

COYOTES

in Insular Newfoundland

May 2006

Current Knowledge and Management of the Islands Newest Mammalian Predator.

The immigration of coyotes onto Insular Newfoundland has been described as the most significant terrestrial ecological event to occur on the Island since the introduction of moose over 100 years ago. It is understandable that for over a decade, debate has raged over such questions as how they arrived, how many are there, should there be bounties or whether they will kill the last caribou. The invasion of our Island by these uninvited predators has caused concern for outfitters, guides, hunters, berry pickers...anyone it seems with an interest in the outdoors. With the spread of this animal over virtually all parts of the Island, reports of human - coyote interaction have increased. As well, outdoor users point to evidence of coyotes preying on larger animals as justification for increased government action.

In recent months, this call has grown, and has consistently been heard on open line shows and read in the printed media. The Wildlife Division welcomes all input and suggestions from the public about its management plans and methods. The Wildlife Division is very serious about its work and its effort to hold and manage in trust the wise and responsible use of wild life for the people of Newfoundland and Labrador. We also firmly believe informed residents interested in supporting conservation can be wildlife's greatest ally. Therefore it is in the best interest of the people and the resource to be well informed about coyotes in order that their input into the management of the animals can be as productive as possible. The contents of this article represent a brief synopsis of what we currently understand

as it relates to coyotes in Insular Newfoundland. It will discuss **what we know**, in terms of ongoing research activities and some preliminary findings. It will discuss **what we've done** and will relate the sequence of events that lead to the current coyote shooting and trapping strategies employed, as well as relate information on past harvests. And finally, it will discuss **what we need to know**, or in other words, the direction we hope future research and management activities will pursue as it relates to coyotes. Let's begin with what we do know.



*Did you know...
The first confirmed
coyote on insular
Newfoundland was
in 1987, a pup
hit by a car near
Deer Lake.*



COLONIZATION

During the past 100 years, coyotes (*Canis latrans*) have successfully colonized most of North America. Their rapid range expansion from the open prairies of western US and Canada has resulted in a near total occupation of all available habitats in North America. Localized extinction of wolves, along with land clearing, urbanization and agricultural practices are likely contributing factors to their success.

By the 1970's, coyotes had occupied much of North America, and by the 1980's were common throughout all of Atlantic Canada.

Figure 1 is a graphic illustration of the coyotes documented and proven range expansion across eastern North America. Coyotes were confirmed in Prince Edward Island long before the Confederation Bridge linked the Island with the mainland, proving the animals ability to cross ice bridges. During the winter of 1985, reports of wolf like dogs coming ashore from the ice near the Port au Port Peninsula were quite likely one of the earliest known incidents of coyotes entering upon the Island of Newfoundland. The first confirmed coyote on the Island of Newfoundland was a pup hit by a car near Deer Lake in 1987. Reports of coyotes traveling on ice between Nova Scotia and Newfoundland have been received from reputable sources since 1985, supporting the notion that the emigration of coyotes from mainland Canada onto the Island continues. Animals crossing an ice bridge is not a rare occurrence. During the late 1980's, arctic fox, which were at high densities in Labrador but not normally found on the Island, migrated south on drifting ice and were trapped or shot as far south as Trepassey. It is reasonable then that high coyote populations on Cape Breton and other parts of Nova Scotia was and likely continues to be a potential source of coyote dispersal over ice bridges to Insular Newfoundland. In fact, many island wildlife species including bears and caribou are likely to have arrived here by crossing ice bridges thousands of years ago. By the mid 1990's, coyotes were confirmed throughout most of the Island, and in recent years, reports from Goose Bay confirm the animal's presence in the central and southern Labrador portion of the province. The howl of the coyote can now be heard in virtually all parts of North America.



Figure 1. Coyote Colonization in Eastern North America

Did you know...

One coyote collared in the middle ridge averaged 12 km movements each day, and travelled over 2100 km in six months!



Is it a Coyote, Dog or Wolf?

Actually, there is some evidence to suggest it may be all three. Unlike the desert coyote of the western grasslands and deserts, the animal which emigrated north and east into the boreal forest of northeastern North America encountered remnant populations of red wolves and in some cases wild dogs. Some researchers believe that the current northeastern coyote retains at least some wolf and possibly wild dog genetic traits. Average weights of the north eastern coyote appear slightly larger than their western cousins, and pelt coloration is coarser and somewhat darker. Reports from hunters and conservation officers in northeastern US and Canada suggest considerable differences in their behavior as well. Are these characteristics purely as a result of breeding with dogs and wolves, or can it also be explained through the process of natural adaptation? The environment in which any animal finds itself ultimately shapes its behavior and physical features. The boreal northern forest supports less prey species for a coyote to hunt than does southern, warmer climates. Their larger size here in the north may therefore be explained, at least partially, by the fact that northeastern coyotes must hunt larger prey to survive. This may be a case of both natural selection and genetics coming to play. Only through further genetic study can the mysteries of the true origins of the Northeastern Coyote be unraveled.

RESEARCH ACTIVITIES AND PRELIMINARY FINDINGS

The Need For Study. It has been suggested by some that there is no need to study the coyote in Newfoundland. They argue that they've been studied extensively elsewhere and any additional work is simply a waste of money. Nothing could be further from the truth. Coyotes in this province seem to be existing in a unique ecological system where caribou are present and wolves are absent. Understanding what, if any, differences exist between coyotes here and elsewhere could be the key in successful management. If we ever hope to have an effective management strategy for coyotes, understanding the life history and ecological interactions and implications of this new predator is essential. Research and science is and has always been the backbone of effective wildlife management. Without it, decisions regarding our wildlife and its habitat are diminished to best guess scenarios. The long term health of our wildlife resources require that we understand what is happening on the landscape. The following highlights some of the ongoing coyote research and its implications to date. Please note that this information is presented as initial, incomplete summary information, and that full analysis and publication of this data are ongoing.



Did you know...

The average age of 284 sampled coyotes harvested in Newfoundland was 1.8 years and ranged from 0.5 up to 12.5 years.



GOVERNMENT OF
NEWFOUNDLAND
AND LABRADOR
Department of Environment and Conservation
Wildlife Division



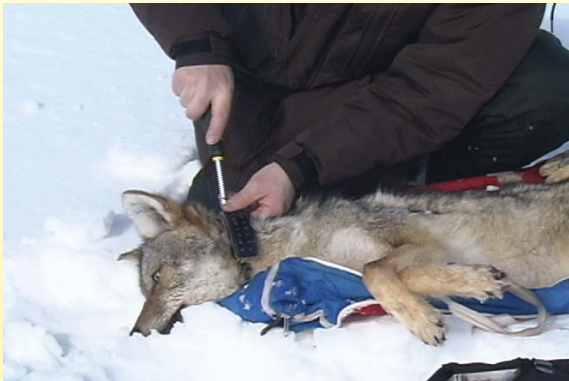
Coyote Carcass Collection. The collection and analysis of carcasses has provided considerable information concerning coyotes. The information is used to answer questions related to their morphology (physical appearance), body condition, diet and population age structure. Further, closely examining this information allows for comparison of basic biological parameters of coyotes harvested from forested environments versus barren ground habitats. The answers may affect how we manage coyotes in these two distinctly different environments. To date, the Wildlife Division has analyzed over 400 carcasses submitted by hunters and trappers. Highlights of the results of this work include;

- Almost all coyotes had moderate to abundant fat stores indicating good physical condition. This illustrates the coyotes ability to find prey and successfully capture it. It appears that coyotes may be preying more heavily on large prey like caribou during times when snowshoe hare populations crash. Continuing to monitor stomach samples through the various hare cycles is needed to get a complete picture.
- The average age of coyotes sampled was 1.8 years of age, and 68% of the 2004/05 harvest were pups and yearlings. Young animals represented in a harvest usually suggest a healthy, increasing population, although tracking this data for years is necessary to get an accurate picture. It also tells us there is high mortality in coyotes and that young coyotes are susceptible to existing harvest strategies. It illustrates that adults are difficult to harvest and any effort to reduce coyote populations in a specific area will need to focus on adult breeding pairs, and perhaps utilize different techniques than currently exist.
- Stomach samples analyzed indicate caribou, moose and snowshoe hare are the principal sources of protein in the coyote's diet during the period October through April. Other food items included berries, beaver, squirrels, voles, grouse, ptarmigan and cattle. Most moose were determined to be from carrion.
- Despite having a much larger appearance, the Northeastern coyote in Newfoundland ranges in size from 25 to 50 lbs, an average of about 15-20% larger than its western cousins.
- Most coyote harvest is taking place on or adjacent to open barren ground habitats along the South Coast and Northern Peninsula, indicating a possible preference for open habitat.

Continuing to collect this type of information can help answer the question of whether coyote body conditions are better or higher in areas within or overlapping caribou ranges. This will help in further defining the level of importance caribou are to the diet of coyotes, and thus may affect the way coyotes and/or caribou are managed.

Did you know...

The average weight of adult coyotes as determined by weighing nearly 150 coyote carcasses in Newfoundland was 35 lbs. for males and 29 for females.



Radio Telemetry Study. During the winter of 2005, nine coyotes were captured and fitted with radio transmitters. An additional 10 were deployed on coyotes in the winter of 2006. The study area for both years was the southern portion of the Middle Ridge Wilderness Reserve, right in the middle of the wintering Middle Ridge caribou herd. Most of these collars were GPS collars, which record precise movements and locations every four hours and have proven invaluable in understanding the coyote in Newfoundland. Initial findings include;

- Some coyotes made extraordinary movements. One moved 170 km north to Carmanville from its original collaring site. Another moved 110 km west to the Bay d'Espair area.
- Home ranges of adult paired coyotes are between 140 and 190 square kilometers (see figure 2). This is many times larger than the coyote home ranges reported from other provinces, indicating coyotes in Insular Newfoundland are occupying a unique niche. If coyotes maintain these large home ranges, coyote densities will remain much lower than seen in other jurisdictions. This has implications not just for how the animal is managed, but also its long-term potential impact on caribou and other prey species. Also, it is important to know seasonal home range information to determine if coyotes inhabiting caribou wintering areas will move to a different summer home range in the spring and then back again the following winter.

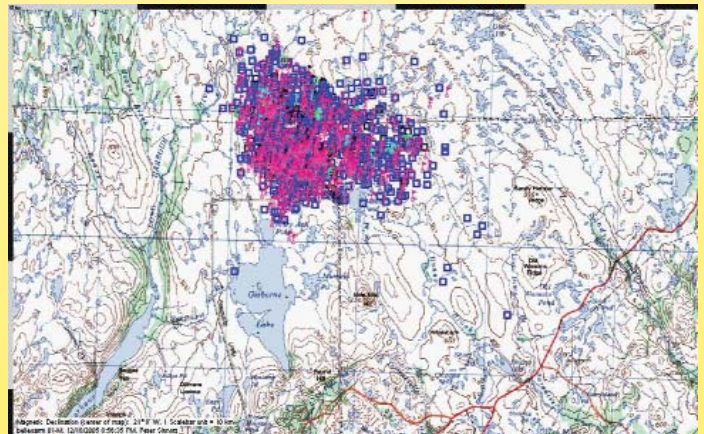
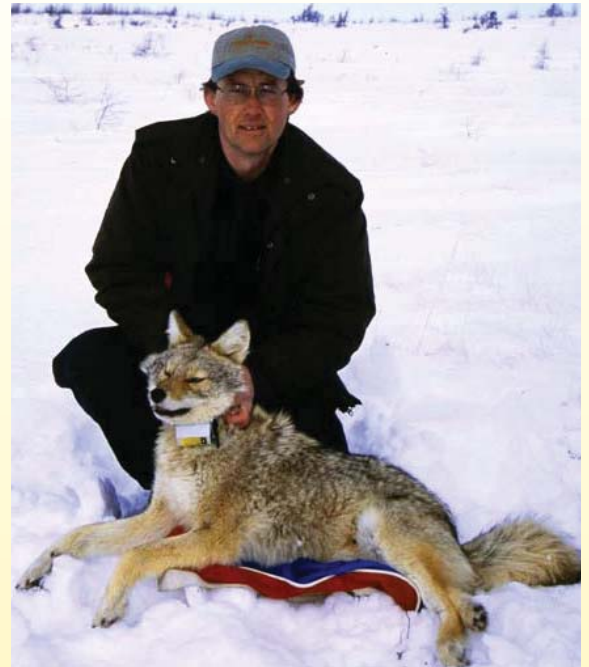


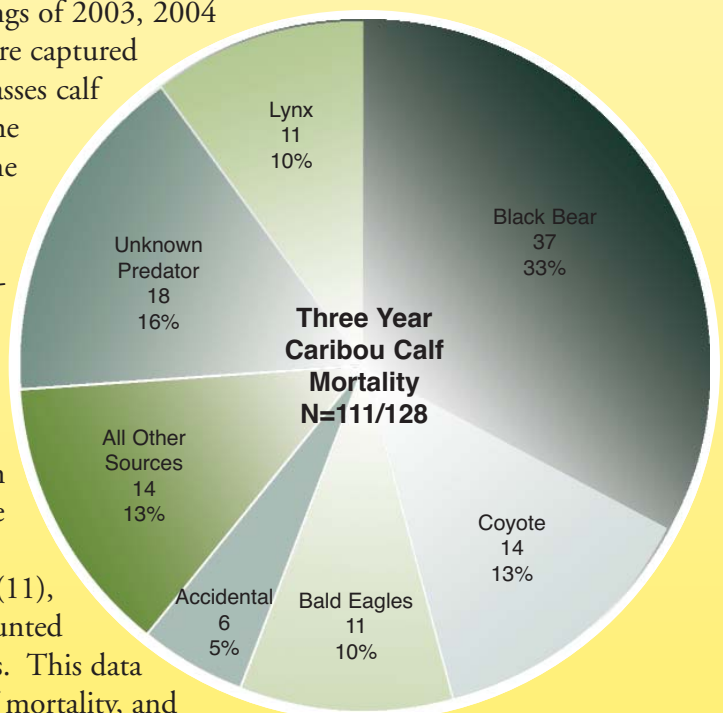
Figure 2. GPS Collar recorded locations of two coyotes in Middle Ridge

*Did you know...
The aerial net-gun technique used to capture coyotes is the same method employed in the capture of caribou.*

- Collaring data indicates that pups are born in late April or early May. Mating appears to begin in February and runs through March. In two cases, female den sites were above ground, in the open next to a small tuck, and that litter size appears smaller than litters reported elsewhere. This is a small sample size of adult females, but illustrates the potential for annual variations in coyote populations.
- Collaring coyotes have given us a method to measure their mortality. Of the 19 coyotes collared, eight remain active. Measuring mortality is an essential component of population dynamics and must be understood to effectively manage the animal.
- GPS collar data provides information on areas of repeated use by coyotes. These areas are investigated for prey remains. Preliminary analysis indicates that coyotes in or near open ground habitat are relying considerably on moose and caribou. One coyote visited the remains of five moose during a seven month period, at least two of which were hunter kills and one a road kill. Gathering this information will determine the predation rates on caribou and the level of importance caribou are to the coyote diet. It appears at this point that most moose are being consumed as carrion. In other words, coyote predation was not the initial cause of death.
- Collar data will assist in answering the hypothesis that perhaps coyotes move out of boreal forest habitats during the winter in favor of the shallower, more compact snow of barren ground habitats. This would be considered abnormal behaviour throughout most coyote range. It is an important consideration in evaluating management options for caribou in their winter range.



Caribou Calf Predation. During the springs of 2003, 2004 and 2005, a total of 128 caribou calves were captured and fitted with radio collars in a study to assess calf mortality. The study was carried out on the Gaff Topsails and Middle Ridge herds. The study was initiated in response to fall and winter caribou classifications that were showing low calf recruitment. The preliminary data suggests calf predation is a significant cause in current caribou population declines. Of the 128 calves collared, 111 died of all causes (87%), and 91 of these 111 mortalities were due to predation (82%). Specific causes of mortality may be summarized as follows; black bear (37), unknown predator (18), coyote (14), lynx (11), bald eagles (11). Accidental mortality accounted for 6 calves and 14 died from other sources. This data therefore seems to suggest that caribou calf mortality, and thus poor recruitment, is not being driven



Did you know...

Preliminary estimates of home range size of coyotes in Insular Newfoundland is 3 to 7 times larger than those in other East Coast jurisdictions.

solely by coyote predation, but rather from a complex web of predators, the most significant of which is black bears (beginning in 2006, the Wildlife Division increased the bag limit on black bear from one to two per season). Other findings from this calf study are as follows;

- Poor calf recruitment during 2003-2005 was the most significant contributing factor to caribou population declines across all south coast herds.
- Predation by black bear was the most significant cause of calf mortality in at least one caribou management area.
- Most calf mortality occurs within the first few weeks after calves are born. In 2005, 70% of calf mortalities were recorded in the first four weeks of life.
- Calves that make it to the fall have an excellent chance of surviving to adult age.

Management of the Coyote in Insular Newfoundland

The Wildlife Division began management of the Coyote in Insular Newfoundland in 1985 after receiving a phone call announcing the animals sighting near March's Point on the Port au Port Peninsula. A Wildlife Officer was dispatched to investigate the report, but their search turned up no concrete evidence. This is not surprising - such a search was considered similar to looking for a needle in a haystack. No concrete evidence was received until the spring of 1987 when a pup was killed on the road near Deer Lake. Given what we now know from our GPS collars concerning coyote movements in Newfoundland, this pup may well have been an offspring of the coyotes reported a year and a half earlier, or quite possibly the result of an even earlier successful ice crossing.



Management of the coyote initially involved a lot of speculation regarding their potential impact on the natural life in Newfoundland. Biologists and managers conducted an exhaustive literature search regarding research and management of coyotes, and relied heavily on the lessons from other jurisdictions, especially the Atlantic Provinces, who faced the same situation a decade or so earlier. It became clear quickly that the predatory nature of coyotes were in direct conflict with human interests and activities, particularly game and livestock management. It also became apparent that no jurisdiction was ever successful at eradicating coyotes. Fur managers and biologist from across Canada and the eastern U.S. met to discuss coyotes in Newfoundland, and the synopsis was that bounties did not work. Despite aerial slaughters, poisons, and bounties, the resilient coyote proved to be a survivor, and the lesson was that on a large scale at least, coyotes could not be eradicated. In fact, their versatility and reproductive capacity actually allowed them to expand their range despite very intense control initiatives. Many jurisdictions who spent millions of dollars and tried large scale population control and eradication efforts have now settled on a more selective approach. This is an approach where predator damage control is seen as the only viable option of dealing with problem coyotes and where in limited cases localized area specific control efforts may be considered. Along with developing a competent and effective group of trappers and hunters needed to address specific coyote problems, other jurisdictions have explored better fencing for livestock and guard dogs and donkeys.

Did you know...

In one caribou management area, black bears were responsible for 50% of all caribou calf predation.

Coyote Population Estimates and Harvest. Furbearer population estimates are normally conducted on what are referred to as a relative basis. In other words, managers monitor trends from trapper and hunter returns or harvest data in an effort to determine if there are changes over time. This is unlike a moose count, where an actual count is conducted of a portion of a management area and a population estimate is determined. Still, the public wish to assign some numerical value to the coyotes presence here on the Island. Some have suggested there are 100,000 coyotes and that the population is growing. With the information we have at hand, we are confident that this is a gross overestimate. By using what we know, we can place a number to it, recognizing there may be a large margin of error.

By using a siren to elicit vocal responses after dark, researchers in New Brunswick estimated coyote densities there at less than 0.1 per square kilometer(km²). Collaring of coyotes in that area also indicates home ranges of adult pairs to be significantly less than home ranges determined here through our efforts. Given the social structure and behaviour of coyotes in general, it is a safe assumption that our densities are likely less than those reported in New Brunswick. A density of 0.05/km², which is half that of New Brunswick, might be considered a reasonable estimate. If we assume the entire land mass of 112,000 km² on the Island is occupied by coyotes, this would yield a population estimate of 5,600 coyotes.

Another way to look at estimating a population is through our knowledge of known mortality of coyotes. In 2005, of nine radio collared coyotes, six were shot or trapped. Of the ten collared in 2006, two were shot or trapped. This is a harvest of eight out of 19 marked animals, or 42%. There is some evidence that the open terrain where these coyotes were collared increased their likelihood of being shot or trapped, and thus this harvest estimate may be considered significantly inflated. For discussion purposes lets assume a provincial harvest of 20% of the coyote population through trapping and hunting. This would be less than half the harvest data for Middle Ridge. In the 2004/05 season, there were 357 coyote carcasses submitted. Assuming a 20% harvest of the population, the population before harvest would have stood at 1,785 coyotes, or 5 times the harvest.

5,600 or 1,785 coyotes. How accurate are these estimates? In both cases, there are considerable assumptions made that place the confidence of the estimates extremely wide and questionable. However, in both instances, it clearly shows that we are not dealing with 100,000 coyotes. This number of coyotes would translate into a density ten times that of New Brunswick! Harvest and home range data collected here simply cannot support this. What is more important rather than a specific number of coyotes is the fact that our harvest of coyotes appears to be stabilized. The number of coyotes submitted during the 2005/06 trapping and shooting season is pretty much on par as the previous year, 374 coyotes compared to 357 during the previous year. This indicates that the population may be close to reaching its peak and is probably stabilized. (See figure 3)

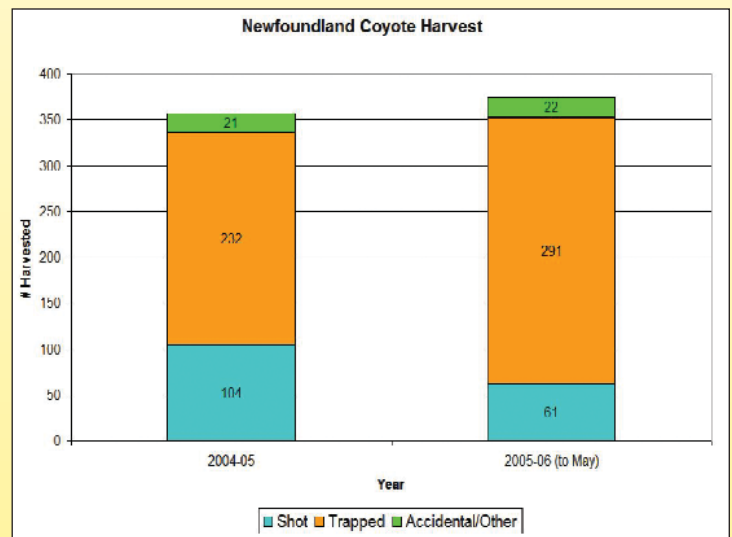


Figure 3. Coyote harvest during the last 2 seasons.

Did you know...

Trapping accounts for over 77% of the entire coyote harvest in Insular Newfoundland.

To summarize harvest data, we continue to gather information to refine our assessment of coyote population trends and population ecology. Based on the preliminary data, we can say with confidence that the provincial coyote population estimate is considerably less than 10,000 animals, and that the population appears to have stabilized in relation to 2004/2005.

Coyote Harvest Strategies. The Newfoundland and Labrador Wildlife Division have adopted a basic philosophy for the management of the coyote in Newfoundland. It involves mitigating against area specific predation on livestock and big game, providing recreational and economic benefits to the trappers and hunters of the province who pursue the animal, and educating hunters, trappers and other members of the public about the biology, management and harvest of coyotes. any program or regulation amendment relating to the harvest of wildlife, coyote included, must pass certain tests. These include consideration of user and public safety, recognition of the need to harvest wildlife in a sustainable and humane manner, and acknowledgement that the harvest of wildlife is not considered frivolous or unnecessary. As noted earlier, the total eradication of the animal from insular Newfoundland is not considered a viable option, and this Division will not support or condone the illegal harvest of this or any game animal to achieve some end other than that described here. The Wildlife Division has worked hard to adjust regulations and programs in response to public need, and continue to welcome suggestions regarding modification of harvest strategies. We have liberalized firearm regulations where necessary and provided for a variety of harvest techniques. Current harvest management of coyotes in Newfoundland & Labrador involves four strategies;

Trapping. A trapping season for qualified trappers currently runs from October 20th through February 1st each trapping season. The season in Labrador runs until late March. The trapping of coyotes was first permitted beginning in 1989, just two years after confirmation coyotes had reached the Island. Post data indicates the harvest was extremely low, with only a scattering of coyotes being harvested. During the 1991/92 season, a total of seven coyotes were trapped Island wide. Trappers now harvest between 250 and 300 coyotes annually. In terms of an effective strategy for harvesting coyotes (figure 3), it is clear that trapping is the most effective means currently available to harvest coyotes.

Incidental Shooting. Holders of small and/or big game licences may harvest coyotes under authority of their small and/or big game licence using the firearms permitted under that particular licence and during the period of time their big/small game licence is valid. A big game licence remains valid until an animal is either harvested, or the season closes. Depending on the licence type you possess and the area in which you hunt, this may allow the hunting of coyotes from September through February on the Island. These provisions were initiated in 2002, initially as a temporary measure until regulations could be amended to allow a specific coyote season and regulations. However, this harvest strategy proved popular amongst hunters, and it was decided that it would remain in place and complement coyote specific shooting licences and other harvest initiatives. In terms of harvest, it appears that only a very small percentage of the coyote harvest comes from this licence type.

Permitting System. A permit to shoot coyotes may be issued to individuals who experience specific coyote predation on livestock or other domestic animals. This permit can be issued at any time of the year, and is designed to provide primarily livestock farmers with a mechanism to deal with any coyote found preying or molesting domestic animals. This harvest strategy was initiated in the late 1980's on an ad hoc basis. In 2002/03 the system was streamlined to provide easy access to permits by farmers and livestock owners and also allowed farmers to access professional trappers. This system accounts for a very small number of the province's total coyote harvest.

Did you know...

Millions of dollars were spent across North America in attempts to control or eliminate coyotes, yet no jurisdiction was ever successful at eradicating coyotes.

A specific coyote hunting licence. This licence is designed for those persons with an express intent on hunting coyotes. It was announced in 2004, and has a current season that runs from the second Saturday in September through the second Saturday of July in the year following. This harvest strategy is designed to provide enhanced recreational benefit to the province's hunters while helping to mitigate against livestock and big game predation. The intent of this licence was not necessarily for the incidental harvest of coyotes, but for the individual serious about pursuing coyotes as a hunting opportunity. As with all harvested wildlife, the humane and effective harvest of coyotes was a key consideration in the establishment of the coyote specific licence and regulations. The firearms permitted under authority of this licence help ensure the animals humane harvest. They allow the use of centre-fire 22 calibre rifles and shotguns using #2 or larger shot. Additional information on firearms suitable for coyotes and coyote hunting techniques may be found by visiting <http://www.env.gov.nl.ca/env/wildlife/publications/coyotefile.pdf>. This licence type accounts for a small but growing percentage of the annual coyote harvest.



Coyote Hunter Education. Newfoundland hunters have little experience with coyotes. They know little of their biology and behavior, critical knowledge in successfully hunting any animal. Similarly many people do not know about the techniques used to hunt them or the firearms recommended for their effective and humane harvest. Coyotes are extremely difficult to hunt, and it appears the northeastern coyote found here is even more difficult to hunt than its western cousins. This could be due to its previous interbreeding with wolves and its reliance on larger prey like caribou. Knowledgeable, responsible and effective coyote hunters are necessary to help address coyote specific problems, and help where possible the control of predation on livestock and big game populations.

A Coyote Hunter Education Information Session has been developed and delivered on a small scale throughout select areas of the province. It discusses the biology and management of coyotes in Insular Newfoundland, as well as firearm and other considerations for hunting this animal. It also stresses responsible and humane harvest strategies. As the agency responsible for wildlife conservation, the Wildlife Division promotes the wise and responsible use of our wildlife resource, and we therefore promote respect for the animals we harvest. This respect is the basis for many of our firearm laws - which establish minimums for the humane harvest of that wildlife. We are obligated to treat coyotes no different than moose or ptarmigan when it comes to ethics of the hunt, and are active in the promotion of maintaining respect and ensuring their humane and ethical harvest.



Did you know...

No one approach to coyote management has proven to work. Instead, a multi-method approach which targets a response to specific situations and is supported by information and education will be the most effective choice of action.

Information Gaps and Future Research

There is much we do not know about the coyote in Newfoundland and Labrador. What are the real impacts on our game populations? Do coyotes spend more time on open barren ground habitat than forested area? Has the coyote population reached its peak on the Island? These questions and many more need to be considered and evaluated into the future. The Wildlife Division requires a better understanding of the biology of the animal and circumstances surrounding its negative human–coyote interactions, which include predation on livestock and game animals. Coyote research and its ecological implications will continue provide us the necessary tools to help manage the animal and its prey species. Aspects of coyote research and management that will be investigated in the future include;

- Quantifying the effects of coyote predation on caribou populations through the use of coyote and caribou collar deployment.
- Continuing exploration of the life history and ecological implications of this new predator in order to make informed conservation decisions.
- Continuing to assess the abundance, home range size and movements of coyotes.
- Monitoring harvest trends and harvest strategies in an effort to refine and improve our ability to deal with area or problem specific coyote predation.
- Evaluating practical, realistic approaches to coyote predation on livestock and big game.
- Improving the education and technology available to trappers and hunters to be able to more effectively deal with area specific coyote depredation.
- Expanding public access to available information about coyotes and wildlife management in an effort to assist the public in providing valuable, informed input into wildlife conservation in Newfoundland and Labrador.

Did you know...

Female coyotes can begin breeding just prior to being 2 years old and have average litters of 5 to 6 pups.

