



US state policies put gray wolf populations at risk.

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## Restore protected status for gray wolves

In January, the US Fish and Wildlife Service terminated Endangered Species Act protections for gray wolves (1), with the caveat that a status review to determine whether delisting is warranted could be prompted “if a change in State law or management objectives would significantly increase the threat to the wolf population.” Since the decision, Idaho and Montana have sanctioned the killing of 90% of their wolves (2). Those promoting these massive statewide hunts argue that culling wolves is necessary to protect the livelihoods of ranchers from the depredations of livestock. However, these policies put wolves, humans, and ecosystems at risk.

Counterintuitively, analyses of lethal wolf control programs indicate that killing wolves may disrupt wolf social structures, leading to more, not fewer, livestock deaths (3, 4). In addition, wolves are responsible for at most 1 to 2% of unwanted livestock deaths (5). The economic cost of livestock losses attributed to wolves is far outweighed by the economic benefits that wolves provide by controlling deer populations. Smaller deer populations cause fewer deer-automobile collisions, saving human lives and preventing injuries (6). Supporters of lethal wolf control also

claim that the approved quotas for hunting will not imperil the wolves because their reproduction can easily make up for the losses. However, the hunting limits approved in Montana and Idaho are more than four times the rates of human-caused mortality witnessed in recent decades (1) and are reminiscent of the historical massacres that extirpated wolves.

The delisting decision (1) was based on the observation that wolf population numbers had exceeded the numerical goals laid out in the 1987 recovery plan, specifically the target of more than 10 breeding pairs of wolves in each of three designated management areas. The problem is that these goals are far too low—something that has been noted as an issue not just for wolves but also as a broader problem affecting many species listed in the Endangered Species Act (7, 8). In addition, the population target for wolves does not account for the added threat of climate change, the extent of which was not well understood when the recovery plan was written.

Wolves are a keystone predator (9, 10). For keystone species (such as wolves, beavers, and sea otters) that engineer wild ecosystems, recovery goals should take into account not just the bare minimum survival of the species but also the restoration of the structuring role these species play in their ecosystems (11). Recovery goals that are set too low undermine the original intent of the Endangered Species Act. We

urge the Department of the Interior to delist gray wolves and to examine recovery goals for all species in light of climate change and essential ecosystem functions.

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## Brazil can protect sharks worldwide

In the past few years, some countries have prohibited the removal of shark fins in an effort to protect shark populations (1). However, sharks remain at risk from this practice as long as other countries drive up demand by buying the finless shark carcasses for a cheap price (2–4). Brazil, the world's largest importer of shark meat (3, 4), imports finless shark carcasses and steaks from countries that are involved in the fin trade, such as China and Spain, and from Uruguay, which exports processed shark meat (3, 4). The growing shark meat trade in Brazil can be attributed in part to attractive prices, but the demand is complicated by mislabeled products; Brazilians are often unaware that they are eating sharks (2, 5). Brazil has the power to disrupt the global shark market, but it will require policies that limit shark meat imports as well as an effort to provide consumers with accurate information.

In Brazil, although protected sharks cannot be legally marketed by local fishers or entrepreneurs, they can be imported without any restrictions. Moreover, it is mandatory to provide information for the proper labeling only if the imported frozen fish is in the Salmonidae family (which includes salmon and trout) or the Gadidae family (which includes cod and haddock) (6). Instead of being packaged with proper labeling, Brazil's shark meat is sold as unidentifiable carcasses or in pieces marked as *cação*, a deliberately ambiguous name used for multiple species (7). Despite a growing debate about shark mislabeling among nongovernmental organizations and academic communities (8), no government measures have been implemented. As a result, the consumers in Brazil remain unaware that they are purchasing shark meat and contributing to the decline of vulnerable shark species.

Sharks are facing irreversible population reductions, and action is urgently needed worldwide (9), especially in Brazil (10). As a first step, Brazil's government should widely disseminate the fact that *cação* may refer to shark meat. The country should require all domestic and imported products to be labeled with their scientific names throughout the supply chain, ensuring accurate monitoring of the species in the system and allowing consumers to decide whether to eat a species at risk of extinction. As a result of such changes, demand would likely decrease, limiting the market for sharks with illegally removed fins. Brazil could

also protect sharks worldwide by prohibiting the importation of species on Brazil's National Red List (11). Because of Brazil's outsize role in global shark trade, these changes could vastly improve conservation efforts.

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## Call for protection of scatter-hoarding rodents

Mutualistic interactions between seed dispersers and tree species are important to both animal and plant populations. Scatter-hoarding rodents benefit plant species by carrying seeds to areas with more space for growth and increasing the number of seeds that germinate and grow. Forest fragmentation has compromised scatter-hoarding rodent habitats, causing population declines worldwide. In turn, disruption of dispersal mutualisms may predispose some trees to population decline or even local extinction (1). However, compared with large mammals, scatter-hoarding rodents have been largely overlooked in conservation plans.

In Central American neotropical forests, the ground-dwelling acouchies and agoutis that disperse and scatter-hoard large-seeded tropical endemic tree species, including the arara nut-tree (*Joannesia princeps*) and palms such as *Astrocaryum*

*standleyanum* and *A. aculeatissimum*, are sensitive to and threatened by forest fragmentation (2). In North America, the largest kangaroo rat, *Dipodomys ingens*, an endangered species that plays a crucial role in scattering the seeds of various plants, has suffered substantial population decline and now is restricted to 3% of its historical range (3). The scatter-hoarding Edwards's long-tailed giant rat (*Leopoldamys edwardsi*) disappeared after forest fragmentation compromised its habitat in southern Thailand (4) and has been lost in Hong Kong (5). Small-bodied scatter-hoarding rats have also become extinct as a result of fragmentation (6).

Scatter-hoarding squirrels, which are widely distributed across the world and include the Siberian flying squirrel (*Pteromys volans*), northern flying squirrel (*Glaucomys sabrinus*), eastern gray squirrel (*Sciurus carolinensis*), eastern fox squirrel (*S. niger*), Eurasian red squirrel (*S. vulgaris*), and American red squirrel (*Tamiasciurus hudsonicus*), are rarely found in the small forest fragments that remain after the loss of larger habitats (7–10). Eight species in the Sciurid family have declined as a result of deforestation in Singapore since the early 19th century (11). Smith's bush squirrel (*Paraxerus cepapi*), the sole secondary seed disperser of marula fruit (*Sclerocarya birrea*), is endangered in the African savanna (12).

Disrupting the patterns of scatter-hoarding rodents and the plants they support puts entire ecosystems at risk. Given the crucial role these species play in regions across the world, local governments and forestry administrations worldwide should implement conservation measures to preserve and restore large, unfragmented areas to protect them.

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