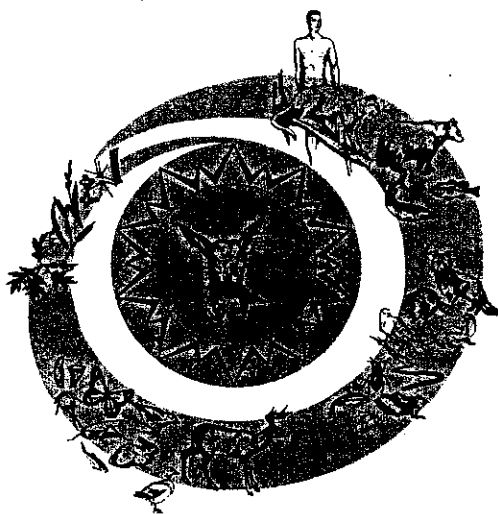


NEW YORK'S WILDLIFE RESOURCES

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Eastern Coyote (*Canis latrans*)

Description

The eastern coyote resembles a medium-sized, shepherdlike dog with a foxlike muzzle and large erect ears. Most have a variegated coat consisting of various shades of brown, blonde, white, gray, black, and/or rufous that often produces an overall grayish appearance. Individual hairs from the back frequently have four bands of color. The lips are often bordered by white. The throat and underside are commonly white or buff. The back of the ears, flanks, and lower legs are usually rufous, especially the ears. Predominately black hairs are most numerous on top of the head, along the back and down the shoulders. The sides are commonly various shades of tan and gray. The straight, bushy tail usually has a black tip and has a black spot on the upper surface near the base.

Although most eastern coyotes have this variegated coat, predominately blonde or rufous individuals are occasionally observed. A thin, relatively short, summer coat contrasts sharply with a long, luxuriant winter coat characterized by long guard hairs and dense underfur.

Eastern coyotes closely resemble their western counterparts except for their larger size, and some less noticeable differences. Eastern coyotes average 16 kg (35 lb) and 14.5 kg (32 lb) for adult males and females, respectively. Few eastern coyotes exceed 22.7 kg (50 lb). Western coyotes generally average 3-4 kg less. A large frame and long, full coat belies the eastern coyote's slender build. Some size characteristics of New York State coyotes are presented in Table 1.

Table 1. Some average size characteristics of coyotes in New York State.^a

Measurement	Adult ^b female coyotes		Adult ^b male coyotes	
	cm	(in)	cm	(in)
Total length	119.9	(47.2)	124.0	(48.8)
Tail length	35.4	(13.9)	36.3	(14.3)
Hind foot length	19.3	(7.6)	20.3	(8.0)
Ear length	10.6	(4.2)	11.6	(4.6)
Weight	kg	(lb)	kg	(lb)
	14.7	(32.4)	16.1	(35.5)

^aData collected on 163 New York State coyotes by Peter Gaskin (pers. comm., 1982).

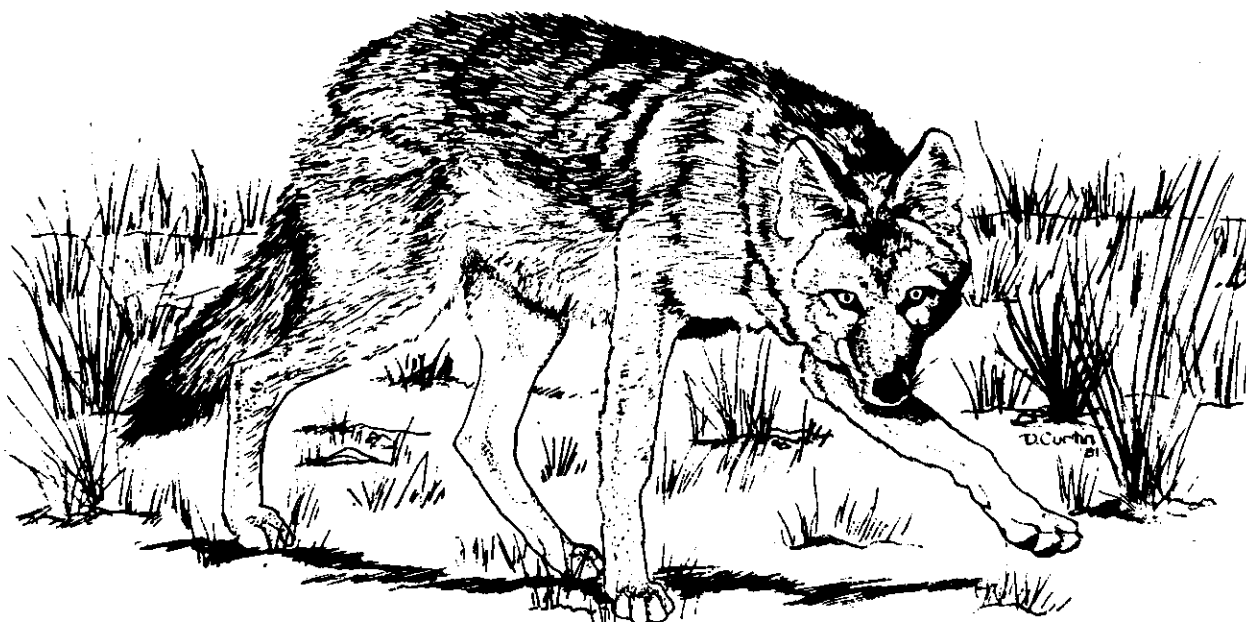
^bApproximately 80% of sample was over 8 months of age, with remainder 6 to 8 months of age.

Differentiation of Eastern Coyotes from Other Wild Canids

Some shepherdlike dogs are occasionally mistaken for eastern coyotes when observed at a distance. Similarly, eastern coyotes are occasionally mistaken for the eastern timber wolf (Canis lupus). Two- to 3-month-old coyote pups are even mistaken for adult gray foxes.

German shepherds, huskies, and various mongrels superficially resemble eastern coyotes in size, coloration, and fullness of coat. However, these dogs differ from eastern coyotes by some combination of the following physical characteristics: broader forehead; shorter, broader muzzle; shorter, more blunt canines; heavier build; feathering along the tail or legs; ability to curl tail over the back; lopped ears; winter coat that lacks dense underfur and long guard hairs; or the absence of individual hairs with more than three bands of color.

The key feature distinguishing wolves from eastern coyotes is their larger size. In southern Ontario (the population closest to New York), adult male timber wolves average slightly under 27 kg (60 lb), with females averaging around 4.5 kg less. Therefore, some size overlap exists between



small female wolves and large male eastern coyotes. Wolves, however, invariably have more massive skulls (particularly noticeable is the broad forehead) than eastern coyotes, regardless of weight. Other distinguishing characteristics of wolves include their seemingly out-sized feet (especially their forefeet), their relatively smaller, more rounded ears, and their habit of holding their tail parallel to the ground while running (coyotes hold their tail down). Pelage (coat) characteristics are similar to those of eastern coyotes. The distinctive, long, drawn out howl of wolves lacks the prevalent yip-yapping characteristics of eastern coyote vocalizations.

Wolves, coyotes and dogs are very closely related taxonomically and are potentially capable of breeding with one another. Analyses of various skull characteristics suggest that eastern coyotes may have a trace of domestic dog or wolf in their ancestry. Where well-established eastern coyote populations exist, the vast majority of the population breeds only with other coyotes. However, cross-breeding with dogs occasionally occurs at the periphery of coyote populations, resulting in coyote-dog hybrids known as "coydogs". These first generation hybrids have physical characteristics of both parents and generally resemble mongrel dogs more than coyotes (unless the dog is coyotelike in appearance).

Although coyote-dog hybrids are fertile, there is a reduced likelihood of successful breeding with coyotes or other fellow hybrids. Research with captive hybrids has shown that both males and females are seasonal breeders, but they are sexually active approximately 3 months before eastern coyotes. Survival of offspring from hybrid x hybrid matings are undoubtedly low in the wild for the following reasons: (1) due to the advanced breeding season, pups are born in mid-winter, a time of extreme cold and food scarcity in the Northeast; (2) unlike male coyotes, male dogs and hybrids exhibit little or no parental care of pups; and (3) hybrids may inherit physical and behavioral characteristics that make them poorly adapted for survival in the wild.

Signs

The most distinctive evidence of coyote presence is their howling. Howls may be given by individuals, pairs, or groups, usually at night. Coyotes are most frequently heard during mid-summer, early fall, and in late winter during the breeding season. The lone howls of individuals are often immediately preceded by one or more sharp barks, the last blending into a howl that is generally less than 2 seconds in duration. Coyotes are reknowned for their "choruses" (group yip-howls), in which the lone howls of an individual are joined with the howls of other family members. The howls become greatly frequency modulated and are interspersed with yips. The entire chorus usually lasts for 20-60 seconds, often ending with barks. Two or three coyotes yipping and howling can easily be mistaken for twice as many individuals.

Barking by itself may be used as a warning or to signal alarm. Lone howls may serve to locate other group members. Group yip-howls may advertise territorial claims and help to maintain family cohesion.

In addition to these "long-range" vocalizations, coyotes use a variety of short-range vocalizations, including whines, woofs, growls and combinations thereof, similar to those of domestic dogs. Coyotes, especially juveniles, will respond vocally to many sounds resembling their own howls. Human imitations of coyote howls are frequently successful, particularly during late summer and late winter.

Coyote tracks are difficult to distinguish from those made by some dogs. However, coyote tracks are more elongated than those of many dogs. Front tracks are approximately 5.7-7.0 cm (2 1/4-2 3/4 in) long and 4.4-6.0 (1 3/4-2 3/8 in) wide. Hind tracks are 5.1-6.0 cm (2-2 3/8 in) long and 3.8-4.8 cm (1 1/2-1 7/8 in) wide. The heel pad of the hind foot is smaller and a different shape than the heel pad of the front foot. The tracks of a walking coyote follow a relatively straight line due to the coyote's narrow thorax and pelvis. Walking tracks are spaced about 33-40 cm (13-16 in) apart. When a coyote is galloping, its leaps may exceed 150 cm (59 in).

Besides tracks, coyotes leave other signs of their presence. Coyote scats (feces) are often found along trails. These are highly variable in size and texture. Scats from adults are about 2.5 cm (1 in) in diameter and from 7.5-15 cm (3-6 in) in length. Varying with the animal's diet, the scats range from a semi-liquid to firm cylinders packed with hair. If its diet has consisted of nuts or raspberries, the scats may crumble into piles of shells or seeds.

History, Distribution, and Abundance

Little is known about the distribution and abundance of the eastern coyote in New York before 1940, after which the coyote population increased and expanded its distribution dramatically. Consequently, its genetic heritage, natural history, and future in New York State are not completely understood.

Although coyote remains have been found in cave deposits and at sites of ancient Indian villages along the east coast dating from the latter part of Ice Age to about 1,000 years ago, early settlers made no specific reference to the presence of coyotes. In contrast, the presence of timber wolves in the north and the smaller red wolves (Canis niger) in the south were noted frequently.

The earliest records of coyotelike canids in New York in this century were from the northern and western Adirondack regions in the 1920's and 1930's. By the late 1940's a viable population of eastern coyotes was established in the Adirondacks. The origin of these Adirondack coyotes is still debated. An eastward expansion of coyote range from west to east across Ontario preceded the coyote's appearance in New York. Many researchers believe that coyotes dispersing from Ontario across the St.

Lawrence River during winter were the principal, if not only, source of New York's coyotes. The possible wolf and/or dog influence would most likely have been the result of interbreeding along the front of the expansion through the Northeast.

Another hypothesis on the origin of our present coyote population is that the eastern coyote may have been present during the early colonial period and not differentiated from the eastern timber wolf by Europeans. If so, a small number of these canids (unlike the wolf) may have eluded extirpation and habitat alteration in remote areas like the western foothills of the Adirondacks, eventually providing the seed stock for a population expansion in the 1940's. Unfortunately, bounty records and documentation of canid sightings and kills from that time period are scanty. The controversy over the origin of our coyotes may never be settled.

The coyote's current distribution extends from northern Alaska and much of boreal Canada south to Central America. Only a few southeastern states do not yet appear to have viable coyote populations. In New York State the coyote has been recorded in all regions except for New York City and Long Island. Population densities vary greatly with local conditions in New York. The densest populations presently occur in the Adirondacks, the Tug Hill Plateau and the St. Lawrence Plains. Wildlife biologists estimate the coyote population of New York State at 5,000 to 12,000.

Life History

In the northeastern United States, male coyotes are able to breed from about December through March, but females are receptive for only a few days, usually in February. Coyotes are generally monogamous (one male breeds with one female) and a pair may mate for several consecutive years. In contrast to their western counterparts, eastern coyotes do not appear to breed until their second winter.

Enlarged fox or woodchuck dens, thickets, hollow logs, natural "caves" under rock ledges or roots, dry culverts, and deserted buildings may serve as coyote dens. An average of six pups are born in a den in April or early May after a gestation period of about nine weeks.

The development of coyote pups is similar to that of domestic dogs. The newborn pups are blind and helpless. They weigh about 260 g (9.2 oz)

and are about 16 cm (6.3 in) long. Their short woolly hair is yellowish brown or tawny. Within one week, the pups double in weight. They begin to walk when 8-10 days old. If disturbed, the female will carry the pups to another den. When 10-14 days old, the pups' eyes open, their teeth erupt on days 14-16, and soon after they emerge from the den. By then, they also begin to eat solid food brought to them (often regurgitated) by their parents. The male coyote aids the female in cleaning and feeding the pups and will bring food to her when she is lactating. Occasionally, an offspring of the previous year may assist in pup rearing.

The pups are fully weaned at 5-7 weeks. They begin to take short trips from the den when about 2 months of age, at which time the den may be abandoned. The rest of the summer is commonly spent at various sites where the pups are left while the adults forage afield. These so-called rendezvous sites are used for days or weeks at a time before they are abandoned. In forested areas, rendezvous sites are frequently located adjacent to clearings such as the wet meadows that succeed abandoned beaver ponds. As summer progresses, pups make increasingly longer exploratory journeys with their littermates and/or parents, hunt small prey, and feast on ripening fruit. At 9 months of age, the young are nearly physically mature.

During the fall coyote families occasionally travel as a unit. Many pups, however, become increasingly independent and may disperse from the parental area.

The family is the only known social structure in coyote populations. They are less social than wolves, but more so than foxes. Eastern coyotes may travel alone, in pairs, or as family groups. A few observers have noted pairs or groups of coyotes hunting in what appears to be a cooperative manner, but this is probably unusual, except perhaps in the case of predation on deer during winter.

The size of a coyote's home range (the area in which the animal's activity is centered) varies with: locale, habitat, season, and the age and sex of the individual. Summer ranges are relatively smaller than during other seasons due to the abundance of a wide variety of foods and the demands of the less mobile pups. Conversely, home ranges are generally larger during winter due to a decline in food abundance. Adult male

coyotes have larger home ranges than do female and immature coyotes. An eastern coyote's yearly home range may encompass 100 km² (40 mi²), although half of that is probably more nearly the norm. Eastern coyotes appear to be somewhat nomadic as they tend to concentrate their activities for periods of a few weeks within portions of their yearly home range. Coyotes often have favorite travel routes within their home ranges. In the Adirondacks for example, old logging roads, deer trails, and snowmobile trails are heavily traveled in areas with dense vegetation.

Coyotes are primarily active during early evening, the first half of the night, and again around dawn and early morning. Many kilometers may be traveled during foraging trips. The latter part of the night and much of the middle of the day are spent resting. Resting spots are often chosen with an eye on comfort: cool shady spots in midsummer; sunny, wind-sheltered sites in winter. If underground dens are used at all by families, it is only during the early stages of pup rearing.

Family groups may establish territories (a territory is an actively defended portion of an animal's home range). Nonbreeding coyotes not associated with families are not territorial and their home ranges may overlap the territories of one or more families. Territorial occupancy is advertised through vocalizations and scent marking. Territorial boundaries and travel routes are marked with deposits of feces and urine. Feces are often left at elevated spots and urine is often deposited on conspicuous objects such as stumps, rocks, or bushes. Encounters between trespassers and residents may result in chasing, ritualized aggressive displays and, occasionally, serious fighting.

The coyote has a diverse and seasonally varied diet that can best be described as opportunistic. Mammalian flesh constitutes the bulk of the coyote's diet and thus it is considered a carnivore (meat eater) but plant foods are important at times. Depending upon geographic location, mice, muskrats, beavers, woodchucks, rabbits, hares and deer are the most common mammalian food items. For example, hare and deer are heavily represented in the diets of coyotes in the Adirondacks while mice, rabbits and woodchucks may be the most important prey items for coyotes in farm country. Much of the deer eaten by coyotes is in the form of carrion, made available by winter losses, vehicle collisions, and hunting season

injuries. In addition to mammals, coyotes also eat groundnesting birds, amphibians, turtles, snails, fish, crustaceans, and insects. Occasionally, domestic animals such as sheep and poultry are taken. Livestock and poultry carrion is often a food source of coyotes in agricultural areas. Garbage dumps may also be frequented.

Coyotes rely primarily on their keen senses of sight and smell for locating prey, but their well-developed sense of hearing is also important, especially when hunting mice. Small prey (mice, other rodents) are taken by stalking and pouncing. Upon encountering a large mammal such as a deer, a coyote may give chase, testing the ability of the deer to outdistance it. The chase will be quickly abandoned unless the quarry shows some weakness or is hindered by snow conditions. Coyotes often subdue large prey by biting the head and neck region. It usually takes two or more coyotes to bring down mature deer.

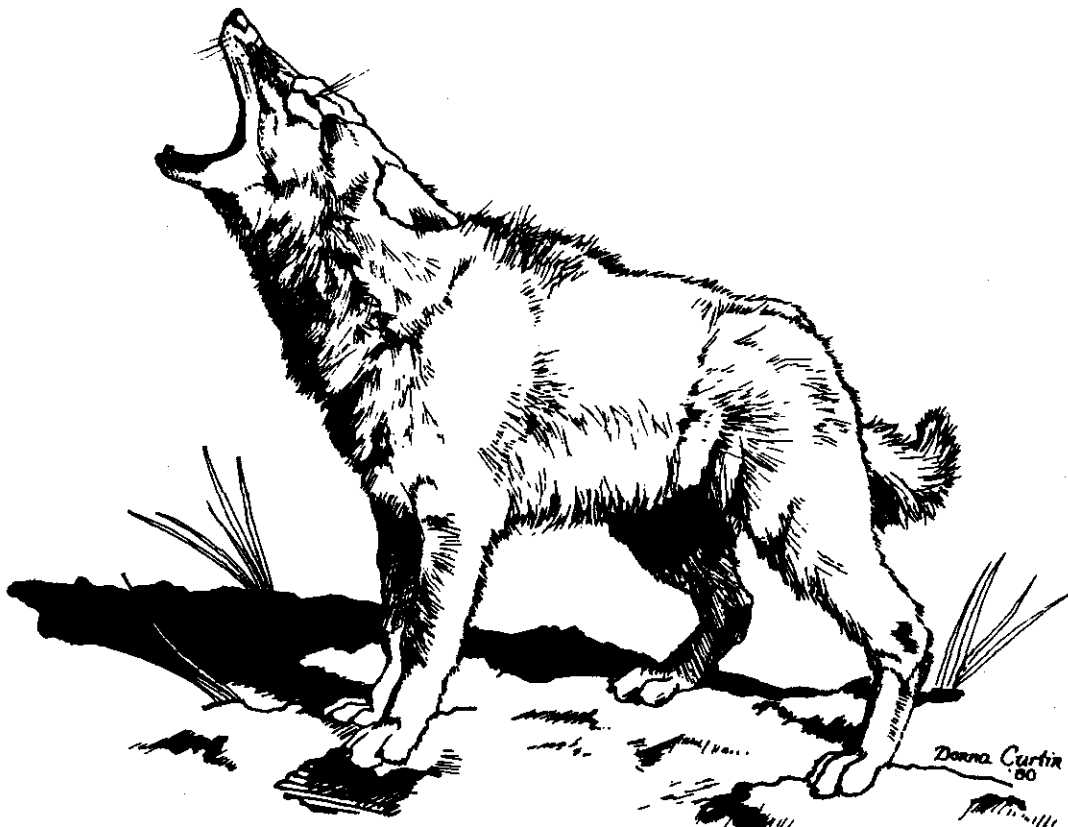
In late summer and early fall plant foods are often important. Raspberries, blackberries, blueberries, apples and corn may be consumed in quantity. Cherries, other fruits, beechnuts and grasses are also eaten.

Trapping and hunting are probably the most significant mortality factors of coyotes in New York (especially those older than 5 months). Adult coyotes bearing scars or missing toes from earlier encounters with steel leg-hold traps are occasionally observed. Mortality and injury along highways probably represents the most common type of accidental trauma sustained by coyotes. Infectious and parasitic diseases do not appear to be particularly important in adult coyotes except for sarcoptic mange, a parasitic skin disease caused by the mite Sarcoptes scabiei. Mangy coyotes typically show considerable hair loss and flaking skin with some minor encrustations. Darkening of the skin often accompanies long-term hair loss. Occasionally, more severe thickening and cracking of the skin occurs, particularly in pups. Signs of mange are initially most noticeable on the lower legs (especially around hocks and elbows), around the anus, and on the tail. Mange can progress until near complete hair loss has occurred. Severe cases can be fatal, particularly in juveniles and/or in combination with harsh winter weather. Mangy coyotes sometimes seek shelter in barns, garages, and under porches. In contrast to red foxes (which are invariably killed by sarcoptic mange), some adult coyotes appear

to recover (at least from the acute phase) and grow a new coat. Coyotes shedding their luxurious winter fur during the spring may be mistaken for mangy individuals.

Coyotes harbor many of the same external and internal parasites as dogs and wolves and are susceptible to the same bacterial and viral diseases. Nematodes like roundworms, hookworms and lungworms may have some impact on pups. Another nematode, the heartworm, is presently found in about 5% of the State's coyotes, especially those in the Hudson Valley.

Coyotes are susceptible to canine distemper, but clinical cases have been recorded rarely. Rabies has only been confirmed in three coyotes in New York in the last 15 years despite an abundance of coyotes in the heart of the rabies epizootic in the St. Lawrence Plains region during this period. Any coyote suspected of being sick should not be handled and an Environmental Conservation Officer or New York State Department of Environmental Conservation (NYS DEC) regional representative promptly notified.



Habitat

It is likely that the coyote was primarily a plains animal before extirpation of the timber wolf from the forests of north-central and northeastern United States. It is unlikely that viable coyote populations co-existed where timber wolves were well established, as wolves apparently will not tolerate the presence of coyotes in their territories. Presently, the eastern coyote occupies a wide variety of habitats, including the extensive forests of the Adirondacks and the dairy farm country of the St. Lawrence Plain. As a predator/scavenger, the coyote prefers those habitats that produce the greatest abundance of herbivorous prey. Such areas generally are those in early successional stages with an abundance of brushy species, regenerating hardwoods, or active agriculture mixed with brushland or woodland.

Ecological Role

Throughout much of its range in the Northeast, the coyote is the largest carnivore except where the black bear occurs. As such, the coyote is at the top of the food chain as a predator, but its opportunistic and diverse feeding habits means that it intercepts the chain at several different trophic (feeding) levels (i.e., carnivore, herbivore, scavenger). Such diversity lends stability to the coyote population as it is not totally dependent upon the availability of any one food source.

Particularly in the Adirondacks, where much of the coyote's winter diet consists of white-tailed deer weakened by malnutrition and disease, coyote kills provide a critical food source for a wide range of carrion eating animals such as bobcats, raccoons, fox, fisher, red squirrel, bald eagles, crows, ravens, blue jays, and chickadees.

Some people believe that eastern coyotes have filled the niche (ecological role or function in the environment) once occupied by the eastern timber wolf in that it is a canid capable of killing large mammalian prey. However, the eastern coyote's niche is considerably broader than that previously occupied by the wolf. The coyote utilizes a much wider range of prey species and food resources. The more sociable wolf, in contrast, relies almost exclusively on large cervids (i.e., members of the deer family such as caribou and moose) as prey.

Social and Economic Values

Centuries ago, the coyote was a prominent figure in the religion of the Aztecs, a group of Central American Indians. In fact, the Aztec word "coyotyl" is the basis for the coyote's common name. Other North American Indians considered the coyote to have supernatural powers and it became the central character in numerous legends and superstitions.

During the last 150 years, human attitudes toward this carnivore fluctuated dramatically. Antipathy towards coyotes has its origins in the early settler's fear of and antagonism towards all predators, particularly wolves. Predators were viewed as competitors for animal resources (wild and domesticated) that were much more important to the livelihood of those homesteaders than they are to contemporary farmers and sportsmen. The coyote has always had a reputation as a major predator of poultry and sheep. Some sportsmen also believe that it suppresses local populations of small game animals and deer.

Some individual coyotes or groups seem to specialize on domestic fare, especially when unchallenged by shepherders, guard dogs or adequate fencing. The coyote's intelligence and opportunistic nature make this inevitable. Surprisingly, relatively few verified cases of coyote predation on domestic animals have been documented in the Northeast.

Under particular snow conditions, coyotes can become very efficient predators of deer. They also no doubt capture a number of fawns in early summer. In general, however, they lack the size and cooperative hunting behavior of the wolf and remain opportunistic predators of larger mammals.

Outside of the Adirondacks, New York State's coyote population is so small and the deer population so large and healthy that coyotes have a negligible effect on the deer population. In the Adirondacks, where the climate and habitat is less favorable for deer, coyotes may have some effect on deer population levels. However, where winter starvation of deer is common, predation by coyotes cannot be considered a significant controlling factor of the deer herd.

Coyotes rely on small game animals for a portion of their diet, but as with any predator in a stable ecosystem, its predation level operates within nature's system of checks and balances. The number of prey animals of any one species that coyotes take is directly related to the abundance

of the prey. Under normal circumstances, coyotes are incapable of significantly limiting any viable small game population.

In recent years, the coyote has become an important furbearer in northern New York. In the St. Lawrence Plains, coyote hunting has become increasingly popular. About 1,500 coyotes are now "harvested" annually in New York State by trapping and hunting.

Lastly, coyotes have always been appreciated for the aesthetic appeal they lend to a wilderness setting. Although its scientific name "Canis latrans" means "barking dog", it is often called the "singing dog" in recognition of its thrilling nighttime choruses and howls. These serenades contribute to the "wilderness atmosphere" of the Adirondacks. Attempting to induce coyotes to howl in response to your own vocal chord stretching efforts is a highly recommended form of recreation!

Management

The use of bounties, a first attempt at management, was employed to control predators in New York beginning in the 1800's. New York bounty records from the late 1800's mention payment for several "small, gray wolves". It is only speculation, but perhaps some of these "wolves" were actually coyotes. The tactics "promoted" by bountying, such as trapping, poisoning, den digging, and hounding, have proved devastating to wolves, but coyotes have survived and prospered under even more intense persecution throughout western United States. Bountying is now considered costly, ineffective, and unacceptable.

For decades following their appearance (or reemergence), no coyote management was undertaken in New York. As an unprotected wildlife species it could be killed at any time. The New York State DEC began field work in 1949 to study coyote behavior and to determine the best method for trapping them. Since then, several other studies have been conducted by government agencies and universities. Although much is known, many questions about the eastern coyote's ecology, behavior, and population size remain unanswered.

In 1976, the NY State Legislature granted "protected game status" to coyotes allowing the DEC to establish trapping and hunting seasons for coyotes. In 1979, the coyote was added to the list of furbearers requiring

mandatory reporting of pelt tags. This tagging system provides information on the number of coyotes taken by ecological unit which will help improve future management efforts.

Control Methods

Farmers can take preventative measures to help avoid coyote predation on livestock and poultry. Animals should be penned or housed indoors at night. Dead livestock should be removed from the farm area and disposed of properly. This is important since carrion may attract coyotes and may encourage them to prey on livestock. The presence of a guard dog (or any dog) is often helpful. If coyotes can be positively identified as killing livestock, punitive measures may be taken to remove the offender(s). Special permission from an Environmental Conservation Officer is necessary, however, if a hunting or trapping season is not in effect. Steel leg-hold traps or footsnare traps employed by an experienced trapper are recommended for removing the offenders.

-- Gary R. Goff
Joseph C. Okoniewski
Shari L. McCarty
Daniel J. Decker

(Illustrations drawn by Donna Curtin.)

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