



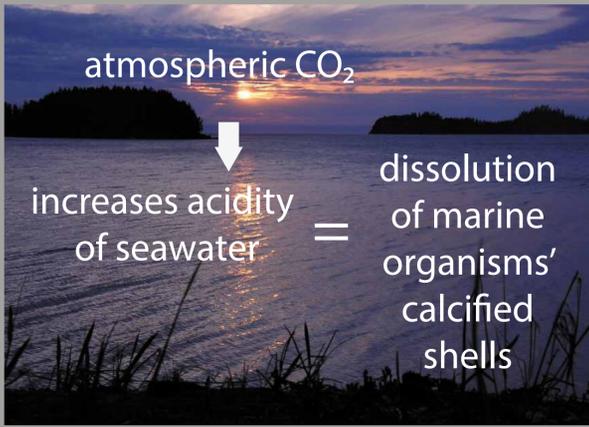
NOAA FISHERIES

Ocean Acidification Research

Will Increased Ocean Acidity Affect Alaska's King Crabs?

Kodiak Laboratory

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Blue King Crab
(*Paralithodes platypus*)



Red King Crab
(*Paralithodes camtschaticus*)

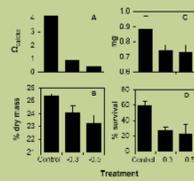
2006 Research: Blue King Crab

Objective Study the effect of increased acidity (reduced pH) on the survival, growth and calcium uptake of larvae.

MIKE LITZOW, JEFF SHORT, SARA PERSELIN, LISA HOFERKAMP, SUSAN PAYNE

Methods Larvae raised to first juvenile stage at ambient pH seawater and ambient pH minus 0.3 and 0.5 pH units. pH level adjusted with hydrochloric acid.

Results Survival, growth and calcium uptake were reduced in both low pH treatments.



2007 Research: Blue King Crab

Objective Study the effect of different pH levels on the survival and developmental morphology of early life stages.

SARA PERSELIN, KATHY SWINEY, JEFF SHORT, AAREN ELLSWORTH

Methods 2006 treatments plus one more acidic and one less acidic treatment Morphology measurements taken on larvae and juveniles.

2008-2009 Research: Carbon dioxide dosing system

Objective Develop infrastructure for dosing multiple life stages of crab with CO₂ to simulate in the lab what environmental conditions a crab experiences in the wild.

Methods Design and build a system to put CO₂ into seawater at levels we expect to see on average in the world's oceans in the next 50-100 years.

2010-2012 Research: Red King Crab

Objective Study survival, growth, morphology, and calcium content of embryos, larvae, and juveniles red king crab. Include molecular and cellular response to ocean acidification.

CHRIS LONG, KATHY SWINEY, ROBERT FOY

Methods Conduct numerous exposure experiments to test pH = 7.8 and 7.5 compared to an ambient pH (8.0). Also test for additional variables such as temperature.

2012-2014 Research: Red King Crab, Tanner Crab, Golden King Crab

Objective Expend studies to include additional species. Study survival, growth, morphology, and calcium content of embryos, larvae, and juvenile Tanner crab and golden king crab. Study Tanner crab for a full two year cycle.

CHRIS LONG, KATHY SWINEY, ROBERT FOY

Methods Conduct similar exposure experiments to test pH = 7.8 and 7.5 compared to an ambient pH (8.0). Expand results to understand population levels of ocean acidification on Bering Sea crab stocks.

Future Research

Study additional crab and invertebrate species and life stages.

King crab larval stages



Zoea 1



Zoea 2



Zoea 3



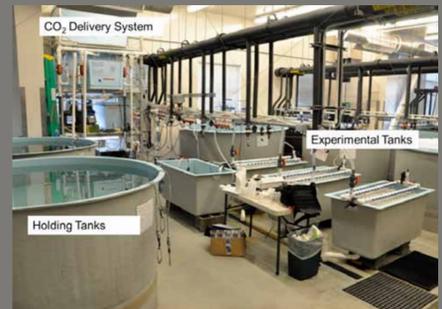
Zoea 4



Glaucothoe



Juvenile



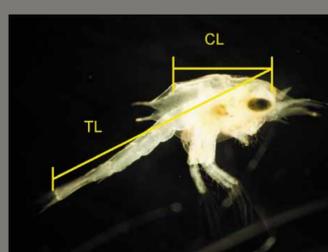
Larvae in experimental beakers at different pHs



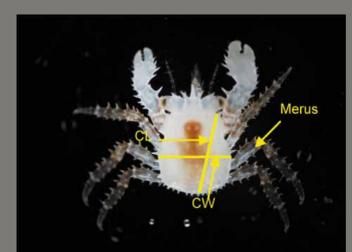
Larval culture beakers and pH meter in temperature-controlled room

Morphology Measurements

Total Length = TL, Carapace Width = CW, Carapace Length = CL



Blue king crab larva



Blue king crab juvenile



Crab eggs



Tanner crabs



Shrimp