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A Network of Marine Protected Areas in the Southern Ocean

Protecting one of Earth's last great wilderness areas

Overview

The Southern Ocean, surrounding Antarctica, is one of the least altered marine ecosystems on Earth. Encompassing 15 percent of the world's ocean, it is home to thousands of species found nowhere else, from brilliantly hued starfish and bioluminescent worms to pastel octopuses. It is also home to millions of penguins that depend on large swarms of krill, a tiny shrimplike crustacean, as well as other forage species that form the base of a delicate food web. Scientists believe this ecosystem is changing due to the impact of climate change and temperatures that are warming faster than nearly anywhere else on Earth.

These waters are also vital to the health of the planet, producing strong upwelling currents that carry critical nutrients to seas around the world.

To protect this spectacular region, The Pew Charitable Trusts and its partners are working with the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) and its member governments to establish a network of large-scale marine protected areas (MPAs) around Antarctica.

A Living Laboratory of Unique Biodiversity

Antarctic krill are a keystone species, serving as a major food source for more than 25 percent of the species in the diverse Antarctic food web, including penguins, seals, whales, and many fish species. The many remarkable species of the Southern Ocean make up some of the most intact marine ecosystems on the planet, where scientists are continually discovering new marine biodiversity, and can study nature in the absence of human interference.

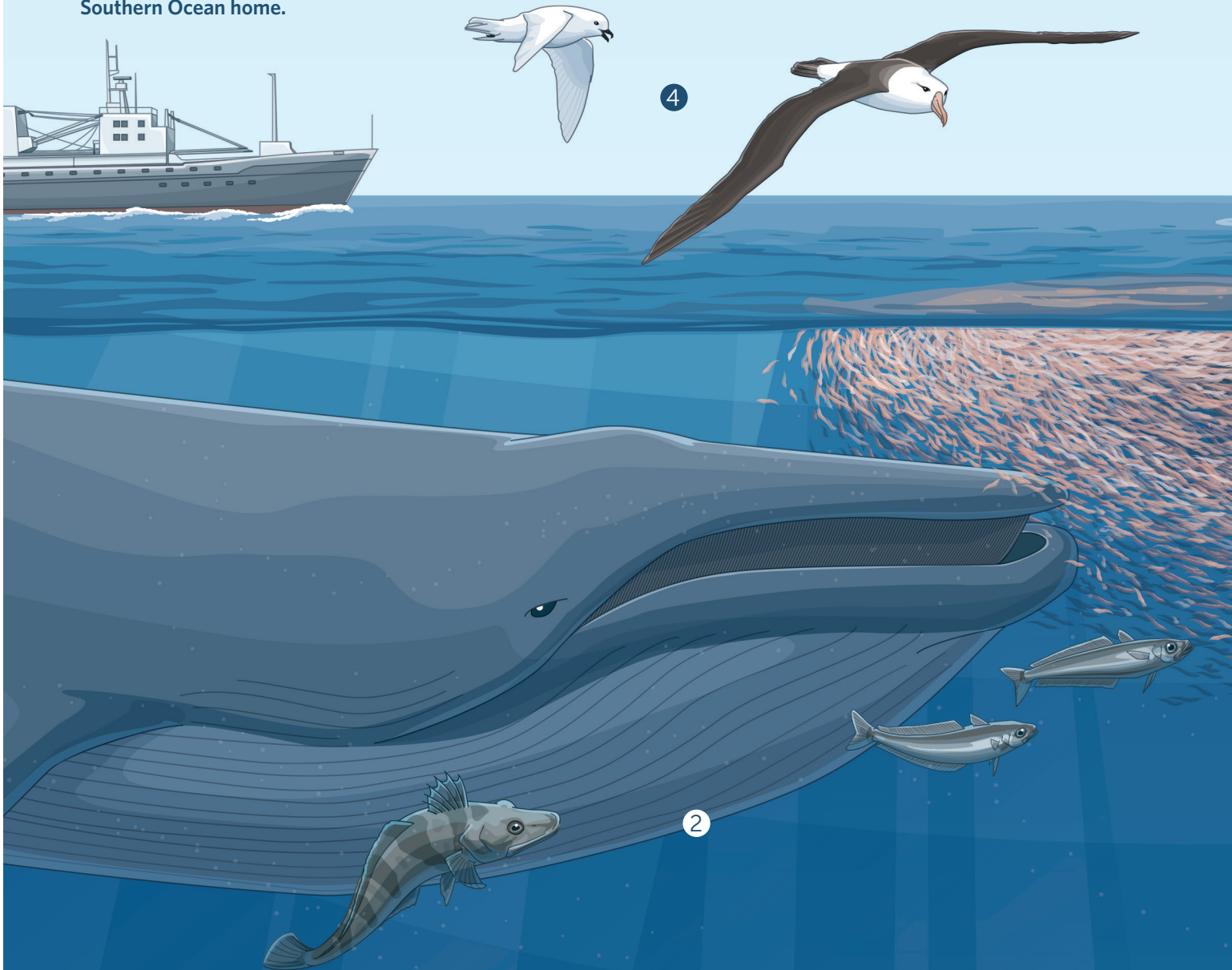
The following are some of the species that call the Southern Ocean home.

1 Penguins

Adélie
Chinstrap
Gentoo
Emperor
King
Southern rockhopper
Macaroni

2 Whales

Blue
Southern bottlenose
Humpback
Antarctic minke
Long-finned pilot
Sperm
Sei
Arnoux's beaked
Fin
Orca



3 Seals

Antarctic fur
Crabeater
Southern elephant
Leopard
Ross
Weddell

4 Seabirds

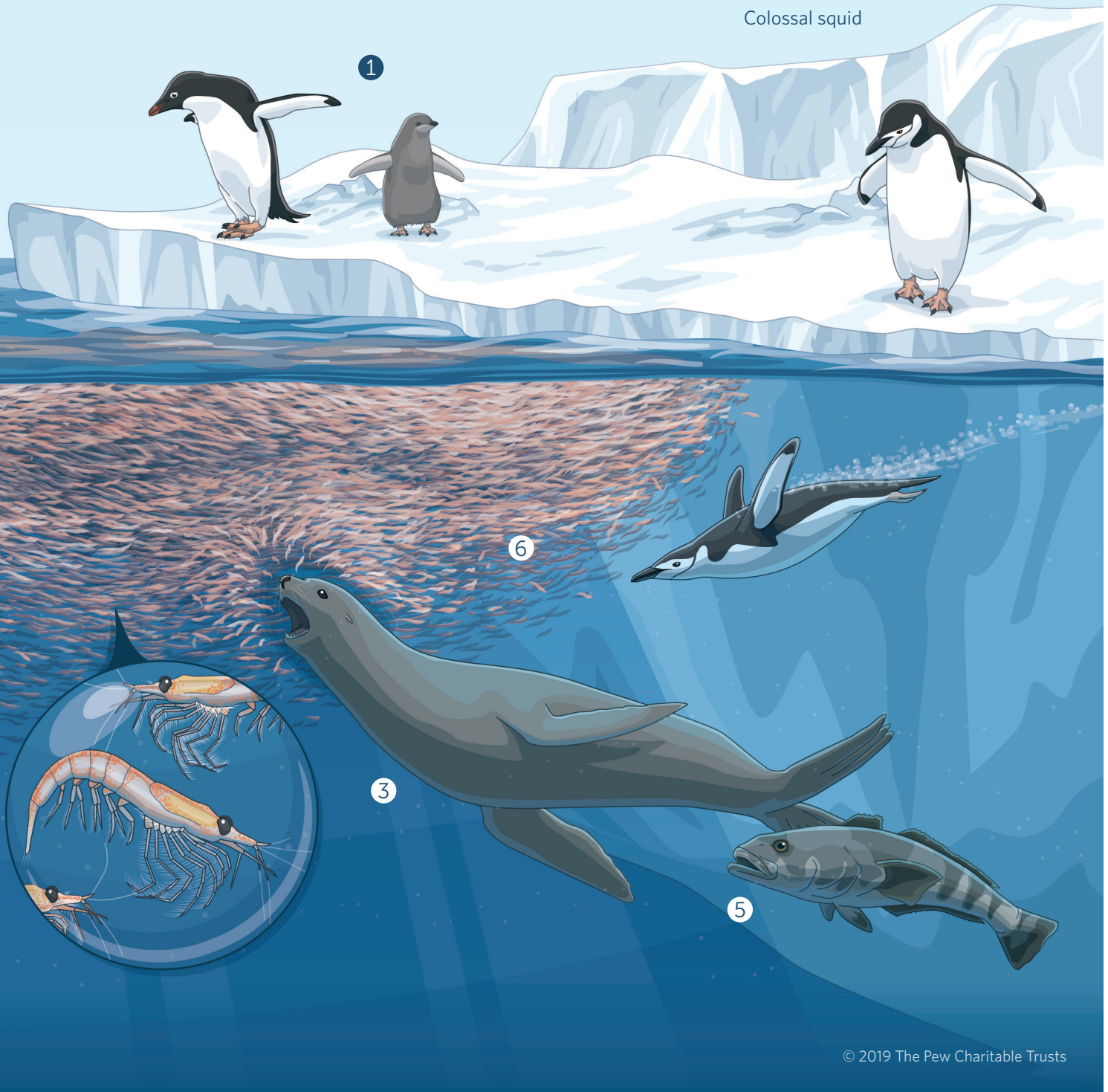
Snow petrel
Wandering albatross
Antarctic petrel
Antarctic fulmar

5 Fish

Antarctic and Patagonian
toothfish (Chilean sea bass)
Icefish
Lanternfish
Antarctic eel cod
Grenadier
McCain's skate
Marbled rockcod

6 Invertebrates

Krill
Antarctic sea spider
Crawling and glass sponges
Antarctic coral
Bone-eating worm
Yeti (hairy) crab
Octopus
Starfish
Colossal squid



CCAMLR's commitment to creating a network of MPAs

CCAMLR is an international body made up of 24 countries and the European Union, established in 1982 with the primary mission of protecting the Southern Ocean's diverse marine life. While prioritizing conservation, CCAMLR allows limited fishing in some areas in accordance with its ecosystem-based management approach. The main fishing activities in these waters target toothfish and Antarctic krill.

- In 2002, CCAMLR became the first international body to commit to creating a network of MPAs following recommendations from the United Nations World Summit on Sustainable Development.
- CCAMLR's commitment was based on a mission to protect, rather than exploit, life in the Southern Ocean, as well as the precautionary principle, which errs on the side of conservation when the best available science is limited or unclear.
- In 2011, CCAMLR members agreed by consensus to adopt Conservation Measure 91-04,¹ a framework for creating a network of MPAs, and identified nine planning domains² for developing these protected areas.

Mitigating and adapting to climate change

Some of the most pronounced effects of climate change on Earth, such as warming and acidifying seas,³ and changes in sea-ice concentration and duration,⁴ are found in Antarctica. Studies show that MPAs can help build ecosystem resilience to those changes by eliminating stresses, such as fishing.⁵

- The relatively undisturbed waters of the Southern Ocean provide a natural laboratory for studying how intact marine ecosystems react to a warming and acidifying ocean.
- MPAs can also protect important carbon pools, also known as biological reservoirs, and sinks. Over 55 percent of the biological carbon stored globally is kept by living marine organisms.⁶
- Antarctic krill feed on microscopic plankton near the ocean surface and move to deeper waters, injecting carbon dioxide as they excrete waste. It is estimated that up to 23 million tons of carbon are locked in this way every year, equivalent to the carbon produced by 35 million cars.

Greater than the sum of its parts

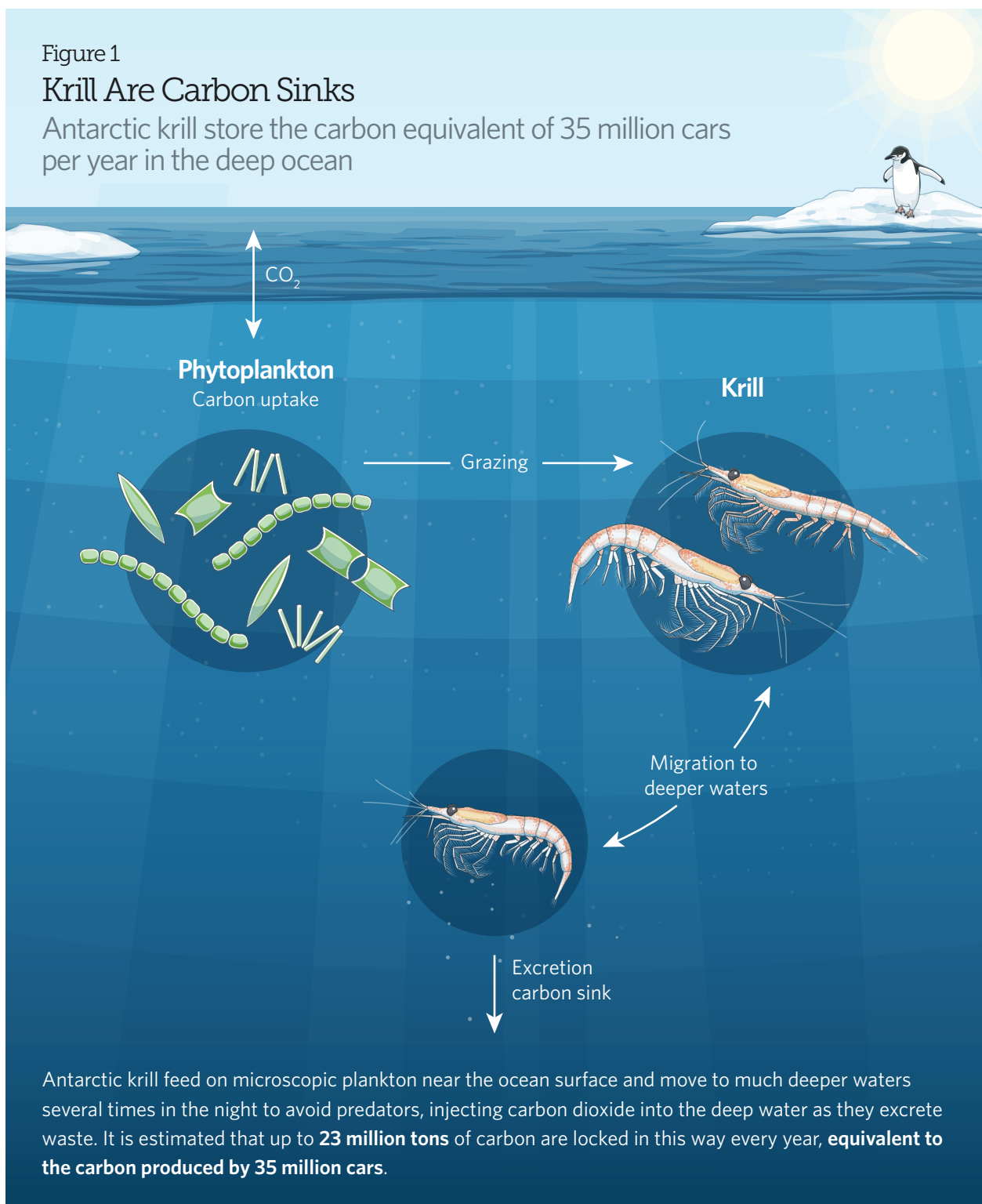
A network of MPAs would not only preserve connectivity among the many unique ecosystems of the Southern Ocean, allowing marine life to migrate between protected areas for breeding and foraging, but it would also significantly contribute to global ocean protection goals.

- In 2016, the journal *Conservation Letters* published a scientific review concluding that at least 30 percent of the global ocean needs to be set aside in MPAs to achieve effective conservation results and help manage and rebuild depleted fish stocks.⁷
- According to a 2014 study in the journal *Nature*, to be successful, an MPA should be large, isolated, well-enforced, long-lasting, and should prohibit any extraction of fish or other resources.⁸
- MPAs that meet the above criteria create a spillover effect, improving the health of marine life in waters outside of the protected regions.⁹

Figure 1

Krill Are Carbon Sinks

Antarctic krill store the carbon equivalent of 35 million cars per year in the deep ocean



Antarctic krill feed on microscopic plankton near the ocean surface and move to much deeper waters several times in the night to avoid predators, injecting carbon dioxide into the deep water as they excrete waste. It is estimated that up to **23 million tons** of carbon are locked in this way every year, **equivalent to the carbon produced by 35 million cars**.

Source: Geraint A. Tarling and Magnus L. Johnson, "Satiating Gives Krill That Sinking Feeling," *Current Biology* 16, no. 3 (2006): R83-84, [http://www.cell.com/current-biology/abstract/S0960-9822\(06\)01053-0](http://www.cell.com/current-biology/abstract/S0960-9822(06)01053-0)

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* The South Georgia and South Sandwich Islands MPA was designated by the United Kingdom. These islands' sovereignty remains contested by Argentina.

† At the time of printing, MPA enhancements were under consideration by the U.K. government.

Note: In 2011, CCAMLR members agreed by consensus to adopt Conservation Measure 91-04, a framework for creating a network of MPAs, and identified nine planning domains for developing these protected areas.

Source: CCAMLR

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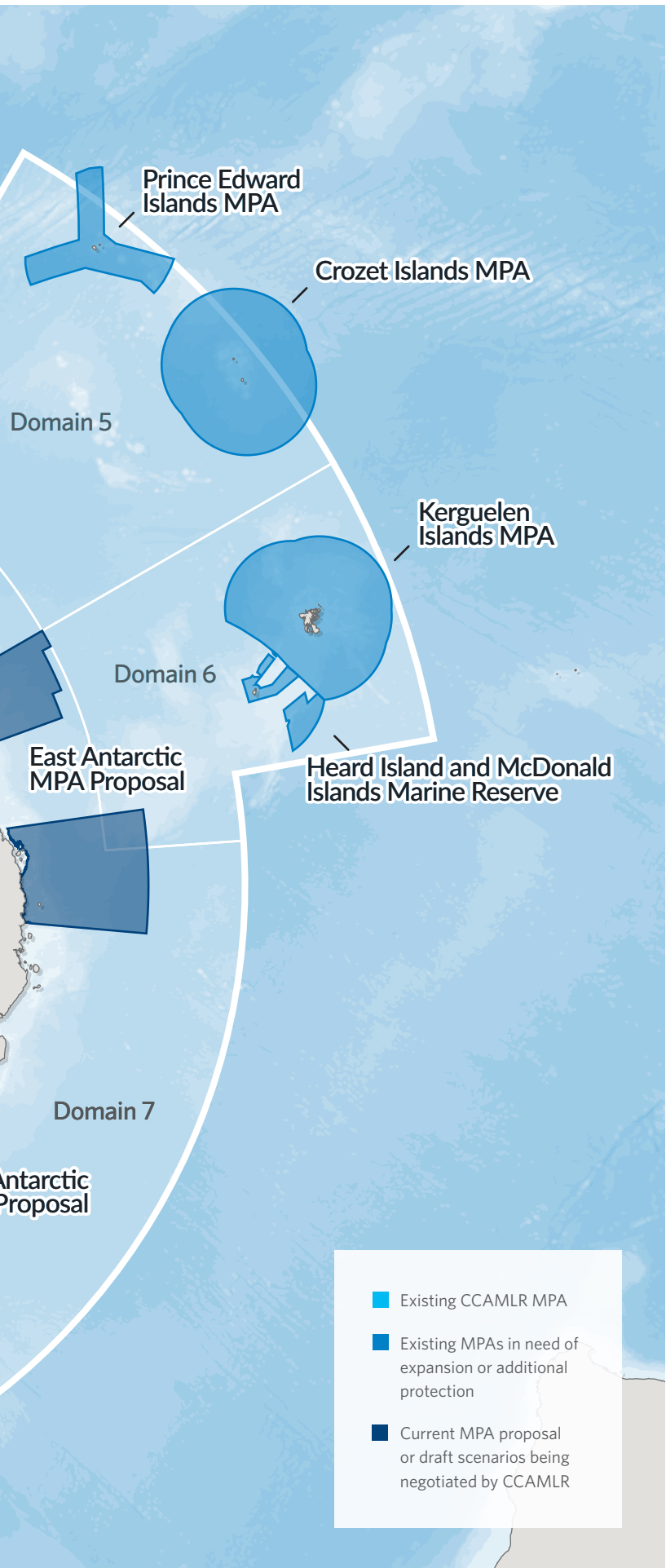
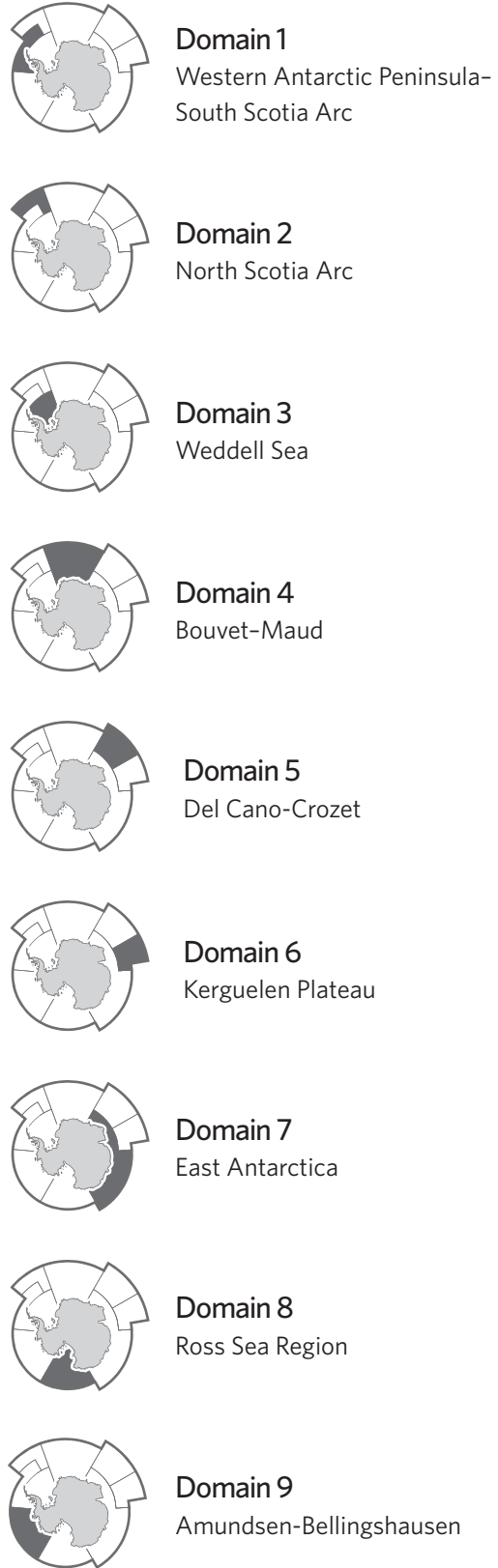


Figure 2
Southern Ocean Regions in Need of Protection

A network of MPAs would allow for conservation of distinct areas, each representing unique ecosystems



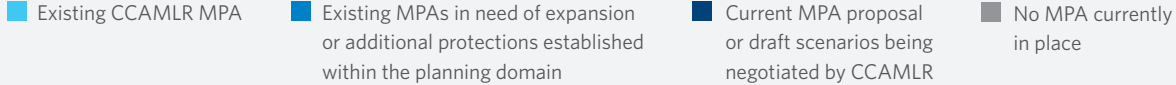

Looking ahead

Successfully implementing a network of MPAs in the Southern Ocean would exemplify global cooperation in the face of increasing environmental challenges.




In 2016, the annual CCAMLR meeting showcased an example of such cooperation with the consensus designation of the world’s largest MPA, in the Ross Sea. The 2.06 million-square-kilometre (almost 800,000-square-mile)¹⁰ area includes 1.55 million square kilometres of open water and extends to the coastline under the Ross Ice Shelf. The MPA, more than three times the size of France, went into force in December 2017.

With the establishment of the Ross Sea Region MPA, CCAMLR has taken the first step needed to create a network of large-scale MPAs. The next steps toward reaching this goal must include designating the proposed Weddell Sea, East Antarctic and Antarctic Peninsula (Domain 1) MPAs. Further efforts must also be taken to safeguard Domain 9.








Figure 3
Pieces of the Ecosystem Puzzle: Status of MPAs in the Southern Ocean
 Pew’s vision for a Southern Ocean MPA network

CCAMLR MPA planning domain	Size of existing or proposed MPA	MPA status	Pew’s vision for network of MPAs
			
 <p>Domain 1 Western Antarctic Peninsula and South Scotia Arc^a</p>	94,000 square kilometres (sq km)	CCAMLR South Orkney Islands Southern Shelf MPA (2009)	Expand the South Orkney Islands MPA northward to include biodiversity hotspots and key penguin foraging grounds
	In progress	Antarctic Peninsula MPA proposal was submitted by CCAMLR members Argentina and Chile in 2018, and CCAMLR’s Scientific Committee has considered it.	No-fishing buffer zones in penguin foraging areas Protect biodiversity hotspots and representative benthic (sea floor) and pelagic (open ocean) regions, particularly in coastal areas Protect sensitive areas, including nursery habitat for krill and areas used during key life stages for birds and mammals Establish climate change reference areas

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CCAMLR MPA planning domain	Size of existing or proposed MPA	MPA status	Pew's vision for network of MPAs
<p> ■ Existing CCAMLR MPA ■ Existing MPAs in need of expansion or additional protections established within the planning domain ■ Current MPA proposal or draft scenarios being negotiated by CCAMLR ■ No MPA currently in place </p>			
 <p>Domain 2 North Scotia Arc, including South Georgia and the South Sandwich Islands</p>	1.07 million sq km	South Georgia and South Sandwich Islands MPA (2012) includes 12-nautical-mile no-fishing region around South Georgia, Clerke Rocks, and Shag and Black rocks, and 3-nautical-mile no-fishing region around South Sandwich Islands ^b	Consider enhanced protections of biodiversity in the region
 <p>Domains 3 and 4 Weddell Sea, Bouvet Island, and the Maud Rise</p>	Over 2 million sq km	Weddell Sea MPA proposal first submitted to CCAMLR in 2016 by the European Union, led by Germany In 2018, a revision was submitted that includes additional protections for the Eastern Antarctic Peninsula.	Key regions for protection: Polarstern Canyon, Filchner Trough, Eastern Antarctic Peninsula, western Weddell Sea, Astrid Ridge, Queen Maud Land seamounts, Maud Rise, Lazarev Sea, the entire Weddell Gyre ecosystem, and a wider area around Bouvet Island
 <p>Domains 5 and 6 Crozet Islands, the Del Cano Rise, and the Kerguelen Plateau</p>	180,000 sq km	Prince Edward Islands MPA (2013) established by South Africa	Key regions for additional protection include: Ob and Lena Banks and surrounding seamounts, Del Cano Rise region, Southwest Indian Ridge, Banzare Bank, Elan Bank, Kerguelen Plateau high seas areas, and the Kerguelen Production Zone
	1.14 million sq km	Crozet Islands and Kerguelen Islands MPAs established by France and expanded in 2017	
	71,000 sq km	Heard Island and McDonald Islands Marine Reserve established by Australia and expanded in 2014	Enhanced protections for national waters around Kerguelen and Crozet islands

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CCAMLR MPA planning domain	Size of existing or proposed MPA	MPA status	Pew's vision for network of MPAs
<p>  Existing CCAMLR MPA  Existing MPAs in need of expansion or additional protections established within the planning domain  Current MPA proposal or draft scenarios being negotiated by CCAMLR  No MPA currently in place </p>			
 <p>Domain 7 East Antarctica</p>	950,000 sq km	<p>A CCAMLR proposal for an East Antarctic Marine Protected Area was first submitted to CCAMLR in 2011 by Australia, France, and the European Union; negotiations are ongoing</p>	<p>Three representative areas protected in MacRobertson, Drygalski, and D'Urville-Mertz areas</p> <p>Protect representative benthic and pelagic regions</p> <p>Protect habitat used during key life history stages for important prey species (including krill and silver-fish), birds, and marine mammals</p> <p>Establish climate change and fishery reference areas</p> <p>Key regions for protection beyond current proposal include all of Prydz Bay, Cosmonaut polynya off Wilkes Land, Enderby Islands, and Gunnerus Ridge</p>
 <p>Domain 8 Ross Sea region^c</p>	2.06 million sq km	CCAMLR Ross Sea Region MPA (2016)	<p>An effective and comprehensive research and monitoring plan adopted to monitor the world's largest protected area</p> <p>Effective MPA enforcement in place</p>
 <p>Domain 9 Amundsen and Bellingshausen seas</p>		No MPA proposed; limited planning underway	<p>Coastal and offshore areas in the Bellingshausen Sea, including areas with ice shelves vulnerable to collapse</p> <p>Key areas for protection include waters around Peter I Island and seamounts to the north and open water and seamounts in the Amundsen Sea</p>

^a Special Areas for Scientific Study may be designated in any newly exposed marine areas after the retreat or collapse of an ice shelf, glacier, or ice tongue (a narrow sheet of ice) in the Antarctic Peninsula region (encompassing parts of Statistical Subareas 48.1, 48.5, and 88.3). While not an MPA, these areas offer protections similar to one for up to 10 years.

^b Note that this MPA (declared by the United Kingdom), and sovereignty of the islands, remains contested by Argentina.

^c This MPA is the largest protected area in the world. This figure includes the Ross Ice Shelf; without the ice shelf, the MPA covers 1.55 million square kilometers.

Endnotes

- 1 Commission for the Conservation of Antarctic Marine Living Resources, "Conservation Measure 91-04: General framework for the Establishment of CCAMLR Marine Protected Areas" (2011), <https://www.ccamlr.org/en/measure-91-04-2011>.
- 2 Commission for the Conservation of Antarctic Marine Living Resources, "Marine Protected Areas (MPAs)," accessed March 14, 2017, <https://www.ccamlr.org/en/science/marine-protected-areas-mpas>.
- 3 Elizabeth M. Jones et al., "Ocean Acidification and Calcium Carbonate Saturation States in the Coastal Zone of the West Antarctic Peninsula," *Deep Sea Research Part II: Topical Studies in Oceanography* (2017): doi:10.1016/j.dsr2.2017.01.007.
- 4 Sharon E. Stammerjohn et al., "Trends in Antarctic Annual Sea Ice Retreat and Advance and Their Relation to El Niño–Southern Oscillation and Southern Annular Mode Variability," *Journal of Geophysical Research* 113, no. C3 (2008): C03S90, <http://onlinelibrary.wiley.com/doi/10.1029/2007JC004269/abstract>.
- 5 International Council for the Exploration of the Sea, "Report of the Study Group on Designing Marine Protected Area Networks in a Changing Climate (SGMPAN)" (2010), https://www.researchgate.net/publication/263888915_Report_of_the_Study_Group_on_Designing_Marine_Protected_Area_Networks_in_a_Changing_Climate_SGMPAN.
- 6 National Oceanic and Atmospheric Administration, "Marine Protected Areas: Building Resilience to Climate Change Impacts," accessed March 14, 2017, http://marineprotectedareas.noaa.gov/pdf/helpful-resources/mpas_climate_change_march_2013.pdf.
- 7 Bethan C. O'Leary et al., "Effective Coverage Targets for Ocean Protection," letter, *Conservation Letters* 9, no. 6 (2016): 398–404, <http://dx.doi.org/10.1111/conl.12247>.
- 8 Graham J. Edgar et al., "Global Conservation Outcomes Depend on Marine Protected Areas With Five Key Features," letter, *Nature* 506 (2014): 216–220, <http://dx.doi.org/10.1038/nature13022>.
- 9 Callum M. Roberts, Julie P. Hawkins, and Fiona R. Gell, "The Role of Marine Reserves in Achieving Sustainable Fisheries," *Philosophical Transactions of the Royal Society B: Biological Sciences* 360, no. 1453 (2005): 123–32, <http://dx.doi.org/10.1098/rstb.2004.1578>.
- 10 Commission for the Conservation of Antarctic Marine Living Resources, "CCAMLR to Create World's Largest Marine Protected Area," news release, 28 October 2016, <https://www.ccamlr.org/node/92518>.

This fact sheet was revised May 31, 2019 to reflect the current status of the Southern Ocean MPA proposals.

For further information, please visit:

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