



Background Document for Blue whale  
*Balaenoptera musculus*



## OSPAR Convention

The Convention for the Protection of the Marine Environment of the North-East Atlantic (the “OSPAR Convention”) was opened for signature at the Ministerial Meeting of the former Oslo and Paris Commissions in Paris on 22 September 1992. The Convention entered into force on 25 March 1998. It has been ratified by Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, Netherlands, Norway, Portugal, Sweden, Switzerland and the United Kingdom and approved by the European Community and Spain.

## Convention OSPAR

La Convention pour la protection du milieu marin de l'Atlantique du Nord-Est, dite Convention OSPAR, a été ouverte à la signature à la réunion ministérielle des anciennes Commissions d'Oslo et de Paris, à Paris le 22 septembre 1992. La Convention est entrée en vigueur le 25 mars 1998. La Convention a été ratifiée par l'Allemagne, la Belgique, le Danemark, la Finlande, la France, l'Irlande, l'Islande, le Luxembourg, la Norvège, les Pays-Bas, le Portugal, le Royaume-Uni de Grande Bretagne et d'Irlande du Nord, la Suède et la Suisse et approuvée par la Communauté européenne et l'Espagne.

## Acknowledgement

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### Photo acknowledgement

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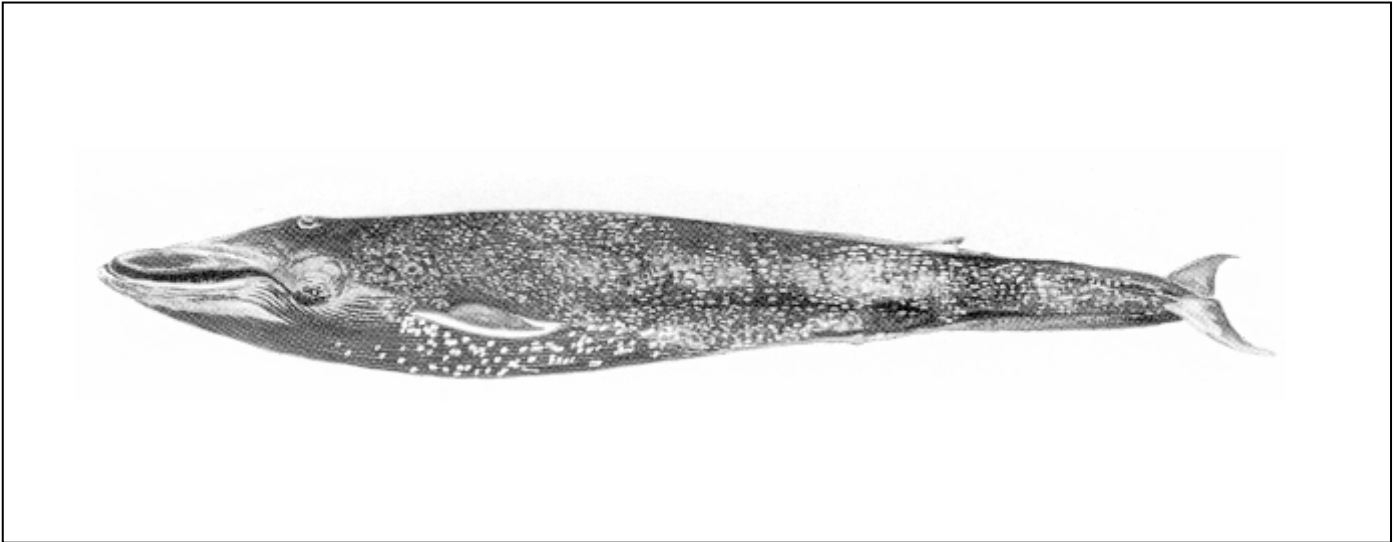
# Background Document for Blue whale *Balaenoptera musculus*

## Executive Summary

This background document on the Blue whale *Balaenoptera musculus* has been developed by OSPAR following the inclusion of this species on the OSPAR List of threatened and/or declining species and habitats (OSPAR Agreement 2008-6). The document provides a compilation of the reviews and assessments that have been prepared concerning this species since the agreement to include it in the OSPAR List in 2003. The original evaluation used to justify the inclusion of *B.musculus* in the OSPAR List is followed by an assessment of the most recent information on its status (distribution, population, condition) and key threats prepared during 2009-2010. Chapter 7 provides proposals for the actions and measures that could be taken to improve the conservation status of the species. In agreeing to the publication of this document, Contracting Parties have indicated the need to further review these proposals. Publication of this background document does not, therefore, imply any formal endorsement of these proposals by the OSPAR Commission. On the basis of the further review of these proposals, OSPAR will continue its work to ensure the protection of *B.musculus*, where necessary in cooperation with other competent organisations. This background document may be updated to reflect further developments or further information on the status of the species which becomes available.

## Récapitulatif

Le présent document de fond sur la baleine bleue a été élaboré par OSPAR à la suite de l'inclusion de cette espèce dans la liste OSPAR des espèces et habitats menacés et/ou en déclin (Accord OSPAR 2008-6). Ce document comporte une compilation des revues et des évaluations concernant cette espèce qui ont été préparées depuis qu'il a été convenu de l'inclure dans la Liste OSPAR en 2003. L'évaluation d'origine permettant de justifier l'inclusion de la baleine bleue dans la Liste OSPAR est suivie d'une évaluation des informations les plus récentes sur son statut (distribution, population, condition) et des menaces clés, préparée en 2009-2010. Le chapitre 7 fournit des propositions d'actions et de mesures qui pourraient être prises afin d'améliorer l'état de conservation de l'espèce. En se mettant d'accord sur la publication de ce document, les Parties contractantes ont indiqué la nécessité de réviser de nouveau ces propositions. La publication de ce document ne signifie pas, par conséquent que la Commission OSPAR entérine ces propositions de manière formelle. A partir de la nouvelle révision de ces propositions, OSPAR poursuivra ses travaux afin de s'assurer de la protection de la baleine bleue, le cas échéant avec la coopération d'autres organisations compétentes. Ce document de fond pourra être actualisé pour tenir compte de nouvelles avancées ou de nouvelles informations qui deviendront disponibles sur l'état de l'espèce.



## 1. Background information

### Name of species

*Balaenoptera musculus* (Linnaeus, 1758), Blue whale.

Blue whales are members of the family Balaenopteridae (suborder Mysticeti, order Cetacea).

Currently it is thought that there are four subspecies of blue whales: *B. musculus intermedia* is the largest of all the blue whales and lives in Antarctic waters; *B. musculus musculus* inhabits the oceans in the Northern Hemisphere and is somewhat smaller than its Antarctic counterpart; *B. musculus brevicauda*, or the pygmy blue whale, the smallest (Calambokidis *et al.*, 1997), is found in the sub Antarctic zone of the southern Indian Ocean and south-western Pacific Ocean; *B. musculus indica* is known from the northern Indian Ocean.

Blue whales are closely related to fin whales and interbreeding has been reported by the sighting and examination of hybrids.

### Description

The blue whale is the largest animal known to have existed on Earth. Blue whales in the Northern Hemisphere are somewhat smaller than their counterparts in the Antarctic. The largest animal recorded for the Northern Hemisphere was a 28.1 m long female reported in whaling statistics. Blue whale females are about 1.5 m longer than males (Calambokidis *et al.*, 1997). Body weights of adults generally range from 80 to 150 tons.

Seen from above, blue whales have a tapered elongated shape, with a huge broad, relatively flat, U-shaped head. The baleen is black, half as broad as its maximum 1 m length and 270-395 plates can be found on each side of the upper jaw. There are 60-80 throat grooves or ventral pleats running longitudinally parallel from the tip of the lower jaw to the navel, which enable the throat or ventral pouch to distend when feeding (Perrin *et al.*, 2002).

The dorsal fin that varies in shape, ranging from a small nubbin to triangular and falcate, is positioned far back on the body. The characteristic mottled skin pigmentation is a blend of light and dark shades of gray displayed in patches of varying sizes and densities. This pigmentation can vary, however, from sparse mottling, where the individual appears uniformly pale or dark, to densely mottled individuals, where the pigmentation is a highly contrasted variegation of spots unique to each whale. Only some

individuals raise their tail fluke when diving. The tail flukes are predominantly gray above and below; however, some individuals do have white patches of pigmentation on the ventral surface (Perrin *et al.*, 2002). As the shape of the dorsal fin and the pattern of light and dark pigmentation of the body as well as the underside of the tail fluke are unique to each individual, these characteristics allow for photo-identification as a useful research method (Calambokidis *et al.*, 1997).

The blow is almost 10 m high.

### **Species ecology and breeding biology**

Blue whales are found in all oceans of the world. Food availability probably dictates blue whale distribution for most of the year. They can be found in coastal waters but are predominantly found offshore.

Blue whales are observed most commonly alone or in pairs; however, concentrations of 50 or more can be found spread out in areas of high productivity (Perrin *et al.*, 2002).

Some populations appear to be resident in habitats of year-round high productivity, while others undertake seasonal north-south migrations between cold water (high-latitude) summer feeding areas and warm water winter breeding areas (Charif & Clark, 2000, 2009).. They are fast swimmers and can move long distances quickly.

Most information about what they eat comes from the examination of stomach contents of animals killed during whaling. Blue whales feed almost exclusively on euphausiids (krill). In the North Atlantic, blue whales feed on the krill species *Meganctiphanes norvegica*, *Thysanoessa raschii*, *T. inermis* and *T. longicaudata* (Perrin *et al.*, 2002). They feed by taking huge gulps of water filled with dense swarms of krill. The water is pushed back out through the fringed baleen plates that retain the krill. The daily consumption on the feeding grounds is probably of 4 tons of krill per day (Calambokidis *et al.*, 1997). Blue whales feed both at the surface and also at depth, following the diurnal vertical migrations of their prey to at least 100m (IUCN, 2008). They generally dive for 8-15min; dives of more than 30min are rare. During these months of intense feeding they are storing energy in their blubber which can be used during the rest of the year. They feed very little during the migration and may fast in the winter while in tropical waters (Calambokidis *et al.*, 1997).

Breeding occurs during winter in tropical waters. Blue whales are sexually mature at 8-10 years. Length at sexual maturity in females from the Northern Hemisphere is 21-23m, whereas males reach sexual maturity at 20-21m (Perrin *et al.*, 2002). Mating takes place in late fall and winter, and it takes 11 to 12 months for the fetus to develop. At birth calves are 6-7m long and weigh 2-3 tons. Calves swallow at least 190 litres of rich milk (35-50% fat) per day as they gain 4 kg an hour while nursing which allows them to grow every day about 4 cm and to gain some 90 kg (Calambokidis *et al.*, 1997).

The mother loses about 50 tons, or about one-third of her body weight. The calf shifts from its mother's milk to krill when it is about seven month old. The calving interval is usually once every two to three years.

They emit low-frequency vocalizations that have generally been described as being primarily in the 15-20Hz range and their intensity has been measured at about 185-190 dB using scientific monitoring equipment. These sounds can be audible for thousands of miles. They can hear each other and potentially communicate across entire ocean basins. The acoustic world of the blue whale is the subject of intensive new research (Calambokidis *et al.*, 1997).

Blue whales are thought to live for at least 80-90 years.

Their natural predators are killer whales. Indeed, killer whale, *Orcinus orca*, attacks on blue whales, especially calves and juveniles have been witnessed (Calambokidis *et al.*, 1997).

## 2. Original Evaluation against the Texel-Faial selection criteria

### List of OSPAR Regions and Dinter biogeographic zones where the species occurs

All OSPAR Regions

Biogeographic zones: Warm-temperate waters, Cold-temperate waters, Cold-Arctic waters, Warm-temperate pelagic waters, Azores shelf, Lusitanian (Cold/Warm), Lusitanian-boreal, Cold-temperate pelagic waters, Boreal-lusitanian, Seamounts and plateaus, Boreal, Norwegian Coast (Finnmark), Norwegian Coast (Westnorwegian), Norwegian Coast (Skagerrak), South Iceland - Faroe Shelf, Southeast Greenland, North Iceland Shelf, Northeast Greenland Shelf (incl. NEWP), High Arctic Maritime, Barents Sea.

### List of OSPAR Regions where the species is under threat

All where it occurs.

### Original evaluation against the Texel-Faial criteria for which the species was included on the OSPAR List

*B. musculus* was nominated for inclusion in a joint submission by three Contracting Parties (Iceland, Portugal and UK) citing sensitivity, keystone role and decline with information also provided on threat.

Table 1: Summary assessment of *B. musculus* against the Texel-Faial criteria

Criterion	Comments	Evaluation
<b>Decline</b>	<p>The blue whale has been severely depleted throughout its range. Whaling during the late 1800s and early 1900s targeted stocks in the North Atlantic and the North Pacific and then moved to other areas leading to a drastic reduction of the population throughout the world. The North Atlantic stock is estimated to have been made up of around 3 500 whales in Northern Norway and 10 000 in the Denmark Strait (FAO, 1978; Yochem &amp; Leatherwood, 1985). Large scale sighting surveys in the North Atlantic in 1987, 1989, 1995 and 2001 gave estimates of the population around Iceland ranging from 222 to 1206 animals. All estimates are considered negatively biased to a varying degree and the authors concluded the 1995 estimate of 979 blue whales was the best point estimate. Pike <i>et al.</i> (2009) also found a significant increase in abundance in the survey area amounting to 9% per year. Previously Gunnlaugsson and Sigurjónsson (1990) had estimated an annual increase rate of 5.2%.</p> <p>The IWC only gives an estimate for blue whales in the southern hemisphere but has not given an estimate for the northern hemisphere population of blue whales at present. Sears &amp; Perrin (2009) recently suggested that North Atlantic blue whale abundance probably ranges from 600 to 1500, although further photo-identification and sighting surveys are needed to produce reliable estimates.</p>	Qualifies



<b>Keystone species</b>	The blue whale feeds almost exclusively on a few species of euphausiids in highly productive polar waters. There is evidence to suggest they also feed on shallow banks in the Azores before resuming migratory movements and where they probably have a significant impact on plankton numbers, consuming around 2-4 tons of food a day (OSPAR, 2008).	Qualifies (at least when at initial stock size)
<b>Sensitivity</b>	Like other baleen whales the blue whale has a low reproductive rate and late age of maturity. This means that recovery of depleted populations will take many decades rather than years. Baleen whales, such as the blue whale use sound to provide information about the physical environment and to communicate between individuals. They emit low frequency sound that can travel hundreds of kilometers (Evans, 2000). This makes them sensitive to acoustic disturbance from military activities such as naval sonars (particularly low frequency acoustics), as well as other sources such as seismic exploration. The whales will be particularly vulnerable if the zone of influence coincides with feeding or breeding areas and migratory corridors. In the case of the blue whale this would include the edge of the continental shelf and the region around the Azores and along the mid-Atlantic Ridge to Iceland, that may be important migration routes for this species (Evans, 2000; OSPAR, 2008; Sears & Perrin, 2009).	Qualifies - very sensitive
<b>Threats</b>	The blue whale was the preferred target of modern whalers because of its size and, once they could be taken and processed on factory ships, they were hunted in all the world's oceans. Catches peaked in 1930-31 when nearly 30 000 were taken worldwide. It has also been estimated that over 280 000 blue whales (including pygmy blues) were taken between 1924-5 and 1970-71, mostly in the Southern Hemisphere (Chapman (1974) in Klinowska 1991). Commercial whaling was therefore the overriding pressure on this species until it was banned in 1964. Current threats come from acoustic disturbance and habitat degradation. Depletion of food resources can be an issue in the Antarctic where krill is harvested. In the Arctic however, global warming may be another factor influencing krill abundance and therefore could be a threat to blue whales in this area. Ship collisions also pose some threat to the whales, particularly during their spring and autumn migrations (OSPAR, 2008).	

**Relevant additional considerations**

**Sufficiency of data:** Data are available on the numbers of whales taken during the period when they were subject to commercial exploitation. Since then, sighting data have been collected to determine population size and trends. Given the current rarity of the species, with the exception of a few areas, the population density is too thin to enable any recovery to be detected from surveys except over a very long period (Klinowska, 1991) (OSPAR, 2008).



**Changes in relation to natural variability:** The large numbers of blue whales that were taken by commercial whalers will have masked any changes caused by natural variability. With such a small number remaining, natural variability may however become a major contributory factor in any further decline (OSPAR, 2008).

**Expert judgement:** There is overwhelming evidence of the severe decline in blue whale numbers as a result of past commercial whaling activity. Current threats are known but there is uncertainty about precise trends in the North East Atlantic stock. The IWC gives no estimate of population size for blue whales in the Northern Hemisphere at the present time (OSPAR, 2008). However there was a significant positive trend in abundance northeast of Iceland and in the total survey area around Iceland during 1987-2001 (Pike *et al.* 2009).

**ICES Evaluation:** The species occurs in all regions of the OSPAR area, but Region II is peripheral to the range of the species. The ICES Advisory Committee on Ecosystems (ICES, 2003) concluded that there is good evidence of decline but there is no evidence of a direct threat currently although indirect threats such as pollutant effects may be present (OSPAR, 2008).

### 3. Current status of the species

#### Distribution

The blue whale is found in all major oceans of the world (except the Arctic), but absent from some regional seas such as the Mediterranean, Okhotsk and Bering seas (IUCN, 2008).

**Distribution in OSPAR maritime area:** Stock structure in the North Atlantic is unclear; under the two-stock hypothesis it is the east Atlantic stock that occurs in the OSPAR Maritime Area. Apart from the Icelandic and Azores sightings, few blue whales have been reported from eastern North Atlantic waters recently. From late spring to summer, blue whales can be found in the productive feeding grounds around Iceland, in the Barents Sea and around Spitsbergen (OSPAR, 2008). The migration patterns in the OSPAR range are poorly known. Blue whales are observed from late winter to early summer off the Azores (January to August, with a peak between April and June) and Canary Islands and these may be observations on a migration north along the mid-Atlantic ridge to Iceland, where they are seen from May to September. Other blue whales probably migrate along the European coast, far offshore and out around Ireland to either Iceland or Norway. It is not clear where blue whales winter in the North Atlantic but the southernmost observations on the eastern side of the Atlantic are in the waters between the coast of Africa and the Cape Verde Islands (Sears & Perrin, 2009) whilst there is also evidence that some individuals remain in high northern latitudes throughout the winter months (Charif & Clark, 2000, 2009). There have been two recent sighting occurrences in deeper Atlantic waters to the west of Ireland (Ó Cadhla *et al.*, 2004; Wall *et al.*, 2009). Five further sighting records from Irish waters and the deeper Atlantic west of the European continental shelf were given in Reid *et al.* (2003).

**General distribution in the North Atlantic:** In the North Atlantic, eastern and western subdivisions are proposed. Photo-identification work from eastern Canadian waters indicates that blue whales from St. Lawrence, Newfoundland, Nova Scotia, New England, and Greenland all belong to the same stock, whereas blue whales photo-identified off Iceland and the Azores appear to be part of a separate population (Perrin *et al.*, 2002).

Apart from the Icelandic and Azores sightings, few blue whales have been reported from eastern North Atlantic waters recently.

In the North Atlantic, blue whales reach as far north as Davis Strait and Baffin Bay in the west, while to the east they travel as far north as Jan Mayen Island and Spitsbergen during summer months. Some

have been observed in the St. Lawrence as late as February; however, acoustic studies have revealed that they are spread out across the North Atlantic basin, south as far as Bermuda and Florida, with concentrations south of Iceland, off Newfoundland and Nova Scotia. The southernmost observations on the eastern side of the North Atlantic are in the waters between the coast of Africa and the Cape Verde Islands (Perrin *et al.*, 2002).

No specific breeding ground has been discovered for blue whales.

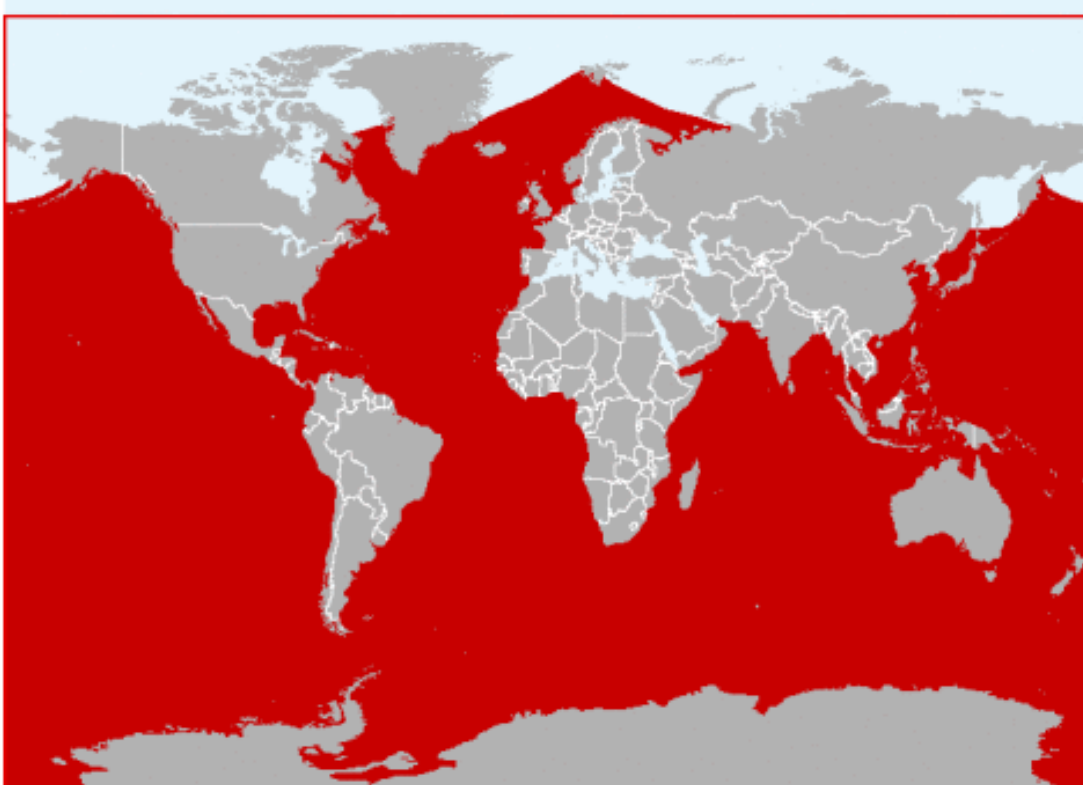


Figure 1: IUCN range map for the blue whale. In the North Atlantic the summer distribution of blue whales extends in the west from the Scotian Shelf to the Davis Strait (Canada) (NMFS 1998). Blue whales occur in the Denmark Strait, around Iceland and north to the ice edge, and in the northeast to Svalbard (Norway). Historically, blue whales were commonly caught along the coasts of North and West Norway, the Faeroes and the NW British Isles. They also occur in low numbers off NW Spain (Bérubé and Aguilar 1998) and in the past near the Strait of Gibraltar, but not in the Mediterranean (Reeves and Notarbartolo di Sciara 2006). The winter distribution is poorly known but it appears that in the past blue whales were widely distributed in the southern half of the North Atlantic in winter (Reeves *et al.* 2004) (IUCN, 2008).

#### **Population (current/trends/future prospects)**

Abundances (N) and actual conservation statuses (N/K):

The worldwide population is estimated at only 11% of the carrying capacity with some 10000-25000 individuals. The IUCN evaluation of the blue whale's global conservation status classes this species as endangered (EN). Indeed, its numbers have been reduced by more than 70% in less than three generations. A local evaluation classifies the North Atlantic stocks as vulnerable (VU) as the reproductive population counts less than 1000 individuals (IWC, 2008). Nevertheless, a significant

positive trend of 9% per year in abundance is reported in Icelandic and adjacent waters during 1987-2001 (Pike *et al.*, 2009).

Table 2: stocks, carrying capacity (K), actual abundance (N) for *B. musculus*.

Stocks or areas	K	N	Census year
Worldwide population ( <i>B. m. intermedia</i> , <i>B. m. breviceuda</i> , <i>B. m. musculus</i> , <i>B. m. indicus</i> )	275.000	5000-12.000 10000-25000	2002 (IUCN, 2008)
North-west Atlantic, north-east Atlantic ( <i>B. m. musculus</i> )	-	308 (St. Lawrence), 979 (CI 95%: 137-2542) (waters surrounding Iceland)	1987 1995

#### General IUCN assessment information:

Red List category & criteria: Endangered A1(abd)

Year assessed: 2008

Assessors: Reilly, S.B., Bannister, J.L., Best, P.B., Brown, M., Brownell Jr., R.L., Butterworth, D.S., Clapham, P.J., Cooke, J., Donovan, G.P., Urbán, J. & Zerbini, A.N.

Evaluators: Taylor, B.L. & Notarbartolo di Sciara, G. (Cetacean Red List Authority)

Justification: The cause of the population reduction in this species (commercial whaling) is reversible, understood, and is not currently in operation. For this reason, the species is assessed under criterion A1, not under A2, A3 or A4. There is no doubt that the global blue whale population has been depleted greatly. Although there are uncertainties over present abundance, the total population has been depleted by at least 70%, and possibly as much as 90%, over the last three generations, assuming a 31-year average generation time. The species therefore meets the criterion A1(abd) for Endangered, and probably meets the same criterion for Critically Endangered. The dominant contribution to the reduction in the global population is the massive reduction of the formerly very large Antarctic population. For that reason, the Antarctic blue whale (*B. m. intermedia*) subspecies should be treated separately as Critically Endangered due to a reduction over the same period of over 97% (that assessment will proceed in future). The pygmy blue whale (*B. m. breviceuda*) subspecies is less depleted. It is included in this global assessment (IUCN, 2008).

#### History:

- 1996 – Endangered (Baillie and Groombridge 1996)
- 1994 – Endangered (Groombridge 1994)
- 1990 – Endangered (IUCN 1990)
- 1988 – Endangered (IUCN Conservation Monitoring Centre 1988)
- 1986 – Endangered (IUCN Conservation Monitoring Centre 1986)

Blue whales were hunted relentlessly from the late 1800s and the species became severely depleted (Perrin *et al.*, 2002).

### *Current population sizes*

Generation time: The inferred value of 31 years for generation time given in Taylor et al. (2007) is considered appropriate, given an absence of any indications to the contrary from available biological information for the species. That implies that the three generation time window for applying the A (past reduction) criterion is 1914-2007 (IUCN, 2008).

**North Atlantic:** In the North Atlantic, about 400 whales have been photo-identified in the Gulf of St Lawrence (Ramp *et al.* 2006) and Pike *et al.* (2004) estimate 1000–2000 in the central North Atlantic (Iceland, Denmark Strait, East Greenland, Jan Mayen, Faeroes and the British Isles). Sightings of blue whales are still very rare in areas where substantial catches were made in the past – e.g. off Norway and especially in northern Norway (Christensen *et al.* 1992, Norwegian sighting surveys 1995-2006), Svalbard and the British Isles (Reid *et al.*, 2003). Approximately 8000 blue whales are specifically recorded in whaling statistics since the start of modern whaling in northern Norway in 1868, but an additional 30,000 unspecified large whales were recorded caught in the late 19th and early 20th centuries, of which perhaps as many as 25% could have been blue whales (IWC 2006). However, only about 1600 blue whales were caught after 1914, hence the main decline occurred primarily before the time window of interest (three generations). The population is estimated to have been recovering at 5.2% p.a. (SE 1.1%) in the Iceland/Denmark Strait area during 1969-88, after catching had ceased (Sigurjónsson and Gunnlaugsson 1990). Recent estimates of the rate of increase for the area is 9% per year (95% CI 2% to 17%) (Pike *et al.* 2009). Taken together this all suggests that the North Atlantic population was very low when whaling ceased in the mid-1960s (apart from a very few pirate whaling catches up to 1978) and may now be at or above the 1911 level but still well below the pre-whaling level (IUCN, 2008).

**Global:** The global population of blue whales is uncertain, but based on the above information, the global total for the species is plausibly in the range of 10,000-25,000, corresponding to about 3–11% of the population size (IUCN, 2008).

Population trend: Increasing (IUCN, 2008).

### **Condition (current/trends/future prospects)**

Blue whales were decimated by hunting in the first half of the twentieth century. This intensive exploitation started in the North Atlantic. Populations are still at depressed levels (Calambokidis *et al.*, 1997).

### **Limitation in knowledge**

No recent assessment of blue whale conservation status in the North Atlantic is available.

## 4. Evaluation of threats and impacts

Table 3: Summary of key threats and impacts to *B. musculus*

Type of impact	Cause of threat	Comment
Death or injury by ship strikes	Shipping and navigation	Increasing ship traffic increases this kind of threat for blue whales.
Disturbance	Research, whale-watching	If too invasive.
Entanglement in fishing gears	Fishing	Few entanglements have been reported but the risk exists.
Noise disturbance	Military activities (sonars)	Hearing damage, inter-individual communication affected, habitat loss, disturbance
Noise disturbance	Shipping and navigation	Hearing damage, inter-individual communication affected, habitat loss, disturbance
Noise disturbance	Oil and gas exploration and extraction activities	Hearing damage, inter-individual communication affected, habitat loss, disturbance
Health, fertility problems	Chemical pollution	Persistent organic pollutants bio-accumulate in lipid rich tissues (blubber).
Prey decline	Global warming	Consequences are still largely unknown, further studies are needed.
Habitat disturbance and loss	Noise pollution, reduction of sea surface ice (global warming), disturbance, removal of target species	In areas where habitat loss is a risk, studies are needed to evaluate how the species is at risk from this threat and how its effects might be mitigated..

*Cross-reference to checklist of human activities in OSPAR MPA Guidelines*

**Relevant human activity:** Shipping & navigation; military activity; fishing, hunting, harvesting; research.

**Category of effect of human activity:** Physical – Noise disturbance. Biological – removal of target species, removal of non-target species, physical damage to species.

Commercial whaling was undoubtedly the cause of the decline in blue whale numbers in the last century and therefore there was a clear link between the threat to this species and human activities. Today the threats that may lead to further decline or failure to recover are more indirect. They include marine pollution, poor water quality, acoustic disturbance, and collisions with vessels (OSPAR, 2008).

At least 25% of the blue whales photo-identified in the St. Lawrence carry scars that can be attributed to collisions with shipping.

Few entanglements in fishing gear have been reported.

Persistent contaminants accumulated over time, such as PCBs, may have an impact on reproduction and limit the recovery of certain populations.

The increasing anthropogenic noise probably has an impact on blue whales and their habitat and could also limit recovery of this species (Perrin *et al.*, 2002).

During this century, a profound reduction in the extent of sea ice in the Arctic is expected, and possibly a complete disappearance in summer, as mean Arctic temperatures rise faster than the global average (Turner *et al.* 2006). The implications of this for blue whales are unclear but warrant monitoring (IUCN, 2008).

In recent years, there was a temporal shift in the whale watching activity in the Azores. Now, the operators begin their activity in early spring to coincide with the migration of blue whales through the region. Although the whale watching activity is regulated, lack of law enforcement raises concerns for the welfare of the animals.

## 5. Existing Management measures

The population was severely depleted before it was given protection by the IWC in 1964 and, while it was too rare to be the main target species of any fishery it was vulnerable to illegal whaling. OSPAR does not deal with whaling issues directly but can communicate an opinion on it to the IWC and to the North Atlantic Marine Mammal Commission (NAMMCO). Management measures need to be geared towards enabling the recovery of the population and, apart from direct protection this could include actions to minimize acoustic disturbance (OSPAR, 2008).

The IUCN have classified the Blue Whale as an endangered species (IUCN, 2002). The species is on Appendix I of both CITES and CMS. Blue whales are also protected by the Bern Convention (Annex III).

Like all cetaceans, blue whales are listed in the Annex IV of the European Habitat Directive.

As a cetacean species known to occur in the waters of European Fishery Zones, Blue whales are afforded strict protection as Annex IV species under the EU Habitats Directive (i.e. Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora).

In Ireland, all whales are listed as a protected species under the Wildlife (Amendment) Act 1976-2005 making it an offence to hunt, kill or injure a whale and/or disturb their breeding or resting places. In addition, a “Code of Practice for the Protection of Marine Mammals during Acoustic Seafloor Surveys in Irish Waters” has been in place since 2007. This is applied by all Authorities when licensing acoustic surveys, e.g., petroleum exploration and development, marine scientific research, etc. The guidelines provide mitigation measures designed to minimise the potential impact on cetaceans from certain anthropogenic sound sources including *inter alia* seismic surveys.

Similarly, in the UK, blue whales are protected under the various country-specific Habitats Regulations and the Offshore Regulations, which make it an offence to hunt, kill or injure and/or disturb them. In 2010, guidance will be provided on regulations related to the protection of all cetaceans in UK waters from injury and disturbance potentially caused by human activities. In addition, as part of the consents process for undertaking seismic surveys, and activities involving explosives and piling, there is a requirement to undertake operations in accordance with JNCC guidelines which include conducting marine mammal observations prior to and during the activity and utilising procedures to reduce and avoid direct harm to animals (see <http://www.jncc.gov.uk/default.aspx?page=4273>).

## 6. Conclusion on overall status

The blue whale stock in the OSPAR region, as in all the species range, is still at a very low level compared to pre-whaling stocks, despite more than 40 years of protection against whaling. Populations may be slowly recovering from post-whaling minimal levels. Various threats can indirectly impede this recovery process. The status and seasonal occurrence within the overall OSPAR Maritime Area is poorly understood.

## 7. Action to be taken by OSPAR

### **Actions/measures that OSPAR could take, subject to OSPAR agreement**

As set out in Article 4 of Annex V of the Convention, OSPAR has agreed that no programme or measure concerning a question relating to the management of fisheries shall be adopted under this Annex. However where the Commission considers that action is desirable in relation to such a question, it shall draw that question to the attention of the authority or international body competent for that question. Where action within the competence of the Commission is desirable to complement or support action by those authorities or bodies, the Commission shall endeavour to cooperate with them. For the avoidance of doubt, in the context of the OSPAR Convention, the management of fisheries includes the management of marine mammals.

OSPAR recognises that the IWC is the main international organisation in charge of protecting large whales in the world and assessing their status. Therefore OSPAR could contact the IWC to notify its concern about the status and conservation of the North Atlantic stock(s) of the blue whale and request that issues relative to assessing the status of this stock(s) and the current level of the threats that it is currently facing would be placed as priority issues in the IWC Scientific Committee agenda.

OSPAR recognizes that NAMMCO is a regional organization in charge of the conservation and management of marine mammal stocks in the North Atlantic. Therefore OSPAR could contact NAMMCO to notify its concern about the status and conservation of the North Atlantic stock(s) of the blue whale and request that issues relative to assessing the status of this stock(s) and the current level of the threats that it is currently facing would be placed as priority issues in the NAMMCO Scientific Committee agenda.

OSPAR could also consider:

- a. developing guidelines or Codes of Practice to mitigate the potential impact on cetacea (including Blue whales) of anthropogenic sound sources.
- b. use and application of the reporting system for ship strikes of large whales operated by the ICES ship strikes working group to develop better information on the scale of this occurrence and possibly identify critical areas or seasons for such events.
- c. encouraging Contracting Parties to facilitate information exchange and cooperate in research efforts where new records of this endangered species occur within the OSPAR Maritime Area.

### **Actions/measures for relevant Contracting Parties**

OSPAR could request that Contracting Parties:

- a. report on a regular basis on any available information regarding the status of the species in the OSPAR region as well as the extent and levels of potential threats in the species habitat.
- b. consider the endangered status of the North Atlantic blue whale stock in the planning of any activity in the species habitat (e.g. shipping lane, seismic survey, fisheries).
- c. communicate any new sighting or acoustic records of the species to OSPAR, other Contracting Parties and to the relevant authorities and institutions internationally.
- d. implement effective mitigation measures for potential threats to the remaining Blue whale stocks.
- e. include the consideration of potential occurrence of Blue whale in designing national and international cooperative research programmes for cetaceans, as appropriate.



Table 4: Summary of key priority actions and measures which could be taken for *B.musculus*. Where relevant, the OSPAR Commission should draw the need for action in relation to questions of fisheries management to the attention of the competent authorities. Where action within the competence of the Commission is desirable to complement or support action by those authorities or bodies, the Commission shall endeavour to cooperate with them.

<b>Key threats</b>	Death or injury by ship strikes, noise pollution, chemical pollution, habitat loss	
<b>Relevant Contracting Parties</b>	Denmark, France, Iceland, Ireland, Norway, Portugal, Spain, UK	
<b>Other responsible authorities</b>	NAMMCO; IWC; CITES	
<b>Already protected? Measures adequate?</b>	IWC (fully protected) Bern Convention Annex II Bonn Convention (CMS) Annex I CITES Appendix I IUCN Red List (Endangered) EU Habitats Directive Annex IV	Current measures mostly ban hunting and international trade of blue whale. No measure is designed to protect habitat against identified threats such as global warming, ecosystem shifts and associated effect on prey stocks, pollution, man-made noise, ship strikes... Guidance to mitigate the impact on cetaceans of anthropogenic sound from acoustic surveys is in place in Ireland and the UK.

### Suggestions for further research

Further research should start with an assessment of the species conservation status in the area from existing information (stock structure, abundance, distribution). OSPAR could invite Contracting Parties which are partners of the NASS surveys series to analyze specifically blue whale data.

Passive acoustic methodology has been shown to be particularly suited to monitoring the seasonal occurrence of blue whales in the northeast Atlantic (Clark and Charif, 2000; Charif and Clark, 2009) and other parts of the world (Samaran, 2008). OSPAR could stimulate dedicated development of such research approaches in the North Atlantic.

### Brief summary of the proposed monitoring programme

OSPAR should engage further with IWS and NAMMCO in considering appropriate development needs for monitoring of blue whales.

## Annex 1: Overview of data and information provided by Contracting Parties

Contracting Party	Feature occurs in CP's Maritime Area	Contribution made to the assessment (e.g. data/information provided)	National reports References or web links
<i>Belgium</i>			
<i>Denmark</i>	yes		
<i>European Commission</i>			
<i>France</i>	yes		
<i>Germany</i>			
<i>Iceland</i>	yes	<a href="#">yes</a>	
<i>Ireland</i>	yes	<a href="#">yes</a>	<a href="#">Charif and Clark 2009</a> ; <a href="#">Charif and Clark 2000</a> <a href="#">Ó Cadhla <i>et al.</i>, 2004</a> <a href="#">Reid, Evans and Northbridge 2003</a> <a href="#">Wall <i>et al.</i>, 2009</a>
<i>Netherlands</i>			
<i>Norway</i>	yes	<a href="#">yes</a>	
<i>Portugal</i>	yes	<a href="#">yes</a>	
<i>Spain</i>	yes		
<i>Sweden</i>			
<i>UK</i>	yes	<a href="#">yes</a>	<a href="#">Charif and Clark 2009</a> ; <a href="#">Charif and Clark 2000</a> <a href="#">Reid, Evans and Northbridge 2003</a>

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