Risk from Ocean Acidification to NE Seafood Production

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The Seattle Times

Oysters in deep trouble: Is Pacific Ocean's chemistry killing sea life?



Oyster hatchery failure in the Pacific NW



Three Points:

- Ocean acidification is going to happen
- Effects are complex, potentially costly
- Need more information (research) for effective response

OA: Changing Ocean Chemistry

Ocean pH, $[CO_3^{2-}]$, Ω , & pCO₂ have changed measurably since the Industrial Revolution



More change is "dialed in" so long as atmospheric CO_2 is elevated

Doney et al. Oceanography 2009

Model projections of future Ω_{ar}



 $\begin{array}{l} \mbox{Monthly mean } \Omega_{ar} \\ \mbox{Decadal mean } \Omega_{ar} \\ \mbox{2010 } \Omega_{ar} \mbox{ envelope} \end{array}$

"envelope" = mean ± RMS



Cooley et al. submitted

Threshold dates



When Ω_{ar} will be profoundly different from 2010



Calculated from CCSM3 data; Figure from Cooley et al. submitted to Fish and Fisheries

So what?



OA poses risk to "calcifiers": mollusks, crustaceans, etc.

OA may decrease calcifier populations via

- calcification decreases
- declining larval survival
- life history changes



Anne Cohen, WHOI, 2009

Effects are complex



Vary by organism:

...and habitat:

Oysters

Near shore

Scallops

Offshore

Lobster

Mixed

Large pH & CO₂ Variability in Near Shore Waters





McCorkle et al., in prep.

Massachusetts Shellfish Production



Oysters: farmed, near-shore \$20+ million/year

Scallops: wild harvest, mostly offshore \$300 million/year

Lobster: wild harvest \$50 million/year

What should we do?



Understand effects, risks

Develop adaptation plans

Requires investment in research

Summary



- OA will likely proceed over decades, regardless of climate measures
- Effects are complex & uncertain
- Potential threat to shellfish populations/harvests
- Commission/study, investment in research are appropriate steps

Focus on <u>understanding risks</u>, and <u>adaptation</u>

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