

POLAR BEARS, GOLDEN TOADS, AND CONSERVATION FUTURES

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* reprinted from the Bulletin of the British Ecological Society

The polar bear is an icon of the Arctic. It figures prominently (as *Nanook*) in Inuit legends and art and, more recently, as Lyra's strong protector in Phillip Pullman's *His Dark Materials* trilogy. Polar bears are a charismatic species in what is, quite literally, a coldspot of global biodiversity.

They are also the subject of mounting conservation concern. So much so that, after considerable foot-dragging and administrative dithering, in May of this year the United States government listed the polar bear as a "threatened species" under the Endangered Species Act. This means that the species is likely to become endangered (i.e., "in danger of extinction throughout all or a significant portion of its range") in the foreseeable future unless actions are taken now. This decision is noteworthy because, unlike other species that have been afforded federal protection under this act, the threat to the long-term viability of polar bears as a species stems directly from the effects of global climate change. Polar bears are dependent on sea ice for hunting ringed seals, their primary prey. And as the rate of climate warming in the Arctic accelerates even beyond the projections of the recent Intergovernmental Panel on Climate Change (IPCC) report, the threat of a complete disappearance of this essential habitat within the next few decades becomes ever more real. Based on even moderate climate-model projections, scientists with the United States Geological Survey have predicted that two-thirds of the world's polar bears are likely to disappear by 2050.

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The listing of the polar bear under the Endangered Species Act was overdue (the International Union for the Conservation of Nature – IUCN – classified the species as “vulnerable” in 2006), but this “victory” for conservation has a hollow ring. The listing has been opposed by native groups in Canada and by the State of Alaska over concerns about constraints on hunting rights and economic development, and the listing itself contains an exclusionary clause that precludes restrictions on oil and gas development that might result from the listing. Other groups have challenged the science behind the decision, arguing that it is based on computer models and laced with uncertainties. And despite the clear identification of the loss of sea ice as the primary threat to the persistence of the species, the listing explicitly excludes global warming from the threats that must be considered when protecting the bear’s habitat.

The listing of the polar bear also highlights a conservation conundrum. When a species is listed under the Endangered Species Act, a process is initiated to prepare, and then implement, a recovery plan for abating the threats, arresting a population’s decline, and restoring the distribution and abundance of the species to the point where its long-term survival in the wild is ensured. Recovery plans usually entail population management, captive breeding and release, control of predators or competitors, habitat protection, or similar actions. But the success rate over the thirty-plus years of the Act’s existence is not encouraging, and a recent unpublished analysis by Mike Scott and his colleagues suggests that as many as eighty percent of the currently listed species may be “conservation reliant” (Scott et al. 2005), requiring continuing, species-specific conservation management to ensure their persistence.

So here’s the conundrum: the decision to list a species often comes too late; most of the currently imperiled species are conservation-reliant and will require long-term management actions to forestall their extinction; the threat to polar bears (either the loss of sea ice or the

global warming that drives this loss) is beyond the scope of feasible management actions; many more species will be threatened with extinction as the environmental changes already instigated by climate change are played out; as these extinctions occur, and as species distributions shift with climate changes, new community complexes will be created. The resulting management challenges will far exceed our wildest dreams (or nightmares).

I suggest that it's time to rethink our approach to biodiversity conservation. We are dealing with global processes and threats that have local consequences, and we are likely to see nature rearranged in ways that are beyond our previous experience (and science). As the queue of species heading toward extinction becomes longer and more crowded and unruly, we cannot continue to manage them all individually, especially over a long haul. We need to revisit the original intent of the Endangered Species Act, "to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved." We need to think about conservation of the broad functionality of Nature.

This is where ecologists can help -- by putting flesh on the bones of phrases such as "ecological integrity" or "ecosystem health"; by conducting the research that explores how community and ecosystem processes are likely to change with accelerating turnover in species assemblages that create new complexes and new pathways of species interactions; by devising robust ways of grouping species that will respond to management actions in similar ways; and by assessing where and how species and ecological systems are likely to be most vulnerable to the cascading consequences of climate change.

So what about golden toads? Golden toads inhabited a small area of cloud-forest habitat near Monteverde, Costa Rica. They are now extinct, most likely as a consequence of climate changes that shifted the distribution and occurrence of the cloud zone on the mountain that was

critical to their survival. They were victims of forces acting at a global scale driving regional and local changes that occurred rapidly and were beyond the reach of conservation management.

Polar bears are wide-ranging apex predators in an entirely different sort of ecosystem, but the same forces may imperil their survival. And the list will grow. Conservation of the future cannot rely on approaches of the past.

Reference

Scott, J.M., D.D. Goble, J.A. Wiens, D.S. Wilcove, M. Bean, and T. Male. 2005. Recovery of imperiled species under the Endangered Species Act: the need for a new approach. *Frontiers in Ecology and the Environment* 3: 383-389.