



The Ecological Importance of Predators

Predators have profound effects throughout their ecosystems. Dispersing rich nutrients and seeds from foraging, they influence the structure of ecosystems. And, by controlling the distribution, abundance, and diversity of their prey, they regulate lower species in the food chain, an effect known as trophic cascades. Regrettably, the U.S. Department of Agriculture's Wildlife Services ignores the positive role that predators play in their surrounding habitat, as demonstrated through their reckless practice of killing large numbers of predators. Wildlife Services has a long history of persecuting predators, considered competitors for game animals such as fish and elk, and viewed as threats to livestock and agriculture. As a result, in many areas, large predators have been eliminated entirely and most of these species now occupy only a fraction of their historical distribution.

To help demonstrate the critical role that predators play in protecting and sustaining their surrounding environments, several predators are highlighted here:

Wolves

Wolves are one of the most closely studied predators whose ecological effects have been widely documented. Their extermination and subsequent reintroduction into areas like the Rocky Mountains has revealed to researchers that in areas where wolves are absent, unchecked populations decrease the abundance of native plant species, and their overgrazing leads to the general degradation of forests and riparian habitat;¹ this overbrowsing has also been linked to a decrease in neo-tropical migrant songbirds.² The reintroduction of wolves, however, restores these habitats, and additionally reduces coyote populations, thereby boosting pronghorn antelope and other small mammal populations.³ Furthermore, by increasing the availability of carrion throughout the year, wolves increase the food sources for raptors and other scavengers.⁴ Through their role regulating

prey species, wolves have a profound effect on the surrounding plant, bird, and mammal communities throughout the greater ecosystem.

Mountain Lions

While mountain lions are largely solitary creatures, with an expansive home range, their role as top predators has a significant effect on their ecosystem. Much like wolves, mountain lions affect vegetation by regulating ungulate species that browse in riparian habitat. For example, the loss of mountain lions in Yosemite National Park has been linked with a decrease in black oak recruitment.⁵ Similarly, in Zion National Park, the absence of mountain lions has led to a reduction in cottonwood trees. These changes in the plant communities have in turn led to greater stream erosion and a decrease in the number of terrestrial and aquatic species including wildflowers, butterflies, reptiles, and amphibians. In addition to affecting overall species diversity, the density of native fish is higher in areas with mountain lions than in those without.⁶

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Coyotes

Coyotes are often vilified for their impact on livestock and many efforts have been made to control their numbers. Extensive research has shown, however, that indiscriminate killing of coyotes through the use of aerial gunning, traps, snares, and M-44s does little, if anything, to reduce coyote populations or their predation rates. Most coyote predation is caused by alpha pairs that are less likely to be targeted by indiscriminate lethal control measures.⁷ Furthermore, exploited coyote populations have been shown to have increased juvenile reproduction and larger litters, which suggest that control measures may actually increase coyote populations.⁸ In cases where coyote numbers have been successfully reduced, other mesopredators such as foxes, badgers and raccoons, which coyotes often compete with and sometimes prey on, have increased significantly, thereby altering the surrounding ecosystem. 'Mesopredator release,' as this phenomenon is called, has been shown to decrease overall species diversity and density of smaller prey such as bird and rodent populations.⁹ Because birds and rodents are often either seed dispersers or seed predators, fluctuations in their abundance can have a corresponding effect on the surrounding plant community.¹⁰ Coyotes, therefore, play an important role in maintaining the balance of species diversity within their ecosystems.

River Otters

Although not traditionally thought of as top predators, river otters prey on a wide variety of animals including fish, crayfish, frogs, insects,

and birds. Their presence, therefore, regulates the population of these species lower in the food chain.¹¹ Additionally, otters play an important role in distributing aquatic nutrients in terrestrial ecosystems. For example, the presence of otter 'latrines' has been shown to increase the nitrogen content and growth rate of some plant species.¹² By contributing to primary production, river otters increase the prevalence and growth of the plant community in the surrounding riparian habitat.

Badgers

Badgers are fossorial carnivores meaning that they prey on animals that mostly live underground such as ground squirrels, marmots and prairie dogs, insects, lizards, and birds. Badgers also live primarily underground, creating extensive burrow systems that are used as shelter by other wildlife. When foraging, badgers use their strong sense of smell to locate prey and then penetrate the soil in targeted areas.¹³ This digging provides aeration and nutrient mixing, and helps maintain moisture to the soil, all of which aid in recruiting native plant species.¹⁴

Preserving the Balance of Ecosystems

Predators play a key role in maintaining the natural balance of ecosystems. Given the delicate and interdependent nature of the food chain, and the laws of trophic cascades and seed distribution, predators cannot be eliminated without risking the larger ecosystem. Killing off predators disrupts the natural balance of wildlife and their environment. Science-based, non-lethal approaches to predator control should be emphasized.



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¹ Ripple, W. J. and E. J. Larsen. 2000. Historic aspen recruitment, elk and wolves in northern Yellowstone National Park, USA. *Biological Conservation* 95: 361-370; Beschta, R. L. 2003. Cottonwoods, elk and wolves in the Lamar Valley of Yellowstone National Park. *Ecological Applications* 13: 1295-1309.

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³ Berger, K. M. and M. M. Conner. 2008. Recolonizing wolves and mesopredator suppression of coyotes: impacts on pronghorn population dynamics. *Ecological Applications* 18: 599-612.

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⁵ Ripple, W. J. and R. L. Beschta. 2008. Trophic cascades involving cougar, mule deer, and black oaks in Yosemite National Park. *Biological Conservation* 141: 1249-1246.

⁶ Ripple, W. J. and R. L. Beschta. 2006. Linking a cougar decline, trophic cascade, and catastrophic regime shift in Zion National Park. *Biological Conservation* 133: 397-408.

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¹¹ Gittleman J. L. and M. E. Gompper. 2005. Plight of predators: The importance of carnivores for understanding patterns of biodiversity and extinction risk. Pages 370-388 in Barbosa, Castellanos I, eds. *Ecology of Predator-Prey Interactions*. Oxford (United Kingdom): Oxford University Press.

¹² Crait, J.R. and M. Ben-David. 2007. Effects of river otter activity on terrestrial plants in trophically altered Yellowstone Lake. *Ecology* 88: 1040-1052.

¹³ Messick, J. P. 1987. North American badger. In: M. Novak, J. A. Baker, M. E. Obbard and B. Mallock (eds). *Wild Furbearer Management and Conservation in North America*. Ontario Trappers Association and Ministry of Natural Resources, Toronto, Ontario. Pp. 586-597.

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