Table S1: Criteria[a] for designation of an ecologically or biologically significant area (EBSA).

Criteria and Description	**Justification[b]**
Uniqueness or rarity: a) unique, rare, or endemic species, populations, or communities; b) unique, rare, or distinct habitats or ecosystems; c) unique or unusual geomorphological or oceanographic features	Unique, but not rare sympagic species (e.g., sympagic hydrozoans and nematodes) (Sections 4.1, 4.2.1); marginal ice zone and inner pack ice shear zones provide unique icescapes / oceanographic features (Sections 4.3, 7, 9.1.1)
Special importance for life-history stages of species: areas are required for a population to survive and thrive (e.g., breeding grounds, spawning or nursery areas, migratory species habitat).	For forage species such as ice amphipods and copepods, Arctic cod and Antarctic krill, the sympagic ecosystem is essential for reproduction, survival and recruitment from juvenile stages (4.2.3, 4.3.1, 4.3.2). Important populations of many Arctic seabird species depend on the Arctic sea-ice habitat for foraging for at least part of their annual cycle: several alcid species, e.g., Brünnichs guillemot, little auk, parakeet auklet, large numbers of black-legged kittiwake and northern fulmar exploit the Arctic sea ice during the breeding season (4.3.3). In the Arctic, ringed and bearded seals, and some walrus populations are ice-associated year-round, and sea ice is vital for building lairs of snow and ice for birthing and care of pups (ringed seals) and for accessing rich benthic communities (4.3.3). Several penguin species depend on the seasonal sea ice. Emperor penguins are fully ice-dependent as all its colonies breed on the sea ice. Adélie and chinstrap penguins depend on the pelagic sea-ice and iceberg areas throughout the year, gentoo penguins are more restricted to the coastal areas (4.3.3). Among tube-nosed seabirds the sea ice is of critical importance to Antarctic petrel, snow petrel, southern fulmar, southern giant petrel and Wilsons storm-petrel. They are followed by south polar and Antarctic skuas (4.3.3). The sea-ice environment surrounding the Antarctic continent sustains large populations of migrant and non-migrant pinnipeds and cetaceans where different components of the sea-ice covered parts of the Southern Ocean play specific roles in their life cycles (4.3.3).
Importance for threatened, endangered or declining species and/or habitat: a) areas containing habitat for the survival and recovery of endangered, threatened, or declining species; b) areas with significant assemblages of endangered, threatened, or declining species	Polar bear, ice seals and walrus, some bowhead whale populations (declining, some populations threatened) (4.3.3, 9.1.1), some ice-associated bird species, i.e., Steller's (declining) and spectacled eider (near-threatened) (9.1.1), narwhal, beluga and bowhead whales are more vulnerable to invading predatory species like the orca without ice. In the Southern Ocean Adélie and Chinstrap penguins (locally declining) depend on the pelagic sea-ice and iceberg areas (4.3.3, 9.1.2). Key habitat for emperor penguins (near threatened) (4.3.3, 9.1.2), the Southern Ocean seasonal sea-ice zone is key habitat for Antarctic blue whales (critically endangered), other whale species with ice associations are listed near-threatened, vulnerable, or endangered (4.3.3, 9.1.2).
Vulnerability, fragility, sensitivity, or slow recovery: areas that contain a relatively high proportion of sensitive habitats, biotopes, or species that are highly susceptible to degradation or depletion, or slow to recover	Sea-ice habitat is highly sensitive to disruption as the retreat in sea ice will lead to isolation of habitats and disrupt the transfer of species between habitats (9.1.1, 9.1.2). Sea-ice habitats are highly vulnerable to atmospheric and oceanic warming and will likely decrease as sea ice continues to decline (9.1.1, 9.1.2). Multi-year ice (MYI) is important for the biodiversity of sea-ice algal communities in the high Arctic and is currently in decline (9.1.1) Sea ice is a major driver of food web structure in polar marine systems, and multi-scale variations in sea-ice dynamics could cause major changes to food web functioning (4.3.1, 9.1.1).

Criteria and Description	Justification[b]
Biological productivity: areas containing species, populations, or communities with comparatively higher natural biological productivity	While not highly productive (compared to the overall productivity of ice-covered ocean areas) chlorophyll *a* concentrations and primary productivity rates within sea ice are the highest of any aquatic environment, also providing a highly concentrated food source for pelagic herbivores (4.2.1). Nutrients released into the ocean by melting sea ice fuel high pelagic production which makes the ice edge a highly productive zone that is used by foraging higher trophic level species (6.5, 4.3.3).
Biological diversity: a) areas containing comparatively higher diversity of ecosystems, habitats, communities, or species; b) areas with higher genetic diversity	While biodiversity is lower in sea ice than other marine habitats, sea ice hosts many endemic species for which there is no known replacement (4). MYI helps shape the biodiversity of sea-ice algal communities in the high Arctic. Hence, the decline in MYI cover will likely result in a loss of ice-algal diversity and increase the relative importance of under-ice and pelagic species in biogeochemical cycling and Arctic food webs. Loss in algal biodiversity will affect the resilience of the ecosystem in general. Similarly, dispersal and diversity of meiofauna (especially of species with poor swimming ability) may be compromised with MYI loss (9.1.1).
Naturalness: areas with comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation	Human activity in marine and sea-ice areas (e.g., tourism, research, exploration and commercial fishing) are expanding in both the Arctic and the Southern oceans. A reduced sea-ice cover furthers the expansion into new regions with the potential for increased human-induced disturbance (7.2, 7.3). In the Southern Ocean the Commission for the Conservation of Antarctic Marine Living Resources's precautionary approach to management supports retainment (e.g., krill fisheries) and even return (whales) of naturalness (7.2, 9.1.2)

[a] Following CBD, 2008.

[b] Relevant section references are provided in parentheses.