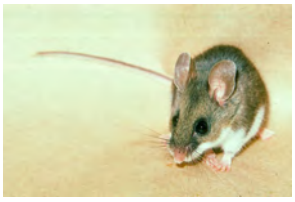
Chapter 3

Biota of the Lehigh Gap Wildlife Refuge -- Mammals

LGWR Biota - Mammals

Mammals of the LGWR

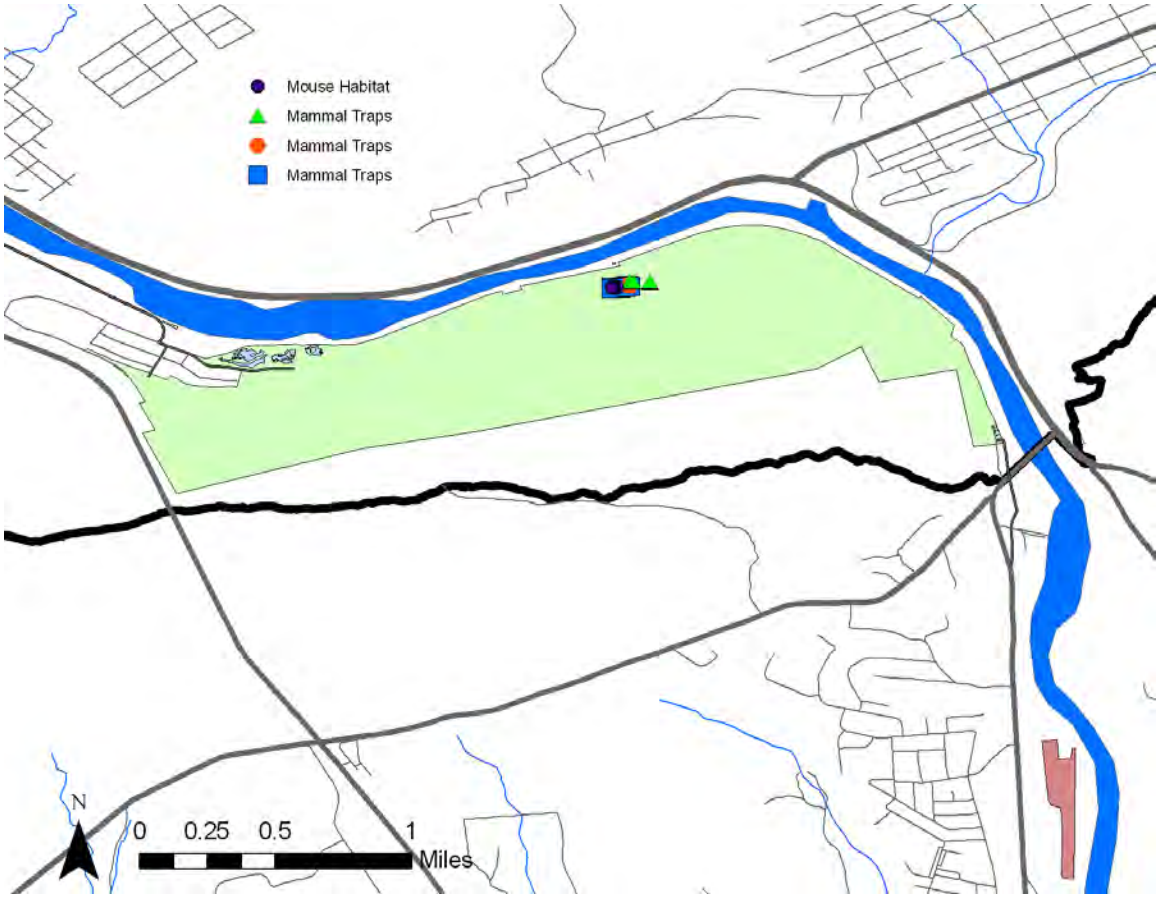
The mammal species list for Lehigh Gap Wildlife Refuge primarily includes species that have been observed on the Refuge as well as a few species that have been trapped in preliminary small mammal survey efforts. The first of these was conducted by Guthrie Mitchell from Lehigh University (see map on next page for location of traps).



The 23 species sighted on the Refuge through December, 2010 include:

Mammals of the Lehigh Gap Wildlife Refuge

Virginia Opossum
(*Didelphis virginiana*)
Northern Short-tailed Shrew
(*Blarina brevicauda*)
Little Brown Bat
(*Myotis licifugus*)
Red Bat
(*Lasiurus borealis*)
Eastern Cottontail
(*Sylvilagus floridanus*)
Eastern Chipmunk
(*Tamias straitus*)
Woodchuck
(*Marmota monax*)
Gray Squirrel
(*Sciurus carolinensis*)
Red Squirrel
(*Tamiasciurus hudsonicus*)
Beaver
(*Castor canadensis*)
White-footed Mouse
(*Peromyscus leucopus*)
Meadow Vole
(*Microtus pennsylvanicus*)
Muskrat
(*Ondatra zibethicus*)
Porcupine
(*Erethizon dorsatum*)
Eastern Coyote
(*Canis latrans*)
Red Fox
(*Vulpes vulpes*)
Gray Fox
(*Urocyon cinerecargenteus*)
Black Bear
(*Ursus americanus*)
Raccoon
(*Procyon lotor*)
Weasel sp.
(*Mustela sp.*)
Mink
(*Mustela vison*)
River Otter
(*Lutra canadensis*)
White-tailed Deer
(*Odocoileus virginianus*)



Location of Traps Used in Preliminary Small Mammal Trapping Study in the LGWR Grasslands.

A more comprehensive small mammal survey of the Refuge involving small mammal trapping and photography was initiated in Fall 2010 by John Corbin under the supervision of Dr. Frank Kuserk from Moravian College. This study was conducted along the Lehigh & New England Trail, Delaware & Lehigh Trail, Three Ponds Trail, Prairie Grass Trail, Chestnut Oak Trail, and Double G Trail (see LGNC Trail Map on p. 1-9). The two methods used included setting 23 Sherman Live Traps out and using trail (game) cameras. The Sherman traps were set along the trails every 100 meters and were baited with paste made of wild bird seed and beef fat. The following species were captured using the Sherman Traps: *Peromyscus* (this genus includes deer mice and white-footed mice; it is difficult to distinguish between the two species without skull and teeth measurements); Meadow Vole *(Microtus pennsylvanicus*); Short-tailed Shrew (*Blarina brevicauda*); and Eastern Chipmunk (*Tamias striatus*).

Ideally, this type of study could be repeated using a grid style trapping lay-out but comes with the risk of destroying the vegetation between

each trap which is checked every day for two weeks. This method was suggested by Rexford Lord, Ph.D. (zoologist and author of *The Mammals of South America* and *Capybara*) who is an advisor to the LGNC for the mammal project.

The second method involved the use of ir4 Trail-Game Cameras made by Wildgame Innovations. These trail cameras were set up along the before mentioned trails but far enough back to prevent visitors from seeing the cameras in an attempt to prevent theft. The exact locations were chosen by the presence of animal sign, intersections of game trails, presence of food sources, and access to water. Most locations were baited with fish oil or Russ Carman's Raccoon Lure #1 (sweet smelling). GPS coordinates of each camera were taken, but have not yet been mapped. The following species were photographed (see sample photos on page 3-7 below:

- Virginia Opossum (*Didelphis virginiana*) – near the Three Ponds Trail;
- Eastern Cottontail (*Sylvilagus floridanus*) – near the Lehigh River;
- Eastern Gray Squirrel (*Sciurus carolinensis*) – along the Chestnut Oak Trail;
- Muskrat (*Ondatra zibethicus*) – in the Three Ponds;
- Gray Fox (*Urocyon cinereoargenteus*) – near the Three Ponds Trail;
- Raccoon (*Procyon lotor*) – near the Three Ponds Trail;
- River Otter (*Lutra canadensis*) – near the Lehigh River;
- Black Bear (*Ursus americanus*) – near the Lehigh River
- White-tailed Deer (*Odocoileus virginianus*) – throughout the research area;
- Feral or Domesticated Cat (*Felis catus*) – along the Three Ponds Trail and the Double G Trail.

The feral or stray domestic cats are an important issue in terms of conservation management. Multiple photos of multiple cats on the Refuge have been obtained in Corbin's study and feral cats are known to have an impact on bird and small mammal populations.

The LGNC plans to do additional mammal surveys in the future. Given that small mammals form the base of the food chain for a variety of vertebrate predators, monitoring their population will help establish the viability of resident and migratory predator populations.

Dr. Lord has offered to assist in survey efforts by netting bats and has suggested a simple, yet comprehensive and effective means of surveying the diversity and abundance of mammal populations at LGWR. The method involves first live-trapping small mammals using baits such as peanut butter-oatmeal mix and apple slices. Each trapped mammal is placed in a garbage can with a sheet of plain white paper and an exposed inkpad. The animal runs across the pad and paper, leaving clean tracks on the paper. The

specimen is then released. This technique is repeated with each of the different species captured. This provides the researchers with a library of ink prints of native mammal species.

Once a collection of ink prints is created, floor tiles are covered with ink on one half and a sheet of paper on the other and set out in the mammal study areas. This survey can be done with bait to get an idea of what mammals inhabit the varied habitats as well as without bait to give us an idea of the density of the species. Unknown tracks will be identified to the extent possible with field guides; however, according to Dr. Lord, these books are difficult to use and problematic with small mammals for which they are generally not highly accurate.

The Carnegie Museum of Natural History maintains an online resource of the mammals of Pennsylvania. [1] This site includes a list of 70 species, distribution (range) maps, and other species data. The table on the next page identifies the number of species in each family of mammals that have published ranges covering the LGWR property (Carbon and Lehigh Counties) and indicates how many have been observed to date at the Refuge. The table suggests that the number of observed species of small mammals and nocturnal species are relatively low at the LGWR. It is not yet know if this is due to their absence or lack of a thorough study. Given the good habitat that now exists for small mammals and the number of snakes that have been observed on the property, it is suspected that the latter is the problem. This table may serve as a guide for target species in future studies.

[1] See http://www.carnegiemnh.org/mammals/PAmamm/pamammals2.html).

Mammals of Lehigh and Carbon Counties and the Lehigh Gap Wildlife Refuge

Family	Number of species whose distribution (range) includes the LGWR property (of total species in that family in PA)[2]	Number and percentage of species from a family that have been seen at the LGWR as of 12/1/10
Pouched mammals (Marsupialia)	1 (of 1)	1 (100%)
Shrew family (Soricida)	6 (of 7)	1 (17%)
Mole family (Talpidae)	3 (of 3)	0 (0 %)
Evening bat family (Vespertilionidae)	8 (of 10)	2 (25%)
Rabbits and hares (Lagomorpha)	3 (of 3)	1 (33%)
Squirrel family (Sciuridae)	5 (of 8)	4 (80%)
Beaver family (Castoridae)	1 (of 1)	1 (100%)
New World rats and mice (Cricetinae)	8 (of 9)	3 (37%)
Old World rats and mice (Murinae)	2 (of 3)	0 (0%)
Jumping mice family (Zapodidae)	2 (of 2)	0 (0%)
Porcupine family (Erethizontidae)	0 (of 1)	1[*]
Dog family (Canidae)	3 (of 3)	3 (100%)
Raccoon family (Procyonidae)	1 (of 1)	1 (100%)
Bear family (Ursidae)	1 (of 1)	1 (100%)
Weasel family (Mustelidae)	5 (of 10)	3 (60%)
Cat family (Felidae)	1 (of 1)	0 (0%)
Deer family (Cervidae)	1 (of 1)	1 (100%)

[2] Table compiled from species lists and distribution maps found at http://www.carnegiemnh.org/mammals/PAmamm/pamammals2.html <accessed on 12/27/10> and documented sightings from the LGWR. Species for which no range maps are included at the Carnegie site were excluded from this table.

[*] The range map for porcupines does not currently cover lower Carbon or Lehigh counties but these have been observed at the refuge.

Sample Trail Camera Images from the Lehigh Gap Wildlife Refuge

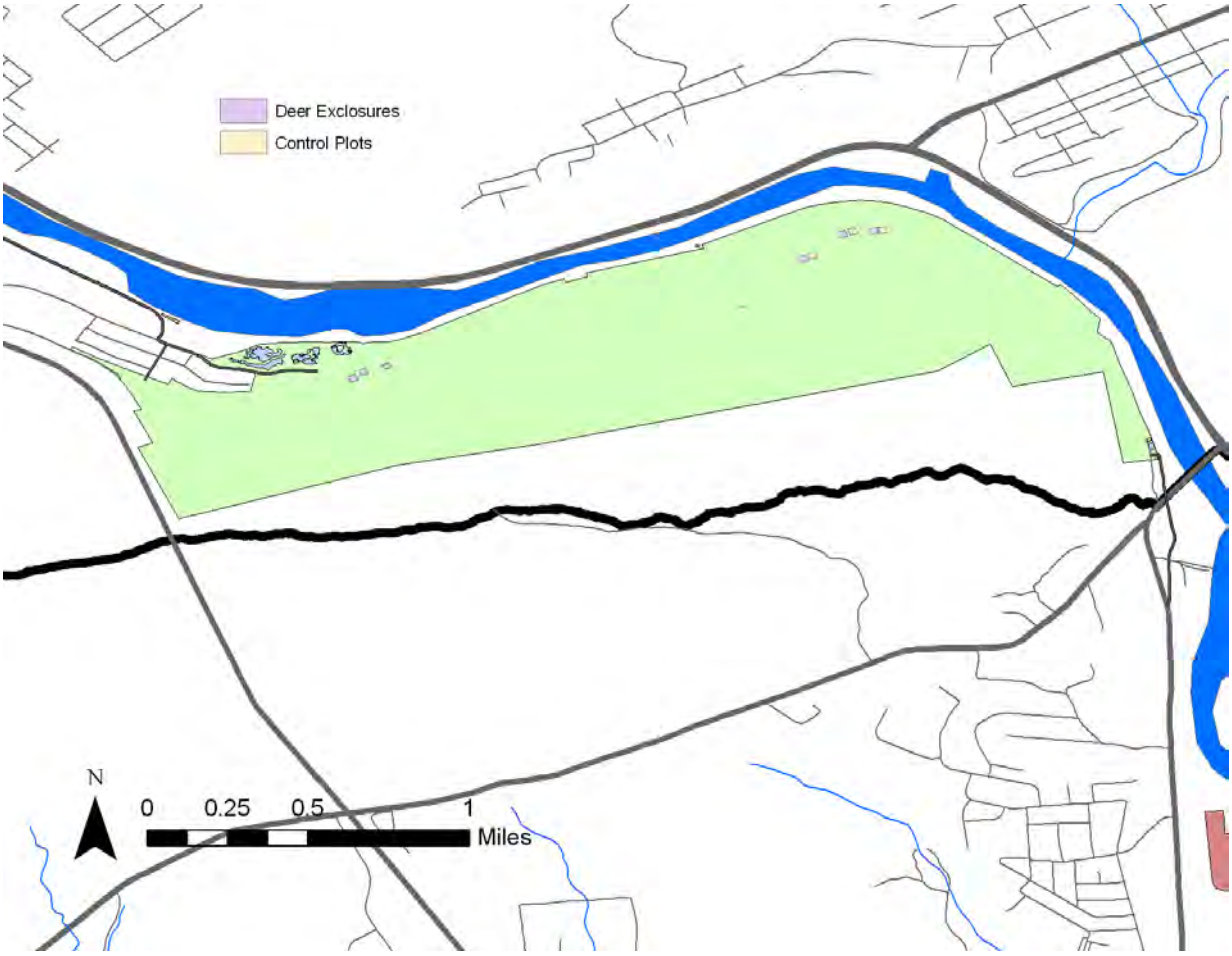
In addition to the small mammal surveys, the impact of deer browsing on the Refuge is being studied. Forested areas of the Refuge appear to be over-browsed. Deer exclosures have been installed in the forested areas to study the regeneration of plants inside the fences where deer grazing is excluded. In addition, the effect of deer browsing on the grassland enhancement effort is being studies (see maps on next two pages, Chapter 8 and Appendix F-2).

The LGNC had an offer of the use of an airplane and pilot to do winter aerial deer surveys to get an actual count of deer numbers on the Refuge and surrounding area. An experimental aerial surveillance with a single-engine Cessna aircraft was performed in January 2010 with the ground covered by snow. No deer were spotted from the air, even though there was excellent visibility on much of the Refuge.

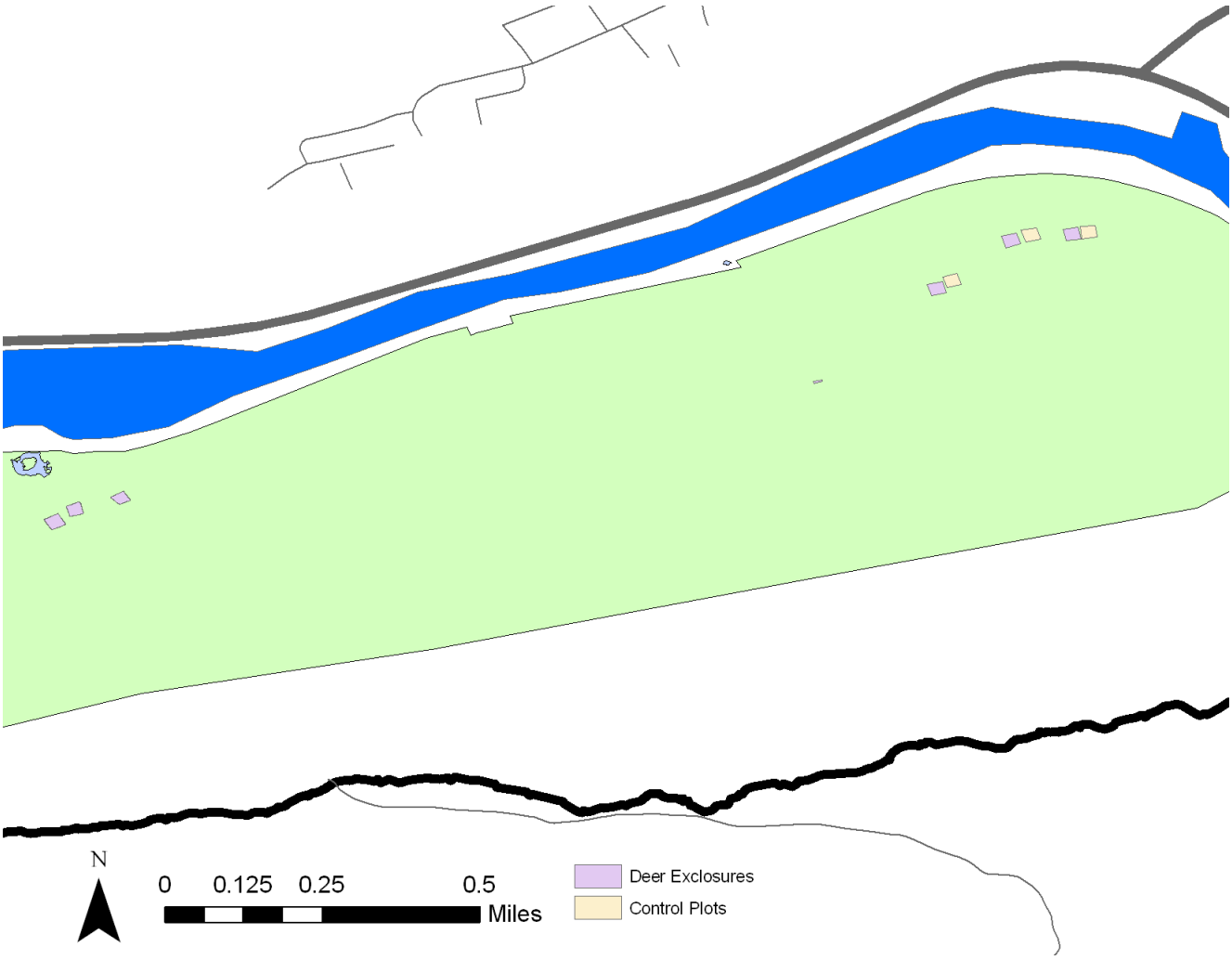
Exclosure in Forested (Western) Area of the LGWR

Bats are of particular concern because of the recent decline in bat numbers due, at least in part, to the White-nose Syndrome (WNS). This past year, in the late morning of March 27, 2010, a little brown bat was seen flying erratically near the Visitor and Education Center. After hitting the house windows a few times and perching on a utility pole, it flew behind the second floor shutter. Given that this animal was spotted in the daylight on a cold day and the erratic behavior displayed both suggest that the bat was affected with WNS.

One final mammal species warrants attention: the Allegheny Woodrat (*Neotoma magister).* Woodrats live in other rocky areas along the Kittatinny Ridge and it is possible that there are woodrats somewhere on the Refuge or adjacent National Park Service or PA Game Commission properties. Woodrats traditionally eat the fruit of American Chestnuts, which are in the region, including Refuge property. A comprehensive Eastern Woodrat survey of likely habitats within the Refuge is planned for the near future.



Location of Deer Exclosures on the LGWR property
(See also zoomed-in map of exclosures on next page)



Location of Deer Exclosures on the LGWR property – a Zoomed-In Image

Grassland Deer Exclosure