North Pacific Fishery Management Council

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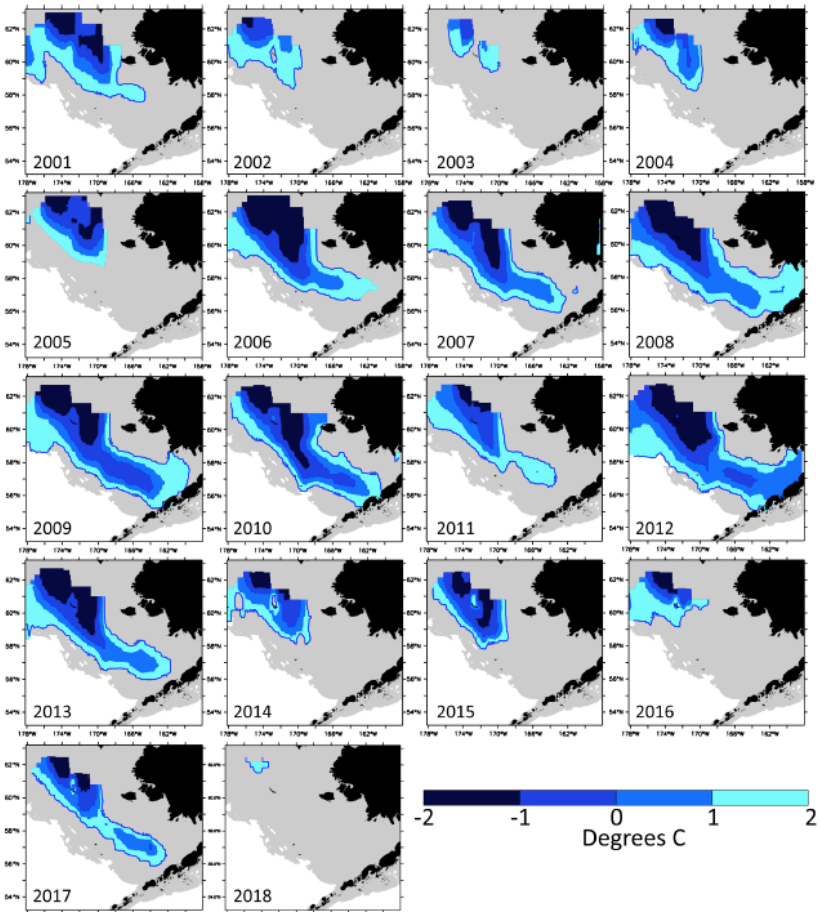
Shifting Stocks and Changing Ocean Conditions

DRAFT May 31, 2019

Background

The North Pacific is currently experiencing significant changes in ocean conditions. Recent monitoring of oceanographic and biological parameters indicate that unprecedented ecological conditions are currently being observed, especially on the Bering Sea shelf and in the northern Bering Sea. For example, the absence of the cold pool (bottom temperatures below 2° C) in the Bering Sea in 2018 appears to have caused major changes in the distribution of commercially important species, including pollock and Pacific cod. The adjacent figure shows the changes in the distribution of the cold pool since 2001.



How are these conditions being addressed in current management?

Surveys and long-term monitoring

There are several longstanding North Pacific surveys that create and maintain indispensable data that substantially contribute to our understanding and sustainable management of fish populations, fisheries, and the communities dependent upon those fisheries. In recent years we have seen rapid changes in environmental conditions and fish abundance and distribution in response to the marine heat wave, and changes in the extent of the Bering Sea cold pool. Maintaining frequent surveys makes it is possible to observe rapid changes in fish abundance in response to these conditions. Monitoring also allows us to assess the underlying ecosystem state which, if rapidly changing, is important to document to assess whether the underlying assumptions of the ecological and assessment models are still reliable. The North Pacific trawl surveys are explicitly multispecies, and obtain not only data on abundance and distribution of fished stocks, but also the specimens needed for age composition, weight–at-age, and other metrics used in assessment models. The surveys also provide important information on the ecosystem, including environmental conditions, and provide a platform for investigations of food habits and other additional research on target species. With climate change and warming occurring much faster than initially expected, recent experience supports the notion that frequent surveys may be the only way to monitor the impacts of these events on fish stocks.

Stock assessments and harvest specifications

Most North Pacific stock assessments accommodate natural mortality factors based on survey data. As such, the individual assessments can take into account changes in distribution driven by temperature, and survival of fish and prey due to oceanic heat waves or a lack of cold pool. In some cases, changing oceanic conditions have caused some stocks to move outside of the normally surveyed areas. There has been an increased effort in recent years to extend the trawl survey coverage north and west of the standard eastern Bering Sea shelf survey to respond to these spatial shifts.

The Council also receives an annual Ecosystem Status Report that provides an ecological context to their recommendations about harvest specifications. The reports synthesize ecosystem indicators to describe recent conditions in the relevant ecosystem area, as well as summarizing how commercial fish species, their predators and prey, and other protected marine resources responded.

Management evaluation

The Council has also initiated other projects to address changing ocean conditions. In 2018, the Council adopted a Bering Sea Fishery Ecosystem Plan, which establishes a framework for the Council's continued progress towards ecosystem-based fishery management (EBFM) of the Bering Sea fisheries, effected through research projects (Action Modules) to address Council priorities. One of the Council's first projects identified through this framework is to address the effects of climate change on fish, fisheries, and the Bering Sea ecosystem, and develop considerations for fishery management. The Council project leverages ongoing work through the NMFS Alaska Integrated Ecosystem Assessment program and other ongoing research to highlight key vulnerability and climate-resilience information for the public and Council.

What are the North Pacific Council's concerns for the future?

In April 2019, the Council was informed by the Director of the NMFS Alaska Fisheries Science Center that significant activities that have historically been funded are now unfunded in FY19, and this erosion of capabilities is expected to continue into future years. The implications of reduced funding for basic science are of great concern to the Council, and will have deleterious downstream impacts to our management process. The North Pacific Council has repeatedly emphasized that surveys, and funding for process studies, are a critical ongoing monitoring need and are among the highest priorities for research identified by the Council.

For the Council, the implications of losing funding for surveys, process studies to inform stock assessments and ecosystem understandings, ecosystem modeling, and research to improve surveys and assessments include:

- Increased uncertainty in estimates of annual catch limits due to loss of survey effort. This translates to more conservative harvest quotas and more inseason closures - lower harvests and higher fishing costs.
- Slowdown in production of reports related to future climate and ecosystem impacts. This provides the Council with fewer tools to consider management resiliency in the face of changing conditions, and the potential future impacts of management decisions.