DIEOFF DÉJÀ VU

THE LATE 1980'S SEAGRASS DIEOFF IN FLORIDA BAY LOOKED EERILY SIMILAR TO CURRENT EVENTS

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With thanks and acknowledgements to: Penny Hall, Paul Carlson, Mike Durako, Marguerite Koch, Brad Furman and Jay Zieman
In summer 1987 large seagrass dieoff patches were observed in areas of dense seagrass coverage.
Seagrass die-off occurred mostly in western Florida Bay, distant from land-based sources of nutrients.
Consequences

Seagrass dieoff, sediment resuspension, and decreased seagrass nutrient uptake

Increased water column nutrient availability

Phytoplankton blooms
Sponges were killed during algal blooms, Florida Bay trophic ecology was altered for decades.
Coastal eutrophication is a common cause of seagrass loss.
Florida Bay seagrass dieoff

Dieoff occurred in patches under clear water column

Seagrass “stubble”
Note surviving shoal grass (arrow)

Florida Bay seagrass dieoff is unique

Images from Zieman et al. 2004 and Brad Furman
Florida Bay Seagrass Dieoff Characteristics “Clues”

Occurred predominantly in central and western Florida Bay
Only in most dense seagrass meadows
Occurred in late summer and fall, bay waters warm
Only Turtle Grass
Clear water column – abundant light
No epiphyte or macroalgal abundance
Occurred during drought, hypersaline
Damage concentrated at seagrass meristem
Disease organism present (*Labyrinthula*)

No historical record of such an event happening on this scale before
Prime suspects

Hypersalinity

Temperature

Sulfide stress (Paul Carlson, Marguerite Koch)

Disease (Mike Durako, Dave Porter, Lisa Muehlstein)
Clues from Denmark

Oxygen and sulfide measurement *inside* plants

Similar dieoff of eelgrass in the Baltic Sea

New technologies revealed sulfide poisoning
Oxygenated water column keeps sulfide away
Low oxygen allows sulfide intrusion
Dying turtle grass experienced hypoxia and sulfide intrusion

Oxygen demand

Oxygen use increases dramatically with temperature

Also, dense seagrass uses more oxygen than sparse!
Oxygen supply

Hot, salty water holds less oxygen than cooler less-salty water.
Turtlegrass abundance
Salinity exceedance
2015 seagrass dieoff

Very high salinity and high seagrass abundance at time of 2015 seagrass dieoff

From Penny Hall and Brad Furman, FWC
Florida Bay seagrass dieoff – A recurring cycle?

From Penny Hall and Brad Furman, FWC
THANK YOU!

To all the Florida Bay researchers and cooperating agencies:

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Scientists at the South Florida Water Management District
And scores of others!

Jay Zieman 1943-2015