SOUTH FLORIDA WATER MANAGEMENT DISTRICT

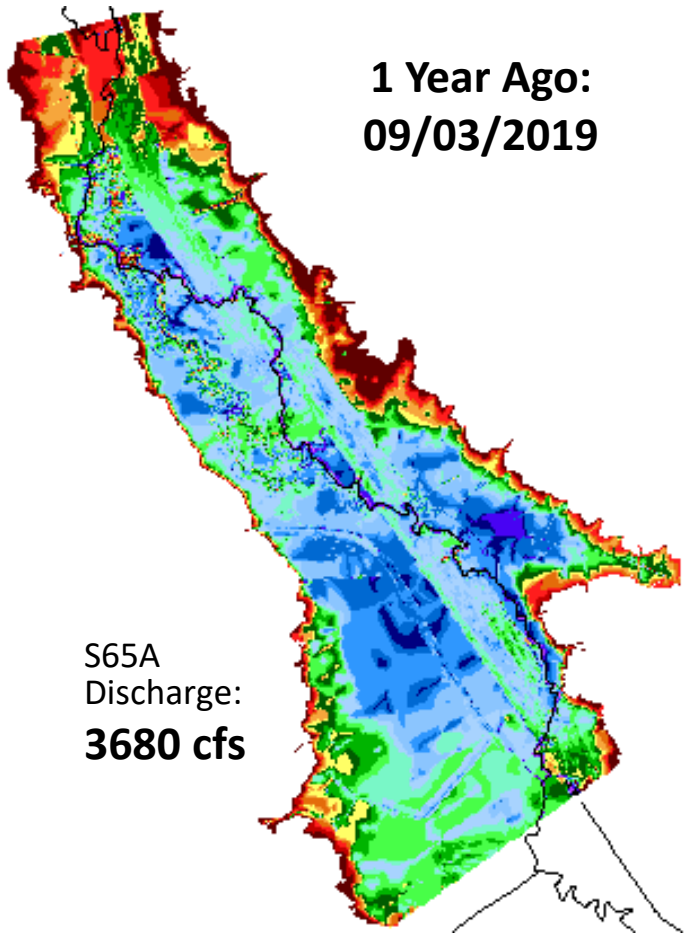
Governing Board Meeting
September 10, 2020

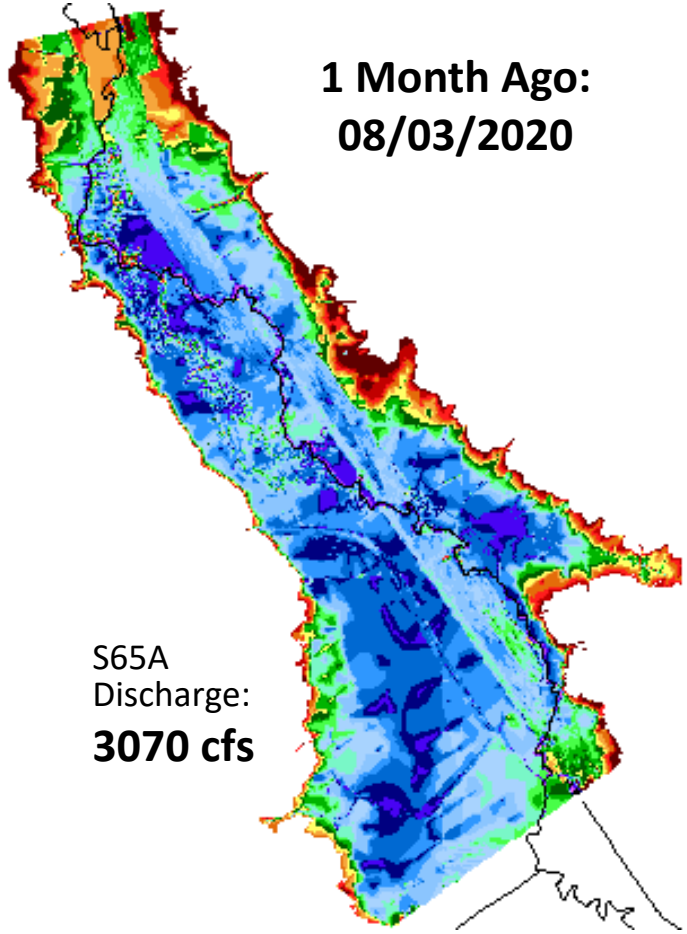
Ecological Conditions Update

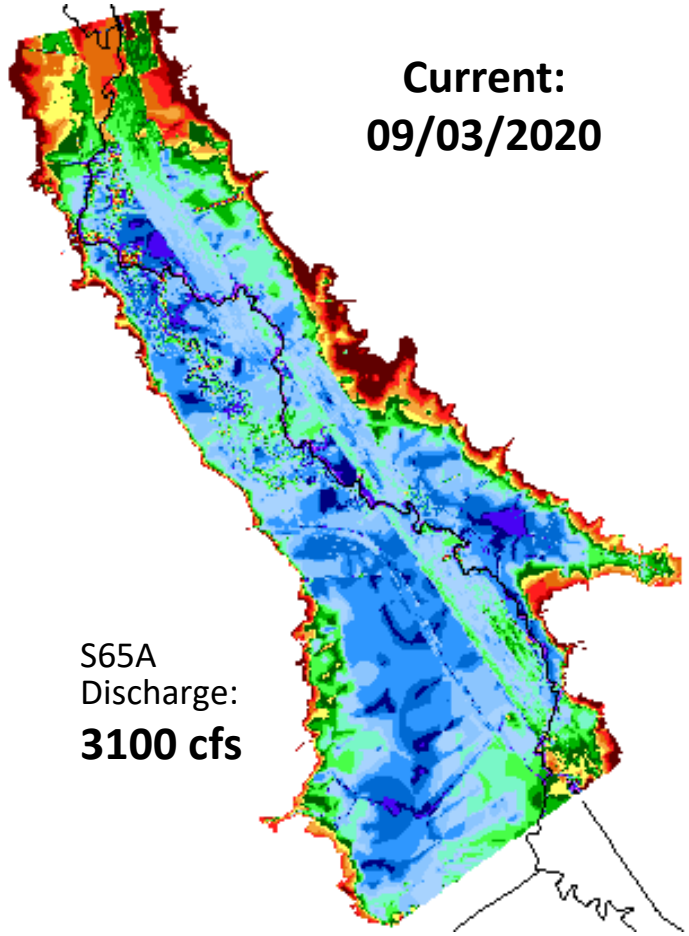
Lawrence Glenn
Water Resources Division Director

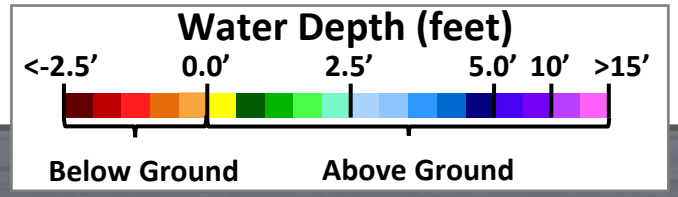
Roosevelt Bridge over St. Lucie Estuary in Stuart, Florida
Photograph courtesy of Anna Wachnicka, SFWMD

Kissimmee River Phase I Restoration Area
Water Depth Maps

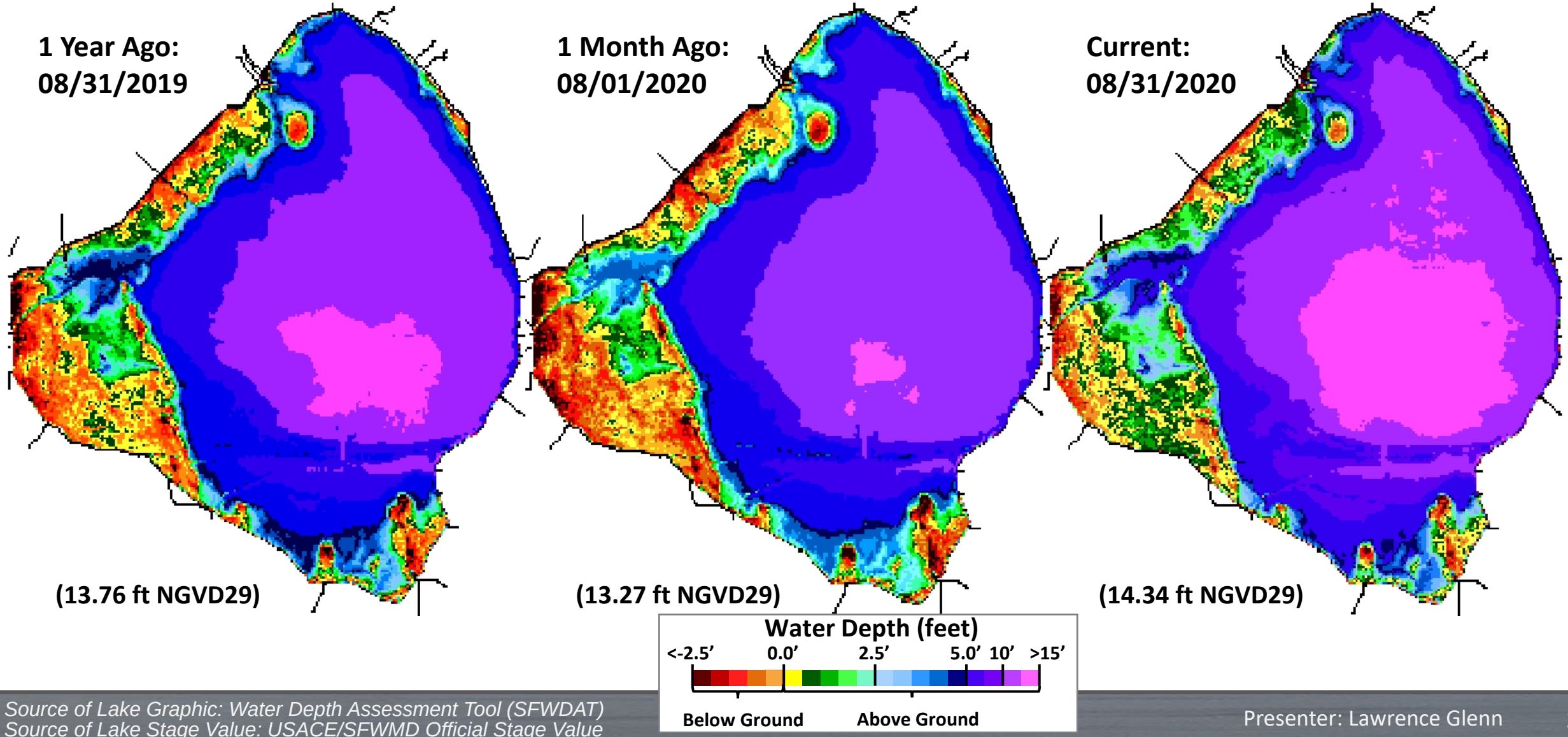






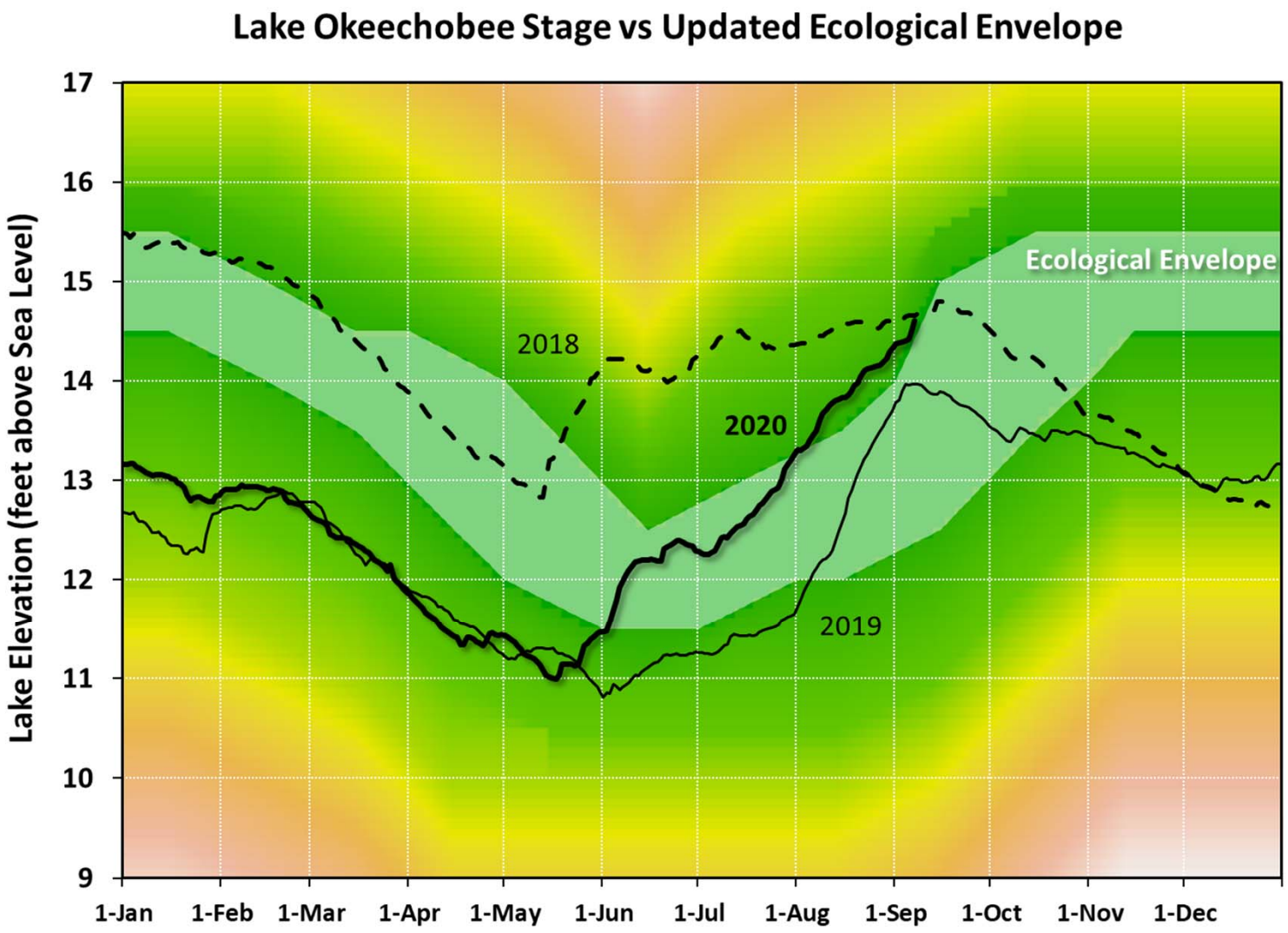


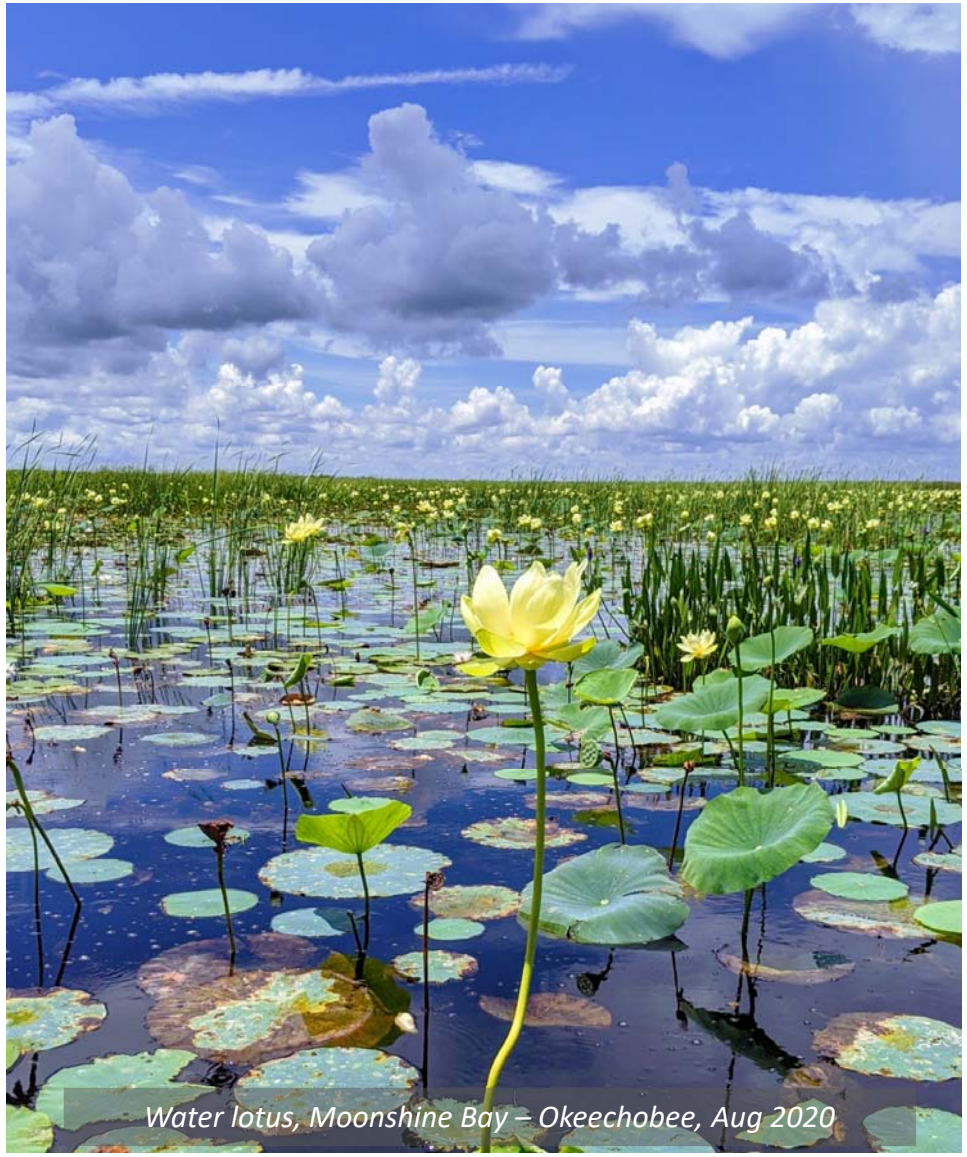
Lake Okeechobee Water Depth Maps



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

Lake Okeechobee Stages and Ecological Envelope





Water lotus, Moonshine Bay – Okeechobee, Aug 2020

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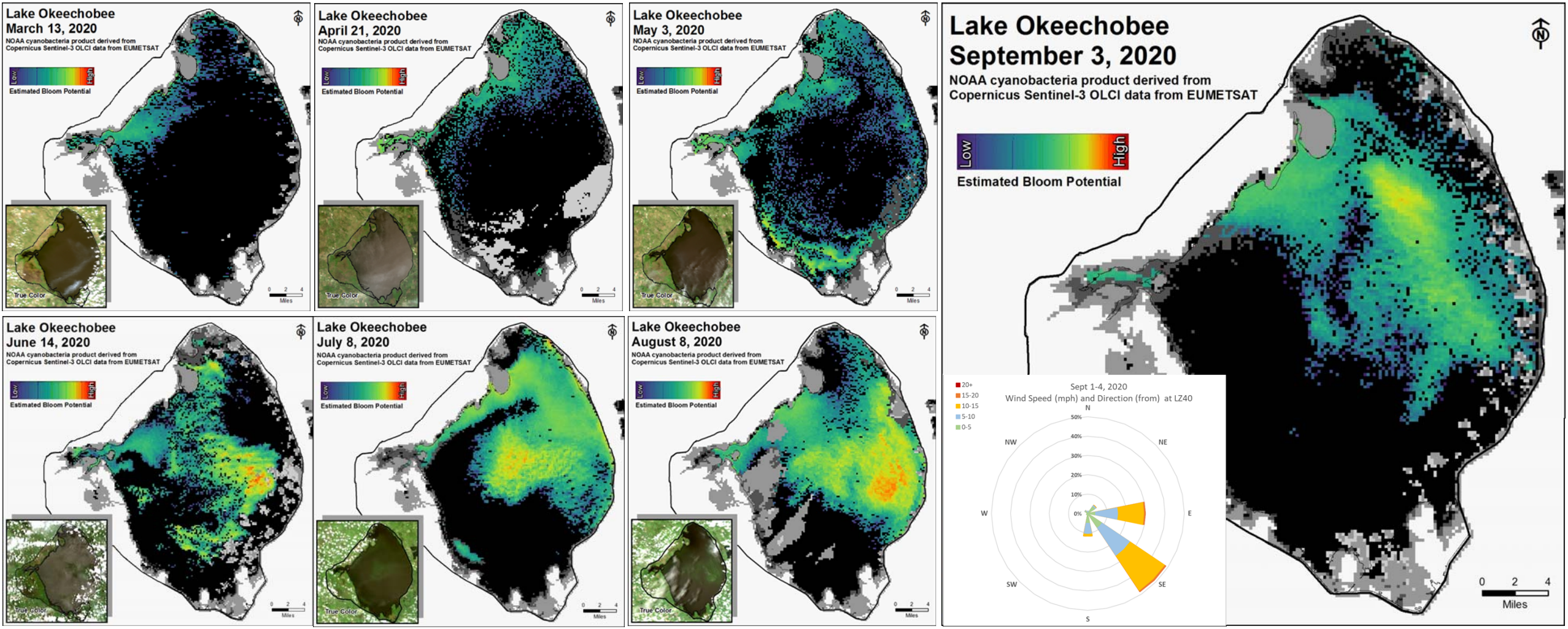
Lake Okeechobee
Cyanobacteria Bloom Potential



NOAA cyanobacteria product derived from Copernicus Sentinel-3 OLCI data from EUMETSAT

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Lake Okeechobee Water Quality

Provisional Data

Samples collected on August 4- 5, 2020

Station	CHL*a* (ug/L)	TOXIN (ug/L)	TAXA
FEBIN (8/17)	P	BDL	*Cylindro*
* FEBOUT (8/17)	P	**0.2**	*Planktol*
KISSR0.0	20.0	BDL	*mixed*
L005	21.0	BDL	*Cylindro*
LZ2	32.3	BDL	*mixed*
KBARSE	51.9	**1.0**	*Micro/Cylin*
* RITTAE2	17.0	**0.4**	*Microcys*
PELBAY3	7.6	**0.3**	*mixed*
POLE3S	9.0	BDL	*mixed*
LZ25A	5.8	BDL	*mixed*
PALMOUT	6.1	BDL	*mixed*
PALMOUT1	21.9	**3.2**	*Microcys*
PALMOUT2	15.4	**2.2**	*Microcys*
PALMOUT3	7.7	**2.0**	*Microcys*
POLESOUT	66.8	**0.3**	*Cylindro*
POLESOUT1	39.5	**0.3**	*Cylindro*
POLESOUT2	66.0	**0.3**	*Micro/Cylin*
POLESOUT3	45.2	**0.5**	*Micro/Cylin*
EASTSHORE	67.5	**0.5**	*Microcys*
NES135	74.5	BDL	*NS*
NES191	47.2	**0.3**	*mixed*

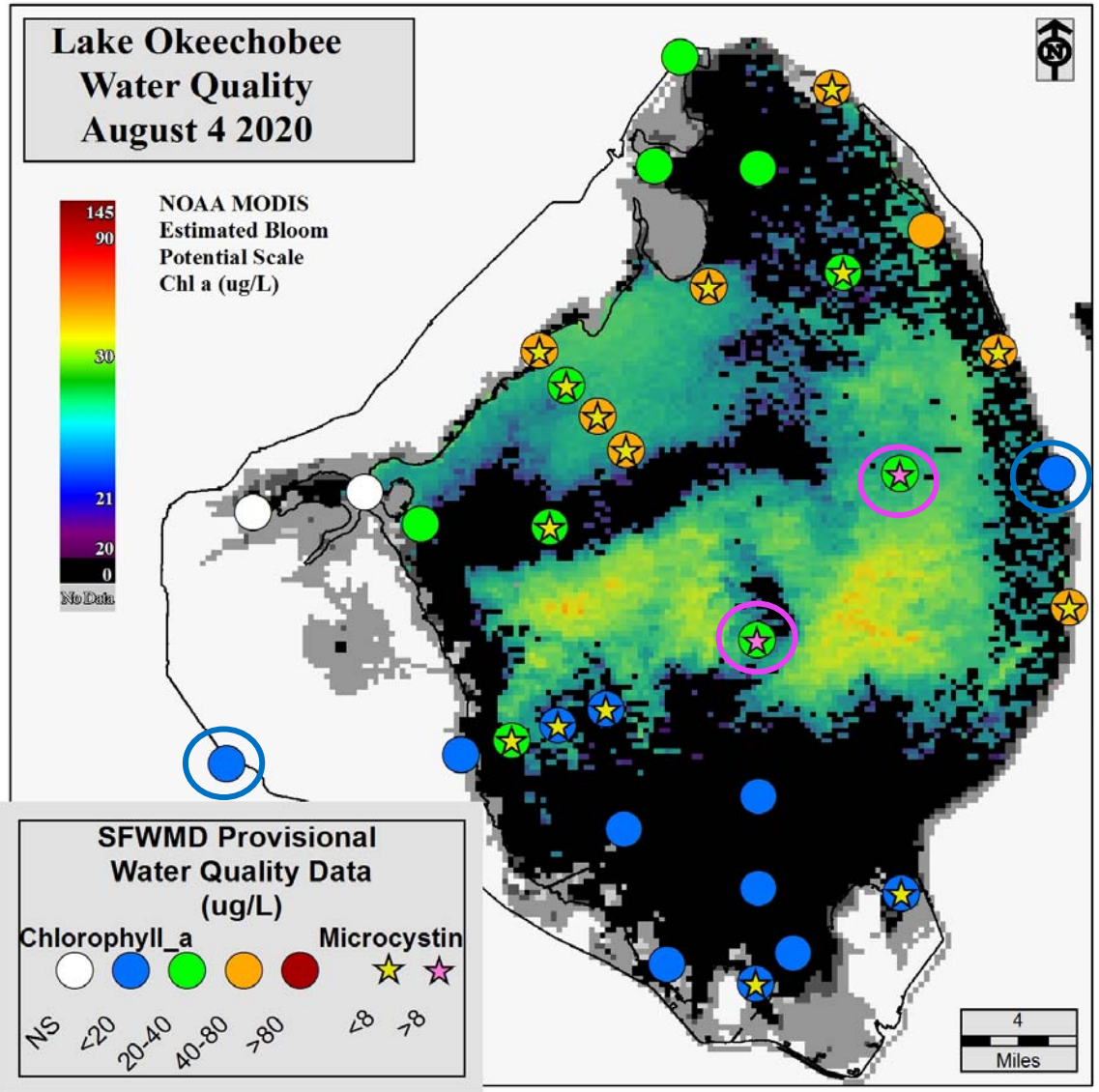
Station	CHL*a* (ug/L)	TOXIN (ug/L)	TAXA
L001	34.1	BDL	*mixed*
L004	21.5	28.0	*Microcys*
L006	6.5	BDL	*mixed*
L007	6.3	BDL	*mixed*
L008	32.5	**0.7**	*Microcys*
LZ30	8.3	BDL	*Microcys*
LZ40	31.9	25.0	*Microcys*
CLV10A	69.7	**0.3**	*Microcys*
NCENTER	38.4	**1.8**	*Microcys*

Samples collected Aug 10

S308C	4.1	BDL	*mixed*
S77	3.9	BDL	*mixed*

- SFWMD considers >40 µg/L Chlorophyll *a* (Chl*a*) an algal bloom
- BDL – Below Detectable Limit of **0.25** µg/L
- ND – No Dominant taxa
- P – Pending
- NS – Not Sampled
- Bold – crew observed possible BGA
- Chlorophyll *a* analyzed by SFWMD
- Toxin and Taxa analyzed by FDEP

Cylindro = Cylindrospermopsis
Planktol = Planktolyngbya
Dolicho = Dolichospermum



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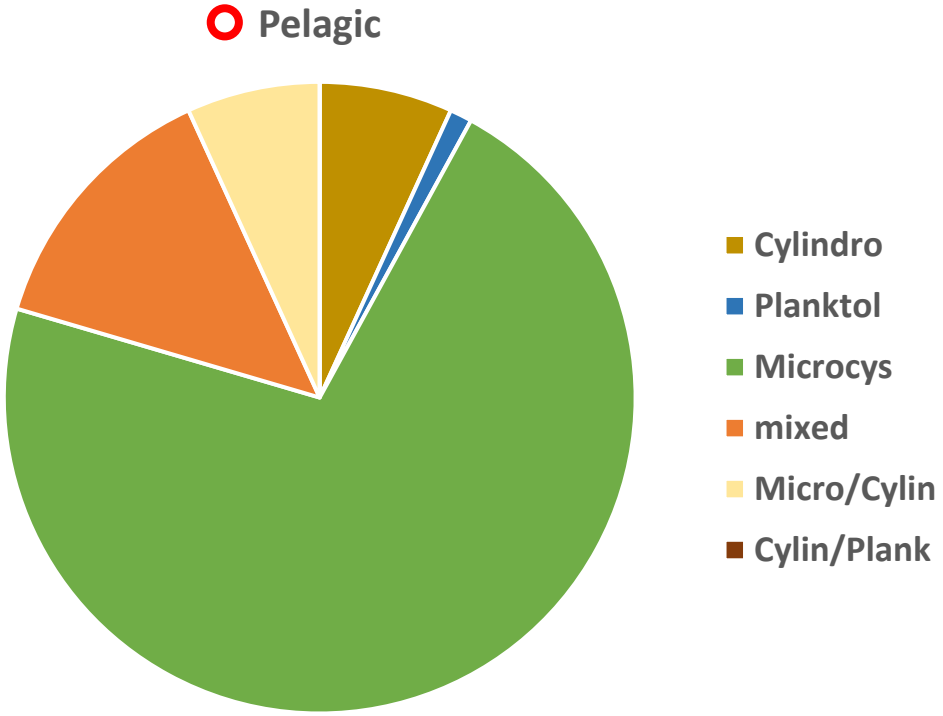
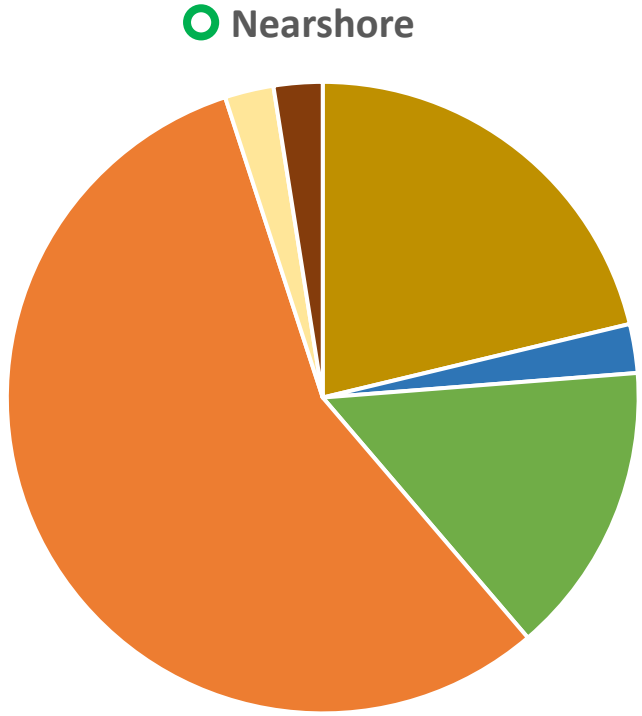
Lake Okeechobee Dominant Cyanobacteria Taxa (Jun-Aug)

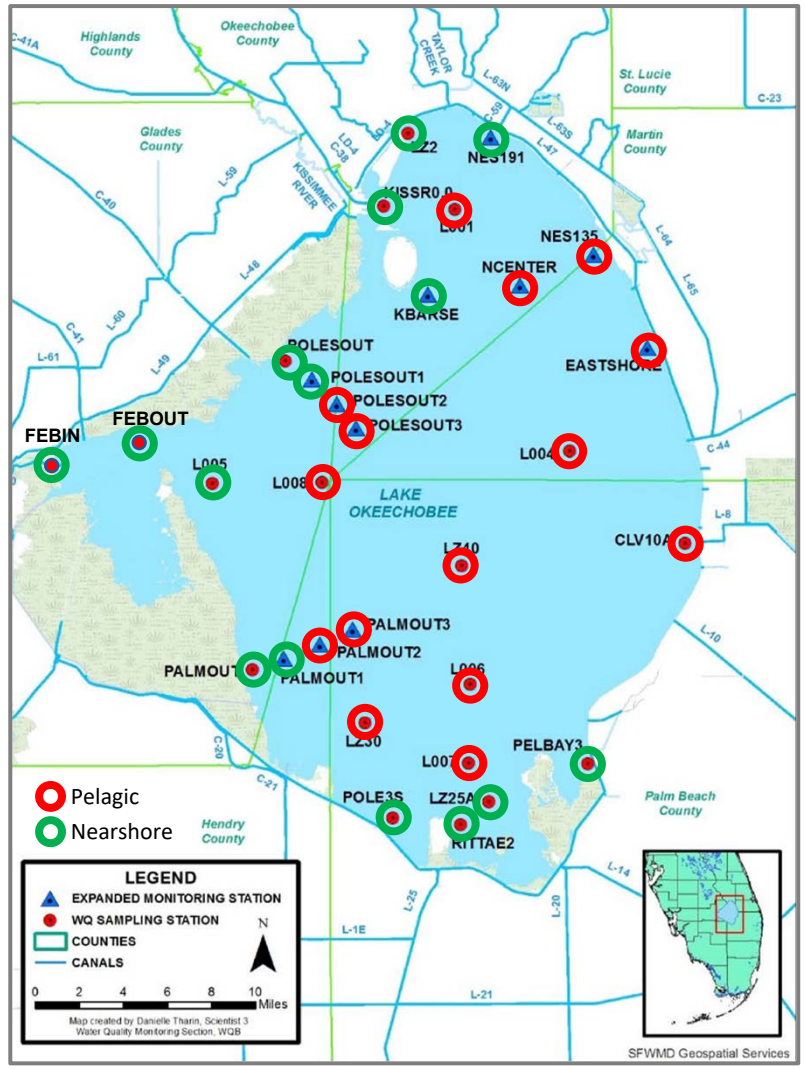
Algal Taxa Likely Dominating Samples from June – August (FDEP)





Microcystis was usually dominant taxa in center of lake

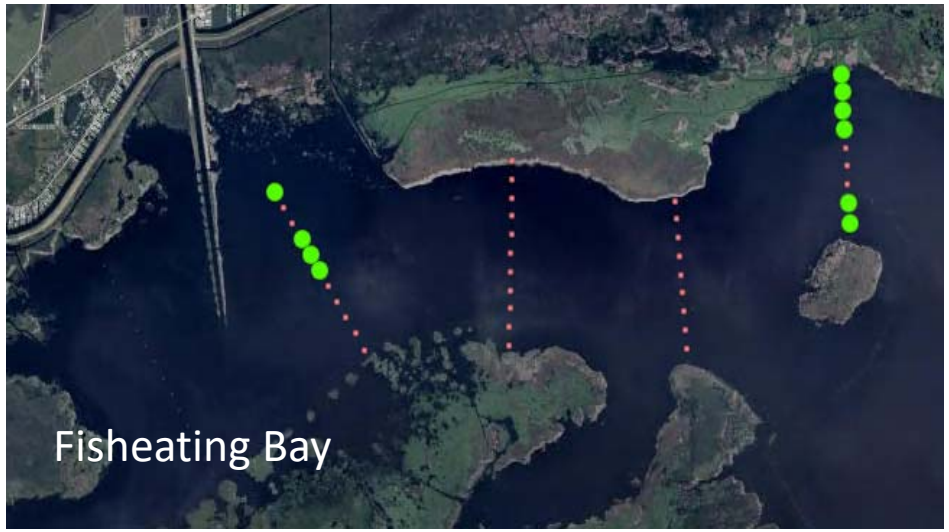
Microcystis not dominant in samples closer to shore; often mixed taxa

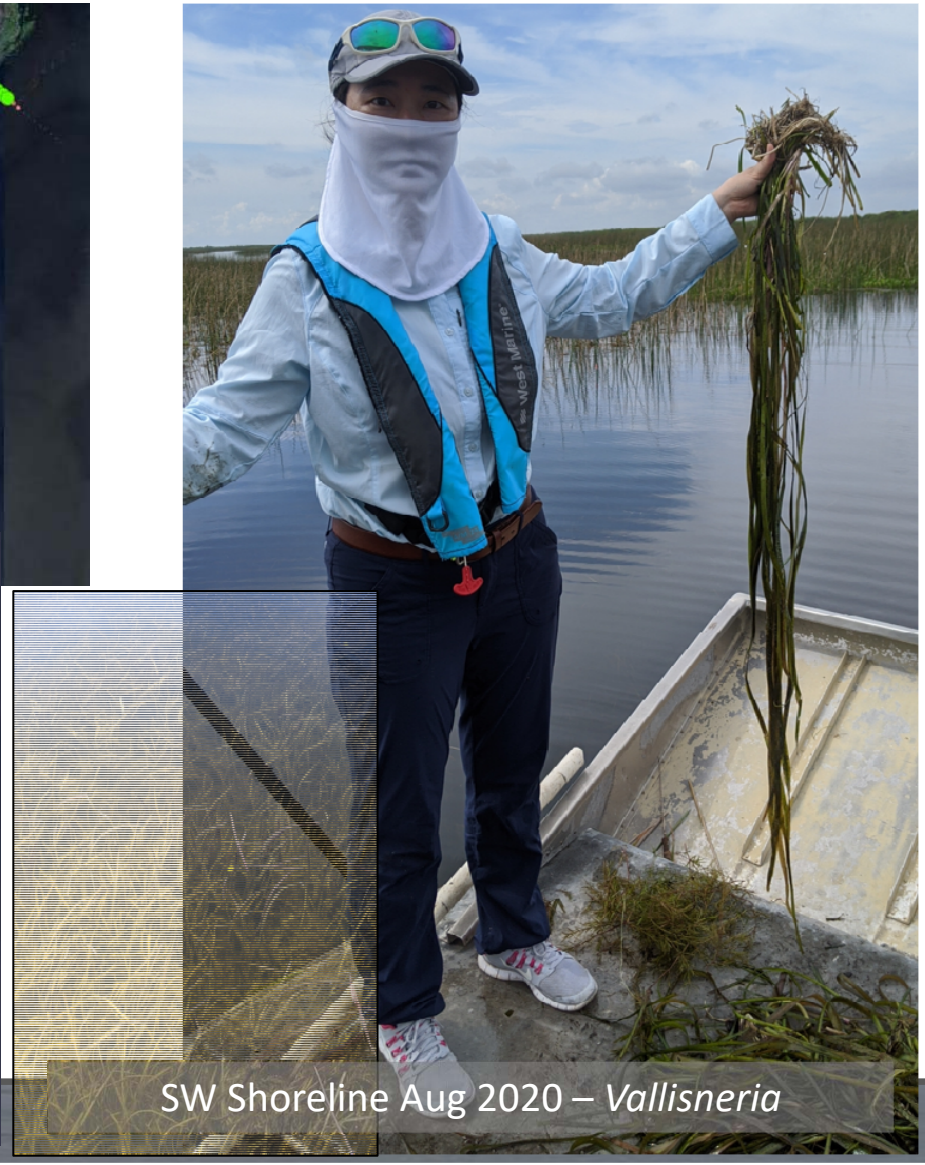


Source: https://floridadep.gov/dear/algal-bloom/content/algal-bloom-sampling-results

(Data are from all samples collected, not just from sites with visible blooms or high Chla concentrations)

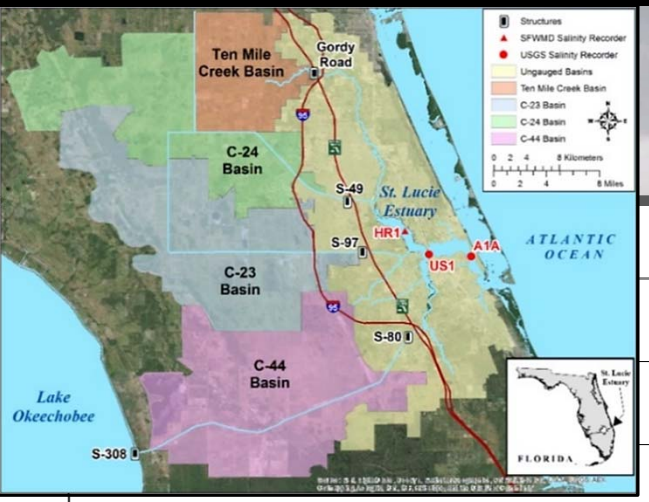
SAV Shoreline Transect Monitoring



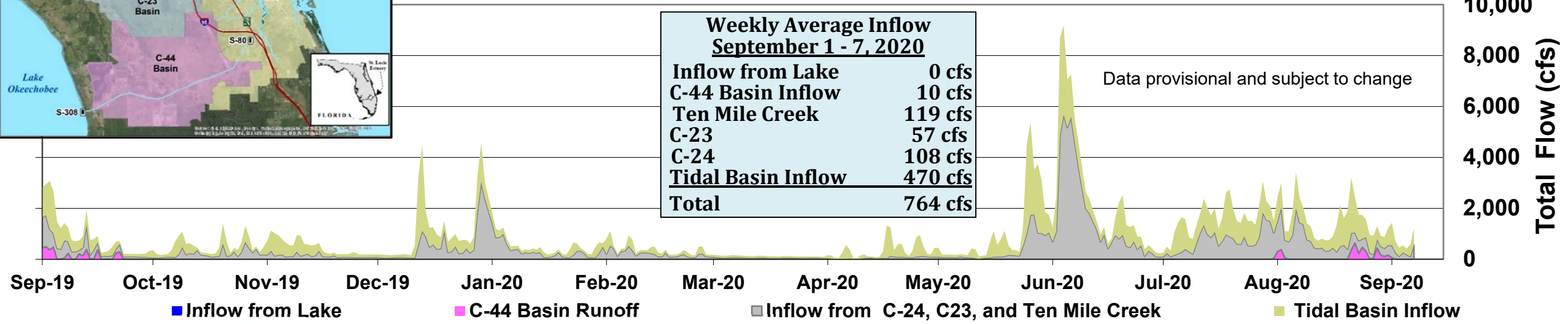


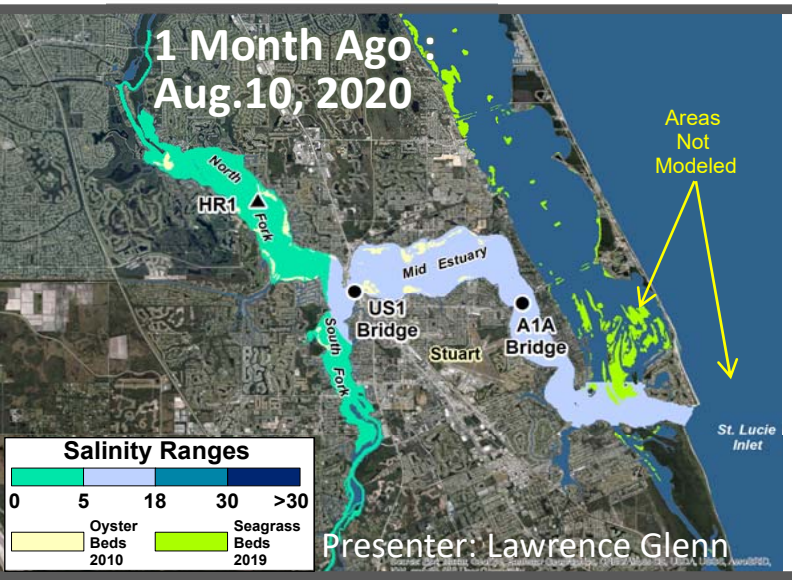
SW Shoreline Aug 2020 – *Vallisneria*

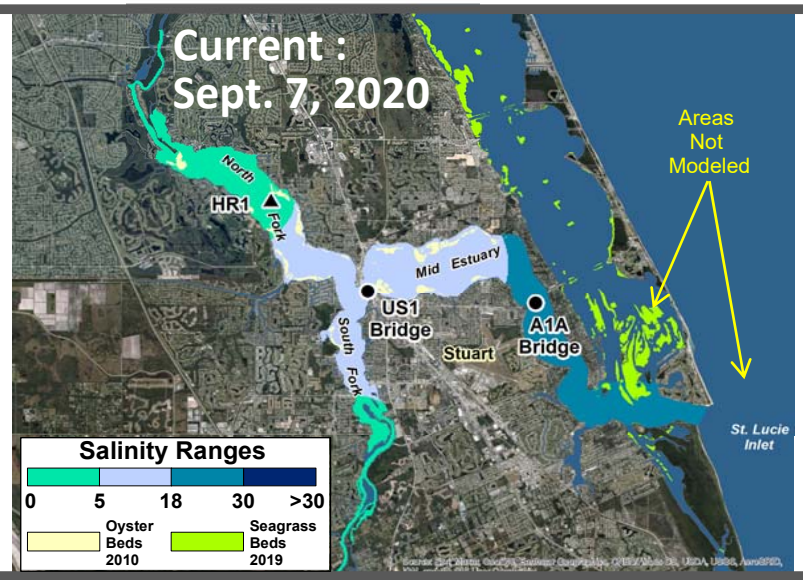
St. Lucie Inflows and Salinity Conditions



Total Daily Inflow into the St. Lucie Estuary







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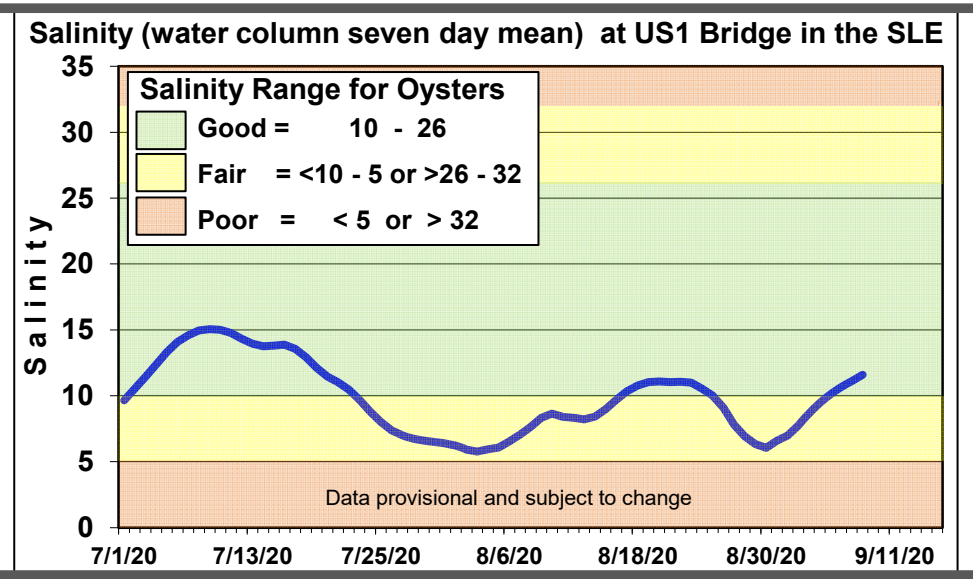
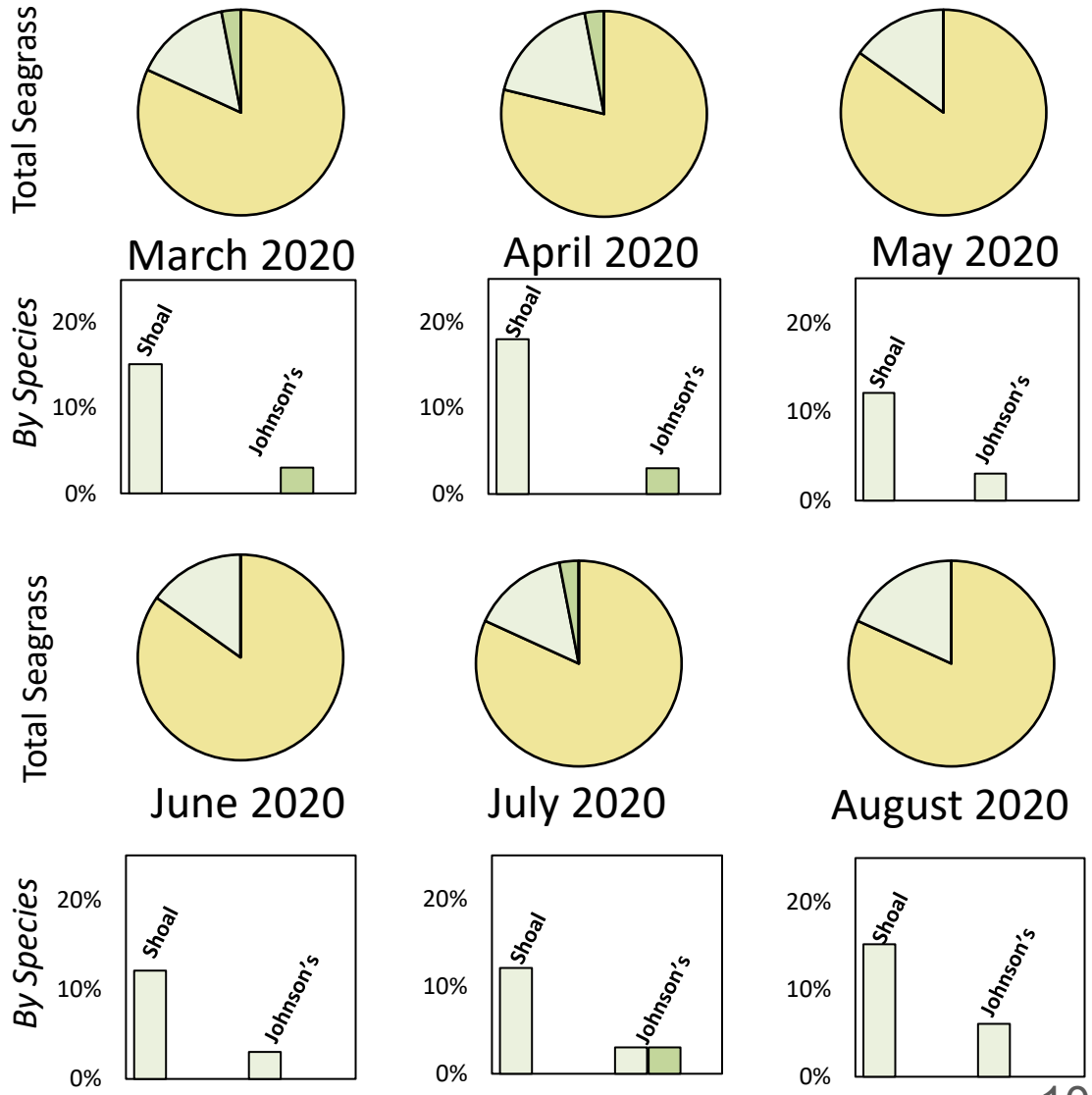


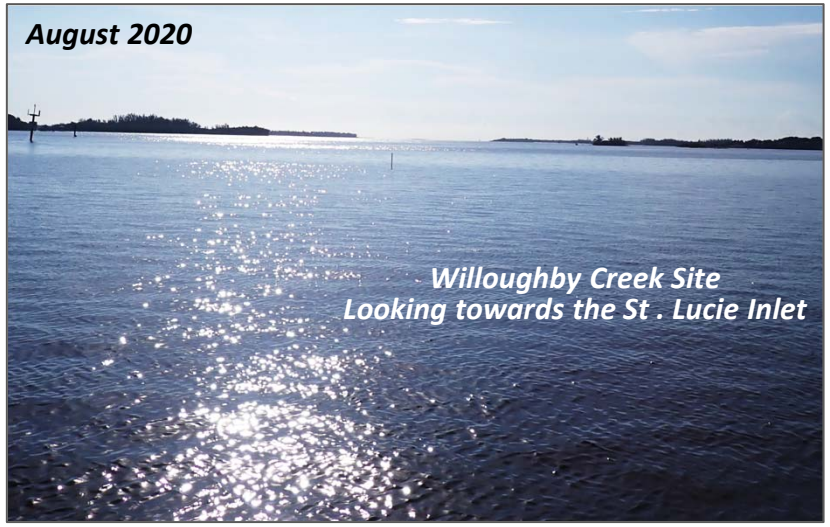
St. Lucie Estuary Seagrass
Willoughby Creek Site March - August 2020

Seagrass % cover categories:

- 0 %
- < 5%
- 6-25%
- 26-50%
- 51-75%

Relative number of quadrats along the transects in each of the seagrass percent cover categories by total seagrass (pie charts) and by species (bar graphs)





St. Lucie Seagrass
St. Lucie Inlet Site March – August 2020

Seagrass % cover categories:

- 0 %
- < 5%
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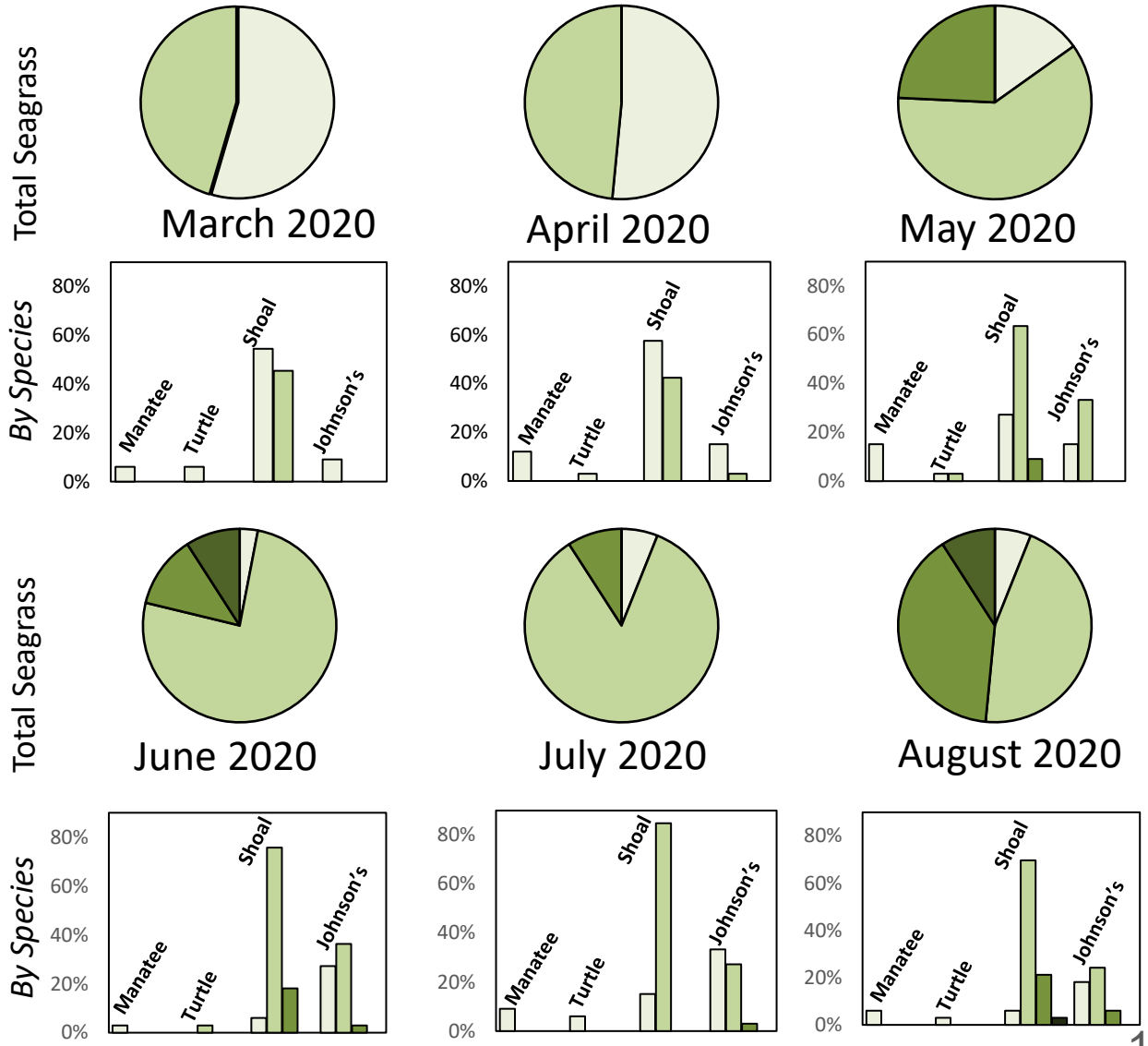
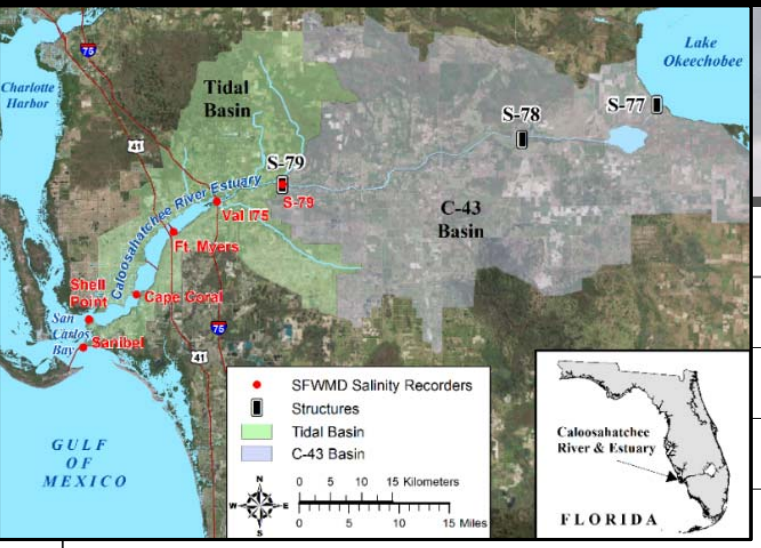
- 26-50%
- 51-75%

Relative number of quadrats along the transects in each of the seagrass percent cover categories by total seagrass (pie charts) and by species (bar graphs)



Caloosahatchee Inflows and Salinity Conditions

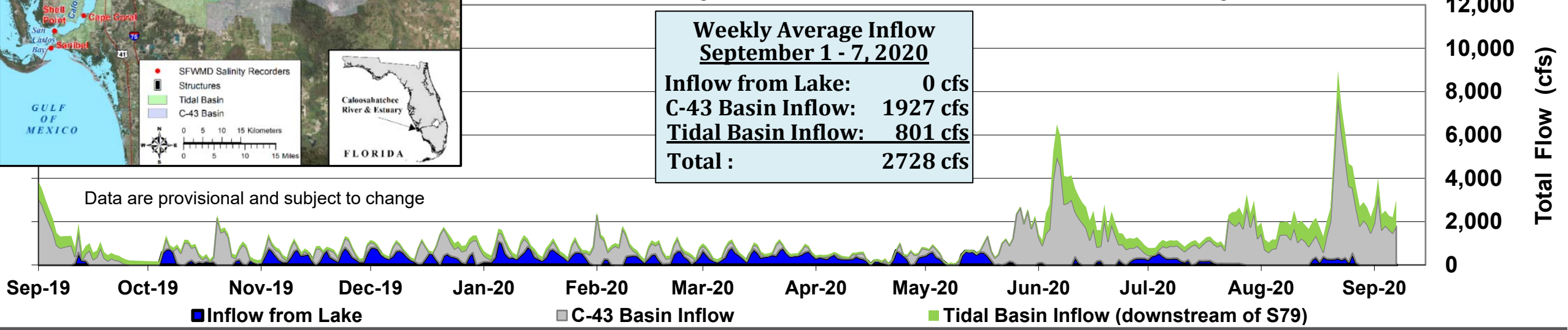


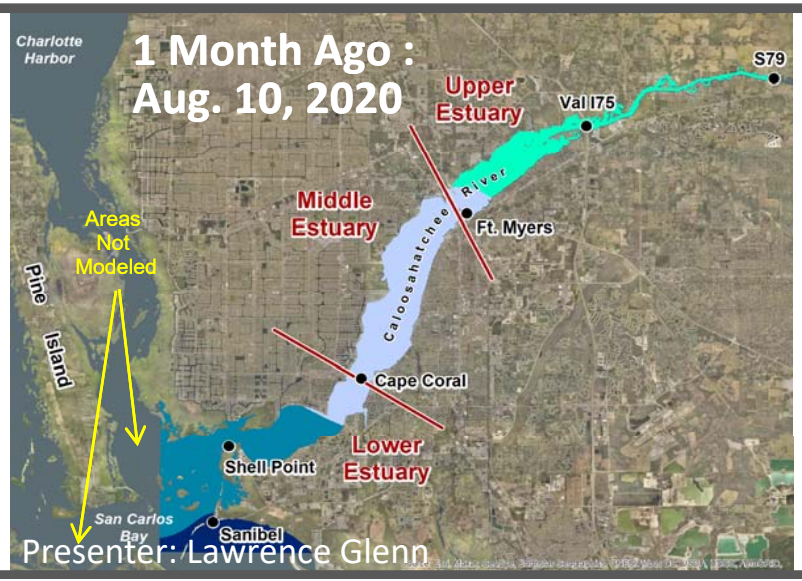
Total Daily Inflow into the Caloosahatchee Estuary

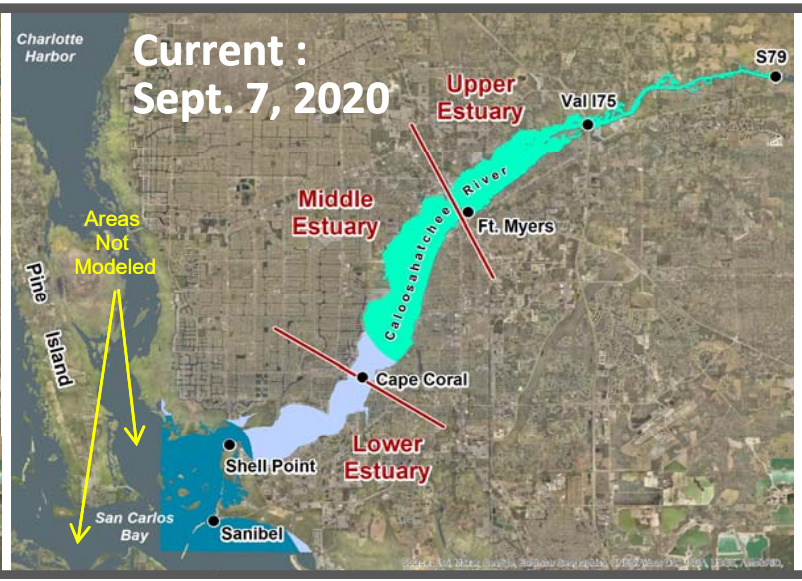
Weekly Average Inflow
September 1 - 7, 2020

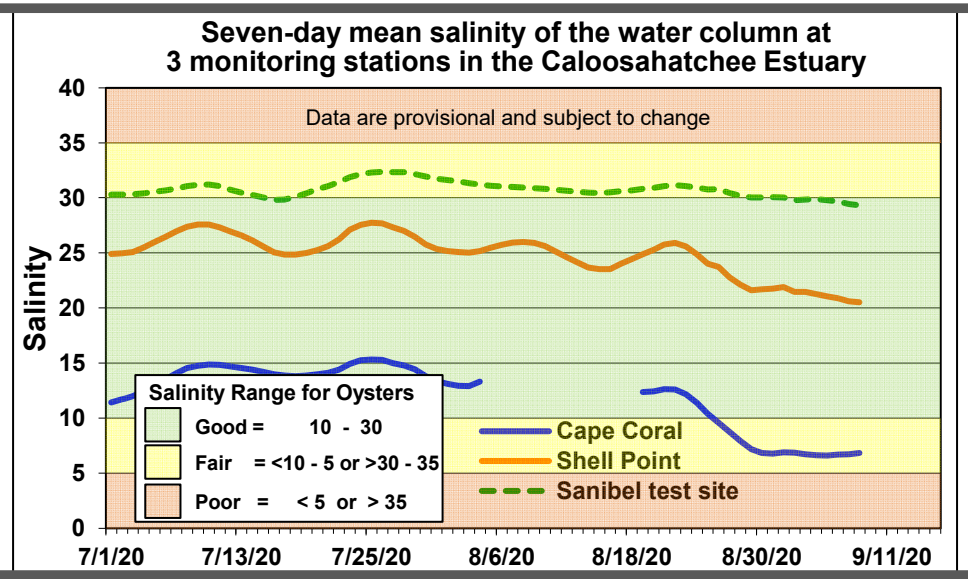
Inflow from Lake:	0 cfs
C-43 Basin Inflow:	1927 cfs
Tidal Basin Inflow:	801 cfs
Total :	2728 cfs

Data are provisional and subject to change









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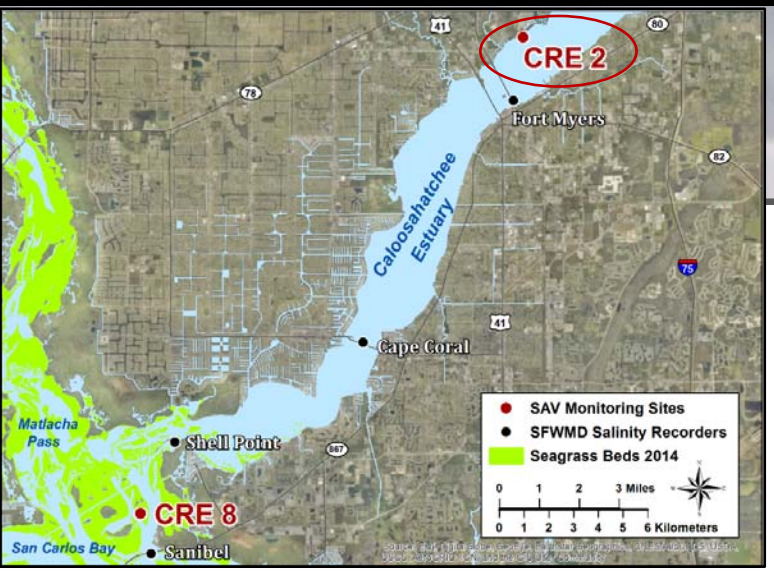
Caloosahatchee River Estuary – CRE 2 SAV (Submerged Aquatic Vegetation)



SAV % cover categories:

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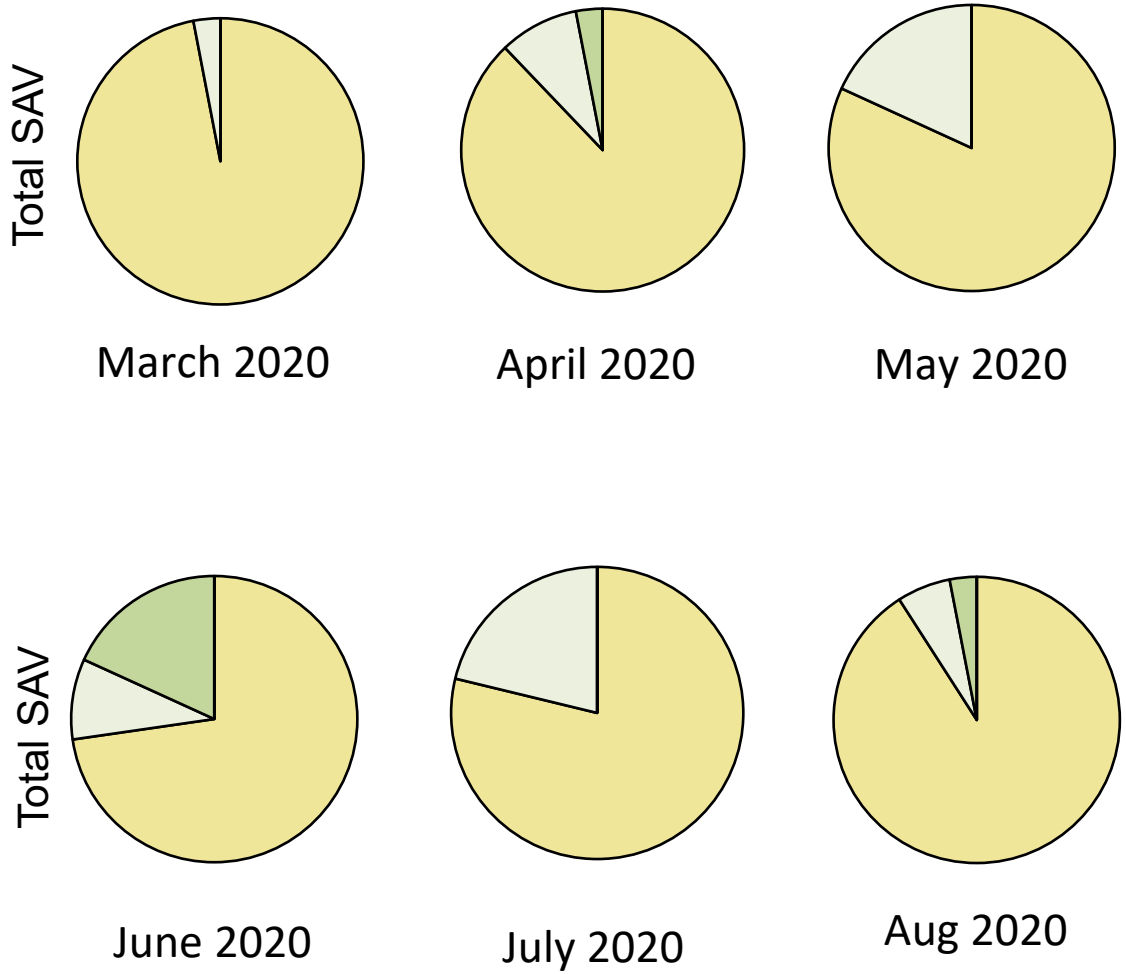
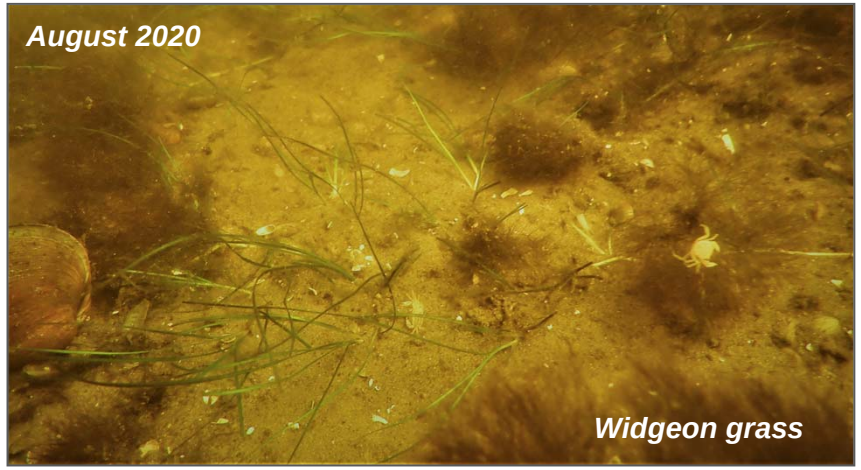
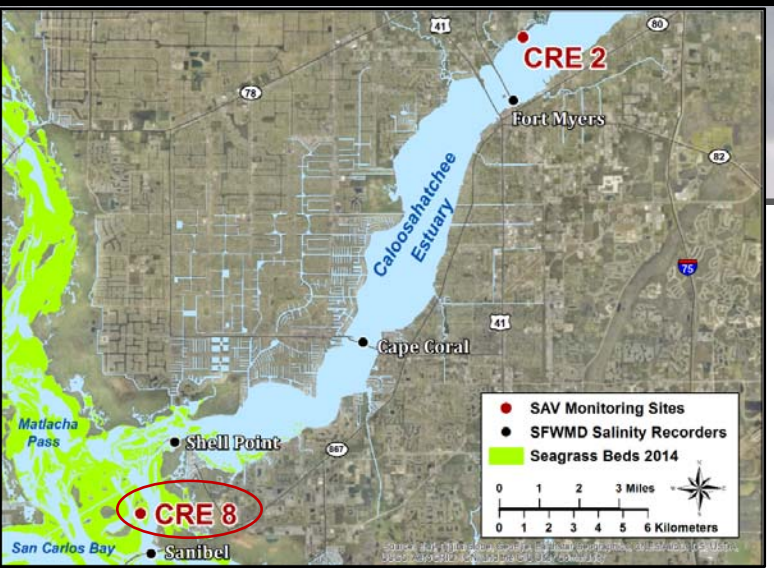


- Pie charts represent the relative number of quadrats along the transects in each percent cover categories for total SAV
- Only widgeon grass (*Ruppia maritima*) was observed growing along the transects over this monitoring period
- Sparse shoots of tape grass (*Vallisneria americana*) were observed adjacent to site August 2020



Caloosahatchee River Estuary Seagrass CRE 8 March - August 2020



Seagrass % cover categories:

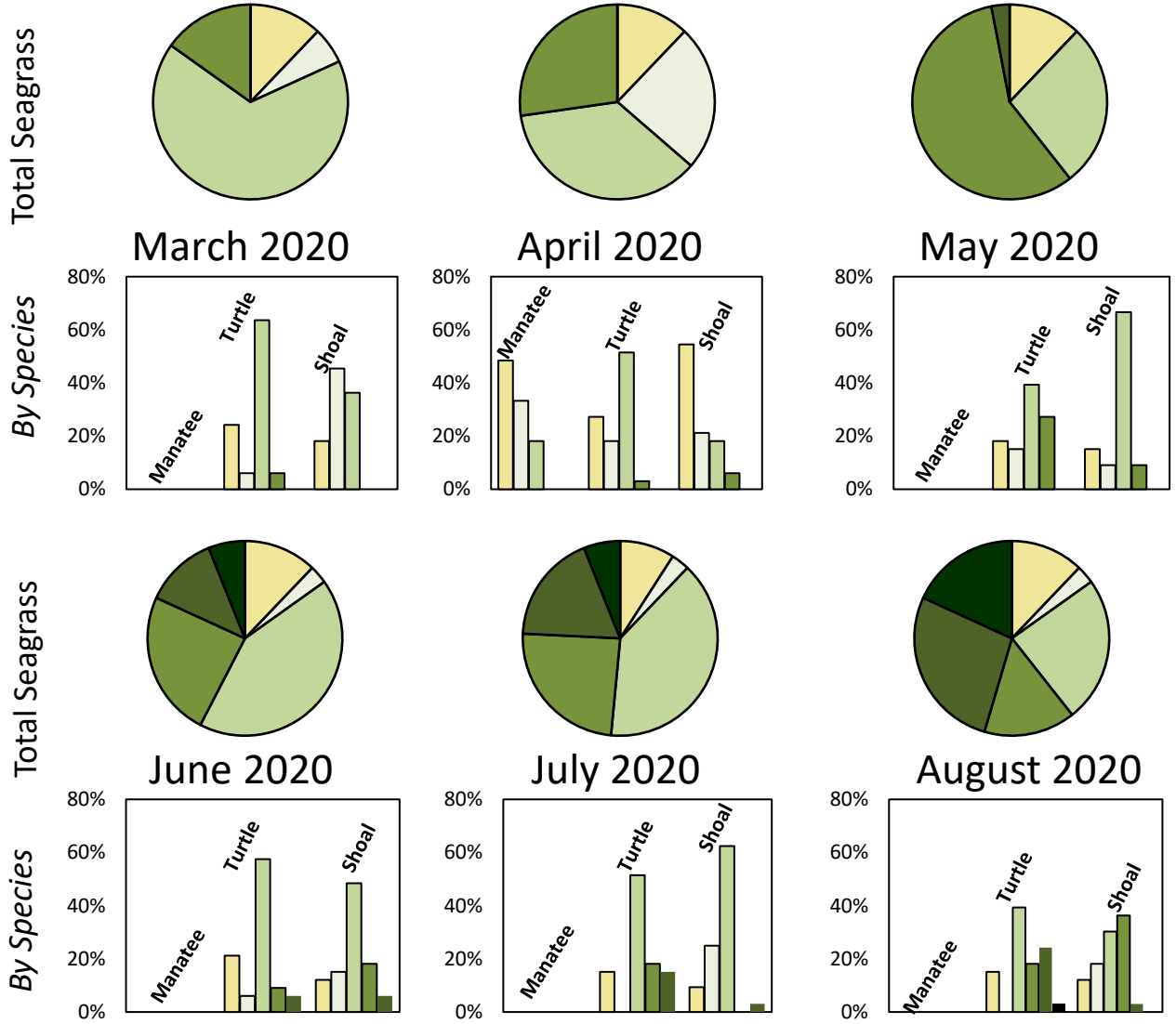
- 0 %
- < 5%
- 6-25%
- 26-50%
- 51-75%
- >75%

Relative number of quadrats along the transects in each of the seagrass percent cover categories by total seagrass (pie charts) and by species (bar graphs)

Turtle and Shoal grass August 2020

Turtle and Shoal grass March 2020

Turtle and Shoal grass May 2020



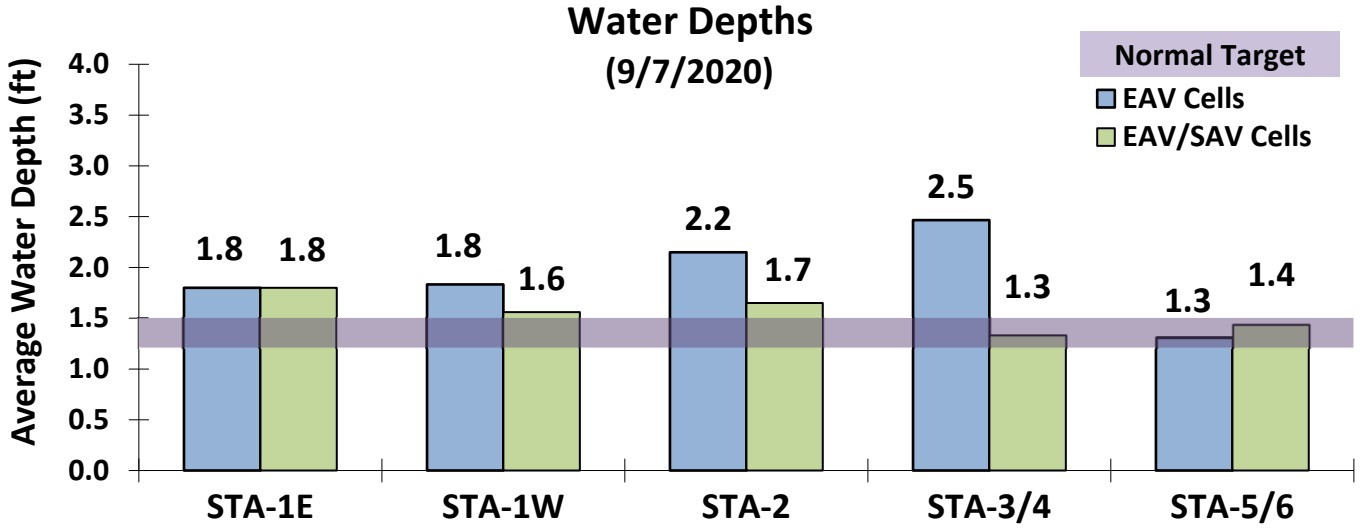
Everglades Stormwater Treatment Areas (STAs)

- STAs treated high inflow volumes from basin runoff in August
  - Total Inflows to STAs in WY2021 ~694,000 ac-ft
  - Lake Okeechobee releases to STAs in WY2021 ~11,000 ac-ft (2% of total)
- Extensive vegetation management activities underway to address stressed and highly stressed vegetation especially in EAV cells
- All treatment cells are at or above target depth

Water Year 2021
5/1/2020 to 9/6/2020

	STA-1E	STA-1W	STA-2	STA-3/4	STA-5/6
Inflow TP Concentration (ppb)	105	233	114	48	204
Outflow TP Concentration (ppb)	17	31	18	12	75
365-day Phosphorus Loading Rate ($g/m^2/yr$)	1.6	1.4	0.5	0.3	0.2
Inflow Volume (ac-ft)	123,600	108,300	158,500	265,200	38,800

Includes preliminary data; all concentrations are flow-weighted means

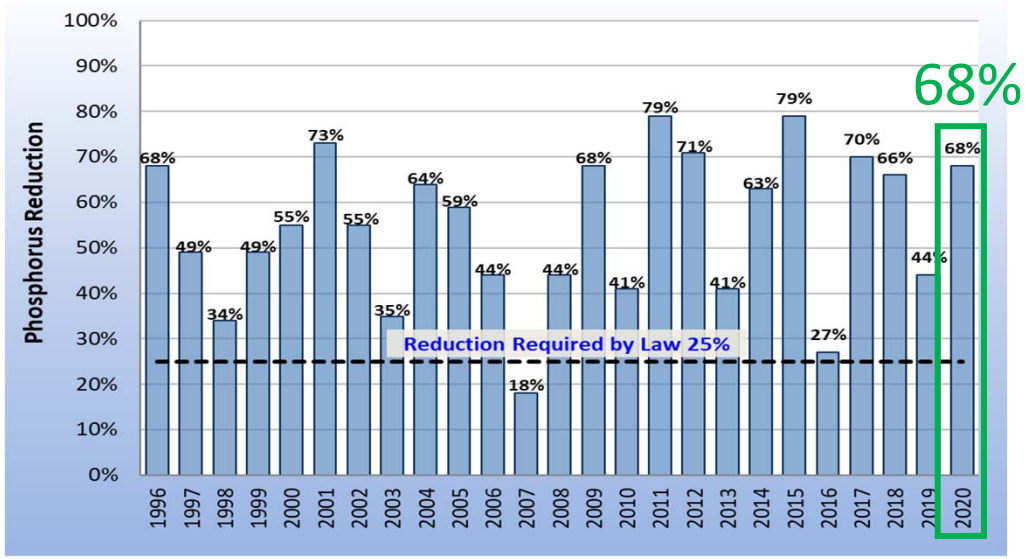


Includes preliminary data; Emergent Aquatic Vegetation (EAV); Submerged Aquatic Vegetation (SAV)

Everglades Agricultural Area Basin Source Control Program

EAA Basin Monitoring & Performance Results

The SFWMD monitors Basin discharges to collectively quantify TP loads from the EAA Basin. The TP load for the current Water Year is compared to a period before the BMP Program to determine compliance with the 25% reduction requirement. The Rule adopted compliance methodology is a 2-part test to account for statistical uncertainty. For example, if the 25% reduction is not met in a single year, the basin is considered to have achieved the expected performance level unless it is exceeded for three consecutive years.

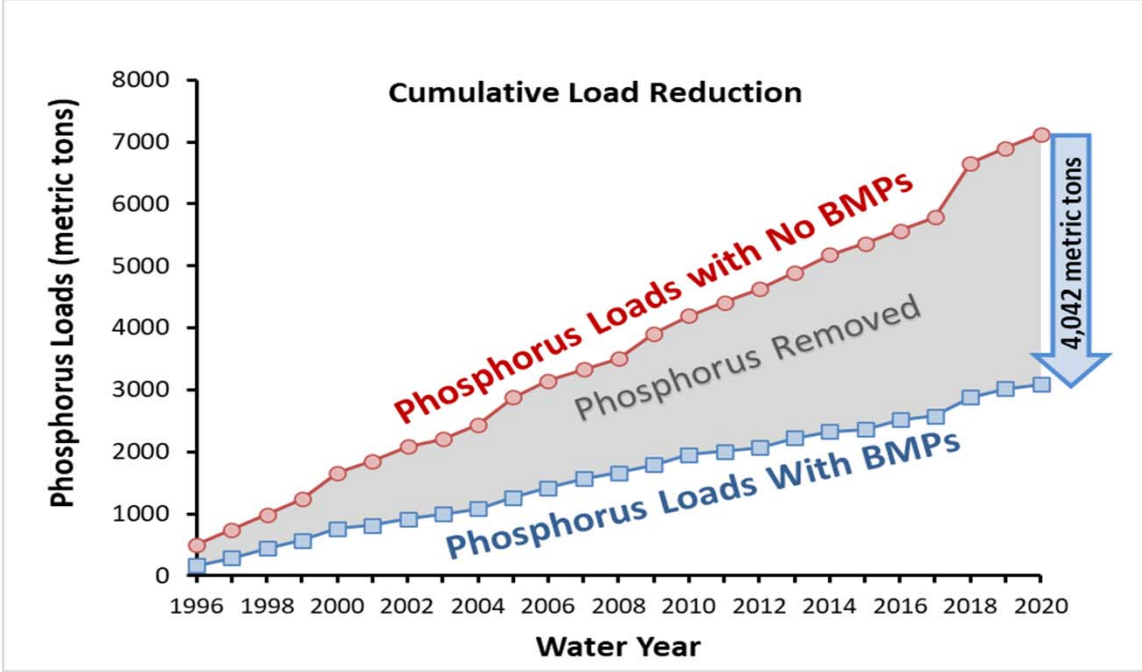


*Water year 2007 phosphorus reduction was below 25%, however due to the 2-part test, the EAA Basin was in compliance.

Quantifying Performance

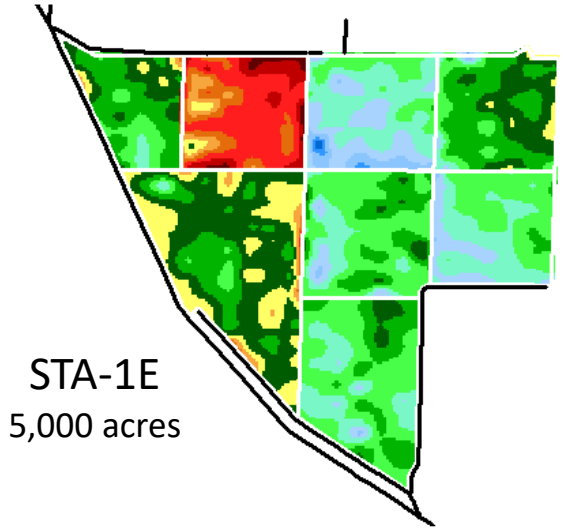
The EFA-mandated TP load reduction requirement was considered in the design of downstream construction projects; therefore their performance is dependent upon the EAA meeting required load reductions.

BMP Performance Requirement → 25% TP Load Reduction Compared to Before the BMP Program

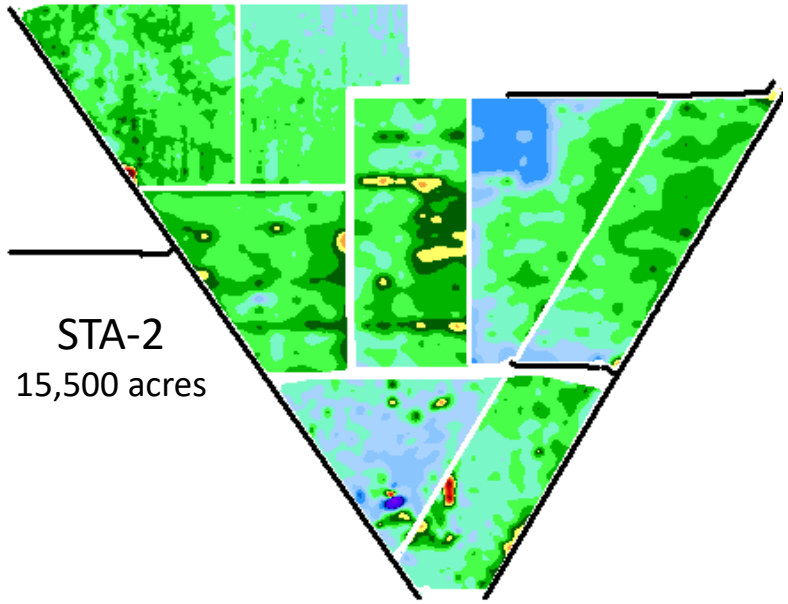


Everglades Stormwater Treatment Areas

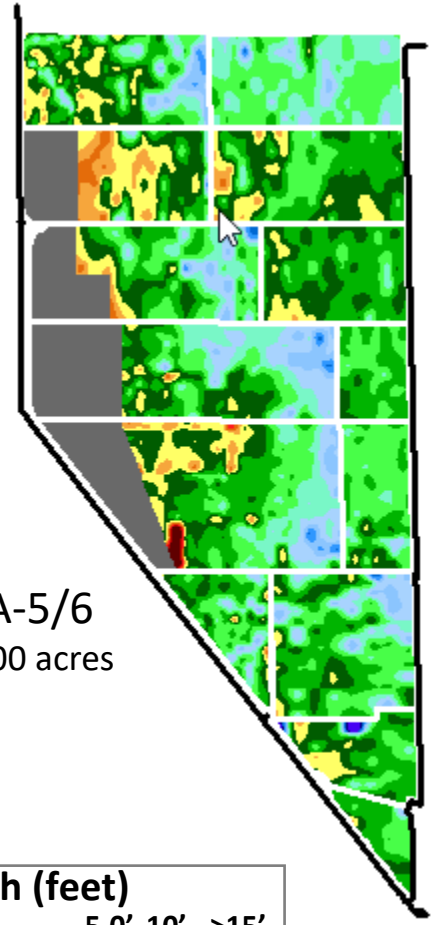
Daily Average Water Depths on 9/7/2020



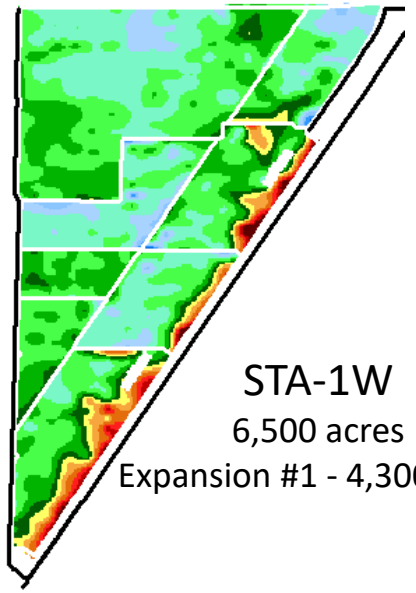
STA-1E
5,000 acres



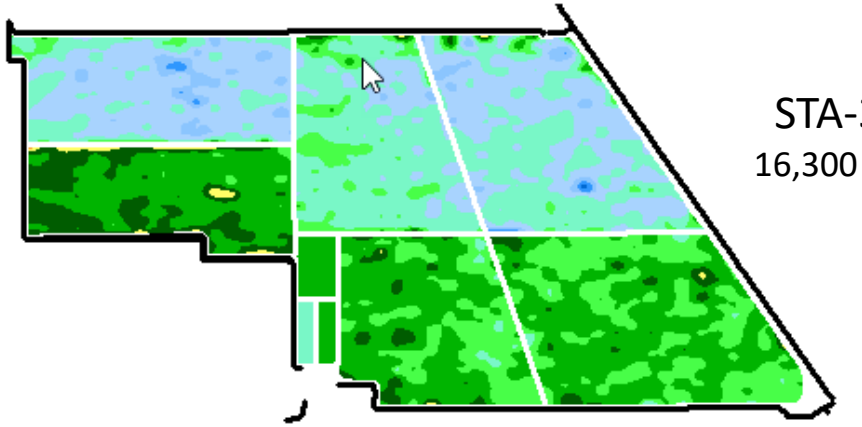
STA-2
15,500 acres



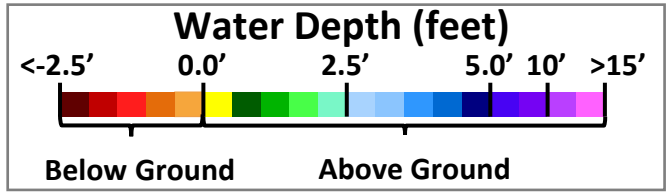
STA-5/6
13,700 acres



STA-1W
6,500 acres
Expansion #1 - 4,300 acres



STA-3/4
16,300 acres



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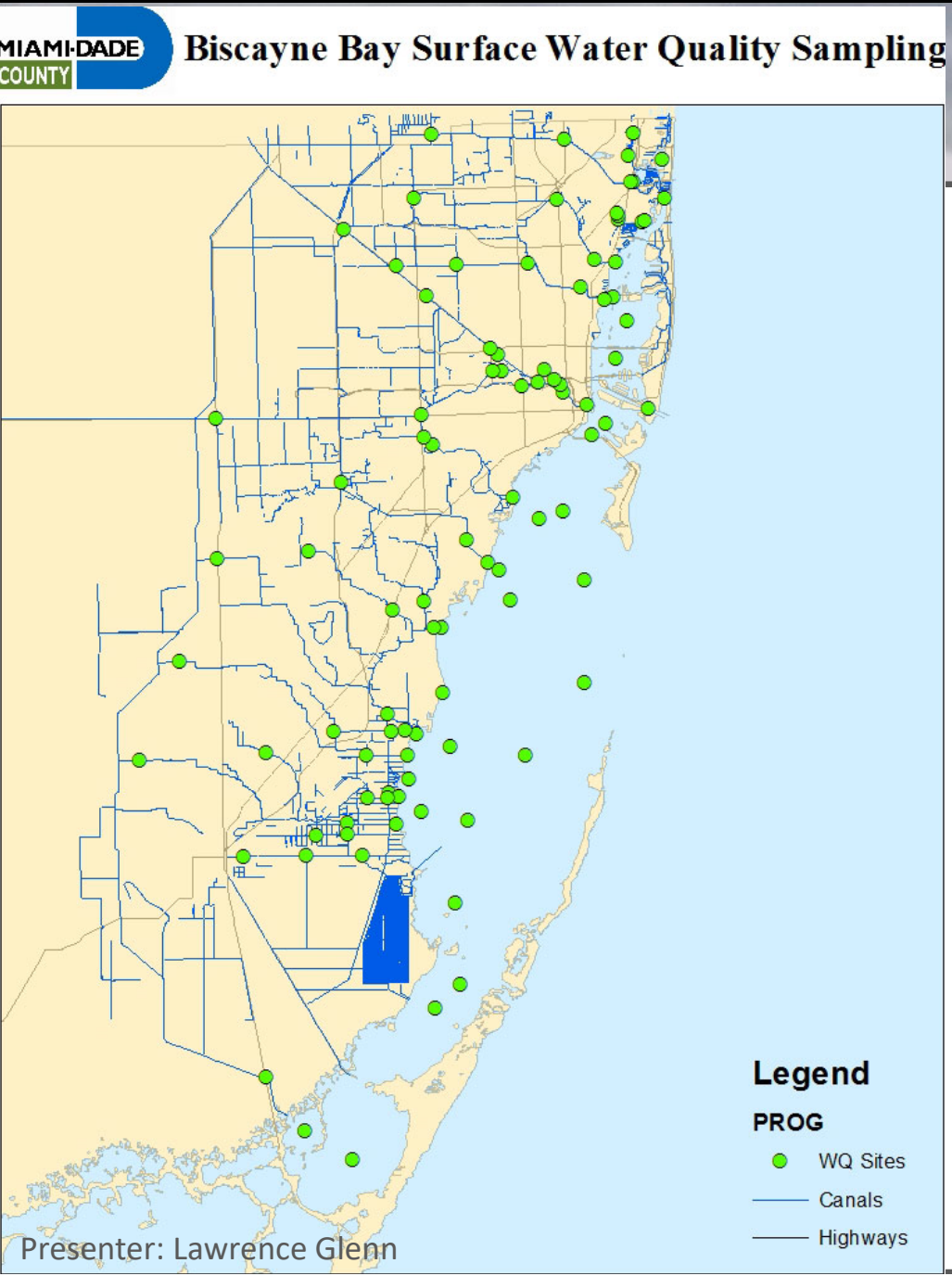
Long-Term DERM Surface Water Quality Monitoring

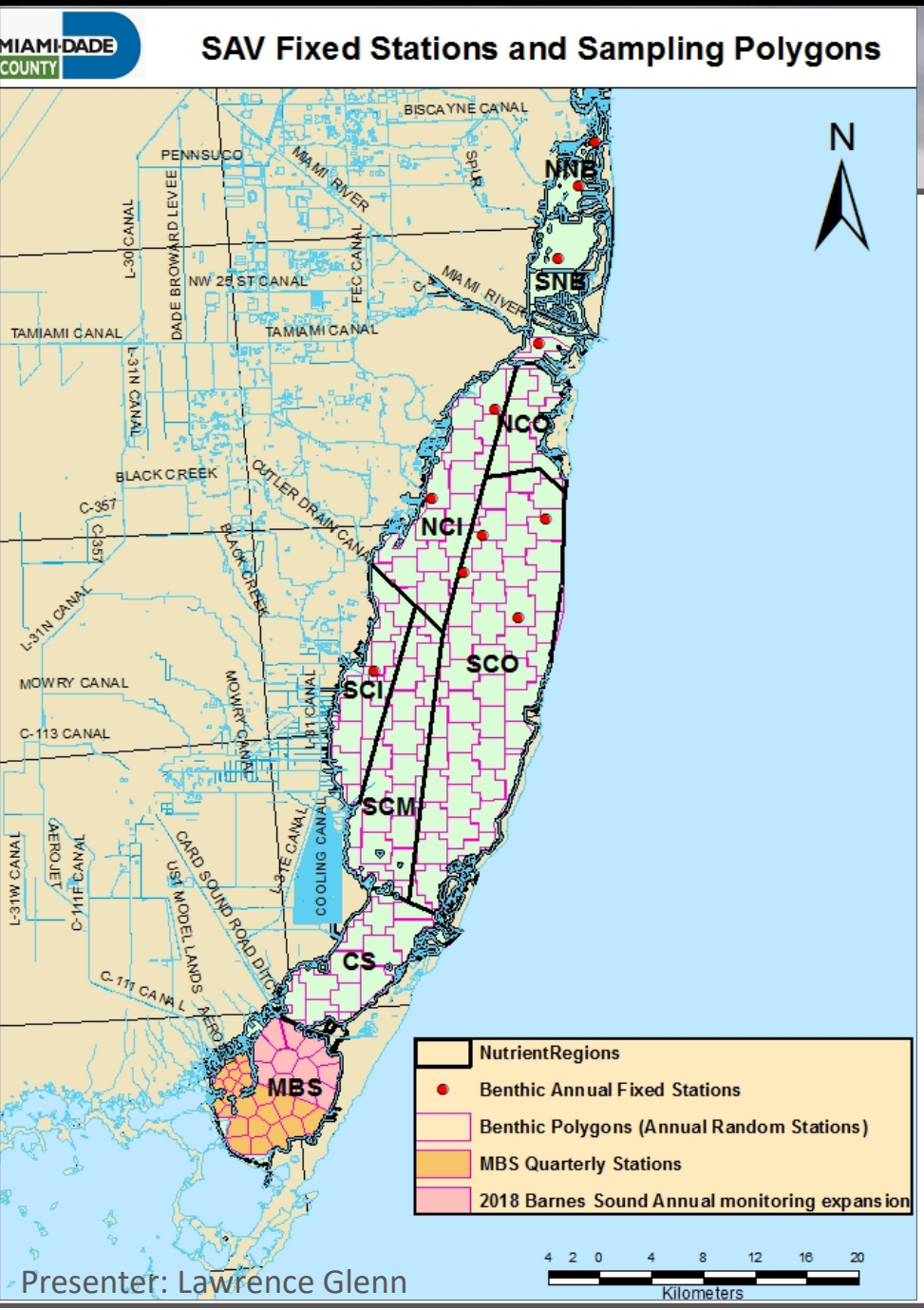


- 61 monitoring sites in canals
- 42 monitoring sites in the Bay
- Monthly monitoring of physical-chemical WQ data, bacteria, and algal biomass monitored at most sites (not all), metals quarterly
- Monitoring network optimization completed by Miami-Dade County DERM

Map Source: Miami-Dade County Department of Environmental Resources Management (DERM)

Presenter: Lawrence Glenn

DERM Seagrass Monitoring Network

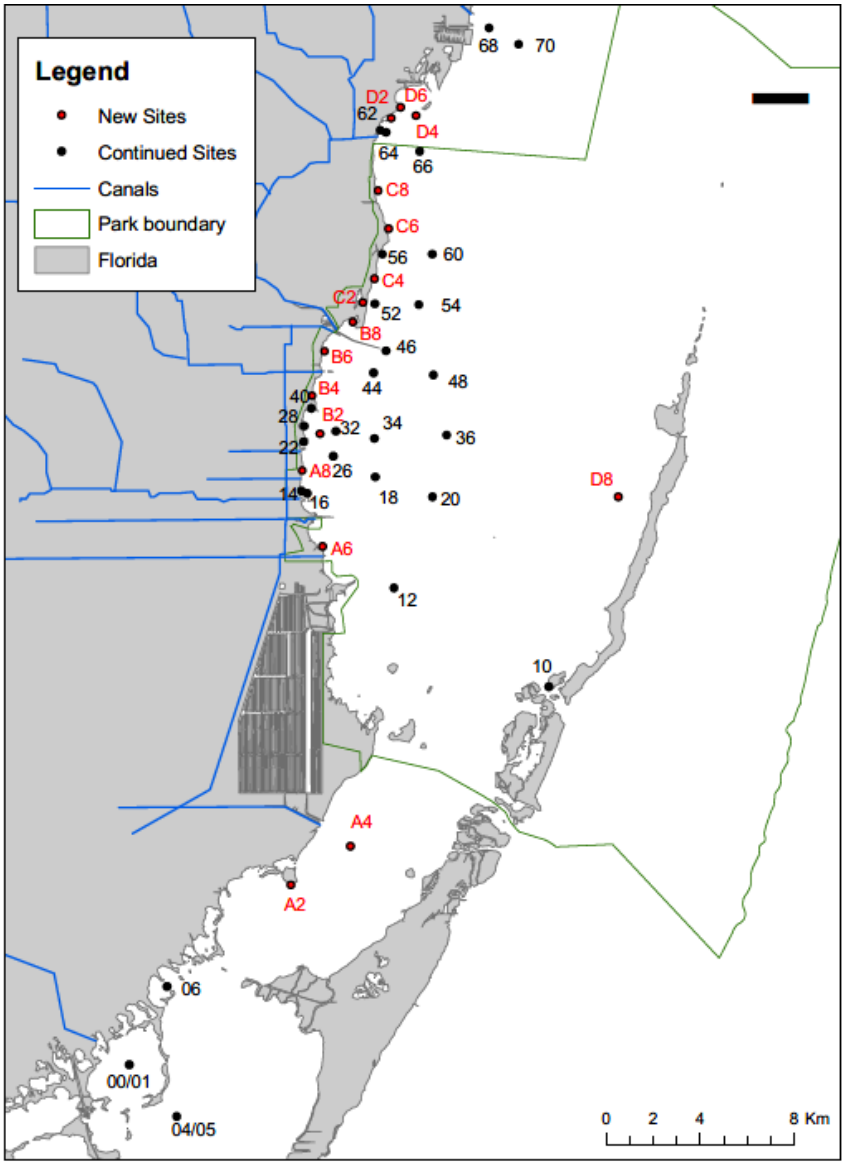


- 101 random monitoring sites
- 11 fixed monitoring sites
- Quarterly monitoring
- Monitoring completed by Miami-Dade County DERM

Map Source: Miami-Dade County Department of Environmental Resources Management (DERM)

Presenter: Lawrence Glenn

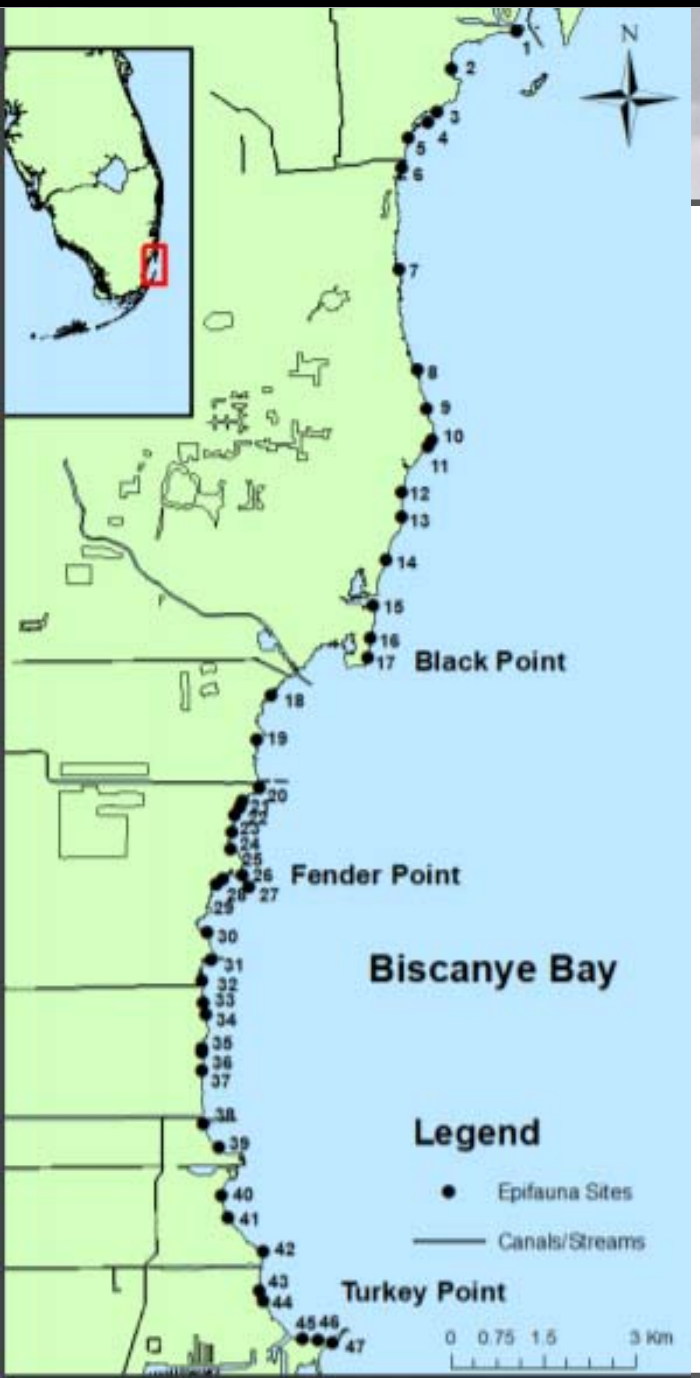
Long-Term Biscayne Bay National Park Service salinity and temperature monitoring



- 52 monitoring sites
- Paired continuous recorders (YSI 6600) recording interval every 15 minutes
  - Salinity, temperature, depth
- Delay with obtaining data (~ 60-day delay)
  - Data downloaded from sondes every month
  - Data post-processing, QA/QC required
  - Stations are not automated
- Funding agencies: RECOVER
- Annual Report

Map Source: Biscayne Nat. Park/National Park Service

Long-Term Integrated Biscayne Bay Ecological Assessment and Monitoring Project (IBBEAM)

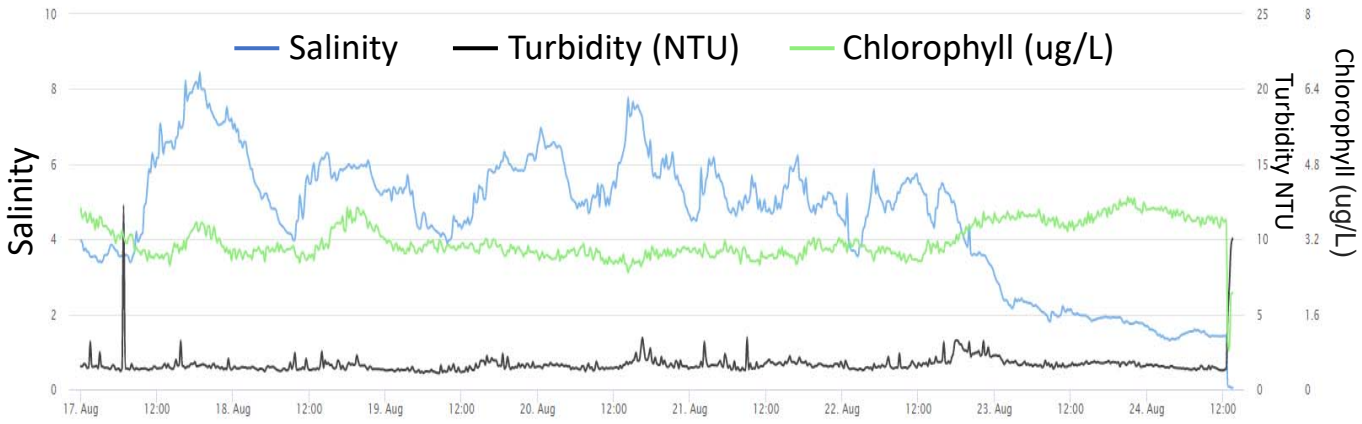


- 47 monitoring locations
- Epifauna, fish, water quality, SAV and sediment depth monitoring every wet and dry season (generally October and March)
  - Taxonomic identification and enumeration of fish, epifauna and seagrasses, size structure, biomass
- Epifauna collected with 1-m^2 replicated throw traps
- Fish monitoring: visual assessment (30 m long belt-transect surveys)
- Seagrasses: Data from 10 quadrates per site including % cover, community structure (species ID and biomass, canopy height); 100-120 randomly sampled sites in total

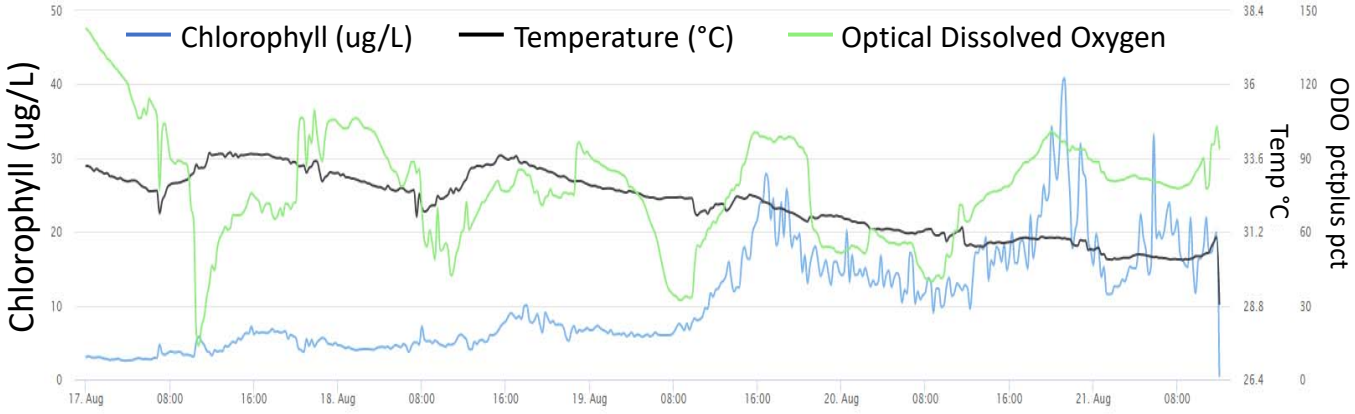
Source: NOAA Fisheries

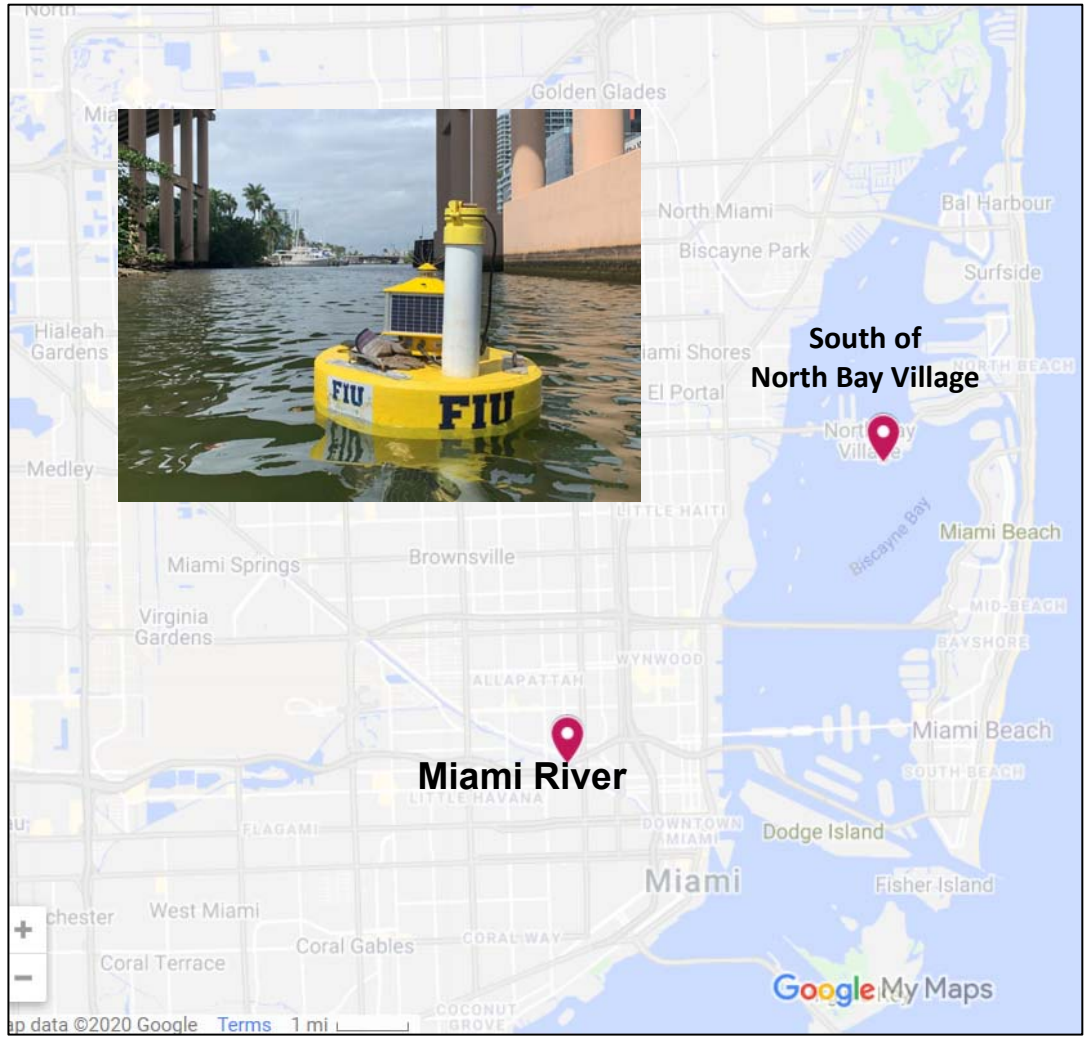
Florida International University Monitoring Buoy Stations in North Biscayne Bay

FIU_CREST2



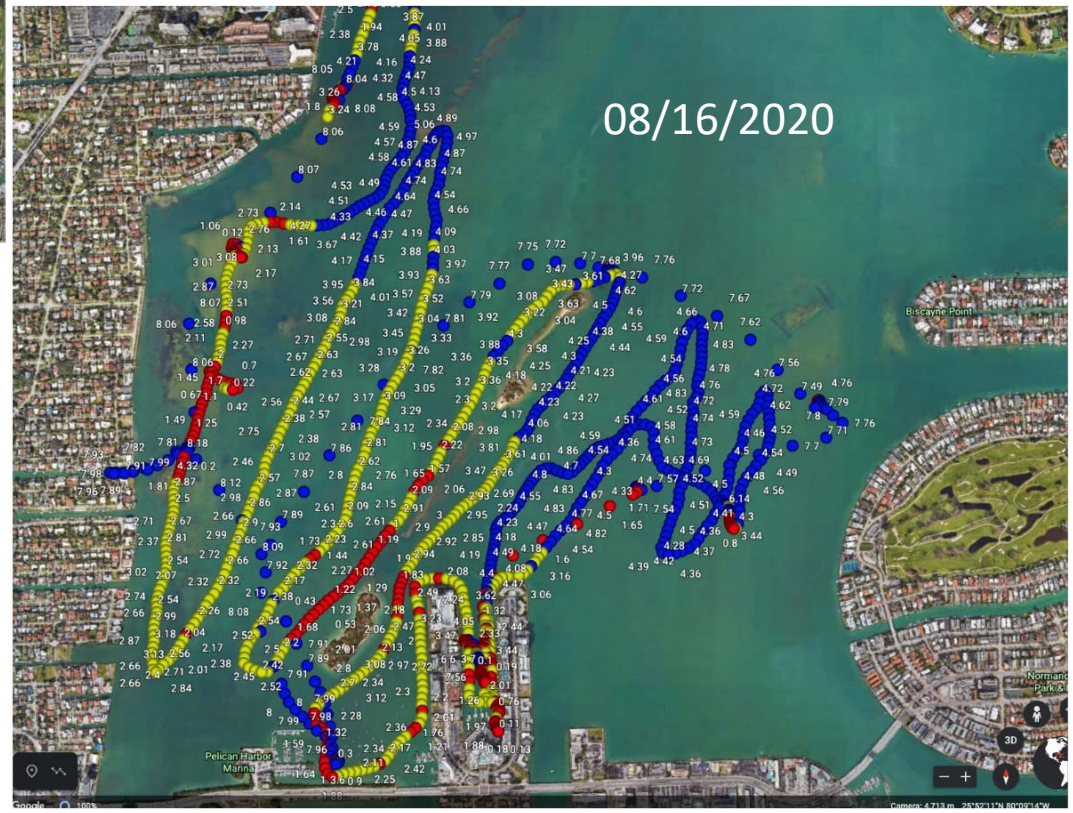
FIU_CREST3

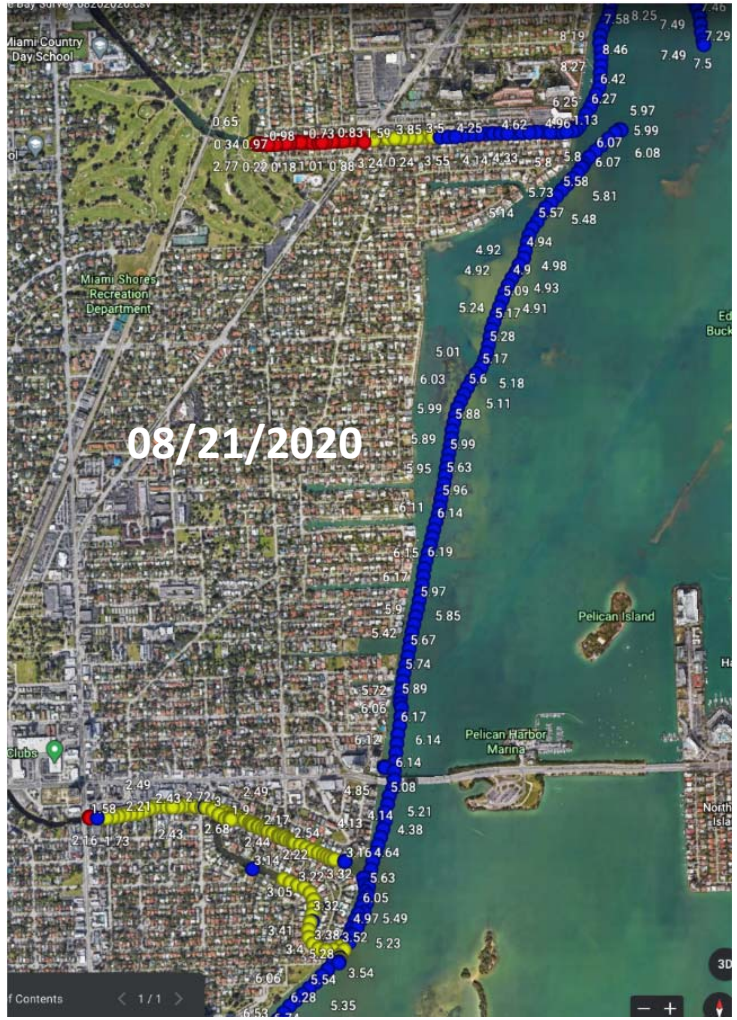




Florida International University DO Study in North Biscayne Bay August 2020 Fish Kill

- Ongoing investigation by InWe/FIU of the low DO/fish kill event
- Data collected daily

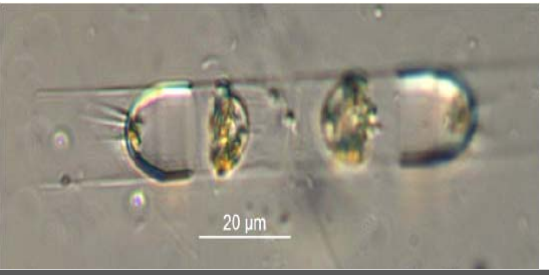




Maps Source: InWe/FIU
Photo Source: Miami Water Keepers

Presenter: Lawrence Glenn

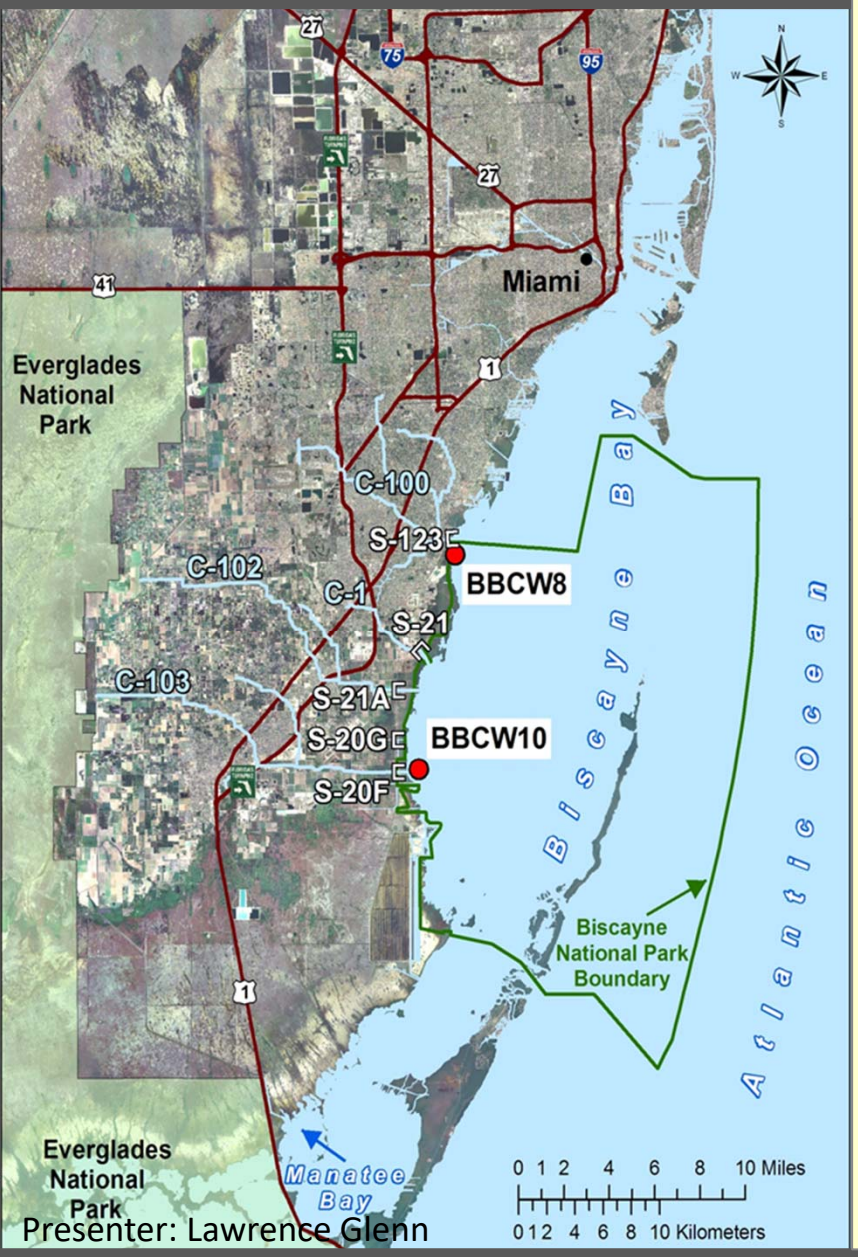
Florida International University
Bloom Monitoring in North Biscayne Bay (August 2020)

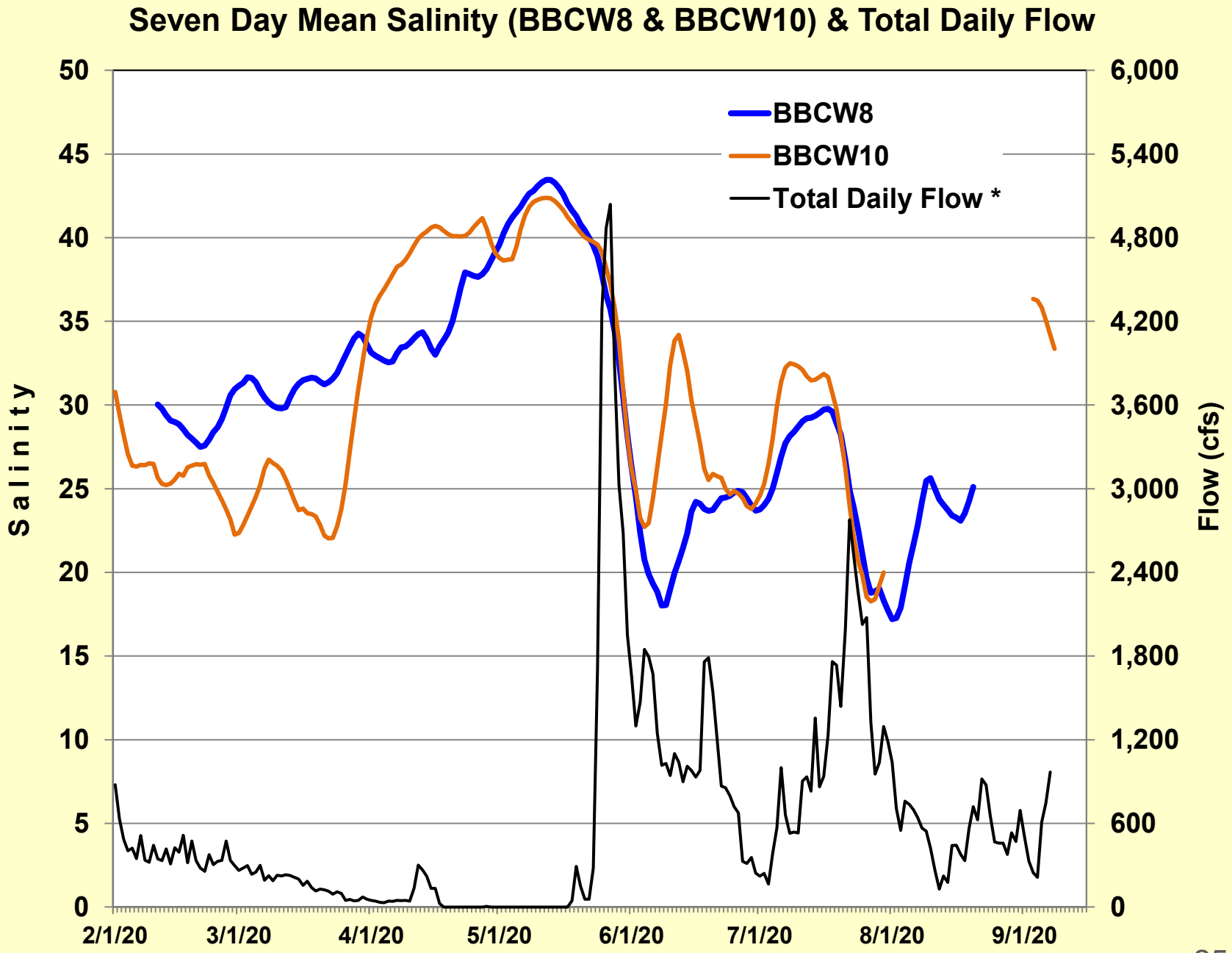


- Dominant blooming species *Chaetoceros lauderi* – a non-toxic diatom species
- High algal biomass can decrease light penetration to benthic habitats (e.g., seagrasses)
- Decomposing organic matter from the bloom can also consume oxygen and release noxious odors as it decomposes
- Possible causes of the current algal bloom:
  - Increased overland and canal freshwater inflows that are nutrient-rich
  - Nutrients released from decomposing fish material
  - High temperatures

Photo Source: InWe/FIU

Biscayne Bay



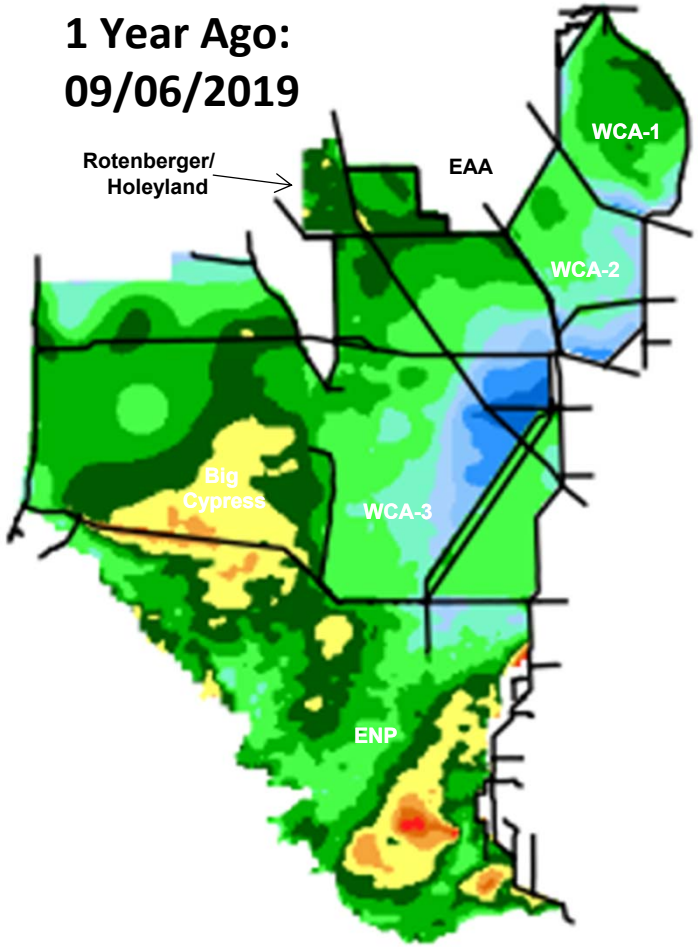


* Total flow from S20G, S20F, S21, S21A, S123, S700P

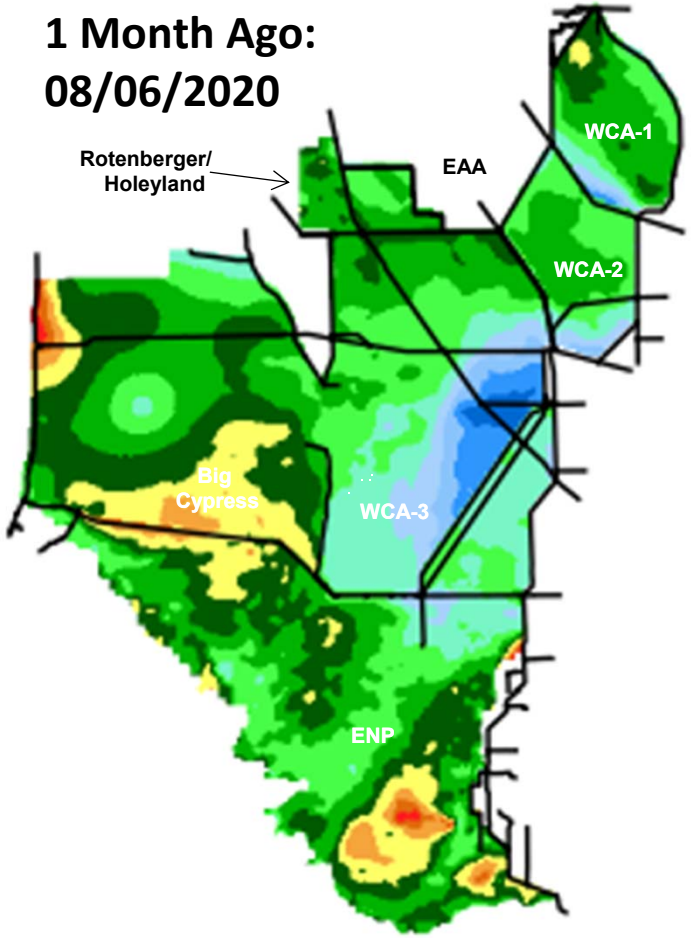
Presenter: Lawrence Glenn

Everglades Water Depth Maps

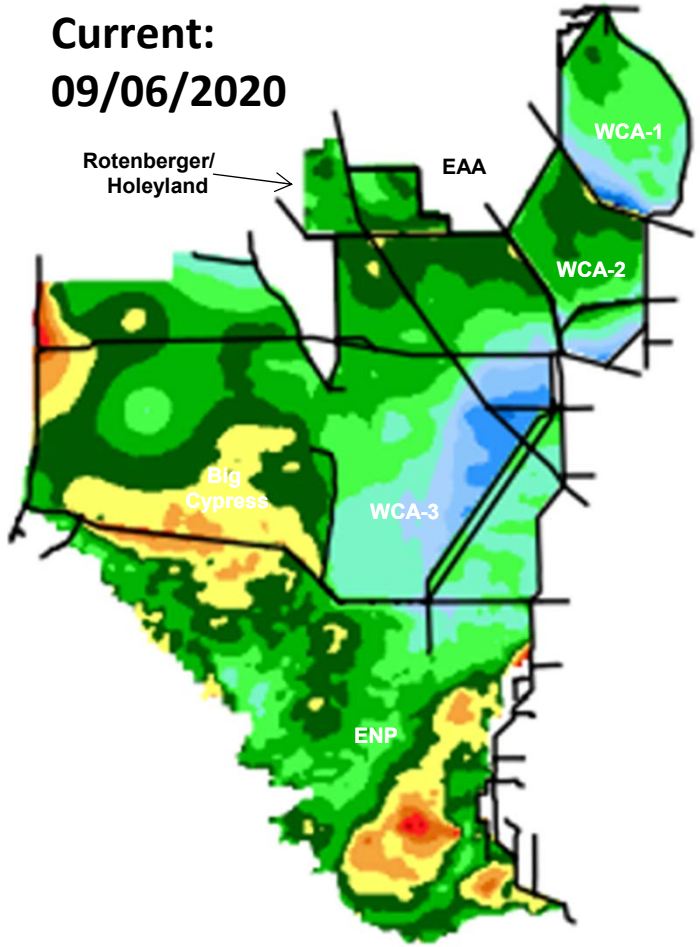
1 Year Ago:
09/06/2019

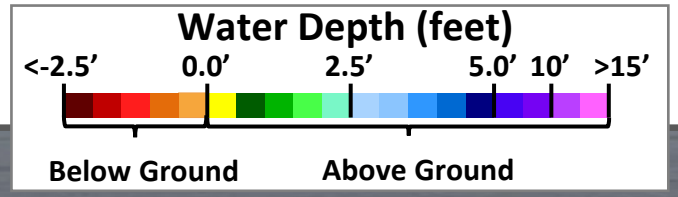


1 Month Ago:
08/06/2020

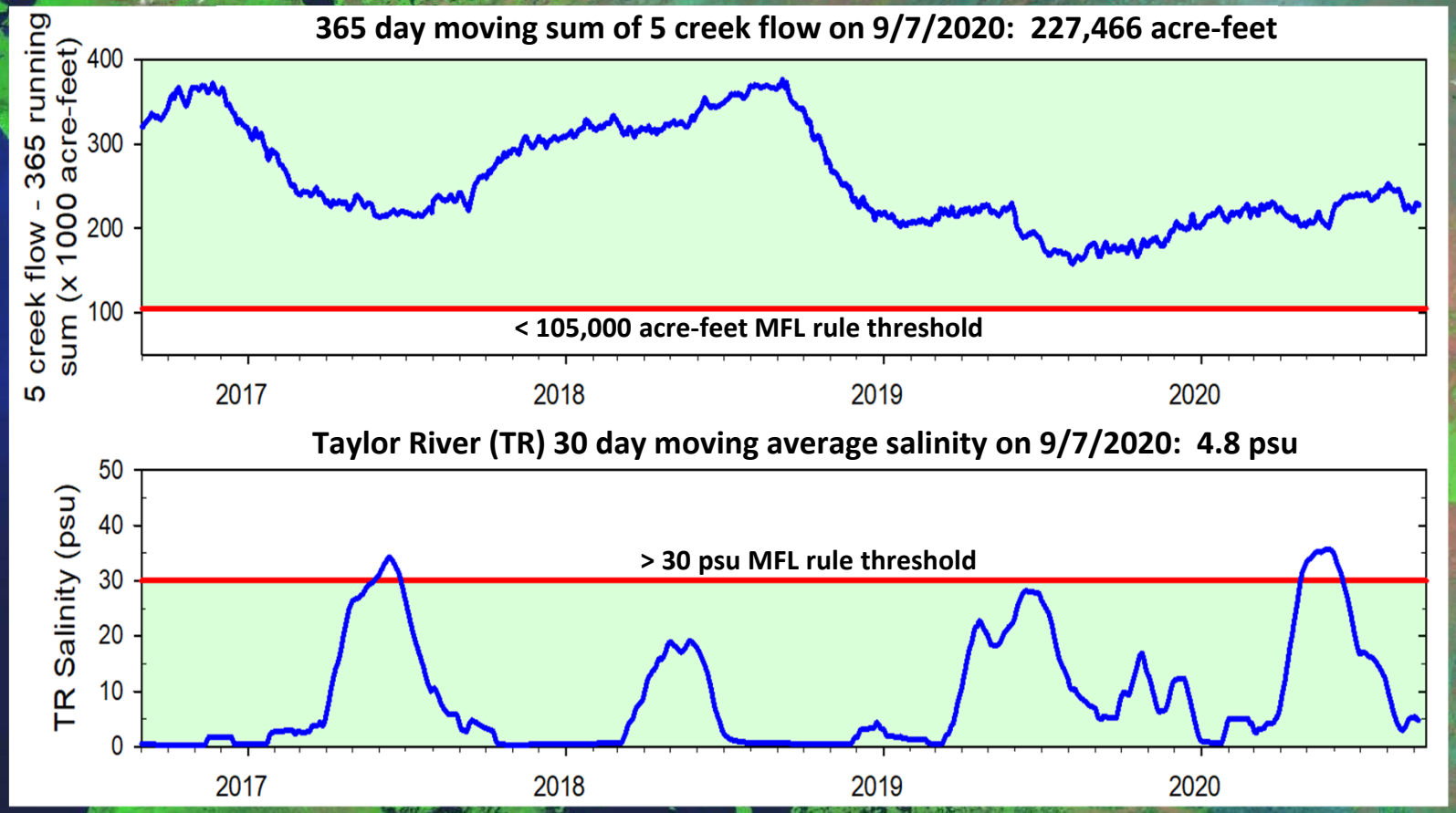


Current:
09/06/2020

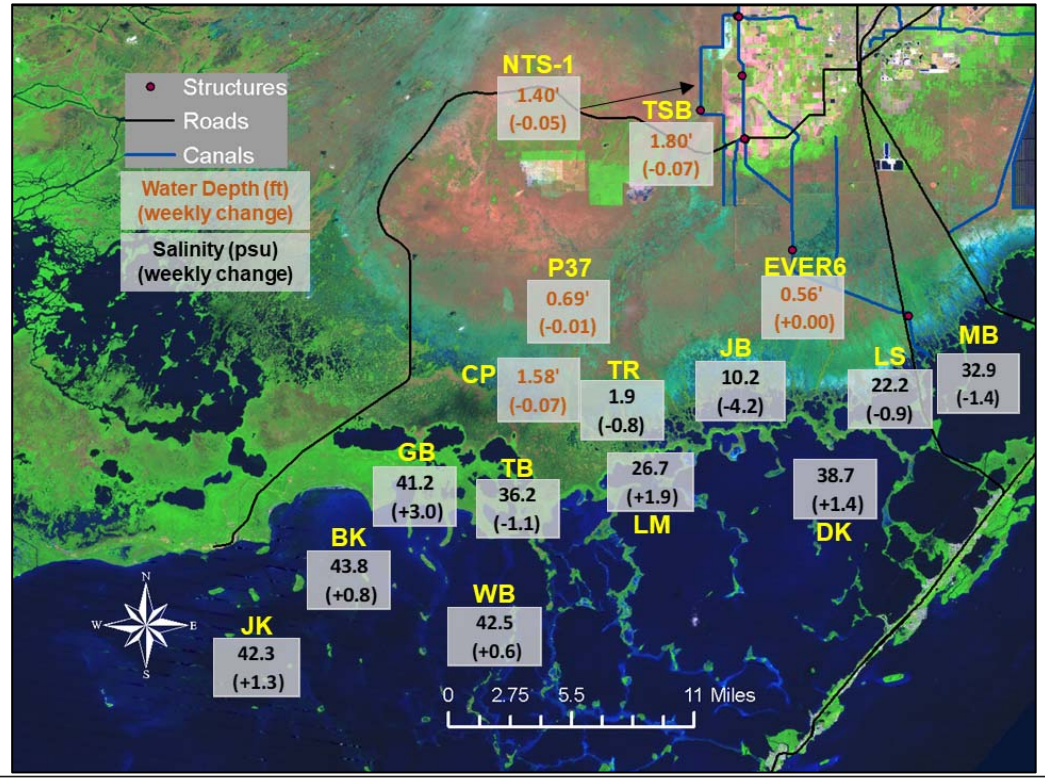


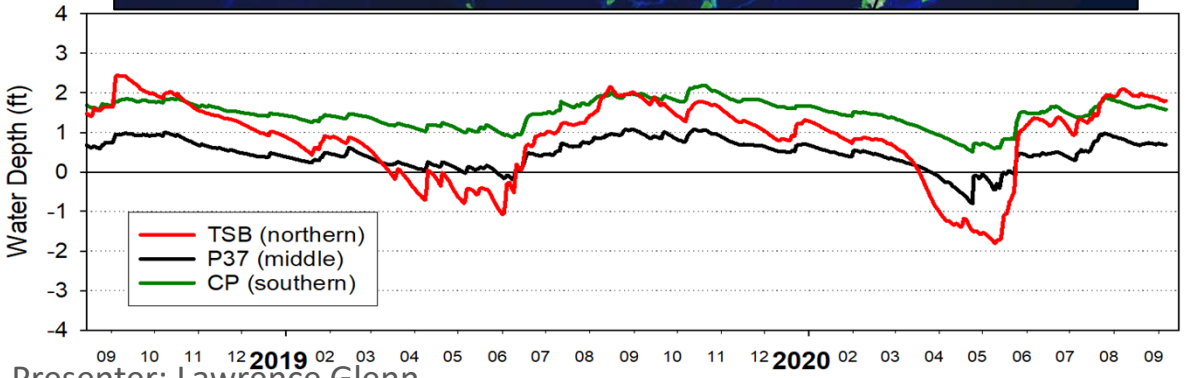


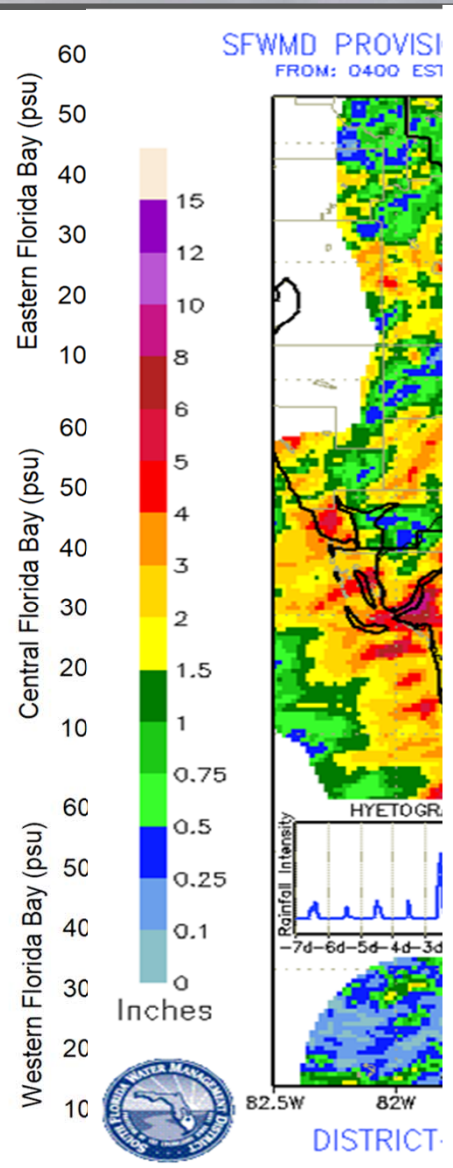
Northeast Florida Bay MFL

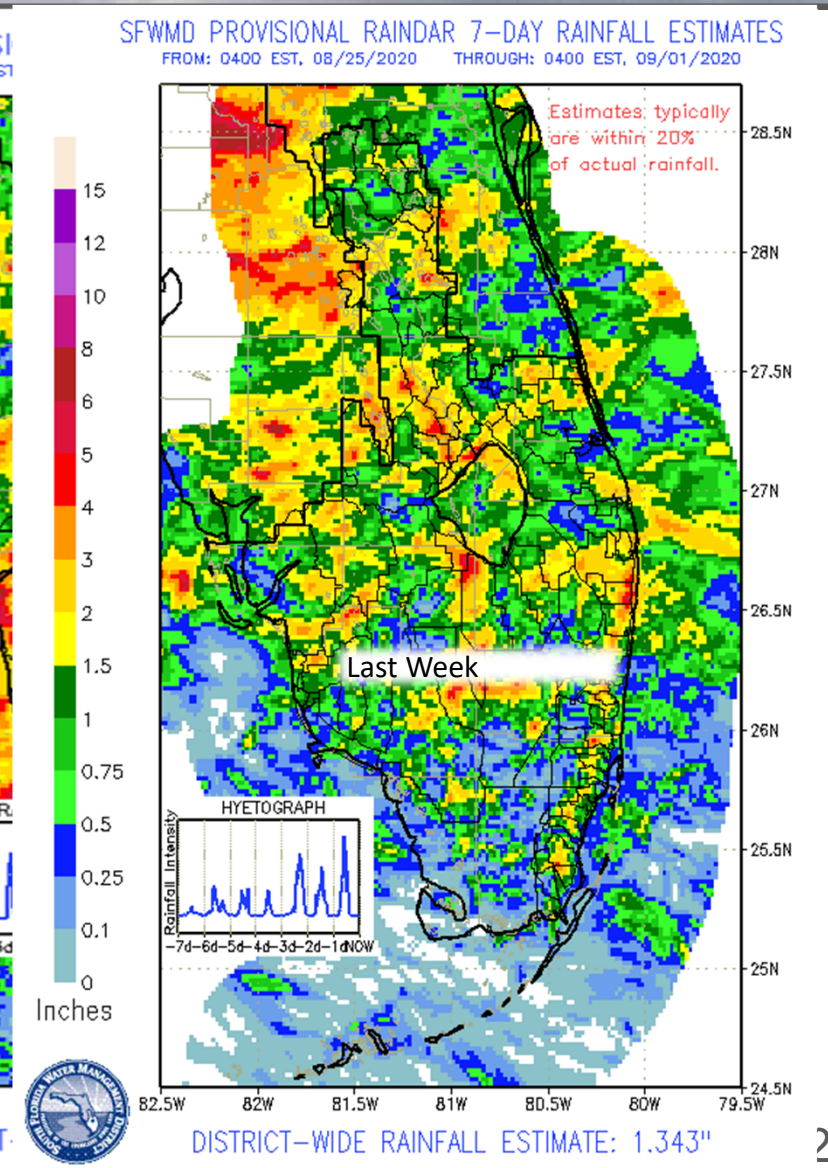


Taylor Slough Stages and Florida Bay Salinity









Presenter: Lawrence Glenn

Thank You

Bottlenose dolphins in Lostman's Slough, Everglades National Park
Photograph courtesy of Mark Cook, SFWMD