This information is taken from the Four Seasons Environmental Centre materials prepared in 2007. Many thanks to Ken Duncan and Kela Graphics for spearheading the project and Glen Hvenegaard, Chad Winger, Susanna Bruneau, and Kim Macklin for the research and writing on the FSEC project.

The FSEC was a project of the Rotary Club of Camrose funded in part with a Government of Canada Rural Economic Development Grant.

Four Seasons
Environmental Centre

Mammals

Introduction

In Alberta, 91 species of mammals have been reported. These include representatives from many families of rodents, deer (Cervidae), cat (Felidae), dog (Canidae), weasel (Mustelidae), bear (Ursidae), rabbit (Leporidae), and evening bat (Vespertilonidae). Alberta's provincial mammal is the Bighorn Sheep (Ovis canadensis).

In Camrose and area, 51 of the 91 species of mammals in Alberta have been or are currently found in the area. Some prefer the open areas surrounding Camrose, areas of heavier tree cover, or the areas surrounding the creek. Some species have done well in more urban parts of Camrose.

Rodents (Order Rodentia)

Of the 51 species currently in the Camrose area, rodents make up the largest percentage, with 19 species. They make up the base of the food chain, being primary consumers. They feed the majority of the carnivores, such as foxes, coyotes, badgers, and other members of the weasel family.

All rodents found in this area are here all year around, employing a variety of strategies. A number are hibernators, using a den, burrow, or nest to overwinter. Others are active year round, and some are in between.

Historical information on the small rodents is negligible. Few surveys were conducted and few records, if any, were kept. Thus, historical range is hard to determine. However, as many rely on grasslands, some species may have been more widespread before agricultural practices expanded.

Though some rodents, such as the Richardson's ground squirrel or beaver, are high profile and easily noticed, the smaller members are the most successful order in the province in terms of sheer numbers[1]. Rustles in the bush or small holes in snow mounds with tiny tracks are evidence of the activities of some of these mammals throughout the year.

Richardson's Ground Squirrel (Spermophilus richardsonii)

Commonly know as the gopher, the Richardson's Ground Squirrel (Spermophilus richardsonii) is very common in prairies, meadows and pastures. This species is common in the Camrose river valley and surrounding area, including Driedmeat Lake. In rural and agricultural areas, it is viewed as a pest as it conflicts with agricultural practices and endangers cattle. Due to population control in some areas, numbers may be low [2]. It hibernates from around September to late February or March. Individuals can be seen until October, but these are the young males. As with most ground squirrels, the Richardson's live in underground colonies which consist of many burrows and tunnels (in which they hibernate), with a primary entrance and numerous secondary entrances [1].

S. richardsonii has buffy grey to cinnamon mottled upperparts, with pale yellowish, pinkish, or greyish underparts. The buffy-brown tail is one-third (6-8 cm) the length of the body (28-32 cm) and is fringed with short black, white-tipped hairs. One distinguishing character of S. richardsonii is that it stands erect on its hindlegs to survey the surroundings [1]. A high-pitched alarm call warns the rest of the colony to any approaching danger.

This ground squirrel feeds on flowers, grasses, seeds, fruits, green vegetation, some insects, an possibly some carrion. It fills the cheek pouches with seed and carries it back to store in the burrow [1].

Thirteen-lined Ground Squirrel (Spermophilus tridecemlineatus)

Found throughout the aspen parkland, the Thirteen-lined Ground Squirrel (Spermophilus tridecemlineatus) varies in abundance, from common to sporadic, absent, or scarce [2]. S. tridecemlineatus prefers tallgrass prairie [1]. It has been recorded in the Camrose area including Driedmeat Lake [2,3], preferring nesting cover of two to three years old [3].

On the back there are 13 alternating solid and dotted lines separated by dark-brown. The sides are grey, with a buffy colouration for the head and tail [1]. The squirrel is 21-30 cm long. The alarm call is a shrill seek-seek or a high-pitched trill. Unlike the extensive colonies and burrow system of S. richardsonii, S. tridecemlineatus may be in small, loosely-associated colonies, or may be solitary [1].

Of all the squirrels, S. tridecemlineatus eats the most meat. Its diet changes, eating mostly vegetation just after emerging from hibernation, to a summer diet of meat. Seeds are the staple diet, with native fruits, berries, and some peas, bean, and strawberries, which can make them a garden pest in some areas [1]. In the summer, a diet consisting of insects, slugs, invertebrates, young birds, mice, and carrion is sought [1].

Thirteen-lined Ground Squirrel (Spermophilus tridecemlineatus)

Franklin's Ground Squirrel (Spermophilus franklini)

The Franklin's Ground Squirrel (Spermophilus franklini) is uncommon, but has been documented in the Camrose area, especially at Driedmeat Lake [3]. It is primarily found in the aspen parkland belt at forest edges, though tends to be inconspicuous [2]. Unlike other ground squirrels, it is almost always close to trees, and is an active climber. S. franklini prefers to spend much time underground and in deep vegetation. It is often mistaken for a member of the tree squirrel family. Its overall colouration is grey, darker on the back. It is larger than the other two species of ground squirrel found in this area. The most striking characteristic of S. franklini is its tail (12-16 cm) which is one-third the total body length (33-43 cm). The tail is bushier than all other ground squirrels; it resembles a tree squirrel tail [1].

Like S. tridecemlineatus, S. franklini is largely solitary, but may have small, loosely-associated colonies in areas of high food abundance with well-concealed burrow entrances. The diet consists of a great mixture of food sources. A herbivorous diet of grasses, berries, seeds, and green vegetation is complemented by a variety of meat sources. Mice, young birds, eggs, frogs, toads, small rabbits and ducks, other ground squirrels, and all kinds of carrion are eaten [1].

Franklin's Ground Squirrel (Spermophilus franklini)

American Red Squirrel (Tamiasciurus hudsonicus)

The Red Squirrel (Tamiasciurus hudsonicus) is common throughout the coniferous and mixed wood forests of the province, including Camrose and surrounding area [2,3]. Towns with trees that are more than 40 years old can also support populations [1]. In anecdotal evidence, some individuals have been seen in Camrose in areas near the river valley. Lack of appropriate spruce habitat in the Camrose area may restrict this species. However, with more spruce used in landscaping, urban habitat for T. hudsonicus may increase. Total length is 28-35 cm. Overall, the summer coat of T. hudsonicus is shiny, clove brown with greyish white underparts. The tail (11-15cm), commonly held along its back while sitting, is the same colour but fringed with long black hairs. In winter, all parts darken slightly. Unlike the other squirrels, T. hudsonicus remains active for most the winter, except during the coldest days [1]. It can be rather rambunctious, with breeding commencing with long chases, and often engaging in disputes with neighbouring red squirrels, accompanied by chattering. Dens are in tree cavities, logs, or burrows. Each den has an expanded cavity with a nest ball [1].

The staple of the red squirrel's diet consists of the seeds from conifer cones, cutting the cones and storing seeds for the winter. Sometimes, bark can even be eaten. Other components of the diet include flowers, mushrooms, birds, berries, eggs, mice, insects, and even chipmunks [1].

Northern Flying Squirrel (Glaucomys sabrinus)

The Northern Flying Squirrel (Glaucomys sabrinus) (25-37 cm) is common in suitable habitat, which includes coniferous and mixed wood forests, as well as aspen and cottonwood forests [2]. Records have been made in the Camrose area, all the way to the Battle River [2]. Due to its nocturnal habits, it is difficult to determine overall status [2]. With greyish brown colouration on the back with smoky grey underparts, G. sabrinus has folds of skin, called patagium, that are spread tightly between the front and rear legs during flight. The tail, 11-18 cm, is flattened to aid in the aerial glides between trees. Such "flights" can be up to 100 m. Due to its nocturnal and aerial habits, G. sabrinus has larger eyes for better vision[1].

These squirrels make nests in tree cavities lined with lichens and grass, or make a "leaf nest" in a tree fork near the trunk of the tree. They are quite gregarious. Often, many individuals can be found in a tree or at a feeding site. They also often nest together. This behaviour is likely a strategy to keep warm, as G. sabrinus seems to have a tendency to chill easier than other squirrels [1].

Most of the diet of the northern flying squirrel consists of lichens and fungi, though it does cache cones and nuts. It also eats bubs, berries, some seeds, some arthropods, bird eggs and nestlings [1].

Least Chipmunk (Tamis minimus)

The Least Chipmunk (Tamis minimus) is the most widely distributed chipmunk in the province, inhabiting a variety of areas, including open coniferous and aspen forests, alpine meadows, and sagebrush flats, mostly seen in the understory. It is common throughout the province as well as in Camrose and surrounding area [1,3]. As with all chipmunks, T. minimus (though slightly lighter) has the typical stripe colouration: 3 dark stripes and two light stripes on the face and five dark and four light stripes on its greyish body (18-24 cm). The central stripe goes to the end of its relatively long tail (7.5-11 cm)[1,3].

Though some individuals live in tree cavities or make leaf nests, most Least Chipmunks live in burrows underground, where they hibernate. Though seeds, nuts, and grasses make up the staple of the diet, T. minimus enjoys ripe native fruits (chokecherries, blueberries, raspberries, strawberries), as well as mushrooms, and some insects [1].

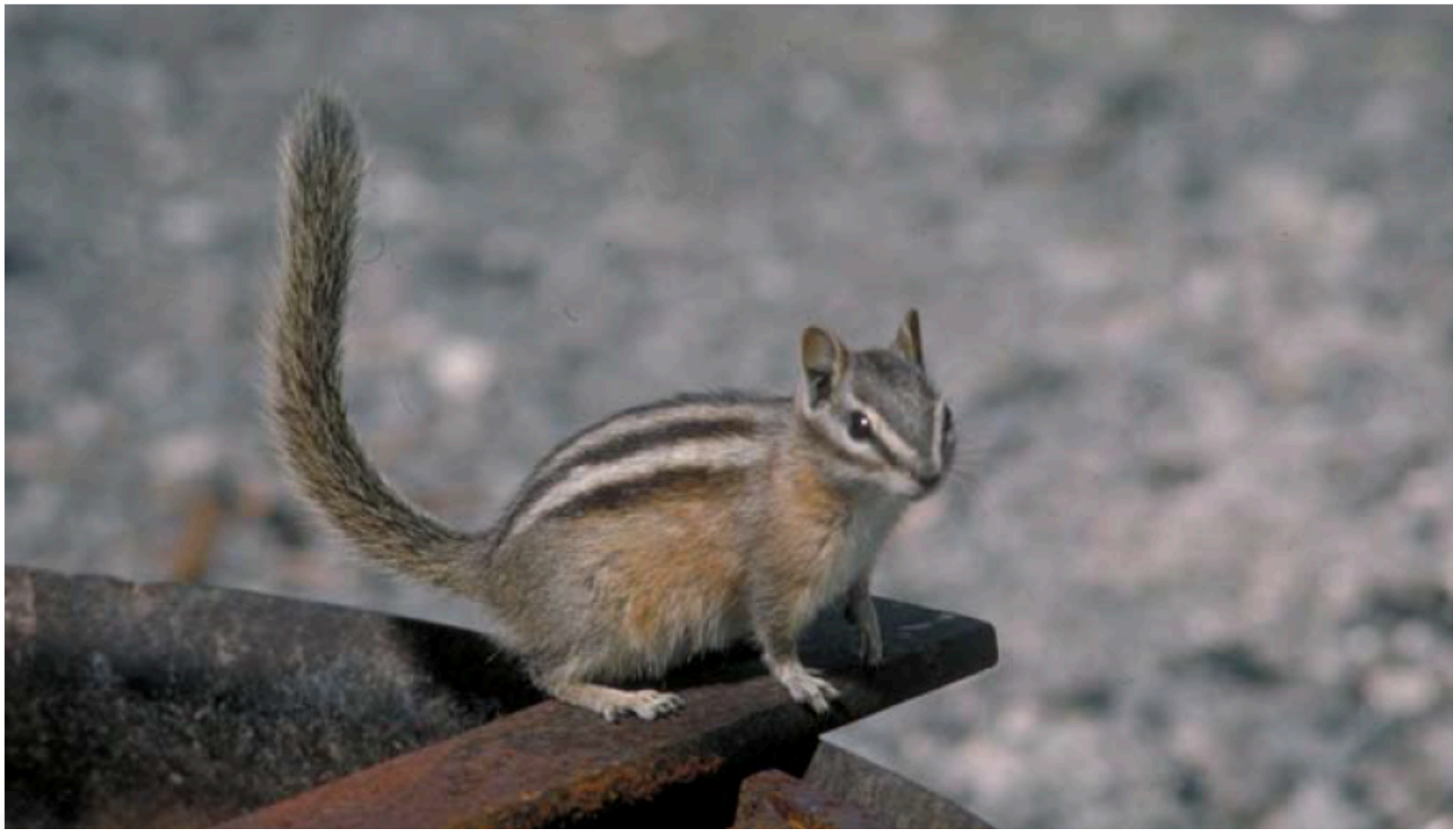
Woodchuck/Groundhog (Marmota monax)*

Though there are no confirmed accounts of the Woodchuck or Groundhog (Marmota monax) in the Camrose area recently, reports from in the Battle River Valley have been made [2]. Although they are present in the northern two-thirds of the province, they are far from common. M. monax is present in the Edmonton River Valley [1]. Their

preferred habitat includes river valleys, meadows, pastures, rock piles, and old fields close to wooded areas. Usually solitary, woodchucks dig long burrows, 3-15 m long underground, with their long, powerful claws, where they spend most of the year. A large ground squirrel (46-65 cm; 1.8-5.4 kg), the woodchuck has short legs and a chunky body. It is brownish, with a grizzled appearance with a bushy, slightly flattened dark tail and small ears[1,3]

The woodchuck eats primarily green grasses and vegetation, as occasionally bark. While it is hibernating, like with most rodents, the metabolism slows allows them to survive the winter. In this torpor, the woodchuck may breathe once every six minutes [1].

Least Chipmunk (Tamis minimus)



Southern Red-backed Vole (Clethrionomys gapperi)

Common in poplar and spruce forests, the Southern Red-backed Vole (Clethrionomys gapperi) is found in a variety of habitats, preferring vegetation that is at least two years old [3]. They are also found in damp, bog areas [1]. Surveys have noted this species is very abundant in Camrose and surrounding area, including Miquelon Lake; it is likely the most abundant vole in this area[2,3]. This vole has reddish dorsal stripes that give it its name, and makes it easy to recognize. They grow up to 12-16 cm. The sides and underparts are greyish to greyish white. The tail (3-5.7 cm) is short and slender with short hair, and the ears are rounded [1].

Strictly herbivorous, the diet is comprised of green vegetables, berries, seeds, grasses, lichens, and fungi. Unlike some other rodents, C. gapperi never caches food for the winter. They forage under the snow for food [1]. C. gapperi lives out the winter between the snowpack and the ground in a typical subnivean lifestyle. Subnivean means living beneath the snowpack and above the ground in the space created by the heat released by the ground. They make summer nests and winter nests. Summer nests are made in rotten logs or rock crevices. Winter nests are subnivean [1].

Meadow Vole (Microtus pennsylvanicus)

The ecologically important Meadow Vole (Microtus pennsylvanicus) serves as that main food source for raptors, owls, as well as terrestrial predators on the prairies. Six species of owls in Alberta feed extensively on meadow voles [2]. Like Clethrionomys gapperi, M. pennsylvanicus has a subnivean lifestyle during the winter. Though it is present in a variety of habitats, the best place to find it is in ungrazed pastures and prairies throughout the province, especially in moist areas like marshes near dense shrubbery [1,2]. Studies reveal that meadow voles, along with deer mice (Peromyscus maniculatus) and red-back voles (Clethrionomys gapperi), were the most abundant small mammals in the aspen parkland study area [3]. M. pennsylvanicus preferred nesting cover at least 2 years old [3]. In and around Camrose, including Driedmeat Lake and Miquelon Lake, meadow voles are common [3]

A relatively large vole (50 g; 13-19cm), the body of M. pennsylvanicus is reddish-brown to blackish, being darker above, and greyish underneath. The tail is relatively long (3.3-4.6 cm), being twice as long as the hindfoot [1,3].

Like some other species, the population of meadow voles fluctuates cyclically [3]. The summer diet of M. pennsylvanicus consists largely of green parts of shrubs, grasses, and buds. In the winter, copious amounts of seeds, insects, and bark are consumed. These diets may be supplemented by beans, grains, roots, and bulbs [1]. Nesting behaviour is similar to that of C. gapperi.

Prairie Vole (Microtus ochrogaster)*

Though the range for the prairie vole (in Alberta) is limited to the aspen parkland of the east-central region, few individuals have been documented [1,3]. It is considered rare and sporadic, with its population undergoing cyclic fluctuations [1,3]. Microtus ochrogaster prefers undisturbed arid grasslands and upland prairies surrounded by aspen forest [1,3].

This medium-sized vole (12-17 cm) has a grizzled appearance due to a mixture of brown and buffy hairs. It has short legs, small rounded ears, and a short, well-furred, bicoloured tail (2.5-4 cm), dark on top and light on the bottom[1,3]. Like other voles, the diet of the prairie vole varies from summer to winter. In the summer, the diet consists of green shoots of grasses, and flowers and leaves of bulbs. In winter, ripened fruits, bulbs, roots, seeds, and the inner bark of corns and shrubs constitute the diet [1].

Meadow Jumping Mouse (Zapus hudsonius)

The Meadow Jumping Mouse (Zapus hudsonius) tends to small (19-22 cm) with a long tail (11-14 cm) [1,3]. It is common in the northern three-quarters of Alberta primarily in moist meadows, but also in marshes, bush, and even thick vegetation [3]. The body is brown with yellowish sides and a whitish belly, with small ears. The naked tail is bicoloured (dark on top, light on the bottom). The distinguishing characteristic of jumping mice is the greatly elongated hindfeet [1,3]

As its name suggests, this mouse hops, jumping much like a frog when startled. The elongated hindfeet are designed for this purpose. Insects make up about half of the diet in the spring, supplemented with seeds and buds [1].

Western Jumping Mouse (Zapus princeps)

The Western Jumping Mouse (Zapus princeps) is similar to the meadow jumping mouse, though it is slightly larger (22-26 cm), but with an equally long tail (12-15 cm). Because these two species are so similar, determining the accurate range is difficult; Z. princeps tends to have a more southern distribution. Z. princeps prefers moist meadows bordered by brush, nearby a stream, or in tall grasses. It appears to be a good swimmer, as it frequently enters the water and dives as deep as 1 m. Like Z. hudsonius, the side of mouse is yellowish. Z. princeps has broad dark band down the back. Both species of jumping mice are long hibernators, creating burrows lined with vegetation [1,3].

Like Z. hudsonius, Z. princpes hops and jumps using elongated hindfeet. This mode of locomotion in both species of jumping mice, is an easy identification technique, though to tell which species it is will more challenging. It eats berries, tender vegetation, insects, other invertebrates, grass seeds, and fruits. A favorite is subterranean fungi [1].

House Mouse (Mus musculus)

The House Mouse (Mus musculus), an introduced species, is common, mostly occurring wherever there is human habitation. Typical habitats include barns, hay stacks, and other associated buildings. In summer, mice may disperse into shrubby areas on open prairie and into fields with relatively young vegetation [3], rarely straying far from buildings. If a mouse is found in a house in the summer, it is a deer mouse (Peromyscus maniculatus). M. musculus (13-20 cm) is uniformly yellowish brown to grey with large hairless ears. The tail is long (6.5-10 cm), hairless and scaly, with a pinkish colour[1,3].

The bulk of their diet consists of stems, seeds, and leaves, but insects, carrion, and human food are readily eaten. Unlike many introduced species, House Mice appear to have had negligible negative impacts on native species. This may be due to the fact that they cannot tolerate temperatures below -10°C [1].

Deer Mouse (Peromyscus maniculatus)

Deer mice (Peromyscus maniculatus) are common, found in almost all habitats throughout the province. They are one of the most abundant small mammals in the aspen parkland [1,3]. In the wild, they are found in groundcover ranging from deadfall to thick grass. According to Skinner et al. (1995), deer mice preferred younger vegetation, and comprised 32% of the small mammals captured in surveys. The deer mouse is also very common in human buildings. This mouse is about 14-21 cm. It has large ears and a pointed nose with long whiskers. Colouration can be quite variable, from yellowish buff, tawny brown, or greyish- to black-brown. Underparts are white. The tail is sharply bicoloured with a dark top and light bottom [1].

Nests are made in a variety of places. Burrows are made in prairie and meadow areas or on elevated ground; in wooded areas, nests are made in hollow logs or under debris. Nests are also made in rock crevices [1]. Their cheek pouches are used to transport food to burrows or nests. Seeds from grasses and grains, and other weeds, as well as from chokecherries are the mainstay of their diet. They may also feed on insects [1].

In close proximity to humans in buildings, they pose a health risk. The deadly Hanta virus is associated with the faeces and urine of deer mice, and caution should be used when removing any mouse waste [1].

Deer Mouse (Peromyscus maniculatus)

Norway Rat (Rattus norvegicus)*

Though not common due to strict border control and monitoring, the Norway Rat (Rattus norvegicus) has been sporadically found in Camrose, and still may occur occasionally. It is an introduced species, about 32-46 cm long, with a long, round, scaly tail about 12-22 cm. It is grizzly brown in colouration, varying from red-brown to black, with a pale belly. R. norvegicus is omnivorous, eating grains, vegetables, shoots, insects, garbage, carrion, and even attacking young chickens, ducks, and piglets [1].

Northern Pocket Gopher (Thomomys talpoides)

The Northern Pocket Gopher (Thomomys talpoides) is common in parkland region, and in Camrose and surrounding area [1,3]. It is a burrowing rodent present in native grasslands, meadows, roadside ditches and gardens [2]; it avoids densely forested areas and areas that have shallow or wet soil [1]. T. talpoides prefers nesting cover vegetation that is around

2 years old, but is found in both young and older vegetation [3]. It lives the majority of the time in its intricate network of tunnels, with sections for various uses, such as food storage or latrines. It has a stout, bullet-shaped body (19-26 cm) with a large head, and a short (4.1-7.7 cm), largely hairless tail [1,3]. Colouration matches the soil, ranging from black, grey, brown, to light grey, with the underparts being slightly lighter. Long front claws explicate its role as an adept burrower. The pocket gopher had cheek pockets, similar to its relatives the pocket mice, which are used to transport food [1].

This rodent has gotten its reputation as being a garden pest from its taste for the succulent underground parts of plants that make up the staple of its diet. However, during the summer, it sometimes emerges during the night to collect green vegetation [1].

Porcupine (Erethizon dorsatum)

The porcupine (Erethizon dorsatum) is quite common throughout the province, especially in the Camrose area [3]. It prefers mixed forest, wooded riparian areas, and willow-edged wetlands, but can be seen feeding in agricultural fields. As its claim to fame, the porcupine uses quills, numbering up to 30,000, as defense against predators. Quills are modified hairs, and are very effective weapons. Quills are not thrown, but are easily detached from the tail when the animal attacks. Quills expand when they come in contact with body heat, and become buried deep in the attackers flesh, causing festering, and may cause serious injury or sometimes death depending where the quills strike. Despite the formidable quills, the porcupine is a relatively docile, solitary animal. It is also a common victim of collisions on the highway [2,3].

It is the second largest rodent in Alberta, second only to the beaver. It is quite large, weighing up to 12 kg, and reach a length of 53-94 cm. The undercoat is dark, with long white-tipped guard hairs with dark-tipped white to yellowish quills. The tail is thick and powerful [1].

Though the porcupine is a nocturnal animal, it is commonly seen during the day. It moves relatively slow. It is strictly herbivorous, and particularly likes the tender bark of young trees. Like the beaver, the porcupine has

large incisor teeth to strip the bark. It is an adept climber, using their sharp claws and thick padded feet with rough, sandpaper-like soles. Often, it is seen venturing far onto thin branches. It will often remain in one tree, even sleeping there, until it has finished stripping all the bark on that tree (either coniferous or deciduous). It also eats leaves, buds, and twigs [1].

Porcupine (Erethizon dorsatum)

Beaver (Castor canadensis)

Beaver (Castor canadensis)

The Beaver (Castor canadensis) is common, and are present throughout the province. They are very common in the Battle River and its tributaries (including Camrose Creek). They are a common sight in Mirror Lake, as well as in the river Valley. In some places they are so common they are considered pests [2]. They require freshwater environments with surrounding suitable woody vegetation. They are present in lakes, but are more commonly associated with flowing water bodies, such as rivers and streams [1,2]. The beaver, our national icon, is the largest rodent in Canada, weighing in at 8-45 kg, and 89-120 cm in length. The fur of the beaver is dark brown with a reddish hue, with short ears and small eyes on its broad head. Only the hindfeet are webbed, the source of propulsion underwater. Large incisor teeth that continuously grow are used to cut vegetation and strip off bark. The broad, black, scaly tail (29-53 cm) is used to stabilize the beaver while cutting trees, for thermoregulation, as a fat storage are, and are slapped on the ground or water surface as an alarm signal [1]

Beavers, like porcupines, eat the bark of trees, preferring aspen, birch, and willow. Aquatic pond vegetation is also eaten in the summer. They may even come ashore in search of grains and grasses. Trees are also cut for other purposes. Beavers use branches and logs to build their dams and lodges. Beavers usually have a series of dams, one main one and

several serial ones. Lodges are built so that the entrance is underwater to evade predators and maintain access trees stored under the ice during the winter [1]. The lodges are also used to protect beavers from extreme cold and heat. Lodges usually contain three generations of beavers: the parent pair, yearlings, and the current year's kits (baby beavers). Once the youngsters reach two years old, they leave the lodge to find their own territory, often downstream of their parents [1].

The beaver a keystone species, meaning that it plays a key role in the ecosystem. These species affect many other species, and whose presence or absence would have great impacts on the existence of these other species. Beavers affect not only animal life, but because of their need for trees and its ability to change its environment means they also greatly impact the vegetation in the vicinity [1].

Abundance of moose (Martell et al., 2006), waterfowl (Brown et al., 1996; McCall et al., 1996; McKinstry et al., 2001), herpetofauna (Metts et al., 2001; Stevens et al., 2007), fish (Collen & Gibson, 2000; Pollock et al., 2003), and invertebrates (Margolis et al., 2001) are all affected by beavers. Beaver dams have been found to alter the invertebrate assemblages in streams. Biodiversity was not altered, though changes in dominance and differences in taxonomic groups present were found[4]. Standing water created by beaver dams also helps wetland birds and waterfowl by creating more suitable feeding and breeding habitat [5].

The physical structure of the dam itself (as well as beaver lodges) can also serve as breeding structures [6]. In terms herpetopfauna, it appears that beaver ponds are able to affect biodiversity and numbers of a variety of species. Overall, beaver ponds tend to increase the abundance of anurans (frogs and toads), but salamanders tend to decrease in abundance. Variation in species depends on life histories. Reptiles associated with water may increase in abundance, and life history characteristics may be affected by the warmer water and the resulting warmer air surrounding beaver ponds. Local species, such as the wood frog and the boreal chorus frog were found to be present in beaver ponds, but not in unobstructed streams [7]. In both studies, the beaver dams created appropriate breeding habitat[7].

The beaver dams also influence fish populations, which can affect amphibian populations as predatory fish species eat amphibian eggs and larvae. Some species of amphibians appear to be more vulnerable to fish predation, such as salamanders [8]. The way the beaver dams affect fish populations depends on the species and its physiological and behavioural needs. The changes in hydrology and stream bottom morphology can increase some species, such as trout [9,10]. However, depending on the chemical composition of water, pH, temperature, and oxygen content, as well depth (important for overwintering) beaver ponds may decrease certain species but increase others, such as smaller species becoming

more abundant and larger species less abundant [9]. Beaver dams also create obstacles for migrating fish (like salmon) [9]. Beaver dams also create refuges "from high or low water flows, low oxygen or high temperatures" [9] are provided in the presence of adverse conditions in any season.

As previously mentioned, hydrology is altered by beavers, dramatically altering the dynamics of stream systems [10]. Dams alter sedimentation, allowing sediment to settle on previous spawning areas [9] and otherwise change the overall morphology of the stream floor [10]. Temperature and chemical composition of the water is affected to varying degrees depending on where the dams are placed [10].

Beavers alter not only the aquatic ecosystem, but also the surround terrestrial ecosystem. Beavers set back succession, altering the landscape considerably by their activities and new ecosystems are created [1]. Their preferred food is aspen (Populus tremuloides) and beavers will typically only colonize areas where aspen is within 60 m from the water. However, trees may be harvested from several hundred feet away [3]. When aspen becomes less abundant beavers will move to less preferred species, such as willow, birch, and/or broadleaf plants. Few coniferous trees are

harvested as the higher levels of resin make them less palatable. In high quality habitats, beavers select fewer trees, but take the larger trees. In lower quality habitats, beavers are less selective [11]. For the size of the trees seen cut down each year, it would appear the Camrose valley is a higher quality habitat. Due to their selective feeing, beavers significantly impact riparian ecosystems, affecting the diversity and structure of plant communities).

As previously mentioned, beavers were extirpated through much of their range in Alberta through trapping in the 1800s and 1900s. The removal of the beavers without any inclination to re-establish beavers in some areas may aggravate the effects of land use on the groundwater levels [10].

Due to the impacts beavers have on a riparian ecosystem and biodiversity, forest managers and county governments should carefully manage beaver populations. Biodiversity would be affected by both the presence and absence of beavers. Management practices should be determined by location[9].

Common Muskrat (Ondatra zibethicus)

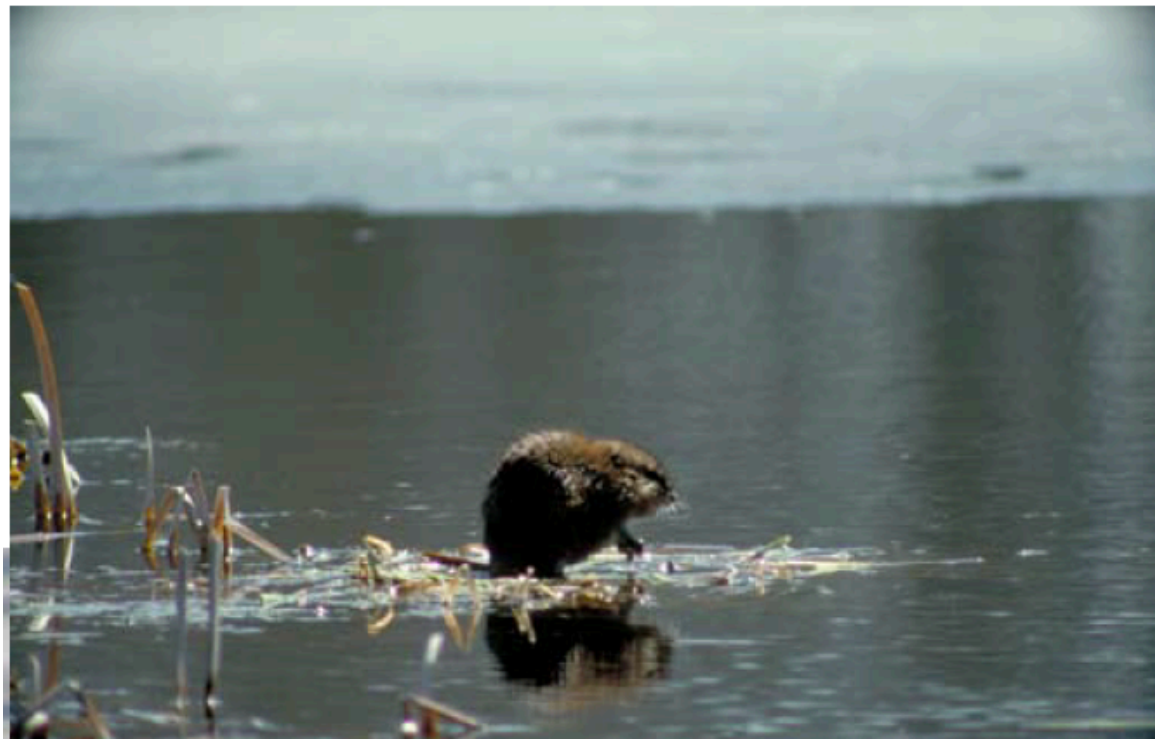
Though it looks like a small beaver, the Common Muskrat (Ondatra zibethicus) is in a different order. It is actually an aquatic vole, and the largest vole in Alberta. It occupies a similar habitat to the beaver: permanent or long-standing sloughs, lakes, marshes, streams, preferring ones with cattails or rushes [1,2]. It is common in most areas of the province, and is quite common in Camrose, being found in Mirror Lake, as well as in the surrounding area, including Driedmeat Lake and Miquelon Lake (Kelsall et al., 1973; Skinner et al., 1995; Smith, 1993; Pattie & Fisher, 1999). As many as 18 muskrats were recorded in surveys at Driedmeat Lake in October 1973. The muskrat is 46-62 cm long (0.8-1.6 kg), with long, shiny, reddish to black guard hairs with a brownish-grey undercoat. The tail is long (20-28 cm), hairless with black scales, and somewhat laterally compressed, though is more whip-like than that of the beaver. The hindfeet are webbed, and claws are long and strong [1,2]. As their name suggests, muskrats emit a bit of a musky smell during breeding season [1]

The muskrat houses are built entirely out of herbaceous vegetation (such as cattails and rushes, unlike the branches used by beavers) with underwater entrances. Burrows may also be dug out from river banks.

Sometimes, numerous muskrats may use abandoned beaver lodges [12]. Muskrat homes are important not only to the muskrats, but because they rise out of shallow water, they make great nesting platforms for a variety of waterfowl. Muskrats, like beavers have large incisor teeth for eating various types of vegetation such as cattails, rushes, water lilies, and pondweeds. They will also eat snails, fish, and frogs [1].

The winter is spent like beavers, swimming under the ice to retrieve food. Their dives can last as much as 15 minutes, and can swim the length of a football field in that time. In spring, young muskrats travel over land in search of new territories, which puts them at risk by crossing highways and other roadways [1].

In the past, like beavers, it was hunted for its fur. In 1972-73, muskrat pelts made up 82% of all furbearers caught in the region [2].



Common Muskrat (Ondatra zibethicus)

Snowshoe Hare (Lepus americanus)

Hares and Rabbits:

Only two species of lagomorphs (members of the rabbit family) live in the Camrose. Both are quite common, but utilize slightly different habitat.

Snowshoe Hare (Lepus americanus)

The Snowshoe Hare (Lepus americanus) is very common in almost any forested and shrubby area throughout Alberta, and across most of Canada [1]. It is rarely seen in open areas [2]. Studies show that L. americanus prefers cover that is at least two years of age [3]. The hare has been seen at Driedmeat Lake, in Camrose and surrounding area. They weigh 1-1.5 kg, with a length of 39-53cm [1].

Summer colouration is rusty brown over the majority of the back with black ear tips. Adult feet are white, while juvenile feet are grey. In the winter, the outer parts of the fur turns white (around mid-October), with the ear tips and the hair bases remaining black. As suggested by their name, their large hindfeet allow these hares to easily cross over soft snow [1].

In the summer, these hares eat grasses, herbaceous plants, and brush. Winter diet consists of mostly buds, twigs, and bark of woody trees and shrubs, specializing on young aspen saplings [1].

A long-studied phenomenon occurs in snowshoe hare populations. Over ten years, there is a cyclic fluctuation in the abundance of snowshoe hare. These fluctuations are connected to the delayed mirrored cycles of the hare's main predators, the Canadian lynx and coyote [13].

White-tailed Jackrabbit (Lepus townsendii)

The White-tailed Jackrabbit (Lepus townsendii) is common in the southeastern portion of the province, and quite common around Camrose, with anecdotal evidence of its presence in the river valley. It is the largest and most commonly encountered hare in this region on the province [1]. This species also fluctuates, though no evidence of a cyclic pattern is evident. These rabbits prefer open grassland and open meadows [2]. They will enter open woodlands in search of shelter in winter [1]. Usually solitary, they often use the same rest areas from day to day, so if you spook one, you can go back, cautiously, the next day and look for it in the same area. In winter, up to 50 can be found gathered together [1].

L. townsendii is larger than L. americanus, getting as big as 54-63 cm and 3-5 kg. When it runs it holds it white tail rigid. In the summer, the coat is light greyish-brown with a belly that is nearly white. Unlike the snowshoe hare, the bases of the hairs of the jackrabbit are creamy-white. In winter, the entire coat is white except for the black ear tips and the greyish forehead. The eyes of the jackrabbit protrude slightly, and the limbs are more sinuous that other rabbits [1].

Grasses and herbs are the staples in the jackrabbit's diet, but they also enjoy alfalfa and clover where they are available in agricultural areas. Common to all hares, the jackrabbit eats its own fecal pellets to pass the bacteria and matter through the digestive system again to absorb more of the nutrients [1].

The claim to fame for the jackrabbit is its incredible speed. It outruns most land predators. Ambush in the open grasslands is difficult. Air ambush, as employed by Golden Eagles, has moderate success [1].

White-tailed Jackrabbit (Lepus townsendii)

Shrews

All shrews are insectivores, eating a variety of invertebrates. They are food for a variety of predators, such as foxes, coyotes, weasels, owls, and hawks

Masked Shrew (Sorex cinereus)

The Masked Shrew (Sorex cinereus) is likely the most common shrew in Alberta, utilizing many habitats. In is common at Miquelon Lake, Driedmeat Lake, as well as in and around Camrose [1]. It favours coniferous and deciduous forests, and sometimes in areas of tallgrass prairie (at least 3 years old) and shrubby wooded areas [1].

S. cinereus is a medium-sized shrew (7.1-11 cm; tail 2.5-5 cm). It has a dark brown back with a lighter belly. Like most shrews, it has a long flexible snout and long whiskers for foraging through detritus in search searching for insects. It has tiny eyes and small feet. It eats insects primarily, but also eats plenty of slugs, snails, young mice, and carrion. It even eats some vegetation [1].

Arctic Shrew (Sorex arcticus)

The Arctic Shrew (Sorex arcticus) is relatively common in Alberta, as well as Camrose and surrounding area [1,2,3]. It is reported as being common in central Alberta from 1894-95 [2]. In some studies, numbers at Driedmeat

Lake exceeded those of the masked shrew. This shrew seems to prefer moist habitats with tree and shrub cover in willow-sedge, poplar forest, and grasslands, preferring areas with vegetation two years or older [1,3]. The Arctic Shrew (10-12 cm; 6-14 g) is the only shrew that is distinctly tricoloured, and changes colouration during winter. In summer, the back is a chocolate brown or dark grey-brown, with the sides being a light grey-brown. The belly is ash-white. In the winter, the coat becomes longer and denser. The back becomes a glossy black or very dark brown, with greyish sides and a silvery-white belly. The tail (3.8-4.5 cm) remains cinnamon colour throughout the year [1,2]. It eats larval and adult insects primarily, preferring caterpillars, centipedes, and beetles, but also eats plenty of earthworms, slugs, snails, and carrion [1].

Prairie (Hayden's) Shrew (Sorex haydeni)

In Alberta, Prairie (Hayden's) Shrew (Sorex haydeni) is only found in southeastern to east central portion of the province. It is uncommon over most of its range, but has been found in the Camrose area [3], and can be quite common in the central parklands [1]. It inhabits open native grasslands, as well as shrubby areas, open fields and pastures, preferring vegetation older than three years [1,2,3] This mid-sized shrew (7.4-8.8 cm; tail 2.5-3.3 cm) has a cinnamon brown back. Like other shrews, it has a long flexible snout and long whiskers and tiny eyes. It eats insects primarily, but also eats plenty of slugs, snails, young mice, and carrion. It even eats some vegetation [1].

Dusky Shrew (Sorex monticolus)

Common in most of the province, the Dusky Shrew (Sorex monticolus) inhabits wet meadows, bogs, and among willows along streams, preferring older, dense vegetation [1,2,3]. A small to mid-size shrew (8.6-13 cm; tail 3.6-5.1 cm), S. monticolus has a pale greyish brown colouration with a bicoloured tail. Like shrews, it has a long flexible snout and long whiskers and tiny eyes. It eats a variety of insects, adults and larvae, as well as earthworms, spiders, slugs, snails, carrion, and even some vegetation [1].

Pygmy Shrew (Sorex hoyi)*

The Pygmy Shrew (Sorex hoyi) is the smallest shrew in Alberta, measuring 5.5-6.1 cm (2.5-6.3 g – no more than a penny!). Though range maps indicate its range extends south to Camrose and to the Battle River, it has not been recorded in this area. Unlike other shrews, Sorex hoyi does not have a continuous distribution, and is considered uncommon [1,3]. Moist, dry, forested or open areas are all good habitats to find this shrew. It eats larval and adult insects primarily, preferring caterpillars, centipedes, and beetles, but also eats plenty of earthworms, slugs, snails, and carrion [1].

Water Shrew (Sorex palustris)

Considered uncommon, the Water Shrew (Sorex palustris) is usually found near creeks, ponds, and lakes with nearby cover [1,2]. It is most abundant in the aspen parkland [1], and has been found at Driedmeat Lake. In 1972, five were caught in Camrose[2].

It is the largest long-tailed shrew in Alberta, growing up to 14-17 cm (tail 6-8.5 cm) and weighing up to 20 g. It has a velvety black back and silver to light brown underparts. Among shrews, it has some very interesting characteristics. A few of the toes on the hindfeet are slightly webbed, with stiff hairs around the hindfeet, both of which aid in swimming. Its diet is also different, adapted to its aquatic lifestyle. It eats aquatic insects, insect nymphs, spiders, snails, small fish like sticklebacks, and may even attack fish half its size [1].

Bats:

Bats are common in many ecosystems around the world. Only the Arctic and Antarctic do not have any bats. They also utilize a variety of food sources. There are fruit bats, insectivores, frog-eating bats, and famous vampire bats that drink blood. The bats are classified into the Old World bats and the New World bats, referring to the bat species of the eastern and western hemispheres, respectively. The famous Old World bats are

bats commonly referred to as “flying foxes”, which live in the neotropics of Asia, Africa, Australia, and other Pacific islands. They are frugivorous (fruit-eating). There are also some frugivorous bats in the New World, but they only live in the tropics [14].

In Alberta, there are nine species of bat, all of which are in the evening bat family. These bats are active are active at dusk and often again just before dawn [1]. Most of the species in Alberta eat flying insects, mosquitoes, moths, beetles, flies, and true bugs [1]. Some species specialize on specific types, while others eat any and all types. In the Battle River valley and Camrose area, there are five species of bats [15].

Most bats prefer forested areas with nearby open patches for foraging. However, due to deforestation for agricultural use and urbanization, most species of bats in Alberta have adapted to using old buildings, parks, and any other unnatural, yet appropriate habitats.
Bats are often limited in the habitats they can inhabit by their wing morphology, if there are large differences in the wing size. Small differences may affect which insect prey species are utilized[16].

Little Brown bat (Myotis lucifugus)

The Little Brown Bat (Myotis lucifugus) is very common, and is the most encountered bat in Alberta. It is dark brown to reddish brown to pale brown with dark-brown to black flight membranes. Adults are 6-10 cm weighing up to 12g. Ears reach to the nose, but no longer. M. lucifugus specializes on night-flying insects [1].

Little Brown bat (Myotis lucifugus)

In this part of Alberta, where trees do not grow very large, M. lucifugus uses old buildings near trees and water primary areas for nursery colonies and roosts. Caves, if available, are used for hibernating, but old buildings are more common in the Camrose area [1]. They can roost in large numbers, small numbers, or on their own. Many stay and hibernate in large colonies; however, it is believed that some may migrate south [1].

Northern long-eared bat (Myotis septentrionalis)*

The Northern Long-eared Bat (Myotis septentrionalis) is uncommon, but likely lives in the Camrose area. This bat gets its name from its ears which are unusually long for bats. Ears can be up to 19 mm long. It is smoky brown on the back, and light brown on the belly, 8-10 cm in length, and weigh up to 9 g [1,2].

M. septentrionalis is a solitary species, roosting in trees or buildings, though it prefers tight holes and crevices. A mother bat will care for her young on her own, or in much smaller groups than others Myotis species. It hibernates in caves. Mixed and coniferous forests near water are its preferred habitats. These bats hibernate in buildings or any other appropriate location [1].

M. septentrionalis may be present in Camrose, however by be confused with M. lucifugus (Audet, personal communication). As mentioned earlier, differentiating bat species is done primarily by listening to their echolocation frequency and pattern. M. septentrionalis and M. lucifugus have similar "calls" so the only way to determine if both species are present is by catching them [17].

Big Brown bat (Eptesicus fuscus)

The Big Brown Bat (Eptesicus fuscus) is relatively common, but susceptible to habitat loss through destruction of old buildings (principle habitat) in the urban environment. In the wild, it prefers forested areas. It can also be found in crevices and caves. E. fuscus grows up to 12-29g and 9.3-14 cm. It is Alberta's largest brown bat (Pattie & fisher, 1999). It is pale brown to reddish brown with black flight membranes and ears. They have relatively large ears, but do not reach to its nose [1,2].

E. fuscus is a faster flyer compared to some of the other bats. This allows it to feed on plant hoppers and beetles. It also feeds heavily on agricultural pests [1].

Sometimes, on a warm winter day, these bats may rouse and seek another roost. If a bat is seen in the winter, it can only be the big brown bat [1].

Hoary Bat (Lasiurus cinereus)*

The Hoary Bat (Lasiurus cinereus) is common throughout Alberta, especially during spring and fall migration. It has been noted at Beaverhill Lake [2], and may also occur in Camrose. It is a solitary species, roosting in trees in coniferous and deciduous forests (Pattie & fisher, 1999; Audet, pers. comm.). It has black round ears. General colouration is brown with numerous white/gray hairs, giving this bat its name. There are cream-coloured patches at its thumbs and ruff around neck. As Alberta's largest bat, they can weigh up to 35g, and grow to up to 15 cm long [1,2].

Hoary bats are a migratory species, just spending the summer in Alberta.

Silver-haired bat (Lasionycteris noctivagans)

The Silver-haired Bat (Lasionycteris noctivagans) is considered common in southern Alberta, especially as spring and fall migrants [2]. They prefer woodland habitat, but has adapted to parks and cities. It roosts in woodpecker holes and behind loose bark. Though previously thought to rarely enter buildings, they do use old buildings for hibernating [1,2]. Some individuals migrate.

L. noctivagans can weigh up to17g and be 9-11 cm long. It is characterized by dark brown to black fur with white/silver-tipped hairs. The short, round ears are black, as are the flight membranes. It is easy to recognize while it is flying as it is one of the slowest flying bats in North America [1].

Carnivores:

Striped Skunk (Mephitis mephitis)

The Striped Skunk (Mephitis mephitis) is famous, or rather, infamous for its spray of foul-smelling liquid when threatened. This omnivore is common throughout the province, preferring streamside woodlands, hardwood groves, open grasslands, and valleys. Skunks are highly adaptable to human habitats, cultivated areas, farmsteads, and even cities are suitable, where it eats garbage and gardens [1,2]. Aspen parkland, including the area around Camrose, including Driedmeat Lake, is one of the best places to observe the striped skunk [1,2,3]. This cat-sized mammal (54-79 cm; 1.9-4.2 kg) is mostly active at night when it usually forages. Though primarily solitary, skunks often form nesting groups in the winter. It is slow, and its taste for highway carrion often leads to fatalities on roadways. The distinctive white and black colouration is widely

recognized, with a black body with a thin white stripe from the forehead to the nose, and two stripes around the back of the skunk, reaching down the bushy tail. The front claws of the skunk are long from digging for food, while the rear claws are short [1].

As mentioned earlier, the skunk is omnivorous, eating a combination of animal products and vegetation. Insects, including bees and grasshoppers, make up a large proportion (40%) of the diet in the spring and summer. Carrion, small mammals and birds, bird eggs, herptiles, green vegetation, fruits and berries make up the rest of the diet. The only regular predator of the skunk is the Great Horned Owl [1].

Short-tailed Weasel or Ermine (Mustela erminea)

The Short-tailed Weasel (Mustela erminea), or the Ermine as it is commonly called, is common in the north, but is less common or even scarce in the parklands and grovelands of the southern part of the province. The ermine is Alberta's most common weasel, and may possibly be the most common carnivore in the province [1]. It is most abundant in coniferous or mixed forests, as well as in streamside woodlands [1,2]. It is common in the Camrose area, though not documented at Driedmeat Lake (though it likely does exist there) [3]. The common name "ermine" came from the Europeans for the name of the white winter pelage (coat). As three species of weasels in Alberta change to a white pelage, the preferred common name for Mustela erminea is the short-tailed weasel.

As with the least weasel (M. nivalis) and the long-tailed weasel (M. frenata), the colouration of the short-tailed weasel changes seasonally. In the summer, the coat of M. erminea is light brown on the back with creamy white underparts with some yellow. Paws are white. The majority of the tail is the same colour as the back, but the last third is black. In winter, the animal becomes completely white except for the black tip on the tail, though the underparts still have a hint of yellow. This medium-sized weasel (22-32 cm; 35-106 g) has short oval ears, but larger than that of the least weasel. The tail is relatively short, only 4-9 cm [1]. M. erminea is also a skilled hunter. They are very quick and agile, both of which are important for predators. They eat all varieties of shrews and rodents, as well as pikas, rabbits, baby birds and bird eggs, amphibians, and insects. Almost every part of the prey is consumed, except the stomach. In mice, M. erminea cuts out the stomach with great surgical skill, and it is left on a rock. They are also very relentless in the pursuit of any prey. If the short-tailed weasel seizes prey larger that itself, it will take the prey by the neck and strangle it [1].

Least Weasel (Mustela nivalis)

Being the smallest member of the Weasel family in Alberta, the Least Weasel (Mustela nivalis) (15-22 cm; 25-73 g) can sneak into small mouse holes (anything about the size of a loonie), and find shelter anywhere. It is in fact the smallest member of the carnivore order in the world [1]! As prey availability is the dominant factor in determining the range of the least weasel, it is found in a number of habitats, such as shortgrass prairies, coniferous and mixedwood forests, marshes, tundra, and parkland [1,2]. It ranges from common to uncommon, depending on the area. In the Camrose area, it is common in tall grass vegetation more than two years of age, and was also found at Driedmeat Lake [3]. As with the short-tailed weasel (M. erminea) and the long-tailed weasel (M. frenata), the colouration of the least weasel changes seasonally. In the summer, it is walnut brown on the back and tail, and the belly and feet are white. In the winter, the entire weasel is white, except for a few black hairs on the end of its short tail (2.2-4.2 cm). Ears are short [1].

It is a voracious hunter, almost eating its own weight in meat each day, or 1 g of meat an hour! Small rodents, such as voles and mice, along with insects make up most of the diet, though amphibians, birds, and eggs are eaten as well. Frozen mice found in winter are often dragged back its nest to thaw. Like most other members of its family, the least weasel is a solitary animal and mostly nocturnal, though can be seen during the day [1].

Long-tailed Weasel (Mustela frenata)

The Long-tailed Weasel (Mustela frenata) is only found in North America, and prefers native grasslands in the bottom two-thirds of the province. As much of the native habitat has been converted, populations have declined, and in Alberta is a species of concern [1,2]. On the plains and in the grasslands, they are still fairly common, foraging in aspen parkland and open forests, and have been found around Camrose [3].

This weasel is quite long (34-49 cm) and slim with a relatively long tail (12-19 cm). As with the short-tailed weasel (M. erminea) and the least weasel (M. nivalis), the colouration of the long-tailed weasel changes seasonally. In the summer, the back is a cinnamon or reddish-brown, with a dull orange underneath and on the feet. Most of the tail is cinnamon, but the last quarter is black. In winter, the body turns white, except the black tip of the tail. The underneath often has an orange hue.

Like other weasels, it is an efficient hunter. Though voles and mice make up the bulk of its diet, M. frenata also eats insects, snakes, squirrels, shrews, eggs and young birds, and rabbits. Unlike its smaller relatives, the long-tailed weasel can tackle larger prey. In trying to subdue larger prey, M. frenata grabs the prey by the neck and wrestles it to the ground, and wraps its body around the prey. It then tries to kill the prey by biting it on the head and neck [1].

Mink (Mustela vison)

In Alberta, the Mink (Mustela vison) has an interesting history. Currently, the mink is common in Edmonton and throughout the province, but seen occasionally in the Camrose area [2,3]. It is always seen near water with coniferous and hardwood forests. Like the skunk, this weasel produces a musky, stinky liquid when threatened, but does not spray it as skunks do. The mink's sleek, reddish- or dark-brown to black fur has been highly prized for garments for many years. Unlike other weasels, its coat remains the same colour year round. There are often white spots on the chin. They are 42-62 cm long with a 13-21 cm tail [1,2].

Unlike most other members of the weasel family, the mink is highly aquatic, making dives of several meters. Only the otter is more aquatic. It eats fish, aquatic invertebrates, frogs, snakes, waterfowl and their eggs, voles, mice, and rabbits. Mustela vison seldom passes up a hunting possibility. It stores extra kills in its den [1].

American Badger (Taxidea taxus)

The American Badger (Taxidea taxus) is the largest member of the weasel family in the Camrose area, growing up to 78-85 cm [1]. Badgers are found in the aspen parklands and open grasslands, and avoid forests. Badgers can be found at Driedmeat Lake and other areas close to Camrose with ground squirrels. They have also been seen traveling through Camrose. The large burrows left by badgers are important den sites for many other species, such as coyotes. Badgers are perceived as a pest by farmers due to their burrows being hazardous for farm animals, and are often eradicated [18]. Loss of badgers in specific areas coincides with decreases in these other species that depend on the badger's burrows [1,18].

The badger is squat, with long hair on the sides. It is grizzled with yellow-grey hair. There is a prominent, thin stripe running from the nose back over the head to the shoulders. The cheeks are white; black "badges" are placed between the whitish cheeks and the short, rounded furry ears. The bristled tail (13-16 cm) is more yellow than the rest of the body. The

short legs and feet are dark-brown to blackish. The front claws have long claws which the badger uses for digging [1,2].

The primary component of the badger's diet is burrowing animals. It feeds almost exclusively on Richardson's Ground Squirrels and Northern Pocket Gophers [18], but is also eats eggs, mice, retiles, amphibians, fish, invertebrates, carrion, and even some plant material[1]. Badgers are often found near ground squirrel colonies, and have been found to cache ground squirrels after they have entered hibernation [19]. Badgers eat the ground squirrels in the order in which they were caught [19].

With such a close dependence to the population of Richardson's Ground Squirrels and Northern Pocket Gophers, eradication of this food source by farmers will force badgers out of that area [18].

American Badger (Taxidea taxus)

Red Fox (Vulpes vulpes)

Until recently, the Red Fox (Vulpes vulpes) was considered uncommon. However, recently it has made a comeback. It now commonly found throughout the province, especially in southern Alberta [2]. In the Camrose river valley, the Red Fox is well established. It is also found in the surrounding area, including Driedmeat Lake and Beaverhill Lake [3]. The preferred habitat for the red fox is open habitats such as grasslands interspersed with bushed areas, but can be found in a variety of habitats [1,2]. During summer, red foxes are largely nocturnal, and are harder to see. Winter is the best time to view these animals as they hunt openly during the day for mice is fields[1]. Red foxes often occur in closer proximity of humans than other members of the dog family, usually due to interspecific interactions with coyotes [6].

Red foxes are fairly small (90-113 cm), about the size of a smaller dog. The fur is a vivid rusty or reddish orange with a white chest and belly. The back of the ears as well as front of the legs are black. The long tail (38-41 cm) of the red fox is exceptionally bushy. It is the same colour as the body but with a white tip [1,2]. Variations, known as a "cross fox" and the "silver fox"[1] can be found. The cross fox has darker hairs along the back and over the shoulders. The silver fox is almost entirely black with silver-tipped hairs [1].

The red fox is an opportunistic feeder, eating small rodents, birds, rabbits, invertebrates, and eggs. Though primarily a carnivore, dried and fresh berries and fruit are also eaten [1].

In 1952, the province engaged in a rabies control campaign. Targets for this campaign were skunks, porcupine, wolves, coyotes, and foxes [6]. Though wolves and coyotes are smarter and did not take the bait as readily, foxes were more easily coerced. This campaign decimated the population of red foxes in the Camrose area. Even up to ten years ago there were not a lot of foxes in the Camrose valley (Frank, pers. comm.). The red foxes are now common in the Camrose valley and surrounding area. A survey conducted last summer indicated that there were approximately 10 dens in the Camrose greenspace corridor. The coyote is a natural predator of foxes, but (in Camrose) coyotes will not enter into

the city. Thus, the foxes are safe from predators within the city's corridor [6,20]. Though foxes are wild animals, they are easily habituated to the human presence.

Coyote (Canis latrans)

The Coyote (Canis latrans) is common throughout the province. Its range expanded when the coyote filled the niche once occupied by the grey wolf when it was extirpated by humans [1,2]. Coyotes are generally more wary of humans than foxes. Though coyotes do not occur directly in Camrose, they are present just outside of the city and in the surrounding area, preferring areas of older vegetation [3,6]. Despite this, coyotes have been noted as being able to successfully utilize corridor habitat [21], as found in cities. This may explain their increasing presence in places such as Edmonton, wandering the streets. Foraging and traveling habitat is critical for their movement into such areas [21]. The coyote is the fastest

runner in the dog family, reaching speeds of 40-50 km/h [1]. Canis latrans is about the size of a medium-sized dog (1.1-1.3 m long; shoulder height 58-66 cm; 8-34 kg). The fur colour varies greatly, ranging from yellowish-grey, reddish-grey, to dark brown, with the back being darker than the sides. The underparts are light to whitish. The nose is pointed with a tawny patch on the snout. The long tail (30-40 cm) is bushy with a black tip, and is held down when running [1,2].

Coyotes usually only attack young ungulates, as well as the old and the disabled. Otherwise, it eats a variety of carrion of ungulates, small mammals, ground-nesting birds, and utilizes berries, seeds, and insects[1]. Since the removal of wolves in the majority of the province, some coyotes in Alberta have altered their social structure to be a more wolf-like strategy for hunting by having larger packs. This enables them to kill larger ungulates [1].

Coyote (Canis latrans)

Gray Wolf (Canis lupus)*

The Gray Wolf was common in the prairies, including around Camrose, in the times of the buffalo. In 1872, seven were taken at Driedmeat Lake [6]. More recently, wolves are not normally found in southeastern Alberta, but some sightings have been reported around Edmonton [2]. Anecdotal sightings around Driedmeat Lake have been made in recent years. In the last number of years, the gray wolf has been recovering its numbers. Smith (1993) places the population around 4500 in Alberta, and is primarily found in the mountains, foothills, and the northern half of the province. As the largest member of the dog family in Alberta, the gray wolf is the only animal that limits the range of coyotes. The grey wolf can resemble a German Shepherd with long legs and large paws, growing up to 1-2 m long and 66-97 cm at shoulder height (26-79 kg). The colour of the grey wolf ranges in colour, usually depending on the habitat in which it is found. Though typically thought of as a grizzly dark grey, the colour ranges from coal black to whitish. The tail is the same colour as the body and is held straight out when running [1,2].

Wolves primarily eat members of the deer family and Bighorn Sheep, which makes up about 80% of the diet. The rest is comprised of smaller mammals, nesting birds, and carrion, as well as unguarded livestock [1]. This has made the wolf disliked by farmers, and has lead to their extirpation.

Canadian Lynx (Lynx canadensis)

The Canadian Lynx (Lynx canadensis) was common in the area up until about 1930 (Farley, 1932). Around Edmonton, in 1972-3, 104 lynx pelts were recorded [2]. More recent sightings around Camrose have been recorded [2]. The lynx is classified as common, but its numbers are closely tied to the population size of its prey, the Snowshoe Hare (Smith, 1993; Krebs et al., 2001). Primary habitat for the lynx is forested areas, either coniferous or mixed wood. It is also rarely found in streamside forest and bushy badlands, and is primarily solitary [1,2]. The lynx is more than twice the size of a house cat, standing 46-58 cm at the shoulder, with a total length of 78-101 cm (6.8-18 kg). The long legs (the hindlegs are longer

than the forelegs) and large paws are used for the pursuit and ambush of prey. The long silvery-grey fur with hints of darker stripes throughout covers the entire cat, with a long black ruff around the neck. The short stubby tail (9-12 cm) is tipped with black [1,2].

The primary food of the lynx is the Snowshoe Hare [1], though it can be sustained on squirrels, grouse, other rodents, and occasionally domestic animals [1].

Black Bear (Ursus americanus)

The Black Bear is the smaller of the two bear species found in Alberta. The shoulder height is 91-107 cm with a total length of 1.3-1.9 m. The fur is generally black with a white blaze across the chest. However, it is highly variable ranging to reddish-brown, to tan and honey coloured. The famous Spirit bear of the West Coast with white to cream-coloured fur is a variety of black bear [1,2].

Black bears are omnivores, meaning they eat meat and plants. Up to 95% of their diet is plant material, consisting of leaves, buds, flowers, berries, fruit, and roots. The other 5% of their diet is insects, bees & honey, and

the odd young hoofed mammal, and carrion. Bears use a den for winter hibernation. This can be made from a cave, hollow tree, beneath a fallen log, or under roots of a windthrown tree, even a haystack. They prefer forested habitat, foraging in clearings.

Black bears were common in this area up until about 1930 (Farley, 1932). Up to the early 1900s, numerous accounts were reported in rural areas around Camrose (Lions Club of Camrose, 1955; Armena Local History Committee, 1982; Nordin & Wylied, 1983). A number of sightings have been reported around Edmonton and Miquelon Provincial Park (Smith, 1979; Smith, 1993). In the 1960s, one was spotted at Driedmeat Lake (Kelsall et al., 1973), though is still considered rare in this area.

Hoofed Mammals:

Members of the deer family are plentiful in Alberta, and are the focus of many management issues, as the primary predator of the cervids, the grey wolf, had been greatly reduced in numbers. There are five species of the deer family in Alberta: elk, mule deer, white-tailed deer, moose, and caribou.

In Camrose and area, there are three species from the deer family present. Wapiti or elk, have been extirpated from the area. Though the mule deer is common in the river valley, white-tailed deer and moose are found in the direct vicinity of Camrose.

Mule Deer (Black-tailed Deer) (Odocoileus hemionus)

Mule Deer (Odocoileus hemionus) are very common throughout the province, and a regular sight in Camrose and surrounding area [3,6]. Provincially, it is outnumbered by white-tailed deer, but seems more numerous as it frequents open areas, and can be bold and conspicuous [1]. Mule deer, often referred to as black-tailed deer, are 90-105 cm (35-41 in) at the shoulder, with a total length of 1.3-1.9 m (4.5-6 ft). The summer diet consists of grasses and herbaceous plants. In the winter, the diet is made up of twigs and woody vegetation, grazing in nearby hayfields [1]. It takes roughly a month for the deer to switch over to different food sources (altering enzymes and other digestion processes) [6]

The mule deer gets it name from the large ears. It has a white rump with black-tipped tail. Overall, the colouring is tan in summer and dark grey in winter. Males develop heavy upswept antlers that are equally branched.

Their bouncing gait ("stotting" or "pronking") allows mule deer to move quickly and safely across many obstructions (Bauer & Bauer, 1995; Pattie & Fisher, 1999). White-tailed deer run in a graceful gallop [22].

Mule Deer (Black-tailed Deer)
(Odocoileus hemionus)

In the late 1800's, numbers were low in Alberta, as they were hunted extensively after the buffalo all but disappeared, as well a series of harsh winters. In the 1900's, their numbers recovered, and gradually increased, fluctuating with harsh winter conditions, drought, harvest amounts, and while they adapted to the changes in their habitat [23] O. hemionus continues to do well in fragmented and broken landscapes, and in the mountains, thriving in early successional stages of a forest [1], preferring stands of trees around three years of age [3].

White-tailed deer (Odocoileus virginianus)

The White-tailed deer (Odocoileus virginianus) is likely the most abundant member of the deer family in Alberta, found primarily in the south. Optimum habitat is deciduous forests with rolling country nearby. They prefer patches of vegetation around three years of age on the open prairie and parkland [1,2,3]. Though not seen in Camrose proper, white-tailed deer Odocoileus virginianus is in the surrounding area, often seen briefly bounding through the valley or on the ridgetop[6] It also frequents Driedmeat Lake (Kelsall et al., 1973). It appears similar to mule deer O. hemionus, though it does not have the larger white rump patch and smaller ears. O. virginianus has reddish brown colouration in the summer and greyish brown in the winter. White-tails are roughly the same size as mule deer, but can get a bit larger, get to 68-114 cm (27-45 in) tall, and getting 1.3-2.2 m (4-7 ft) long. They get their name from the white tails they hold up when they flee. Antlers are unbranched [1].

As with mule deer, diet changes with the season. During the summer, the white-tailed deer eat buds, grasses, and mushrooms. In the winter, the diet changes to a more woody diet, eating leaves and twigs of evergreens and deciduous trees and bushes [1].

White-tailed deer
(Odocoileus virginianus)

Moose (Alces alces)

The Moose (Alces alces) is common throughout its range [2]. They were locally quite abundant and around Driedmeat Lake but were extirpated for quite some time [6]. Now, they have come back somewhat, and are found in the area [3]. There are no moose in the Camrose corridor at this time, though there are a number in the surrounding area (about 78 outside the city; Frank, 2007). In the late 1990s, a mother and calf wandered through the school yard of Camrose Composite High School (Frank, 2007). The moose is the largest of the deer family in Alberta.

Shoulder height of the moose is 1.9-2.2 m (6-7 ft) with long legs. The total length is 2.1-2.8 m (7-9 ft). The moose has a short neck, large bulbous nose, humped shoulders with shovel-like antlers on males, emerging laterally. The fur is dark-brown to black. In winter, a long mane develops over the hump and nape of neck; "bell" or "dewlap" from the chin [1].

The moose's diet consists of wood, twigs, buds, bark, branches, especially from deciduous tree and shrubs. In summer, it sometimes feeds on submerged aquatic plants. Moose are invading riverine valleys far into the prairies. They are particularly numerous in early successional stages of willow, balsam, and aspen forests. Moose frequent streamsides and bushy areas with abundant deciduous woody plants.

Ticks, especially the winter tick Dermacantor albipictus, have caused large die-offs of the moose in recent years in areas like Elk Island National Park and Miquelon Provincial Park. A single moose can have 30,000 to 50,000 ticks [24]. Loss of winter coat guard hairs due to extensive grooming to remove parasites can increase the moose's susceptibility to hypothermia and pneumonia. Excessive grooming also increases extra energy expenditure and less time feeding. The tick is attributed to muscle loss, weight loss due to decreased fat stores, reduced weight gains, and

Moose (Alces alces)

possible decreased metabolism. These all cause a weakening in the body's response to the ticks, and thus compromise the ability of the moose/host to survive the winter.

Ticks also infect other deer species (Mule Deer, White-Tailed Deer, Wapiti, Elk), but they aren't as affected. Denser coats prevent most ticks from penetrating to the skin [25]. Fur loss was therefore, not as extensive as found in moose [26]. Ticks can be removed by some birds of the Corvidae family (crows, etc).

Chronic wasting disease, a prion-based disease, has become a major concern involving a variety of cervids. Mule deer, white-tailed deer, and elk are known victims of the disease. Spreading vectors or symptoms are still not understood. In Alberta, there have been 17 cases in wild deer. This disease also has had devastating effects on game farms [23]. None has been found in Camrose or surrounding area as of yet, though the disease appears to be moving slightly inwards from the Alberta-Saskatchewan border.

Bison (Bison bison)

Bison (Plains Bison Bison bison bison) were present in this area and common, until the 1800's when it was hunted extensively and extirpated [1,2.3,6]. Historically, it was quite common in Battle River until 1875, with Driedmeat Lake as a favorite local hunting ground [6].

Pronghorn Antelope (Antilocapra americana)

Though now common in southeastern Alberta, the Pronghorn Antelope once ranged between the Battle River and the North Saskatchewan River until about 1880. The last specimens seen in the Camrose area were near Driedmeat in 1903 [6]. Some have recently been seen sporadically wintering in the Camrose area.

Wapiti/Elk (Cervus elaphus)

Wapiti once occurred in large herds around Edmonton (Smith, 1979; Smith 1993). Many wapiti occurred in the Camrose area until 1880 [6]. Currently, there are just small remnant populations, some seen as far south as Miquelon Lake [2]. These records east southeast of Edmonton are

likely introduced animals (Smith, 1993, Pattie & Fisher, 1999). Today, they are more common in the Rocky Mountains and other wooded habitat.

During the summer, the fur is golden brown, but in the winter grows longer and turns to a greyish browns. Head, neck, and legs are darker brown, and there is a whitish-orangish rump patch. Males have a dark throat mane. Shoulder height is 1.2-1.5 m (4-5ft), with a total length of 1.8-2.8 m (6-9ft). Elk currently prefer mixed wood forests, but used to prefer uplands and prairies [1].

Swift Fox (Prairie Kit Fox) (Vulpes velox)*

The Swift Fox (Prairie Kit Fox) (Vulpes velox) was once very common on the southern plains, but now extirpated, though attempts have been made to reintroduce is several areas [2]. It is thought to have ranged up north of the Battle River, though there is no confirmation of it being present in Camrose area.

Grizzly Bear (Brown Bear) (Ursus arctos)

The Grizzly Bear is the largest carnivore in Alberta. The height at the shoulder is 0.9-1.2 m (3-4 ft). The total length is 1.8-2.6 m (6-8.5 ft). Grizzly bears have brown to yellowish colour fur with white/grey tipped guard hairs. It typically has a large shoulder hump. Grizzly bears are very strong, and will attack if it is surprised, feels threatened, or a human

comes between a mother and a cub. Angry bears often get up on their hind feet in an impressive, frightening display. Despite the terrible, yet rare, encounters with some bears, bears try to avoid humans.

Grizzly bears are primarily omnivores, though they do eat more meat than their relatives, the black bears. As omnivores, they eat leaves, stems, flowers, roots, berries, and fruits. Grizzlies also dig insects, ground squirrels, marmots, and mice out of ground. Young cervids (members of the deer family) are more commonly taken that adults, but weak adult cervids and big-horn sheep may be prey. Carrion is also eaten. In B.C. and in Alaska, fish are also eaten [1].

Current habitat is primarily forest, preferring to forage in the open spaces of clearings or roadsides. Grizzles used to be found on the prairies where they used their claws to dig up roots, bulbs, and burrowing rodents [1]. There was a sighting in 1829 at Fort Edmonton [2]. Grizzlies were found around Driedmeat Lake, and three were killed in the Battle River between 1870 and 1880 [6].

Conservation and Management Issues

History and Changes:

Many of the larger mammals, such the bison, the various species in the deer family, as well as the "furbearers" (wolf, beaver, coyote, fox, weasel family, etc) were heavily harvested in the late 1800s and early 1900s [6] to the extent that some of these species were extirpated from this area. A number of these species, such as the deer, coyotes, and foxes, have naturally recovered more quickly than others. Wolves are recovering, but at a slower rate. Some have never come back. Mink were farmed extensively for their furs, with a number in the Camrose-Wetaskiwin area. Some animals invariably escaped, so this may be a reason mink are common in this area.

Conservation

Conservation in the urban and cultivated landscape poses a lot of challenges. Not only does the loss of some animals lead to declining populations of other animals, but the loss of some animals as cause an "ecological release" of others, allowing them to flourish. For some mammals, especially some of the smaller species, little is known about their population and their habits. Lack of knowledge makes it hard to protect them, or monitor changes in their abundance. Populated areas, as well as some agricultural areas, such as in and around Camrose, do not favour some of the more gregarious mammals.

One factor in the lack of recovery of some species may be habitat destruction through urbanization and agricultural development. Some species, such as the large ungulates, and large carnivores, such as cougars, wolves, and lynx, are more sensitive to habitat fragmentation [27]. Habitat fragmentation affects large carnivores more as they have often have large hunting territories and ranges, low numbers, and are heavily persecuted by humans. This can lead to local extinctions of these species [27]. Animals such as the ground squirrels are particularly vulnerable for human persecution and habitat loss due to the overlap in land use.

Another factor is the perception that some of these species, such as the larger carnivores (lynx, bears, wolves, etc), are threats and/or pests, especially in regards to livestock. Others, like the rodents, foxes, bats, and members of the weasel family are sometimes regarded as pests.

Urbanization

Some of the animals still present, as well as a couple re-emerging species, such as the deer, coyote, skunk, raccoon, and fox, are becoming highly urbanized. For some species, urbanization can open up new resources to be exploited, as well as release from larger predators (Crooks, 2002; DeStefano & DeGraaf, 2003). Some species are sensitive to

habitat fragmentation, some benefit from fragmentation, while others are neutral [27]. Badgers, lynx, and long-tailed weasels are sensitive to habitat fragmentation, declining as habitat patch size decreases and patches become more isolated, while the abundance of foxes increases with greater fragmentation and greater isolation of the fragments [27]. Fragmentation appears to have little effect on abundance and distribution of striped skunks [27]. Generalist predators (such as skunks, coyotes, and foxes) benefit from supplemental food sources, allowing them to proliferate. As well, the loss of larger predators enables smaller carnivores to be ecologically free to expand in distribution and abundance [27]. Another part of the issue, as seen locally with mule deer, beavers, and crows, is that some other animals can increase to the point to where they can become a pest, and even a safety issue [6,27]. Part of the solution is to educate people about the natural world around them and how to treat it. The other issue is proper management, which can be challenging [6,27]

Education & Involvement

The most important piece of wildlife conservation is education about the animals. People need to know how wildlife operates, what they eat, and appreciate them for the exquisite creatures they are. We need to understand that it is us who first invaded their land, not the other way around. This may foster most respect for animals. Visiting nearby provincial and national parks, going on long walks in the river valley and learning about mammals on your own are great ways to understand animals.

Management

Managing animals in an urban setting can be hard balancing act between maintaining biodiversity and habitat, and "overabundant" and "problem" wildlife [6]. Within Alberta, this is the job of Alberta Fish and Wildlife, wildlife biologists, and other governmental bodies. Within Camrose and the surrounding area, the City, and the local Fish and Wildlife officer monitor and manage populations of some of the animals, such as deer, foxes, and beavers. Problem animals are rare, but there are other public concerns. These challenges can also serve as a great educational opportunity to help people's understanding of the natural world, and how people fit in the natural world. People need to know that having greenspaces and corridors is not just about having trees and some birds, but that a host of animals call those spaces home.

Getting Involved

Build a Bat House! Attract the furry mosquito-munching mammals to your park of backyard by building a cozy bat home!
Go to http://www.srd.gov.ab.ca/fw/bats/bathouse.html or pick a copy of the building plans at the centre.
Check out the bat houses on the outside of the nature centre *

Go mammal tracking! An animal tracks guide from your local library or bookstore on local mammals and a walk in the river valley in the winter can help you learn to identify animals active during the winter. If you encounter any animals, remember to watch from a respectable distance.

Have you found a sick or hurt mammal? Call Camrose City or Fish & Wildlife.

In the species list, the asterisk (*) denotes a species whose range includes Camrose and area, but no confirmed or official documentation of sightings in the area exist. Also may include animals that were once here in great abundance and only a few having been seen since their numbers were depleted.

Frank Farley

An Early Camrose Naturalist

Francis (Frank) LeGrange Farley was born in St. Thomas, Ontario on Feb 24, 1870. He was the son of the late John Farley, K.C. He was one of six children, two sons and four daughters [1].

Mr. Farley was slotted for a career in the public schools of his home town. After graduating from Collegiate Institute in 1889, he then became involved in the banking business for two years. The new developing regions of Western Canada started to attract him. In March of 1892, he decided to move to Red Deer, as it was the most northern point of the Canadian Pacific Railroad between Calgary and Edmonton. In those early days, the only banks in the territory were in Edmonton and Calgary. Mr. Farley arrived at Red Deer with a working capital of only fifty dollars. He chose a homestead in the southeast section of Red Deer, where he would farm for the next fifteen years. He then proceeded to walk to Innisfail to buy a horse. It did not take Mr. Farley long to start exploring the region. His travels took him the coalfields near Ardley, Buffalo Lake country, as well as to the foothills near Rocky Mountain House, where he was fortunate enough to discover some unusual caves [2]. Farley came to love the land, and he would forever identify himself with this country.

In 1896 Frank Farley married Ethel. It was not without troubles, as he had to look for three days to find an official who could issue the license, as license officials were quite scarce in this time [3]. They had one daughter, Georgi, who eventually married A.R. Knox of Edmonton. While in Red Deer, Frank entered the real estate and insurance business. In 1902, he also worked for Bell Telephone Company as the local agent [2]. He sold his farm and in 1907 moved to Camrose, at the age of 37. They settled onto a farm at Dried Meat Lake.

When Mr. Farley first came to Camrose, he was associated with Frank P. Layton in the real estate and brokerage business. Later, he joined Dennis Towmey in the firm of Farley and Twomey in real estate, brokerage, and the Camrose Collieries. Farley was also a member of City Council. One of his projects, with a fellow group of men, was a Camrose publicity campaign. They chartered a train and traveled down east as well as to the United States to raise the profile of Camrose abroad [3].

Mr. Farley was heavily involved with the Camrose community from the time he moved. Not only was he part of town council, but also of the school board, and the Rotary Club [2,3]). He was also a member of the United Church. He became the president of the Camrose Historical Society for many years, and was a dedicated supporter of the Boy Scouts [3]. Frank Farley was an ardent liberal in politics, and he would fly to Ottawa in the summer to attend the National Liberal Convention. He was a progressive, public-spirited citizen and a man who carried the prestige.

Frank Farley continued to be a great traveler. He explored northern Alberta, and journeyed to Hudson's Bay, all around Canada, the U.S., the Caribbean, the Arctic Circle, and to Europe [2,3].

However, it was in the worlds of natural history and ornithology that Mr. Farley found great interest and satisfaction. Even before he moved from Ontario he became interested in the study of birds, where he had made

a survey for the Ontario Government of bird life in Western Ontario [3]. He was recognized as an international authority on North American bird life. He wrote many articles for the local newspaper, and wrote 36 papers in peer-reviewed journals [2]. The information of those journals is summarized in his book, ¬Birds of the Battle River Region, published in 1932. He also regularly wrote reports for the U. S. Bureau of Agriculture and started a conservation program for hawks [2]. In 1921, a bird sanctuary was established at Miquelon Lake was one of the first in Alberta. Frank Farley served as the first warden, from 1921 to 1931 [4]. His wage while working there was $10.00 a month [5]. He helped to organize and run the Christmas Bird Count (CBC) in Camrose for many years as a member of the Camrose Bird Club.

He prized among his acquaintances many authorities on bird life whom he had met on various pilgrimages, such as Percy Taverner. He also became a mentor to the authors of the first Birds of Alberta, especially Albert Wilk [2]. Frank Farley inspired a number of locals in the interest of ornithology. Dr. Arthur Twomey was inspired to enter ornithology and became the Curator of the Ornithology Division in the Pittsburg-Carnegie Museum. Roland Hawkins, son on James N. Hawkins of Camrose, entered into the same field, and went to the National Museum in Ottawa, and then on to be the Avi-culturalist at the Pittsburgh Aviary-Conservatory [1]

Frank Farley died in October 22 of 1949. His nephew is Farley Mowat. The Camrose Canadian wrote, "He was a prime example of how to grow old gracefully." His name continues on, however, with his famous nephew, Farley Mowat.