# A Boring Future:

## Impacts of boring sponge on oyster reef restoration

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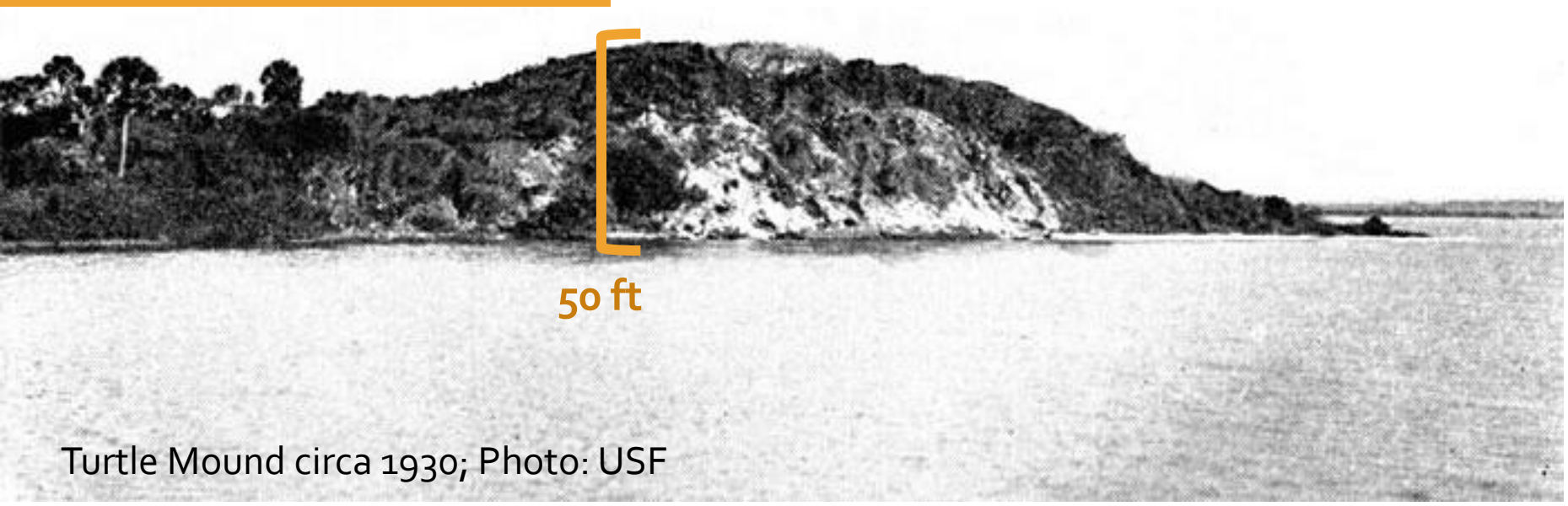
# Mosquito Lagoon

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

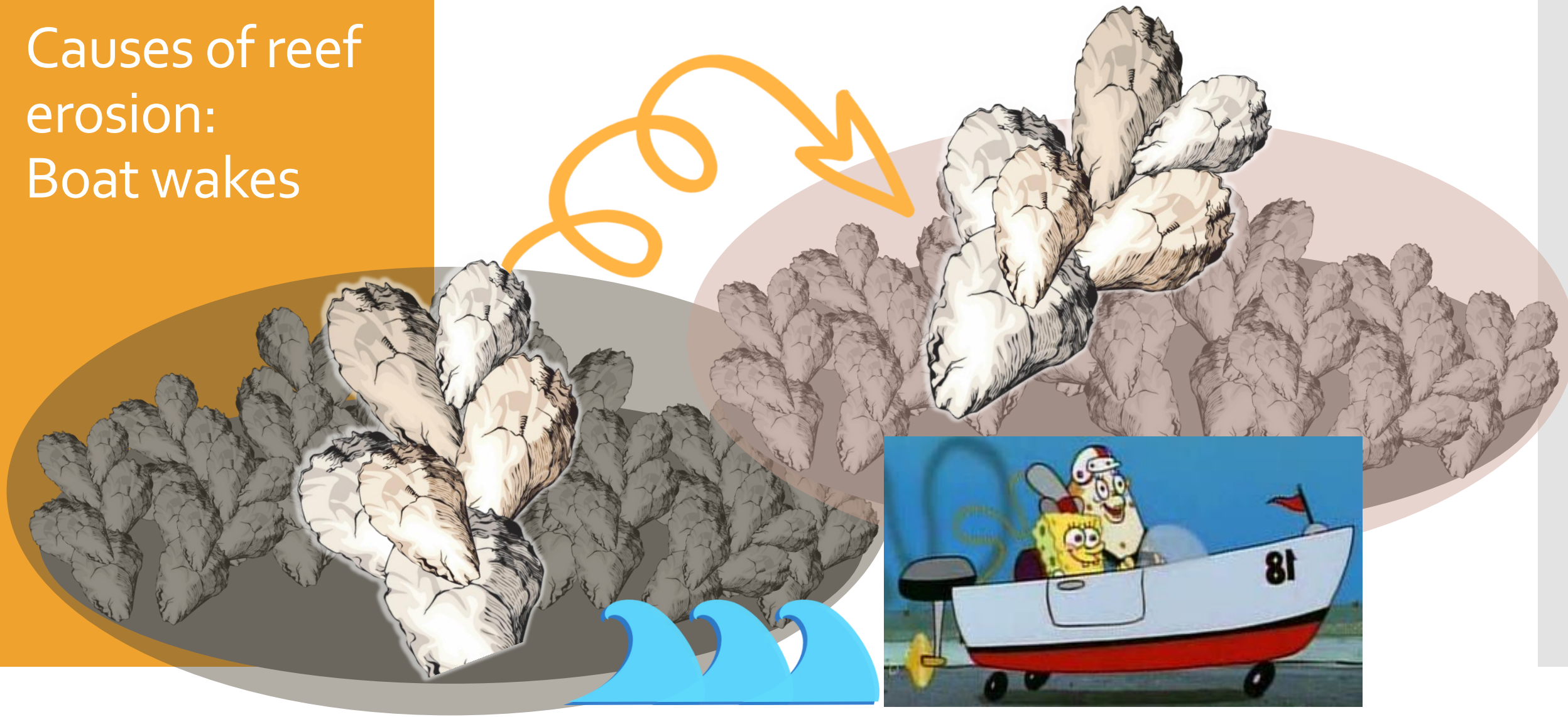



Turtle Mound circa 1930; Photo: USF

# 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

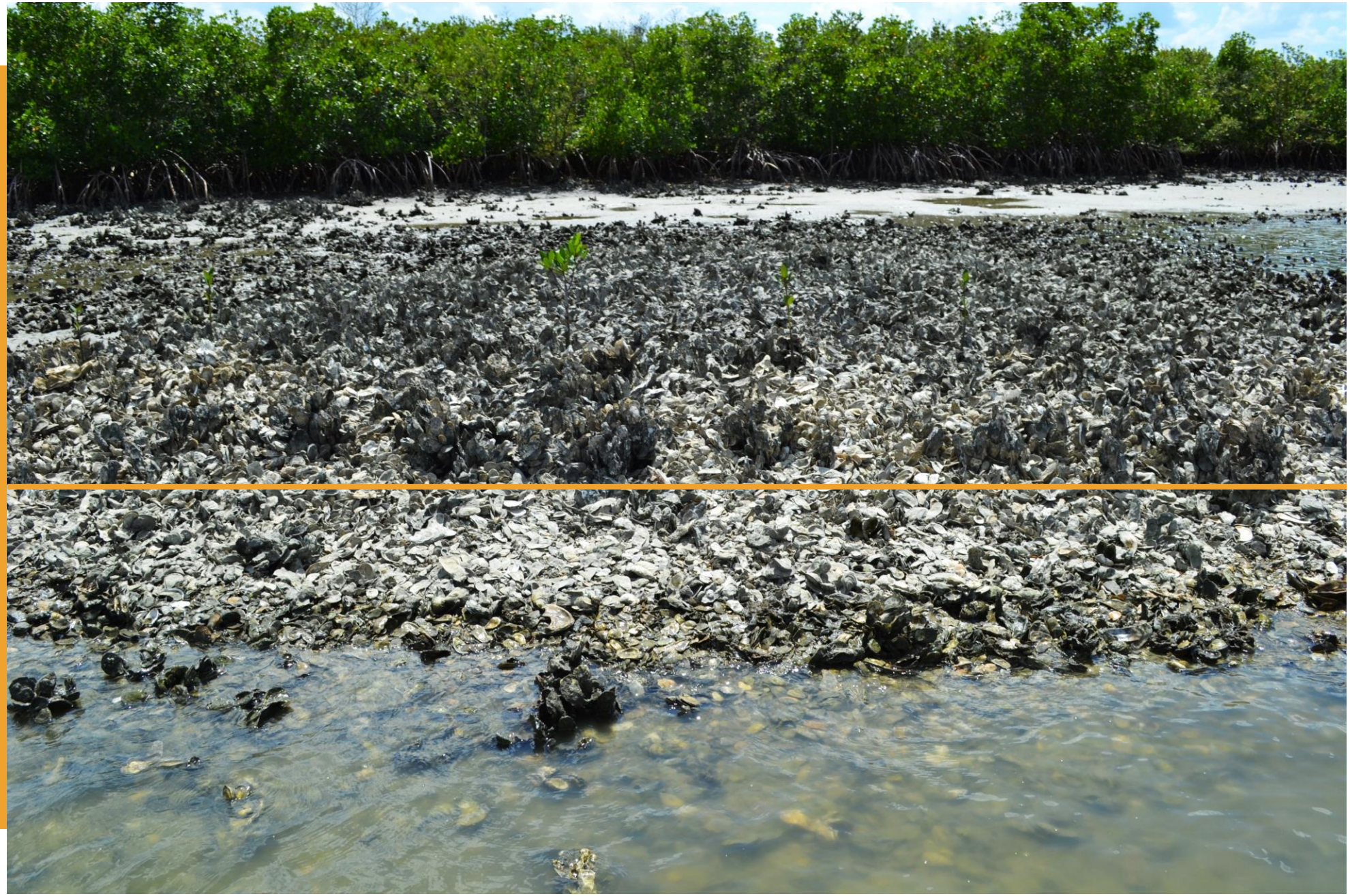
# Causes of reef erosion: Boat wakes



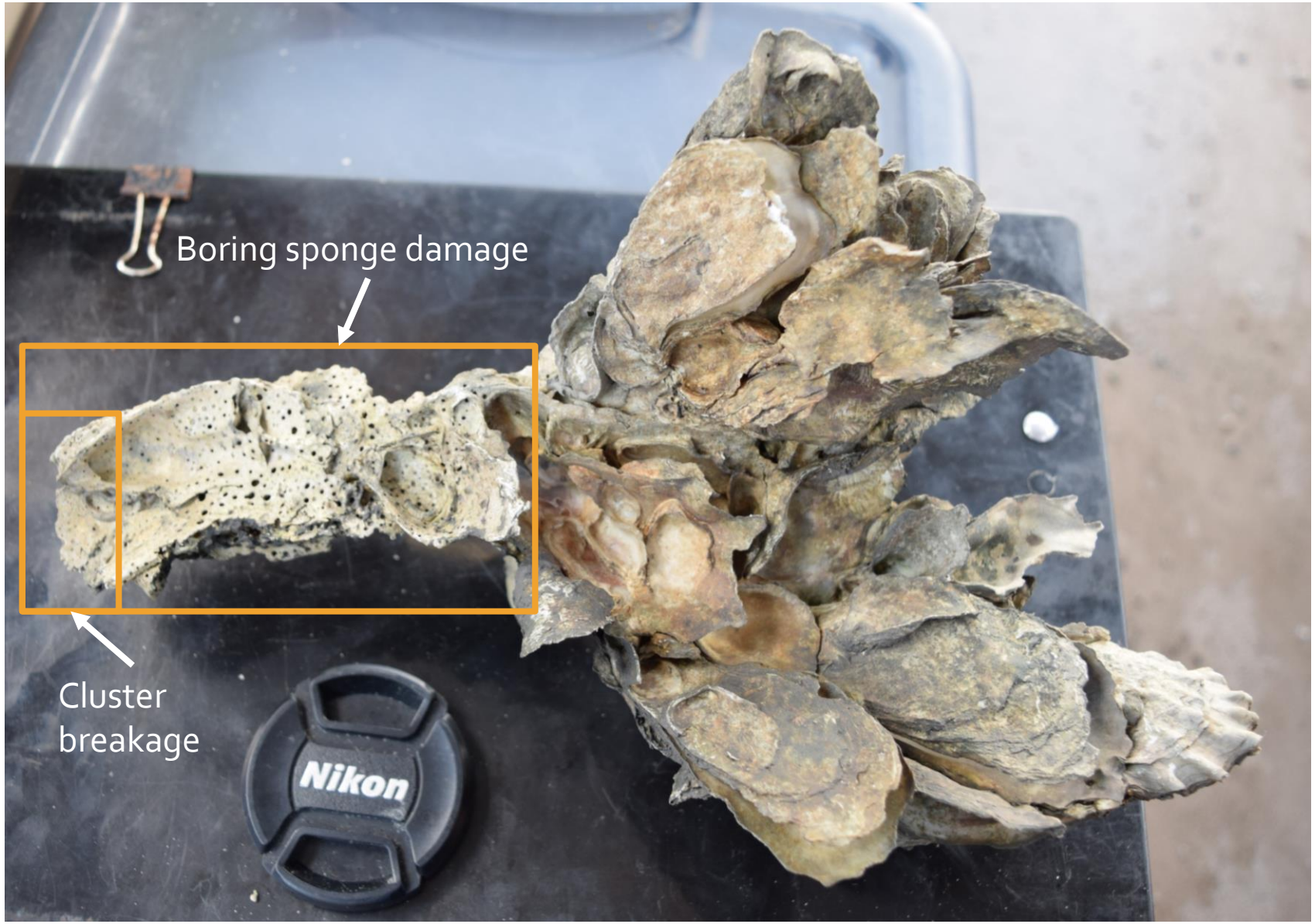

Campbell, 2015


I5544

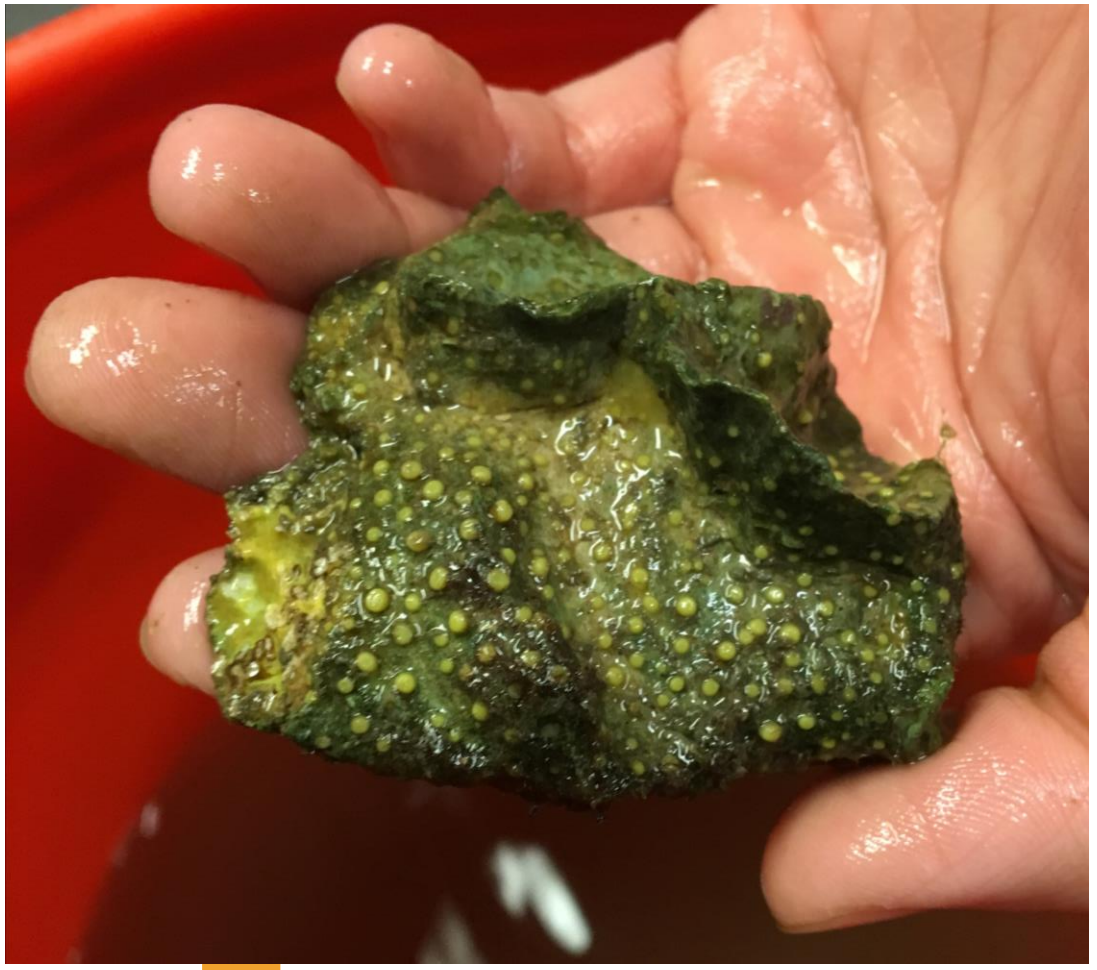
# Another culprit?



# Another culprit?



# Boring sponge bioerosion

*Cliona celata*

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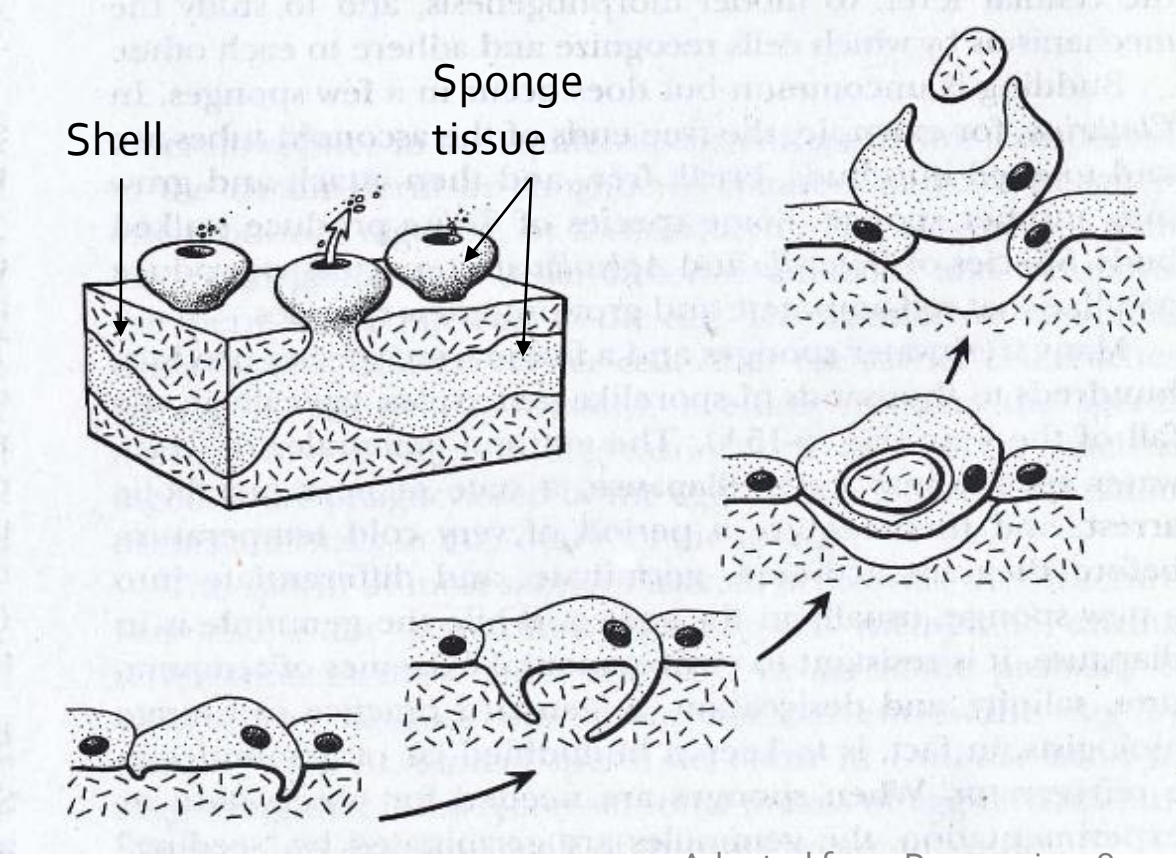
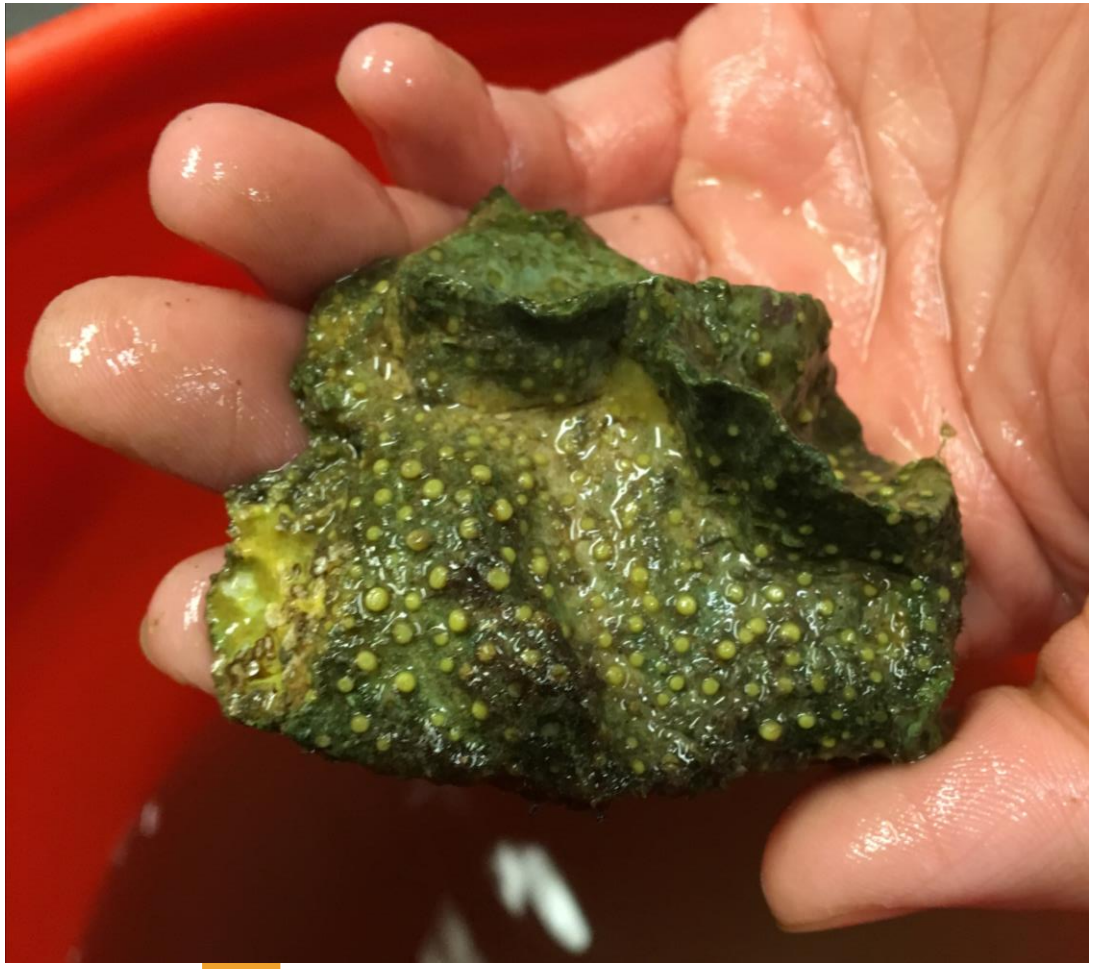



Adapted from Pomponi, 1980



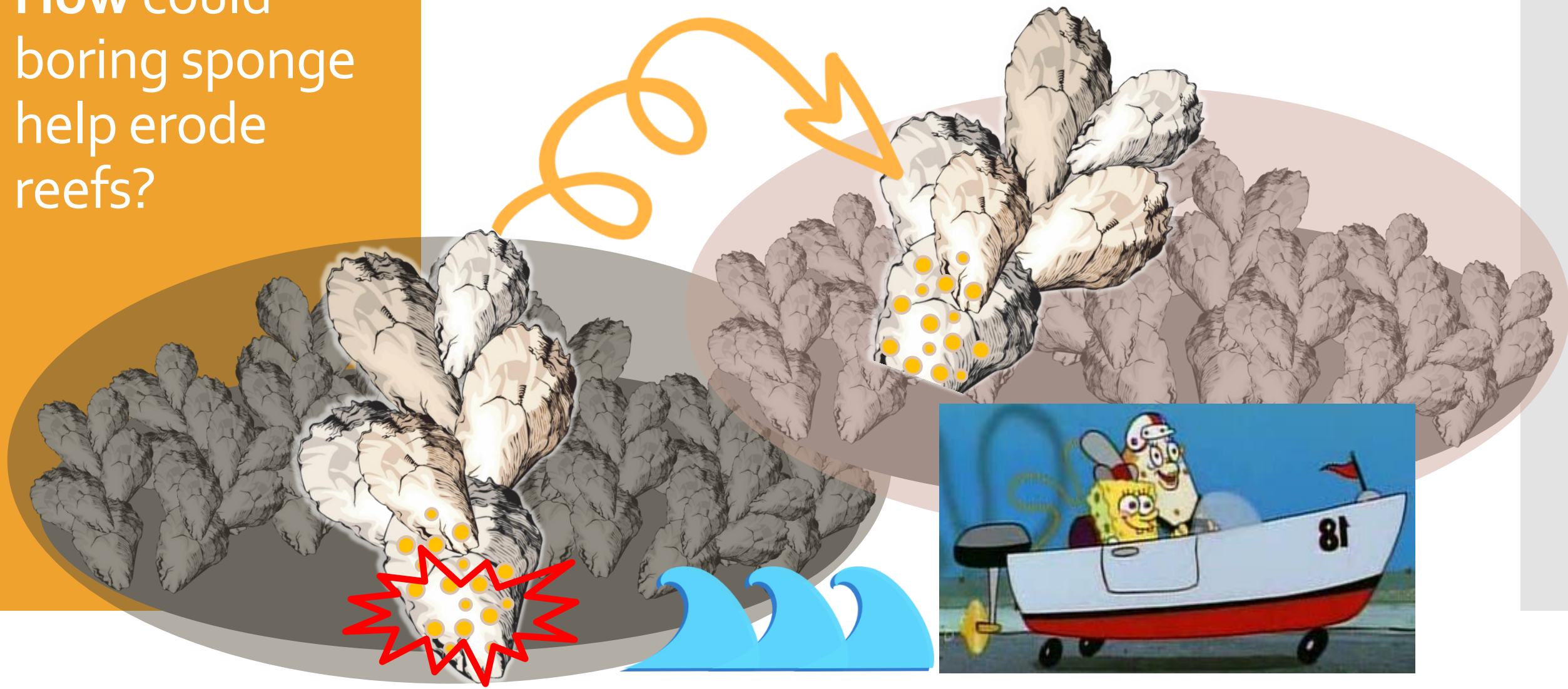
*Cliona celata*

# 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

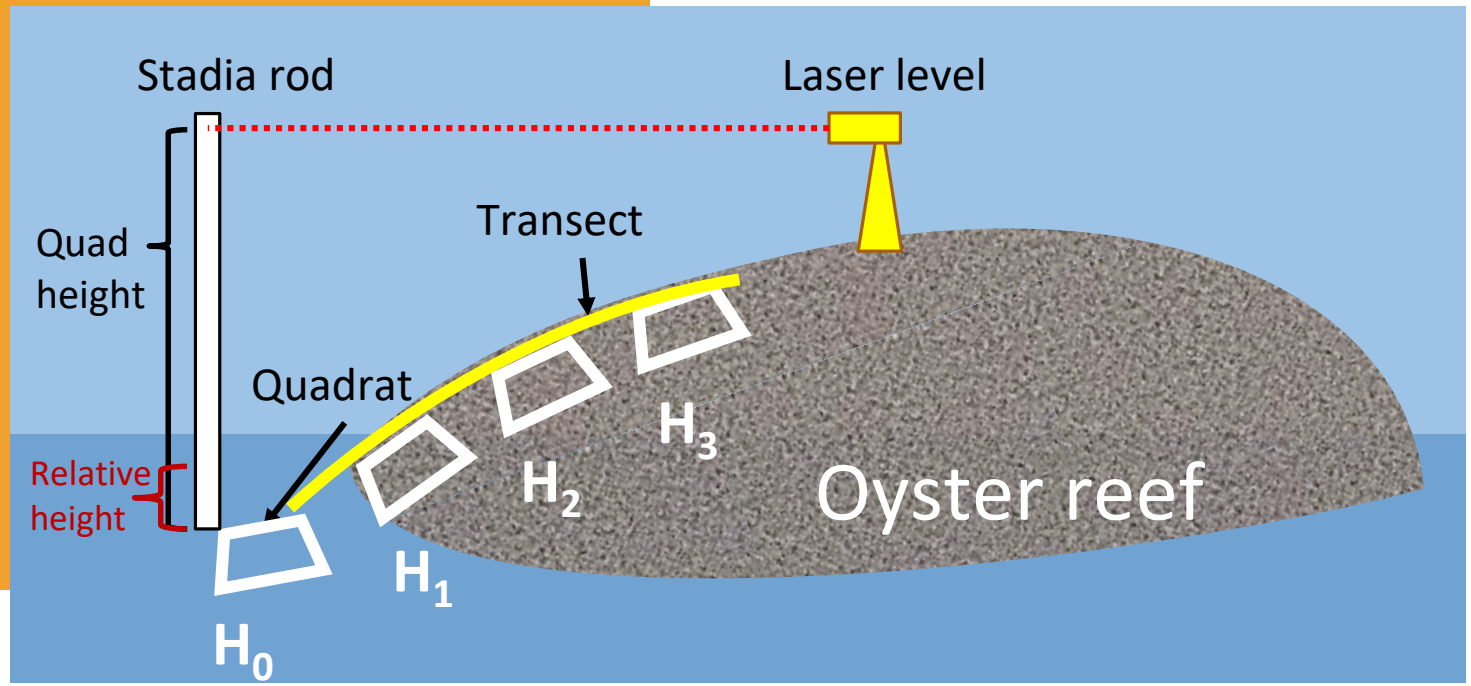
Warburton, 1958b, 1958c; Carver *et al.*, 2010; Duckworth & Peterson, 2013; Carroll *et al.*, 2015; Photos: In a Half Shell

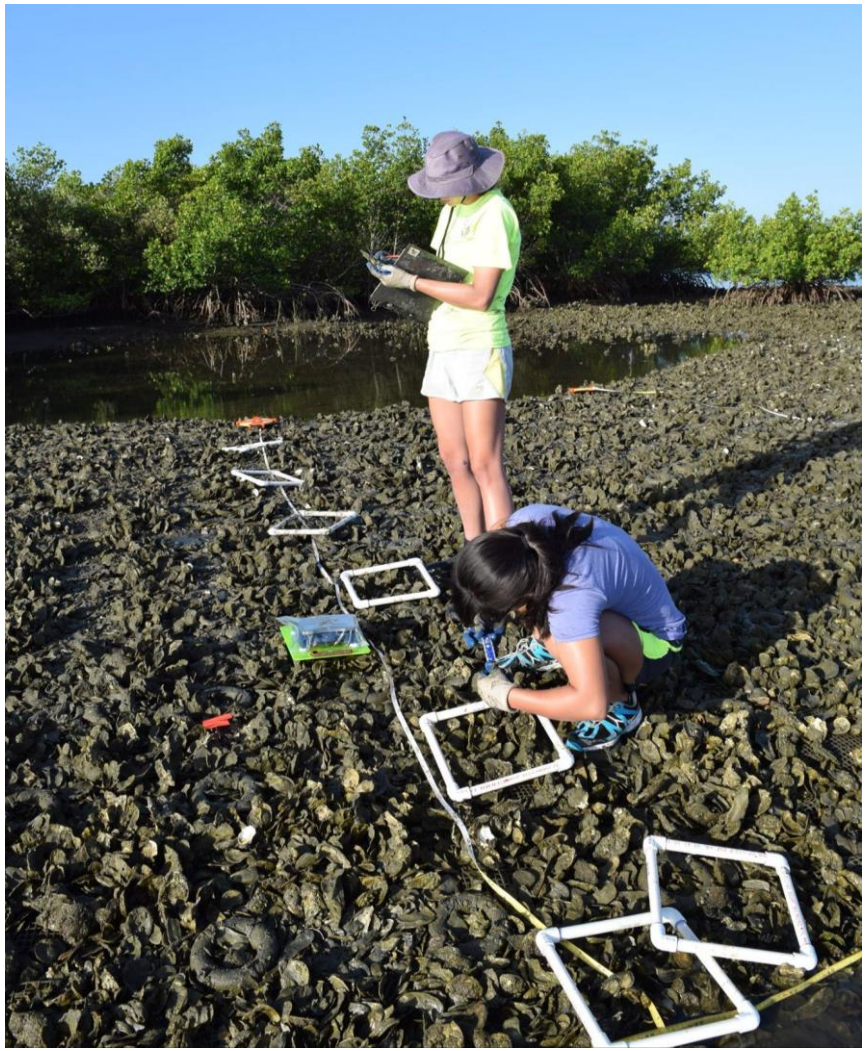
**How** could boring sponge help erode reefs?



# 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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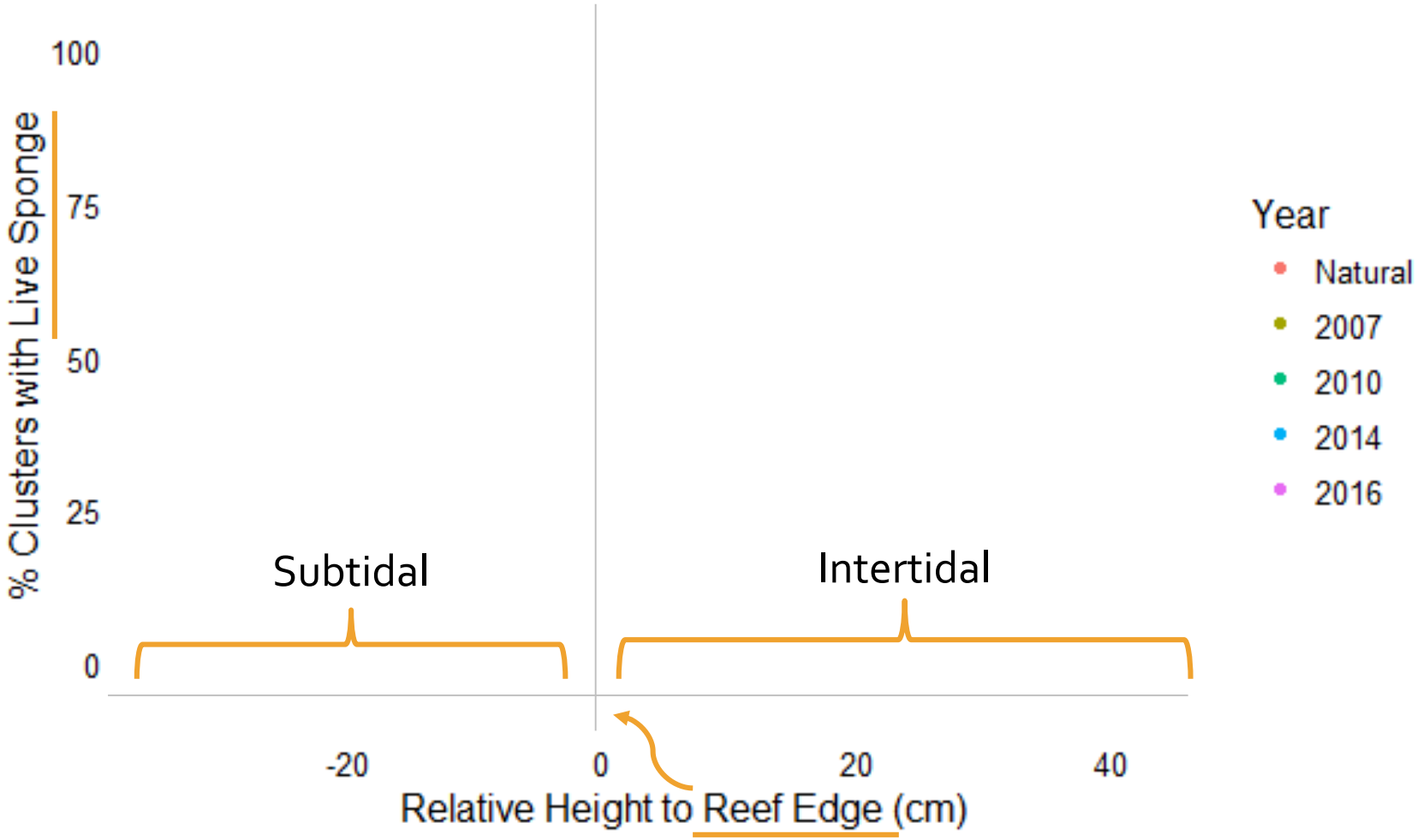

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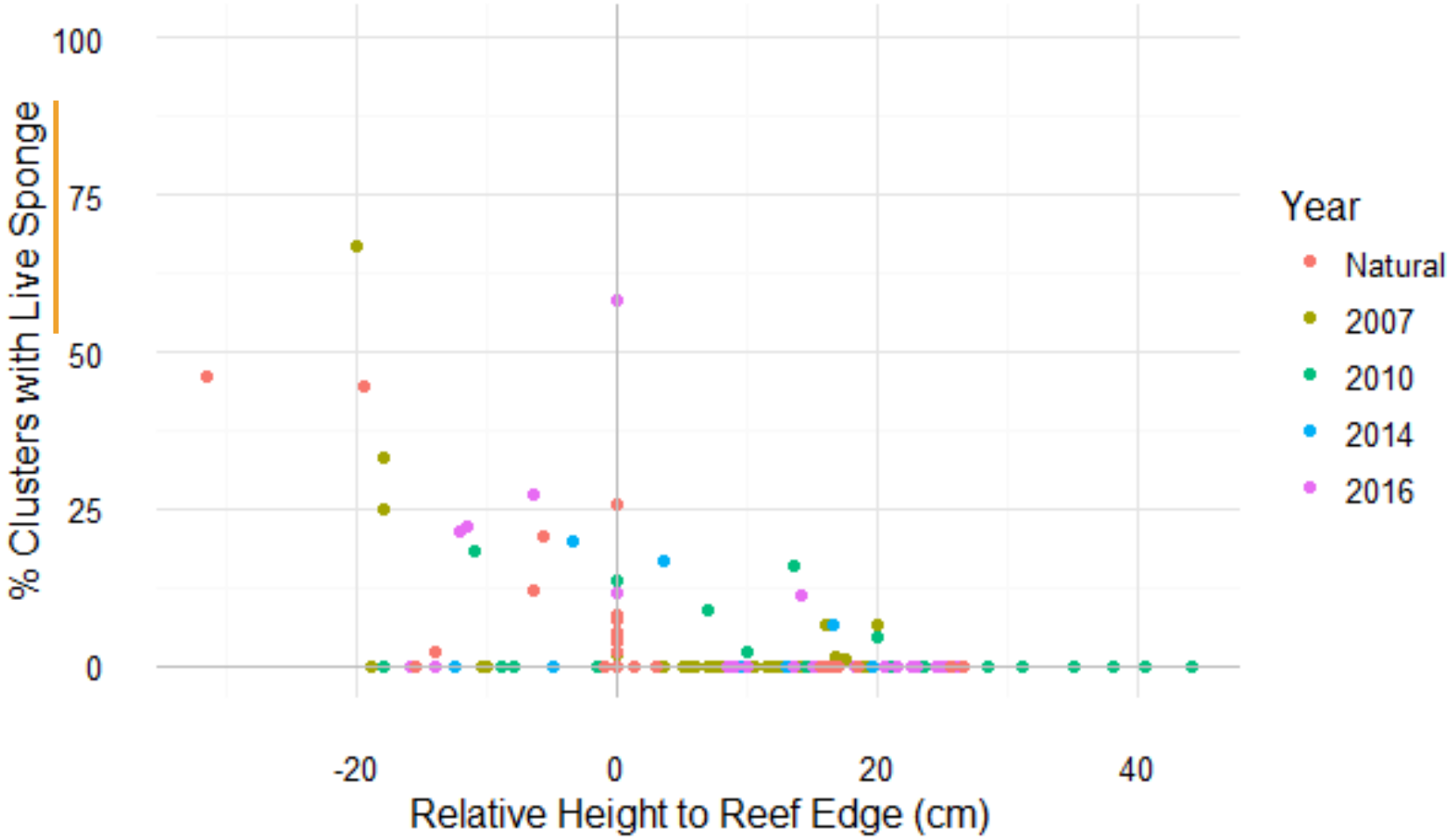

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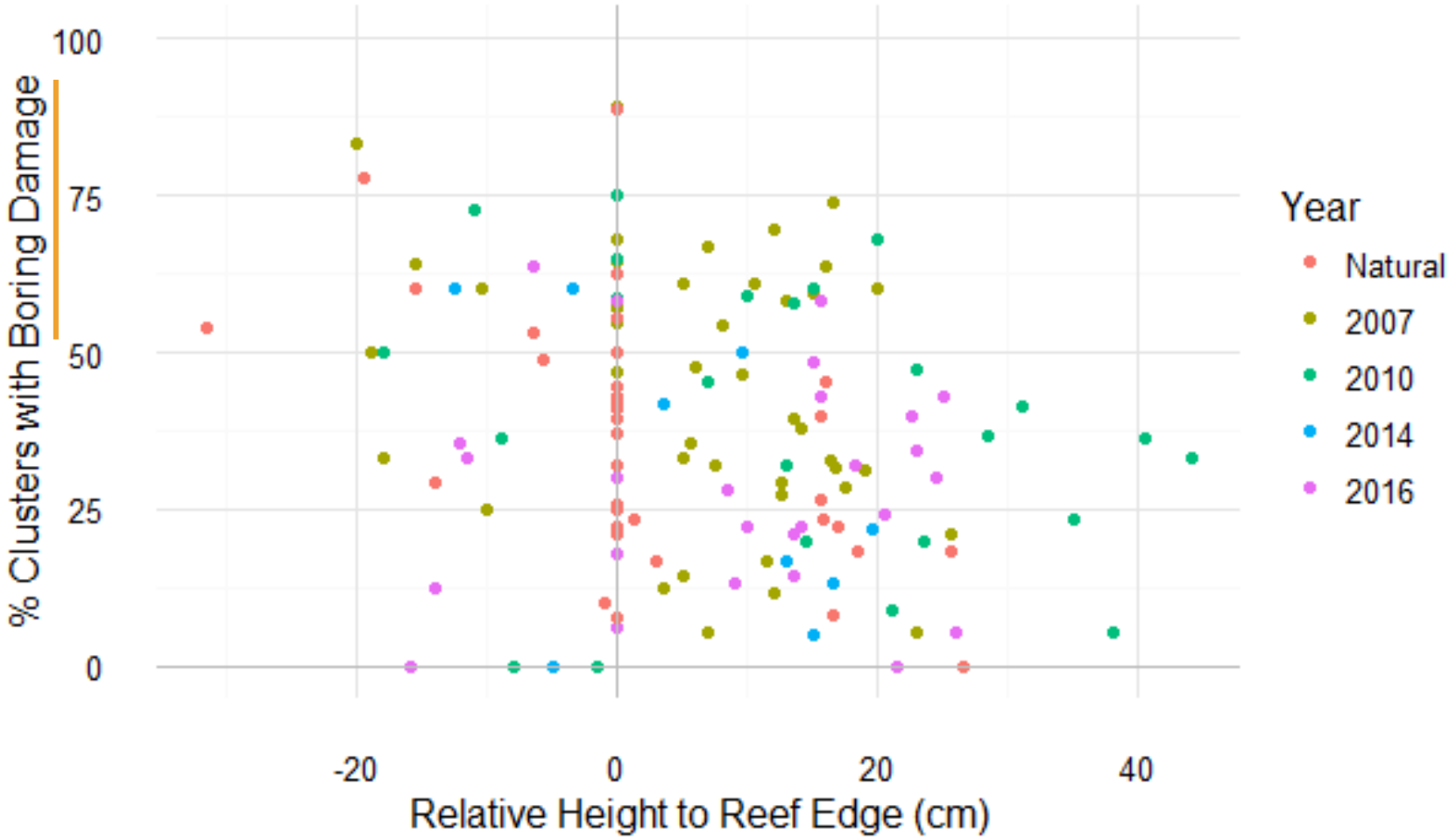
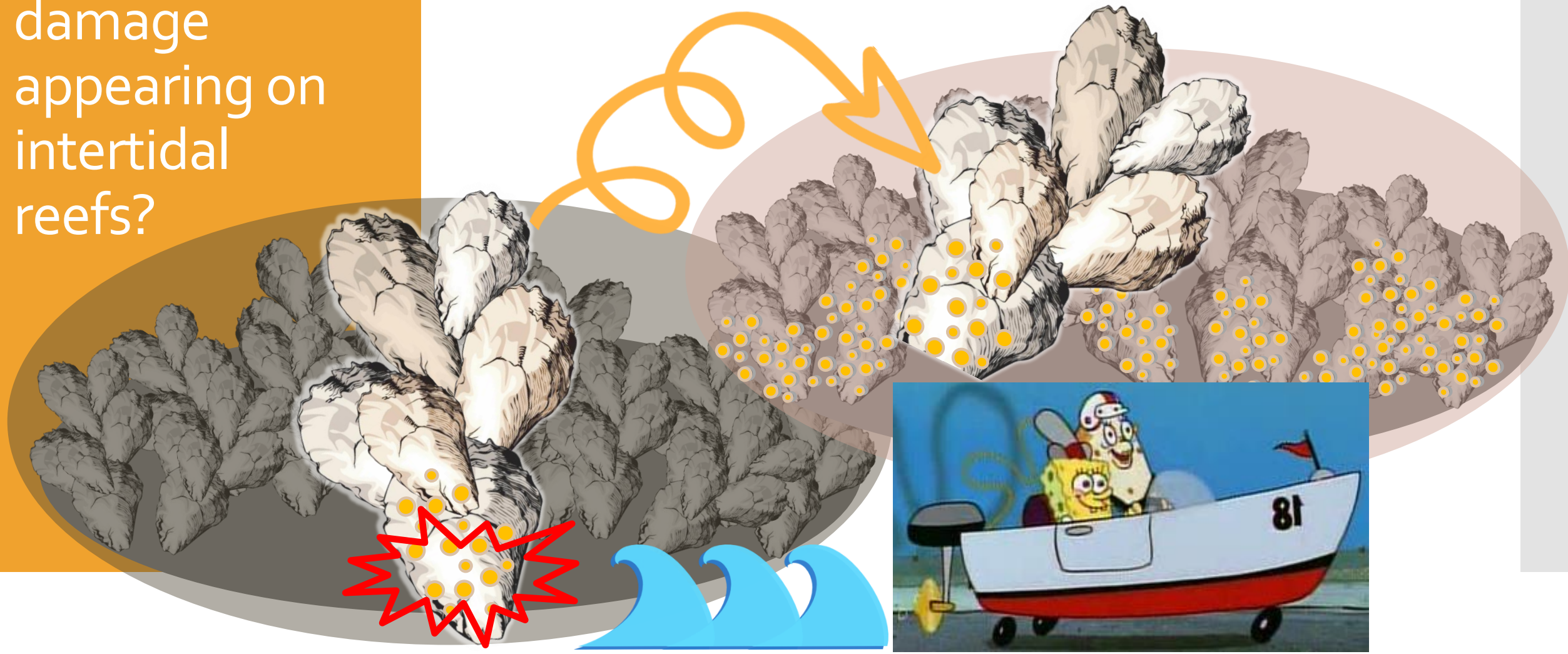


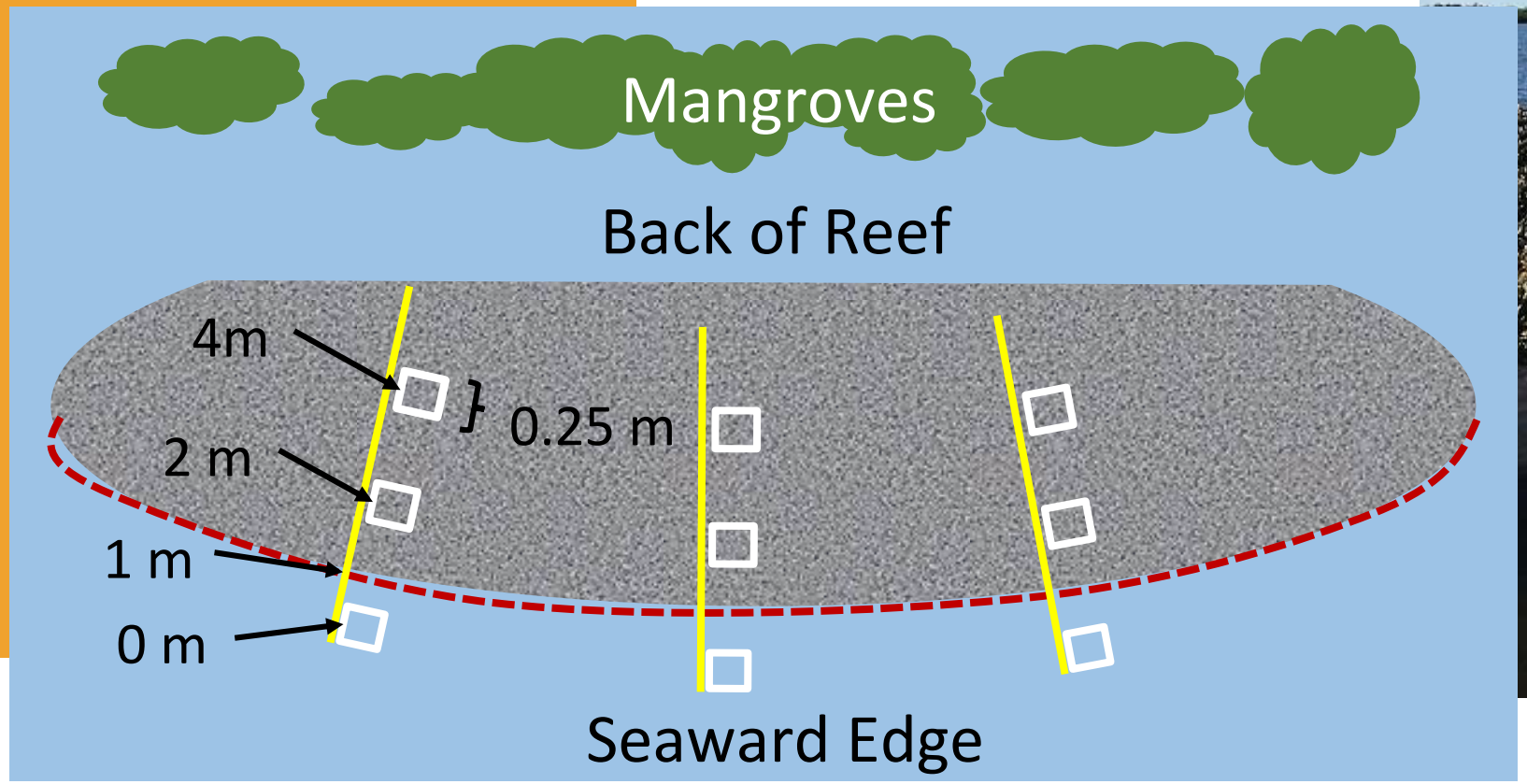
# **Why** is boring damage appearing on intertidal reefs?

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



# 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 ↑ with temperature & acidification
  - ↑ water level → 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!

- CEELab
- UCF Department of Biology
- UCF Department of Engineering
- Southeast Archeological Center
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- IRL NEP