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### MARINE INVASIVE SPECIES CHALLENGES IN THE ARCTIC

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The rapid pace of climate change and increased human disturbance of ecosystems in the Arctic is bringing urgency to concern over non-native species introductions and their potential threats to the marine environment and its economic productivity, where before environmental conditions served as a barrier to their establishment. The same characteristics that have previously made the Arctic less open to the establishment and spread of invasive species are ones that make the potential problem so expansive. At stake are unique species and co-evolved systems that have taken millennia to develop. Small perturbations in the fragile Arctic ecosystems are likely to have outsized impacts both ecologically and economically. This work discusses the optimal management of invasive species threats as a process that begins before the arrival of any species, with prevention, and continues in an integrated fashion through phases of biological invasion to minimize overall damages and costs. The related cases of the purposeful introduction of the Red King Crab (Falk-Petersen et al, 2011; Sundet 2014) and the accidental introduction of the Snow Crab (Sundet and Bakelev, 2013) in the Barents Sea, and the Red King Crab's recent identification in Icelandic waters (pers. Comm., G. Thorarindottir, Sept 4, 2014), are used to develop the discussion of the tradeoffs, governance opportunities and failures, and intervention possibilities.

#### References

Falk-Petersen, J.; Renaud, P.; Anisimova, N. 2011. Establishment and ecosystem effects of the alien invasive red king crab (*Paralithodes camtschaticus*) in the Barents Sea – A Review, *ICES Journal of Marine Science* 68(3), 479–488. doi:10.1093/icesjms/fsq192

Sundet, J.H. and Bakanev, S. (2013). Snow crab (*Chionoecetes opilio*) – stock status of the new invasive crab species in the Barents Sea. Presentasjon on the *Arctic Frontiers Conference*, Tromsø, Januar 2013

Sundet, J. H. (2014). Red king crab in the Barents Sea. pp 485-500. In B. G. Stevens (ed.) *King Crabs of the World: Biology and Fisheries Management*. CRC Press (Taylor and Francis), Boca Raton, FL.