

Vermont Furbearer Management Newsletter



Vermont Fish & Wildlife Department



As you may have noticed, we are behind in the delivery of our “annual” newsletter. Therefore, in December we will post the 2009-10 harvest data on our website along with other relevant furbearer articles. Thank you for your patience!

Vermont’s Coyote—What is it? Where did it come from?

By Dr. Roland Kays, Curator of Animals, New York State Museum



The MISSION of the Vermont Fish & Wildlife Department is the conservation of fish, wildlife, and plants and their habitats for the people of Vermont.

Several years ago a few cooperating coyote hunters and trappers in Vermont contributed carcasses and/or coyote tissue samples to Dr. Roland Kays at the New York State Museum in Albany in order to assist him in his coyote genetics study. Below is a write-up of the results of his work. I’m sure you will find it extremely interesting. Thanks to those participating trappers and hunters, we are learning more and more about the background of this interesting animal.



public enemy number one, and the government paid bounties to encourage their persecution. As a result of this unregulated hunting and the mass conversion of forest to agriculture, wolves were essentially gone by the middle of the 1800s.

Over the next 60 years a scattering of wolves and coyotes were reported around the state. Some of these turned out to be feral dogs, others were pet wolves or wolf-hybrids. By the 1940s, records of coyote-like creatures were more of a regular occurrence in New York state. These records started in St. Lawrence County and radiated out in all directions, eastward into the rest of New England, south towards New York City, and even back in a westward direction toward the Finger Lakes. These original wild canids apparently crossed the St. Lawrence River from Ontario and found prime habitat



Who are you? Where did you come from? This pair of questions greets any newcomer, be they a new family moving in down the street or a new species of animal colonizing an area. A coyote-like animal moved into Vermont 60 or 70 years ago, but never gave its name. It also failed to mention how it got here; from the west or north? On four feet or in someone’s truck? Maybe it was always here and we just never noticed?

The fossil record provides an answer for the last question — there is no evidence that coyotes lived in Vermont since it was covered in tundra at the last glaciation. Instead there were wolves running in the state, hunting deer, beaver, and elk, and threatening colonist’s livestock. Fear made the wolf

Inside this Issue:

Season Results 2008-09	3-6
Featured Species: Beaver (<i>Castor canadensis</i>)	7-8
Muskrats in Decline?	9
Lynx in Vermont	10

Vermont's Coyote—What is it? Where did it come from? *(continued from page 1)*

everywhere they went. Over the ensuing 30 years coyote populations continued to grow, until today when they are a relatively common, if elusive, species in wild, rural, and urban areas. Vermont has a new top predator.

But what is this thing? Everyone recognized that these animals were larger than western coyotes. Typical western coyotes weigh 25-30 lbs. while Vermont animals were averaging 35-40 lbs., with a few maxing out around 50 lbs. They looked different too; hunters and trappers were bringing back a variety of odd-looking animals including some that were all black or very pale-colored, others had reddish fur, shaggy coats, or even German-shepherd like markings.

The widespread assumption was that coyotes had hybridized with dogs, and the name 'coydog' became popular. Coyotes, dogs, and wolves are all close evolutionary cousins, all part of the genus *Canis*, and all biologically able to cross-breed and foster fertile offspring. In the 1960s two biologists from Harvard measured the skulls of all three canids to compare with eastern 'coydogs'. The skulls of eastern coyotes were most similar to western coyotes, with some resemblance to wolves. The eastern coyote skulls had little in common with dog skulls, or even with the skulls of known coydog hybrids raised in captivity.

The debate continued over the next four decades, with many theories but little new data. Were the eastern coyotes larger because of genetics (i.e., wolf hybridization) or the environment? Western coyotes

prefer to use open country and eat primarily rabbits, mice, fruit, and some deer. Eastern coyotes use all types of forests and eat more deer and fewer mice. Maybe the abundance of food and the different environment allowed eastern coyotes to grow larger without any genetic influence — just like people would with different diets and exercise regimes.

New Data

Modern genetic techniques offer biologists a more sophisticated tool for studying this question. Instead of ranking animal similarities through skull measurements, we can also deduce their origins by tracking the evolutionary history recorded in their DNA. At the New York State Museum, two colleagues and I explored the genetics of eastern coyotes to try and provide a better answer as to what it is and how it got here.

The approach was to examine a relatively small portion of the canid DNA, but to do this across as many animals as possible, to map out geographic patterns in the region. We obtained data from almost 700 animals collected from coyote hunters in Ohio east to New Jersey, and north into Maine and southern Quebec, including Vermont.

The results were simple, but striking. The northeast population of coyotes had strong evidence for past hybridization with wolves, but almost none for dog hybridization. Approximately 20% of the eastern coyotes we tested had a type of DNA typical of wolves from eastern Canada and

the Great Lakes region, while only one sample was dog-like. This is strong evidence for a recent (last 100 years) hybridization with wolves. Since that initial cross-breeding, hybrid animals have continued to cross back with coyotes, wolves, and other hybrids, producing what is known as a 'hybrid swarm'. All populations we examined contained a combination of wolf-like and coyote-like genes.

Thus, all northeastern coyotes contain a blend of wolf and coyote genes. Because we only looked at a small portion of their DNA, we cannot estimate the percentage of genetic material of individual animals that comes from either wolves or coyotes. However, eastern coyotes are more similar in size and appearance to coyotes than wolves, and coyote-like genotypes were more common in our study. Therefore, it seems that eastern coyotes are more like coyotes with a dash of wolf than vice versa.

We cannot rule out the idea that there was initially more hybridization with dogs when coyotes first colonized an area, but that this genetic signature has since been swamped out by coyote and wolf genes. The rarity of dog genes surprised us a bit, since many of the animals we analyzed looked like what you would expect from coy-dog.

In addition to analyzing genetic samples, we also collected and measured 196 skulls from the northeast. We confirmed the earlier work showing that eastern coyote

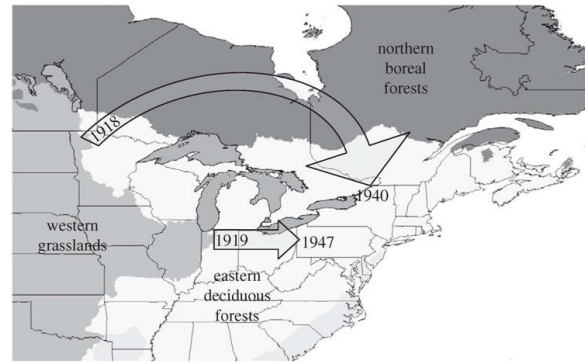
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Vermont's Coyote—What is it? Where did it come from? *(continued from page 2)*

skulls were larger than western coyotes, especially in width. In addition, eastern coyotes are sexually dimorphic, with males being larger than females. This dimorphism is also seen in wolf populations, but not in coyotes. Larger skulls would help an animal hunt and eat deer. The increased consumption of deer in the east is one of the primary ecological differences between eastern and western coyotes. Our data suggest that hybridization with wolves allowed eastern coyotes to rapidly evolve larger skulls, which made them better adapted to eastern forests where deer offer an abundant food option.

Where did it come from? Coyotes made headlines as they spread east from their original range in the Great Plains. The arrival of a new top predator does not go unnoticed, and scientists and newspapers alike took notice. From these records we can trace their route into New York along two separate fronts: a slow-moving westward front coming from

Figure 1.



Indiana through Ohio and Pennsylvania and a fast-moving northward front coming from the Great Lakes through Ontario (Figure 1).

Coyotes moving through the Great Lakes and Ontario encountered wolf populations and this seems to be where the hybridization occurred. This influx of wolf genes, and ensuing rapid evolution into a larger type of coyote, helped the northern front move five times faster than the animals moving through Ohio, which never encountered wolf populations.

Eastern coyote populations that originated from this northern colonization front have a unique

genetic signature. First, about 20% of animals have wolf-like mitochondrial DNA. Their migration also left a second unique pattern in their genetics — very low diversity, with only three genetic types present throughout the region (Figure 2). This is very unlike the typical western coyote which exhibits many dozens of genetic types. We believe that this low diversity in the eastern coyote is the result of a very limited dispersal of possibly just a handful of female coyotes that made it across the St. Lawrence River from Ontario into the Northeast. This very low diversity is seen in all populations from central New York and

Continued on page 9

Season Results 2008-09

Sixty-four bobcat, 327 fisher, and 101 otter were reported and tagged by Vermont's Wardens during the 2008-09 season. Wildlife biologists and volunteers examined each carcass to determine their sex, age, and physical condition. These data are used to monitor changes in health, status, and population levels.

Bobcat and fisher are well distributed throughout much of

the state (Figures 1 and 2). Otter are managed by Watershed Management Units, as this species is closely tied to waterways and well distributed throughout the state (Figure 3). We also monitor the harvest of furbearer species through the annual trapper mail survey (Figure 4), which allows us to track trapper effort (# traps x # nights) and pelt price. Historically, trapping effort has been closely related to harvest levels. This

relationship helps us to better track the harvest of furbearers in Vermont.

Thanks to all of you who collect and/or contribute this essential information to the furbearer program. As pelt prices increase, monitoring harvest and effort data will become even more critical to understanding furbearer population dynamics and management.

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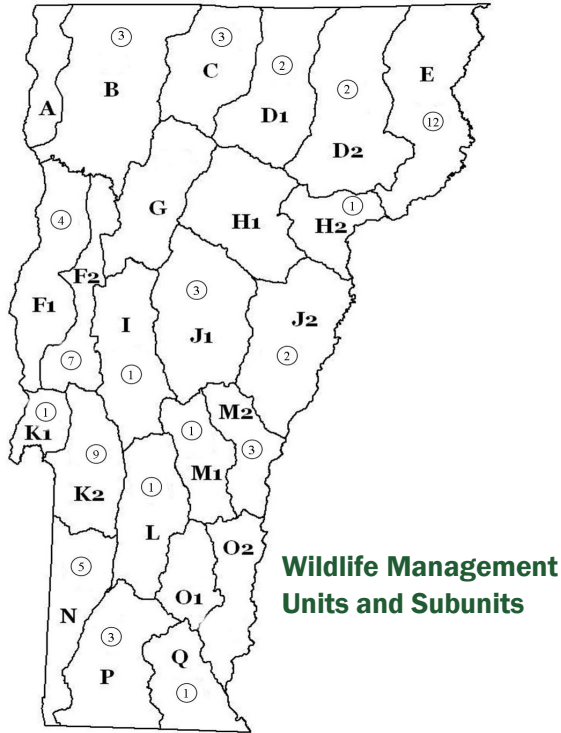


Figure 1. Distribution of 64 bobcat taken during the 2008-2009 season. (The remaining 16 are unknown).

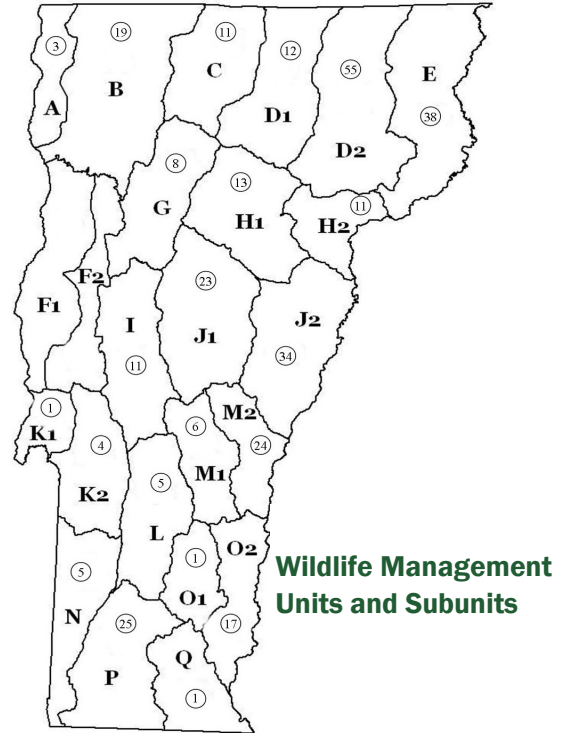
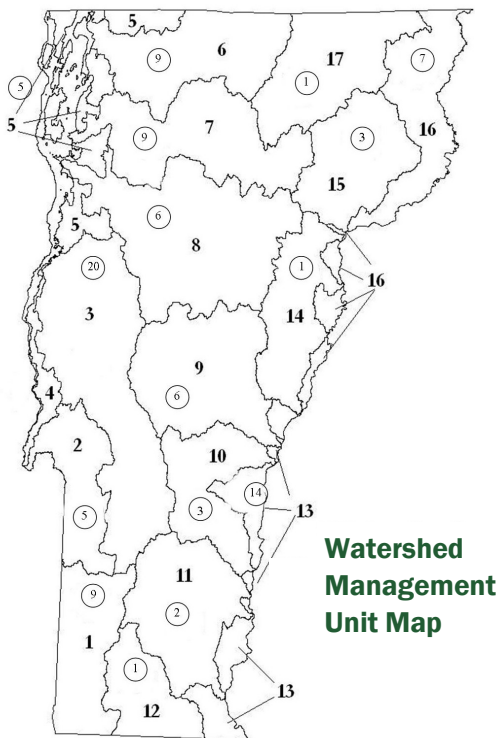


Figure 2. Distribution of 327 fisher taken during the 2008-2009 season. (The remaining 29 fisher are unknown).



Watershed Management Units	
1.	Batten Kill, Walloomsuc, Hoosic
2.	Poultney, Mettawee
3.	Otter Creek, Little Otter Creek, Lewis Creek
4.	Lower Lake Champlain
5.	Upper Lake Champlain, LaPlatte, Malletts Bay, St. Albans Bay, Rock, Pike
6.	Missisquoi
7.	Lamoille
8.	Winooski
9.	White
10.	Ottauquechee, Black
11.	West, Williams, Saxtons
12.	Deerfield
13.	Lower Connecticut, Mill Brook
14.	Stevens, Wells, Waits, Ompompanoosuc
15.	Passumpsic
16.	Upper Connecticut, Nulhegan, Willard Stream, Paul Stream
17.	Lake Memphremagog, Black, Barton, Clyde

Figure 3. Distribution of 110 otter taken during the 2008-2009 season. (The remaining 27 otter are unknown).

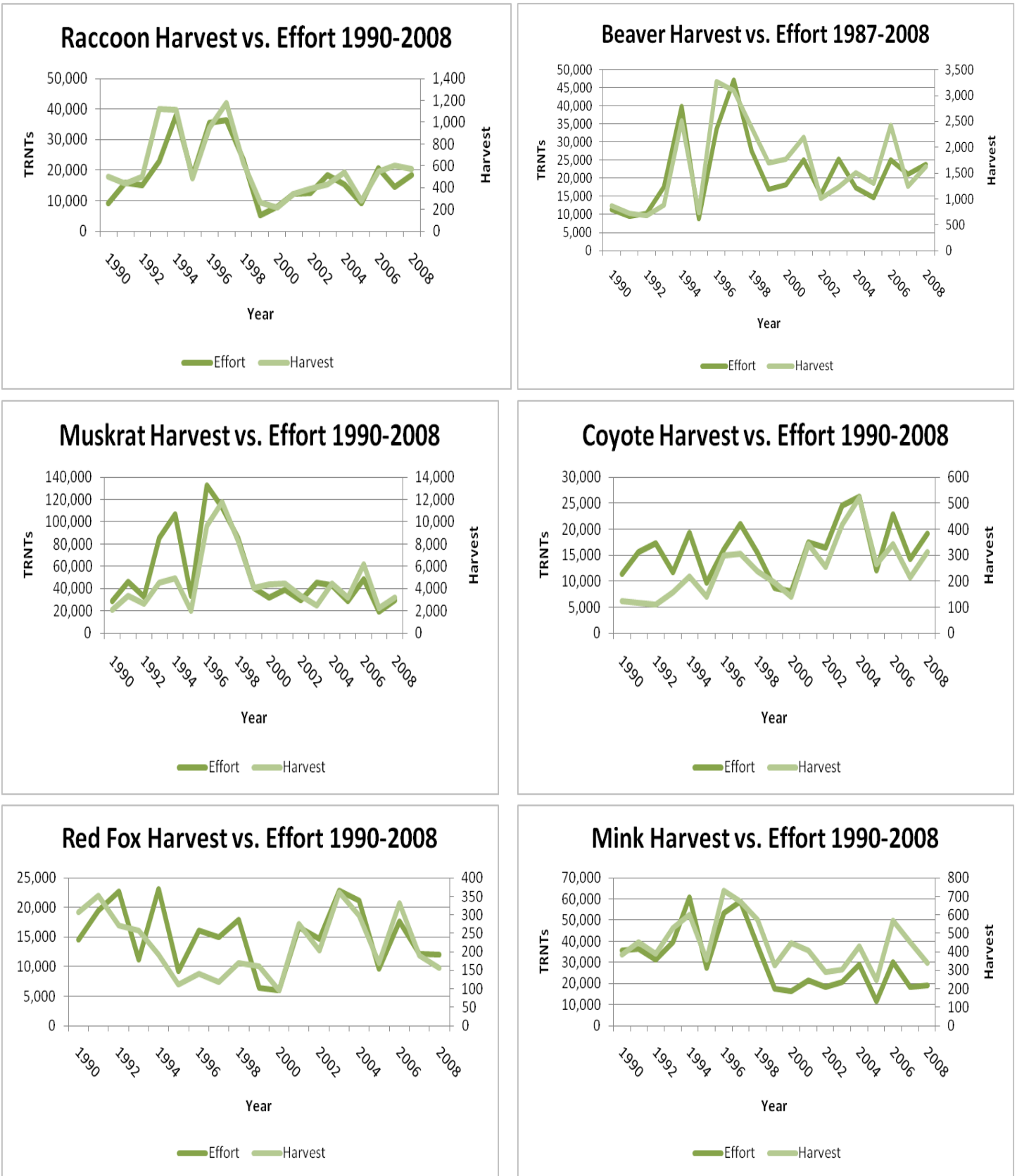


Figure 4. Harvest vs. Trapper Effort in Vermont (data from annual Trapper Mail Survey returned by trappers — thank you!). TRNTs = Number of trapping nights or effort.

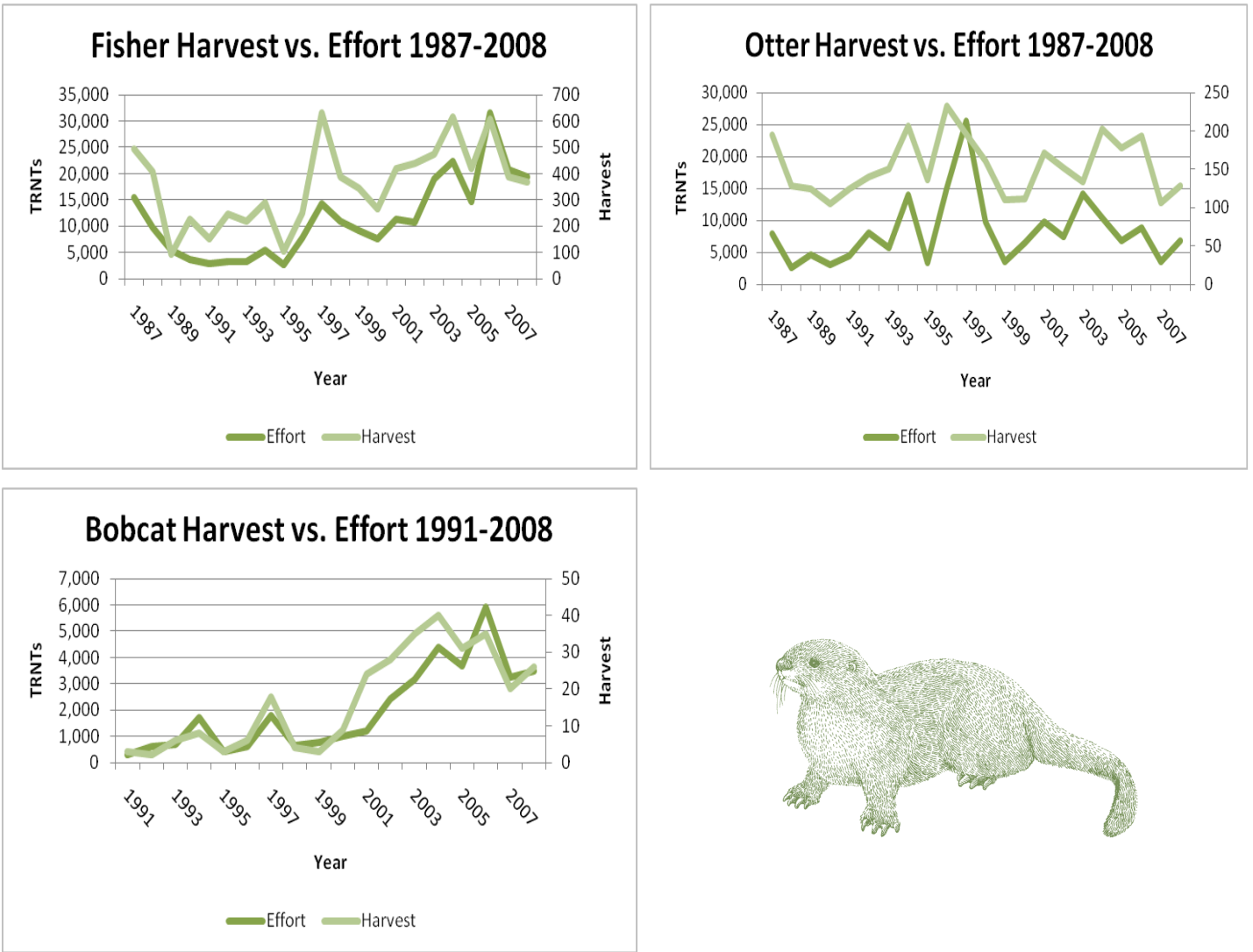


Figure 4. Harvest vs. Trapper Effort in Vermont (cont. from page 5).

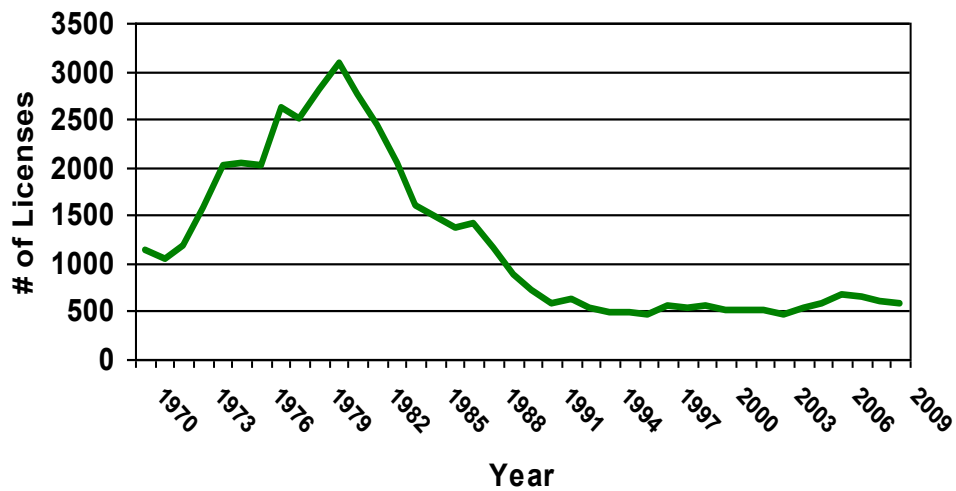


Figure 5. Total number of resident trapping license sales in Vermont by calendar year.

Featured Species: Beaver (*Castor canadensis*)

A beaver is easily recognized by its broad, flat, leathery tail which it uses for storing fat, as a paddle and rudder, for balance, and as a warning device, and by its large, yellowish-orange teeth. Its fur is usually dark brown with lighter highlights. Coarse, shiny guard hairs protrude from the dense short underfur which insulates and waterproofs the beaver. It is the underfur that was so greatly sought after during the historical fur trade years. The fur was felted to create warm, waterproof material for hats.

Castor canadensis is the largest of the rodent family, averaging 40 to 60 pounds, but sometimes weighing in at as much as 100 pounds. It has short, muscular legs with strong claws for digging on its front feet and large, webbed hind feet for swimming and walking across mud. The second toe from the inside of each rear foot has a large, open-split nail the beaver uses to comb its fur and catch parasites. (During the combing process, a yellowish-brown substance secreted from the anal glands is spread through the fur making it water repellent and providing scent clues for other beavers. Castoreum, a yellowish, pleasant smelling oil produced by the castor sacs, is deposited on mud patties as another form of communication).

Beavers are found throughout Vermont along wooded streams,



ponds, small lakes, and marshes where there is an abundant supply of desirable trees for food and building activities. They prefer the bark of deciduous trees, especially aspen, birches, maples, and willow but will also eat hemlock, white pine, balsam fir, and larch if the others are not available. During the summer months they include bulrushes, sedges, pond lily roots, and other aquatic plants in their diet. They are one of the few species who creates their own habitat. Built with sticks, stones, mud, grass, and leaves, the dams and lodges they construct are diligently maintained. (A family of beavers can construct a dam 35' in length in one week, and even large breaks in the dam are repaired overnight). They are most active in the late afternoon and throughout the night.



Credit: U.S. Fish & Wildlife Service.

The adult male and female, yearlings, and kits for the year comprise a colony sharing one lodge. Breeding season is from mid-January through mid-March, with the gestation period averaging 106 days. Prior to the kits being born in late spring, the yearlings are forced out to establish their own colony. A single litter averaging three to five fully-furred kits is born from mid-May through early June. They



can swim after a few days and eat solid food at about 2½ weeks. They are weaned at about six weeks. Captive beavers have been known to live for 20 years, but their life span in the wild is probably considerably less.

It is almost impossible to exaggerate the importance of beaver to creating and maintaining wetland habitats. Beavers create critical wetland habitat – homes for a diversity of wildlife including otter, mink, muskrat, 92 different bird species, moose, trout, reptiles, and amphibians. In addition, their rooting, feeding, and digging activities help to circulate nutrients within the flowage, and the dams they build actually help to reduce flooding and erosion.

Prior to the colonization of North America by the Europeans, beavers could be found in abundance in Vermont and throughout the United States and Canada. According to Alice Outwater in her book, *Water*, there may have been as many as 300 dams per square mile! The demand for fur in Europe, especially beaver, was a driving force in the exploration and settlement here by the French, English, and Dutch. The fur trade introduced the Indians to metal utensils, guns, and beads; and

Featured Species: Beaver (*Castor canadensis*) (continued from page 7)



beaver pelts quickly became the main item of trade. Eighty pelts made a 100-pound pack and brought \$300 to \$500. If a trapper averaged three pelts a day, he earned well above that of a farmer. By 1670, nearly a quarter of a million beaver pelts had been shipped to London from the Connecticut River Valley.

The combination of unregulated trapping and destruction of habitat led to the near extirpation of beavers in Vermont. Zadock Thompson in his *Natural History of Vermont*, wrote in 1853, "The beaver, though formerly a very common animal in Vermont, is probably now nearly or quite exterminated, not one of them having been killed within the state, to my knowledge, for several years." By 1910, the realization of the loss of a valuable natural resource prompted laws to protect the beavers in Vermont. By the mid to late 1700s the loss of beaver-created wetlands likely resulted in the decline of many of the other species dependent on beaver flowages, and we know for a fact that it contributed to the reduction of moose and otter around New England.

During the 1920s and 1930s, beavers were reintroduced to Vermont from New York and

Maine by the Vermont Fish & Wildlife Department. The abandonment of farms and resulting reforestation of Vermont coincided with this reintroduction, and the increase in habitat allowed for a gradual return of the beaver population. In 1950 when the population was estimated at 8,000, the first open trapping season of 15 days was set. Since then, the trapping season has varied in length but has never been less than a month.



Today, the beaver population is healthy and prospering. In fact, due to the extirpation of the wolf (the main predator of beaver besides humans), predation rates are probably significantly lower than they were prior to European colonization when beaver provided an important prey base for native Americans and wolves alike.

The Fish & Wildlife Department manages beaver as a renewable resource and attempts to resolve human/beaver conflicts in cooperation with others through a combination of the installation of water control structures and regulated trapping. Water control structures reduce and then stabilize the water level so that the valuable wetland habitat can be maintained. Regulated trapping allows for the sustainable utilization of this natural resource and helps control the beaver population.

The restoration of beaver is a success story in wildlife management, particularly because as a "keystone species", it provides critical habitat for so many other fish and wildlife species.

When consumed, beaver are a terrific source of natural protein, and they provide a variety of social benefits to Vermont citizens such as trapping, fishing, and wildlife watching. Though low prices and competition have influenced trapping for beavers in recent years, the annual take during 1995-1995 season in the U.S., valued at \$6,604,417, is evidence of their importance as a renewable resource.



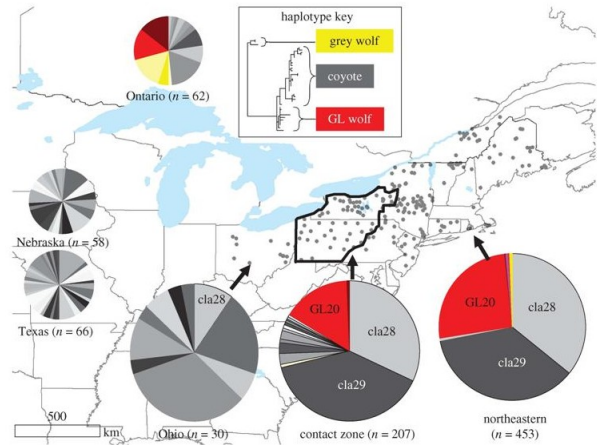
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Pennsylvania east through New England and into Quebec, and suggests that the sporadic introduction of coyotes by hunting clubs or pet owners did not influence the colonization of the region by coyotes. If these introduced animals had survived and bred, they would have injected more genetic diversity into the population which would still be evident today.

The genetic pattern of coyotes in Ohio was very different from that of New England with a high variety of genetic types and no wolf-like influences. This is typical of western coyote populations, and suggests these animals faced no hybridization or major barriers to their movement.

Western Pennsylvania and western New York are now a contact zone between these types of coyotes; western coyotes are spreading from Ohio while northeastern coyotes are moving in from the north and east. How

Figure 2.



these types interact is anyone's guess. Do they recognize each other as being different? Will they breed and further mix up the genetics of eastern coyotes? Will the strains with a dash of wolf DNA survive better because they are more efficient deer hunters? Or, will the pure coyotes survive better because they are better able to sneak around and avoid conflict with humans?

Last but not least — what should we call this animal? Coydog

seems inaccurate since we found so little evidence for dog genes in the population. Coywolf might be more accurate, but may also overstate the amount of wolf influence. For now, I prefer the term 'Eastern Coyote', since it implies the animal is still a coyote, but is different than its western cousin. Just as wiley, no doubt, but even more adaptable, with a little help from the wolves.

Roland Kays, Curator of Animals, New York State Museum

Muskrats in Decline?

In recent years, Northeastern and Canadian furbearer biologists have been attempting to sort out what has been happening with the muskrat population in our region. The limited data collected to date suggests that there *may* be a region-wide decline possibly related to reproductive success. As such, for the last couple of years we have been attending the semi-annual fur auctions and collecting and compiling sex and age information. In addition, biologists from Prince Edward Island have been researching a

variety of potential causes for the decline including: disease, toxins, predation, and habitat changes.

We would like to step up our data collection and begin looking at reproductive tracts to determine reproductive potential. **To that end we are hoping to collect up to 60 or 70 adult female muskrat carcasses.**

If you are willing to collect and freeze carcasses for future examination, please email Melissa at melissa.currier@state.vt.us or call at 802-885-8845. Thanks in advance for your support.



Lynx in Vermont

We continue to receive occasional sightings of lynx, particularly in northern Vermont.



If you are trapping in lynx country, please remember to follow the recommendations on our website at: [http://www.vtfishandwildlife.com/library/Factsheets/furbearer/how_to_avoid incidental_take_of_lynx.pdf](http://www.vtfishandwildlife.com/library/Factsheets/furbearer/how_to_avoid_incidental_take_of_lynx.pdf)

If by chance you do inadvertently take a lynx, please follow the steps below:

- Carefully release uninjured lynx and report immediately to the local Fish & Wildlife Department biologist or warden. Be prepared to give exact location of capture.
- If the animal is dead or injured, leave exactly as found and immediately call the local warden or biologist so he/she can pick up the animal or carcass for rehabilitation or study.

THANK YOU, THANK YOU

Trappers, hunters, game wardens, biologists, seasonal staff, education specialists, support staff, and volunteers for your help in the management and conservation of Vermont's furbearers



Your purchase of hunting and fishing licenses as well as equipment supports Fish and Wildlife Restoration.



Fish & Wildlife Department

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