

Wolf Reintroduction Changes Ecosystem in Yellowstone

Wolves are causing a trophic cascade of ecological change, including helping to increase beaver populations and bring back aspen, and vegetation.

By [Brodie Farquhar](#) Updated: Jul 3, 2019 Original: Jan 15, 2019

On a quiet spring morning, a resounding "Slap!" reverberates through the air above a remote stream leading to Lake Yellowstone. Over much of the past century, it has been a rarely heard noise in the soundscape that is Yellowstone National Park, but today is growing more common—the sound of a beaver slapping its tail on the water as a warning to other beavers.

When the grey wolf was [reintroduced into the Greater Yellowstone Ecosystem in 1995](#), there was only one beaver colony in the park, said Doug Smith, a wildlife biologist in charge of the Yellowstone Wolf Project.



Today, the park is home to nine beaver colonies, with the promise of more to come, as the reintroduction of wolves continues to astonish biologists with a ripple of direct and indirect consequences throughout the ecosystem. A flourishing beaver population is just one of those consequences, said Smith.

A Yellowstone Beaver's Tale of Elk

What happened, said Smith, is that the presence of wolves triggered a still-unfolding cascade effect among animals and plants—one that will take decades of research to understand.

"It is like kicking a pebble down a mountain slope where conditions were just right that a falling pebble could trigger an avalanche of change," Smith mused. So how did this avalanche of change work out for the beaver?

To answer that, you have to go back to the 1930s, when the wolf was killed off in Yellowstone. Even though [Yellowstone elk](#) were still preyed upon by black and grizzly bears, cougars and, to a lesser extent, coyotes, the absence of wolves took a huge amount of predatory pressure off the elk, said Smith. As a result, elk populations did very well-perhaps too well. Two things happened: the elk pushed the limits of Yellowstone's carrying capacity, and they didn't move around much in the winter-browsing heavily on young willow, aspen and cottonwood plants. That was tough for beaver, who need willows to survive in winter.

Healthier Willow Stands in Yellowstone

This created a counterintuitive situation. Back in 1968, said Smith, when the elk population was about a third what it is today, the willow stands along streams were in bad shape. Today, with three times as many elk, willow stands are robust. Why? Because the predatory pressure from wolves keeps elk on the move, so they don't have time to intensely browse the willow. Indeed, a research project headed by the U.S. Geological Survey in Fort Collins found that the combination of intense elk browsing on willows and simulated beaver cuttings produced stunted willow stands. Conversely, simulated beaver cutting without elk browsing produced verdant, healthy stands of willow. In the three-year experiment, willow stem biomass was 10 times greater on unbrowsed plants than on browsed plants. Unbrowsed plants recovered 84 percent of their pre-cut biomass after only two growing seasons, whereas browsed plants recovered only 6 percent.

With elk on the move during the winter, [willow stands recovered from intense browsing](#), and beaver rediscovered an abundant food source that hadn't been there earlier. As the beavers spread and built new dams and ponds, the cascade effect continued, said Smith. Beaver dams have multiple effects on stream hydrology. They even out the seasonal pulses of runoff; store water for recharging the water table; and provide cold, shaded water for fish, while the now robust willow stands provide habitat for songbirds.

"What we're finding is that ecosystems are incredibly complex," he said. In addition to wolves changing the feeding habits of elk, the rebound of the beaver in Yellowstone may also have been affected by the 1988 Yellowstone fires, the ongoing drought, warmer and drier winters and other factors yet to be discovered, Smith said.

Yellowstone Wolf Trophic Cascade

Biologists are often faced with the grim task of documenting the cascade effects of what happens when a species is removed from an ecosystem, by local extirpation or even extinction. In Yellowstone, biologists have the rare, almost unique, opportunity to document what happens when an ecosystem becomes whole again, what happens when a key species is added back into the ecosystem equation.

"In the entire scientific literature, there are only five or six comparable circumstances," Smith said. "What we're seeing now is a feeding frenzy of scientific research." Scott Creel, an ecology professor at Montana State University, is hip-deep in that feeding frenzy. "My research has been in the Gallatin Canyon," said Creel, where elk inhabit four drainages. Wolves come and go, he said, enabling him to study what elk do in the presence and absence of wolves. "Elk have proven to be pretty adaptable," Creel said. "When wolves are around, they're more vigilant and do less foraging."

<https://www.yellowstonepark.com/things-to-do/wolf-reintroduction-changes-ecosystem>

Elk move into heavy timber when wolves are around, Creel added, but return to the grassy, open meadows when wolves go away. Creel and other researchers are still working out what that means in terms of the elk's diet and whether there are costs associated with this behavior. Rather surprisingly, elk herd size breaks up into smaller units when wolves are around, said Creel, who had expected herd size to get bigger as a defense mechanism. "I think they're trying to avoid encounters with wolves," he said, by being more vigilant, moving into the timber and gathering in smaller herd units.

Yellowstone Wolves are Food Distributors

Researchers have also determined that wolves, in the recent absence of hard winters, are now the primary reason for elk mortality. Before wolf reintroduction, deep snows were the main determinant of whether an elk was going to die. Researchers from the University of California at Berkeley determined that the combination of less snow and more wolves has benefited scavengers both big and small, from ravens to [grizzly bears](#).

Instead of a boom and bust cycle of elk carrion availability-as existed before wolves and when winters were harder-there's now a more equitable distribution of carrion throughout winter and early spring, said Chris Wilmers in the on-line journal Public Library of Science Biology. He added that scavengers that once relied on winter-killed elk for food now depend on wolf-killed elk. That benefits ravens, eagles, magpies, coyotes and bears (grizzly and black), especially as the bears emerge hungry from hibernation.

"I call it food for the masses," said Ed Bangs, wolf recovery coordinator for the U.S. Fish and Wildlife Service. He said he was genuinely surprised by the vast web of life that is linked to wolf kills. "Beetles, wolverine, lynx and more," he said. "It turns out that the Indian legends of ravens following wolves are true--they do follow them because wolves mean food."

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Unit 3 Reading Journal Questions:

1. Should no animal be allowed to be extinct? Is it our human responsibility to ensure this? Explain in at least 3 sentences.
2. Are you surprised that one species can have such a large impact on an ecosystem? Why/why not? What do you think would happen if the elk were eliminated from Yellowstone Park?
3. Can one person have as comparable of an impact on a community? How can you make an impact in your community? Explain in at least 3 sentences.