

Coyotes and the Food Chain

Christopher Neill

If you drive the roads of Falmouth at dawn or dusk you likely have caught a glimpse of our local “top dog,” the eastern coyote.

Or maybe you’ve had dealings with a coyote in another way — when your cat fails to return, or your dog gives chase and comes back worse for wear, or less fortunately, does not come back at all.

Despite the downside to pet owners, I welcome these wild canids to our woods, which have gone far too long with a vacancy at the top spot in the food chain. In reality, we all probably don’t have a choice. Once established, coyotes are remarkably resourceful and notoriously difficult to eradicate.

When a coyote makes off with a cat or shakes a small dog to death, it is doing what it was born to do – killing other midsized predators. Now some new evidence is emerging that suggests that by doing what coyotes do, preying on other “mesopredators,” they improve the chances that a number of sensitive bird species will successfully reproduce.

This occurs through a series of interactions among species in the food chain, or in ecological parlance, “trophic cascades.” They work as follows. Coyotes are at the top of the food chain, or at the highest “trophic” level. Coyotes prey on mesopredators, like raccoons, opossums, striped skunks, and red foxes, which occupy the next lowest trophic level. Because these common mammals are much more efficient predators on bird nests than coyotes, birds, at a still lower trophic level, increase.

The high densities of mammalian predators, like raccoons, near urban areas and in woodlands that have been bisected or fragmented by human activities, especially residential development, are another piece of this picture. All of these mesopredators adapt very well to the edges around human settlements.

The thinking is that in the absence of top carnivores, the release of mesopredators in fragmented habitats reduces the population and diversity of small mammals, birds, and lizards that make up the bulk of mesopredator diets.

Raccoons and other mammalian predators can reach phenomenal densities in suburban areas. Seth Riley and colleagues from the National Park Service found 320 raccoons per square mile in Rock Creek Park in Washington, D.C. These exceed typical populations in rural areas by tenfold or more. This density of raccoons and other predators puts intense pressure on birds.

Biologist Michael Soulé has been the most vocal proponent of the “mesopredator release” hypothesis. He has used this to argue that reintroduction of large carnivores should be part of large-scale restoration of ecosystems where they were formerly eliminated by human persecution.

Soulé and colleague Kevin Crooks of the University of California at Santa Cruz published a recent study that supports their ideas. They examined the numbers of coyotes, other mammalian predators, and birds in remaining patches, or fragments, of California chaparral on the urban fringe of San Diego. They found that a higher number of coyotes was associated with a lower number of foxes and opossums. The simple presence of coyotes in a chaparral fragment had a negative effect on opossums, raccoons, domestic cats, and the total number of mesopredators.

At the same time, the diversity of shrub birds, many of them species whose overall populations are declining from habitat loss, was higher in fragments with larger numbers of coyotes.

In another study from southern Michigan in 1999, C. M. Rogers and M. J. Caro found that the breeding success of song sparrows increased after coyotes invaded woodlots that were surrounded by cultivated fields. Song sparrows are susceptible to nest predation because they nest on or near the ground. The number of nests that produced at least one young went from less than ten percent without coyotes to thirty percent when coyotes were present. Rogers and Caro also showed that the density of raccoons was inversely correlated with song sparrow reproduction.

Interestingly, Crooks and Soulé's study of suburban San Diego found that cats were by far the most abundant predator in their chaparral fragments. By surveying surrounding residents, they estimated that a modest-sized fragment of fifty acres was visited by approximately thirty-five hunting cats from surrounding houses. That compared with only one to two pairs of native predators, such as gray foxes or coyotes. They concluded it was the coyote-cat interactions that had the greatest effect on birds.

Free ranging cats are notorious predators of wild birds. A study of cat predation in an English village in 1987, which is fast becoming a classic, found that a population of 70 domestic cats captured more than 1000 birds and small mammals in one year, including 22 species of birds.

Birds that nest in fragmented woodlands, especially in suburban areas, face a number of hardships, such as changes to forests and high densities of other predators such as jays and crows that are not likely to be influenced by coyotes.

But one effect of our newest top carnivore is that many cat owners have learned their cats are safer indoors. This, in the end, may be the largest — though indirect — effect of coyotes that ultimately cascades down to benefit birds. 

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