

Lessons from the Wolf (Part 1)

Directions: Read each section. When you see Stop and Think, stop reading and answer the corresponding questions on your worksheet.

Several scrawny cottonwood trees do not usually generate much excitement in the world of ecology. But on an August afternoon in Yellowstone National Park's Lamar Valley, William J. Ripple, a professor stands next to a 12-foot-high cottonwood tree and is quietly ecstatic. "You can see the terminal bud scars," which are lines that show that trees have grown over a foot in one year, Ripple says. "You can see that elk haven't eaten these trees this year, and in fact haven't eaten them since 1998."

Ripple points out that the valley currently has a few larger, older trees, but many young ones. Before 1995, the valley was home to many larger and older trees, without a newcomer in. These trees could have died out entirely, some experts believe, if wolves hadn't shown up in Yellowstone. And there lies a fascinating tale of how ecosystems work, and how making one change can produce all sorts of surprises.

Stop and Think - A

In the dead of winter in 1995 the National Park Service and the U.S Fish and Wildlife Service reintroduced 14 wolves into Yellowstone. Gray wolves (*Canis lupus*) from Canada, were the first to call Yellowstone home since the creatures were hunted out of existence there in the early 1900s. A year later, 1996, 17 more wolves were added.

Biologists hoped that the reintroduction would return the mix of animals to its more natural state. They expected for instance, that the wolves would stabilize the population of the many elk that lived in the park. When the wolves—once the region's top predators—were gone, the elk population had grown rapidly. And the new generation of *Canis* behaved as predicted. Sixteen packs of wolves, each composed of 10 animals, now roam the park, and each pack kills an average of one elk a day. The elk population, which had risen to 20,000 by the early 1990s, is now less than 10,000.

Stop and Think – B

William J. Ripple was the first to discover “the wolf effect.” When looking at photographs taken of the same spot in the Lamar Valley more than 50 years apart, he noticed that there were only tall, older trees in the 1920s but in the 1990s, young aspen and willow trees were abundant. He figured out that tree saplings (young trees) had disappeared at the same time the last substantial populations of wolves were killed or driven out of Lamar Valley.

The wolf-effect theory holds that wolves keep elk populations at a level that prevent them from eating up every tree sapling that sprouted out of the ground. When the wolves were killed off in the park because they were thought to be a menace, elk numbers soared, and tons of them consumed the vegetation, which, in turn, affected many other species.

After the wolves’ reintroduction in 1995 and 1996, their population increased fairly rapidly, which caused a drop in elk population. IF the wolf-effect hypothesis is correct, and wolves are greatly reducing elk numbers, the vegetation should be coming back for the first time in seven decades.

Along the Lamar River lie the skull, ribs, and spine of many elk. And all around, the trees are much taller than Ripple, some more than three meters high. Ripple and his colleague have indeed found trees and willows rebounding in Yellowstone as wolf numbers have climbed—but that is only part of the change occurring in the park.

Trees are coming back most dramatically in places where browsing elk don’t have a clear view of the area. Elk don’t feel safe in these areas, Ripple explains, because they can’t see what is going on all around and are nervous about spending time here. Just 50 meters away, however, where the land is level and wide open and the elk enjoy full view, the willows are less than a meter tall and have been browsed much more heavily over the past three years. “It’s the ecology of fear,” Ripple says.

Stop and Think – C

Lessons from the Wolf (Part 2)

Directions: Read each section. When you see Stop and Think, stop reading and answer the corresponding questions on your worksheet.

In 1995, scientists reintroduced wolves into the Lamar Valley of Yellowstone National Park. This action was taken as a direct result of the large elk population reducing the tree population to a point in which they could have died out entirely.

The wolf introduction has had numerous unexpected effects as well. The animal's impact on both biotic and abiotic factors of the park has been profound. Indeed, the breadth of change has been so far-reaching that researchers from around the country have come to study. "Wolves are shaping what you see here," says the leader of the Yellowstone Wolf Project. "In 30 years, when you drive through the park it will look very different."

Stop and Think – D

The wolf seems to have an incredibly long reach into other parts of the Yellowstone food web as well. One of its most dramatic effects has been on coyotes. Coyotes, researchers have found, have sacrificed a great deal to make room for the return of the wolves.

The number of coyotes in the park is down 50% and in core wolf areas, has dropped 90 percent. Male coyotes are smaller than they were before the wolves arrived. With fewer coyotes, their prey—voles, mice, and other rodents—have exploded in number. While this change has negatively impacted the vegetation (grasses and grains) that mice and voles feed off of, it has benefited red fox and hawks. Both red fox and hawk populations have been booming because of the abundance of mice and voles. The red fox prey on songbirds as well, and more foxes could mean a greater toll on birds.

Wolves have also thrown the doors to the Yellowstone meat market wide open. Unlike other animals, wolves are known to hunt down big elk. After they have had their fill, they wander away to sleep it off, or they get pushed off the kill by a grizzly bear. The presence of wolves has meant that much more meat is available on the ground, meaning an increase in scavengers (bald eagles, golden eagles, coyotes, ravens, etc). The largest number of ravens (135) on a wolf kill ever recorded was here.

Stop and Think – E

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.

Ten years ago, when the grey wolf was reintroduced into the Greater Yellowstone Ecosystem, there was only one beaver colony in the park. 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.

With elk on the move during the winter, to avoid wolf predation, willow trees recovered from intense browsing, and beaver rediscovered an abundant food source that hadn’t been there earlier. Ripple believes that the re-growth of vegetation has given beavers something to eat again. As the beavers spread and built new dams and ponds, the cascade effect continued. As more woody vegetation grows along the Lamar, it will stabilize the banks and stop some erosion. More vegetation, Ripple predicts, will also shade and cool the stream. It means, too, more woody debris in the Lamar will slow the river, causing water to pool, and improving the trout habitat, leading to more and bigger fish.

Stop and Think – F