Regional Economic Impacts of Climate Change

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AFSC projects

Ocean acidification (OA) – Bristol Bay red king crab (BBRKC) fishery

• See Dalton talk

Rising temperatures

• Eastern Bering Sea pollock
Rising temperatures

- Negative impact on pollock (e.g., Mueter et al. 2011)
  - Important projection consideration
- Catch policies therefore need re-evaluation
- What are the temporal and cumulative economic impacts?
- Here we evaluate seven alternative policies (including status quo)

(Seung and Ianelli 2016, 2017)
Approach

• Two linked models:
  1. Temperature-sensitive biological yield projection model (Ianelli et al. 2011) and
  2. A dynamic regional computable general equilibrium (DRCGE)

• Simulations from 82 IPCC climate change models (drives biology)

• Solve DRCGE for each period
  • projected yield exogenously given in each period
  • introduce a shadow price variable
Performance metrics

- pollock catch
- total regional output
- welfare change
- real gross regional product (RGRP)
- uncertainty (variability) in pollock yields.
Harvest policies

- **Status quo:** Catch depends on fishing mortality, which is a function of biomass.
  - Subject to a constraint that if biomass falls below 20% of unfished stock size, fishery is closed due to Steller sea lion forage needs.
- Six alternative polices are specified as deviations from status quo policy.
Pollock catch w/o CC under status quo, 20 simulations
Pollock catch \textit{w/ CC} under status quo, 20 simulations
Summary

- Status quo policy performs worse than some others
- Relatively conservative policies generally perform better
- Removes catch upper limit ("High cap") performs the worst
- Adjusting fishing mortality downwards as biomass approaches the target size ("Adj B_{47%}") performs best from a biological perspective
Rising temperatures in the Bering Sea and Gulf of Alaska will reduce stocks and harvests of Alaska pollock by mid-century, but there is a silver lining for the fishing industry, according to a new report: The ubiquitous whitefish gobbled around the world in fast-food sandwiches, frozen sticks and imitation crab meat will no longer be ultra-cheap. Economic losses from a diminished catch will be partially offset by rising prices for the fish species that supports the nation’s single biggest seafood harvest, according to an analysis by researchers at the National Oceanic and Atmospheric Administration’s Alaska Fisheries Science Center. The report, by economist Chang Seung and biologist Jim Ianelli and published in the journal Natural Resource Modeling, estimates that ............
Opportunities

• Will continue research that estimates the economic impacts of climate change.
  • Possibly using more recent data (e.g., BCA-level data recently collected)
References


