

Norway. Progress report on cetacean research, January 2009 to December 2009, with statistical data for the calendar year 2009

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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	<i>Globicephala melas</i>	North Atlantic	2.1.2;9
Bowhead whale	<i>Balaena mysticetus</i>	North Atlantic	4.4;9
Sperm whale	<i>Physeter macrocephalus</i>	North Atlantic	2.12;2.2;4.1;9
Humpback whale	<i>Megaptera novaeangliae</i>	North Atlantic	2.1.2;2.2;3.1.1;3.2;4.4
Killer whale	<i>Orcinus orca</i>	Northeast Atlantic	2.1.1;2.1.2;9
Minke whale	<i>Balaenoptera acutorostrata</i>	Northeast Atlantic	2.1.1;2.1.2;2.2;4.2; 4.4;6.2;6.3.2;9
Harbour porpoise	<i>Phocoena phocoena</i>	Northeast Atlantic	2.1.1;2.1.2;5
White-sided dolphin	<i>Lagenorhynchus acutus</i>	Northeast Atlantic	2.1.1;2.1.2

2. SIGHTINGS DATA

2.1 Field work

2.1.1 Systematic

During the period 25 June to 31 July 2009, with 26 days allocated to whale surveying, a sighting survey was conducted with the research vessel Johan Hjort in the North Sea. The areas covered are parts of the IWC Small Management Area EN which comprises the North Sea and the Atlantic Ocean south of 62°N and east of 18°W. This was the second 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 1,541 nautical miles was surveyed on primary effort and 56 sightings of minke whales were made during this effort. Sightings of other cetacean species include white-sided dolphins (29 primary sightings), *Lagenorhynchus* dolphins (11 primary sightings), harbour porpoises (10 primary sightings) and one primary sighting of a killer whale. (IMR)

During the period 15 July to 6 August 2009 mapping of whale distributions was conducted during an ecosystem survey in the Norwegian Sea onboard the research vessel M/S Libas by having dedicated whale observers who collected information following line transect protocols. A similar arrangement with dedicated marine mammal observers following a line transect protocol was conducted also during the annual ecosystem surveys in the Barents Sea, over the period 20 August to 3 October 2009 on the vessels G O 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 2009 a total of 750 observation incidents have been reported. The most frequently observed species were sperm whales (243 groups), minke whales (115), long-finned pilot whales (67), humpback whales (65), killer whales (64), *Lagenorhynchus* dolphins (52), fin whales (31) and harbour porpoises (20 groups). (IMR)

2.2 **Analyses/development of techniques**

An estimate of abundance of Northern minke whales in the Northeast Atlantic, based on partial surveys conducted over the period 2002-2007 was presented to the annual meeting of the IWC/SC in 2008 but received critics which have been followed up with additional analyses. The revised total abundance for the areas covered over the period 2002-2007 is 108,000 (cv 0.23). Of these, 81,000 (cv 0.23) minke whales are within the Eastern Medium Area. These estimates are in accordance with the corresponding estimates from the previous survey period 1996-2001. Interannual variation in the spatial distribution of minke whales arising from the partial coverage nature of these surveys has been incorporated in these estimates. These estimates were approved by the IWC/SC for use in the RMP. (IMR)

Abundance estimates for fin, sperm and humpback whales based on recent surveys have been published. (IMR)

Databases containing incidental observations of marine mammals have been updated. Minke whale catch data for the 2009 season have been computerised and evaluated. (IMR)

Data collected during recent sightings surveys on other species than the large whales are being analysed 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 21 humpback whales. (IMR)

3.1.2. *Artificial marking data*

No new information.

3.1.3 *Telemetry data*

No new information

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 progressing. (IMR)

4. **TISSUE/BIOLOGICAL SAMPLES COLLECTED**

4.1 **Biopsy samples (summary only)**

During field work, biopsy samples have been collected from sperm (1) and pilot (3) whales. (IMR)

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 assess possible effect of seismic activities, and to establish nutritive status by analyses of fatty acid composition in blubber profiles, were taken from minke whales taken on one of the vessels participating in whaling operations in the North Sea in May. (IMR)

Brain samples were collected from 3 minke whales for studies of the mechanisms underlying neuronal tolerance to lack of oxygen (hypoxia) in diving mammals (collaboration with Dr. T. Burmester, Zoologisches Institut und Museum, Universität Hamburg, Germany), by veterinarian Arild Jøssund, inspector on board the whaling vessel "Unstad junior" (UIT-AAB).

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. (IMR)

Analyses of the occurrence and distribution of the respiratory protein neuroglobin (Ngb) in brain tissue from minke whales have been conducted at the University of Hamburg, in collaboration with UIT-AAB. The immunohistochemical studies show that (Ngb) is not distributed in a similar way as in the hooded seal, but more like in non-diving species (i.e. Ngb is primarily found in neurons instead of in glia cells). This difference may suggest that minke whale neurons are not protected from hypoxia in the same way as seems to be the case for the expert diver, the hooded seal. However, minke whales appear to have higher total brain levels of neuroglobin than hooded seals, but the functional implications of these differences are not yet understood and further studies are needed (UIT-AAB)

Data on minke whale consumption is being used in multispecies modelling (e.g., GADGET) of the Barents Sea ecosystem. (IMR)

Biopsy samples of bowhead whales from western Greenland are analyzed. (GNI, DFO, NHM).

Biopsies collected from humpback whales in the Barents Sea have been through a DNA laboratory analysis and results are in the process of being prepared for publication. (IMR)

5. POLLUTION STUDIES

The Nordic project "New POPs in marine mammals in Nordic Arctic areas during three decades" has included perfluorated compounds (PFCs) to be analysed. PFCs will be analysed in liver samples. From Norway pools of harbour porpoise blubber and liver were included in the study for analyses of BFRs and PFCs. The samples were collected during the NFR project "Population structure of harbour porpoises in Norwegian waters", Ref Lars Kleivane. (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 2009

Species	Type of catch	Management Areas					Total catch
		EB	EN	ES	EW	CM	
Minke whale	Small-type whaling	4	49	250	182	0	485

6.3 Anthropogenic mortality of large whales for the calendar year 2009

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

On 14 August 2009 one minke whale was trapped and died in a salmon cage at a fish farm in Northern Norway (management area EW, position N6703E 1358). This whale is included in the catch statistics from Norway for 2009.

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 2009

No direct catches

7.3 Anthropogenic mortality of small cetaceans for the calendar year 2009

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

The Barents Sea, with its relatively low diversity and long and detailed time series of data, provides an ideal setting to develop, calibrate and compare multi- and extended single species models. The current modelling approaches in the Barents Sea, involving sea mammals, range from extended single species assessment models to detailed age-length structured multispecies models. The models being used are SeaStar, Bifrost and GADGET (Globally applicable Area-Disaggregated General Ecosystem Toolbox). The predation by minke whales have been incorporated in SeaStar, an extended single species assessment model, developed for the assessment of Norwegian Spring spawning herring, and GADGET. The latter is an age-length structured multispecies model in which the modelled species are cod, capelin, herring and minke whales with minke whales and cod as predators, and capelin, herring and cod as prey. The SeaStar modelling results suggests that minke whales can inflict major mortality on adult and juvenile herring and that minke whales display a sigmoid (type III) functional response. The GADGET modelling results suggests that indirect effects are important in the Barents Sea; cod fishing pressure, cod cannibalism and whale predation on cod having an indirect impact on capelin, emphasising the importance of multi-species modelling in understanding and managing ecosystems. Further, NAMMCO Scientific Committee endorses and motivates for funding support of a co-ordinated multi-year project where the aim is to do multi-model comparisons using the same data. One of these models was GADGET. (IMR)

A passive acoustic recorder was attached to a NPI mooring in the Fram Strait in the period September 2008-September 2009. The recorder (AURAL-M2) provided one year of sub-sampled (9 min on/21 min off) recordings at 0.1 Hz–4 kHz (8192 sampling rate). Preliminary results show that winter whales (bowheads, narwhals and beluga) and summer whales (including blue and fin whales) were recorded. Of particular interest was the detection of bowhead whale song in Fram Strait throughout much of the winter. (UWash., NOAA, DFO, NP, NHM)

In connection with the project Lowfreq (Low Frequency sonar – potentials and dangers for marine ecosystems application) the effects of low frequency military sonars (1-7 kHz) on marine mammals are also investigated (Dr thesis, Lise Doksæter). This is done by Controlled Exposure Experiments (CEE). Whales are exposed to the military sonar while their diving behaviour as well as horizontal and acoustic behavior is monitored by a Digital tag (D-tag) attached to the whale. Behavior during exposure is compared to normal behavior to reveal differences in behavior related to the sonar exposure. This far, CEEs have been conducted on killer whales, pilot whales and sperm whales. (IMR)

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