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2° IS TOO MUCH!

IMPACTS OF 2°C GLOBAL WARMING
ON ANTARCTIC PENGUINS



Global warming and Antarctica

A new study commissioned by WWF which combines state-of-the art climate models with latest scientific knowledge on penguin ecology clearly demonstrates that Antarctic penguins are in jeopardy. The research shows that 50% of the colonies of the iconic Emperor penguin and 75% Adelle penguin colonies face marked decline or disappearance if global temperature is allowed to rise 2°C above pre-industrial levels. 2°C global warming could be a reality in less than 40 years; reduced sea ice coverage and thickness would make it increasingly difficult for some penguins to hunt and to breed¹.

Although far from the centers of human population, Antarctica has important relevance to human-caused global warming. Over the past 50 years, human activities - burning of fossil fuels and the clearing of forests for agriculture - have led to large-scale changes in the global climate, including altered wind patterns, increases in air and ocean temperatures, widespread melting of snow and ice and global sea level rise. The Antarctic Peninsula is among the regions that is warming the fastest and the melting of its glaciers is contributing to global sea level rise.

Not only does Antarctica play an important role in the global climate system, it is also home to unique species which are found nowhere else on Earth. Whales, seals, penguins and other seabirds thrive on abundant, fish, krill and other plankton in the Southern Ocean. Lichens, mosses and bacteria can be found in the coldest, darkest, harshest parts of the continent. These species are part of our planet's rich and biodiverse heritage. They enrich and influence the culture of human civilization and continue to capture the imagination of generations.



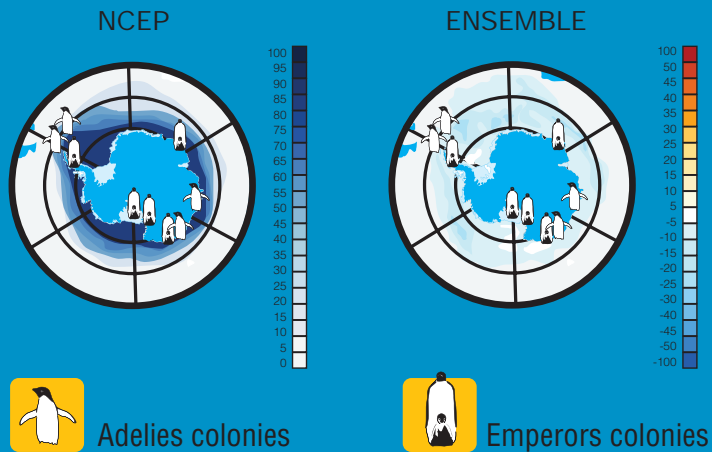
1- Ainley, D., Russell, J. and Jenouvrier, S. 2008. The fate of Antarctic penguins when Earth's tropospheric temperature reaches 20°C above pre-industrial levels. Available at: www.panda.org/antarctica

50% of the colonies of the iconic Emperor penguin and 75% Adelie penguin colonies face marked decline or disappearance if global temperature is allowed to rise 2°C above pre-industrial levels.

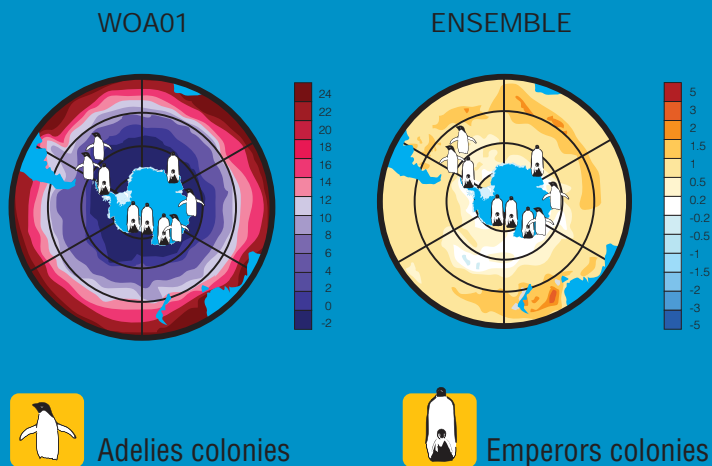


Antarctic penguins under 2°C global warming

Global warming could reach 2°C above pre-industrial levels in fewer than 40 years. At the time of 2°C warming, sea ice coverage will have decreased everywhere in the Southern Ocean. The more northerly locations, such as Admiralty Bay, Arthur Harbor and Pointe Géologie, would show the most pronounced declines in ice coverage. Westerly winds will clearly strengthen as well as shift southwards towards the pole. Air temperatures will be 1°-2°C warmer (in the annual mean) over all locations.



Above left: Observed annual mean sea-ice coverage (%) from the National Center for Environmental Prediction reanalysis. Above right: Difference in sea-ice coverage between Y2C (year of 2°C warming: 2027-2053) and modern-day (1981-2000 average). Red indicates greater sea ice coverage in Y2C and blue indicates less sea ice coverage in Y2C.



Above left: Observed annual mean sea surface temperatures (°C) from the World Ocean Atlas. Above right: Difference in mean sea surface temperatures between Y2C (year of 2°C warming: 2027-2053) and modern-day (1981-2000 average). Red indicates warmer temperatures in Y2C and blue indicates cooler temperatures in Y2C.

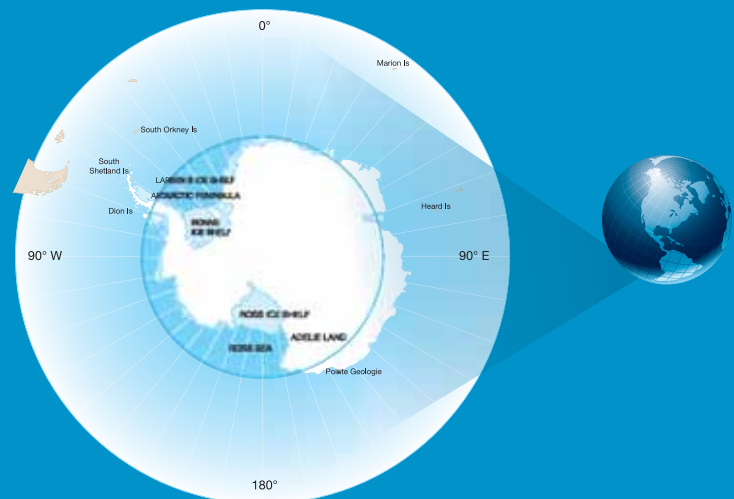
Adélie penguins

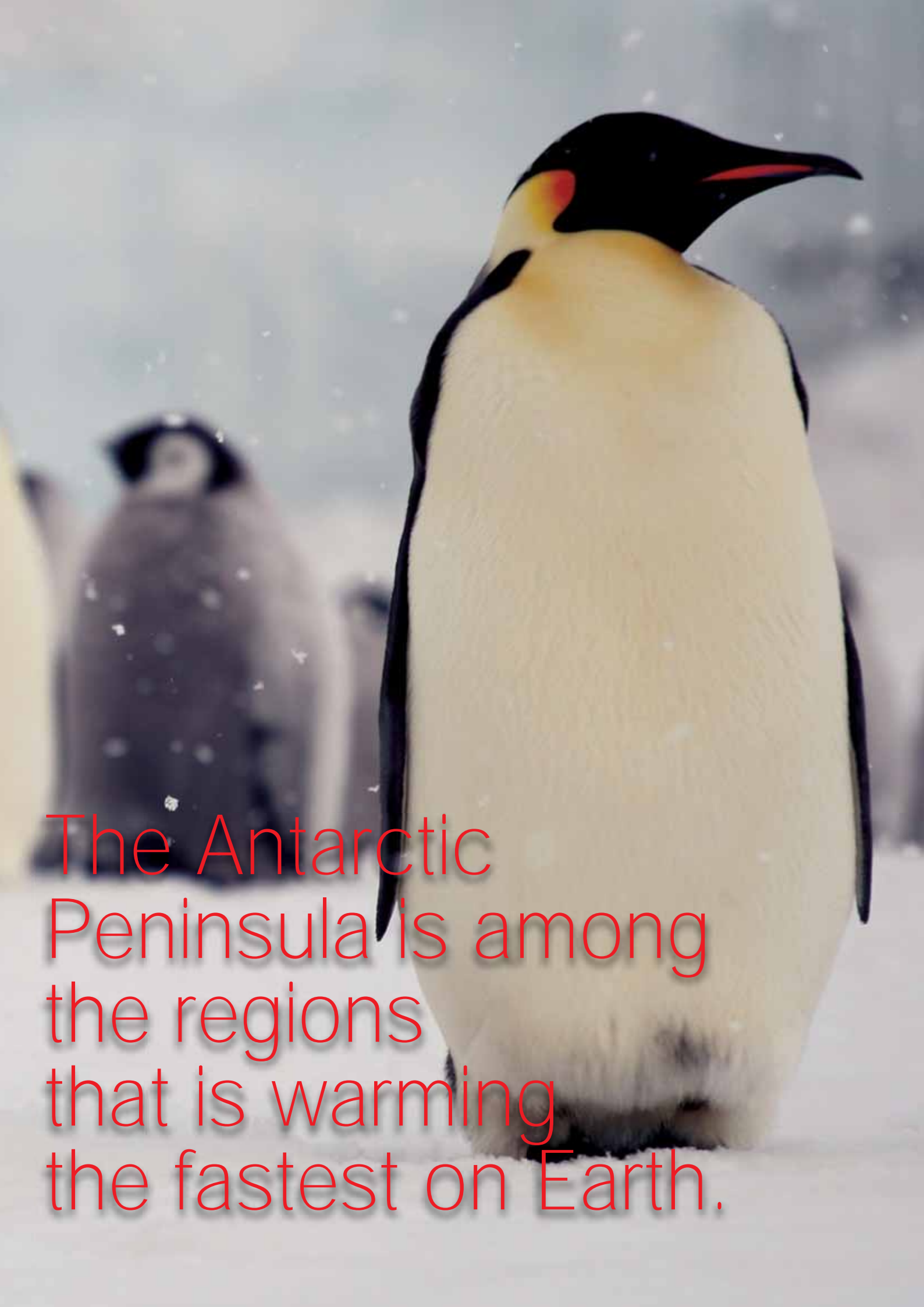
Over the past 25 years, linked to warmer temperatures and decreasing sea ice, populations of Adélie penguins have decreased dramatically along the northwestern coast of the Antarctic Peninsula. This trend is likely to expand to other geographic locations under 2°C global warming. Existing colonies could stop growing or even disappear. This would especially be the case for Adélie penguins in the Antarctic Peninsula region and East Antarctica.

Warmer temperatures are, however, also likely to lead to more ice shelves collapsing exposing new coastline and more coastal areas with less sea ice. Adélie penguins are likely to colonize some of these areas, e.g. along the eastern side of the Antarctic Peninsula and in the southern Bellingshausen and Amundsen seas, where they are able to find ice-free land for nesting and access to sea ice and open water for foraging. How far south they can expand and indeed, the survival of the species, may be limited by the amount of light and sea ice available during winter. Currently, during winter, Adélie penguins only live in sea ice areas where there is light for at least a few hours every 24-hour period. With less light, they are not able to hunt effectively. If the sea ice season shortens, and there is no longer any sea ice north of the Antarctic Circle (66.5° S) during the winter, then the wintering of the Adélie penguin could be called into question.

Emperor penguins

Under 2°C global warming and the projected decrease in sea ice thickness and increase in open water area, Emperor penguins will find it increasingly difficult to find new nesting areas. Finding stable, long lasting fast ice may be difficult even in far southern locations.





The Antarctic Peninsula is among the regions that is warming the fastest on Earth.

Conclusions



Currently, approximately 50% of Emperor penguin colonies, representing almost 40% of the total world population, as well as 75% of colonies and about 70% of the total world population of Adélie penguins exist north of 70° S. The significant lessening of sea ice projected at these latitudes by 2025-2070, should have negative effects on these colonies³. Therefore, by the time mean global atmospheric temperature rises to 2°C above pre-industrial levels – a possibility that could take place in fewer than 40 years - we can expect major reductions and changes in the abundance and distribution of pack-ice penguins.

The only way to significantly reduce the risks of climate change in Antarctica as well as globally is to substantially reduce greenhouse gas emissions. Scientific findings are clearly showing that emissions reduction must be much stronger than currently planned if dangerous global impacts of climate change are to be avoided⁴. Even with ambitious emission cuts, however, damages will be large: any impact that occurs below a global atmospheric temperature rise of 1°C is now unavoidable. **It is imperative that action is taken to conserve ecosystems in their changed environment and help them build resilience against the effects of climate change.** Research shows that depleted ecosystems have the least resilience to changing climate.

3- These projections have not included the effects of climate change on the food web, and ultimately the populations of these species. These interactions are complex and poorly understood, involving perhaps decreases in certain prey and increases in others particularly in coastal, continental shelf areas.

4- Parry, M., Palutikof, J., Hanson, C. and Lowe, J. 2008. Squaring up to reality. Nature reports climate change, 2, 68-70.

WWF is calling for:

Globally

- All nations must work together to agree on a **new ambitious climate treaty by 2009 that will tackle climate change beyond 2012** after the present pledges in the Kyoto Protocol run out.
- **Developed countries must cut 25-40% of their emissions by 2020 and 80-95% by 2050 compared to 1990 levels.**
- Investments in socially and environmentally robust adaptation and mitigation activities must be developed and implemented.

Regionally

In view of the launch of this report at the International Union for Conservation of Nature (IUCN) World Conservation Congress in Barcelona, Spain in advance of the XXXVIth meeting of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) and in anticipation and celebration of the upcoming 50th Anniversary of the signing of the Antarctic Treaty and conclusion of the International Polar Year, WWF has the following asks with a regional focus:

The European Union should:

- Commit to an overall emission reduction target of **30% below 1990 levels by 2020** to be achieved within the boundaries of the European Union. The financial equivalent of additional 15% emission reductions should be invested in adaptation and emission reduction activities in developing countries, which also provide sustainable development benefits.

In the specific case of the Southern Ocean, CCAMLR and the Antarctic Treaty Consultative Parties should:

- Issue a Resolution acknowledging the potential adverse impacts of climate change on the Southern Ocean and its marine living resources and commit to identify and introduce necessary steps to minimize and avoid impacts where possible.
- Apply a highly precautionary approach to managing krill and finfish fisheries that allows for existing uncertainties including the impacts of climate change. This will ensure the future health of krill and finfish populations and all the Southern Ocean species – including the Emperor and Adélie penguins - that are dependent on them.
- In the next few years, establish a series of marine protected areas of ecologically significant size in collaboration with the Antarctic Treaty Consultative Meeting (ATCM), as refuges where species' can attempt to cope with climate change without the added burden of fishing mortality and resulting alterations of foodwebs and therefore allow the acquisition of information to manage fish stocks sustainably elsewhere in the Antarctic.

Acknowledgements

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**The brochure text was prepared
by WWF Antarctic Climate Change Focal Project (ACCFP):**

Principal Technical Consultant: Tina Tin

ACCFP Coordinator: Juan Casavelos

Steering Group: Debbie Chapman, Martin Hiller, Emilie Hugenholtz, Sarah Jones, Rob Nicoll

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Graphics Design: perezdiseño
www.perezdiseño.com.ar



for a living planet®

WWF International

Avenue de Mont-Blanc
1196 Gland - Switzerland

Tel: +41 22 364 9111
Fax: +41 22 364 3239



FUNDACIÓN
VIDA SILVESTRE
ARGENTINA

Fundación Vida Silvestre Argentina (FVSA)

Defensa 251 Piso 6 "K" (C1065AAC)
Buenos Aires, Argentina

Tel: +54 11 4331-3631 / 4343-4086
Fax: +54 11 4331-2217