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# MAMMALS

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## BUSHY-TAILED WOODRATS AND OTHER SMALL MAMMALS IN BIRD PELLETS FROM GRASSLANDS NATIONAL PARK, SASKATCHEWAN

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*Bushy-tailed Woodrat accepting an offering of peanuts at Cadomin Cave, Alberta. The animals are common in the mountains of that province.* *Tim Schowalter*

Recently, Grasslands National Park (hereafter “GNP”) staff have carried out or supported studies of small mammals related to endangered species and grassland management.<sup>4,6,7</sup> In addition to other interesting results, those studies found two species of potential conservation concern, Sagebrush Voles and Olive-backed Pocket Mice, to be comparatively common in GNP (scientific names of mammal species are given in Table 1). In this study, we identified prey

remains in Great Horned Owl and other bird species pellets collected in and near GNP to learn more about the occurrence of small mammals in the region.

### Methods

Pellet collections were made within or in the immediate vicinity of the East and West Blocks of GNP (Figure 1). Land use in the region is primarily cattle ranching and dry land farming with pockets of irrigated hay



land in the Frenchman River valley. Irrigation and cattle grazing has been ended on land acquired by Parks Canada. GNP has been acquiring land on a willing seller – willing buyer basis since 1984 and currently owns a little over half of the proposed final park area of 906.5 km<sup>2</sup>.

The park is in the mixed-grassland prairie ecoregion in SW Saskatchewan. The climate is semi-arid with short hot summers and long cold winters. Periods of intense drought have occurred. Total annual precipitation ranges from 250 to 350 mm and the elevation ranges from 747 to 1044 m. The landscape includes rolling upland prairie, extensive coulees which are often wooded in their higher reaches, eroded badland complexes, the Frenchman River and several ephemeral streams, wide valley grasslands and shrub lands, and large Black-tailed Prairie Dog (*Cynomys ludovicianus*) colonies.

In September 2000, we searched for pellets in old buildings and at other locations where owls had recently been seen roosting. Pellets were collected as site composite samples at five sites in or near GNP (Table 1, Figure 1). The two Lochart collection sites are near the western boundary of the GNP's East Block, while the Gergovia, Tantor and South Gillespie sites are within the GNP West block. Because of the occurrence of a woodrat in the September 2000 collection at the South Gillespie homestead, the remaining building left at the site was searched again in May 2002 and additional pellets collected and analyzed.

The majority of the pellets were large and otherwise similar to Great Horned Owl pellets collected at other sites in Saskatchewan and Alberta (Schowalter, pers. obs.). Pellets collected from the Gergovia and Tantor homesteads were in buildings and are probably exclusively from Great Horned Owls. Pellets obtained from the Lochart yard, Lochart Dam, and South Gillespie homestead sites were from outdoor roosts and can not be ascribed to a particular bird

species. While collecting pellets, we observed Long-eared Owls and Prairie Falcons at the Lochart Yard site. As well, Pat Fargey observed Great Horned Owls there during the summer of 2000. Some of the pellets collected at the Lochart Yard site were similar to raven pellets, but considerably smaller, and may have been cast by American Crows or Black-billed Magpies. Ferruginous and Swainson's hawks both occur in the area of the yard and may also have contributed pellets.

Pellets were carefully picked apart by hand under a magnifying lens. Identifiable elements were set aside for later identification. Pellets with unidentifiable shrew remains were washed, dried, and re-examined in an effort to recover diagnostic parts. Small mammal jaws were identified by Tim Schowalter by examining the teeth under a dissecting microscope, usually at 30x magnification. Prairie Shrews are very similar to Masked Shrews (*Sorex cinereus*). Identification of the former was based upon the positions of the infraorbital and lacrimal foramina, supported by the presence of comparatively large, heavily pigmented teeth.<sup>13</sup>

Two species of *Peromyscus*, the Deer Mouse (*P. maniculatus*) and the White-footed Mouse (*P. leucopus*) are reported to occur in the GNP region.<sup>1,2</sup> Their skulls are very similar and cannot usually be identified from remains in bird pellets where they are usually separated into individual bones. Because of that, we identified these mice as the genus "*Peromyscus*."

Counts of animals were based upon the minimum number represented in each pellet. For small species, including woodrats, the jaws were counted. Left and right mandibles of each species were matched and the number of pairs plus the number of unmatched jaws was determined to be the number of individuals of the species in the pellet. For larger animals, including muskrats, rabbits and hares, identifiable portions of an animal

Table 1. Number of individual mammals identified from bird pellets in the area of Grasslands National Park, Saskatchewan.

Species	Location						Total
	Tantor NW 28-2-11 W3	Gergovia SE 4-3-11 W3	Lochart Dam NE 21-1-7 W3	Lochart Yard SE 21-1-7 W3	South Gillespie SE 9-1-10 W3	South Gillespie May 2002	
Prairie Shrew ( <i>Sorex haydeni</i> )	10						10
Shrew sp.	5		1	3			9
Hoary Bat ( <i>Lasiurus cinereus</i> )			1				1
Snowshoe Hare ( <i>Lepus americanus</i> )	7						7
White-tailed Jackrabbit ( <i>Lepus townsendii</i> )	1	1					2
Hare species	7						7
Nuttall's Cottontail ( <i>Sylvilagus nuttallii</i> )	6	1	1	1		4	13
Rabbit or Hare	3	1				2	6
Richardson's Ground Squirrel ( <i>Spermophilus richardsonii</i> )			6				6
Northern Pocket Gopher ( <i>Thomomys talpoides</i> )	3					7	10
Olive-backed Pocket Mouse ( <i>Perognathus fasciatus</i> )	13	5	3	7	2	3	33
<i>Peromyscus</i> sp.	135	11	41	13	3	5	208
Northern Grasshopper Mouse ( <i>Onychomys leucogaster</i> )		1					1
Bushy-tailed Woodrat ( <i>Neotoma cinerea</i> )					1	4	5
Meadow Vole ( <i>Microtus pennsylvanicus</i> )	28	2	1	9		3	43
Sagebrush Vole ( <i>Lemmiscus curtatus</i> )	23	7	5	9			44
Muskrat ( <i>Ondatra zibethicus</i> )	10	1	1	1			13
House Mouse ( <i>Mus musculus</i> )			3	17			20
Western Jumping Mouse ( <i>Zapus princeps</i> )	2						2
<b>Total</b>	<b>253</b>	<b>30</b>	<b>63</b>	<b>60</b>	<b>6</b>	<b>28</b>	<b>440</b>

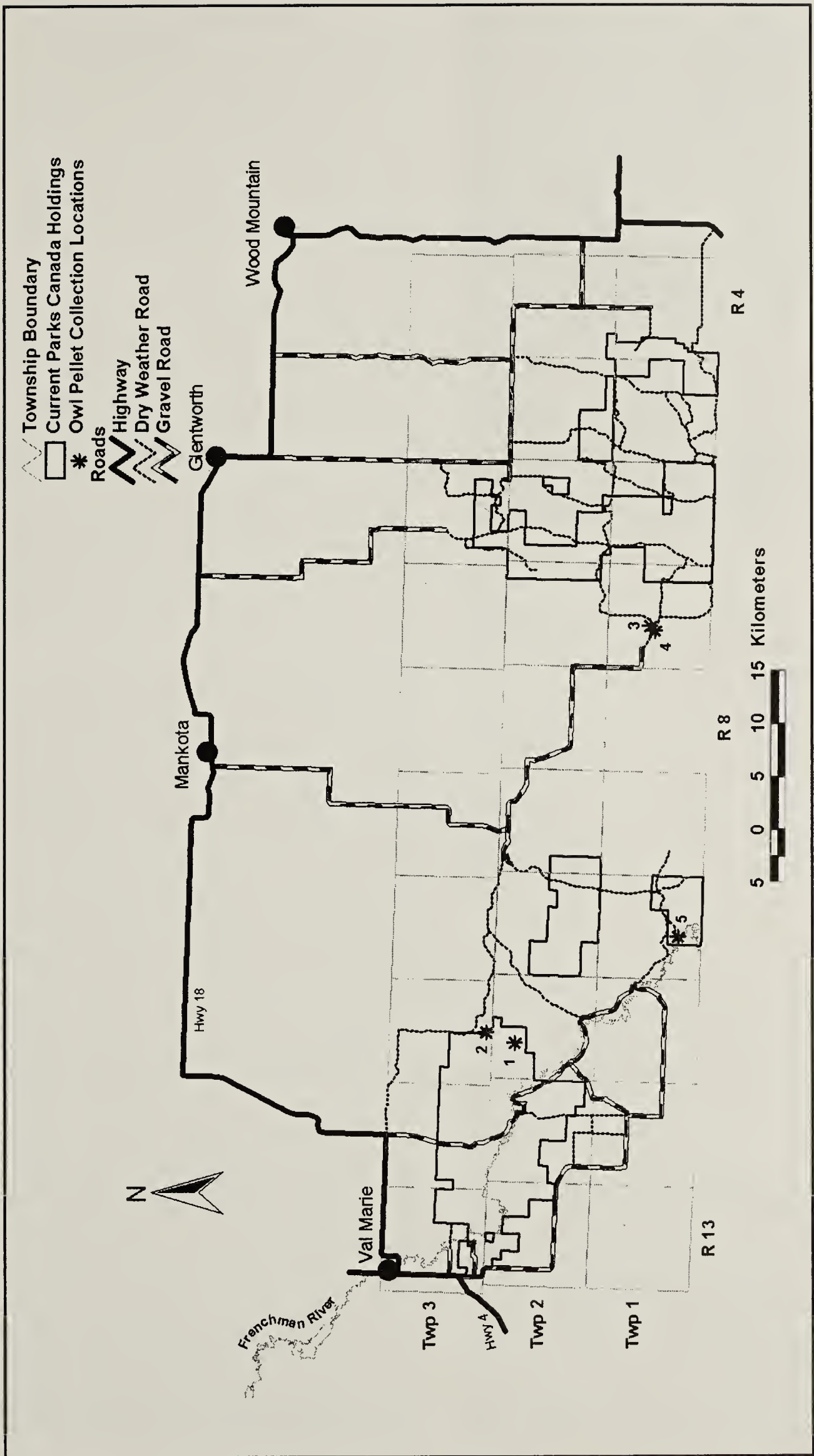
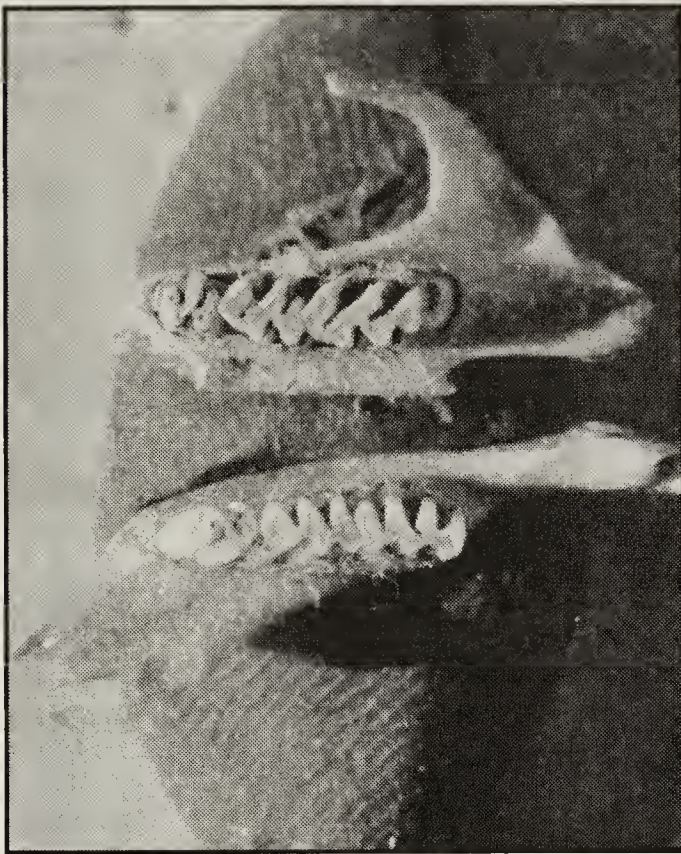


Figure 1. Bird pellet collection sites in and near Grasslands National Park, SK. Site names are: 1 - Tantor, 2 - Gergovia, 3 - Lochart Dam, 4 - Lochart Yard, and 5 - South Gillespie.





**Figure 2. Upper (top) and lower (bottom) jaws of a subadult Bushy-tailed Woodrat (RSM 17907) from the South Gillespie site, Grasslands National Park. /Tim Schowalter**

in a pellet were counted as one animal of a species unless there was duplication of bones that demonstrated that more than one individual was represented. The material recovered from pellets collected during this study has been incorporated into the collections of the Royal Saskatchewan Museum in Regina.

## Results and Discussion

Counting “*Peromyscus*” as only one species, we identified 16 mammal species in the bird pellets (Table 1). Several interesting specimens were found and are discussed below.

### *Bushy-tailed Woodrat*

Remains of a Bushy-tailed Woodrat (also known as “packrat”) were found in a pellet collected at the South Gillespie site (49°01' N 107°17' W) in GNP in September 2000. The remains represent the second specimen record of the species in Saskatchewan. The previous record of a Bushy-tailed Woodrat in the province is one taken in a basement in Govenlock in 1950 in the extreme southwest

of the province.<sup>8</sup> The animal from the South Gillespie site is a subadult with the third molars just starting to show wear (Figure 2). Bones of the woodrat have been deposited in the Royal Saskatchewan Museum as RSM 17907. The species of bird which cast the pellet is not known; however, the pellet was of a similar size to Great Horned Owl pellets collected at other locations.

Subsequent to the initial discovery of the woodrat remains in the pellet, conversations with park staff revealed that woodrats had been known at the South Gillespie site since approximately 1991. The animals had built a large nest in the old Quonset barn that used to be at the site. Leon Perrault reports a particularly memorable observation of approximately six of the animals when he, Dennis Madsen, Rob Watson, and Keith Foster were burying an old garbage dump at the site.

In addition to the pellet collected in September 2000, six of the Great Horned Owl pellets collected in the one remaining building at the site in May 2002 contained woodrat remains representing a minimum of four individuals based upon the number of jaws present. The floor of the valley at the South Gillespie site is predominately native vegetation though areas near the old buildings have considerable Smooth Brome (*Bromus inermis*) and Crested Wheatgrass (*Agropyron cristatum*). The banks of the valley in the area of the site vary from densely covered grassy slopes to nearly unvegetated badlands. Bushy-tailed Woodrats are not well adapted to the summer heat of prairie river valleys and depend upon crevasses or other locations that allow them to remain cool during hot weather.<sup>3,11</sup> The badlands near the South Gillespie site likely have crevasses that allow the animals to persist in the area.

Bushy-tailed woodrats are native to mountainous regions over much of western North America.<sup>1</sup> In Montana and Alberta, Bushy-tailed Woodrats also occur widely in arid river valleys.<sup>3,5,12</sup> Woodrats are known



from Phillips County adjacent to GNP in Montana.<sup>3</sup> As the South Gillespie Site is just over 2 km from the Montana border, it is possible that these animals represent the northern part of a population that lives along the Frenchman River in that state. Woodrats have recently been found along the South Saskatchewan River in Alberta less than 15 km from the Saskatchewan border near Leader.<sup>5</sup> Residents in, and visitors to, that and other river valleys in southwestern Saskatchewan should be aware of the possibility that woodrats may be encountered, particularly in areas that have crevasses that might provide shelter for the animals. Records of observations of woodrats would be of great value in determining the distribution and status of the animals in Saskatchewan.

#### *Hoary Bat*

The remains of a Hoary Bat were recovered from a pellet cast by an unknown bird species at the Lochart Dam site. Hoary Bats occur widely in Saskatchewan<sup>10</sup> and the individual may have either been a summer resident or a migrant passing through. The specimen is the first record for GNP.

#### *Northern Pocket Gopher*

The remains of three Northern Pocket Gophers were identified from the Tantor site which is adjacent to cultivated land. The remains of seven more were recovered from pellets collected in May 2002 at the South Gillespie homestead. Pocket gophers are frequently taken in considerable numbers by Great Horned Owls elsewhere (Schowalter, pers. obs.). While we have seen the characteristic mounds made by the animals in GNP, they occur in scattered clusters and in limited numbers. For example, pocket gopher mounds were found in only a few places with loose soil in the banks of the larger gullies in the area of the South Gillespie site in May 2002. The small number of specimens in the pellets reinforces the impression that the animals are not generally abundant in GNP.



**Figure 3.** Lower jaws of Northern Grasshopper Mouse (top) and Deer Mouse (bottom) showing large curved coronoid process (at arrow) from the top right of the grasshopper mouse jaw that distinguishes it from the Deer Mouse jaw. / Tim Schowalter

#### *Olive-backed Pocket Mouse*

Olive-backed Pocket Mice have been trapped recently in various parts of GNP.<sup>7</sup> Those results and our owl pellet data suggest that the species is widespread and moderately abundant in GNP. The 33 Olive-backed Pocket Mice we found comprise 9% of the 351 mice and voles identified. As well, the species occurred in pellets at all five collection sites. Olive-backed Pocket Mice are listed as “S3” (Rare to Uncommon) in Saskatchewan.<sup>9</sup> This discovery of a good number of animals of a species identified as a potential conservation concern is encouraging.

#### *Northern Grasshopper Mouse*

In GNP, Northern Grasshopper Mice have been trapped in valleys and prairie dog colonies.<sup>7</sup> Only a single Northern Grasshopper Mouse was recovered in the pellets from the park (Fig. 3). The species is listed as “S3” (Rare to Uncommon) in



Saskatchewan.<sup>9</sup> Trapping and owl pellet results from GNP suggest that the animal is not common there.

### *Sagebrush Vole*

Sagebrush Voles were found in all sites except the South Gillespie site. The species made up 13% of all the mice and voles identified. Sagebrush Voles have been trapped in GNP on eroded slopes, grassland slopes, and upland prairie.<sup>6,7</sup> Trap results and pellet analyses suggest that these voles are moderately common in the GNP area.

### *Western Jumping Mouse*

While specimens have been taken in the region,<sup>1,2</sup> the two Western Jumping Mice from the Tantor Site represent the first record of the species for GNP.

### *Other Species*

Remains of rabbits and hares were found in 35 pellets. Because of their large size, individual rabbits and hares are consumed as several meals by hawks and owls. It is rarely possible to be certain that remains in two different pellets are from the same animal. As a consequence, remains of individual rabbits or hares are likely to be in more than one pellet and be counted more than once. Counts of these larger animals can not be compared to those of the smaller mice and voles which are eaten whole. However, the number of pellets with rabbits and hares, and the animals' comparative large body size, show that they contribute greatly to the total mass of the diet of the birds.

A limitation of this study was that there are few old buildings available for use by owls in GNP. Consequently, collections were not made from large portions of the park. As well, all of the samples, including those under roosts outside of buildings, were from abandoned yards or, in the case of the Lochart Dam Site, an artificial reservoir. Such locations are considerably modified from the original native prairie. Our results, while contributing to the understanding of small mammals in GNP, may not be representative of large tracts of less

modified habitat in the park. Collection and analyses of bird pellets at nest and natural roost sites in the park are likely to produce new information on the mammals there.

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*Hoary Bat*

*Lorne Scott*