

Coyotes, Deer, and Hunters
Making Room for the New Kid on the Block
By Gerry Lavigne, Wildlife Biologist

The arrival of the Eastern Coyote (*Canis latrans*) into the Northeastern US and Maritime Canada has had a profound impact on wildlife ecology of the region, and on how man utilizes wildlife resources. For thirty years (1975-2005) I served as the Department of Inland Fisheries and Wildlife's deer management and research biologist. During that tenure, we struggled to maintain viable populations of white-tailed deer in the face of major habitat changes, increasing hunter demand, and the presence of a new deer predator.

Gray wolves and mountain lions died out during the late 1800s in the Northeast. For at least three quarters of a century, Maine lacked a canine predator that could efficiently kill white-tailed deer. During this era, bobcats, black bears, and man comprised the major deer predators. Wherever access to hunters was good, deer populations could be held in check using our 3 to 5 week hunting seasons coupled with regulations that allowed a hunter to choose a buck or a doe (either-sex hunting). Where hunting access was poor, as in the big woods section of northern and eastern Maine prior to the 1970s, deer populations were more difficult to control, despite the presence of black bears and bobcats. It's hard to imagine now, but deer in the northern half of Maine experienced several cycles of extreme abundance followed by a crash to low numbers between the 1880s and early 1960s. Deer populations typically built up slowly to high numbers, at which time hungry deer over-browsed their food supply. Population crashes were more rapid, usually in response to severe winters.

Since the 1960s, deer populations in the northern half of Maine have been steadily declining, and they appear to be limited by mortality factors that were not present earlier. Predation by coyotes, and degradation of wintering habitat have combined to play a deciding role. Even in the more deer-friendly central and southern parts of Maine, deer mortality patterns have changed since the arrival of the coyote. And this in turn, has reduced the number of does that can be safely taken by hunters over the years.

Coyotes are not native to Maine or to the Northeast. Into the vacuum created by the disappearance of gray wolves, coyotes began to migrate across the northern tier of Midwestern states and adjacent parts of Canada. Along the way, they evidently interbred with remnant populations of wolves. Hence, eastern coyotes are mostly coyote and part wolf, genetically, physically, and behaviorally. Compared to their western cousins, eastern coyotes are larger (25 to 45 lbs.; rarely to 60lbs.), their family groups tend to stay together longer over the course of the year, and they are more efficient deer predators. Mainers began encountering coyotes in the 1950s, and coyotes were distributed statewide at peak numbers by the late 1970s. Southeastern Quebec got coyotes slightly earlier, while New Brunswick and Nova Scotia were colonized somewhat later (mid to late 1980s).

Coyotes and hunters have one thing in common -- they both love venison! But unlike the much larger gray wolf (70 lbs. to 120 lbs.), coyotes can readily thrive on smaller prey during most of the year in Maine. The eastern coyote has been described as the ultimate opportunist, but that really describes all predators. No hungry carnivore will pass up an easy meal! The coyote's advantage is in its size. As a mid-sized carnivore, the eastern coyote can efficiently

prey on mice, songbirds, turkeys, snowshoe hares, raccoons, beaver, fawn and adult deer, and even your pet cat and dog, when the opportunity presents itself. To round out their diet, coyotes are not averse to dining on fruits and carrion, both from the wild and from agricultural sources. Such flexibility in acquiring its groceries enables the coyote to thrive almost anywhere in the Northeast.

Coyote predation on deer has been researched extensively by state, provincial, and federal fish & wildlife agencies, as well as universities, on both sides of the US border in the Northeast during the past four decades. Studies run the gamut from analysis of coyote scat, snow tracking of coyotes, radio telemetry of coyotes and/or deer (including young fawns), and examination of coyote-killed deer. Much has been learned, yet coyote/deer interactions are as complex and variable as the weather in this part of the world. There are a couple of excellent reviews of coyote/deer research available at this time. One is a book published in 1995 by Canadian wildlife biologist Gerry Parker titled: Eastern Coyote. The Story of Its Success. Another more recent review (2008) was produced by wildlife biologists Pete Pekins and Matt Tarr for the Cooperative Forestry Research Unit at the University of Maine. This scientific report is a critical analysis of the winter ecology of deer in northern Maine deer wintering areas (CFRU Research Report RR-08-02).

It has been widely stated that coyotes only kill the old, weak or sick deer in the population, thereby culling the herd of unfit individuals that would soon die anyway. Well, our coyotes do readily take any unfit deer they encounter. What predator wouldn't do so? But research has shown that eastern coyotes are capable of killing perfectly healthy deer under several, sometimes common, conditions. Coyotes can and do prey non-selectively on deer when deep snow prevents escape. A deer run off of its trail in a deer yard in two feet of snow soon flounders in that belly-deep snow, and can become exhausted, defenseless, and dinner for coyotes regardless of the physical condition of the deer at the beginning of the chase. Snow depths exceeding two feet are the norm in northern Maine for weeks on end. In central and southern Maine, deep snow winters occur less frequently, and for shorter durations within a given winter.

Glare ice on lakes, ponds and streams also favors non-selective predation by coyotes. Deer hooves offer little traction on glare ice; coyote claws do. Since nearly all deer wintering areas occur along Maine waterways, conditions that tip the scales in favor of coyotes can be commonplace, and devastating for deer when they occur.

The quality of wintering habitat available to deer can influence predation rates by coyotes. Deer seek out dense, tall coniferous forests during winter. The canopy of mature spruce, balsam fir, hemlock, and cedar forests shelters deer from the wind, provides a source of food, and reduces the depth of the snow underfoot. Dense conifer canopies are so efficient at intercepting snow, that snow depths there are typically one-half that in nearby openings or in hardwood forests. Extensive tracts of mature conifer forests allow wintering deer to create and maintain an extensive system of trails that aid in finding food and escaping predators. Disturbances that fragment these forests, reduce their size, or excessively thin the canopy will cause increased snow depth, reduced foraging ability for deer, and higher losses to coyote predation and malnutrition. During the past 40 years, northern and eastern Maine conifer forests have been extensively altered by the spruce-budworm infestation, and logging. Many forests that once sheltered deer can no longer accommodate them; others remain, but are not

in optimum condition; some remain viable. Despite the importance of wintering habitat quality, coyotes can still successfully kill some deer, even in the best quality deer yards. Consequently, deer can be held below the forage carrying capacity of otherwise intact, viable deer wintering habitat.

Winter severity greatly affects deer survival. Long winters with prolonged cold and deep snow take their toll on deer. Quality habitat helps, but too often deer are losing a race against time. All winter long, deer are subsisting on poor quality foods, and continually losing weight. Deep snow that restricts deer to trails exacerbates the problem of finding adequate food. After 10 to 12 weeks of severe nutritional deprivation, deer mortality due to malnutrition becomes evident. Fawns and mature bucks are usually the first to die; mature does are the most resilient. During severe winters, losses to malnutrition and coyote predation both increase. Because they can prey on healthy deer in deep snow, winter losses are higher in the presence of coyotes than where they are absent, when severe winters occur. In other words, deer losses to coyotes don't merely replace starvation losses, they add to them to some degree.

Although less well documented, coyotes do at times kill adult deer during snow-free months. Some of these losses occur during spring, when deer weakened by the previous winter, are moving onto summer range. Other losses occur during summer and fall, when one would expect most deer to be in good physical condition. It is possible that cooperative hunting by two or more coyotes comprising a family group (another wolf-like trait) may tip the scales in favor of the coyote. Deer losses to coyotes outside of winter are less frequent than are losses during winter. In most areas, other foods are more readily available to coyotes during the snow-free months.

Like many other mammalian predators, eastern coyotes target newborn deer fawns during June and July. Fawns are relatively defenseless when moving, they often occur in predictable habitats, and they provide a sizeable meal for hungry pups in the coyote den. Coyotes, along with black bears, bobcats, red fox, fishers, and feral dogs, may collectively exert a profound impact on early fawn survival and the viability of deer populations.

The Fish and Wildlife Department does not routinely estimate how many deer are lost to coyote predation annually in Maine. That number undoubtedly varies by year anyway. Yet, the addition of this new predator has to some degree added to herd losses, not merely replaced others. In a report to the Maine Legislature during 1995, I estimated that roughly 22,000 deer were lost to coyotes at a time when hunters harvested about 30,000 deer, and the statewide herd numbered about 200,000. Any time that a single mortality factor approaches 10% of the deer population, given all the other mortality deer experience, deer managers need to take notice. And we did!

In Maine, we were aware by the early 1980s that deer mortality was too high and unsustainable. At the time, the most promising approach was to reduce hunting mortality to offset higher natural losses, including coyote predation. We initially shortened our either-sex hunting seasons in the western mountains area (1980 to 1982). This was followed by bucks-only hunting and a limited number of either-sex hunting days in various zones within Maine during 1983 to 1985. From 1986 to the present, we have used any-deer permits issued to a limited number of hunters in each of 29 or 30 wildlife management districts comprising Maine. All other hunters could only take an antlered buck. This enables the Department to control the doe harvests as needed to achieve population objectives.

During the past three decades, hunters have borne the brunt of offsetting higher natural losses among deer by dramatically reducing their harvest of antlerless deer. On average, hunters in deer-friendly central and southern Maine have had their doe and fawn harvests cut by at least one-third, compared to pre-coyote times. In eastern and northern Maine, antlerless deer hunting is no longer allowed during most years. And at best, doe harvests are but a tiny fraction of what had formerly been sustainable.

From a deer management perspective, there really are two Maines. In central and southern Maine, overall deer mortality is lower, fawn survival is higher, and deer populations are more resilient to changes in mortality, as when the occasional severe winter occurs. In this region, deer populations consistently respond to deliberate changes in the hunter harvest of does and fawns. Deer populations vary greatly depending on hunting access, but range from 10 to 20 per square mile where adequately hunted, to more than 50 per square mile elsewhere.

In the northern half of the state, overall deer mortality is consistently higher, given the normally severe wintering conditions that prevail. In contrast with the south, fawn survival appears to be consistently lower, which greatly limits the ability of the herd to grow. To date, complete cessation of hunting opportunity for antlerless, at best, has only slowed the rate of decline of northern Maine deer populations. Although essential to prevent complete loss of deer populations, the Department's sole reliance upon manipulation of hunter harvests has been insufficient to allow deer populations to increase. Moving northern and eastern Maine deer populations onto a positive trajectory will require a sharp reduction of non-hunting mortality. Currently, northern and eastern Maine deer populations are measured in fractions of a deer per square mile in many areas. During the pre-coyote, pre-spruce budworm era, deer density in the northern half of Maine commonly exceeded 10 to 20 deer per square mile.

The precipitous decline of Maine's white-tailed deer population has been accompanied by a proportionate loss of hunting opportunity and the economic benefits that hunting and wildlife watching brings to rural economies in the state. After decades of lost opportunity, hunters and non-hunters alike are wondering if deer losses can be lessened by controlling coyote abundance. Why should coyote populations be allowed to remain at their peak, if these densities negatively impact deer population recovery? If wildlife agencies manage other species of wildlife to offset negative consequences, why not actively manage coyote populations? Many wildlife biologists and others believe that coyote populations cannot be successfully managed at lower densities. The truth is that no one really knows. It has never been attempted here in the Northeast, at least on a large scale.

The concept of reducing coyote populations over large areas using properly-timed applications of foothold trapping and hunting is being advocated here in Maine. If the effort gets off the ground, it may prove to be an interesting experiment! For a long time now, hunters have had to accommodate a competing deer predator. Perhaps now this competition can be diminished somewhat. Eastern coyotes are a valuable, but underutilized renewable furbearer resource. In addition, coyotes are challenging to hunt, and a growing number of hunters are pursuing them. Increased hunting and trapping pressure prior to winter may temporarily reduce coyote abundance. As a result, a diminished presence of coyotes on the landscape may allow deer populations in the northern half of the state to become sustainable and economically viable again, for the people who work and recreate there. Time will tell.