A Boring Future: Impacts of boring sponge on oyster reef restoration

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Mosquito Lagoon

- Northernmost extent of Indian River Lagoon
- Canaveral National Seashore
  - Boating & fishing
- Historic shell middens circa 1000-1200 AD
- Intertidal oyster reefs

Turtle Mound circa 1930; Photo: USF
Oyster restoration in Mosquito Lagoon

- 40% coverage lost in Canaveral National Seashore since 1943
  - Garvis et al., 2015
- 83 reefs restored since 2007
  - MDC, CCA, Nature Conservancy, Brevard Zoo
- 49,000+ volunteers
Causes of reef erosion: Boat wakes
Another culprit?
Another culprit?

- Boring sponge damage
- Cluster breakage
Boring sponge bioerosion

Cliona celata
Boring sponge bioerosion

Adapted from Pomponi, 1980
Boring sponge impacts on oysters

- Reduced subtidal oyster aquaculture yield 25-30% in Canada
- Alter shellfish metabolism
  - Less energy to somatic growth
  - More energy to shell maintenance & repair
- More brittle, prone to predation

Warburton, 1958b, 1958c; Carver et al., 2010; Duckworth & Peterson, 2013; Carroll et al., 2015; Photos: In a Half Shell
How could boring sponge help erode reefs?
How much of the intertidal has been impacted?

- Data collected for each intact shell & cluster:
  - Height, width, weight
  - Area of live sponge coverage
  - Area of boring damage
  - Penetration of damage
  - Width of breakages
  - Count of live oysters
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Why is boring damage appearing on intertidal reefs?

1. Movement of damaged shells & clusters
2. Hitchhiking sponges during high water
High water → survival & recruitment?

- Monitor over one calendar year
- Compare inundation time of different reef elevations

![Diagram showing different reef elevations and inundation times with various symbols and measurements.](image-url)
This is boring. Why should we care?

- Cosmopolitan & not invasive
  - Found in shells from Mosquito Lagoon dated ~1020 AD
- Increasing worldwide threat in changing climate
  - Bioerosion rates $\uparrow$ with temperature & acidification
  - $\uparrow$ water level $\rightarrow$ potential habitat expansion
- Suggest to include boring sponges in monitoring & restoration
  - Impact oyster health
  - Impact reef structure
  - Interactions with other sources of erosion
  - Impact restoration success

Wisshak et al., 2012, 2013, 2014; Fang et al., 2013; Hernandez-Ballesteros et al., 2013; Stubler et al., 2014
Prepare for a boring future...
Thank you!

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