Early Life History of Crabs in Pribilof Islands Nearshore Habitat and Potential for Rebuilding of Alaskan Blue King Crab

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**Introduction**

Pribilof Islands blue king crab (*Paralithodes platypus*) is the only federally-managed commercially-recruiting species in the Northeast Pacific, and recruitment limitation could be a contributing factor to failed rebuilding efforts. Because crabs have a complex life cycle with dispersive larval stages and a sedentary adult, successful larval recruitment is required for recruitment. Cobble and shell hash substrates are a preferred benthic settlement habitat for blue king crab (Armstrong et al. 1987). Once settled, groundfish predation and inter, and intra-cohort competition are hypothesized to be factors affecting survival (Long et al. 2015). Proposed studies will examine larval seasonal abundance and advection dynamics and juvenile recruitment to the benthos and mortality regionally in the U.S. Arctic Subarctic.

**Hypotheses**

- Pelagic larval crab distribution and abundance is species and stage-specific across water masses.
- Benthic juvenile crab distribution and abundance is mediated by larval supply, habitat, and predation pressure.

**Methods**

**Bering and Chukchi Sea Sampling**
- 60 cm diameter Bongo net (500 μm mesh) samples during 2012, 2013, and 2017.

**Pribilof Islands Sampling**
- Diver and camera surveys, megalopae collector bags, and tethering experiments

**Study Area**

- U.S. Arctic and Subarctic Seas
- Pelagic larval crab studies in the northeastern Bering Sea and Chukchi Sea (NBCS).
- Benthic juvenile crab studies in the nearshore neritic zone of St. Paul Island, Alaska.

**Oceanography**

- Five distinct water masses observed in the NBCS (Danielson et al. 2016).
- Surface water temperatures represent a ‘cold’ year.
- Atmospheric wind field maintained water mass fronts.

**Pelagic Larval Crab in the Arctic**

- Total crab larvae catch-per-unit-effort (CPUE, ind. m\(^{-3}\)) reveals high abundance of early stage zoae in the Alaska Coastal Current.
- Late stage zoae and glaucothoe blue king crab are seemingly restricted to bottom or off-shore Bering/Chukchi Shelf Waters.

**Future 2017-2018 Proposed Field Studies**

- SCUBA diver and collection bag surveys (1) will be used to enumerate recent blue king crab recruits.
- Diver and drop camera surveys (8) will assess current habitat structure and bottom community composition.
- Diver fish surveys and fish stomach content analysis will expose species preying upon blue king crab.
- Video recorded blue king crab tethering experiments will estimate predation by predators and survival.

**Benthic Juvenile Crab in the Pribilof Islands**

**1983-84 Sampling**
- Historically, high abundances of juvenile blue king crab were found in shell hash and rock/gravel habitats.

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**Literature**


**Red King Crab**

*P. camtschaticus*

Background Photo by Chris Millbern
Title:

EARLY LIFE HISTORY OF CRABS IN PRIBILOF ISLANDS NEARSHORE HABITAT AND POTENTIAL FOR REBUILDING OF ALASKAN BLUE KING CRAB

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Abstract:

Pribilof Islands blue king crab (*Paralithodes platypus*) is the only federally-managed overfished commercial fishery stock in the North Pacific, and recruitment limitation could be a contributing factor to failed rebuilding efforts. This project will explore blue king crab early life history and assess potential bottlenecks in pelagic larval and early benthic phases. We will investigate the nearshore environment near the Pribilof Islands in the Bering Sea to quantify settlement and survival through early benthic stages. We will quantify availability of crab habitat and predation pressure from local groundfish. Preliminary 2016 results from habitat and bottom community assessments and settlement collectors will inform future methodology and site selection in 2017 and 2018. Additionally, pelagic larval crab distribution and abundance from the Pribilof Islands to the Chukchi Sea shelf break (57°-73°N latitude) will be quantified with plankton tows over the period from 2012-2019. Larval *P. platypus* CPUE abundance will be combined with corresponding oceanographic data and ROMS models to infer retention of larvae around the Pribilof Islands and northward flowing advection processes. This multifaceted approach will address the mechanisms controlling the abundance and survival of young-of-year blue king crabs and evaluate whether lack of juvenile recruitment is occurring and limiting recovery of the Pribilof Islands stock.