

ICES/PICES Session B

Responses of living marine resources to climate change and variability: learning from the past and projecting the future

Conveners:

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Shifts in distribution and abundance of living marine resources can have dramatic ecological and economic consequences and challenge fisheries managers faced with providing effective advice and stewardship using an ecosystem-based approach. Over the past three decades, warming has occurred in many ecosystems that produce high fishery yields. Research worldwide has documented historical and ongoing shifts in the geographical/latitudinal distribution and/or abundance of key species of marine plants and animals and, in some cases, whole communities. However, projecting future changes may not be a straightforward exercise and some studies suggest that future range shifts are unlikely when critical habitat and local reorganization of populations are considered. Furthermore, there is disparity in the projected response of primary and secondary producers at local and large-scale ecosystems. The dichotomous nature of these assessments and projections calls for a greater focus on historical and contemporary data from marine ecosystems that have experienced substantial climate variability and/or change. Understanding how various factors have interacted to affect historical responses of species to climate variability and change and the development of process-based knowledge of the causes and consequences of range shifts will be critical if we hope to project future changes in distribution and productivity of living marine resources.

The present theme session invites presentations on changes in the distribution, abundance, and productivity of living marine resources that take into account historical patterns to explore underlying processes and develop tools to help build predictive capacity of future changes. Presentations are particularly welcome that address community- and/or ecosystem-level processes and projections. This session hopes to continue the dialogue between fisheries biologists and biophysical modellers by also inviting presentations that discuss how process knowledge has been utilized within models to project changes in key ecosystem characteristics such as ocean circulation, temperature, oxygen, lower trophic level productivity, and keystone predators. Finally, this session also offers a venue for more mature examples of research, linking patterns/observations to processes/mechanisms and predictions/projections to “real world” management concerns/implications.

The session invites presentations that cover the following topics:

- Historical, contemporary, and projected impacts of climate variability and change on living marine resources. Studies that exclusively focus on future projections (using IPCC-class climate and earth system models) will be considered but must also describe how historical and contemporary data were used;
- Multiple trophic levels, including phytoplankton, zooplankton, fish, seabirds, turtles, and marine mammals;
- Conservation, management, and recovery plans that consider the impacts of climate on marine ecosystems;
- Assessments and models of single species, populations, trophic groups, and ecosystems as related to climate;
- New and existing methodologies that incorporate climate variables into marine ecosystem and single-species models.