

Snow crab (*Chionoecetes opilio*) – a new invasive crab species becoming an important player in the Barents Sea ecosystem

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Summary

Since the first recordings in 1996, the snow crab has now spread to most parts of the Russian Economic Zone and international waters of the Barents Sea. It is also observed in the Norwegian Economic Zone and in the Svalbard area. The extent of distribution and crab density indices reveal that the total stock size must be considerable. Recordings of berried female snow crabs and numerous juveniles confirm that this species is self reproducing in the Barents Sea. It is therefore obvious that the propagule pressure for further spread in this arctic region is high and that new areas further north and west is likely to be invaded. The snow crab in the Barents Sea will probably adopt a more northerly distribution than the red king crab; the other invasive crab species in the area. A commercial fishery started in 2013 and counts now 15 vessels fishing for the snow crab in the Barents Sea. Future impact of this new species on the existing ecosystem is discussed based on preliminary stomach analyses and potential spread to new areas.

Introduction

The snow crab (*Chionoecetes opilio*) is the second and most recent large non native decapod that has become invasive to the Barents Sea, in addition to the red king crab (*Paralithodes camtschaticus*) (Alsvåg *et al.* 2009, Agnalt *et al.* 2010, Falk-Petersen and Renault 2011). Three other crab species formerly occupied the same niche as these two non-indigenous species do in the Barents Sea ecosystem. These constitute a minor total biomass in the Barents Sea ecosystem. The snow crab is naturally distributed in the north Pacific, the Sea of Japan, in northwest Atlantic, and in coastal areas of eastern Canada and Greenland (Burmeister 2002) and it is cryptic how it entered the Barents Sea. Recent genetic studies indicate lowest genetic distance between crabs in the Barents Sea, Bering Sea and eastern Canada (Dahle *et al.* 2014). A proposed hypothesis today is that the snow crab may have entered the Barents Sea by a route north of Siberia from the Chukchi Sea. This presentation gives updated knowledge on the geographical distribution of the snow crab in the Barents Sea, indexes on population growth and structure, and preliminary stomach content analysis. Finally we discuss future development of this new species in the Barents Sea and what consequences it may have for the receiving ecosystem as the crab spread to more arctic regions in the northern Barents Sea.

Material and Methods

The major part of the snow crab material in this study is collected at the Norwegian – Russian ecosystem cruises in the Barents Sea during 2004 – 2013. Snow crabs were frozen and packed individually in plastic bags onboard and all measurements carried out in the laboratory (Norwegian vessels) or all measurements performed at sea (Russian vessels).

Results and discussion

The abundance increase and spread of the snow crab stock in the Barents Sea have taken place at a much higher rate than what was the case with the red king crab in this area. The snow crab is now distributed in the whole northern part of the Russian Economic Zone (REZ), parts of international waters, and is also observed in the Svalbard Fishery Protection Zone (Figure 1). Some single crabs

have also been recorded along the coast of Finnmark. High concentrations of juvenile crabs are found in shallow waters along the northern coast of Novaja Zemlja, while large males and females seem to occupy deeper waters further west. Actually, the large males targeted in fishery seem to be in highest densities at the fringe of the distribution area; in the deeper western part.

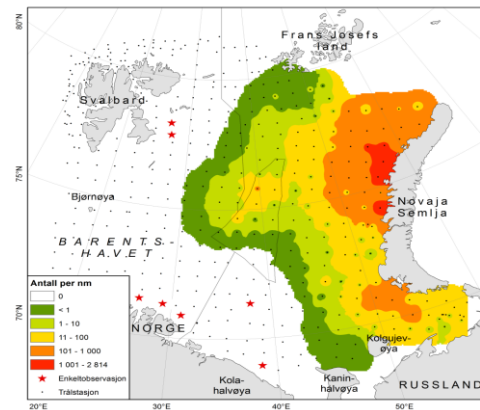


Figure 1. Distribution of snow crab in the Barents Sea in 2013. Red asterisk: single crab observations.

The snow crab stock at the moment is dominated by juveniles indicating successful recruitment recently, although the abundance and density of large (commercial) males are high enough to support an ongoing commercial fishery in international waters. At the moment, 15 large vessels from several nations are fishing for this crab in the Barents Sea, and forecast models indicate that the commercial snow crab stock in this region may reach the same level as in eastern Canada (Hvingel and Sundet 2014).

The snow crab is expected to spread further north and west in the Barents Sea, and will probably invade most areas around the Svalbard archipelago. Preliminary stomach content analysis show that the crab feed on slow moving benthic animals, where species groups such as bivalves, polychaetes and crustaceans dominate in the diet. In conclusion we therefore foresee a severe impact of the snow crab on the arctic benthic ecosystem in this region, which must be followed up by investigations to provide knowledge on this issue for the managers.

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