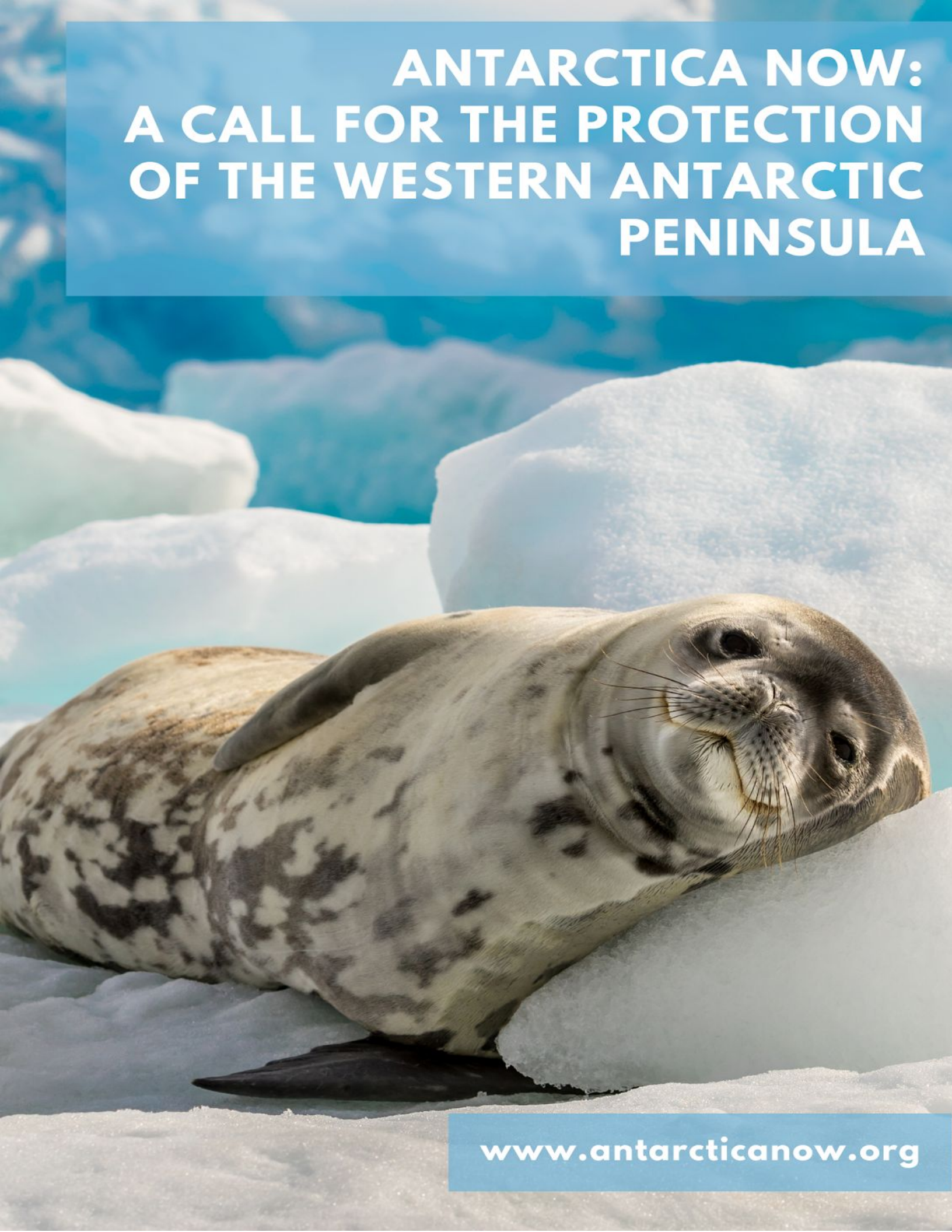
ANTARCTICA NOW: A CALL FOR THE PROTECTION OF THE WESTERN ANTARCTIC PENINSULA



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GLOBAL IMPORTANCE

Antarctica is uniquely positioned as a globally significant asset to international governance, scientific discovery, innovation, and ecosystem biodiversity. It is unique due to its vast, remote wilderness, pristine ocean ecosystems, and harsh climate. Antarctica is a successful example of international governance after being effectively declared a global commons through the Antarctic Treaty dedicated to peace and science in 1961. This superbly cold place is home to over 8,200 species, the majority of which are marine species and found nowhere else on Earth.[1]

Antarctica and the Southern Ocean play a vital role in earth systems, regulating the earth's climate and driving ocean circulation. The dark sea surface absorbs heat from the sun and plays a critical role in the ocean's temperature. Simultaneously, the continent's vast ice-bound expanses cool the atmosphere through the albedo effect, which causes upwelling from the Antarctic Circumpolar Current. Beyond regulating the climate, the Southern Ocean has a significant job of cycling Atmospheric CO_2 and accounts for 40% of annual uptake. Antarctica also plays a vital role in sea level regulation through water storage in its vast glaciers.

However, Antarctica's ecosystem is rapidly changing, and the Western Antarctic Peninsula is one of the fastest-warming places on earth.[2] Cumulative global impacts threaten the area, and the future of this delicate ecosystem hangs in the balance.[3] Protection of the Western Antarctic Peninsula through a Marine Protected Area (MPA) is the first step to securing a sustainable future for the Antarctic and the species that inhabit this awe-inspiring region.[4]

WESTERN ANTARCTIC PENINSULA

The Western Antarctic Peninsula (WAP) is the most biodiverse region of Antarctica.[5] Within this unique, intricate ecosystem, glaciers are melting, and populations of top predators such as Adélie (*Pygoscelis adeliae*) and chinstrap (*P. antarcticus*) penguins may be declining.[6] As the ice melts, Antarctic krill (*Euphausia superba*)

[1] Griffiths, H. J. (2010). Antarctic marine biodiversity – what do we know about the distribution of life in the Southern Ocean?. PloS one, 5(8), e11683.

[2] Robinson, S. A. *et al. Glob. Change Biol.* 26, 3178–3180 (2020).

[3] *Antarctic Climate Change and the Environment. Turner, J., Bindschadler, R.A., Convey, P., Di Prisco, G., Fahrbach, E., Gutt, J., Hodgson, D.A., Mayewski, P.A., and Summerhayes, C.P.: 526 pp., 2009. Cambridge, SCAR. ISBN 978 0948277221*

[4] Hughes, K. A., Ireland, L. C., Convey, P., & Fleming, A. H. (2016). Assessing the effectiveness of specially protected areas for conservation of Antarctica's botanical diversity. *Conservation biology : the journal of the Society for Conservation Biology*, *30*(1), 113–120. https://doi.org/10.1111/cobi.12592

[5] Griffiths, H. J. (2010). Antarctic marine biodiversity – what do we know about the distribution of life in the Southern Ocean?. PloS one, 5(8), e11683.

[6] Dahood, A., Watters, G. M., & de Mutsert, K. (2019). Using sea-ice to calibrate a dynamic trophic model for the Western Antarctic Peninsula. PloS one, 14(4), e0214814.

habitat has contracted.[7] Climate change and fishing may be reducing krill populations and thus impacting the survival of other species, such as local and migratory birds and mammals, including whales.[8] Antarctic krill is the keystone prey species of the Southern Ocean food chain. Seventy percent of the global population of Antarctic krill live in the waters surrounding the WAP, where ample algae form on sea ice for the krill to consume during key life-history stages. However, the changing climate and warming oceans are threatening this delicate balance.[9]

Eye contact with Weddell seal

The abundance of krill feeds local and migratory birds and mammals from all over the Southern Hemisphere, which come to the WAP seasonally to forage. Some of these animals, particularly whales, are still recovering from historic overexploitation. Such species include the southern fin (*Balaenoptera physalus quoyi*), blue (*B. musculus intermedia*), and sei (*B. borealis*) whales.[10] Krill is the primary food source for many additional species of whales as well as crabeater seals (*Lobodon carcinophaga*), chinstrap (*Pygoscelis antarcticus*), gentoo (*P. papua*), and Adélie (*P. adeliae*) penguins.[11] These species in turn are prey to higher-trophic predators such as orcas (*Orcinus orca*) and skuas (*Stercorarius* spp.). Furthermore, Antarctic krill play a critical role in biogeochemical cycles by transporting essential nutrients, driving primary production in the oceans, and influencing the carbon sink.[12] In addition to a changing climate, the WAP is impacted by anthropogenic activities such as fishing and tourism. The 2019 fishing season saw the largest Antarctic krill catch to date.[13]

[7] Atkinson, A., Hill, S.L., Pakhomov, E.A. et al. Krill (Euphausia superba) distribution contracts southward during rapid regional warming. Nature Clim Change 9, 142–147 (2019). https://doi.org/10.1038/s41558-018-0370-z

[8] Branch, T. A. Abundance of Antarctic blue whales south of 60° from three complete circumpolar sets of surveys. *Journal of Cetacean Research and Management* 9, 253-262 (2007).

[9] A. Atkinson, V. Siegel, Ea Pakhomov, P. Rothery, V. Loeb, Rm Ross, Lb Quetin, et al., *Oceanic circumpolar habitats of Antarctic krill*, Mar. Ecol. Prog. Ser. 362 (June) (2008) 1–23, https://doi.org/10.3354/meps07498

[10] Branch, T. A. Abundance of Antarctic blue whales south of 60° from three complete circumpolar sets of surveys. *Journal of Cetacean Research and Management*

[11] Rintoul, S. R. *et al.* Choosing the future of Antarctica. *Nature* 558, 233-241 (2018).

[12] Cavan, E. *et al.* The importance of Antarctic krill in biogeochemical cycles. *Nature communications* 10, 1-13 (2019).

[13] Watters, G. M., Hinke, J. T., & Reiss, C. S. (2020). Long-term observations from Antarctica demonstrate that mismatched scales of fisheries management and predator-prey interaction lead to erroneous conclusions about precaution. *Scientific reports*, *10*(1), 2314. https://doi.org/10.1038/s41598-020-59223-9

THREATS

The WAP faces a precarious future. Impacts of climate change and resulting sea-ice loss, habitat alterations, and temperature increases are already impacting the region, with the worst yet to come. The current protective measures fail to conserve the ecosystem, while the effects of historical overexploitation linger. A comprehensive and integrated approach, such as establishing a MPA, is necessary to combat these threats.

CLIMATE CHANGE

As a result of climate change, the loss of ice along the coast of Antarctica is expected to increase, causing significant impacts globally due to sea-level rise.[14] Almost 90% of the region's glaciers are receding rapidly, and its sea-ice is also declining in extent and season. In spring 2016, sea-ice levels reached their lowest since records began. If carbon emissions keep climbing, within 50 years the total area of sea-ice will almost halve, and the volume of ice-shelves will decrease by one quarter leading to an overall increase in global sea levels.[15] Changes in sea-ice and other climate change related impacts are causing shifts throughout the WAP ecosystem.

Likely due to impacts from warming and changes in sea ice, Antarctic krill range has shifted more than 400 kilometers south since the 1970s.[16] This shift has impacted many species, most notably the Adélie penguin, whose habitat on the Antarctic Peninsula has also been reduced by 65% over the last 25 years.[17] Other species threatened by the warming Southern Ocean and depleting krill populations include whales, seals, penguins, albatrosses, petrels, and squid. According to the last biomass estimate of krill performed in 2000, the once most abundant species on Earth may now be only a fraction of its current size.[18] Some research shows that Antarctic krill populations may have declined by 80%

[14] *Vaughan, D.G., J.C. Comiso, I. Allison, J. Carrasco, G. Kaser, R. Kwok, P. Mote, T. Murray, F. Paul, J. Ren, E. Rignot, O. Solomina, K. Steffen and T. Zhang, 2013: Observations: Cryosphere. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.*

[15] Parkinson, C. L. (2019). A 40-y record reveals gradual Antarctic sea ice increases followed by decreases at rates far exceeding the rates seen in the Arctic. Proceedings of the National Academy of Sciences, 116(29), 14414-14423.

[16] Atkinson, A., Hill, S.L., Pakhomov, E.A. *et al.* Krill (*Euphausia superba*) distribution contracts southward during rapid regional warming. *Nature Clim Change* 9, 142–147 (2019). https://doi.org/10.1038/s41558-018-0370-z

[17] Hinke, J. T., Trivelpiece, S. G., and Trivelpiece, W. Z.. (2017) Variable vital rates and the risk of population declines in Adélie penguins from the Antarctic Peninsula region. *Ecosphere* 8(1):e01666. 10.1002/ecs2.1666

[18] *Clucas, G. V., Dunn, M. J., Dyke, G., Emslie, S. D., Naveen, R., Polito, M. J., Pybus, O. G., Rogers, A. D., & Hart, T. (2014). A reversal of fortunes: climate change 'winners' and 'losers' in Antarctic Peninsula penguins. Scientific reports, 4, 5024. https://doi.org/10.1038/srep05024*

since the 1970's. If current global greenhouse gas emissions continue, sea-ice loss is predicted at an unprecedented rate. This will cause decreased populations of phytoplankton, diatoms, and krill, devastating to the ecosystems that rely on them.[19]

Besides shifts in krill populations, the benthic and fish communities are also changing in the WAP. For example, many benthic communities in the Antarctic live in shallow water habitats created by sea ice, which produces a low-light marine environment. As a result of climate change and sea ice retreat, the amount of light reaching these habitats is increasing, causing a shift in invertebrate-dominated communities, replacing them with macroalgal beds. An estimated 79% of Antarctica's endemic benthic species will face a reduction in suitable temperature habitat during this century. These numbers are predicted to be exceptionally high in the WAP.[20]

The Antarctic silverfish is another key prey species in the Southern Ocean and relies on ice throughout its life span for survival. There have been documented declines in the populations of this species in parts of the WAP, which may have irreversible consequences on associated food webs, and for species including emperor penguins (*Aptenodytes forsteri*), and crabeater (*Lobodon carcinophaga*), Ross (*Ommatophoca rossi*), Weddell (*Leptonychotes weddellii*), and leopard seals (*Hydrurga leptonyx*), to name a few.[21] Another critical aspect is that the same species struggling to adapt to a changing climate are also facing increasing pressure from fishing.

INDUSTRIAL FISHING

Antarctica has a long history of exploitation, which began soon after its discovery in the 1770s. Some of the species exploited remain at risk such as whales and marbled rockcod (*Notothenia rossii*).[22] In 1980, to reckon with the dark past and in response to an Antarctica krill fishery initiation, the Antarctic Treaty Parties created the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR). CCAMLR commenced in 1982 to ensure that fishing does not have significant adverse effects on targeted species and the greater Southern Ocean ecosystem. There are two main fisheries that CCAMLR manages in the Southern Ocean - toothfish and krill.

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[19] Rogers, A. D., Frinault, B. A. V, Barnes, D. K. A., Bindoff, N. L., Downie, R., Ducklow, H. W., Friedlaender, A. S., Hart, T., Hill, S. L., Hofmann, E. E., Linse, K., Mcmahon, C. R., Murphy, E. J., Pakhomov, E. A., Reygondeau, G., Staniland, I. J., Wolf-Gladrow, D. A., & Wright, R. M. (2019). *Antarctic Futures: An Assessment of Climate-Driven Changes in Ecosystem Structure, Function, and Service Provisioning in the Southern Ocean*. https://doi.org/10.1146/annurev-marine-010419

[20] Meredith, M., M. Sommerkorn, S. Cassotta, C. Derksen, A. Ekaykin, A. Hollowed, G. Kofinas, A. Mackintosh, J. Melbourne-Thomas, M.M.C. Muelbert, G. Ottersen, H. Pritchard, and E.A.G. Schuur, 2019: Polar Regions. In: *IPCC Special Report on the Ocean and Cryosphere in a Changing Climate* [H.-O. Pörtner, D.C. Roberts, V. Masson-Delmotte, P. Zhai, M. Tignor, E. Poloczanska, K. Mintenbeck, A. Alegría, M. Nicolai, A. Okem, J. Petzold, B. Rama, N.M. Weyer (eds.)]. In press.

[21] Meredith, M., M. Sommerkorn, S. Cassotta, C. Derksen, A. Ekaykin, A. Hollowed, G. Kofinas, A. Mackintosh, J. Melbourne-Thomas, M.M.C. Muelbert, G. Ottersen, H. Pritchard, and E.A.G. Schuur, 2019: Polar Regions. In: *IPCC Special Report on the Ocean and Cryosphere in a Changing Climate* [H.-O. Pörtner, D.C. Roberts, V. Masson-Delmotte, P. Zhai, M. Tignor, E. Poloczanska, K. Mintenbeck, A. Alegría, M. Nicolai, A. Okem, J. Petzold, B. Rama, N.M. Weyer (eds.)]. In press.

[22] Marschoff ER, ER Barrera-Oro, NS Alescio and DG Ainley. 2012. Slow recovery of previously depleted demersal fish at the South Shetland Islands, 1983-2010. Fisheries Research 125-126: 206-213; Croxall JP and S Nicol. 2004. Management of Southern Ocean Fisheries: global forces and future sustainability. Antarctic Science 16(4): 569-584.

The Antarctic krill fishery, largely operating in the WAP, is the most massive fishing operation by tonnage in CCAMLR's waters.[23] The Antarctic krill fishery started in the early 1970s and hit peak catches in the late 1980s—taking up to 500,000 tonnes per year. After the mid-1980s, catch yields declined and at the same time the species' numbers plummeted.[24] The demand for omega-3 oil supplements, aquaculture feed, and bait for fishing are the primary drivers of fishing in such a remote place.[25] Due to this demand, interest in Antarctic krill has been renewed. In the 2019/20 season, 446,783 tonnes were taken from the Antarctic Peninsula region.[26] Upwards of 19 nations fish for Antarctic krill, with the largest krill fishing nations being Norway, Korea, China, and Chile.

While fishery management measures are in place to regulate krill catches in the WAP, these measures largely ignore the foraging needs of other krill-dependent wildlife. Declines in krill foraging species could create a negative cascading effect throughout the Antarctic food web.[27] Additionally, the critical breeding areas of krill are located in the WAP. [28] With the growing demand for krill, reductions in sea-ice, and the increased fishing activity in the WAP, ships are encroaching on the habitats and foraging grounds of sensitive species such as the Adélie penguin and impacting the overall health of the ecosystem.[29] CCAMLR's 'ecosystem as a whole' principle was a progressive approach in managing marine living resources.[30] However, this approach has not sufficiently taken climate change into account. Yet, the opportunity exists to do so, including through adopting an MPA in the WAP.

TOURISM

Aside from the direct environmental impacts of climate change on the Antarctic Peninsula, there is an increase in marine and cruise tourism operations due to lower costs and ease of accessibility because of its proximity to South America. These tourism operations are largely based around the few wildlife-rich ice-free areas of Antarctica, most of which are in the

[23] Nicol, S., & Foster, J. (2016). The fishery for Antarctic krill: Its current status and management regime. In Biology and ecology of Antarctic krill (pp. 387-421). Springer, Cham.

[24] Kock, K. H., Reid, K., Croxall, J., & Nicol, S. (2007). Fisheries in the Southern Ocean: an ecosystem approach. Philosophical transactions of the Royal Society of London. Series B, Biological sciences, 362(1488), 2333–2349. https://doi.org/10.1098/rstb.2006.1954

[25] FAO. 2016. The State of World Fisheries and Aquaculture 2016. Contributing to food security and nutrition for all. Rome. 200 pp.

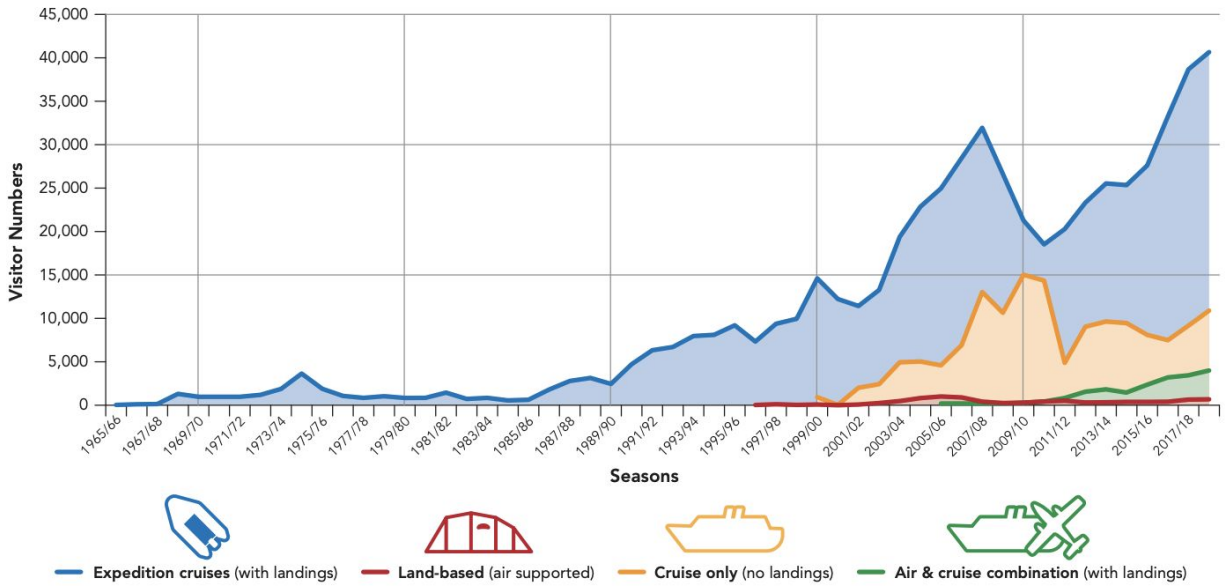
[26] Report of the Thirty-ninth meeting of the Commission (Rep. No. 39-Preliminary). (2020). Virtual: Commission for the Conservation of Antarctic Marine Living Resources. doi:https://www.ccamlr.org/en/system/files/e-cc-39-prelim-v1.2.pdf

[27] Cavan, Emma & Belcher, Anna & Atkinson, Angus & Hill, Simeon & Kawaguchi, S & Mccormack, Stacey & Meyer, Bettina & Nicol, Stephen & Ratnarajah, Lavenia & Schmidt, Katrin & Steinberg, D & Tarling, Geraint & Boyd, Philip. (2019). The importance of Antarctic krill in biogeochemical cycles. Nature Communications. 10. 10.1038/s41467-019-12668-7.

[28] *CCAMLR. Krill Fishery Report. Commission for the Conservation of AntarcticMarine Living Resources. http://fishdocs.ccamlr.org/FishRep_48_KRI.pdf (2020).*

[29] Watters, G.M., Hinke, J.T. & Reiss, C.S. Long-term observations from Antarctica demonstrate that mismatched scales of fisheries management and predator-prey interaction lead to erroneous conclusions about precaution. Sci Rep 10, 2314 (2020). https://doi.org/10.1038/s41598-020-59223-9

[30] CCAMLR. 1980. Text of the Convention on the Conservation of Antarctic Marine Living Resources. See Article II.



Graph by the International Association of Antarctica Tour Operators (IAATO) displaying visitor trends over time

WAP.[31] The first recorded year of tourism in Antarctica saw 6,700 tourists between 1992-1993; in 2016-2017, there were 37,000 tourists, in 2017-2018 there were 52,707 and last year (2019-20) saw over 74,000 tourists visit the area.[32] It is challenging to predict the impact that ship traffic and habitat fragmentation due to tourism may have on these fragile ecosystems. This challenge stems from uncertainties surrounding the growth in predominantly shipborne tourism, industrial fishing operations and the unknowns of future Antarctic sea ice conditions. Increased ship activity in the Southern Ocean may also present a risk for higher introduction of non-native marine species, with the potential for these species to become invasive under changing conditions.[33] Under the Protocol on Environmental Protection to the Antarctic Treaty, the introduction of non-native species is prohibited. Yet, foreign species continue to be introduced to the continent and sub-Antarctic islands.[34] Thus far, 14 non-native terrestrial species have colonized the Antarctic Treaty area,[35]

[31] Meredith, M., M. Sommerkorn, S. Cassotta, C. Derksen, A. Ekaykin, A. Hollowed, G. Kofinas, A. Mackintosh, J. Melbourne-Thomas, M.M.C. Muelbert, G. Ottersen, H. Pritchard, and E.A.G. Schuur, 2019: Polar Regions. In: IPCC Special Report on the Ocean and Cryosphere in a Changing Climate [H.-O. Pörtner, D.C. Roberts, V. Masson-Delmotte, P. Zhai, M. Tignor, E. Poloczanska, K. Mintenbeck, A. Alegría, M. Nicolai, A. Okem, J. Petzold, B. Rama, N.M. Weyer (eds.)]. In press.

[32] Secretariat of the Antarctic Treaty. (2018). ATCM 7a IAATO Overview of Antarctic Tourism: 2017-18 Season and Preliminary Estimates for 2018-19 Season IP 71. www.iaato.org

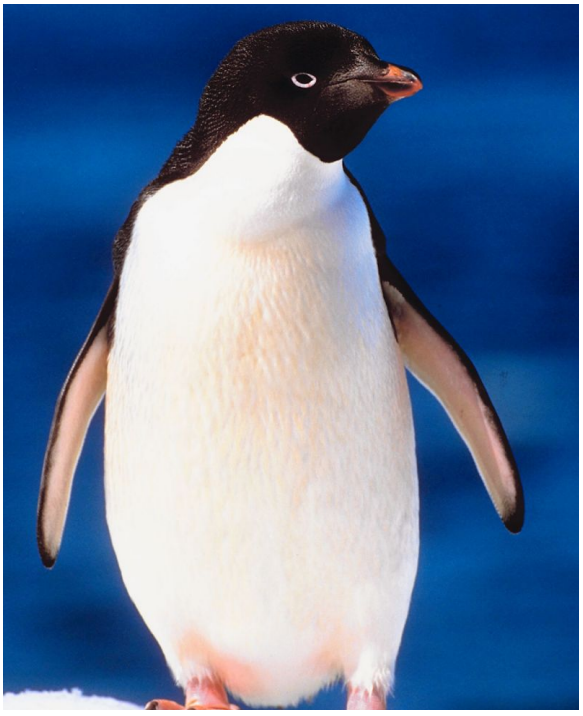
[33] McCarthy, A. H., L. S. Peck, K. A. Hughes and D. C. Aldridge, 2019: Antarctica: The final frontier for marine biological invasions. Glob Chang Biol, 25 (7), 2221-2241, doi:10.1111/gcb.14600.

[34] Hughes, K. A., L. R. Pertierra, M. A. Molina-Montenegro and P. Convey, 2015: Biological invasions in terrestrial Antarctica: what is the current status and can we respond? Biodiversity and Conservation, 24 (5), 1031-1055, doi:10.1007/s10531-015-0896-6.

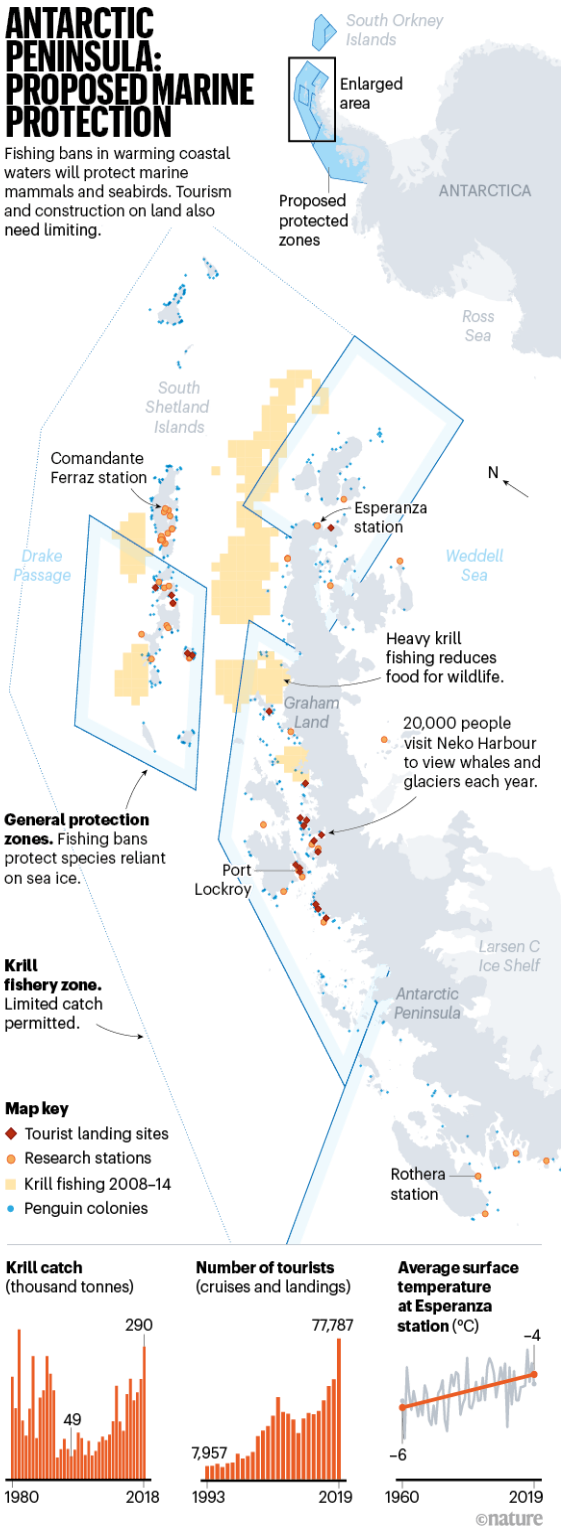
[35] Hughes, K. A., L. R. Pertierra, M. A. Molina-Montenegro and P. Convey, 2015: Biological invasions in terrestrial Antarctica: what is the current status and can we respond? Biodiversity and Conservation, 24 (5), 1031-1055, doi:10.1007/s10531-015-0896-6.

with the WAP area being the most vulnerable to species establishment.[36]

Guidelines for cruise ships and tourists visiting Antarctica are provided by the International Association of Antarctica Tour Operators (IAATO), a self-regulating association that advocates for safe and environmentally responsible travel. IAATO has guidelines for biosecurity and restrictions for the number of daily visitors to each landing location. However, these restrictions are only in place for IAATO members and not all tour operators are members leading to some ships ignoring guidelines. As a result, some popular sites like the Neko Harbour and Port Lockroy receive more than 20,000 visitors per season. In addition, between 1981 and 2011, at least 19 ships ran aground in the WAP and released oil into the ocean.[37]



Adélie penguin



Infographic by Nature[37]

[36] Duffy, G. A. et al., 2017: Barriers to globally invasive species are weakening across the Antarctic. Diversity and Distributions, 23 (9), 982-996, doi:10.1111/ddi.12593.

[37] Hogg, C. J., Lea, M. A., Soler, M. G., Vasquez, V. N., Payo-Payo, A., Parrott, M. L., ... & Brooks, C. M. (2020). Protect the Antarctic Peninsula—before it's too late.

ROLE OF A MARINE PROTECTED AREA

Multiple international targets call for a global network of Marine Protected Areas (MPAs) to mitigate ocean threats, conserve biodiversity and manage fisheries. The International Union for the Conservation of Nature (IUCN) defines an MPA as any area of intertidal or subtidal terrain, with its entire environment from the ocean surface to the ocean floor and everything in-between, protected by laws or other substantial means to maintain its natural environment with little or no human activity.[38]

MPAS FOR RESILIENCY

MPAs can enhance the adaptation and resilience of an ecosystem in the face of threats such as climate change. MPAs, especially no-take zones (often called marine reserves), can increase biomass, density, and diversity of life within the MPA and may benefit neighboring ecosystems and fisheries. MPAs maintain all trophic levels of the ecosystem and increase both species and genetic diversity. As such, they can be proactive and precautionary tools to enhance resilience to environmental stressors such as climate change. Protecting the Southern Ocean regions through MPAs will give the ecosystem and its species, including Antarctic krill, the best chance of adapting to a changing climate.[39]

In addition to climate adaptations for the species that call this ecosystem home, humans could benefit from the Southern Ocean's protection through the sustainable use of resources for future generations. Studies have shown that by strategically expanding the existing global MPA network by just 5%, we can improve future fishery catches by at least 20%.[40] Thus, a network of MPAs thoughtfully designed to enhance fisheries productivity can substantially increase resources and food provisions while also improving conservation measures.

Weddell seal pup lying in the snow

[38] IUCN. Marine Protected Areas and Climate Change (2017).

[39] Brooks, C. M., Chown, S. L., Douglass, L. L., Raymond, B. P., Shaw, J. D., Sylvester, Z. T., & Torrens, C. L. (2020). *Progress towards a representative network of Southern Ocean protected areas*. https://doi.org/10.1371/journal.pone.0231361

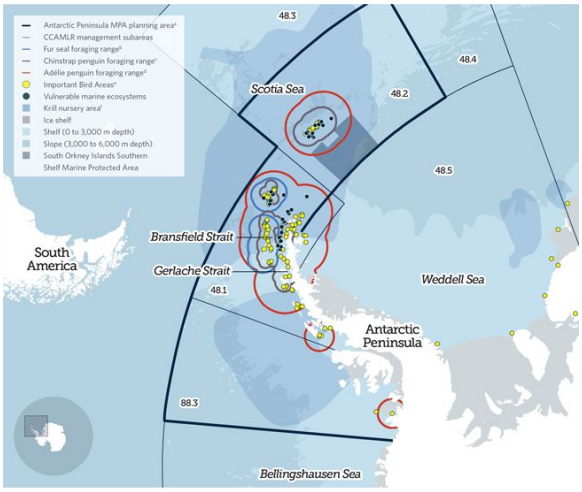
[40] Cabral, R. B., Bradley, D., Mayorga, J., Goodell, W., Friedlander, A. M., Sala, E., ... & Gaines, S. D. (2020). A global network of marine protected areas for food. Proceedings of the National Academy of Sciences, 117(45), 28134-28139.

THE OPPORTUNITY AT CCAMLR

BUILDING A NETWORK

In 2002, the CCAMLR became the first international body to commit to establishing a network of MPAs following recommendations from the United Nations World Summit on Sustainable Development.[41] In 2011, CCAMLR adopted Conservation Measure 91-04, which served as a framework for creating a network of MPAs. CCAMLR created nine planning domains for developing this network surrounding Antarctica.[42] Ratifying each MPA requires unanimous approval of all 26 CCAMLR members (25 countries and the European Union). There are currently two MPAs in Antarctic waters including in the Ross Sea, the world's largest MPA, which CCAMLR successfully adopted in 2016 to global acclaim and recognition. However, despite CCAMLR's success thus far, current protected areas in the Southern Ocean are not adequately representative of Southern Ocean biodiversity to ensure successful conservation.

For an MPA to be effective at conserving biodiversity and ecosystems, it must encompass ecologically representative areas, meaning it should conserve areas that include all, or close to all, species of the ecosystems. In essence, the current protections do not benefit all the species experiencing threats in the Southern Ocean and, therefore, are not as effective as they could be. In the Southern Ocean, there are 23 distinct benthic regions and 19



Map by The Pew Charitable Trusts depicting biodiversity hotspots within the WAP MPA Planning Area

pelagic regions. To have effective protection, the area must protect biodiversity in full by including these benthic and pelagic regions. Currently, 46.46% of these benthic ecosystems are represented in a proposed WAP (Domain 1) MPA, and 50% of the area's pelagic clusters are represented. With the adoption of the Domain 1 MPA, in its proposed boundaries, there will be significant progress towards the effective representation of ecosystems in the Southern Ocean.[43]Adopting three additional proposed MPAs in the Weddell Sea, East Antarctic, and WAP would increase this representation and provide progress towards a Southern Ocean MPA network. The proposal for a WAP MPA (Domain 1 MPA) is on CCAMLR's decision-making table and is to be

[41] Cvkel, B. (2019). *A Network of Marine Protected Areas in the Southern Ocean*. http://share.

[42] Cvkel, B. (2019). *A Network of Marine Protected Areas in the Southern Ocean*. http://share.

[43] Brooks, C. M., Chown, S. L., Douglass, L. L., Raymond, B. P., Shaw, J. D., Sylvester, Z. T., & Torrens, C. L. (2020). *Progress towards a representative network of Southern Ocean protected areas*. https://doi.org/10.1371/journal.pone.0231361

negotiated again in 2021. While this MPA proposal joins two other proposals (in the Eastern Antarctic and the Weddell Sea), the WAP MPA represents particularly time-critical protection required for this vulnerable region and its species.

WESTERN ANTARCTIC PENINSULA PROPOSAL

The WAP, threatened particularly by climate change and industrial fishing, has been a priority area for MPA planning in CCAMLR. Since 2011, Chile and Argentina have spear-headed efforts towards developing an MPA in the WAP, which is within CCAMLR's MPA Planning Domain 1. In 2018, those efforts were realized with a formal submission of the Domain 1 MPA proposal to CCAMLR. Throughout the planning process, Chile and Argentina held collaborative workshops and events and maintained relationships with other CCAMLR members to ensure actionable science was applied to the co-production of the Domain 1 MPA plans.[44] Once enough actionable science was produced, Chile and Argentina brought the revised proposal, based on the incorporation of feedback and the lessons learned through planning, to the table at the Scientific Committee and Commission.[45] Both the Commission and the Scientific Committee agreed that the process had been collaborative, transparent, and comprehensive. Almost all Member States supported the proposal with the exceptions of two: China and Russia. In response to their opposition, the iterative co-production process continued into 2019. The revised proposal was submitted in 2019 and had widespread support, but failed to reach consensus. The 2020 CCAMLR annual meeting commenced remotely due to the COVID-19 pandemic and given the truncated agenda of the virtual meeting, MPAs were not negotiated at length. Negotiations are ongoing with hope for ratification in 2021.

CONSERVATION THROUGH COLLABORATION

Currently about 12% of the Southern Ocean is established as MPAs governed by individual nations and CCAMLR, with 4.61% of this comprising no-take zones. Through this success, CCAMLR and national governments have surpassed the region's Aichi Biodiversity Target of 10% protection by 2020 as set forth by the Convention on Biological Diversity and United Nations Sustainability Goals. However, this 12% of protected areas does not encompass a representative area for biodiversity. The IUCN have called for the conservation of at least 30% of the ocean by 2030 through a network of MPAs.[46] This push for further protection and the encouragement for new MPA establishment in the Southern Ocean is an opportunity for CCAMLR to support their objectives and further safeguard the Southern Ocean's global resources. With increasing threats from climate change and unsustainable fishing, the time to protect the WAP is now. The Domain 1 MPA and the other MPAs currently proposed to CCAMLR need immediate action to create sustainability and support the network of conservation in the Southern Ocean before it is too late.

[44] Sylvester, Z. T., & Brooks, C. M. (2020). Protecting Antarctica through Co-production of actionable science: Lessons from the CCAMLR marine protected area process. *Marine Policy*, *111*. https://doi.org/10.1016/j.marpol.2019.103720

[45] Ibid

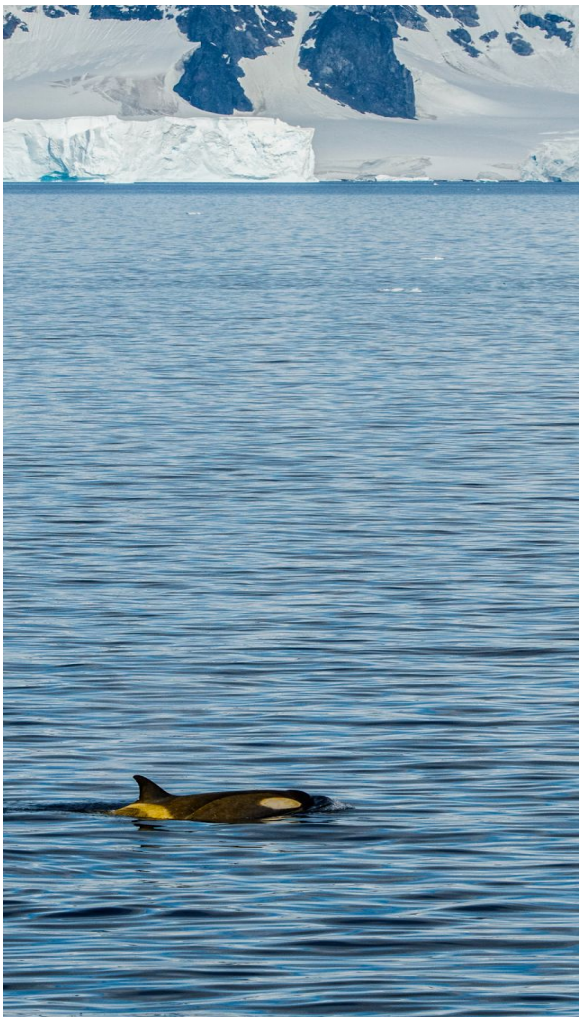
[46] World Conservation Congress. (2016). Increasing marine protected area coverage for effective marine biodiversity conservation. *WCC-2016-Res-050-EN*. https://doi.org/10.1111/conl.12247

There will be an increase from 12% to 22% protection of the Southern Ocean if the three MPAs on the table are adopted. Through this protection, CCAMLR can further embody the three principles listed in Article II of the CCAMLR Convention:

- Prevent any harvested population to decrease to levels so low that it is unable to maintain itself;
- Maintain and where necessary restore the ecological relationships between harvested, dependent and related populations of Antarctic marine living resources;
- Prevent or minimize the risk of change to the marine ecosystem based on the best available science.

To create effective conservation, collaboration across jurisdictions and institutions is vital. While CCAMLR can develop and enforce MPAs, it cannot mitigate climate change or reduce greenhouse gas emissions globally. These factors contribute to the degradation of marine living resources in the Southern Ocean, including within established MPAs. Some of the institutions that should be included in collaborative decision-making are the United Nations Framework Convention on Climate Change, International Union for Conservation of Nature, Convention on Biological Diversity, International Association of Antarctica Tour Operators, International Maritime Organization, and the International Whaling Commission. Partnerships and effective communication are required globally to protect our oceans for the future health of wildlife, ecosystems and people.

The WAP is a place where history and policy show that conservation can and should be a top priority while simultaneously encouraging exploration and scientific discovery. But even though some progress has been made in Antarctica, the future of the WAP is still in jeopardy. Without the adoption of Domain 1 MPA, the commitments, policy, and good intent of CCAMLR do not reach their full potential. There is much work to be done to encourage the establishment of marine protected areas in Antarctica like the Domain 1 MPA and preserve and restore this fragile ecosystem. We need your support to make sure that progress made in Antarctica continues in 2021 with the adoption of the Domain 1 MPA.



Killer whale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