

PAME II-2015 Agenda Item 4.8
AMSA Recommendation II(E)
AOR Final Report Recommendation 3
Aquatic Invasive Species in Arctic Marine Waters Subject to U.S. Jurisdiction

Background

AMSA Report Recommendation II (E) provides:

"That the Arctic states should consider ratification of the IMO International Convention for the Control and Management of Ships Ballast Water and Sediments, as soon as practical. Arctic states should also assess the risk of introducing invasive species through ballast water and other means so that adequate prevention measures can be implemented in water under their jurisdiction."

AOR Final Report Recommendation 3 provides in relevant part:

"Arctic states should also encourage ratification to enable entry into force and implementation of the Ballast Water Management Convention and research into ballast water management systems that are effective in colder settings of polar regions."¹

PAME I-2015 adopted a Record of Decision (ROD) under AMSA II(E) "inviting member governments to submit to PAME II-2015 information on the nature, extent and impact of aquatic invasive species within Arctic marine waters subject to their jurisdiction." This paper responds to that invitation.

I. Introduction

Invasive species have a profound effect on aquatic ecosystems often resulting in the displacement of native species, reduced biodiversity, and the alteration of community structure and food webs. In addition to the severe and permanent damage to the habitats they invade, invasive species are known to adversely impact the socio-economic fabric, inhibit recreational and commercial activities, decrease the aesthetic value of nature, and serve as vectors of wildlife and human disease. More than a decade ago, it was reported that invasive species cost the United States, alone, more than \$120 billion in damages every year². Most invasions are linked to human activities, either deliberate or unintentional, and may include biofouling on vessels,

¹ Chapter 3 of the AOR Final Report notes: "Recent growth in Arctic regional marine operations and trans-Arctic voyages, as well as evidence of alien and invasive species in the Arctic, highlight the need for ratification and entry into force of the BWM Convention and/or adoption of other domestic prevention measures as more regular summer voyages are conducted in Arctic waters." AOR Final Report, p. 32.

² Pimentel et al. 2005. Update on the environmental and economic costs associated with alien-invasive species in the United States. *Ecological Economics* 52:273-288

ballast water exchange, aquaculture and aquaria escape, and natural resource management projects (as these projects often take biologists, technicians, and their equipment to many different habitats).

II. Aquatic Invasive Species in Arctic Waters Subject to U.S. Jurisdiction

Although marine invasions are known from all latitudes and global regions, relatively little is known about the magnitude of coastal invasions for high latitude systems in the United States.³ Globally, the documented number of introduced species (with established, self-sustaining populations) is greatest in temperate regions and declines sharply at higher latitudes.⁴ This observation may be a result of differences in historical baseline knowledge, propagule supply, resistance to invasion, and/or level of disturbance.⁵

This global trend of a reduction in aquatic invasive species at higher latitudes appears to be true in the United States as well: the scant information available shows a relatively pristine Arctic as it pertains to aquatic invasive species⁶. However, there is a severe lack of information on this front: Ruiz et al. sampled only in Dutch Harbor, Alaska, and an exhaustive literature search uncovered almost no studies assessing even a baseline inventory of aquatic invasive species in the Arctic marine waters subject to U.S. jurisdiction. Though the better-studied terrestrial habitat has uncovered extensive invasions in northern Alaska,^{7,8,9} at this time we do not have reliable information on the “nature, extent and impact of aquatic invasive species” in Arctic marine waters subject to U.S. jurisdiction.

Given the potential harm of aquatic invasive species, it is clear that baseline scientific assessments need to be undertaken to gather more information on this subject.

III. Potential future invasions

Though little information exists on aquatic invasive species in Arctic marine waters subject to U.S. jurisdiction, there is a high potential for future invasions into the area. Research modeling the predicted spread of invasive species along the west coast of the U.S. based on habitat suitability and future warming shows that four extremely harmful invasive species have the potential to move into Arctic waters in the near future.¹⁰ Additionally, shipping through both the Northwest and Northeast Passages during summer months has generally been modestly

³ Ruiz et al., 2006. Biological Invasions in Alaska’s Coastal Marine Ecosystems: Establishing a Baseline. *Report submitted to Prince William Sound Regional Citizen’s Advisory Council and U.S Fish & Wildlife Service.*

⁴ Ruiz and Hewitt, 2009. Latitudinal patterns of biological invasions in marine ecosystems: a polar perspective. *In: Smithsonian at the Poles: Contributions to International Polar Year Science.*

⁵ *Id.*

⁶ Ruiz et al., 2006. Biological Invasions in Alaska’s Coastal Marine Ecosystems: Establishing a Baseline. *Report submitted to Prince William Sound Regional Citizen’s Advisory Council and U.S Fish & Wildlife Service.*

⁷ Bella, 2009. Invasive plant species response to climate change in Alaska. *US Fish & Wildlife Service Report.*

⁸ Oldham, 2007. 2006 Survey of exotic plants along Northwest Territories Highways. *Report for the Department of Environment and Natural Resources.*

⁹ Carlson and Shephard, 2007. Is the spread of non-native plants in Alaska accelerating? *In: Meeting the Challenge: Invasive Plants in Pacific Northwest Ecosystems.*

¹⁰ De Rivera et al., 2011. Potential for high-latitude marine invasions along western North America. *Diversity and Distributions* 17:1198-1209.

increasing in the last several years and is projected to continue to do so. This will likely facilitate the transport of species between the Pacific and Atlantic Oceans. Indeed, the volume of trans-Arctic shipping traffic has been increasing measurably, albeit from a very low base; Northern Sea Route vessel transits increased from only a few in 2009 to 71 in 2013.¹¹ Though we cannot be sure that this increase in shipping will bring with it an increase in aquatic invasive species, the two seem to be tightly coupled, and that trend has been reliably demonstrated elsewhere previously.¹² Finally, it has recently been estimated that the Arctic contains vast reservoirs of untapped oil and gas¹³. An increase in exploration for these resources in the U.S. Arctic will also likely augment the number of future invasions, for which some International Guidelines to management have already been put forth.¹⁴ Such an increase in invasive species would likely have significant adverse ecological and economic consequences.¹⁵

IV. USA Recommendation

The USA recommends that PAME II-2015 adopt one or more RODs that:

- Invite the PAME Secretariat to contact the CAFF Secretariat to explore the exchange of information on any projects or initiatives undertaken by each Working Group on aquatic invasive species and how PAME and CAFF might collaborate in addressing the threats posed by aquatic invasive species to the Arctic marine environment;
- Invite PAME member governments to inform PAME I-2016 on whether, and if so how,
 - they regulate ship ballast water in Arctic waters subject to their jurisdiction;
 - they are implementing IMO's 2011 *Guidelines for the Control and Management of Ships' Biofouling to Minimize the Transfer of Invasive Aquatic Species (Resolution MEPC.207/62, 15 July 2011)* in Arctic waters subject to their jurisdiction;
 - they are implementing the IPIECA/OGP *Alien Invasive Species and the Oil and Gas Industry: Guidance for Prevention and Management* (2010) in Arctic waters subject to their jurisdiction; and
 - they are applying any innovative measures to address the threats posed by aquatic invasive species in Arctic waters subject to their jurisdiction.
- Invite the United States to submit a paper to PAME I-2016 on Hazard Analysis and Critical Control Points (HACCP) planning as a management tool that provides a structured method to identify risks and focus procedures in natural resource pathways activities to avoid and/or mitigate the unintended spread of aquatic invasive species; and

¹¹ Miller and Ruiz, 2014. Annual transits of the Northern Sea Route (NSR) during the period 2009-2013. *Nature Climate Change* 4:413-416.

¹² Sebens et al. 2013. The risk of marine bioinvasion caused by global shipping. *Ecology Letters* 16:782-790

¹³ Bird et al. 2008. Circum-Arctic Resource Appraisal: Estimates of Undiscovered Oil and Gas North of the Arctic Circle. *U.S. Geological Survey Fact Sheet 2008-3049*.

¹⁴ IPIECA Report: Alien Invasive Species and the Oil and Gas Industry. 2010. *International Association of Oil and Gas Producers Report Number 436*.

¹⁵ Pimentel et al. 2005. Update on the environmental and economic costs associated with alien-invasive species in the United States. *Ecological Economics* 52:273-288

- Encourage Arctic States, other Arctic Council Working Groups, Observers and stakeholders to direct additional resources for purposes of collecting baseline information and gaining a better understanding of the nature, extent, and impact of invasive species in Arctic waters. This information will be indispensable for making future assessments and determining the impact of any future spread of invasive species.