

Identifying Marine Mammal Fall Migration Core Areas in the U.S. Beaufort Sea

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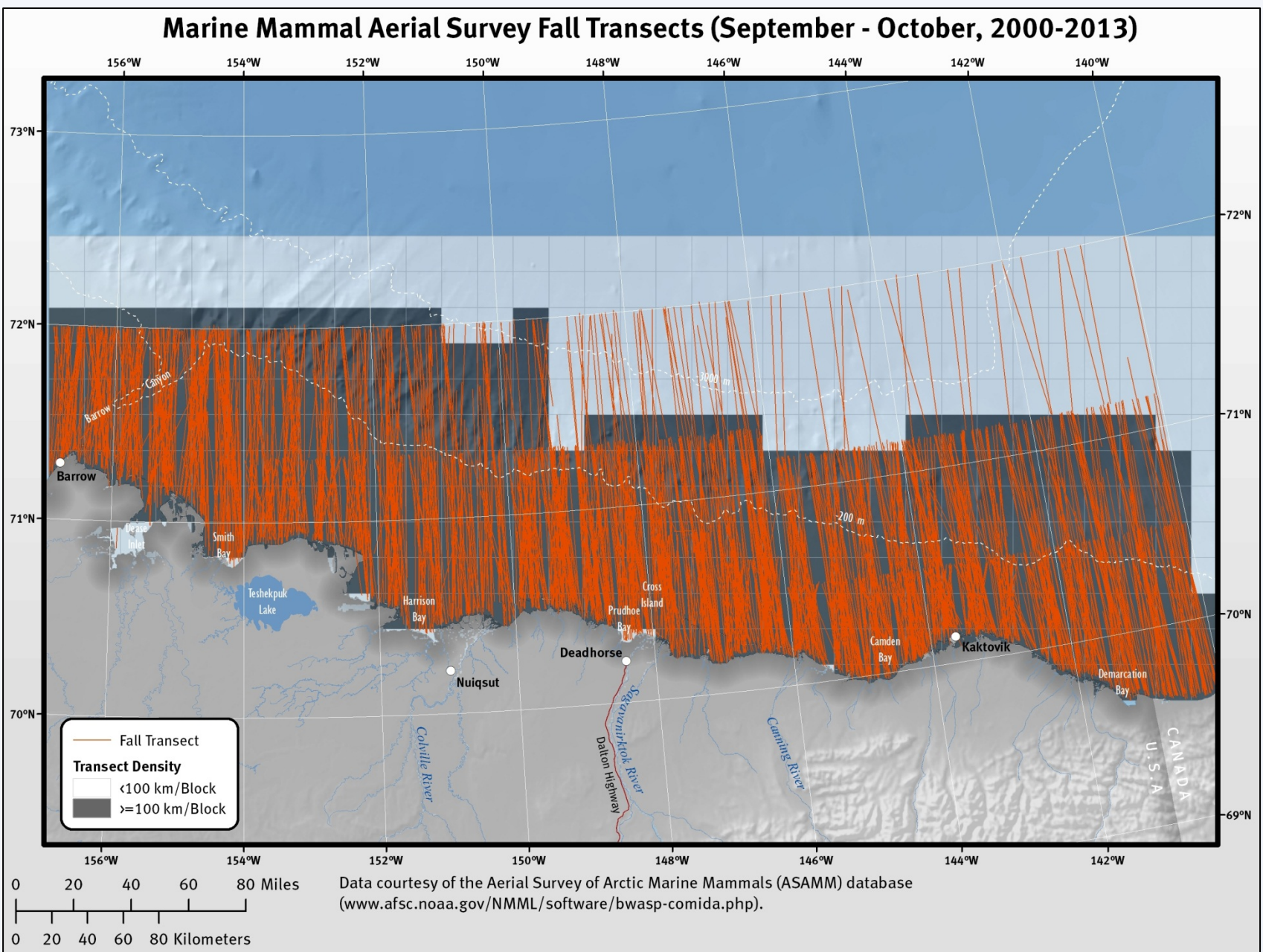


Introduction

An understanding of the distribution of marine mammals is needed to minimize impacts from expanding industrial activities in the Arctic Ocean. We examined observations of bowhead whales, beluga whales, and pinnipeds from the NOAA/BOEM Aerial Surveys of Arctic Marine Mammals (ASAMM) database¹ to identify fall migration corridors and core areas.

Methods

- 2000-2013 fall (after Sept. 1) on-transect data
- 20x20km grid created over U.S. Beaufort Sea
- Survey effort per grid cell calculated
- Grid cells with < 100km effort removed
- Observation rate in each grid cell calculated (# of animals/100km of survey effort)
- Grid cells converted to point data (centroid)
- Grid cell values smoothed with 80x40km elliptical kernel density function (widest in east-west direction)
- Isopleth contours generated to identify core areas (50% isopleth)



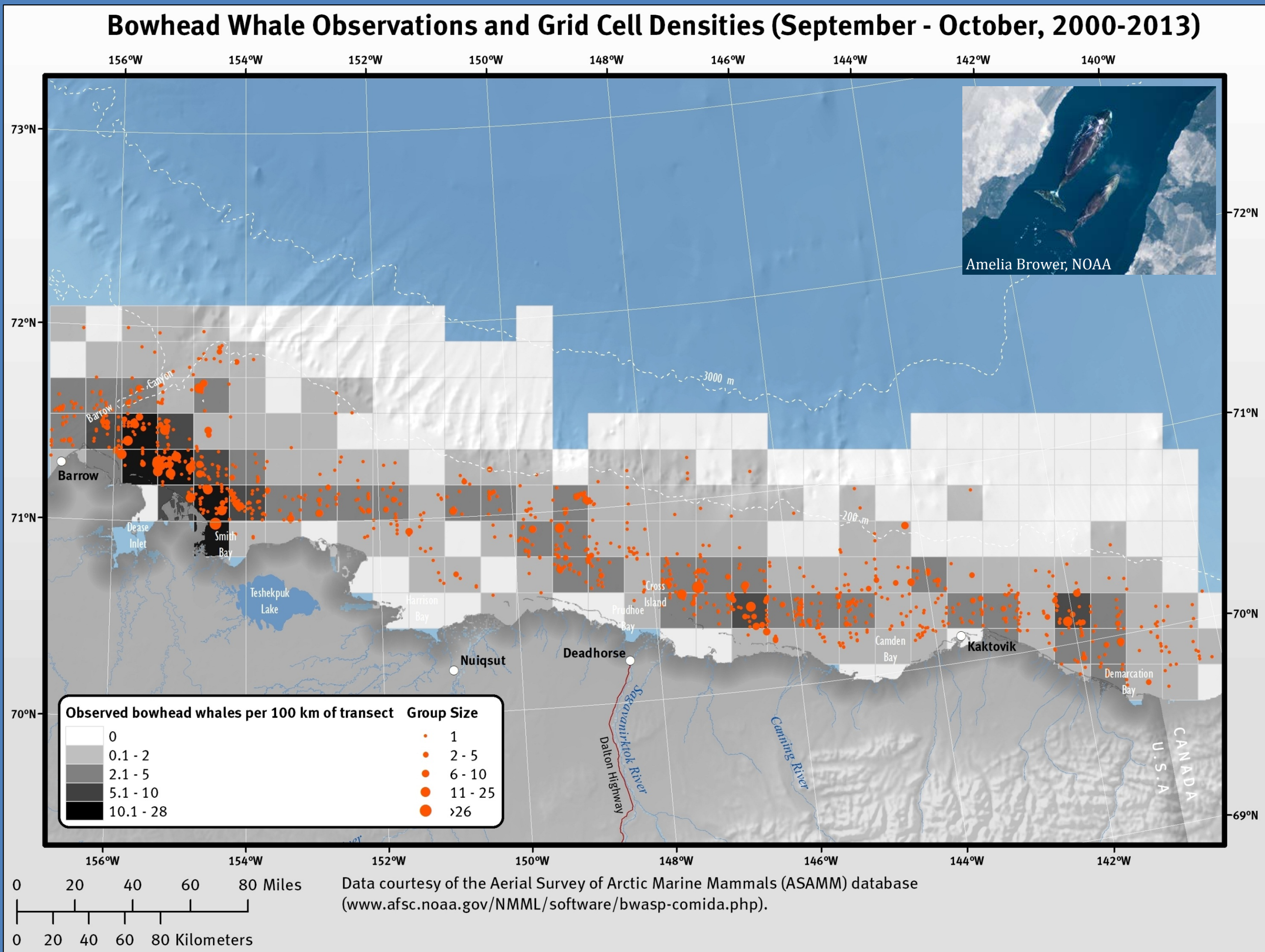
Results and Discussion

While marine mammal migration routes are often considered pass-through travel corridors, our analyses of the ASAMM database¹ indicate spatial heterogeneity and varying intensity of use within those corridors. Our results are consistent with studies documenting bowhead and beluga whale core areas off Point Barrow² and Barrow Canyon³, despite using different data sources and methodologies. At present the ASAMM data alone is not adequate to identify core areas for pinnipeds, because the surveys often combine species and were not designed to evaluate pinniped densities¹.

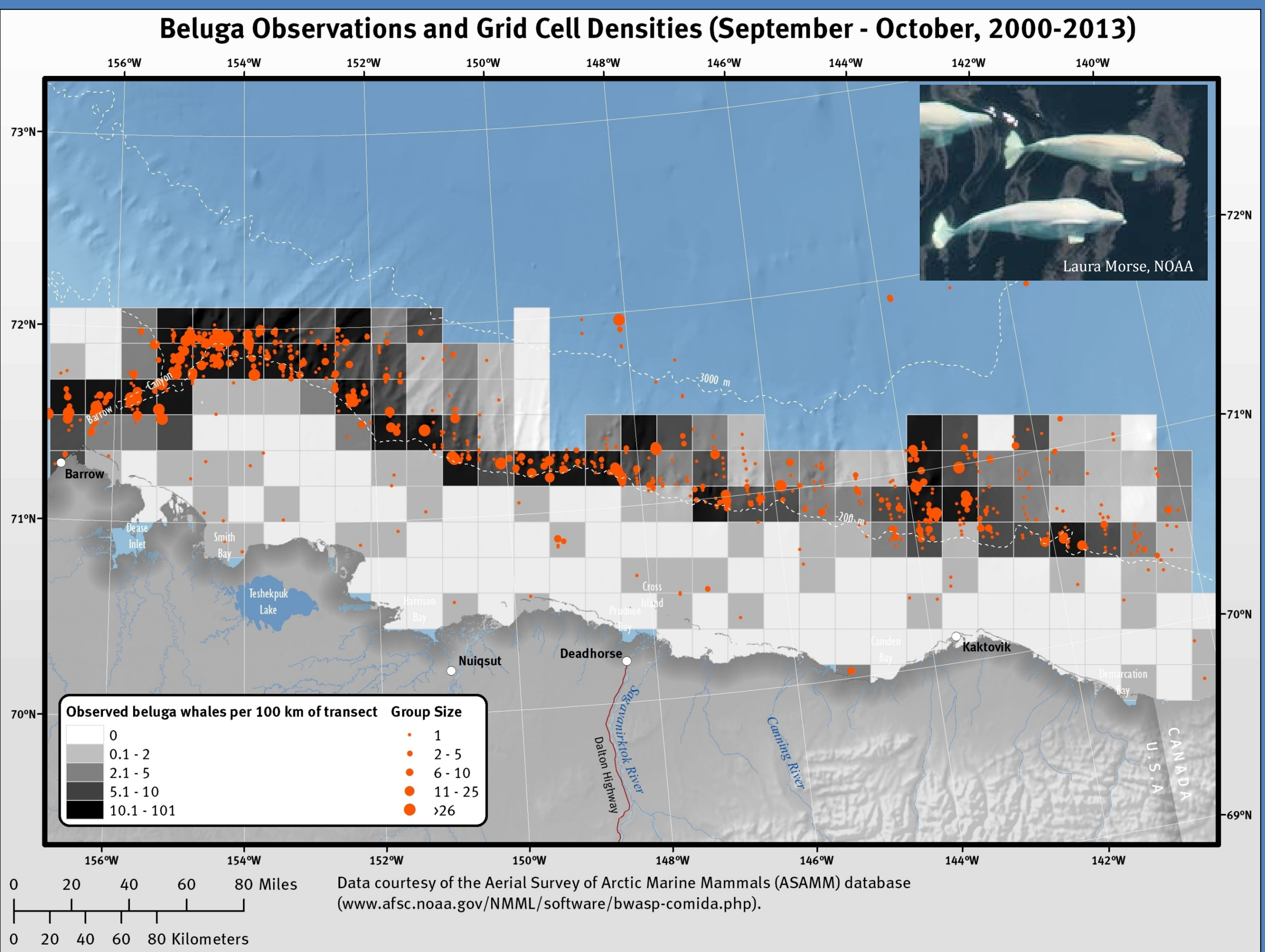
- 1) Clarke, J. T., A. A. Brower, and others. 2014. Distribution and Relative Abundance of Marine Mammals in the Northeastern Chukchi and Western Beaufort Seas, 2013. Annual Report, OCS Study BOEM 2014-018. NMML, NOAA, Database: www.afsc.noaa.gov/NMML/software/bwasp-comida.php.
- 2) Ashjian, C. J., S. R. Braund, and others. 2010. Climate variability, oceanography, bowhead whale distribution, and Inupiat subsistence whaling near Barrow, Alaska. Arctic 63:179-194. Citta, J. J., L. T. Quakenbush, and others. 2014. Ecological characteristics of core-use areas used by Bering-Chukchi-Beaufort (BCB) bowhead whales, 2006-2012. Progress in Oceanography.
- 3) Hauser, D. D. W., K. L. Laidre, and others. 2014. Population-specific home ranges and migration timing of Pacific Arctic beluga whales (*Delphinapterus leucas*). Polar Biology.

Observations & Grid Cell
Relative Density

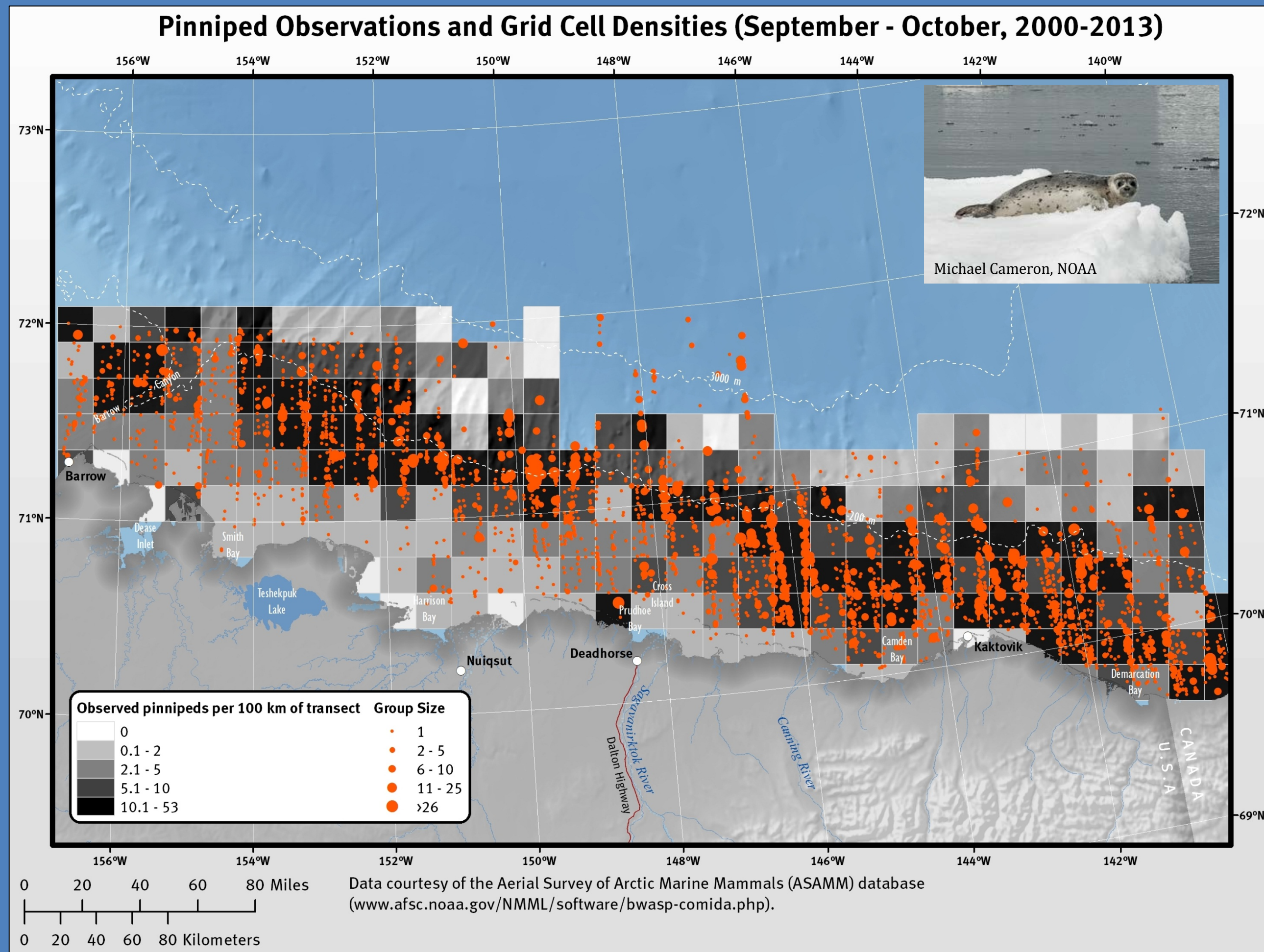
BOWHEAD



BELUGA

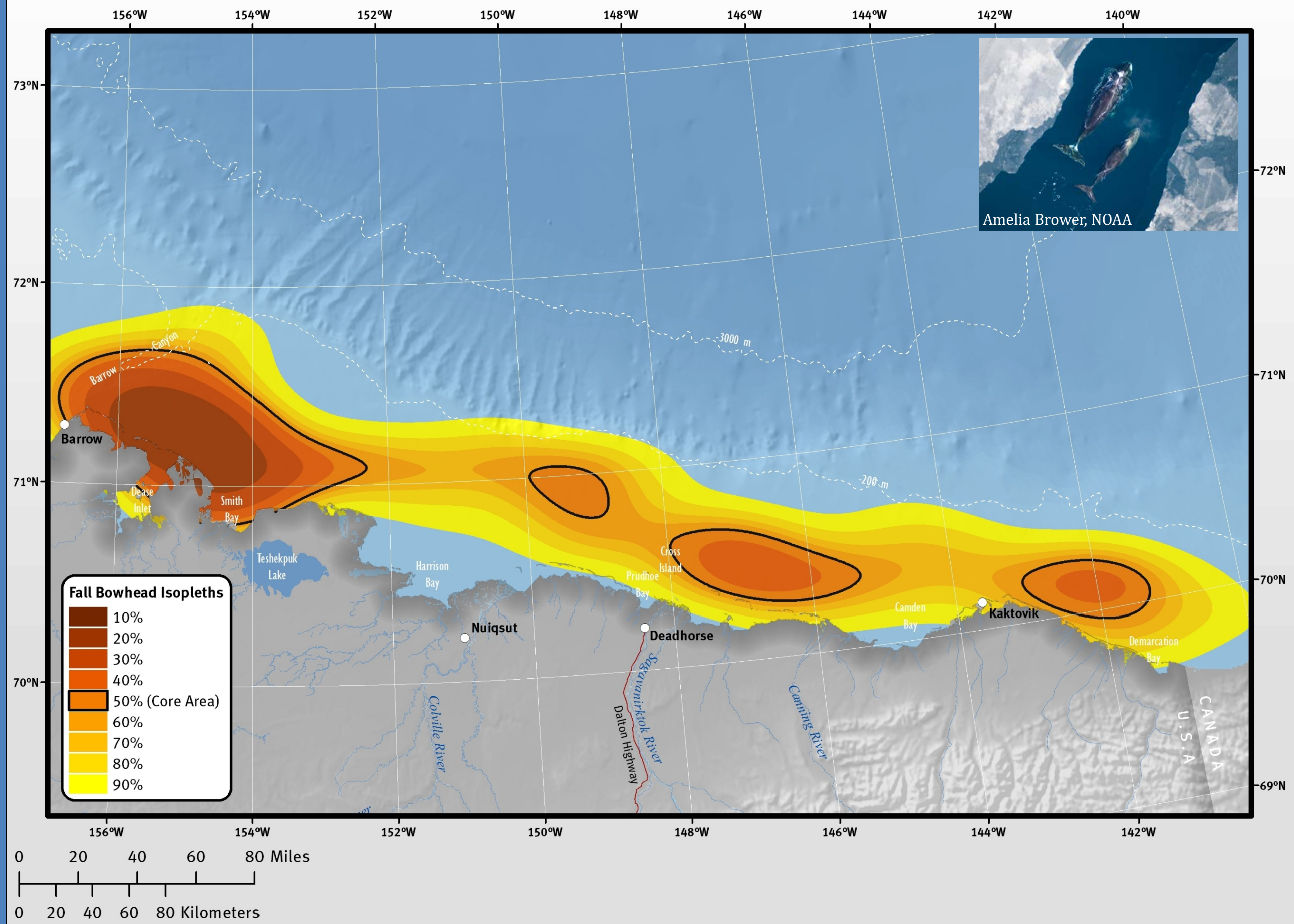


PINNIPED

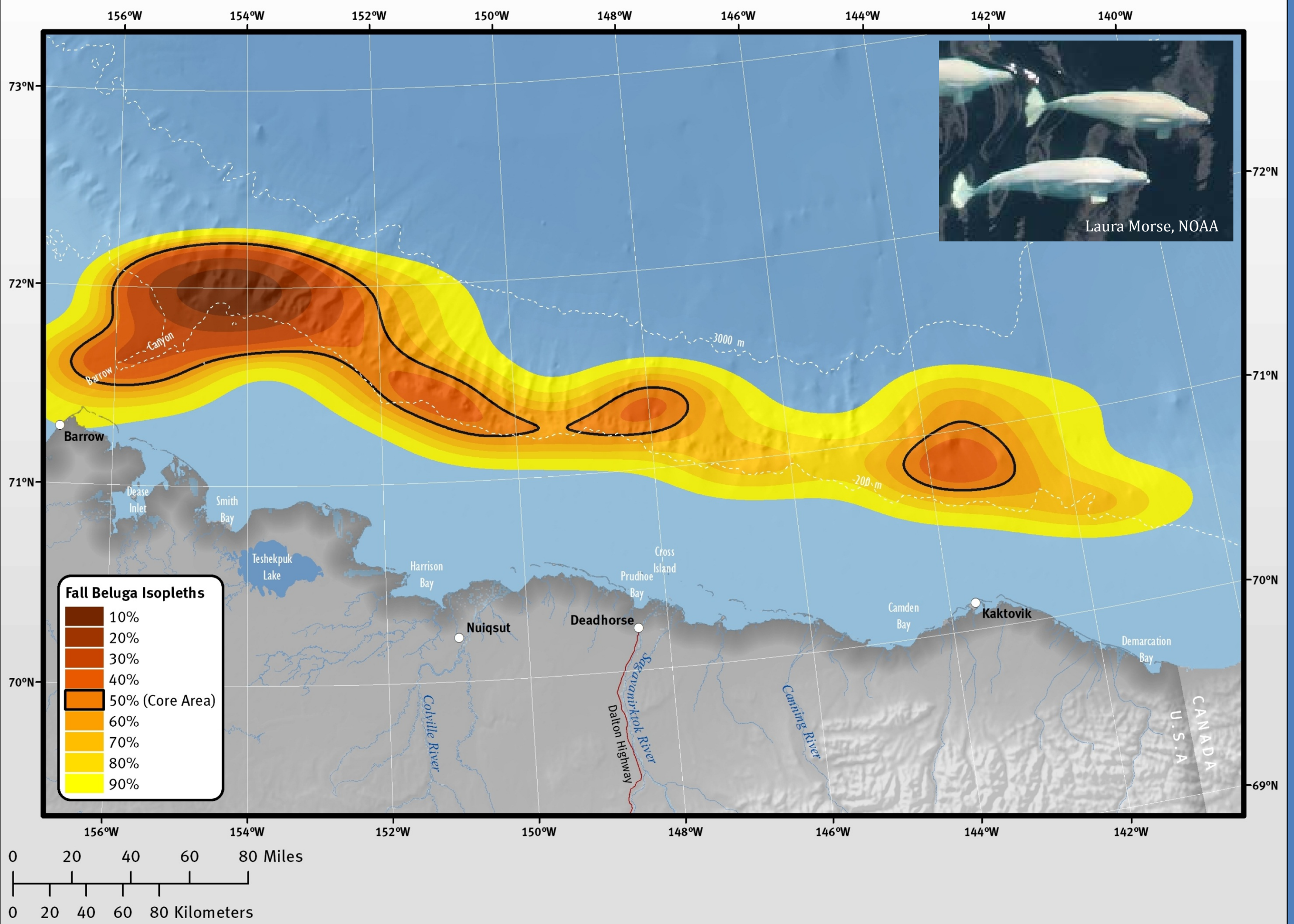


Smoothed Relative Density
& Core Areas

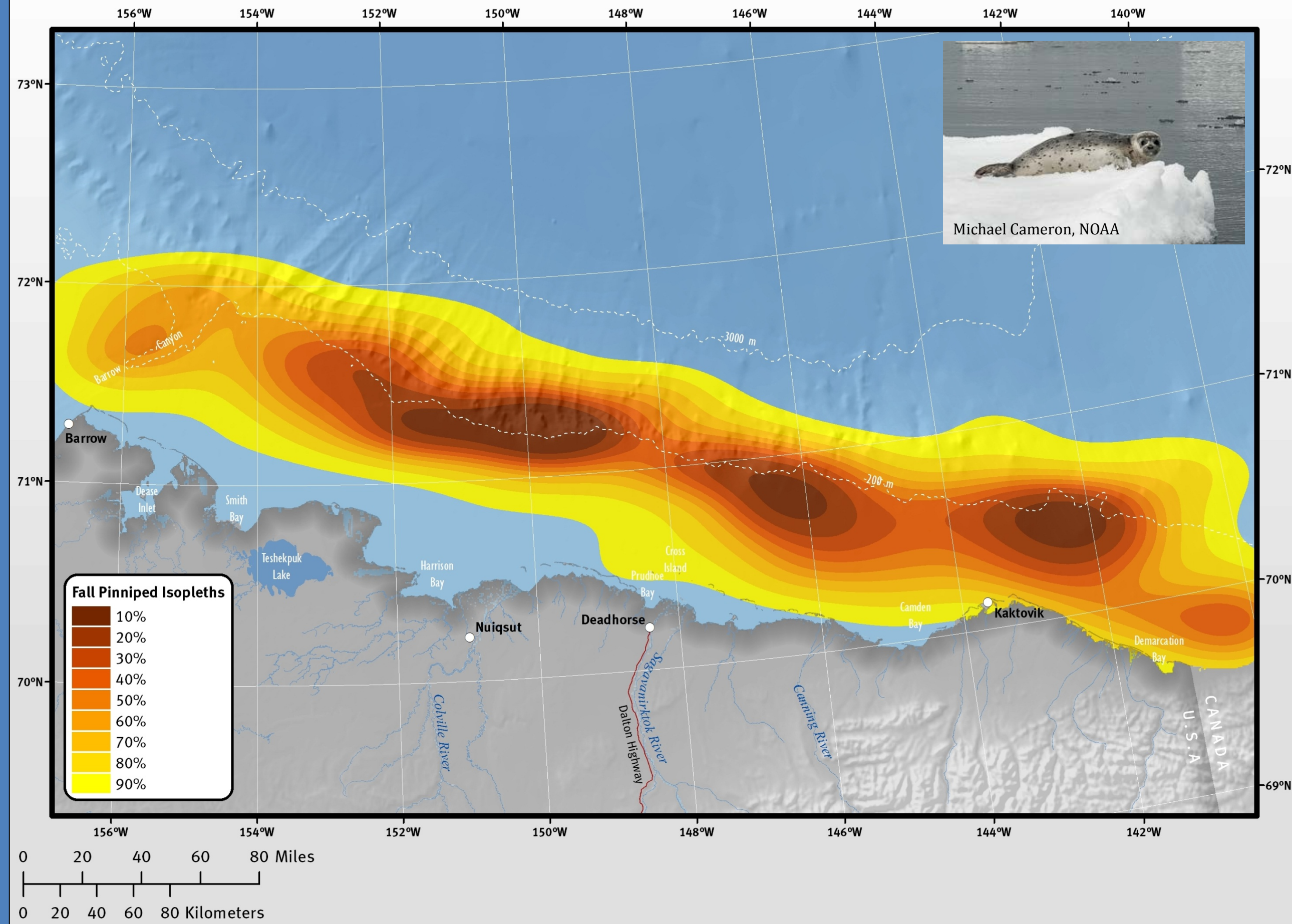
Bowhead Whale Relative Density and Core Areas (September - October, 2000-2013)



Beluga Whale Relative Density and Core Areas (September - October, 2000-2013)



Pinniped Relative Density (September - October, 2000-2013)



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