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Division of Natural Heritage Report on a
Small Mammal Survey of the Savanna Army Depot, Savanna, IL.
September 7-9, 1994

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Introduction

The Savanna Army Depot (SAD) is located along the east bank of the Mississippi River on the border of Carroll and Jo Daviess Counties, Illinois (Figure 1). The Depot occupies over 13,000 acres on a 12 mile long sand deposit which supports some of the most extensive sand prairie habitat in the state. It lies in the Mississippi River Section of the Illinois and Mississippi Rivers Sand Areas Natural Division of Illinois (Schwegman 1973). The Depot is owned by the U.S. Army and has been managed as a munitions base since 1917. The Army has utilized the prairie here as a rangeland since 1975 (Bowles 1993).

The Illinois Department of Conservation has been involved in conducting biological surveys at the SAD since 1980, after acting as a partner in the Illinois Natural Areas Inventory (INAI) conducted during the 1970's. The SAD was identified by the INAI as an Illinois Natural Area under four categories: I - High Quality Natural Area, II - Endangered Species Habitat, VI - Unique Natural Area, and VII - Outstanding Aquatic Resource (White 1978). At the time of that inventory 10 endangered/threatened species were recorded for the site (Table 1). Since that time, the Division of Natural Heritage has been responsible for coordinating inventories of the flora and fauna at the site and currently there are 27 special status species documented (Table 2). In this continued effort to document the biological resources of the SAD, the Division of Natural Heritage recently conducted a small mammal survey to inventory species present in several upland habitat types on the Depot. The following report contains the results of that survey.

Site Description

The major habitat type at the SAD is dry and dry-mesic sand prairie, which occupies the majority of the 6,200 acres of the uplands. Most of this area lies within a munitions bunker and storage building complex that contains over 40 parallel east-west roads spaced at 150m. A major portion of the sand prairie is grazed, however there are several grazing exclosures present. Typical species documented in recent vegetational surveys for the sand prairie area include; Schizachium scoparius (Little Bluestem), Koeleria cristata (June Grass), Carex muhlenbergii (Sand Sedge), and Cyperus schweinitzii (Umbrella Sedge) (Bowles and Jones 1991, Bowles 1993). Sorghastrum nutans (Indian Grass) is another species noted for the ungrazed prairie and Bouteloua hirsuta (Hairy Grama Grass) and a number of Panicum spp. for the grazed prairie during this present survey.

The northern end of the sand prairie, still within the bunker complex, grades into several hundred acres of dry, dry-mesic, and

mesic sand savanna. Typical savanna species listed in the previously mentioned vegetation surveys include; Quercus velutina (Black Oak), Schizachium scoparius (Little Bluestem), and Koeleria cristata (June Grass) (Bowles and Jones 1991, Bowles 1993). Acer negundo (Boxelder), Gleditsia triacanthos (Honey Locust), Ribes missouriense (Missouri Gooseberry), and Rhus aromatica (Fragrant sumac) are additional species noted in the savanna during this present survey.

To the north of the prairie and savanna, and outside of the bunker complex, is a sedge meadow surrounded by floodplain forest. North of this is an area of mesic upland sand forest. Wetland and floodplain forest habitat are extensive (several thousand acres) within the Depot, primarily along its north and west borders which are defined by the Mississippi River and its' backwaters. These floodplain areas were not sampled in this survey. The upland sand forest type occupies several hundred acres. Cattle were observed grazing within the sedge meadow and while there are no cattle grazing within the forest, there is evidence of deer browse. Species typical for these areas were not mentioned in Bowles' 1991 and 1993 surveys. Species noted during the present survey include: a variety of Carex species, Phalaris arundinacea (Reed Canarygrass), and an occasional black locust and Fraxinus pennsylvanica (Green ash) in the sedge meadow; Quercus rubra (Red oak), Quercus alba (White oak), Prunus serotina (Black cherry), and Ribes missouriense (Missouri Gooseberry) in the forest.

Methods

Trapping of small mammals, using Museum Special snap traps, was conducted at the SAD from 7-9 September 1994. Four 100 trap transects were set on 7 Sept. and run for two nights, for a total of 800 trap nights. An additional 25 trap transect was set on 8 Sept. and run for one night in the grazed sedge meadow *. The four initial transects were established in : (1) - Ungrazed (for two growing seasons) dry sand prairie, (2) - Grazed dry sand prairie, (3) - Grazed mesic sand savanna, (4) - Ungrazed mesic upland sand forest, and the partial transect, (5) - Grazed sedge meadow/wetland. Figure 1 shows locations of all transects.

Each transect, except (1) and (5), ran (roughly) in a line and consisted of 32 plots (spaced at approximately 15 m.) of 3 traps each and 2 plots of 2 traps each. Transect (1), the ungrazed sand prairie, was divided into two parallel 50 trap lines. One line ran along a ridge top of dense little bluestem and Indian

* - See first paragraph under "Results"

grass, the other ran along the lower part of this ridge and had a sparse covering of little bluestem, June grass, and panic grasses. The lower transect was characterized by numerous blowouts and dunes. Each of these had 16 plots of 3 traps each and 1 plot of 2 traps. The partial Transect in the grazed sedge meadow (5) used a random spacing of 1 plot of 3 traps and 11 plots of 2 traps each. Plots were marked with blaze orange survey flags. Traps were placed in a random fashion at approximately 1-2 m. distance from the flag.

Traps were baited using a mixture of peanut butter, bacon grease, and rolled oats. All traps were checked daily, rebaited and reset as needed, and captured animals were processed and frozen after all traps had been checked. Live animals found in the traps were identified as to species and gender and released, unless their condition warranted that they be euthanized. Two birds were caught in traps during the survey; one unidentified species (dead) and one Toxostoma rufum (Brown Thrasher), which was released. Of the small mammal specimens collected, some will be used for educational/demonstration purposes (i.e. study skins, or skull specimens). The majority will be donated to animal rehabilitators to be used as food for recovering raptors.

Processing of animals consisted of weighing each specimen and identifying each according to; species, relative age (adult/juvenile), and gender. In the case of adult females, evidence of pregnancy and/or lactation was also noted. Additional comments were recorded for any animal(s) which exhibited an unusual condition, such as the presence of a bot fly larvae.

Weather conditions for the trapping period were typical for the season. Temperatures ranged from an overnight low of 49°F on the night of September 7, and a daytime high of 86°F on September 8. Humidity ranged from 47% to 100%, with trace precipitation on the morning of September 8. The light rainfall occurred while traps were being checked and reset, so the timing probably did not effect our trap success, but it should be mentioned that it was enough to set off some of the traps. Cloud cover estimates for each 24 hour period in between trap checks averaged from 10% to 50%. Finally, the lunar phase was in new moon during the trapping period. This is an important factor regarding trap (sampling) success. These small mammals, which feed mostly at night, are most active during times of low moonlight and/or significant cloud cover, as their predators (especially raptors) are least successful during these times of low visibility.

Results and Discussion

In the interest of congruency, data from the sedge meadow, which represents a only a partial transect and only one night trapping, will only be mentioned in the discussion, in and of itself, and not listed in the table for comparison with other data.

During 800 trap nights a total of 200 animals were caught, representing 8 species and an overall trap success (TS) of 25% (reported as captures per 100 trap nights). Species and total per species were: Peromyscus maniculatus, deer mouse (75); Peromyscus leucopus, white-footed mouse (68); Microtus ochrogaster, prairie vole (33); Sorex cinereus, masked shrew (9); Blarina brevicauda, short-tail shrew (6); Reithrodontomys megalotis, western harvest mouse (5); Spermophilus tridecelineatus, thirteen-lined ground squirrel (3); and Microtus pennsylvanicus, meadow vole (1). Table 3 lists individual species by gender and habitat.

All species caught were typical for the site and the habitats represented, with the only exception being a white footed mouse (typical of, but not limited to, forest habitat) found in the ungrazed dry sand prairie. The sampling failed to yield a specimen of the Perognathus flavescens (plains pocket mouse), which is found at its eastern range limit in similar sand prairie habitats in Iowa. The Mississippi River offers an obvious natural eastern barrier of which this species has apparently never crossed. No specimens were taken during this survey. No state or federally listed endangered or threatened species was trapped during this survey.

Of the species collected, the deer mouse and the white-footed mouse were the most abundant, representing 37.5% and 34.0% of the capture, respectively. All deer mice were found in the prairie habitats and except for the one previously mentioned exception, all white footed mice were found in the savanna and forest habitats. The meadow vole, found in the grazed prairie, was the least abundant species, representing only 0.5% of the capture. One additional meadow vole was found in the sedge meadow, the only species found at that location. This sole occurrence in the sedge meadow may not accurately represent the population(s) present, as numerous voles were seen within the sedge meadow while setting the transect and many traps were set off by captured frogs and, evidently, by grazing cows. No species occurred in all habitats, although the white footed mouse, masked shrew, and prairie vole were found in three of the four habitats.

The capture yielded, only slightly more males, 104 (52.0%), than females, 96 (48.0%). However by age, adult females were more abundant than males, accounting for 38.0% of total capture, while males represented 26.5%. A breakdown of gender by age is: 104 (52.0%) males = 51 (49.0%) juvenile, 53 (51.0%) adult; and 96 (48.0%) female = 20 (20.8%) juvenile, 76 (79.2%) adult. Of the adult females, a total of 53 (69.7%) were lactating and 9 (11.8%) were pregnant.

The ungrazed prairie transect showed the greatest diversity of species, with 7, and the greatest trap success (TS) of 34.0%. The other transects resulted in: Grazed prairie - 5 spp.,

TS=27.5%; Grazed savanna - 3 spp., TS=21.0%; and Ungrazed Forest - 1 sp., TS=17.5%. In regard to small mammal populations, differences between the ungrazed prairie, which showed 20.0% more captures and 2 (29%) more species than the grazed prairie, were of particular interest. Occurrences between sites for individual species are also listed in table 3 and were generally higher in the ungrazed prairie. The ungrazed prairie had 80.0%, 66.6%, and 13.4% greater trap frequency of short-tailed shrew, masked shrew, and prairie vole, respectively. Three species, the white-footed mouse, the western harvest mouse, and the thirteen lined ground squirrel, were trapped only in the ungrazed and not in the grazed prairie. The grazed prairie had 8.0% greater trap frequency of the deer mouse, and one occurrence of a meadow vole, which was not found in the ungrazed tract.

No conclusions can be drawn from the data provided from this (single) survey and no other small mammal survey has been conducted at the SAD for comparison of these data regarding population changes. However, one point is obvious: The ungrazed prairie, which has a denser growth of all species and the occurrence of tall dominants (Indian grass and little bluestem) in the upland portion, offers greater cover and nesting sites for small mammals than the grazed prairie. Both Little Bluestem and Indian Grass are reduced under heavy grazing and are eventually replaced by weedy species.

The SAD is known to support a diverse raptor population, some of which are state listed species (see Table 2), and several of which depend on a diet that consists largely of small mammals. Management for the small mammals found in this survey may be desired in the interest of sustaining these raptor populations. Reduced grazing and occasional burning of areas within the sand prairie would promote the grasses and denser growth found in the ungrazed transect, and subsequently provide favorable conditions for the majority of the small mammals sampled.

Acknowledgements

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Table 1

SAD Illinois Natural Areas Inventory Special Status Species
 Source: INAI Survey Record 1978

Plants:

<u>Bouteloua gracilis</u> (Blue Grama)**	SE
<u>Ceanothus ovatus</u> (Redroot)	SE
<u>Hudsonia tomentosa</u> (False Heather)	SE
<u>Opuntia fragilis</u> (Fragile Prickly Pear)	SE
<u>Orobanche fasciculata</u> (Clustered Broomrape)**	SE
<u>Polanisia jamesii</u> (James' Clammyweed)	SE

Animals:

<u>Haliaeetus leucocephalus</u> (Bald Eagle)	SE, FE
<u>Lepus townsendii</u> (White-tailed Jackrabbit)	SE
<u>Lutra canadensis</u> (River Otter)	SE
<u>Notropis amnis</u> (Pallid Shiner)*	SE

ST = State Threatened, SE = State Endangered, SW = State Watch,
 FT = Federal Threatened, FE = Federal Endangered, FC = Federal
 Candidate

N - Nesting Species

* - Last confirmed occurrence 1963 (INAI Survey Record 1978).

** - Last confirmed occurrence 1908 (Gleason 1910, in INAI Survey
 Record 1978).

Table 2

SAD Natural Heritage Database Special Status Species
 Source: Natural Heritage Database 1994

Plants:

<u>Agropyron subsecundum</u> (Bearded Wheat Grass)	SE
<u>Besseya bullii</u> (Kitten Tails)	ST
<u>Bouteloua gracilis</u> (Blue Grama)**	SE
<u>Carex tonsa</u> (Shaved Sedge)	SE
<u>Ceanothus herbaceus (ovatus)</u> (Redroot)	SE
<u>Cyperus grayioides</u> (Gray's Umbrella Sedge)	ST,FC
<u>Hudsonia tomentosa</u> (False Heather)	SE
<u>Mirabilis hirsuta</u> (Hairy Umbrella-wort)	SE
<u>Opuntia fragilis</u> (Fragile Prickly Pear)	SE
<u>Orobanche fasciculata</u> (Clustered Broomrape)**	SE
<u>Polanisia jamesii</u> (James' Clammyweed)	SE
<u>Salvia azurea ssp. pitcheri</u> (Blue Sage)	ST
<u>Talinum rugospermum</u> (Prairie Fame-flower)	SW,FC

Animals:

<u>Accipiter cooperii</u> (Cooper's Hawk)	SE
<u>Asio flammeus</u> (Short-eared Owl)	SE
<u>Bartramia longicauda</u> (Upland Sandpiper) N	SE
<u>Buteo lineatus</u> (Red-shouldered Hawk)	SE
<u>Casmerodius albus</u> (Great Egret)	ST
<u>Certhia americana</u> (Brown Creeper) N	ST
<u>Emydoidea blandingi</u> (Blanding's Turtle)	ST,FC
<u>Etheostoma clarum</u> (Western Sand Darter)	SE
<u>Haliaeetus leucocephalus</u> (Bald Eagle) N	SE,FE
<u>Heterodon nasicus</u> (Western Hognose Snake) N	ST
<u>Lanius ludovicianus</u> (Loggerhead Shrike) N	ST
<u>Lepus townsendii</u> (White-tailed Jackrabbit)	SE
<u>Lutra canadensis</u> (River Otter)	SE
<u>Notropis amnis</u> (Pallid Shiner)*	SE

ST = State Threatened, SE = State Endangered, SW = State Watch,
 FT = Federal Threatened, FE = Federal Endangered, FC = Federal
 Candidate

N - Nesting Species

* - Last confirmed occurrence 1963 (INAI Survey Record 1978).

** - Last confirmed occurrence 1908 (Gleason 1910, in INAI Survey
 Record 1978).

Table 3

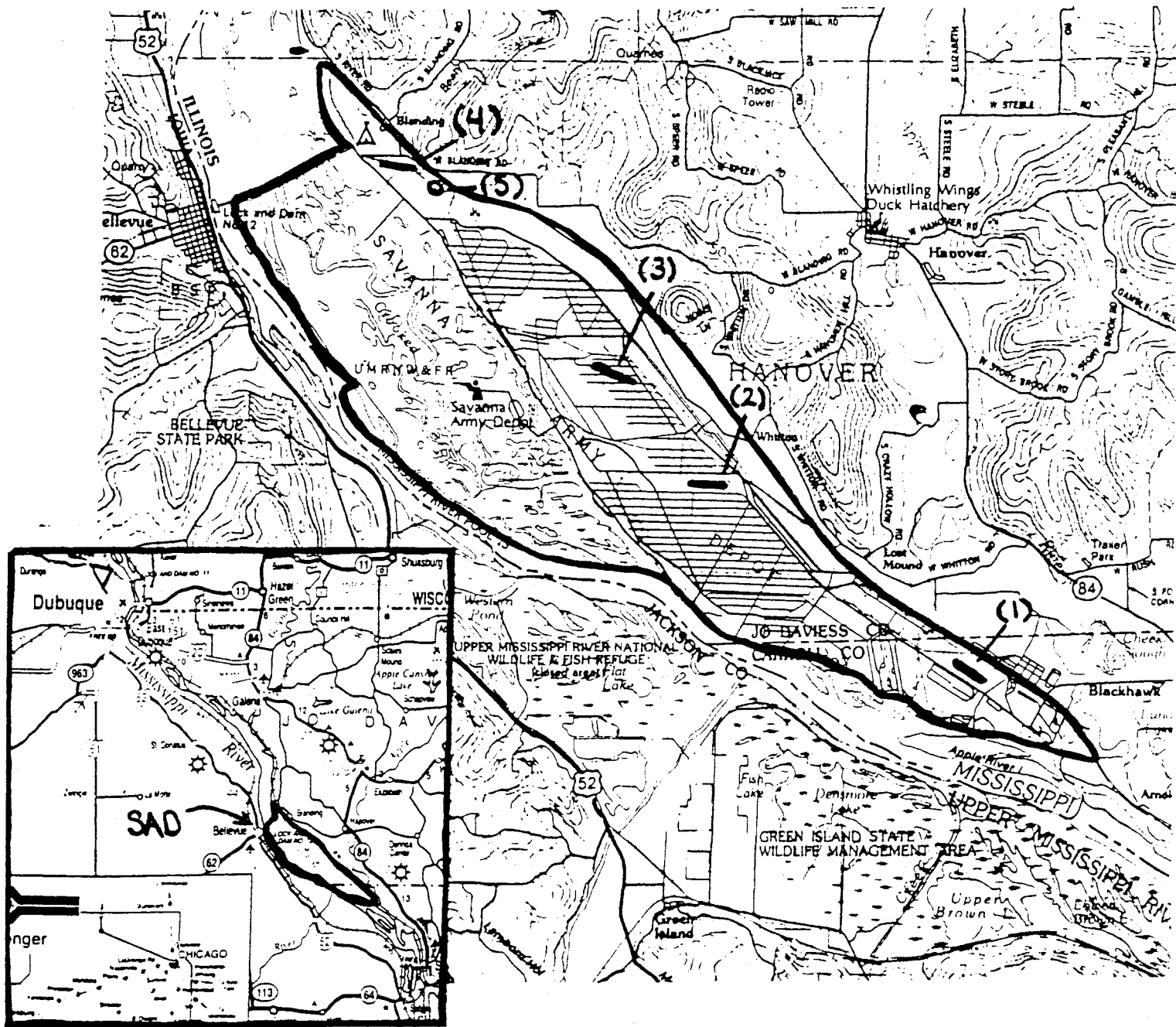
SAD Small Mammal Survey, Sept. 7-9, 1994.

Listed by species and number of individuals (by gender) caught during 200 trap nights per habitat. Habitats: 1 - ungrazed sand prairie, 2 - grazed sand prairie, 3 - grazed sand savanna, 4 - ungrazed sand forest. (Illustrations of each species provided in Figure 2)

Species	Habitat				Totals ♀ ♂ (Sp)	%
	1	2	3	4		
<u>Blarina brevicauda</u> , ♀ short-tail shrew ♂	5	1			6 0 (6)	3.0
<u>Microtus</u> ♀ <u>ochrogaster</u> , ♂ prairie vole	8 7	7 6	5		15 18 (33)	16.5
<u>M. pennsylvanicus</u> , ♀ meadow vole ♂		1			1 0 (1)	0.5
<u>Peromyscus</u> ♀ <u>leucopus</u> , ♂ white-footed mouse	1		13 19	14 21	28 40 (68)	34.0
<u>P. maniculatus</u> , ♀ deer mouse ♂	17 19	15 24			32 43 (75)	37.5
<u>Reithrodontomys</u> ♀ <u>megalotis</u> , western ♂ harvest mouse	4 1				4 1 (5)	2.5
<u>Sorex cinereus</u> , ♀ masked shrew ♂	3	1	4 1		8 1 (9)	4.5
<u>Spermophilus</u> ♀ <u>tridecelineatus</u> , ♂ 13-lined ground squirrel	2 1				2 1 (3)	1.5
Totals ♀ ♂ Habitat Sp.	40 28 68 7	25 30 55 5	17 25 42 3	14 21 35 1	96 104 200 8	
Trap Success	34.0	27.5	21.0	17.5	25.0	

Figure 1

Savanna Army Depot, Savanna, Illinois.
 Location of the SAD and Transect Lines for a Small Mammal Survey,
 Sept. 7-9, 1994.



- Transects:
- (1) - Ungrazed dry sand prairie
 - (2) - Grazed dry sand prairie
 - (3) - Grazed mesic sand savanna
 - (4) - Ungrazed mesic upland sand forest
 - (5) - Grazed sedge meadow

Figure 2

Illustrations of Species Trapped During
the SAD Small Mammal Survey, Sept. 7-9, 1994.

All illustrations adapted from Mullen, 1991, except Thirteen-lined Ground Squirrel adapted from Schwartz and Schwartz, 1981.



Western harvest mouse
Reithrodontomys megalotis

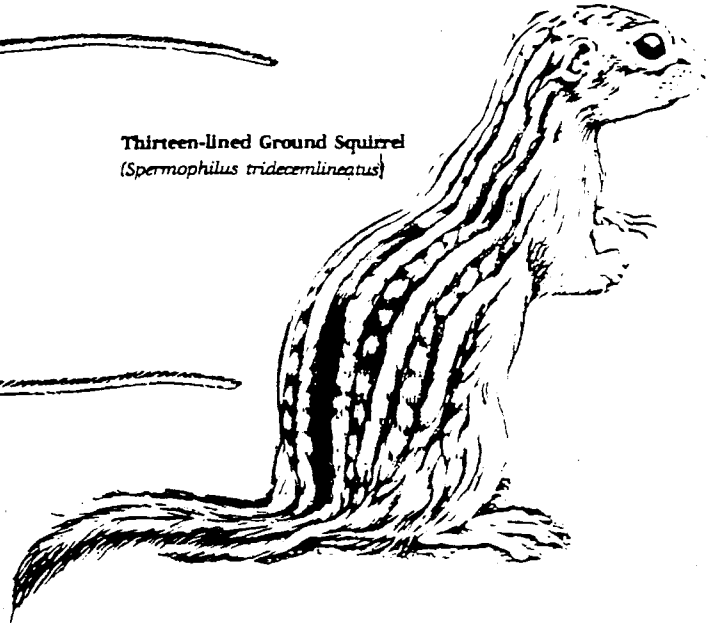


White-footed mouse
Peromyscus leucopus



Deer mouse
Peromyscus maniculatus

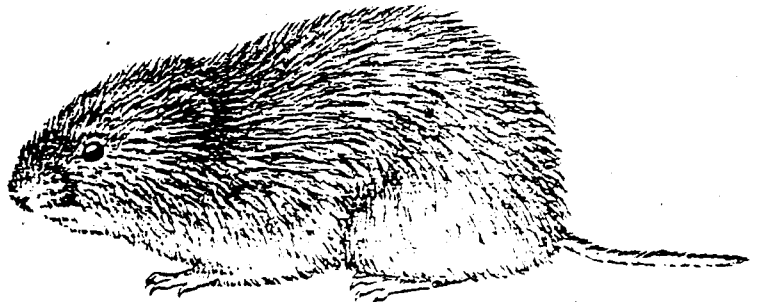
Thirteen-lined Ground Squirrel
(Spermophilus tridecemlineatus)



Northern short-tailed shrew
Blarina brevicauda



Masked shrew
Sorex cinereus



Prairie vole
Microtus ochrogaster



Meadow vole
Microtus pennsylvanicus

