Norway. Progress report on cetacean research, January 2010 to December 2010, with statistical data for the *calendar year* 2010

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1. SPECIES AND STOCKS STUDIED

IWC common name	IWC recommended scientific name	Area/stock(s)	Items referred to
Long-finned pilot whale	*Globicephala melas*	North Atlantic	2.1.2;5;9
Bowhead whale	*Balaena mysticetus*	North Atlantic	2.1.2;3.1.3;4.1
Sperm whale	*Physeter macrocephalus*	North Atlantic	2.1.1;2.12; 9
Humpback whale	*Megaptera novaeangliae*	North Atlantic	2.1.1;2.1.2;3.1.1;3.1.3;3.2;
Killer whale	*Orcinus orca*	Northeast Atlantic	2.1.1;2.1.2;9
Minke whale	*Balaenoptera acutorostrata*	Northeast Atlantic	2.1.1;2.1.2;2.2;3.2;4.2; 4.4;5;6.2;9
Harbour porpoise	*Phocoena phocoena*	Northeast Atlantic	2.1.2;4;5
White-sided dolphin;	*Lagenorhynchus* dolphins	Northeast Atlantic	2.1.1;2.1.2;5
Fin whale	*Balaenoptera physalus*	Northeast Atlantic	2.1.1, 2.1.2, 5

2. SIGHTINGS DATA

2.1 Field work

2.1.1 Systematic

During the period 20 July to 31 August 2010, with 42 days allocated to whale surveying, a sighting survey was conducted with the chartered vessel M/S *Hegur* in the Norwegian and Greenland Seas, including the Jan Mayen area. The area which was covered is the IWC *Small Area CM* which is part of the Medium Management Area C which comprises waters bordering Iceland and Greenland. This was the third year of the six-year program 2008-2013 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. A total of 2,073 nautical miles was surveyed with independent double platforms on primary effort. From the primary platform (secondary platform) 38 (19) sightings of minke whales were made during this effort. Sightings of other cetacean species include fin whales (37 (24) primary sightings), humpback whales (35 (31) primary sightings), sperm whales (28 (23) primary sightings), killer whales (18 (10) primary sightings), Lagenorhynchus dolphins (15 (15) primary sightings), and one (3) sighting of Northern bottlenose whale. The sighting rate for minke whales was less than half the corresponding sighting rates from previous survey cycles (1996-2001 and 2002-2007) and at about the same level as in 1995. (IMR)

Duing the period 23 August to 25 September 2010 mapping of whale distributions was conducted during the annual ecosystem surveys in the Barents Sea. Data were collected by dedicated marine mammal observers following a line transect protocol on borad the vessels “GO Sars”, “Johan Hjort” and “Jan Mayen”. (IMR)

2.1.2 Opportunistic, platforms of opportunity
Research vessels, coastguard vessels and other providers have collected incidental observations of marine mammals. Recorded data include date, position, species and numbers. During 2010 a total of 597 observation incidents have been reported. The most frequently observed species were minke whales (163 groups), humpback whales (69), fin whales (59), *Lagenorhynchus* dolphins (111), killer whales (52), long-finned pilot whales (21), sperm whales (18), harbour porpoises (41 groups) and common dolphins (10 groups). (IMR)

One bowhead whale was observed twice (10 days apart- identified as the same whale based on scarring pattern) during a scientific cruise along the ice edge in the Greenland Sea in March-April with RV Lance. (NP, NHM, GINR).

2.2 Analyses/development of techniques
Databases containing incidental observations of marine mammals have been updated. Minke whale catch data for the 2010 season have been computerised and evaluated. (IMR)

Abundance data collected during recent sightings surveys on large whales and odontocetes are being analysed with respect to trend information and the use of whale sightings collected during ecosystem surveys are under evaluation. (IMR)

3. MARKING DATA

3.1 Field work

3.1.1 Natural marking data
Photo IDs have been collected from around 70 humpback whales during field work and from incidental sources. (IMR)

3.1.2. Artificial marking data
No new information.

3.1.3 Telemetry data
A satellite transmitter was deployed on one bowhead whale in the Greenland Sea. The whale was tracked from the end of April till the end of July. (NP, NHM, GINR)

3.2 Analyses/development of techniques
The work with cataloguing identification photos of humpback whales collected on incidental occasions and during our own surveys in Norwegian and adjacent waters are continuing.(IMR)

Local abundance, migration and habitat use of humpback whales in the Barents Sea are studied based on photo ID. (IMR)

Diving behaviour and habitat use of minke whales are studied based on radio tagging experiments.(IMR)

4. TISSUE/BIOLOGICAL SAMPLES COLLECTED

4.1 Biopsy samples (summary only)
A biopsy sample was collected from the bowhead whale observed in the Greenland Sea. (NP, NHM)

4.2 Samples from directed catches (commercial, aboriginal and scientific permits) or bycatches
During the traditional whaling season (April-October), body condition data and tissue materials for studies of DNA identity were collected from all minke whales taken by vessels participating in the Norwegian small type whaling. (IMR)

Biological material to establish nutritive status by analyses of stomach contents and fatty acid composition in blubber profiles, were taken from minke whales taken on two of the vessels participating in whaling operations in the Barents Sea and along the coast of Norway in May-June. (IMR)

Brain samples were collected from two minke whales for studies of the mechanisms underlying neuronal tolerance to lack of oxygen (hypoxia) in diving mammals (collaboration with Dr. T. Burmester and Dr. N. Czech, Zoologisches Institut und Museum, Universität Hamburg, Germany), by Nils-Erik Skavberg IMR. (UIT-AMB)

4.3 Samples from stranded animals

No new information

4.4 Analyses/development of techniques

Tissues sampled for stock identity studies of minke whales have been archived and analysed using DNA techniques. During the analyses, a deviating DNA pattern was found in an adult female whale caught off Spitsbergen in June 2007. The whale was shown to be a hybrid with maternal contribution from Antarctic minke whale, *Balaenoptera bonaerensis*. The paternal contribution could not be conclusively resolved but most probably came from the North Atlantic common minke whale *Balaenoptera acutorostrata acutorostrata*. This is the first example of hybridization between different minke whale species, although hybridization has been shown previously between blue and fin whales among cetaceans. The detection of this hybrid caught attention to a morphologically deviating male minke whale which was caught at Jan Mayen in 1996; this whale lacked the white flipper bands typical of the North Atlantic minke *B.a.acutorostrata*. Luckily, biological samples still existed from this whale and the genetic analyses showed that this was a true Antarctic minke whale, *B. bonaerensis*. This is the first documented occurrence of an Antarctic minke whale north of the tropics. (IMR)

With the aim of developing a simpler way of describing minke whale diets (as compared with stomach sampling), the predator-prey relationship with respect to fatty acids was studied in 28 minke whales taken in the 2010 hunt off Vesterålen and in the Svalbard area. The fatty acid composition was determined in the inner and outer sections of the whale blubber – these two sections differed considerably. Fatty acid composition in the inner blubber (assumed to be the most active metabolically) differed between hunting areas (Vesterålen and Svalbard) and between whales with different stomach contents. When fatty acid composition in whale blubber was compared with potential prey species, considerable differences were found. Analyses are still in progress. (IMR - UIT)

Immunohistochemical studies of the regional/cellular distribution and the levels of the respiratory protein neuroglobin in brain tissue from minke whales were made, as part of ongoing collaborative studies between Dr. T. Burmester, Zoologisches Institut und Museum, Universität Hamburg, Germany, and Prof. Lars Folkow at UIT-AMB. Levels of neuroglobin in the minke whale brain are higher than in the brain of hooded seals. However, the distribution of neuroglobin between neurons and glia cells in minke whales was similar to that of previously studied non-diving mammals, while hooded seals (as previously reported) display an unusual distribution pattern, with higher levels of neuroglobin in glia cells than in neurons. The interpretation of these findings require further data collection and analysis (UIT-AMB)

Serum and body fluid samples from 16 harbour porpoises were analysed for Brucella spp. antibodies using an indirect ELISA at NVH/SAV. The samples were from West Greenland, Maniistoq, and collected in the end of 2009. They were hunted for scientific purposes under a project from the Greenland Nature Institute lead by Dr. Mads-Peter Heide-Jørgensen. There were no seropositive animals among the porpoises. (NVH)

In a cooperation between the Greenland Institute of Natural Resources and NVH, serum samples from 16 harbour porpoises from Greenland were assayed for antibodies against *Toxoplasma gondii*. Antibodies recognizing *T. gondii* were detected in nine individuals. In a subsequent assay (nested polymerase chain reaction, n-PCR) for detection of *T. gondii* by detection of parasite-specific DNA, all tissue samples from the nine porpoises assayed were negative. The results combined indicate that the presence of the antibodies detected in the nine porpoises may have been caused by one or more parasites known to be serologically cross-reacting with *T. gondii*, such as *Neospora caninum* or *Hammondia* sp. Further studies addressing the question of which parasite was infecting the porpoises, using specific PCR-methods for detection of *Neospora* and *Hammondia*, are awaited. (NVH)

Biopsies collected from humpback whales in the Barents and Norwegian Seas have been through a DNA laboratory analysis and the results are analysed in a Northeast Atlantic context comparing with data from other feeding areas. (IMR)

5. POLLUTION STUDIES

The Nordic project "New" POPs in marine mammals in Nordic Arctic areas during three decades" (Nordic Council of Ministers, see report for 2008, 2009), analysed brominated flame retardants (BFRs) in blubber of pilot whale, minke whale, fin whale, harbour porpoise and white-sided dolphin. Perfluorated compounds (PFCs) were analysed in liver samples of long-finned pilot whale and Atlantic white-sided dolphin. Chemical analyses were performed at the MTM Research Center, Örebro, Sweden. (NVH/VI)

The PBDE pattern was dominated by BDE-47, -99, -100, -154 and -153. These congeners were found in 100% of the samples in all species. BDE-47 was the most abundant PBDE congener in most species, with highest levels in pilot whales from 1997 (1389 ng/g lw). In several species, levels of ∑10PBDEs increased from the 1980s to the late 1990s, after which they declined during the first decade of 2000. However, the time trends were only significant for fin whale and white sided dolphin. (NVH/VI)

All of the analyzed PFCs except PFBuS, PFPeA, PFHxA and PFHpA were detected in the liver samples. PFOS was found at highest levels in White-sided dolphins (95-130 ng/g) while the levels ranged between 24 and 95 ng/g in ringed seal, hooded seal and long-finned pilot whale. Second highest levels were found for PFUnDA (1-68 ng/g), which equaled the PFOS levels in recent samples of pilot whales. PFOSA concentrations ranged between 0.2 and 74 ng/g, the highest levels found in pilot whale while PFDS was found to be between 0.1 and 1.9 ng/g. PFNA and PFDA were at levels between 0.5-15 ng/g and 2-16 ng/g, respectively, and PFHxS and PFOA at levels between 0.1-0.7 ng/g. The range of PFDoDA was 0.3- 11 ng/g and 0.4-26 ng/g for PFTrDA. In general, the levels of the odd-number chain-length carboxylates exceeded the levels of the corresponding even number chain-length congeners. (NVH/VI)

6. STATISTICS FOR LARGE CETACEANS

6.1 Corrections to earlier years' statistics for large whales

No corrections made.

6.2 Direct catches of large whales (commercial, aboriginal and scientific permits) for the calendar year 2010

Species	Type of catch	Management Areas					Total catch
		EB	EN	ES	EW	CM	
Minke whale	Small-type whaling	18	34	270	145	1	468

6.3 Anthropogenic mortality of large whales for the calendar year 2010

6.3.1 Observed or reported ship strikes of large whales (including non-fatal events)

No new information

6.3.2 Fishery bycatch of large whales

No new information

7. STATISTICS FOR SMALL CETACEANS

7.1 Corrections to earlier years' statistics for small cetaceans

No corrections made.

7.2 Direct catches of small cetaceans for the calendar year 2010

No direct catches

7.3 Anthropogenic mortality of small cetaceans for the calendar year 2010

7.3.1 Observed or reported ship strikes of small cetaceans (including non fatal events)
No new information

7.3.2 Fishery bycatch of small cetaceans
No new information

8. STRANDINGS

Information on strandings has been collected by IMR.

9. OTHER STUDIES AND ANALYSES

In connection with the project Lowfreq (Low Frequency sonar – potentials and dangers for marine ecosystems application) the behavioural effects of low frequency military sonars (1-7 kHz) on fish and marine mammals have been investigated (Dr. thesis, Lise Doksæter). The study has been conducted on killer whales, pilot whales and sperm whales. (IMR)

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