

Species invasion and diversity in benthic macrofaunal communities in the Pacific Arctic

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There is growing evidence of increased Pacific water transport into the Arctic that is influenced by variations in atmospheric forcing. One of the empirical and theoretical predictions for a future Arctic impacted by increased Pacific water transport is that new taxa will expand or invade the Arctic ecosystem. However, well-documented examples are still scarce due to the limited number of time-series measurements in the Arctic, particularly for benthic organisms. Although benthic organisms are normally stationary and less mobile than fishes, seabirds and mammals, it seems relevant that benthic organisms with pelagic life stages will be less limited in their expansion abilities. In this study, the relationship between the number of benthic macrofaunal taxa and atmospheric forcing was investigated in the Pacific Arctic. Average taxon number of benthic macrofauna for 2010–2012 has increased significantly compared to 2000–2006 on the continental shelf area from south of St. Lawrence Island in the northern Bering Sea to just north of St. Lawrence Island in the Chirikov Basin, likely caused by the difference in magnitude and location of the Aleutian Low. By comparison, the biomass-based Shannon-Weaver diversity index did not reflect the changes in taxon number of benthic macrofauna. These results indicate increased invasion of new taxa into the region for 2010–2012 compared to 2000–2006, but the biomass of new taxa is negligible when compared with the total benthic macrofaunal biomass. Our findings demonstrated indications of ongoing changes that could continually be facilitated by climate change to future Arctic marine ecosystems in the Pacific Arctic region.

Keywords: Arctic, Benthic community, Pacific water transport