Wolves, Fish, (Popes) and "Trophic Cascades"

By Nigel Douglas, AWA Conservation Specialist

Did you know that healthy wolf numbers can help to encourage bull-trout populations? Or that they can even have a beneficial effect on soil productivity? It is well known that wolves have a significant effect on the environment around them: on populations of prey species or on other carnivores, for example. But just how profound and incredibly varied that effect can be is only just beginning to be understood.

It has been known for some time that wolves can have a beneficial effect on other wildlife populations. In Banff National Park, studies have found (Hebblewhite and Nietvel, for example) that in areas where wolves have reduced the density of elk, rejuvenating willow scrub becomes host for a range of songbirds, such as American redstart. In contrast, near the town of Banff, where elk have learned to take refuge from predators, willow is heavily grazed. Diversity of songbirds here is much lower and species such as the redstart are absent.

Biologists refer to this process as a "trophic cascade." It occurs when predators in a food web suppress the abundance of their prey, thereby releasing the next lower level of the food chain from predation.

More recently, an October 25 article in the *Missoulian* ("Tracking science: Biologist's findings show forest diversity, health influenced by wolves,") detailed some surprising findings coming out of studies of wolves in Glacier National Park. Cristine Eisenberg of Oregon State University has been studying the diverse impacts of wolves for a number of years and her studies in Glacier National Park have been finding more and more direct and indirect effects of wolf populations.

Looking closely at aspen growth in some areas of the park, there are small young trees and there are tall old trees, but nothing in between. Wolves were resident in the region up until the 1920s, when they were hunted into extinction. Then in the 1980s, after a sixty-year absence, wolves began to return, finding their way south from Canada. For the 60 or so years in between, elk were allowed to graze on the aspen growth unmolested, and so very few new trees ever made it to maturity. Eisenberg, according to the *Missoulian*, said: "Being hammered over and over by an elk really stresses a tree. Pruning is healthy, but this is like pruning your roses way back every week or two. The trees become shrubs, essentially, little bonsai aspens."

Urban Dance Between Crocus and Sky, 23 by 30 in., mixed media.

Interestingly, there are still plenty of elk in the area – as many as 14 elk per square kilometre. The effect of wolves is less on elk numbers, more on elk behaviour. As Eisenberg puts it, "For 60 years we've become used to complacent elk. These elk aren't complacent. They're on high alert." Whereas in the absence of wolves, elk can lead the easy life, hanging around in one place and munching at their leisure, when there are wolves on the landscape, the elk learn to

Other recorded effects of wolf populations include:

- Beavers are reestablishing in northern parts of Yellowstone, from which they had disappeared. In the absence of wolves, elk browsing had removed the age-range of trees that beavers needed for dam building.
- Coyote numbers in Yellowstone have halved since return of wolves.
- Sightings of red foxes in Yellowstone are higher in areas with wolves. In the same way that larger wolves out-compete coyotes, the coyotes themselves out-compete the smaller red foxes

From: Sharon Levy, "A Top Dog Takes Over," National Wildlife, September 2004

be much more elusive. They nibble on a tree here or there and then move on.

Just like in Banff, where heavily elk-grazed willow scrub means less songbirds, so in Glacier National Park, aspen groves where wolves are present support four or five times as many songbird species as groves in places where wolves are absent. But the effects do not stop there. As “complacent” elk and deer munch comfortably on river-side willows, so the shady spots beloved by bull trout disappear. Insects feeding on the overhanging vegetation, which fall into the water to become fish food, begin to disappear too.

Removing wolves from the landscape also allows coyotes to flourish (wolves are much larger than coyotes and will kill them and take over their territories). One of the favourite foods of coyotes is ground squirrels, which play a major role in aerating soils and mixing leaf litter. So as wolves return, coyotes become scarcer and ground squirrels return to their soil restoration work.

Alexander Pope, the eighteenth century satirical poet, wrote ‘’From Nature’s chain whatever link you strike, Tenth or ten thousandth, breaks the chain alike.’’ Pope had presumably never heard of “trophic cascades” but he understood the concept.