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 22, 2019

SUBJECT: Weekly Environmental Conditions for Systems Operations

Summary

Weather Conditions and Forecast

Heading into a wet week. East and southeast winds will bring a return of moisture to the area and allow spotty to scattered light showers to develop mainly east today and Wednesday. A cold front is forecast to push through the District Thursday bringing widespread moderate to heavy rainfall during the day and evening before it stalls near the southern end of the peninsula Thursday night. Upper level energy streaming across the area is expected to flare up shower activity along the stalled frontal boundary which will affect the southern portion of the District Friday. An upper level trough moving across the Gulf of Mexico is then forecast to induce a surface wave/low along the frontal boundary which will move across the area Sunday. The exact timing and location of the wave remains uncertain, but such a scenario would keep areas of heavy showers over portions of the District Saturday and Sunday with heaviest activity more likely over the southern half of the District. As the frontal wave exits to the east, showers would continue to affect eastern areas Monday with drier conditions moving in Monday night and Tuesday.

Kissimmee

Tuesday morning stages were 57.4 feet NGVD (0.6 feet below schedule) in East Lake Toho, 54.4 feet NGVD (0.6 feet below schedule) in Toho, and 50.8 feet NGVD (1.7 feet below schedule) in Kissimmee-Cypress-Hatchineha; headwater stages were 46.3 feet NGVD at S-65A and 26.1 feet NGVD at S-65D. Tuesday morning discharges were 731 cfs at S-65, 589 cfs at S-65A, and 259 cfs at S-65E. Dissolved oxygen concentration in the Kissimmee River averaged 6.3 mg/L for the week. Kissimmee River mean floodplain depth on Sunday was 0.08 feet. There are no new recommendations for the week.

Lake Okeechobee

Lake Okeechobee stage is 12.26 feet NGVD, falling 0.16 feet from the previous week and 0.49 feet over the past 30 days. Lake stages are the lowest they have been for this time of year since 2008 and are now 2.11 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.

Estuaries

Total inflow to the St. Lucie Estuary averaged 125 cfs over the past week with 0 cfs coming from Lake Okeechobee. Over the past week, salinity increased throughout the estuary. The seven-day average salinity at the US1 Bridge is within the fair range for adult eastern oysters.

Total inflow to the Caloosahatchee Estuary averaged 798 cfs over the past week with 508 cfs coming from the Lake. Over the past week, surface salinity increased throughout the estuary. The 30-day moving average surface salinity is 2.5 at Val I-75 and 7.8 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 2,300 acre-feet of Lake releases. The total amount of inflows to the STAs in WY2019 (since May 1, 2018) is approximately 1,210,000 acre-feet, which includes approximately 340,400 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, STA-1E Central Flow-way is offline for vegetation management activities, STA-1E Western Flow-way is offline for initiation of levee repairs in West Distribution Cell, and 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 northeastern WCA-3A continue to decline below ground. Stages remain below regulation in the WCAs with WCA-2A being the exception. Water management supporting the ecological need for hydration in northeast WCA-3A continues with discharge from S-150 continuing last week averaging around 85 cubic feet per second, providing water to northeastern WCA-3A. Stages continued to decline this week throughout Taylor Slough, however are about 0.8 inches above average for this week 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 1.3 psu increase over the last week. Salinities remain above average for this time of year.

Supporting Information

KISSIMMEE BASIN

Kissimmee Basin Rainfall

The Upper Kissimmee Basin received 0.20 inches of rainfall in the past week and the Lower Basin received 0.26 inches (SFWMD Daily Rainfall Report 1/21/2018).

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: 1/22/2019

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)						
							1/20/19	1/13/19	1/6/19	12/30/18	12/23/18	12/16/18	12/9/18
Lakes Hart and Mary Jane	S-62	1	LKMJ	61.0	R	61.0	**0.0**	0.0	0.0	0.0	-0.3	-0.9	-1.0
Lakes Myrtle, Preston, and Joel	S-57	4	S-57	61.5	R	61.5	**0.0**	0.1	0.0	-0.1	-0.3	-0.5	-0.7
Alligator Chain	S-60	0	ALLI	63.2	R	64.0	**-0.8**	-0.7	-0.7	-0.7	-0.7	-0.9	-1.0
Lake Gentry	S-63	0	LKGT	61.5	R	61.5	**0.0**	0.0	0.0	0.0	0.0	0.1	0.0
East Lake Toho	S-59	130	TOHOE	57.5	R	58.0	**-0.5**	-0.4	0.0	0.0	-0.1	-0.8	-1.0
Lake Toho	S-61	454	TOHOW, S-61	54.5	R	55.0	**-0.5**	-0.4	-0.5	-0.5	-0.1	-0.2	-0.2
Lakes Kissimmee, Cypress, and Hatchineha	S-65	392	KUB011, LKIS5B	50.8	R	52.5	**-1.7**	-1.8	-1.8	-2.0	-2.6	-3.1	-3.2

[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: **1/22/2019**

Metric	Location	1-Day Average	Average for the Preceeding 7-Days[1]									
		1/20/2019	1/20/19	1/13/19	1/6/19	12/30/18	12/23/18	12/16/18	12/9/18	12/2/18	11/25/18	11/18/18
Discharge (cfs)	S-65	503	392	343	273	277	253	301	330	337	346	349
Discharge (cfs)	S-65A[2]	400	306	261	194	201	182	180	252	232	254	256
Discharge (cfs)	S-65D[2]	347	341	261	241	242	238	253	298	276	315	321
Headwater Stage (feet NGVD)	S-65D[2]	25.94	25.94	25.91	25.86	25.88	25.73	25.80	25.84	25.82	26.20	26.66
Discharge (cfs)	S-65E[2]	335	309	261	215	218	266	242	292	302	335	317
Discharge (cfs)	S-67	0	0	0	0	0	0	0	0	0	0	0
DO (mg/L)[3]	Phase I river channel	6.8	6.3	5.9	5.6	6.1	6.2	5.4	5.1	5.9	5.5	5.7
Mean depth (feet)[4]	Phase I floodplain	0.08	0.07	0.08	0.09	0.11	0.12	0.10	0.10	0.12	0.10	0.12

[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).
DATA ARE PROVISIONAL; N/A indicates that data were not available.

KCOL Hydrographs (through Sunday midnight)

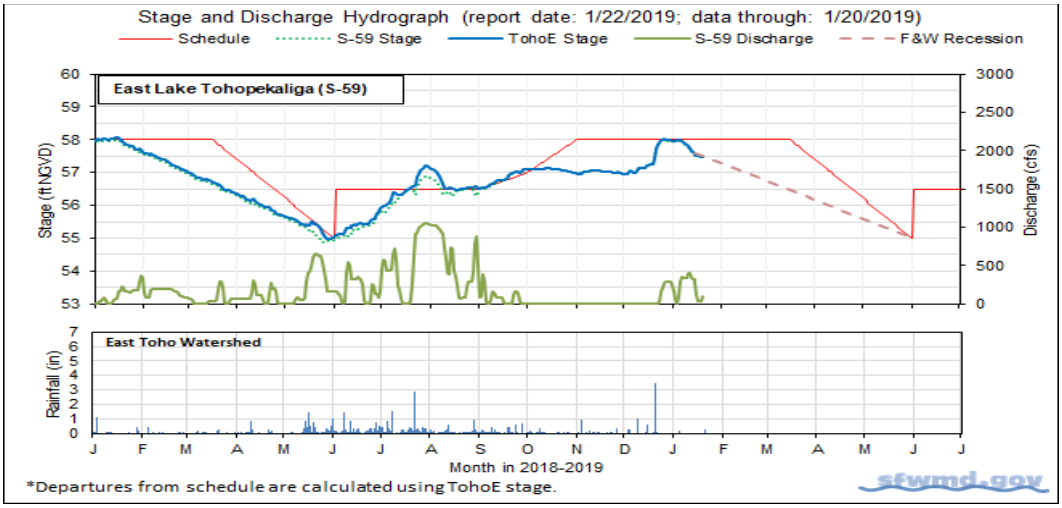


Figure 1.

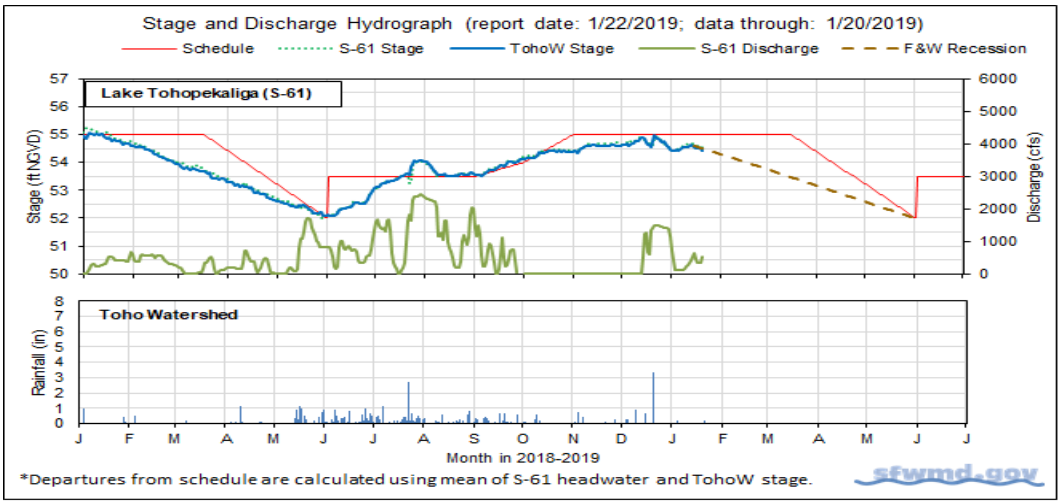


Figure 2.

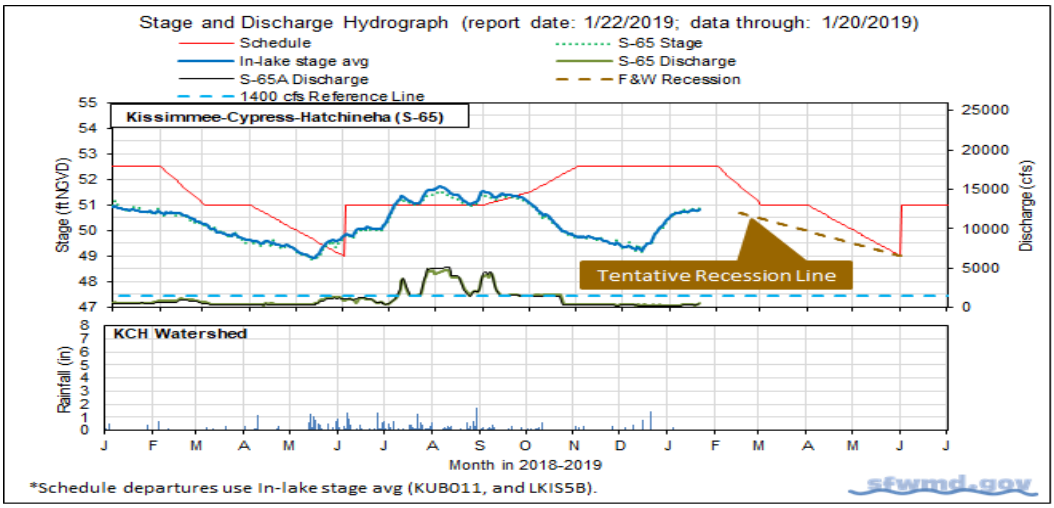


Figure 3.

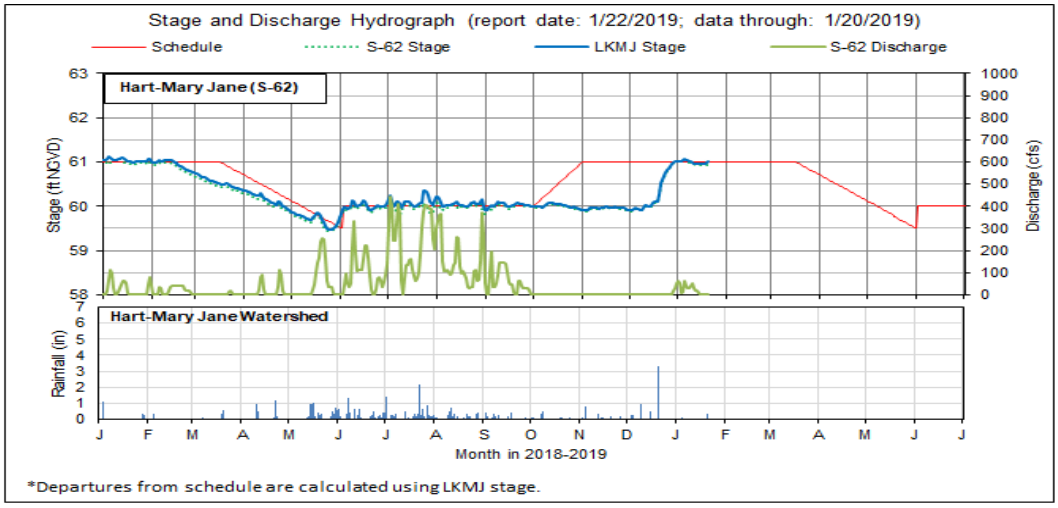


Figure 4.

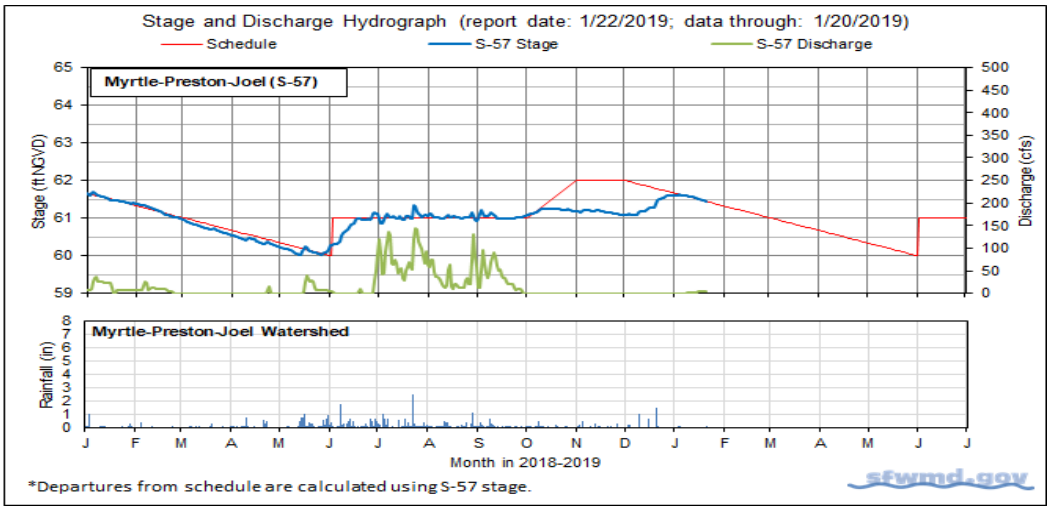


Figure 5.

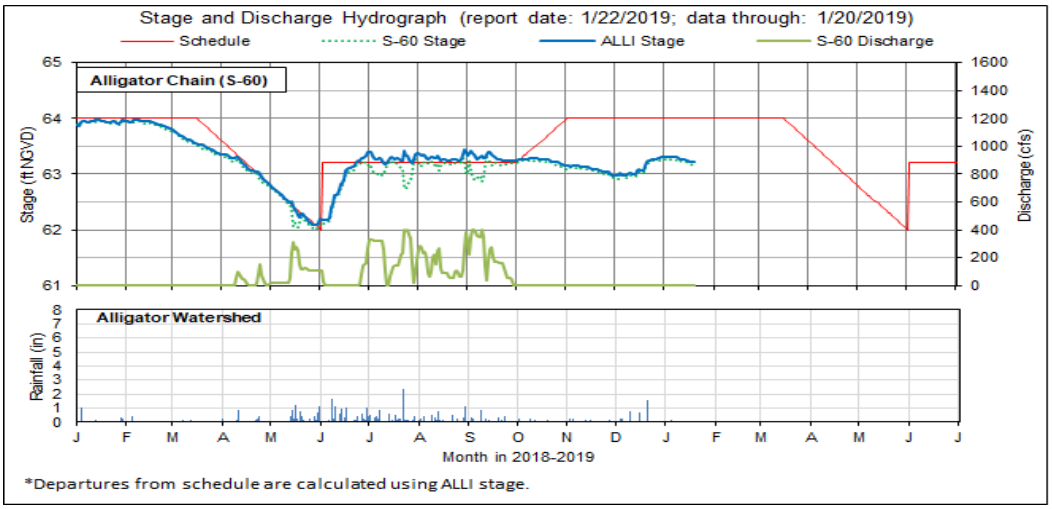


Figure 6.

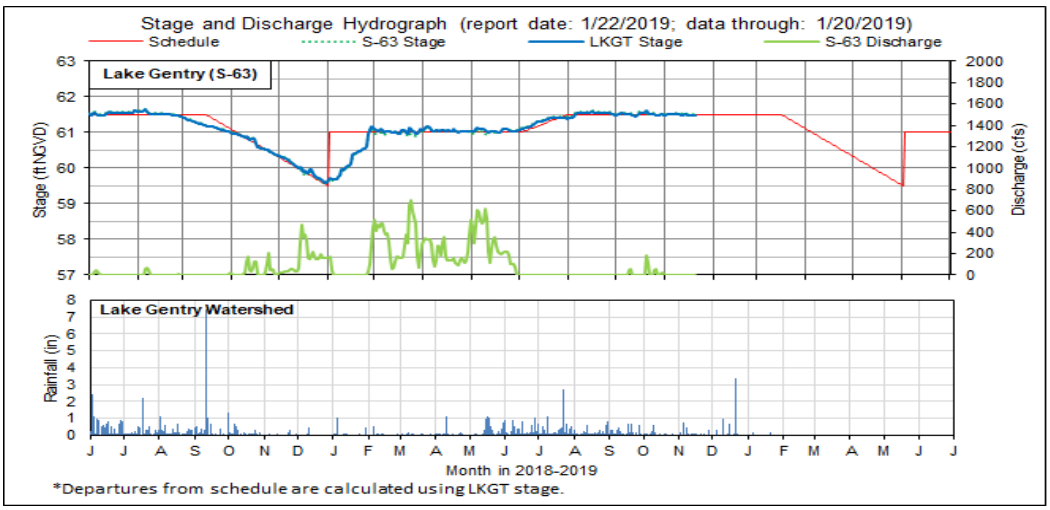


Figure 7.

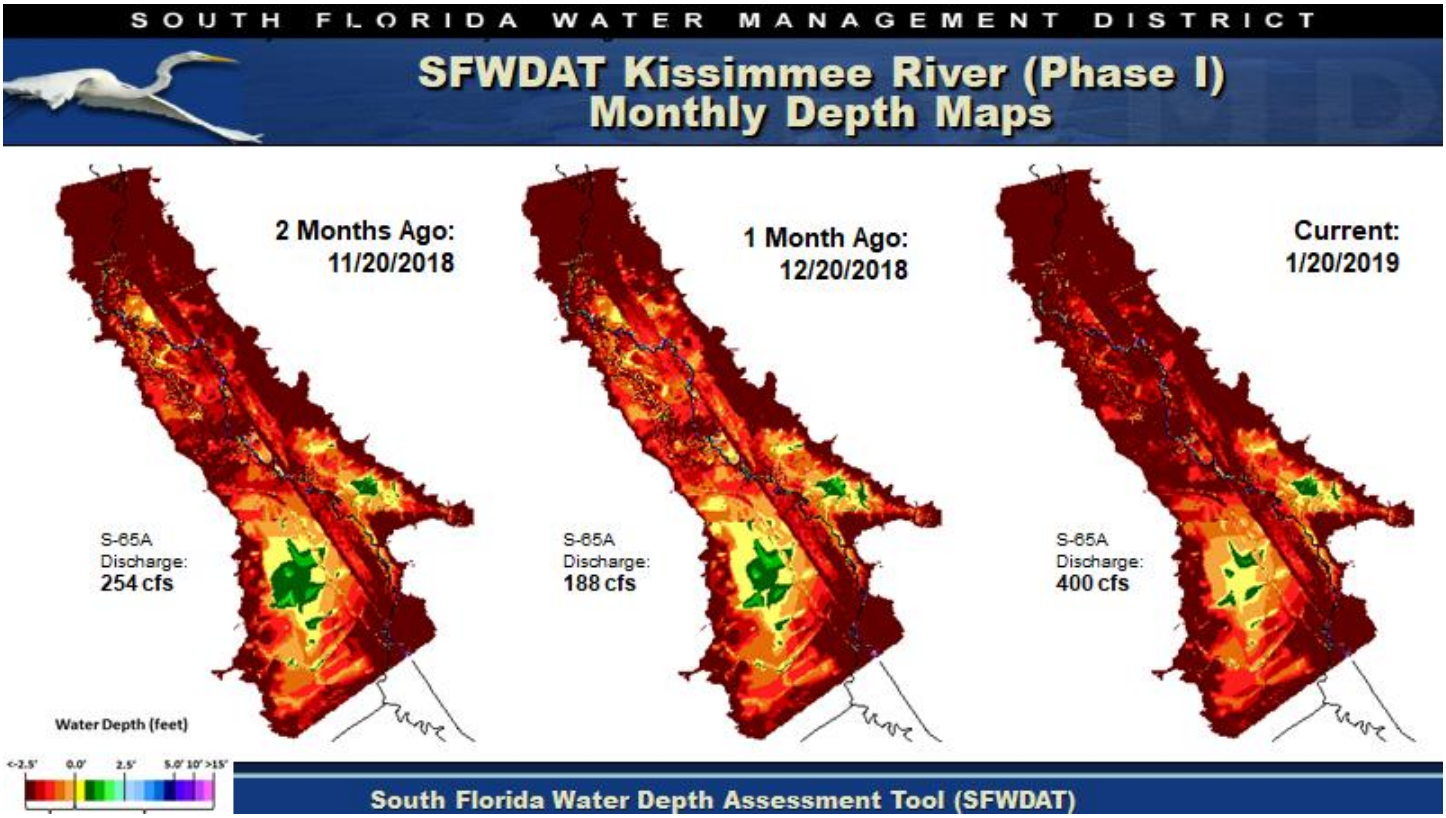


Figure 8. Phase I area floodplain water depths for this week, one month ago, and two months ago. Note that the WDAT color-coding has been modified to accommodate greater water depths; these maps are not directly comparable to Kissimmee Basin WDAT maps published prior to January 16, 2012.

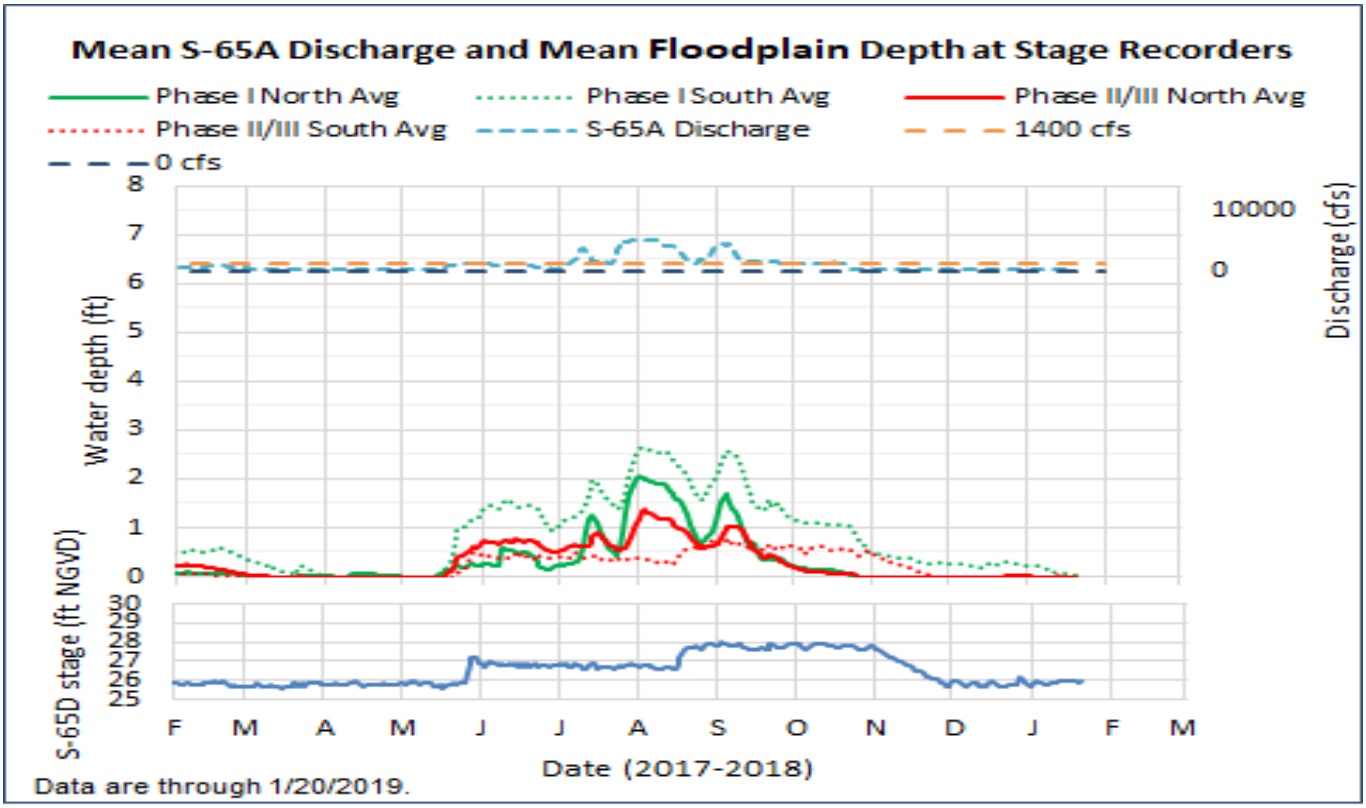
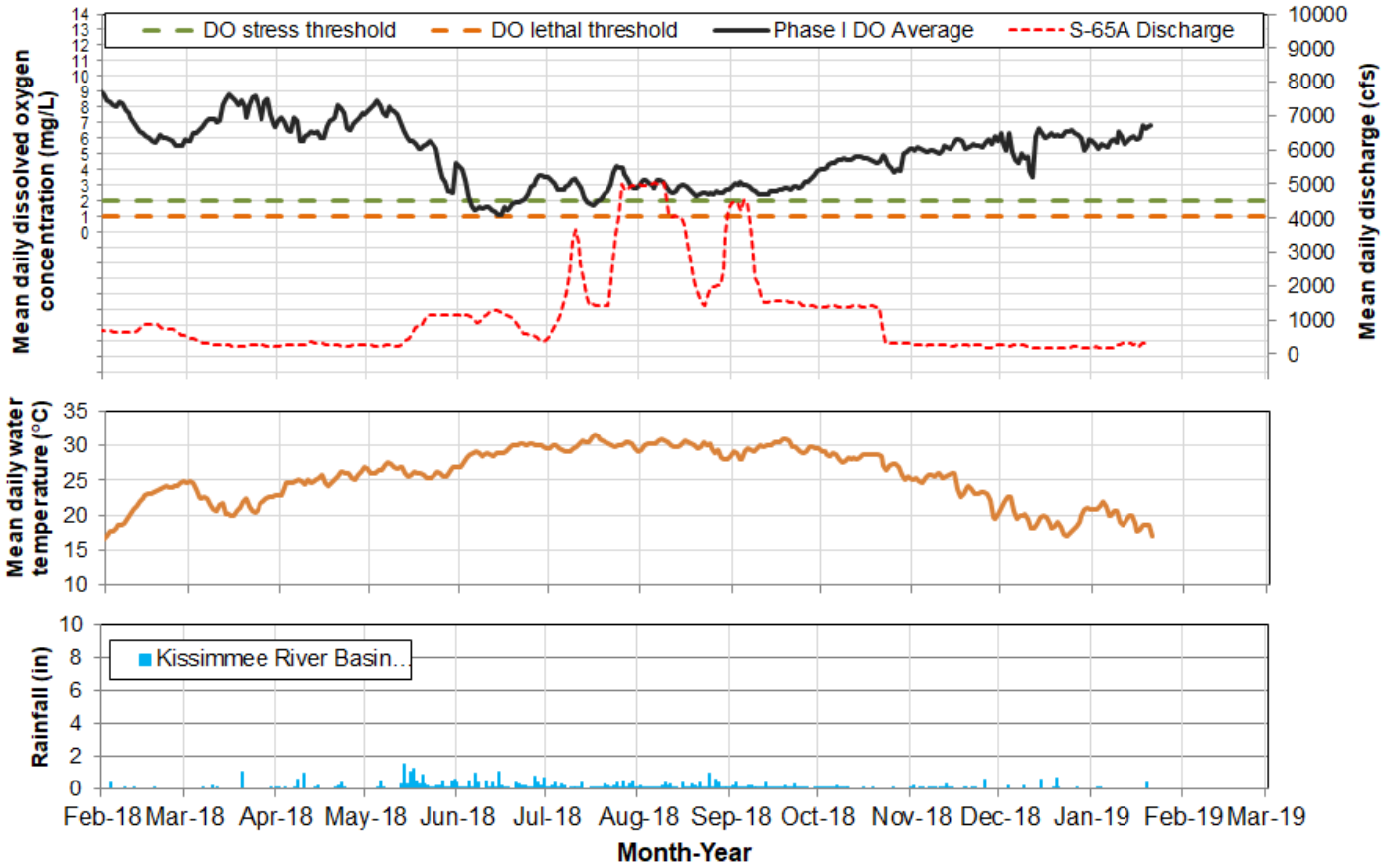


Figure 9. Mean water depth at stage recorders in the northern Phase I, southern Phase I, northern Phase II/III, and southern Phase II/III areas in relation to the S-65A discharge and S-65D headwater stage.



Report Date: 1/22/2019; data are through: 1/20/2019.

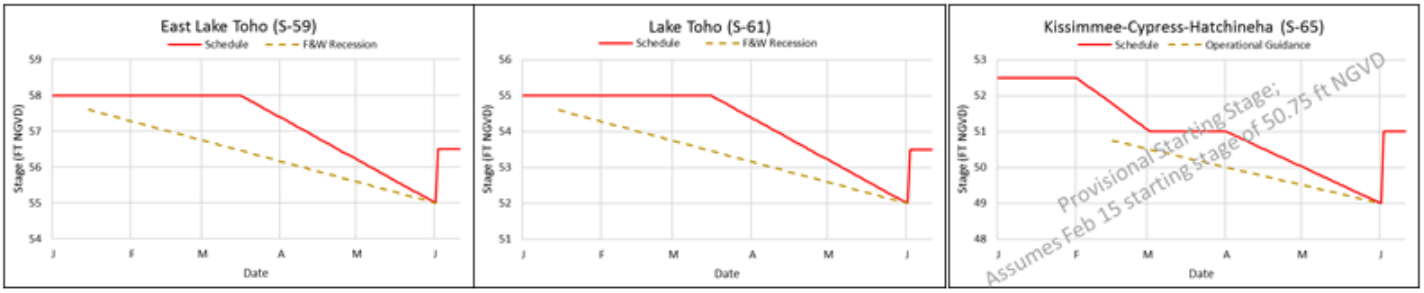
Figure 10. Mean daily dissolved oxygen, discharge, temperature and rainfall in the Phase I river channel.

Water Management Recommendations

Recommendation Date	Recommendation	Purpose	Outcome	Source	Report Date
1/22/2019	No new recommendations.		N/A		1/22/2019
1/15/2019	Begin recessions on Lake Toho and East Lake Toho on Jan 15, with a continuous recession to the regulation dry season low (52.0 ft on Toho; 55.0 ft on East Lake) on May 31. The lines are represented graphically in the Dry Season Operations slides. Tentatively plan on a recession in Kissimmee-Cypress-Hatchineha starting on February 15 with a continuous recession to the dry season low (49 ft) on May 31. A provisional diagram is included in the Dry Season Operations slides; however, starting stage may change depending on conditions. Discharge and reversal guidelines are provided in the Dry Season Operations slides.	Slow recession rates in East Toho, Toho, and KCH to benefit fish and wildlife; as possible limit flow volume at S-65D to facilitate KRR construction.	N/A	KB Ops	1/15/2019
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

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Dry Season Operations Slide 1 - 2018-2019
(NOTE revised discharge table)



Other Considerations
- KCH starting stage may vary; the maximum is 50.75 ft NGVD on Feb 15.
- Maintain S65/S65A discharge of at least 300 cfs.
- If outlook is for extreme dry conditions meet with KB staff to discuss modifications to this plan.

Version 1: January 14 2019

Discharge Rate of Change Limits for S65/S65A (revised 1/14/19).

Q (cfs)	Maximum rate of INCREASE (cfs/day)	Maximum rate of DECREASE (cfs/day)
0-300	100	-50
301-650	150	-75
651-1400	300	-150
1401-3000	600	-300
>3000	1000	-1000

Figure 11A. Slide 1 of the 2018-2019 Dry Season Operations Plan for S-59, S-61, and S-65/S-65A.

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Dry Season Operations Slide 2 - 2018-2019

East Lake (ELT) and Toho (WLT)

- **East Toho and Toho Recessions:**
  - Make releases to begin recessions on Jan 15 with lake stage approximately 0.4 ft below winter pool and continue to follow straight line recessions through May 31st to the extent practical
- **East Toho and Toho Stage Reversals :**
  - Adjust discharge to bring stage back to the recession line within about a week
  - Pre-storm releases may be used to lower stage below the recession line and create storage of about half of the forecast rain volume
  - If stage cannot be brought back to the recession line within about a week, the recession line may need to be reset following discussion with partner agencies
  - In general, the water released from ELT and WLT basins will be released to KHC (to the extent that hydraulic capacity is available) without consideration for Lake KHC stage. However, the priority of KCH is subject to change if more nesting occurs in KCH than Toho or East

Kissimmee-Cypress-Hatchineha (KCH)

- **KCH Recession:**
  - Begin recession on February 15 (subject to change) starting no higher than 50.75 feet
  - To the extent feasible considering discharge constraints, make releases to follow a straight-line recession through May 31
  - In general, use the available storage in Lake KCH to keep flow at S-65D below 1,000 cfs; when possible keep flow below 600 cfs
- **KCH Stage Reversals :**
  - To address reversals, in general increase flow by 100 cfs for every 0.1 foot of rise above the recession line (e.g. from 300 cfs at the line to 800 cfs at 0.5 feet above the line)

Figure 11B. Slide 2 of the 2018-2019 Dry Season Operations Plan for S-59, S-61, and S-65/S-65A.

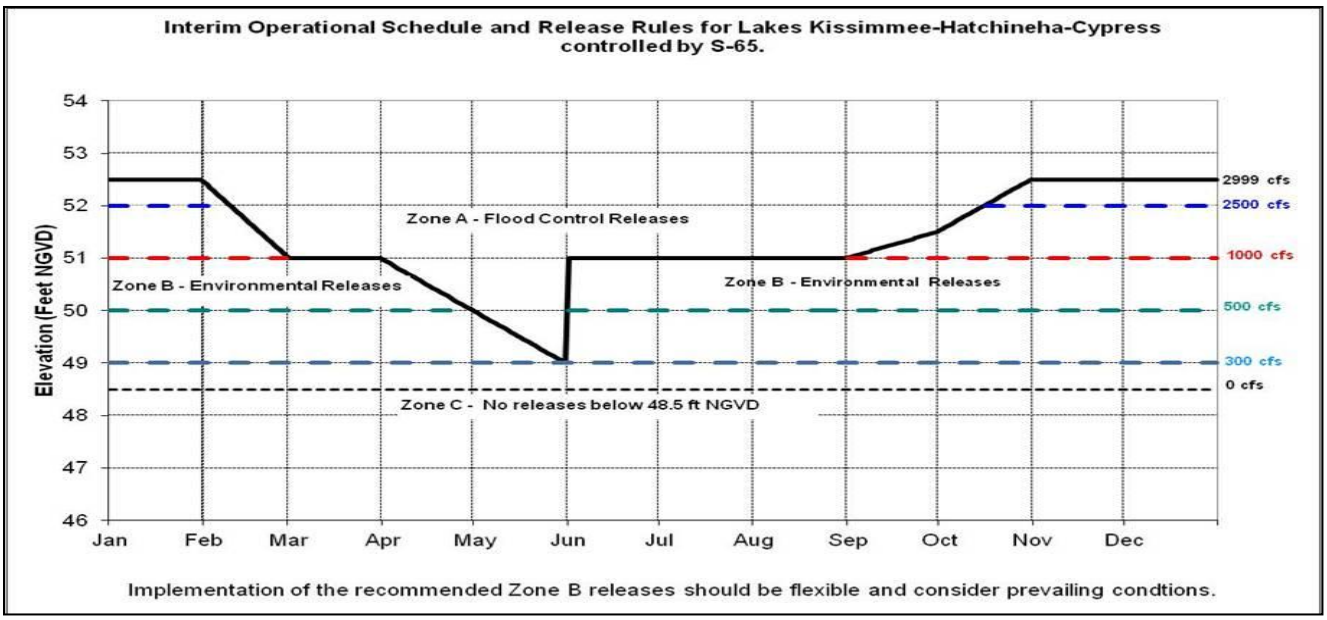


Figure 12. Interim operations schedule for S-65. The discharge schedule shown to the right has not been used in recent years.

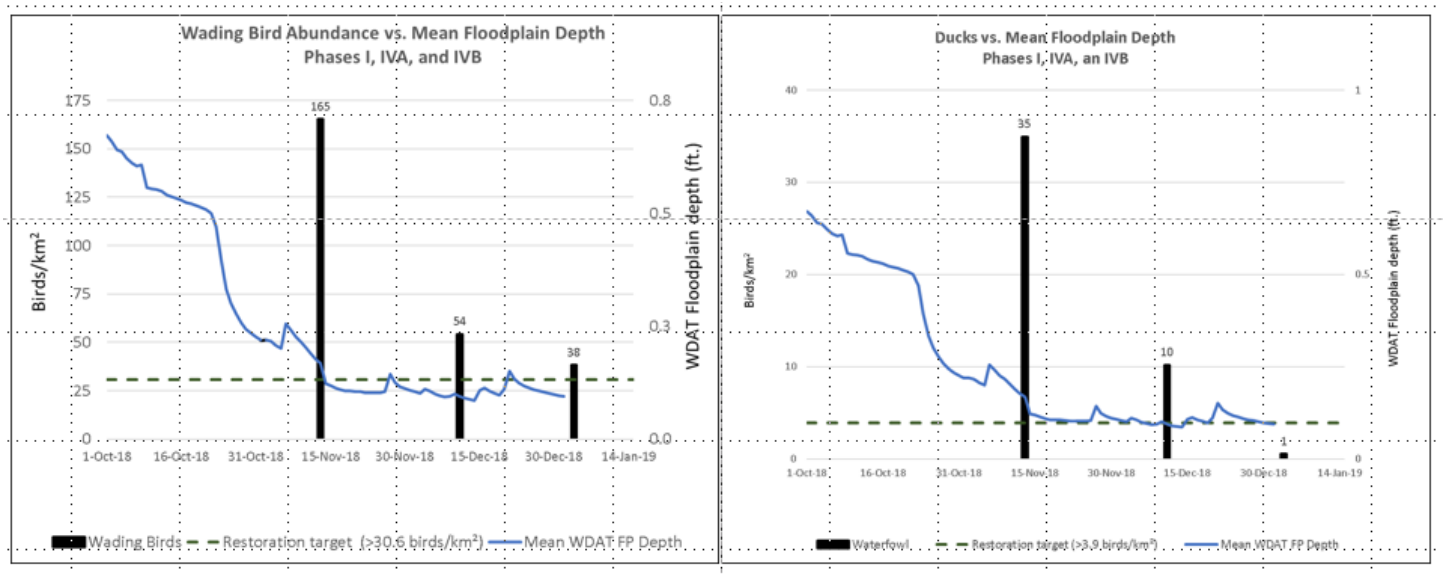


Figure 13. Kissimmee River Wading Bird and Waterfowl Surveys from November 2018 to January 2019.

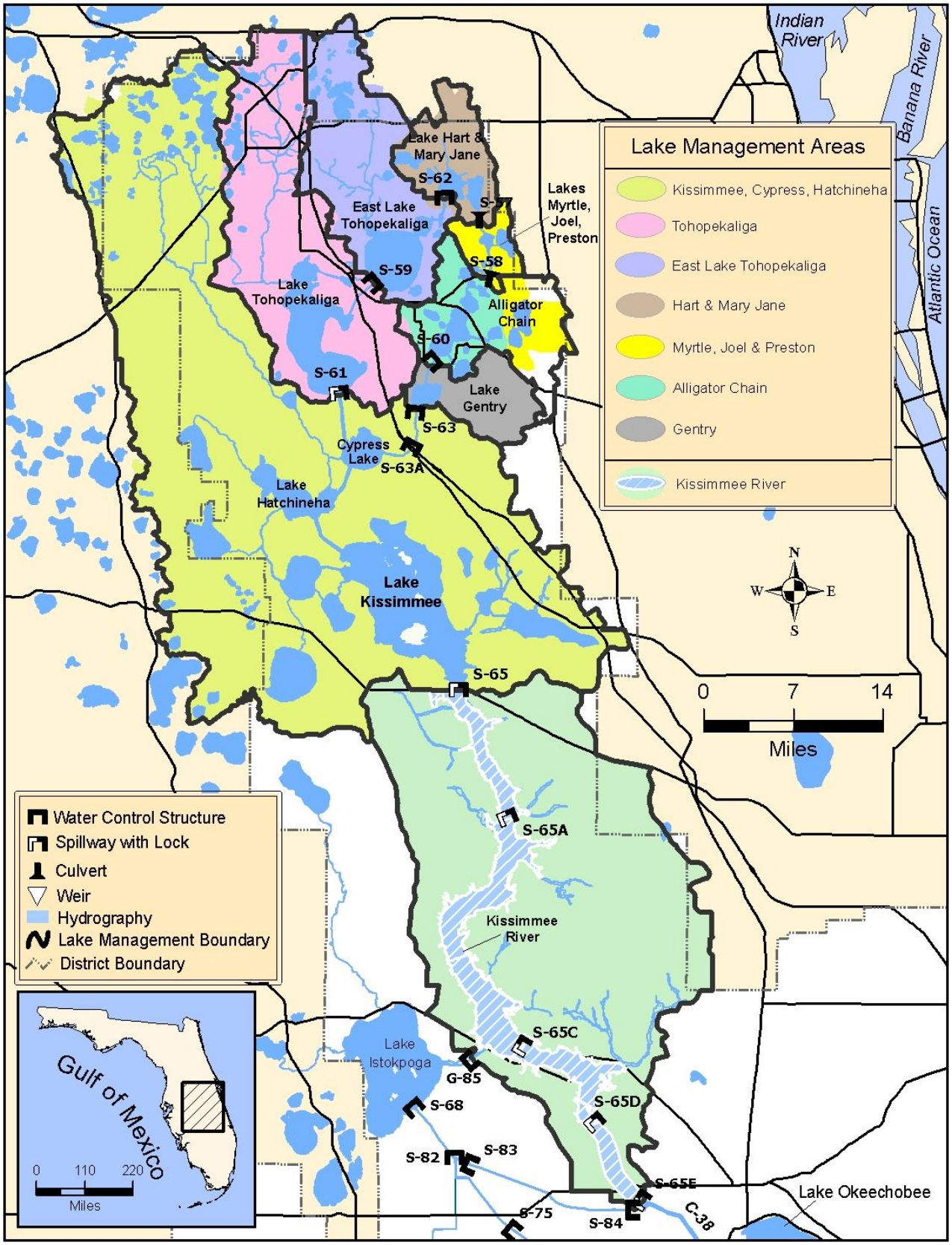


Figure 14. The Kissimmee Basin.

LAKE OKEECHOBEE

According to the USACE web site, Lake Okeechobee stage is at 12.26 feet NGVD for the period ending at midnight on January 21, 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). The Lake is now 0.49 feet lower than it was a month ago and 3.06 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 21 lake stage was the lowest for this time of year since 2008, which followed extreme drought conditions in 2007 (Figure 3). According to RAINDAR, 0.30 inches rain fell over the Lake during the week January 15, 2019 – January 21, 2019 (Figure 4). Most of the watershed received similar rainfall, except for areas to the south that received between 0.5 to 1.0 inches of rainfall.

Average daily inflows (minus rainfall) to the Lake were very similar to the previous week, going from 332 cfs to 320cfs, with 303 cfs coming from the Kissimmee River.

Total outflows (minus evapotranspiration) increased just slightly from the previous week, going from 1,915 average daily cfs to 2,092 cfs this past week (Table 1). Outflows west via S-77 and south through the S-350 structures were very similar to the previous week, while passive flows through the navigation lock and/or structure of S-308 increased from a negative (backflow) of 183 average daily cfs the previous week to 17 cfs of outflow this past week. 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.

Water quality samples collected on December 4 and December 11 found seven of eight stations in the nearshore zone with Chlorophyll a (Chla) values >20 µg/L, with a high of 32.9 µg/L. Two of nine stations in the pelagic had elevated values of Chla >20 µg/L, while all others were between 7.3 µg/L and 13.1 µg/L (Figure 6). Microcystin was only detected at one nearshore site, with a value of 0.29 µg/L. Turbidity, a measure of water clarity, and total phosphorus values increased in the pelagic zone from November as wind speeds increased; going from a turbidity of 17 NTUs to 36 NTUs in December, while total phosphorus went from 105 to 144 µg/L (Figure 7). Nearshore values remained similar, at 14 NTUs and 91 µg/L turbidity and total phosphorus, respectively.

Water Management Recommendations

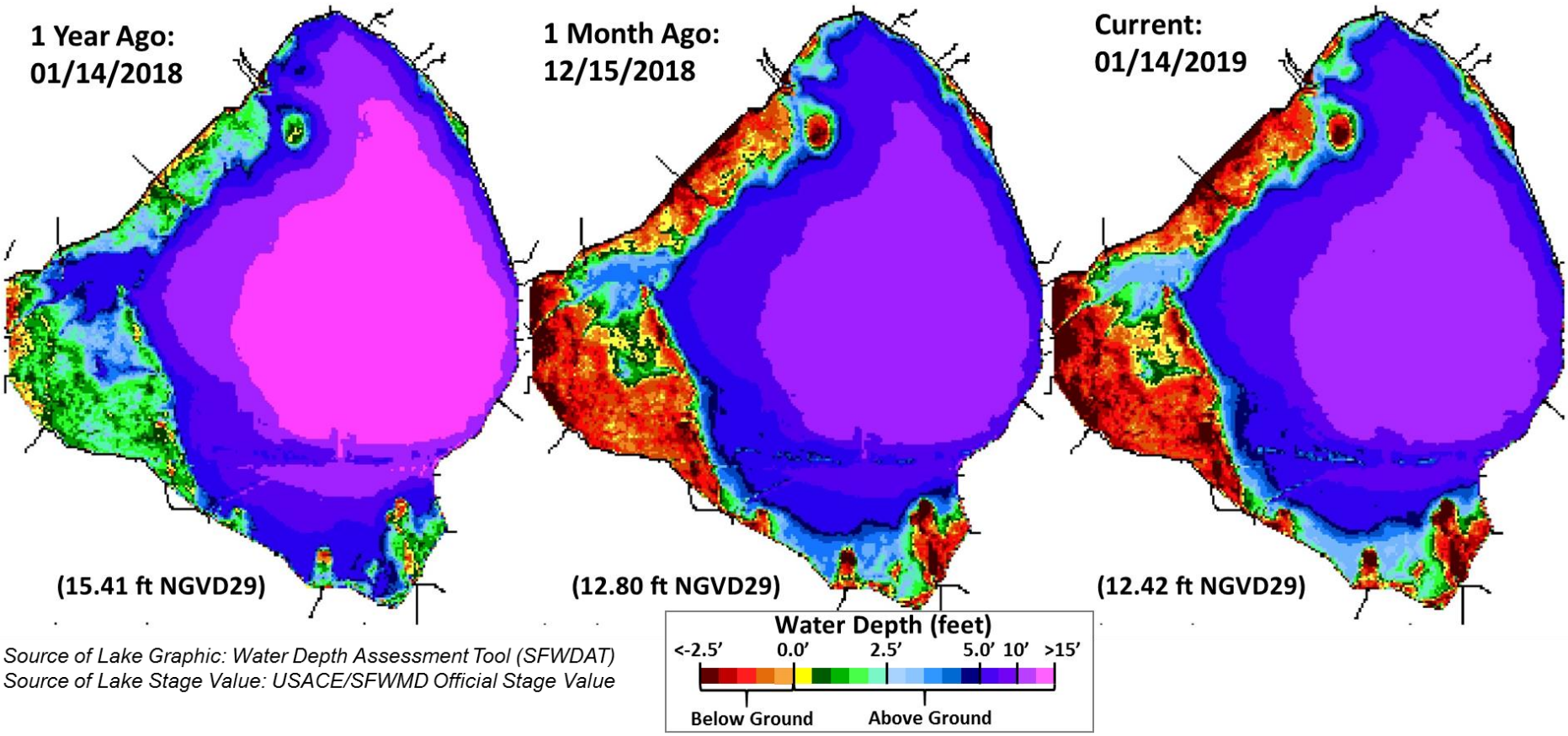
Lake Okeechobee stage is 12.26 feet NGVD, falling 0.16 feet from the previous week and 0.49 feet over the past 30 days. Lake stages are the lowest they have been for this time of year since 2008 and are now 2.11 feet below the bottom of the preferred ecological envelope, which varies seasonally from 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	275	303	0.1
S71 & 72	11	1	0.0
S84 & 84X	27	0	0.0
Fisheating Creek	19	17	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	0	0	0.0
S131 P	0	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	0.0	658	0.3
Total	**332**	**978**	**0.4**

OUTFLOWS	Previous Week Avg Daily cfs	Avg Daily Outflow cfs	Equivalent Depth Week Total (in)
S77	873	790	0.4
S308	-183	17	0.0
S351	493	509	0.2
S352	460	444	0.2
S354	178	248	0.1
L8 Outflow	95	85	0.0
ET	774	734	0.3
Total	**2690**	**2826**	**1.3**

PROVISIONAL DATA



Source of Lake Graphic: Water Depth Assessment Tool (SFWDAT)
Source of Lake Stage Value: USACE/SFWMD Official Stage Value

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

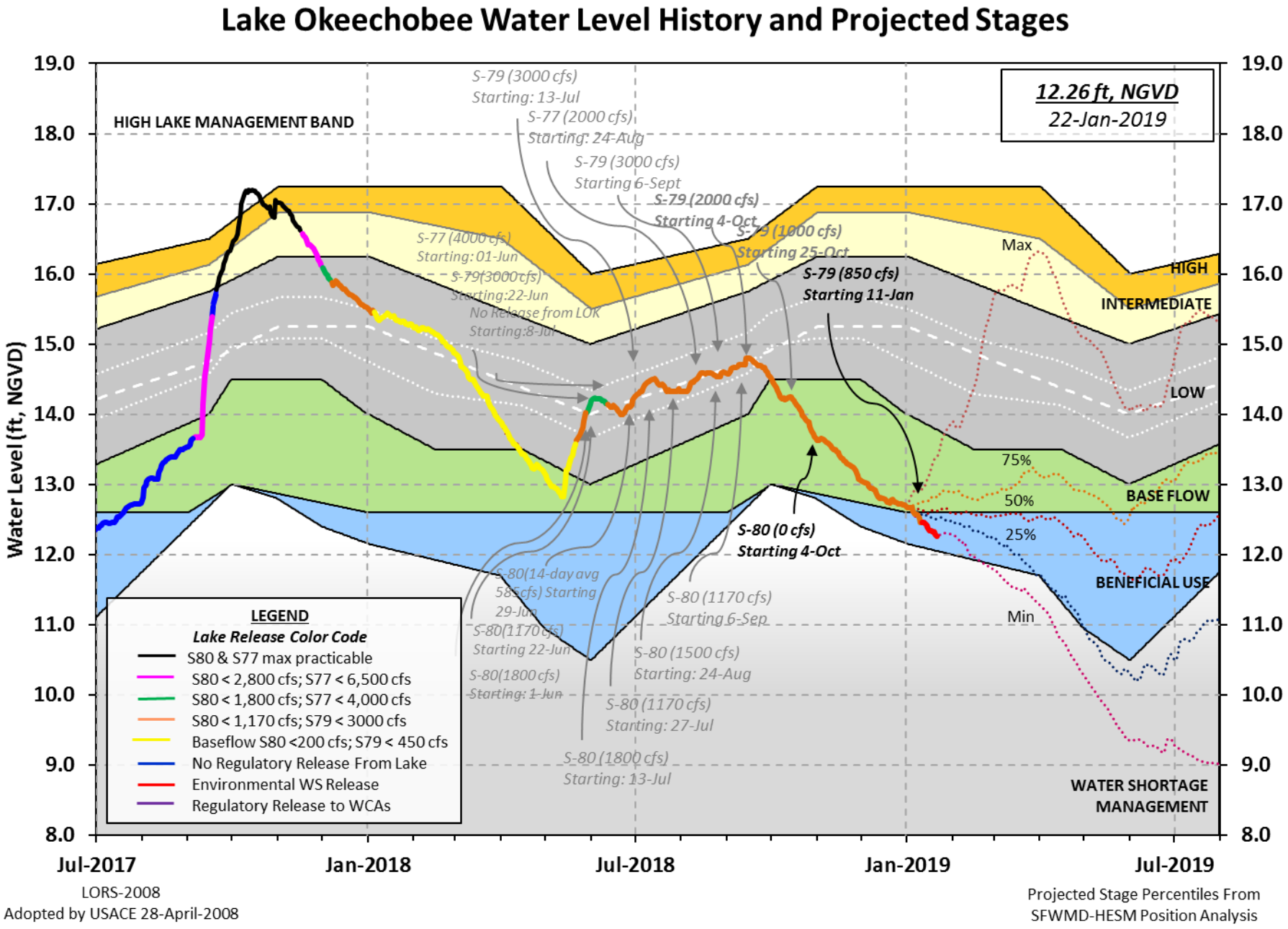


Figure 2. Recent Lake Okeechobee stage and releases, with projected stages based on a dynamic position analysis.

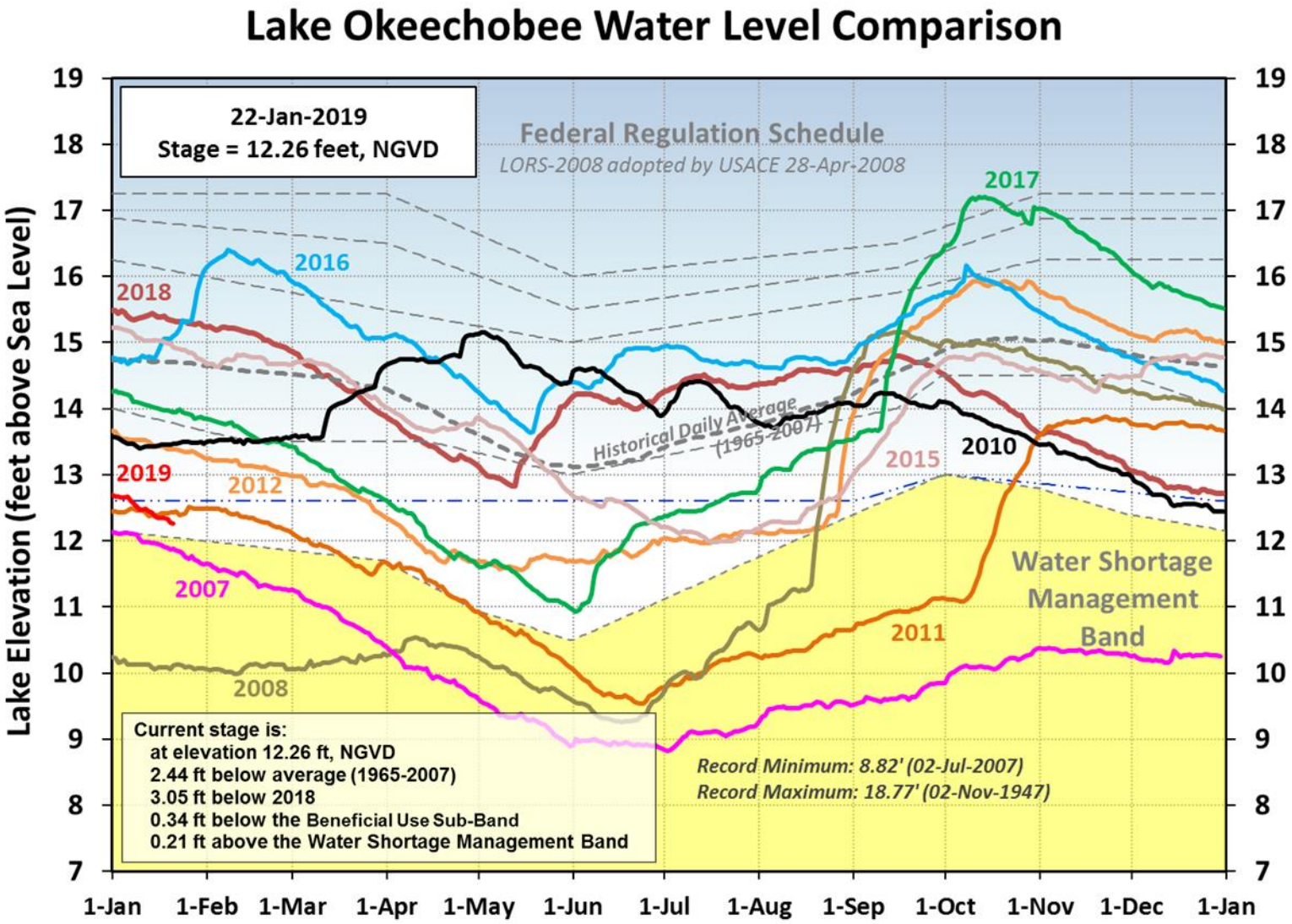


Figure 3. Annual stage hydrographs for Lake Okeechobee from 2010 – 2019.

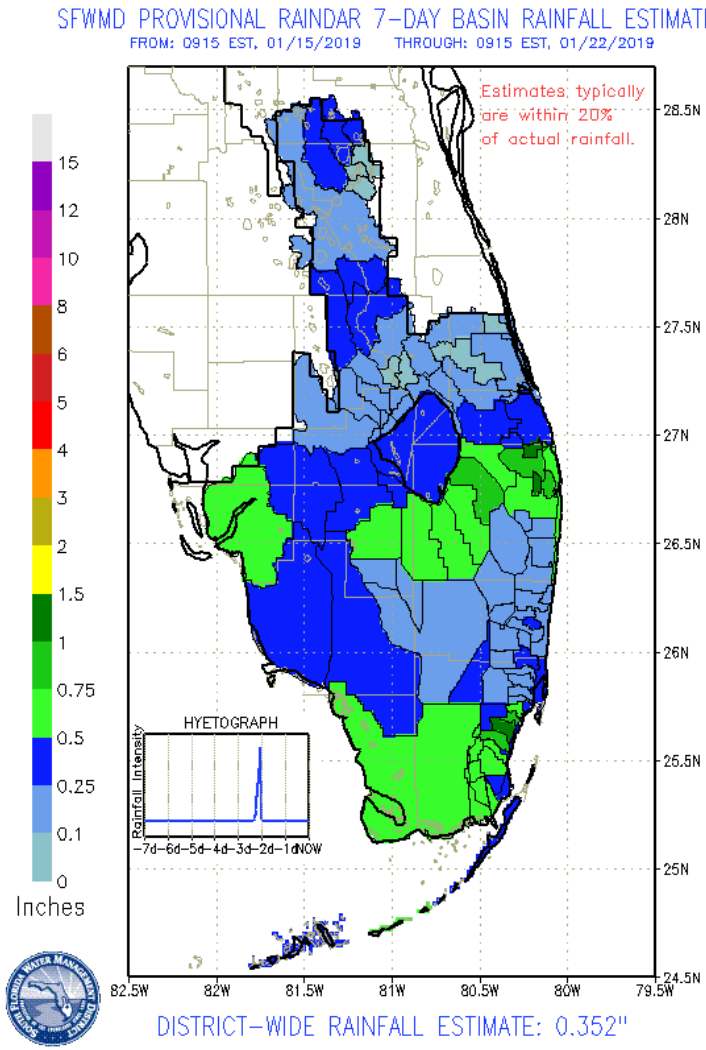


Figure 4. Rainfall estimates by basin.

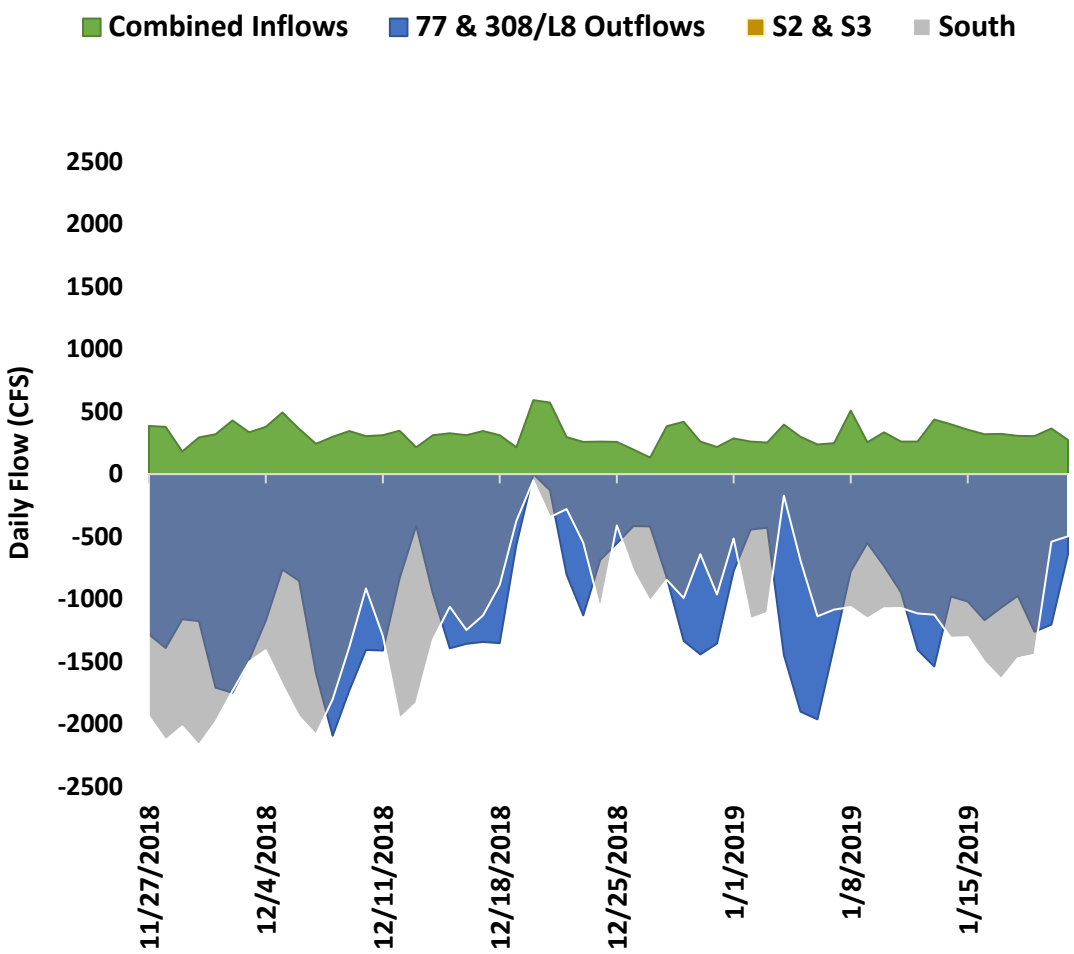
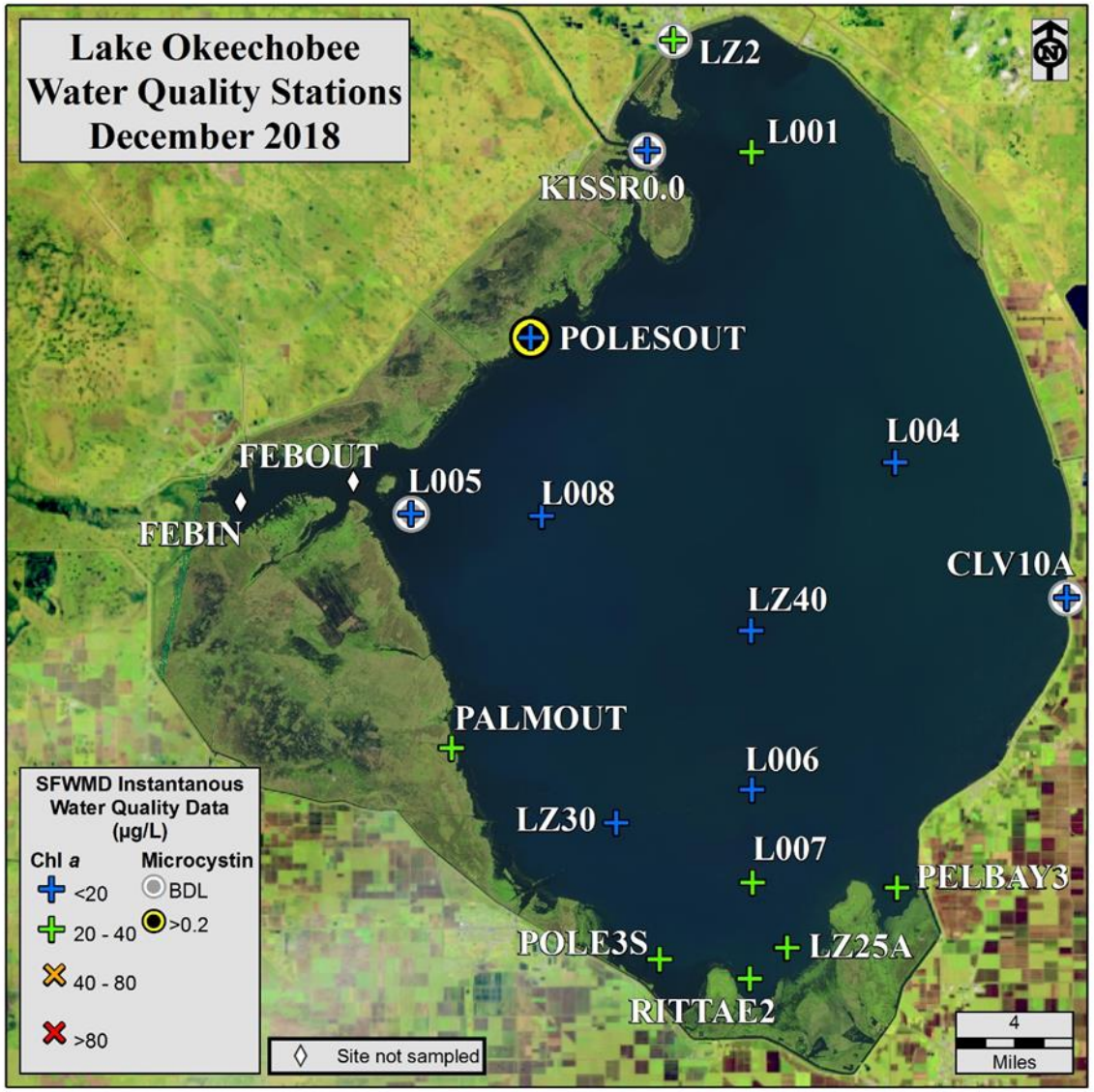


Figure 5. Major inflows (orange) and outflows (blue) of Lake Okeechobee, including the S-350 structures designated as South (green). The L-8 canal flows through culvert 10A are included as outflows when positive, and as inflows when backflowing into the lake. All inflows and outflows are shown as positive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



Dec 4 & 11, 2018

Site	Chlorophyll *a* (µg/L)	Microcystin (µg/L)
Nearshore Stations		
FEBIN	Not Sampled	
FEBOUT	Not Sampled	
KISSR0.0	17.9	BDL
LZ2	21.1	BDL
LZ25A	29.1	
PALMOUT	20.2	
PELBAY3	32.9	
POLE3S	23.2	
POLESOUT	17.4	0.29
RITTAE2	20.6	
Pelagic Stations		
L001	26.0	
L004	10.1	
L005	13.1	BDL
L006	8.0	
L007	23.4	
L008	7.3	
LZ30	12.4	No Data
LZ40	10.1	
CLV10A	11.4	BDL

Figure 6. Chlorophyll *a* (µg/L) and microcystin (µg/L) values for nearshore and pelagic stations for mid-December 2018. SFWMD classifies an algal bloom as having Chla values >40 µg/L. Microcystin values <0.20 µg/L are below the detection limit (BDL).

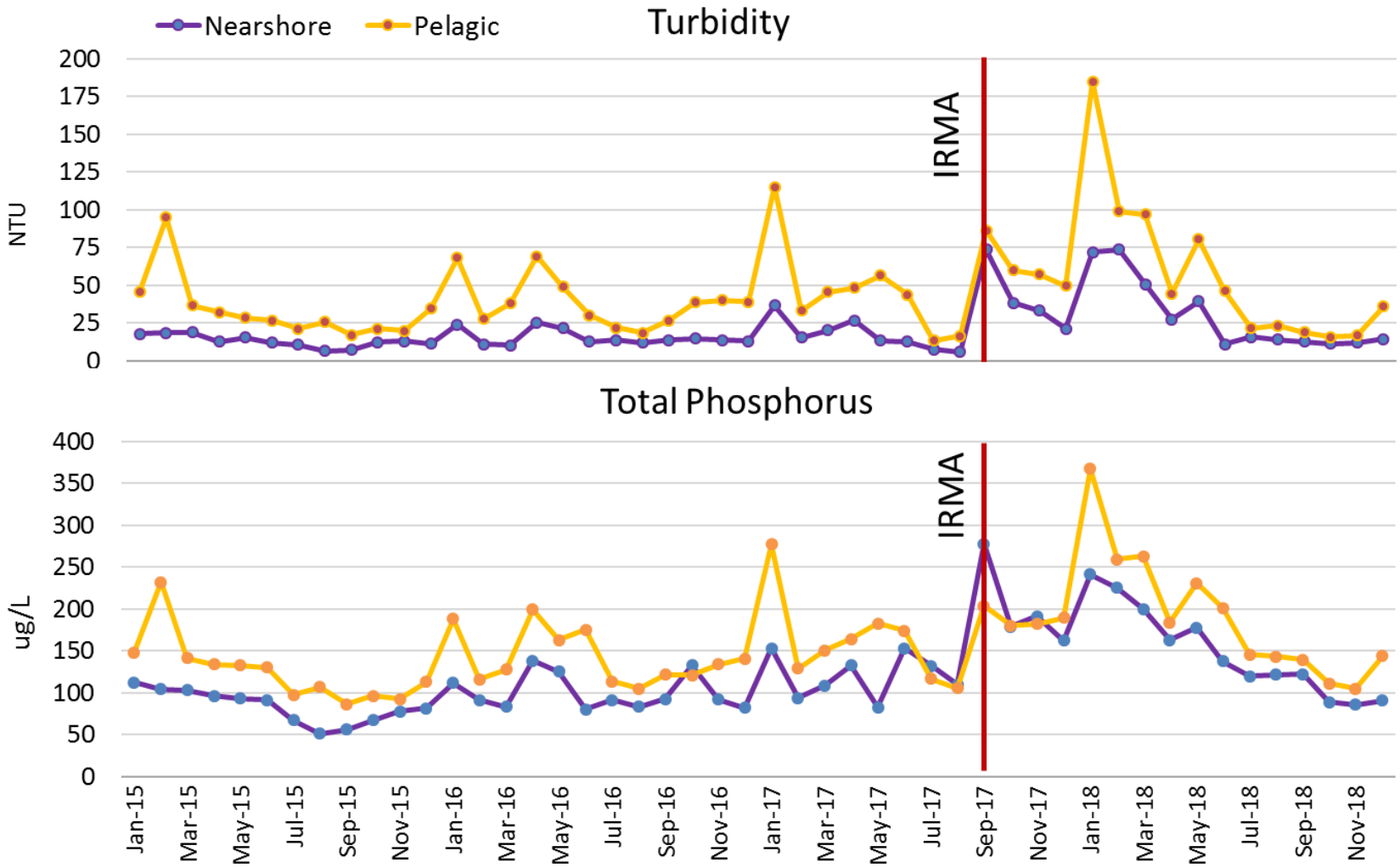


Figure 7. Water quality sampling locations on Lake Okeechobee in the nearshore and pelagic regions (right) and average turbidity (top graph) and total phosphorus (bottom graph) monthly values for each region from January 2015 – December 2018.

ESTUARIES

St. Lucie Estuary:

Last week total inflow to the St. Lucie Estuary averaged approximately 125 cfs (Figures 1 and 2) and last month inflow averaged about 120 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	68
S-80	0
S-308	17
S-49 on C-24	0
S-97 on C-23	0
Gordy Rd. structure on Ten Mile Creek	57

Over the past week, salinity increased 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 above 26. 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)	**24.5** (23.0)	**26.0** (25.5)	NA[1]
US1 Bridge	**26.8** (26.2)	**EM**[2] (EM)	10.0-26.0
A1A Bridge	**31.4** (31.1)	**31.9** (31.8)	NA[1]

[1]Envelope not applicable and [2]Equipment Malfunction.

Caloosahatchee Estuary:

Last week total inflow to the Caloosahatchee Estuary averaged approximately 798 cfs (Figures 5 and 6) and last month inflow averaged about 969 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	790
S-78	514
S-79	726
Tidal Basin Inflow	72

Over the past week, surface salinity increased 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 2.5 at Val I-75 and 7.8 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)	**3.2** (2.0)	**3.2** (2.1)	NA[1]
Val I75	**3.5** (2.1)	**4.9** (4.0)	0.0-5.0[2]
Ft. Myers Yacht Basin	**8.2 (**7.5)	**11.0** (11.4)	NA
Cape Coral	**16.1** (15.0)	**17.5** (18.2)	10.0-30.0
Shell Point	**25.9** (25.2)	**25.2** (24.2)	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 4.1 to 8.2 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 176 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	176	8.2	4.5
B	300	176	6.6	4.0
C	375	176	5.9	3.8
D	450	176	5.2	3.7
E	650	176	4.1	3.3

Red tide

The Florida Fish and Wildlife Research Institute reported on January 18, 2019, that *Karenia brevis,* the Florida red tide dinoflagellate, was observed at background to low concentrations in two samples collected offshore of Lee County and was not observed in samples collected from Palm Beach or Miami-Dade counties. No samples were collected from St. Lucie, Martin, or Broward 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.

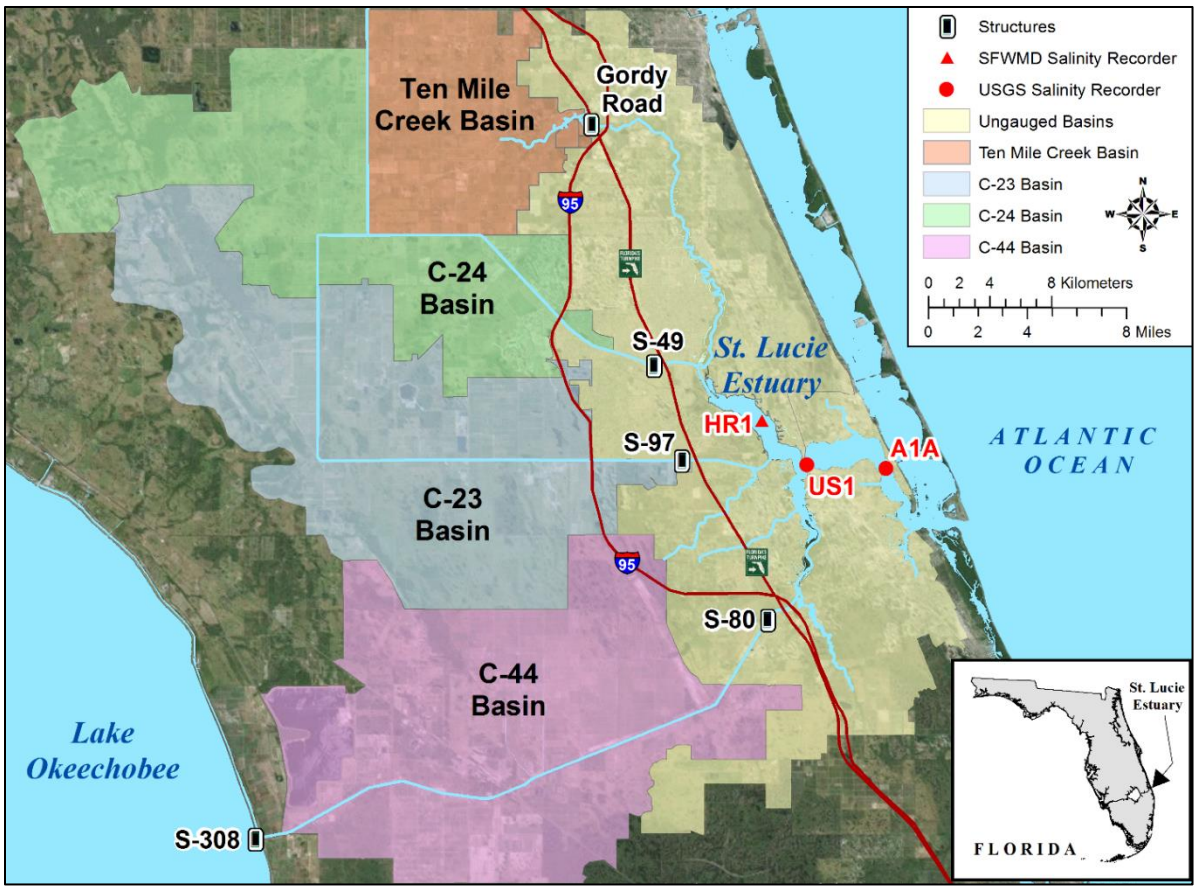


Figure 1. Basins, water control structures, and salinity monitoring for the St. Lucie Estuary.

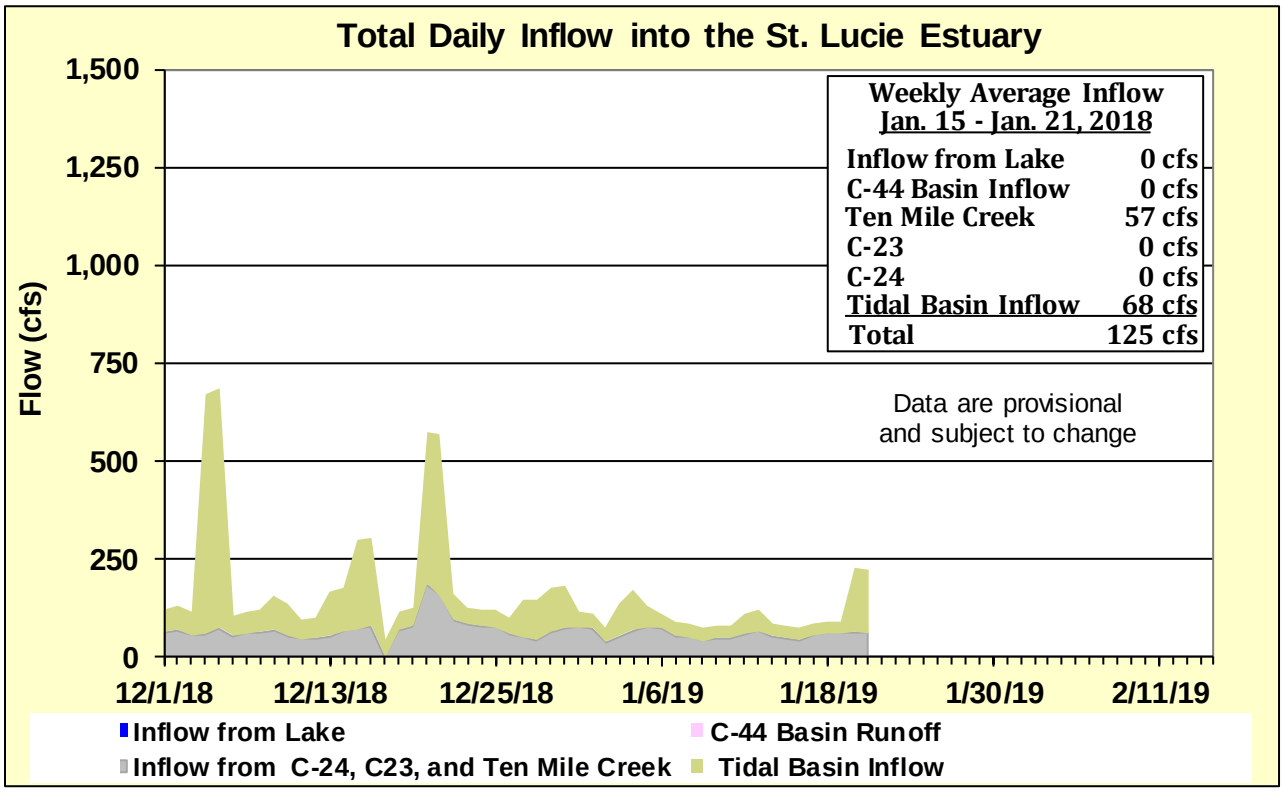


Figure 2. Total daily inflows from Lake Okeechobee and runoff from the C-44, C-23, C-24, Ten Mile Creek, and tidal basins into the St. Lucie Estuary.

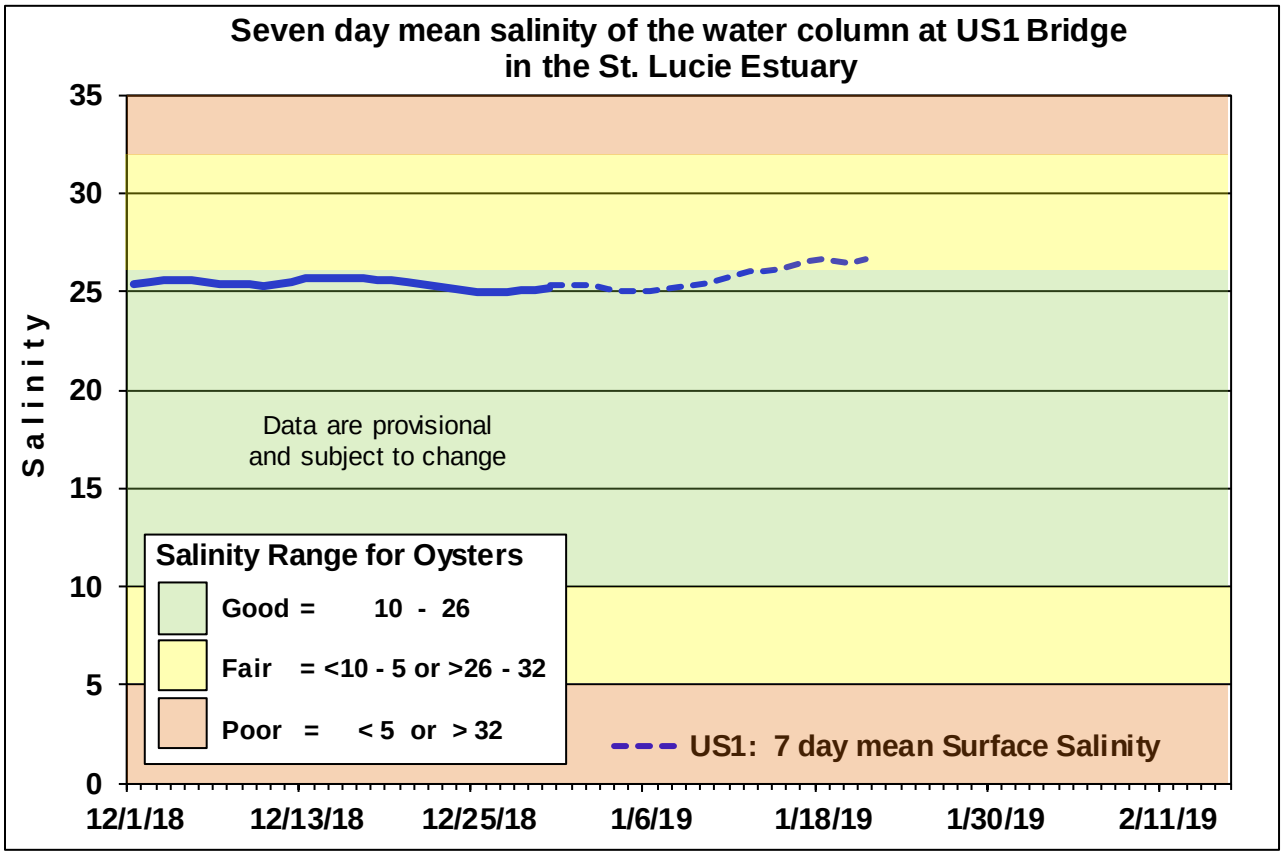


Figure 3. Seven-day mean salinity of the water column at the US1 Bridge.

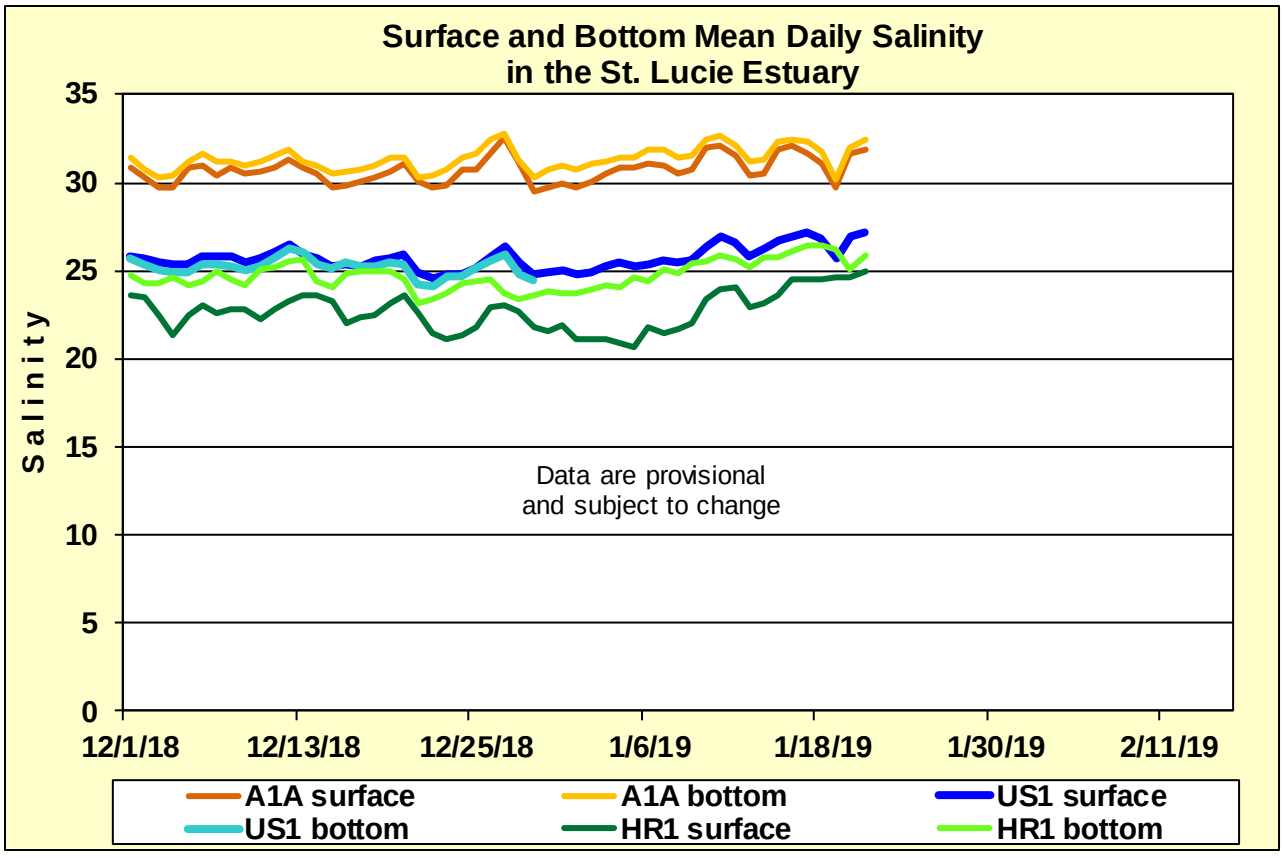


Figure 4. Daily mean salinity at the A1A, US1 and estimated HR1 stations.

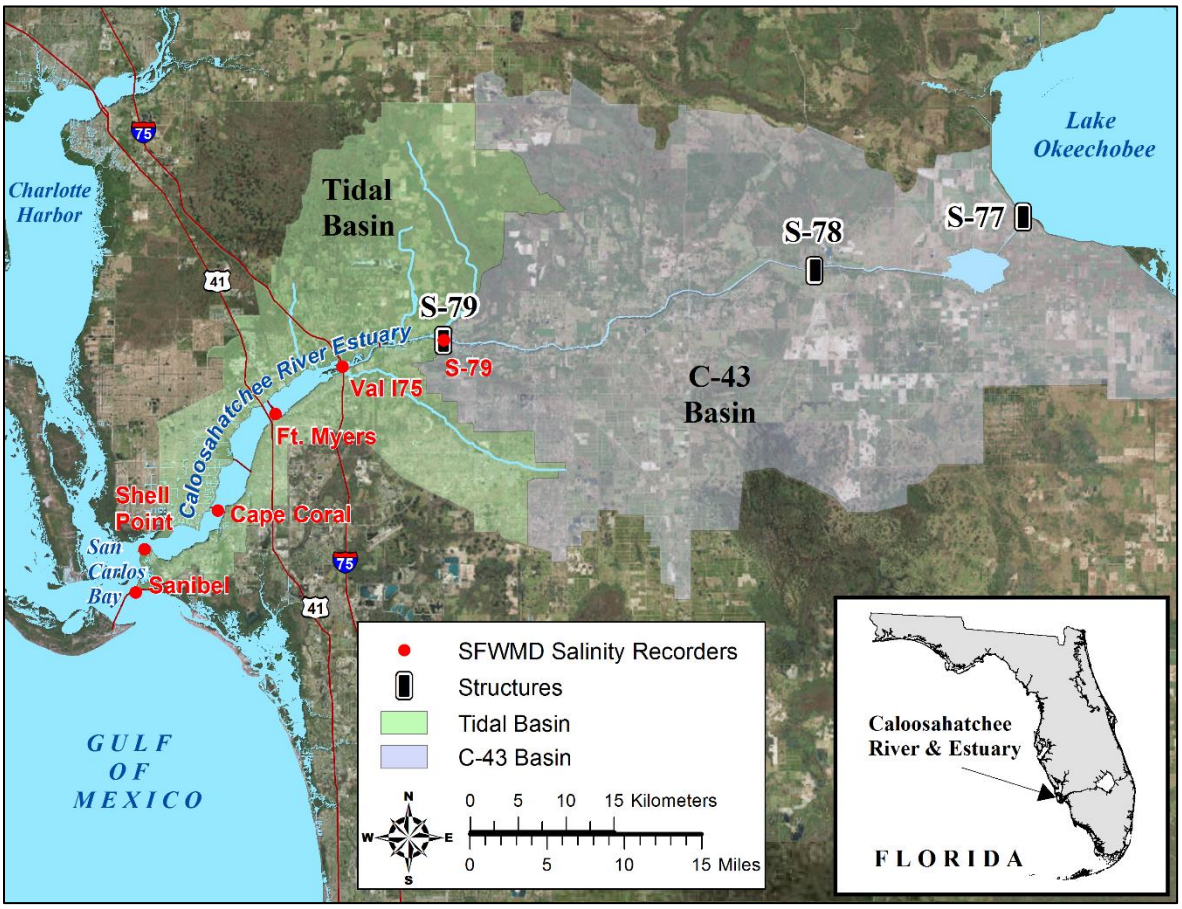


Figure 5. Basins, water control structures, and salinity monitoring for the Caloosahatchee Estuary.

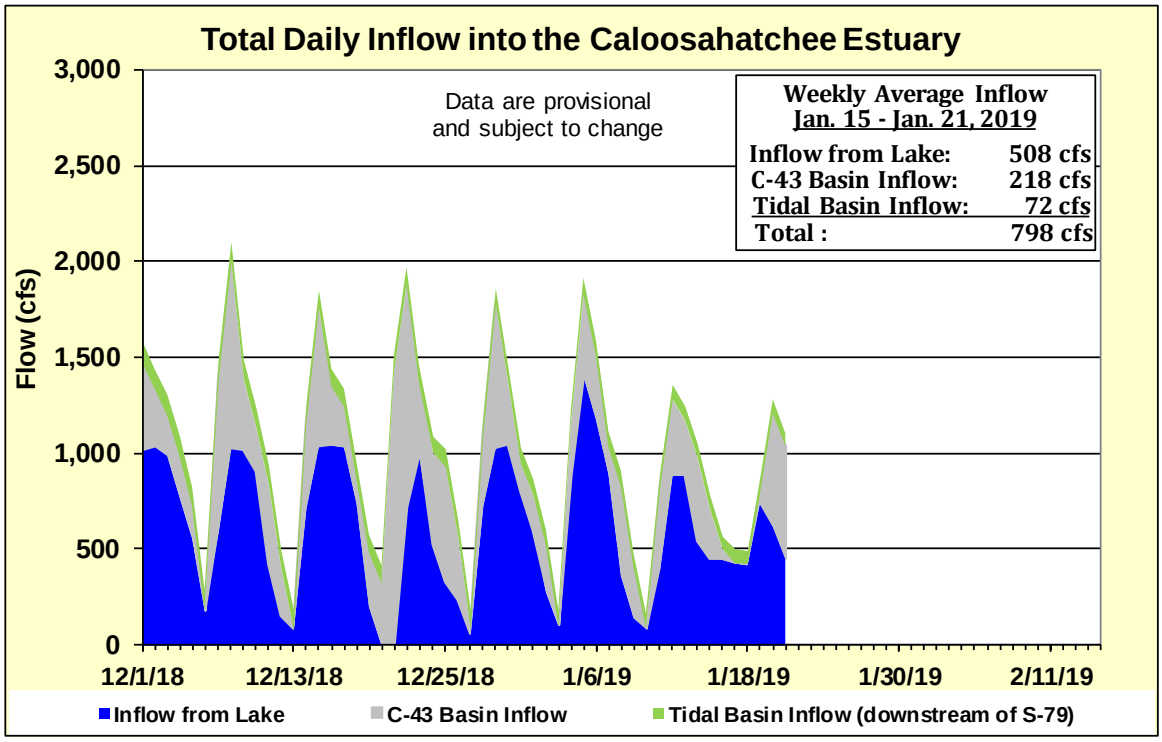


Figure 6. Total daily inflows from Lake Okeechobee, runoff from the C-43 basin, and tributaries in the tidal basin into the Caloosahatchee River Estuary.

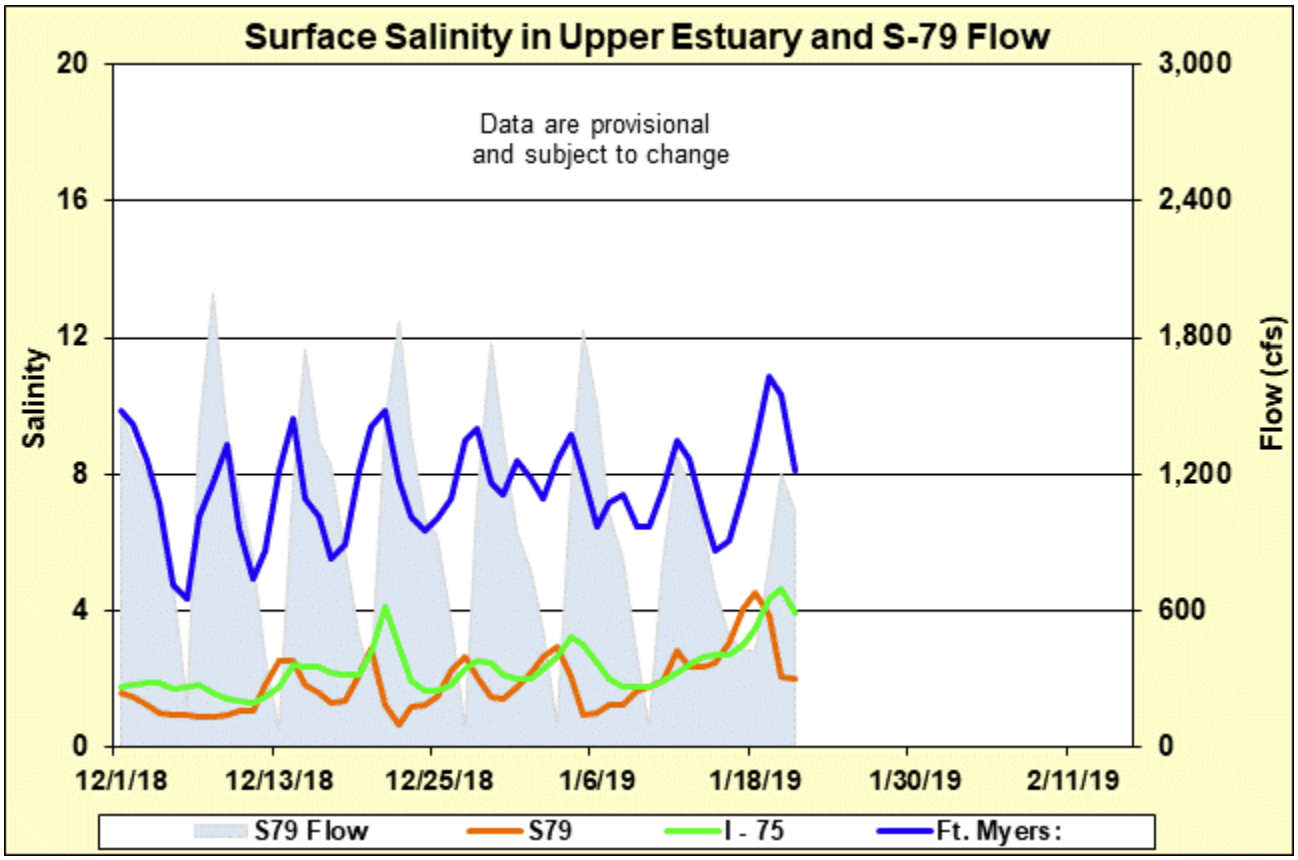


Figure 7. Daily mean flows at S-79 and salinity at upper estuary monitoring stations.

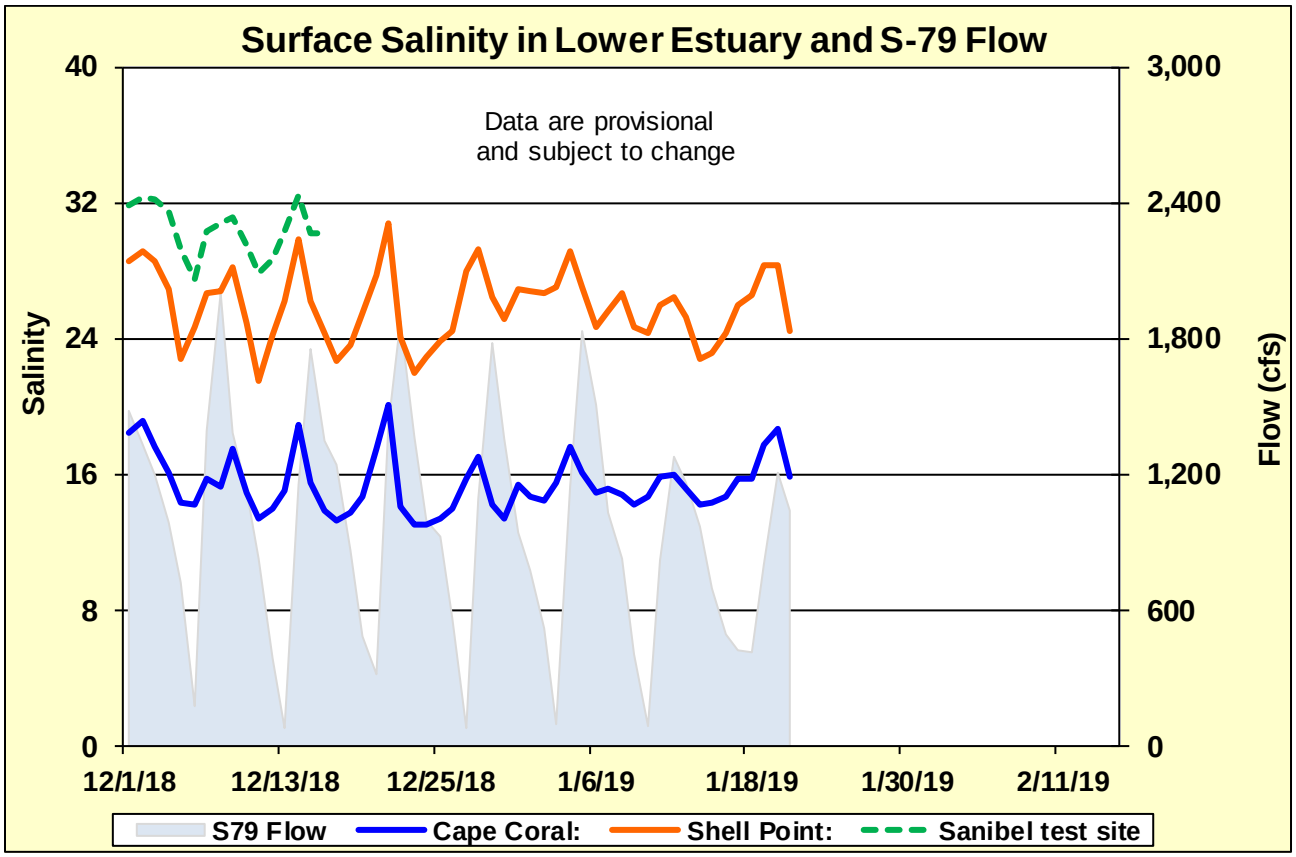


Figure 8. Daily mean flows at S-79 and salinity at lower estuary stations.

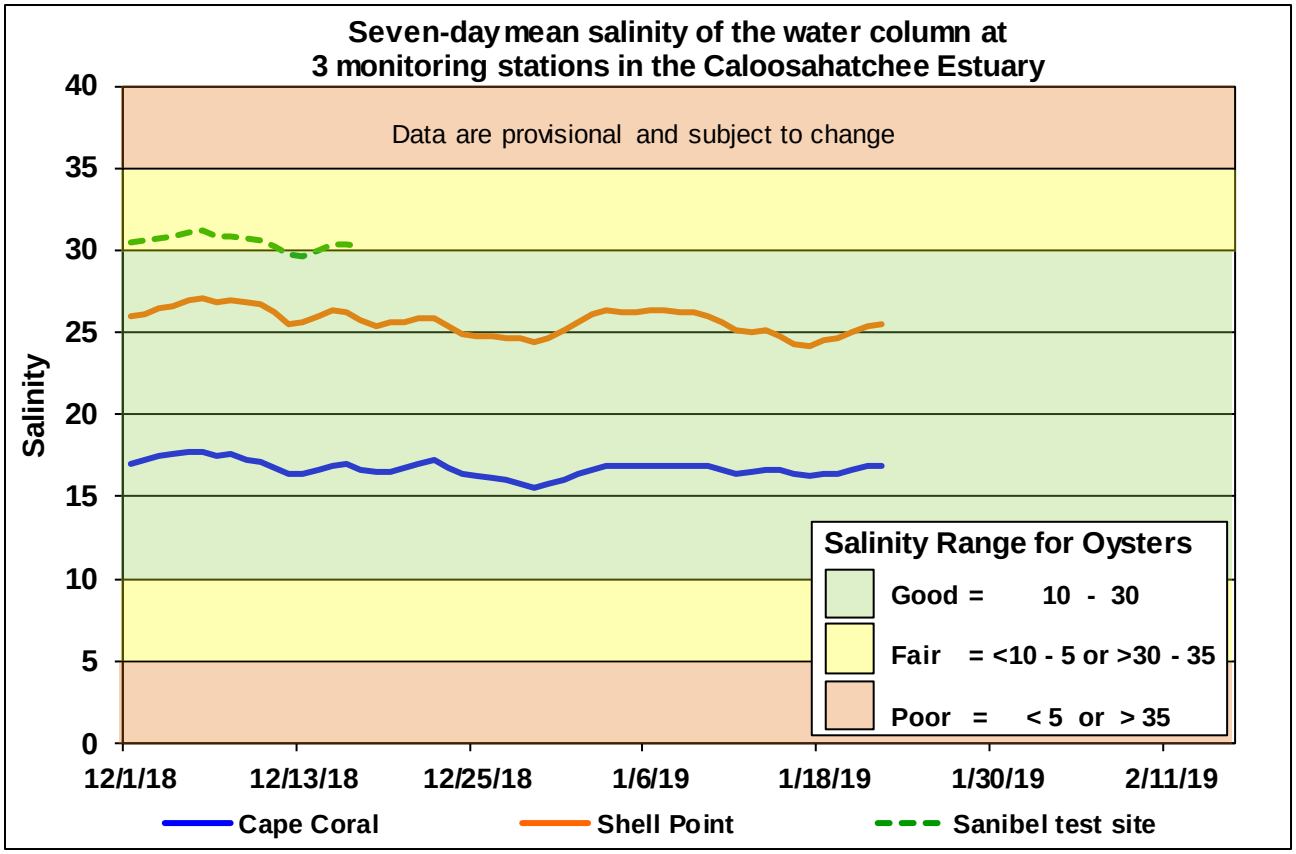


Figure 9. Seven-day mean salinity at Cape Coral, Shell Point, and Sanibel monitoring stations.

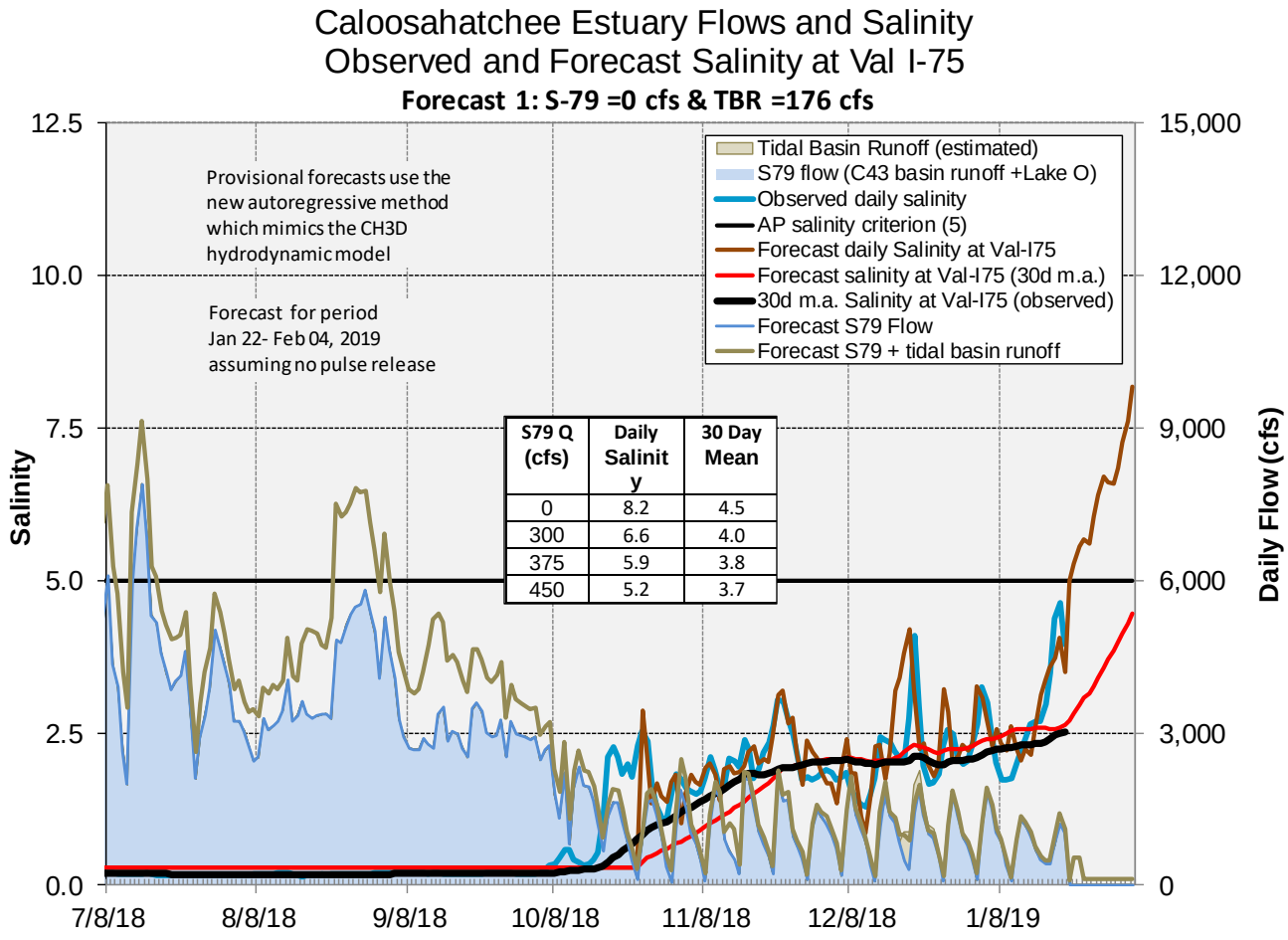
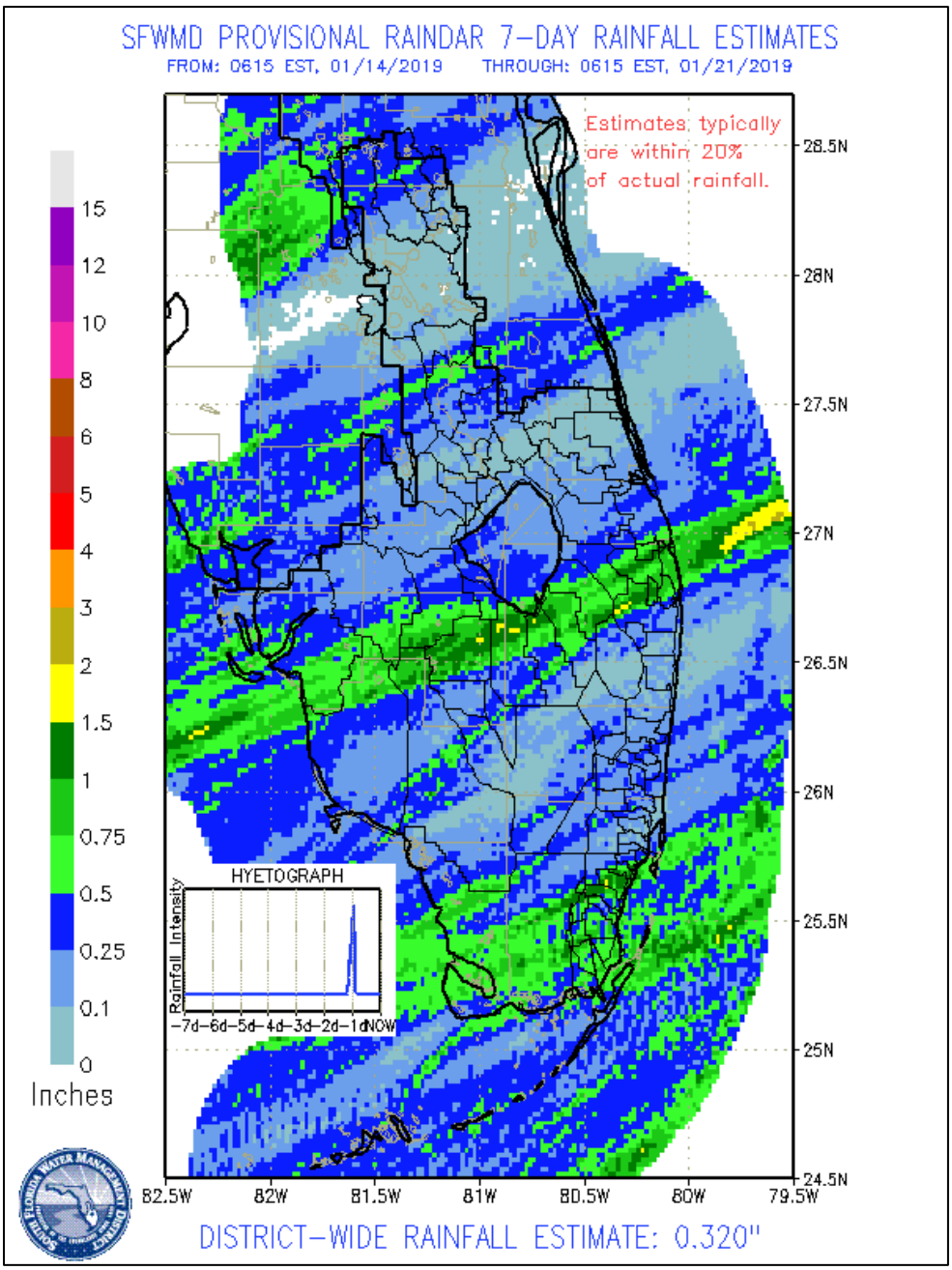


Figure 10. Forecasted Val I-75 surface salinity assuming no pulse release at S-79.

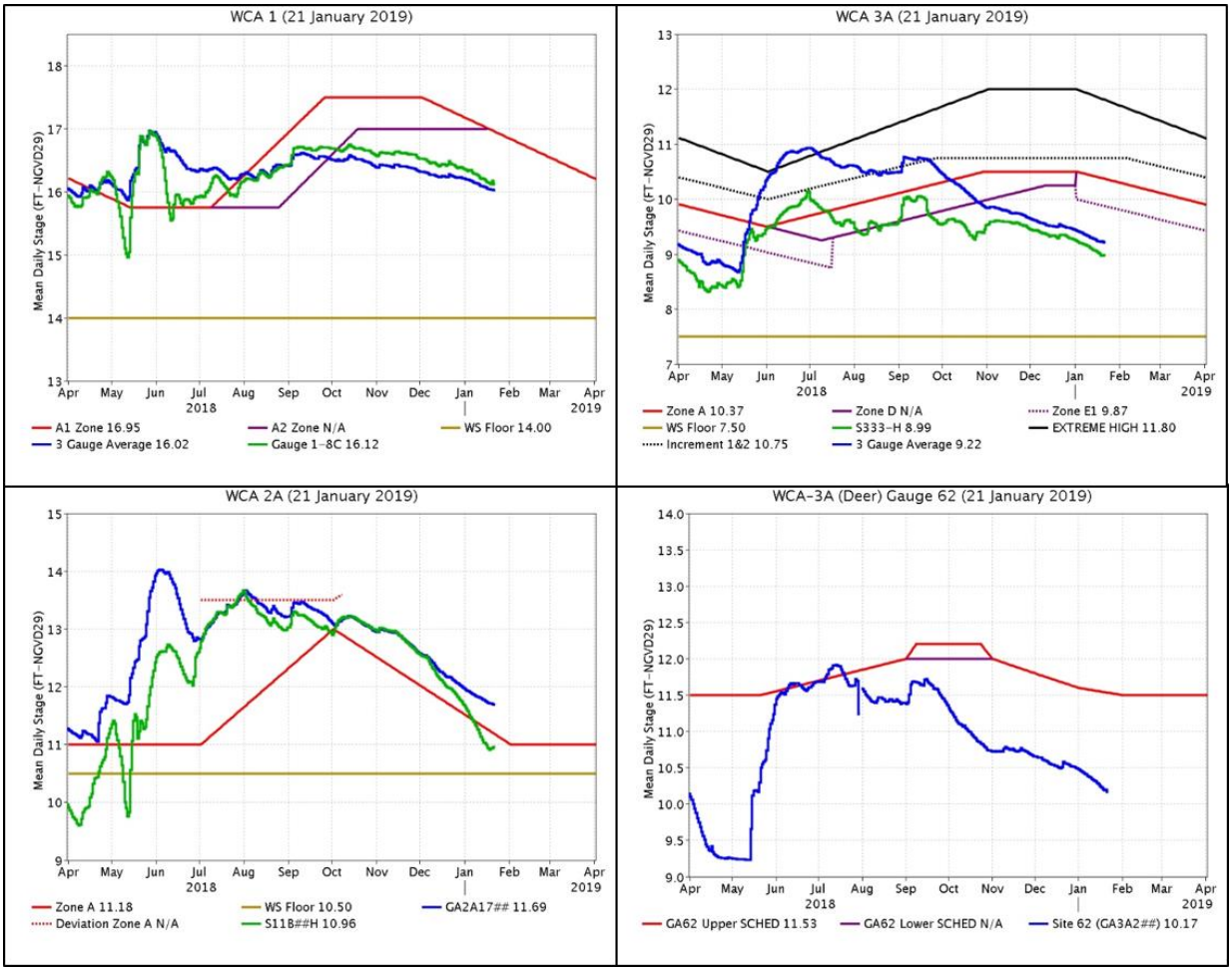
EVERGLADES

At the gauge locations monitored for this report, stages within the WCAs and ENP fell 0.07 feet on average over the last week, the same rate as the last month and slightly less than last week. The most extreme individual gauge changes within the WCAs ranged from -0.02 feet (WCA-3B) to -0.13 feet (WCA-2B). Pan evaporation was estimated at 0.91 inches this week.

Everglades Region	Rainfall (Inches)	Stage Change (feet)
WCA-1	0.19	−0.05
WCA-2A	0.15	−0.07
WCA-2B	0.17	−0.13
WCA-3A	0.19	−0.08
WCA-3B	0.26	−0.03
ENP	0.53	−0.07



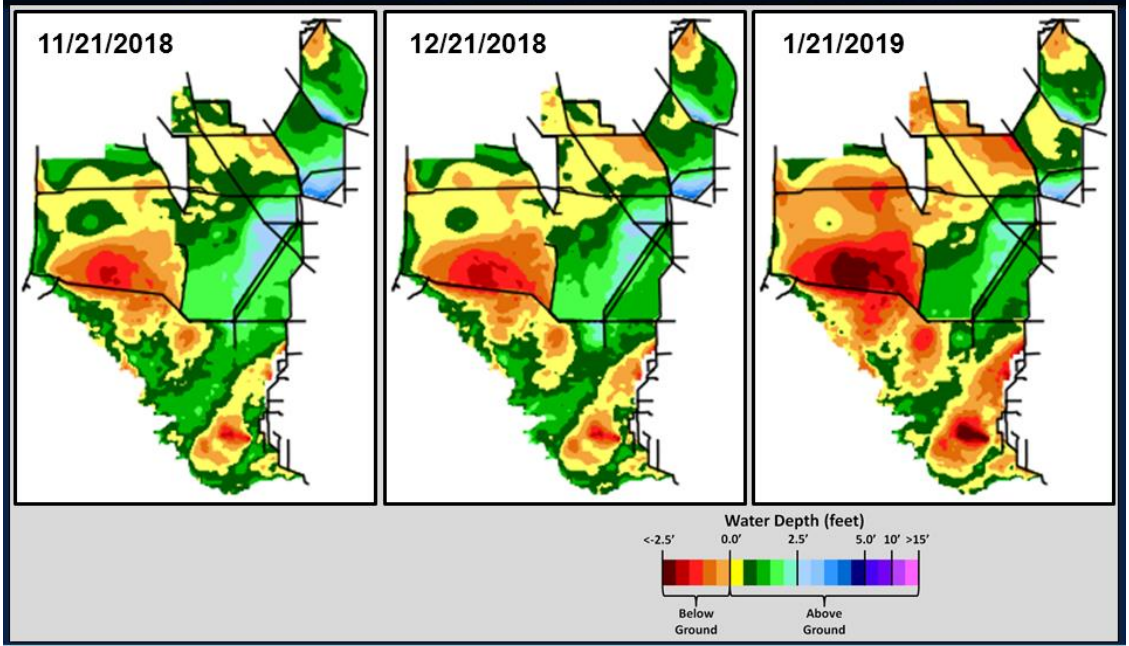
Regulation Schedules: Gauge 1-8C is 0.83 feet below the Zone A2 regulation line. The three-gauge average is 0.10 below the canal stage. Gauge 2A17 is 0.51 feet above Zone A and is receding parallel to that line. S-11B Headwater recovered slightly, now 0.22 feet below the regulation line (-0.26 last week). WCA-3A three-gauge average stage is 0.65 feet below the Zone E1 regulation line and trends parallel to the regulation line. WCA-3A at gauge 62 (northwest corner) remains 1.36 feet below the lower schedule and falls away from the regulation line.



Water Depths and Changes: The WDAT tool for spatial interpolation of depth monthly snapshots indicate conditions that are unseasonably dry, more typical of later in the dry season. In the northeast region of WCA-3A the model indicates nearly the entirety of WCA-3A North with depths at or near ground surface with the extreme northeast of that basin indicating depths greater than 0.5 feet below ground and now a clear pocket of habitat with 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 all of the Everglades over the last week and month, yet the rate of change is moderate and is happening at the same rate across the basins. Relatively small portions of extreme northeastern WCA-3A, southern WCA-2A and western WCA-1 have experienced a more than moderate drop. 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 high water stress.

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

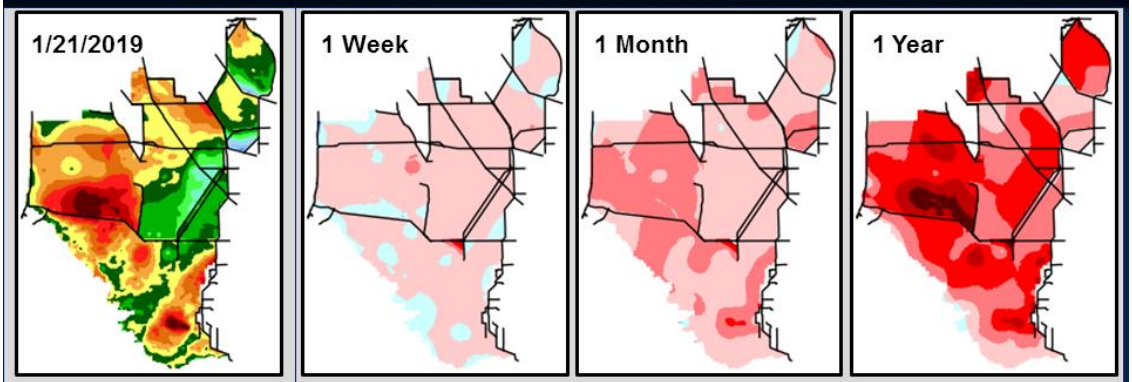
SFWDAT Water Depth Monthly Snapshots

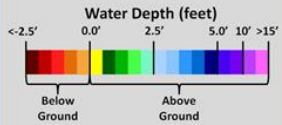


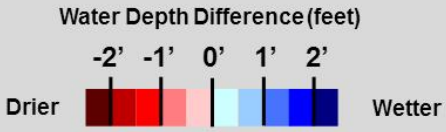
South Florida Water Depth Assessment Tool (SFWDAT)

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

SFWDAT Everglades Difference Maps (Present – Past)



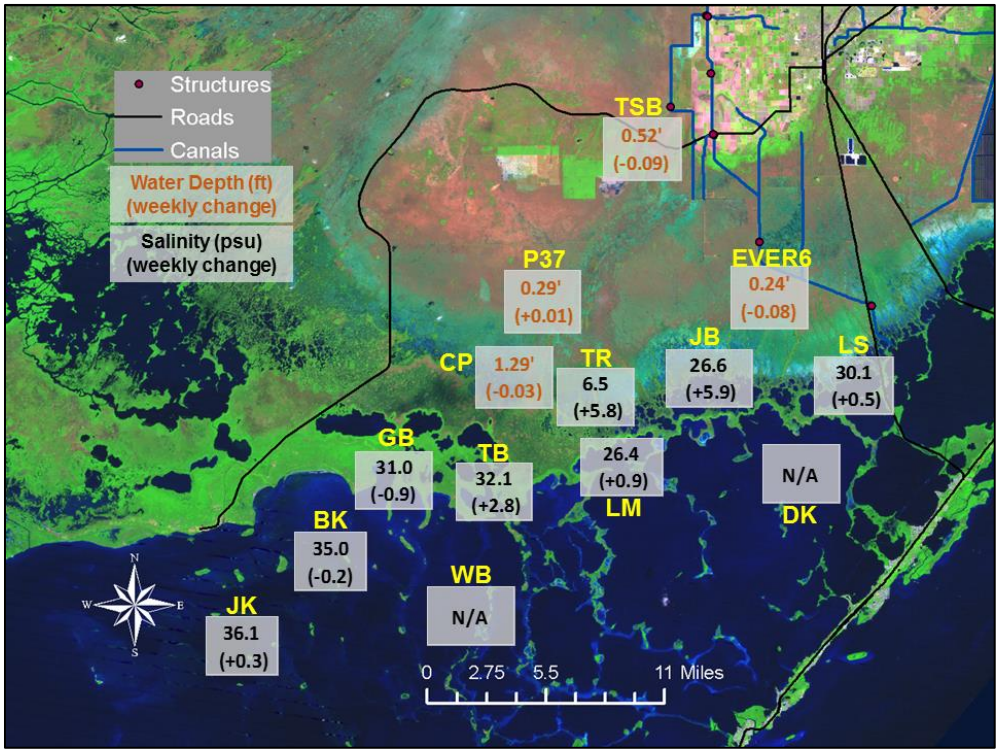


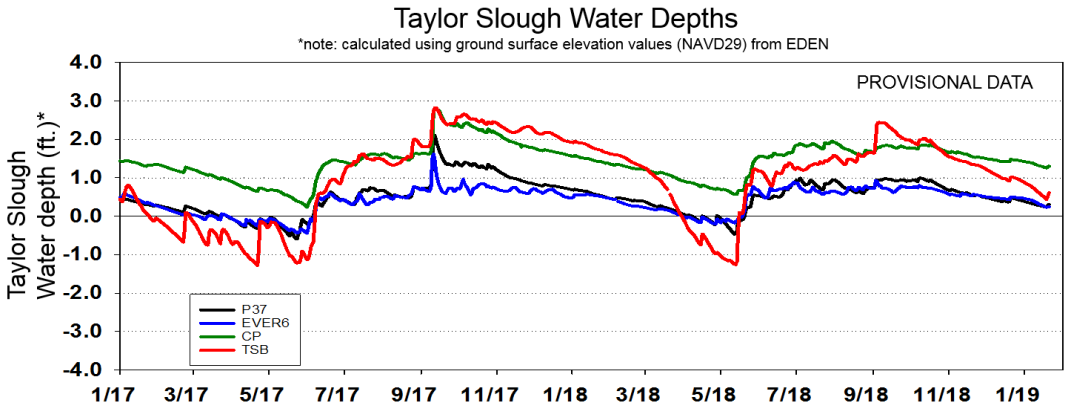


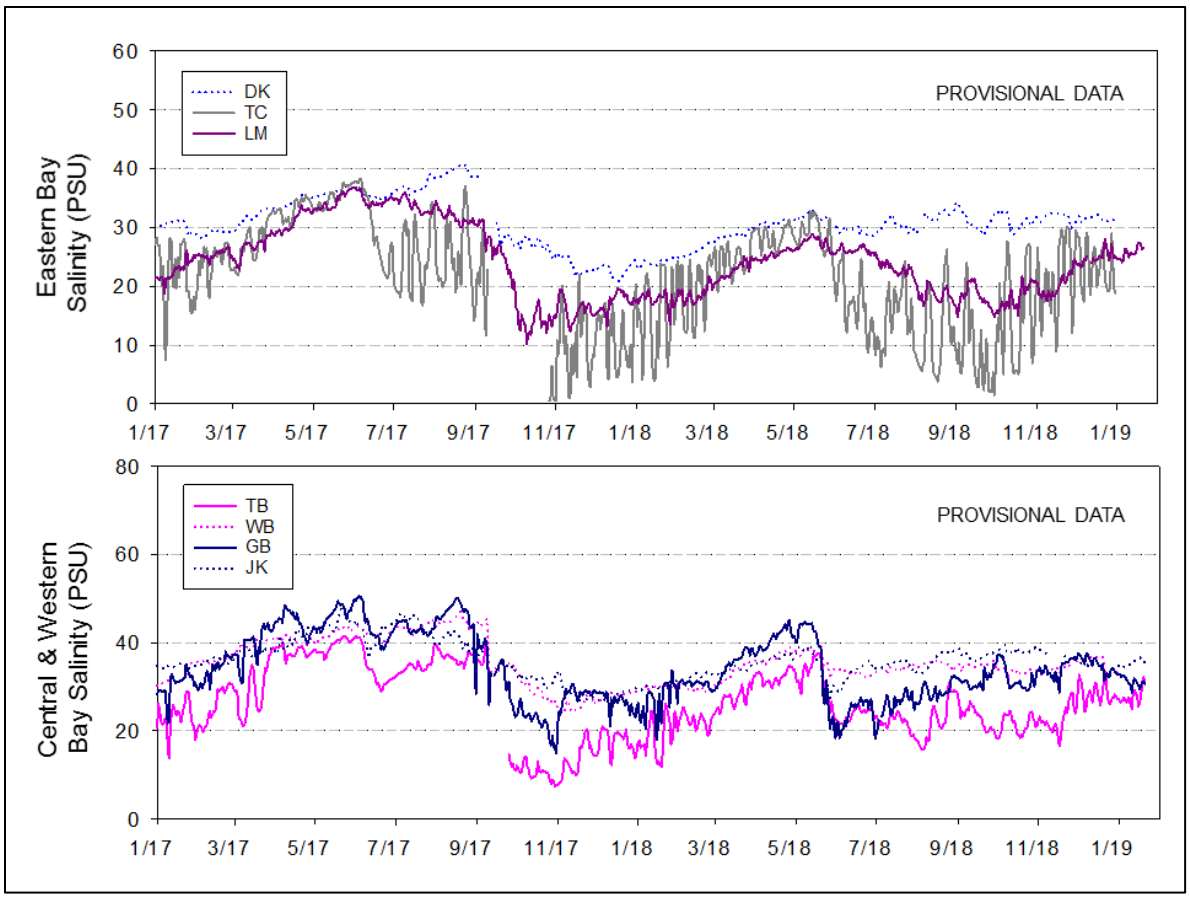
South Florida Water Depth Assessment Tool (SFWDAT)

Taylor Slough Water Levels: An average of 0.6 inches of rain fell on Taylor Slough and Florida Bay this past Sunday and stages to continue decreasing by an average of 0.05 feet last week. Water depths averaged 0.55 feet across Taylor Slough and are about 0.8 inches above average with the greatest divergence from average still near water management components in the north and east.

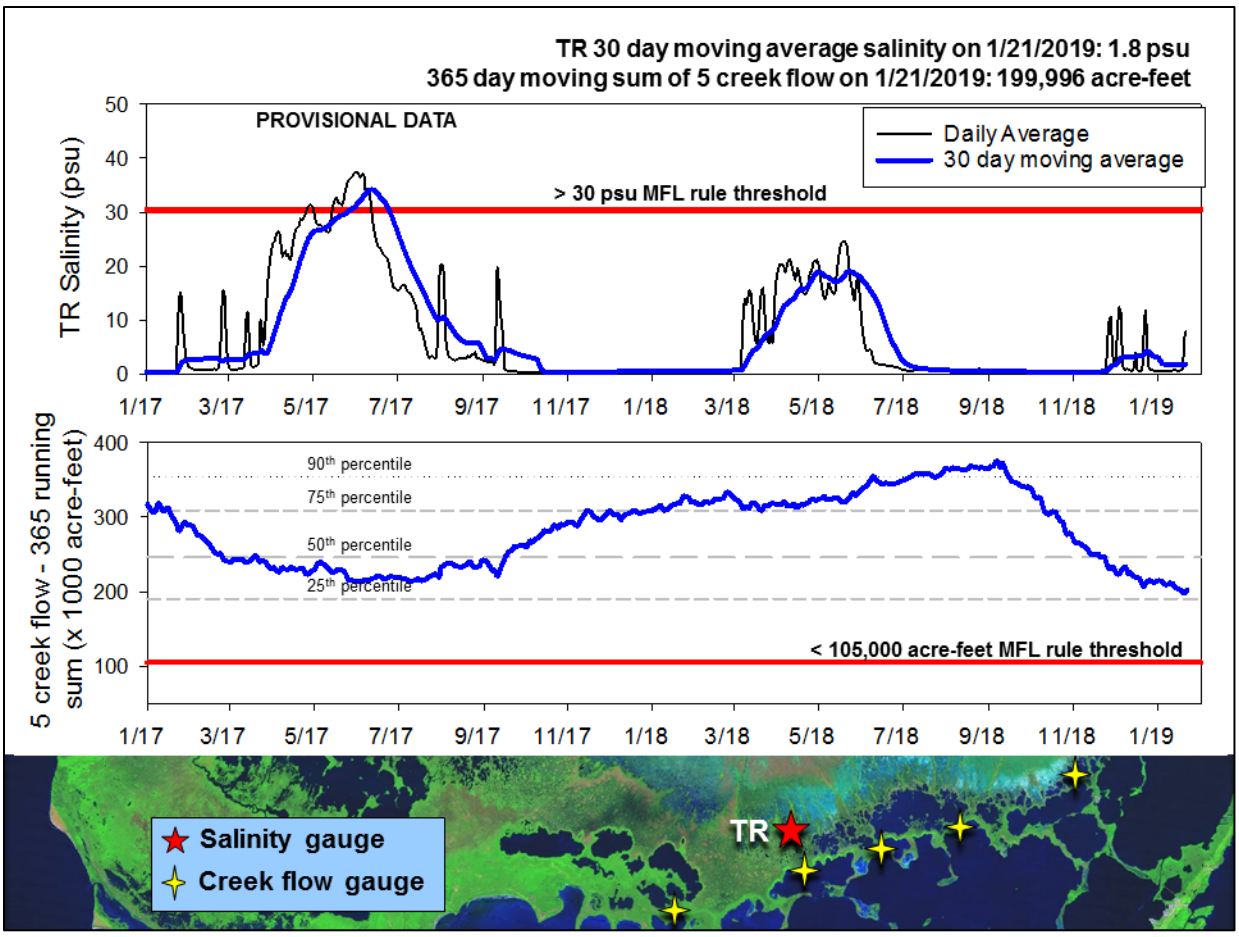
Florida Bay Salinities: Salinity data for eastern and central Florida Bay are not available. Elsewhere, salinities averaged a 1.3 psu increase with a maximum increase of 6 psu for the week in Joe Bay (JB). Daily average salinities ranged from 26 psu in the northeast to 36 psu in the western bay and are 1 to 12 psu above average for this time of year.







Florida Bay MFL: Salinity in the mangrove zone averaged 0.7 psu for the last week but started rising again over the weekend. The 30-day moving average remained at 1.8 psu after the last week. All 5 of the USGS creek gauges used for the Florida Bay MFL are back online. The weekly total of flow from the 5 creeks indicated by yellow stars on the map was -351 acre-feet. Flows had been upstream since Thursday. As of Monday, positive flows had resumed. The 365-day moving sum of flow from the five creeks (tracked as part of the Florida Bay MFL criteria) has decreased to 199,996 acre-feet (less than the long-term average of 257,628 acre-feet and approaching the 25th percentile). 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. Any water not available to protect the peat soils in WCA-3A North, would be ecologically beneficial to Holeyland and Rotenburger WMA. 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, most likely this was aided by water management. This benefit was noted visually from the air two weeks ago, 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 22nd, 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 0.07'	Maintain depths at regulation schedule. Moderate recession rates to the extent possible.	Protect upstream/downstream habitat and wildlife.
WCA-2B	Stage decreased by 0.13'	Maintain depths at regulation schedule. Moderate recession rates to the extent possible.	Protect upstream/downstream habitat and wildlife.
WCA-3A NE	Stage decreased by 0.06'	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 0.12'	Maintain depths at regulation schedule. Moderate recession rates to the extent possible.	
Central WCA-3A S	Stage decreased by 0.05'	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 0.07'		
WCA-3B	Stage decreased by 0.03'	Maintain depths at temporary regulation schedule. Moderate recession rates to the extent possible.	Protect upstream/downstream habitat and wildlife.
ENP-SRS	Stage decreased by 0.07'	Make discharges to the Park according to the 2012 WCP rainfall plan.	Protect upstream/downstream habitat and wildlife.
Taylor Slough	Stage changes ranged from −0.09' to +0.01'	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 −0.9 to +5.9 psu	Move water southward as possible	When available, provide freshwater to maintain low salinity buffer and promote water movement.