

Background

- Leptasterias* spp. is a species complex of small, six rayed, predatory sea stars that inhabit rocky intertidal communities along the Pacific coast of North America¹.
- This species brood their young until they reach the juvenile state which leads to limited dispersal capabilities and may result in fine-scale local adaptation and speciation².
- Leptasterias* spp. are frequently found on both substrate subject to strong wave forces and in more protected pool habitats⁵.
- Previous studies have shown that *Leptasterias* spp. from differing microhabitats display variation in attachment strength and mobility. Stars from microhabitats with high wave impact tend to attach more strongly to substrate than stars in protected microhabitats³.
- Preliminary trials indicated a difference in prey choice between stars from microhabitats with different levels of wave impact.



Figure 1A. *Leptasterias* spp. Figure 1B. *Leptasterias* spp. Brooding its young

Objective

- Compare the prey choice of stars from different microhabitats.

Hypotheses

- Stars from wave impacted microhabitats will prefer sessile prey (mussels) due to star's more limited movement in wave impacted areas.
- Stars from protected microhabitats will prefer mobile prey (snails) due to greater star mobility.
- After feeding the stars a certain prey, they will show preference towards that specific prey over the other.

Collection Site

- Leptasterias* spp. were collected from inferred high and low wave impacted microhabitats at Palmer's Point in northern California.
- High wave impacted areas are characterized by the presence of Postelsia, mussels, and red algae as well as the location of the boulders (facing the waves).
- Low wave impacted areas are characterized by the presence of seagrass, brown algae, and the lack of water flow.

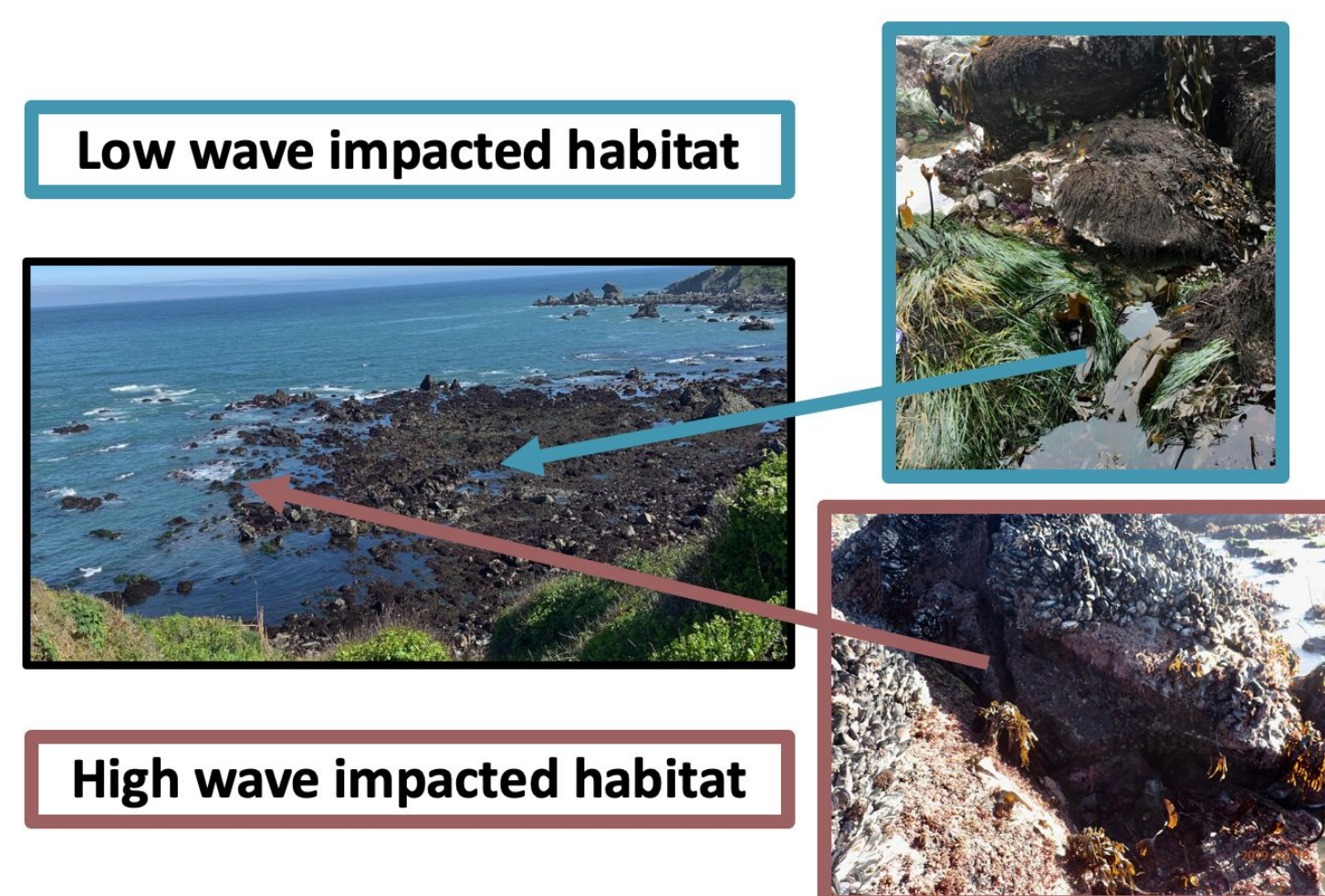


Figure 2. 41 stars were collected at Palmer's Point in northern California during June 2019.

Flume Tank

Two-Current Choice Flume

- A method used to measure preference avoidance responses of aquatic organisms to chemical cues.
- A two-current choice flume is a tank that creates and maintains two separate laminar currents with cues distributed evenly within each current.
- Two-current flume tank adapted from Jutfelt et al. (2017) for the size and crawl range of *Leptasterias* spp.
- Tank dimensions 96 x 22 cm

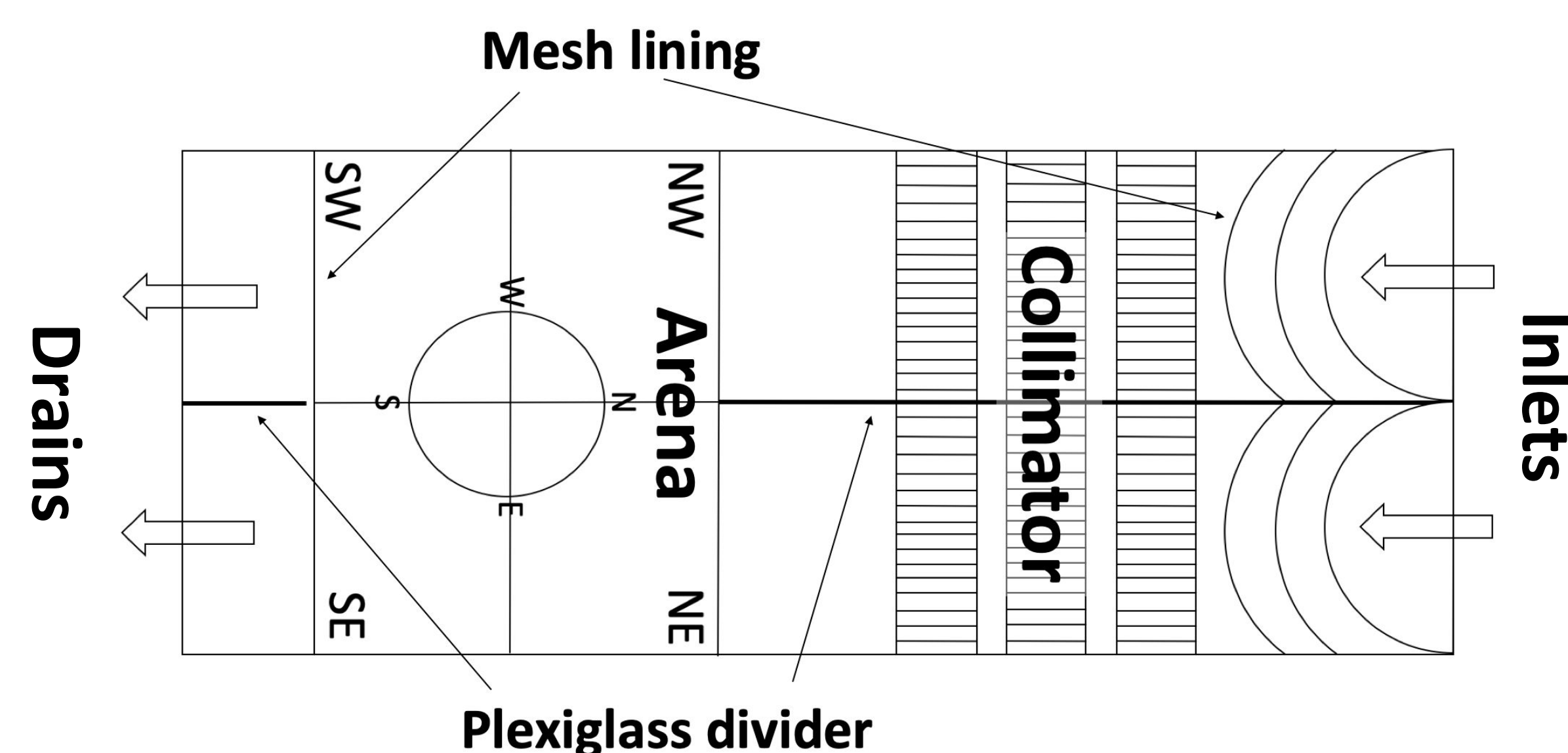


Figure 3. Overhead view of flume tank. Mesh and Honeycomb panel components are used for the dispersal and delineation of flow.

Experiment

Binary Prey Choice Experiment

- Stars were starved for two weeks prior to running prey choice trials.
- Common prey of *Leptasterias* was placed in two header tanks, from which sea water flowed into a choice arena.
 - Prey used in this experiment were snails, *Tegula funebris*, and mussels, *Mytilus californianus*, both collected from Rockaway Beach in Pacifica, CA.
- Water flowing out of the tank was filtered and recirculated back to the header tanks.
- Star activity and choice behavior was observed via time lapse photography, with one image captured every 10 seconds.
- Between each individual trial, inlet valves carrying water from header tanks were alternated to minimize side bias.
- This experiment was conducted in the dark, using a red light to illuminate recording because *Leptasterias* spp. is known to be photogenative and forage more frequently at night⁴.
- 4 separate treatments were conducted:

No prey			
vs.	vs.	vs.	vs.
No prey	No prey	No prey	

Binary Prey Choice Results

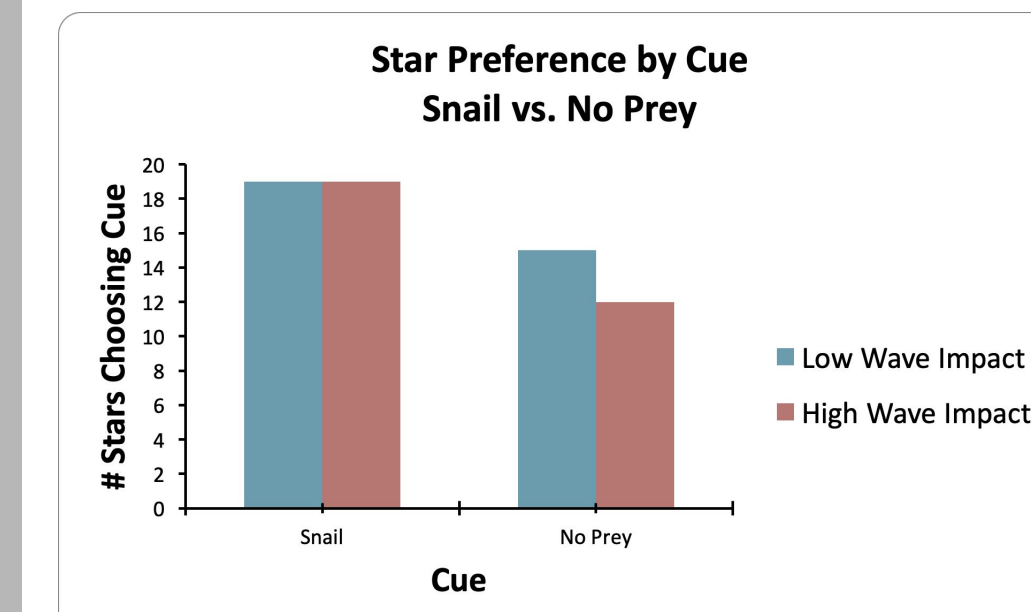


Figure 4. P-value with Yates correction: 0.6098
Stars showed slight preference towards snail cue however, results were not significant. (n=41, high wave impact 20, low wave impact 21)

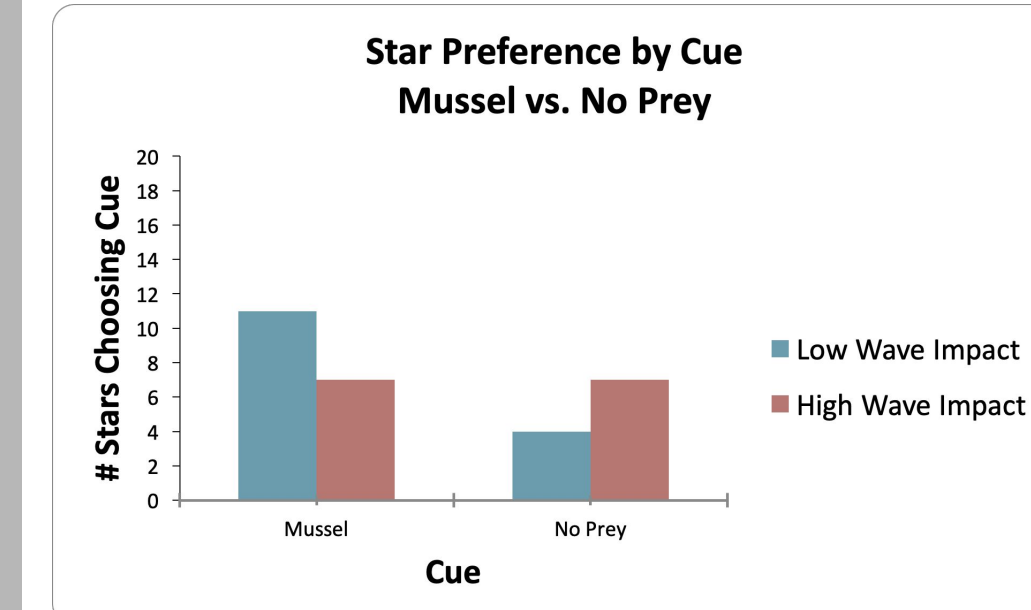


Figure 5. P-value with Yates correction: 0.4360
Low wave impact stars showed slight preference towards mussel cue. High wave impact stars did not. (n=30, high wave impact 14, low wave impact 16)

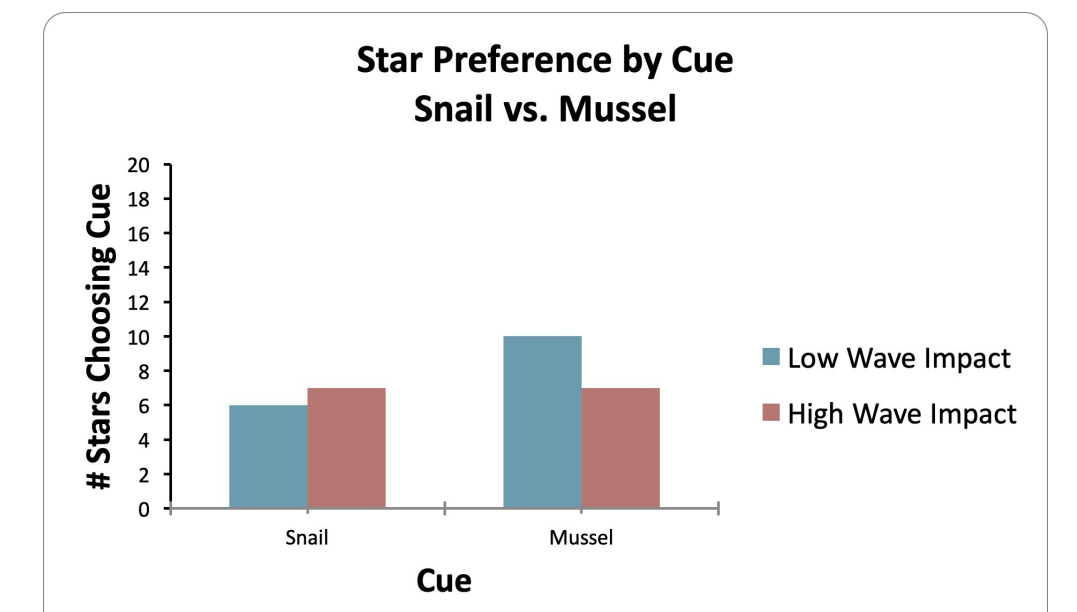


Figure 6. P-value with Yates correction: 0.1781
Low wave impact stars showed slight preference towards mussel cue. High wave impacted stars did not. (n=31, high wave impact 15, low wave impact 16)

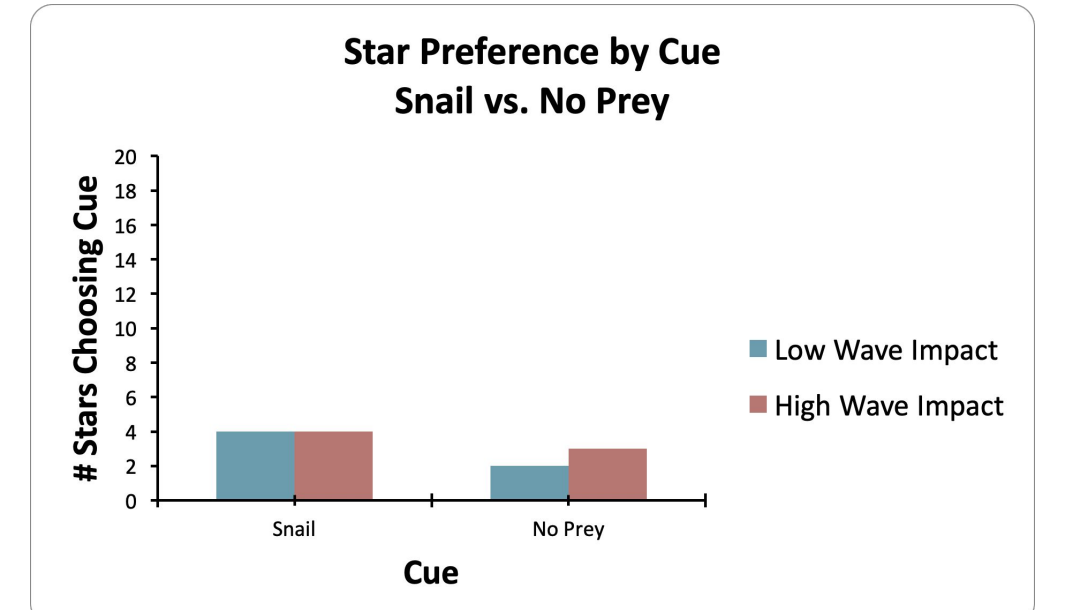


Figure 7. P-value with Yates correction: 0.4986
Stars showed slight preference towards snail cue. Results were not significant. (n=13, high wave impact 7, low wave impact 6)

Discussion

- Although not significant, high wave impact stars picked more mussels in both mussel vs. no prey and mussel vs. snail trials than the no prey vs snail trial,
 - Data was analyzed using chi square with Yates correction for small sample size.
- The results were not consistent with preliminary data.
- Confounding variables and external factors:
 - Although stars from different microhabitats did not exhibit difference prey preferences, further genetic analysis is needed to compare preference among clades.
 - Chemoreception may not be a primary method of foraging in *Leptasterias* spp.⁴
 - Stress in the lab environment (heat stress, bay contamination) could have affected foraging ability (find source about effect of stress on echinoderm behavior).

References

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