Red Mangroves positively influence the Eastern Oyster along an intertidal gradient

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Oyster Integrated Mapping and Monitoring Program

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The Eastern Oyster (*Crassostrea virginica*)

- Is a sessile bivalve mollusk

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- Has a wide distribution

Image source: World - Blue by FreeVectorMaps.com

The Eastern Oyster (*Crassostrea virginica*)

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- Has a wide distribution
- Performs a variety of ecosystem services

water filtration

sediment stabilization

Image source: smi247.com
Jonathan Wilker/Purdue University

The Eastern Oyster (*Crassostrea virginica*)

- Is a sessile bivalve mollusk
- Has a wide distribution
- Performs a variety of ecosystem services
  - Is an ecosystem engineer

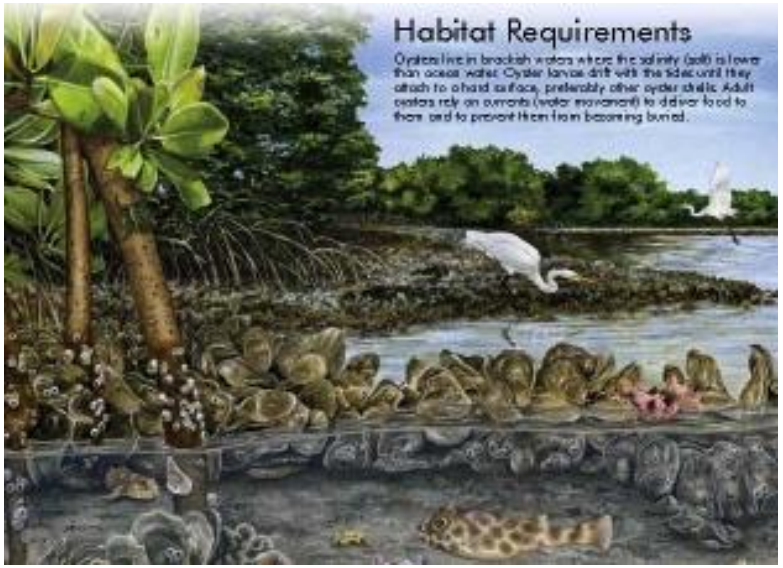
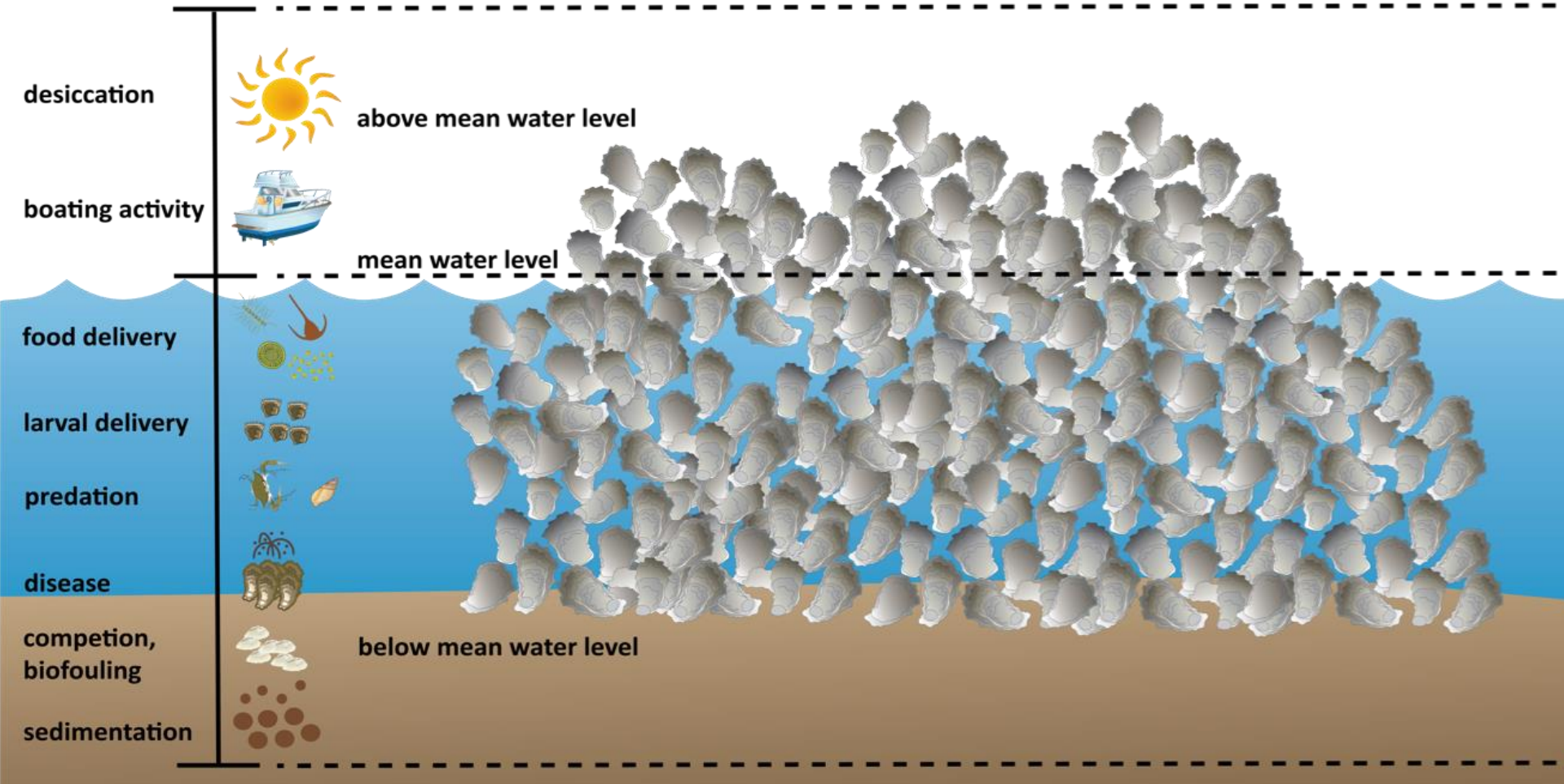
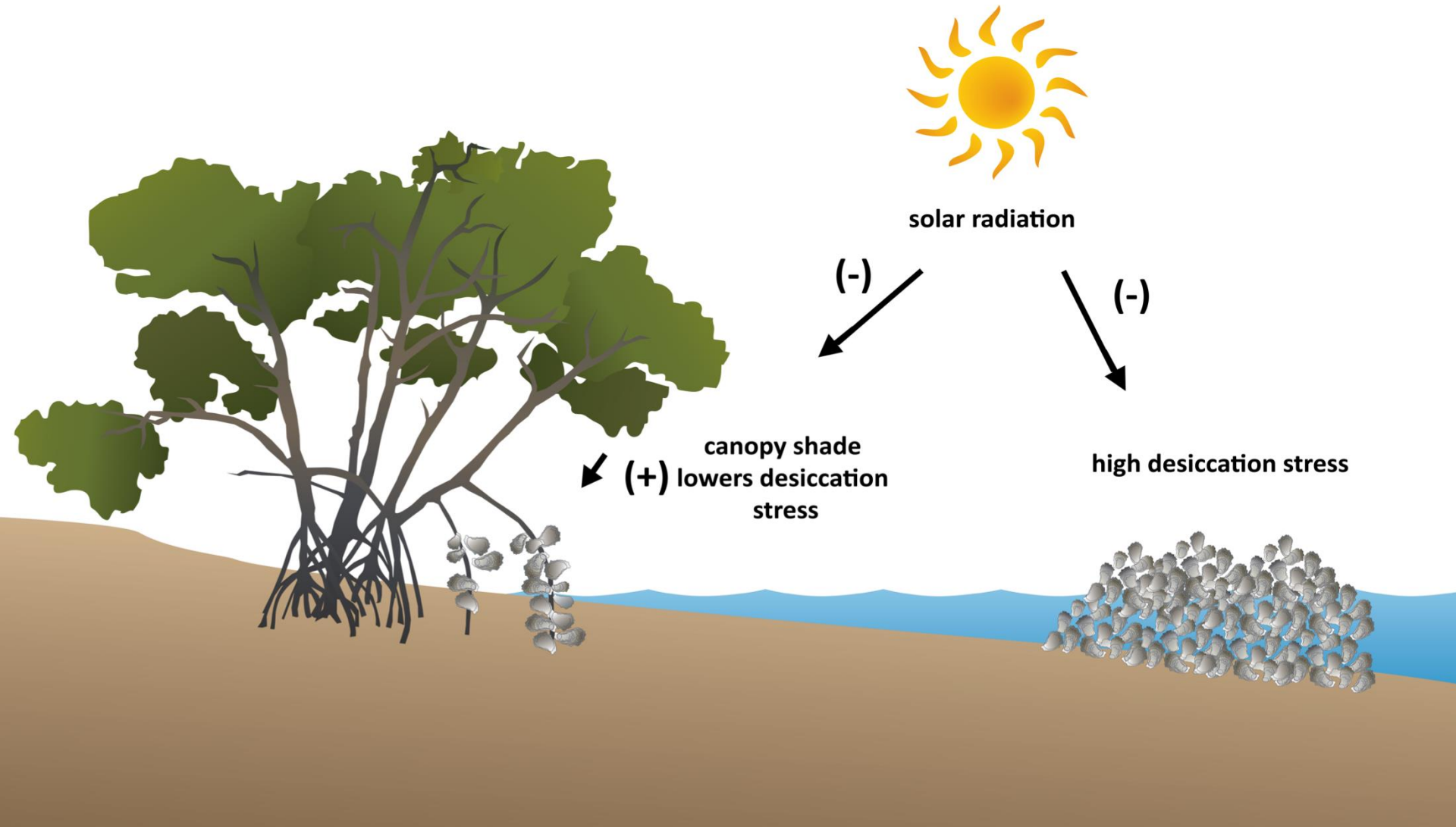


Image source: Loxahatchee River District

Biotic and abiotic factors vary along the intertidal



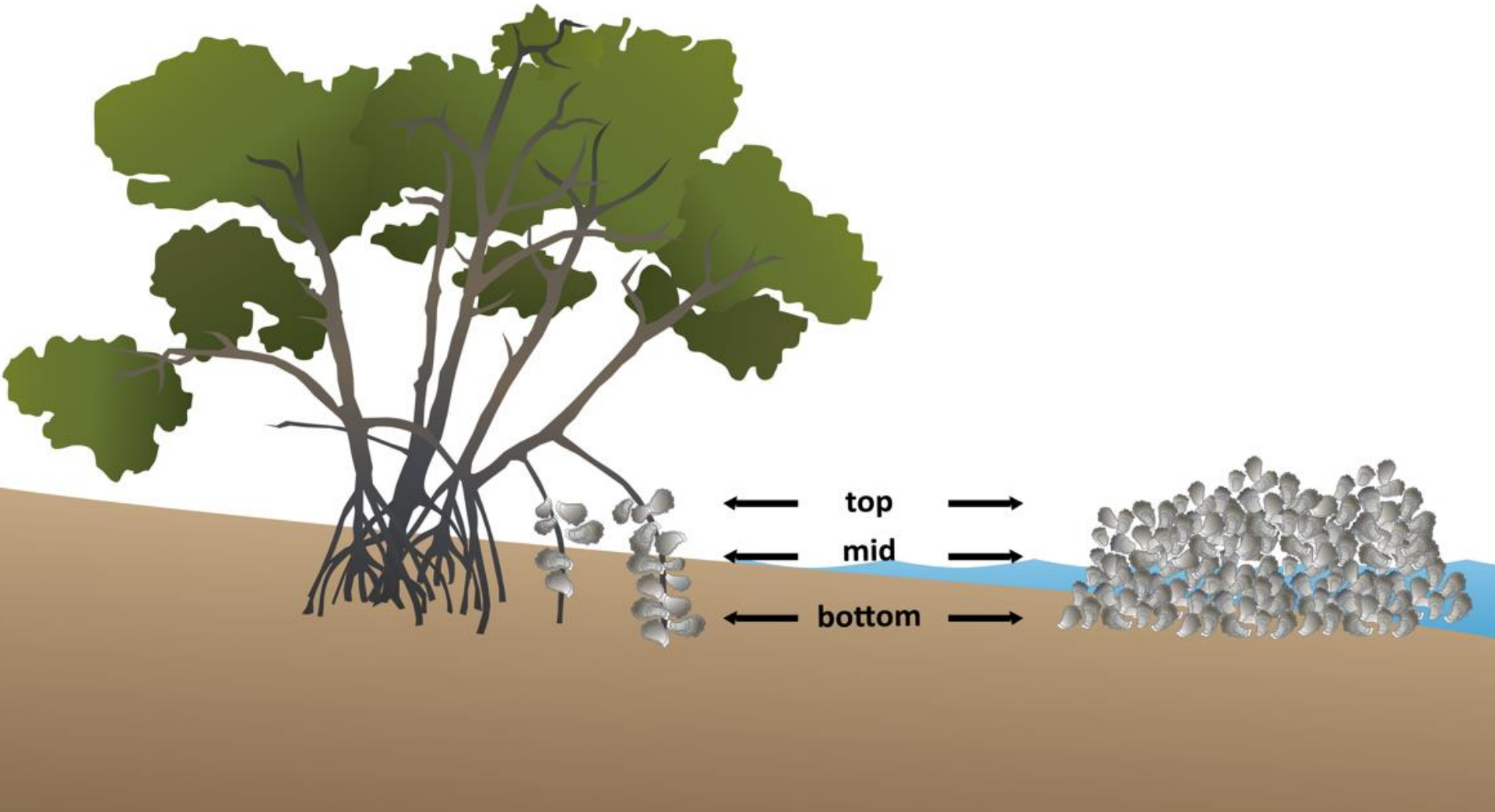
Oysters can grow on mangrove prop roots



Tampa Bay study questions

- Do oysters demographic rates along different **tidal elevations** differ between **reefs** and **Red Mangroves**?
- Which **biotic** and **abiotic** factors differ along the intertidal zone?
- Are oysters on **high** intertidal zones on prop roots **positively** influenced by Red Mangroves?

Methodology



Methodology

- Oyster reefs and Red Mangrove prop roots were sampled:
  - to quantify abundance of oysters, predators, gapers per ~0.25m^2
  - to quantify recruitment and survival using ceramic tiles
  - at 3 tidal elevations (bottom, mid, top)

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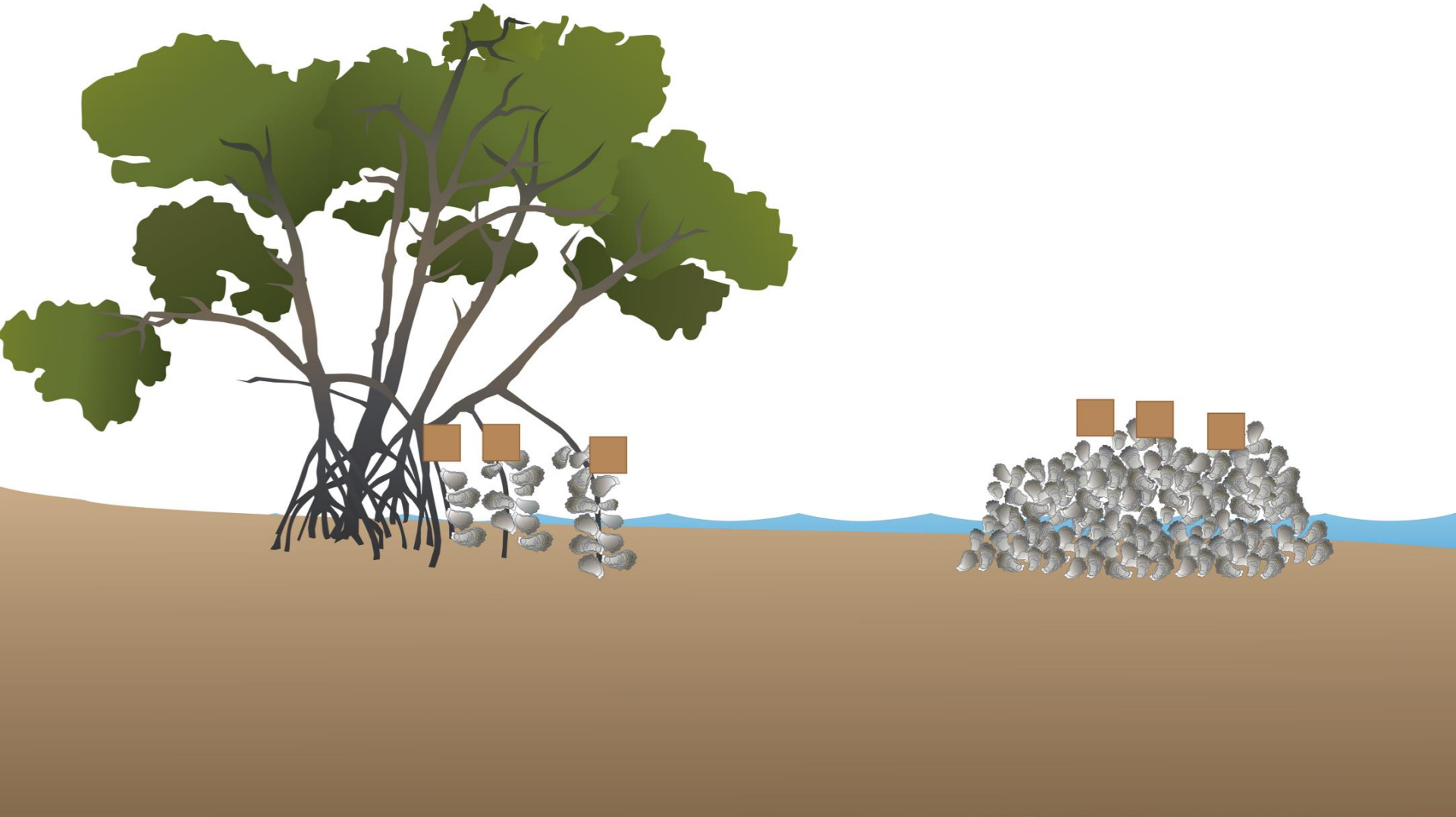
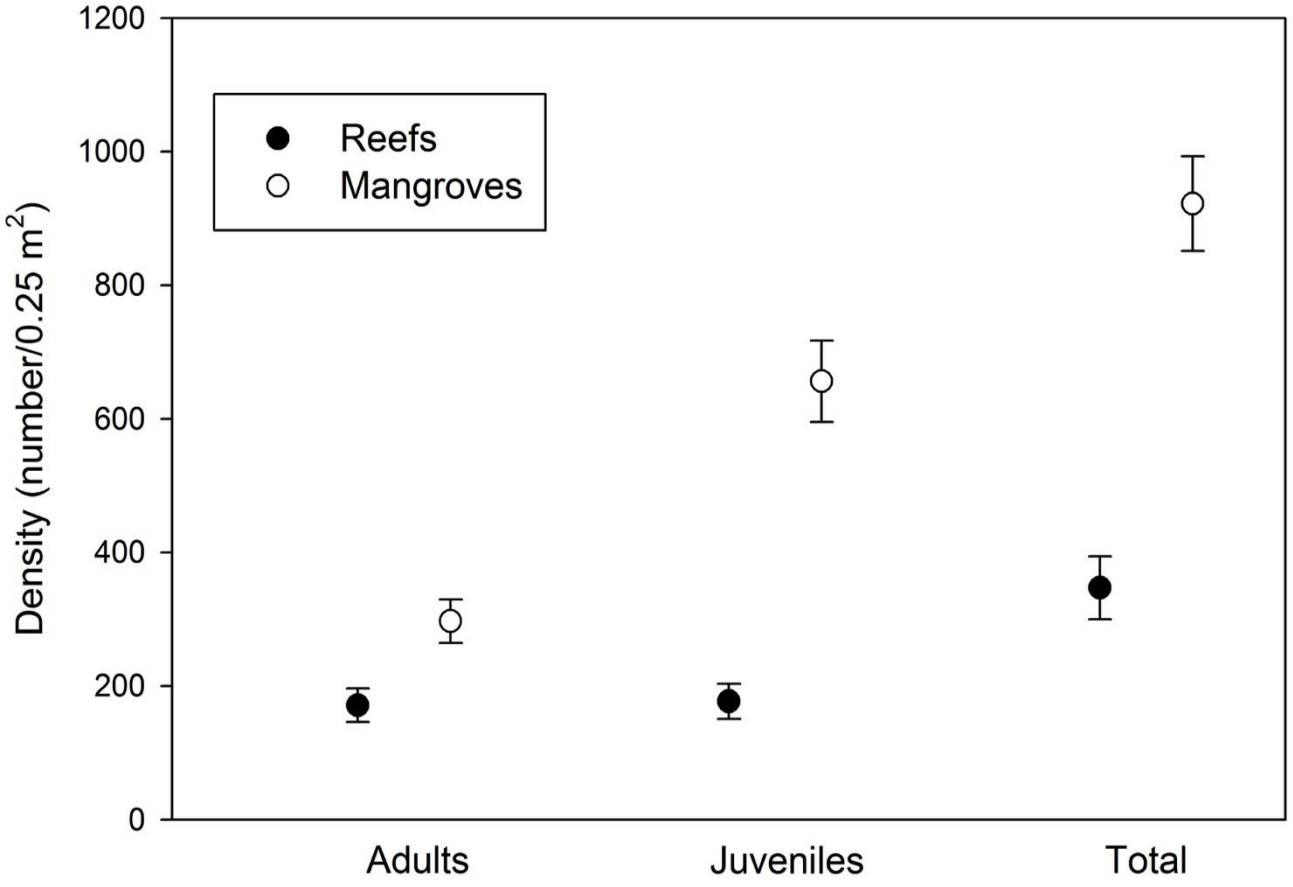
  - to quantify recruitment and survival using ceramic tiles
  - at 3 tidal elevations (bottom, mid, top)
- Evaporative water loss experiment on top zones of both habitats

Evaporative water loss experiment



Oyster density was higher on Red Mangroves than on reefs

$F_{1,35} = 15.23$, $p = 0.01$



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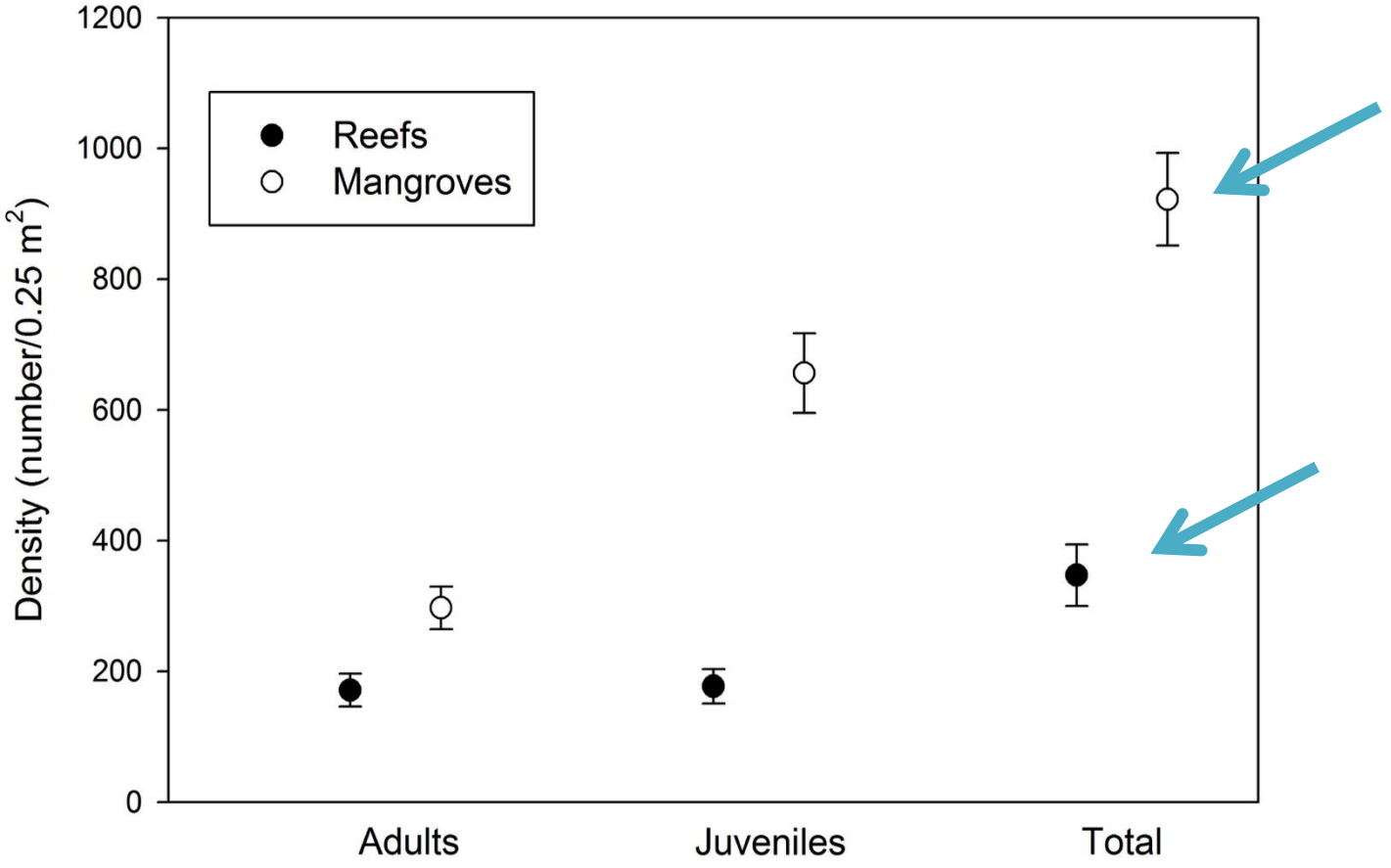

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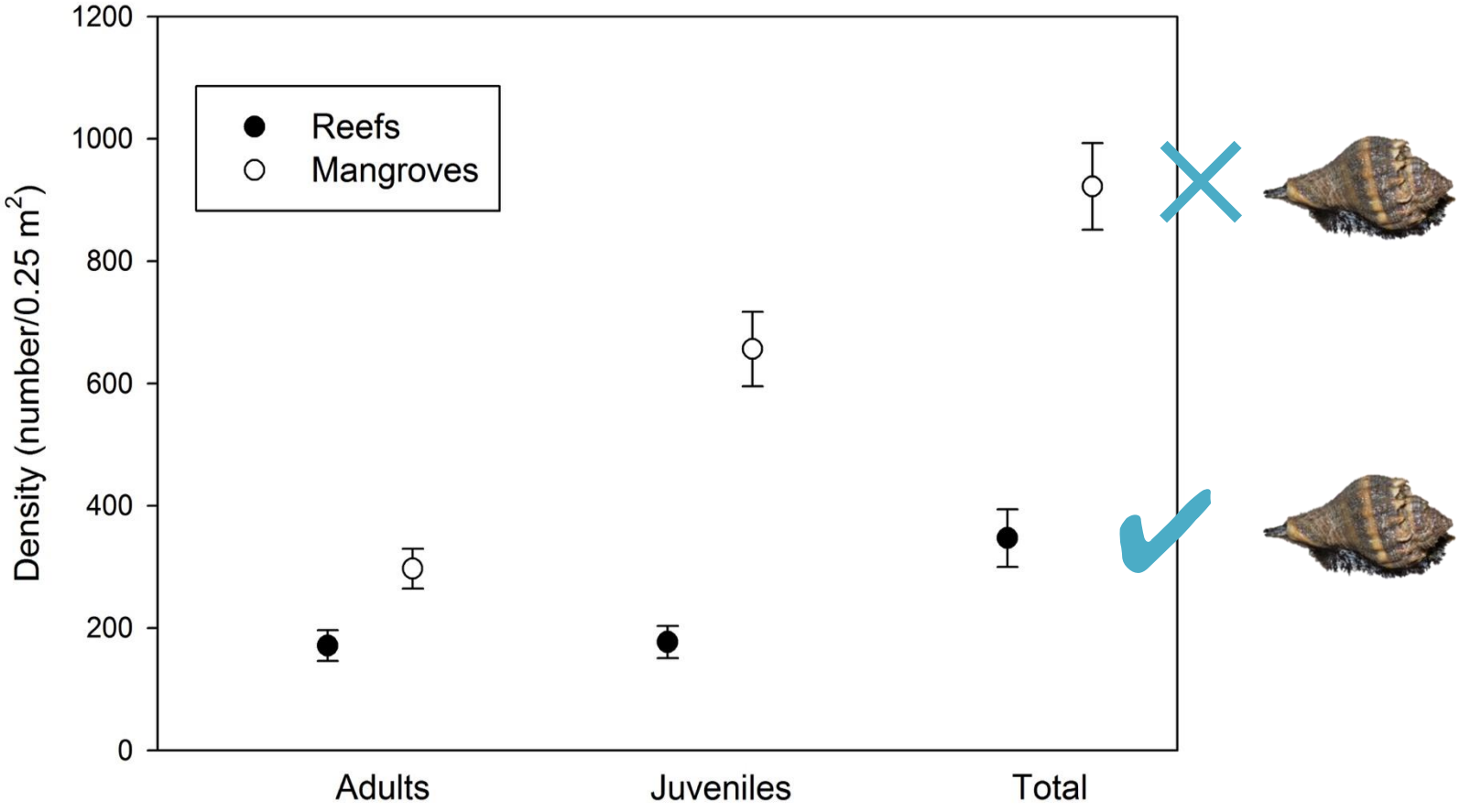
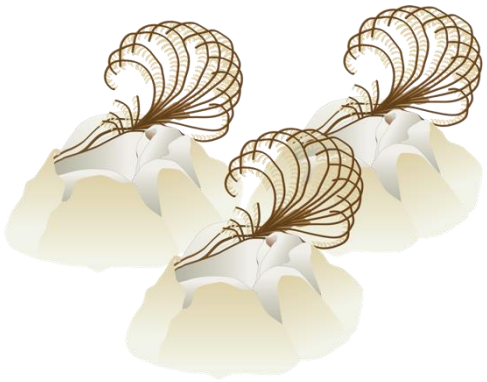
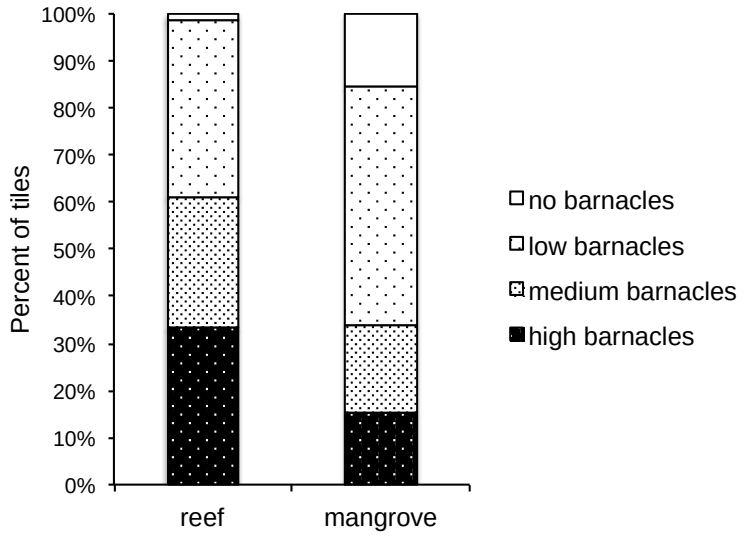
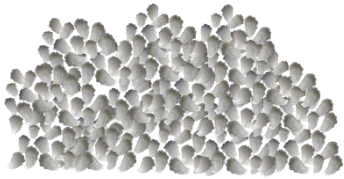




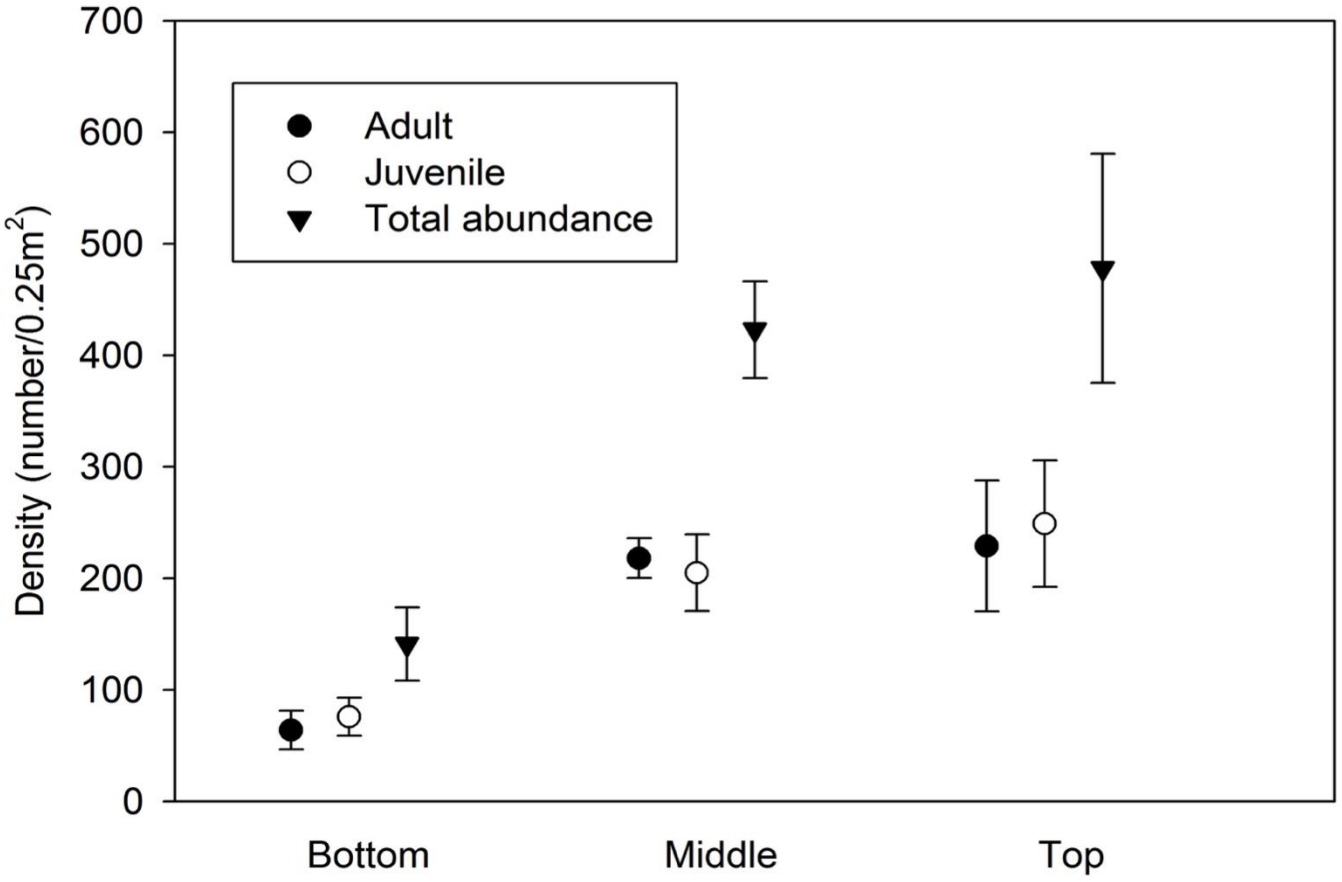

100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percent of tiles
reef
mangrove
no barnacles
low barnacles
medium barnacles
high barnacles

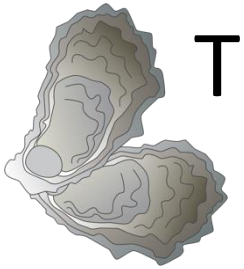

1200
1000
800
600
400
200
0
Density (number/0.25 m2)
Reefs
Mangroves
Adults
Juveniles
Total

Density of oysters was lower at lower intertidal zones of reefs

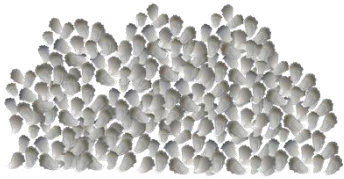


$F_{2,24} = 6.21$, $p = 0.001$

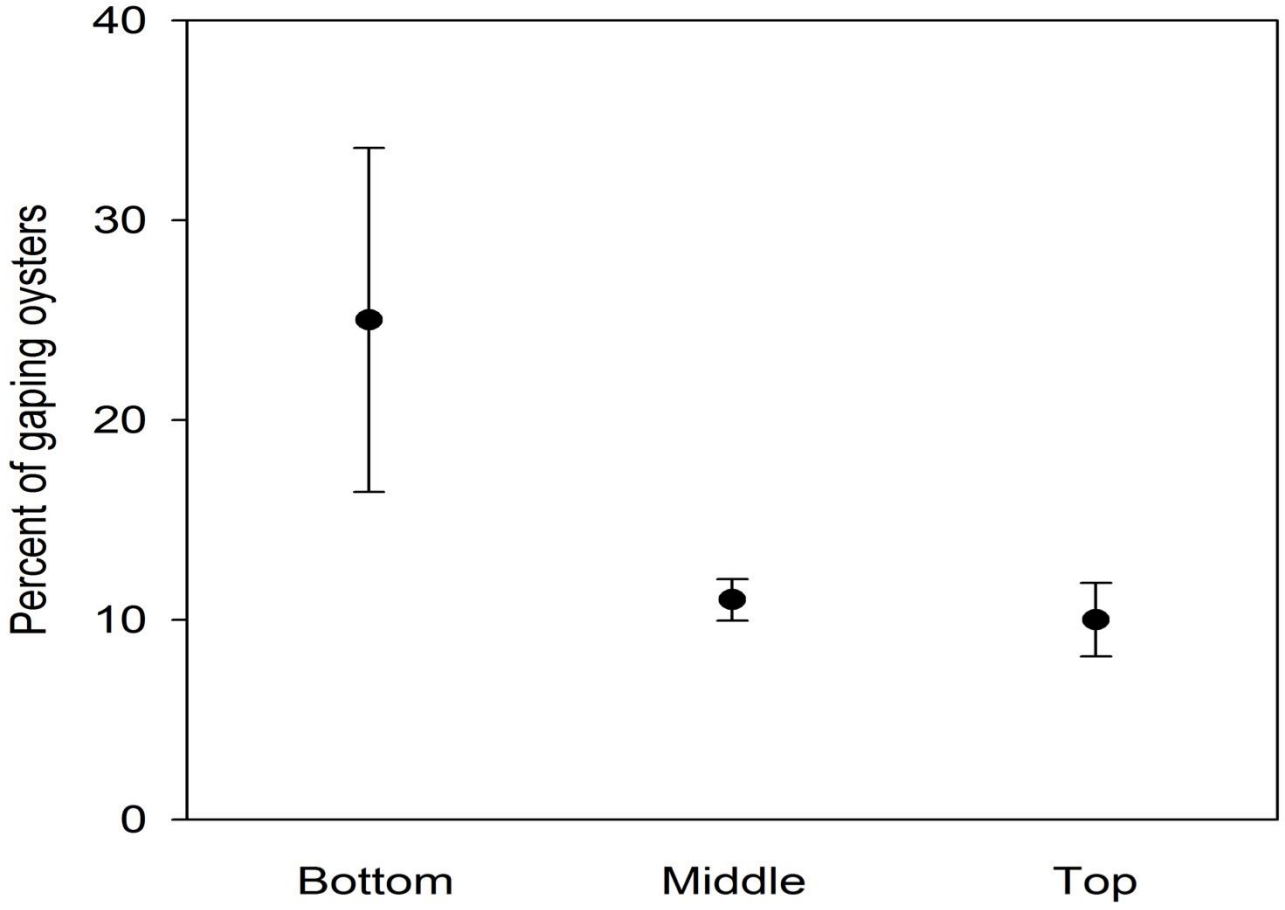


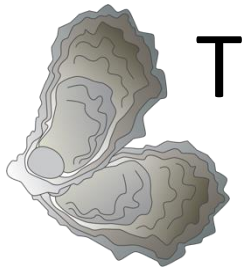


The percent of gapers seemed higher and more variable at the bottom zone



$F_{2,24} = 15.23$, $p = 0.091$





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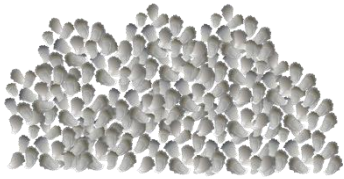

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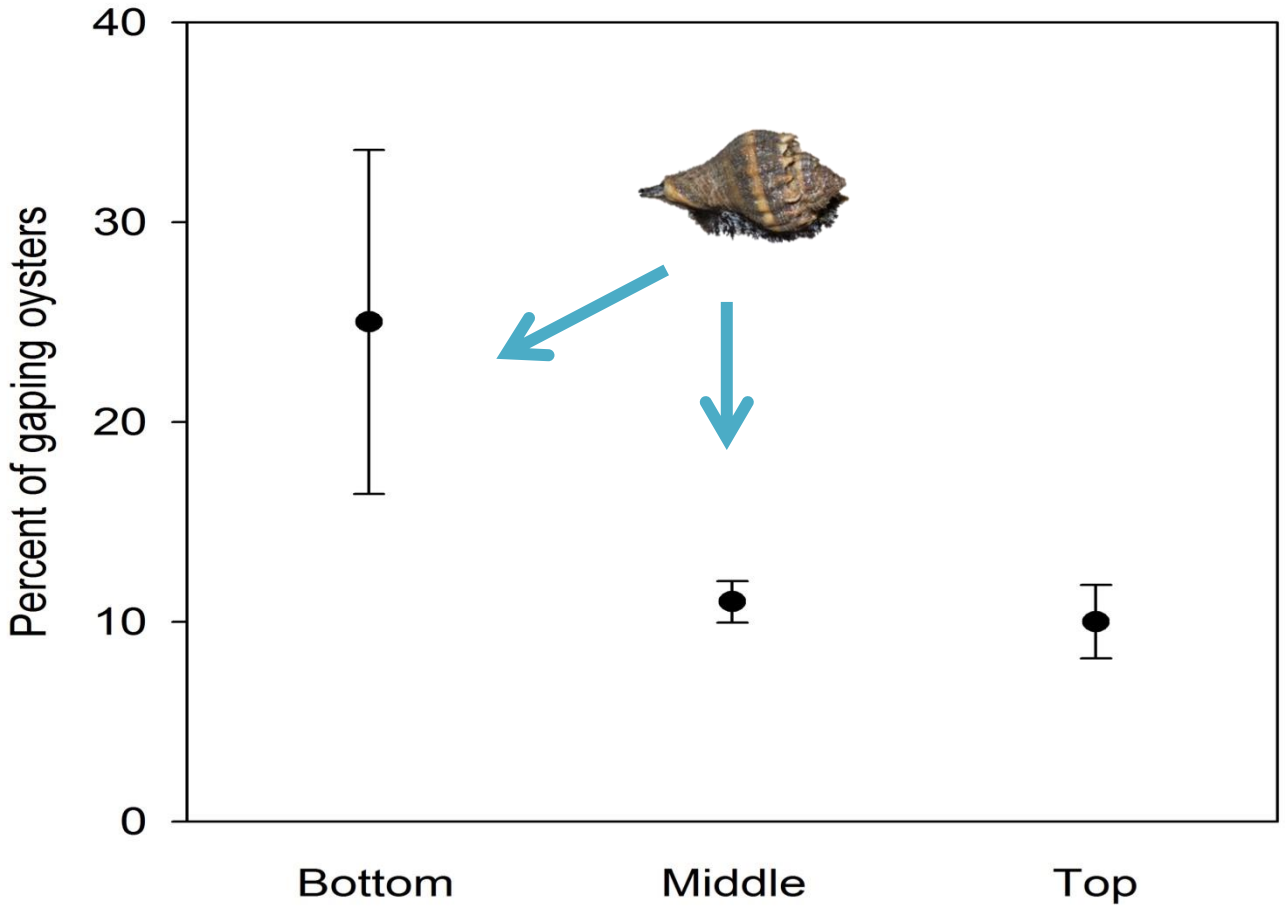
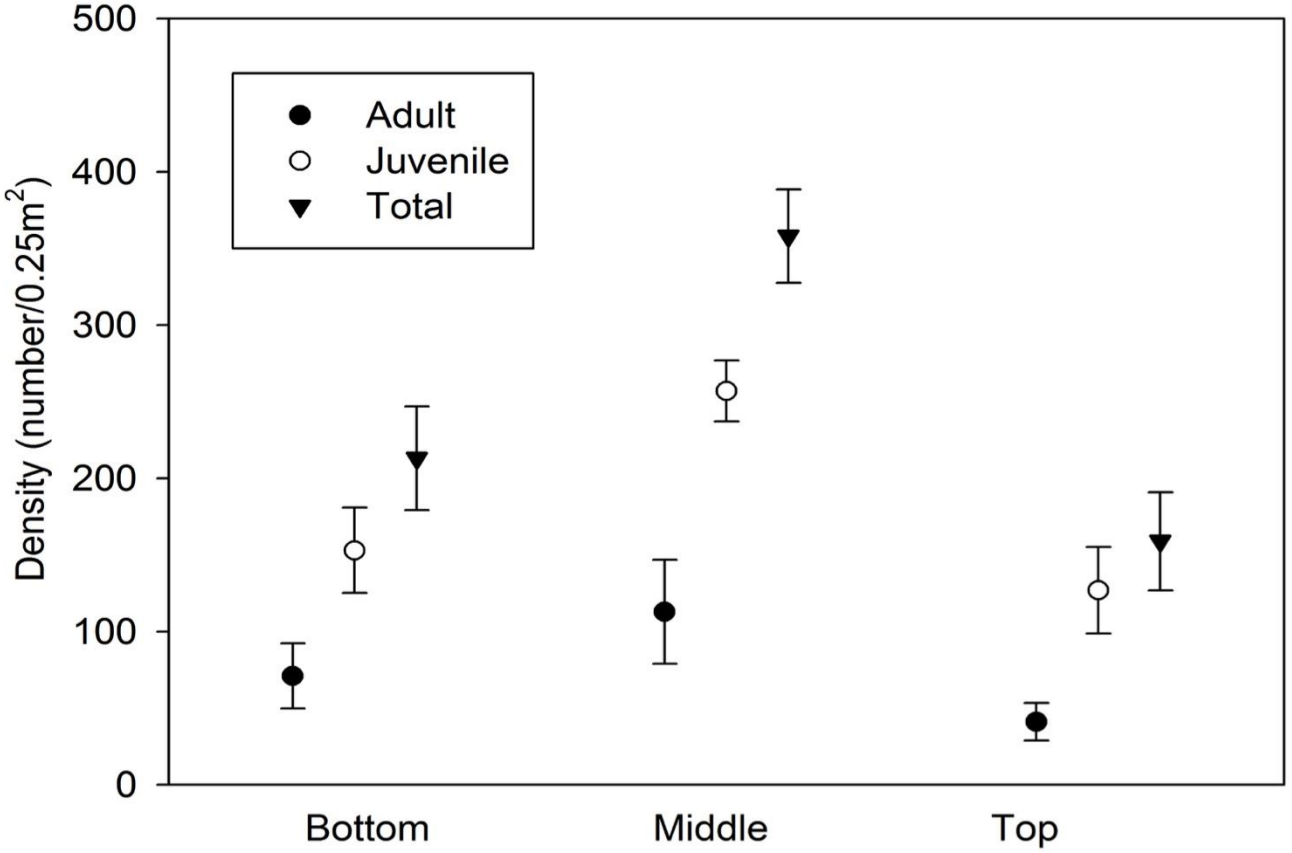
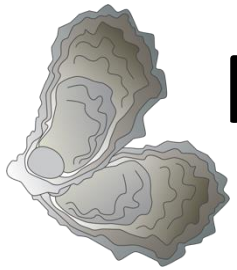


Oyster density was lower at the lower and higher intertidal zones the prop roots

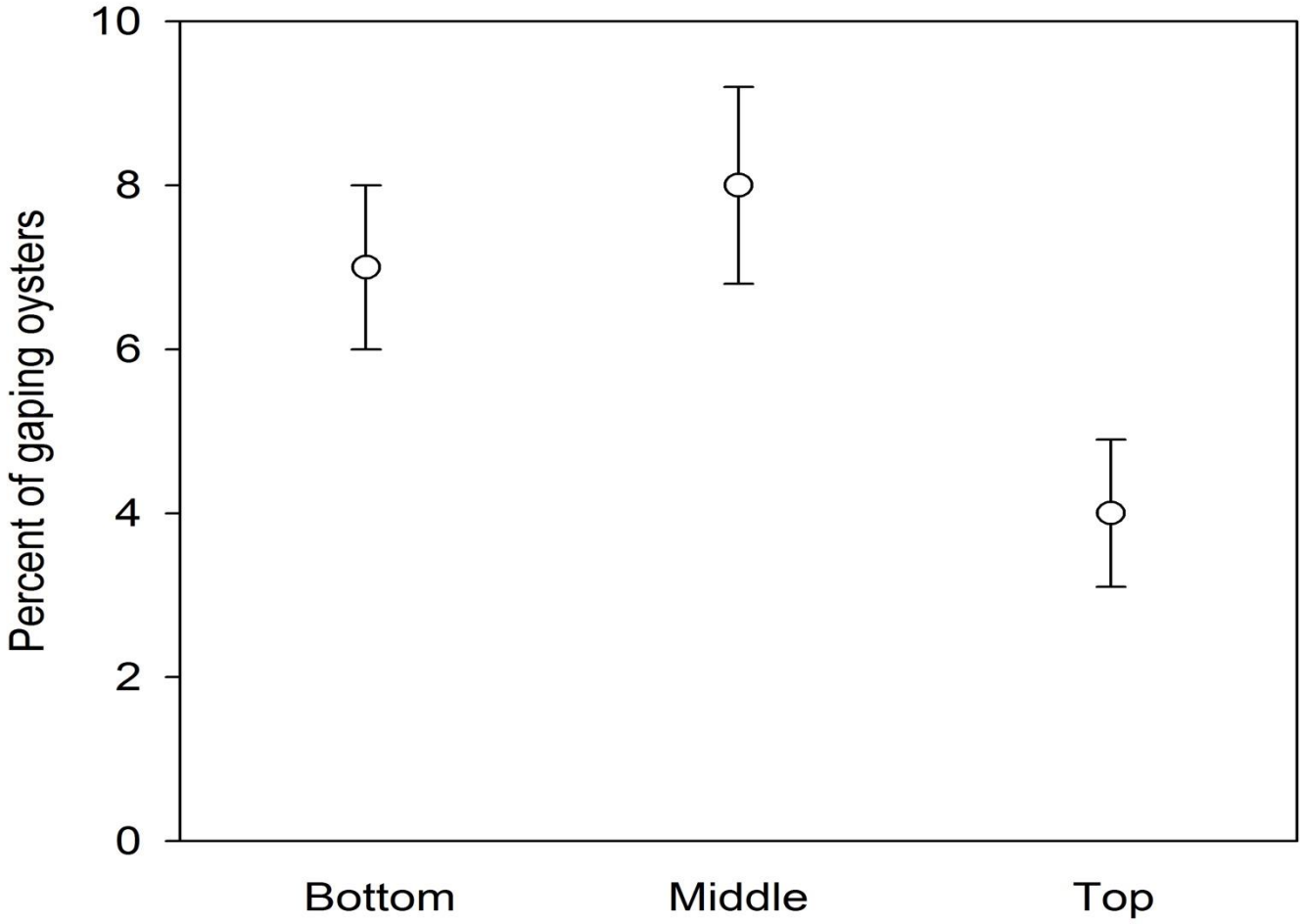
$F_{2,30} = 2.88$, $p = 0.011$



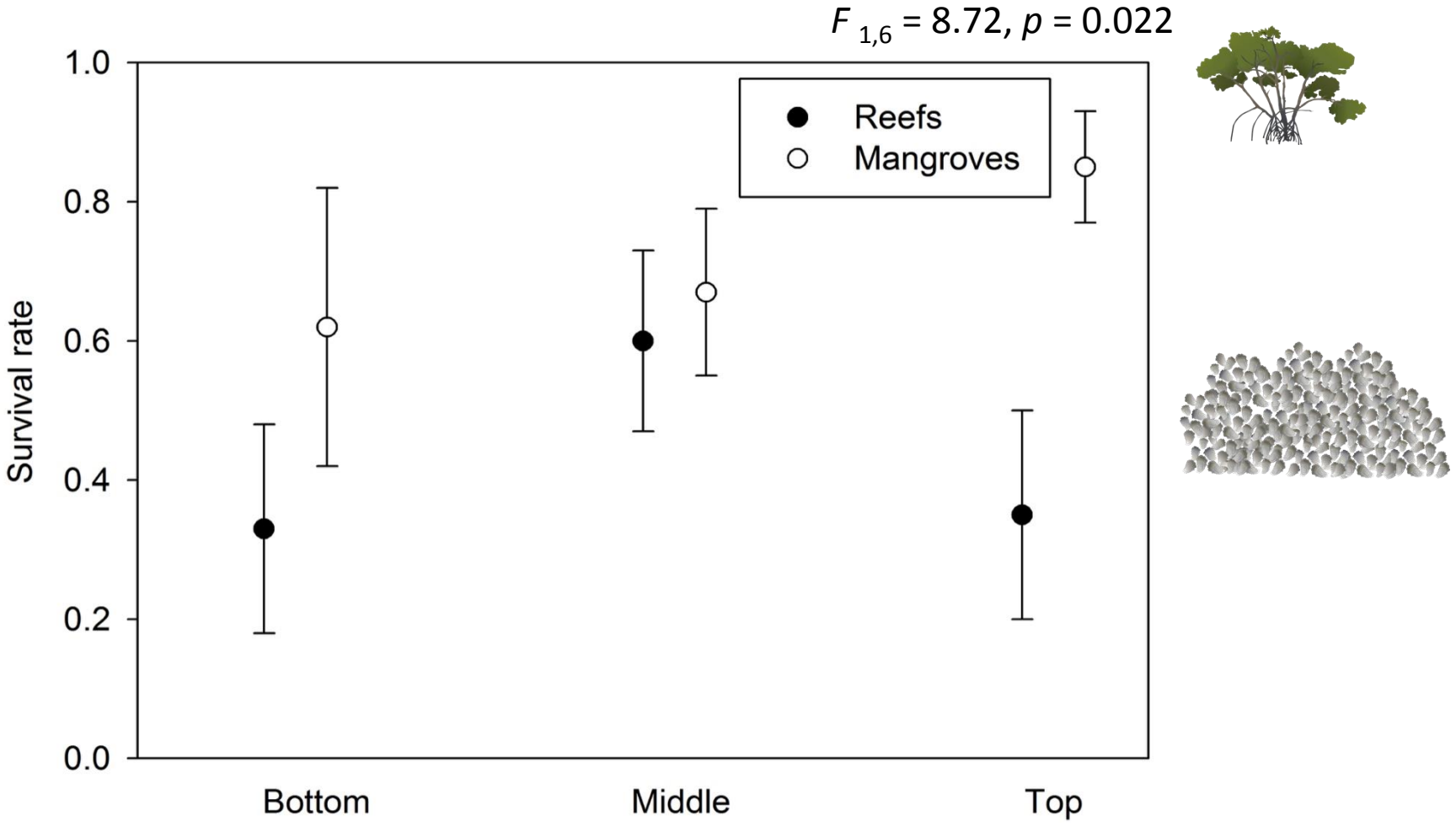


Percent of gapers was lower at the higher intertidal on prop roots

$F_{2,30} = 2.15$, $p = 0.056$



Survival rates were generally similar, but were higher at the higher intertidal on pop roots



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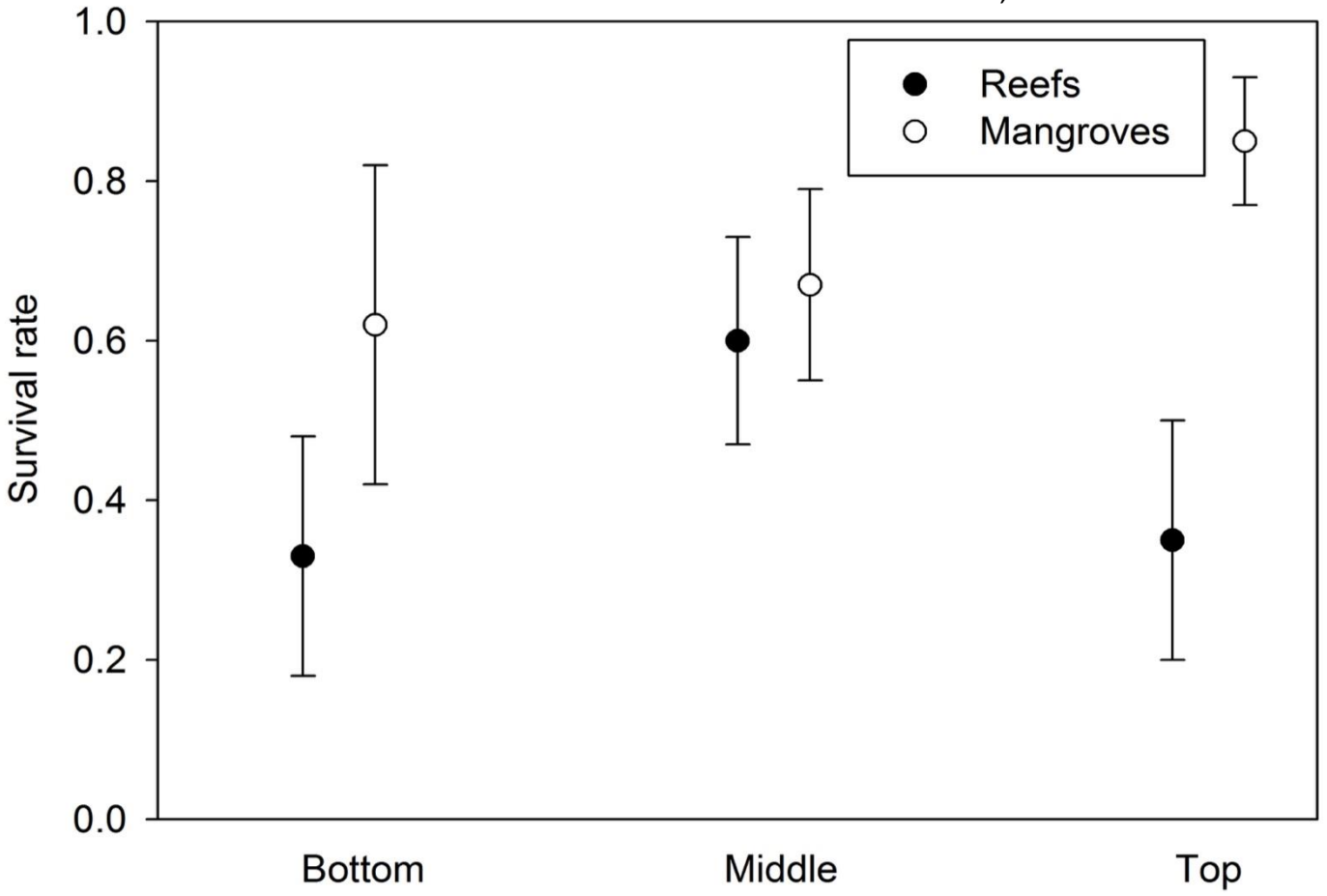
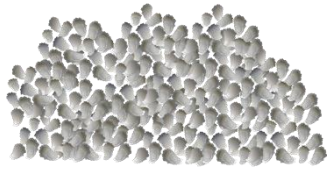
$F_{1,6} = 8.72$, $p = 0.022$



~13% water loss

~2.9hrs emersion



~22% water loss

~4.3hrs emersion

Tampa Bay study - summary

- There are oyster demographic patterns of zonation along the intertidal zone.
- These patterns can be influenced by the presence of Red Mangroves.
- Mangroves positively influenced oysters.
  - Predation refuge
  - Desiccation stress refuge

Implications and future directions

- Red Mangroves could serve as a potential refuge for oysters in the face of climate change.

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  - Structural threshold
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- Red Mangroves could serve as a potential refuge for oysters in the face of climate change.
- Further studies are in need to separate structural complexity versus canopy effect.
  - Structural threshold
  - Canopy size
- Results could be used in living shoreline projects.

Immensely thankful!

- Committee members
- Fish Ecology Lab members
- Numerous field assistants