

8.8 Barents Sea case study (The shrimp fishery)

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8.8.1 Brief presentation of the CS and fisheries concerned

Northern shrimp (*Pandalus borealis*) in the Barents Sea and in the Svalbard zone (ICES Sub-areas I and II) is considered as one stock. Norwegian, but also Russian vessels exploit the stock in the entire area, while vessels from other nations are restricted to the Svalbard fishery zone and the “Loop Hole” (Fig. 1). Norwegian vessels initiated the fishery in 1970. As the fishery developed, vessels from several nations joined and the annual catch reached 128 000 t in 1984 (Fig. 6.2). In the recent 10-year period catches have varied between 20 000 and 40 000 t/year, 50–90% taken by Norwegian vessels and the rest by vessels from Russia, Iceland, Greenland and the EU. (NIPAG 2014)

In contrast to the other countries managing their shrimp fisheries in the North Atlantic, and to the Norwegian management of other commercially important species, Norway does not manage the shrimp fishery by total allowable catch (TAC). Instead the shrimp fishery in the Norwegian exclusive economic zone (EEZ), and the Norwegian participation in the shrimp fisheries are regulated through licenses, minimum size of shrimp, limits for by-catch and gear requirements.

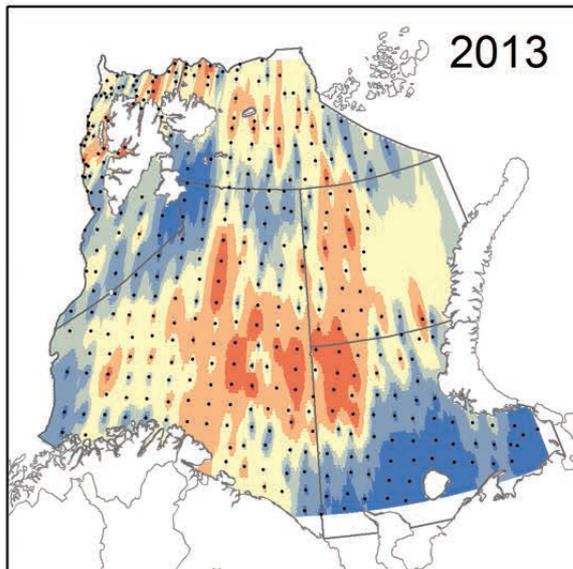


Fig. 1. The distribution of shrimp in the Barents Sea in 2013 based on the Joint Russian-Norwegian Ecosystem survey conducted since 2004 (Hvingel and Tangstad 2014).

8.8.2 Causes of discarding

Due to area closures and sorting grids in the shrimp fishery the by-catch consists of small juvenile fish and shrimp that enter the trawl. This bycatch is discarded as there is no commercial interest for the product of mixed juveniles. If there would be a market it is still unlikely that valuable freezing space would be given priority to shrimp.

8.8.3 Measuring Discards

Discard of shrimp cannot be quantified but is believed to be small as the fishery is not limited by quotas. Bycatch rates of other species are estimated from at-sea inspections and research surveys and are corrected for differences in gear selection pattern (Kvamme et al. 2007). Area-specific bycatch rates are then multiplied by the corresponding shrimp catches from logbooks to give an overall bycatch estimate. Since the introduction of the Nordmøre sorting grid in 1992, only small individuals of cod, haddock, Greenland halibut, and redfish, in the 5–25 cm size range, are caught as bycatch. The bycatch of small cod ranged between 2 and 67 million individuals/yr and redfish between 2 and 25 million individuals/yr from about 1992 to 2010 while 1–9 million haddock/yr and 0.5–14 million Greenland halibut/yr were registered in 2000–2004 (Fig. 2). In recent years there has been a decline in bycatch owing to reduced effort in the shrimp fishery. Details of bycatch are no longer reported by the ICES Arctic Fisheries Working Group. NIPAG will update this bycatch information at its 2015 meeting. (NIPAG 2014).

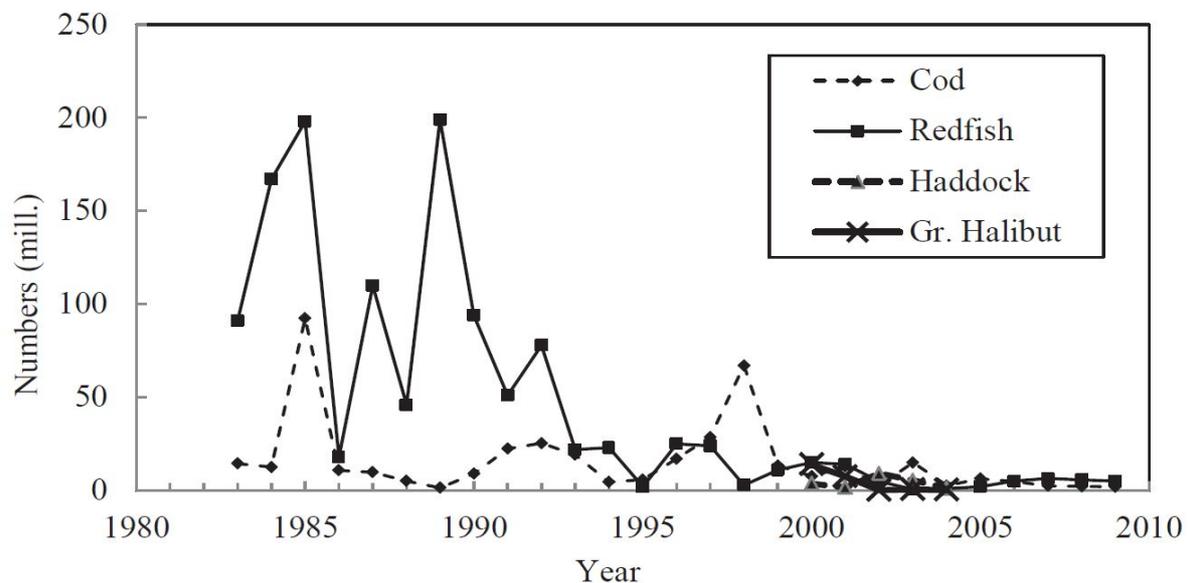


Fig. 2. Shrimp in ICES SA I and II: Estimated bycatch of cod, haddock, Greenland halibut and redfish in the Norwegian shrimp fishery (million individuals). No data available for 2010-14 (NIPAG 2014).

The estimation method combines several data sources (official shrimp landing statistics, logbooks from shrimp trawlers, shrimp surveys, surveys using shrimp trawl, and fishery surveillances data (for details see Ajiad et al. 2004, 2006).

The number of juvenile fish allowed as bycatch depends on bio-economic considerations, yet if a fish stock is outside safe biological limits, biological more than economic considerations should be taken into account (see Reithe & Aschan 2008 for more details).

8.8.4 Methods for reducing discards

The legal framework aiming at reduced bycatch and discards in Norway is summarized elsewhere (Borges et al. In press). The first regulation concerning bycatch was implemented in

1983 when the 11th Session of The Joint Norwegian Soviet Fisheries Commission set the maximum number of juveniles allowed as by-catch to three cod and haddock pr 10 kg shrimp. This regulation was based on the argument that a 10% loss from a weak year class was the upper limit to what could be accepted. At that time the annual catch of shrimp was 30-40 000 tonnes and a weak year class of cod or haddock was assumed to be about 100 million individuals. With a maximum by-catch of three juveniles pr 10 kg shrimp the maximum loss would be 12 million specimens.

Sorting grids in the shrimp trawls first became mandatory operating within the Norwegian 12 miles zone in February 1990. In October 1991 this directive was extended to apply to shrimp trawls used in all of the Norwegian EEZ. Finally, in 1993 the Joint Norwegian Russian Fisheries Commission agreed that the sorting grid was to be mandatory for all vessels conducting shrimp fishery in the Barents Sea and the Svalbard zone (Anon. 1992).

The combination of sorting grids and area closures seem to provide good protection for juvenile, cod, haddock, redfish and Greenland halibut, and some of the increase in stock sizes of these listed commercial fish species since the late 80's is considered to be due to reduced by-catch of juvenile fish.

8.8.5 References

Anon. 1992. Protocol from the 21st session of the Joint Norwegian Russian Commission, Moscow, 16-19 November. 16 pp.

Ajiad A., Aglen, A., Nedreaas, K. and Kvamme, C. 2006. Cod bycatches in the Barents Sea shrimp fishery during 1983-2005. WD: 1, Arctic Fisheries Working Group, Copenhagen.

Borges, L., Cocas, L. & Nielsen, K. Discard ban and balanced harvest: a contradiction in (more than) terms? ICES journal of Marine Science- in press.

Kvamme, C., Ajiad, A., Aglen, A. and Nedreaas, K 2007 Estimated bycatch of haddock (*Melanogrammus aeglefinus*) and Greenland halibut (*Reinhardtius hippoglossoides*) in the Barents Sea shrimp fishery during 2000-2005 NAFO SCR Doc. 07/87. Serial No. N5473.

NIPAG 2014. NAFO/ICES Pandalus Assessment Group Meeting, 10–17 September 2014. Greenland Institute of Natural Resources, Nuuk, Greenland. NAFO SCS Doc. 14/18 Serial No. N6365

Reithe, S., & Aschan, M. 2004. Bioeconomic analysis of by-catch of juvenile fish in the shrimp fisheries – an evaluation of management procedures in the Barents Sea. - Environmental & Resource Economics, 28,1:55-72.

Research survey results pertaining to northern shrimp (*Pandalus borealis*) in the Barents Sea and Svalbard area 2004-2013, NAFO/ICES WG Pandalus Assessment Group, September 2014. NAFO SCR Doc. 14/051, Serial No. N6353