

Energetic consequences of inducible defenses to invasive green crab (*Carcinus maenas*) predation in blue mussels (*Mytilus edulis*)

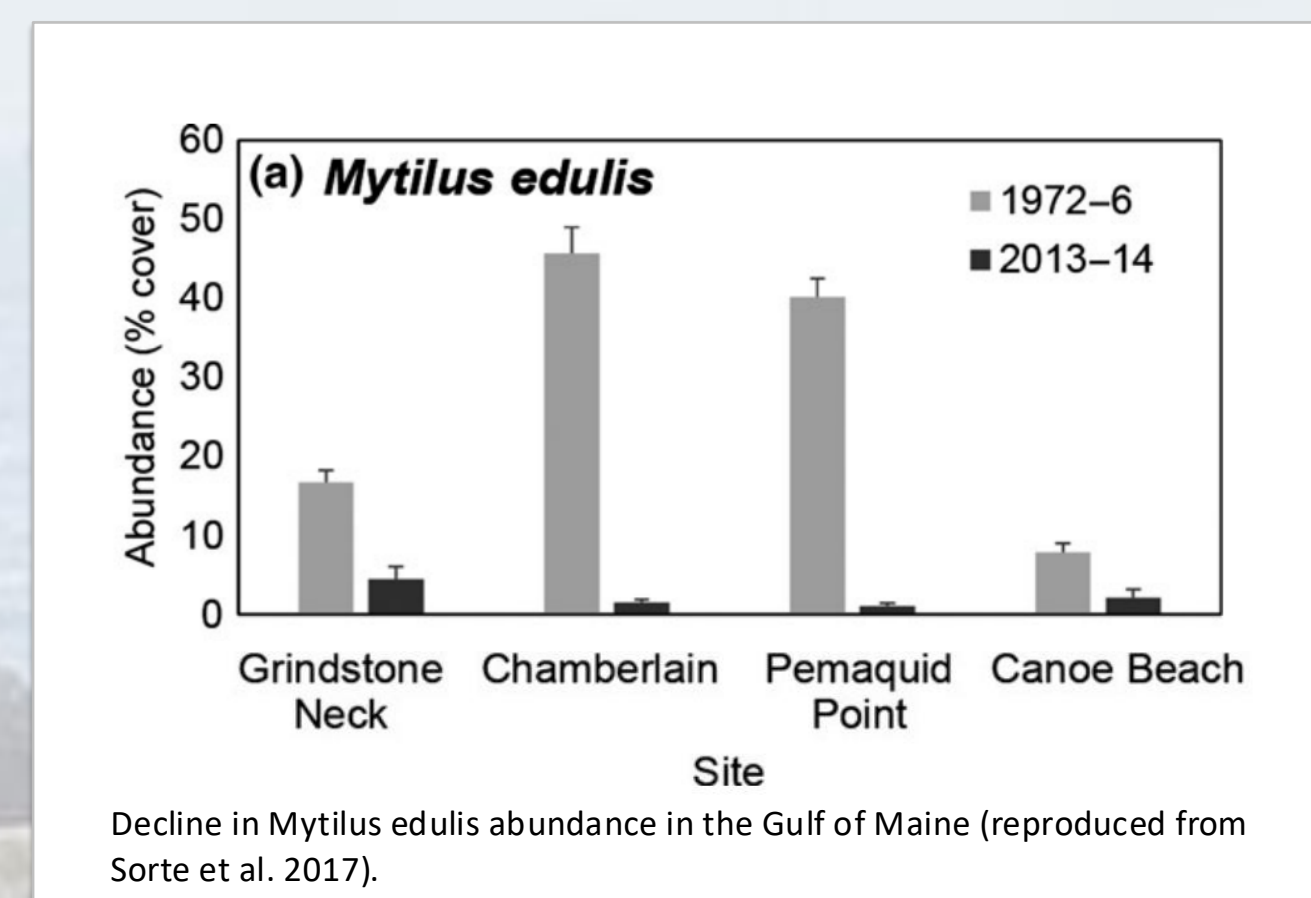


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Blue Mussels are Facing a Variety of Threats

- o Foundation species declined >60% in the Gulf of Maine
- o Inducible defenses differ by predator (shell vs. muscle)
- o These defenses are energetically costly



Mussels from High Crab Sites Had Thicker Shells And Stronger Adductor Muscles

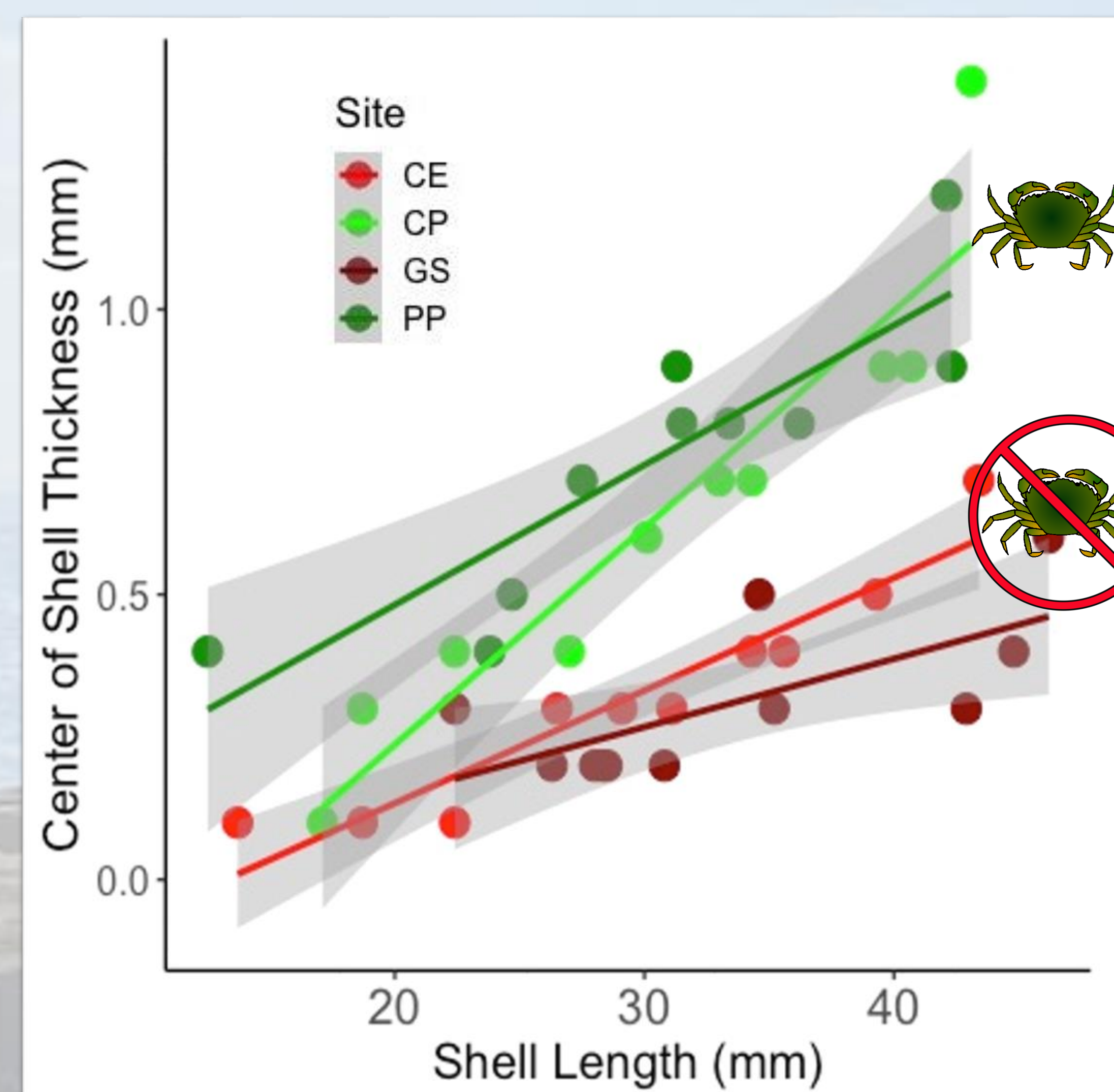


Figure 1. Center of shell thickness versus shell length for *M. edulis*. Lines of best fit and SE around lines shown for each site. Colors of lines and circles indicate wave exposure: red - exposed, green - protected). N=10 mussels for each site.

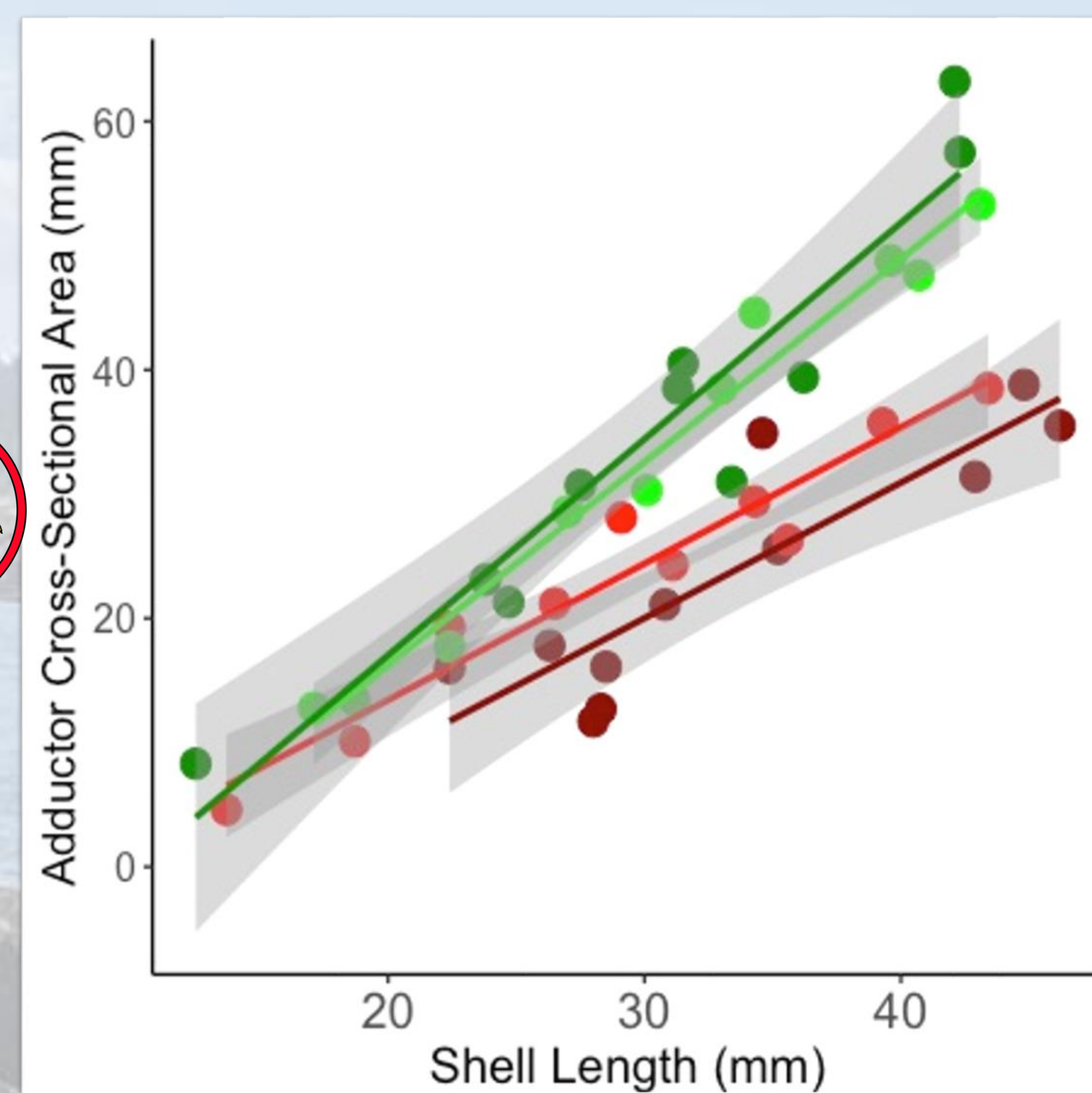


Figure 2. Adductor cross-sectional area versus shell length for *M. edulis*. Lines of best fit and SE around lines shown for each site. Colors of lines and circles indicate wave exposure: red - exposed, green - protected). N=10 mussels for each site.

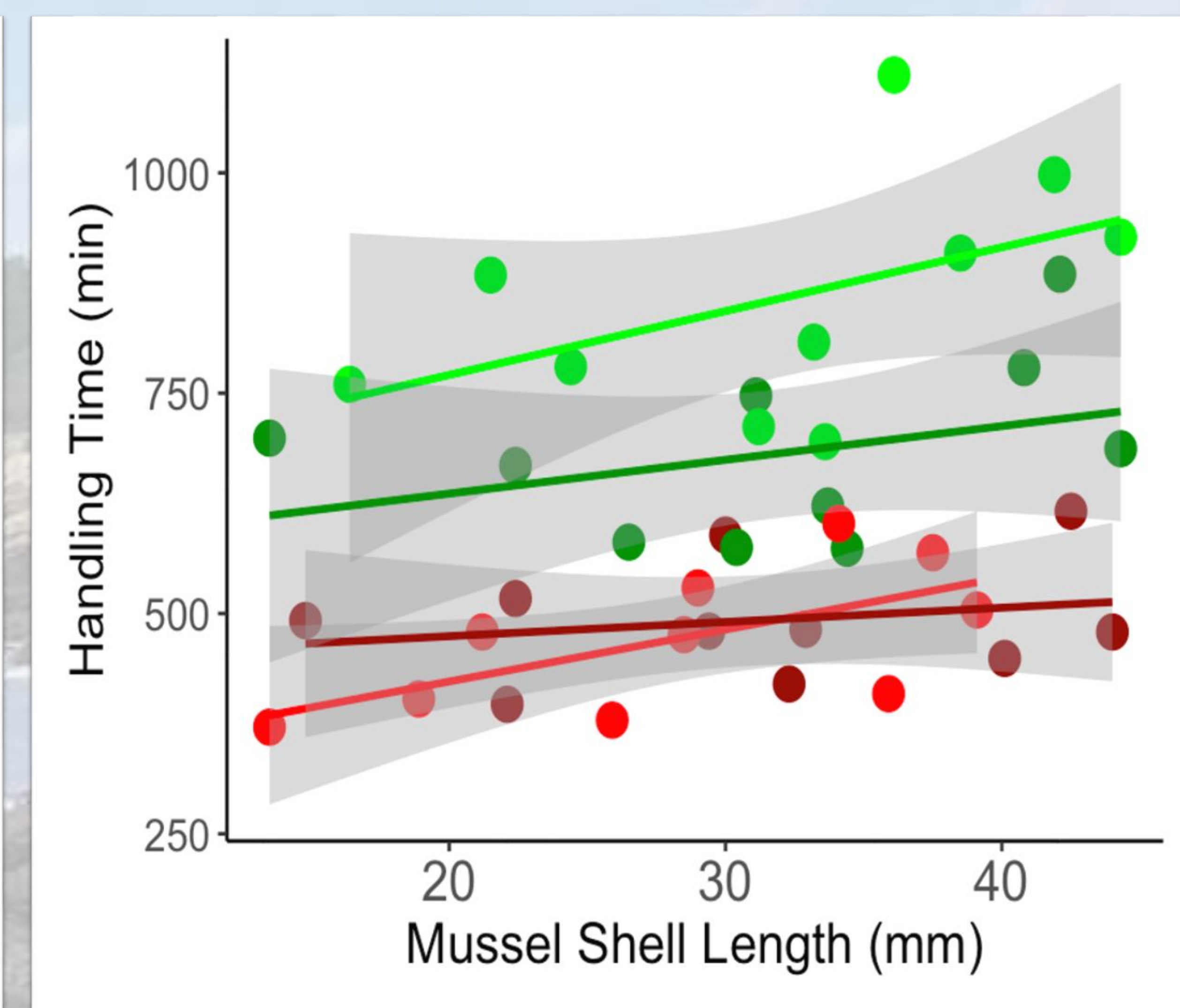


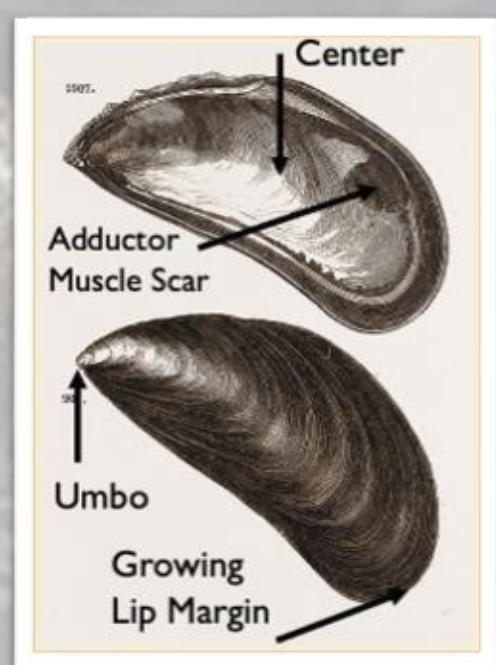
Figure 3. *A. forbesi* handling time of *M. edulis* versus mussel length. Lines of best fit and SE around lines shown for each site. Colors of lines and circles indicate wave exposure: red is wave exposed, green is wave protected). N=10 mussels for each site.

Where's the Tradeoff?

Collected mussels from sites of high and low crab predation



Measured shell thickness and adductor muscle cross-sectional area



Measured sea star handling time



No Tradeoff Between Defensive Traits

- o Green crab exposure drives coordinated increases in shell thickness and adductor muscle size.
- o No morphological tradeoff detected.
- o If defenses are energetically costly... where is the cost paid?

Is Reproduction Paying the Cost?

- o Plan to measure gonad size in mussels with induced defenses to green crabs
- o Will conduct two coordinating experiments:
 - o **Field:** Collect mussels with induced shell thickening, measure Gonadosomatic Index (GSI)
 - o **Lab:** Conduct downstream scent experiment with mussels and green crabs, measure altered defense morphology and GSI

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References

