



Observing Trends and Assessing Data for Commercial Fisheries

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Main Science Questions

According to the SEARCH Plans for Implementation (2005:vii), "The overall goal of the Study of Environmental Arctic Change (SEARCH) is to understand the nature, extent, and future development of the system-scale changes presently observed in the Arctic." The overarching SEARCH science question, "Is the Arctic system moving to a new state?" leads to six other science questions, one of which is, "How do cultural and socioeconomic systems interact with environmental change?" Both of these questions drive the science in this project.

How is climate likely to interact with humans in the arctic?

Climate-linked environmental changes will directly affect ecosystems that provide services to people—including processes that support human life. Social drivers of change in the Arctic, such as development and government policies, affect individual and collective decisions about resource use and both commercial and subsistence harvests, creating feedbacks that may change the ecosystems.

Development—mainly resource development and tourism—provides flows of jobs and money, while government policies affect services, infrastructure, money, and rules. These factors all influence resource use decisions. Climate change also impacts development activities in the Arctic, along with infrastructure, transportation, and provision of government services. Studying the interactions within these arenas of change, and evaluating the coping capacity of communities, will advance the systematic assessment of Arctic societies' vulnerability to climate change.

How does this project fit into the SEARCH science plan?

In keeping with the priorities of the SEARCH Implementation Plan, this project focuses on existing data. It is a first step in the long term SEARCH goal to "develop and deploy a pan-Arctic observing system that will enable [understanding and responding to change]."

We anticipated that existing data would not be sufficient to support analysis to understand arctic change. A major product of the project is therefore an assessment of the adequacy of existing data and recommendations for improvements in the observing system.

<http://www.search-hd.net>

Data Sets

Goals

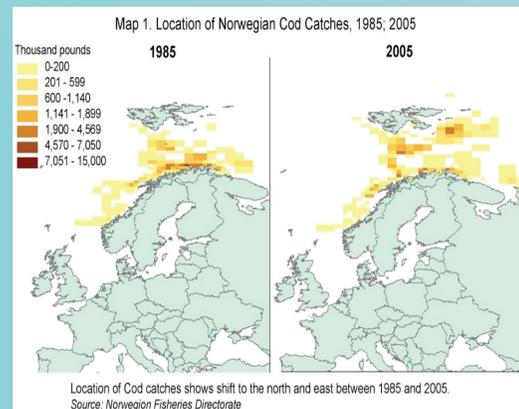
The goal of this project was to identify social and economic indicators of change in arctic resource domains, collect existing data sets, and prepare them for use in time-series analyses. The data include measures of socioeconomic variables at an intra-regional (or county level) in the context of development and industrial activities. Data are available in downloadable Excel and SPSS tables.

Variables

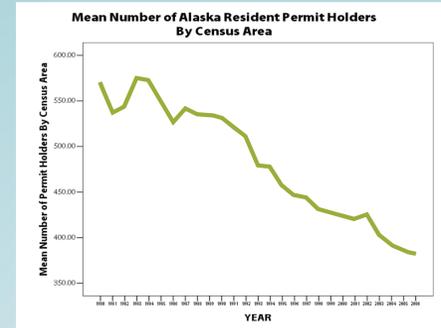
Variables include: fisheries catch in metric tons, #fishing permit holders, #fishing permits issued, total kilograms landed, estimated gross earnings, #fishermen who fished, value of fish landed, and #permits fished. Data collection for these variables is individually interpreted by national agencies within each arctic country and not available for all variables.

Scope

The project's commercial fisheries database currently consists of catch and landings data from 1980-Present for commercially important species north of 60°N and in Alaska waters. Datasets were collected to date for Alaska, Iceland, Norway and Chukotka at the regional levels. Alaska: Shoreside economic data for all Alaska fisheries by census area and Catch-Price-Value data of major Bering Sea commercial species: Crab, Halibut, Herring, Salmon; Iceland: Landings by county and port; fisheries earnings; 31 species; Norway: Catch and location of catch; GIS geodatabase of catch data; Landings and value by county; Atlantic Cod, Atlantic Mackerel, Blue Whiting, Capelin, Pollock, Haddock, Shrimp; Russia (Chukotka): Chum Salmon Landings.



Possible Scales of Analysis



Shoreside Socioeconomic Data

Example: Although the North Pacific /Bering Sea regime shift of 1977 resulted in increased catches of some pelagic stocks such as salmon and pollock, the overall number of resident permit holders in Alaska is in decline. A critical examination of socioeconomic drivers of change in fisheries (legislative, market, and cultural) is necessary and should be pursued in conjunction with studies on changing abundance and stock range extensions. Potential barriers to entry for arctic residents in the context of changing stock conditions of the future should be a priority in management planning (Lowe 2008).

Landings Data

Example: Historically, the Icelandic fishing economy and culture has been shaped by cod fishing. As a feeder stock for cod, capelin has also been economically central for Iceland since the collapse of herring stocks in the 1960s and in buffering gradual losses in cod catches. However, Icelandic capelin fisheries are threatened today and in serious decline. Iceland's recent banking collapse has caused a renewed focus on its commercial fishing sector, but the decline of fisheries like capelin begs the question of future viability of this industry and the Icelandic economy. Research also demonstrates key interactions between herring, capelin, and cod in climate change contexts require an ecosystem approach to management. (Hamre 2003).

Geospatial Tracking of Range Extensions

Example: Geospatial modeling of movement in cod stocks demonstrates a northeasterly trend as does recent research on capelin spawning areas. Although joint management regimes between Norway and Russia are currently in place for the Barents Sea, new range extensions will challenge long standing boundary disputes.

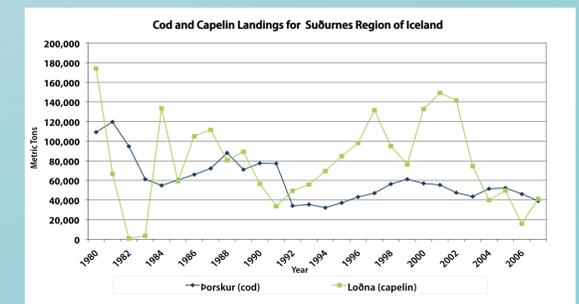
Data Applications

The data should be used to answer questions about how exploitation and governance of fisheries resources are changing in the arctic in response to changes in abundance and geographic dispersion of stocks. They can be used to construct key stories explaining what changes we can attribute to climate change and those which have little to do with it. Ultimately, the data should be used to identify what changes are occurring and how people are adapting to them. Central questions should include: how have options for the arctic's commercial fishing people and communities changed within the current warming trend? What options do they have for the future? Arctic resident access to resources is a central issue across the AON social indicators project's domains.



Commercial Fisheries Observation In the Future

Planning arctic fisheries of the future is dependent upon research that addresses and examines change for successful development of new management plans and governance structures accommodating: international boundary conflicts, indigenous rights to resources, and organization/oversight of arctic marine science initiatives. Also important is the need to understand how changes in fisheries fit within a broader resource use and development context in the arctic, for example and especially in the case of oil and gas development. The Arctic Observation Network Social Indicators project takes a first step in examining what kind of arctic resource change and associated human dimension data are available and how best they can be organized.



Recommendation:

Standardization and/or comparability of time series data sets will be important for the future monitoring and modeling of changes in the arctic environment and associated impacts on fisheries such as diminishing sea ice cover, ocean acidification, species range extensions, and increasing production.

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