What are the key challenges to climate change adaptation in Bering Sea and Aleutian Islands groundfish fisheries?

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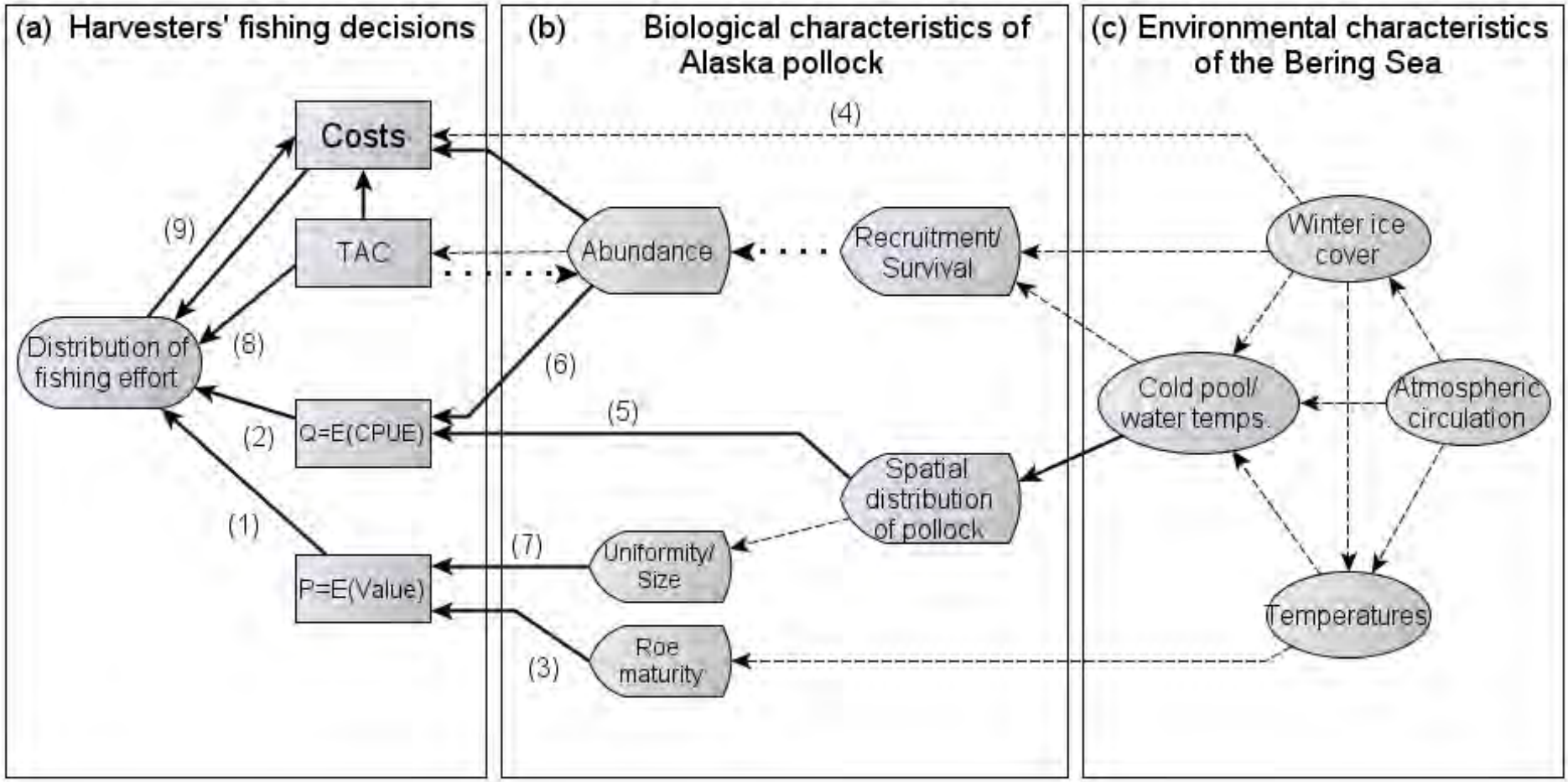
Key challenges

- How can we better understand how incentives impact fisher behavior?

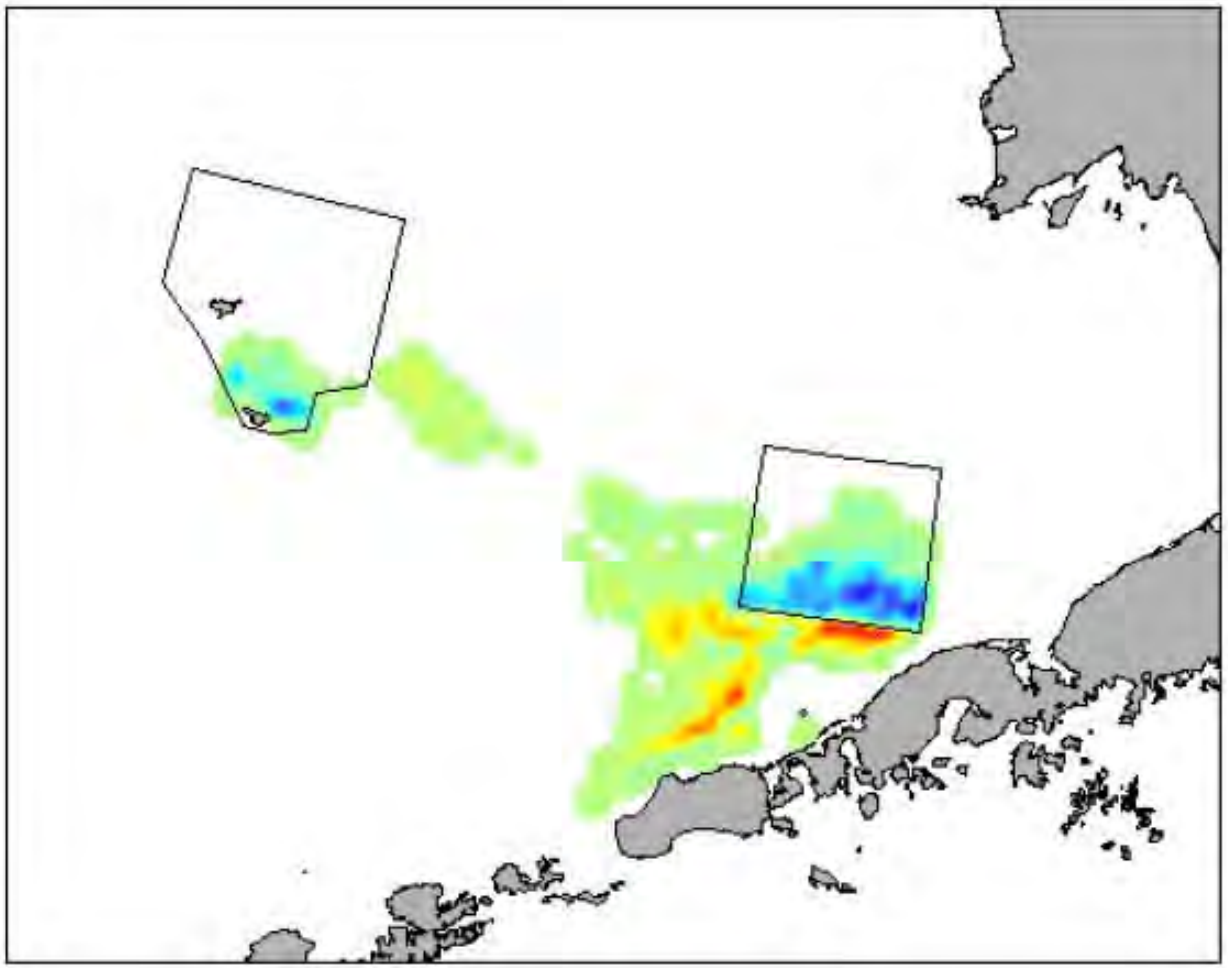
- What's the path to a structural/ mechanist model of fisher behavior linked to a mechanistic model of climate to fish?



Conceptual model of how the environment affects the distribution of pollock fishing effort.
(from Haynie and Pfeiffer *ICES J. of Mar. Sci.* 2012).

2 fish stories about the BSAI multispecies catcher-processor trawl fishery

How did the distribution of fishing effort change in the wake of crab and habitat protective closures?



Abbott and Haynie *Ecol. App.* 2012

Positive relationship between cod and Halibut

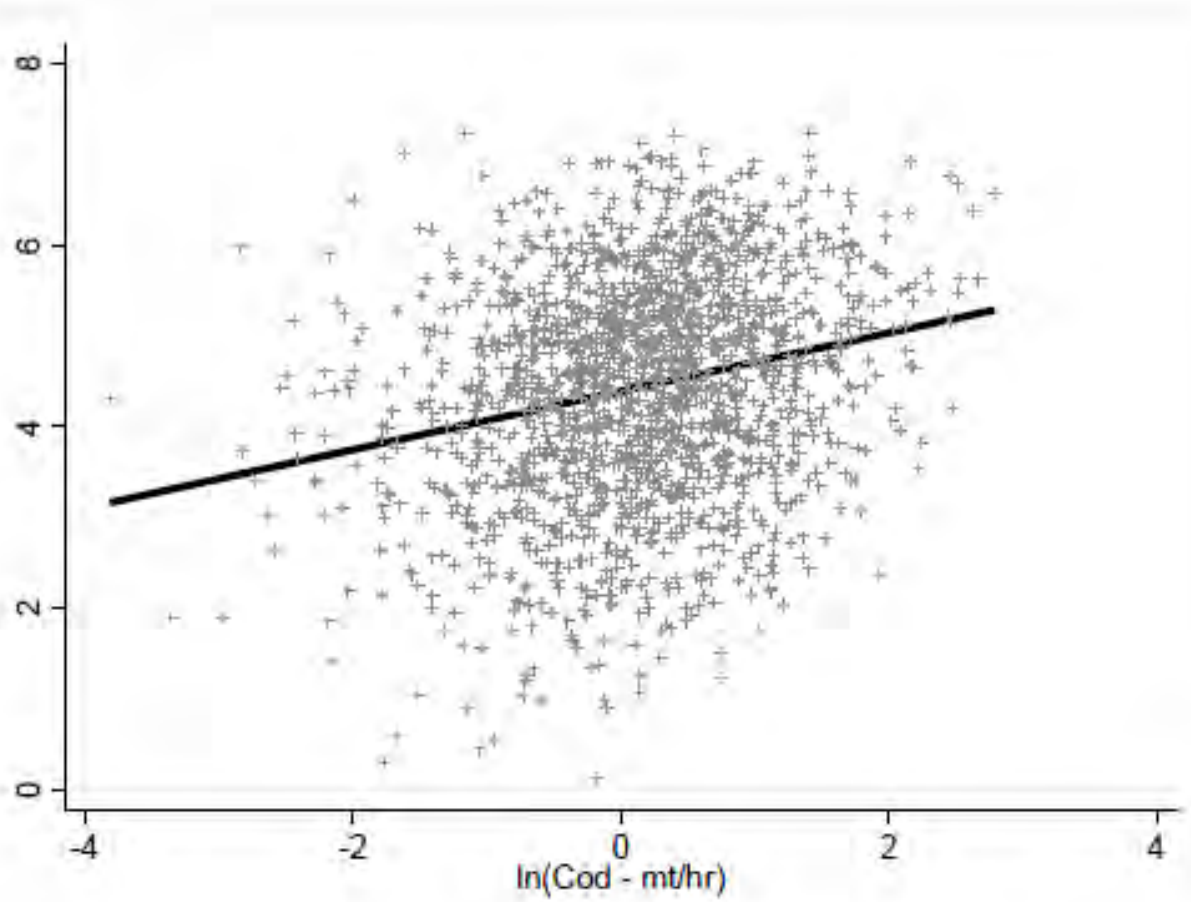


Figure 4: Scatterplot and fitted trend of the natural log of halibut CPUE against the natural log of cod CPUE.

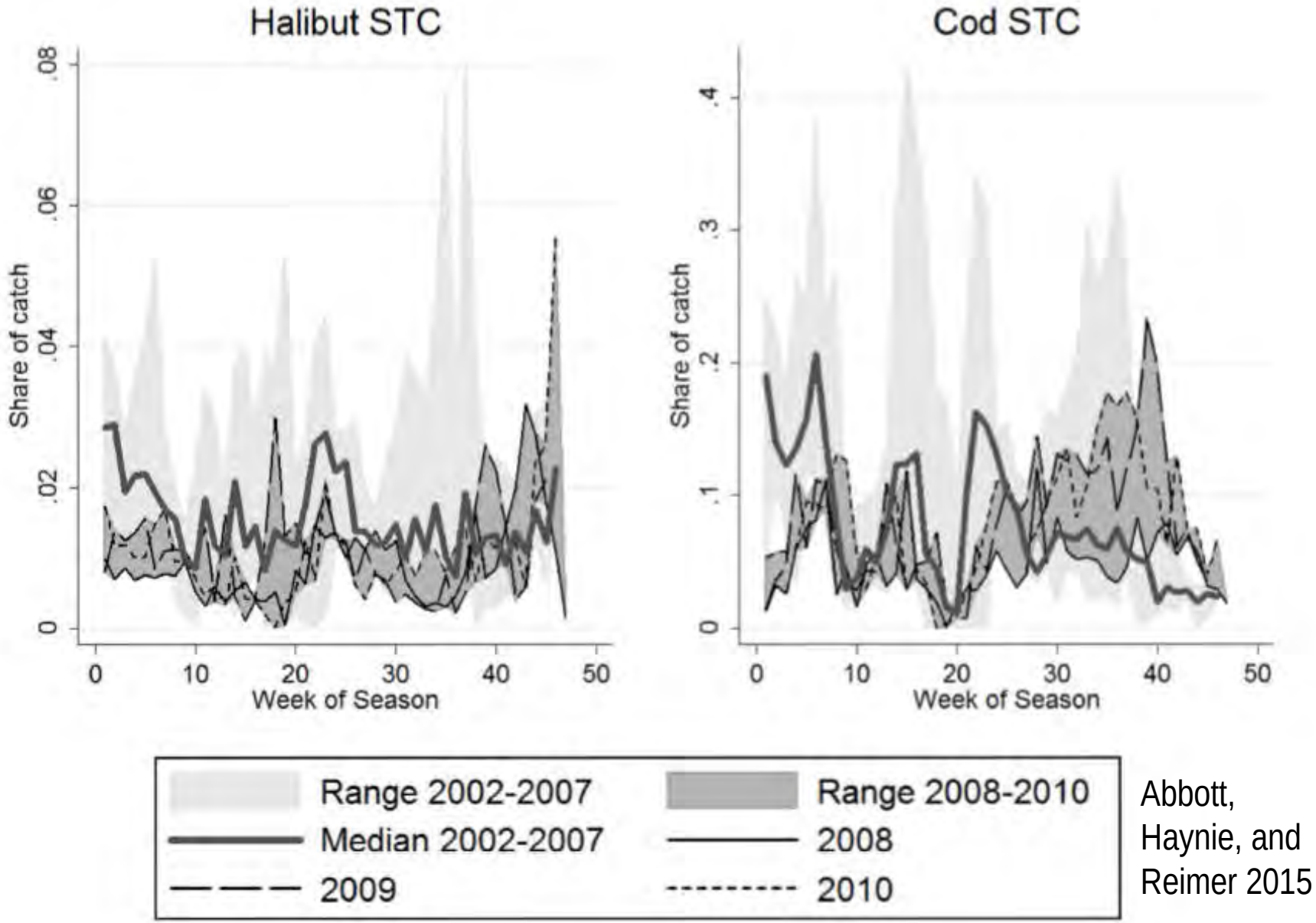
2008: Amendment 80 (A80) Catch Share System

- Designed to increase target catch and profits, reduce bycatch and discards and increased flexibility

- Vessels must join a cooperative or participate in the limited access fishery
- Coop vessels receive a share of 6 A80 target species and crab and halibut prohibited species catch quota
  - In practice the coop has treated the quota like an IFQ
- Also in 2008, these vessels had a decrease in cod allocation.

Abbott, Haynie, and Reimer. *Land Economics*, February 2015.

Weekly "Bycatch" Share of Total Catch



Abbott, Haynie, and Reimer 2015

How did vessels reduce their bycatch?

A story of “multiple margins”

1. Large scale choice of fishing grounds
2. “Reactive” spatial avoidance
3. Reductions in night fishing
   - a decrease of between 15 and 18% relative to those found in 2007. There is also a pronounced seasonality to the reduction in night-fishing.

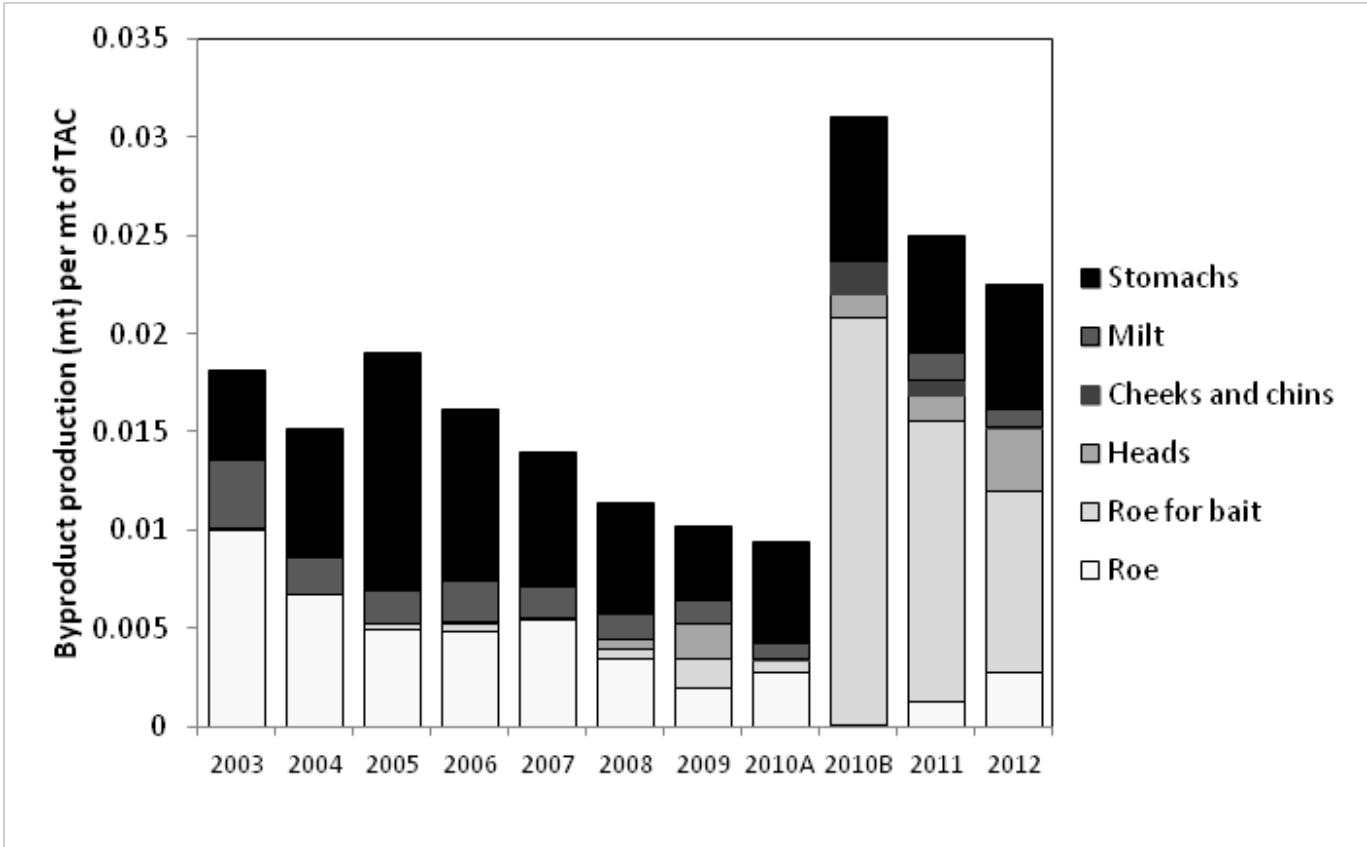
Fisheries management is largely about getting the incentives right

- Creating catch shares of target and bycatch species encourages efficient utilization of those species… but not necessarily other parts of the ecosystem

Large scale spatial avoidance: Sep - Dec

- No discernable large scale pattern of avoidance
  - Consistent with a late-season relaxation of avoidance efforts after uncertainty over multi-species quota scarcity is resolved

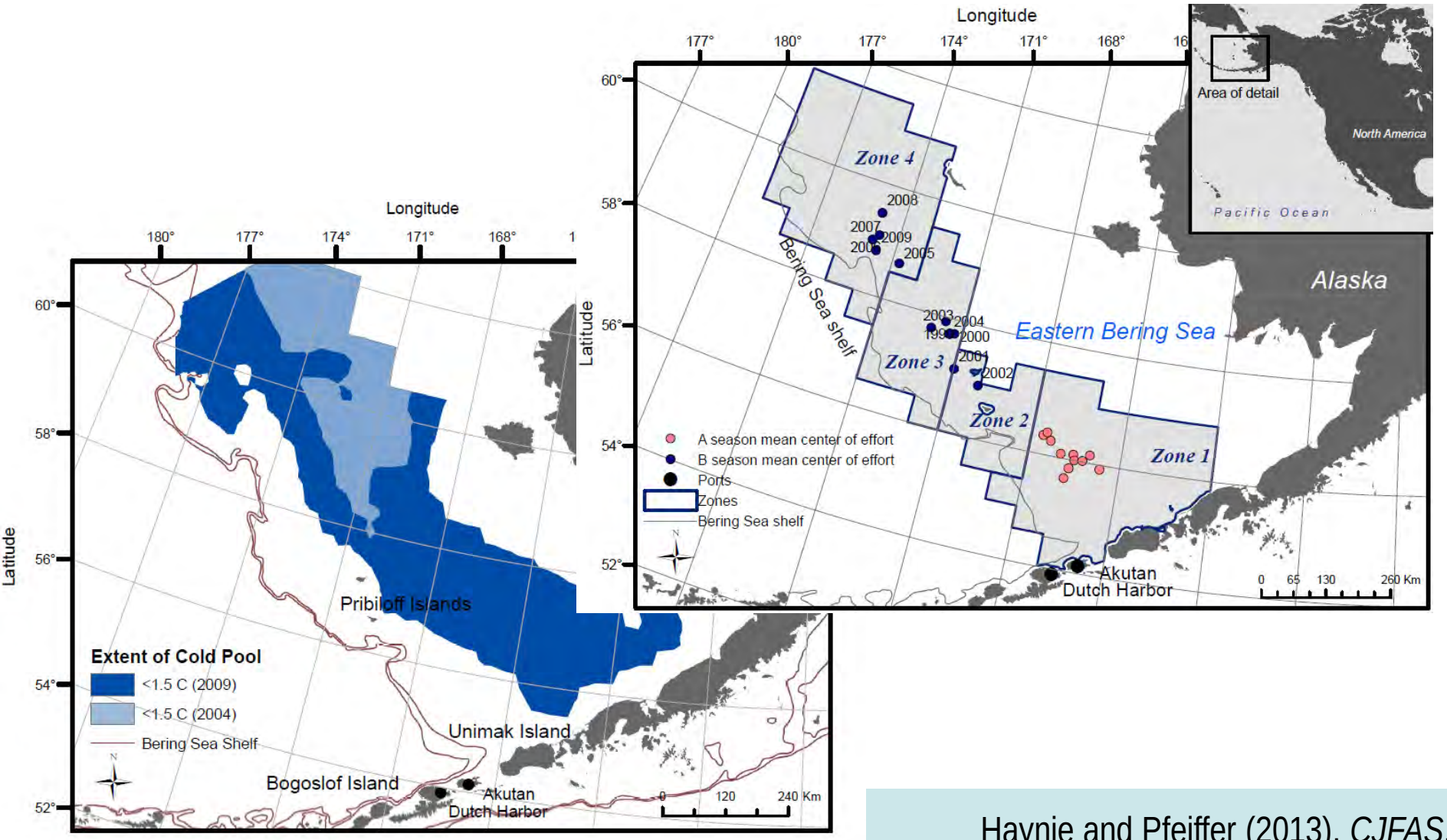
Significant increase in Pacific cod byproduct utilization under cooperatives



Significant increase in Pacific cod byproduct utilization under cooperatives

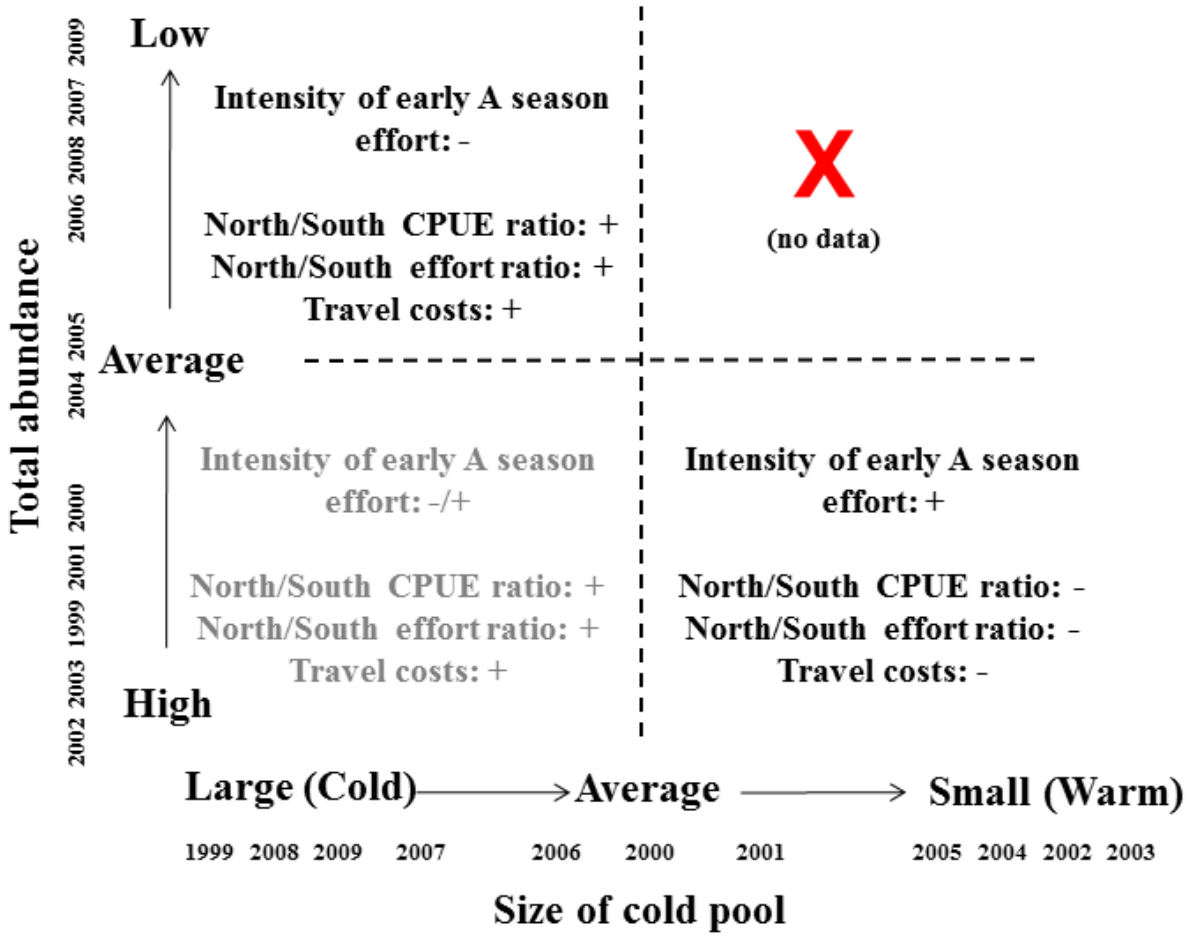
Pfeiffer and Haynie, *Under review*

Key Finding: The "march to the north" is not a consistent story for pollock catcher processors

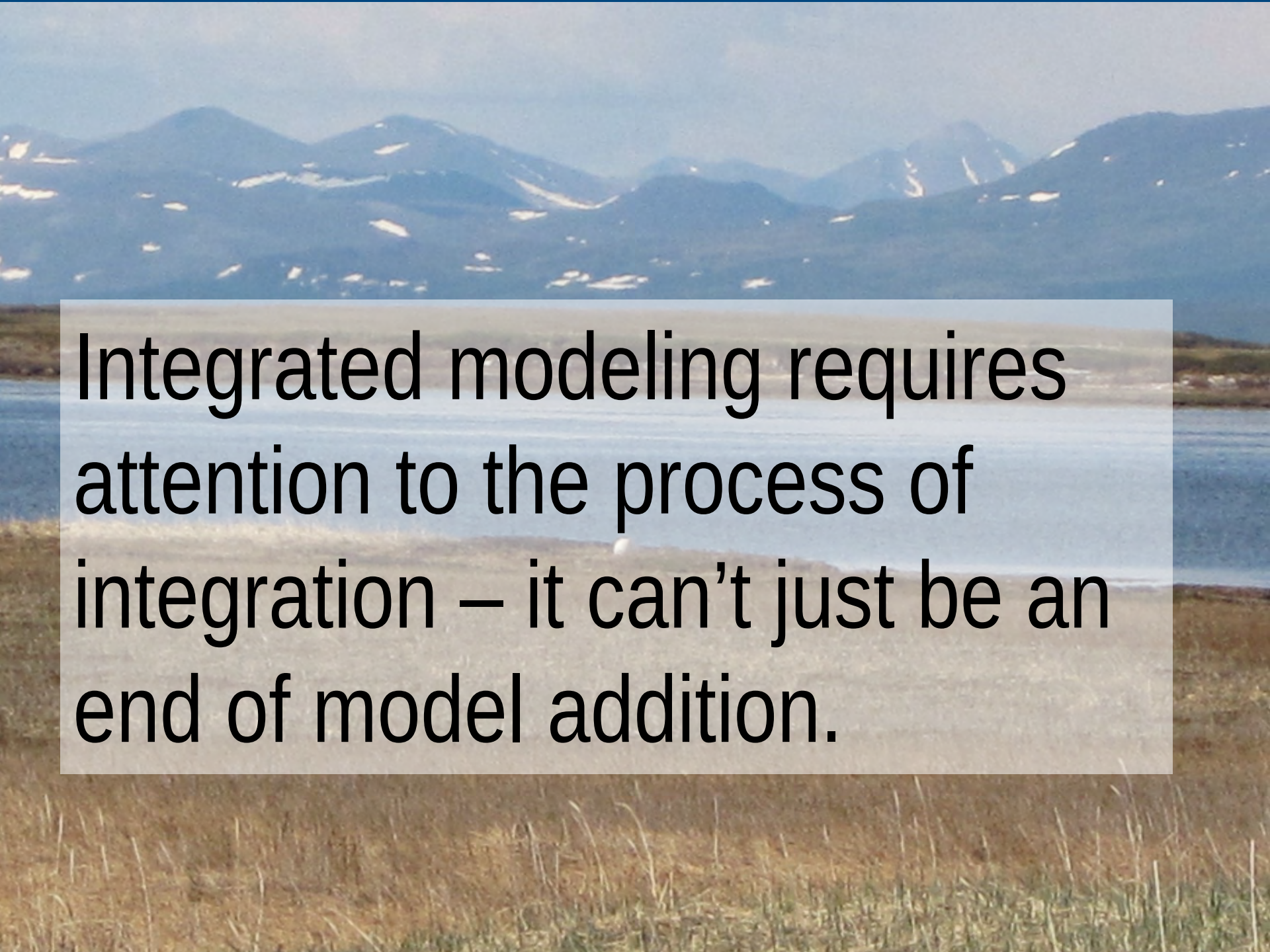


Haynie and Pfeiffer (2013), *CJFAS*.

Key Finding: Many types of uncertainty will interact in determining future behavior



Haynie and Pfeiffer, *CJFAS 2013*


Integrated modeling requires attention to the process of integration – it can’t just be an end of model addition.

Incentives can induce a wide range of changes in fishing behaviors

- Changes in time, location, and depth of fishing
- Gear changes such as excluders
- Increased communication about bycatch
- More effort can be exerted by vessels with lower bycatch avoidance costs

Fishermen – the experts – get to make the decisions and adapt to ever-changing fishing conditions.

Encourage transparency

For example,auctioning a small share of fishing quota would provide a regular market price -- the value for different uses. It would also ensure that the highest value users had access to quota.

FishSET

Spatial Economics Toolbox for Fisheries

FishSET's goal is to enable NOAA Fisheries economists and social scientists to better inform policy decisions by predicting how a variety of factors might influence fisher behavior.

Many modeling challenges exist. While predictive models are valuable tools for sustainable fisheries management and conservation, challenges to their development include preparing, integrating & updating many data sources, choosing appropriate models, and interpreting results.

FishSET provides:

1. **Superior data organization, analysis, and integration** for spatial models.
2. **Best management practices** for data, modeling, and model comparison.
3. **Many models in a single toolbox** for ease of model comparision and use. Combines several fisheries economics modeling approaches in one toolbox.

FishSET facilitates better and more expedient analyses to improve marine resource management.

What tools are in the FishSET toolbox?

Data Tools

Data Management & Integration Tool
Facilitates the development and integration of datasets for spatial modeling

Monte Carlo Tool
Simulates real fisheries data while preserving confidentiality, allowing better model testing and comparison.

Data Analysis & Mapping Tool
Enables graphical and geographic data viewing and prepares data for spatial modeling

Model Tools

Model Design & Selection Tool
Enables modeling of different combinations of variables and models

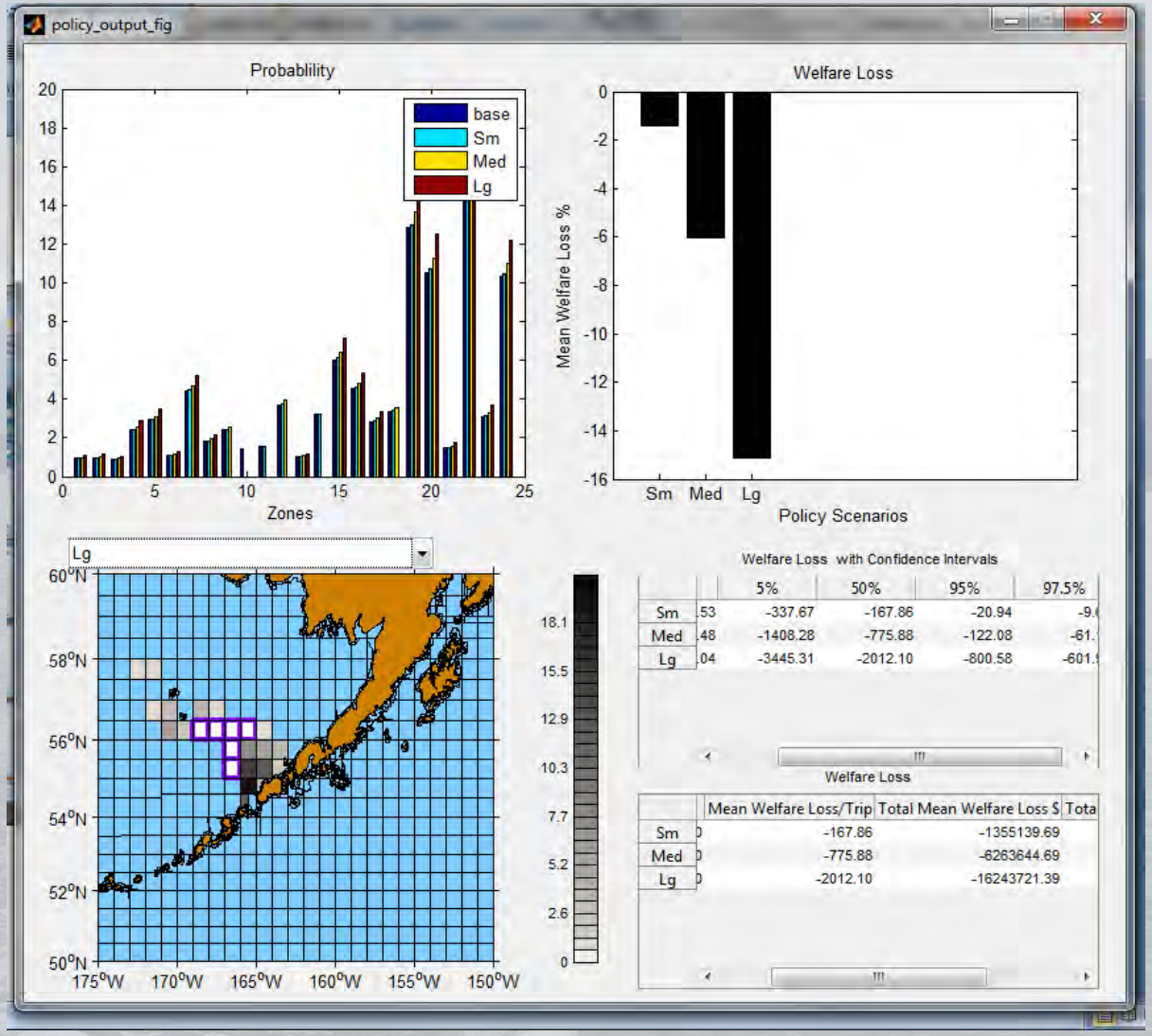
Modeling Tool
Runs standard, cutting-edge, and user-designed models

Model Comparison & Reporting Tool
Provides an extensive comparison of model performance and summarizes data, models, and results

Policy Tools

Policy Simulation Tool
Predicts location choices and estimates policy impacts

Policy Simulation Tool



Allows analysts and policy-makers to compare the impacts of potential policies


The right incentives, institutions, and tools can help us adapt to a changing environment.

Thank you!

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