

Ballast water of domestic ships as a pathway for the introduction of non-indigenous mesozooplankton in coastal Nunavik, Canada

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Abstract:

Ballast water discharge is a major source of nonindigenous species (NIS) introductions globally and in Canadian waters. This water is carried in ship tanks, where surviving organisms may be released in new environments after deballasting. Arctic economic development and consequential rise in sea traffic, combined with sea ice reduction, could increase the rate of introductions. Ballast water exchange regulations for international vessels, under the "Canada Shipping Act", were designed to limit NIS introductions in Canadian waters. However, domestic ships, navigating within Canadian waters, are currently exempt from it. However, some domestic vessels undergo ballast water exchange on a voluntary basis. We are assessing the risks of NIS introduction to Nunavik waters by quantifying species composition and abundance of mesozooplankton in ballast waters discharged by a domestic vessel that regularly transits to this region of the Canadian Arctic. Comparison of voluntarily exchanged ballast water revealed lower efficacy in reducing plankton abundance relative to unexchanged ballast water. The mesozooplankton community in the unexchanged ballast water tanks experienced higher mortality than in the exchanged tanks. However, species composition in exchanged tanks was similar to the community in the port of destination, whereas unexchanged tanks transported more NIS.

Data obtained through this study will improve our knowledge of introductions in the Arctic and contribute to the revision of actual ballast water regulations.

Keywords: Ballast water discharge ; Non-indigenous species ; Mesozooplankton ; Canadian Arctic ; Deception Bay ; Port of Quebec ; Domestic vessels, Voluntary ballast water exchange ; Strait of Belle Isle ; Strait of Jacques Cartier

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