

Benthic non-indigenous species in ports of the Canadian Arctic: risks associated with global warming and shipping activity

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Abstract:

In recent years, high-latitude areas have shown a disproportionate increase in temperature, and their coasts are highly susceptible to climate change impacts. These projected impacts together with increased shipping activity are expected to increase the risk for establishment of ship-mediated invasive species. However, in contrast to the two most populated coasts in Canada, the distribution of taxa along the Arctic coastline is poorly known, and the extent of non-indigenous species (NIS) incursions in the area is unknown making it difficult to determine origins of new species and predict impacts to native communities. Recent surveys of high risk ports indicated the presence of several new benthic marine species for the Canadian Arctic that are considered cryptogenic along with a number of taxa representing new records within the ports or the more extended, adjacent surrounding regions. Although no known invasive species have been detected in these surveys, species distribution modelling under current environmental conditions predicted that at least three of eight candidate high risk benthic invasive species, have suitable habitat conditions for survival and reproduction in the Hudson Complex and Beaufort Sea regions of the Canadian Arctic. Under future environmental conditions, a northward extension of suitable habitat was predicted in the same regions for all 8 modelled species. These results are now being combined with shipping and habitat sensitivity in an ecological risk assessment framework to evaluate species-specific risk by pathway and year. Preliminary results show that discharges from domestic vessels generally pose a higher relative risk than international vessels for NIS of concern.

Key word: shipping, climate change, benthic invertebrates, nonindigenous species, species distribution modelling

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