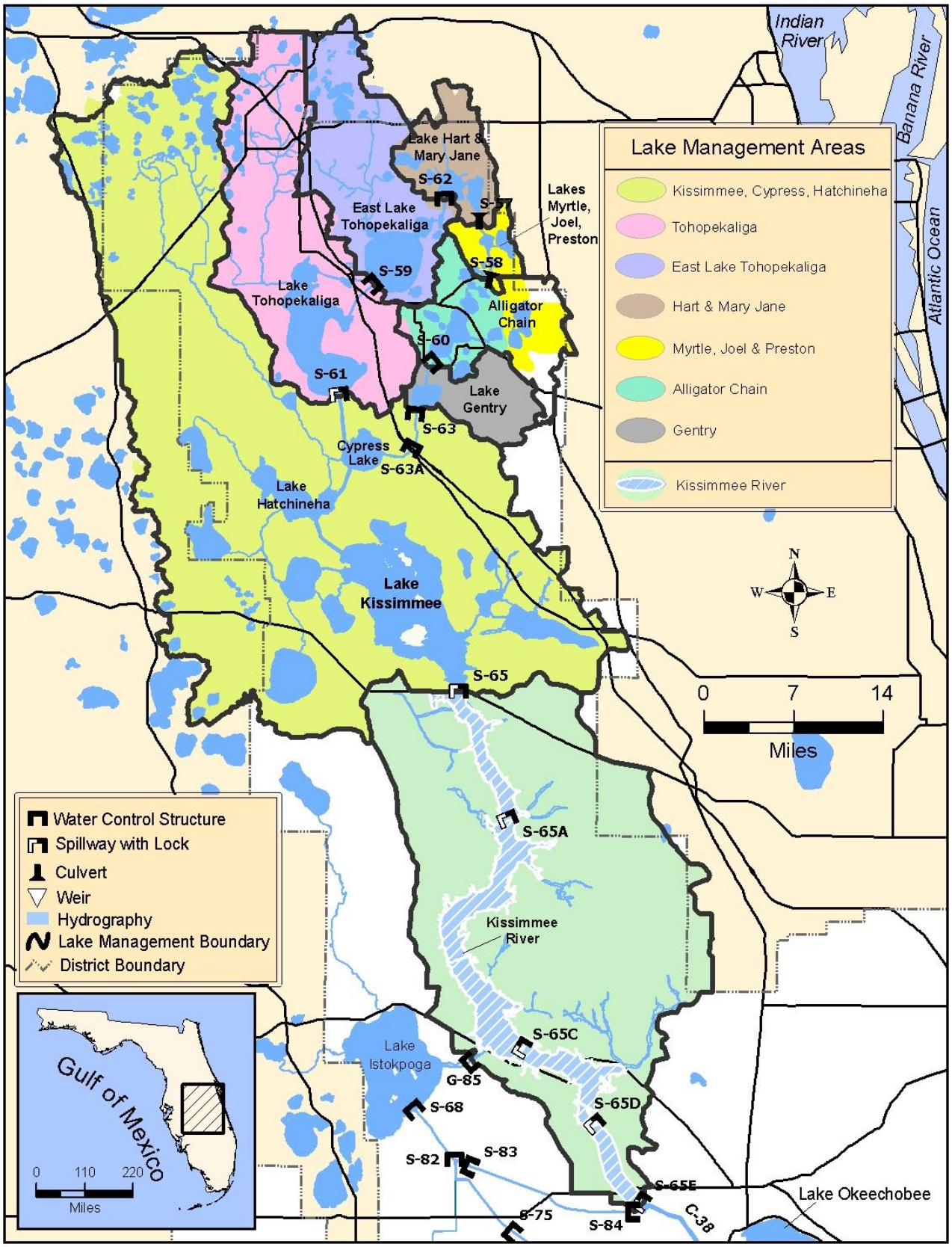


Figure 13. The Kissimmee Basin.

LAKE OKEECHOBEE

According to the USACE web site, Lake Okeechobee stage is at 12.57 feet NGVD for the period ending at midnight on January 7, 2019. This value is based on the use of three interior lake stations (L001, L005, L006 and LZ40) and four perimeter stations (S-308, S-4 and S-133). No data are available for S-352. The Lake is now 0.36 feet lower than it was a month ago and 2.77 feet lower than a year ago when runoff from Hurricane Irma caused extreme high lake stages (Figure 1). The Lake is in the Beneficial Use sub-band (Figure 2). The January 7 lake stage was the lowest for this time of year since 2010 (Figure 3). According to RAINDAR, 0.30 inches of rain fell over the Lake during the week January 1, 2019 – January 7, 2019. Most of the watershed received less than 0.5 inches of rain while the lower west coast received no rainfall (Figure 4).

Average daily inflows (minus rainfall) to the Lake were similar to the previous week, going from 239 cfs to 240 cfs, almost entirely from the Kissimmee River.

Total outflows (minus evapotranspiration) increased from the previous week, going from 1,615 average daily cfs the previous week to 2,091 cfs this past week (Table 1). The increase in outflows was primarily in discharges south through the S-350 structures and west via S-77. Flows south through the S-350s went from 808 cfs the previous week to 947 cfs this past week. Outflows via the S-77 increased from 738 cfs the previous week to 1,073 average daily cfs this past week. Flows through the S-308 have been passive flows through the navigation lock and/or structure and averaged a backflow of -43 cfs. The corrected average daily evapotranspiration value for the week based on the L006 weather platform solar radiation was 0.05 inches this week.

Total lake inflows and outflows for the past week are detailed in Table 1, as well as the approximate change in lake stage from each major structure's total flows over the period. Figure 5 shows the combined average daily cfs for inflows and outflows for the Lake over the past eight weeks. These data are provisional and are subject to change.

The most recent wading bird survey reported just over 6,400 foraging wading birds on the lake, mostly in western Moonshine Bay (Figure 6) as most of the higher elevations are dry and unsuitable for foraging (Figure 7, red areas). If lake levels continue to recede over the next couple of months wading birds will most likely delay, if not abandon, nesting activities.

Water Management Recommendations

Lake Okeechobee stage is 12.57 feet NGVD, falling 0.12 feet from the previous week and 0.36 feet over the past 30 days. Lake stages are the lowest they have been for this time of year since 2010 and are now 1.93 feet below the bottom of the preferred ecological envelope, which varies seasonally from 12.5 – 15.5 feet NGVD. 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. However, low stages also encourage expansion of invasive vegetation in the upper marsh and temporarily reduce the quantity and quality of habitat for fish and wildlife.

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	208	222	0.1
S71 & 72	0	0	0.0
S84 & 84X	0	0	0.0
Fisheating Creek	20	18	0.0
S154	0	0	0.0
S191	0	0	0.0
S133 P	0	0	0.0
S127 P	0	0	0.0
S129 P	4	0	0.0
S131 P	7	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			
Rainfall	67	550	0.2
Total	**306**	**790**	**0.4**

OUTFLOWS	Previous Week Avg Daily cfs	Avg Daily Outflow cfs	Equivalent Depth Week Total (in)
S77	738	1073	0.5
S308	-45	-43	0.0
S351	239	389	0.2
S352	388	351	0.2
S354	181	207	0.1
L8 Outflow	116	114	0.1
ET	918	815	0.4
Total	**2534**	**2905**	**1.3**

PROVISIONAL DATA

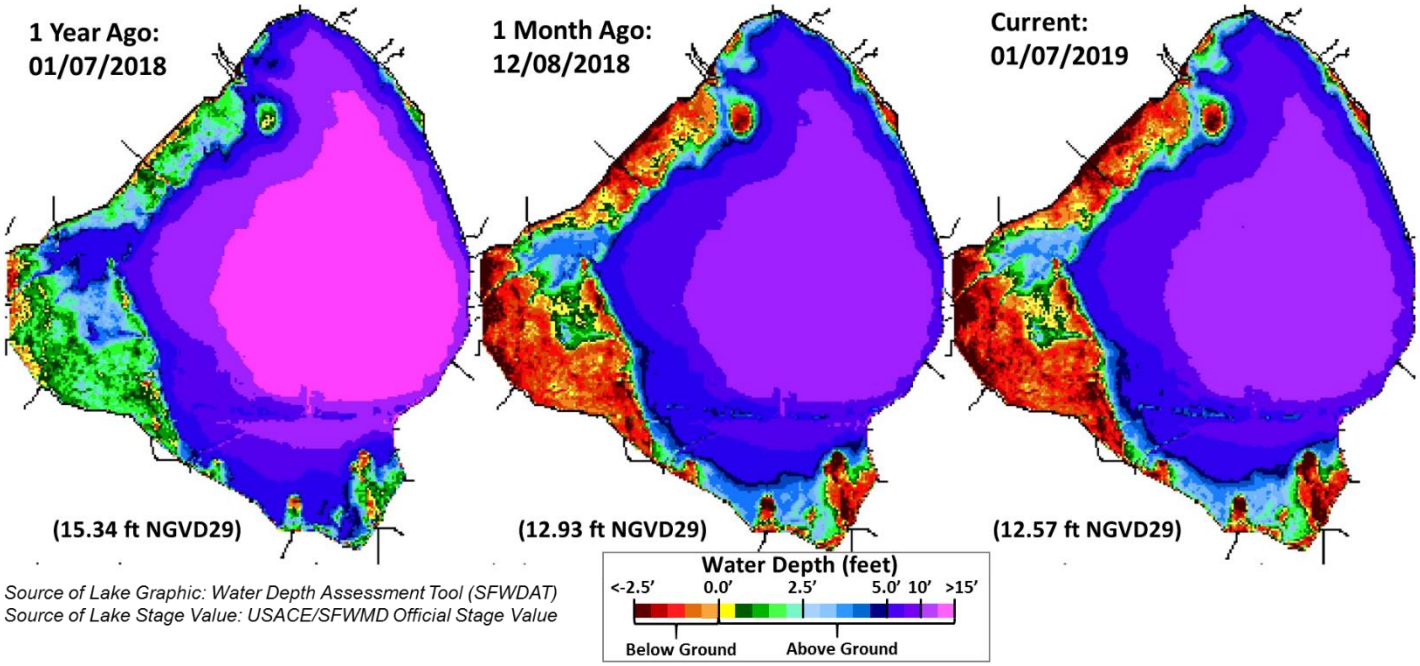


Figure 1. Water depth estimates on Lake Okeechobee based on the South Florida Water Depth Assessment Tool.

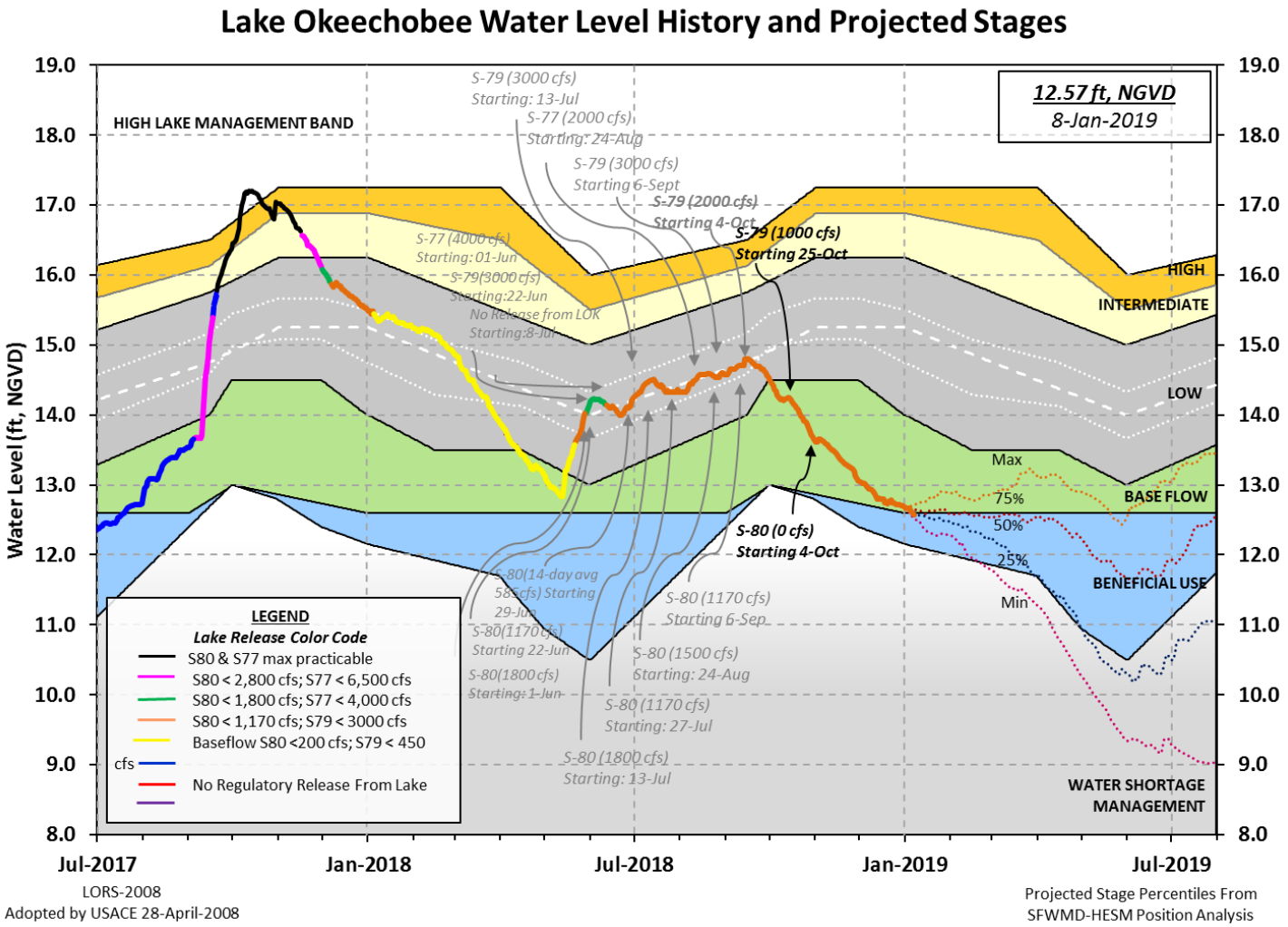


Figure 2. Recent Lake Okeechobee stage and releases, with projected stages based on a dynamic position analysis.

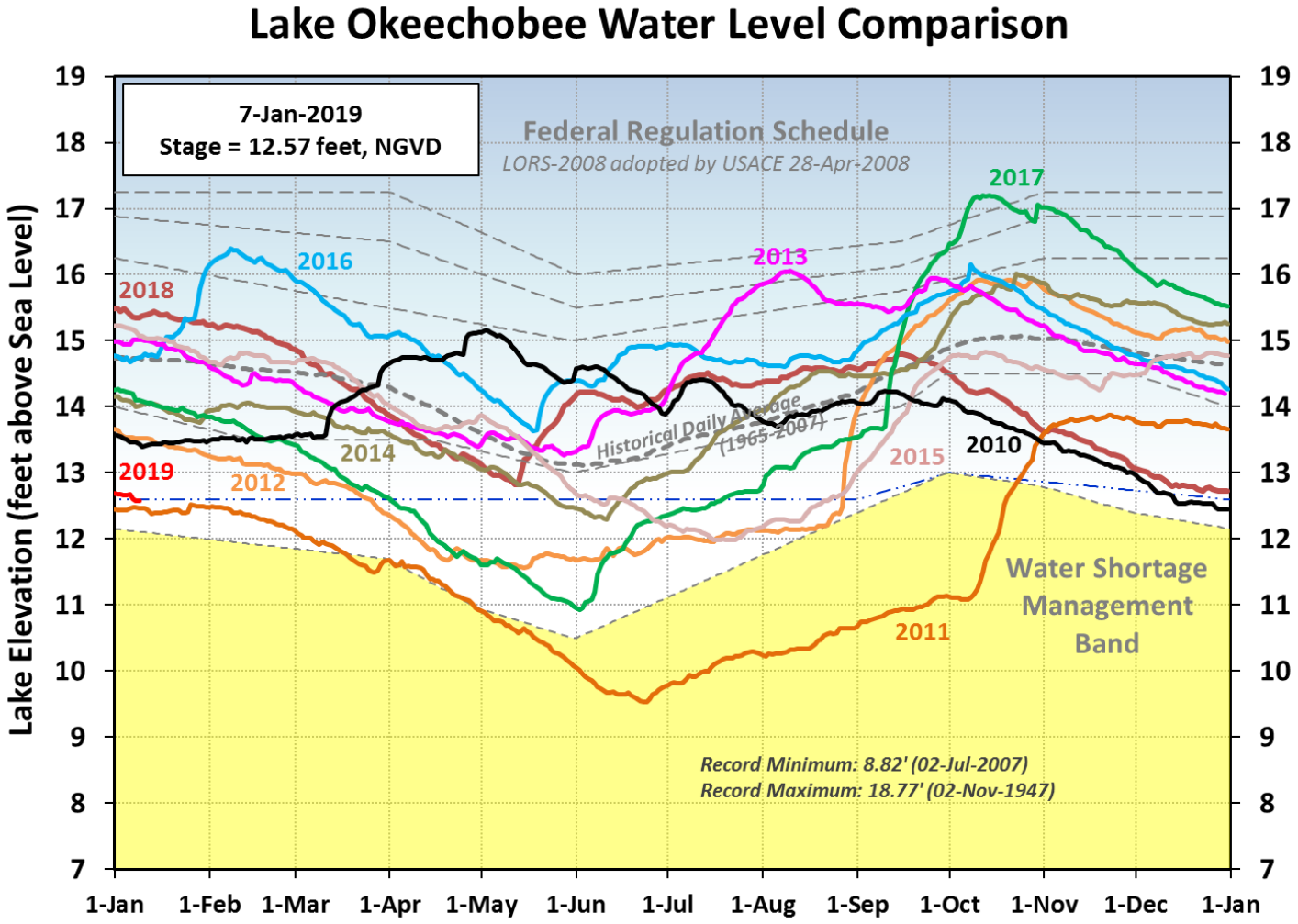


Figure 3. Annual stage hydrographs for Lake Okeechobee from 2010 – 2019.

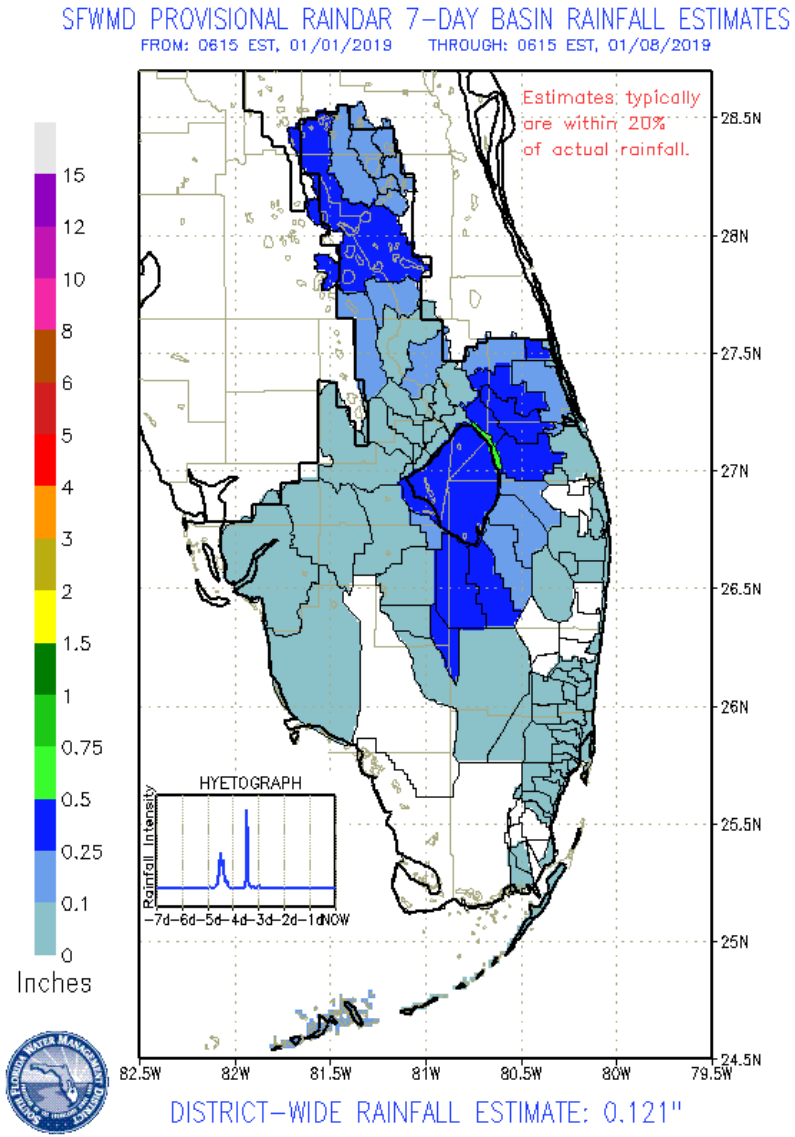


Figure 4. Rainfall estimates by basin.

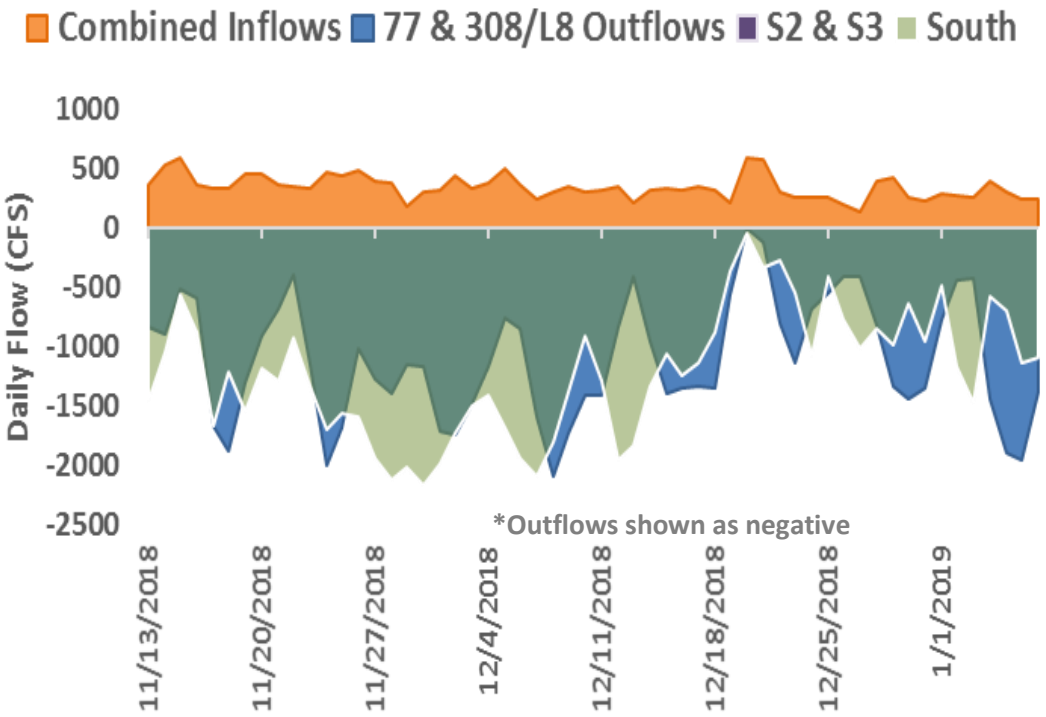


Figure 5. Major inflows (orange) and outflows (green) of Lake Okeechobee, including the S-350 structures designated as South (blue). The L-8 canal flows through culvert 10A are included as outflows when positive, and as inflows when backflowing into the lake. All inflows and outflows are shown as positive and negative, respectively, for visual purposes.

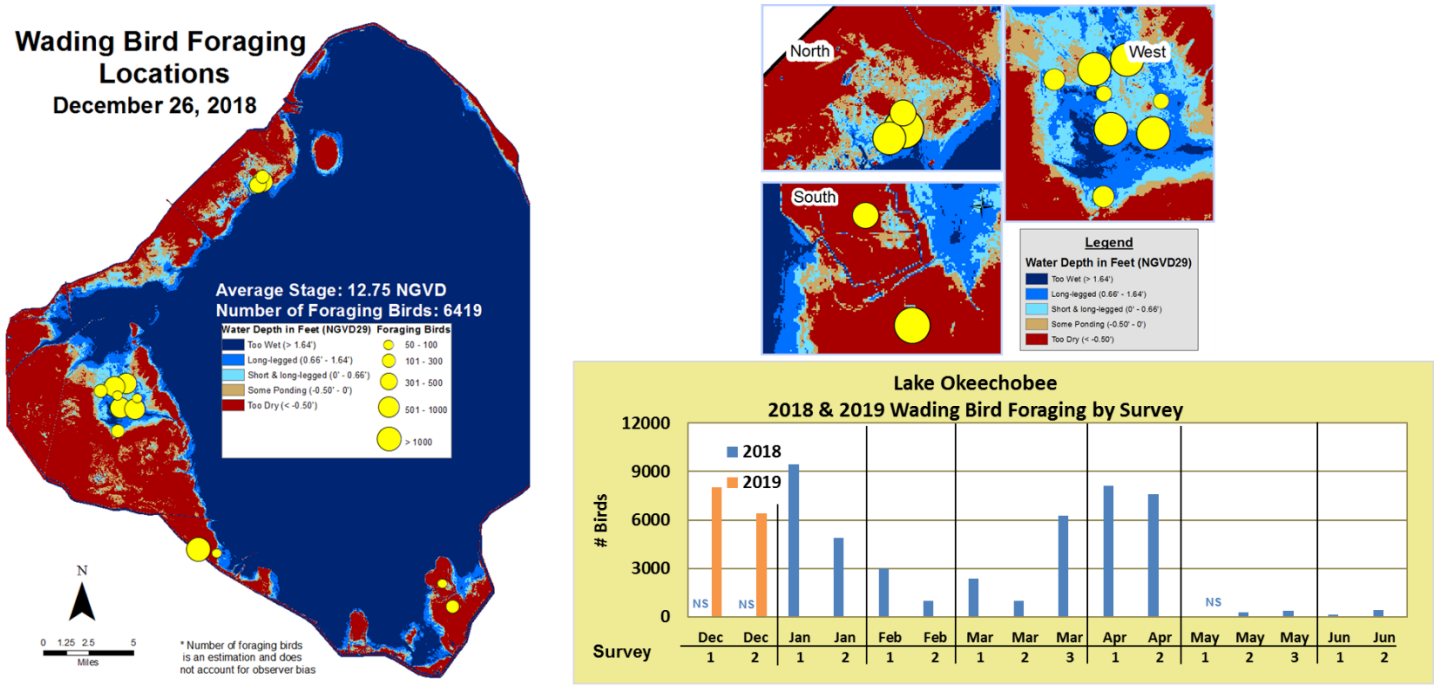


Figure 6. Locations of foraging flocks of wading birds observed during a monitoring flight on December 26, 2018 are shown in yellow, with circle sizes representing the size of the flocks. Previous survey totals from this season and from 2018 are compared in the bar graph.

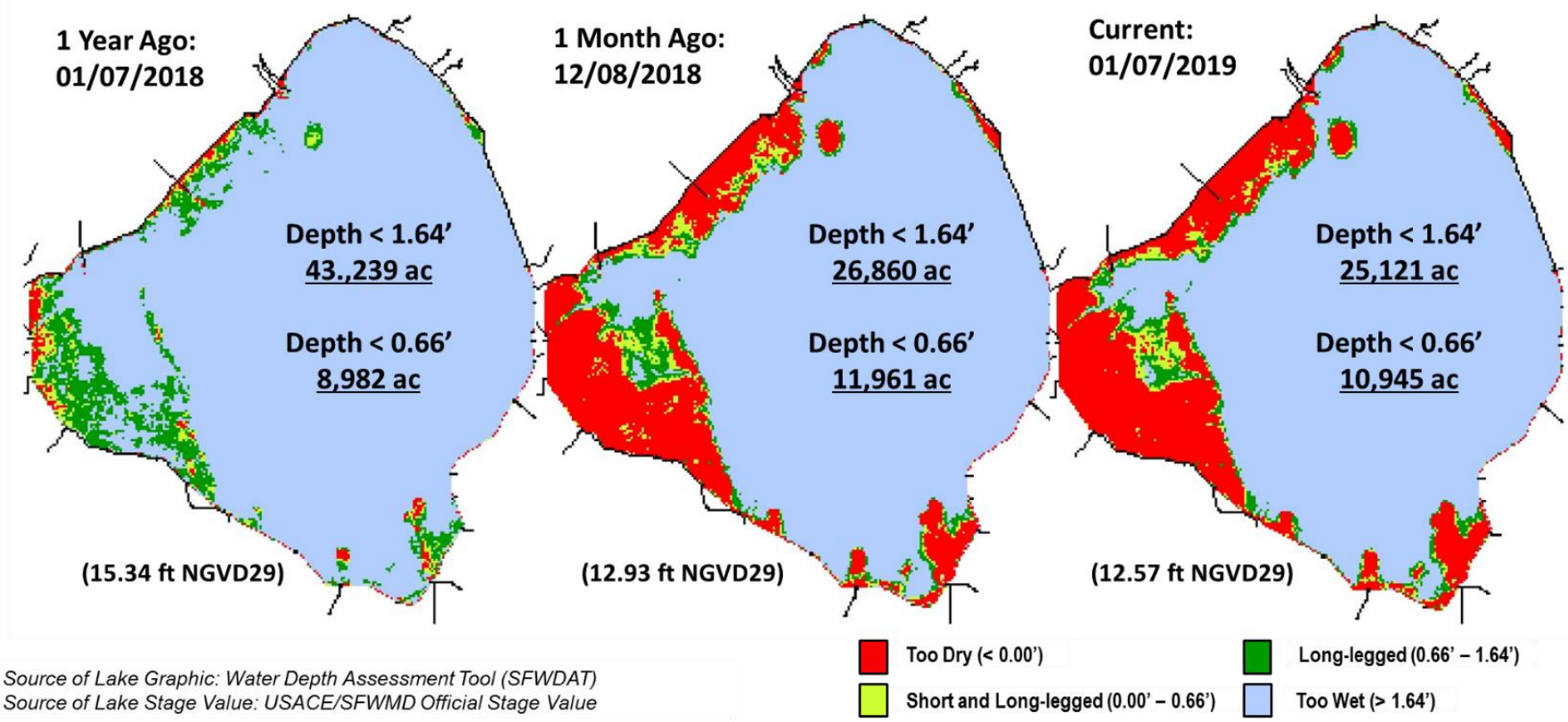


Figure 7. Wading bird habitat suitability index for Lake Okeechobee based on the South Florida Water Depth Assessment Tool.

ESTUARIES

St. Lucie Estuary:

Last week total inflow to the St. Lucie Estuary averaged approximately 119 cfs (Figures 1 and 2) and last month inflow averaged about 170 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	55
S-80	0
S-308	-43
S-49 on C-24	0
S-97 on C-23	0
Gordy Rd. structure on Ten Mile Creek	64

Over the past week, salinity stayed about the same 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 26. 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)	**21.1** (22.2)	**24.3** (23.9)	NA[1]
US1 Bridge	**25.2** (25.4)	**NR**[2] (25.2)	10.0-26.0
A1A Bridge	**30.6** (30.8)	**31.3** (31.5)	NA[1]

[1]Envelope not applicable and [2]Not Reporting.

Caloosahatchee Estuary:

Last week total inflow to the Caloosahatchee Estuary averaged approximately 1,082 cfs (Figures 5 and 6) and last month inflow averaged about 1,104 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	1073
S-78	768
S-79	1001
Tidal Basin Inflow	81

Over the past week, salinity stayed about the same throughout the estuary (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 2.2 at Val I-75 and 7.6 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)	**1.9** (1.9)	**1.9** (2.0)	NA[1]
Val I75	**2.5** (2.1)	**4.3** (3.9)	0.0-5.0[2]
Ft. Myers Yacht Basin	**7.8 (**8.0)	**9.7** (10.3)	NA
Cape Coral	**15.5** (14.8)	**18.2** (18.1)	10.0-30.0
Shell Point	**26.7** (26.3)	**25.7** (25.0)	10.0-30.0
Sanibel	**NR**[3](NR)	**NR** (NR)	10.0-30.0

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

Forecast of surface salinity (Table 5 and Figure 10) at Val I-75 for the next two weeks using the autoregression model (Qiu and Wan, 2013) coupled with a linear reservoir model for the tidal basin predicts daily salinity ranging from 3.7 to 6.3 at the end of the next two weeks for pulse release at S-79 ranging from 0 to 650 cfs and Tidal Basin inflows of 110 cfs.

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

Scenario	Q79 (cfs)	TB runoff (cfs)	Daily salinity	30 day mean
A	0	110	6.3	3.7
B	300	110	5.1	3.3
C	375	110	4.7	3.2
D	450	110	4.4	3.1
E	650	110	3.7	3.0

Red tide

The Florida Fish and Wildlife Research Institute reported on January 4, 2019, that *Karenia brevis,* the Florida red tide dinoflagellate, was observed at background concentrations in one sample collected from Lee County and was not observed in samples collected from Palm Beach or Miami-Dade counties. No samples were collected from St. Lucie or Martin counties.

Water Management Recommendations

Lake stage is in the Beneficial Use sub-band of 2008 LORS. Tributary hydrological conditions are dry. The 2008 LORS recommends no release at S-79 and S-80. Given the current estuarine conditions, there are no ecological benefits to the upper estuary associated with freshwater releases from Lake Okeechobee, but some benefits may accrue to areas further downstream.

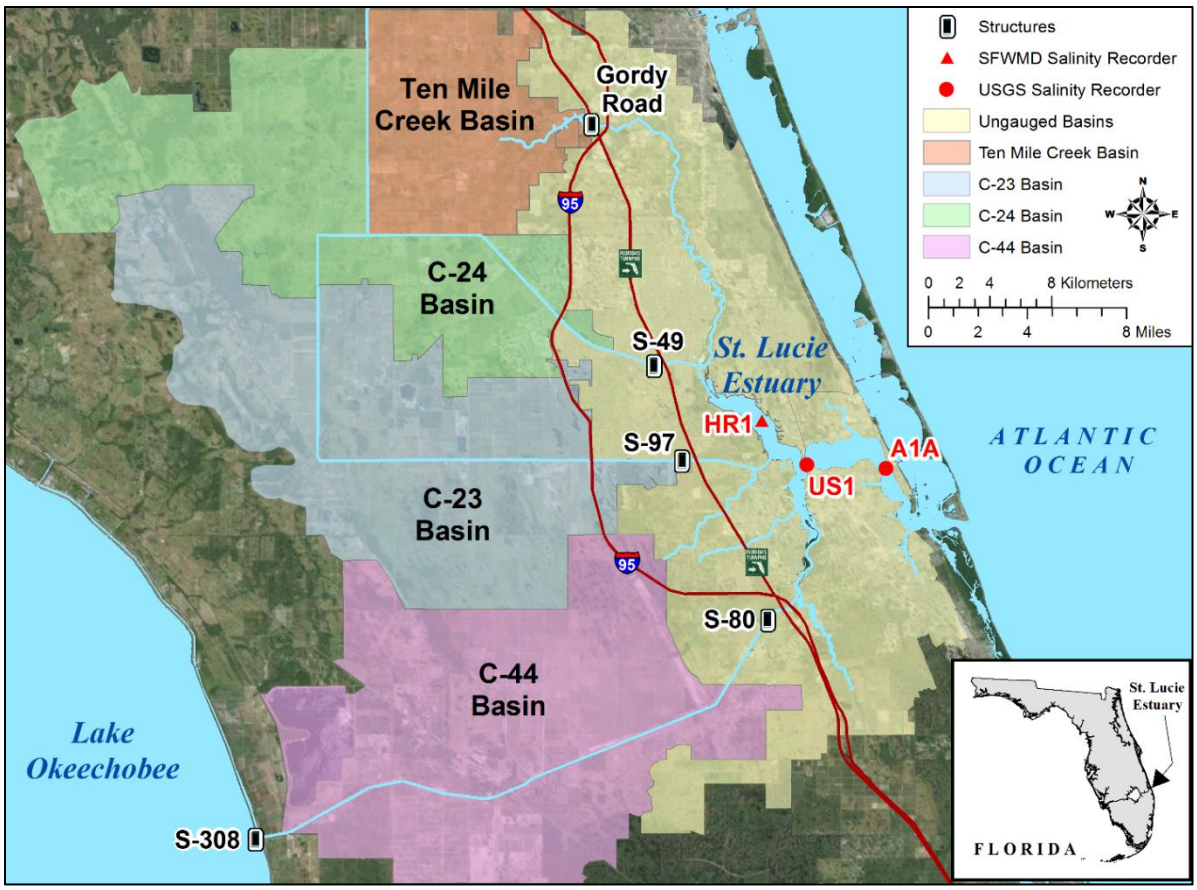


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

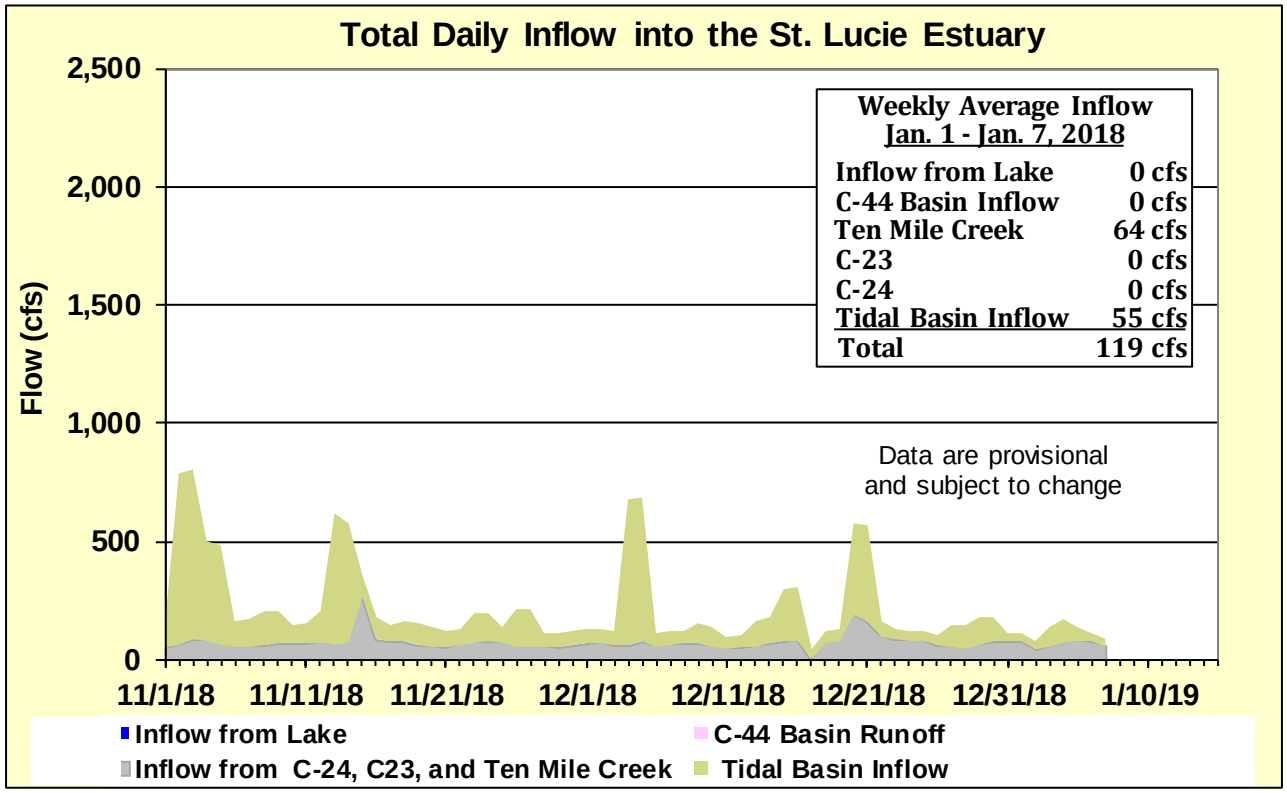


Figure 2. Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basins into the St. Lucie Estuary.

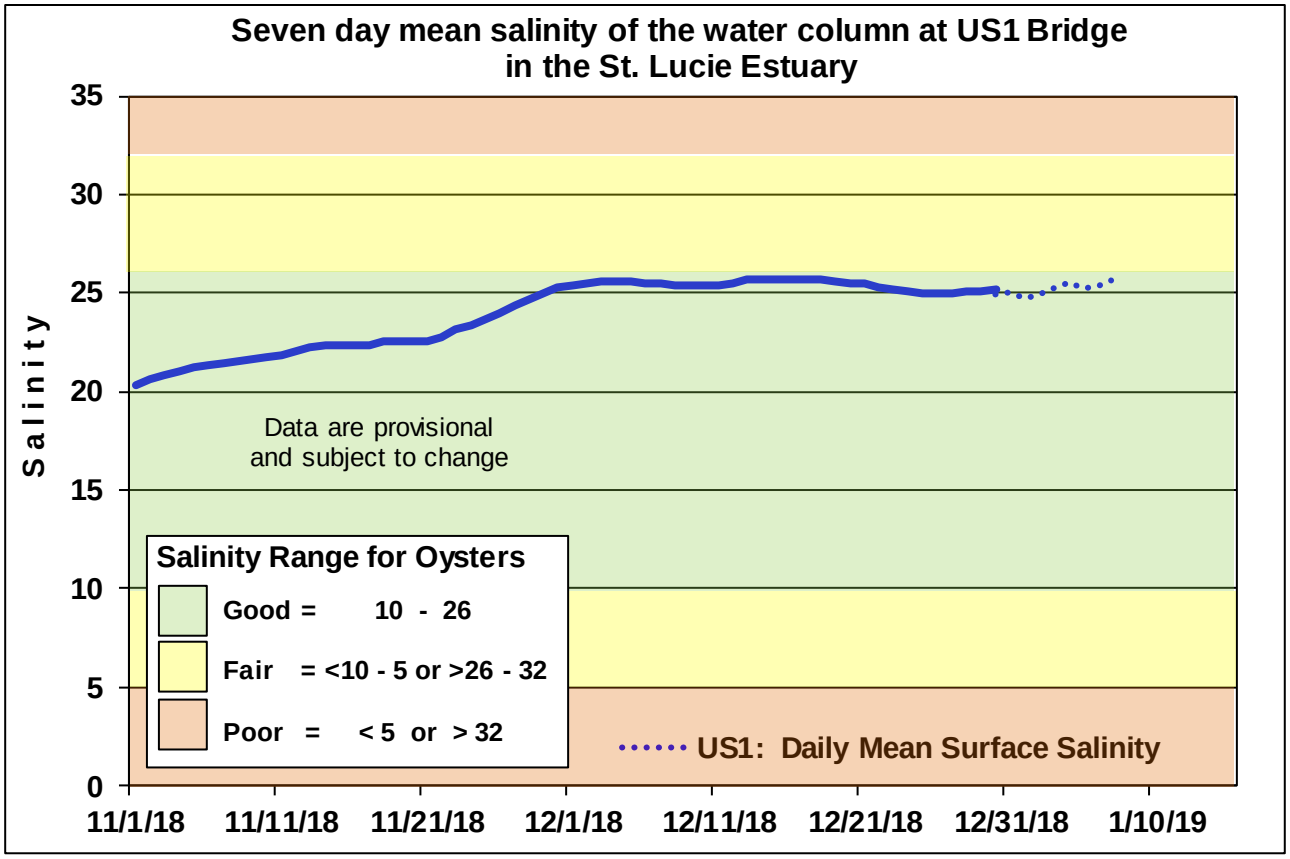


Figure 3. Seven-day mean salinity of the water column at the US1 Bridge.

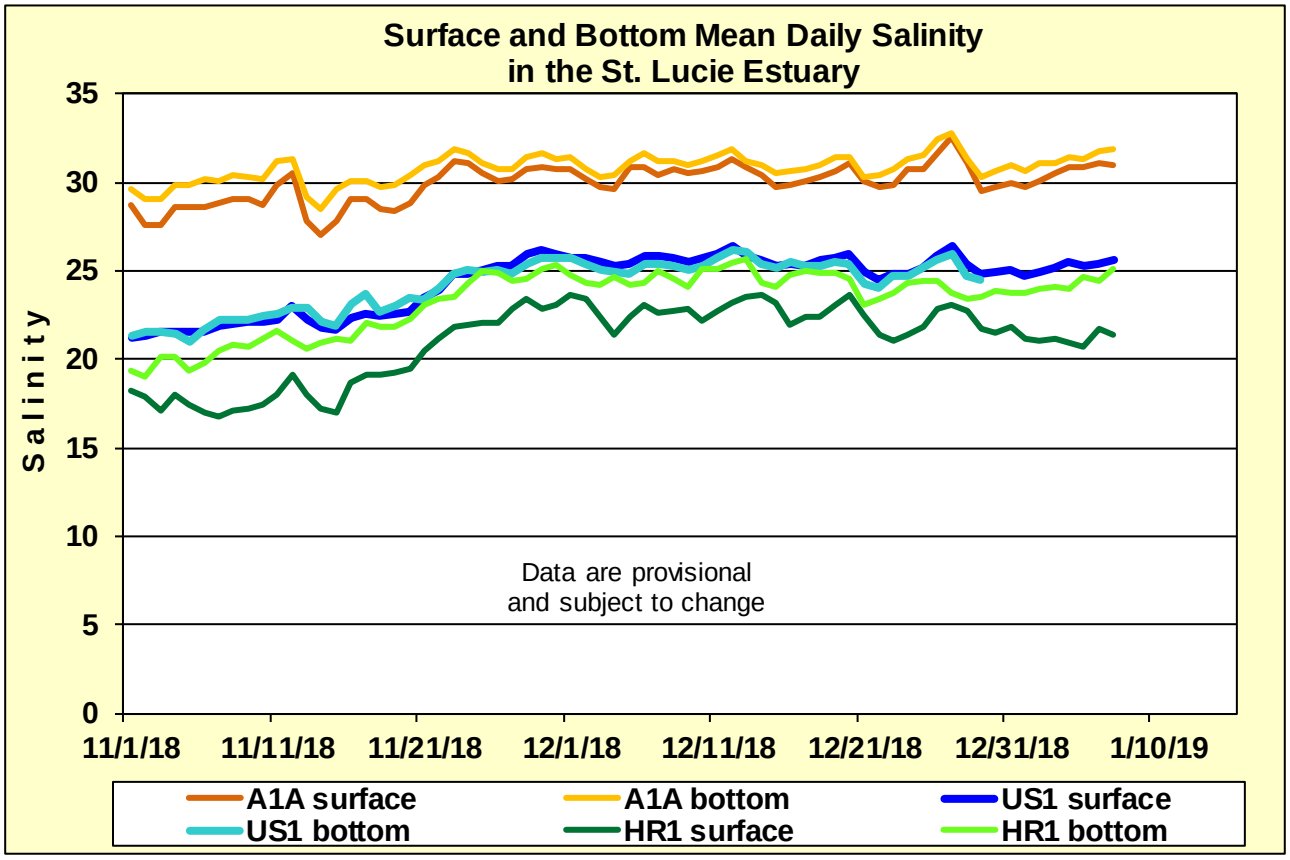


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

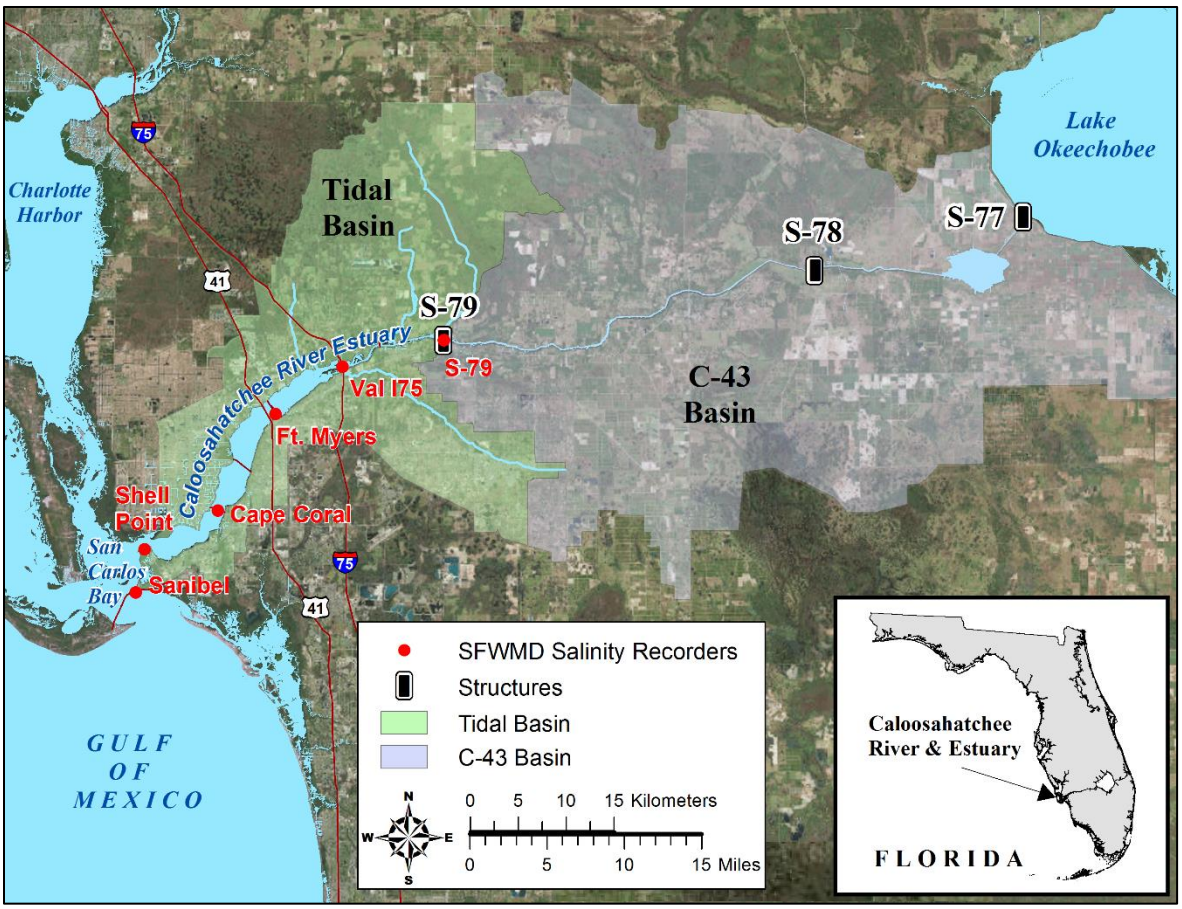


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

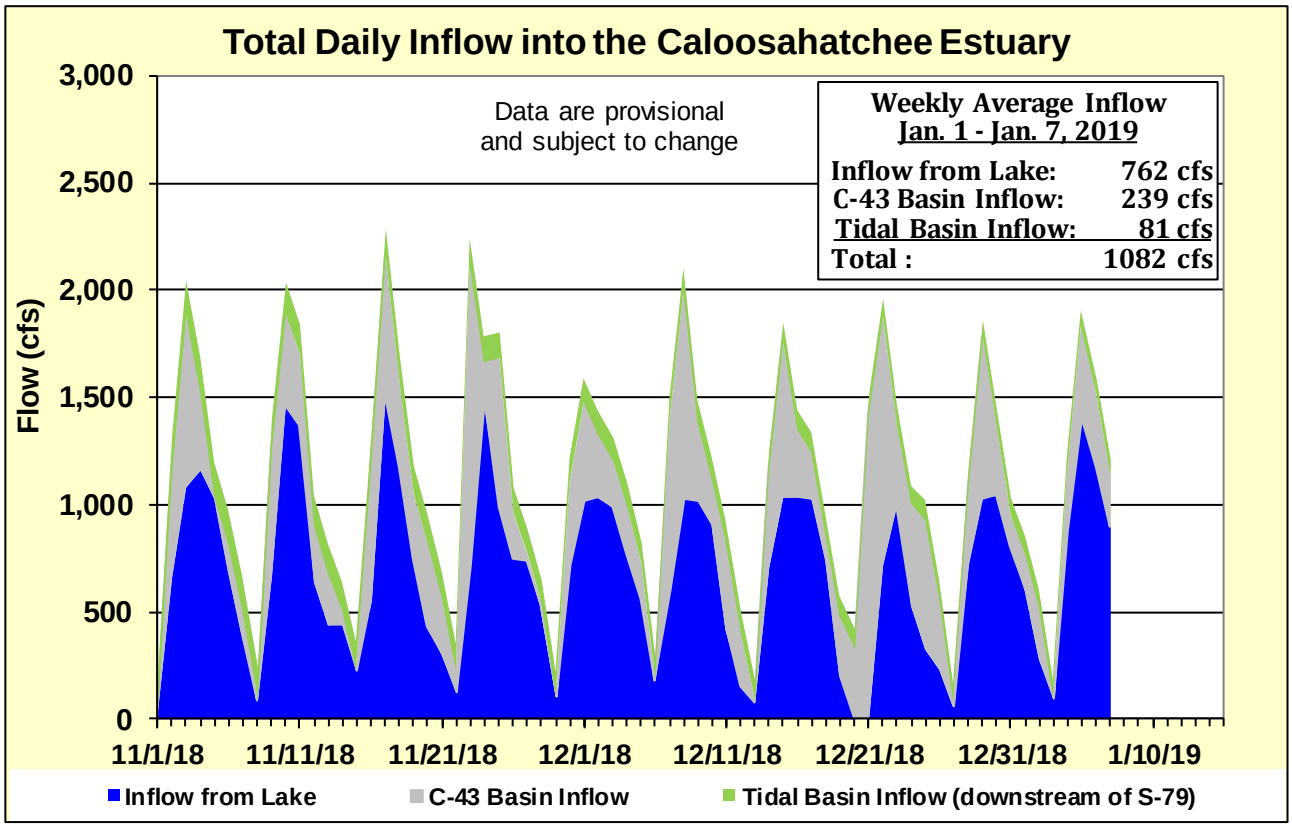


Figure 6. Total daily inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.

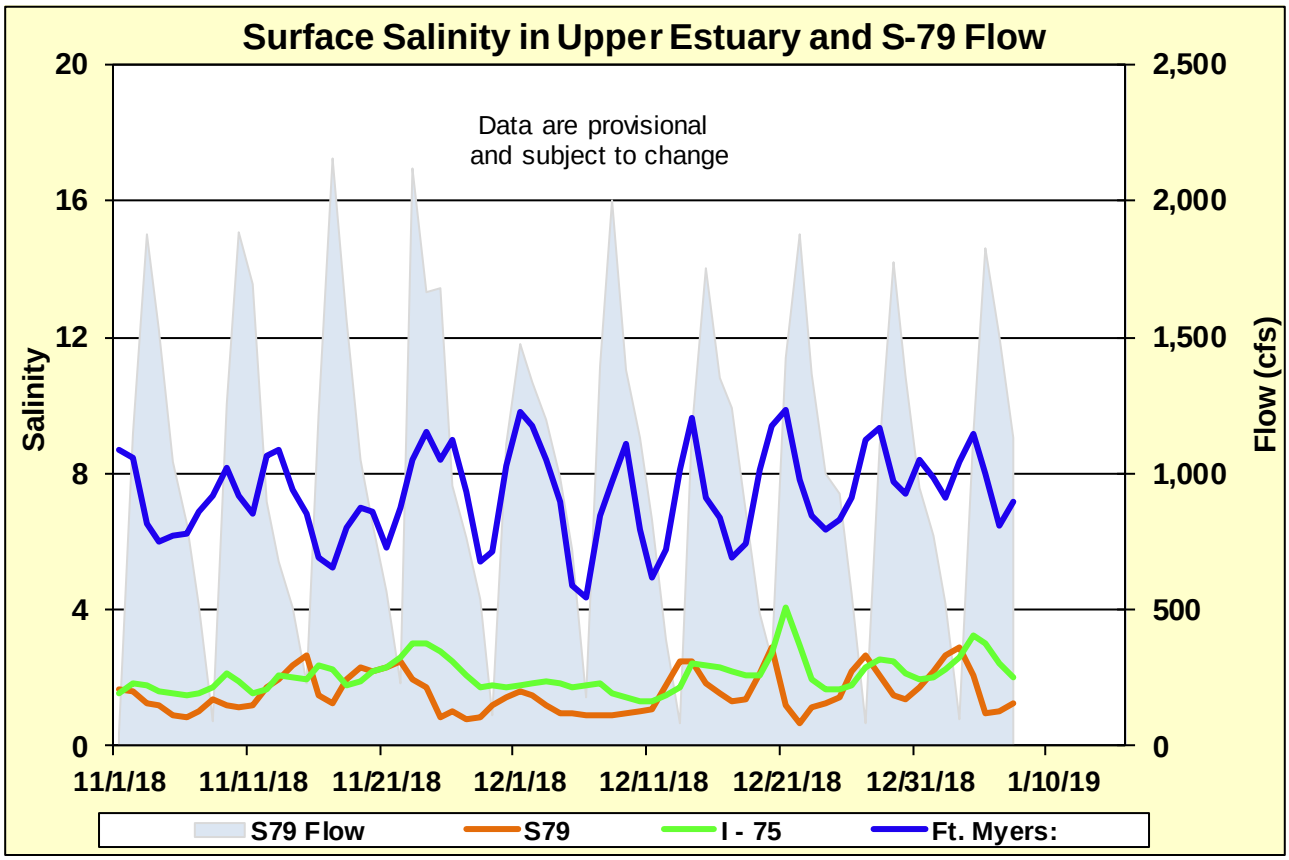


Figure 7. Daily mean flows at S-79 and salinity at upper estuary monitoring stations.

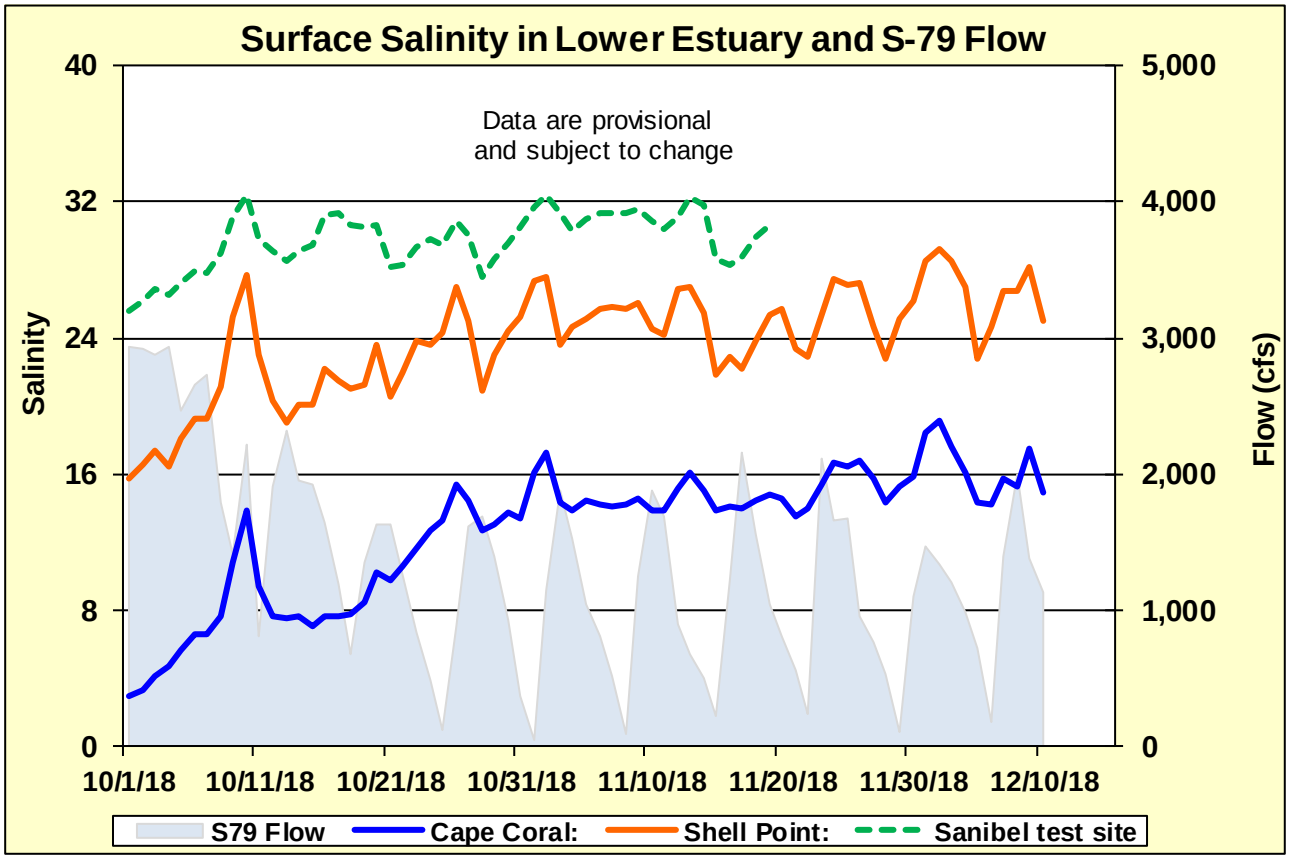


Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.

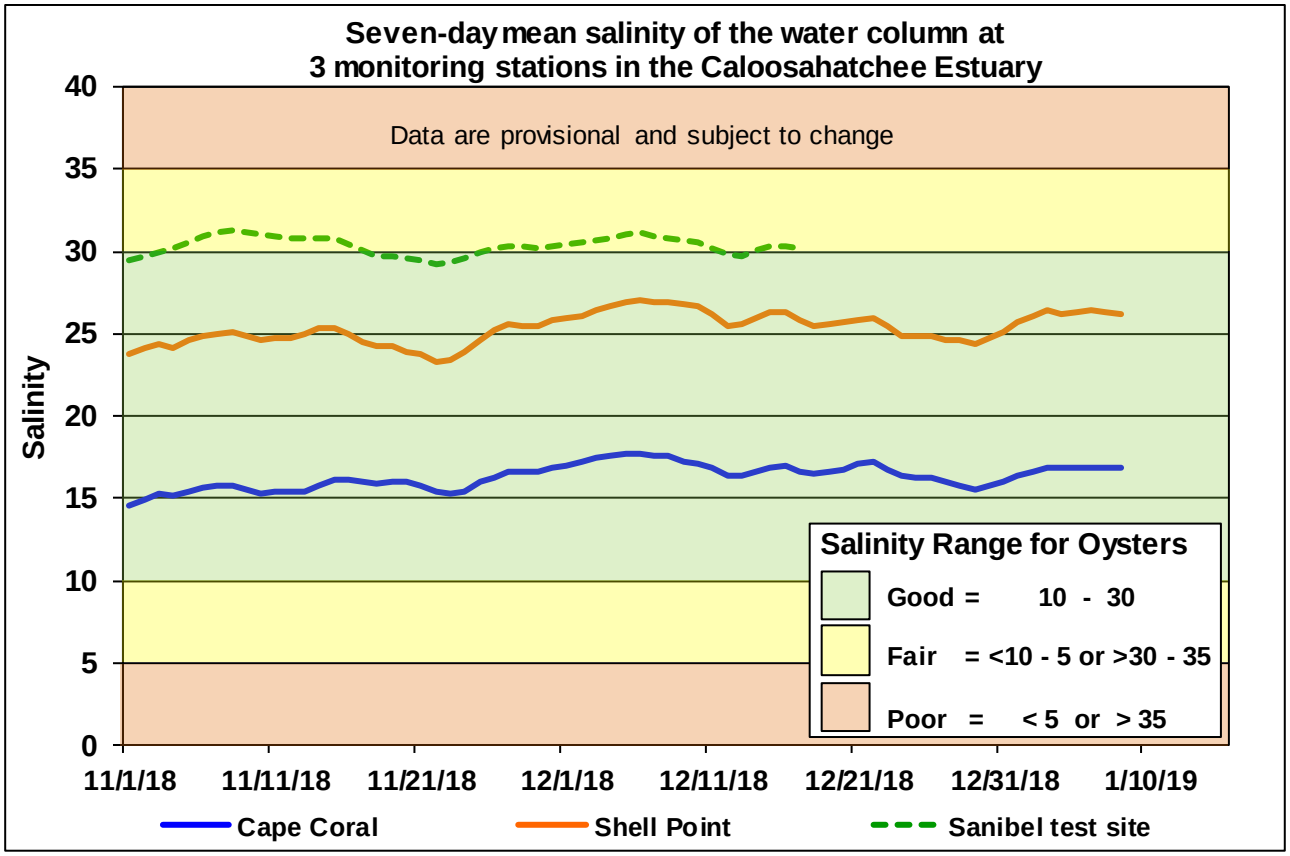


Figure 9. Seven-day mean salinity at Cape Coral, Shell Point, and Sanibel monitoring stations.

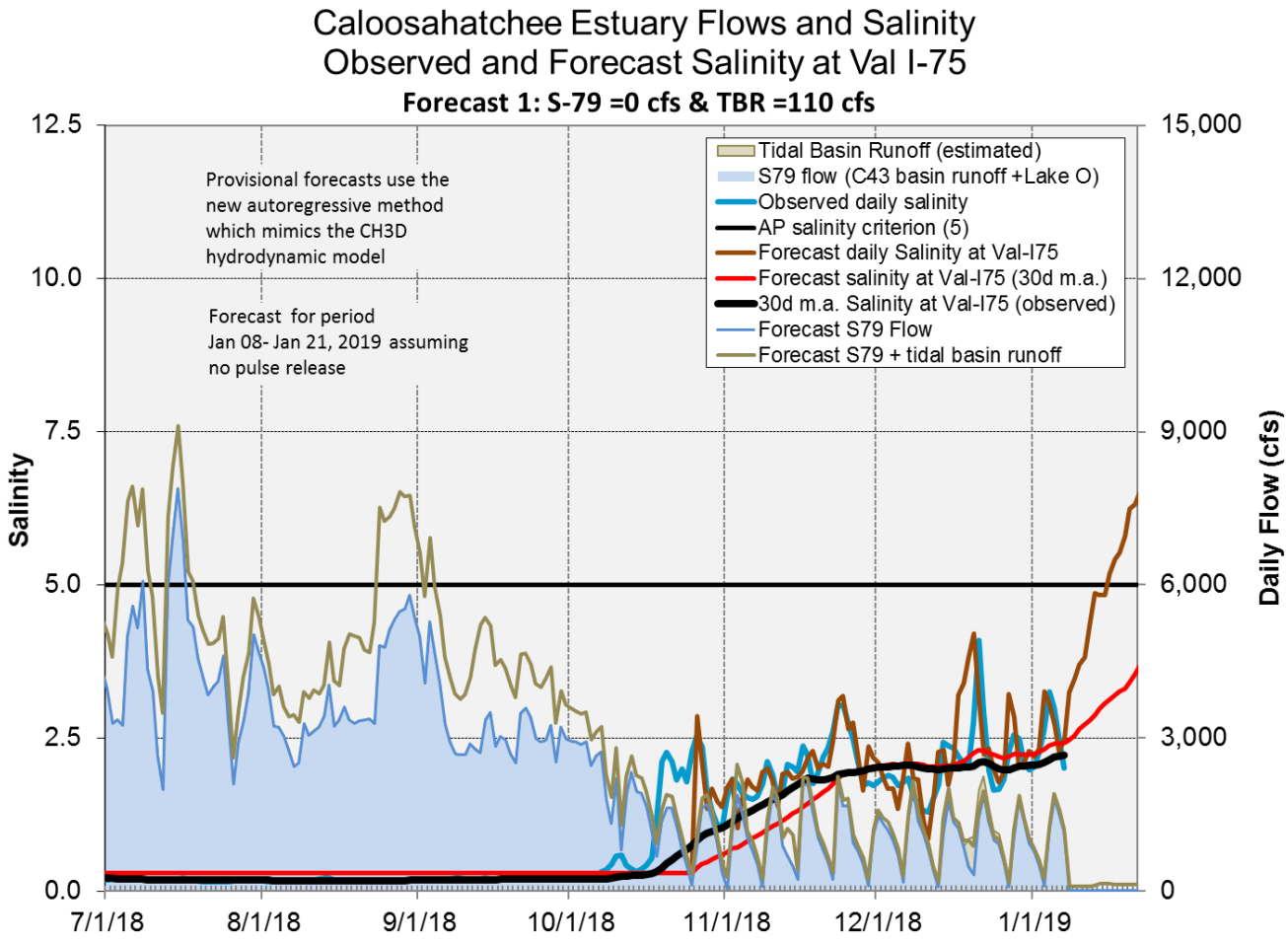
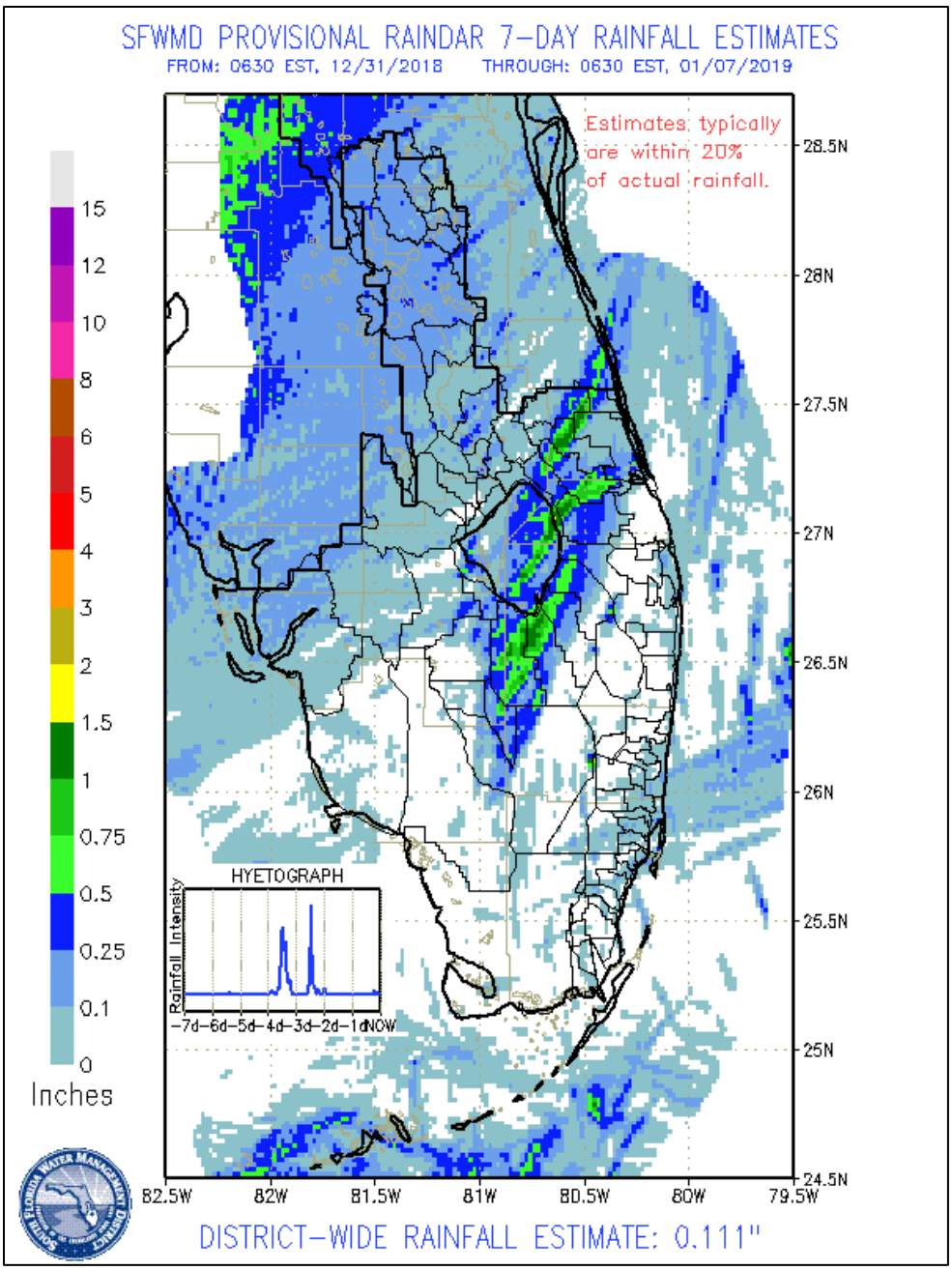


Figure 10. Forecasted Val I-75 surface salinity assuming no pulse release at S-79.

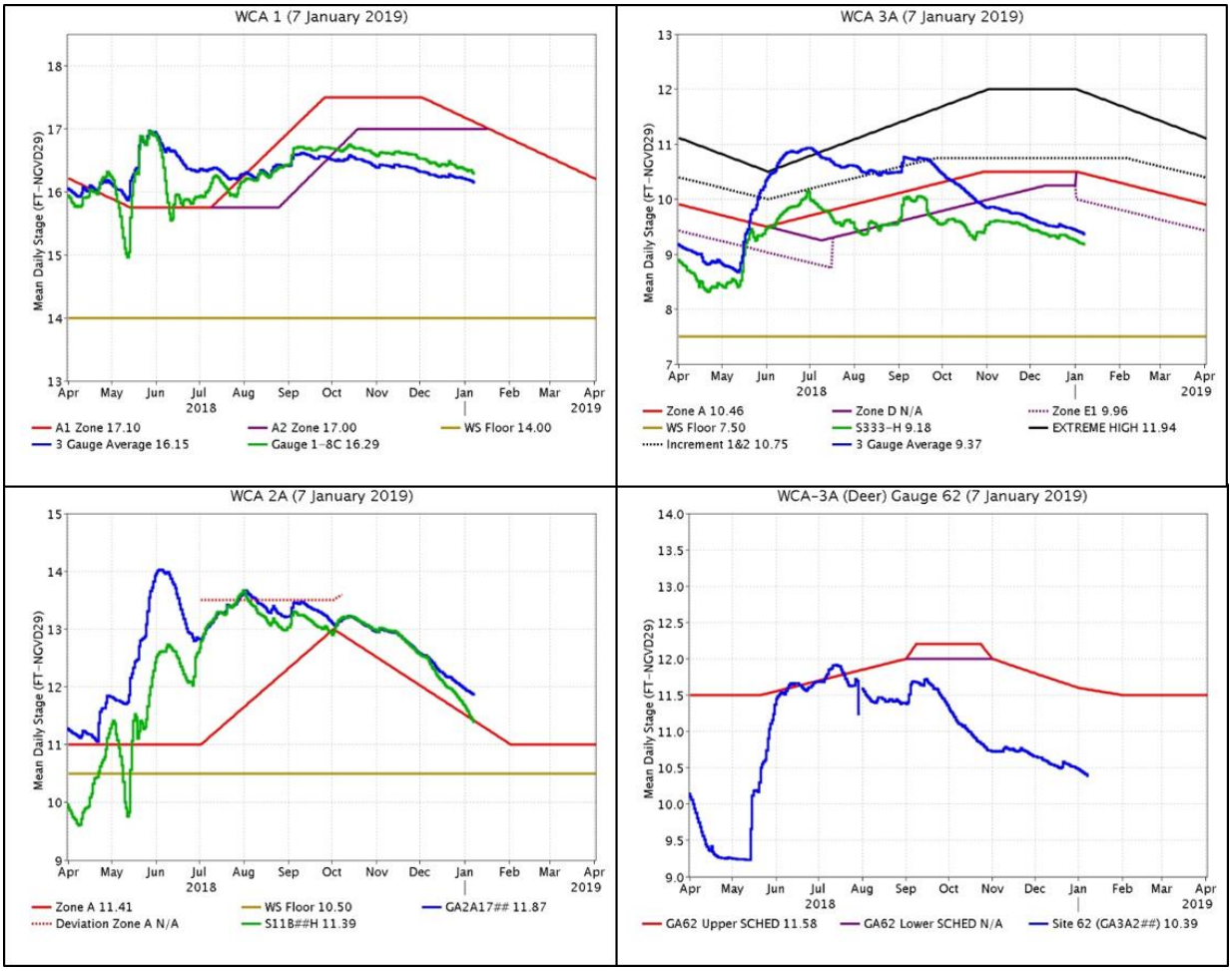
EVERGLADES

At the gauge locations monitored for this report stages within the WCAs and ENP fell 0.08 feet on average over the last week, a slightly higher rate than the last month. The most extreme individual gauge changes within the WCAs ranged from -0.05 feet (WCA-2B) to -0.15 feet (WCA-2B). Pan evaporation was estimated at 0.90 inches this week.

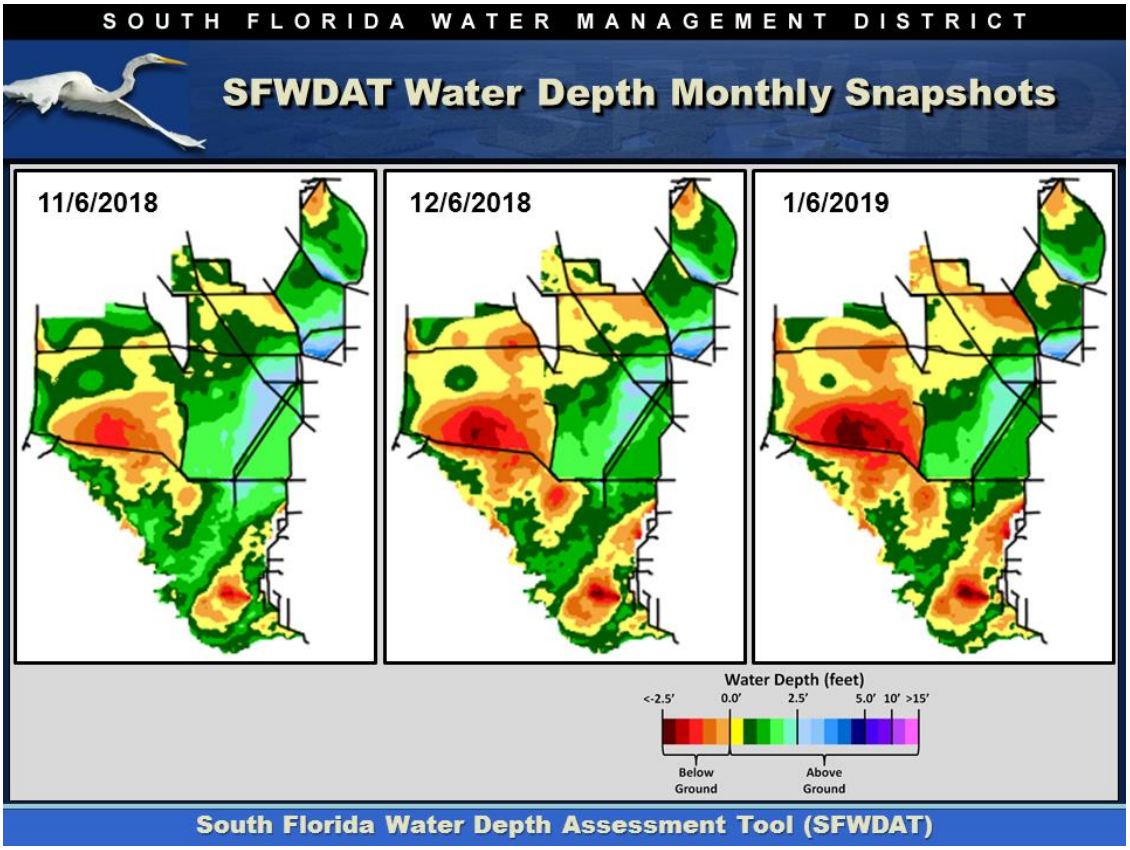
Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	0.01	−0.05
WCA-2A	<0.01	−0.11
WCA-2B	0.00	−0.15
WCA-3A	0.04	−0.08
WCA-3B	0.05	−0.07
ENP	<0.01	−0.08

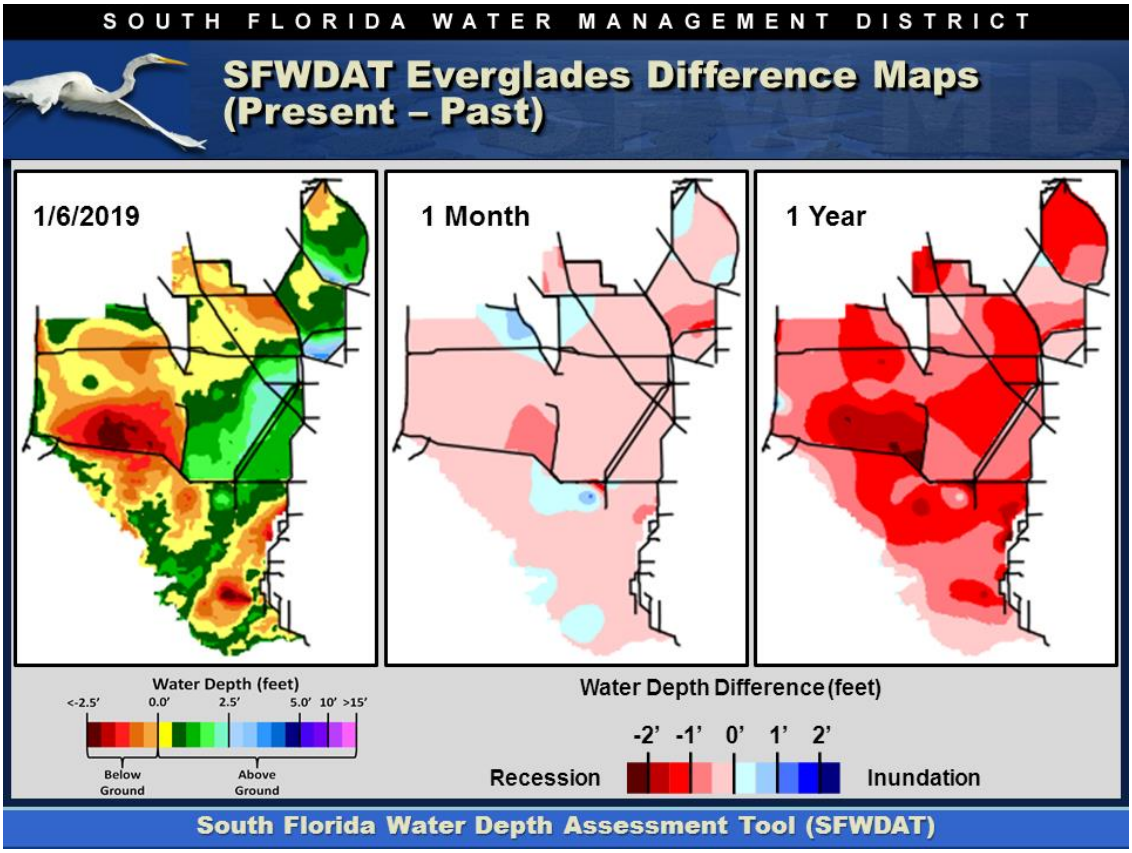


Regulation Schedules: Gauge 1-8C is 0.71 feet below the Zone A2 regulation line. The three-gauge average remains near 0.20 below the canal stage. Gauge 2A17 is 0.46 feet above Zone A and is receding parallel to that line. S-11B Headwater stage is 0.02 feet below the regulation line. WCA-3A three-gauge average stage is 0.59 feet below the Zone E1 regulation line and trends parallel to the regulation line. WCA-3A at gauge 62 (northwest corner) remains 1.19 feet below the lower schedule.



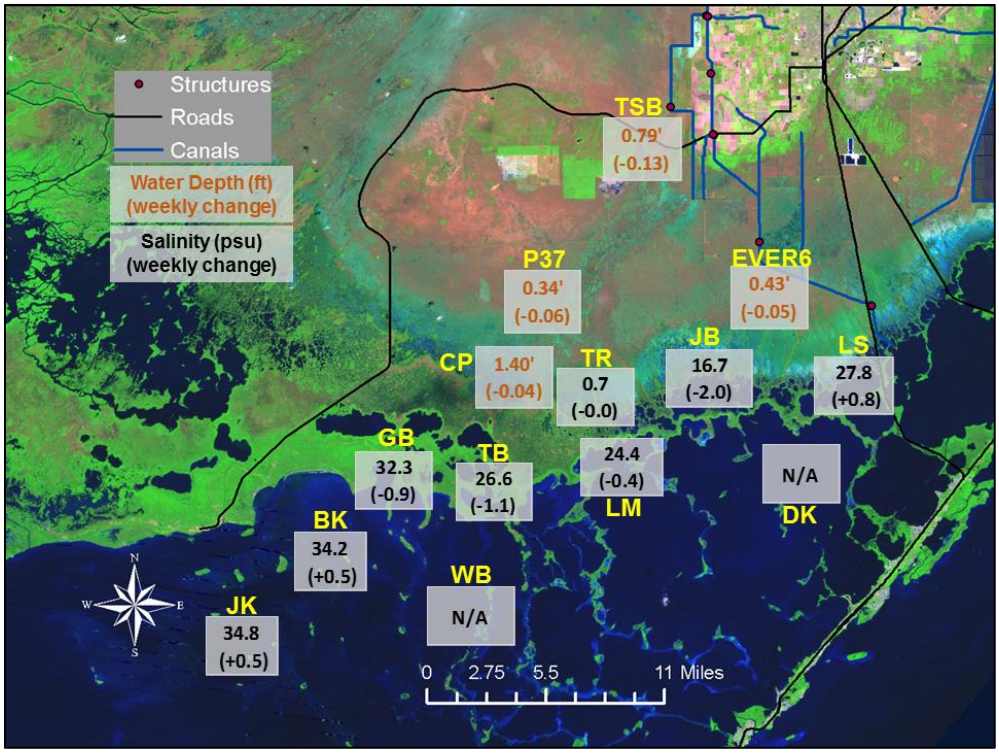
Water Depths and Changes: The WDAT tool for spatial interpolation of depth monthly snapshots indicate gradually drying conditions. In the northeast region of WCA-3A the model indicates expanding regions with water depths below ground, with pockets of habitat at greater than 0.5 feet below ground and now an indication of depths greater than 1.0 feet below ground. Extreme Northern WCA-1 looks to have received some benefit from water management and has recovered slightly. WDAT difference output indicates that water levels dropped across the Everglades over the last month, yet the rate of change is moderate, except in southern WCA-2A. In the “1 Year” inset we see the comparison between current depth conditions and post Hurricane Irma’s lessening impact on water depths a year ago, this previous year’s high-water event suggest the current lower than seasonal water depths, while precarious may be allowing ecological process to recover from flooding stress.

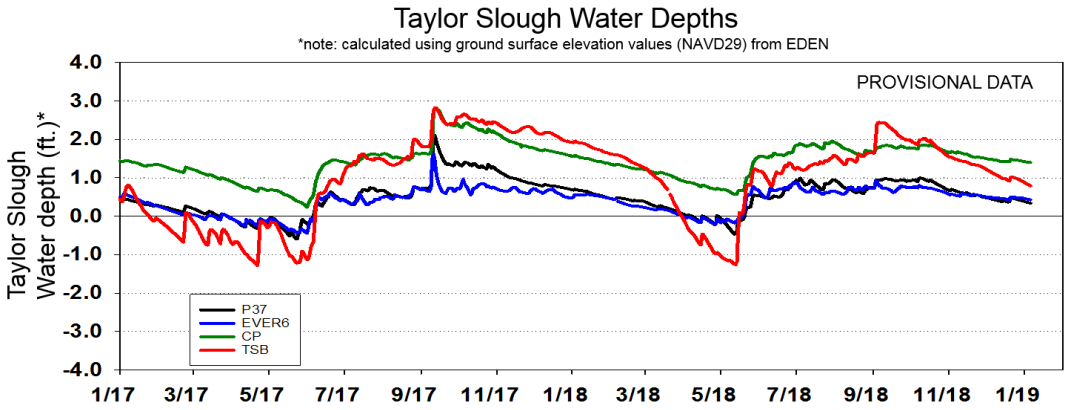

SOUTH FLORIDA WATER MANAGEMENT DISTRICT
SFWDAT Water Depth Monthly Snapshots
11/6/2018
12/6/2018
1/6/2019
Water Depth (feet)
<-2.5'
0.0'
2.5'
5.0'
10'
>15'
Below Ground
Above Ground
South Florida Water Depth Assessment Tool (SFWDAT)

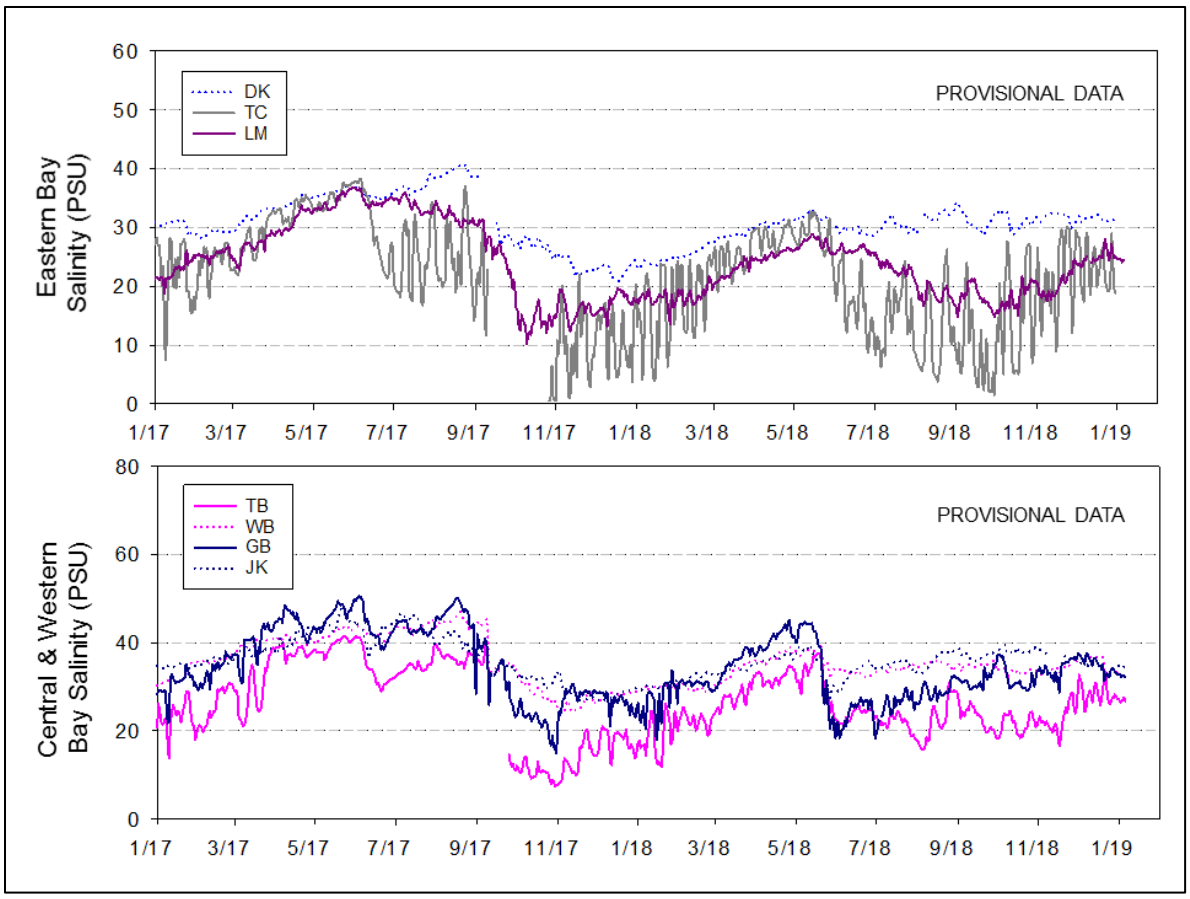

SOUTH FLORIDA WATER MANAGEMENT DISTRICT
SFWDAT Everglades Difference Maps
(Present – Past)
1/6/2019
1 Month
1 Year
Water Depth (feet)
<-2.5'
0.0'
2.5'
5.0'
10'
>15'
Below Ground
Above Ground
Water Depth Difference (feet)
-2'
-1'
0'
1'
2'
Recession
Inundation
South Florida Water Depth Assessment Tool (SFWDAT)

Taylor Slough Water Levels: Very little rain fell on Taylor Slough and Florida Bay this past week allowing stages to continue decreasing by an average of 0.06 feet last week. Water depths averaged 0.70 feet across Taylor Slough and are about 2.1 inches above average with the greatest divergence from average near water management components in the north and east.

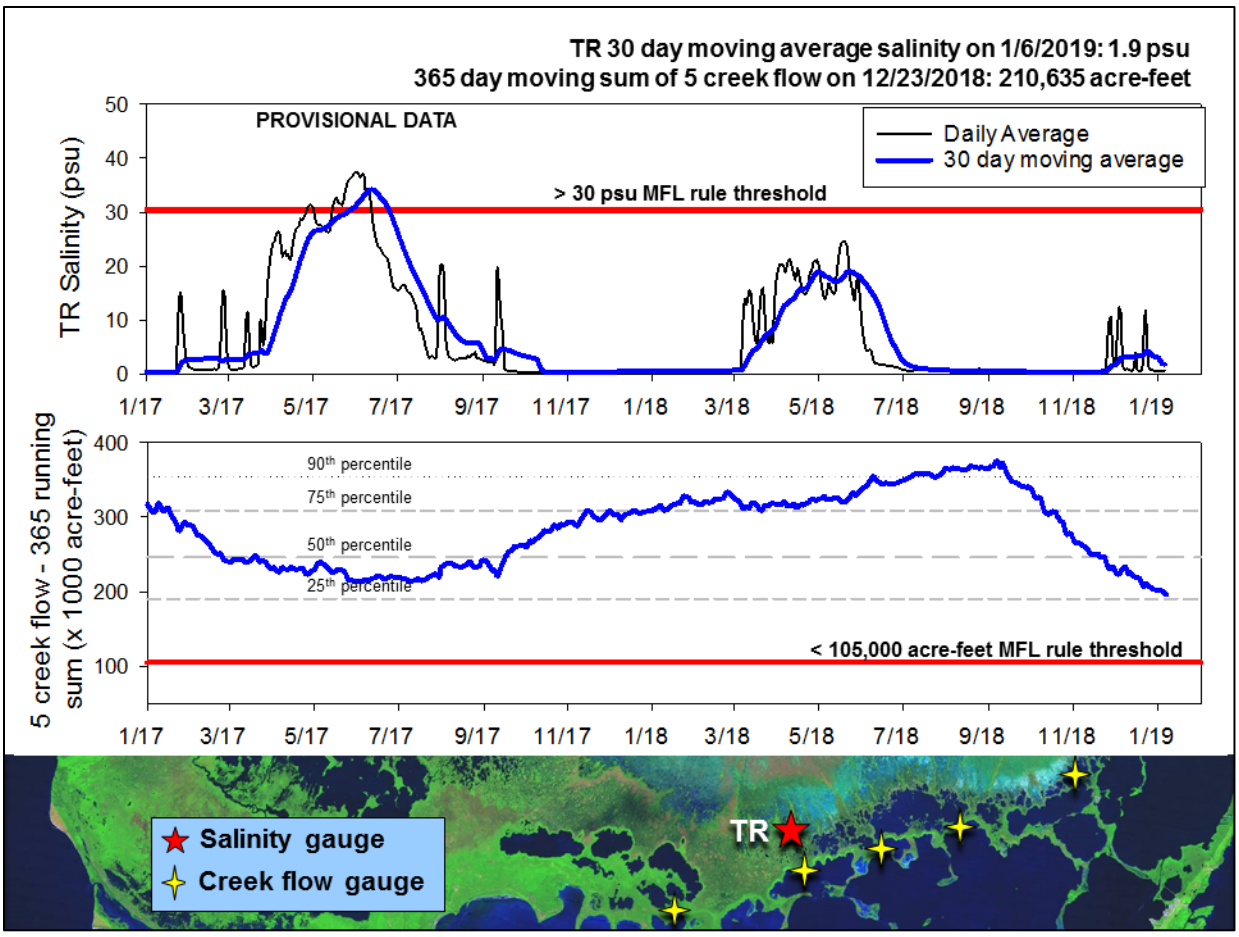
Florida Bay Salinities: Salinity data for eastern and central Florida Bay are not available this week. Elsewhere, salinities averaged a 0.4 psu decrease with individual station changes staying within 2 psu for the last week. Daily average salinities ranged from 17 psu in the northeast to 35 psu in the western bay which is about 6 psu higher than average.







Florida Bay MFL: Salinity in the mangrove zone averaged 0.7 psu for the last week. The 30-day moving average decreased from 3.1 psu to 1.9 psu over the last week. One of the 5 creek gauges used for the MFL criteria stopped reporting on 12/23. These gauges belong to USGS so when the data stream will be repaired is unknown. As of 12/23/2018, the 365-day moving sum of flow from the five creeks was 210,635 acre-feet (less 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

Water management that protects peat soils, especially in WCA-3A North, as the dry season becomes established has increasing ecological benefit as unusually dry conditions pervade the WCA-3A basin. Moving water from WCA-2A, as that basin is above its regulation schedule and receding roughly in parallel to the regulation line, into northeastern WCA-3A has ecological benefit in protecting the historically over-dried peat soils in that region. This benefit was anecdotally noted from a helicopter flight this last week, as it was evident from the air that the marsh downstream of S-150 discharges look to be holding more water than the marsh further west and downstream of the structure. Due to the anecdotal evidence that this discharge is benefitting northeast WCA-3A, and no wading birds have been detected foraging in WCA-2A, we are recommending continuing routing water via this path (WCA-2A, backflow S-7, S-150 discharge, WCA-3A) until the stage reaches the regulation line in WCA-2A. Any water not available to protect the peat soils in WCA-3A North, would be ecologically beneficial to Holeyland and Rotenburger wilidlife management areas. According to the WDAT modeling, depths in the northern portion of WCA-1 that are below ground level have not expanded significantly over the last month and is no longer showing depths significantly below ground. Most likely this is a result of water management. This benefit was noted visually from the air this week, however only in the extreme north of the basin. Further south very low water levels were noted for this time of year and thus, this historically dry area would continue to benefit from hydration as possible. 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, January 8th, 2019 (red is new)			
Area	Weekly change	Recommendation	Reasons
WCA-1	Stage decreased by 0.05'	Maintain depths at regulation schedule. Moderate recession rates to the extent possible.	Protect upstream/downstream habitat and wildlife.
WCA-2A	Stage decreased by 0.11'	Maintain depths at regulation schedule. Moderate recession rates to the extent possible.	Protect upstream/downstream habitat and wildlife.
WCA-2B	Stage decreased by 0.15'	Maintain depths at regulation schedule. Moderate recession rates to the extent possible.	Protect upstream/downstream habitat and wildlife.
WCA-3A NE	Stage decreased by 0.07'	Maintain depths at regulation schedule. Moderate recession rates to the extent possible.	Protect habitat including peat soil development, tree islands and wildlife. Hydration provided to this area has high ecological value due to unseasonably dry conditions.
WCA-3A NW	Stage decreased by 0.09'	Maintain depths at regulation schedule. Moderate recession rates to the extent possible.	
Central WCA-3A S	Stage decreased by 0.07'	Maintain depths at regulation schedule. Moderate recession rates to the extent possible.	Protect upstream/downstream habitat and wildlife.
Southern WCA-3A S	Stage decreased by 0.08'		
WCA-3B	Stage decreased by 0.07'	Maintain depths at temporary regulation schedule. Moderate recession rates to the extent possible.	Protect upstream/downstream habitat and wildlife.
ENP-SRS	Stage decreased by 0.08'	Make discharges to the Park according to the 2012 WCP rainfall plan.	Protect upstream/downstream habitat and wildlife.
Taylor Slough	Stage changes ranged from −0.13' to −0.04'	Move water southward as possible	When available, provide freshwater buffer for downstream conditions. Decrease potential for high phosphorus input to ENP.
FB- Salinity	Salinity changes ranged −2.0 to +0.8 psu	Move water southward as possible	When available, provide freshwater to maintain low salinity buffer and promote water movement.