Climate Change and Changing Fisher Behavior in the Bering Sea Pollock Fishery

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Overview

- Introduction to the Bering Sea pollock fishery
- Economics and climate modeling
- How does climate affect fishing?
- How do we predict the impact of climate change on fisher behavior?
- Future work
Bering Sea pollock fishery

- 1.5 million metric tons caught in recent years – TAC adjusted downward last 2 years to 1.0 million tons in 2008
- Three sectors – inshore, catcher processor, and mothership
- American Fisheries Act passed in October 1998 “rationalized” the fishery and ended the race for fish.
BSIERP Project Overview

- Bering Sea Integrated Ecosystem Research Program (BSIERP)
- Early stages of project
- Human component includes both economic modeling and work with local traditional knowledge (LTK)
Why is it important to include economics in an integrated climate / ecosystem model?

- Redistribution of fleet effort with changing ecosystem will have a significant impact on the ecosystem.
- Spatial and market regulations will be much more effective if they consider the relationship between fishermen and the environment.
- Fisheries management should be forward-looking.
Economics in BSIERP

- Spatial Economic Models of Pollock and Cod
  - Methods discussed here
  - Work will begin with pollock, then extend to cod, then return to both species as ecosystem work advances

- Separate economic component of BSIERP will integrate fleet impacts directly into the ecosystem model.
Modeling a fisherman’s choice

- A fisherman chooses to fish in a certain location to maximize expected net revenue from fishing
- A fisherman makes a discrete choice of a zone
- The zone is chosen as a function of
  - Expected catch/revenue in the zone
  - Travel costs (fuel, time, wages, the opportunity cost of not using the boat elsewhere)
  - Boat characteristics
STAT6 Areas in the Bering Sea
What determines expected catch/revenue?

- Probability of encountering fish at acceptable abundance/ CPUE
- Product type/quality
- Price for products
- Fishing technology.

We would expect all of these factors to evolve with climate change.
Predicting climate change’s impact on the pollock fishery

- Include direct affects of weather
  - Ice
  - Winds
  - Cold pool.
- Stock effects – link observed fishing distributions to the following information
  - Driving strong year classes
  - Systematic movements of pollock densities
  - Size of stock.
- Integrate as a loop with the ecosystem model.
Sample ice coverage data
July-August Crab and Groundfish Sampling Survey Stations
Next Steps

- Run current models with complete suite of available climate information
- Investigate spatial and temporal scale of environmental data and choice model
- Compare results to other economic models
- Adapt and apply models to cod fishery.
The End

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