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# Norwegian Studies of Harp Seal Invasions and the Ecology of Harp and Hooded Seal Pups in Their First Year of Life in 1995

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## Abstract

Two particular fields of seal studies in Norwegian and adjacent waters during the winter and spring in 1995 included a study of the present 'harp seal (*Phoca groenlandica*) invasions' in North Norway and the 'ecology of seal pups'. This report summarizes the information collected to date from these two projects. The mid-winter invasion data showed harp seal interactions with finfish fisheries such as damage to gillnets and disappearance of fish from traditional grounds along the coast of Norway. Age determinations of 80 individuals, showed that 71 were young-of-the-year (i.e. born in 1994), 6 were born in 1993 and 2 in 1992. From the preliminary stomach data, it appears that small gadoids dominated the diet. In the early-spring invasion it appeared that all the sampled seals were sexually mature females, ranging in standard length between 155 and 184 cm. All sampled seals had stomachs well-filled with fish and invasions appear to be related to feeding migrations performed by adult females. In the seal pup ecology project considering the short time period since the survey, only preliminary results were available for this presentation. One vessel (M/S *Harmoni*) operated in the East Ice. Data were obtained from 152 ragged jackets and 96 beaters. Two vessels (M/S *Polarfangst* and M/S *Polarstar*) operated in the West Ice. Data were obtained from 360 ragged jackets, 8 beaters, and 364 bluebacks.

*Key words*: Body condition, diet, growth, harp seals, hooded seals

## Introduction

Two particular fields of seal studies in Norwegian and adjacent waters during the winter and spring in 1995 were given priority by the Norwegian research institutions. The first included a study of the present 'harp seal (*Phoca groenlandica*) invasions' in North Norway. The second addressed the 'ecology of seal pups', related to growth, changes in condition and diet, through the initial stages of their independent life, i.e. from weaning until they have started to feed independently. The pup ecology project included both harp (*Phoca groenlandica*) and hooded (*Cystophora cristata*) seals. Considering the shortness of period since the survey to this presentation, this report only summarizes the information collected to date from these two projects.

### The Harp Seal Invasion Project

#### Purpose

Since 1978 Barents Sea harp seals, *Phoca groenlandica*, have appeared annually in substantial numbers in Finnmark, North Norway, in mid-winter. The size of these 'seal invasions' increased dramatically in 1986, 1987 and 1988 when large seal herds were observed along the entire coast of North Norway through January to August and gave rise to severe seal versus commercial fisheries conflicts (Haug *et al.*, 1991, Nilssen *et al.*, 1992, Haug and Nilssen, 1995). In recent years, however, the invasions have again been confined mainly to Finnmark. The purpose of the winter studies of harp seals in 1995 was to compare the age and sex compositions, the general condition and the feeding ecology of the invading seals with those observed from the 1986–88 period and earlier.

#### Mid-winter invasion

Data from this study showed harp seal interactions with finfish fisheries such as damage to gillnets and disappearance of fish from traditional grounds along the coast of Norway, as far south as Western Norway, started to occur in mid-December 1994 (Fig. 1). A total of 87 animals, taken as by-catch in gillnets in the Tromsø area during the period 12 January–12 February 1995, were retrieved, sexes

determined and analyzed for age composition, stomach contents and general body condition. While the harp seals which occurred along the Norwegian coast in 1986–88 included animals of all age groups (Haug *et al.*, 1991), it was evident that the present incidents involved almost exclusively young animals of both sexes. Age determinations of 80 individuals, showed that 71 were young-of-the-year (i.e. born in 1994), 6 were born in 1993 and 2 in 1992. One 12 year old but still immature female was also recorded. The stomach samples have not been completely analyzed yet. From preliminary data, it appears that small gadoids (saithe *Pollachius virens* in particular) dominated the diet, as was observed 1986–88 (Haug *et al.*, 1991). Condition data have not been analyzed yet.

Young harp seals are not uncommon on the coast in the winter. The numbers observed in 1995 appeared to be larger, however, and distributed over a wider area than in previous years. This could be related to the known increase in recruitment to the stocks in the early-1990s compared to the poor recruitment in the late-1980s (Kjellqwist *et al.*, 1995).

A total of 38 harp seals, tagged in the White Sea in 1992, 1993 and 1994 (1, 2 and 35 seals, respectively and recaptures in the period from 17 December 1994 to 30 March 1995 (Fig. 1), indicated that the young harp seals feeding along the Norwegian coast this winter, all belonged to the White and Barents Sea stock. The young seals appeared to leave the coast during late-March 1995; only four recaptures were recorded after 15 March and none in April (records were updated to 10 May).

### Early-spring invasion

In late-March 1995, adult harp seals started to appear as by-catch in gillnet fisheries in eastern Finnmark, North Norway. A total of 27 seals were retrieved for sampling (from the Tanafjord) during the period 2–8 April. It appeared that all the sampled seals were sexually mature females, ranging in standard length between 155 and 184 cm. All sampled seals had stomachs well-filled with fish, however, the data on diet and condition have not been analyzed yet.

Apparently, the harp seals moved away from the coast of Finnmark after mid-April. The observations made in March–April in 1995 seem to be consistent with the general pattern of harp seal immigrations observed in North Norway after 1988. These early-spring invasions have been confined mainly to eastern Finnmark, and appear to be related to feeding migrations performed by adult females in the period between lactation and moult (Nilssen *et al.*, 1995a; Haug and Nilssen, 1995).

## The Seal Pup Ecology Project

### Purpose

The purpose of the seal pup ecology project is to gain a better understanding of mechanisms that influence the development and survival of seal pups during their first year of life. Such information is expected to provide a better understanding of the sometimes large variations in the size of year-classes that have been observed (Kjellqwist *et al.*, 1995). Recent Russian data suggest a connection between the condition of seal pups and their survival success (Timoshenko, 1995).

In the period 1990–94, comprehensive Norwegian studies of nutrition, condition and reproduction of harp seals of all age-groups were carried out in the Barents Sea through the annual cycle (Nilssen, 1995; Kjellqwist *et al.*, 1995). In addition, biological samples had been collected during commercial seal hunting in the East Ice and on scientific expeditions using research and chartered vessels. These studies carried out as joint efforts with the participation of Norwegian and Russian scientists, had yielded data from pups-of-the year in the Barents Sea in June, September, October and February (Nilssen *et al.*, MS 1994; 1995a, b). Therefore, to cover the entire year, the appropriate period for collection of supplementary seal pup data was March–May, i.e. in the period from weaning until the pups started to feed independently.

Harp seal pups in the East and in the West Ice start independent feeding in completely different habitats. While the southeastern parts of the Barents Sea (the East Ice) are shallow waters (70–100 m deep), the West Ice pups are born in the pack-ice above 1 000 to 3 000 m deep waters. It is desirable to evaluate the dynamics involved in the pup survival strategy in two such different habitats. For this reason, studies of the development of harp seal pups both in the West Ice and in the East Ice were included in the project.

In the West Ice, harp seals and hooded seals are present in the same areas throughout the breeding season, and pups of both species have to start independent feeding in what might appear to be a competitive situation. We know from Russian data that adult harp seals in the West Ice have a completely different diet from that of hooded seals (Vladimir Potelov, Kjell T. Nilssen, and Tore Haug, unpublished material currently being prepared for joint Russian-Norwegian publication). It would be of great interest to establish whether the same is true of pups of these two species when they start independent feeding. If a competitive situation exists, the size of a year-class in one species might for example influence the corresponding year-class in the other. For these reasons, a comparative study

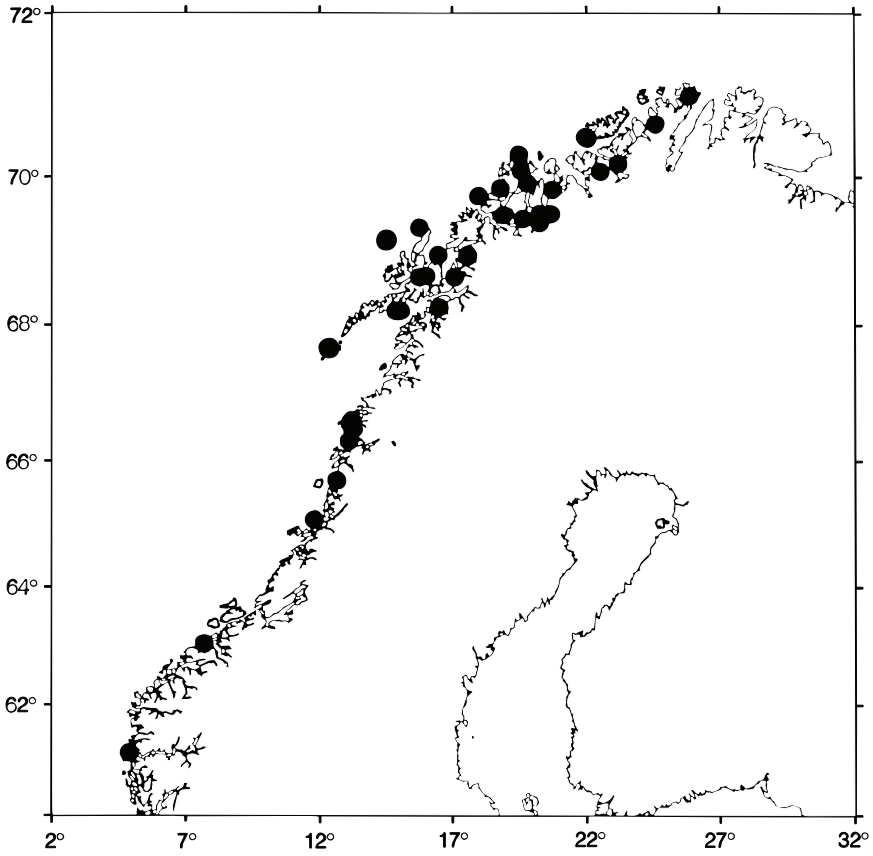


Fig. 1. Recaptures of 38 tagged harp seals along the coast of Norway during the period 17 December 1994 to 30 March 1995. All animals were tagged in the White Sea, in 1992, 1993 and 1994.

of harp and hooded seal pups from the West Ice was included in the project.

Simultaneously with the seal pup ecology studies, a project comparing alternative methods to kill seal pups was conducted on one of the vessels in the West Ice.

**Implementation**

Sampling was conducted in the East Ice and the West Ice during the hunting season in 1995. Permission was obtained to catch up to 1 500 harp seal pups (750 from the East Ice and 750 from the West Ice), and up to 750 hooded seal pups from the West Ice. As there was little probability of encountering whitecoats in the East Ice area (outside the White Sea Funnell), the catch there was expected to comprise only ragged jackets (half moulting whitecoats) and beaters (completely moulted whitecoats).

For a study of the development of the pups after weaning, it was necessary to ensure a temporal distribution of the catches. Therefore, the aim was to obtain data from up to 150 ragged jackets and then up to 200 beaters per week. The sampling program in the West Ice was the same as that followed in the East Ice, except for the fact that in the West Ice it was thought possible to obtain data on weaned whitecoats. Thus, the ideal plan for the West Ice was to obtain data from up to 150 weaned whitecoats, up to 150 ragged jackets and then up to 200 beaters per week. It was also necessary to ensure temporal distribution of the catches of hooded seal pups in the West Ice. For this species the ideal plan was to take up to 200 pups per week.

Samples were collected in accordance with the guidelines followed during the previous 1990-94 harp seal project. Records were kept for each pup taken of species, date, time of day, position, sex and stage of development (this applied particularly to the earliest stages of development of harp seal pups). All pups were measured (standard length, girth, ventral and dorsal blubber thickness) and weighed. The stomach and large intestine of each pup was removed and frozen on board for

subsequent laboratory processing. Blood samples for DNA analyses were secured from a subsample (50–100 individuals) of the harp seal pups.

Two scientists collected samples on each of the three Norwegian sealing vessels operating during the commercial season in 1995. The pup killing method study on one of the West Ice vessels was headed by the seal inspector (a veterinarian), assisted by the two scientists. Since moulting seals aged one year and older were taken simultaneously with the pups in both areas, samples were taken also from some of these. This included jaws with teeth for age determinations, some weights/measurements for studies of condition, some stomachs for diet analyses and some blubber and other tissues for studies of lipids and pollutants.

### Preliminary results

Considering the short time period since the survey, to this presentation, only preliminary results were available. One vessel (M/S *Harmoni*) operated in the East Ice during the two periods, 23 March–13 April and 24 April–10 May. During the first period data were obtained from 152 ragged jackets and 92 beaters. The rather low number of beaters was mainly due to some problems in obtaining the formal permission to take seal pups for scientific purposes in the Russian EEZ. These problems were solved when the vessel made its second trip to the East Ice. At this point in time, however, very little ice was left in the traditional catch areas such that only 4 beaters were caught.

Two vessels (M/S *Polarfangst* and M/S *Polarstar*) operated in the West Ice from 8 April to 12 May. Through the period of sampling, data were obtained from 360 ragged jackets, 8 beaters, and 364 bluebacks.

All the collected material is now being analyzed.

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