

# Loss of top predators causes chaos, including fires and disease

## Yellowstone's rebound after wolves reintroduced offers hope for restoration

By Margaret Munro, Postmedia News July 15, 2011

Thirty-one grey wolves from Canada were turned loose in Yellowstone in the 1990s.

The iconic canines were soon tearing after elk in the U.S. national park, which had not seen wolves in seven decades.

Aspen, willow and cottonwood trees have begun to sprout now that the elk are in check. Beavers have started to move back in, increasing habitat for birds and insects.

"It's amazing the effect one species, the wolf, can have on the entire ecosystem," says William Ripple, at Oregon State University, co-author of an international report on the profound and cascading impact large animals have on ecosystems.

He and his colleagues say the demise of lions, wolves, bison, sharks, great whales and other large animals is part of "the sixth mass extinction" now underway, and that their disappearance affects everything from wildfires to the spread of disease.

"The loss of these animals may be humankind's most pervasive influence on nature," the team of 24 scientists from the United States, Europe, Africa and Canada are reporting today in the journal *Science*.

So-called "apex consumers" have roamed the planet for millions of years but have vanished from most of their range, largely because of human hunting and fishing, and habitat loss.

The scientists point to "extensive cascading effects."

"The disappearance of these animals reverberates further than previously anticipated, with far-reaching effects on processes as diverse as the dynamics of disease, fire, carbon sequestration, invasive species, and biogeochemical exchanges among Earth's soil, water and atmosphere," they say.

They also suggest the loss of the top animals can be linked to "many of the ecological surprises that have confronted society over past centuries -pandemics, population collapses of species we value and eruptions of those we do not, major shifts in ecosystem states, and losses of diverse ecosystem services."

The report lists examples from Africa to the Aleutian Islands.

The reduction of lions and leopards in the sub-Saharan caused the baboon population to swell. This increased transmission of intestinal parasites from baboons to humans as the primates foraged closer to human settlements.

Industrial whaling in the 20th century killed off large numbers of plankton-eating great whales, which sequester carbon into the deep sea in their feces. The scientists say about 105 million tonnes of carbon has ended up in the atmosphere, contributing to climate change, instead of resting at the bottom of the ocean.

Coastal kelp forests, important marine nurseries and habitat, were decimated when sea otter populations collapsed from over-hunting in the Pacific Northwest. This was because kelp-grazing sea urchins proliferated when sea otters were no longer around to eat them.

The loss of sharks has led a boom in the population of cow-nosed rays, which have in turn triggered collapse of shellfish populations along the East Coast of North America.

The researchers, including zoologist Anthony Sinclair at the University of B.C., say that large animals have long been seen as "riding atop" ecosystems but not really affecting the species and structure below.

That, they say, is a fundamental misunderstanding of ecology.

"By looking at ecosystems primarily from the bottom up, scientists and resource managers have been focusing on only half of a very complex equation," lead author James Estes, at the University of California at Santa Cruz, said in a summary of the findings.

The wolves in Yellowstone show the damage is not necessarily irreversible, Ripple said in an interview.

He and associates have been documenting the "restoration" that started in the park's ecosystem after 31 grey wolves from Alberta were introduced in Yellowstone the 1995 and 1996, and the packs began to grow.

The wolf, once widespread across most of North America, has been hunted ruthlessly and was eradicated from Yellowstone by the 1920s. During the wolves' seven-decade absence from the park, Ripple says, elk not only increased in number but their behaviour changed.

The elk were no longer afraid of browsing young aspen trees in places where historically the animals might have been vulnerable to wolf attack. As a result, the growth of young aspen trees and willow almost stopped, and there were fewer beaver. Plant communities, tree growth and stream ecology all were affected, Ripple said.

But in parts of Yellowstone, he said, aspen and willow are now recovering. The trees and shrubs are attracting more beavers, which in turn set the stage for more birds and insects.

"It is shocking and very humbling to see how an individual species can be so important," he said of the wolves' cascading effect on the ecosystem.

Habitat-restoration efforts often start from the ground up, with the planting of trees or other landscape manipulations, said Ripple, "but here all we had to do was release a few dozen wolves and let them do their thing."

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