Agenda Item 5.1

Implementation of the Triennium Work Plan (2010-2012)
Review of New Information on Population Size, Distribution, Structure and Causes of Any Changes

Document 5-01

Characteristics of and Threats to Toothed Whales Found Frequently Within the ASCOBANS Area

Action Requested

- Take note of the report
- Comment

Submitted by

Secretariat

NOTE:
IN THE INTERESTS OF ECONOMY, DELEGATES ARE KINDLY REMINDED TO BRING THEIR OWN COPIES OF DOCUMENTS TO THE MEETING

Secretariat's Note

1. An extensive review of scientific publications on Odontocetes, prepared by Prof. Boris Culik has been recently published on the website of the Convention on Migratory Species (CMS) of UNEP. It can be accessed in full at http://www.cms.int/reports/small_cetaceans/index.htm. For the information of the Advisory Committee, the ASCOBANS Secretariat has prepared an excerpt of this review, which is presented below. The Secretariat would like to express their gratitude to Ms Polina Khrycheva, who is currently completing an internship with the Secretariat, and has worked on this compilation.
2. This document contains information on biology, behaviour, distribution, and population size and structure of the small cetacean species most commonly found in the ASCOBANS Agreement Area and the threats they are facing in this region. Sometimes, geographic locations outside of the Agreement Area are included, if the text contains relevant facts on, for example, global population structure and ways to mitigate human impacts. Adjacent locations are included in this document, especially where information on the agreement area is not available. The Pacific, Southern and Indian Oceans, as well as western Atlantic are largely omitted in this report extract.
3. Empty square brackets […] indicate omitted text, whereas the text inside square brackets, e.g. [in the ASCOBANS area:] has been added by the Secretariat.
4. Ms Khrycheva has also produced a brief overview of the conservation status of cetacean populations within the ASCOBANS area and most important threats to these populations. This overview, annexed to the document, is based on the report of Prof. Culik, with some additional references, which are explicitly indicated.

Reference for the original report:

Odontocetes - the toothed whales. Distribution, Behaviour, Migration and Threats. 2010. Compiled for CMS by Boris M Culik, F. Illustrations by Maurizio Würtz, Artescienza. Maps by IUCN. Published by UNEP / CMS Secretariat, Bonn, Germany. http://www.cms.int/reports/small_cetaceans/index.htm

Characteristics of and threats to toothed whales found frequently within the ASCOBANS area

Excerpts from the report "Odontocetes: the toothed whales: Distribution, Behaviour, Migration and Threats" by Boris Culik (2010), pertaining to species and the geographical area[1] covered under the ASCOBANS Agreement

[1] Sometimes other areas were included when the information could be of general significance for the species or could possibly be relevant to the ASCOBANS

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Secretariat's Note

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Delphinus delphis

(Linnaeus, 1758)

English: Short-beaked common dolphin
German: Gemeiner Delphin mit kurzem Schnabel
Spanish: Delfín común a pico corto
French: Dauphin commun à bec court
[Russian: Обыкновенный дельфин, дельфин-белобочка]

Family: Delphinidae

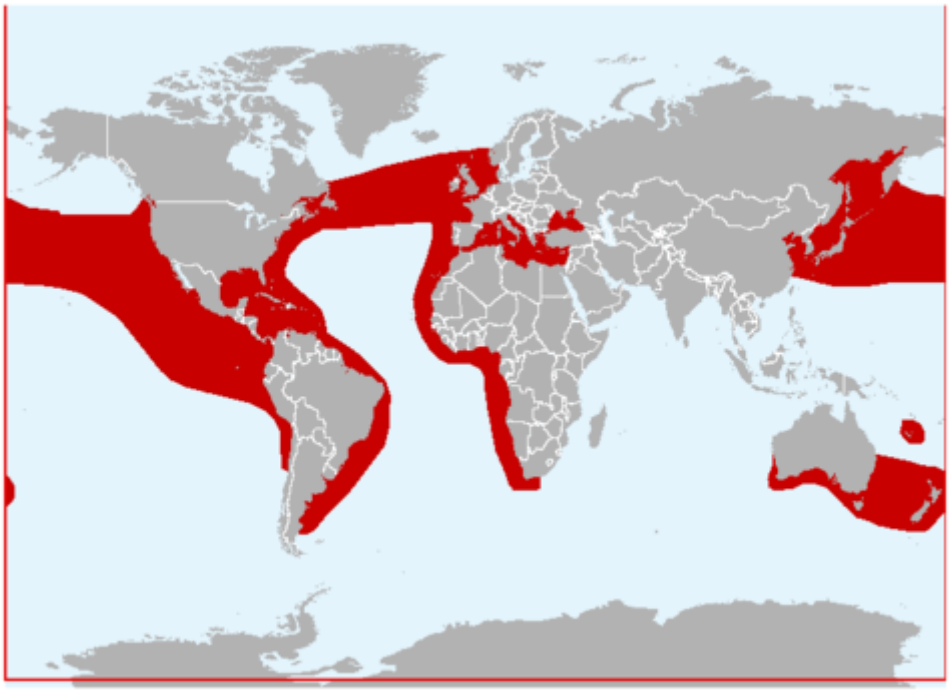
Delphinus delphis © Wurtz-Artescienza

1. Description

Common dolphins of both species are slender and have a long beak sharply demarcated from the melon. The dorsal fin is high and moderately curved backwards. Common dolphins are distinguished from other species by a unique crisscross colour pattern formed by interaction of the dorsal overlay and cape. This yields a four-part pattern of dark grey to black dorsally, buff to pale yellow anterior thoracic patch, light to medium grey on the flank and a white abdominal field. In the short-beaked species, *D. delphis*, the colour pattern is more crisp and colourful than in *D. capensis*. Body size ranges from 164 to 201cm and body mass to about 200 kg (Perrin, 2009).

2. Distribution

Delphinus delphis is widely but discontinuously distributed in warm temperate and tropical waters of the Atlantic and Pacific oceans. Its total distribution is uncertain because of past taxonomic confusion (Rice, 1998 and refs. therein). […]



Distribution of *Delphinus delphis* (Hammond et al. 2008; © IUCN):
warm temperate, subtropical, and tropical waters worldwide

Most areas of distribution coincide with moderate to strong upwelling, and common dolphins appear to avoid warm, tropical waters. Their study shows that great care must be taken in identification of similar-appearing long-beaked delphinids, and that uncritical acceptance of records at face value can lead to incorrect assumptions about the ranges of the species involved (Jefferson et al. 2009).

3. Population size

The species is very abundant, with many available estimates for the various areas where it occurs.

[…] In the North Sea, Hammond et al. (2002) found common dolphins almost exclusively in the Celtic Sea. Abundance was estimated as 75,450 (95% CI = 23,000-149,000). A sighting survey conducted in the Bay of Biscay in 1993 led to a population estimate of 62,000 short-beaked common dolphins in the fishing grounds of the albacore tuna driftnet fishery (Goujon, 1996).

De Boer et al. (2008) provided estimates from winter pelagic trawl fishing grounds in the English Channel with a mean abundance of 3,055 dolphins (95% CI = 1,425-6,544). The relative index for abundance (number of schools per 100km effort, mean school size 5.1) was the highest recorded from comparable surveys in the North Atlantic and shows that the Channel is a very important winter habitat for common dolphins. […]

4. Biology and Behaviour

Habitat: *D. delphis* is usually found where surface water temperature is 10°C-20°C, which limits the distribution north and south of the range, but it may follow warm water currents beyond the normal range. It is less commonly seen in water shallower than 180m. *D. delphis* occurs over the continental shelf, particularly in areas with high seafloor relief, but mainly offshore (Carwardine, 1995) […]

Schooling: Often found in large, active schools: jumping and splashing can be seen and even heard from a considerable distance. Several members of a group often surface together. School size often varies seasonally and according to time of day. Animals bunch tightly together when frightened (Carwardine, 1995). Herds range in size from several dozen to over 10,000. Associations with other marine mammal species are not uncommon (Jefferson et al. 1993). […]

Reproduction: Breeding peaks in spring and autumn or summer have been reported for some stocks (Jefferson et al. 1993). Ferrero and Walker (1995) found that calving in the offshore waters of the North Pacific appeared to peak in May and June. Females in the eastern tropical Pacific average 197.2 cm at asymptotic body length. The estimated age at attainment of sexual maturity is 7.9 years and the oldest animal in the study was 25 years. Calving occurred throughout the year, with females producing a calf approximately every 2.1 years after a gestation period of approximately 11.4 months, an average lactation period of 16.5months, and an average resting period of 2.8 months. A relatively high percentage (30.4%) of lactating females were simultaneously pregnant, which effectively shortens the average calving interval. No clear evidence of senescence was found (Danil and Chivers, 2007).

Food: The prey of common dolphins consists largely of small schooling fish (e.g. sardines) and squid. Co-operative feeding techniques are sometimes used to herd fish schools (Jefferson et al. 1993; Silva, 1999). […]

In the pelagic North Atlantic Ocean, diet was dominated by fish (90% by number and 53% by mass of total diet), while cephalopods played a secondary role (9%, 46%, respectively). Crustaceans were of minor importance. At the species level, the myctophid fish (*Notoscopelus kroeyeri*) largely dominated the diet. Prey size ranged from 1 to 68 cm, but the majority of the preys were from 2 to 30 cm long. Common dolphins forage preferentially on small schooling, vertically migrating mesopelagic fauna in the surface layer at dusk and early night (Pusineri et al. 2007).

Meynier et al. (2008) analysed stomach contents from 71 common dolphins stranded along the French coast between 1999 and 2002. The most important prey species were sardine, anchovy, sprat and horse mackerel, which represented 44.9, 22.6, 8.0 and 5.0% by mass of the fresh diet, respectively. In spite of the main prey species varying extensively, estimated daily food intakes changed relatively little, because all diets included a high proportion of fat fish (73 to 93% by mass).

Kastelein et al. (2000) published food consumption data from common dolphins held in a delphinarium. The food intake quantities should be viewed as rough weight estimates of what wild conspecifics might eat (depending on their diet). Annual food intake of two dolphins increased to 3,300kg at around 12 years of age, after which it decreased, stabilising at around 2,200kg between the ages of 16 and 25 years.

5. Migration

[…] In the eastern North Atlantic, Goold (1998) used passive acoustic monitoring of common dolphins off the west Wales coast during the months of September, October, November and December 1994 and 1995. Distributions of common dolphins within the survey area showed a marked decrease in dolphin contacts between September and October of both years. These observations suggest offshore migration of the populations at that time of year. It is hypothesised that offshore migration of common dolphins coincides with a break-up of the Celtic Sea Front, a distinct oceanographic feature, which crosses the survey area.

Goold (1996) reported on southwesterly migratory behaviour of common dolphins monitored acoustically in the North Sea in the fall of 1995. Collet (1981, in Collet, 1994) supposed that *D. delphis* spends the winter on the French coast of the Bay of Biscay and leaves this area after March. […]

6. Threats

Direct catch: [According to Culik (2010) common dolphin fishing has occurred in different parts of the world, including a few takes along the Mediterranean coast of Spain and some off the Atlantic coast of France.]

[…] Off the Atlantic coast of France some [common dolphins] were harpooned by fishermen for consumption at sea (Reyes, 1991 and refs therein, Jefferson et al. 1993). […]

Incidental catch: The common dolphin is one of the most prominent by-catches of both the worldwide pelagic purse seine and drift net fisheries. This is due in part to its abundance and possibly because of a shared feeding ecology with the targets of those fisheries, large migratory pelagic fish (e.g. tuna). […]

Small-scale incidental catches in gillnets occur elsewhere in the range. [...] This is confirmed by by-catch assessments from various sources: Antoine et al. (2001), from the north-east Atlantic, […], Berrow and Rogan (1998) and Couperus (1997) from Irish waters, [...] and Kuiken et al. (1994) from the coast of Cornwall, England […].

In northern Portuguese waters the common dolphin accounted for 60% of all reported strandings. Confirmed by-catch was responsible for 34% of all strandings, and up to 18% of the deaths were suspected to have been caused by interactions with artisanal fishing gear (Ferreira et al. 2003). Silva and Sequeira (2003) found that larger numbers of strandings were recorded in the northern and central Atlantic Portuguese coast and showed a significant degree of seasonality, with 37% occurring in the spring and 33% in the winter months. Their stranding data suggest that fishery interactions could be responsible for up to 44% of mortality for this population. Goujon (1996) reported that in 1992 and 1993 on average 1.7 common dolphins were incidentally caught per trip by the French drift nets targeting albacore tuna off the Bay of Biscay. The annual additional mortality linked to the driftnets was estimated at 0.8%. By-catch in the Albacore tuna (*Thunnus alalunga*) drift net fishery in the eastern North Atlantic was estimated at 11,723 common dolphins during the period 1990-2000 (Rogan and Mackey 2007).

Tregenza and Collet (1998) found that pelagic trawl by-catches of dolphins are widespread in the Bay of Biscay, Western Approaches and Celtic Sea and are likely to be the largest of several fishery by-catches of common dolphins which together probably exceed 1% of the local summer population. Tregenza et al. (2003) analysed stranding records in the southwest of England and found a disproportionate increase in the first four months of the year since 1970. Parsons et al. (2007) found high dolphin by-catch rates in the UK pelagic pair trawl fishery for sea bass in the western English Channel. The small UK fishery is estimated to have killed over 900 common dolphins in the five years from 2000 to 2005. […]

Culling: [no information pertaining specifically to the ASCOBANS area]

Competition with fisheries: [no information pertaining specifically to the ASCOBANS area]

Pollution: […] Pierce et al. (2008) reported on high concentrations of polychlorinated biphenyls (PCBs) in blubber of 40% of female common dolphins from the Atlantic coast of Europe, above the threshold at which effects on reproduction could be expected. However, the average pregnancy rate recorded in common dolphins (25%) was similar to that of the western Atlantic population and only a few of the common dolphins sampled had died from disease or parasitic infection. Holsbeek et al. (1998) investigated heavy metal concentrations (total and organic Hg, Ti, Cr, Cu, Zn, Cd and Pb) in 29 common dolphins stranded on the French Atlantic coast and found no difference in contamination between the 1977-1980 and 1984-1990 periods. […]

Noise pollution: Evans (1994) feared that the development of the offshore petroleum industry is likely to have a negative effect on pelagic cetacean species such as *D. delphis*, and Goold (1996) as well as Stone and Tasker (2006) confirm this, describing the avoidance reaction of *D. delphis* to airguns used in the corresponding seismic surveys.

Overfishing: In many areas, [...] common dolphins feed on schooling fish that are also the target for commercial fisheries. [no information pertaining specifically to the ASCOBANS area]

Tourism: [no information pertaining specifically to the ASCOBANS area]

7. Remarks

Range states [in the ASCOBANS area:] Belgium; Denmark; France; Germany; Ireland; Netherlands; Norway; Portugal; Spain; United Kingdom [...] (Hammond et al. 2008).

Tighter fishery management is needed urgently for at least some populations of short-beaked common dolphins (Reeves et al. 2003). Tregenza et al (2003) summarized that a) strandings are still substantially under-reported, b) a recent real rise in common dolphin by-catch is likely, c) a mark-recapture or body loss rate approach to strandings might provide a useful basis for assessing true stranding rates, d) rigorously recording the reliability status of species, length, and sex data will enhance the long term value of these records, e) marking of discarded cetaceans by fisheries observers would be immensely valuable but is still not routinely practised, and f) accessible data on fishery location, effort and method would be valuable. […]

The common dolphin is categorized as "least concern" by the IUCN. The species is listed in Appendix I of CITES. The North and Baltic Sea populations, […] of *Delphinus delphis* are listed in Appendix II of CMS. However, recent data indicate that the species may also migrate in the Strait of Gibraltar area (range states: Spain, Portugal, Algeria, Morocco), along the coast of southern California (range States US, Mexico), and in the Nova Scotia area (range states US and Canada). It is therefore recommended that the species as a whole should be included in App. II of CMS, without restriction to particular stocks. […]

For the full species account of the report "Odontocetes: the toothed whales: Distribution, Behaviour, Migration and Threats" by Boris Culik (2010) please refer to http://www.cms.int/reports/small_cetaceans/data/d_delphis/d_delphis.htm.

Globicephala melas

(Traill, 1809)

English: Long-finned pilot whale
German: Lagflossen-Grindwal
Spanish: Calderón negro
French: Globicéphale noir
[Russian: Обыкновенная гринда]

Family Delphinidae

Globicephala melas © Würtz-Artescienza

1. Description

The body in pilot whales is robust, with a deep tailstock. The melon is exaggerated and bulbous and the beak is barely discernible or non-existent. The dorsal fin is wide, broad based, falcate and set well forward on the body. The flippers are long, slender, and sickle-shaped. A faint grey saddle patch may be visible behind the dorsal fin in southern Hemisphere specimens. In the North Atlantic, a thin whitish stripe can be visible in less than half of all adult pilot whales. A pale eye blaze is visible in one fifth of all adult pilot whales, most often in males (Bloch et al. 1993a). A grey midventral line extends to the front into an anchor-shaped chest patch and widens posteriorily to a genital patch. Sexual dimorphism exists with longer flippers and larger flukes in males (Bloch et al. 1993a). The long-finned pilot whale has a narrower skull than the short-finned species, with the maxillary bones exposed laterally along the full length of the rostrum (Olson, 2009).

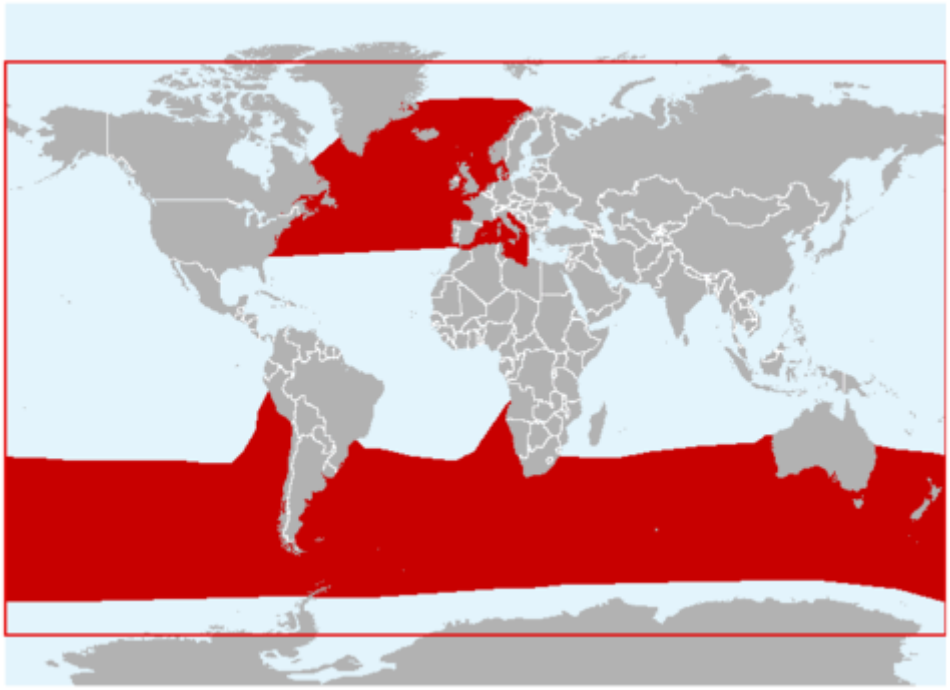
Long- and short-finned pilot whales (*G. melas* and *G. macrorhynchus*) are difficult to distinguish at sea. However, the species differ, as the name suggests, in flipper length, skull shape and number of teeth. On average, the flippers reach 18-30% of the body length in long-finned pilot whales, but only 14-19% in short-finned pilot whales (Bloch et al. 1993a). Adults reach a body length of approx. 6.5 m, males being 1 m larger than adult females (Bloch et al. 1993b; Olson, 2009). Body mass reaches up to 1,300 kg in females and up to 2,300 kg in males (Jefferson et al. 2008).

2. Distribution

Two sub-species are recognized in some classifications (Rice, 1998):

G. m. melas: This subspecies ranges in the North Atlantic from Ungava Bay, Disko in western Greenland, 68°N in eastern Greenland, Iceland, the Faroes, and Nordland in Norway, south to North Carolina, the Azores, Madeira, and Mauritania, including the western Mediterranean (Rice, 1998 and refs. therein). It occurred as recently as the 8th to 12th century in northern Japanese waters (Olson, 2009).

According to Bloch and Lastein (1993) pilot whales on the western (Newfoundland) and eastern (Faroes) sides of the North Atlantic are distinguishable by minor external morphometric characters and may be geographically isolated from each other. However, Fullard et al. (2000) concluded that despite genetic, morphometric, physiological and observational studies, it remains unclear whether any population substructure exists. They used eight highly polymorphic microsatellite loci to analyse samples from the US East Coast (Cape Cod), West Greenland, the Faeroe Islands and the UK. Although their results indicate that substructure does exist, and is particularly pronounced between West Greenland and other sites, the magnitudes of the various pairwise comparisons do not support a simple isolation-by-distance model. Instead, the patterns of genetic differentiation suggest that population isolation occurs between areas of the ocean which differ in sea surface temperature (Fullard et al. 2000).



Distribution of *Globicephala melas* (Taylor et al. 2008; © IUCN):
"antitropical" in cold temperate and subpolar waters of all oceans except the North Pacific

[…]

3. Population size

There is little information on stocks within the species, and there is no information on global trends in abundance (Taylor et al., 2008). [...] In the north-eastern Atlantic the number of pilot whales inhabiting the area between East Greenland, Iceland, Jan Mayen, Faroe Islands and off the western coasts of the British Islands and Ireland was estimated at around 778,000 by Buckland et al. (1993). However, in a more recent meeting, the North Atlantic Marine

Mammal commission (NAMMCO, 2006) noted that there had been no assessment of pilot whales since 1994. […]

4. Biology and Behaviour

Habitat: The typical temperature range for the species is 0-25°C (Martin, 1994) and it may be found in inshore, but mostly in offshore waters (Reyes, 1991 and refs. therein). […]

Behaviour: [no information pertaining specifically to the ASCOBANS area]

Schooling: Pilot whales are highly social; they are generally found in pods of 110, but some groups contain up to 1,200 individuals (Zachariassen, 1993; Bloch, 1998). Based on photo-identification and genetic work, pilot whales appear to live in relatively stable pods like those of killer whales, and not in fluid groups characteristic of many smaller dolphins (Jefferson et al. 1993; Cañadas and Sagarminaga, 2000). They are social animals, with close matrilineal associations with 60% females.

The pods are often mixed with Atlantic white-sided dolphins (*Lagenorhynchus acutus*) and bottlenose dolphins (*Tursiops truncatus*) (Bloch et al. 1993c). When travelling, pods may swim abreast in a line several kilometres across. Short-finned pilot whales are often found in the company of bottlenose dolphins and other small cetaceans, although they have been known to attack them (Carwardine, 1995). Baraff and Asmutis (1998) described the association of an individually identified long-finned pilot whale with Atlantic white-sided dolphins over six consecutive years. Pilot whales were also observed in close association with fin, sperm and minke whales, and common, bottlenose, hourglass and possibly dusky dolphins (Goodall and Macnie, 1998). […]

G. melas is one of the species most often involved in mass strandings [...]. Their tight social structure also makes pilot whales vulnerable to herding, and this has been taken advantage of by whalers in drive fisheries off Newfoundland, the Faroe Islands, and elsewhere (Jefferson et al., 1993). If a whale of extreme social importance or strong filial bond strands due to pathological or navigational problems, others in the pod may strand also and then be unable to remain off the beach once removed due to a secondary social or "caring" response. [...]

Reproduction: Mating occurs primarily in May-June and again at a lower rate in October in the North Atlantic (Desportes et al. 1993; Martin and Rothery, 1993). Calving and breeding can apparently occur at any time of the year, but peaks occur in summer in both hemispheres (Jefferson et al. 1993). […]

Food: Primarily squid eaters, pilot whales will also take small medium-sized gregarious fish, when available (Desportes and Mouritsen, 1993; Jefferson et al. 1993). They feed mostly at night, when dives may last for 18 minutes or more and reach 828 m depth (Carwardine, 1995, Heide-Jørgensen et al. 2002). […]

The squid *Todarodes sagittatus* and species of the genus *Gonatus* are reported prey items of long-finned pilot whales in the eastern North Atlantic (Olson, 2009). […]

Werth (2000) described the feeding mechanism in captive juvenile long-finned pilot whales: Depression and retraction of the large, piston-like tongue generated negative intra-oral pressures for prey capture and ingestion. Food was normally ingested without grasping by teeth, yet was manipulated with lingual, hyoid, and mandibular movement for realignment; suction was then used to transport prey into the oropharynx.

5. Migration

[no information pertaining specifically to the ASCOBANS area] [...]

6. Threats

Direct catch: [no information pertaining specifically to the ASCOBANS area]

Drive fisheries for long-finned pilot whales in the Faroe Islands date back to the Norse settlement in the 9th century. Catch statistics exist from the Faroes since 1584, unbroken from 1709-today and showing an annual average catch of 850 pilot whales (range: 0 - 4,480) with a cyclic variation correlated with North-Atlantic climatic variations (Bloch and Lastein, 1995; Bloch, 1998). Considering the mobility of these animals, it seems likely that these catches are recruited from a larger area in the North Atlantic than previously assumed (Bloch et al. 2003).

The only current fishery for long-finned pilot whales is undertaken in the Faroe Islands. […] ICES and NAMMCO as well as the IWC, have concluded that with an estimated population size of 778,000 in the eastern North Atlantic and approximately 100,000 around the Faroes (Buckland et al. 1993; NAMMCO, 1997) the Faroese catch will not deplete the population. Pilot whales seem to utilise a larger area around the Faroes (Desportes et al. 1994; Bloch et al. 2003), which according to these sources also reduces any threat. [...]

Incidental catch: Incidental catches are reported from Newfoundland, the Mediterranean and the Atlantic coast of France, and according to Bernard and Reily (1999 and refs. therein) there are probably more pilot whales taken incidentally than are presently documented. […]

In British waters, long-finned pilot whales are accidentally caught in gillnets, purse seines and in trawl fisheries (Reyes, 1991 and refs. therein). The seas around Cornwall, SW Britain, are one of the most heavily fished areas of the UK, and Leeney et al. (2008) found that strandings of pilot whales around Cornwall have increased significantly since the mid-1970s, with seasonal peaks in stranding frequencies between November and January. 61% of investigated individuals were determined to have died due to by-catch in fishing gear.

A 1990 workshop to review mortality of cetaceans in passive nets and traps documented an annual kill of 50-100 *G. melas* off the Atlantic coast of France. [...] Lopez et al. (2003) report that around 200 cetaceans might be caught annually in inshore waters and around 1500 in offshore waters of Galicia (NW Spain), mainly small dolphins, as well as *Tursiops truncatus* and *Globicephala melas.* […]

Overfishing: [no information pertaining specifically to the ASCOBANS area]

Commercial fisheries for squid are widespread in the western North Atlantic. Target species for these fisheries are squid species, which form a large part of the diet of pilot whales, making these vulnerable to prey depletion (Taylor et al. 2008).

Ship strikes: [no information pertaining specifically to the ASCOBANS area]

Since high-speed ferries were introduced in the Canary Islands in 1999, their number has grown steadily, and collisions with cetaceans have been reported ever since. While true numbers of collisions remain unknown, estimates range from approx. 10 to 30 cetaceans killed every year. Present knowledge indicates that the sperm whale is the species most frequently hit, but baleen, beaked and pilot whales are affected as well (Weinrich et al. 2005)

Pollution: Long-finned pilot whales off the Faroes, France, UK and the eastern US appear to be carrying high levels of DDT and PCB in their tissues, and where whales are consumed by humans, this leads to high-level burdens of organohalogens among residents, e.g. at the Faroes (Faengstroem et al. 2005). In other parts of their distributional range, e.g. off Newfoundland and Tasmania, very low levels of DDT were detected. Heavy metals such as cadmium and mercury also have been found in pilot whales from the Faroes. Because these contaminants accumulate in tissues over time, older animals and especially adult males tend to have higher concentrations (Borrell and Aguilar, 1993; Caurant et al. 1993; Caurant and Amiard-Triquet, 1995). Combinations and levels of these pollutants may one day play a role in stock differentiation (Reyes, 1991 and refs. therein; Bernard and Reilly, 1999 and refs. therein; Frodello et al. 2000; Nielsen et al. 2000). […]

Noise pollution: The military makes extensive use of underwater sound in order to find targets such as ships and submarines, and some active military sonar systems are known to use very loud sources. However, in part because these systems are classified, the characteristics of such sound sources have rarely been published, and there have been few studies of their effects on cetaceans. [...]

7. Remarks

Range states [in the ASCOBANS area]: Belgium; Denmark; France; Germany; Ireland; Netherlands; Norway; Portugal; Spain; Sweden; United Kingdom [...] (Taylor et al. 2008).

[...]

Globicephala melas is considered as "Data Deficient" by the IUCN. The species is listed on CITES Appendix II.

The North and Baltic Sea populations have been listed in Appendix II of CMS. However, data on long-range movements in the NW and NE Atlantic suggest that these stocks should also be included in App. II of CMS. Range states concerned are the US, Canada, Greenland, Iceland, Norway, Ireland and the UK. […]

As noted above, pollution (including noise pollution) by-catch and mass strandings may be a threat to the species and warrant further investigation. Population size and migratory patterns, including home-range sizes are insufficiently known. […]

Please also see a report on the long-finned pilot whale posted on the web by the North Atlantic Marine Mammal Commission: http://www.nammco.no.

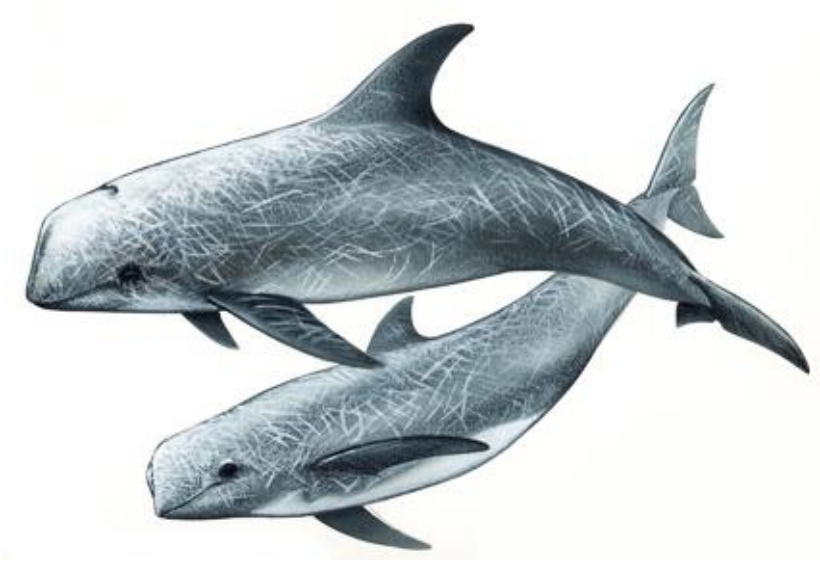
For the full species account of the report "Odontocetes: the toothed whales: Distribution, Behaviour, Migration and Threats" by Boris Culik (2010) please refer to http://www.cms.int/reports/small_cetaceans/data/G_melas/g_melas.htm.

Grampus griseus

(G.Guvier, 1812)

English: Risso's dolphin
German: Rundkopfdelphin
Spanish: Delfín de Risso
French: Dauphin de Risso
Russian: Серый дельфин

Family Delphinidae



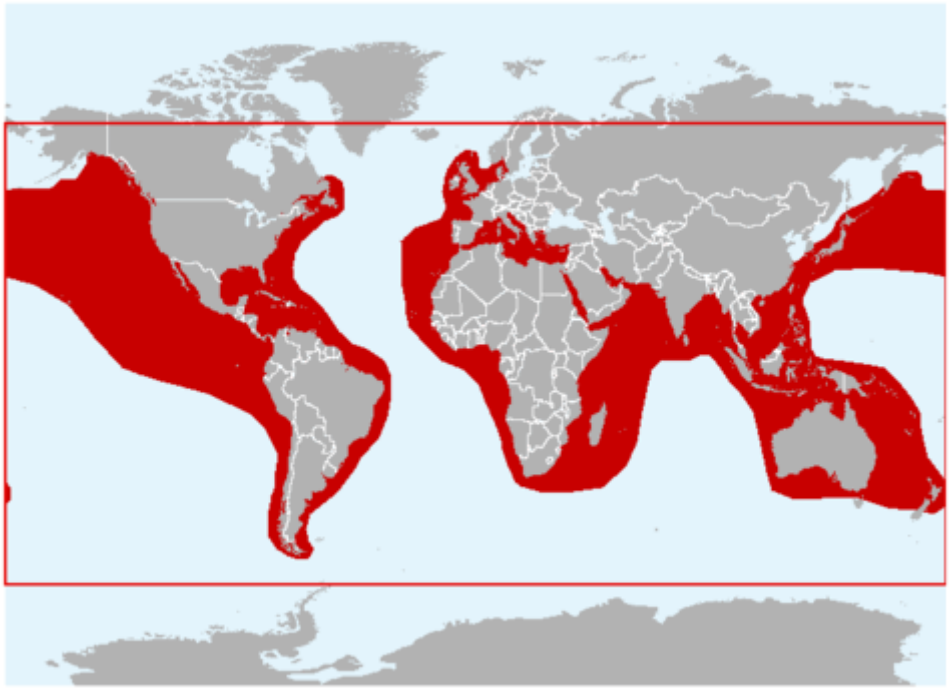
Grampus griseus © Würtz-Artescienza

1. Description

Risso's dolphin is the fifth largest of the delphinids. Adults of both sexes reach 4 m in length. Its anterior body is extremely robust, tapering to a relatively narrow tail stock and its dorsal fin is one of the tallest in proportion to body length of any cetacean, exceeded only by that of the adult male killer whale (Orcinus orca). The bulbous head has a distinct vertical crease or cleft along the anterior surface of the melon. Colour patterns change dramatically with age. Infants are dorsally grey to brown, then darken to nearly black and lighten while maturing (the dorsal fin remaining dark). In ageing animals, the majority of the dorsal and lateral surfaces become covered with distinctive linear scars. Older animals can appear completely white on the dorsal surface (Baird, 2002). Risso's dolphins are often confused with killer whales, due to the size of their dorsal fin (Baird, 2009). Adult size ranges up to 3,8 m long and body mass may reach 500 kg (Jefferson et al. 2008).

2. Distribution

This is a widely distributed species, inhabiting deep oceanic and continental slope waters 400-1,000 m deep (Baird, 2002) from the tropics through the temperate regions in both hemispheres (Jefferson et al. 1993). Sighting records indicate this species occurs roughly between 60°N and 60°S latitudes, where surface water temperatures are above 10 °C (Kruse et al. 1999). It ranges […] [around] the Shetland Islands, the North Sea (Weir et al. 2001) [and] the Mediterranean Sea […]



Worldwide distribution of *Grampus griseus* (Taylor et al. 2008; © IUCN):
tropical and warm temperate waters in both hemispheres

3. Population size

[No information pertaining specifically to the ASCOBANS area]

4. Biology and Behaviour

Habitat: Risso's dolphins are pelagic, mostly occurring seaward of the continental slope. They frequent subsurface seamounts and escarpments where they are thought to feed on vertically migrant and mesopelagic cephalopods. […] Currents and upwelling causing local increases in marine productivity may enhance feeding opportunities, resulting in the patchy distribution and local abundance of this species worldwide (Kruse et al. 1999 and refs. therein). […]

Behaviour: *G. griseus* are often seen surfacing slowly, although they can be energetic, sometimes breaching or porpoising, and occasionally bowriding (Jefferson et al. 1993).

Reproduction: In the North Atlantic and western Pacific, there appears to be a summer calving peak (Jefferson et al. 1993) and a winter calving peak in the eastern Pacific (Baird 2009).

Schooling: Herds tend to be small to moderate in size (1-100 individuals), averaging 30 animals, but groups of up to 4,000 have been reported, presumably in response to abundant food resources. Limited data on subgroup composition obtained from mass strandings and observations of captive animals suggest that cohesive subgroups may be composed of same-sex and similar-age individuals. Risso's dolphins commonly associate with other species of cetaceans such as gray whales, Pacific white-sided dolphins, northern right whale dolphins, Dall's porpoises, sperm whales, short-finned pilot whales, bottlenose dolphins, common dolphins, striped dolphins, spotted dolphins, false killer whales, and pygmy killer whales (Kruse et al. 1999 and refs. therein). [...]

Food: Kruse et al. (1999) reported that Risso's dolphins prey on a mix of neritic, oceanic, and occasionally bottom dwelling cephalopods. From daily activity patterns observed off Santa

Catalina Island, California, Risso's dolphins are presumably mainly nocturnal feeders. Santos et al. (2001) found *Octopus vulgaris* in the stomachs of animals stranded in NW Spain. […]

Philips et al. (2003) monitored a trained Risso's dolphin and established that the species echolocates, and that, aside from slightly lower amplitudes and frequencies, the clicks emitted are similar to those emitted by other echolocating odontocetes.

5. Migration

Although *G.griseus* is present year-round in most of its range, there may be seasonal onshore-offshore movements in some areas (Carwardine, 1995). In more constant environments, e.g. the Azores, Hartman et al. (2008) found strong site fidelity for at least part of the population. In seasonally more variable areas, *G. griseus* seems to show annual changes in abundance, being e.g. more abundant around northern Scotland in the summer and in the Mediterranean in the winter (e.g. Gannier, 1998; Evans, 1998). Similar seasonal shifts in abundance have been reported from the Northwest Atlantic […].

Water temperature appears to be a factor that affects the distribution of Risso's dolphins, the acceptable temperature range for the species being 7.5°C-35°C (Kruse et al. 1999 and refs. therein). In California, increasing numbers of Risso's dolphin and a shoreward shift in their distribution have been observed during periods of warm water, suggesting that seasonal patterns of distribution and abundance [can be] associated with changing sea surface temperatures (Kruse et al. 1999). […]

6. Threats

Direct catch: [no information pertaining to the ASCOBANS area]

Incidental catch: Although they have never been the basis of a large-scale fishery, Risso's dolphins have been taken periodically as by-catches in other fisheries throughout the world. There are reports from the North Atlantic […] [and from other parts of the range]. […]

Garrison (2007) found that incidental by-catch of marine mammals was likely associated with depredation of the commercial catch and is increased by the overlap between marine mammal and target species habitats. Altering gear characteristics and fishery practices may mitigate incidental by-catch and reduce economic losses due to depredation.

Culling: [no information pertaining to the ASCOBANS area]

Pollution: Accumulation of butyltin compounds, organochlorine and DDT levels have been analysed in tissue samples from various specimens (Kruse et al. 1999 and refs. therein). Mercury levels have been reported by Frodello et al. (2000). Increasing levels of plastics and other refuse at sea may pose a threat to wild populations: Necropsies of specimens from Japan revealed that they had eaten foreign materials such as plastic bags, soda cans, and pieces of rope, which may have been fatal (Kruse et al.1999 and refs. therein).

Chou and Li (2004) analysed blubber samples of cetaceans from Taiwan coastal waters for polychlorinated biphenyls (PCB). […] Stranded cetaceans had significantly higher PCB levels than by-caught cetaceans because of their higher lipid consumption during starvation or illness. However, by comparison cetaceans from Taiwan waters had relatively lower PCB concentrations than those from high-latitude areas.

Noise pollution: [no information pertaining specifically to the ASCOBANS area] […]

7. Remarks

Range states [in the ASCOBANS area]: Belgium; Denmark; France; Germany; Ireland; Netherlands; Norway; Portugal; Spain; Sweden; United Kingdom [...] (Taylor et al., 2008).

This is a circumglobal species, which migrates between summering and wintering grounds. Off California, where these movements are best known, they may involve US and Mexican waters. In other areas, the species is insufficiently known with respect to basic biological parameters. Abundance, by-catch and behavioural data at sea are needed in order to enable protection of the natural habitat of the species. […]

The IUCN lists *G. griseus* as "Least Concern" (Taylor et al. 2008). The Mediterranean, North and Baltic Sea populations are included in Appendix II of CMS. However, as described above, populations off the East and West coasts of North America (Range states US, Mexico, Canada) also seem to migrate along the coast, and this is also the case for animals off SE South Africa. It is therefore suggested not to restrict the inclusion into CMS App. II to the populations mentioned, but to include *G. griseus* as a species.

The species is listed in Appendix II of CITES.

For the full species account of the report "Odontocetes: the toothed whales: Distribution, Behaviour, Migration and Threats" by Boris Culik (2010) please refer to http://www.cms.int/reports/small_cetaceans/data/g_griseus/g_griseus.htm.

Hyperoodon ampullatus

(Forster, 1770)

English: North Atlantic bottlenose whale, northern bottlenose whale
German: Dögling, Entenwal
Spanish: Ballena nariz de botella del Norte
French: Hyperoodon boréal
Russian: Высоколобый бутылконос

Family Ziphiidae

Hyperoodon ampullatus © Würtz-Artescienza

1. Description

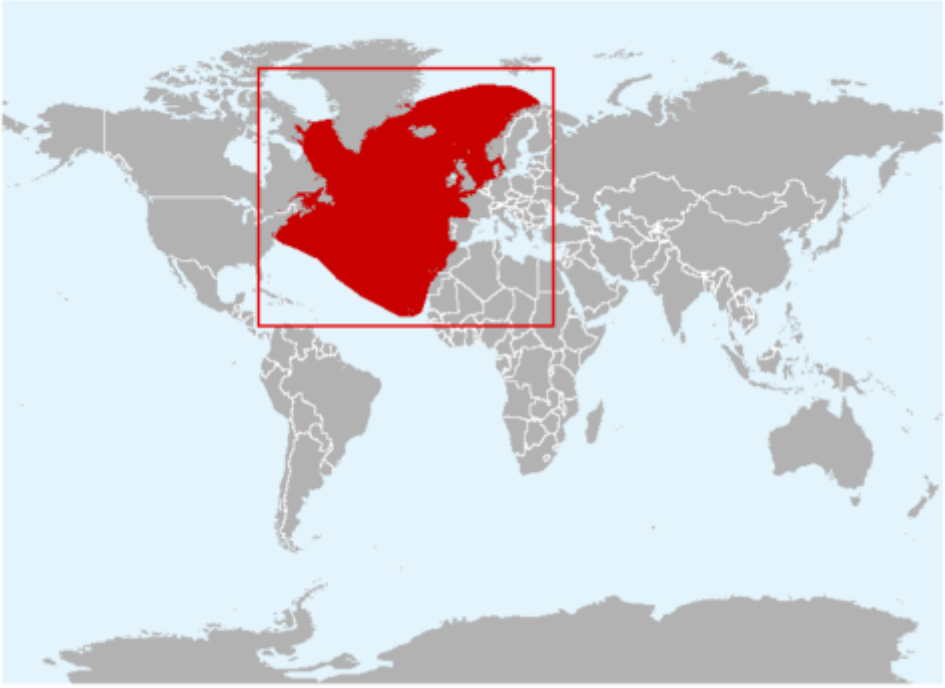
Northern bottlenose whales are the largest beaked whales in the North Atlantic and reach 10 m (and possibly up to 11.2 m) body length. Their body mass can reach 7,500 kg (Jefferson et al. 2008). Body shape is robust and they have a large, bulb-shaped forehead and short, dolphin-like beak. Their colour is chocolate brown to yellowish-brown, being lighter on the flanks and belly. Some of this colouration is believed to be caused by a thin layer of diatoms. Mature males have a squared-off forehead, which turns white after sexual maturity is reached, whereas in females and immature males it is rounded and brown (Bloch et al. 1996). Older females have a white band around the neck (Jefferson et al. 2008). Males possess a single pair of conical teeth at the tip of the lower jaw, rarely visible in live animals, especially if the mouth is closed (Gowans, 2002).

2. Distribution

The North Atlantic bottlenose whale is found in the sub-arctic North Atlantic from Davis Strait, Jan Mayen, west coast of Spitsbergen, and Bjornøya, south to Nova Scotia and the western side of the British Isles (Rice, 1998).

[...] There are few records east of the Norwegian Sea and from the Mediterranean (Rice, 1998). One specimen was reportedly caught in the North Sea during the period 1938-1972 and Kastelein and Gerritis (1991) observed an animal off The Netherlands, however the shallow southern North Sea may not be part of its native range.

Strandings are reported from the coasts of Belgium, The Netherlands, Denmark, France and England (Boschma, 1950; De Smet, 1974; Duguy 1990, Van Gompel 1991, Kinze et al, 1998). Lick and Piatkowski (1998) report on a stranding in the southern Baltic Sea. […]



Distribution of *Hyperoodon ampullatus* (Taylor et al. 2008; © IUCN):
North Atlantic Ocean, normally in water deeper than 1,000m.

3. Population size

Stocks: [no information pertaining specifically to the ASCOBANS area] [...]

Population size: […] Gunnlaugsson and Sigurjonsson (1990) estimate 5,827 whales at high latitudes in the North-eastern Atlantic and NAMMCO has calculated the population size of this species in the eastern part of the North Atlantic to be around 40,000 individuals (NAMMCO Annual Report 1995).

A study by Christensen and Ugland (1984) resulted in an estimated initial (pre-whaling) population size of about 90,000 whales, reduced to some 30,000 by 1914. The population size by the mid-1980's was said to be about 54,000, nearly 60% of the initial stock size.

4. Biology and Behaviour

Habitat: H. ampullatus is most common beyond the continental shelf and over submarine canyons, in deep water (>1,000m). It sometimes travels several kilometres into broken ice fields, but it is more common in open water. Few whales were caught over the continental shelf off Labrador and in waters less than 1,000m deep off the west coast of Norway. In the surrounding waters of Iceland, the whales were sighted at surface temperatures between -1.3°C and +0.9°C (Reyes, 1991).

Behaviour: The northern bottlenose whale is a curious animal: it will approach stationary boats and seems to be attracted by unfamiliar noises, such as those made by ships' generators. This, combined with its habit of staying with wounded companions, made it especially vulnerable to whalers. These deep divers can remain submerged for an hour, possibly as long as 2 h (Reeves et al. 1993, Bloch et al. 1996). Hooker and Baird (1999) showed that northern bottlenose whales in a submarine canyon off Nova Scotia exhibit an

exceptional diving ability, with dives approximately every 80 min to over 800 m (maximum 1,453 m) depth, and up to 70 min in duration. Sonar traces of non-tagged, diving bottlenose whales in 1996 and 1997 suggest that such deep dives are not unusual. This shows that they may make greater use of deep portions of the water column than any other mammal so far studied. Many of the recorded dives of the tagged animals were to, or close to, the sea floor, consistent with benthic or bathypelagic foraging.

Reproduction: Northern bottlenose whales have a peak in calving in April (Jefferson et al. 1993).

Schooling: Most pods contain at least 4 whales, sometimes with as many as 20, and there is some segregation by age and sex (Mead, 1989, Jefferson et al. 1993). [...]

Food: Although primarily adapted to feeding on squid, these whales also eat fish, sea cucumbers, starfish, and prawns. They apparently do much of their feeding on or near the bottom (Jefferson et al. 1993; Mead, 1989). […]

Stomach content analysis by Clarke and Kristensen (1980) on a specimen stranded on the Faroe Islands showed that while the cephalopods found included six cold water species which were probably taken in deep water within the vicinity of the Faroes, they also included one species, *Vampyroteuthis infernalis*, which is a warmer water species and probably ranges little further north than 40°N. This suggests the whale had been much further south in the Atlantic than the Faroes at 62°N just before its stranding or that the distribution pattern of this cephalopod is not that well known. The stomach contents examined in the Faroese show more diversity with 13 species eaten than those from a whale stranded in Denmark (Clarke and Kristensen, 1980) and from whales shot off Labrador and Iceland, which contained only one species, Gonatus fabricii. Santos et al. (2001) report on stomach contents of bottlenose whales stranded in the North Sea. Their results are in agreement with those of previous authors in that cephalopods in general, and *G. fabricii* in particular, are the main prey of the northern bottlenose whale.

5. Migration

Migratory movements are poorly documented, as are stock relations among the animals found in apparently disjunct centres of spring and summer abundance (Reeves et al. 1993). In the eastern part of the range *H. ampullatus* probably moves north in spring and south in autumn; in the west, at least some animals are believed to overwinter at lower latitudes. There may also be some inshore-offshore movements (Carwardine, 1995). […]

A southward migration, better known in the eastern North Atlantic, begins in July, when animals are moving south from the Norwegian Sea, and continues to September. The increase of strandings on the British coasts and on the North Sea coasts probably reflects part of this summer migration, which remains unknown in the northwest Atlantic. There is evidence from the distribution of catches that a northward migration occurs in the eastern North Atlantic in April-July (Reyes, 1991 and refs. therein). Bottlenose whales occur all year round in the Faroes, but with a distinct peak a fortnight around 1 September pointing at a very synchronized southernly migration route (Bloch et al. 1996).

This is further supported by MacLeod et al. (2004): Strandings of northern bottlenose whales on the coasts of the UK and the Republic of Ireland were lowest in April and highest in September. The number of strandings between months differed significantly from an even spread, with more strandings between July and October. Most strandings in late summer and autumn occurred on North Sea coasts and their stomach contents included the squid *Gonatus fabricii*, which is found only in more northern waters. This suggests that these whales may be migrating southward at this time of the year.

Evidence of migratory movements of beaked whales in the Northeast Atlantic was obtained from an examination of historical strandings data from the United Kingdom and the Republic of Ireland, and from whaling records from the Faroes, Iceland and the Norwegian Sea. There is strong evidence to suggest that beaked whales, particularly northern bottlenose whales, undertake regular migrations, moving south-west in late summer and autumn and moving north-east in late winter and spring (MacLeod and Reid, 2003).

6. Threats

Direct catch: Northern bottlenose whales have traditionally been the most heavily hunted of the beaked whales. Some hunting has been done by the British and by the Canadians, but by far the major bottlenose whaling nation was Norway: 65,800 were caught by Norway in the period 1882-1972 (Reeves et al. 1993, Bloch et al. 1996). They have also been hunted in a drive fishery in the Faroe Islands, with over 800 taken there (Bloch et al. 1996). Early on, they were hunted primarily for oil, but later mainly for animal feed. The northern bottlenose whale is said to have been twice overexploited by Norwegian hunting, in the periods 1880-1920 and 1938-1973. No hunting has been conducted by Norway since 1973 (Jefferson et al. 1993, Reyes, 1991). It was included in the IWC Schedule in 1977 and classified as a provisional Protected Stock with zero catch limits (Reyes, 1991).

Mitchell (1977) considers that the population was severely depleted in both the early and modern whaling periods. At present some are taken in the Faroe Islands, on average 2.2 whales per year in the period 1709-2002 (Reyes, 1991; NAMMCO, 1995). [...]

Incidental catch: None reported (Reyes, 1991).

Overfishing: There are no major fisheries for squid in the Northeast Atlantic, but future developments could represent some threat for a population which is still recovering from heavy losses due to whaling.

Pollution: [no information pertaining specifically to the ASCOBANS area] […]

Noise pollution: […] There seem to be two important areas for beaked whales on the Atlantic Frontier: The Shetland-Faroes Channel and an area to the south-west of the Faroes, including the northern end of the Rockall Trough. These areas are linked by a corridor of suitable beaked whale habitat approximately 80km long and 50km wide at its narrowest point. During movements between the two areas, this narrow corridor may form a bottleneck through which the beaked whales must pass. Noise pollution, which has the potential to impact a large area simultaneously, in this bottleneck area during migrations may have a disproportionately large impact on beaked whales on the Atlantic Frontier (MacLeod and Reid, 2003).

There are a number of exercise areas for submarine and other naval vessels in UK waters, particularly in the coastal waters of Scotland, including a sub-marine testing site in Gairlochhead, near Glasgow. A number of northern bottlenose whale strandings over the past few decades were clustered around this particular site. A torpedo testing range in the Sound of Raasay in Scotland is also adjacent to the site of an unusual occurrence in shallow waters (less than 10m) of two normally deep-water (i.e. >250m) northern bottlenose whales in 1998 (Parsons et al. 2007).

7. Remarks

Range States [in the ASCOBANS area:] Belgium; Denmark; France; Germany; Ireland; The Netherlands; Norway; Portugal; Spain; Sweden; United Kingdom [...] (mod. from Taylor et al. 2008)

H. ampullatus is categorised as "Data Deficient" by the IUCN (Taylor et al. 2008). It is listed in Appendix II of CMS as well as in Appendix I & II of CITES.

For the full species account of the report "Odontocetes: the toothed whales: Distribution, Behaviour, Migration and Threats" by Boris Culik (2010) please refer to http://www.cms.int/reports/small_cetaceans/data/H_ampullatus/h_ampullatus.htm.

Lagenorhynchus acutus

(Grey, 1828)

English: Atlantic white-sided dolphin
German: Weißseitendelphin
Spanish: Delfín de costados blancos
French: Dauphin à flancs blancs
[Russian: Атлантический или белобокий дельфин]

Family: Delphinidae

Lagenorhynchus acutus © Würtz-Artescienza

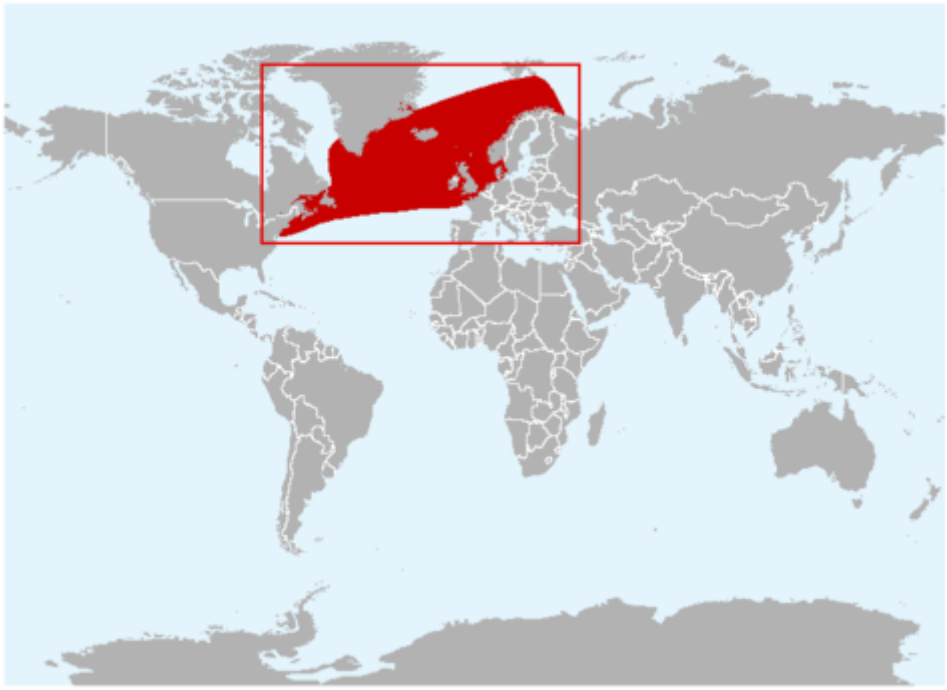
1. Description

Atlantic white-sided dolphins are robust and, with a maximum girth of up to 60% of total length. The tail stock is laterally compressed into vertical keels and the beak is short (Jefferson et al. 2008). These dolphins are impressively patterned and more colourful than most dolphins. Below the black or very dark grey back and dorsal fin a narrow, bright white patch on the side extends back from below the dorsal fin, overlaying a yellow blaze above a thin dark stripe running towards the flukes. The belly and lower jaw are white, and the sides of the body are light grey. A black eye ring extends in a thin line to the upper jaw and a very thin stripe extends backward from the eye ring to the external ear. A faint grey stripe may connect the leading edge of the flipper with the rear margin of the lower jaw. Male Atlantic white sided dolphins reach 270 cm and 230 kg, whereas adult females are about 20 cm shorter and 50 kg lighter (Cipriano, 2002).

2. Distribution

L. acutus is a deepwater species which ranges across the North Atlantic, from Cape Cod in the western North Atlantic to southern Greenland, across the Barents Sea to Svalbard and from there south to the North and Irish Seas as far south as Brittany (France) (Reeves et al. 1999; Cipriano, 2009). The species rarely enters the Baltic Sea (Kinze et al. 1997 and pers. obs.). It has been seen as far south as Strait of Gibraltar (Hammond et al., 2008).

Mikkelsen and Lund (1994) found no evidence of separate populations based on a study of metrical and non-metrical skull characters of 123 Atlantic white-sided dolphins from much of the species' range.



Distribution of *Lagenorhynchus acutus* (Hammond et al. 2008; © IUCN): cool, temperate and subarctic waters of the northern North Atlantic

3. Population size

Evans (1987, in Reeves et al. 1999) suggested a total population throughout the North Atlantic of tens of thousands to low hundreds of thousands, which is supported by Kaschner (2004). Compton et al. (2007) found that *L. acutus* was the second most commonly sighted species during a crossing of the North Atlantic covering waters between the UK, Iceland, Greenland and Canada. […]

In the Eastern North Atlantic, Weir et al. (2001) carried out surveys to the north and west of Scotland (UK) and found that Atlantic white-sided dolphins were the most abundant species in the region with a total of 6,317 animals recorded. However, based on data obtained during a shipboard survey conducted in 1998 within an area to the west of Scotland commonly known as the Atlantic Frontier, MacLeod (2004) estimated an uncorrected Atlantic white-sided dolphin abundance of 27,194 (CV = 0.29). After correction for g(0), the abundance was re-estimated as 21,371 (CV = 0.54) to the west of the Outer Hebrides and 74,626 (CV = 0.72) in the Faroe Shetland Channel.

The first SCANS (Small Cetacean Abundance in the North Sea), survey, conducted in summer 1994 yielded a *Lagenorhynchus* spp. abudance of 11,760 (95% CI 5900-18 500) (Hammond et al. 2002), while SCANS II yielded an abundance of only 1,860 (95% CI 611 - 5,661) for pooled common, striped, white-sided and white-beaked dolphins (Burt et al. 2006).

4. Biology and Behaviour

Habitat: *L acutus* seems to prefer areas with high seabed relief along the edge of the continental shelf (Carwardine, 1995). It is more pelagic than the white-beaked dolphin, occurring mainly along edges or seaward of continental shelves, over depths of 100-300 m. However, it sometimes does come onto the continental shelf and may enter fjords and inlets with depths of less than 50 m (Evans, 2009).

Along the Mid-Atlantic Ridge from Iceland to the Azores, white-sided dolphins tend to aggregate in areas of steep slopes, but actual bottom depth appears to be less important. Based on spatial correlations between dolphin occurrence and candidate prey organisms recorded acoustically and by midwater trawling, mesopelagic fishes and squids were assumed to be important prey items, with *Benthosema glaciale* probably being their most important prey (Doksaeter et al. 2008). Waring et al. (2008) sighted white-sided dolphins mainly in the cold (5-16°C) and less saline (34.8-36.7 PSU) water masses along the Reykjanes Ridge.

From the Sea Watch database, 75% of sightings in NW European seas were recorded at SSTs of 7-13°C (total range including outliers 6-17.5°C) (Anderwald, 2002). [...]

Behaviour: *L. acutus* an acrobatic and fast swimmer and frequently breaches (though not as often as white-beaked or common dolphins) and lobtails. It surfaces to breathe every 10 to 15 seconds, either leaping clear of the water or barely breaking the surface and creating a wave over its head. *L. acutus* is wary of ships in some areas (Palka and Hammond, 2001) but will swim alongside slower vessels and may bow-ride in front of faster ones. Sometimes it can be observed riding the bow-waves of large whales. Individual and mass strandings are relatively common (Carwardine, 1995; Jefferson et al. 1993). The species is presumably not a deep diver, as maximum recorded dive times were 4 min and most dive times were shorter than 1 min (Cipriano, 2009).

Schooling: Herds of up to several hundred are seen, and there is some age and sex segregation among these. Older immature individuals are not generally found in reproductive herds of mature females and young (Jefferson et al. 1993; Reeves et al. 1999). Gaskin (1992) hypothesized that Atlantic white-sided dolphins split into small groups for feeding and that such small groups merge into large aggregations "while migrating". Groups often associate and probably feed with fin whales (*Balaenoptera physalus*), humpback whales (*Megaptera novaeangliae*) and long-finned pilot whales (*Globicephala melas*). Mixed herds of Atlantic white-sided dolphins and white-beaked dolphins have been observed in the North Sea (Reeves et al. 1999, and refs. therein).

Reproduction: Females reach sexual maturity between 6 and12 years of age, males 7-11 years. Maximum recorded ages were 27 and 22 years, respectively (Cipriano, 2009). Parturition in the western North Atlantic usually takes place between May and August, with a peak in June and July, following an estimated 11-month gestation period. The timing of parturition is apparently similar in the eastern North Atlantic, where sightings have been interpreted to suggest "breeding areas" offshore in the North Sea and in the Atlantic to the north and west (Reeves et al. 1999 and refs. therein).

Food: Atlantic white-sided dolphins feed on small schooling fish and squid. These include herring (*Clupea harengus*), small mackerel (*Scomber scombrus*), silvery pout (*Gadiculus argenteus*), blue whiting (*Micromesistius poutassou*), American sand lance (*Ammodytes americanus*), smelt (*Osmerus mordax*), silver hake (*Merluccius bilinearis*) and short-finned squid (*Illex iilecebrosus*) (Jefferson et al. 1993; for details see Reeves et al. 1999). In the North Sea, oceanic cephalopods seem to be their main diet (Das et al. 2001). Different prey species may predominate at different times of year, representing seasonal movements of prey, or in different areas, indicating prey and habitat variability in the environment (Cipriano, 2002). [...] Atlantic white-sided dolphins apparently co-operate in their efforts to contain and attack schools of fish, a behaviour which is similar to that described for dusky dolphins off Argentina (Reeves et al. 1999 and refs. therein).

5. Migration

There may be inshore-offshore movements with the seasons in some areas (Carwardine, 1995). Selzer and Payne (1988) suggested that *L. acutus* moves south along the continental shelf edge in winter and spring, in association with the relatively cold, less saline Gulf of Maine water flowing southwards through Northeast Channel during these seasons. Seasonal variation in sea-surface temperature and salinity and local nutrient upwelling in areas of high sea floor relief may affect preferred prey abundances, which in turn may affect dolphin distribution. […]

Couperus (1997) investigated the occurrence of incidental cetacean catches in the Dutch pelagic trawl fishery. These are largely restricted to late winter early spring in an area along the continental slope southwest of Ireland. Available evidence indicates that annual variations are large. It seems that the Atlantic white-sided dolphin is normally a more oceanic species but will actively search for mackerel (*Scomber scombrus*) closer to shore in early spring. Fresh mackerel remains were found in the stomachs of nearly all white-sided dolphins taken as by-catch, whereas deep-water fish otoliths suggested that the dolphins had a completely different diet before moving to the southwest of Ireland.

6. Threats

Direct catch: Some hunting for this species occurred in the past, especially in Norway. Some are still taken in Greenland, the Faeroe Islands, and eastern Canada (Jefferson et al. 1993; Reeves et al. 1999 and refs. therein). There is still a substantial hunt in the Faroe Islands today, with 310 animals landed in 2005 and 617 in 2006. [...] (NAMMCO, 2006).

Incidental catch: Incidental mortality in fishing gear has been documented off Canada, the United States, the United Kingdom and Ireland. […]

Morizur et al. (1999) investigated marine mammal by-catch in 11 pelagic trawl fisheries operated by four different countries in the Northeast Atlantic. One of the main marine mammal species identified in by-catches was *L. acutus*. Mean dolphin catch rate for all fisheries combined was 0.048 per tow (one dolphin per 20.7 tows), or 0.0185 per hour of towing (one dolphin per 98h of towing). All dolphin by-catches occurred during the night. White-sided dolphins were observed feeding around the net during towing, and this behavior may make them more vulnerable to capture. Substantial numbers have also been by-caught in pelagic trawl fisheries for horse mackerel and mackerel southwest of Ireland (Reeves et al. 1999 and refs. therein).

Pollution: A juvenile dolphin from the northwest coast of Ireland was found to have a relatively high concentration of mercury in its liver (44 ng per g wet weight) (Reeves et al. 1999 and refs. therein). [...]

Hexabromocyclododecane (HBCD), a brominated flame retardant used primarily in expanded polystyrene foams and other styrene resins, was found in blubber and liver samples of Atlantic white-sided dolphins stranded on the eastern coast of United States between 1993 and 2004. However, concentrations were lower than in cetaceans from Western Europe (Kucklick et al. 2008), which is not really reassuring.

7. Remarks

Range states [in the ASCOBANS area]: Belgium; Denmark; France; Ireland; Netherlands; Norway; Sweden; United Kingdom [...] (Hammond et al. 2008).

The North and Baltic Sea populations are listed in Appendix II of CMS, but inclusion of the NW Atlantic stock in CMS Appendix II is recommended on the basis of observed migrational behaviour: Atlantic white-sided dolphins seem to be migratory in North America, where range states are the USA, Canada and France (St. Pierre et Miquelon).

IUCN Status: "Least Concern" (Hammond et al. 2008).

The species is listed in appendix II of CITES.

For the full species account of the report "Odontocetes: the toothed whales: Distribution, Behaviour, Migration and Threats" by Boris Culik (2010) please refer to http://www.cms.int/reports/small_cetaceans/data/l_acutus/l_acutus.htm.

Lagenorhynchus albirostris

(Gray, 1846)

English: White-beaked dolphin
German: Weißschnauzendelphin
Spanish: Delfín de pico blanco
French: Dauphin à bec blanc
[Russian: Беломордый дельфин]

Family Delphinidae

Lagenorhynchus albirostris © Würtz-Artescienza (see "links")

1. Description

The white-beaked dolphin has a robust appearance. The dorsal fin is in the middle of the back, erect and strongly curved. Adults grow between to 2.4 and 2.1m long and may weigh between 180 and 350 kg. Males usually grow larger than females. The coloration is typically black on the back, with a white saddle behind the dorsal fin and whitish bands on the flanks that vary in intensity from a shining white to ashy grey. Belly and beak are normally white, but the beak may be ashy grey or even darker; it may appear that a white beak is missing. The beak is only 5-8 cm long (Kinze, 2009).

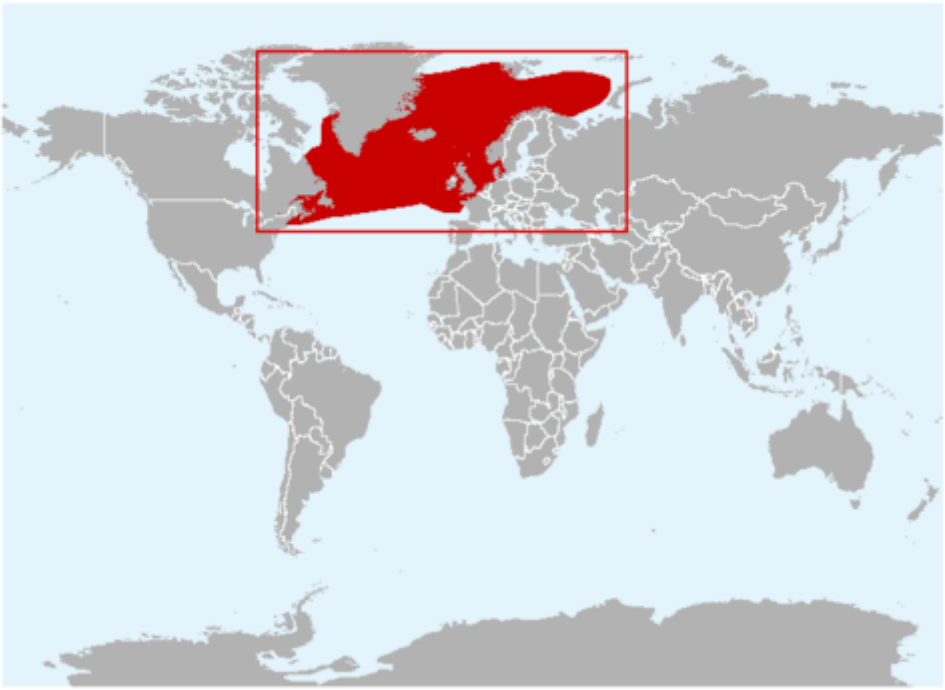
Populations in the eastern and western North Atlantic are separable on the basis of skull characters (Mikkelsen and Lund, 1994) as well as on the basis of the control region of the mtDNA and microsatellites (Banguera-Hinestroza et al., 2009 submitted). Based on these and other data, four distinct management units have recently been suggested: western North Atlantic, Iceland, Northern Norway and British Isles and North Sea (Evans and Teilmann, 2009).

2. Distribution

This is the most northerly member of the genus *Lagenorhynchus* and has a wide distribution. Animals in the northernmost part of the range occur right up to the edge of the pack-ice (Carwardine, 1995). The species is found in the immediate offshore waters of the North Atlantic, […]; off the European coast from Nordkapp in Norway south through the North Sea to the British Isles, Belgium, the Netherlands and Denmark. L. albirostris is vagrant to France, the north coast of Spain, the Strait of Gibraltar, and the Mediterranean Sea (Rice,

1998). It is only seen occasionally in inner Danish waters (Reeves et al. 1999) and the Baltic proper (Kinze, 2002).

Kinze (2009) identified four principal centres of high densities […] [one of them being] the waters around Scotland including the northern Irish Sea and the North Sea.



Distribution of *Lagenorhynchus albirostris* (Hammond et al. 2008; © IUCN): cool temperate and subarctic waters of the North Atlantic

The main concentrations around the British Isles are off northern Scotland (including the Outer and Inner Hebrides, Orkney and Shetland islands) and along portions of the Atlantic coast of Ireland. It is common in the northern and central North Sea and in the Kattegat and Skagerrak between Jutland (Denmark), Norway and Sweden. It is the most common delphinid stranded and sighted in Dutch waters and is common around the Faroe Islands. (Reeves et al. 1999; Kinze et al. 1997).

3. Population size

[…] It seems that at least a few thousand white-beaked dolphins inhabit Icelandic waters and up to 100,000 the north-eastern Atlantic including the Barents Sea, the eastern part of the Norwegian Sea and the North Sea north of 56°N. The total number of white-beaked dolphins throughout the North Atlantic thus may be in the high tens or low hundreds of thousands (Reeves et al. 1999 and refs. therein).

The most recent total abundance estimate for European Atlantic continental shelf waters was 22,665 (CV = 0.42) in 2005 (Hammond and Macleod 2006). The highest densities occurred in the waters of western Scotland. Numbers in the North Sea and adjacent waters, with a population of 10,562 (CV=0.29) and no statistical difference from previous estimates of 7,856 (CV = 0.30) obtained in the 1994 SCANS survey (Hammond et al. 2002).

However, when evaluating genetic variation in the species using a fragment of the control region of the mtDNA, Banguera-Hinestroza et al. (2009, submitted) found that it was extremely low (p =0.0056 ± 0.0004), comparable only to values reported in cetacean populations with historically small population sizes or which had been strongly affected by human activities. Among the populations that were analysed, the highest variability was found in the population from the western North Atlantic (Canada) and the lowest in eastern North Atlantic populations.

4. Biology and Behaviour

Habitat: This species is found mostly in continental shelf waters of depths between 50 m and 100m and rarely out to the 200-m isobath (Northridge et al. 1997). Distribution has been linked to sea-surface temperature, local primary productivity and prey abundance (Weir et al., 2007). Along the Aberdeenshire (UK) coast, most sightings were over depths of 20-30 m (Canning et al. 2005).

Behaviour: *L. albirostris* may bow-ride, especially in front of large, fast-moving vessels, but usually it loses interest quickly. Sometimes they are acrobatic (especially when feeding) and when breaching they normally fall onto the side or back. They are typically fast, powerful swimmers (Carwardine, 1995).

Reproduction: Females reach sexual maturity at 8.7 years. The mating season is in July and August, and the gestation period lasts about 11 months. Maximum recorded age was 37 years (Kinze, 2009).

Food: In all areas where stomach contents have been examined, clupeids (e.g. herring), gadids, e.g. Atlantic cod (*Gadus morhua*), haddock (*Melanogrammus aeglefinus*), poor-cod (*Trisopterus minutus, T. luscus*), whiting (*Merlangius merlangus*), capelin (*Mallotus villosus*) and hake (*Merluccius merluccius*) have been found to be the principal prey of white-beaked dolphins. Others consumed include Scomber, Pleuronectes, Limanda, Eleginus and Hyperoplus as well as squid, octopus and benthic crustaceans (Reeves et al. 1999 and refs. therein).

Schooling: Along the Aberdeenshire (UK) coast, average group size was 4.6, rising to 5.9 when calves were present (Caning et al. 2005). Generally, groups of less than 50 are most common, but herds of many hundreds have been seen. While feeding they sometimes associate with large whales such as fin and humpback whales but also with herds of pilot whales, sei whales, killer whales, bottlenose dolphins, white-sided dolphins and common dolphins (Jefferson et al. 1993; Reeves et al. 1999 and refs. therein). In contrast to the Atlantic white-sided dolphin, which sometimes mass strands, the white-beaked dolphin usually strands singly or in small groups. Co-operative feeding has been described. Dolphins herd the fish into a tight cluster and trap them against the surface (Reeves et al. 1999 and refs. therein).

5. Migration

[...] Northridge et al. (1997) concluded that white-beaked dolphins around the British Isles have a fairly consistent distribution throughout the year, although during spring they appear to aggregate around two areas of concentration to the north of Scotland and off the Yorkshire coast. At a coastal North Sea study area in Aberdeenshire, Scotland, a peak in occurrence was found during August (Weir et al. 2007).

Migration over longer distances is poorly known. However, photo-ID pilot studies conducted in the Skagerrak and Northern North Sea established matches between these areas and the Scottish coast (Kinze, 2009).

6. Threats

Direct catch: There is a history of hunting for white-beaked dolphins in Norway, the Faeroe Islands, Greenland, and Labrador. […]

Incidental catch: White-beaked dolphins have been taken in fishing gear in many areas, and at least the Newfoundland/Labrador by-catch is substantially under-reported in published accounts (Reeves et al. 1999). However, incidental catches are not thought to be high enough to represent a threat to this species (Jefferson et al. 1993). De Haan et al. (1998) outlined possible mitigation measures for the pelagic trawl fishery.

Pollution: Like other North Atlantic marine mammals, white-beaked dolphins are contaminated by organochlorines, other anthropogenic compounds and heavy metals (Reeves et al. 1999 and refs. therein). Siebert et al. (1999) reported concentrations of total mercury and methylmercury in muscle, kidney and liver samples of three white-beaked dolphins, stranded or by-caught from the German waters of the North and Baltic Seas.

Noise pollution: Nachtigall et al. (2008) showed that high frequency hearing in white-beaked dolphins is the most sensitive of any known dolphin and as sensitive as in the harbour porpoise. Stone and Tasker (2006) demonstrated that cetaceans can be disturbed by airguns used in seismic exploration. Small odontocetes showed the strongest lateral spatial avoidance (extending at least as far as the limit of visual observation) in response to active airguns. Responses to active airguns were greater during those seismic surveys with large volume airgun arrays than those with smaller volumes of airguns.

7. Remarks

Range states [in the ASCOBANS area] Belgium; Denmark; France; Germany; Ireland; Netherlands; Norway; Sweden; United Kingdom [...] (Hammond et al. 2008).

The North and Baltic Sea populations are listed in Appendix II of CMS. However, white-beaked dolphin abundance seems also to vary throughout the year off north-eastern North America, suggesting possible seasonal migrations. Therefore this stock (Range states US and Canada) should also be included in CMS App. II.

IUCN Status: "Least Concern" (Hammond et al. 2008). The species is listed in Appendix II of CITES

According to JNCC (2007) the species is expected to survive and prosper. However, studies of genetic variability of white-beaked dolphins show that its populations are highly vulnerable; the extremely low nucleotide diversity is probably due to a reduction in population sizes in the past, combined with the restricted habitat of this species to coastal areas highly affected by human activities (for example pollution and/or fisheries). It should be a priority to study and protect populations of *L. albirostris* on both sides of the North Atlantic (Evans and Teilmann, 2009).

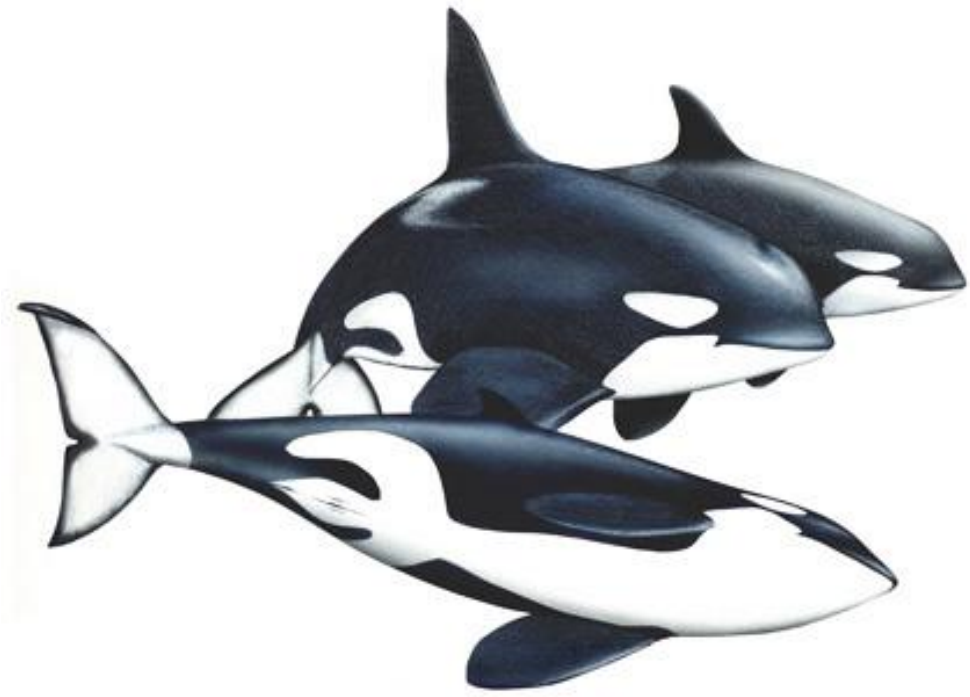
For the full species account of the report "Odontocetes: the toothed whales: Distribution, Behaviour, Migration and Threats" by Boris Culik (2010) please refer to http://www.cms.int/reports/small_cetaceans/data/l_albirostris/l_albirostris.htm.

Orcinus orca

(Linnaeus, 1758)

English: Killer whale
German: Schwertwal
Spanish: Orca
French: Orque
[Russian: Косатка]

Family: Delphinidae



Orcinus orca ©Wurtz-Artescienza

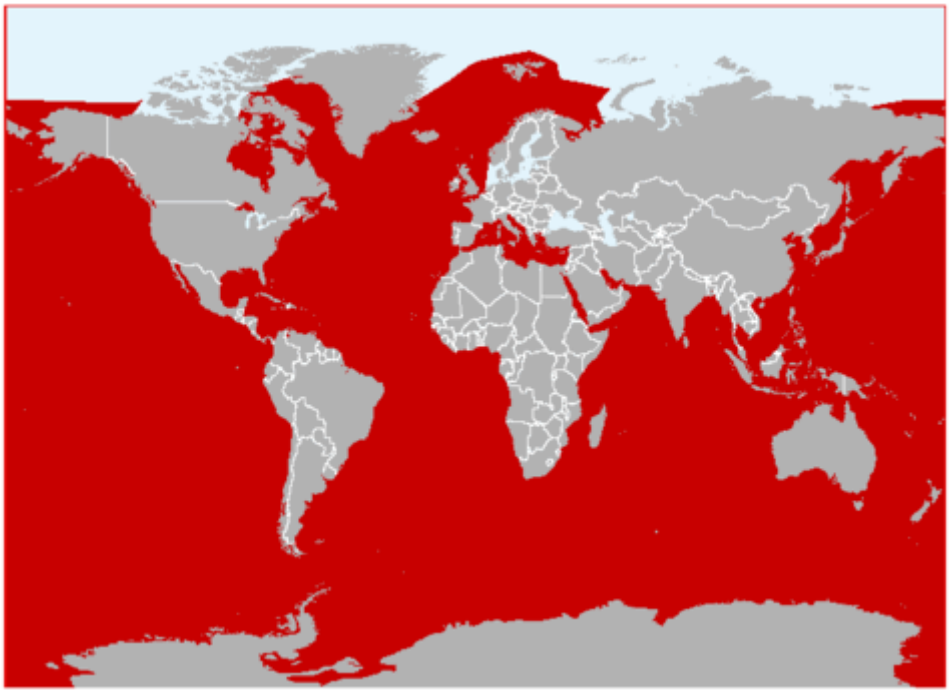
1. Description

The killer whale is the largest member of the dolphin family. Maximum body lengths are 9 m in males and 7.7 m in females. Males reach 6,600 kg, whereas female maximum weight is 4,700 kg (Ford, 2009). Killer whales are recognized by their distinctive black, white and grey coloration and a white eye patch, or spot, located just above and behind the eye. Just behind the dorsal fin there is a grey saddle patch. The whale's belly, lower jaw and the underside of the tail flukes are white. The rest of the body is black. The wide, tall dorsal fin is curved backwards in females and juveniles and upright and triangular in adult males. The head is rounded, with a barely distinguishable beak. The pectoral flippers are paddle-shaped. In addition to sexual size dimorphism, male appendages, especially the dorsal fin, are disproportionately larger than in females. [...]

2. Distribution

This is probably the most cosmopolitan of all cetaceans and can be seen in literally any marine region. *O.orca* occurs throughout all oceans and contiguous seas, from equatorial regions to the polar pack-ice zones, and may even ascend rivers. However, it is most

numerous in coastal waters and cooler regions where productivity is high (Jefferson et al. 1993; Dahlheim and Heining, 1999 and refs. therein). […]



Distribution of *Orcinus orca* (map mod. from Taylor et al. 2008; © IUCN):
found in all regions of the world

3. Population size

Although the available data are far from complete, abundance estimates for the areas that have been sampled provide a minimum worldwide abundance estimate of about 50,000 killer whales (Taylor et al. 2008). […]

In the North Atlantic, questionnaire surveys yielded 483-1,507 killer whales for Norwegian coastal waters (Dahlheim and Heining, 1999 and refs. therein). Sightings in the eastern North Atlantic gave rough estimates of around 3,100 killer whales for the area comprising the Norwegian and Barents Seas and Norwegian coastal waters and some 6,600 whales for Icelandic and Faroese waters (Reyes, 1991 and refs. therein). […]

4. Biology and Behaviour

Habitat: Sightings range from the surf zone to the open sea, though usually within 800km of the shoreline. Large concentrations are sometimes found over the continental shelf. Generally, killer whales prefer deep water, but they can also be found in shallow bays, inland seas, and estuaries (but rarely in rivers). They readily enter areas of floe ice in search of prey (Carwardine, 1995). [...] In the southwestern Atlantic Ocean, the majority of sightings per unit of effort occurred between 35° and 37° S, over depths of 200-3000 m. The presence of killer whales there coincides mainly with surface temperature fronts (Passadore et al. 2007).

Reproduction: […] In the Northeast Atlantic, [...] [calving] occurs from late autumn to mid-winter (Jefferson et al. 1993). Gestation lasts 15 to 18 months and is first observed in females 12-14 years old. Intervals between calves average 5 years, and the reproductive life span is around 25 years long. Mean life expectancy is 50 years and longevity up to 90 years (Ford, 2009).

Schooling: [no information pertaining specifically to the ASCOBANS area]

Pods of resident killer whales in British Columbia and Washington represent one of the most stable societies known among non-human mammals; individuals stay in their natal pod throughout life. Differences in dialects among sympatric communities appear to help maintain community discreteness. Most pods contain 1 up to 55 whales; resident pods tend to be larger than those of transients (Jefferson et al. 1993). Social organization can be classified into communities, pods, subpods, and matrilineal groups: a community is composed of individuals that share a common range and are associated with one another; a pod is a group of individuals within a community that travel together the majority of time; a subpod is a group of individuals that temporarily fragments from its pod to travel separately; and a matrilineal group consists of individuals within a subpod that travel in very close proximity. Matrilineal groups are the basic unit of social organization, and consist of whales from 2-3 generations. Membership at each group level is typically stable for resident whales, except for births and deaths (Dahlheim and Heining, 1999 and refs. therein).

Social organisation of mammal-eating transients is less well understood. Although the basic socal unit is the matriline, offspring often disperse for extended periods or permanently, and the transient matrilines are smaller than those of residents. Transient group size is often only one, reflecting the hunting specialisation of these killer whales (Ford, 2009). Baird and Dill (1996) summarize that the typical size of transient killer whale groups is consistent with the maximisation-of-energy-intake hypothesis. Larger groups may form for the occasional hunting of prey other than harbour seals, for which the optimal foraging group size is probably larger than three, and for the protection of calves and other social functions.

Food: […] In the waters between northern Scotland and Norway, killer whales are frequently observed in the vicinity of the Scottish pelagic fleet targeting mackerel (*Scomber scombrus*) and herring. They approach the vessels during retrieval of the net, and remain there until this is completed. There is no evidence that killer whales ever become entangled in the nets (Luque et al. 2006). Killer whales are known to follow fish-processing vessels for many miles, feeding on discarded fish. In the Bering Sea, the same pod of whales was reported to follow a vessel for 31 days for approximately 1,600 km (Dahlheim and Heyning, 1999 and refs. therein). […]

5. Migration

[…] In most geographical regions, killer whale movements may be related to movements of their prey. Orcas may travel 125-200 km per day while foraging (Dahlheim and Heyning, 1999 and refs. therein; Guerrero-Ruiz et al. 1998).

In the Beaufort, Chukchi and northern Bering Seas, killer whales move south with the advancing pack ice, performing long-range movements. Similar movements are reported for the western North Atlantic (Reyes, 1991 and refs. therein). [...]

6. Threats

Direct catch: Killer whales have been exploited at low levels in several regions worldwide (Jefferson et al. 1993). Norwegian whalers in the eastern North Atlantic took an average of 56 whales per year from 1938 to 1981. […]

Because individuals play various roles in maintaining social integrity of mammalian populations, not all individuals are equal, and historic live-captures are likely to have broken matriline networks into isolated groups (Williams and Lusseau, 2006). […]

Incidental catch: [no information pertaining specifically to the ASCOBANS area]

Incidental takes during fishing operations occur but are considered rare (Dahlheim and Heyning, 1999 and refs. therein). […]

Killing: [no information pertaining specifically to the ASCOBANS area]

Fishermen in many areas see killer whales as competitors, and shooting of whales is known to occur. This problem has been especially serious in Alaska, where conflicts with longline fisheries occur (Jefferson et al. 1993). Although much reduced, some such persecution continues today in Alaska and in the Strait of Gibraltar (Ford, 2009).

Pollution: [no information pertaining specifically to the ASCOBANS area]

[…] Killer whales in northern Norway are among the most polluted arctic animals. Average total polychlorinated biphenyl (PCB) and pesticide levels were similar; approximately 25 µg/g lipid, and polybrominated diphenyl ethers (PBDEs) were approximately 0.5 µg/g, exceeding the already very high levels in polar bears. The levels in Norwegian killer whales are more than 20 times higher than those found in beluga whales (*Delphinapterus leucas*) (Wolkers et al. 2007).

Noise pollution: Killer whales use sound for echolocation, social communication, and passive listening. Anthropogenic noise including sonar, acoustic harassment devices, vessel traffic, and construction noise has the potential to interfere with bioacoustics. […]

From a sound propagation and impact model, Erbe (2002) deduced that fast boats are audible to killer whales for over 16km, mask killer whale calls over 14 km, elicit a behavioral response over 200m, and cause a temporary threshold shift (TTS) in hearing of 5 dB after 30-50 min within 450m. For boats cruising at slow speeds, the predicted ranges were 1km for audibility and masking, 50m for behavioral responses, and 20 m for TTS. Superposed noise levels of a number of boats circulating around or following the whales were close to the critical level assumed to cause a permanent hearing loss over prolonged exposure. From a study on the effects of acoustic harassment devices, Morton and Symonds (2002) deduced that whale displacement resulted from the deliberate introduction of noise into their environment. […]

Habitat degradation: [no information pertaining specifically to the ASCOBANS area]

Habitat disturbance may be a matter for concern in areas inhabited by killer whales and supporting whale-watching industries (Reyes, 1991). Visser (1999) e.g. reports on propeller scars observed on killer whales and their possible cause of mortality. Vessel traffic may have contributed to southern resident killer whales becoming endangered. Lusseau et al. (2008) observed a reduction in time spent foraging, confirming an effect also previously observed in northern resident killer whales. Each school was within 400 m of a vessel most of the time during daylight hours from May through September. If reduced foraging effort results in reduced prey capture, this would result in decreased energy acquisition and biological fitness (Lusseau et al. 2008).

After the 1989 'Exxon Valdez' oil spill in Alaska, the resident AB Pod and the transient AT1 group suffered losses of 33 and 41%, respectively, in the year following the spill. By 2005, AB Pod had not recovered to pre-spill numbers. Moreover, its rate of increase was significantly less than that of other resident pods that did not decline at the time of the spill. The AT1 Group, which lost 9 members following the spill, continued to decline and is now listed as depleted under the U.S. Marine Mammal Protection Act (Matkin et al. 2008).

Overfishing: Some populations of killer whales could be affected by reduction of their food supply. For example, coastal Norwegian populations reportedly feed mainly upon herring, a fish heavily exploited in the area (Reyes, 1991 and refs. therein). […]

7. Remarks

Range states [in the ASCOBANS Area]: Denmark, France; Ireland; Netherlands; Norway; Portugal; Spain; United Kingdom (Taylor et al. 2008).

Orcinus orca is listed in Appendix II of CITES and in Appendix II of CMS. The species is categorised as "Data Deficient" by the IUCN. Some regional populations are small or highly specialised and may be threatened by habitat deterioration. This is the case in the critically threatened small Strait of Gibraltar population, which suffers declines in numbers and prey availability; as well as in the southern resident community of Washington and British Columbia, which is listed as Endangered under the US Endangered Species Act and the Canadia Species at Risk Act (Ford, 2009).

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Phocoena phocoena

(Linnaeus, 1758)

English: Harbour porpoise
German: Schweinswal
Spanish: Marsopa comú́n
French: Marsouin commun
[Russian: Обыкновенная морская свинья]

Family: Phocoenidae

Phocoena phocoena © Wurtz-Artescienza

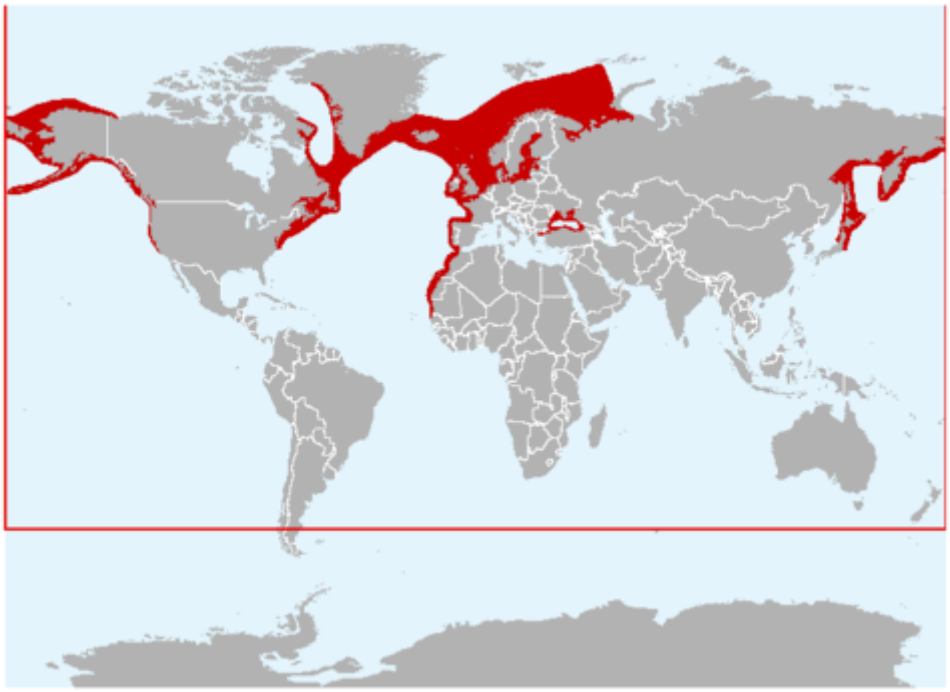
1. Description

Harbour porpoises have a short, stocky body resulting in a rotund shape, which enables them to limit heat loss in cold northern climes. Adult females reach a mean body length of 160cm and males only 145cm. Mean mass is 60 kg and 50 kg, respectively (Bjorge and Tolley, 2009). […]

The dorsal side is dark grey, while the belly is a contrasting light grey to white, which sweeps up to the midflanks in a mottled pattern. There is a dark stripe from the mouth to the flippers. The small triangular dorsal fin and the characteristic swimming pattern of several short, rapid surfacings followed by an extended dive of several minutes are characteristic for this species. Whereas early morphological studies suggested a close relationship of the harbour porpoise with *P. sinus* and *P. spinipinnis*, recent genetic information suggests that the closest relative of the harbour porpoise is in fact Dall's porpoise, *Phocoenoides dalli* (Bjorge and Tolley, 2009). There is molecular and morphological evidence of frequent hybridization between free-ranging Dall's and harbour porpoises (Willis et al. 2004).

2. Distribution

Harbour porpoises are found in cool temperate and subpolar waters of the Northern Hemisphere (Jefferson et al. 1993). Significant differences in the skulls of P. phocoena from the North Atlantic, the western North Pacific, and the eastern North Pacific have been found and two subspecies are recognised, one in the Atlantic and one in the Pacific. However, western Pacific animals differ sufficiently from those in the eastern Pacific to warrant sub-specific separation, although no species-group name has been based on a western Pacific specimen (Rice, 1998 and refs. therein).



Distribution of the four subspecies of *Phocoena phocoena* (Hammond et al. 2008a; IUCN): cold temperate and subarctic waters of the Northern Hemisphere.

[…] In the eastern Atlantic, its range includes the coasts around Iceland; the Faroes; and the coasts of Europe from Mys Kanin and the White Sea in northern Russia, west and south as far as Cabo de Espichel, Portugal (38°24'N), including parts of the Baltic Sea and the British Isles. […] In the Gulf of Bothnia and the Gulf of Finland, both in the Baltic Sea, the species is no longer observed (Koschinski, 2002). […]

Genetic analysis shows that movements of harbour porpoises across the Atlantic appear to occur at a low level (Rosel et al. 1999) and harbour porpoises from West Greenland, the Norwegian West coast, Ireland, the British North Sea, the Danish North Sea and the inland waters of Denmark (IDW) are all genetically distinguishable from each other (Andersen et al. 2001). In a more recent review, Evans et al (2009) suggest subdivision of the North Atlantic into the following stocks or subpopulations: 1) Gulf of Maine & Bay of Fundy; 2) Gulf of St Lawrence; 3) Newfoundland; 4) West Greenland; 5) Iceland; 6) Faroe Islands; 7) Northwest/Centralwest Norway & Barents Sea; 8) Northeastern North Sea & Skagerrak; 9) Southwestern North Sea & Eastern Channel; 10) Inner Danish Waters; 11) Baltic Sea; 12) Celtic Sea (plus South-west Ireland, Irish Sea & Western Channel); 13) North-west Ireland & West Scotland; 14) Bay of Biscay (West France); 15) IBNA (NW Spain, Portugal & NW Africa).

3. Population size

There are no synoptic surveys covering the entire range within ocean basins, but abundance has been estimated for selected portions of the range. Taken together, these numbers indicate that the global abundance of the harbour porpoise is at least about 700,000 individuals (Hammond et al. 2008).

Note that all abundance estimates have to be taken with a grain of salt: According to Read (1999) there was an 80% discrepancy between abundance estimates for the Gulf of Maine in 1991 and 1992 (37,500 as opposed to 67,500, respectively). Similarly, aerial surveys conducted in 1995 and 1996 in the German North Sea revealed a mean abundance of 4,288 in 1995 and 7,356 harbour porpoises in 1996 (Siebert et al. 2006). In the south-western

Baltic Sea, abundance estimates varied between 457 (CV 0.97, March 2003) and 1,726 (CV=0.39, June 2003) (Scheidat et al. 2008).

The factors responsible for this variation may be related to migratory behaviour in response to changes in water temperature or prey availability on a regional scale, but are not fully understood. Methodology also plays a role: Carretta et al. (2001) estimated the abundance of harbour porpoises in northern California at 5,686 from a November 1995 ship survey. However, this abundance estimate was significantly different from an aerial survey estimate obtained 1 to 2 months earlier in the same region, where abundance was estimated at 13,145. A possible explanation was insufficient transect effort during the ship survey, or underestimates of the fraction of porpoise groups missed on the trackline due to large swells. […]

Atlantic Ocean: […] A survey conducted in the eastern North Atlantic in July 2005 (SCANS II), covering continental shelf seas from SW Norway, south to Atlantic Portugal, gave an estimate of 385,600 (CV = 0.20) (Hammond et al., 2008), with regional estimates: North Sea (c. 231,000), Baltic (23,000 in Kattegat/Skagerrak/Belt Seas/Western Baltic Sea), Channel (40,900), and Celtic Shelf (58,400). From line transect surveys in July 1994 (Hammond et al., 2002), with a somewhat different coverage, population was estimated at 341,000 porpoises (CV=0.14; 95% CI: 260,000-449,000): North Sea (c. 250,000), Baltic region (36,600 in Kattegat/Skagerrak/Belt Seas/Western Baltic Sea), Channel (0), and Celtic Shelf (36,300). Comparing the two surveys, although the overall number estimated for the North Sea, Channel and Celtic Sea was comparable (341,000 in 1994, and 335,000 in 2005), numbers in the northern North Sea and Danish waters had declined from 239,000 to 120,000, whereas in the central and southern North Sea, Channel and Celtic Shelf, they had increased from 102,000 to 215,000. This is thought to represent a southwards range shift rather than actual changes in population size (Winship, 2009), at least for the month of July. This is consistent with recent studies using stranding data and observations from seabird surveys indicating a comeback of the species along the Dutch and Belgian coast (Laczny and Piper, 2006; Haelters and Camphuysen, 2009).

Baltic Sea: In the Skagerrak / Kattegat region between the Baltic and the North Seas, 36,046 (CV = 0,34); 5,262 (CV = 0,25) were estimated (Hammond et al. 2002). Teilmann et al. (2003) used satellite transmitters on animals in Skagerrak/North Sea and in Inner Danish Waters. Throughout the year there was no overlap in the home range of adult porpoises tagged in the two areas, respectively. The authors suggest a population boundary in the northern Kattegat across the Danish island of Læsø. This population structure is confirmed by genetic studies of all ages during the summer season (Teilmann et al., 2003; 2008).

Harbour porpoises were also once numerous in the Baltic Sea south and east of the Belt region but today the population is estimated in the low thousands. Scheidat et al. (2008) give combined estimates for the German EEZ south in Kiel Bight, Mecklenburg Bight and the German waters of the Baltic proper ranging between 457 (March 2003; CV = 0.97) and 4610 (May 2005; CV = 0.35). The abundance in Kiel Bight was estimated at 588 (CV= 0,48) from 1994 data, with a density of 0.101 ind/km² (Hammond et al. 2002), of which about 50% or 300 would likely be mature (Taylor et al. 2007). Recent density estimates are somewhat higher, with 0.13 ind/km² in July 2004 (Scheidat et al. 2008).

Between Kiel and Mecklenburg Bights the relative abundance of porpoises decreases continuously (Gillespie et al. 2003), from 16.2 acoustic detections/100-km in the northern Kiel Bight, 9.2/100km in the southern Kiel Bight, and 2.8/100km in the Mecklenburg Bight to only 0.1/100km in the Baltic proper. During visual surveys, porpoises were only sighted in Kiel Bight. These results are consistent with Scheidat et al. (2008) who found similar densities in Kiel Bight: 0.13 ind/km² (95% CI = 0.02 - 0.38) and Mecklenburg Bight: 0.178 ind/km² (95% CI = 0.007 - 0.41) in July 2004, but only 0.008 ind/km² (95% CI = 0-0.03) in the Pomeranian Bight further east. The latter confirms earlier estimates of 599 individuals for an area around the Island of Bornholm determined in 1995 by L. Hiby and P. Lovell (pers. comm. to Scheidat

et al. 2008), corresponding also to a density of roughly 0.09 ind/km². A survey of Polish coastal waters conducted in 2001 using the same acoustic equipment, which found 0.05 detections/100km (Gillespie et al. 2003).

Kilian et al. (2003) support these findings using autonomous click detectors (PODs): Around the island of Fehmarn, harbour porpoise click trains were recorded almost every day, whereas along the east coast of the island of Rügen, only few porpoise encounters were collected. Nevertheless, for most areas investigated, porpoises were present regularly. Verfuss et al. (2007) also noted a significant decrease from west to east in the percentage of days with POD porpoise detections. There were more days of porpoise detections in summer than in winter, suggesting that the German Baltic Sea is an important breeding and mating area for these animals. Scheidat et al. (2003) report that on the Oderbank east of Rügen, Baltic harbour porpoise concentrations between May and August 2002 were very high with 0.086 animals per km aerial transect, as opposed to 0.014 and 0.024 in nearby Mecklenburg and Kiel Bights, respectively. The reason for this high density in the area of the Oderbank could be foraging behaviour (S. Koschinski, 2010, pers. comm.). […]

4. Biology and Behaviour

Habitat: Throughout its range, *P. phocoena* is limited to the waters of the continental shelf by its demersal foraging behaviour and diving capacity (see below). [...] Harbour porpoises are seldom found in waters with an annual average temperature above 17°C, preferring cool waters, where aggregations of prey are concentrated (Read, 1999 and refs. therein).

In the Horns Reef area, eastern North Sea, small-scale changes in local currents reflecting upwelling driven by the interaction of the semi- diurnal tidal currents with the steep slopes of the bank are the main habitat driver of harbour porpoises. The distribution of harbour porpoises alternates between 2 upwelling cells less than 10 km large, depending on the direction of tidal currents (Skov and Thomsen, 2008). Similarly, at Morte Point in North Devon, UK porpoises are found to aggregate in an area of high tidal flow, where prey items are likely to be abundant (Goodwin, 2008). [...]

Behaviour: The harbour porpoise is difficult to observe. It shows little of itself at the surface, so a brief glimpse is the most common sighting. On calm days it may be possible to approach a basking animal, but it is generally wary of boats and rarely bow-rides. It can sometimes be detected by the blow, which, although rarely seen, makes a sharp, puffing sound rather like a sneeze (Carwardine, 1995). Observations from cliffs above calm fjords yield the best results (Culik et al. 2001).

Schooling: Most harbour porpoise groups are small, consisting of fewer than 8 individuals (pers. obs.). They do, at times, aggregate into large, loose groups of 50 to several hundred animals, mostly for feeding or migration (Jefferson et al. 1993). Harbour porpoises are not generally found in close association with other species of cetaceans and instead are observed to avoid bottlenose dolphins (*Tursiops truncatus*) due to aggressive and lethal interactions (Read, 1999).

Reproduction: Most calves are born from spring through mid-summer (Jefferson et al. 1993). The majority of female harbour porpoises in Denmark and the Bay of Fundy become pregnant each year and are simultaneously lactating and pregnant for much of their adult lives. In contrast, female porpoises in California do not appear to reproduce each year (Read, 1999 and refs. therein). In Aberdeenshire, North Sea, Scotland most porpoise calves and juveniles were recorded between June and September, when 35% of harbour porpoise groups contained immature animals. The proportion of calves amongst porpoise sightings was higher during June than any other month (Weir et al. 2007). Sexual maturity is reached at the age of 3 years and gestation lasts approximately 10.5 months. The life span is on average 8 to 10 years, the oldest documented individual was 23 years old (Bjorge and Tolley, 2009).

Food: Harbour porpoises eat a wide variety of fish and cephalopods, and the main prey items appear to vary on regional and seasonal scales (Jefferson et al. 1993). In the North Atlantic, harbour porpoises feed primarily on clupeoids and gadoids […]. Squids and benthic invertebrates have also been recorded, the latter considered as secondarily introduced (Reyes, 1991 and refs. therein). Individual prey are generally less than 40cm in length and typically range from 10cm to 30cm in length (Read, 1999).

Many prey items are probably taken on, or very close to, the sea bed. Even though a wide range of species has been recorded in the diet, porpoises in any one area tend to feed primarily on two to four main species (e.g. whiting *Merlangius merlangus* and sandeels (Ammodytidae) in Scottish waters). The literature on porpoise diets in the northeast Atlantic suggests that there has been a long-term shift from predation on clupeid fish (mainly herring Clupea harengus) to predation on sandeels and gadoid fish, possibly related to the decline in herring stocks since the mid-1960s. Evidence from studies on seals suggests that such a shift could have adverse health consequences. Food consumption brings porpoises into contact with two important threats - persistent organic contaminants and fishing nets, both of which have potentially serious impacts (Santos et al. 2003; Santos et al. 2004).

In the Kattegat and Skagerrak stomach contents of juvenile and adult harbour porpoises contained mostly Atlantic herring (*Clupea harengus*) while Atlantic hagfish (*Myxine glutinosa*) was also important for adults (Boerjesson et al., 2003). In another study on animals stranded and by-caught in Denmark, cod (Gadidae), viviparous blenny (Zoarcidae) and whiting (Gadidae) made up most of the stomach contents while in the Netherlands whiting was the main prey, making up around 34 % of the total reconstructed prey weight (Santos et al. 2005).

In Danish waters, maximum dive depth generally does not exceed 50m, corresponding to the depth of the Belt seas and Kattegat. Maximum dive depth recorded was 132 m from animals moving north into Skagerrak. Dives were frequently recorded in the category 10-15 min, and harbour porpoises dive continuously both day and night, with peak activity during daylight hours (Teilmann et al. 2007). Dives to at least 226 m have been recorded via telemetry in other areas (Westgate et al. 1995).

5. Migration

[…] For the Baltic Sea, Koschinski (2002) summarised that 1) there might be a tendency of animals from the Kattegat to migrate into the North Sea during winter months; 2) a proportion of animals may stay in the western Baltic during the winter or even in the Baltic proper; 3) there might be a difference in migratory tendency between putative subpopulations; and finally 4) migration patterns might depend on winter severity. Verfuss et al. (2007) identified the Kadet Trench and Fehmarn Belt as important migration corridors.

Satellite telemetry revealed that in a few cases sub-adult porpoises tagged in the inner Danish waters moved into the Skaggerak/North Sea while only one of the tagged porpoises moved into the Baltic proper for a short visit (Teilmann et al. 2003). Teilmann et al. (2008) satellite-tagged 24 porpoises on the border between Skagerrak and Kattegat on the northern tip of Denmark (Skagen, Jylland) and 39 in Kattegat, Little Belt, Great Belt or Western Baltic (Inner Danish Waters, IDW) from 1997 to 2007. All animals from the northern group stayed in the northern Kattegat or in the Skagerrak and North Sea (including the EEZ of Norway and Sweden). Porpoises tagged in IDW stayed south of this area (including the EEZ of Germany, Sweden and Poland) except for five animals. Three of these stayed the majority of time in IDW and the other two animals moved immediately after tagging into the Skagerrak and North Sea and stayed there for the entire contact period. Based on these data, Teilmann et al. (2008) propose that the Danish waters be divided into four management areas for harbour porpoises 1) southern North Sea, 2) northern North Sea and Skagerrak, 3) Inner Danish Waters and Kattegat and 4) The Baltic Sea proper.

6. Threats

Direct catch: Directed fisheries have occurred in Puget Sound, the Bay of Fundy, Gulf of St. Lawrence, Labrador, Newfoundland, Greenland, Iceland, Black Sea, and the Baltic Sea. Many of these fisheries are now closed, but hunting of harbour porpoises still occurs in a few areas. Greenland and the Black Sea are the only areas where large direct catches have been reported within the last 20 years (Jefferson et al. 1993). […]

In the Baltic Sea, historical catch levels averaged about 1,000 porpoises per year during most of the nineteenth century, increasing to 2,000 at the end of the century with a subsequent declining trend during the twentieth century until catches increased again in the 1940s. Historical directed catches in the Baltic proper might have been higher than the catches in the Danish Straits (Kinze, 1995). Due to the resulting low abundance, the current by-catch, known to be at least 7 porpoises per year, is thought to be unsustainable, and Baltic porpoises may become extinct in the near future unless actions are taken to prevent future anthropogenic mortality (ASCOBANS 2000).

Incidental catch: Due to their habitat in productive coastal waters, harbour porpoises are captured incidentally in commercial fisheries throughout their range. Porpoises are taken in a variety of gear types including weirs, pound nets, cod traps, purse seine nets and surface gill nets, but the vast majority of this mortality occurs in bottom-set gill nets. […]

The annual by-catch of harbour porpoise in the Danish North Sea bottom-set gillnet fisheries was estimated to have been in the range of 2,867-7,566 between 1987-2001, with a significant reduction in the most recent years due to a decrease in both effort and landings (Vinther and Larsen, 2004).

A distinct increase in the numbers of strandings of porpoises showing lesions indicative of by-catch along the Dutch and Belgian coastline has occurred in recent years, in parallel to the increasing number of porpoises sighted in the southern North Sea (Haelters and Camphuysen, 2008). By-catch and drowning were noted most frequent in winter and spring. By-catch and drowning rate was responsible for 7 - 19 % of deaths similar to the statistics in neighbouring countries (Osinga et al. 2008).

Kuklik and Skóra (2003) report that in Polish waters of the Baltic Sea, by-catch occurred mostly in so-called salmon "semi-driftnets" and cod bottom-set nets, amounting to 62 by-catch reports between 1990 and 1999. Berggren et al. (2002) estimated potential limits to anthropogenic mortality for harbour porpoises in the Baltic region and concluded that immediate management action is necessary to reduce the magnitude of by-catches to meet the conservation objectives of ASCOBANS [...]. In German Baltic Sea waters low by-catch numbers are reported (8 individuals reported in 2008, IWC 2009). However, between the years 2000 and 2007, strandings have increased dramatically from 25 to 173. A large proportion of these animals has net marks or cuts indicating a vast majority of unreported cases (Herr et al. 2009; Koschinski and Pfander, 2009).

In northern Portuguese waters (Ferreira et al. 2003) confirmed by-catch was responsible for 34% of all strandings and up to 18% of the deaths were suspected to have been caused by interactions with artisanal fishing gear. This coastal area is used by harbour porpoises as an important feeding and breeding site, thus making by-catch a serious threat to the species. Up to 53% of all harbour porpoise strandings recorded involved animals caught in beach purse-seine nets. […]

There is some hope that acoustic deterrents may help to reduce by-catch rates in gillnets in certain fisheries, provided foraging harbour porpoises can find prey in pinger- as well as net-free areas (Culik et al. 2001). These devices are now mandatory in Danish gillnet-fisheries around wrecks (Finn Larsen, pers. comm.) as well as in the North and Celtic Seas, the German Baltic Sea between Warnemünde and the Polish border and in 2 areas in Swedish Baltic for gillnet vessels over 12 m length (EU Regulation 812/2004). Another solution may lie in using enticing sounds, i.e. of alerting porpoises to nets rather than attempting to deter

them. Koschinski et al. (2003) and Eskesen et al. (2003) report that certain sounds trigger investigative behaviour, echolocation activity increasing by 70-130% to investigate the sound source. This may help in alerting them to otherwise "invisible" nets. However, a field study by Kindt-Larsen (2008) concluded that a pinger producing porpoise-alerting-sounds based on porpoise clicks did not reduce by-catch. The author does not exclude, however, the possibility that an alerting pinger which succeeds in stimulating porpoises to a higher click rate may achieve this.

Another possibility for the reduction of by-catch is the use of acoustically reflective nets. High-density iron-oxide (IO) gillnets proved to be effective in reducing by-catch while catches of target species (cod) were reduced by as much as 30%. However, both effects were attributed to the mechanical properties of the net material rather than to acoustic reflectivity (Larsen et al. 2007). However, Mooney et al (2004) and Koschinski et al. (2006) found that in an acoustically enhanced Barium-Sulfate net, acoustic target strength was higher at 150 kHz than in a standard nylon net. Koschinski et al. (2006) conclude that harbour porpoises can detect the enhanced net 4.4 m in advance of standard nylon nets. However, because porpoises were found to often swim without echolocating, the authors suggest using a combination of reflective nets and warning sounds.

The most promising means for elimination of by-catch is the closure of important areas for certain fisheries and a shift to porpoise friendly gear such as baited pots and jigging reels, in some cases also long-lines.

Overfishing: Large-scale fisheries operating in the North Sea are targeted at species, which are important prey items for harbour porpoises. […] Independent of fishery-related data, stable isotope analysis from harbour porpoises tissue collected prior to and after the 1960's in the North Sea indicates that lately they have been feeding at a lower trophic level than during the preceding century (Christensen et al. 2008) and this may also be reflected in the available recent stomach content analyses.

Climate change: One of the prey items of harbour porpoises in the Scottish North Sea, sandeels, are known to be negatively affected by climate change in a number of ways. When porpoise diet from spring 2002 and 2003 was compared to baseline data of 1993-2001, the diet was found to be substantially different, with a significant and substantially smaller proportion of sandeels being consumed in March and May. Whereas 33% of stranded porpoises died of starvation in spring 2002 and 2003, only 5% did so during the baseline period, suggesting that the negative effects of climate change on sandeel availability may have serious negative effects on harbour porpoise populations (MacLeod et al. 2007).

Pollution: A considerable body of literature exists describing the levels of various pollutants in tissues of the harbour porpoise. Contaminant levels in harbour porpoises often vary geographically and may serve as useful markers in studies of population structure (Read, 1999 and ref. therein, Koschinski, 2002).

Pesticides, plasticisers, flame retardants (such as PBDEs BPA and HBCD) and trace metals are of special concern due to their bioaccumulative or endocrine disrupting potential.

In 48% of all samples, concentrations of polychlorinated biphenyls (PCBs) in blubber of female harbour porpoises from the Atlantic coast of Europe were above the threshold at which effects on reproduction could be expected. This rose to 74% for porpoises from the southern North Sea. The average pregnancy rate recorded in porpoises (42%) in the study area was lower than in the western Atlantic. Porpoises that died from disease or parasitic infection had higher concentrations of persistent organic pollutants (POPs) than animals dying from other causes (Pierce et al. 2008). Perfluorooctane sulfonate (PFOS) contamination in samples from the German Baltic Sea and from coastal areas near Denmark are comparable to levels found in Black Sea harbour porpoises and might pose a threat to these populations (Van de Vijver et al. 2007).

Furthermore, as opposed to a series of other local top predators, harbour porpoises in Danish coastal waters contained the highest hepatic concentrations of butyltin, an antifouling agent in ship paint, with (134-2283 ng/g ww), indicating a strong degree of bio-magnification in the food chain (Strand et al. 2005).

Noise pollution: Harbour porpoises react very sensitively to anthropogenic noise. Consequently, shipping, marine exploration, construction and operation of noisy equipment such as sonar are likely to affect the behaviour and distribution of the species. Dense maritime traffic e.g. was correlated with reduced harbour porpoise density in the North Sea (Herr et al. 2005). Furthermore, there are many areas where ammunition was dumped at sea. Underwater detonations, e.g. from ammunition removal, mine diver training, ship shock trials, closure of drill holes and other military or civil applications can seriously harm harbour porpoises due to extremely strong pressure changes created by the shock wave (S. Koschinski, 2010, pers. comm.)

The planned construction of offshore wind turbines in the North and Baltic Seas involves the emission of high numbers of intense impulsive sounds when turbine foundations are driven into the ground by impact pile driving, evoking at least a temporary threshold shift (TTS) in the auditory system of harbour porpoises (Lucke et al. 2008). Cumulative effects of multiple pulses must be considered (Southall et al. 2007). During operation of the offshore turbines, available data indicate that the potential masking effect would be limited to short ranges in the open sea (Koschinski et al. 2003)

7. Remarks

Range states [in the ASCOBANS area]: Belgium; Denmark; Estonia; Finland; France; Germany; Ireland; Latvia; Lithuania; Netherlands; Norway; Poland; Portugal; Russian Federation; Spain; Sweden; United Kingdom (Hammond et al. 2008).

The species is listed in Appendix II of CITES. The Baltic Sea […] [population is one of those] listed in Appendix II of CMS.

The IUCN considers the species as "Least Concern" with the exception of the Baltic Sea (Critically endangered) and Black Sea (Endangered) populations (Hammond et al. 2008a).

This is justified by all individuals in the Baltic Sea population belonging to one sub-population, which numbers fewer than 250 mature animals. A continued decline can be inferred based on the current information on by-catches (Hammond et al. 2008b).

[…] There have been several reports of decline of harbour porpoise populations in various parts of the range (Reyes, 1991 and refs. therein). [...]

Acknowledgement: We are grateful to Sven Koschinski for kindly reviewing this species summary.

For the full species account of the report "Odontocetes: the toothed whales: Distribution, Behaviour, Migration and Threats" by Boris Culik (2010) please refer to http://www.cms.int/reports/small_cetaceans/data/P_phocoena/p_phocoena.htm.

Stenella coeruleoalba

(Meyen, 1833)

English: Striped dolphin, blue-white dolphin
German: Blauweißer Delphin
Spanish: Delfín listado
French: Dauphin bleu et blanc, dauphin rayé
[Russian: Полосатый продельфин]

Family Delphinidae

Stenella coeruleoalba © Würtz-Artescienza

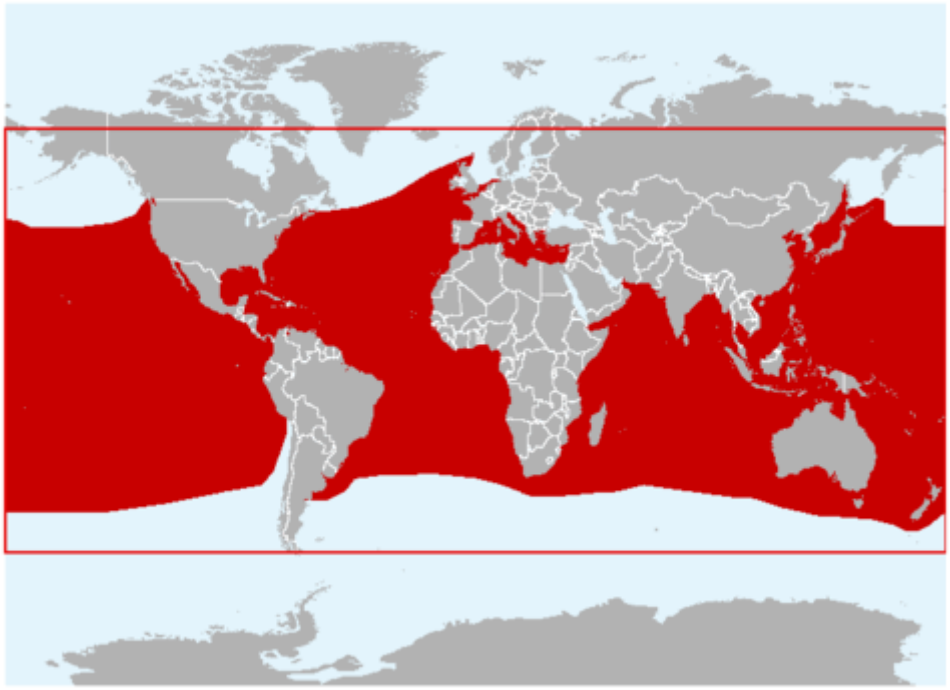
1. Description

The species name "coeruleoalba" refers to the pattern of blue/dark-gray and white stripes and blazes along the lateral and dorsal sides of the body. The dorsal cape is muted blue or blueish-grey, usually invaded by a white to light grey spinal blaze. The sides are darker than the belly. Striped dolphins have a long beak, well demarcated from the melon and falcate dorsal fin. In the field, they are most likely confused with common dolphins (Delphinus delphis) and other similar-sized species but can be distinguished by their robust body and coloration. The largest recorded specimen was 2.56 m long and the maximum weight recorded was 156 kg. Mean body length in the western Pacific is 2.4 m for males and 2.2 m for females (Archer, 2009).

Striped dolphins show only moderate geographical variation in skeletal morphometrics and little if any geographical variation in pigmentation pattern. However, several authors found slight but significant differences in body size between local populations in the eastern North Atlantic, the northwestern Mediterranean, and the southwestern Mediterranean (Rice, 1998). MtDNA and microsattelite differentiation suggests that NE-Atlantic striped dolphins form a separate population from the Mediterranean population (Garcia-Martinez et al. 1999; Bourret et al. 2007).

2. Distribution

The striped dolphin is distributed worldwide in tropical and temperate waters. It ranges north in the Atlantic to Newfoundland, northern Scotland, and Denmark […].



Distribution of *S. coeruleoalba* (Hammond et al. 2008; © IUCN):
warm temperate, subtropical, and tropical waters around the world.

Although Perrin et al (1994) stated that it is not a common inhabitant of cold boreal waters as previously claimed, there are coldwater records, e.g. from Greenland and the Faroe Islands, and Syvertsen et al. (1999) and Isaksen and Syvertsen (2002) reported sightings/strandings from the Norwegian and Swedish coasts. Vagrants have even been recorded from Komandorskiye Ostrova (Rice, 1998).

3. Population size

Würsig et al. (1998) assessed cetacean responses to survey ships and aircraft and found that *S. coeroleoalba* moved to avoid the ships in 33% of sightings. This indicates that density estimates for this species may tend to be biased downwards. […]

In the eastern Atlantic Ocean, the Bay of Biscay population size was estimated at 74,000 animals in 1993 (Goujon, 1996) and more recently at 56 500 (95% CI 29 100-90 400) in 2002 (Certain et al. 2008). […]

4. Biology and Behaviour

Habitat: Striped dolphins are pelagic animals. […] In the eastern North Atlantic, as well as off South Africa they are found in deep water (greater than 1,000m) past the continental slope (Perrin et al. 1994 and refs. therein). [...]

Schooling: Schools are of varying size and composition. [...] Schools in the eastern North Atlantic more commonly have 10-30 individuals and rarely reach the hundreds (Perrin et al. 1994 and refs. therein). [...]

Food: Feeding depth may extend to below 200m and down to 700m (Archer, 2009). […]

In the oceanic waters of the Northeast Atlantic, the diet was found to be primarily composed of fish (39% by mass) and cephalopods (56%) and less of crustaceans (5%). The most significant fish family identified was the lanternfish (24%). The oceanic squid Teuthowenia

megalops and Histioteuthis spp. were the most significant. The pelagic shrimp Sergastes arcticus and Pasiphaea multidentata were the most prevalent crustaceans. Prey sizes ranging from 30 to 170 mm accounted for 80% of the prey items, while 80% of the reconstituted biomass consisted of prey measuring between 60 and 270 mm.

Prey composition and size range differed slightly with sex and age or body size of the dolphins. The state of digestion of food remains suggested that predation took place at dusk or during the early hours of the night (Ringelstein et al. 2006). In the Bay of Biscay striped dolphins are able to shift from vertically migrating meso-pelagic prey to neritic or coastal prey types (Spitz et al. 2006). The diet of striped dolphins also varies according to food availability both in terms of quantity and composition, reflecting changes in the relative abundance of fish species (Spiz et al. 2003).

5. Migration

[no information pertaining specifically to the ASCOBANS area]

While in some regions (e.g. portions of the US east coast) striped dolphins are encountered in all seasons, they elsewhere appear to be associated with the fronts of warm oceanic currents that move seasonally and produce sporadic warm water intrusions and meanders. […]

6. Threats

Direct catch: […] In the Northeast Atlantic, striped and common dolphins were harpooned to supply food for consumption on board or to scare them away from tuna trolling lines. It is difficult to ascertain the number of dolphins taken in this way, but it has been estimated in the thousands (Reyes, 1991).

Incidental catch: Incidental catches are known to occur […] in fisheries in the north-eastern Atlantic, in drift nets, purse seines and other gear in the Mediterranean, in various gear off the coast of Japan, and in drift gillnets in the North Pacific, and probably occur in similar fisheries in tropical and warm-temperate waters around the world. […] Despite a UN moratorium on the use of drift-nets in the high seas and a ban in the Mediterranean by all European Union countries, some fisheries continue to operate illegally. […]

Antoine et al. (2001) estimated that by-catches in the tuna drift-net fishery in the Northeast Atlantic were to 90% composed of *Delphinus delphis* and *S. coeruleoalba*. Mean catch rate by trip in the years 1992-1993 were 4.7 striped dolphins per km of net and per day. Such rates are similar to those estimated in other driftnet fisheries. Goujon (1996) estimated the annual additional mortality linked to the driftnets in the Bay of Biscay albacore tuna fishery to 1.8% for the striped dolphin (this estimate must be increased by 30% in order to take into account the whole European albacore tuna driftnet fishery). The extrapolated decadal scale data from Irish and other driftnet fleets operating in this area suggest that during the period 1990-2000, a minimum of 12,635 (10,009-15,261) striped dolphins were killed as by-catch (Rogan and Mackey, 2007). Unfortunately, acoustic deterrents developed for harbour porpoise (*Phocoena phocoena*) show no effect on striped dolphins (Kastelein et al. 2006).

Overfishing: [no information pertaining specifically to the ASCOBANS area]

Pollution: Contaminants have been studied more intensively in this species than in any other cetacean. […]

In European waters, decreasing lead concentrations in tissues reflect the decrease in the production of alkyl lead and the increasing use of unleaded gasoline (Caurant el al., 2006). Similarly, concentrations of PCBs, DDT and its metabolites have slowly decreased, although the decline in PCB has been steeper than that of DDT, suggesting that the offshore marine environment has not been exposed to significant releases of these contaminants in recent

years (Aguilar and Borell, 2005; Wafo et al., 2005). However, the detected levels reflect the ubiquity and environmental persistence of these compounds. […]

Noise pollution: Observations undertaken during seismic surveys employing airguns in UK and adjacent waters show a clear effect on several dolphin species. Small odontocetes showed the strongest lateral spatial avoidance (extending at least as far as the limit of visual observation) in response to active airguns (Stone and Tasker, 2006). [...]

7. Remarks

Range states [in the ASCOBANS area]: Denmark; France; Germany; Ireland; Netherlands; Portugal; Spain; United Kingdom (Hammond et al., 2008).

S. coeroleoalba is categorised as "Least Concern" by the IUCN (Hammond et al. 2008). The species is listed in Appendix II of CITES. The eastern tropical Pacific population and the Mediterranean populations are included in Appendix II of CMS. However, observations off the coast off Japan also indicate migratory behaviour in these waters. Range states concerned in these waters are Japan, North and South Korea, the Peoples Republic of China and Taiwan (see Perrin et al. 1996 in Appendix 2). Therefore, it is recommended that the West Pacific Stock also be included in Appendix II of CMS.

To date, striped dolphins have faced relatively few threats compared with other small cetacean species, although very little is known about the species in some areas. […]

For the full species account of the report "Odontocetes: the toothed whales: Distribution, Behaviour, Migration and Threats" by Boris Culik (2010) please refer to http://www.cms.int/reports/small_cetaceans/data/S_ceoruleoalba/s_coeruleoalba.htm.

Tursiops truncatus

(Montagu, 1821)

English: Common bottlenose dolphin
German: Grosser Tümmler
Spanish: Delfín mular
French: Grand dauphin
[Russian: Афалина, или бутылконосый дельфин]

Family: Delphinidae

Tursiops truncatus © Würtz-Artescienza

1. Description

The common bottlenose dolphin is presumably the most familiar of the small cetaceans because of its coastal occurrence around the world, its prevalence in dolphinaria and zoos and its frequent appearance in the media (Jefferson et al. 2008). This species is recognized by its medium-sized, robust body, with a sharp demarcation between the melon and the short rostrum, and the moderately curved dorsal fin. Pigmentation is light grey to black dorsally, with a light belly. Adult length ranges from 2-3.8 m and body mass from 220-500 kg, varying geographically. Body size seems to vary inversely with water temperature in many parts of the world (Bloch and Mikkelsen, 2000; Wells and Scott, 2009).

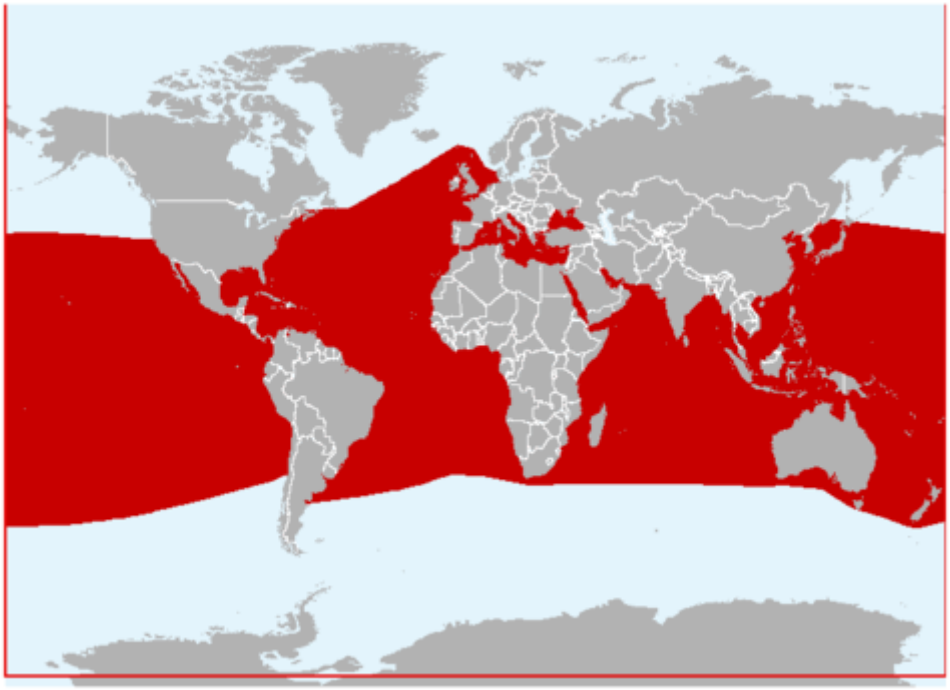
Geographical variation in bottlenose dolphins is only vaguely comprehended, and in most parts of the world sub-specific designations are best avoided. The name *T. t. truncatus* (type locality: Great Britain) may be applied to the offshore populations on both sides of the North Atlantic, and some authors have used it for similar animals that live in the temperate waters of the western North Pacific, South Africa, Walters Shoal, southern Australia, and New Zealand (Rice, 1998 and refs. therein).

In some parts of the world, sharply differentiated inshore and offshore populations live in close proximity. Results of mtDNA analyses do not indicate genetic isolation among offshore populations from different ocean basins, but do show that there are differing coastal or inshore populations, which are genetically isolated from offshore populations (Rice, 1998 and refs. therein). Thus bottlenose dolphins occurring in the pelagic waters of the North Atlantic, including the Azores and Madeira archipelagos, were shown to belong to a large oceanic population, which must be regarded as a single conservation unit (Querouil et al. 2007). […]

Oceanic bottlenose dolphins seem to maintain high levels of gene flow, unlike coastal populations. E.g. in the Gulf of Mexico, a significant genetic population structure was found among four resident, inshore bottlenose dolphin stocks (Sarasota Bay, FL, Tampa Bay, FL, Charlotte Harbor, FL and Matagorda Bay, TX) and one coastal stock (1-12 km offshore). This is surprising given the short geographical distance between many of these areas and the lack of obvious geographic barriers to prevent gene flow (Sellas et al. 2005). […]

2. Distribution

Bottlenose dolphins are found primarily in coastal and inshore regions of tropical and temperate waters of the world, and population density seems to be higher near-shore. […]



Distribution of *Tursiops truncatus* (map mod. from Hammond et al. 2008; © IUCN):
widely distributed in cold temperate to tropical seas worldwide

In the [eastern] Atlantic, *T. truncatus* occurs [….] along the southern coast of Iceland, northern Norway (Lofoten Islands), the Mediterranean and Black seas. […] The species is rare in the Baltic Sea, and there is some question as to its occurrence in the Barents Sea (Wells and Scott, 1999 and refs. therein).

3. Population size

Summing available estimates, a minimum worldwide estimate is 600,000 (Wells and Scott, 2009; Hammond et al. 2008). There are recent abundance estimates for several parts of the species' range, but there is generally insufficient data to estimate population trends:

Atlantic: […] A wide-scale survey in 2005 of western European continental shelf waters including the western Baltic, North Sea and Atlantic margin as far as southern Spain estimated that there were 12,600 bottlenose dolphins in this area (CV=27%, Hammond et al. 2006).

4. Biology and Behaviour

Habitat: As a result of increased pelagic survey efforts, researchers have come to recognise *T. truncatus* as a truly cosmopolitan species. Although it tends to be primarily coastal, it can also be found in pelagic waters (Wells and Scott, 1999). Bottlenose dolphins exploit a wide variety of habitats. The inshore form frequents river mouths, bays, lagoons and other shallow coastal regions (between 0.5-20m). Occasionally they may travel far up into rivers. [...]

The offshore form is apparently less restricted in range and movement, and can be found in many productive areas, particularly in the tropics. Some offshore populations are residents around oceanic islands (Reyes, 1991 and refs. therein). [...] Limits to the species' range appear to be temperature related, either directly, or indirectly through distribution of prey. […]

In Moray Firth, NE Scotland, there are clear relationships between feeding events and submarine habitat characteristics; during June and July certain forms of feeding occur primarily over steep seabed gradients and in deeper waters (Hastie et al. 2004). Along the Dorset coast of England chlorophyll a and fish distribution (brill, cuttlefish, plaice, Pollack, red and grey mullet, sole, sprat and spurdog) were the main factors influencing distribution and could explain 13.5% and 88% of the frequency of dolphin sightings, respectively (Sykes et al. 2003).

Food: The differences between inshore and offshore *Tursiops* are also reflected in their feeding habits. The inshore form feeds primarily on a variety of fish and invertebrates from both the littoral and sub-littoral zones, whereas mesopelagic fish and oceanic squids are commonly reported as the diet of animals of the offshore form (Reyes, 1991 and refs. therein). Diet varies with local prey availability including benthic-reef and sandy-bottom prey and their associated predators, pelagic schooling fish and cephalopods, and deeper-water fish (Wells and Scott, 1999 and refs. therein). […]

Off the coast of Normandy, France, the diet was dominated by gadoid fish (*Trisopterus* sp.), gobies and mackerel (*Scomber scombrus*) (de Pierrepont et al. 2005).

Off Galicia, north-western Spain, the most important prey species between 1990 and 2005 were blue whiting (*Micromesistius poutassou*) and hake (Merluccius merluccius), both of high commercial importance. Although bottlenose dolphins are often seen close inshore, their diet suggests that they feed at the shelf edge. The amount of hake in the diet remained stable against a background of falling local abundance, while the amount of blue whiting declined despite an increase in spawning stock size (Santos et al. 2007). […]

Although individual feeding is perhaps most prevalent, co-operative herding of schools of prey fish has been reported from a number of regions. During the hunt, dolphins are very agile and were observed to rapidly manoeuvre during chases of fish in open water or around patches of rooted vegetation. Video analysis of chase sequences indicates that mean rate of turn was 561.6 degrees /sec with a maximum rate measured at 1,372.0 degrees /sec (or 3.8 turns per sec). High turning rates with small turning radii were primarily the result of maneuvers in which the dolphin rolled 90 degrees and rapidly flexed its body ventrally (Maresh et al. 2004).

In the deep waters surrounding the Bermuda Pedestal, satellite-tracked dolphins travel a mean distance of 28.3 km/day. Dive behaviour correlates with the reported nightly vertical migrations of mesopelagic prey. At night, dive depths are greater than 450 m and last longer than 5 min. whereas during daytime dives are restricted to 50 m of the surface, lasting less than 1 min (Klatsky et al. 2007).

Schooling: Group size is commonly around 2-15 animals, but large herds of several hundred to a thousand are regularly seen offshore (Bloch, 1998; Wells and Scott, 2009). In order to maintain group cohesion, bottlenose dolphins developed individually distinctive signature whistles to transmit identity information, which was found to be independent of the caller's voice or location (Janik et al. 2006). [...]

Bottlenose dolphins are commonly associated with other cetaceans, such as pilot whales, white-sided, spotted, rough-toothed and Risso's dolphins, and humpback whales. Hybrids with other species are known from both captivity and in the wild (Jefferson et al. 1993; Bloch, 1998; Wells and Scott, 1999). However, interspecific interactions may be aggressive. […] Aggressive and lethal interactions with harbour porpoises (*Phocoena phocoena*) were frequently reported (e.g. Read, 1999).

Reproduction: Longevity in females is more than 57 years and in males up to 48 years (Wells and Scott, 1999). Females reach sexual maturity at 5 - 13 years and males at 9-14 years. Spring and summer or spring and autumn calving peaks are known for most populations, and gestation lasts about 12 months (Jefferson et al. 1993; Wells and Scott, 2009).

5. Migration

According to Wells and Scott (1999; 2009), coastal dolphins exhibit a full spectrum of movements, including 1) seasonal migrations, 2) year-round home ranges, 3) periodic residency, and 4) a combination of occasional long-range movements and repeated local residency. Long-term residency may take the form of a relatively permanent home range or repeated occurrence in a given area over many years. [...]

Dolphins living at the high latitude or cold water extremes of the species' range may migrate seasonally. […] In Moray Firth, northeastern Scotland, bottlenose dolphins were seen in all months of the year, but numbers were low in winter and spring and peaked in summer and autumn. Individuals exhibited rapid movements across the population's range, and one individual was sighted at locations 190 km apart within a 5-day period (Wilson et al. 1997). […] In the coastal waters of Cornwall, UK, dolphins demonstrated a seasonal residency pattern, spending the winter in southern Cornwall and moving farther north-eastward during spring and summer. The dolphins occupied a linear coastal range of 650 km. Within this range they repeatedly made long-distance journeys covering up to 1,076 km and lasting up to 20 days (Wood, 1998). [...]

Long-distance migrations are presumably regularly undertaken by offshore bottlenose dolphins, whose diet is comprised of highly migratory species of fish and squids (Silva et al. 2008). [...]

6. Threats

Direct catch: [no information pertaining specifically to the ASCOBANS area]

[…]. The species was taken in a drive fishery in the Faroe Islands which dates back to 1803, annual takes numbering from 1-308, often in mixed schools with long finned pilot whales (*Globicephala melas*) (Reyes, 1991 and refs. therein; Bloch, 1998). However, there are no reports on catches in recent years (NAMMCO, 2008). […]

Live captures: [no information pertaining specifically to the ASCOBANS area]

Incidental catch: Fisheries around the world account for incidental takes of bottlenose dolphins, in gillnets, driftnets, purse seines, trawls, long-lines, and on hook-and-line gear used in commercial and recreational fisheries, but the present level of take remains unknown (Hammond et al. 2008). [...]

A high proportion of the common dolphins that strand on the south coast of England in winter months bear evidence of fishery interactions. Many animals were recorded from trawl tows targeted at bass. Preliminary mitigation trials using pingers, however, were not effective, and current work is focussed on using exclusion grids to allow dolphins to escape from the sleeve of the trawl, as the number of stranded by-caught dolphins has raised concerns for their conservation status (Northridge, 2003). […]

Overfishing: [no information pertaining specifically to the ASCOBANS area]

Killing: [no information pertaining specifically to the ASCOBANS area]

Pollution: [no information pertaining specifically to the ASCOBANS area]

[The author suggests that contamination of this dolphin species with pollutants is likely to be a world-wide problem. Documented health effects of pollution from various parts of the world are mentioned in the report.]

Its worldwide distribution and great adaptability to diverse habitats make this species a good indicator of the quality of inshore marine ecosystems. Concentrations of many contaminants in common [bottlenose] dolphin tissues are magnified through bioaccumulation and often are the highest recorded in any mammal. […]

Noise pollution: Anthropogenic sounds in the ocean are increasing from such influences as shipping, drilling, sonars, and scientific exploration. Several marine mammal strandings have been linked to anthropogenic noise-induced events. Odontocetes rely on utilizing sound in the ocean and are particularly affected by man-made noise. [...]

Mooney et al. (2006) showed that temporary threshold shifts in the bottlenose dolphin can be induced by long exposure times or high sound pressure levels. Whereas bottlenose dolphins may have a protective mechanism that reduces harmful physiological noise damage at shorter duration exposures, the inverse might be true for long duration exposures at lower levels.

In Teignmouth Bay, UK, stationary boats elicited no response, but speedboats and jet skis were associated with aversive behaviours, even when boats were not directly approaching the dolphins (Goodwin and Cotton, 2004). In Aberdeen harbour, Scotland, dolphins were usually concentrated around the harbour entrance. Their responses to boats varied considerably according to boat size, activity and speed, but there was evidence of habituation to boat traffic (Sini et al. 2005).

A more subtle effect of noise is the acoustic detection range of female dolphins and their dependent calves. Quintana-Rizo et al. (2006) found it to be noise limited as opposed to being limited by hearing sensitivity. In shallow-water sea grass areas, low-frequency (7-13 kHz) whistles with a 165 dB source level can be normally heard by dolphins at a distance of 487 m, which is larger than usual mother-calf separation distances.

Tourism: Excessive and unregulated visiting of wild dolphins habituated to humans has raised concern in several areas, in particular in Europe (Reyes, 1991 and refs. therein). Off Sarasota, Florida animal behavioural observations conducted during boat approaches detected longer inter-breath intervals compared to control periods (no boats within 100m). Dolphins decreased inter-animal distance, changed heading, and increased swimming speed significantly more often in response to an approaching vessel than during control periods (Nowacek et al. 2001). These findings provide additional support for the need to consider disturbance in management plans for cetacean conservation (P. Yazdi, pers. comm. 2003).

In South Carolina, USA, and New Zealand multiple boats were found to have a greater influence on dolphin behaviour and movement than the presence of a single boat (Constantine et al. 2004; Mattson et al. 2005). Dolphin-watching boats, motorboats, shrimp boats, and jet skis affected group size and behaviour of dolphin groups, with jet-skis having the most pronounced effects (Mattson et al. 2005). […]

7. Remarks

Range states [in the ASCOBANS area]: Belgium; Denmark; France; Germany; Netherlands; Portugal; Spain; United Kingdom (Hammond et al. 2008).
The common bottlenose dolphin is listed in Appendix II of CITES.

The North Sea, Baltic Sea, Mediterranean and Black sea populations are listed in Appendix II of CMS.

The IUCN lists the species as "Least Concern" with the exception of the Black sea bottlenose dolphin *T. t. ponticus*, which is listed as "Endangered". […]

For the full species account of the report "Odontocetes: the toothed whales: Distribution, Behaviour, Migration and Threats" by Boris Culik (2010) please refer to http://www.cms.int/reports/small_cetaceans/data/t_truncatus/t_truncatus.htm.

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Conservation status and threats: an overview

(Compiled by Polina Khrycheva, ASCOBANS Intern)

1. Conservation status of the cetaceans covered under the ASCOBANS agreement

Six of the small cetacean species most commonly occurring in the ASCOBANS Agreement Area are categorised as least concern by the International Union for Conservation of Nature (IUCN) and three as data deficient (Table 1). The harbour porpoise in the Baltic Sea is the only population within the ASCOBANS area, which is considered "critically endangered" by the IUCN.

According to the listing under the Convention on Migratory Species (CMS), the North and the Baltic Seas populations of six ASCOBANS species have an unfavourable conservation status or would benefit significantly from international co-operation organised by tailored agreements (Table 1). These are included in Appendix II of the Convention. Two species, the northern bottlenose whale and the killer whale, are listed on Appendix II without distinguishing between populations. None of the species have been categorized as being in danger of extinction throughout all or a significant proportion of their range, as is the case for species listed on Appendix I of the CMS. The striped dolphin is the only species of which no population within the ASCOBANS area is listed on the CMS Appendices.

Under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) all species commonly occurring within the Agreement Area are categorised as "not necessarily now threatened with extinction, but may become so unless trade is closely controlled" (Appendix II). The northern bottlenose whale is additionally listed on CITES Appendix I, which means that it is considered threatened with extinction and CITES prohibits international trade in specimens of these species except when the purpose of the import is not commercial.

Table 1 Abundance estimates and conservation status of the most common small cetacean species covered under ASCOBANS

Species	**Population size estimate[2] in the ASCOBANS area**	**Conservation status**		
		IUCN	**CMS**	**CITES**
Delphinus delphis, short-beaked common dolphin	Very abundant, hot spots in North Sea: Celtic Sea, Bay of Biscay and the English Channel	Least concern	North and Baltic Sea populations in Appendix II	Appendix II
Globicephala melas, long-finned pilot whale	No assessment since 1994, in the north east Atlantic including outside of ASCOBANS 778,000 (1993)	Data deficient	North and Baltic Sea populations on Appendix II	Appendix II
Grampus griseus, Risso's dolphin	No information for ASCOBANS, in the north-western Mediterranean low abundance 4.3% of all cetacean sightings (2008)	Least concern	North and Baltic Sea populations on Appendix II	Appendix II
Hyperoodon ampullatus, northern bottlenosed whale	Eastern north Atlantic around 40,000 (1995)	Data deficient	Appendix II	Appendices I and II
Lagenorhynchus acutus, Atlantic white-sided dolphin	Northeast Atlantic variable estimates between 11,760 (2001) and 1,860 (2006), it is likely most abundant north and west of Scotland	Least concern	North and Baltic Sea populations on Appendix II	Appendix II
Lagenorhynchus albirostris, white-beaked dolphin	European Atlantic shelf 22,665 (2005), high densities in western Scotland, 10,562 in the North Sea	Least concern	North and Baltic Sea populations on Appendix II	Appendix II
Orcinus orca, killer whale	Norwegian coastal waters 483-1,507 (1999)	Data deficient	Appendix II	Appendix II
Phocoena phocoena, harbour porpoise	Eastern North Atlsantic 385,600 (SCANS II, before December 2006), Baltic Sea sub-population 250 mature individuals	Least concern, Baltic sea critically endangered	Baltic Sea population Appendix II	Appendix II
Stenella coeruleoalba, striped dolphin	Bay of Biscay 56,500 (2002)	Least concern	Populations within ASCOBANS not listed	Appendix II
Tursiops truncates, common bottlenose dolphin	12,600 in European continental shelf (2006)	Least concern	North and Baltic Sea populations on Appendix II	Appendix II

[2] The source of these estimates is the report Odontocetes - the toothed whales. Distribution, Behaviour, Migration and Threats**.** (2010) prepared by B.Culik (2010) for CMS/UNEP and references therein

2. Threats to cetacean populations in the ASCOBANS Area

Small cetaceans within the ASCOBANS Agreement Area face a number of threats such as by-catch, prey depletion, noise and chemical pollution. These threats have been extensively discussed by Culik (2010) and are likely affecting most or all of the species within the Agreement Area. Climate change is expected to impact the whole cetacean community as well. Other factors contributing to dolphin and whale mortality include ship strikes, various types of disturbance due to tourism, ammunition dumped at sea, oil spills and direct killing by humans. The present overview summarises recent information on anthropogenic threats to small cetaceans mainly from the recent report on Odontocetes of B.Culik with a few other sources concerning Climate Change, pollutants and ammunition dumped at sea, which are explicitly indicated.

By-catch

ASCOBANS species significantly affected within the ASCOBANS area: at least 50%

A major threat for most Odontocetes worldwide is by-catch during fisheries operations (Culik, 2010). Odontocetes die of suffocation when becoming entangled or captured in gillnets, driftnets, traps, weirs, purse-seine nets, long-lines, trawls and other gear.

By-catch seems to be affecting the populations of at least six of the species covered under ASCOBANS. It has been reported for short-beaked common dolphin, harbour porpoise, striped dolphin, common bottlenose dolphin, long-finned pilot whale, Atlantic white-sided dolphin, and periodically for Risso's and white-beaked dolphins (Culik, 2010). Within the Agreement Area, by-catch levels are probably the highest and best documented for harbour porpoises and short-beaked common dolphins. However, one should bear in mind that levels of incidental take are probably under-reported for all species.

The common dolphins are the most prominent by-catch worldwide (Culik, 2010). High by-catch rates are reported in particular in northern Portuguese waters, the Bay of Biscay, western English Channel, western Approaches and the Celtic sea (Culik, 2010 and Refs therein).

Harbour porpoise by-catch and drowning rate has increased in recent years together with the number of sightings in the southern North Sea. Interaction with fishing gear was responsible for 7-19% of deaths along the Dutch and Belgian coastline, similar to the statistics in neighbouring countries (Osinga et al. 2008 in Culik, 2010). Present level of by-catch of the harbour porpoises in the Baltic Sea is said to be unsustainable (ASCOBANS 2000 in Culik, 2010).

Northern Portuguese waters are an important feeding area and breeding ground for harbour porpoises. They are frequently killed in fishing operations in this location. Confirmed by-catch level in the area reaches 53% of strandings (Ferreira et al. 2003) and poses a serious threat to the species (Culik, 2010).

By-catch is also significant for the striped dolphin (30% of annual deaths from the European albacore tuna driftnet fishery) and likely significant for the common bottlenose dolphin, the exact level of by-catch for which is presently unknown (Culik, 2010). According to Culik (2010) the incidental takes of the long-finned pilot whales may be one of the important threats to the species. In the north Atlantic, southwestern Britain, strandings of the species, 61% due to by-catch, are reported to have increased since 1977 (Leeney et al., 2008 in Culik, 2010).

Substantial by-catch of the Atlantic white-sided dolphin occurs at least in some areas of the north-east Atlantic, for example in pelagic trawl fisheries for horse mackerel southwest of Ireland (Reeves et al., 1999 and Refs therein in Culik, 2010).

There is particularly little information on by-catch of north Atlantic bottlenose whale and white-beaked dolphin. The latter is not expected to be threatened by interaction with fishing gear (Culik, 2010). Killer whales are also not likely to be affected, as they rarely get caught or entangled (Culik, 2010).

Noise pollution:

ASCOBANS species vulnerable to noise pollution: 100%

Anthropogenic sounds in the ocean are increasing. Odontocetes rely on utilizing sound in the ocean and are particularly affected by man-made noise (Culik, 2010). Anthropogenic noise can impair the perception of sounds of interest and even cause physical damage.

Although sensitivity may differ between species, all cetaceans can be affected by anthropogenic noise. Evidence for such effects has been described in the report by Culik (2010) for almost all the species commonly occurring within ASCOBANS Area. No information on the effects of noise pollution for North Atlantic bottlenose whale was provided in the report.

Noisy activities like intensive or fast traffic, military exercises, offshore oil exploration, wind farm construction, whale watching and other leasure activities, such as speedboats and jet skis have caused avoidance of the areas by cetaceans, reduction in feeding or have been linked to mass stranding events.

Several examples of cetaceans already being affected by this problem within the ASCOBANS area have been reported. A number of northern bottlenose whale strandings over the past few decades were clustered around one particular site in the vicinity of exercise areas for submarine and other naval vessels in UK waters, particularly in the coastal waters of Scotland, including a sub-marine testing site in Gairlochhead, near Glasgow (Culik 2010 and references therein).

Observations undertaken during seismic surveys employing airguns in UK and adjacent waters caused lateral spatial avoidance (extending at least as far as the limit of visual observation) in response to active airguns, which was the strongest for small odontocetes (Stone and Tasker, 2006 in Culik, 2010).

Speedboats, other fast moving boats and jet skis off the coast of UK were associated with aversive behaviours of dolphins, whereas stationary boats elicited no response (Goodwin and Cotton, 2004 in Culik, 2010). Possible strategies to reduce underwater noise due to traffic are discussed by Leaper et al. (2009).

Planned construction of offshore wind turbines in the North and Baltic Seas is expected to cause additional noise pollution and can seriously affect the harbour porpoises (Lucke et al. 2008 in Culik, 2010).

Offshore windmills may also cause long-term disturbance such as noise due to operating turbines and increased ship traffic due to maintenance. Masking effect operating turbine noise in the open sea, however, is expected to be limited to short distances (Koschinski et al. 2003 in Culik, 2010).

Prey depletion due to over-fishing

ASCOBANS species preying mainly on commercially important fish: at least 60%

Many cetaceans prey primarily on the fish species that are also targeted by commercial fisheries. Excessive extraction of fish can cause ceatceans to starve or to switch to other prey, which may lead to a reduction in fitness, if the alternative is less nutritious or requires higher energy expenditure to capture.

Six of the ASCOBANS species (short-beaked common dolphin, common bottlenose dolphin, harbour porpoise, killer whale, Atlantic white-sided dolphin and white-beaked dolphin) prefer to prey on commercially targeted species and are vulnerable to prey depletion.

For example, coastal Norwegian populations of killer whales reportedly feed mainly upon herring, a fish heavily exploited in the area (Reyes, 1991 in Culik, 2010). Harbour porpoises in the North Sea have already been shown to feed at a lower trophic level than during the preceding century (Christensen et al. 2008 in Culik, 2010).

There are no major fisheries for squid in the Northeast Atlantic (Culik, 2010), but future developments could represent a threat to a further four species (North Atlantic bottlenose whale, long-finned pilot whale, Risso's dolphin and striped dolphin), which preferably feed on squids and other cephalopods. Potential over-fishing of squid stocks could be especially dangerous to the North Atlantic bottlenose whale population, still recovering from heavy losses due to whaling (Culik, 2010).

Pollution

Species commonly occurring in the ASCOBANS area, in tissues of which contaminants have been detected: 100%

ASCOBANS species in tissues of which contaminant levels above toxic thresholds have been detected: at least 40-60 %

(Information on contaminant levels and toxic thresholds not available for all species)

Pollutants include thousands of chemical compounds and elements from such sources as maritime traffic, waste dumped at sea, run-off from land, industrial effluents and municipal sewage.

Persistent organic pollutants (POPs) and organometallic compounds, like butyltins and methylmercury are lipophilic and are found in higher concentrations in biological tissues compared to the abiotic environment into which they are released (e.g. Jones and De Voogt 1999; Girar et al. 2009). Some of these chemicals also biomagnify in food chains, that is they are usually found in higher concentrations in tissues of animals from higher trophic levels.

Cetaceans feed at a high trophic level and are particularly vulnerable to contaminant-related adverse health effects. Reduced reproductive health, increased susceptibility to disease, appearance of lesions and tumours, and increased incidence of developmental abnormalities have been observed in contaminated marine mammal populations (Ross et al., 2007).

Contaminants have been reported in tissues of all species commonly occurring within the ASCOBANS Area (Culik, 2010 and Refs therein). High contaminant concentrations in animals from the ASCOBANS area, compared to animals from other geographic locations were reported by Culik (2010) for: common dolphins (e.g. Pierce et al., 2008), long-finned pilot whales (e.g. Faengstroem et al. 2005), Atlantic white-sided dolphins (e.g. Kucklick et al. 2008) and harbour porpoises (e.g. Pierce et al., 2008). No data on levels of contamination for other species specifically from the ASCOBANS area were available.

However, considering the information provided in the review by Culik (2010) it is likely that at least common bottlenose dolphins and killer whales also carry high pollutant burdens.

Common bottlenose dolphins around the world often accumulate some of the highest concentrations of chemical contaminants in their tissues (Culik, 2010). Killer whales are top predators, and are therefore likely to be one of the species most affected by biomagnifying pollutants. For example, in northern Norway they are among the most contaminated arctic animals (Wolkers et al. 2007 in Culik, 2010). The levels of contamination in their tissues are similar to those in polar bears, with concentrations of some contaminants even exceeding the already very high concentrations in polar bears (Wolkers et al. 2007 in Culik, 2010).

One of the best-researched species in relation to pollution in the ASCOBANS area is the harbour porpoise. In a study by Pierce et al. (2008 in Culik, 2010) 48% of blubber samples from individual harbour porpoise females from the European Atlantic and 74% from the North Sea contained pollutants in concentrations above which reproductive effects could be expected. And indeed, a decreased average pregnancy rate was observed in comparison with the animals from West Atlantic (Pierce et al, 2008 in Culik, 2010). In addition, there was some evidence for immune effects of pollution in the study: porpoises that died from a parasitic infection contained higher concentrations of POPs than those dying from other causes. In the same study, blubber of 40% of common dolphin females from the Atlantic coast of Europe was found to contain polychlorinated biphenyls (PCBs) above threshold concentrations for reproductive effects. However, no difference in pregnancy rate between East and West Atlantic could be detected (Pierce et al., 2008 in Culik, 2010).

Depending on such factors as population growth, changes in regulation and in technology, inputs of contaminants into the environment and the body burdens of cetaceans can change. For example, concentrations of some persistent contaminants, like lead, organochlorine chemicals, e.g. the pesticide dichlorodiphenyltrichloroethane and its metabolites (DDTs) and the industrial chemicals PCBs, showed a decreasing trend in tissues of striped dolphins in European waters (Culik, 2010). This reflects decreasing lead inputs into the environment due to the increasing use of unleaded gasoline (Caurant el al., 2006 in Culik, 2010). Both DDTs and PCBs have been banned in many countries worldwide, and the offshore marine environment has not been exposed to significant releases of these contaminants in recent years (e.g. Aguilar and Borell, 2005; Wafo et al., 2005 in Culik, 2010).

In addition to chemical pollutants, increasing levels of plastics and other refuse at sea may pose a threat to wild populations: Necropsies of specimens from Japan revealed that they had eaten foreign materials such as plastic bags, soda cans, and pieces of rope, which may have been fatal (Kruse et al.1999 and refs. therein).

Climate change

Climate change is expected to affect cetaceans primarily via loss of habitat (given the distinct thermal ranges of most species), changes in prey availability, quality and distribution, and potentially increased competition from range expansions of other species (Alter et al., 2009 and references therein).

Halpern et al. (2008 in Alter et al, 2009) synthesized data from a broad variety of threats (including climate change) and produced a global map of cumulative impacts on the marine environment. Within the ASCOBANS area climate change (using Sea Surface Temperature as a proxy) was found to be a particular threat in the North Sea.

Effects on the cetacean populations, including increased starvation deaths (e.g. Culik 2010) and a southward range shift (e.g. McLeod et al., 2005), have already been observed and documented in the North Sea. Sand eels and important prey species of harbour porpoises in the Scottish North Sea have declined due to climate change. As a result, there has been a significant increase in starvation deaths among the harbour porpoises in the area (Culik 2010 and references therein). MacLeod et al. (2005) report that there has been a decrease in the cold water species white-beaked dolphin and an increase in the warm water species common dolphin off northwest Scotland in the period from 1992 to 2003. The authors also suggested that an additional danger to cetacean populations may arise as cetaceans are forced to move outside of the areas designated for their protection due to changing water temperatures.

Ammunition dumped at sea

The threat posed to cetaceans by blasting and the decay of underwater unexploded ordnance has not been extensively investigated (Koschinski and Kock, 2009). More data is required in order to evaluate the impacts of this problem on cetacean populations.

At least 500,000 tons of ammunition from World Wars I and II plus an unknown amount of modern ammunition from the Federal German Navy, the former National People's Army of the German Democratic Republic, NATO and Soviet Navy activities still lie in German waters of the North and Baltic Seas (Nehring 2008 in Koschinski and Kock, 2009).

For cetaceans, the conventional ammunition removal by blasting is a particular hazard. High sound pressure and explosion-related shock waves can lead to severe injury and hearing impairment in marine mammals at considerable distance from detonation sites. Techniques to mitigate these effects and alternative techniques to render old ammunition harmless are described by Koschinski and Kock (2009).

Other important threats with examples from areas outside ASCOBANS

Ship strikes

High-speed vessels may increase cetacean lethality. For example, since high-speed ferries have been introduced on the Canary Islands in 1999, there have been regular collisions with cetaceans, estimated at 10-30 collisions per year (Weinrich et al. 2005 in Culik, 2010).

Ship traffic may cause significant population decline. According to Visser (1999 in Culik, 1020), who reported propeller scars on killer whales and their possible cause of mortality, vessel traffic may have contributed to southern resident killer whales becoming endangered.

Tourism

Disturbance may be a matter of concern in areas inhabited by marine mammals and supporting whale- and dolphin-watching industries (Reyes, 1991 in Culik, 2010).

Oil spills

Oil spills may have long-term consequences for cetaceans. For example, both resident and transient killer whales suffered losses after the Exxon Valdez oil spill and showed a decreased rate of population growth compared to other less affected pods, one group of transient whales even continued to decline and is currently depleted (Matkin et al. 2008 in Culik, 2010).

Killing

Occasionally, fishermen use harpoons to kill common dolphins and other small cetaceans that cause damage to fishing gear. This is known to occur off the coast of Spain in the western Mediterranean (Culik, 2010 and references therein). Killer whales are sometimes seen as competitors and shooting of whales is known to occur (Culik, 2010 and references therein). To some extend such persecution continues today in Alaska and in the Strait of Gibraltar (Ford, 2009 in Culik, 2010).

4. References

Additional references, not included in B. Culik's report are listed below. For references cited in B. Culik's report, please see References section on pages 52-66

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