



Late summer distribution and abundance of ice-associated whales in the Norwegian High Arctic

Jade Vacqué-García^{1,*}, Christian Lydersen¹, Tiago A. Marques^{2,3}, Jon Aars¹,
Heidi Ahonen¹, Mette Skern-Mauritzen¹, Nils Olsen¹, Rolf M. Kovacs¹

¹Norwegian Polar Institute, Postboks 40, 8200 Tromsø, Norway

²Centre for Research into Ecological & Environmental Modelling (CREEM) Ocean Institute, Buckham Gardens, St Andrews, KY16 9LX, UK

³Centro de Estatística e Aplicações da Universidade de Lisboa, Campo Grande, 1700-016 Lisboa, Portugal

⁴Institute of Marine Research, 5017 Bergen, Norway

ABSTRACT: The Arctic is experiencing rapid warming, and resultant sea ice losses represent a serious threat to ice-associated species in the region. This study explored the distribution and abundance of the 3 Arctic resident whale species: narwhals, bowhead and white whales, in the marginal ice zone and into the sea ice north of the Svalbard Archipelago. Line-transect surveys were conducted using a combination of helicopter-based and ship-based efforts in August 2015. Twenty-six sightings, involving 27 bowhead whales and 58 narwhals, occurred along the helicopter transects, while no whales were recorded along ship transects. No white whales were observed during these surveys. After correcting for surface availability, distance sampling produced abundance estimates of 343 (CV = 0.468) bowhead whales and 837 (CV = 0.501) narwhals within the 52 910 km² study area. Bowhead whales were predominantly seen close to the ice-edge, whereas narwhals were located deeper into the ice. To contextualize these results within the broader Svalbard cetacean community, all whale sightings from the Norwegian Polar Institute's Svalbard Marine Mammal Sighting Data Base, from the period of the survey, were mapped to compare general distributions. These opportunistic sightings included numerous cetacean species, especially seasonally occurring ones. However, white whales dominated in terms of the numbers of individuals reported. Our results suggest little spatial overlap between seasonally occurring whales and the 3 Arctic resident whales. Bowhead whales and narwhals were tightly associated with sea ice, and white whales were tightly coastal. In contrast, the seasonally occurring species were found near the shelf and along its edges.

KEY WORDS: Abundance • Arctic • Bofugas • Bowhead whales • Climate change • Distribution • Narwhals • Svalbard • White whales

INTRODUCTION

Climate change has already caused warming of the atmosphere and oceans (IPCC 2013). In the oceans, this warming results in deepening of the thermocline, increased ocean stratification, decreased dissolved oxygen at depth as well as reduction of sea ice cover (Joos et al. 2003, Ballal et al. 2015). The Arctic region is changing most rapidly, with sea ice loss

now being one of the most visible climate-induced changes to date (Walsh 2006, Ossefson et al. 2014). The Svalbard Archipelago in Norway is an Arctic 'hot spot', which is experiencing anomalously high losses of sea ice in terms of overall extent, thickness, proportion of multiyear ice and seasonal duration of sea ice, as well as large increases in both air and water temperatures (Perlov et al. 2013, Nordli et al. 2014, Latdre et al. 2015, Stephenson & Smith 2015).

*Corresponding author: jadevacquegarci@gmail.com

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