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# Ocean Acidification and Warming effects on important Socio-Economic and Ecological Species in a Sub-Arctic Marine Ecosystem

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The Arctic is undergoing fast paced changes due to the amplified global change drivers and their effects on biophysical processes there. In particular, ocean acidification (OA) and global warming are likely to affect marine ecosystem processes with severe consequences for livelihoods that depend on natural resources from these ecosystems. Here, we examined those combined effects by running a series of scenarios of OA and warming on an end-to-end ecosystem model (Atlantis) parameterized for the waters around Iceland, and compared those to a baseline projection with no warming and OA. We assessed the resulting population dynamics for a subset of species in Icelandic waters that are important for their economic (catch value), social (number of participants in fisheries), or ecological (keystone species) importance. We used literature-derived values for the sensitivity of these species and functional groups to OA and warming. We show that the responses to OA and warming vary by species and trophic levels; generally, under warming and acidification scenarios several planktonic groups and forage fish improved their populations, while benthic groups and predatory fish populations decreased. When examining the combined effects of OA and warming under current conservative harvest rates for the largest catch-value species, Atlantic cod, we find that surprisingly this population remains stable, even when considering the strongest acidification and warming. However, when the model projects reductions in biomass of Atlantic cod, other species in the ecosystem increase likely due to reductions in competition and predation. Our results highlight possible cascading effects through trophic networks on both ecological and socio-economically important species, and the need for more ecosystem modeling of global change drivers to find such effects.