

Presence of wolves allows aspen recovery in Yellowstone

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The wolves are back, and for the first time in more than 50 years, young aspen trees are growing again in the northern range of Yellowstone National Park.

The findings of a new study, just published in *Biological Conservation*, show that a process called “the ecology of fear” is at work, a balance has been restored to an important natural ecosystem, and aspen trees are surviving elk browsing for the first time in decades.

The research, done by forestry researchers at Oregon State University, supports theories about “trophic cascades” of ecological damage that can be caused when key predators – in this case, wolves – are removed from an ecosystem, and show that recovery is possible when the predators are returned. The results are especially encouraging for the health of America’s first national park, but may also have implications for other areas of the West and other important predators.

After an absence of 70 years, wolves were re-introduced to Yellowstone Park in 1995, and elk populations began a steady decline, cut in half over the past decade. Also, the presence of a natural predator appears to have altered the behavior of the remaining elk, which in their fear of wolves tend to avoid browsing in certain areas where they feel most vulnerable. The two factors together have caused a significant reduction in elk browsing on young aspen shoots, allowing them to survive to heights where some are now above the animal browsing level.

“This is really exciting, and it’s great news for Yellowstone,” said William Ripple, a professor in the OSU College of Forestry. “We’ve seen some recovery of willows and cottonwood, but this is the first time we can document significant aspen growth, a tree species in decline all over the West. We’ve waited a long time to see this, but now we’re optimistic that things may be on the right track.”

The study found significant numbers of aspen, especially in streamside “riparian” zones, that have grown from tiny shoots in the past decade to heights of more than seven feet – a key point in their long-term survival, placing their crowns above the height easily browsed by elk and other animals. Tree growth in some stands has been particularly apparent just in the past 4-5 years.

The long-term decline, to the point of localized extinctions, of aspen and cottonwood trees in Yellowstone National Park dates to the extirpation of the last known wolf packs in the 1920s. Prior to the re-introduction of wolves, scientists found there were many small sprouting shoots of these important tree species, and numbers of large trees 70 years old or more – but practically nothing in between. High populations of grazing ungulates, primarily elk, had grazed on the small tree shoots at leisure and with little fear of attack.

But the ecological damage, researchers say, went far beyond just trees. The loss of trees and shrubs opened the door to significant stream erosion. Beaver dams declined. Food webs broke down, and the chain of effects rippled through birds, insects, fish and other plant and animal species.

Aspen, a beautiful hardwood tree with golden fall color, a key to ecosystem biodiversity and a hallmark feature of mountain areas across the West, has been the focus of concern. Unlike willows, aspen are more easily killed or suppressed by browsing and have been the slowest to

show any recovery. In some areas of the West, up to 90 percent of the aspen have disappeared.

“When I first looked at these degraded ecosystems in the mid-1990s in Yellowstone, I had doubts we would ever be able to bring the aspen back,” said Robert Beschta, a professor emeritus of forestry at OSU and co-author on the study. “There were so many elk, and the stream ecosystems were in such poor shape. The level of recovery we’re seeing is very encouraging.”

The OSU researchers say they believe there are two forces at work – both the lower populations of elk, and their changed behavior due to fear of wolves – but it’s difficult to determine exactly which force is the most significant.

Of note, they say, is that elk populations now are actually higher than they were in the mid-1960s, when aspen trees were still in significant decline. The major change from that period of time is the presence of wolves. The effect of behavioral changes “may be equal to or even greater than” lower elk population levels in allowing tree survival, the researchers said in their report.

“In riparian zones, where wolves can most easily sneak up on elk, and gullies or other features make it more difficult for elk to escape, we’ve seen the most aspen recovery,” Ripple said. “We did not document nearly as much recovery in upland areas, at least so far, where elk apparently feel safer. But even there, aspen are growing better in areas with logs or debris that would make it more difficult for elk to move quickly.”

This element of fear, the OSU scientists said, is a concept that is now getting more attention in ecology – it factors in not just the numbers or species of animals, but also their behavior and the reasons for that

behavior. Predators such as wolves or cougars, OSU researchers have shown, have the ability to strike fear into their prey and significantly change their behavior as a result.

The recovery of aspen, the researchers said, appears to have no link to climate or local terrain, since unbrowsed aspen in upland sites are growing just about as much as those in riparian zones. More details on this research and the findings can be found on the web at www.cof.orst.edu/cascades

“The issue of aspen decline in the American West is huge, and their recovery will depend on local conditions and issues in many areas,” Ripple said. “In northern Yellowstone, we finally have some good news to report. It’s just a start, but it’s a pretty good start.”

Source: Oregon State University

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