



BLUE WHALES AND CLIMATE CHANGE

The future of the Blue Whale is threatened by the effects of climate change – Photo: Blue Whale © UW News

ABOUT THE BLUE WHALE

Names:

Scientific: *Balaenoptera musculus*

English: Blue Whale

French: Baleine bleue

Spanish: Ballena Azul

The Blue Whale is found in all the oceans on Earth except the Arctic. It is estimated that the global population ranges between 10,000 and 25,000 individuals, which according to IUCN is between 3 and 11 per cent of their population in the year 1911. They are the largest animals ever to have lived on the planet, weighing up to 200,000 kg and reaching up to 30 m in length. A cow usually gives birth to a single calf every 2 - 3 years and, apart from the rearing period, these whales appear to travel alone or in small groups. However, as their voices are incredibly powerful, in fact the loudest of any creature, it may well be that they communicate and travel in larger groups.

The diet of *Balaenoptera musculus* is mainly composed of krill (planktonic, shrimp-like crustaceans). The whales need to eat about 4,000 kg per day during the summer months. Blue Whales typically need to be near the surface of the water to feed at night; diving to greater depths is required to follow the krill's diurnal vertical migrations. Although knowledge is lacking regarding migration patterns of discrete populations, Blue Whales have been observed feeding in Antarctic waters during the summer months before migrating to warmer waters for their winter breeding cycle.

Threats due to climate change

Historically, the Blue Whale's main threat was commercial whaling. Populations decreased drastically, prompting various international whaling bans which have helped the species recover to present day numbers. However, other threats menace these amazing creatures, such as habitat loss, entanglement in fishing gear, chemical and sound pollution and the overfishing of krill. In addition, a more recent threat to these ocean giants is climate change.

The melting of polar ice due to climate change has been recognized as an indirect threat to the Blue Whale. This could be a problem for the Blue Whale because its principal prey, krill, is dependent on algal plankton and there is a strong association between at least some of this plankton and the ice. For example, some marine algae are found on the underside of the ice in cracks and in crevices. The algae are also trapped between ice crystals which are formed during the autumn as the sea water freezes. The marine algae grow around the ice during the winter, supplying a rich diet for krill populations which overwinter under the sea ice. When the ice melts in the summer, the algae are released into the water where they photosynthesize and multiply in number, providing food for various species such as krill. The melting of the ice is a serious cause for concern as lower levels of ice reduces the optimal habitat for marine plankton.

Apart from *Balaenoptera musculus's* reliance on healthy krill populations, the melting of the Antarctic ice will have a more direct effect on the Blue Whale. The whales will be forced to migrate hundreds of kilometres further south, perhaps more than 500, to reach the retreating ice where the marine algae grow and the krill feed. This makes the migration longer for the Blue Whales, taking up more of their energy and resulting in a shorter foraging season which is their primary feeding time. The energy stores they build up during this period should sustain the whales throughout the migration and breeding periods. If they cannot build up sufficient stores of energy due to the shorter feeding season, the non-feeding seasons may be particularly arduous for these whales.

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The timing of the algal bloom is also critical for the survival of these whales. If these blooms are unpredictable due to an erratic climate, the whales may arrive too early or too late, with negative impacts on their ability to feed. This could mean that their fitness, possibly including their ability to reproduce, would be impaired. However, the likely results of climate-related threats such as these remain largely uncertain due to the low numbers of animals and the challenges involved in studying them.

In addition to warming sea waters are also becoming more acidic due to the uptake of carbon dioxide (CO₂) from the atmosphere. This is problematic for crustaceans such as krill, which need carbonate ions to form their calcium carbonate-based exoskeletons. In addition, ocean acidification is known to inhibit the viability of krill eggs. Krill eggs sink to deep, cold waters to hatch but these waters also now contain higher levels of carbon dioxide, reducing hatching success. Negative impacts of climate change and ocean acidification on krill are deeply concerning as krill play such a pivotal role in the survival of the Blue Whale and the Antarctic ecosystem in general.

Species Listing

Balaenoptera musculus was placed on Appendix I of the Convention on the Conservation of Migratory Species (CMS) in 1979 and is included under the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic Area (ACCOBAMS) and the Memorandum of Understanding for the Conservation of Cetaceans and their Habitats in the Pacific Islands Region. It is considered 'Endangered' by the International Union for Conservation of Nature (IUCN) and is found on Appendix I of the Convention on International Trade Endangered Species of Wild Fauna and Flora (CITES).



Photos: Blue Whale (*Balaenoptera musculus*) © David Slater; Blue Whales off Redondo Beach Coast © mikepmiller

About CMS

The Convention on the Conservation of Migratory Species of Wild Animals (CMS), also known as the Bonn Convention, works for the conservation of a wide array of endangered migratory animals worldwide through negotiation and implementation of agreements and species action plans. It has 130 Parties (as of 1 February 2020).

CMS engages all relevant stakeholders in addressing threats to migratory species in concert with all other aspects of wildlife conservation and management.

CMS Instruments

Animals receive protection under CMS through listing on its two Appendices, through global or regional agreements and through action plans.

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