Tropical Storm Impacts to Everglades Stormwater Treatment Area Submerged Aquatic Vegetation Communities

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Objectives

1) Examine severity of tropical storm impacts in two Everglades Stormwater Treatment Area flow-ways (STA-1W Cell 5b and STA-2 Cell 3)
   • Impacts on vegetation communities
   • Water quality impacts

2) Describe design and management approaches being implemented to minimize future impacts
Six very large treatment wetlands (ranging from 913 to 6695 ha)

Typically multiple flow-ways in each STA

Most flow-ways have an emergent macrophyte “front end”, followed by a submerged macrophyte (SAV) “back end”
Common SAV species in STAs

- Hydrilla
- Najas
- Chara
- Potamogeton
Initially, many STA back end cells were comprised of vast uninterrupted expanses of SAV

STA 1W Cell 5b, outlined in red, consisted of two compartments ~ 500 ha in size
Hydrilla in STA-1W Cell 5b

Outflow region of STA-1W Cell 5b
Semi-quantitative SAV assessments in STAs

Plant cover assessed visually and with a rake, which is dragged three times on the bottom (~ 1 m distance) to capture vegetation.

- The rake is used to
  - Facilitate SAV detection under turbid water conditions.
  - Determine if other species are present underneath dense SAV beds

- The assigned cover category takes into account the SAV observed in the vicinity and the vegetation collected with the rake.
Hurricane Season 2004

Source: National Weather Service/National Hurricane Center
Airborne *Hydrilla*, Lake Toho, Sept. 04
(photo courtesy Ken Langeland, U of FL IFAS)
STA-1W Cell 5B: Feb 00 – Mar 10

Hydrilla Cover Trends (arrow depicts 2004 hurricanes)
Earthen remnants of farm roads support emergent macrophytes, effectively compartmentalizing the cell into 6 sub-cells, each ~ 140 ha.
Transmission Lines in STAs following Wilma
Hurricane Wilma Impacts on SAV in STA-2 Cell 3

August 2005

Hurricane Wilma: October 24, 2005

November 2005

Najas  Hydrilla  Ceratophyllum  Chara  Potamogeton
STA-2 Cell 3: May 03 – Oct 09
Najas Cover Trends (arrow depicts 2005 Hurricane Wilma)

SAV swept onto the levee in STA-2 Cell 3 after Hurricane Wilma
Spatial relationship between SAV cover and water quality, STA-2 Cell 3
Currently, many back end STA cells are highly compartmentalized by bands of emergent macrophytes (STA-3/4 Cell 3B has sub-cells of ~ 20ha and smaller)
Emergent Vegetation Strips in STA-1W Cell 5
Conclusions

• The hurricanes of 2004 and 2005 adversely impacted SAV communities in STA-1W and STA-2. Impacts were characterized through visual observation and with semi-quantitative vegetation surveys.

• In STA-2 Cell 3, internal water quality surveys demonstrated that the SAV impairment temporarily impacted wetland TP removal performance.

• Since 2005, bands of emergent macrophytes have been established to compartmentalize the large shallow SAV wetlands. This approach has proven effective to date, but as of yet it is untested under tropical storm conditions.