Fisheries and Oceans Canada | Pêches et Océans Canada
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Arctic Region

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# RE-EVALUATING ECOLOGICALLY AND BIOLOGICALLY SIGNIFICANT AREAS IN BAFFIN BAY, DAVIS STRAIT, AND HUDSON STRAIT

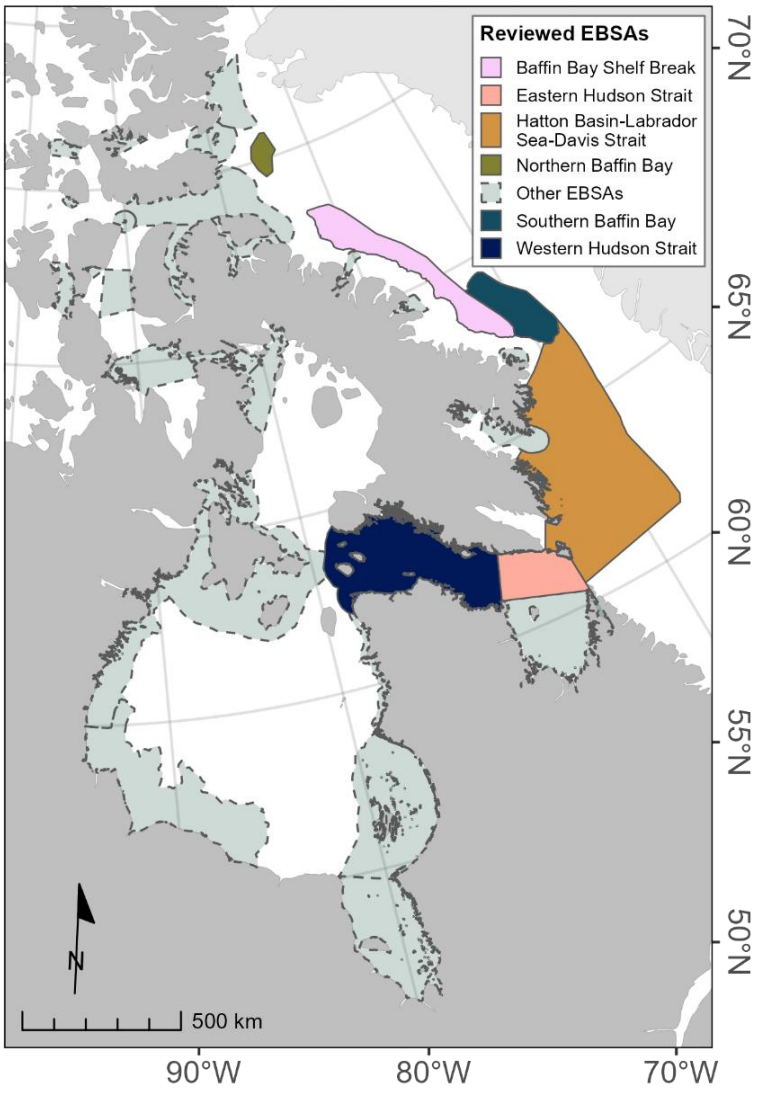



*Figure 1. Six Ecologically and Biologically Significant Areas (EBSAs) in Baffin Bay, Davis Strait, and Hudson Strait identified for review (coloured polygons). Other EBSAs in the Hudson Bay Complex and Eastern Arctic Federal Marine Bioregions are also shown (green fill, dashed line).*

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# CONTEXT

Ecologically and Biologically Significant Areas (EBSAs) identity marine areas of special importance as assessed by standardized criteria and guidance adopted by DFO (2004, 2011). EBSAs may require a higher degree of risk-aversion in the management of human activities within their suggested boundaries, and therefore require periodic re-evaluation as new information, empirical evidence, and knowledge on their component ecological properties become available. DFO first identified EBSAs in the Canadian Arctic, including the Eastern Arctic and Hudson Bay Complex Biogeographic Regions in 2011, (DFO 2011b; Kenchington et al. 2011). Most EBSAs in the Eastern Arctic Biogeographic Region were later re-evaluated and refined based on the best available information (DFO 2015). DFO Fisheries Management has requested that DFO Science undertake a similar review process of six additional priority EBSAs in Baffin Bay, Davis Strait, and Hudson Strait to determine whether they continue to meet EBSA criteria based on updated sources of ecological information, knowledge, and data, to propose boundary changes if justified, and to identify new areas that meet EBSA criteria based on the compiled sources.

This Science Advisory Report is from the regional peer review of June 11-13, 2025, on Re-evaluating Ecologically and Biologically Significant Areas (ESBAs) in Baffin Bay, Davis Strait, and Hudson Strait. Additional publications from this meeting will be posted on the Fisheries and Oceans Canada (DFO) Science Advisory Schedule as they become available.

# SUMMARY


- Six Ecologically and Biologically Significant Areas (EBSAs) in Baffin Bay, Davis Strait, and Hudson Strait, originally identified in 2011, were re-evaluated to assess their underlying ecological properties and support for their designation and boundaries based on updated and best-available information, data, and knowledge sources in consideration of the three main EBSA criteria (Uniqueness, Aggregation, Fitness Consequences).
- Published research, reports, maps, and geospatial layers delineating the distribution of relevant ecological features within the broader Eastern Arctic and Hudson Bay Complex Biogeographic Regions were compiled and consulted including published repositories and reports of Inuit Qaujimajatuqangit (IQ) and recent syntheses of satellite telemetry datasets on marine mammals, birds, and fishes.
- New analyses of DFO multispecies bottom trawl survey data were used to identify hotspots of biomass and diversity for marine fishes and invertebrates using Kernel Density Estimation as well as assemblage structure using hierarchical clustering techniques.
- From the review of the best available empirical data and knowledge, four of the original EBSAs considered continue to meet the main EBSA criteria with no proposed changes to their boundaries: Western Hudson Strait, Eastern Hudson Strait, Southern Baffin Bay, and Northern Baffin Bay.
- The Baffin Bay Shelf Break EBSA has been extended westward and shallower to the 500-m isobath to better capture marine fish, benthic habitat, and marine mammal migratory corridors along the shelf break.
- The largest EBSA (Hatton Basin- Labrador Sea- Davis Strait) was subdivided into three component EBSAs (Southeast Baffin Shelf, Southeast Baffin Slope, and Northern Davis Strait) to reflect spatial heterogeneity in the underlying ecological features.

- A new EBSA was identified in Home Bay, north of Qikiqtarjuaq, NU based mainly on its use as a seasonal stopover area for migrating marine mammals.

# INTRODUCTION

Ecologically and Biologically Significant Areas (EBSAs) call attention to marine areas that have particularly high ecological or biological importance and therefore may require a higher degree of risk aversion in the management of human activities in those areas. While no special legal status is attached to areas designated as EBSAs, they are used as a spatial tool that provides information about important species, habitats and ecosystem components. EBSA identification contributes towards a more comprehensive, ecosystem-based management approach for the marine environment. EBSA identification is highly relevant to a number of the Department of Fisheries and Ocean's (DFO) operational programs including marine spatial planning, marine conservation network development, marine incident response planning initiatives, which in turn support the implementation of integrated and ecosystem-based oceans and fisheries management approaches that are key national obligations outlined in the *Fisheries Act* and *Oceans Act*.

In Canada, EBSAs have been identified according to national guidelines adopted by the Department of Fisheries and Oceans (DFO 2004, 2011a) outlining a set of scientific criteria. At the time of identification, EBSAs are designated based on the best-available sources of information delineating the distribution of the important ecological properties within a biogeographic area. However, EBSAs and their boundaries should be reviewed periodically as improved data products and new information becomes available or to the extent that the identified ecological and biological features are known or suspected to have changed (e.g., DFO 2018). This re-evaluation is particularly pertinent for sensitive and unique marine regions, such as the Arctic, where the effects of anthropogenic climate change are advancing more rapidly than other parts of the globe (Hobday and Pecl 2014; Deb and Bailey 2023) increasing the potential for anthropogenic impacts and altered trophic interactions with continued sea ice loss, ocean warming, and northward species range shifts.

Across the five biogeographic marine regions within the Canadian Arctic (Western Arctic, Eastern Arctic, Hudson Bay Complex, Arctic Basin, Arctic Archipelago) (DFO 2009) DFO initially identified 38 EBSAs in 2011 (Paulic et al. 2009; DFO 2010, 2011b). These EBSAs also integrated the results of a parallel process to identify benthic EBSAs (Kenchington et al. 2011). Many of these EBSAs were relatively large to account for the uncertainty introduced by limited data coverage and the broad spatial scope of the Arctic, long distance migration patterns, along with high seasonal and interannual variability in oceanographic conditions, sea ice, and species habitat use (Cobb 2011; DFO 2011b). In 2015, DFO re-evaluated the majority of EBSAs in the Eastern Arctic biogeographic region to better characterize their component ecological properties and to assess whether boundaries could be focussed with a better understanding of the spatial heterogeneity in those areas (DFO 2015). In the process, 12 of the original 16 Eastern Arctic EBSAs were reviewed and updated with 20 EBSAs that are more spatially refined and reducing the total area by 179,984 $km^2$.

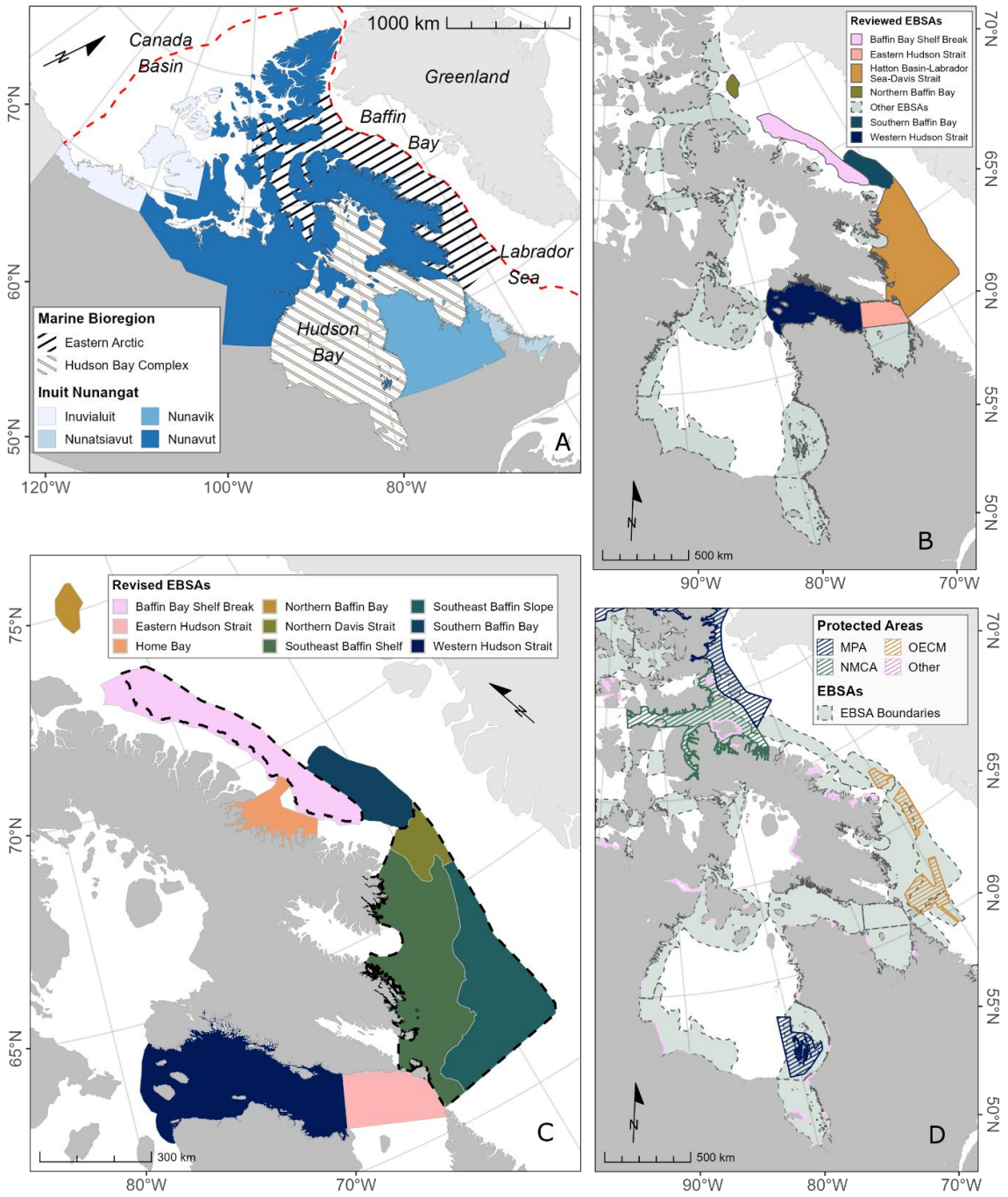



*Figure 2. A) Eastern Arctic (EA) and Hudson Bay Complex (HBC) marine biogeographic regions (hatched polygons) in the context of the four regions of Inuit Nunangat (blue shaded polygons) and the Canadian Exclusive Economic Zone (red dashed line). B) Six priority Ecologically and Biologically Significant Areas (EBSAs) identified for re-evaluation (coloured polygons, solid border) relative to other EBSAs in EA and HBC Bioregions (green shade, dashed border). C) Nine EBSAs resulting from this review (coloured polygons, solid border). Black dashed lines denote previous boundaries where original EBSAs have been modified (i.e., split or expanded). D) All EBSAs in the HBC and EA Bioregions and adjoining areas (green shade, dashed border) in relation to established marine conservation areas (hatched polygons) including Marine Protected Areas (MPAs), Other Effective Area-based Conservation Measures (OECMs), National Marine Conservation Areas (NMCA) and other protected area types.*

Now, DFO Fisheries Management has identified six additional Arctic EBSAs as priority for a similar review process. Four offshore EBSAs in the Eastern Arctic Bioregion (Hatton Basin-Labrador Sea-Davis Strait, Baffin Bay Shelf Break, Southern Baffin Bay, and Northern Baffin Bay) (Figure 1, Figure 2a, b) were excluded from the 2015 re-evaluation process owing to time constraints and to better integrate more thorough evaluation of key data sources (e.g., DFO multispecies bottom trawl surveys, satellite telemetry studies) in a separate peer review process (DFO 2015). A similar data compilation and review exercise is also required for the Eastern and Western Hudson Strait EBSAs within the Hudson Bay Complex Bioregion (Figure 1, Figure 2a, b). These areas of Baffin Bay, Davis Strait, and Hudson Strait feature important habitat for seasonal and resident species of marine mammals and seabirds, areas of high pelagic primary and secondary productivity, dynamic oceanography, productive commercial fisheries, dense aggregations of deep-sea corals and sponges, and diverse epibenthic assemblages (see Schimnowski et al. 2018, Norda-Stelo 2023 for biophysical overviews). These areas also occur within key gateways between the Arctic and North Atlantic Oceans, which is reflected in the oceanography and biological assemblages. However, they are also potentially positioned at an interface of increasing environmental, biotic, and anthropogenic change. For example, the frequency of ship transits in Hudson Strait throughout the annual cycle, including icebreaking activities is expected to increase as major industrial projects are developed or expanded (e.g., Baffinland Steensby Inlet port, Port of Churchill, deepwater port at Qikiqtarjuaq) (DFO 2012). Therefore, delineation of the key ecological areas within this region is particularly pressing.

DFO Fisheries management requested that DFO Science conduct this analysis and re-evaluate areas within Baffin Bay, Davis Strait, Hatton Basin and Hudson Strait (Figure 1). The objectives of this review process are:

1. To compile and document new relevant sources of ecological data, information, and/or knowledge within the Eastern Hudson Strait, Western Hudson Strait, Hatton Basin-Labrador Sea-Davis Strait, Baffin Bay Shelf Break, Southern Baffin Bay, and Northern Baffin Bay EBSAs and adjacent areas and;
2. Based on the most recent and best available information, to evaluate if these six EBSAs, as currently identified, continue to meet the main EBSA criteria in DFO's national framework (uniqueness, aggregation, fitness consequences), revise the existing boundaries as necessary, and identify new areas meeting EBSA criteria.

The identification of geospatial ecological information will also support any future impact assessment and/or mitigation work needed in the area.

# ASSESSMENT

## Information Sources

To re-evaluate the six EBSAs in the Eastern Arctic Biogeographic Region and Hudson Strait as requested by DFO Fisheries Management, we compiled new and updated sources of information on the previously identified ecological and structural features contained within the existing boundaries and in adjacent areas, while also addressing potential knowledge and data gaps. While the focus of this information-gathering phase was to assemble newer published information and data products made available since 2011 (the initial identification of EBSAs in the Canadian Arctic), this did not preclude us from referencing materials identified in past processes or older sources. Key sources of published information and knowledge used in this re-evaluation process included DFO scientific and technical reports, peer-reviewed literature,

published repositories and reports of Inuit Qaujimajatuqangit (IQ), published open data platforms, and secondary scientific publications (e.g., COSEWIC, Committee On the Status of Endangered Wildlife In Canada, Assessment and Update Status Reports). We consulted figures and maps within these resources for geospatial information on the distribution of ecological and biological features in relation to the EBSA boundaries, and in some cases direct access to the underlying spatial layers allowed for visualization in GIS software. To facilitate their use in future EBSA re-evaluation processes and risk management, we documented each source consulted in this re-evaluation with accompanying metadata about that source (e.g., spatial and temporal domain, seasonality).

The compiled sources of spatially-explicit information on the ecological features in the region included updated assessments of areas of aggregation, high diversity, and key habitats for marine mammals, seabirds, sea ducks, and migratory birds, sharks, skates, and other marine fishes, corals, sponges, and other benthic invertebrates based on analyses of compiled satellite and acoustic telemetry datasets, research bottom trawl surveys, and other survey methodologies. This report has also benefitted from Inuit Qaujimajatuqangit (IQ) contained in public resources such as the Nunavut Coastal Resource Inventory (Government of Nunavut 2009, 2010, 2012, 2013, 2014, 2018) that provide comprehensive maps and geospatial representations of a wide spectrum of species and valued ecosystem and socioeconomic components, particularly in nearshore and coastal areas. This information was gathered by community input, interviews, and participatory mapping with Inuit Knowledge Holders and community members across Nunavut along with the best-available research. However, we acknowledge that IQ is under-represented in this re-evaluation process. This under-representation is partially a consequence of limiting the scope of the search to publicly available resources with a geospatial component. Digitized representations of IQ mapped by Geographic Information Systems were evaluated similarly to the other geospatial data layers and maps considered in this review. We also acknowledge that Knowledge Holders did not participate directly in interpreting these IQ layers during this process, and that future EBSA processes could be improved upon as a result of their direct involvement.

## Additional Spatial Data Layer Production

To address some data gaps for under-represented species groups in the initial identification of Canadian Arctic EBSAs (DFO 2011b), we conducted additional analyses of available data sources to identify hotspots of biomass and diversity for marine fishes, epibenthic invertebrates, and benthic macroalgae and delineate the distribution of unique assemblages of demersal fishes and benthic epifauna in Baffin Bay, Davis Strait, and Hudson Strait.

### Marine Fishes and Invertebrates – Diversity and biomass hotspots and community structure

To assess spatial patterns in the diversity, abundance, and composition of marine fishes and benthic invertebrates, we analyzed catch records from two synoptic multi-species, stratified random bottom trawl surveys in offshore areas of the Eastern Canadian Arctic and Hudson Strait. The DFO Greenland Halibut stock assessment and ecosystem survey covers western Baffin Bay and Davis Strait from depths of 400 m to 1,500 m. The Northern Shrimp Research Foundation (NSRF) survey is a joint DFO/industry trawl survey covering Eastern Hudson Strait, Ungava Bay, Davis Strait, Northern Labrador and occasionally Baffin Bay and Western Hudson Strait at depths between 100 m and 800 m.

To identify areas of high biomass and diversity, we used a hotspot approach based on Kernel Density Estimation (KDE). Variations of this approach have been used to identify significant

aggregations of corals and sponges that represent Sensitive Benthic Areas (Kenchington et al. 2016), and also shown to be a suitable method for identifying EBSAs (DFO 2018). KDE applies a non-parametric, neighbour-based smoothing function to spatial point data, that smooths the contribution of each point within a specified neighbourhood weighted by a selected variable. We applied this approach to the available trawl data for select species or species groups, weighting the estimated density distributions by either their total standardized weight (kg) per trawl set (biomass hotspots) or taxa richness per set (diversity hotspots). The species or species groups chosen for this KDE analysis were based on their ecological importance, relative productivity, sensitivity, or rare or threatened status in the region. For biomass hotspots, these included:

1. Greenland halibut (*Reinhardtius hippoglossoides*),
2. Northern and Striped Shrimp (*Pandalus borealis* and *P. montagui*),
3. Redfish (*Sebastes* spp.),
4. mesopelagic fishes,
5. forage species, and
6. Wolffishes listed in Schedule 1 of the *Species at Risk Act* (*Anarhichas* spp.).

For diversity hotspots, we evaluated richness for:

1. cold-water corals
2. sponges,
3. other epibenthic invertebrates,
4. demersal fishes, and
5. bathypelagic fishes.

The presence of unique community types in an area may also be considered as a Structural Biodiversity Feature justifying EBSA identification (DFO 2004). To identify the predominant types of assemblages of demersal fishes and epibenthic invertebrates in Hudson Strait, Davis Strait, and Baffin Bay, we applied a hierarchical clustering approach. This type of approach has been shown to be effective for identifying spatially coherent assemblages from synoptic trawl survey data in Canada's Pacific and Atlantic marine bioregions at spatial scales of 10s – 1,000s km (i.e., mesoscale) (Rubidge et al. 2016; O'Brien et al. 2022; Murillo et al. 2024). Here, we aggregated available trawl data to larger 10-km grid cells (sites) and grouped sites based on between-site similarity (Simpson Index) of the catch composition using hierarchical agglomerative clustering. Fishes and invertebrates were treated in separate analyses and the predominant community types for each identified from the clustering results.

**Benthic macroalgae – alpha diversity**

Macrophyte beds are considered a Structural Habitat Feature in DFO's EBSA Framework (DFO 2004). To examine historic spatial patterns of diversity for benthic macroalgae in the region, we referred to a museum catalogue of benthic macroalgae distribution records curated by the Canadian Museum of Nature (Lee 1980) that summarizes systematic collections of benthic macroalgae at 105 sites across the Canadian Arctic made by dredge or SCUBA between 1967 and 1976. From species lists reported in this catalogue for sites in the Hudson Bay Complex and Eastern Arctic Bioregions, we calculated site-level species richness as a measure of alpha diversity.

## EBSA Criteria and Re-Evaluation Process

Using the best-available data and knowledge, the Steering Committee proposed subdivision of one of the original EBSAs into three distinct areas, modifications to the boundaries of another, and identified a new candidate EBSA in Home Bay (Figure 2C). Therefore, nine areas in total were brought forward to the peer-review meeting (Figure 2C) to determine whether they met DFO's criteria for EBSA designation (DFO 2004, 2011a). For each area, we identified the component ecological and biological features characterizing that area from the available sources. For evaluation, each of these components was then categorized into the main types of Ecological Functions (e.g., Nursing/Rearing, Seasonal Refugia, Feeding/Foraging) or Physical Oceanographic (e.g., Polynya), Habitat (e.g., Cold-water Corals), or Biodiversity (e.g., Presence of Endangered or Threatened species) Structural Features considered in DFOs EBSA Framework (adapted from DFO 2004). An individual ecological component could be assigned to and ranked on more than one type of Function or Structural Feature. For example, aggregations of juvenile Thorny Skate describe an Ecological Function (Nursery/Rearing) while also contributing information on the presence of threatened species (a Structural Biodiversity Feature). We then assigned each feature qualitative scores ('high', 'medium', 'low') on each of DFOs three primary EBSA criteria (Uniqueness, Aggregation, Fitness Consequences) based on adapted descriptions of how each type of Ecological Function or Structural Feature should be judged along this continuum for each EBSA criterion (DFO 2004). Each criterion was assessed in terms of the importance of that area compared to surrounding areas. Two secondary EBSA criteria (Resilience and Naturalness) were discussed at the peer-review meeting. However, these were not applied in evaluating the support for each EBSA, but rather to provide additional context for prioritizing EBSAs or managing risks (DFO 2004). These secondary criteria cannot serve as the sole basis for EBSA designation, but rather provide further support for areas identified under the three primary dimensions (DFO 2011a). In keeping with national advice, areas that ranked high on at least one of the primary EBSA criteria for a single species, species group, or ecological feature, or towards the higher end of the continuum (medium-high) for most dimensions and many species/features, were considered to meet the requirements for EBSA designation.

## Results

In this re-evaluation process, it was determined that the rationale for four EBSAs in Hudson Strait and Baffin Bay continue to be supported based on previously identified ecological features and with additional support bolstering their designation coming from new sources. These included the Western Hudson Strait, Eastern Hudson Strait, Southern Baffin Bay, and Northern Baffin Bay EBSAs. No changes were proposed to their respective boundaries. Participants agreed that the western boundary of the Baffin Bay Shelf Break EBSA should be extended shallower to the 500-m isobath (Figure 2, Figure 4) to better capture marine fish, benthic habitat, and marine mammal migratory corridors along the shelf break. It was recommended that the largest EBSA (Hatton Basin-Labrador Sea-Davis Strait) be subdivided into three component EBSAs (Southeast Baffin Shelf, Southeast Baffin Slope, Northern Davis Strait) with the same overall spatial footprint to better reflect the spatial heterogeneity in the underlying ecological features (Figure 2, Figure 3). Support for a new EBSA identified in Home Bay (Figure 2C), north of Qikiqtarjuaq, NU was based mainly on its use as a seasonal stopover area for migrating

marine mammals. The boundaries and key underlying ecological and biological features for each are described below and summarized in Table 1.

### Western Hudson Strait

The Western Hudson Strait EBSA spans the breadth of Hudson Strait from the entrance to Hudson Bay and Foxe Basin in the west to the mouth of Ungava Bay near Quaqtaq and across east of Kimmirut (Figure 2). Physical oceanographic features associated with enhanced productivity (e.g., recurrent polynyas, major flaw leads, and thermal fronts) form around Salisbury, and Nottingham Islands, in the nearshore of Baffin Island, and along the 200-m isobath (Cyr and Larouche 2015; Nunavut Planning Commission 2023). The EBSA includes major hotspots of diversity and abundance for marine mammals, seabirds, and sea ducks (Yurkowski et al. 2019). Western Hudson Strait is an obligatory passage for several marine mammal populations undertaking seasonal migrations between summering and overwintering areas including Bowhead (*Balaena mysticetus*, Eastern Canada-West Greenland population), Beluga (*Delphinapterus leucas* , Western and Eastern Hudson Bay populations), and Narwhal (*Monodon monoceros*, Northern Hudson Bay population) (Government of Nunavut 2018). The EBSA is itself a key overwintering area for Atlantic Walrus (*Odobenus rosmarus*, Hudson Bay-Davis Strait stock), Bowhead, and Beluga (WHB population) (Government of Nunavut 2018; Hamilton et al. 2022).

Several other areas supporting the fitness of marine and terrestrial mammals and seabirds occur within the boundaries including numerous terrestrial haul-out sites for Walrus, denning areas for Polar Bears (*Ursus maritimus*, Foxe Basin subpopulation), a Bowhead calving area near Kinngait, sea-ice crossings to Caribou post-calving areas, and important nesting and foraging areas for seabirds and sea ducks (Nunavut Planning Commission 2023). Markham Bay is used by a significant proportion of the breeding pairs of Common Eider (*Somateria mollissima borealis*) in the Canadian population, and one of the largest colonies of Thick-billed Murres (*Uria lomvia*) occurs in Digges Sound (Mallory et al. 2019). With respect to benthic fauna and habitats, Western Hudson Strait hosts high diversity of marine macroalgae, epibenthic invertebrates, and demersal fishes.

*Table 1. EBSA evaluation matrix for each of 9 EBSAs in Baffin Bay, Davis Strait, Hudson Strait assessed in this report. For each identified or proposed EBSA, the ecological features contained within the EBSA that scored Medium (M) or High (H) on the 3 main EBSA dimensions (uniqueness, aggregation, fitness consequences) are indicated. Superscript numbers next to EBSA names correspond with the associated EBSA originally identified by DFO (2011b).*

| EBSA | Uniqueness | Aggregation | Fitness Consequences |
|---|---|---|---|
| **Western Hudson Strait**[1.11] | • Marine mammal migration corridor (H)<br>• Marine mammal overwintering (H)<br>• Sponge assemblage (M)<br>• Polynyas (M)<br>• Thermal fronts (M) | • Marine mammal migration corridor (H)<br>• Atlantic Walrus overwintering and terrestrial haul-outs (M)<br>• Beluga (EHB, WHB) migration (H)<br>• Beluga (WHB) overwintering (H)<br>• Bowhead overwintering (H)<br>• Bowhead calving (M)<br>• Narwhal (NHB) migration | • Seabird feeding and breeding (M)<br>• Marine mammal migration (H)<br>• Marine mammal overwintering (H)<br>• Atlantic walrus breeding and nursery (M) |

| EBSA | Uniqueness | Aggregation | Fitness Consequences |
|---|---|---|---|
| | | • Seabirds nesting and foraging sites (H)<br>• Epibenthic invertebrates (H)<br>• Demersal fishes (H)<br>• Macroalgae (H)<br>• Polynyas (M)<br>• Thermal fronts (M)<br>• Biodiversity – Presence of Highly Productive or Diverse Communities (H) | |
| **Eastern Hudson Strait**[1.12] | • Marine mammal migration corridor (H)<br>• Marine mammal overwintering (H)<br>• Sponge Assemblage (M)<br>• Thorny skate nursery (H)<br>• Biodiversity – Presence of Endangered or Threatened Species (M) | • Beluga (EHB, WHB) migration (H)<br>• Beluga (WHB) overwintering (H)<br>• Bowhead migration (H)<br>• Narwhal (NHB) migration<br>• Seabird migration (M)<br>• Epibenthic invertebrates (H)<br>• Demersal fishes (H)<br>• Marine mammal migration (H)<br>• Polynyas (M)<br>• Thorny Skate nursery (H)<br>• Biodiversity – Presence of Highly Productive or Diverse Communities (H) | • Marine mammal migration (H)<br>• Thorny Skate nursery (H)<br>• Northern Shrimp genetic connectivity (H)<br>• Arctic Cod genetic connectivity (H)<br>• Narwhal (NHB) foraging on migration route (M) |
| **Southeast Baffin Slope**[2.8] | • Ivory Gull overwintering (H)<br>• Ross's Gull overwintering (H)<br>• Greenland Shark nursery (H)<br>• Greenland shark overwintering (H)<br>• Sponge assemblage (H)<br>• Demersal fish assemblage (H)<br>• Epibenthic assemblage (H)<br>• Greenland halibut spawning (H) | • Narwhal (NHB) overwintering (H)<br>• Seabird foraging, overwintering, and migration (H)<br>• Epibenthic invertebrates (M)<br>• Demersal and bathypelagic fishes (M)<br>• Corals (H)<br>• Sponges (H)<br>• Greenland Shark (H)<br>• Hooded Seal (H)<br>• Sperm Whale (M)<br>• Northern bottlenose whale (M) | • Narwhal (NHB) foraging in wintering area (H)<br>• Greenland Shark reproduction, movement, and foraging (H)<br>• Hooded Seal foraging and whelping (M)<br>• Harp Seal foraging and foraging and whelping (M)<br>• Ivory Gull overwintering (H)<br>• Ross's Gull overwintering (H)<br>• Greenland Halibut movement and spawning (H) |

| EBSA | Uniqueness | Aggregation | Fitness Consequences |
|---|---|---|---|
| | • Biodiversity – Presence of Highly Productive or Diverse Communities (H)<br>• Biodiversity – Presence of Endangered or Threatened Species (H)<br>• Narwhal (NHB) overwintering (H)<br>• Hooded and Harp Seal whelping (H)<br>• Coral diversity (H)<br>• Large gorgonian corals (H) | • Biodiversity - Presence of Highly Productive or Diverse Communities (H)<br>• Biodiversity – Presence of Endangered or Threatened Species (H) | • Large gorgonian corals (H) |
| **Southeast Baffin Shelf**[2.8] | • Davis Strait Polar Bear foraging and denning (H)<br>• Redfish (H)<br>• Wolffish (H)<br>• Mesopelagic fishes (H)<br>• Biodiversity – Presence of Endangered or Threatened Species (H) | • Seabird nesting, breeding, and staging (H)<br>• Bowhead overwintering and foraging (M)<br>• Polar bear foraging and denning (H)<br>• Atlantic Walrus overwintering and terrestrial haul-outs (M)<br>• Ringed seal (M)<br>• Northern shrimp (M)<br>• Redfish (H)<br>• Wolffish (M)<br>• Mesopelagic fishes (M)<br>• Forage species (M)<br>• Demersal fishes (M)<br>• Epibenthic invertebrates (M)<br>• Polynyas (M)<br>• Biodiversity – Presence of Endangered or Threatened Species (H) | • Seabird nesting and foraging (M)<br>• Bowhead foraging (M)<br>• Polar bear foraging and denning (M)<br>• Caribou sea ice crossing (M) |
| **Northern Davis Strait**[2.8] | • Sponge assemblage (H)<br>• Demersal fish assemblage (H)<br>• Epibenthic assemblage (H)<br>• Sponge diversity (H)<br>• Epibenthic diversity (H) | • Corals (H)<br>• Sponges (H)<br>• Arctic Skate reproductive area (H)<br>• Biodiversity – Presence of Highly Productive or Diverse Communities (H)<br>• Seabirds (M) | • Arctic Skate reproductive area (H)<br>• Hooded Seal migration (H)<br>• Atlantic Walrus migration (H)<br>• Greenland Halibut migration (H) |

| EBSA | Uniqueness | Aggregation | Fitness Consequences |
|---|---|---|---|
| | • Migration corridor (M)<br>• Unique Oceanographic Transition (H) | • Narwhal overwintering (M) | |
| **Southern Baffin Bay**[2.12] | • Bamboo corals (H)<br>• Narwhal overwintering (H) | • Narwhal overwintering (H)<br>• Gorgonian corals (H)<br>• Black corals (M)<br>• Sea pens (M)<br>• Hooded Seal (H)<br>• Seabirds (M)<br>• Greenland Shark (H)<br>• Sperm Whale (H)<br>• Northern Bottlenose Whale (H)<br>• Epibenthic invertebrates (M) | • Narwhal overwintering and foraging (H)<br>• Hooded Seal foraging (H) |
| **Baffin Bay Shelf Break**[2.11] | • Sponge assemblage (M) | • Marine mammal migration (H)<br>• Bowhead and narwhal migration (H)<br>• Baffin Bay Polar Bear (H)<br>• Seabirds (M)<br>• Epibenthic invertebrates (M)<br>• Demersal fishes (M)<br>• Arctic skate (M)<br>• Sea pens (M)<br>• Sponges (M)<br>• Biodiversity – Presence of Highly Productive or Diverse | • Arctic Skate nursery (M)<br>• Narwhal foraging (M) |
| **Home Bay**[NEW] | • Marine mammal stopover (H)<br>• Dovekie colony (H) | • Marine mammal migration, foraging, and nursery (H)<br>• Baffin Bay Polar Bear foraging and denning (M)<br>• Bowhead foraging and calving (M)<br>• Narwhal foraging and calving (M)<br>• Beluga calving (M)<br>• Killer whale migration and foraging (M)<br>• Ringed Seal (M)<br>• Sea pens (M)<br>• Seabed topography (M) | • Marine mammal foraging and migration (M)<br>• Seabed topography (M) |

| EBSA | Uniqueness | Aggregation | Fitness Consequences |
|---|---|---|---|
| | | • Biodiversity – Presence of Highly Productive or Diverse | |
| **Northern Baffin Bay**[2.13] | • Sea pen aggregation (*Umbellula* spp.) (H)<br>• Greenland Shark movement and overwintering (H)<br>• Cold-adapted epibenthic invertebrates (H) | • Sea pens (H)<br>• Sponges (H)<br>• Epibenthic invertebrates (H)<br>• Baffin Bay and Lancaster Sound Polar Bear (H) | • Greenland Shark migration (H)<br>• Beluga (EHA-BB) migration (H) |

**Eastern Hudson Strait**

The Eastern Hudson Strait EBSA is contiguous with the Western Hudson Strait EBSA. The southern and eastern boundaries extend to the mouth of Ungava Bay and the entrance of Hudson Strait between Resolution Island and the tip of Labrador, respectively (Figure 2). The outflow of Hudson Strait provides a major source of freshwater input to the Northwest Atlantic (Ridenour et al. 2021). A number of the ecological and biological features that characterize the Western Hudson Strait EBSA are also important features in Eastern Hudson Strait. These include the formation of major flaw leads along the southern coast of Baffin Island and areas of high primary productivity (Cyr and Larouche 2015). As with the rest of Hudson Strait, this area represents a bottleneck along the seasonal migration routes of marine mammal populations (e.g., Beluga, Narwhal, Bowhead) and hosts high diversity of marine mammals and seabirds, especially during the winter-spring period (Yurkowski et al. 2019). Likewise, there are extensive hotspots of high species richness for both demersal fishes and epibenthic invertebrates. The EBSA also includes overwintering and foraging areas used by Beluga (WHB population) and Narwhal (NHB population) (Bailleul et al. 2012; Watt et al. 2017).

Despite the similarities, there are some ecological features that distinguish this EBSA from Western Hudson Strait. Eastern Hudson Strait is subject to extreme tidal mixing and high amplitudes (Saucier et al. 2004). High chl-*a* concentrations are indicative of high primary productivity throughout the Eastern Hudson Strait, but there are secondary productivity hotspots as well, as denoted by biomass aggregations of Greenland Halibut and Northern and Striped Shrimp. Genomics studies highlight the importance of this area for connectivity between subarctic subpopulations of Northern Shrimp and Arctic Cod (*Boreogadus saida*) in Hudson Strait and Northern Labrador (Bourret et al. 2024; Bringloe et al. 2024). The area around Killiniq and the Button Islands represents an important corridor during the spring and fall for sea ducks migrating between breeding and wintering habitats including Common Eider, King Eider (*Somateria spectabilis*) and Long-tailed Duck (*Clangula hyemalis*) (Bowman et al. 2022). The Meta Incognita Peninsula on the southern coast of Baffin Island is the northern extent of breeding habitat in Canada for Harlequin Ducks (*Histrionicus histrionicus*) (SARA Schedule 1 and COSEWIC Special Concern) (COSEWIC 2013). The EBSA also contains a nursery area for Thorny Skate (*Amblyraja radiata*) (COSEWIC Special Concern) (IUCN SSC Shark Specialist Group 2022).

**Southeast Baffin Slope**

The Southeast Baffin Slope EBSA is one of three new EBSAs resulting from subdivision of the large Hatton Basin-Labrador Sea-Davis Strait EBSA. The boundaries include the offshore portion of the former EBSA deeper than 500 m, but excluding Northern Davis Strait (Figure 3).

The 500-m contour corresponds roughly with a recurring thermal front spanning from Davis Strait to Hudson Strait (Cyr and Larouche 2015) and an inshore-offshore gradient in the seasonal phenology of sea ice freeze-up/break-up (York et al. 2020). Participants agreed the new boundary would better separate species groups characteristic of continental slope habitats and deeper, open waters, or mobile pack ice from those occupying shelf and nearshore areas or more reliant on landfast and consolidated pack ice.

The EBSA is a hotspot of diversity for marine mammals, seabirds, and marine fishes especially during the winter-spring period (Yurkowski et al. 2019). The EBSA contains critical areas for seabird foraging, overwintering, and migration (Mallory et al. 2019) including the core overwintering habitat for endangered Ivory Gull (*Pagophila eburnea*) and Ross's Gull (*Rhodostethia rosea*) (Maftei et al. 2015; Spencer et al. 2016). Seabirds are abundant year round, especially diving piscivores such as Northern Fulmar (*Fulmarus glacialis*), Black-legged Kittiwake (*Rissa tridactyla*), and Glaucous Gulls (*Larus hyperboreus*) (Wong et al. 2014). The EBSA includes Hatton Basin, which is the primary overwintering area for Northern Hudson Bay Narwhal (Westdal et al. 2010) and hosts dense aggregations of large, habitat-forming gorgonian corals, astrophorid and glass sponges (Kenchington et al. 2016). The EBSA is also a key area for marine mammals that are seasonal residents of the Eastern Canadian Arctic such as Sperm Whales (*Physeter macrocephalus*) and Northern Bottlenose Whales (*Hyperoodon ampullatus*), which are consistently sighted (Davidson et al. 2023), and Hooded (*Cystophora cristata*) and Harp Seals (*Pagophilus groenlandicus*) that use the area for foraging and whelping (Andersen et al. 2013; Grecian et al. 2022).

The Southeast Baffin Slope contains regional hotspots of diversity of deep-sea corals, sponges, epibenthic invertebrates and bathypelagic fishes. Assemblages of demersal fishes, epibenthic invertebrates, sponges and zooplankton are also unique compared with other parts of the Eastern Canadian Arctic and Hudson Bay Complex with a greater representation of taxa characteristic of warmer boreal-temperate waters (Murillo et al. 2018; Darnis et al. 2022). The EBSA also contains key areas important for the movement and fitness of marine fishes. The Southeast Baffin Slope EBSA overlaps with the only known spawning ground for Greenland Halibut stocks in the Northwest Atlantic and consequently is an area of higher fish movement between management areas (Vihtakari et al. 2022). The deeper parts of the continental slope in the EBSA represent potential nursery and overwintering areas for Greenland Shark (*Somniosus microcephalus*) (IUCN SSC Shark Specialist Group 2022).

### Southeast Baffin Shelf

The Southeast Baffin Shelf EBSA corresponds with the continental shelf and nearshore areas along southeast Baffin Island, excluding Frobisher Bay and Cumberland Sound. This new EBSA comprises the shallower portion (< 500 m) of the former Hatton Basin-Labrador Sea-Davis Strait EBSA (Figure 3). Areas supporting foraging/feeding, nursery/rearing, and seasonal refugia for multiple species coincide with high levels of biological diversity of mobile marine predators such as marine mammals, seabirds, and large marine fishes year-round (Yurkowski et al. 2019).

A significant polynya network forms at the mouth of Frobisher Bay (Nunavut Planning Commission 2023), supporting overwintering areas for Bowhead and Atlantic Walrus (Stewart 2008; Hamilton et al. 2022). Ringed Seals (*Pusa hispida*) that spend summers further north in the Canadian Arctic Archipelago aggregate in higher numbers and forage along the Cumberland Peninsula and in Cumberland Sound during winter (Ogloff et al. 2021). Atlantic Walrus (Hudson Bay-Davis Strait Stock) are abundant around the Hall and Cumberland Peninsulas in summer-fall where there are foraging areas and numerous haul-out sites (Government of Nunavut 2012, 2013). This stretch of southeast Baffin Island represents the core range of the Davis Strait

population of Polar Bear (Taylor et al. 2001) offering numerous denning areas along with seal-hunting opportunities on sea-ice habitats (Government of Nunavut 2012, 2013). Sea-ice crossings provide Caribou with access to calving and post-calving areas on Loks Land Island (Nunavut Planning Commission 2023).

Significant aggregations of seabirds and sea ducks are found throughout the EBSA from May through October. The mouth of Frobisher Bay contains key terrestrial and marine habitats for migratory birds. There are feeding, breeding, nesting, and staging areas for numerous species including large colonies of Black-legged Kittiwakes and Thick-Billed Murres on Hantzsch Island (Mallory et al. 2019). Southeast Baffin Shelf includes several biomass and richness hotspots for marine fishes and invertebrates. East of Resolution Island, there is a productive area for Northern Shrimp. Midwater mesopelagic fishes and forage species are abundant east of Cumberland Sound between 200 m – 300 m depth. High richness of benthic invertebrates occurs off the Hall and Cumberland Peninsulas. Between 300 m – 500 m depth around Hatton Basin and Davis Strait, higher richness of demersal fishes and biomass hotspots of Wolffishes and Redfish are observed.

### Northern Davis Strait

Northern Davis Strait was identified as an EBSA to capture the sill across Davis Strait that marks a unique biogeographic and oceanographic transition from relatively warm, saline conditions of the temperate North Atlantic and cold, lower salinity Arctic waters in Baffin Bay and further north. Biotic and environmental gradients extend latitudinally, and also east-west under the influence of the West Greenland Current to the east and the Baffin Island Current on the west side. The boundaries separate the area east of Cape Dyer, deeper than 500 m, and north of 65.5° N from the rest of the former Hatton Basin-Labrador Sea-Davis Strait EBSA (Figure 3).

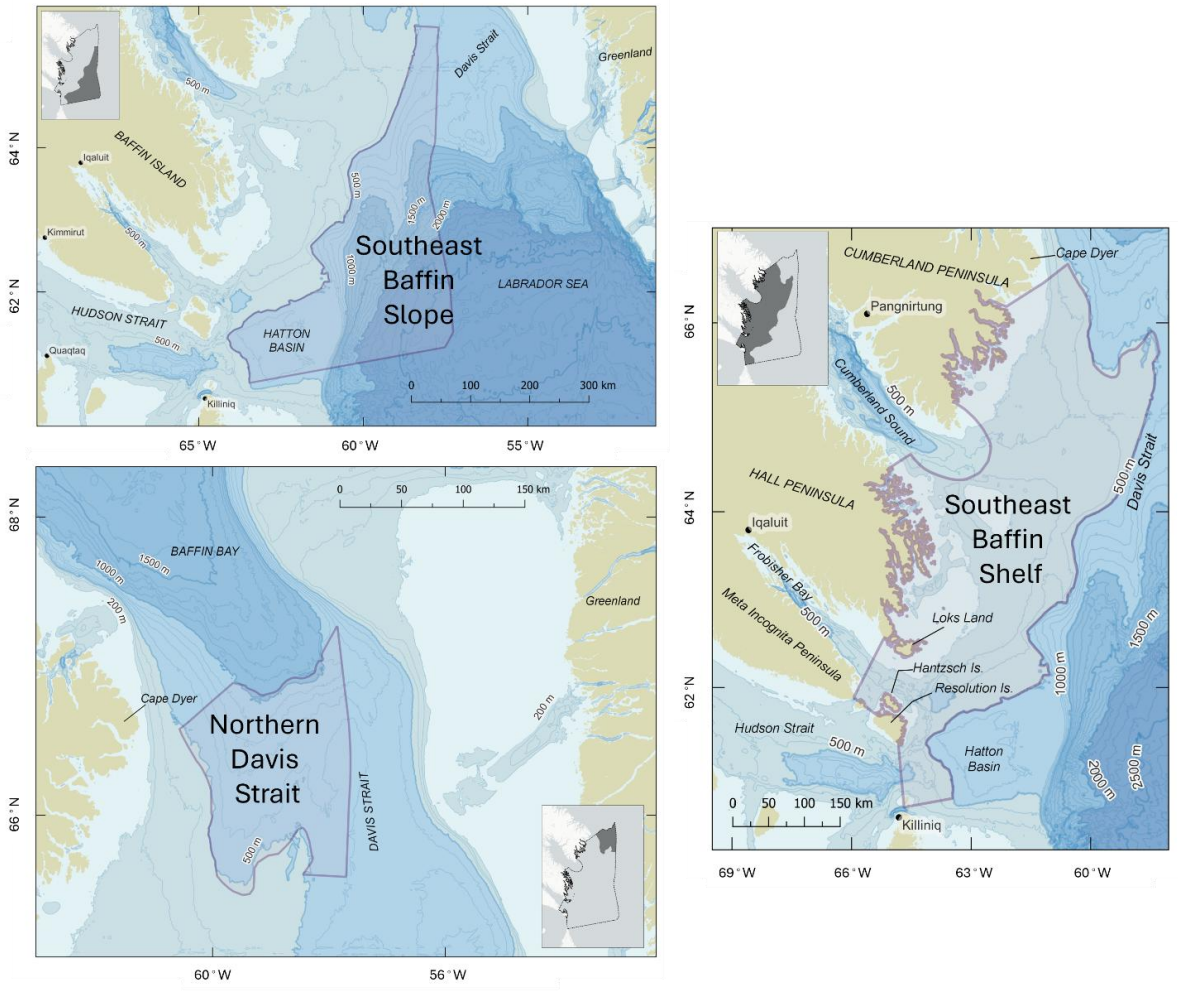



*Figure 3. Boundaries (purple polygons) of the Southeast Baffin Slope EBSA (top left), Northern Davis Strait EBSA (bottom left), and Southeast Baffin Shelf EBSA (right). The insets indicate the location of the EBSA boundaries in relation to the former Hatton Basin-Labrador Sea-Davis Strait EBSA.*

The transition in environmental conditions across this gateway is reflected by the unique character, diversity, and relatively sharp changes in structure and turnover of the biotic assemblages. The vertical structure of midwater fish and zooplankton assemblages changes rapidly across this polar front (Chawarski et al. 2022). The assemblage compositions of sponges (Murillo et al. 2018), demersal fishes, and epibenthic invertebrates are characterized by mixtures of community types and species with affinities to both cold-polar and warm-temperate conditions. This diversity of assemblage types is concomitant with hotspots of taxa richness for these species groups. Biomass (Kenchington et al. 2016) and diversity of cold-water corals and sponges are high with significant aggregations of smaller gorgonian corals, sea pens, medium-large astrophorid sponges, golf-ball sponges, and glass sponges.

With respect to highly mobile and migratory species, Davis Strait is a corridor of movement for species that migrate into or out of Baffin Bay (e.g., Hooded Seal, Sperm Whale, Northern Bottlenose Whale, Greenland Halibut) (Lefort et al. 2022; Madigan et al. 2025) or between eastern Baffin Island and western Greenland (e.g., HB-DS Walrus, Bowhead) (Dietz et al. 2014; Nielsen et al. 2015). Within the EBSA boundaries, there is a potential reproductive and nursery

area for Arctic Skate (*Amblyraja hyperborea*) (IUCN SSC Shark Specialist Group 2022), abundance hotspots for seabirds belonging to surface (e.g., Northern Fulmar, Black-legged Kittiwake) and diving piscivore (e.g., Thick-billed Murre) feeding guilds (Wong et al. 2014), and foraging areas for Narwhal on their overwintering grounds (Watt et al. 2017).

### Southern Baffin Bay

The Southern Baffin Bay EBSA adjoins Davis Strait and occupies the southern extent of Baffin Bay adjacent to the Disko Shelf Break (Figure 2). The EBSA was originally identified for Narwhal overwintering and concentrations of black corals. The latest available data strengthens the original rationale for EBSA designation while highlighting the importance to other marine mammals, seabirds, fishes, and sensitive benthic species.

From satellite telemetry, the EBSA corresponds with the core overwintering area of several Baffin Bay Narwhal stocks (Hamilton et al. 2022). Acoustic telemetry has shown that highly migratory marine fishes like Greenland Sharks and Greenland Halibut also repeatedly aggregate along the Disko Shelf Break (Edwards et al. 2022; Madigan et al. 2025). In addition to presence of black corals, the bamboo coral forests (*Keratoisis flexibililis*) of the Disko Fan are globally unique (Neves et al. 2015). Significant concentrations of sea pens occur along the Disko Shelf Break including dense fields of *Ptilella grandis* (Coté et al. 2023). Seabirds such as Northern Fulmar, Black-legged Kittiwake, and Dovekie (*Alle alle*) are particularly abundant in the EBSA (Wong et al. 2014). Southern Baffin Bay also is one of the core areas used by Sperm Whale, Northern Bottlenose Whale, and Hooded Seal entering Baffin Bay to forage during the summer period (Andersen et al. 2013; Davidson et al. 2023). Diversity hotspots of demersal fishes and epibenthic invertebrates occur toward the southern boundary.

### Baffin Bay Shelf Break

An EBSA extending along the shelf break and continental slope of eastern Baffin Island was first identified as a migratory corridor for marine mammals (e.g., Bowhead, seals), for epibenthic habitat, and inferred importance for marine fishes (Figure 2B). Following review of the updated sources of information, meeting participants agreed that extension of the western boundary of the Baffin Bay Shelf Break EBSA from the 1,000-m to the 500-m isobath (Figure 2, Figure 4) would better capture the steeply sloping shelf break itself, the defining ecological features recognized previously, and those newly identified.

This EBSA is characterized by high diversity of highly mobile marine predators from summer to fall (Yurkowski et al. 2019). Satellite telemetry data indicates that highly migratory marine mammals (e.g., Narwhal, Bowhead, Hooded, Ringed, Harp Seals) in the Eastern Canadian Arctic may use either shallower coastal routes along Baffin Island, or more offshore routes along the shelf break or deeper open waters of Baffin Bay (Andersen et al. 2013; Nielsen et al. 2015; Shuert et al. 2023). The Baffin Bay Shelf Break EBSA captures the latter and also overlaps with the core range of the Baffin Bay Polar Bear population (Taylor et al. 2001; Yurkowski et al. 2019). In the southern third of the EBSA, there are significant aggregations of diving and surface piscivore seabird guilds (Wong et al. 2014) and highly suitable habitat for Northern Bottlenose Whale and Sperm Whale (Davidson et al. 2023). With respect to benthic habitat features and importance to marine fishes, the shallower extension of the original EBSA creates better overlap with known aggregations of sea pens and sponge grounds characterized by carnivorous and glass sponges (Kenchington et al. 2016; Murillo et al. 2018), a recently identified nursery area for Arctic Skate (IUCN SSC Shark Specialist Group 2022), and regional hotspots of diversity for demersal fishes and benthic invertebrates, and biomass for Greenland Halibut.

### Home Bay

A new EBSA was identified in Home Bay, comprising the large embayment between Isabella Bay and Qikiqtarjuaq, including the Home Trough and the numerous intervening islands and inlets (Figure 2C). Published sources of Inuit Qaujimajatuqangit (IQ) highlight Home Bay as an area of special importance, high biological diversity, and a key stopover site for marine mammals migrating between summer areas in northern Baffin Bay and the Canadian Arctic Archipelago and wintering areas further south (Government of Nunavut 2010, 2014). These sources identify numerous seasonal occupants including Bowhead, Beluga, Narwhal, Killer Whale (*Orcinus orca*), Hooded Seal, Harp Seal, and Bearded Seal along with calving areas (Beluga, Bowhead, Bowhead) (Nunavut Planning Commission 2023). Ringed Seals are abundant year-round in Home Bay and breed during the spring. Polar Bears are abundant and emerge from denning areas in fjords and on the numerous islands to hunt seals from the floe edge, pack ice, or on landfast ice during spring and summer. Analyses of tracks, movement patterns and diving behaviour of satellite-tagged animals similarly indicate that Home Bay and other deep troughs and fjord systems along eastern Baffin Island favour foraging activities and serve as stopover spots for migrating marine mammals travelling along nearshore routes (Nielsen et al. 2015; Ogloff et al. 2021; Grecian et al. 2022; Shuert et al. 2023). Consequently, this is an area of seasonally high concentrations and diversity of mobile species (Yurkowski et al. 2019). IQ also indicates that the numerous islands in the EBSA support nesting of Arctic Tern (*Sterna paradisaea*), Long-tailed Jaeger (*Stercorarius longicaudus*), Common Eider, and Dovekie (Government of Nunavut 2010, 2014). Uniquely, Home Bay hosts the only recorded Canadian breeding colonies of Dovekies (Finley and Evans 1984). The Home Trough and trough-mouth fan contain boulder-cobble fields mixed with sandy-mud that support dense aggregations of sea pens, stalked sponges, basket stars, and soft corals (Edinger and Neves 2014).

### Northern Baffin Bay

The Northern Baffin Bay EBSA is a relatively small EBSA located at the northern extent of Baffin Bay east of Devon Island at the outflow of Lancaster Sound (Figure 2C). In this area, the warm saline West Greenland Current turns westward across Baffin Bay to merge with the southward flowing cold waters of the Baffin Island Current. It was determined that this EBSA continues to meet the EBSA designation and the existing boundaries are well-defined. Initially, the EBSA was identified solely based on the presence of unique dense aggregations of the large stalked sea pen *Umbellula* spp. The most recent data indicates that the EBSA boundaries capture the area with the largest aggregations, highest biomass, and highest predicted probability of occurrence for the sea pens (Beazley et al. 2016; Kenchington et al. 2016). Dense aggregations of *Umbellula* spp. also occur in Jones Sound and Lancaster Sound, but the Jones Sound colonies are not as large and the spatial extent in Lancaster Sound is unknown (de Moura Neves et al. 2018). In addition to sea pens, the EBSA generally harbours high richness and biomass of other epibenthic invertebrate fauna (Jørgensen et al. 2022). The benthic assemblage of this Arctic outflow shelf area is characterized by mainly cold-water adapted taxa.

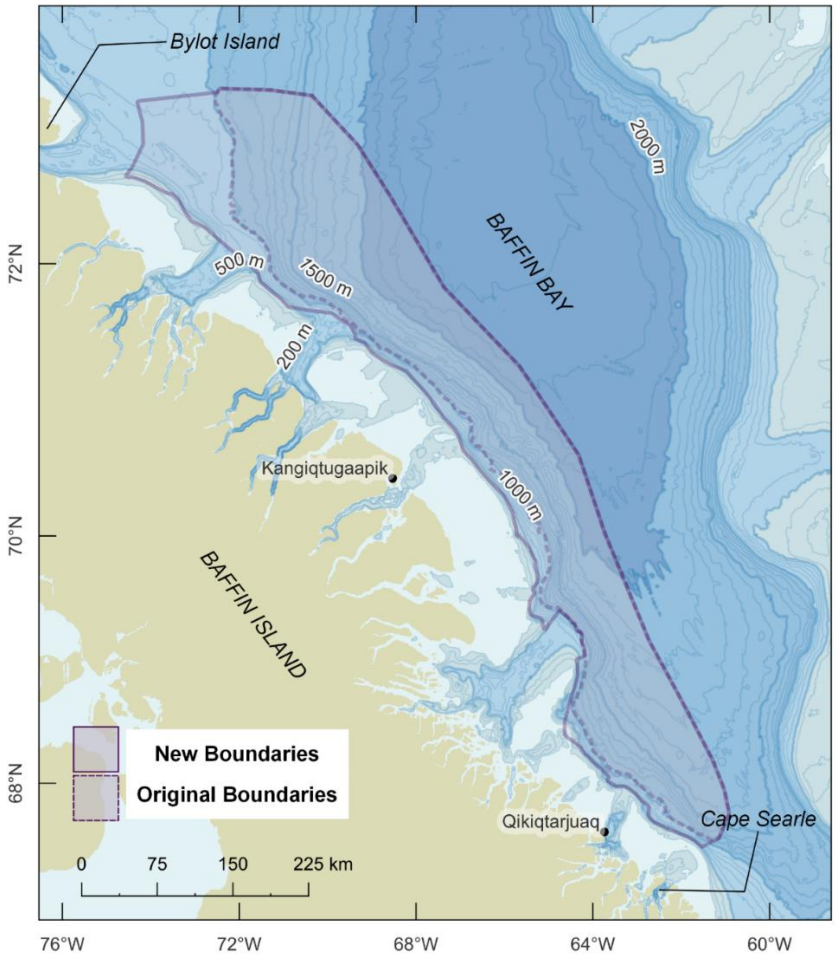



*Figure 4. Revised boundaries of the Baffin Bay Shelf Break EBSA (purple polygon). The dashed line indicates the original western boundary of the EBSA at the 1,000-m depth contour.*

The area also is significant for larger marine predators, overlapping partially with a large diversity hotspot that also includes Lancaster Sound and Jones Sound and high abundance of Polar Bear (winter-spring) (Yurkowski et al. 2019). The EBSA overlaps with the putative migration route for Eastern High Arctic – Baffin Bay Beluga travelling between the Canadian Arctic Archipelago and overwintering areas in Disko Bay and along other parts of West Greenland (COSEWIC 2020). Greenland Sharks from Jones Sound also move eastward across this EBSA and the North Water Polynya prior to sea ice formation as they move to overwintering areas along West Greenland (IUCN SSC Shark Specialist Group 2022).

## Sources of Uncertainty

- Interannual variability in the locations and extent of sea-ice features (e.g., floe edge, polynyas, flaw leads) that may impact year-to-year differences in the areas of importance for sea-ice associated biota have not been considered here. There is a lack of spatially-comprehensive data on under-ice faunal assemblages and regional productivity hotspots of sea-ice algae.
- Spatial and temporal scope and granularity – Datasets considered in this re-evaluation that have broad regional coverage are often more coarsely resolved in spatial and temporal

grain. This could introduce imprecision in the delineation of ecological and biological features and therefore drawing of EBSA boundaries. It also means that finer-scale spatial heterogeneity in locations of ecologically and biologically significant features and seasonal or shorter-term changes in their use of or occurrence in certain areas will be missed. Furthermore, data coverage and sampling effort in the Arctic are comparatively lower to other regions. Data collection is often clustered around communities or during the open water period. Addressing these large data gaps across expansive geographic areas and the ice-covered period may reveal additional significant areas. Scientific trawl data and other systematic, recurring surveys are generally limited to waters beyond depths of 200 m. Nearshore and coastal areas tend to be under-sampled. Inuit Qaujimajatuqangit fills large gaps in these shallower areas resulting from this largely ship-based sampling bias.

- Interpretations of regional hotspots of diversity for benthic macroalgae are not based on contemporary data. While more updated information exists on the general distribution of certain species groups in the Eastern Canadian Arctic (e.g., kelp) or more detailed subtidal surveys have occurred in limited areas, a spatially and taxonomically comprehensive dataset from the last half-century is not available.
- Regional evaluations of primary productivity hotspots are limited by the challenges to remote sensing in Arctic settings. The presence of sea ice, frequent cloud cover, low sun angles and failure to detect prominent features of Arctic primary productivity such as under-ice and ice-edge blooms and subsurface chlorophyll maxima may significantly bias these estimates.
- There continues to be uncertainty surrounding placing static EBSA boundaries around dynamic ecological features. Interannual variability in the locations of species aggregations and hotspots of abundance and diversity or how they may change with longer-term climate shifts are not well understood. Ecologically significant features will extend beyond drawn EBSA boundaries, the Canadian Exclusive Economic Zone (e.g., towards Greenland), and bioregional boundaries (e.g., the Labrador Shelf). From the perspective of managing risks, EBSA boundaries provide preliminary guidance.
- Sampling biases of scientific bottom trawl gears – These gears are biased toward benthic and demersal taxa. Other gear types, such as zooplankton nets or acoustic surveys, are required to effectively sample pelagic species . Interpretations of mesopelagic fishes hotspots presented here should be viewed with caution. Trawl gears also under sample habitats with complex bottom topography or with diminutive, non-aggregating, or fragile taxa resulting in a potential underestimate to species richness.

## CONCLUSIONS AND ADVICE

An updated and extensive list was compiled of ecological data and knowledge sources that provide geospatial information on the distribution of key ecosystem components in the Eastern Arctic and Hudson Bay Complex biogeographic regions. This information-gathering exercise is an essential step in the EBSA re-evaluation process while also aiding in identifying underlying spatial heterogeneity in existing EBSAs and new candidate EBSAs.

Following the EBSA review process, Eastern Hudson Strait, Western Hudson Strait, Southern Baffin Bay, and Northern Baffin Bay were evaluated to continue to meet the main EBSA criteria identified in DFO’s national guidelines with no changes to the existing boundaries. It was recommended that the Baffin Bay Shelf Break EBSA still meets the EBSA criteria, but the western boundary should be extended shallower to the 500-m isobath to better capture marine fish and epibenthic habitat and marine mammal migration routes along the continental shelf

break. Based on the substantial spatial heterogeneity in the extensive Hatton Basin-Labrador Sea-Davis Strait EBSA, three smaller EBSAs with the same overall spatial footprint were identified: Southern Baffin Shelf, Southern Baffin Slope, and Northern Davis Strait. A new nearshore EBSA in the area surrounding Home Bay was identified based mainly on its general importance as a key seasonal stopover site for migrating marine mammals. Following this re-evaluation, there are 27 recognized EBSAs in the Eastern Arctic Bioregion and 13 recognized EBSAs in the Hudson Bay Complex Bioregion (Figure 2).

The identified EBSAs themselves, the descriptions of their underlying features, and the updated list of regionally-relevant, georeferenced ecological information sources used in this report should inform a broader strategy for minimizing impacts to important ecological features in the Eastern Canadian Arctic. Further consideration is required with respect to the most appropriate management tool(s) for mitigating risks in these areas. Some of the EBSAs identified in the Eastern Arctic Bioregion already benefit from enhanced risk mitigation due to boundary overlaps with existing protected areas (e.g., Disko Fan Marine Refuge, Davis Strait Marine Refuge, Hatton Basin Marine Refuge, Tallurutiup Imanga National Marine Conservation Area, Qikiqtait Marine Protected Area, Sarvarjuaq Marine Protected Area) (Figure 2D). The results of this review could inform other marine spatial planning exercises, emergency response planning, environmental impact assessments, or the application of other spatial and non-spatial management tools both within and outside existing or proposed protected areas.

No EBSAs were reduced in size and the individual and collective spatial footprint of the EBSAs considered remains quite large. EBSA areal extent ranged between 6,860 $km^2$ – 107,750 $km^2$ (mean = 51,586 $km^2$). However, based on the best-available sources at the time of this evaluation, EBSA boundaries were considered to be focussed on key ecological features and the size and footprint may be more reflective of the features considered and the nature of Arctic ecosystems. For example, many of the species considered in this study undergo long-distance migrations between core areas that vary between the open-water and ice-covered periods. Large inter-annual variability in core areas, especially for species associated with sea ice habitat features, also likely contributes to large areas being identified as important across years.

EBSA dimensions of Uniqueness and especially Aggregation continue to play the largest role in contributing to EBSA identification. These criteria tend to be easier to interpret with data more readily available to support their evaluation relative to Fitness Consequences. Importance of areas to species overall fitness is often inferred (e.g., from movement patterns and dive behaviour). Other direct evaluations of the breeding/spawning, feeding, and nursery/rearing areas most critical to species fitness would support improved management prioritization within EBSAs. Recognition of key areas of the Arctic meeting the Fitness Consequences criterion could be enhanced by better integration of Inuit Qaujimajatuqangit in the EBSA process.

As oceanographic conditions and sea ice concentration and extent continue to change in a rapidly warming Arctic, it will be imperative to periodically update relevant sources of ecological data and knowledge and re-visit these criteria to evaluate EBSAs in light of anticipated and unforeseen ecosystem changes in Arctic marine ecosystems.

## ADDITIONAL CONSIDERATIONS

- Consideration of available sources of Inuit Qaujimajatuqangit together with other sources of ecological data provided valuable insights in the process of identifying and evaluating EBSAs. However, there remain challenges and barriers around incorporation of sources of IQ and other knowledge systems into an evaluation framework designed around Western science that creates imbalances. IQ may not have a georeferenced component and

principles around data ownership, sovereignty, and use must be respected. Ongoing discussions and consultations will be required to integrate IQ and other knowledge systems into the EBSA evaluation process in a more effective, appropriate, and equitable manner.

- Risk assessment and mitigation – The secondary EBSA dimensions of Naturalness and Resilience were not considered in this re-evaluation process. However, given that they relate to ecological risk and sensitivity, they should be evaluated within any area-specific risk assessment exercises when determining how best to mitigate risks to the underlying Ecological Properties within EBSAs. EBSA evaluation decisions are based on the best available information at the time of assessment. Human activities and rapidly developing climate change in the Arctic have the potential to alter ecological features post-evaluation and should also be considered in risk assessment and mitigation.
- Frobisher Bay was discussed by meeting participants as a potential EBSA. A non-migrating portion of the Western Hudson Bay population of Beluga summers in Frobisher Bay. There are important overwintering areas for Bowhead and Walrus and feeding, staging, and breeding areas for numerous seabirds. The diversity and abundance of benthic macrofauna is high in inner Frobisher Bay and there are unique sponge gardens. However, it was discussed that evaluation of this area may be better served by a separate process with the incorporation of IQ. The deep trough north of Scott Inlet (Buchan Gulf) is another area that could be considered for EBSA status given observations of large gorgonian corals and seasonal use by migrating marine mammals.
- Connectivity – The framework for identifying and evaluating EBSAs highlights the uniqueness and distinct nature of individual areas. However, there are often overlaps in the ecological features between EBSAs. While ecological connectivity between EBSAs is not a primary consideration in the EBSA framework, peer-review meeting participants recognized that important connections exist between the EBSAs considered in this re-evaluation as well as others outside the scope of the meeting both within and outside the Eastern Arctic and Hudson Bay Complex Bioregions (Figure 2). This connectivity should be considered in management decisions and risk management mitigation measures to maintain the integrity of the broader ecosystems.
- While oceanographic features can be considered in DFO's EBSA framework, they are often under-represented. Oceanographic features and processes, which are dynamic, often have large influences on biological patterns and processes or relate to threats. EBSAs experiencing or anticipated to undergo more rapid environmental change may require more frequent re-evaluation with better integration of oceanographic and environmental data.

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** Did not attend the meeting, but provided comments in the draft Research Document*

*† Did not attend the meeting, but provided a general comment on draft Research Document*

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