



Technical Assistance to OSPAR Task Group on Priority Sites and Possible Area-based Conservation and Management Measures in Arctic Waters

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Acronyms

ABMTs	Area-Based Management Tools
ABNJ	Areas Beyond National Jurisdiction
AHES	Area of Heightened Ecological Significance
AMAP	Arctic Monitoring and Assessment Programme
APMs	Associated Protective Measures
AOWG	Arctic Outcomes Working Group
ArcNet	Arctic Ocean Network of Priority Areas for Conservation
ATG	Arctic Task Group
BBNJ	Biodiversity Beyond National Jurisdiction
CAFF	Conservation of Arctic Flora and Fauna
CAO	Central Arctic Ocean
CBD	Convention on Biological Diversity
EBSA	Ecologically or Biologically Significant marine Area
ECS	Extended Continental Shelf
EEZ	Exclusive Economic Zone
FPIC	Free, Prior and Informed Consent
GEBCO	General Bathymetric Chart of the Oceans
ICES	International Council for the Exploration of the Sea
IMO	International Maritime Organisation
IPCA	Indigenous Protected and Conserved Area
IUCN	International Union for Conservation of Nature
KMGBF	Kunming-Montreal Global Biodiversity Framework
LME	Large Marine Ecosystem
MPA	Marine Protected Area
NEAES	OSPAR North-East Atlantic Environment Strategy 2030
NEAFC	North East Atlantic Fisheries Commission
OECM	Other Effective Area-Based Conservation Measure
PAC	Priority Area for Conservation
PAME	Protection of the Arctic Marine Environment
PSSA	Particularly Sensitive Sea Area
SDWG	Sustainable Development Working Group
SVO	Particularly valuable and vulnerable area (Særlig verdifulle og sårbare områder)
UNCLOS	United Nations Convention on the Law of the Sea
VME	Vulnerable Marine Ecosystem

Executive Summary

This report delivers technical assistance to the OSPAR Arctic Task Group (ATG) in identifying and prioritising candidate conservation sites and possible area-based measures for the protection of Arctic marine biodiversity in Areas Beyond National Jurisdiction (ABNJ) within OSPAR Region I (Arctic Waters). The work aligns with OSPAR's strategic commitments and recent policy developments, notably the North-East Atlantic Environment Strategy (NEAES) 2030 (OSPAR Commission, 2025), the UN BBNJ Agreement, and global targets set by the Kunming-Montreal Global Biodiversity Framework.

The Arctic marine environment represents an irreplaceable reservoir of cultural, scientific, ecological, and economic value. However, it faces severe and rapidly accelerating threats from climate change, sea-ice loss, industrialisation, and anthropogenic disturbance, endangering critical ecosystems and the livelihoods of Indigenous Peoples. Governance in Arctic waters located in ABNJ is complex, requiring integrated, cross-sectoral collaboration among international bodies, Arctic States, and Indigenous Peoples' Organisations. OSPAR holds legal competence to designate and manage Marine Protected Areas (MPAs) and recognises the role that Other Effective Area-Based Conservation Measures (OECMs) will play in helping OSPAR to meet its target of protecting 30% of the OSPAR Maritime Area by 2030 (as set out in the NEAES 2030), contributing to an ecologically representative and resilient network of protected areas.

This report applied OSPAR's ecological criteria for identification of MPAs and OECMs and analysed international frameworks [CBD EBSAs, NEAFC closures, WWF ArcNet, areas of heightened ecological significance (AHES) by the Arctic Council and regional Particularly valuable and vulnerable areas (SVO)], as well as published Arctic Indigenous Peoples' Knowledge. In addition, multiple spatial datasets — including administrative boundaries, national and international frameworks, environmental and biological variables, and model outputs — were integrated into a GIS Repository and provided as a supporting tool for present and future initiatives of area-based management (**Appendix 1**).

The following four sites containing ABNJ were identified as potential candidate conservation sites:

1. Central Arctic Ocean multi-year Arctic sea ice habitat
2. Central Barents Sea
3. Arctic Mid-Ocean Ridge
4. Imarssuak Sea Channel

A data-driven characterisation was undertaken for each of the candidate sites in OSPAR Region I, utilising the latest oceanographic, biological and geospatial evidence, with special attention to knowledge of Indigenous Peoples and recognition of their critical role in conservation planning. The core of the report is a comparative, criteria-based synthesis of the four candidate sites containing ABNJ, summarised in the main text tables (Tables 15–19). Each site is described in terms of the degree to which it fulfils the following OSPAR's ecological criteria for area-based conservation:

1. Threatened or declining species and habitats/biotopes
2. Important species and habitats/biotopes

3. Ecological significance
4. High natural biological diversity
5. Representativity
6. Sensitivity
7. Naturalness

1. Multi-year Arctic sea ice habitat of the Central Arctic Ocean:

- Encompasses the last area of multi-year Arctic sea ice over deep ocean basins, serving as a unique and increasingly critical climate refugium for ice-dependent species (such as bowhead whales, narwhals and polar bears).
- High/medium certainty for nine OSPAR-listed threatened or declining species and habitats (including ivory gull, black-legged kittiwake, Brünnich's guillemot, bowhead whale, blue whale, seamounts, hydrothermal vents, and deep-sea sponge aggregations)
- Supports globally significant biodiversity (e.g., polar bear, ivory gull, bowhead whale, narwhals and belugas).
- The site overlays the Gakkel Ridge — the slowest-spreading mid-ocean ridge globally — characterised by high geodiversity, hydrothermal vent systems, unique benthic biodiversity.
- Overlaps with CBD EBSA 1, WWF ArcNet PAC 28/55, Arctic Council AHES 67, and Norwegian SVOs BH1/BH2.
- Meets all core OSPAR ecological criteria at a high level of confidence.

2. Central Barents Sea:

- The Central Barents Sea is characterised by the marginal sea ice zone — a highly dynamic and productive ecological transition area where the polar front/ ice edge advances and retreats seasonally.
- High/medium certainty for nine threatened or declining species/habitats (e.g., ivory gull, black-legged kittiwake, Brünnich's guillemot; bowhead whale, blue whale, deep-sea sponge aggregations, and others) fifteen important species/habitats identified, including migratory corridor for North Atlantic humpback whale, spawning and nursery grounds for polar cod, feeding areas for polar bears, fin whales, minke whales, and others.
- Central to seabird moulting/post breeding aggregations, important feeding, nursery, and settlement ground for multiple pelagic fish species, including capelin and polar cod.
- Overlaps with IUCN IMMA (North Atlantic Humpback Whale Migratory Corridor), Arctic Council AHES 22/23, and Norwegian SVOs BH1/BH2.
- Meets all principal OSPAR criteria at high or medium confidence; some features representative of high-Arctic ecosystems.

3. Arctic Mid-Ocean Ridge:

- Hosts unique benthic habitats on the Mohns and Ægir Ridges, including seamounts, hydrothermal vents, coral gardens, and deep-sea sponge aggregations.
- High certainty for four OSPAR criteria.
- Feeding and migration areas for deep-diving whales and supporting complex pelagic-benthic coupling.
- Overlaps with IUCN IMMA, Norwegian SVOs NH4/NH8, WWF ArcNet PAC 35, and Arctic Council AHES 9.

4. Imarssuak Sea Channel:

- Medium certainty for most OSPAR criteria due to limited direct data; important for elasmobranchs, orange roughy, and both cold-water coral and deep-sea sponge habitats.
- Coincides with CBD EBSA 7 (Southern Reykjanes Ridge) and the NEAFC Irminger Sea VME Closure.
- Potential OECM candidate site under OSPAR/NEAFC.
- Features are comparable to those found at other OSPAR Mid-Atlantic Ridge MPAs.

The report recommends OSPAR take a staged approach to further prioritisation, incorporating practical criteria such as site size, restoration potential, rightsholder and/or stakeholder acceptance (especially engagement with Indigenous Peoples), and likelihood of effective management — summarised in the guidelines in the concluding section. In addition to these, it is important to ensure that specific ecological criteria, as set out in the OSPAR guidelines, are explicitly considered throughout the process. The ecological coherence of the wider OSPAR network should also be a guiding principle, including site representativity, connectivity, replication, and resilience. Arctic Indigenous Peoples' Knowledge highlights deep ecosystem connectivity and evolving risks, and full and effective participation in decision making and meaningful engagement — including by ensuring Free, Prior, and Informed Consent — is essential for any future area-based designation.

In the final summary, **Table 21** provides a visual, side-by-side appraisal of the four candidate sites by OSPAR's main conservation criteria, the number of significant conservation features, degree of confidence, and overlap with existing regional and global designations. The identification of these four areas as candidate conservation sites in this report serves as a pragmatic starting point for collating available evidence and highlighting key areas of interest for potential protection. To guide the process of spatial prioritisation and delineation of conservation sites within these ABNJ sectors, the report recommends that OSPAR consider the adoption of a systematic conservation planning approach. This structured and objective methodology will enable the identification of optimal site boundaries and conservation networks based on ecological value, connectivity, and representativity as more data become available. Systematic conservation planning facilitates transparent, evidence-based site selection and ensures that area-based measures are robust, efficient, and aligned with OSPAR's ecological network goals.

Introduction

The Task

The purpose of this report is to provide technical assistance to the OSPAR Arctic Task Group responsible for the implementation of the Task '**Priority Sites and Possible Area-based Conservation and Management Measures in Arctic Waters**', which has the aim of identifying priority sites to be considered by OSPAR in developing its network of marine protected areas (MPAs) and other effective area-based conservation measures (OECMs) in ABNJ in OSPAR Arctic Waters (Region I).

Background environmental context

The Arctic marine environment is described by the Arctic Council as an '**irreplaceable cultural, scientific, ecological, economic and spiritual asset**'. Beyond its inherent value and its uniqueness, the biodiversity of the Arctic Ocean is crucial for Indigenous Peoples and their way of life. Despite the physical environmental constraints, the Arctic shelf sustains some of the most productive marine ecosystems on Earth in terms of primary production and provides invaluable ecosystem services to people relying upon marine resources on local, regional and global scales (CAFF, 2013). The connectivity of these marine ecosystems is a fundamental aspect, with biodiversity loss in the Arctic Ocean threatening the resilience and health of the global ocean.

Global climate change together with industrial and geopolitical development pose major threats to Arctic marine ecosystems and biodiversity including but not limited to rise in water and air temperatures, loss of sea ice habitats, introduction of non-indigenous species and anthropogenic pollution. Changes in environmental conditions can have an impact on abundance, distribution ranges, food availability or habitat suitability of certain species affecting the ecosystem's stability. The speed and magnitude of the environmental change, including the oceanic warming observed in the polar regions over recent decades, is unprecedented (Barnes and Tarling, 2017). Due to the polar amplification effect, climate change accelerates in the high latitudes at a greater rate than anywhere on Earth (IPCC, 2022) making it by far the most serious threat to Arctic biodiversity. More specifically, the Arctic has warmed at more than twice the global average rate over the past 50 years (2°C increase since 1850 compared with 1°C globally) and in recent decades (1979–2020), the Arctic warmed at more than three times the global average rate (IPCC, 2021; Siebert et al., 2020). The Arctic is projected to further increase by at least another 1°C on average and by 2°C in the Atlantic sector even under the most optimistic climate scenarios (Hunt et al., 2016; AMAP, 2024). The urgent need to protect Arctic marine ecosystems and biodiversity is underscored by numerous national and international strategies and policy frameworks.

Environmental governance in ABNJ in the Arctic and adjacent waters

Environmental governance in Areas Beyond National Jurisdiction (ABNJ) in the Arctic and its adjacent waters presents unique challenges due to the region's ecological sensitivity and complex legal status. The Arctic Council, established in 1996, plays a central role as a high-level intergovernmental forum promoting cooperation, coordination, and interaction among Arctic

States and Indigenous Peoples' Organisations as Permanent Participants. The Permanent Participants have full consultation rights in connection with the Council's negotiations and decisions, and make valuable contributions to its activities in all area, which among other outcomes ensure that environmental governance frameworks in the region respect both ecological sustainability and the rights of Indigenous Peoples. The six Permanent Participants include two Indigenous Peoples' Organisations representing Peoples whose lands border on the areas under the OSPAR Commission: Inuit Circumpolar Council and Saami Council.

The OSPAR Commission has the legal competence to establish area-based conservation measures aimed at protecting and conserving the marine environment of the North-East Atlantic. For each MPA in ABNJ, OSPAR adopts a Decision establishing the site, which is legally binding on OSPAR Contracting Parties, alongside an associated Recommendation on the management of the site. These Recommendations commit OSPAR and its Contracting Parties to measures that should be considered, both nationally and collectively, to help achieve the sites' conservation objectives. However, most of the management actions required to achieve the conservation objectives of OSPAR's MPAs in ABNJ require cooperation with other Competent Authorities.

The commitment of the OSPAR commission '**to protect the Arctic marine environment, including through collaboration with other relevant organisations, such as the Arctic Council and the International Maritime Organisation,**' is evident in the 2021 Cascais Ministerial declaration, the 2025 Vigo declaration, and the formation of the OSPAR Arctic Outcomes Working Group (AOWG) as a part of the implementation of the Roadmap to support achievement of OSPAR objectives in the Arctic (Agreement 2022-01). This led to a later formation of the Arctic Task Group (ATG).

The work carried out by the ATG aligns with the OSPAR North-East Atlantic Environment Strategy 2030 (NEAES 2030), specifically strategic objectives 5 (Protect and conserve marine biodiversity, ecosystems and their services), 7 (Ensure sustainable use of the marine environment through integrated management of current and emerging human activities), and 9 (Safeguard marine ecosystems and seabed structures by preventing significant habitat loss and physical disturbances caused by human activities).

The execution of this task coincides with the entry into force of the Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas beyond National Jurisdiction (the 'BBNJ Agreement').

OSPAR's contributions towards protecting the Arctic marine environment are in line with the objectives of the Agreement and with Part III of the Agreement, aimed at the conservation and sustainable use of marine biological diversity in areas beyond national jurisdiction through area-based management tools, including ecologically representative and well-connected networks of marine protected areas.

Other Effective Area-based Conservation Measures (OECMs) in the Arctic Marine Environment can complement MPAs by enhancing connectivity and representation. OECMs are important tools towards achieving global biodiversity conservation objectives, such as those set up by the Kunming-Montreal Global Biodiversity Framework (KMGBF). OECMs are defined and guided by international bodies such as the Convention on Biological Diversity (CBD) and International Union for Conservation of Nature (IUCN). OSPAR had adopted the OECMs definition established by the CBD in 2021 by including it in the OSPAR NEAES 2030. OSPAR

has developed Guidance on identifying and recognising OECMs in the North-East Atlantic (OSPAR Agreement 2025-07e) to further complement existing global guidance on OECM such as the identification criteria by the CBD and the site-level tool for identifying OECMs by the IUCN.

Arctic States have varying degrees of framework maturity for identifying marine OECMs. Canada, for instance, has well-established methods for recognising marine OECMs, guided by principles aligned with the CBD. The World Database on Protected Areas (WDPA) and the World Database on OECMs (WD-OECM) provide a comprehensive list of areas with designated conservation status, but there are many more that may fit the criteria but are not currently recognised by international bodies. According to the recent report by the Arctic Council's Protection of the Arctic Marine Environment (PAME) and Conservation of Arctic Flora and Fauna (CAFF) working groups, some Indigenous sustainable management practices such as Indigenous Protected and Conserved Areas (IPCAs), may be identified as OECMs (PAME/CAFF, 2025).

Dynamic ocean management describes a new generation of area-based management tools (ABMTs) designed to respond to the inherent variability of marine ecosystems by using real-time environmental data and flexible regulatory approaches that adjust spatial protections and management measures as conditions change, in contrast to traditional, static marine protected areas (Maxwell et al., 2015; Crespo et al., 2020). A recent publication by Klerk (2026) used the northernmost ABNJ sector in OSPAR Region I as a case study to study the feasibility of implementing a dynamic ABMT. The study proposed creating a dynamic ABMT specifically adapted to the Arctic Marginal Ice Zone (MIZ), taking into account its ecological importance, environmental sensitivity, rapid changes, and increasing human activity. This dynamic ABMT would have three dimensions: spatial (with boundaries that shift biannually based on up-to-date satellite data to track the moving ice edge and ecological front), normative (with management measures that are regularly reviewed and adjusted through ongoing monitoring and scientific assessment), and institutional (requiring flexible coordination and timely decision-making among governing bodies). The ideal model envisions an ABMT that is responsive to real ecological changes and operates on a biannual cycle, but recognises that implementing such an adaptive approach would be challenging in practice given the limitations of existing legal and governance structures. Klerk (2026) also notes that the main constraint to fully operationalising dynamic ABMTs in the Arctic lies in institutional rigidity rather than scientific knowledge or technological capability.

OSPAR MPA and OECM designation criteria

The process of identifying the candidate conservation sites within the area of interest in this report was guided by the OSPAR Guidelines for the identification and selection of Marine Protected Areas in the OSPAR Maritime Area [Agreement 2003-17 (amended in 2016)] and OSPAR guidance on identifying and recognising Other Effective Area-Based Conservation Measures (OECMs) in the North-East Atlantic [Agreement 2025-07e].

According to the MPA guidelines, at the first stage, the ecological criteria/considerations listed in Appendix 1 of the OSPAR MPA Guidelines [Agreement 2003-17 (amended in 2016)] should be applied - the areas should be selected if they meet several of the following criteria/considerations:

1. Threatened or declining species and habitats/biotopes

The area is important for species, habitats/biotopes and ecological processes that appear to be under immediate threat or subject to rapid decline as identified by the ongoing OSPAR (Texel-Faial) selection process.

2. Important species and habitats/biotopes

The area is important for other species and habitats/biotopes as identified by the ongoing OSPAR (Texel-Faial) selection process.

3. Ecological significance

The area has:

- A high proportion of a habitat/biotope type or a biogeographic population of a species at any stage in its life cycle;
- Important feeding, breeding, moulting, wintering or resting areas;
- Important nursery, juvenile or spawning areas; or
- A high natural biological productivity of the species or features being represented.

4. High natural biological diversity

The area has a naturally high variety of species (in comparison to similar habitat/biotope features elsewhere) or includes a wide variety of habitats/biotopes (in comparison to similar habitat/biotope complexes elsewhere).

5. Representativity

The area contains a number of habitat/biotope types, habitat/biotope complexes, species, ecological processes or other natural characteristics that are representative for the OSPAR maritime area as a whole or for its different biogeographic regions and sub-regions.

6. Sensitivity

The area contains a high proportion of very sensitive or sensitive habitats/biotopes or species.

7. Naturalness

The area has a high degree of naturalness, with species and habitats/biotope types still in a very natural state as a result of the lack of human-induced disturbance or degradation.

Recognising an OECM is guided by the same ecological criteria/consideration to evaluate whether the area-based measure delivers (or is expected to deliver) positive and sustained long-term outcomes for *in situ* biodiversity conservation. According to the OSPAR guidelines, an OECM should protect one or more of the criteria listed above.

The following nomenclature was used in this report to classify the degree to which the site meets the criteria - High/Medium/Low:

- High degree of certainty means that the criteria is met and supported by robust scientific evidence specifically from the candidate site in ABNJ;
- Medium level of certainty means that the criteria is likely met based on the data from nearby areas, modelling studies and other indirect evidence;
- Low level of certainty indicates lack of data to determine whether the criteria is met.

BBNJ ANNEX I, Indicative criteria for identification of areas

The BBNJ Agreement establishes indicative criteria for the identification of areas for ABMTs, including MPAs and OECMs, in ABNJ. These criteria are designed to ensure that proposed areas are selected based on ecological significance, vulnerability, and potential for effective management, while also taking into account cultural and traditional considerations. The indicative criteria for identification of areas are found in Annex I. These include:

- Uniqueness;
- Rarity;
- Special importance for the life history stages of species;
- Special importance of the species found therein;
- The importance for threatened, endangered or declining species or habitats;
- Vulnerability, including to climate change and ocean acidification;
- Fragility;
- Sensitivity;
- Biological diversity and productivity;
- Representativeness;
- Dependency;
- Naturalness;
- Ecological connectivity;
- Important ecological processes occurring therein;
- Economic and social factors;
- Cultural factors;
- Cumulative and transboundary impacts;
- Slow recovery and resilience;
- Adequacy and viability;
- Replication;
- Sustainability of reproduction;
- Existence of conservation and management measures.

These criteria are intended to be applied flexibly and may be further refined or expanded in the future, reflecting advances in scientific knowledge and international best practice through the work of the Scientific and Technical Body and the Conference of the Parties. A comparison of the BBNJ criteria with those used by other international and regional frameworks — including OSPAR, CBD and IMO — is provided later in the report in the ‘Synthesis of Nomination Criteria’ section (**Table 16**). This comparative matrix highlights both commonalities and distinctions in how key conservation areas are identified and can support the translation and harmonisation of area-based designations across multiple processes.

Introduction to the Area of Interest

Geographic scope

OSPAR Region I constitutes approximately 40% of the OSPAR maritime area, it covers the northern parts of the Atlantic Ocean, the Barents Sea, the Norwegian Sea, and parts of the Arctic Ocean. A total of 5,523,298 km² corresponds to OSPAR Region I (Arctic waters), of which 738,140 km² corresponds to the High Seas (13.36%) (**Figure 1**).

Due to numerous Extended Continental Shelf (ECS) deposits, overlapping claims, recommendations and submissions in OSPAR Region I that are illustrated in this report (**Figure 3**), ABNJ in this region are limited to the seabed (the Area) and suprajacent water column (High Seas) outside of these. Due to the nature of physical, chemical, biogeochemical, and biological coupling between the seabed and water column, this report uses High Seas polygons to map the data and knowledge that was compiled to support the ATG. Where relevant, the report notes data and knowledge from adjacent national waters including areas where the seabed is co-located with an ECS but the overlying water column is High Seas. As part of the technical assistance to the ATG, a separate geographic information systems (GIS) geodatabase has been developed with supporting datasets on the environment, biodiversity, and ecologically important areas as well as all known ECS deposits, overlapping claims, recommendations, and submissions and High Seas polygons to assist OSPAR in delineating boundaries and identifying nearby States with ECS (**Appendix 1**).

There are four areas that contain ABNJ within OSPAR Region I according to the Maritime Boundaries Geodatabase of the Flanders Marine Institute (2024) (**Figure 2**), and these areas are considered as candidate conservation sites in the present report:

1. Section of the Central Arctic Ocean in the north, corresponding to the multi-year Arctic sea ice habitat and encompassing part of the Gakkel Ridge seafloor, 232,396 km² (31.5% of the High Seas area in OSPAR Region I);
2. Section of the Central Barents Sea in the east, 75,158 km² (10.2% of the High Seas area in OSPAR Region I);
3. Section along the Arctic Mid-Ocean Ridge in the central area, 318,189 km² (43.1% of the High Seas area in OSPAR Region I);
4. Section to the southeast of Greenland corresponding to the Imarssuak Sea Channel, off the slope of Reykjanes Ridge, 112,397 km² (15.2% of the High Seas area in OSPAR Region I).

The identification and analysis of these four areas serve as a spatial framework for this initial evidence-gathering phase. While some conservation features of interest, such as multi-year sea ice or broad-scale ecosystem processes, occur widely or throughout an entire area, others — such as specific seamounts, migration corridors, or unique benthic habitats — are more localised within these sectors. Therefore, the current delineation is intended as a pragmatic starting point for compiling available information. Further refinement of spatial boundaries and prioritisation will be necessary as OSPAR's site selection process advances.

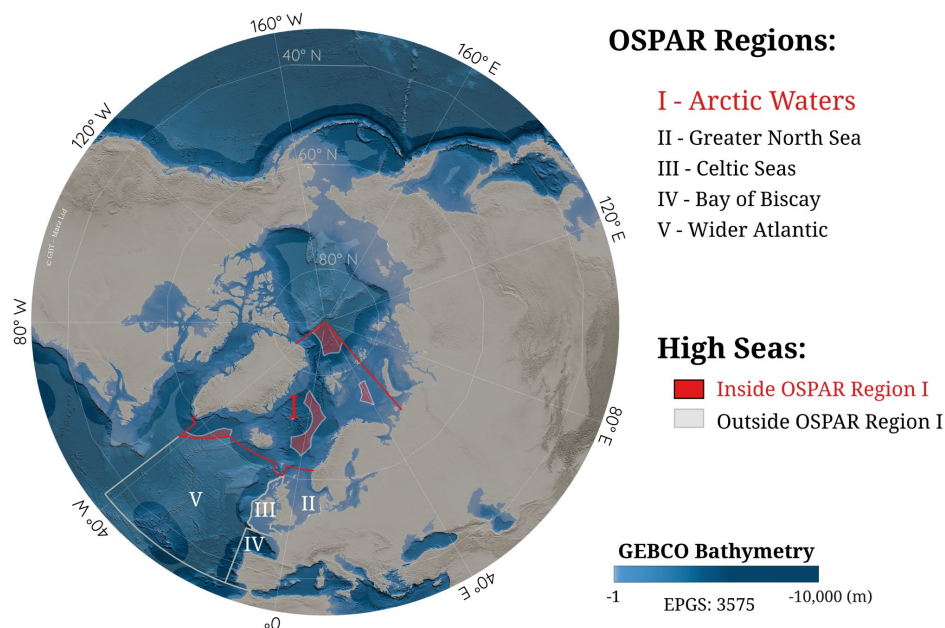


Figure 1: Project Area of Interest (High Seas areas within OSPAR Region I highlighted in red colour). Sources of data: High Seas -> Flanders Marine Institute (2024). Maritime Boundaries Geodatabase: High Seas, version 2¹. GEBCO -> GEBCO Compilation Group (2025) GEBCO 2025 Grid².

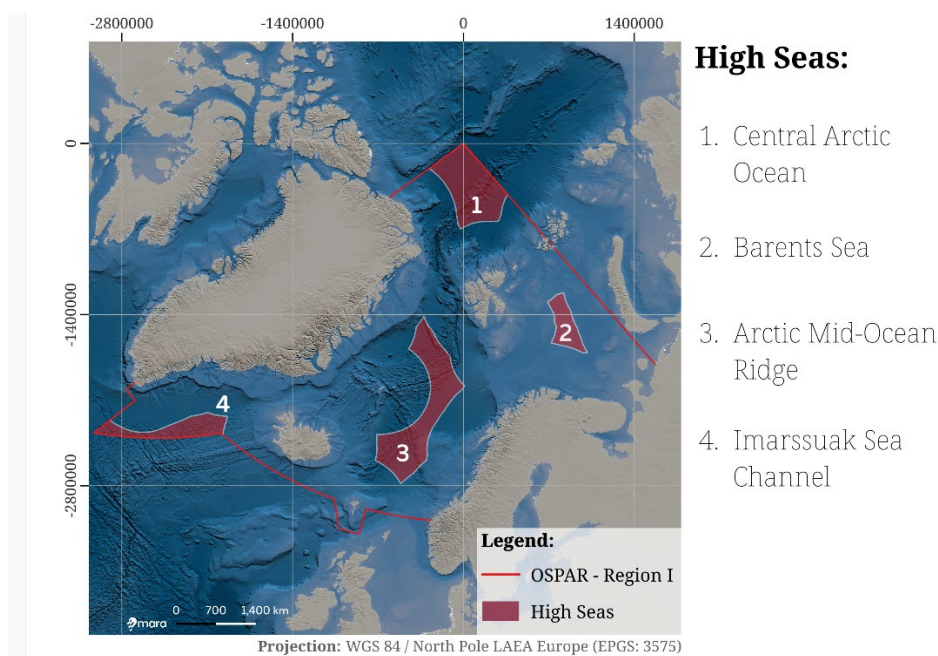


Figure 2. A close up view of the 4 candidate sites within OSPAR Region I. Sources of data: High Seas -> Flanders Marine Institute (2024). Maritime Boundaries Geodatabase: High Seas, version 2³. GEBCO -> GEBCO Compilation Group (2025) GEBCO 2025 Grid⁴.

¹ <https://www.marineregions.org/>. <https://doi.org/10.14284/696>

² [doi:10.5285/37c52e96-24ea-67ce-e063-7086abc05f29](https://doi.org/10.5285/37c52e96-24ea-67ce-e063-7086abc05f29)

³ <https://www.marineregions.org/>. <https://doi.org/10.14284/696>

⁴ [doi:10.5285/37c52e96-24ea-67ce-e063-7086abc05f29](https://doi.org/10.5285/37c52e96-24ea-67ce-e063-7086abc05f29)

Notably, according to the Commission on the Limits of the Continental Shelf (CLCS) and the Division for Ocean Affairs and the Law of the Sea (DOALOS), there are a number of ECS submissions in OSPAR Region I (**Figure 3**). The ECS represent the portion of the continental shelf that extends beyond 200 nautical miles, as submitted by a State to or recommended by the CLCS, or as unilaterally established by a State (including Non-Parties to UNCLOS) in accordance with their own procedures. Several OSPAR states have potential or established extended continental shelf areas in Region I.

Key Submissions:

1. Norway (**Figure 4**)
 - Norway's submission concerns areas north of Svalbard and in the Arctic Ocean (notably the 'Loop Hole' and 'Banana Hole' in the Barents Sea, and the Nansen Basin). Norway has submitted its claim to the CLCS, which received CLCS recommendations with minor modifications (2009).
2. Kingdom of Denmark (**Figure 5**)
 - Denmark's submission for an extensive area north of Greenland, reaching the North Pole was filed with CLCS on 15 December 2014. The submission overlaps with those of Russia and Canada in central Arctic areas.
3. Russia (**Figure 6**)
 - Although not an OSPAR Contracting Party, Russian submission overlap with the ECS areas of OSPAR states. Russia made its initial submission to the CLCS concerning the limits of its outer continental shelf in 2001, followed by a revised submission in 2015.
4. Iceland (**Figure 7**)
 - Iceland's submission concerning the outer limits of its continental shelf, involving the Ægir Ridge area and parts of the Reykjanes Ridge (2010 submission), overlaps in some areas with submissions by Norway and Denmark.

There are overlaps in submissions, especially in the Central Arctic Ocean. The key area of overlap is between Denmark (Greenland), Norway, Russia, and Canada. **Figures 3-7** illustrate the ECS submission and their status according to the Maritime Boundaries Geodatabase of the Flanders Marine Institute (2024). It is important to note that some seafloor areas within ABNJ in OSPAR Region I are not covered by any ECS submission, and are thus likely to remain part of the international seabed area ('the Area' under UNCLOS).

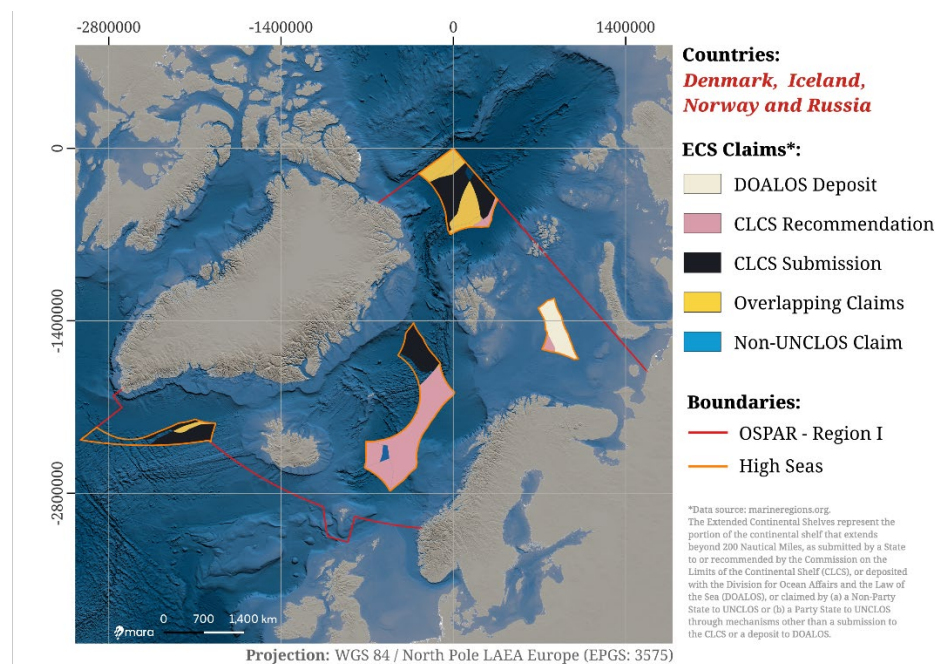


Figure 3. The four candidate sites boundaries in relation to outer limits of Extended Continental Shelves as set out in the respective submissions by coastal States to the United Nations Commission on the Limits of the Continental Shelf (CLCS). Data source: Marine Regions⁵.

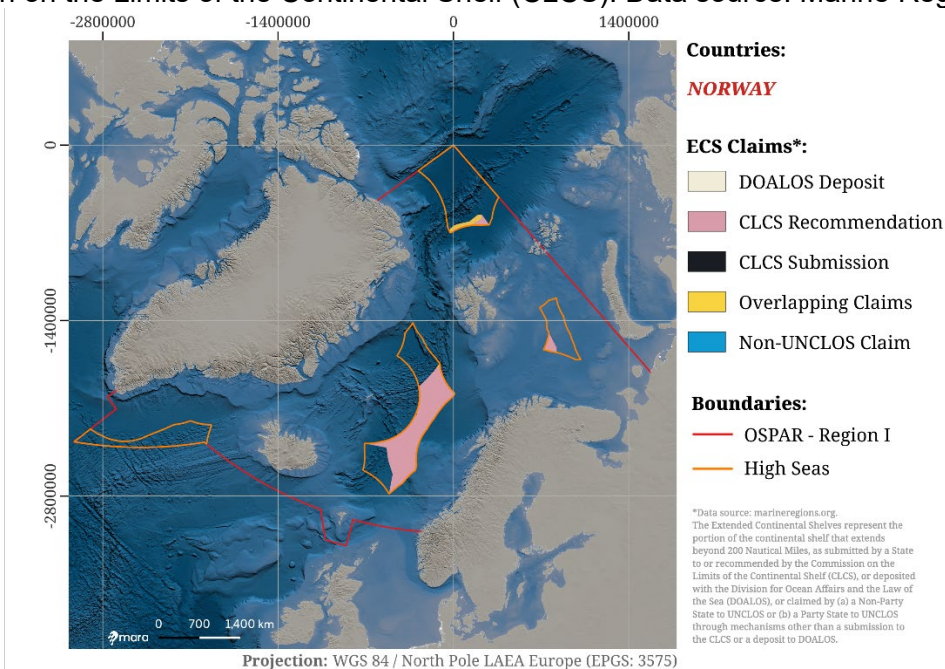


Figure 4. Extended Continental Shelves submissions by Norway to the United Nations Commission on the Limits of the Continental Shelf (CLCS). Data source: Marine Regions⁶.

⁵ Flanders Marine Institute (2024). Maritime Boundaries Geodatabase: Extended Continental Shelves, version 2. Available online at <https://www.marineregions.org/>. <https://doi.org/10.14284/697>

⁶ Flanders Marine Institute (2024). Maritime Boundaries Geodatabase: Extended Continental Shelves, version 2. Available online at <https://www.marineregions.org/>. <https://doi.org/10.14284/697>

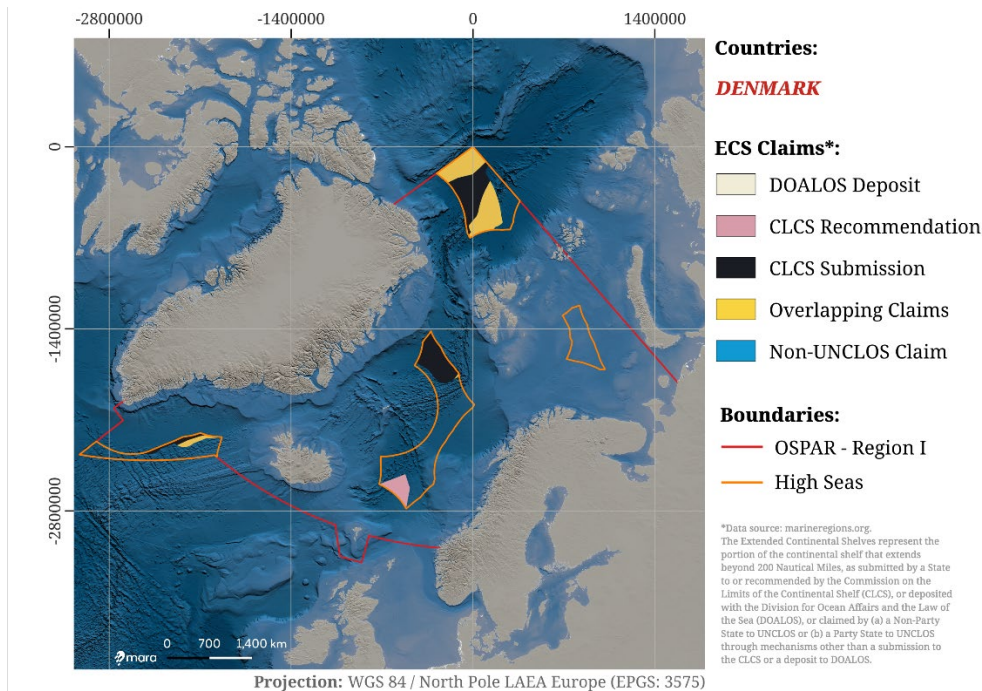


Figure 5. Extended Continental Shelves submissions by Denmark to the United Nations Commission on the Limits of the Continental Shelf (CLCS). Data source: Marine Regions⁷.

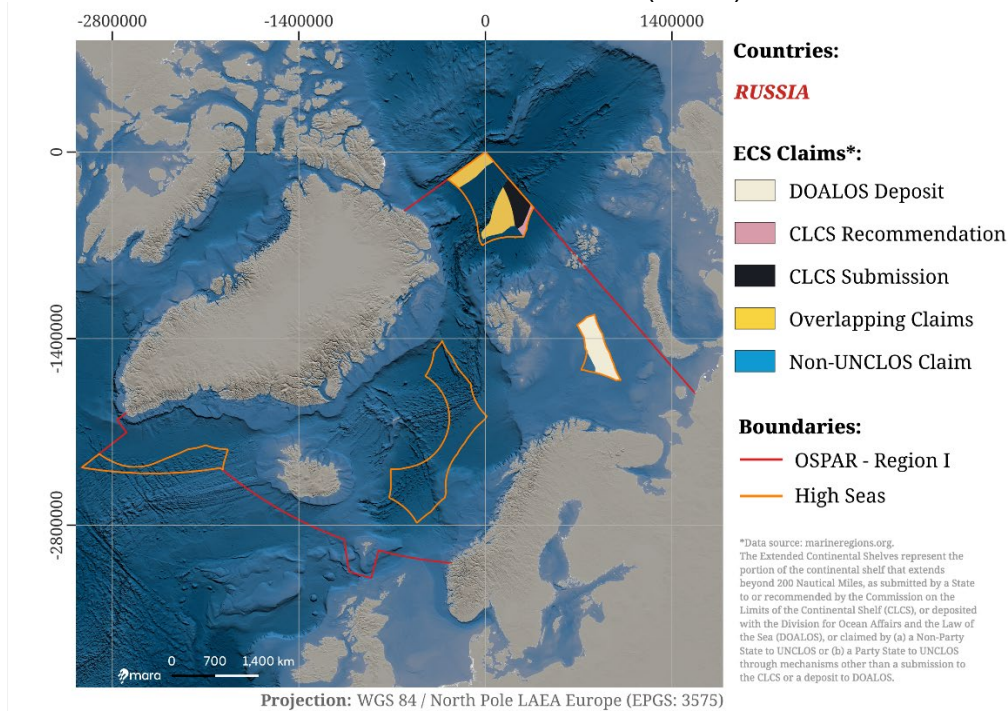


Figure 6. Extended Continental Shelves submissions by Russia to the United Nations Commission on the Limits of the Continental Shelf (CLCS). Data source: Marine Regions⁸.

⁷ Flanders Marine Institute (2024). Maritime Boundaries Geodatabase: Extended Continental Shelves, version 2. Available online at <https://www.marineregions.org/>. <https://doi.org/10.14284/697>

⁸ Flanders Marine Institute (2024). Maritime Boundaries Geodatabase: Extended Continental Shelves, version 2. Available online at <https://www.marineregions.org/>. <https://doi.org/10.14284/697>

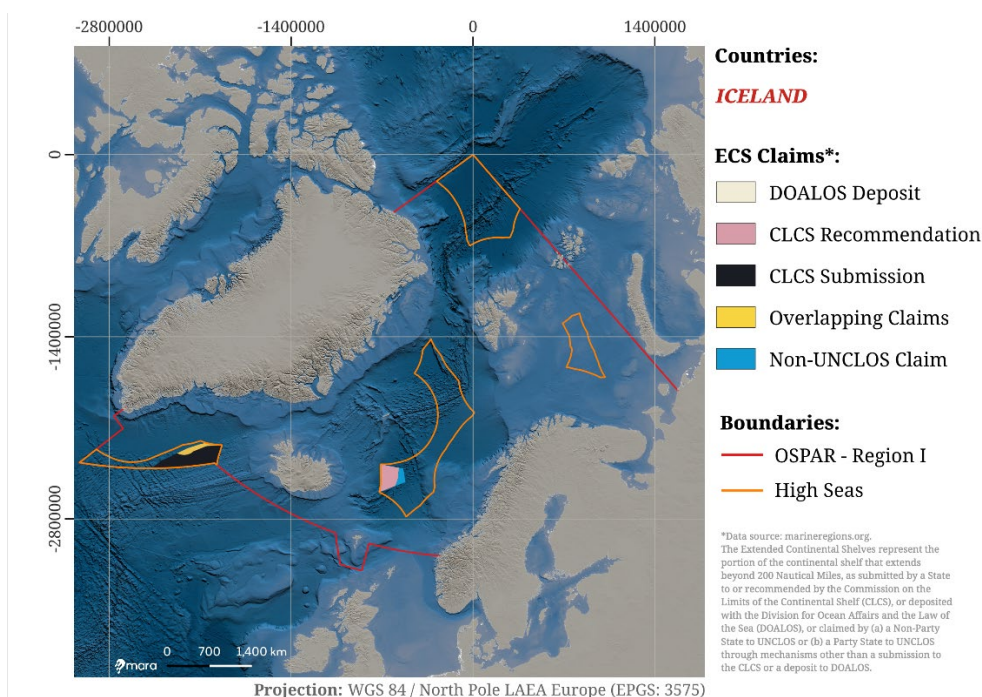


Figure 7. Extended Continental Shelves submissions by Iceland to the United Nations Commission on the Limits of the Continental Shelf (CLCS). Data source: Marine Regions⁹.

Ecological, geomorphological and oceanographic characteristics

This section of the report provides brief descriptions of the key characteristics of the marine environment in OSPAR Region I. The purpose of this section is to identify potential conservation features. For more comprehensive background information on oceanography, geology, and biology in OSPAR Region I, please refer to specialised reports, such as:

- OSPAR Quality Status Report 2023;
- OSPAR Arctic Waters Report 2024;
- CAFF (2013). Arctic Biodiversity Assessment;
- CAFF (2017). State of the Arctic Marine Biodiversity Report;
- K.M. Kovacs, S. Belikov, P. Boveng, G. Desportes, S. Ferguson, R. Hansen, K. Laidre, G. Stenson, P. Thomas, F. Ugarte, D. Vongraven. (2021). 2021 State of the Arctic Marine Biodiversity Report (SAMBR) Update: 2021 State of the Arctic Marine Biodiversity Report (SAMBR) Update: Marine Mammals. Technical Report.
- CAFF (2021). State of the Arctic Marine Biodiversity Report Update: Seabirds. Conservation of Arctic Flora and Fauna International Secretariat: Akureyri, Iceland.
- Skjoldal, H. R. (Ed.). (2022). Ecosystem assessment of the Central Arctic Ocean: Description of the ecosystem. ICES Cooperative Research Reports Vol. 355. 341 pp.

⁹ Flanders Marine Institute (2024). Maritime Boundaries Geodatabase: Extended Continental Shelves, version 2. Available online at <https://www.marineregions.org/>. <https://doi.org/10.14284/697>

Geomorphology and benthic habitats

OSPAR Region I is characterised by rugged topography, dynamic seafloor and diverse habitats and geological features such as basins, sea banks, abyssal plains, as well as ridges, fracture zones, and seamounts. The complex interplay of tectonic activities, sedimentary processes, and ice dynamics shapes the seabed geomorphology (Jakobsson et al., 2012). The Arctic waters of OSPAR Region I include extensive continental shelves, notably around Greenland, Svalbard, and the Barents Sea. These shelves often feature complex topography with troughs, banks, and escarpments that play critical roles in oceanic processes and ecosystems. The region includes several deep-sea basins, such as the Norwegian Basin and the Greenland Basin, which are characterised by thick sediment deposits. In the Central Arctic Ocean, wide variations in seabed topography and substrate types play a major role in creating diverse habitats and supporting a rich array of associated biota (ICES, 2025).

OSPAR listed habitats

The OSPAR habitat list, formalised under Annex V of the OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic, identifies marine habitat types nominated by the Contracting Parties and Observers to the Commission to be in need of priority protection. Inclusion on this legally recognised list obligates Contracting Parties to implement appropriate measures for the protection and conservation of these habitats. The OSPAR Habitats in the North-East Atlantic Ocean dataset¹⁰ is a comprehensive compilation of point records submitted by the contracting parties of the OSPAR Convention, illustrating the distribution of priority habitats across the region. Coordinated by the UK's Joint Nature Conservation Committee (JNCC), this publicly accessible dataset brings together verified habitat data that were compiled from 2022 to 2025 but which may not yet include datasets, with exclusions for sensitive species and records subject to data use restrictions.

Oceanic Ridges with Hydrothermal Vents

Oceanic ridges with hydrothermal vents are assessed as being in good status in Region I according to the latest status assessment (OSPAR Status Assessment 2022¹¹). The central part of the Region I is characterised by the Arctic Mid-Ocean Ridge, a continuation of the Mid-Atlantic Ridge system north of the Fram Strait, which is structuring the deep Arctic Basin in this section separating the Central Nansen Basin to the south from the Amundsen Basin to the north. The Arctic Mid-Ocean Ridge is characterised by high geodiversity and high density of geomorphological features including ridges, rises, fracture zones, and banks. The Gakkel Ridge, the Mohns Ridge, and the Ægir Ridge overlap with ABNJ in OSPAR Region I (**Figure 8**). The Gakkel Ridge is known for being the slowest spreading ridge in the world, featuring unique geological and hydrothermal activity due to its slow spreading rate (Michael et al., 2003).

The Arctic Mid-Ocean Ridge is characterised by high hydrothermal activity with deep-sea hydrothermal vent fields, mud volcanoes, and cold methane seeps located along the ridge. There has also been a recent discovery of the natural oil seep offshore western Svalbard (Panieri et al., 2024). Three vent fields on the Gakkel Ridge and one on the Mohn Ridge fall into the ABNJ

¹⁰ <https://emodnet.ec.europa.eu/geonetwork/srv/api/records/e5a4ae14-a116-42e1-8f86-e6f055accbcf?language=all>

¹¹ <https://oap.ospar.org/en/ospar-assessments/committee-assessments/biodiversity-committee/status-assessments/oceanic-ridges-hydrothermal-vents/>

(**Figure 9**). Loki's Castle Vent Field on Knipovich Ridge just outside of the ABNJ is the first black-smoker vent field discovered in the Arctic in 2008 (Eilersten et al., 2024). The Arctic vent fields support unique microbial communities, which demonstrate unique adaptations and influence the chemistry of the ocean floor (Hribovšek et al., 2023; Hribovšek et al., 2025), and unique biological communities often with newly discovered species (Eilersten et al., 2024). Arctic Mid-Ocean Ridge hydrothermal vents also play an important role in bioprospecting, including recent discoveries of new enzymes from bacteria at Jan Mayen vents (Røyseth et al., 2025; Tarrant et al., 2026). For example, the novel marine-derived protease globupain demonstrates unique substrate specificity and exceptional stability under industrial conditions, highlighting its strong potential for biotechnological applications such as tailored protein hydrolysis in food processing, development of specialised pharmaceuticals, bioremediation of protein-rich waste, and advanced proteomic analyses (Røyseth et al., 2025).

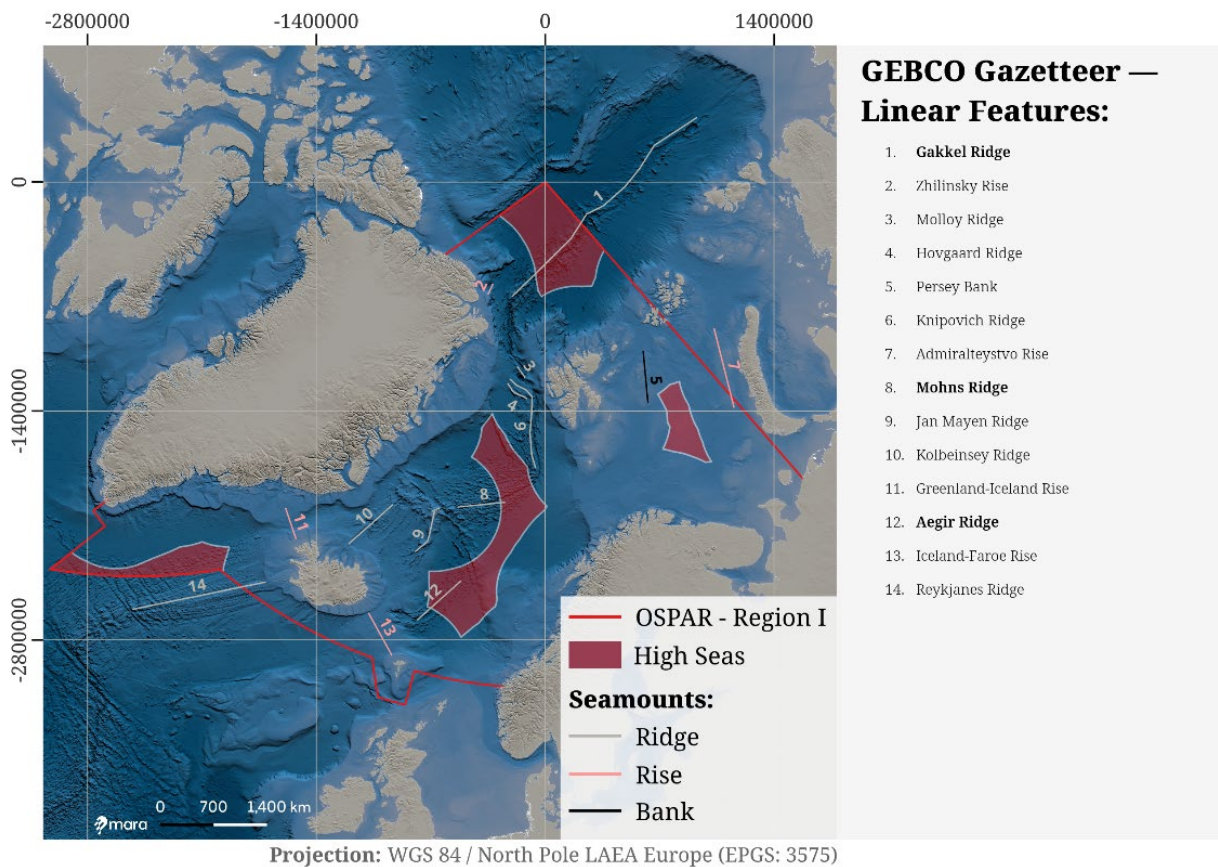


Figure 8. Geodiversity of OSPAR Region I, including positions of ridges, rises and banks. Source: GEBCO Gazetteer¹².

¹² <https://www.ngdc.noaa.gov/gazetteer/view/home>

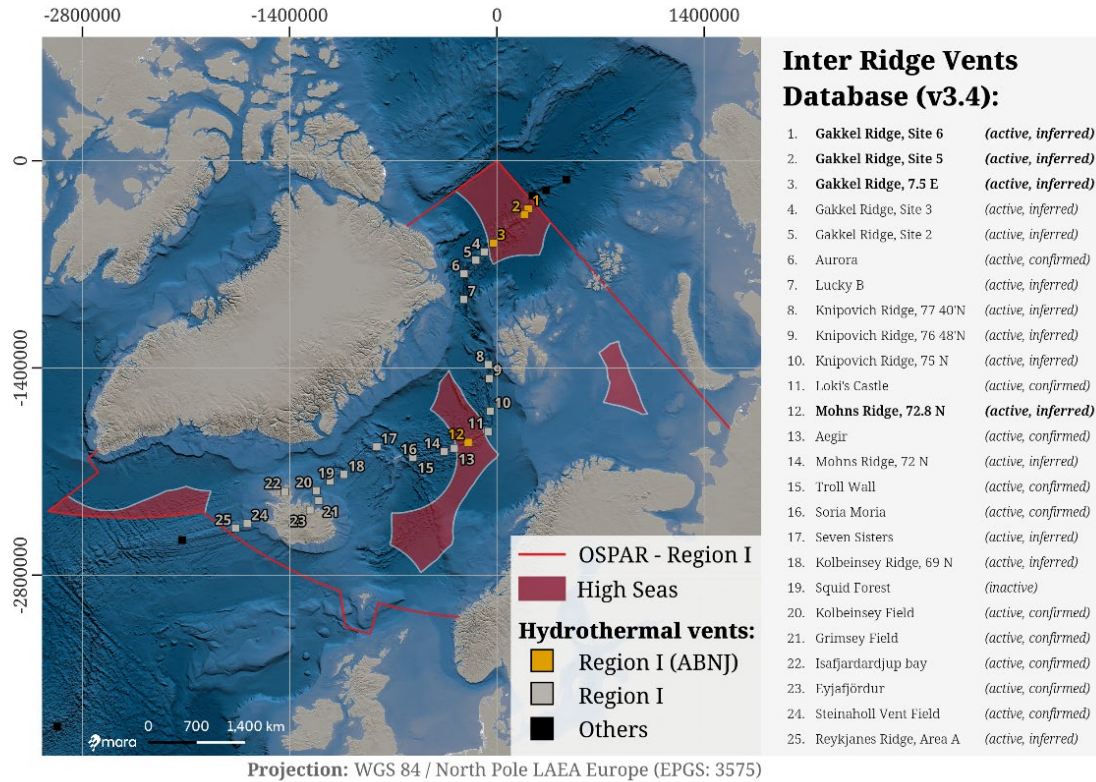


Figure 9. Hydrothermal vent fields in OSPAR Region I. Source: Inter Ridge Vents Database.

Seamounts

OSPAR assesses the seamounts in Arctic Waters (Region I) as having a poor status, largely due to their vulnerability to bottom-contact fishing gear (OSPAR Status Assessment 2022¹³). Seamounts and knolls are prominent features along the Arctic Mid-Ocean Ridge, especially in the northern and central areas of OSPAR Region I. **Figure 10** illustrates these features, using the OSPAR habitat point data from EMODnet¹⁴, showing seamounts overlapping with three of the four candidate sites of OSPAR Arctic Waters. Additionally, a semi-automated workflow utilising a combination of IBCAO (version 5.1) and GEBCO bathymetric grids (2025 edition), was developed as part of the present technical assistance project to identify, extract, and quantify significant seafloor features rising at least 1000 m above the surrounding seafloor, such as seamounts and ridges, within OSPAR Region I, as depicted in **Figure 11**. Because the IBCAO grid does not fully cover OSPAR Region I, it was supplemented with the standard GEBCO grid in areas lacking bathymetric data. Detailed descriptions of this methodology can be found in **Appendix 2**. This figure underscores the high rugosity of the seafloor along the Arctic Mid-Ocean Ridge. A similar approach was used by the recent study by Dolan and Bjarnadóttir (2025), which used advanced, automated geomorphometric methods applied to GEBCO bathymetry (2024 edition) to map and characterise 974 peaks (including seamounts, knolls, mounds, and ridges) across Norwegian waters, discovering hundreds of new topographic highs not previously reported.

¹³ <https://oap.ospar.org/en/ospar-assessments/committee-assessments/biodiversity-committee/status-assessments/seamounts/>

¹⁴ <https://emodnet.ec.europa.eu/geonetwork/srv/api/records/e5a4ae14-a116-42e1-8f86-e6f055accbcf?language=all>

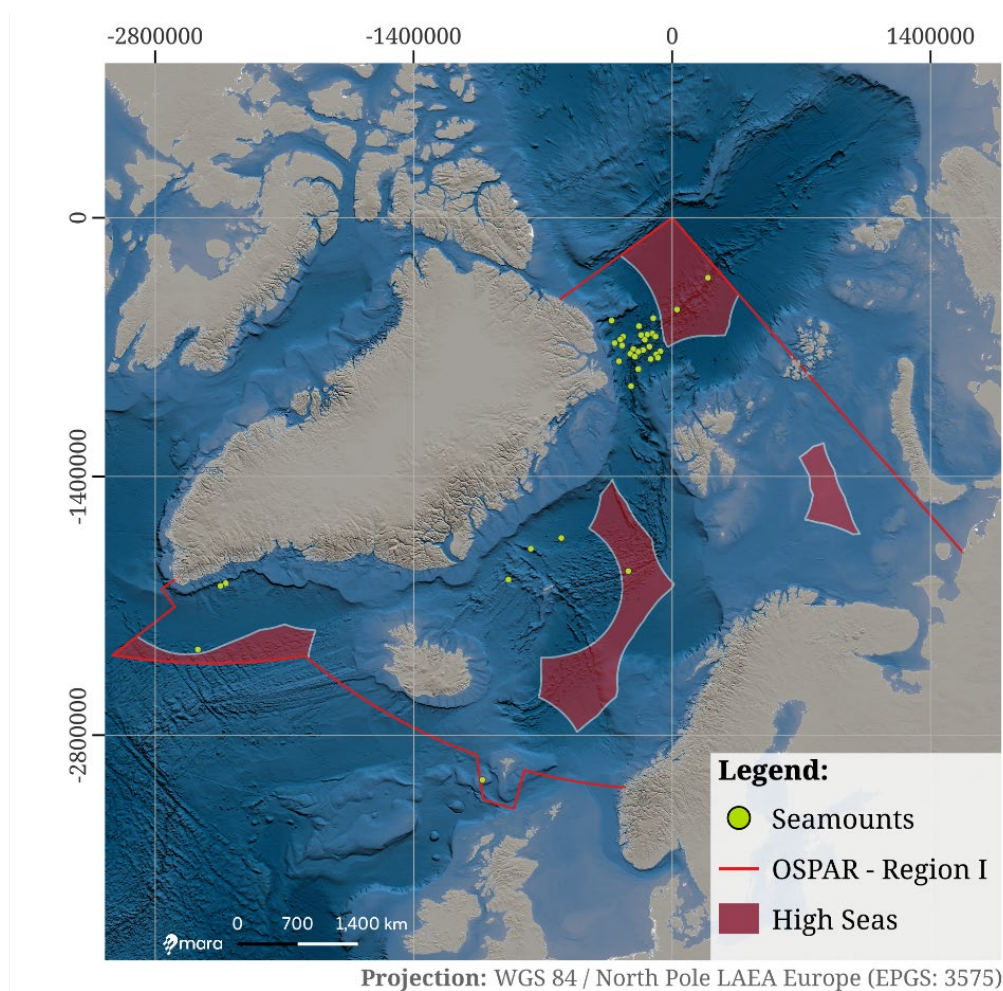


Figure 10. Seamounts in OSPAR Region I - Arctic Waters. Source: OSPAR 2025 (EMODnet)¹⁵.

¹⁵ <https://emodnet.ec.europa.eu/geonetwork/srv/api/records/e5a4ae14-a116-42e1-8f86-e6f055accbcf?language=all>

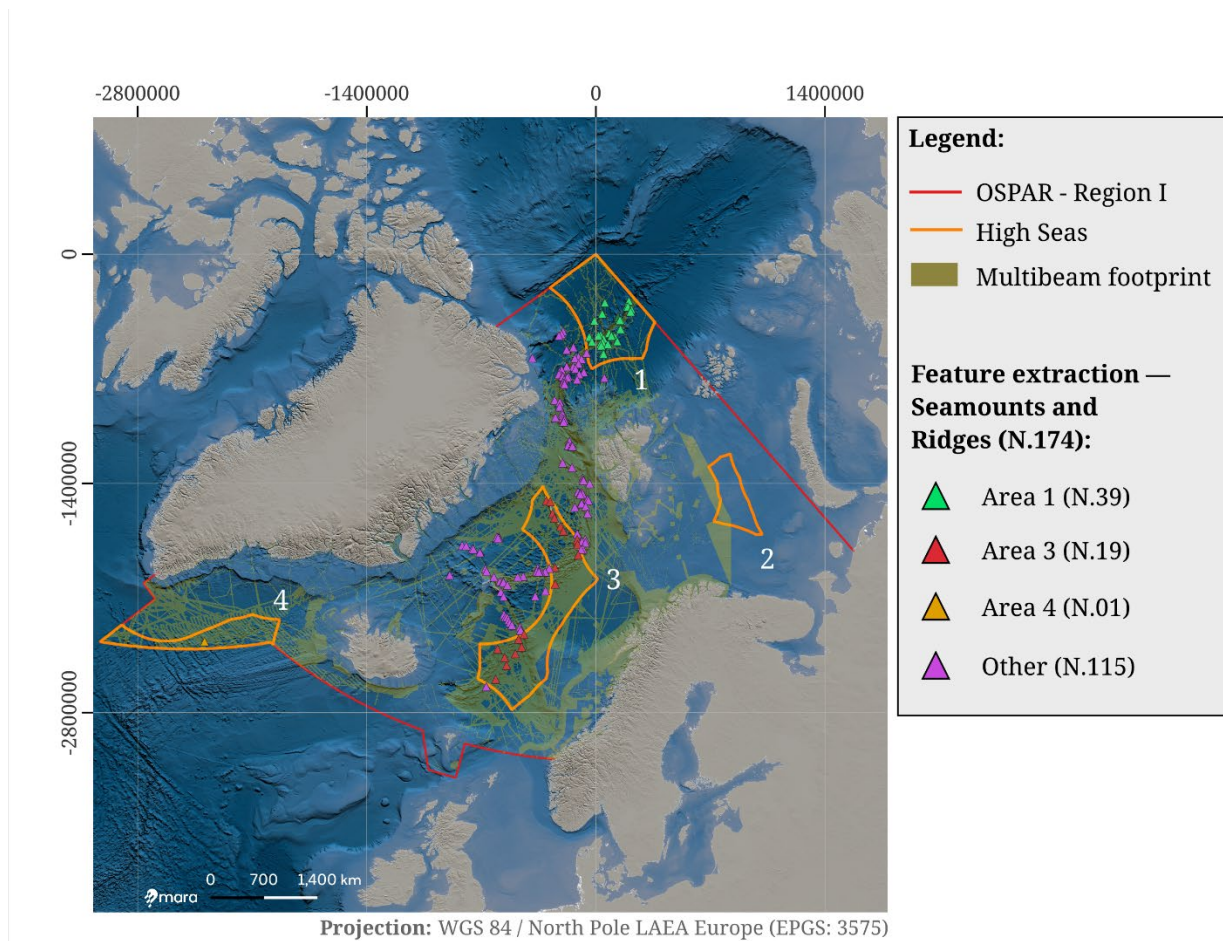


Figure 11. Topography of OSPAR Region I - Arctic Waters, including seamounts and ridges. Source: IBCAO, 2025¹⁶ & GEBCO, 2025¹⁷.

***Lophelia pertusa* Reefs**

Lophelia pertusa (alt. *Desmophyllum pertusum*) reefs, are listed as threatened/declining habitats by OSPAR in Region I and assessed as having a poor status in the last status assessment (OSPAR Status Assessment 2022¹⁸). These habitats are found throughout the OSPAR Region I on the shelf along the eastern Norwegian Sea, in the Lofoten area, near Iceland and Faroes (Buhl-Mortensen et al., 2015). Notably, Norway has the highest known density of *Lophelia pertusa* reefs in the world, mapped at depths between 39 and 400 metres. The Arctic Marine Shipping Assessment (AMAP/CAFF/SDWG, 2013) identified the following sites in the Norwegian Sea as areas of ecological significance, with the presence of *Lophelia* reefs serving as one of the selection criteria: (1) the Norwegian coast and shelf — Møre-Helgeland; and (2) the Lofoten area. Notably known locations of *Lophelia pertusa* reefs do not overlap with ABNJ in Region I (**Figure 12**).

¹⁶ IBCAO (2025) International Bathymetric Chart of the Arctic Ocean (IBCAO) V5.1 Grid. <https://www.gebco.net/data-products/gridded-bathymetry-data/arctic-ocean>

¹⁷ GEBCO Compilation Group (2025) GEBCO 2025 Grid (doi:10.5285/37c52e96-24ea-67ce-e063-7086abc05f29)

¹⁸ <https://oap.ospar.org/en/ospar-assessments/committee-assessments/biodiversity-committee/status-assessments/lophelia-pertusa-reefs/>

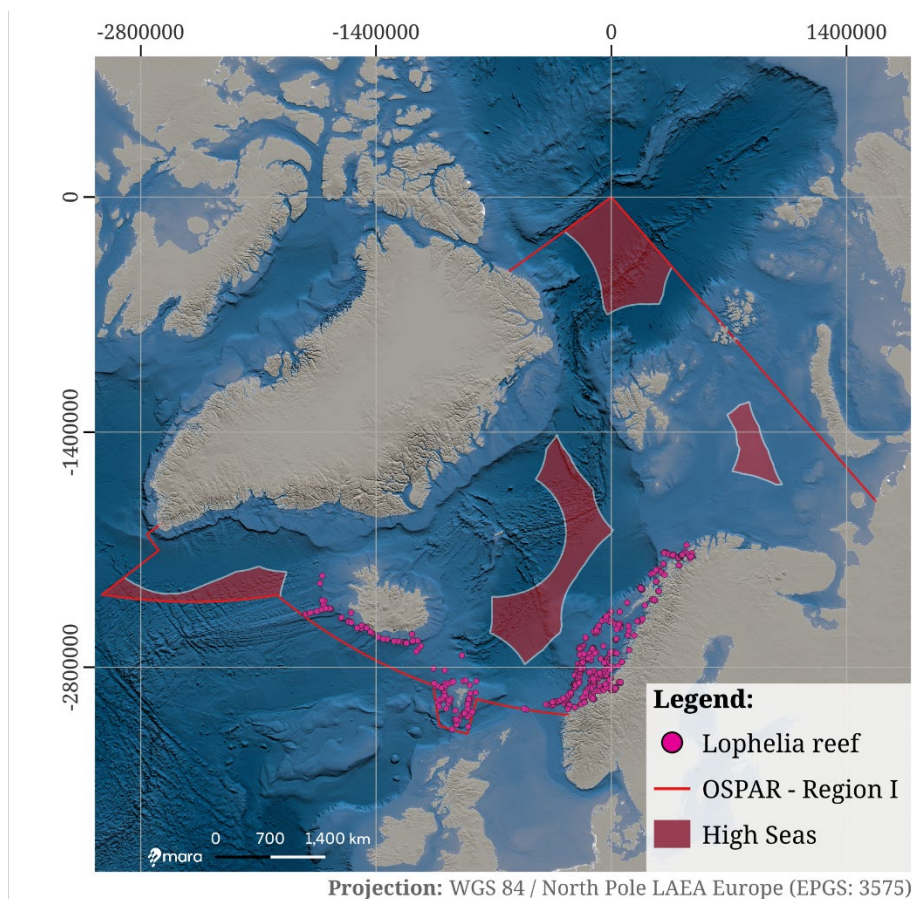


Figure 12. *Lophelia pertusa* reefs in OSPAR Region I - Arctic Waters. Source: OSPAR 2025 (EMODnet)¹⁹.

Coral Gardens

Coral gardens, defined as relatively dense aggregations of one or more coral species on various seabed types, support a wide range of marine life but are highly sensitive to physical disturbance from bottom-contact fishing gear and vulnerable to climate change stressors such as warming and ocean acidification (OSPAR, 2010a). Coral gardens are listed as under threat and/or in decline in OSPAR Arctic Waters and assessed as having a poor status according to the last status assessment (OSPAR Status Assessment 2022²⁰). In Region I, coral gardens are recorded primarily in the continental shelf and upper slope areas, especially along the Norwegian and Barents Seas. Coral gardens have been observed in areas such as the Lofoten–Vesterålen shelf, the Barents Sea shelf edge, and around Svalbard, with additional records near the Faroe Islands and off northern Iceland (**Figure 13**). Suitable habitats in this region are structured by cold, nutrient-rich waters and strong currents, which provide an optimal environment for the diverse assemblage of corals that typify coral gardens (OSPAR, 2010a). Coral gardens overlap with the Barents Sea polygon in Region I. However, precise mapping and comprehensive data remain

¹⁹ <https://emodnet.ec.europa.eu/geonetwork/srv/api/records/e5a4ae14-a116-42e1-8f86-e6f055accbcbf?language=all>

²⁰ <https://oap.ospar.org/en/ospar-assessments/committee-assessments/biodiversity-committee/status-assessments/coral-gardens/>

limited, and much of the current understanding is based on research cruises, remotely operated vehicle surveys, and predictive habitat modelling.

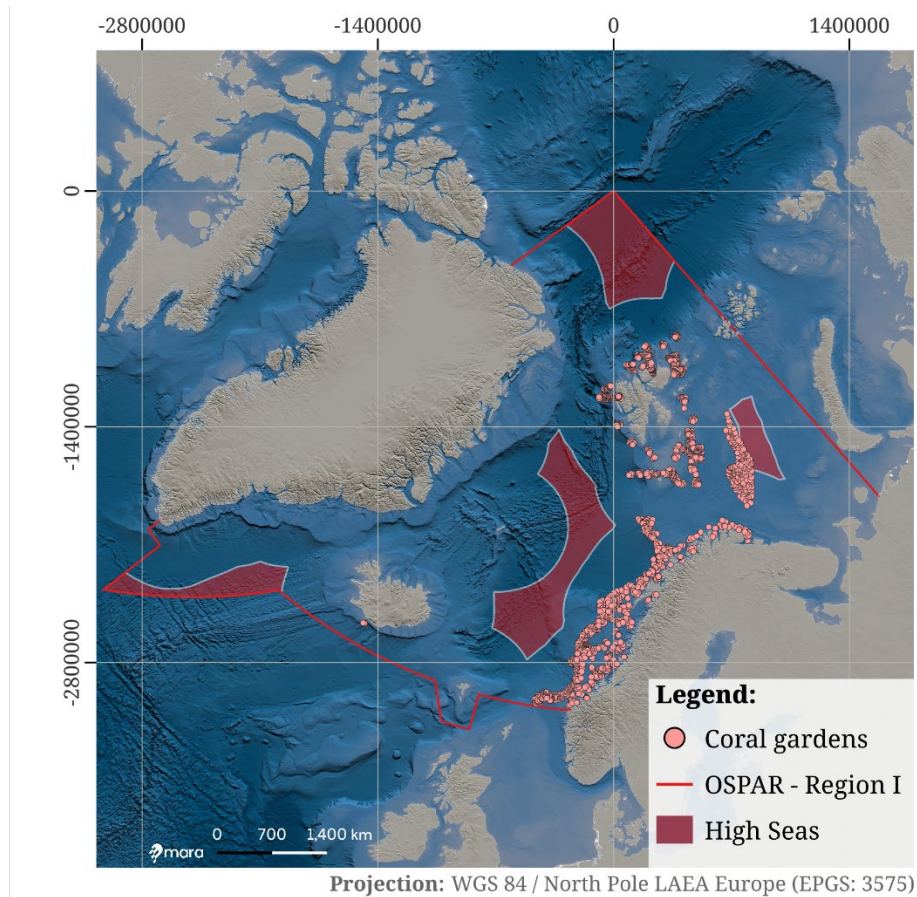


Figure 13. Coral gardens in OSPAR Region I - Arctic Waters. Source: OSPAR 2025 (EMODnet)²¹.

Deep-Sea Sponge Aggregations

Deep-sea sponge aggregations in OSPAR Region I (Arctic Waters) are widely distributed across the continental shelves and slopes, extending from the Denmark Strait and East Greenland, to the Norwegian and Barents Sea margins in deep fjords, offshore banks, and seamounts, with particularly abundant grounds dominated by tetractinellid sponges (notably *Geodia* spp.) found within the Exclusive Economic Zone (EEZ) of Norway, Svalbard, Iceland, and Greenland (OSPAR, 2010b) (**Figure 14**). According to the OSPAR Habitats in the North-East Atlantic Ocean dataset, deep-sea sponge aggregations are recorded within the Barents Sea in Region I (**Figure 14**). These habitats typically occur at bathyal depths (250–1,300 m and beyond), with iceberg ploughmarks, stable boulders, and cobble substrates providing ideal attachment points.

²¹ <https://emodnet.ec.europa.eu/geonetwork/srv/api/records/e5a4ae14-a116-42e1-8f86-e6f055accbcf?language=all>

There are also other records of these habitats in the Denmark Strait and East Greenland Shelf from historic literature (e.g., Klitgaard and Tendal, 2004) and more contemporary baseline surveys such as those supported by the Initiating North Atlantic Benthos Monitoring (INAMon) project, which was funded by the Greenland Institute of Natural Resources, North Atlantic Cooperation, Sustainable Fisheries Greenland, the Ministry for Research in Greenland, and Denmark's Environmental Protection Agency (Zwerschke et al., 2025). On the East Greenland Shelf, these habitats are characterised by tetractinellid sponges including *Geodia hentscheli*, *G. parva*, *Stelletta rhapsidophora* and *Thenaea valdiviae*, but also hexactinellid ("glass") sponges such as *Schaudinna rosea*, *Trichasterina borealis*, *Scyphidium septentrionale*, and *Asconema foliatum* (Klitgaard and Tendal, 2004; Samuelson et al., 2022).

Following OSPAR's latest Threatened/Declining Habitat Assessment of Deep-Sea Sponge Aggregations in 2022, there has been more recent examination of eight years of demersal trawl bycatch data (Zwerschke et al., 2025). This dataset (outside of the Area) now offers the largest assessment of benthic Greenlandic shelf ecosystems to date, though the authors carefully note that sampling effort was unevenly distributed so these data only represent areas where trawl sets occurred. Notably, for deep-sea sponge aggregations occurring off East Greenland, hindcast ocean-climate simulations between 1948 and 2014 showed relatively little environmental variability in deep-sea conditions in both intermediate (200–700 m) and deeper water mass layers (Samuelson et al., 2022).

Subsequent sampling campaigns such as the EUROFLEETS BENCHMARK expedition to the Denmark Strait (Burgos et al., 2025) offer further details on not just deep-sea sponge aggregation occurrences but other VME indicator taxa as well, with the Greenland-Iceland Ridge region being particularly important for such species and habitats (see Table 1 in Burgos et al., 2025) though no stations appear to be in the Area.

While mapping and knowledge of such habitats has significantly improved, the full extent remains uncertain due to limited and spatially patchy surveying –habitat suitability models offer opportunities to fill gaps (Howell et al., 2016). **Figure 15** presents modelled habitat suitability maps from Howell et al. (2016) indicating the likely occurrence of two types of deep-sea sponge aggregations in the North Atlantic, Norwegian, and Barents Seas, showing a high likelihood of the sponge presence in Imarssuak Sea Channel (candidate site 4 in OSPAR Region I). Sponge grounds remain exposed to persistent pressures, particularly from demersal fisheries — a key threat given the slow recovery rates and exceptional sensitivity of these communities, therefore deep-sea sponge aggregations are listed as under threat and/or in decline in Region I (OSPAR, 2010b). Deep-sea sponge aggregations are assessed as being in poor condition in Region I (OSPAR Status Assessment, 2022²²).

²² <https://www.ospar.org/work-areas/bdc/species-habitats/list-of-threatened-declining-species-habitats/habitats/deep-sea-sponge-aggregations>

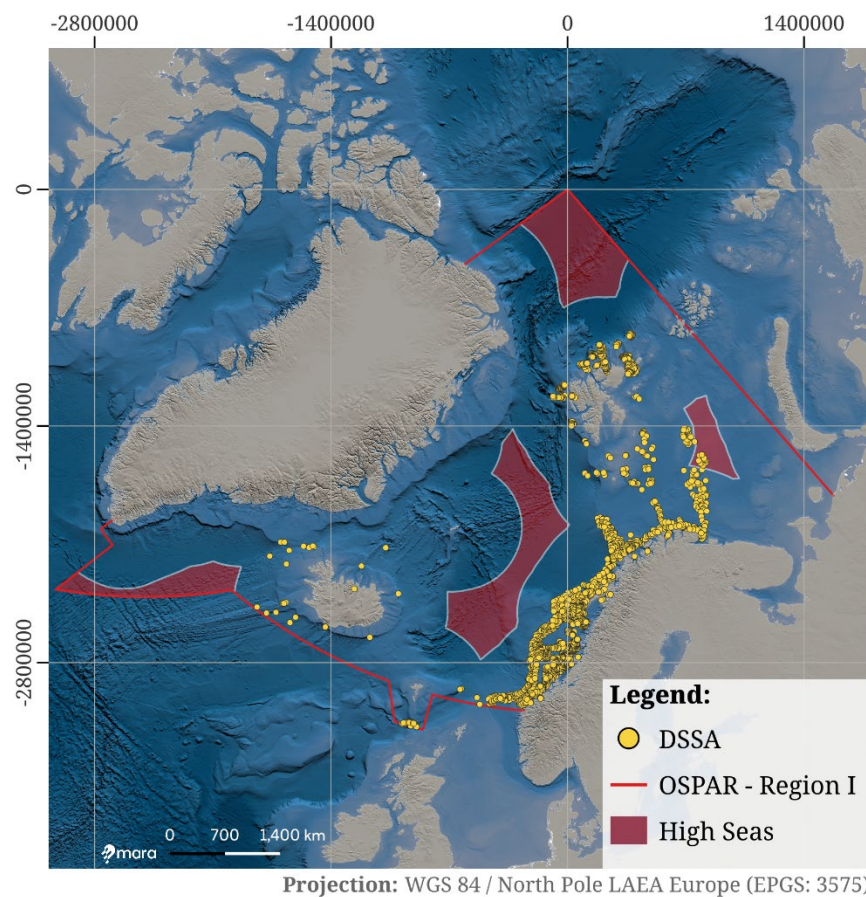


Figure 14. Deep-sea sponge aggregations (DSSAa) in OSPAR Region I - Arctic Waters. Source: OSPAR 2025 (EMODnet)²³.

²³ <https://emodnet.ec.europa.eu/geonetwork/srv/api/records/e5a4ae14-a116-42e1-8f86-e6f055accbcf?language=all>

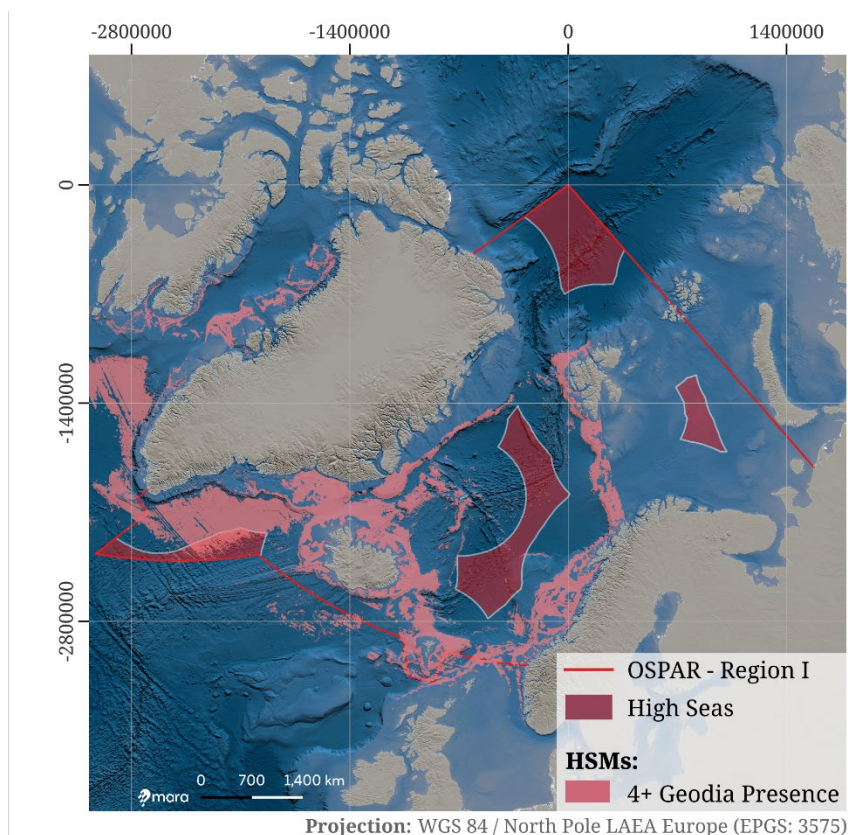


Figure 15. Predicted distribution of areas with co-occurrence of four or more *Geodia* sponge species in the North Atlantic, Norwegian, and Barents Seas, based on habitat suitability modelling. Data source: Howell et al., 2016.

Sea-Pen and Burrowing Megafauna Communities

Sea-pen and burrowing megafauna communities are characteristic of fine muddy sediments typically found in sheltered coastal basins, fjords, and deep offshore waters across OSPAR Region I (Arctic Waters) (OSPAR, 2010c). These habitats are defined by the presence of bioturbating burrowing crustaceans — such as *Nephrops norvegicus* and *Calocaris macandreae* — alongside conspicuous populations of sea-pens, notably *Virgularia mirabilis*, *Pennatula phosphorea*, and in deeper fjordic sites, *Funiculina quadrangularis* (OSPAR, 2010c). In Region I, these communities are documented in Norwegian inshore waters, particularly in fjords and sheltered bays influenced by glacial and oceanographic processes (**Figure 16**). However, there are currently no records of sea-pen and burrowing megafauna communities that overlap with ABNJ in Region I, which could reflect both a genuine biogeographic pattern and data gaps due to limited offshore surveying and habitat suitability in deep habitats. The full distribution and condition of these communities in Arctic Waters remain poorly understood, with status currently assessed as unknown due to the scarcity of systematic mapping and monitoring (OSPAR Status Assessment, 2022²⁴).

²⁴ <https://oap.ospar.org/en/ospar-assessments/committee-assessments/biodiversity-committee/status-assessments/sea-pen-and-burrowing-megafauna-communities/>

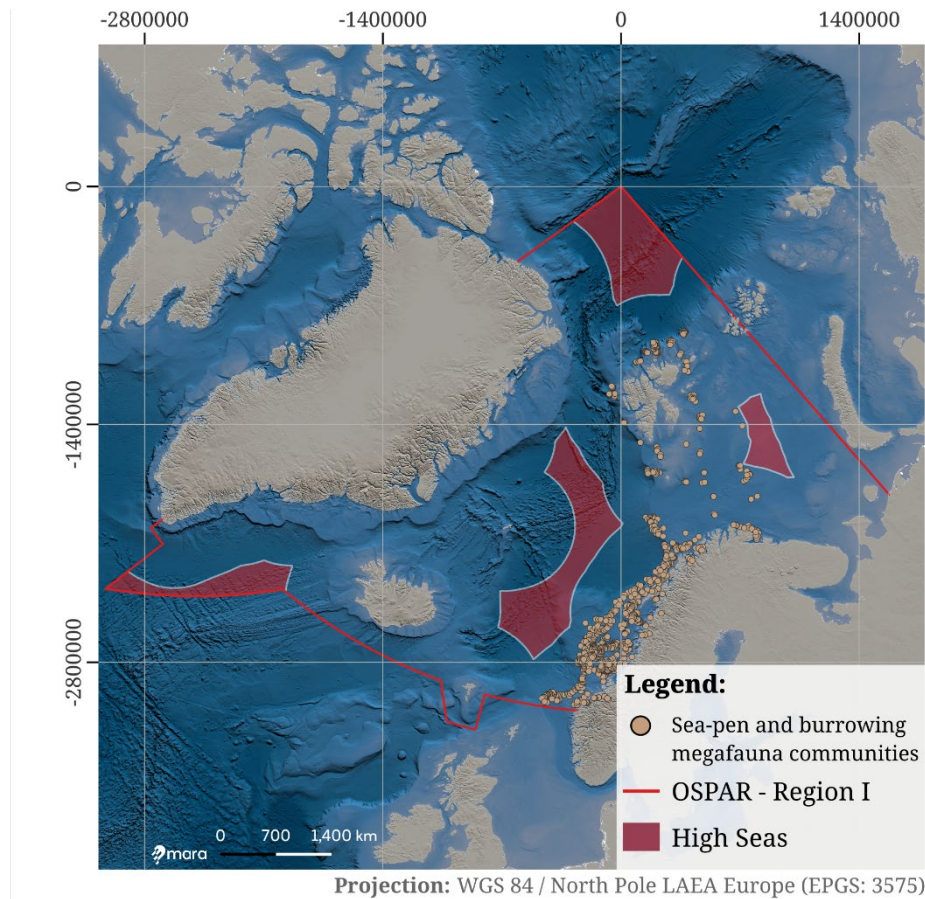


Figure 16. Sea-Pen and Burrowing Megafauna Communities in OSPAR Region I - Arctic Waters. Source: OSPAR 2025 (EMODnet)²⁵.

ICES VME Habitats and Indicators

International Council for the Exploration of the Sea (ICES) Vulnerable Marine Ecosystem (VME) habitats and indicators are defined to support the implementation of international obligations such as those set out in UNGA Resolutions 61/105 and 64/72, and within the context of the FAO International Guidelines for the Management of Deep-sea Fisheries in the High Seas. Within the ICES framework, VME habitats refer to specific types of ecosystems — such as cold-water coral reefs, deep-sea sponge aggregations, and sea-pen fields — that are recognised for their sensitivity to disturbance and their significance in supporting biodiversity. At the same time, VME indicators are particular biological or physical features, species, or assemblages (e.g., the presence of *Lophelia pertusa*, specific sponge morphotypes, or characteristic substrate types) that signal the likely presence of a VME habitat.

The ICES VME data portal²⁶, developed by the Joint ICES/NAFO Working Group on Deep-water Ecology and hosted by ICES, is a central repository for geo-referenced records of VME habitats and indicator species across the North Atlantic. Designed to support scientific assessments and management advice — such as informing NEAFC area fisheries closures to

²⁵ <https://emodnet.ec.europa.eu/geonetwork/srv/api/records/e5a4ae14-a116-42e1-8f86-e6f055accbcf?language=all>

²⁶ <https://gis.ices.dk/geonetwork/srv/api/records/50051026-435d-4554-9692-4cb2f62ab5f9>

protect VMEs — the database is updated annually and integrates quality-assured contributions from multiple national and regional programmes.

Figures 17 and 18 illustrate ICES VME indicators and habitats data, respectively. According to the dataset, ICES VME indicators are mostly concentrated around Svalbard and northern coast of Norway, however, some, including sponges and soft corals, overlap with the Barents Sea polygon in Region I (**Figure 17**). **Figure 18** illustrates the presence of hydrothermal vents on the Gakkel Ridge, corresponding to other sources of data reviewed in this report. This dataset is limited to the sampling effort undertaken by national and international research institutes in the area, including programs such as the ICES International Bottom Trawl Survey (IBTS) and regional surveys like the Barents Sea Ecosystem Survey (BESS). Notably, the dataset is lacking data for the Central Arctic Ocean sector of Region I.

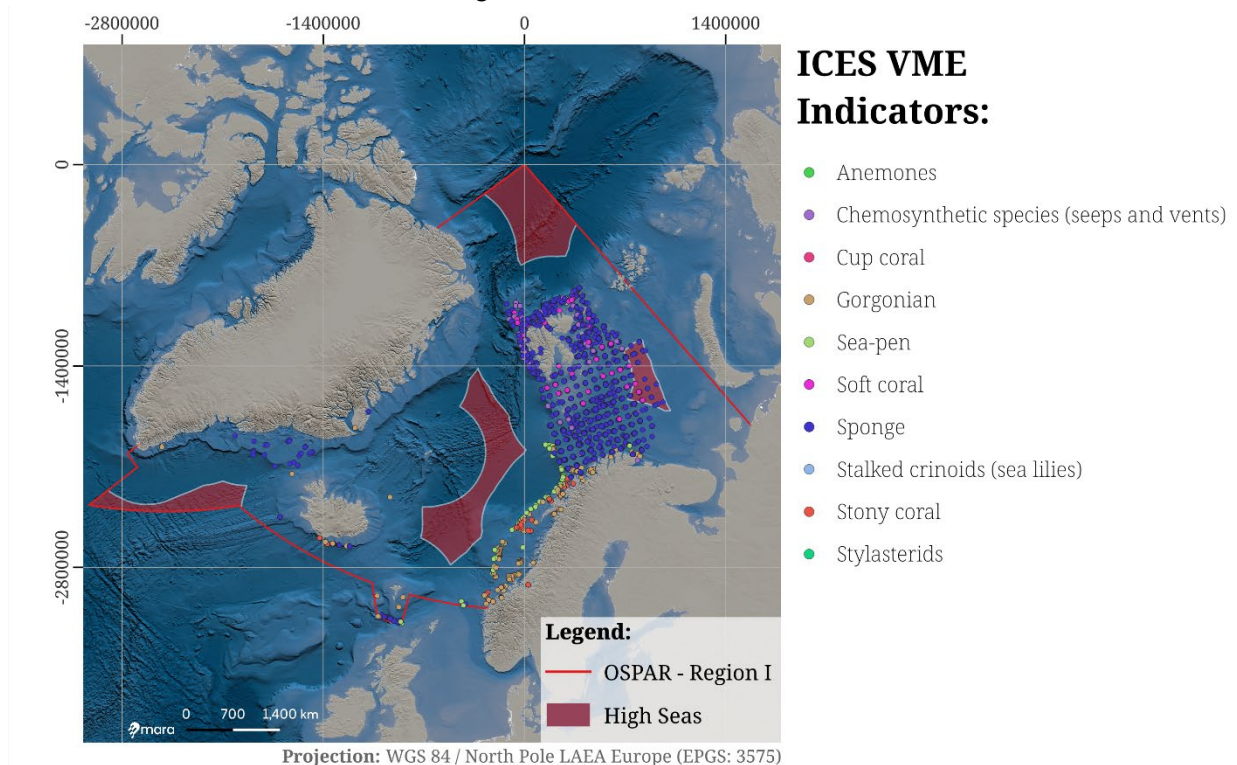


Figure 17. ICES VME Indicators in OSPAR Region I - Arctic Waters. Source: ICES VME Dataset 2020. ICES, Copenhagen²⁷.

²⁷ <https://gis.ices.dk/geonetwork/srv/api/records/50051026-435d-4554-9692-4cb2f62ab5f9>

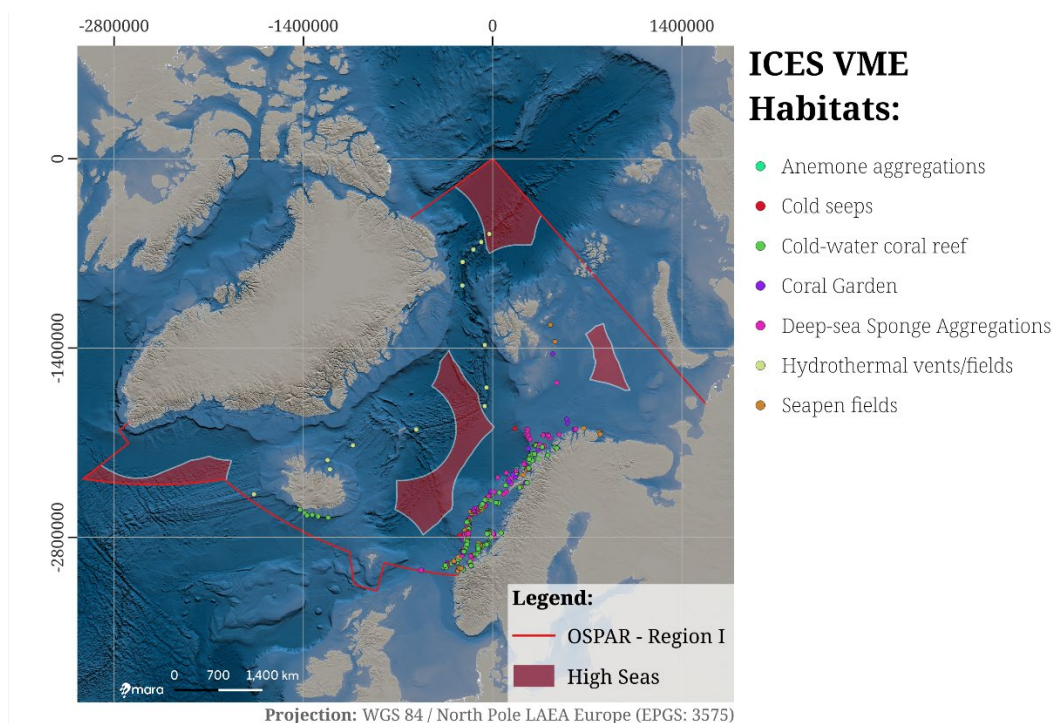


Figure 18. ICES VME Habitats in OSPAR Region I - Arctic Waters. Source: ICES VME Dataset 2020. ICES, Copenhagen²⁸.

Oceanography

The Arctic Basin's water circulation is influenced by complex factors such as basin topography, extensive sea ice, strong seasonal and freshwater input from melting ice and major rivers, and seasonal and meteorological changes, leading to distinct patterns in surface and deep water flows which are also affected by larger decadal climatic variations (McClelland et al., 2012; Walsh, 2008). These circulation patterns are strongly associated with the Arctic Ocean Oscillation, which is altered by increasing greenhouse gas concentrations, contributing to the variability in ice distribution, sea level pressure, and water mass dynamics (Najafi et al., 2015; Walsh, 2008). Four primary circulation systems are identified in the Arctic Ocean, including the wind-driven Trans-Polar Drift and Beaufort Gyre, the halocline complex influenced by Pacific and Atlantic waters, the Arctic Circumpolar Boundary Current, and the slow exchange of the Arctic Ocean Deep Waters (Bluhm et al., 2015).

From the oceanographic perspective, the main characteristic of OSPAR Region I is the Fram Strait - a crucial 450 km wide and 2,700 m deep oceanic gateway between the Atlantic and Arctic Oceans, which plays a pivotal role in the heat and salt exchange, greatly influencing both ecosystems and climate patterns (Rudels et al., 2002). The Fram Strait region is primarily dominated by two currents: the warm, saline West Spitzbergen Current which introduces Atlantic Water into the Arctic on the strait's eastern side, and the colder, fresher East Greenland Current that facilitates the outflow of Arctic waters and sea ice on the western side (Saloranta and Haugan, 2001) (**Figure 19**). These currents are essential in setting the hydrographic structure of the strait,

²⁸ <https://gis.ices.dk/geonetwork/srv/api/records/50051026-435d-4554-9692-4cb2f62ab5f9>

driven by density gradients aided by wind, tidal currents, and the inherent temperature and salinity differences between the merging bodies of water (Rudels, 2019).

The Atlantic Water flowing into the Arctic exhibits variation influenced by seasonal and decadal changes, significantly impacting its temperature and salinity profiles (Loeng, 1991). Upon reaching the Barents Sea, two main branches form: the West Spitzbergen Current continues northward through the Fram Strait, while a portion diverts eastward as the Barents Sea Branch Water onto the Barents Shelf (Ingvaldsen, 2005; Lien and Trofimov, 2013) (**Figure 19**). This bifurcation and subsequent circulation play crucial roles in shaping the regional hydrographic characteristics, with the major branches carrying significant volumes of Atlantic water through various paths, influencing water properties across the Arctic Basin (Ingvaldsen, 2005).

Further complexities arise as the West Spitzbergen Current interacts with the colder waters of the East Greenland Current, leading to the formation of additional currents like the Return Atlantic Current which contribute to recirculating Atlantic Water within the region (Saloranta and Haugan, 2001). These interactions at various levels within the strait, involving processes such as mixing, bifurcation, and recirculation, not only determine local water column structures but also exert significant influence over broader environmental and climatic systems in the Arctic, highlighting the critical nature of Fram Strait as a dynamic link between the Atlantic and Arctic oceans.

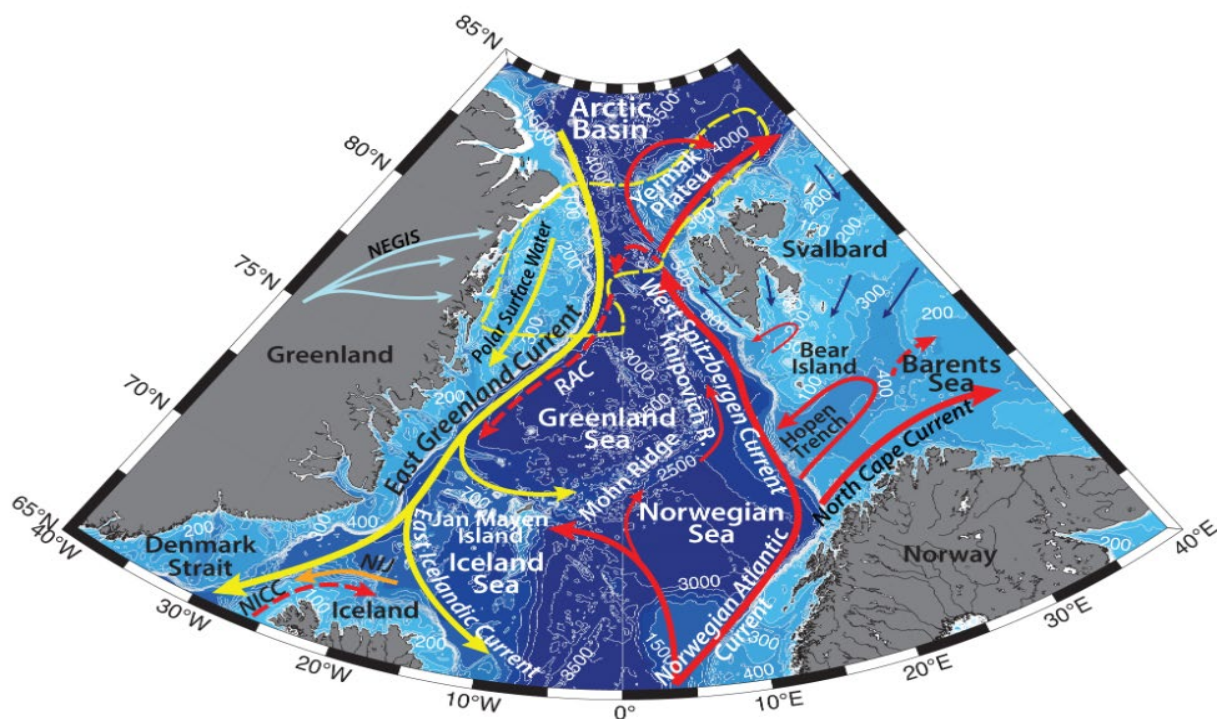


Figure 19. Arctic Ocean Circulation in the Fram Strait Region (From WWF, 2026²⁹, figure created by Maria Pisareva, ArcNet). RAC - Return Atlantic Current; NICC - Northward Icelandic Current Core; NIJ - North Icelandic Jet; NEGIS - Northeast Greenland Ice Stream. Numbers correspond to depth (m) isobaths.

²⁹ <https://wwf-arctic-programme.github.io/chicory/oceanic/ofce3dc6b.html>

As an example of the ongoing oceanographic research in OSPAR Region I, the Horizon Europe Explaining and Predicting the Ocean Conveyor (EPOC) project brings together international experts to advance understanding of the Atlantic Meridional Overturning Circulation, its drivers and impacts on climate, by combining observations, modelling, and new observing systems³⁰. EPOC's ongoing work in the Arctic and OSPAR Region 1 focuses on quantifying ocean exchanges and heat/freshwater transports through key Arctic gateways (like Fram Strait and the Barents Sea Opening), investigating long-term changes in the Norwegian Atlantic Current and the inflow of warm Atlantic Water into the Arctic, and tracking the movement of Arctic waters — including the 'Great Arctic–Atlantic Loop' — to understand how these processes influence ocean circulation, sea-ice dynamics, and climate connectivity between the Arctic and the North Atlantic.

Sea ice and cryopelagic habitats

Arctic sea ice plays a critical role in the global climate by regulating exchanges of heat and moisture between the atmosphere and the ocean, influenced by a complex set of factors including atmospheric warming, changes in air circulation, and ice motion. The increased flow of warm Atlantic waters to the Arctic is a significant cause of the long-term reduction in sea ice extent, potentially driven by a feedback loop involving the sea ice and the Atlantic meridional overturning circulation (Kinnard et al., 2011).

Sea ice is a characteristic feature of the pelagic habitats in the Arctic region, it creates cryopelagic habitats supporting communities of species associated with seasonal and multiyear sea ice. Sea ice hosts a diverse array of sympagic organisms, from microscopic protists and invertebrates inhabiting brine channels to macrofauna, seabirds, and mammals along ice edges and leads, with species diversity influenced by ice age, geography, and season (ICES, 2025). The structure and functioning of the Central Arctic Ocean (CAO) food web are closely tied to sea-ice coverage and the primary production of ice-associated algae, but recent declines in sympagic production — driven largely by climate change — have reduced its role in regional primary production and impacted the dependence of key species like ice amphipods and polar cod on sympagic carbon (ICES, 2025). In parts of Region I, sea ice occurs seasonally. The ice and ice-melt have a large influence on ecological conditions. As the ice melts, there is a marked increase in sunlight which triggers a rapid growth of plants, leading to what is known as an ice edge bloom. This supports large populations of fish, marine mammals and birds.

The multi-year ice

The northernmost segment of the ABNJ within OSPAR Region I, which corresponds to the Central Arctic Ocean, is characterised by multi-year ice. The multi-year ice habitat is designated by the CBD as an ecologically or biologically significant marine area (EBSA)³¹. This multi-year ice in the Arctic Ocean, which endures through the summer melt, is crucial for both global and regional habitats and has seen significant reductions in both its area and thickness over recent years (PAME, 2025). The composition of the ice cover includes various ice forms, ranging from

³⁰ <https://epoc-eu.org/our-work/arctic-research/>

³¹ <https://chm.cbd.int/en/database/record?documentID=204088>

thin seasonal ice to dense, compressed multi-year pack ice ridges that have endured beyond five summer melt cycles. This ice cover exhibits pronounced seasonal changes.

Over recent decades, there has been a notable reduction and thinning in the ice cover, specifically at the edges of the ice sheet (Kwok et al., 2004; Kwok and Untersteiner, 2011; Onarheim et al., 2024). Recent analyses have demonstrated that much of the long-standing multi-year pack ice in the Arctic has transitioned to seasonal (first-year) ice, with first-year ice now occupying regions once dominated by multi-year ice. This shift is evidenced by trends of expanding first-year ice extent and prolonged melt seasons across multiple Arctic sectors between 1988 and 2021 (Wang et al., 2026). Transition from multi-year to seasonal ice drastically impacts thermal exchanges; as ice melting begins, lower albedo leads to more solar heat absorption by the ice and ocean, intensifying further ice melting and altering oceanic and atmospheric conditions (Perovich and Polashenski, 2012; Serreze and Stroeve, 2015). A transition towards reduced levels of multi-year sea ice will also alter the species diversity and the production levels of primary producers within the region, potentially triggering a chain of impacts across the ecosystem. In scenarios of diminishing ice coverage, the implications on the ice fauna will be strongest at the edges of the multi-year sea ice. Polar bears (*Ursus maritimus*), Atlantic walrus (*Odobenus rosmarus rosmarus*), narwhals (*Monodon monoceros*), bowhead whales (*Baleana mysticetus*), ringed seals (*Pusa hispida*) and bearded seals (*Erignathus barbatus*) are highly dependent on the sea ice habitat and are therefore particularly vulnerable to changes in sea ice extent, duration and thickness.

To analyse the long-term changes in Arctic sea ice, we implemented a multi-stage geospatial processing using the 'terra' package, utilising data from the Copernicus Climate Change Service, Climate Data Store (2026). Sea ice data from early March each year from 1980 to 2025 were classified into Multi-Year Ice and First-Year Ice; annual and decadal frequencies of these types were calculated for each grid cell to document temporal changes. **Figure 20** displays the positions of multi-year ice during the periods 1980-1989 and 2020-2025, showing a clear reduction in the extent of multi-year sea ice cover over these years. Notably, the northernmost ABNJ sector of Region I still falls within the bounds of multi-year ice even in the more recent timeframe. For a comprehensive visual comparison, a detailed catalogue of images depicting both multi-year and first-year ice across each decade can be found in **Appendix 3**.

Predictive models, such as those by Anisimov et al. (2007) and Polyakov et al. (2010), suggest that by the late 21st century, the Arctic Basin's ice cover might no longer be permanent. With medium confidence, an ice-free Arctic Ocean in summer is projected by the mid-21st century (Hunt et al., 2016; IPCC, 2022), potentially as early as 2040 (AMAP, 2024). At the same time, models predict that the Central Arctic Ocean ABNJ will likely maintain its ice coverage longer than any other Arctic regions, thereby serving as a climate refugia for unique, ice-reliant species, including those that are vulnerable, as the reduction in ice persists.

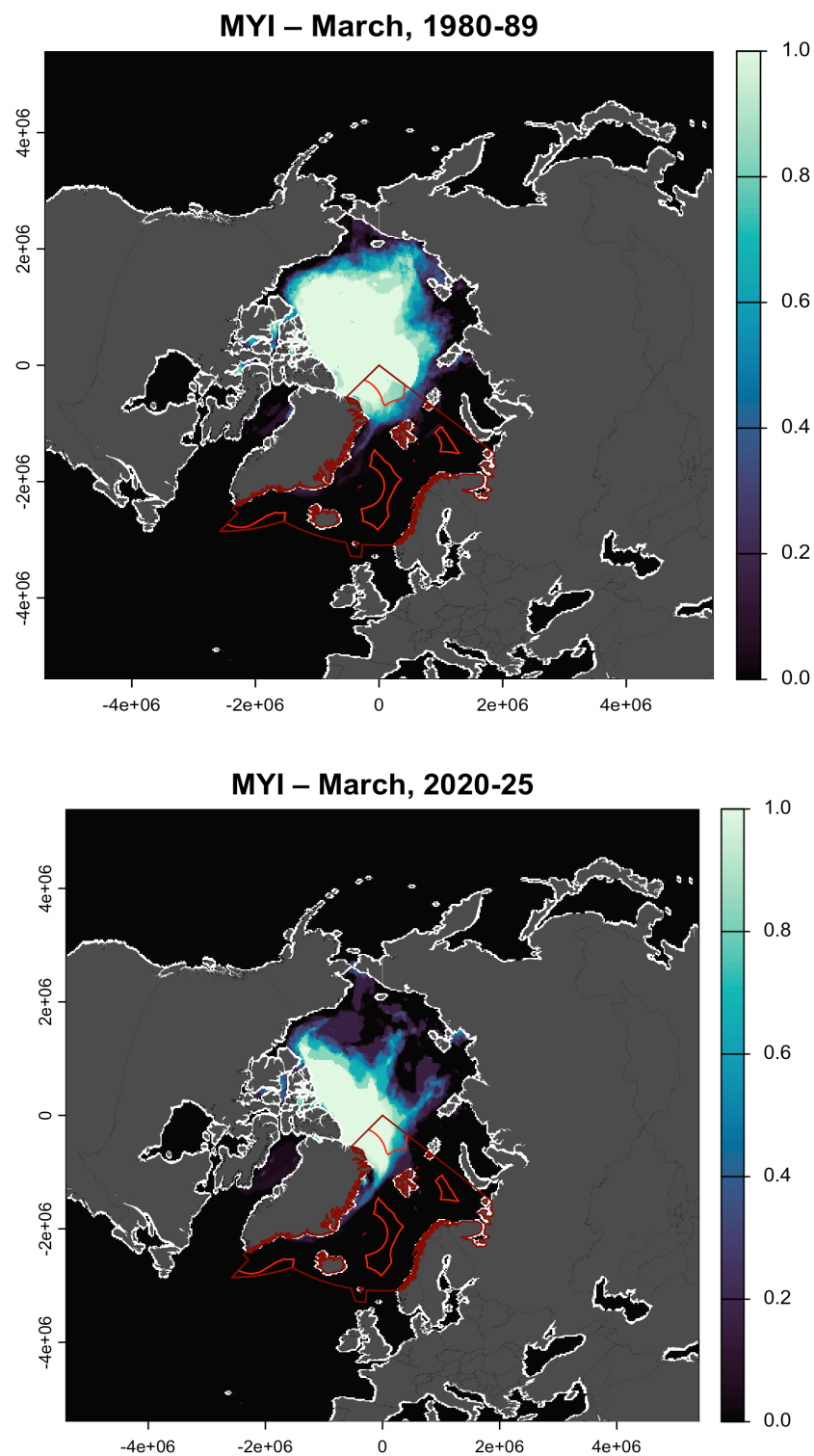


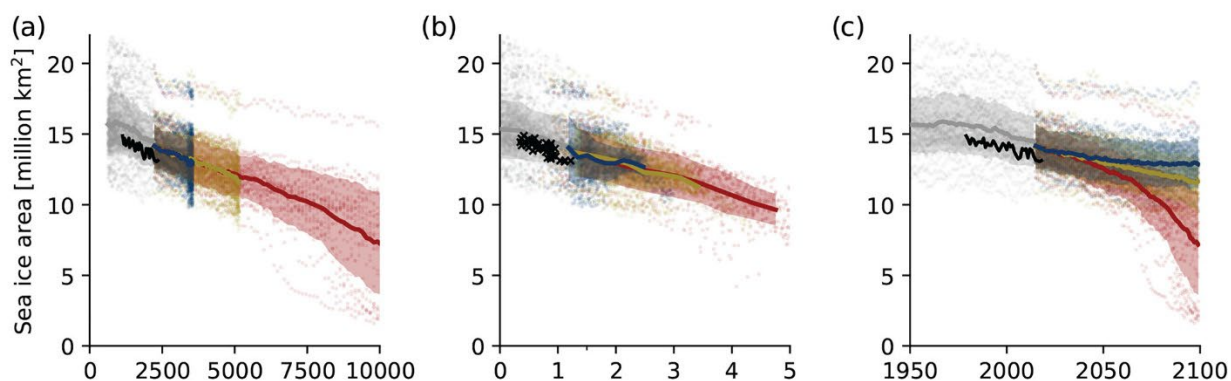
Figure 20. Multi-Year Sea Ice position during the periods 1980-1989 and 2020-2025 and the four candidate site boundaries in OSPAR Region I - Arctic Waters. Source of data: Copernicus Climate Change Service, Climate Data Store, (2026).

According to the IPCC Special Report on the Ocean and Cryosphere in a Changing Climate (Meredith et al., 2019), Arctic sea ice extent has declined in all months since 1979, with the most pronounced reductions in September (–12.8% per decade), and multi-year ice has shrunk from 30% to just 2% of total cover since 1979. Projections show that, under high emissions scenarios (RCP8.5), the Barents Sea — a key area within OSPAR Region I — is expected to become ice-free even in winter after 2050, while the central Arctic Ocean is projected to retain sea ice longer than peripheral seas, reinforcing its role as a future climate refugium (Meredith et al., 2019). The report highlights that under stabilised global warming of 1.5°C, September ice-free conditions in the Arctic will remain rare, but with 2°C warming, the probability of ice-free summers rises substantially (up to 10–35% of years by century's end) (Meredith et al., 2019). The transition from multi-year to predominantly first-year ice will continue, affecting ecosystem structure, ice habitat persistence, and the possible distribution of refugia for sea ice-dependent biodiversity in the region.

Recent projections using the latest CMIP6 climate models confirm a continued rapid loss of Arctic sea ice area, with most models simulating the first practically ice-free Arctic September (defined as <1 million km² sea-ice area) before 2050 under all emission scenarios, including both low and high emissions (Notz et al., 2020) (**Figure 21**). While the exact timing is uncertain and varies across models and scenarios, a clear majority of plausible simulations indicate this transition will occur between 1.3°C and 2.9°C global mean warming above preindustrial levels, and/or at cumulative CO₂ emissions of well less than 1,000 Gt above 2019 levels (Notz et al., 2020). Importantly for OSPAR Region I and the Central Arctic Ocean, the CMIP6 ensemble projects that the central Arctic is likely to retain summer sea ice longer than marginal seas, supporting its anticipated role as a future climate refugium for ice-dependent species even as peripheral seas experience seasonally ice-free conditions (Notz et al., 2020).

Recent work further underscores the central Arctic Ocean — including areas north of Greenland and the Canadian Arctic Archipelago, often referred to as the 'Last Ice Area' — as the site of the most persistent Arctic summer sea ice. Newton et al. (2021) have shown that the entire Arctic has historically contributed sea ice to this 'ice shed', but future scenarios point to a dramatic shrinkage of the ice shed's geographic extent by mid-century. Critically, the dominant source of sea ice to the Last Ice Area transitions from the Russian shelves in recent history to the central Arctic itself, with the proportion of sea ice formed in the central Arctic projected to rise from about 10% to over 70% by late in the 21st century. This shift underpins the growing role of the central Arctic Ocean and the 'Last Ice Area' as the most significant long-term refugium for ice-dependent species, even as ice pathways from peripheral seas such as the Beaufort, Chukchi, East Siberian, and Barents are expected to largely disappear (Newton et al., 2021).

March



September

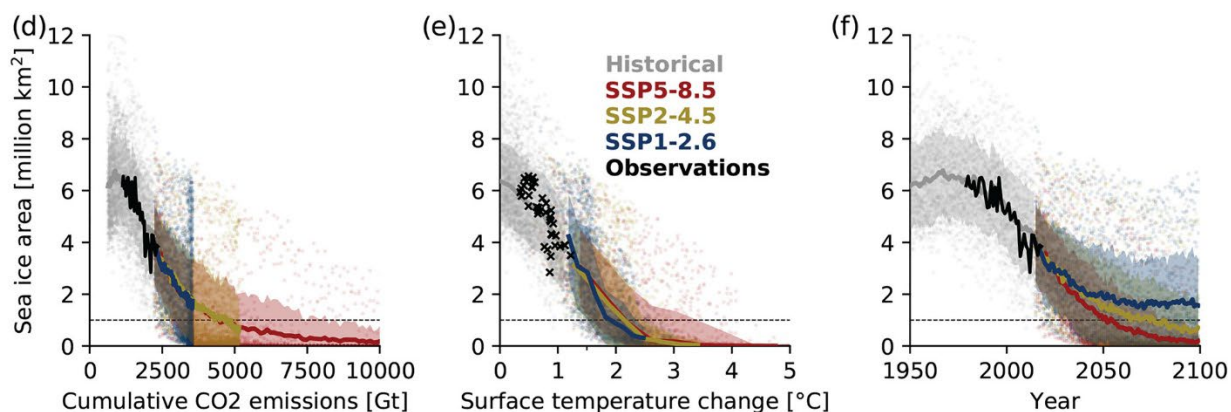


Figure 21. Projected and observed changes in Arctic sea-ice area in March and September, shown against cumulative CO₂ emissions, global temperature rise, and year for all CMIP6 models. Solid lines are the model averages, shaded areas show variability across models, and observations are marked in black. From: Notz et al. (2020).

The Barents Sea has been identified as a global climate change hotspot — an area of extremely rapid change in annual near-surface air temperatures (Hersbach et al., 2020; AMAP, 2024) (**Figure 22**). However, data demonstrating the ecosystem response to this accelerated warming are lacking. At the same time the CAO sector of the OSPAR Region I corresponds to the area with the slowest rate of change in annual near-surface air temperatures (**Figure 22**).

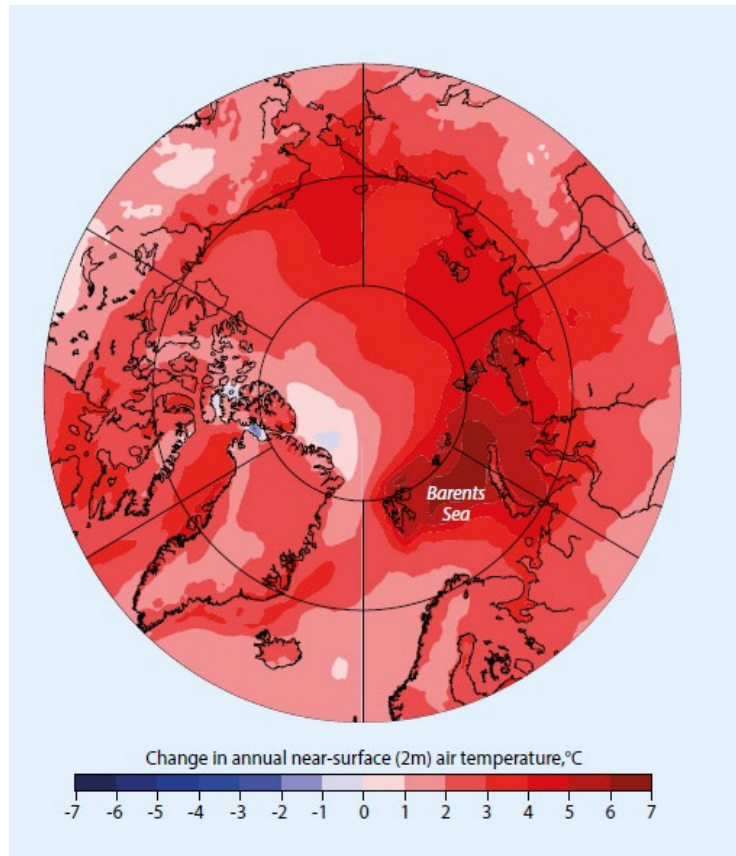


Figure 22. Heatmap showing change in near-surface air temperature in the Arctic, showing the Barents Sea area as a hotspot of warming and the Central Arctic Ocean sector north of Greenland as the potential climate refugia. From AMAP, 2024.

The multi-ice area of OSPAR Region I was proposed in 2016 as a potential 'OSPAR Arctic Ice High Seas MPA' (Document BDC 16/5/4 Rev.1 (**Figure 23**), with the goal of safeguarding the ecosystems and biological diversity associated with dynamic sea ice and the water column in the High Seas. A draft nomination proforma was developed and discussed by OSPAR's Biodiversity Committee (BDC) and forwarded to the OSPAR Heads of Delegation (HOD) for further consideration. However, the MPA was not formally nominated or adopted. This was due to a lack of consensus among Contracting Parties on both the scientific justification and political timing for the designation. As such, the Arctic Ice High Seas MPA remains a proposal that was explored and documented, but it does not have formal OSPAR status. The conservation vision articulated for the area was:

'The ecosystems and biological diversity associated with the dynamic sea ice and the water column in the High Seas of the area established as the Arctic Ice High Seas MPA are protected against adverse impacts and degradation resulting from human activities in the area and conserved with a view to strengthen the resilience and capacities of these ecosystems and the biological diversity they contain so as to better adapt to the effects of climate change.'

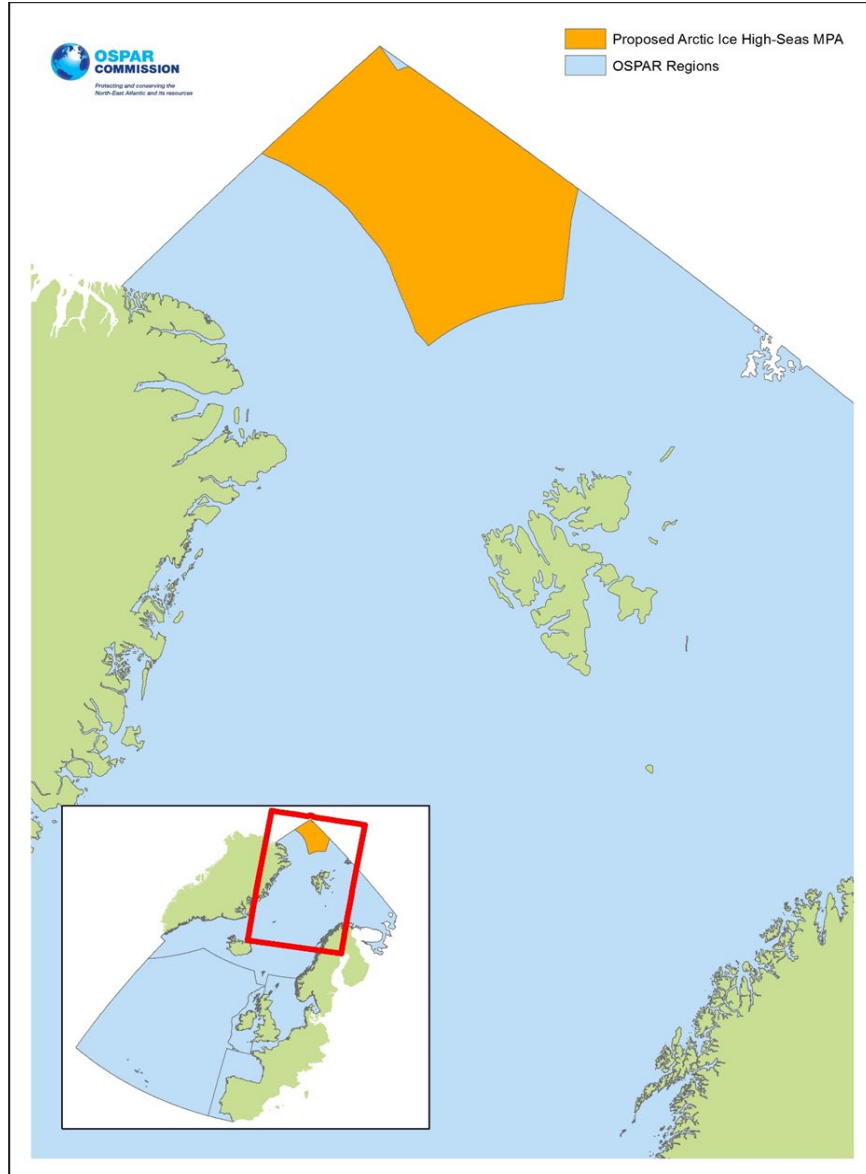


Figure 23. Arctic Ice High Seas MPA proposal from 2016. The proposed boundaries relate to the water column beyond the 200 nm zones of Arctic coastal States, i.e. the High Seas in the Arctic Basin. Figure from Draft Nomination Proforma for the Establishment of an OSPAR Marine Protected Area in Region I (Arctic Waters) (BDC 16/05/04 Rev.1).

Marginal ice zones

The central Arctic is expected to undergo significant reductions in multi-year ice coverage, leading to large areas being covered by seasonal (winter) ice and are thus considered as ice edges and seasonal ice zones with a period of open water in summer, creating critical habitats for various ice-dependent and endangered species as conditions like light and temperature change (AMAP, 2024). Marginal ice zones, the transitional areas between the open ocean and sea ice, play a pivotal role in the Arctic Ocean's productivity; the stratification of the water column due to ice melt increases light penetration, thereby determining the timing and intensity of spring phytoplankton blooms, generally earlier than in open waters (Perrette et al., 2011). These zones also see nutrient replenishment through wind- or eddy-induced upwelling, extending the duration of algal growth (Gradinger and Baumann, 1991). The variable hydrographic conditions cause uneven patterns of primary and secondary production, affecting the distribution of predators (Bluhm et al., 2015). It is important to note that depth plays a significant role in shaping these productivity patterns: while the relatively shallow continental shelves experience enhanced nutrient supply and higher productivity, the deep central Arctic Ocean is generally more nutrient-limited and less productive due to greater water column stability and reduced upwelling. Boundary regions like the polar front segregate polar and Arctic pelagic fauna in the Greenland Sea and Fram Strait, influencing life cycles of dominant copepod species such as *Calanus glacialis* and *Calanus finmarchicus* which rely on ice edge-related blooms for their life processes (Leu et al., 2011).

Polynyas

Polynyas are open water regions in sea ice, categorised into mechanical polynyas formed by wind action and sensible heat polynyas maintained by warmer water; both types significantly affect sea ice dynamics by enhancing ice production and contributing to Arctic winter ice formation. They play crucial ecological roles by boosting early plankton production that supports a diverse range of marine life, from fish to seabirds, and increasing biomass and diversity in benthic communities due to the organic matter enrichment (AMAP/CAFF/SDWG, 2013). North East Water Polynya on the East Greenland shelf plays a pivotal role for seabirds, particularly for the major breeding colonies in the Greenland Sea, Svalbard archipelago, and Jan Mayen Island (AMAP/CAFF/SDWG, 2013). The reproductive success and population dynamics of these seabirds, such as the thick-billed murres in Greenland, are closely linked to the timing of breeding, which coincides with the seasonal shifts in the marginal ice zone and plankton blooms facilitated by the presence of the polynya. Polynyas also serve as crucial habitats for bowhead whales and narwhals, providing them with essential open water areas for breathing and access to concentrated food sources during the ice-covered winter months.

Biota

Biodiversity

We queried the Global Biodiversity Information Facility (GBIF) data to see what marine taxa records were available for OSPAR Region I. The first query was spatial and considered presence records of kingdom 'Animalia' within the bounding box encompassing OSPAR Region I polygon

(latitude 55–90°N, longitude 44.2°W–51°E), excluding points without coordinates and with geospatial issues. This returned over 277 million records. In a second stage, we filter out all points not falling within OSPAR Region I polygon, taxa that were not registered as marine in the WoRMS - World Register of Marine Species, records not associated with any depth values when extracted by underlying GEBCO bathymetry and records not reporting any year of collection or collected prior to 2000. This second filtering resulted in over 3 million points in OSPAR Region I of which 602 were in Central Arctic Ocean multi-year Arctic sea ice habitat, 6,937 were in Central Barents Sea, 6,715 were in Arctic Mid-Ocean Ridge and 6,226 were in Imarssuak Sea Channel (GBIF.org 2026³²). **Figure 24** illustrates the observations of marine taxa in OSPAR Region I, including the records for ABNJ.

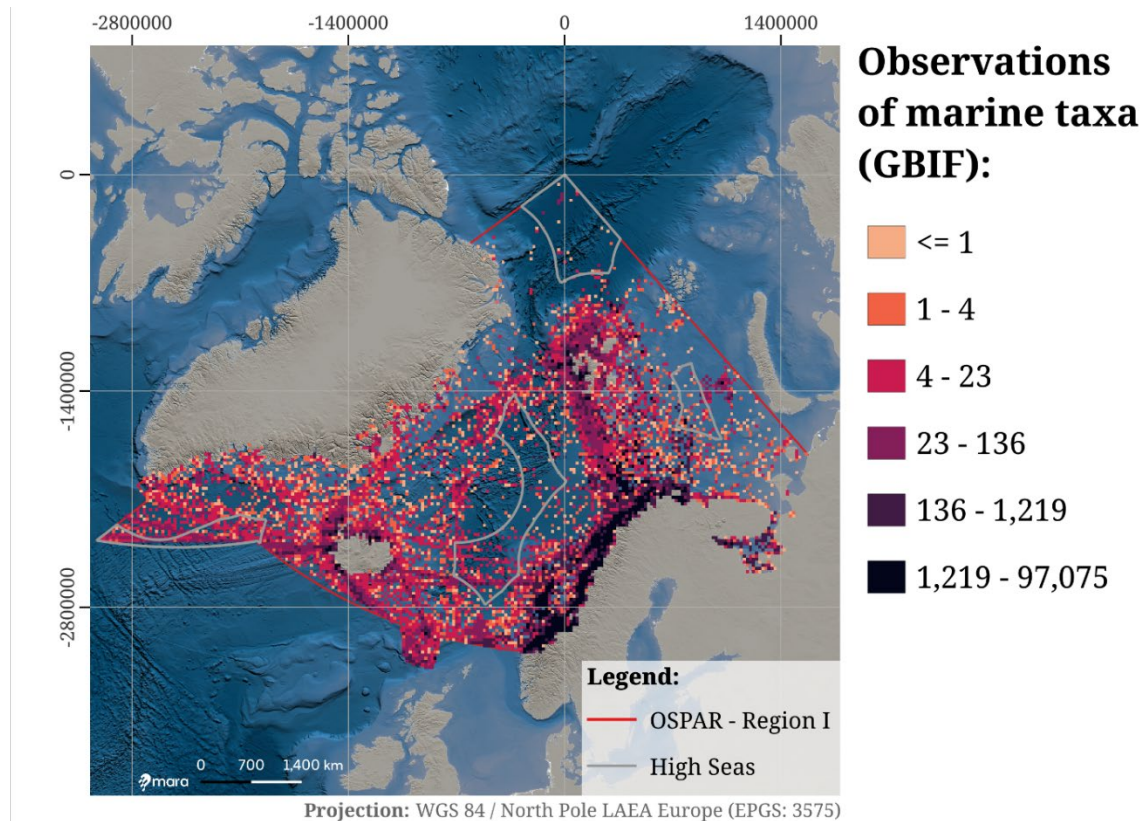


Figure 24. Observations of marine taxa in OSPAR Region I, according to the Global Biodiversity Information Facility data (GBIF.org 2026³³).

As the next step, we further filtered the GBIF biodiversity records in the ABNJ of OSPAR Region I to look specifically for the OSPAR-listed species and VME indicator species. We discovered 746 records of Cnidaria, 75 records of Porifera and 29 records of Bryozoa (**Table 1**) (**Figure 25**), as well as 3 records of OSPAR-listed elasmobranchs (**Figure 26**), 110 records of OSPAR-listed bird species (**Figure 27**), and 41 records of OSPAR-listed marine mammals (**Figure 28**) (**Table 2**).

³² GBIF.org (13 April 2026) GBIF Occurrence Download <https://doi.org/10.15468/dl.4mjqt>

³³ GBIF.org (13 April 2026) GBIF Occurrence Download <https://doi.org/10.15468/dl.4mjqt>

Table 1. Records of taxonomic groups corresponding to potential VME indicators in the ABNJ of OSPAR Region I according to GBIF data.

Phylum	Taxonomic Group	Taxonomic Level	ABNJ Records
Cnidaria		Phylum	746
	Hexacorallia	Class	108
	Scleractinia	Order	0
	Antipatharia	Order	0
	Octocorallia	Class	8
	Hydrozoa	Class	122
	Stylasteridae	Family	0
Porifera		Phylum	75
Bryozoa		Phylum	29

Table 2. Records of the OSPAR-listed species in the ABNJ of OSPAR Region I according to GBIF records.

Group	Species	ABNJ Records
Elasmobranchs		3
	Basking shark (<i>Cetorhinus maximus</i>)	2
	Spurdog (<i>Squalus acanthias</i>)	1
Birds		110
	Ivory gull (<i>Pagophila eburnean</i>)	67
	Black-legged kittiwake (<i>Rissa tridactyla</i>)	43
Marine mammal		41
	Bowhead whale (<i>Balaena mysticetus</i>)	40
	Blue whale (<i>Balaenoptera musculus</i>)	1

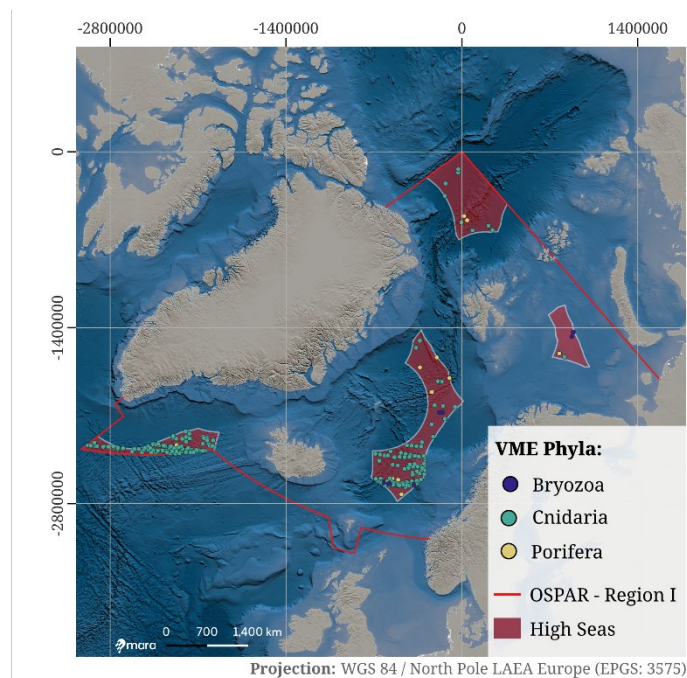


Figure 25. Observations of VME indicator taxa in OSPAR Region I, according to the Global Biodiversity Information Facility data (GBIF.org 2026³⁴).

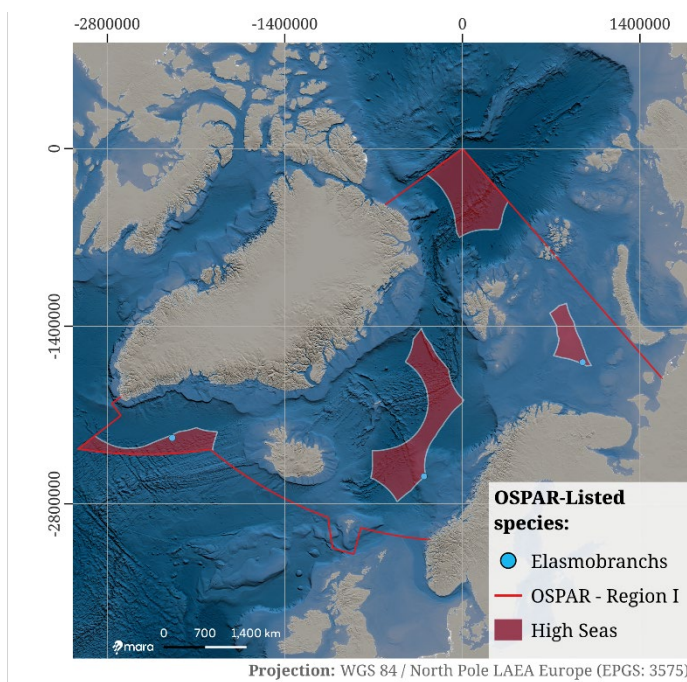


Figure 26. Observations of OSPAR-listed elasmobranch species in OSPAR Region I, according to the Global Biodiversity Information Facility data (GBIF.org 2026³⁵).

³⁴ GBIF.org (13 April 2026) GBIF Occurrence Download <https://doi.org/10.15468/dl.4mjqct>

³⁵ GBIF.org (13 April 2026) GBIF Occurrence Download <https://doi.org/10.15468/dl.4mjqct>

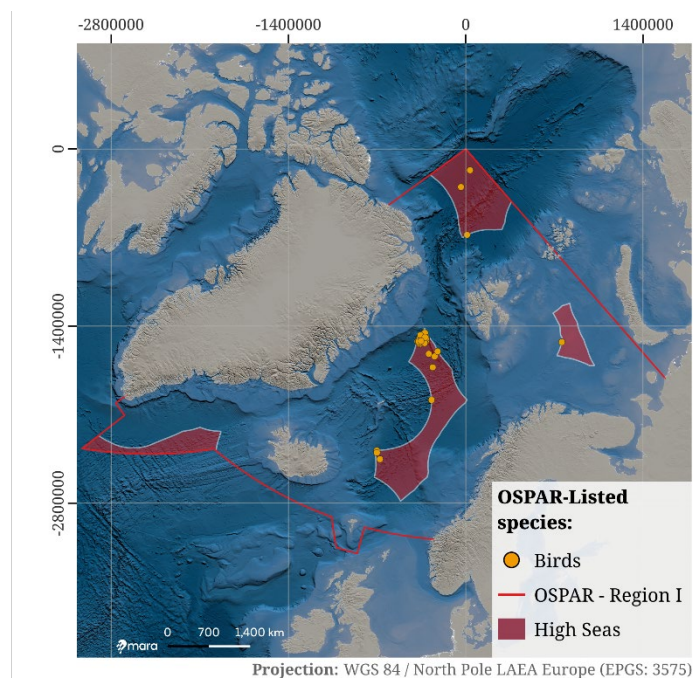


Figure 27. Observations of OSPAR-listed bird species in OSPAR Region I, according to the Global Biodiversity Information Facility data (GBIF.org 2026³⁶).

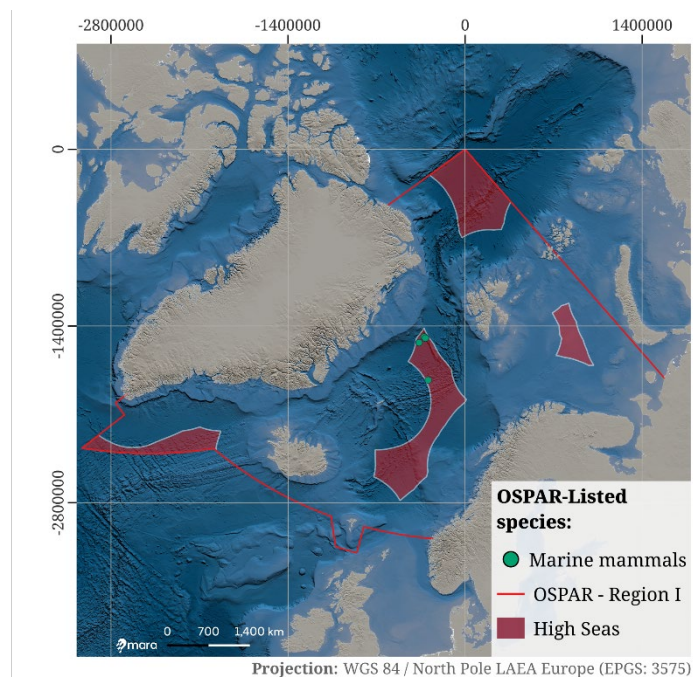


Figure 28. Observations of OSPAR-listed marine mammal species in OSPAR Region I, according to the Global Biodiversity Information Facility data (GBIF.org 2026³⁷).

³⁶ GBIF.org (13 April 2026) GBIF Occurrence Download <https://doi.org/10.15468/dl.4mjqt>

³⁷ GBIF.org (13 April 2026) GBIF Occurrence Download <https://doi.org/10.15468/dl.4mjqt>

Plankton and cryopelagic communities

Ice-edge blooms are significant features of Arctic primary production; they occur in all seasonally ice-covered areas in the Arctic (Perrette et al., 2011). Ice algae can contribute to fuelling phytoplankton blooms in areas covered by seasonal sea ice; however, their impact may be limited if the dominant ice algal species differ from those driving the main spring bloom. Studies from the Barents Sea demonstrate that algae colonise the sea ice by a 'sieving' process, whereby algal cells are trapped and accumulate as water passes through the closely spaced platelets on the underside of the ice, enabling the formation of distinct algal assemblages - surface, interior, and bottom, with the bottom assemblage being quantitatively dominant (Syvertsen, 1991). As the ice matures, these algae adapt and become dominant, significantly impacting the timing and intensity of phytoplankton blooms when the ice melts.

Over the last three decades the Arctic Ocean has undergone significant climate-driven changes. For example, in the Barents Sea, an average sea surface temperature increase of 1°C from 1998 to 2017 has occurred which has led to reduced sea ice cover and extended the area and duration available for phytoplankton growth (Dalpadado et al., 2020). These changes have more than doubled the annual net primary production (NPP) from approximately 40 to over 100 Tg C (Dalpadado et al., 2020). Earlier onset of phytoplankton blooms, advanced by over a month in areas with decreased ice coverage, indicates rapid shifts in phytoplankton dynamics primarily driven by these changing climatic conditions. A recent study by Castagno et al. (2023) found that, in 2019, the Fram Strait experienced a record-setting spring phytoplankton bloom, with chlorophyll concentrations peaking weeks earlier than in previous years and surpassing all previously recorded May values. The authors showed that increased sea ice meltwater led to stronger near-surface stratification and, along with warmer temperatures, supported both the earlier timing and greater intensity of the bloom in this region (Castagno et al., 2023).

Understanding spatial and temporal patterns in Arctic Ocean primary productivity is crucial for assessing ecosystem functioning and food-web health in a rapidly warming Arctic. Recent satellite-derived estimates, synthesised in the 2025 NOAA Arctic Report Card (Frey et al., 2025), reveal that eight out of nine Arctic marine regions exhibited above-average ocean primary productivity in 2025 compared to the 2003–2022 mean. The strongest positive trends were observed in the Eurasian Arctic (+80.2%), Barents Sea (+33.8%), and Hudson Bay (+27.1%) (Frey et al., 2025). This increase in primary productivity is closely linked to ongoing sea ice decline, warming ocean temperatures, and increased light and nutrient availability, though patterns remain regionally complex and highly dynamic.

The presented map (**Figure 29**) shows annual primary productivity for 2025, as estimated from the MODIS-Aqua satellite record, highlighting productivity hotspots along retreating sea ice edges, particularly in the northern Greenland, Barents, and Kara Seas (Frey et al., 2025). While increased productivity can benefit some components of the food web, it may also result in ecological mismatches and an increased prevalence of harmful algal blooms with potentially negative consequences for Arctic ecosystems and subsistence resources (Castagno et al., 2023; Frey et al., 2025). Notably, interpretation of satellite-derived values should be made with caution in areas of persistent sea ice, high dissolved organic matter, or limited data availability.

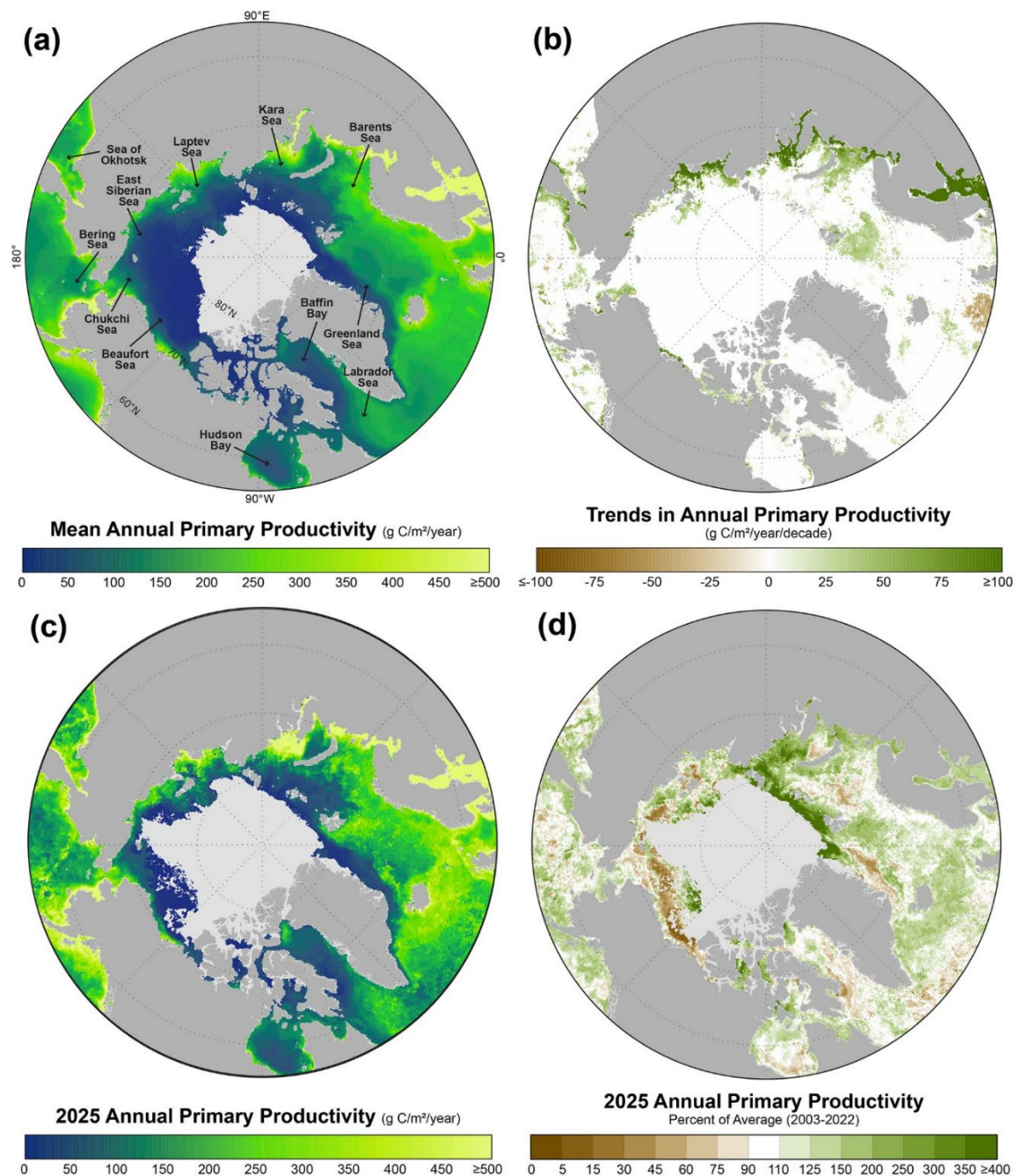


Figure 29. Pan-Arctic patterns of primary productivity based on MODIS-Aqua satellite data: (a) Mean annual primary production (g C/m²/yr) from March to September, averaged for 2003–2025; (b) Spatial trends in annual productivity over 2003–2025, with only statistically significant trends ($p < 0.05$) shown; (c) Annual primary productivity for 2025; and (d) 2025 anomaly in annual primary productivity (as a percent difference from the 2003–2022 mean). Averages, trends, and anomalies are calculated with respect to the depicted pan-Arctic marine area: ocean regions north of 60°N, limited to grid cells with less than 10% sea ice cover and sufficient MODIS-Aqua data, as shown in each map. Light grey denotes areas with insufficient data due to sea ice cover. Figure and data from: Frey et al. (2025), Arctic Report Card.

Zooplankton and Invertebrate Ice Fauna

Zooplankton and invertebrate ice fauna represent fundamental components of the CAO ecosystem, playing pivotal roles in its food webs and responding dynamically to the region's unique and changing environmental conditions (Skjoldal et al., 2022). Foundational studies began with the Fram expedition in the late 19th century, but modern research — particularly since the 1980s, and notably through the international Census of Marine Life — has greatly refined our understanding of both the diversity and structure of these communities (Kosobokova & Hirche, 2009; Kosobokova et al., 2011). The structure and abundance of zooplankton communities in Arctic waters display pronounced spatial, vertical, and seasonal variability, shaped by factors such as ocean currents, light availability, sea-ice cover, and food resources (ICES, 2025).

Vertical migration patterns include seasonal movements between surface and deep waters, with key Arctic copepods retreating to depth for dormancy during the polar night and returning to shallower waters to feed during the polar day, resulting in peak zooplankton abundance and diversity in surface waters in early summer (ICES, 2025). The key zooplankton species in the Arctic waters are the copepods *Calanus finmarchicus* and *Calanus glacialis*, which contribute up to 90% of the total zooplankton biomass during the summer period (Arashkevich et al., 2002). *C. finmarchicus* is of North Atlantic origin and can be used as a tracer of Atlantic water masses; while *C. glacialis* is a typical Arctic species. While a considerable number of studies is devoted to the ecology of large-sized species of copepods, namely *Calanus*, *Metridia*, and *Pseudocalanus*, information on smaller zooplankton species is still limited. Recent studies have highlighted the functional importance of these small copepods in Arctic food webs (Skjoldal et al., 2022).

According to the outcomes of the Nansen Legacy project, other taxa represented in zooplankton communities of the Barents Sea and the Fram straight are euphausiids, which represent a minor fraction of the biomass, chaetognaths and other gelatinous zooplankton, which contribute substantially to the winter zooplankton composition, and amphipods, which have high biomass in early winter (Van Engeland et al., 2023). In total, 174 mesozooplankton species have been identified in the central Arctic Basin of which 148 species are true residents, and 19 endemic (Kosobokova et al., 2011). Six of the endemics belong to the ice-related fauna, 13 species are common bathypelagic species at depths below 1,000 m. Overall, zooplankton biomass decreases towards the central Arctic Basin, reaching a minimum in the most northerly waters, i.e. the region with permanent ice cover (Mumm et al., 1998).

The Barents Sea and the Eastern Fram Strait serve as inflow systems through which Atlantic Water is transported into the Arctic Ocean, significantly affecting the region's ecosystem dynamics by altering species composition, particularly in zooplankton communities. Studies have shown that warmer Atlantic Water carries Atlantic species that directly change local zooplankton structures and contribute to biodiversity patterns, reflecting the temperature changes and water mass characteristics driven by this influx (Van Engeland et al., 2023).

The biogeographic relationships and connections are summarised in **Figure 30** from the ICES WGICA report (Skjoldal et al., 2022). This figure illustrates the structure of the CAO zooplankton community, showing resident species in surface and midwater layers as well as routes of expatriate species from Atlantic, Pacific, and shelf sources. It also highlights the main taxonomic groups using standard abbreviations (am = amphipod, ap = appendicularian, c =

copepod, ct = ctenophore, ch = chaetognath, e = euphausiid, h = hydromedusae, o = ostracod, p = pteropod).

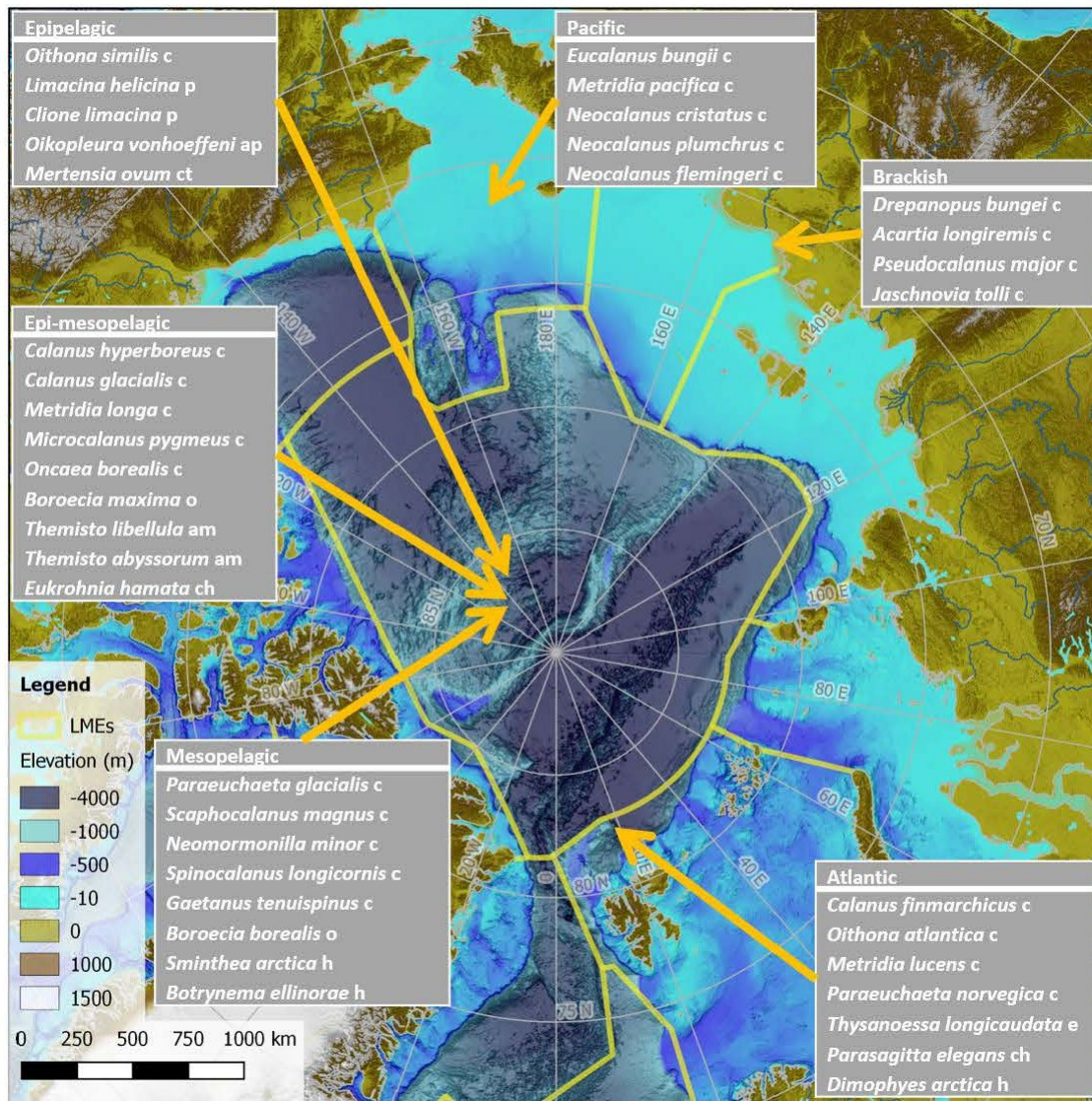


Figure 30. Schematic of zooplankton community structure in the Central Arctic Ocean, showing resident species and pathways for Atlantic, Pacific, and shelf expatriate inputs. Taxonomic group abbreviations: am = amphipod, ap = appendicularian, c = copepod, ct = ctenophore, ch = chaetognath, e = euphausiid, h = hydromedusae, o = ostracod, p = pteropod. From: ICES WGICA Report 2022 (Skjoldal et al., 2022).

The ice-associated (sympagic) fauna — particularly amphipods such as *Gammarus wilkitzkii*, *Apherusa glacialis*, and *Onisimus* spp. — is an integral facet of the Arctic ecosystem (Skjoldal et al., 2022). These invertebrates, adapted to highly variable and extreme ice conditions, contribute to under-ice biomass and play a key role in linking ice algal and pelagic production. However, their abundance is generally an order of magnitude lower than that of pelagic

zooplankton, and recent climate-driven loss of multiyear ice has led to regional declines in these specialised taxa (Skjoldal et al., 2022). Ongoing research addresses how these amphipods recolonise new ice and maintain their populations under changing sea-ice regimes, including potential pelagic life stages.

Benthic communities

Benthic ecosystems are vital for carbon cycling and storage, as they not only embed carbon directly into ocean floor sediments but also process organic material, aiding in both immediate and enduring carbon sequestration. Some of the shelf areas in Region I, specifically around the Franz Josef Land archipelago, sustain some of the most productive macrobenthic communities of the Eurasian Arctic, reaching biomass values of 3.9 kg/m² (Gebruk et al., 2025). The main contributors to the benthic biomass in the area are bivalve molluscs, namely *Hiatella arctica* (Gebruk et al., 2025). Shelf areas near Svalbard and Greenland are also characterised by high benthic biomass (around 500 g/m²), often forming foraging grounds for benthic predators such as walruses (Dahle et al., 2009; Solovyova et al., 2024).

Benthic biomass and diversity typically decrease from shelf areas towards the abyssal depths due to reduced food supply. The CAO is characterised by particularly low biomass and diversity of macrobenthos due to permanent sea-ice cover and low primary productivity in the mostly ice-covered Central Arctic ocean basins (Vedenin et al., 2018). Some studies report extremely low biomass values (<1 g/m², wet mass), a rare exception is a recorded maximum of 650 g/m² at 534 m depth at a station in the CAO northwest of Franz Josef Land (N 82.123; E 42.538 Vedenin et al., 2018). In general, the deep-sea basin of the CAO remains one of the least studied benthic habitats on the planet.

The continental margins are characterised by high diversity of benthic habitats, including sedimentary slopes, canyons, cold-water coral reefs and cold seeps, which are all characterised by different benthic fauna (Ramirez-Llodra et al., 2024) (**Figure 31**). A recent review of the deep-sea Arctic benthic communities by Ramirez-Llodra et al. (2024) compiled all available data to provide a taxonomic inventory of the known benthic taxa. Overall, **2,637 taxa** were recorded, phyla with the most records were the Arthropoda, Annelida and Porifera; phyla with the most documented taxa were the Arthropoda, Annelida and Mollusca (Ramirez-Llodra et al., 2024). While deep Arctic benthic communities are often regarded as having relatively low abundance and biomass compared to the more productive continental shelves, recent syntheses (Bluhm et al., 2011; Ramirez-Llodra et al., 2024) demonstrate that the Central Arctic deep-sea floor actually hosts a relatively high degree of natural biological diversity for an abyssal system. This is evidenced not only by the substantial number of recorded taxa, but also by the prevalence of rare species — many of which are found at only one or two sites — and by the unsaturated nature of species discovery. Notably, no species inventory or accumulation curve compiled for the region has yet reached a plateau, a pattern typical for the global deep sea (Bluhm et al., 2011; Bodil et al., 2011). This strongly implies that Arctic deep-sea benthic diversity remains under-quantified, with true species richness likely to be substantially higher than current estimates. These findings highlight the ecological complexity of this environment and underscore the need for further baseline research to support effective conservation under OSPAR's 'high natural biological diversity' criterion.

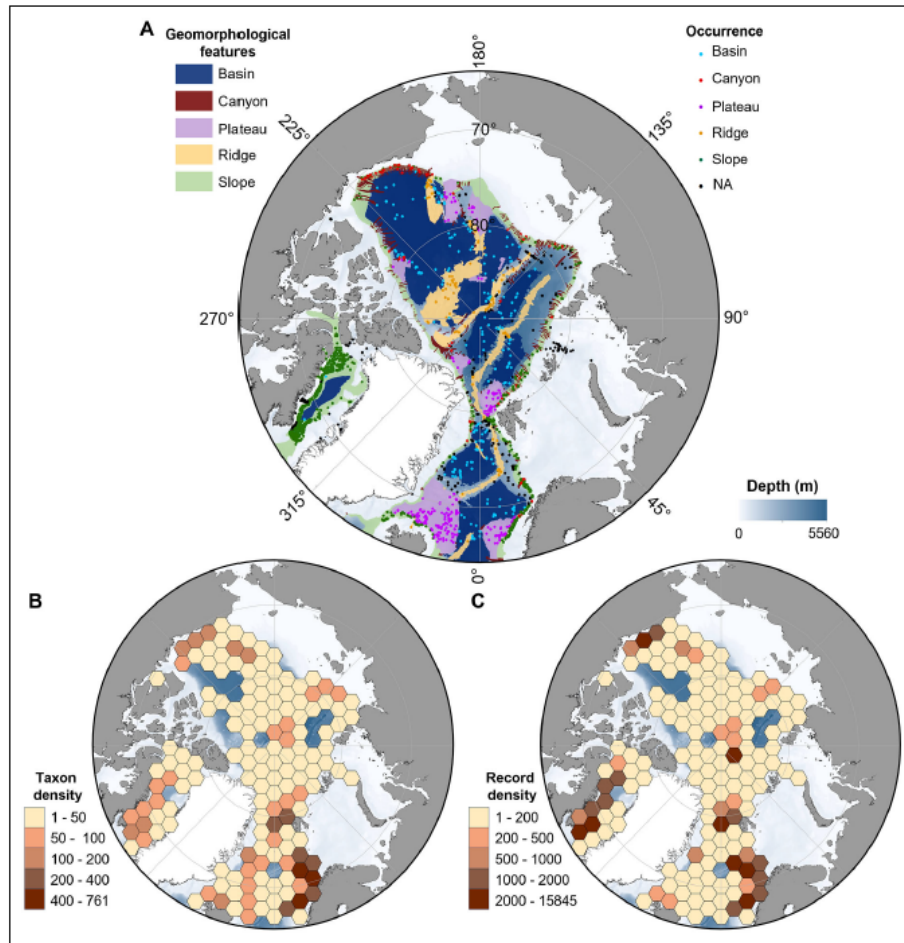


Figure 31. Maps representing occurrence of records of deep-sea Arctic benthic fauna (A), taxon density (B) and record density (C), from Ramirez-Llodra et al., 2024.

Appendix 4 provides figures from Ramirez-Llodra et al. (2024) with representative benthic fauna observed at different benthic habitats in the deep Arctic Ocean, namely slopes and canyons, basins and abyssal plains, ridges and plateaus, seamounts and banks, hydrothermal vents and cold seeps.

The Arctic Mid-Ocean Ridge features ultra-slow spreading rates, with significant hydrothermal activity. Loki's Castle Vent Field (LCVF) discovered in 2008, is characterised by mounds of hydrothermal sulphide and black smoker fluids reaching temperatures up to 320°C (Eilertsen et al., 2024). The fauna at LCVF, which includes several newly described species, indicates highly specialised communities that differ significantly from other regions, suggesting potential unique biogeographic classification for Arctic hydrothermal vent fauna (Eilertsen et al., 2024). Notably, six species from the LCVF are listed as vulnerable in the Norwegian Red List for Species and are also under consideration for the newly started assessment of vent-endemic fauna for the IUCN (Eilertsen et al., 2024).

The only other vent fields on the Arctic Mid-Ocean Ridge with described fauna are the Jan Mayen Vent Fields on the Mohn Ridge, but notably those vent fields are mainly inhabited by

background fauna, and those fields do not support a high biomass of vent-endemic fauna (Schander et al., 2010).

The Ægir Ridge System (ARS), an ancient rift in the Norwegian Sea, lies within OSPAR Region I with much of its northern section overlapping with ABNJ (**Figure 8**). A study by Brix et al. (2022) provides a description of habitat variability and faunal zonation of the ARS. Using remotely operated vehicles and epibenthic sledges, researchers identified clear depth-related zonation in macro- and megafauna, with increased diversity and abundance in canyon-like structures of the ridge (Brix et al., 2022). Importantly, several VME indicator species, including sponges and soft corals characteristic of Arctic habitats, were newly discovered in these areas (Brix et al., 2022). **Figure 32** replicated from Brix et al. (2022) illustrates characteristic megafauna at ARS. The findings highlight the ecological significance and naturalness of the ARS, supporting recommendations to designate it as an EBSA (Brix et al., 2022).

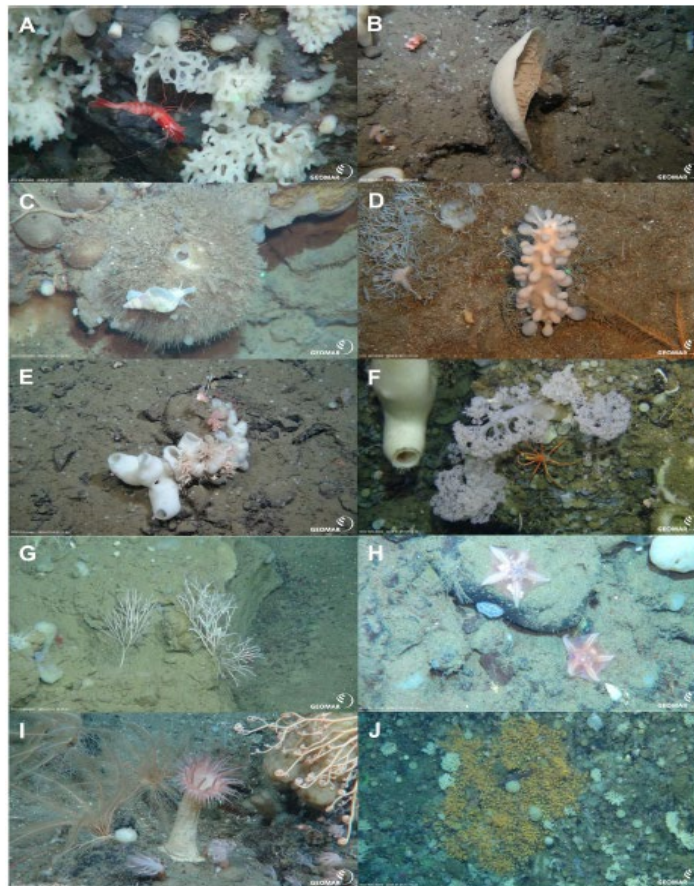


Figure 32. Characteristic megafauna at Ægir Ridge System at 2,000–600 m., from Brix et al. (2022). (A) Demosponge *Lissodendoryx* (*Lissodendoryx*) *complicata* with caridean decapod. (B) Flabellate demosponge *Phakellia* sp. indet. (C) The tetractinellid sponge *Geodia hentscheli* with neogastropod; (D) Carnivorous sponge *Chondrocladia* (*Chondrocladia*) *grandis*. (E) Glass sponge *Schaudinnia rosea* (F) Soft coral with *Colossendeis* sp. seaspider. (G) Carnivorous sponge *Asbestopluma* (*Asbestopluma*) *furcata*. (H) Pterasterid starfish *Hymenaster* sp. (I) Commatulid crinoids, basket star *Gorgonocephalus* sp. (J) Aggregations of demosponges and zoanthid cnidarians. Image source credits: GEOMAR/Senckenberg.

A notable source of information on benthic biodiversity in Norwegian waters of OSPAR Region I is the MAREANO programme, which also includes survey areas extending into adjacent ABNJ north of the Norwegian continental shelf. These ABNJ areas, which are relevant to this report, are covered in certain MAREANO mapping activities and associated data products (**Figure 33**). The MAREANO programme maps and investigates the depth, topography, sediment composition, biodiversity, habitats, and pollution of the seabed in Norwegian offshore areas. Its aim is to provide comprehensive scientific information to support the sustainable management of Norway's marine resources, particularly in relation to fisheries and petroleum activities. In particular, MAREANO programme provides spatial information for the following eight vulnerable biotopes in Norwegian waters:

- Soft-bottom sponge aggregations: these are communities of large sponges (e.g., *Geodia* spp.) creating mats on muddy seabeds, which may correspond to Deep-Sea Sponge Aggregations, a habitat listed under threat/decline in OSPAR Region I.
- Hard-bottom sponge aggregations: these are erect, fan-shaped or branching sponge communities (e.g., *Phakellia* spp., *Axinella infundibulum*) on rocky or coarse seabeds. This may correspond to Deep-Sea Sponge Aggregations, a habitat listed under threat/decline in OSPAR Region I.
- Deep Arctic sponge aggregations: these are deep, cold-water sponge habitats dominated by species like *Caulophacus arcticus* on hard bottoms. These may correspond to Deep-Sea Sponge Aggregations, a habitat listed under threat/decline in OSPAR Region I.
- Sublittoral seapen communities: these are areas with seapens (e.g., *Funiculina quadrangularis*, *Virgularia mirabilis*) and associated megafauna, mostly in fjords and deeper coastal channels. These are a listed habitat by OSPAR, but these are not under threat/in decline in Region I.
- Bathyal seapen communities: these are deep-sea zones with high densities of *Umbellula encrinus* and other tube-building fauna on soft bottoms (>800 m depth). It is a listed habitat by OSPAR, but this is not under threat/in decline in Region I.
- Soft bottom coral gardens: these are dense stands of gorgonians, mainly *Radicipes gracilis*, found on sandy-muddy sea floors and considered endangered in Norway, listed under threat/decline in OSPAR Region I.
- Hard-bottom coral gardens: these are habitats on hard sea floors with strong currents, dominated by sea fans like *Paragorgia arborea* and *Primnoa resedaeformis*. Corresponds to coral gardens, a habitat listed under threat/decline in OSPAR Region I.
- Cold-water coral reefs: these are reef structures mainly built by the stony coral *Lophelia pertusa*, hosting diverse marine life and forming important habitats. *Lophelia pertusa* Reefs are listed as under threat/decline in OSPAR Region I.

The programme provides an online GIS tool allowing to investigate and map different features, including the vulnerable benthic biotopes³⁸. **Figure 33** below illustrates a map showing the distribution of the vulnerable biotopes mapped by MAREANO to date. The distribution maps for individual biotopes are also available in Gonzalez-Mirelis and Buhl-Mortensen (2015).

³⁸ https://kart.mareano.no/mareano/mareanoPolar_en.html?#maps/7712

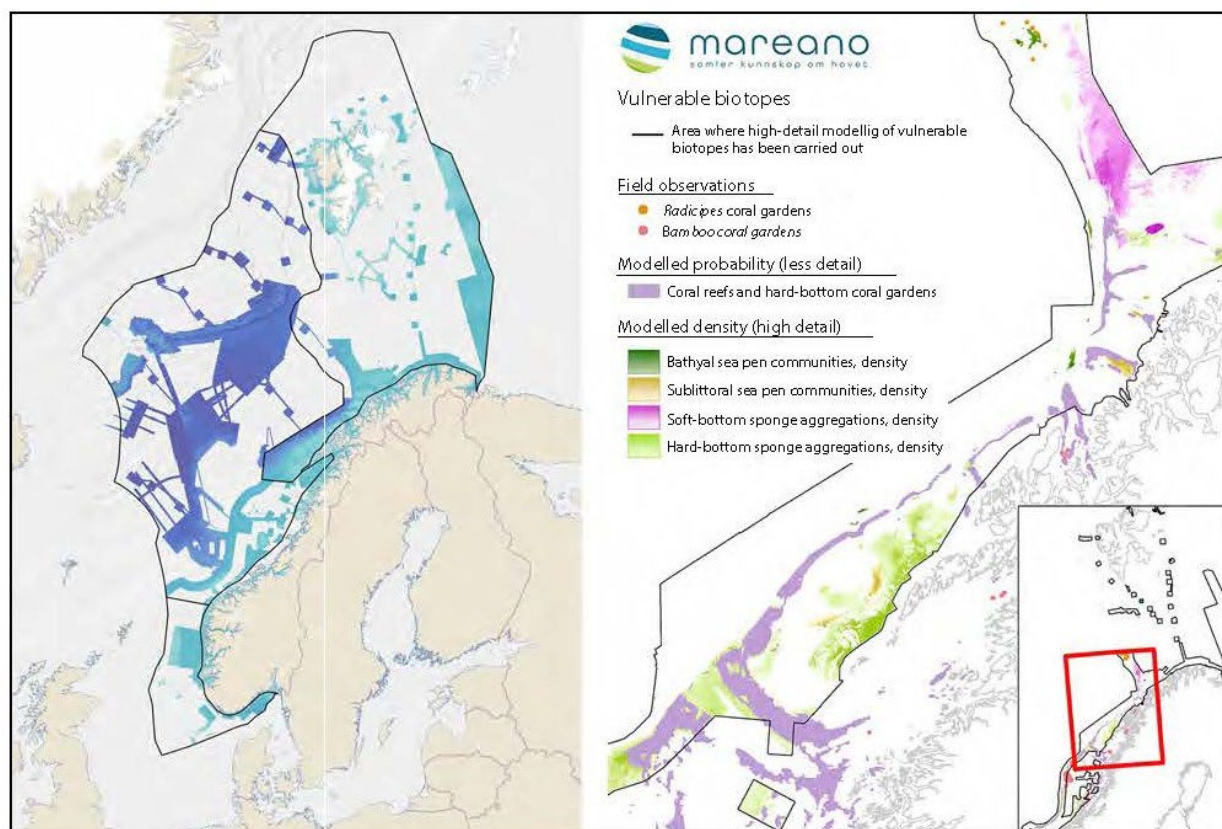


Figure 33. Mapping the seabed. Areas where the MAREANO programme has mapped depth and topography or obtained data from other sources (left). Vulnerable habitats modelled on the basis of data collected by the MAREANO programme (right). From: Meld. St. 21 (2023-2024).

Another project providing crucial information on benthic biodiversity in the area of interest is the NovasArc project³⁹. The NovasArc project (2016–2018), led by the Institute of Marine Research (Norway) in partnership with the Marine and Freshwater Research Institute (Iceland) and the Faroe Marine Research Institute (Faroe Islands), focused on mapping, classifying, and assessing VMEs such as cold-water coral reefs, coral gardens, and deep-sea sponge aggregations in Arctic and sub-Arctic waters of the North-East Atlantic. NovasArc compiled and analysed key data on benthic species and habitats, mapped the distribution of fishing and other anthropogenic pressures, and identified areas of potential conflict between conservation and resource use. One of the project outcomes is the report on VMEs by Buhl-Mortensen et al. (2019), which includes maps of the predicted VME distribution, using the MaxEnt models based on known locations of indicator species. The maps are provided in **Appendix 5**. Notably, those maps lack data for most of the ABNJ in Region I, but there is some overlap with the Central Barents Sea sector, showing likely presence of sponge aggregations and seapen communities in the area (**Appendix 5**, Buhl-Mortensen et al., 2019).

Time-series studies of Arctic marine ecosystems are rare. The Long-Term Ecological Research observatory HAUSGARTEN, located in the eastern Fram Strait within OSPAR Region

³⁹ <https://novasarc.hafogvatn.is/>

I within the Norwegian EEZ (approximately 79° N, 6° E) and established by the Alfred Wegener Institute, serves as a critical hub for monitoring deep Arctic Ocean ecosystems, spanning depths from 250 to 5,500 meters to detect changes in abiotic and biotic parameters. This observatory has been operational since 1999 and employs a range of methodologies such as permanent stations, moorings, ROVs, and autonomous underwater vehicles (AUVs) for comprehensive sampling and observation. Long-term ecological research at the HAUSGARTEN observatory has identified significant temporal trends across a range of biological variables from the pelagic system to the deep seafloor, particularly in response to a warm water anomaly observed from 2005 to 2008 (Soltwedel et al., 2016). Dominant megafauna species identified at the HAUSGARTEN observatory along the bathymetric gradient included *Ophiocten gracilis*, an unidentified small white amphipod, *Kolga hyalina*, and *Bathycrinus carpenteri* on the slope and continental rise, with *Elpidia heckeri* dominating the deepest site (the Molloy Hole) (Soltwedel et al., 2009). Megafaunal densities ranged from 11 to 38 individuals per square meter, peaking at intermediate depths (1,650 m) and decreasing at greater depths (3,000–5,500 m) (Soltwedel et al., 2009). Distribution patterns were primarily dictated by food availability (phytodetritus input and benthic biomass), while physical factors like water depth and substrate played a lesser role (Soltwedel et al., 2009).

Benthopelagic coupling

Interactions between ocean currents, kinetic energy, seafloor topography, and species ecology and behaviour facilitate a wide range of biophysical processes that can entrain and advect nutrients, increase productivity, retain organisms, and transport particulate matter and energy downstream - commonly referred to as benthopelagic coupling (Cascão et al., 2019 and references therein). For instance, particle retention over seamounts through Taylor caps and Taylor columns is well-documented. With many seabed features such as seamounts, ridges, hydrothermal vent fields and abyssal plain systems present in the OSPAR Region I - Arctic Waters, it is highly probable that similar interactions are occurring there. The study describing hydrothermal vent fauna of the Jan Mayen fields on the Mohn Ridge noted large clouds of planktonic organisms observed above the vents, and these are mainly comprised of crustacean species (Schander et al., 2010).

The sinking of organic material from shallower waters to the sea floor, known as biological carbon pump, is one of the vectors of benthopelagic coupling. Using DNA metabarcoding to study the diet of the deep-sea scavenger amphipod *Eurythenes gryllus* in the Fram Strait, a recent study by Schmittmann et al. (2024) identified a diverse range of nekton species, primarily fish, cephalopods, and mammals, as its main food sources. This analysis not only supports the notion of *E. gryllus* as a key indicator of 'food falls' from the upper layers of the ocean but also highlights its role as a 'natural sampler' for assessing local variations in carbon export and food fall availability in the changing Arctic ecosystem.

These biophysical processes are ecologically significant to the region. Life in open ocean pelagic systems is closely linked to the deep sea and the seafloor, through the downward flux of organic matter and the upwelling of nutrients from ocean depths, driving primary production at the surface. In ice-covered regions, the release and rapid sinking of well-developed ice algal communities during melt events can deliver large pulses of organic carbon directly to the seafloor, supporting higher benthic biomass than is typically sustained by water column phytoplankton

export alone. Nöthig et al. (2020) demonstrated that ice algae export events, especially involving *Melosira arctica*, can account for a substantial proportion of the annual organic matter flux to the deep Arctic seafloor, directly linking ice community development to the food supply and elevated biomass of benthic megafauna in ice-covered basins.

Fish

The CAO remains one of the world's most understudied regions in terms of fish fauna. This is principally due to the difficulty of sampling in extensive, ice-covered waters — where standard trawl surveys are largely impractical — as well as a historical lack of commercial fishing interest (Skjoldal et al., 2022). Recently, however, shrinking sea ice and the prospect of new fisheries have driven a surge in scientific attention, international monitoring efforts, and regulatory agreements (e.g., the 2018 The Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean (CAOFA)). Across the broader Arctic, around 720 fish species have been documented, but true Arctic specialists are a minority, only about 59 species are classed as strictly Arctic, with another 40 as Arctic-boreal (Skjoldal et al., 2022). The highest Arctic shelf fish diversity is generally found on the Atlantic side, reflecting the more diverse boreal incursions in that region (Skjoldal et al., 2022). The following OSPAR listed species of fish occur in Region I:

- Atlantic salmon (*Salmo salar*)
- Basking shark (*Cetorhinus maximus*)
- Cod (*Gadus morhua*)
- Common skate (*Dipturus batis*)
- European eel (*Anguilla anguilla*)
- Leafscale gulper shark (*Centrophorus squamosus*)
- Orange roughy (*Haplostethus atlanticus*)
- Porbeagle (*Lamna nasus*)
- Portuguese dogfish (*Centroscymnus coelolepis*)
- Sea lamprey (*Petromyzon marinus*)
- Spurdog (*Squalus acanthias*)
- Thornback ray (*Raja clavata*)

The High Seas portion of the CAO has historically seen very limited fish research. Recent synopses list only about 12 fish species with confirmed records from ABNJ (Skjoldal et al., 2022). Most of these are eelpouts and snailfishes (benthic slope and deep basin species), with polar cod and Arctic cod the sole widely distributed pelagic/demersal species in central waters.

The principal families of Arctic and Arctic-boreal fish are eelpouts (Zoarcidae), sculpins (Cottidae), snailfishes (Liparidae), lumpsuckers (Cyclopteridae), and pricklybacks (Stichaeidae) (Skjoldal et al., 2022). Polar cod (*Boreogadus saida*) and capelin (*Mallotus villosus*) are the key species in marine food webs of the Arctic and the Barents Sea (Hop and Gjørseter, 2013). Polar cod (*Boreogadus saida*) is a cornerstone fish species in Arctic marine ecosystems, serving as a primary food source for a wide range of predators, including fish, seabirds, and marine mammals. Its high lipid content and abundance make it essential for transferring energy through the Arctic food web, and its presence underpins the health and stability of numerous Arctic communities. Polar cod has a circumpolar distribution (**Figure 34**) and relies on ice for shelter and feeding,

consuming under-ice amphipods and zooplankton, and forms large schools in varying habitats from pelagic zones to ice-covered areas (Eamer et al., 2013). Polar cod currently has no large-scale or commercial fisheries targeting it. However, historical fishing efforts by Norway and Russia were short-lived due to rapid depletion of the resource. Polar cod is highly vulnerable to the effects of climate change, with declines in sea ice and increased ocean temperatures in the Barents Sea leading to reduced survival and recruitment, particularly by eliminating critical ice-associated spawning and nursery habitats (Huserbråten et al., 2019). As a result, polar cod spawning has shifted northwards, and continued warming may lead to recruitment collapses and profound impacts on the Arctic marine ecosystem (Jansen et al., 2026).

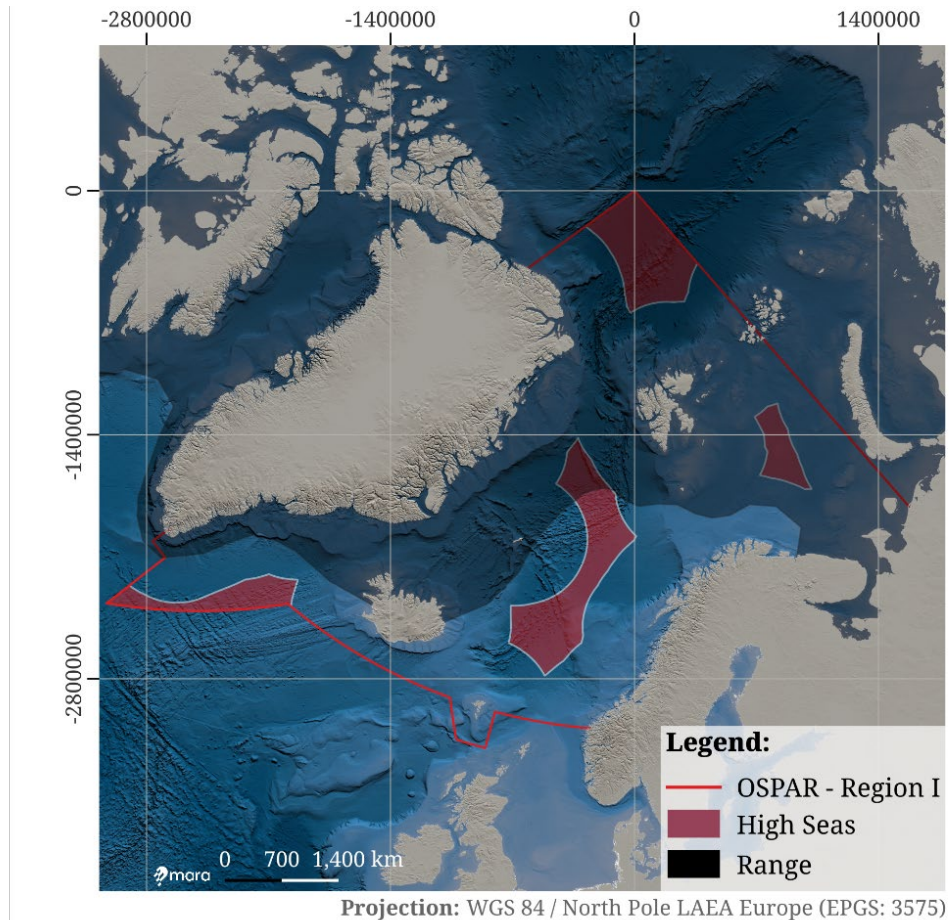


Figure 34. Distribution of polar cod (*Boreogadus saida*) in OSPAR Region I based on participation in research sampling, examination of museum voucher collections and the literature (Mecklenburg et al., 2011; Mecklenburg and Steinke, 2015). The map shows the maximum distribution observed from point data and includes both common and rare locations. Source: ABDS⁴⁰.

Capelin (*Mallotus villosus*) is a small, pelagic forage fish that plays a critical role in sub-Arctic marine ecosystems as a key prey item for numerous commercially important fish, seabirds, and marine mammals. Capelin is classified as an Arctic species with a circumpolar distribution in

⁴⁰ <https://geo.abds.is/geonetwork/srv/eng/catalog.search#/metadata/7d3e0244-280b-40b2-941e-f5a91d66143a>

the Northern Hemisphere, although it mainly occupies sub-Arctic regions (Hop and Gjørseter, 2013). Its feeding range overlaps with that of polar cod; however, capelin's spawning grounds extend further south than those of polar cod on both sides of the Atlantic. In the OSPAR Region I, capelin is particularly important for supporting higher trophic levels, including cod and seabirds, and is a valuable target species itself for fisheries including the cultural valuable subsistence fisheries in Greenland. Capelin's occurrence in this region is closely linked to the cold waters around Iceland, Greenland, and the Barents Sea, where it undertakes extensive spawning migrations and forms substantial biomass pulses that underpin regional food webs. The Horizon Europe iAtlantic research programme (2019–2024) found that, since 2003, capelin in Icelandic waters have shifted their spawning grounds northwards and northwestwards in response to a significant increase in ocean temperatures in these areas (Matabos et al., 2022). This shift has resulted in greater connectivity between new spawning areas and the Greenlandic shelf, as demonstrated by particle-tracking model simulations showing increased westward larval transport from northwest Iceland to Greenlandic nursery grounds (Matabos et al., 2022). These findings explain the observed post-2003 rise in juvenile capelin on the Greenland shelf, with temperature increases identified as the main environmental driver, while changes in salinity were less influential and remained within the species' tolerance limits.

In OSPAR Region I there are six species of fish that support the major fisheries in the Nordic and Barents Sea: cod, saithe, haddock, blue whiting, herring and capelin. Importantly, major spawning grounds for these and other commercially important fish exist along the continental shelves along the Nordic countries. The Arctic Marine Shipping Assessment (AMAP/CAFF/SDWG, 2013) identified fish spawning areas in the Iceland Sea, Norwegian Sea and Barents Sea as areas of heightened ecological significance (**Table 3**).

Table 3. Areas of heightened ecological significance and their ecological functions for fish species according to Arctic Marine Shipping Assessment (AMSA) IIc (AMAP/CAFF/SDWG, 2013).

Area	Ecological function
Iceland Shelf and Sea LME	
Coastal banks	Fish spawning areas; capelin, herring, cod
Norwegian Sea LME	
Norwegian coast and shelf – Møre-Helgelan	Herring spawning area
Lofoten area	- Spawning area for Barents Sea cod - Spawning area Greenland halibut
Barents Sea LME	
Pechora Sea	- Spawning area polar cod - Spawning area herring
Norwegian and Murman coasts	Spawning area capelin
Svalbard Archipelago	Spawning area for polar cod

Fish habitats in the wider CAO can be mapped onto five primary zones: estuarine, coastal, shelf, slope, and basin (deep sea), with additional divisions for pelagic, demersal, and benthic ecological types (Skjoldal et al., 2022). The shelves harbour the greatest species richness, including a diversity of sculpins, eelpouts, flatfish, capelin, and gadids. The slopes — particularly

on the Atlantic side — act as a dispersal corridor for both Arctic and boreal species, while true deep-basin habitats are dominated by a small fauna of benthic eelpouts and snailfishes thriving at depths of 2000–3000 m (Skjoldal et al., 2022).

The deep waters in the ABNJ areas of OSPAR Region I likely support a large variety of fish species, but only a few are currently fished commercially, such as the Greenland halibut, and deep-sea redfish. Notably, the Irminger Sea Closure is recognised as a VME closure area under the jurisdiction of the NEAFC⁴¹ (**Figure 59**). The closure is intended to protect the shallow pelagic redfish stock and the deep pelagic redfish (*Sebastes mentella*) stock in the Irminger Sea and adjacent waters.

The deep-sea waters in the Arctic Mid-Ocean Ridge area serve as important year-round habitats for mesopelagic fish such as glacier lanternfish, silvery lightfish, and spotted barracudina, which play crucial roles in the food web as prey for deep-diving marine mammals like sperm, fin, and bottlenose whales (Meld. St. 21 (2023–2024)). The deep basins also support large populations of zooplankton, particularly *Calanus copepods*, which underpin the productivity of higher trophic levels, including pelagic fish such as herring, blue whiting, and mackerel (Meld. St. 21 (2023–2024)). Along the seabed, the complex topography of seamounts, ridges, and muddy plains provides habitat for fragile, slow-growing communities of corals and sponges, which act as important nursery grounds for a variety of fish species (Meld. St. 21 (2023–2024)).

The Important Shark and Ray Areas (ISRA) initiative, led by the IUCN SSC Shark Specialist Group, is a global, science-driven effort to identify and map key habitats essential for the survival and recovery of sharks, rays, and chimaeras. ISRAs are specific, three-dimensional habitats identified based on scientific criteria including species vulnerability, range restriction, vital life-history activities, distinctiveness, and diversity. ISRAs are not management or regulatory tools but rather highlight regions that are especially important to these species, providing evidence-based guidance to support future conservation measures. The Northeast Atlantic Corridor ISRA overlaps with OSPAR Region I and partly overlaps with the Arctic Mid-Ocean Ridge polygon (**Figure 35**). The Northeast Atlantic Corridor ISRA is designated as an area important for threatened species (e.g., Porbeagle *Lamna nasus*); and areas important for movement (e.g., Basking Shark *Cetorhinus maximus*)⁴².

⁴¹ chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.neafc.org/system/files/Rec_01-2026_Redfish-in-the-Irminger-Sea_2026-and-2027.pdf

⁴² <https://sharkrayareas.org/e-atlas/>

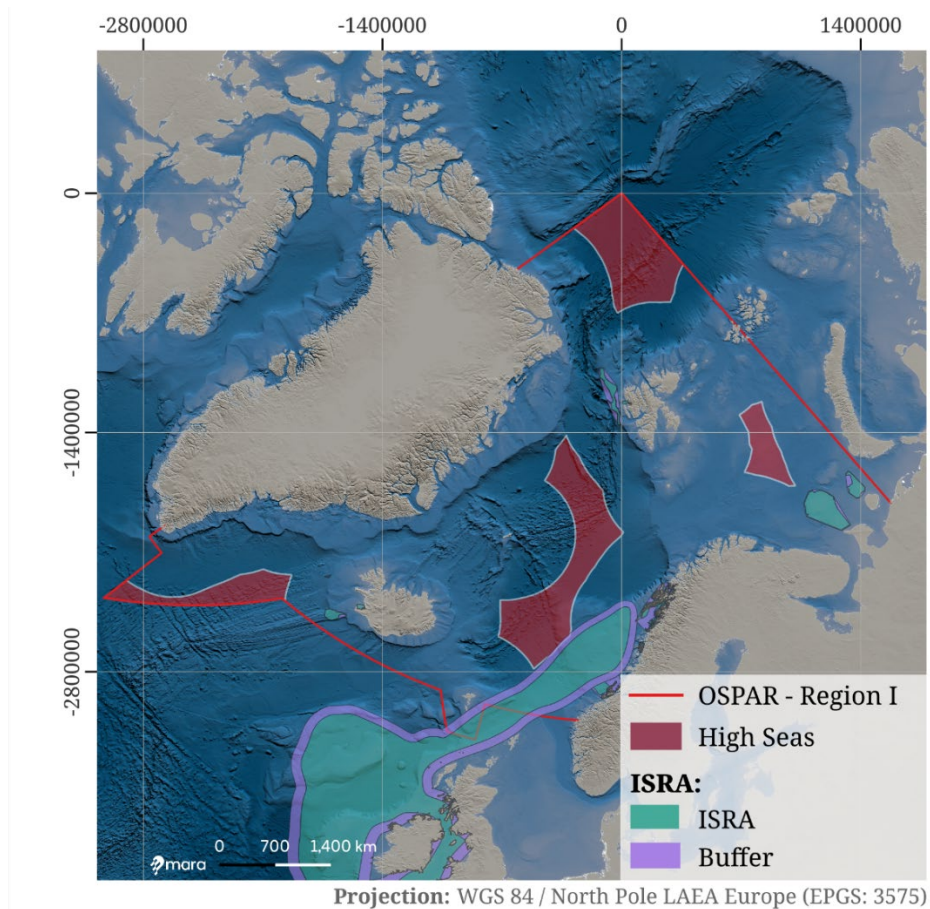


Figure 35. The Important Shark and Ray Areas (ISRA) and the four candidate sites in OSPAR Region I. Data Source: IUCN SSC Shark Specialist Group 2026. Important Shark and Ray Areas (ISRA) eAtlas. International Union for Conservation of Nature (IUCN) Species Survival Commission (SSC) Shark Specialist Group. Version 2026-2 (April).

Warming trends and loss of perennial sea ice are driving 'borealisation' in adjacent Arctic shelves, most notably with the northward advance of species such as Atlantic cod (*Gadus morhua*), haddock (*Melanogrammus aeglefinus*), and boreal flatfishes into the northern Barents Sea (Skjoldal et al., 2022). Borealisation is currently more advanced on the Atlantic side due to deep gateways (Fram Strait, Atlantic inflow) and the migratory capabilities of commercial species (Skjoldal et al., 2022). Atlantic cod, for example, has been recorded pelagically as far north as the Amundsen Basin, feeding on pelagic crustaceans, although in very small numbers (Skjoldal et al., 2022). Deepwater redfish (*Sebastes mentella*), grenadiers, and other boreal slope forms have also expanded northward along slope corridors (Skjoldal et al., 2022).

Seabirds

Seabird diversity in the CAO is relatively low, with around 35 species observed, but only eight species occurring regularly within the region (Skjoldal et al., 2022). The most commonly encountered seabirds include the northern fulmar, ivory gull, Ross's gull, black-legged kittiwake, glaucous gull, dovekie, thick-billed murre, and black guillemot (Skjoldal et al., 2022). Most other species are vagrants or rare visitors to the Arctic Basin, with the highest seabird densities typically found in peripheral areas such as the marginal ice zone (Skjoldal et al., 2022). At the same time, the European Arctic, which comprises the northern regions of Norway, Denmark (Greenland, the Faroe Islands), Finland, Sweden, and Iceland is one of the most abundant seabird regions globally with a breeding population of more than 25 million surface feeders (i.e., gulls, or fulmars) and pursuit diving subsurface feeders (i.e., Thick-billed murre)⁴³. At least five of the OSPAR Threatened/Declining bird species are known in the region⁴⁴:

1. Black-legged Kittiwake (*Rissa tridactyla*)
2. Ivory gull (*Pagophila eburnea*)
3. Lesser black-backed gull, Fuscus sub-species (*Larus fuscus fuscus*)
4. Steller's eider (*Polysticta stelleri*)
5. Thick-billed murre (*Uria lomvia*)

The CAO itself has no large breeding colonies but is surrounded by significant seabird nesting areas located on high Arctic archipelagos and shelf regions, including Svalbard, Franz Josef Land, Novaya Zemlya, Severnaya Zemlya, the New Siberian Islands, Wrangel and Herald Islands, and Northeast Greenland (Skjoldal et al., 2022). Major breeding species include dovekie, thick-billed murre, black-legged kittiwake, glaucous gull, northern fulmar, and black guillemot, with colony sizes ranging from several thousand to millions of birds (Skjoldal et al., 2022) (**Figure 36**). These colonies are mainly situated on steep cliffs or screes and show distinct regional patterns in species composition. The foraging ranges of breeding seabirds, such as northern fulmar, allow some individuals to enter the CAO during the breeding season, although most feeding activity is concentrated closer to colony sites. The main Arctic colonies and their sizes are visualised in **Figure 36**, which shows the distribution and magnitude of major breeding aggregations around the periphery of the CAO (Skjoldal et al., 2022).

⁴³ <https://www.ospar.org/convention/the-north-east-atlantic/i>

⁴⁴ <https://datazone.birdlife.org/search>

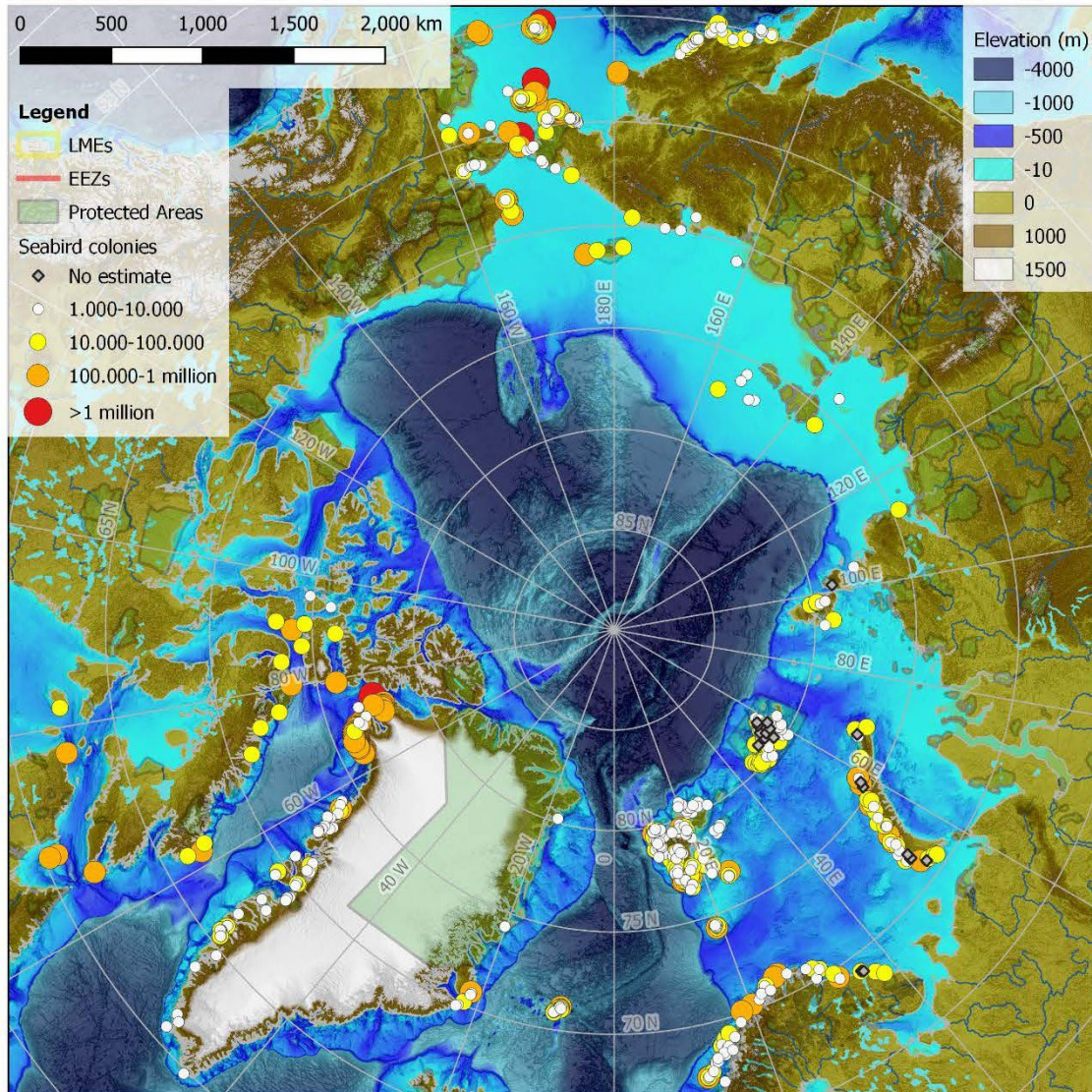


Figure 36. Locations and size categories of seabird breeding colonies around and adjacent to the CAO. The map illustrates colonies of various sizes (ranging from 1,000 to over 1 million birds) for all species combined. From: ICES WGICA Report 2022 (Skjoldal et al., 2022).

The State of the Arctic Marine Biodiversity Report Update: Seabirds (CAFF, 2021) synthesises data from 2016–2019 to provide an updated overview of status and trends for Arctic seabird populations, as part of the Circumpolar Biodiversity Monitoring Programme (CBMP). The report focuses on eight priority species that serve as ecological indicators across five feeding guilds: Glaucous gull (*Larus hyperboreus*), Ivory gull (*Pagophila eburnea*), Least auklet (*Aethia pusilla*), Little auk (*Alle alle*), Common murre (*Uria aalge*), Thick-billed murre (*Uria lomvia*), Black-legged kittiwake (*Rissa tridactyla*), and Common eider (*Somateria mollissima*). Findings show continued widespread population declines for several seabirds in the Atlantic Arctic, particularly kittiwakes and murre, while populations in the Beaufort, Pacific Arctic, and Arctic Archipelago are generally stable or increasing, notwithstanding some localised declines (CAFF, 2021). The trend for ivory gulls has improved for smaller populations but remains negative in larger ones, and

common eiders have changed from increasing to decreasing in two Atlantic regions (CAFF, 2021). Major drivers include sea ice retreat and changes in prey availability linked to climate change, as well as threats from fisheries bycatch and significant data gaps, especially in the Russian Arctic. The report highlights the importance of international cooperation and expanded monitoring to better understand and conserve Arctic seabird populations.

The SEATRACK programme is an international collaborative initiative launched in 2014 to map the non-breeding distribution of seabirds across the North Atlantic and investigate how environmental changes and other threats impact their populations. SEATRACK employs advanced tracking technologies to follow sixteen key seabird species year-round. The programme runs two GIS applications that enable mapping of the distribution or abundance of the target species⁴⁵. Its 'Distribution App' enables users to visualise where selected seabird species are likely to be found by displaying kernel density maps with coloured contours that represent 25%, 50%, and 75% probability levels, based on tracking data. The 'Abundance App' presents monthly, large-scale maps of estimated adult seabird densities for six species, using models that combine tracking data and population size, allowing users to explore changes in abundance through the year. The screenshot below illustrates the abundance of Black-legged Kittiwake in OSPAR Region I mapped by SEATRACK for the month of July (**Figure 37**).

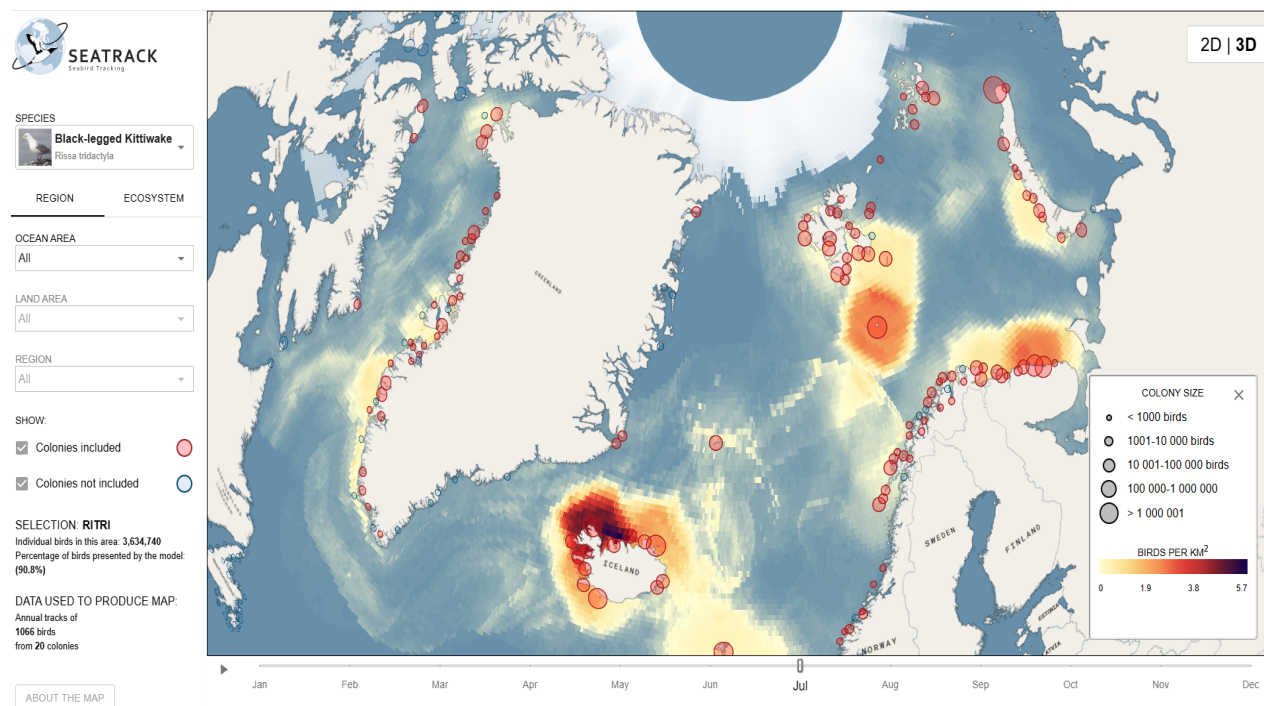


Figure 37. Distribution of Black-legged Kittiwake (*Rissa tridactyla*) in July visualised by the SEATRACK programme abundance app⁴⁶.

⁴⁵ <https://seatrack.net/data/web-apps/>

⁴⁶ <https://abundanceapp.seatrack.net/>

The SEATRACK programme allows data requests for research purposes. Another major source of tracking data for seabirds is the Seabird Tracking Database by BirdLife International⁴⁷. The geographic search for OSPAR Region I yielded 159 datasets related to seabirds in the area, however further analysis of tracking data was out of the scope of this report.

More than 30 Important Bird and Biodiversity Areas (IBAs) and Key Biodiversity Areas (KBAs) can be found in OSPAR Region I along the coastal areas of Svalbard, Jan Mayen island, Bjørnøya (Bear Island), Greenland and Iceland (**Figure 38**).

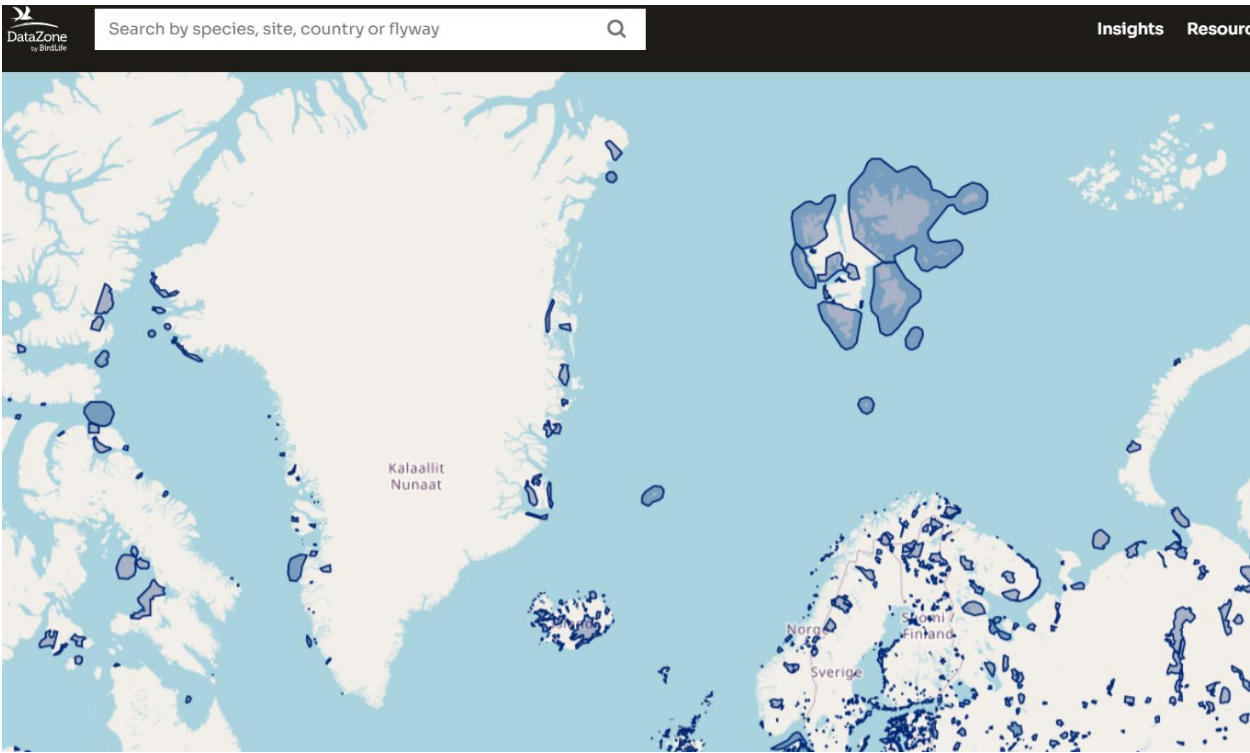


Figure 38. Important Bird and Biodiversity Areas (IBAs). Blue polygons represent the IBAs. Source: DataZone by BirdLife⁴⁸.

There are numerous sites within Region I that provide important ecological functions for seabirds, according to the Arctic Marine Shipping Assessment (AMSA) IIc (AMAP/CAFF/SDWG, 2013), notably all within the EEZ of the Arctic states. Seabird breeding colonies, feeding areas, moulting and wintering areas and staging areas can be found in the coastal areas of the Iceland Sea, Greenland Sea, Faroe Plateau, Norwegian Sea and Barents Sea - detailed list of the areas of heightened ecological significance and the ecological functions they provide is presented in **Table 4**.

Table 4. Areas of heightened ecological significance and their ecological functions for seabirds according to Arctic Marine Shipping Assessment (AMSA) IIc (AMAP/CAFF/SDWG, 2013).

⁴⁷ <https://www.seabirdtracking.org/>
⁴⁸ <https://datazone.birdlife.org/search>

Area	Ecological function
Iceland Shelf and Sea LME	
Vestmannaeyjar	Seabird breeding colonies, summer feeding areas
Reykjanes Peninsula	Seabird breeding colonies, summer feeding areas
Snæfellsness Peninsula	Seabird breeding colonies, summer feeding areas
Faxaflói Bay	- Waterfowl breeding, feeding, moulting and wintering; common eider. - Shorebird feeding and staging areas
Breiafjörður	- Waterfowl breeding, feeding, moulting and wintering; common eider. - Shorebird feeding and staging areas
Latrabjarg	Seabird breeding colonies, summer feeding areas
Hornbjarg and Hælavíkubjarg	Seabird breeding colonies, summer feeding areas
Offshore waters	Seabird migration and wintering; ivory gull, thickbilled murre
Drangey, Grimsey, Langanes	Seabird breeding colonies, summer feeding areas
Melrakkasletta	Shorebird feeding and staging areas
Skrudur	Seabird breeding colonies, summer feeding areas
Skardsfjörður	Shorebird feeding and staging areas
Greenland Sea LME	
Northeast Water polynya area and Peary Land	Pre-breeding staging area for sea ducks and feeding area during the breeding period for seabirds and sea ducks.
Scoresby Sund fjord and adjacent fjord areas on Blosseville Coast	Moulting and staging area for seabirds
Sirius Water/ Young Sound Polynya	Staging area for spring migrating water birds
Sea ice in the western Greenland Sea	Seabirds migration corridor in late summer and autumn
Southeastern Greenland and Denmark Strait	- Staging, breeding and moulting area for seabirds - Migration corridor for seabirds
Faroe Plateau LME	
Faroe Islands	Seabirds breeding and feeding areas
Norwegian Sea LME	
Norwegian coast and shelf – Møre-Helgeland	Seabird breeding colonies
Lofoten area	Seabird breeding colonies (summer)
Jan Mayen	Seabird breeding colonies
Barents Sea LME	
Pechora Sea	- Moulting and staging areas for waterfowl - Moulting and staging area for seaducks, staging area for auks
Norwegian and Murman coasts	- Seabird breeding colonies - Wintering area seaducks
Bear Island	Seabirds breeding colonies
Svalbard Archipelago	- Seabird breeding colonies (summer) - Moulting areas seaducks and geese (late summer)
Franz Josef Land	Seabird breeding colonies

Area	Ecological function
	• Staging area for seabirds (spring)
Western and central Barents Sea	• Feeding area for seabirds (summer) • Seabird wintering area • Moulting area and swimming migration auks (late summer)
Central Arctic Ocean LME	
Pack ice	• Summer and post-breeding feeding area for ivory and Ross's gulls

Marine mammals

According to the OSPAR website⁴⁹, the following species of marine mammals occur in Region I:

1. Minke whale (*Balaenoptera acutorostrata*)
2. Fin whale (*Balaenoptera physalus*)
3. Blue whale (*Balaenoptera musculus*)
4. Pilot whale (*Globicephala melas*)
5. Sperm whale (*Physeter macrocephalus*)
6. Northern right whale (*Eubalaena glacialis*)
7. Bowhead whale (*Balaena mysticetus*)
8. Harbour Porpoise (*Phocoena phocoena*)
9. Atlantic walrus (*Odobenus rosmarus rosmarus*)
10. Common harbour seal (*Phoca vitulina*)
11. Grey seal (*Halichoerus grypus*)
12. Harp seal (*Pagophilus groenlandicus*)
13. Hooded seal (*Cystophora cristata*)
14. Ringed seal (*Pusa hispida*)
15. Bearded seal (*Erignathus barbatus*)

The recent satellite tracking study (Hamilton et al., 2022) also illustrates occurrence of the following species of marine mammals in the waters corresponding to OSPAR Region I:

1. Narwhals (*Monodon monoceros*)
2. Beluga whales (*Delphinapterus leucas*)
3. Humpback whales (*Megaptera novaeangliae*)
4. Polar bears (*Ursus maritimus*)

Notably, of these species the following are ice-dependent or ice-associated and occupy Arctic waters year-round - narwhal (*Monodon monoceros*), beluga (*Delphinapterus leucas*), bowhead whale (*Balaena mysticetus*), ringed seal (*Pusa hispida*), bearded seal (*Erignathus barbatus*), walrus (*Odobenus rosmarus rosmarus*) and polar bear (*Ursus maritimus*) (Burns, 2009; Laidre and Regehr, 2017). Additionally, other important Arctic endemic marine mammals include harp seal (*Pagophilus groenlandicus*), hooded seal (*Cystophora cristata*), ribbon seal

⁴⁹ <https://www.ospar.org/convention/the-north-east-atlantic/i>

(*Histriophoca fasciata*), and spotted seal (*Phoca largha*), with varying degrees of ice-association and distribution (Kovacs et al., 2021).

In addition, there are a number of other cetacean species that are commonly sighted in in Arctic or sub-Arctic waters during the summer months, including: white-beaked dolphin (*Lagenorhynchus albirostris*), killer whale (*Orcinus orca*), long-finned pilot whale (*Globicephala melas*), harbour porpoise (*Phocoena phocoena*), fin whale (*Balaenoptera physalus*), blue whale (*Balaenoptera musculus*), sei whale (*Balaenoptera borealis*), minke whale (*Balaenoptera acutorostrata*), humpback whale (*Megaptera novaeangliae*) and northern bottlenose whale (*Hyperoodon ampullatus*) (Kovacs et al., 2011).

Recent findings from the 2021 CBMP/CAFF update (Kovacs et al., 2011):

- There are now 11 recognised Arctic endemic marine mammal Focal Ecosystem Components, acknowledging both their ecological and cultural importance: Narwhal (*Monodon monoceros*), Beluga (*Delphinapterus leucas*), Bowhead whale (*Balaena mysticetus*), Ringed seal (*Pusa hispida*), Bearded seal (*Erignathus barbatus*), Harp seal (*Pagophilus groenlandicus*), Hooded seal (*Cystophora cristata*), Ribbon seal (*Histriophoca fasciata*), Spotted seal (*Phoca largha*), Walrus (*Odobenus rosmarus rosmarus*), Polar bear (*Ursus maritimus*)
- The Arctic marine mammal community includes at least 101 recognised regional stocks, but a major knowledge gap persists: the status and trends are still unknown for 66% of these stocks, especially for ice-associated seals.
- Some populations (e.g., a few Atlantic walrus stocks, the Bering-Chukchi-Beaufort bowhead, and certain harp seal populations) are stable or increasing, while others such as several polar bear, narwhal, beluga, hooded seal, and East Greenland walrus stocks are declining or at high conservation concern.
- Major threats remain climate-induced sea ice decline, 'borealisation' (northward shifting of temperate marine mammal species), increased shipping, resource development, contaminants, disease, and changing access for Indigenous and local hunters.

The data portal by the Norwegian Institute of Marine Research⁵⁰ contains a mapping tool displaying distribution maps for different species of marine mammals, the maps are listed in **Appendix 6**. These maps are derived from expert assessment, specifically reflecting the species manager's interpretation of distribution patterns observed over the past three decades. Detailed information regarding the underlying data and the species covered is available from the Institute of Marine Research⁵¹. According to the data from the portal, the following species have overlapping distributions with OSPAR Region I:

- Pilot whale (*Globicephala melas*)
- Beluga whale (*Delphinapterus leucas*)
- Humpback whale (*Megaptera novaeangliae*)
- Narwhal (*Monodon monoceros*)
- Northern bottlenose whale (*Hyperoodon ampullatus*)

⁵⁰ https://kart.hi.no/datasett/#/item/Utbredelse_sjopattedyr

⁵¹ <https://www.hi.no/hi/temasider/arter>

- Killer whale (*Orcinus orca*)
- Sperm whale (*Physeter macrocephalus*)
- Minke whale (*Balaenoptera acutorostrata*)
- Harbour porpoise (*Phocoena phocoena*)
- Harp seal (*Pagophilus groenlandicus*)
- Harbour seal (*Phoca vitulina*)

Further information on the distribution of marine mammal species in the CAO is also available in the recent ICES WGICA (2022) report (Skjoldal et al., 2022). **Appendix 7** of this report contains a set of distribution maps for key marine mammal species, including bowhead whale stocks, beluga whale populations, walrus, and polar bear subpopulations. These maps are based on the latest expert assessments and compiled data, providing visual overviews of range boundaries, seasonal migration patterns, and population structuring within and around the CAO. This supplementary material offers valuable spatial context to support understanding of the occurrence and ecology of these marine mammals in the region.

The North Atlantic Marine Mammal Commission (NAMMCO) is an international body dedicated to the conservation, management, and study of marine mammals in the North Atlantic. One of NAMMCO's most significant collaborative initiatives is the North Atlantic Sightings Survey (NASS), a large-scale effort to monitor the abundance and distribution of cetaceans across this vast region. Since 1987, NASS surveys have brought together several nations to conduct coordinated synoptic surveys, ensuring comprehensive coverage that transcends national boundaries. In 2024, NASS carried out its seventh survey, with all four NAMMCO member countries — Greenland, the Faroe Islands, Iceland, and Norway — participating. Utilising both aerial and ship-based surveys, including the innovative use of vessels already engaged in other activities, NASS 2024 aimed to provide critical data on trends and changes in cetacean populations over nearly four decades. The maps below illustrate sightings of the NASS four target species in OSPAR Region I: fin whales, humpback whales, minke whales, and pilot whales. Additionally, a sightings map is provided for the OSPAR-listed harbour porpoise.

Fin whales

Fin whales (*Balaenoptera physalus*) (IUCN VU) are the second-largest living animal and play a key role as major consumers in marine ecosystems, influencing food web dynamics and nutrient cycling. Fin whales in OSPAR Region I have a wide summer distribution (**Figure 39**), with the highest densities found between East Greenland, Iceland, Jan Mayen, and Svalbard (NAMMCO, 2022a; Lydersen et al., 2020). They exhibit migratory behaviour, generally moving to lower-latitude waters in winter for breeding and returning north in summer to feed, although recent studies suggest some individuals may remain at high latitudes year-round (Simon et al., 2010; Lydersen et al., 2020). Despite most migrating, their migratory routes and precise wintering grounds remain poorly defined, with evidence of both extensive movements and some residency within the region (NAMMCO, 2022a).

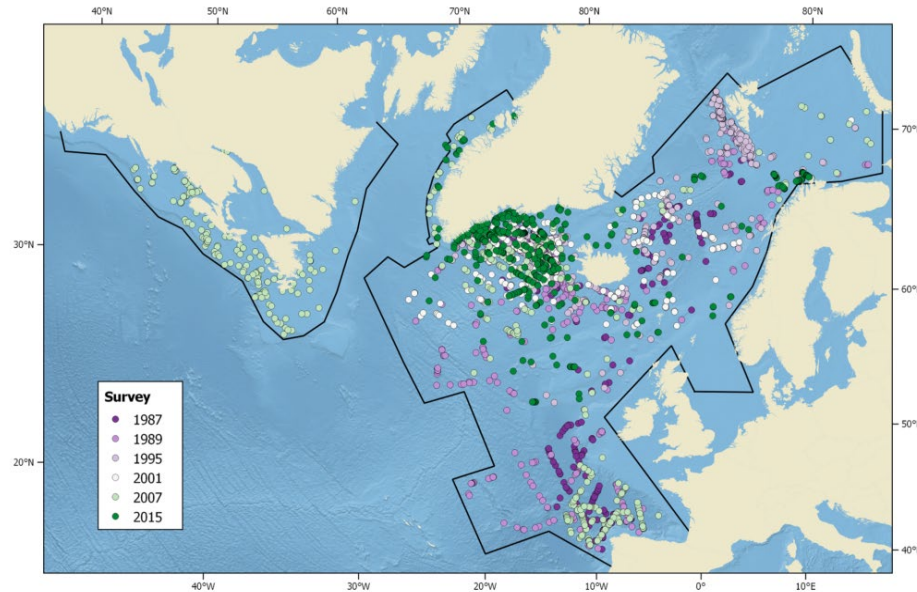


Figure 39. Summer distribution of fin whales in the North Atlantic, showing sightings and effort from all North Atlantic Sightings surveys, 1987 - 2015, as well as 2007 CODA and SNESSA surveys. The black line illustrates the survey boundary. Data source: NAMMCO⁵²

Humpback whales

The humpback whale (*Megaptera novaeangliae*) (IUCN LC) is a highly migratory baleen whale renowned for complex social and feeding behaviours; as major predators of small fish and zooplankton, they play an important ecological role in marine ecosystems. Humpback whales are known to seasonally occupy low- or high-Arctic waters, primarily in the summer to feed (Laidre and Regehr, 2017). In OSPAR region I, humpback whales are widely distributed during summer, concentrating along productive feeding grounds off northern Norway, Bear Island, Jan Mayen, East and West Greenland, and Iceland (NAMMCO 2022b) (**Figure 40**).

The North Atlantic Humpback Whale Migratory Corridor Important Marine Mammal Area (IMMA) designated by IUCN in 2024 represents the central migratory corridor of humpback whales during their annual seasonal migrations between feeding grounds in the northern Atlantic and breeding grounds in the Caribbean. The northern branch of the IMMA extends northeast toward Iceland and the Norwegian and Barents Seas and crosses OSPAR Region I ABNJ (**Figure 41**).

⁵² <https://nammco.no/fin-whale/>

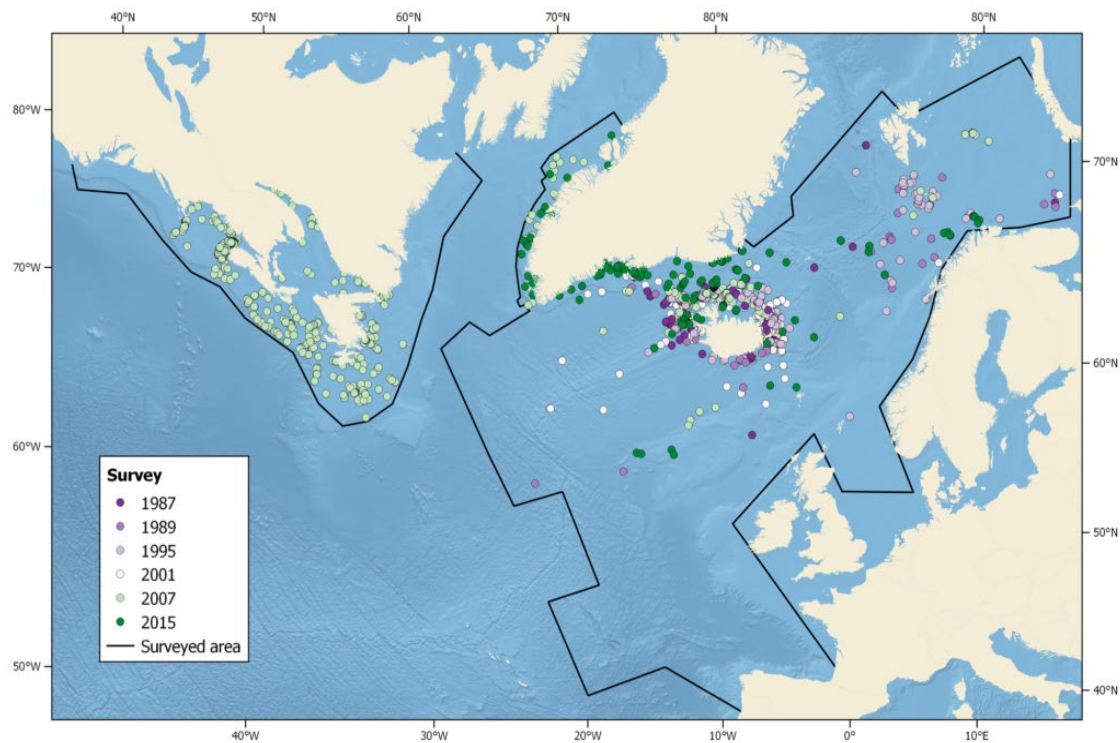


Figure 40. Summer sightings of humpback whales during all NASS from 1987-2015. The black line illustrates the survey boundary. Data source: NAMMCO⁵³

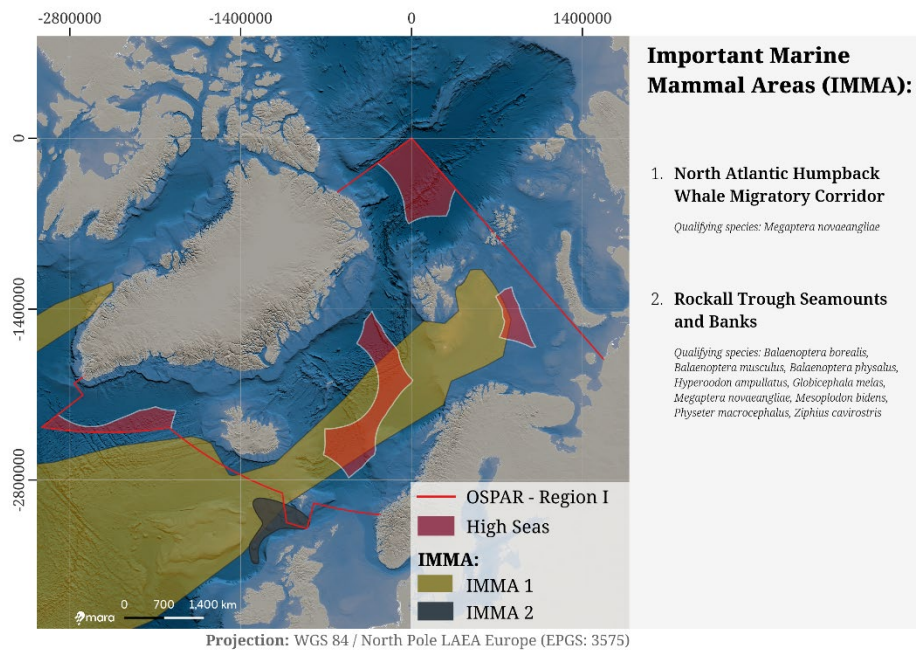


Figure 41. Intersection of the North Atlantic Humpback Whale Migratory Corridor Important Marine Mammal Area (IMMA) and the four candidate sites in OSPAR Region I.

⁵³ <https://nammco.no/humpback-whale/>

In the study by Hamilton et al. (2022), 10 humpback whales were tagged in the Barents Sea and were observed in the area in summer/autumn. **Figure 42** shows hotspots around the Svalbard archipelago.

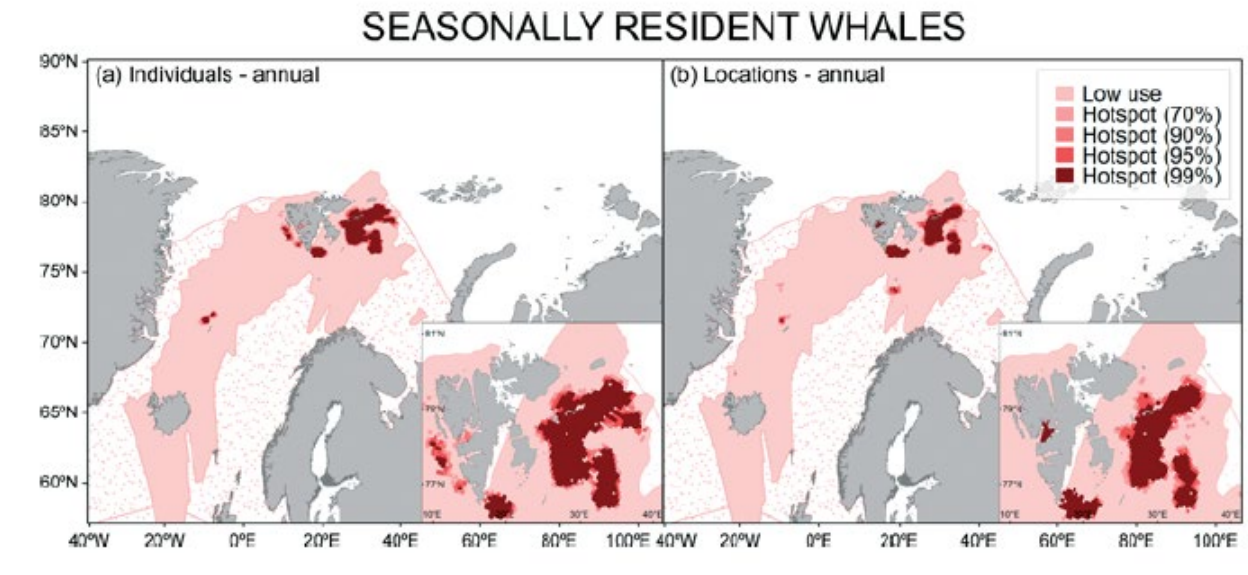


Figure 42. Seasonally resident whales, tagged in the Barents Sea: (a) individual hotspots and (b) location hotspots for blue, fin and humpback whales (total n = 26 seasonally resident whales) tagged around Svalbard. From Hamilton et al. (2022).

Minke whales

The common minke whale (*Balaenoptera acutorostrata*) (IUCN LC) is the smallest and most numerous of the rorquals, playing a crucial role as a versatile predator within marine food webs across the North Atlantic. In OSPAR Region I, minke whales are widely distributed during the summer months, with major concentrations found in the Barents, Norwegian, and North Sea, as well as the coastal waters of Iceland, Greenland (both east and west coasts), and to a lesser extent, farther north into Arctic regions (NAMMCO, 2022c; Haug et al., 2024) (**Figure 43**). Recent research indicates that minke whales in this region are shifting their ranges northwards in response to climate-driven changes in prey availability, such as capelin and krill, leading to expansion into previously uncommon areas and reflecting broader patterns of Arctic ecosystem 'borealisation' (Haug et al., 2024; Sun et al., 2022). Minke whale populations in the North Atlantic are currently considered healthy, with a total abundance exceeding 220,000 individuals and classified as Least Concern by the IUCN.

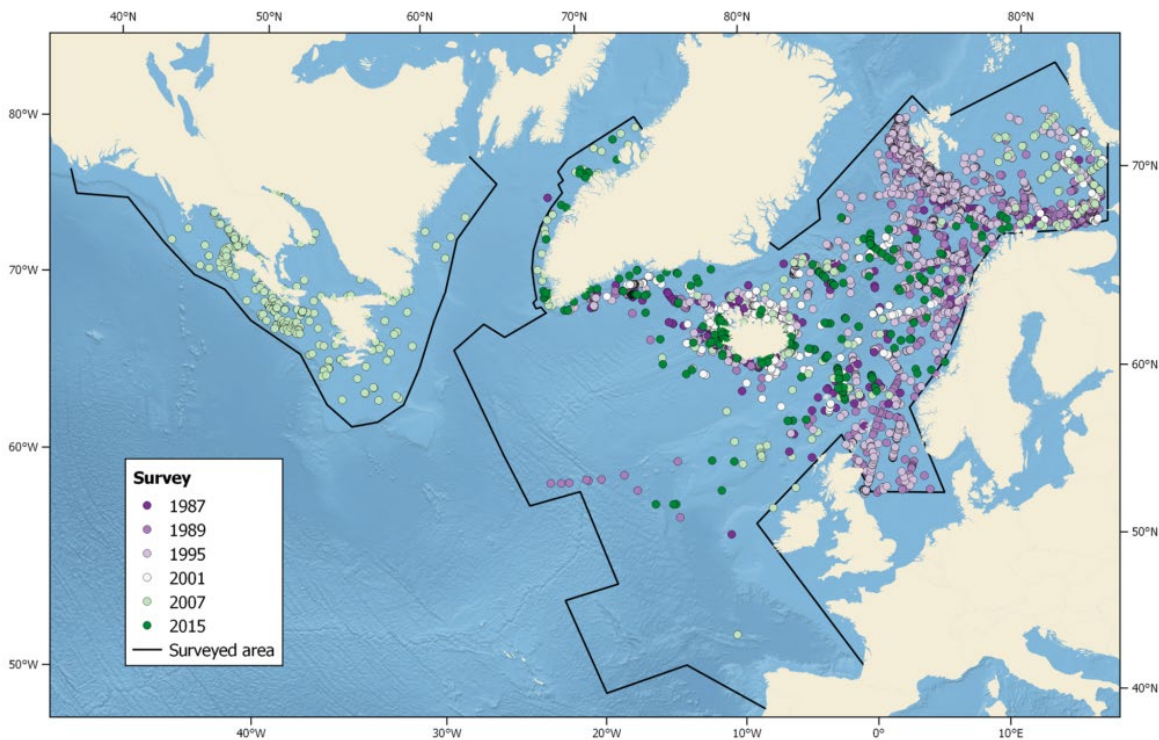


Figure 43. Summer distribution (June-August) of common minke whales in the North Atlantic, showing sightings from dedicated cetacean surveys in the North Atlantic over the period 1987-2015. Included are the 2007 CODA and SNESSA surveys. The black line illustrates the survey boundary. Data source: NAMMCO⁵⁴.

Long-finned pilot whale

The long-finned pilot whale (*Globicephala melas*) (IUCN LC) is a large social cetacean commonly found in the North Atlantic, recognised for its strong associations with continental shelf waters and deep coastal zones. In OSPAR Region I, pilot whales are largely absent from the High Seas and are instead mainly distributed over the continental slope and coastal regions of the Faroe Islands, Iceland, and Norway, reflecting their preference for areas with steep underwater topography and productive shelf edges (Buckland et al., 1993; NAMMCO, 2022d) (**Figure 44**). This distribution pattern is likely linked to the availability of their primary prey — squid and schooling fish — which are abundant over the shelf break and upper slope, rather than in pelagic high-seas environments. Consequently, pilot whales are more commonly encountered near coasts and shelf edges, leaving the High Seas portion of OSPAR Region I largely unoccupied by this species (NAMMCO, 2022d).

⁵⁴ <https://nammco.no/common-minke-whale/>

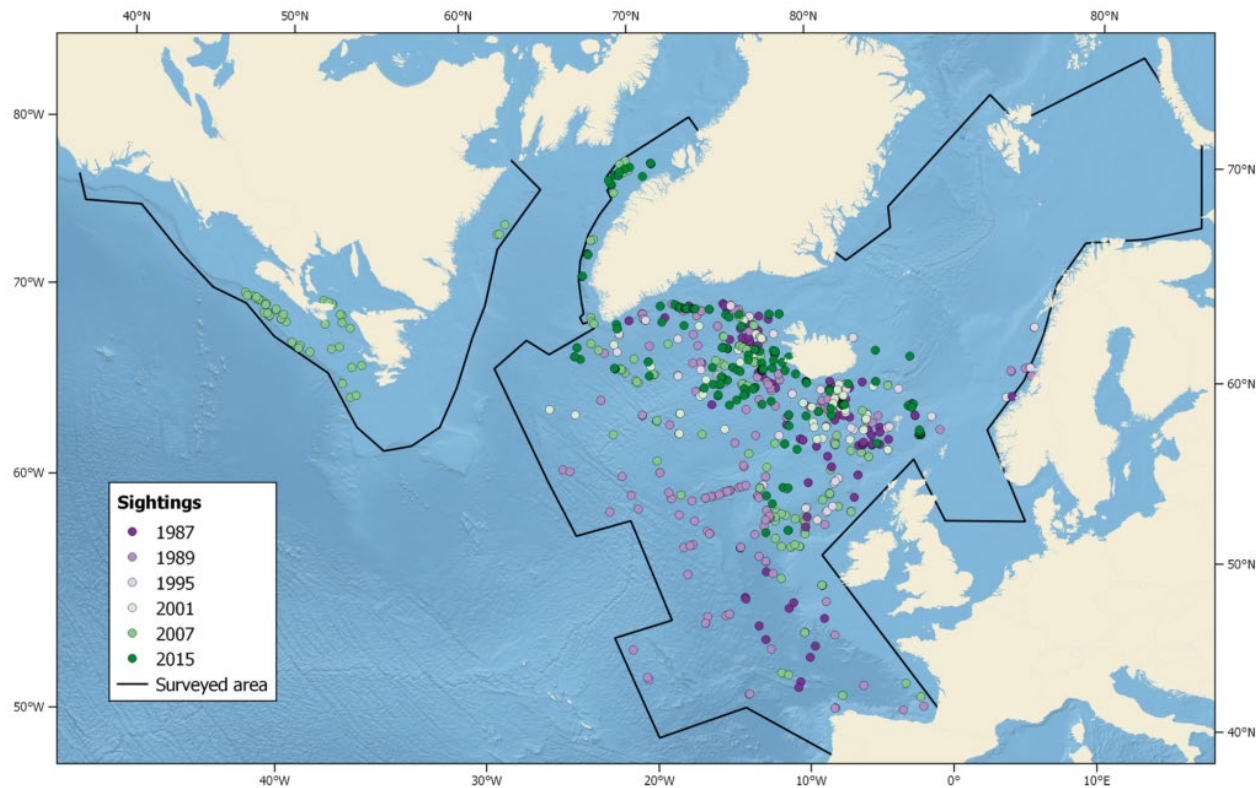


Figure 44. Summer distribution of long-finned pilot whales in the North Atlantic, showing sightings from all North Atlantic Sightings Surveys, 1987 - 2015, as well as 2007 CODA and SNESSA surveys. The black line illustrates the survey boundary. Data source: NAMMCO⁵⁵

Harbour porpoise

The harbour porpoise (*Phocoena phocoena*) (IUCN LC) is one of the most widely distributed cetaceans in northern Europe, occurring predominantly in coastal and continental shelf waters mainly at depths of 20–200 m, with a range spanning from Senegal in the south to Novaya Zemlya and the Barents Sea in the north, and including areas around Greenland, Iceland, the Faroe Islands, the UK, Ireland, and the North Sea. They may also sometimes travel over deeper offshore waters. Despite its wide range, the harbour porpoise is listed as a threatened and declining species by OSPAR due to significant and ongoing threats, most notably high levels of bycatch in static fishing gear, environmental pollution, and increasing underwater noise, all of which contribute to population declines in some areas. In OSPAR Region I, harbour porpoises are mostly found in seasonally ice-free coastal zones and continental shelves — particularly around Iceland, northern Norway, and western Greenland — with decreasing abundance towards higher latitudes and a general absence from deep offshore Arctic basins (Lockyer, 2003; NAMMCO, 2021; OSPAR, 2009) (**Figure 45**).

⁵⁵ <https://nammco.no/long-finned-pilot-whale/>

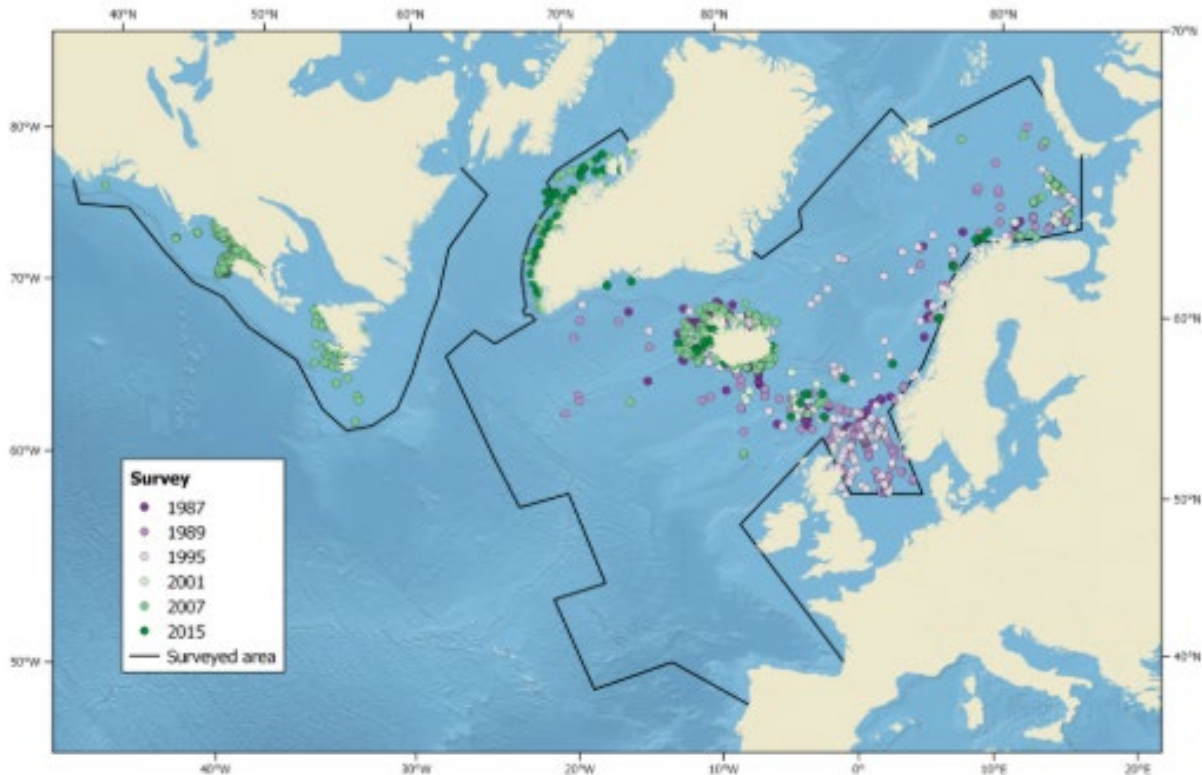


Figure 45. Sightings of the harbour porpoise during all NASS surveys. The black line illustrates the survey boundary. Source: NAMMCO⁵⁶.

Another mapping project, which contains species information relevant for Region I, is the Blue Corridors initiative⁵⁷. The Blue Corridors initiative is an international collaborative project focused on mapping cetacean migration routes and identifying critical habitats and threats along these pathways. Using over 30 years of satellite tracking data from 1,400+ tagged animals and contributions from more than 50 partners — including universities, research institutes, NGOs, and government agencies (including WWF, Oregon State University, University of St Andrews, UC Santa Cruz, University of Southampton, the Greenland Institute of Natural Resources, and several others worldwide) — the project compiles and visualises movement patterns for multiple whale species in an interactive online map. The online mapping tool shows bowhead whales, fin whales, humpback whales, sperm whales, and north Atlantic right whales migrating through the High Seas of Region I.

The recent study by Segueira et al. (2025) assembled global tracking data from over 15,000 individuals across 121 marine megafauna species to identify core migratory corridors and residence areas. Results show that the planned conservation target of protecting 30% of the ocean will be insufficient to safeguard most important areas used by these species, as almost 60% of key habitats remain unprotected and highly exposed to threats such as fishing, shipping,

⁵⁶ <https://nammco.no/harbour-porpoise/>

⁵⁷ <https://bluecorridors.org/explore/species>

plastic pollution, and climate change (Segueira et al., 2025). Notably the study lacks records from the ABNJ of OSPAR Region I.

The Arctic Marine Shipping Assessment carried out by the Arctic Council in 2013 (AMAP/CAFF/SDWG, 2013) identified a number of sites with important ecological functions related to marine mammals in the areas of the Greenland Sea, Norwegian Sea, Barents Sea, and Iceland Sea within OSPAR Region I, including foraging areas, important habitats, moulting areas, wintering sites, haul-out sites and whelping areas (**Table 5**).

Table 5. Areas of heightened ecological significance and their ecological functions for marine mammals according to Arctic Marine Shipping Assessment (AMSA) IIc (AMAP/CAFF/SDWG, 2013).

Area	Ecological function
Greenland Sea LME	
Northeast Water polynya area and Peary Land	• Important walrus and polar bear habitat
Scoresby Sund fjord and adjacent fjord areas on Blosseville Coast	• Narwhal of the Northeast Atlantic stock (or stocks) have summering areas. • Foraging area for the Critically Endangered Spitsbergen stock of bowhead whale.
Sirius Water/ Young Sound Polynya	• Feeding grounds for walrus, polar bears and bowhead whale
Sea ice in the western Greenland Sea	• Whelping area for harp and hooded seals from the 'West Ice' populations and polar bear habitat
Southeastern Greenland and Denmark Strait	• Narwhal summering area • Walrus wintering area • Hooded seal moulting area
Norwegian Sea LME	
Norwegian coast and shelf – Møre-Helgeland	• Seal colonies
Barents Sea LME	
Pechora Sea	• Beluga wintering area • Ringed seal breeding area • Walrus wintering area • Walrus feeding and haul-out
Svalbard Archipelago	• Potential wintering area narwhal and bowhead • Harbor seal habitat year-round • Walrus feeding and haul-out • Ringed seal breeding area • Feeding area for bowhead, blue whale, minke whale
Franz Josef Land	• Wintering area bowhead and walrus • Walrus feeding and haul-out
Western and central Barents Sea	• Feeding area - polar bear and harp seal
Northern Barents Sea - marginal ice zone	• Polar bear feeding area
Iceland Shelf and Sea LME	

Area	Ecological function
Offshore waters	• Summer feeding, Northern right whale • Feeding area, hooded seal
Central Arctic Ocean LME	
Pack ice	• Summer feeding area for polar bears from several subpopulations

Arctic endemic sea-ice-associated marine mammal species

Below, the report next provides brief ecological summaries for the high-Arctic species that are not currently listed by OSPAR in Region I:

Bowhead whales

Bowhead whales (*Balaena mysticetus*) (IUCN LC) are true Arctic specialists, exceptionally adapted to life in the high-latitude, ice-covered waters (Skjoldal et al., 2022). Four populations are recognised, with the East Greenland/Svalbard/Barents Sea stock (also known as the Spitsbergen stock) present in the northeast Atlantic Arctic, including OSPAR Region I (Skjoldal et al., 2022; Hamilton et al., 2022). This population was heavily exploited historically and is currently listed as Endangered, with recent estimates suggesting a recovering population but still consisting of only a few hundred individuals (Cooke and Reeves, 2018).

Bowhead whales are known for their ability to navigate dense sea ice, relying on large, robust skulls to break through thick floes in order to breathe. They are unique among baleen whales in being year-round Arctic residents, rarely if ever leaving the region. Their diet consists primarily of Arctic zooplankton, especially copepods and krill, which are seasonally concentrated by oceanographic processes along the marginal ice zone (Skjoldal et al., 2022).

Recent satellite tracking has provided new insights into the movement ecology and habitat use of this species. Twenty-two bowhead whales tagged in the marginal ice zone of the Fram Strait and northeast Greenland were located mainly in the northern Barents and Greenland Seas, closely associated with the dynamic marginal ice zone (Hamilton et al., 2022). Individual and location hotspots were identified in Northeast Greenland and around Franz Josef Land, with larger summer and autumn hotspots compared to winter and spring (Hamilton et al., 2022) (**Figure 46**). Hotspots detected in null model analyses show significant overlap with observed bowhead hotspots, highlighting the importance of this region as core habitat for the species. Movements observed for the East Greenland/Svalbard/Barents Sea stock often align with seasonal shifts in sea ice, with some individuals ranging widely between the Greenland and Barents Seas, including extensive use of the Northeast Water Polynya area and the waters around Franz Josef Land (Hamilton et al., 2022).

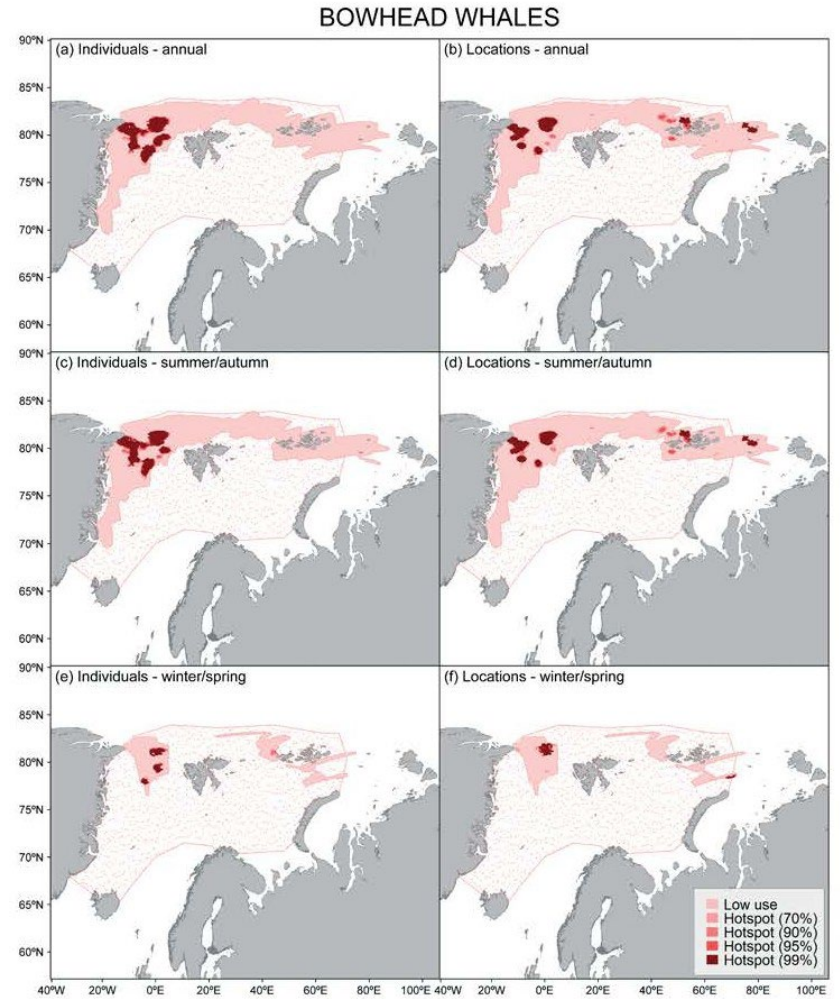


Figure 46. Bowhead whale movement in Region I. (a,c,e) individual hotspots and (b,d,f) location hotspots for 22 bowhead whales tagged in the marginal ice zone in the Fram Strait and off northeast Greenland over (a,b) the entire year, (c,d) during the summer/autumn and (e,f) during the winter/spring. Source: Hamilton et al., 2022.

Narwhals

Narwhals (*Monodon monoceros*) (IUCN LC) are considered as one of the most climate change-sensitive Arctic endemic marine mammals due to their limited prey selection, strict migratory patterns and high site fidelity. These cetaceans have a vast range that spans from the Canadian Arctic Archipelago to East Greenland, Svalbard, and the western sectors of the Russian Arctic. Sea ice provides concentrated zones of prey, such as fish, squid, and shrimp, which are essential for their diet, by corralling these species at ice edges or beneath the ice itself. This makes foraging more efficient for narwhals (Laidre et al., 2008). Research by Chambault et al. (2020) highlights that environmental changes, particularly warming seas, are likely influencing their population dynamics, including reducing their numbers in affected areas.

Narwhals exhibit a high degree of site-fidelity and are closely associated with specific migratory corridors during their biannual migrations between summer and winter habitats.

Narwhals migrate over 3,000 km each year, moving from high Arctic summer feeding grounds to regions with persistent open water, such as polynyas, for overwintering. These movements correlate closely with the seasonal cycles of Arctic waters and the seasonal distribution of sea ice (Dietz et al., 2001). Narwhals are likely the most ice-adapted whale, capable of using areas with > 90% ice cover for 6 months of the year (Laidre and Regehr, 2017).

There were 39 narwhals tagged by Hamilton et al. (2022) in Northeast Greenland that utilised the northern part of OSPAR Region I including areas that overlapped ABNJ for movement, but the individual and location hotspots occurred close to the shoreline within Scoresby Sound (summer hotspots) and at the edge of the continental shelf outside of the fjord (winter hotspots) (**Figure 47**).

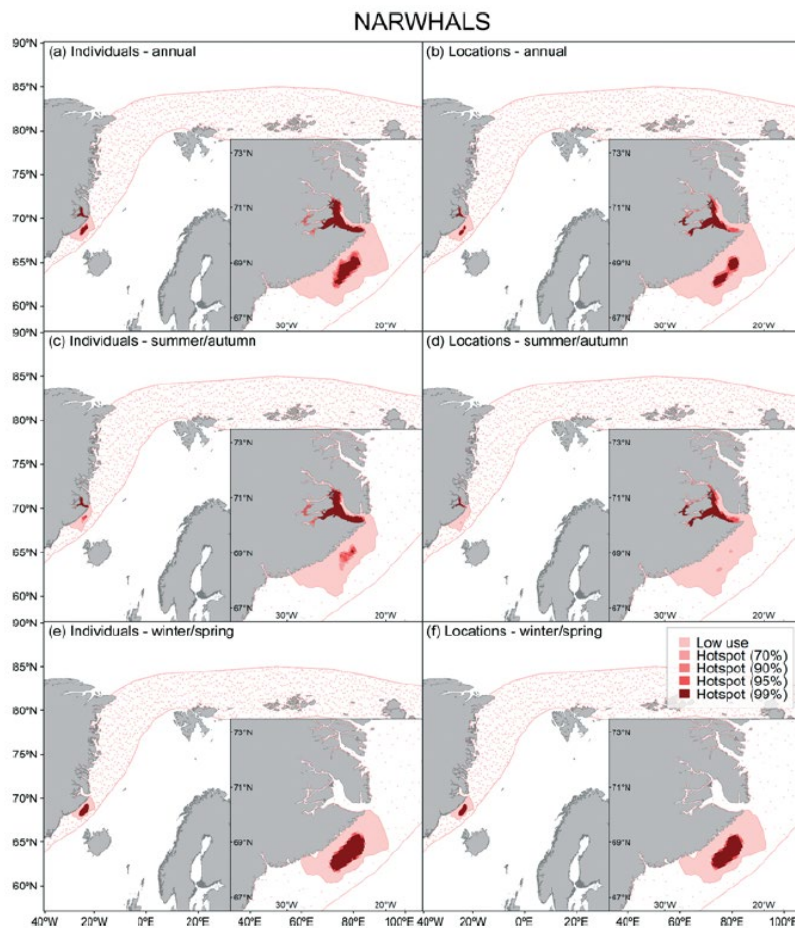


Figure 47. Narwhal movement in Region I. (a,c,e) individual hotspots and (b,d,f) location hotspots for 39 narwhals tagged in Northeast Greenland over (a,b) the entire year, (c,d) during the summer/autumn and (e,f) during the winter/spring. Inset maps show hotspots in Northeast Greenland. Source: Hamilton et al., 2022.

Beluga whales

Beluga whales (*Delphinapterus leucas*) (IUCN LC), characterised by their distinctive white colouration and high-pitched calls, are widely distributed across Arctic and sub-Arctic regions, including in OSPAR Region I. These cetaceans thrive in estuaries, continental shelf and slope

waters, and deep ocean basins in conditions of open water, loose ice and heavy pack ice. Belugas feed on pelagic and benthic fish, squid and amphipods (Laidre and Regehr, 2017).

While some belugas engage in extensive annual migrations between their summer and winter habitats, others remain in the same locality throughout the year, venturing into deeper waters only when the formation of fast ice blocks their access to coastal areas (Laidre and Regehr, 2017). Beluga movements are closely aligned with the ice edge, which not only provides essential breathing spaces but also rich feeding opportunities and migration pathways.

Little is known about the population size of belugas in the Russian High Arctic, but it is believed that most belugas in this region winter in the Barents Sea (Boltunov and Belikov, 2002).

Eighteen belugas tagged by Hamilton et al. (2022) in Svalbard utilized a wide area for movement, travelling east to Franz Josef Land and Kara Sea, and south to Norwegian coast. Individual and location hotspots were identified in both south-eastern and south-western Svalbard (**Figure 48**).

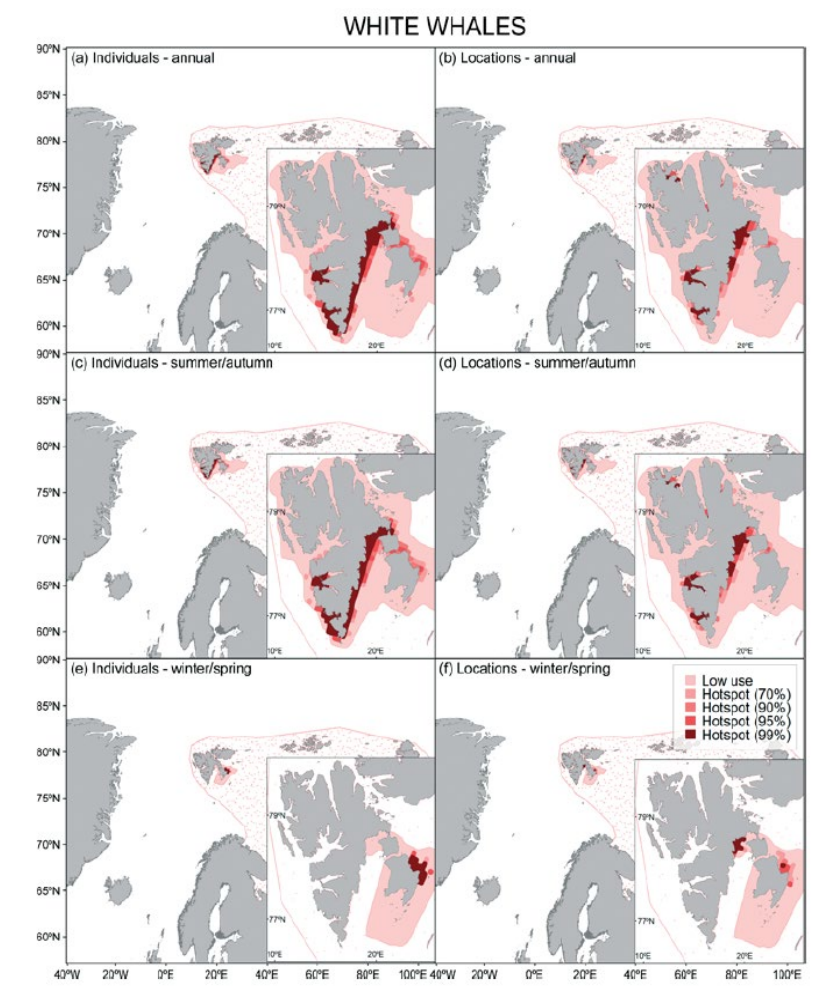


Figure 48. Beluga movement in Region I. (a,c,e) individual hotspots and (b,d,f) location hotspots for 18 white whales tagged in Svalbard over (a,b) the entire year, (c,d) during the summer/autumn and (e,f) during the winter/spring. Inset maps show hotspots around the Svalbard Archipelago. Source: Hamilton et al., 2022.

Polar bears

Polar bears are listed as Vulnerable (VU) by IUCN (Wiig et al., 2015). Polar bears exhibit a circumpolar distribution confined by the southern margins of the sea ice. There are an estimated 26,000 polar bears globally, divided into 20 sub-populations⁵⁸ that demonstrate considerable genetic connectivity and broad geographical overlap (Schliebe et al., 2008). Within the Eurasian High Arctic, three sub-populations are identified: those in the Arctic Basin, East Greenland, and the Barents Sea. As of the 2024 IUCN/SSC Polar Bear Specialist Group assessment, both the Arctic Basin and East Greenland subpopulations remain Data Deficient, with no reliable estimates of abundance available due to logistical and ecological challenges, although an aerial survey of northern and central East Greenland was conducted in spring 2023 and results are forthcoming (IUCN/SSC, 2024). In the Barents Sea specifically, an estimated 2,650 polar bears reside, reaching the highest densities of two bears per 100 km² on the fast ice in the eastern region (Aars et al., 2009), with recent studies suggesting the abundance has been stable or possibly increased over the past generation (IUCN/SSC, 2024). Polar bears depend on sea ice as a platform for hunting, seasonal movements, mating and sometimes maternal denning (Laidre and Regehr, 2017). Several sub-populations also utilise the marginal zones of the central Arctic Ocean's pack ice as their summer feeding grounds (AMAP/CAFF/SDWG, 2013). Loss of Arctic sea ice habitats due to climate change is the most serious threat to polar bears throughout their circumpolar distribution (Obbard et al., 2010).

In the Hamilton et al. (2022) study, polar bears were tagged in the Greenland Sea, northern Barents Sea and Arctic Ocean (n=235). Hotspots (both individual and location) were recorded in coastal and offshore areas of Northeast Greenland and around the Svalbard Archipelago (**Figure 49**).

⁵⁸ <https://www.iucn-pbsg.org/#home-statistics>

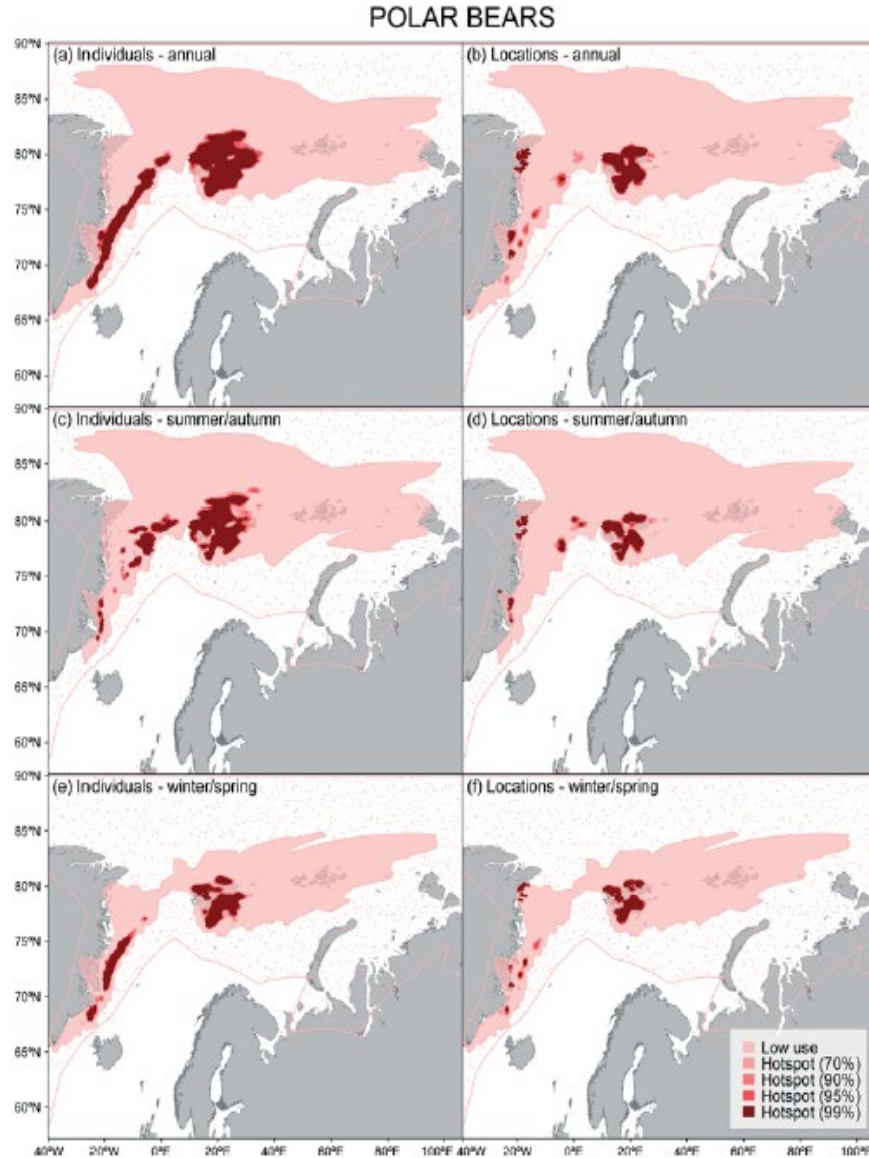


Figure 49. Polar bear movement in Region I: (a,c,e) individual hotspots and (b,d,f) location hotspots for 235 polar bears tagged around Svalbard and Northeast Greenland over (a,b) the entire year, (c,d) during the summer/autumn and (e,f) during the winter/spring. Source: Hamilton et al., 2022.

Marine reptiles

The Leatherback turtle (*Dermochelys coriacea*) is listed by OSPAR as under threat and/or in decline in Regions I, II, III, IV, and V (OSPAR Agreement 2008-6). The Leatherback turtle frequents the Atlantic Ocean, especially the Northeast Atlantic, which provides abundant forage for mature individuals (Doyle et al., 2008). Although global population estimates for the species are not available, severe declines observed in the Pacific have raised significant concerns about the Atlantic populations, which might represent a last stronghold for leatherbacks (Crowder, 2000; Lewison et al., 2004). These turtles display remarkable navigational abilities, with a northerly distribution limit that has shifted over 300 km northwards alongside the 15°C isotherm over 17 years (McMahon and Hays, 2006) and exhibit a variety of foraging and diving behaviours adapted to local sea surface temperatures and prey availability (Okuyama et al., 2021). Facing threats from oil spills, entanglement in fishing gear, and plastic ingestion, leatherbacks are at risk, yet their widespread movements and reliance on specific oceanographic features highlight their complex ecological requirements and the ongoing challenges for their conservation (Wakefield, 2018; Frasier et al., 2020).

Key habitat modelling

The report ‘Key habitats – modelling critical habitats for Atlantic salmon, sharks, rays, and cetacean species listed as threatened in the North-East Atlantic under OSPAR’ (Mercker, 2025) provides an empirical, model-based analysis of critical habitats for 11 threatened or declining marine species within the OSPAR Maritime Area, using an extensive collection of occurrence, survey, and environmental data from a wide range of sources. Applying both regression-based and presence-only modelling approaches, the study identifies and maps hotspots of relative habitat suitability for key species, determines the degree of existing MPA coverage, and proposes supplementary locations for protection. Notably, the study reveals that for several species — especially wide-ranging and migratory taxa like the blue whale (*Balaenoptera musculus*) and bowhead whale (*Balaena mysticetus*) — major critical habitats and distribution hotspots occur in OSPAR Region I, including areas in the Greenland Sea and the Fram Strait. For bowhead whales, predicted high-suitability habitats are concentrated in the Fram Strait region between eastern Greenland and Svalbard, extending to Franz Josef Land — matching recent sighting and tagging data and identifying the Fram Strait as a key area of conservation interest (**Figure 50**).

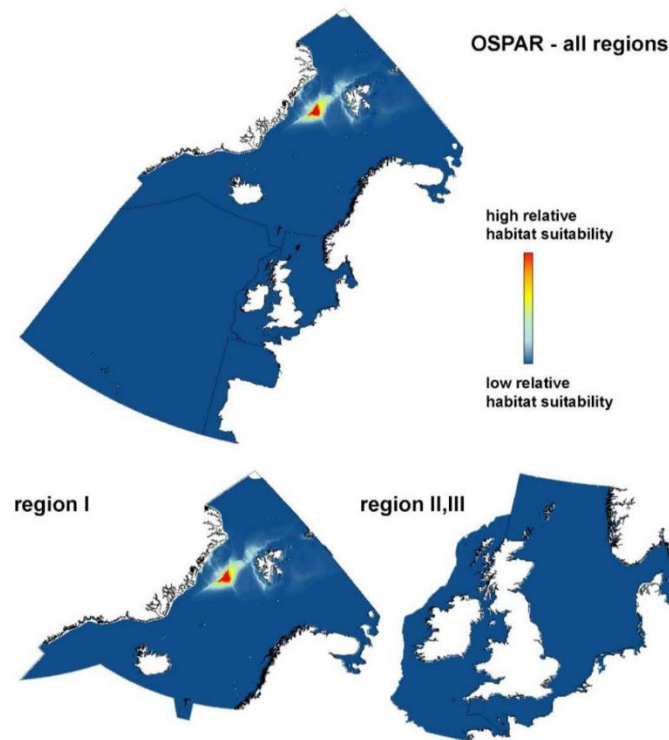


Figure 50. MaxEnt-based predicted relative habitat suitability (heatmap colour scale) for bowhead whales (*Balaena mysticetus*) for all sexes and ages in the OSPAR region and different subregions. From: Mercker, 2025.

With regard to the ABNJ of OSPAR Region I, the modelled distributions for several whale, shark, and ray species highlight multiple offshore hotspots lying beyond national jurisdiction. In particular, the report emphasises the Fram Strait as under-protected yet critical habitats for the bowhead whale, with current MPA coverage in the region less than 5% of predicted suitable habitat. The study also suggests that the same ABNJ region, especially deep-sea continental slopes and open-ocean fronts, provides poorly protected but ecologically important habitats for deepwater sharks such as the leafscale gulper shark (*Centrophorus squamosus*) and the Portuguese dogfish (*Centroscymnus coelolepis*) (Mercker, 2025). For all these taxa, the report proposes expanding the MPA network in OSPAR Region I, including the designation of additional high-seas MPAs to meet the 30% protection target — and highlights the Fram Strait as an area of particular importance for consideration in future ABNJ management under OSPAR, especially with respect to the needs of threatened whales, sharks, and rays for which current protection is insufficient.

Potential conservation features

The OSPAR List of Threatened and/or Declining Species and Habitats identifies high-priority conservation features within the OSPAR Region, detailing specific areas where these features are under threat or declining and recommending targeted management actions. Despite OSPAR's recommendations and various conservation measures, the QSR 2023 status assessments indicate that the status remains poor for many of the features in Arctic Waters. To summarise, the following OSPAR listed species and habitats and considered to be under threat and/or in decline in OSPAR Region I - Arctic Waters (**Table 6**):

Table 6. OSPAR Threatened and/or declining species and habitats considered under threat and/or in decline in Region I - Arctic waters and their status if assessed. Blank cells mean no status assessment.

Conservation feature	Status Assessment 2022
Marine Birds	
Black-legged Kittiwake (<i>Rissa tridactyla</i>)	
Ivory gull (<i>Pagophila eburnea</i>)	
Lesser black-backed gull (<i>Larus fuscus fuscus</i>)	Poor
Steller's eider (<i>Polysticta stelleri</i>)	
Thick-billed murre (<i>Uria lomvia</i>)	
Marine Mammals	
Bowhead whale (<i>Balaena mysticetus</i>)	Poor
Blue whale (<i>Balaenoptera musculus</i>)	Poor
Northern right whale (<i>Eubalena glacialis</i>)	Poor
Marine Reptiles	
Leatherback Turtle (<i>Dermochelys coriacea</i>)	Poor
Fish	
Atlantic salmon (<i>Salmo salar</i>)	Poor
Basking shark (<i>Cetorhinus maximus</i>)	Poor
Common skate (<i>Dipturus batis</i>)	Poor
European eel (<i>Anguilla anguilla</i>)	Poor
Leafscale gulper shark (<i>Centrophorus squamosus</i>)	
Orange roughy (<i>Hoplostethus atlanticus</i>)	
Porbeagle (<i>Lamna nasus</i>)	
Portuguese dogfish (<i>Centroscymnus coelolepis</i>)	Poor
Sea lamprey (<i>Petromyzon marinus</i>)	Poor
Spurdog (<i>Squalus acanthias</i>)	Poor
Habitats	
Coral gardens	Poor
Deep-sea sponge aggregations	Poor
Intertidal mudflats	
<i>Lophelia pertusa</i> reefs	Poor

Conservation feature	Status Assessment 2022
<i>Modiolus modiolus</i> beds	
Seamounts	Poor
Zostera beds	Poor

The following species and habitats are known to occur in OSPAR Region I, but are not considered under threat and/or in decline in Region I (**Table 7**):

Table 7. OSPAR Threatened and/or declining species and habitats that occur in Region I - Arctic waters and their status if assessed.

Conservation feature	Status Assessment 2022
Marine Mammals	
Harbour porpoise (<i>Phocoena phocoena</i>)	
Invertebrates	
Dog whelk (<i>Nucella lapillus</i>)	
Flat oyster (<i>Ostrea edulis</i>)	
Ocean quahog (<i>Arctica islandica</i>)	
Fish	
Cod (<i>Gadus morhua</i>)	
Thornback ray (<i>Raja clavata</i>)	
Habitats	
Carbonate mounds	
Kelp Forest	
Maerl Beds	Unknown
Oceanic ridges with hydrothermal vents	Good
<i>Sabellaria spinulosa</i> reefs	
Sea-Pen and Burrowing Megafauna Communities	Unknown

In addition, **Table 8** lists species, habitats, and processes that, based on the findings of this study — including alignment with Focal Ecosystem Components identified in recent CBMP/CAFF assessments — can be considered as having special ecological significance in Region I (Arctic Waters), even if they are not currently listed by OSPAR as threatened or declining. It is recommended that these species, habitats and processes are considered as potential conservation features in future prioritisation exercises.

Table 8. Other species, habitats and processes of special concern in OSPAR Region I - Arctic Waters.

Conservation feature
Marine Mammals
Atlantic walrus (<i>Odobenus rosmarus rosmarus</i>)

Beluga whale (<i>Delphinapterus leucas</i>)
Bearded seal (<i>Erignatus barbatus</i>)
Harp seal (<i>Pagophilus groenlandicus</i>)
Hooded seal (<i>Crystophora cristata</i>)
Humpback whale (<i>Megaptera novaeangliae</i>)
Narwhal (<i>Monodon monoceros</i>)
Polar bear (<i>Ursus maritimus</i>) [IUCN Status Vulnerable]
Ringed seal (<i>Pusa hispida hispida</i>)
Fish
Polar cod (<i>Boreogadus saida</i>)
Invertebrates
Cryopelagic communities of multi-year ice
Hydrothermal vent communities
Habitats
Abyssal plains
Arctic Mid-Ocean Ridge
Basins
Fracture zones
Marginal ice zone of the Central Arctic Ocean
Multi-year ice of the Central Arctic Ocean
Polynyas
Processes
Bentho-pelagic coupling

Management, conservation and other important areas: designations by regional and international authorities and scientifically identified areas of interest

This chapter analyses the overlap between management, conservation, and other important area designations by regional and international authorities and other scientifically identified areas of interest and ABNJ in OSPAR Region I. By systematically comparing networks and frameworks such as OSPAR MPAs, Arctic Council initiatives, CBD EBSAs, NEAFC closures, Norwegian SVOs, and IMO PSSAs, the chapter identifies where these designations intersect with ABNJ sectors. The chapter also reviews the outcomes of the pan-arctic systematic conservation planning analysis carried out by WWF ArcNet project. This approach enables the identification of key conservation features and priorities in potential conservation sites.

OSPAR MPA network

The NEAES 2030 sets a clear target under operational objective S5.O1: *'By 2030 OSPAR will further develop its network of marine protected areas (MPAs) and other effective area-based conservation measures (OECMs) to cover at least 30% of the OSPAR maritime area to ensure it is representative, ecologically coherent and effectively managed to achieve its conservation objectives.'* This aim is complementary to the objectives of Part III of the BBNJ Agreement (Article 17), including the following *'(a) Conserve and sustainably use areas requiring protection, including through the establishment of a comprehensive system of area-based management tools, with ecologically representative and well-connected networks of marine protected areas; (b) Strengthen cooperation and coordination in the use of area-based management tools, including marine protected areas, among States, relevant legal instruments and frameworks and relevant global, regional, subregional and sectoral bodies; (c) Protect, preserve, restore and maintain biological diversity and ecosystems, including with a view to enhancing their productivity and health, and strengthen resilience to stressors, including those related to climate change, ocean acidification and marine pollution'*.

The OSPAR maritime area consists of around 40% of areas beyond national jurisdiction, where OSPAR has been establishing MPAs to create an ecologically coherent and well-managed network. Since 2007, OSPAR has been actively proposing and designating MPAs in ABNJ, with a significant step made in 2010 when six MPAs were adopted at the OSPAR Ministerial Meeting, followed by two additional designations in subsequent years⁵⁹. The management of these MPAs involves various stakeholders, gathering relevant scientific information and addressing concerns, thus ensuring the protection of these MPAs within OSPAR's mandate.

While the OSPAR MPA network has expanded in recent years, the 2021 assessment determined that it cannot yet be considered ecologically coherent across the OSPAR Maritime Area. Significant gaps are particularly evident in ABNJ of OSPAR Region I (Arctic Waters). The 2023 OSPAR QSR ecological coherence assessment underscored a lack of MPA coverage in key Dinter biogeographic regions, including the North-East Greenland Shelf, North-East Water Polynya, Barents Sea: White Sea, and Norwegian coast: Finnmark (Hennicke et al., 2021). Arctic

⁵⁹ <https://www.ospar.org/work-areas/bdc/marine-protected-areas/mpas-in-areas-beyond-national-jurisdiction>

Waters (Region I) has the lowest overall MPA coverage among all OSPAR regions, at just 2.0% (107,846 km²), with most sites clustered around the Svalbard archipelago and none established in ABNJ of Region I (2023 OSPAR QSR ecological coherence assessment) (**Figure 51**).

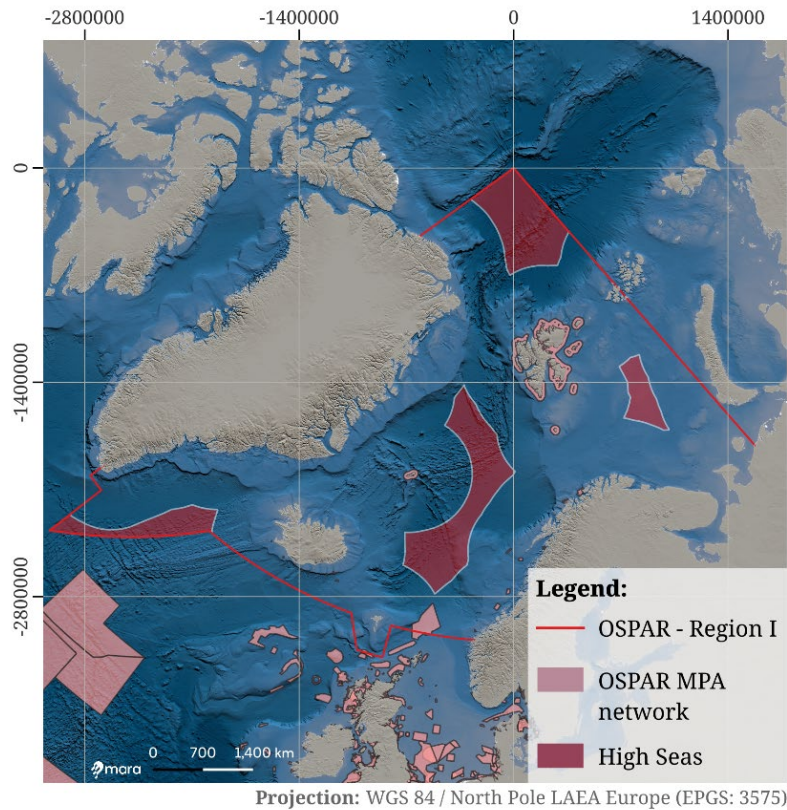


Figure 51. OSPAR MPA network and the four candidate sites boundaries in Region I.

Key gaps identified include:

- **Low Coverage:** As of 2021, only about 2% of the Arctic Waters (Region I) are designated as MPAs, one of the lowest coverage rates across all OSPAR regions. Most of this coverage is concentrated around the Svalbard archipelago, with very limited representation elsewhere in Region I.
- **Poor Distribution and Connectivity:** According to the Madrid Criteria (especially Criterion A), OSPAR MPAs in Region I are not geographically well-distributed. There are large spatial gaps in the ABNJ and a lack of connectivity between existing sites, which is considered critical for maintaining viable populations and supporting ecological processes, especially for wide-ranging or migratory species.
- **Biogeographic Representation:** Assessment against Criterion B (biogeographic representation) shows that several Dinter biogeographic provinces in the Arctic have no or very limited MPA coverage (0–5.8%), and some provinces are entirely unrepresented. This indicates that the current network in Region I is not adequately representing the full range of habitats, species, and ecological processes.

- **Feature Protection and Replication:** Assessment against Criterion C highlights that many OSPAR-listed threatened and/or declining species and habitats in the Arctic Waters are not yet sufficiently protected or replicated across multiple MPAs within the region.
- **Data and Monitoring Gaps:** Robust assessments of ecological coherence in Region I are hampered by limited site-specific ecological data, which restricts the ability to measure long-term effectiveness or to identify priority areas for network expansion.

In summary, addressing these gaps — by increasing MPA coverage (especially in the ABNJ of Region I), ensuring the inclusion and replication of key habitats and species, and improving geographic distribution and connectivity — is a critical priority for achieving the objective of an ecologically coherent OSPAR MPA network in the Arctic.

The World Database on Protected and Conserved Areas⁶⁰ also illustrates that there are no other MPAs or OECMs in ABNJ within Region and the only protected areas in Region I correspond to the coastal areas within national jurisdictions of Russia, Kingdom of Denmark and Norway (**Figure 52**).

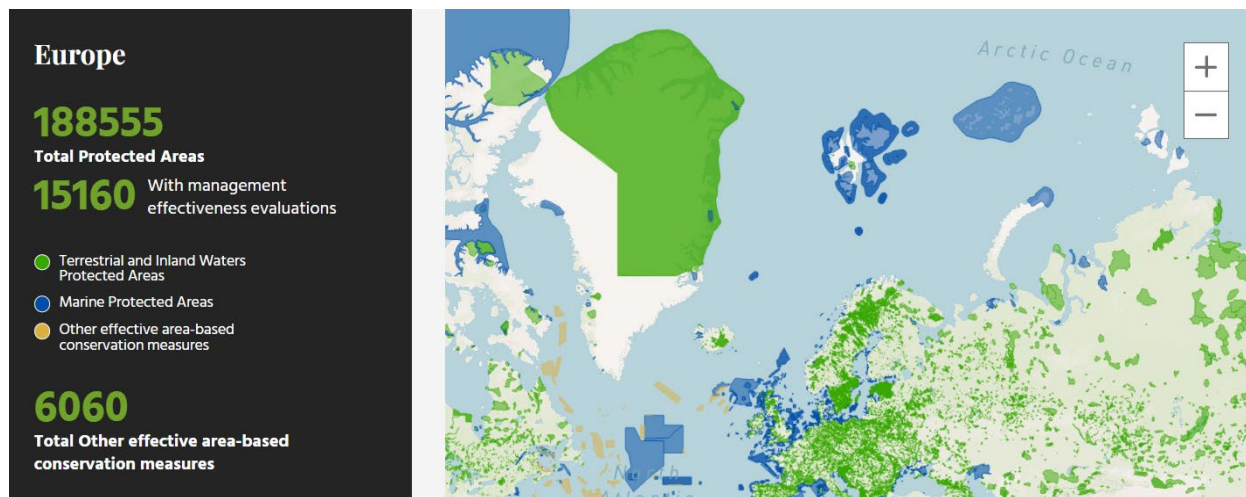


Figure 52. Protected and conserved areas in OSPAR Region I as per the World Database on Protected and Conserved Areas. Green polygons correspond to terrestrial and inland waters protected areas, and blue polygons correspond to marine protected areas. Source: WDPA⁶¹.

Arctic Council

The Arctic Council is a high-level intergovernmental forum that promotes cooperation, coordination, and interaction among the Arctic States and Indigenous Peoples on common Arctic issues, particularly on issues of sustainable development and environmental protection. Importantly, the Arctic Council does not have a legal mandate to establish MPAs in ABNJ of the Arctic.

⁶⁰ <https://www.protectedplanet.net/en/thematic-areas/wdpa?tab=WDPA>

⁶¹ <https://www.protectedplanet.net/en/thematic-areas/wdpa?tab=WDPA>

Planning tool for area-based conservation of Arctic species and ecosystems

There is currently an ongoing project between the Arctic Council's PAME and CAFF Working Groups on the Development of a planning tool for area-based conservation of Arctic species and ecosystems: A case study on sea ice-dependent species (2025-2029). This project develops an interactive metadatabase, digital atlas and spatial planning tool to identify and prioritise Arctic areas of high conservation importance for sea ice-dependent species, supporting the long-term vision to identify a climate-resilient network of area-based conservation tools, amongst which MPAs, OECMs, and Indigenous Protected and Conserved Areas (IPCAs), across the 18 defined Large Marine Ecosystems (LMEs). The project follows a cooperative, three-phase process: horizon scan and scoping, development of a data portal and atlas, and the creation of a spatial planning app that incorporates the best available scientific and Indigenous knowledge. Ultimately, the project will deliver a flexible, data-driven resource to support pan-Arctic area-based conservation planning, adaptable to include a wider range of species, features, and human activities in the future. Noting the synergies between the PAME/CAFF project and the work of the OSPAR's Arctic Task Group, it is recommended that OSPAR continues to closely collaborate with the Arctic Council, including through participation in the future project workshops and other project activities.

In addition to the spatial planning tool for sea ice-dependent species, PAME and CAFF have recently initiated a separate project in 2026 to evaluate the status and trends of Arctic protected areas, OECMs, and vulnerable and sensitive areas across both marine and terrestrial ecosystems. This new project, currently in its data collection and harmonisation phase, will encompass OSPAR Region I and aims to provide an integrated pan-Arctic overview of area-based conservation measures. Early engagement and information exchange with this PAME/CAFF project is recommended to ensure coordination, avoid duplication of effort, and help harmonise future conservation planning across relevant Arctic fora.

MPAs

The Arctic Council itself does not directly designate or manage MPAs. While the Arctic Council facilitates cooperation and provides a platform for discussion on environmental protection, the actual designation and management of MPAs are typically handled by the individual Arctic states within their respective Exclusive Economic Zones. Most Arctic states have established some MPAs, but are still in the early stages of filling gaps and connecting and managing MPAs as ecologically functional MPA networks (**Figure 53**).

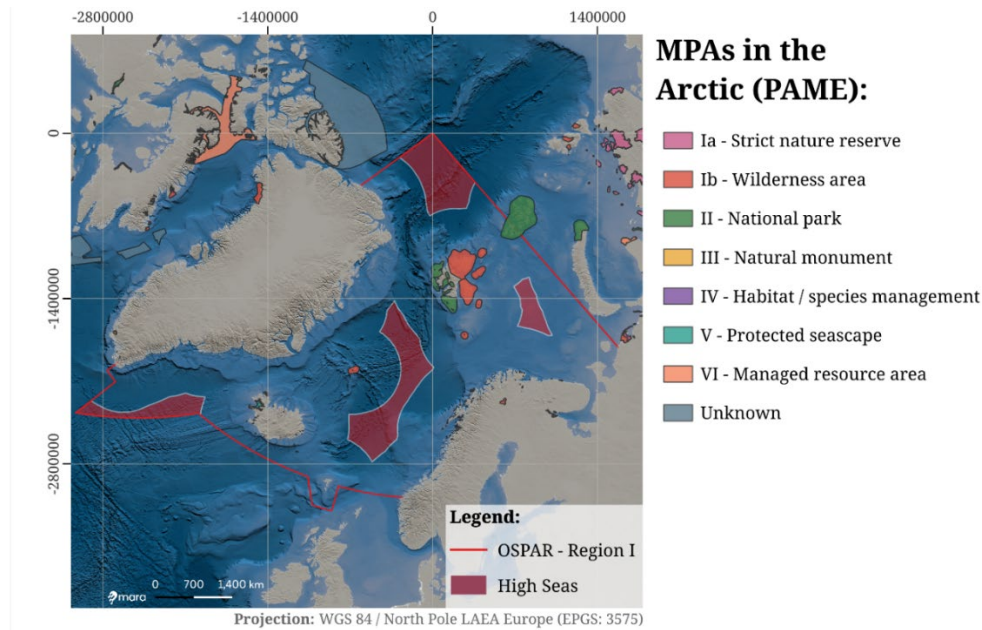


Figure 53. MPAs in the Arctic, classified by the IUCN protected area management categories (Map source: PAME, 2021).

The Arctic Council's PAME working group has developed an MPA-Network **Toolbox** to support the design and management of MPAs across the Arctic. Key features of the toolbox include frameworks for assessing ecological connectivity, strategies for integrating diverse stakeholder interests, and methodologies for applying ecosystem-based management practices. It draws on international developments and best practices to help Arctic States tailor their MPA strategies to local conditions while aligning with global conservation goals. Since its inception, the toolbox has evolved to incorporate the latest scientific research and policy developments, offering up-to-date resources for creating more cohesive and effective MPA networks across Arctic regions. The eight Arctic States involved in development of this framework for the Pan-Arctic marine conservation network follow a variety of approaches in the design and management of their conservation networks. The toolbox doesn't have specific arrangements in place for the creation of MPAs in ABNJ.

Arctic marine areas of heightened ecological and cultural significance (CAFF/PAME)

As a part of the Arctic Marine Shipping Assessment (AMSA) by the Arctic Council the AMAP and CAFF working groups undertook to identify a network of areas of heightened ecological and cultural significance (**Figure 54**) (AMAP/CAFF/SDWG, 2013).

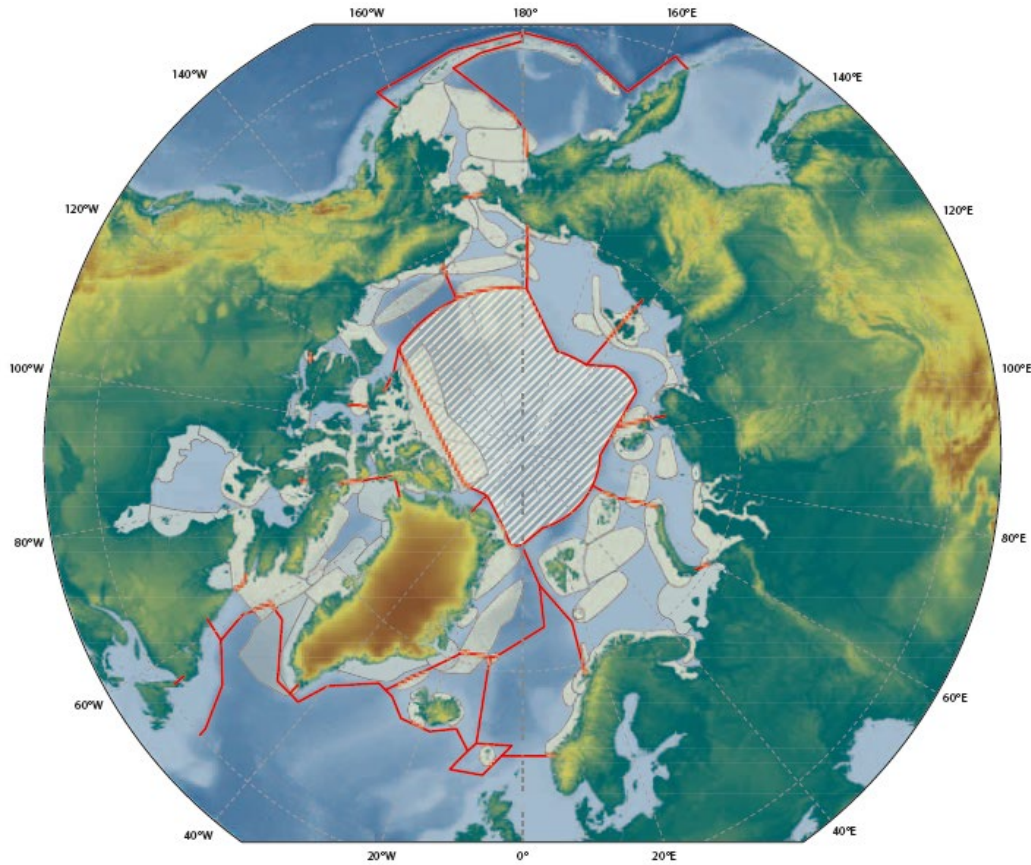


Figure 54. Arctic marine areas of heightened ecological and cultural significance (From AMAP/CAFF/SDWG, 2013).

The Arctic Marine Shipping Assessment (AMSA) 2009 Report highlighted the environmental impacts and threats posed by Arctic marine shipping, prompting AMSA Recommendation IIC. This recommendation urged Arctic States to identify and protect areas of heightened ecological and cultural significance, adapting to climate change and increased marine activity. As a result, led by Norway, Canada, Kingdom of Denmark, and the USA, and supported by AMAP, CAFF, and SDWG, a project was initiated to define such areas, with the subsequent report delineating regions across 18 Large Marine Ecosystems that are crucial for fish, birds, and mammals due to their ecological importance.

OSPAR Region I lies on the intersection of several Large Marine Ecosystems used by the report, namely - Central Arctic Ocean, Barents Sea, Greenland Sea, Norwegian Sea, Iceland Shelf and Sea, Faroe Plateau. A total of 33 sites were identified by the report as areas of heightened ecological and cultural significance in the area corresponding to OSPAR Region I - Arctic Waters. However, only 4 of them intersect with ABNJ (**Figure 55**): (1) Sea ice in the western Greenland Sea (**Figure 56**), Western and central Barents Sea, and Northern Barents Sea - marginal ice zone (**Figure 57**), and Pack ice of the Central Arctic Ocean (**Figure 58**).

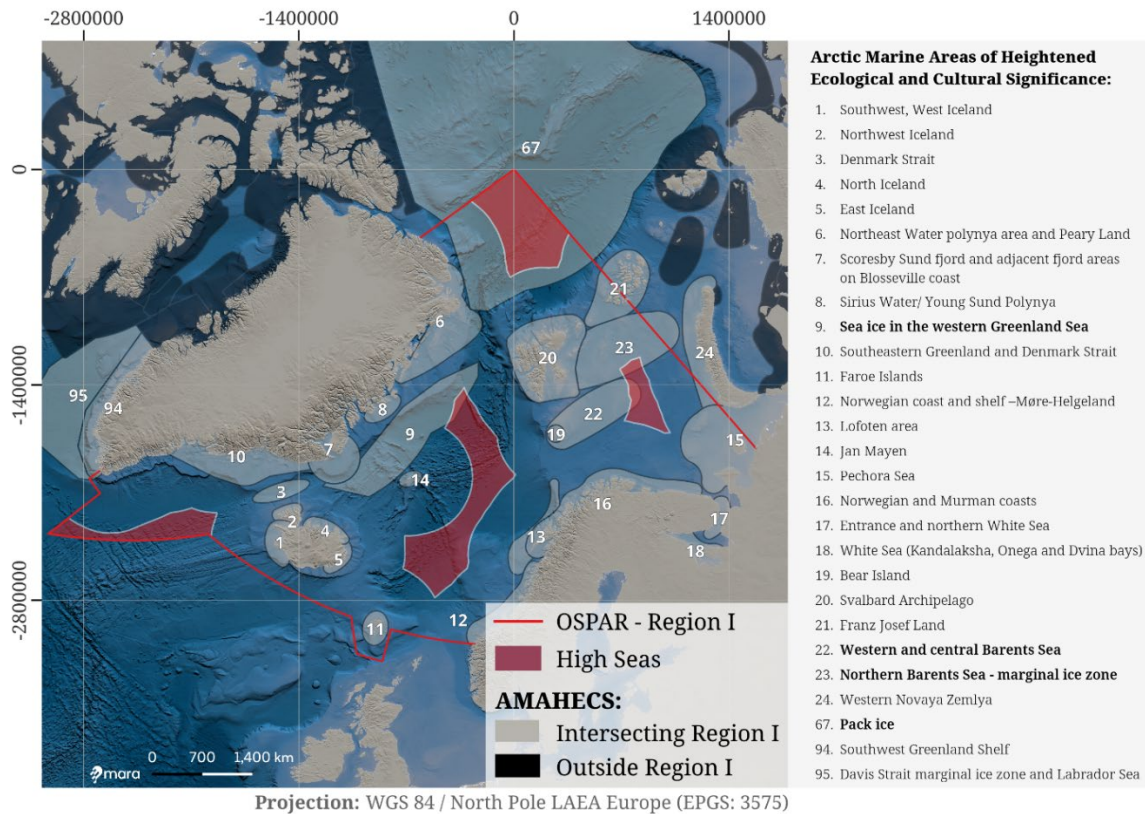


Figure 55. Arctic marine areas of heightened ecological and cultural significance and the four candidate sites boundaries in OSPAR Region I - Arctic Waters (From AMAP/CAFF/SDWG, 2013).

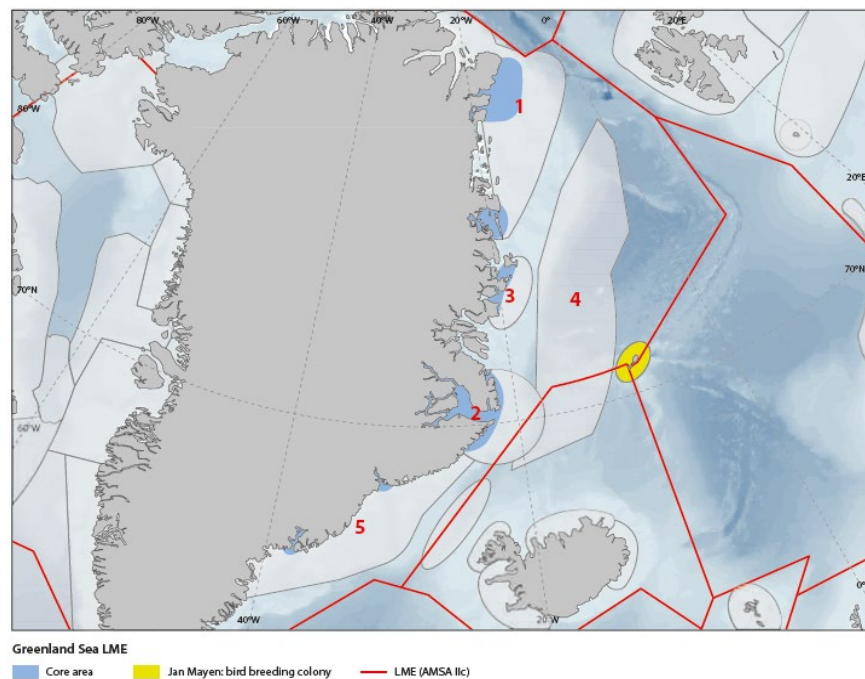


Figure 56. Arctic marine areas of heightened ecological and cultural significance in the Greenland Sea LME. Site 4 corresponds to Sea ice in the western Greenland Sea (From AMAP/CAFF/SDWG, 2013).

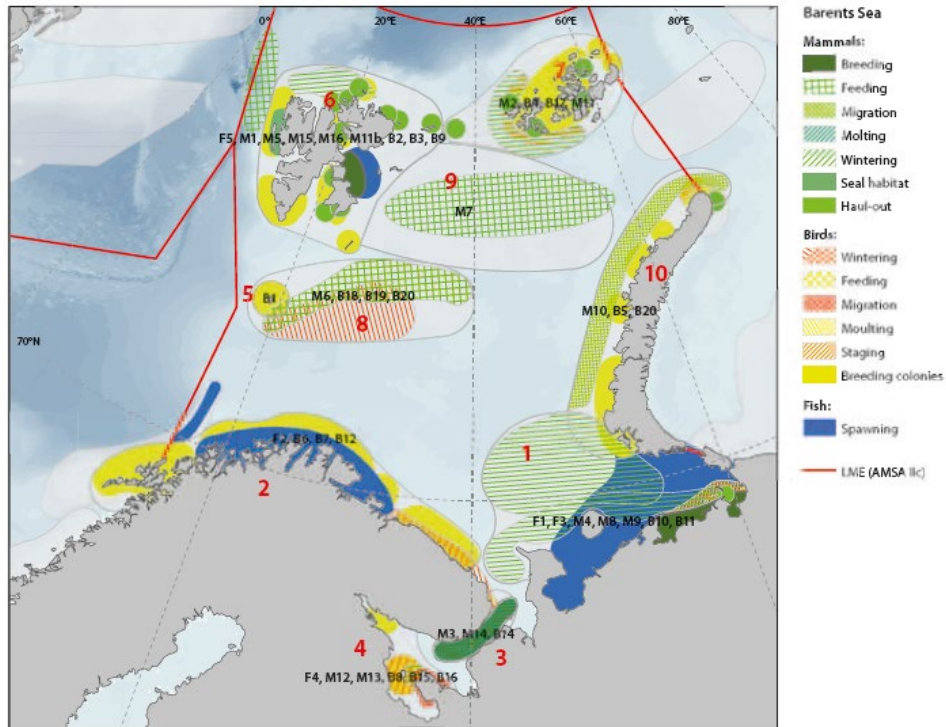


Figure 57. Arctic marine areas of heightened ecological and cultural significance in the Barents Sea LME. Site 8 corresponds to Western and central Barents Sea and Site 9 corresponds to Northern Barents Sea - marginal ice zone (From AMAP/CAFF/SDWG, 2013).

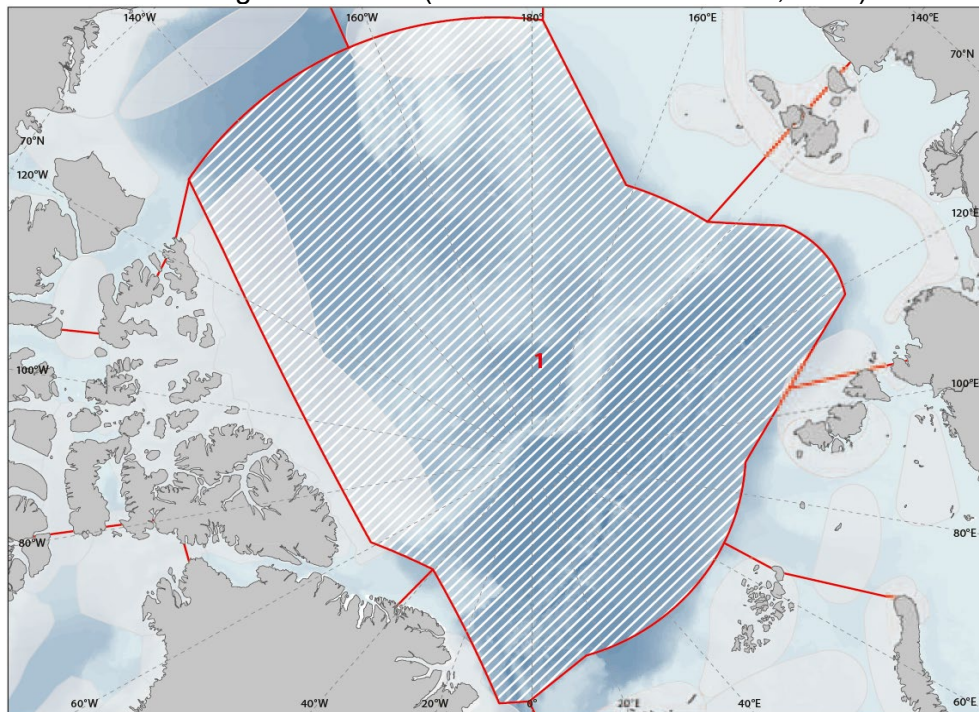


Figure 58. Arctic marine areas of heightened ecological and cultural significance in the Central Arctic Ocean LME (From AMAP/CAFF/SDWG, 2013).

Table 9 summarises ecological criteria which led to the identification of the Arctic marine areas of heightened ecological and cultural significance for each of the sites that intersect with ABNJ in OSPAR Arctic Waters.

Table 9. Ecological criteria used for the identification of the Arctic marine areas of heightened ecological and cultural significance (From AMAP/CAFF/SDWG, 2013) and relevance to the OSPAR MPA criteria.

	Greenland Sea LME	Barents Sea LME	Barents Sea LME	Central Arctic Ocean LME
Location	Sea ice in the western Greenland Sea	Western and central Barents Sea	Northern Barents Sea - marginal ice zone	Pack ice
Candidate site	3 – Arctic Mid-Ocean Ridge	2 – Barents Sea	2 – Barents Sea	1 – Arctic Basin
Ecological Criteria	• Whelping area for harp and hooded seals from the 'West Ice' populations and polar bear habitat • Seabirds migration corridor in late summer and autumn	• Feeding area - polar bear and harp seal • Feeding area for seabirds • Seabird wintering area • Moulting area and swimming migration auks	• Polar bear feeding area	• Unique environment with very low primary productivity, however the multi-year pack ice biota contains an endemic fauna component; • Summer feeding area for polar bears from several subpopulations • Summer and post-breeding feeding area for ivory and Ross's gulls
Relevance to OSPAR MPA Criteria	• Important species and habitats/biotopes • Ecological significance	• Important species and habitats/biotopes • Ecological significance	• Important species and habitats/biotopes • Ecological significance	• Threatened or declining species and habitats/biotopes • Important species and habitats/biotopes • Ecological significance • Representativity • Sensitivity

Convention on Biological Diversity (CBD) Ecologically or Biologically Significant marine Areas (EBSAs)

ABNJ in OSPAR Region I overlaps with two Ecologically or Biologically Significant marine Areas (EBSAs) described under the Convention on Biological Diversity (CBD) (**Figure 59**):

- EBSA 1 - Multi-year Ice of the Central Arctic Ocean (COP Decision 15/25). Area size: approximately 1,854,965 km² (note the area is dynamic in time and space)
- EBSA 7 - Southern Reykjanes Ridge (dec-COP-12-DEC-22). Area size: approximately 377,501 km²

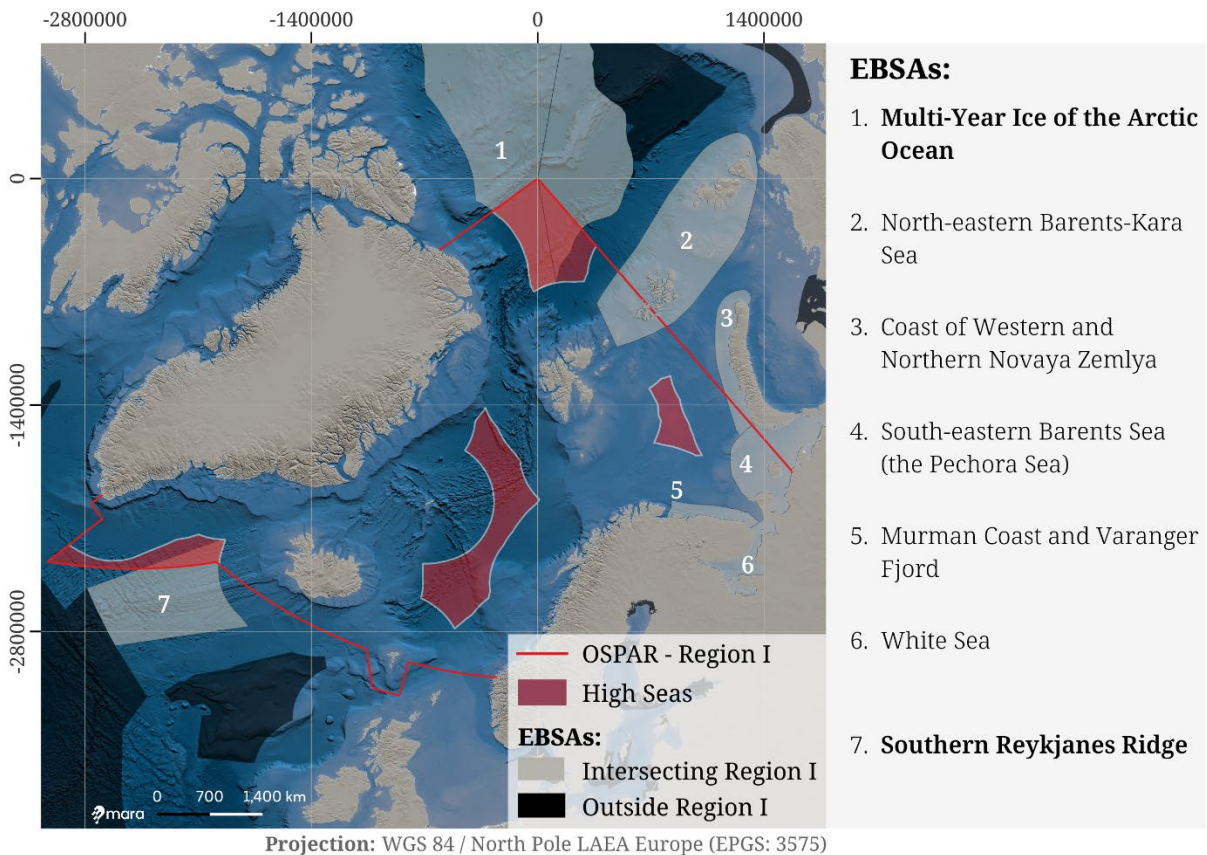


Figure 59. Ecologically or Biologically Significant marine Areas (EBSAs) designated by the Convention on Biological Diversity (CBD) and the four candidate sites in OSPAR Region I - Arctic Waters. Source: CBD Clearing House Mechanism database⁶².

Below we summarise assessments of the two EBSAs against the CBD EBSA criteria and relevance for the OSPAR MPA criteria.

EBSA 1 - Multi-year Ice of the Central Arctic Ocean

The multi-year ice of the Central Arctic Ocean — defined each September as ice surviving the summer melt — serves as a globally and regionally important habitat increasingly impacted

⁶² <https://chm.cbd.int/en/database/record?documentID=263493>

by climate change. This distinctive ecosystem supports specialised communities, including ice-dependent and vulnerable species such as the polar bears from the southern and northern Beaufort Sea subpopulations. The multi-year-ice-covered basins are strongly stratified by freshwater runoff and saltier deeper waters, yielding low vertical nutrient fluxes and light attenuation; ice-associated primary production (such as the diatom *Melosira arctica*) can dominate local production and export to the deep benthos (Gosselin et al., 1997; Sakshaug, 2004; Boetius et al., 2013), while diverse sympagic communities (e.g. amphipods, nematodes and many micro-eukaryotes) support higher trophic levels. Biodiversity is low in the Central Basin (Christiansen and Reist, 2013) with polar cod a keystone ice-associated fish, and megafauna such as polar bears rely on multi-year ice for feeding and breeding, making them highly vulnerable to ongoing ice loss (Durner et al., 2009; Aars, 2025). **Table 10** below provides an overview of the justifications for each of the EBSA designation criteria mapped against OSPAR MPA criteria.

Table 10. EBSA 1 - Multi-year Ice of the Central Arctic Ocean. CBD EBSA Justification and Relevance to OSPAR MPA criteria. Source of the justification text: CBD database.⁶³

CBD EBSA Justification	Confidence	Relevance to OSPAR
C1: Uniqueness or rarity This is the largest multi-year ice feature of the world's oceans, making it globally unique. The Arctic multi-year ice is mostly over the deep Arctic ocean basins and contains ice that is more than five years old (Maslanik et al., 2011). This contrasts with Antarctica, which only has small areas of coastal multi-year ice, which is no more than three-years old (Turner et al., 2009). Multi-year ice-dependent communities, fauna and flora, e.g. endemic sea ice nematodes and amphipods (Homer et al., 1992; Werner and Gradinger, 2002; Arndt and Swadling, 2006; von Quillfeldt et al., 2009; Poulin et al., 2010). Historical records indicate that this was key breeding habitat for a significant proportion of the southern and northern Beaufort Sea subpopulations of polar bear, although the current status of use of multi-year ice by these subpopulations is unknown (personal communication Stanislav Belikov). Multi- year ice normally has ice specialists that do not occur in younger sea ice (von Quillfeldt et al., 2009).	High	Important species and habitats/biotopes Ecological significance Representativity
C2: Special importance for life-history stages of species Historical records indicate that this was key breeding habitat for a significant proportion of the southern and northern Beaufort Sea subpopulations of polar bear, although the current status of use of multi-year ice by these subpopulations	Medium	Important species and habitats/biotopes Ecological significance

⁶³ <https://chm.cbd.int/en/database/record?documentID=263493>

CBD EBSA Justification	Confidence	Relevance to OSPAR
is unknown (personal communication, Stanislav Belikov) Multi-year ice has autochthonous species that are believed to live their entire life connected to the sea ice (e.g., nematode worms, rotifers and other small soft-bodied animals within the ice and amphipods on the underside) (Lønne and Gulliksen, 1991; Tchesunov and Riemann, 1995; Arndt and Swadling, 2006; Tchesunov, 2006).		
C3: Importance for threatened, endangered or declining species and/or habitats Historical records indicate that this was key breeding habitat for a significant proportion of the southern and northern Beaufort Sea subpopulations of polar bear, although the current status of use of multi-year ice by these subpopulations is unknown (personal communication, Stanislav Belikov).	Medium	Important species and habitats/biotopes Ecological significance
C4: Vulnerability, fragility, sensitivity, or slow recovery Extremely vulnerable for a warming climate and human activities in general. Ice algae constitute the second source of primary production in Arctic seas, with the highest relative contribution in the central Arctic Ocean (Gosselin et al., 1997). The increased freshening of surface waters underneath multi-year ice likely impacts the sea-ice biota (Melnikov et al., 2002). Multi-year ice has been declining rapidly over the last 30 years, both in extent and age (Maslanik, 2011), and in September 2013, ice older than two years old occupied only 42% of the area beyond national jurisdiction in the central Arctic, very little of which is now greater than five years old.	High	Sensitivity
C5: Biological productivity Production levels are low, but ice-based production contributes a significant portion of the total multi-year ice ecosystem production. Ice algae are estimated to contribute to more than 50% of the primary production in the permanently ice-covered central Arctic, forming a distinct community. (Gosselin et al., 1997; Sakshaug, 2004).	Low	Ecological significance
C6: Biological diversity Often higher biodiversity compared to annual ice in specific localities (Gradinger, 1999; Melnikov et al., 2002; von Quillfeldt et al., 2009; Zheng et al., 2011). The sub-ice community of two-year-old and multi-year ice is dominated by the centric diatom, <i>Melosira arctica</i>, which sinks and forms a	Low	High natural biological diversity

CBD EBSA Justification	Confidence	Relevance to OSPAR
link between ice and benthic ecosystems (Boetius et al., 2013).		
C7: Naturalness Very low impact from human activities (but vulnerable for climate change, already acting) (Meltotte et al., 2013, Eamer et al., 2013).	High	Naturalness

EBSA 7 - Southern Reykjanes Ridge

Reykjanes Ridge is a significant geological and ecological segment of the Mid-Atlantic Ridge, a major tectonic boundary characterised by a deep rift valley flanked by high mountains and plateaus. It plays a pivotal role in Atlantic Ocean circulation by dividing it longitudinally and influencing water mass distribution across various basins (Heezen et al., 1959; Rossby, 1999). The ridge itself is largely composed of volcanic rock, creating a hard-bottom substrate crucial for the colonisation of various benthic communities, including diverse and vulnerable marine species such as the coral gardens and deep-sea sponge aggregations (Gebruk et al., 2010). The complex hydrographic settings around the ridge contribute to increased vertical mixing and productivity, creating vital habitats and supporting high biodiversity, making this area ecologically significant (Falkowski et al., 1998; Heger et al., 2008). **Table 11** provides an overview of the justifications for each of the EBSA designation criteria mapped against OSPAR MPA criteria.

Table 11. EBSA 7 - Southern Reykjanes Ridge. CBD EBSA Justification and Relevance to OSPAR MPA criteria. Source of the justification text: CBD database.⁶⁴

CBD EBSA Justification	Confidence	Relevance to OSPAR
C1: Uniqueness or rarity Reykjanes Ridge and its biological communities are biogeographically distinct from other parts of the MAR (Mironov and Gebruk, 2006; Gebruk et al., 2010; Dilman, 2013; Alt et al., 2019) bounded by a permanent coldwater current (Iceland-Scotland Overflow Water (Shor et al., 1980). There is some evidence (explained above) to suggest the presence of several unique and rare species, like elasmobranchs <i>Bathyrja pallida</i> and <i>B. richardsoni</i> and Greenland shark <i>Somniosus microcephalus</i> (Hareide and Garnes, 2001), although detailed investigations have only been conducted relatively recently, so it is possible that many other species exist in this area.	High	Important species and habitats including biotopes

⁶⁴ <https://chm.cbd.int/en/database/record?documentID=263493>

CBD EBSA Justification	Confidence	Relevance to OSPAR
C2: Special importance for life-history stages of species Cold-water corals, habitat-forming scleractinians and areas of natural coral rubble, and sponge aggregations provide shelter, nursery and feeding grounds for a variety of species (e.g., Mortensen et al., 2008; Roberts et al., 2009; Maldonado et al., 2016). Furthermore, Reykjanes Ridge is important in the life history of the calanoid copepod <i>Calanus finmarchicus</i>, which has an important role as a prey species in the wider food web.	Medium	Threatened or declining species and habitats including biotopes Ecological significance
C3: Importance for threatened, endangered or declining species and/or habitats Several endangered and threatened shark and ray species have been found in the area. Orange roughy (<i>Hoplostethus atlanticus</i>) form aggregations at Reykjanes Ridge at depths exceeding 600 m (Magnússon and Magnússon, 1995; Hareide and Garnes, 2001). There is also evidence for deep-water coral and sponge communities (Mortensen et al., 2008; Cárdenas and Rapp, 2015), both of which have been described as threatened. The area supports species of cold-water corals, including black corals, bamboo corals, hard and soft corals. These form localised reef and coral garden habitats that are listed under OSPAR as threatened and declining habitats (Roberts et al., 2006; 2009). In addition, deep-sea sponge aggregations are also known to be present and these are also listed under OSPAR (Howell et al., 2016).	High	Threatened or declining species and habitats including biotopes Ecological significance
C4: Vulnerability, fragility, sensitivity, or slow recovery This Ridge rises from the abyssal plain and provides a wide range of benthic habitats and is colonised by a variety of erect megafauna (e.g., gorgonians, sponges and cold-water corals) (Copley et al., 1996). At least 20 species of cold-water corals were reported at Reykjanes Ridge during the MAR-ECO project cruise (Mortensen et al., 2008). Further study of benthic communities in the shallow portions of the Reykjanes Ridge (ATLAS, 2019) has also revealed new occurrences of scleractinian (<i>Lophelia pertusa</i>, <i>Madrepora oculata</i>) and octocoral (<i>Paragorgia arborea</i>, <i>Primnoa resedaeformis</i> and species in the families Anthothelidae and Nephtheidae) cold-water corals and diverse sponge communities. It can therefore be inferred that cold-water corals occur along the Reykjanes Ridge, providing further support to past studies (e.g., Copley et al., 1996). There is also evidence from experimental trawling of the Reykjanes Ridge that sponge communities inhabit the flanks and summits of the Ridge (Magnússon and Magnússon, 1995). Many of the fauna present in this area are deep-sea fauna that have life history characteristics that make them particularly vulnerable to the effects of fishing. Many of the cold-water coral	High	Threatened or declining species and habitats including biotopes Sensitivity

CBD EBSA Justification	Confidence	Relevance to OSPAR
species have slow growth rates, and long generation times (Roark et al., 2006) leading to very slow and episodic recoveries following human impact. Seamount fish species have been shown in the past to be slow to recover from the impacts of fishing. There is clear evidence of aggregations of both demosponges and glass sponges on the Reykjanes Ridge, which are identified as Vulnerable Marine Ecosystems (UNGA, 2006) under the FAO's guidelines for the management of deep-sea fisheries (FAO, 2009).		
C5: Biological productivity Reykjanes Ridge plays an important role within the open ocean ecosystem. The lack of terrigenous nutrient input to the open ocean means that productivity is generally low, and the deep-sea fauna found there are reliant on the limited local surface water primary production (Fossen et al., 2008). The complex hydrographic setting and the presence of Reykjanes Ridge itself leads to enhanced vertical mixing and turbulence, resulting in areas of increased productivity over the Ridge (Falkowski et al., 1998; Fossen et al., 2008; Heger et al., 2008). This increased biological productivity means that Reykjanes Ridge is likely to have a greater abundance and diversity of fauna than the surrounding open ocean and abyssal plains (Sutton et al., 2008). However, the research conducted through the MAR-ECO project found that primary production and export flux over the MAR were not enhanced compared with a nearby reference station over the Porcupine Abyssal Plain, and biomass of benthic macrofauna and megafauna were similar to global averages at the same depths. There is some evidence for pelagic fish concentrating in the benthic boundary layer (to 200 m above the seafloor) over the MAR.	Medium	Ecological significance
C6: Biological diversity There is clear evidence of aggregations of both demosponges and glass sponges on the Reykjanes Ridge. Sponge aggregations create complex habitats supporting high biodiversity (Bett and Rice, 1992); they provide a refuge for fish, are a source of novel chemical compounds (Bell, 2008; Maldonado et al., 2016), and may also play an important role as a sink in the marine silicon cycle, which is thought to primary productivity and the carbon cycle (Hendry et al., 2019).	High	High natural biological diversity
C7: Naturalness The actual extent and severity of the impact that fishing and other human activities have had on MAR ecosystems is largely	No information	Naturalness

CBD EBSA Justification	Confidence	Relevance to OSPAR
unquantified. Although Magnússon & Magnússon (1995a) reported that the Reykjanes Ridge is in general a very difficult area for bottom trawling because of its extremely irregular bottom topography, detailed and accurate mapping of the seafloor may change this.		

The North East Atlantic Fisheries Commission (NEAFC)

The North East Atlantic Fisheries Commission (NEAFC) and the OSPAR Commission have adopted a collective arrangement in 2014 to enhance dialogue, cooperation and coordination in ABNJ in the North-East Atlantic⁶⁵. Evolving from an informal cooperation signified by a Memorandum of Understanding in 2008 to a joint narrative, it facilitates coordination between bodies that may each adopt measures within their own mandates.⁶⁶

NEAFC employs a range of fisheries management measures to prevent significant adverse impacts on marine ecosystems, including area closures to protect vulnerable marine ecosystems (VMEs) such as deep-sea sponges and corals, notably by prohibiting bottom-contact fisheries. VMEs are marine ecosystems that are particularly susceptible to significant adverse impacts from fishing activities and therefore require measures to prevent degradation, such as closures to certain fisheries. Some of these closures are explicitly labelled as OECMs or are geographically defined areas, outside protected areas, that are governed and managed in ways that deliver effective and long-term in-situ conservation of biodiversity, regardless of their primary objective. They play a critical role in maintaining ecosystem functions and protecting the biogeographic diversity of the maritime domain. Notably, NEAFC is the first Regional Fisheries Management Organisation (RFMO) to report to CBD on OECMs in ABNJ. Examples of NEAFC closures currently recognised as OECMs include:

- Hatton Bank VME Closed Area
- Reykjanes Ridge VME Closed Areas
- Southwest Rockall and Northwest Rockall closures.

NEAFC operates within four regulatory areas, all of which intersect with OSPAR Region I - Arctic Waters, but all existing VME closures and OECMs are located in regulatory area 1 (Reykjanes Ridge) and regulatory area 3 (Barents Sea).

Map on **Figure 60** illustrates the NEAFC VME closures. Notably, one of them, the Irminger Sea Closure, overlaps with OSPAR Arctic Waters candidate site 4. NEAFC has implemented a closure on directed fishing for shallow and deep pelagic redfish in the Irminger Sea and adjacent waters⁶⁷. This measure, extended in 2023, includes a ban on landing/port services for vessels carrying these species. Irminger Sea Closure is not currently recognised as an OECM.

Figure 61 illustrates the NEAFC OECMs and there is currently no overlap with Arctic Waters located in the ABNJ.

⁶⁵ <https://www.neafc.org/collective-arrangement>

⁶⁶ https://www.neafc.org/system/files/opsar_mou.pdf

⁶⁷ https://oceans-and-fisheries.ec.europa.eu/system/files/2021-12/2021-12-01-non-paper-updates-2022-fishing-opportunities-regulation_en.pdf

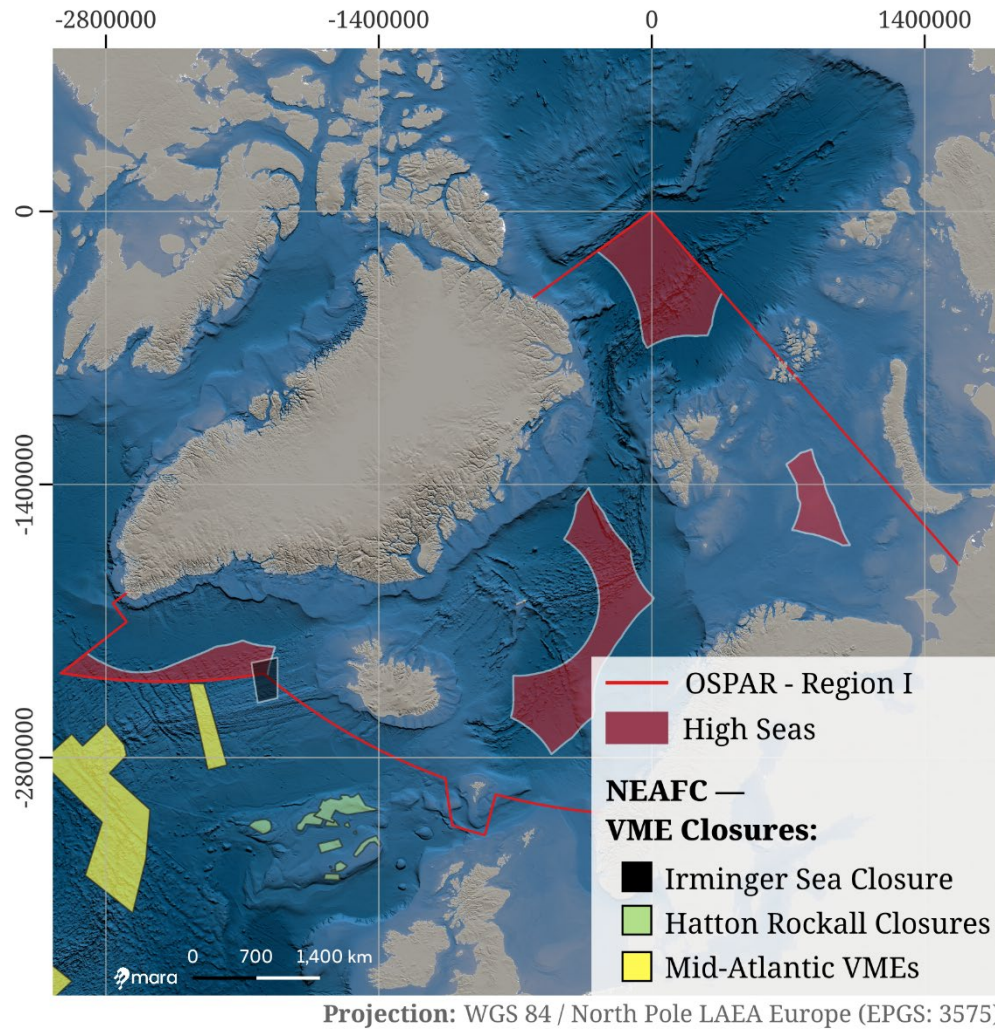


Figure 60. NEAFC VME closures and the four candidate sites in OSPAR Region I. Source: NEAFC⁶⁸.

⁶⁸ <https://www.neafc.org/closures/coordinates>

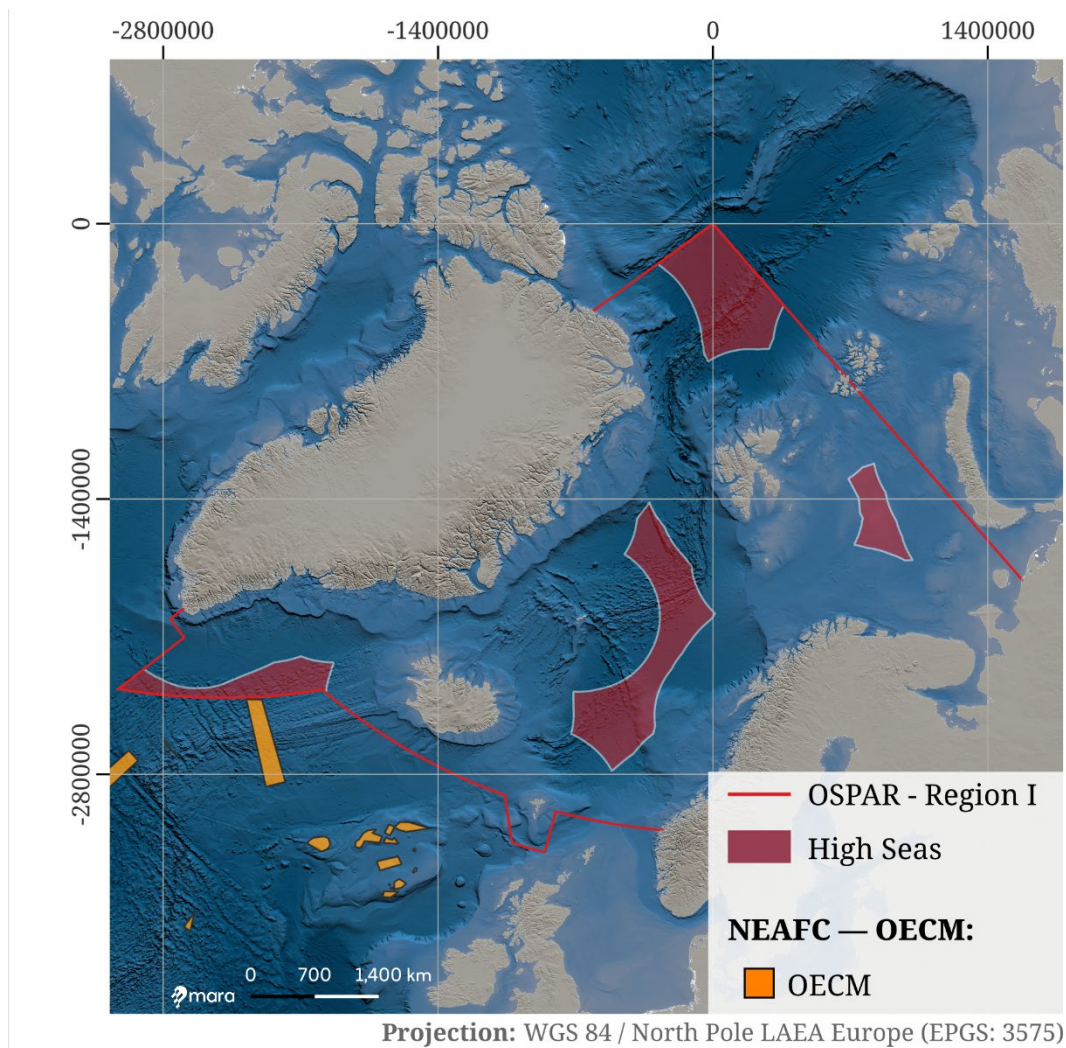


Figure 61. NEAFC OECMs and OSPAR Arctic Waters ABNJ. Source: NEAFC⁶⁹.

Central Arctic Ocean Fishing Agreement (CAOFA)

The Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean (CAOFA) is a landmark international treaty adopted in 2018 and entering into force in 2021. Signed by the Arctic Five (Canada, Denmark/Greenland, Norway, Russia, USA) together with China, the EU, Iceland, Japan, and South Korea, the CAOFA represents a proactive, science-driven response to the potential risk of unregulated fishing in newly accessible Arctic marine areas, as sea ice recedes due to climate change (Agreement to Prevent Unregulated High Seas Fisheries in the Central Arctic Ocean [CAOFA], 2018). The agreement addresses ABNJ in the Central Arctic Ocean, corresponding to approximately 2.8 million km². Notably, the Central Arctic Ocean ABNJ sector of OSPAR Region I overlaps with the CAOFA agreement area (**Figure 62**).

CAOFA is exemplary in its application of the precautionary principle. Recognising the scientific uncertainties and the absence of baseline data on fish stocks, ecosystems, and the

⁶⁹ <https://www.neafc.org/oecm/coordinates>

impacts of climate change in Central Arctic ABNJ, the agreement places a moratorium on commercial fishing in this region before such activities can begin (CAOFA, 2018). Specifically, all parties commit not to authorise domestic vessels to conduct commercial fisheries in the agreement area until sound, science-based regulatory mechanisms are developed (CAOFA, 2018). Central to this approach is a Joint Program of Scientific Research and Monitoring, designed to build collective knowledge on the Central Arctic ecosystem and inform any potential future management measures, including the possible establishment of a regional fisheries management organisation. While not formally designated as an MPA or OECM, CAOFA's moratorium on unregulated commercial fishing in the region effectively functions as a de facto area-based conservation measure, in line with ecosystem-based management principles.

The CAOFA highlights the necessity of international collaboration and the integration of Indigenous knowledge with scientific research and ensures transparency and adaptive management by requiring the periodic review and renewal of the agreement in light of new scientific findings. This would be central to the conservation planning and management of any future ABMT intersecting with or inside the CAOFA Area (**Figure 62**). The spatial footprint, precautionary character, and governance arrangements of the CAOFA are directly relevant to ongoing and future discussions regarding the development of ABMTs and MPAs in the ABNJ, and highlight opportunities for coordination and synergies between fisheries management and marine biodiversity conservation within the overlapping areas of the Central Arctic Ocean and OSPAR Region I.

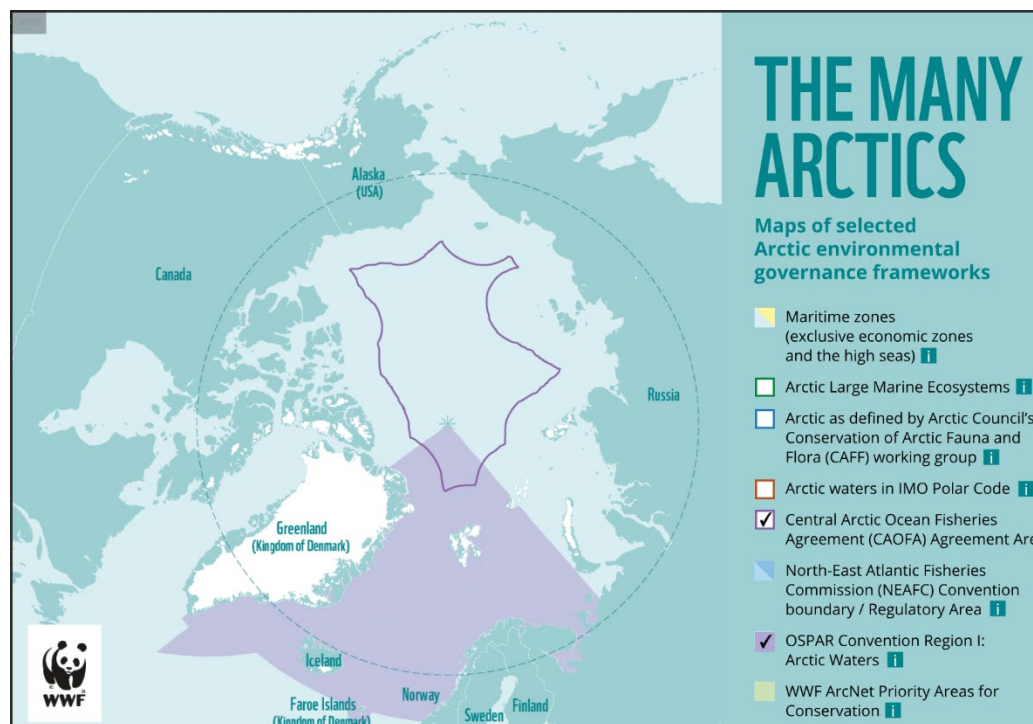


Figure 62. OSPAR Region I and CAOFA agreement area. Source: WWF Global Arctic Programme⁷⁰.

⁷⁰ <https://www.arcticwwf.org/newsroom/features/crunch-time-for-central-arctic-ocean-fisheries-precaution-is-essential/>

There is a direct spatial overlap between the Central Arctic Ocean ABNJ candidate conservation site identified in this report and the area covered by the CAOFA. The implications of a future OSPAR area-based conservation measure (such as an MPA or OECM) within this zone would depend on the nature of the measure and its management objectives. At present, the CAOFA establishes a moratorium on unregulated commercial fishing and thereby functions as a precautionary, temporary de facto conservation measure pending the acquisition of sufficient scientific information.

Should OSPAR proceed to propose the formal designation of a conservation area within this ABNJ sector, it would be essential to coordinate closely with CAOFA parties to ensure alignment between conservation objectives and future fisheries management.

The International Maritime Organisation (IMO) Particularly Sensitive Sea Areas (PSSAs)

The International Maritime Organisation (IMO) designates Particularly Sensitive Sea Areas (PSSAs) to offer special protection through Associated Protective Measures (APMs) to areas of significant ecological, socio-economic, or scientific value which are vulnerable to the damaging impacts of international shipping activities. These areas, such as the Great Barrier Reef and the Galapagos Archipelago, meet criteria set out in the IMO's revised guidelines⁷¹ and are safeguarded through stringent measures including routeing adjustments and enhanced MARPOL regulations. These efforts contribute to the preservation of the unique characteristics of PSSAs in the face of global shipping traffic, contributing to sustainable shipping practices in accordance with the relevant obligations under the United Nations Convention on the Law of the Sea (UNCLOS).

There are 19 PSSAs designated globally to date, but none of them are in the Arctic or intersecting with OSPAR Region I (**Figure 63**). Furthermore, while the IMO's PSSA concept has been used for over 30 years, no State has yet proposed a PSSA in ABNJ although there are some threats to biodiversity in ABNJ from shipping (Roberts, 2024) and efforts are underway to do so in the Costa Rica Thermal Dome in the eastern Pacific Ocean. The recent adoption of the BBNJ Agreement by the United Nations, which provides a global legal mechanism for establishing ABMTs, including MPAs in ABNJ, strengthens the need for enhanced cooperation between the IMO and the BBNJ Agreement.

⁷¹ <https://wwwcdn.imo.org/localresources/en/OurWork/Environment/Documents/A24-Res.982.pdf>



Figure 63. The International Maritime Organisation (IMO) Particularly Sensitive Sea Areas (PSSAs). Source: IMO⁷².

Particularly valuable and vulnerable areas (SVO) in Norwegian marine areas

Particularly Valuable and Vulnerable Areas (SVOs) are clearly defined regions within Norway's marine waters acknowledged for their exceptional ecological or biological significance (**Figure 64**). SVOs are identified based on robust scientific criteria (based on the CBD's EBSA criteria), including uniqueness, biodiversity, productivity, and the presence of threatened or declining species. At present, SVOs are embedded within the national marine management plans for the Barents Sea, the Norwegian Sea, and the North Sea/Skagerrak, where they function as essential tools for guiding ecosystem-based management, targeted monitoring, and the application of precautionary approaches to marine resource use. The currently accepted boundaries and selections for SVOs are established in governmental white papers, notably Meld. St. 21 (2023-2024) and reflect earlier expert assessments; SVO designation signals the need for special care but does not in itself confer direct legal restrictions on human activities. Recognising advances in marine science and the need for consistency across sea areas, a comprehensive scientific review in 2021 ('Particularly valuable and vulnerable areas (SVO) in Norwegian marine areas – Environmental value') recommended substantial amendments (Eriksen et al., 2021), which is reflected in the latest report Meld. St. 21 (2023-2024). These proposed changes include merging smaller SVOs into fewer, larger areas that better reflect entire ecosystems and ecological processes, the introduction of new SVOs in deep-sea and offshore environments, and the removal

⁷² <https://wwwcdn.imo.org/localresources/en/MediaCentre/Documents/Worldwide%20PSSA%202023.pdf>

or adjustment of some areas where evidence for particular value is now lacking. This updated approach ensures that SVOs remain scientifically robust and fit for purpose as key reference points for marine conservation and sustainable management in Norway's seas.

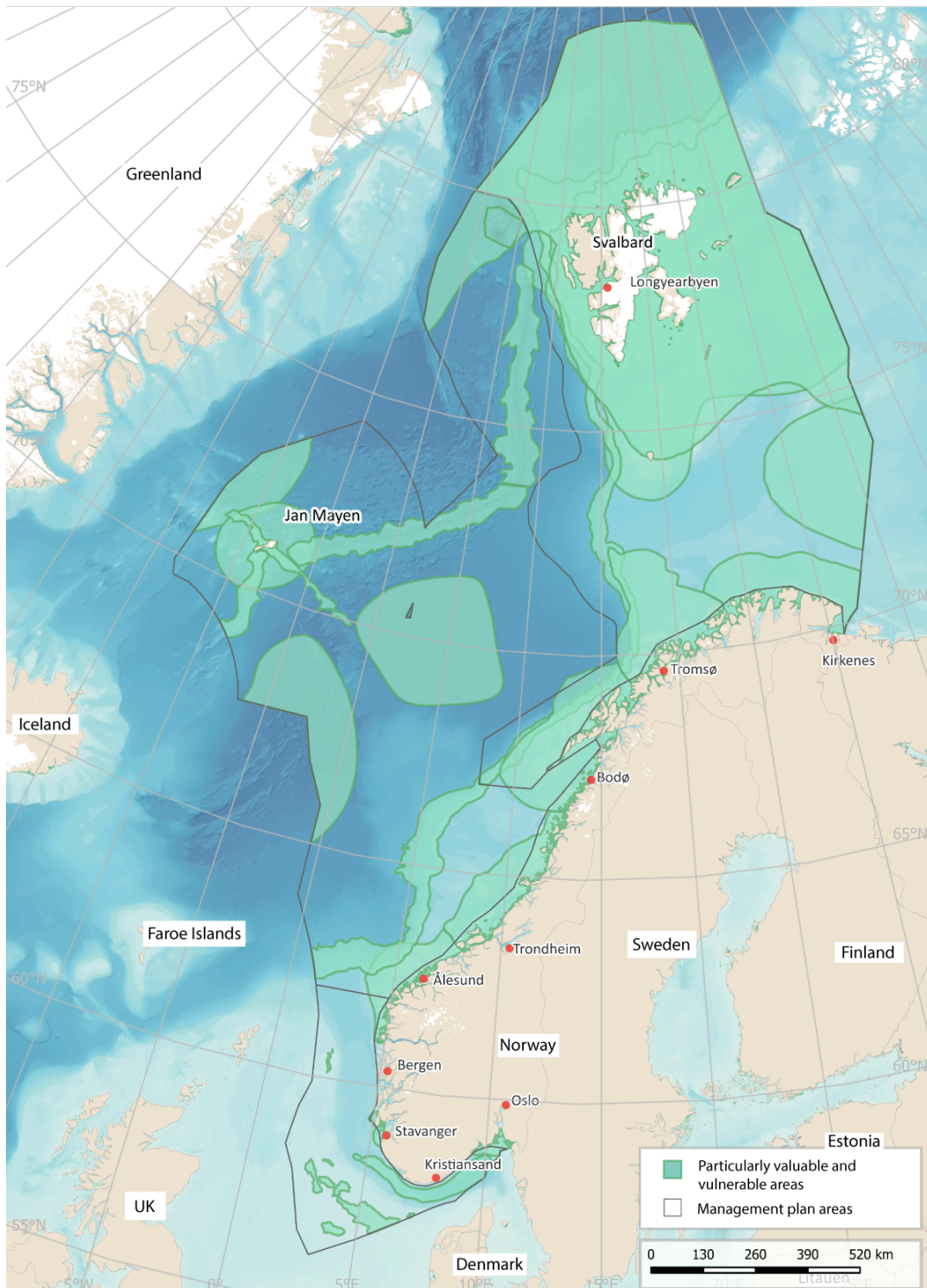


Figure 64. The particularly valuable and vulnerable areas (SVO) identified in the three ocean management plans (White paper n. 21 (2023-2024)).

The evidence base collected through the identification of the SVO areas includes information that goes beyond the Norwegian EEZ, and therefore there is a notable overlap between the Norwegian SVO's and the ABNJ sectors in OSPAR Region I - Arctic Waters (**Figure 65**), specifically:

- Waters around Svalbard (BH1) intersects with Sector 1 – Arctic Basin and Sector 2 – Barents Sea
- The Marginal Ice Zone (BH2) intersects with Sector 1 – Arctic Basin and Sector 2 – Barents Sea
- The Central Barents Sea (BH7) intersects with Sector 2 – Barents Sea
- The Mid-Atlantic Ridge (NH4) intersects with Sector 3 – Arctic Mid-Ocean Ridge
- Norwegian Sea Deep Waters (NH8) intersects with Sector 3 – Arctic Mid-Ocean Ridge

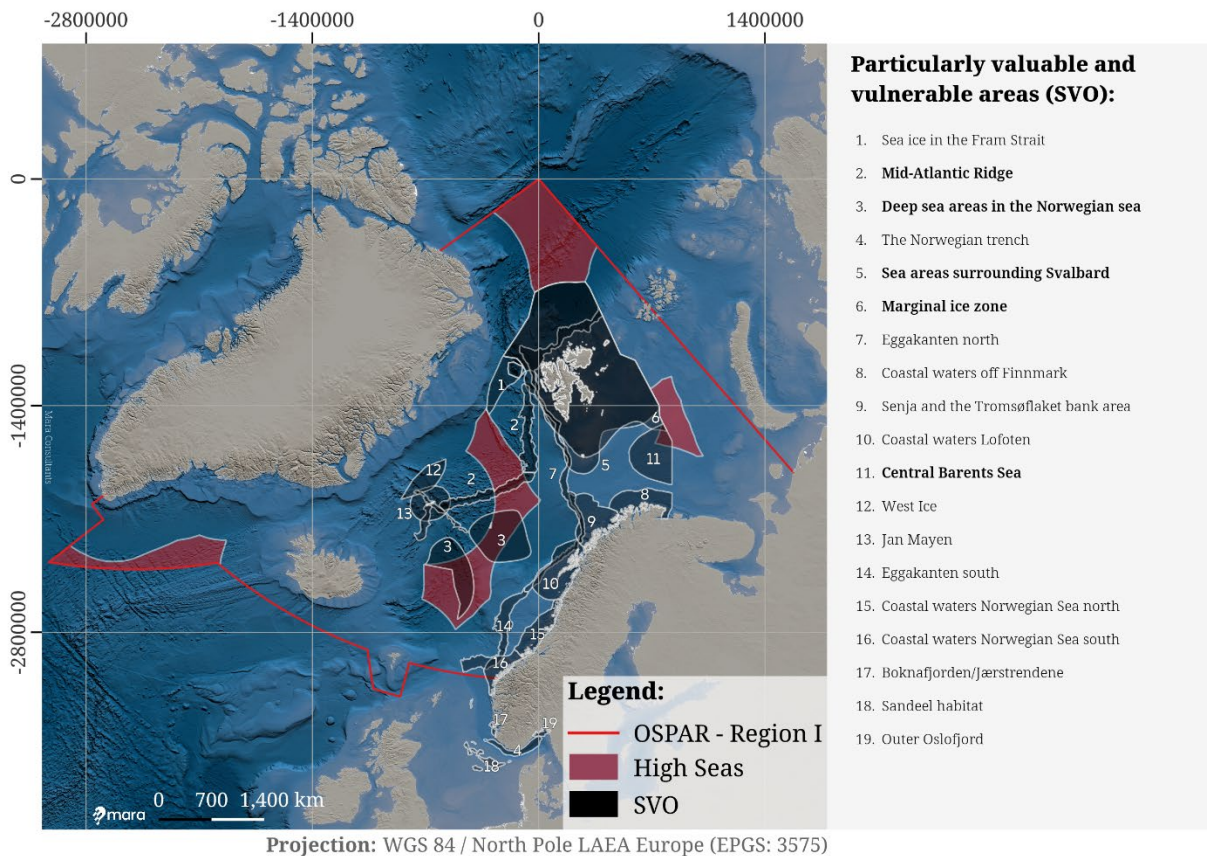


Figure 65. Overlap between the existing SVOs and the four candidate sites in OSPAR Region I. Source: Meld. St. 21 (2023-2024).

Table 12 consolidates information on conservation features that led to the designation of the SVO's that overlap with OSPAR Region I ABNJ and maps it against OSPAR MPA selection criteria.

Table 12. Criteria used to designate Norwegian SVOs overlapping with the four candidate sites in OSPAR Region I and their relevance to the OSPAR MPA selection criteria (ecological considerations).

SVO code	Designation conservation features	Relevance to OSPAR MPA criteria	Overlapping candidate sites
Waters around Svalbard (BH1)	• Polar cod (<i>Boreogadus saida</i>): spawning and nursery grounds in coastal waters and under sea ice • Golden redfish (<i>Sebastes norvegicus</i>): nursery and feeding grounds in fjords and on the continental shelf • Capelin (<i>Mallotus villosus</i>): seasonal feeding grounds in open water • Brünnich's guillemot (<i>Uria lomvia</i>): large breeding colonies on cliffs; wintering in fjords and polynyas • Ivory gull (<i>Pagophila eburnea</i>): breeding colonies on remote islands and sea ice edges; feeding at ice margins • Bowhead whale (<i>Balaena mysticetus</i>): feeding and migratory grounds in open water and near sea ice • Walrus (<i>Odobenus rosmarus</i>): haul-out sites and feeding areas on coastal beaches, ice floes, and shallow fjords • Polar bear (<i>Ursus maritimus</i>): year-round habitat on sea ice; denning on coastal islands and fast ice • Sponge aggregations: undisturbed benthic habitats on soft sediment and rocky substrates • Seapens (Pennatulacea): deep water and sheltered fjords with soft sediment • Rhodolith beds (unattached calcareous algae): continental shelf and fjords, important as nursery habitat for invertebrates	• Threatened or declining species and habitats/biotopes • Important species and habitats including biotopes • Ecological significance	1 – Arctic Basin 2 – Barents Sea
The Marginal Ice Zone (BH2)	• Polar cod (<i>Boreogadus saida</i>): spawning, nursery, and feeding grounds in ice-covered and marginal ice zone waters • Arctic cod (<i>Arctogadus glacialis</i>): pelagic species using the marginal ice zone as nursery and feeding habitat • Brünnich's guillemot (<i>Uria lomvia</i>): large spring aggregations and feeding flocks in leads and marginal ice zone	• Threatened or declining species and habitats including biotopes • Important species and habitats	1 – Arctic Basin 2 – Barents Sea

SVO code	Designation conservation features	Relevance to OSPAR MPA criteria	Overlapping candidate sites
	• Little auk (<i>Alle alle</i>): feeding in the marginal ice zone and adjacent waters during breeding season • Ivory gull (<i>Pagophila eburnea</i>): breeding on sea ice edges and remote islands, feeding at the ice edge • Black guillemot (<i>Cepphus grylle</i>): year-round presence, feeding along ice edges and leads • Fulmar (<i>Fulmarus glacialis</i>), glaucous gull (<i>Larus hyperboreus</i>), kittiwake (<i>Rissa tridactyla</i>): present year-round, utilise marginal ice zone for feeding • Bowhead whale (<i>Balaena mysticetus</i>): genetically distinct population, uses marginal ice zone for feeding and migration • Beluga (<i>Delphinapterus leucas</i>) and narwhal (<i>Monodon monoceros</i>): year-round residents, feeding and migrating in ice-covered and marginal ice zone areas • Blue whale (<i>Balaenoptera musculus</i>), fin whale (<i>Balaenoptera physalus</i>), humpback whale (<i>Megaptera novaeangliae</i>), minke whale (<i>Balaenoptera acutorostrata</i>), orca (<i>Orcinus orca</i>): summer feeding in the marginal ice zone • Harp seal (<i>Pagophilus groenlandicus</i>) and ringed seal (<i>Pusa hispida</i>): whelping, moulting, and hauling out on sea ice • Walrus (<i>Odobenus rosmarus</i>): haul-out and feeding on ice floes and shallow marginal ice areas • Polar bear (<i>Ursus maritimus</i>): year-round use of sea ice and marginal ice zone for hunting and migration, especially at the ice edge • Diverse benthic megafauna communities: high biodiversity on Spitsbergen Bank and along west, north, and east Svalbard under influence of ice cover • Arctic zooplankton: high productivity areas, key prey for fish, seabirds, and marine mammals in the marginal ice zone • Multi-year Arctic sea ice habitat: critically endangered, supporting unique ice flora and fauna	including biotopes • Ecological significance • High natural biological diversity	

SVO code	Designation conservation features	Relevance to OSPAR MPA criteria	Overlapping candidate sites
The Central Barents Sea (BH7)	• Common guillemot (<i>Uria aalge</i>): post-breeding moulting and wintering flocks feed in the area • Brünnich's guillemot (<i>Uria lomvia</i>): post-breeding moulting and wintering flocks feed in the area • Puffin (<i>Fratercula arctica</i>): autumn and winter distribution and feeding area • Glaucous gull (<i>Larus hyperboreus</i>): autumn and winter feeding area • Kittiwake (<i>Rissa tridactyla</i>): spring feeding grounds • Fulmar (<i>Fulmarus glacialis</i>): red-listed species, feeding and present year-round • Cod (<i>Gadus morhua</i>): larvae settle on the bottom here in winter; adults feed in the area • Haddock (<i>Melanogrammus aeglefinus</i>): larvae settle on the bottom here in winter; adults feed in the area • Haploids amphipod communities (<i>Haploids</i> spp.): rare benthic habitat on the Thor Iversen Bank • Diverse benthic fauna: unique communities vulnerable to seabed disturbance • High richness and diversity of fish species: area acts as a feeding, nursery, and settlement ground for multiple fish and invertebrates	• Threatened or declining species and habitats including biotopes • Important species and habitats including biotopes • Ecological significance • High natural biological diversity	3 – Arctic Mid-Ocean Ridge
The Mid-Atlantic Ridge (NH4)	• Hydrothermal vent fauna (including chemosynthetic species): endemic communities found exclusively at active and inactive vent fields such as Loki's Castle • Sponges and deep-sea corals (e.g. hard-bottom coral gardens, OSPAR-listed habitats): slow-growing, fragile benthic communities on the ridge and seamounts • Seamounts: provide spawning and nursery areas for slow-growing, vulnerable fish species • Hard-bottom coral gardens: near-threatened habitats supporting specialised assemblages • High productivity and concentrations of phyto- and zooplankton near the Arctic front:	• Threatened or declining species and habitats including biotopes • Ecological significance • High natural biological diversity	3 – Arctic Mid-Ocean Ridge

SVO code	Designation conservation features	Relevance to OSPAR MPA criteria	Overlapping candidate sites
	important seasonal feeding grounds for multiple trophic levels • Bottlenose whale (<i>Hyperoodon ampullatus</i>): important potential summer feeding area • Distinct assemblages of deep-sea benthic fauna: highly vulnerable to bottom disturbance and habitat loss		
Norwegian Sea Deep Waters (NH8)	• <i>Calanus</i> copepods (e.g. <i>Calanus finmarchicus</i>, <i>Calanus hyperboreus</i>): year-round plankton reservoirs in deep basins, vital for regional secondary production • Glacier lantern fish (<i>Benthosema glaciale</i>), silvery lightfish (<i>Maurolicus muelleri</i>), spotted barracudina (<i>Arctozenus risso</i>): year-round mesopelagic inhabitants, important prey for whales • Krill, amphipods, copepods, cephalopods: abundant mesopelagic and deep-water prey species • Herring (<i>Clupea harengus</i>), blue whiting (<i>Micromesistius poutassou</i>), mackerel (<i>Scomber scombrus</i>): feed on <i>Calanus</i> copepods in the upper mesopelagic, supporting higher trophic levels • Sperm whale (<i>Physeter macrocephalus</i>), fin whale (<i>Balaenoptera physalus</i>), bottlenose whale (<i>Hyperoodon ampullatus</i>): deep-diving whales foraging on mesopelagic prey • Sponge aggregations (OSPAR-listed habitat): deep muddy plains, important nursery areas, vulnerable and slow to recover • Coral gardens and hard-bottom coral reefs (OSPAR-listed habitats): fragile benthic communities, high species richness, especially along Ægir Ridge • High diversity of benthic fauna: supported by mosaic of soft/hard-bottom habitats and seamounts within the basins	• Threatened or declining species and habitats including biotopes • Important species and habitats including biotopes • Ecological significance • High natural biological diversity	3 – Arctic Mid-Ocean Ridge

Important areas for ecosystems and species in Greenland marine areas

Several areas within Greenland's waters were identified as “ecological and biological valuable areas” in a report prepared by the Danish Centre for Environment and Energy (DCE) for the Ministry of Independence, Nature, Environment and Agriculture under the Government of Greenland. This was based on data from DCE and the Greenland Institute of Natural Resources (GINR). Three key areas were identified:

- Species specific core areas – these are hotspots that are critical for specific species such as important spawning areas for Greenland halibut or migratory corridors.
- Important habitats, nature types, or other ecosystem components – these are areas of high productivity, that are unique, and/or have high biodiversity.
- Ecological and Biological valuable areas – these are areas where both species-specific core areas and important habitats, nature types, or other ecosystem component areas are close.

The criteria applied to identify these areas incorporated CBD criteria to identify EBSAs, IMO criteria for PSSAs, and IUCN criteria for identifying key biodiversity areas. Valuable areas identified off East Greenland but within the EEZ included denning areas for polar bears, migration routes for hooded seals, haul-out sites for harbour seals, areas with high densities of narwhals, and breeding sites for Sabine's gull (*Xema sabini*) and ivory gull (*Pagophila eburnea*), for example. In ABNJ, there are important nursery areas for Greenland halibut, which may be under threat due to bycatch of small individuals in shrimp fisheries (Christensen et al. 2016). There is also a site partially within ABNJ referred to as the Cape Farewell Whaling Ground, which was a historically important feeding ground for North Atlantic right whale (*Eubalaena glacialis*), however few individuals are known to still visit this area (Christensen et al. 2016). Areas important to wildlife regarding Mineral Resources in Greenland can be visualised online⁷³. Further areas including an assessment of potential impacts from petroleum activities off Greenland were assessed in an updated Strategic Environmental Impact Assessment (SEIA, Boertmann et al. 2020).

WWF ArcNet

In addition to officially designated spatial measures adopted by regional and international authorities, there are also areas of interest identified through independent scientific and conservation initiatives. ArcNet, an Arctic Ocean Network of Priority Areas for Conservation, developed by WWF is a network design framework devised to help achieve ocean-scale, area-based marine conservation in the Arctic. Applying systematic conservation planning and utilising Marxan, a decision-support software, ArcNet employs a database of 818 conservation features representing Arctic biodiversity to identify priority areas for conservation (PACs), focusing on ecological representation and connectivity (James et al., 2024). ArcNet's expert-driven systematic conservation planning approach and Marxan support tool identify an optimised scenario for a network of PACs that jointly achieves science-based conservation targets for each and all marine

⁷³ <https://experience.arcgis.com/experience/bd79afa2f84f4d70be9c1f15e7f79b38>

conservation features considered in its pan-Arctic database. The framework incorporates a suite of web-based tools that provide stakeholders with real-time access to data and analyses, promoting transparency and facilitating collaborative conservation efforts (WWF Arctic Programme, 2023).

For the purposes of this report to assist OSPAR, two ArcNet tools were used to explore conservation features in ABNJ in OSPAR Region I - Arctic Waters:

- Chicory - a tool that provides information on the ArcNet PACs and facilitates access to the underlying data layers of the ArcNet Marxan analysis.
- GERANIUM - a tool that enables running new conservation scenarios for selected areas, including OSPAR Region I.

Chicory

ABNJ in OSPAR Region I - Arctic Waters intersect with the following ArcNet Priority Areas for Conservation - PAC 28, PAC 35, and PAC 55, there is also a marginal overlap with PAC 29 (Figure 66).

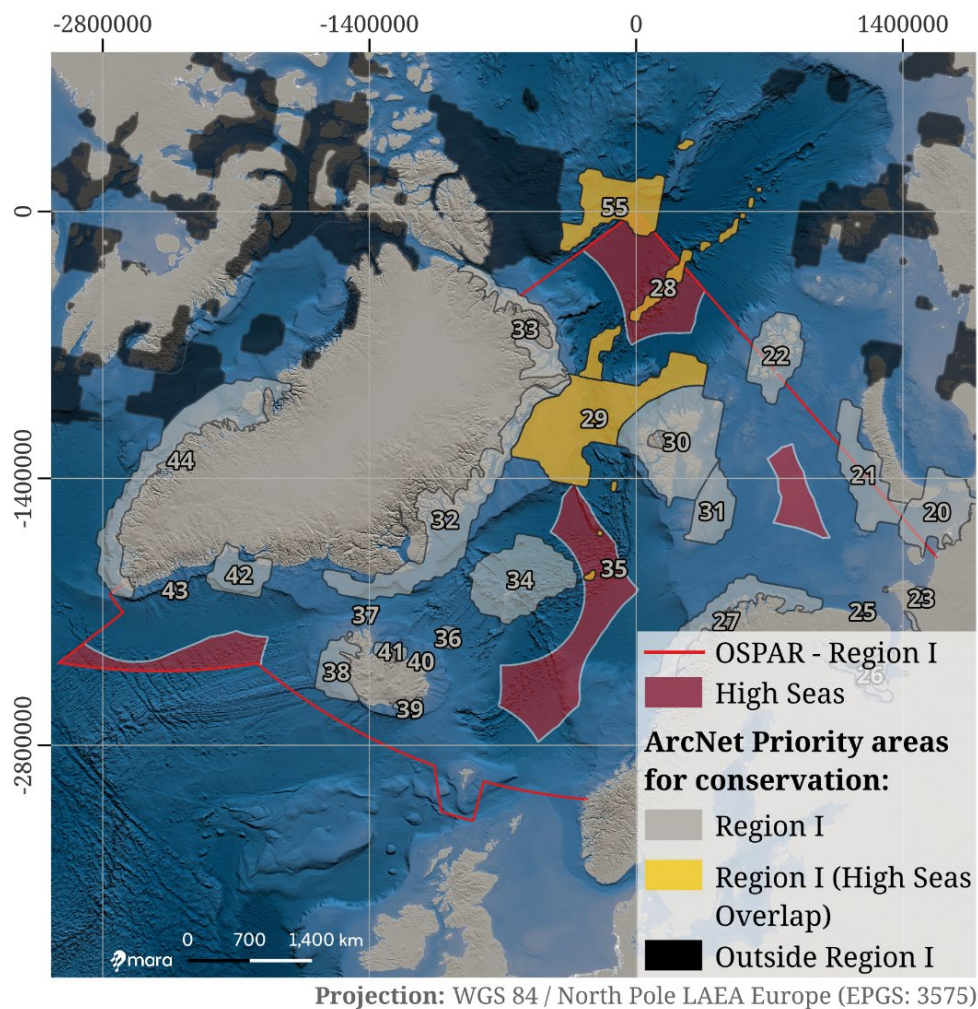


Figure 66. WWF ArcNet Priority Areas of Conservation (PAC) and ABNJ in OSPAR Region I - Arctic Waters. Source: WWF ArcNet⁷⁴.

Below we provide a summary of information on conservation features that underpin the designation for each of the PACs intersecting the four candidate sites in OSPAR Region I – Arctic Waters (PAC 28 - **Table 13**; PAC 35 - **Table 14**; PAC 55 - **Table 15**).

Table 13. ArcNet Priority Conservation Area (PAC) 28 - conservation features and their relevance to OSPAR criteria (features with >10% proportion in the PAC selected).

Conservation Features	Proportion in the PAC	Conservation Target	Representative / Distinctive	Relevance to OSPAR
Benthic communities, VI.2.2. Gakkel Ridge and Ermak Plateau terraces	100%	100%	R	Representativity
Biological communities, Gakkel Ridge central rift mountains	100%	75%	D	Important species and habitats/biotopes
Biological communities, Gakkel Ridge western rift mountains	98.6%	75%	D	Important species and habitats/biotopes
Biological communities, vents	90.9%	75%	D	Important species and habitats/biotopes
Biological communities, Gakkel Ridge eastern rift mountains	82.5%	75%	D	Important species and habitats/biotopes
Biological communities, Gakkel Ridge central flank mountains	82.1%	75.0%	D	Important species and habitats/biotopes
Biological communities, Gakkel Ridge western flank mountains	80.8%	75.0%	D	Important species and habitats/biotopes
Biological communities, Gakkel Ridge eastern flank mountains	79.5%	75.0%	D	Important species and habitats/biotopes
Benthic communities, VI.2.6. Gakkel Ridge and Ermak Plateau rift valleys	58.2%	69.0%	R	Representativity
Benthic communities, VI.2.3. Gakkel Ridge and Ermak Plateau ridges	49.0%	52.9%	R	Representativity
Benthic communities, VI.2.4. Gakkel Ridge and Ermak Plateau spreading ridges	32.8%	28.4%	R	Representativity
Benthic communities, VII.2.4. Amundsen and	24.6%	12.8%	R	Representativity

⁷⁴ <https://wwf-arctic-programme.github.io/chicory/navigation.html>

Conservation Features	Proportion in the PAC	Conservation Target	Representative / Distinctive	Relevance to OSPAR
Nansen basins abyssal mountains				
Benthic communities, VI.2.7. Gakkerl Ridge and Ermak Plateau canyons	14.6%	100.0%	R	Representativity

Table 14. ArcNet Priority Conservation Area (PAC) 35 - conservation features and their relevance to OSPAR criteria.

Conservation Features	Proportion in the PAC	Conservation Target	Representative / Distinctive	Relevance to OSPAR
Benthic communities, VI.1.8. Greenland Sea and Fram Strait seamounts	28.2%	97.3%	R	Representativity
Benthic communities, VII.1.4. Greenland Sea and Fram Strait abyssal mountains	2.7%	23.5%	R	Representativity
Benthic communities, VI.1.3. Greenland Sea and Fram Strait ridges	2.4%	44.3%	R	Representativity
Benthic communities, Greenland Sea abyssal Zoogeographic region	1.1%	15.7%	R	Representativity
Orca (<i>Orcinus orca</i>) summer feeding grounds, eastern North Atlantic	1.2%	6.0%	D	Important species and habitats/biotopes

Table 15. ArcNet Priority Conservation Area (PAC) 55 - conservation features and their relevance to OSPAR criteria (features with >10% proportion in the PAC selected).

Conservation Features	Proportion in the PAC	Conservation Target	Representative / Distinctive	Relevance to OSPAR
Benthic communities, VI.3.3. Lomonosov Ridge region ridges	96.2%	75.7%	R	Representativity
Benthic communities, VI.4.3. Mendeleev and Alpha ridges and plateaus region ridges	40.4%	100.0%	R	Representativity
Benthic communities, VI.3.2. Lomonosov Ridge region terraces	33.6%	43.5%	R	Representativity
Benthic communities, VI.3. Lomonosov Ridge and VI.3.1. Plateaus	23.5%	50.0%	R	Representativity
Benthic communities, VI.3.7. Lomonosov Ridge region canyons	19.5%	39.1%	R	Representativity

Benthic communities, Makarov Basin abyssal Zoogeographic region	17.0%	17.6%	R	Representativity
Benthic communities, Lomonosov Ridge Zoogeographic region	10.6%	15.2%	R	Representativity

Based on these data, all three PACs intersecting with ABNJ of OSPAR Region I – Arctic Waters are characterised by both regionally typical (representative) and rare/unique (distinctive) benthic communities, associated with different geomorphological features such as ridges, seamounts, abyssal plains, and banks.

GERANIUM

GERANIUM is a tool designed to assist stakeholders in making decisions on conservation measures in the context of existing and anticipated anthropogenic pressures. It visualises and quantifies conservation concerns and risks arising from industrial activities for selected areas in the Arctic. For the purpose of this report, OSPAR Region I was selected as a focus area for the analysis. Full Instant Report of the analysis is available in **Appendix 8-1**, including a list of activities ordered by relative overall concern, list of conservation features sorted by the relative overall concern level, and top conservation features sorted by coverage in the region.

According to the analysis, industrial activities that pose the highest potential threats in OSPAR Region I are offshore mining (52% relative overall concern level); dredge fishing (46.6%); dredging (40.2%); bottom trawling (39.1%); offshore oil & gas-condensate production (32.5%), and underwater oil & gas pipelines (32.4%).

A total of 293 conservation features were present in OSPAR Region 1, and of these, the following were showing the highest relative overall concern (>75%):

- Polar bear (*Ursus maritimus*), East Greenland subpopulation, denning grounds
- Polar bear (*Ursus maritimus*), Barents Sea subpopulation, denning grounds
- Polar bear (*Ursus maritimus*), Arctic Basin subpopulation, denning grounds
- Biological communities, salt marshes, Barents Sea
- Little auk (*Alle alle polaris*) breeding colonies
- Atlantic puffin (*Fratercula arctica naumanni*) breeding colonies
- Thick-billed murre (*Uria lomvia lomvia*) breeding colonies
- Little auk (*Alle alle alle*) breeding colonies, Spitsbergen
- Common murre (*Uria aalge aalge*) breeding colonies
- Biological communities, intertidal zone, Barents Sea

Furthermore, GERANIUM analysis is now also available for the Central Arctic Ocean ABNJ sector of OSPAR Region I (however, note that it needs to be run from a personal project space, which is publicly available upon request). Only 15 conservation features are featured for the area, including benthic communities in different locations within the area and the multiyear ice biological communities:

- Biological communities, Gakkel Ridge eastern flank mountains

- Biological communities, Gakkel Ridge central flank mountains
- Biological communities, Gakkel Ridge central rift mountains
- Biological communities, Gakkel Ridge eastern rift mountains
- Biological communities, vents
- Benthic communities, VII.2.4. Amundsen and Nansen basins abyssal mountains
- Benthic communities, VI.2.4. Gakkel Ridge and Ermak Plateau spreading ridges
- Benthic communities, VI.2.3. Gakkel Ridge and Ermak Plateau ridges
- Benthic communities, VI.2.6. Gakkel Ridge and Ermak Plateau rift valleys
- Benthic communities, VII.2.3. Amundsen and Nansen basins abyssal hills
- Benthic communities, VII.2.2. Amundsen and Nansen basins abyssal plains
- Benthic communities, Amundsen and Nansen Basins abyssal Zoogeographic region
- Glacial eelpout (*Lycodes frigidus*) home range
- Multiyear Ice biological communities, April, Central Arctic Ocean
- Multiyear Ice biological communities, September, Central Arctic Ocean

The offshore mining was noted as an activity that poses the highest potential threat in the area (88% relative overall concern). Full Instant Report of the analysis is available in **Appendix 8-2**.

Synthesis of Nomination Criteria

This section summarises the criteria to identify key conservation areas by different organisations in a comparative matrix, focusing on OSPAR MPA; BBNJ ABMT; CBD EBSA; IMO PSSA and FAO VME (**Table 16**). This matrix can help translate information from existing designations, such as CBD EBSA, to potential future OSPAR MPA or OECM nominations, and vice versa. This is not a fully comprehensive list, and other conservation tools can be added to the matrix in the future. This matrix is focused on area-based conservation tools that function as actual management or regulatory measures. ArcNet PACs, which result from systematic conservation planning exercises, and SVO areas, which are scientific recommendations, are not formal management measures and thus are not included here, but may inform future prioritisation and designation processes.

Table 16. Criteria used to designate management, conservation and other important areas identified by regional and international authorities.

OSPAR MPA/OECM	BBNJ ABMT	EBSA	PSSA	VME
	Biodiversity Beyond National Jurisdiction (Annex 1 of BBNJ Agreement)	Ecologically and Biologically Significant marine Areas (CBD)	Particularly Sensitive Sea Areas (IMO)	Vulnerable Marine Ecosystems (RFMOs)

OSPAR MPA/OECM	BBNJ ABMT	EBSA	PSSA	VME
Ecological criteria/considerations				
Threatened or declining species and habitats/biotopes	Importance for threatened, endangered or declining species or habitats	Importance for threatened, endangered or declining species or habitats		
Important species and habitats/biotopes	Special importance of the species found therein		Critical Habitat	
Ecological significance	• Uniqueness • Rarity • Special importance for the life history stages of species • Important ecological processes	• Uniqueness or Rarity • Special importance for life history stages of species	• Uniqueness or Rarity • Spawning or breeding grounds	• Uniqueness or Rarity • Functional significance of the habitat
	Ecological connectivity			
				Structural complexity
High natural biological diversity	Biological diversity and productivity	• Biological Productivity • Biological Diversity	Productivity	
Representativity	Representativeness			
	Dependency		Dependency	
Sensitivity	• Vulnerability, including to climate change and ocean acidification • Fragility • Sensitivity • Slow recovery and resilience	Vulnerability, Fragility, Sensitivity, or Slow recovery	Fragility	• Fragility • Life-history traits of component species that make recovery difficult
Naturalness	Naturalness	Naturalness	Naturalness	

OSPAR MPA/OECM	BBNJ ABMT	EBSA	PSSA	VME
Practical criteria/considerations				
Size			Integrity	
Potential for restoration				
Degree of acceptance				
Potential for success of management measures	Adequacy and viability			
Potential damage to the area by human activities	Cumulative and transboundary impacts		Vulnerable to impacts of international shipping	
Scientific value			• Research • Education • Baseline for monitoring studies	
	Economic and social factors		Human dependency And Social or economic dependency	
	Cultural factors		Cultural heritage	
	Replication			
	Sustainability of reproduction			
	Existence of conservation and management measures			

Areas and knowledge systems identified by Indigenous Peoples and organisations

Indigenous Peoples in the Arctic have a unique knowledge on sea-ice, lands, waters, animals and ecosystems, accumulated through generations (ICC, 2025). Indigenous Peoples rely heavily on the sea for sustenance, transport, cultural identity, and social well-being, and are increasingly sharing their environment with various human-driven activities like industrial projects, marine management, scientific research, shipping, and tourism. The escalation of these activities requires full and effective participation in decision-making and more frequent and meaningful engagement with these communities, which involves respect for their culture and inclusion of their knowledge in planning and decision-making (PAME, 2019). Research focused on water, wildlife, or ecosystems in the Arctic is often closely connected to the lives of Indigenous Peoples, so ethical implications must be considered even when the research does not directly involve Indigenous Peoples, as such work may still affect their rights, territories, or ways of life (Holmberg et al., 2025). Meaningful engagement varies across different actors and activities, and it is essential to tailor engagement efforts to accommodate the specific needs and expectations of the communities involved (PAME, 2019). This process includes defining the engagement's purpose and the issues to be discussed, ensuring both sides find the interaction substantive. In some cases, meaningful engagement is not just beneficial but mandated by laws or agreements, underlining its significance in harmonising external activities with the wellbeing, traditions and rights of Arctic Indigenous Peoples.

Climate change has significant direct impacts on Indigenous Peoples of the Arctic. Climate change is occurring in Sápmi at an especially rapid and pronounced pace, dramatically affecting weather patterns, temperature, precipitation, permafrost, ecosystems, and species distributions (Saami Council, 2023). These changes threaten the ecological foundations of Saami culture and livelihoods, including reindeer husbandry, fishing, hunting, berry harvest, and duodji (traditional craft) (Saami Council, 2023). Saami culture is highly vulnerable to climate-driven ecological shifts, with risks for loss of Arctic Indigenous Peoples' Knowledge, language, and landscape memory (Saami Council, 2023). Observed impacts include unstable seasons, unpredictable weather, loss of characteristic species, altered fish and game distributions, pervasive stress on reindeer husbandry, and increased mental and physical health burdens for Saami people, especially reindeer herders and youth (Saami Council, 2023). The Barents Sea supports a rich fishery for Atlantic cod, important for Saami fisheries. Disturbances to the fish stocks would have direct impacts on economy and life in the Saami fjord communities, thus affecting Saami culture, livelihoods and society (Saami Council, 2023). Similar observations have been made for the communities in northeast Greenland. The community of Ittoqqortoormiit, as presented in the study by Sandré et al. (2024b), experiences several significant changes due to variations in sea ice thickness and extent, which are primarily driven by climate change. These changes include:

- **altered seasonality:** The timing and stability of sea ice formation and melt are shifting, which affects the traditional seasonal activities of the community. This unpredictability in ice conditions influences when and how community members can engage in hunting and other activities that depend on stable ice.

- **impact on hunting practices:** The primary source of livelihood in Ittoqqortoormiit is subsistence hunting, which relies heavily on the presence of sea ice. Changes in the ice condition affect the availability of marine animals such as seals, walrus, and polar bears, which are traditional hunting targets. Additionally, the less predictable ice makes it riskier and sometimes impossible to access these hunting areas using traditional methods such as dog sleds and snowmobiles.
- **interactions with wildlife:** Thinning and retreating sea ice patterns have also altered the behaviour of wildlife, particularly polar bears, which are coming closer to human settlements in search of food. This increased proximity leads to more frequent and potentially dangerous interactions between polar bears and the community, affecting the safety and lifestyle of the residents.

The recent '*Oceans & Inuit Knowledge*' report by the Inuit Circumpolar Council, Greenland presents a unique compilation of Arctic Indigenous Peoples' Knowledge related to the North Water Polynya, located in the waters between Greenland and Canada in the Smith Sound area of Baffin Bay (ICC, 2025). The report provides a synthesis of perspectives of 42 Inuit fishers and hunters, collected through a series of meetings and workshops. The North Water Polynya is one of the largest and most biologically productive areas in the Arctic. The productivity of the North Water Polynya is crucial for a wide range of species including marine mammals, seabirds and fish. This abundance, in turn, supports the traditional lifestyle and economy of the Inuit communities who live along its shores by providing essential hunting and fishing grounds that are critical for their subsistence. While there is less published Indigenous Peoples' Knowledge on the North East Water Polynya in the Greenland Sea, it may support species, habitats, and ecological processes that are of indirect import to Inuit fishers further south. Some of the key messages from the '*Oceans and Inuit Knowledge*' report are also transferable to OSPAR Region I (ICC, 2025):

- Hunters and fishers are deeply reliant on **traditional economies**;
- Inuit continue to observe evidence of **climate change impacts** - changes in wind patterns, proliferation of hummocked ice that challenges navigation by dog sledge, long-term lack of sea ice coverage that can last over a year rather than a single season, and recession of local glaciers and inland ice, among other observations;
- The observed changes across nature and the environment **threaten critical species** populations, health, behaviour, normal occurrences, patterns and cycles - including for species that Inuit intimately depend on such as seals, whales and polar bears;
- Government-imposed management decisions are sidelining **wildlife management approaches** that are based on Inuit Knowledge - these approaches rely on community-wide sharing of knowledge on hunting grounds, traditional rules and laws;
- Communities call for **improvements to research governance** through more open, transparent, and cohesive consideration of ecosystems and species of importance, ensuring an approach guided by the community and through co-production of knowledge;
- Communities feel their perspectives, needs, and livelihoods are **overlooked by the government** and management authorities;

On narwhals and belugas:

- **Inuit communities, narwhals and belugas are intimately connected;**
- Special attention and respect is given to hunting narwhal and beluga because of their intelligence, family structure, and wary nature, and how Inuit interact with them is guided by Inuit Knowledge;
- Hunters are noticing **new body shapes and behaviours**, indicating possible population shifts, and visits from narwhals that are believed to belong to a Nunavut population not previously seen.

On polar bears:

- Inuit continue to rely on polar bears for meat and fur;
- Inuit Knowledge allows hunters to **identify the polar bear's sex, age, and health indicators** even when they are not being hunted;
- Inuit note an **increase in the number** of polar bears in the region, leading to close encounters and public safety concerns;
- The communities call for the **reform of polar bear management**, including changes to the quotas and other hunting restrictions.

Indigenous Peoples have particularly strong connections with the Arctic marine mammals, such as polar bears, narwhals and belugas, which play a critical role in their livelihood and economies. Narwhals and belugas play a vital and irreplaceable role in every community (ICC, 2025). When these animals are hunted, their meat and *mattak* (the skin and blubber) are distributed widely, so even a single narwhal can provide for many people. Regarding belugas, Inuit remember that they usually migrate north past Upernavik in spring, but environmental changes since 2000 have made them harder to reach by boat as their migration routes have shifted farther offshore (ICC, 2025). Belugas are also seen migrating with their young calves during this period. Traditionally, belugas would head south again in October and November, but recently their migration patterns have become much less predictable than in previous decades. By contrast, narwhals are observed around Upernavik throughout the year due to their habit of surfacing for air more often. Hunters have noticed more variation among narwhals, with some now appearing shorter or having differently shaped fins, which could suggest different groups or subspecies (ICC, 2025). Some narwhal populations have grown and travel with calves, but hunters have to stop hunting because of strict quotas. The increase in narwhal numbers is noted to have a negative impact on the halibut population, as female narwhals may consume up to 35 kg of halibut per day. As narwhal numbers rise, they are eating even more halibut - fishers, who contributed in the workshop which lead to generation of the report, have unanimously called for an increase in narwhal and beluga quotas in recognition of the relationship imbalance between whales and halibut (ICC, 2025).

A study by Sandell and Sandell (1996) highlights the critical role of polar bear hunting in Itoqortoormiit, noting its significance in the community's subsistence economy and cultural identity since its establishment in 1925. The study details how legislative changes and technological advancements have influenced hunting practices, adapting to new conservation measures while maintaining traditional activities. Polar bear hunting not only provides essential economic benefits but also confers social prestige, underscoring its enduring importance in local cultural practices amidst environmental and regulatory shifts. The study by Sandré et al. (2024a)

explores the epistemic injustices in species at risk assessments through the case study of narwhal management in Ittoqqortoormiit. It highlights how local resistance to narwhal hunting quotas stems not merely from a desire to preserve economic resources or traditional practices, but also as a response to the systematic exclusion of local knowledge from decision-making processes. This has led to tensions between scientific assessments and local value systems, **underlining the urgent need for incorporating local narratives into wildlife management to ensure both ecological sustainability and inclusivity of Indigenous Peoples.**

There are important examples of how co-creation of knowledge with Indigenous knowledge holders has significantly enhanced marine resource management and conservation. Lessons from such initiatives can inform conservation strategies not only in coastal zones, but also in the broader context of ABNJ where governance complexities and large-scale ecological processes require collaborative approaches. One such example is the BIRGEJUPMI Project⁷⁵, an international, community-driven effort that strengthens Indigenous Peoples knowledge and environmental governance in Arctic coastal regions of Sápmi and Greenland, grounded in the Saami concept of ‘birgejupmi’ for sustainability and reciprocity with nature. Work Package 5 exemplifies this integrated approach by uniting Saami knowledge with scientific and local expertise to address issues like invasive species and seal conservation through participatory resource management. By engaging Indigenous Peoples in policy co-creation, BIRGEJUPMI demonstrates how weaving Arctic Indigenous Peoples knowledge into coastal management can inform broader conservation frameworks, including for ABNJ. These methods are also widely reflected in other initiatives across the Arctic. Notable examples include the PISUNA project’s co-management of living resources in Greenland⁷⁶, BuSK’s participatory land use planning⁷⁷, and the ArcticHubs project⁷⁸, which addresses multiple stakeholder perspectives. These and similar initiatives demonstrate a broader trend toward inclusive coastal governance and the co-production of knowledge in Arctic environmental management.

Recommendations on the meaningful engagement with the Indigenous Peoples

In the Vigo Declaration agreed at the OSPAR Ministerial Meeting in June 2025⁷⁹, OSPAR reaffirmed its strong commitment to the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) and committed to the meaningful engagement of Arctic Indigenous Peoples in its work. This represents a significant step in integrating Indigenous rights and perspectives into OSPAR’s regional marine environmental governance.

Importantly and relevant to the present task, the BBNJ Agreement outlines several modalities to ensure Indigenous Peoples’ participation, many of which can help act as guiding principles for the present specific task including:

- the Agreement requires that Indigenous Peoples’ Knowledge be considered in the establishment of ABMTs including MPAs and involved in ABMTs at every stage from

⁷⁵ <https://birgejupmi.eu/>

⁷⁶ https://pisuna.org/uk_project.html

⁷⁷ <https://busk.interreg-npa.eu/>

⁷⁸ <https://projects.luke.fi/arctichubs/>

⁷⁹ https://www.ospar.org/site/assets/files/36552/vigo_declaration_2025-1.pdf

consultation and proposals (see Article 18) to monitoring and reviewing (Article 21) (Tugenda, 2021)

- Indigenous Peoples' Knowledge should only be accessed with the free, prior and informed consent (FPIC) or approval and involvement of the relevant Indigenous Peoples;
- the BBNJ Agreement preamble recalls the UN Declaration on the Rights of Indigenous Peoples (UNDRIP) that ensures the Agreement does not diminish or extinguish existing indigenous rights;
- the Agreement establishes a Clearing House Mechanism to facilitate the sharing of data, including Indigenous Peoples' Knowledge; however, any work involving Indigenous Peoples' Knowledge such as the present task should also respect the right of Indigenous Peoples to not have their knowledge shared in a digital platform (e.g., digital rights; Friedman, 2025).

The Inuit Circumpolar Council (ICC) offers the following definition of for Indigenous Knowledge:

'Indigenous Knowledge is a systematic way of thinking applied to phenomena across biological, physical, cultural and spiritual systems. It includes insights based on evidence acquired through direct and long-term experiences and extensive multigenerational observations, lessons and skills. It has developed in a living process, including knowledge acquired today and in the future, and it is passed on from generation to generation'.

Notably, Indigenous People's perspectives and knowledge systems have long recognised that coastal and marine ecosystems including those in ABNJ are interconnected and seasonal or cyclical, with connections established through oceanographic, ecological and cultural pathways (Popova et al., 2019), with Indigenous Peoples' Knowledge, cultural practices, stewardship, and subsistence use of migratory species (Mulalap et al., 2020). Complementing scientific data with Indigenous Peoples' Knowledge on connectedness of processes, nutrients, and species such as migratory species' life histories, migratory routes, predator-prey relationships and habitat preferences can help identify candidate important sites in ABNJ (Tugenda, 2021). Likewise, anthropogenic impacts are understood to extend and be connected beyond boundaries, affecting biodiversity and ecosystem services within Indigenous Peoples' traditional and coastal territories and adjacent waters. Indigenous Peoples' Knowledge of a given area is valuable in the overall ABMT process from identifying a candidate area for an MPA, to area-based monitoring and management (Tugenda, 2021). Thus, participation of Indigenous Peoples in this task is crucial.

Indigenous governments primarily take the lead in ecosystem conservation through Indigenous laws, governance, and knowledge systems, as outlined by the Indigenous Circle of Experts (ICE). IPCAs (Indigenous Protected and Conserved Areas) are defined by ICE as varying in objectives but all share three core features: they are Indigenous-led, symbolise a long-term conservation commitment, and promote Indigenous rights and responsibilities (PAME, 2025). An illustrative initiative is the Arqviit IPCA Establishment Project in the Hudson Bay region, spearheaded by the Nunavik Inuit to protect the Ottawa Islands' ecosystems and vital polar bear habitat, while boosting local management capacity and economic opportunities (PAME, 2025). Although there are no IPCAs in ABNJ, the designation process shows a valuable example of inclusion of Indigenous Peoples' Knowledge into marine conservation and management.

Ethical, respectful, and mutually beneficial collaborations between researchers and Indigenous communities are essential for producing relevant Arctic research. However, navigating these collaborations can be challenging due to a history of colonialism in research and the absence of formal guidelines in many Indigenous communities. The 'Ethical Collaborations in Arctic Research: Guidance for Researchers and Indigenous Communities' report, produced by the Saami Council, Ikaarvik, and the Research Institute for Sustainability in 2025 (Holmberg et al., 2025), offers practical guidance for researchers and Arctic Indigenous communities aiming to build ethical, respectful partnerships in research. Although the report focuses specifically on research, the fundamental principles of ethical collaboration described in the report are also relevant for the present task. The key findings of the report included (Holmberg et al., 2025):

- Indigenous Peoples have inherent rights to land, knowledge, and self-determination, which must be recognised and respected in all research.
- Arctic research is shaped by a legacy of colonialism and power imbalances; researchers must be aware of these histories and prioritise Indigenous rights, perspectives, and community priorities in all research.
- There is no single approach: every community is unique, so effective collaboration depends on listening, flexibility, and adapting to local protocols and needs.
- Co-creation and data sovereignty are essential: research must integrate Indigenous and Western knowledge systems from the start, with Indigenous communities retaining control over their data and knowledge.
- Trust-building and reflexivity matter: successful research partnerships require ongoing relationship-building, self-reflection on the part of researchers, and clear, jointly developed agreements on roles, responsibilities, and benefits.
- Practical support: the report provides reflective questions, tools for dialogue, and examples to help both researchers and communities achieve meaningful and mutually beneficial collaboration throughout the entire research process.

The Circumpolar Inuit Protocols for Equitable and Ethical Engagement (EEE Protocols), developed by the Inuit Circumpolar Council (ICC), provide a comprehensive framework for ethically and equitably engaging with Inuit (ICC, 2022). They address historic exclusion and call for genuine partnerships that recognise Inuit rights, knowledge, and self-determination. The protocols are grounded in Inuit values such as respect, cooperation, sharing, patience, and a holistic worldview that sees all aspects of the Arctic environment and knowledge as interconnected. These values are central to Inuit survival, governance, and knowledge transmission. The document sets out eight main protocols (ICC, 2022):

1. 'Nothing About Us Without Us' – ensure Inuit are engaged in all matters affecting them.
2. Recognise Indigenous Knowledge as distinct and valid in its own right.
3. Practice good governance that is transparent, inclusive, and responsive to Inuit priorities.
4. Communicate with intent, using culturally appropriate and inclusive methods.
5. Exercise accountability and build trust through responsible engagement.
6. Build meaningful, mutually beneficial partnerships.
7. Respect Inuit ownership, control, and sharing of information and data.

8. Equitably fund Inuit representation and knowledge, ensuring proper resourcing and compensation.

These protocols are intended for researchers, policy-makers, funders, governments, and international organisations engaging with or conducting work related to Inuit. They emphasise active Inuit leadership and participation at all stages, and are meant to complement local or regional Inuit protocols. The protocols advocate for a fundamental change in how institutions interact with Inuit — moving from extractive or tokenistic practices to true partnership and recognition of Inuit as rights-holders and decision-makers. Implementation of the protocols is vital to support Inuit sovereignty, self-determination, and effective, ethical engagement, setting a new standard for research and policy in the Arctic (ICC, 2022).

As part of implementing this task, introductory meetings were held with representatives from the ICC and the Saami Council to discuss recommendations for ensuring Arctic Indigenous Peoples' knowledge relevant to the Task Group's can guide OSPAR's future work; the main take-away messages from these meetings were as follows:

- Indigenous Knowledge is dynamic by nature and linked to lived experiences, therefore 'static' publications don't always represent it in the best way. Recommendations have been given to consider **knowledge holder forum** or **sharing circle** as a format of acquiring additional input moving forward – this is a format that is widely implemented in the UN system, for example in the Local Communities and Indigenous Peoples Platform (LCIPP) Knowledge Holders' Forum under the UNFCCC or the UN Permanent Forum on Indigenous Issues (UNPFII).
- OSPAR should carry out **consultations with Indigenous Peoples** prior to designating MPAs in ABNJ of Arctic Waters. It has been noted that the consultation should allow sufficient time for meaningful engagement and be carried out in an appropriate format to enable open dialogue. Early notification can help provide Indigenous Peoples with the information necessary to participate in meaningful engagement. It has been noted that the timing of any consultation process should be chosen carefully to avoid hunting and fishing seasons, and the format should allow in-person contributions (e.g., via town hall meetings), rather than written comments to a report produced in English.
- Additional insights into the Indigenous Peoples' Knowledge, particularly concerning the communities of Tasiilaq and Iltoqqortoormiit on the eastern coast of Greenland, may be available in publications from the University of Greenland. However, it should be noted that some of these documents may be in Danish, and translating these texts was beyond the scope of this study. Similarly, published resources by Saami organisations (such as Bivdu or Mearrasiidá) and the Sámi Parliament in Norway are typically in Norwegian or Saami. Resourcing and other capacity needs should be considered to ensure this body of knowledge across all systems is considered as fully as possible in the prioritisation and selection of sites to progress through the process of being established as an MPA or OECM in ABNJ.

Some further recommendations include:

- **Seek ongoing guidance from representatives of Indigenous Peoples' Organisations:** All future work should be guided by direct input from Indigenous Peoples' Organisations representatives participating in the Arctic Task Group, as well as from Contracting Parties with Indigenous populations. Their advice should shape both process and content in identifying, acquiring and addressing additional Arctic Indigenous Peoples' Knowledge relevant to the work of the Task Group.
- **Leverage existing Indigenous expertise and representation within Contracting Parties and competent authorities in the Arctic region.** This approach ensures that institutional knowledge and existing networks support the integration of Indigenous Knowledge at all stages of site identification, assessment, and management.

Criteria-based characterisation of the candidate sites

The present section provides a synthesis of information on the MPA and OECM ecological criteria for the 4 candidate conservation sites in OSPAR Region I - Arctic Waters (**Figure 67**):

1. Central Arctic Ocean multi-year Arctic sea ice habitat
2. Central Barents Sea
3. Arctic Mid-Ocean Ridge
4. Imarssuak Sea Channel

The summary tables below provide information on conservation features, including level of confidence and source of data, for each of the sites.

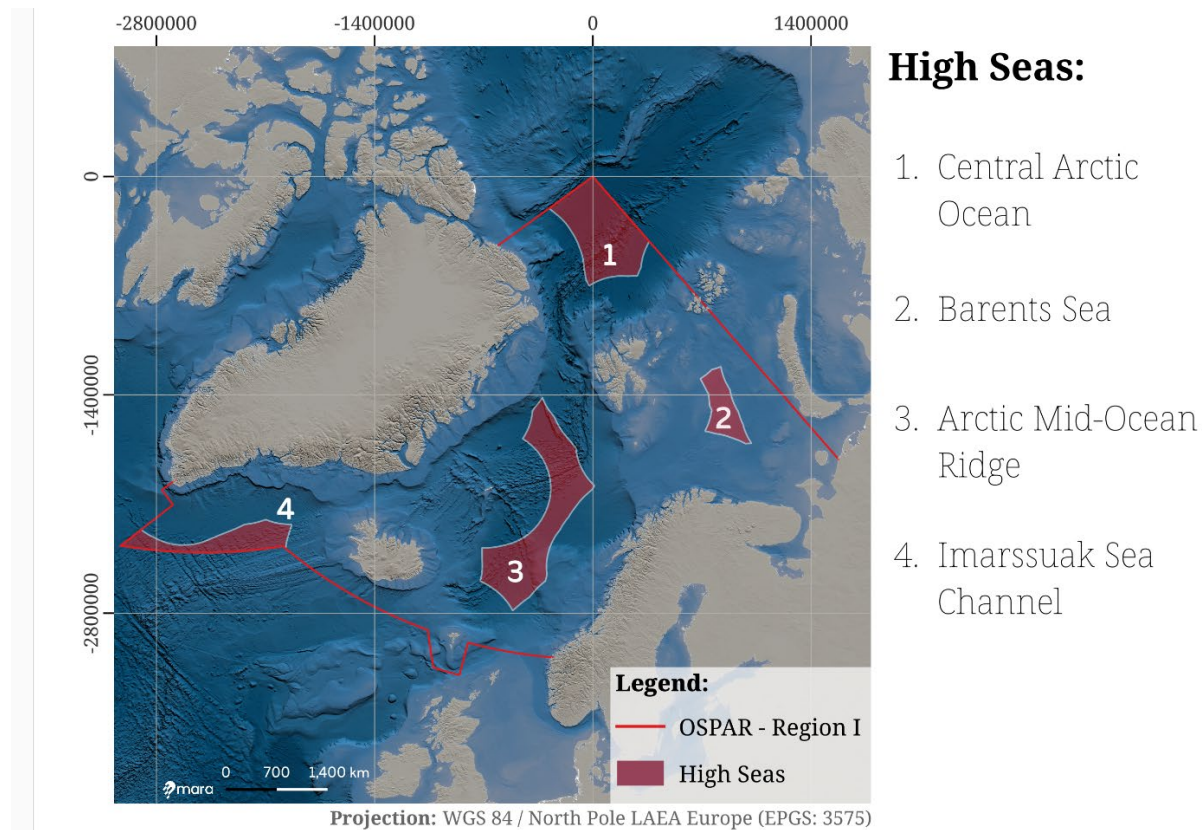


Figure 67. Candidate conservation priority sites in OSPAR Region I.

Site 1 - Central Arctic Ocean

This site encompasses the multi-year Arctic sea ice habitat of the Central Arctic Ocean, characterised by permanent ice cover over deep waters and supporting unique ice-associated flora and fauna. It provides vital spawning, nursery, and feeding grounds for polar cod and Arctic cod; serves as a year-round habitat and migration corridor for polar bear, ivory gull, bowhead whale, beluga, narwhal, Brünnich's guillemot, and several seal species. The seafloor area of the site corresponds to the Gakkel ridge and includes features such as deep-sea sponge aggregations, seamounts, hydrothermal vent fields, and sea-pen communities. The area is noted for its high natural biological diversity, distinct benthic and pelagic communities, year-round ecological functions, and exceptional sensitivity to climate change. **Table 17** below provides a detailed overview of conservation features corresponding to MPA and OECM ecological criteria / consideration criteria for this site.

Table 17. Summary matrix of conservation features according to MPA and OECM ecological criteria / consideration for the candidate Site 1 - Central Arctic Ocean.

	Conservation feature	Level of confidence	Source of data
MPA and OECM ecological criteria / consideration			
Threatened or declining species and habitats/biotopes	Ivory gull (<i>Pagophila eburnea</i>): under threat and /or in decline in OSPAR Region I. Pack ice of the Central Arctic Ocean serves as summer and post-breeding feeding grounds.	High	AMAP/CAFF/SDWG, 2013
	Black-legged kittiwake (<i>Rissa tridactyla</i>): under threat and /or in decline in OSPAR Region I. Feeds in the marginal ice zones.	High	SEATRACK database
	Brünnich's guillemot (<i>Uria lomvia</i>): under threat and /or in decline in OSPAR Region I. Large spring aggregations and feeding flocks in leads and marginal ice zone.	Medium	Meld. St. 21 (2023–2024) Report to the Storting
	Bowhead whale (<i>Balaena mysticetus</i>): under threat and /or in decline in OSPAR Region I. Endemic Arctic species, highly adapted to Arctic environments and relies on sea ice for protection from predators, seasonally foraging near ice edges where food is abundant, and using ice-covered waters as key habitats throughout its life cycle.	High	Hamilton et al., 2022
	Blue whale (<i>Balaenoptera musculus</i>): summer feeding in the marginal ice zone.	Medium	Meld. St. 21 (2023–2024) Report to the Storting

	Conservation feature	Level of confidence	Source of data
	Seamounts: under threat and /or in decline in OSPAR Region I. Eight distinct seamounts identified along the Gakkel Ridge.	High	GEBCO, 2025; OSPAR Habitat Point Data 2025
	Oceanic Ridges with Hydrothermal Vents: three vent fields known on the Gakkel Ridge.	High	Inter Ridge Vents Database; ICES, 2025
	Deep-Sea Sponge Aggregations: under threat and /or in decline in OSPAR Region I. Undisturbed benthic habitats on soft sediment and rocky substrates, likely present on the Gakkel Ridge.	Medium	Meld. St. 21 (2023–2024) Report to the Storting
	Sea-Pen & Burrowing Megafauna Communities: known in deep waters along the Gakkel Ridge.	Medium	Meld. St. 21 (2023–2024) Report to the Storting
Important species and habitats/biomes	Multi-year Arctic sea ice habitat: critically endangered, supporting unique ice flora and fauna.	High	Meld. St. 21 (2023–2024) Report to the Storting; CBD EBSA; AMAP/CAFF/SDWG, 2013
	Polar bear (<i>Ursus maritimus</i>): year-round habitat on sea ice; denning on coastal islands and fast ice.	High	Meld. St. 21 (2023–2024) Report to the Storting; Hamilton et al., 2022; AMAP/CAFF/SDWG, 2013
	Beluga (<i>Delphinapterus leucas</i>) and narwhal (<i>Monodon monoceros</i>): year-round residents, feeding and migrating in ice-covered and marginal ice zone areas.	High	Meld. St. 21 (2023–2024) Report to the Storting; Hamilton et al., 2022; AMAP/CAFF/SDWG, 2013
	Fin whale (<i>Balaenoptera physalus</i>), humpback whale (<i>Megaptera novaeangliae</i>), minke whale (<i>Balaenoptera acutorostrata</i>), orca (<i>Orcinus orca</i>): summer feeding in the marginal ice zone.	Medium	Meld. St. 21 (2023–2024) Report to the Storting
	Harp seal (<i>Pagophilus groenlandicus</i>) and ringed seal (<i>Pusa hispida</i>): whelping, moulting, and hauling out on sea ice.	Medium	Meld. St. 21 (2023–2024) Report to the Storting
	Polar cod (<i>Boreogadus saida</i>): spawning, nursery, and feeding grounds in ice-covered and marginal ice zone waters.	High	Meld. St. 21 (2023–2024) Report to the Storting; AMAP/CAFF/SDWG, 2013; ABDS

	Conservation feature	Level of confidence	Source of data
	Arctic cod (<i>Arctogadus glacialis</i>): pelagic species using the marginal ice zone as nursery and feeding habitat.	Medium	Meld. St. 21 (2023–2024) Report to the Storting
	Little auk (<i>Alle alle</i>): feeding in the marginal ice zone and adjacent waters during breeding season.	Medium	Meld. St. 21 (2023–2024) Report to the Storting
	Fulmar (<i>Fulmarus glacialis</i>), glaucous gull (<i>Larus hyperboreus</i>), kittiwake (<i>Rissa tridactyla</i>): present year-round, utilise marginal ice zone for feeding.	Medium	Meld. St. 21 (2023–2024) Report to the Storting
Ecological significance	Summer feeding area for polar bears from several subpopulations.	High	AMAP/CAFF/SDWG, 2013
	Summer and post-breeding feeding area for ivory and Ross's gulls.	High	AMAP/CAFF/SDWG, 2013
	Spawning, nursery, and feeding grounds: - Polar cod (<i>Boreogadus saida</i>) spawn, grow, and feed in ice-covered and marginal ice zone waters. - Arctic cod (<i>Arctogadus glacialis</i>) use the marginal ice zone as nursery and feeding habitat.	High	Meld. St. 21 (2023–2024) Report to the Storting
	Feeding grounds for seabirds: - Brünnich's guillemot forms large spring aggregations and feeding flocks in leads and marginal ice zone. - Little auk feeds in the marginal ice zone and adjacent waters during breeding season. - Black guillemot is present year-round, feeding along ice edges and leads. - Fulmar, glaucous gull, and kittiwake utilise the marginal ice zone for feeding year-round.	High	Meld. St. 21 (2023–2024) Report to the Storting; AMAP/CAFF/SDWG, 2013
	Feeding and migration habitat for marine mammals: - Bowhead whale uses the marginal ice zone for feeding and migration. - Beluga and narwhal are year-round residents, feeding and migrating in ice-covered and marginal ice areas. - Blue whale, fin whale, humpback whale, minke whale, and orca use the marginal ice zone for summer feeding.	High	Meld. St. 21 (2023–2024) Report to the Storting; AMAP/CAFF/SDWG, 2013

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	Conservation feature	Level of confidence	Source of data
	Harp seal and ringed seal use sea ice for whelping, moulting, and hauling out.		
High natural biological diversity	- Arctic zooplankton: high productivity areas, key prey for fish, seabirds, and marine mammals in the marginal ice zone. - Often higher biodiversity compared to annual ice in specific localities. - Diverse benthic megafauna communities thrive under the influence of ice cover, particularly on Gakkel ridge.	High	Meld. St. 21 (2023–2024) Report to the Storting CBD EBSA
Representativity	In the OSPAR maritime area, the combination of permanent ice cover over deep waters is unique. The site is representative of ice-associated habitats in the high Arctic.	High	CBD EBSA
Sensitivity	Extremely vulnerable for a warming climate and human activities in general. Multi-year ice has been declining rapidly over the last 30 years, both in extent and age.	High	CBD EBSA
Naturalness	Very low impact from human activities (but vulnerable for climate change, already acting).	High	CBD EBSA
Pan-Arctic systematic conservation planning analysis			
Identified as PAC by ArcNet	Yes, the site overlaps with PAC 55 and PAC 28.		
Other conservation measures			
Recognised as an EBSA by CBD	Yes – the area corresponds to EBSA ‘Multi-year Ice of the Central Arctic Ocean’.		
Recognised as IMMA by IUCN	No.		
Recognised as area of heightened ecological significance by the Arctic Council	Yes – the site overlaps with area 67 (Pack Ice).		
Recognised as an SVO in Norway	Yes – the site overlaps with SVO BH1 (sea areas surrounding Svalbard) and BH2 (marginal ice zone).		

Site 2 - Central Barents Sea

Candidate site 2 in OSPAR Region I - Arctic Waters, corresponds to the Central Barents Sea, covering the southern Central Bank and extending towards Novaya Zemlya. In spring, the polar front and ice edge largely coincide in the western and central parts of the region, forming a highly productive marginal ice zone. This area serves as a main wintering ground for the Barents Sea capelin stock, which is an important food source for harp seals, seabirds, and other marine predators. Polar bears are concentrated in the marginal ice zone during spring and early summer, following the receding ice edge north and east. The Central Barents Sea is also a gathering and moulting site for seabirds from colonies across the region, as well as an important wintering and migration corridor for species such as thick-billed murre, puffins, glaucous gulls, and kittiwakes. Each spring and summer, the area supports abundant feeding opportunities for adult fish, seabirds, and marine mammals, resulting in a high richness of fish species and high biological productivity and biodiversity, particularly during post-breeding and moulting periods for seabirds. Notably, the Central Barents Sea also overlaps with the North Atlantic Humpback Whale: Migratory Corridor IMMA, providing an important route for migrating humpback whales. Deep-sea habitats in the area include records of coral gardens and deep-sea sponge aggregations. **Table 18** below provides a detailed review of conservation features corresponding to MPA and OECM ecological criteria / consideration criteria for this site.

Table 18. Summary matrix of conservation features according to MPA and OECM ecological criteria / consideration for the candidate Site 2 - Central Barents Sea.

	Conservation feature	Level of confidence	Source of data
MPA and OECM ecological criteria / consideration			
Threatened or declining species and habitats/biotopes	Ivory gull (<i>Pagophila eburnea</i>): under threat and /or in decline in OSPAR Region I. Breeding colonies on sea ice edges; feeding at ice margins.	Medium	Meld. St. 21 (2023–2024) Report to the Storting
	Black-legged kittiwake (<i>Rissa tridactyla</i>): under threat and /or in decline in OSPAR Region I. Spring feeding grounds.	High	Meld. St. 21 (2023–2024) Report to the Storting; SEATRACK
	Brünnich's guillemot (<i>Uria lomvia</i>): post-breeding moulting and wintering flocks feed in the area, part of the swimming migration route.	High	AMAP/CAFF/SDWG, 2013; Meld. St. 21 (2023–2024) Report to the Storting; SEATRACK
	Bowhead whale (<i>Balaena mysticetus</i>): under threat and /or in decline in OSPAR Region I. Feeding and migratory grounds in open water and near sea ice.	Medium	Meld. St. 21 (2023–2024) Report to the Storting

	Conservation feature	Level of confidence	Source of data
	Blue whale (<i>Balaenoptera musculus</i>): summer feeding in the marginal ice zone.	High	Meld. St. 21 (2023–2024) Report to the Storting; Pike et al., 2009
	Cod (<i>Gadus morhua</i>): larvae settle on the bottom here in winter; adults feed in the area.	Medium	Meld. St. 21 (2023–2024) Report to the Storting
	Deep-Sea Sponge Aggregations: under threat and /or in decline in OSPAR Region I. Undisturbed benthic habitats on soft sediment and rocky substrates.	High	OSPAR Habitat Point Data 2025; Meld. St. 21 (2023–2024) Report to the Storting
	Sea-Pen & Burrowing Megafauna Communities: known in deep waters.	Medium	Meld. St. 21 (2023–2024) Report to the Storting
	Coral gardens: records from the Central Barents Sea.	High	OSPAR Habitat Point Data 2025
Important species and habitats/biotopes	North Atlantic Humpback Whale (<i>Megaptera novaeangliae</i>): Migratory Corridor and summer feeding grounds.	High	IUCN IMMA; NAMMCO, 2022
	Polar bear (<i>Ursus maritimus</i>): feeding area; denning on fast ice.	High	AMAP/CAFF/SDWG, 2013; Meld. St. 21 (2023–2024) Report to the Storting
	Beluga (<i>Delphinapterus leucas</i>): year-round residents, feeding and migrating in ice-covered and marginal ice zone areas.	High	Meld. St. 21 (2023–2024) Report to the Storting; Institute of Marine Research, Norway
	Fin whale (<i>Balaenoptera physalus</i>), humpback whale (<i>Megaptera novaeangliae</i>), minke whale (<i>Balaenoptera acutorostrata</i>), orca (<i>Orcinus orca</i>): summer feeding in the marginal ice zone.	High	Meld. St. 21 (2023–2024) Report to the Storting; NAMMCO, 2022
	Harp seal (<i>Pagophilus groenlandicus</i>): whelping, moulting, and hauling out on sea ice.	High	Meld. St. 21 (2023–2024) Report to the Storting; Hamilton et al., 2022
	Polar cod (<i>Boreogadus saida</i>): spawning and nursery grounds in coastal waters and under sea ice.	Medium	Meld. St. 21 (2023–2024) Report to the Storting
	Capelin (<i>Mallotus villosus</i>): seasonal feeding grounds in open water.	Medium	AMAP/CAFF/SDWG, 2013; Meld. St. 21 (2023–2024) Report to the Storting

	Conservation feature	Level of confidence	Source of data
	Arctic cod (<i>Arctogadus glacialis</i>): pelagic species using the marginal ice zone as nursery and feeding habitat.	Medium	Meld. St. 21 (2023–2024) Report to the Storting
	Haddock (<i>Melanogrammus aeglefinus</i>): larvae settle on the bottom here in winter; adults feed in the area.	Medium	Meld. St. 21 (2023–2024) Report to the Storting
	Little auk (<i>Alle alle</i>): feeding in the marginal ice zone and adjacent waters during breeding season.	Medium	Meld. St. 21 (2023–2024) Report to the Storting
	Black guillemot (<i>Cepphus grylle</i>): year-round presence, feeding along ice edges and leads.	Medium	Meld. St. 21 (2023–2024) Report to the Storting
	Common guillemot (<i>Uria aalge</i>): post-breeding moulting and wintering flocks feed in the area.	Medium	Meld. St. 21 (2023–2024) Report to the Storting
	Puffin (<i>Fratercula arctica</i>): autumn and winter distribution and feeding area.	High	Meld. St. 21 (2023–2024) Report to the Storting; SEATRACK
	Glaucous gull (<i>Larus hyperboreus</i>): autumn and winter feeding area.	Medium	Meld. St. 21 (2023–2024) Report to the Storting
	Fulmar (<i>Fulmarus glacialis</i>): red-listed species, feeding and present year-round.	High	Meld. St. 21 (2023–2024) Report to the Storting; SEATRACK
Ecological significance	Feeding area - polar bear and harp seal.	High	AMAP/CAFF/SDWG, 2013
	Feeding area for seabirds.	High	AMAP/CAFF/SDWG, 2013
	Seabird wintering area.	High	AMAP/CAFF/SDWG, 2013
	Moulting area and swimming migration auks.	High	AMAP/CAFF/SDWG, 2013
	High richness and diversity of fish species: area acts as a feeding, nursery, and settlement ground for multiple fish and invertebrates.	Medium	Meld. St. 21 (2023–2024) Report to the Storting
	Migratory corridor for humpback whales.	High	IUCN IMMA
High natural biological diversity	- Arctic zooplankton: high productivity areas, key prey for fish, seabirds, and marine mammals in the marginal ice zone. - Diverse benthic fauna: unique communities vulnerable to seabed disturbance.	Medium	Meld. St. 21 (2023–2024) Report to the Storting

	Conservation feature	Level of confidence	Source of data
	High richness and diversity of fish species: area acts as a feeding, nursery, and settlement ground for multiple fish and invertebrates.		
Representativity	Benthic and pelagic communities are representative of the wider Barents Sea Large Marine Ecosystem.	Medium	AMAP/CAFF/SDWG, 2013
Sensitivity	- Benthic communities: Highly vulnerable to bycatch, abrasion, invasive species, habitat loss, and climate change. - Early life stages of fish: Highly vulnerable to pollution. - Seabirds: Highly vulnerable to bycatch, disturbance from human presence, litter, pollution (including oil), and climate change.	Medium	AMAP/CAFF/SDWG, 2013; Meld. St. 21 (2023–2024) Report to the Storting
Naturalness	Requires further assessment.		
Pan-Arctic systematic conservation planning analysis			
Identified as PAC by ArcNet	No.		
Other conservation measures			
Recognised as an EBSA by CBD	No.		
Recognised as IMMA by IUCN	Yes – the site overlaps with the North Atlantic Humpback Whale Migratory Corridor IMMA.		
Recognised as area of heightened ecological significance by the Arctic Council	Yes – the site overlaps with area 22 (Western and central Barents Sea) and 23 (Northern Barents Sea - marginal ice zone).		
Recognised as an SVO in Norway	Yes – the site overlaps with SVO BH1 (sea areas surrounding Svalbard) and BH2 (marginal ice zone).		

Site 3 - Arctic Mid-Ocean Ridge

The candidate Site 3 is situated on the Arctic Mid-Ocean Ridge system and includes ridges such as the Mohns Ridge and the Ægir Ridge. The site features hydrothermal vents, seamounts, coral gardens, and deep-sea sponge aggregations, all recognised as threatened or declining habitats by OSPAR. The site provides spawning and nursery areas for slow-growing, vulnerable fish species, and offers migratory corridors and feeding grounds for marine mammals such as the North Atlantic humpback whale and bottlenose whale, with deep-diving whale species utilising abundant mesopelagic prey. Notably, the area overlaps with the North Atlantic Humpback Whale Migratory Corridor Important Marine Mammal Area (IMMA) as identified by the IUCN. The region is characterised by high productivity, year-round reservoirs of key zooplankton (such as *Calanus* species), and includes whelping grounds for ice-associated seals, but remains sensitive to bottom disturbance, habitat loss, and climate change. **Table 19** below summarises information about the conservation features at the site according to OSPAR ecological criteria for MPA and OECM designation.

Table 19. Summary matrix of conservation features according to MPA and OECM ecological criteria / consideration for the candidate Site 3 - Arctic Mid-Ocean Ridge.

	Conservation feature	Level of confidence	Source of data
MPA and OECM ecological criteria / consideration			
Threatened or declining species and habitats/biotopes	Oceanic Ridges with Hydrothermal Vents: support unique communities of benthic organisms.	High	Inter Ridge Vents Database; Meld. St. 21 (2023–2024) Report to the Storting
	Seamounts: under threat and /or in decline in OSPAR Region I. Provide spawning and nursery areas for slow-growing, vulnerable fish species.	High	GEBCO, 2025; Meld. St. 21 (2023–2024) Report to the Storting
	Coral Gardens: under threat and /or in decline in OSPAR Region I. Undisturbed benthic habitats on the ridge and seamounts, high species richness, especially along Ægir Ridge.	High	Meld. St. 21 (2023–2024) Report to the Storting
	Deep-Sea Sponge Aggregations: under threat and /or in decline in OSPAR Region I. Undisturbed benthic habitats on the ridge and seamounts, particularly along Ægir Ridge.	High	Brix et al., 2022; Meld. St. 21 (2023–2024) Report to the Storting

	Conservation feature	Level of confidence	Source of data
Important species and habitats/biotopes	North Atlantic humpback whale (<i>Megaptera novaeangliae</i>): Migratory Corridor and summer feeding grounds.	High	IUCN IMMA; NAMMCO, 2022
	Hydrothermal vent fauna (including chemosynthetic species): endemic communities found exclusively at active and inactive vent fields.	Medium	Inter Ridge Vents Database; Meld. St. 21 (2023–2024) Report to the Storting
	Bottlenose whale (<i>Hyperoodon ampullatus</i>): important potential summer feeding area.	Medium	Meld. St. 21 (2023–2024) Report to the Storting
	Glacier lantern fish (<i>Benthoosema glaciale</i>), silvery lightfish (<i>Maurolicus muelleri</i>), spotted barracudina (<i>Arctozenus risso</i>): year-round mesopelagic inhabitants, important prey for whales.	Medium	Meld. St. 21 (2023–2024) Report to the Storting
	Krill, amphipods, copepods, cephalopods: abundant mesopelagic and deep-water prey species.	Medium	Meld. St. 21 (2023–2024) Report to the Storting
	Sperm whale (<i>Physeter macrocephalus</i>), fin whale (<i>Balaenoptera physalus</i>), bottlenose whale (<i>Hyperoodon ampullatus</i>): deep-diving whales foraging on mesopelagic prey.	High	Meld. St. 21 (2023–2024) Report to the Storting; NAMMCO, 2022
	Large summer concentrations of the common minke whale (<i>Balaenoptera acutorostrata</i>) .	High	NAMMCO, 2022
Ecological significance	Whelping area for harp and hooded seals from the 'West Ice' populations and polar bear habitat.	High	AMAP/CAFF/SDWG, 2013
	Seabirds migration corridor in late summer and autumn.	High	AMAP/CAFF/SDWG, 2013
	<i>Calanus</i> copepods (e.g. <i>Calanus finmarchicus</i> , <i>Calanus hyperboreus</i>): year-round plankton reservoirs in deep basins, vital for regional secondary production.	Medium	Meld. St. 21 (2023–2024) Report to the Storting
	Migratory corridor and summer feeding grounds for humpback whales.	High	IUCN IMMA, NAMMCO, 2022

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	Conservation feature	Level of confidence	Source of data
	Summer feeding area for bottlenose whales (<i>Hyperoodon ampullatus</i>).	High	IUCN IMMA
	Supports unique benthic communities at oceanic ridges with hydrothermal vents, including endemic chemosynthetic species.	Medium	Meld. St. 21 (2023–2024) Report to the Storting
	Key year-round habitats for mesopelagic fish (glacier lantern fish, silvery lightfish, spotted barracudina), which are important prey for whales.	Medium	Meld. St. 21 (2023–2024) Report to the Storting
	Spawning and nursery grounds for slow-growing and vulnerable fish species, particularly in seamount and ridge habitats.	Medium	Meld. St. 21 (2023–2024) Report to the Storting
High natural biological diversity	- High productivity and concentrations of phyto- and zooplankton near the Arctic front: important seasonal feeding grounds for multiple trophic levels. - High diversity of benthic fauna: supported by mosaic of soft/hard-bottom habitats and seamounts within the basins.	Medium	Meld. St. 21 (2023–2024) Report to the Storting
Representativity	The geodiversity and benthic biodiversity of the site is characteristic of the wider Arctic Mid-Ocean Ridge system.	High	Meld. St. 21 (2023–2024) Report to the Storting
Sensitivity	- Distinct assemblages of deep-sea benthic fauna: highly vulnerable to bottom disturbance and habitat loss. - Presence of VME indicator species in the Ægir Ridge System.	High	Brix et al., 2022; Meld. St. 21 (2023–2024) Report to the Storting
Naturalness	High naturalness - area remains largely undisturbed by human actions.	Medium	Brix et al., 2022
Pan-Arctic systematic conservation planning analysis			
Identified as PAC by ArcNet	Yes, the site overlaps with PAC 35.		
Other conservation measures			

Recognised as an EBSA by CBD	No.
Recognised as IMMA by IUCN	Yes – the site overlaps with the North Atlantic Humpback Whale Migratory Corridor IMMA.
Recognised as AHES by the Arctic Council	Yes – the site overlaps with area 9 (Sea ice in the western Greenland Sea).
Recognised as an SVO in Norway	Yes – the site overlaps with area NH4 (Mid-Atlantic Ridge) and area NH8 (Deep sea areas in the Norwegian sea).

Site 4 - Imarssuak Sea Channel

The candidate Site 4, the Imarssuak Sea Channel, lies on the slope of the Reykjanes Ridge. The Reykjanes Ridge system supports important benthic ecosystems, including cold-water corals, deep-sea sponges, and key fish species such as orange roughy, deep-sea redfish, deep-sea elasmobranchs and Greenland shark. The area also provides essential life-history habitats for the calanoid copepod *Calanus finmarchicus*, with broader food web importance. However, the data records specifically for the High Seas and the Area are extremely limited. The site overlaps with an CBD EBSA 7 (Southern Reykjanes Ridge) and a VME closure under NEAFC, the Imarssuak Sea Channel. **Table 20** below provides information for MPA and OECM ecological criteria for the site.

Table 20. Summary matrix of conservation features according to MPA and OECM ecological criteria / consideration for the candidate Site 4 - Imarssuak Sea Channel.

	Conservation feature	Level of confidence	Source of data
MPA and OECM ecological criteria / consideration			
Threatened or declining species and habitats/biotopes	Orange roughy (<i>Hoplostethus atlanticus</i>) form aggregations at Reykjanes Ridge at depths exceeding 600 m.	Medium	CBD EBSA; Magnússon and Magnússon, 1995; Hareide and Garnes, 2001
	The site is within the distribution range of Black-legged kittiwake (<i>Rissa tridactyla</i>) and Thick-billed murre (<i>Uria lomvia</i>) , which are both under threat and/or in decline in OSPAR Region I.	Medium	SEATRACK
	Seamounts: under threat and /or in decline in OSPAR Region I. Individual seamounts have been identified in the area utilising high-resolution GEBCO bathymetry.	High	GEBCO, 2025
	Coral Gardens: under threat and /or in decline in OSPAR Region I. Reykjanes Ridge supports species of cold-water corals, including black corals, bamboo corals, hard and soft corals. These form localised reef and coral garden habitats	Medium	CBD EBSA

	Conservation feature	Level of confidence	Source of data
	Deep-Sea Sponge Aggregations: under threat and /or in decline in OSPAR Region I. Modelling data suggests likely occurrence at the site. There is also evidence from experimental trawling of the Reykjanes Ridge that sponge communities inhabit the flanks and summits of the Ridge.	Medium	CBD EBSA; Howell et al., 2016; Magnússon and Magnússon, 1995
Important species and habitats/biotopes	Recorded presence of elasmobranchs <i>Bathyraxa pallida</i> and <i>B. richardsoni</i> in the area.	Medium	CBD EBSA; Hareide and Garnes, 2001
	Recorded presence of Greenland shark <i>Somniosus microcephalus</i> in the area.	Medium	CBD EBSA; Hareide and Garnes, 2001
	Important habitat of deep-sea redfish <i>Sebastes mentella</i> .	Medium	NEAFC
	The site is important in the life history of the calanoid copepod <i>Calanus finmarchicus</i> , which has an important role as a prey species in the wider food web.	Medium	CBD EBSA
	Reykjanes Ridge supports species of cold-water corals, including black corals, bamboo corals, hard and soft corals. These form localised reef and coral garden habitats. At least 20 species of cold-water corals were reported at Reykjanes Ridge during the MAR-ECO project cruise.	Medium	CBD EBSA; Mortensen et al., 2008
	Large summer aggregations of the fin whale (<i>Balaenoptera physalus</i>) .	High	NAMMCO, 2022
	Distribution range of the humpback whale (<i>Megaptera novaeangliae</i>) , sightings are rare.	Medium	NAMMCO, 2022
Ecological significance	Supports unique and rare species and biological communities, distinct from other parts of the Mid-Atlantic Ridge (MAR), as well as multiple threatened and endangered species and habitats including cold-water corals, sponges, and several deep-sea elasmobranch species.	Medium	CBD EBSA

	Conservation feature	Level of confidence	Source of data
	Provides essential life-history habitats—such as shelter, nursery, and feeding grounds—for a variety of species, including those with important roles in the broader food web (e.g., <i>Calanus finmarchicus</i>).	Medium	CBD EBSA
	Sponge aggregations contribute to complex habitats, biodiversity, innovation in chemical compounds, and play roles in silicon and carbon cycling.	Medium	CBD EBSA
High natural biological diversity	• Sponge aggregations create complex habitats supporting high biodiversity • Promotes elevated biological productivity compared to surrounding regions, due to vertical mixing and turbulence	Medium	CBD EBSA
Representativity	The biodiversity of the site is representative of the wider Reykjanes Ridge system.	Medium	CBD EBSA
Sensitivity	• The Reykjanes Ridge supports a diverse range of sensitive benthic habitats, including cold-water corals (e.g., <i>Lophelia pertusa</i>, <i>Madrepora oculata</i>) and sponge communities, many of which are slow-growing and vulnerable to disturbance due to their specific life history traits and slow recovery rates following human impacts such as fishing. • Aggregations of both demosponges and glass sponges on the Reykjanes Ridge qualify the area as a VME as outlined according to FAO guidelines, highlighting its heightened sensitivity and need for protection from activities that can cause significant long-term ecological damage.	Medium	CBD EBSA
Naturalness	The area likely remains largely undisturbed due to difficult topography for bottom trawling and other activities, although the actual extent and severity of impact need to be measured.	Medium	CBD EBSA

	Conservation feature	Level of confidence	Source of data
Pan-Arctic systematic conservation planning analysis			
Identified as PAC by ArcNet	No		
Other conservation measures			
Recognised as an EBSA by CBD	Yes – the site overlaps with EBSA 7 (Southern Reykjanes Ridge).		
Overlaps with NEAFC VME closures	Yes – the site overlaps with the Irminger Sea Closure.		
Recognised as IMMA by IUCN	No.		

Recommendations for further identification and prioritisation of the sites

Data Limitations and Recommendations for Addressing Gaps

The findings and analyses in this report are shaped by the availability and scope of existing spatial datasets, scientific studies, and personal communications that could be acquired in the timeframe of the technical assistance being provided for this report. Thus, the maps, data layers, and information presented in this report can only reflect the geographic extent of research and sampling efforts (a) that the technical assistance could compile but also (b) the availability of such data and information, rather than the true spatial distribution of areas and features of conservation and/or sociocultural importance such as biological, ecological, oceanographic, hydrographic, and geological features across OSPAR Region I. As a result, there is a notable concentration of data from some relatively well-sampled areas such as within or adjacent to Norwegian waters, while large parts of the CAO remain significantly data-poor — particularly for benthic taxa and benthic habitat types. The data sets compiled for this report, such as those from the Barents Sea Ecosystem Survey, are limited to the sampling undertaken by national and international research institutes, and lack coverage for much of the CAO sector of Region I.

Additionally, some of the spatial information used is based on outdated assessments (e.g., the Arctic Marine Shipping Assessment from 2009), due to the lack of more recent updates at the regional scale. Thus, the absence of data should not be taken to necessarily mean the lack of conservation importance but rather could be used to assist by targeting future research campaigns and efforts to collaborate to compile and bring to light further datasets and knowledge.

As part of the present report, relevant and publicly available spatial data was collected and organised into a GIS repository, further information including the organisation structure of the layers, data sources and citations are summarised in **Appendix 1**.

Recommendations for Future Work

- **Habitat Modelling:** To help overcome critical data gaps, it is recommended that new habitat suitability models be developed for key conservation features — including not only benthic taxa and VMEs, but also important bird, fish, and marine mammal species. Because many of the existing datasets are limited to the more intensively sampled Norwegian waters, and do not adequately cover data-poor regions such as the CAO, modelling approaches can be key for predicting the likely distribution of conservation features in these under-sampled areas. Habitat suitability modelling can integrate available environmental data with known occurrence records to generate maps of predicted distributions, providing a more comprehensive and equitable basis for site prioritisation. Implementation of this recommendation would benefit from close collaboration with Indigenous Peoples and ongoing Arctic Council initiatives, such as the CAFF/PAME geospatial planning tool project, to ensure modelling outputs are harmonised regionally and based on the best available science.
- **Continual Monitoring and Data Updates:** The OSPAR Arctic Task Group should actively monitor and incorporate emerging data sources and revisions, such as updated Norwegian SVOs and new reports from the Arctic Council and OSPAR.

- **Pan-Arctic Collaboration:** In the case of the high Arctic, especially areas with multi-year sea-ice, it is strongly recommended that follow-up work is coordinated with Indigenous Peoples and the Arctic Council's CAFF/PAME geospatial planning tool project to address persistent gaps in spatial coverage and harness the best available pan-Arctic science.

Acknowledging and addressing these limitations is crucial for robust, science-based spatial planning and the identification of sites that reflect the full diversity and importance of Arctic marine ecosystems.

OSPAR processes for MPA and OECM identification and selection

According to the OSPAR Guidelines for the Identification and Selection of Marine Protected Areas in the OSPAR Maritime Area (OSPAR Agreement: 2003-17), the process of identification and selection of MPAs includes two stages:

- **Stage 1: Identification of possible sites**

For this stage, the ecological criteria/considerations listed in Appendix 1 of the OSPAR Guidelines should be applied. In some cases, this stage will identify a number of possible sites, for example to protect a certain species, and it may not be possible to establish them all as MPAs. On the other hand, it may be necessary to select priority sites from a number of possible sites that each meet one or several, but not the same, ecological criteria. For these reasons, sites that meet the ecological criteria/considerations need to be further prioritised at Stage 2.

- **Stage 2: Prioritisation of sites for designation**

In this second stage of the process, the ecological criteria/considerations listed in Appendix 1 of the OSPAR Guidelines should be reapplied to help prioritise the identified sites. For example, an area that holds a higher population of the species concerned, or that meets additional ecological criteria, may warrant a higher priority. In addition, at this stage, the practical criteria/considerations given in Appendix 2 should be taken into account in developing a prioritised list of sites. For instance an area with a comparatively higher level of support from stakeholders and political acceptability will be more suitable to be established as an MPA.

Practical criteria/considerations:

1. **Size**

The size of the area should be suitable for the particular aim of designating the area, including maintaining its integrity, and should enable the effective management of that area.

2. **Potential for restoration**

The area has a high potential to return to a more natural state under appropriate management.

3. **Degree of acceptance**

The establishment of the MPA has a comparatively high potential level of support from stakeholders and political acceptability.

4. **Potential for success of management measures**

There is a high probability that management measures and the ability to implement them (such as legislation, relevant authorities, funding, and scientific knowledge) will meet the aims for designation.

5. Potential damage to the area by human activities

It is an area where significant damage by human activity may happen in the short term.

6. Scientific value

The area has a high value for scientific research and monitoring.

In accordance with the OSPAR Guidance on Developing an Ecologically Coherent Network of OSPAR Marine Protected Areas (OSPAR Agreement 2006-3), the process of selecting and prioritising sites aims not only to address site-specific ecological and practical considerations, but also to contribute to the overall ecological coherence of the OSPAR MPA network. This involves ensuring that site selection collectively delivers on key principles of ecological coherence:

- **Representativity:** Sites are chosen to best represent the full range of species, habitats, and ecological processes present across different biogeographic regions using standard classification systems (such as EUNIS).
- **Connectivity:** The network is designed so that sites promote ecological linkages, including species movements, larval dispersal, and ecosystem flows, ensuring that populations and processes are maintained at appropriate spatial scales.
- **Replication:** Multiple examples of important features (habitats, species, or ecological processes) are included within each biogeographic area to spread risk and maintain natural variation.
- **Adequacy and Resilience:** The size and configuration of sites are sufficient to maintain the integrity and long-term viability of the features of interest, providing resilience to environmental changes and disturbances.

Through applying these principles, the site selection and prioritisation process ensures that the OSPAR MPA network consists of well-managed, connected, and representative areas that function collectively to support biodiversity conservation.

While OECMs are a complementary tool to the network of MPAs, the two sets of area-based measures contribute towards delivering *in situ* biodiversity conservation. However, while MPAs are specifically designated for conservation with explicit management objectives for biodiversity, OECMs may achieve conservation benefits as a by-product of other management objectives (e.g., areas set aside for cultural, spiritual, or other purposes but which benefit biodiversity).

OSPAR guidance on identifying and recognising Other Effective Area-Based Conservation Measures (OECMs) in the North-East Atlantic (OSPAR Agreement 2025-07e) outlines the following process for identification of OECMs:

- **Stage 1: Launching and Initial Screening**

Competent authority or another stakeholder screens an area-based measure against two key criteria:

- (A1) The area is not already recognised as a protected area.
- (C3) The measure achieves *in situ* conservation of biodiversity (either by design or as a demonstrable outcome).

If these are potentially met, the area proceeds as a potential OECM.

- **Stage 2: Stakeholder Engagement**

Competent authority leads engagement with stakeholders and relevant parties (including OSPAR observers, local communities, sectoral bodies, NGOs, etc.).

Ensures consent, gathers information on cultural, social, governance, and biodiversity values.

OSPAR encourages following established stakeholder engagement guidelines (e.g., OSPAR 2019-09 and 2008-02; Aarhus Convention principles).

- **Stage 3: Full Evaluation**

Full evaluation against CBD criteria (A–D, with sub-criteria) is performed by the competent authority. This involves completing the OECM identification template, carefully documenting:

- Geographical delineation and legitimacy of governance
- Management structures and their effectiveness
- Documentation of existing biodiversity features and expected outcomes
- Information and monitoring systems in place
- Consideration of ecosystem services and cultural values

Expert review/audit (optional but recommended) by independent or regional experts, or OSPAR stakeholders.

Only if all CBD sub-criteria (A1-D2) are satisfactorily addressed can an OECM be recognised.

- **Stage 4: Reporting and Recognition**

The area is formally recognised as an OECM by the competent authority.

Reporting: The OECM is reported using an agreed OECM Reporting Template and GIS shapefile.

OSPAR maintains a regional database for OECMs and also communicates with the global database for target setting (e.g., towards 30% by 2030).

The Annex I of the guideline includes a 12-step identification template which helps to ensure all relevant criteria (A1-D2) are addressed when selecting a potential OECM:

1. Is the site currently recognised as a protected area?
2. Does the area have clear, geographically delineated boundaries, in three dimensions where necessary?
3. Do institutions or mechanisms exist to govern and manage the site?
4. Is the site under sustained and effective management?
5. Does the site achieve, or expected to achieve, positive and sustained outcomes for the *in situ* conservation of biodiversity?
6. Is the measure in place, or expected to be in place, for the long term?
7. Have the biodiversity features, including species, habitats, ecosystem services and functions and supporting features as appropriate, of the site been documented.
8. Have the biodiversity attributes, governance and management of the site been documented in a baseline, and are plans for ongoing monitoring in place.
9. Have the ecosystem functions, services and contribution to the large-scale processes of importance for the ecosystem been evaluated and documented.
10. Have the cultural, spiritual, socio-economic and other locally relevant values been incorporated in the OECM identification template and supporting documentation under step 8 and steps 3 and 4 on governance and management, as required

11. Are the positive and long-term outcomes for the *in situ* conservation of biodiversity of the site referred to in step 7 negatively affected by any other activities occurring in the same geographical area?
12. If the answer to Step 11 is 'yes', can these other activities be limited through other measures?

The OECM has to be identified and recognised based on existing area-based measures, i.e. some kind of regulation or restriction to manage the impact of human activity. Notably, none of the sites in OSPAR Region I that overlap with ABNJ currently have existing MPAs or OECMs with the exception of Site 4 - Imarssuak Sea Channel, which overlaps with the Irminger Sea Closure under NEAFC due to the occurrence of VMEs. The Irminger Sea Closure could be considered as a candidate OECM to explore but formal recognition depends on completion of the full reporting and review process (by NEAFC, OSPAR, other parties and entry to the WD-OECM).

Summary of the information on the four candidate sites containing ABNJ reviewed in this report

For the purpose of further potential prioritisation of the four identified candidate conservation sites in areas overlapping with ABNJ in OSPAR Region I - Arctic Waters, and noting there may potentially be overlapping ECS that would require closer cooperation with Contracting Parties, **Table 21** below provides a concise visual summary of the key information for each site, including an assessment of the degree of certainty regarding whether the ecological criteria is met for the site:

- High degree of certainty means that the criteria is met and supported by robust scientific evidence specifically from the candidate site in ABNJ
- Medium level of certainty means that the criteria is likely met based on the data from nearby areas, modelling studies and other indirect evidence
- Low level of certainty indicates lack of data to determine whether the criteria is met.

The number in brackets indicates the number of conservation features corresponding to each ecological criteria, for example, the number of different threatened / declining species recorded in the site. The summary table also provides information on the other conservation measures implemented in the area, for example overlap with the CBD EBSAs, IUCN IMMA, and NEAFC closures. Finally, the table provides an indication of the contribution of the candidate area to the representativity/representation of the OSPAR MPA-network as a whole.

The final prioritisation of candidate sites should consider their role in enhancing the ecological coherence of the wider OSPAR MPA network, as outlined in OSPAR Agreement 2006-3, in addition to meeting specific site-based criteria.

Table 21. Summary of ecological criteria, degree of certainty, conservation features, and overlapping conservation measures for 4 candidate conservation sites with the ABNJ of OSPAR Region I (Arctic Waters).

The table indicates the degree of certainty that each ecological criteria is met (high, medium, or low), with numbers in brackets showing the number of conservation features

**AHES - Area of Heightened Ecological Significance*

	Site 1 - Multi-year Arctic sea ice habitat of the Central Arctic Ocean	Site 2 - Central Barents Sea	Site 3 - Arctic Mid-Ocean Ridge	Site 4 - Imarssuak Sea Channel
Threatened or declining species and habitats/biotopes	High (5) Medium (4)	High (5) Medium (4)	High (4)	High (1) Medium (4)
Important species and habitats/biotopes	High (4) Medium (5)	High (7) Medium (8)	High (3) Medium (4)	High (1) Medium (6)
Ecological significance	High (5)	High (5) Medium (1)	High (4) Medium (4)	Medium (3)
High natural biological diversity	High	Medium	Medium	Medium
Representativity	High	Medium	High	Medium
Sensitivity	High	Medium	High	Medium
Naturalness	High	Low	Medium	Medium
Other conservation measures	Overlaps with: EBSA 1; WWF ArcNet PAC 55 and PAC 28; the Arctic Council AHES* 67; Norwegian SVO BH1 and BH2	Overlaps with: the North Atlantic Humpback Whale Migratory Corridor IMMA; the Arctic Council AHES 22 and 23; Norwegian SVO BH1 and BH2	Overlaps with: the North Atlantic Humpback Whale Migratory Corridor IMMA; WWF ArcNet PAC 35; the Arctic Council AHES 9; Norwegian SVO NH4 and NH8	Overlaps with: EBSA 7; NEAFC Irminger Sea Closure
Contribution to the OSPAR MPA network	In the OSPAR maritime area, the combination of permanent ice cover over deep waters and a ridge system /seamounts is unique. Some conservation features concern high-Arctic species unique to the OSPAR maritime area.	Some conservation features concern high-Arctic species unique to the OSPAR maritime area.	The conservation features are similar to those of the OSPAR MPAs covering the Mid-Atlantic Ridge sites.	The conservation features are similar to those of the OSPAR MPAs covering the Mid-Atlantic Ridge sites.

Dynamic Ocean Management Tools

Dynamic area-based management tools represent an innovative approach to spatial conservation, allowing boundaries and management measures to adjust in response to real-time environmental data and changing ecological conditions, rather than remaining fixed as in traditional marine protected areas. As climate change accelerates ecological variability and shifts habitats, the use of dynamic ABMTs could provide OSPAR with greater flexibility to maintain effective protection of biodiversity in the ABNJ of Region I. While implementation in the ABNJ context presents unique governance and operational challenges, emerging experience from other regions — such as NOAA’s dynamic ship strike management for North Atlantic right whales in the United States⁸⁰ and dynamic fisheries bycatch mitigation programmes⁸¹ — demonstrates the growing feasibility of these tools in practice. It is therefore recommended that OSPAR further explore and conduct scenario testing of dynamic spatial protections and adaptive management approaches, including assessments of how existing governance frameworks — such as the OSPAR Collective Arrangement — might be enhanced or adapted to facilitate timely, coordinated decision-making. Such analysis will help determine how dynamic ABMTs could be integrated into the OSPAR toolbox for addressing ongoing and future climate-driven changes in marine ecosystems, particularly in the rapidly changing Arctic.

Incorporating Indigenous Peoples’ Knowledge

As detailed in the chapter on *Recommendations on the meaningful engagement with Indigenous Peoples*, the following recommendations set out how practical steps towards the further prioritisation of the candidate sites must be complemented by explicit, culturally appropriate engagement with Indigenous Peoples. Incorporating Indigenous Knowledge and ensuring Free, Prior, and Informed Consent are essential for the effective and equitable area-based management in the Arctic. The recommendations below expand upon these principles and outline their integration within the staged approach to area-based site selection and management.

- **Early and Ongoing Meaningful Engagement**

Ensure Indigenous Peoples are involved from the outset of ABNJ ABMT site identification and throughout the prioritisation process, moving beyond generic stakeholder consultation to respect Free, Prior and Informed Consent. Engagement formats should be culturally appropriate (e.g., knowledge holder forums, sharing circles) and aligned with Indigenous Peoples’ preferences and seasonal calendars.

- **Integration of Indigenous Knowledge**

Recognise Indigenous Knowledge as a dynamic, living system that should inform both site selection and management. Co-generate assessments by equitably integrating Indigenous Knowledge and scientific data, and ensure Indigenous Peoples retain control over how their knowledge is shared or published, with full respect for consent and knowledge sovereignty.

⁸⁰ <https://www.fisheries.noaa.gov/national/endangered-species-conservation/reducing-vessel-strikes-north-atlantic-right-whales#dynamic-management-areas>

⁸¹ <https://pmc.ncbi.nlm.nih.gov/articles/PMC5976278/>

- **Leverage Existing Regional Expertise and Representation**

Existing relevant expertise and Indigenous representation within competent authorities in the Arctic region should be actively utilised to facilitate effective engagement, support co-development of management approaches, and ensure that institutional knowledge and relationships enhance the ABNJ ABMT site identification and prioritisation process in OSPAR Region I.

Next Steps and Final Recommendations

Based on the findings of this report and the feedback received from the OSPAR Arctic Task Group, we recommend that the Task Group consider the following next steps in the process of identifying Priority Sites and potential area-based conservation and management measures in Arctic waters. While these considerations were outside the scope of the current report, they will be important for informing future decision-making and the successful implementation of conservation measures in the region.

- **Use the findings of the current report as the basis for an initial assessment and shortlisting of possible conservation sites within OSPAR Region I.** This evidence base can inform initial discussions on which areas warrant further consideration as candidate MPAs or OECMs in ABNJ to assist the OSPAR Arctic Task Group in the ongoing identification and prioritisation of candidate conservation sites and possible area-based measures to protect Arctic marine biodiversity in ABNJ within OSPAR Region I (Arctic Waters).
- **Consider adopting a systematic conservation planning approach to guide further identification and prioritisation of candidate sites.** This structured, transparent, and objective methodology will strengthen decision-making by integrating ecological, spatial, and socio-cultural data — including Indigenous Knowledge — and by applying clear conservation targets and principles such as representation, connectivity, and resilience. SCP enables the use of spatial prioritisation tools and stakeholder engagement to ensure that the selection of MPAs and OECMs is robust, efficient, and aligned with OSPAR's ecological network goals and international best practices.
- **Initiate the formal process for site identification (Stage 1) by preparing nomination proformas for all shortlisted possible sites.** This should include compiling all available ecological, spatial, and management information in alignment with OSPAR MPA and/or OECM guidelines.
- **Plan for additional assessments in preparation for Stage 2 prioritisation, including a detailed review of the main anthropogenic activities and pressures within each candidate site, as well as an evaluation of the potential for success of future management measures (in line with OSPAR practical criteria, Appendix 2).** It will also be important to apply an ecosystem-based approach to identify and assess potential socio-economic impacts — both positive and negative — of proposed

conservation measures, to inform which sites are most suitable and feasible for effective protection in the longer term.

- **Launch a parallel process of stakeholder engagement, including dedicated workshops and consultations with Indigenous Peoples.** These workshops will both validate preliminary site information in the proformas and assess levels of support for the sites identified.
- **Dual management mandates and governance coordination:** Undertake a detailed assessment of potential overlaps and interactions between any proposed MPA/OECM in OSPAR Region I and existing agreements such as the Central Arctic Ocean Fisheries Agreement (CAOFA), including consideration of how any conservation measures would relate to the current moratorium and any future exploratory fisheries authorised under CAOFA. Close coordination with CAOFA parties will be essential to ensure that conservation and fisheries management objectives are aligned and mutually supportive within overlapping areas.
- **Maintain and strengthen cooperation with the Arctic Council, particularly through its PAME and CAFF working groups, to ensure OSPAR's efforts are aligned with ongoing pan-Arctic conservation initiatives and the best available geospatial data.** As analysing which parts of the Region I sector of the CAO could be prioritised for area-based conservation measures requires comprehensive spatial information covering the entire CAO, the OSPAR ATG should seek further data compilation and spatial analysis beyond the scope of this report. In this context, it is recommended that OSPAR actively participates in and draws upon the Arctic Council's project on developing a geospatial planning tool for area-based conservation of Arctic species and ecosystems (2025–2029), which will be especially valuable for the identification and prioritisation of sites for sea ice-dependent species, and for supporting a climate-resilient, interconnected network of MPAs, OECMs, and Indigenous Protected and Conserved Areas across the broader Arctic region.
- **Ensure the meaningful integration of Indigenous Knowledge and ongoing, culturally appropriate engagement with Indigenous Peoples in all stages of area-based site identification and management.** This should involve respecting Free, Prior, and Informed Consent, using suitable formats such as sharing circles or knowledge holder forums. Further gathering of Arctic Indigenous Peoples Knowledge should be prioritised through continuous collaboration with Indigenous Peoples Organisations.

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Appendices

Appendix 1. GIS Repository

As part of the present report, relevant and publicly available spatial data was collected and organised into a GIS repository (**Table A-1**). Given the large size of some of the layers, the repository was divided into thematic collections, which are briefly described in the following sections. Please refer to **Table A-1** for data sources and citations.

The GIS Repository serves as a supporting resource for OSPAR, its partners, and associated working groups to facilitate activities aligned with their organisational mandates. Although all data layers incorporated in this repository have been duly acknowledged and are covered by licences permitting their sharing and modification, it is strongly advised that the original data providers be consulted in advance of any intention to make this repository publicly available.

Collection 1: *Seabed_Claims_and_HighSeas*. This collection includes spatial polygons defining the boundaries of the High Seas and Extended Continental Shelf statuses within OSPAR Region I (Arctic Waters).

Collection 2: *Bathymetry*. This collection is provided as a 6-band GeoTIFF containing bathymetric grids and multibeam footprint data for OSPAR Region I (Arctic Waters). The International Bathymetric Chart of the Arctic Ocean (IBCAO v5.1), with a resolution of 100 x 100 m, represents the best publicly available bathymetric dataset for this region. However, because the IBCAO grid does not provide complete coverage of Region I, missing areas were filled using the general GEBCO 2025 grid, which was reprojected and resampled to match the IBCAO grid. The six bands of this collection are structured as follows:

- Band 1: The standalone GEBCO bathymetric grid.
- Band 2: The standalone IBCAO bathymetric grid.
- Band 3: The combined (IBCAO + GEBCO) bathymetric grid.
- Band 4: Multibeam depth measurement footprint for the GEBCO grid.
- Band 5: Multibeam depth measurement footprint for the IBCAO grid.
- Band 6: Multibeam depth measurement footprint for the combined grid.

Collection 3: *Seabed_Features*. This collection is provided as a 6-layer GeoPackage containing spatial data on key seafloor geomorphological features, such as ridges, seamounts, and hydrothermal vents.

Collection 4: *Species_Occurrence_and_Habitats*. This collection is provided as an 8-layer GeoPackage containing habitat and species records, as well as estimated ranges and habitat use of key species.

Collection 5: *Sea_Ice*. This collection is provided as a ZIP file containing two 5-band GeoTIFF raster layers. These layers map the probability of a pixel being classified as Multi-Year Ice (MYI) or First-Year Ice (FYI) during the first 18 days of March. The five bands within each raster

represent the temporal bins used to compute these decadal probabilities: 1980s, 1990s, 2000s, 2010s, and 2020s.

Collection 6: *Area_Based_Frameworks*. This 10-layer GeoPackage collection summarises relevant area-based frameworks available in OSPAR Region I and in its neighbouring areas.

Table A-1. Spatial layers included in the GIS repository for OSPAR Region 1 – Arctic Waters. *Layers visualised in the report but not included in the repository because of the type of license.

N.	Name	Type	Collection	Description	Data Source
1	01_High_Seas_OSPAR_reg1	Vector (Polygon)	Seabed_Claims_and_HighSeas	High Seas in OSPAR Region I – Arctic Waters	Flanders Marine Institute (2024). Maritime Boundaries Geodatabase: High Seas, version 2. Available online at https://www.marineregions.org/ https://doi.org/10.14284/696
2	02_ECS_v02_OSPAR_reg1	Vector (Polygon)	Seabed_Claims_and_HighSeas	Extended Continental Shelf Claims in OSPAR Region I – Arctic Waters	Flanders Marine Institute (2024). Maritime Boundaries Geodatabase: Extended Continental Shelves, version 2. Available online at https://www.marineregions.org/ https://doi.org/10.14284/697
3	Bathymetry	Raster	Bathymetry	Six-band GeoTiff comprising bathymetric datasets and multibeam footprints of: GEBCO, IBCAO and a combination of IBCAO bathymetry supplemented with GEBCO grid in areas lacking IBCAO bathymetric data	GEBCO Compilation Group (2025) GEBCO 2025 Grid (https://doi.org/10.5285/37c52e96-24ea-67ce-e063-7086abc05f29) IBCAO (2025) International Bathymetric Chart of the Arctic Ocean (IBCAO) V5.1 Grid. https://www.gebco.net/data-products/gridded-bathymetry-data/arctic-ocean
4	4a_peak_ridge_OSPAR_reg1_ply	Vector (Polygon)	Seabed_Features	Peaks and Ridges extracted from the IBCAO/GEBCO combined grid following the methodology outlined in the report (as polygons)	Data produced by Mara Consultants Ltd (see Appendix 1)
5	4b_peak_ridge_OSPAR_reg1_pnt	Vector (Point)	Seabed_Features	Peaks and Ridges extracted from the IBCAO/GEBCO combined grid following the methodology outlined in the report (as points)	Data produced by Mara Consultants Ltd (see Appendix 1)

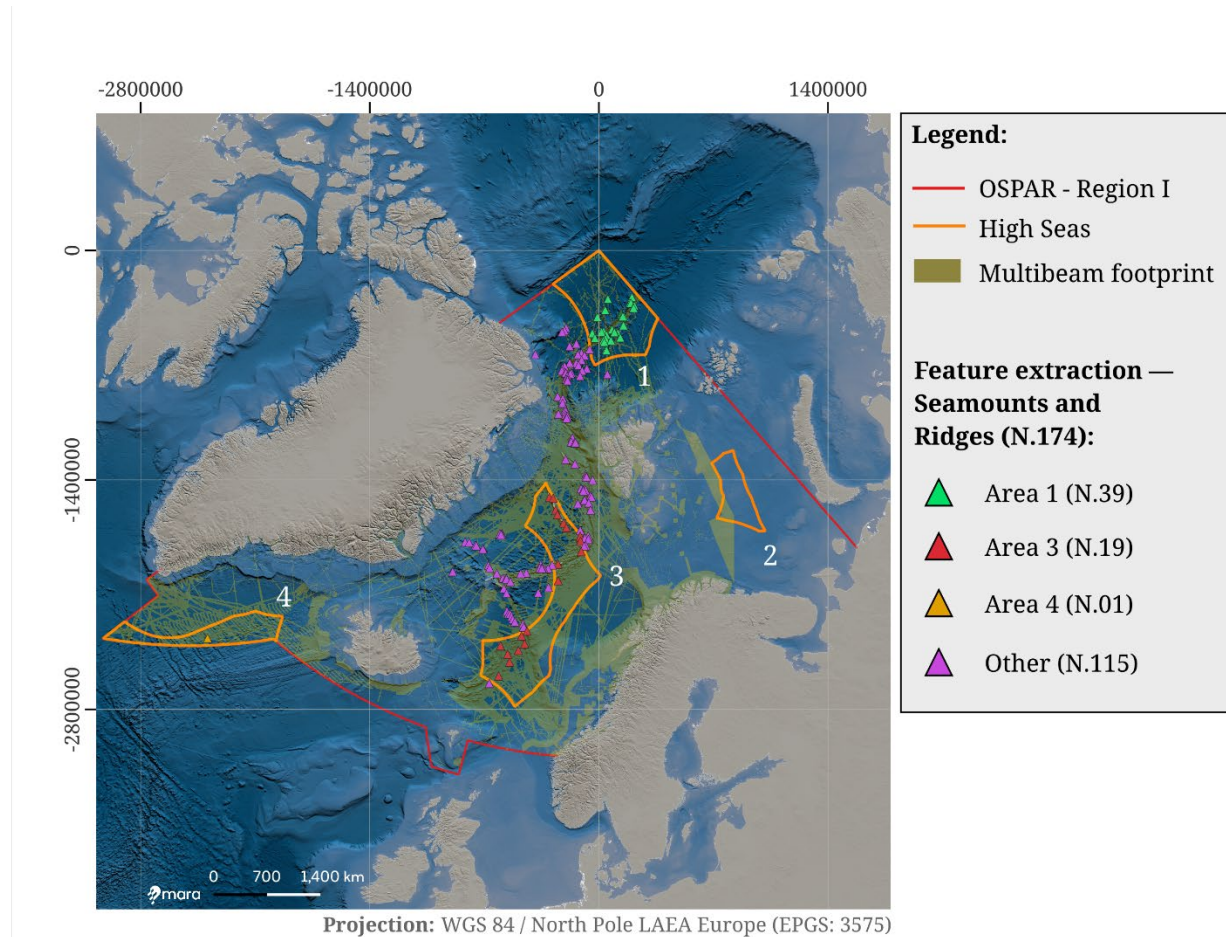
N.	Name	Type	Collection	Description	Data Source
6	05a_Gazetteer_Sm	Vector (Point)	Seabed_Features	Seamounts included in the IHO-IOC GEBCO Gazetteer of Undersea Feature Names for OSPAR Region I – Arctic Waters	IHO-IOC GEBCO Gazetteer of Undersea Feature Names, www.gebco.net . Accessed March, 2026.
7	05b_Gazetteer_Lines	Vector (Line)	Seabed_Features	Banks, Ridges and Rises included in the IHO-IOC GEBCO Gazetteer of Undersea Feature Names for OSPAR Region I – Arctic Waters	IHO-IOC GEBCO Gazetteer of Undersea Feature Names, www.gebco.net . Accessed March, 2026.
8	06a_InterRidgeVentsDatabasev3.4_ALL	Vector (Point)	Seabed_Features	InterRidge Global Database of Active Submarine Hydrothermal Vent Fields Version 3.4	Beaulieu, Stace E; Szafranski, Kamil M (2020): InterRidge Global Database of Active Submarine Hydrothermal Vent Fields Version 3.4 [dataset]. PANGAEA, https://doi.org/10.1594/PANGAEA.917894
9	06b_InterRidgeVentsDatabasev3.4_OSPAR_reg1	Vector (Point)	Seabed_Features	InterRidge Global Database of Active Submarine Hydrothermal Vent Fields Version 3.4 in OSPAR Region I – Arctic Waters	Beaulieu, Stace E; Szafranski, Kamil M (2020): InterRidge Global Database of Active Submarine Hydrothermal Vent Fields Version 3.4 [dataset]. PANGAEA, https://doi.org/10.1594/PANGAEA.917894
10	07_OSPAR_Habitats_N_E_Atlantic_2025_Pnt_Reg1	Vector (Point)	Species_Occurrence_and_Habitats	Compilation of OSPAR habitat point data for the northeast Atlantic submitted by OSPAR contracting parties in OSPAR Region I – Arctic Waters.	JNCC (2026) OSPAR Habitats in the North-East Atlantic Ocean - 2025 Point Records. EMODnet Product Catalogue. https://emodnet.ec.europa.eu/geonetwork/srv/eng/catalog.search#/metadata/e5a4ae14-a116-42e1-8f86-e6f055accbcf
11	08a_VME_ICES_Habitat Type_OSPAR_reg1	Vector (Point)	Species_Occurrence_and_Habitats	VME habitats (i.e. records for which there is unequivocal evidence for a VME) in OSPAR Region I – Arctic Waters.	Vulnerable Marine Ecosystems (VME). Accessed April, 2026. ICES, Copenhagen, Denmark. https://vme.ices.dk

N.	Name	Type	Collection	Description	Data Source
12	08b_VME_ICES_Indicators_OSPAR_reg1	Vector (Point)	Species_Occurrence_and_Habitats	VME indicators (i.e. records that suggest the presence of a VME with varying degrees of uncertainty) in OSPAR Region I – Arctic Waters.	Vulnerable Marine Ecosystems (VME). Accessed April, 2026. ICES, Copenhagen, Denmark. https://vme.ices.dk
13	09a_MYI_Decadal_Averages_1980_2025	Raster	Sea_Ice	6-band GeoTiff. Each band represent the decadal probability of a pixel being classified as Multi-Year Ice during the first 18 days of March	Data processed by Mara Consultants Ltd based on Copernicus Climate Change Service, Climate Data Store, (2020): Sea ice edge and type daily gridded data from 1978 to present derived from satellite observations. Copernicus Climate Change Service (C3S) Climate Data Store (CDS). DOI: 10.24381/cds.29c46d83 (Accessed on 16-03-2026) (see Appendix 2)
14	09b_FYI_Decadal_Averages_1980_2025	Raster	Sea_Ice	6-band GeoTiff. Each band represent the decadal probability of a pixel being classified as First-Year Ice during the first 18 days of March	Data processed by Mara Consultants Ltd based on Copernicus Climate Change Service, Climate Data Store, (2020): Sea ice edge and type daily gridded data from 1978 to present derived from satellite observations. Copernicus Climate Change Service (C3S) Climate Data Store (CDS). DOI: 10.24381/cds.29c46d83 (Accessed on 16-03-2026) (see Appendix 2)
15	10a_gbif_OSPAR_reg1	Vector (Point)	Species_Occurrence_and_Habitats	GBIF records of marine taxa in OSPAR Region I – Arctic Waters	GBIF.org (13 April 2026) GBIF Occurrence Download https://doi.org/10.15468/dl.4mjqct
16	10b_gbif_OSPAR_reg1_highSeas	Vector (Point)	Species_Occurrence_and_Habitats	GBIF records of marine taxa in OSPAR Region I – Arctic Waters (high seas only)	GBIF.org (13 April 2026) GBIF Occurrence Download https://doi.org/10.15468/dl.4mjqct
17	10c_GBIF_Records	Raster	Species_Occurrence_and_Habitats	Counts of GBIF records of marine taxa in OSPAR Region I – Arctic Waters	GBIF.org (13 April 2026) GBIF Occurrence Download https://doi.org/10.15468/dl.4mjqct

N.	Name	Type	Collection	Description	Data Source
18	11_isra_OSPAR_reg1	Vector (Polygon)	None*	Important Shark and Ray Area in OSPAR Region I – Arctic Waters	IUCN SSC Shark Specialist Group 2026. Important Shark and Ray Areas (ISRA) eAtlas. International Union for Conservation of Nature (IUCN) Species Survival Commission (SSC) Shark Specialist Group. Version 2026-1 (February).
19	12_IMMA_OSPAR_reg1	Vector (Polygon)	Species_Occurrence_and_Habitats	IUCN MMPATF 2026 Global Dataset of Important Marine Mammal Areas in OSPAR Region I – Arctic Waters	IUCN MMPATF 2026 Global Dataset of Important Marine Mammal Areas (IUCN-IMMA). Accessed April, 2026. Made available under agreement on terms and conditions of use by the IUCN Joint SSC/WCPA Marine Mammal Protected Areas Task Force and accessible via the IMMA e-Atlas http://www.marinemammalhabitat.org/imma-eatlas
20	13_ospar_mpa_single_area_2024	Vector (Polygon)	Area_Based_Frameworks	OSPAR Marine Protected Areas Network 2023	OSPAR data & Information Management System https://odims.ospar.org/en/submissions/ospar_mpa_2023_01/ (Accessed 13 March 2026)
21	14_AMSAIIC_Areas	Vector (Polygon)	Area_Based_Frameworks	Arctic marine areas of heightened ecological and cultural significance	AMAP/CAFF/SDWG, 2013. Identification of Arctic marine areas of heightened ecological and cultural significance: Arctic Marine Shipping Assessment (AMSA) IIc
22	15_ArcNet2021	Vector (Polygon)	Area_Based_Frameworks	Arctic Ocean Network of Priority Areas for Conservation	WWF ArcNet https://admin.arcticwwf.org/app/uploads/2023/11/ArcNet-Arctic-Ocean-Priority-Areas-for-Conservation-WWF-2021.zip (Accessed 18 March 2026)
23	EBSA_33degN	Vector (Polygon)	Area_Based_Frameworks	Ecologically or Biologically Significant Marine Areas (EBSAs) located above the latitude of 33° N	https://www.cbd.int/ebsa/repository

N.	Name	Type	Collection	Description	Data Source
24	17a_IrmingerSeaClosure	Vector (Polygon)	Area_Based_Frameworks	NEAFC VMEs and Closed Area	https://www.neafc.org/closures/coordinates
25	17b_MidAtlanticVMEs	Vector (Polygon)	Area_Based_Frameworks	NEAFC VMEs and Closed Area	https://www.neafc.org/closures/coordinates
26	17c_HattonRockallClosures	Vector (Polygon)	Area_Based_Frameworks	NEAFC VMEs and Closed Area	https://www.neafc.org/closures/coordinates
27	17d_NEAFC_OECM_notoverlapMPA_v2	Vector (Polygon)	Area_Based_Frameworks	NEAFC OECMs not overlapping OSPAR MPAs	https://www.neafc.org/oecm/coordinates
28	18_svo_omrade	Vector (Polygon)	Area_Based_Frameworks	Particularly Valuable and Vulnerable Areas (SVO)	Norwegian Environment Agency https://kartkatalog.miljodirektoratet.no/Dataset/Details/702?lang=en-us (Accessed 24 April 2026)
29	19_PAME_Marine2022	Vector (Polygon)	Area_Based_Frameworks	Arctic Protected Areas - 2022	Arctic Biodiversity Data Service https://geo.abds.is/geonetwork/srv/eng/catalog.search#/metadata/5feeff3c-9eb5-43bf-9456-c1f478d25ee1 (Accessed 23 April 2026)
30	20_PolarCod_range	Vector (Polygon)	Species_Occurrence_and_Habitats	SAMBR - Distribution of polar cod (<i>Boreogadus saida</i>)	Arctic Biodiversity Data Service https://geo.abds.is/geonetwork/srv/eng/catalog.search#/metadata/7d3e0244-280b-40b2-941e-f5a91d66143a (Accessed 28 April 2026)

Appendix 2. Semi-Automated Seamount and Ridge Extraction Methodology



1. Objective

We implemented a semi-automated workflow to identify, extract, and quantify prominent seafloor features (seamounts and ridges) rising for 1000 m or more from the surrounding seafloor using a combination of IBACAO (IBACAO 2025) and GEBCO (GEBCO 2025) bathymetric grids within OSPAR Region I. Because the IBACAO grid does not fully cover OSPAR Region I, it was supplemented with the standard GEBCO grid in areas lacking bathymetric data. By combining multi-scale topographic position indices, landform classification algorithms, and rigorous spatial filtering, the implemented workflow isolates prominent geological structures from background noise and exports them as spatial datasets.

2. Computational Environment

All geospatial processing, spatial filtering, and analysis were conducted within the R programming environment (R Core Team, 2025). To handle the massive, high-resolution bathymetric grids (over 3 billion pixels in OSPAR Region I) without exceeding active memory limits, the workflow relies on two primary packages:

- terra (v. 1.8-70): Used for all out-of-core raster algebra, spatial masking, geometric alignment, and final vectorization (Hijmans, 2025).
- whitebox (v. 2.4.3): Used to execute the computationally intensive algorithms, including the Relative Topographic Position (RTP) (Newman et al. 2018), Geomorphons landform classification (Jasiewicz and Stepinski, 2013), and Connected Component Labelling (i.e., grouping cells that form discrete, contiguous areas into unique categories). This package serves as the R frontend for the WhiteboxTools standalone geospatial analysis platform (Wu & Brown, 2025; Lindsay, 2016), which is highly optimized for the processing and rapid analysis of massive raster datasets.

3. Feature Extraction – Workflow

Raw geomorphometric computations frequently produce highly fragmented outputs, with thousands of small, localised patches classified as distinct peaks or ridges due to minor topographic noise. In order to improve final outputs, the implemented workflow goes beyond the application of standard algorithms (e.g., BPI or Geomorphons) and implements a series of additional steps designed to rigorously isolate, quantify, and validate, as much as possible, the geological structures of interest.

- **Step 1.** Data quality filtering. An initial data quality filter was applied to the bathymetric grid. Utilising the accompanying IBACAO and GEBCO Type Identifier (TID) grid, bathymetry data were masked to retain exclusively those areas mapped by direct multibeam echosounder measurements (TID = 11). All regions lacking multibeam data were excluded from the analysis.
- **Step 2.** Topographic indices and landform classification.
 - o *Bathymetric Position Index (BPI)*: BPI is a spatial metric of relative elevation. It compares the depth of a specific focal cell to the mean depth of a defined surrounding neighborhood (Newman et al. 2018). Positive BPI values indicate areas that are elevated relative to their immediate surroundings (e.g., crests, banks, and peaks). To capture the large-scale topographic prominence of broad seamounts and continuous ridges – and to intentionally limit the noise generated by small-scale features – a broad neighborhood diameter of 50 km was applied.
 - o *Geomorphons*: Jasiewicz and Stepinski (2013) developed a pattern-recognition algorithm that classifies terrain into ten distinct landform elements (such as peaks, ridges, valleys, and slopes). It utilises a ‘line-of-sight’ principle, evaluating the topographic profile and visibility in eight principal directions extending outward from a focal cell. Here a maximum search radius of 30 km was utilised. By applying this large search radius, the algorithm limits the influence of minor topographic noise and small-scale features, focusing instead on categorising the macro-scale morphology of the seafloor to effectively map the distinct peaks and ridgelines within the area of interest.

- **Step 3.** Initial feature extraction and clumping. A binary was created, isolating pixels classified as 'Peaks' or 'Ridges' by the geomorphon algorithm. Contiguous peak/ridge pixels were grouped together, assigning a unique ID integer to each distinct geographical cluster.
- **Step 4.** Cluster size and zonal statistics. In order to reduce the spatial noise caused by small, isolated clusters, a minimum cluster-size threshold was established. After visually inspecting the spatial distribution of various thresholds (e.g., 5, 10, 50, 100, and 500 pixels) against the underlying bathymetry, a conservative threshold of 50 contiguous pixels was selected. Only clusters meeting or exceeding this size were retained. For each of these surviving macro-scale clusters, zonal statistics were then computed to extract topographic prominence metrics, specifically, the maximum and mean BPI values within each unique feature footprint.
- **Step 5.** Prominence filtering and vectorisation. A secondary prominence threshold was applied to the extracted attributes, requiring candidate features to exhibit a maximum BPI strictly greater than 1000. This step ensured that the retained structures were not only spatially extensive but also strongly elevated relative to their surroundings. Finally, the raster footprints of the validated seamount and ridge candidates were converted into discrete vector polygons and spatial points (i.e. centroids of the polygons). The calculated geometric and topographic statistics (pixel count, mean BPI, and maximum BPI) were joined directly to the vector attribute table, yielding a spatially referenced GeoPackage of prominent seafloor features.

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- R Core Team. (2025). R: A language and environment for statistical computing (Version 4.5.0). R Foundation for Statistical Computing, Vienna, Austria.
- Wu, Q., & Brown, A. (2025). whitebox: 'WhiteboxTools' R Frontend (R package version 2.4.3). Comprehensive R Archive Network (CRAN). <https://CRAN.R-project.org/package=whitebox>

Appendix 3. Sea Ice Type Classification and Decadal Analysis

To visualise the long-term spatial dynamics of Arctic sea ice, a multi-stage geospatial processing workflow was implemented using the terra package in R (Hijmans, 2024). The analysis utilised [Copernicus daily sea ice](#), targeting the first 18 days of March for the period 1980–2025 (Copernicus Climate Change Service, Climate Data Store, 2020).

Annual Frequency Mapping

For each year in the study period, daily NetCDF (.nc) files were filtered and processed to extract the ice_type variable. These data were reclassified into binary masks for two primary classes: Multi-Year Ice (MYI) and First-Year Ice (FYI). Pixels matching the target class were assigned a value of 1; pixels classified as 'ambiguous' by the Copernicus algorithm were assigned NA values and excluded from the analysis; all remaining pixels (other ice types or open water) were assigned a value of 0.

An annual average frequency was then calculated for each grid cell, representing the percentage of March days per year that a specific ice type was present.

Decadal Climatology Generation

The resulting yearly datasets were grouped into five temporal bins: the 1980s, 1990s, 2000s, 2010s, and 2020–2025. For each bin, a decadal mean frequency was computed using a pixel-wise average. The final output consists of multi-layer SpatRaster objects representing the decadal probability of a pixel being classified as MYI or FYI during the first 18 days of March.

References

Copernicus Climate Change Service, Climate Data Store, (2020): Sea ice edge and type daily gridded data from 1978 to present derived from satellite observations. Copernicus Climate Change Service (C3S) Climate Data Store (CDS). DOI: [10.24381/cds.29c46d83](https://doi.org/10.24381/cds.29c46d83) (Accessed on 16-03-2026)

Attribution

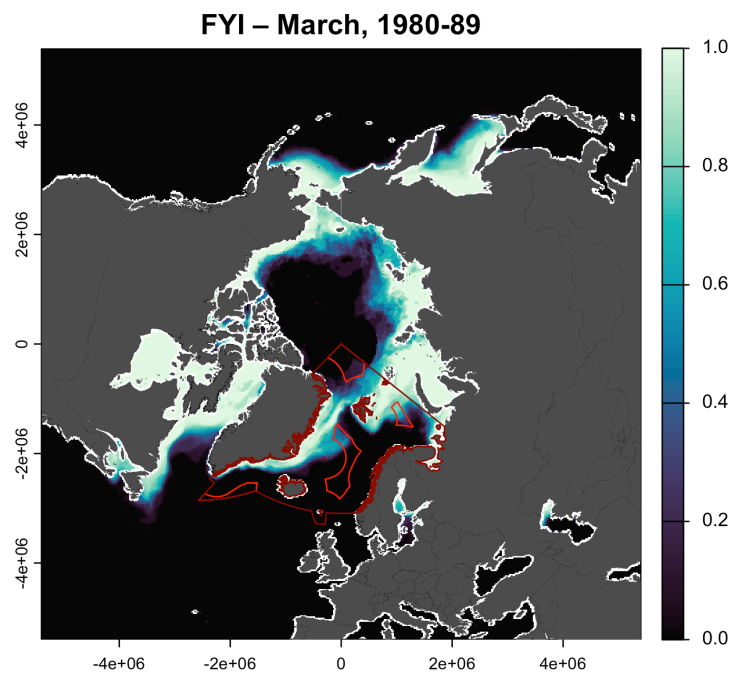
Copernicus programme:

Generated using Copernicus Climate Change Service information [2026]. Neither the European Commission nor ECMWF is responsible for any use that may be made of the Copernicus information or data it contains.

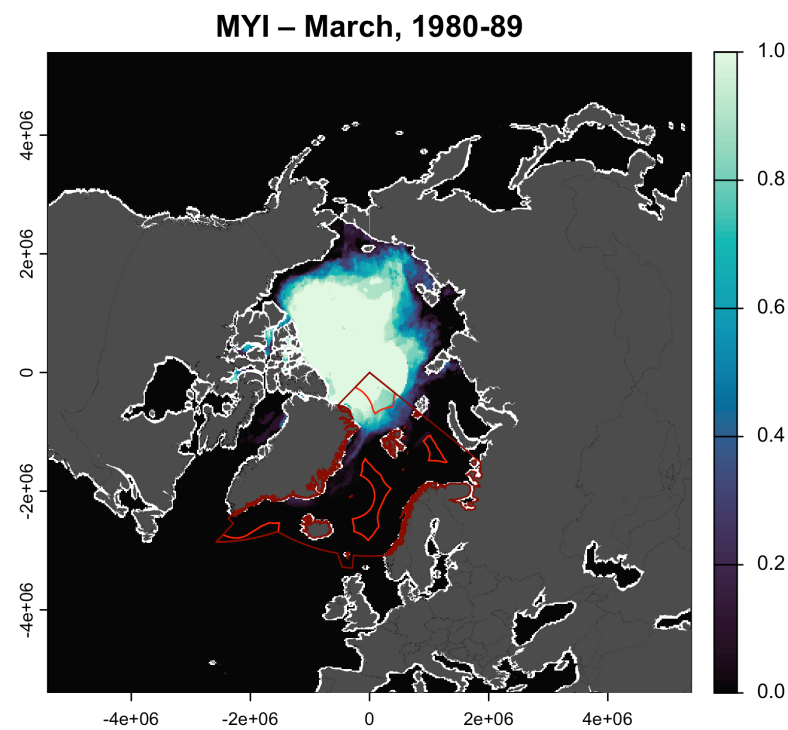
Aaboe, S., Down, E.J., Sørensen, A., Lavergne, T., Eastwood, S. (2023): Sea-ice type climate data record 1978-present, v3.0. Copernicus Climate Change Service (C3S) Climate Data Store (CDS). DOI: [10.24381/cds.29c46d83](https://doi.org/10.24381/cds.29c46d83) (Accessed on 16-03-2026).

Image catalogue

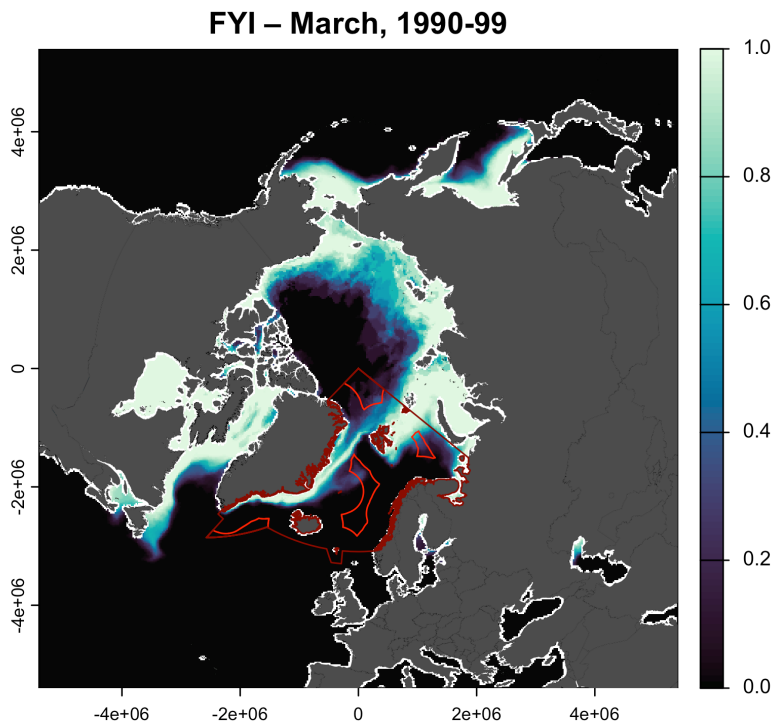
First Year Ice, 1980-1989



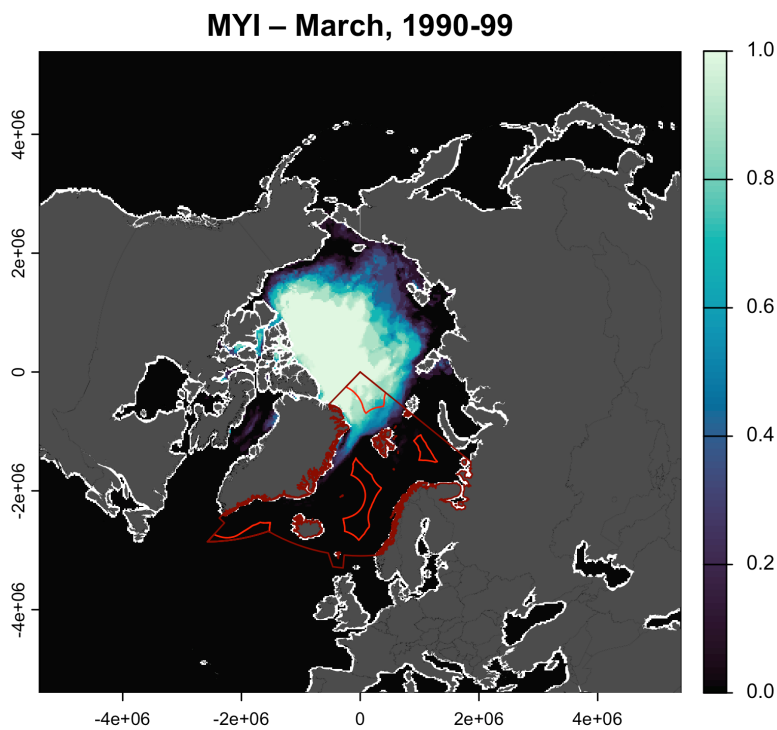
Multy-Year Ice, 1980-1989



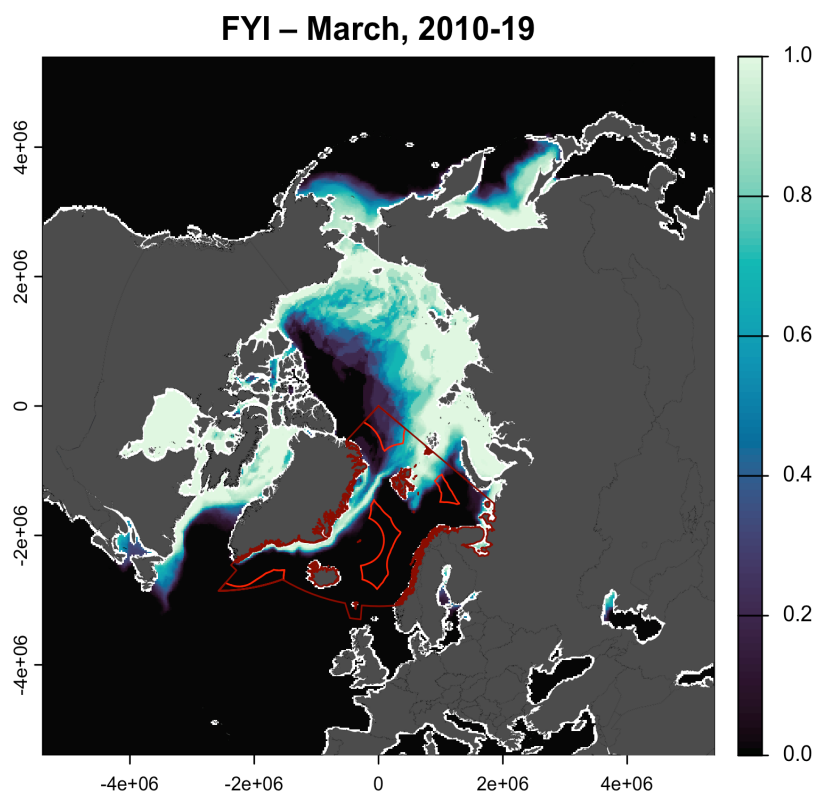
First Year Ice, 1990-1999



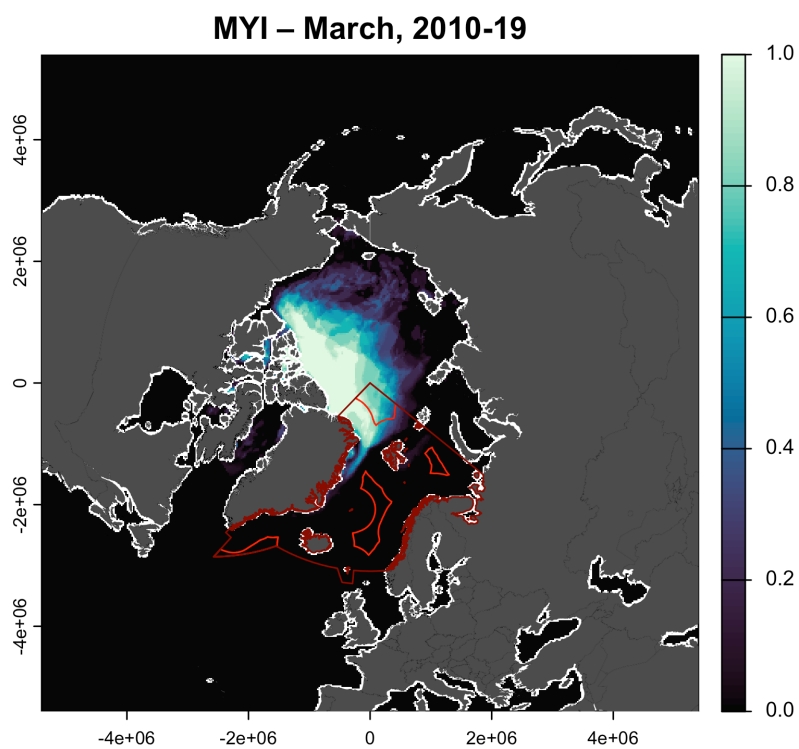
Multi-Year Ice, 1990-1999



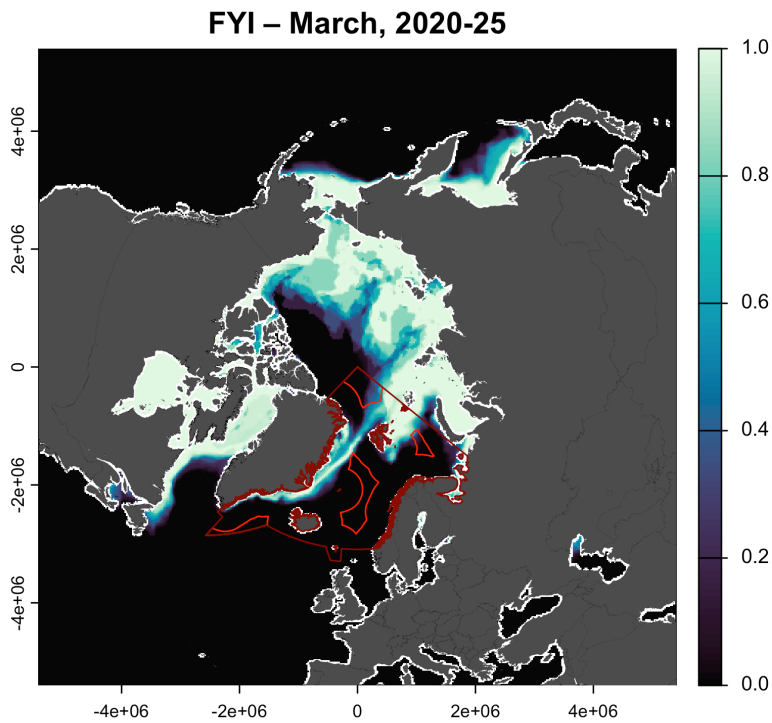
First Year Ice, 2010-2019



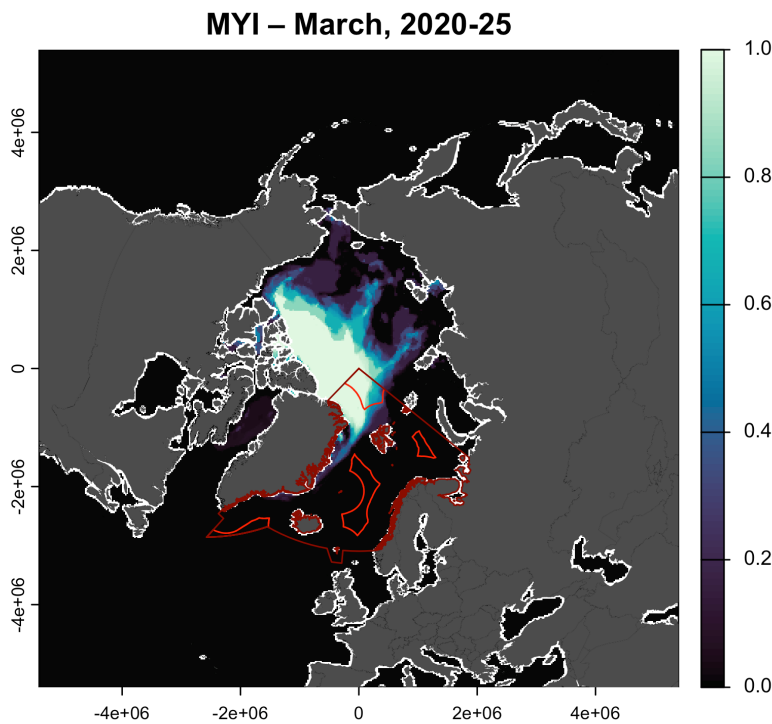
Multi-Year Ice, 2010-2019



First Year Ice, 2020-2025



Multi-Year Ice, 2020-2025



Appendix 4. Representative benthic fauna observed at different deep-sea habitats of the Central Arctic Ocean - from Ramirez-Llodra et al., 2024

Slopes and canyons

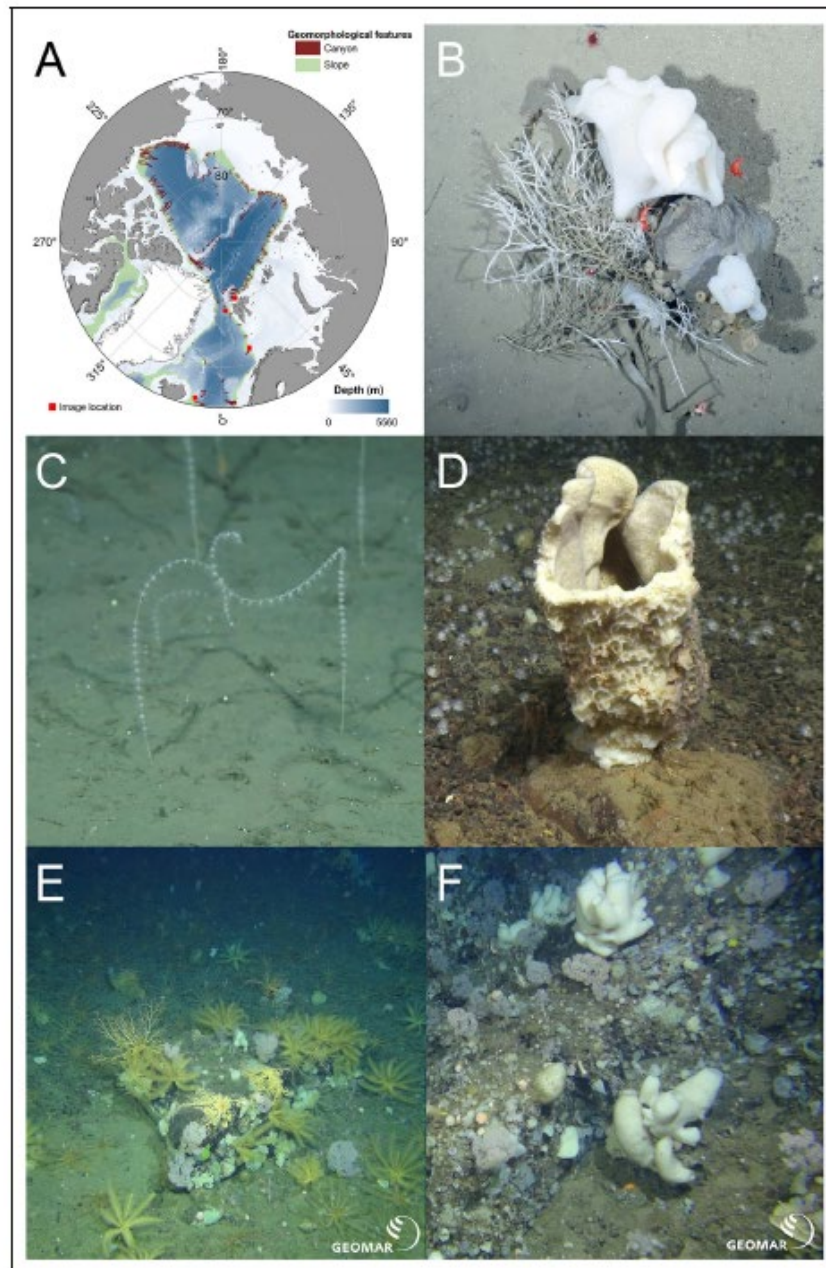


Figure 7. Representative fauna observed around the slopes and canyons in the deep Arctic Ocean. (A) Locations of the representative images; (B) *Caulophacus* (*Caulophacus*) *arcticus* (Hansen, 1885) and Cladorhizidae sponges at HAUSGARTEN Observatory (Source: Thomas Soltwedel, AWI, Deep-Sea Research Group); (C) *Radicipes* Stearns, 1883 fields on the continental slopes west of Bear Island; (D) *Haliclona* (*Gellius*) *fibulata* (Schmidt, 1862) and *Kükenthalia borealis* (Gottschaldt, 1894) aggregations in a canyon north of Svalbard (Source: Pål Buhl-Mortensen, MAREANO, Institute of Marine Research); and (E) crinoid fields with *Heliometra glacialis* (Owen, 1833 ex Leach MS), *Drifa glomerata* (Verrill, 1869) and *Gorgonocephalus* Leach, 1815 and (F) cauliflower coral gardens with *Drifa glomerata* and *Schaudinnia rosea* (Fristedt, 1887) in a canyon-like section of Aegir Ridge (Source: James Taylor and Saskia Brix, DZMB Senckenberg, GEOMAR Kiel 6000).

Basins and abyssal plains

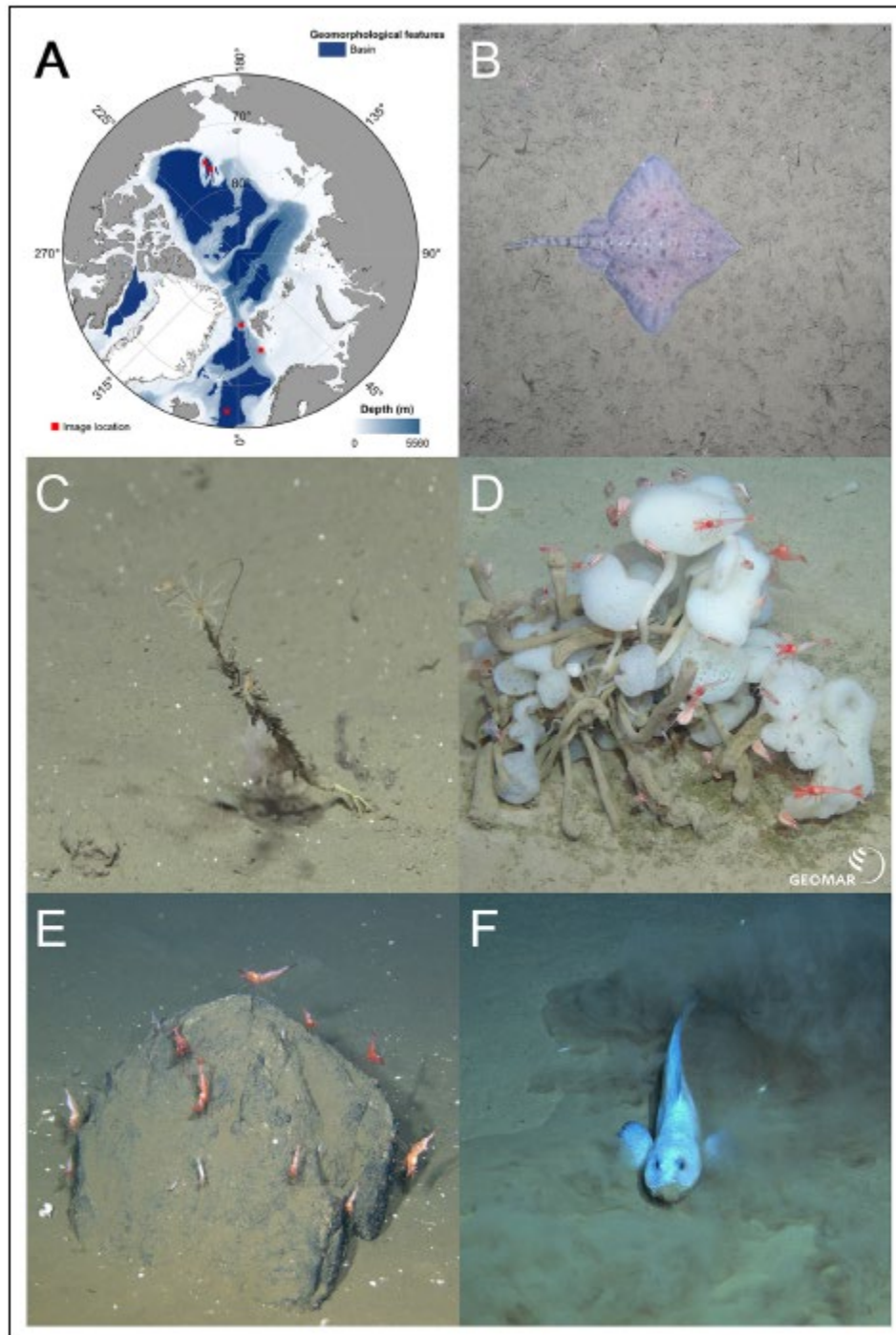


Figure 8. Representative fauna observed around the basins and abyssal plains in the deep Arctic Ocean.

(A) Locations of the representative images; (B) *Amblyraja hyperborea* (Collett, 1879) surrounded by crinoids and ophiuroids in Molloy Deep (Source: Autun Purser, AWI, Deep-Sea Research Group); (C) *Bathyrinus carpenterii* (Danielssen & Koren, 1877) west of Bear Island (Source: Pål Buhl-Mortensen, MAREANO, Institute of Marine Research); (D) *Caulophacus* Schulze, 1886 glass sponges with caridean shrimps and calliopid amphipods (Source: James Taylor and Saskia Brix, DZMB Senckenberg, GEOMAR Kiel 6000); (E) *Bythocaris* G.O. Sars, 1870 on a dropstone; and (F) *Lycodes frigidus* Collett, 1879 in the Chukchi Borderland (Source: Irina Zhulay and Katrin Iken, The Hidden Ocean 2016: Chukchi Borderland, NOAA, University of Alaska Fairbanks, Oceaneering-DSSI).

Ridges and plateaus

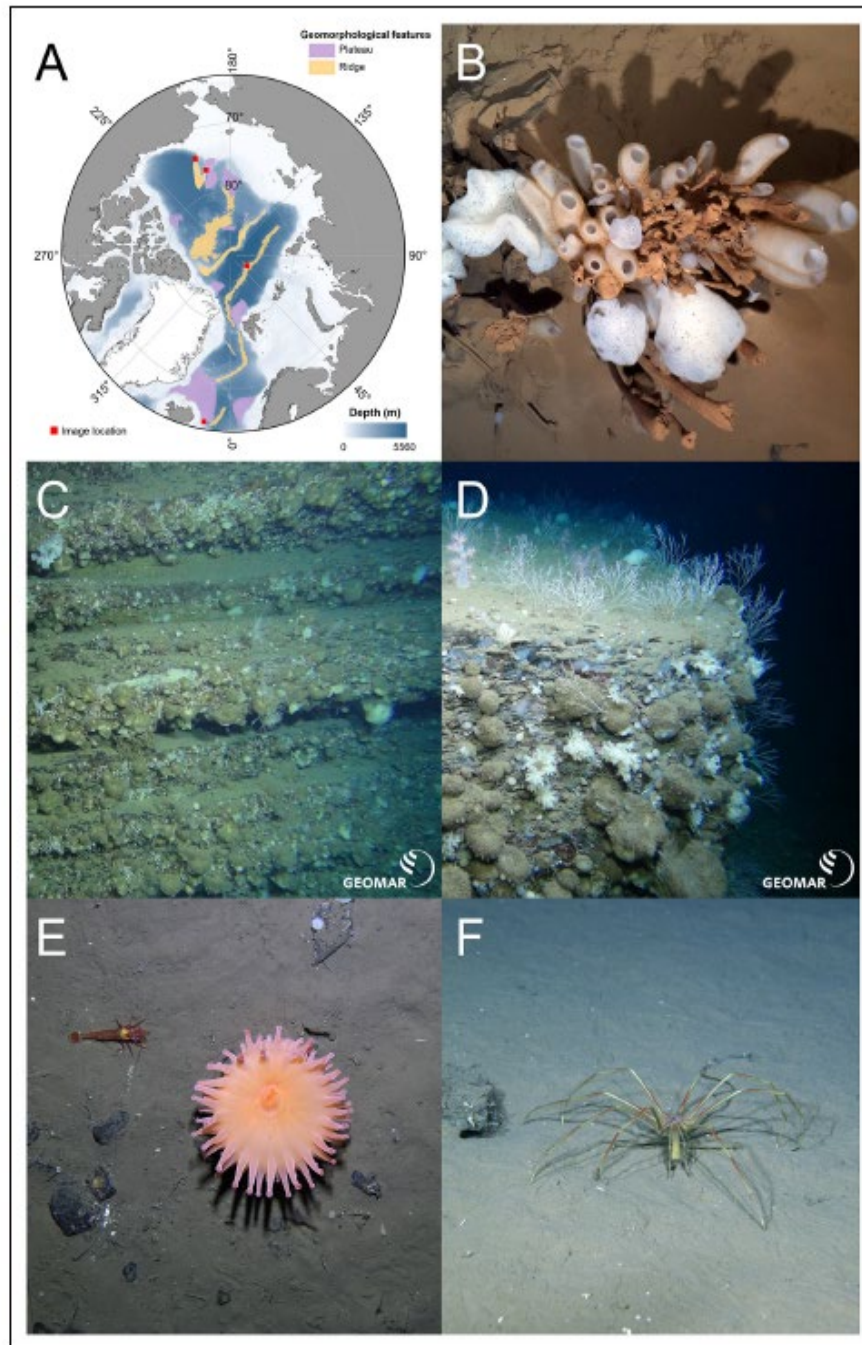


Figure 9. Representative fauna observed on the ridges and plateaus in the deep Arctic Ocean. (A) Locations of the representative images; (B) glass sponges on the Gakkel Ridge (Source: Thomas Soltwedel, AWI, Deep-Sea Research Group); (C,D) vertical *Geodia* walls with *Asbestopluma* (*Asbestopluma*) *furcata* Lundbeck, 1905 and *Gersemia* von Marenzeller, 1878 on Aegir Ridge (Source: James Taylor and Saskia Brix, DZMB Senckenberg, GEOMAR Kiel 6000); and (E) *Pycnanthus densus* Carlgren, 1921 and *Bythocaris* on the Northwind Ridge and (F) *Colossendeis proboscidea* (Sabine, 1824) on the Chukchi Plateau (Source: Irina Zhulay and Katrin Iken, The Hidden Ocean 2016: Chukchi Borderland, NOAA, University of Alaska Fairbanks, Oceaneering-DSSI).

Seamounts and banks

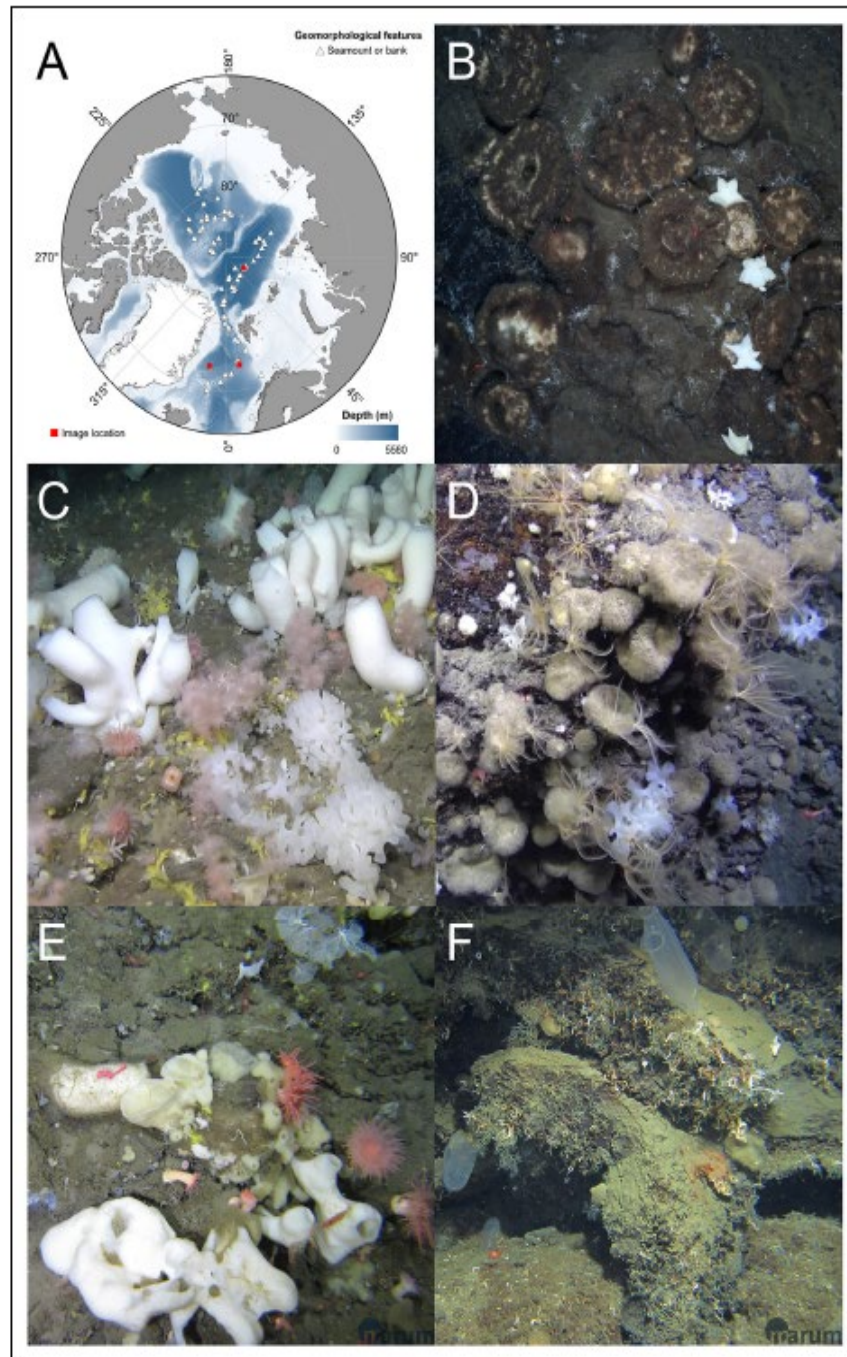


Figure 10. Representative fauna observed on seamounts and banks in the deep Arctic Ocean. (A) Locations of the representative images; (B) *Geodia* Lamarck, 1815 and *Stelletta* Schmidt, 1862 with predating seastars on the summit of Karasik Seamount (Source: Autun Purser, AWI, Deep-Sea Research Group); (C) *Schaulinnia rosea* (Fristedt, 1887), *Asconema foliatum* (Fristedt, 1887), *Geodia parva* Hansen, 1885 with associated fauna on the summit; (D) *Geodia* sponges with crinoids and associated fauna on the flanks of Schulz Bank (Source: Heidi Meyer, SponGES project and University of Bergen); and (E) *Schaulinnia rosea* and *Geodia* with associated fauna on the eastern flank and (F) ascidians, bryozoans, and polychaetes on the deep western slope of Vesteris Bank (Source: Jan Steger, copyright MARUM, University of Bremen, Germany. Cruise MSM86).

Hydrothermal and cold seep systems

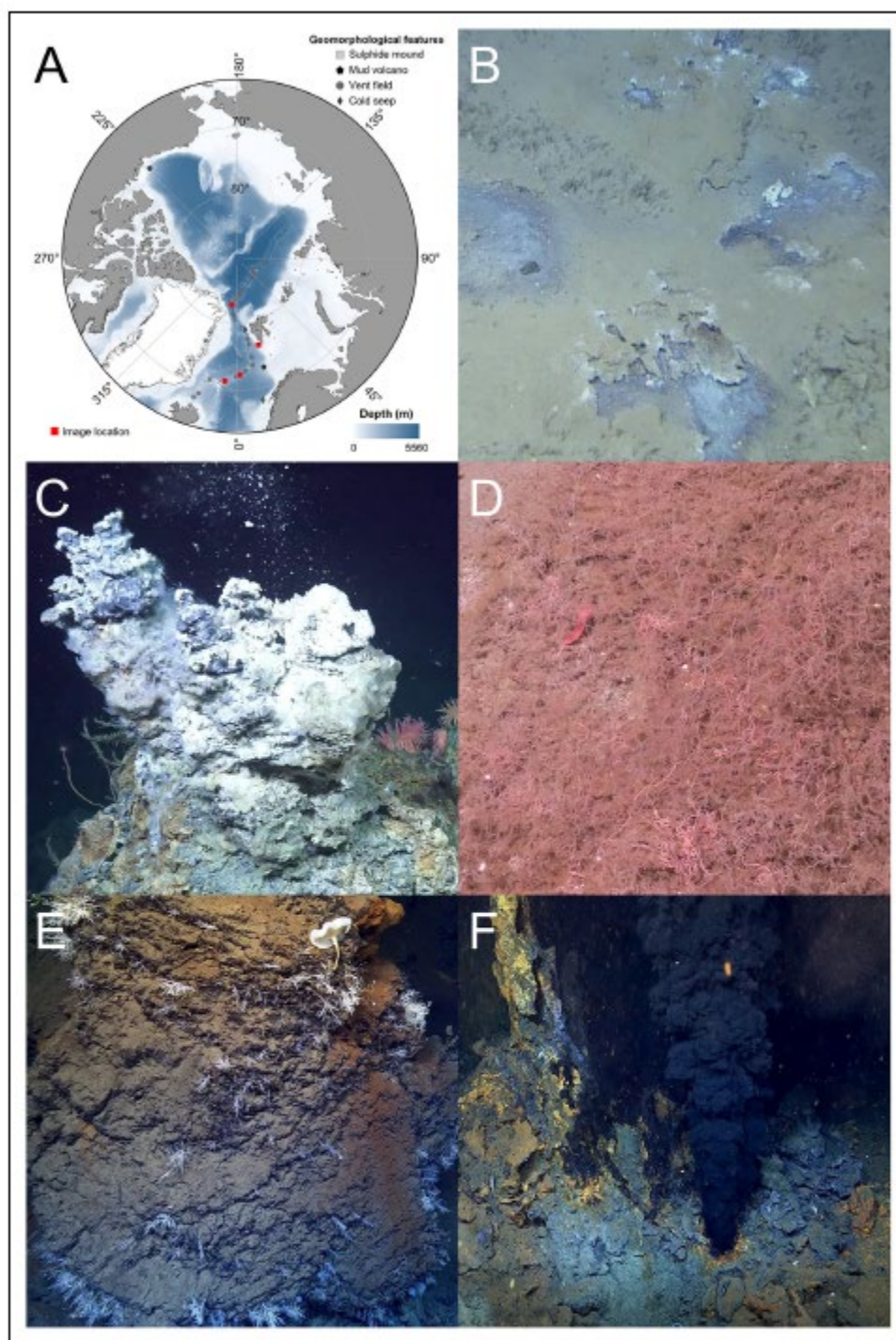
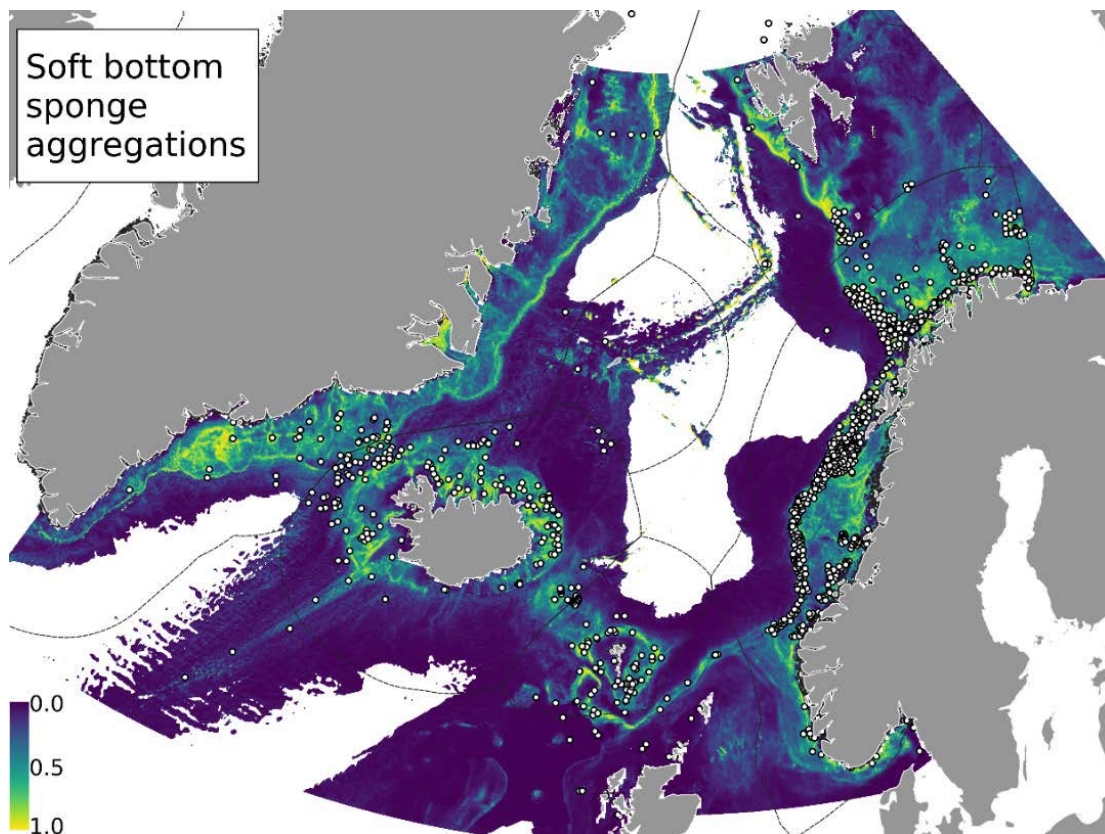
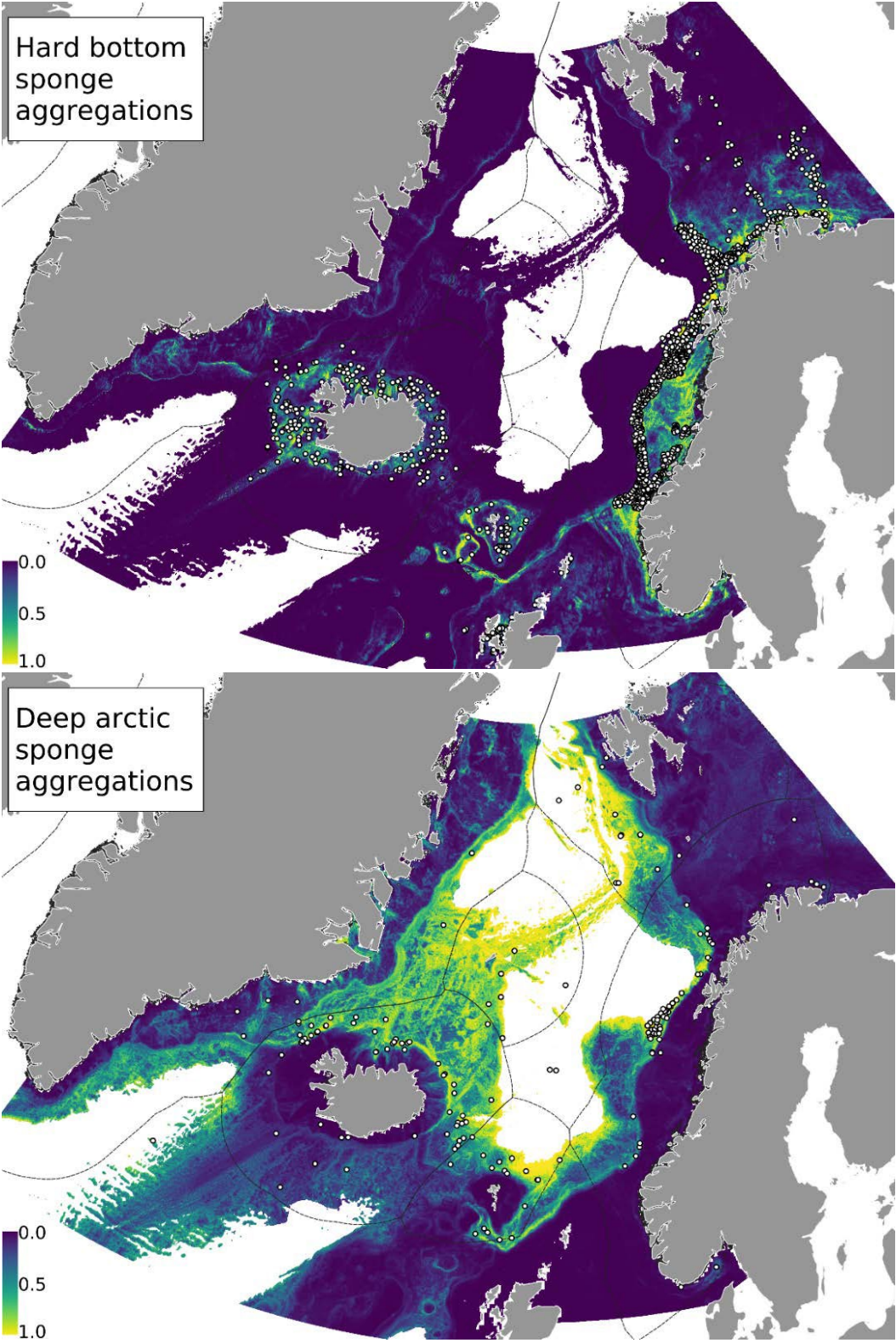


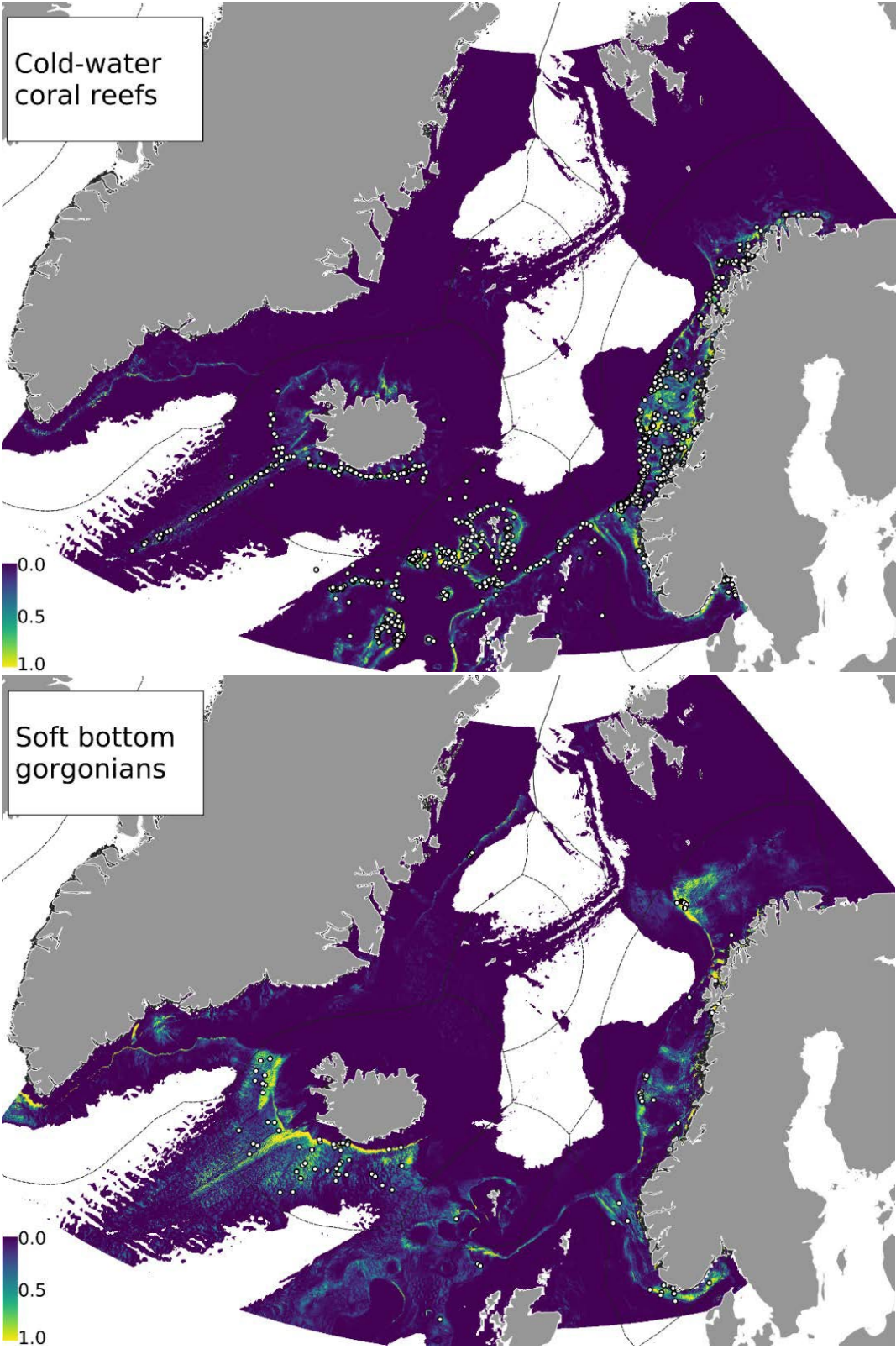
Figure 11. Representative fauna observed on hydrothermal and cold seep systems in the deep Arctic Ocean. (A) Locations of the representative images; (B) microbial mats with siboglinid worm fields at seeps west of Svalbard (Source: Pål Buhl-Mortensen, MAREANO, Institute of Marine Research); (C) microbially covered chimney with associated hydrozoans and actinarians at Perle & Bruse vent field and (D) *Sclerolinum contortum* Smirnov, 2000 worm field at a diffuse venting region of Ægir vent field (Source: Mari Heggernes Eilertsen, Centre for Deep Sea Research, University of Bergen, Norway); and (E) Cladorhizidae-covered chimney and (F) Enceladus black smoker at the Aurora vent field (Source: Eva Ramirez-Llodra, HAICON21 and REV Ocean).

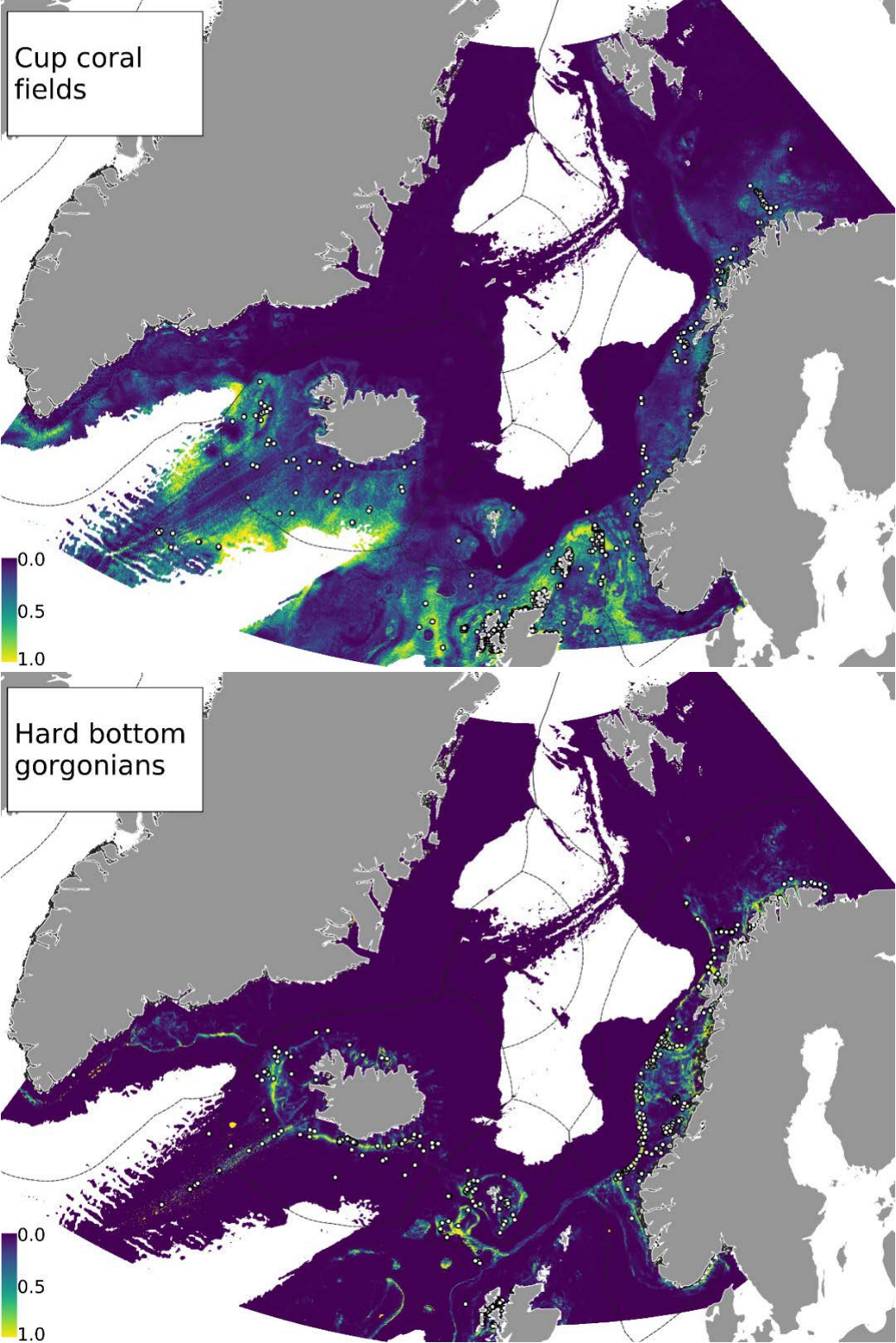
Appendix 5. Predicted VME distribution maps - from Buhl-Mortensen et al., 2019

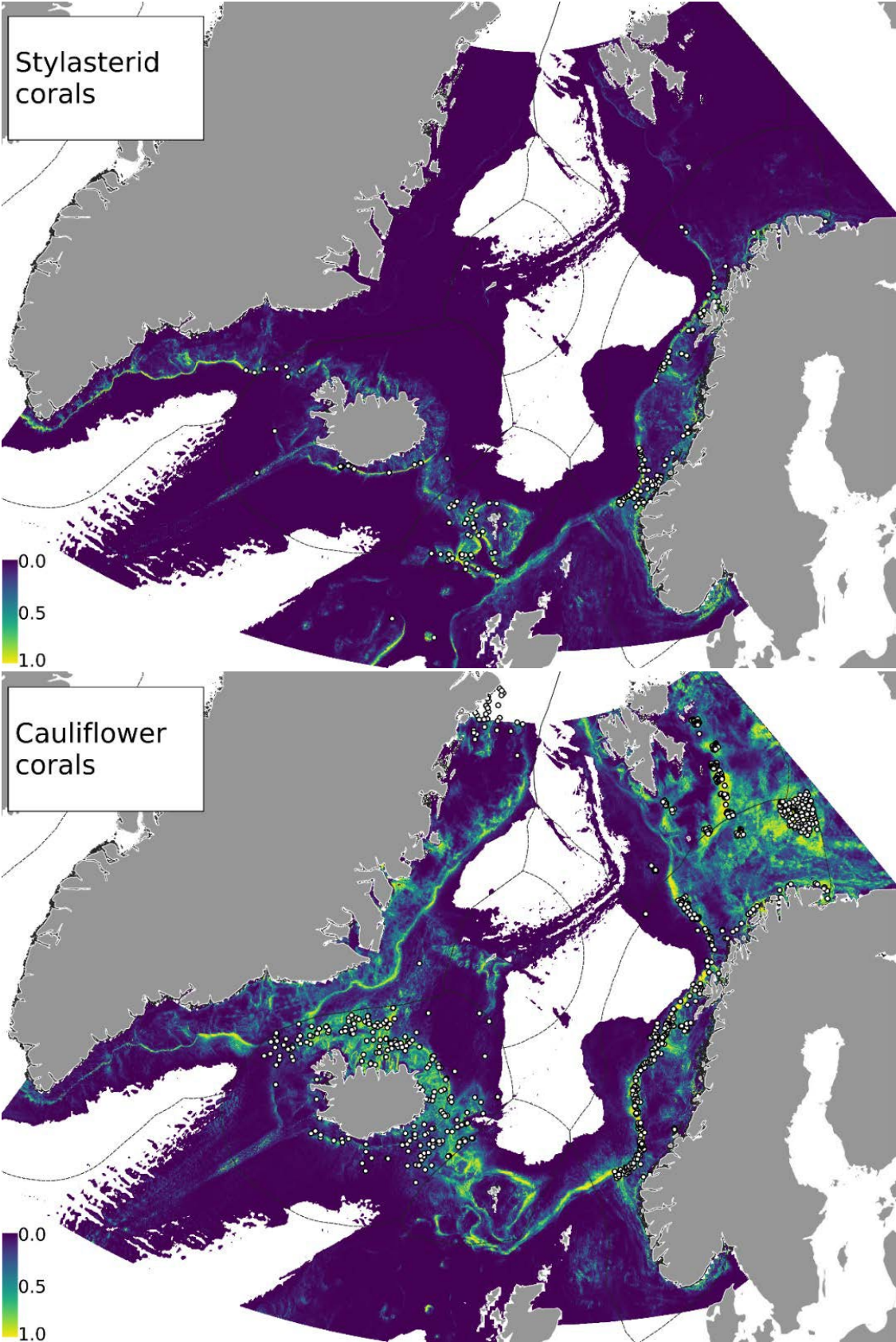
These maps indicate the distribution of the VMEs, as predicted by the MaxEnt models based on presence locations (shown as white dots) of indicator species and using environmental parameters as predictors. Light colours indicate high habitat suitability and can be considered as an indication of high probability of VME presence.

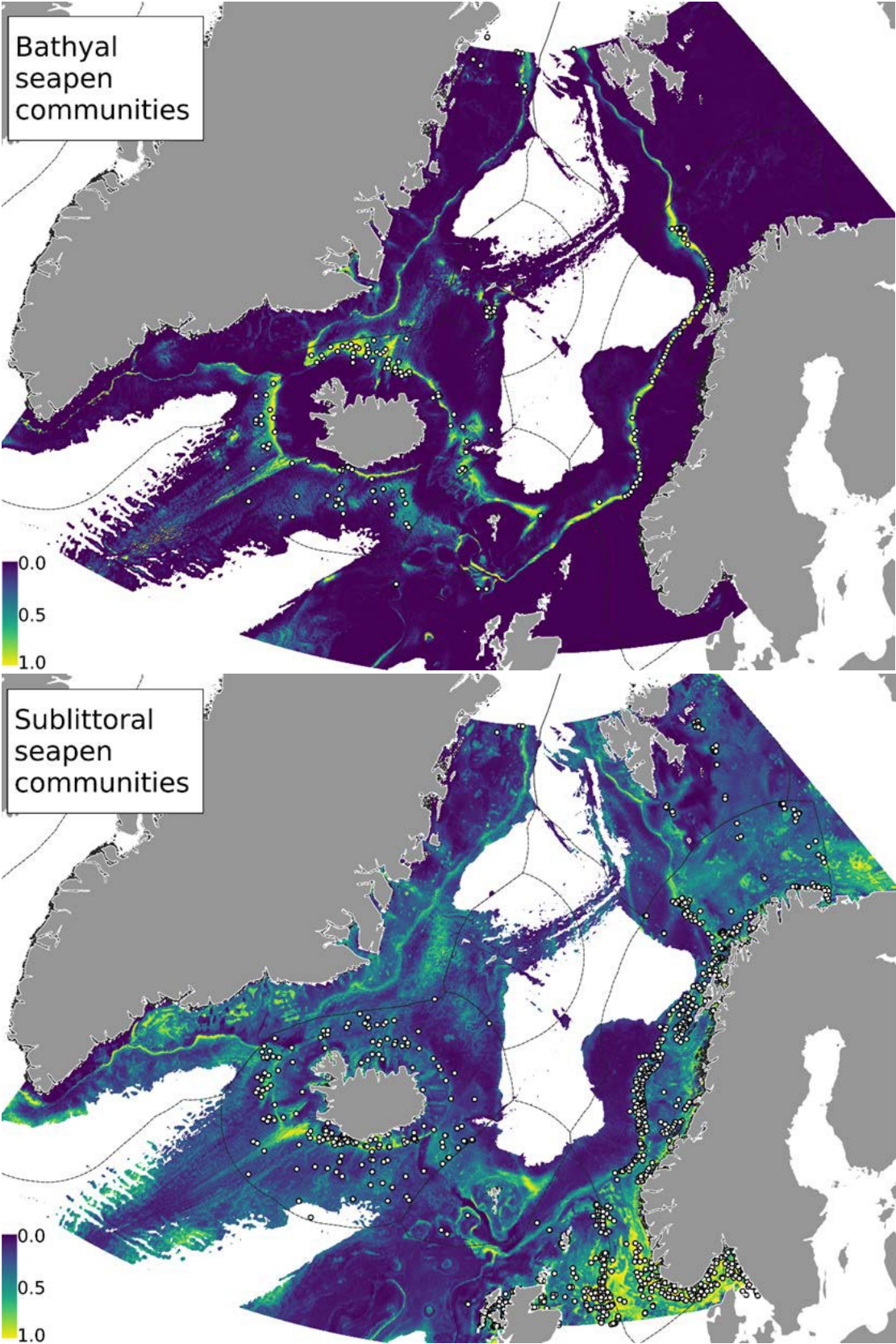












Appendix 6. Distribution ranges maps for all available species of marine mammals, from the Institute of Marine Research, Norway

The dataset contains generalised distribution maps for various species of marine mammals in Norwegian areas, based on the species manager's interpretation of the distribution over the past 30 years. More information about the data basis and the species can be found at the Institute of Marine Research: <https://www.hi.no/hi/temasider/arter>.

Minke whale



Narwhal



Beluga whale



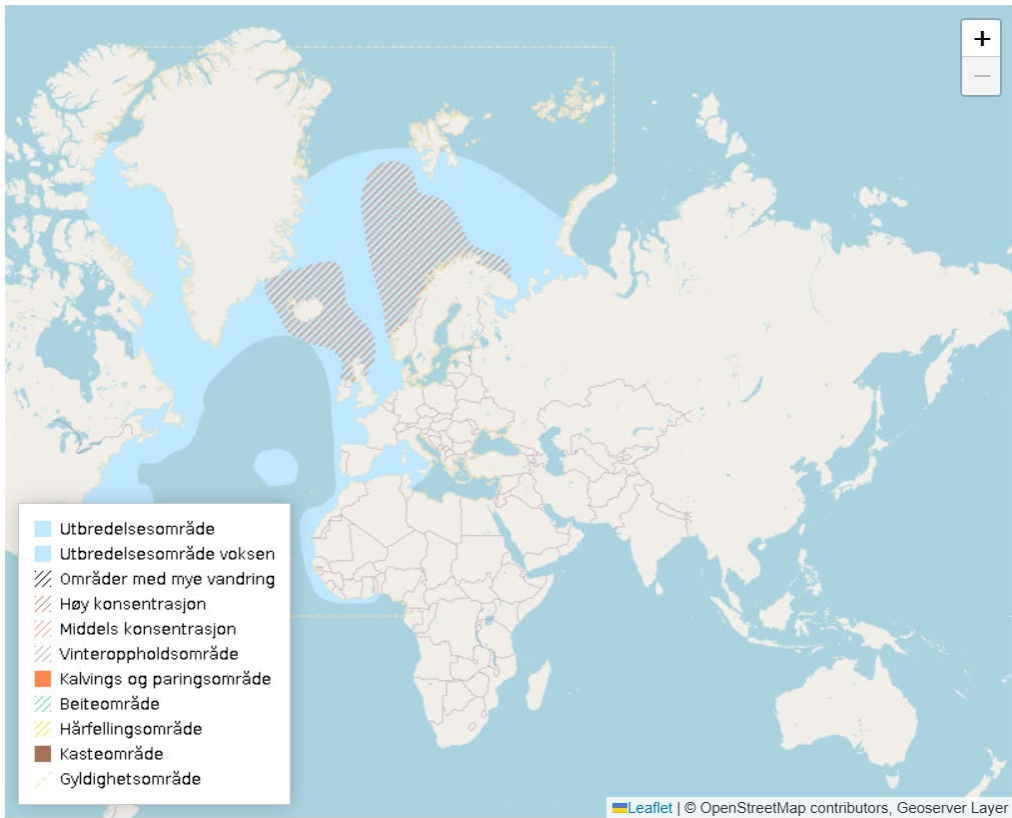
Humpback whale



Pilot whale



Killer whale



Sperm whale



Porpoise



Harp seal

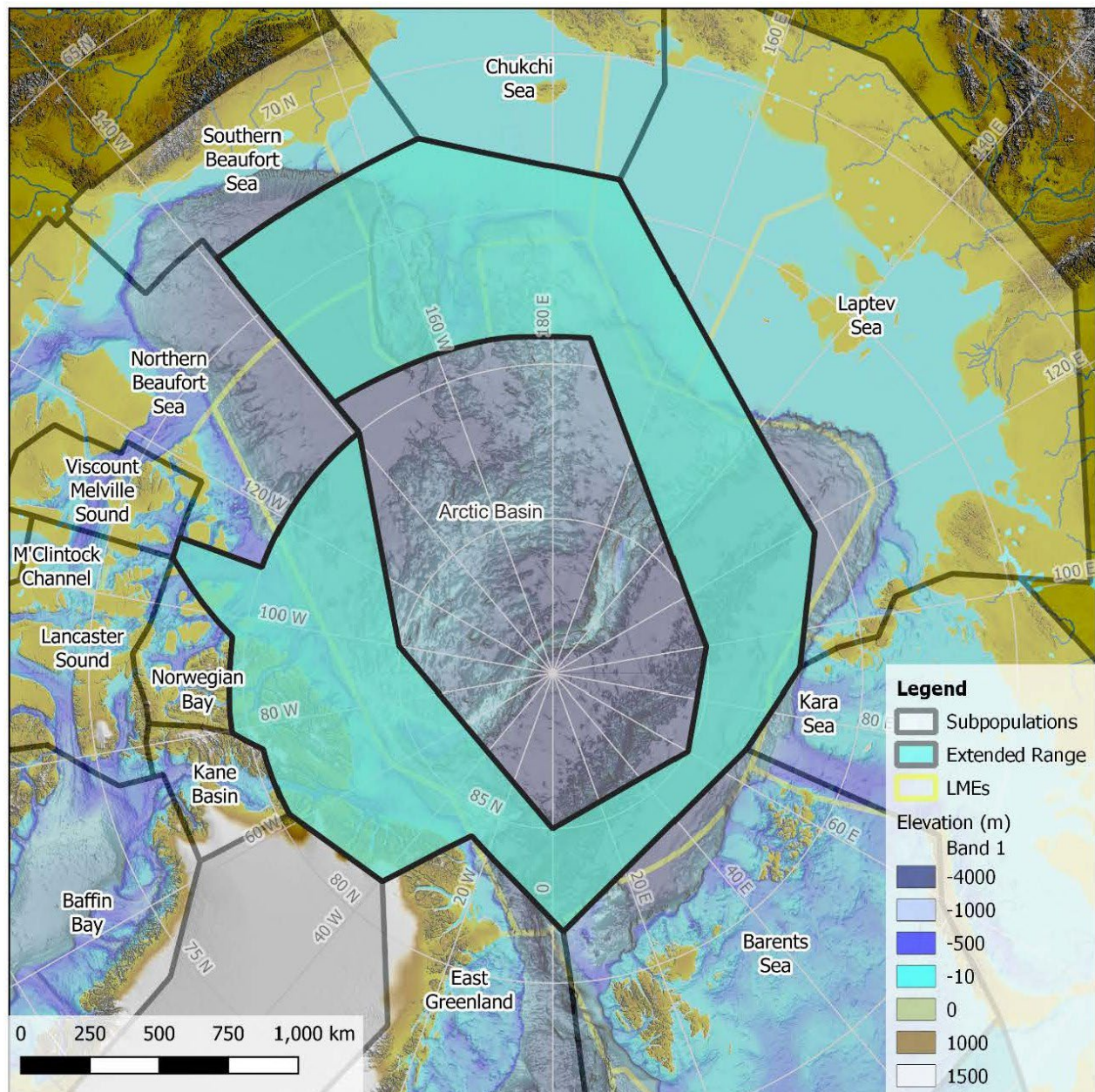


Harbour sea

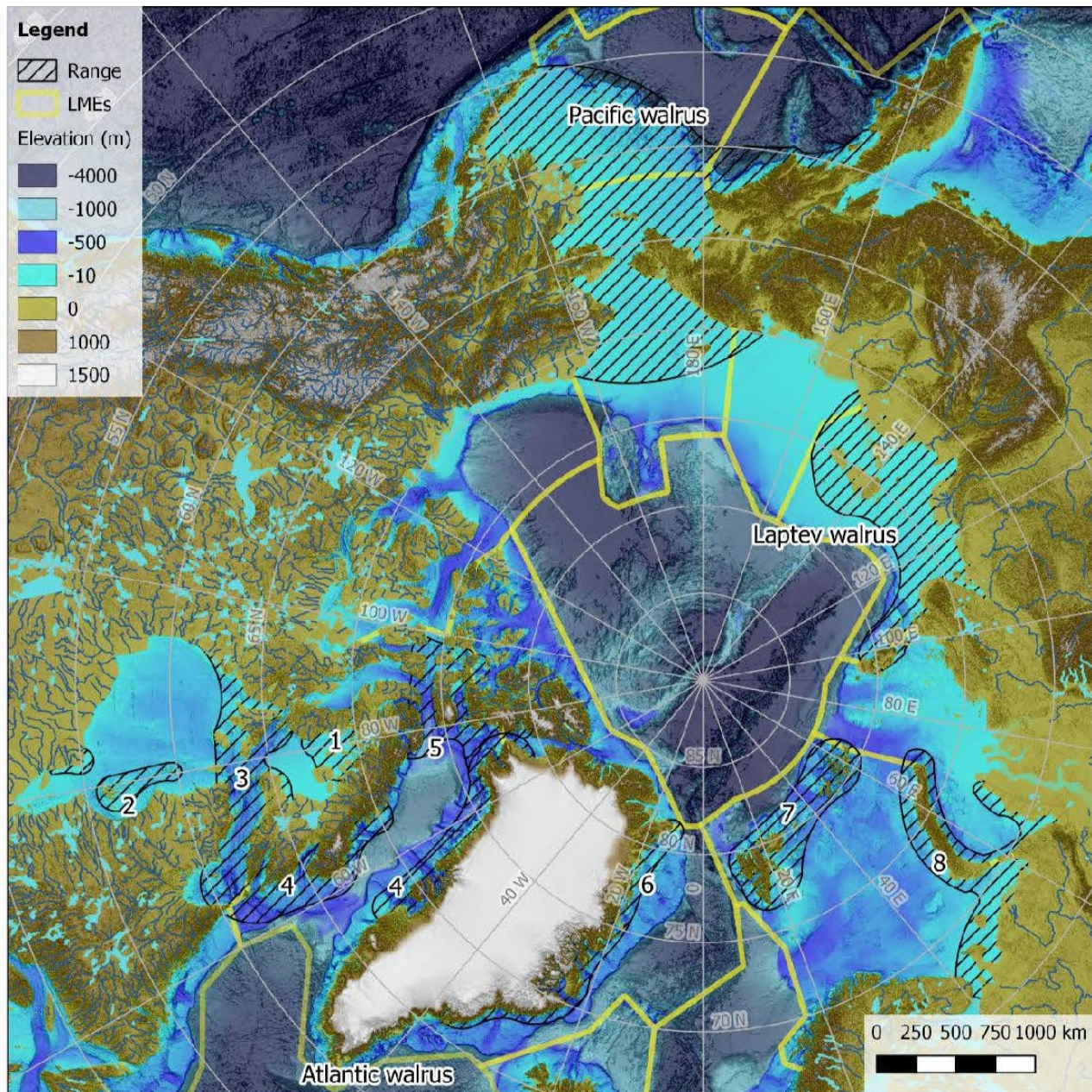


Appendix 7. Distribution ranges maps for available species of marine mammals in CAO, from the WGICA 2022 report (Skjoldal et al., 2022)

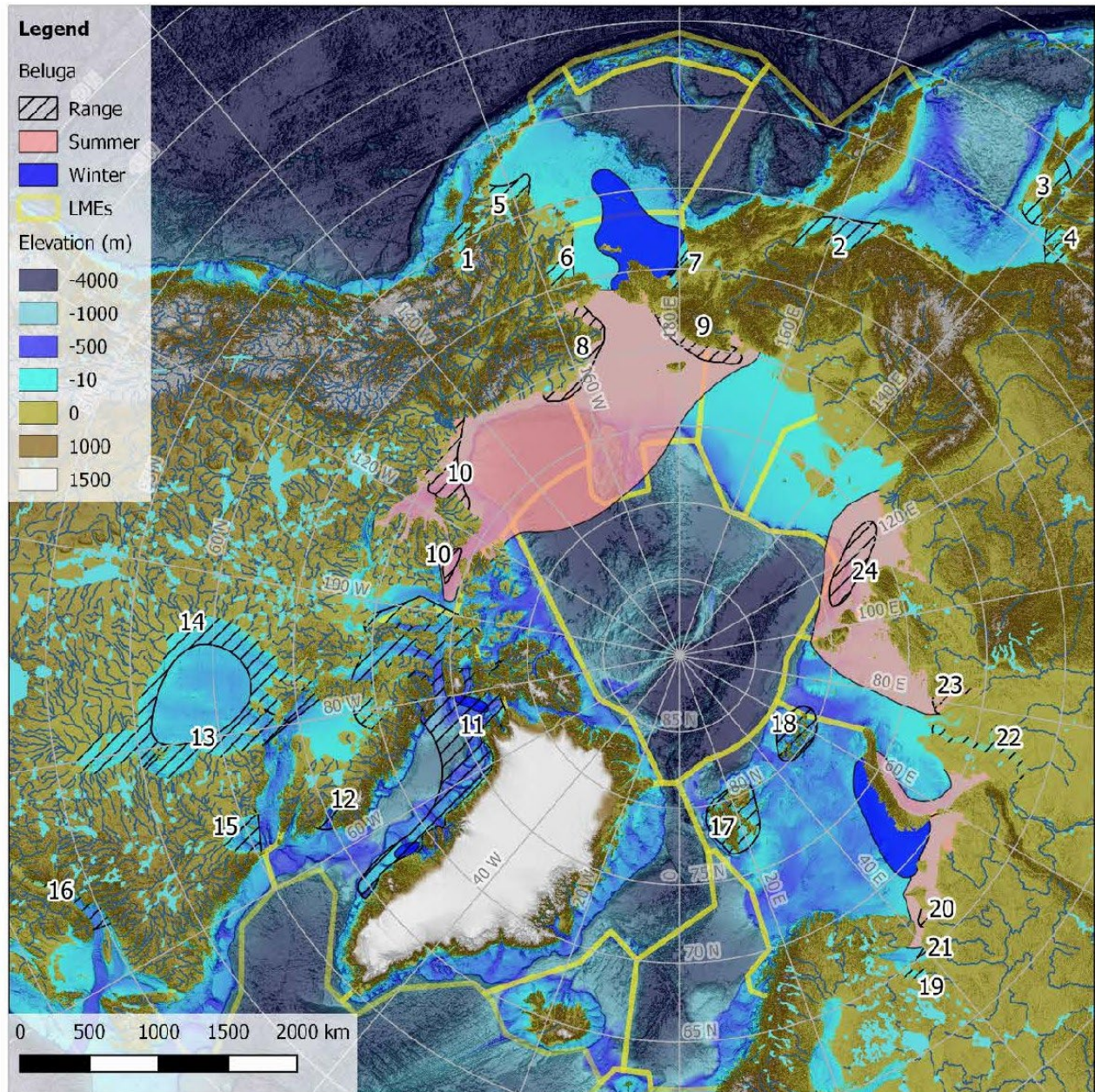
Polar bear subpopulations in and around the CAO. The black lines show the delineation of subpopulations recognized by the Polar Bear Specialists Group of IUCN, with the names of the subpopulations given. The green areas are extended ranges of the subpopulations in ice-covered waters of the CAO as revealed by satellite-tracked individuals (Skjoldal et al., 2022).



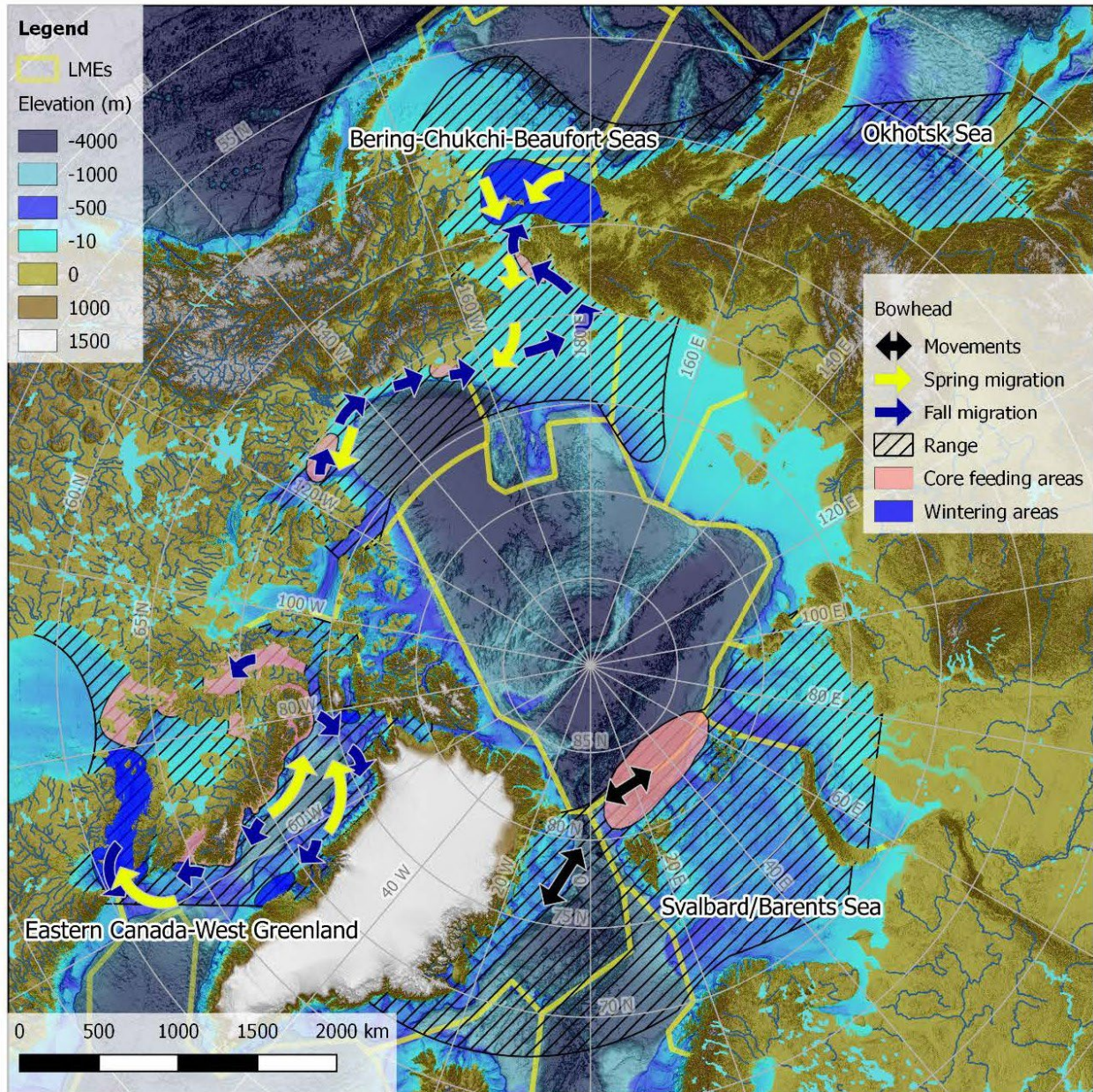
Distribution of Atlantic, Pacific and Laptev walrus. The numbers denote identified populations of Atlantic walrus: 1 – Foxe Basin, 2 – South and East Hudson Bay, 3 – Northern Hudson Bay-Davis Strait, 4 – Western Greenland, 5 – Baffin Bay-Eastern Canadian Arctic, 6 – Eastern Greenland, 7 – Svalbard-Franz Joseph Land, 8 – Kara Sea-Southern Barents Sea-Novaya Zemlya. Pacific and Laptev walrus occur with one population each (Skjoldal et al., 2022).



Distribution of beluga whale populations or stocks in the circumpolar Arctic seas. Numbers refer to identified stocks, or core summer areas for the Russian Arctic. Summer and winter areas are shown for two of the populations in the Pacific Arctic: the Eastern Chukchi Sea (No. 8) and Eastern Beaufort Sea (No. 10) stocks, wintering in the Bering Sea and summering in the Chukchi and Beaufort seas, and for the Karskaya population (No. 24, and possibly including No. 22 and 23), wintering in the southeastern Barents Sea and summering in the Kara and Laptev seas (Skjoldal et al., 2022).



Distribution and seasonal migrations of bowhead whales of the Bering/Chukchi/Beaufort stock, East Canada/West Greenland stock, and East Greenland/Svalbard/Barents Sea stock. There is limited information on the latter stock which was depleted almost to extinction and was until recently considered Critically Endangered. It has now been downlisted by IUCN to Endangered (Skjoldal et al., 2022).



Appendix 8-1. ArcNet Geranium Instant Report for OSPAR Region I

Instant Report for OSPAR Region I.

Acronyms:

- AOI - area of interest
- CF - conservation feature
- PU - planning unit
- ROC - relative overall concern
- RSC - relative significant concern

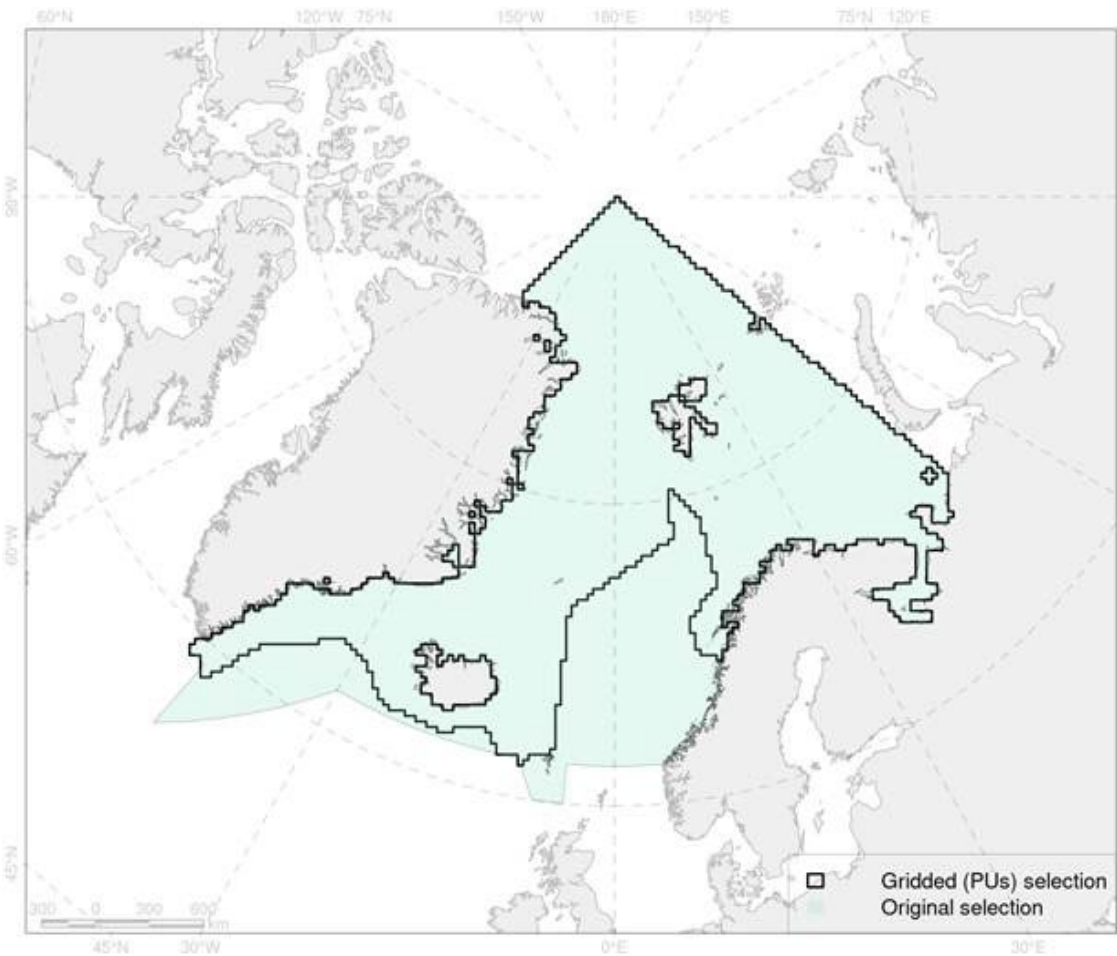


Figure 1: Selected Area

Basic statistics of selected area:

Table 1: Basic statistics

No of PUs	No of CFs	Total Area, km ²	Total Area, PUs, km ²	Terrestrial Area, PUs, km ²	Marine Area, PUs, km ²
4664	293	5482506	4197600	64449	4133151

Concern Indexes:

Table 2: Concern Indexes

RSC-PU, %	ROC-PU, %	RSC-AOI, %	ROC-AOI, %
96.2	99	15.7	18.8

Relative Overall Concern Level by Month (ROC-M):

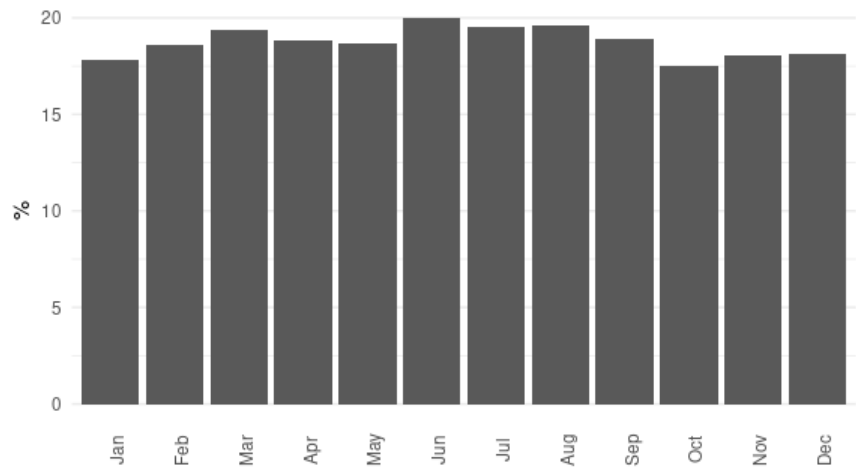


Figure 2: Relative Overall Concern Level by Month (ROC-M)

Relative Overall Concern Level by Activity (ROC-IA):

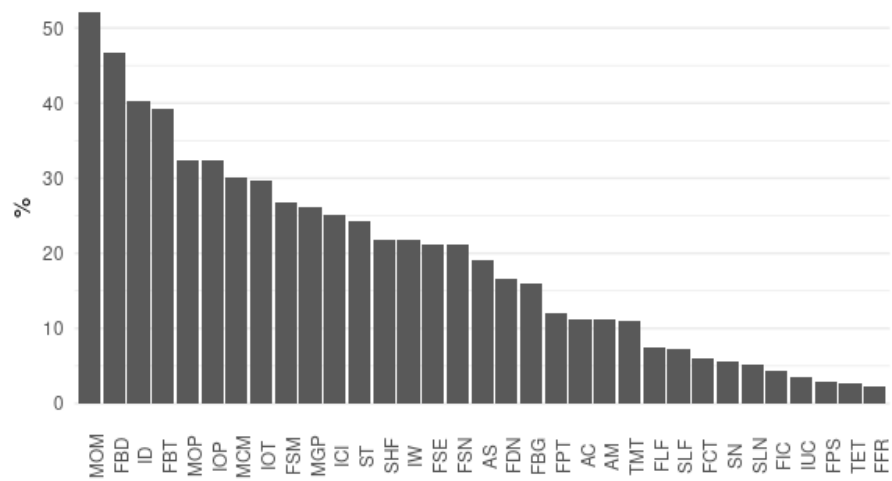


Figure 3: Relative Overall Concern Level by Activity (ROC-IA)

Relative Overall Concern Level of Activities:

Table 3: List of Activities ordered by Relative Overall Concern Level by Activity

Activity ID	Activity	ROC-IA, %
MOM	Other Offshore Mining	52.1
FBD	Dredge Fishing	46.6
ID	Dredging	40.2
FBT	Bottom Trawling	39.1
MOP	Offshore Oil & Gas-condensate Production	32.5
IOP	Underwater Oil & Gas Pipelines	32.4
MCM	Coastal Onshore Mining	30.0
IOT	Coastal Oil Terminals	29.7
FSM	Seaweed Mowing	26.8
MGP	Offshore Gas Production	26.2
ICI	Coastal Infrastructure	25.1
ST	Tankers carrying oil and other petrochemicals	24.3
SHF	Cargo Vessels - Heavy Fuel Oil	21.8
IW	Offshore Wind Farms	21.8
FSE	Seine and Stationary Seine Fishing	21.2
FSN	Snurrevad Fishing	21.1
AS	Seaweed Farms	19.0
FDN	Drift Net Fishing	16.7
FBG	Bottom Gillnets Fishing	15.9
FPT	Pelagic Trawling	12.0
AC	Finfish Farms	11.1
AM	Shellfish Farms	11.1
TMT	Mass tourism	11.0
FLF	Longline Fishing	7.5
SLF	Cargo Vessels – Light Fuel Oil	7.2
FCT	Pot and Trap Fishing	5.9
SN	Nuclear-powered Vessels	5.6
SLN	Cargo LNG-powered Vessels	5.3
FIC	Invertebrates Collection by Divers	4.2
IUC	Submarine Communication Cables	3.5
FPS	Purse Seine Fishing	2.9
TET	Ecotourism	2.6
FFR	Pole and Line Fishing	2.2

CF list by Relative Overall Concern Level:

Table 4: CF list by Relative Overall Concern Level (ROC>25%)

CF ID	CF Name	ROC- CF, %
9024	Polar bear (<i>Ursus maritimus</i>), East Greenland subpopulation, denning grounds	86.9
9038	Polar bear (<i>Ursus maritimus</i>), Barents Sea subpopulation, denning grounds	86.9
9020	Polar bear (<i>Ursus maritimus</i>), Arctic Basin subpopulation, denning grounds	86.3
8032	Biological communities, salt marshes, Barents Sea	82.0
6003	Little auk (<i>Alle alle polaris</i>) breeding colonies	81.1
6022	Atlantic puffin (<i>Fratercula arctica naumanni</i>) breeding colonies	80.8
6082	Thick-billed murre (<i>Uria lomvia lomvia</i>) breeding colonies	80.8
6033	Little auk (<i>Alle alle alle</i>) breeding colonies, Spitsbergen	80.2
6075	Common murre (<i>Uria aalge aalge</i>) breeding colonies	80.2
8025	Biological communities, intertidal zone, Barents Sea	77.9
6037	Ivory gull (<i>Pagophila eburnea</i>) breeding colonies, FJL	72.1
6036	Ivory gull (<i>Pagophila eburnea</i>) breeding colonies, East Greenland	72.1
6042	Ivory gull (<i>Pagophila eburnea</i>) breeding colonies, Spitsbergen	70.6
7250	Seagrasses, White Sea	69.7
6031	Little auk (<i>Alle alle alle</i>) breeding colonies, Greenland and North America	67.5
7245	Kelp forests, Pechora Sea	67.2
2046	Ringed seal (<i>Phoca hispida</i>) whelping grounds, FJL region	65.9
7247	Seagrasses, Arctic	65.8
7248	Seagrasses, Iceland	65.3
7249	Seagrasses, Scandinavian Peninsula	65.3
7225	Kelp forests, White Sea Gorlo	65.3
7227	Kelp forests, Kanin Cape	64.6
7237	Kelp forests, Solovetsky Islands and North Onega Peninsula	64.6
7218	Kelp forests, East Greenland	64.2
7228	Kelp forests, White Sea Karelian coast and neighboring coasts	64.1
6047	Black-legged kittiwake (<i>Rissa tridactyla pollicarius</i>) breeding colonies	64.0
7219	Kelp forests, FJL	63.9
7240	Kelp forests, South Greenland	63.4
1012	Walrus (<i>Odobenus rosmarus rosmarus</i>) haulouts, East Greenland	62.3
2051	Ringed seal (<i>Phoca hispida</i>) whelping grounds, Spitsbergen region	61.3
7226	Kelp forests, Iceland	61.1
7231	Kelp forests, Murman coast	61.1
2018	Harbour seal (<i>Phoca vitulina</i>) whelping and moulting grounds, Spitsbergen region	61.0
7238	Kelp forests, Spitsbergen	60.9
7234	Kelp forests, Scandinavian Peninsula	59.8
1008	Walrus (<i>Odobenus rosmarus rosmarus</i>) haulouts, Spitsbergen and FJL region	58.7
5023	Beluga (<i>Delphinapterus leucas</i>), Barent-Kara-Laptev Seas stock, summer / autumn grounds, FJL	57.6

8016	Biological communities, estuaries, Barents Sea	56.5
7253	Benthic communities, FJL bank	52.8
5028	Beluga (<i>Delphinapterus leucas</i>), Svalbard stock, summer grounds / core areas	51.0
6053	Common eider (<i>Somateria mollissima borealis</i>) breeding / moulting grounds, FJL	51.0
7255	Benthic communities, Goose bank	50.3
5072	Narwhal (<i>Monodon monoceros</i>), East Greenland stock, summer grounds	50.2
6043	Stellers eider (<i>Polysticta stelleri</i>) moulting / migration stopovers, Atlantic	50.1
6056	Common eider (<i>Somateria mollissima borealis</i>) breeding / moulting grounds, Spitsbergen	49.9
6060	Common eider (<i>Somateria mollissima borealis</i>) breeding / moulting grounds, Iceland	49.5
6062	Common eider (<i>Somateria mollissima mollissima</i>) breeding / moulting grounds, White Sea	49.3
6061	Common eider (<i>Somateria mollissima mollissima</i>) breeding / moulting grounds, south-eastern Barents and Kara Seas	49.2
6052	Common eider (<i>Somateria mollissima borealis</i>) breeding / moulting grounds, Eeast Greenland	49.1
5079	Narwhal (<i>Monodon monoceros</i>), FJL stock, summer grounds / core area	48.8
5035	Beluga (<i>Delphinapterus leucas</i>), White Sea stock, summer grounds / core areas	48.6
7252	Benthic communities, Svalbard bank	48.6
8039	Biological communities, glacial termini, FJL	47.8
8044	Biological communities, glacial termini, Spitsbergen	47.8
8040	Biological communities, glacial termini, Greenland	47.8
7262	Benthic communities, North-East Greenland bank	47.8
7261	Benthic communities, North-East Greenland shelf	47.6
7264	Benthic communities, South-East Greenland bank	47.6
5073	Narwhal (<i>Monodon monoceros</i>), East Greenland stock, winter grounds / core area	47.3
2015	Bearded seal (<i>Erignatus barbatus</i>) whelping grounds, Spitsbergen region	46.4
7051	Cold water coral communities, Barents Sea	46.0
7263	Benthic communities, South-East Greenland shelf	45.2
7056	Biological communities, cold water seeps and mud volcanoes	44.3
7054	Cold water coral communities, Iceland and East Greenland	43.5
6069	King eider (<i>Somateria spectabilis</i>) moulting / migration stopovers, Atlantic	43.5
7265	Benthic communities, Barents and Kara sea throughs	42.9
7052	Cold water coral communities, North America and West Greenland	41.7
7053	Cold water coral communities, Atlantic Arctic	40.9
7254	Benthic communities, Novaya Zemlya bank	40.4
6018	Long-tailed duck (<i>Clangula hyemalis</i>) moulting / migration stopovers, Greenland	39.8
6086	Long-tailed duck (<i>Clangula hyemalis</i>) moulting / migration stopovers, Iceland	38.9

6020	Long-tailed duck (<i>Clangula hyemalis</i>) moulting / migration stopovers, eastern North Atlantic	38.2
1020	Walrus (<i>Odobenus rosmarus rosmarus</i>) winter grounds, East Greenland	37.7
2016	Bearded seal (<i>Erignatus barbatus</i>) whelping grounds, White Sea	36.2
6044	Stellers eider (<i>Polysticta stelleri</i>) winter grounds, Atlantic	35.0
2025	Harp seal (<i>Pagophilus groenlandicus</i>) whelping grounds, West Ice region	34.6
7060	Biological communities, Gakkel Ridge eastern flank mountains	34.4
7058	Biological communities, Gakkel Ridge central flank mountains	34.4
7059	Biological communities, Gakkel Ridge central rift mountains	34.4
7061	Biological communities, Gakkel Ridge eastern rift mountains	34.4
7062	Biological communities, Gakkel Ridge western flank mountains	34.4
7063	Biological communities, Gakkel Ridge western rift mountains	34.4
7057	Biological communities, vents	31.9
5055	Harbour porpoise (<i>Phocoena phocoena</i>) feeding grounds, Iceland	30.2
2039	Ringed seal (<i>Phoca hispida</i>) feeding grounds, Spitsbergen region	29.8
1005	Walrus (<i>Odobenus rosmarus rosmarus</i>) winter grounds, Spitsbergen and FJL region	29.3
2026	Harp seal (<i>Pagophilus groenlandicus</i>) whelping grounds, White Sea	29.1
5045	Bowhead whale (<i>Balaena mysticetus</i>), Spitsbergen population home range, core area	28.4
6063	Common eider (<i>Somateria mollissima mollissima</i>) wintering grounds, White Sea	27.0
2052	Ringed seal (<i>Phoca hispida</i>) whelping grounds, White Sea	26.9
1006	Walrus (<i>Odobenus rosmarus rosmarus</i>) summer grounds, Spitsbergen and FJL region	26.5
6059	Common eider (<i>Somateria mollissima borealis</i>) wintering grounds, West Greenland	26.2
6068	Common eider (<i>Somateria mollissima mollissima</i>) wintering grounds, Murman and Scandinavian coast	26.0
1004	Walrus (<i>Odobenus rosmarus rosmarus</i>) summer grounds, East Greenland	25.4
6021	Long-tailed duck (<i>Clangula hyemalis</i>) wintering grounds, eastern North Atlantic	25.0
6019	Long-tailed duck (<i>Clangula hyemalis</i>) wintering grounds, Greenland	25.0

Top CFs by Coverage (all with spatial presence in region (coverage) above 25%):

Table 5: Top CFs by Coverage

CF ID	CF Name	Coverage, %	ROC-CF, %
2018	Harbour seal (<i>Phoca vitulina</i>) whelping and moulting grounds, Spitsbergen region	100.0	61.0
2025	Harp seal (<i>Pagophilus groenlandicus</i>) whelping grounds, West Ice region	100.0	34.6

2031	Hooded seal (<i>Cystophora cristata</i>) whelping grounds, West Ice region	100.0	14.9
3024	MIZ biological communities, April, Iceland	100.0	1.0
3046	Multiyear Ice biological communities, April, Barents Sea	100.0	1.0
4051	Norwegian pollock (<i>Theragra finmarchica</i>) home range	100.0	1.9
4060	Greenland halibut (<i>Reinhardtius hippoglossoides</i>) spawning grounds	100.0	2.8
4064	Smooth polar sculpin (<i>Cottunculus subspinosus</i>) home range	100.0	1.4
5049	Fin whale (<i>Balaenoptera physalus</i>) summer feeding grounds, Jan Mayen	100.0	6.8
5073	Narwhal (<i>Monodon monoceros</i>), East Greenland stock, winter grounds / core area	100.0	47.3
5113	Sperm whale (<i>Physeter macrocephalus</i>) summer feeding grounds, Atlantic	100.0	6.0
7027	Benthic communities, Greenland Sea abyssal Zoogeographic region	100.0	1.6
7058	Biological communities, Gakkel Ridge central flank mountains	100.0	34.4
7059	Biological communities, Gakkel Ridge central rift mountains	100.0	34.4
7062	Biological communities, Gakkel Ridge western flank mountains	100.0	34.4
7063	Biological communities, Gakkel Ridge western rift mountains	100.0	34.4
7070	Benthic communities, I.1.2.1. Barents Sea western slope	100.0	14.8
7174	Benthic communities, VII.1.4. Greenland Sea and Fram Strait abyssal mountains	100.0	7.2
7184	Benthic communities, VI.1. Greenland Sea and Fram Strait Basin rises and VI.1.1. plateaus	100.0	11.4
7185	Benthic communities, VI.1.2. Greenland Sea and Fram Strait terraces	100.0	6.8
7186	Benthic communities, VI.1.3. Greenland Sea and Fram Strait ridges	100.0	6.8
7187	Benthic communities, VI.1.4. Greenland Sea and Fram Strait spreading ridge	100.0	6.8
7188	Benthic communities, VI.1.5. Greenland Sea and Fram Strait fans	100.0	11.4
7190	Benthic communities, VI.2. Gakkel Ridge and VI.2.1. Ermak Plateau	100.0	11.4
7191	Benthic communities, VI.2.2. Gakkel Ridge and Ermak Plateau terraces	100.0	8.7
7195	Benthic communities, VI.2.7. Gakkel Ridge and Ermak Plateau canyons	100.0	7.2
7211	Benthic communities, V.1.2. North Iceland slope	100.0	15.5
7213	Benthic communities, V.2.2. South Iceland slope	100.0	15.5
7252	Benthic communities, Svalbard bank	100.0	48.6
7253	Benthic communities, FJL bank	100.0	52.8
7255	Benthic communities, Goose bank	100.0	50.3
7262	Benthic communities, North-East Greenland bank	100.0	47.8
7264	Benthic communities, South-East Greenland bank	100.0	47.6
3045	Multiyear Ice biological communities, April, Greenland Sea	100.0	1.0
6063	Common eider (<i>Somateria mollissima mollissima</i>) wintering grounds, White Sea	100.0	27.0
7173	Benthic communities, VII.1.3. Greenland Sea and Fram Strait abyssal hills	100.0	8.1

7172	Benthic communities, VII.1.2. Greenland Sea and Fram Strait abyssal plains	100.0	1.6
5064	Orca (<i>Orcinus orca</i>) summer feeding grounds, eastern North Atlantic	99.9	7.4
2028	Hooded seal (<i>Cystophora cristata</i>) moulting grounds	99.9	24.1
5098	White-beaked dolphin (<i>Lagenorhynchus albirostris</i>) feeding grounds, central North Atlantic	99.8	10.7
5051	Fin whale (<i>Balaenoptera physalus</i>) summer feeding grounds, eastern North Atlantic	99.8	6.9
5053	Harbour porpoise (<i>Phocoena phocoena</i>) feeding grounds, Barents Sea	99.6	24.9
4066	Pink salmon (<i>Oncorhynchus gorbuscha</i>), native populations, feeding / migration grounds	99.6	1.7
5048	Fin whale (<i>Balaenoptera physalus</i>) summer feeding grounds, East Greenland and western Iceland	99.6	6.8
5037	Blue whale (<i>Balaenoptera musculus</i>) summer feeding grounds, eastern North Atlantic	99.4	6.6
3025	MIZ biological communities, April, Greenland Sea	99.4	1.0
5061	Humpback whale (<i>Megaptera novaeanglia</i>) summer feeding grounds, eastern North Atlantic	99.0	20.4
3036	MIZ biological communities, July, Greenland Sea	98.8	1.0
7189	Benthic communities, VI.1.8. Greenland Sea and Fram Strait seamounts	98.7	6.5
5067	Minke whale (<i>Balaenoptera acutorostrata</i>) feeding grounds, eastern North Atlantic	98.6	7.4
5101	Northern bottlenose whale (<i>Hyperoodon ampullatu</i>) summer feeding grounds, eastern North Atlantic	98.5	4.8
4069	Atlantic herring (<i>Clupea harengus</i>) spawning grounds	98.3	5.5
2059	Harp seal (<i>Pagophilus groenlandicus</i>) feeding grounds, Greenland, as predicted by MIZ distribution	98.1	9.1
7209	Benthic communities, V.1.1.1. North Iceland medium and low profile shelf	98.0	12.0
6004	Little auk (<i>Alle alle polaris</i>) wintering grounds	97.7	5.5
5066	Minke whale (<i>Balaenoptera acutorostrata</i>) feeding grounds, central North Atlantic	97.5	6.9
7161	Benthic communities, III.6.1.1. Southeast Greenland medium and low profile shelf	97.2	12.6
7162	Benthic communities, III.6.1.2. Southeast Greenland glacial troughs	97.1	14.1
7163	Benthic communities, III.6.2. Southwest Greenland slope	96.9	14.8
3054	Multiyear Ice biological communities, September, Greenland Sea	96.8	1.0
1020	Walrus (<i>Odobenus rosmarus rosmarus</i>) winter grounds, East Greenland	96.6	37.7
5036	Beluga (<i>Delphinapterus leucas</i>), White Sea stock, winter grounds	96.2	19.1
7261	Benthic communities, North-East Greenland shelf	96.2	47.6
7029	Benthic communities, Iceland Zoogeographic region	96.0	1.9

2016	Bearded seal (<i>Erignatus barbatus</i>) whelping grounds, White Sea	95.9	36.2
7054	Cold water coral communities, Iceland and East Greenland	95.8	43.5
5055	Harbour porpoise (<i>Phocoena phocoena</i>) feeding grounds, Iceland	95.8	30.2
7210	Benthic communities, V.1.1.2. North Iceland glacial troughs	95.6	12.4
7212	Benthic communities, V.2.1. South Iceland shelf and glacial troughs	95.4	12.4
7040	Benthic communities, Transitional Zoogeographic zone, north-eastern Barents Sea	95.1	2.1
6093	Little auk (<i>Alle alle alle</i>) breeding colonies foraging range buffer, Spitsbergen	95.1	6.4
4063	White Sea eelpout (<i>Lycodes marisalbi</i>), European population, home range	94.9	1.6
3122	Polynya biological communities, East Greenland	94.7	1.0
7039	Benthic communities, Transitional Zoogeographic zone, Central Barents Sea	94.7	2.4
9006	Polar bear (<i>Ursus maritimus</i>), East Greenland subpopulation, home range	94.6	6.3
1004	Walrus (<i>Odobenus rosmarus rosmarus</i>) summer grounds, East Greenland	94.6	25.4
2015	Bearded seal (<i>Erignatus barbatus</i>) whelping grounds, Spitsbergen region	94.4	46.4
6098	Ivory gull (<i>Pagophila eburnea</i>) breeding colonies foraging range buffer, Spitsbergen	94.3	4.0
2047	Ringed seal (<i>Phoca hispida</i>) whelping grounds, Greenland region	94.3	13.4
7050	Benthic communities, Transitional Zoogeographic zone, south-eastern Greenland	94.2	2.0
2017	Grey seal (<i>Halichoerus grypu</i>) home range	94.0	9.9
7166	Benthic communities, IV.1.3. White Sea Dvina Bay and Onega Bays shelf	93.3	10.9
5099	White-beaked dolphin (<i>Lagenorhynchus albirostris</i>) feeding grounds, eastern North Atlantic	92.5	10.7
2026	Harp seal (<i>Pagophilus groenlandicus</i>) whelping grounds, White Sea	92.3	29.1
4027	Atlantic salmon (<i>Salmo salar</i>), European populations, feeding / migration grounds	92.3	6.6
4068	European eel (<i>Anguilla anguilla</i>) migration range	91.7	1.8
5059	Humpback whale (<i>Megaptera novaeanglia</i>) summer feeding grounds, East Greenland and Iceland	91.4	19.3
3125	Polynya biological communities, White Sea	91.2	1.0
5034	Beluga (<i>Delphinapterus leucas</i>), White Sea stock, summer grounds	91.1	18.6
7160	Benthic communities, III.6.1. Southeast Greenland shelf	90.9	10.8
7263	Benthic communities, South-East Greenland shelf	90.6	45.2
7159	Benthic communities, III.5.2. Northeast Greenland slope	90.0	13.0
7208	Benthic communities, V.1.1. North Iceland shelf	90.0	10.6
6086	Long-tailed duck (<i>Clangula hyemalis</i>) moulting / migration stopovers, Iceland	89.7	38.9

4071	Pacific herring (<i>Clupea pallasii</i>), White-Sea local races, home range	89.4	6.6
3121	Polynya biological communities, Spitsbergen	89.2	1.0
7164	Benthic communities, IV.1.1. White Sea Gorlo Strait shelf	88.7	10.9
3124	Polynya biological communities, Mezen region, White Sea	88.6	1.0
7165	Benthic communities, IV.1.2. White Sea Mezen Bay shelf	87.8	10.9
2051	Ringed seal (<i>Phoca hispida</i>) whelping grounds, Spitsbergen region	87.7	61.3
5045	Bowhead whale (<i>Balaena mysticetus</i>), Spitsbergen population home range, core area	87.6	28.4
7157	Benthic communities, III.5.1.1. Northeast Greenland medium and low profile shelf	87.1	13.5
7038	Benthic communities, Transitional Zoogeographic zone, western Barents Sea	86.3	1.9
7167	Benthic communities, IV.1.4. White Sea Kandalaksha Bay and central deep part	86.2	13.1
7051	Cold water coral communities, Barents Sea	85.4	46.0
7069	Benthic communities, I.1.1.5.2. Barents and Kara Seas shelf banks, moderate (>100 m)	85.2	14.5
2039	Ringed seal (<i>Phoca hispida</i>) feeding grounds, Spitsbergen region	85.2	29.8
7156	Benthic communities, III.5.1. Northeast Greenland shelf and slope	85.0	12.4
7015	Benthic communities, Chioshkaya Bay boreal Zoogeographic enclave	84.9	2.2
7016	Benthic communities, White Sea Arctic Zoogeographic enclave	84.1	2.1
6024	Yellow-billed loon (<i>Gavia adamsii</i>) wintering grounds, Atlantic	83.9	7.0
7075	Benthic communities, I.1.3.3. Chioshkaya Bay - large shallow unstratified bays	83.8	11.5
6062	Common eider (<i>Somateria mollissima mollissima</i>) breeding / moulting grounds, White Sea	83.6	49.3
3055	Multiyear Ice biological communities, September, Barents Sea	83.4	1.0
4054	Shorthorn sculpin (<i>Myoxocephalus scorpius</i>), European populations, home range	83.4	1.3
6021	Long-tailed duck (<i>Clangula hyemalis</i>) wintering grounds, eastern North Atlantic	83.2	25.0
5072	Narwhal (<i>Monodon monoceros</i>), East Greenland stock, summer grounds	83.0	50.2
6090	Atlantic puffin (<i>Fratercula arctica naumanni</i>) breeding colonies foraging range buffer	81.4	6.2
2052	Ringed seal (<i>Phoca hispida</i>) whelping grounds, White Sea	80.7	26.9
4057	American plaice (<i>Hippoglossoides platessoides</i>), American populations, home range	80.5	1.5
7237	Kelp forests, Solovetsky Islands and North Onega Peninsula	80.3	64.6
7158	Benthic communities, III.5.1.2. Northeast Greenland glacial troughs	78.7	12.7
5027	Beluga (<i>Delphinapterus leucas</i>), Svalbard stock, summer grounds	78.5	17.9

7171	Benthic communities, VII.1. Greenland Sea and Fram Strait basins and VII.1.1. rises (slope foot)	77.8	11.4
3007	Fast Ice biological communities, East Greenland region	77.7	1.0
7033	Benthic communities, North and East Greenland Zoogeographic region	77.2	2.0
1005	Walrus (<i>Odobenus rosmarus rosmarus</i>) winter grounds, Spitsbergen and FJL region	76.7	29.3
6095	Ivory gull (<i>Pagophila eburnea</i>) breeding colonies foraging range buffer, East Greenland	76.4	4.9
4049	Haddock (<i>Melanogrammus aeglefinus</i>) home range	75.6	1.6
6023	Atlantic puffin (<i>Fratercula arctica naumanni</i>) winter grounds	75.2	4.7
7053	Cold water coral communities, Atlantic Arctic	75.0	40.9
5035	Beluga (<i>Delphinapterus leucas</i>), White Sea stock, summer grounds / core areas	74.0	48.6
6056	Common eider (<i>Somateria mollissima borealis</i>) breeding / moulting grounds, Spitsbergen	73.6	49.9
7192	Benthic communities, VI.2.3. Gakkerl Ridge and Ermak Plateau ridges	73.3	8.4
2020	Harp seal (<i>Pagophilus groenlandicus</i>) feeding grounds, Barents Sea	72.4	16.9
5046	Bowhead whale (<i>Balaena mysticetus</i>), Spitsbergen population, home range	72.3	24.6
7067	Benthic communities, I.1.1.4. Barents and Kara Seas shelf troughs	71.6	13.2
7249	Seagrasses, Scandinavian Peninsula	70.6	65.3
7265	Benthic communities, Barents and Kara sea throughs	70.3	42.9
4020	Vendace (<i>Coregonus sardinella marisalbi</i>) feeding grounds	70.1	5.1
6076	Common murre (<i>Uria aalge aalge</i>) wintering grounds	68.6	5.2
7068	Benthic communities, I.1.1.5.1. Barents and Kara Seas shelf banks, shallow (* <100 m*)	67.7	14.5
3026	MIZ biological communities, April, Barents Sea	67.5	1.0
7218	Kelp forests, East Greenland	66.7	64.2
7071	Benthic communities, I.1.2.2. Barents - Kara Seas northern slope	65.6	15.5
7072	Benthic communities, I.1.2.3. Barents - Kara Seas slope canyons	65.4	15.5
4040	Polar cod (<i>Boreogadus saida</i>) larvae distribution range, Barents Sea	64.5	5.0
7056	Biological communities, cold water seeps and mud volcanoes	64.3	44.3
6002	Little auk (<i>Alle alle alle</i>) wintering grounds	63.8	5.3
7057	Biological communities, vents	63.6	31.9
4045	Atlantic cod (<i>Gadus morhua</i>) feeding / migration grounds	63.3	1.8
6052	Common eider (<i>Somateria mollissima borealis</i>) breeding / moulting grounds, East Greenland	63.2	49.1
1008	Walrus (<i>Odobenus rosmarus rosmarus</i>) haulouts, Spitsbergen and FJL region	62.9	58.7
6060	Common eider (<i>Somateria mollissima borealis</i>) breeding / moulting grounds, Iceland	62.7	49.5

6054	Common eider (<i>Somateria mollissima borealis</i>) wintering grounds, Iceland	62.1	24.5
6101	Common murre (<i>Uria aalge aalge</i>) breeding colonies foraging range buffer	61.4	6.4
9003	Polar bear (<i>Ursus maritimus</i>), Barents Sea subpopulation, home range	61.1	6.2
6049	Black-legged kittiwake (<i>Rissa tridactyla tridactyla</i>) winter grounds	61.0	4.6
6042	Ivory gull (<i>Pagophila eburnea</i>) breeding colonies, Spitsbergen	60.9	70.6
3037	MIZ biological communities, July, Barents Sea	60.9	1.0
4038	Polar cod (<i>Boreogadus saida</i>) feeding grounds, Barents Sea	56.9	2.7
7227	Kelp forests, Kanin Cape	56.9	64.6
7060	Biological communities, Gakkel Ridge eastern flank mountains	56.8	34.4
6033	Little auk (<i>Alle alle alle</i>) breeding colonies, Spitsbergen	56.0	80.2
6040	Ivory gull (<i>Pagophila eburnea</i>) postbreeding grounds, Barents and Kara Sea	55.9	4.6
7025	Benthic communities, Eurasian bathyal Zoogeographic region	55.5	2.2
3015	Fast ice biological communities, Spitsbergen region	55.3	1.0
4032	Arctic skate (<i>Amblyraja hyperborea</i>) home range	54.2	1.4
4067	Capelin (<i>Mallotus villosus villosus</i>) spawning grounds	53.2	8.1
4046	Thorny skate (<i>Amblyraja radiata</i>) home range	53.1	1.3
7178	Benthic communities, VII.2.4. Amundsen and Nansen basins abyssal mountains	53.0	8.6
7066	Benthic communities, I.1.1.3. Barents and Kara Seas shelf plains	52.9	11.9
4017	Greenland Shark (<i>Somniosus microcephalus</i>) feeding / migration grounds	52.3	1.3
6018	Long-tailed duck (<i>Clangula hyemalis</i>) moulting / migration stopovers, Greenland	52.2	39.8
6031	Little auk (<i>Alle alle alle</i>) breeding colonies, Greenland and North America	52.1	67.5
6022	Atlantic puffin (<i>Fratercula arctica naumanni</i>) breeding colonies	52.0	80.8
6047	Black-legged kittiwake (<i>Rissa tridactyla pollicarius</i>) breeding colonies	52.0	64.0
4039	Polar cod (<i>Boreogadus saida</i>) spawning grounds, Barents Sea	51.8	9.7
1006	Walrus (<i>Odobenus rosmarus rosmarus</i>) summer grounds, Spitsbergen and FJL region	51.6	26.5
7061	Biological communities, Gakkel Ridge eastern rift mountains	50.9	34.4
6057	Common eider (<i>Somateria mollissima borealis</i>) wintering grounds, Spitsbergen	50.7	24.5
3016	Fast ice biological communities, White Sea	50.6	1.0
7245	Kelp forests, Pechora Sea	50.0	67.2
6099	Black-legged kittiwake (<i>Rissa tridactyla tridactyla</i>) breeding colonies foraging range buffer	49.6	5.5
4072	Pacific herring (<i>Clupea pallasii suworowi</i>) home range, Pechora Sea	48.9	6.9
6036	Ivory gull (<i>Pagophila eburnea</i>) breeding colonies, East Greenland	48.4	72.1

6106	Thick-billed murre (<i>Uria lomvia lomvia</i>) breeding colonies foraging range buffer	47.5	6.4
7194	Benthic communities, VI.2.6. Gakkerl Ridge and Ermak Plateau rift valleys	47.2	8.2
7225	Kelp forests, White Sea Gorlo	47.1	65.3
6068	Common eider (<i>Somateria mollissima mollissima</i>) wintering grounds, Murman and Scandinavian coast	46.9	26.0
8044	Biological communities, glacial termini, Spitsbergen	46.8	47.8
7250	Seagrasses, White Sea	46.7	69.7
4059	Greenland halibut (<i>Reinhardtius hippoglossoides</i>) home range, Atlantic Arctic	46.7	1.4
6070	King eider (<i>Somateria spectabilis</i>) wintering grounds, Atlantic	45.7	23.5
4003	Capelin (<i>Mallotus villosus villosus</i>) home range	45.5	2.1
3113	Polynya biological communities, FJL	45.1	1.0
6075	Common murre (<i>Uria aalge aalge</i>) breeding colonies	44.6	80.2
3120	Polynya biological communities, Pechora Sea	44.2	1.0
2003	Bearded seal (<i>Erignatus barbatus</i>) whelping grounds, Barents Sea	44.2	24.5
7193	Benthic communities, VI.2.4. Gakkerl Ridge and Ermak Plateau spreading ridges	43.9	8.5
7228	Kelp forests, White Sea Karelian coast and neighboring coasts	43.5	64.1
6082	Thick-billed murre (<i>Uria lomvia lomvia</i>) breeding colonies	43.1	80.8
7238	Kelp forests, Spitsbergen	42.6	60.9
4043	Nawaga (<i>Eleginus nawaga</i>) home range	42.5	2.5
6096	Ivory gull (<i>Pagophila eburnea</i>) breeding colonies foraging range buffer, FJL	41.5	4.6
7064	Benthic communities, I.1.1.1. Barents Sea coastal domain	40.9	10.3
7017	Benthic communities, Amundsen and Nansen Basins abyssal Zoogeographic region	40.6	1.7
2041	Ringed seal (<i>Phoca hispida</i>) whelping grounds, Barents Sea	40.5	12.5
5028	Beluga (<i>Delphinapterus leucas</i>), Svalbard stock, summer grounds / core areas	39.6	51.0
7073	Benthic communities, I.1.3.1. Scandinavian deep stratified fjords	39.2	17.1
7176	Benthic communities, VII.2.2. Amundsen and Nansen basins abyssal plains	38.5	1.7
1010	Walrus (<i>Odobenus rosmarus rosmarus</i>) winter grounds, Pechora and Kara region	38.3	22.0
4047	Atlantic cod (<i>Gadus morhua marisalbi</i>) spawning grounds	38.0	20.1
9024	Polar bear (<i>Ursus maritimus</i>), East Greenland subpopulation, denning grounds	37.3	86.9
6083	Thick-billed murre (<i>Uria lomvia lomvia</i>) wintering grounds	37.1	5.2
7226	Kelp forests, Iceland	36.3	61.1
4030	Arctic charr (<i>Salvelinus alpinus</i>), European anadromous populations, feeding grounds	35.3	4.3

6091	Little auk (<i>Alle alle alle</i>) breeding colonies foraging range buffer, Greenland and North America	33.8	6.6
7231	Kelp forests, Murman coast	33.6	61.1
7248	Seagrasses, Iceland	33.3	65.3
6037	Ivory gull (<i>Pagophila eburnea</i>) breeding colonies, FJL	31.8	72.1
6044	Steller's eider (<i>Polysticta_stelleri</i>) winter grounds, Atlantic	31.1	35.0
4096	Glacial eelpout (<i>Lycodes frigidus</i>) home range	31.0	1.5
7177	Benthic communities, VII.2.3. Amundsen and Nansen basins abyssal hills	30.7	7.5
6009	Brent goose (<i>Branta bernicla hrota</i>) breeding / moulting grounds, Greenland, Spitsbergen and FJL	30.7	19.2
7234	Kelp forests, Scandinavian Peninsula	30.2	59.8
5112	Arctic Cetaceans - beluga whale (<i>Delphinapterus leucas</i>), bowhead (<i>Balaena mysticetus</i>), narwhal (<i>Monodon monoceros</i>) winter habitats, as predicted by MIZ	29.8	5.8
6061	Common eider (<i>Somateria mollissima mollissima</i>) breeding / moulting grounds, south-eastern Barents and Kara Seas	29.4	49.2
2046	Ringed seal (<i>Phoca hispida</i>) whelping grounds, FJL region	29.4	65.9
7014	Benthic communities, Canadian - Greenland Province, Arcto-Atlantic Zoogeographic region, core area	28.5	2.0

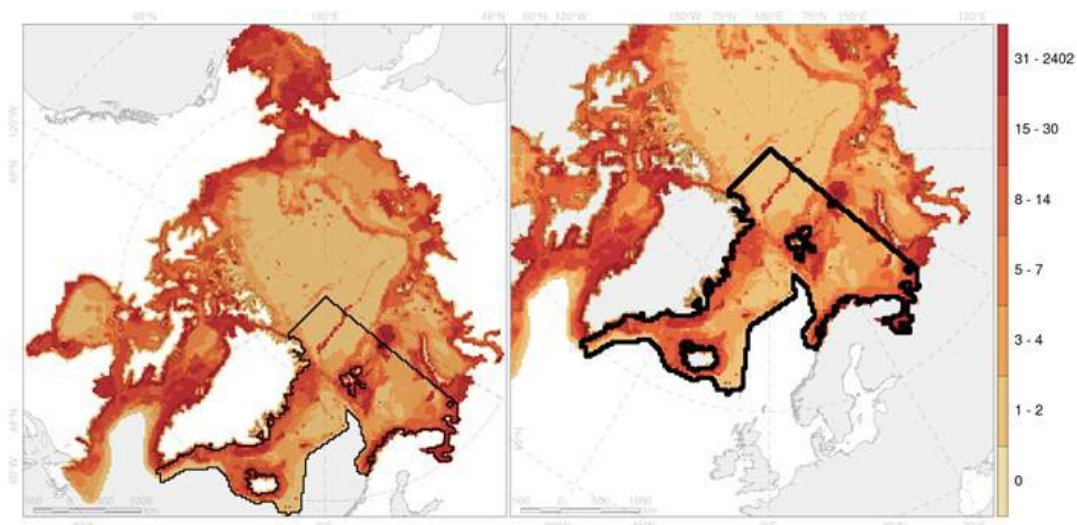


Figure 4: Overall Concern level calculated for each Planning Unit index distribution

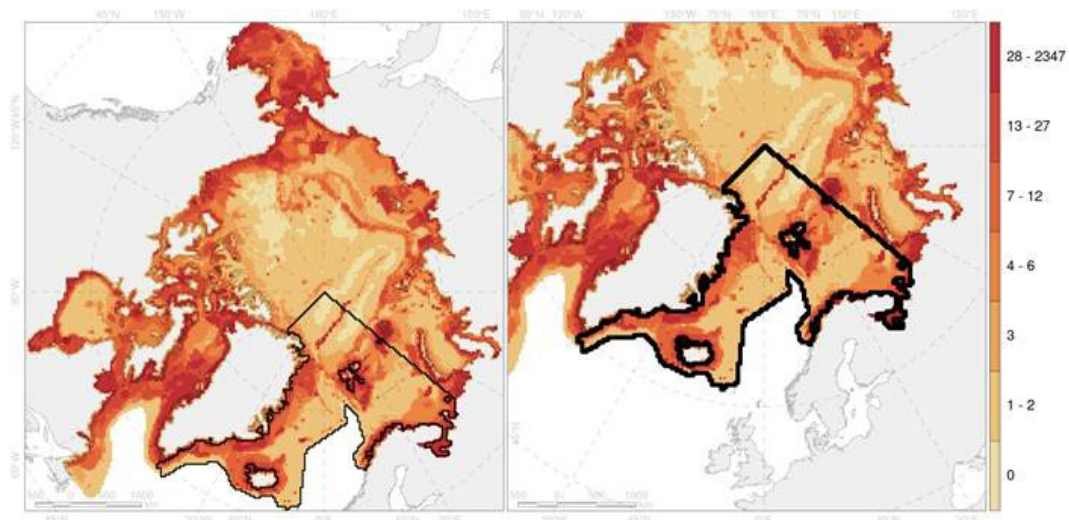


Figure 5: Significant Concern level calculated for each Planning Unit index distribution

Appendix 8-2. ArcNet Geranium Instant Report for CAO ABNJ
Instant Report for Central Arctic Ocean ABNJ of OSPAR Region I.

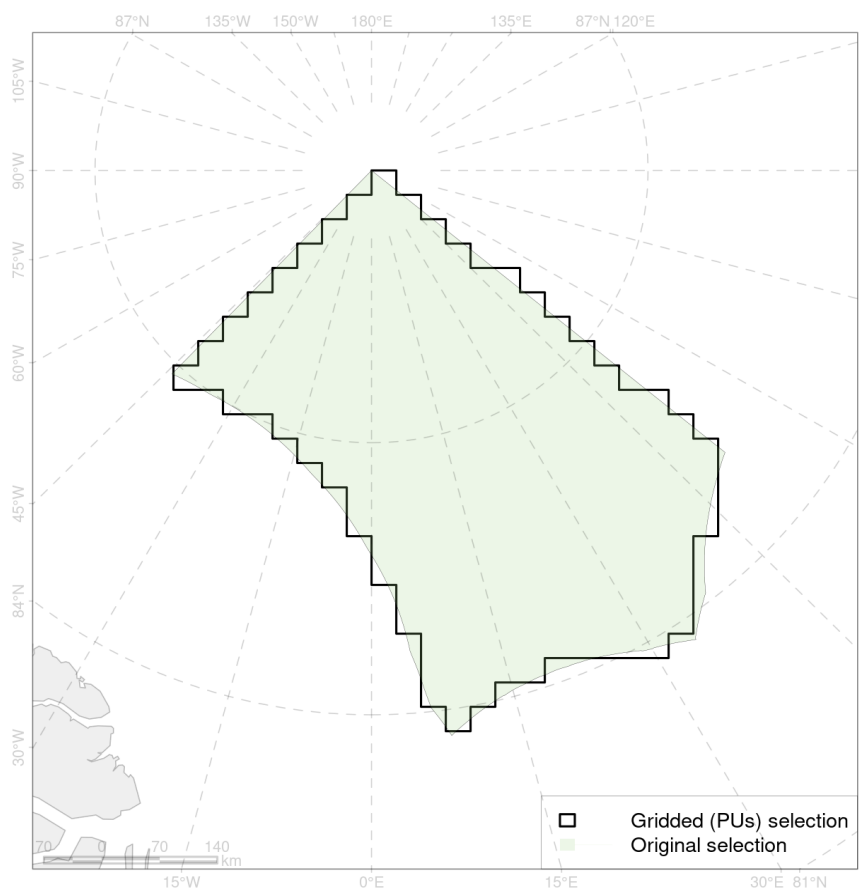


Figure 1: Selected Area

Basic statistics of selected area:

Table 1: Basic statistics

No of Pus	No of CFs	Total Area, km ²	Total Area, PUs, km ²	Terrestrial Area, PUs, km ²	Marine Area, PUs, km ²
253	15	230338.2	227700	0	227700

Concern Indexes:

Table 2: Concern Indexes

RSC-PU, %	ROC-PU, %	RSC-AOI, %	ROC-AOI, %
91.7	84.6	21.4	24

Relative Overall Concern Level by Month (ROC-M):

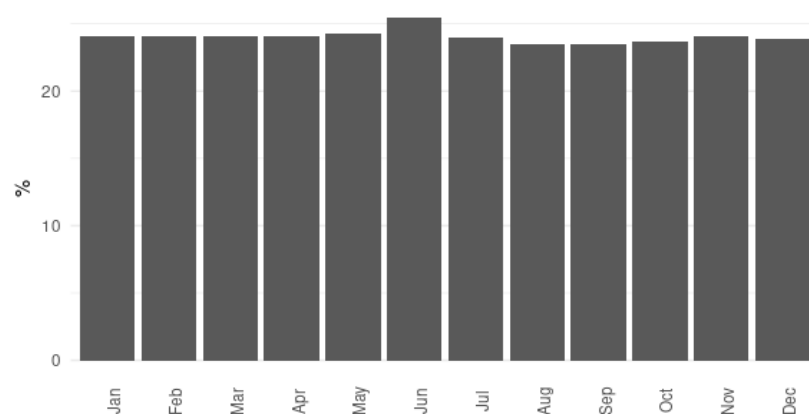


Figure 2: Relative Overall Concern Level by Month (ROC-M)

Relative Overall Concern Level by Activity (ROC-IA):

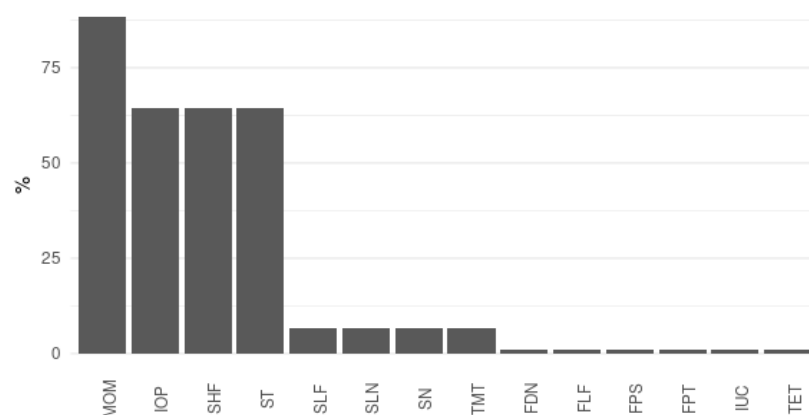


Figure 3: Relative Overall Concern Level by Activity (ROC-IA)

Relative Overall Concern Level of Activities:

Table 3: List of Activities ordered by Relative Overall Concern Level by Activity

Activity ID	Activity	ROC-IA, %
MOM	Other Offshore Mining	88.4
IOP	Underwater Oil & Gas Pipelines	64.5
SHF	Cargo Vessels - Heavy Fuel Oil	64.5
ST	Tankers carrying oil and other petrochemicals	64.5
SLF	Cargo Vessels – Light Fuel Oil	6.8
SLN	Cargo LNG-powered Vessels	6.8
SN	Nuclear-powered Vessels	6.8
TMT	Mass tourism	6.8
FDN	Drift Net Fishing	1.0
FLF	Longline Fishing	1.0
FPS	Purse Seine Fishing	1.0
FPT	Pelagic Trawling	1.0
IUC	Submarine Communication Cables	1.0
TET	Ecotourism	1.0

CF list by Relative Overall Concern Level:

Table 4: CF list by Relative Overall Concern Level

CF ID	CF Name	ROC-CF, %
7060	Biological communities, Gakkel Ridge eastern flank mountains	34.4
7058	Biological communities, Gakkel Ridge central flank mountains	34.4
7059	Biological communities, Gakkel Ridge central rift mountains	34.4
7061	Biological communities, Gakkel Ridge eastern rift mountains	34.4
7057	Biological communities, vents	31.9
7178	Benthic communities, VII.2.4. Amundsen and Nansen basins abyssal mountains	8.6
7193	Benthic communities, VI.2.4. Gakkel Ridge and Ermak Plateau spreading ridges	8.5
7192	Benthic communities, VI.2.3. Gakkel Ridge and Ermak Plateau ridges	8.4
7194	Benthic communities, VI.2.6. Gakkel Ridge and Ermak Plateau rift valleys	8.2
7177	Benthic communities, VII.2.3. Amundsen and Nansen basins abyssal hills	7.5

CF ID	CF Name	ROC- CF, %
7176	Benthic communities, VII.2.2. Amundsen and Nansen basins abyssal plains	1.7
7017	Benthic communities, Amundsen and Nansen Basins abyssal Zoogeographic region	1.7
4096	Glacial eelpout (<i>Lycodes frigidus</i>) home range	1.5
3042	Multiyear Ice biological communities, April, Central Arctic Ocean	1.0
3049	Multiyear Ice biological communities, September, Central Arctic Ocean	1.0

Top CFs by Coverage (all with spatial presence in region (coverage) above 20%):

Table 5: Top CFs by Coverage

CF ID	CF Name	Coverage, %	ROC- CF, %
7059	Biological communities, Gakkel Ridge central rift mountains	100.0	34.4
7058	Biological communities, Gakkel Ridge central flank mountains	79.5	34.4
7060	Biological communities, Gakkel Ridge eastern flank mountains	56.8	34.4
7061	Biological communities, Gakkel Ridge eastern rift mountains	50.9	34.4
7192	Benthic communities, VI.2.3. Gakkel Ridge and Ermak Plateau ridges	48.1	8.4
7057	Biological communities, vents	27.3	31.9
7178	Benthic communities, VII.2.4. Amundsen and Nansen basins abyssal mountains	24.8	8.6
7176	Benthic communities, VII.2.2. Amundsen and Nansen basins abyssal plains	21.7	1.7

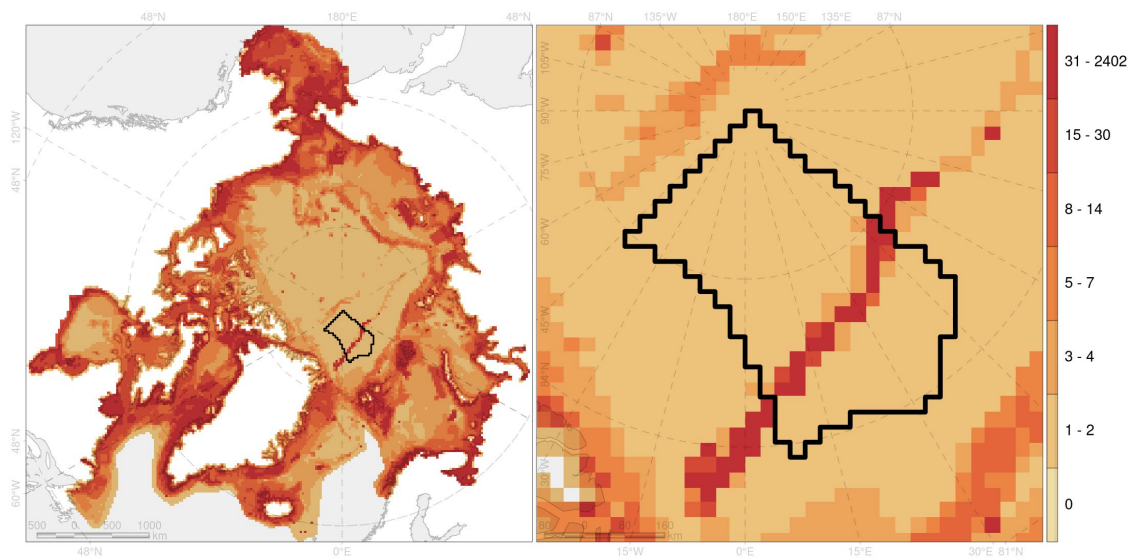


Figure 4: Overall Concern level calculated for each Planning Unit index distribution

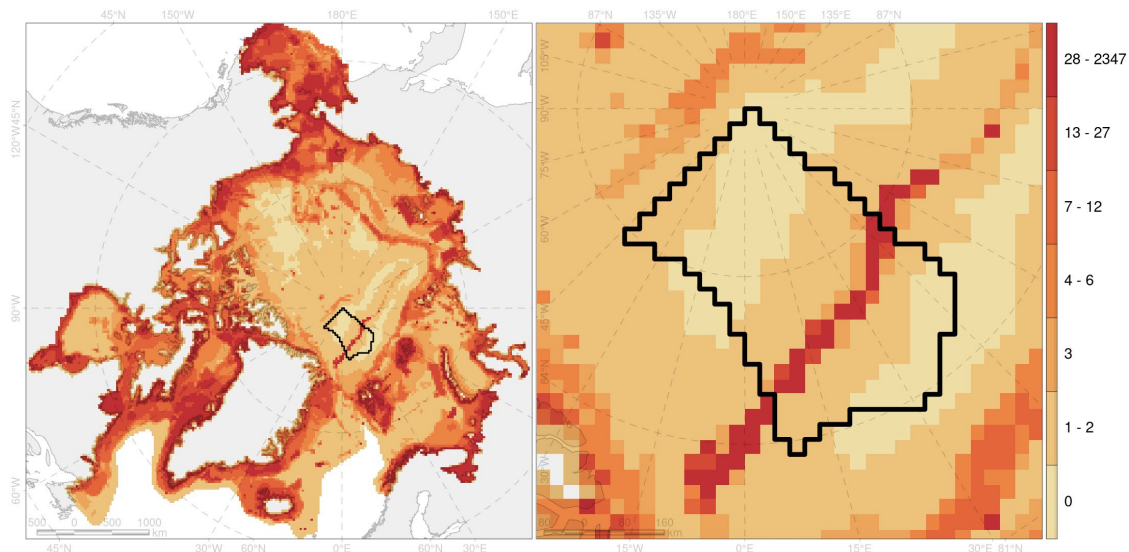


Figure 5: Significant Concern level calculated for each Planning Unit index distribution