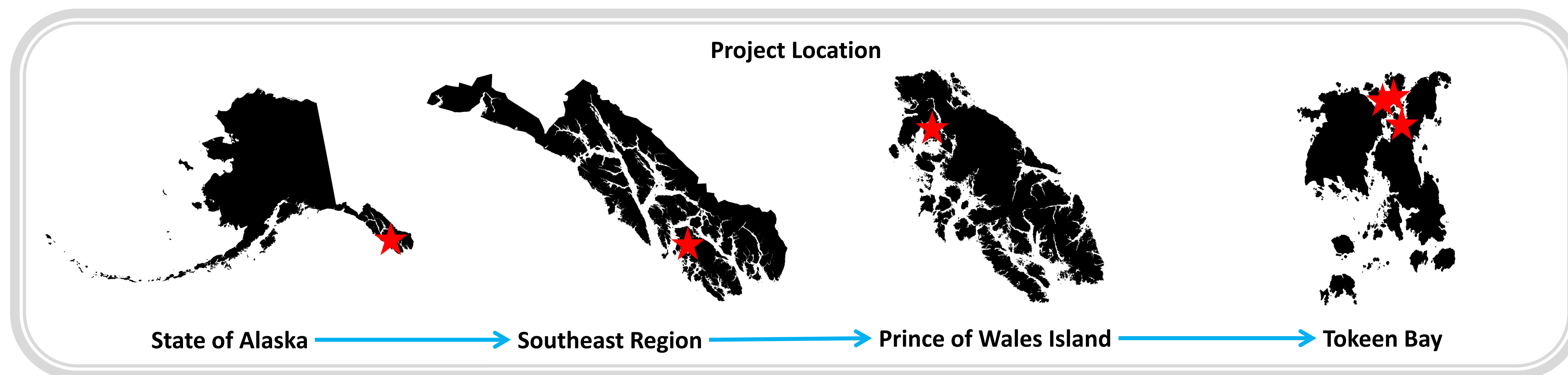


# EFFECTS OF PREDATOR EXCLUSION NETTING ON THE SURVIVAL AND GROWTH OF LITTLENECK CLAMS IN TOKEEN BAY ALASKA



## Introduction

From 2009 to 2013, the Alaska Department of Fish and Game Mariculture Program worked with the University of Alaska Fairbanks Sea Grant Marine Advisory Program to conduct a survival and growth experiment on littleneck clams (*Protothaca staminea*) in Tokenen Bay, southeast Alaska. Three areas of intertidal shoreline, within a permitted mariculture site, were manipulated with juvenile littleneck clam seed and predator exclusion netting to determine the effects of protection on the survival and growth of littleneck clams. Predator exclusion netting is frequently used by mariculturists in Alaska but, has not been thoroughly vetted as a production enhancing technique.

## Methods

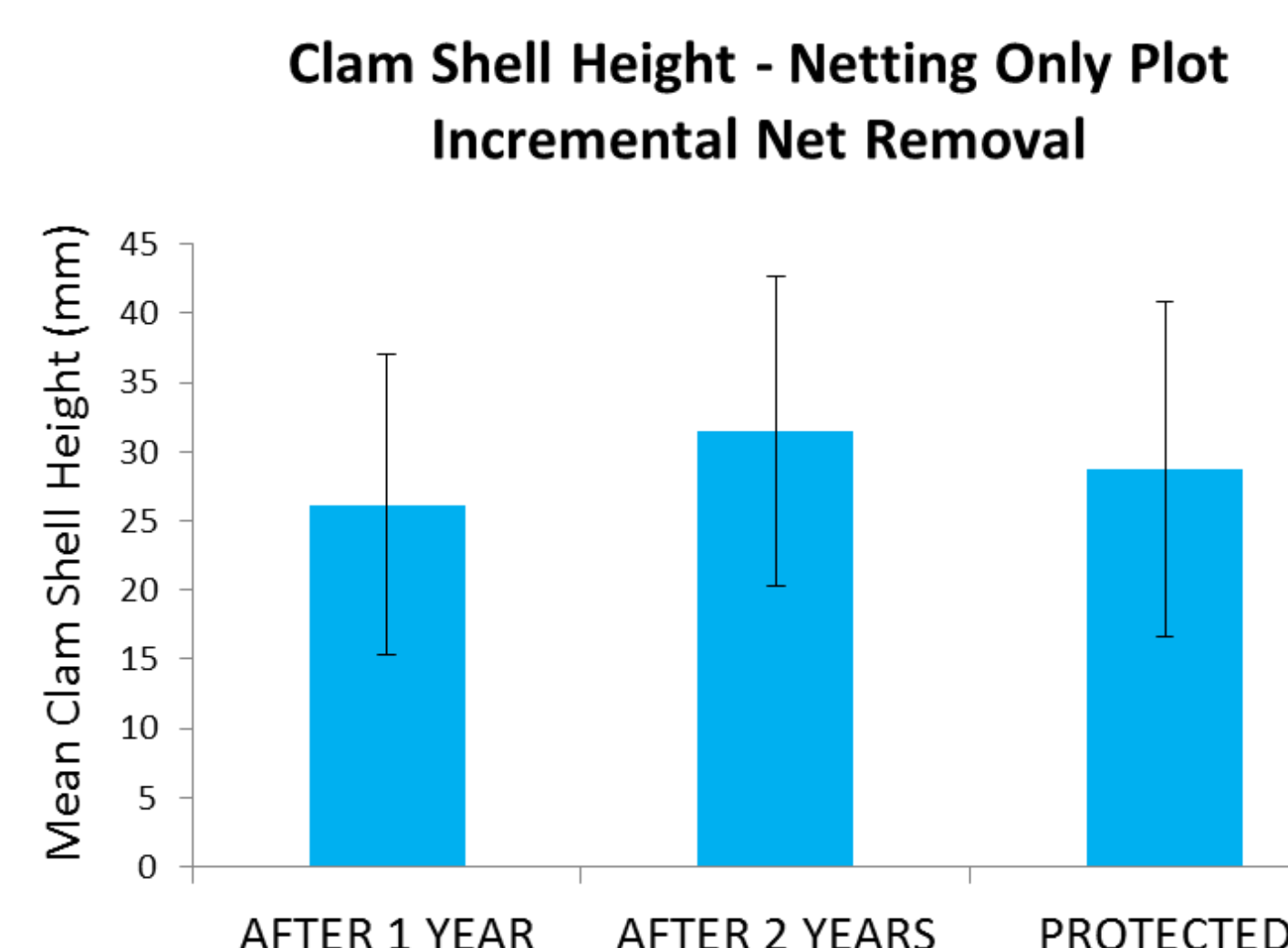
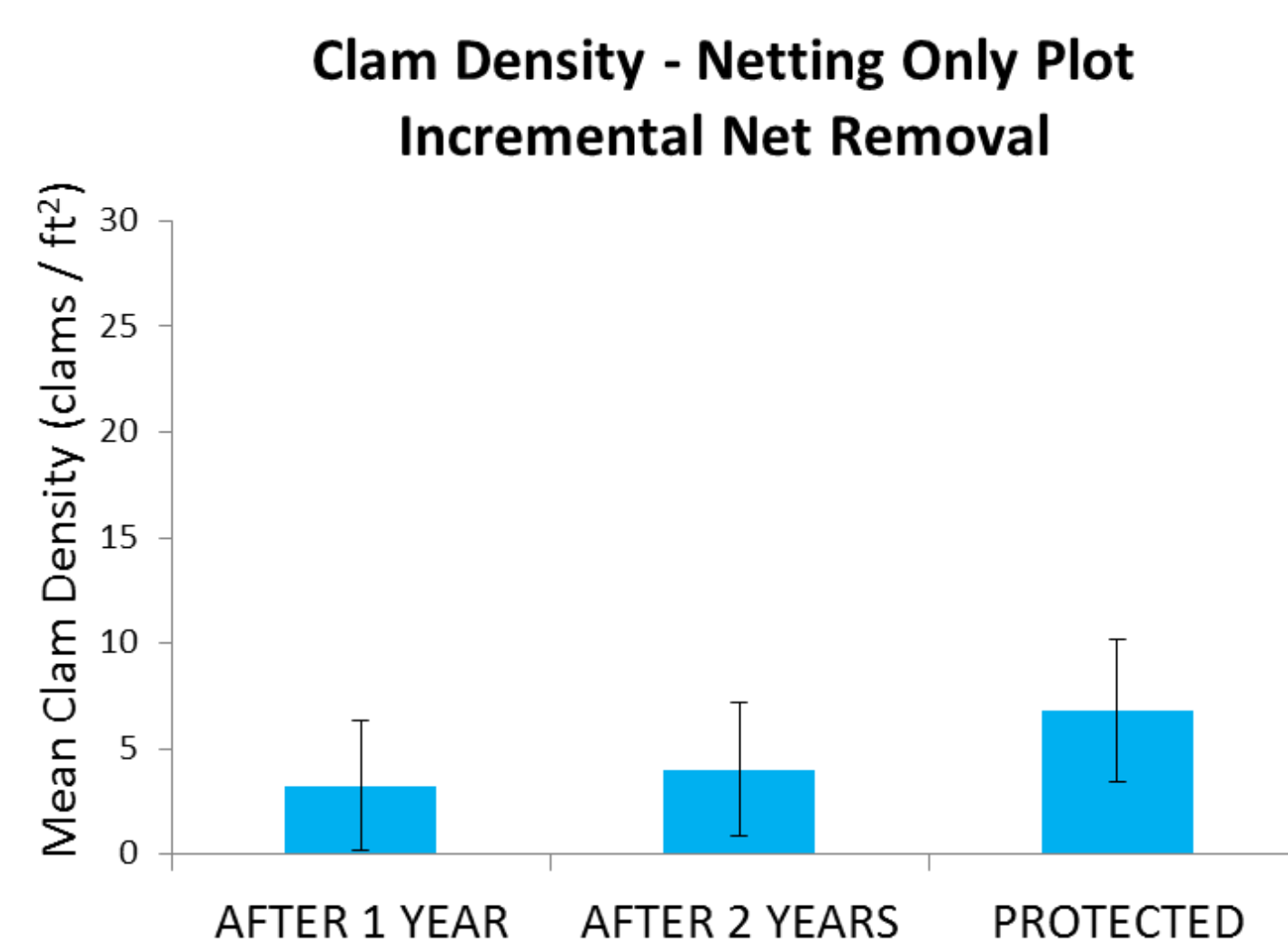
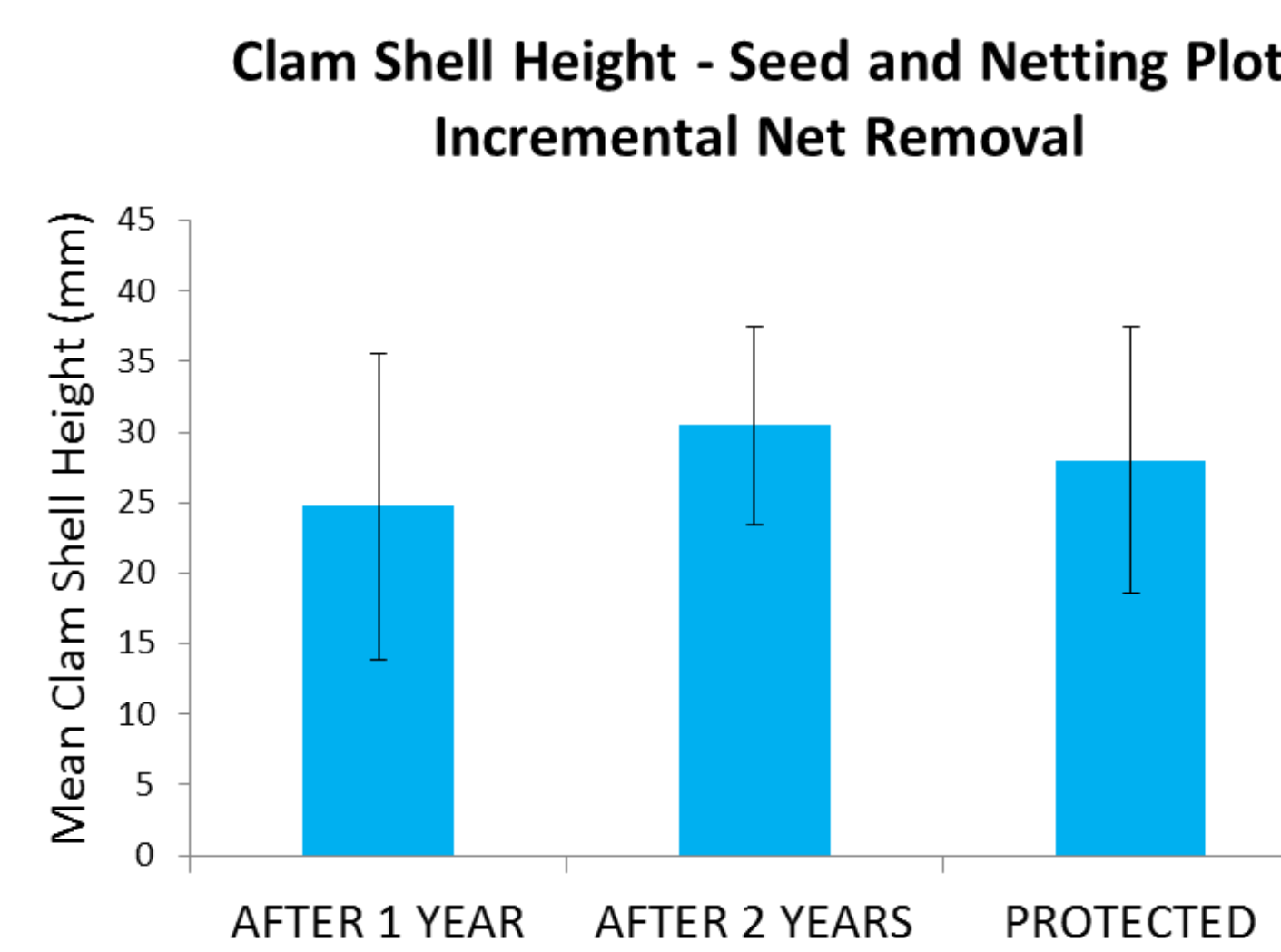
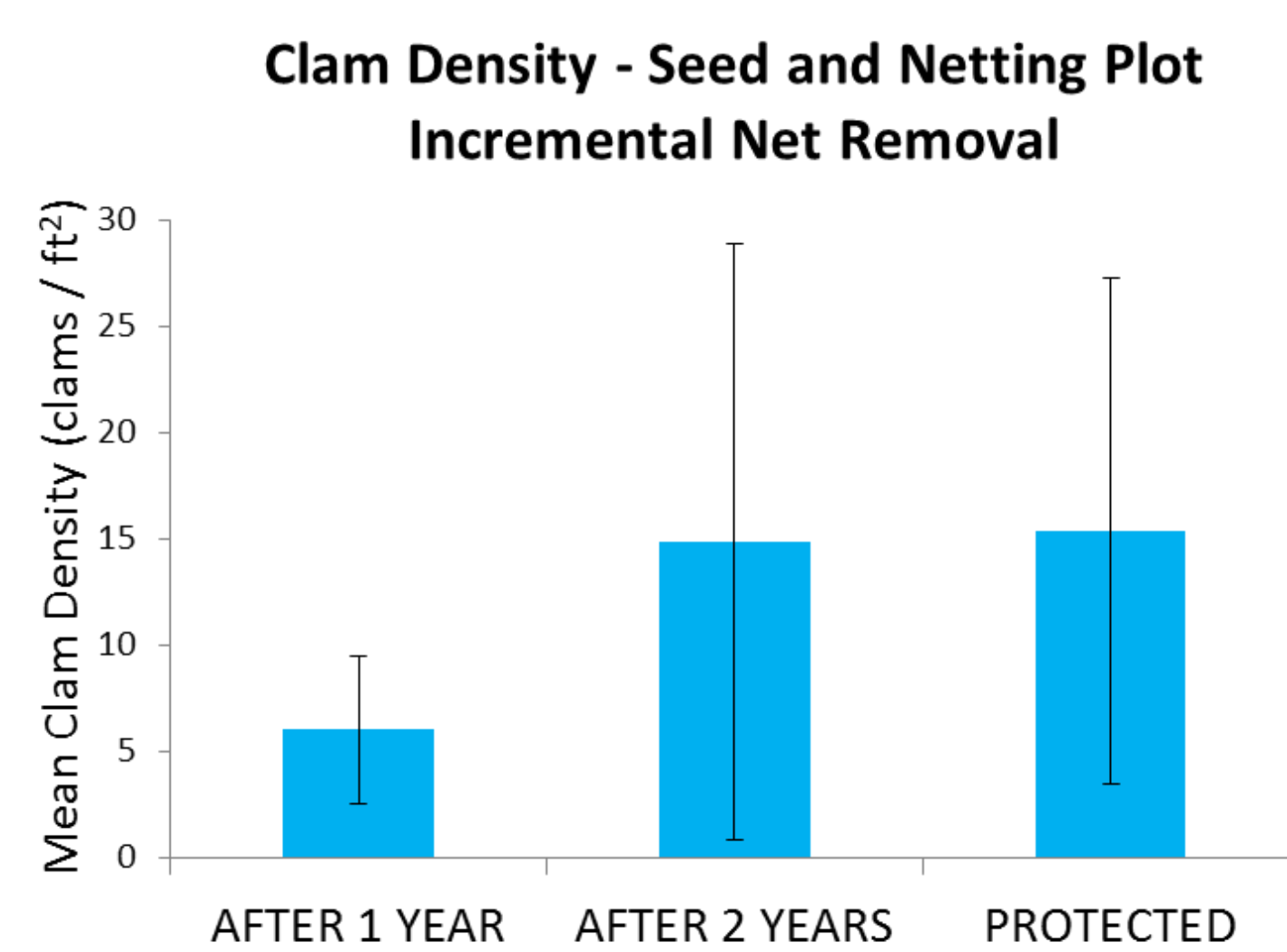
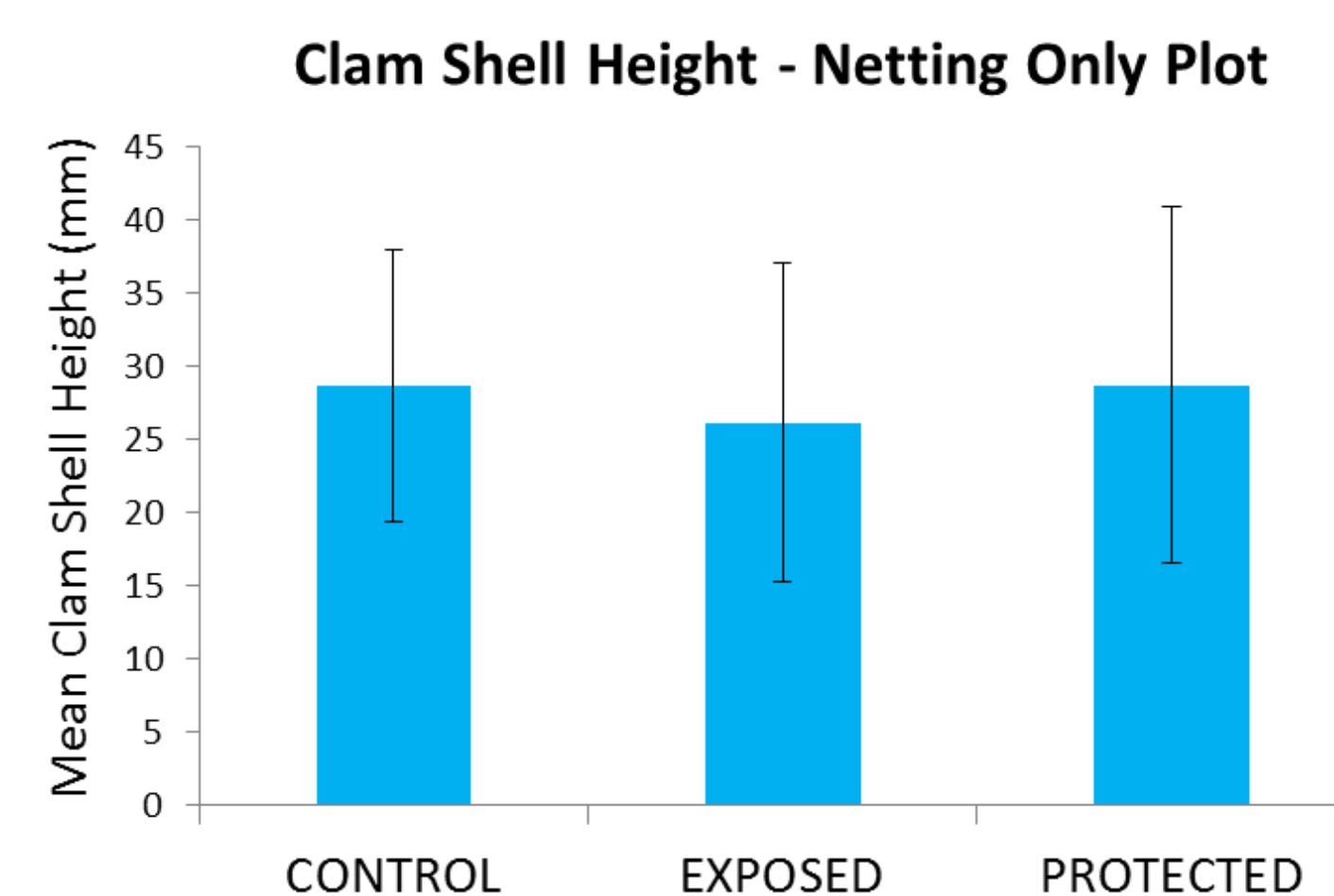
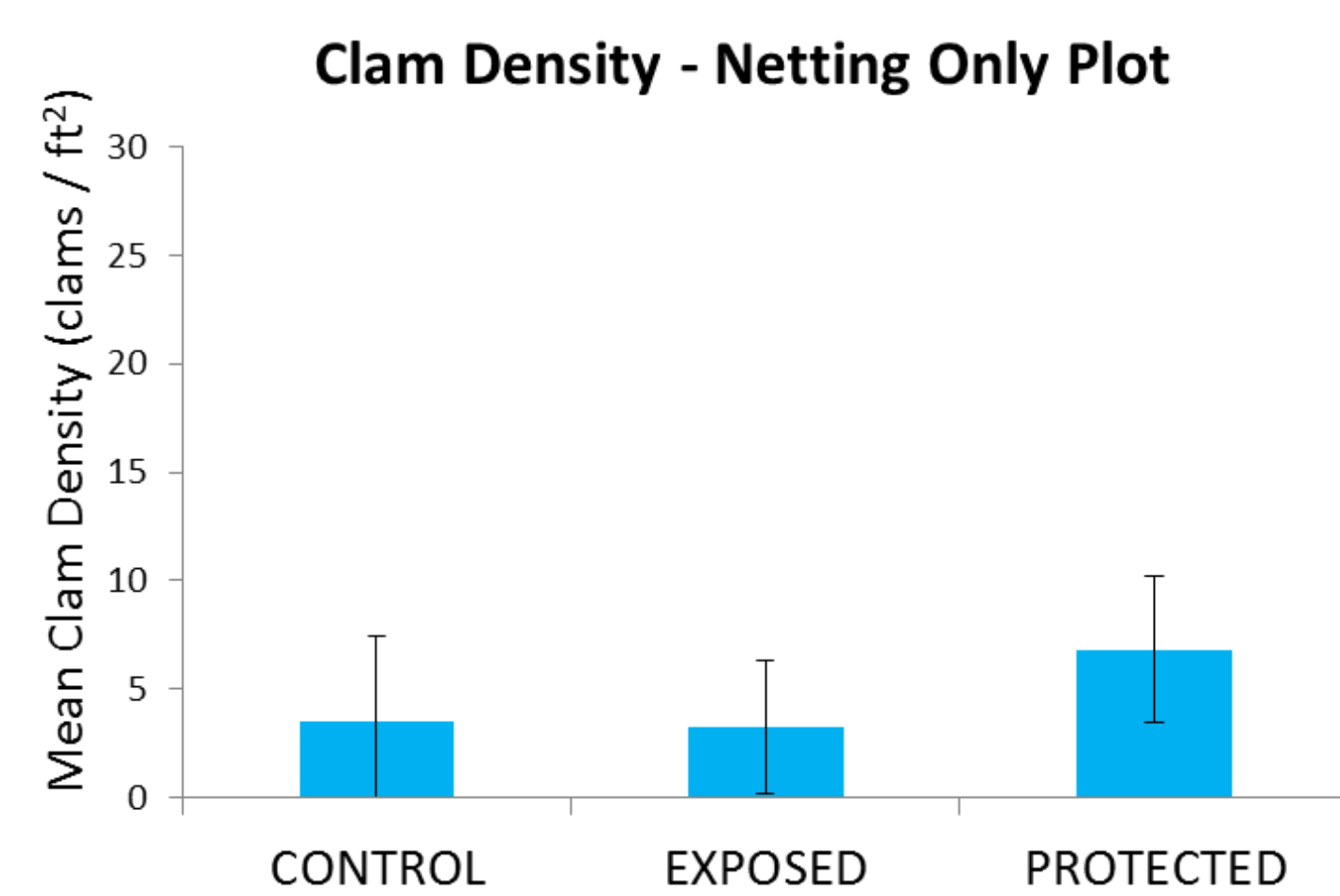
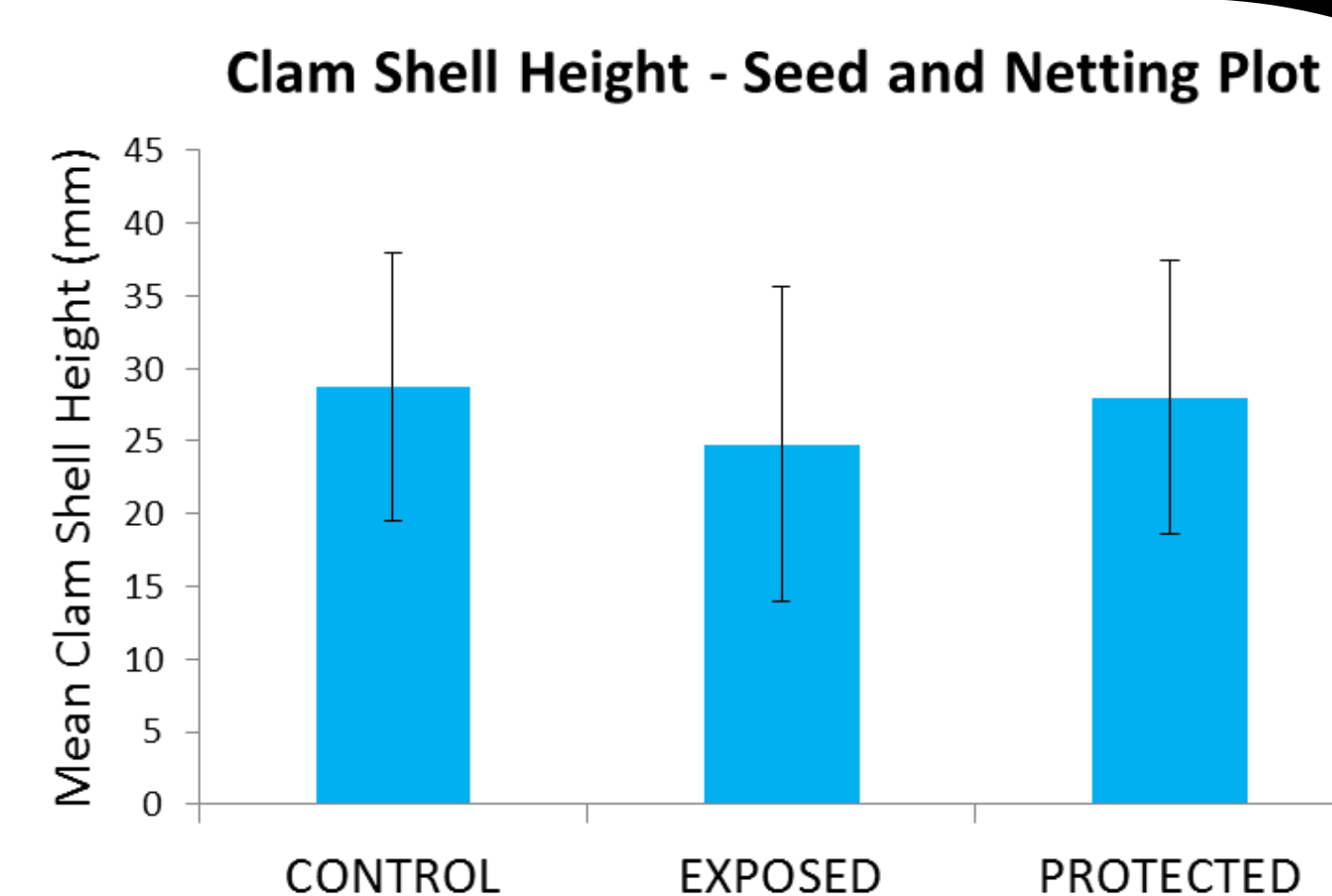
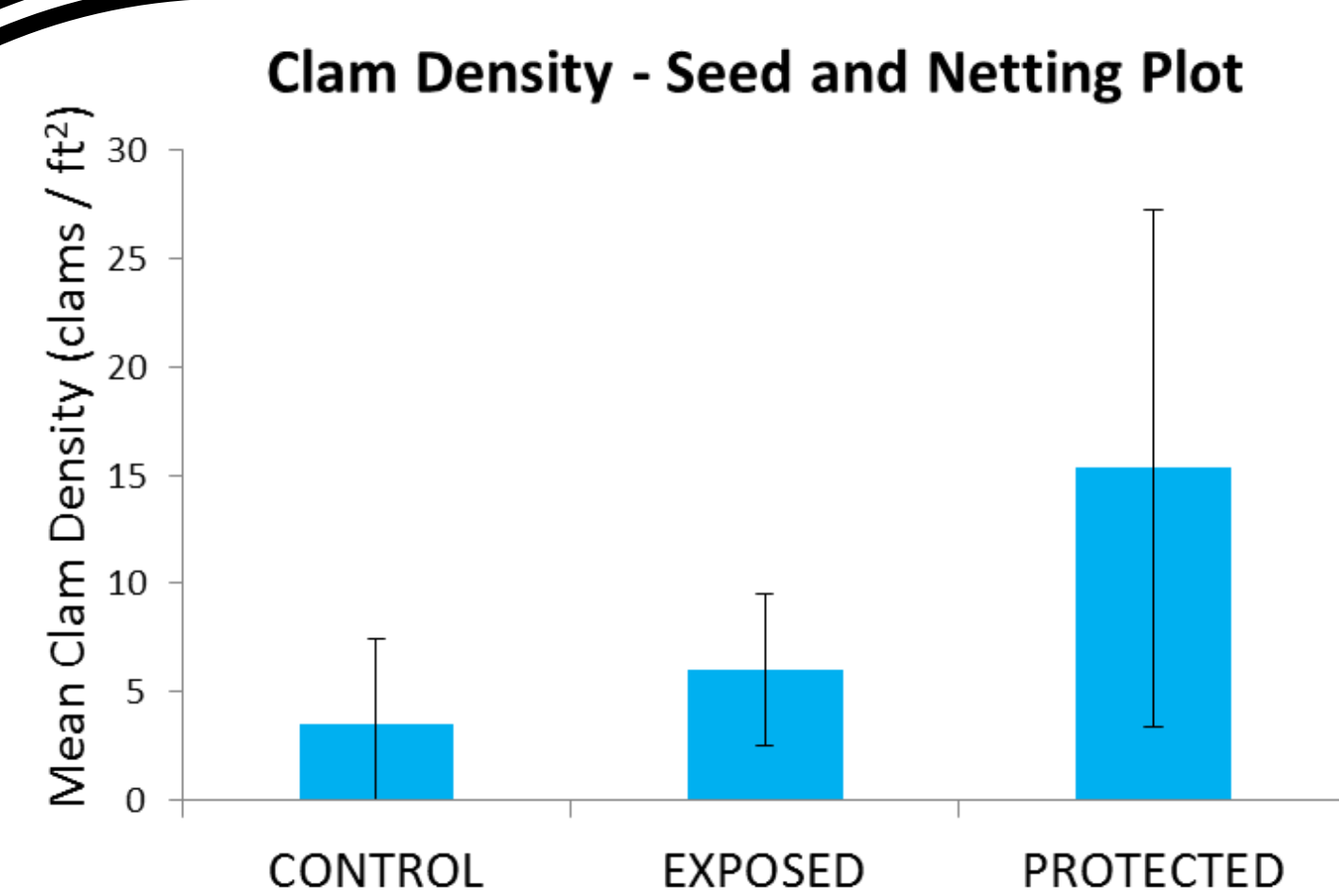
Three intertidal project sites were selected in Tokenen Bay based on their proximity to one another, their similar beach topography, sediment composition, wave energy, and similar littleneck clam population densities. Each site was partitioned into three adjacent treatment plots (12'x28').

In 2009, one plot from each project site was seeded with 6mm juvenile clams at a density of 60 clams/m<sup>2</sup>. The seeded plot was then covered with ½" plastic predator exclusion netting. A second plot was not seeded but, was covered with predator exclusion netting. The third plot was left untouched as a control.

All treatment plots were sampled in 2010, 2011, and 2013 using a stratified, random design and 1ft<sup>2</sup> quadrats to collect data on clam shell heights and densities. Immediately prior to each sampling, ½ of the predator exclusion netting was removed from the seeded and unseeded treatment plots. Quadrat samples were collected from each treatment plot such that clam densities and shell heights could be summarized from areas that were constantly protected by netting, constantly exposed, incrementally exposed after 1 and 2 years, or unaltered (control).

## Analysis

Results were pooled across project sites and analyzed in R using non-parametric techniques to compensate for an unbalanced sampling design created by fluctuations in sampling personnel. The data were evaluated using a Kruskal-Wallis rank sum test and Wilcoxon rank sum pairwise comparisons.



## Density Results

- Seeded areas protected by netting maintained significantly greater mean clam densities than exposed and control areas.
- Unseeded areas protected by netting maintained mean clam densities that were significantly greater than exposed areas but, not significantly different from control areas.
- Removing protective netting after 1 or 2 years resulted in mean clam densities that were significantly less than or, equal to, areas that received constant protection.

## Shell Height Results

- Seeded areas protected by netting maintained mean clam shell heights that were significantly larger than exposed areas but, not significantly different from control areas.
- Unseeded areas protected by netting maintained mean clam shell heights that were not significantly different from exposed or control areas.
- Removing protective netting after 1 or 2 years resulted in mean clam shell heights that were significantly less than or, equal to, areas that received constant protection.

## Discussion

- Constant protection with predator exclusion netting can enhance the survival and growth of littleneck clams in southeast Alaska.
- The use of predator exclusion netting can enhance clam production in Alaskan mariculture.
- Further research is needed to assess the cumulative effect of predator exclusion netting on littleneck clam population dynamics in southeast Alaska. Future research should consider the effects of predator exclusion netting while :
  - Accounting for littleneck clam recruitment
  - Assessing primary productivity & environmental variables
  - Evaluating community assemblage and competition
  - Scaling up sampling to increase statistical power
  - Assessing locations outside of mariculture sites

## Acknowledgements