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The Antarctic Specially Managed Area (ASMA) spatial management tool: an underused solution to Antarctica's increasing environmental challenges

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The footprint and cumulative impact of national governmental programme and tourist activities is increasing at marine and terrestrial sites across Antarctica. Associated impacts on species and ecosystems include habitat degradation, wildlife disturbance, pollution and the introduction of non-native species. Through Annex V to the Protocol on Environmental Protection to the Antarctic Treaty, Parties commit themselves to the comprehensive protection of the Antarctic environment. In 2002, the Antarctic Specially Managed Area (ASMA) management tool was established to '*assist in the planning and co-ordination of activities, avoid possible conflicts, improve cooperation between Parties or minimise environmental impacts*'. Subsequently, seven ASMAs were agreed during the period 2004 to 2008; however, no further ASMAs have been designated since then, despite at least six initiatives to do so by various individual or groups of Parties. Furthermore, one agreed ASMA was de-designated in 2014 and alternative site protection put in place. Here I investigate (i) how ASMA development and use contrasts with that of spatial protection tools such as Antarctic Specially Protected Areas, (ii) the possible factors contributing to the failure to designate new ASMAs, and (iii) the potential future use of the tool to address Antarctica's increasing spatial management needs. Revitalised use of ASMAs may help address existing and emerging governance and environmental management challenges. However, to be effective, Parties may need to soften their geopolitical positions, build consensus and identify sufficient resource to deliver spatial management objectives at increasingly busy and impacted sites across the continent.

KEYWORDS
Antarctica, ASPA, Environmental Protocol, Marine Protected Area, spatial management, tourism

1 Introduction

1.1 Human activities in the Antarctic Treaty area

Humans have been active within the Antarctic Treaty area (the area south of latitude 60°S) for a little over 200 years. Today, human activity is associated predominantly with the tourism and fishing industries or scientific research and operation of the associated logistical and national programme infrastructure. The establishment of permanent Antarctic research stations became widespread across the continent in the build up to the International Geophysical Year (IGY) 1957/58 (Collis and Dodds, 2008). Since that time, human presence

and activity in the region has increased considerably. Today there are c. 80 research stations, with most located in coastal areas, although some are located on permanent ice at inland sites (COMNAP, 2017). New stations are planned (e.g., a Turkish Station on Horseshoe Island, Antarctic Peninsula, and a Chinese Station at Cox Point, Marie Byrd Land), and the footprint of many existing stations is expanding (e.g., Maitri Station, Rothera Research Station and Scott Base) (Brooks et al., 2019). Tourism activities have also dramatically increased in the past 2 decades (Bastmeijer et al., 2023; McCarthy et al., 2022). More than 118,000 tourists visited the Treaty area during the 2024/25 season, predominantly in the Antarctic Peninsula region (IAATO, 2025), and there are over 700 listed tourist visitation sites. Infrastructure is increasingly being constructed to facilitate both national Antarctic programme and tourism activities, including accommodation buildings, wharfs and airstrips on rock and permanent ice (Nielsen and Hodgson-Johnston, 2024). Examples include the upgrading of the Teniente Marsh Airfield and construction of a new wharf at Presidente Frei Montalva Base, Fildes Peninsula, King George Island, by Chile, and the expansion of Petrel Station, Dundee Island, by Argentina, including the development of further air transport infrastructure to facilitate governmental and tourist access to the region (Kalosh, 2024; Anonymous, 2025). Fishing vessels may also undertake logistically complex activities, such as refuelling and catch transshipment operations, close to shore in the vicinity of other scientific and touristic activities (Grant et al., 2021).

Some areas of Antarctica have become a focus of human activity with, for example, multiple research stations established within close proximity (as seen at sites on the South Shetland Islands) or high numbers of tourist and national Antarctic programme personnel visiting an area for recreation (Pertierra et al., 2017; Leihy et al., 2020). Increased human presence and activity has resulted in a corresponding increase in human impacts on the region, including the introduction of non-native species, local pollution, wildlife disturbance and habitat destruction, with negative consequences for many ecosystem services (Tin et al., 2009; Hughes and Convey, 2014; Coetzee and Chown, 2016; Bargagli and Rota, 2024; Pertierra et al., 2021; Hughes et al., 2023a; 2025). Concentration of a diverse range of activities, undertaken by different governmental and non-governmental actors, may create an environment that would benefit from formal channels of communication to facilitate cooperation and coordination of activities. This may reduce the likelihood of unintended environmental impacts (including cumulative impacts), provide spatial and temporal separation of activities to avoid mutual interference, and facilitate the delivery of stakeholders' needs.

1.2 Antarctic spatial protection and management

The Antarctic Treaty Consultative Meeting (ATCM) is the body that makes governance decisions for the Treaty area. The Protocol on Environmental Protection to the Antarctic Treaty (also known as the Environmental Protocol or Madrid Protocol; agreed in 1991 and entered into force in 1998) designated Antarctica as a 'natural reserve, devoted to peace and science'. The Protocol established the Committee for Environmental Protection (CEP) to provide advice to the ATCM on the implementation of the Protocol (Hughes et al., 2023b). Annex V to the Protocol, concerning 'Area protection and management', entered into force in 2002 (Recommendation XVI-10) and allows for the designation of Historic Sites and Monuments (HSMs), Antarctic Specially Protected Areas (ASPAs) and Antarctic Specially Managed Areas (ASMAs) (Goldsworthy and Hemmings, 2008). The CEP's Subsidiary Group on Management Plans (SGMP) undertakes much of the Committee's work on area protection (see: https://www.ats.aq/e/sgmp.html). However, draft ASPA and ASMA management plans have, up to now, been developed by one or more proponent Party, although the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), the Scientific Committee on Antarctic Research (SCAR) or the CEP itself are also permitted to do so under Annex V (Article 5 (1)). ASPAs and ASMAs complement the tools for protection of the marine environment established under the Convention for the Conservation of Antarctic Marine Living Resources (CAMLR Convention; agreed 1980, entered into force 1982) that include marine protected areas (MPAs), Vulnerable Marine Ecosystems (VMEs) and CCAMLR Ecosystem Monitoring Program (CEMP) sites (Roura et al., 2018; Lockhart and Hocevar, 2021).

In recent years, efforts to reach agreement on the use of tools to deliver spatial protection and management of areas in the Antarctic region have been met with increasing challenges (Roura, 2023). Efforts by CCAMLR to establish a robust and representative system of MPAs around Antarctica have struggled to make progress since the agreement of the Ross Sea Region MPA in 2016 (Brooks et al., 2020; Guggisberg, 2025). The system of ASPAs has been described as 'inadequate' (Shaw et al., 2014) with several studies showing under-representation of many of the values and features (e.g., geological features, microbial communities, terrestrial biodiversity) identified for protection under the Protocol (Coetzee et al., 2017; Hughes et al., 2015; 2016a; b; Wauchope et al., 2019; Phillips et al., 2022; Walshaw et al., in review). Furthermore, the list of HSMs has been generated in an inconsistent manner, due in part to a general lack of heritage expertise within the CEP (Barr, 2018) and geopolitical factors (Hingley, 2024). Less attention by scholars has been afforded to the use of the third spatial management tool available under Annex V, the Antarctic Specially Managed Area (but see, e.g., Roura et al., 2018; 2023; Jiang and Tang, 2023).

1.3 ASPAs and ASMAs

In contrast to HSMs, which generally protect objects or buildings and their immediate surroundings, more substantial spatial protection and management of Antarctic terrestrial and near shore marine environments is generally afforded through the designation of ASPAs and ASMAs.

1.3.1 Antarctic Specially Protected Areas

The ATCM has engaged in area protection since the entry into force of the Agreed Measures for the Conservation of Antarctic Fauna and Flora in 1964 (Recommendation III-VIII (1964)), which established Specially Protected Areas (SPAs) to protect unique natural ecological systems, followed by the establishment of Sites of Special Scientific Interest (SSSIs; Recommendation VIII-3 (ATCM VIII - Oslo, 1975)) to protect scientific research sites. SPAs and SSSIs were subsequently reclassified as ASPAs with the

entry into force of Annex V to the Protocol. Any area, including any marine area, can be designated as an ASPA to protect outstanding environmental, scientific, historic, aesthetic or wilderness values, any combination of those values, or ongoing or planned scientific research (Article 3 (1)). Article 3 (2) goes on to state that Antarctic Treaty Parties 'shall seek to identify, within a systematic environmental-geographical framework, and to include in the series of Antarctic Specially Protected Areas: (a) areas kept inviolate from human interference so that future comparisons may be possible with localities that have been affected by human activities; (b) representative examples of major terrestrial, including glacial and aquatic, ecosystems and marine ecosystems; (c) areas with important or unusual assemblages of species, including major colonies of breeding native birds or mammals; (d) the type locality or only known habitat of any species; (e) areas of particular interest to ongoing or planned scientific research; (f) examples of outstanding geological, glaciological or geomorphological features; (g) areas of outstanding aesthetic and wilderness value; (h) sites or monuments of recognised historic value; and (i) other areas as may be appropriate to protect the values set out in Article 3 (1).'. ASPAs must have a management plan which is generated as part of the designation process (Article 5). Prior to entry to an ASPA, a permit must be obtained to do so from a competent national authority, usually a government body (Article 3 (4); Pertierra and Hughes (2013)).

1.3.2 Antarctic Specially Managed Areas

The ASMA management tool evolved from earlier efforts by the ATCM to implement spatial management of activities. The ATCM recommended the establishment of a category of protected area, for voluntary observation by Parties, called a Multiple-use Planning Area (Recommendation ATCM XV-11 (1989)) the aim of which was to assist in planning and co-ordinating activities to avoid mutual interference and minimise cumulative environmental impacts in high-use areas. Subsequently, the voluntary Southwest Anvers Island and Vicinity Multiple-use Planning Area was adopted at ATCM XVI in 1991. However, the Multiple-use Planning Area tool did not enter into effect, and the adopted Southwest Anvers Island and Vicinity Multiple-use Planning Area set the foundation for the subsequent designation of ASMA 7 Southwest Anvers Island and Palmer Basin (Measure 1 (2008)).

Article 4 of Annex V to the Protocol sets out details regarding ASMAs. It states that 'Any area, including any marine area, where activities are being conducted or may in the future be conducted, may be designated as an ASMA to assist in the planning and co-ordination of activities, avoid possible conflicts, improve cooperation between Parties or minimise environmental impacts'. Furthermore, 'ASMAs may include areas where activities pose risks of mutual interference or cumulative environmental impacts and sites or monuments of recognised historic value'. However, in common with ASPAs, ASMA management plans cannot be used to directly regulate fishing activities, which is regulated under the CAMLR Convention with decisions made by CCAMLR. Furthermore, an ASPA or ASMA with a substantial marine component can only be designated following the prior approval of CCAMLR (Decision 9 (2005); Roura et al. (2018)).

The legal status of ASMA management plans may be a cause for confusion because they are adopted by the ATCM through a Measure, which implies that they are legally binding. However, as entry can occur without a permit, there is an expectation that Parties will ensure visitors comply with the provisions of the management plan. ASMAs may include within their boundaries other Annex V protected areas including ASPAs and HSMs, as well as sites where other visitor management tools are employed, such as Visitor Site Guidelines (VSGs; https://www.ats.aq/devAS/Ats/VisitorSiteGuidelines?lang=e; Cajiao et al., 2025). A permit is always required to enter an ASPA, even when it is located within an ASMA.

ASMA management plans are essential for ASMA designation and constitute the main instrument for the management of the area and outline the management framework. The Parties active in the proposed ASMA must agree and set out in the plan the range of permitted or restricted activities and include a map showing agreed Facilities and Operations, Access, Historic, Scientific, Restricted and Visitor Zones (United States, 2010a; b). It should provide information on, for example, access and movement within the area, field camp locations, waste management and installations, and modification or removal of structures. Other guidelines or codes of conduct may be drafted concerning scientific research, facility and operational activities, hazard avoidance and non-native species. Any VSGs agreed for sites within the ASMA may also be included in the management plan. One important section concerns the agreed mechanisms for exchange of information, which is essential for the avoidance of conflict within the area and allows for the communication of information by appropriate national authorities on authorized governmental and non-governmental activities in the area, including tourism. The basis for the exchange of information regarding entry to ASPAs and ASMAs is provided in Article 10 of Annex V to the Protocol.

ASMA proponent Parties have, in most cases, formed management groups, which may also invite participation by CEP Observers such as the Antarctic and Southern Ocean Coalition (ASOC), which represents a coalition of non-governmental organisations with an interest in Antarctic conservation, and the International Association of Antarctica Tour Operators (IAATO), which is the industry body for Antarctic tourism. ASMA management groups may meet in the margins of the CEP meeting, virtually, occasionally during dedicated workshops or communicate by e-mail. One of the main roles of the management group is to review and revise the ASMA management plan. Management groups may also promote the dissemination of information on the ASMA, with dedicated websites being made available for, e.g., ASMA 4 Deception Island (https://www.deceptionisland.aq/) and ASMA 5 Amundson-Scott South Pole Station (https://www.southpole.aq/) although challenges associated with keeping websites current have resulted in consideration of such sites being hosted on the Antarctic Treaty Secretariat website (Norway et al., 2025). Management groups may also lead or be consulted on the revision of any VSGs or HSM conservation management plans for sites within the ASMA boundaries. Finally, management groups may provide regular updates to the CEP on their work.

Inspections of protected areas are permitted under Article VII of the Antarctic Treaty, Article 14 of the Protocol and Article 10 of Annex V to the Protocol. Article 10 contains text concerning the exchange of information regarding entry to ASPAs and ASMAs.

1.4 Aims

Compared to ASPAs and HSMs, few studies of the designation and use of ASMAs are available in the academic literature. To remedy this situation, an analysis is made of: (i) how ASMA development and use contrasts with that of other spatial protection tools, and in particular ASPAs, (ii) the possible factors affecting the designation of new ASMAs, and (iii) the potential for future use of the ASMA tool to address Antarctica's increasing spatial management needs.

2 Methods

The aims of the project were delivered by accessing information that was available, predominantly, on the website of the Secretariat to the Antarctic Treaty (https://www.ats.aq/index_e.html).

Information concerning ASMA management documents and guidelines was obtained from the Antarctic Treaty Secretariat website pages listing 'Tools for delegates' (https://www.ats.aq/devAS/EP/ToolsForDelegates?lang=e) and 'Guidelines and procedures' (https://www.ats.aq/devAS/EP/GuidelinesAndProcedures?lang=e).

Details of the current and de-listed ASPAs and ASMAs (e.g., year of designation/de-designation, size, proponent Parties, etc.), as well as the associated management plans, were obtained from the Antarctic Protected Areas Database (https://www.ats.aq/devph/en/apa-database) that is hosted by the Antarctic Treaty Secretariat. Information on the characteristics of each protected area was obtained following a systematic analysis of the respective management plan. Further information on the designation process for each proposed protected area was obtained by examining relevant papers submitted to meetings of the ATCM and CEP; submitted papers were accessed through the Meetings Document Archive (https://www.ats.aq/devAS/Meetings/DocDatabase?lang=e). Search terms included 'ASMA', 'ASPA', 'inspection' or the use of fragments of the name of a specific protected area, e.g., 'Deception' or 'South Pole'. This method was used to determine the number of papers concerning each of the ASMAs that were submitted to the CEP by the managing Parties following designation. To ascertain whether any ASPAs or ASMAs contained CEMP sites, CEMP site locations were obtained from the CCAMLR GIS (https://gis.ccamlr.org/).

Information concerning inspections of protected areas under Article VII of the Antarctic Treaty, Article 14 of the Protocol on Environmental Protection to the Antarctic Treaty and Article 10 of Annex V to the Protocol was obtained by searching the Meeting Document Archive using the search term 'inspection'. Further information was obtained through the Inspections Database by selecting 'protected area' under the 'facility type' (https://www.ats.aq/devAS/Ats/InspectionsDatabase?lang=e).

Details of Recommendations, Resolutions, Measures and Decisions agreed by the ATCM were accessed through the Antarctic Treaty Database, again using fragments of the protected area name as a search term (https://www.ats.aq/devAS/ToolsAndResources/AntarcticTreatyDatabase?lang=e).

Best efforts were made to access available information and make this study as comprehensive as possible. However, it is acknowledged that the analysis is the product of a single author from the British Antarctic Survey, United Kingdom, and other relevant information and means of analysis and interpretation may exist.

3 Results

3.1 ASMA designation and management

3.1.1 ASMA management documents and guidelines

The CEP coordinates the use of the Annex V protected area management tools. The Committee has developed several guidelines for those engaged in the identification of candidate ASMA sites and preparing for ASMA designation, as well as for those undertaking ASMA inspections (see Table 1).

3.1.2 Characteristics of ASMAs compared with ASPAs

Table 2 details some of the key characteristics of ASMAs and shows how they differ from ASPAs. One of the most striking differences concerns the period during which the two spatial management tools have been available, compared to the period in which areas were designated. ASPAs, or their precursors, have been available to deliver spatial protection for 62 years with the period of their designation covering 59 years (95%). In contrast ASMAs have been available for 24 years, yet the period of their designation was only 5 years (21%). This may, in part, explain the designation of a much larger number of ASPAs (76) compared to ASMAs (six currently in effect). ASMAs are on average substantially larger than ASPAs (8,100 km^2 *cf.* 52.8 km^2, respectively), with the median size of ASMAs 860 times greater than that of ASPAs (1979 km^2 *cf.* 2.3 km^2). Overall, ASMAs encompass over 12 times the area protected by ASPAs (48,600 km^2 *cf.* 4,014.5 km^2). Figure 1 shows the spatial scale of current ASPAs, ASMAs and CCAMLR MPAs and reveals that ASMAs are currently used at spatial scales of 100s to 10,000s km^2. In contrast, ASPAs cover a range of spatial scales from <1 to 1000s of km^2. Being larger, individual ASMAs generally encompass a wider diversity of environment types (marine/terrestrial/ice) than individual ASPAs. The largest ASPAs protect predominantly or exclusively marine environments. ASMAs tend, on average, to have a larger number of proponent Parties, compared to ASPAs (i.e., 3.5 *cf.* 1.2, respectively). Table 3 provides details of the ASMAs, including the proponent Parties, the size, the values under protection, the features contained and the management tools employed within their boundaries (e.g., ASPAs, HMSs, VSGs, etc.). Maps of the ASMAs are provided in Figure 2. ASMAs encompass a diverse range of natural and human-modified environments, involving diverse stakeholders over a range of spatial scales, and therefore precedents exist that demonstrate how equivalent areas elsewhere could be managed using this tool.

TABLE 1 Guidance material for the identification, designation and inspection of Antarctic Specially Managed Areas (ASMAs).

No.	Document title	Agreed through	Link
1	Guidelines for implementation of the framework for protected areas (2000)	Resolution 1 (2000) Attachment	https://documents.ats.aq/recatt/Att081_e.pdf
2	Guidance for assessing an area for a potential ASMA designation (2017)	Resolution 1 (2017) Annex A	https://documents.ats.aq/recatt/Att625_e.pdf
3	Guidelines: A prior assessment process for the designation of ASPA and ASMAs (2017)	CEP XX Report: Appendix 4	https://documents.ats.aq/ATCM40/WW/ATCM40_WW011_e.pdf
4	Guidelines for the preparation of ASMA management plans	Resolution 1 (2017) Annex B	https://documents.ats.aq/recatt/Att626_e.pdf
5	Revised guide to the presentation of Working Papers containing proposals for Antarctic Specially Protected Areas, Antarctic Specially Managed Areas or Historic Sites and Monuments	Resolution 2 (2021) Annex	https://documents.ats.aq/recatt/Att705_e.pdf
6	Guidelines for CEP consideration of new and revised draft ASPA and ASMA management plans (2008)	Annex 1 of Appendix 3 to the CEP XI Report	https://documents.ats.aq/cephandbook/cep11_app3_1_e.pdf
7	Flowchart to illustrate/summarize the process of evaluating and drawing conclusions with regard to assessing an area for potential ASMA designation (2019)	CEP XXII Report: Appendix 2	https://documents.ats.aq/ATCM42/WW/ATCM42_WW007_e.pdf
8	Checklist to assist in the inspection of ASPAs and ASMAs (2008)	Resolution 4 (2008) Annex	https://documents.ats.aq/recatt/Att409_e.pdf

3.1.3 ASMA proponent and managing parties

Figure 3 shows the number of ASMAs for which the Party is either a proponent or involved in management. Of the 29 Consultative Parties to the Antarctic Treaty, over half (16) have at some point been actively engaged in the management of at least one ASMA. The United States is the proponent of five ASMAs and is the sole managing Party for ASMA 7 Southwest Anvers Island and Palmer Basin and was the sole proponent for ASMA 5 Amundsen-Scott South Polar Station until Norway joined as a co-managing Party in 2015 (United States and Norway, 2016). Norway is also a proponent for ASMA 4 Deception Island, South Shetland Islands. All 14 other Parties are involved with just one ASMA. Romania is the only non-Consultative Party to be a proponent Party for an ASMA (ASMA 6 Larsemann Hills, East Antarctica). Figure 4 shows the number of papers on each of the ASMAs submitted to the CEP by the managing Parties following designation. The number of CEP papers for each ASMA appears to increase with the number of proponent Parties, indicating a higher level of communication, both within the management group and with the CEP in general.

3.1.4 ASMA designation and de-designation

Figure 5 shows the period during which papers were submitted to the CEP and/or ATCM concerning the potential designation of ASMAs at various locations around Antarctica. For both successful and unsuccessful proposals, the duration of discussion within the CEP or ATCM can be long with, for example, those concerning ASMA 1 Admiralty Bay commencing at least 10 years before formal designation of the area as an ASMA. Similarly, discussions concerning the failed bids for ASMA designation for Fildes Peninsula and Dome A occurred over a period of at least 8 years and 6 years, respectively. In comparison, ASPAs are typically designated in as little as 2 years (i.e., three CEP meetings) from the time a proposal is first made to the Committee to the designation being formally agreed through an ATCM Measure.

ASMA 3 Cape Denison, Commonwealth Bay, George V Land, East Antarctica, is the only ASMA to have been de-designated. It was designated in 2004, with Australia as the sole proponent. The ASMA was established to manage activities in the vicinity of the hut established by the Australasian Antarctic Expedition of 1911–14 led by Sir Douglas Mawson. Included within the ASMA boundaries were ASPA 162 and HSM 77 that protect the historical buildings and artifacts. VSGs were agreed for the site in 2011. However, to enhance protection of the site and simplify the management arrangements, ASPA 162 was enlarged to cover the area that was designated as ASMA 3 and the ASMA was de-designated in 2014 (Measure 9 (2014)).

3.1.5 ASMA inspections

To date, only three ASMA inspections have been undertaken, i.e., ASMA 2 McMurdo Dry Valleys in 2006 (New Zealand et al., 2006), ASMA 5 Amundsen-Scott South Pole Station, South Pole in 2016 (Australia, 2017) and ASMA 1 Admiralty Bay, King George Island in 2022 (Brazil et al., 2022). However, some Parties have stated their intent to undertake further inspection of ASMAs in the Antarctic Peninsula region (Netherlands et al., 2025).

3.2 ASMA proposals that have not been agreed

During the period 2004–2008, seven ASMAs were agreed, but despite six more initiatives concerning the designation of further ASMAs, no more have been adopted formally by the ATCM in the past 18 years. The following sections describe the circumstances around each of the initiatives that are either dormant or remain in progress.

TABLE 2 Characteristics of Antarctic Specially Managed Areas (ASMAs) and Antarctic Specially Protected Areas (ASPAs).

Characteristic	ASMA	ASPA
Forerunner of current protected area	Multiple-use Planning Area (MPA) (did not enter into effect)	Specially Protected Areas (SPAs) Sites of Special Scientific Interest (SSSIs) Special Reserved Areas (did not enter into effect)
Current number	6	76
Permit required for entry	No	Yes
Recreational/tourism activities permitted within area	Yes (including Visitor Zones)	Generally limited to ASPAs protecting historic values (e.g., ASPA 158)
Logistical infrastructure within area	May include research stations, historic sites, airstrips, wharfs, scientific equipment etc.	Generally small-scale huts/refuges (although see ASPA 122 Arrival Heights)
Management plan required	Yes	Yes
Interval for initiation of management plan review	5 years	5 years
Period of designation	Indefinite (unless stated otherwise in management plan)	Indefinite (unless stated otherwise in management plan)
Special Zones within area	Facilities and Operations Zones Access Zones Historic Zones Scientific Zones Restricted Zones Visitor Zones Historic Sites and Monuments Visitor Site Guidelines ASPAs CEMP sites	Facilities Zones Access Zones Historic Zones Scientific Zones Restricted Zones Prohibited Zones Historic Sites and Monuments Visitor Site Guidelines for some historic huts within CEMP sites
Period over which conservation/management tool has been available	24 years (2002–2026)	62 years (1964–2026)
Period over which new areas have been designated	5 years (2004–2008)	59 years (1966–2025)
New areas currently under formal consideration by the CEP	No	Yes
Total area	48,600 km^2	4,014.5 km^2
Mean area	8,100 km^2	52.8 km^2
Median area	1979 km^2	2.3 km^2
Range	159–26,286 km^2	0.001–1,520 km^2
Mean number of proponent parties (range)	3.5 (range: 1–6)	1.2 (range: 1–4)
Environments present in areas designed to date:		
• exclusively terrestrial	No	Yes
• exclusively marine	No	Yes
• exclusively permanent ice	Yes	No
• mixed	Yes	Yes
Number of multi-site areas (i.e., spatially separate sites comprising the protected area)	0	13

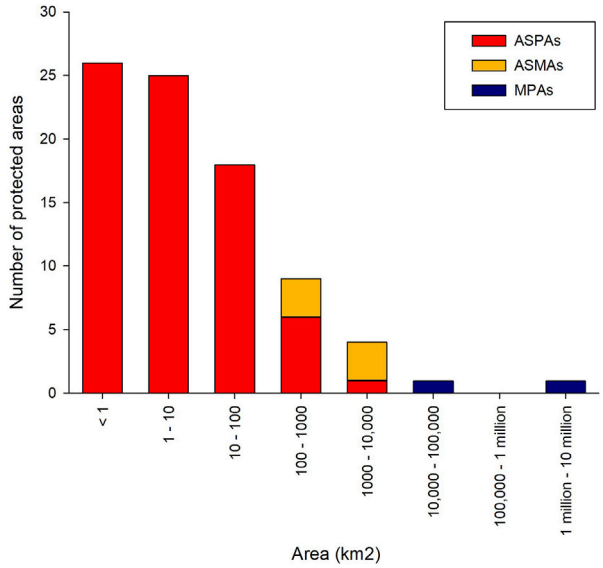

FIGURE 1
The number of Antarctic Specially Protected Areas (ASPAs), Antarctic Specially Managed Areas (ASMAs) and Antarctic Marine Protected Areas (MPAs) by area.

3.2.1 Fildes Peninsula

Fildes Peninsula, King George Island, South Shetland Islands, is one of the largest ice-free areas in the northern Antarctic Peninsula region, characterised by rich biodiversity and extensive biological communities and containing two ASPAs and four HSMs. It is also one of the busiest logistical hubs in Antarctica with six research stations (operated by Chile, China, the Russian Federation and Uruguay) and an intercontinental rock airstrip operated by Chile. The airstrip supports logistical and scientific activities, but also tourists engaging in the air-cruise modality of tourism activity (i.e., use of the airlink between Punta Arenas and Fildes Peninsula where cruise ships are boarded, thereby avoiding the notoriously rough crossing of the Drake Passage) (Pfeiffer et al., 2007). Concerns about the cumulative environmental impacts resulting from the long human presence on Fildes Peninsula were expressed by Parties undertaking station inspections (United Kingdom and Germany, 1999; United States, 2001; 2007; United Kingdom et al., 2013) and SCAR encouraged greater coordination of scientific activities (SCAR, 2001). Earlier comprehensive research projects undertaken by German scientists showed substantial human impacts in the area such as (i) disturbance of wildlife including declines in some bird populations caused by air, ship and land traffic as well as visitors, (ii) poor waste management including open dumps and burning of waste, (iii) widespread oil contamination due to poor fuel handling, storage and oil spill response facilities, (iv) large scale construction and quarrying activities without the appropriate level of environmental impact assessment, (v) poorly coordinated scientific, recreational and tourism activities resulting in cumulative impacts on fauna and flora and (vi) the inadvertent and deliberate introduction of non-native species (Peter et al., 2008; 2013; Braun et al., 2012). Germany initiated discussions in 2004 on the use of existing management tools, including ASMA designation, to increase coordination and strengthen environmental protection in the Fildes Peninsula, possibly following the precedents set by Parties' work towards the successful establishments of ASMAs nearby on Deception Island and Admiralty Bay (Germany, 2004). Interested Parties participated in the 'International Working Group for the Fildes Peninsula region' for six intersessional periods between (2006–2007 to 2011–12) as well as attending workshops and other meetings. However, according to Braun et al. (2017) 'The discussion process on environmental management that started in 2004 is currently dormant, as there is no agreement between the stakeholders present in the area about regulatory measures'. Some management practices in the region, including sewage treatment, waste management and fuel storage have improved in recent years; nevertheless, increases in the development of the area to accommodate an increasingly diverse range of stakeholders and activities remains a substantial cause for concern (Laursen, 2013; Convey, 2020; Soutullo et al., 2022).

3.2.2 Graham Coast, Argentine and adjacent islands

In 2005, Ukraine proposed the initiation of discussions concerning the designation of an ASMA around Petermann Island, Wilhelm Archipelago, Antarctic Peninsula, in response to the expansion of scientific and touristic activities in the area (Ukraine, 2005). Subsequently, in 2009, Ukraine revised and expanded the proposal for the ASMA, with the new name 'Graham Coast, Argentine and adjacent islands' in the vicinity of its Vernadsky Research Station (Ukraine, 2009). The proposed area included a large marine component, had an area of 1800 km^2 and shared a northern boundary with ASMA 7 Southwest Anvers Island and Palmer Basin. Ukraine submitted papers to CCAMLR on the issue and according to Fedchuk (2009) several CEP Members supported the Ukrainian proposal and expressed their interest in the project. The topic was raised again by Ukraine at ATCM XXXV (Ukraine, 2012). However, since that time, the work of Ukraine on protected areas has focussed on the designation of a multi-site ASPA in the vicinity of Collins Bay, Kyiv Peninsula (Ukraine, 2025).

3.2.3 Chinese Antarctic Kunlun Station, Dome A

Dome A is the highest ice dome on the Antarctic plateau and in 2009 China established the Kunlun Station there to facilitate research and logistical activities in the region. At CEP XVI (2013), China proposed the designation of an ASMA entitled 'Chinese Antarctic Kunlun Station, Dome A' (China, 2013). The proposed ASMA centred on the Kunlun Research Station, and included a clean air sector, quiet sector, dark sector and other zones that extended up to 120 km from the station and was broadly similar in layout to ASMA 5 Amundsen-Scott South Pole Station, South Pole. During CEP discussions, several Parties questioned the need for an ASMA at Dome A, including (i) the need for management to avoid conflict and improve collaboration

TABLE 3 Information summary for the six ASMAs currently in effect (amended from Australia (2011)).

No.	ASMA No. 1	ASMA No. 2	ASMA No. 4	ASMA No. 5	ASMA No. 6	ASMA No. 7
Name and location	Admiralty Bay, King George Island	McMurdo Dry Valleys	Deception Island, South Shetland Islands	Amundsen-Scott South Pole Station, South Pole	Larsemann Hills, East Antarctica	Southwest Anvers Island and Palmer Basin
Proponent Party/ Parties	Brazil[1], Ecuador[1], Peru[1], Poland[1] and United States[2]	New Zealand[3] and United States[2]	Argentina[3], Chile[3], Norway[3], Spain[1], United Kingdom[3] and United States[2]	United States[2] and Norway[3]	Australia[3], China[1], India[1], Romania[1] and Russian federation[2]	United States[2]
Year of designation	Measures 2 (2006)	Measure 1 (2004)	Measure 3 (2005)	Measures 2 (2007)	Measures 2 (2007)	Measure 1 (2008)
Current management plan	Measure 1 (2023)	Measure 18 (2015)	Measure 10 (2019)	Measure 8 (2017)	Measure 1 (2021)	Measure 1 (2022)
Area	360 km^2	17,945.42 km^2	158.56 km^2	26,286.03 km^2	252.54 km^2	3,548.53 km^2
Terrestrial component	Yes	Yes	Yes	Yes	Yes	Yes
Ice-free component	Yes	Yes	Yes	No	Yes	Yes
Marine component	Yes	No	Yes	No	No	Yes
Main Environmental Domains	A- Antarctic Peninsula northern geologic E – Antarctic Peninsula, Alexander Island and other islands G – Antarctic Peninsula offshore islands	S - McMurdo - South Victoria Land geologic	G - Antarctic Peninsula offshore islands	Q - East Antarctic high interior ice sheet	D - East Antarctic coastal geologic	B- Antarctic Peninsula mid-northern latitudes geologic E – Antarctic Peninsula, Alexander Island and other islands
Antarctic Conservation Biogeographic Regions (ACBRs)	ACBR 3 North-west Antarctic Peninsula	ACBR 9 South Victoria Land	ACBR 3 North-west Antarctic Peninsula	N/A	ACBR 7 East Antarctica	ACBR 3 North-west Antarctic Peninsula
Important Bird and Biodiversity Areas (IBAs)	45 - Point Hennequin, King George Island 46 - West Admiralty Bay, King George Island	182 - Blue Glacier to Cape Chocolate	55 - Baily Head, Deception Island 56 - Vapour Col, Deception Island	None	None	85 - Cormorant Island 86 - Litchfield Island 87 - Joubin Islands 88 - Islet south of Gerlache Island
Visitor Site Guidelines	None	30 – Taylor Valley	17 - Whalers Bay 19 - Baily Head 20 - Telefon Bay (East) 35 - Pendulum Cove	None	None	None
Values identified	Environmental; historical; scientific; aesthetic; educational and touristic	Scientific; wilderness, ecological; aesthetic	Natural; scientific; historic; educational; aesthetic; wilderness	Scientific; environmental; historic	Environmental; scientific; logistical; wilderness and aesthetic	Scientific; flora and fauna; educational and visitor

(*Continued*)

TABLE 3 Continued

No.	ASMA No. 1	ASMA No. 2	ASMA No. 4	ASMA No. 5	ASMA No. 6	ASMA No. 7
Overall aims and objectives	To avoid or to reduce the risk of mutual interference and minimize environmental impacts, thus providing an effective mechanism for the conservation of the valuable features that characterize the area	To manage and coordinate human activities in the Area such that the values of the McMurdo Dry Valleys are protected in the long term	To conserve and protect the unique and outstanding environment of Deception Island, whilst managing the variety of competing demands placed upon it, including science, tourism, and the conservation of its natural and historic values. To protect the safety of those working on, or visiting the island	To coordinate activities in the Area such that the scientific and environmental values of the Area can be sustained indefinitely, and the historical values preserved to the greatest extent practicable	To protect the environment by promoting coordination and cooperation by parties in the planning and conduct of all human activities in the area	To conserve and protect the unique and outstanding environment of the southwest Anvers Island and Palmer Basin region by managing the variety of activities and interests in the Area. To ensure that these important values are protected and sustained in the long-term, especially the extensive scientific data sets collected over the last 100 years
Specific codes of conduct	Visitors	Environmental; Scientific research; Facilities zones; Tourism zone; Special features	Facilities; Visitors; Alert scheme and escape strategy	Non-governmental organisation guidelines; Scientific Zone guidelines	Environmental	Scientific and environmental guidelines (including guidelines for Restricted Zones); Visitor guidelines
ASMA management group	Yes	Yes	Yes	Yes	Yes	Yes
ASMA website	http://www.admiraltybayasma.aq/ (link may not be working)	http://www.mcmurdodryvalleys.aq/	http://www.deceptionisland.aq/	https://www.southpole.aq/	None	None
Antarctic Specially Protected Areas	ASPA 128 Western Shore of Admiralty Bay	ASPA 123 Barwick and Balham Valleys; ASPA 131 Canada Glacier; ASPA 138 Linnaeus Terrace; ASPA 154 Botany Bay	ASPA 140 Parts of Deception Island; ASPA 145 Port Foster	None	None	ASPA 113 Litchfield Island; ASPA 139 Biscoe Point; ASPA 176 Rosenthal Islands, Anvers Island, Palmer Archipelago
Historic Sites and Monuments (HSMs)	HSM 51 Puchaslki Grave	None	HSM 71 Whalers Bay; HSM 76 Aguirre Cerda Station ruins	HSM 1 South Pole Flag Mast; HSM 80 Amundsen's Tent	None	None

(*Continued*)

TABLE 3 Continued

No.	ASMA No. 1	ASMA No. 2	ASMA No. 4	ASMA No. 5	ASMA No. 6	ASMA No. 7
CCAMLR Ecosystem Monitoring Program (CEMP) Site	One (Code: ADB)	None	None	None	None	None, but CEMP relevant research undertaken. Four CEMP sites in close proximity (Codes: GAI; GOI; PTI; YAL)
Special Zones	Visitor; Scientific; Facilities	Facilities; Tourism; Special features	Facilities; Visitors	Operational; Scientific; Historic; Hazardous	Facilities; Magnetic Quiet Zone Magnetic Quiet; Restricted	Restricted; Visitor; Operations
National Antarctic programme research stations	Henryk Arctowski (Poland); Commandante Ferraz (Brazil); Machu Picchu Station (Peru); Copacabana Field Camp (US); República del Ecuador (Ecuador)	None	Decepcion (Argentina); Gabriel de Castilla (Spain)	Amunsden-Scott South Pole (USA)	Zhongshan (China); Progress II (Russian Federation); Bharati (India); Law (Australia)	Palmer (USA)
Multiple national programme activities	Yes	Yes	Yes	Yes	Yes	Yes
Tourism/Non-governmental activities	Yes	Yes	Yes	Yes	Limited	Yes

[1]Non-claimant state.
[2]State that reserves the right to claim Antarctic territory (semi-claimant state).
[3]Claimant state.

between different users when China was the only stakeholder operating at the location and (ii) the lack of clarity over the threats in the area (CEP XVI Report, para. 118–124). China reiterated that its proposal 'was based not on the premise that more than one Party would necessarily be using the site but on a precautionary approach to likely future activities and interest in the region, and on the values to be protected' (CEP XVI Report, para. 122). China was invited to coordinate intersessional discussions on the CEP forum (e.g., see China, 2014), which continued each year for the next 4 years. At the end of these discussions (2017), several Parties were reluctant to agree to the designation of an ASMA in an area that lacked multiple users. Rather, Parties suggested investigating other management options including the development of a 'Code of conduct for protection of Dome A area in Antarctica', which continued for another 2 years after which discussions on the CEP forum halted (China, 2019).

3.2.4 Barrientos (Aitcho) Island

Ecuadorian researchers, sometimes in collaboration with Spanish scientists, have undertaken research into the impact of tourist activities on Barrientos (Aitcho) Island since c. 2010, which has been facilitated by the presence of the Ecuadorian research station 'Pedro Vicente Maldonado' in the near vicinity (Cajiao et al., 2020; 2022). In 2022, Ecuador submitted an Information Paper to CEP XXIV, highlighting the impacts of human activities on the island and the potential benefits of ASMA designation in managing the area, including coordination of research activities and establishment of long-term monitoring programmes (Ecuador, 2022). Since that time, it remains unclear what, if any, progress has been made.

3.2.5 Marguerite Bay

The vicinity of northern Marguerite Bay is an area of increasing human activity containing the research infrastructure of five Parties, but also sites under international protection and/or management including six ASPAs, three HSMs, five International Bird and Biodiversity Areas (IBAs) and two sites with VSGs. The area is also subject to increasing ship-borne tourist visitation, possibly facilitated by recent declines in sea ice which have made access to the area more achievable (Siegert et al., 2023). At ATCM XLV, in Helsinki (2023), the United Kingdom initiated informal discussions with interested Parties, including Argentina, Chile, the Netherlands, Türkiye, the United States, as well as the CEP Observer organisations ASOC and IAATO concerning initial investigations into the usefulness of the designation of a new ASMA in the vicinity of Marguerite Bay, Antarctic Peninsula. The following year, the United Kingdom submitted a paper to the CEP meeting in Kochi providing a record of informal intersessional discussions and a

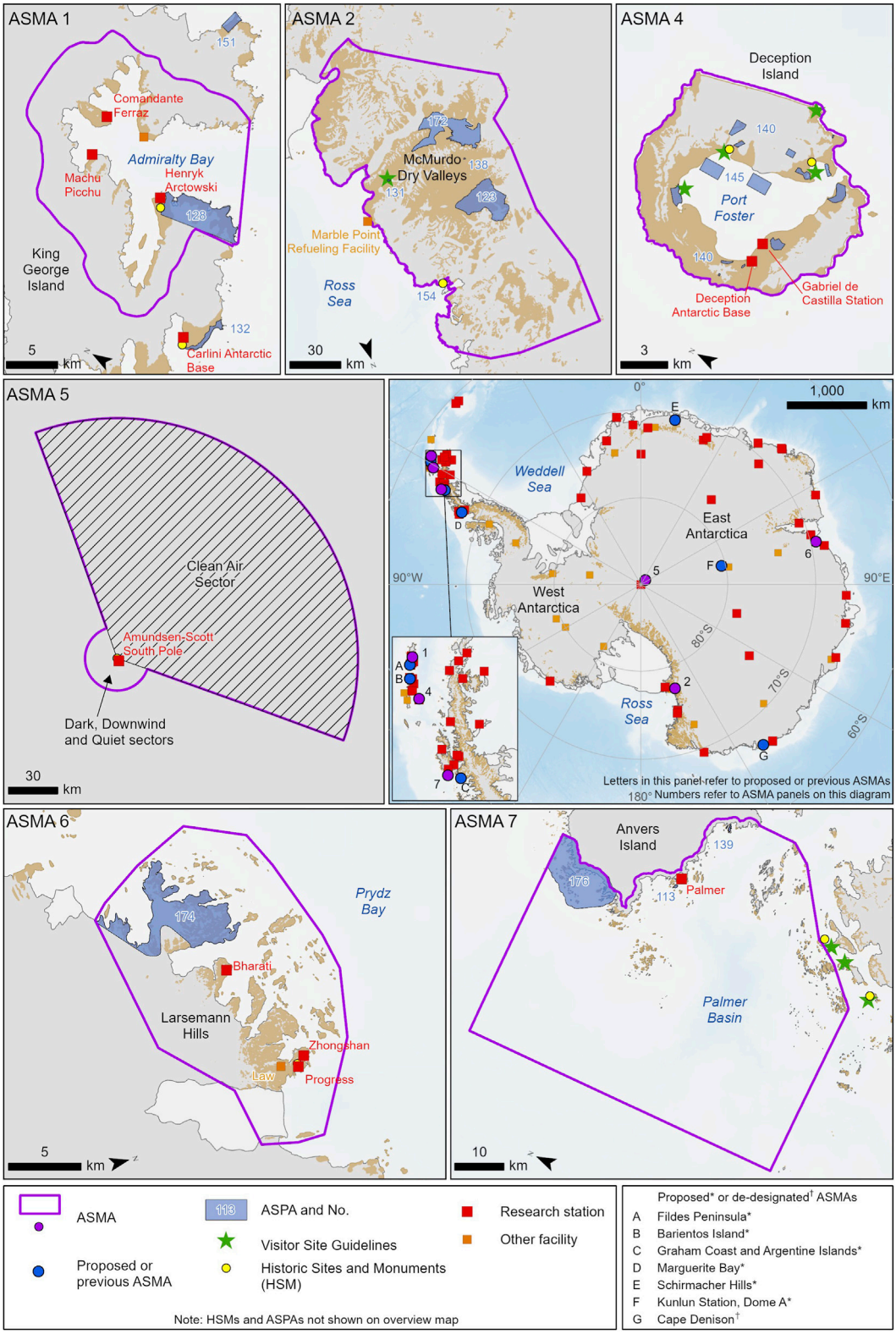

FIGURE 2
Map of the designated, de-designated and proposed Antarctic Specially Managed Areas (ASMAs) within the Antarctic Treaty area. More detailed maps of the designated ASMAs are also provided.

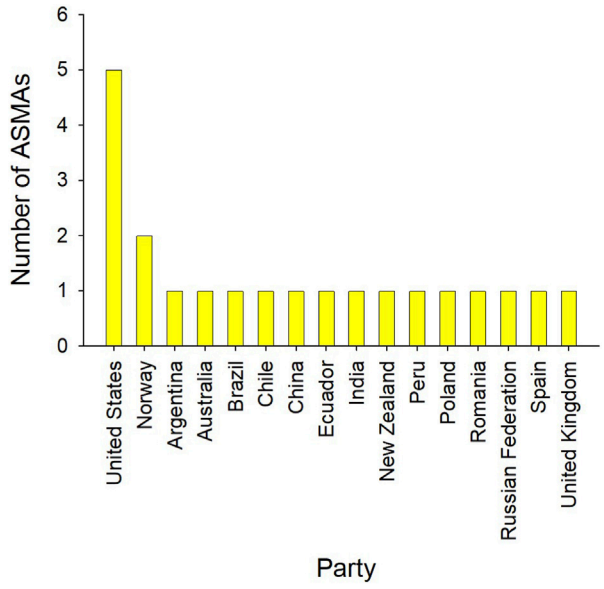

FIGURE 3
Number of Antarctic Specially Managed Areas (ASMAs) for which each Party is a proponent or managing Party.

comparison of a potential Marguerite Bay ASMA with other existing ASMAs (United Kingdom, 2024a; b,c). While there was general support for the designation of a new ASMA, there was a suggestion from one Party that other more northerly areas on the Antarctic Peninsula were busier and should be prioritised for ASMA designation. Consequently, consensus to proceed was not reached.

3.2.6 Schirmacher Hills, East Antarctica

At ATCM 47 (2025), the Russian Federation provided details of baseline monitoring activities of bird biodiversity, undertaken with logistical support from India, to inform the potential development of a management plan for an ASMA at Schirmacher Hills, Dronning Maud Land, East Antarctica (Russian Federation, 2025). The Russian Federation operates the Novolazarevskya Research Station and the associated 3.3 km long Novolazarevskya blue ice air strip (ICAO: AT17). Other potential co-proponents of the ASMA may include India and South Africa, who have research infrastructure in the region (Maitri and SANAE stations, respectively), but their participation in the proposed ASMA was not mentioned in the Russian paper.

4 Discussion

The six ASMAs currently in effect have provided spatial management at selected locations across the Antarctic Peninsula region and continental Antarctica (Figure 2) for up to 22 years. However, over that time there has been no systematic review or assessment of how effective ASMAs have been at encouraging cooperation or reducing conflict between stakeholders. Given the diverse nature of areas designated as ASMAs, comparing relative effectiveness would be a challenge, but it is likely that some ASMAs have proven more effective than others and benefits may result from the sharing of expertise and 'lessons learnt' between ASMA management groups. Some clear examples of ASMA effectiveness do exist including the demonstration of cooperation through the development of a volcanic monitoring network and eruption evacuation plan for ASMA 4 Deception Island. In another example, when United Kingdom researchers that were part of the European Space Agency-funded PolarGAP project wanted to fly aircraft within the clean air sector of ASMA 5 Amundsen-Scott South Pole Station, a compromise on aircraft movement was reached with the ASMA proponent (the United States) (Winter et al., 2018).

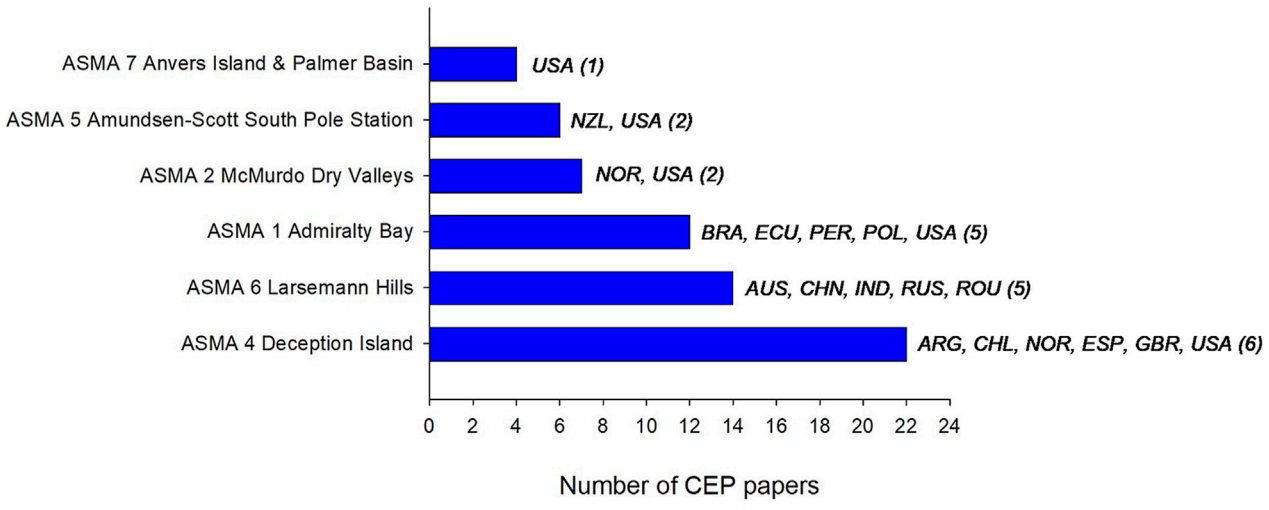

FIGURE 4
Number of papers on each of the Antarctic Specially Managed Areas (ASMAs) submitted to the Committee for Environmental Protection (CEP) by the managing Parties after designation. The names and number of Parties for each ASMA are provided in *italics*.

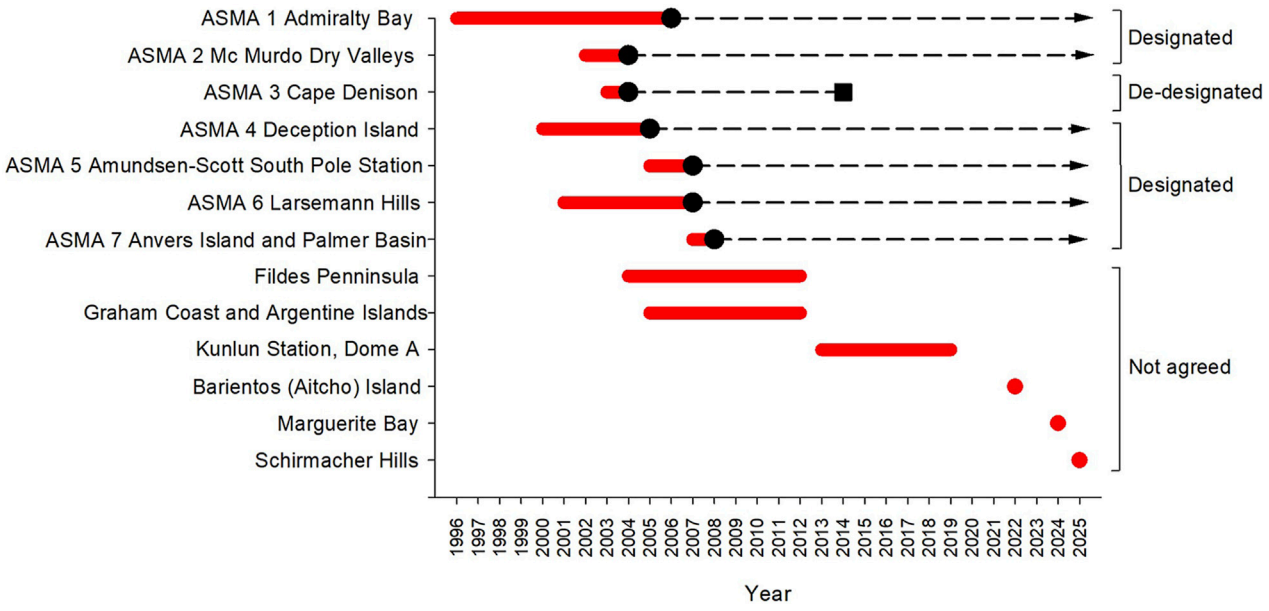

FIGURE 5
Timelines for the development of Antarctic Specially Managed Area (ASMA) proposals. The red bar indicates the period during which the first and last paper concerning the potential designation of the proposed ASMA was submitted to the CEP or ATCM (however, Parties may have participated in preparations for ASMA designation prior to this period or engaged in discussions after the latest paper was presented). The black circle (•) indicates the year ASMA designation was agreed, the black square (■) the year ASMA 3 was de-designated and the dashed line (---) the years when the ASMA was effective. The management plan for ASMA 1 Admiralty Bay, King George Island, was voluntarily adopted by Parties in 1996, but was only formally agreed as an ASMA in 2006.

The data presented in this study reveal a mixed outlook concerning further use of the ASMA spatial management tool. On a positive note, with more than half of the Consultative Parties acting as proponents for at least one ASMA, there should be a broad understanding of the use of the ASMA tool within the Committee (Figure 3). Furthermore, the CEP has developed guidance on the identification and designation processes for candidate ASMA sites (Table 1). Diverse environments and activities are managed already under existing ASMA management plans and, with these examples, the structural and technical requirements are now well established, simplifying future management plan drafting. Moreover, ASMAs are sufficiently flexible to encompass natural and human-centric values beyond current applications (IUCN, 2012). In 2011, the CEP held a 'Workshop on Marine and Terrestrial Antarctic Specially Managed Areas' to exchange best practice and work towards producing guidelines for preparing management plans for ASMAs (Australia and Uruguay, 2011a; b). Building on the CEP could pursue further initiatives to enable Parties to exchange knowledge and communicate the benefits of ASMAs to others with less experience of area protection. The on-going submission of papers to the CEP on each ASMA demonstrates that efforts are being made to communicate management activities, particularly for those ASMAs with a larger number of proponent Parties (Figure 4). Nonetheless, it is a matter of concern that following an intense spell of ASMA designations between 2004 and 2008, there have been no further successful ASMA designations (Figure 5).

4.1 Factors affecting ASMA designation

Since 1964, ASPAs or their precursors have been agreed as a rate of just over one per year and, despite some earlier challenges, this is likely to continue (Hughes and Grant, 2017; Lee et al., 2022). In contrast, the future role of ASMAs is more difficult to predict, particularly when we consider that area designation has been stagnant for almost 2 decades. Since the last ASMA was approved in 2008, Antarctica has become busier and more complex politically. The number of signatories to the Treaty increased from 47 to 58 and more Parties are active in the region, with multiple initiatives for infrastructure development in progress. Furthermore, annual tourist numbers have increased from 37,858 (2008/09) to 118,491 (2024/25), accompanied by an increase in the diversity of activities on offer and the number of sites visited (IAATO, 2010; IAATO, 2025). As an additional factor, rapid climate change in the region may have exacerbated the environmental impact of expanding human activities (Tin et al., 2009; Chown et al., 2022; Davies et al., 2026). Recently, the ATCM has acknowledged the expansion and increasing diversification of tourist activities in Antarctica, and through Decision 6 (2023) agreed to start a dedicated process to develop a comprehensive and consistent framework for the regulation of tourism and other non-governmental activities. This work is on-going. If implemented appropriately, ASMAs could prove effective for managing tourism activity, while simultaneously accounting for the interests of other stakeholders (Brooks et al., 2024).

Given the dramatic increase in human activity in the Antarctic region and the repeated expression of interest in new ASMA

TABLE 4 Initiated or proposed ASMAs and potential reasons for lack of progress toward designation.

Name of proposed ASMA	General location coordinates	Proposed size (km^2)	Current status	Potential reason for lack of progress				
				Perception that ASMA designation may dilute the influence of one or more Parties active in the area	ASMA designation seen as an attempt to formalise single Party influence over a region	Large marine component likely to make ASMA designation complex	Proponent has not developed the proposal further	Other management tools considered more appropriate
Fildes Peninsula	62°10′56″S; 58°56′53″W	~30	Dormant	✓				
Graham Coast, Argentine and adjacent islands	65°10′0″S; 64°10′0″W	~1800	Dormant		✓	✓	✓	✓(?)
Chinese Antarctic Kunlun Station, Dome A	80°24′59″S; 77°6′58″E	19,764	Dormant		✓			✓
Barrientos (Aitcho) Island	62°24′22″S; 59°44′57″W	<1 (?)	Dormant (?)		✓		✓(?)	✓(?)
Marguerite Bay	68°30′0″S; 68°30′0″W	~7,200	Dormant	✓		✓		
Schirmacher Hills, East Antarctica	71°35′60″S; 62°19′0″W	~34 (?)	Early stages of proposal development				✓(?)	

designations shown by at least 10 Parties since 2008, there is an identified need for revitalised implementation of the ASMA management tool. Nevertheless, analysis of initiatives since 2008 to propose new sites for ASMA designation revealed several factors that may have hindered progress (Section 3.2), which are summarised in Table 4 and discussed in more detail below.

4.1.1 Geopolitics

Geopolitical positions play a part in almost every discussion within the Antarctic Treaty system, with area protection a particularly sensitive subject due to its potential use to assert national dominance and its possible association with the reinforcement of existing territorial claims (Hughes and Grant, 2017; Johnstone, 2022). Except for France, all the claimant states are proponents of ASMAs that are almost always located in their claimed territory, indicating a desire to be actively involved in management activities and potentially to reinforce their territorial claims (see Table 3). Argentina, Chile and the United Kingdom have overlapping territorial claims in the Antarctic Peninsula region, and it is notable that for each current or proposed ASMA, either none or all of these Parties are involved (e.g., all three are the proponents of ASMA 4 Deception Island and were engaged in discussions on the proposed Marguerite Bay ASMA). More generally, following ASMA designation, increased use of official inspections, made possible under the Treaty and Protocol, may help ensure transparency concerning the management activities undertaken within the area (Netherlands et al., 2025).

ASMA designation may be regarded as either a negative or positive development, depending upon the circumstances of each Party operating within the proposed Area. Should the Party have control over logistical infrastructure upon which other governmental and non-governmental stakeholders depend, then it may be reluctant to support the implementation of a spatial management tool that extends formal influence to other proponent Parties, thereby diluting its regional influence (as could be the case at Fildes Peninsula) (Braun et al., 2017). In contrast, if a Party unilaterally proposes an ASMA and is the only stakeholder active or operating facilities within its boundaries, their proposal may be seen as an attempt to formalise their dominance in the area using Antarctic Treaty system management tools. An example may include the ASMA proposal for the Chinese Antarctic Kunlun Station, Dome A, where consensus could not be reached following (at least) 4 years of international discussion (Hataya, 2020; Jiang and Tang, 2023). Other examples may include the single Party proposals for the Graham Coast, Argentine and adjacent islands ASMA by Ukraine and the Barrientos (Aitcho) Island ASMA by Ecuador, neither of which received substantial international support, but it is noted that the proposed areas were also subject to substantial tourism activity.

Some reassurance that an ASMA designation does not promote national priorities could be provided by multiple Parties acting as

proponents for a proposed ASMA, thereby emphasising the international need and support for the proposal. That ASMAs are intended to prevent conflict and build cooperation between stakeholders might lead to some expectation that more than one Party should always be involved, notwithstanding the potential need for coordination with non-governmental organisations such as IAATO and ASOC. However, recent discussions regarding a potential ASMA in Marguerite Bay, which involved six Parties plus ASOC and IAATO, stalled despite general support, with the views of one Party sufficient to halt progress. This outcome demonstrates the challenge of involving multiple Parties in the planned implementation of area protection tools which, while important to reduce geopolitical suspicions, are left vulnerable to multiple perspectives and may make protected area designation difficult, if not impossible. Even within individual proponent Parties, multiple stakeholder organisations, including civilian and military logistics providers, may need to be convinced of the benefit before ASMA designation can get approval at a domestic level, never mind at the ATCM itself. Nevertheless, it is important not to lose sight of Parties' overarching commitment to the protection of the Antarctic environment and the international delivery of functional regional management and environmental protection under an effective Antarctic Treaty system, which, itself, may be considered a political 'win' for many Parties at a domestic and international level.

4.1.2 The role of CCAMLR in ASMAs

Krill fishing in the Southern Ocean has proven to be controversial, despite conservative catch limits, because krill are the primary food source of many marine higher predators, including penguins, seals and whales. The regulation of fishing activities in the Southern Ocean, including waters within the Antarctic Treaty area, falls under the CAMLR Convention, while the management of areas using the ASMA tool falls under the Protocol. ASMA 7 Southwest Anvers Island and Palmer Basin contains a substantial marine area, and the management plan explicitly states that any marine harvesting activities should be coordinated with scientific research and other activities taking place within the ASMA (Roura et al., 2018). However, other ASMA management plans have not been as explicit. During 2009–2010, krill fishing occurred within ASMA 1 Admiralty Bay, with a total catch of 11,500 tonnes (CCAMLR, 2012). Fishing was not an activity explicitly identified in the ASMA management plan, but concern was expressed that fishing might impact upon on-going scientific work undertaken within the area on fish, krill, benthic communities and seabirds (ASOC, 2012). This was the first instance of reported fishing in an ASMA and, in 2013, CCAMLR decided that 'any proposal to undertake commercial harvesting within an ASMA should be submitted to CCAMLR for its consideration and that the activities outlined in that proposal should only be taken with the prior approval of CCAMLR' (Final Report CCAMLR-XXXII, paragraph 5.83). The Commission also agreed that the provision of advice from CCAMLR to the ATCM, in order that such advice could be included in decision-making, was consistent with the spirit of cooperation and harmonisation between CCAMLR and the ATCM.

Noting the on-going challenges in the delivery of MPAs by CCAMLR (Brooks et al., 2020; Guggisberg, 2025), the proposal of new large-scale marine ASMAs, and the associated involvement of the CEP and ATCM, may serve to further complicate the delivery of effective marine area protection. Nevertheless, designation of marine ASMAs may be one mechanism by which vessel strikes on whales and other marine mammals and penguin species may be reduced by limiting vessel speed (IAATO, 2019). Furthermore, ASMAs may be useful for the pre-emptive management of coastal marine areas that are likely to become available to ship traffic as a result of sea ice decline, as well as any associated increase in human activity on newly accessible coastal areas (Davies et al., 2026; Siegert et al., 2026).

4.1.3 Complexity and cost of implementation

The complexity, cost and duration of preparations for ASMA designation and the effectiveness of on-going management are likely to depend upon many factors (Roura, 2023). These may include the size of the area, the nature of and variability in landscape (e.g., marine, ice-free, permanent ice, geothermal, etc.) and the stakeholder number and type (governmental/non-governmental; claimant/non-claimant; prior level of spatial management experience). Further factors may include the extent, intensity, duration and nature of human activities (e.g., fishing, research, tourism, etc.), and the existing use of other spatial management tools within the proposed area (e.g., ASPAs, HSMs, VSGs, etc.). The process for ASMA designation may require considerable resource, including for site visits, stakeholder meetings, and drafting of the ASMA management plan and associated papers to the CEP/ATCM. The long discussion period prior to ASMA designation may be essential for the proponent Parties to understand one another's concerns and develop an effective/trusted working relationship. Nevertheless, the larger scale of most ASMAs compared to ASPAs may make them efficient spatial management tools despite the typically longer period for agreement. However, it could be argued that this process is too slow to respond to the rapid expansion of human footprint seen in recent years and may justify the precautionary designation of ASMA at earlier stages of human activity expansion, as was attempted for Marguerite Bay (see later).

Following designation, ASMA management may require resource to deliver the five-yearly review of the management plan (although to date these are delivered at intervals of 7 years, on average), undertake monitoring of the values within the ASMA to determine the effectiveness of management measures, coordinate the work of the ASMA management group, draft papers to the CEP, consider any arising issues and maintain any associated ASMA website. Depending upon the level of engagement of the ASMA proponents with the active management of the area, involvement may consume a non-trivial amount of resource. Given finite budgets and human resource, the cost of existing commitments to area protection and management, in addition to other environmental management obligations, may deter Parties from supporting new initiatives or engaging in further ASMA designations.

4.1.4 Concerns over activities being constrained

A Party with an existing or planned operational footprint within an area proposed for ASMA designation may have concerns that its future activities may be constrained (as was perhaps the case with the proposed ASMA on Fildes Peninsula, discussed earlier). A further example concerns the negotiation of ASMA No. 6 Larsemann Hills, where just prior to the ASMA being agreed, India announced its intention to construct a research station at a pristine site outside the planned Facilities Zone within which all other stations in the vicinity were located (India, 2006). As the new station construction was incompatible with the aims of the ASMA management plan, the proposal for designation was not agreed. The chosen site was of significance to India due to the Gondwanan connection between India and the Larsemann Hills, which may have stymied inter-Party discussions regarding alternative locations (O'Reilly, 2011). Subsequently, India joined the proponent Parties to produce an updated management plan that took the location of the new station into account, and the ASMA was agreed in 2007. In a vast continent, where the infrastructure of different nations can be separated by hundreds of kilometres, 'ASMAs concentrate the roles and ideas of nations onto a relatively small international space' (O'Reilly, 2011). The need to share logistics or agree policies for harmonious operation in the ASMA may contrast starkly with the relative freedoms experienced by Parties with stations at more isolated locations where additional external constrains are not imposed. Furthermore, due to the non-trivial effort and perceived complexity of ASMA designation, at sites occupied by multiple Parties, there may be a preference for the use of informal agreements to deliver potentially more flexible management of the immediate area.

4.2 Identification of new ASMA sites

In common with ASPAs, ASMAs have been designated in an unsystematic manner, driven by perceived need, rather than through strategic planning undertaken on a regional or continental scale (Shaw et al., 2014; Hughes and Grant, 2017). The political appetite for a more strategic approach may not be forthcoming in the foreseeable future, particularly when we consider the current challenges surrounding marine protection in the Southern Ocean (Brooks et al., 2020; Guggisberg, 2025). Nevertheless, the identification of new areas for subsequent ASMA designation could be achieved using a holistic assessment of anticipated future human activity across the Treaty area and the ecosystems affected. This would involve the identification of areas: (i) of expanding human activity close to areas containing vulnerable features and values; (ii) where there was a risk of mutual interference by stakeholders active in the vicinity; and (iii) where substantial cumulative impacts were anticipated. This analysis could be achieved largely using available datasets (e.g., Pertierra et al., 2017; Brooks et al., 2019; Leihy et al., 2020; Terauds et al., 2025; Tóth et al., 2025). Delivery of a strategic planning process for new ASMAs would require input from a range of stakeholders, potentially including Treaty Parties, CEP, COMNAP, CCAMLR, SCAR, IAATO and ASOC. The necessary engagement by multiple stakeholders could complicate and prolong the planning and designation process. However, preliminary work by researchers, potentially supported by SCAR, may help this process by identifying an appropriate planning methodology and pinpointing initial areas for subsequent consideration by stakeholders and the ATCM.

Looking at existing examples of Antarctic spatial management, CCAMLR has divided the CAMLR Convention area into contiguous management regions (CCAMLR, 2026), and contiguous maritime Search and Rescue Regions have been agreed through the International Maritime Organization (IMO) (COMNAP, 2008). No such contiguous regions for general area management have been adopted by the ATCM for the continent itself. When the ASMA management tool was first developed, it was likely not intended to be used to divide the Treaty area into contiguous management regions (hence the use of the word 'Specially' within the ASMA name). Furthermore, designation of contiguous ASMAs across terrestrial Antarctica and marine environments may not be deemed practical or politically acceptable currently, in part due to overlapping jurisdictions with CCAMLR (Australia and Uruguay, 2011b). Nevertheless, within the Treaty area, the diversity of human activities and the scale of footprint is likely to increase over time, including, for example, the expansion of the tourism and fishing industries and potential development of mineral resource extraction industries following a possible revision of the Environmental Protocol (Article 7). Furthermore, we may see the emergence of permanent human populations through the 21st Century and beyond, particularly as climate change makes the region more hospitable for colonisation (Chown, 2012; Carter et al., 2025). Under these circumstances, a more structured and interconnected approach to area management may become desirable to deliver the objectives of the Antarctic Treaty and Protocol. ASMAs, likely in a modified form to account for changing political and practical considerations, could form the basis of future contiguous management areas.

5 Conclusion

The Antarctic Treaty area is becoming increasingly busy with scientific, national, touristic and fishing activities. Through the Environmental Protocol, the ATCM agreed the ASMA spatial management tool in 2002, in order to increase cooperation and reduce conflict between stakeholders and minimise environmental impact at marine and terrestrial sites within the Treaty area. Between 2004 and 2008, seven ASMAs were agreed that encompassed a diverse range of environments and infrastructure, thereby demonstrated the flexibility of the ASMA spatial management tool. Since that period, however, no further ASMAs have been agreed, despite considerable efforts by a range of CEP Members and Observer organisations. Political sensitivities and, in some cases, insufficient consensus building are likely to be the main reasons for the lack of progress. The current era of Antarctic development presents unprecedented spatial management challenges that existing governance structures are struggling to contain. Modernizing and expanding the use of ASMAs provides a vital pathway to harmonise diverse activities with environmental protection. Yet, this revitalised vision cannot be realized without a shift in the political landscape. By allocating the necessary resources to break the 18-year epoch of inaction, the ATCM can transform ASMAs from a dormant legacy tool into a dynamic instrument for future-proofed Antarctic

governance. To facilitate greater use of the ASMA spatial management tool, the CEP and ATCM, with support from other stakeholders, may like to consider.

- assessing the effectiveness of the ASMA management tool at existing locations, and identifying notable examples of successful implementation and effective management;
- developing a mechanism for greater communication and information exchange between existing ASMA proponents and/or management groups to enhance collective learning on the use of the ASMA tool;
- undertaking a holistic assessment of anticipated future human activity across the Treaty area and the ecosystems affected to inform the strategic identification of areas appropriate for future ASMA designation; and
- making efforts to identify and remove barriers to the establishment and operation of new ASMA, where necessary.

Analysis of the recent lack in progress of ASMA designations suggests a proposal may be more likely to succeed if it: (i) is a multi-Party initiative, (ii) has little or no impact on the influence of Parties active in the vicinity, (iii) contains little or no marine component, and (iv) has sufficient resource allocated to ensure the development of the ASMA proposal can be carried through to designation, recognising that this could take several years.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

KH: Conceptualization, Formal Analysis, Funding acquisition, Investigation, Methodology, Visualization, Writing – original draft, Writing – review and editing.

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Conflict of interest

The author(s) declared that this work was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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The author(s) declared that generative AI was not used in the creation of this manuscript.

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