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Reproductive parameters of Greenland Sea hooded seal (*Cystophora cristata*) females 1958-1999 – clues to the lack of population recovery?

Anne Kirstine Frie[1], Vladislav Svetochev[2], Garry Stenson[3] and Tore Haug[1]

[1)]Institute of Marine Research (IMR) Sykehusveien 23, Pb-9490 Tromsø, Norway

[2)] Murmansk Marine Biological Institute of the Kola Science Centre of the Russian Academy of Sciences (MMBI KSC RAS), Ulitsa Vladimirskaya 17, 183010 Murmansk, Russia

[3)] Northwest Atlantic Fisheries Centre, Department of Fisheries and Oceans, PO Box 5667, St John's Newfoundland, Canada A1C 5X1

Extended abstract

Hooded seals are large deep-diving seals inhabiting both the Western and Eastern North Atlantic (Northwest Atlantic stock and Greenland Sea stock, respectively). They have a varied diet mainly comprised by bathypelagic fish but also including some squid and crustaceans (mainly in juveniles). Several commercial fish species such as Greenland halibut (*Reinhardtius hippoglossoides*), redfish (*Sebastes spp*.), capelin (*Mallotus villosus*) and greater argentine (*Argentina silus*) are known to be preyed upon by hooded seals.

In spite of their large size (females may weigh up to 300 Kg), hooded seals have historically shown a remarkable capacity for early maturation with mean age at first birth (Mean age at primiparity=MAP) for Northwest Atlantic hooded seals estimated at 4.3 years from the late 1950s to 1978. Later, MAP increased and the last available estimate for Northwest Atlantic hooded seals is ~ 6.1 years in the period 1989-95. This and other signs of reduced reproductive rates in Northwest Atlantic hooded seals occurred without any major change in population size. In contrast, the abundance of Greenland Sea hooded seals has changed

dramatically during the data collection period of the present study. Modelling suggests that the total abundance of Greenland Sea hooded seals has declined from about 1.3 million seals in 1946 to about 200000 seals in 1980 with a further reduction to about 82000 in 2012. If reproductive rates have been limited by per-capita resource levels, reductions in abundance of this magnitude might be expected to allow an increase in reproductive rates, which in turn would be an important contribution to population recovery.

In the present study, however, we find that reproductive rates of Greenland Sea hooded seals have remained relatively low throughout the study period, compared to the values observed in Northwest Atlantic hooded seals up to 1978. This might suggest that any possible reductions in interspecific resource competition have been compensated by reductions in overall resource availability or increased competition from other species and/or commercial fisheries. Alternatively, Greenland Sea hooded seals could have adopted a more "qualitative" breeding strategy than Northwest Atlantic hooded seals by allocating more resources to fewer offspring. This could involve attaining a larger size before giving birth or more frequently skipping reproduction in some years to allow higher investments in other years. The plausibility of the latter hypothesis is evaluated based on analyses of morphometric and reproductive data from both Northwest Atlantic and the Greenland Sea hooded seals.

Key words: density dependence, age at primiparity, size at primiparity, body condition, hooded seals

Corresponding author: Anne Kirstine Frie, Institute of Marine Research, Sykehusveien 23, Pb-9490 Tromsø, Norway, e-mail: anne.kirstine@imr.no