J. Northw. Atl. Fish. Sci., Vol. 22: 47–54

The Occurrence of Vagrant Seals in Iceland, in 1989–94

Erlingur Hauksson and Valur Bogason
Marine Research Institute, Skúlagata 4, 121 Reykjavík, Iceland

Abstract

New findings are presented about the occurrence of hooded seals (*Cystophora cristata*), harp seals *(Phoca groenlandica*), bearded seals (*Erignathus barbatus*) and ringed seals *(Phoca hispida*) in Icelandic waters for 1989–94. These animals had been entangled in gill nets for lumpsuckers (*Cyclopterus lumpus*) and cod *(Gadus morhua*), shot by local hunters, or found dead on the shore. The majority of the animals were from the north coast of Iceland, during the spring and summer.

The majority of the hooded seals, were pups and one-year-olds, although older animals occurred frequently. Males were significantly more abundant in the catch than females. Young seals, pups and one-year-olds, dominated in the catch of harp seals. Males were not significantly more abundant than females.

During the period 1989–94, there seemed to have been an increase in the frequency of visits of hooded and harp seals to Icelandic waters, and they seemed to be more numerous off the north coast than about a decade ago. However, they are probably not as numerous now as in earlier times, especially in years of heavy land-ice and polar-ice in the 18th and 19th century.

Ringed seals were mainly caught during the spring and early summer, while most of the bearded seals were caught in winter. The majority of the bearded seals visiting the Icelandic coast were young immature animals, while the ringed seals were sub-adults and adults.

Key words: bearded seals, harp seals, hooded seals, Iceland area, ringed seals

Introduction

New information is presented about the occurrence of hooded *(Cystophora cristata*), harp (*Phoca groenlandica*), ringed (*Phoca hispida*) and bearded (*Erignathus barbatus*) seals in Icelandic waters. These animals had either been entangled in gill nets for catching lumpsuckers (*Cyclopterus lumpus*) and cod (*Gadus morhua*), found dead on the shore, or shot by local hunters, during the period of 1989–94. So, these seals are only vagrant in these waters. No breeding records were available for any of these species in Icelandic waters (Hauksson, 1986), although limited information was available about vagrant seals in Icelandic waters. Hauksson (1982 and 1986) presented records of vagrants seals in Iceland in the period 1979–84, with information on date and place of occurrence, and compared historical and recent levels of their occurrence. During 1979–84, these seal-species visited mainly the coast of northern Iceland, during the spring and early summer. Historical catch records, prior to 1979, compiled mainly by Gudmundsson (1944) and Kristjánsson (1980), indicated that vagrant seals visited mainly the north coast of Iceland. They were only rarely seen off the northwest coast and the east coast of Iceland.

The number of seals that visit the coast is quite variable. It is believed one could relate the intensity of their visits to the density of sea-ice of the northwest and north coasts of Iceland, where in years of heavy sea-ice, they were even caught by the thousands (Kristjánsson, 1980). In this paper the occurrence of vagrant seals in Icelandic waters is studied for the period 1984–94.

Material and Methods

During 1989 to 1994, whole animals or samples of the lower jaws and sex-organs were obtained from local fishermen and seal-hunters. The age of

each animal was determined by counting cementum growth-layers in a section (0.5–0.7 mm) of the canine tooth. Teeth were cut using a low speed saw near the base of the root. Sections were read using a binocular dissecting microscope with 6X to 50X magnification under transmitted light (Laws, 1962; Bowen *et al*., 1983; Lawson *et al*., 1992).

Results

Hooded seals

A total of 170 animals were recovered during the period 1989–94, where only one animal was found in 1989, 2 were recovered in 1990, 5 in 1991, 63 in 1992, 29 in 1993 and 70 animals were recovered in 1994. The majority of hooded seals were caught off the north coast of Iceland (Fig. 1). Thirteen animals were obtained elsewhere; three from the east coast, six from the west coast and four from the south coast of Iceland. Most of hooded seals were caught during May and August followed by March and April (Fig. 2). Very few animals were recovered during the summer months of June and July, and only few recoveries were made during winter. Pups and one year old animals composed 39% of the catch, but animals older than 3 years were also quite common (Fig. 3). Animals twenty years and older were few, but did occur. It is interesting to note the few recoveries of 2 and 3-year-old seals. It was possible to determine sex of 73 of the recovered hooded seals. More males (N = 54 or 74%) than females (N = 19 or 26%) were recovered, which is significantly different from 1:1 ratio (Chi square = 16.78, df = 1, p = 0.00004).

Harp seals

During the period 1989-94, a total of 183 harp seals were recovered. Most animals (99%) were recovered after 1992 and none were caught prior to 1990. The majority (63%) of the animals were caught off the north coast of Iceland (Fig. 1), 7% were obtained off the east coast and 30% off the west coast of Iceland. Only one record of a harp seal came from the south coast of Iceland. Harp seals were caught mainly in May, followed by the months March, April and June (Fig. 4), respectively. Pups and one-year-old animals dominated the sample (Fig. 5). Animals older than two years were rarely caught. It was possible to determine sex of 57 of the recovered harp seals. More males (N = 33) than females (N = 24) were caught, but the ratio did not differ significantly from 1:1 ratio (Chi-square = 1.42, df = 1, p = 0.23).

Bearded seals

During the years 1989–94, a total of 16 bearded seals were caught off the north, east and west coasts of Iceland (Fig. 1). Half of these were caught in the wintertime (November–January), while the remaining half was mainly caught during the period March–June. Pups and yearlings dominated the catch, with the oldest seals being 3 years old (Table 1). All animals were considered to be immature.

Ringed seal

Only four ringed seals were obtained during the period 1989–94. The seals were caught during April to December off the north, east and west coasts of Iceland (Fig. 1). The seals were of both sexes and ranged from 3 to 18 years of age (Table 1).

Discussion

The findings presented here are based on samples of seals obtained by fishermen and seal hunters. Therefore, the distribution of recoveries may be biased by the distribution of the fishery and hunting effort. In addition, the weather conditions are often poor off the north coast during winter and visits of vagrant seals during the winter may therefore occur unnoticed. However, the information from this study is, in many respects, similar to that obtained from old chronicles (annals), when people hunted seals for subsistence.

In earlier times, hooded seals mainly visited the north coast of Iceland. Sæmundsson (1932) mentions that hooded seals were never very common, in comparison with the harp seal, and visited mainly Húnaflói, Eyjafjördur and to a lesser extent Skjálfandi (see Fig. 1). They were only rarely seen off the northwest coast and the east coast of Iceland. The number of hooded seals that visited the coast varied greatly and may be related to the density of sea-ice off the northwest and north coast of Iceland. In the period 1850–80, hooded seals were rare, except for the winter of the year 1867 when 60 to 100 hooded seal pups were killed at Langanes, (northeast Iceland). In the years 1880–1900, hooded seals were common and in the year 1904 they were reported to be very abundant, especially in Húnaflói. Little is known about the period 1900–81 but many hundreds were taken in 1895 at the northeast coast of Iceland (Gudmundsson, 1944; Kristjánsson, 1980). The frequency of occurrence of hooded seals in the period 1981–84 seems similar as in the period 1989–91 (Hauksson, 1986). However, it seems to be increasing in recent years.

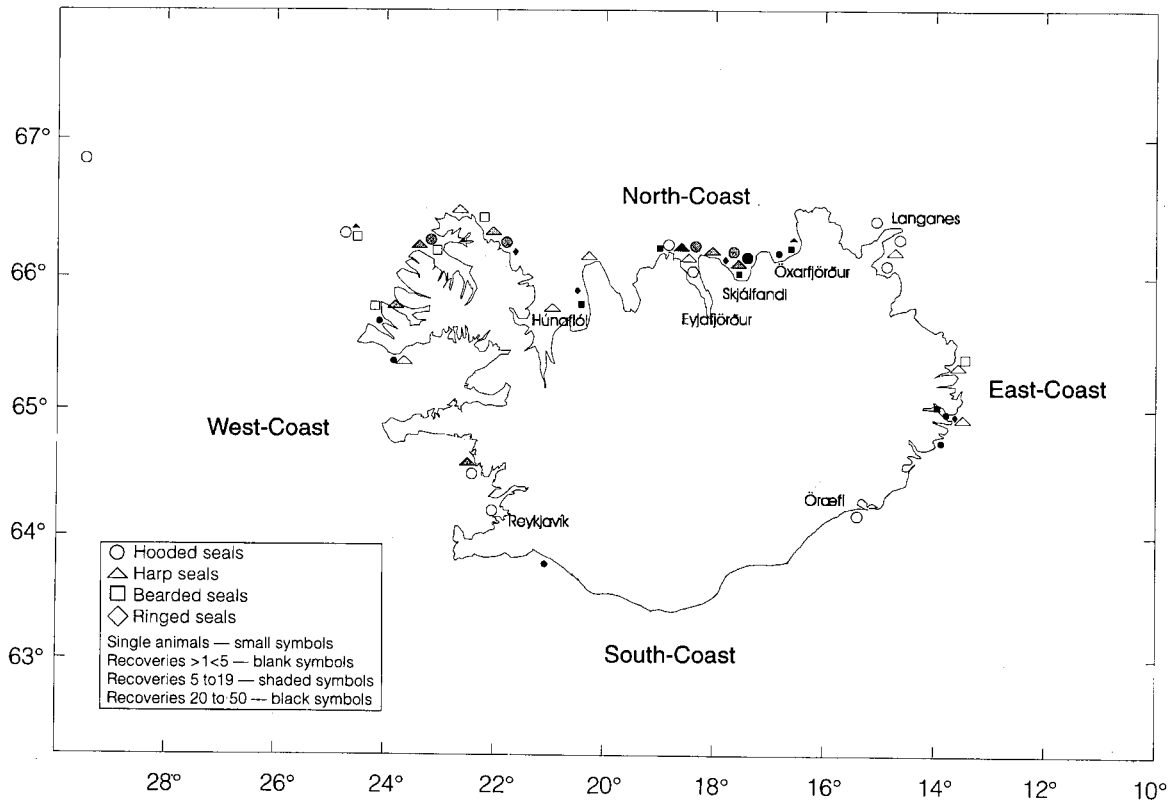

Fig. 1. Distribution of the hooded seals (*Cystophora cristata*), harp seals (*Phoca groenlandica*), bearded seals (*Erignathus barbatus*) and ringed seals (*Phoca hispida*), caught off the coast of Iceland in the period 1989–94.

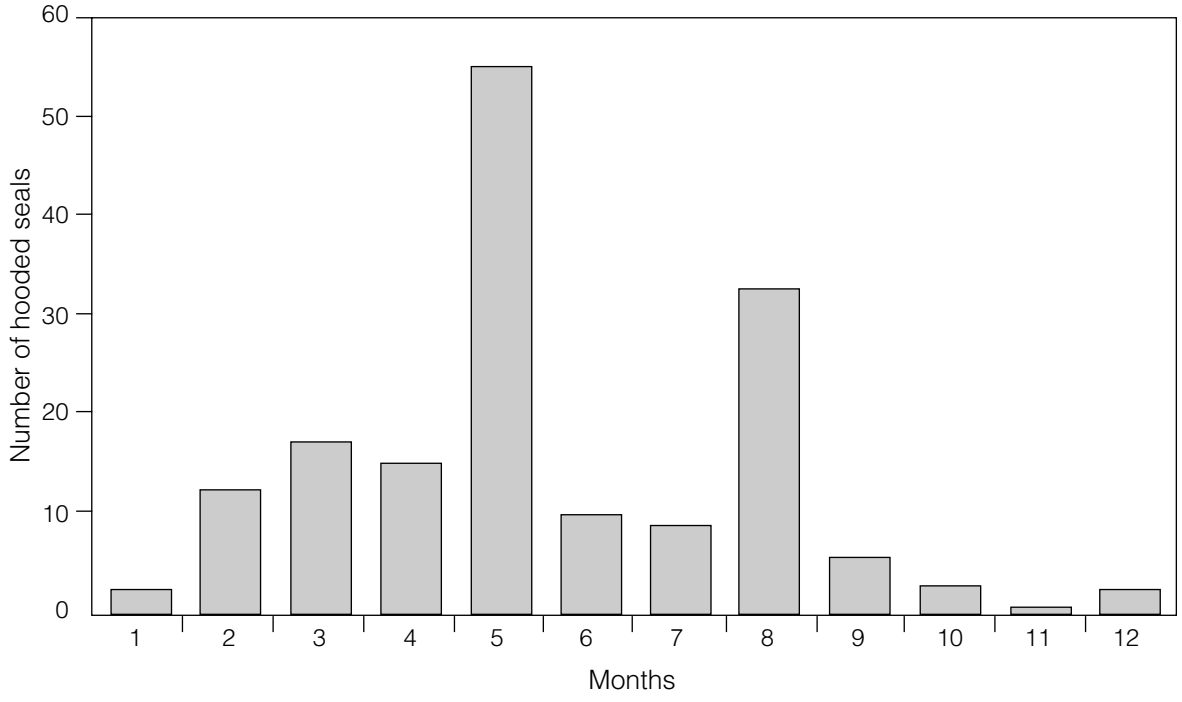

Fig. 2. Catches of hooded seals (*Cystophora cristata*) by month off the coast of Iceland in the period 1989–94.

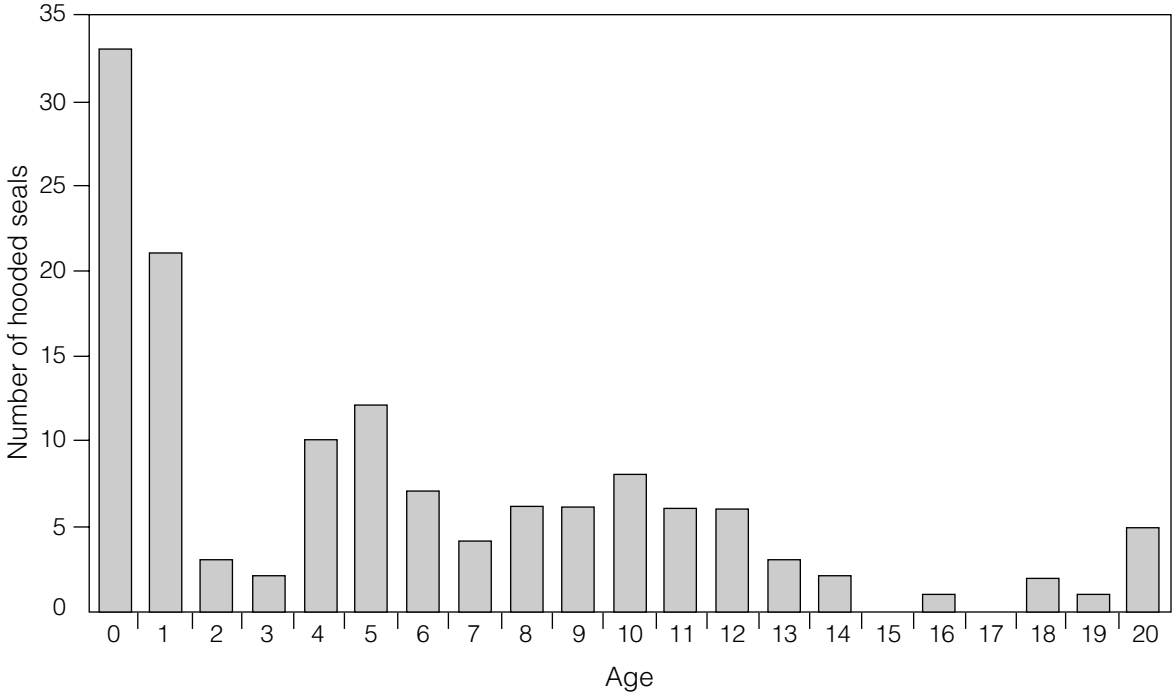

Fig. 3. Age distribution (years) of hooded seals (*Cystophora cristata*) caught off the coast of Iceland in the period 1989–94.

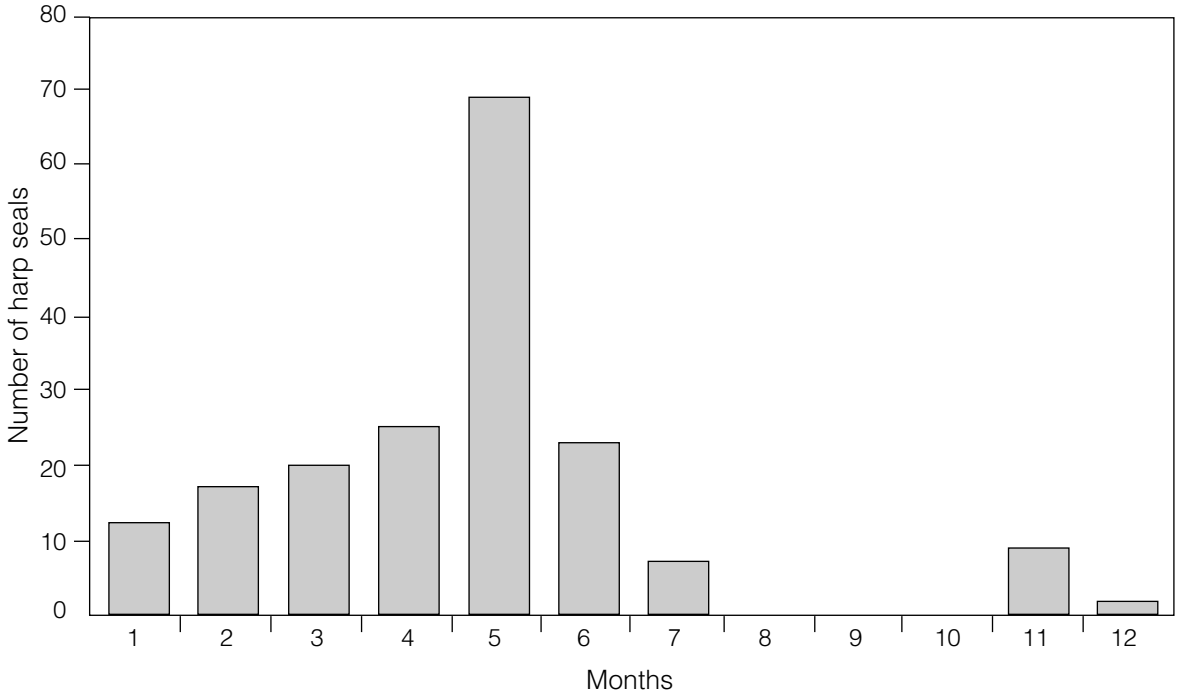

Fig. 4. Catches of harp seals (*Phoca groenlandica*) by month caught off the coast of Iceland in the period 1989–94.

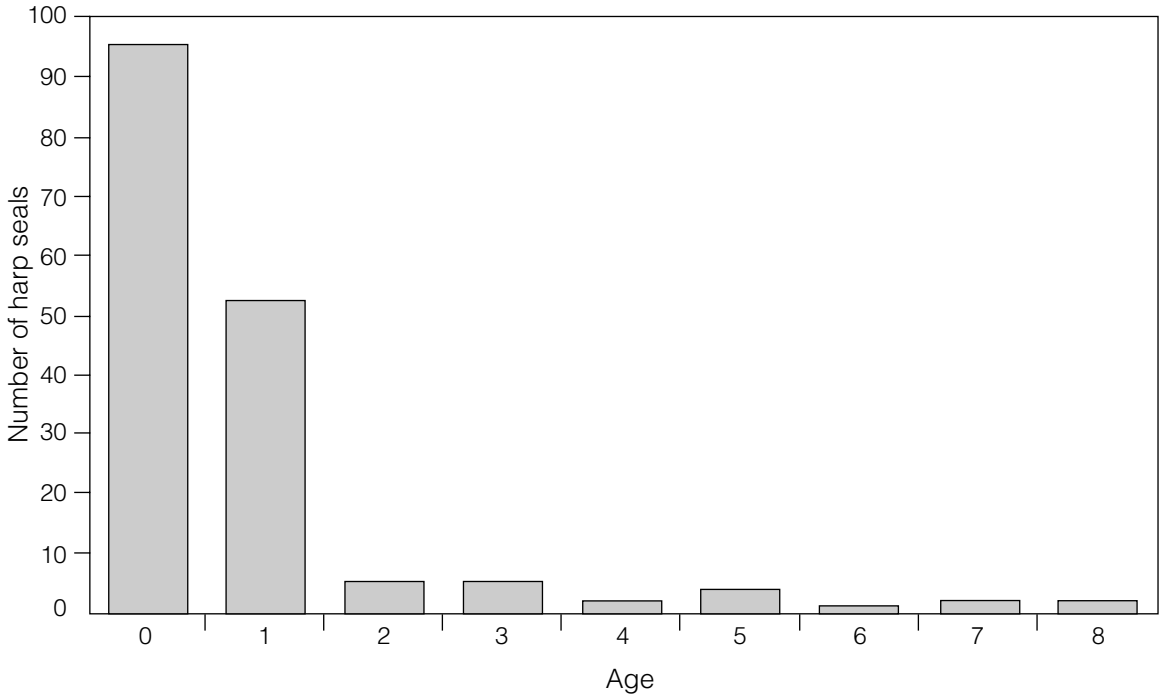

Fig. 5. Age distribution (years) of harp seals (*Phoca groenlandica*) caught off the coast of Iceland in the period 1989–94.

TABLE 1. Occurrences of bearded seals (*Erignathus barbatus*) and of ringed seals (*Phoca hispida*) off the coast of Iceland, 1990–94; M = mature, IM = immature (see Fig. 1 for locations).

Seal species	Year	Coastal area	Month	Sex	Age	Maturity
Bearded seal	1990	East	Dec	Male	3	IM
	1992	North	Jan	Male	3	IM
	1992	Northeast	Apr	?	1	IM
	1992	Northwest	May	Male	1	IM
	1992	Northwest	Nov	?	–	IM
	1993	Northeast	Mar	Female	1	IM
	1993	Northwest	Apr	Female	1	IM
	1993	Northwest	Apr	?	1	IM
	1993	Northwest	Dec	?	–	IM
	1993	Northwest	Dec	?	–	IM
	1993	Northwest	Dec	Female	–	IM
	1993	East	Dec	?	–	IM
	1993	East	Dec	Male	–	IM
	1994	Northwest	Mar	Female	?	?
	1994	Northwest	May	?	–	IM
	1994	Northeast	Aug	?	–	IM
Ringed seal	1991	Northwest	Jun	?	3	IM
	1990	East	Dec	?	?	?
	1993	Northwest	Apr	Female	18	M
	1994	Northeast	Aug	Male	6	?

The seasonal distribution of recoveries indicates that hooded seals arrive later in Icelandic waters than harp seals. After breeding on the ice north of the Jan Mayen island, the animals disperse, but aggregate in the drift ice off the north-eastern coast of Greenland to moult (Folkow and Blix, 1995). Part of the stock visits the Icelandic coast in the period between breeding and moulting. Mostly juveniles and adult males were recovered at Iceland, but such age and sex segregation has not been substantiated by satellite tracking (Folkow *et al*., 1996). The scarcity of two and three year old hooded seals from the recoveries in Iceland (Fig. 3) seems particularly noteworthy.

Irminger Sea can be characterised as a mixing ground for the two stocks of hooded seals, the northwest and northeast Atlantic stock. Recovered tagged animals in the waters off Greenland, however, indicate that the hooded seals in northeastern Greenland and Icelandic waters are mostly from the northeast Atlantic stock (Kapel, 1996).

Historical records indicate that harp seals were the most dominant vagrant seal species in earlier times. In 1718, many harp seals were killed on sea-ice off the northeast coast of Iceland, while in 1817 many harp seals were taken off the northwest coast of Iceland. Two years later, thousands of harp seals were taken in the northeast and eastern parts of the country. This was followed in 1820 by a good catch in the north and northwest part of the country. Between 1817 and 1821 several good catches occurred (Gudmundsson, 1944; Kristjánsson, 1980).

In recent times, harp seals seem to occur close to the coast of Iceland in the wintertime, but are absent during the late summer and autumn (Fig. 4). This appears to be similar to historical accounts from the eighteenth and nineteenth century, which suggest that harp seals regularly visited the north coast of Iceland during the wintertime and stayed until April–May (or even June) in some coastal areas (Gudmundsson, 1944; Kristjánsson, 1980). However, there is also some evidence that they regularly hauled out on the sandy beaches along the south coast of Iceland (Ragnar Stefánsson, Marine Research Institute, Reykjavik, pers. comm.).

This study indicates that harp seal pups and yearlings visit the coast of Iceland mainly after the pupping season is over. Harp seals give birth on the pack ice north of Jan Mayen island in the Greenland Sea during March. Moulting occurs in April–May, with younger seals moulting early in the period (King, 1964). The timing of the harp seal occurrence coincides with the spawning migration of the capelin (*Mallotus villosus*) to the coast of Iceland during February–May (Vilhjálmsson, 1994). Capelin seems to be an important food of harp seals in Icelandic waters in the spring and cod, sand lance (*Ammodites* sp.) and shrimp (*Pandalus* sp.) at other times of the year (Hauksson and Bogason, MS1995). Contrary to hooded seals, harp seals visiting the Icelandic coast seem to be pups and subadults. They also seem to have a similar age-distribution as harp seals caught in Norwegian waters during the seal invasion in the years 1987 and 1988 (Haug *et al*., 1991). There is, however, no evidence for an increase in records of harp seals off the Icelandic coast in 1987 and 1988, when the harp seal invaded Norwegian waters. Such an increase in harp seal numbers off the Icelandic coast, however, would only be expected if the seal invaders of Norwegian waters came from the Jan Mayen (West-Ice) part of the northeast harp seal stock. But according to Haug *et al*. (1991) the majority of the invading harp seals to the Norwegian coast came from the Barents Sea, from the East-Ice part of the stock.

The occurrence of harp seals in Icelandic waters varies somewhat through time. During the period 1750–90, harp seals seemed to be much rarer, than during the following decade. A peak in catches occurred in the period 1800–25. Few seals were reported during the middle of the nineteenth century, but catches increased again from 1910–25. Since then, a downward trend in catches occurred, reaching a low of very few seals in 1942 (Gudmundsson, 1944).

According to Thorsteinsson (1964), abundance of harp seals increased off the north coast of Iceland during the Second World War. This did, however, not lead to an increase in sealing, because there was no homemarket for the seal products in the country at that time (Thorsteinsson, 1964). After the Second World War, hunting for harp seals in Icelandic waters was discontinued. This may be due both to fewer seals, and a change in lifestyle of the people in the farming districts.

In those years when harp seal catches were high, the ice-edge was usually close to the coast for one month or longer (Bergthórsson, 1969). The only exception to this rule was the period 1750–60,

when sea-ice was close to shore for over four months in the northern part of Iceland, but seal catches were low.

In recent years, number of harp seals in Icelandic waters seems to have increased. They appeared more numerous in 1993 and 1994 than during the periods of 1990–92 and 1981–84 (Hauksson, 1986), respectively. During the years 1981–94, sea-ice has not been stationary close to the north coast of Iceland for long periods of time, the part of the Icelandic coast which sea-ice usually visits most frequently, except in the autumn and winter of 1981, in the summer of 1986, and in winter and spring of 1988 (Sigurdsson, 1985, 1986, 1987, 1988, 1990, 1992 and 1994). Sea-ice conditions off the north coast of Iceland can, therefore, not explain the increase in recorded harp and hooded seals in the years 1981–94. A general increase in the harp and hooded seal populations in the Jan Mayen area, which leads to more recoveries of these seals in Icelandic waters, is a more likely explanation.

Based on historical records, occurrences of ringed seals and especially bearded seals seem to have been much rarer than visits of harp and hooded seals. However, there are good catches reported of ringed seals during the years 1700–25 and again in 1896, when there seems to have been a real invasion of ringed seals to Öxarfjördur, Northeast Iceland (Gudmundsson, 1944). Historically, ringed seals occurred off the north coast after mid-winter and stayed until spring. They were most abundant off the north coast, but visited also the east- and west coast of Iceland (Hauksson, 1982). Recently a few ringed seals were caught in Eyjafjörður North Iceland (March 1995).

The few bearded seals that occurred were found close to the north coast of Iceland. This is similar to the historical patterns (Sæmundsson, 1932), although occasionally they did occur in other parts of the coast (Table 1).

Acknowledgements

Droplaug Ólafsdóttir and Gudbjörn Karlsson assisted in processing of samples. Icelandic fish-industry and fisheries' organisations sponsored this investigation. Ragnar Stefánsson, Skaftafell, gave valuable information about the regular hunting of harp seals for food on the shores of Öræfi, South Iceland, in the nineteenth century.

References

BERGTHÓRSSON, P. 1969. Hafís og hitastig á lidnum öldum. *In*: Hafísinn M. Á. Einarsson (ed.). Almenna bókafélagid, Reykjavík, (in Icelandic). p. 333–345.

BOWEN, W. D., D. E. SERGEANT and T. ØRITSLAND. 1983. Validation of age estimation in the harp seal, *Phoca groenlandica*, using dental annuli. *Can. J. Fish. Aquat. Sci.*, **40**: 1430–1441.

FOLKOW, L. P. and A. S. BLIX. 1995. Distribution and diving behaviour of hooded seals. *In*: Whales, seals, fish and man, A.S. Blix, L. Walløe and Ø. Ulltang (eds.), *Elsevier Science B.V.*: 193–202.

FOLKOW, L. P., P.-E. MÅRTENSSON and A. S. BLIX. 1996. Annual distribution of hooded seals (*Cystophora cristata*) in the Greenland and Norwegian Seas. *Polar Biol.*, **16**: 179–189.

GUDMUNDSSON, B. 1944. Nokkur ord um selveidi á Íslandi fyrrum og nú. *Náttúrufrædingurinn*, **14**(3.–4.): 149–169 (in Icelandic).

HAUG, T., A. B. KRØYER, K. T. NILSSEN, K. I. UGLAND and P. E. ASPHOLM, 1991. Harp seal (*Phoca groenlandica*) invasions in Norwegian coastal waters: age composition and feeding habits. *ICES J. Mar. Sci.*, **48**: 363–371.

HAUKSSON, E. 1982. Occurrence of ringed seal in Icelandic Waters. *Tyli*, **12**(1): 7–12 (in Icelandic with a summary in english).

HAUKSSON, E. 1986. Vagrant seals visiting the coast of Iceland in the period 1979–1984. *Hafrannsóknir*, **35**: 41–68 (In icelandic with an english abstract).

HAUKSSON, E. and V. BOGASON. MS 1995. Food of harp seals (*Phoca groenlandica* Erxleben, 1777), in Icelandic waters, in the period of 1990–1994. *ICES C.M. Doc.*, No. 14.

KAPEL, F. 1996. Recoveries in Greenland, 1949–94, of Tagged or Branded Harp and Hooded Seals. *NAFO Sci. Coun. Studies*, **26**: 87–100.

KING, J. 1964. Seals of the world, Trustees of The British Museum (Natural History), London, 154 p.

KRISTJÁNSSON, L. 1980. *Íslenskir sjávarhættir 1*. Reykjavík, Menningarsjódur. Reykjavík, (in Icelandic with a summary in english), 472 p.

LAWS, R. M. 1962. Age determination of pinnipeds with special reference to growth layers in the teeth. *Säugetierkunde Mitteilungen*, **27**(3): 129–145.

LAWSON, J. W., G. D. Harrison and W. D. Bowen. 1992. Factors affecting accuracy of age determination in the harp seal, *Phoca groenlandica*. *Marine Mammal Science*, **8**(2): 169–171.

SIGURDSSON, E. 1985. Sea ice off the Icelandic coasts. October 1980–September 1983, The Icelandic Meteorological Office, Reykjavík, 88 p.

1986. Sea ice off the Icelandic coasts. October 1985–September 1986. The Icelandic Meteorological Office, Reykjavík, 32 p.

1987. Sea ice off the Icelandic coasts. October 1986 – September 1987. The Icelandic Meteorological Office. Reykjavík, 31 p.

1988. Sea ice off the Icelandic coasts. October 1987–September 1988. The Icelandic Meteorological Office. Reykjavík, 45 p.

1990. Sea ice off the Icelandic coasts. October 1988–September 1989. The Icelandic Meteorological Office. Reykjavík, 53 p.

1992. Sea ice off the Icelandic coasts. October 1990–September 1991. The Icelandic Meteorological Office. Reykjavík, 39 p.

1994. Sea ice off the Icelandic coasts. October 1991–September 1992. The Icelandic Meteorological Office. Reykjavík, 38 p.

SÆMUNDSSON, B. 1932. *Íslensk dyr II. Spendyr*. Reykjavík, Bókaverslun Sigfúsar Eymundssonar, 437 p. (in Icelandic).

VILHJÁLMSSON, H. 1994. The Icelandic capelin stock. *Rit Fiskideildar*. (*Journal of the Marine Research Institute*), Reykjavík, **13**(1): 1–281.

THORSTEINSSON, G. 1964. Selaródrar. *Árbók Thingeyinga,* **7**: 93–110 (in Icelandic).