

Restore large carnivores to save struggling ecosystems



What? It's just a flesh wound. Steve Jurvetson

We are losing our large carnivores. In ecosystems around the world, the decline of large predators such as lions, bears, dingoes, wolves, and otters is changing landscapes, from the tropics to the Arctic. Habitat loss, persecution by humans and loss of prey have combined to inflict great losses on these populations.

In fact more than 75% of the 31 largest carnivore species are declining, and 17 species now occupy less than half their former ranges. Southeast Asia, southern and East Africa, and the Amazon are among areas in which multiple large carnivore species are declining. And with only a few exceptions, large carnivores have already been exterminated from much of the developed world, including areas of Western Europe, and the eastern United States.

Top dogs keep ecosystems in order

Many of these large carnivore species are endangered and some are at risk of extinction, either in specific regions or entirely. Ironically, they are vanishing just as we are learning about their

important ecological effects, which is what led us to write a new paper in the journal Science to document their role.

From a review of published reports, we singled out seven species that have been studied for their important ecological role and widespread effects, known as [trophic cascades](#). These are the African lion, [leopard](#), Eurasian lynx, cougar, [gray wolf](#), [sea otter](#) and dingo.

Based on field research, my Oregon State University co-author [Robert Beschta](#) and I documented the impact of cougars and wolves on the regeneration of forest tree stands and riverside vegetation in Yellowstone and other national parks in western North America. Fewer predators, we found, lead to an increase in browsing animals such as deer and elk. More browsing disrupts vegetation, reduces birds and some mammals and changes other parts of the ecosystem. From the actions of the top predator, widespread impacts cascade down the food chain.

Similar effects were found in studies of Eurasian lynx, dingoes, lions and sea otters. For example in Europe, absence of lynx has been closely tied to the abundance of roe deer, red fox and hare. In Australia, the construction of a [3,400-mile dingo-proof fence](#) has enabled scientists to study ecosystems with and without dingoes which are closely related to gray wolves. They found that dingoes control populations of herbivores and exotic red foxes. The suppression of these species by dingoes reduces predation pressure, benefiting plants and smaller native prey.

In some parts of Africa, the decrease of lions and leopards has coincided with a dramatic increase in olive baboons, which threaten crops and livestock. In the waters off southeast Alaska, a decline in sea otters through killer whale predation has led to a rise in sea urchins and loss of kelp beds.

Predators are integral, not expendable

We are now obtaining a deeper appreciation of the impact of large carnivores on ecosystems, a view that can be traced back to the work of landmark ecologist [Aldo Leopold](#). The perception that predators are harmful and deplete fish and wildlife is outdated. Many scientists and wildlife managers now recognise the growing evidence of carnivores' complex role in ecosystems, and their social and economic benefits. Leopold recognised these relationships, but his observations were ignored for decades after his death in 1948.



Top carnivores, at work keeping things in check. Doug Smith

Human tolerance of these species is the major issue. Most would agree these animals have an intrinsic right to exist, but additionally they provide economic and ecological services that people value. Among the services documented in other studies are carbon sequestration, restoration of riverside ecosystems, biodiversity and disease control. For example, wolves may limit large herbivore populations, thus decreasing browsing on young trees that sequester carbon when they escape browsing and grow taller. Where large carnivore populations [have been restored](#) – such as wolves in Yellowstone or Eurasian lynx in Finland – ecosystems appear to be bouncing back.

I am impressed with how resilient the Yellowstone ecosystem is, and while ecosystem restoration isn't happening quickly everywhere in this park, it has started. In some cases where vegetation loss has led to soil erosion, for example, full restoration may not be possible in the near term. What is certain is that ecosystems and the elements of them are highly interconnected. The work at Yellowstone and other places shows how species affect each another through different pathways. It's humbling as a scientist to witness this interconnectedness of nature.

My co-authors and I have called for an international initiative to conserve large carnivores in co-existence with people. This effort could be modelled after a couple of other successful efforts including the [Large Carnivore Initiative for Europe](#), a non-profit scientific group affiliated with the [International Union for the Conservation of Nature](#), and the [Global Tiger Initiative](#) which involves all 13 of the tiger-range countries. With more tolerance by humans, we might be able to avoid extinctions. The world would be a scary place without these predators.