Overview of the effects of ocean acidification on commercial Alaskan crabs

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Kodiak Laboratory: Running OA experiments since 2008

- Focused on federally-managed commercial crab species
- Crabs are long-lived
- Have many very different life history stages
Red king crab life history

This cycle takes about 7-9 years to complete!
Red king crab

- Embryos (late development)
  - No effect on mortality
  - Slight change in development
  - Results from longer term project pending
- Larvae
  - Slightly increased mortality
  - Pending longer term results
- Juveniles
  - Decreased growth
  - Increased mortality
  - Decreased condition
  - Decreased hardness
  - Effects are temperature dependent
- Adults
  - Increased calcium content
  - Altered gene expression
Blue king crab

• Juveniles
  • Decreased growth
  • Increased mortality
  • Increased respiration rate
  • Decrease hardness
Golden king crab

- Juveniles
  - Decreased growth
  - Increased mortality
- Adults (results pending)
  - Hardness
  - Hemolymph chemistry
  - Immune response
Tanner crab

- Embryos
  - BIG increase in mortality
  - Slight change in development
- Larvae
  - Increased mortality
  - Decreased calcium content
- Juveniles
  - Decreased growth
  - Increased mortality
  - Decreased calcification
- Adults
  - Decreased immune response
  - Decreased hardness
  - Gene expression pending
Adult Tanner crabs- shell dissolution

Snow crabs

- **Embryos**
  - No effect on mortality
  - No effect on development

- **Larvae**
  - No effect on mortality
  - No effect on calcification
  - No effect on condition

- **Juveniles**
  - In progress

- **Adults**
  - No effect on hardness
## Past Results: Crab Summary

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<tr>
<th>Species</th>
<th>Life history stage</th>
<th>Growth</th>
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Some Crabby Observations

• Red king crab and Tanner crab are more sensitive to OA than snow crab and blue king crab
• Larvae are pretty resistant to OA
• Juveniles are the most sensitive
• There’s a lot of differences among species
• Some species can adapt
In progress/planned

• In progress
  • Effects of food ration and OA on red king crab juveniles
  • Effect on juvenile snow crabs
  • Effects on gene expression in snow crab adults
  • Effects of OA and temperature on snow crab embryos and larvae
• Planned
  • Effects on blood chemistry in Tanner and snow adults
  • Effects of OA and temperature on snow crab juveniles
  • Effects of OA and temperature on Tanner crab juveniles
  • OA selection experiment (Tanner crabs)
Thanks

Kodiak Lab Staff