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10 (Comité Arctique International (CAI): Commentary, No. 2, Febr. 1990: 10-13.)

Seals in the Northeast Atlantic and Interactions with Fisheries

The walrus and six species of ear-less or true seals are resident in North Atlantic waters. They are the bearded, ringed, harp, hooded, harbour and grey seals.

The walrus, the largest seal of the North, grow to a length of more than 3 m and a weight above 1.2 tonnes. A gregarious animal feeding on bottom invertebrates, mostly mussels, the walrus is found in herds in shallow waters around the Arctic. After more than two Centuries of often wasteful overexploitation, the walrus neared extinction in the Northeast Atlantic when total protection was introduced in the early 1950's. Nowadays, the walrus is well on its way to recovery around Svalbard and Franz Josef Land. It has little or no effect on commercial fisheries.

Two species of true seals, the bearded and the ringed seals, also have a circumpolar arctic distribution. The former feeds on bottom invertebrates in coastal waters of moderate depths. Before 1965, Norwegian sealers regularly caught a few thousand bearded seals as well as some polar bears in the Svalbard pack-ice every summer. A gradual reduction in the market value of seal skins and the protection of polar bears made these operations uneconomic. This animal has a negligible effect on fisheries.

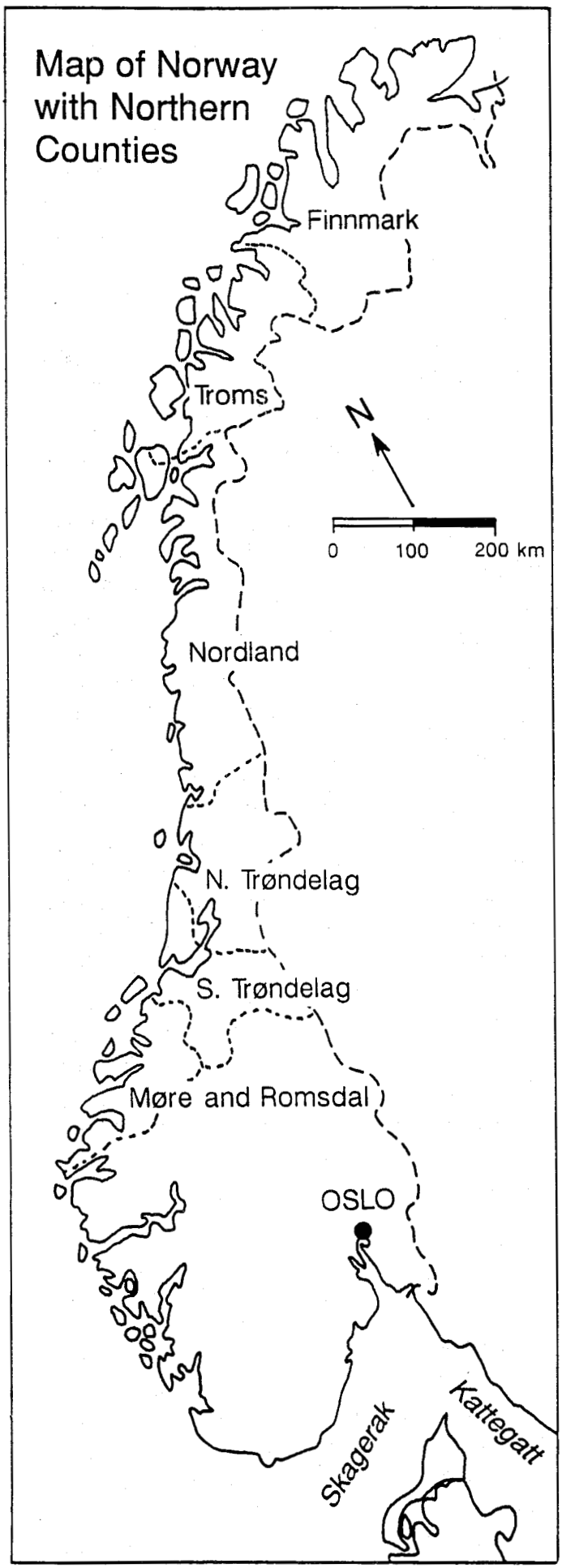
The ringed is the smallest seal and also the most abundant Arctic marine mammal. Males may reach a length of 1.5 m and a weight of 70 kg. A total population of 7-8 million has been suggested. Because of the poor quality of its fur, ringed seals were never exploited to any extent by Norwegian sealers, however, this seal is a mainstay in the diet of Innuits and other aboriginals as well as for polar bears. Close relatives are found in the Baltic and in fresh water lakes, e.g. Ladoga, Saima, Baikal, and the Caspian Sea. Ringed seals also frequent coastal waters of the northern Norwegian mainland where they forage in numerous small groups on small fishes in shallow bays and fjords. They do not appear to interfere with coastal fisheries to any extent and these quite extensive invasions therefore never receive much public attention.

Very much more significant is the impact of the numerous herds of harp or Greenland seals that have invaded Norwegian coastal waters regularly during the last decade.

The harp seals breed and moult on the pack-ice in three separate areas of the North Atlantic, presumably as three separate and selfsustaining stocks: at Newfoundland, in the Jan Mayen area of the Greenland Sea - the "West Ice" - and in the southeastern Barents and the White Sea - The "East Ice" of Norwegian sealers. In late winter/early spring harp seals haul out on the pack-ice to breed and moult. At all other times seals from the eastern stock usually roam the northern and northeastern Barents Sea to feed on available fish, including herring, capelin, cod and polar cod, and on invertebrates like squid, shrimp and amphipods.

Seal herds comprising several hundred thousand individuals from the East Ice stock invaded coastal waters of eastern Finnmark every year from 1978 to 1984. Capelin and cod were still abundant up to 1984, and there was no indication of a reduced food supply in the Barents Sea, but these invasions coincided with a period of low temperatures and salinities, an extensive ice cover and a consequent westerly distribution of both producers, grazers and predators in the Barents Sea. Like the cod, dispersed herds of harp seals from the large and then rapidly increasing East Ice stock (nearly one million head increasing by about 5% p.a.) followed the capelin on its annual migration to the coastal spawning grounds, to feed on this rich supply. Stomachs of seals contained mostly capelin but also cod and even capelin roe after the capelin had spawned. When there was still a market for the skins, two to three thousand skins were collected each year from harp seals drowned in gillnets during the winter and spring cod fisheries. However, small boats had difficulties in recovering the nets with heavy seals in them, so most of the seals were cut loose and dumped. If every fifth seal was landed, this suggests that 10-15 thousand seals were drowned in cod nets in each of the seven years these invasions of harp seals were repeated.

In previous periods of harp seal invasions corresponding with extensive pack-ice in the Barents Sea, the invasions stopped after a few years (1901-3, 1916-9). The 1978-84 period therefore was exceptionally long in the history of the Finnmark spring cod-fisheries. When only a few small herds of harps were seen inshore during the winter/spring of 1985, the hoped relief was not to be realized. From 1986 to 1988 from early January through April and into May,



large herds of harp seals again invaded coastal waters. In these years the seals came in to western Finnmark and northern Troms, and quickly spread out both to the South and to the North and East. The invasions expanded so rapidly that a broad-fronted movement towards the coast was suggested rather than a migration along the coast.

In 1986 a total of 4.4 thousand seals were caught and recorded for compensation for damage to fishing gear from Finnmark in the North to Trøndelag in the South. In 1987 the number increased to 56.2 thousand recorded from Finnmark all the way down to the Skagerrak coast, with small flocks also sighted in the Oslo Fjord. In 1988 the number of seals recorded caught, mostly in gill-nets but also by long-lines, trawls and other fishing gear, exceeded 21.5 thousands distributed from Finnmark to Møre. These changes do not directly reflect the magnitudes of the invasions in individual years. In particular the human effort in inshore fisheries was reduced from 1987 to 1988 - offshore trawlers continued to fish but the availability of cod to inshore fishermen was limited, at least partly because of the seals, so that fewer nets were in the sea in 1988.

Invasions in these last three years differ from preceding ones both in geographical distribution and in the age-composition and condition of the seals. In 1978-1984 normal seals of all age-groups were represented in eastern Finnmark, whereas subadult seals in a very poor condition appeared to dominate the western invasions in the last period. Recaptures on the mainland coast of 13 harp seals tagged in the West Ice, and an admixture of hooded seals in the recorded catches, indicate that West Ice seals at least contributed to the 1986-1988 invasions. This is consistent with the fact that catches of harp seal pups in the West Ice were reduced from an average 11 thousand per year in the preceding ten-year period to a few hundred in 1984 and 1985, to increase again to 4.5 thousand in 1986 and nearly 8 thousand in 1987. Such a variation, which helps to explain the apparent preponderance of subadults in the most recent invasions, did not occur in the East Ice where annual pup catches increased from 30 thousand early in the period to an average in excess of 53 thousand the last five years up to 1987.

The relative abundance of West Ice harp seals among those invading Norwegian coastal waters in 1986-1988 is not known. However, the mere fact they were represented makes it difficult to find an unambiguous explanation for these invasions. In

these years both herring and capelin and even cod were scarcer in the Barents Sea, but there was still an abundant supply, at least of capelin, and no indication of a scarcity of food for the seals in the western Norwegian Sea.

The picture is further complicated by secondary invasions to eastern Finnmark in 1987 and 1988. During a brief mass invasion, apparently from the East and including all age-groups, more than 6 thousand harps were landed in Vardø in one week in late April 1987. In 1988 a similar invasion, spreading to a somewhat wider area, caused a stop in all coastal fisheries in eastern Finnmark in late May. The seals disappeared again in early June and large numbers were found on drifting pack-ice near Bear Island a few days later. The seals reappeared in a brief but extensive invasion to eastern Finnmark in early April 1989, apparently feeding on an abundant local supply of capelin. Such occasional visits by straggling herds of harp seals moving with their food supply, must be expected as long as the East Ice stock is maintained at a relatively high level. Mortality in Norwegian cod-nets and other fishing gear also has made an impact on the seal stock, and Soviet surveys indicate that recruitment to the White Sea harp seal breeding lairs has been significantly reduced in recent years. It still remains, however, to assess more precisely the consequences of this mortality.

Throughout the history of commercial sealing the harp seal has provided the largest numbers of seals taken by any nation in the North Atlantic. The second species hunted by the sealers, the hooded seal, breeds in numbers on the pack-ice off Newfoundland-Labrador and in the West Ice near Jan Mayen. A third breeding location is found in the Davis Strait, but this may be an offspring of the stock breeding at Newfoundland. Only a very few hooded seals breed in the East Ice. Because of the superior quality of the fur of the pup, the blueback, this species has at times been more important economically to the sealers than the harp.

Hooded seal males may grow to a length of nearly 3 m and weigh up to 400 kg. The hooded seal is less gregarious than the harp, spreading out all over the sea when feeding, and never moving about in large schools. The species is also less abundant than the harp, and therefore not so conspicuous at sea or on the fishing grounds. They also tend to feed further offshore. Although presumably they affect commercial fish stocks by predation, hooded seals have little noticeable impact on fisheries, even when they come close to the shore pursuing seasonally migrating fishes.

More important is the direct and indirect impact on inshore coastal fisheries by the two resident seals on the coasts of Norway and other countries around the North Atlantic, the common or harbour seal and the grey seal. Interactions with fisheries include damage to fishing gear and to fish captured in standing gear. Increasing numbers of seals also reduce local fish stocks by predation and chase the fish from nearshore grounds. Most important, however, is the fact that both species act as final hosts to mature stages of nematode parasites (roundworms) which have larvae infecting the fish.

Fertilized eggs or early larval stages of the nematodes are shed into the water with the seals' faeces. For further development the larvae depend upon entering the foodchain, in the first instance to be eaten by invertebrates which are then taken by fish, and finally to reach maturity in a warm-blooded animal like the seal. Two of the three nematodes common to seals and fishes in the North Atlantic have larvae which develop on viscera in the body cavities of the fish. With proper gutting and processing of the fish these cause little trouble. The third species, however, has larvae which encapsulate in the fish muscle and can only be removed at a cost. This is the cod-worm which is well known to fishermen and processors on both sides of the North Atlantic and which has in Canada recently had its name changed to seal-worm.

The cod-worm larvae develop by stages in benthic or bottom-dwelling invertebrates and fishes like cod, tusk and flounders, and accumulate in locally resident fishes and seals. Recent indications of a reduced infection of cod-worms in certain grey seal colonies on the Norwegian coast may possibly be explained by a change in the seals' diet from benthic to pelagic fishes, following the restoration of the herring stock in Norwegian waters.

Deaths by drowing in commercial fishing gear affect the resident coastal common and grey seals, and may account for an average 6% pup mortality among grey seals in Norway. Floating debris, in particular the remains of dumped or lost fishing gear, also is an increasingly important cause of injury and death to seals and other animals in the sea. Other major man-induced factors which have adversely affected local stocks of coastal seals include excessive hunting, ingestion, habitat limitation and disturbance by traffic or recreational activities.

The possibility that contaminants like organochlorines and heavy metals, in addition to possibly causing reduced fecundity through immunosuppressive effects, may have influenced the spread of the seal disease around the North Sea in 1988, is still being investigated. The epidemic started in central Kattegat in April and spread rapidly to the Wadden Sea, Skagerrak and the southwestern Baltic. Seals on the coast of Norway were affected from early July, and colonies around the British Isles from early August. Up to December 1988 a total of more than 17 thousand seals had been found dead along the coasts of the North Sea. Only about three hundred grey seals were found to be affected by the disease, the rest were common seals. In Norway 950 common seals out of an estimated total population of about 5 thousand were found dead along the coast from the Oslofjord area to Møre and Romsdal county.

The primary cause of the epidemic in 1988 has been attributed to an infectious disease inflicted by a previously unknown morbillivirus similar to the canine distemper virus. The seal virus has now been named "phocine distemper virus", PDV.

As a result of the epidemic, a series of research projects was started in several North Sea states, to some extent also co-ordinated internationally through established contacts.

In Norway investigations of the spread, impact, causes and characteristics were improvised in co-operation between national laboratories at the outbreak of the epidemic. Continued studies are being considered for inclusion in the current national marine mammal research program. This extensive five-year program with a total budget of NOK 120 million, is funded through and co-ordinated by the Norwegian Fisheries Research Council (NFFR). The program is primarily oriented towards studies of stock identity and size, feeding and ecology, and of general biology including reproduction, growth and mortality, of exploited or abundant and ecologically significant species of whales and seals in Norwegian waters and adjacent areas of the Northeast Atlantic. In practical terms priority is given to studies of minke whales, harp and hooded seals and killer whales, with coastal common and grey seals further down on the list.

International co-ordination is achieved both by direct contact between researchers and laboratories and through established fora like the Marine Mammal Committee, the Working group on Harp and Hooded Seals and the Working Group on Baltic Seals of the International Council for the Exploration of the Sea (ICES); the European Seal Group; and for whale research, the Scientific Committee of the International Whaling Commission.

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