scientific data

Check for updates

OPEN

DATA DESCRIPTOR

A distribution-wide dataset of Atlantic walrus terrestrial haul-out sites

Hannah C. Cubaynes[1]✉, Cory J. D. Matthews[2], Eva Garde[3], Maria Gavrillo[4], Mads Peter Heide-Jørgensen[3], Jeff W. Higdon[5], Kit M. Kovacs[6], Margarita Leskova[9], Christian Lydersen[6], Boris Solovyev[7], Alejandra Vergara-Pena[8] & Peter T. Fretwell[1]

The Atlantic walrus (*Odobenus rosmarus rosmarus*) is an Arctic endemic species that is under increasing threat due to declines in their sea ice habitats. Walruses rely directly (*e.g.*, resting, giving birth) and indirectly (*e.g.*, tight coupling between sympagic and benthic productivity) on sea ice, and are particularly sensitive to disturbance by increasing anthropogenic activities (*e.g.*, shipping) that are taking place concomitant with sea ice declines throughout their Arctic range. Management and conservation of Atlantic walrus require monitoring of their distribution and assessments of regional and range-wide abundance trends. Atlantic walrus population assessments are typically based on counts of walruses hauled out at terrestrial sites during aerial or boat-based surveys, and increasingly, using satellite imagery. We compiled a comprehensive, distribution-wide dataset of all known Atlantic walrus terrestrial haul-out sites from relevant national datasets to promote accessibility and consistency of use among multiple users, including Indigenous groups, scientific researchers, and resource managers.

Background & Summary

Walruses (*Odobenus rosmarus*) are an Arctic-endemic species with a near circumpolar range. The Atlantic subspecies *O. r. rosmarus* is distributed from the Canadian Arctic eastward to the Kara Sea (Fig. 1). The remaining regions of the Arctic are occupied by the Pacific subspecies (*O. r. divergens*). Throughout their range, walruses are facing growing threats due to global warming inducing declines in sea ice, on which they depend for resting and giving birth[1–3]. Walruses forage almost exclusively on benthic organisms, and changes in the tight coupling between ice algae production's delivery of nutrients to benthic communities is likely to impact food availability for walruses[4–6]. Increased shipping with declining sea ice has also been identified as one of the key anthropogenic threats to walruses[7]. Walruses are sensitive to shipping disturbance[8,9], which can cause stampedes. These have been reported to lead to injuries and death[2,7,10–12], and abortion of foetuses[2], as well as long-term abandonment of haul-out sites (and associated preferred foraging sites)[2]. Reduced sea ice might also lead to increased predation (*e.g.*, from killer whales, *Orcinus orca*, and polar bears, *Ursus maritimus*, as their seasonal and geographical overlap with walruses is expected to increase) and exposure to pathogens (*e.g.*, temperate-adapted species migrating to the Arctic and carrying disease walruses have not previously been exposed to)[13].

Walruses are a sentinel species that can signal environmental changes taking place in their communities. The Conservation of Arctic Flora and Fauna (CAFF) recognises walruses as a focal ecosystem component (FEC) due to the key role they play in the Arctic ecosystem[14] and their cultural and economic importance to Arctic residents[15]. The International Union for Conservation of Nature (IUCN) classified walruses as vulnerable on the global Red List because walrus populations are predicted to decline due to the loss of sea ice[16]. Therefore, systematic monitoring of walrus populations, particularly abundance trends and changes in distribution, is required to assess how walruses are responding to loss of sea ice habitats and anthropogenic disturbances. Walruses are also hunted in several areas of the Arctic and monitoring population trends is critical for the assessment of the sustainability of the hunt. Atlantic walrus population assessments are often based on counts of walruses at

[1]British Antarctic Survey, Cambridge, United Kingdom. [2]Fisheries and Oceans Canada, Winnipeg, Canada. [3]Greenland Institute of Natural Resources, Nuuk, Greenland. [4]Arctic and Antarctic Research Institute, St Petersburg, Russia. [5]Higdon Wildlife Consulting, Manitoba, Canada. [6]Norwegian Polar Institute, Tromsø, Norway. [7]Systematic Conservation Consultancy, Sydney, Australia. [8]WWF-UK, Woking, United Kingdom. [9]Independent researcher: Margarita Leskova. ✉e-mail: hannah.cubaynes@bas.ac.uk

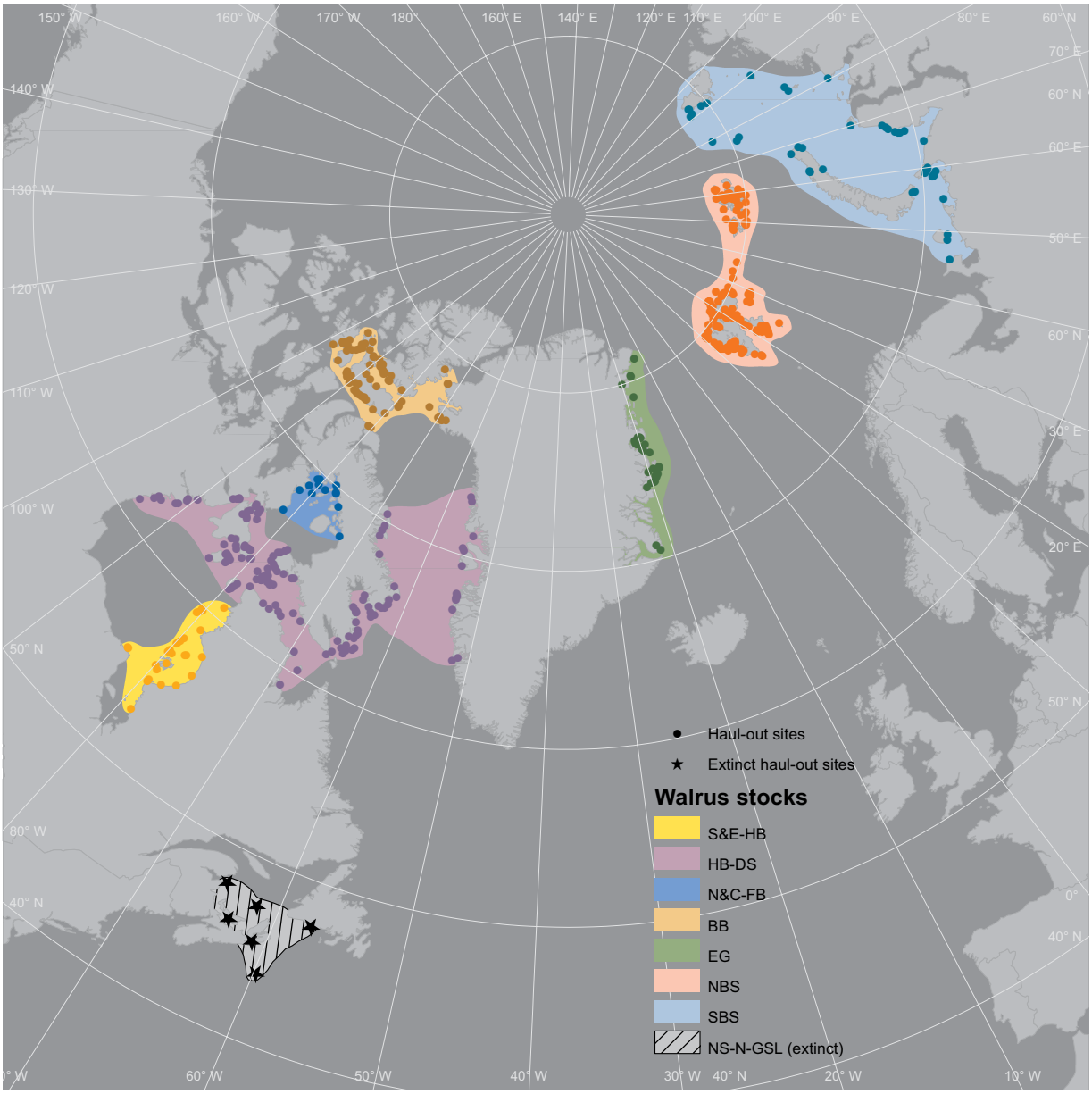

Fig. 1 Map of the Atlantic walrus (*Odobenus rosmarus rosmarus*) management stocks and all the terrestrial haul-out sites listed in the dataset.

terrestrial haul-out sites in the summer months when sea ice is at its annual minimum, and when the maximum numbers of walruses are hauled out on land to rest between foraging trips[2,17]. Walruses exhibit strong interannual site fidelity to certain terrestrial sites over long periods of time that are typically surveyed using aircraft and boats, and increasingly, satellite imagery[17–25]. For Pacific walruses (*O. r. divergens*), all known terrestrial haul-out sites are published in one dataset[20]. However, locations and other relevant metadata for Atlantic walrus haul-out sites are spread among many different datasets and publications. To promote accessibility of haul-out site data, as well as consistent use across multiple users and jurisdictions, we have compiled a comprehensive dataset of known Atlantic walrus terrestrial haul-out sites from various disparate sources, which we have made available on the Arctic Biodiversity Data Service of CAFF. This dataset will be kept up to date.

Methods

Compiling the dataset. We compiled the dataset[26] by merging existing datasets[27,28] and incorporating all available information from published scientific and Indigenous works. The merged dataset is largely a combination of national and other jurisdictional datasets maintained for the purpose of regular walrus stock assessments. These, in turn, have been compiled through consultations with indigenous Knowledge Holders (*e.g., Inuit Qauijimajatuqangit*, or IQ), historical records, and observations during dedicated coastal surveys of walrus

Field	Description
ID_CAFF	Identification number unique to each haul-out site for the dataset uploaded on the Arctic Council Conservation Arctic Fauna and Flora.
HAUL_NAME	Haul-out site name.
ALT_NAME	Alternative haul-out site name(s).
LATITUDE	Latitude in decimal degree (WGS 1984).
LONGITUDE	Longitude in decimal degree (WGS 1984).
AREA	Area of one or more stocks as defined by NAMMCO[29]. See Table 2 and Fig. 1.
STOCK	Walrus stock as defined by NAMMCO[29]. See Table 2 and Fig. 1.
COUNTRY	Country where the haul-out site is located.
SPATIAL_AC	Spatial accuracy (high, moderate, uncertain) as defined by Higdon (2016)[28]. **High:** exact coordinate provided. **Moderate:** position estimated from map(s) with sufficient resolution to have reasonable certainty of accuracy within 5 km. **Uncertain:** position estimated from map(s) with insufficient resolution (or landscape pattern adds uncertainty), from non-spatial sources, or for haul-out sites where different sources locate them differently or show different numbers of sites in particular locations. Certainty of accuracy is greater than 5 km.
STATUS	Status of the haul-out site (active, not in use, uncertain, extinct) as defined by Higdon (2016)[28] with the added class "extinct". **Active:** currently used by walruses (*i.e.*, published evidence of recent use in the last 10 years or reported to be active by local communities). **Uncertain:** no recent data to confirm or suggest current use. **Not in use:** haul-out site previously reported to be abandoned, with no recent data to refute this. **Extinct**: haul-out site from population reported to be extinct.
LAST_SEEN	The year walruses were last observed at a given haul-out site.
LARGEST_N	Largest number of walruses recorded at the haul-out site.
LGST_N_10Y	Largest number recorded in approximately the last 10 years at the haul-out site.
LAST_SRVD	Year the haul-out site was last surveyed.
LST_SRV_BY	Who last surveyed the haul-out site.
TIME_PRES	Time when walruses are known to be present at the haul-out site.
PRIM_SOURC	Primary source.
OTR_SOURCS	Other sources.
COMMENTS	Any notes thought to be helpful.

Table 1. Description of each field for the Atlantic walrus terrestrial haul-out site dataset.

Stock	Area
Baffin Bay (BB)	High Arctic
North and Central Foxe Basin (N&C-FB)	Central Arctic
Hudson Bay – Davis Strait (HB-DS)	
Southern & Eastern Hudson Bay (S&E-HB)	
Nova Scotia-Newfoundland-Gulf of St Lawrence (NS-N-GSL) (***Extinct***)	Nova Scotia-Newfoundland-Gulf of St Lawrence
East Greenland (EG)	Greenland Sea
Northern Barents Sea (NBS)	Barents Sea
Southern Barents Sea (SBS)	

Table 2. List of management stocks and their corresponding areas of occupancy for Atlantic walruses based on definitions and terminology of NAMMCO[29]. See also Fig. 1.

abundance and distribution (see the user's guide document included with the dataset for a detailed list of all references used to compile the dataset).

Dataset attributes. This dataset includes all sites where walruses have been observed on land. Although each haul-out site is identified by a coordinate, location certainty ranges from high (*e.g.*, records with GPS measurements during surveys) to uncertain for records from some sources (*e.g.*, historic reports). Each haul-out site record is characterised by the same set of information, which is described in Table 1.

Each haul-out site in the dataset was assigned to a stock recognised by NAMMCO[29], with two exceptions (Table 2 and Fig. 1) which are:

1. Northern Foxe Basin and Central Foxe Basin are joined together as the North and Central Foxe Basin Stock (N&C-FB) because no geographical distinction can be made between animals at these sites: walruses from these stocks can only be differentiated based on their morphology and isotopic differences[30–32].
2. The Nova Scotia-Newfoundland-Gulf of St Lawrence (NS-N-GSL) stock is not included in NAMMCO, because it is extinct[2,33–35]. However, we include it herein to ensure comprehensiveness, given that we include all historical and active haul-out sites.

Long-term dataset management. This Data Descriptor describes a static dataset that was peer reviewed at the time of article submission and acceptance. Future updates will be reviewed and the dataset updated as needed by members of CAFF's Marine Mammal Expert Group, who will remain in contact with national walrus experts and researchers surveying Atlantic walruses. These will be assigned a different identifier and may be found via the repository page.

Data Records

The dataset (identifier: fcdc5e58-3318-4a02-a484-8ecb7cfb66e2) is available on the Arctic Biodiversity Data Service of CAFF[26]. It contains the dataset available either in a Comma Separated Values (CSV) file or a shapefile (SHP) format and a user's guide. The dataset includes 499 terrestrial haul-out sites, spread across Canada (237 sites), Greenland (51 sites), Norway (125 sites) and Russia (86 sites).

Technical Validation

We mapped all haul-out sites using a geographic information system software suite (ESRI ArcGIS Desktop 10.8.0.12790) and ESRI World Imagery basemap (ID: 10df2279f9684e4a9f6a7f08febac2a9). Local experts ensured locations were correctly placed before exporting the dataset as a CSV file.

Usage Notes

The geographic coordinate system for all coordinates is WGS 1984 (EPSG: 4326). For best visualisation, we recommend projecting the dataset in North Pole Stereographic (EPSG: 102018) or North Pole Azimuthal Equidistant (EPSG: 102016).

Potential applications. This dataset has applicability for any walrus monitoring effort aiming to assess population trends (*i.e.*, abundance estimates) and distribution/range that rely on surveying walruses at their terrestrial haul-out sites. Applications extend to the use of emerging tools, such as tasking locations for satellite imagery collection[25]. This is particularly relevant if using very high-resolution satellite imagery because these types of satellites do not generally capture imagery unless an order is placed. The Walrus from Space project (https://www.wwf.org.uk/learn/walrus-from-space)[36], which aims to monitor Atlantic walrus populations across their range, has been making use of this dataset. Applications also extend to marine planning, such as regulation of shipping routes, or in case of oil spills.

Data availability

The dataset[26] is available on the Arctic Biodiversity Data Service of CAFF, accessible at the following link: https://geo.abds.is/geonetwork/srv/eng/catalog.search#/metadata/fcdc5e58-3318-4a02-a484-8ecb7cfb66e2.

Code availability

The dataset was compiled manually from existing national or other jurisdictional datasets and complemented with published work mentioning terrestrial haul-out sites, without the use of coding.

Received: 26 September 2025; Accepted: 1 April 2026;
Published online: 09 April 2026

References

1. Fay, F. H. Ecology and biology of the Pacific walrus, *Odobenus rosmarus divergens* Illiger. *North Am. Fauna* **74**, 1–279, https://doi.org/10.3996/nafa.74.0001 (1982).
2. Born, E. W., Gjertz, I. & Reeves, R. A. *Population Assessment of Atlantic Walrus (Odobenus rosmarus rosmarus L.)*. vol. 138 (Norsk Polarinstitutt, Oslo, 1995).
3. Keighley, X., Olsen, M. T., Jordan, P. & Desjardins, S. *The Atlantic Walrus: Multidisciplinary Insights into Human-Animal Interactions*. (Elsevier, Academic Press, London, UK, 2021). ISBN: 978-0-12-817430-2.
4. Yurkowski, D. J., Brown, T. A., Blanchfield, P. J. & Ferguson, S. H. Atlantic walrus signal latitudinal differences in the long-term decline of sea ice-derived carbon to benthic fauna in the Canadian Arctic. *Proc. R. Soc. B Biol. Sci.* **287**, 20202126, https://doi.org/10.1098/rspb.2020.2126 (2020).
5. Niemi, A. *et al*. Ice algae contributions to the benthos during a time of sea ice change: a review of supply, coupling, and fate. *Front. Environ. Sci.* **12**, 1432761, https://doi.org/10.3389/fenvs.2024.1432761 (2024).
6. Grebmeier, J. M. *et al*. A major ecosystem shift in the northern Bering Sea. *Science* **311**, 1461–1464, https://doi.org/10.1126/science.1121365 (2006).
7. COSEWIC. *COSEWIC Assessment and Status Report on the Atlantic Walrus Odobenus rosmarus rosmarus, High Arctic Population, Central-Low Arctic Population and Nova Scotia-Newfoundland-Gulf of St. Lawrence Population in Canada*. xxi + 89 p https://publications.gc.ca/collections/collection_2018/eccc/CW69-14-461-2017-eng.pdf (2017).
8. Mansfield, A. & St. Aubin, D. J. Distribution and abundance of the Atlantic walrus, *Odobenus rosmarus rosmarus*, in the Southampton Island – Coats Island region of northern Hudson Bay. *Can. Field-Nat* **105**, 95–100 (1991).
9. Stewart, R. E. A., Lesage, V., Lawson, J. W., Cleator, H. & Martin, K. A. *Science Technical Review of the Draft Environmental Impact Statement (EIS) for Baffinland's Mary River Project*. vi + 62 p (2012).
10. Loughrey, A. G. Preliminary investigation of the Atlantic walrus *Odobenus rosmarus rosmarus* (Linnaeus). *Can. Wildl. Serv. Bull.* **14**, 1–123, https://publications.gc.ca/collections/collection_2018/eccc/cw69-13/CW69-13-1-14-eng.pdf (1959). Available at.
11. Kavry, V. I., Boltunov, A. N. & Nikiforov, V. V. New coastal haulouts of walruses (*Odobenus rosmarus*) – response to the climate changes. in *Collection of Scientific Papers* 248–251 Available at marmam.ru/upload/conf-documents/mmc2008_full.pdf (Odessa, Ukraine, 2008).
12. Garlich-Miller, J. *et al. Status Review of the Pacific Walrus (Odobenus rosmarus divergens)*. United States Fish and Wildlife Service, Marine Mammal Management Office, Anchorage, AK. vi + 155 p (2011).
13. Born, E. W., Wiig, Ø. & Olsen, M. T. The future of Atlantic walrus in a rapidly warming Arctic. in *The Atlantic walrus: Multidisciplinary insights into human-animal interactions* 309–332 https://doi.org/10.1016/B978-0-12-817430-2.00012-1 (Elsevier, Academic Press, London, UK, 2021).

14. Ray, G. C., McCormick-Ray, J., Berg, P. & Epstein, H. E. Pacific walrus: Benthic bioturbator of Beringia. *J. Exp. Mar. Biol. Ecol.* **330**, 403–419, https://doi.org/10.1016/j.jembe.2005.12.043 (2006).
15. CAFF (Conservation of Arctic Flora and Fauna). *State of the Arctic Marine Biodiversity Report*. Conservation of Arctic Flora and Fauna International Secretariat, Akureyri, Iceland. ISBN: 978-9935-431-63-9 (2017).
16. Kovacs, K. M. *Odobenus rosmarus*. The IUCN Red List of Threatened Species 2025: e.T15106A272356023, https://doi.org/10.2305/IUCN.UK.2025-2.RLTS.T15106A272356023.en (2025).
17. Kovacs, K. M., Aars, J. & Lydersen, C. Walruses recovering after 60+ years of protection in Svalbard, Norway. *Polar Res.* **33**, 26034, https://doi.org/10.3402/polar.v33.26034 (2014).
18. Hammill, M. O. *et al*. *Estimating Abundance and Total Allowable Removals for Walrus in the Hudson Bay-Davis Strait and South and East Hudson Bay Stocks during September 2014*. DFO Canadian Science Advisory Secretariat, Research Document 2016/036. v + 37 p (2016).
19. Lydersen, C., Aars, J. & Kovacs, K. M. Estimating the number of walruses in Svalbard from aerial surveys and behavioural data from satellite telemetry. *Arctic* **61**, 119–128, https://www.jstor.org/stable/40513198 (2008).
20. Fischbach, A. S., Kochnev, A. A., Garlich-Miller, J. L. & Jay, C. V. *Pacific Walrus Coastal Haulout Database, 1852–2016—Background Report*. 27 p, https://doi.org/10.3133/ofr20161108 (2016).
21. Matthews, C. J. D., Dispas, A. & Mosnier, A. *Evaluating Satellite Imagery for Atlantic Walrus (Odobenus rosmarus rosmarus) Stock Assessment-a Pilot Study*. v +25 ISBN: 978-0-660-44127-6 (2022).
22. Boltunov, A. N., Semenova, V. S., Sokolov, A. A. & Kucheyko, A. A. Newly detected haul-out of Atlantic walruses (*Odobenus rosmarus rosmarus*) on Yamal Peninsula has become the biggest in the Kara Sea. *Polar Biol* **44**, 2077–2083, https://doi.org/10.1007/s00300-021-02942-0 (2021).
23. Dietz, R. *et al*. Movements of walruses (*Odobenus rosmarus*) between Central West Greenland and Southeast Baffin Island, 2005-2008. *NAMMCO Sci. Publ.* **9**, 53–74, https://doi.org/10.7557/3.2605 (2014).
24. Mikkelsen, E., Kovacs, K. M., Blanchet, M.-A., Brodin, G. & Lydersen, C. Interannual site fidelity by Svalbard walruses. *Sci. Rep.* **14**, 15822, https://doi.org/10.1038/s41598-024-66370-w (2014).
25. Cubaynes, H. C. *et al*. A roadmap towards monitoring walruses from space. *ICES J. Mar. Sci.* **83**, fsag017, https://doi.org/10.1093/icesjms/fsag017 (2026).
26. Cubaynes, H. C. *et al*. Atlantic walrus haul-out site database. CAFF - Arctic Biodiversity Data Service Available at https://geo.abds.is/geonetwork/srv/eng/catalog.search#/metadata/fcdc5e58-3318-4a02-a484-8ecb7cfb66e2 (2025).
27. Lydersen, C. Walrus terrestrial haul-out dataset in Svalbard [Dataset]. Norwegian Polar Institute https://doi.org/10.21334/NPOLAR.2008.788AC8FE (2008).
28. Higdon, J. W. *Walrus Haulouts in the Eastern Canadian Arctic: A Database to Assist in Land Use Planning Initiatives*. Expert Report (16-015E -2016-08-15 WWF-Canada) on the 2016 Draft Nunavut Land Use Plan by Higdon Wildlife Consulting, Winnipeg, MB, on behalf of WWF-Canada, Iqaluit, NU, for submission to the Nunavut Planning Commission, Cambridge Bay, NU. Available on the Nunavut Planning Commission (NPC) Public Registry at https://lupit.nunavut.ca/portal/registry. 18 p (2016).
29. NAMMCO. 5. Atlantic Walrus Stocks. https://nammco.no/atlantic-walrus/#1475843214679-e49183cc-36fc (2025).
30. DFO (Fisheries and Oceans Canada). *Estimates of Abundance and Total Allowable Removals for Atlantic Walrus (Odobenus rosmarus rosmarus) in the Canadian Arctic*. http://www.dfo-mpo.gc.ca/csas-sccs/Publications/SAR-AS/2013/2013_034-eng.html (2013).
31. Shafer, A., Davis, C. S., Coltman, D. W. & Stewart, R. E. A. Microsatellite assessment of walrus (*Odobenus rosmarus rosmarus*) stocks in Canada. *NAMMCO Sci. Publ.* **9**, 15–31, https://doi.org/10.7557/3.2607 (2013).
32. Stewart, R. E. A. *Can We Calculate Total Allowable Harvests for Walrus Using Potential Biological Removal?* Research document 2008/025. DFO Canadian Science Advisory Secretariat. 16 p (2008).
33. Allen, J. A. *History of North American Pinnipeds: A Monograph of the Walruses, Sea-Lions, Sea-Bears and Seals of North America*. vol. 12 (Government Printing Office, Washington, 1880).
34. Bruemmer, F. And then there were none. *Int. Wildl.* **22**, 20–23 (1992).
35. Higdon, J. W. & Stewart, D. B. *State of Circumpolar Walrus (Odobenus rosmarus) Populations*. Prepared by Higdon Wildlife Consulting and Arctic Biological Consultants, Winnipeg, MB for WWF Arctic Programme, Ottawa, ON. 100 p Available at https://nammco.no/wp-content/uploads/2018/10/higdon-stewart-2018-1.pdf (2018).
36. WWF-UK. Walrus from space. https://www.wwf.org.uk/learn/walrus-from-space (2023).

Acknowledgements

We are thankful to WWF (UK, Canada and Global Arctic Programme), and players of People's Postcode Lottery, who provided funding. This study represents a contribution to Fisheries and Oceans Canada (DFO), Nunavut Wildlife Management Board (NWMB), the Ecosystems component of the Wildlife from Space Project at the British Antarctic Survey Polar Science for Planet Earth programme (which is funded by the Natural Environment Research programme). Norwegian data collection is supported by the Norwegian Polar Institute. We thank Rod Downie, Mette Frost, and Brandon Laforest who facilitated access to some of the datasets. We are grateful for the support from the Arctic Council working group on Conservation of Arctic Flora and Fauna to host the dataset on their Arctic Biodiversity Data Service, with special thanks to Hólmgrímur Helgason and Courtney Price. We thank the editor and reviewers for their time and their valuable feedback, which helped improve this manuscript.

Author contributions

Conceptualisation: H.C.C., J.W.H., P.T.F.; Data compilation: H.C.C.; Data contribution: C.J.D.M., E.G., M.G., M.P.H.J., J.W.H., K.M.K., M.L., C.L., B.S., P.T.F.; Writing-original draft: H.C.C., C.J.D.M.; Writing-review and editing: H.C.C., C.J.D.M., E.G., M.G., M.P.H.J., J.W.H., K.M.K., M.L., C.L., B.S., A.V.P., P.T.F.

Competing interests

The authors declare no competing interests.

Additional information

Correspondence and requests for materials should be addressed to H.C.C.

Reprints and permissions information is available at www.nature.com/reprints.

Publisher's note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.


Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit http://creativecommons.org/licenses/by/4.0/.

© The Author(s) 2026