

Introduction

Southeast Alaska red king crab stocks decreased in the early 1980's, and have made little recovery since, despite numerous years of fishery closures. It is thought that a bottleneck may exist at some point in the early life history stages as hundreds of thousands of eggs are released, yet only a small percentage survive to recruit into the fishery. One aspect of early life history that may be important is the necessity of a specific type of habitat for optimal growth and survival. Juveniles are thought to prefer a rocky heterogeneous rocky substrate with an abundance of biogenic assemblages.

Introduction –Complex Life History



Four zoeal stages One glaucothoe stage Benthic juvenile
Sole purpose: find suitable habitat
1.5-2 yrs. near-shore areas, cryptic, solitary, cannibalistic

Complex Habitat



Figure 1. Examples of juvenile red king crab complex habitat

Methods

Habitat/Species Associations

- Sampled at low tide monthly (Dec-Apr) at 2 sites – Indian Point, Anderson Beach
- Counted all crabs in 30 m² transect
- When a crab was found, quantified substrate percent cover and species associations in a 10x10 cm quadrat

Growth measurements

- Carapace length
- Carapace width

Environmental meas.

- Salinity
- Water temperature

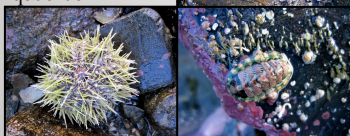


Figure 2. Common intertidal invertebrates at study sites

Results

Habitat Preferences

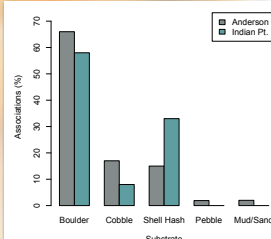
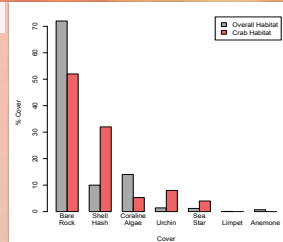


Figure 3

The makeup of the substrate type at each study location. Anderson is dominated by boulders, Indian Point is dominated by cobble & shell hash. Each site has a different makeup of substrate, but both locations represent rocky heterogeneous substrate that is "good" crab habitat

Figure 4

The overall study area is compared to the habitat selections of juveniles. The most common association was with rocky substrate and shell hash. Shell hash made up only about 10% of the overall habitat, and >30% of crab habitat. Associations did occur with invertebrates but to a much lesser extent.



Abundance

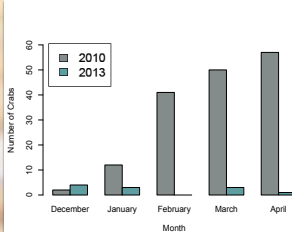


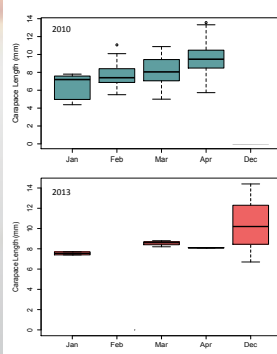
Figure 5

The abundance of crabs found in 2013 compared with a previous study on juvenile growth physiology (Westphal, 2011). Using the same methods and locations, 93% less crabs were found in 2013, which suggests great variability in recruitment for this economically important species.

Growth

Figure 6

Growth patterns of juvenile red king crab for 2010 and 2013. Carapace length for the months of December – April suggest that a high amount of variability exists in the size of individuals of the same age class. The sample size (n=11) obtained in 2013 was too small for statistical comparison.



Discussion

Substrate

Juvenile red king crab were found to prefer a heterogeneous rocky substrate, which is in agreement with a previous study (Loher et al, 2000).

Habitat Preferences

- No specific species associations were evident during this study
- Invertebrates may provide three dimensional structure that offers protection from predation.
- Optimal nursery habitat for growth and survival provided by combination of shelter providing habitat and abundance of biogenic assemblages



Figure 7. Cryptic juveniles in complex habitat

Abundance

Possible reasons for the low abundance in 2013:

- High interannual variability in crab recruitment
- Depressed adult stocks, fishery closures, 2006-10, and again 2012
- Sampling in winter and searching for 4-10mm crabs is challenging

Growth

High variability between individuals of the same age class



Figure 8. Juveniles of same age class

Future Studies

This research will continue through the summer with extension to larval distribution and settlement.

References

- Loher, T., D.A. Armstrong, 2000. Effects of habitat complexity and relative larval supply on the establishment of early benthic phase red king crab *Paralithodes camtschaticus* (Tilesius 1815) populations in Auke Bay, Alaska. J. Exp. Mar. Bio. Ecol. 245, 83-109
- Westphal, M.J., 2011. Growth physiology of juvenile red king crab *Paralithodes camtschaticus* in Alaska. Master's Thesis. University of Alaska Fairbanks, Fairbanks, Alaska

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