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HARBOUR PORPOISES IN THE NORTH ATLANTIC

ABSTRACTS

Harbour porpoises (*Phocoena phocoena*) in the North Atlantic: Distribution and genetic population structure

Andersen. L.W. 2003. Harbour porpoises (*Phocoena phocoena*) in the North Atlantic: Distribution and genetic population structure. *NAMMCO Sci. Publ*. 5:11-30.

The known geographical distribution (based on ship surveys, aerial surveys, incidental sightings, stranding and bycatch data) and the population genetic structure obtained from mitochondria DNA and nuclear DNA (isozymes and microsatellites) data analyses of the harbour porpoise in the North Atlantic have recently been reviewed and revised by the International Whaling Commission. The present review builds on these documents by integrating more recent genetic and distributional studies. Studies of the genetic structure of harbour porpoise populations tend to be concentrated in areas where samples are available which coincide with areas where incidental or directed catches or stranding take place. Nevertheless, recently, several genetic studies on the population structure have been able to reveal a more comprehensive picture of the harbour porpoise population structure in the Northwest and Northeast Atlantic, although not all areas have been subjected to analyses.

Habitat characteristics of the shelf distribution of the harbour porpoise (*Phocoena phocoena*) in the waters around the Faroe Islands during summer

Skov, S., Durinck, J. and Bloch, D. 2003. Habitat characteristics of the shelf distribution of the harbour porpoise (*Phocoena phocoena*) in the waters around the Faroe Islands during summer. *NAMMCO Sci. Publ.* 5:31-40.

Observations from a large number of seabird line-transect surveys conducted in Faroese waters are used to derive some general conclusions regarding the distribution of harbour porpoises (*Phocoena phocoena*) in the region using estimates of encounter rates (no.·km^{-1}) in different meso-scale habitats around the Faroes during the breeding season (May-September). Based on a sub-set of the data collected during calm conditions (sea states below Beaufort 3) we analyse of the distribution of harbour porpoises in relation to 5 potentially important physical parameters: water depth, distance to shore, slope of the ocean floor, distance to tidal front and Beaufort sea state. These parameters were determined from data collected during the surveys, the literature as well as from the new bathymetry established for the Faroese shelf. In order to link the differently scaled physical parameters with the encounter rates and sea states recorded during the surveys we used a suite of geo-statistical and raster-based GIS techniques based on a uniform grid resolution of 1 km in UTM zone 29 N projection. After removing parameters with

insignificant effects a model of main effects was produced with sea state and distance to the tidal front having a significant negative effect on the rate of encountering harbour porpoises during both sets of cruises analysed (August 1997 and other surveys). During both sets of cruises the distance to the tidal front had a larger effect on the distribution of the animals than sea state. The strong relationship between harbour porpoise distribution and the average position of the tidal front around the Faroes strongly suggests that the species concentrates near the quasi-stationary circular shelf front separating mixed from stratified waters around the Faroes. However, the importance of shelf fronts for the distribution of harbour porpoises needs to be studied in detail in order to establish the proportion of the populations associated with these structures.

A review of methods for defining population structure in the harbour porpoise (*Phocoena phocoena*)

Lockyer, C. 2003. A review of methods for defining population structure in the harbour porpoise (*Phocoena phocoena*). *NAMMCO Sci. Publ.* 5:41-70.

Wide-ranging methods that have been used to determine population structure, including distribution, life history, biology, ecological factors such as diet and contaminant loads, morphology and genetics, are reviewed. The importance of determining population sub-structure of harbour porpoise throughout the North Atlantic, especially in regions affected by incidental take in fisheries, is discussed in relation to management measures. Some practical proposals are made for integrating diverse information about populations, using the phylogeographic approach, for the purpose of evaluating the need to manage putative subpopulations separately. Examples focusing on the North and Baltic seas areas are used in this discussion, with some reference to other areas. It is concluded that the existing IWC proposal for 13 populations in the North Atlantic is generally supported, but with some refinement and modification; in particular, allowing sub-divisions in the area through from the North Sea to the Baltic.

Harbour porpoises (*Phocoena phocoena*) in the North Atlantic: Biological parameters

Lockyer, C. 2003. Harbour porpoises (*Phocoena phocoena*) in the North Atlantic: Biological parameters. *NAMMCO Sci. Publ.* 5:71-90

Biological parameters for harbour porpoises are reviewed throughout their range in the North Atlantic. Most information is based on studies of a combination of directed catches, by-catches and strandings. All these sources are valuable for providing biological information, but each carries some bias when it comes to interpretation of parameters, especially those involving age structure.

Information on age-related parameters, reproduction and growth is presented and assessed by region and/or population, of which there may be 14 throughout the North Atlantic. Among age-related parameters, maximum longevity recorded is 24 years; maximal rate of population growth is probably 9.4% but in the range 5-10%; mortality is

highest in year 1, and <5% of the population live beyond 12 years; an estimate of 0.867 with a maximum age of 23 years has been given for survival. Among reproductive parameters, age at sexual maturation falls between 3-4 years for both sexes; age at first parturition is probably 4-5 years; age at first ovulation is >3 years; ovulation rates fall in the range 0.64 –0.988 corpus per year, and reproductive interval is 1.01 - 1.57 years; pregnancy rates are generally in the range 0.74 – 0.986 per year, meaning that not all females produce a calf every year; there is seasonal breeding/mating in the period June – August; gestation lasts 10-11 months; parturition generally occurs between mid-May to mid-July; duration of lactation is uncertain, but is probably at least 8 months; size at birth is usually in the range 65 - 75 cm with a maximum size of about 80 cm. Sex ratio is biased to males throughout life: 1.1 - 1.2 males : 1.0 females in the foetal stage, and 1.1 - 1.7 males : 1.0 females post-natal. Growth parameters indicate an asymptotic length and weight that varies with population, but usually falls in the range 153 – 163 cm and 55 – 65 kg for females and 141 – 149 cm and 46 – 51 kg for males. Growth models used for length and weight are typically based on von Bertalanffy and Gompertz models. Length at sexual maturity also varies with population, but is usually in the range 138 – 147 cm for females and 127 – 135 cm for males. There is no information based on vertebral epiphyseal fusion to indicate age at physical maturity. Foetal growth appears normal, but there is uncertainty about the existence of embryonic diapause. Size/age at weaning are uncertain, but size may be <115 cm and at an age >8 months; however, entirely independent feeding may not occur until about 10 months.

Multiple insights into the reproductive function of harbour porpoises (*Phocoena phocoena*): An ongoing study

Desportes, G., Kristensen, J.H., Benham, D., Wilson, S., Jepson, T., Siebert, U., Korsgaard, B., Driver, J., Amundin, M., Hansen, K. and Shephard, G. 2003. Multiple insights into the reproductive function of harbour porpoises (*Phocoena phocoena*): An ongoing study. *NAMMCO Sci. Publ*. 5:91-106.

The harbour porpoises kept at the Fjord&Bælt since April 1997 offer a unique opportunity to gain a better understanding of the reproductive function in harbour porpoises, especially in terms of physiological cycle and concomitant behavioural traits. A study was initiated in 1997 with the following aims: 1) characterising the annual reproductive cycle in terms of behaviour and endocrine activity; 2) finding the most suitable techniques for a longitudinal investigation of the reproductive function, in particular with respect of the small size of the species; 3) ensuring a precise monitoring of the reproductive state of the Fjord&Bælt porpoises; 4) evaluating the best techniques for a vertical assessment of the reproductive state in wild harbour porpoises; 5) providing comparative basis for toxicological studies.

Three harbour porpoises have participated in the study: a male and a female estimated 2-3 old years at their arrival at the Centre in 1997, and a one-year old female. The different methods for investigating their reproductive function include techniques not previously used with harbour porpoises, such as behavioural observation, measurement of sexual hormones in blood and other matrices, vaginal cytology, body temperature, and

ultrasound scanning of testes and ovaries. These methods are discussed in terms of practicality and invasiveness. Selected examples of the preliminary results obtained are reported.

Projects have concentrated on the sexual behaviour of the adult male and female (frequency, initiative, courtship behaviours) and their hormonal correlates, as well as on the interaction of the juvenile with the 2 adult animals. Behavioural sexual activity is very seasonal (peaking at the end of July and August), as is the testosterone cycle (levels increasing from less than 1ng/ml to 30ng/ml in May) and the development of the testis (peaking in July-August). Progesterone and oestrogen levels vary between less than 1 to 17ng/ml and less than 0.1 to 1.8 ng/ml respectively, but infrequent blood sampling precluded obtaining a detailed picture of the ovarian cycle. We are attempting to measure sexual hormones in saliva and eye secretion. Successful matings have been confirmed by the presence of sperm on vaginal smears in 4 consecutive summers, but no pregnancy has occurred yet.

Monitoring growth and energy utilisation of the harbour porpoise (*Phocoena phocoena*) in human care

Lockyer, C., Desportes, G., Hansen, K., Labberté, S. and Siebert, S. 2003. Monitoring growth and energy utilisation of the harbour porpoise (*Phocoena phocoena*) in human care. *NAMMCO Sci. Publ.* 5:107-120.

Two harbour porpoises of an estimated age of 1-2 yrs were held in captivity from April 1997 and were still alive in April 2002, after rescue from pound nets set in inner Danish waters. They are presently housed in an outdoor penned-off area of Kerteminde fjord. Their growth (total body length, girth, body weight and blubber thickness) and daily dietary intake (weight of fish, dietary composition and energy value) have been monitored since capture. The general activity of the animals was regularly monitored, including two 24-hour long observation periods.

Initial body weights were 37.5 kg for Eigil (male) and 40.5 kg for Freja (female). Both porpoises lost 4 to 5 kg in the first few days because of their initial refusal to feed from the hand. Then body weight increased steadily reaching a peak of 44.75 kg for Eigil and 51.6 kg for Freja in early February 1998. A fluctuation in body weight with peaks of 44 to 45 kg for the male and 51to 56 kg for the female in winter followed by lows of 41 to 44 kg and 47 to 48 kg respectively in summer, established a clear pattern of seasonal fluctuation, mirrored by girth and blubber thickness variation. Length increased steadily from 130.5 cm to 139cm in Eigil, and from 127.5 cm to 150 cm in Freja. Food intake also fluctuated seasonally, and increases in food intake preceded weight gains. Daily food consumption in Eigil and Freja represented about 7 to 9.5% of body weight.

The growth of the animals resembles that of wild porpoises in the region. The sudden initial weight losses suggested that the energy reserves of the animals may only be short-term. The large weight increase in the winter months with colder water, correlating with

the increase in girth and blubber thickness, suggest that energy reserves and blubber fat may be important for insulation.

During the two 24-hour observations, the animals spent most of their time cruising around, although slow swimming and logging at the surface increased at night. Breathing rates were lower in the early morning hours, consistent with diminished activity. Both animals' movements were influenced by external activities at poolside.

Analysis of seasonal changes in reproductive organs from Icelandic harbour porpoises (*Phocoena phocoena*)

Halldórsson, S.D. and Víkingsson, G.A. 2001. Analysis of seasonal changes in reproductive organs from Icelandic harbour porpoises (*Phocoena phocoena*). *NAMMCO Sci. Publ*. 5:121-142.

In this study, we analyse some aspects of the macro- and microscopical appearance of gonads of harbour porpoises *(Phocoena phocoena)* from Icelandic coastal waters. Sampling of animals bycaught in gillnets took place in the years 1991 to 1997 and covered the months from September to June. The differences in diameter of seminiferous tubules between samples from the peripheral and central parts of the testis indicate that histological changes associated with maturity begin in the core of the testis. The average tubule diameter was 49, 78 and 118 µm in immature, pubertal and mature animals respectively. The tubule size increased from 55 to 95 µm, coinciding with combined testis weight of 75 to 150 g, indicating the onset of puberty within this range of tubule size and testis weight. The estimated average diameter of tubules when an animal reaches maturity is 82.2µm or 86.15µm depending on the method used. The diameter of seminiferous tubules of mature and pubertal animals varies seasonally with a steady increase in the spring. However, lack of samples after mid-June makes estimation of the exact timing of mating impossible. In females, the follicle size of mature and immature animals of age 2 years and older shows seasonal variation, increasing in late winter or spring. The *corpus luteum* increases in size during the late pregnancy. The average size of the *corpus albicans* as a function of the total number of *corpora albicantia* for each animal, diminishes following the logarithmic equation $y = 4.49 - 0.447 \cdot \ln x$ (y = *corpus* size, x = number of *corpora albicantia*) but apparently they never disappear completely from the ovary. Ovarian activity was almost confined to the left ovary. Our results indicate parturition and copulation in the summer months from late June to August.

Status, ecology and life history of the harbour porpoise (*Phocoena phocoena*) in Danish waters

Lockyer, C. and Kinze, C. 2003. Status, ecology and life history of harbour porpoise (*Phocoena phocoena*) in Danish waters. *NAMMCO Sci. Publ.* 5:143-176.

A review of historical harbour porpoise catches in Danish waters, together with current distribution, are provided. Most information on distribution is derived from historical catch data with a total of about 100,000 animals taken in Little Belt alone and 40,000 from

Isefjord area during the 19th century. Recent sightings surveys and tagging indicate extensive movements of animals within and between Inner Danish Waters and the Skagerrak / North Sea. Biological information is reviewed for the region, drawing on directed catches, bycatches and strandings from a database comprising nearly 1,900 records from 1834 through 1998. Diet, parasites, pollutants, biological parameters (age and reproduction) and body condition are reported, focusing mainly on the period 1996-98 when comprehensive data were collected. In 1980s samples, gadoids were the most important prey items (found in 62% of stomachs) followed by clupeoids (35%), gobiids (30%), and ammodytids (30%). Some dietary differences were observed between North Sea and Inner Danish waters. Pollutant analyses indicated a decline in sumDDT concentrations yet an increase in sumPCB and HCH levels in Danish porpoises, with comparatively higher levels here than in Baltic and Norwegian waters. Heavy metal concentrations appear higher than in Baltic porpoises. Biological parameters indicate a longevity of up to 23 years in both sexes but with fewer than 5% living beyond 12 years. Sexual maturity occurred at slightly over age 3 in both females and males, with corresponding lengths of about 135 cm in males and 143 cm in females. The data indicate a size range at birth of 65 - 75 cm (weight 4.5 – 6.7 kg), with a minimum of 60 cm. and 3.4 kg, and a likely gestation time of 10 months. Conception most likely occurs during August, with peak births in June. Directed catches comprised adult animals whereas bycaught and stranded porpoises comprised predominantly juveniles. In data from all sources, males outnumbered females. Directed catches occurred in winter months, strandings year-round with a peak in late summer, and bycatches year-round with most in September and the later part of the year.

Life history and ecology of harbour porpoises (*Phocoena phocoena*) from West Greenland

Lockyer, C., Heide-Jørgensen, M.P., Jensen, J. and Walton, M.J. 2003. Life history and ecology of harbour porpoises (*Phocoena phocoena*) from West Greenland. *NAMMCO Sci. Publ.* 5:177-194.

During 1988, 1989 and 1995, 187 harbour porpoises (*Phocoena phocoena*) were sampled from the catches off West Greenland. The samples were taken in 3 areas between 62°N and 70°N: northerly (n=134, Maniitsoq and locations Kangaamiut, Qeqertarsuaq and Qasigiannguit further north), southerly (n=30, Nuuk) and southernmost (n=23, Paamiut). A suite of biological measurements and data were collected from these samples. Comparison of age and length distributions between years and areas indicated that while there were no statistical differences between the Maniitsoq and northerly samples in different years, the southerly Nuuk and Paamiut samples were biased to younger age classes. Application of the Gompertz growth model to length and weight at age data indicated an asymptotic length of 154 cm in females and 143 cm in males with weights of 64 kg and 52 kg respectively. A number of correlations were observed between length, mid-girth (G_3), body and blubber weights and blubber thickness. Indicators of body condition showed that overall pregnant females were fattest but that blubber thickness was greatest in juveniles. The blubber lipid content was generally 92-95% wet weight of tissue. Stomach content analysis for 92 animals indicated regional differences, although capelin (*Mallotus villosus*) was predominant in all samples. The presence of fish, squid

and crustaceans indicated opportunistic feeding. Females ovulated from age 3-4 years at a length of about 140 cm; combined testis weights >200 g indicated maturation in males from age 2 years upwards at a length >125 cm. Several small embryos were found, consistent with a mating season in late summer. Testis hypertrophy in August also supported a late summer breeding. Analysis of ovarian *corpora* indicated annual ovulation. Certain biological parameters, including body condition indicators, indicate differences between West Greenland and eastern North Atlantic populations that agree with published genetic findings.

Growth and reproduction in harbour porpoises (*Phocoena phocoena*) in Icelandic waters

Ólafsdóttir, D., Víkingsson, G. A., Halldórsson, S. D. and Sigurjónsson, J. 2003. Growth and reproduction in harbour porpoises (*Phocoena phocoena*) in Icelandic waters. *NAMMCO Sci. Pub*. 5:195-210.

A total of 1,268 harbour porpoises were obtained from fishing nets in Icelandic coastal waters from September to June in the years 1991 to 1997. Foetal sex ratio was 1.2:1 (male:female). The bias towards males increased further among older animals in the present collection. The modal year classes were 0 and 1 years but the oldest porpoise was a female estimated at 20 years of age. Length at birth was estimated as approximately 75 cm, and females grew faster and attained larger sizes than males. Asymptotic length was 149.6 cm for males and 160.1 cm for females. Estimated age and length at sexual maturity was 1.9 to 2.9 years and 135 cm for males and 2.1 to 4.4 years and 138 to 147 cm for females. Immature individuals were significantly shorter than pubertal and mature animals in both sexes in age-classes 1 to 3. Testes weight increased only slightly with body size in immature males but increased rapidly around maturity. Pronounced seasonality was also observed in testes weight, indicating a peak in testes activity in summer. Lack of data from the summer makes the exact timing of parturition and mating unknown. Births do, however, most likely peak in June and July and lactation lasts at least 7 to 8 months. Ovulation and pregnancy rates were 0.98.

Growth of the harbour porpoise (*Phoceona phocoena*) in eastern Newfoundland, Canada

Richardson, S.F., Stenson, G.B. and Hood, C. 2003. Growth of the harbour porpoise (*Phoceona phocoena*) in eastern Newfoundland, Canada. *NAMMCO Sci. Publ.* 5:211-222.

Although the stock relationships among harbour porpoise (*Phocoena phocoena)* in the Northwest Atlantic are unknown, it has been postulated that there are 4 local populations: Bay of Fundy/Gulf of Maine, Gulf of St. Lawrence, Newfoundland, and west Greenland. Data on the Newfoundland population are extremely limited. To determine growth rates and examine if these animals can be differentiated from other sub-populations on the basis of growth characteristics, 94 porpoises caught incidentally in fishing gear along the southeast coast of Newfoundland during the summers of 1990 and 1991 were examined. Most porpoises (56%) were ≤ 4 years of age. Maximum age was 9 for females and 12 for males.

Growth rates were similar for both sexes until one year of age, after which females grew longer and weighed more than males of similar ages. Using the Gompertz growth model, asymptotic values for body length were 156.3 cm for females and 142.9 cm for males. Asymptotic weights were 61.6 kg and 49.1 kg for females and males respectively. With the exception of West Greenland porpoise that were shorter and females from Norway that were lighter, Newfoundland porpoises could not be differentiated from animals collected in other areas based on growth data. However, differences in dental deposition patterns were noted suggesting that Newfoundland porpoise may belong to a separate population.

The harbour porpoise (*Phocoena phocoena*) in the North Atlantic: Variability in habitat use, trophic ecology and contaminant exposure

Bjørge, A. 2003. The harbour porpoise (*Phocoena phocoena*) in the North Atlantic: Variability in habitat use, trophic ecology and contaminant exposure. *NAMMCO Sci. Publ*. 5:223-228.

Harbour porpoises inhabit coastal waters, in habitats that are characterized by high diversity and complexity in terms of their bathymetry, substrate, fish communities and point sources of contaminants. The complexity in these habitats influences both the habitat use and feeding ecology of porpoises. Congregations of porpoises feeding primarily on one species are observed in some areas and seasons, while wide movements and diets composed of several species are observed in other areas. Due to these observations, this paper suggests that caution is needed when extrapolating knowledge from one area to another with regard to porpoise habitat use, exposure to contaminants, and interactions with fisheries. Management plans should be site specific and based on local knowledge incorporating porpoise population structure, habitat use, and multiple environmental factors in order to ensure appropriate conservation of this abundant but still vulnerable small cetacean species.

An experimental study of postmortem ocular fluid and core temperature analysis in incidentally captured harbour porpoise (*Phocoena phocoena*)

Hood, C., Daoust, P.Y., Lien, J. and Richter, C. 2003. An experimental study of postmortem ocular fluid and core temperature analysis in incidentally captured harbour porpoise *(Phocoena phocoena). NAMMCO Sci. Publ.* 5:229-242.

Determination of elapsed time since death in small cetaceans can be important to our understanding of the nature of their interactions with fishing operations. This pilot study was conducted to determine the potential diagnostic usefulness of ocular fluid (vitreous humour) and core body temperature to estimate postmortem intervals in harbour porpoises (*Phocoena phocoena*). Core temperature and concentrations of various constituents of vitreous humour (glucose, urea, sodium, potassium, chloride, magnesium, calcium, and phosphorus) were determined in 24 harbour porpoises incidentally caught in groundfish gillnets in the waters of the Gulf of Maine and the Bay of Fundy. These parameters were compared to published values for rectal temperatures and the serum concentrations of several selected elements in live harbour porpoises. Glucose in vitreous humour decreased

in dead animals compared to serum values in live ones; its level was positively correlated with core temperature. Potassium and magnesium in vitreous humour increased following death. These data suggest that most animals analysed had been dead for several hours. For the present, the methodology affords researchers an approach that appears to hold some promise. However, the most practical technique requires testing animals with a known time of death in order to derive a set of curves for ocular fluid values and temperature versus time that are appropriate for a statistical presentation of predictability for the time since death.

Diet of harbour porpoises (*Phocoena phocoena*) in Icelandic coastal waters

Víkingsson, G.A., Ólafsdóttir, D. and Sigurjónsson, J. 2003. Diet of harbour porpoises (*Phocoena phocoena*) in Icelandic coastal waters. *NAMMCO Sci. Publ*. 5:243-270.

The stomach contents of 1,047 harbour porpoises (*Phocoena phocoena*) bycaught in gillnets off Iceland were analysed. Most of the samples were obtained southwest (SW) and southeast (SE) of Iceland and the majority were taken in March and April. The sex ratio was biased towards males (63% males), particularly in the SE area (76%). The proportion of sexually mature porpoises was 35% and was higher in the northern part of the study area. Most examined stomachs contained identifiable food remains (97%). More than 40 fish and invertebrate prey taxa were identified. Overall capelin (*Mallotus villosus*) comprised the predominant prey, followed by sandeel (*Ammodytidae* sp.) and then gadids and cephalopods, while other taxa were of less importance. Differences were detected in diet composition among 5 areas around Iceland with redfish (*Sebastes marinus*) and gadids more prominent in the northern areas. Off SW Iceland there was considerable seasonal variation in the porpoise diet, where capelin appeared to be dominant in late winter and spring and sandeel in the summer through early winter. Predominance of capelin in the diet coincided with the spawning migration of capelin from northern waters along the east, south and west coasts of Iceland. Mature females appeared to have a more diverse diet than other reproductive classes. The length distributions of fish consumed by the porpoises ranged from 1 to 51 cm although most fish prey were less than 30 cm.

Harbour porpoise (*Phocoena phocoena*) in the North Atlantic: Abundance, removals, and sustainability of removals

Stenson, G. B. 2003. Harbour porpoise (*Phocoena phocoena*) in the North Atlantic: Abundance, removals, and sustainability of removals. *NAMMCO Sci. Publ.* 5:271-302.

The status of harbour porpoise (*Phocoena phocoena*) populations in the North Atlantic has raised numerous concerns. Although a number of factors that may be adversely affecting harbour porpoise populations have been identified, focus has been on the impact of removals, primarily due to incidental catches in fishing gear. As a result, considerable efforts have been made to determine the levels and/or impact of bycatch in a number of areas. Unfortunately, however, many areas remain little studied. Currently, harbour porpoise are listed as threatened or vulnerable in many parts of their range. In order to

determine if the current levels of removals are sustainable, information on stock identity and seasonal movements, population parameters, abundance, and the magnitude of removals are required. Although substantial progress has been made to improve our knowledge of these parameters in the last decade, significant gaps still exist. After reviewing the available data for each sub-population in the North Atlantic, it is clear that the information required to assess the status of harbour porpoise populations is still not available for most areas. Attempts have been made to assess the status of harbour porpoise based on trends in sightings or, in areas where information on abundance and bycatch are available, on models using arbitrary criteria and/or theoretical estimates of potential population growth. Detailed case-specific population models have been proposed but are not yet available.

Bycatch as a potential threat for harbour porpoises (*Phocoena phocoena*) in Polish Baltic waters

Skóra, K.E. and Kuklik, I. 2003. Bycatch as a potential threat for harbour porpoises (*Phocoena phocoena*) in Polish Baltic waters. *NAMMCO Sci. Publ.* 5:303-315.

Sixty-two verified reports obtained in the years 1990-1999 on the bycatch, strandings and sightings of harbour porpoises in the Polish Baltic were analysed in this study. In relative terms the highest number of reports (22) was noted in Puck Bay. Forty-five (72.6%) reports referred to specimens from bycatch, 10 (16.1%) were individuals observed at sea, and 7 (11.3%) were stranded. A large proportion (42.2%) of the bycatch occurred in the fishing grounds of Puck Bay. Forty carcasses of harbour porpoises were obtained for further analysis. Most of the bycatch took place from December to April with a maximum in March. In the rest of the year there were 1 to 3 bycaught animals reported per month with no cases of bycatch in June. Taking into account data on fishing effort collected for the study area it appears that by far the greatest threat to harbour porpoises is posed by nets used for salmonids. Among all the bycaught animals, most (40.0%) perished in salmon semi-drift nets. A considerable number of the harbour porpoises perished in bottom set nets for cod (33.3%) while only a single bycatch event was reported from herring trawl nets. To assess the danger from different fishing gear and to determine the areas where the threats are the highest, direct observation of the fisheries was conducted. In the course of boat inspections various types of fishing gear were identified and geographical positions of 1,069 nets were marked. The majority (92%) consisted of semi-drift nets for sea trout and salmon. Relatively low rates of bycatch were reported from bottom set nets, which had a density over 20 times less than that of surface salmon nets in the area in the autumn months. The density and distribution of both types of nets in the surveyed area was comparable during autumn and winter, when the majority of bycaught animals in bottom set nets were reported.