

work, mainly including measurements of body proportions and collecting of sexual organs, ear plugs and bulla tympanica. The material is now being worked up at the Institutes.

Only a small scale marketing programme was carried out in the 1977 season. One of the observers marked a humpback whale in Bear Island waters and a killer whale off Svalbard.

During the 1977 season, five minke whales marked in the Bear Island area in 1975 were caught in about the same area as the marking had taken place.

At the Department of Marine Zoology and Marine Chemistry, University of Oslo, biological material from large whales collected in post-war seasons at the shore stations in Norway is continued to be analysed. A paper on the Eastern North Atlantic sei whale has been published. Studies on the propagations of fin whales (Balaenoptera physalus) has now been completed, and a brief report will be available in the near future.

In cooperation with the Marine Research Institute in Bergen studies are being made in Norwegian coastal waters on the grey seal codworm problem. In cooperation with the Marine Research Institute in Iceland, an Icelandic programme for minke whale research has been carried into effect.

#### Seals (T. Øritsland)

Seal research aimed at stock assessments of North Atlantic harp and hooded seals was continued in 1977 by the Sea Mammal Section of the Institute of Marine Research, Bergen (T. Øritsland, T. Benjaminsen and B. Bergflødt) partly in cooperation with the School of Fisheries, University of Bergen (N.O. Jacobsen). The Sea Mammal Section also continued surveys and parasitological studies of coastal grey and common seals in cooperation with the Zoological Laboratory, University of Bergen (B. Berland and K. Toklum), the Department of Marine Zoology and Chemistry, University of Oslo (A.J. Bjørge) and the Bedford Institute of Oceanography, Dartmouth, N.S., Canada (P. Brodie).

Sampling and charting of seal concentrations were carried out on a commercial sealer on the Front off Newfoundland-Labrador from 11 March to 12 April; on a sealer in the West Ice (the Jan Mayen area of the Greenland Sea) from 17 March to 17 April and the relief vessel in the West Ice from 18 March to 28 April. Work at the laboratory was concentrated on a review of age determinations of samples collected from West Ice hooded seals and re-analysis of age samples and catch statistics.

#### Harp seals (Pagophilus groenlandicus)

Age samples (canine teeth from lower jaws) were collected from 657 moulting harp seals at Newfoundland and 275 breeding females and 1 200 moulting harp seals in the West Ice. Reproductive organs were collected with the age material from 136 breeding females in the West Ice.

A total of 482 harp seal pups were tagged in the West Ice and three of these were recaptured during the sealing season. One pup tagged northeast of Jan Mayen on 27 March was recaptured in Eyarfjord in northern Iceland one month later. Another pup tagged on the same day was recaptured on the east coast of Greenland, southwest of Angmassalik, on 3 November. No seals were tagged by Norway in other areas in 1977, but 6 recaptures were made of seals tagged at Newfoundland in previous years, one tagged in 1972 and five tagged in 1976. Three of these were caught by Newfoundland landsmen in February, March and April, and the other three in West Greenland in January, July and November.

The stochastic model for estimation of production, mortality and sustainable yield of northwest Atlantic harp seals was published (Lett and Benjaminsen, 1977) and a new analysis was made of age frequencies and catch statistics for the stock of harp seals in the White Sea and the Barents Sea. This analysis indicates a pup production in the White Sea of 92-103 thousand around 1964 when quotas were introduced, and productions of about 99 thousand in 1968, and about 164 thousand in 1978. The data show an annual increase of 4.9% per year during the last few years, and are supported by Soviet aerial surveys which show a recent increase of 5.4% per year in the number of breeding females on the ice in the White Sea. The sustainable yield of harp seals in the White Sea and the Barents Sea in 1978 was estimated at 94 thousand.

#### Hooded seals (*Cystophora cristata*)

Age samples collected on the Front at Newfoundland comprise about 1 800 and West Ice age samples total 990 breeding seals. Reproductive organs were collected from 28 breeding females in the West Ice. The average length and weight of the 74 pups measured in the West Ice was 105.7 cm and the weight was on average 33.7 kg.

Taggings in the West Ice in 1977 included 35 hooded seal pups, and 10 of these were recaptured later in the hunting season. A female hooded seal tagged as a pup in the West Ice in 1972 was caught with a pup of her own in the same area on 25 March 1977. Another hooded seal tagged at an age of about two years in the moulting lairs in the Denmark Strait in 1974, was killed in Notre Dame Bay, Newfoundland, on 25 April 1977. This is the fourth recapture from 100 tagged animals in the Denmark Strait in 1974. Three of these have been taken at Newfoundland and the fourth at Julianehåb in southern West-Greenland. So far, this tagging experiment has therefore confirmed that hooded seals from Newfoundland moult in the Denmark Strait.

Norwegian age samples of hooded seals collected in the West Ice from 1953 to 1977 total 7 379 seals. However, about 80% of the material collected up to 1971 had not been sexed and therefore cannot be used for stock assessments. Sexed material from later years total 3 071 seals, including two large samples collected in 1975 (1 106) and 1977 (990).

The average total annual mortality of 6 year old and older female hooded seals was estimated at 19.0% from these recent Norwegian age samples. Corresponding values were found from previous (18.4) and recent (18.1) Soviet samples and from recent Dutch samples (18.6) collected in the West Ice.

Pup catches in individual years related to the survival of corresponding year classes of females as estimated from the recent Norwegian age samples, indicate a pup production of about 58 thousand in 1968 ( $r = 0.97$ ). Assuming a mean age of productive maturity of 5 years and 95% fertility, production in 1978 was estimated at 58 thousand, 52 thousand and 45 thousand respectively for alternative natural mortality rates of 10%, 11% and 12%. The sustainable yield in 1978 for 11% natural mortality was estimated at 23 300 pups and 2 000 adult females.

#### Common seals (*Phoca vitulina*)

Surveys were carried out from Vikna in Nord-Trøndelag county to Vega in Nordland county from 16 June to 7 July. Provisional results suggest lower numbers in Nordland county than previously assumed. The surveys indicate about

200 common seals in the Vikna area. Age material and stomach contents were collected from 10 common seals and 2 grey seals at Vikna.

#### Grey seals (*Halichoerus grypus*)

Grey seals were sampled in the Halten-Froan area of Sør-Trøndelag from 20 September to 10 October. Teeth for age determinations, stomach contents and parasites and reproductive organs were collected from 17 grey seals and 2 common seals. Samples for parasitological studies were also collected from samples of fish and benthic invertebrates.

A total of 50 grey seal pups were counted during an aerial survey of the Halten-Froan area on 3 October. Poor weather prevented further surveys until 22 November, when three adults and no pups were found at Orskjærene in Møre county. On a survey flight on 6 December over Halten-Froan, Vikna and Vega (Nordland) only one pup and 6 adult grey seals were found.

Experimental culling in the area west of Vega (Nordland), started in 1976, was continued during 17 to 23 October 1977. A total of 36 pups, one sub-adult, one adult male and 17 adult females were killed. Age material, reproductive organs and stomach contents were collected from 6 adult females.

At Halten, 99 grey seal pups were tagged in October 1977. Five early recaptures show that pups can move as far as four nautical miles before they are three weeks old. Three additional recaptures were made south of Halten in November and December, two of them 70 nautical miles away from the tagging locality. One grey seal tagged at Floholmene, Nordland county, in 1976, was recaptured in January 1977 at Myken, some 45 nautical miles further north.

#### Other seal research

A special project on seal physiology was initiated and will be continued for another two or three years at the Institute of Zoophysiology, University of Oslo (A. Päsche). Provisional results show that seals which loose blubber from starvation or physiological stress during breeding and moult, compensate for increased heat loss by a higher metabolism.

#### Poland

No report received.

#### Portugal

(M. L. Dias)

No research on marine mammals was carried out in 1977.

#### Spain

(O. Cendrero and H. Quiroga)

The Spanish research workers on marine mammals have continued the usual records of stranded cetaceans, most observations were carried out by scientists of the Zoological Museum of Barcelona. In addition, some enquiries have been made about recent sightings of Mediterranean monk seals, Monachus monachus, from former Balearic Islands colonies. The results have been negative in all cases.