

NORWAY. PROGRESS REPORT ON CETACEAN RESEARCH, JANUARY 2001 TO DECEMBER 2001, WITH STATISTICAL DATA FOR THE CALENDAR YEAR 2001

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This report summarises information obtained from: the University of Tromsø: the Department of Arctic Biology (UITØ-AAB) and the Norwegian College of Fishery Science (UITØ-NFH), the Norwegian School of Veterinary Science, Department of Arctic Veterinary Medicine, Tromsø (NVH-IAV), the National Veterinary Institute (VI), the Institute of Marine Research, Bergen (IMR), the Norwegian Institute of Fisheries and Aquaculture, Tromsø (NIFA), and the Norwegian Polar Institute, Tromsø (NP).

1. Species and stocks studied

Common name	Scientific name	Area/stock(s)	Items referred to
Minke whale	<i>Balaenoptera acutorostrata</i>	Northeast Atlantic	2.1.1; 2.2; 3.1.3; 4.1; 4.2; 4.4; 5; 6.1; 9
Humpback whale	<i>Megaptera novaeangliae</i>	North Atlantic	3.1.1; 4.1
Killer whale	<i>Orcinus orca</i>	Northeast Atlantic	3.1.3; 5
White whale	<i>Delphinapterus leucas</i>	Svalbard	3.1.3; 4.1; 5
Harbour porpoise	<i>Phocoena phocoena</i>	Norwegian coastal waters	2.2; 3.1.3; 3.2; 4.3;
Sperm whale	<i>Physeter macrocephalus</i>	North Atlantic	4.3; 5
White-beaked dolphin	<i>Lagenorhynchus albirostris</i>	Northeast Atlantic	4.1; 5

2. Sightings data

2.1 Field work

2.1.1 SYSTEMATIC

During the period 27 June to 7 August 2001 a sighting survey was conducted with one vessel covering the southeastern Barents Sea including Russian EEZ and one vessel in parts of the Norwegian Sea. The latter vessel was originally planned to cover the North Sea but was denied access to UK waters. This was the sixth and final year of a six-year program to cover the northeast Atlantic to provide a new abundance estimate of minke whales every sixth year as part of the management scheme established for this species. (IMR)

2.1.2 OPPORTUNISTIC, PLATFORMS OF OPPORTUNITY

In August/September mapping of whale distributions was conducted during 0-group fish surveys in the Barents Sea. (IMR)

Incidental observations of marine mammals have been collected from research survey vessels and Coastguard vessels. Recorded data include date, position, species and numbers. (IMR)

2.2 Analyses/development of techniques

In July an experimental survey for estimating abundance of harbour porpoises in coastal waters was conducted in Sognefjord and Romsdalsfjord in southern Norway. (IMR)

The methods for analysing sightings survey data have been further developed with respect to combining multi-year survey data for Northeast Atlantic minke whales. (IMR)

3. Marking data

3.1 Field work

3.1.1 NATURAL MARKING DATA

During the minke whale sightings survey (see 2.1.1) fluke photoes of humpback whales were collected from the southeastern Barents Sea and parts of the Norwegian Sea. (IMR)

3.1.3 TELEMETRY DATA

During the minke whale sightings survey (see 2.1.1) satellite tagging of large whales was conducted. Instrumentation of minke whales with VHF tags for collecting dive time information was also conducted although without any successful results. (IMR)

In August/September VHF tagging of minke whales was conducted in the Vestfjord area. Four whales were instrumented, and dive time data from three of these were collected. (IMR)

Capture and satellite tagging studies of harbour porpoise were carried out in Varangerfjord, Northern Norway in - June 2001 as a continuation of telemetric studies started in 1999. Three porpoises were tagged in 2001. (IMR)

Five killer whales were instrumented with satellite tags in Tysfjord in November/December. (IMR)

In late October in Storfjorden, Svalbard three white whales were equipped with satellite transmitters to study winter migration. (C. Lydersen, NP).

3.2 Analyses/development of techniques

Experiments to use by-caught harbour porpoises for satellite tagging have been successful, and three animals were tagged in June 2001.

4. Tissue/biological samples collected

4.1 Biopsy samples

Field work on white whales was conducted at Svalbard in late October. A total of 8 white whales were live-captured. Tissue and blood samples were collected for studies of genetics and pollution. (NP).

During the minke whale sightings survey (see 2.1.1.) biopsy samples were collected from several whale species, including white-beaked dolphins, humpback, minke and fin whales. Biopsy samples from minke whales in the Vestfjord area were collected in August/September. (IMR)

Species	Area/stock	Calendar year/ season no. collected	Archived (Y/N)	No. analysed	Total holdings	Contact person/institute
White whale	Svalbard	2001 8	Y			C. Lydersen, Norwegian Polar Institute, Tromsø

4.2 Samples from directed catches

During the commercial whaling season (May-June), stomach samples, body condition data and biological material for studies of demography, reproduction and pollutants were collected from minke whales by scientific personnel on four of the participating vessels. Additionally, tissue materials for studies of stock identity were collected by governmental inspectors from all whales taken by the other vessels participating in the Norwegian small type whaling. (NIFA)

Biological material and especially material relevant for studying alternative age determination techniques for baleen whales, was collected during the commercial minke whale catch operations off Spitsbergen and Jan Mayen and in the North Sea. (IMR)

Samples for pathological studies were collected from 19 minke whales during the 2000 catch operations. The studies include gross post mortem examinations in the field and histological examinations of tissues from vital organs. (NVH-IAV).

4.3 Samples from stranded animals

Feeding and reproduction of harbour porpoises are being studied based on material collected in recent years from bycaught animals. (IMR)

Biological material (blubber, eye, teeth) were collected from a sperm whale stranded at Sola in southwestern Norway. Fluke photos were compared with the sperm whale catalogue of Andenes, northern Norway, but no match was found. (IMR)

4.4 Analyses/development of techniques

Studies of a number of alternative methods, including an evaluation of current methods for age determination of minke whales have been continued. Age estimation of minke whales based on reading growth zones in bullae has been shown to be of little use. This conclusion is based on experiments where several readers have done multiple readings of bullae sections and then compared to other length-related parameters like total length and number of ovulations. Growth structures in mandibles were also investigated but not found to be formed at a regular rate with

poor agreement in within and between reader estimates. Age estimation of minke whales using the aspartic acid racemization reaction is apparently a promising technique. (IMR)

Stomach content samples from minke whales have been analysed using traditional methods where the original biomass of prey items are reconstructed based on remaining hard parts in the contents. Acoustic and biological data from prey estimate surveys on the whaling grounds have also been analysed. (NIFA/UITØ-NFH)

Substantial changes have occurred in the Barents Sea ecosystem over the past 30 years, the most conspicuous being related to the rises and falls of stocks of the two dominant pelagic shoaling fish species: capelin and herring. Based on data from annual studies, effects of these ecological changes on the diet and food consumption of minke whales have been assessed for the whole period 1992-2001. Following a collapse in the capelin stock in 1992/1993, minke whales foraging in the northern Barents Sea apparently switched from a capelin-dominated diet to a diet almost completely comprised of krill. The second half of the 1990s saw a clear improvement of the capelin stock, and the species was again observed on the whale menu in the northern areas in 2000. In the southern area of the Barents Sea capelin have been observed to be preyed upon by minke whales increasingly after 1995. In this area, also gadoids and, more importantly, krill and herring, are the food items of interest for the whales. The southern region of the Barents Sea include important nursery areas for the Norwegian spring spawning herring. Good recruitment to this stock gives strong cohorts (e.g., 1991, 1992 and 1998) and large numbers of young, adolescent herring (0-3 years old) which serve as the main food for minke whales feeding in the area. Recruitment failure with subsequent weak cohorts (e.g., 1993-1997) seems, however, to reduce the availability of adolescent herring to such an extent that minke whales switch to other prey items such as krill, capelin and, to some extent, gadoid fish. In the North Sea (first sampled in 2001), the whale diet appear to be dominated by sand-eels. The annual changes in prey abundance and whale body condition, measured as girth and blubber index, was weakly correlated. Apparently, however, immature animals and adult females seemed to be in better condition in years with good abundance of immature herring in the southern Barents Sea. (NIFA)

In 1998 and 1999, stomach content samples from minke whales, caught during the Norwegian commercial whaling in the southern Barents Sea in the period May-June 1998, were compared with results from a comprehensive resource survey conducted concurrently in order to identify and estimate the abundance of potential prey items for the whales. The small scale resource surveys revealed significant variations in absolute and relative prey abundance both geographically and temporally. Similar variations were, to some extent, also observed in the whale diets. The results from the prey preference analysis gave evidence that the whales may have selected capelin actively. Gadoids (cod, haddock, saithe) appeared to have been avoided, while krill appeared to have been either avoided, fed randomly, or preferred, depending on sub area and analysis level. Herring was eaten as expected given the relative abundance of the species in the sea. The results from the 1998 and 1999 minke whale prey preference studies have served as basis for a PhD project. (NIFA, UITØ-NFH)

Based on tissues collected for scientific purposes during Norwegian and Greenland whaling operations in 1998, questions concerning minke whale stock identity were addressed in a joint Greenland-Norwegian program. The methods applied included analyses of DNA, organochlorines, heavy metals and fatty acid signatures. The results, which are now being published, may indicate some sub-structuring of minke whales within the entire study area, e.g., with animals from the North Sea possibly being different from animals taken elsewhere in the northeast Atlantic. (NIFA, IMR)

5. Pollution studies

Samples from the North Atlantic populations of minke whales (n=20) were analysed with respect to chlororganic pollutants. Both muscle and entire blubber layer samples were sectioned and analysed with respect to PCBs. A preliminary report is available at the Ministry of Fisheries. Publication of data in progress (VI-NVH).

Specific blubber samples from 10 minke whales caught in the southern part of the North Sea and south of Spitsbergen in the Barents Sea were analysed with respect to PCBs, dioxins and polybrominated diphenyl ethers. The results reveal a surprising and apparent difference between regions. The levels of polychlorinated dibenzo-*p*-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) (hereafter called dioxins) and dioxin-like PCBs (non-ortho PCB and mono-ortho PCBs) were analyzed in three different types of blubber (tongue blubber, dorsal blubber and abdominal blubber) from each animal. In addition, the congeners included in the ΣPCB_{35} and ΣPCB_7 were analyzed. Large variations in ΣPCB_{35} contamination were found between individuals despite the fact that only adult females were used in this study. However, contamination levels are well within the ranges found in previous studies. As predicted, the lowest concentrations of these substances were found in the tongue blubber, which contains a

significantly lower percentage of fat than the two other types of blubber. In this study, new findings emerged regarding a clear geographical variation in the ΣPCB_{35} contamination found in minke whale blubber, with the lowest concentrations in the animals harvested from the Barents Sea/ Spitsbergen area. The mean concentrations of ΣPCB_{35} in tongue, back and abdominal blubber obtained from Barents Sea/Spitsbergen area were 288 ng/g, 461 ng/g and 456 ng/g wet weight, respectively. Whereas mean concentrations of PCB_{35} in tongue, back and abdominal blubber obtained from the southern North Sea area was 1332 ng/g, 2186 ng/g and 2409 ng/g wet weight, respectively. These variations are likely to be associated with reproductive biology and variations in the migratory patterns of the minke whale. Little is known about either of these variables. However, ongoing studies may reveal different sub-populations of minke whales in the presented material.

This study reconfirms that findings from dioxin analysis will be of minimal significance to risk assessment of minke whale blubber, since dioxins contribute on average only four per cent of the total toxicity (TE). Non-ortho and mono-ortho PCB congeners contribute more or less equally to the overall toxicity. The toxicity contribution of dioxin-like PCBs should therefore provide a sufficient basis for risk assessment efforts. If the levels of such substances in minke whale blubber are to be monitored in the future, it is advisable to consider whether the analysis methodology can be simplified. This study finds that analysis of a single PCB congener, PCB-153, may be a good indicator of PCB_7 and PCB_{35} as well as the overall toxicity of PCBs and dioxins combined.

Quality control measures for and standardization of sampling methods should be devised. A preliminary report is available at the Ministry of Fisheries. Publication of data is in progress (VI-NVH).

Concentrations and patterns of OC contaminants in biopsy sampled material of white-beaked dolphins from the Barents Sea, Norway. Publication of data in progress (VI-NVH/MRI).

Concentrations and patterns of OC contaminants in biopsy sampled material from blue whale, fin whale, humpback whale, sperm whale, killer whale and pilot whale from North Atlantic waters. Publication of data is in progress (VI-NVH/MRI).

Samples from 8 white whales live-captured at Svalbard were taken for, amongst other, studies of pollution. (NP).

6. Statistics for large cetaceans

6.1 Direct catches for the calendar year 2001

Species	Type of catch	Management Areas					Total catch
Minke whale		EB	EN	ES	EC	CM	
	Small-type whaling	262	128	120	11	31	552

8. Strandings

Information on strandings has been collected by the Institute of Marine Research, Bergen, Norway.

9. Other work

Two killer whales tagged in December 2000 were followed for three and five months. They followed the migrating herring southwards to the spawning grounds off West Norway, and then northwestwards into the Norwegian Sea herring feeding grounds in April/May. Dive time patterns have also been collected, showing that the killer whales spent most of the time in the upper 28m layer of water although dives down to the interval 352-400m were recorded. (IMR)

The population structure of harbour porpoises in Norwegian waters has been investigated by genetic and ecological methods applied to samples from porpoises incidentally bycaught or stranded. The results support to a certain degree the population divisions in the North Atlantic as suggested by the International Whaling Commission, but some refinement leading to a finer scale division seems to be necessary for the North Sea region. (IMR)

In cooperation with the Directorate of Fisheries changes have been made to compulsory fisheries log books to accommodate recording of bycatches of marine mammals. (IMR)

The research work on pathological studies of minke whales killed by penthrate grenades was continued in 2001. Analysing and processing of the material will be finished and the results will be published in 2002. The above study aims to conclude in a veterinary doctoral degree. (NVH-IAV)

Scientists from NVH-IAV have been engaged in co-operative work with scientists, authorities, whale hunters and whale hunters organisations in Norway, Greenland, Alaska, and Japan to refine the design of hunting gears and penthrate grenades used for whale hunting. They have also been engaged in the planning of workshops, preparation of manuals and lecturing for whale hunters and/or administrators in Norway, Greenland, Faroe Islands, Alaska (USA) and Japan. (NVH-IAV)

11. Publications

11.1 Published or 'In Press'

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