

Monitoring Freshwater Flows to the Coastal Everglades in Response to Restoration Efforts



Image provided by Raabe USGS

GEER April 2019



OVERVIEW

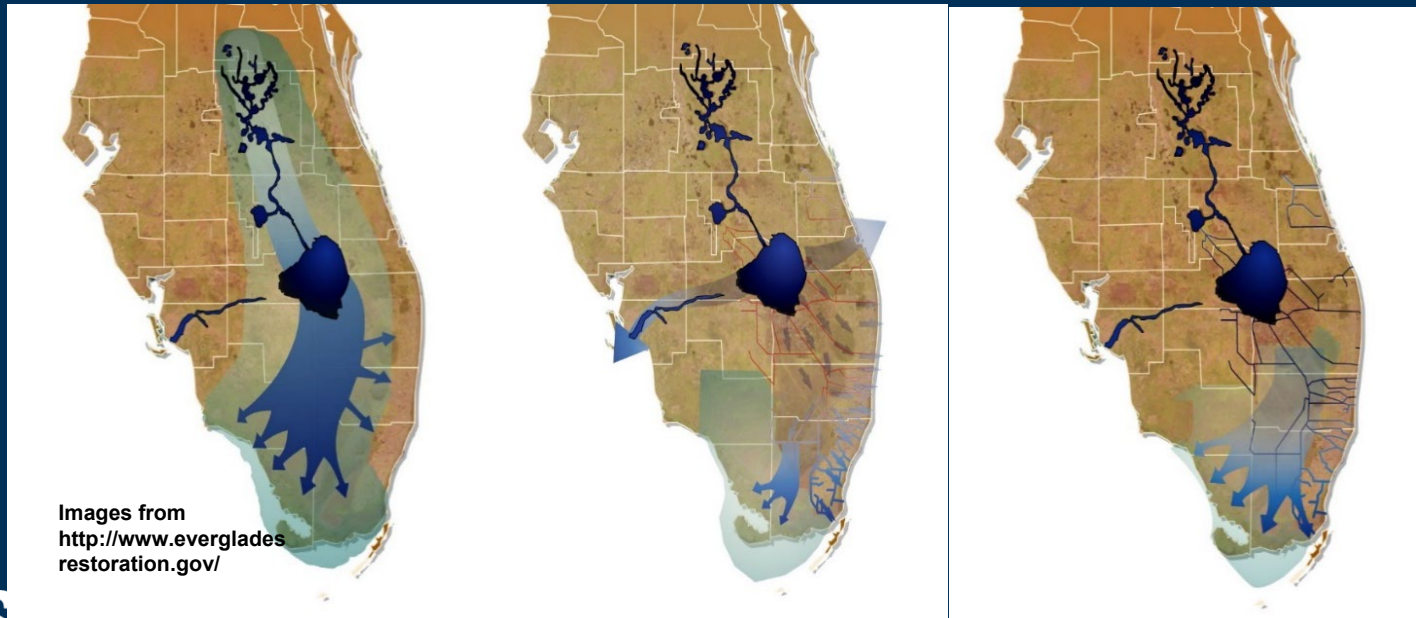
Basic study design, monitoring locations

Examine the Quantity, Timing, and Distribution of flow from Shark River Slough and Taylor Slough to the Gulf of Mexico and Florida Bay.

Link upstream drivers (rainfall, water operations, and restoration efforts) and stressors of hydrology to the downstream estuaries (flow and salinity)

Comprehensive Everglades Restoration Plan (CERP)

- In 2000 Congress approved CERP Restore freshwater flows to the Everglades and adjacent estuaries.
- Redirecting excess freshwater runoff lost to tide into the Everglades and to the coastal waters of Everglades National Park (ENP).



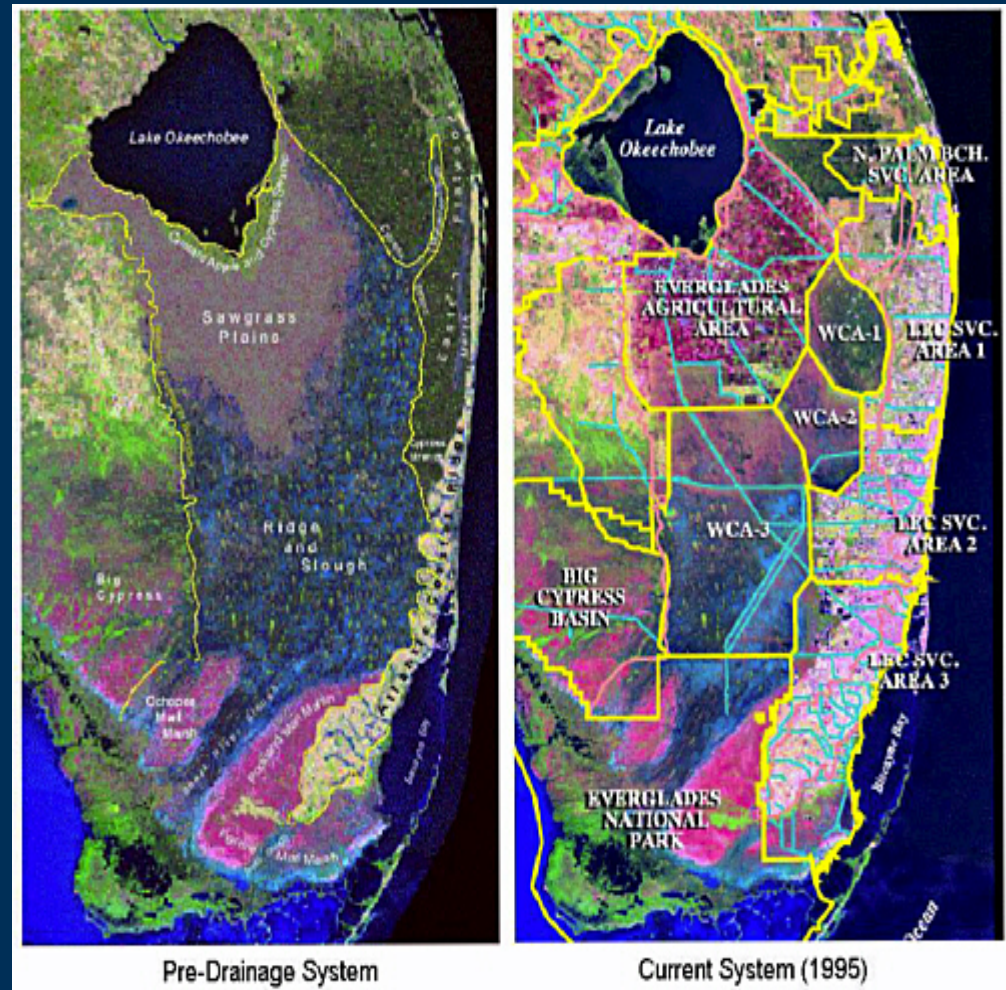
CERP Projects

Multiple WCA's and STA's

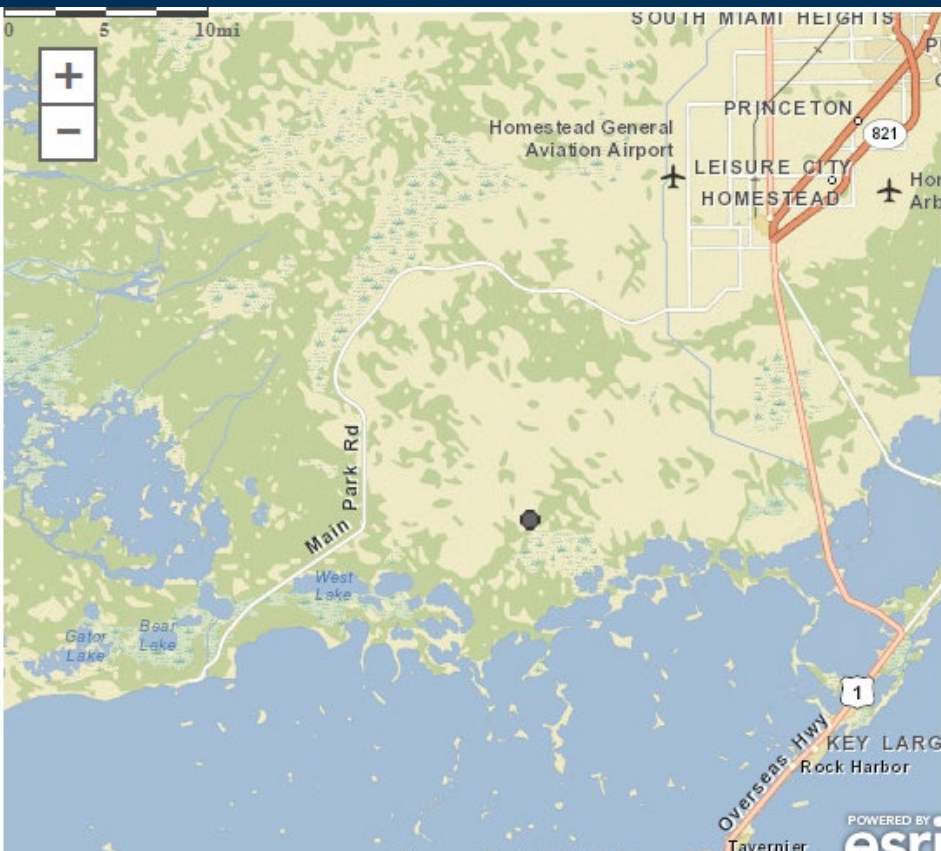
Control structures allows the stored water to be transported when needed.

Although the water is not free flowing it allows for aquifer recharge and increases the freshwater head gradient to the coast.

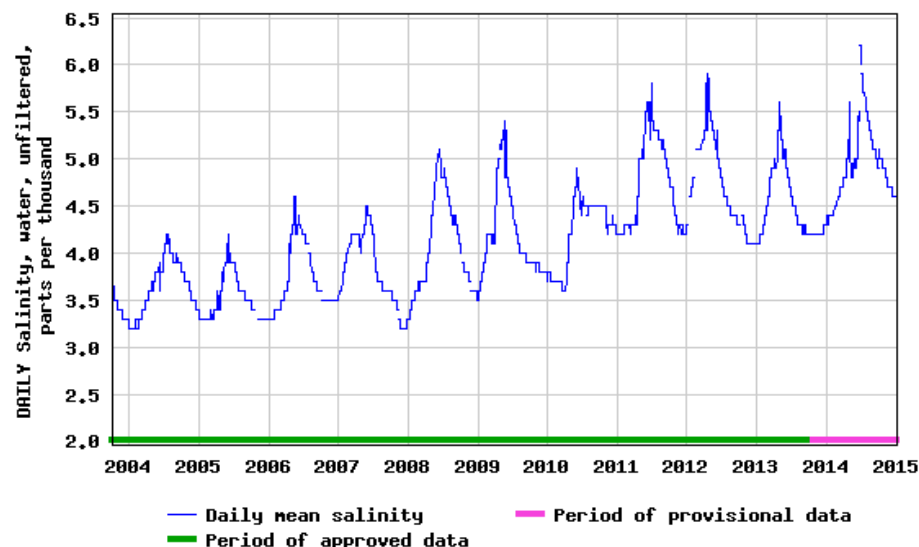
Protect aquifers and coastal marshes against SLR and salt water intrusion, while also improving ecosystem health.



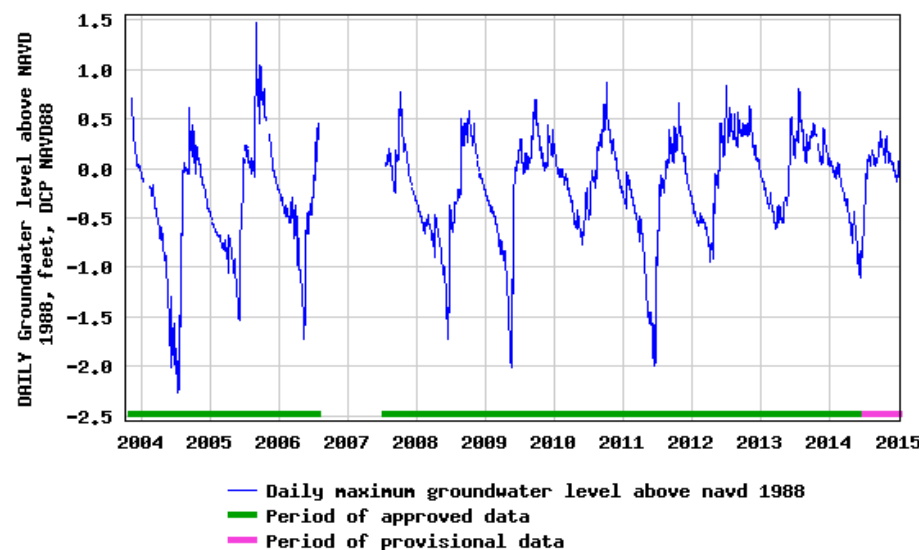
Ground Water monitoring in Taylor Slough



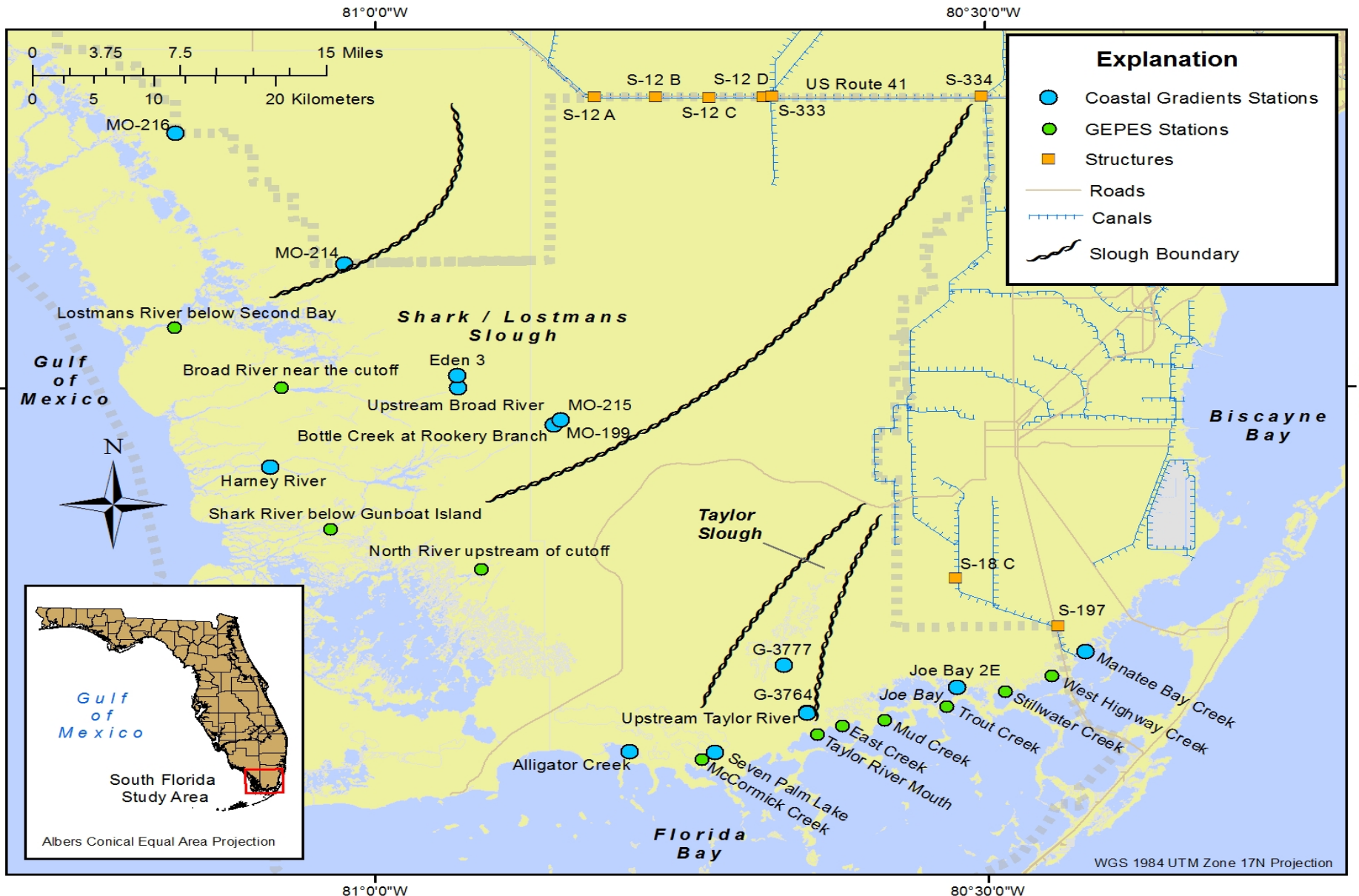
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USGS Monitoring Station Locations, Water Management Structures, and Sloughs





One Mile Bridge and L29 Canal

Improve distribution and timing of inflows into Everglades National Park from L29 canal

S-356 Increment 1 Pump Test

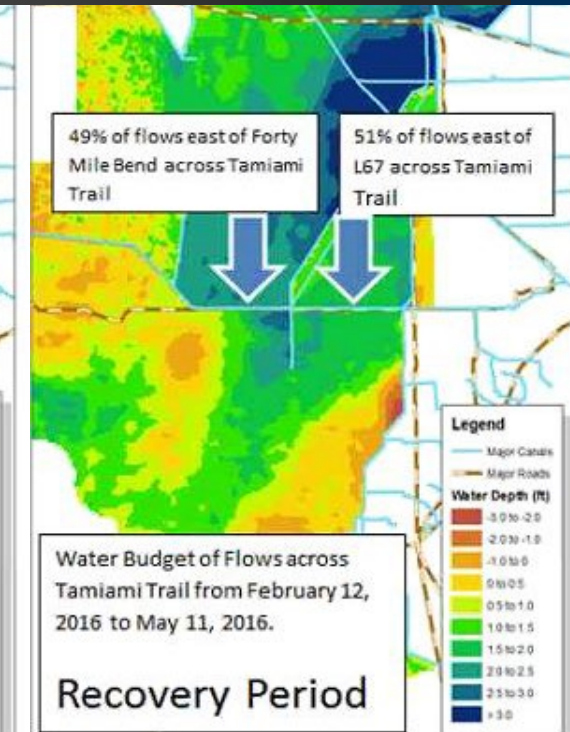
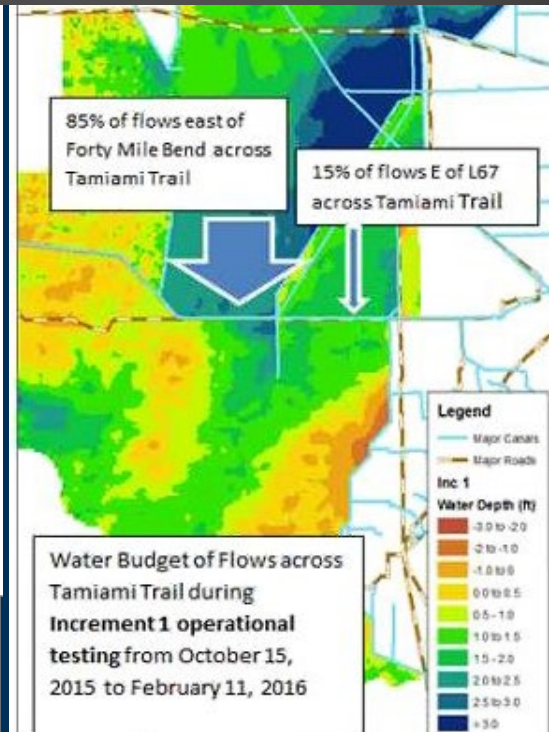
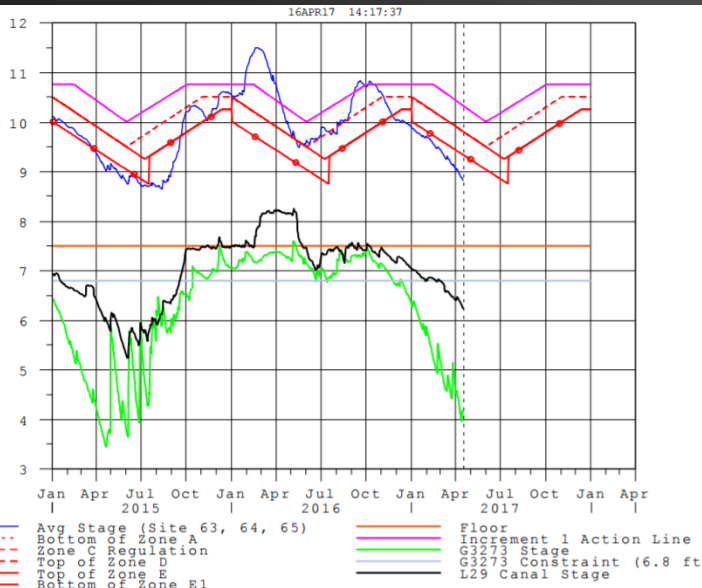
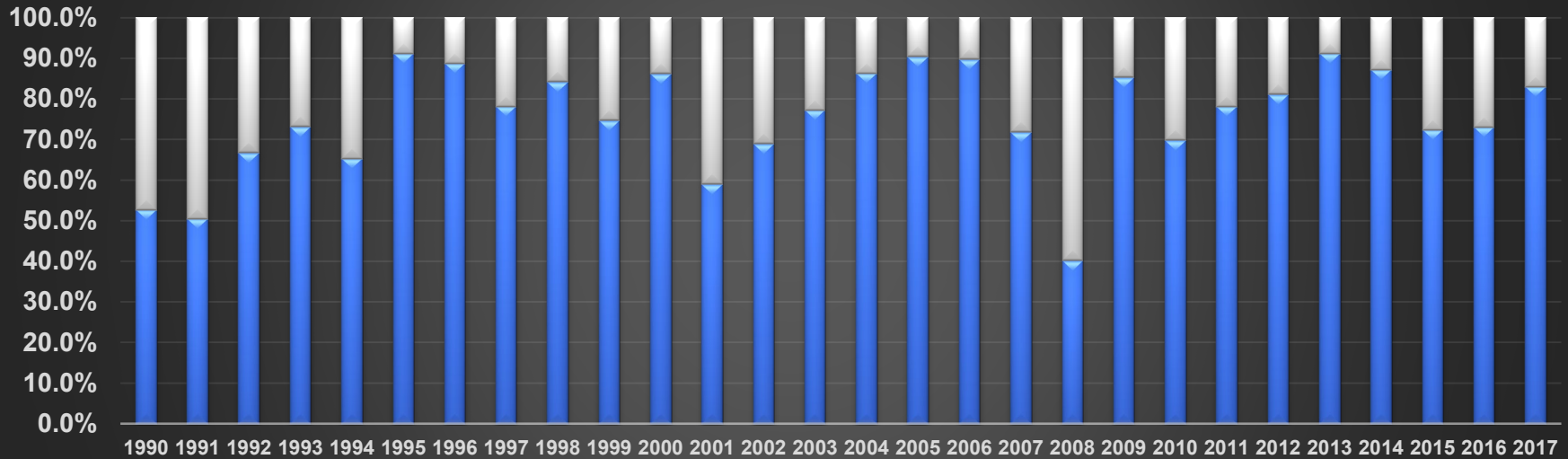
**Pumps active Oct. – Feb.
2015, raise stage to 7.5 ft**

**Emergency water releases
Feb. – May as a result of
extreme rain events in Jan.**

**Raised L29 canal levels to
8.3 ft to avoid flooding**

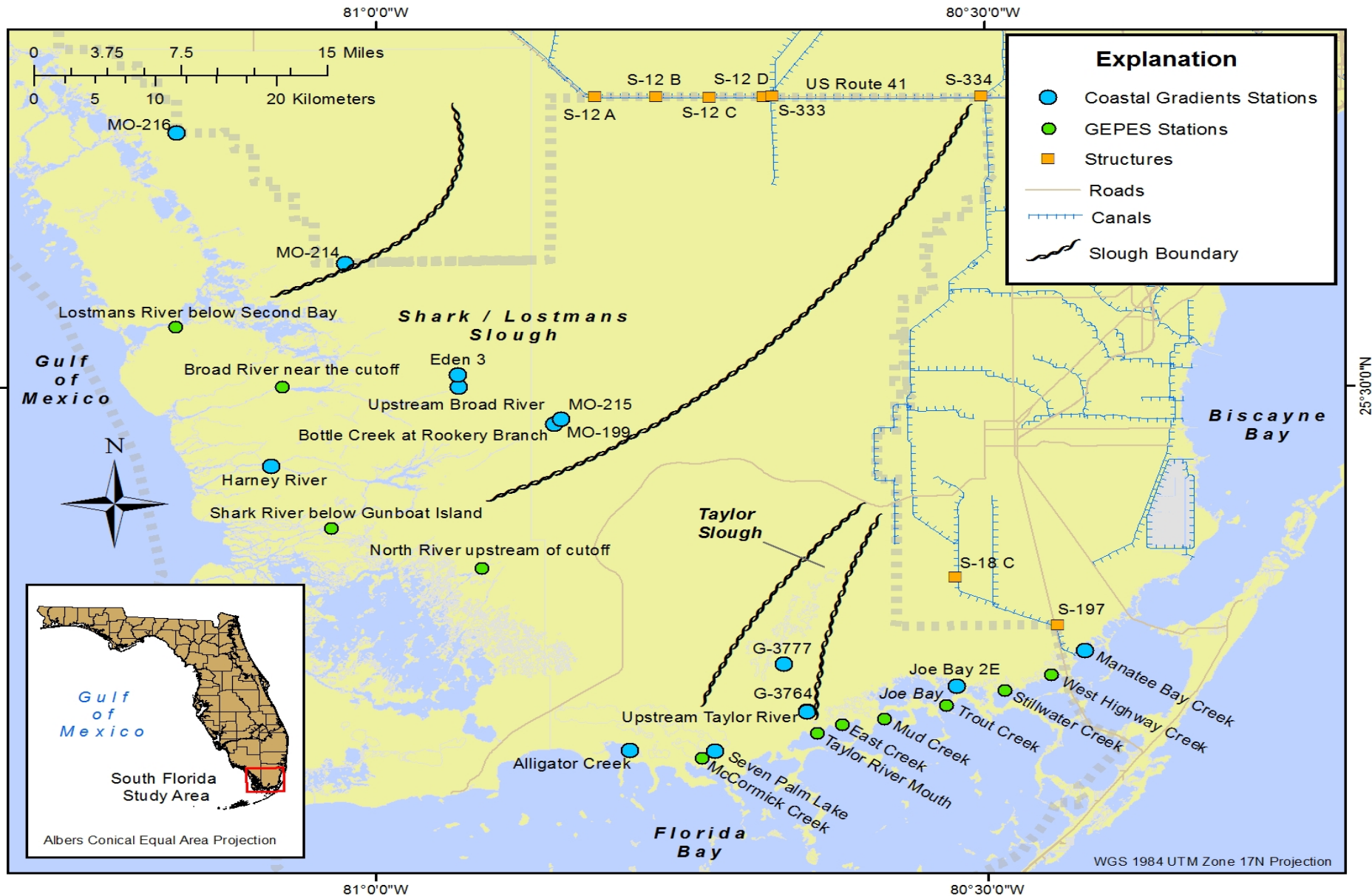


Percentage of Flow thru the S12's vs. TAMIMI CANAL OUTLETS L-30 TO L-67A



WCA3A with S-3273/S-356 Field Test Action Line.
 Slide presented at the E RTP Increment 1 Field Test,
 Emergency Deviation & Recovery Operations
 meeting 1/25/2017

Monitoring Station Locations, Water Management Structures, and Sloughs



Instrumentation

- Acoustic Doppler current meters
- Continuous water quality monitors
- Shaft encoders/pressure sensors
- Precipitation and wind sensors
- Automatic samplers



Card Sound
Canal

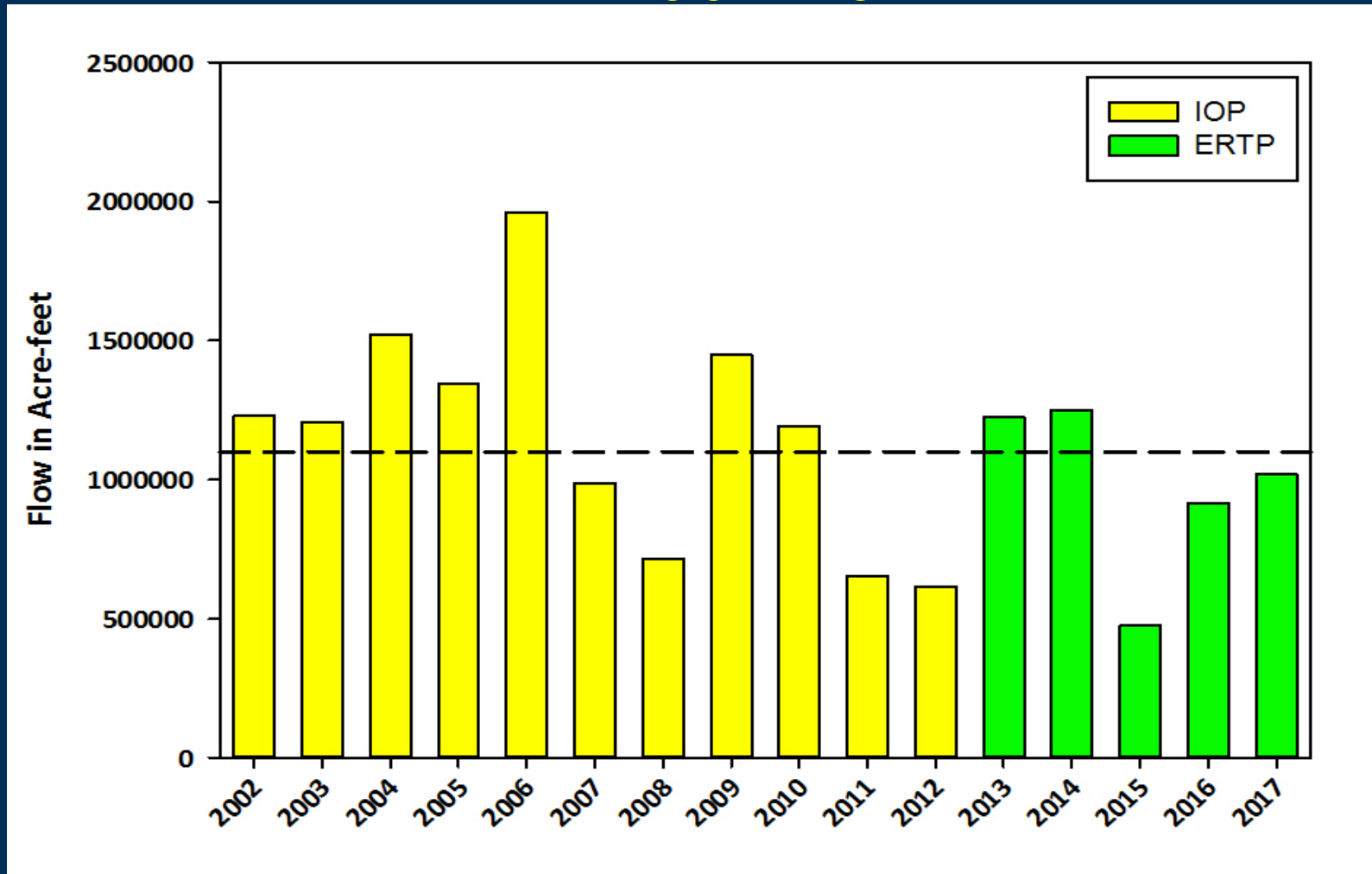
Card Sound
Canal





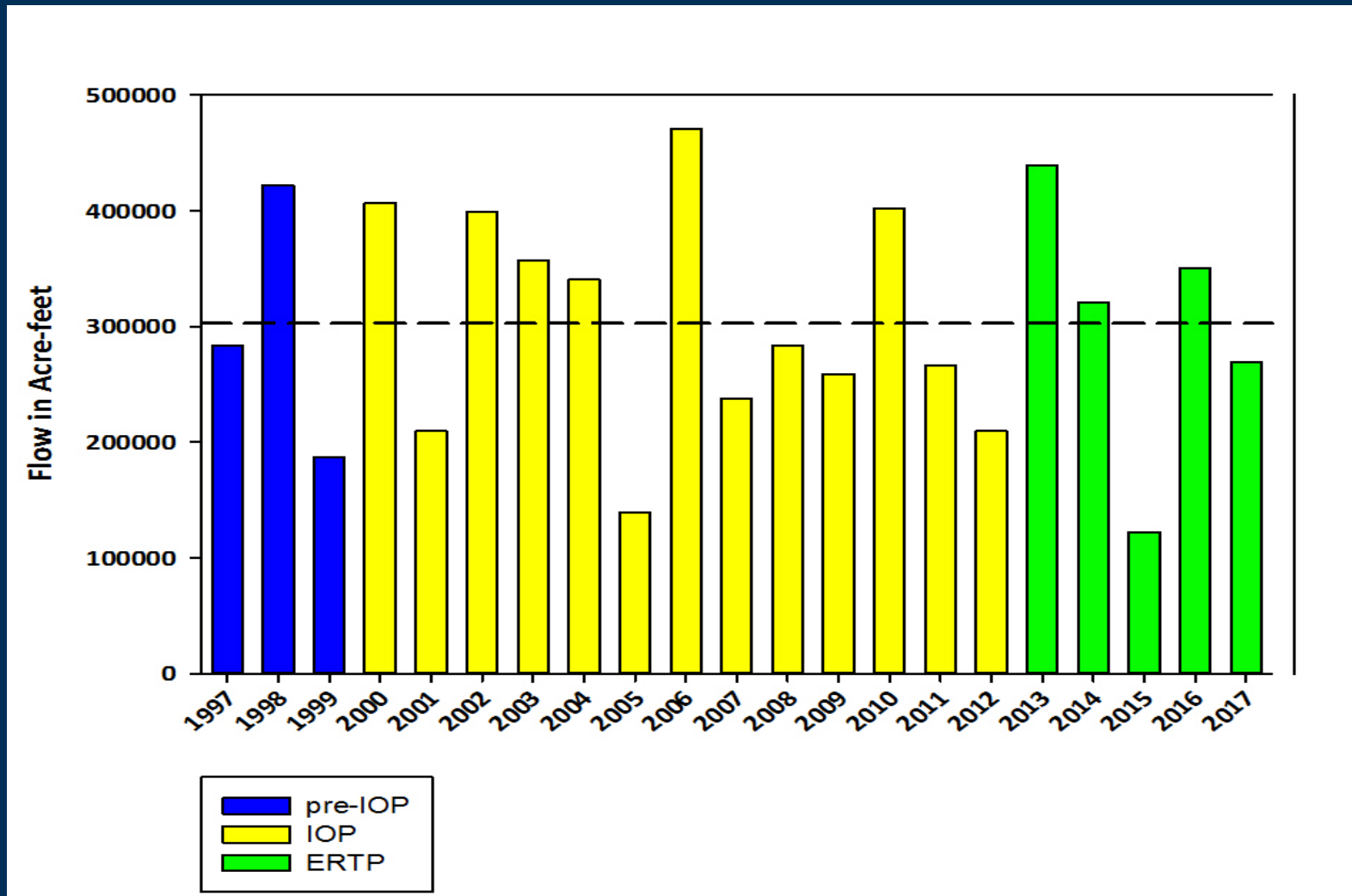



Annual Flows to the Southwest Coast of FL WY 2002-2017



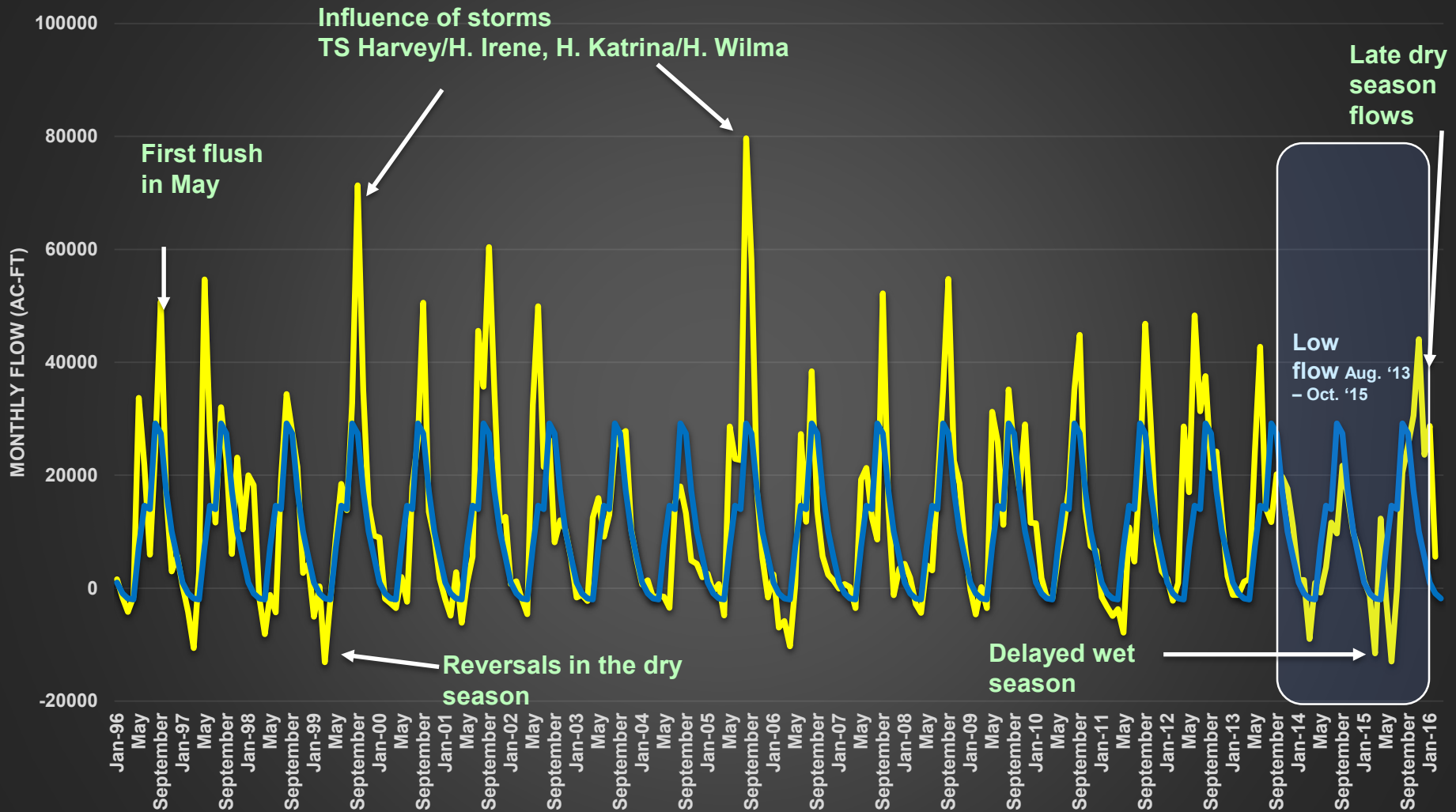
Dashed line shows average annual flow from WY 2002–WY 2012 (1,176,682 AC-FT).

Annual flows to Northeastern Florida Bay WY 1997-2017



 The dashed line is the average annual flow from WY 1997–WY 2012 (304,449 AC-FT.)

Monthly and Median Discharge at Trout Creek 1996-2016



Annual Versus Historical Rainfall Data 2004 to 2017



BREAKING NEWS

Early sign of algae bloom detected in Florida Bay
Miami Herald-10/11/2015

Dying seagrass and 'yellow fog' signal trouble for Florida Bay
Miami Herald 10/23/2015

Seagrass Die-Off Carries Fears Of Another Collapse For Florida Bay
WLRN 12/8/2015

Water flowing from Lake O to eastern Everglades for first time in nearly a century
NEWS-PRESS.COM 2/17/2016

Florida Bay Relapse Threatens Ecosystem
NPR 2/20/2016

With big seagrass die-off in Florida Bay, officials and others beg for speedier Everglades cleanup
Keysinfonet 3/26/2016

Bay degradation dominates meeting
FreePressStaff 4/13/2016

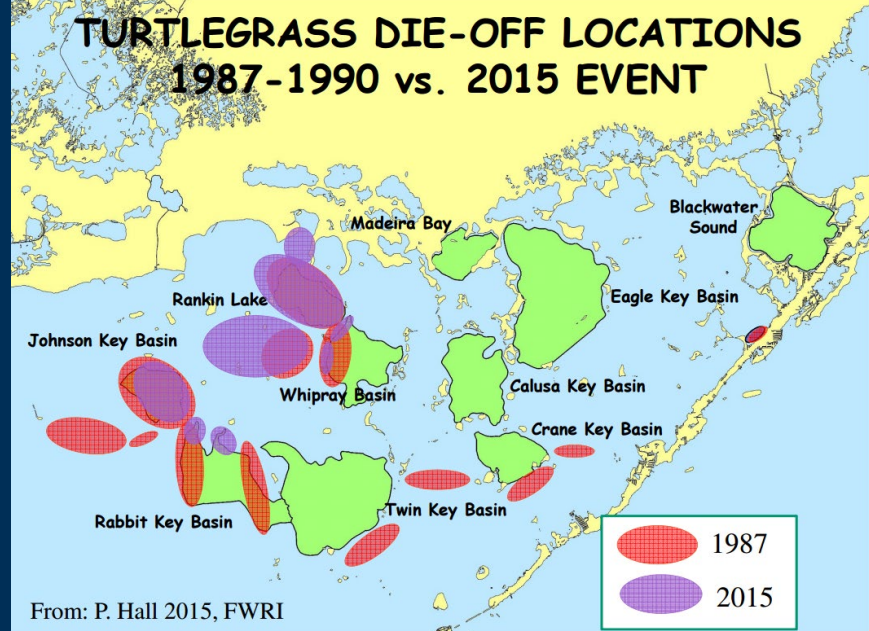
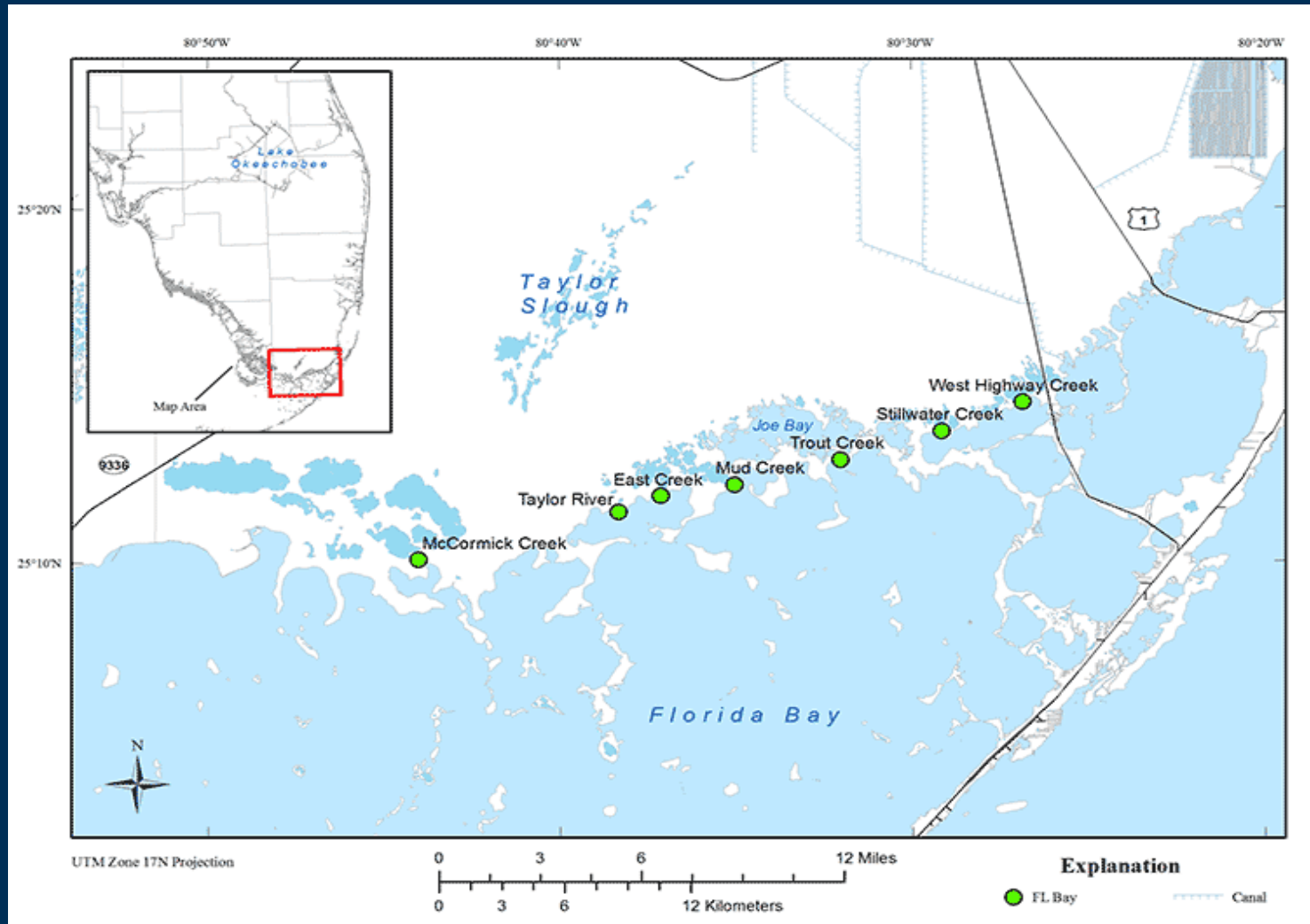


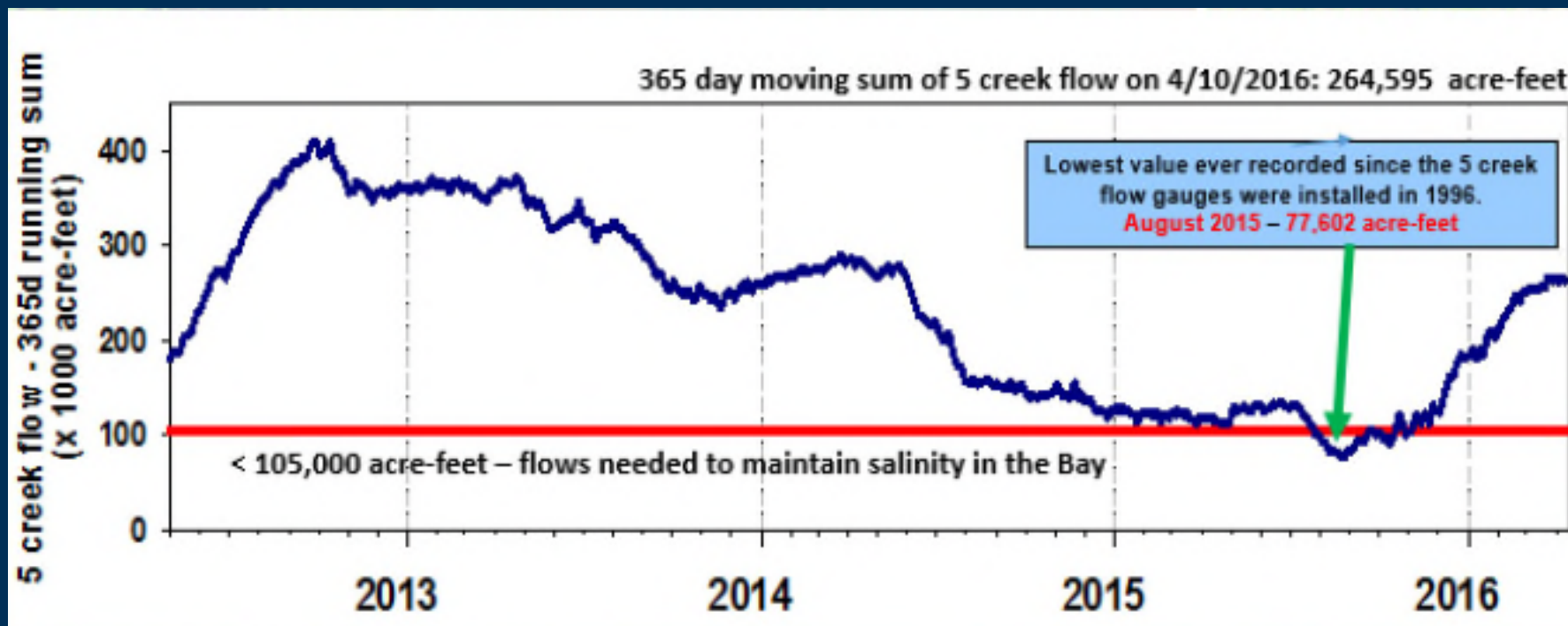
Image from FWC

MFL criteria used by the SFWMD

105,000 acre feet

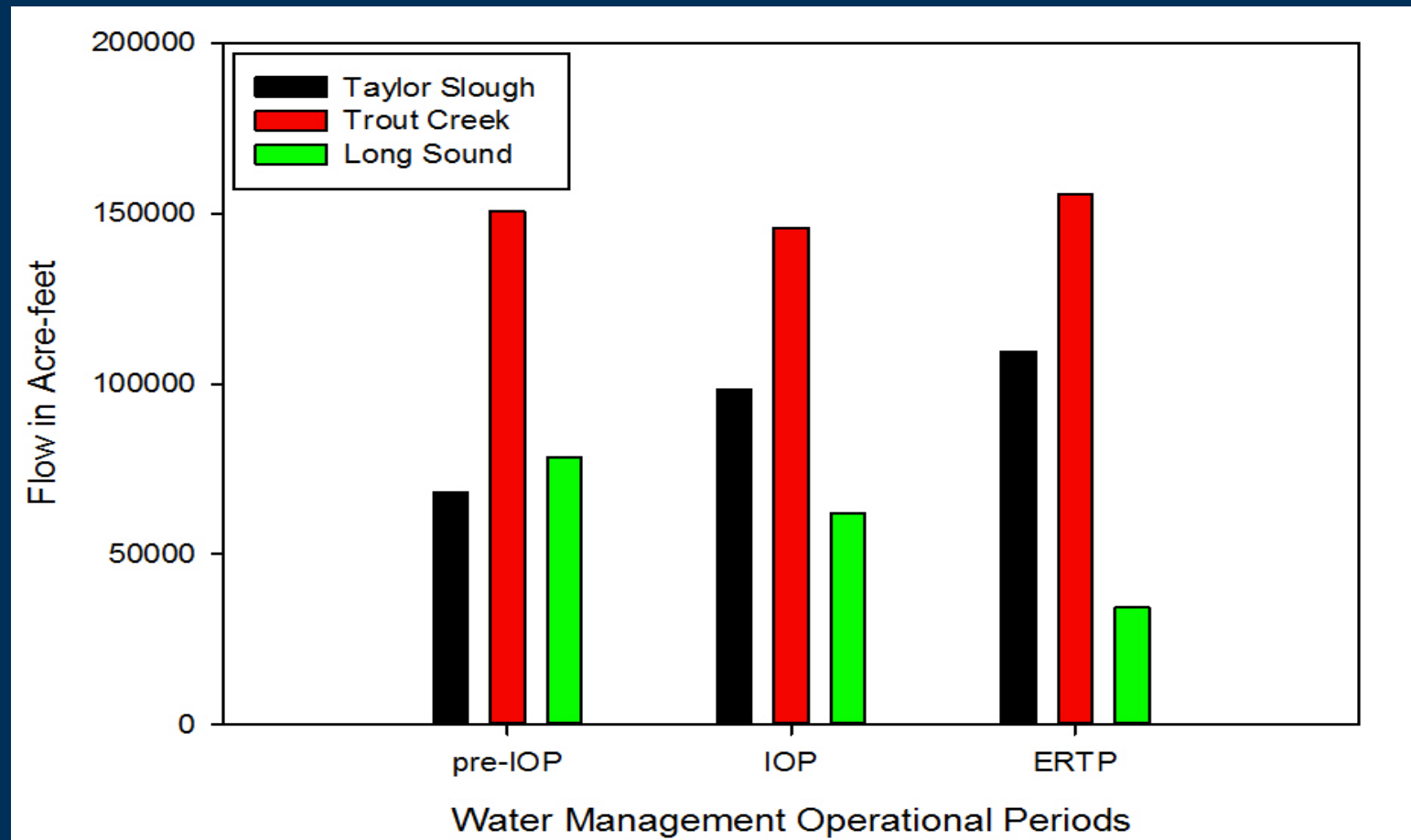


MFL criteria used by the SFWMD

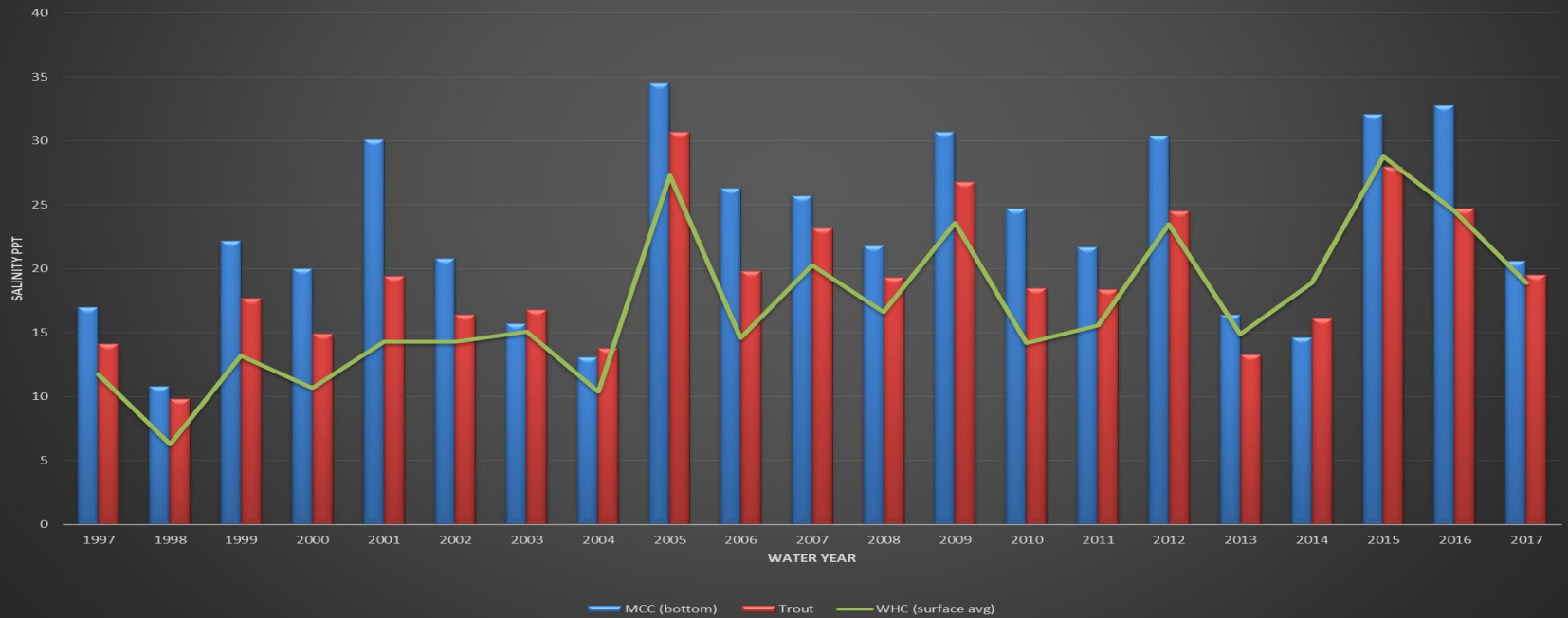


Slide from WRAC meeting on Florida Bay MFL, 5/5/2016

Average flow (AC-FT) distributed to Long Sound, Trout Creek, and Taylor Slough during pre-IOP/S332i (1997–1999), IOP/S332D (2000–2012), and E RTP (2013-2017)



WHC Salinity Trend



WHC Salinity Increasing

WHC mean annual salinity WY 2014 – 2017 increased 45% when compared to period of record mean 1997-2017

Historically the lowest salinities in FL Bay

CONCLUSIONS

The quantity, timing, and distribution of flow in Shark River Slough and Taylor Slough are linked to upstream drivers (rainfall, water management operations, and restoration projects).

Distribution of water to Florida Bay has changed. Restoration of Florida Bay may be limited without additional upstream sources of water.

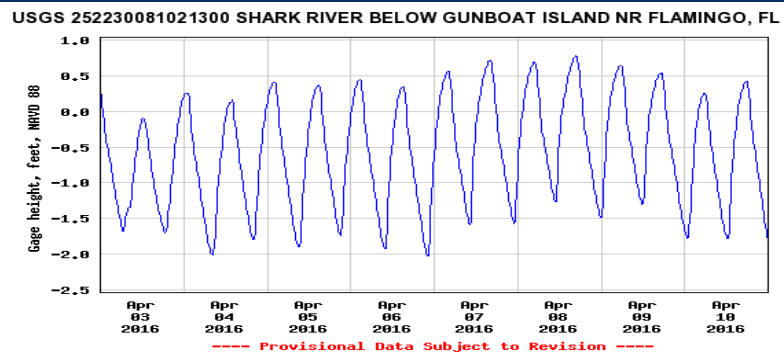
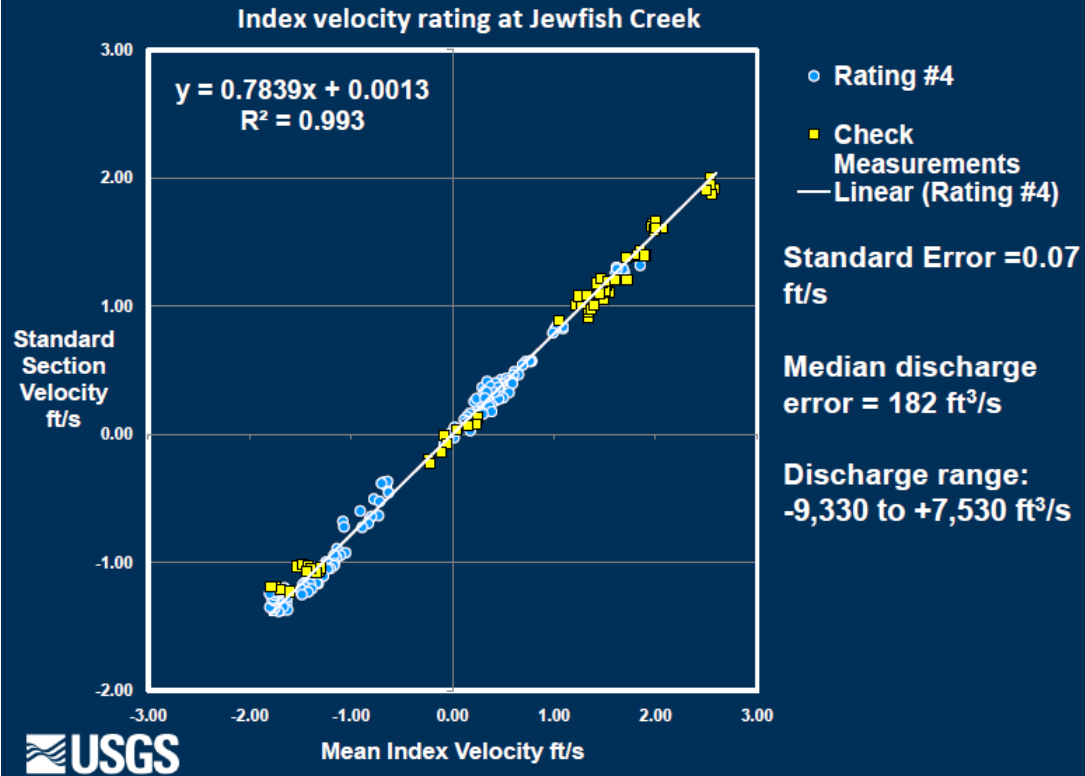
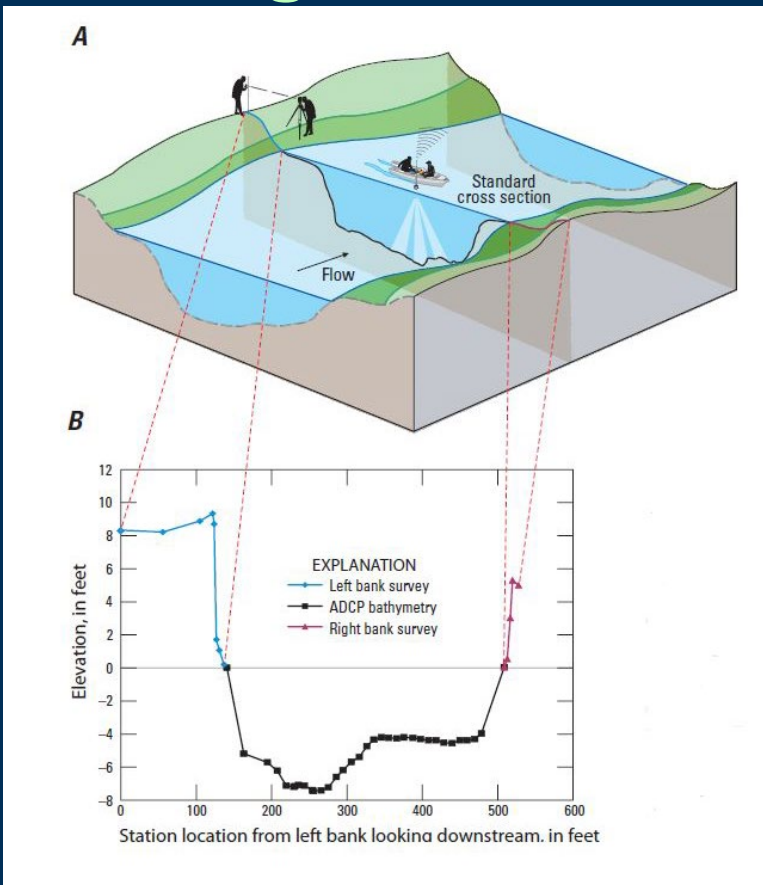
Coastal monitoring provides insight on the impacts from current water management practices, storms, and impacts of restoration activities.



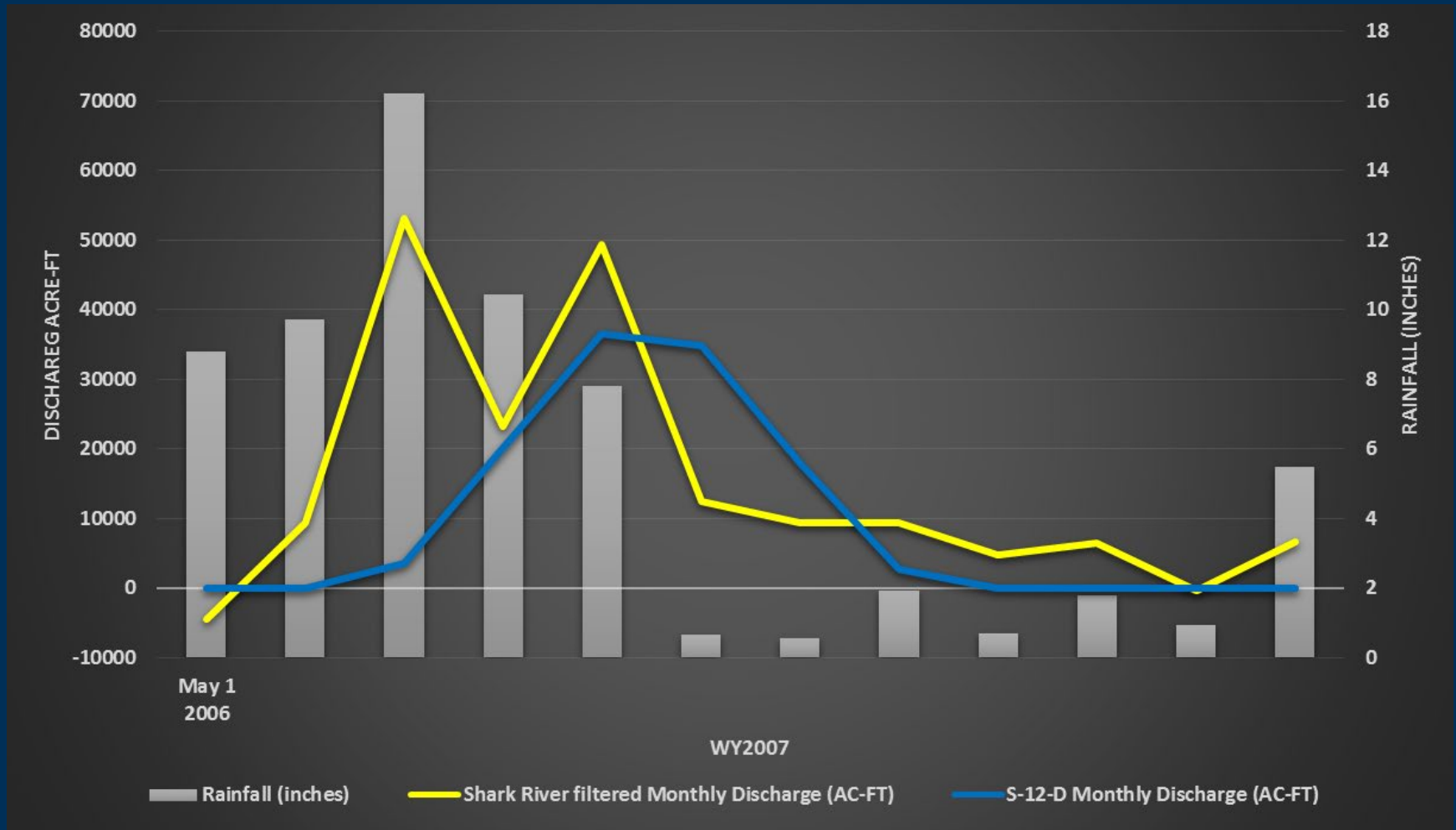
Questions?



Discharge methods



Monthly mean residual discharge at Shark River, S-12D, and monthly rainfall for WY2007



Pre-drainage vs. current system

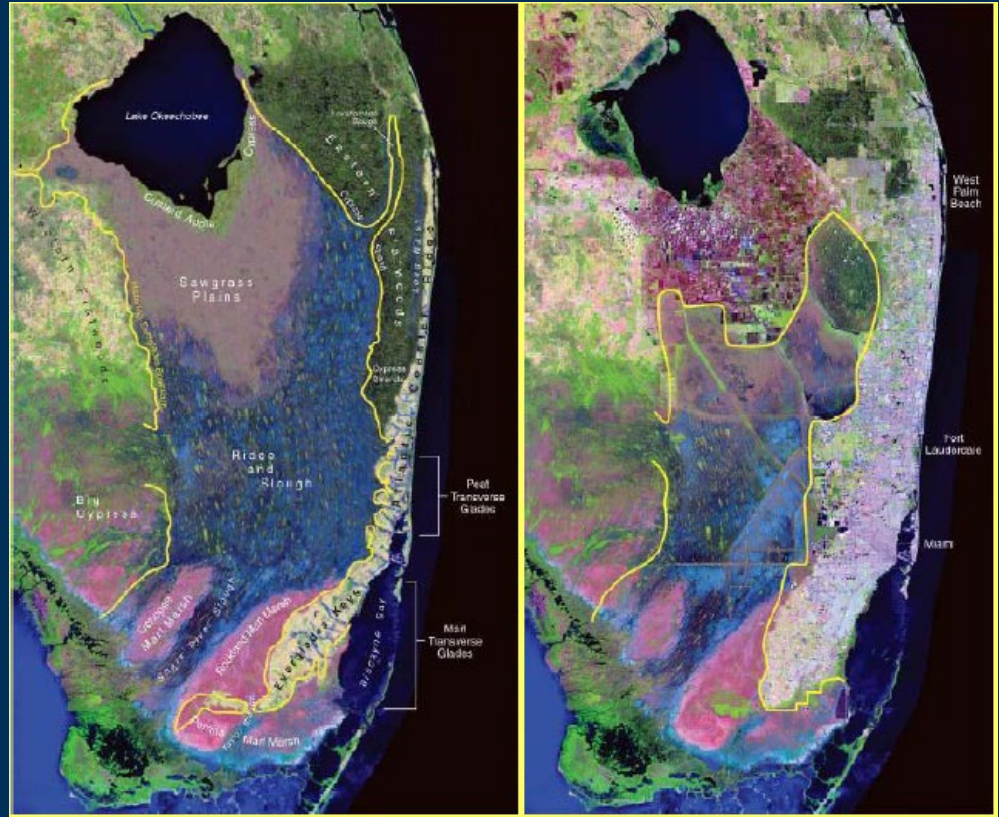
Predevelopment 100 miles long and 60 miles wide

Vertical gradient from lake O to FL bay is about 2 inches per mile

Water flows at about a half mile per day

Drained for development, farming, and flood control

Ecosystem degraded, water shortages



Quantity, Quality, Timing, and Distribution of Flow throughout the Everglades

