

Study tracks effects of declining predator numbers

The shift in the food chain carries steep consequences for many ecosystems, including humans

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Killing off the top predators in the ocean and on land has sent huge ripples through nearly every type of ecosystem in the world and disrupted the environment in ways researchers are just beginning to understand, according to a report released Thursday.

From sharks to wolves to lions, sharp declines in the animals that normally sit at the top of the food chain have triggered large-scale changes that ultimately affect humans by altering the spread of disease, eliminating habitat, causing wildfires and erosion, and spreading invasive species, said forestry professor William Ripple of Oregon State University. Ripple is a co-author of the study, which appears in the current issue of *Science* magazine.

“Regardless of where we look, we see very strong effects of predators,” Ripple said. “From the tropics up to the arctic, from the oceans to the higher mountains, regardless of the ecosystem we’re seeing that the presence or the absence of these apex predators can be extremely important.”

The loss of top predators has come largely as the result of human activity through hunting or habitat loss, the study says. The research suggests that the loss may be the most pervasive influence that people have had on the landscape and constitutes what is considered the sixth mass extinction in Earth history.

The wide-ranging study, which involved 23 scientists from six nations, suggests that predator assessments should play a larger role in evaluating ecosystem health and in decisions on how to manage, or not manage, those ecosystems, Ripple said. It concludes that in some cases the best way to restore biodiversity most likely involves reintroducing top predators, a finding that’s sure to be controversial in the ongoing debate over the return of wolves to Oregon and other Western states.

The study looks at what are known as “trophic cascades,” the domino-like changes that follow when a key part of an ecosystem is altered. OSU has a research program in trophic cascades and has documented their effects in specific Western landscapes.

One such OSU study looked at two canyon ecosystems in Utah that differed mainly in that cougar were present in one and not the other. Where cougar were not present, deer and elk populations rose and their browsing stripped away brush and streamside vegetation, severely reducing habitat for native birds, eroding stream banks, reducing streamside shade and reducing water depth, which made the water too warm for native fish.

But where cougar were present, deer and elk populations were held in check. That allowed streamside willows and cottonwoods to survive, protecting stream banks from erosion, providing shade and creating habitat for an array of birds, insects, amphibians and fish.

Lead author James Estes, a professor of ecology and evolutionary biology at the University of California at Santa Cruz, said the effects of predators across large expanses reach deep into plant and animal communities.

“The top-down effect of apex consumers in an ecosystem are fundamentally important, but it is a complicated phenomenon,” Estes said. “They have diverse and powerful effects on the ways ecosystems work, and the loss of these large animals has widespread implications.”

Ripple said the researchers acknowledge that other things also occur in ecosystems that affect their overall health, such as climate change, disease and habitat loss. But he said the effect of reducing predator species hasn’t been given much consideration in evaluations of ecosystem health.

“A lot of times predators are overlooked,” he said. “There’s overwhelming evidence that in many systems in the world these are very important species. We think that these top predators provide a function, and when we lose the top predators we lose ecosystem function.”

Predator loss also can affect people, Ripple said. In Africa, the killing of lions and leopards has caused an increase in olive baboons, which carry diseases that are passed to people.

In the ocean, the loss of sharks to overfishing in the North Atlantic resulted in a jump in the population of cow-nosed rays, which feed on shellfish and caused a collapse of the bay scallop fishery in the Northeast.

And the hunting of sea otters decimated coastal ecosystems when kelp-grazing sea urchins, which the otters eat, multiplied and destroyed kelp forests. Those forests act as a kind of nursery for many ocean fish and other species harvested by people.

“We were very surprised to see the extent of the effects of predators,” Ripple said. “It is just astounding to see how these predators in very diverse types of ecosystems are so important to the functioning of nature.”

The research is likely to be controversial when applied to predators such as wolves. Wolves have only recently returned to parts of northeast Oregon after an absence of many decades, which has sparked a sharp debate between ranchers, who see wolves as a threat to their herds, and environmentalists, who see them as a natural part of the ecosystem.

Ripple said he understands the threat wolves pose for ranchers and hunters and acknowledges there are areas where reintroduction of top predators is not practical or feasible.

“Change is difficult, and some of these predators are difficult to live with,” Ripple said. “What I’m suggesting is we at least consider that predators have an important role in ecology. It’s more than their charismatic return to the landscape. Once that becomes part of the discussion, then it becomes more of a balanced discussion for the management of top predators.”