Coyotes in the East: Are They Impacting Deer?

John C. Kilgo, Research Wildlife Biologist
USDA Forest Service Southern Research Station

Many hunters and landowners in the eastern United States have expressed concern in recent years about the number of coyotes they are seeing and whether coyotes might be affecting deer and other wildlife. Coyotes have long been known to be effective predators of fawns and other small animals in the West, but eastern biologists have generally not considered coyotes a management problem. However, recent research indicates that predation by coyotes may be more of a concern than previously thought. Much of this work has been conducted at the U.S. Department of Energy's Savannah River Site (SRS), a 300 square mile, forested area in western South Carolina where concerns over the possible effects of coyotes on deer prompted the research. The first step was to study the coyotes themselves—their population size, their movements and habitat use, survival and mortality, and food habits. This work later led to more direct assessments of their impact on the deer population.

Some Coyote History

It is important to understand that coyotes did not historically occur in eastern North America. They were native to the western plains from southern Canada to Mexico. Now, however, they have expanded their range in all directions to include most of the continent. Habitat change, primarily the clearing of land, which resulted in more open, early successional habitat, and the removal of gray wolves allowed for movement of coyotes into the Northeast from the Midwest.

Colonization of the Southeast was expedited by the direct translocation of coyotes by fox hunters, who released coyotes into large enclosures called "fox pens" in which the coyotes were hunted with hounds. Coyotes occasionally escaped the fox pens and established isolated populations, which grew and merged over time.

The eastern U.S., from Maine to Florida, is now fully occupied by coyotes, though many eastern states have only seen well-established populations within the past couple of decades. Thus, coyotes are still very new to many areas and much remains to be learned about how they function ecologically in the region. The species is clearly highly adaptable to a wide range of conditions.

Coyote Ecology

Habitat

In contrast to the open nature of the historic western range of coyotes, much of the eastern U.S. is forested. This drastic difference in habitat may affect coyotes in many ways and makes it difficult to apply what we know of western coyotes to the newly established populations in the East. For example, with different foods available to them, eastern coyotes necessarily differ in what they eat. Other characteristics such as habitat use, daily and seasonal movements, social organization and behavior, and size may also distinguish them from their western counterparts.

Appearance

In Georgia and South Carolina, coyotes average 28.5 pounds in size and in Maine, 33 pounds. Coat color ranges from light tan to black. Some eastern populations have a higher incidence of black coloration, but there is no evidence that this results from hybridization with dogs. At SRS, approximately one-third of coyotes are black, a relatively high proportion.

Mating and Relationships

Coyotes mate only once a year, during winter. Pups are born 63 days later,

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usually in April. Litter sizes range from three to seven pups. Coyote dens may be in brush piles, rock crevices, enlarged burrows of other animals, or any suitable hole. They may use more than one den, particularly if the active den is disturbed. Pups emerge from the den within two to three weeks of birth and are usually weaned at about two months of age, but they remain with the parents until the fall.

In the South, coyotes rarely form persistent packs. Mated pairs occasionally travel together, and during summer and fall, pups of the year may also be present. However, it is unusual to see more than two coyotes together; most often, coyotes are solitary.

Howling is a means of communication that occurs throughout the year, but it peaks during the winter months, when pair bonds are being established. A howling sequence often consists of a very rapid series of yips and howls, and when two coyotes perform this yip-howl together, the impression can be of a large "pack" with many individuals.

Life Span

Coyotes rarely live more than a few years. Where trapping and hunting pressure is heavy, few live more than two or three years. Humans account for most coyote deaths through hunting, trapping, or vehicle collisions. Other causes of death include disease and accidents. At SRS, the annual survival rate of 33 radio-collared coyotes monitored over a 2-year period was 66 percent. In other words, one-third of the adult population died every year. At least 60 percent of the mortality was from anthropogenic sources, despite the fact that no shooting or trapping occurred on the study area. Because coyotes move over large areas (home range size at SRS averaged over 12 square miles, with some transient individuals covering much more ground), the radio-collared animals occasionally left the SRS and were then vulnerable to trapping and shooting.

Diet

The coyote diet is highly diverse and varies markedly through the year. One of the reasons coyotes have been so successful is that they eat just about anything, from garbage to insects to fruit to other animals. However, at any particular time, coyotes typically focus on just a few abundant food sources.

At SRS, food preferences were assessed on a monthly basis through examination of scat contents. During months in which natural fruits are available (May through November) fruit is always the number one food item, with the particular species depending on what is fruiting at the time and the size of the annual crop: in May, wild plum; in mid-summer, black berry and black cherry; and in late summer and fall, pokeweed, persimmon, and muscadine.

Plant material, which remains a significant if less important part of the diet throughout the year, is replaced during the winter and spring by mammals. Wild hog carcasses, rabbits, squirrels, and other small mammals are eaten throughout the year but are most important during the winter, while deer fawns are important during the spring and early summer. Large insects, particularly beetles and grasshoppers, are frequently eaten during summer. Interestingly, birds, though occasionally taken, are never an important part of the diet. Other mammalian food items recorded include beaver, armadillo, raccoon, opossum, and gray fox.

Impacts on Deer

So what about deer? The SRS fawn research began in 2005 and is ongoing. The approach of the study is to capture, radio-collar, and monitor a sample of fawns to determine the proportion that die and, in particular, the proportion that die from coyote predation. This number can then be plugged into statistical population models to assess whether the amount of mortality caused by coyotes is sufficient to explain the decline in the deer population.

Each radio-collar is equipped with a

motion-sensitive switch that changes the signal emitted by the collar when it has not moved in four hours, thereby indicating that the fawn is dead (fawns rarely remain motionless for four hours). By checking the signal from each fawn frequently, researchers are then able to determine when a fawn died, and therefore how old it was at death.

When a "mortality signal" is detected, the transmitter and carcass are recovered and an attempt is made to determine the cause of death. Whether the predator was a coyote or bobcat (essentially the only two possibilities at SRS) can be determined from evidence at the scene. Coyotes and bobcats cache their prey in different manners and leave different sign. For example, coyotes often bury a carcass in the ground, whereas bobcats only scrape litter over it. Bobcats may leave scratch marks on nearby trees or logs. Coyotes occasionally defecate near the carcass to "mark" it. Tracks may be visible if there is exposed moist soil. A field necropsy is performed on the fawn to examine the pattern and location of bite wounds and the distance between canine punctures, which can also aid in predator identification. Finally, residual predator saliva is collected from bite wounds using a cotton-tip swab. Genetic analysis of saliva can reveal not only the species of the predator, but can also identify individual animals. This information indicates whether just a few experienced predators or all of them kill fawns.

To date, the SRS research has found that coyotes are, in fact, taking a tremendous toll on fawns. Of 60 fawns monitored over the course of the work, only 16 have survived until autumn, when they are old enough to be safe from predation and can be considered part of the huntable population. That means that 44 fawns, or 73 percent, did not survive. Predation by bobcats and coyotes has accounted for all but one of the deaths. The great majority of the predation, though, has been by coyotes: 36 of the 44 (82 percent) have been either confirmed or probable coyote predation, 6 have been bobcat predation, and 2 have been attributed to unknown predators.

The risk of predation is greatest in the first month of a fawn's life. By about 6 weeks of age, they seem generally able to evade predators, and no fawns have been killed by predators after 10 weeks. Genetic analysis has revealed that many different coyotes kill fawns, with only two individual coyotes being responsible for more than one kill.

Population models show that this level of mortality is more than sufficient to explain the decline that has been seen in the SRS deer population, but does it mean that coyotes represent a threat for deer across the Southeast? The density of the SRS deer population is very low, so the effects of predation may be especially magnified. However, the statewide deer population in South Carolina has declined approximately 30 percent since the mid 1990s. How much of that broader decline can be attributed to coyotes versus other factors such as large-scale changes in habitat conditions is uncer-

tain, but the SRS data demonstrates that coyotes are capable of inflicting severe losses on deer populations.

Management Options

Knowing that coyotes eat a lot of fawns, hunters inevitably will ask what can be done about it. There are no easy answers, but the first step is to consider the situation and the management goals of a particular property. Many parts of the Southeast, particularly urban areas with limited hunting, still have problems with over-abundant deer. In such areas, some predation losses may actually be helpful to deer managers. Researchers at Auburn University found that coyote predation was the leading cause of fawn mortality in suburban areas around Auburn, Alabama. High-density deer populations in rural areas may also benefit from the additional controlling influence of coyotes, especially if hunters are not able to achieve adequate control through doe harvest.

On the other hand, if a deer population appears to be declining or is at a low density, coyote predation may well be responsible. In this case, two possibilities exist: attempt to limit predation by reducing the number of coyotes or attempt to increase production by increasing the number of does. Although there is some disagreement among biologists as to whether coyote control can be effective, a recent University of Georgia study conducted in northeastern Alabama documented higher fawn to doe ratios (indicating increased fawn survival) following an intensive predator removal program.

However, coyote control can be very expensive and time consuming, and it generally requires the efforts of an experienced trapper; occasional shooting will have little to no effect. It must be done over a fairly large area because of the wide-ranging nature of coyotes, and it must be done as close in time to fawning season as possible (late winter is better than fall) because transient coyotes will quickly move in where resident coyotes have been removed. For the same reason, it must be conducted year after year. In short, this is not a feasible option for most landowners.

Increasing the number of does in the population by limiting harvest is a more easily achieved option, but less attractive for hunters who like to harvest does. Unfortunately, limiting doe harvest may be the only option available in most cases. Based on the SRS data, some deer populations simply cannot sustain both coyote predation and heavy doe harvest, at least at the levels to which hunters became accustomed during the 1980s and 90s. Something will have to give, and hunters tend to be easier to control than coyotes. Whether doe harvest will need to be substantially curtailed or just slightly restricted will depend on many factors specific to the local situation, but some adjustment may be necessary in many areas.

Conclusion

Regardless of whether they have positive or negative effects in any particular situation, the now-widespread abundance of coyotes means that deer managers and hunters will need to consider this new source of mortality in deer populations. For better or for worse, this fascinating and adaptable animal is here to stay. ◆

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