

# Abundance of Crabs and Predation on *Hemigrapsis oregonensis* in

## Tiscornia Marsh, San Francisco Bay

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### Introduction

*Hemigrapsis oregonensis* is a native shore crab found in the San Francisco Bay.

Commonly found in the rocky intertidal, these habitats provide protection against desiccation and temperature changes.

Other crabs, birds, rodents, and sharks pose direct threat to the native species, as both a predator as well as a competitor for food and shelter. (Jensen 2002)



Figure 1. *H. oregonensis*

### Methods

#### Habitat Types

- Habitat descriptions are for the 1 meter radius around the pole
- Habitat comparisons were tested for each response variable using a generalized linear model with binomial errors

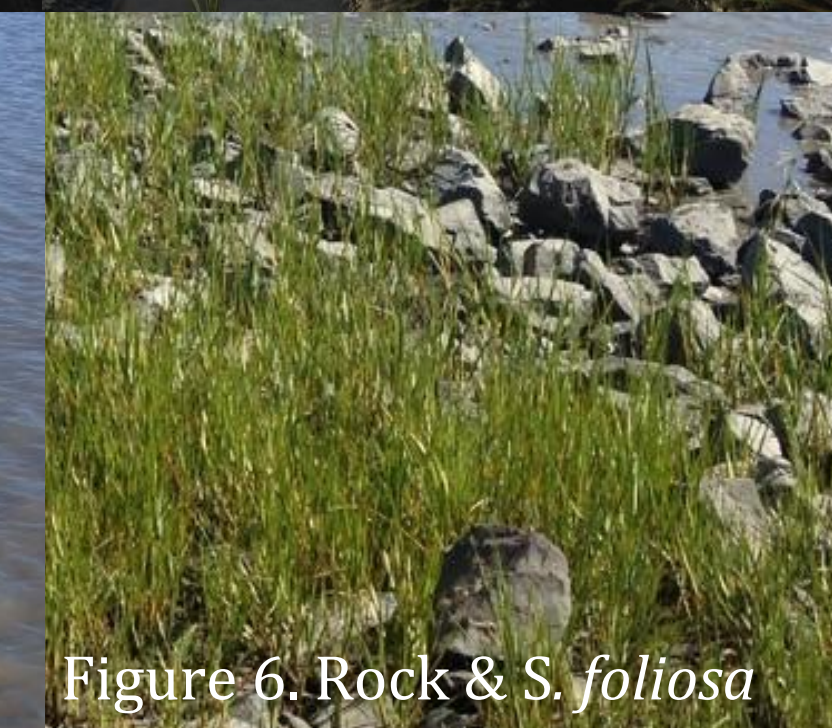


Figure 5. Rock

Figure 6. Rock & *S. foliosa*

#### Abundance

- 10 alternating collapsible and minnow traps ~ 5 meters apart
- crabs collected after 24 hours
- repeated 3 times
- total of 30 traps at each habitat



Figure 9. minnow trap



Figure 10. collapsible trap

#### Predation

- 10 *H. oregonensis* tethered with ~1 meter of fishing line ~ 5 meters apart
- 24 hour trials
- Repeated twice
- Total of 20 tethers at each habitat

Figure 7. *H. oregonensis* with tether

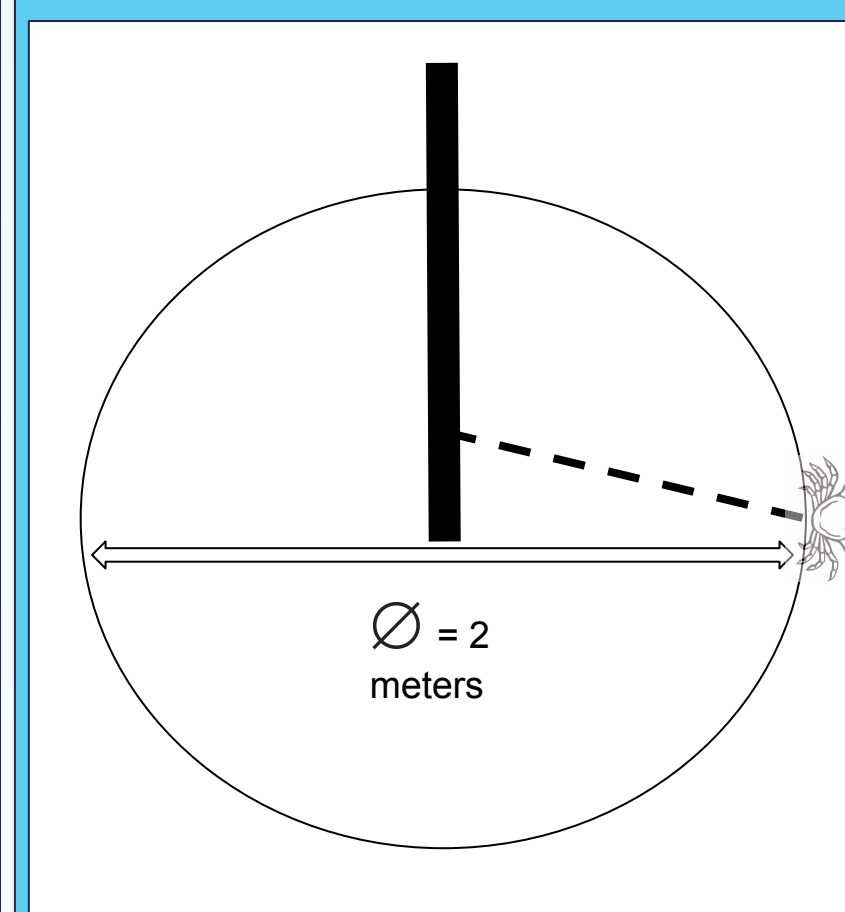


Figure 8. diagram of tether used during the experiment

### Results

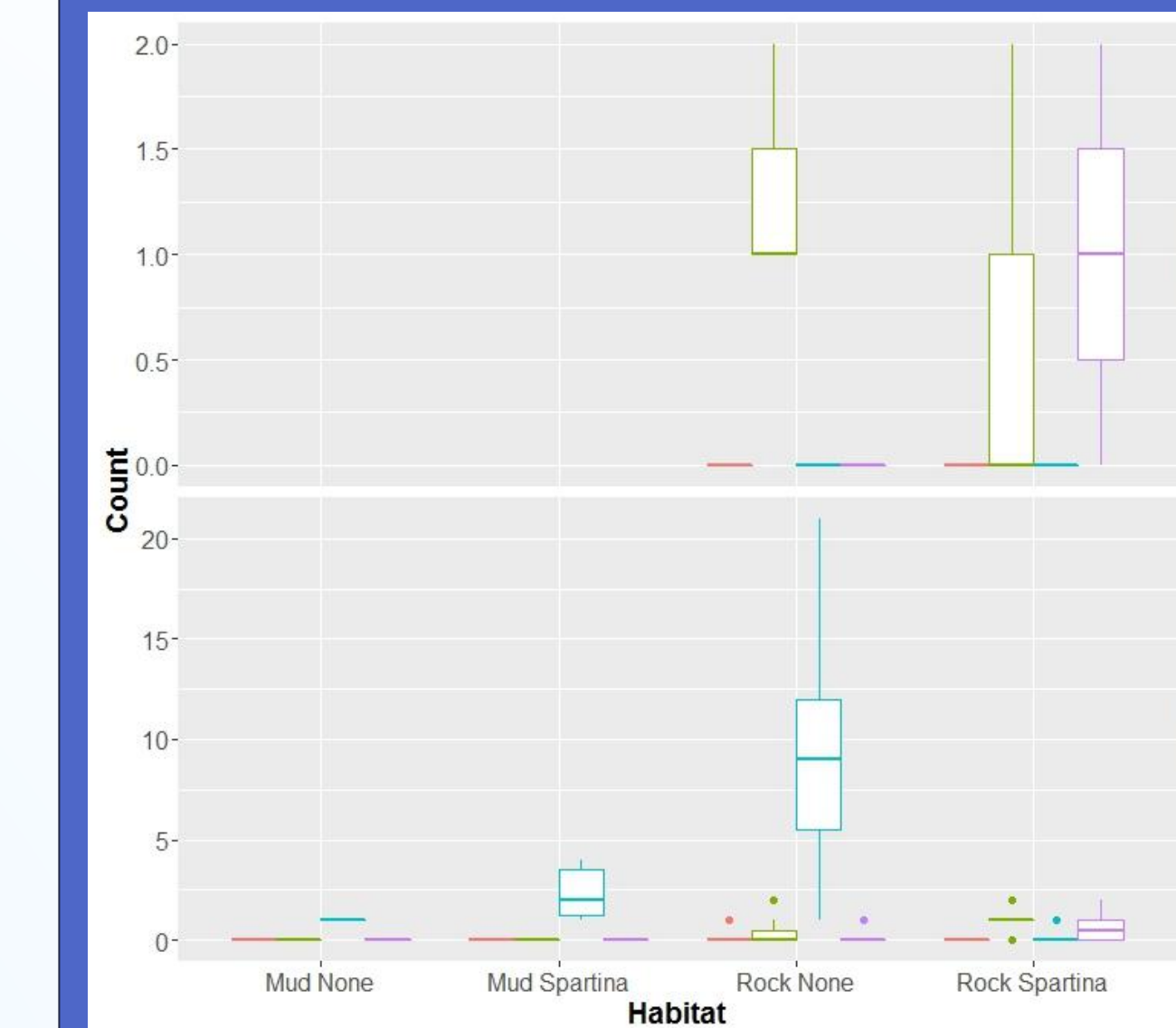


Figure 11. Abundance of crabs by trap type in Tiscornia Marsh

#### Abundance

- Results support the hypothesis.
- Rock had the largest abundance of crabs ( $p=0.03$ , GLM) followed by rock and *S. foliosa* ( $p=0.6$ , GLM)
- Trap types captured different abundances; collapsible traps caught no crabs in the mud habitat types

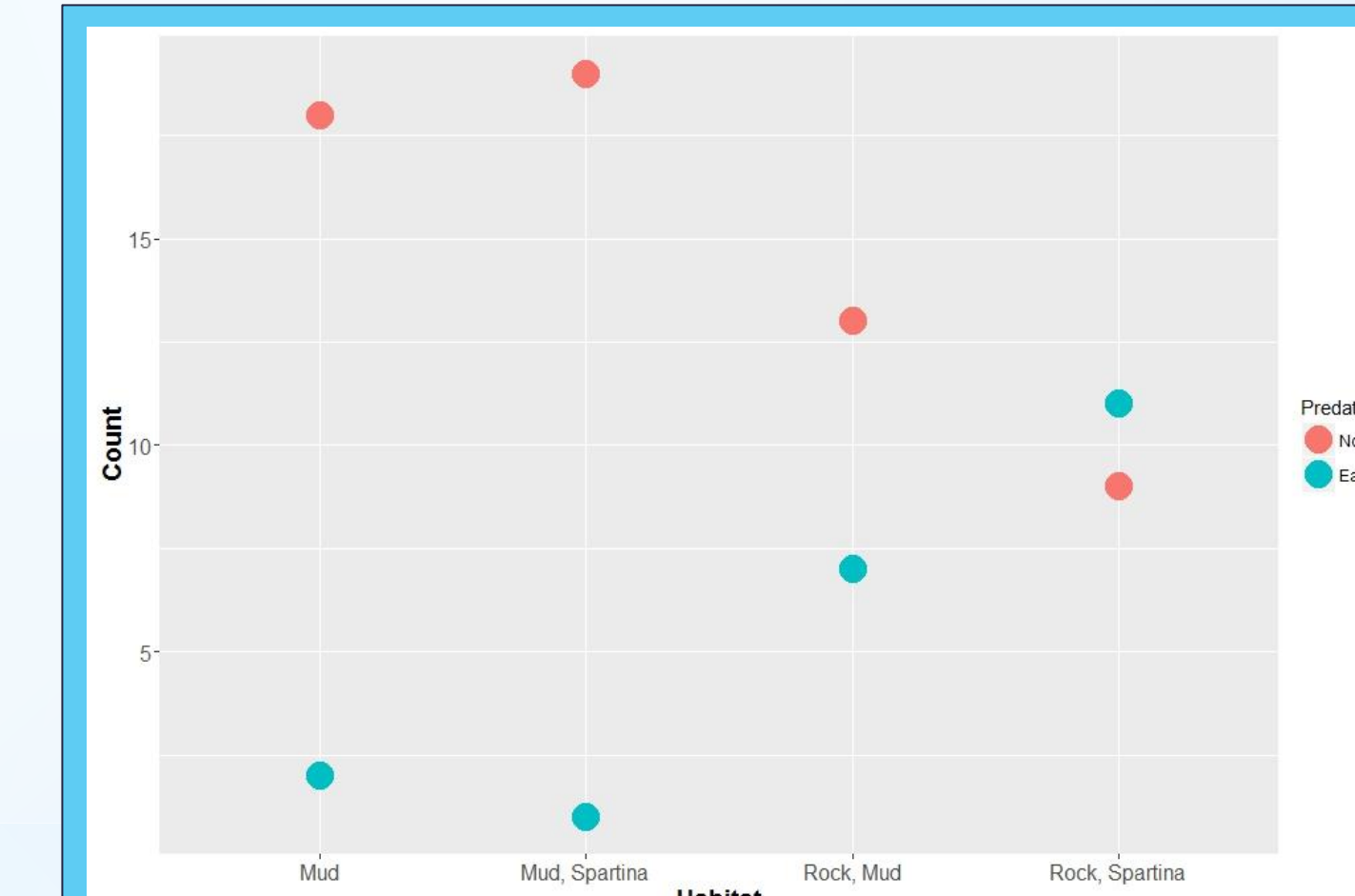


Figure 12. Predation rates in the 4 habitats of Tiscornia Marsh

#### Predation

- Results do not support the hypothesis.
- Rock and *S. foliosa* habitat had the highest predation rate and mud the lowest ( $p<0.01$ , GLM).

### Discussion

- Largest abundance of *H. oregonensis* was found in the habitats with some rock
- Predation risk can help to explain why *H. oregonensis* is found in the rock with no vegetation
- Predator of *H. oregonensis* unknown
- Crabs were still being eaten even if they were hiding under rocks

#### Further research:

- Another experiment including mesh to prevent crabs from burrowing into the mud
- More research to determine if the distribution of *H. oregonensis* is due to the presence of *Spartina foliosa*, predators, or another factor

### Research Questions

Between the four habitat types in Tiscornia Marsh:

- Will there be a difference in abundance of crabs?
- Will there be a difference in predation of *H. oregonensis*?



Figure 2. Map of San Francisco Bay, red star indicates the location of Tiscornia Marsh

### Hypotheses

#### 1. Abundance

rock = rock & *S. foliosa* > mud & *S. foliosa* > mud

#### 2. Predation

mud > mud & *S. foliosa* > rock = rock & *S. foliosa*

### References

Jensen, G., McDonald, P., & Armstrong, D. (2002). East meets west: Competitive interactions between green crab *Carcinus maenas*, and native and introduced shore crab *Hemigrapsus* spp. *Marine Ecology Progress Series Mar. Ecol. Prog. Ser.*, 225, 251-262. doi:10.3354/meps225251

Willason, S.W. *Mar. Biol.* (1981) 64: 125. doi:10.1007/BF00397101

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