

Penguins and climate change:

WWF cherry-picks its way to a news story

by

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The press out of Bali today includes coverage of a World Wildlife Fund (WWF) report about the fate of penguin species under climate change. The press reports draw heavily from the press release put out by the WWF to draw attention to their report on penguins, but more importantly, the WWF's desire for large and immediate carbon dioxide emissions restrictions. From the press reports and the WWF release, things seem bad for Antarctica's penguin species. But, as is the case with nearly every alarmist issue, the truth reveals quite a different story. In this case, a review of the literature on penguins, climate change, and ecosystem disturbances, reveals a large variety of penguin responses to changing conditions, changes that include in addition to climate fluctuations, a large-scale alteration to the local and regional food chain as industrial whaling and fishery operations over the course of the past several decades have significantly reduced the number of many species, including both predators and prey. This perturbation to the foodweb has likely had large impacts on the resident penguin species and makes isolating or even correctly identifying impacts from a changing climate quite difficult (Ainley et al., 2007).

Nevertheless, the WWF draws connections between climate change and penguin declines. However, the example of penguin hardships selected by the WWF to highlight in their press release is simply that - a carefully picked selection of individual penguin colonies that exhibit population declines during the past 10-20 years or so. There are many other examples that show stable or expanding penguin populations, but these are carefully avoided by the WWF (in their press release¹ at least, their underlying report² does include descriptions of flourishing and growing penguin colonies). Descriptions of penguin species with stable or increasing populations can be found in a variety of recent studies and reports including Barber-Meyer et al. (2007), Stokstad (2007), and Ainley et al. (2007) among others.

The bottom line is that Antarctica is a vast place, with a variety of climate fluctuations and trends occurring across the continent at various temporal and spatial scales. The Antarctic Peninsula, which is often touted as experiencing the greatest amount of warming on earth, makes up only about 2% of Antarctica. Across most other areas of the continent, the long-term temperature change has been slight or even undetectable for more than 30-40 years (Chapman and Walsh, 2007; British Antarctic Survey temperature database). While sea ice extent may be declining off the coast of the peninsula, it has changed little, or even increased around the continent in total (see Cryosphere Today, <http://arctic.atmos.uiuc.edu/cryosphere/>).

These local and regional climate variations, as well as the depletion of some select upper trophic level aquatic species combine to impact the local and regional populations of penguins. And as a consequence, penguin species/populations show a variety of responses—some expanding their ranges, some declining, some populations growing, other shrinking, most remaining fairly stable.

¹ http://www.panda.org/news_facts/newsroom/index.cfm?uNewsID=119060

² http://assets.panda.org/downloads/folleto_penguins.pdf

Both the press coverage, as well as the WWF press release (which undoubtedly guided the press coverage), inadequately characterizes this situation, instead, for the purposes of serving their ultimate goal—restrictions of carbon dioxide emissions—the WWF carefully crafts its story from select bits and pieces, while ignoring the larger truth—that on the whole, penguin species across Antarctica are neither faring poorly, nor, is it evident that they should do so in the future, in response to anthropogenically-induced climate changes.



Additional Information:

From: Barber-Meyer, S.B., et al., 2007. Estimating the relative abundance of emperor penguins at inaccessible colonies using satellite imagery. *Polar Biology*, 30, 1565-1570.

“Numerous studies have concluded that emperor penguin population data remain insufficient for large scale analysis such as impacts of environmental change...”

From: Barber-Meyer, S.B., et al., 2007. Trends in western Ross Sea emperor penguin chick abundances and their relationships to climate, *Antarctic Science*, DOI: 10.1017/S0954102007000673, 1-9.

Conclusions: The only other long-term emperor penguin studies are located at Terre Adélie (Barbraud & Weimerskirch 2001), the Mawson Coast (Robertson 1992), and the Prince Olav Coast / Riiser-Larsen Peninsula (Kato et al. 2004). The Pointe Géologie population at Terre Adélie appears to have stabilized following a significant decline in the 1970s (Barbraud & Weimerskirch 2001) and both the Taylor Glacier and Auster colonies along the Mawson Coast appeared stable during 1988–99

(Woehler & Croxall 1997, Woehler et al. 2001). In contrast, the Prince Olav Coast / Riiser-Larsen Peninsula populations have recently declined in 2000 (Kato et al. 2004). Compared to these colonies, the Ross Sea population represents a more substantial component of the total population of emperor penguins (about 25% of the worldwide population; Kooyman 1994) and is located in an area of Antarctica subject to different climate patterns. While the Ross Sea population appeared stable (i.e. we did not find evidence suggesting an overall increase or decrease) during 1983–2005, continued research is warranted, especially in light of global climate change and the recent effects of B15A on the Cape Crozier and Beaufort Island colonies (Kooyman et al. 2007).

From: Stokstad, E., 2007. Boom and Bust in a Polar Hot Zone, *Science*, 315 (5818), 1522–1523, doi:10.1126/science.315.5818.1522:

[A]lthough Adélie [penguin] populations have fluctuated over millennia, the current decline is unprecedented [around the Arctic Peninsula]. Within a decade, there may be no more Adélies within 200 kilometers of Palmer Station.

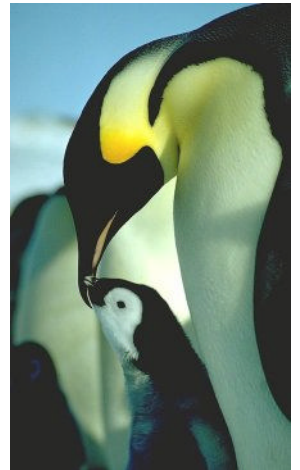
This doomsday prediction doesn't tell the whole story, however. As Adélie penguins lose ground, other species are thriving. Species that prefer open ocean used to be limited to the north and east parts of the peninsula, where the ocean didn't freeze during the winter. Now, with ever more open water, these species are expanding their ranges.

In the past decade, Palmer Station has seen a huge proliferation of southern fur seals and southern elephant seals—species that were present only as small colonies in the 1990s. In one case, a population of six seals now numbers 5000. The presence of these species suggests that a sub-Antarctic ecosystem is replacing the polar ecosystem of Adélies and silverfish.

But as this ecosystem moves southward, so too is the “polar” world, and that's good news for the overall survival of Adélie penguins. Some 400 kilometers south of Palmer Station, the populations of Adélies in Marguerite Bay have tripled since the 1950s. Just as Adélies don't like a lack of ice, they also dislike a surfeit—the greater expanse makes it strenuous to reach open water for foraging. The warming climate and reduced sea ice are apparently making Marguerite Bay a nicer place for Adélies to live. That's true farther south too, says David Ainley of H. T. Harvey & Associates in San Jose, California, who studies Adélies in the southern Ross Sea. “As ice shelf breaks up, there should be more habitat, and we should be seeing more penguins.”

From: Ainley, D., et al., 2007. Paradigm lost, or is top-down forcing no longer significant in the Antarctic marine ecosystem? *Antarctic Science*, 19, 283–290, doi:10.1017/S095410200700051X

Abstract: Investigations in recent years of the ecological structure and processes of the Southern Ocean have almost exclusively taken a bottom-up, forcing-by-physical-processes approach relating various species' population trends to climate change. Just 20 years ago, however, researchers focused on a broader set of hypotheses, in part formed around a paradigm positing interspecific interactions as central to structuring the ecosystem (forcing by biotic processes, top-down), and particularly on a "krill surplus" caused by the removal from the system of more than a million baleen whales. Since then, this latter idea has disappeared from favour with little debate. Moreover, it recently has been shown that concurrent with whaling there was a massive depletion of finfish in the Southern Ocean, a finding also ignored in deference to climate related explanations of ecosystem change. We present two examples from the literature, one involving gelatinous organisms and the other involving penguins, in which climate has been used to explain species' population trends but which could better be explained by including species interactions in the modelling. We conclude by questioning the almost complete shift in paradigms that has occurred and discuss whether it is leading Southern Ocean marine ecological science in an instructive direction.

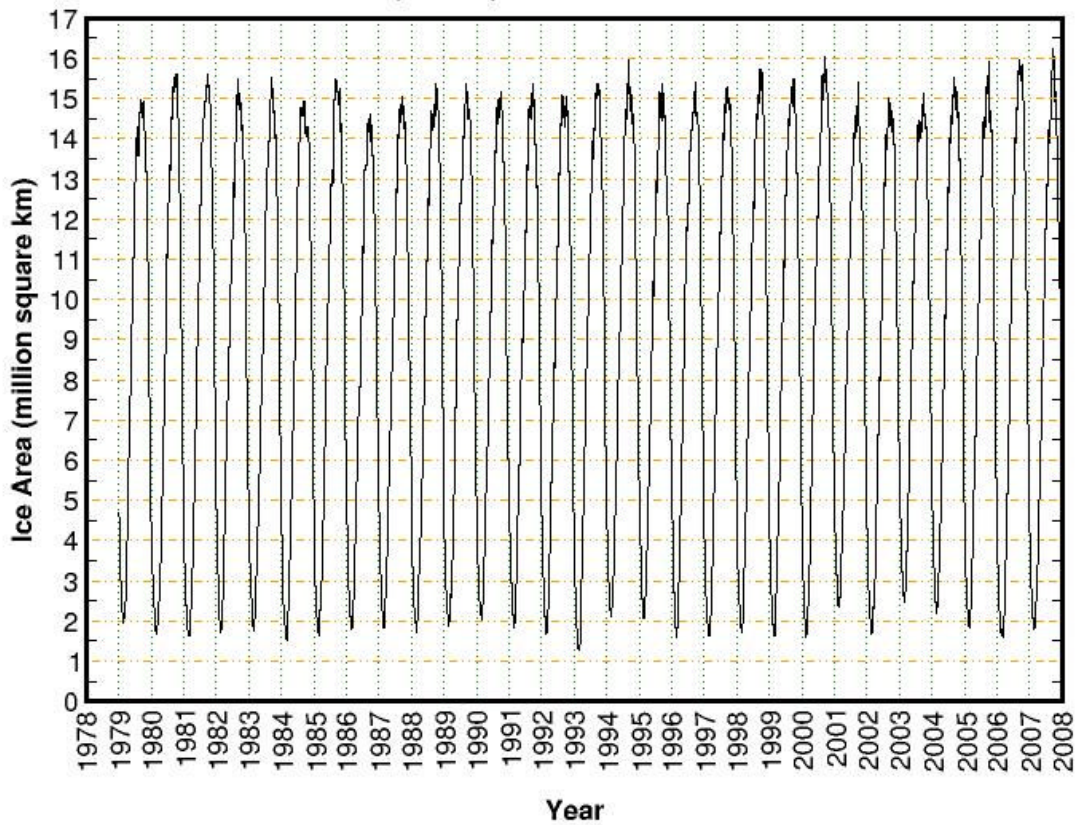


"They are extraordinarily like children, these little people of the Antarctic world, either like children, or like old men, full of their own importance and late for dinner, in their black tail-coats and white shirt-fronts — and rather portly withal." — *Cherry-Garrard about penguins.*

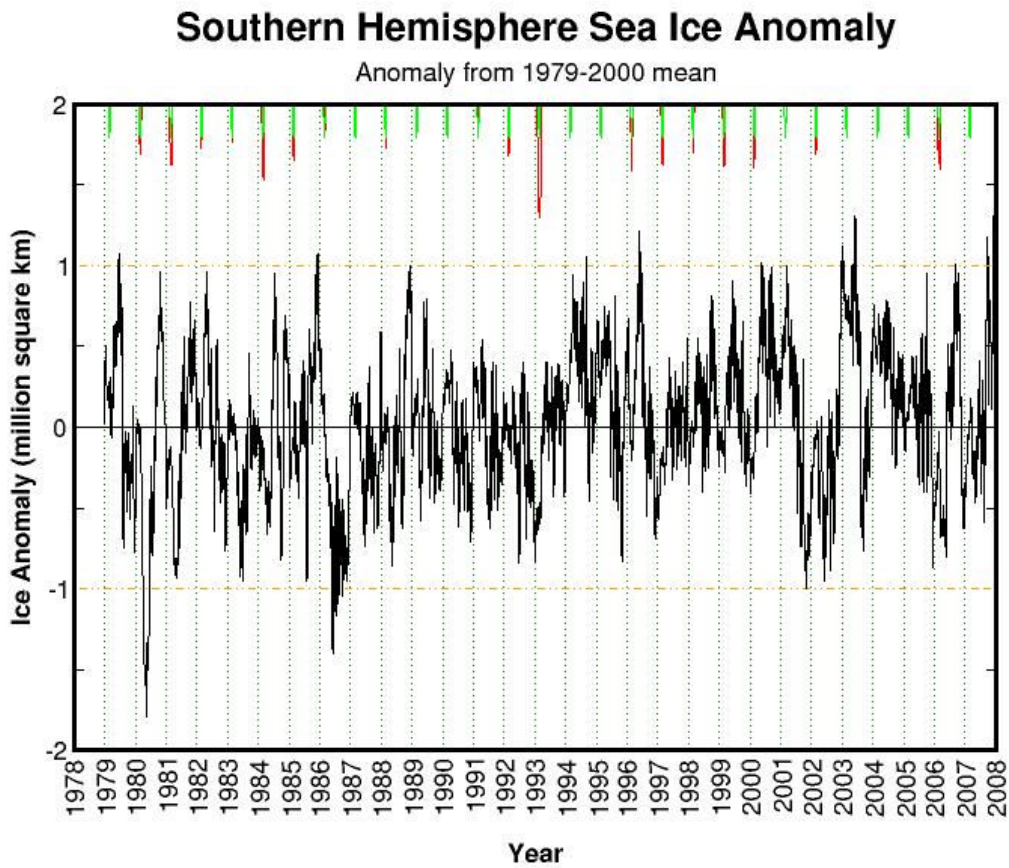
Arctic Sea Ice Area as measured by satellite, 1979-present: Note that the highest sea ice area *on record* occurred during the 2007 Antarctic winter. (Source: <http://arctic.atmos.uiuc.edu/cryosphere/IMAGES/current.area.south.jpg>)

Southern Hemisphere Sea Ice Area

Data provided by NSIDC: NASA SMMR and SSM/I



Antarctic Sea Ice Anomaly: Note that there is no decline in total sea ice around Antarctica, and in fact there has been a slight increase. Note also that the greatest positive anomalies (more sea ice) have occurred in recent years. (Source: <http://arctic.atmos.uiuc.edu/cryosphere/IMAGES/current.anom.south.jpg>)



References:

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Barber-Meyer, S.B., et al., 2007. Trends in western Ross Sea emperor penguin chick abundances and their relationships to climate. *Antarctic Science*, in press, DOI: 10.1017/S0954102007000673, 1-9.

Barber-Meyer, S.B., et al., 2007. Estimating the relative abundance of emperor penguins at inaccessible colonies using satellite imagery. *Polar Biology*, **30**, 1565-1570.

British Antarctica Survey temperature database, <http://www.antarctica.ac.uk/met/gjma/>

Chapman, W.L. and J.E. Walsh. 2007. A Synthesis of Antarctic Temperatures. *Journal of Climate*, **20**, 4096-4117.

Cryosphere Today, <http://arctic.atmos.uiuc.edu/cryosphere/>

Stokstad, E., 2007. Boom and Bust in a Polar Hot Zone, *Science*, **315** (5818), 1522 – 1523, doi:10.1126/science.315.5818.1522

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<http://www.gdargaud.net/Antarctica/Penguins.html>

