

DENMARK
PROGRESS REPORT ON CETACEAN RESEARCH, APRIL 2001 - APRIL 2002

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

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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), Tarpbagevej, 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), Frederiksborgvej 399, DK-4000 Roskilde, Denmark, (jte@dmu.dk).
- Center for Sound Communication (CSC), Institute of Biology, University of Odense, Campusvej 55, DK-5230 Odense M, Denmark (lee@dou.dk).
- 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	<i>Balaenoptera acutorostrata</i>	Denmark, West & East Greenland, North Atlantic	4.2; 5; 6.1; 8
Fin Whale	<i>Balaenoptera physalus</i>	Denmark, West Greenland	4.2; 6.1
Humpback Whale	<i>Megaptera novaeangliae</i>	West Greenland	6.2
Sperm Whale	<i>Physeter macrocephalus</i>	Norway, Denmark	9
Narwhal	<i>Monodon monoceros</i>	Northwest Greenland, Canada	3.1; 5
Beluga	<i>Delphinapterus leucas</i>	West Greenland, Alaska, Canadian Gulf of St. Lawrence	5
Longfinned Pilot Whale	<i>Globicephala melas</i>	Denmark	2.1.2
Striped Dolphin	<i>Stenella coeruleoalba</i>	Denmark	2.1.2; 8
Common Dolphin	<i>Delphinus delphis</i>	Denmark	2.1.2; 4.3
White-beaked Dolphin	<i>Lagenorhynchus albirostris</i>	Denmark; Iceland	2.1.2; 4.3; 8; 9
Harbour Porpoise	<i>Phocoena phocoena</i>	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 of 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

Four harbour porpoises have been freeze branded on both sides just below the dorsal fin with the numbers 1-4. The marking took place in the inner Danish waters from Skagen to Gedser (DMU, DFU, FBC).

3.1.3 Telemetry data

Eight Harbour Porpoises were equipped with satellite transmitters in the Danish waters. Locations as well as information on diving behaviour was transmitted by satellite. Three animals were tagged in the Danish Belts and stayed within the Kattegat, Skagerrak, and the south western Baltic. The remaining five animals were tagging in Skagen (northern tip of Jutland). The transmission time was between 21 and 306 days (DMUDFU/FBC/).

3.1.3 Telemetry data

Five bowhead whales were instrumented with satellite transmitters in northwestern Disko Bay, West Greenland, May 2001. The movements within Disko Bay showed that the tagged whales preferred the northern part of the bay. Two of the tags were successful in tracking two of the whales during migration. The two whales moved from Disko Bay to northern Canada in ten days; they left Disko Bay nine days apart, and took different routes across Baffin Bay to the southern part of the North Water just east of the entrance to Lancaster Sound.

One fin whale was instrumented with a satellite transmitter the 24th of August 2001 near Aasiaat (68.74 N 52.72 W) in West Greenland. The whale stayed in the coastal area around Aasiaat until the 9th of September, before it travel approximately 400 km to the south in less than eight days, to an area (65.35 N 53.40 W) between Maniitsoq and Nuuk. Here it stayed for eight days until contact was lost. This movement resembles that of the fin whale that was tagged in 2000, except that the southward migration was approximately one month earlier in 2001 than in 2000.

Species	Tag type	Nos. Successfully deployed	Max. time transmitting	Contact person/institute
Harbour Porpoise	Satellite	17	21-306 days	Jonas Teilmann, 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 by-catches 2001

Species	Area/stock	Calendar year/season total	Archived (N/Y)	Tissue type(s), stomach samples	Contact person/institute
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Fin Whale	Greenland	3	Y	skin biopsy	GN
Minke Whale	Greenland	39	Y	skin biopsy	GN
Harbour Porpoise	Danish waters	11	Y	8 full autopsies and sampling for tissue bank	DFU

4.3 Samples from stranded animals 2001

Species	Area/stock	Calendar year/season total	Archived (N/Y)	Tissue type(s), stomach samples	Contact person/institute
Harbour Porpoise	Danish waters	17	Y	15 full autopsies	DFU
White-beaked Dolphin	Danish waters	19	Y	full autopsies and sampling for tissue bank	ZM/FSM

5. Population and pollution studies

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. A new approach to the age verification is by means of aspartic acid racemisation rate of eye lens and tooth tissue (DFU). This new study is being undertaken in co-operation with Roskilde University Centre (RUC) and will use material from West Greenland and Canada.

Studies on the ultrastructure of harbour porpoise teeth for determining stock structure is also ongoing, with material from throughout the North Atlantic. Aspartic acid racemisation techniques are also being tested on porpoise eye lens and teeth (DFU and RUC) where GLG deposition rate in dentine is known.

6. Statistics for large cetaceans

6.1 Direct catches for the calendar year 2001

Commercial, aboriginal and scientific permits						
Species	Type of catch	Area/stock	Males	Females	Total Landed	Struck and lost
Fin whale	Aboriginal	West Greenland	3	4	7	1
Minke whale	Aboriginal	West Greenland	32	91	136	1
Minke whale	Aboriginal	East Greenland	0	14	14	3

Other non-natural mortality

Species	Type	Area/stock	Males	Females	Total Landed
Humpback whale	Bycatch (*)	West Greenland			2

(*) Bycatch in fishing gear

Source: GHG

6.2 Other non-natural mortality for the calendar year 2001

No information

6.3 Earlier year's statistics

No corrections.

7. Statistics for small cetaceans

7.1 For the calendar year 2001

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 2001:

- White-beaked Dolphin 16
- Common Dolphin 1
- Minke Whale 3
- Harbour Porpoise 139 (some are probably discard of by-caught animals)

9. Other studies and analyses

Acoustics

Since August 1997 an ongoing study of the prey capture behaviour is carried out on Harbour Porpoises in captivity at FBC, Kerteminde, Fyn. The aim is to investigate the echolocation during capture of live fishes (contact person: Ursula Verfuss and Lee Miller, lee@dou.dk, Center for Sound Communication, Odense University and University of Tübingen, Germany).

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).

Energetics, prey analysis and feeding

A study on the energy utilisation in captive harbour porpoises continues (DFU, FBC). The ultimate 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. Two harbour porpoises at FBC 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. Monitoring has now continued for nearly 5 years, and there is a clear correlation between seasonal increases in food intake at the end of summer and body fat increase. This increase is reflected in body weight (9-15 kg increase), girth and blubber thickness. Food consumption varies between 7.5 - 10% body weight daily. The seasonal increase in winter and loss in summer reflects changes in water temperature. A role in insulation is implicated.

Studies on prey and food type of harbour porpoise and White-beaked dolphin are currently underway at DFU in cooperation with ZM and FSM.

The stomachs of 77 harbour porpoises from Danish waters, both by-caught in bottom-set gillnets and stranded, have been examined for food remains. The number of female and male by-caught harbour porpoises examined, were as follows: 49 males including 36 immature and 13 mature; 28 females including 21 immature and 7 mature. The remaining 7 individuals had no stomach content. Both soft and hard remains of prey were recorded and otoliths were analysed concerning amount, fish-species and -families. The presence of crustacean (*Crustacea*), bivalve (*Bivalvia*), octopus (*Loliginidae vulgaris*) and sand were also recorded. Otoliths from cod (*Gadus morhua*) and whiting (*Merlangius merlangius*) were measured linearly and converted into fork-length. The samples comprised material from three geographical areas between 1996-2000 inclusive: Skagerrak, Kattegat and Sound waters, Inner Danish waters, and central North Sea. Both sexes were represented but females formed only 25 - 43% of any sample. In all areas, immature animals comprised between 60 - 82.5% of the sample, which is normal for by-catch. For all animals, the Gadidae appeared to be the most common fish type in all areas

(39.5 - 50% by species) as reported in earlier studies, while other types varied in amount. Clupeid (herring) types appeared popular in all areas (12 - 25%) – presumably when available. These two families are generally mid-water pelagic fish, but gadoids are also bottom-living fish. The remaining fish types, apart from Scomber (mackerel), are generally bottom-living, and may be taken opportunistically. The analyses of results of the stomach contents of only the immature male harbour porpoises (Differences between diet of immature and mature males of harbour porpoises: Katja Vinding Petersen, Helle Torp Christiansen, Michael Kjær Andersen, Ingrid Elmedal, Christian Bidstrup Permin, Maria Sønderkær Graae, Liva Vejgaard (Roskilde University Centre)), showed the mainly represented fish-species to be cod (58% of stomachs), whiting (42%), goby (35,5%) and "unspecified fish" (29 %). The most frequent length of cod found in the stomach content from immature males was 0 to 200 mm, and for whiting 100 to 200 mm.

This result showed the immature males to be less selective in their diet than the rest of the population. They eat between one and three different species. For the immature males that had only eaten one fish-species, goby and sand eel were the most preferred. The conclusion was that a significant difference exists in the diet between the immature males and the rest of the population concerning family and species. There is no significant difference concerning the size of the prey fishes. Therefore it seems that there is a relation between by-catch and the diet of the male harbour porpoises. The presence of gobies (25% in Inner Danish waters), blennies, sand lance (24%, in the North Sea area) and eels supports observations on a favoured "bottom-grubbing" feeding behaviour where the porpoises are searching vertically head-down on the seabed for fish. Clearly porpoises are bottom-feeders in some areas, and this has serious implications in fishery management in relation to by-catch mitigation.

Analysis of quantity of food from the samples collected between 1996-98 indicated that stranded porpoise stomachs were usually empty, while by-caught porpoise stomachs (chiefly the first chamber) contained up to a maximum fill of 1 kg in a 120 cm length animal.

Studies on the diet of the White-beaked dolphin in Danish waters, based on stomach contents from 23 stranded and by-caught dolphins between 1984 and 2001, comprised 9 males and 14 females. Different invertebrates were recorded. Fish otoliths were identified and counted, the total number of otoliths being 2,429, representing six different fish families. Cod type fish *Gadidae*, Herring *Clupidae*, Sandeels *Ammodytidae*, Turbot *Pleuronectidae* and Mackerel *Scrombridae*. *Gadidae* was the most important prey fish family, consisting mainly of cod *Gadus mohua*. Otoliths from cod consumed by White-beaked dolphin and harbour porpoise have been measured linearly and converted into fork-length. The average length of the cod eaten by White-beaked dolphin was larger than those eaten by harbour porpoise. There was no observed characteristic difference in the diet of males and females. This study was a student project (Diet of White-beaked dolphin in Danish waters: Heidi Andreassen (DFU and Copenhagen University), Katja Vinding Petersen (Roskilde University)).

The cephalopod remains in the stomachs of ten sperm whales (*Physeter macrocephalus*) stranded on the west coast of Denmark between 1991-2000 were examined and the following species were found: *Gonatus fabricii*, *Todarodes sagittatus*, *Bathypolypus arcticus*, *Histioteuthis sp.*, *Haliphron sp.* and *Cycloteuthis sp.*. (Malene Simon, ZM in cooperation with T.K. Kristensen, Danish Bilharziasis Laboratory, and ZM/FSM).

Student's project at ZM

Projects have been carried out on the epiphysal ankylosis in harbour porpoises (Anders Galatius), the cranial growth and osteology of minke whales (Line Kyhn), diagnostic features in the skull of Bryde's whales (Maja Kirkegaard) and osteological development in white-beaked dolphins (Poul Boel Jørgensen and Sune Riis Sørensen).

EPIC

The research programme EPIC, with participation from Denmark, Sweden and UK, initiated in 1998 and finalised in September 2001, has produced a report (now publicly available) to EC DG XIV.

The EPIC project addresses methods for mitigation of by-catches of harbour porpoises in bottom-set gillnets, and the area of study focusses on the North Sea and Inner Danish waters. Results should be applicable to other areas and different situations.

The study involved recording and analysing behaviour of harbour porpoises mainly in controlled (enclosed) conditions, in relation to foraging, reaction to obstacles presented and acoustic stimuli, and potential deterrent devices. Research and technical improvements of deterrent devices, signal processing, relevant analysis and engineering on the basis of new data and current research were undertaken. In addition, monitoring of by-catch

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 by-catches were continued with collation of a biological database and bibliography of by-catch publications for dissemination via CD-ROM and media presentation through videos to the fishing industry.

The study has been undertaken in a semi-natural enclosure ultimately separated from the adjacent fjord in Kerteminde, Denmark only by nets at opposite ends, thus providing both advantages and disadvantages. The former offer near-natural habitat with exposure of the porpoises to tide, natural seawater, climate, local fauna and flora and environmental noise and activities e.g. fishing boats. The latter have centred mainly on problems associated with inclement and unpredictable weather conditions (as normally experienced in the field) which frequently limit the research, but also must include problems with water visibility and difficulties in viewing all parts of the enclosure.

During the experimental periods, two porpoises were available, a male, Eigil, and a female, Freja. Both were in early maturity and aged ca 3 years old initially. During the experimental period, a third porpoise, a female, Nuka, was acquired. She was a juvenile of less than a year when she joined the other animals. Unfortunately she died later in February 2000, less than one year after acquisition, from an infection.

The foraging studies have shown clearly that a significant component of feeding behaviour is the head-down vertical feeding on the seabed - "bottom-grubbing", especially in the young. Observations showed that preoccupation with bottom-grubbing and catching prey made at least one of the animals insensitive to surrounding threats, indicating that bottom entanglement in nets would be very likely unless the animal was alerted to the threat. Examination of stomachs of by-caught and stranded porpoises in the North Sea and Inner Danish waters corroborated the likelihood of bottom-feeding, from the high incidence of bottom-dwelling prey species. The studies also indicated that whilst echo-location was important in foraging, sight was probably also important although this could not be tested directly within the timeframe available. It was concluded that passive means of enhancing the acoustic (or even visual) reflectivity of nets would not alone be sufficient to prevent entanglement, as the porpoises did not regularly echo-locate ahead: and, even when they were aware of obstacles in the environment, they did not necessarily pay attention to them while busy hunting prey. Therefore, we conclude that passive enhancement of net "visibility" acoustically may be useful only when backed up by and armed with acoustic alerting devices.

The beacon-mode acoustic deterrents (based on ¹LU's PICE99TM - AQUAmark100TM) with multi-signal random emissions (3 different sounds of 3 durations, and 2 different sounds with one duration; see below) proved to be significantly effective at encouraging the porpoises to leave the area away from the sound source - even after persistent exposure over time, thus indicating no compelling evidence for habituation. However, post-test recovery was always very rapid, indicating that once the source of stress (sound emission) was removed, the porpoises resumed former activities. This has important implications in the field, where porpoises could be expected to move back into areas once "pingered" fishery operations had finished.

Five sound types in all were tested as deterrent signals, and the most aversive were all non-click sounds. Diminishing the duration (256 msec., 128 msec. to 64 msec.) of the signal emission had no significant diminishing of the aversive effectiveness of the "pinger", so that this factor could be exploited to prolong battery life in pinger manufacture and to increase the variety of signals. In the captive situation it was not possible to see how far the porpoises could be displaced from the deterrent sound source because of the limits of the enclosure, although field experiments using pound-nets off the coast offered a chance to investigate this. Our investigation did not

¹ The acoustic deterrent "pinger" design currently incorporating input from EPIC is the AQUAmark100TM with the full specification:

Frequency	A variety of complex broad band chirps sweeping between 20kHz and 80kHz with harmonics extending to 160 kHz.
Signal Strength	Peaks at 145dB re 1µPa at 1m, typical. Remains constant over lifetime.
Signal Duration	300ms typical
Signal Interval	Pseudo-random between 5 and 30s typical
Dimensions	140 mm (5.5 inches) long x 56 mm (2.2 inches) maximum diameter
Weight in water	110 g (4 oz)
Attachment	Single point attachment through mounting hole, or by placement in bait bags, or similar
Spacing	200 m maximum recommended
Maximum depth	200 m
Shelf life	4 years (battery manufacturer's recommendation)
Battery life	1 to 2 years with continuous immersion, dependent on temperature. Up to 4 years in typical fishery with seasonal or discontinuous deployment as devices switch off when not in water.

contradict the previously reported findings that pingers may be effective from 125 - 130 m and even up to 600 m. Presently “pingers” are placed at up to 200 m centres on nets, but this could possibly be increased.

Other methods of excluding porpoises from areas were tried, including an interactive “pinger” where the porpoises themselves triggered the device acoustically, and a very limited trial (because of inclement weather) on the different use of sound designed to mask the echo-location frequencies (100-150 kHz range) that would inhibit foraging, creating an “acoustic fog”. The former has the consequence of acting as a “wake-up call” encouraging the porpoises to explore the environment by echo-locating ahead. Results indicated a very promising method of acoustic deterrent deployment that could minimise general acoustic emissions from “pingers” into the environment, and further delay possible habituation, although only limited testing was possible. The porpoises responded very cautiously to the powerful “echo” returned from the transducer, and kept away from it during the test period. The recovery was slower than with the beacon-mode “pinger”, but was still rather quick. The latter induced the porpoises to stop bottom-grubbing and move away during test noise exposure, although recovery afterwards was rapid. This method could be very effective by creating temporary “exclusion zones” while fishing operations were taking place. The system however, requires heavy-duty continuous power supply - unsuited to long nets and long soak times, and could only be suitable for discrete operations e.g. wreck sites, or in other fishery operations e.g. trawling where the ship would be able to continuously supply power.

The continued monitoring of porpoise by-catch onboard the Danish gillnet fleet has not produced new information since the estimate of 6,785 (c.v. 0.12) per year in the Danish North Sea fleet, based on 1993-1998 data. By-catch recovery, augmented by strandings recovered in Danish waters, has enabled a continued updating of the biological database first started under BYCARE (EU FAIR contract CT05-0523). This database now holds 1966 records, from between 1834 and 2000, with full biological information, including digital photographs in most cases, from dissections of porpoises between 1996-2000 inclusive.

Biological investigations indicate that young juveniles (age 1-2 years) are predominantly the victims of by-catches, that potential life-span may be ca 24 yr, and that the female can remain fecund all through life with a potential for calf production annually. However, life expectancy mostly does not exceed 10 yr. A disturbing but as yet unexplained persistence in sex-ratio imbalance has been found with up to 1.5 males : 1 female in both by-catches and strandings. A segregation by area and / or time is suggested but not verified. Porpoise stomach analyses reveal a catholic diet, with some differences between areas, but bottom-dwelling prey species comprise a significant part of the diet in all.

A reference database on publications and other literature on marine mammal by-catch-related and harbour porpoise topics has been established where there are currently 1383 references. Hard copies of at least a third are held at the Danish Institute for Fisheries in Charlottenlund, Denmark.

A film of ca 21 min. duration, designed as an instructional video (in English and Danish - eventually also Swedish) has been compiled showing the current international agreements and legislation concerning cetacean by-catches, the problems besetting the fisheries, the current scale of by-catch, research supporting adopted mitigation measures, and practical implementation of mitigation measures and future prospects.

Continuous feedback - both formal and informal between scientists, fishermen and governmental authorities at national and international levels, has taken enabling the improvement of the “pinger” design and its attachment in different national fisheries.

Reproductive studies

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).

Fishing gear technology

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

The public awareness programme entitled Look out for whales, dolphins, and porpoises in Denmark (Fokus på Hvaler i Danmark), a cooperation between the Fishery and Maritime Museum in Esbjerg.

Research on the use of so-called acoustically reflective nets to reduce bycatch of harbour porpoises was continued in 2001. Results from fishing trials conducted in the Danish North Sea bottom set gill net fishery in the Fall of 2000 suggested that nets, where iron oxide was used as filler in the net material to increase the acoustic reflectivity, had a lower bycatch of porpoises than conventional nets but also a lower catch of the target species. The research in 2001 was aimed at determining the causes of the reduced target species catches and determining if the iron oxide nets were indeed more detectable than conventional nets. Results from these studies are presented at the 2002 Annual Meeting of the Scientific Committee (DFU, CSC).

10. Literature cited

(see 11.).

11. Publications

11.1 Published papers

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Andersen, M. & C.C. Kinze 2000. Review and new records of marine mammals and sea turtles of Indochinese waters. *Nat. Hist. Bull. Siam Soc.* 48:177-184.

Heide-Jørgensen, M.P. and C.Lockyer. 2001. Age and sex distributions in the catches of belugas, *Delphinapterus leucas*, in West Greenland and in western Russia. *Zeitschrift für Säugetierkunde Mamm. biol.* 66 (2001):215-227.

Lockyer, C. 2001. 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.

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Lockyer, C., Heide-Jørgensen, M.P., Jensen, J., Kinze, C.C. and T. Buus Sørensen. 2001. Age, length and reproductive parameters of harbour porpoises *Phocoena phocoena*, (L.) from West Greenland. *ICES Journal of Marine Science* 58:154-162.

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11.2 Presentations in symposia

Amundin, M., Desportes, G., Goodson, D., Kristensen, J.H. 2001. Testing new acoustic approaches for harbour porpoise by-catch reduction. Presented at the 2nd Symposium on Underwater Bio-Sonar Systems and Acoustics. July 2001, Loughborough, England.

Amundin, M., Desportes, G., Goodson, D., Kristensen, J.H. and Teilmann, J. 2001. Akustiska metoder för att reducera bifångst av tumlare. Presented to the "Seminarium om tumlarens situation i Östersjön", Oktober 2001, Kolmården, Sweden. [Organised by the Swedish National Environmental Protection Agency and the Swedish National Board of Fisheries].

Beineke, A., Siebert, U., Van Elk, N., Desportes, G., Baumgärtner, W. 2001. Development of a lymphocyte-transformation-test for peripheral blood lymphocytes of the harbour porpoise (*Phocoena phocoena*) and detection of selected cytokines using the Reverse-transcription-polymerase-chain-reaction. Poster presented to the 14th Annual Conference of the European Society, May 2001, Rom, Italy.

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