

INTRODUCTION

Polar Research Special Cluster—Beluga whales (*Delphinapterus leucas*): knowledge from the wild, human care and TEK

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Beluga whales (also known as white whales) are distributed throughout much of the circumpolar Arctic and, in addition, occur in some few Subarctic areas (Fig. 1). They are one of the three Arctic cetaceans that live much of their lives in close association with sea ice, occupying areas that have at least seasonal ice coverage. Across the 21 recognized stocks globally, hunting levels, population trends, basic aspects of ecology and knowledge of individual stocks are highly variable, making a simple species-level description of the beluga's conservation status inadequate. Regardless of the status of individual stocks, a common concern for the future of the species is warranted, given the substantial warming of the Arctic climate and concomitant changes to, and degradation of, beluga habitats. The need to monitor beluga populations and collate available knowledge of their biology at regional levels has been recognized for decades as essential for management (Cooke 1991).

The International Whaling Commission's (IWC) Scientific Committee carried out an initial global review of white whale stocks in 1992 (IWC 1993) and a more thorough review in 1999 (IWC 2000). In the latter year, the Scientific Committee Working Group on the Population Status of Beluga (and Narwhal) of the North Atlantic Marine Mammal Commission (NAMMCO) carried out a stock-by-stock review of white whales in the Atlantic Arctic and Subarctic (NAMMCO 1999). Large knowledge gaps were noted for some stocks in all these review efforts. In an attempt to stimulate comprehensive and unified collection of data on belugas and unite various communities' knowledge about this species, L'Océanografic, in partnership with the US Fish and Wildlife Service, organized the First International Workshop on Beluga Whale (and Ringed Seal) Research and Conservation, which was held at L'Océanografic in Valencia, Spain, in March 2007. The workshop included Traditional Ecological Knowledge (TEK) holders, marine mammal scientists who studied wild populations, and

scientists and animal-care specialists from facilities housing these animals. Enthusiasm among participants and extensive collaboration after the workshop with the Arctic Council's Conservation of Arctic Flora and Fauna (CAFF) secretariat and working groups led to detailed monitoring plans (e.g., Kovacs 2007, 2014; Laidre 2007), but the official workshop output was only a more general framework for monitoring Arctic marine mammals (Simpkins et al. 2009).

In 2017, the International Union for Conservation of Nature (IUCN) Species Survival Commission's Cetacean Specialist Group updated its assessment of the global conservation status of belugas, which was generally considered favourable while acknowledging that there were important gaps in knowledge for some stocks (Lowry et al. 2017). In March 2017, a beluga (and narwhal) workshop—Global Review of Monodontids (GROM)—was held in Hillerød, Denmark (hosted by NAMMCO, with additional funding from the Government of Greenland, the US Marine Mammal Commission and Shell Oil). The final workshop report contained information on distribution and stock identity, abundance, past and current commercial and subsistence removals, population trends, sustainable limits on removals, habitat threats and other concerns, and conservation status of stocks for which there were enough data (NAMMCO 2018; Hobbs et al. 2019). Ongoing climate change and other environmental stressors were noted as primary threats to belugas, consistent with several recent studies (e.g., Kovacs et al. 2011; Laidre et al. 2015). The quantity, type and quality of available information varied greatly from stock to stock, often with abundance estimates lacking or outdated and with no information on trends. Of the 22 stocks recognized by the GROM, one (south-west Greenland) was classified as extirpated and another (Ungava Bay, northern Quebec) as possibly extirpated; overharvesting was thought to be the cause in both cases. Among the 20 remaining stocks, one was classified as increasing (or stable), four were classified

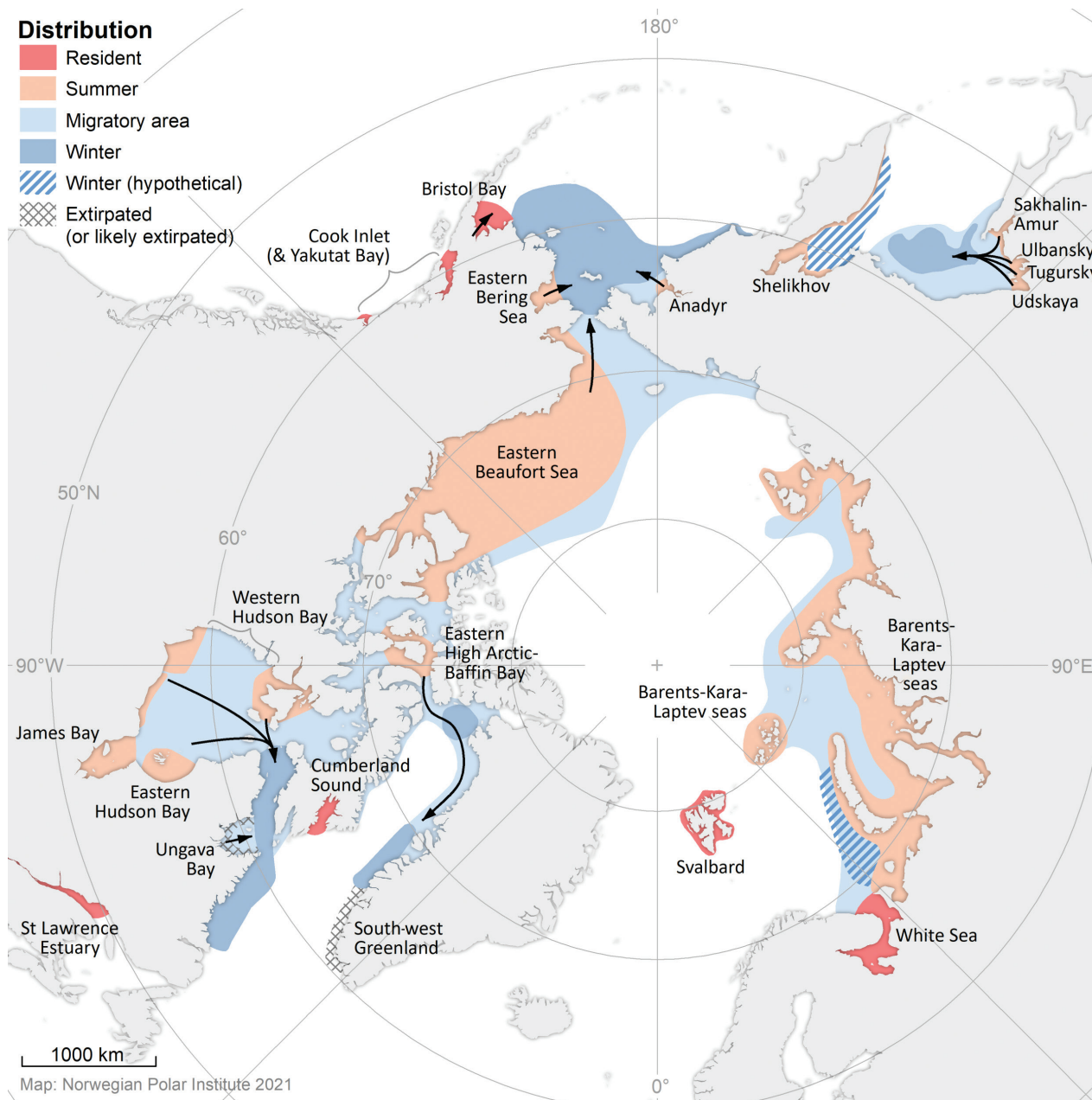


Fig. 1 Map of beluga distribution, with stocks and, where appropriate, seasonal migratory paths indicated.

as stable, three were known to be declining and the trends of the other 12 stocks were unknown. Five stocks (in addition to the possibly extirpated Ungava Bay stock) were judged to be of highest concern on the basis of available knowledge. The Cook Inlet stock in Alaska was seriously depleted by overhunting and has continued to decline despite being protected from hunting since the early 2000s. The cumulative effects of ongoing human activities in Cook Inlet—anthropogenic noise, shipping, oil and gas developments, commercial and sport fishing,

etc.—are likely preventing the recovery of this small population of less than 300 animals (also see Lowry et al. 2019). Centuries of removals have left the St. Lawrence population at only about 900 today. Despite a long period of protection from harvest, this population faces pollution, disturbance and habitat degradation challenges. The Cumberland Sound and Eastern Hudson Bay stocks (both in eastern Canada), currently numbering around 1200 and 3500–4000, respectively, were subjected to intensive commercial drive hunting in the 19th and early 20th

centuries, followed by decades of overhunting for subsistence. Managing the hunting of these stocks continues to be a major challenge. The GROM also raised specific concerns about the Barents–Kara–Laptev seas stock (in the Russian Arctic) because so little was known about it. Soviet-era hunting almost certainly caused considerable depletion, and the rapid increases in ship traffic, industrial and urban developments, tourism and a military presence, as the Northern Sea Route becomes more navigable, meaning that greater attention should be paid to the white whales in this vast region. However, other stocks are also poorly known, and monitoring continues to be sporadic or nonexistent for many beluga stocks. The lack or inadequacy of current information is a significant basis for concern regarding the conservation status of some additional beluga stocks. The GROM concluded that in light of the rapid, large-scale alterations that are under way in the biophysical environment, and the associated changes in human demography and human activities throughout the high-latitude range of white whales, it is important that these animals and their habitat are monitored closely, stock by stock, and that a precautionary approach is applied to the management of hunting, industrial and commercial activities, tourism and scientific exploration (Hobbs et al. 2019).

Our spotty knowledge of beluga stocks, threats posed by climate change and many other anthropogenic factors, and the challenges of unifying various knowledge sources led Mystic Aquarium to initiate the Second International Workshop on Beluga Whale Research and Conservation, 12–14 March 2019. One hundred and fifty participants from eight countries made their way to Mystic, Connecticut, to share and update knowledge of belugas obtained from scientific studies and from TEK holders, from animals in the wild and in human care. Four keynote addresses provided regional assessments of conservation status and concerns across the beluga's range, and 34 oral and 28 poster presentations were held within the themes of (1) behaviour and ecology, (2) aquarium animal husbandry, science and education and (3) conservation and management. Lively group discussions following the presentations and themed panel discussions illustrated the synergy gained by sharing knowledge from different sources, solidifying the whole community's desire for beluga conservation globally. This cluster of articles—Beluga whales (*Delphinapterus leucas*): knowledge from the wild, human care and TEK—aims to capture some of the knowledge from the workshop and share it more broadly to help address conservation issues currently faced by this species (and other Arctic endemic marine mammals that must deal with climate change impacts on their habitats).

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