IWC/SC/53/Prog.Rep.Denmark
Ref. SN 2001-886/33-0001
5 June, 2001

DENMARK
PROGRESS REPORT ON CETACEAN RESEARCH, APRIL 2000 - APRIL 2001

Ministry of Environment and Energy
National Forest and Nature Agency
Haraldsgade 53, DK-2100 København Ø

Compiled by Palle Uhd Jepsen, Senior Adviser
Nature and Wildlife Section
Ålholtvej 1, DK-6840 Oksbøl
E-mail: puj@sns.dk

This report summarises information obtained from:

- Danish Institute for Fisheries Research (DFU), Charlottenlund Slot, DK-2920 Charlottenlund, Denmark (chl@dfu.min.dk; fl@dfu.min.dk).
- Zoological Museum (ZM), University of Copenhagen, Universitetsparken 15, DK-2100 København Ø, Denmark (cckinze@zmuc.ku.dk).
- Fisheries & Maritime Museum (FSM), Tarphagevej, DK-6710 Esbjerg , Denmark (svend.tougaard@fimus.dk).
- Greenland Institute of Natural Resources (GN), P.O. Box 570, DK-3900 Nuuk, Greenland (larsw@natur.gl; ewb@dmu.dk).
- Greenland Home Rule Government (GHG), P.O. Box 269, 3900 Nuuk, Greenland
- (amalie@gh.gl).
- Fjord and Belt Centre (FBC), Margrethes Plads 1, DK-5300 Kerteminde, Denmark
- (genevieve@fjord-baelt.dk).
- Department of Arctic Environment, National Environmental Research Institute (DMU), Tagensvej 135, DK-2200 København N, Denmark (rdi@dmu.dk; jte@dmu.dk).
- Center for Sound Communication (CSC), Institute of Biology, University of Odense, Campusvej 55, DK-5230 Odense M, Denmark (lee@dou.dk).
- Danbiu ApS, Tornagervej 2, DK-2920 Charlottenlund, Denmark.
- National Forest and Nature Agency (SNS), Haraldsgade 53, DK-2100 København Ø (puj@sns.dk).

1. Species and stocks studies

The following studies were conducted in the period:

Common name	Scientific name	Area/stock(s)	Items referred to
Minke Whale	*Balaenoptera acutorostrata*	Denmark, West & East Greenland, North Atlantic	4.2; 5; 6.1; 8
Fin Whale	*Balaenoptera physalus*	West Greenland	4.2; 6.1
Humpback Whale	*Megaptera novaeangliae*	West Greenland	6.2

Bryde's Whale	*Balanoptera edeni*	Denmark	4.3; 8
Sperm Whale	*Physeter macrocephalus*	Norway, Denmark	9
Narwhal	*Monodon monoceros*	Northwest Greenland, Canada	3.1; 5
Beluga	*Delphinapterus leucas*	West Greenland, Alaska, Canadian Gulf of St. Lawrence	5
Bottlenose Whale	*Hyperoodon ampullatus*	Denmark	8
Pilot Whale	*Globicephala melas*	Denmark	8
Killer Whale	*Orcinus orca*	Denmark	2.1
Common Dolphin	*Delphinus delphis*	Denmark	2.1
Bottlenose Dolphin	*Tursiops truncatus*	Denmark	2.1
White-beaked Dolphin	*Lagenorhynchus albirostris*	Iceland	4.3; 8; 9
Harbour Porpoise	*Phocoena phocoena*	Denmark and Greenland	3.1; 4.2; 4.3; 5; 7.1; 8; 9

2. Sightings data

2.1 Field work

2.1.1 Systematic

No information

2.1.2 Opportunistic, platforms and opportunity

Cetacean sightings have been collected during acoustic data sampling along the west coast of Norway and Iceland (CSC).

Jointly collecting opportunistic sighting data from the public (FBC, ZM, FSM & SNS).

2.2 Analyses/development of techniques

No information.

3. Marking data

3.1 Field work

3.1.1 Natural marking data

No information.

3.1.2 Artificial marking data

No information.

3.1.3 Telemetry data

Ten Harbour Porpoises were equipped with satellite transmitters in the inner Danish waters. Locations as well as information on diving behaviour was transmitted by satellite. All animals were tagged in the Danish Belts and stayed within the Kattegat, Skagerrak, and the south western Baltic. The transmission time was between 99 and 255 days (CSC/DFU/FBC/Danbiu).

One Harbour Porpoise were marked with a Time-Depth-Recorder/Satellite/VHF-radio combination in the Great Belt. The pack released after ten days and was found on Anholt. Swimming speed, orientation and diving behaviour is now being analysed (CSC/DFU/FBC/Danbiu in cooperation with Kiel University).

One fin whale was tagged with a satellite transmitter on September 30, 2000 in Greenland. The animal was tagged in the archipelago south of Aasiaat, and it stayed in the southern parts of the Disko Bay for two weeks, before it used one week to travel 400 km to the south, to an area between Maniitsoq and Nuuk. Here it stayed for two months until contact was lost ultimo December. At the southern area, the whale generally stayed less than 50 km from the shore, while it was found far as 160 km from the shore during its southward movement.

Species	Tag type	Nos. successfully deployed	Max. time transmitting	Contact person/institute
Narwhal	Satellite	5	45->195 days	Rune Dietz, DMU
Narwhal	T/D recorder	2	No info	Rune Dietz, DMU
Harbour Porpoise	Satellite	10	99 – 255 days	Jonas Teilmann, CSC/DMU
Harbour Porpoise	T/D recorder	1	No info	Jonas Teilmann, CSC/DMU

3.2 Analyses/development of techniques
Nothing to report

4. Tissue/biological samples collected
4.1 Biopsy samples
Nothing to report

4.2 Samples from directed catches or bycatches

Species	Area/stock	Calendar year/season total	Archived (N/Y)	Tissue type(s), stomach samples	Contact person/institute
Fin Whale	Greenland	5	Y	skin biopsy	GN
Minke Whale	Greenland	41	Y	skin biopsy	GN
Harbour Porpoise	Danish waters	18	Y	17 full autopsies and sampling for tissue bank	DFU

4.3 Samples from stranded animals

Species	Area/stock	Calendar year/season total	Archived (N/Y)	Tissue type(s), Stomach samples	Contact person/institute
Bryde's Whale	Danish waters	1	Y		ZM
Minke Whale	Danish waters	2	Y		ZM
White-beaked Dolphin	Danish waters	4	Y	Full autopsies and sampling for tissue bank	DFU, ZM, FSM
Harbour Porpoise	Danish waters	31	Y	31 full autopsies	DFU

5. Population and pollution studies

A joint programme on Narwhal samples from Northwest Greenland is being conducted within 1997-2000. In 1999 the analysis of heavy metals, POPs, DNA and stable isotopes were terminated, and the data handling and reporting is expected to be terminated in 2000.

In 1998 the Greenland Institute of National Resources in cooperation with the National Environmental Research Institute (Copenhagen) and the Institute of Marine Research (Bergen) initiated a study to address the question of population sub-structuring in North Atlantic minke whales and to determine the levels of pollutants in an important Greenland food source. To eliminate the problem in earlier studies that interpretations were confounded due to potential temporal differentiation samples were collected during one season. Samples of various tissues were collected from a total of 221 minke whales taken during 1998 in the Greenland (n=110) and Norwegian (n=111) catches.

The entire sampling area covered the area from western Greenland and the North East Atlantic from Jan Mayen over the Barents Sea and south to the North Sea. In 1999 the samples were analysed by various genetic techniques and for contents of a range of POPs (persistent organic pollutants), trace elements, stable isotopes (^{15}N,^{13}C,Pb) and ^{137}Cs. The expectation is that analyses for spatial trends in concentration and relative composition in a variety of substances, some of which (e.g. POP) have shown to have a geographical trend within the marine environment of the minke whale study area (Anon. 1998a), will provide more insight into the identity of in particular "West Greenland" minke whales.

In 1999, the FBC initiated a research project investigating ”the Influence of pollutants on the Endocrine and Immune Systems of Harbour Porpoises (Phocoena phocoena) from the German North and Baltic Seas” in cooperation with several German institutes with the University of Kiel (FTZ) as project leader (contact person: Ursula Siebert, FTZ). Blood samples were provided from the FBC harbour porpoises as well as harbour porpoises by-caught in pound nets before satellite tagging and release (cf. 3.1).

A study on ultrastructure in beluga teeth from West Greenland, Alaska and Canadian Gulf of St. Lawrence is ongoing, with the emphasis on the use of tooth characteristics for differentiating between populations. A detailed study on ways to verify age determination in beluga teeth is also ongoing with collation of known-age and -history animals and captive tetracycline records. An international workshop addressing the specific problem of GLG deposition rates in beluga dentine will be held at the NOAA lab, Beaufort, USA, 20-22 March 2001.

Studies on the ultrastructure of harbour porpoise teeth for determining stock structure is also ongoing, with material from throughout the North Atlantic.

6. Statistics for large cetaceans

6.1 Direct catches for the calendar year 2000

Species	Type of catch	Area/stock	Males	Females	Total landed	Struck and lost
Fin Whale	Aboriginal	West Greenland	3	3	6	1
Minke Whale	Aboriginal	West Greenland	36	102	142	3
Minke Whale	Aboriginal	East Greenland	2	8	10	0

Direct catches (commercial, aboriginal and scientific permits). Source: GHG

6.2 Other non-natural mortality for the calendar year 2000

Species	Type of catch	Area/stock	Males	Females	Total landed	Lost
Humpback whale	By-catch *	West Greenland		2	2	0
Minke whale	By-catch *	West Greenland	1	1	2	0

Other non-natural mortality. Source: GHG. * By-catch in various fishing gear.

6.3 Earlier year's statistics
No corrections.

7. Statistics for small cetaceans
7.1 For the calendar year 2000
Concerning statistics on small cetaceans the Greenland Home Rule Government, the Directorate for Fishery, Hunt, Trade and Agriculture, and the Home Rule Government of the Faroe Islands as a matter of principles request IWC to obtain scientific and technical information on small cetaceans from the North Atlantic Marine Mammal Commission (NAMMCO), University of Tromsø, N-9037 Tromsø, Norway. Tel: +47 77 64 56 08; fax: +47 77 64 59 05.

8. Strandings
The Danish stranding network is based on a contingency plan developed and managed by the National Forest and Nature Agency in cooperation with the Zoological Museum in Copenhagen and the Fisheries and Maritime Museum in Esbjerg.

The following observations of stranded *cetaceans* are recorded in 2000:
- Bryde's Whale 1
- Minke Whale 2
- Sperm Whale 1
- Pilot Whale 1
- Northern Bottlenose Whale 1
- White-beaked Dolphin 8
- Harbour Porpoise 110 (some are probably discard of bycaught animals)

9. Other studies and analyses
The fine-scale distribution of harbour porpoises in relation to gillnet fishing activities in the Danish North Sea was studied during 2000 using automated porpoise click detectors. The aim of the study is to evaluate population level effects for harbour porpoises of wide spread pinger use (DFU).

During July-August 1997-1998 a study to investigate the source-level and acoustic behaviour of Sperm Whales was conducted from a sailing boat in Andenes, Vesterålen, Norway. The results are currently being analysed. It is the intension to continue the field work in 2000 (contact person: Bertel Møhl, Center for sound Communication, Aarhus University; bertel.moehl@biology.aau.dk).

During summer 1997-1999 a study to investigate the acoustic behaviour and characteristics of White-beaked Dolphins was carried out from whale watching boats in Icelandic waters. The

data has been analysed (contact person: Marianne Rasmussen and Lee Miller, lee@dou.dk, Center for sound Communication, Odense University).

During 1998 and 1999 a study on the echoes from various objects like nets and fish using harbour porpoise echolocation clicks was carried out by Tim Kirkterp at FBC , Kerteminde, Fyn (Contact person: Lee Miller, Center for Sound Communication, Odense University, lee@dou.dk).

An on-going study of hearing by harbour porpoises using a target simulator is continuing with the animals at FBC, Kerteminde, Fyn by Jakob Tougaard (Contact person: Jakob Tougaard, Center for Sound Communication, Odense University, jakob.t@biology.sdu.dk).

A study on the energy utilisation in captive harbour porpoises is ongoing. The objective is to determine the efficiency of energy utilisation in captive harbour porpoises seen in relation to growth and activity pattern in order to determine energy budget and total food consumption of free living porpoises. One of the three porpoises at FBC, the youngest female, died in February 2000, but the two remaining are monitored regularly for health and fitness, and records are maintained of feeding regimes and medication administered FBC monitoring routine). Particular measurements and data are gathered in the course of such routine observations and experimental feeding regimes, that provide insight into energy utilisation and food preference of these animals. So far results indicate that the captive animals are growing as predicted from existing knowledge and that there is a marked regular seasonal increase in body fat in late autumn and subsequent loss in early April, that correlates with food intake (DFU, FBC).

The tetracycline-marked teeth of the deceased porpoise were examined and the findings indicated a confirmation of an annual GLG deposition rate in the dentine. The dosage administered in life was satisfactory for marking the teeth, and future treatments using this dosage will continue to be given to the two other porpoises at intervals of 1-2 years.

The research programme EPIC, with participation from Denmark, Sweden and UK was initiated in 1998 and was finalised in October 2000. The programme included:

1. investigating porpoise foraging behaviour (fish detection, interception and capture) in enclosed conditions in relation to prey behaviour and availability and obstacles presented (FBC); experiments were conducted in December 98 and January 99 at the FBC (contact person: Genevieve Desportes, FBC);
2. investigating which deterrent sound characteristics induce an avoidance response in porpoises (FBC); further experiments were conducted in Oct-Nov 98 and Feb-March 99 at the FBC (Contact person: Genevieve Desportes, FBC);
3. investigating how porpoises respond to an interactive type deterrent in the presence of fish prey (FBC);
4. testing masking porpoise sonar echoes to create “no-foraging” zones (FBC);
5. investigating the distance at which an acoustic deterrent may be effective (DFU);
6. the technical improvement of deterrent devices, signal processing, analysis and engineering on the basis of new data and current research (Loughborough University);
7. providing a report of bycatch rate for the harbour porpoise population(s) at risk in set gillnet fisheries in Danish waters through monitoring schemes, and of population structure and diet through biological sampling of bycatches (DFU);

8. producing a results database and bibliography of publications on bycatch and bycatch mitigation for dissemination via the internet or on CD-ROM (DFU, FBC, Loughborough University, Kolmårdens Djurpark).
9. Producing an educational film for the fishing industry on harbour porpoise bycatch, and the implications of mitigation measures for the fishing industry (DFU, FBC, Loughborough University, Kolmårdens Djurpark)..

An Executive Summary of the final report is available, and copies of the film (item 9.) are available at cost on request. The IWC will be given a copy of the full report and the film.

The study of "Reproductive behaviour and physiology of the harbour porpoises kept at the Fjord and Belt Centre" initiated in 1997 by the FBC and looking at reproductive physiology in male and females harbour porpoises in relation with their behavioural correlates continued in collaboration with the University of Southern Denmark/University of Odense, and institutes from Germany and Sweden. This project provided the first data on reproductive steroids in harbour porpoises and their seasonal changes in relation to behavioural changes. It also provided the first longitudinal live-sampling of testes weight seasonal changes. (Contact person: Genevieve Desportes, FBC).

Analyses of harbour porpoise bycatch rates in relation to gear type, environmental factors and season is being continued (DFU).

10. Literature cited
(see 11.).

11. Publications
11.1 Published papers

Kinze, C.C. 2000a. Rehabilitation of Platanista gangetica (Lebeck, 1801) as the valid scientific name of the Ganges dolphin. Zool. Medd. Leiden 74: 193-203.

Kinze, C.C. 2000b. Grønlandhvalen i naturen og museum. Dyr i natur og museum 2000/2: 13-15

Kinze, C.C. 2000c. Fastingsgrømlandshvalunge fra 1843. Dyr i natur og museum 2000/2: 16.

Lockyer, C., Desportes, G., Anderson, K., Labberté, S., and U. Siebert. 2000. How well we grow – monitoring growth of harbour porpoise in captivity. European Research on Cetaceans 13: 383-388.

Lockyer, C., Heide-Jørgensen, M.P., Jensen, J., Kinze, C.C. and T. Buus Sørensen. 2000. The biology of harbour porpoises (phocoena phocoena, L.) from West Greenland - age, length and reproductive parameters. ICES Journal of Marine Science 58: 154-162.

Neve, P.B., 2000. The diet of the minke whale in Greenland – a short review. In: G.A. Vikingson & F.O. Kapel (red.). Minke whales, Harp and Hooded Seals: Major predators in the Northatlantic Ecosystem. NAMMCO Scientific Publications Vol. 2: 92-96.
.

Reed, J.Z., Chambers, C., Hunter, C.J., Lockyer, C., Kastelein, R., Fedak, M.A. and R.G.Boutilier. 2000. Gas exchange and heart rate in the harbour porpoise, Phocoena phocoena. J.Comp. Physiol. B 170: 1-10.

11.2 Unpublished papers

Evans, P.G.H., Lockyer, C. and A.J.Read. In press. Harbour porpoise Phocoena phocoena. In, The New Handbook of British Mammals, ed. S.Harris. Academic Press.

Heide-Jørgensen, M.P. and C.Lockyer. In press. Age and sex distributions in the catches of belugas, Delphinapterus leaucas, in West Greenland and in western Russia. Zeitschrift für Säugertierkunde.

Kinze, C.C. 2001 (in press): Marine Mammals. In The Living Marine Resources of the Western Central Pacific. Vol 5, FAO, Rome.

Lockyer, C. In press. Ecological Aspects of Reproduction of Marine Mammals. In, Marine Mammals: Biology and Conservation, ed. P.G.H.Evans and J.A.Raga, Chapter 3. Kluwer Academic / Plenum Press, New York.

Møller, P., Lockyer, C., Walton, M., Lund, T., Heide-Jørgensen, M.P., Jensen, J. and H.Andreasen, submitted. Distinguishing between foraging patterns and sexual maturity of harbour porpoise (Phocoena phocoena) utilising blubber fatty acid signature and classification regression analysis. J.Cetacean Res. Manage.