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Title: *Benthic diversity vulnerability to increasing temperatures and sea ice reduction in the changing ecosystems of the Bering and Chukchi Seas*

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The seasonally ice-covered Bering and Chukchi Sea shelves are currently exposed to increasing seawater temperatures and experiencing major reductions in sea ice cover. In these Pacific-influenced ecosystems, high biomass, abundance and diversity of benthic organisms are observed, mainly due to high water column production and tight benthic pelagic coupling in the continental shelf. Changes in sea ice extent, thickness and duration can be expected to affect the annual primary production of ice algae and phytoplankton. Therefore there will be critical consequences for benthic populations that directly influence the functioning of the ecosystem, its trophic dynamics and organic carbon cycling.

This study examined the structure, function and diversity of benthic macroinfaunal organisms in the diversity and biomass “hot spot” areas of the Bering and Chukchi Seas and evaluated their vulnerability to increasing temperatures and sea ice reduction, as well as to predict potential changes to marine food webs. Samples were taken in four high diversity and productivity areas (southwest of St. Lawrence Island, the Chirikov Basin north of St. Lawrence Island, in the southeastern Chukchi Sea north of Bering Strait, and within the head of Barrow Canyon) resulting in a collection of about 280 van Veen grabs from depths ranging from 35 to 130 m. Samples were collected at the same stations in three consecutive years: 2010, 2011 and 2012. Benthic infaunal diversity, abundance, biomass and production were determined in relationship with physical and chemical data. A longer existing data set was also used to compare time-series results over the last 30 years. Changes observed include decline and a switch in dominant bivalves species (Nuculana radiata and Ennucula tenuis) in the St. Lawrence Island area, a decline in tube dwelling amphipods (Ampelisca macrocephala and other Ampelisca species) while some tube dwelling polychaetes (Ampharete spp.) increased in abundance and biomass in the SW Chirikov Basin. There are also indications of a decline in biomass in the southeastern Chukchi Sea. All of the observed changes have implications for the ecosystem functioning and energy transfer to higher tropic levels.

This study is a contribution to the international Distributed Biological Observatory (http://www.arctic.noaa.gov/dbo/index.html) that is being implemented in the Pacific-influenced Arctic.