ICES/PICES 6ZPS 2016 S2/ Response of zooplankton communities to changing ocean climate
Or
ICES/PICES 6ZPS 2016 S8/ New technologies and approaches in zooplankton trophic studies

Title: Evaluating the Impacts of Fisheries and Climate Change on Polar Marine Ecosystems: Comparing the Beaufort Sea Shelf with the Antarctic Peninsula Marine Ecosystem using Ecopath with Ecosim models.

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Ecopath with Ecosim models were created for two polar regions in order to compare food web changes from 1970-2000s. For both the Antarctic Peninsula (FAO area 48.1) and the Canadian Beaufort Sea, changes within the systems have resulted from changes in climate and fishing pressure. Drivers for both models include sea ice, sea surface temperature (SST) and catches of harvested species, in order to re-create past data trends. For the Antarctic Peninsula, multi-stanza groups were used to represent krill and allow for different feeding and environmental stressors at various life stages. Overall declines in sea ice and krill (all life stages) cause large reductions across all trophic levels of the food web, reducing the biomass of nearly all species. Scenarios testing the model sensitivity to environmental drivers and harvest levels identify the sensitivity of the system to environmental changes. Increasing the past catches to the CCAMLR quota level results in minimal differences (>3% change in biomass) for all species groups when compared to the fitted model using historical catches. For the Beaufort Sea, ecosystem biomass remains stable over the simulation, with decreases in sea ice weakening the sea ice to detritus to benthos pathway. Increases in SST favour smaller zooplankton, however there are no significant decreases across zooplankton groups within the model. Fisheries operating within the Beaufort Sea show minimal impacts. For both polar systems, the success of zooplankton species is a key factor in determining large-scale ecosystem changes. Furthermore, changes in environmental conditions are shown to be more severe than fisheries removals.

Keywords: Antarctic Peninsula, Beaufort Sea, Ecosystem Model, Ecopath with Ecosim, Polar Ecosystem, Antarctic Krill, copepods, Fisheries, Harvest, Climate Change

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