Florida Bay: Current Conditions

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Everglades Systems Assessment
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Florida Bay Environment

- Everglades discharges are greatest in northeastern Florida Bay
- Extensive seagrass meadows are important nursery grounds for recreational fisheries
- Basins are separated by an extensive network of mud banks
- Florida Bay salinity reflects a long term flow signal and a short term rainfall signal
Florida Bay Seagrass - 1980’s Die-Off

- Drought, hypersalinity, sulfide, hypoxia triggered seagrass dieoff in 1987; nearly 10,000 acres died in the central and western bay
- Almost 60,000 more acres of critical habitat were damaged with reduced productivity and biomass
- Die-off impacts lasted for 2 decades and included: reduced water clarity, increased nutrients, algae blooms, impaired fisheries
- Better conditions had returned with healthy seagrasses and clearer water
- However lack of fresh water has left the bay vulnerable to drought

At 500,000 acres Florida Bay has one of the largest seagrass meadows in the world.

Stippled areas affected by severe loss of seagrass in 1987
Interagency Coordination

- Investigations into causes and effects of seagrass die-off began after the late-1980’s event.
- Partners include Everglades National Park, National Oceanic and Atmospheric Administration, Florida Fish and Wildlife Research Institute, U.S. Geological Survey, Florida International University, University of North Carolina at Wilmington, University of Virginia, University of Maryland, and Florida Atlantic University.
- Areas of collaborative investigation include:
  - Water Quality (nutrient concentrations, salinity, chlorophyll, dynamics, and drivers)
  - Porewater Quality and Flux
  - Sediment Nutrient Dynamics
  - SAV Spatial Distribution, Density, and Physiology
  - Fish and Invertebrate Densities and Condition
- Ongoing communication increased when hypersalinity and seagrass die-off first reported in 2015.
Salinity gauge
Creek flow gauge

2012-2015 Conditions - Florida Bay
Taylor River Salinity & MFL Flow

>30 psu MFL rule threshold

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Salinity gauge
Creek flow gauge
2012-2015 Conditions - Florida Bay
Taylor River Salinity & MFL Flow

105,000 acre-feet MFL rule threshold

Lowest value ever recorded since the 5 creek flow gauges were installed in 1996.
August 2015 – 77,602 acre-feet

Salinity gauge
Creek flow gauge
• Taylor Slough & Florida Bay received the lowest amounts of rainfall
• 25-35 inches compared to 50-60 inches (wet year)
Florida Bay Salinity Map

Late July 2015

Salinity highs at ENP platforms:
- 72 psu (Garfield Bight, 7/21)
- 66 psu (Buoy Key, 7/15)
- 57 psu (Terrapin Bay, 7/12)
- 57 psu (Johnson Key, 7/12)
- 54 psu (Whipray Basin, 7/28)

Difference from 2006 – 2014 Average (Jun – Aug)
Mapping Florida Bay Salinity

Sept 2015

15 psu at Taylor River & Joe Bay

The July hypersaline regions are no longer above average
Algae Bloom Region: One month after the hypersaline event

Sept 14-17 2015
Current Ecological Conditions in Florida Bay

Healthy seagrass, clear water
Rabbit Key Basin
May 2015

Dead seagrass, cloudy water
Johnson Key Basin
August 2015

Large floating rafts of dead seagrass
Central Florida Bay
“Yellow Fog” under investigation

- Areas of yellow cloudy water within SAV beds with very low dissolved oxygen and high sulfur
- Low sport fish numbers (cannot be wholly attributed to recent hypersalinity)
Sediment Porewater Sulfide - August 2015
 (> 2.0 mM is toxic to Thalassia)
The Cascade Hypothesis

**Low Flow, High Salinity, High Temperature** = Increased SAV mortality

- Decomposing SAV removes oxygen
- Low oxygen conditions increase sulfide production
- High sulfide concentrations + low oxygen kills SAV

- Decomposing SAV releases nutrients
- Nutrient release leads to algal bloom
- Blooms deprive SAV of light
- Low light starves and kills SAV

- Loss of SAV destabilizes sediments
- Resuspension of sediments releases nutrients and increases turbidity.
- Turbidity decreases available light
The interagency team is collaborating to:

- Assess information gathered during event
- Identify further data needs
- Identify point person(s) to address data needs
The Long Term Signal
“Getting Water to Florida Bay”

- ModWater
  - One Mile Bridge
  - S-356 Pump Station
  - 8.5 Square Mile Flood Mitigation
  - Increment 1 Field Test- ready to operate

- C-111 West Spreader Canal Project
  - Frog Pond Detention Area-S-200 pump station
  - Aerojet Canal Extension S-199 pump station

- Tamiami Trail Next Steps- 2.6 Mile Bridge
  - FDOT and ENP- advertising for Design-Build

- C-111 South Dade
  - S-332 pump stations
  - Detention areas
  - Taylor Slough Bridge
  - Degrading southern C-111 Levee
  - Northern Detention - Contract 8 FY16 construction

*Projects are in various stages of implementation. Some are complete.*
Questions?