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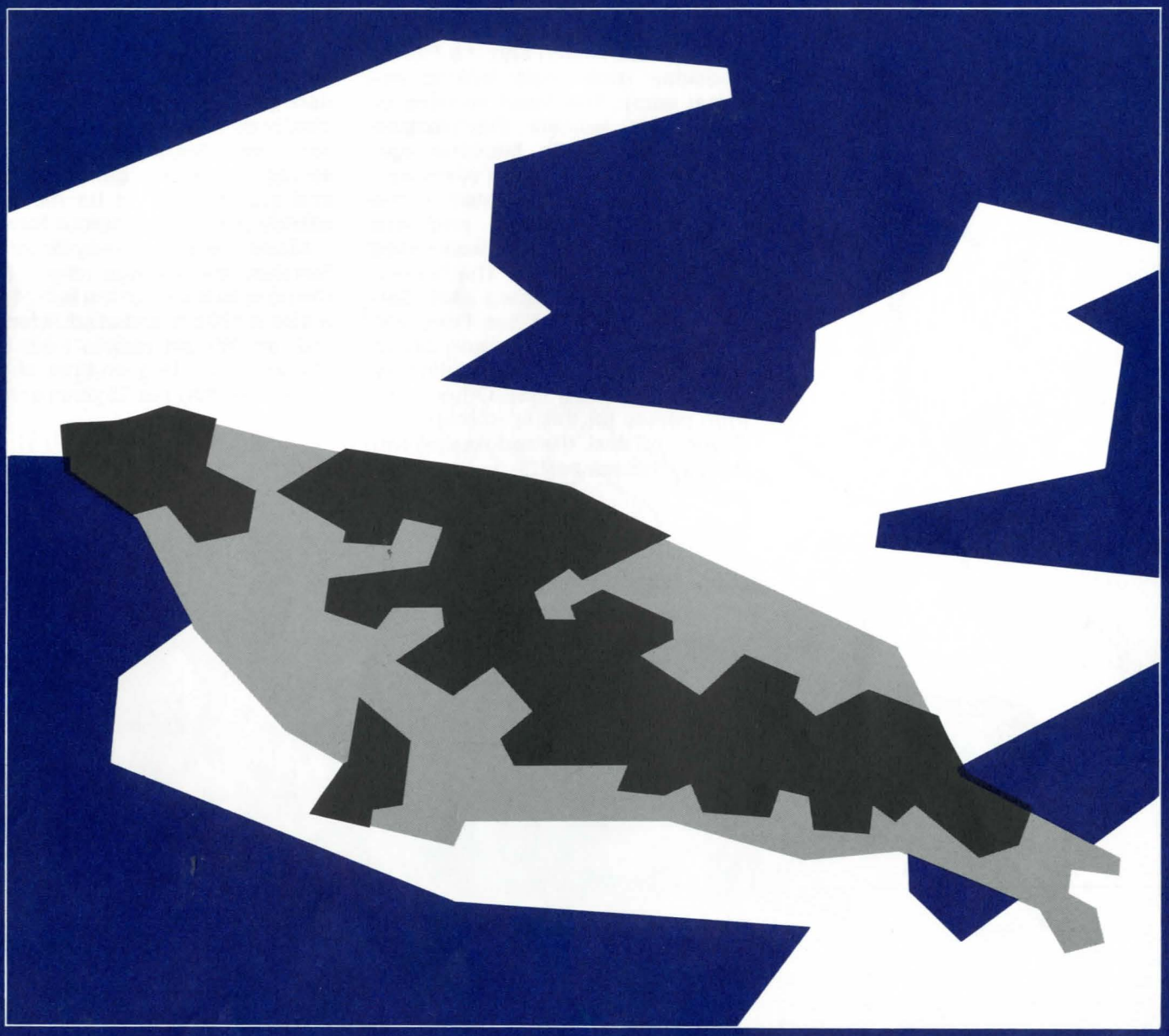
The Harp Seal



Canada

The Harp Seal

Each spring the vast ice floes off Labrador and in the Gulf of St. Lawrence come alive with the arrival of adult female harp seals. There they give birth, each usually to a single pup (twins are uncommon). These pups, known as whitecoats at the time of birth, have been the focus of an annual hunt that antedates the time of Jacques Cartier.

Description

The harp seal (*Phoca groenlandica*) is a marine mammal belonging to the Suborder Pinnipedia (fin-footed animals) and the Family Phocidae (true seals lacking external ears). The fossil remains of harp seals indicate they existed during the middle Miocene age, approximately 20 million years ago. They apparently originated in the northern hemisphere and are derived from a stock of land-based flesh-eating mammals. The Norwegian name for the harp seal, Selhund, which means Sea Dog, and the French name, loup-marin, or sea wolf, aptly reflect the evolutionary origin of the harp seal. Other common names for this species are the Greenland seal, the saddle seal and the saddleback seal.

Harp seals owe their name to the irregular horseshoe-shaped band of black straddling the back in the adult male (Fig. 1). This band, or "harp", unites across the shoulders, curves down toward the abdominal region and then back up toward the posterior flippers where it abruptly disappears. The background colour of the pelt is steel blue when wet and pale grey when dry. The head and tail are black, while the anterior flippers and belly are whitish. Adult females are similarly patterned, except that the "harp", the head, and the tail are usually somewhat lighter in colour. Some adult females have irregular dark grey spots on the back with no clearly defined "harp". Occasionally very dark 'smutty' seals are observed; these are generally males and are thought to be melanistic (darkly pigmented) colour forms.

Males are only slightly larger than females: the average length (from the nose to the tip of the tail) of adult males is 170 cm, and of adult females 162 cm. Weight ranges from 85 to 190 kg depending on time of year. Harp seals may live 35 years or more.

Fig. 1 Adult male harp seal.

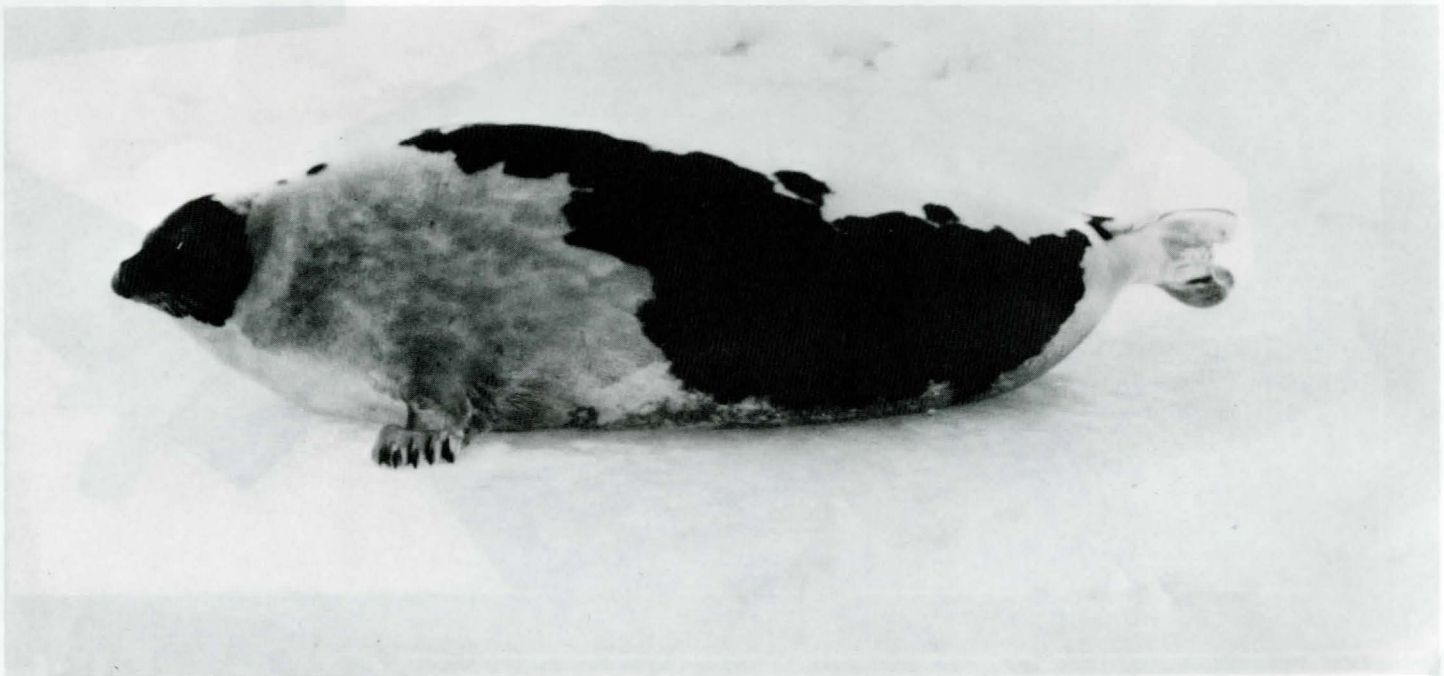
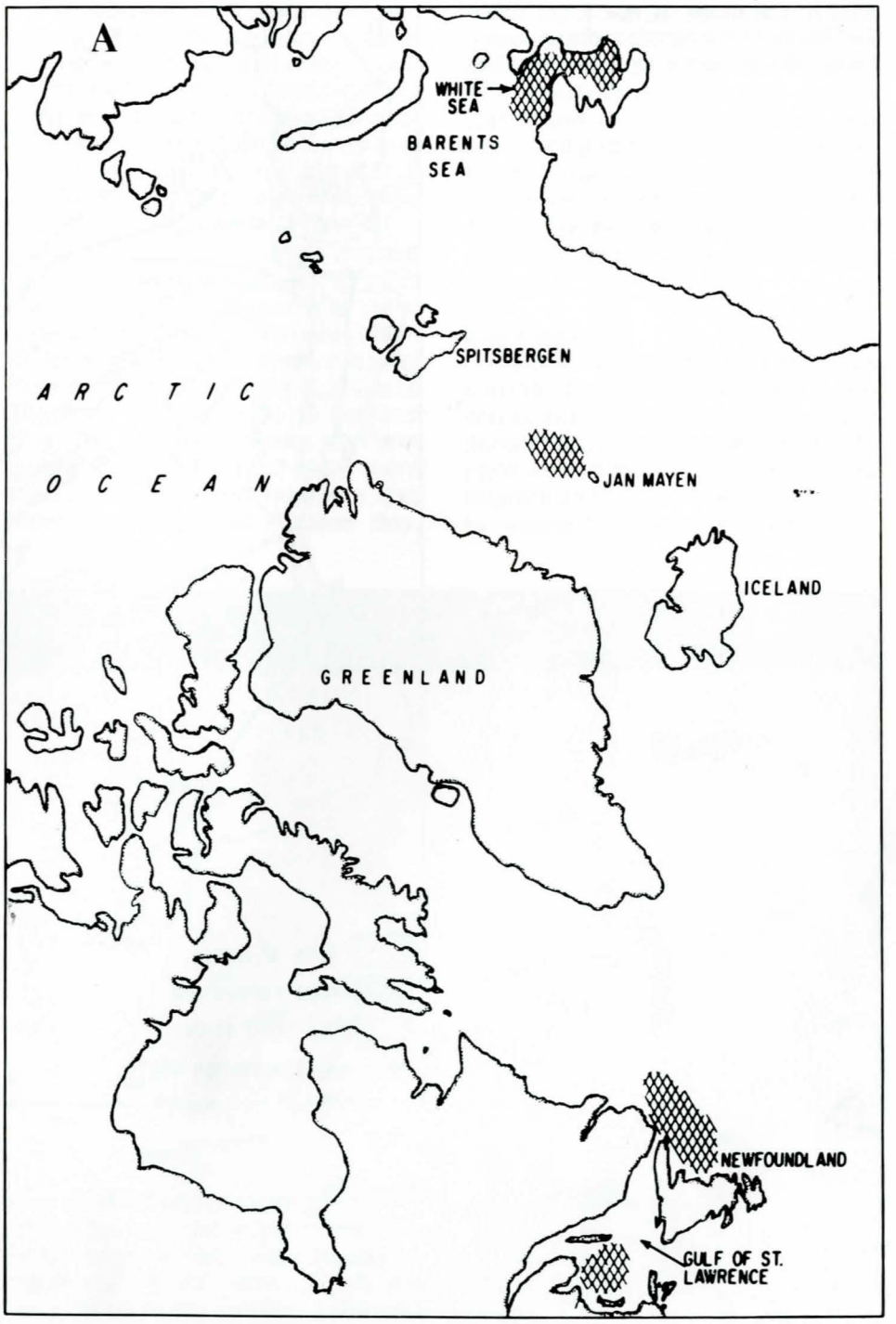


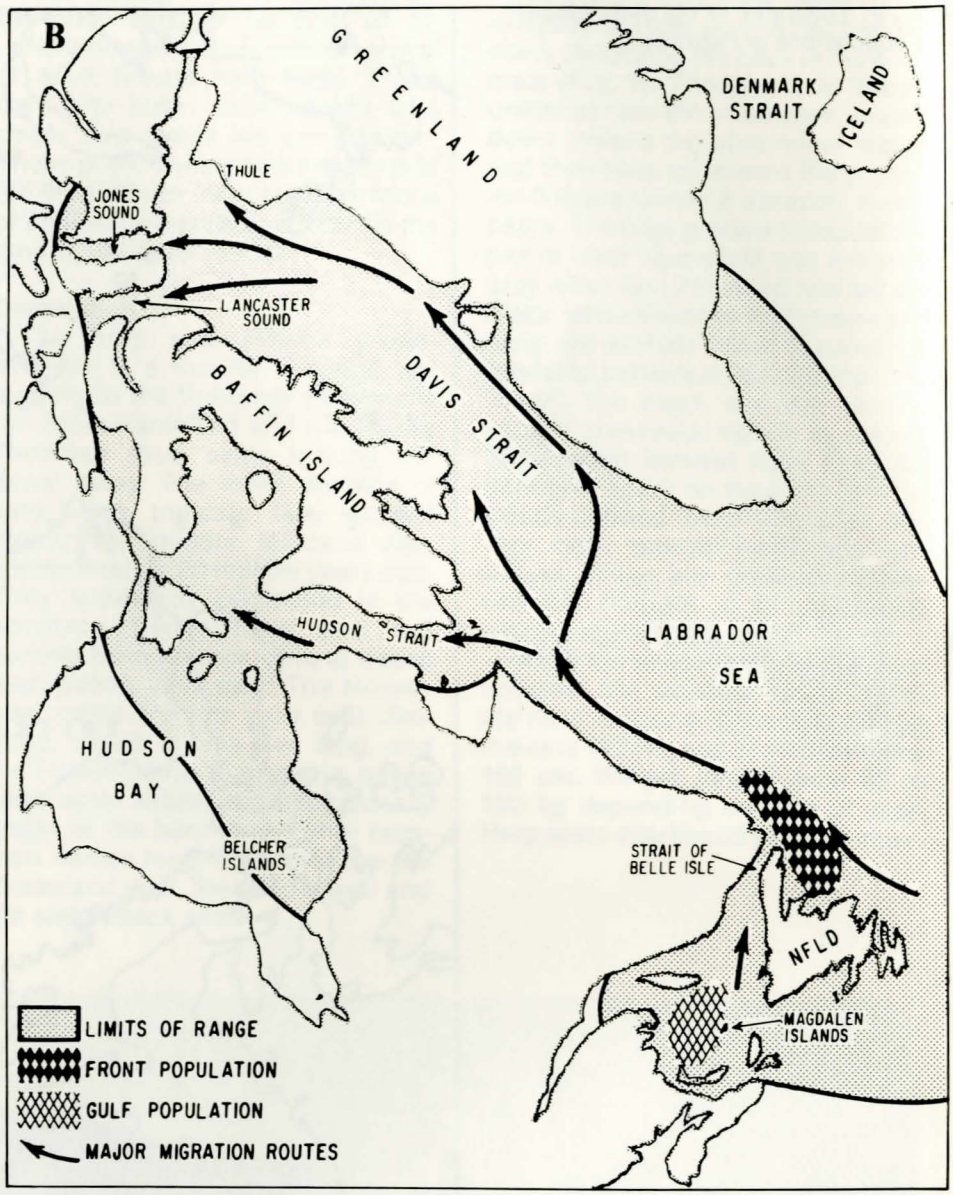
Fig. 2a Locations of the three breeding populations of harp seals.



Distribution and Migration

Harp seals occur in Arctic and sub-Arctic waters of the North Atlantic Ocean. They are confined to three widely separated populations breeding in the White Sea north of U.S.S.R., the "West Ice" near Jan Mayen Island southeast of Spitsbergen, Norway, and off Newfoundland (Fig. 2a). Studies of skull and body dimensions indicate that Northwest Atlantic harp seals (the Newfoundland population) may be genetically distinct from the two eastern stocks.

Fig. 2b Locations of the Front and Gulf herds of the Newfoundland population also show main migration routes.



The Northwest Atlantic harp seal population is divided into two herds, one breeding on the southward drifting Arctic pack ice off Southern Labrador (called the "Front" sub-population), and the other breeding on ice in the Gulf of St. Lawrence near the Magdalen Islands (called the "Gulf" sub-population) (Fig. 2b). Until recently the relationship between these two sub-populations was unclear. In years of negligible ice in the Southern Gulf, some seals that would normally have whelped (given birth) on that ice reproduced instead on the Labrador ice floes. In spite of this evidence of mixing between the sub-populations, there is a consistent difference of about five days in the dates of whelping between the two areas. From recent marking studies and blood protein analyses, it now seems likely that these sub-populations do interbreed. The difference in birth dates of pups between the two areas appears to be the result of environmental differences.

The survival of a harp seal pup during its first two weeks depends upon the availability of stable habitat. At the Front heavy Arctic ice provides this stability until late March or early April. In the Gulf the ice usually begins to disappear by mid-March and for the pup to survive, it must be born earlier than at the Front.

During spring, harp seals migrate north following the receding pack ice. Through their summer residence in the Arctic, harp seals reach as far north as Jones and Lancaster Sounds in the Canadian Arctic and Thule in northwestern Greenland (Fig. 2b). To reach these northern waters, harp seals must swim more than 3,200 km. Small numbers also move westward into Hudson Bay, reaching Southampton Island and occasionally as far south as the Belcher Islands near James Bay. The southward migration begins just ahead of the formation of new Arctic ice and involves all adults and most juveniles. Some immature seals spend much of the winter in the Arctic, as tagged seals have been recorded at West Greenland in all months.

Life History

Harp seals are highly gregarious marine mammals, hauling themselves out of the water onto the ice in dense herds to bear their young, to mate and to molt (Fig. 3). They also migrate and feed in loose herds of up to several hundred individuals.

Fig. 3. Molting harp seals located east of Belle Isle, Newfoundland in April, 1981.

In late September when new Arctic ice is forming, the seals start their journey south along the east and west coasts of Baffin Island and eastward through Hudson Strait. The first migrants reach northern Labrador in mid-to-late October and the Strait of Belle Isle (separating Newfoundland and Labrador) by mid-December. Here the migrating herd separates, about one third of the population going into the Gulf of St. Lawrence and the remainder continuing down the east coast of Newfoundland. During January and February seals disperse widely and feed intensively. Huge amounts of energy in the form of blubber are accumulated during this time. This is particularly important for pregnant females, for they need this energy to support the enormous demands of their rapidly growing offspring, both before and after birth.

Wintering harp seals appear to feed chiefly on capelin, other pelagic fish such as herring and polar cod, and crustacea such as euphausiids, mysids, amphipods and shrimps. Small amounts of bottom-living fish such as redfish, cod, American plaice and Greenland halibut are also eaten.

Pregnant females give birth several days after they have hauled out onto the winter pack ice in late February or early March. In each area the herds are generally concentrated into two main "patches" on the ice. These vary from 20 to 200 square kilometres and may contain as many as 2,000 adult females per square kilometre.

Newborn pups are about 85 cm long, weigh about 11 kg and are yellowish in colour. In about three days the fur turns to a fluffy white from which the pups derive the name "whitecoats" (Fig. 4). Young harp

Fig. 4. Harp seal whitecoat, approximately seven days of age.

seals rank among the fastest growing and most precocious of young mammals. They are nursed for about nine days and then are abandoned by their mothers. During this period they more than triple their weight on milk which contains up to 45 per cent fat (compared to four per cent for cow's milk). When weaned, pups weigh an average of 33 kg. More than half of this weight is fat in the form of blubber.

During their first week of life pups nurse almost continuously and wail if their mothers leave them even temporarily. It seems astonishing that mothers can find their own pups among so many. They do this by the odor and perhaps the call of the pup.

After the pups are abandoned by their mothers, they begin to lose weight and to molt (i.e. shed) their white coats. Partially molted pups are called "ragged jackets". After about 18 days this coat is completely shed and is replaced with a short silvery one, flecked with small dark spots along each side and sparsely flecked on the back. The pups are now called "beaters".

As soon as females have finished nursing but before they leave the "whelping patch", they are courted by males which have been waiting nearby in large herds. Mating appears to be promiscuous and may occur either in the water or on the ice. Males reach maturity at seven or eight years of age.

The females come into breeding condition annually about two weeks after their pups are born, when nursing has ended. The gestation period is approximately nine months. Usually only a single pup is born each year, but twins have been recorded. Females generally mature at between four and six years of age.

Each year, beginning in early April, harp seals molt. Adult males and immatures, called "bedlamers"[1], molt first, followed by adult females which start to molt about the third week of April. During the approximately four weeks of molting, harp seals rarely feed and as a result lose more than 20 per cent of their fat. After they have molted, adults and immatures migrate to their summer feeding grounds in the Arctic, thus completing their annual cycle.

While the older animals are molting, beaters begin to feed, mainly on small crustaceans and larvae and small fish. They actively seek the ice and gradually move northwards, reaching west Greenland in early to mid-June where they spend the summer.

Economics

It was the commercial demand for harp seal oil and skins in the late 18th century that gave rise to the sealing industry. By 1850 the annual seal hunt was worth between $1.0 and $1.25 million to Newfoundland. At that time much of this revenue came from the sale of oil, an odorless, tasteless, clear liquid obtained by rendering (melting down) the thick layer of fat attached to the skin. Harp seal oil became valued as a fuel for lamps, a cooking oil, and a lubricant.

Today fur and leather, oil, and meat are the principal products of the hunt, representing approximately 75 per cent, 10 per cent, and 14 per cent, respectively, of the income derived by Canadian sealers. The value added to Atlantic Canada's economy in 1980 was about $10.7 million. This included revenues in the neighbourhood of $300,000 to $500,000 derived from the sale of carcasses and flippers for food, mainly in Newfoundland.

[1](The term "bedlamer" comes from the Basque and Breton settlers who took up residence along the Strait of Belle Isle in the 15th and 16th century. They were fascinated by the unusual curiosity of the young seals and called them "Bêtes de la mer", Animals of the Sea. English fishermen corrupted this phrase into the term "bedlamer".)

History of Exploitation and Trends in Abundance

The harp seal is the basis of a traditional sealing industry in Newfoundland and the Gulf, which was well established by the early 18th century. At that time the manning of sealing stations was given as the major reason for breaking the ban on the colonization of Newfoundland. Initially seals were captured in nets set from shore, a practice which continues today in parts of Newfoundland, along the North Shore of Quebec and in southern Labrador. By the late 18th century Newfoundland fishermen owned 2,000 nets and earned half of their annual income from the sale of oil and skins.

The first step toward the development of a commercial offshore harvest was the appearance in 1794 of the first wooden sailing ship to hunt seals. The schooner sealing fleet was not significant until the early years of the 19th century, but between 1825 and 1860, the heyday of the seal hunt, more than 300 schooners were sailing from St. John's and Conception Bay with crews exceeding 12,000 men. Eleven times during this period catches greater than 500,000 pelts were landed, the maximum being 744,000 in 1832. These catches were mainly young harp seals, but also included adults and immatures and a small number of hooded seals.

Fig. 5. Harp seal with modern steel-hulled sealing vessel in the background.

In 1863 a second advance in hunting technology occurred when steamers were used for the first time. The number of steam-powered sealing ships increased rapidly to 25 in 1880 and by 1911 all offshore sealing ships were steam-powered. The final revolution in sealing methods came in 1906 when the first steel-hulled ship, the S.S. ADVENTURE, was fitted for the hunt (Fig. 5).

Although the large vessel hunt in March is well known, smaller vessels are also used to hunt seals. "Landsmen" in small boats and larger vessels up to 20 m in length (longliners) from the Magdalen Islands, the North Shore of Quebec, and Newfoundland take pups and older seals from late December to May (Fig. 6). Harp seals are also taken in the Canadian Arctic and along the coast of west Greenland from June to August. About 45 per cent of the total allowable catch of harp seals is currently taken by the landsmen and Arctic hunts.

Despite the replacement of sailing ships with steam-powered vessels, catches of seals in the Northwest Atlantic declined substantially towards the latter part of the 19th century, averaging about 341,000 between 1863 and 1894. Beginning in 1895 harp seal catches were recorded separately and continued to decline, averaging 249,000 between 1895 and 1911 and 159,000 between 1912 and 1940.

In 1938, the large Norwegian sealing ships began to hunt the Northwest Atlantic population. Following the Second World War, during which little sealing occurred, the Norwegian fleet returned and gradually increased. By 1949 this resulted in a doubling of catching effort. Although mainly a Canadian and Norwegian industry, ships under the registry of Denmark, France, the United States, and the Soviet Union occasionally have participated in the Atlantic coast hunt.

Fig. 6. Adult harp seal with two whitecoats.

Fig. 7 Female harp seal and whitecoat.

Annual catches of harp seals by ships from 1949 to 1961 averaged 185,000 young and 70,000 adults and bedlamers. In addition the catch by landsmen from Cape Breton Island, Quebec, Newfoundland, Labrador, and West Greenland was approximately 55,000 annually. The total catch averaged 310,000 seals. Between 1961 and 1970, annual catches averaged 287,000 animals. Under quota management, introduced in 1971, harp catches for the decade 1971-1981 averaged 172,000 animals of which about 137,000 were pups.

The large catches of harp seals in the post-war years and the increased proportion of the catch comprised of older seals resulted in a marked decline in population size and pup production. Although historical data are inadequate to accurately assess population size prior to 1950, it is evident that the reduction in stock size between 1950 and 1970 was approximately 50 per cent, or from about 2.5 to 3.0 million animals in 1950 to about 1.5 million seals age one and older in 1970.

Research and Management

Research to determine the size of the harp seal population and the effect of existing catches on trends in population size began in the early 1950s. Since then a number of assessment methods have been used. All require certain assumptions, and it is not always possible or practical to test whether these are justified. However, this is a common problem in the estimation of abundance and productivity of most animal species and is not unique to harp seals.

The earliest method used to estimate harp seal abundance was aerial survey. Initially, normal daylight film was used to photograph the seals, but the white pups were often invisible against their background of snow. In the 1970s it was discovered that the fur of whitecoats absorbs ultra-violet radiation. Thus, in an ultra-violet photograph, pups produce a black image against the white background of the surrounding snow and ice.

A second system used to estimate the population is the survival index method. Annual studies of the age composition of seals killed while migrating show that the level of survival of young seals varies inversely with the level of catch. This method cannot provide an estimate for a single year — only an average estimate for a period of years. The method assumes that pup production during the period in question (usually five years) remains constant, and that the subsequent survival of a year-class (pups born during a particular year) is accurately reflected in age composition of the catch.

Mark-recapture methods have also been used to estimate pup production. In this method, a large number of whitecoats in each whelping patch are marked with coloured tags. Some time later — usually April or May of the same year — beaters are taken during the landsmen's hunt. Some of these beaters are marked and some are not. By considering the ratio of marked beaters to total beater catch, and knowing the number of whitecoats initially marked, it is possible to determine the number of whitecoats born.

Computer models are also used to estimate population size and total annual allowable catch. These models use: the age composition of the catch; the age structure of the population; proportion of pregnant females at each age; and rate of natural mortality. These models enable the reconstruction of trends in abundance since 1950 and allow short-term predictions about the future size of the population, given a stated level of harvest.

Regulations were first imposed on the harp seal hunt in 1961 when a closing date of May 5 was introduced.

In 1963 the closing date was changed to April 30 in an attempt to protect adult females in molting concentrations. In 1965, more significant conservation measures were taken. These included the total protection of females on whelping patches, a catch limit of 50,000 seals in the Gulf of St. Lawrence (effectively stopping Norwegian sealing in this area), and the banning of the use of aircraft which had been introduced in 1962.

Commercial sealing, at Canada's request, was placed under the deliberation of the International Commission for the Northwest Atlantic Fisheries (ICNAF) in 1966. The following year, scientists of the ICNAF seal assessment working group reported that the harp seal population had sustained a marked decline since 1950. Accordingly in 1968, opening dates were established and the hunt shortened, with a closing date of April 25. However, these regulations had little effect on limiting the numbers of seals harvested.

Effective management began in 1971, when the first catch quota (245,000 seals) was imposed. This move was taken as a result of substantial and sustained decline in the population. In 1972 the quota was reduced to 150,000, of which 12,000 was to be taken by large vessels, with an allotment of 30,000 animals to landsmen. Ship-based sealing was also banned in the Gulf in 1972. From 1972 to 1975 the quota remained at 150,000 seals.

In 1976 scientific advisers to ICNAF reviewed new analyses which indicated that the seal population had been increasing since 1972. Accordingly, the quota was raised to 160,000 with an allotment of 10,000 for the Arctic summer harvests. In 1978 this was increased to 170,000 plus an Arctic allotment of 10,000. From 1978 to 1981 the quota remained at this level. Landsmen were regulated by quota beginning in 1977.

Recent data indicate that pup production is in the neighbourhood of 475,000 animals, with an associated population of animals one year and older of 2.0 million seals. Assuming that the existing level of harvest is maintained, the population is projected to increase to 2.3-2.5 million by 1985. There is no scientific evidence to show that the population is endangered by the existing levels of harvest.

The management of the harp seal has improved considerably in recent years. Further study of the marine ecosystem and research into the interactions between harp seals and other species is now underway. Considerable effort must be devoted to multispecies interactions if harp seals are to be managed as one of the principal predators in an ever-changing marine community.

Fig. 8 Female harp seal with whitecoat ready to nurse.

Further Reading

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St. John's, Newfoundland
A1C 5X1

Published by:
Communications Branch
Department of Fisheries and Oceans
Ottawa, Ontario
K1A 0E6

UW 82/011 E

Cat. No. Fs 41-33/11-1982 E
ISBN 0-662-11929-0

Disponible en français.

Cat. No. FS41-33/11-1982E
ISBN 0-662-11929-0