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Project Description

Memorandum to Senior Artic Officials *12/02/2016*

Arctic Invasive Alien Species

Project description

Overall goal: Prevent the introduction of invasive species in Arctic marine, coastal, freshwater, and terrestrial ecosystems, and through establishing a baseline, improve management of on-going invasions using risk-based assessment and management approaches.

Motivation: This effort is particularly urgent for the Arctic region. Rapid climate change is making the region more vulnerable to invasive species introductions, and at the same time a rapid increase in human activity and transit and energy development in the region is increasing the chance of introduction of new and invasive species. There is an immediate opportunity—already largely lost in many other regions of the world—to proactively build resilience to the risks posed by invasive species to the Arctic's unique social, economic, and environmental systems.

Actions: Consistent with Recommendation 9 of the Conservation of Arctic Flora and Fauna (CAFF) working group's 2015 *Actions for Arctic Biodiversity Assessment 2013-2021*, we will develop a collaborative process to: "Reduce the threat of invasive alien/non-native species to the Arctic by developing and implementing common measure for early detection and reporting, identifying and blocking pathways of introduction, and sharing best practices and techniques of monitoring, eradication and control."

- 9.1 (Phase 2: 2015-2017) "Develop a strategy for the prevention and management of invasive species across the Arctic, including the identification and mitigation of pathways of introduction of invasions. Include involvement of indigenous observing networks, which include invasive and new species reporting, to assist with early detection."
- 9.2 (Phase 3: 2017-2019) "Incorporate common protocols for early detection and reporting of non-native invasive species in the Arctic into Circumpolar Biodiversity Monitoring Program (CBMP) monitoring plans."

We will accomplish this vision via a risk-based approach to assessment and management of potential and on-going invasions of plants, animals, and their parasites and pathogens, including those pathogens that may directly and indirectly affect human health.

Definition of invasive species: We propose to be guided by the definition used in the *Arctic Biodiversity Assessment* (p. 560): "The term 'invasive species' is used here to refer to species that are not native to a given ecosystem (i.e., when a species is present due to an intentional or unintentional escape, release, dissemination or placement into that ecosystem as a result of human activity) and which may cause economic or environmental harm (including harm to subsistence species and activities) or harm to human health."

Specific goals: We will use the concept of risk assessment to accomplish the goals listed below. Specific goals identified in the strategy will lead to products that can inform priority setting by the Arctic Council, its Member States, observer countries and organizations, the Permanent Participants, industry and others to improve risk management of invasive species. We will focus especially on prevention of new introductions because prevention is likely to bring the largest long-term return on investment; other on-going Arctic Council efforts will inform early detection (e.g., the Circumpolar Biodiversity Monitoring Program); and resources constraints are unlikely to allow a rigorous approach to other aspects of management that require distinct approaches for different species (e.g., control).

Arctic Council members, observer countries and organizations, the Permanent Participants, other partners and individuals may choose to contribute differently to the different goals, contingent on available resources and interests. We aim to create an overall strategy or framework that will establish a baseline and identify best management practices for some pathways, and identify the information or models that are needed to address future risks from other pathways. We aim to address this by using appropriate tools and methodologies, including, for example, the driver-pressure-state-response framework.

Questions to be addressed in the strategy/framework:

A) How and where are living organisms likely to be introduced to Arctic ecosystems?

1. Using existing information and expert knowledge identify trends in risks associated with human activities and rank the pathways by which alien species are likely to be introduced into the Arctic, and produce maps of the geographic locations where each pathway is likely to deliver organisms. Proxies of the likelihood of invasion, such as human density, human economic activity or shipping traffic might be used. Ranks might be based on the number of species transported and the frequency with which introductions might occur. All pathways would be considered, including transportation-related pathways (e.g., ships, ice-breakers, fishing vessels, drilling platforms, trucks, planes) and commerce in living organisms (e.g., agricultural, aquaculture, ornamental plants and animals, pet trade).

B) Which species are both likely to be introduced *and* likely to be harmful?

2. Use a literature review and other existing knowledge to create lists, identify trends and map alien species currently established in the Arctic, and any knowledge about invasive species impacts.
3. Trends in the extinction risks of native species impacted by invasive species
4. Use existing global knowledge (e.g., about biogeographic regions, climate, environmental conditions) to create a map of the world indicating regions that might harbour species that could thrive if introduced into the Arctic.
5. Use consensus building (e.g., horizon scanning) and/or statistical methods to develop risk assessment tools to distinguish species that are likely to be harmful (in terms of ecological, economic and health impact) from those unlikely to cause harm. Such tools

could then be used by multiple Arctic Council members, helping to harmonize risk assessment outcomes across jurisdictions and therefore allow jurisdictions to avoid harm from a species that might otherwise be allowed into one jurisdiction and then spread easily to other jurisdictions in this region of shared ecosystems.

C) Which high value locations (areas protected for biodiversity value, indigenous hunting and fishing areas, important caribou/reindeer habitat, etc.) are especially vulnerable to invasion?

6. Use existing data (e.g. from ABA) and expert knowledge to map areas that are of high value (including for biodiversity) to enable more informed prioritization of prevention and management measures.
7. Use a literature review, expert knowledge and where possible existing data, to make recommendations on best practices and techniques for early detection and monitoring (including synergies with CBMP), as well as eradication and control efforts for highly vulnerable areas for reporting for the member states.

D) How can the different layers of information gathered to answer the questions above be integrated to identify locations and practices that are most likely to prevent future harm from invasions?

8. Create a spatially explicit risk atlas of the Arctic by using expert knowledge and output from the efforts described above to elicit scores for ecological, economic and health risk (considering the probability of invasion and the probability of impact given invasion). The value of the resource should also be assessed in conjunction with each risk.
9. Recommend codes of pathway practices to block invasions from prioritized pathways into prioritized areas of terrestrial, freshwater and marine ecosystems.
10. Integrate risk atlas results and information on high-risk species and pathways to inform monitoring and other management activities (e.g., Hazard Analysis & Critical Control Points (HACCP)) that can contribute to early detection and rapid response activities.
11. Liaise with other multi-lateral efforts developing similar broad initiatives to prevent the spread and establishment of invasive species into a region of the globe to share experiences, ideas and lessons-learned, and develop a system for collating and sharing information to meet future monitoring and management needs.

E) What management activities and polices have been adopted to improve management of invasions?

12. Identify and share trends in international and national efforts to address the impacts and risks of invasive species.