

Modified Water Deliveries

G-3273/S-356 Increment 1.1 and 1.2 Field Test

Quarterly PDT Meeting – Q3

Jacksonville District, Everglades National Park,
South Florida Water Management District

November 13, 2017

*Team of Professionals Making
Tomorrow Better*





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INTRODUCTIONS AND OPENING REMARKS



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DEVIATIONS



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CURRENT OPERATIONS UPDATE

Hydrologic Conditions and Temporary Deviations Operations

Olice Williams



U.S. ARMY

MWD Field Tests, 2017 Temporary Deviation, and COP Operations Timeline



Action/Operation	Begin Date	End Date
Increment 1	October 15, 2015	December 1, 2015
Temporary Emergency Deviation Request/Authorization (SAD)	February 12, 2016	December 15, 2016
Temporary Emergency Deviation Implementation	February 15, 2016	May 11, 2016
Recovery Period	May 12, 2016	July 10, 2016
Extension of the Recovery Period	July 11, 2016	Nov 30, 2016 (FDEP Permit); Dec 15, 2016 (SAD Approval)
Increment 1	December 1, 2016	February 28, 2017
Increment 1.1 and 1.2	February 21, 2017 (RPA March 1, 2017)	February 28, 2018
2017 Planned Temporary Deviation <i>(Maximize Discharges out of WCAs)</i>	June 28, 2017	October 31, 2017
WCA-2A Regulation Schedule Planned Deviation	August 1, 2017	April 30, 2018
2017 Emergency Actions <i>S-357 Flexibilities, use of S-356, full use of S-332BN/BW/C, opening of S-339/S-340, S-331 Flexibilities</i>	September 9, 2017 – September 21, 2017	Until Target Stage Met
Deviation for Closure Delay for S-12s, Reopening of S-343s & S-344	October 6, 2017*	Until Target Stage Met
Increment 2	March 1, 2018*	December 2019*
Combined Operations Plan (COP)	December 2019*	Permanent

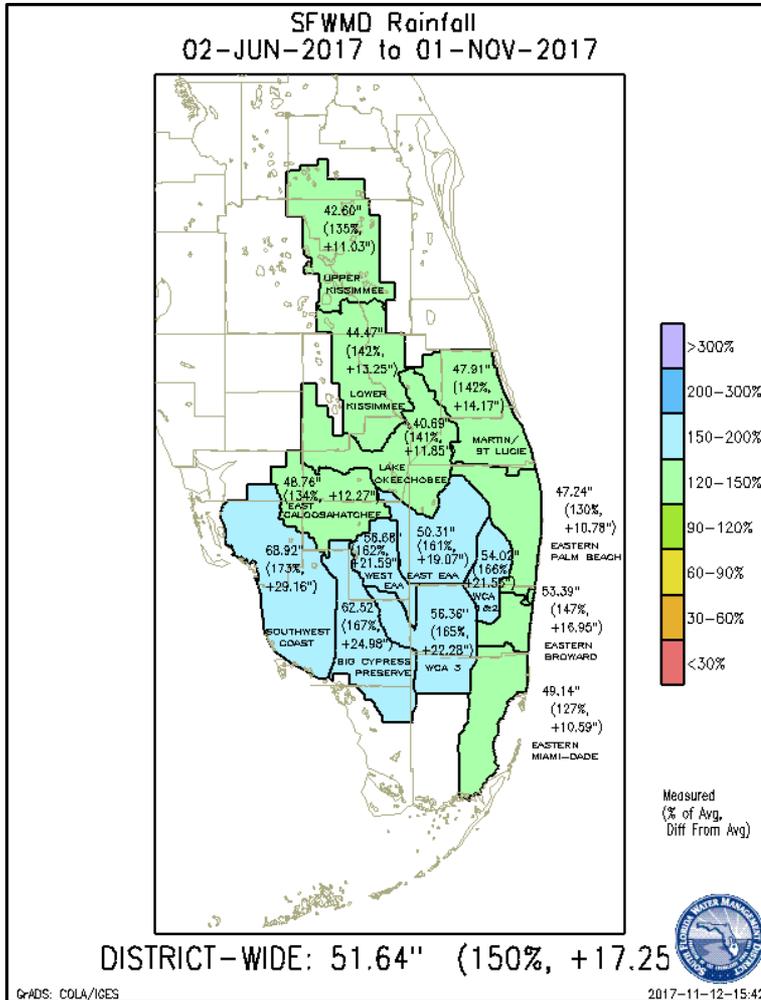
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POC:



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2017 WCA-3A Seasonal Rainfall

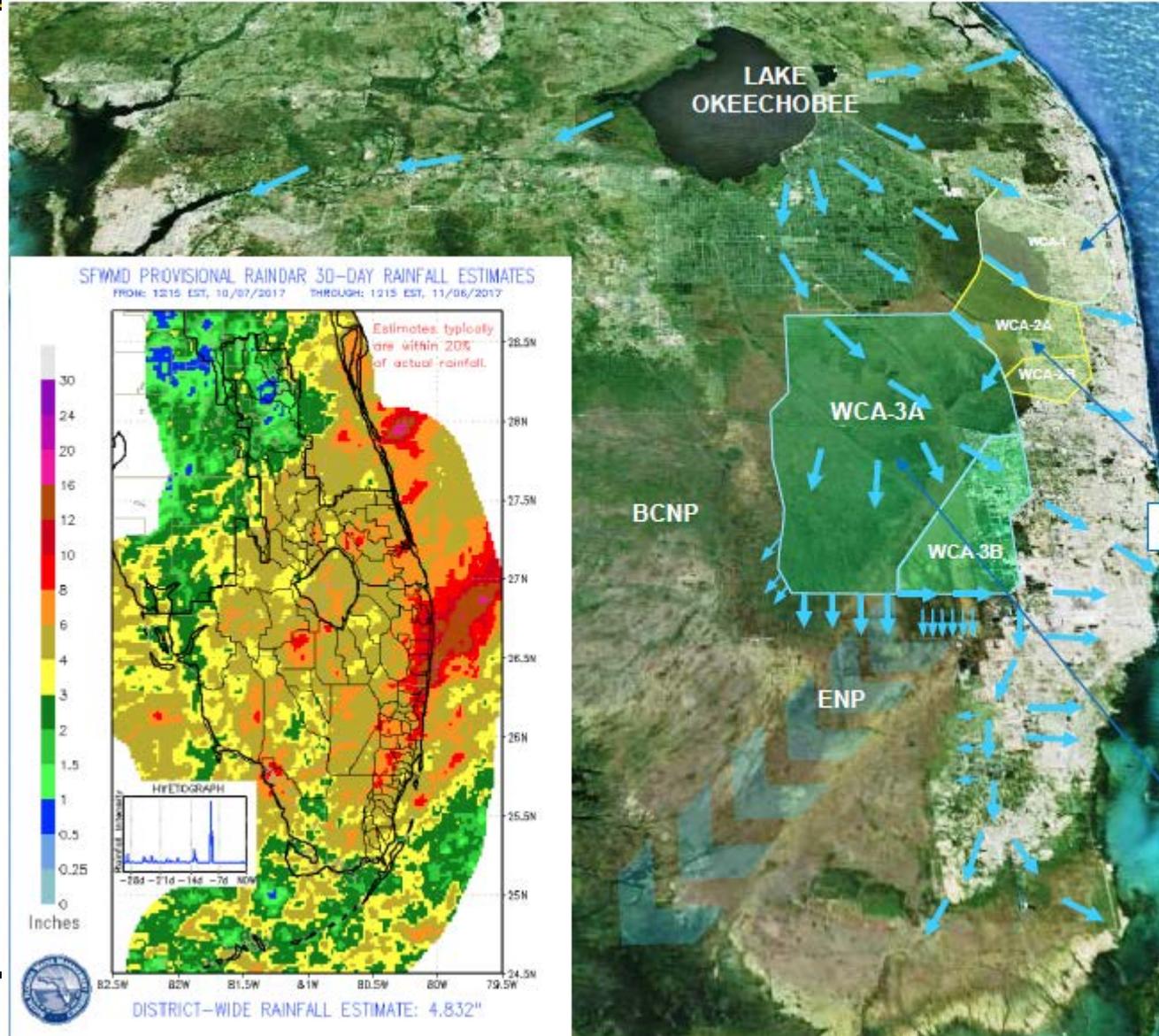


WCA-3A Monthly Rainfall	WCA-3A Rainfall (Inches)	% of Average Rainfall	Deviation from the average rainfall (Inches)
January	1.91	116%	+0.27
February	0.93"	48%	-0.99"
March	1.27"	53%	-1.11"
April	2.57"	89%	-0.33"
May	4.31"	100%	-0.01"
June	18.74"	219%	+10.18"
July	9.47"	134%	+2.42"
August	6.93"	92%	-0.56"
September	13.27"	190%	+6.30"
October	8.08"	187%	+3.44"

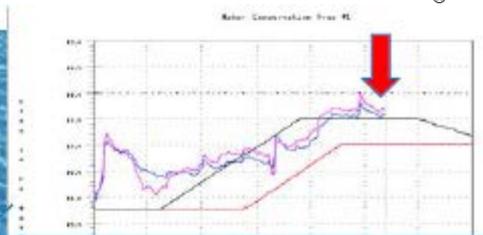
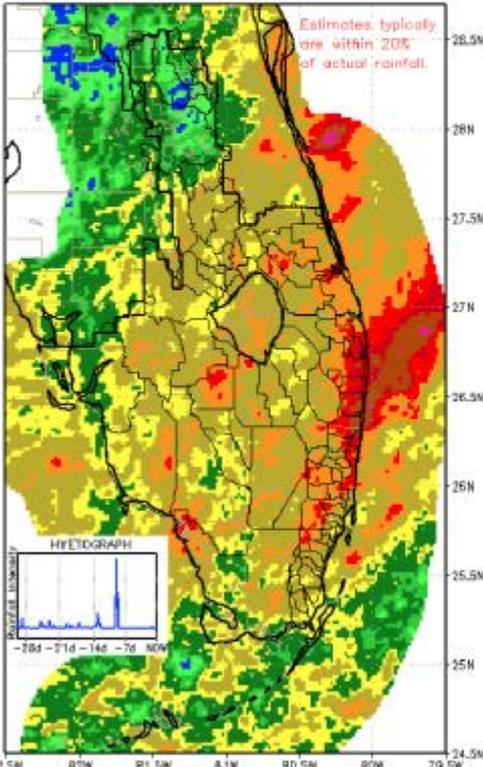
WCA-3: 56.36" (165%, +22.28")



WATER MANAGEMENT OPERATIONS



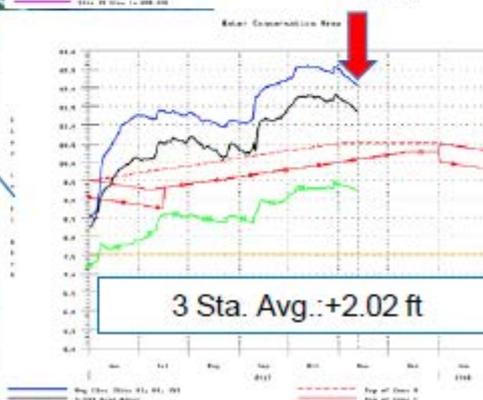
SFWMD PROVISIONAL RAINDAR 30-DAY RAINFALL ESTIMATES
 FROM: 1215 EST, 10/07/2017 THROUGH: 1215 EST, 11/06/2017



3-Sta. Avg.: +0.05 ft/1-8C:+0.17 ft



Site 2-17:-0.02 ft/S-11B HW: -0.10 ft



3 Sta. Avg.: +2.02 ft

POC:

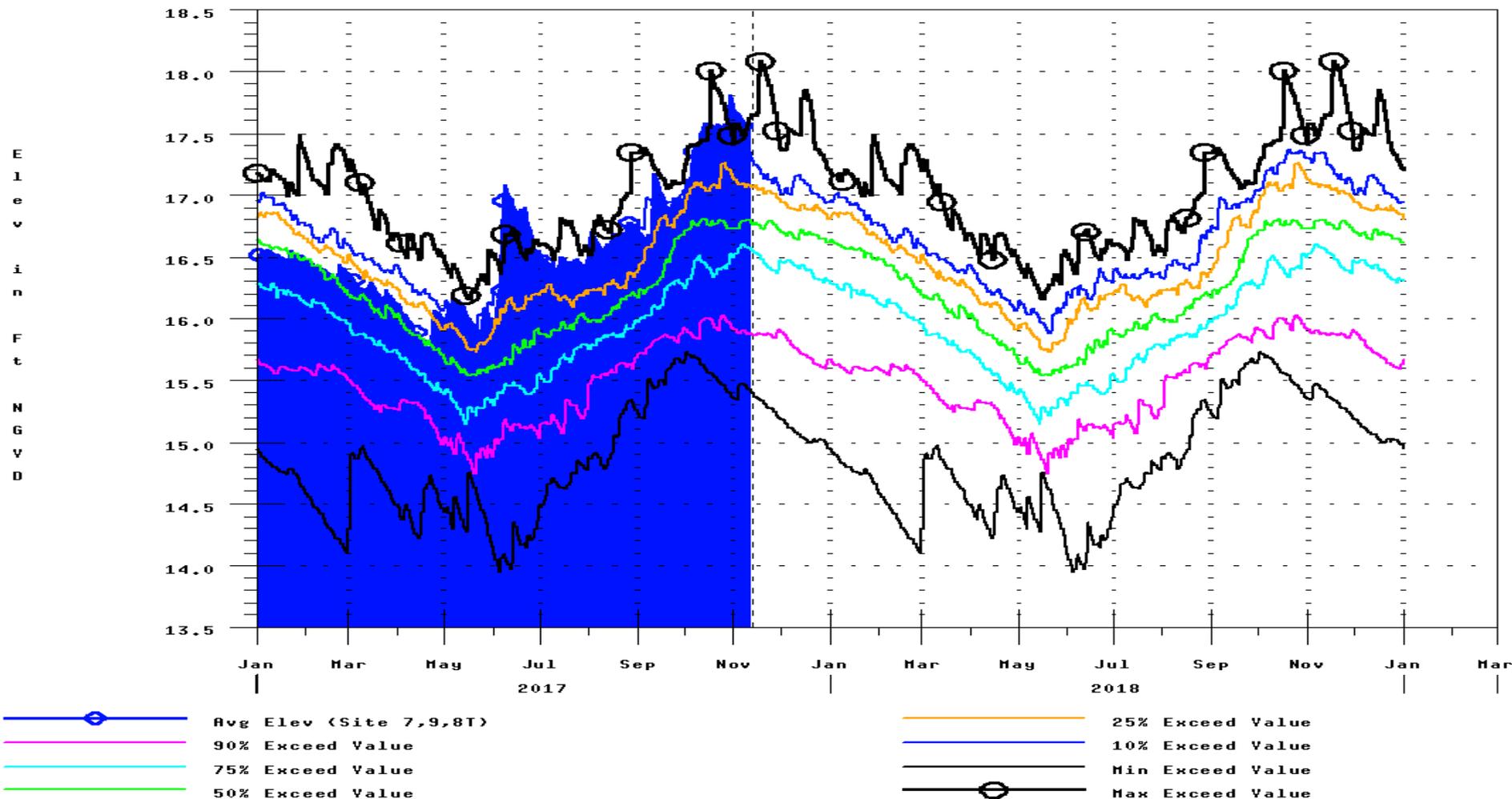


WCA-1



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Water Cons. Area #1 Compared to 1979-2016 Exceedance Statistics

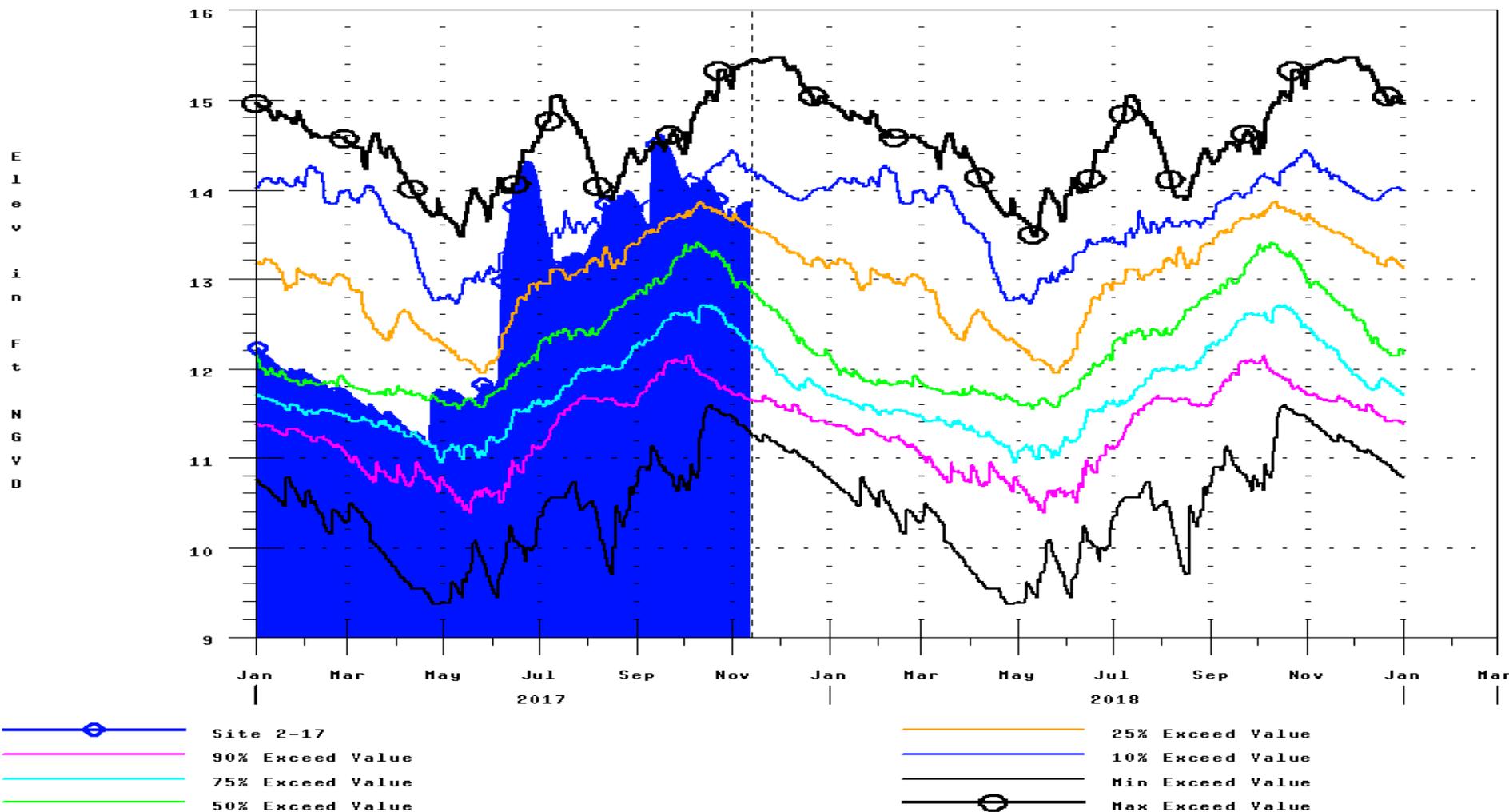




WCA-2A



Water Cons. Area #2A Compared to 1954-2016 Exceedance Statistics



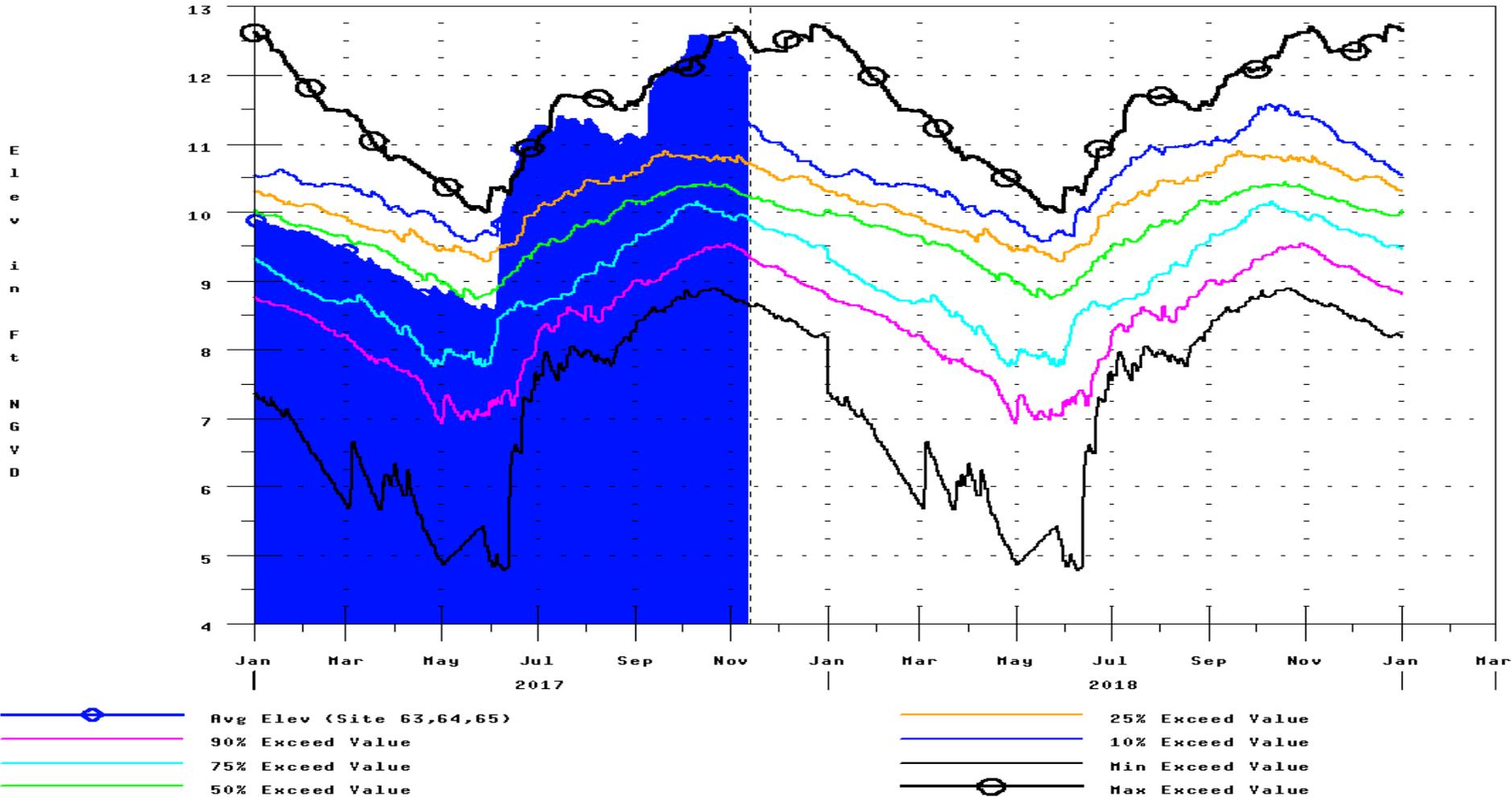


WCA-3A



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Water Cons. Area #3A Compared to 1962-2016 Exceedance Statistics





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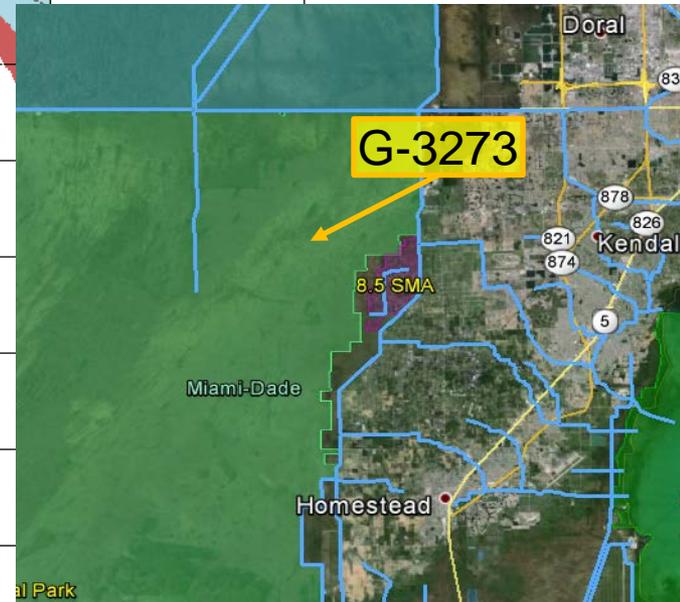
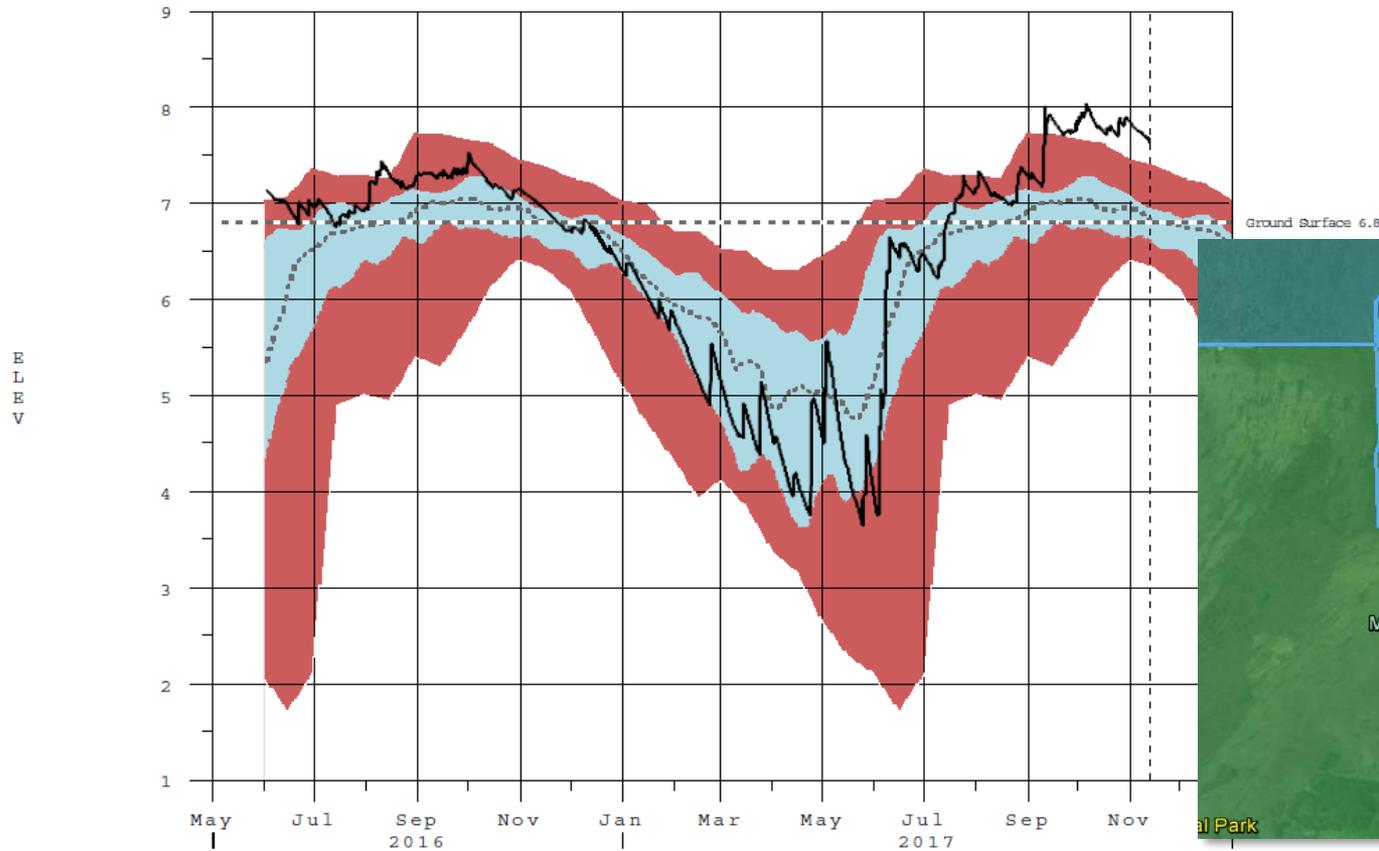
G-3273 Exceedance



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G3273 ELEV Exceedance Bands for Available Data

12NOV17 16:18:35



- 95% Band
- 50% Band
- - - - - 50 Percentile Line
- - - - - (Stats POR: JUL2002-MAY2015)

— Stages in FT-NGVD, Flows in CFS
 — G3273 ELEV (Hourly Data)



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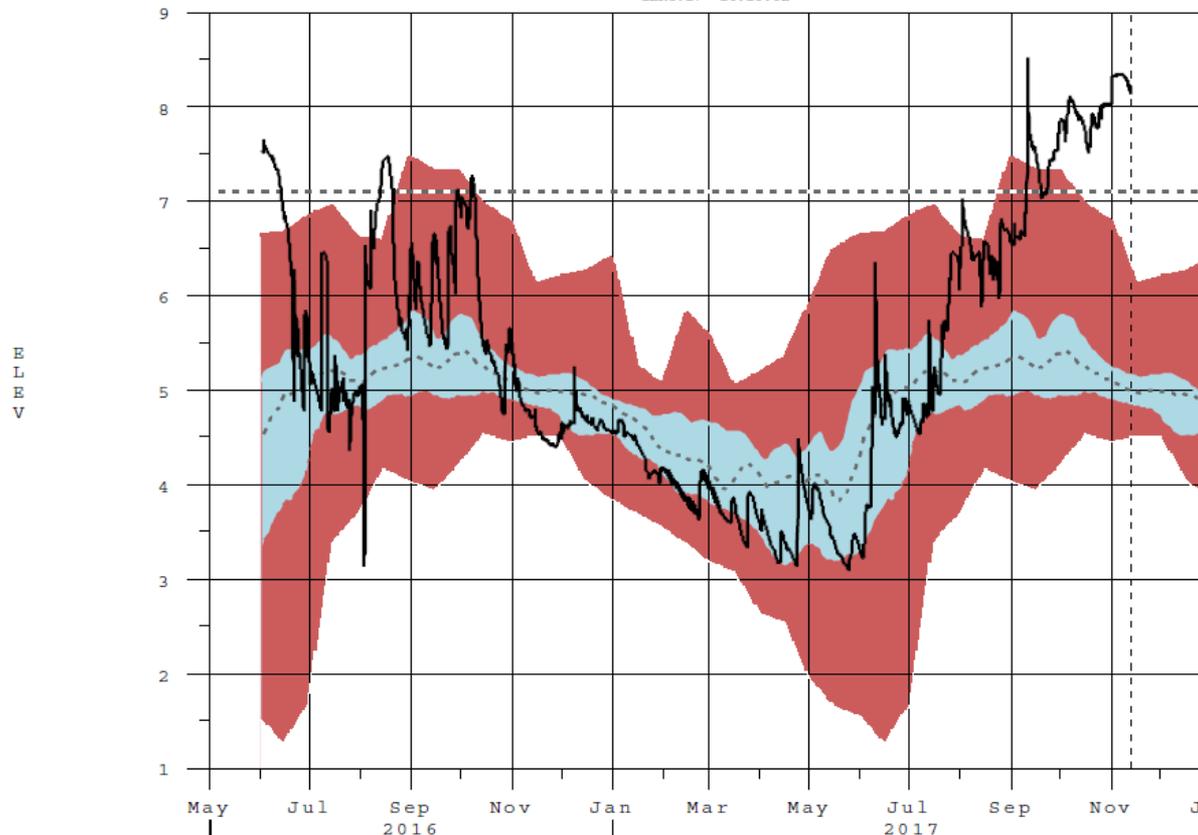
G-3628 Exceedance



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G3628 ELEV-GW Exceedance Bands for Available Data

12NOV17 16:19:02

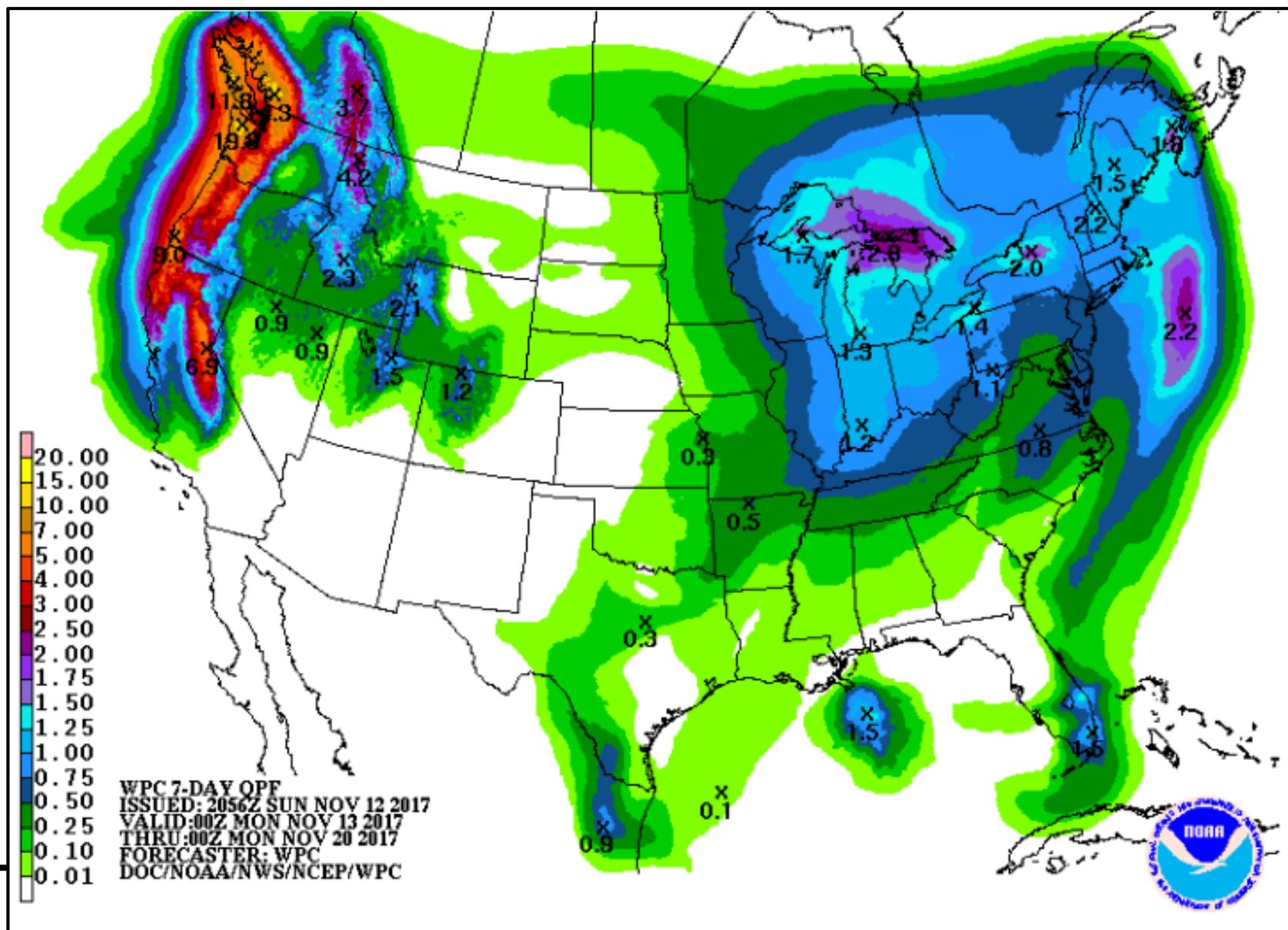


- 95% Band
 - 50% Band
 - - - 50 Percentile Line
 - - - (Stats POR: JUL2002-MAY2015)
- Stages in FT-NGVD, Flows in CFS
— G3628 ELEV-GW (Hourly Data)



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7-Day QPF

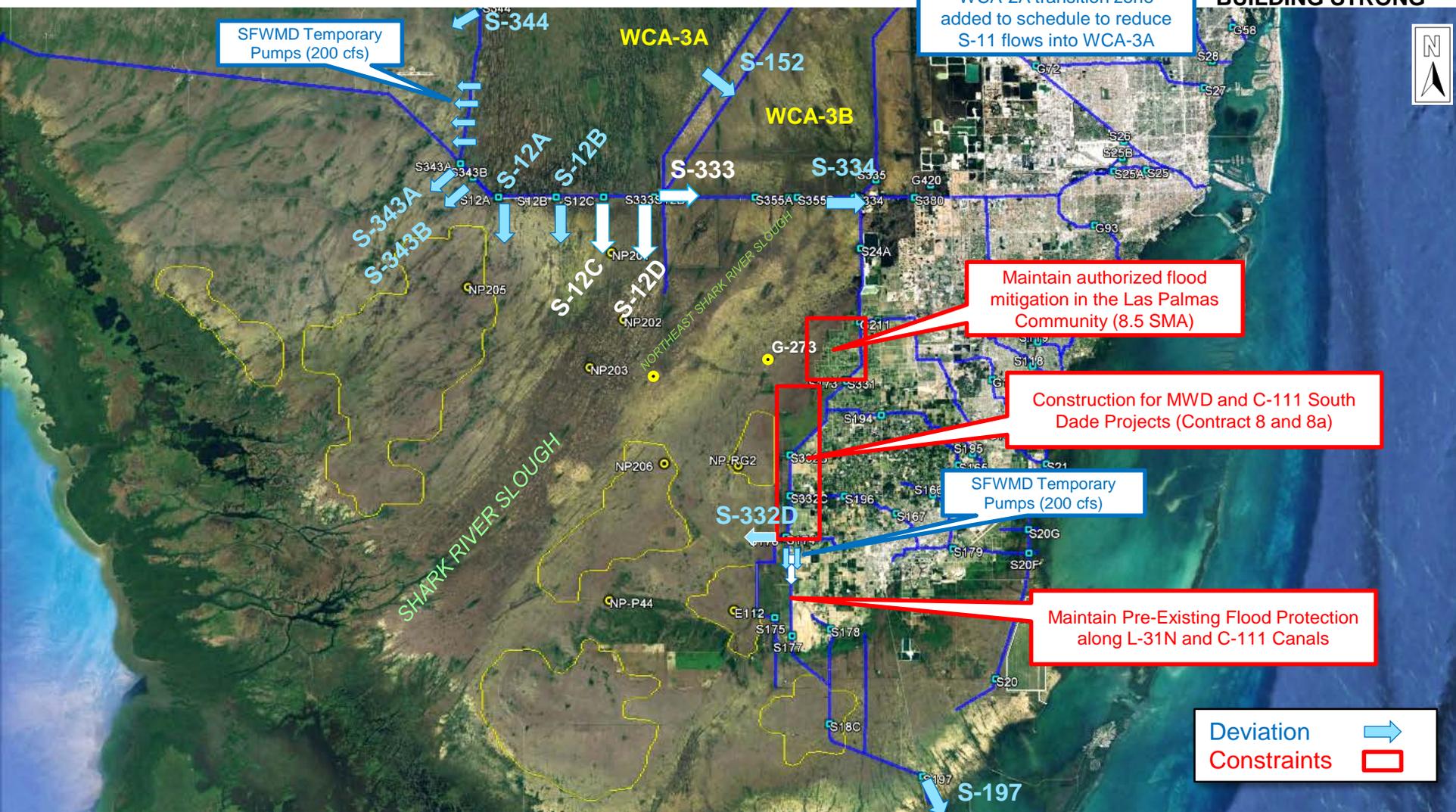




2017 Temporary Deviation Actions



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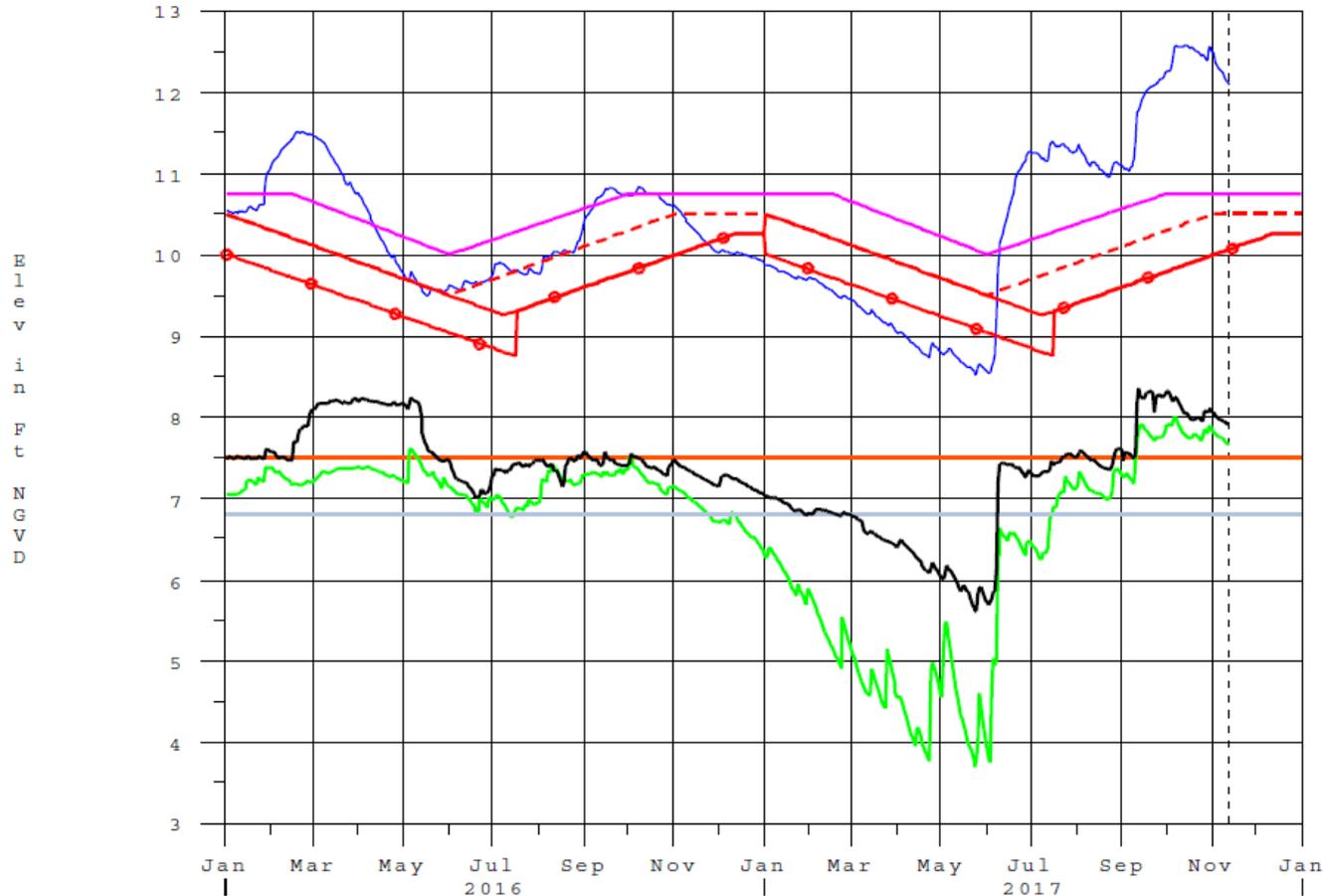
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WCA-3A & L-29 Stages



Water Conservation Area #3A with G-3273/S-356 Field Test Action Line

12NOV17 16:18:12



- | | | | |
|--|-----------------------------|--|---------------------------|
| | Avg Stage (Site 63, 64, 65) | | Floor |
| | Bottom of Zone A | | Increment 1 Action Line |
| | Zone C Regulation | | G3273 Stage |
| | Top of Zone D | | G3273 Constraint (6.8 ft) |
| | Top of Zone E | | L29 Canal Stage |
| | Bottom of Zone E1 | | |



C&SF System Status



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Lake Okeechobee and WCAs

Average Daily Conditions as of:
12 November 2017, 0000 hrs

Lake Okeechobee Stage: 16.72 ft
Previous day: 16.77 ft
One week ago: 16.95 ft

Total Structure/Creek Inflows: 4293 cfs
Total Structure Outflow: 9014 cfs

Area	Stages	Schedule
WCA-1	Site 1-8C: 17.67 ft 3-Station: 17.55 ft	17.50 ft
WCA-2A	Site 2-17: 13.82 ft S-11B HW: 13.74 ft	13.84 ft
WCA-3A	12.08 ft	10.06 ft



[Water Management Main Page](#)

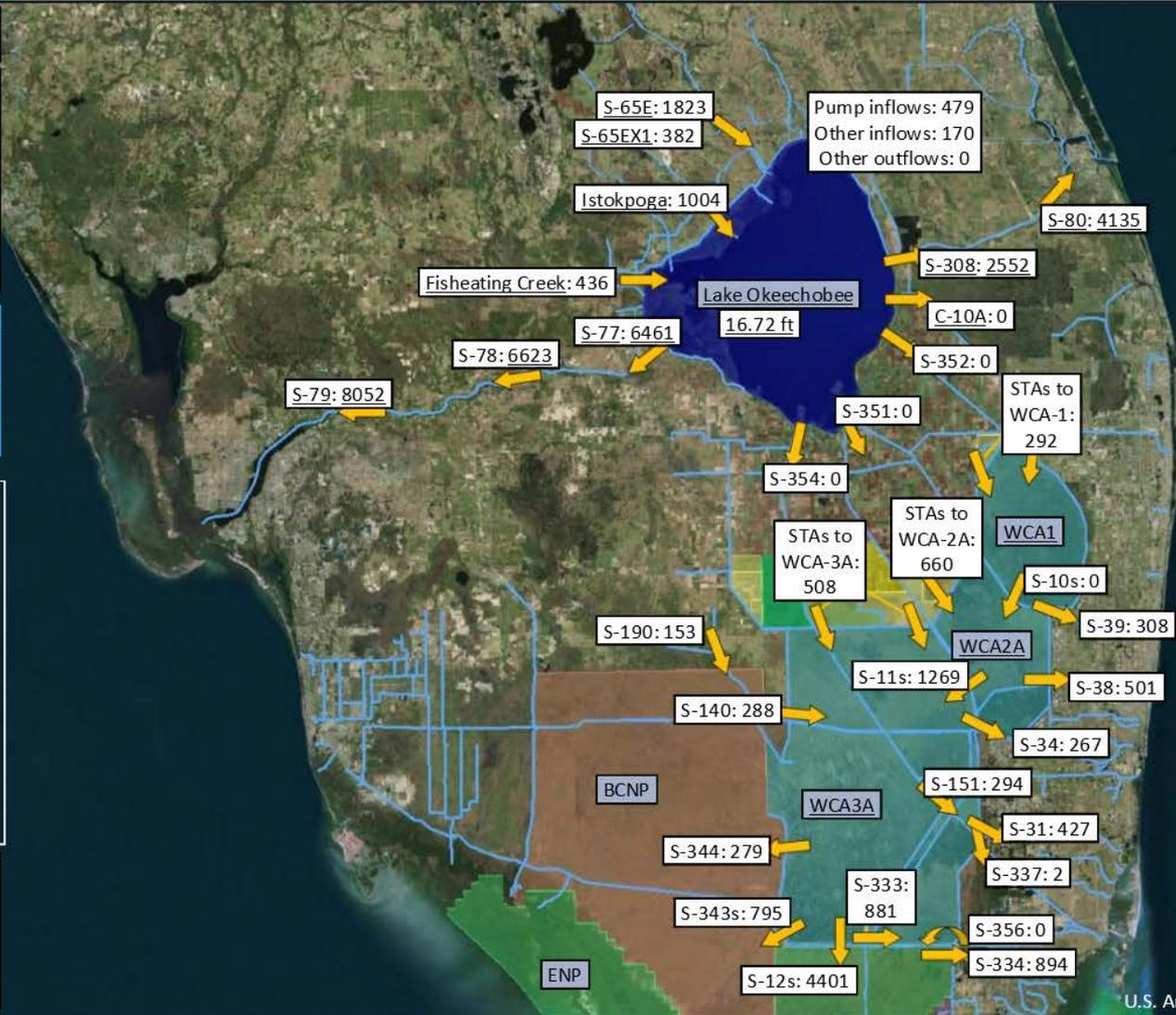
[Status Update Archives](#)

Elevations are ft-NGVD.

Flows are average daily CFS.

Data is provisional & subject to revision.

Report generated: 12NOV2017 @ 16:20



U.S. Army Corps of Engineers



South Dade Conveyance System Status



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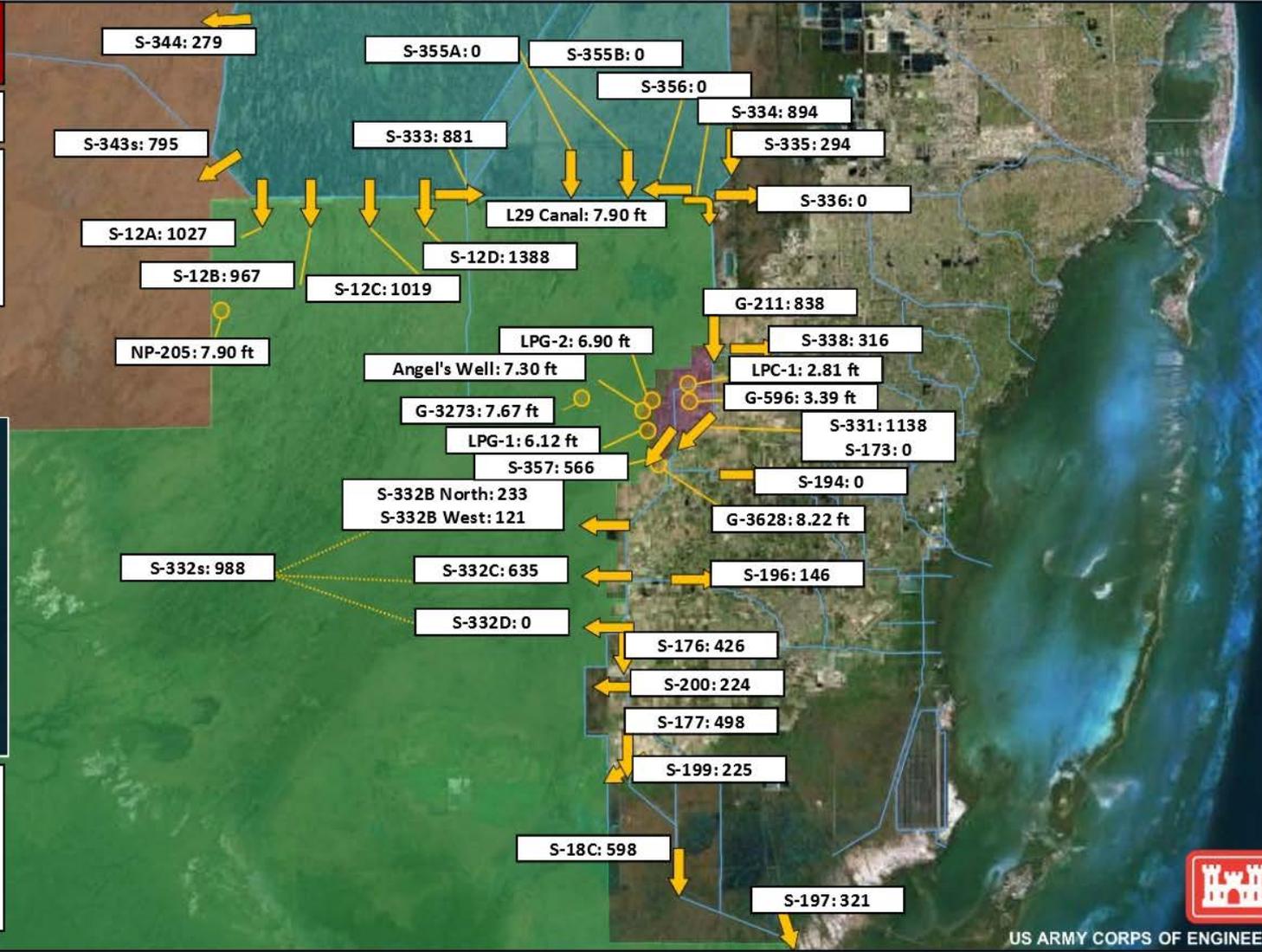
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South Dade Conveyance System

Average Daily Conditions as of:
12 NOV 2017, 0000 hrs

WCA-3A 3-Station Average
12.08 ft

WCA-3A Regulation Zones
Top of D = 10.50 ft
Top of E = 10.06 ft
Bottom of E1 = 10.06 ft



[Water Management Main Page](#)

[Status Update Archives](#)

Elevations are ft-NGVD.

Flows are average daily CFS.

Data is provisional & subject to revision.

Report generated: 12 NOV 2017 @ 16:20



US ARMY CORPS OF ENGINEERS



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QUESTIONS?



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MONITORING



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Surface Water Quality S-356 Project Area

Jim Riley



Surface Water Quality Conditions



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- No near term anticipated S356 operations, will not occur this wet season or near term. Stages too high in WCA-3A.
- S356 pumping occurred during Hurricane Irma for 6 days, 11 Sept- 17 Sept 2017, to address potential flooding concerns. Low total phosphorus concentrations during flow period, peak auto sampler value of 12ppb for one day.
- Peak total phosphorus concentration (grab) at S333 was 87 ppb (June12) following very high rainfall events. Peak ADT sample was 91ppb (June 10).
- Phosphorus dropped below 20ppb (ADT) by 24 June 2017 after record June rainfall events.
- Appears project area water quality is fully recovered from extreme rainfall events/ hurricane with total phosphorus values (grabs) at or below 10ppb.
- Samples for the S-328 and G-737 (C111/Frog Pond) have continued to be low, 10 or below (grabs only, excluding construction periods, no autosampler data available as of this meeting).
- Water quality in the project area is expected to remain stable in Total P (low ~10ppb or below) concentrations as wet season conditions continue.



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PRELIMINARY TP CONCENTRATION (mg/L) DATA FROM SFWMD LABORATORY INFORMATION MANAGEMENT SYSTEM (LIMS)

LIMS query performed 10/27/2017 1500 HOURS

DATE	G G737	G S12A	ADT S12A	G S12B	G S12C	G S12D	G S151	ACT S151	G S152	ACT S152	G S197	G S328	G S333	ADT S333	G S334	G S344	G S356-334	ADT S356-334	G S357	
10/27/2017																				
10/26/2017																				
10/25/2017																				
10/24/2017											0.006	0.004							0.005	
10/23/2017		0.008		0.007	0.005	0.008			0.006	0.008			0.007		0.010		0.010			
10/22/2017														0.009						
10/21/2017														0.009				0.011		
10/20/2017														0.009						
10/19/2017														0.009				0.011		
10/18/2017														0.009				0.010		
10/17/2017	0.006											0.006		0.008				0.010	0.005	
10/16/2017		0.008		0.005	0.004	0.006			0.006	0.008			0.007	0.010			0.009	0.011		
10/15/2017			0.013											0.009				0.010		
10/14/2017			0.011											0.009				0.009		
10/13/2017			0.011											0.010				0.010		

G Grab
 ADT Autosample, daily, time-proportional
 ACT Autosample, composite (weekly), time-proportional

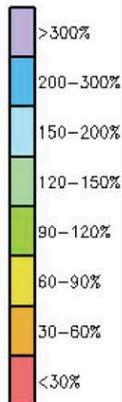
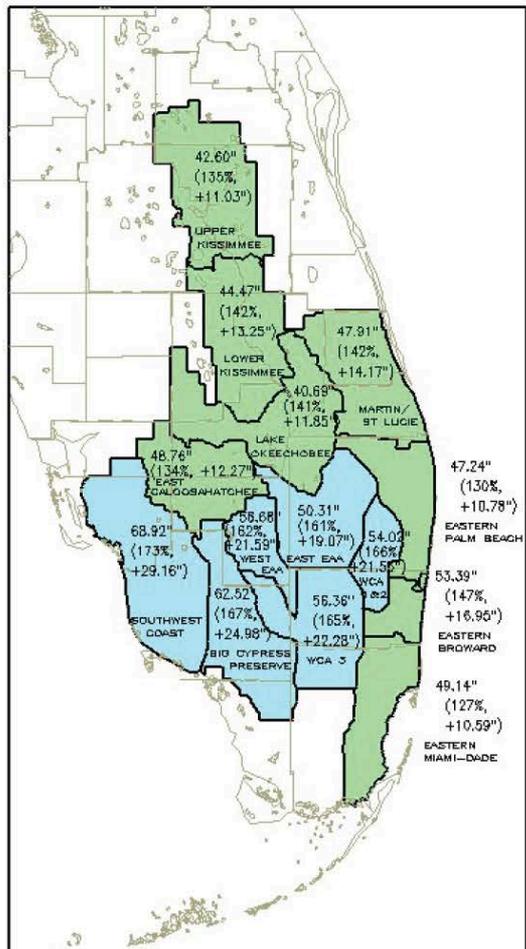


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2017 WCA-3A Seasonal Rainfall



SFWMD Rainfall
02-JUN-2017 to 01-NOV-2017



Measured
(% of Avg.
Diff From Avg)



DISTRICT-WIDE: 51.64" (150%, +17.25)

GADS: COLA/ICES

2017-11-01-15:22

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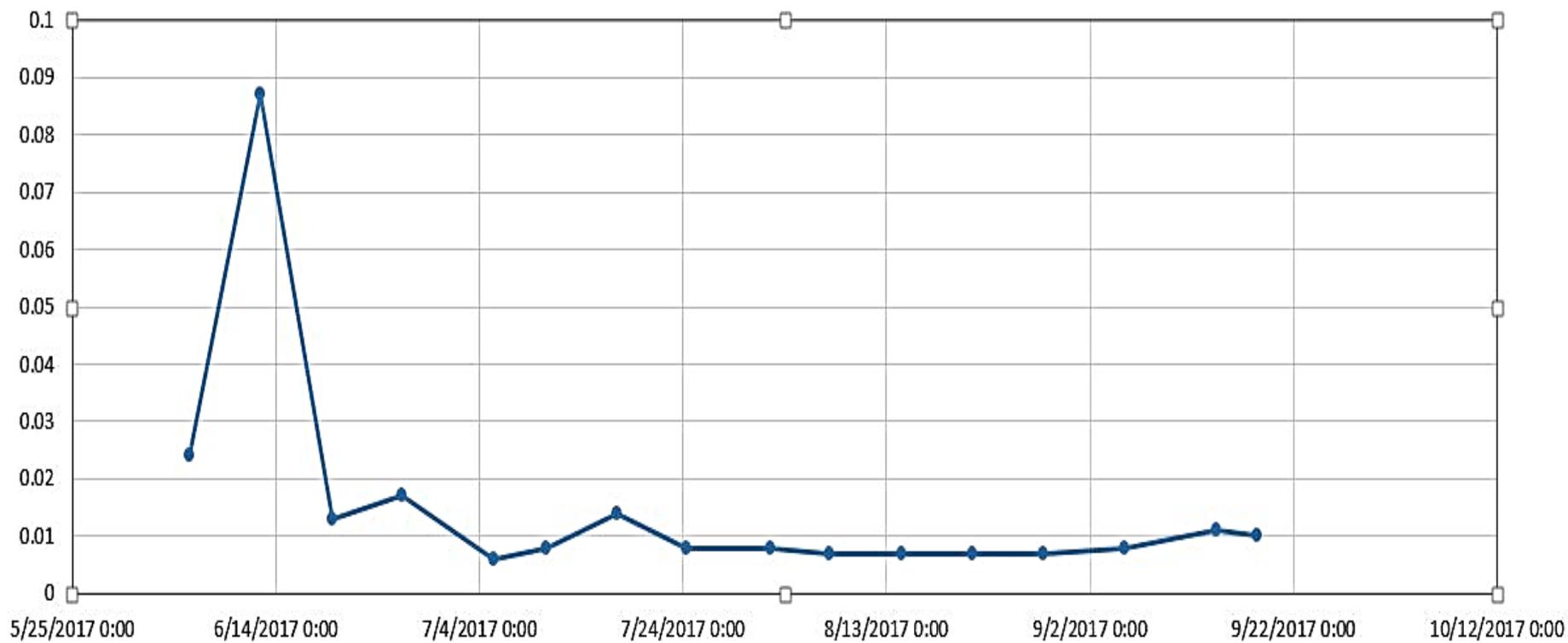


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S333 Grabs Total P conc parts per million



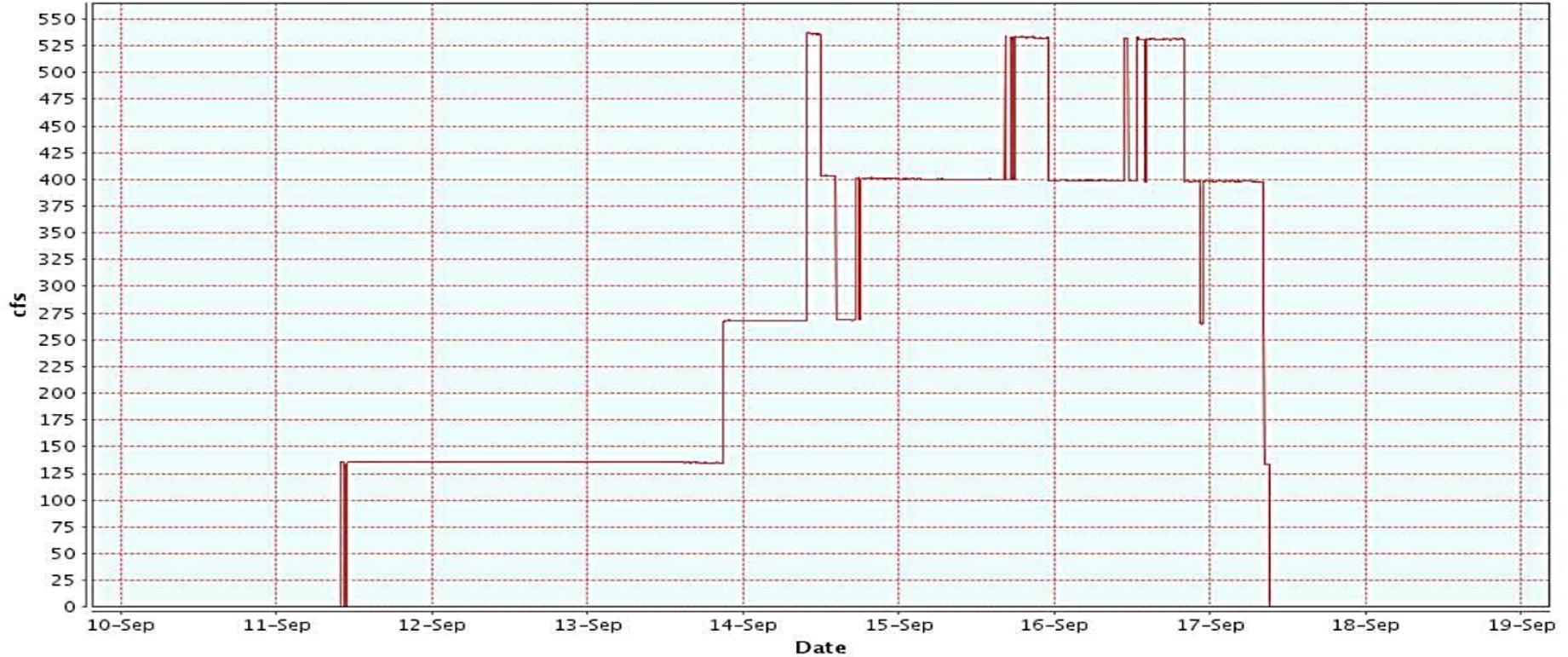


S356 pumping during Irma 11Sep_17Sep 2017



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DBHYDRO Chart
10-SEP-2017 to 18-SEP-2017

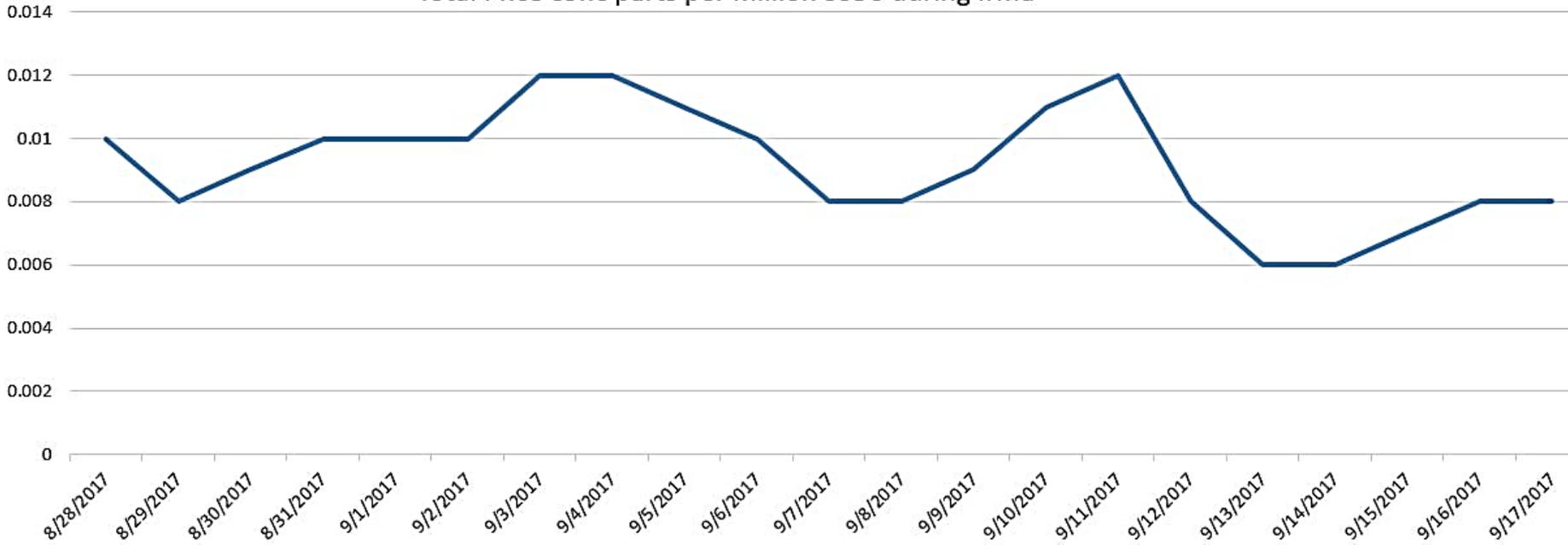


DBKey	Station	Agency	Data Type	Unit	Statistic	Frequency	Strata	Gate/Pump#
92190	S356_P	WMD	FLOW	cfs	INST	BK	0	N/A



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Total Phos conc parts per million S356 during Irma





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QUESTIONS?



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ESA

Miles Meyer

G-3273/S-356 Increment 1.1/1.2

ESA Briefing - Q3 PDT Meeting

November 13, 2017



South Florida Field Office
Vero Beach, Florida

Cape Sable Seaside Sparrow



South Florida Field Office
Vero Beach, Florida

Cape Sable seaside sparrow annual count 2013-2017

Population Year	A		B		C		D		E		F		Total	
	BC	Est	BC	Est	BC	Est	BC	Est	BC	Est	BC	Est	BC	Est
2013	18	288	112	1,792	8	128	1	16	45	720	1	16	185	2,960
2014	4	64	114	1,864	7	112	2	32	42	672	1	16	170	2,720
2015	13	208	120	1,920	7	112	4	64	55	880	2	32	201	3,216
2016	3	48	112	1,792	7	112	5	80	24	384	0	0	151	2,416
2017	1	16	121	1,936	3	48	4	64	75	1,200	1	16	205	3,280

Consecutive Dry Nesting Days 2017	
Population	≥ 90 days
AX	46 %
B	69 %
C	100 %
D	59 %
E	79 %
F	100 %



Everglades Snail Kite



South Florida Field Office
Vero Beach, Florida

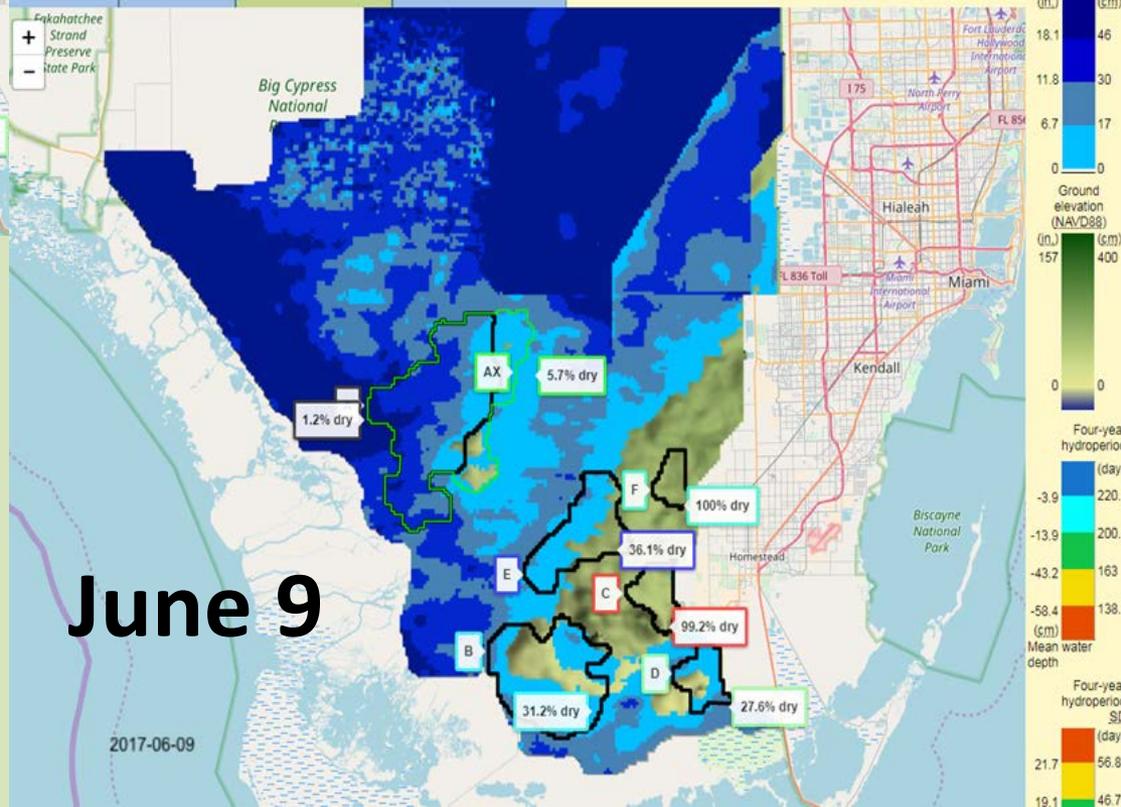
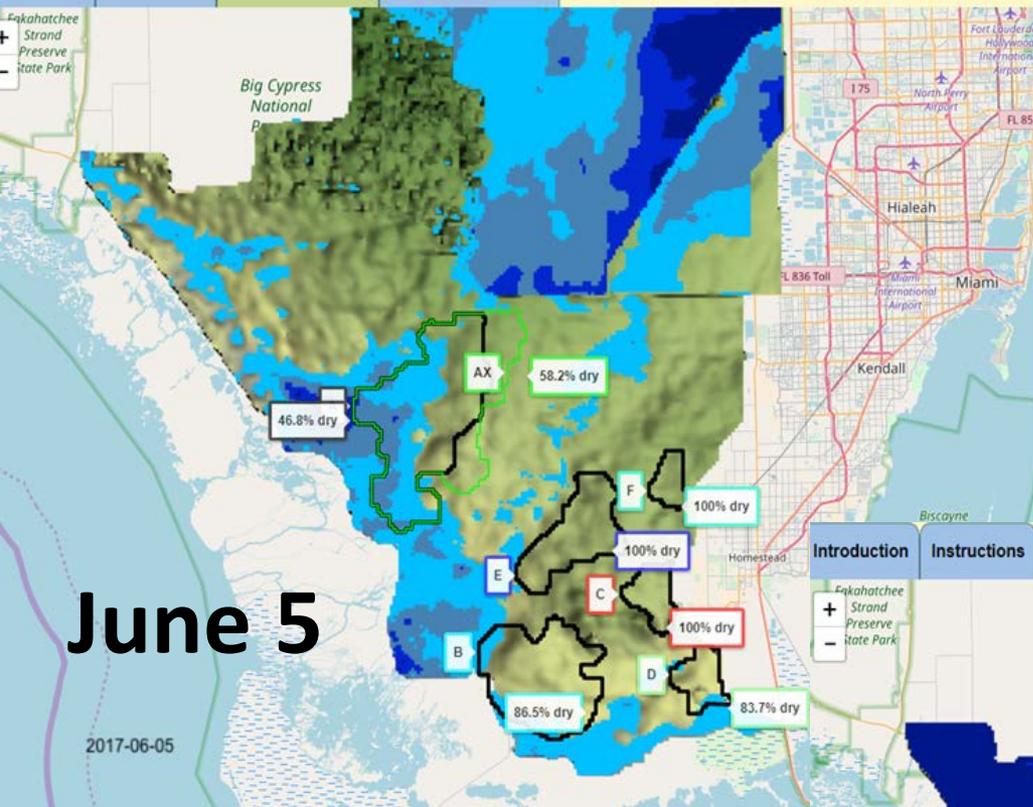
Snail Kites

- Nesting activity in 2017 prior to Irma (204 nests) was down from 2016 (771 nests).
- There were a total of 54 active kite nests state-wide before Hurricane Irma, all failed.
- Rotenburger is the only site where re-nesting occurred after Irma (12 active nests).



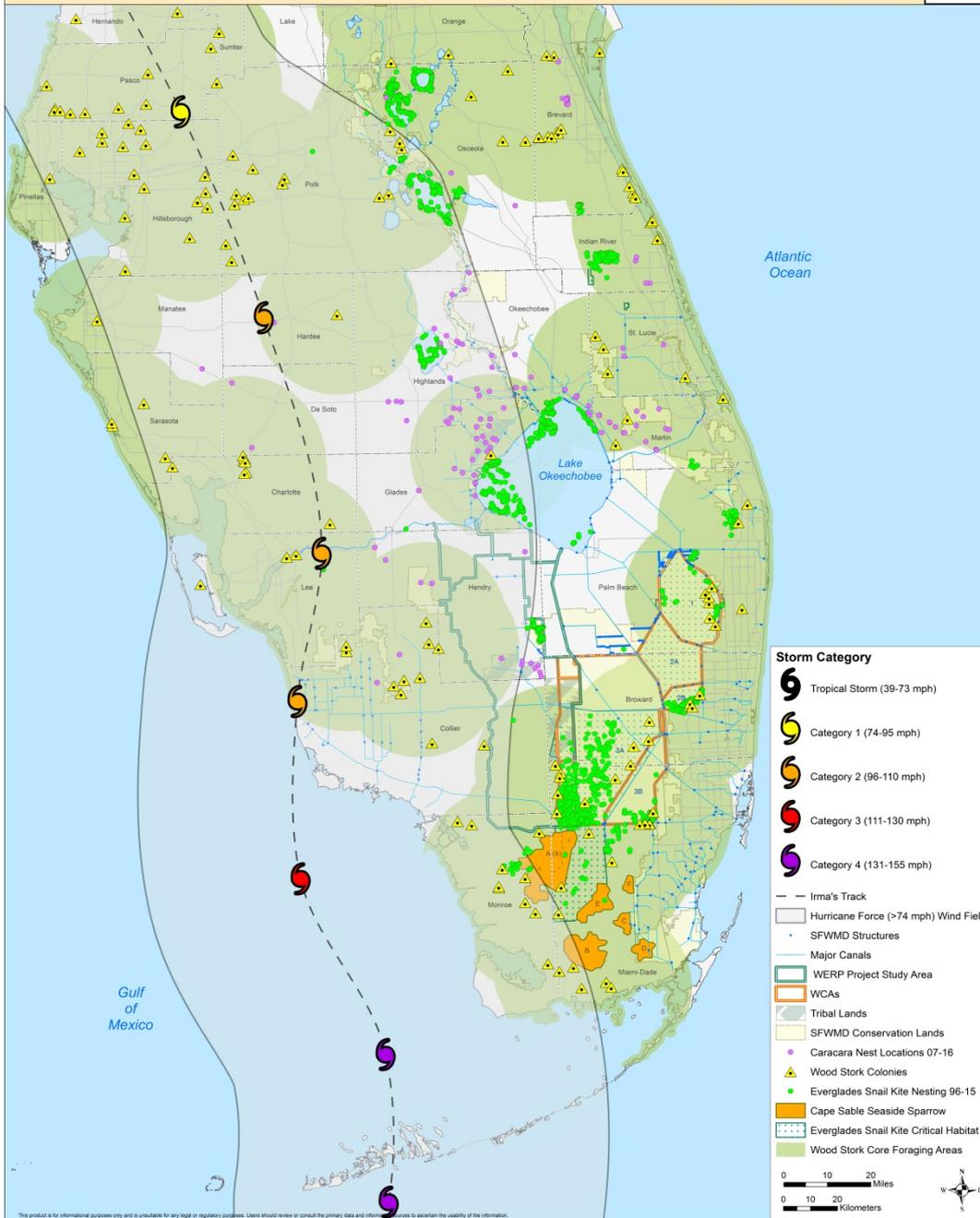
Current Conditions and Multispecies Recommendations



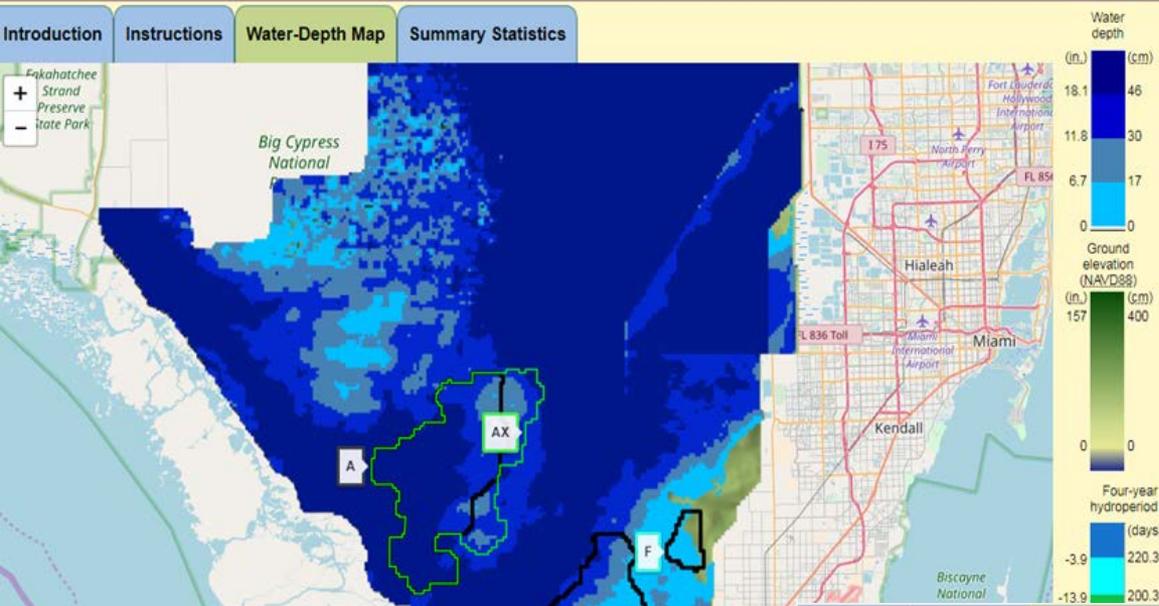




Hurricane Irma



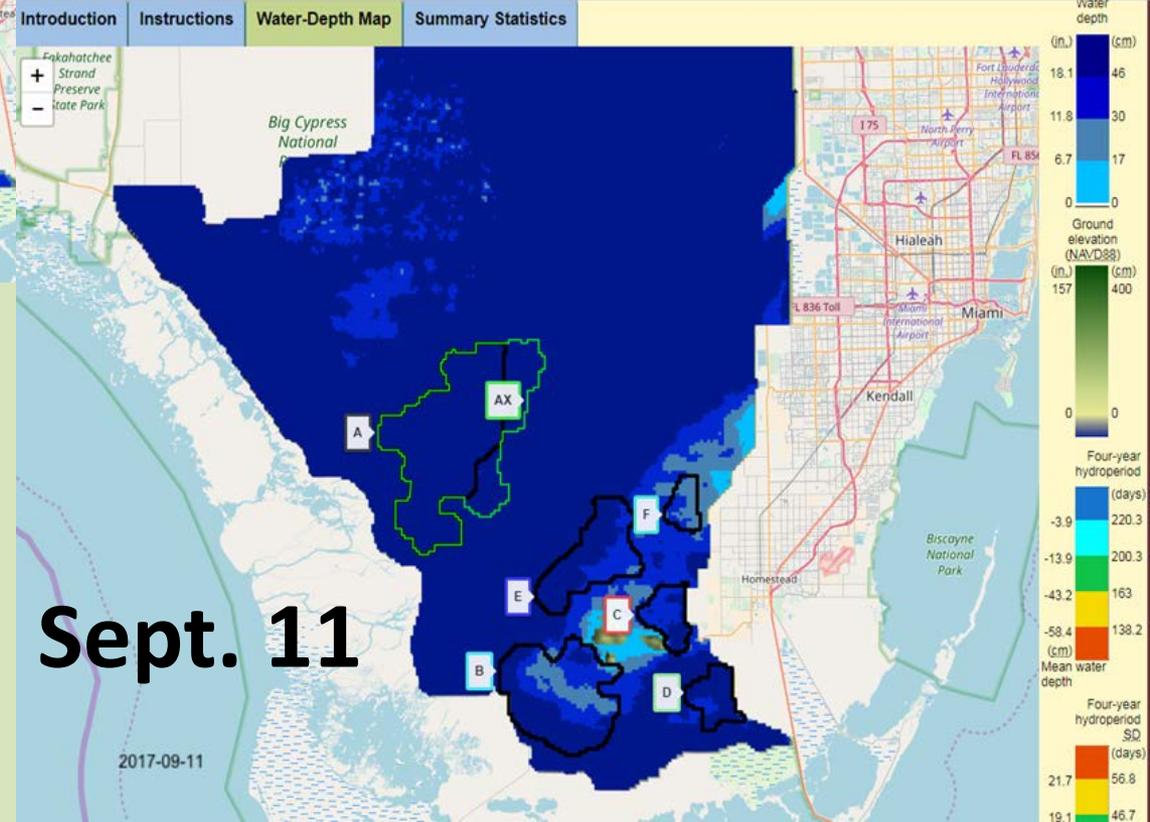
This product is for informational purposes only and is unsuitable for any legal or regulatory purposes. Users should review or consult the primary data and information sources to ascertain the quality of the information.



Sept. 8

2017-09-08

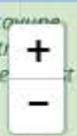
Before/After Irma



Sept. 11

2017-09-11





Fakahatchee Strond Preserve State Park

Big Cypress National Preserve

Hialeah

Kendall

Biscayne National Park

Homestead

SR 175

SR 836 Toll

North Perry Airport

Miami International Airport

Current Conditions

2017-11-11



Multispecies Water Management Recommendations

- All structures remain open to allow WCA-3A levels to recede.
- Maximize flows out of WCA-3A to the east.
- Reassess S-12A/B closures around Jan. 1, 2018.
- Target suitable water levels in WCA-3A for wading birds, snail kites and tree islands.
- Target water levels at or below ground surface in CSSS subpopulations prior to March 1, 2018.

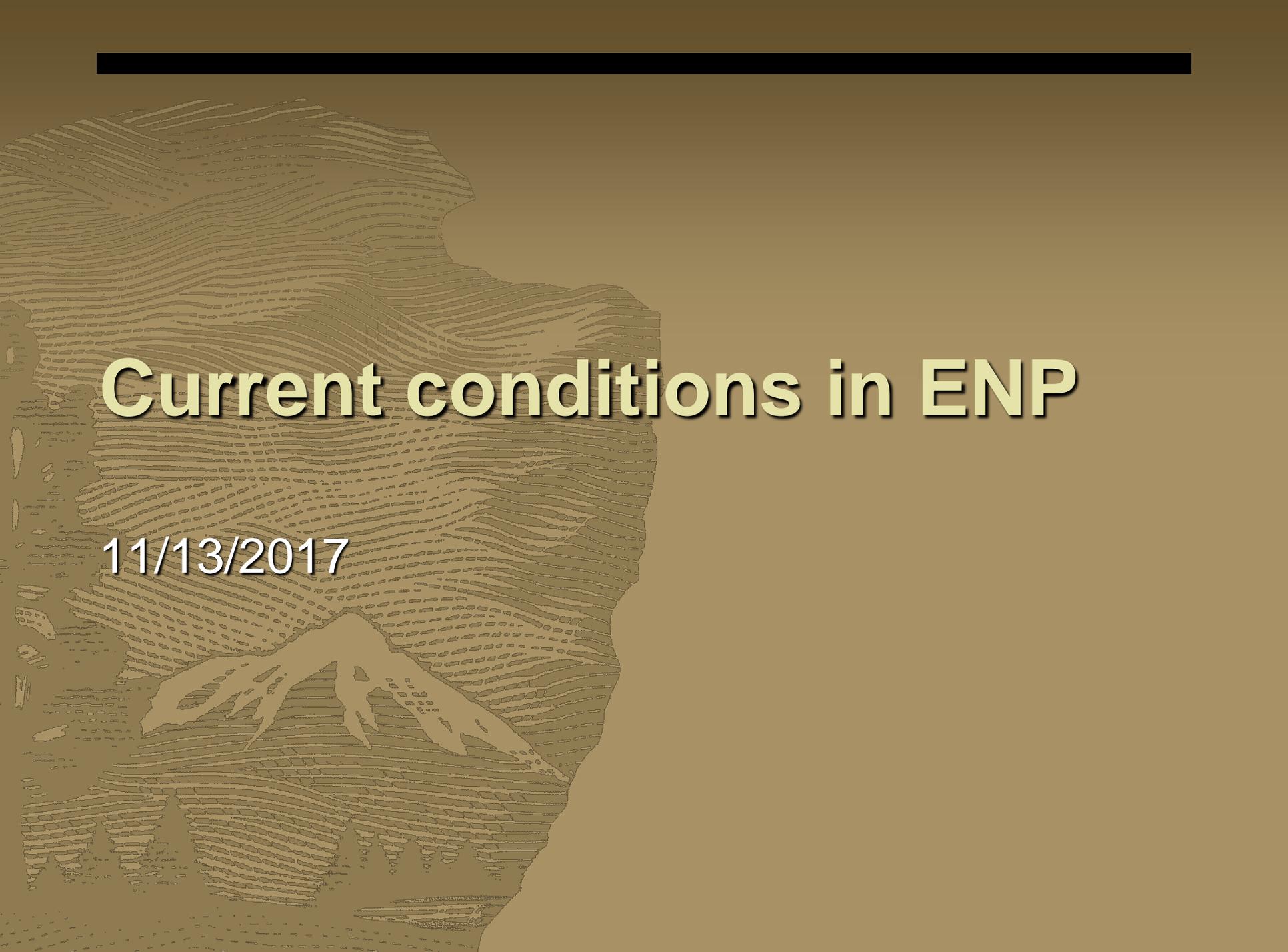




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Environmental Conditions in ENP

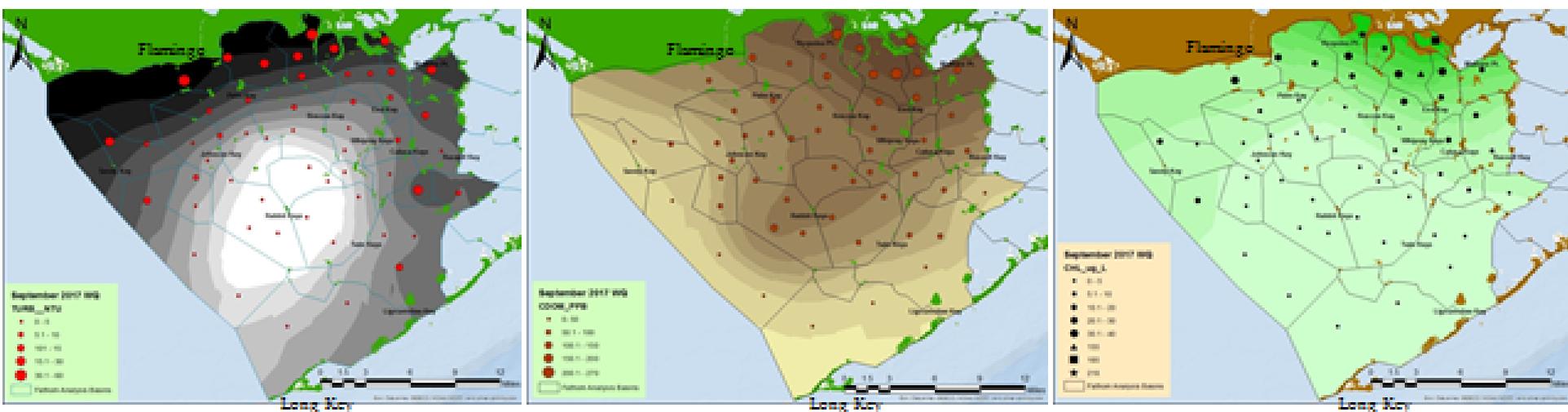
Jed Redwine



Current conditions in ENP

11/13/2017

Post Hurricane Irma water quality measures in Florida Bay September 26-29, 2017



(A) Turbidity (NTU) Field measurement with Hach 2100Q in nephelometric turbidity units, sub-surface water (0.3 m). ***North coastal waters extremely turbid. Low turbidity water found in central and south basins.

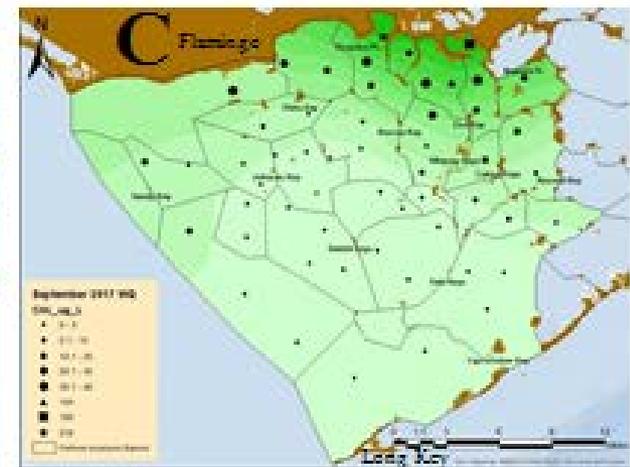
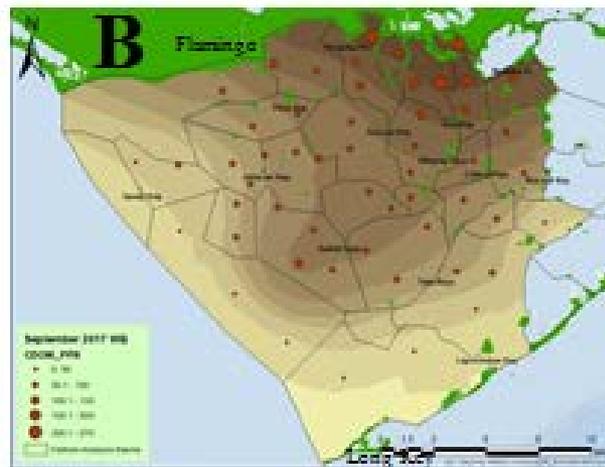
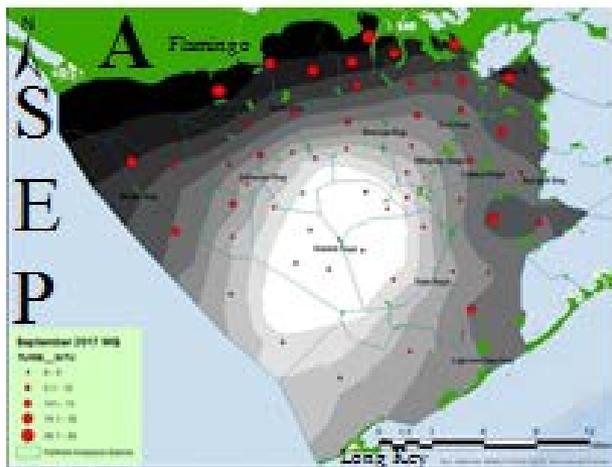
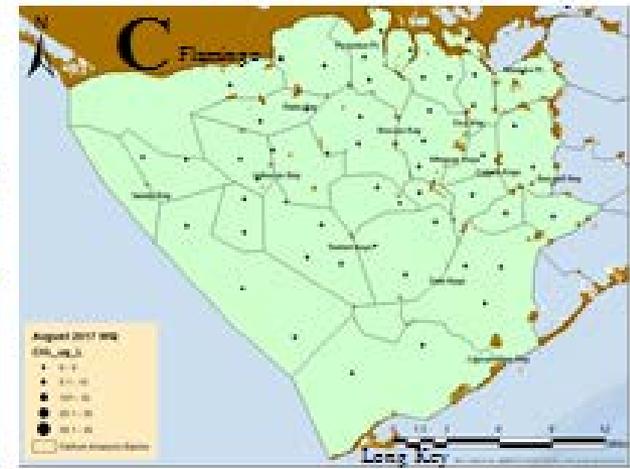
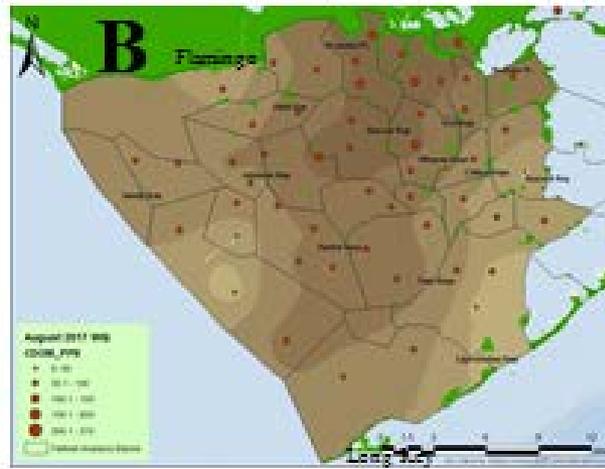
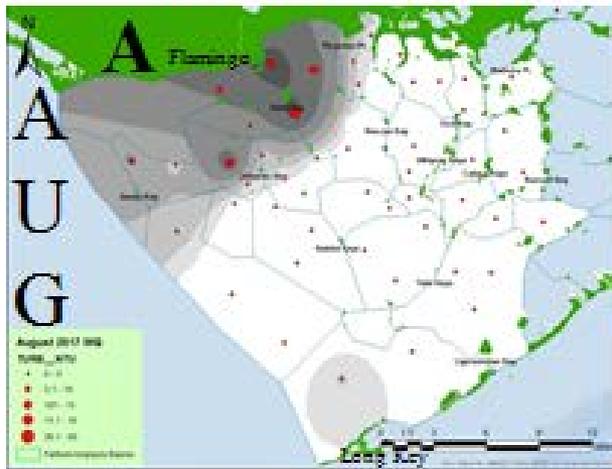
(B) CDOM (Colorimetric dissolved organic matter, filtrate of 0.45um glass fiber filter, lab fluorometry in quinine sulfate, ppb). Clear waters found in some basins in south.

(C) Chlorophyll-a (EPA method 445.0, laboratory filtration, extraction, and fluorometric determination - Turner 7200)

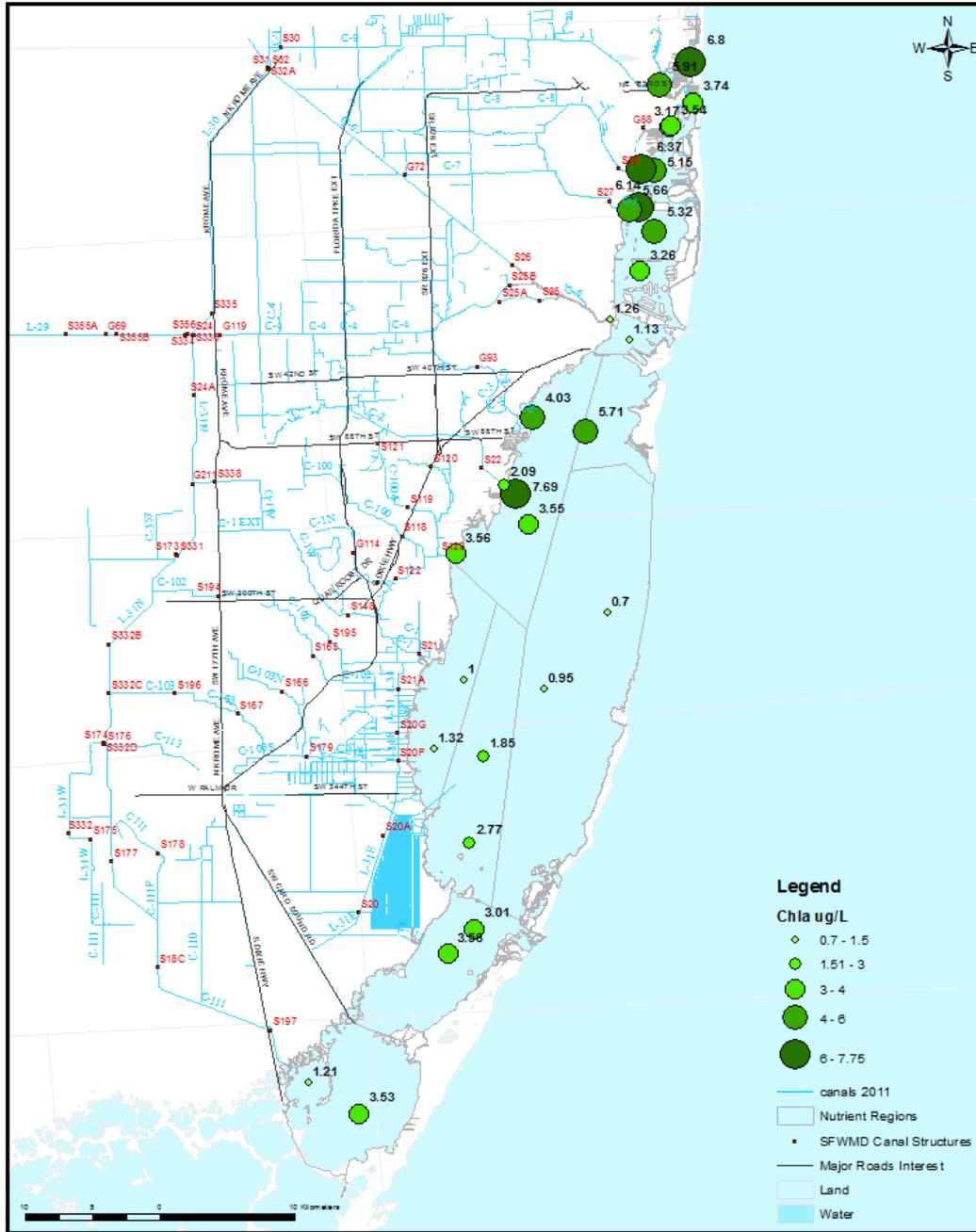
***Extreme values of chlorophyll-a in north central bights at Garfield Bight and Terrapin Bay and N Whipray basin, exceeding 115 ug/L (upper calibration limit) and as high as 300 ug/L. Similar measurements made by FIU at Alligator Point.

Source: Everglades National Park, Florida Bay Interagency Science Center: Vicki Absten, Zachary Fratto, Christopher Kavanagh

Pre/Post Hurricane Irma water quality measures in Florida Bay

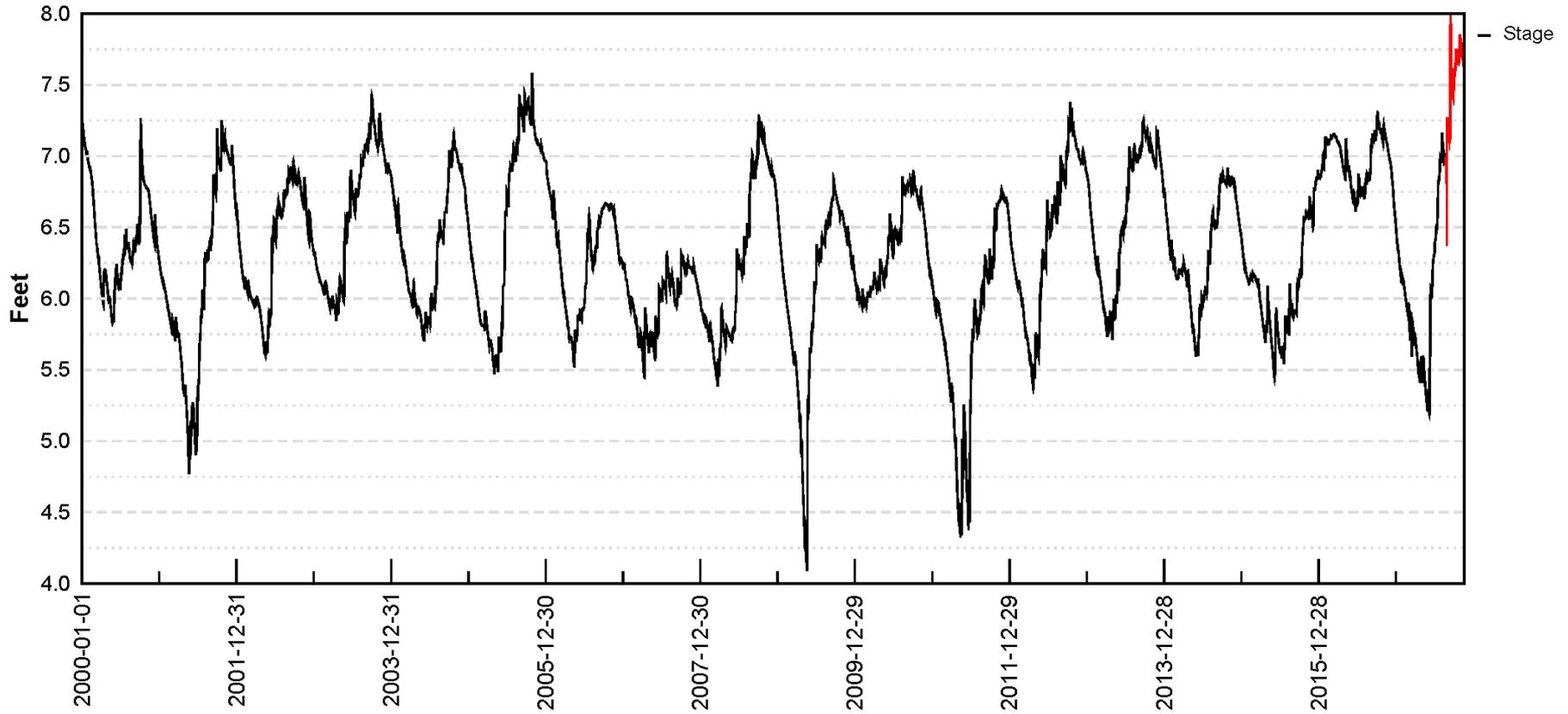


Post Hurricane Irma Biscayne Bay Chlorophyll Results September 25-28 2017



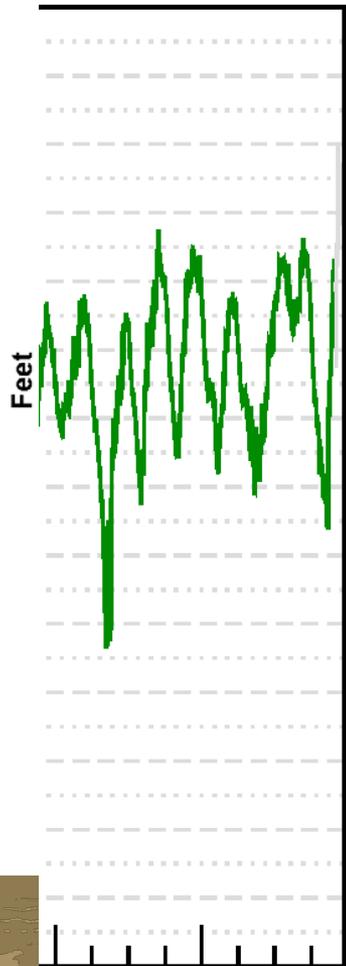
1 Day Moving Maximum

P33/Stage from 2000-01-01 to 2017-11-13

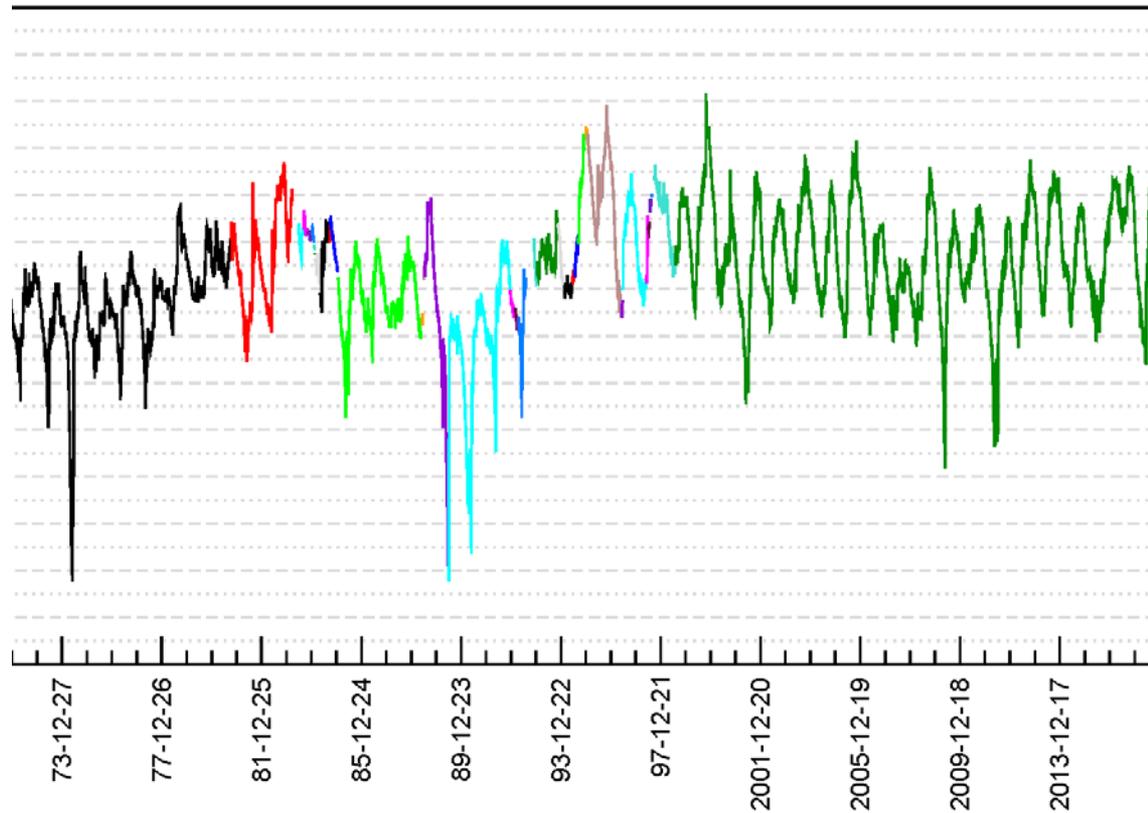


1 Day Moving Maximum

P33/Stage from 1954-01-01 to 2017-11-13



— Stage



— Stage

P33

Go to [EDEN station page for P33](#)

Operating Agency: [ENP \(Agency POC\)](#)

Vertical Conversion at Gage (feet) used by EDEN
(NGVD29 to NAVD88): -1.51 ft.

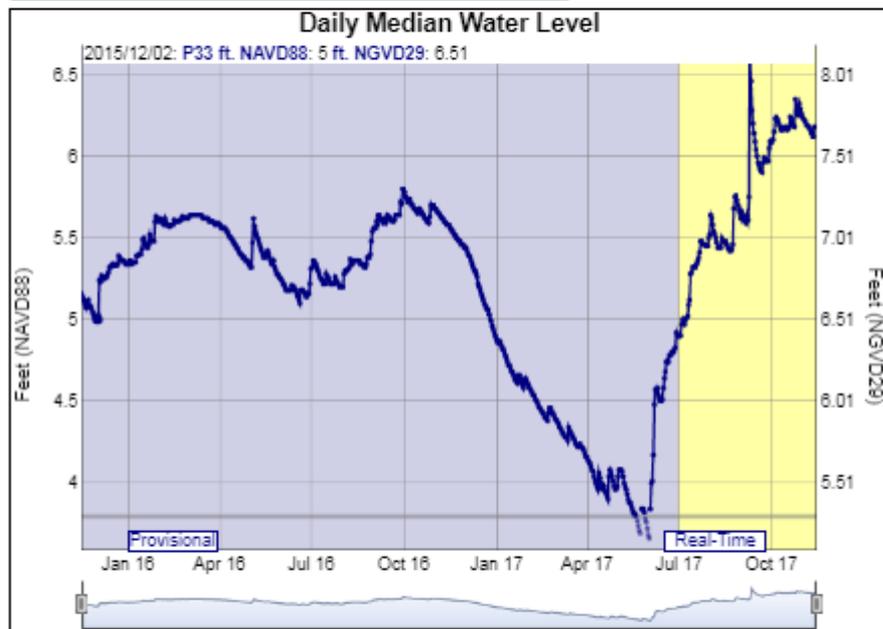
Available EDEN data	Period of record
Water Level (measured)	1990-01-01 — 2017-11-13
Rainfall	2002-01-01 — 2017-09-30
Evapotranspiration	1995-06-01 — 2016-12-31

Go to [ENP](#) for complete datasets for this gage

Legend

- Observed data
- - - - - Estimated data
- - - - - Hindcasted data
- Dry conditions
- Min. ground ele.
(3.81 ft. NAVD88)

Recent water levels subject to revision. Non-final data are either **real-time** or **provisional**.



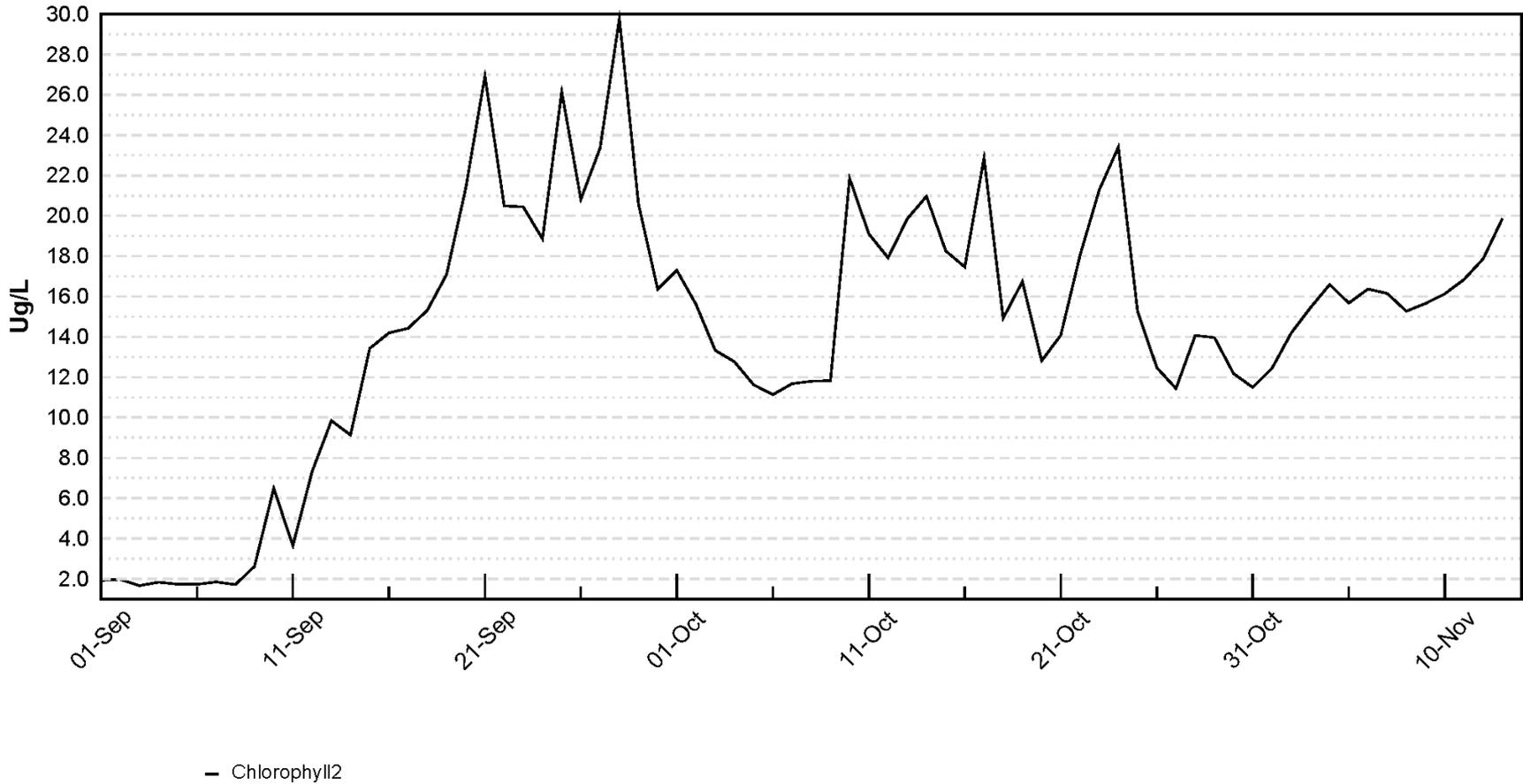
Tips: Mouse over plot for interactive data point values. Click and drag in the plot to zoom either dimension. Double-click to reset zoom to full selected period; shift-click and drag to pan in the zoomed-in view.

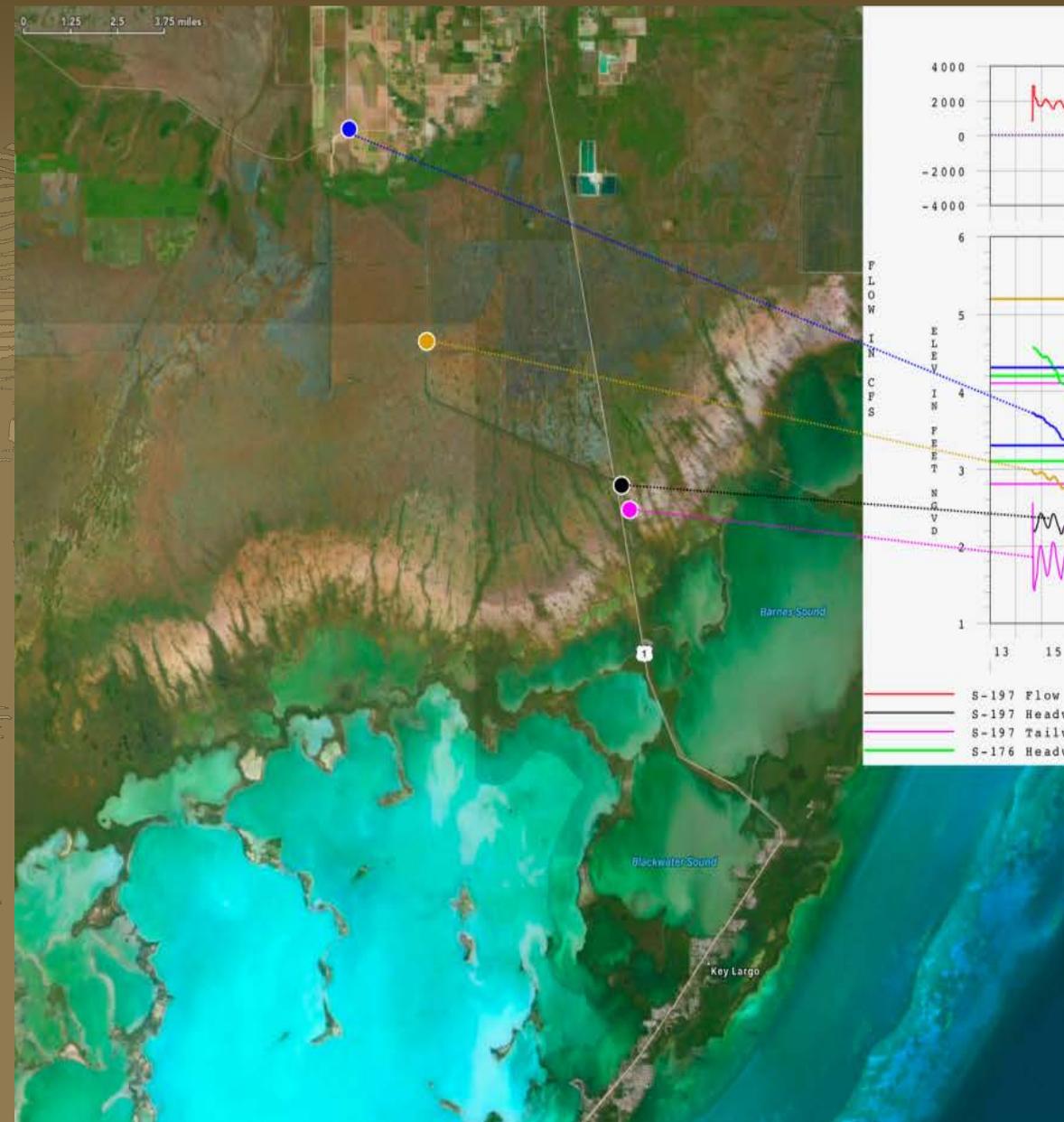
Provisional Water depths at P33 are 4-5 feet during the period following IRMA.

https://sofia.usgs.gov/eden/eve/index.php?site_list%5B%5D=P33&water_level=stage&rainfall=rainfall&et=et

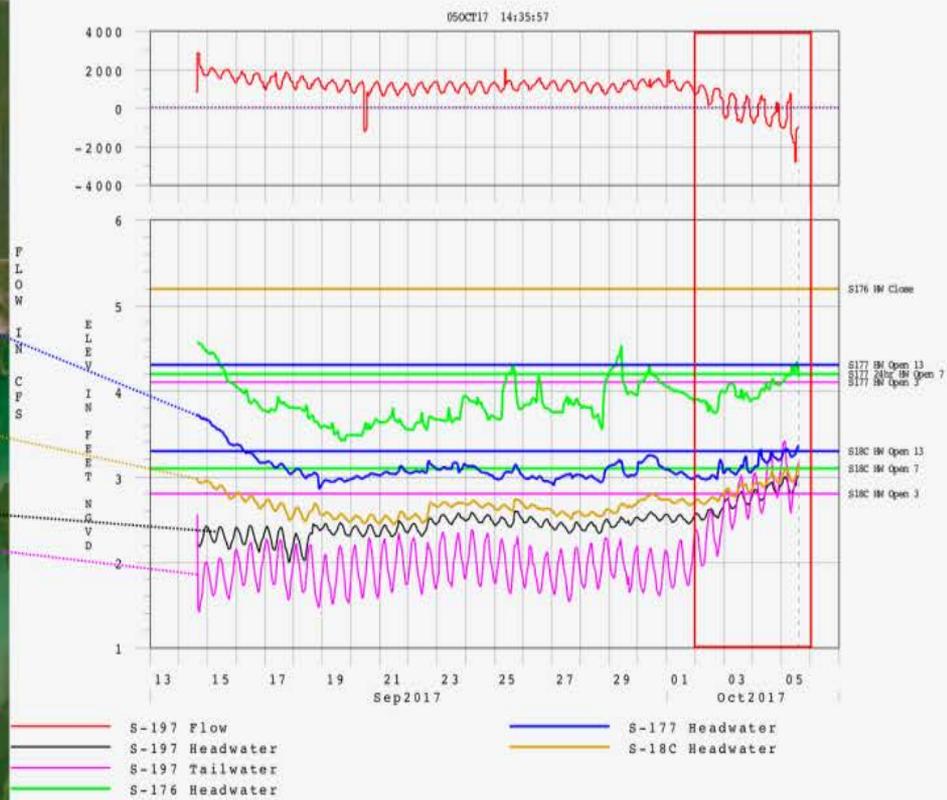
TB/Chlorophyll2 Daily Average Values

Beginning: 2017-09-01 Ending: 2017-11-13





C-111 Canal at S-197

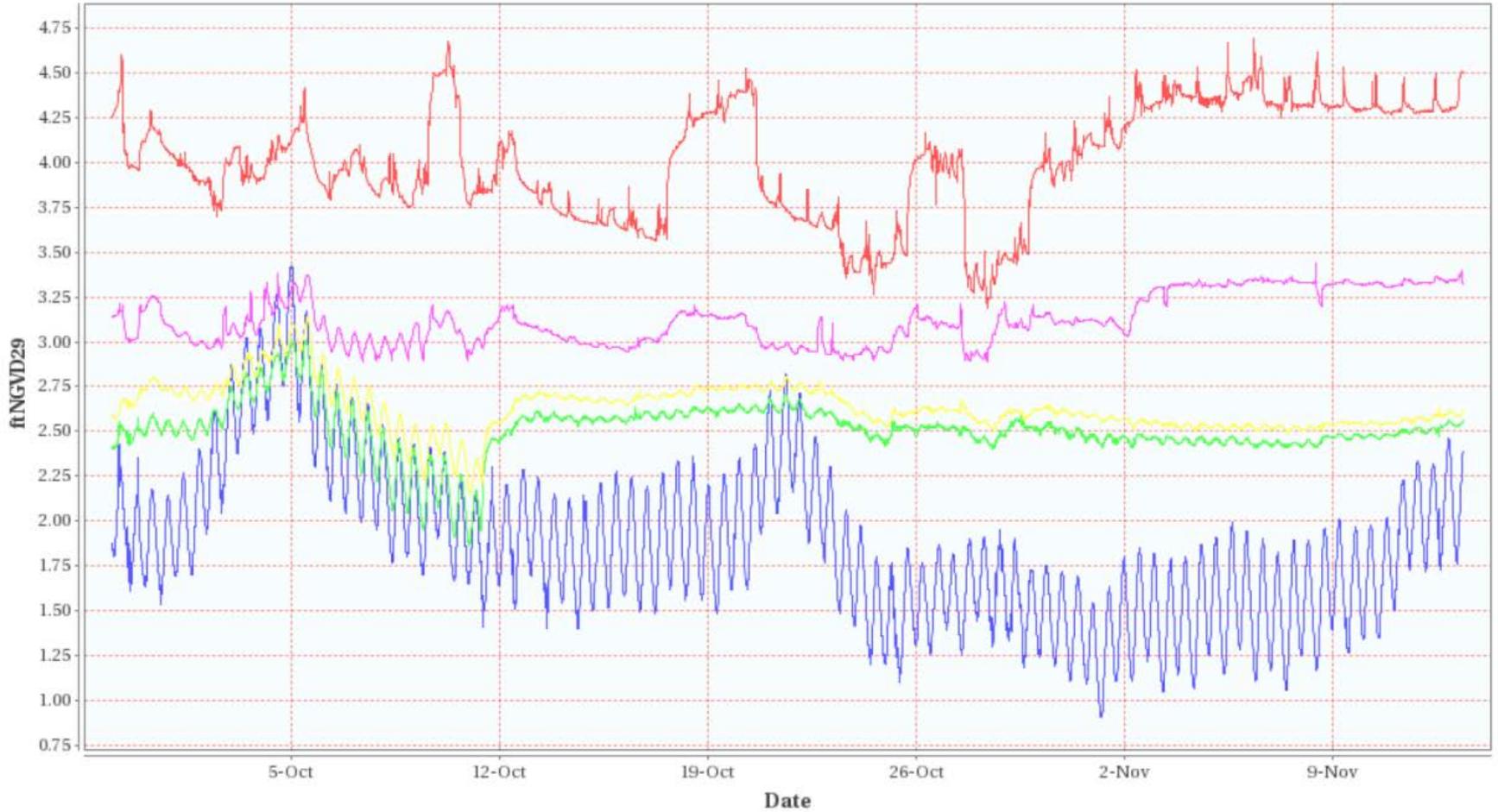


September 13 to October 5, 2017

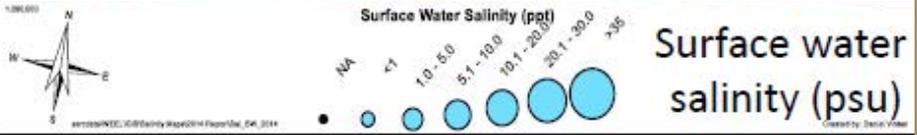
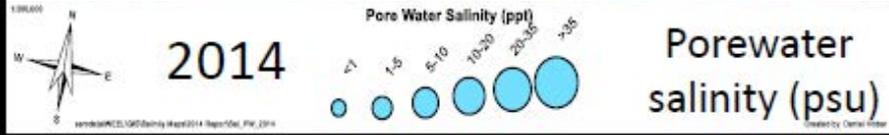
TOP: S-197 Discharge and BOTTOM: stages at S-197 (HW and TW), S-18C (HW), S-177 (HW), and S-176 (HW). All gauges identified on map, except S-176 which is north of S-177 and the main park road.

DBHYDRO Chart

29-SEP-2017 to 13-NOV-2017



DBKey	Station	Agency	Data Type	Unit	Statistic	Frequency	Strata	Gate/Pump#
88909	S176_H	WMD	STG	ft NGVD29	INST	BK	0	N/A
88911	S177_H	WMD	STG	ft NGVD29	INST	BK	0	N/A
V7577	S18C_H	WMD	STG	ft NGVD29	INST	BK	0	N/A
IY509	S197_H	WMD	STG	ft NGVD29	INST	BK	0	N/A
IY512	S197_T	WMD	STG	ft NGVD29	INST	BK	0	N/A



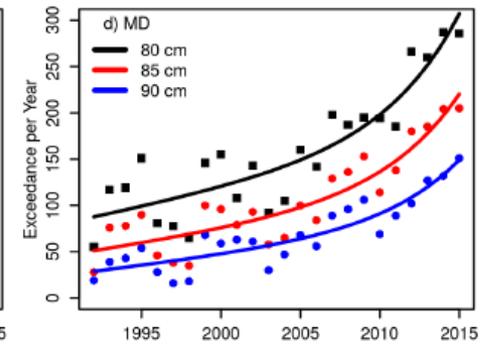
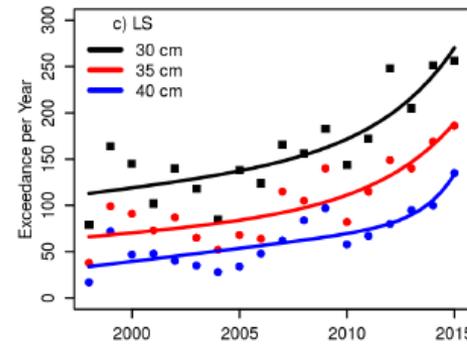
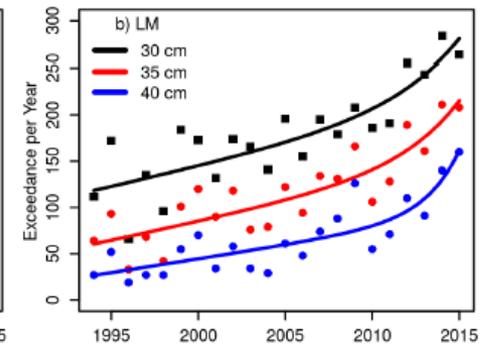
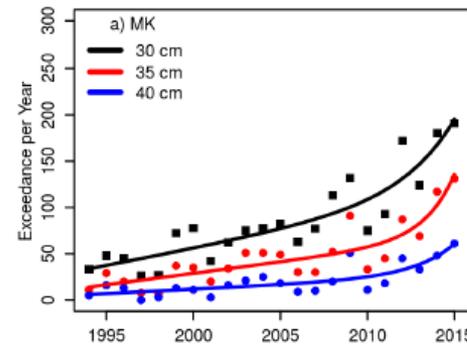


Figure 10. Yearly water level elevation exceedance data and fits to the model of Equation (1). Elevation thresholds are with respect to the NGVD29 datum. Note that the MD station is located on a higher land elevation than the other three stations. (a) MK; (b) LM; (c) LS; (d) MD.



Source: Park et al. 2017. J. Mar. Sci. Eng. 2017, 5, 31; doi:10.3390/jmse5030031

Enhanced overland freshwater flow is needed for:

- Meaningful ecological restoration.
- Nutrient reduction of runoff waters.
- Stabilization of salinity patterns in Florida Bay.
- Minimizing/slowing the ecological effects of sea-level rise.*
 - Reducing landward migration of saline water.
 - Flushing soil porewater that becomes saline during dry conditions.

* CISRERP 2008: "Impending climate change should not be an excuse for delay or inaction in the restoration but instead provides further motivation to restore the resilience of the ecosystem."



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South Dade Update

Brenda Mills

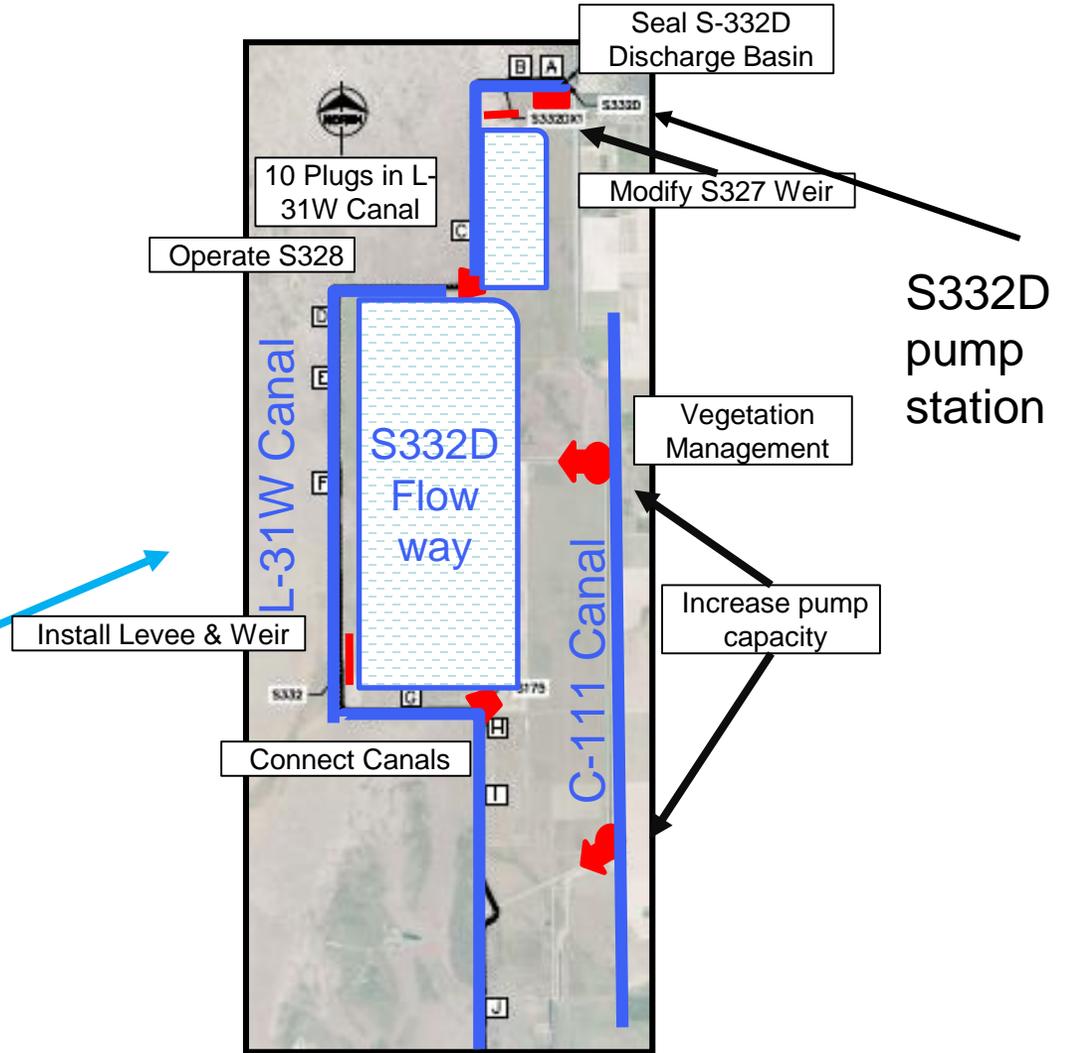


Moving Freshwater South to Florida Bay

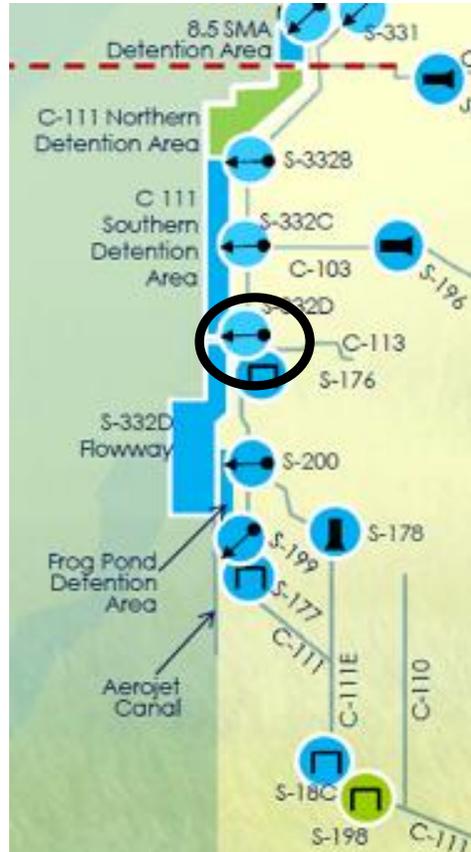
Brenda J. Mills, Principal Scientist

Everglades Policy and Coordination Division

Project Features to Move Water South to Florida Bay - September 2016



S332D Discharge Basin Sealing



Location of Sheet Pile and Tremie Concrete downstream of S332D

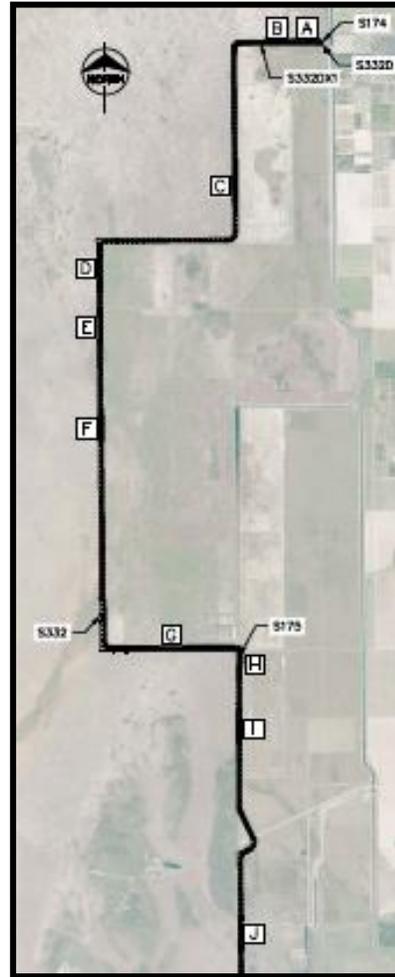
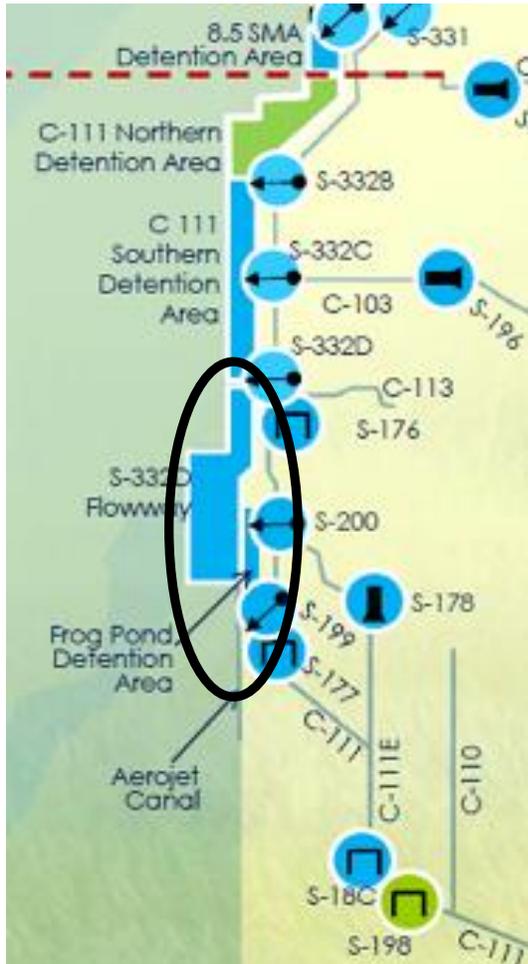


First tremie pour

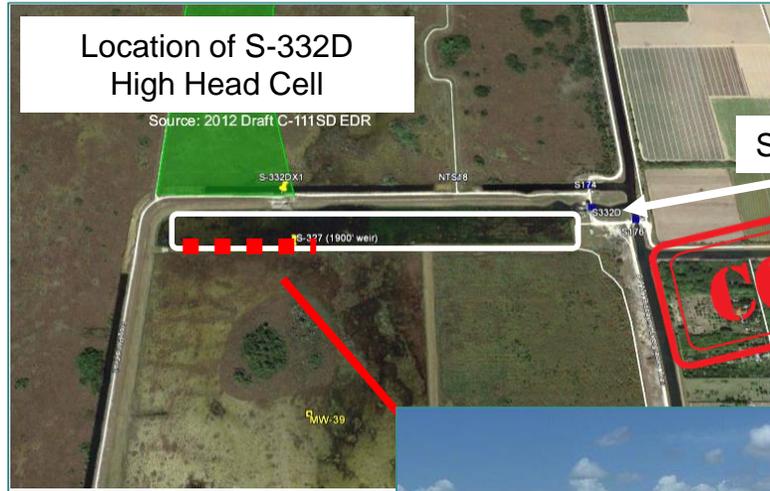
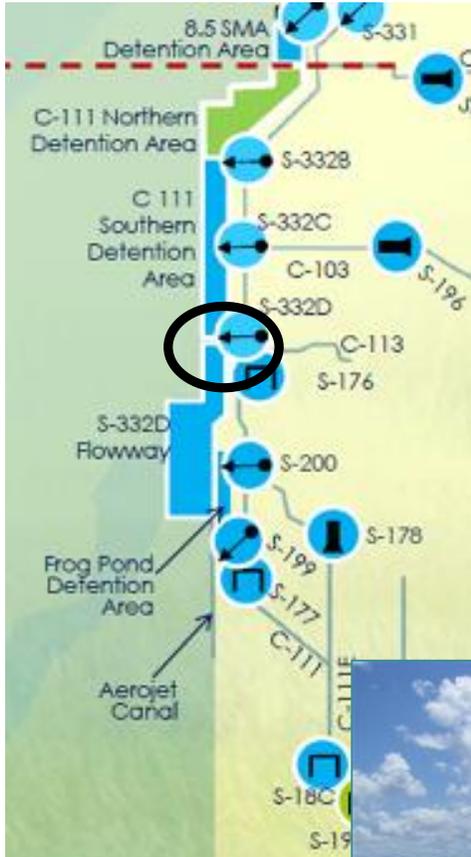


Sheetpile on northside of pump

Ten Plugs in L-31W Canal



Modify S332D High Head Cell Weir (S327)



COMPLETED



S327 Weir looking west towards ENP



S327 Weir, looking west towards ENP after partial removal

Operation of S-328



- Provides flow to Taylor Slough via L-31W canal.
 - Opened September 7, 2017.
 - In first 31 days of operation conveyed approximately **6,500 acre-feet** of water.
 - Average 219 acre-feet per day.
- All gates have been open for 42 days. However, gauge was inoperable during and after Hurricane Irma.
- Periodically closed during October and November to enable construction at S-332D pump station.



L-31W Canal Levee and Weir



Location of levee and weir

UNDER CONSTRUCTION



L-31W Canal and Levee



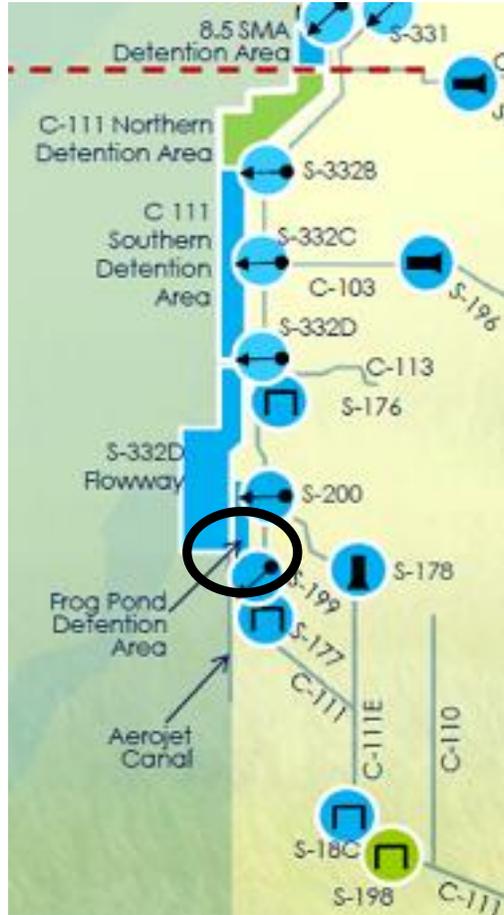
L-31W Canal and Levee

Modify C-111 Spreader Canal Project

- Lowered operating range and added seasonal variation in March 2016.
- Increase capacity of two pump stations S199 and S200 by 75 cubic feet per second.
- Contract executed August 2017.
- Substantial completion April 2018.



Connect Canals: G737 Structure



G737 Intake Basin

COMPLETED



G737 Discharge to L-31W Canal

Connect Canals: G737 Structure

- Provides flow towards Taylor Slough via L-31W Canal.
 - Opened June 30, 2017.
 - In first 131 days of operation, G737 provided approximately **22,000 acre-feet** of water.
 - Average approximately 85 acre-feet per day.

COMPLETED



Plug G in L-31W Canal after opening G737



Vegetation Management

- Remove vegetation along C-111 Canal south of S18C
- Remove or cut roads within Aerojet facility
- Mechanical clearing of vegetation in S200 and S199 unlined header channels
- Mechanical clearing of vegetation in S357 Flowway
- Prescribed fire at Frog Pond Detention Area
- Four cycles of mowing of levees, pump stations
- Terrestrial and aerial spraying to control cane and rag grass, woody vegetation, Brazilian pepper, old world climbing fern, etc

Conducted by Homestead Field Station and Land Resources Bureau



COMPLETED



Mechanical clearing of S-200 Channel



Aerial Spraying

Moving Freshwater South to Florida Bay Schedule

Project Features	Permit and Approvals	Operation / Construction Completion
Refine Operations of Structures & Pumps	✓ March 2016 & 2017	✓ March 2016 & 2017
Modify S332D High Head Weir (S327)	✓ June 2016	✓ July 2016
Operate S328 structure	✓ March 2017	✓ September 2017
Connect canals C200 to L-31W (G737)	✓ January 2017	✓ April 2017 ✓ June 2017
Rebuild L-31W levee and weir	✓ December 2016	January 2018
10 Plugs in L-31W Canal	✓ December 2016	✓ September 2017
Seal S332D discharge basin	✓ December 2016	December 2017
Increase S200 and S199 pump capacity	✓ December 2016	April 2018
Vegetation Management	N/A	Ongoing



Questions?



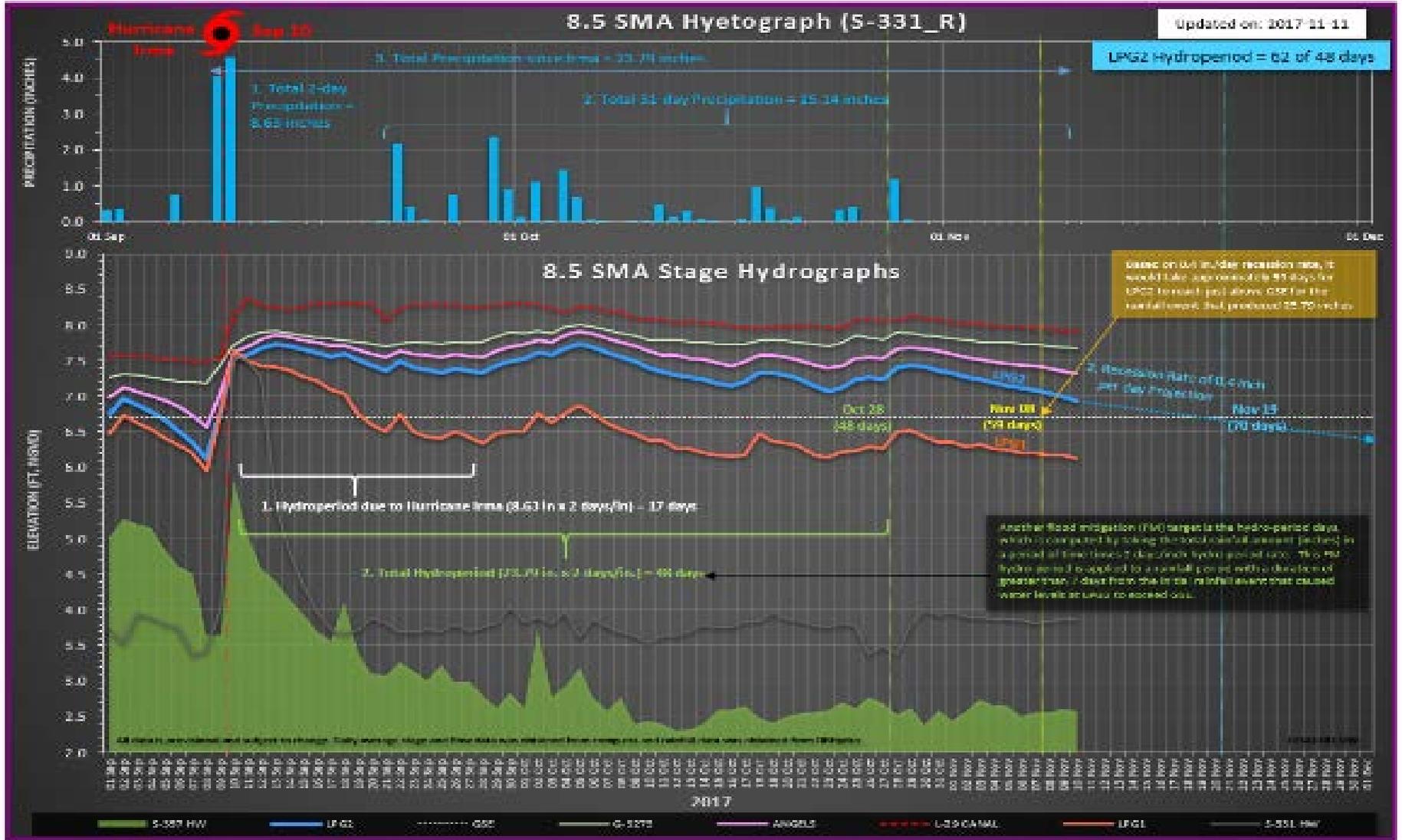
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8.5 Square Mile Area

Lan Do



8.5 SMA Operations





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Public Comment



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COP Update



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COP Objectives

Brooke Hall



COP Objectives



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1. Improve water deliveries (timing, location, volume) into ENP and take steps to restore natural hydrologic conditions in ENP given current C&SF infrastructure and features expected to be completed by the time of implementation, to the extent practicable by
 - a) Changing schedule of water deliveries so that it fluctuates in consonance with local meteorological conditions, including providing for long term and annual variation in ecosystem conditions in the Everglades (Timing) (P.L. 101-229, Section 101b).
 - b) Restoring NESRS as a functioning component of the Everglades hydrologic system (Location) (P.L. 101-229, Section 101b).
 - c) Adjusting the magnitude of water discharged to ENP to minimize effects of too much or too little water (Volume) (1992 MWD GDM, Section 44).
2. Maximize progress toward restoring historic hydrologic conditions in the Taylor Slough, Rocky Glades, & eastern Panhandle of ENP.
3. Protect the intrinsic ecological values associated with WCA-3A and ENP.
4. Minimize the damaging* freshwater flows to Manatee Bay/Barnes Sound through the S197 structure and increase flows through Taylor Slough and coastal creeks (1994 C-111 GRR, Section 5.2).
5. Include consideration of cultural values and tribal interests & concerns within WCA-3A and ENP.



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Scoping Comments Received

Melissa Nasuti



NEPA SCOPING



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- Prepared NEPA scoping letter to solicit participation of Federal and State agencies, Native American Tribes and interested parties in identifying issues or concerns.

- NEPA Scoping Letter 22 September 2017.
 - ▶ 30 Day Comment Period 21 October 2017.
 - ▶ Preparing Comment Response Matrix To Be Posted:

<http://www.saj.usace.army.mil/Missions/Environmental/Ecosystem-Restoration/G-3273-and-S-356-Pump-Station-Field-Test/>



NEPA SCOPING



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What We Heard:

- Agency, Stakeholder and Tribal Engagement
- Operational Considerations
 - ▶ Mitigation for 8.5 SMA
 - ▶ Use of Column 2 Operations (2012 Water Control Plan)
 - ▶ Regulation Schedules for WCA 1 and 2
 - ▶ Operational Flexibility to Address High Water Events
 - ▶ Use of S-197 and discharges to Manatee Bay/Barnes Sound
- Support for ecosystem restoration but want issues adequately addressed
 - ▶ Potential Effects to Fish and Wildlife Resources
 - ▶ Water Quality Concerns
 - ▶ Water Supply and Flood Risk Management Concerns



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Modeling Strategy

Ceyda Polatel



Presentation Outline



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- COP Modeling Tools.
- COP Modeling Needs.
 - ▶ Planning Conditions.
 - ▶ Alternatives.
- COP DRAFT Modeling Schedule.

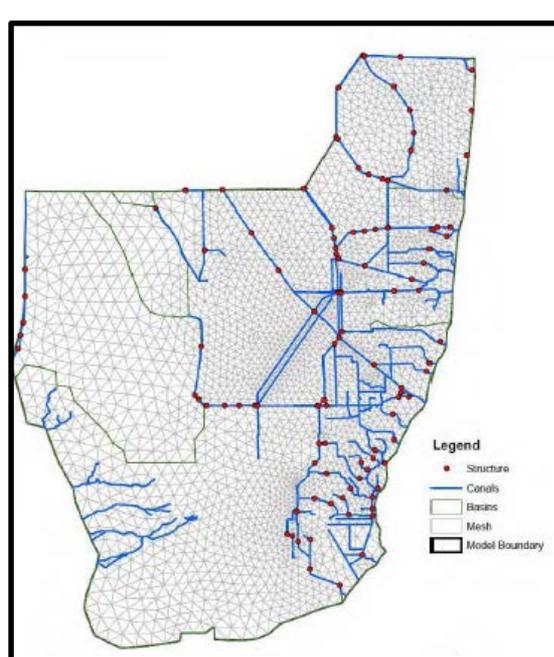


Modeling Tools: Regional Scale



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- Regional Simulation Model for the Glades and Lower East Coast Service Areas (RSM-GL).
 - Simulates hydrology/water management of South Florida.
 - Integrated surface water and ground water simulation. Finite-volume method.
 - Model area: 5,943 square miles including WCAs, BCNP, ENP, LEC.

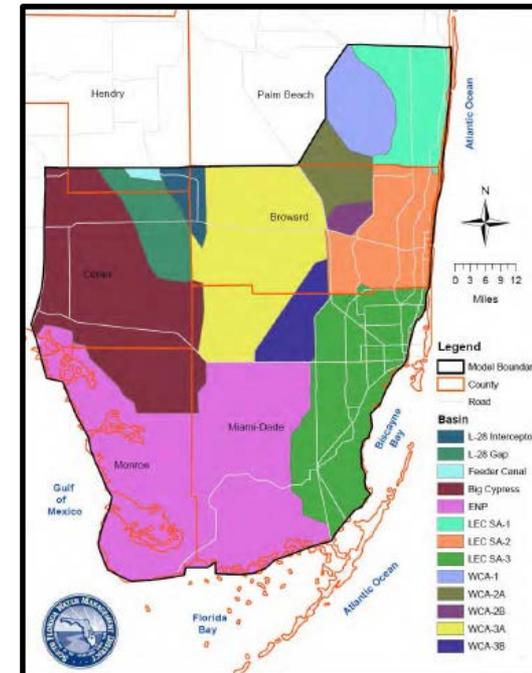


Average cell size: ~0.9 square miles.

Period of Record: 1965-2005.

Model Run Time: ~1 day.

- RSM-GL previously applied for:
- CERP Central Everglades Planning Project.
 - Lake Okeechobee Watershed Restoration.
 - Western Everglades Restoration Project.
 - SFWMD South Dade Study, etc.





Modeling Tools: Regional Scale



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- RSM-GL output needs will be identified in the Evaluation Methodology developed in coordination with the COP PDT.
 - ▶ Existing standard outputs can be readily provided, for example:
 - Daily stage and structure flow information.
 - Transect flows.
 - Canal and groundwater stage duration curves.
 - Water supply performance metrics.
 - Levee seepage.
 - Basin water budget maps.
 - Annual & P.O.R. average hydroperiod / difference maps.
 - Annual & P.O.R. average stage / difference maps.
 - Structure critical flows report (average annual flow volume).
 - ▶ New model outputs can be requested and prioritized by the PDT.
 - Not all requests may be able to be accommodated within the COP schedule.



Modeling Tools: Sub-Regional

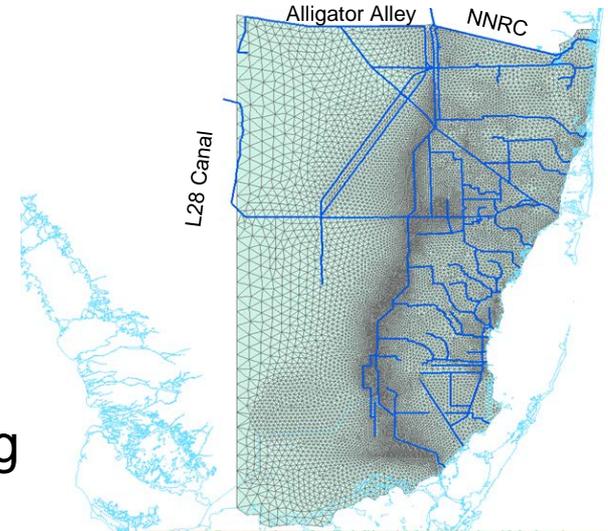


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■ Miami-Dade Application of the RSM model (MD-RSM).

- ▶ Currently being calibrated by SFWMD.
- ▶ Same software as the RSM-GL.
- ▶ Will be applied for Round 2 alternatives and the COP Recommended Plan.
 - Flood risk management evaluations for C-111 Basin and 8.5 SMA.
- ▶ Model area: 2,700 square miles including south WCA 3A, ENP, and the LEC.

Average cell size: 53 acres, or 0.08 square miles.
Period of Record (3 years): Wet, Dry, and Average.
Sub-daily time steps ~15 mins (longer run times).



■ ENP MIKE Marsh Model (MIKE-SHE)

- ▶ Integrated surface water and ground water
- ▶ COP scope pending coordination with ENP
 - Potential application for ENP hydrology and 8.5 SMA





Modeling Approach



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- Planning Conditions required to address closeout of MWD and C-111 South Dade projects, NEPA, and ESA consultation:
 1. 1983 Base: represents the conditions in the 8.5 SMA before MWD was implemented, consistent with the requirements set forth in the 8.5 SMA 2000 GRR Record of Decision (ROD); identifies the level of flood mitigation for 8.5 SMA that will be maintained in the COP process; evaluation planned using the sub-regional MD-RSM.
 2. 1994 GRR C-111 Base: identifies the minimum level of flood protection for the C-111 basin that will be maintained in the COP process; evaluation planned using MD-RSM.
 3. 2019 Existing Condition: represents conditions assumed in place at the time of implementation of the COP Water Control Plan, includes the following:





Modeling Approach (Con't)



BUILDING STRONG

- Planning Conditions required to address closeout of MWD and C-111 South Dade projects, NEPA, and ESA consultation:
 3. 2019 Existing Condition: represents conditions assumed in place at the time of implementation of the COP Water Control Plan, includes the following:
 1. MWD Increment 1.1 and 1.2;
 2. Existing C&SF project infrastructure and Regulation Schedules;
 3. MWD Tamiami Trail Modifications 1-Mile Bridge and Raised Roadway;
 4. Tamiami Trail Next Steps 2.6 Mile Western Bridge (December 2018);
 5. Full construction of C-111 South Dade to include Contracts 8, 8A and 9;
 6. 8.5 SMA project features to include C-358 and S-357N;
 7. Miami-Dade Limestone Products Association (MD-LPA) 5-mile Seepage Cutoff wall along L-31 North; and
 8. Current permitted operations for the SFWMD C-111 Spreader Canal project components (includes G-737 and S-199/S-200 at expanded 300 cfs each);
 9. SFWMD S-333 increased capacity.



Modeling Schedule: DRAFT



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- Modeling Strategy: by DEC 2017.
- Evaluation Methodology: NOV 2017-JAN 2018.
- MD-RSM Model Calibration & Corps reviews: by MAR 2018.
- RSM-GL Base Conditions:
 - ▶ 2019 Existing Condition (No Action) – assumptions table under development.
- MD-RSM Base Conditions:
 - ▶ 2019 Existing Condition (No Action) – assumptions table under development.
 - ▶ 1983 Base Condition – assumptions table unchanged from 2004 CSOP PDT version.
 - ▶ 1994 GRR C-111 Base Condition – assumptions table unchanged from 2004 CSOP.
- Round 1 Alternatives: start modeling ~FEB 2018:
 - ▶ Identified following Corps plan formulation and screening process.
 - ▶ RSM-GL regional modeling only.
- Round 2 Alternatives developed following evaluations:
 - ▶ RSM-GL and MD-RSM models, with potential ENP MIKE-Marsh.



Modeling Approach



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DRAFT MWD and C-111SD COP Modeling Schedule (SEP 2017 to SEP 2019)	FY2017	↓												FY2018	↓												FY2019									
DRAFT MWD and C-111SD COP Modeling Schedule (SEP 2017 to SEP 2019) RSM-GL and MD-RSM Modeling Application: DRAFT 10-20-2017 Modeling Tasks	FY2017				↓												FY2018				↓												FY2019			
	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O							
(1) Develop Modeling Strategy																																				
(2) Develop Evaluation Methodology: PMs, Ecological Model, Spreadsheets, Post-Processing Script Needs																																				
(2a) Updates and/or development for PMs and Post-Processing Tools																																				
(3) Develop Design Storm Events and Analysis Methods (socio-economics evaluation for TSP only)																																				
(4) Sub-regional MD-RSM Development and Calibration																																				
(5) COP ATR review of modeling strategy and modeling tools (MD-RSM)																																				
(6) Regional RSM-GL: Planning Conditions (WERP RSM-BN for boundary conditions)																																				
(6a) No Action Base Condition (may include minor updates from WERP RSM-GL)																																				
(7) Sub-Regional MD-RSM: Planning Conditions																																				
(7a) No Action Base Condition (RSM-GL for boundary conditions; concurrent with final calibration)																																				
(7b) 1983 MWD Base Condition (boundary condition adjustments beginning with RSM-GL No Action)																																				
(7c) 1994 C-111 GRR Base Condition (boundary condition adjustments beginning with RSM-GL No Action)																																				
(8) Regional RSM-GL: Round 1 Alternatives (expected 3-4 alternatives); I-model to optimize operations																																				
(9) Regional RSM-GL: Round 2 Alternatives (expected 1-2 alternatives); I-model to optimize operations																																				
(10) Sub-Regional MD-RSM: Round 2 Alternatives (expected 1-2 alternatives)																																				
(11) Regional RSM-GL: TSP Optimization (if needed)																																				
(12) Sub-Regional MD-RSM: TSP Optimization																																				
(13) Sub-Regional MD-RSM: Design Storm Analysis for Flood Risk Management																																				
expected periods of IMC (SFWMD and/or USACE) model efforts:																																				
Model Tool Development																																				
RSM-GL Regional Model Application																																				
MD-RSM Sub-Regional Model Application																																				
Technical Reviews																																				



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Questions and Discussion



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COP

Performance Measures

Agnes McLean



COP Eco Subteam



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- Please sign up!
- Stand-up team and schedule first conference call (week of 27 Nov).
 - ▶ Confirm list of performance measures.
 - ▶ Confirm list of ecological tools/models.
 - ▶ Begin development of evaluation methodology.
- Coordination with FWS on performance metrics for T&E species.



POTENTIAL PERFORMANCE MEASURES

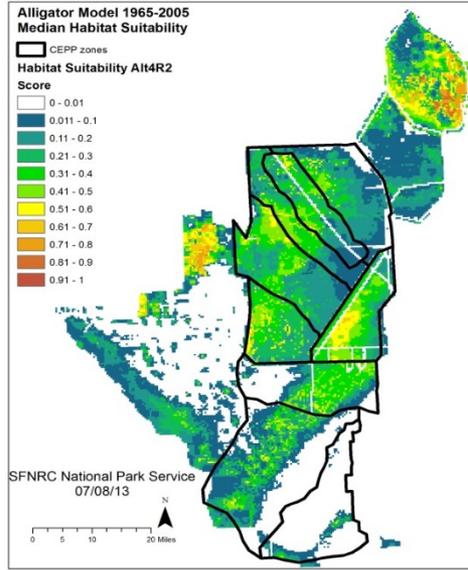
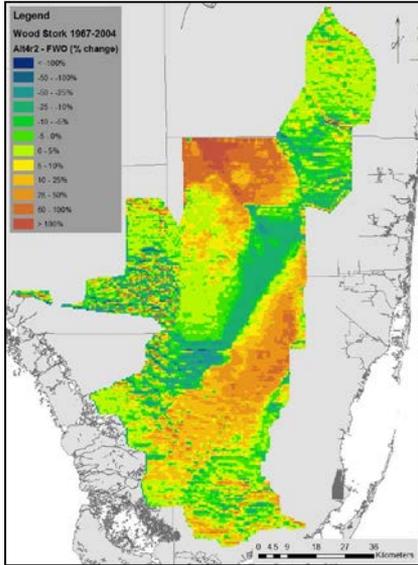


AREA	PERFORMANCE MEASURE	DESCRIPTION
WCA 3 & ENP	Inundation Patterns PM Percent Period of Record (PPOR) of Inundation	Above Ground Water Levels - Measure of the duration of inundation over the period of record within WCA 3 and ENP. Desired restoration condition is to restore pre-drainage patterns of multi-year hydroperiods.
WCA 3 & ENP	Sheetflow PM Timing of Sheetflow PM Continuity of Sheetflow PM Distribution of Sheetflow	Sheet flow - Measure of the timing and distribution of sheet flow across the landscape within WCA 3 and ENP. Desired restoration condition is to restore natural patterns of spatial distribution, timing and continuity of sheetflow to restore micro topography, directionality, and spatial extent of ridges and sloughs.
WCA 3 & ENP	Hydrologic Surrogate for Soil Oxidation PM Drought Intensity Index	Below Ground Water Levels - Measure of cumulative drought intensity below ground to reduce exposure to peat within WCA 3 and ENP. Desired restoration condition is to restore processes that result in soil accretion.
ENP (Northeast Shark River Slough)	Dry Events in Shark River Slough PM Number of Dry Events PM Duration of dry Events PM Percent Period of Record (PPOR) of Dry Events	Below Ground Water Levels - Measure of number of times and mean duration in weeks that water drops below ground in NESRS. Desired restoration condition is to restore pre-drainage patterns of multi-year hydroperiods.
WCA 3 & ENP	Slough Vegetation Suitability PM Hydroperiod PM Drydown PM Dry Season Depth PM Wet Season Depth	Above & Below Ground Water Levels - Measure to evaluate the hydrologic suitability for vegetation communities within WCA 3A and ENP. Desired restoration condition is to restore pre-drainage water patterns suitable for white water lily and slim spikerush.
Biscayne Bay Manatee Bay / Barnes Sound	Salinity North, Central and South Structure flows are generally reported as mean annual flows and percent changes of those flows for alternatives relative to ECB and FWO	Daily, monthly, or seasonal flow envelope targets – the RECOVER salinity performance measures developed for select coastal structures act as a proxy for desired salinity conditions in the bays.
Florida Bay	Southern Coastal Systems Dry Season Regime Overlap Wet Season Regime Overlap Dry Season High Salinity Wet Season High Salinity	Salinity - Measure to evaluate suitability for flora and fauna in Florida Bay based on salinity envelopes.

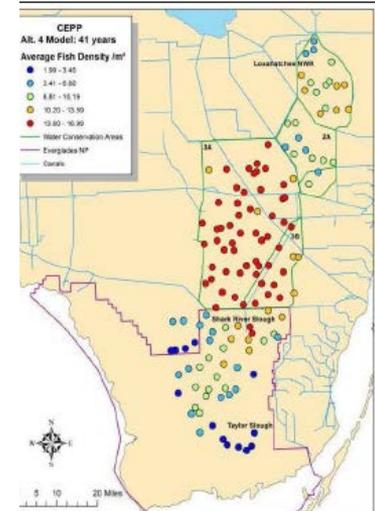


U.S. ARMY

POTENTIAL ECOLOGICAL PLANNING TOOLS*



Juvenile crocodile growth and survival

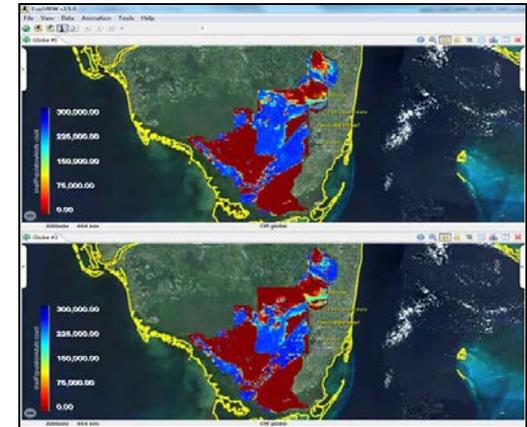
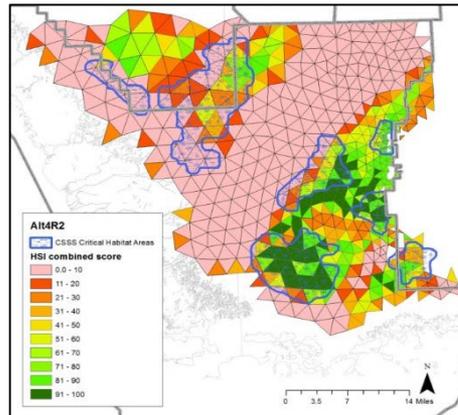


Fish density

Great Egret, White Ibis, Wood Stork (WADEM)

Marl prairie habitat suitability

Alligator



Apple snail

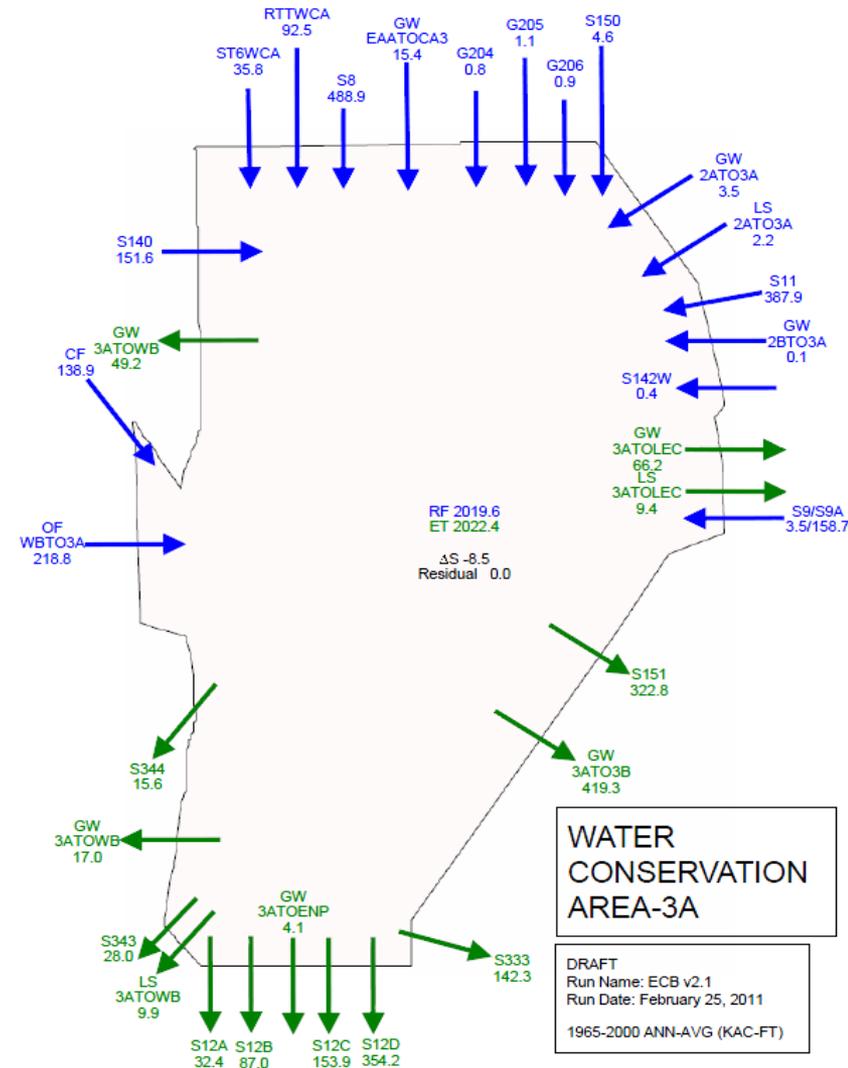
*Not all-inclusive. See <https://www/jem.gov>



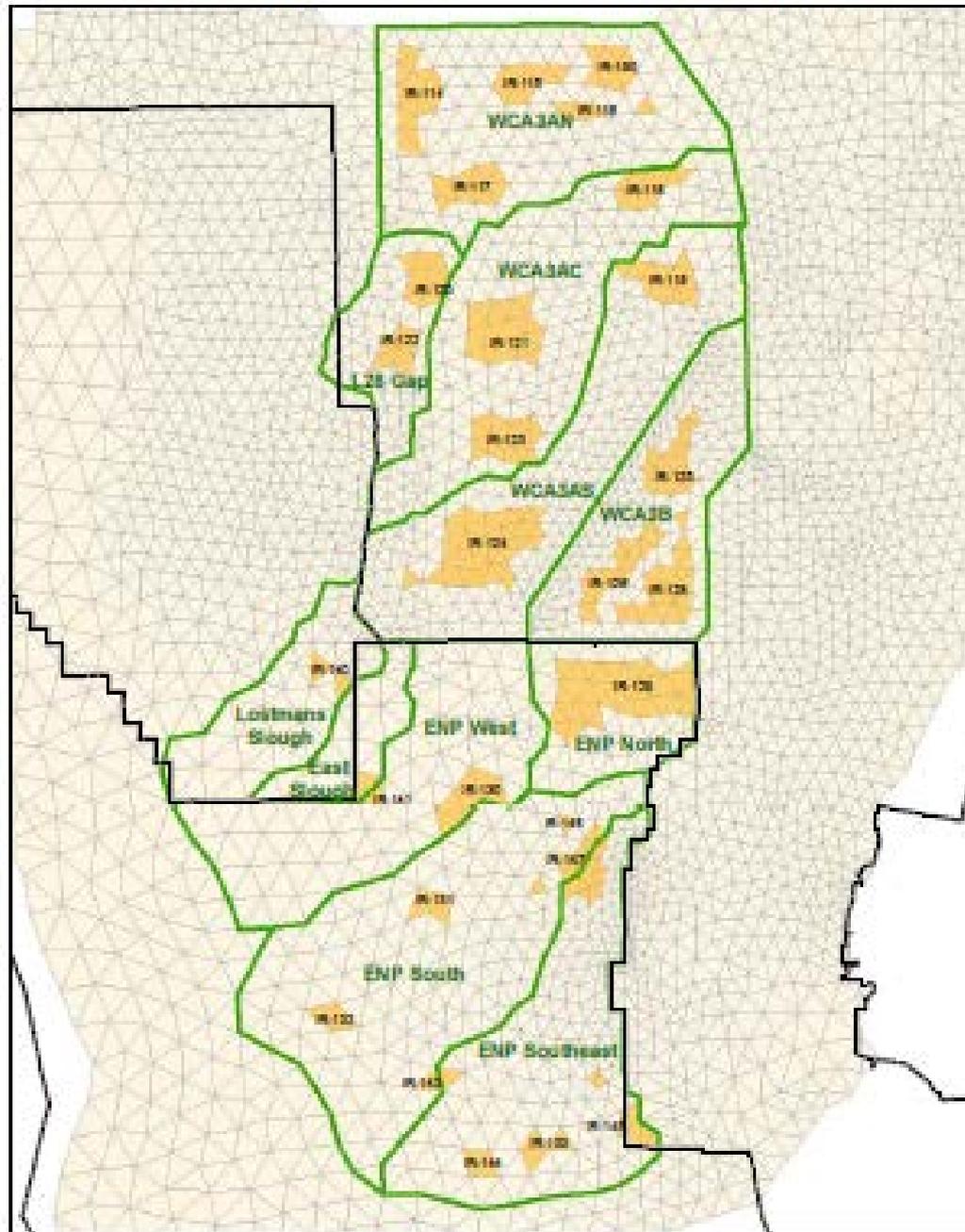
RSM-GL Modeling Products



- Stages / Head
- Ponding depths
- Hydroperiods
- Stage duration
- frequency curves
- Hydrographs
- Groundwater flow vectors
- Overland flow vectors
- Transect flows
- Basin water Budgets



Indicator Regions within the RSM-GL Model Mesh



RECOVER indicator regions and zones within the RSM-GL - may need revision; transect map to follow.



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QUESTIONS?



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NEXT STEPS



Increment 2 Schedule



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- State & Agencies, Tribal and Public Review:
 - ▶ 14 Nov 17 – 12 Jan 18
- Deviation Approved (SAD)
 - ▶ 25 Feb 18
- Implement Increment 2
 - ▶ 01 Mar 18



Increment 3 (COP) Schedule



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Event	Date
Eval Method/Planning Conditions	Dec. 17
Formulate Draft Alternatives	Jan. 18
Alternative Comparison	Oct. 18
BA and TSP (SAJ)	Nov. 18
Final Operational Guidance (SAJ)	Jan. 19
BO from FWS	Mar. 19
S&A, Tribal and Public Review	Jun. 19 – Jul. 19
S&A, Tribal and Public Review	Oct. 19 – Nov. 19
ROD Signed (SAD)	Dec. 19



Future Meetings



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- Increment 3 PDT: Dec. 2017.
 - ▶ Planning Conditions/Draft Alternatives.
- Increment 2 PDT (Teleconference): Jan. - Feb. 2018.
 - ▶ Review of Final Documents.
- Increment 1.1/1.2 Q4 PDT: Feb. - Mar. 2018.
 - ▶ Final Quarterly Meeting.
- Increment 2 Q1 PDT: Jul. 2018.
 - ▶ First Quarterly Meeting.



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Public Comment



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Closing Comments