Alaska OA Network: What's new

Alaska Ocean Acidification Network

Dec 16, 2019

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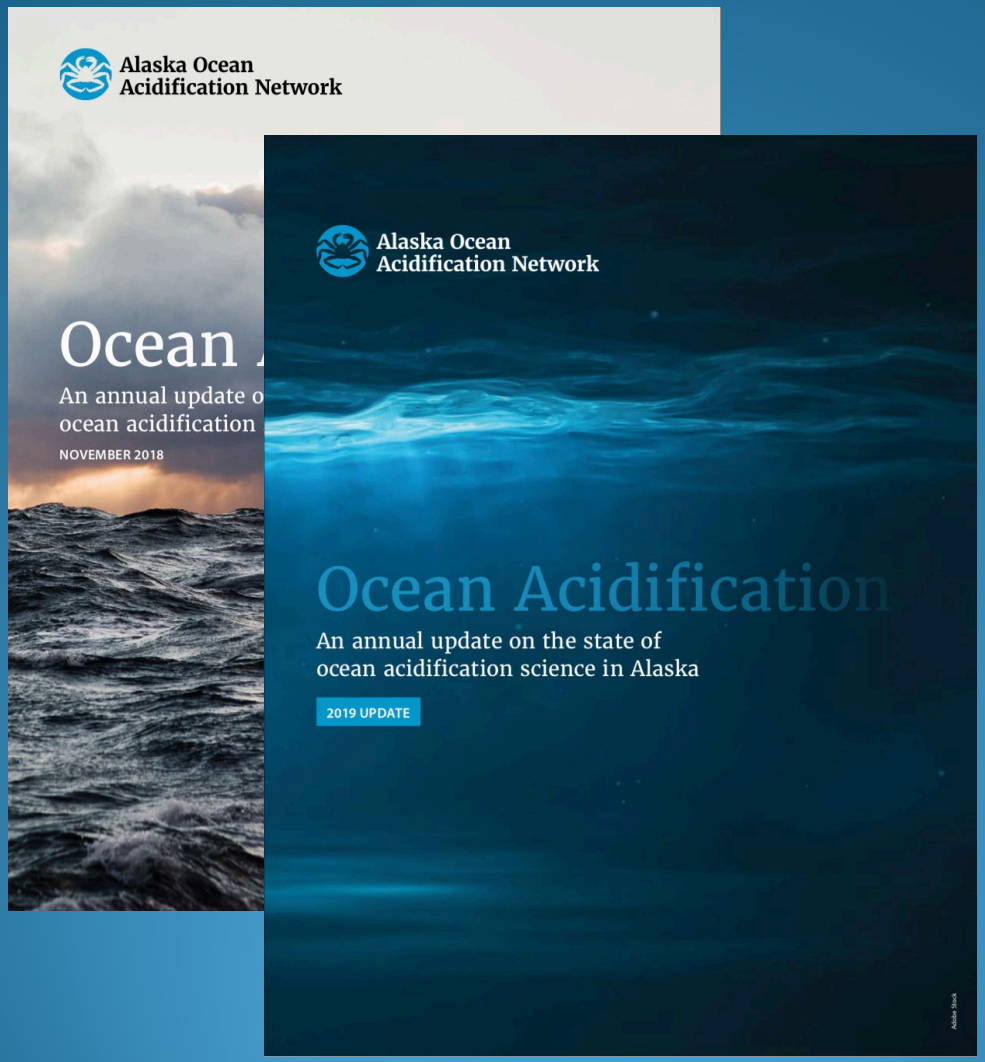
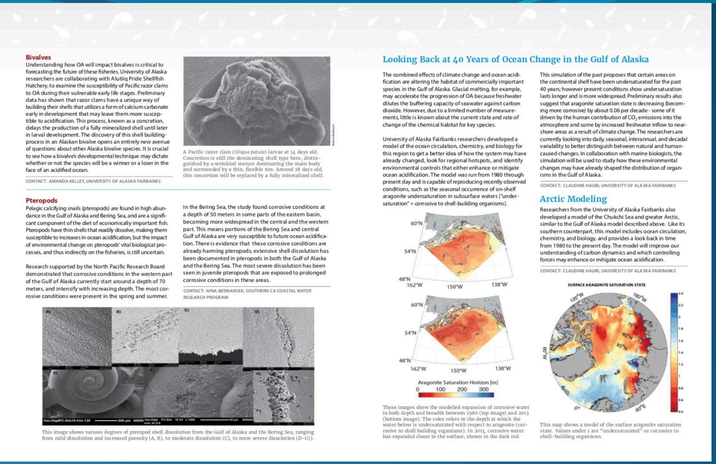
AOOS

2019 Science Update



AOOS

Sneak peak



- **Herring:**
  - OA: longer roe with smaller yokes
  - OA + warming: opposite effect
  - Can kelp help?
- **Bivalves:** discovery of razor clam ‘concretion’
- **Gulf modeling**: looking back 40 years
- **Nearshore observations**: clear seasonal cycles
- **Ferry**

Multi-stressors

Jointly produced with NOAA AFSC

Response to fishing community request

SPECIES RESPONSE TO OCEAN ACIDIFICATION IN THE FACE OF OTHER STRESSORS

Scientists estimate the ocean is 30% more acidic today than it was 300 years ago. This is due to increasing levels of atmospheric carbon dioxide (CO_2) emitted by humans that dissolves into the surface ocean waters, lowering the pH and increasing the acidity. Higher acidity water can reduce the ability of shell-forming organisms to build and maintain their shells, and can also affect the growth and behavior of fish.

While ocean acidification is expected to increase in the coming decades, it is not the only change that marine organisms will experience. Factors such as ocean warming and shifts in prey populations can create multiple stressors. Cumulative impacts are complex and not easy to predict, but scientists are developing a general understanding of how these factors will influence different species.

Crab

Although there are differences in the response of individual species, crabs are sensitive to higher acidity water. Juvenile crabs seem to be the most sensitive, although changes in acidity can affect any life stage.

Direct response to high CO_2 (more acidic) water:

- Decreased growth and increased mortality of juvenile red, blue, and golden king crab, and Tanner crab
- Altered embryo development in Tanner and red king crab
- Increased embryo and larval mortality in Tanner crab
- Reduced exoskeleton strength in Tanner and red and blue king crab
- Increased hemocyte (white blood cell) mortality in Tanner crabs

Potential indirect effects of high CO_2 (more acidic) water:

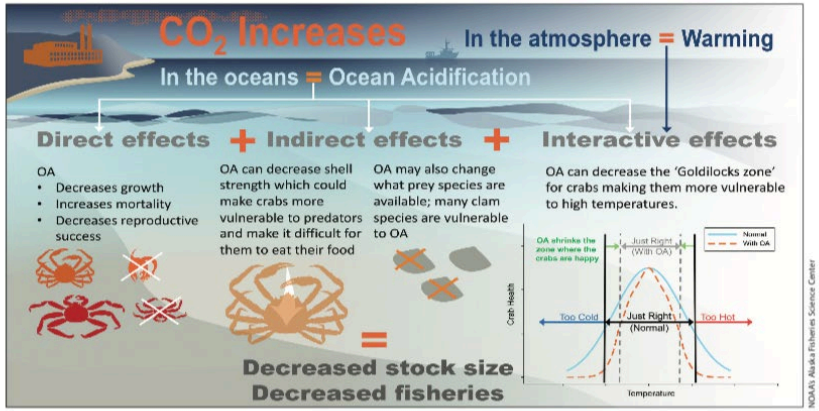
- Increased risk of predation
- Trouble consuming hard-shelled prey
- Greater risk of disease
- Reduced prey availability

Multiple stressors - high CO_2 water + increased temperature *(To date only red king crab juveniles tested)*

- A small increase in temperature may be beneficial for crabs in more acidic water
- A larger increase in temperature was much worse for crabs in more acidic water than would be expected from the response to each stressor alone

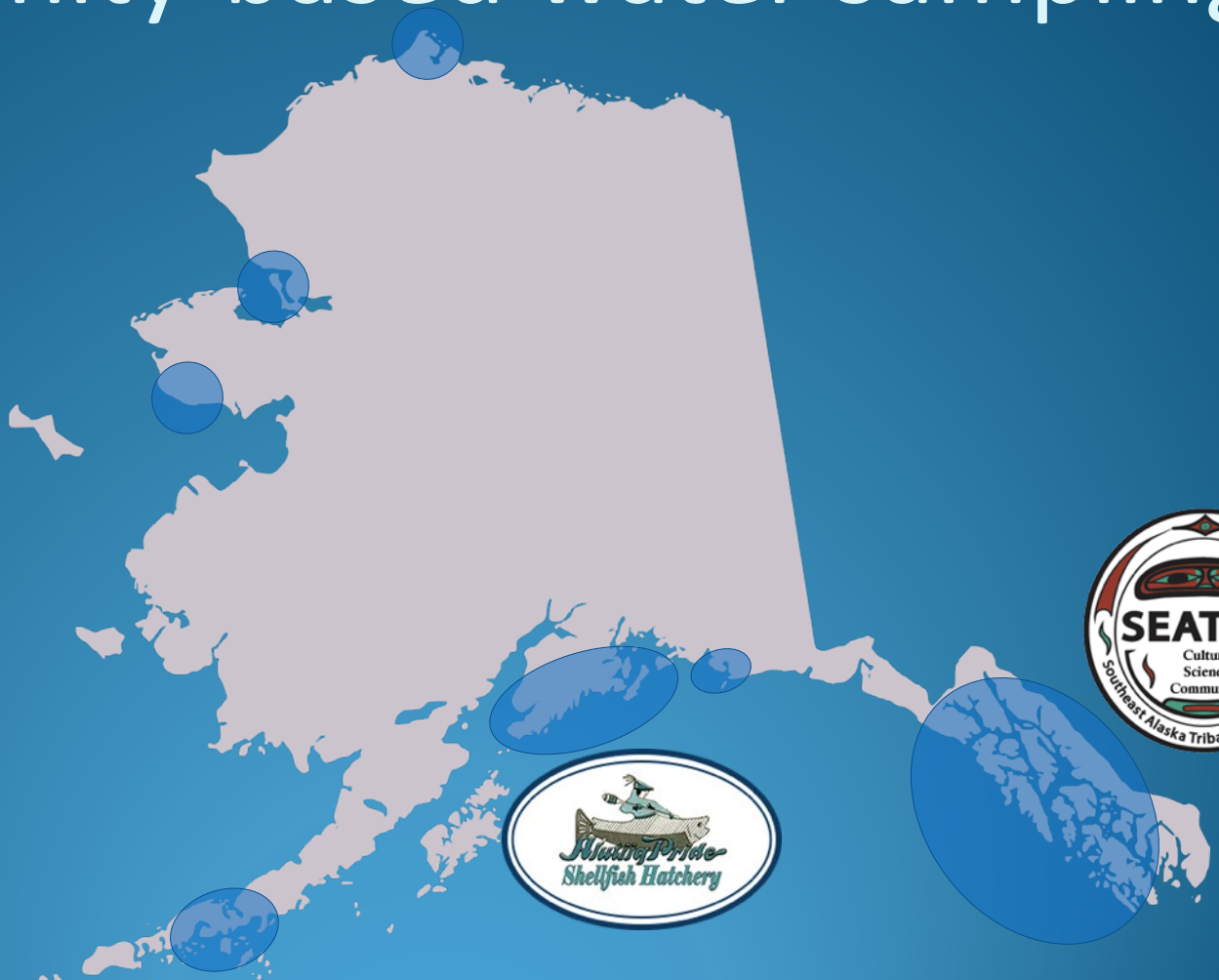
Future work:

- Experiments to understand the basis for crabs' response to increased acidity
- Testing the importance of indirect effects
- Understanding whether crab may acclimate or adapt
- Integrated models that look at the combined effects of acidification, temperature, and other climate-related stressors on survival and growth.



AOOS

Community-based water sampling



Board of Fish

First ever briefing on OA

<u>Speakers:</u>
Bob Foy (NOAA)
Toby Schwoerer (UAA)

Pacific Marine Expo

Annual event in Seattle
7,000 fishermen

- Fishermen are interested in OA

Other Outreach

- Monthly eNews
- Scientist interviews

Coming up:

- Alaska Shellfish Growers Association
- Alaska Marine Science Symposium Town Hall
- Alaska Forum for the Environment
- Legislature?
- ACCAP webinar?
- Carbon policy podcast series